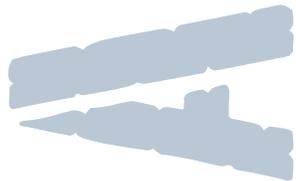
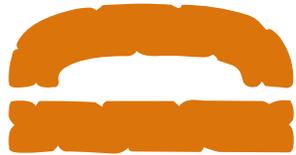


MacBook Pro



MacBook Pro 15-inch Repair Guide

Get the most out of your Mac. Visit Powerbookmedic.com today.

TAKE-APART

Our guide will show you step by step how to take apart your Mac. Each step will be given in great detail and aided with high quality pictures of each step.

REPAIR

It will also show you what needs to be done for each ailment your Mac may be having. It will explain why it is doing it and where to find the parts to fix it.

REASSEMBLE

The hardest part about a repair is reassembly. With this guide, it will assist you in getting those screws back where they came from.

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At PowerbookMedic.com, we treat each customer and each Mac like a patient. We understand the importance of your Mac in your life, as they are equally important in our own lives. Whether your Mac is healthy or sick, we hope you choose us to be your Mac's doctor.

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Disclaimer

Any portion of this manual may not be copied, reproduced, or distributed without the written consent of Powerbookmedic.com. Violators will be prosecuted.

This manual is presented as a guide in order to help you repair problems with your MacBook Pro. Working on a MacBook can be dangerous if not done properly. We at Powerbookmedic.com take no responsibility for any damage or harm done to yourself or your MacBook as a result of reading this guide.

Apple manufactures several revisions in each line of their products. This guide will try to cover each of these revisions, but you may find subtle differences between our manual and what you see in your unit. This may require small adjustments to the repair procedure as described in our manual. If you are confused at what you are seeing in comparison to the manual's description and pictures, you may contact us by phone or email and we will try to assist you.

As of the writing of this manual, Apple's warranty policy denotes that opening up your Apple product will void the warranty. If you are still under coverage by Apple for your MacBook Pro, we would suggest contacting them first.

Repair Center

Powerbookmedic.com offers a repair service if you do not feel confident on performing the repair yourself after reading this manual. The repair service is a flat labor charge plus the cost of the parts needed.

You can view our labor fees on our website by clicking on the repair center link at the top of the page.

Suggestions?

If you see any problems with the manual, tips you would like added, or any suggestions to make the manual better, don't hesitate to email us with your ideas to...

support@powerbookmedic.com

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Your Mac — Our Patient

TOOLS NEEDED

Phillips #00 Screwdriver



TORX (r) T6 Screwdriver



Spudger



Other tools...

There are more tools that may come in handy during the repair. Needle-nose pliers, a slotted screwdriver, and a flat tool such as a small putty knife may help in some areas of the repair. The guide will go into more detail when these items may be used to help ease the repair process.

"TORX(r) is a registered trademark of Textron Inc."

MACBOOK PRO 15-INCH

Introduction:

General information about the MacBook and what you should be prepared for when attempting a repair.



Welcome to the
MacBook Repair Guide
provided by
Powerbookmedic.com

YOUR FIRST LOOK AT YOUR MACBOOK PRO...

It all starts with the first look. There are several things that can go wrong with your MacBook Pro, and hopefully this guide will be able to shed some light on issues you may have, are having, and how to alleviate them.

The MacBook Pro is Apple's first line introduced in early 2006 utilizing the Intel Core Duo processor. The MacBook Pro is the successor to the Powerbook G4 line of Apple laptops. The design is fairly similar with some slight changes to the casing but numerous changes under the hood of the sleek metal exterior.

At first glance after opening up the MacBook Pro, you should see the striking similarity of the MacBook Pro to the older Powerbook G4 series. They have fairly similar designs, and if you have dabbled with repairs on one of those older models, you should not have any problems at all tackling one of these. You should also see the iSight camera built into the top of the display. All models include this camera. The manual will go in for a closer look later and guide you through replacing it if necessary.

You should also be able to notice the IR port added to the front of the machine for fun times with the Front Row software.

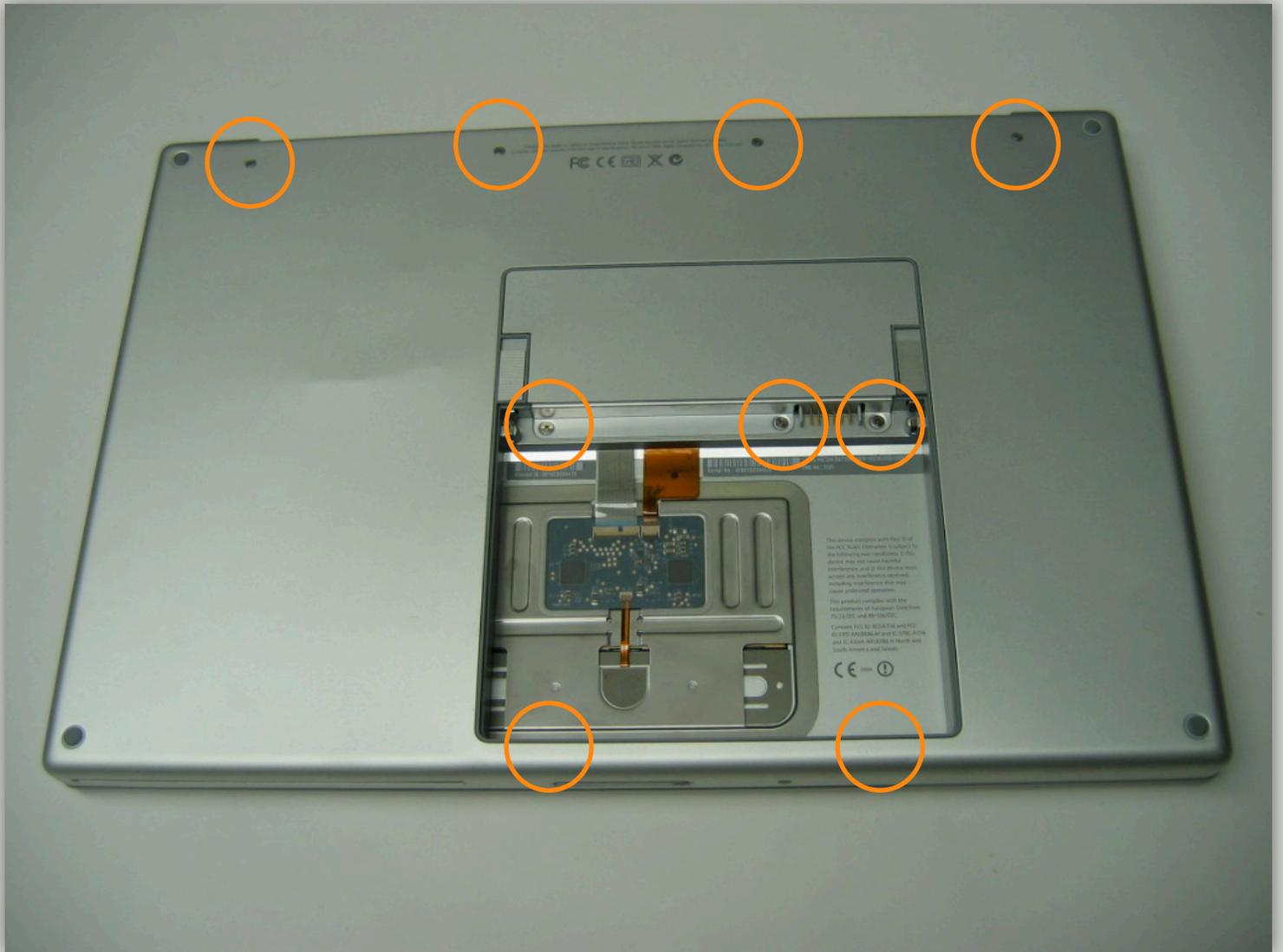
At the time of this manual, there are two different revisions of the MacBook Pro 15-inch. The original versions used the Intel Core Duo processor and came in speeds of 1.83 GHz, 2.0 GHz, and 2.16 GHz. Several months later, the MacBook Pros were rereleased with the newer Intel Core 2 Duo processors as well as a Firewire 800 port and a 2.33 GHz model. There are several small differences between the Core Duo (CD for short) and the Core 2 Duo (C2D for short) models. When replacing certain parts, be sure to take note if the part has multiple options depending on which revision you have or you will run into problems during your repair.

With all this in mind, let us begin.



MacBook Top Case

The top case includes the trackpad and the keyboard is attached to it. All repairs start here.



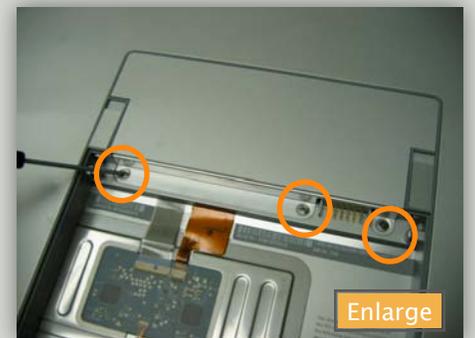
Opening up the MacBook Pro...

The first step to opening the MacBook Pro as with most Apple laptops is flipping it over and removing the battery. It is always wise to remove the battery during any repair. It is best to remove any possible electricity that could damage the components inside. If you have an anti-static wristband, that will reduce your chances of accidentally damaging your MacBook Pro.

To remove the battery, you should notice two switches near the middle of the bottom case. You will need to slide both of these switches towards the back of the machine. You should notice a red colored bottom underneath if they are being slid the correct way. Once they are both pushed back, the battery should pop out. Just grab the battery and remove it from the bay. Place it aside and be careful not to scratch the casing on it.

After removing the battery, you should be able to see the bottom side of the track-pad as well as reveal five screws. Three of the screws marked in the middle in the picture above are for the memory bay cover. These screws are going to have large polished heads and be very short. These are the only three like this you will see on the MacBook Pro so make sure you keep track of them and remember where they go. Removing the battery should also reveal two screws on the inside wall of the battery bay on the same side as the latch of the unit. These two screws help hold the top case in place. There are also the four long polished phillips head screws lining the back of the bottom case marked above. Remove all of these.

Once removed, you can proceed to take off the memory bay cover. It will slide out towards the front of the machine and then you can lift it out.



SIDE SCREWS



Top Case Screws

All of the top case screws are Phillips head screws with polished heads. There will be four on each side, two in the battery bay, and two on the back. The nine screws on the bottom will also need to be removed.

Removing / Replacing Memory...

Underneath the battery cover, you will get your first look at the main logic board (MLB for short). There will be two RAM slots. Depending on the configuration you chose when ordering your MacBook Pro, one or both of these slots may have memory modules already installed. To remove the modules, you should see metal clasps on each side. Gently push those away to the sides and that should unlock that memory module. Usually it will slightly pop up after being successful. You can then slide out the RAM. Most RAM will have a sticker denoting how much memory the chip is. You can have any combination of any two memory modules as long as they are the compatible type. The MacBook Pro uses DDR2 PC5300 SODIMM memory modules. The Powerbookmedic.com [online store](#) currently sells both 512 MB and 1 GB memory modules for the MacBook Pro 15-inch. To reinstall the memory, just slide it in the appropriate slot horizontally. Usually it works best if you are installing it in a 15-20 degree angle. Once the memory module is making good contact within the slot, you can gently

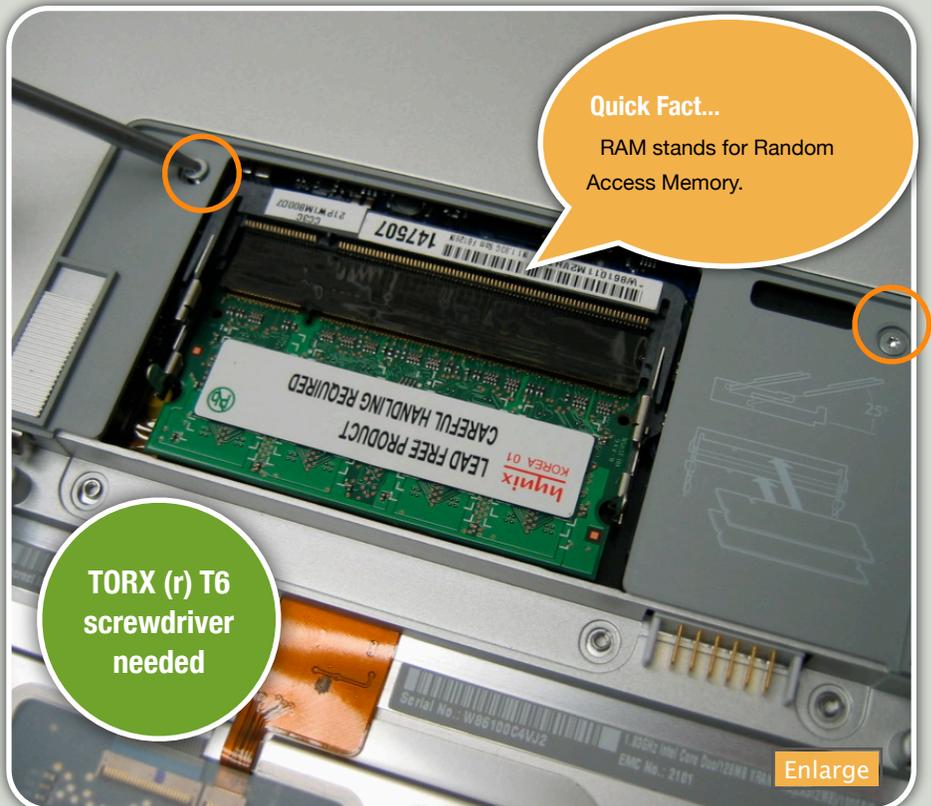
press down on the module until it pops in place around the clasps. If this is all that you needed to replace on your MacBook Pro, you can screw back in the memory bay cover.

Maximum Memory:

You can currently install two 1GB memory modules in your MacBook Pro giving you a total of 2GB in your machine.

Removing the Top Case...

There are several more screws that hold on the top case including the two you have already removed from the battery bay. The left and right side have four screws each, and the rear has two screws. (You can see these in the images to the left.) All of these screws have the polished heads which denote being external screws. It is best to group these in a separate pile in order to insure you do not confuse them with any of the internal screws. Some of these screws may work inside somewhere, but when you get near the end of the repair and only have the ugly screws remaining you will want to go back in.



Quick Fact...

RAM stands for Random Access Memory.

TORX (r) T6 screwdriver needed

Enlarge

LOOKING UNDER THE HOOD



You now have all of the screws needed to remove the top case out and organized to the side. You are now ready to pull off the top case. Be cautious when pulling off the top case as there is a cable connected from the top case to the main logic board. It is best to start at the top two corners above the speakers and gently lift up. Just place each hand at the appropriate corner, place your fingers in the groove between the trim of the top case and the bottom case and lift straight up. In some cases it may require a little force, but it shouldn't take much. Once you have it started, you can make your way down the sides of the case towards the front of the machine. It should be fairly simple,

Start at the top and work your way down.

but with some MacBook Pros, it can get stuck a little on the front side. There are some clasps holding it in. Usually it will lift out fine, but if you are having trouble, you may need to resort to using a flat tool such as a flathead screwdriver or a spudger and help release the clasps in the problem areas. Be very careful if you must use a flat tool. This metal is extremely easy to scratch and bend. The best and safest way to get to the clasps is to come in from the partially lifted sides and apply pressure at the front. Once the top case is separated around all of the sides, you can slowly flip it back and you should be able to see the cable attached to the main logic board. It may have a piece of tape holding it in.

Keeping track of all your screws

There are several ways to organize your screws during a repair. If you have a container such as an empty jewelry box or a small tackle box that has several small sections, that would make it much easier to keep track of your screws.

Organize them by the type of screw it is, what size it is, and any other characteristics such as a polished head or color.

It is also good to organize them in order of removal from the machine so you will be able to follow your way back. This will help get your machine back the way it was with the appropriate screws. You do not want to end up getting your

machine back together and realize you used one of the polished screws inside somewhere and be stuck with going back in or living with your mistake.

These external screws can be purchased from our company, but they are not cheap, so it would be best just to heed this advice and keep track of all your screws.

STEP BY STEP



Removing the Hard Drive

The first thing to do is disconnect the ribbon cable from the main logic board as pictured above at the top. The bracket pictured above in the middle is held in by two phillips head screws marked in the image to the right. The bluetooth board can be removed by gently lifting it up.

Previous steps required...

- [Opening the MacBook Pro](#)
- [Removing the Top Case](#)

Removing the Hard Drive...

The first step in replacing and upgrading your hard drive is to make sure you purchase the correct replacement. MacBooks use Serial-ATA (SATA) drives instead of its predecessor the IDE drives that were used in the older Powerbook and iBook lines from Apple. The SATA drives are much faster by a minimum of 50%. You will also need to choose what size hard drive you want to replace it with. Make sure when shopping for a new drive that you get a compatible one, and if you are worried about getting the correct one, you can purchase your hard drive from our store if you haven't already. They are guaranteed compatible with Apple MacBook and MacBook Pros.

Once the top case is disconnected from the logic board, you can put it off to the side. You should now be getting your first good look at the logic board and all of the internal components. The hard drive is going to be at the

front left corner of the main body of the MacBook Pro. It can be seen in the pictures below with the Toshiba sticker on it. (Your hard drive might not be a Toshiba) The main interface connection is going to be at the top.

As seen in the top picture to the left, the first step is to disconnect the hard drive cable that connects to the main logic board. It is the L-shaped orange cable. To disconnect it from the main logic board just grab hold of both sides of the cable and pull up. Try not to disconnect it from one side as you may damage the socket or the cable.

There will be two screws on the right side of the hard drive holding in the mounting bracket. One of the screws may be hidden by a few wires so just gently move them aside so you can get to the screw. Once both screws are removed, you should be able to pull out the Bluetooth module (Small board wrapped in clear plastic). Once that is taken off, you can prepare to remove the bracket. The orange cables pictured below are just stuck onto the top of the hard drive with adhesive so it should separate easily. There is no need to disconnect the two white cable connectors at this point.



You can lift out the hard drive by prying up from the top left corner of the hard drive as shown in the first image over to the right.. Once it is safely out, you can disconnect the main interface cable shown in the second image on the right. The SATA interface cable is much easier to disconnect than the older EIDE hard drives seen in previous Apple laptops. You no longer have to worry about bending pens. Just pull it straight out and the hard drive should be free. The hard drive has two screws on each side that will need to be transferred over to the new drive. These along with the bracket keep the hard drive in place inside your MacBook Pro.



Enlarge

Almost all hard drives you purchase will not be formatted yet. You will need to place your operating system CD in and boot up from it. It shouldn't find an operating system on the hard drive so it should automatically boot from the install disk. Once you are in the installer, you will need to format the disk using the Disk Utility software. This can usually be found in the top menu in the installer. In the Disk Utility application, make sure the hard drive is detected in the list to the left. If it is not, you will need to go in and recheck your connections between the hard

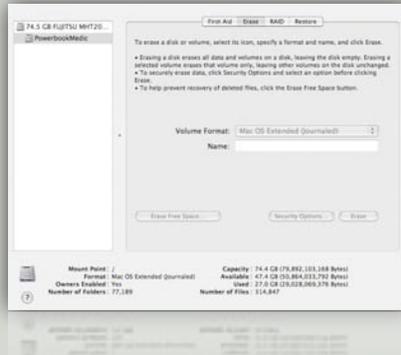


Enlarge

drive and the main logic board. If it is, click on it, and make sure it is reporting the correct size. You will then need to go to the "Erase" tab in

GEEK NOTE
 With hard drive sizes, manufacturers cheat the system on how they advertise hard drive capacity. Manufacturers refer to 1 Gigabyte as 1000 Megabytes instead of the proper 1024 Megabytes. This will result in an inflated Gigabyte capacity but most operating systems will report a much smaller hard drive size.

Disk Utility. Here you will be able to partition and format the hard drive. In the format, it should already be set to the correct value of Mac OS Extended (Journaled). The next blank is for the name of the volume. You can name this whatever you like. The standard is "Macintosh HD", but it is completely up to you.



Once the hard drive is formatted, it is ready to have the OS installed on it. If you are just upgrading your hard drive, you can actually clone your old drive onto the new one and save all of your files. You will need an external hard drive enclosure and cloning software (i.e. Carbon Copy Cloner). The hard drive enclosures are available through our website. Carbon Copy Cloner is free software available online. The copy process can take several hours depending on how much data you have on the hard drive.

Powerbookmedic.com offers several hard drive upgrades for your MacBook Pro. We currently sell Hitachi drives which are known for their superior Mac compatibility. You can view the available drives by going to [our store](#).

STEP BY STEP



Enlarge



Enlarge

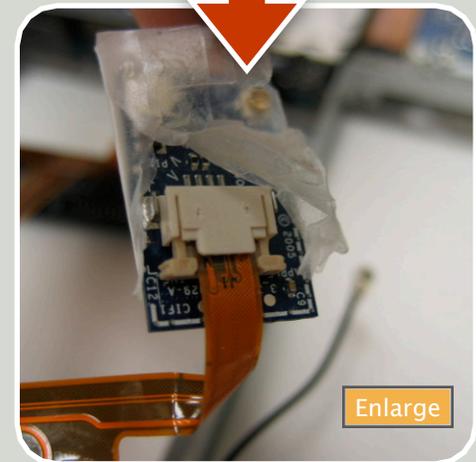
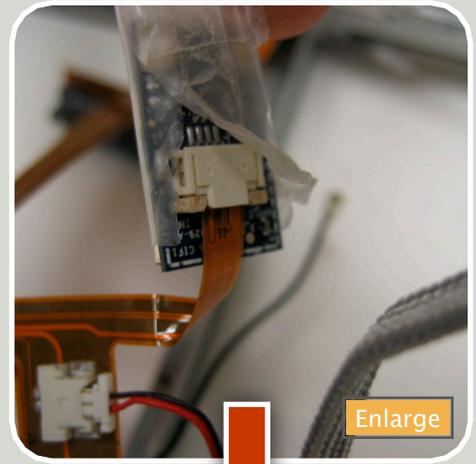
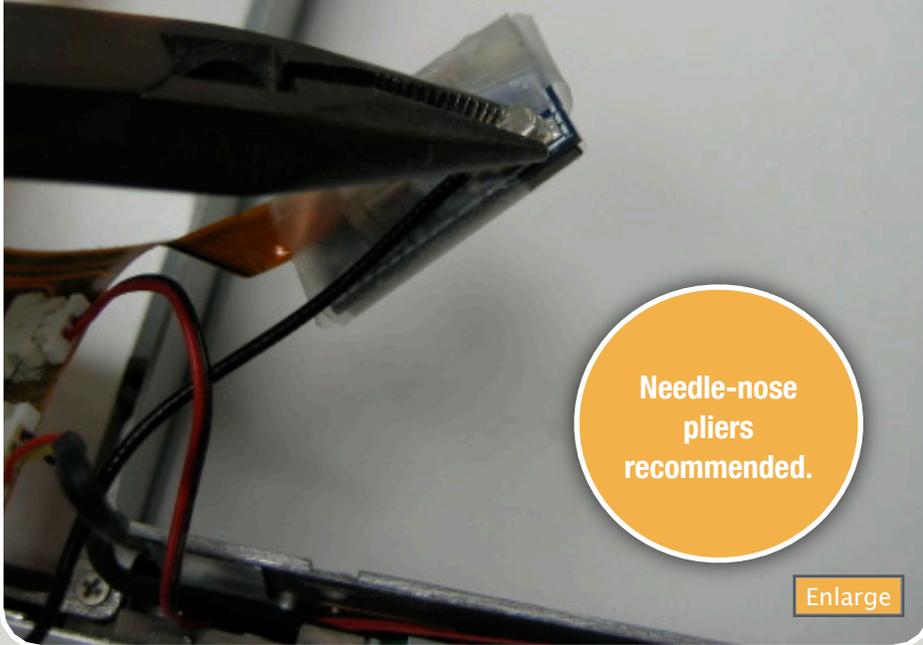


Enlarge

Hard Drive Upgrades

When replacing or upgrading your MacBook Pro hard drive, remember that the new MacBooks use the SATA interface instead of the older EIDE interface used on previous iBook and Powerbook lines of Apple products. The SATA technology is a 50% increase in speed over the older drives.

THE BLUETOOTH MODULE



Replacing the Bluetooth Module...

Previous steps required...

- [Opening the MacBook Pro](#)
- [Removing the Top Case](#)

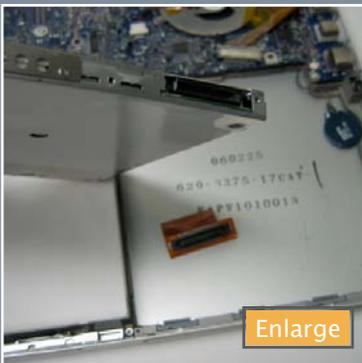
If you haven't found it yet, the Bluetooth Module is nestled on the right side of the hard drive in the lower left corner. You can gently stick a spudger into the plastic that surrounds the module and lift up to free it. Once freed you should notice two cables attached to it. One cable is going to be black in color and round. This is the antenna cable. It is attached to the board here and runs off around the case in order to give you

the maximum signal strength possible with the antenna. This antenna cable is much like a coaxial cable for the television. It has one small straight pin on the cable that needs to go into the hole on the bluetooth module. It doesn't screw in, however, and needs to be removed by pulling up as straight as possible. As pictured above, it is best to use some needle-nose pliers to grab a hold of the end of the antenna cable and pull straight up away from the board.

The other cable attached to the Bluetooth board is the data cable. It is attached by a special locking mechanism. You should see from the pictures above. There is the darker tan colored piece that needs to be gently slid out in order to unlock the cable so it can be removed. Once both sides are slid out, just pull the cable to free it. You can now replace the Bluetooth module and close the machine back up.

WIRELESS CAPABILITIES	AIRPORT	BLUETOOTH	INFRARED
	<p>Airport Express Every MacBook Pro comes with Airport. This allows wireless networking with fast speeds.</p>	<p>Bluetooth 2.0 With Bluetooth, you can wirelessly connect devices to your MacBook Pro.</p>	<p>Apple Remote With the Apple remote you can play with the Front Row software.</p>

CLOSE UP



Superdrive - Tech Specs

6x slot-loading SuperDrive (DVD+R DL/DVD±RW/CD-RW)

- Maximum write: 6x DVD-R and DVD+R; 4x DVD+RW and DVD-RW; 2.4x DVD+R DL (double layer); 24x CD-R; 10x CD-RW
- Maximum read: 8x DVD-ROM, DVD-R, DVD+R; 6x DVD-ROM (double layer DVD-9), DVD+RW, DVD-RW; 4x DVD+R DL (double layer); 24x

Removing / Replacing Superdrive

Previous steps required...

- [Opening the MacBook Pro](#)
- [Removing the Top Case](#)

All MacBooks are equipped with a Superdrive. Superdrive is essentially Apple's nomenclature for a DVD recorder/burner. It can read and write to both CD and DVD media.

Superdrives can have several problems that will require replacing the drive. There is a locking mechanism inside the drive that says there is a disk inside and to not let it out until told to. This, however, can break and get stuck in the locked position and will not allow disks in or out. This behavior is usually noticeable when the disk you are trying to insert is pushed to the left or right side and won't let you put the disk in straight even if there is no disk already present inside. The lasers can also die which requires replacing the drive. This is usually the case when the drive spits out any media you insert.

After removing the top case, you should see the Superdrive sitting in the bottom right

corner of the MacBook Pro. The first step in removing the Superdrive is to unhook the ribbon cable attached to the main logic board. This connector is usually covered by tape, so you may need to pull the tape off. Afterwards you can remove the three screws holding the drive in. There is a TORX T6 screw in the back anchoring the drive to the logic board and two Phillips head screws near the front with one on each side. All three of these are marked in the picture below.

Once those screws are removed, you can take out the drive. As seen pictured to the left, the optical drive cable is simple to remove. Just pull it out and transfer it to the new drive if it is being replaced. There are also 3 brackets around the sides of the Superdrive. These screws would need to be removed and the brackets moved over to the new drive.

Once you are ready to put the machine back together, just replace that cable, the screws, and don't forget to re-plug in the cable. The sticker should be facing up on the Superdrive. You may also want to try inserting a CD to verify that the drive is sitting correctly and it will be able to take in and eject disks properly.



AIRPORT EXPRESS



Airport Extreme

This is Airport's successor to the Airport Express. It uses the new 802.11n protocol and offers incredible improvements over the 802.11g protocol. Most MacBooks are going to have this disabled. Read below for more details.



Removing / Replacing the Airport Card

The Airport card is located on the left side of the MacBook just above where the hard drive normally sits. There are two antenna cables attached at the top of the card marked above with circles. These need to be removed in the same way as the Bluetooth antenna cable was. It is best to use needle-nose pliers or a spudger and pull straight up on the end connector so the pin is not damaged. It shouldn't take much force to disconnect them. You need to be quite gentle with them because if they break, they will need to be replaced. As pictured above, there will usually be a piece of tape on the right side of the card. Peel

Includes
802.11n support

this off from one side. The card should now be free to pop up. Once it is popped up as show in the picture above in the bottom right, the card can now be slid towards the rear of the machine to be taken out of the slot. The Airport card should now be free and ready to replace if need be. These cards are going to be compatible with 802.11b, 802.11g, and 802.11n* wireless networks. It is not necessary to use an Apple Airport base station. Any third party base station should function with the Apple Airport card.

** Apple released purchasable software to enable this feature.*

History of the Apple Airport



The original Apple Airport and Base Station was introduced in July 1999. It used the 802.11b protocol which offered transfer speeds of 11Mbps. (Mbps: Megabits per second)

In January of 2003, Apple released the Airport Extreme which used the 802.11g protocol which greatly increased the bandwidth to 54Mbps. This allowed a much higher level of data transfer over a wireless network including dependable streaming video and music.

In January of 2007, Apple announced the newest revolution to wireless networking with the Airport Express which has adopted the upcoming 802.11n standard. This new protocol offers bandwidth and range increases of several magnitudes.

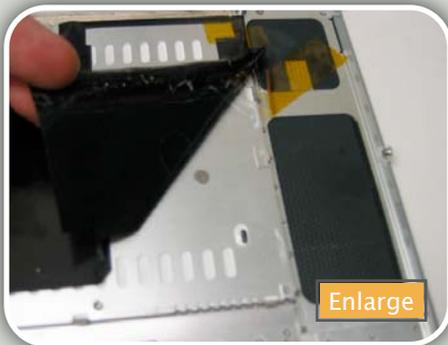
Replacing / Removing the Keyboard

Previous steps required...

[Opening the MacBook Pro](#)
[Removing the Top Case](#)

Remove the Backing

One of the first things you will notice after flipping over the top case is the black plastic backing on the keyboard. This backing is used to help make the backlighting on the keys a little brighter. Removing this without tearing is a tricky task. It is best to start on the edges and free those first where the black backing overlaps the sides. Once that is free you can start peel-



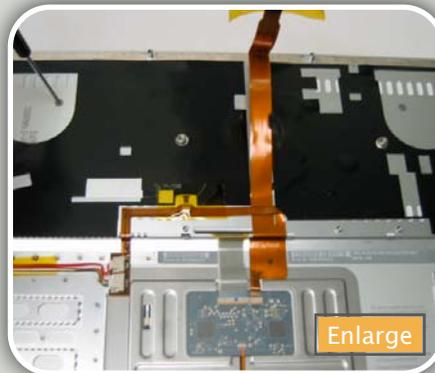
ing the backing from one of the corners. It is best to take it slow unless your new keyboard including a new backing. Just continue to slowly peel it towards the center. It is made up of two separate pieces. If your new keyboard doesn't contain a new package, place these two old pieces to the side with sticky side up. Take note of which side of the backing goes where, but it will later be explained how to match up the correct sides just in case you mixed them up.

If you accidentally tear the backing, don't fret. This isn't a vital piece but it is good to have on there even if it is a little torn.

Free the Keyboard

After getting the black backing off, you should see several screws holding the keyboard in. There should be 10 in total dispersed around the back of the keyboard. All of these should be short threaded Philips screws with large unpolished heads.

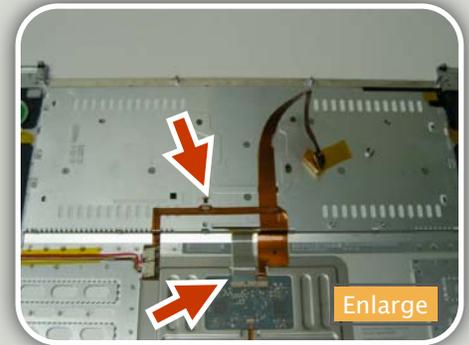
After all of those screws are removed, we need to disconnect the two cables coming from the keyboard. The white and gray striped ribbon cable is the keyboard's data cable. It informs the processor what key is being pressed. This cable connects to the circuit board underneath the trackpad. This circuitry is usually covered by a thin rectangular piece of transparent plastic. It is best to just peel it off from the edges until you can get to the cable connections underneath. The connector type is a common one



found in Apple products. The cable is locked in place by a small bar that needs to be flipped upright into the unlocked position. Be very gentle as breaking this could require a new top case. Once the bar is flipped up, you should be

able to pull the keyboard cable out. The other cable is the backlight cable. It is a very small orange cable coming out just above and to the left of the data cable. This is a similar style connector. The bar needs to be flipped up and the cable pulled out.

One more thing needs to be done to free the keyboard. Along the top of the keyboard while looking on the back of the top case, you should see several metal hooks lining the top. These little hooks need to be twisted counter-



clockwise in order to unlock the keyboard. Once that is complete, you can safely remove the keyboard.

Replacing the Keyboard

To install the new keyboard, it is best to slide it into the bottom, and then slightly bend the sides in in order to fit the tabs on the sides into their appropriate grooves. Make sure you feed the backlight cable and data cable through their slots so we can connect them after the keyboard is in. Once it is in well, you can screw the keyboard back in with the ten screws, twist the hooks to lock the top into position, and connect the data cable and backlight cable.

The best way to line up the backing is to line up the two large screw holes with the holes in the backing.

Keycap vs. Keyboard Issues

The keyboard on a laptop gets a lot of punishment over the years. With the use, exposure, and convenience for accidents, the keyboard can get a lot of damage. If a key stops working, don't jump to the conclusion that you just ruined your keyboard. You may just need a new key which we sell at our online store.

If the character on your key has worn off, or your key has popped off and you can't get it back on, most likely you just need to replace the keycap and scissor mechanism. This will save you a lot of money over having to buy a full keyboard. The procedure for replacing the key is fairly simple, and we offer a small manual on how to replace keys on our website.

Usually with spills, the keyboard is going to be affected as a whole. If several keys in a certain region stop working, or there is no response at all, most likely the entire keyboard will need to be replaced.

Removing the Speaker Assembly

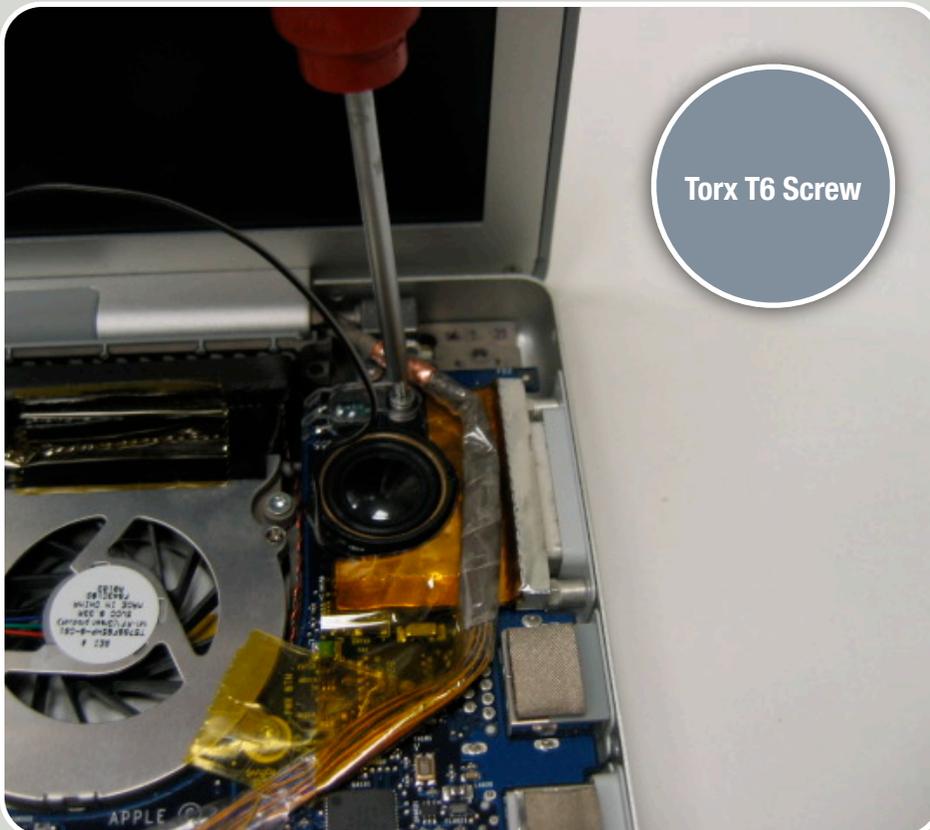
Previous steps required...

[Opening the MacBook Pro](#)
[Removing the Top Case](#)
[Removing the Airport Card](#)

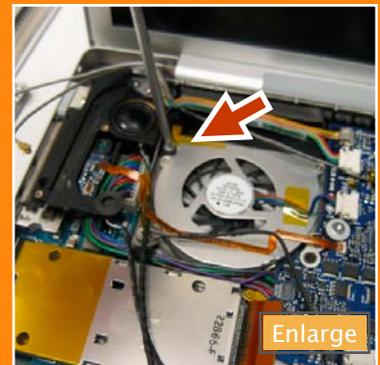
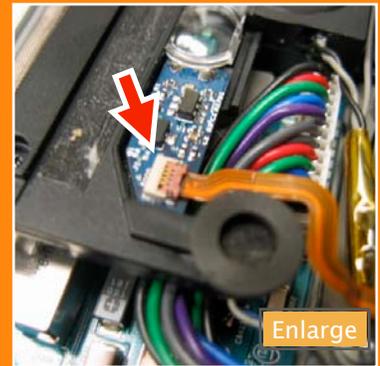
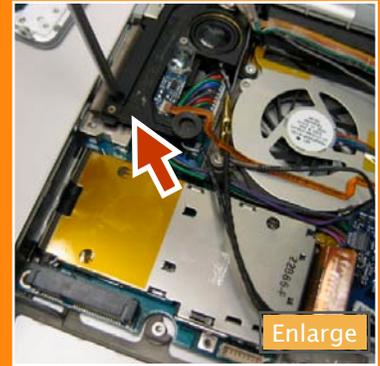
The speaker assembly sits on a lot of key components and removing it is necessary to get to these components. There are two connected parts of the assembly... the left and right speaker.

You can start with the right speaker. There is one Torx T6 screw holding it and the ambient light sensor in place. Once removed, you can lift the plastic cover off the sensor and put it to the side. There is a piece of orange foil stuck to the board here. You can safely pull that off. The right speaker is locked in place. To unlock it, rotate it clockwise until it frees itself. Once unlocked, you should be able to pull it straight up out of its crevice. After the speaker itself is out, you can route the speaker cable back that goes over the logic board.

The left speaker assembly is a little trickier. It is held on by several screws. One screw is pointed out in the first picture to the right. It is located in a slight hole in the assembly. A second screw actually fastens the assembly to the left fan. This will need to be removed as well. Also pictured to the right is the sound cable. This needs to be disconnected. The easiest way to disconnect it is to pop up the locking clip vertically. Once the clip is popped up, the cable can easily be pulled out of the connector. Once all of those screws are removed and the cable disconnected, the speaker assembly can be extracted. Both speakers are connected so be careful not to pull the wires when removing them.

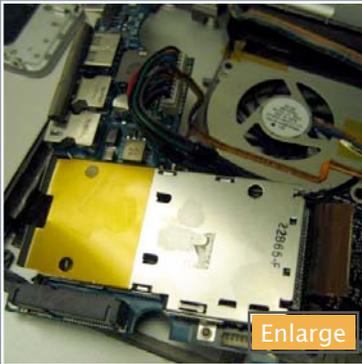


STEP BY STEP



There are three main parts to the MacBook Pro speaker assembly... the left and right speaker and the sub-woofer which provides the bass. If you are only getting sound from one side, none at all, or no bass, you probably will need your speaker assembly replaced.

CLOSE LOOK



Removing the MagSafe Board

Previous steps required...

- [Opening the MacBook Pro](#)
- [Removing the Top Case](#)
- [Removing the Airport Card](#)
- [Removing the Speaker Assembly](#)

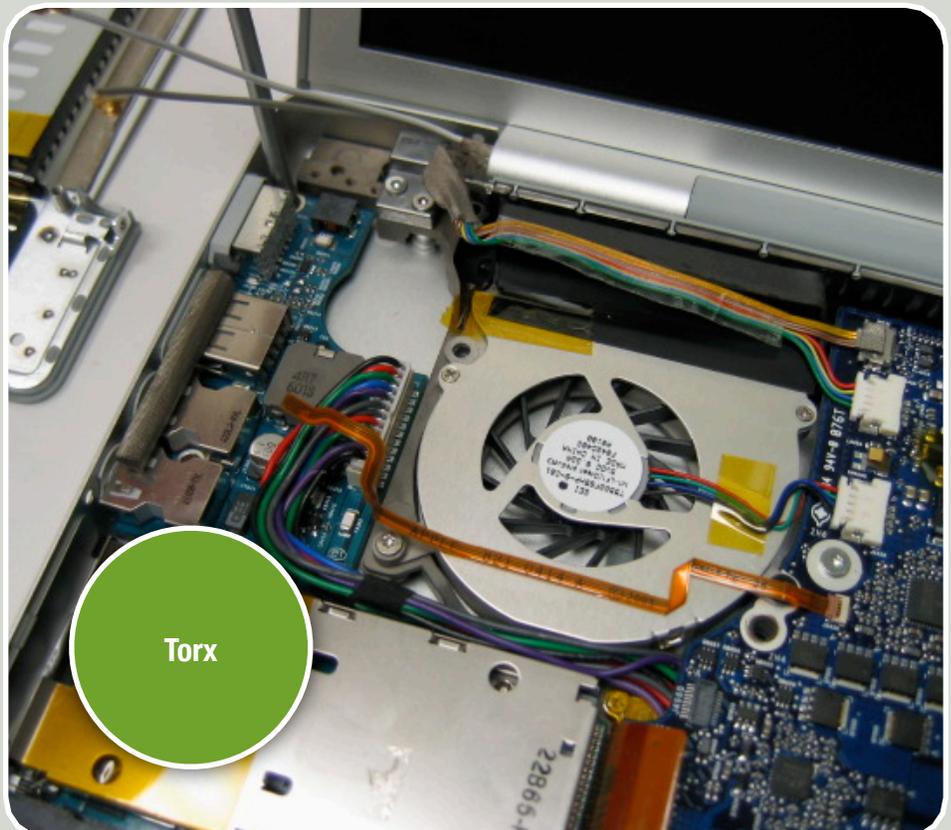
The MagSafe is the new power system used by Apple to help an old problem that has plagued Powerbooks and iBooks in the past. The MagSafe power adapter connects via magnets instead of a normal plug. This makes it impossible to break the power plug inside the machine after a fall or tripping on the cord. The MagSafe will just pop off if too much pressure is applied. The board also serves as the sound board, I/O board, and the ExpressCard slot.

There are four Philips black screws that need to be removed. One is located at the top left corner of the board near the MagSafe connector. There are two along the bottom and one near the middle. This middle screw is usually hiding underneath the colored power ca-

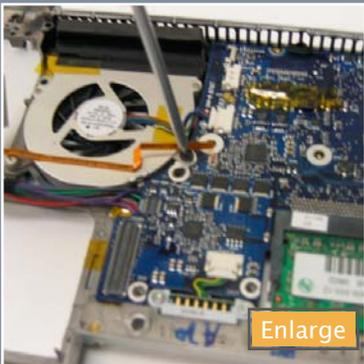
bles that are routed around the left fan. There is one more screw that needs to be removed in order to free the MagSafe board. It is a hex cap screw along the left side of the board. It looks silver and has a hole in it. The easiest way to remove it is to stick a Torx T6 screwdriver in the hole and turn it.

Once all the screws are removed you can begin taking out the board. There are several cables that need to be disconnected. The ExpressCard cable is connected to the logic board and can be pulled up. There is also a cable on the bottom right corner of the MagSafe board. It is best to use a spudger or flat tool and gently lift up on the end of the cable. Pulling it out with your fingers can potentially result in pulling out wires from the connector. The last cable is for power to the main board. It can be difficult getting to this cable, so it is easier to go ahead and begin lifting the board out and disconnecting this last cable at that time. The best way to pull the board out is to tilt it up from the right side, slide it to the left and then out towards you.

Once the board is removed, the card slot needs to be taken off as replacement boards may not come with this.



STEP BY STEP



Logic Board Issues

The logic board is the brain of your MacBook Pro. There are several symptoms of a bad logic board ranging from overheating, display, and power issues. Liquid spills tend to kill logic boards fairly quickly.

Removing the Logic Board

Previous steps required...

- [Opening the MacBook Pro](#)
- [Removing the Top Case](#)
- [Removing the Superdrive](#)
- [Removing the Speaker Assembly](#)

The logic board includes many components. It includes the processor, the memory slots, the video chipset, and temperature sensors.

There are several connections that need to be disconnected. As pictured in the top picture to the right, you need to disconnect the iSight cable, inverter cable, left fan, sound cable, ExpressCard ribbon cable, battery cable, right fan cable, display cable, PRAM battery, and the two visible temperature sensors locating in the top middle and one in the bottom right of the board. There is one more temperature sensor on the bottom right corner. You may need to wait until the board is partially removed to reach this cable.

There are ten small T6 screws scattered

around the board holding it in place. There are also two long T6 screws holding the right fan to the logic board. There is one Philips black screw near the battery bay and one black T6 screw near the left fan.

After those screws are removed you should be able to remove the board. It is best to tilt back both fans and pull the board slightly left and then out. Remember to disconnect that last temperature sensor underneath the top right corner if you did not do it earlier.

When putting the logic board back in, be sure not to forget to reconnect all of these temperature sensors or you can get system crashes with overheating errors or possibly even damaged components due to fans not working properly.

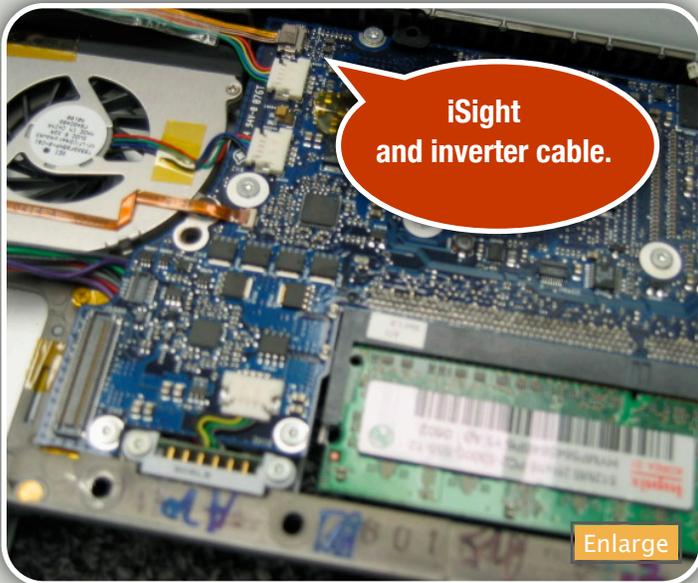


Removing the Display

Previous steps required...

[Opening the MacBook Pro](#)
[Removing the Top Case](#)

Disconnecting the Cables



There are five primary cables that go up into the display. They, therefore, need to be disconnected in order to separate the display from the main body of the MacBook Pro. These are the display cable, the inverter cable, the two wireless antenna cables (Airport and Bluetooth), and the iSight cable. The iSight and inverter cable are the top two cables on the left side of the main logic board. The iSight is the topmost cable. Both cables just slide out. Just be sure to get a good hold and to not pull from the wires if possible. These cables are pictured above. The Airport and Bluetooth cables are con-

ected to the Airport card. These should be removed by using a spudger or needle-nose pliers and lifting as straight up as possible. (A picture of these can be found in the [Removing the Airport Card](#) section) The display cable is located on the other side

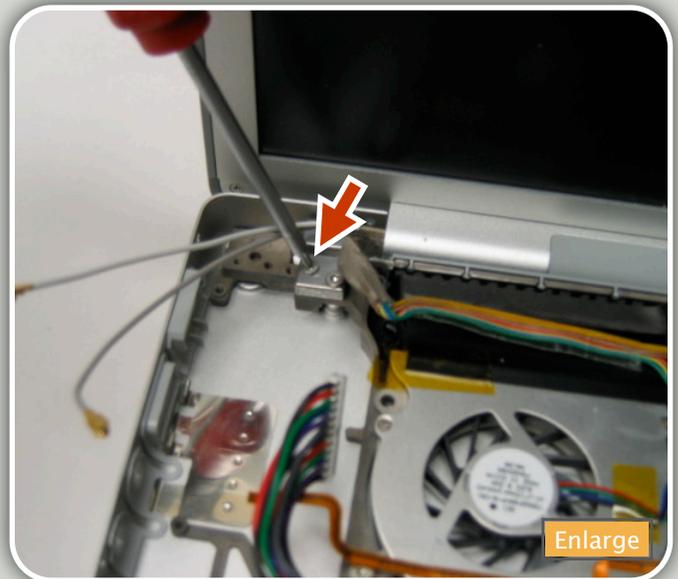
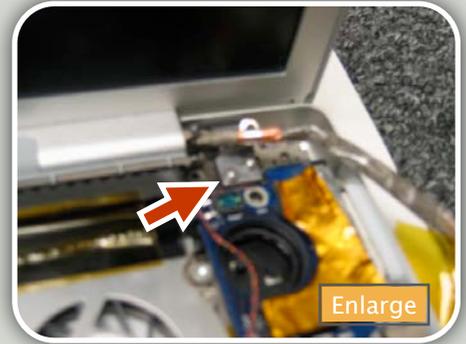
of the board. It is the large orange cable with the metal connector on the



end. This cable controls the picture on the screen. It can just be pulled out of the connector.

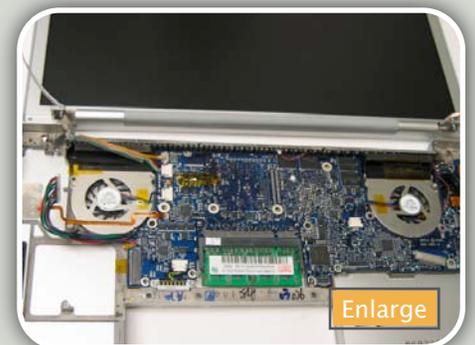
Unscrewing the Hinges

Once all of the cable are disconnected we can proceed with removing the display. The display is held on by 4 screws that are screwed into the hinges. There are two types of screws but both use a Torx T6 screwdriver. The front screws are going to only be partially threaded while the back ones should be fully threaded. Make sure you don't mix these up as switching them can cause problems with the hinges. Once the four screws have been removed, you can gently lift the



display out of the main body of the MacBook Pro. Be sure none of the cables are getting snagged and slowly pull the display straight up and then away. Lay the display flat on its back so the screen does not get accidentally scratched.

(some pictures may show certain components have already been removed, but that removal is not necessarily required to remove the display.)

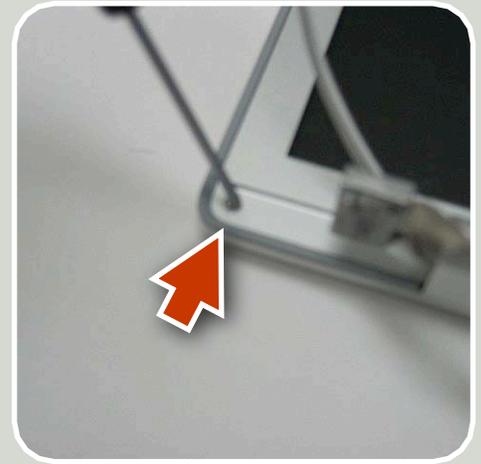


OPENING THE DISPLAY

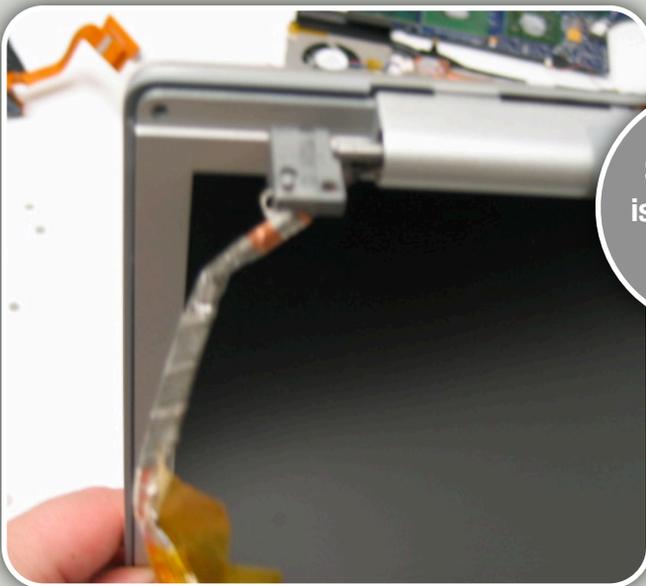


Normal vs. Glossy

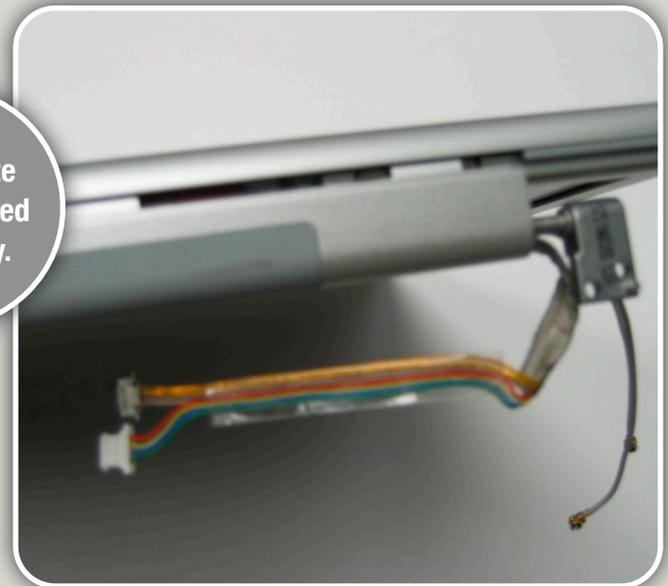
Apple has two types of LCDs for the MacBook. There are the older normal style and the new glossy style. It is completely personal preference, but the glossy seems to work better in low-level lighted areas and the normal otherwise.



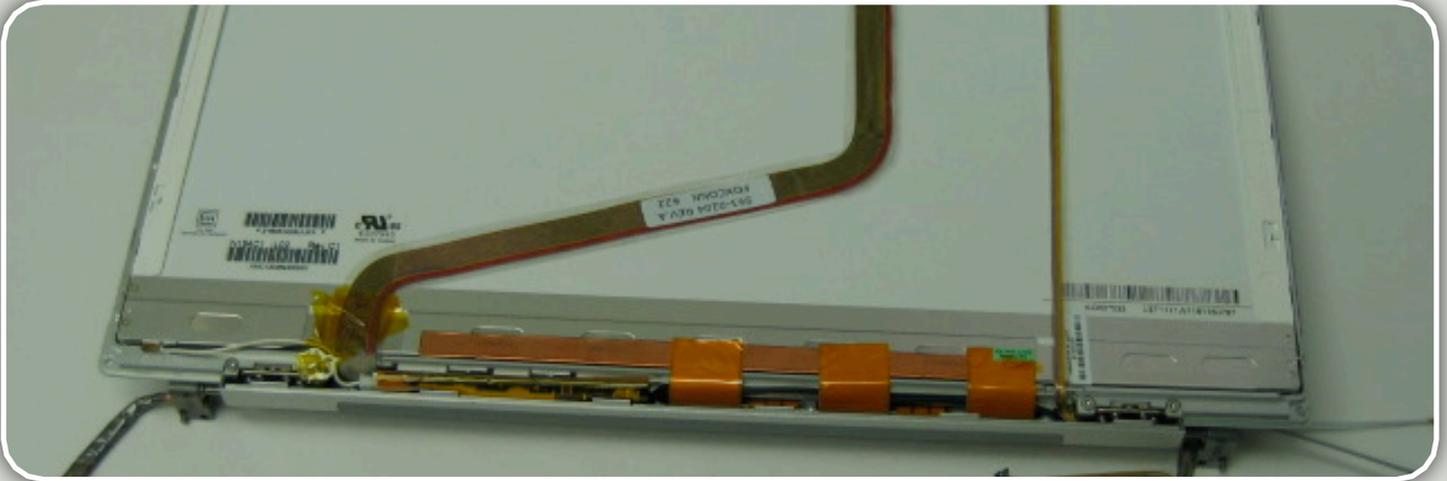
Previous Steps Required: Opening the MacBook Pro, Removing the Top Case



Screen size is determined diagonally.

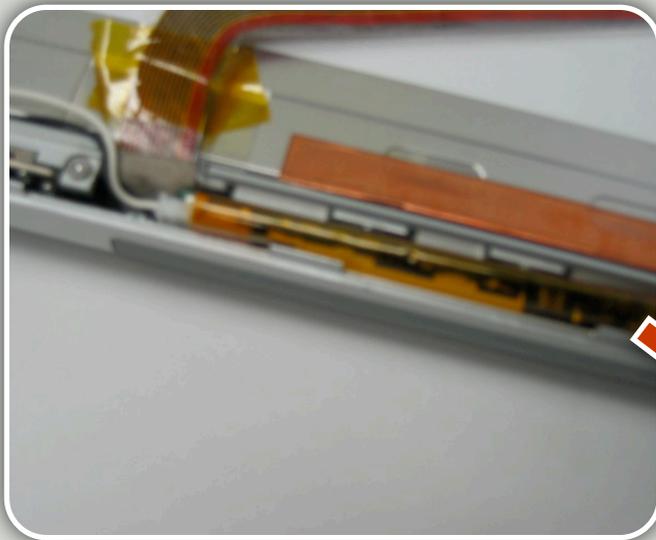


The display has two screws in the two bottom corners on the front bezel. There are both Philips head screws with polished heads. Once those screws are removed, you can begin to take off the back display casing. It is usually best to start in one of the bottom corners. You can sometimes get it to start popping open just by pulling it apart with your fingers, but you may need a flat tool to help. Be careful, however, as it can be easy to scratch the case when using a tool. Once started, you can work your way around. However, be mindful of cutting or pulling wires.



REPLACING THE INVERTER BOARD

The inverter board controls the backlight on the LCD. If you are only able to make out faint images on the screen like the brightness is turned all the way down, then most likely you need a new inverter board.



on the opposite side. They are very susceptible to any water damage that trickles into the LCD, so be extra careful when cleaning your display.

To remove the inverter board, you simply just have to pull up on the side connected to the LCD. Disconnect that cable, then pull the inverter board out and disconnect the inverter cable. Once the board is out, you can simple reconnect the two cables and reseal the inverter board safely into its crevice. Be sure that the wires are routed well and not susceptible to be cut or pinched once we snap the back display cover back on.

A typical symptom of a bad inverter board is when the backlight never comes on at all or it briefly blinks only when powering up.



Previous steps required...

- [Opening the MacBook Pro](#)
- [Removing the Top Case](#)
- [Removing the Display](#)
- [Opening the Display](#)

As pictured above, the inverter board sits at the bottom of the LCD panel. The inverter board controls the backlight on the LCD. There are two cables that connect to the inverter board. The cable from the backlight of the LCD connects to one side, while the inverter cable that is routed through the hinge and connects to the main logic board connects

Removing / Replacing the LCD

Previous steps required...

- [Opening the MacBook Pro](#)
- [Removing the Top Case](#)
- [Removing the Display](#)
- [Opening the Display](#)

One of the most common repairs to a MacBook Pro will be replacing the LCD after an unlucky fall that cracks the display. This is fairly easy to diagnose. The display will have cracks on it and what looks like black ink seeping through. This is actually the liquid crystal that is now pressing up against the outside pane of glass. There is no fix once it is broken. You will have to replace the LCD and they are usually quite expensive.

Once you have the back display casing off, you should have a good view at the back of the LCD. Be aware that the LCD does not include the cables or the casing. It is a separate part. The first thing you will notice on the back of the LCD is the display cable as pictured on the first

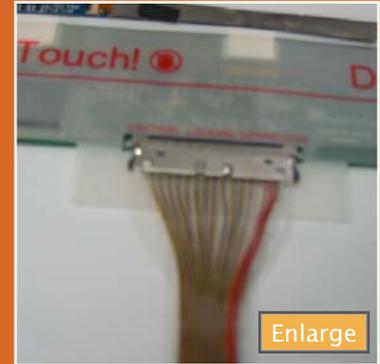
image to the right. There may be some tape covering the connection that needs to be peeled off. If not, you can just pull the cable out of the connector.

As pictured in the second image, the iSight sits at the top of the LCD and has a small ribbon cable attached to the small circuit board for the iSight. The connection is similar to other ones we have already seen in this manual. The locking mechanism must be flipped up to the vertical position so the cable can be removed. The cable itself is held on by a light adhesive.

There are eight small black screws lining the LCD. All of these need to be removed in order to free the LCD from the front bezel. One side of these screws can be seen in the last image to the right. Once all of the screws are removed you can start to extract the LCD. There is a slight adhesive at the top of the LCD but quite a strong adhesive sticking the LCD to the bottom. If the LCD is already being replaced, you don't have to worry about being too gentle as it is already damaged. It is best to rock it back and forth to loosen the adhesive and get a flat tool to help detach it from the bezel. Once removed, you can stick in the new LCD and work your way back.



CLOSE UP



Removing the Display

The display cable, iSight cable, the LCD inverter cable, and the side screws will need to be removed before the LCD can be extracted.

CLOSE UP



Clutch Cover

The clutch cover pictured above is in charge of properly routing all of the cables and hiding them so they are less likely to get damaged.

Replacing Display Cables

Previous steps required...

- [Opening the MacBook Pro](#)
- [Removing the Top Case](#)
- [Removing the Display](#)
- [Opening the Display](#)

There are several cables that go up into the display. The data cable, inverter cable, and wireless antenna all go up into the display. All of these cables must go up through the hinges and with this tight space, there is a high possibility for these cables to get damaged after a lot of use due to the general wearing down of the cables from opening and closing the display. They can also get damaged fairly easily if the MacBook Pro is dropped. The hinges could pinch or cut the cables. If this happens, the machine will need to be opened up and these cables replaced.

The main part that needs to be removed in order to replace these cables is the clutch cover. As seen in the first two images, it is the

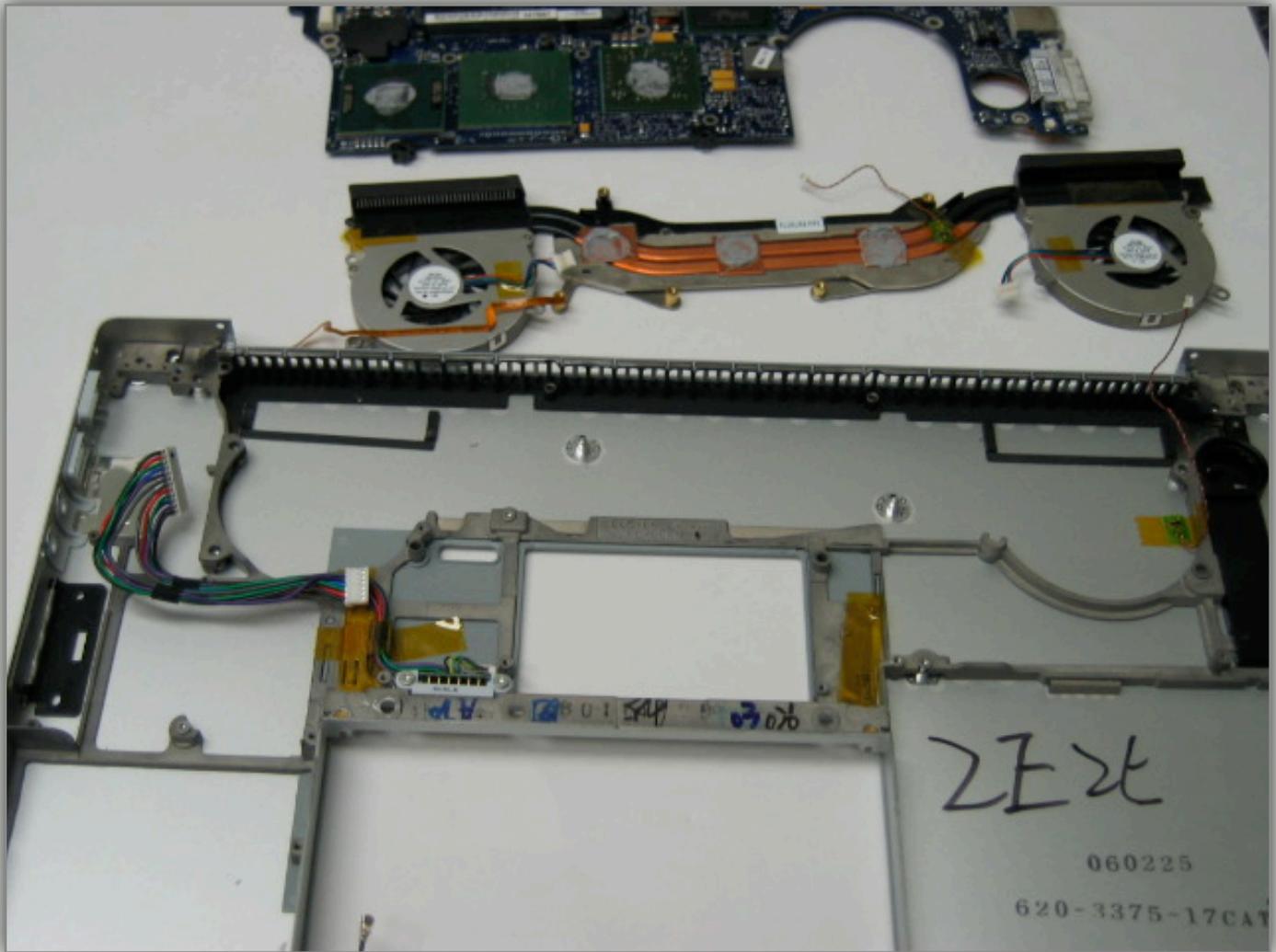
metal piece that goes over the hinges and covers all the cables going up into the display.

There are several Torx T6 screws holding the clutch cover to the front bezel. Depending on what cables you are needing to replace, it is not necessary to completely remove the clutch cover. You can just remove enough of the screws to loosen it enough to extract the old cable and route the new one. Take close note of how each cable is routed before removing them so you know how to route the new cable correctly without risking damaging the cable prematurely.

Replacing the Hinges

As pictured below, you can see one of the hinges. These rarely will go out unless the MacBook is dropped. The clutch cover will need to be fully removed to access the four T6 screws on the hinge. Once it is removed, you can replace it with the new hinge, reroute the cables and reconnect the clutch cover.





Replacing the Bottom Pan

Previous steps required...

- [Opening the MacBook Pro](#)
- [Removing the Top Case](#)
- [Removing the Hard Drive](#)
- [Removing the Superdrive](#)
- [Removing the Airport Card](#)
- [Removing the Speaker Assembly](#)
- [Removing the Display](#)
- [Removing the MagSafe Board](#)
- [Removing the Logic Board](#)

Once all of the main components have been removed you are left mainly with the bottom pan. The bottom pan is usually what is going to get the brunt of any physical mishaps. The bottom will get dented and scratched more than any other part and you may need to get it

replaced. It requires almost a complete disassembly to get to bottom pan so make sure you are up for it as it is a daunting repair.

There are still a couple of steps required in order to get your old bottom pan out of the way. The heat-sink and fan assembly will need to be removed. As long as you removed all of the screws pointed out earlier, this should just lift out. The new bottom pan will not come with the PRAM battery so you need to make sure that is removed and transferred over to the new bottom. The PRAM is located towards the front right of the unit around where the superdrive was located. It is usually going to be a round blue object with a cable coming out of it. It is held on by a slight adhesive. The remnants of the right speaker assembly will also need to be removed. There is one small black screw holding it in place. Once removed, the piece can be taken off. This as well is held on by a slight adhesive. The infrared sensor is the last thing that needs to be transferred over if you haven't already removed it. There is one T6 screw holding it in near the front of the MacBook Pro around the latch button. Remove the screw and the sensor should lift out along with a small retainer clip.

With those last items removed, your bottom pan should be well cleaned out and you can start putting everything back into your new bottom pan.