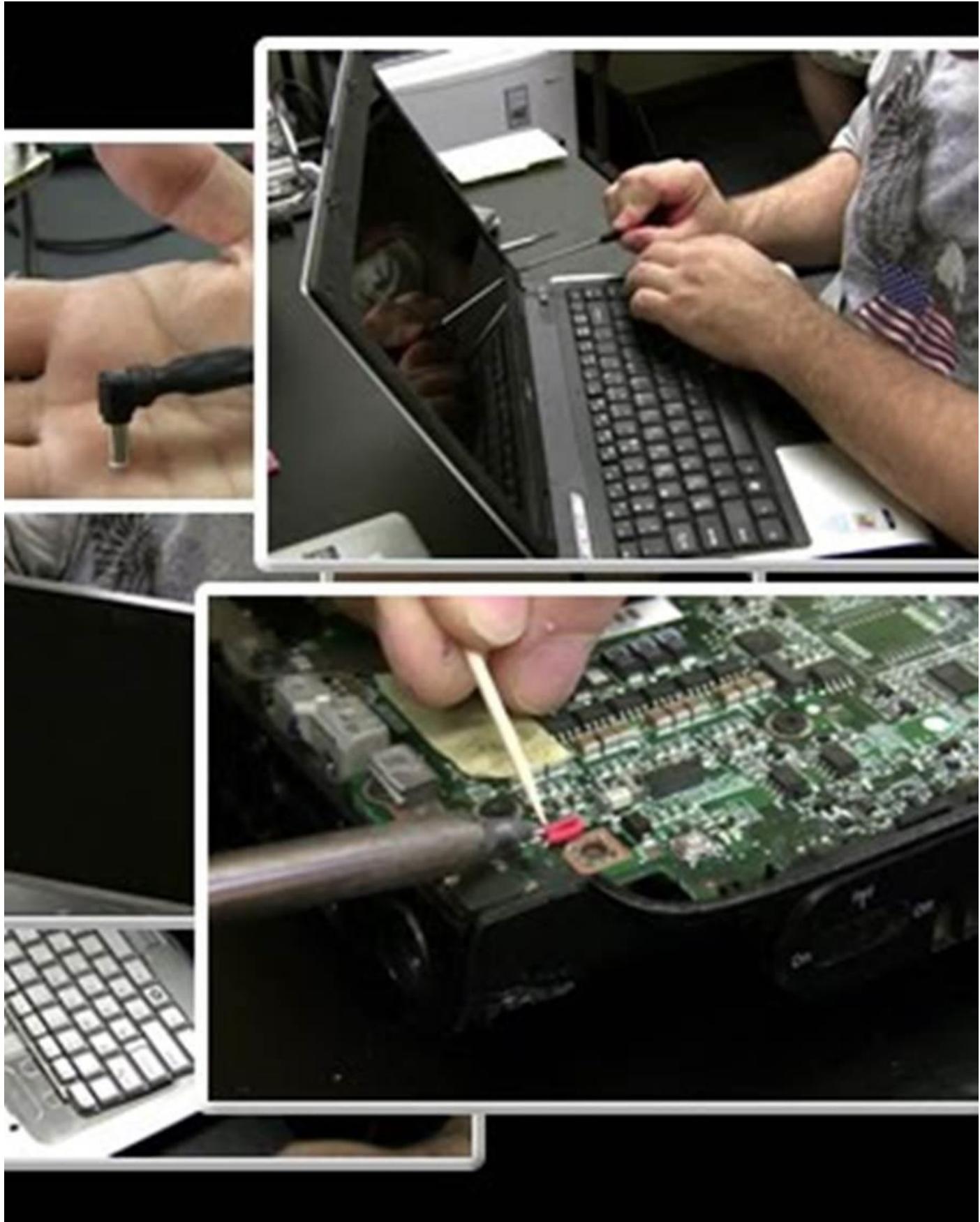




The Ultimate Laptop Repairing Course

K A Rahaman



K A Rahaman

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June, 2014

Table Of Content

<u>Introduction</u>	<u>1 1.</u>
<u>Basic tools</u>	<u>2</u>
<u>2. Parts of the Laptop</u>	<u>11 3.</u>
<u>Installing Operating Systems on Laptops & Netbooks.....</u>	<u>26 4. Laptop</u>
<u>Disassembly.....</u>	<u>65 5.</u>
<u>CD/DVD Drive Repairing.....</u>	<u>105 6. Recover</u>
<u>Lost Data from a Dead Hard Drive.....</u>	<u>114 7. Laptop</u>
<u>Screen Repairing.....</u>	<u>127 8.</u>
<u>Laptop Power on Problem.....</u>	<u>139</u>
<u>9. Laptop Motherboard Component.....</u>	<u>172</u>
<u>10. The Soldering Process.....</u>	
<u>179 11. Motherboard Repairing.....</u>	<u>192</u>

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Introduction

I wrote this book for people who want to upgrade, repair, maintain, and troubleshoot laptop and notebook computers as well as for those enthusiasts who want to know more about laptops or portable PC hardware in general.

No complicated technical theory, fully practical based step by step guide book. It will give you a complete and to the point knowledge on what to do to repair your laptop. It is not that basic that you get bored. Still has a very easy to understand language that all type of people can learn from. Even you don't need any previous technical knowledge to read and understand the book. If you would like to step into laptop repair world, I recommend this book highly.

This is a book that goes deeper into the Motherboard End of Laptop Repairing. After reading the book in it's entirety, then rereading it a second time, you shall able to repair a bunch of laptop motherboards.

This book is written to teach for those people who –

1. Technically inclined and want to know how to successfully repair a laptop or notebook computer.
2. Who is serious to learn to make his career as a laptop repair technician.
3. Individual to know how to repair and maintain his own laptop.

This book is a complete guide book to fulfill those requirements.

This book was written to allow a better understanding as to how exactly a Laptop can fail and how an individual such as yourself, can troubleshoot, diagnose and properly repair the faulty issue(s) that may arise while saving a ton of money rather than sending it to a repair facility or buying new replacement parts.

Great for current Students enrolled in Technology related courses, as this information is not taught in classes.

Please take the time to read this book in its entirety, then re-read it again to ensure you get a clear understanding of all its content. I also recommend that you purchase my First book release entitled: World's First Complete Guide to Laptop & Notebook Repair.– Suitable for all age groups and learning levels – this book will teach you without all the technical terms used, and will explain, step by step, in great detail. I will not include all the arithmetic equations used, or the specific detailed component schematics, rather, I will replace those confusing terms with easily understandable replacement terms for your convenience and to allow a better understanding for the Beginner or inexperienced technician.

Chapter 1

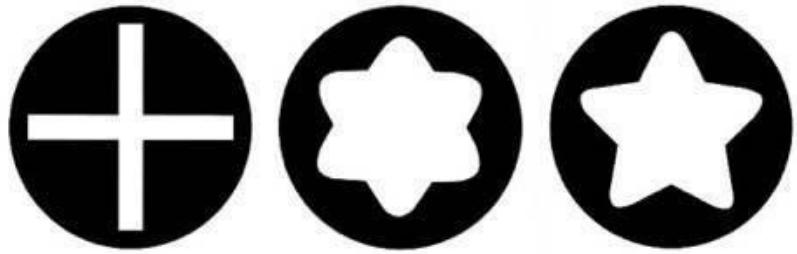
Basic Tools

Introduction

In this chapter I am going to discuss about the tools that are needed to a laptop technician. Here I will list the common names of the tools then, I will give a brief description of that tool's usages relating to Laptop repairing

1.Screwdrivers for Laptop

This is not the average sized screwdriver, as that would be too large for the tiny screws used on laptops today. This is the micro-sized screwdriver, which can be bought at your local Home Improvement store. I myself use an all in-one screwdriver that houses the extra tips inside the screwdriver itself. Then, I also use the screwdriver set



from an Eyeglass Repair Kit. You can purchase one from your local Auto Parts Store (ask the clerk for assistance in locating one) and you will definitely need the multiple tip pack to allow different sizes for different laptop models.

2. Mini Pliers

I suggest that you buy mini needle nosed pliers because they are easier to use on the micro sized components that make up the laptop. The pliers I use are 3 inches long, I find that the normal sized pliers are way too big and do not reach into certain areas that the mini can.



3.Scissors

Yeah, scissors, we need a scissors. The smaller the better when obtaining your scissors. I use haircutting scissors because they are small and the cutting tips are thin and narrow.

4.



Electrical Tape

This is used to wrap cables and wires, and used to secure or flatten wire



or cable tracks on or in the laptop. I try not to use this on wire or cable wrapping if possible because I have found that over time the tape will slowly unravel and can become —sticky on the outer-side.

5. Shrink Wrap Tubing

These can usually be found in variety packs, the larger of the sizes will be the one you use most commonly in laptop repair. These are placed over the repair area on the wire or cable, they are

basically rubber tubes that you cut to your specifically needed length, then heat the tube to shrink it to the size of the wire or cable being repaired.



6. Copper Foil Tape

A less common item used, though you will eventually need this if you are repairing laptops on a regular basis. This will be used for motherboard PCB repair and more commonly used for DC Jack C-ring replacement/repair.

7. Adjustable Pliers



This is a less commonly used tool, though it will be needed at times. I



8. Liquid Flux

will rarely use this on a DC Jack repair to gently wiggle the jack loose from the desoldered contact pads. You will find other uses for this tool so it is a good tool to add to your collection.

For this tool, I recommend that you get both a paste form and the liquid PEN form. Both are readily available on local store for a small price, yet are hard to find locally at a store, you can try shopping at Radio Shack for Flux Paste, but doubtful they have the flux pens.



9. Plastic Prying Tools

These will be needed for almost every laptop repair procedure. When



able, you will **ALWAYS** use plastic over metal to disassemble or work on the laptop or any electronic component. There are various kinds that are used and needed. A guitar pick is the most used tool, not a flimsy pick rather a slightly thicker guitar pick that can withhold bending back and forth numerous times.

10. 2 Part Plastic/Metal Epoxy Glue

You will find many varieties of this product and will have to choose the best one for yourself, I typically use the Black/Clear mix... As it has a longer drying time, it will allow more strength over time and hold up to heat exposure. This will be used in many areas of the laptop, and being that a laptop motherboard is SelfGrounded... it can be used directly on the PCB to cover components or traces. A common use for this Epoxy is for DC Jack Repair, as it will be used in the last step and applied to the



jacks rear end and sides to help secure it to the motherboard. Also this will be used to brace the Jack when the laptops lower cases DC Jack holding cage breaks (common issue for Toshiba – newer modellaptops).

11. Thermal Paste

You will only be using Silver thermal paste in a Laptop, Never Ceramic Paste. Laptops will use 2 cooling sources.... Either Silver paste or a thermal pad. Pads will be hard to

repurchase, and silver thermal paste will be readily available for sale everywhere. If a part or component originally used a thermal pad, it is highly recommended that you keep using a pad and not switch it out to



using paste... These pads also are used to cover a gap which is left for that specific part for thermal expansion and contraction.

12. 30 to 50 Watt Soldering Iron

You can use any brand of these and they are typically disposable. I



recommend that you do dispose of the cheaper soldering irons after 10 or so uses, or get yourself some Tinner to refresh the tip. I do recommend a 50 watt iron for laptop component repair as it will allow for better —flow of the solder due to the higher temperature output.

13. Solder

The average Rosin Core Solder will do, get yourself 1.0mm solder, any thicker and it will apply to heavily.

14. Toothbrush



This, believe it or not, is the second most used tool in Laptop Repair.

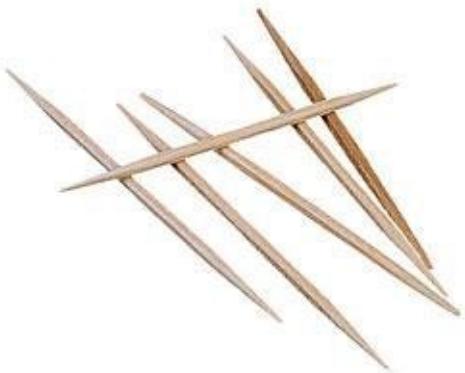


Yes. A toothbrush... You will use this on each and every laptop you repair. Why you ask? The toothbrush is used to clean any and all parts and components in and on the laptop. Cleaning the laptop parts as you repair is detrimental to the longevity of the laptops life. It is used to clean the

keyboard, the motherboard and any case part. More detailed usages will follow throughout this book and should be applied as instructed.

15. Toothpicks

These have many uses and are a handy tool to have nearby. Used to apply fluxes, used to apply epoxies, also can be used to help plug or unplug certain ribbon cables or thin



wire(s).

16. Circuit Board Cleaning Solution/WD40



This solvent is used to clean the motherboard, and I will clarify its uses throughout this book. WD40 is more readily available to purchase and can suffice. Again, I will also explain how to properly use WD40 to clean components/remove flux and so forth.

17. Thin Tipped Black Permanent Marker

This is used often to mark screw holes, or to mark the areas of damage on the laptops parts.



18. Multi-meter



19. Heat Gun

This can be bought at your local Home Improvement store, and you will find a wide variety of quality choices. For a beginner, it is ok to purchase the cheapest Multi-meter to

learn its uses and familiarize yourself with it.

The better the quality the better the final results of your repairs will be. On average, you want to use at least a heat gun with switchable settings... One that will produce temperature of 700 to 800 degrees. I use a RYOBI heat gun, 120v, 11a, Temp: 200-1100 degrees Farenheit.



20. Heat Gun Add On Tips

You will find for sale on any local electrical store or the Web, tips for the heat gun... these are the same or similar to the tips used in professional Rework stations (I'll explain what a Rework Station is later in the book). There are a lot of different tips you can buy and a lot of different sizes to choose from. You will buy these according to your specific needs. I personally use the



Cone telescoping tips, and the Square GPU Covering tips

Chapter 2

Parts of the Laptop

Introduction

A laptop is a portable personal computer with a clamshell form factor, suitable for mobile use. They are also sometimes called notebook computers or notebooks. Laptops are commonly used in a variety of settings, including work, education, and personal multimedia.



A laptop combines the components and inputs as a desktop computer; including display, speakers keyboard, and pointing device (such as a touchpad), into a single device. Most modern-day laptop computers also have a webcam and a mic (microphone) pre-installed. [citation needed] A laptop can be powered either from a rechargeable battery, or by mains electricity via an AC adapter.

I will quickly go over all the basic and additional parts and components that make up your laptop.

1. Palm rest

This is the part that you place your hands on when typing, it is basically the whole top-half of the lower half of your laptop – minus the keyboard and media strip. When replacing the palm rest, it is common for the replacement part to also include the touchpad.



2. Keyboard

Self explanatory here... If repairing the keyboard, the simplest way is to



replace the entire keyboard, though Single key replacement parts are readily available on any computer hardware store.

3. Display Screen

This is what produces the images, accessible by removing the front bezel. Cracked screens can not be repaired and do need to be replaced.

4. CCFL Bulb



This is located in the display panel and will be found on the bottom end of the screen stretching from the right end to the left end...The CCFL



5. Display Cable

bulb is enclosed.. in an open end metal tray that hugs the bottom edge of the glass panel on the screen and shines the light up through the glass panel to illuminate the entire screen evenly.

These are made specific to each model laptop and are not interchangeable. $\frac{3}{4}$ of the cable will house the –data wires and the other $\frac{1}{4}$ will house the



Power/Negative wires for the inverter.

6. Display PCB strips

This part is located inside the Power Inverter -laptop screen, in the middle-bottom of the screen housing. Some inverters will be located in different places, it all depends on the model, and those are rare... like on the rear side of the screen or the side of the screen...

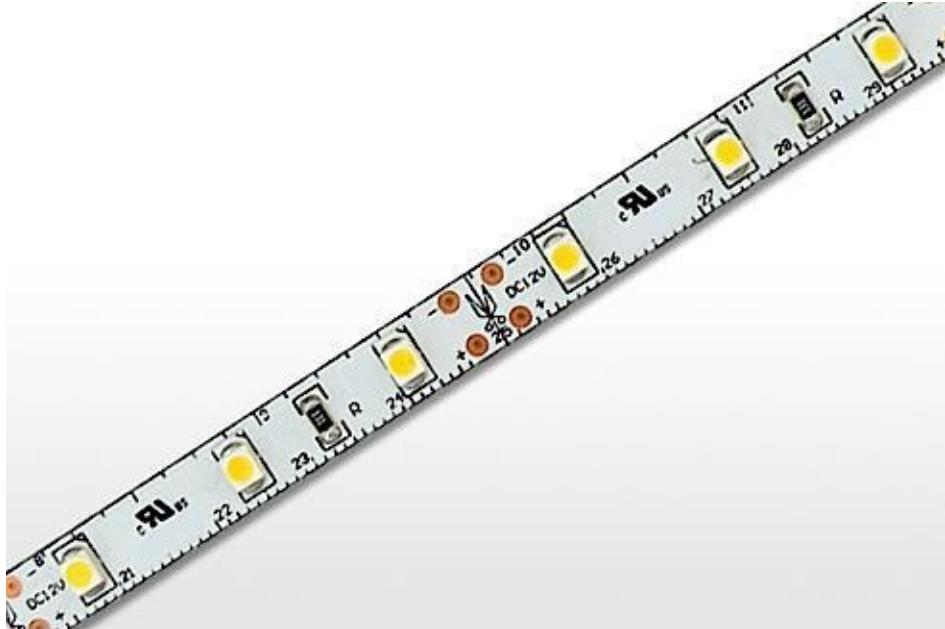
but again those are rare, and you will 90% of the time be replacing one located



just below the actual display panel. The screen light plug is made in such a way that you can not reverse the plug and accidentally plug it in the wrong way, rather, it will only plug into the inverter the correct way (one port is larger than the other).

7. LED light strips

These are the newer source of light for laptops. The light emitted is much brighter and whiter as opposed to the yellowish tint to a CCFL bulb. LED light strips will have the inverter/converter built into the rear side circuit board panel on the screen and they will not have a physical inverter board under the screen.



8. Hinge Set (L&R)

The hinges attach to the bottom base of the laptop and will secure on either end of the inner screen, securing itself to the screens rear cover, then securing the screen by using Hinge rails that run up each



side of the screen.

9. Touchpad/Mouse

Another self-explanatory part that everyone should already know... Some of these will have the capability of being disabled or re enabled by a button located nearby on the palm rest,



some will not.

10. Media Strip

This part is located directly above the keyboard and will sometimes include the hinge covers with it. It will usually include the power



button, and some lighted icons such as battery monitor, hard drive monitor, 15luetooth and Wi- Fi monitor. Some laptops will allow touch sensitive buttons and some will be push buttons, though all

will be labeled. This part is usually just a snap in place part, though if it is secured to the laptop, its screws will be located in the battery bay and on the underside rear end of the laptop near the corners.

11. Optical Drive

This includes a DVD drive, a cd drive a Blu-ray player or similar.



12. Hard Drive

This is where data is stored, the laptop can use different kinds of hard drives. The current 3 most common found are SATA, PATA IDE and SSD. SSD refers to Solid State Drives, which are similar looking to a laptops Wi-Fi card. The SSD is the newest of these three drives. The PATA Ide is the oldest of the three. The SATA and PATA drives are identical except for the connection plug ends, as they both use Platters and magnetics to store data. SSD cards are made with no moving parts. This is what makes them different than the typical drive. They will not produce heat like the SATA/PATA drives, most commonly used in Fanless



Netbooks.

13. Wi-Fi Card

This can either be located on the bottom side of the laptop (most common place) or the upper side – under the keyboard. This part is one of the most stable parts on the laptop and it will rarely fail, so if you are experiencing Wi-Fi issues, you would test all software end issues prior to changing the wireless card. The brand of the card will be listed on the sticker of the card, and will help you in determining what driver to



use for that specific laptop. It is ok to mismatch the color guide for the Wi-Fi antenna wires. Typically the wires are white and black, and will have colored arrows on the Wi-Fi card showing you what wire to connect to what site input plug. It is ok to plug the black onto the white port and visa versa as it will still

allow for signal gain of the antenna wires, because remember, they are just that, antenna wires, not power wires which about 60 percent of the laptops shipped out of the Factory

come mix-matched – reversed wires from day 1...

14. Ethernet Card

Most laptops will have this integrated into the motherboard, and some will have an extension board that connects to the motherboard. Used for internet access or networking purposes, every laptop will have one of these on it, whether integrated or a card.

15. Power Button



Usually located just above the keyboard, some laptops will place the



power button in different areas, like the lid of the laptop, or the front of the laptop or its sides. Power buttons can be lever style, button style, touch sensitive or switch style. Most

common is the push button style. When a power button is pressed, it pushes a button pad on the motherboard or a daughterboard.

16. Lid Lock Lever/Switch

These can be a hook latch style or they can be magnetic. The more common style is the hook and latch style. This uses a push-pull lever, or a button to lock and unlock, which releases the lid from the bottom base locking port slots. The magnetic style has



no visible working parts because the magnets are located in the lid and/or the bottom base of the laptop.

17. Hinge Cover(

Hinge covers will secure to the bottom base typically using a snap and tab system, and some will secure with both snaps/tabs and screws (1 or2). So, first look for any screws and remove, then attempt to unsnap them from the bottom base. You must use plastic prying tools to do this to not scratch the laptop. A guitar pick is a Laptop Technicians best friend, and you should run to the store



right now and buy 5 or 10 of them.

18. Bottom Base

If you flip the laptop over when it's closed, you will encounter the Bottom Base of the laptop. This will usually have removable covers located somewhere on it (hard drive cover, Wi-Fi port



cover, etc...).

19. USB Extension Board

Each laptop model will use a different USB configuration, some will use USB extension boards and some will just have the integrated USB ports that come on the motherboard. This extension

board is used to stretch Ports to opposite sides of the laptop when it is not possible to use integrated ports. They connect to the



motherboard using a plug in (daughterboard), or a wire and/or ribbon cables and plugs.

20. Ethernet Extension Board

These will typically be Ethernet Extension Board included on the USB extension board though

can be on their own boards as well.



21. Rubber Shoes/Feet/Screw Covers

Rubber shoes will be found on the bottom of the laptop and will also be found on the front



bezel of the screen.

22. Case Covers

These are the covers that are located on the underside of the laptop. Typically they will individually cover the components



separately. For instance, the hard drive will have its own cover, usually secured by 2 or 4 screw's, Wi-Fi card access bay will sometimes have its own cover too. The RAM DIMM slots are always accessible from case covers and will usually have their own cover. Some laptops will combine the covers into 1 large cover or 2 separate larger covers.

23. Motherboard

The laptops motherboard is the Main component of a laptop...
It usually takes up $\frac{3}{4}$ of



the inside of the base of the laptop.

24. DC Jack

This is where you plug the charger cord into on any laptop. They are typically elongated box shaped having power pins on the rear side and center... and grounding pins on either sides. I will discuss repair on this part later in this book. Replacement jacks



can be bought off any computer hardware store and are all usually under \$10 USD per part.



26. RAM 25. Docking Port

These are used more often in an Office atmosphere rather than the typical home.

Laptop RAM will be available in different speeds and usually the laptop will allow the various speeds, though some are BIOS programmed to not accept anything but the default RAM assigned. For instance, a laptop



that was running DDR2 666 speed should be able to also run the next slowest speed of 555/533 and possibly the 444.

27. Bluetooth card

The internal Bluetooth cards are not typically integrated into the motherboard, they are usually plugged into the motherboard and will sit in a —cage somewhere on the laptops casing, some are screwed onto the motherboard using riser screws to levitate it away from the motherboard.

28. Wwan Card



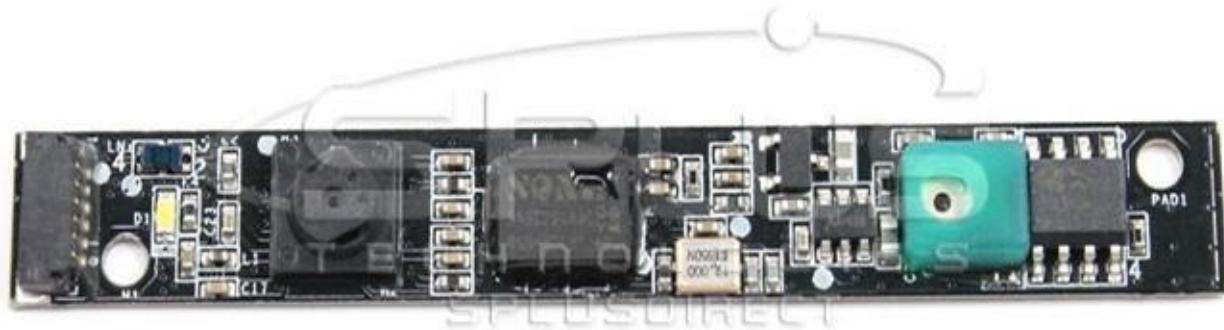
This card is identical to the WLAN card or the Wi-Fi card. And is not



installed on every laptop, rather it is more found on the business end laptops or the gaming laptops. Wwan is commonly used for corporations or larger sized businesses running cross country or worldwide servers or networks. Same goes for the Gaming based laptops like the Alienware m17x which uses Wwan to Game Online. A lot of manufacturers of laptop motherboards will apply the port contact pads but do not install the port due to specific laptop case specs and the port not fitting certain laptop case configurations.

29. Webcam

Laptop webcams have not had a lot of improvement in the past few years, I can't think of any laptop model offhand that has a good Webcam. If a laptop does have one, it will usually be located on the upper portion of the front of the screen. It will usually have a microphone located right next to it or nearby. These are almost always stationary cameras and do not move in any way, though there are models



that have movable cameras. Acer has some models that used a spinning camera. It could rotate up or down, though not left or right.

30. PC Slot Card/SD/MMC

These will be found on both the sides and the front of certain laptops, more commonly found on newer laptops. They allow the use of external components such as Memory cards, Ethernet Network cards, Modems and similar.



32. HDMI/Other 31. VGA Out

This is a port that will be found on almost every laptop ever released. It is used to connect an external monitor or viewing device to. It is Video Out, not Video In. The most common thing to connect to this port is a Desktop Computer Screen.

HDMI ports are found on certain

newer laptops, mainly installed on the —entertainment based laptop, or the Gaming Laptop. It

can pass Video and Audio to and from the television or similar source. DVI or mini DVI ports are

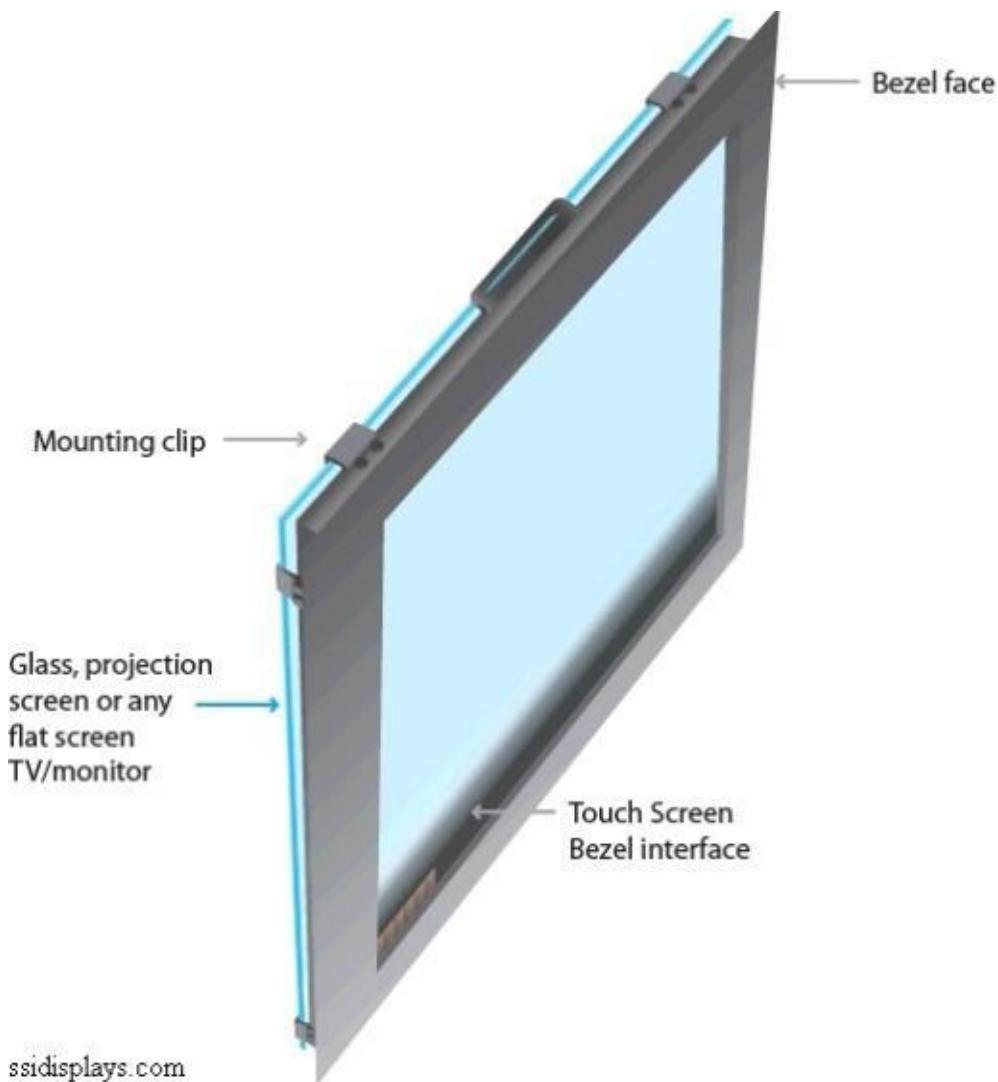
also used on certain laptops to pass



video.

33. Screen Bezel

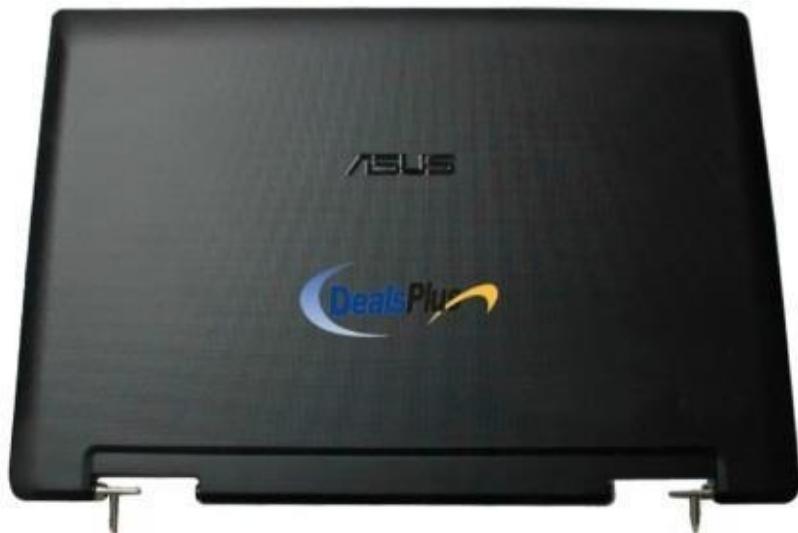
Screen Bezels are the screen frames that cover the front side of the screen. Most bezels will secure to the rear panel by a Snap- Tab connection, often also using screws at all 4 corners and sometimes in the center of the upper and or lower screen bezel. Screen Front Bezels can also be secured with double sided



ssidisplays.com

tape from the manufacturer.

34. Screen Rear Cover



35. Battery

This is the shell or lid of the laptop which is the back side of the laptops screen. These can need replacing from abuse to the hinges. The Rear Screen Cover is typically connected to both the hinges and the front bezel, though it can crack and break if the hinges become loose or weak.

All laptops have a battery as it is the entire reasoning behind the Laptop itself and its portability ability. Laptop batteries are made with different strength or values. They also make batteries for the same model with different shapes to them. For instance... A Dell original battery that was



sold with the laptop rated at 3800mAH. That same model has the ability to run a better battery; the 4300mAH version, or better yet they offer a 6600 or higher... The higher the number, the longer the battery will hold a charge. Laptop battery manufacturers will make the higher mAH batteries using a

different shape than the original, they will add a bump to the battery or they will extend the length/width of the battery. Personally I prefer the Bump addition batteries because they will lift the rear end of the laptop up in the air which will keep its base cooler.

36. AC Adapter

This is also commonly called the —charging cord and its purpose is to supply the correct amount of power to the laptop. The cord end of the AC Adapter where it plugs into the wall outlet is the AC end of the cord, where 120 volts are travelling through to the center inverter power box. In this inverter box, the AC current (alternating current) is converted to DC current (direct current), then, travels to



the plug tip. In this plug tip, you will commonly find 2 main wires... The center —power wire and the outer twisted grounding wire (usually wrapped around the entire circumference of the cable)

37. Internal Speakers

All laptops will have internal speakers, though 90% of them are not of great quality. They are there more for the — dings and pings; and beeping noises that the default sound theme produces when browsing windows explorer or internet explorer. They are not really meant to be blasting music from at its highest level.



There are some models, though, once again in the entertainment and gaming built series of laptops. They will add subwoofers and tweeters and amplifiers to enhance the audio.

38. Audio/Headphone/Mic. – Out Port

Most all laptops will have this set located somewhere on it. It is where you connect an external microphone or headphones or external speaker or even an external amplifier.



39. Printer Port

These used to be found on each and every laptop, but now you will rarely find these on your laptop as they are becoming outdated due to the use of Wi-Fi, USB and Bluetooth. It is a 25 pin port and would connect a parallel/serial cable to your printer. The list above is the parts/components that are the most common,



the ones that typically all laptops will have... Yes, there are others not listed, but they need not be discussed in this particular book.

Chapter 3

Installing Operating Systems on Laptops & Netbooks

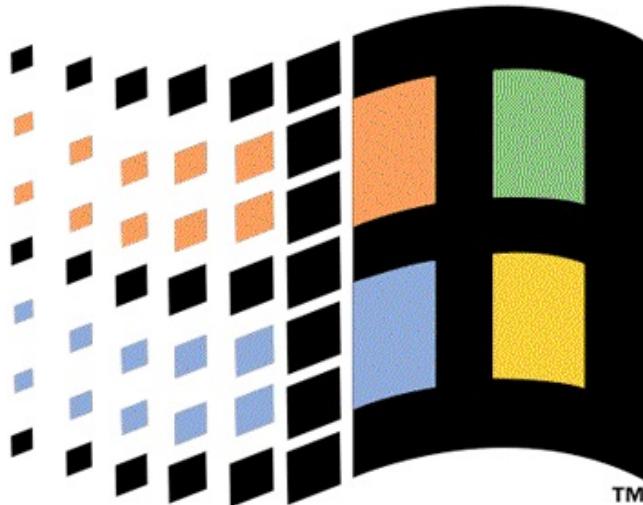
Introduction

To those of you who have never installed an operating system, I will explain the basic process taken before going any further. Always remember that when reinstalling an OS, you will also need to re-setup your Wi-Fi... So if this repair is not for yourself, you must ensure that the person you are doing an Operating System Reinstall for knows their WEP or WAP key to be able to reinstall their Network SSID and KEY. There are a couple ways to start this process. First would be putting the OS install cd/DVD into the optical drive.

Windows 1 (1985)

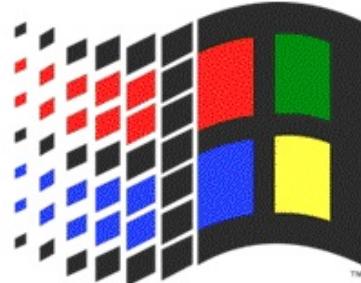


Windows 95, 98, Me y NT (1993-2000)



MICROSOFT®
WINDOWS™

Windows 3.1 (1992)



MICROSOFT®
WINDOWS™
Windows X (2001)

macoteca.com

Windows XP, Vista y v7 (2001 a 2009)



Windows 8 (actual)



How To Install Windows XP Professional

Picture of How To Install Windows XP Professional This set of instructions is teach you how to easily install Windows XP. In just 10 easy steps, you will be able to install and run Windows XP from your laptop or notebook.



Step 1: Insert your Windows XP bootable disk

Open your CD-Rom drive and insert your Windows XP disk. You can now close the CD-Rom Drive.



Step 2: How to boot from a CD/DVD

You must be powered on to eject the optical drive tray or to insert cd into slot. Next you can try using your corresponding - F key, such as F12 or F11 to tell the laptop to boot from CD/DVD. Some laptop default BIOS splash startup screen settings will show you for a brief second the correct - F key to press to boot from CD. This will take you to the boot options menu.

Boot Device Menu

- * Onboard or USB CD-ROM Drive
- * System Setup
- * Diagnostics

**Use Up/Down arrows to highlight desired item.
Use Enter to select highlighted item.**

Now that you are in the boot options menu, you will need to use the arrow keys on your keyboard to move over the choice for an Onboard or USB CD-ROM Drive. Press Enter.

After you have pressed Enter, most Windows XP disks will prompt you to press any key to boot from the CD (As seen in picture 2). When this appears, you will have only a few seconds to press any key on the keyboard. I usually choose the Space-bar because it is the easiest to find and press.

- * Onboard SATA Hard Drive

- * System Setup
- * Diagnostics

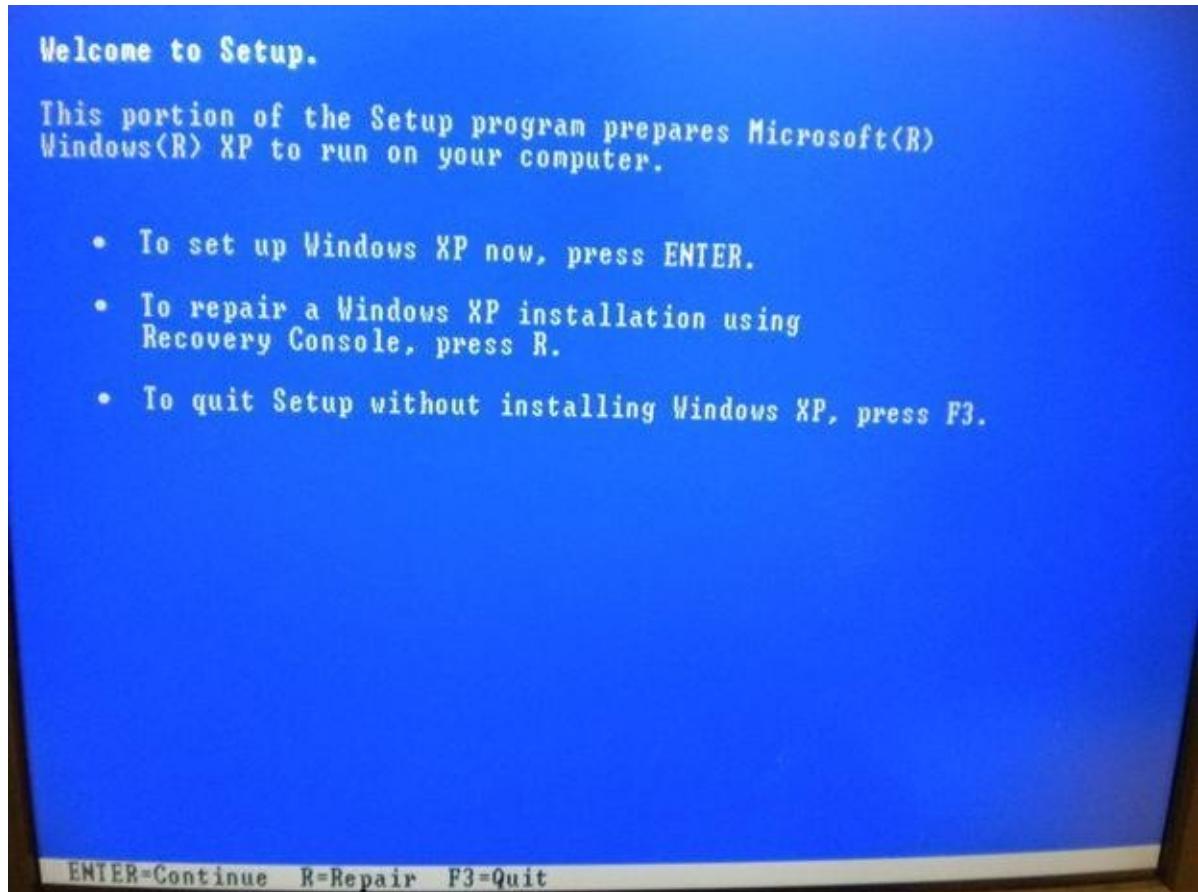
Use Up/Down arrows to highlight desired item.

Use Enter to select highlighted item.

Press any key to boot from CD..

Step 3: Beginning the Process

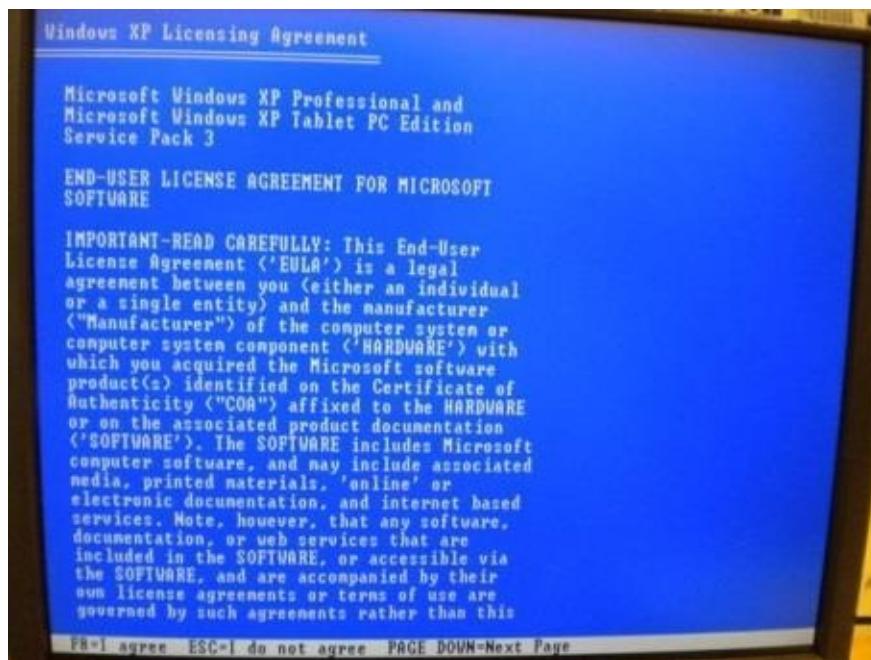
After you have chosen to boot from the CD, you will have to wait a few minutes. The disk will check your hard drive to see if windows XP is currently installed on it. After the disk has made its check you should see a screen like the one in the first picture on this page.



You will want to press Enter because you are planning on installing Windows XP on your system. If you realize that you have data on your hard drive and need to back it up, now would be the time to press F3 and exit the installation program to back it up.

Step 4: Licensing Agreement and Begin Setup

The next page that you will see is the Windows XP Licensing Agreement. On this page, you can take the time to read through the agreement, but it is just saying that you will not be breaking any laws using this product. I personally just hit F8 (to agree) and move on to the next step in the installation.



After pressing F8, you will come to the beginning of the Windows XP setup. On this page, you will want to press the Esc key on the keyboard. This will tell the program not to try and repair the current installation.



Step 5: Deleting the current Partition

The next step in installing Windows XP is to delete the old partition on your hard drive. You will see a screen similar to the one in the first picture of this page. You will want to scroll over the C: partition that is current on your hard drive. The next thing you will need to do is click the D key. This will tell the program that you want to Delete the current partition.

Windows XP Professional Setup

The following list shows the existing partitions and unpartitioned space on this computer.

Use the UP and DOWN ARROW keys to select an item in the list.

- To set up Windows XP on the selected item, press ENTER.
- To create a partition in the unpartitioned space, press C.
- To delete the selected partition, press D.

152587 MB Disk 0 at Id 0 on bus 0 on atapi [MBR]

C: Partition1 [NTFS] 152586 MB (137380 MB free)

ENTER=Install D=Delete Partition F3=Quit

After you click the D key, you will see a screen like the one in the second picture. On this screen you will want to press the L key to confirm the deletion of the partition of the hard drive.

Windows XP Professional Setup

You asked Setup to delete the partition

C: Partition1 [NTFS] 152586 MB (137380 MB free)

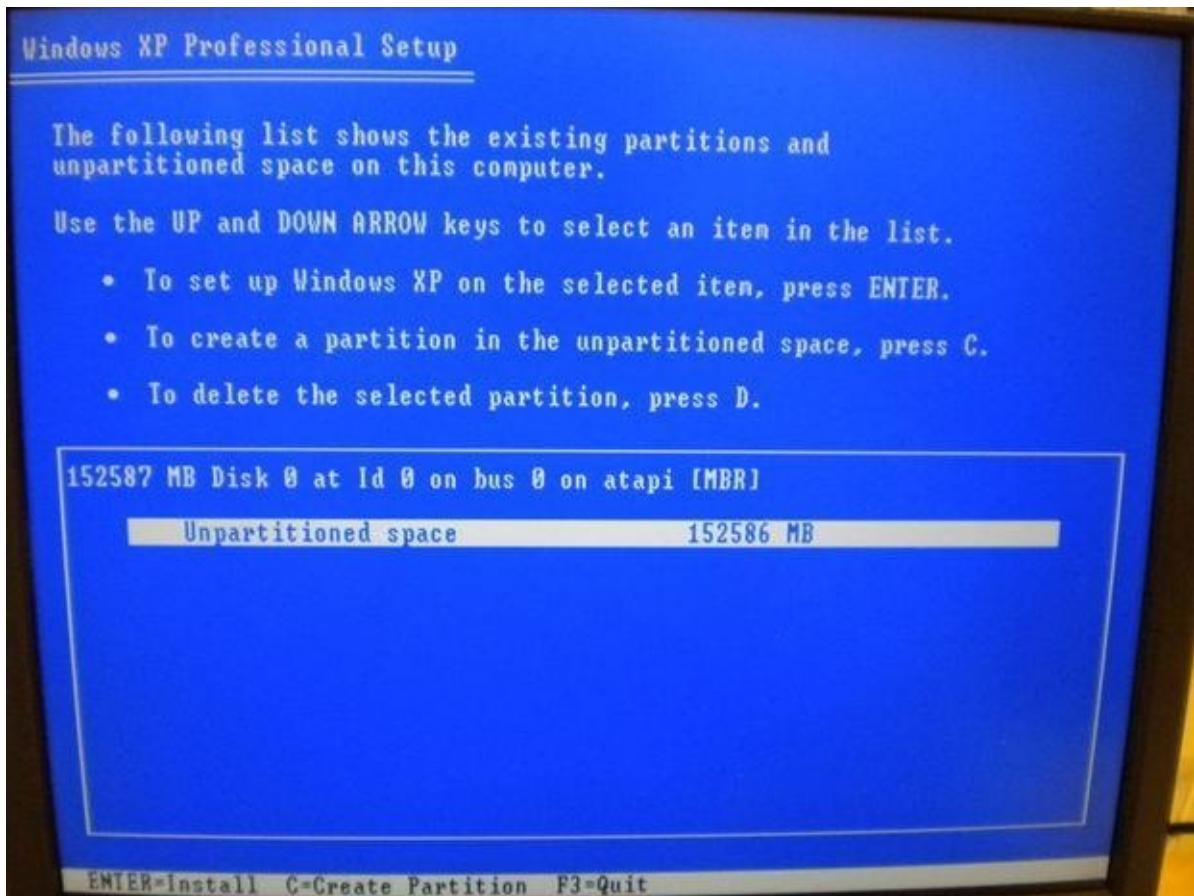
on 152587 MB Disk 0 at Id 0 on bus 0 on atapi [MBR].

- To delete this partition, press L.
CAUTION: All data on this partition will be lost.
- To return to the previous screen without deleting the partition, press ESC.

L=Delete ESC=Cancel

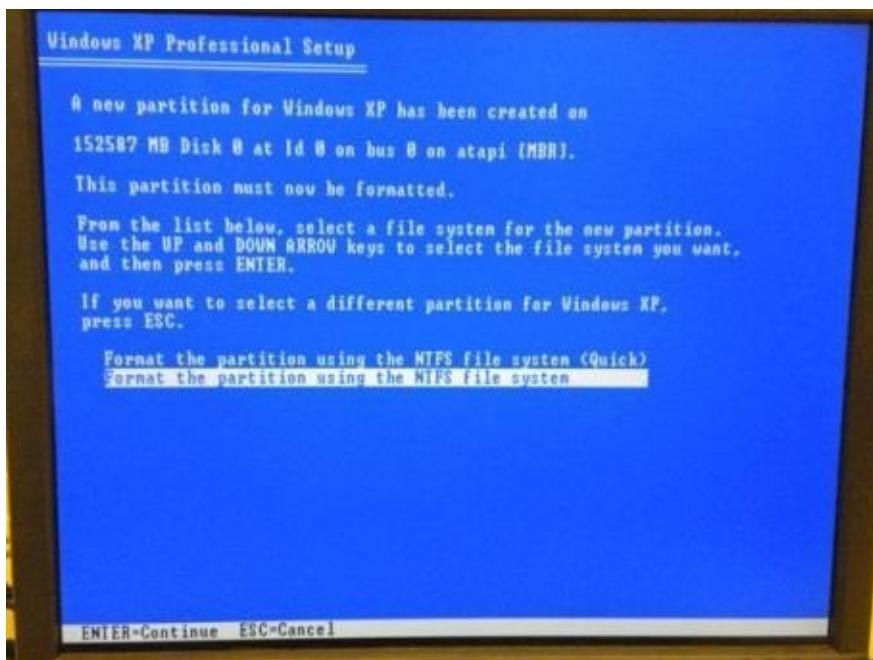
Step 6: Beginning the Install

Now that you have deleted the old partition, you will need to be sure that partition is selected and press the Enter key. This will tell the program that you want to install Windows XP on that partition.



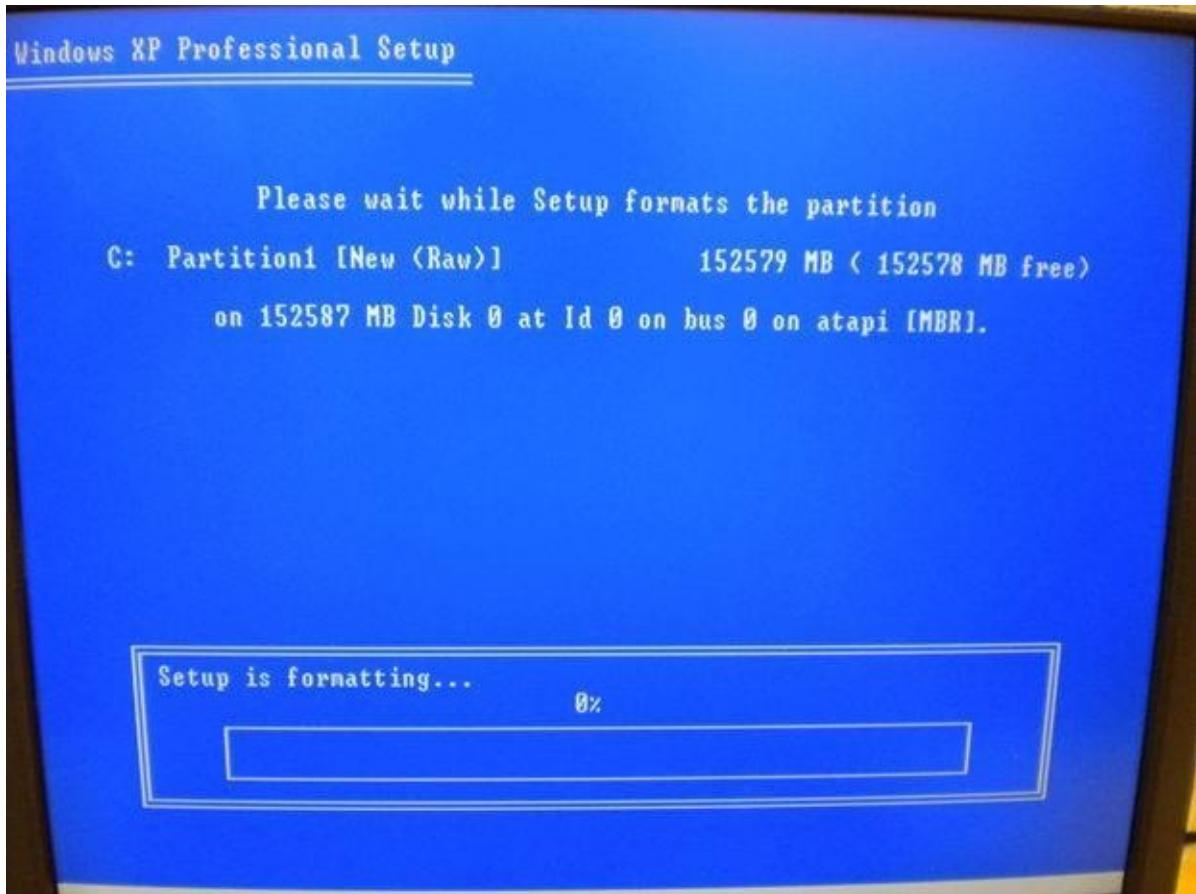
Step 7: Choosing the Type of Installation

In this step, you will want to choose whether you want to have system do a quick installation or a standard installation. For the purposes of this set of instructions, I have chosen to do a standard installation. After choosing your method of installation, you will want to press the Enter key to continue to the installation.

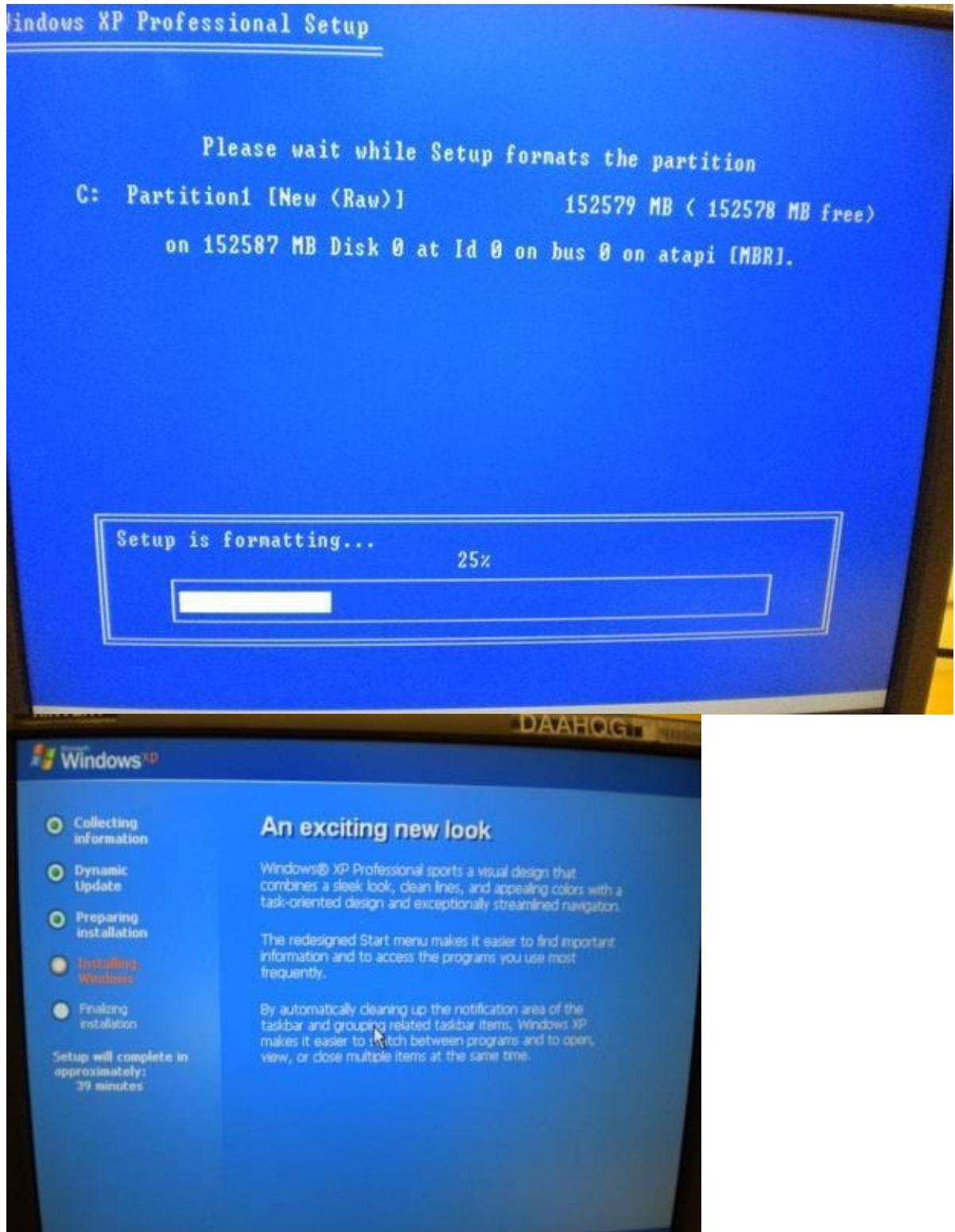


Step 8: Allowing Windows XP to Install

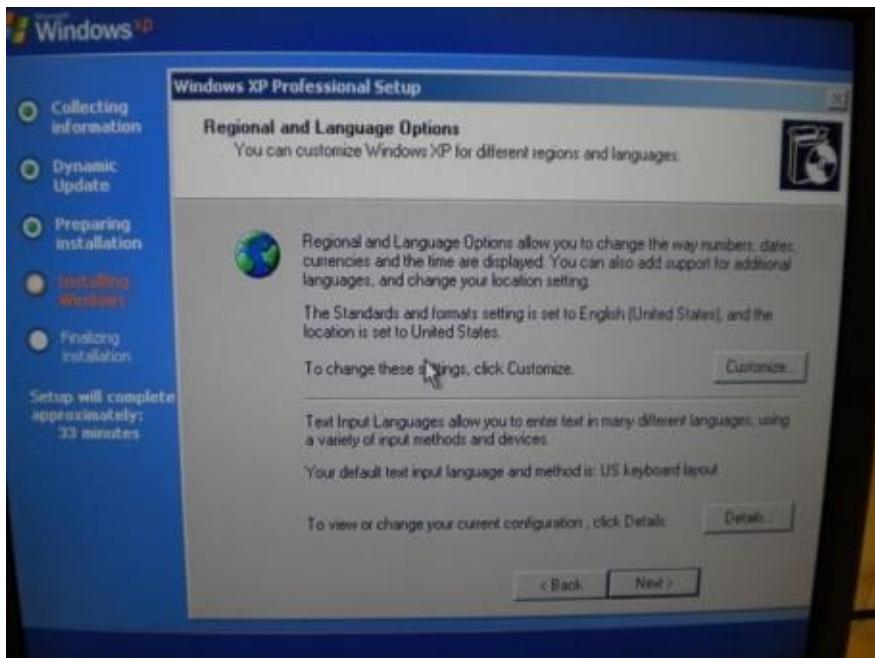
This step will probably be the longest step. This is because you are at the mercy of the system and how fast it installs Windows XP. After you have pressed the Enter key in the last step, you will see the screen in the first picture here appear. This will mean that the program is running the installation.



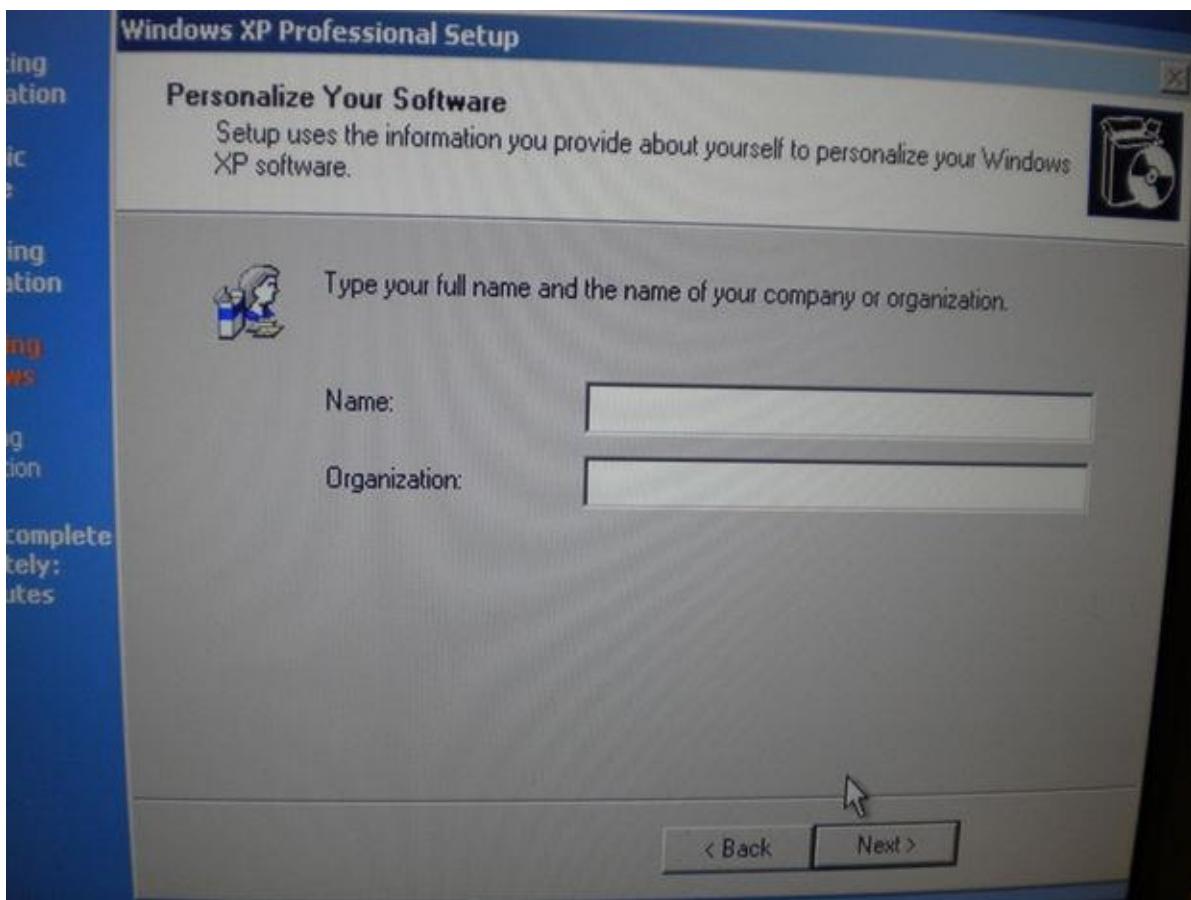
Over time, the progress bar will move across the screen, as shown in the second picture where the progress bar is at twenty-five percent. After the Installation has finished placing the file system on your hard drive, you will see the program restart your computer. Do not be alarmed at this. it will boot back up and you will see a screen similar to the third picture on this page.



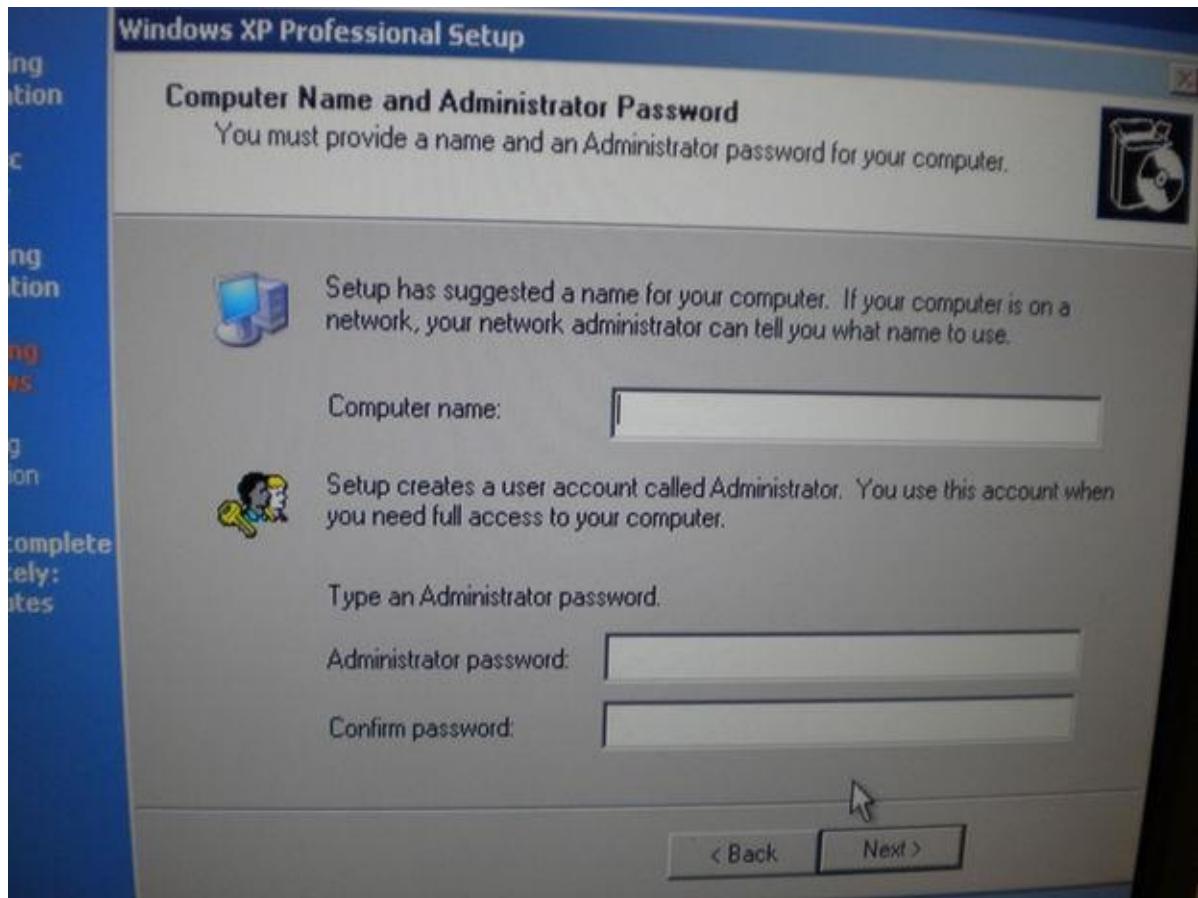
Step 9: Choosing your Keyboard Layout, organization, and Computer Name



The first screen (seen in the first picture) that will come up will be a screen for you to select the language and keyboard style that you wish to use for your new installation of Windows XP. I have chosen to use the English Language and the US keyboard layout. You may select any configuration that you are comfortable with and then press the Next. The next thing the program will ask for is the name and organization that this install is affiliated with (as seen in the second picture). You will want to fill this in with your information. After filling in the information, you will press the Next button.

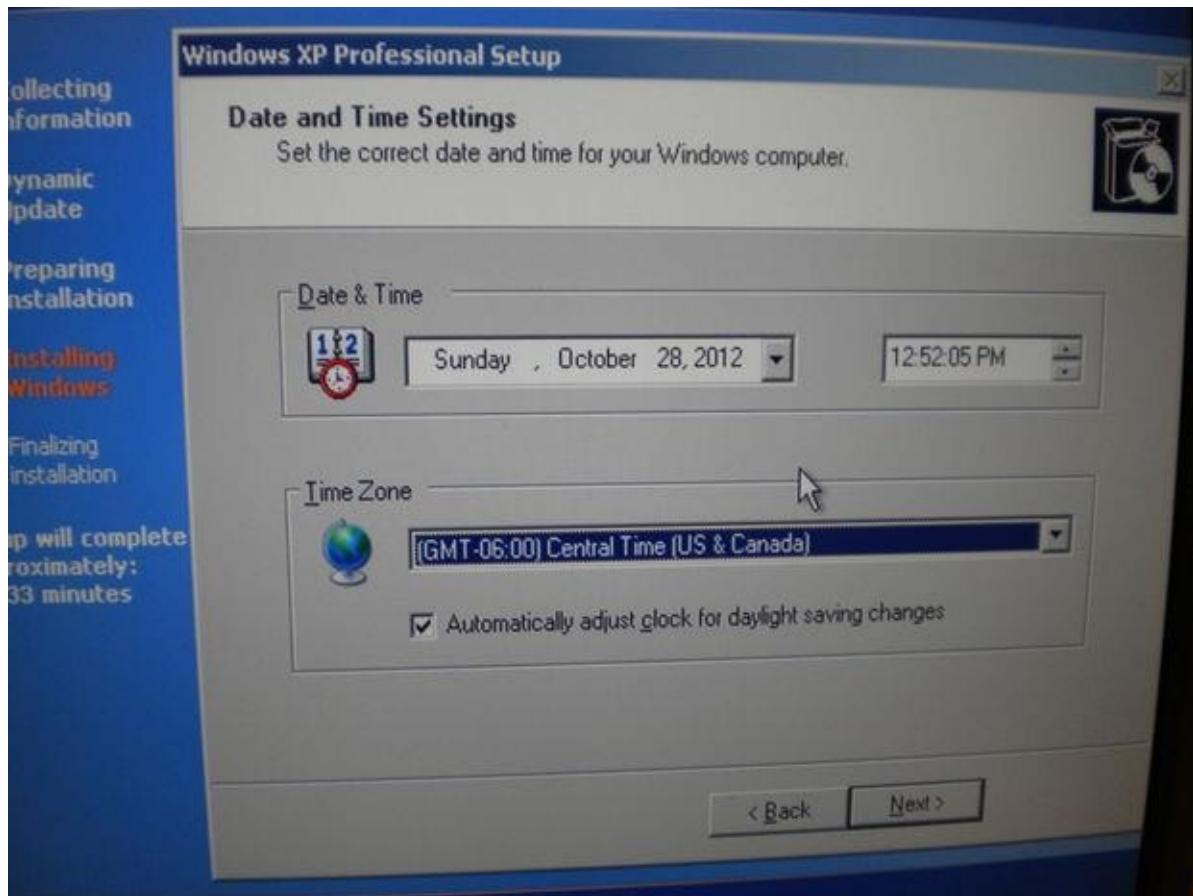


When the next screen comes up (as seen in the third picture), you will want to choose the name you want to give to your computer and the password the Administrator of the computer will have. Press the Next

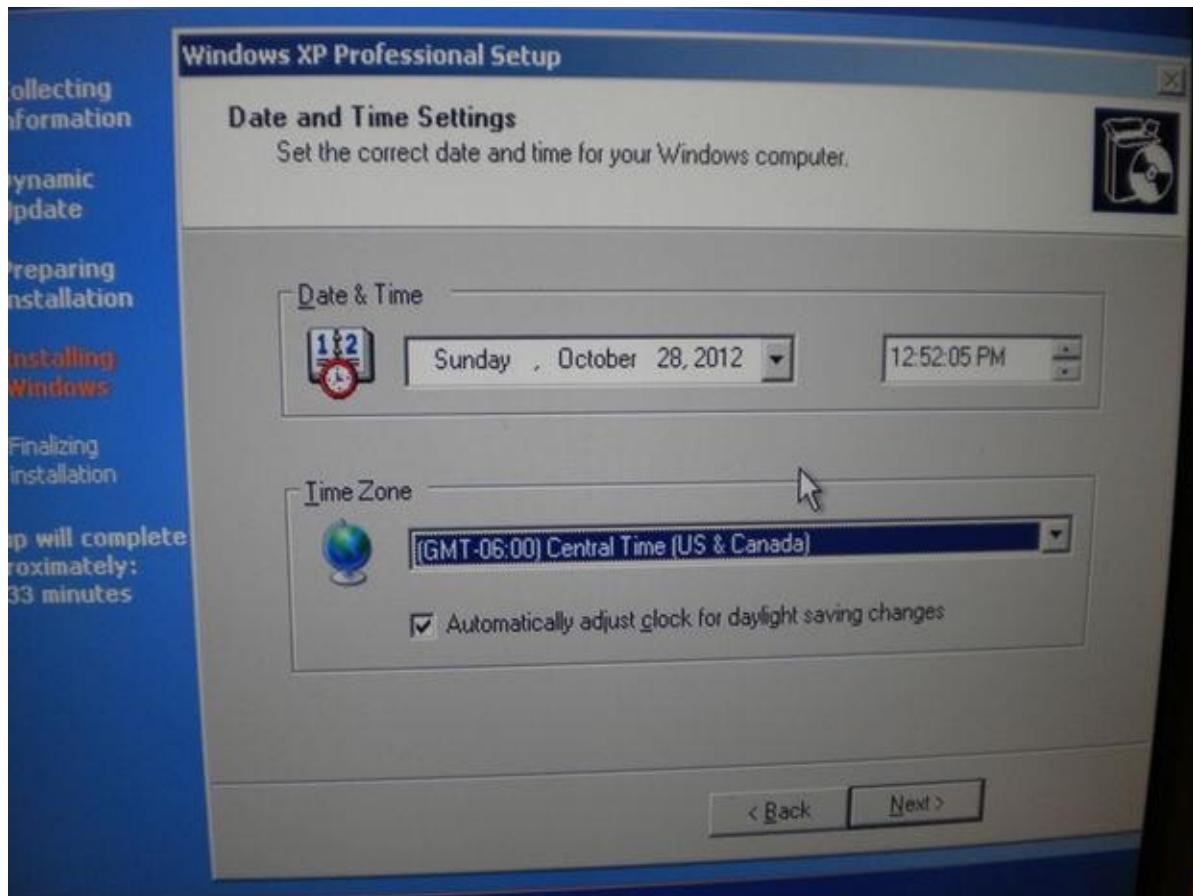


Step 10: Choosing your Time Zone

You will now see the area for you to choose the time and date to be set on the computer. This will correspond to the Time Zone in which you live. I live in the Central Time Zone, so I have chosen to have the date and time correspond to that. You may pick which ever you would like from this menu.

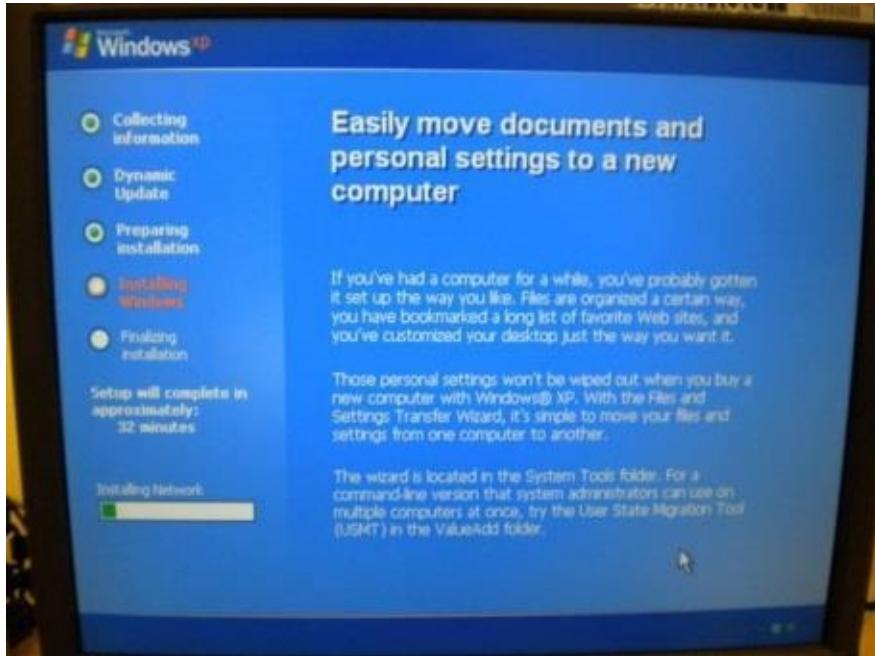


After choosing the Time Zone you are in, you will need to make sure the time is correct. This can be done by checking the time (as seen in the second picture).

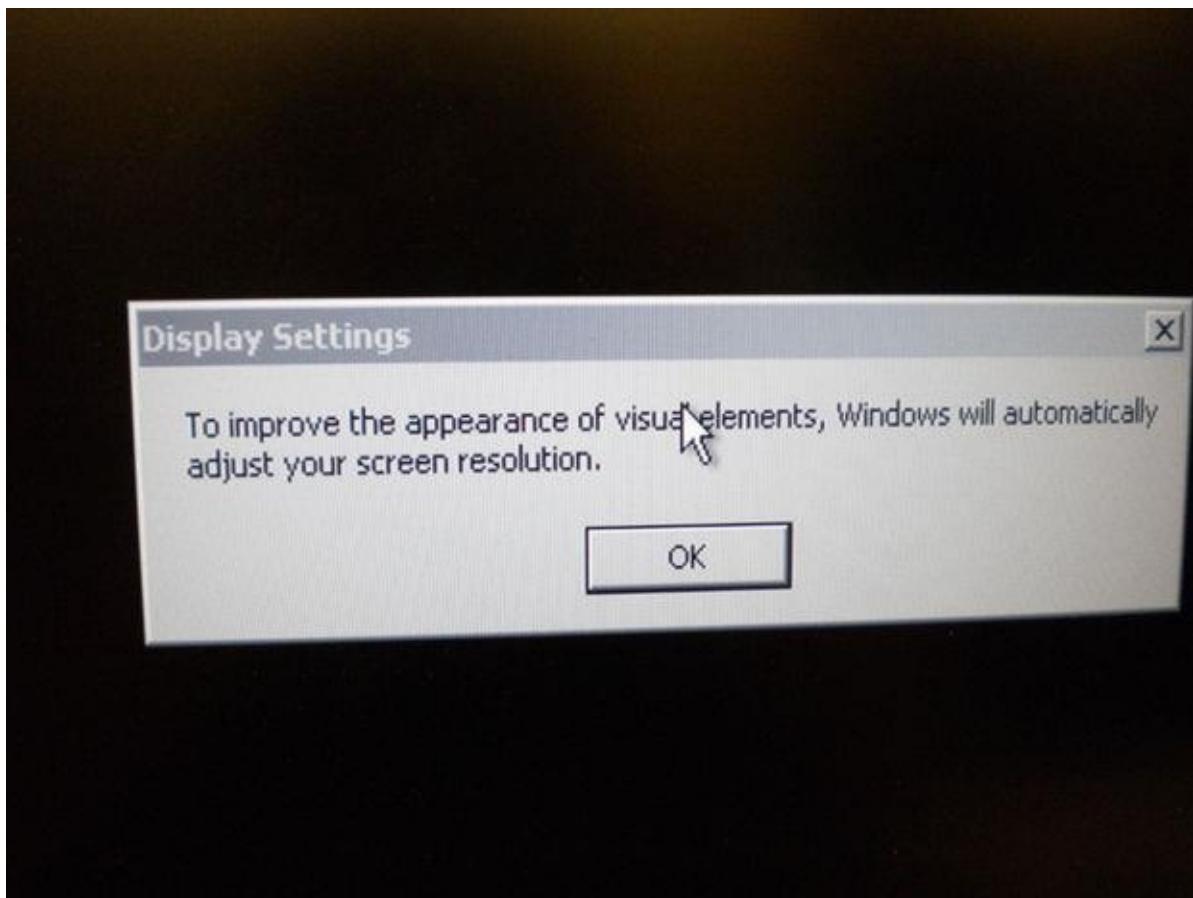


Step 11: Waiting for Installation to continue

Now you will need to wait for the installation to continue before you can do anything more.



Step 12: Display Settings

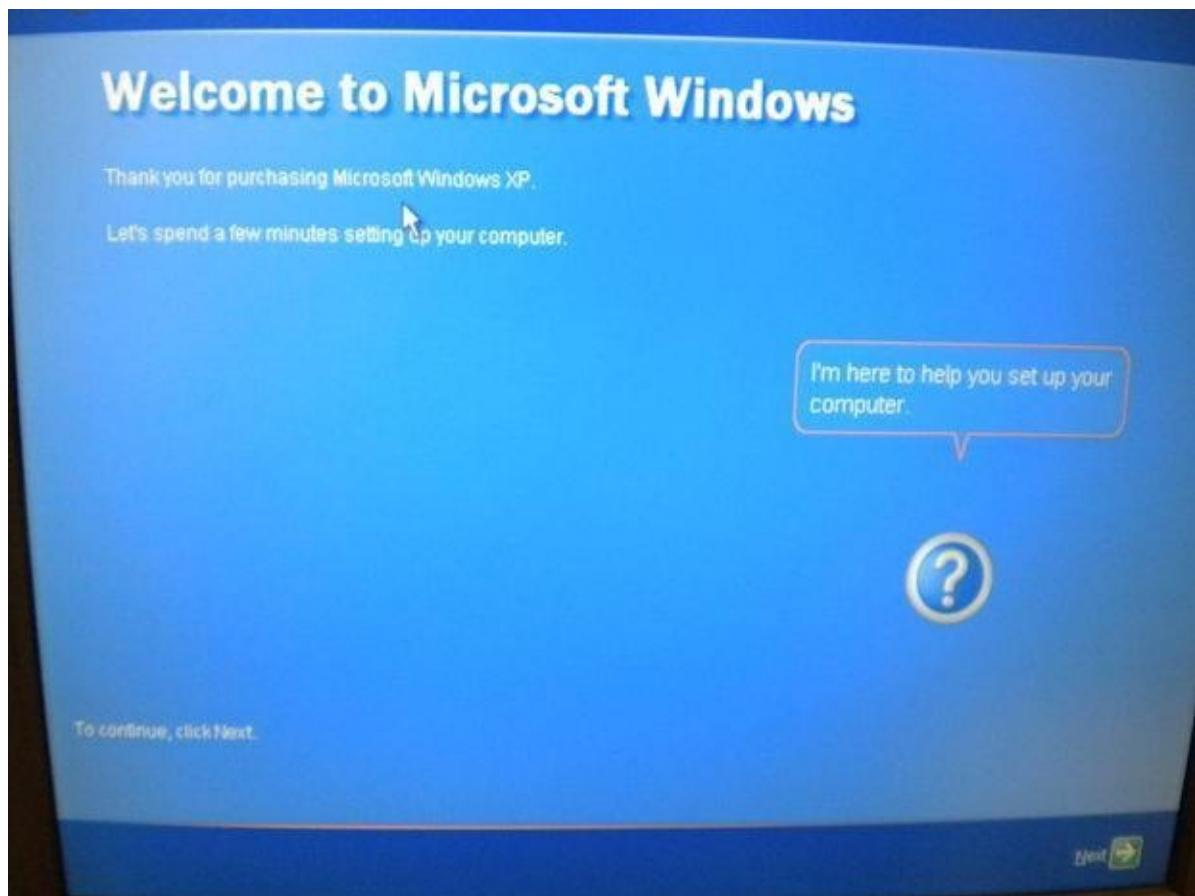


The installation will prompt you to improve the display settings (as seen in the first picture). You will need to press the OK button for this to continue.



After pressing the OK button, you will see another box appear (like the one in the second picture). This box will want you to press the OK button also.

Step 13: Protecting your Computer and Giving it a User



After pressing OK in the last step, you will see the Microsoft Windows welcome screen appear (like the first picture). On this page, you will want to press the next button at the bottom right.



Now you will see a screen prompting you to protect your PC. You will want to decide if you want Windows XP to have automatic updates on or not. I chose to have the system do automatic updating to save from the hassle of having to be sure the computer's user remembers to update the computer. After making your choice, you will need to press the next button in the bottom right.

Who will use this computer?

Type the name of each person who will use this computer. Windows will create a separate user account for each person so you can personalize the way you want Windows to organize and display information, protect your files and computer settings, and customize the desktop.

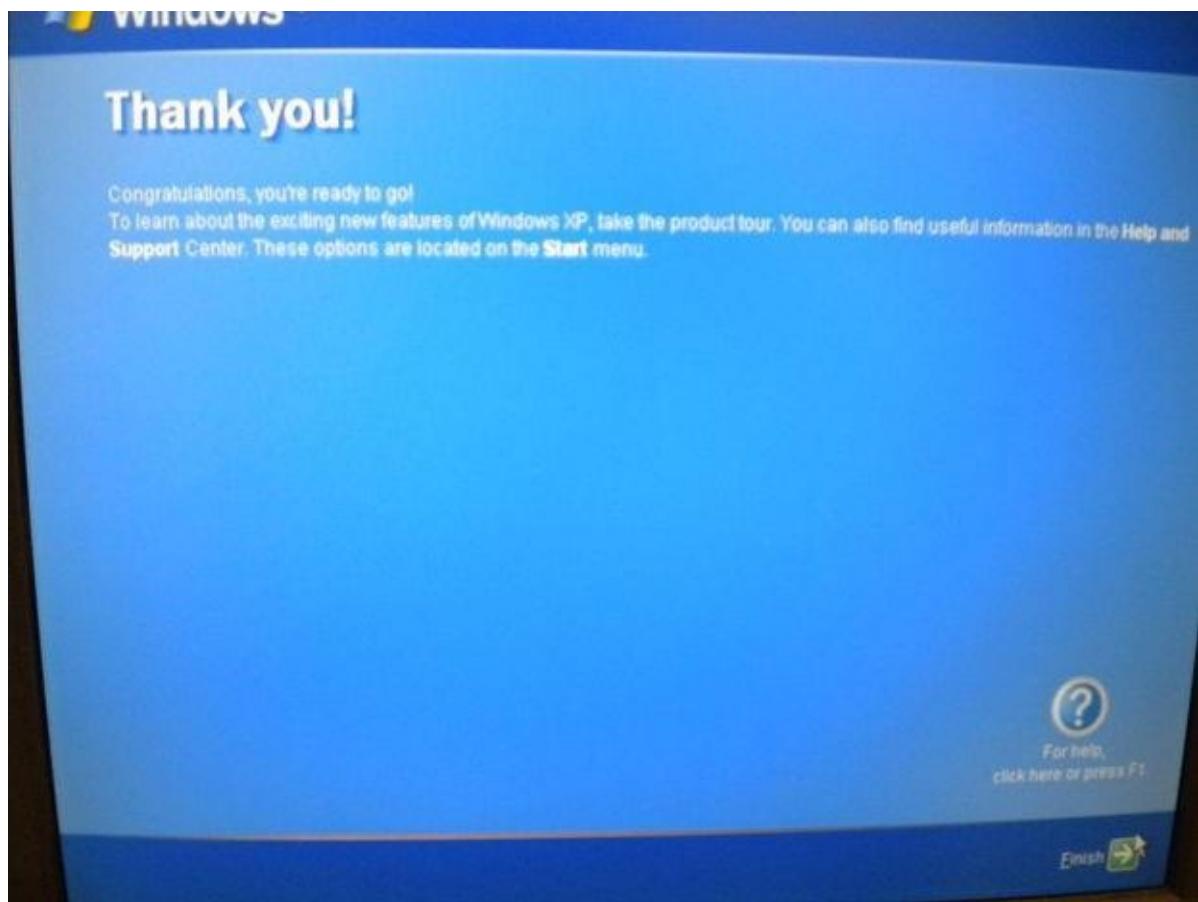
Your name:	<input type="text" value="MyName"/>
2nd User:	<input type="text"/>
3rd User:	<input type="text"/>
4th User:	<input type="text"/>
5th User:	<input type="text"/>

These names will appear on the Welcome screen in alphabetical order. When you start Windows, simply click your name on the Welcome screen to begin. If you want to set passwords and limit permissions for each user, or add more user accounts after you finish setting up Windows, just click **Control Panel** on the Start menu, and then click **User Accounts**.

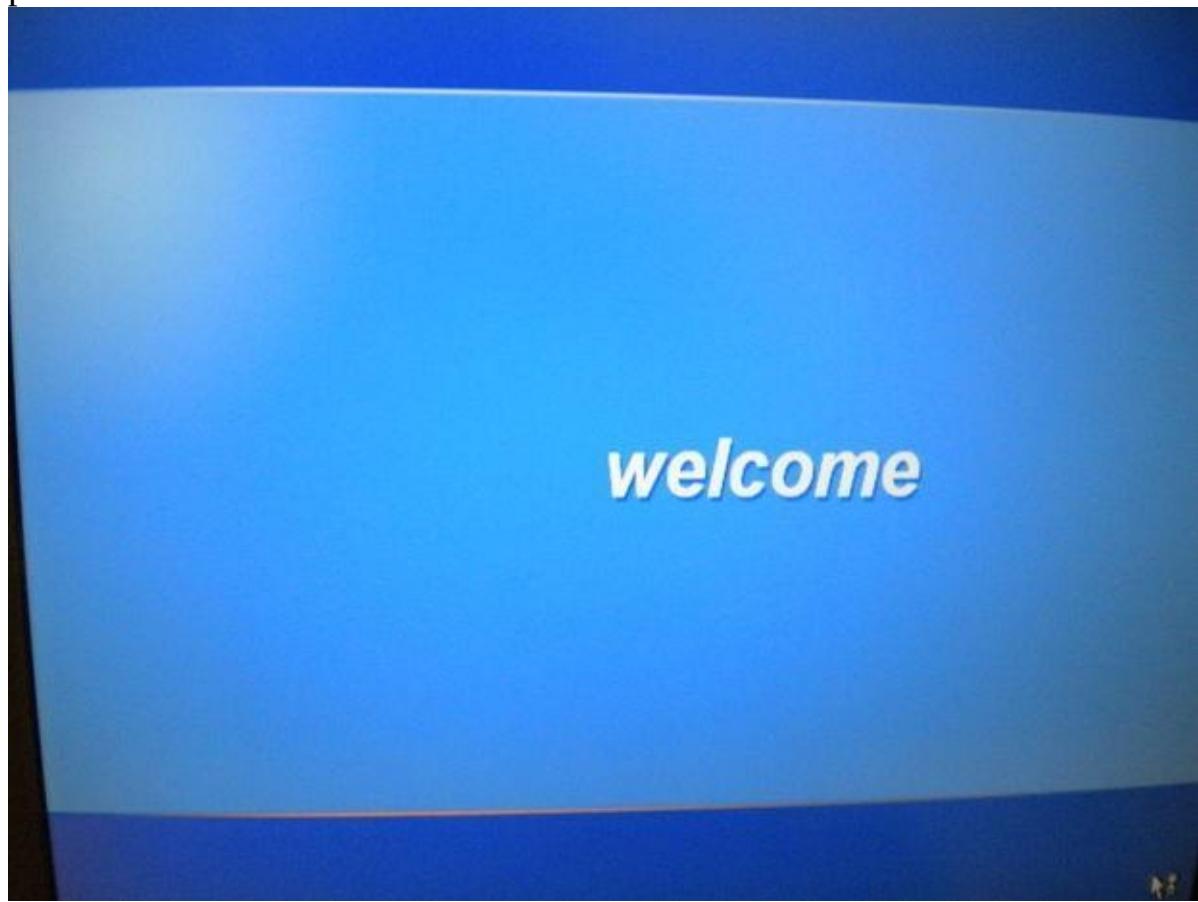


Now you will be prompted to give the computer a user. For the purposes of this set of instructions I gave it a user named “MyName”, but you can name this user whatever you would like. After giving the computer at least one user (you may want to give it many), you will need to press the next button.

Step 14: Finishing the Installation



After pressing the next button, you will see a Thank you screen. On this screen you will need to press Finish.



This will bring up a screen similar to the second picture on this page.

Now you will see that the computer has logged you in for the first time. You should see a screen like the third picture on this page.



I hope you enjoyed the tutorial on how to install Windows XP Professional!

How to Install Windows 7 on Laptop

XP install is different than Windows 7 install. With XP, it is a little less graphical and will ask you more questions than will Windows 7. In a Windows 7 install, you will start by choosing Custom install. I never ever recommend doing an Upgrade of any version of OS install... simply not needed. Follow

through the prompts
and until you get to
the screen showing
the hard drive
partitions. Here you
will make a decision to
wipe the entire hard
drive clean or to save
certain partitions or
partial partitions.



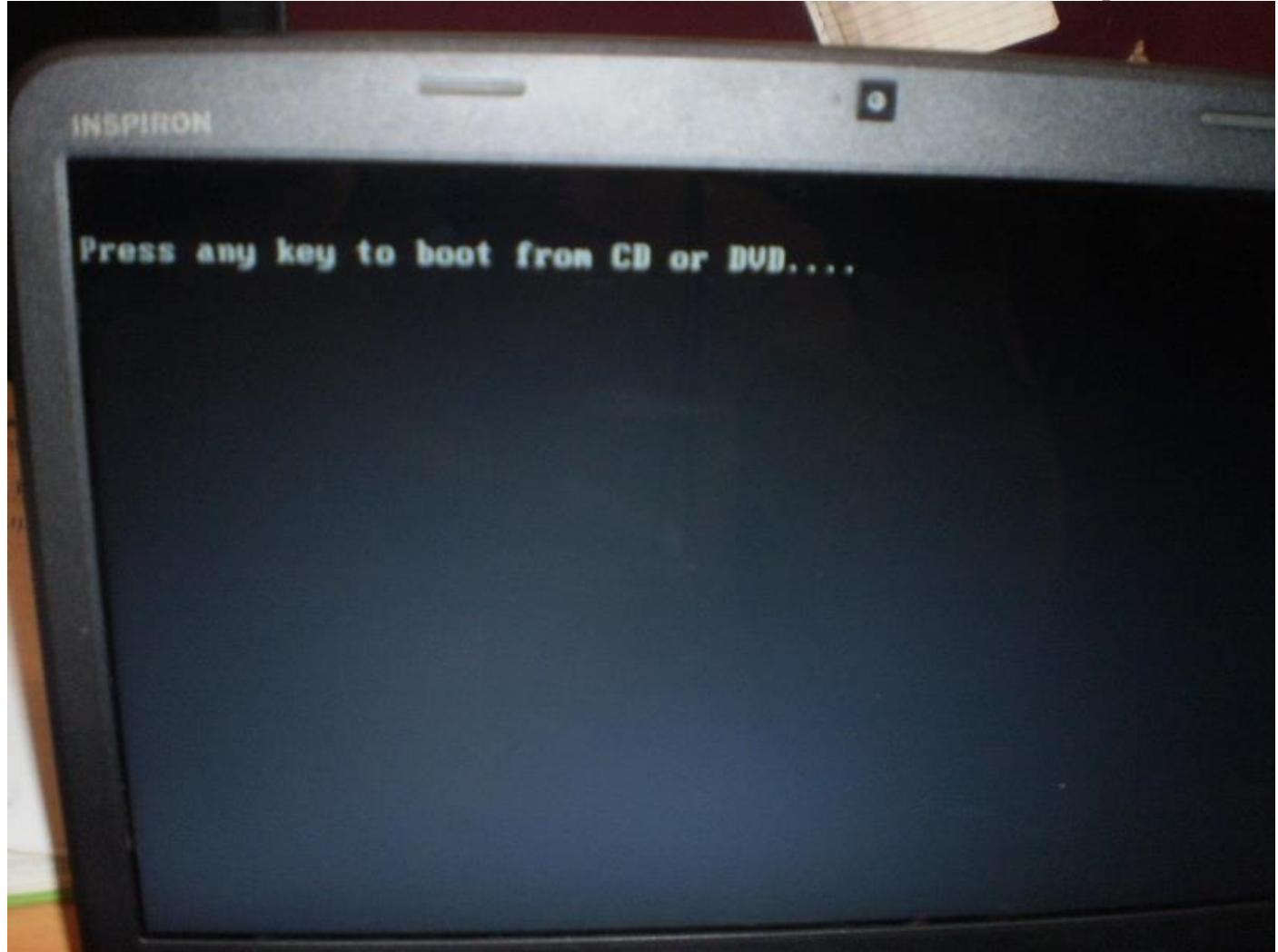
Windows 7™

If you need to save DATA from the previous Operating System install, then you can leave all partitions as they are, even if the Windows 7 operating system is an upgrade to what was previously on the drive (like XP or Vista). Simply keep the default choice partition selected... which will be the largest sized partition, the system partition... and in this window you will just choose —NEXT and not mess with any other setting.

1. Turn “ON” your notebook and insert operating system DVD into drive.



2. Press F12 to select boot device and select “CD/DVD/CD-RW Device” then press enter.

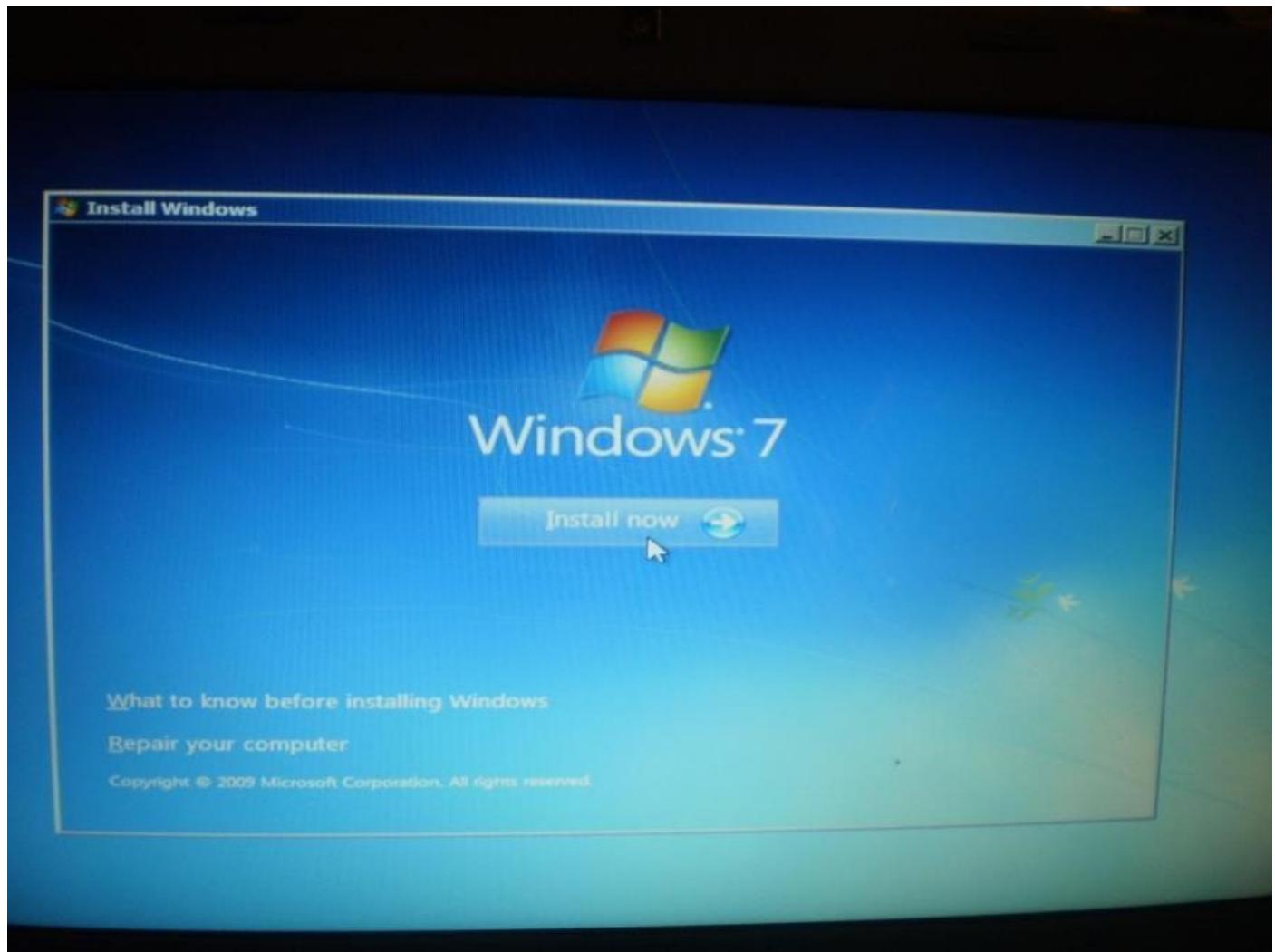


3. Your Laptop will automatically start booting from DVD by pressing any key.

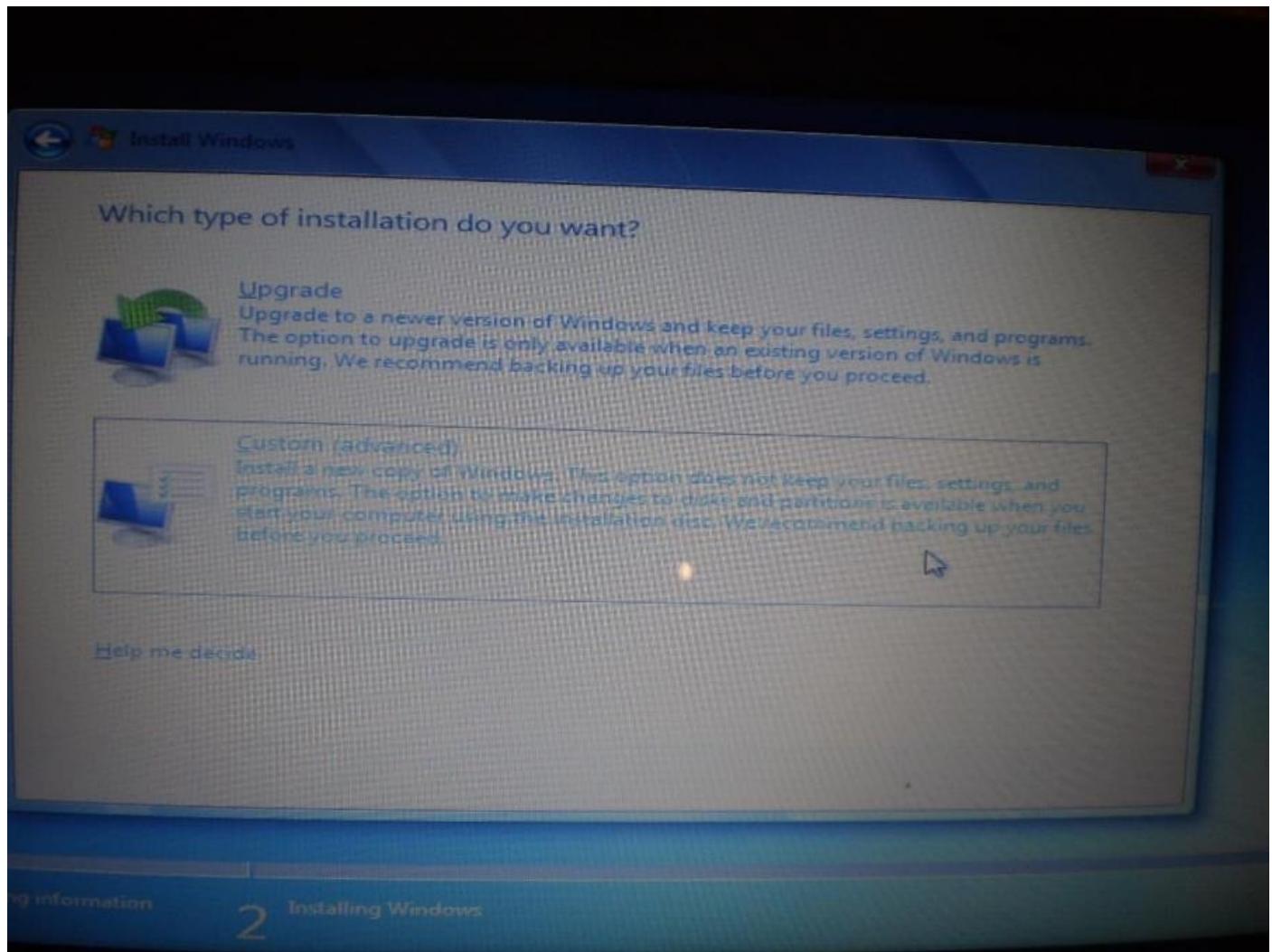
4. Windows will automatically start loading files. It will take few minutes



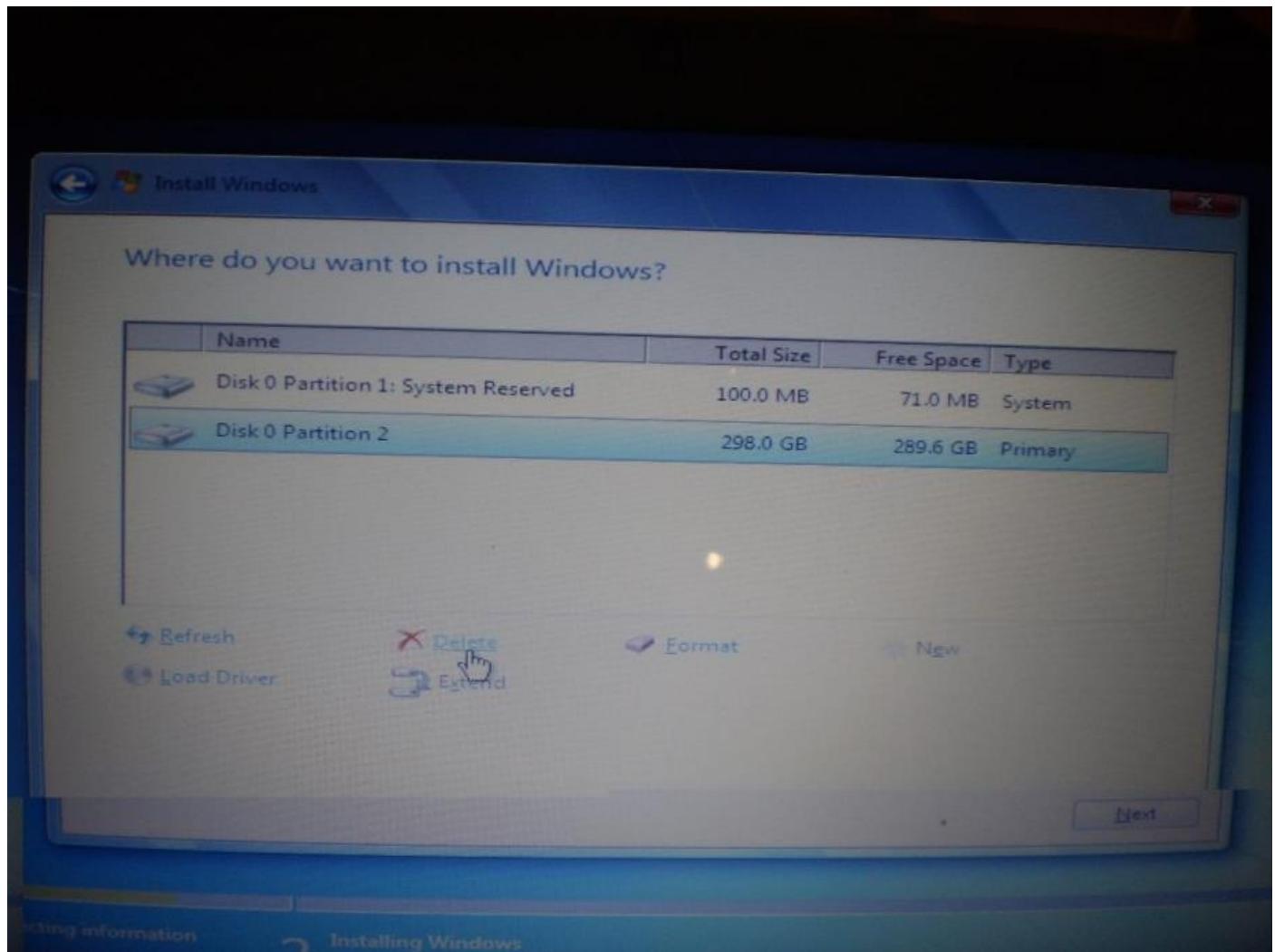
5. A new window will appear, select suitable language and time format then click next.
6. Click "Install Now" button will start initiating a result s



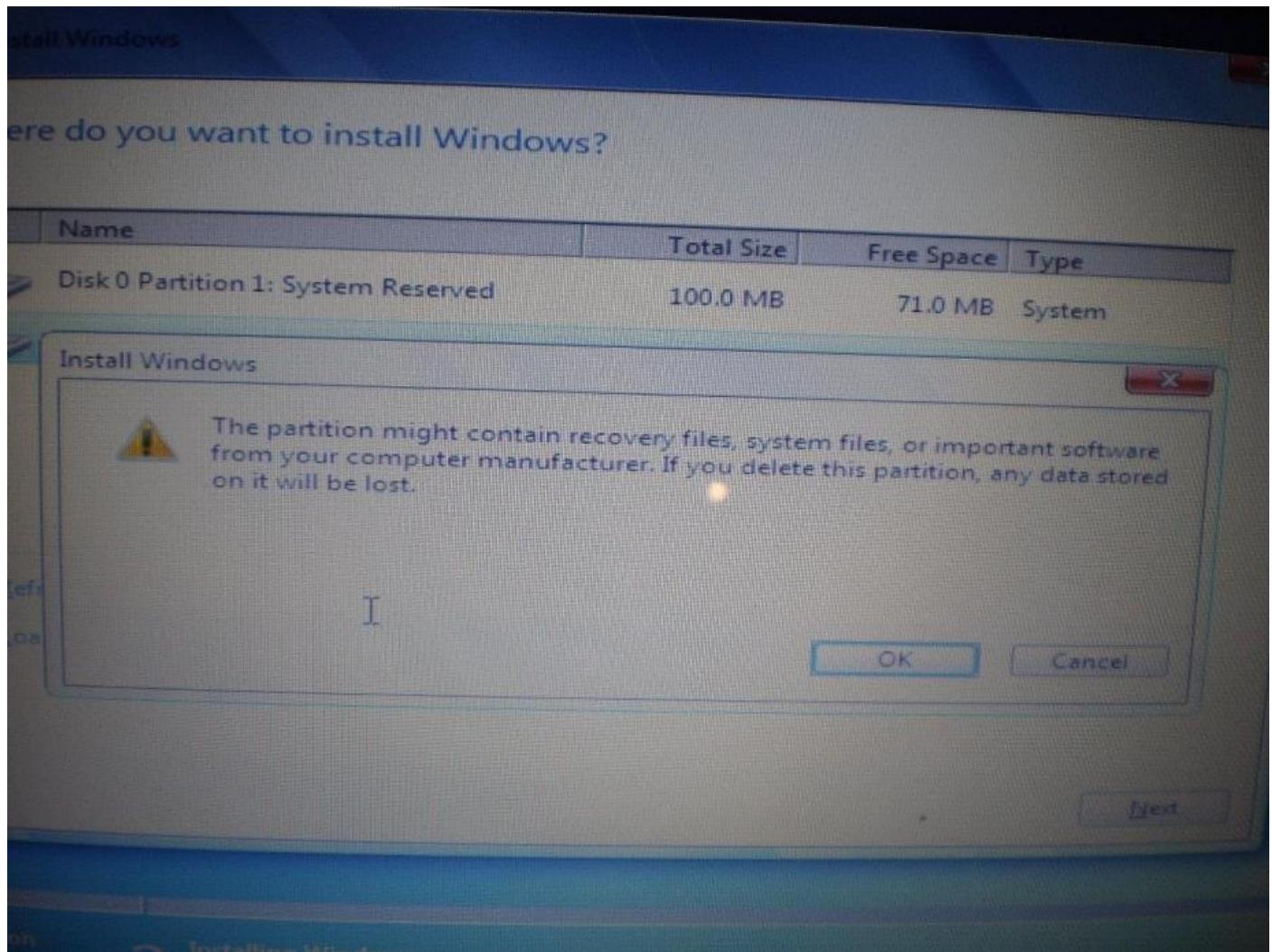
7. Read and accept the license terms by clicking the check box and press next.
8. Select “Custom (advanced)” settings



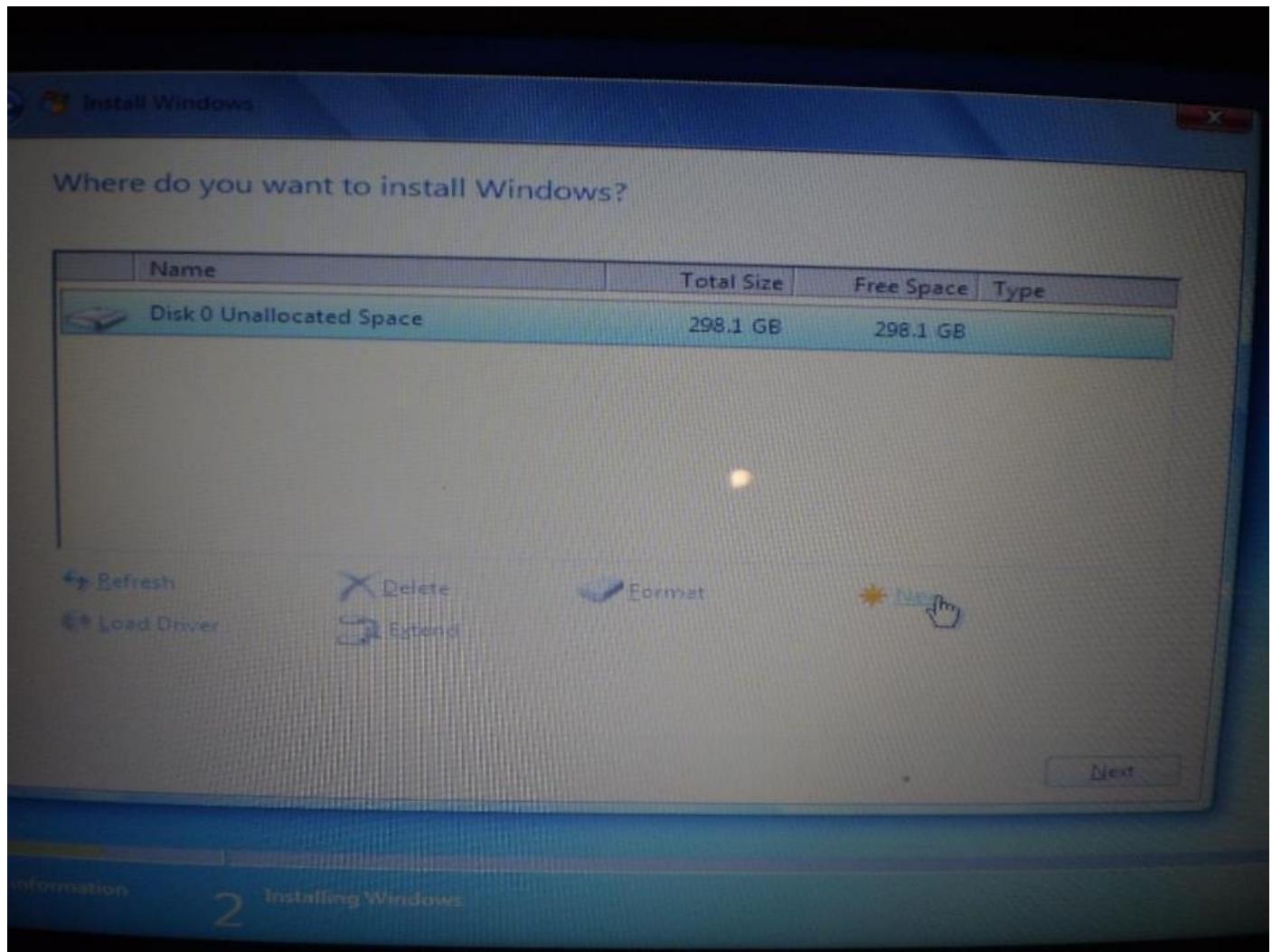
9. In this screen windows setup will show all existing partitions of drive, delete the partitions one by one by selecting drive options.
10. Highlight Drive partition and select delete.



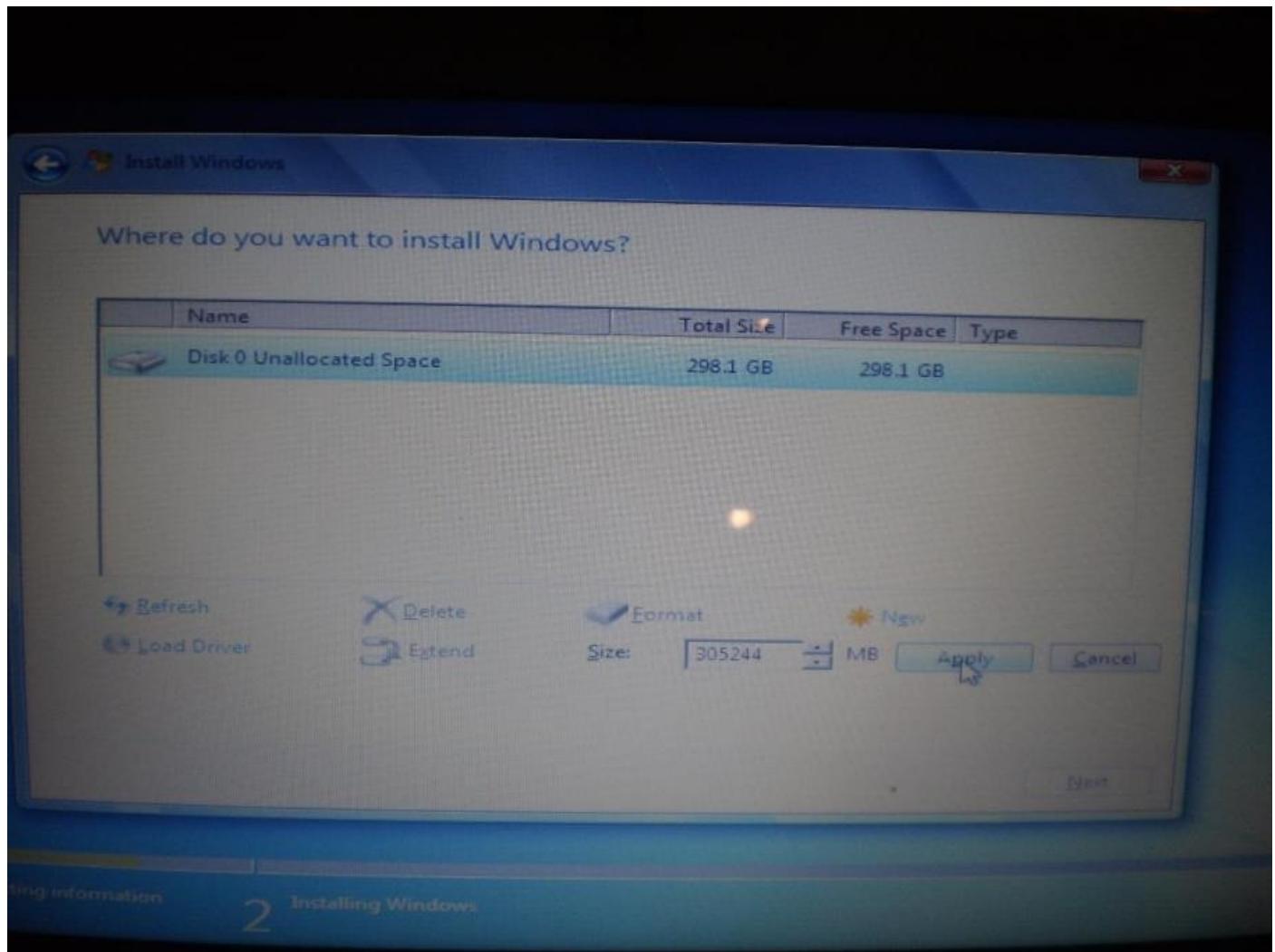
11. Press OK.



12. After deleting all partitions windows setup will show complete unallocated disk space, select New.

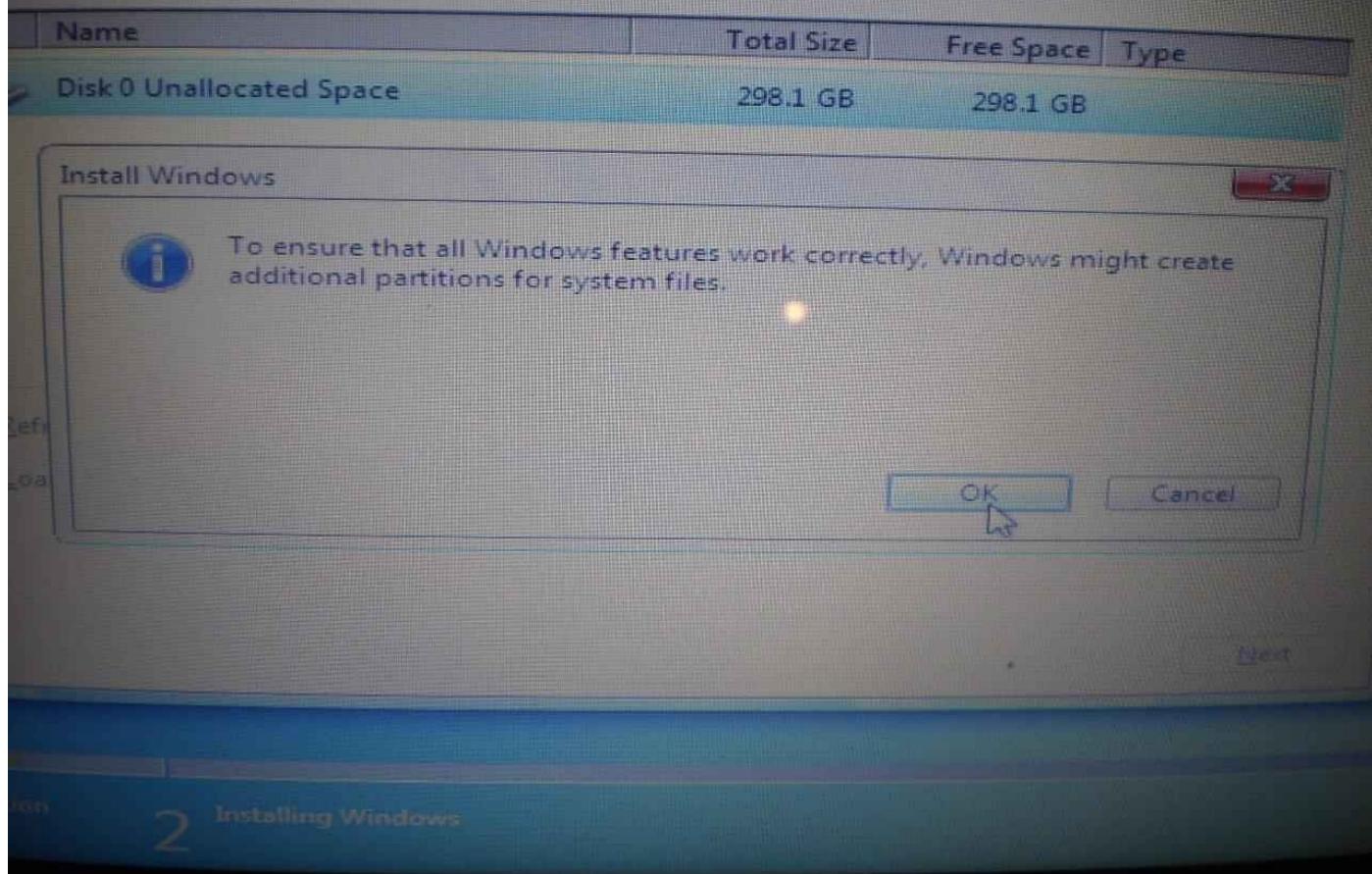


13. Define your required space and press “Apply”.

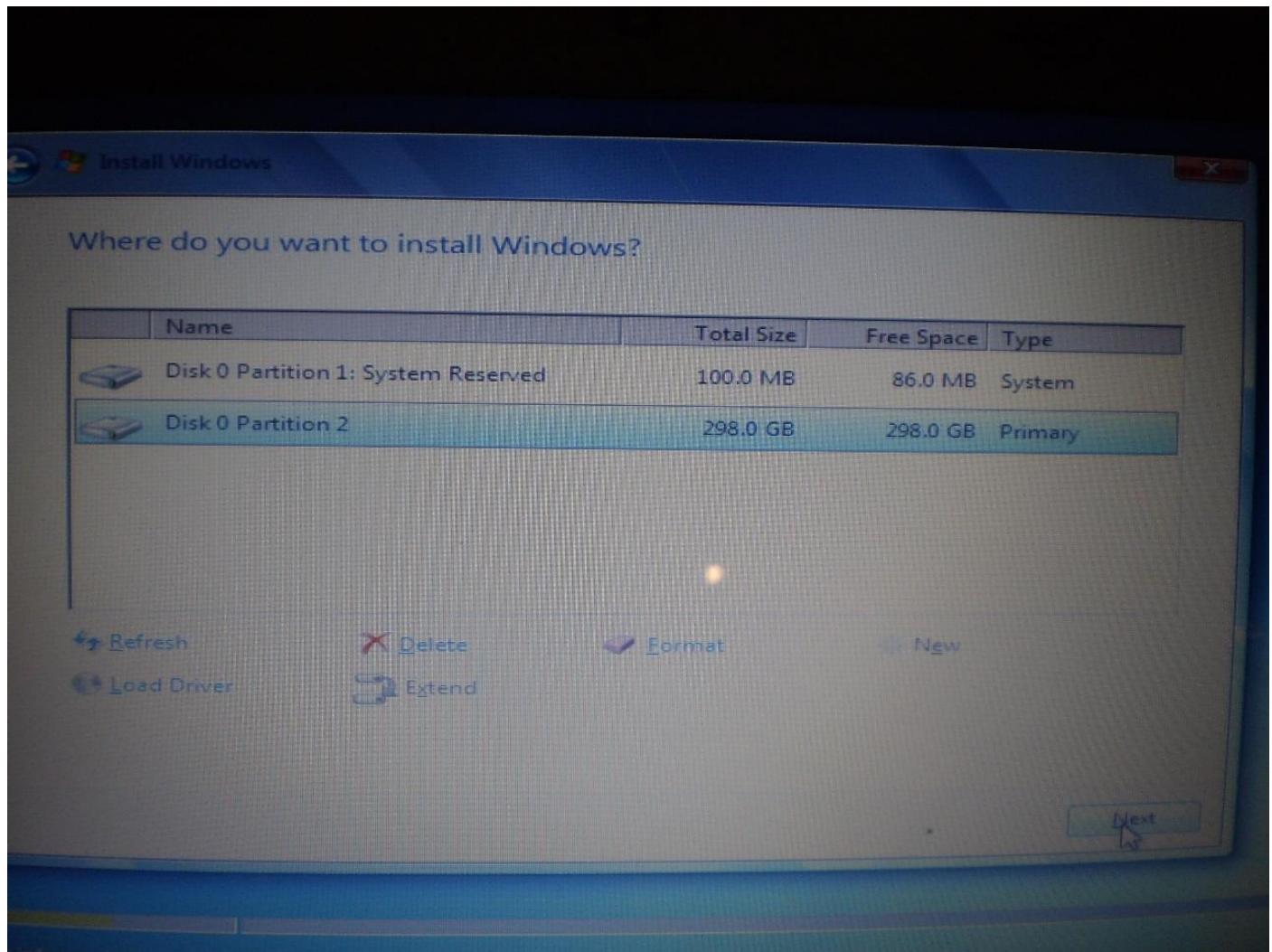


14.Click OK.

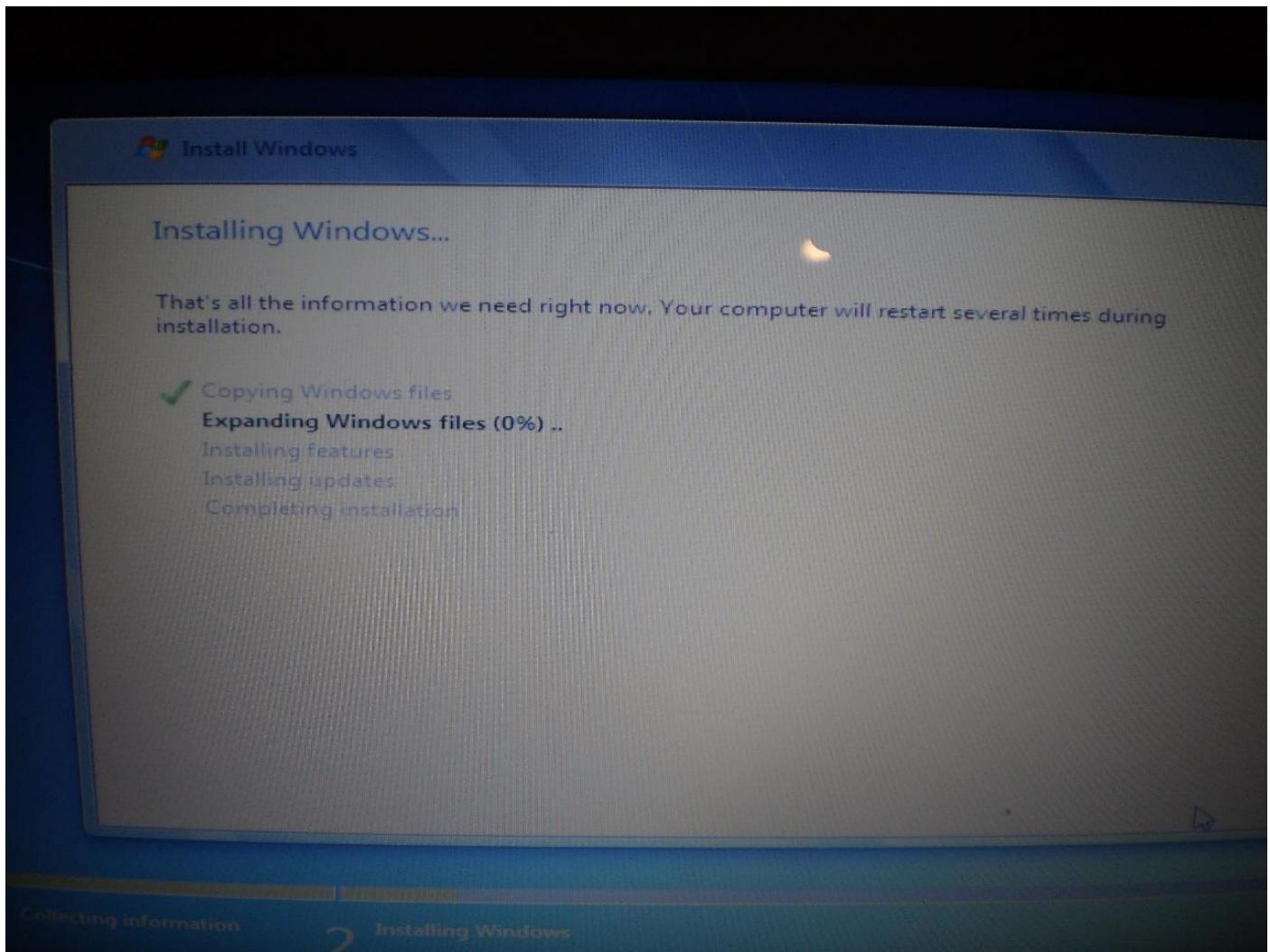
Where do you want to install Windows?



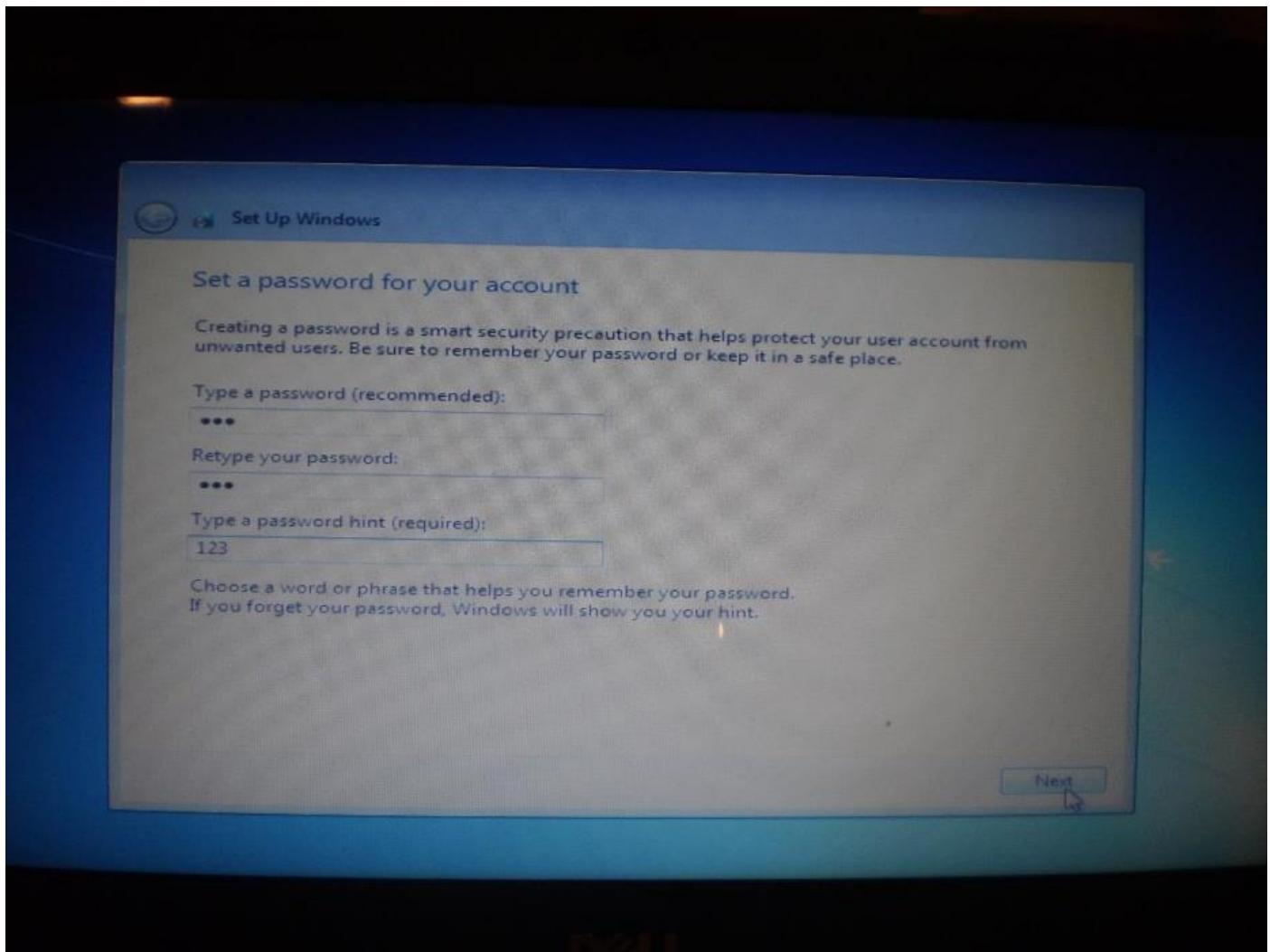
15.Click Next.



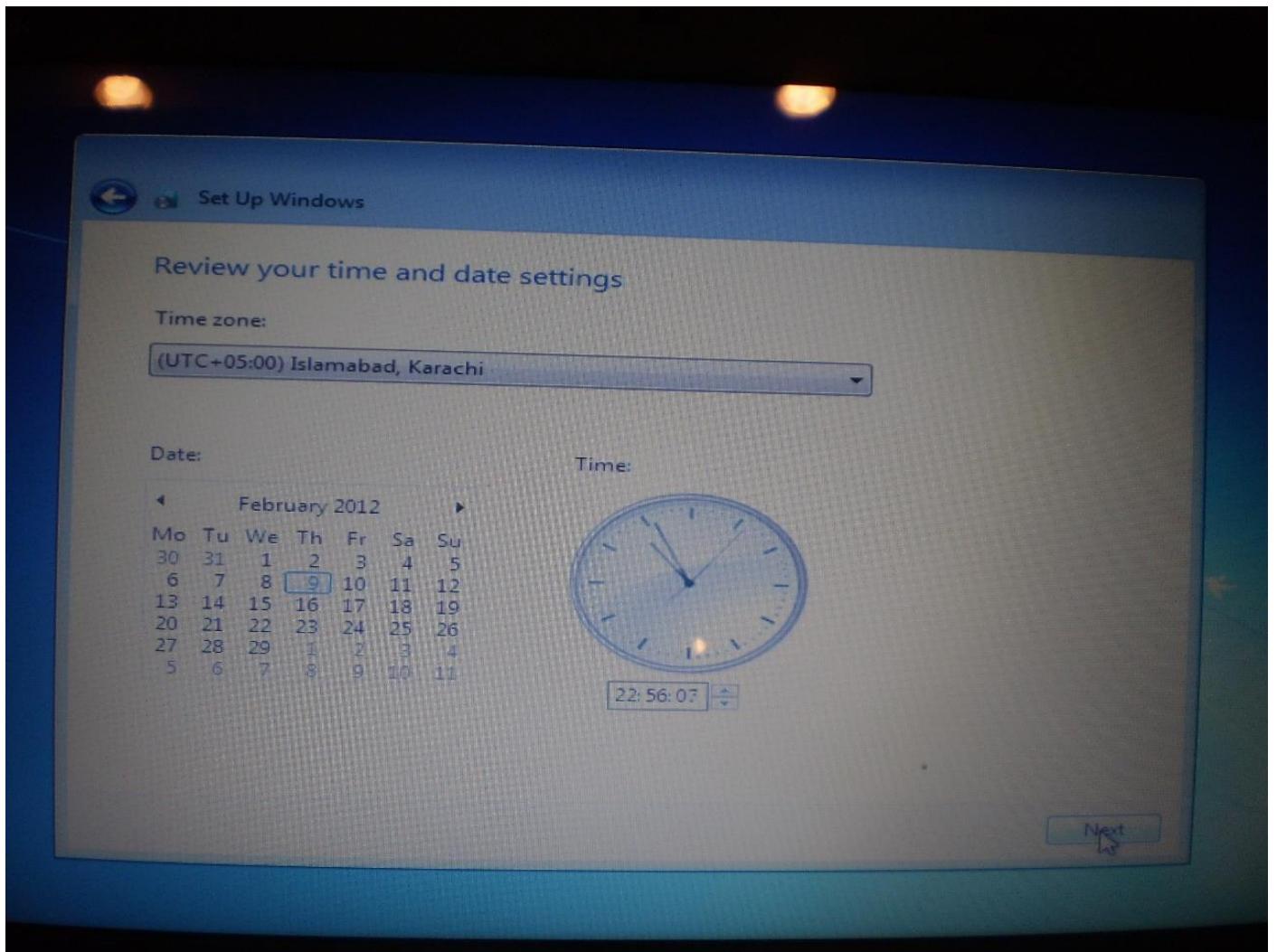
16. Finally windows will start installing its files and then restart system automatically.



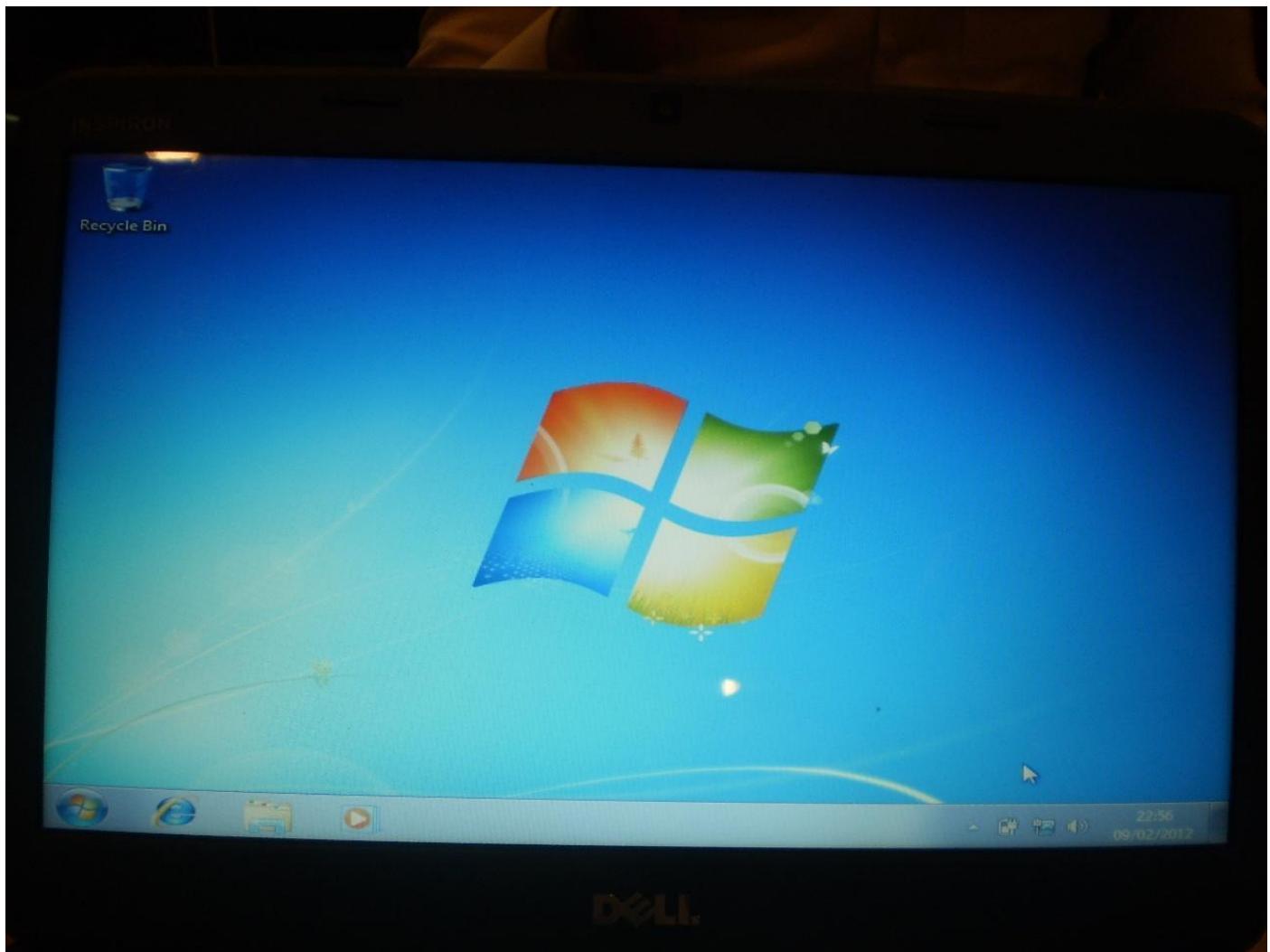
17. Type user name and press next.
18. Type password and press next.



19. Select use recommended setting.
20. Select time and date then press next.



21. Installation has been successfully completed remove OS media from drive



Word Of Warning!!! Do Not Reinstall Any Operating System Unless You Are Sure You Have A Copy Of The Ethernet and or Wireless Corresponding Drivers... The OS Install itself might not load drivers for either which will leave you with no internet capability until they are installed.

Driver Installation

Once at their main page of the website, you will look for a —Services & Support or —Driversn & Downloads or similar to get to their Drivers Page for your model. Next, you will be allowed to choose your Laptops model number and series number. There will usually be a list to choose from or an Auto Detect feature on that Web Page. Once at your Drivers Web Page, you can see the list of all your drivers such as Ethernet, Chipset, Audio, Wi-Fi, BIOS, etc... Download one or all of them, and if needed, you might have to flip through the different operating system versions to find all the drivers... there will be a place somewhere on that page to change what operating system version the drivers are

TOSHIBA

IBM

 **HEWLETT
PACKARD**

FUJITSU

DELL™

COMPAQ

acer

**SONY
VAIO**


Gateway

for...

If installing from a USB device, make sure that you set the BIOS setting to allow the laptop to boot to that USB device first.

Chapter 4

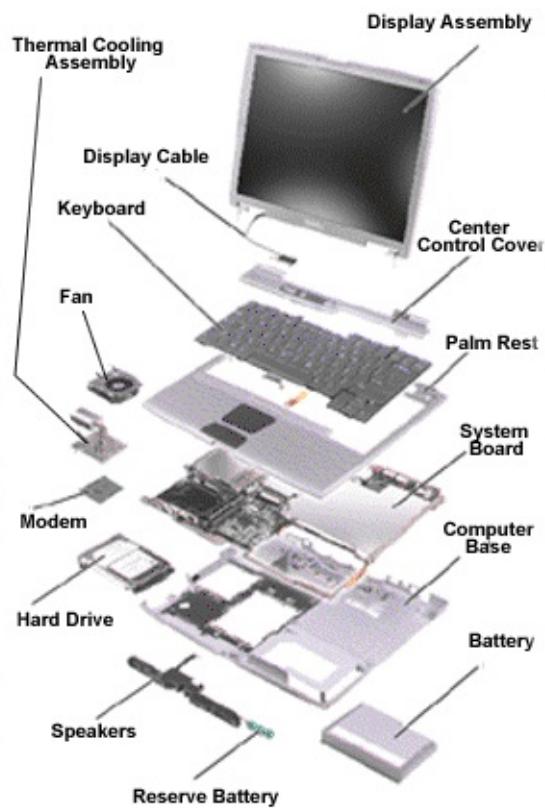
Laptop Disassembly

Introduction

I will explain here how to disassemble any laptop, and not just focus on one specific model. I will teach you this way because there is a general rhythm to the placement of the screws and different types used. With all laptops, you will start the disassembling by flipping the laptop over to its bottom side. Use a foam pad if available so you do not scratch the lid/cover.

These directions are to disassemble the complete unit. You will need a 5.5mm Nut Driver, a medium size Philips screwdriver.

Before disassembly, make sure the



notebook is powered off.

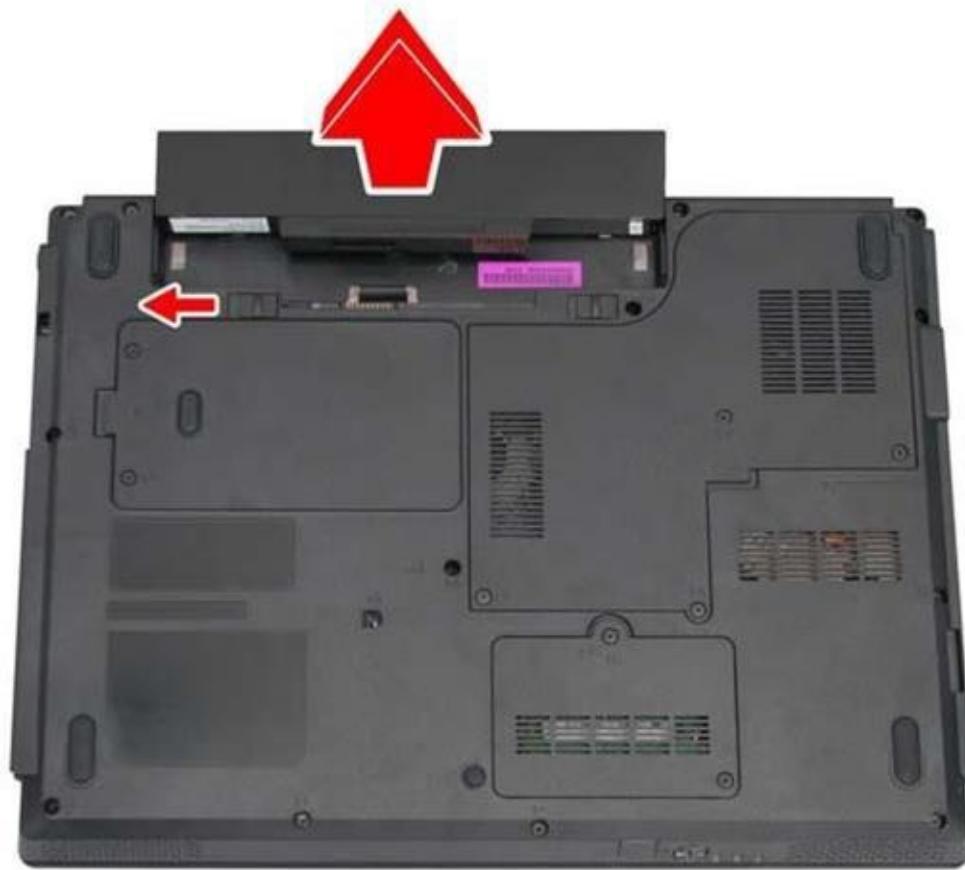
1. Removing the Battery Pack

To remove the battery pack from the battery bay, follow the steps below:

1. Turn the notebook upside down.
2. Slide the right battery release lock in the direction of the arrow to unlock the battery pack.



3. Slide the left battery release latch in the direction of the arrow. The battery pack will pop-up automatically. Gently pry the battery pack from its housing.



NOTE:

Always start laptop disassembly by removing the battery pack first.

2. Removing the HDD Module

Follow the steps below to remove the HDD module:

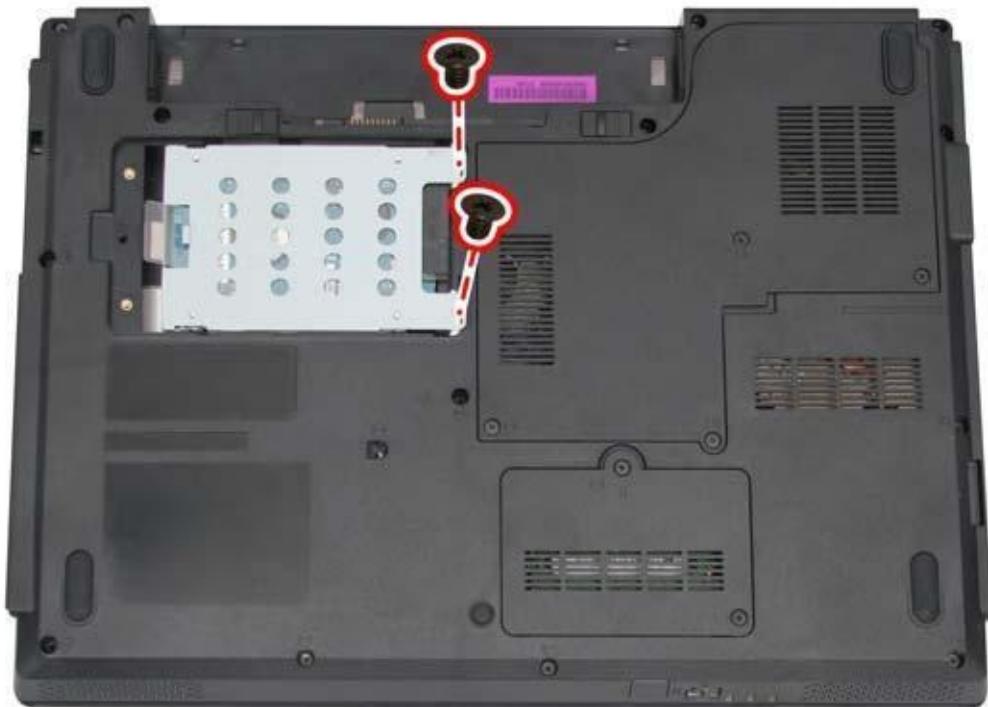
- 1.Turn the notebook upside down.
- 2.Remove the two M2.5x4 screws securing the HDD compartment cover.



- 3.Pull up the HDD compartment cover in the direction of the arrow..



4. Remove the two M2.5x4 screws securing the HDD module in place.



5. Pull the tab to remove the HDD module in the direction of the arrow.



6. Remove the four silver M3x3 screws to take off the HDD case.



7. Remove the HDD module from the HDD case.

3. Removing the DDR RAM

Follow the steps below to remove the DDR RAM:

- 1.Turn the notebook upside down.
- 2.Remove one M2.5x4 screw and one M2.5x18 screw securing the RAM cover, and then remove the cover.



- 3.Push the latches to release the RAM module. A spring will force one end of the module up.



4. Grasp the module and pull it out.



4. Disassembling the ODD (CD-ROM/DVD-ROM/CD-RW...)

Follow the steps below to disassemble the optical drive (ODD):

1. Turn the notebook upside down.
2. Remove the M2.5x10 screw securing the ODD.
3. Insert a flat screwdriver into the slot as shown and gently push out the ODD.



4. Remove the two M2x3 screws from the bracket plate, and then remove the bracket plate.

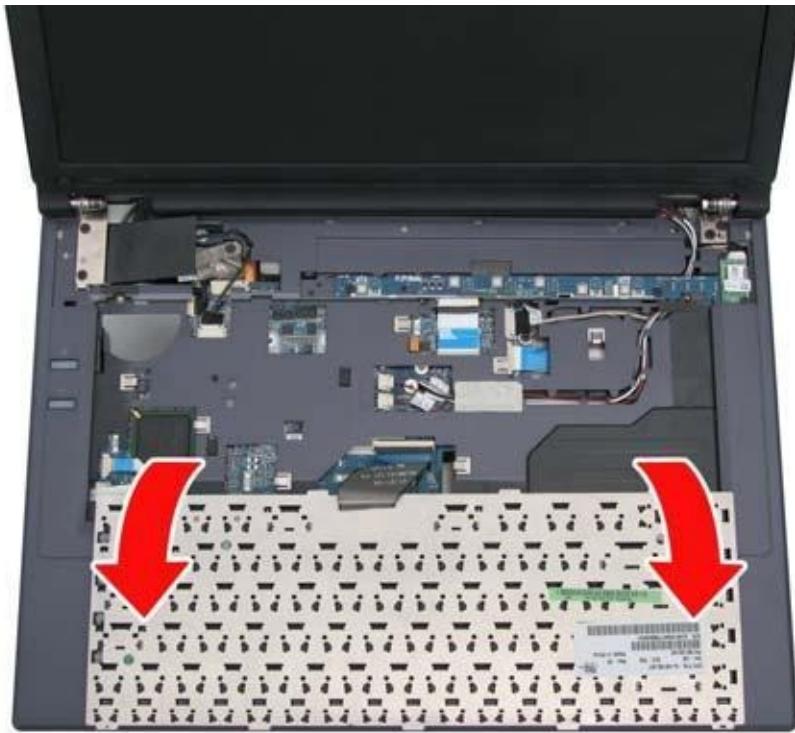
5. Removing the Keyboard

Open the display panel and follow the steps below to remove the keyboard.

1. Lift up the strip cover from the right side and remove it.



2. Remove the two M2.5x4 screws securing the keyboard. 3. Turn over the keyboard, revealing the keyboard cable underneath.



4. Use a thin tool such as a screwdriver to lever up the connector bracket and disconnect the keyboard cable from the motherboard.

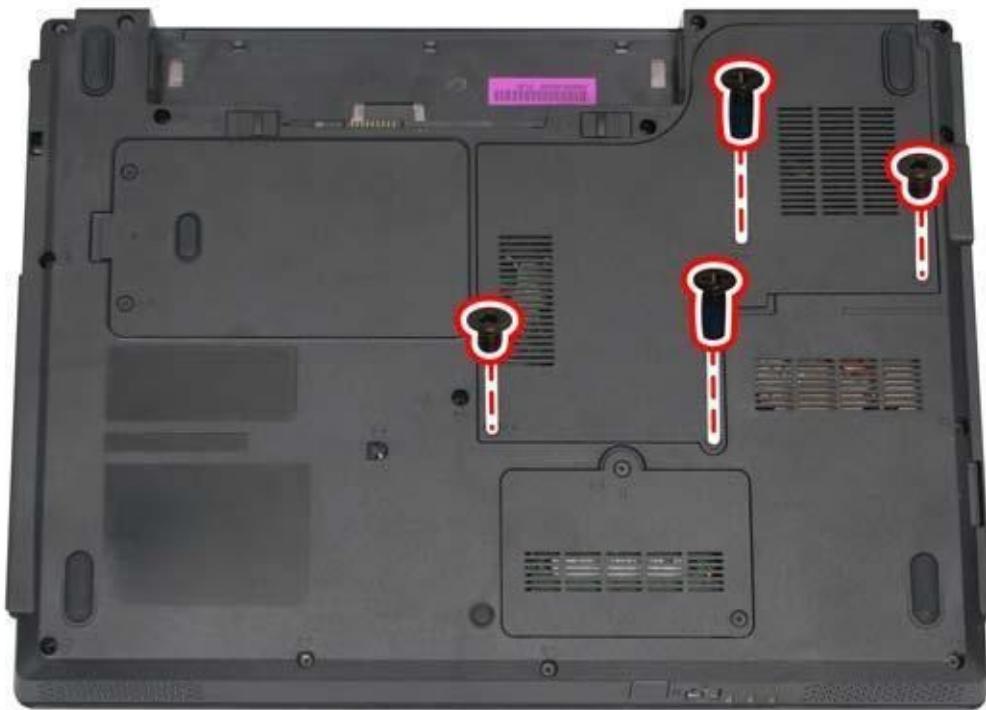
6. Removing the Switch Board Open the display panel and follow the steps below to remove the switch board. **1. Remove the two M2.5x4 screws securing the switch board.**



2. Remove the switch board.
7. Removing the Wireless LAN Card

To remove the wireless LAN card, follow the steps below:

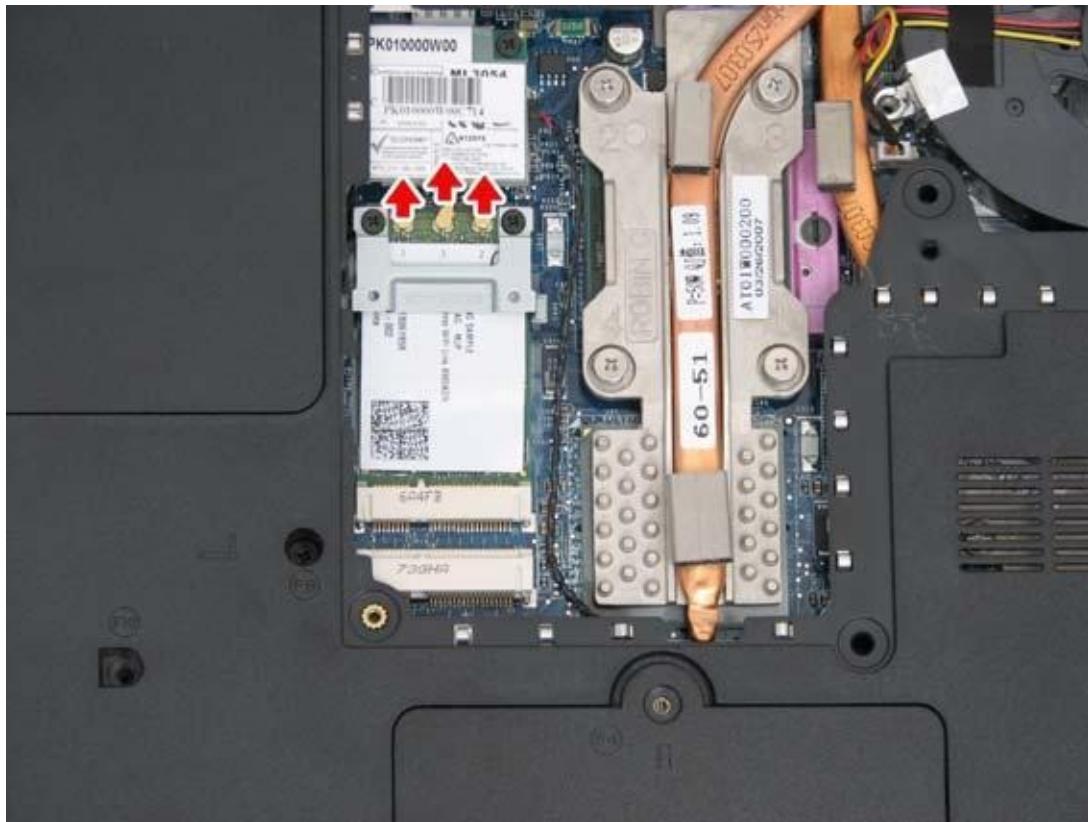
- 1.Turn the notebook over.
- Remove the two M2.5x4 and two M2.5x18 screws securing the thermal cover.



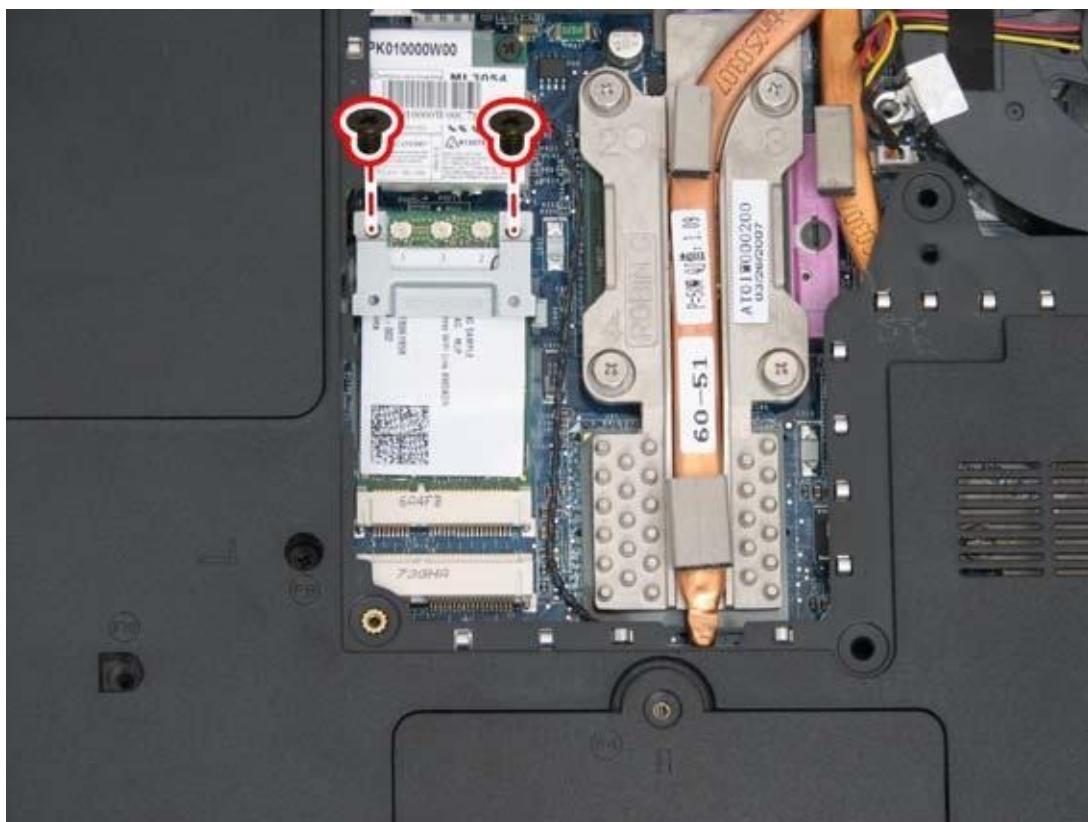
2. Remove the cover.



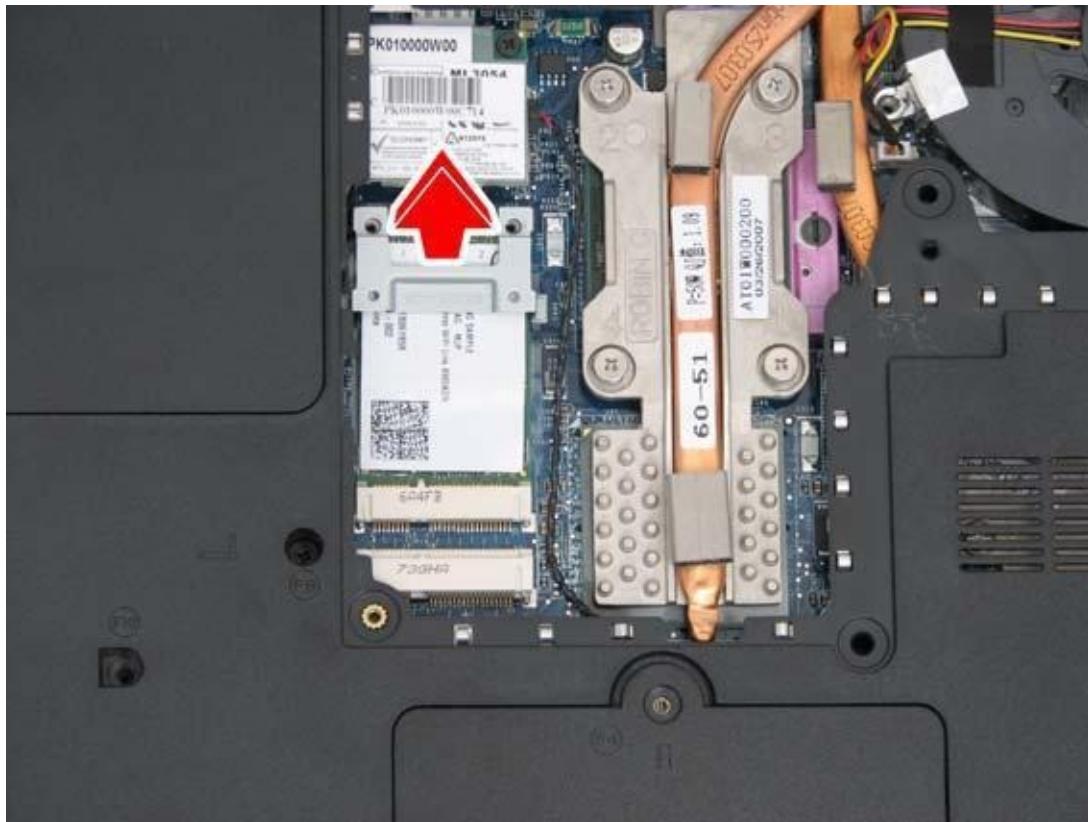
3. Disconnect the three antennas from the wireless LAN card.



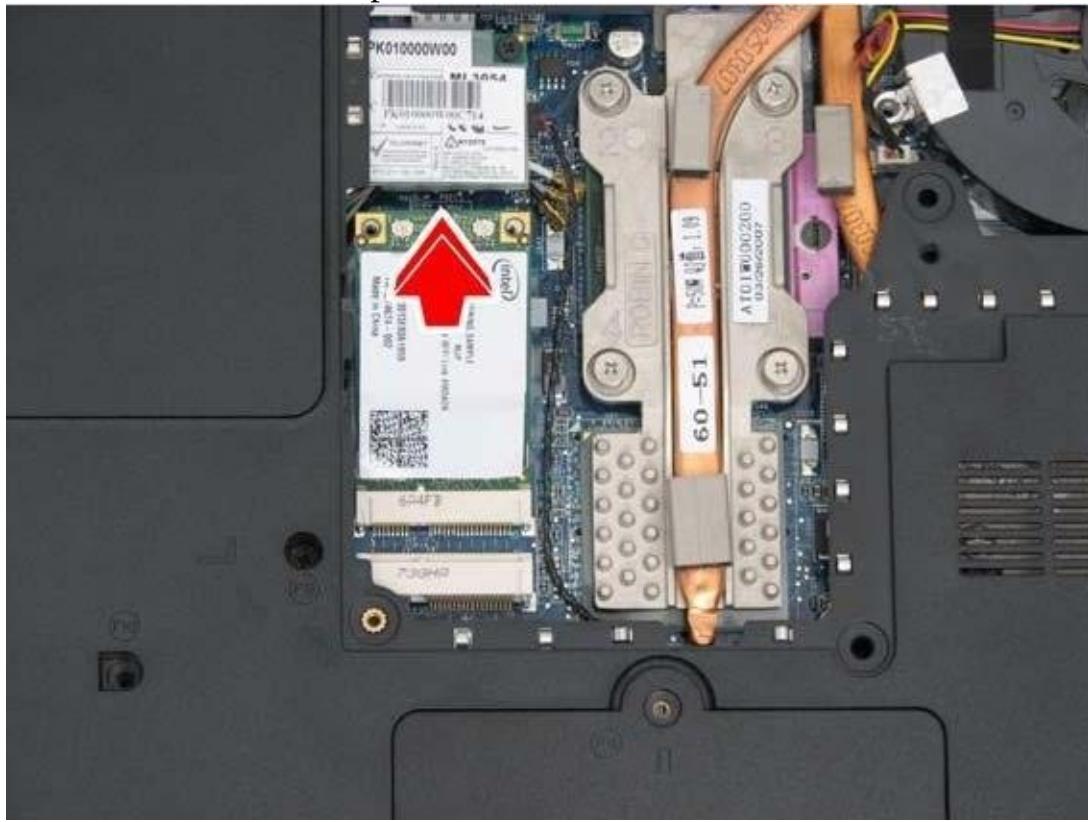
4. Remove the two M2x3 screws attaching the stand-off bracket to the motherboard.



5. Remove the stand-off bracket.



6. Grasp the wireless LAN card and pull it out.

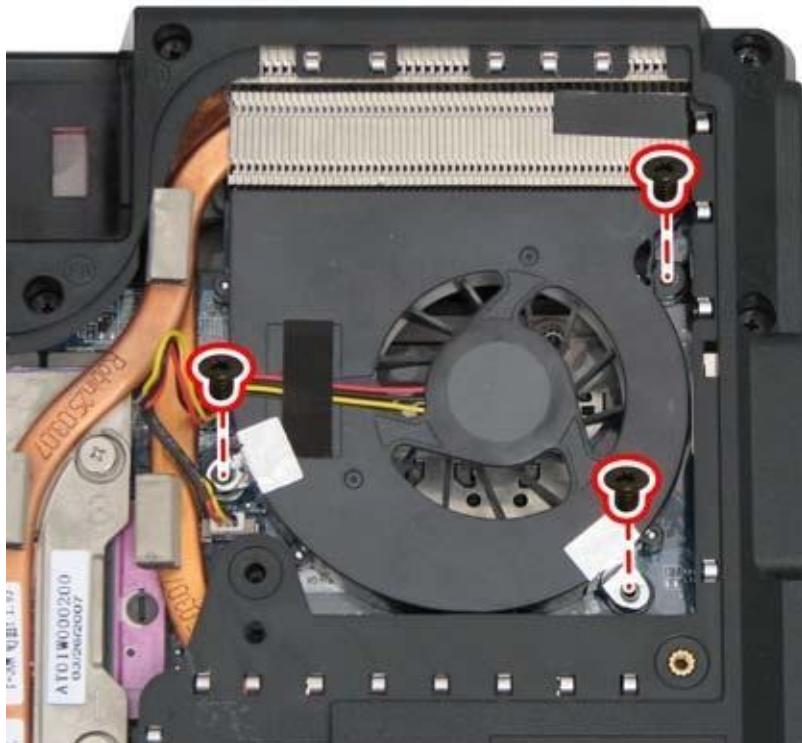


CAUTION: Do not touch the connectors on the wireless LAN card or on the computer. Debris on the connectors may cause the unit to malfunction.

8.Removing the System Fan

To remove the system fan, first remove the wireless LAN card. Then follow the steps below:

1. Turn the notebook over. Remove the three M2.5x4 screws securing the system fan.



2. Disconnect the fan connector from the motherboard as shown, and lift out the system fan.

9. Removing the Thermal Module

To remove the thermal module, first remove the wireless LAN card. Then follow the steps below:

1. Turn the notebook over. Remove the four spring screws securing the thermal module to the motherboard.



2. Lift and remove the thermal module from the motherboard.

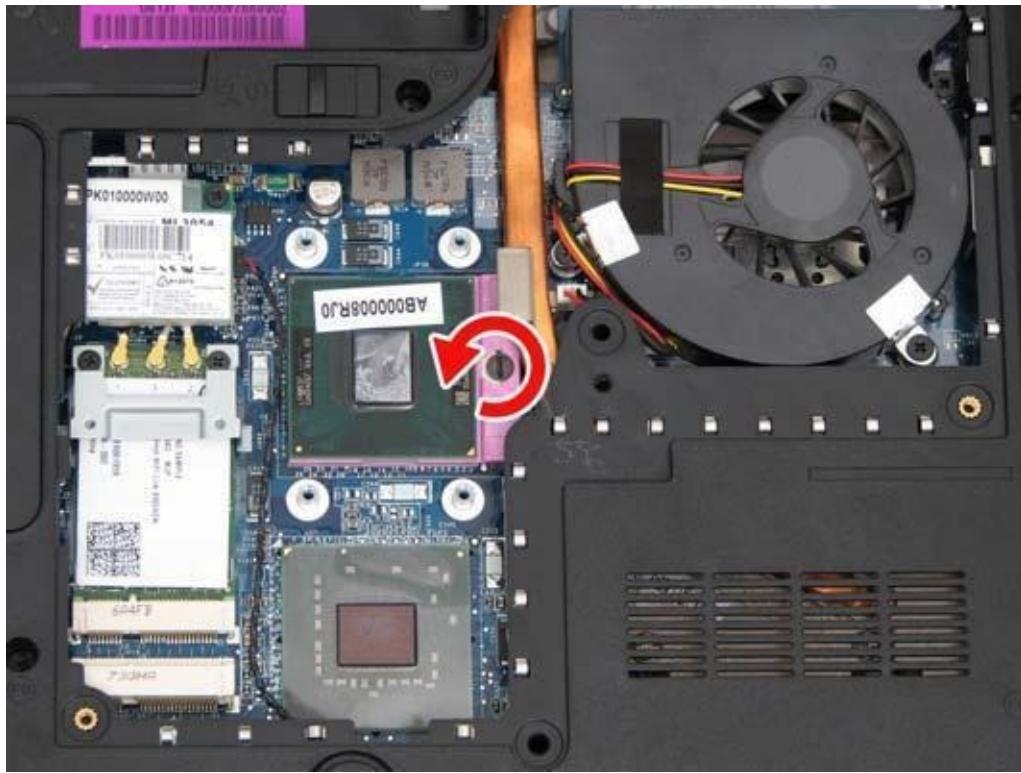


CAUTION: When you remove the thermal module, use the CPU grease tool to remove the grease on the CPU and thermal module. Reapply fresh grease before reinstalling the thermal module.

10. Removing the CPU

To remove the CPU, first remove the wireless LAN card, and thermal module. Then follow the steps below:

1. Turn the cam on the CPU socket with a flat-blade screwdriver so that the notch on the cam is aligned with the open side of the CPU socket to unlock the CPU.



2. Gently lift out the CPU.

11 Removing the Bluetooth Module

To remove the Bluetooth module, first remove the keyboard, and switch board. Then follow the steps below:

1. Remove the two M2x3 screws securing the Bluetooth module to the logic lower.

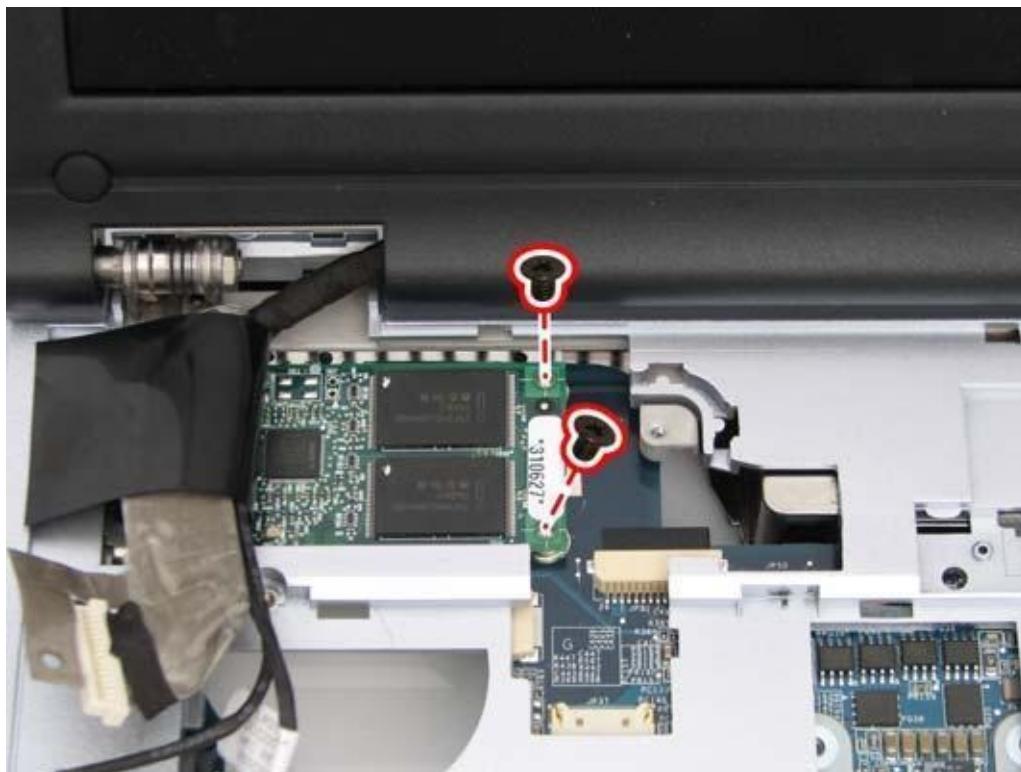


2. Disconnect the Bluetooth cable, and remove the Bluetooth module.

12 Removing the Robson Card

To remove the Robson card, first remove the keyboard, and switch board. Then follow the steps below:

1. Remove the two M2x3 screws securing the Robson card to the logic lower..



2. Remove the Robson card.

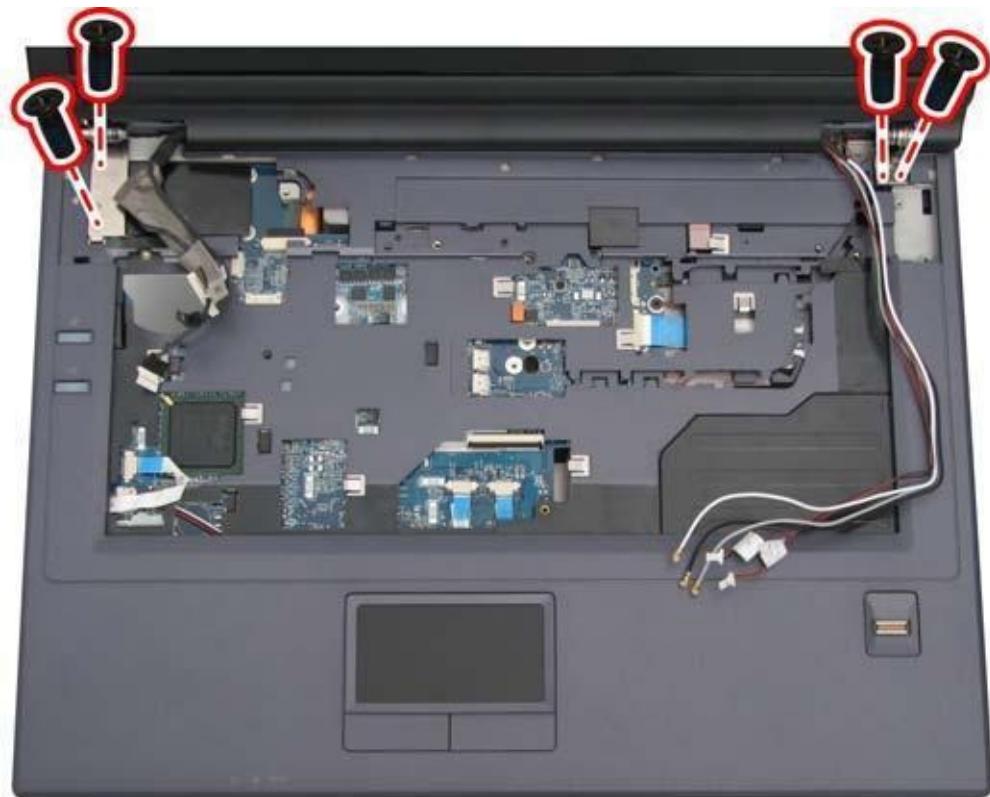
13. Removing the LCD Module

To remove the LCD module, first remove the keyboard, and switch board. Then follow the steps below:

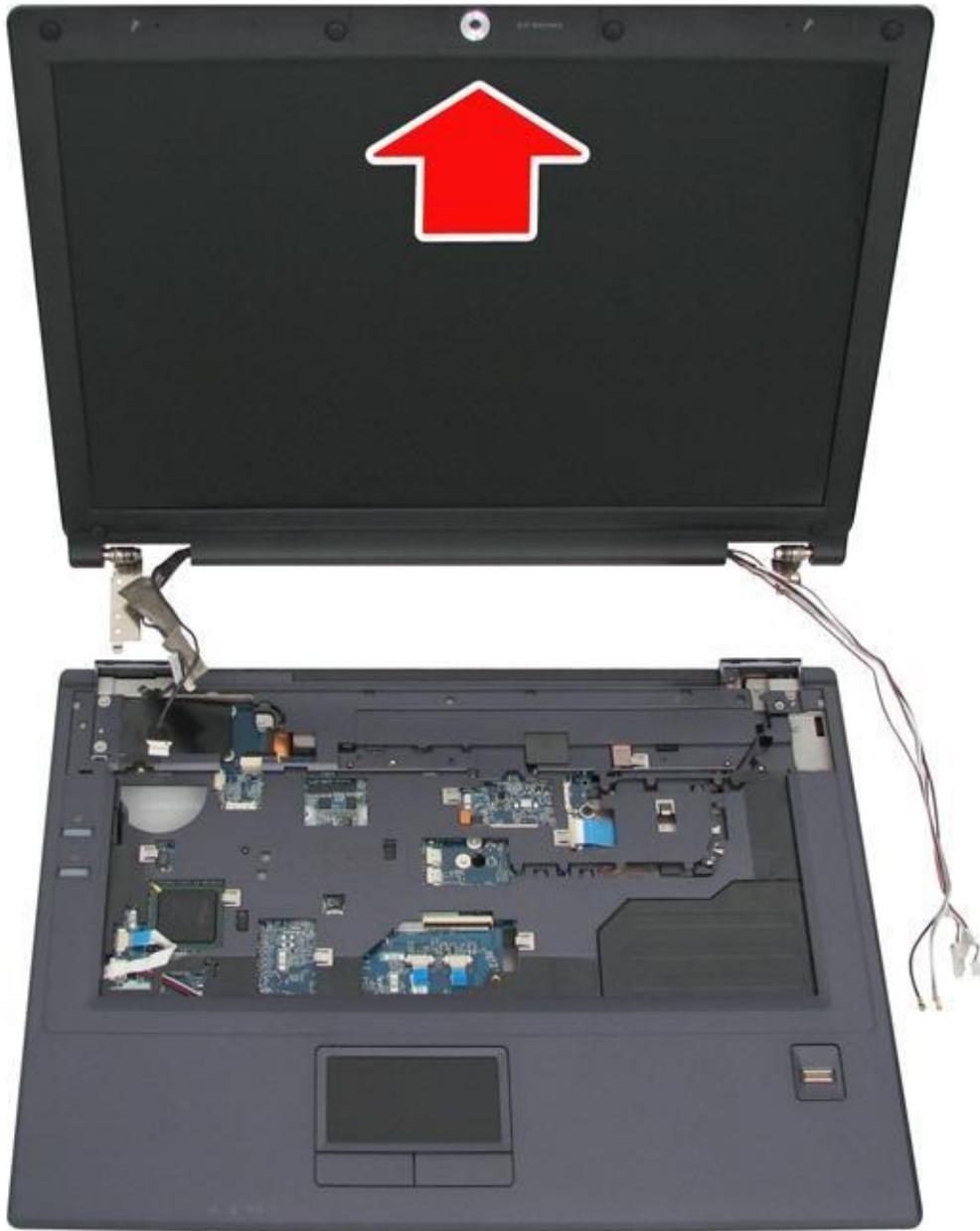
1. Disconnect the LCD power (LVDS), CMOS, and microphone cables and pull the wireless antennas free from the laptop as shown.



2. Remove the four M2.5x4 screws securing the LCD module to the logic upper.



3. Remove the LCD module.



14. Disassembling the Display and the Inverter Board

To disassemble the display and inverter board, first remove the keyboard, and switch board. Then follow these steps:

1. Remove the six screw pads as shown.



2. Remove the six M2.5x6 screws securing the LCD bezel to the LCD module.



4. Carefully insert your fingers between the display and the LCD bezel as indicated by the arrow, and gently pry up the LCD bezel.



4. Remove the five screws mounting the display, inverter board, and LVDS/CMOS cable to the LCD cover.

Two M2.5x6 screws on the display.

Two M2.5x4 screws on the inverter board.

One M2.5x4 screw on the LVDS/CMOS cable.

5. Disconnect the two connectors on either side of the inverter board. Remove the inverter board.



6. Gently lift out the display. Remove the eight M2x3 screws securing the hinges to the

display.

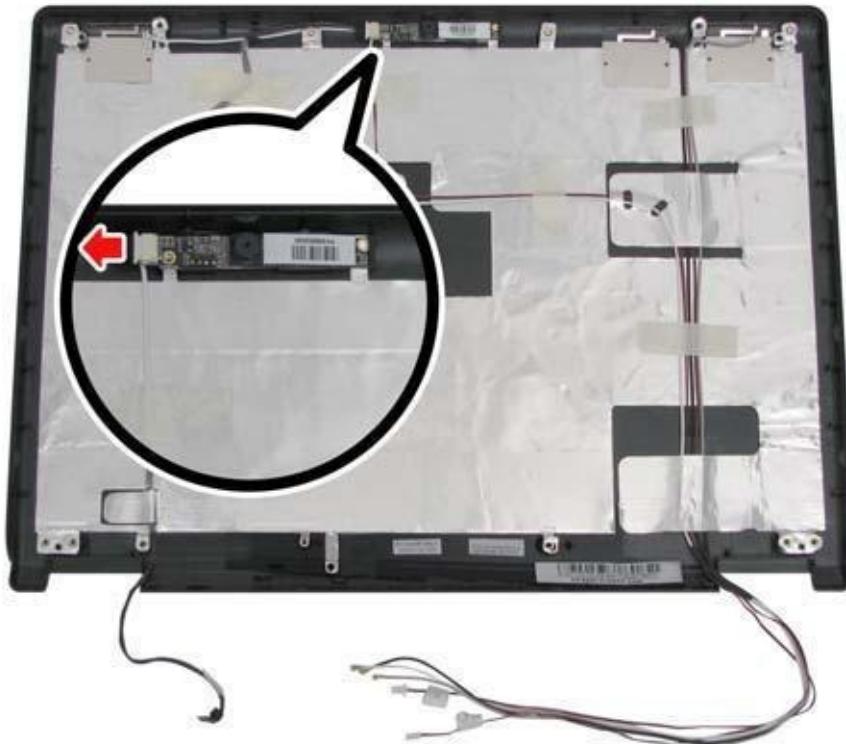
7. Detach the LVDS cable from the back of the LCD panel.



15. Removing the Camera Module

To remove the camera module, first remove the keyboard, switch board, LCD module, LCD display, and inverter board. Then follow these steps:

1. Disconnect the CMOS cable from the camera module.

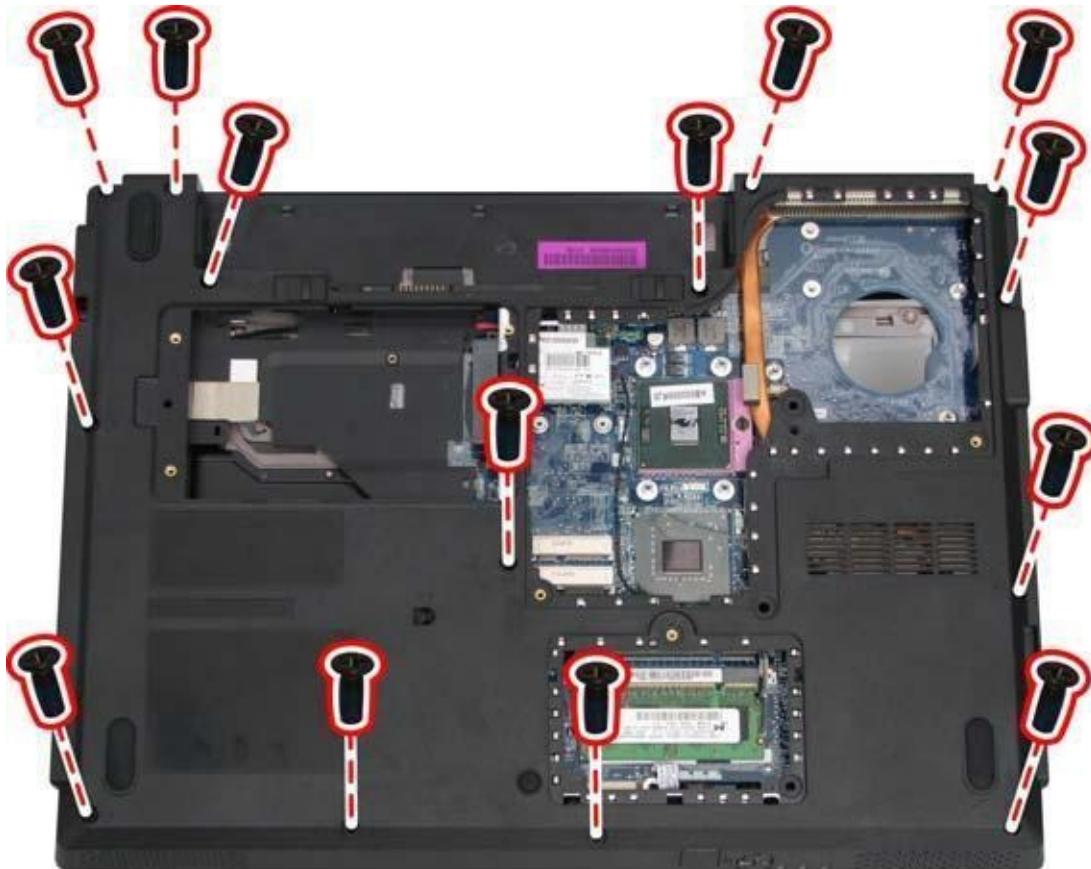


2. Remove the M2x3 screw securing the camera module to the LCD cover. Remove the camera module.

16 Removing the Logic Upper

To remove the logic upper, first remove the battery pack, HDD, memory module, ODD, keyboard, switch board, wireless LAN, system fan, thermal module, CPU, Bluetooth module, and LCD module as described in the preceding sections. Follow the steps below to remove the logic upper.

- 1.Turn the computer upside down and remove the 14 M2.5x8 screws from the bottom side of the notebook.



- 2.Remove the M2x3 screw and M2.5x8 screw securing the logic upper to the logic lower.



3. Turn the computer over again and disconnect the power USB board FFC, touchpad, and finger printer cables as shown.

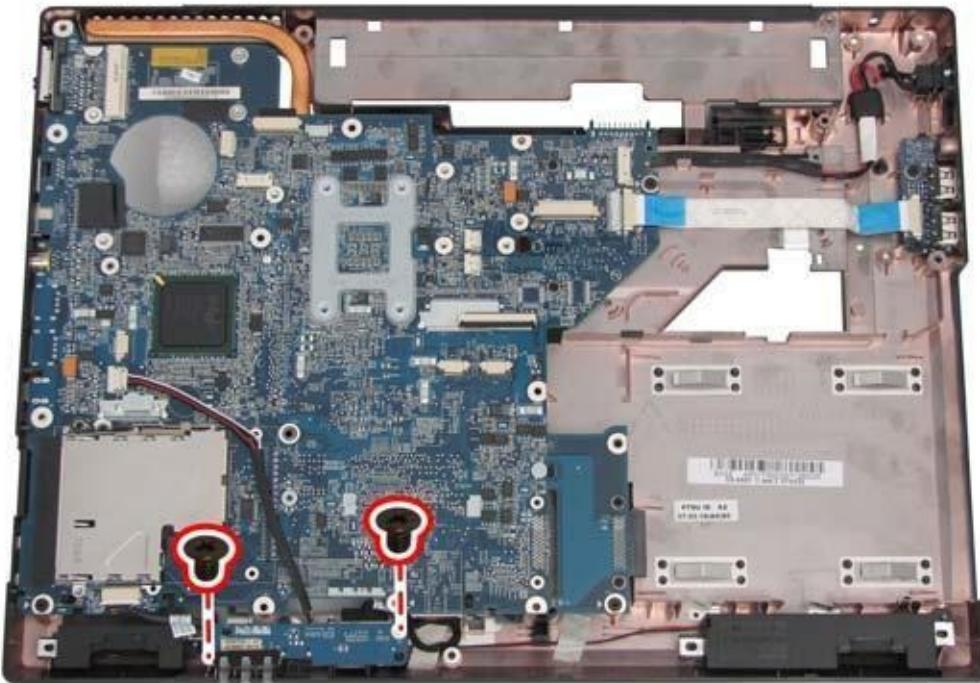


4. Lift off the logic upper.

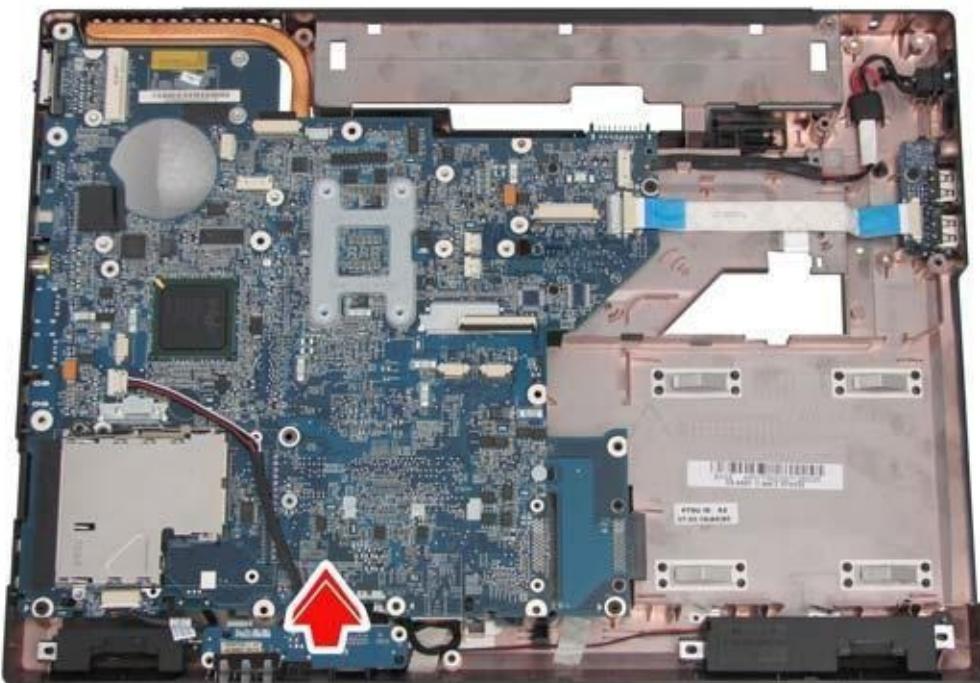
17 Removing the LED Board

To remove the front board, first remove the logic upper as described in the preceding sections. Then follow the steps below:

1. Remove the two M2.5x4 screws securing the LED board to the logic lower.



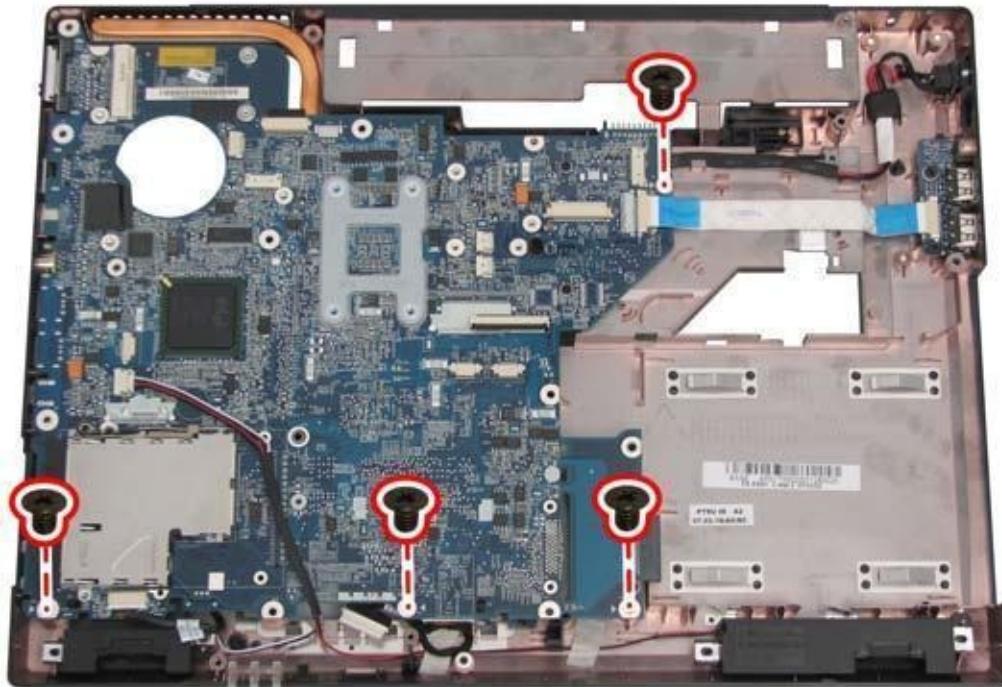
2. Remove the LED board.



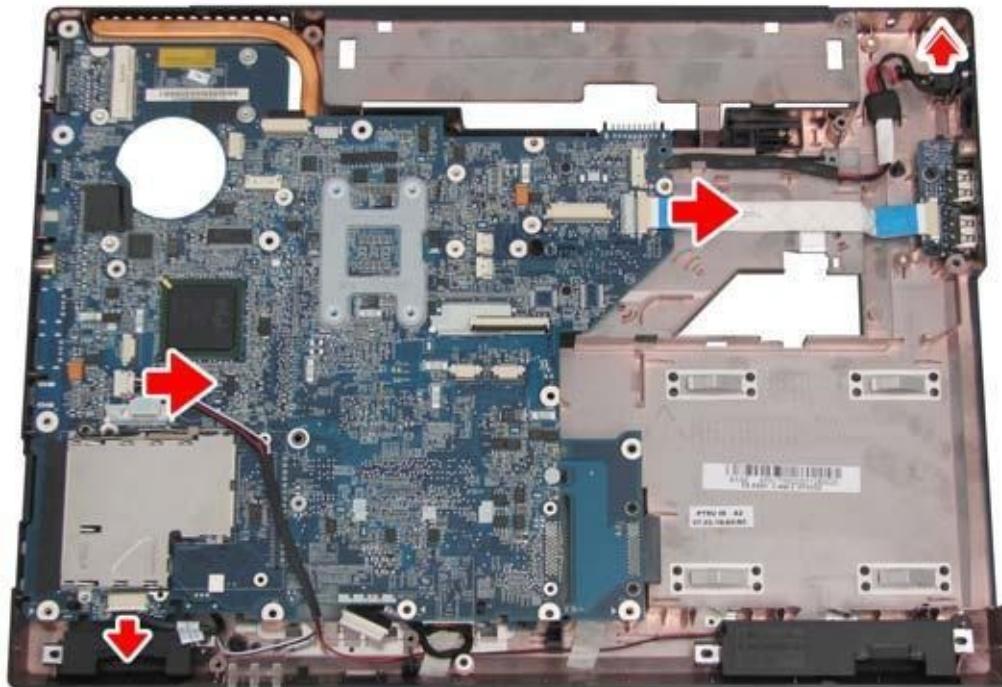
18. Removing the Motherboard

To remove the motherboard, first remove the logic upper, and LED board as described in the preceding sections. Then follow the steps below:

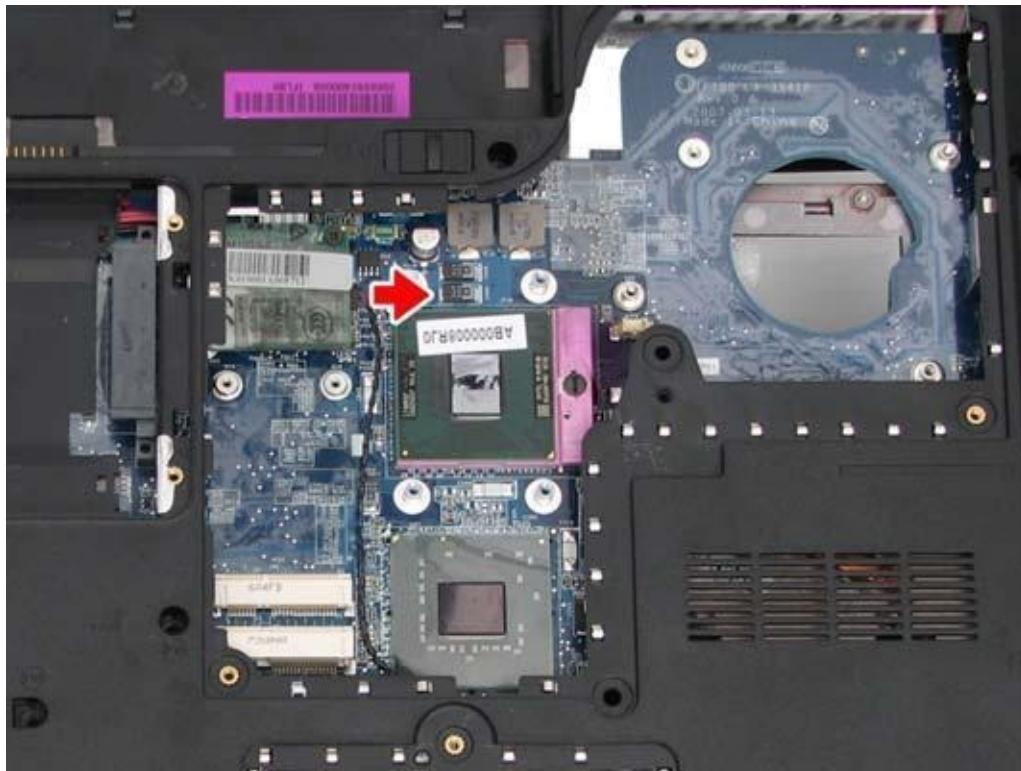
1. Remove the four M2.5x4 screws securing the motherboard to the logic lower.



2. Disconnect the USB board FFC, speaker and audio board cables. Remove the DC-IN socket from its housing and lift out the motherboard.



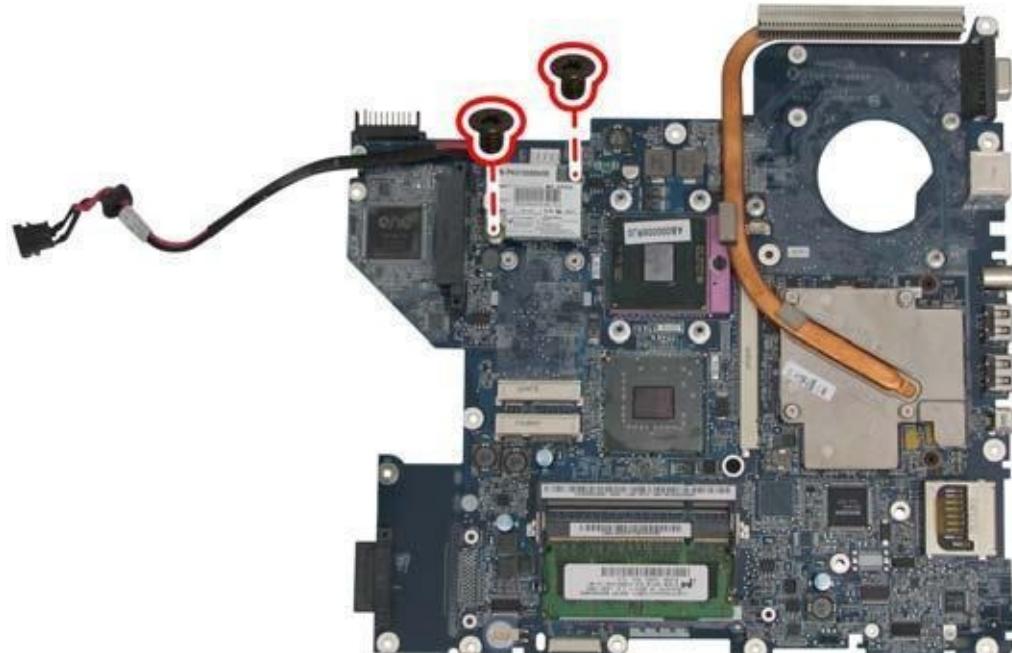
3. Turn over the laptop and disconnect the MDC card cable.



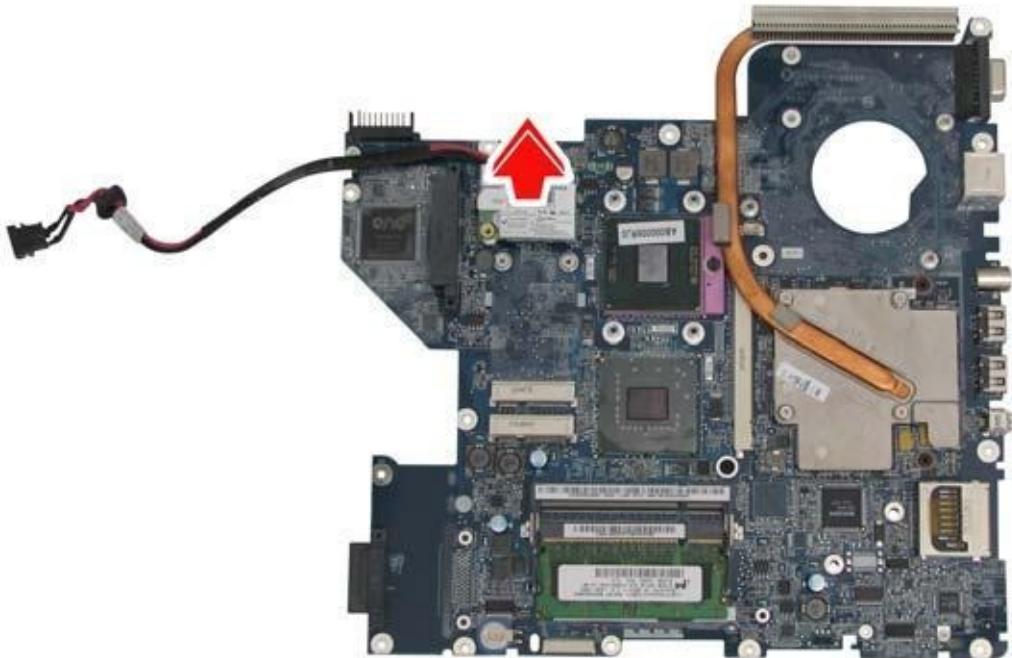
19. Removing the Modem Card

To remove the modem card, first remove the motherboard as described in the preceding sections. Then follow the steps below:

1. Remove the two M2x3 screws securing the modem card to the motherboard



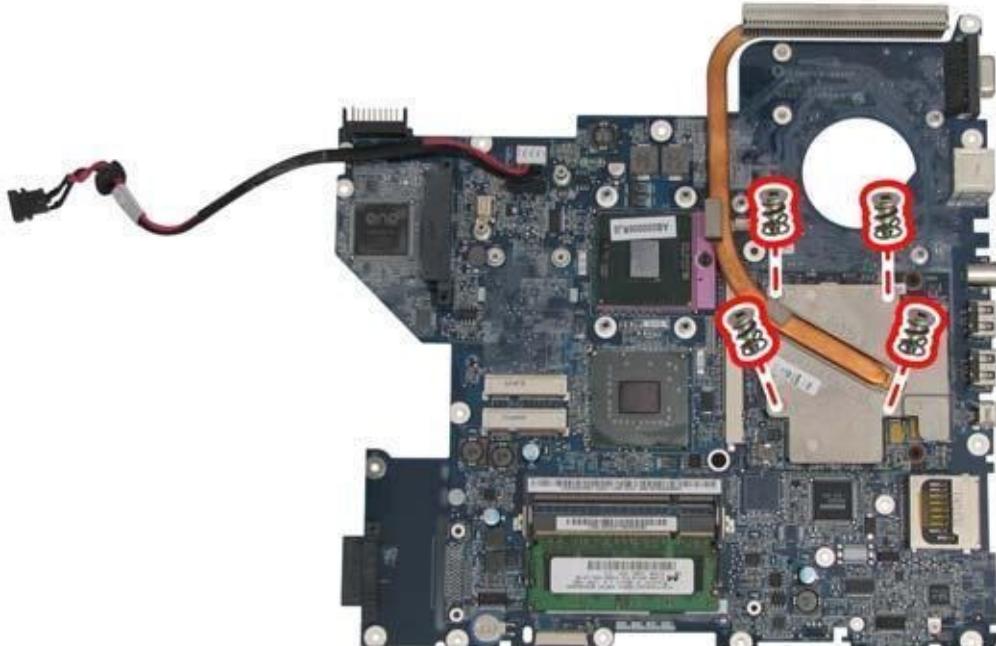
2. Remove the modem card



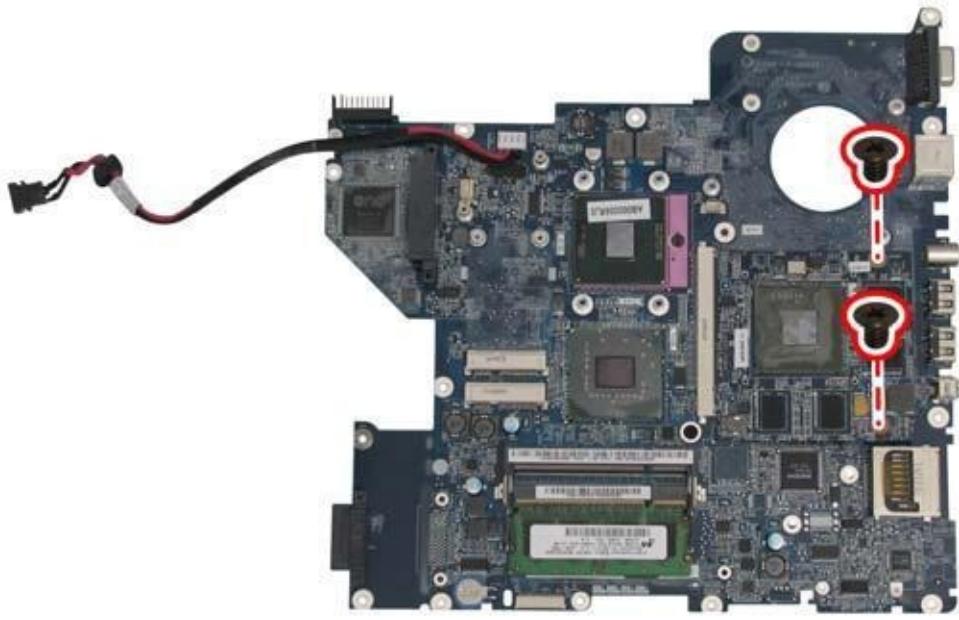
20. Removing the VGA Board

To remove the VGA board, first remove the motherboard as described in the preceding sections. Then follow the steps below:

1. Remove the four spring screws securing the VGA heat sink to the VGA board.



2. Remove the VGA heat sink.
3. Remove the two M2x3 screws securing the VGA board to the motherboard.



4. Remove the VGA board.

21. Removing the Audio Board

To remove the audio board, first remove the logic upper, LED board, and motherboard as described in the preceding sections. Then follow the steps below:

1. Remove the two M2.5x4 screws securing the audio board to the logic lower.

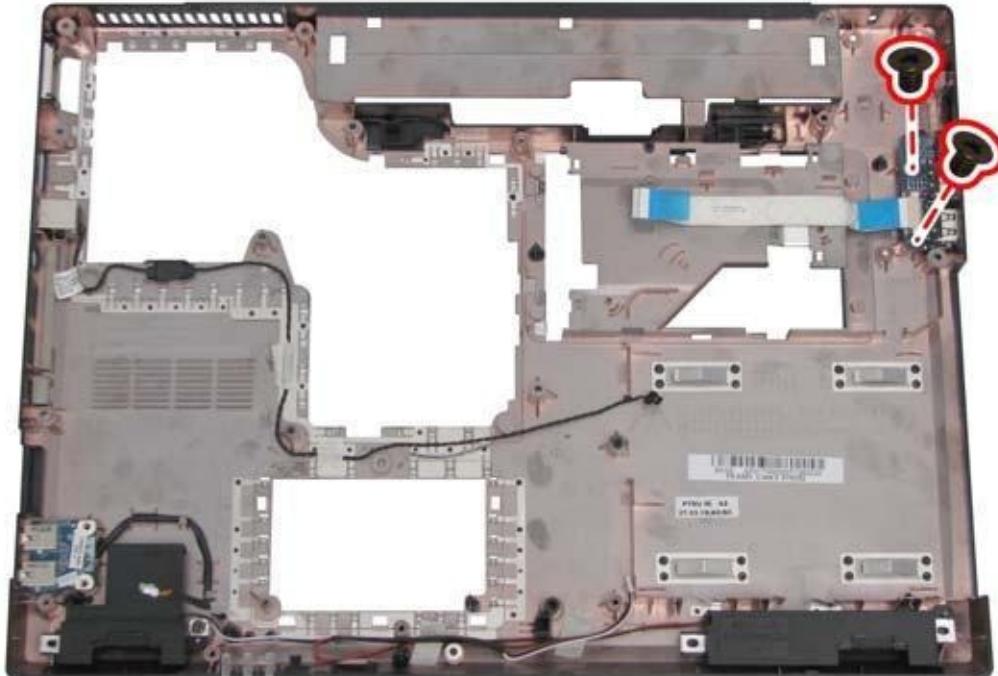


2. Remove the audio board.

22. Removing the USB Board

To remove the USB board, first remove the logic upper, LED board, and motherboard as described in the preceding sections. Then follow the steps below:

1. Remove the two M2.5x4 screws securing the USB board to the logic lower, and remove the USB board.



23. Removing the RJ11 Port

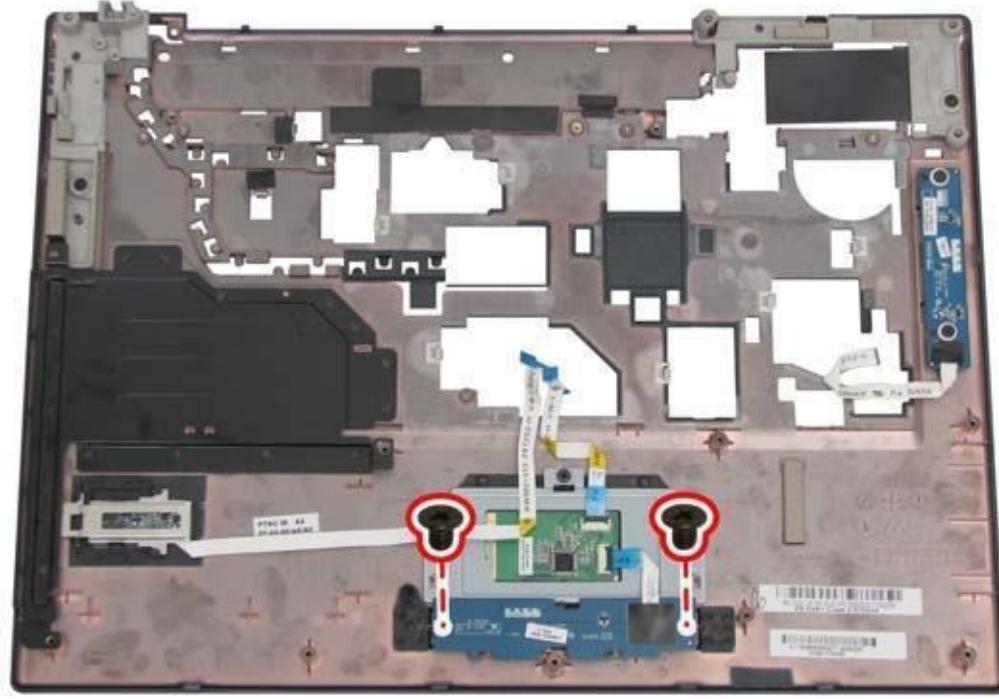
To remove the RJ11 port, first remove the logic upper, LED board, and motherboard as described in the preceding sections. Then follow the steps below:

1. Lift the RJ11 port from its housing and detach the cable to remove it from the logic lower.

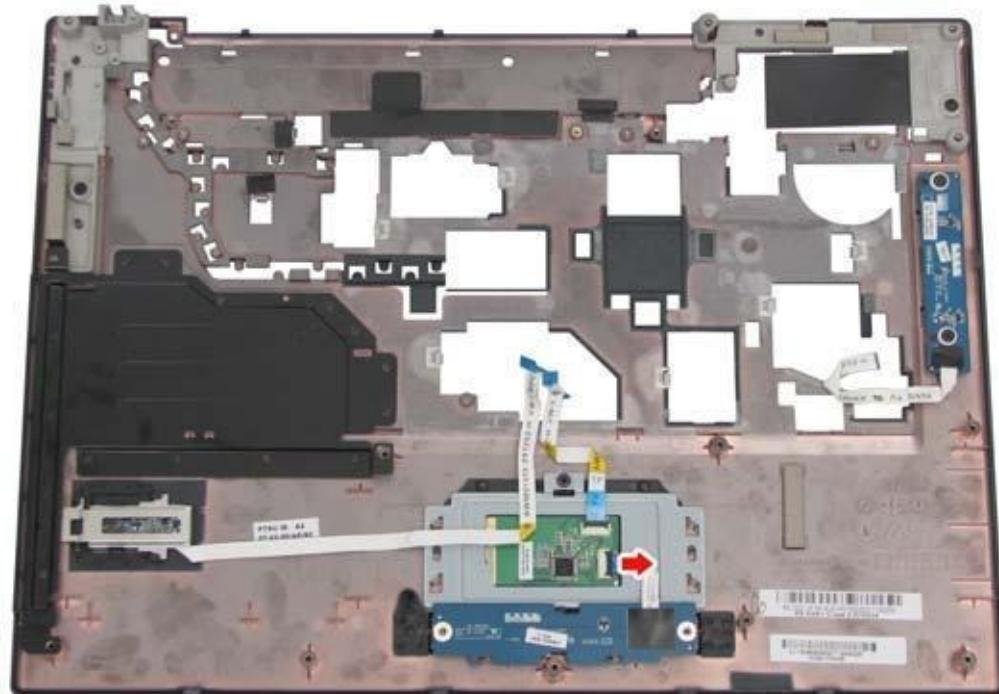
24. Removing the Touch Pad Button Board and Touch Pad

To remove the touch pad button board and touch pad, first remove the logic upper as described in the preceding sections. Then follow the steps below:

1. Remove the two M2.5x4 screws securing the touch pad button board to the rear side of the logic upper.



2. Disconnect the touch pad button board cable from the touch pad module.



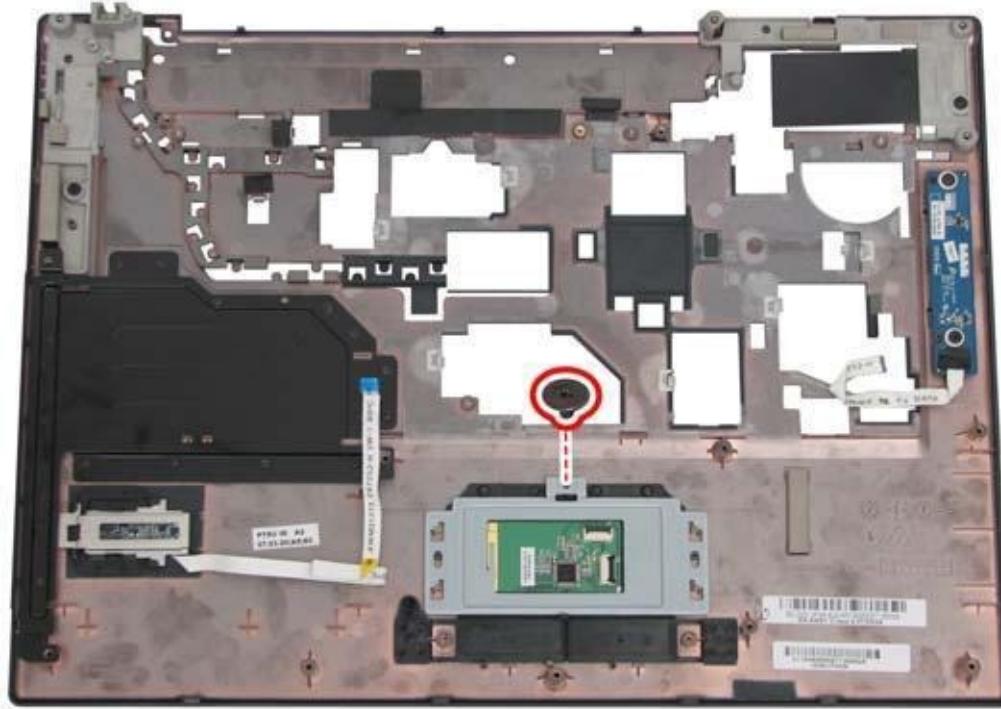
3. Remove the touch pad button board.



4. Disconnect the touch pad cable.



5. Remove the M2.5x4 screw securing the touch pad bracket to the logic upper. Lift off the bracket and remove the touch pad.



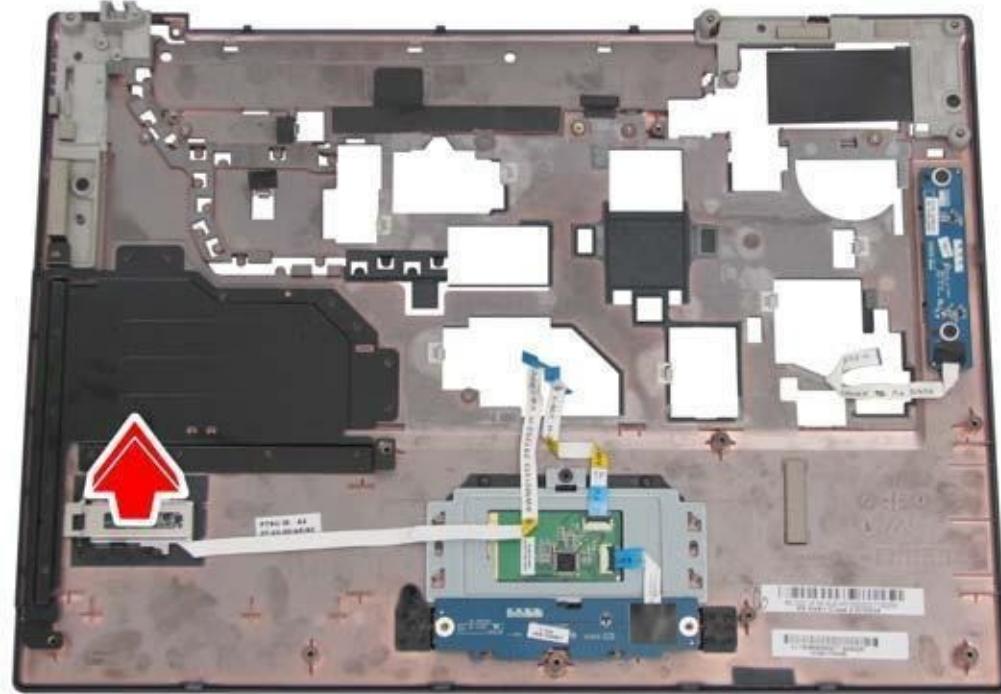
25. Removing the Fingerprinter Module

To remove the fingerprinter module, first remove the logic upper as described in the preceding sections. Then follow the steps below:

1. Remove the one M2x3 screw securing the fingerprinter module to the rear side of the logic upper.



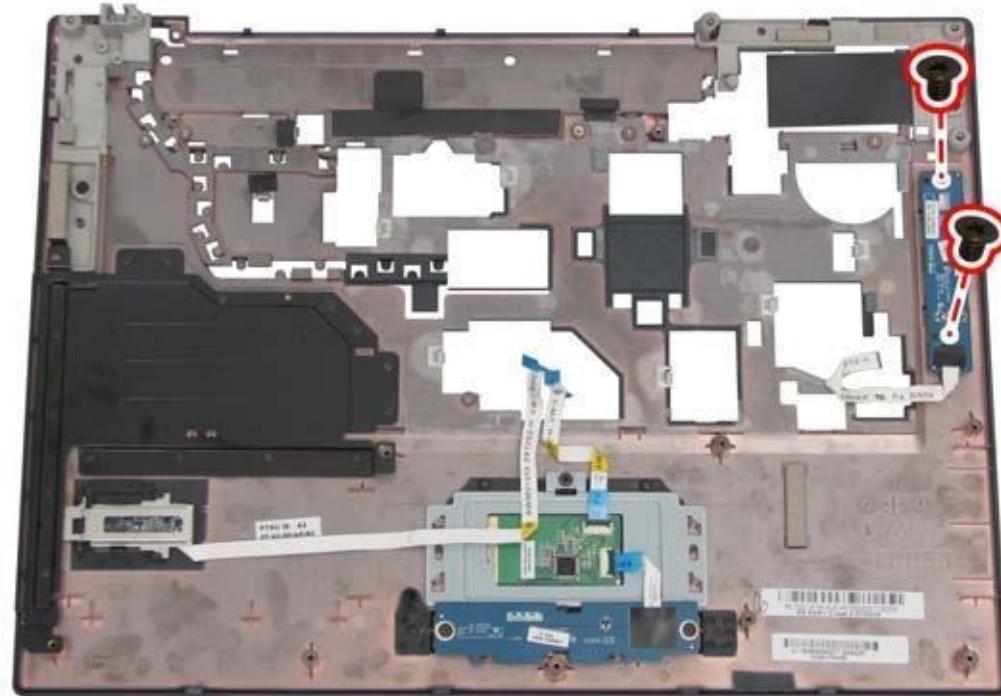
2. Remove the fingerprinter module.



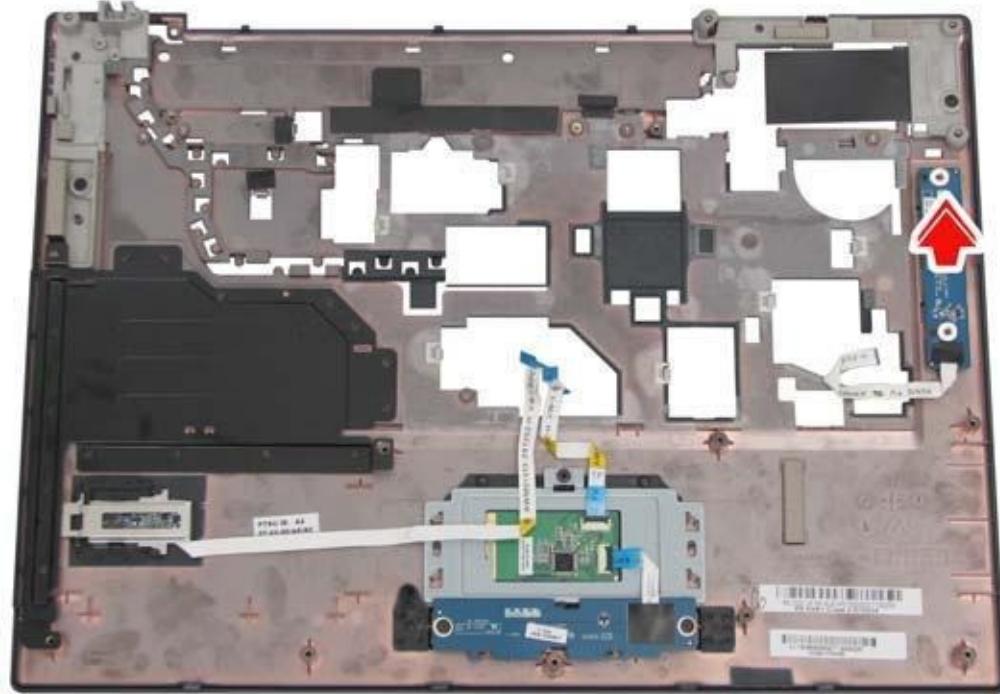
26 Removing the Power USB Board

To remove the power USB board, first remove the logic upper as described in the preceding sections. Then follow the steps below:

1. Remove the two M2.5x4 screws securing the power USB board to the logic upper.



2. Remove the power USB board.



Chapter 5

CD/DVD Drive Repairing

How to Fix a Laptop CD Drive

Your notebook's CD drive is one of the first components to go belly up. A dead lens is the main reason behind an optical drive's failure to read or write data to a CD. Another reason might be a damaged drive belt, but it can be replaced with a new one. An average optical drive lasts for a year and stops functioning because the laser wears out or slips out of alignment.

If your notebook's optical drive stops reading or writing data, then you should replace it with a new drive. However, you can easily fix a laptop CD drive if there is a minor software or hardware problem. This guide will assist you in troubleshooting your notebook's optical drive.

Use Microsoft Fixit

Microsoft's very own software fix allows users to fix CD/DVD drive problems. Install and run this program if any of the following problems occurs:

- Your notebook optical drive is disabled
- The optical drive cannot read data
- It cannot write data to a CD or DVD
- No CD/DVD drive icon
- The optical drive driver is missing or corrupt

Visit Microsoft's official Fixit site and click on the Run button to download the program on your desktop.

Step 1: Double-click on the installer. Once ready, it will ask you to accept the terms and conditions. Click on Accept. The installer will download a diagnostic tool package and the Fixit engine.

Step 2: You will see two options. Click on the recommended option. The diagnostic will detect problems and apply a patch if it finds any.

Step 3: Choose your CD/DVD drive. Next, select any one of the two options. If your notebook's optical drive has reading issues, select the first option. For troubleshooting CD writing issues, select the second option.

Step 4: The next screen will ask you to insert a



readable/writeable media. Based on the choice you have made, insert a writeable/readable CD and then choose the optical drive.

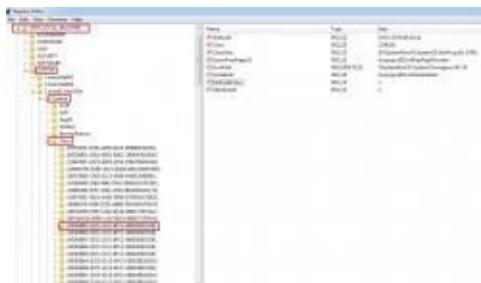
Step 5: The Fixit engine will detect and troubleshoot problems. Once complete, it will show the completion window with status showing as “Fixed”.

System Registry

Can't see the CDROM drive on My Computer? Well, the problem might be connected to your Windows system registry. A registry entry may get corrupted by uninstalling CD burning software. Because of this, Windows cannot access to the CDROM drive. To fix this, follow these steps:

1. Start > Run >
type REGEDIT and
press the Enter
key. This will open
the registry editor.

2. Navigate to the
registry entry as
shown in the



screenshot above.

3. You will find two unwanted entries – UpperFilters and LowerFilters. Right-click each entry and click on Delete. You can also single-click on them and press the delete button to remove them.
4. Exit the window via the File menu and reboot your notebook. You can now see the CD/DVD icon on My Computer.

Laptop DVD Tray Won't Eject - How To Open A CD Or DVD Drive

There are quite a few reasons the DVD tray in your laptop might fail to open when you hit the eject button. About the worst thing it can be is if the motor or gear train failed, which would mean replacing the drive. If the disc in the drive plays OK, you know that the power and the connector are fine. If not, you should try reseating the drive in the bay. It's also possible for the drive to be locked in software by the operating system, or for a power management scheme



to have cut power to the drive.

Check these by right clicking the drive icon and checking properties, or looking at your power management settings. But, when all else fails and you can't get the disc out of the drive, there's always, **THE MIGHTY PAPERCLIP**.

CD and DVD drives for computers have been designed with an emergency release mechanism since time immemorial. Unlike your DVD player for your TV or your stereo CD player, the disc in your



computer drive may be much more valuable than the drive itself. Yes, if you own the software legally, you should be able to get a replacement from the software company for a moderate charge, but maybe you need it now. In any case, the emergency release for the DVD tray doesn't require any special tools or skills, just a paperclip. Start by unbending a leg of the largest diameter paperclip that will fit in the hole

on the faceplate of the drive. Next, insert it straight into the hole, and if you're lucky, there will be a little click before it goes in very far, and the tray will pop out a fraction of an inch.

In the picture to the right, I haven't used any force at all, beyond gently pushing in the paperclip, and the CD tray popped out that far by itself. From here, it's an easy task to pull it out all the way so the disc can be removed. Below, I'm opening the DVD drive out of a Sony Vaio, but the tray didn't spring



out when the paperclip pushed in the release, which you can tell by feel. So I had to pull on it with my fingernail behind the plastic facade while depressing the release. It opened pretty stiffly for the first fraction of an inch, and then pulled right out the rest of the way. That pretty much covers what you'll encounter with manually opening an optical drive, either it will pop open as soon as the paperclip works the latch, or you'll have to help it along.

But there are instances in which the emergency release won't get the tray to eject. The worst of these is if a disc shattered at high speed and jammed all the mechanics up with little shards of plastic. You'll know this is the case



by the noise if you gently tilt the drive back and forth. Another possibility is that an adhesive label peeled off in the drive and has



gummed up the works. In either case, the odds of the drive being salvageable aren't very good, but if it was a label failure, you should be able to rescue the disc by disassembling the drive around it until the tray ejects or the disc is accessible. And before you rush out and buy a supposed generic replacement for the drive, remember that while the connector may be standard, the drive shell is customized, and you may not be able to transfer all of the shell hardware from one drive to another for mounting.

How to Clean CD/DVD Drives

When your CD or DVD (disc) drive starts giving you problems, your first thought may be to replace it or take it to the repair shop, but a good cleaning may be all it needs.

Below are three methods to clean the disc drive. The easiest method is the least effective. The hardest method is the most effective. Since the hardest method takes some time to do, I recommend that you start with the easiest method. If it solves your problems, congratulations. If not, try the next method.

1. The Cleaner Disc method – this, the easiest method, uses a special cleaner disc which can be purchased in computer stores. The disc usually comes with a little bottle of cleaner solution. Apply a few drops of the solution to the disc and insert it in the disc drawer (be sure to read and follow the instructions that come with the cleaner disc). The drive will turn the disc and clean the lens.

Unfortunately, this only works adequately about half the time.



2. The Cleaning Stick method – this is what I do in desperation when the cleaner disc does not work and I don't want to disassemble the drive. Since all that is needed (at least in my mind this is true) is a little more pressure applied to the lens, I start out in search of a thin, flexible stick of some type which is at least six inches long. It should not have sharp or rough edges that would scratch the lens. Next, get a soft, thin cloth and put water or rubbing alcohol in the middle of it. Place one end of the stick under the wet part of the cloth and slide it into the opened disc drawer. The goal is to rub the wet cloth on the lens to clean it. Do not apply so much pressure that you will scratch and ruin the lens. Also try blowing into the disc drive to remove any dirt that may have accumulated in it. If you do not succeed at this, proceed to the next method

3. The Disassembly method – this method should work but it requires you to disassemble the drive. So if you are not comfortable with taking the drive apart, please take it to a computer repair shop and let them do it. Take the cover off your computer, unplug the cords from the back of the disc drive, remove any screws holding it in, and slide it out (you may

need to remove the face plate on the end of the drawer to get the drive out). Remove the screws in the drive housing and take the cover off. The bottom side of the drive is a circuit board, so if that is what you see when you take the cover off, figure out how to access the other side. On the correct side, you should see a lens that runs on a track (there is no harm in moving the lens along the track but do not touch the lens itself). Use a wet, soft cloth to clean the lens. Sometimes a disc drive malfunctions because there is too



much dust or debris in it, so be sure to clean out the inside with either compressed air, a soft cloth, or a cotton swab. Reassemble the disc drive, put it back in the computer case, and cross your fingers. Hopefully, it will work when you turn on the computer.

If these methods work, that's good. If not, you needed a better disc drive anyway..

Additional Tips

Reboot your laptop. When it restarts, quickly press the F8 key. This will initiate the safe mode. Insert CD in your notebook's optical drive. It may read CDs. I thought my DVD drive was dead, until I switched to safe mode. Now my dead CD drive can read CDs but not DVDs.

Update your optical drive's drivers. Press Start and type Device Manager in the search box. Click on it and choose Disk Drives. Right-click on the ATA drive icon. Click on upgrade driver and then click Search automatically. If there's an upgrade available, it will be done automatically.

A dirty lens might be one of the causes behind failure to read/write data to a CD. A can of compressed air might prove quite handy in removing dust from the optical lens. You can also use a CD drive cleaning disk to remove dust, lint and static from the optical lens.

If any of the above tips do not fix your laptop CD drive, consider replacing it with a new one. I would recommend external CD drives. They are quite affordable and last longer than internal optical drives.

Chapter 6

Recover Lost Data from a Dead Hard Drive

Introduction

Hard drives fail. It's a fact of life for anyone who uses a computer. If you store irreplaceable information on your hard drive, then a failure can be a catastrophe. But can you recover the family photos, work documents or financial data that you kept meaning to back up, but never did? There might be hope, so don't give up on that broken hard drive yet.

We're going to describe the warning signs of a hard drive failure, explain the internal parts of a hard drive and why they fail, and then we'll go through a few steps you can take to recover your data. While the files can't always be

Lost your data?



recovered, there's a chance you might be able to retrieve them.

Just remember one thing — even if your files can be restored, it will take hours of frustrating effort and might cost you quite a bit of money, too. The best way to fix a dead hard drive is to send it in under warranty and replace it with your backup drive that has all your files safely stored on it. In fact, after reading this article, you'll find that a good backup plan will keep you from ever experiencing the horrible feeling in the pit of your stomach when you realize that all of your files may be gone.

Why Drives Fail

A hard drive is a mechanical device with several moving parts. Magnetic platters store the data itself, while a motorized spindle spins the platters. A read/write arm moves across the platters, retrieving information or putting down new data. The arm is moved by an actuator, and the read/write heads themselves hover an infinitesimal distance above the

platters. The distance is so small that a single piece of dust can get in the way.

If any of the hard drive's mechanical parts fails, the whole drive will fail.

The parts operate with incredible precision, so hard drives are rather fragile. Circuit boards, spindle motors, ball bearings — any of these parts are susceptible to failure. The worst type of failure is known as a head crash. In this case, the read/write head drops down directly onto the platter and



scrapes away the magnetic material.

The data in that case is totally, permanently lost. Data on unaffected parts of the platters may be recoverable, but usually data are spread around the platters, so a head crash is really bad news.

Other mechanical failures can be both a curse and a blessing. It's a curse because it can be difficult and expensive to get replacement parts and find someone who can make the repair. It's a blessing because, as long as the platters weren't damaged, the data are still there. If you can get the drive running again, the data should be accessible.

The failure might be non-mechanical. Your computer uses a special index and file structure to read all the files stored on the disk. If this index becomes corrupted, the computer won't be able to see or read the data, even though it's still there. In many cases, this can be repaired with the proper software, although it can be tricky.

There's one last area where a drive can fail, and it's particularly insidious because the drive actually didn't fail at all — the drive's connection to your computer failed. Hard

drives connect to your computer's motherboard via a variety of interfaces, IDE, PATA and SATA being the most common. If this connection, or the circuit on the motherboard that controls the disk (called the disk controller) has failed, the symptoms can mimic the symptoms of a hard drive failure.

Signs of Hard Drive Failure

All too often, hard drives fail with no warning whatsoever. One minute the computer is working fine, the next you have a "blue screen of death" and all your data is gone. So, what's the lesson here? Don't rely on warning signs to predict hard drive failure. Assume that your hard drive is going to fail, and back up critical files. If you have a reliable backup, you'll save yourself many headaches.

Some mechanical components can fail gradually, however, so occasionally you'll know when a drive failure is imminent. These warnings fall into two categories: sounds and performance problems.

If you spend a lot of time sitting near your computer, you're probably familiar with the usual sounds it makes. If you hear the hard drive making any unusual noises, that's probably a clue that something is going wrong. Grinding or screeching noises might mean the bearings or spindle motor are failing. A clicking, clunking or clangsing sound could be the read/write arm slamming back and forth. Sometimes these sounds can be subtle and difficult to detect. If you think you're hearing funny noises, open your computer's case and listen with your ear close to the hard drive while someone else uses the computer to save or move some files.

Performance problems include a sudden increase in the frequency of freeze-ups and crashes. Of course, these types of performance problems can be symptomatic of any number of computer maladies, from viruses to memory leaks to non-drive related hardware failures. A more specific tell-tale: saving or moving files suddenly takes a very, very long time. When you run into any of these symptoms, back up anything that isn't already saved and hope the drive lasts long enough to get everything you need copied to another disk.

External Hard Drive? Check Whether The IDE / SATA to USB Enclosure Is OK!

When your external hard drive fails, it can do so for all the same reasons an internal drive can fail. Sometimes, however, it's not the drive that stops working, but a connection within the enclosure! And in that case, the drive is easy to revive.

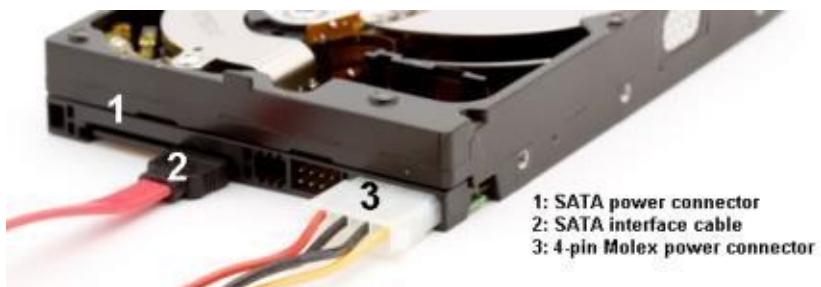
Before you open up any hardware, be sure to discharge your body's static electricity, i.e. ground yourself. Remove the hard drive from its casing and use a IDE / SATA data cable and power connector to



install the drive internally on your desktop computer. Alternatively, you can get an IDE / SATA to USB adapter or a new USB enclosure, so you can hook the drive up externally via USB.

Internal Hard Drive? Make Sure The Hard Drive Connections Are OK!

Sometimes, it's not the drive that failed, but the physical connection of cables that connect the drive with the computer's motherboard. You can only wish that this is your problem! So before you hire an expensive technician, make sure the data and power cables are firmly connected on both ends.



To prevent hazards to your health, it's essential to turn off the computer and unplug the power cord. As mentioned above, you also need to discharge your body's static electricity, i.e. ground yourself before you get working on your computer's internals. Then open up the case and make sure all connections are OK.

Once you have made sure the connections are OK, boot the laptop again.

What's That Sound?

As you are trying to get the hard drive to run, listen to the sound it is making. Is it completely dead? Or is it still spinning? What exactly does it sound like? Compare your sound to the list of hard drive sounds provided by Data Cent. This will help you diagnose the type of damage.

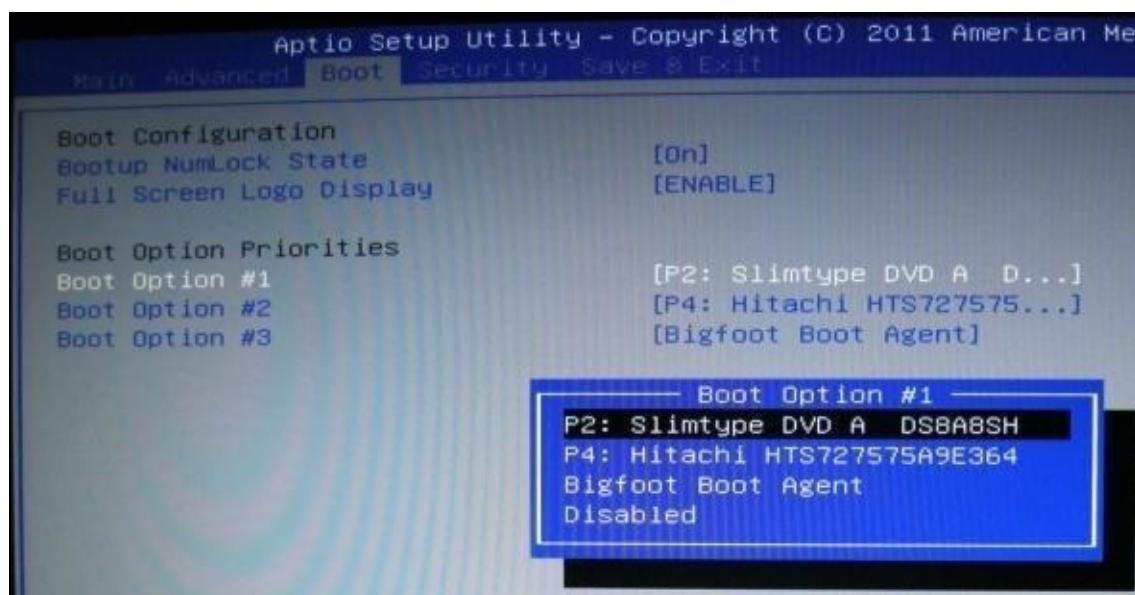


The damage can be either internal or external. A clicking sound, for example, is suggestive of a malfunctioning head, i.e. internal damage. A completely dead drive, on the other hand, could be due to a faulty printed circuit board (PCB), which would be external damage.

Is The Hard Drive Recognized?

Sometimes, you can hear your drive spinning, but it never pops up. Or maybe it's completely dead. To pinpoint the type of damage, try to manually check whether or not the drive is recognized by your computer.

You can do this via the BIOS in case it's the primary hard drive and your computer no longer boots. After you turn on the computer, enter the BIOS by pressing a trigger key, which could be [DEL], [ESC], [F2], or [F10], depending on the manufacturer. Within the BIOS, navigate through the available menus to find where it lists which types of drives are connected to the computer. Usually, this information is found under the Advanced menu, but you might also find it indirectly under Boot settings.



If you have hooked up the drive to another computer, you don't need to access the BIOS at

all. In Windows, click the key combination [Windows] + [R], which will launch the Run input window. Type cmd into the field and hit [Enter]. This will open the Command Prompt. Here type diskpart and hit [Enter], to open the respective tool. In the diskpart window, type list volume and hit [Enter] to show all drives connected to your computer.

```
Microsoft DiskPart version 6.1.7601
Copyright <C> 1999-2008 Microsoft Corporation.
On computer: YUKON

DISKPART> list volume

  Volume ###  Ltr  Label        Fs     Type        Size    Status     Info
  -----  ---  -----  -----  -----  -----  -----  -----
  Volume 0      E          RAW   DUD-ROM    2048 B  Healthy
  Volume 1      F          RAW   DUD-ROM     0 B   No Media
  Volume 2      System Rese NTFS  Partition  100 MB  Healthy  System
  Volume 3      C          NTFS  Partition  100 GB  Healthy  Boot
  Volume 4      D          NTFS  Partition  477 GB  Healthy
  Volume 5      Recovery  NTFS  Partition  18 GB   Healthy  Hidden

DISKPART> run
```

If the drive is recognized and thus appears in the list above, but doesn't show up as an accessible drive, chances are Windows only recognizes the PCB, but the drive itself is damaged (internal damage). In other words, if the drive is recognized in any shape or form, the PCB is most likely working and replacing it will not fix the hard drive!

Is The Printed Circuit Board Broken?

As mentioned previously, your drive can be damaged internally or externally. The external PCB, if damaged, is relatively easy to replace. However, data recovery specialists warn that swapping the PCB can ruin the drive and cause you to lose all data on it. So if you do care about your data, better err on the side of caution.



Even if you can see that your PCB is damaged, there might still be internal damage. Moreover, as mentioned above, replacing the circuit board yourself can damage your drive further, which reduces your chances of recovering your data.

Note that many websites now sell PCBs and provide guides to find exactly the right circuit

board for your drive. You can easily find them on Google.

Witchcraft & Wizardry

When my hard drive failed, the PCB was fine; the drive was still recognized and spinning, but it didn't show up in Windows, meaning I could not access it, and no software recovery tool could help me, either. So I put my last hope into some of those obscure tricks that you'll find floating around the Internet, like shaking the drive, hitting it onto a hard surface, exposing it to dry heat in the oven, or sticking it in the freezer overnight. If you have any idea how a hard drive works, then any of these methods should give you the shivers!

Well, I didn't dare to melt my drive, but my suspicion was that the head was stuck. So I did shake it, but to no avail. Since I could follow the reasoning, I also wrapped my drive in an airtight

Ziploc back and stuck it in the freezer overnight. The idea is that the low temperatures cause metals to shrink and contract. So if the head was stuck, the



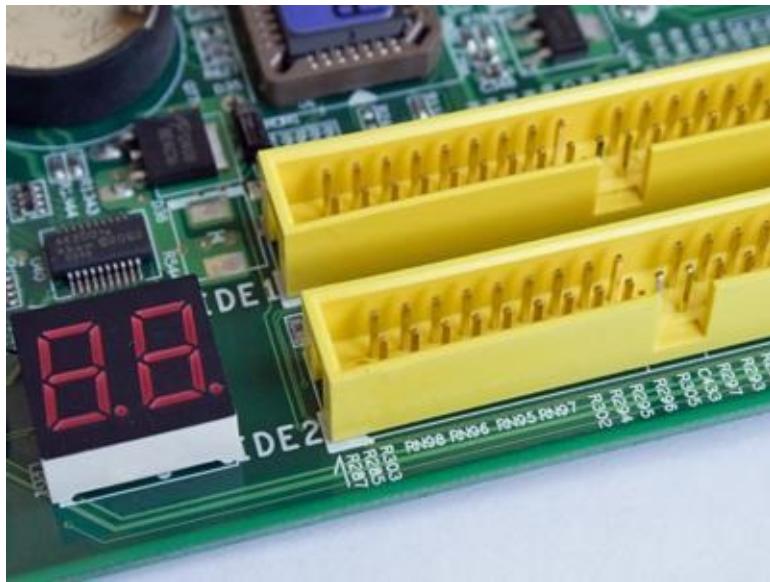
cold might get it unstuck. In practice, that didn't work either. And I probably caused condensation to settle on the hard drive platter, which could have caused a lot more damage. I eventually gave up and stored the drive for a future in which I was hoping to be able to afford professional data recovery.

Troubleshooting a Dead Drive

When your drive seems to have given up the ghost, there are some steps you can take to determine where the problem lies. If your computer is running Windows, the first thing you should do is reboot the computer and go into the basic input/output system (BIOS). Usually you do this by pressing the Delete key during the boot-up sequence -watch for on-screen prompts. BIOS has a utility that autodetects drives. Run this and see if the drive shows up. If it doesn't, there may be a problem with the connections between the drive and the motherboard. Check all those connections.

If the drive does show up, then you can run some more diagnostic tests. You'll need another functional computer to accomplish most of these, unless you've planned ahead. Find the model number and manufacturer of your hard drive. Go to the manufacturer's Web site and look for the company's proprietary diagnostic software. You'll have to download and then burn it to a CD-ROM or save it to a floppy disk, depending on what the "dead" computer is equipped with. Boot the dead computer from the diagnostic disk and run it. The diagnostics should give you some indication of what the problem is, although sometimes it will find no problems, even though the drive is still not working.

You can also create a bootable virus scan disk and scan the dead drive for any viruses that might be causing the problem. If your computer is infected, you may be able to use the virus scan disk to repair the problem as well.



If all has gone well, at this point you should have a rough diagnosis. You might not know exactly what's wrong, but at least you've ruled some things out and narrowed it down. But what if none of those troubleshooting steps worked? Try connecting the drive to another computer, one that you know works. This will let you know if the problem is really with the drive itself.

Also, open your computer's case and listen closely to the drive when you boot up the computer. Is it totally silent? That means the platters aren't "spinning up," indicating a serious mechanical problem. Does it make any of the warning sounds we mentioned

earlier? Remember, these are also a sign of mechanical failure. If it sounds perfectly normal (generally, a steady hiss as the platters spin and internal cooling fans activate — although different drives make different sounds), then the problem is probably not mechanical.

Hard Drive Repair

If you've determined that your drive has a mechanical problem, you may have some difficulties to overcome. The drive might be fixable and your data recoverable, but it might require a professional repair, which can cost hundreds or even thousands of dollars. The main reason for this is that work on the internals of a hard drive have to be done in a "clean room" environment. Any piece of dust on the platters can ruin the drive.

You could attempt a mechanical repair on your own, but you'll need to find exact replacement parts from the exact model and version of the drive. This can be a huge challenge all by itself (even for professional data recovery experts). You might be able to replace a dead circuit board yourself, but spindle



motors and read/write actuators are very difficult to deal with. Also note that opening your hard drive's case will void its warranty. If you do decide to go this route, remember to never touch the platters themselves. The oils from your fingertips are enough to ruin the drive.

A problem with a corrupt file structure or disk index is solved with special software. There are some utilities, such as fdisk, built into most operating systems that can be used for this purpose, but you have to be very careful. Changing the partitions in the drive or formatting it might solve the problem, but you'll lose all your data. Another option is to use a specialized recovery utility such as Disk Warrior to repair the problem while keeping as much of your data as possible. Some corrupted files may not be recoverable.

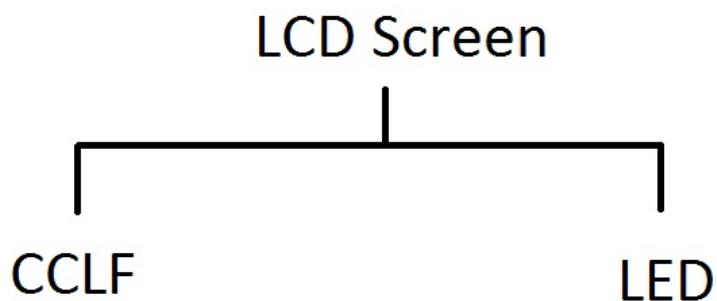
Chapter 7

Laptop Screen Repairing

Introduction

Laptop screens today will use one of two common lighting systems. Both are still considered LCD Screens because they are. The Image to the screen is Liquid Crystal Display; it is only the lighting that will change for these 2 types.

LED light on a laptop is newer technology because all screens used to use only CCFL bulbs. The CCFL bulb is a thin glass tube with a protruding metal pliable rod on either side. Wires are soldered to both ends of the bulb then attach to a plug that will plug into the power inverter... You will need to solder the wires to the ends if you ever need to order a replacement bulb. You can however usually find replacement bulbs that come prewired with plugs also attached. You get the same size bulb as your screen specs specify.



How to replace a broken laptop screen

Getting a replacement screen and tools : To begin your fix, you'll need a few simple tools and a replacement LCD screen. For tools, I recommend a screwdriver with a variety of small bits, such as a Phillips #00 and a Torx T5. It's also a good idea to have a few thin metal blades or plastic spudgers. These are really handy for removing the trim that surrounds the screen.

As for the replacement LCD, you should be able to buy one either from the laptop manufacturer's authorized parts dealer or a third-party supplier. Depending the screen, they usually cost between \$50 and \$250 dollars—more if it's a high-end display or you buy an OEM replacement. Regardless, you'll want to buy a new screen that matches your broken one exactly. The only sure way to do this is to remove the broken one.

The way you should be replacing / ordering the screen is to remove the screen, then look at the white large sticker on the rear side of the screen. It will tell you the exact part



number of the screen, it will also show you the type/model of screen. These numbers/letters are important in ensuring you receive an exact replacement part.

The replacement screen part replacement number will almost always include the screens size in the number.

Here is a typical screen part order number: LP173WD1 HD+ (TL) (A2) 17.3"

Notice in the number that the screen size is in it (LP173), you will find this in most all screen numbers. Now, notice the (TL) and the (A2)... this is very important that you replace with the same exact numbers. If you don't, you are risking damaging the laptop, or the screen simply will not work, it will show grey color or a white-out.

1. Remove the screen bezel : After disconnecting the power supply and removing the battery, carefully examine the bezel around the screen. You'll need to remove this bezel to access the screws that hold the LCD panel in place.



On this laptop, several rubber cushions hide screws, which hold the bezel in place. I'll need to remove these cushions and the screws that are underneath.

With the hidden screws removed, I used a thin metal blade to pop loose one of the bottom corners and worked my way around the bezel with a plastic spudger.



Note: Your laptop may not have cushions or hidden screws. The bezel may simply snap onto the lid or be held in place with doubleside tape. Just, adapt my instructions to fit your specific laptop.

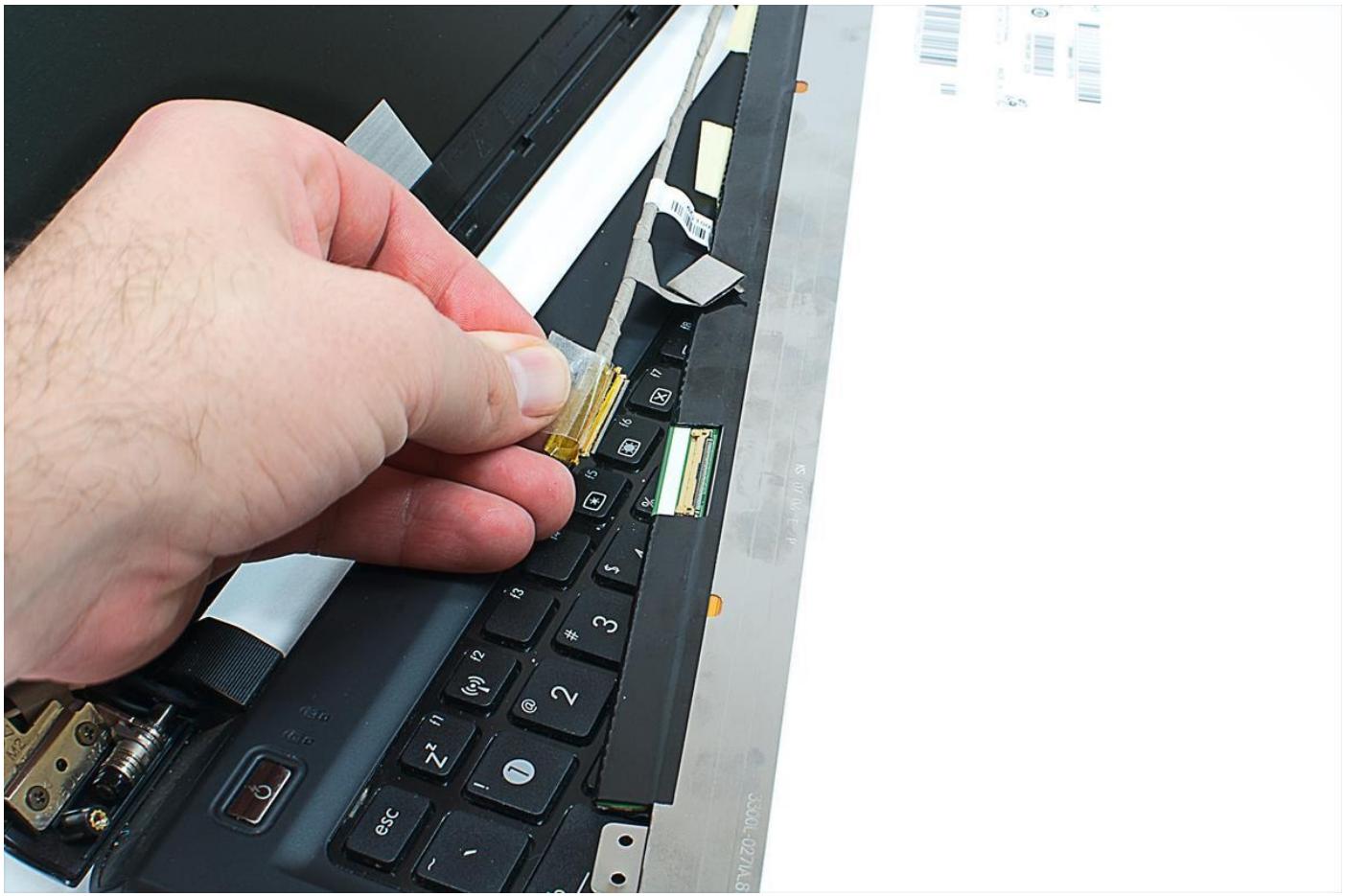
Regardless of how you do it, you'll need to completely remove the bezel.



2. Remove the broken LCD panel : With the LCD's mounting brackets exposed, you can remove the screws that secure it to the lid. Then rest the display front-side-down on the case and disconnect its cable.



If your laptop was made before 2010 and has a LCD with fluorescent backlights, it will likely have two cables. But as this is an LED-backlit LCD, it only has one.



Now, locate the manufacturer's label and note the model number. Using this information you should be able to buy an exact match for your broken screen.

3. Install the new LCD panel : Once your new screen arrives, unpack it and make sure it matches the old one.



the dimensions, mounting brackets, and connector all match, you ready to install the screen. Connect the new panel to the cable, position the panel in the lid, and secure it

using the appropriate screws.



4. Test the new LCD panel and reinstall the bezel : Before reattaching the bezel, it's a good idea to test the new panel. Reconnect the battery and power cable and turn the machine on. If the display works, you can reattach the bezel and any external screws and rubber cushions. The repair is now complete.



As fixes go, this one isn't too tough, but it does take a little patience and planning to make sure you get the right replacement screen.

Power Inverter Issues

The Power inverter is the only part left for screen repairing.

You can only do so much to repair the inverter if failure occurs. The only thing I have found that works about %60 of the time is to change the transformer block on the Inverter. It is the part with the copper wire wrapped all around it... a long rectangular shaped component with legs on both ends (usually 2 to 3 on one side and 2 to 6 on the other – the legs attaching to contact pads on the inverter board. You will need to use a soldering gun and flux paste.

**This component is what
usually fails on the
inverter and IS
replaceable.. Yes, you can
repair your power
inverters...Just replace this
transformer**



The job of a Laptop power inverter is to convert DC power current back over to AC power current, this is done because an LCD bulb needs more power than dc voltage can provide.

When a power inverter fails, you will lose your light to the screen, the bulb will still be good, and the screen is still good, the display will even be running without light.

The easiest way to test a faulty inverter is to replace with a known good one. Another way to test the inverter is to attach another display panel to your laptop .. if that other screen as well has no light, you've just ruled out the LCD bulb as being the problem ...you know this because you know for a fact that the secondary screen that you've attached is a "known working" screen ... and that it has a "good" bulb.

Chapter 8

Laptop Power on Problem

Introduction

There are quite a few different reasons why a laptop can have issues powering on. The most common would be a faulty DC Jack. Though other things like a faulty GPU, or incorrectly seated RAM, or a blown motherboard component, a bad battery, a damaged hard drive, a short in the ac adapter, or even liquid damage can as well... So you see; it is not only the power area that can fail rendering the laptop unable to power on and stay powered on it can be a variety of different issues, and it will be up to you to do process of elimination testing to rule out all other possible problems and pinpoint the exact component causing the issue.

Let's Say... The laptop in front of you will power on when the power button/switch is pushed, it will even splash the BIOS screen (the screen showing the Laptops manufacturers logo), then shuts itself down.

Okay, Now for the process of elimination testing to determine the issue. You will want to first check all the easiest things that you can, the easiest parts to access get looked at first.

Battery Issue

Start by removing the battery. Plug the AC Adapter in and try powering on... If the same, continue on...

RAM Issue

Next, remove the RAM cover on the underside of the laptop (some RAM slots are also situated under the keyboard on the top side of the Motherboard; you will determine the location and reseat both sticks. Then attempt to power back on after reseating the RAM. Reseating the RAM means that you remove both RAM sticks and place them back into the DIMM slots again to ensure they are in straight and not at an angle or slightly ajar.

If you are still getting the same failure when powering on, then pull out both sticks of RAM again and just use one stick, placing it in DIMM 1 first, then checking Power, then trying just DIMM 2, then trying to power on, then taking the 2nd stick of RAM and doing the same thing... trying DIMM1 then DIMM2... That will either rule out the RAM as being the issue if nothing changes, or it will correct the issue, which would also tell you that you have a faulty DIMM slot if the laptop Runs and Powers on



good with 1 missing RAM stick...

Hard Drive Issue

Next you can move on to the Hard Drive by simply removing it. You want to remove/unplug it from the port and set it aside, then try powering up the laptop because



if the hard drive had any issues with it that were stopping the laptop from powering on, removing the drive should bypass the issue and allow the laptop to turn on. Liquid damage to the hard drive is a common reason this can happen... Liquid damage to the internal components can cause

power redirection where the contact pads join and when this occurs, it will tell the motherboard to shut down to prevent further damage. If the laptop is still not powering on, continue with process of elimination testing...

So you have now ruled out the Battery, the DC Jack, the RAM (memory) and the hard drive as being the causing issue. Note here, that, you have ruled out the DC Jack simply

because it is powering on initially, then, shutting down. If the jack were faulty, you would get no power initially, or the shutdowns would be more sporadic and only occur when the cord or plug were moved slightly. Battery was ruled out simply for the fact that removing it didn't change the fault.

So, now that you still have a laptop that won't power on properly, and you have ruled out the easier parts/components, you will now have to move on to disassembling the laptop to begin troubleshooting and viewing all parts and components.

While disassembling the laptop, you will be looking for certain things along the way as the root of the failure causing the laptop to not power up properly. You will basically be looking at everything. Something as simple as crossing pins inside the Ethernet/cat5 cable input port that are bent and touching one another, or possibly even crossed pins inside the USB port can cause the laptop to power on then shut down. So you will need to closely look at all parts and components now to determine where the failure has occurred.

Liquid Damage Issue

Now we will discuss what to look for with liquid damage to a laptop and why that could be the reason for the laptop not powering up correctly.

This is a tough Repair to handle... But I have had great success in repairing motherboards that receive liquid damage...And I m here to share my knowledge to you...

Many types of liquid can/will
spill onto Laptops, the most
common being water, beer,
milk, wine, tea, Coffee, juice
etc.

Each of these liquid cause
damage, though each will
cause damage in different



ways.

When looking for signs of liquid damage, first you want to press down on all the keys of the laptops keyboard, you are doing this to feel for —crispiness or sticking keys. Since most liquid spills will occur over the keyboard, this is the first place that will be affected. If a keyboard is saturated in liquid, and that liquid happens to flow through the protective plastic film under the keys, it can damage the digitizer contact pads of the keyboard, it can also travel through the keyboard and down to the motherboard. Most people will leave the battery in



and can even leave the laptop plugged in after a spill occurs, but what they don't realize is that the electricity that is travelling through the laptop is continuing to cause damage to all the areas that contain liquid. The

liquid will dry eventually if left untouched, though it will take a lot longer to dry if any liquid leaked inside the laptops case and into the motherboard area. I have seen liquid spills 2 months old that still had —puddles of liquid still residing on the motherboard and on the components.

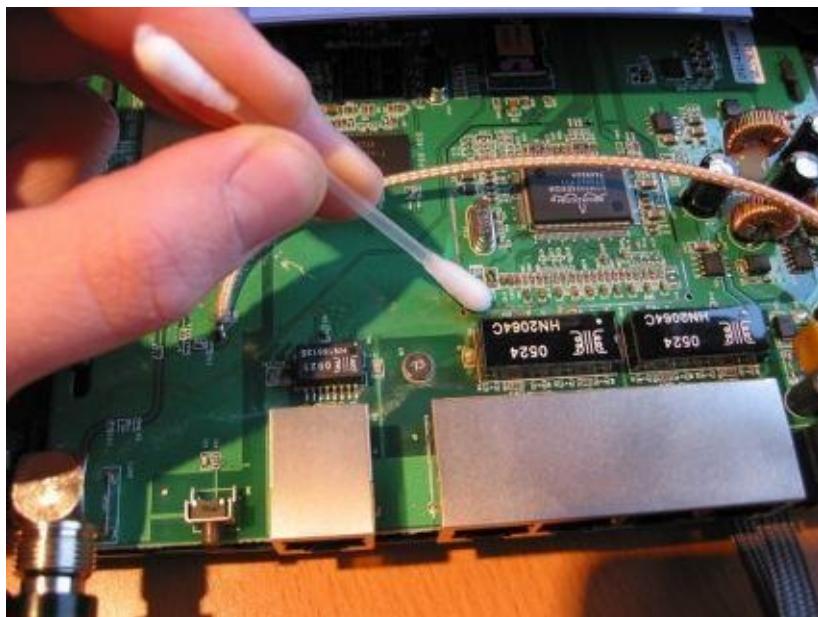
This can occur under IC chips, under protective stickers that are placed on most motherboards, and even in the open areas.

You should now also look at the palm rest and bottom base, you will be looking for liquid stream remains. When liquid touches the case parts, it is more visible on the inner side of the parts than the outer, though still visible on the outer too.

Liquid will leave a — trail of evidence behind when spillage occurs, you will see the plastic has turned a different color and will have "Dflow;Î remains from the liquid. When disassembled, you will also look at the motherboard for any remains of liquid. Liquid will also leave a visible trail on any PCB (printed circuit board).

Water will dry clear to whitish in color,
Powdery looking when dried. Milk will dry

to a white color; it can also stay thick and not completely dissipate. Coffee, Soda, Beer will all dry to a dark brownish to tan



color and will also usually stay pretty thick

- not completely dissipating. Water seems to cause the most damage of all the liquids common to a spill.

Liquid that is left on any PCB that has power supplied to it will corrode the solder contacts on the PCB. This is where you will be able to visually see a whitish powdery (looks like batter acid) substance. It will continue to corrode to the point that it will cause that component to short out and possibly continue to further damage surrounding components and the PCB itself. Worst case scenario is that the laptop could potentially set fire. And, yes;- a laptop can most certainly - set fire... I have personally seen it happen numerous times, I have also had customers that were Fire Chiefs that would show me the pictures of the houses burnt to the ground, then showing me the photo of the burnt/melted laptop with their lids still open as being determined the cause of the fire.



So most important rule here if potential liquid damage has occurred is to remove any and all sources of power running through the laptop, right down to the CMOS battery (if the plug in type)... then complete disassembly of the laptop is a must, you must remove all traces of past and present liquid or residue or corrosion.

Any laptop that has suffered from liquid spill should be completely disassembled and inspired.

Each specific liquid will appear differently on the motherboard, and depending how long it has been there and if power was still on when the spill occurred. It will also show signs of corrosion.

This is what you will be looking for (corrosion)...with water it will appear as a whiteish color and kind of powdery.

I use a product called CRC electrical Grade 2-26 precision lubricant spray to start my



motherboard corrosion cleaning process.

I use a soft – bristled Toothbrush to initially clean the motherboard.. applying a light amount of spray to the bristles.. the toothbrush wont



ruin the motherboard, Nor will it rip off any capacitors or other components.. and it will safely remove the corrosion and help to prevent it from

returning.

You want to inspect both sides of motherboard, start at the DC jack area, look at the shoulder pins of the jack to see if any white powdery substance exist or possibly shorter pin connections.. then you will start by looking at all the capacitors. You might need a magnifying glass to get a close view.. Look in the RAM (DIMM) ports, looking at the golds pins to see if any have a tarnished look or again a powdery substance on them, clean the pins with the toothbrush.

Use the CRC 2-26 spray on the toothbrush bristles. Then dab the toothbrush onto a piece of paper towel to remove some of the spray. You don't want the toothbrush to be wet.. it should have a very tiny amount of spray on it.. then back on forth on capacitors, resistors, MOSFETs etc.. that have visible corrosion.

You need to also check the port that your video display cable plugs into on the motherboard.. look into it for any corroded pins..clean with toothbrush. Look at the display cable plug end too. And clean if necessary. If you know where the liquid initially spilled then you can usually direct your motherboard cleaning to that specific area. But if you don't know and all liquid has already dried then I suggest you go over the whole motherboard with yhe toothbrush and spray. Then do sell circuit board cleaner at electric stores. But I have had such good success with the forementationed spray that it is all I use.

If you are a serious repair tech. I recommended you purchase something called capacitor wizard.

This is a laptop technicians must have tool. It will test your in circuit capacitors and will give accurate immediate results. It will tell you the bad ones and the good



146

ones. No more taking hours upon hours using a multimeter. No more finding a stable negative post and no more misdiagnosed capacitors. It will test other components on the motherboard as well when using the meter. I can fully test a motherboard in a matter of a couple minutes. With my digital multimeter It took me hours . Sometime days and still I was left wandering on some using the multimeter . But not wiyh yhe capacitor wizard. As it measures differently than a multimeter, it measure ESR (Equivalent Series Resistance) and the meter probes are non polar.

Video Related Issue

All laptops have a video card; other common terms for the video card are - graphics card or - GPU (graphics processing unit), graphics chipset or - video chip. The - video chip is integrated on the motherboard, and the - video card is proprietary in that it connects to the motherboard using a ZIF slot (zero insertion force) then secured by screws

A video card or chip will fail mainly due to thermal breakdown. The most likely reason for this breakdown is overheating of the laptop. Overheating happens when the fan and heat-sink assembly become clogged. A heat-sink is typically a metal mix/blend, mainly being copper. It is also fragile. You do not want to bend or flex the heat pipe of the heat-sink or you will increase the chance of overheating due to incorrect motherboard thermal temperature readings. The end of the heat-sink will have —radiator fins attached to the heat pipe end. These metal/copper fins aid in the cooling and heat dissipation by pushing the heat to the pipe end and then carrying it through the fins and out the exhaust port.

As shown in the photo, the dust and debris can build up... Similar to a laundry dryer's lint trap that you remove and empty... except the laptop doesn't allow one to easily clean this without complete disassembly of the laptop. A toothbrush is used to clean



between the fins of the heat-sink, remove all dust and debris from the heatsink. You will then need to unscrew or un-brace the fan from the heat-sink to properly clean the fan. These will be micro sized screws typically 4 of them and some might be hidden under plastic stickers.

Fan/Heat-Sink Separation and Cleaning

Separate the fan lid from the fan base to clean. Most fans will be magnetic not ball bearing, and you will be able to pull the fan blade off of the fan base to clean it. Run the toothbrush in between the fan blades from the top side and bottom sides of the fan. It is a good idea to also use a paper towel or similar (I will spray glass cleaner on it, then fold it a bunch of times to make it thicker, then run the wet towel in between the fan blades) to better clean it, also cleaning the base of the fan housing. Reassemble the fan and reattach it to the heat-sink. Reapply any thermal paste to the heat-sink's cooling pads if needed. If you plan on adding thermal paste to the heat-sink, First, It absolutely must be Silver Thermal Paste, not Ceramic (silver in color, not white or pink in color). Also, you absolutely must remove any remaining —old thermal paste from both the HeatSink and the Chip or CPU it is covering. To remove old paste, use denatured alcohol on a paper towel, rub away. If the old paste is real thick and crusty, use a guitar pick or flat plastic card or tool to



gently scrape away the paste.

Important here not to gouge the heat-sink thermal plate if you are scraping the paste away... that is why you would use plastic to remove it, or just a paper towel.





The CPU will always use thermal paste because it does not get as hot as the GPU does. The GPU will almost always use a thermal pad and not paste. Thermal pads will allow for the natural thermal expansion of the chipset and will allow for the greatest heat dissipation. Do not replace the thermal pad with a copper shim on a NVidia chipset... You must reuse the thermal pad on the video chip.



The Use Of Copper Shims On The Graphics Chip

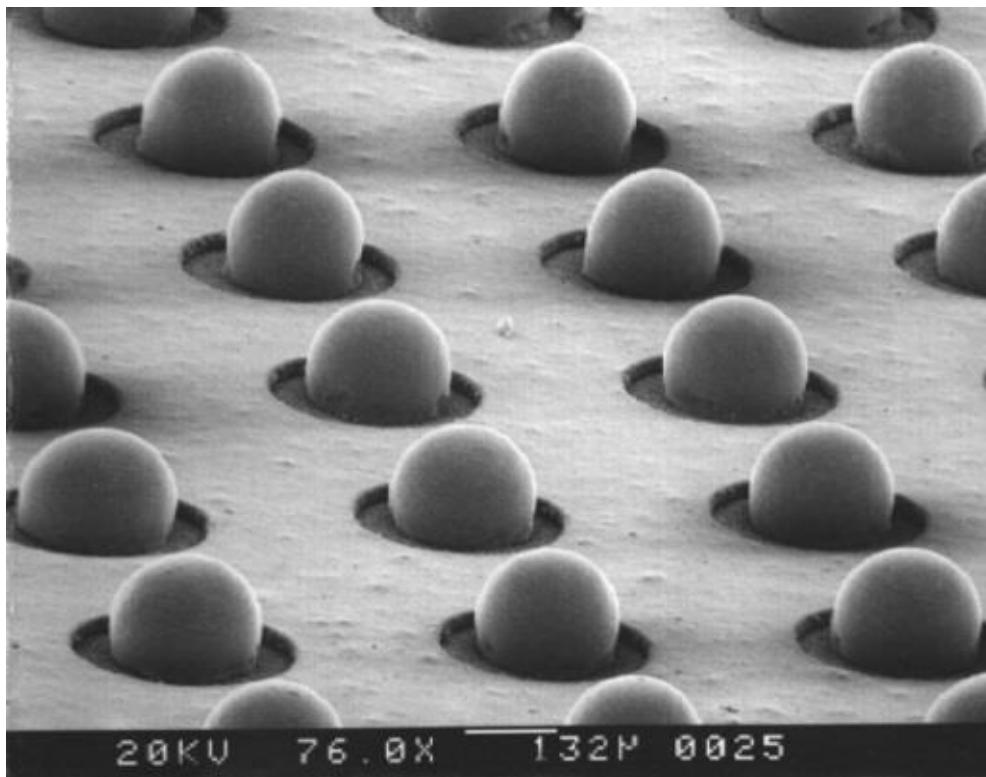
Why GPU Can cause Power Issue

Okay, now back to the GPU and why/how it can cause Power Issues with the laptop.

Typically a motherboard will have a Northbridge chipset, a Southbridge chipset and a GPU chipset (3 Separate IC Chips), though the need for smaller and thinner laptops has led to newer technology parts and components. A lot of laptops will integrate the Southbridge chipset and the GPU into one IC chip. A good example is the HP DV series, which mainly used an AMD/NVidia or Intel/ATI Chipset. The AMD/NVidia IC would use integrated Southbridge/GPU on about half of the models released. If the heat-sink only has one additional cooling thermal pad (besides the CPU pad), then chances are the GPU and Southbridge chipsets are integrated. If the heat-sink has 2 additional thermal cooling pads, the one closest to the CPU would be the GPU and the furthest is typically the Southbridge chipset. The Northbridge does not produce heat.

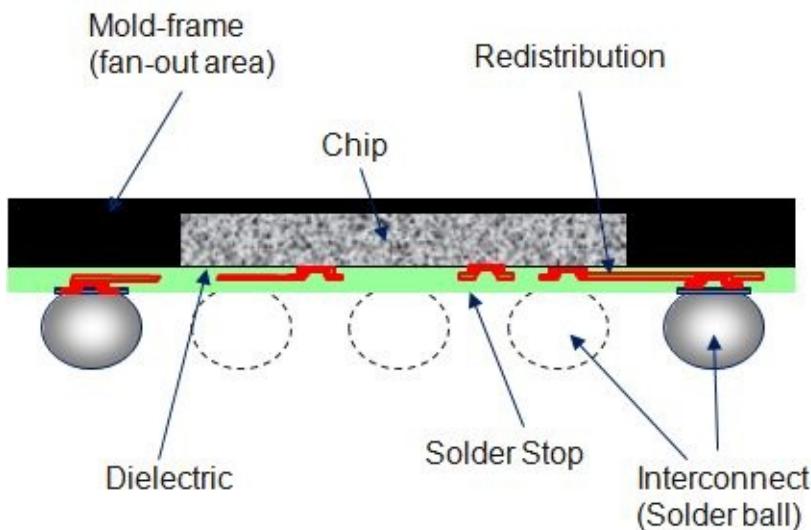
The CPU is one of the most stable components in a laptop and there will be no need to discuss any repair to that part in this book. They can “fail” though and if a replacement CPU is readily available, you can try exchanging just to rule out the CPU. But chances are, it is not the CPU that is causing the issue (unless you installed an incompatible one).

The GPU connects to the motherboard using a BGA (ball grid array) connection; this is a connection that does not allow for physical removal of the chip without special equipment (rework machine or similar).



As opposed to a ZIFF socket CPU where instead of solder ball – to contact pad connection, you have pins protruding from the CPU and fitting into the matching pattern on the ZIFF CPU dock.

Thermal Over-Exposure is what creates failures in the BGA connection grid of the GPU (video chip). The heat combined with some GPUs using incorrect solder; will break down the solder ball contact connection over time and over prolonged exposure to overheating conditions (clogged fan/heatsink).



Video Chip BGA Rework (Reflow)

The coin stack plays several roles in the reflow process ..And is the reason why my method works.

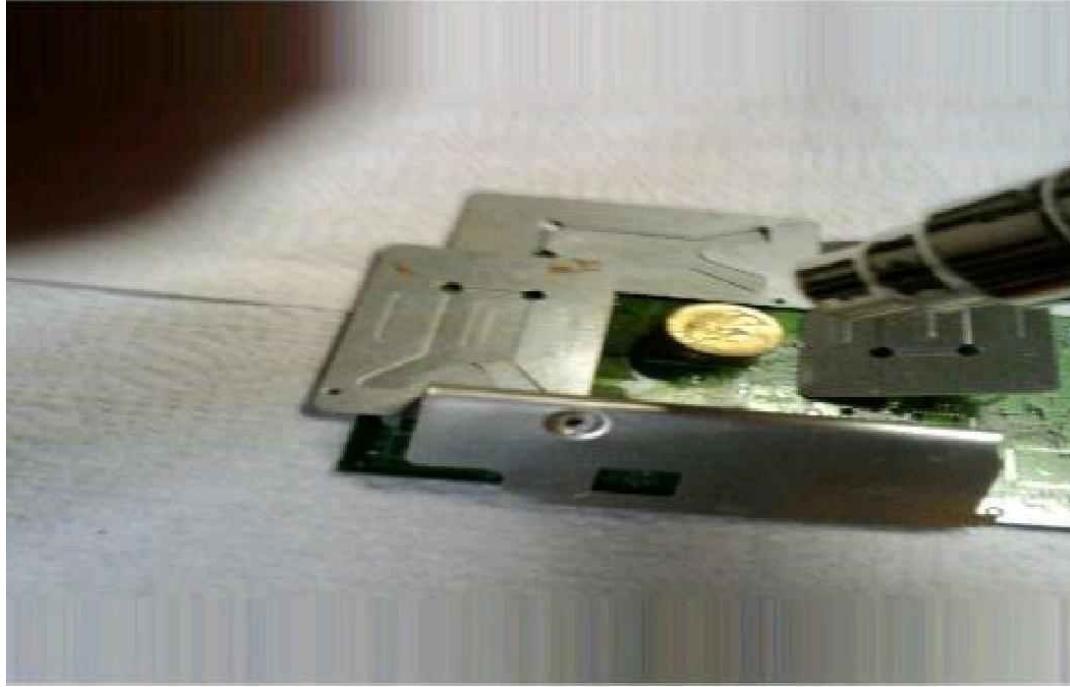
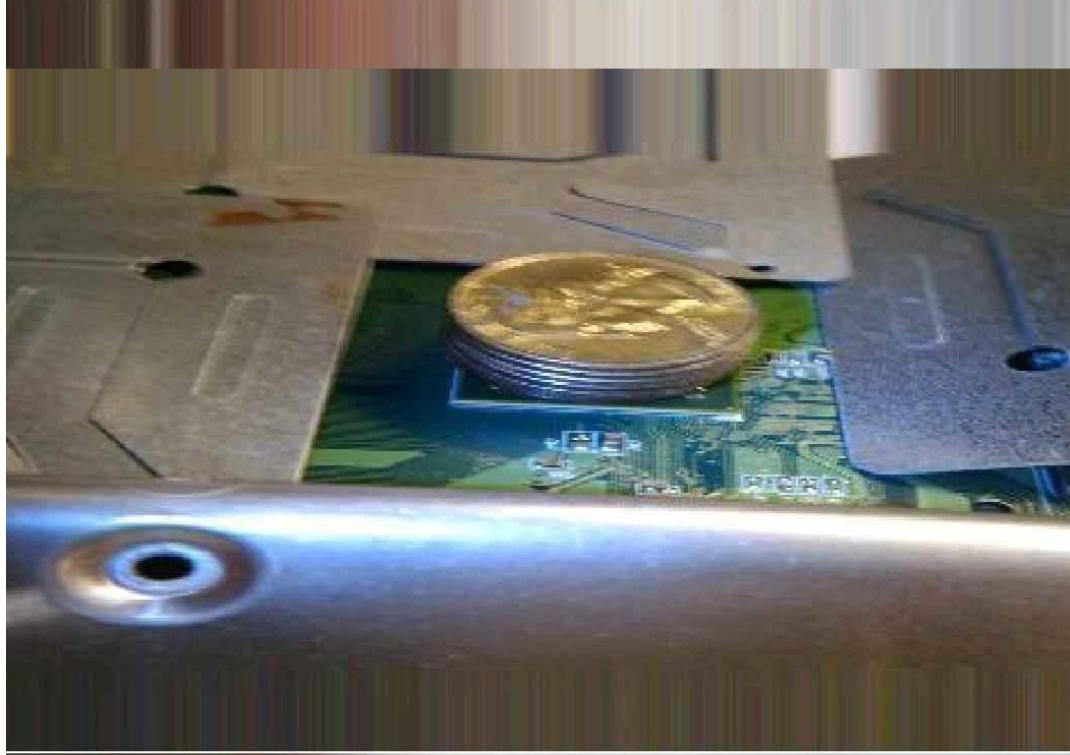
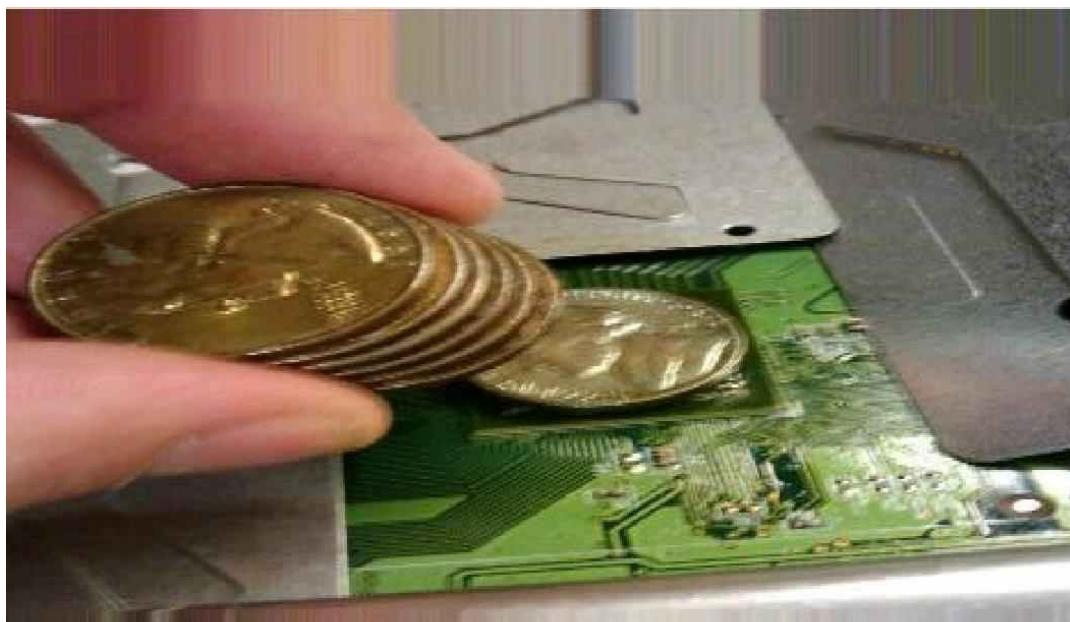
I use a coin stack because of the availability of a Coin world-wide. I started out before releasing this method using a block of silver, which equaled the weight of 6 quarters and 2

nickels..and since coin are easy for everyone Worldwide to obtain.. I went with the common choice.

The importance of weighting the chip is my other main key reason for this method and it's success. It's a matter of the laws of science that anything being heated..especially to the temperature of the

reflow..will want to expand (as apposed to contracting) and by nature the chip will want to "expand" and rise up from the connection. This is also why sealant is used by manufacturers.



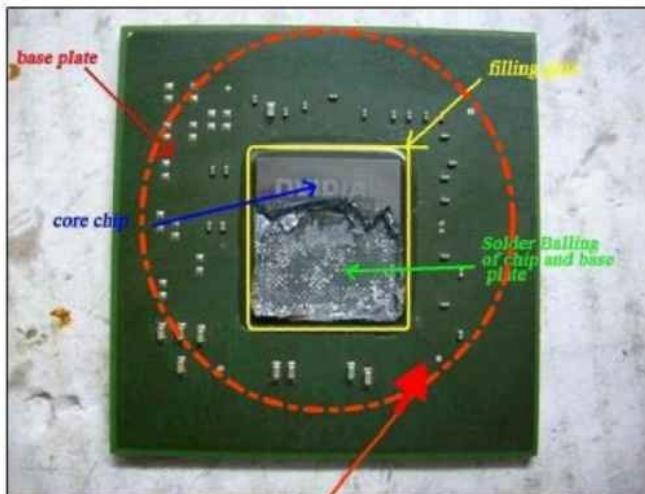






Once you have reached the correct temperature or time length , let the coin stack sit on top of the chip until cooled. Then remove the coin stack and this sheets/foil.

Heating The Chip



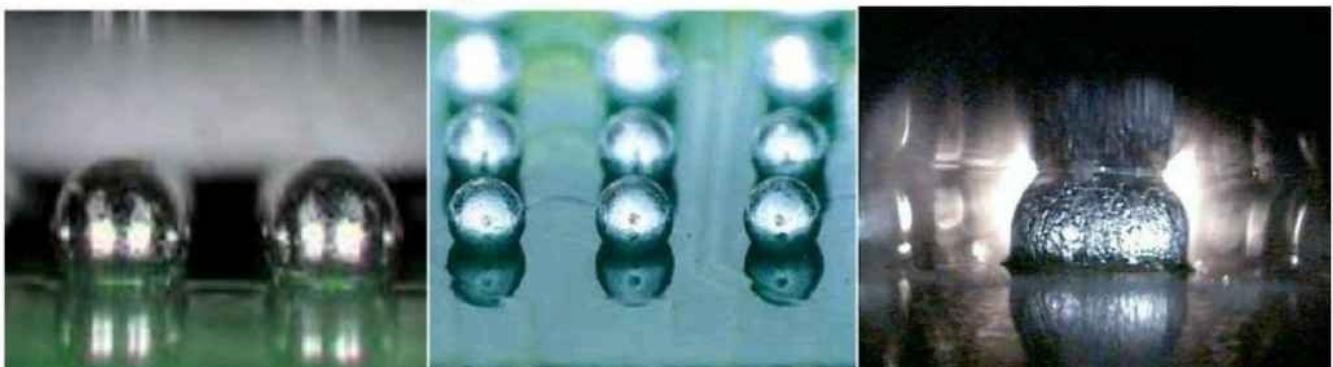
This is where you place the Coin Stack, 2 Nickels rest first upon the upper chip, followed by 6 Quarters



HOLD The Heat Gun At A 45° Angle and Aim it at the GPU Chip's Outer Edge and towards the bottom of the Coinstack

You are to be using Slow Circular motion around the chip, holding the heat gun roughly 6 inches away from the chips surface, then moving it in to about an inch or two away from the chip then alternating.. You are pulling it away because you do not want to heat the chip too quickly.. even though you DO want the chip to heat as quickly as possible, If heated too quickly, you can damage both the motherboard and the chips surface components.

You are heating on an angle to direct the hot air between the chip and the motherboard.. Here below is a photo of the BGA Cold Solder Connection Balls



The Solder Will Crack and when one of these connections is broken, you end up with video failure, or other component failure.. I say other component failure ... because other components such as the Wireless Card, the Speakers, the sound card, the cdrom, the hard drive, all have traces that run under or through the BGA chips connection..they come from the Southbridge Chipset and can travel through the GPU to get to their components destination... Sometimes Sharing things like .. Voltage Regulation Traces, or Power signal traces.

BGA HOT AIR GUN TIPS/NOZZLES



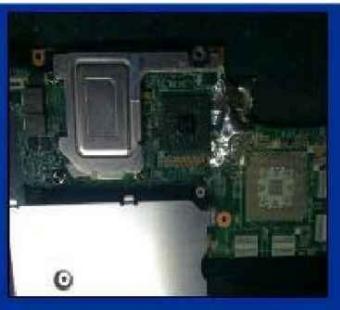
If you use an 18mmx18mm or similar tip, you should lower your heat guns heat setting.. and constantly monitor the temperature.. You will bring the nozzle in closer to the chip with this tip...

I will take a minute here to Explain Hot Air Reflowing and Debunk the Myths Surrounding the use of Hot Air as opposed to Infrared.

Use of a - Hot Air; I gun, if done right, will work exactly as a rework machine. After all, it is the same exact setup as a rework machine except for the PCB braces, temperature dials and the metal supporting arm to hold the heat source.

There are differences between the use of infrared and hot air, though the average person will not be able to obtain or afford an expensive infrared rework machine, which is why this book will teach you the Professional Reflowing Hot Air Method, For Use on Any and All Video Chipsets. Infrared will transfer heat without overheating the surrounding areas; it is more constant source of heat and will penetrate the PCB / ICs more rapidly. Though with the right heat gun and the right instructions, hot air can and will obtain similar results. Infrared is recommended for Reballing and replacing the GPU, but for reflowing (what is taught here), Hot Air is not only more cost efficient, convenient and cost effective.

MONITORING THE TEMPERATURE DURING THE VIDEO CHIP REFLOW PROCESS





Monitoring The Temperature During The Reflow Process

The Best way and most accurate way is to
Set the Heat Gun to read Celcius



The thermometer I recommend is a non contact laser guided, infrared one. You will need to hold it about 2 to 3 inches away from the GPU chip and point the laser at the chips edge, hold the trigger of the thermometer for about 5 seconds and look at the digital readout. If you are noticing that the temp is real low when you think it should be reading higher/hotter.. then move the laser point a touch higher / then lower to see if your laser pointer is misaligned...If it is, you will notice the temperature rise on the digital display when it's moved up or down.

Start out your reflow process by turning on your Heat gun, Use a heat setting from 600 to 800 degrees farenheit. And Hold the heat gun about 4 to 6 inches away from the top of the coinstack(at a 45 degree angle).Your Coin Stack is ...6 Quarters and 2 Nickels (the nickels go on the bottom-the first coins placed on the chip...the reason the 2 nickels are put on first is due to thier size and thickness..

Also note that Most Every Different Model Of Heat Guns will Blow out the Hot Air At Different Speeds...meaning--the "cheap" one I bought from Home Depot that has 2 settings... high and Low.... Blows Less Air At A Slower Speed than the Better RYOBI one I bought for double the money... the ROYBE blows out the hot air MUCH Faster.. So I Have to Pull The Heat Gun Out Alittle More When Using It.. Holding It 6 to 7 Inches Away as Apposed to 4 to 6 For The 2 Setting Heat Gun... So Pay Attention To This When Reflowing... And if you are going to use a tip adapter... then use the 3 tier Cone Tip...

Starting Your Reflow...

You start By Aiming your Heat Gun and Turning it on, Hold at 45 degree angle, It's a Good Idea To Use A StopWatch too... Type: STOPWATCH into Google and Run a Free One On Your Screen While Reflowing...

OK, As Soon as You Start Heating The Chip, You Will Be Aiming The Heat Gun Around The Outer Edge Of The Chip-.And The Base Of The CoinStack....

At The 1 Minute Point of Heating.. Look At Your Digital Thermometer.. You Should Be At A Temperature Of 160 Degrees Celcius...Then At The 2 minute point of reflowing.. you should be at a temperature of 195 degrees celcius....Then.. at around 2:45 or 3 minutes... you should reach 223 degrees celcius... the Reflow Point... The Point at Which The BGA Solder Turns To A Liquid State... And The Cracks/Faults In the Cold Solder BGA Should Reconnect/Recorrect.... In Turn, Repairing the Chip... Once you have Reached 223 Degrees Celcius (or 433 Degrees Farenheit) ... Oh Ya, Let Me Remind You, You Need To Practice Using Your Digital Infrared Thermometers Before Completely Trusting the Temperature Readings You Are Getting... Because If You Are Using Your Thermometer, but Not Monitoring Correctly, You Will OVER Reflow the Chip and Blow it... or the opposite, and Under Reflow It And Not Actually Reach Reflow Temperature...

I usually Hold My Infrared Thermometer about 4 to 6 inches away from the chip..just about the same distance as the heat gun.. and I hold it at a 45 degree angle too... aiming the Laser at the Chips Outer Edge then also monitoring the coin stack as well...switching back and forth...Then I will Keep The Laser Pointed at the Opposite Side Of the Chip That I Am Aiming the Heat Gun At.... Meaning.... Aim The Heat Gun Heat At One Side Of the Chip, Aim The Thermometer At The Opposite Side... Then You Will Be Moving BOTH In A Clockwise Motion... Slow Clockwise Motion... Never Hovering the Heat in One Spot... Keep It Consistantly Moving at the same speed... Pulling the Heat Gun Out Alittle And Coming In Alittle Closer, then Alternating...



TIPS FOR A SUCESSFUL REFLOW:

Remove Chip Sealant: Most GPU Chipsets will have some sort of sealant or glue used on the edges of the chip to secure it to the motherboard (usually red, black, or clear) I have had many successful repairs without removing this sealant, though it is best to remove it prior to reflow to allow the flux and heat to enter.

Removal of the sealant should be done as part of the reflow process, the beginning of the process. You begin heating the GPU without the coin-stack, holding the tip of the heat gun roughly 3 inches away from the chip at a 45 degree angle and circling the chip while you heat it. You move around the chip in a circular motion aiming the heat between the chip and board. The best thing to do would be to get the Cone Tip (looks like a 3 tier cake) for the process. Use either the cone tip or an exact fit Square tip for reflowing.

Begin heating the chip and monitor the temperature with an Infrared Laser Guided Thermometer (if available) to a temperature of 145 degrees Celcius.

REMEMBER that you must insulate any parts or components that will melt or can be damaged from the extreme temperature... This would include any plastic plug ports, CPU Dock, RAM DIMM ports etc... Use tin sheets or Aluminum Foil or similar... No need to wrap the motherboard like a Present though, just the components in the immediate area. It is also a good idea to cover the CMOS battery with foil; or remove if the plug-in type.

Once you have reached 145 degrees celcius, you will use a mini flat head screwdriver to remove the sealant. Not a good idea to use a razor blade for doing this because if you accidentally dig into the motherboard, you could rip or break one of the traces on the motherboard that run under the GPU (there are Hundreds). Carefully hold the mini-screwdriver at a 45 degree angle and immediately after taking the heat away from the chip, you want to begin scraping away the chip sealant. Nvidia chipsets will mainly use the red glue, and the amount will vary. Some will apply it in dots around the chip, some just at the 4 corners, and some will use the sealant the whole way around. Apply slight pressure to start the scraping/peeling of the red epoxy... do not —dig||... you want the screwdriver as flat and parallel to the chip/motherboard as you can get to help prevent scraping of the board or chip. If you have reached the right temperature, removal should be easy, as it should —peel|| right off and away. Do not dig under the chip as you can damage the connection or cause thermal spotting; especially if you wedge any epoxy under it. You might need to heat the chip a couple times to completely remove the sealant, if you notice it becoming harder to —peel|| the sealant you will need to apply more heat (usually twice is sufficient).

Preheat the Underside of the Motherboard :- Before the reflow process is started, yet, after the chip sealant has been removed, you can begin to preheat the underside of the motherboard prior to reflowing the GPU Chipset. This should be done without moving the motherboard during the reflow process. Meaning, you should only be heating the underside of the board if you can set the motherboard up in such a way so that after the underside is heated, you can quickly move to the top-side where the GPU is to begin heating that immediately without moving the motherboard.

How This Is Done: I work on a marble table, so heat is not a factor when worried about ruining the "Dwork area"; I, and I will place the motherboard over the edge of the table to expose the direct underside of the motherboard. You are not heating the entire underside of the motherboard. Rather, you are heating just the area directly opposite from the GPU (about a 2 inch by 2 inch area).

You will not do this if the underside of the board has plastic components placed near that area because you will run the risk of melting or damaging these parts. You can also do this by using board braces, whether you get yourself a professional PCB bracing system, or go

to your local Home Improvement store and make yourself one. You will need to have one with the capability of easily flipping over or capable of flipping the board over without disconnecting it from the braces. Use a cone tip on the heat gun if able to, heat the underside of the GPU and monitor the temperature using your infrared thermal gun. You want to heat the area to around 180 degrees celcius, then as quickly as possible, you will begin heating the GPU. But wait...

Use Liquid Flux on GPU during Reflow : Right now is the perfect time to apply any liquid no residue flux to the outside of the GPU. You can buy a Pen Applicator version of Liquid Flux, as opposed to a bottle with an eye dropper (more common); I recommend you invest in the Pen style. To apply the pen style flux, you will shake the pen for a few seconds to moisten the tip, dab the tip once to release flux into the tip, then carefully apply the liquid flux around the chips edge where it meets the motherboard, the goal is that when the heat is applied, the flux will flow under the chip to reach the BGA. You do not want to create Puddles under the chip so do not use a lot of flux, you want enough so that you see it residing on the board, yet, not so much that it starts to spread and flow without heating.

If the pen is not available to you, and you are using a dropper to apply the flux, you should apply 1 drop to each side, or a half drop if able and spread it down the side using the tip of the dropper. Or don't use the dropper and dip a Q-Tip into the flux bottle to apply the flux.

Fan Mod : Modification of the Laptops Fan Thermal Control Feature cannot be done on all fans. Matter of fact, there are few models that will allow this. The laptops CPU/GPU fan is thermal controlled, and certain fans using a fourth controller wire can allow you to disable the fan speed control and run the fan at full speed – full time.

Take for instance the fan used on the HP DV series (not all)(the TX,2000,6000,9000 models) use a white wire (4 wires total) as the thermal controller wire. If you remove this white wire, the fan will run at full speed the whole time it is powered on. If you attempt this on a different model and you go to power it on but the fan doesn't spin at all... You will not be able to Mod that fan and will have to re-plug the wire back in... Doing this and having it not work will not harm the laptop or —blow anything.

To do the mod, you need your Micro-sized flat head screwdriver to pull the plug wire lock upward to release the wire from the plug tip. Look on the white plug tip of the fan, you will see thin locking tabs on only one side (the opposite side is the flat side). This is the tab you will be prying up to release the wire from its housing. You will take the wire that you removed and bend it upward securing it to the wire set using electrical tape or using heat shrink wire tubing (purchased in electronics or home improvement stores)

Why A Thermal Pad Is Used, Not Paste or Shims : Laptop components such as the GPU and CPU and integrated RAM will generate heat when in use. And the Laws of Science and Physics will tell you that any part that heats and cools will also expand and contract. Why do you think the heat-sinks on the CPU/GPU all have some sort of spring loaded mechanism to secure them, whether it is heat treated metal that will allow for flexing; or, screws on Riser posts that have metal springs attached to them.

The CPU does not generate as much heat as the GPU and is why using thermal paste is sufficient. Certain GPUs will generate more heat than others, and it is usually the GPUs that have the Southbridge chipset integrated into them making the chip both the GPU and

Southbridge Chipset in one. It is imperative that a thermal pad is used. Again, why do you think the manufacturers use them; definitely not to —cut costs||; they're used for a reason.

Thermal Pads are used on the GPU to allow for the natural expansion and contraction of the Chip and the upper flip chip that is secured to all GPUs. You can't physically see this occurrence, yet it does happen. Laptop motherboard repairing deals a lot with Science and Physics along with Electronics, so it is good to know a little of each of these categories of study, the more you understand of each... the better.

If you replace the pad with something like a Copper Shim, you run the risk of applying too much pressure to the upper —flip|| chip and damaging it or its BGA connection to the GPU chip. —Yah||, you will find a lot of people on the internet telling you that you should use a shim to replace the pad... Yet they have no clue what they're talking about... they do not know how these components operate to educate anyone on the subject. A shim can be used on GPUs that do not generate massive amounts of heat, like some Intel GPUs or certain ATI GPUs but I neither condone; nor recommend you do this.

If you remove the thermal pad thinking you can just apply some —fresh|| silver paste to the GPU... you are wrong. There is a —gap|| between the heat-sink and the GPUs upper flip chip, so if you use only paste on the GPU, the heat-sink will not make contact with the surface of the GPU... the paste is not thick enough, and the heat-sink must sit on the surface to properly dissipate the heat.

Motherboard Issues

The laptop motherboard can have m any different issues

Blown Voltage Regulator—

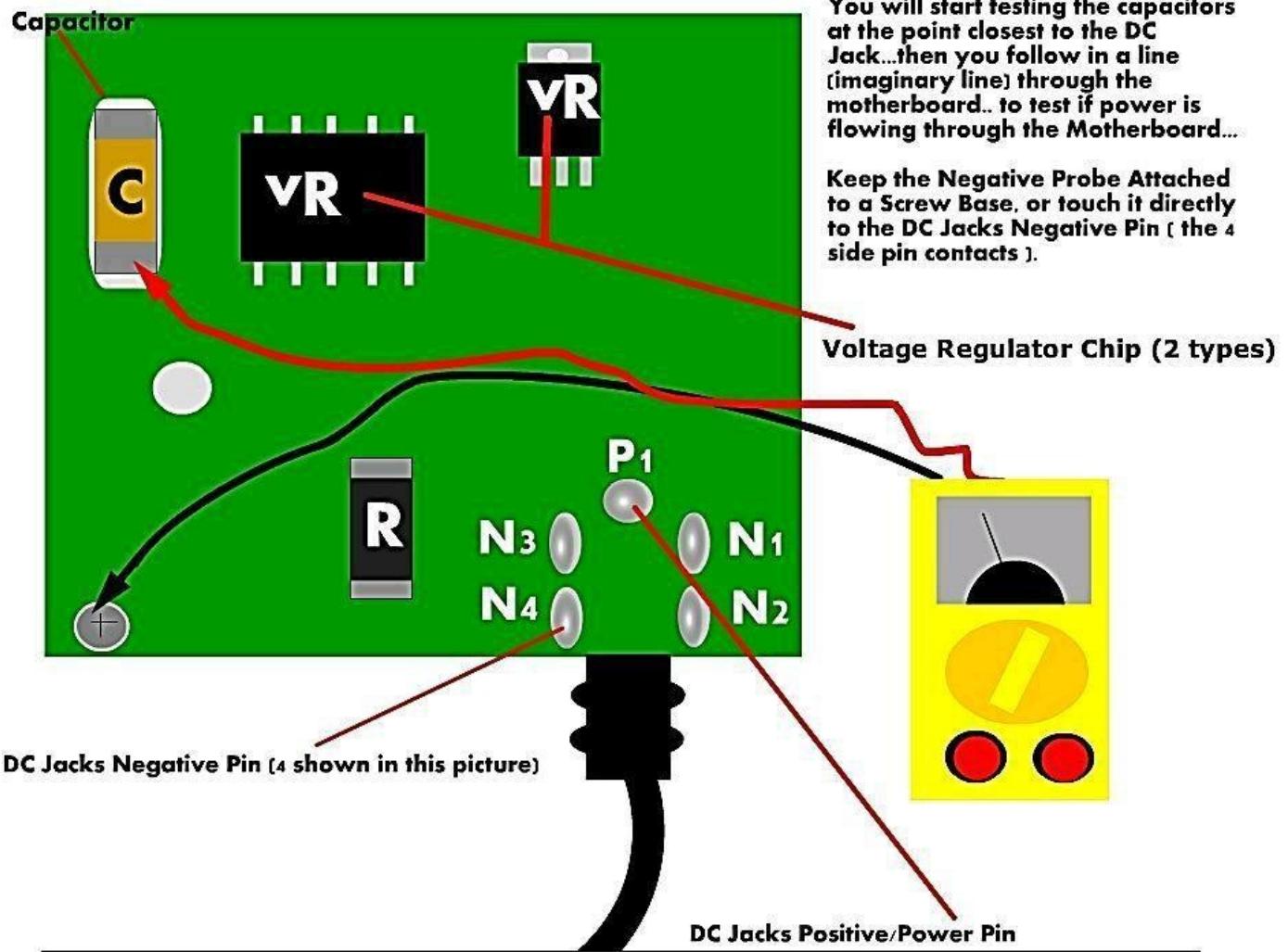
VR chips are also called MOSFETs. They will be one of the most common board failure components you will come across. They will typically fail near the DC Jack or the DC Jack input plug port (both upper and under sides of that area...)

Some reasons they can fail include:

Power surge or Power Dip, Liquid contact, board flex, contact with any metal object while power is running through laptop, pressure to the palmrest or referred failure due to another component failing such as a capacitor or series of caps. You can sometimes



visually see when they have a fault or have blown. They will reveal a crack or can have a circle shaped burn mark on the surface if the IC itself.



While failing capacitors typically results in system instabilities, occasionally failed capacitors will lead to a failure of the voltage regulators on the motherboard. There are two common theories on why this happens.

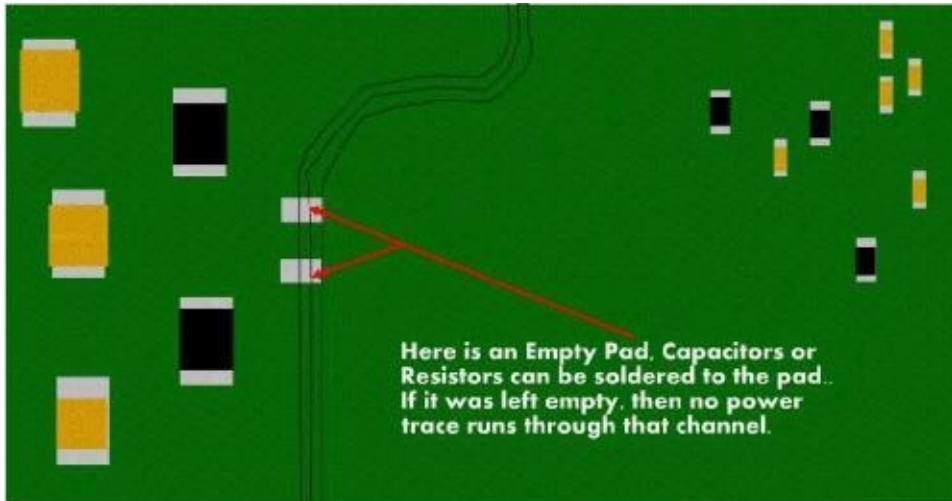
The first (and simple) theory is that the failing capacitors develop a very high leakage current, overloading the voltage regulators and causing them to overheat.

The second theory is that as the capacitance decreases and the ESR increases, the buck controller for the load . Since most of the MOSFET's heat output is produced during the switching transistors, the increased frequency causes them to overheat.

A capacitor rated 2200 F may experience a drop in capacity to as little as 75 F. The design engineer might have assumed that it might drop up to 50% over its life, but not to 5% of its original value. The stability of the buck switching regulator is compromised by such a dramatic drop and the regulator's voltage oscillator is compromised by such a dramatic drop and the regulator's voltage oscillates (perhaps wildly) to voltages above the absolute maximum rating of the ICs to which the supply is connected.

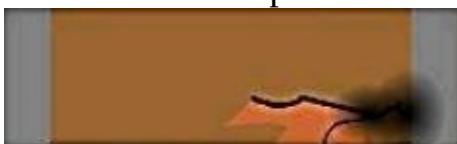
The most common failure mode of the voltage regulator is for the MOSFET to short circuit. Causing the system's power supply (5 or 12 volts depending on the motherboard) to be applied directly to the CPU, northbridge, RAM or other components. This, in turn, causes those parts to catastrophically fail. A motherboard with symptoms of failing capacitors should be taken out of service until it is repaired in order to prevent further

damage.



The Best tool for examining a laptop motherboard is your eyes...you need to visually inspect the motherboard. Most of the time will be able to see if a capacitor has blown or popped you will be able to see if a regulator chip has blown , or a MOSFET has blown just by its appearance...

A laptop that won't power on is likely caused by a blown capacitor. Below is an enlarge view of blown capacitor.



You need to physically inspect the motherboard, using a lighted magnifying glass, you can find an exact replacement for the blown capacitor by removing one from a dead motherboard. Otherwise you will need to buy some capacitor.

Symptoms of a blown capacitor:- When you plug in the AC adapter, and the green power light on the adaptor goes out...resulting in no power to the laptop.

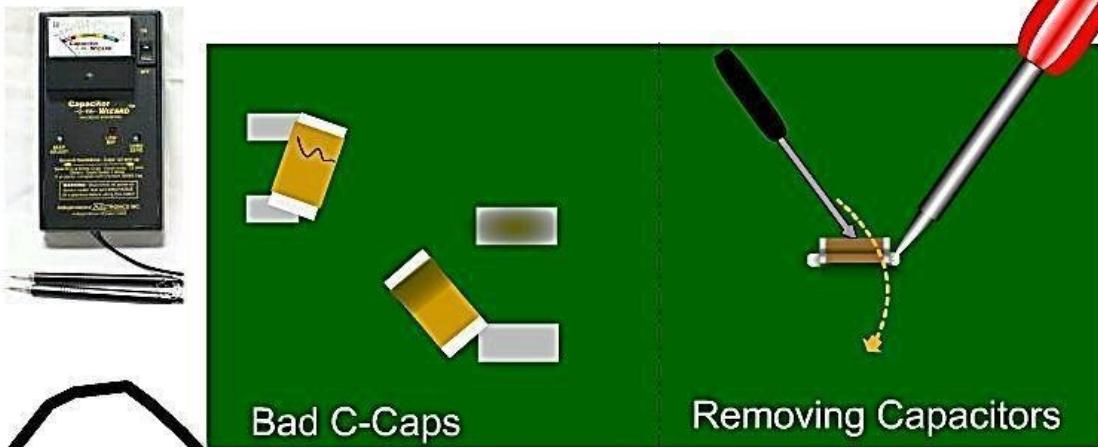
If you find a blown capacitor, you need to replace it. You desolder it from the motherboard. You must be extremely careful in doing so, because if you overheat the contact pads that the capacitor connect to, you won't be able to resolder a new cap onto the motherboard. Add a tiny amount of flux paste to each end of the cap, then use a thin desoldering braid (solder wick) and touch the end of the cap with it, take your soldering gun and touch it to the desoldering braid – then touching the capacitor end to remove the thin layer of solder covering it. You don't need to remove all the solder. Do this once again to the opposite end.

Now you use a Micro-sided flat head screwdriver and gently touch the side of the capacitor, and at the same time , gently apply pressure with the screwdriver to the side of the cap to push it sideways off its pad. Heat the end to melting point. Then quickly switch to the opposite end and heat. The capacitor will pop pff and roll off its pad. Now you can solder a new one.

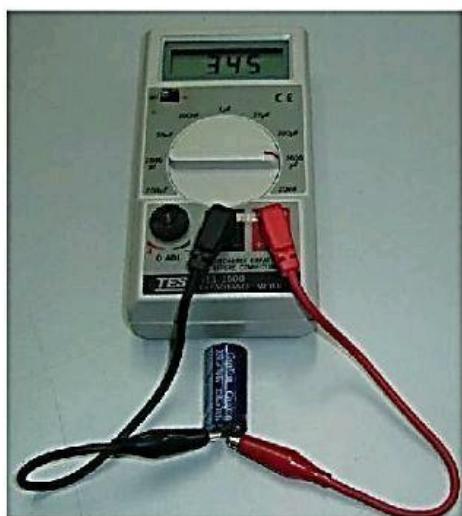
An ESR meter is an electronic measuring instrument which measures the equivalent series resistance of capacitors without disconnecting them from circuit.

Typical values of ESR for capacitors

Type	$22 \mu\text{F}$	$100 \mu\text{F}$
Standard aluminum	$0.1 - 3.0 \Omega$	$0.05 - 0.5 \Omega$
Ceramic	$<0.015 \Omega$	



If the laptop is powering on by itself the instant you plug in the AC Adapter or insert the battery, chances are there is a mis-seated plug, cable or wire set attached to the laptop or motherboard. To remedy this, you should disassemble the laptop, then, reassemble to hopefully correct the fault.



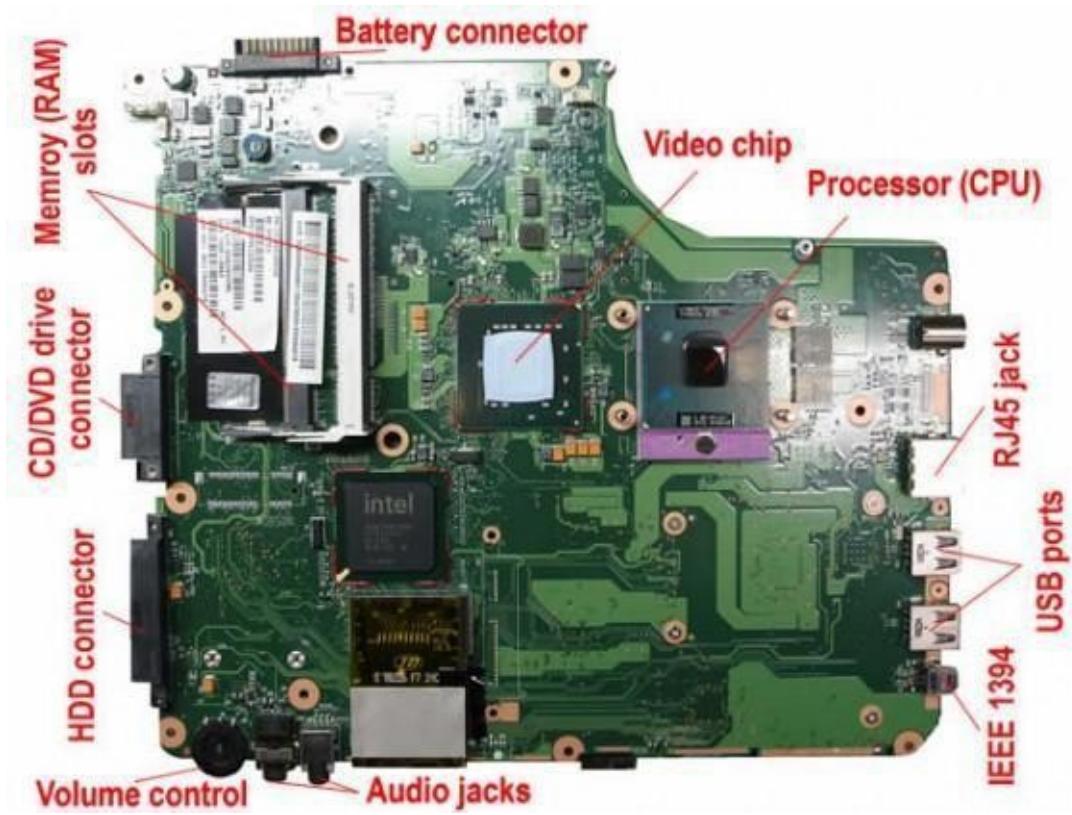
A Digital Capacitance Meter

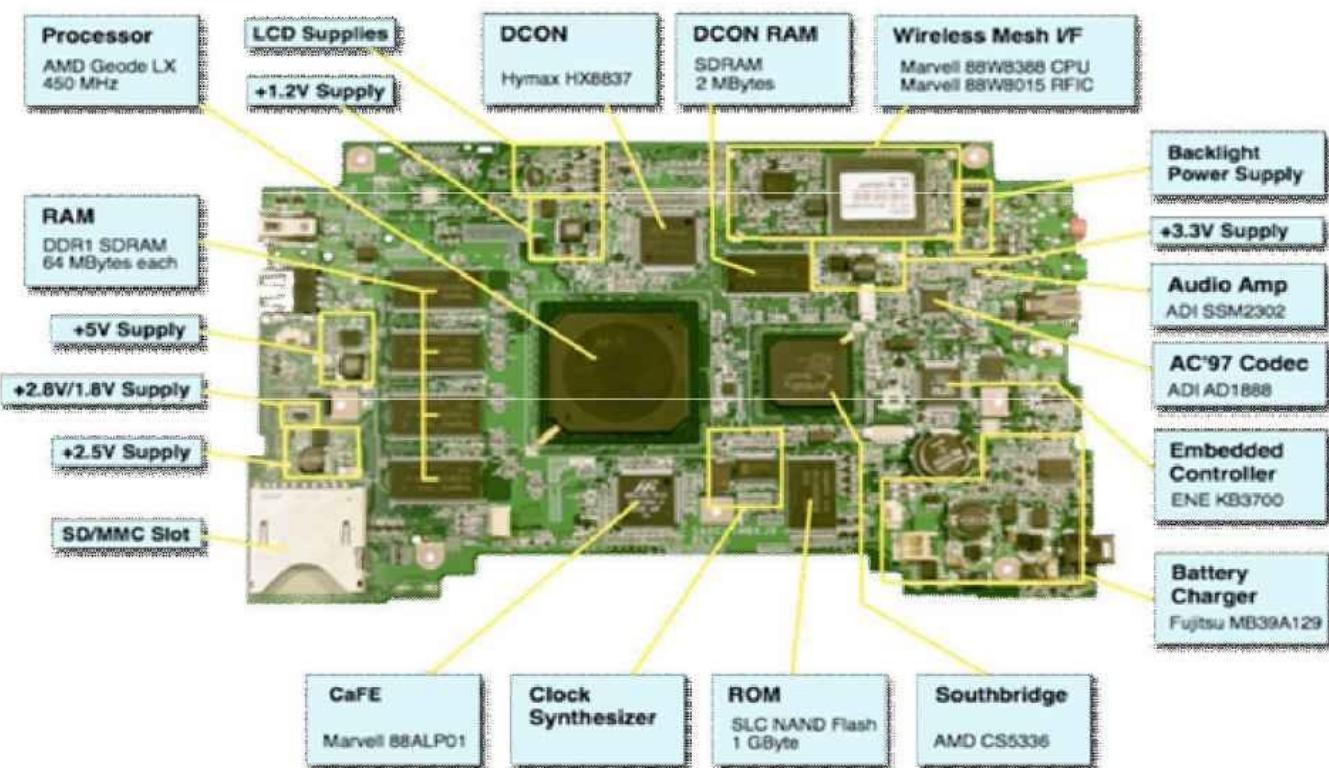
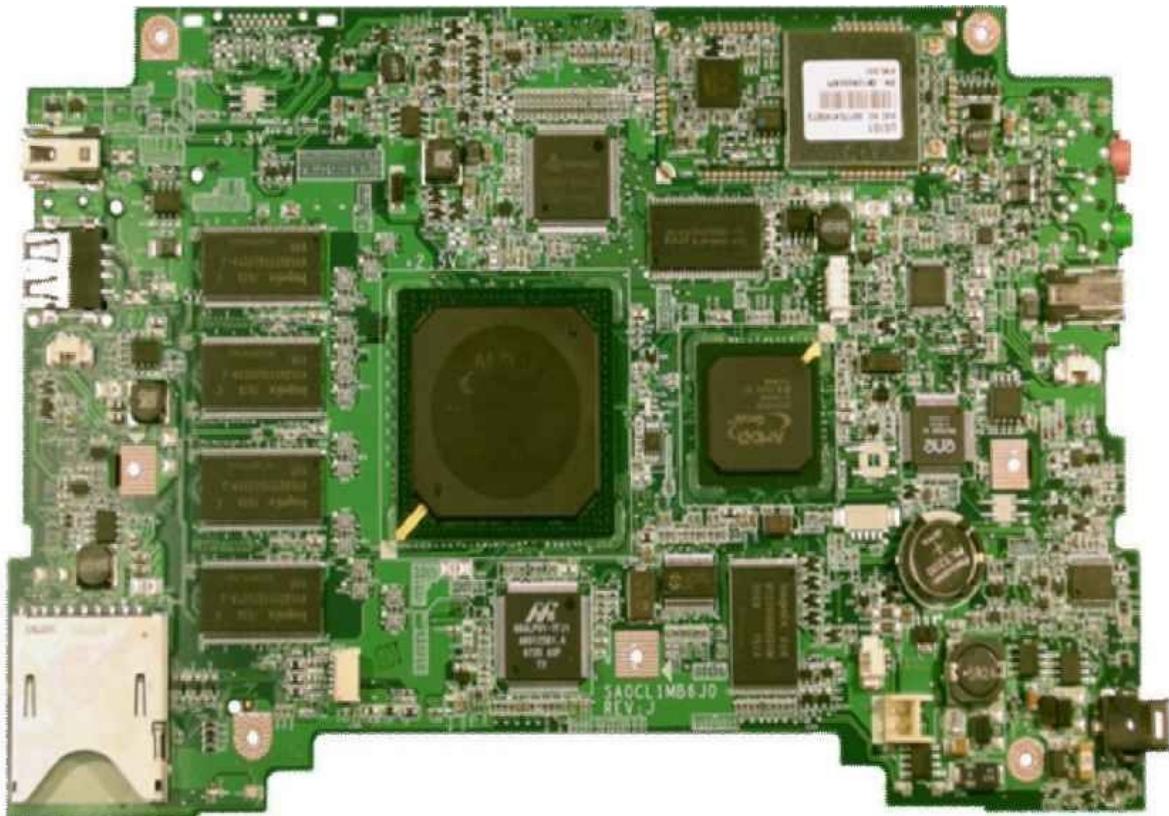
The second method to test capacitor is to use digital capacitance meter and is a little more accurate compares to analog multimeter. Connect the test probe to the capacitor and read the result from the meter lcd display. Example, a 100 microfarad should have the reading of somewhere 90 microfarad to 110 microfarad. Remember, capacitors have tolerance just like resistors.

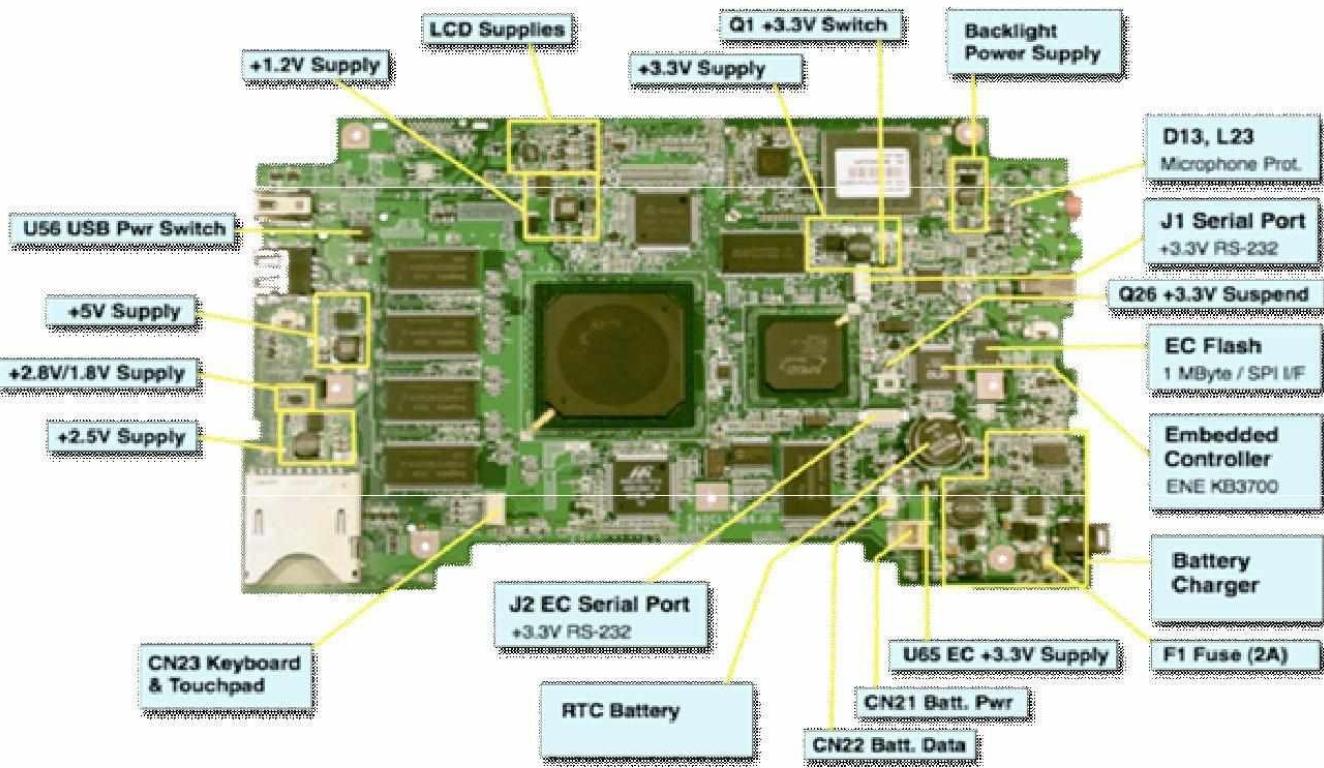
Be sure to discharge capacitor first before testing. A reading of 60 microfarad means the capacitor has lost its capacitance and need to be replaced. This meter is more expensive than analog meter. Somehow digital capacitance meter have its own disadvantage, which is, it can't check capacitor that is breaking down when under load and it can't check capacitors in circuit. It's still worth to invest in this meter because it can check almost 80-90 % of capacitors failure.

Chapter 9

Laptop Motherboard Component







Laptop Motherboard IC identification Common Laptop IC Chip.

POWER SUPPLY CHIP :- (MAX1632, MAX1904, MAX1634, SB3052, SC1402, LTC1628, TMP48U, ADP3160/ADP3167, ADP3168, APW7060 , ETC)

IO CHIP :- (PC97338, PC87392, FDC7N869, FDC37N958, LPC47N227, LPC47N267, PC87591S/ PC 87591L / PC 97317IBW/PC 87393 VGJ PC87591E ETC)

CPU power supply chips :- (ADP3166, ADP3170, ADP3421, AIC1567, CS5322, FAN5056, ITC1709, MAX1710/MAX1711/MAX1712, HIP6004) Charge discharge control chip :- (MAX745, TC490/591, AAI3680, ADP3806, DS2770, LTI505G, MAX1645B, MAX745, MB3878, AAT3680 ,ETC)

CPU temperature control chip :- (MAX1617, MAX1020A, AD1030A, CM8500, MAX1989, DS1620,

Graphics Brand chip :- (ATI, NVIDIA, S3, NEOMAGIC, TRIDENT, SMI, INTEL, FW82807, and CH7001A

Ethernet chips :- (RTL8100, RTL8139, Intel DA82562, RC82540, 3COM, BCM440 LF8423, LF-H80P, H-0023, H0024, H0019, ATPL-119

Sound audio Chip :- (ESS1921, STAC9704, AU8810 ,4299-JQ, TPA0202 , 8552TS, 8542TS, BA7786, AN12942, AD1885, ALC655, APA2020/TPA0202

PC Card Chip :- (R5C551, R5C552, R5C476, R54472

PC Card power supply chips :- (TPS2205, TPS2206, TPS2216, TPS2211, PU2211, M2562A, M2563A, M2564A

COM port chip :- (MAX3243, MAX213, ADM213, HIN213, SP3243, MC145583

Keyboard-chip :- (H8C/2471, H8/3434, H8/3431, PC87570, PC87591 Keyboard chip :- (H8/3434, H8/3437, H8/2147, H8/2149, PC87570, PC87591, H8S/XXX, M38857, M38867, M38869)

Battery IC chip:- (BQ2040 BQ2060 BQ24700 BQ24701 BQ24702/BQ24703 M61040FP..)

Memory control chip :- (CM8501/CM8501CM8562) Clock IC :- (CS950502 CY28404C ICS9248-153 ICS954218 ICS9248-151 ICS9248-39 ICS950901, WINBOND,)

Lcd back light control :- (MAX1522/MAX1523/MAX1524 OZ960) Ddr memory power supply :- (MAX8794 NCP5201 SC1486/SCI486A SC2616 TPS51020 ISL6520, ISL6537 CM8501, ISL6224 ISL6225)

Other Common chipset :- (AAT3200 AAT4280 AMS1505, MIC2545, MIC5205, ADP3168, AIC1567, cM8562, CMI9738, CSS5322, DS1620) Mosfets Used Crystal (14.318 Clock)

Connector Socket (display, battery, dvdrom, modem, keypad, touchpad, onoff panel etc)



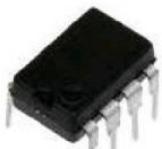
Flash Memory IC



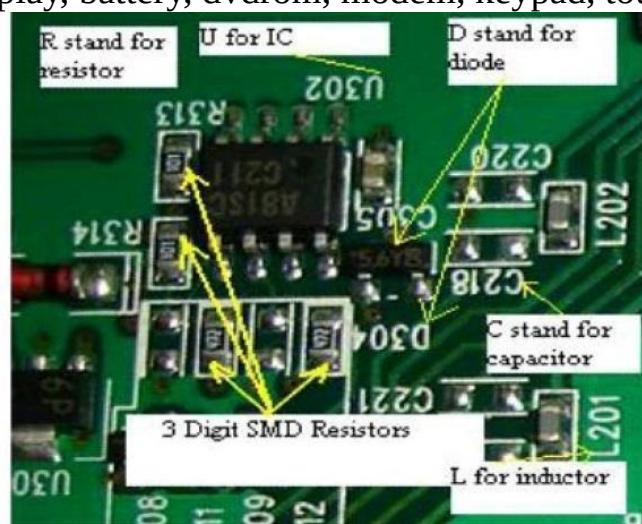
Host Controller IC



IC Voltage

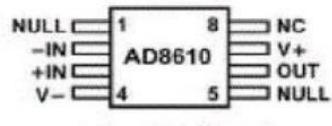


JFET OP Amp

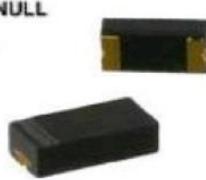


Component Label Guide

8-Lead MSOP and SOIC
(RM-8 and R-8 Suffixes)



Switching Diode



Switching Diode



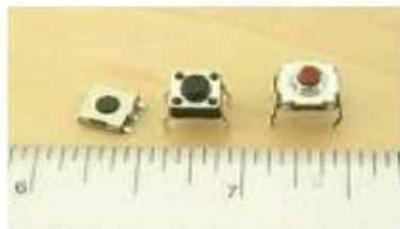
IC OP Amp Dual



SOIC IC Chip



Tantalum Capacitor



Momentary Tact
Switches



NE555 Timer
IC



OP Amp Low



Power Choke Coil



Power Inductor



Power Choke Coil



Power Inductor



Resettable Fuse



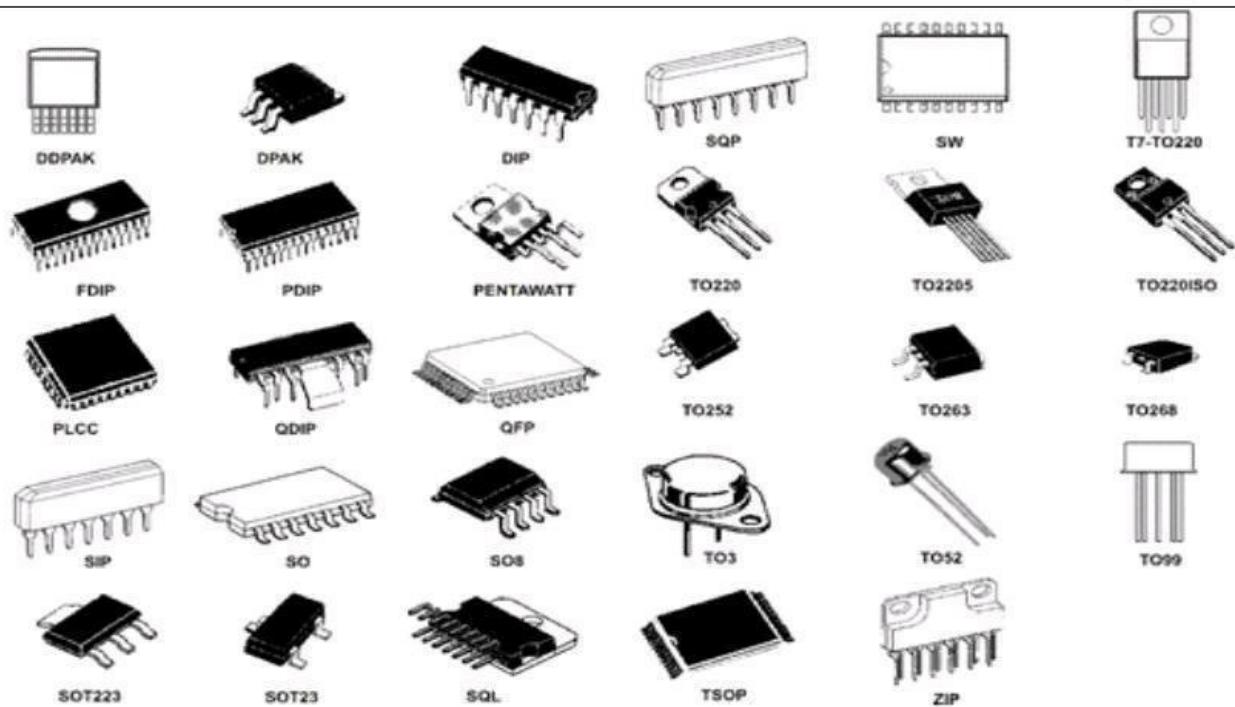
Resistor Array



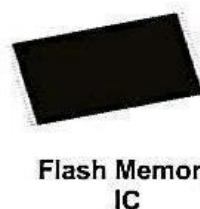
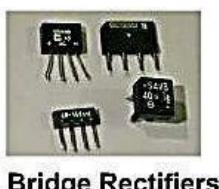
Rectifier Diodes



Resettable Fuses



IC Transistors



Chapter 10

The Soldering Process

This chapter will give you the complete guide of soldering and desoldering components.

Soldering Technique Required Tools

Before discussing soldering techniques, one should must set up a \soldering work station”. The following is a list of tools for a typical soldering station.

1. Variable temperature soldering iron: used for applying heat to joints during the soldering process.
2. Damp sponge: for cleaning soldering iron tip.
3. Rosin-core solder: to electrically and mechanically bond a component to the PCB.
4. Wire cutters or side cutter: for trimming component leads and stripping insulation from wires.
5. Needle nose pliers: for holding, placing and shaping components.
6. Desoldering pump and/or desoldering braid: for removing solder.
7. Scotch tape and/or a \Third Hand”: for securing components.
8. Safety glasses: for eye protection. These are mandatory in the lab.
9. Magnifier: to provide more detail during intricate work. A magnifying glass is convenient, but an illuminated magnifier is better.
10. Light source: to prevent eye-strain.
11. Ventilation: to extract and dispel fumes generated during the soldering process.
12. Flux: to clean components and PCB pads.
13. Acid brush: to assist in the removal of flux residue.

Prior to soldering it is a good idea to have all components organized as it will make populating the PCB more efficient. Make a BOM (bill of materials) for the PCB, and ensure before soldering that the components have been collected. The schematic and PCB layout will also be referred to when populating the board

Important Soldering Tips

The following tips provide a quick guideline on how to make proper joints.

Cleanliness: All parts, including the soldering iron tip, must be clean and free from grease, oxidation and contamination. Solder does not flow over contaminated areas; moreover, solder is repelled by dirt. Severe contamination is evident when solder begins to “bead”. A common source of contamination is oxidation. Old components and copper boards will often have an oxide layer that prevents a good solder joint. Ensure all components have shiny leads and the PCB has clean traces. An abrasive such as a blue or pink eraser, emery paper, or steel wool can be used to remove the oxidized layer from the

PCB board and components.

Tinning: In addition to being clean, the soldering iron tip must also be tinned (coated with solder). Tinning the tip allows solder to flow on the components more quickly rather than the soldering iron tip itself. Tinning involves adding a few millimetres of solder to the tip and then wiping and rotating the tip on the damp sponge to reveal a shiny surface on the tip of the soldering iron: a thin layer of solder will coat or ‘tin’ the tip of the soldering iron. When done soldering, tinning the iron is required to protect the tip from oxidation thereby dramatically increasing its life.

Temperature: Ensure that both the component leads and the PCB’s copper layer are heated at the same time. The soldering iron tip should contact both the component and the PCB pad. This will ensure that each surface is relatively close in temperature resulting in a good joint. If there is a temperature difference between the two surfaces, the solder will form a ‘dry’ joint. Soldering irons are typically set around 650 Fahrenheit, depending on the lead-tin ratio of the solder being used. Too much heat causes excessive ‘sputtering’ of flux, and too little doesn’t melt the solder in a timely manner.

Duration: The duration that the iron is in contact with the component and PCB is dependent on the size of the joint and your soldering iron temperature. For the typical PCB through-hole joint, it should take a few seconds to heat the joint and apply the solder. This will require practice, so don’t expect to be fast if you are a beginner. Excessive heat (several seconds in duration) will damage sensitive semiconductors. If this is a concern, use a heat sink attached to the component leads: sometimes as simple as an alligator clip. These concerns can sometimes be avoided by soldering sockets instead of the semiconductor itself.

Adequate solder coverage: If too little solder is applied, the joint will not make a secure connection and will cause erratic behaviour. However, if too much solder is applied, the joint may bridge with adjacent joints resulting in electrical shorts. How much solder to apply comes with experience.

Handling: Most modern electronics systems contain static-sensitive devices. Use proper handling procedures to minimize the likelihood of damage: grounding wrist-straps, grounded soldering irons, grounding mats, etc.

Precautions

Soldering Irons get very hot (600-8000F, 315-4250C), please ensure you follow precautions during use. Basic safety precautions are listed below.

Never leave your iron turned on while unattended.

Turn the soldering iron off when it is not being used. If the iron is left on for long periods of idle time, the soldering iron tip will be destroyed through oxidation.

Eye protection must always be worn when soldering. Hot flux can spit up and into an unprotected eye. In the Capstone Design Lab, use of eye protection is mandatory.

If the cord of the soldering iron is damaged, inform the lab staff who will ensure it is replaced.

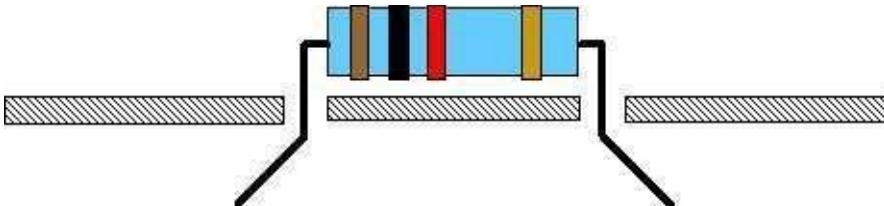
Never set the soldering iron down on anything other than an iron stand. To prevent burning your fingers, use needle nose pliers, heat resistant gloves, or a third hand tool to hold small pieces.

Familiarize yourself with the safe handling of all materials used during the soldering process. This includes solder, flux, alcohol, and desoldering braid. Each has a Material Safety Data Sheet (MSDS) and can be found in the lab or online. "Safe Operating Procedures" are found posted on the wall close to the soldering facilities.

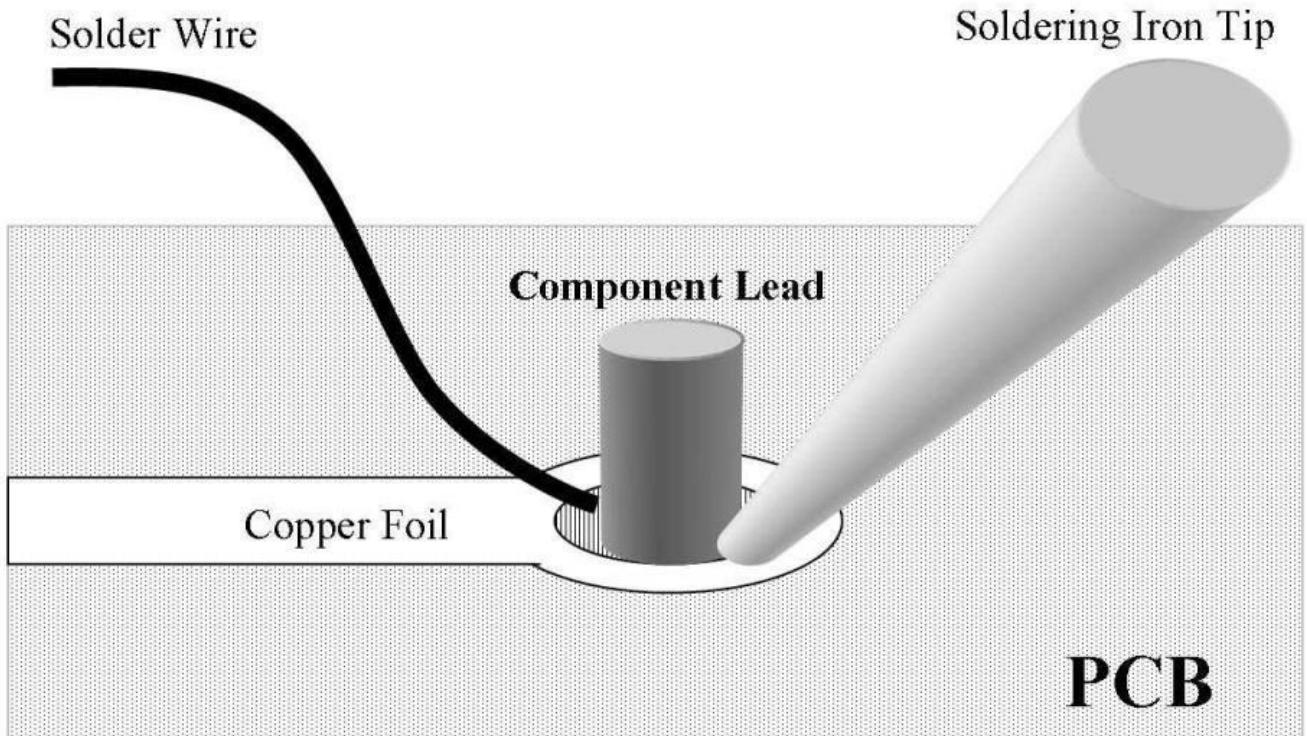
How to Solder Through-Hole Components

Most of the soldering done in the Capstone Design Lab is through-hole. A through-hole joint is a type of soldering joint in which the component joins with the PCB pad through a physical hole in the board. The following steps will illustrate how to make a proper through hole solder joint on a PCB.

1. Ensure that the printed circuit board and all components are clean. Cleaning can be achieved with a mild abrasive and/or the application of flux.
2. Plug in the soldering iron, turn it on, and let it warm up for 2-3 minutes.
3. Wet the soldering station sponge with the water provided in the lab. Do not wet the sponge in the bathroom or the water fountain.
4. Clean the tip of the soldering iron and tin it with solder.
5. Insert the component into the holes. Ensure that the component is secure by taping the component or by using a third hand. Optionally, the component leads can be clinched as shown in Fig. below, however, is not recommended for two-sided boards as the flow of solder to the component side is restricted.



6. Apply the soldering iron tip to one side of joint making contact with the component lead and the board copper foil, ensuring that both are heated up to the same temperature.
7. Slowly add a few millimetres of solder to the other side of the joint. DO NOT apply solder to the soldering iron tip. If enough heat was applied to the PCB pad and component wire, the solder will flow freely onto the joint.



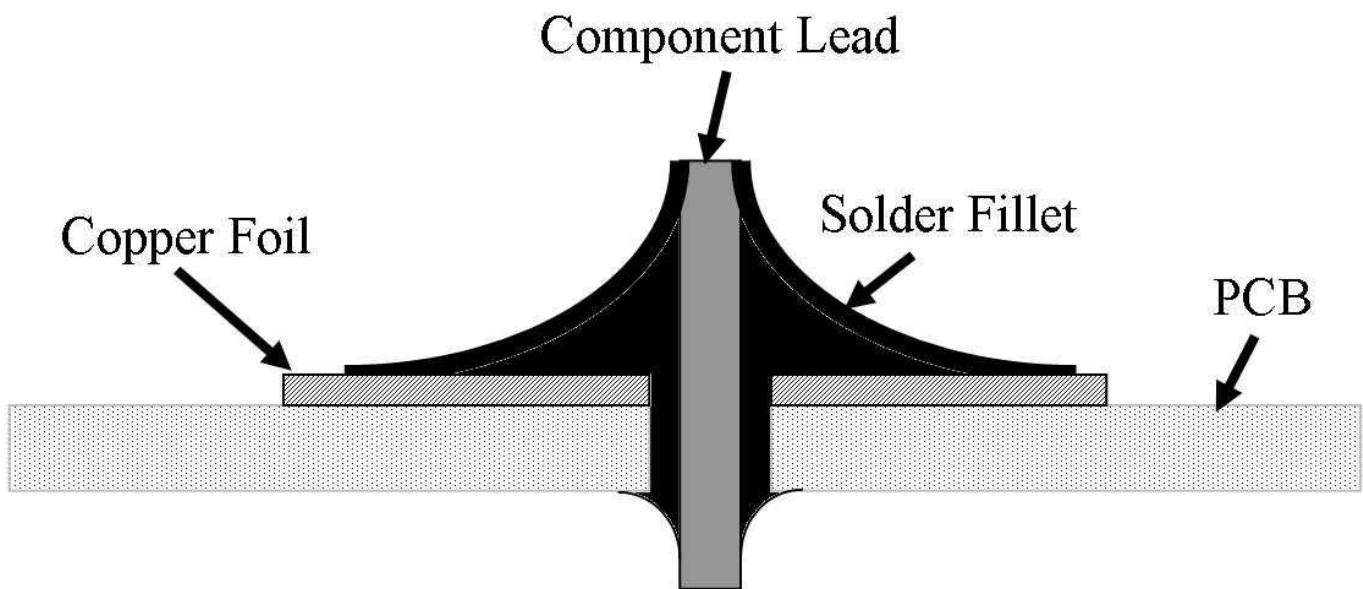
8. Remove the solder when the joint is suitably covered .



The goal is to get the joint to be a “fillet”: a curve

9.If the PCB is double-sided, the solder should flow through the hole around the component lead and make a bond on the component side of the board (opposite to the side that the solder was applied). If this ‘wicking’ does not occur, the hole may be undersized, clinching could be blocking the solder’s path, or the component lead is not clean.

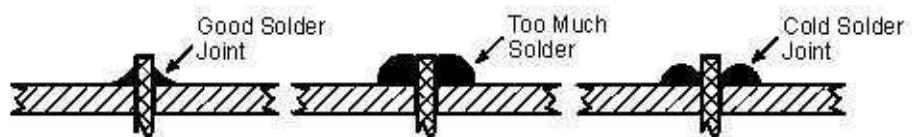
10.Remove the soldering iron and allow the joint to cool naturally.



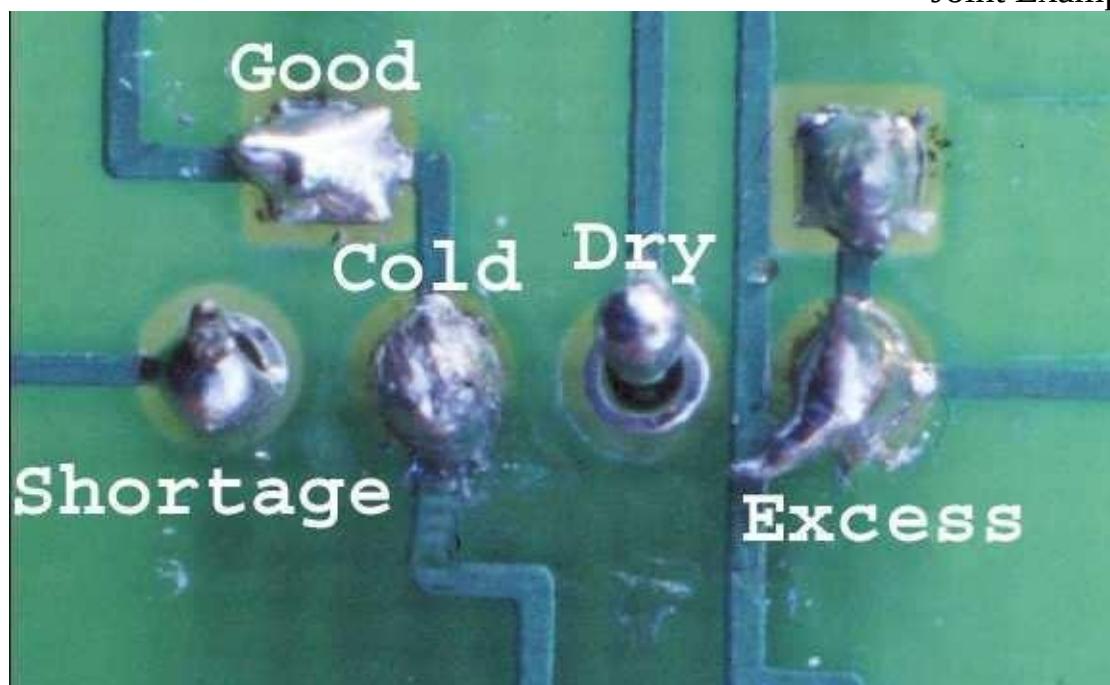
11. Cut the lead of the component, if necessary.



Good Solder Joint

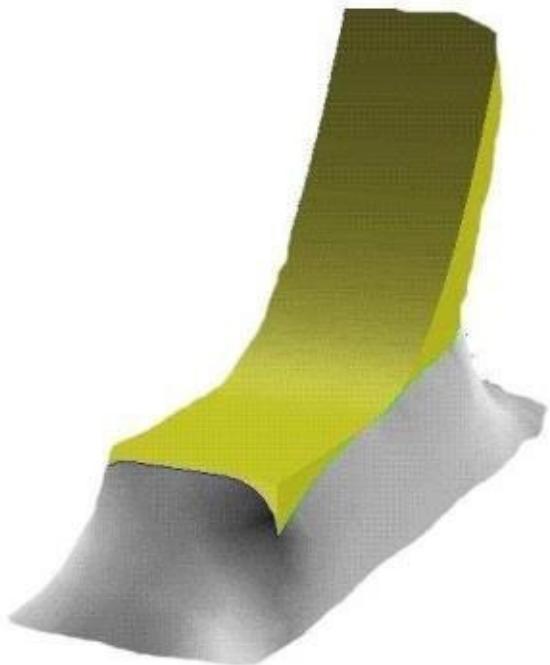


Joint Example

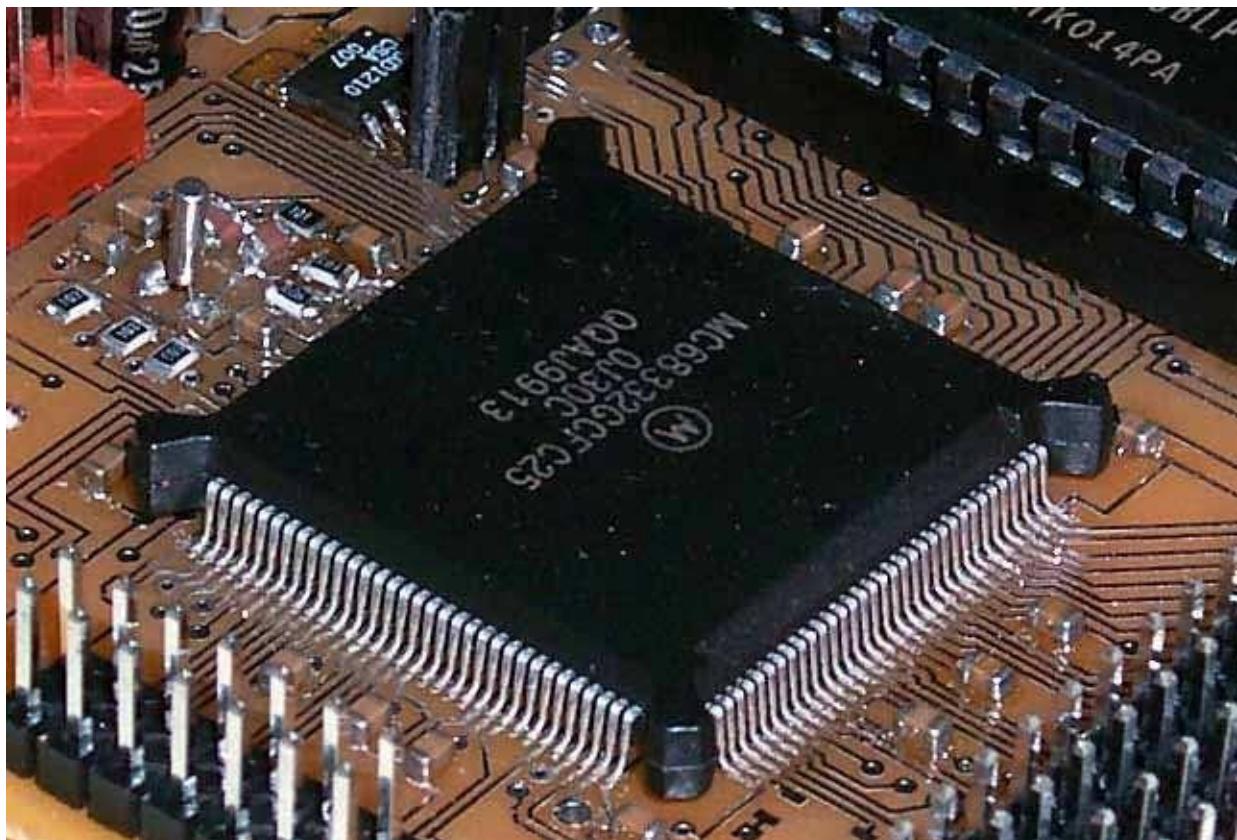


How to Solder Surface-Mount Components

Surface mount soldering requires more experience and skill than through hole. It is recommended that one practices with through-hole prior to attempting any surface mount soldering. As the name suggests, surface mount involves soldering a component to either the top or bottom surface of a PCB. Depending on the footprint, the pads are usually spaced closer together (near pitch), making the



soldering more susceptible to solder bridges,
etc.



The actual soldering of the joints is similar to the through-hole method. One difficulty, however, is

maintaining the part's alignment on the PCB pads. A good technique is outlined here:

1. Align the component on the PCB pads. This can be aided with the use of tweezers and dental picks.
2. Secure the component to the PCB by applying a small amount of pressure onto the top of the component using a small slot screwdriver. An index finger resting on the end of the screwdriver provides enough force to secure the device.
3. Solder one of the corner component leads to the PCB pad.
4. Align the remaining pads and solder the opposite corner PCB pad.
5. Solder the remaining pads in a pattern that does not build-up too much heat in the device

Testing Connections

After completely soldering a component to a PCB, it is good practice to ensure connectivity between the component wire leads and the PCB pads they are soldered to. A DMM (Digital Multi-Meter) is sufficient to determine connectivity; many DMMs include an audible connectivity setting, but failing this, measure the joint resistance.

Desoldering Technique

Desoldering may be required for several reasons:

- a component may have failed
- a wrong part was installed;

a design modification necessitates a change; or if a board contains expensive components that can be salvaged.

Whatever the reason, there are three common techniques to remove solder from a joint: using a desoldering pump, a desoldering wick, or desoldering iron.

Regardless of the method used, if it is permissible to destroy the part during removal, then a lot of time and effort can be saved. For instance, using wire cutters to trim off all the pins of a through-hole IC so they can be removed individually makes the removal process much easier. In most cases, avoiding damage to the PCB is of paramount importance.

Solder Pump/Sucker

A desoldering pump is exactly what it sounds like: a pump that sucks up solder. Usually the pump is spring-loaded and provides a recoil when released. The four steps below outline how to desolder a joint using a desoldering pump.

1. Prime the desoldering pump. This involves depressing the desoldering pump spring. The pump will click when correctly depressed.
2. Heat the joint from one side with the soldering iron tip. Wait 1-2 seconds until the solder begins to melt from the soldering iron heat.
3. Put the pump tip on the other side of the



joint. Don't be afraid to actually touch the joint.



Desoldering Braid/Wick

4. Press the desoldering pump spring release button to suck up the solder. This procedure should be repeated if the joint has a significant amount of solder. If done correctly the joint should eventually be removed.

known as \wicking". Desolder braid is a piece of material that sponges up molten solder by capillary action that draws solder away from the joint the braid. The following procedure outlines the basic steps involved in desoldering a joint using desoldering braid.

1. Place the desoldering braid over the joint.
2. Press the desoldering braid onto the joint with the soldering iron tip. This will apply heat to the desoldering braid and the joint allowing the molten solder to flow.
3. Wait for the solder to melt. The solder should flow onto the braid and away from the joint.
4. Cut off the solder coated portion of the desoldering braid. There should be no



copper visible in the portion that is removed: braid is very expensive.

Desoldering Iron

Using a desoldering iron, available with higher-end soldering stations, is similar to using a solder sucker. The desoldering iron is essentially a soldering iron with a built-in vacuum.

1. Make contact between the iron and the joint to be desoldered, ensuring the vacuum opening is not blocked.

2. Once the solder on the joint has become molten, depress the button on the iron to activate the vacuum.

It is very important for the life of the desoldering iron that the vacuum assembly be cleaned after every session of use. Please ask the lab personnel for a description of the cleaning procedure.

As with a normal soldering iron, the desoldering iron tip should be tinned before and after every use.

Removing Components Effectively

To remove a component with little or no damage to the PCB or component takes practice and patience. Often when removing a component, PCB pads and tracks may be damaged by \lifting" o

the board. Below are some tips that may be useful when removing components from a PCB.

Desolder all joints pertaining to a component prior to removal. It may be necessary to go over the joints several times before all the solder is removed. Practice patience.

Use pliers and gently pull on components while applying heat to the joints. The assistance of a friend can help with this.

Do not pull with force, because the PCB pads and tracks will be damaged.

Do not try and remove components by prying them.

Do not try to push the component out of the holes with the soldering tip. This will certainly lift the copper pad off of the PCB and ruin the iron tip.

In order to get better thermal conductivity between the iron and the solder joint, it is sometimes effective to add a small amount of solder.

Chapter 11

Motherboard Repairing

Introduction

Now I get the impression that motherboards scare a lot of people in this field, you know people don't want to deal with them or replace them or try to fix them. It's a little daunting to try to diagnose the motherboard it might seem, but what I'm going tell you is it's pretty easy. Here's four main symptoms that could go wrong with the motherboard and they are

Four symptoms of a bad motherboard:

1. Computer won't turn on
2. Components won't work
3. Computer shuts down randomly
4. Computer acts abnormally

1. computer won't power on

We got a laptop that doesn't power on. How can you tell if the motherboard is bad? Well, you just ask yourself why else wouldn't a computer power on? Number one, if it's on battery power, the battery is dead or the battery is bad and number two the AC adapter could be bad, so let's roll out number one.

Pull the battery out, keep the battery out of the computer for this test and then take your AC adapter and check the voltage with the voltmeter and I'm going show you how to do that right here. Take a voltmeter and what you want to test for is voltage. Put the meter at 20 volts DC and take the tip, the power jack tip. You hold your black, your negative on the outside of the tip and you put the red in the hole in the inside of the tip. Be very careful not to touch the red and the black and the tips together, otherwise it will create a short circuit. After doing these things, be sure you have 19 volts DC or just about 19 volts DC registered on your multimeter so we can know that the power adapter works. Now, just to make sure the connections is tight, kinda bend the power cord a little bit and make sure that the registered 19 volts DC on the multimeter or voltmeter will not fluctuate or move when you bend the power adapter cord a little. Okay if you're still getting 19 volts DC when bending the power adapter cord, jiggle the power adapter cord a little bit around make sure that there's no crimson wire. Now, after you bend the power adapter cord and jiggle it and you still have 19 volts registered on your multimeter, then the power adapter tip is probably good. A lot of time you know the tip will break, great in this area here, and you wouldn't get that 19 volts DC after you do that, after it's broken. So instead of just taking the whole computer apart and finding out if the laptop has appropriately good power jack, test the power adapter first.

Now another reason a motherboard might not turned on is because it's not getting power to the power jack. Power jack might be damaged, so absorb what you can from the outside and see if it's the power jack is loose or detached from the motherboard and if it is then

you know you have to replace the power jack probably, but if it looks like it's secure the only way we're gonna be able to test the power jack is to get down to the motherboard level and look at where the power jack is soldered on to the motherboard and this I cover in many of the case study videos. Other things that may cause a laptop motherboard not to power on...

Now there's a few other things that might cause a motherboard not to turn on or computer not to turn on, it could have a bad processor, but bad processor are fairly rare I would say 1 out of 75 computers are working on, it's the processor rather than the motherboard that's bad and also there's like maybe the power button on the actual laptop is broken or something mechanical like that, but again that's unlikely but you could check those things too.

2. Components won't work

Okay number two, components on a laptop won't work. For example, a CD drive or a wireless card don't show up in windows. Whether not working properly, well that could possibly be a motherboard but the way to test that is to replace that component. If your CD drive is not working replace the CD drive if it's still not working maybe the CD drive controller or the motherboard is bad. I've had that happened on a couple Toshiba laptops I worked on. I've bought a brand new CD drive put it in, still not working, still wasn't recognized by the BIOS and it was a bad motherboard. Now HP, I also had a problem of their wireless card but it wasn't the wireless cards that were bad it was the actual controller on the motherboard, that controls the card that was bad. I think it was positioned next to a chip that got real hot like the graphics chip or something like that, on the motherboard. So if you have a laptop with components not working, you replace the components and they're still not working then you might have a bad motherboard. Now how do you roll out if windows isn't causing this problem or the operating system's not causing the problem. Well, test it with a different operating systems. This is always a good test of the motherboard using like Linux distribution like knoppix or using the Ultimate Boot CD for windows. These are both bootable CD's and it's essentially testing the hardware of a laptop because you're running it on a different operating systems. Last thing to try if components aren't working and you suspect is your motherboard. Flash the bios of the motherboard, maybe the BIOS got corrupted somehow, and since the BIOS is like handles the basic functions of a computer, maybe it's not doing its job and causing some abnormal activity in the computer.

3. Computer shuts down randomly

Okay number three, laptop shuts down randomly. Now this is a common symptom of a laptop overheating. So let's make sure it's not an overheating problem and how do we do that? Well, what I do is I take a can of compressed air and I blow it in the laptop, in the bottom where the fan is and also in the heat sink, on the side of the computer. If you do this you might see clouds of dust come out and that's a good thing that you want to make sure you get all the chunks out of the laptop before you turned it back on, because those chunks of dust that might still be stuck in there, might cause the fan blades to actually

stick. I go over this in the case study videos several of them. Watch how I do that there and you can see in action you know cleaning out laptop, getting old dust out of it. Now, once you get the dust out of a laptop and you're sure that the fan is spinning and the airways are clean, if the computer keeps shutting down after this, you can be very sure that's not the CPU overheating that's causing the problem but the problem with the motherboard. I had systems where I opened them up I make sure all the airways were clean, I make sure that the heat sink was making a good connection with the processor, put it all back together and the computer still power down. It turned out it was a bad motherboard

4. Computer acts abnormally

Okay number 4, the computer or the laptop acts abnormally. It blue screens, things aren't working the way they're suppose to, it doesn't boot up every time, it doesn't boot up at all sometimes. Now, first I want to make sure it's not Windows that causing a problem. So again we're not going to deal to much for the software sides to do all your Windows fixes and make sure Windows isn't causing the problem or like I said before, just run knoppix which is a good Linux distribution, the Ultimate Boot CD for Windows which is also great and then you'll know Windows isn't the thing that's causing the problem then. If you're still having problems with the computer acting abnormally, start taking out components one by one. Take the hard drive out, you could do that if you're running it from a live Linux distribution. Take the ram out, replace the ram maybe with the stick around that you know is good that you have around in the shop, take the wireless card out take the CD drive out. Start taking components out one by one and get the motherboard down to basics like CPU, one stick of ram, motherboard and power, and hook up the screen, and just make sure that it goes on. But break it down to basics so you're sure that it's not a component that's causing the problem. So once you have it of broken down to basics and you're sure windows isn't causing the problem, then it's probably a bad motherboard. Okay it's a bad motherboard.

Dead Motherboard: Total Power Loss

Laptop does not start. Is it bad power jack or power fuse?

Let's say your laptop does not start at all. You plug in the power adapter and press on the power button, but the laptop will not react. It's dead and the power or battery charge LED will not light up.

What could be wrong? Is it bad power jack or the motherboard is dead? By the way, the power jack aka DC-IN jack is the power socket on the side or back of your laptop where you plug the AC/DC power adapter.

I'll explain how to perform basic troubleshooting and find out what is wrong. This is only for experienced people, who know how to disassemble laptops.

First of all, test the AC/DC power adapter with a multimeter. It's very likely that there is noting wrong with the laptop and your problem is related to the power adapter.

If the adapter tests fine and output correct voltage, disassemble the laptop and remove the

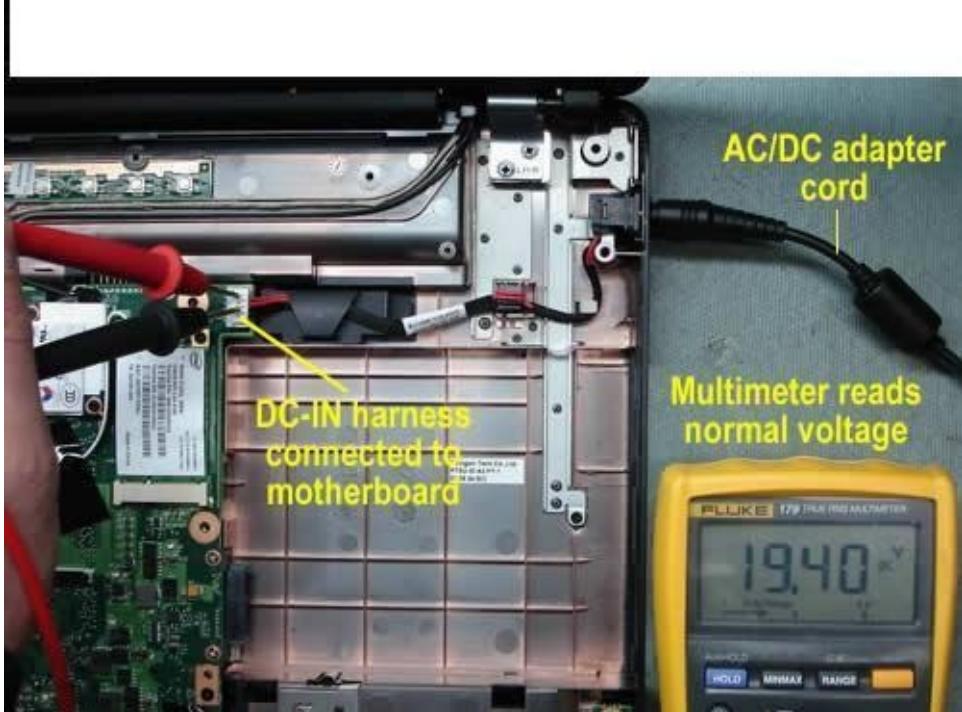
top cover.

As you see on the first picture, in my laptop the power adapter plugs into the DC-IN power jack which is connected to the motherboard via a harness. In some models the DC-IN power jack is soldered directly to the motherboard.

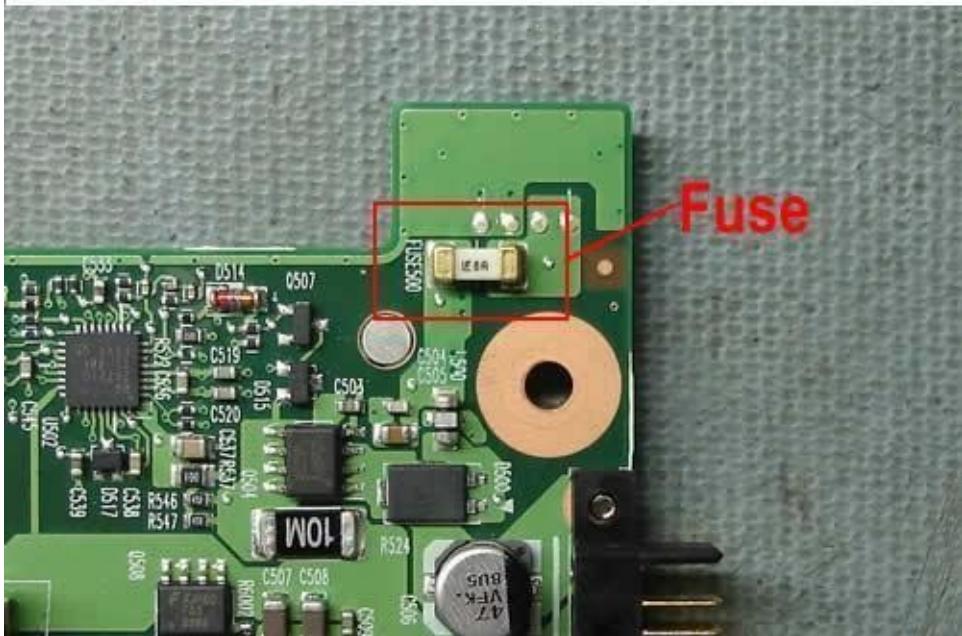
Plug in the power adapter and measure voltage at the point where the DC-IN jack or DC harness (like in my case) connected to the motherboard.

If you are reading the same voltage as on the AC adapter, it means the power jack or harness works properly and the problem is related to the motherboard.

If there is no voltage, most likely there is a problem with the jack or hardness and it has to be replaced



By the way, in some case the problem could be related to the fuse which is usually located somewhere very close to the power jack/harness connector. You can test the fuse with a multimeter.



If the fuse is bad, the motherboard will appear to be dead even if there is nothing wrong with the power jack and AC/DC adapter. If that's the case, replacing the bad fuse should fix the problem.

No power Problem

Diagnosis, Cause and Remedy:

The first thing I did was testing the power adapter with a multimeter in order to verify whether the power adapter is the one that's causing the no power problem or not. The supply voltage indicated on the power adapter is 19v, when I tested it, the supply voltage is just normal. Since the power adapter is just okay, our concentration now is on the laptop itself. In order to ascertain whether the motherboard of the laptop or other peripheral devices which is connected to the laptop causes the no power problem, we have to disassemble the laptop piece by piece. After unscrewing all the laptop parts, I individually pull out each peripheral devices. After completely taking out all devices which is connected to the laptop. I now separated the motherboard in order to be tested. But first I clean out all the dust from the motherboard for this is also a one factor which causes the motherboard electronic components to be shorted. Because when dust gets thick it will become a conductor.

So you need to be aware of this, every time you disassemble a laptop motherboard you need to free the motherboard from all dust, to be sure not the dust is the element causing the motherboard's electronic component parts to be shorted. After cleaning all the dust from the motherboard, I scan all the components to see whether there are any dry joints or not. Dry joints means loose or poor solder connections. Poor solder connections on a laptop motherboard usually occur when your laptop is already well-advanced in years. I did not find any poor solder connections on any part of the motherboard, but for contentment I just carefully resoldered all the SMD components especially on the power section.

Note: All laptop nowadays is designed on a Surface Mounted Device or SMD mode, and this is rarely have dry joints. But for satisfaction I cautiously resoldered all the SMD components particularly the SMD components near the dc power jack.

After resoldering all the sections that needs to be resoldered, I inserted the dc power plug adapter to the dc power jack and see whether the power comes up. Unfortunately, the condition of the problem remains the same. I now tested all the electronic parts on the motherboard to find out whether there are any shorted electronic element parts which causes the no power problem. After testing all the components that could be tested merely with a multimeter, I could not find any shorted parts. The only parts that I still not checked was the dc power jack and the fuse

The final step that I did was testing power jack from input to ground for short. When I tested it, voila! the problem found because it is really shorted. I used x1 range of my multimeter to see the fault and either way there's a deflection. When I go on testing the fuse, I found that the fuse was also open, the rate of the fuse is 5.5 amperes and upon further inspection I found a shorted diode.

The reason why the power jack terminals were shorted is because of the shorted diode that is connected to the power jack. Replacing the diode and the fuse brings the laptop to life.

More About Motherboard Repairing ABOUT THE PCB

The Laptops motherboard or PCB which stands for Printed Circuit Board is made up of layers (it isn't just a thick green plastic board). These layers will be —layered with traces. The traces are copper —wires though not all traces are —wire that travel all throughout the board. Once the Layers and Traces are Set and the board Overcoat is Applied, The Holes or Lands are applied. All are drilled or laser etched. Then contact pads are added to the holes. Some will have only surface pads, and some will have c-caps and lands that go through the hole and out to the opposite side with a contact pad attached to both sides and having a contact —wall through the entire wall of the hole. The purpose of the —wall in the center of the hole is to make contact with the trace inside the board layers corresponding to the holes positioning on the PCB.

The Laptops Motherboard will be colored Green (some are blue), Always having 2 shades of green (or blue); a light green/blue and a dark green/blue. The dark green being the —base board color and the light green printed on to indicate Trace paths and component sections. Then you will see white lines printed all over the board which will correspond with the schematics data on the board component layout. The manufacturers stamp the lines in position to diagram-out the component part numbers; and printed labeling; for every component.

ABOUT LAPTOP SCHEMATICS

<http://www.laptopschematic.com> will have a lot of Schematics available for you
<http://www.eserviceinfo.com/index.php?what=search2&sear> is another place to obtain Schematics for Laptop PCBs
<http://laptop-schematics.com/> another great place for schematics

<http://notebookschematic.com/?tag=kt2-motherboardschematic> Try here as well

Laptop motherboard Schematics sheets are a valuable tool in laptop repair and will be needed for certain motherboard repairs. The schematics will be the "Dblueprints;" of the motherboard and its layers. It will show you the components location, the components power rating, and if it runs in a series, it will reveal that also.

When repairing the motherboard, you will refer to the schematics sheet when you can both visually see the damaged component, and also when you can't see any faults. The schematics sheet will help you when trace re-routing is needed by showing you all surrounding areas (all sides and beneath area in question). If you can visually see the faulty component, the schematics sheet will tell you the exact part name and its rating. This information will allow you to properly test the fault and properly test post-repair for continuity.

MOTHERBOARD REPAIRING TECHNIQUES

Let's say, for instance, that the laptop had a loss of Audio, and you have already determined that the speakers themselves are not the issue. You can look at the motherboard schematics sheet block diagram to locate the path of the onboard audio and locate all components on that path. This will allow you to hopefully locate if there is a fault. The audio will travel from the Southbridge, or the GPU/Southbridge, and you will see it branch out to different controller sections, like the amplifier, the microphone, the audio jacks/modem etc... Each section having its own set of components like voltage regulators, resistors, capacitors, controller ICs, diodes etc... Knowing the faulty components location in relevance to all other components will help you in determining any hidden faults and help you better direct your testing instead of having to test the entire motherboard.

Knowing how the initial failure occurred is very beneficial to helping to locate the fault. If you know that the problem is related to a lightning storm and the power was going in and out, you can direct the diagnosing towards the power input and leading tracks. This would include all components on those paths, like voltage regulators, tantalum capacitors, resistors, diodes and related. Also you would determine from the schematics sheets, the proper testing voltage/amp/current of all those components. Let us say that that did in fact happen to the laptop in question with the fault. You would begin by making sure the AC Adapter is properly functioning. Moving on, you would begin a visual and audio inspection of the motherboard.

Your audio inspection:

Listening closely to a faulty motherboard will sometimes reveal the faults location, or at least show the end result of a blown series of components.

You will sometimes be able to hear blown components making a high pitched buzzing noise, or it will sometimes be a beeping noise, then sometimes it can also be clicking noises.

Your visual inspection:

The visual inspection is the most important part of motherboard testing. It can also be the difference in hours of testing as opposed to directly noticing the issue.

Printed circuit boards (PCBs) are vulnerable to environmental influences; for example, the traces are corrosion-prone and may be improperly etched leaving partial shorts, while the vias may be insufficiently plated through or filled with solder. The traces may crack under mechanical loads, often resulting in unreliable PCB operation. Residues of solder flux may facilitate corrosion; those of other materials on PCBs can cause electrical leaks. Polar covalent compounds can attract moisture like antistatic agents, forming a thin layer of conductive moisture between the traces; ionic compounds like chlorides tend to facilitate corrosion. Alkali metal ions may migrate through plastic packaging and influence the functioning of semiconductors. Chlorinated hydrocarbon residues may hydrolyze and release corrosive chlorides; these are problems that occur after years. Polar molecules may dissipate high frequency energy, causing parasitic dielectric losses.

Above the glass transition temperature of PCBs, the resin matrix softens and becomes susceptible contaminant diffusion. For example, polyglycols from the solder flux can enter the board and increase its humidity intake, with corresponding deterioration of dielectric and corrosion properties. Multilayer substrates using ceramics suffer from many of the same problems.

Conductive anodic filaments (CAFs) may grow within the boards along the fibers of the composite material. Metal is introduced to a vulnerable surface typically from plating the vias, then migrates in presence of ions, moisture, and electrical potential; drilling damage and poor glass-resin bonding promotes such failures. The formation of CAFs usually begins by poor glassresin bonding; a layer of adsorbed moisture then provides a channel through which ions and corrosion products migrate. In presence of chloride ions, the precipitated material is atacamite; its semi-conductive properties lead to increased current leakage, deteriorated dielectric strength, and short circuits between traces. Absorbed glycols from flux residues aggravate the problem. The difference in thermal expansion of the fibers and the matrix weakens the bond when the board is soldered; the leadfree solders which require higher soldering temperatures increase the occurrence of CAFs. Besides this, CAFs depend on absorbed humidity; below a certain threshold, they do not occur. Delamination may occur to separate the board layers, cracking the vias and conductors to introduce pathways for corrosive contaminants and migration of conductive species.

A lighted magnifying glass or better yet a microscope would help you with the visual inspection to bring your field of view up close and allowing you to look for faults. You can buy a headset magnifying glass that rests on your head and has multiple lenses to allow you greater magnification. The headset also has built in adjustable LED lights. This will allow you to work with both hands free. You will inspect all components for physical defects. VOLTAGE REGULATOR

VRs will typically need to be tested with a multi-meter. To visually inspect the regulator, you would be looking at the contact arms, mainly where they meet with the contact pads, looking for melted solder as well. Usually board flex (heat contraction and expansion of

the motherboard) will cause the VRs arm to become mis-seated from the pad. When a Voltage Regulator fails due to a power surge, it will have visible signs of failure. You will need to —zoom in to closely look at the surface of the VR chip. You will see a burn area usually circle in shape and can sometimes be as small as a pin-head or as large as the chip size itself. Certain blown VRs will still allow the laptop to continue running, yet the blown VRs will also continue to —short and if left unattended and continuous power is applied, it can cause the surrounding area to burn and possibly set ablaze. If you in fact do see visual damage, you will replace that voltage regulator from the motherboard. Usually it will only be that 1 VR, and not the set (if in a set or series). First area to check is right near the DC Input (whether the DC Jack Lands, or the Plug-In DC Jack Port) area, looking in the direct area and also on the opposite side of the motherboard. The HP dv9000, dv6000 are 2 good examples that have

common failure to the Voltage Regulator chip located near its dc jack input plug port. This VR blows quite easily and most likely due to poor/cheap manufacturing.

Grounding pin will usually be the last pin, schematics can help you on the pin count of needed, and will tell you the last pins location and possible other grounding pins (so you don't get false readings). Once you place the multi-meters negative probe on the ground pin, you will go around the arms starting from arm 1 and continuing around. To test for continuity, you would set the multi-meter to beep or screech when positive power is detected. To replace the faulty VR, you will need an exact replacement VR. You can't just take one that resembles the faulty one off of an alternate motherboard and expect it to work. It will most likely have a different rating than the one at fault and can cause other nearby components to blow like oscillators or caps. You can locate an exact series motherboard and remove the VR from it to use in replacement of the faulty one. This might be your best option for replacing the component if you do not repair laptops on a regular basis and have access to component inventory surplus. Looking up the part number (zoom in on the IC surface to find it), then either Google it, or go on EBay to locate an exact part match. If you get lucky you will find it, you just have to hope the seller/vendor allows the purchase of a singular one and not require you to buy in Bulk (usually a case or 144). CAPACITOR

The capacitor, or ceramic capacitor, or tantalum capacitor... will also be a component you want to closely look at if you are looking to diagnose a Power failure like a lightning strike (my example) and a Power surge or dip occurred. Visual inspection will reveal cracks in the capacitor or cracks in

the contact tray and pads. Electrolytic capacitors will test differently, as they will leak and will bulge when failing. A useful tool for motherboard testing is a USB microscope. They are sold in various strengths and even the cheapest – lowest strength scope will help greatly in seeing the components, especially when you are able to view it on a monitor and save the captions to disk.

The way a capacitor should be tested is Out Of Circuit Testing, any component for that matter. In- Circuit capacitor testing can be done using a Capacitance Meter, In Circuit ESR meter. OTHER

The power inductor and the power choke coil(s) can also be affected in a motherboard failure issue. You will be able to feel the heat resonating from them usually after failure.

Resettable fuses will fail but rarely will...BIOS chipsets will fail too, they will get blow outs in the center area of the chips surface and is usually visible.

IMPORTANT Addition

A lot of motherboard failures are not a direct result of —mother Nature or the mis-use or even thermal or mechanical breakdown. There are other Not Well Known ways a motherboard component can fail. Packaging and Storage is one. The moisture content and chemical exposure in the packing materials can greatly affect the longevity and stability of the Motherboard and Components thereof. This can cause —motherboard Warp, it can also deteriorate certain affected components on the board, even damaging the contacts. It will deteriorate the wires and cables making them brittle and fragile, it can cause a lot of harm.

Another hidden cause left undiagnosed can be an incorrectly covered trace or land (manufacturer defect). This can cause shorts, it can cause trail blow-outs because the heat generated from the PCBs components will further wear away at the fault areas, causing that component to fail, which for example can throw dc voltage through a path requiring no dc.

Another hidden cause left undiagnosed is a solder chip or ball that was left on the board after the manufacturer completed build on the board. This piece might have stuck to an area on the board having a —negative contact, then at some point that chip or ball was knocked loose being knocked around inside the laptop until eventually touching a voltage regulator positive pin arm or similar components power contact. Which; in turn, would blow that; or any related component, leaving no suspect to the cause of the failure upon inspection.

THE POWER CHOKE COIL, Power Inductors & Chokes

A choke is a coil of insulated wire, often wound on a magnetic core, used as a passive inductor which blocks higher-frequency alternating current (ac) in an electrical circuit while passing signals of much lower frequency and direct current by having an impedance largely determined by reactance, which is proportional to frequency (see Inductor and Inductance). Chokes are typically used as the inductive components in electronic filters.

The name comes from blocking—“choking”—high frequencies while passing low frequencies. It is a functional name; the same inductor is often called a “choke” if used to block higher frequencies, but a “coil” or “inductor” if, say, part of a tuned circuit.

The End