Apple Technician Guide

Mac Pro (Mid 2010)

2010-08-31

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Apple
1 Infinite Loop
Cupertino, CA 95014-2084
USA
+ 1 408 996 1010
www.apple.com

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Mac Pro (Mid 2010)

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About This Guide

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Manual Updates

Update 31 August 2010

Troubleshooting Symptom Charts: Added step for re-aligning graphics card to Deep Dive for three wireless connection issues.

Mac Pro (Mid 2010) Introduced 27 July 2010

Feedback

We want your feedback to help improve this and future Technician Guides!

Please email any comments to:

smfeedback3@apple.com

Apple Technician Guide

Basics

Mac Pro (Mid 2010)

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Overview

The Mac Pro (Mid 2010) features both quad-core and 6-core Intel Xeon processors with up to 12 processing cores. The computer is available in the following configurations.

Single-Processor

Processor	Part Number	Total Cores	Memory Speed	Level 3 Cache/ Processor
2.8 GHz quad-core	661-5709	4	1066 MHz	8 MB
3.2 GHz quad-core (CTO)	661-5710	4	1066 MHz	8 MB
3.33 GHz six-core (CTO)	661-5711	6	1333 MHz	12 MB

Dual-Processor

Processors	Part Number	Total Cores	Memory Speed	Level 3 Cache/ Processor
2.4 GHz quad-core	661-5712	8	1066 MHz	12 MB
2.66 GHz six-core (CTO)	661-5713	12	1333 MHz	12 MB
2.93 GHz six-core (CTO)	661-5714	12	1333 MHz	12 MB

Other features of the Mac Pro (Mid 2010) include:

- 1 TB 7200-rpm 3Gb/s SATA hard drive
- Optional 2 TB 7200-rpm 3Gb/s SATA hard drive
- Optional 512 GB solid-state drive (SSD)
- Up to four drives total
- 1333 MHz DDR3 ECC SDRAM memory*, expandable up to 16GB for single-processor and 32GB for dual-processor systems
- ATI Radeon HD 5770 graphics card with 1GB of memory
- Optional ATI Radeon HD 5870 graphics card with 1GB of memory
- Two Mini DisplayPort and one dual-link DVI output
- Optional Magic Trackpad

***Note:** All configurations use 1333 MHz-DDR3 SDRAM UDIMMs; however, the memory speed for certain configurations is 1066 MHz (see tables above).

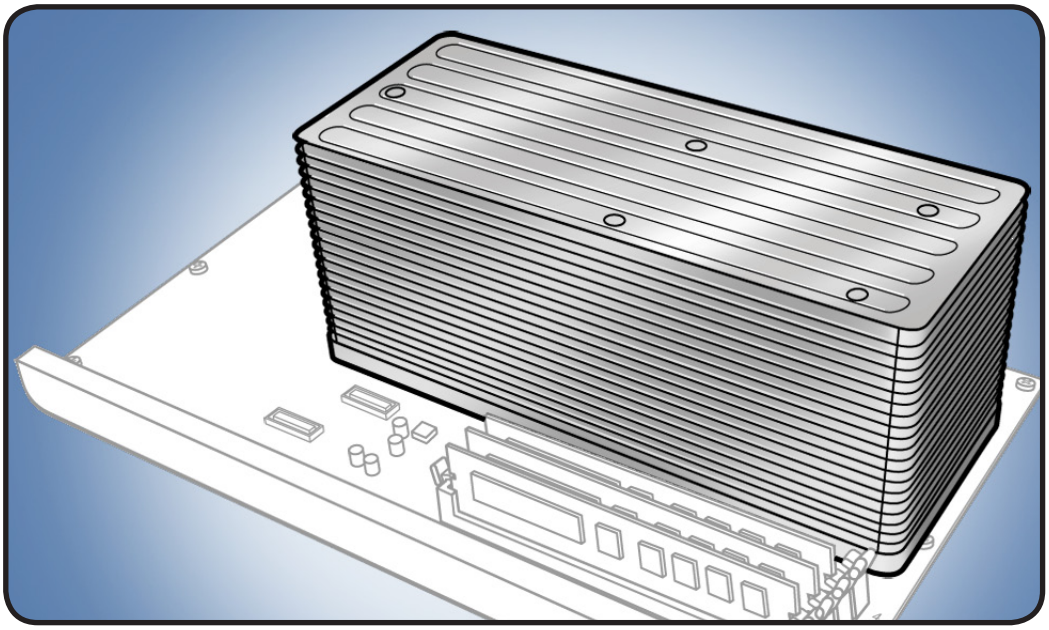
For more information, refer to **http://www.apple.com/macpro/**.

How to Identify Single- and Dual-Processor Configurations

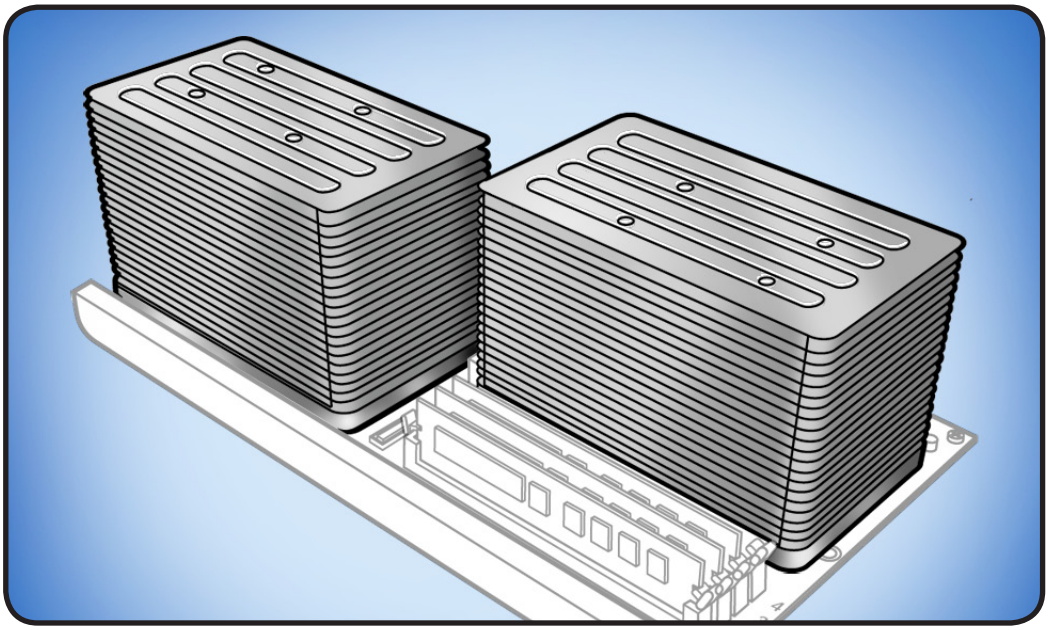
To identify the configuration of a Mac Pro (Mid 2010) computer, check the code on the computer's configuration label, which is located on the computer's back panel directly below the video ports. See "Serial Number Location."

Another quick way to identify the configuration is to open the side panel and inspect the processor heatsinks on the processor board. The configurations look like the following:

Single-Processor Configuration

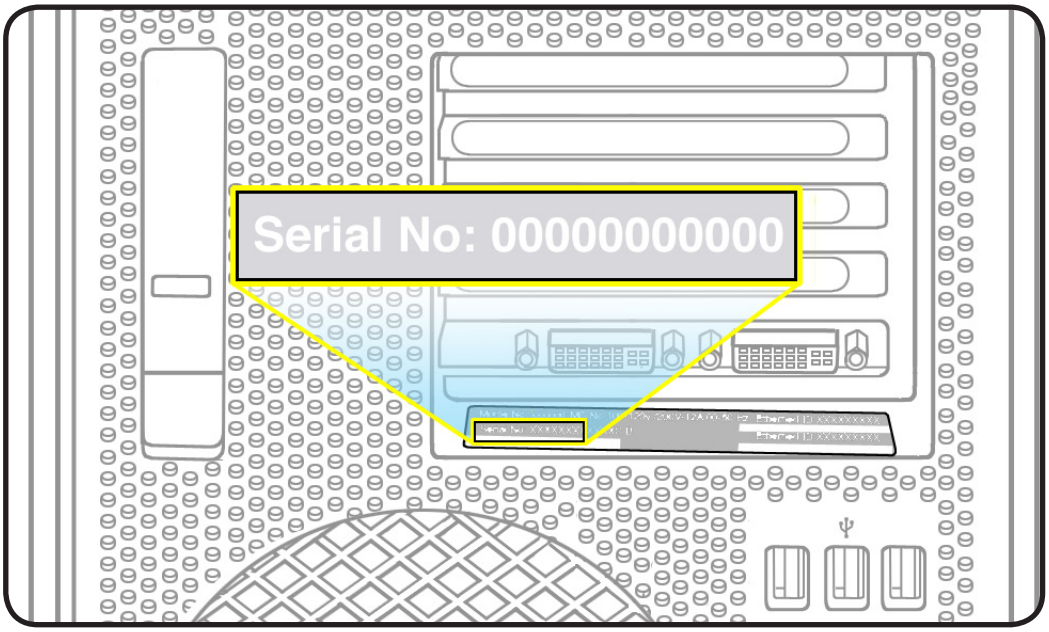


Dual-Processor Configuration



Serial Number Location

The Mac Pro (Mid 2010) serial number is located on the configuration label, directly below the configuration description.



New Accessories

Magic Trackpad

The wireless Magic Trackpad uses Bluetooth technology to connect to the Mac and comes with two AA batteries installed. Use of the Magic Trackpad and its full features requires Mac OS X version 10.6.4 or later and the latest trackpad software.

Note: If the Mac Pro (Mid 2010) has had system software reinstalled for any reason, pair the Magic Trackpad and then run Software Update. If only basic functionality is present on Magic Trackpad, ensure that it is paired correctly before launching Software Update. For more information, refer to:

- HT4254 **About Magic Trackpad and Multi-Touch Trackpad Update 1.0**
- HT4273 **About Magic Trackpad Update 1.0 for Windows**

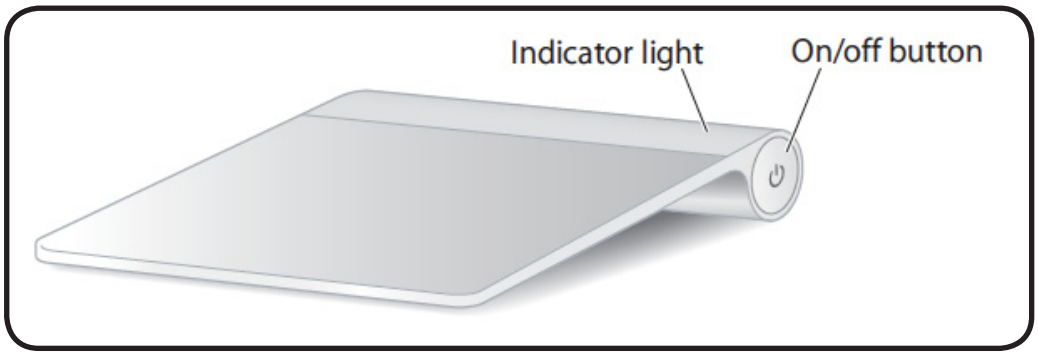
About the Indicator Light

The indicator light displays the status of the Magic Trackpad and the batteries.

- When you first turn on the trackpad, the indicator light glows steadily for 2 to 3 seconds, indicating the batteries are good.
- If the trackpad isn't paired with a Mac, the light blinks, indicating the trackpad is in discovery mode and ready to pair (pairing means connecting the trackpad and Mac to each other wirelessly).
- If you don't pair the trackpad with the Mac within 3 minutes, the light and trackpad turn off to conserve battery life. Press the On/off button on the trackpad to turn it on again, allowing you to pair it with the Mac.
- When the trackpad is on and connected, the indicator light turns off.

Turn on the Trackpad

- To turn on the trackpad, press firmly and release the on/off button.
- To turn on the trackpad and make it stay in discovery mode (prevent auto-pairing to previous known host), press and hold the on/off button.



Pairing the Magic Trackpad

To pair the trackpad:

1. Choose Apple (🍎) > System Preferences, and then click Trackpad.
2. Click "Set Up Bluetooth Trackpad …" in the lower-right corner.
3. Press the On/off button on the trackpad to turn it on.
4. Click Continue when the trackpad is detected.

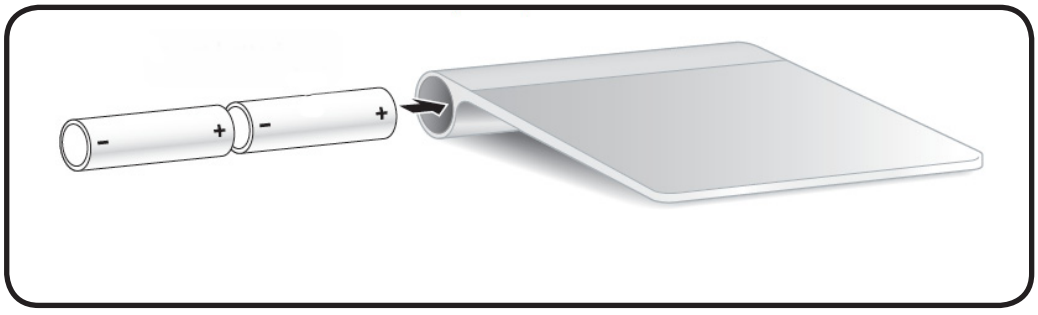
Once the trackpad is paired with the Mac, use Software Update again to make sure the latest software is installed.

Note: If the Mac Pro (Mid 2010) has had system software reinstalled for any reason, pair the Magic Trackpad and then run Software Update. If only basic functionality is present on Magic Trackpad, ensure that it is paired correctly before launching Software Update.

Installing Batteries

1. Use a coin to remove the battery compartment cover on the left side.
2. Insert batteries into the battery compartment as shown.

Warning: Replace or recharge batteries at the same time. Don't mix old batteries with new batteries and don't mix battery types (for example, alkaline and lithium batteries). Don't open or puncture the batteries, install them backwards, or expose them to fire, high temperatures, or water. Don't charge nonrechargeable AA batteries. Keep batteries out of the reach of children.



Apple Battery Charger

The Apple Battery Charger charges rechargeable NiMH batteries for Apple products that use AA batteries. Each Apple Battery Charger comes with six high-performance AA NiMH batteries: two for a keyboard, two for a mouse or trackpad, and two for charging. The Apple Battery Charger can charge either one or two NiMH rechargeable batteries. To charge batteries fully, allow at least five hours of charging time. For more information, refer to Kbase article HT 4275 **About Apple Battery Charger**.

Batteries

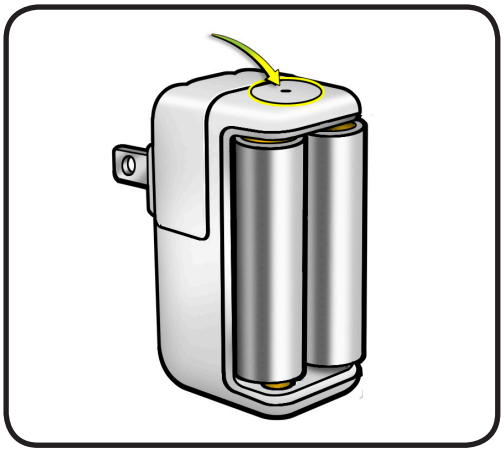
Use only NiMH rechargeable batteries in the Apple Battery Charger. Don't try to charge nonrechargeable AA batteries (lithium or alkaline) in the charger.

Caution: There is risk of explosion if the battery is replaced by an incorrect type. Dispose of used batteries according to the instructions. Don't open or puncture the batteries, install them backwards, short circuit, or expose them to fire, high temperatures, or water. Keep batteries out of the reach of children.

Status Lights

The indicator light on top of the Apple Battery Charger displays the charging status of the batteries.

- Amber: The batteries are charging.
- Green: The batteries are charged and ready to use—the green indicator light shuts off after six hours
- No light: May indicate any of the following conditions:
  - The batteries are charged and ready to use.
  - The inserted batteries are too deeply discharged to register immediately.
- Flashing Amber: May indicate any of the following conditions:
  - The batteries haven't been properly installed in the charger.
  - An unsupported type of battery is in the charger.
  - The batteries may be faulty or damaged and should be replaced.



Apple Technician Guide

Troubleshooting

Mac Pro (Mid 2010)

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General Troubleshooting

Update System Software and Firmware

Important: Apply the latest software and firmware updates before you begin troubleshooting. Computers sometimes exhibit symptoms that indicate the wrong Mac OS X system software is

Troubleshooting Theory

For general information on troubleshooting theory, refer to:

http://service.info.apple.com/service_training/en/006/troubleshoot/index.php?page=intro

Emerging Issues

For the latest on troubleshooting issues, refer to:

http://support.apple.com/kb/index?page=search&q=khot%20Mac%20Pro%20Emerging%20Issue

Hardware vs. Software

For information on how to isolate a hardware issue from a software issue, refer to:

TS1388—Mac OS X: Isolating issues in Mac OS X
<http://support.apple.com/kb/TS1388?viewlocale=en_US>

TS1394—Mac OS X: Troubleshooting installation and software updates
<http://support.apple.com/kb/TS1394>

HT2956—Troubleshooting Mac OS X installation from CD or DVD
<http://support.apple.com/kb/HT2956>

For information on how to troubleshoot a software issue, refer to:

HT1199—Mac OS X: How to troubleshoot a software issue
<http://support.apple.com/kb/HT1199>

Wireless Troubleshooting

If you're having issues with Bluetooth and wireless connectivity issues, refer to the following:

- TS3048 **Troubleshooting wireless mouse and keyboard issues**
- HT3887 **Wireless input devices: Bluetooth frequently asked questions**
- HT1365 **AirPort and Bluetooth: Potential sources of interference for wireless devices and networks**
- HT3903 **Apple Wireless Keyboard and Mouse: How to install batteries**
- HT4273 **About Apple Magic Trackpad Update 1.0 for Windows**
- HT4254 **About: Magic Trackpad and Multi-Touch Trackpad Update 1.0**
- HT 4275 **About Apple Battery Charger**
- **Bluetooth Service Diagnostic (BSD) self-paced training**
- **Bluetooth Troubleshooting Course**

Mac Pro Firmware Updates

Firmware is software written into memory circuits, such as flash memory, that will hold the software code indefinitely, even when power is removed from the hardware. Firmware on Intel Mac computers is designed to be updated if necessary through a software update.

EFI firmware updates update the Boot ROM, and SMC updates update the System Management Controller firmware. The SMC manages fans and other environmental parameters that are independent of the Boot ROM.

Firmware symptoms can be easily mistaken for hardware issues (e.g., overheating issues, fan noise issues, etc.). Always check both EFI and SMC firmware versions and update if necessary before replacing any hardware components.

The following lists describe the type of symptoms that may be resolved by updating the EFI and SMC firmware.

Symptoms that may be resolved by updating EFI firmware:

- Cannot eject media (various conditions)
- No video on start up
- Blue system failure screens in Windows XP/Vista
- Not waking or sleeping when expected
- Bad media taking too long to eject (including holding mouse button down at startup taking minutes to eject)

Symptoms that may be resolved by updating SMC firmware:

- Fan related behavior (excessive speed or noise)
- Loud audible clicking from some fans
- Thermal shut down or warnings
- Diagnostics reporting failures
- Sleep/wake issues
- Intermittent shut down
- SMC causes bad/missing ambient sensor to cause the computer to go to sleep
- Hangs, black screen on restart from Windows

- Quick power cycle causes Memory Processor Board Diagnostic LEDs and CPU Overtemp LEDs to illuminate solidly

Important: Since the SMC firmware is stored on both the backplane board and processor board, it is important that the version of SMC firmware is the same on both boards.

Please follow the steps outlined in KnowledgeBase article HT1557, "**About Firmware Updates for Intel-based Macs**," to perform an EFI and/or SMC firmware update. Information about firmware versions for Intel Macs can be found in KnowledgeBase article HT1237, "**EFI and SMC Firmware Updates for Intel-based Macs**."

Memory Configuration

Mac Pro (Mid 2010) comes with a minimum of 3 GB of memory in single-processor configurations, or a minimum of 6 GB memory in dual-processor configurations, installed as 1 GB unbuffered ECC dual inline memory modules (UDIMMs).

DIMMs must fit these specifications:

- PC3-10600E,1333 MHz, DDR3 SDRAM UDIMMs
- Error-correcting code (ECC)
- 72-bit wide, 240-pin ECC modules
- 36 memory ICs maximum per ECC UDIMM

For proper operation of Mac Pro (Mid 2010) computers, Apple recommends using only Apple-approved DIMMs. Refer to GSX for Apple DIMM service part numbers. Memory from older Macintosh computers is not compatible with Mac Pro (Mid 2010).

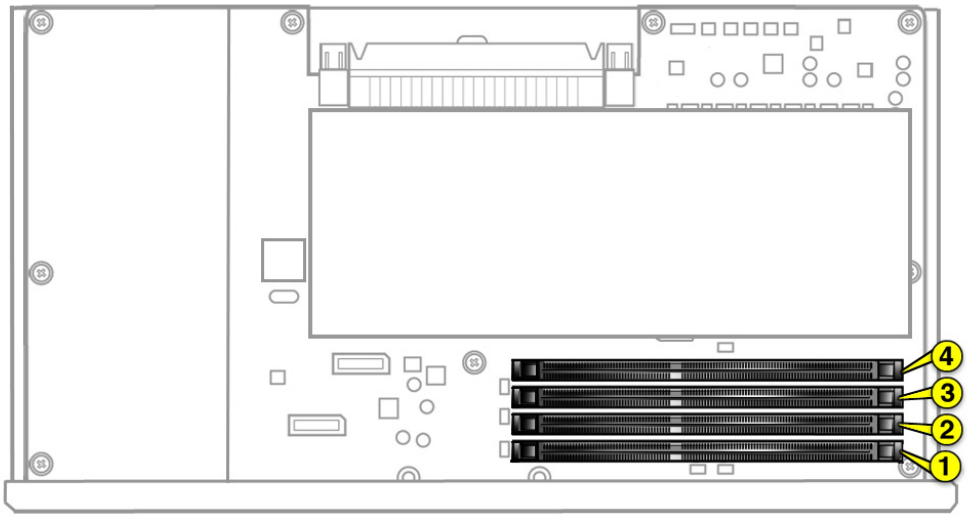
Single-Processor Configuration

A quad-core or 6-core Mac Pro (Mid 2010) has one processor and four memory slots. You can install 1 GB, 2 GB, or 4 GB DIMMs for a total of up to 16 GB of memory.

You can install different size DIMMs in Mac Pro (Mid 2010). However, for best performance, Apple recommends you install equal-size DIMMs (all 1 GB, all 2 GB, or all 4 GB) filling the slots in the order listed in this table. Note that you cannot place a DIMM in slot 4, without first placing a DIMM in slot 3.

If you have	Fill these slots
Two DIMMs	1 and 2
Three DIMMs	1, 2, and 3
Four DIMMs	1, 2, 3, and 4

See also "Memory Slot Utility" below.



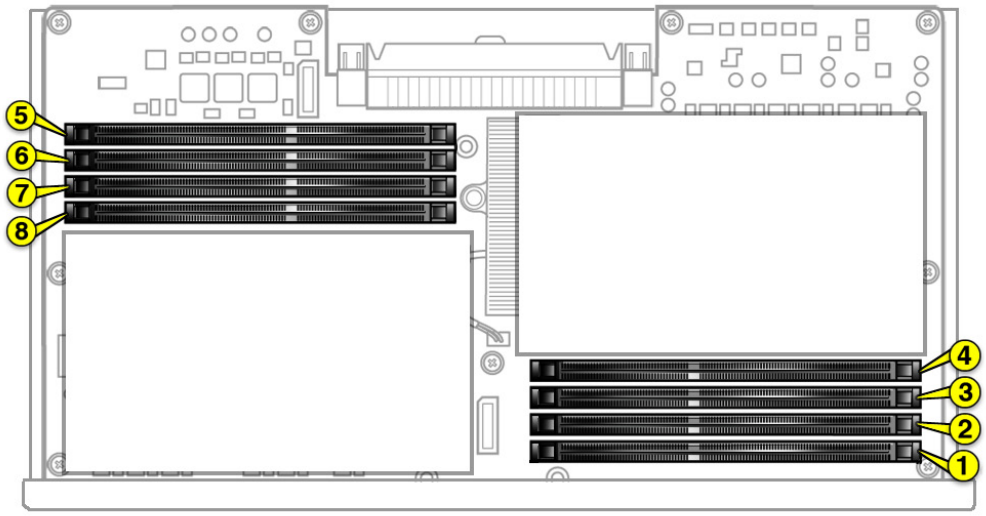
Dual-Processor Configuration

An 8-core or 12-core Mac Pro (Mid 2010) has one processor and eight memory slots. You can install 1 GB, 2 GB, or 4 GB DIMMs for a total of up to 32 GB of memory.

You can install different size DIMMs in Mac Pro (Mid 2010). However, for best performance, Apple recommends you install equal-size DIMMs (all 1 GB, all 2 GB, or all 4 GB) filling the slots in the order listed in this table. Note that you cannot place a DIMM in slot 4, without first placing a DIMM in slot 3; you also cannot place a DIMM in slot 8 without a DIMM in slot 7.

If you have	Fill in these slots
Two DIMMs	1 and 2
Three DIMMs	1, 2, and 3
Four DIMMs	1, 2, and 5, 6
Six DIMMs	1, 2, 3 and 5, 6, 7
Eight DIMMs	1, 2, 3, 4 and 5, 6, 7, 8

See also "Memory Slot Utility" below.



Memory Slot Utility

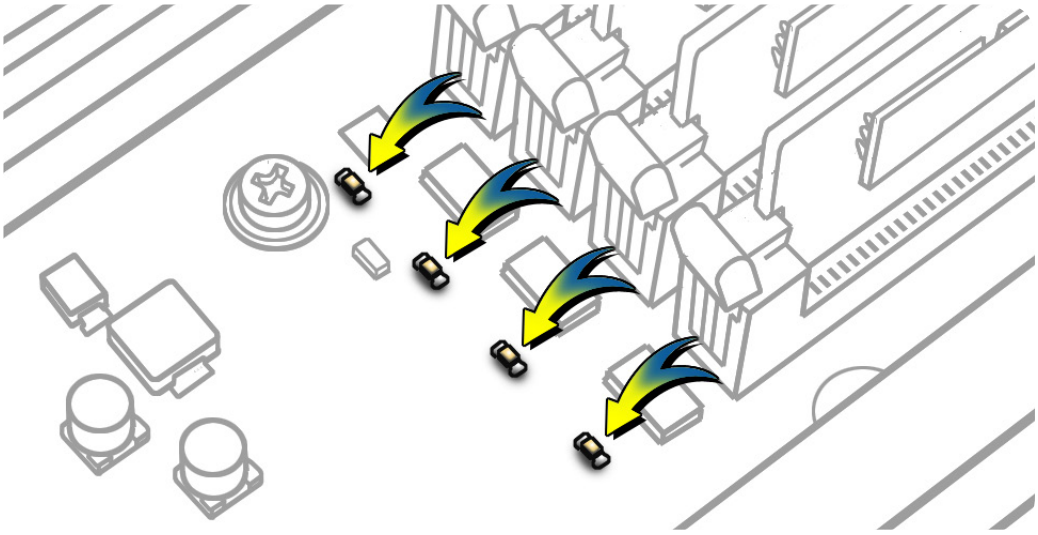
If you install different-size DIMMs in single-processor or dual-processor Mac Pro (Mid 2010) computers, follow the order in the tables above. If the DIMM configuration you install doesn't provide optimized performance, the Memory Slot Utility appears on screen and recommends an improved configuration.

To use the Memory Slot Utility again, go to /System/Library/Core Services.

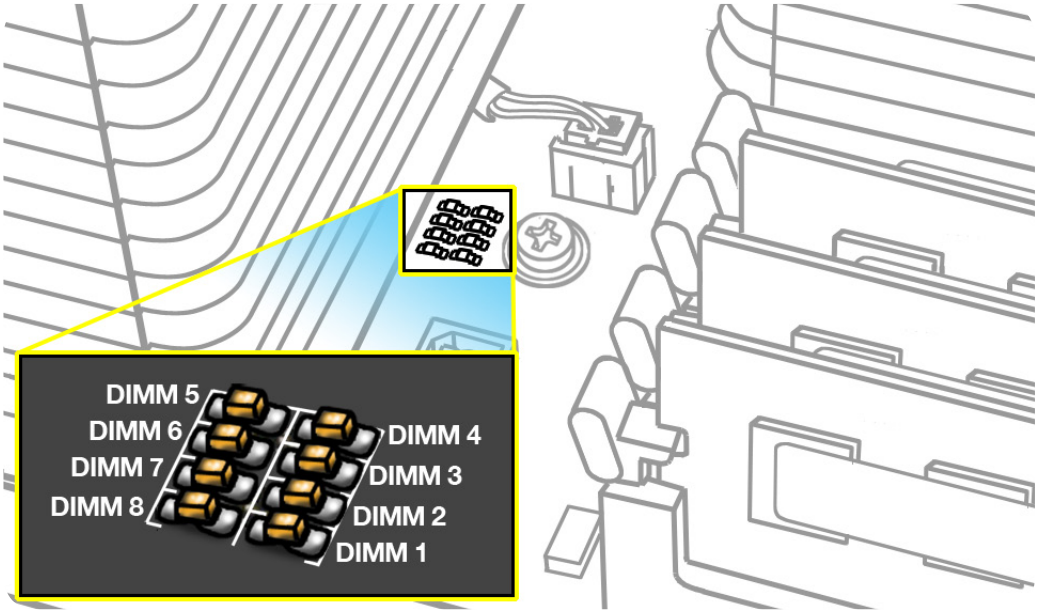
Memory Diagnostic LEDs

The single-processor and dual-processor boards include a set of diagnostic memory LEDs. The following illustrations show the location of each LED and its associated DIMM slot.

Single-Processor Board



Dual-Processor Board



To diagnose memory issues, start up the computer and check the diagnostic memory LEDs. An illuminated, red LED indicates its associated DIMM may be poorly seated or failed.

Note that Apple System Profiler does not report unseated or failed memory. You must use the memory LEDs to locate DIMM issues.

Troubleshooting Memory LEDs

Follow this procedure when troubleshooting each DIMM identified by a red LED:

1. Remove and reseat DIMM.
2. Restart computer. If associated LED is no longer illuminated, issue is resolved.
3. If associated LED remains illuminated, replace DIMM with new DIMM.
4. Restart computer and verify LED is no longer illuminated.

There is one exception. If two LEDs illuminate at the same time for the 3 DIMM and 4 DIMM slots or for the 7 DIMM and 8 DIMM slots, check both DIMMs using this process:

Check	Result	Action
1. Remove both DIMMs identified by illuminated LEDs. Set DIMM 4 (or DIMM 8) aside, and reseat DIMM 3 (or DIMM 7). Restart computer. Is DIMM 3 (or DIMM 7) LED illuminated?	Yes	Replace DIMM 3 (or DIMM 7) with new DIMM. Go to step 2.
	No	Go to step 2.
2. Reinstall DIMM 4 (or DIMM 8). Restart computer. Is one or both LEDs illuminated?	Yes	Replace DIMM 4 (or DIMM 8) with new DIMM.
	No	Issue resolved.

PCIe/Graphics Cards

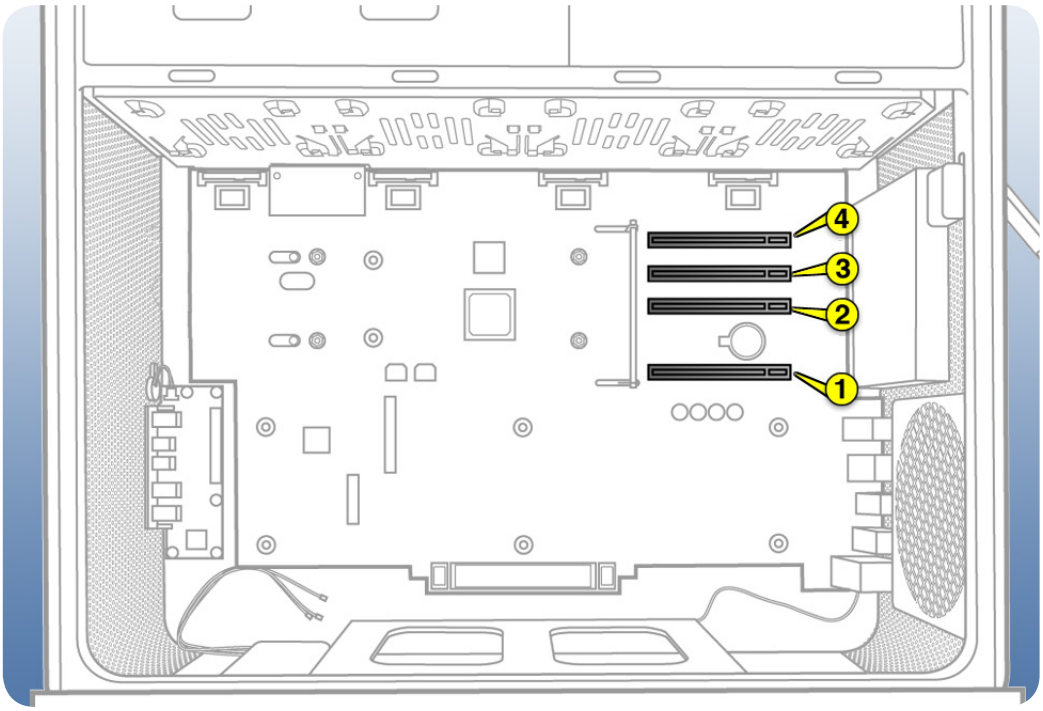
The Mac Pro (Mid 2010) backplane board includes one double-wide PCI Express (PCIe) graphics slot and three PCIe expansion slots, for a total of four slots. The computer comes with a graphics card installed in slot 1. You can install additional PCIe graphics and expansion cards in the remaining three expansion slots.

All four slots support 16-lane cards.

Slot electrical specifications:

- **Slots 1 and 2:** x16 PCIe 2.0
- **Slots 3 and 4:** x4 PCIe 2.0

For more information on Mac Pro (Mid 2010) graphics cards, refer to http://support.apple.com/kb/HT4279.

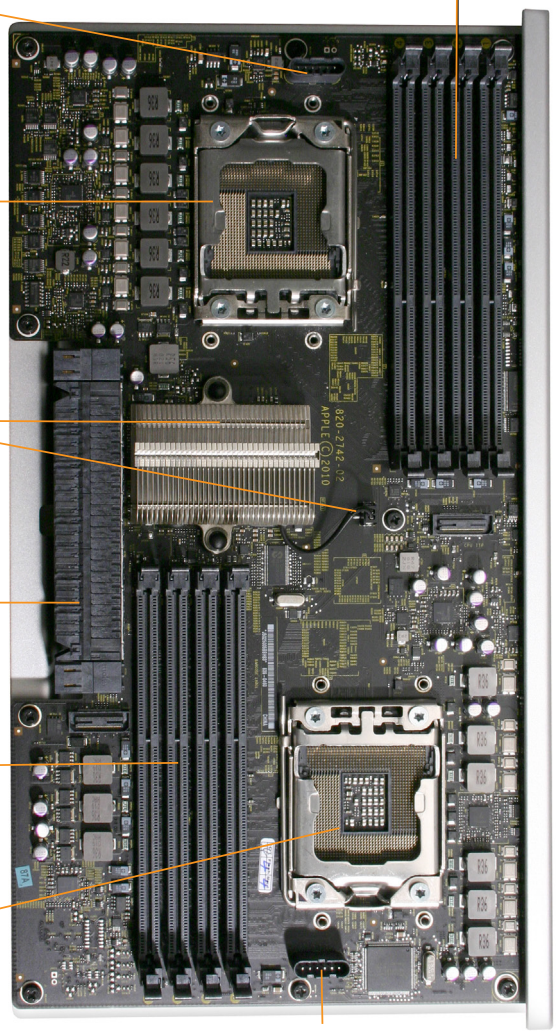


Important: Graphics cards from previous Power Mac G5 and Mac Pro models are not software-compatible with Mac Pro (Mid 2010) models.

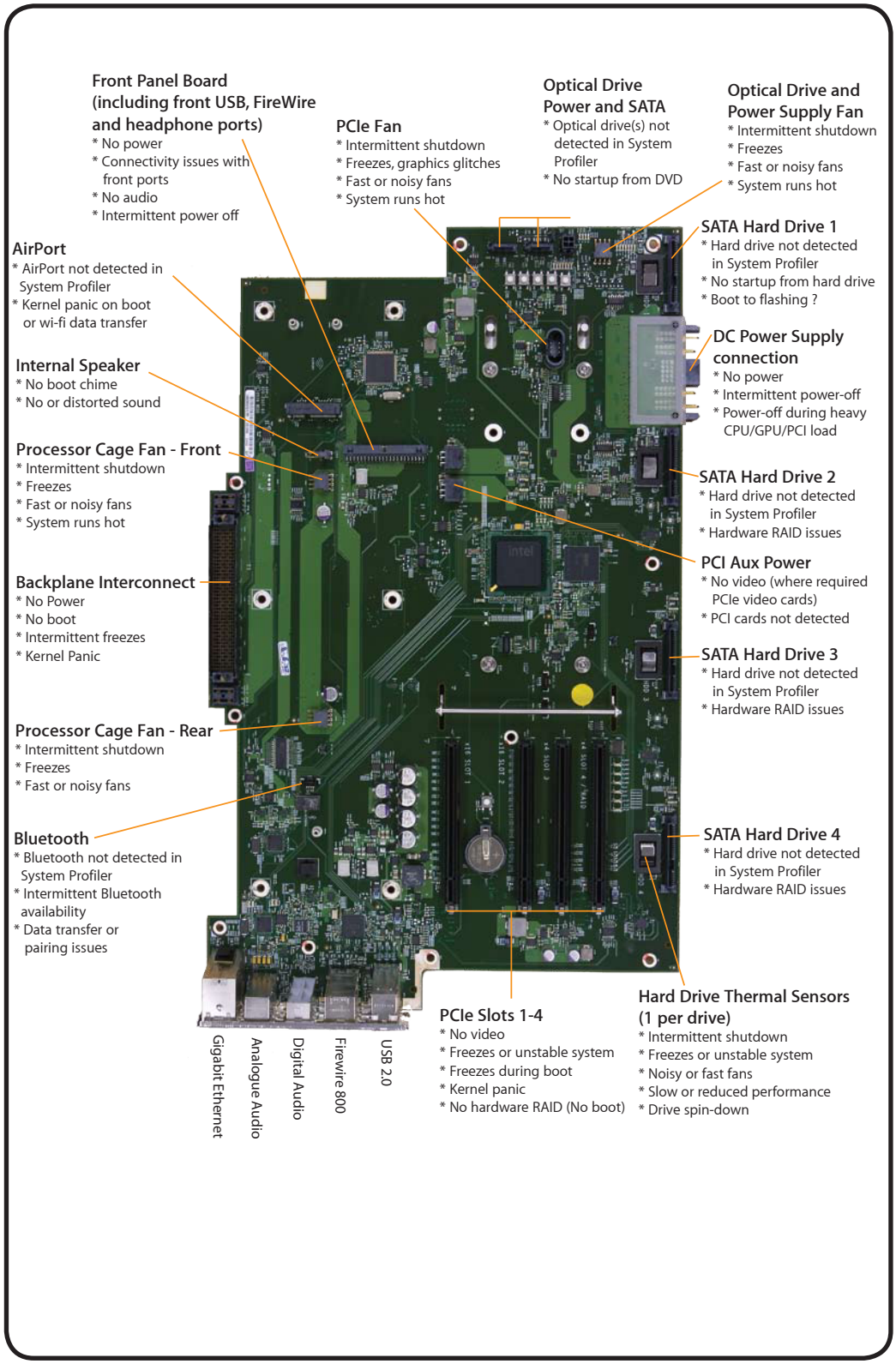
Important: Combined maximum power consumption for all four PCIe slots must not exceed 300 W.

Functional Overview

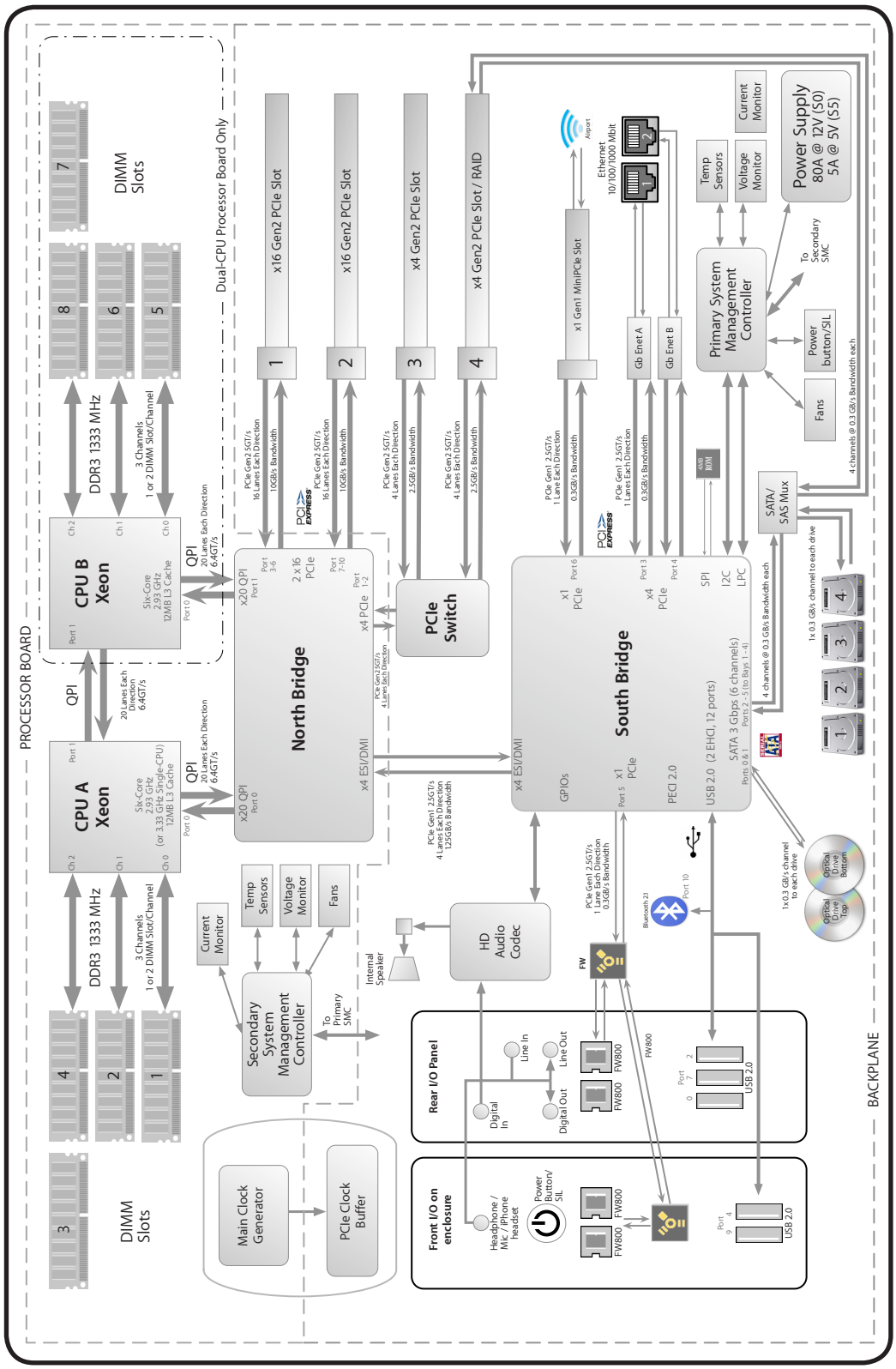
Processor Board



Backplane Board



Block Diagram



Common Reset Procedures

The following reset procedures are often helpful in troubleshooting Mac Pro issues.

Resetting the System Management Controller (SMC)

The System Management Controller (SMC) controls all power functions for the computer. If the computer is experiencing any power issue, resetting the SMC may resolve it. The SMC controls several functions, including:

- Telling the computer when to turn on, turn off, sleep, wake, idle, and so forth
- Handling system resets from various commands
- Controlling the fans

It is also recommended that the SMC be reset after a backplane board or processor board is replaced as part of a repair.

Note that resetting the SMC does not reset the PRAM. Resetting the SMC will not resolve issues in which the computer is unresponsive—in these situations, restarting the computer generally works. If the computer isn't responding, perform these steps one at a time, in the following order, until the issue has been resolved:

1. Force Quit (Option-Command-Escape)
2. Restart (Control-Command-Power)
3. Force Shut Down (press the power button for 10 seconds)

Resetting the SMC can resolve some computer issues such as not starting up, not displaying video, sleep issues, fan noise issues, and so forth. If the computer still exhibits these types of issues after you've restarted the computer, try resetting the SMC by removing AC power:

1. From the Apple menu, choose Shut Down (or if the computer is not responding, hold the power button until it turns off).
2. Unplug the AC power cord.
3. Wait at least 15 seconds.
4. Plug the power cord back in, making sure the power button is not being pressed at the time.
5. Press the power button to start up the computer.

For more information:

http://www.apple.com/support

HT1411—Mac Pro: How to reset the System Management Controller (SMC) <**http://support.apple.com/kb/HT1806**>

Resetting the Parameter RAM (PRAM)

To reset PRAM:

1. If the computer is on, turn it off.
2. Locate the following keys on the keyboard: Command, Option, P, and R. You will need to hold these keys down simultaneously in Step 4.
3. Turn on the computer.
4. Press and hold the Command-Option-P-R keys.

   Important: You must press this key combination before the gray screen appears.
5. Hold the keys down until the computer restarts and you hear the startup sound for the second time.
6. Release the keys.

For more information:

http://www.apple.com/support

HT1379—Resetting your Mac's PRAM and VRAM <**http://support.apple.com/kb/HT1379**>

Starting Up in Safe Mode

A Safe Boot is a special way to start Mac OS X when troubleshooting. To start up into Safe Mode (Safe Boot):

1. Make sure the computer is shut down.
2. Press the power button.
3. Immediately after you hear the startup tone, press and hold the Shift key.

   Note: The Shift key should be held as soon as possible after the startup tone but not before.
4. Release the Shift key when you see the screen with the gray Apple and progress indicator (looks like a spinning gear). During startup, "Safe Boot" appears on the Mac OS X startup screen. To leave Safe Mode, restart the computer normally, without holding down any keys during startup.

For more information:

http://www.apple.com/support

HT1564—What is Safe Boot, Safe Mode? <**http://support.apple.com/kb/HT1564**>

TS1884—Safe Boot take longer than normal startup <**http://support.apple.com/kb/TS1884**>

Real Time Clock (RTC) Reset

The Real Time Clock (RTC) is a chip on the backplane board that controls the date and time functions of the computer. Resetting the RTC may resolve booting issues.

1. From the Apple menu, choose Shut Down (or if the computer is not responding, hold the power button until it turns off).
2. Unplug the AC power cord.
3. Remove the battery for at least 20 seconds. You may need to remove a PCI Express card to have access to the battery.

Alternatively, you can use the RTC reset button (small button located next to the battery). Press the button for one second when the computer is shut down but still connected to AC power.

Power-On Self Test: RAM and Processor Verification

When the computer is started up after being fully shut down, a self test in the computer's ROM is automatically run. (The test is not run if the computer is only restarted.) If the test detects a problem, the status LED (located above the power button on the front of the computer) flashes in the following ways*:

- 1 Flash: No RAM is installed or detected or the quick memory test failed. An LED will light up on the processor board next to the affected DIMM or empty DIMM slot.
- 3 Flashes: A RAM bank failed extended memory testing. An LED will light up on the processor board corresponding to the affected DIMM.

Troubleshooting: Try reseating the memory DIMMs. Check memory installation instructions for proper installation order. Swap affected DIMM with known good DIMM.

***Note:** The status LED lights up when the power button is depressed at startup. Do not count this light as one of the diagnostic flashes. The memory processor board diagnostic LEDs also flash briefly startup and shut down and when the computer goes in and out of sleep mode. This is normal behavior.

Minimum Configuration Testing

The following procedure can help you troubleshoot a "No Power" or other startup related symptom.

The method gradually builds up the system from a minimum configuration and verifies expected behaviors at each step. This approach helps determine which modules function together. The goal is to identify which module(s) cause a symptom to recur when they are added. This method may also help you discover a loose or faulty cable or connector.

If you encounter unexpected behavior during a step, you shoul investigate the last module you re-installed. Backtrack to the previous step, remove the last installed module, and re-verify the expected behavior.

Note: Minimum configuration testing may not be practical for every repair. Refer to other troubleshooting sections in this manual for additional direction.

Take Mac Pro Down to Minimum Configuration

1. Remove the following items from the Mac Pro:

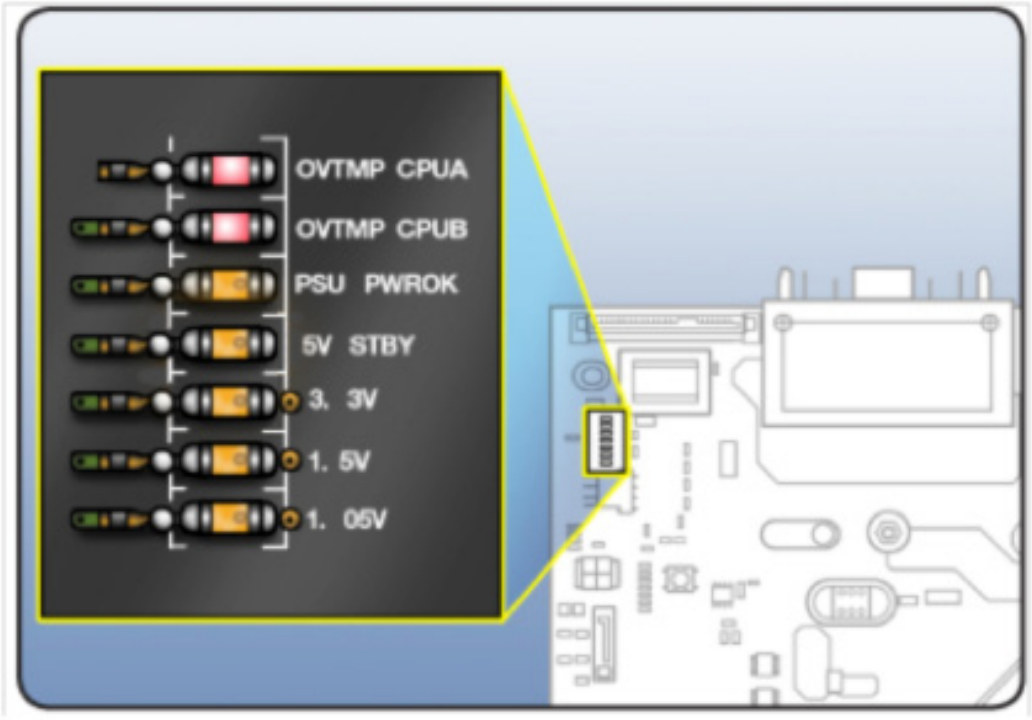
- Hard drives/solid state drives
- Optical drives
- Processor tray and processor board (containing processors, processor heatsinks, and memory)
- PCIe cards
- AirPort card
- Bluetooth card
- Battery
- PCIe fan
- Processor cage (including fans)
- Front panel board

Disconnect all cables from the backplane board, except the power supply.

2. Attach a known good power cord from a known good AC source to the Mac Pro.

Note: When connecting the Mac Pro to AC power, verify that the LEDs for OVTMP CPUA and OVTMP CPUB briefly flash red (less than 0.5 sec). The LEDs are located under hard drive bay 1 on the backplane board. If they do not illuminate briefly, there is an issue with either the power supply or the backplane board. Generally speaking, power supplies can be affected by issues more than other modules. If you suspect a power supply has failed,verify it in another Mac Pro (Mid 2010), if available, before replacing any modules.

Note: The OVTMP CPUA and OVTMP CPUB LEDs on a properly functioning Mac Pro will also momentarily flash red immediately after the Mac Pro is disconnected from AC power.



3. Press the DIAG button, and verify 5V STBY LED (amber) illuminates.

Expected behavior:
5V STBY LED illuminates, confirming power to the backplane board. If the LED does not illumuniate, suspect power supply or backplane board failure.

4. Disconnect AC power cord. Reinstall processor cage with fans and processor board. Do not reinstall processor(s), heatsinks, or memory.

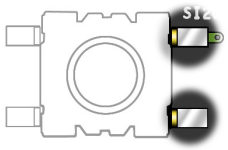
Notes:
- Verify no bent pins on processor connector or mating connector of processor board and backplane board.
- Verify no grime or foreign debris is causing contact issues on processor connectors, and connectors on processor board and backplane board.

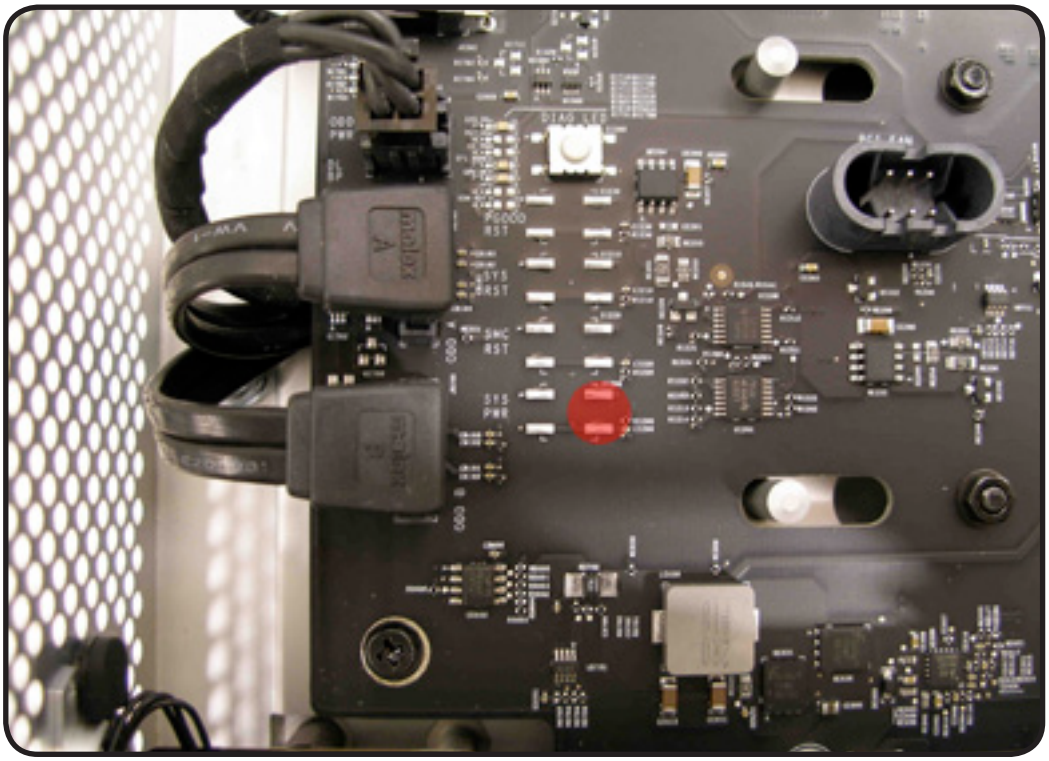
5. Connect AC power cord. Press the DIAG button to verify the 5V STBY LED illuminates. This is

a verify step, as you've added modules since previous step.

Expected behavior:
5V STBY LED illuminates, confirming power to the backplane board. If the LED does not illuminate, suspect power supply or backplane board failure.

6. Momentarily jump the SYS_PWR solder pads to turn ON the Mac Pro.





Expected behavior:
- Front and rear processor cage fans (and PCIe fan, if installed) should spin slowly
- One red-colored error LED illuminates on the processor board (next to the memory slots).

Notes:
- The solder pads are at the same location where the power button would be.
- To help troubleshoot processor issues, check the related CPU Error LED. See "**Processor Diagnostic LEDs**."

7. Press and hold the DIAG button.

Expected behavior:
- PSU PWROK (green), 5V STBY (amber), EFI DONE (green), GPU OK (green) LEDs illuminated
- No startup tone
- Front and rear processor cage fans (and PCIe fan, if installed) should spin slowly

8. Disconnect AC power cord.

At this point, to make testing easier try powering on the computer using a known good front

panel board, power button, and cable, instead of jumpering SYS_PWR solder pads.

9. Reconnect internal speaker. Reinstall a processor and heatsink in processor A connector, and one known good and compatible Apple memory DIMM in slot 1.

Notes:

- The Mac Pro won't start if you use processor B only on a dual-processor board. Use processor A connector.
- Verify no damaged pins on DIMM or processor connectors or mating connector of processor board and backplane board.
- Verify no damaged heatsink thermal sensor and fan connector pins or mating connector on the processor board. If there is damage, all Mac Pro fans will ramp to 100% when power ON.
- Verify no grime or foreign debris is causing contact issues on DIMM, processor connectors, and connectors on processor board and backplane board.

10. Connect AC power cord. Press the DIAG button to verify the 5V STBY LED illuminates. (This is a verification step, as you've added modules since previous step.)

11. Power Mac Pro ON either by PWR_ON solder pads or front panel board.

Expected behavior:

- The red-colored error LED on the processor board next to the memory slots at processor A should flash once only as the Mac Pro powers on.
- Startup tone heard (if not, reset PRAM and retest)
- Front and rear processor cage fans (and PCIe fan, if installed) should spin slowly

Notes:

- If using dual-processor board, both the LEDs next to the memory slots should flash once only.
- You can test both processors independently using processor A connector only.

12. Disconnect AC power cord. Install a known-good hard drive with a compatible/bootable Mac OS installed.

Notes:

- Verify no damaged SATA data or power pins on drive and mating connector on backplane board.
- Verify no grime or foreign debris is causing contact issues on SATA data or power pins on drive and mating connector on backplane board.

13. Connect AC power cord. Power Mac Pro on by PWR_ON solder pads or front panel board.

Expected behavior:

Listen for sound of hard drive boot. If no indication of hard drive boot, try drive in another bay.

Note:

Shortly after boot start, verify that a red-colored LED is illuminated within the optical audio-out jack at the rear of the Mac Pro. If so, software drivers have been loaded.

14. Disconnect AC power cord. Install a known good compatible PCIe graphics card into slot 1 and attach a known good display.

Notes:

- Verify no damaged PCIe pins on the video card and mating PCIe connector on backplane board.
- Verify no grime or foreign debris is causing contact issues on the video card and mating connector on backplane board.

15. Connect AC power cord. Power Mac Pro ON either by PWR_ON solder pads or front panel board.

Expected behavior:

- Listen for sound of hard drive boot.
- Verify good uncorrupted video on display.

Processor Diagnostic LEDs

The dual-processor board and single-processor board include a diagnostic LED for each processor. The following illustrations show the location of each LED and its associated processor. These error LEDs are normally off. A red illuminated LED indicates the associated processor may be missing or in overtemp state (PROCHOT).

Single Processor Board

Dual Processor Board

Troubleshooting CPU Diagnostic LEDs

- Determine if the error LED follows the processor heatsink
- Verify the heatsink is physically undamaged and properly connected to the processor board
- Check that adequate thermal grease is applied, and verify the fan is operating
- For dual processor boards only: determine if the error LED follows the processor by swapping processor A and processor B locations.

Symptom Charts Overview

Use the following as a general troubleshooting road map for Mac Pro (Mid 2010).

Check	Result	Action
1. Plug known good power source and power ON computer. Does computer power ON?	Yes	Computer powers on. Go to step 2.
	No	Go to **No Power Quick Check**.
2. √ Computer powers on √ Startup sound chime (increase sound volume and retest, if unsure.) Connect external DVI or Mini Display Port monitor and restart unit. Is video observed on the external display? **Note:** For more information on supported display configurations, refer to **http://support.apple.com/kb/HT4279**.	Yes	Video present on both. Go to step 3.
	No	No video present on both. Reseat all DIMMs. Refer to **Memory Diagnostic LEDs**. Then go to **No Video Quick Check**.
3. √ Computer powers on √ Startup sound chime √ Video present Restart computer, immediately press and hold OPTION key to see boot drive volumes in Startup Manager. Are any bootable volumes detected?	Yes	Bootable drive volumes detected. Go to step 4.
	No	No bootable drive volumes detected. Go to **Power but No Boot Quick Check**.
4. √ Computer powers on √ Startup sound chime √ Video present √ Boots from drive Try to boot from Install DVD. Is boot possible?	Yes	Can boot from Install DVD. Go to step 5.
	No	Cannot boot from Install DVD. Go to **Power but No Boot Quick Check**.

5. √ Computer powers on √ Startup sound chime √ Video present √ Boots from Install DVD and drive Does computer stay ON. Does it sleep and wake, and not shutdown?	Yes	Computer sleeps/wakes and does not shut down. Go to step 6.
	No	Possible power-related issue. Go to **Intermittent Shutdown Quick Check**.
6. √ Computer powers on √ Startup sound chime √ Video present √ Boots from Install DVD and drive √ Reaches the desktop without kernel panic/freezes √ Computer sleeps/wakes and does not shutdown **Plug in USB and FireWire devices. Do they appear in System Profiler and are they functional?**	Yes	No USB/FireWire problems. Go to step 7.
	No	USB/FW connection fail. Go to **Input Output Devices** symptom charts.
7. √ Computer powers on √ Startup sound chime √ Video present √ Boots from Install DVD and drive √ Reaches the desktop without kernel panic/freezes √ **Computer sleeps/wakes and does not shutdown** √ USB and FireWire functional **Connect to AirPort and Ethernet networks. Do Ethernet/AirPort network connections work?**	Yes	No Ethernet/AP communication problems. Go to step 8.
	No	Ethernet/AP Network connection fail. Go to **Communications** symptom charts.
8. √ Computer powers on √ Startup sound chime √ Video present √ Boots from Install DVD and drive √ Reaches the desktop without kernel panic/freezes √ **Computer sleeps/wakes and does not shutdown** √ USB and FireWire functional √ **Ethernet /AP works** Use wireless mouse or keyboard, pair with the device. Does Bluetooth connection work?	Yes	No Bluetooth communication problems. Go to step 9.
	No	Bluetooth connection fail. Go to **Input Output Devices** symptom charts.

9. √ Computer powers on √ Startup sound chime √ Video present √ Boots from Install DVD and drive √ Reaches the desktop without kernel panic/freezes √ **Computer sleeps/wakes and does not shutdown** √ USB and FireWire functional √ **Ethernet /AP works** √ Bluetooth works. **Check for correct sound input/output setup in System Preferences Sound, then connect audio source and headphones and check to see if alternate audio in and out ports are detected. Record sound using QuickTime Player app, and play it to check for audio in/out functionality. Does internal and external audio in/out work?**	Yes	No audio issue.
	No	Audio Issue. Go to **Front Headphone Jack Has No Audio Quick Check**.

Startup and Power Issues

Follow the steps in the order indicated below. If an action resolves the issue, retest the computer to verify. If the issue persists after retesting, return to step 1.

No Power/Dead Unit

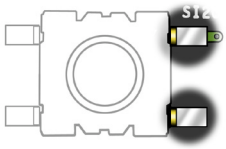
Unlikely cause: Optical drive(s), hard drive(s), fans, memory, processors, PCIe cards, speaker, AirPort card, Bluetooth card

Quick Check

Symptoms	Quick Check
No Power/Dead Unit	Reseat all DIMMs. Refer to **Memory Diagnostic LEDs**.
No power	Verify power source.
No front panel power/sleep LED	Verify power cable.
No startup chime No Image on external display No HD No fans spin No light if Caps Lock pressed Non-operational	Reset SMC by unplugging the AC power cord for 15 seconds. Reconnect the power cord without pressing the power button. After 5 seconds press the power button and verify that the the computer turns on. Reset RTC.

Deep Dive

Check	Result	Action	Code
1. Verify that connection between power supply and backplane board is undamaged and secure. Verify that power button and front panel board cable connections to the front panel board are undamaged and secure. See **Functional Overview**.	Yes	Go to step 2	
	No	Reseat all connectors and retest.	
2. Connect AC power cord to the computer. Verify the 5V STBY LED illuminates when you press the DIAG button on the backplane board.	Yes	STBY LED illuminates, but computer won't power ON. Go to step 4.	
	No	Suspect power supply failure. Replace power supply and go to step 3.	**P01**
3. Verify the 5V STBY LED illuminates when you press the DIAG button on the backplane board.	Yes	Issue resolved.	
	No	Go to step 5.	
4. Disconnect the front panel board. Momentarily jumper the pictured SYS_PWR solder pads on the backplane board. Verify the computer turns ON.	Yes	Front panel board or power button faiure. For front panel board, use code M01. To verify power button, go to **Power Button Stuck**.	**M01**
	No	Go to step 5.	**P01**
5. Reduce computer to minimal configuration. See **Minimum Configuration Testing**. Verify the 5V STBY LED illuminates when you press the DIAG button on the backplane board.	Yes	Suspect a module that has been removed. Reinstall modules until symptom reappears. Replace affected module. Then go to step 6.	
	No	Replace backplane board and retest.	**M01**



6. Reconnect the processor board without processors. Press power button and verify computer turns ON. You can tell if the computer has started up by fans and LEDs. There is no other activity since there are no processors.	Yes	Add processor A and retest. If computer power remains stable, the power issue is resolved.	
	No	Go to step 1.	

Intermittent Shutdown

Unlikely cause: Optical drive(s), hard drive(s), fans, memory, processors, PCIe cards, speaker, AirPort card, Bluetooth card

Quick Check

Symptoms	Quick Check
Intermittent Shutdown • Computer intermittently shuts down, restarts, sleeps • Fans run fast • Slow computer performance prior to intermittent shutdown, restart, sleep	**1.** Confirm known good AC power source, and a known good power cord is fully inserted into the back of the computer **2.** Reset SMC **3.** Power ON the computer **4.** After power ON, verify front panel power/sleep LED illuminated, and not flashing any error sequences indicating a memory failure. **5.** Startup from known good compatible boot device with 'Shift' key to boot into safe mode. **6.** Check system.log in the Console to identify possible shutdown causes. If the computer won't stay ON for long enough, place the customers' hard drive into a known-good computer and retrieve the logs. **7.** Confirm Energy Saver Settings, check for scheduled shutdown/startup/sleep times **8.** Run AHT/ASD for sensor/fan thermal tests. Reset SMC by unplugging the AC power cord for 15 seconds. Reconnect the power cord ensuring the power button is not being pressed. After 5 seconds press the power button and verify if the computer turns on.

Deep Dive

Check	Result	Action	Code
1. Verify shutdown/restart/sleep issue does not occur with a known good AC Mains power source. Rule out customer environment such as defective, uninterruptable power supplies. Rule out power generators which may produce noisy power, straining the computer's internal power supply and causing issues.	Yes	Suspect unstable AC Mains power source. Using an alternate AC Mains power source resolves issue.	
	No	Go to step 2	
2. Remove all non critical internal and external peripherals, i.e. AirPort, Bluetooth, PCIe cards, external USB drives etc. Verify shutdown/restart/sleep issue does not occur	Yes	Shutdown/restart/sleep issue does not occur when internal and external peripherals removed. Troubleshoot suspected peripherals.	
	No	Go to step 3	
3. Verify if fans are running fast.	Yes	Go to "Fast/Failed Fans" Flow	
	No	Fans running at normal speed. Go to step 4.	
4. Reset SMC. Verify computer functions correctly and does not intermittently shutdown/restart/sleep.	Yes	Corrupt SMC State causing power stability issues. Resetting SMC has resolved the issue.	
	No	Go to step 5	
5. Attempt to boot from original or compatible install media, or from a known good external hard drive with compatible OS X installed. Verify computer stays ON without any intermittent shutdown/restart/sleep.	Yes	Computer power remains stable and does not intermittently shutdown/restart/sleep. Clean install customer HD with compatible OS. Perform all Software Updates if required.	
	No	Go to step 5	

6. Disconnect all internal boot volumes. The computer should not discover any boot volumes and should start to the flashing "Folder?" Verify if the computer continues to intermittently shutdown/restart/sleep	Yes	Computer continues to shutdown/restart/sleep. Refer to **Minimum Configuration Testing** troubleshooting: Remove all modules and peripherals not critical to operation. Verify that computer functions correctly and does not shutdown/reset/sleep unexpectedly. Then reinstall modules one at a time and restest until symptom returns. Verify that the last module added is not the cause by removing it again.	
	No	Run Apple Service Diagnostic from an external USB drive. Suggest to also go to **Minimum Configuration Testing** if no errors are found.	

Memory Issues/Kernel Panic and Freezes

Unlikely cause: Power supply, fans, enclosure

Quick Check

Symptoms	Quick Check
Memory Issues/Kernel Panic and Freezes • Computer has kernel panic or freezes on startup, when waking from sleep, or during normal operation • Memory not recognized in System Profiler • Fans run fast	**1.** Reseat all DIMMs. Refer to **Memory Diagnostic LEDs**. **2.** Reset SMC **3.** After power ON, verify front panel power/sleep LED illuminated, and not flashing any error sequences indicating a memory failure. **4.** Remove the installed RAID card and drives during troubleshooting. Install a known-good SATA drive in bay #1 with compatible Mac OS X installed. **5.** Verify the video card is supported in this computer. Previous model Mac Pro video cards may not be compatible. Cross reference the EEE Code and GSX part number. **6.** Verify with known good and compatible ECC DIMMs. Installing a non-ECC DIMM will cause all memory to run as non-ECC. Note that memory from older computers is not compatible and cannot be used. See **Memory Configuration**. **7.** Ensure the compatible memory is filled in the correct order in the memory slots. If memory is not configured for the best performance, the "Memory Slot Utility" will appear onscreen and recommend an improved configuration. To use the utility again go to /System/Library/CoreServices/Memory Slot Utility **8.** Confirm total memory in System Profiler. **9.** Startup with 'Shift' key down for safe mode boot. Check DiagnosticsReport folder for crash cause. **10.** Startup from original install media, or known good boot device with compatible OS X. **11.** Run AHT or ASD.

Deep Dive

Check	Result	Action	Code
1. Remove and reseat all DIMM's. If any memory diagnostic LEDs are illuminated on the processor board, refer to **Troubleshooting Memory LEDs** before proceeding. Verify the computer starts without issue.	Yes	Reseating the DIMMs appears to resolve issue. Verify computer continues to function without freezing or kernel panic.	
	No	Computer had kernel panic or freeze during boot. Go to step 2.	
2. Disconnect all peripherals and PCIe cards. Install known good and compatible video card (ensure the card goes into PCIe slot #1 (16x), and has booster power cable connected if required)	Yes	Suspect peripherals or PCIe cards as cause. Reconnect one at a time, verifying computer operation at each stage	
	No	Computer had kernel panic or freeze during boot. Go to step 2	
3. Reset SMC and verify that unit starts without issue.	Yes	Corrupt SMC state causing stability issues. Reset SMC has resolved.	
	No	Computer had kernel panic or freeze during boot. Go to step 3	
4. Verify all fans are spinning and adequate airflow around the computer.	Yes	All fans are spinning, and adequate airflow. Go to step 4	
	No	One or more fans are not spinning. Go to **Computer Runs Slow with Fast/Failed Fans**.	
5. Attempt to boot with original install media or from an external hard drive with compatible OS X installed. Verify the computer is able to successfully boot to the Finder.	Yes	Computer boots without kernel panic or freeze using external drive. Corrupt OS installed or damaged internal boot drive. Run ASD/Disk Utility drive test and replace hard drive if test fails. Complete a Clean Install with compatible Mac OS X.	**H03**
	No	Computer had kernel panic or freeze during boot. Go to step 5	

6. Inspect if any memory error LEDs are illuminated. Install 1 only known good compatible memory DIMM in memory slot #1. Verify computer boots without kernel panic or freeze.	Yes	Computer boots without kernel panic or freeze with only 1 DIMM installed. Re-install the customer memory (using optimized recommend configurations) until the at-fault memory is identified. Use extra known good memory to identify the faulty memory module. Replace the faulty memory module.	**M07**
	No	Go to step 5	
7. Start with 'Shift' key to boot into safe mode. If computer still crashes during boot, place the hard drive into a good computer to access the Panic log. Check panic log to determine if an I/O interface has crashed, i.e. AirPort card, Bluetooth card, hard drive, optical drive, etc.	Yes	Kernel panic relates to I/O device crash. Go to step 7	
	No	Kernel panic is not relating to an I/O crash. Go to step 8	

8. Disconnect the suspected module and any related cables from the Back Plane board. Attempt to boot with original install media or from an external hard drive with compatible OS X installed. Verify the computer is able to successfully boot to the Finder.	Yes	Computer does not kernel panic or freeze when the suspect I/O module is removed. Replace the affected I/O module. If AirPort module, replace AirPort module. If Bluetooth module, replace Bluetooth module. If optical drive, replace optical drive cable and retest. If issue remains, try using known good optical drive. If issue resolved, replace defective optical drive. If hard drive, try using known good hard drive. If issue resolved, replace defective hard drive. If PCIe card, try using known good, compatible PCIe card, If issue resolved, replace defective PCIe card.	 **N13** **M11** **X03** **J03** **H01** **M17**
	No	Computer still has kernel panic or freeze during startup. Go to step 8.	

9. Run ASD to test hardware function. Verify ASD does report errors.	Yes	ASD reports errors detected. If processor, processor board, backplane board, front panel board, replace affected module and retest.	**M05** (Hang/ freeze) or **M06** (Kernel Panic/ Crash) or **M24** (Con- nectors broken, bent, or hurt)
	No	ASD does not report any errors, or is unable to run without experiencing kernel panic or freeze. Go to **Minimum Configuration Testing**.	

No Video

Unlikely cause: Power supply, fans, speaker, AirPort card, Bluetooth card

Quick Check

Symptoms	Quick Check
No Video • No power perceived • No video • Dim video	**1.** To prevent replacing graphics cards unnecessarily, refer to http://support.apple.com/kb/HT4279. Note that graphics cards have three ports. However, if using more than one Mini Display-Port to Single-Link DVI adapter, only two displays are supported across the three ports. (Three displays are supported if using Mini Display-Port to Dual-Link DVI adapters or Mini Display-Port to VGA adapters.) **2.** Reseat all DIMMs. Refer to Memory Diagnostic LEDs. **3.** Attach a known good and compatible DVI or Mini-DP monitor to computer's video card. Verify video cables and connectors are free from defects (including bent pins). Verify power booster cable(s) are secured to the video card. **4.** Power OFF/ON the display. **5.** Verify the video card is supported in this computer. Previous model Mac Pro video cards may not be compatible. Cross reference the EEE Code and GSX part number. **6.** Reset RTC. **7.** Confirm at least one known good and compatible memory DIMM is installed in the computer. **8.** After power ON, verify front panel power/sleep LED illuminated and is not flashing any error sequences indicating a memory failure. Caps Lock LED illuminates when CapsLock key is pressed. **9.** Verify the computer is alive by listening for the drive booting sounds. If not detected go to Power, but No Boot Quick Check. **10.** Remove non essential peripheral cards **11.** Reseat video card (and power boost cable(s) if required) in the correct PCIe slot **12.** Remove onboard backup battery.

Deep Dive

Check	Result	Action	Code
1. Disconnect all internal drives. Attach a known good display to the video card. Power ON the computer and verify video is observed on the display.	Yes	Video observed. Go to step 2.	
	No	No video observed. Go to step 3.	
2. Verify the video quality observed is OK	Yes	Video quality OK. Go to step 5.	
	No	Video has poor quality, e.g. dim, distorted, etc. Go to step 4.	
3. Reset SMC and PRAM. Reseat memory, processor tray, video card. Verify video is observed.	Yes	Video observed. Go to step 2.	
	No	Move the video card into PCIe slot #2 to determine if backplane board PCIe slot #1 is defective. Retest. If video observed in PCIe slot #2, replace backplane board. If no video observed in PCIe slot#2, replace video card. Alternate: Go to step 7.	**M03**
4. Reset SMC and PRAM. Reseat memory, processor tray, video card. Verify video quality observed is OK.	Yes	Go to step 5.	
	No	Replace video card. Alternate: Go to step 7.	**M03**
5. Reconnect an internal boot drive. Allow the computer to boot (video software drivers will load). Verify video quality is OK	Yes	Video quality observed is OK. Problem maybe with the customer display, or the customer display may not be compatible.	
	No	Video quality problem evident after booting. Verify video card fan operating, and is not clogged with dust preventing adequate cooling. Go to step 6.	

6. Boot from known good and compatible Mac OS X. Verify video quality observed is OK.	Yes	Video quality observed is OK. Problem isolated to software. Clean install the customer hard drive with known good compatible Mac OS X or use the media supplied with the computer.	
	No	Move the video card into PCIe slot #2 to determine if backplane board PCIe slot #1 is defective. Retest. If video quality OK in PCIe slot #2, replace backplane board. If still poor quality in PCIe slot #2, replace video card.	**M04**
7. For testing, dual-processor computers require only one processor installed in socket A. For dual- and single-processor computers, reseat processor in socket A. Verify video observed.	Yes	Go to step 2.	
	No	Go to step 8.	
8. If dual-processor computer, swap out processor in socket A and retest. Verify video is observed.	Yes	Replace defective processor.	**M03**
	No	Replace processor board.	**M03**

Power, but No Boot

Unlikely cause: Enclosure, processor board, processors, front panel board, fans, power supply

Quick Check

Symptoms	Quick Check
Power, but No Boot • Power, fans, hard drive spin, startup chime • Power LED is on, Caps Lock LED illuminates when pressed • Video observed (if no video, go to **No Video**) • No boot	**1.** Reseat all DIMMs. Refer to **Memory Diagnostic LEDs**. **2.** Reset SMC. **3.** Reset RTC. **4.** Reset PRAM **5.** After power ON, verify front panel power/sleep LED is illuminated and not flashing any error sequences indicating a memory failure. **6.** Attempt to startup from original install media, or known good boot device with compatible Mac OS X. **7.** Verify internal hard drive available, smart status, check structure and privileges using Disk utility.

Deep Dive

Check	Result	Action	Code
1. Reset SMC. Verify the computer boots from the internal hard drive	Yes	Corrupt SMC State preventing successful power ON and startup.	
	No	Go to step 2	
2. Remove the customer DIMMs and install a single known good compatible DIMM in socket #1. Start up the computer with Option key pressed using a known good keyboard. Verify the Startup Manager appears.	Yes	Computer boots to Finder with known good DIMM. Add another known good DIMM in socket #2 and retest. If computer starts up, isolate and replace affected customer DIMMs. Ensure the DIMMs are installed correctly following the recommended DIMM arrangement (see **Memory Configuration**) or crashing problems will arise.	**X02**
	No	Go to step 3	

3. Disconnect all internal optical and hard drives. Verify the flashing "Folder?" appears after approximately 30 seconds.	Yes	Computer unable to boot with internal drives connected. Isolate drives Go to **Hard Drive Not Recognized/Mounting** and **Optical Drive Not Recognized/Mounting**.	
	No	Go to **Minimum Configuration Testing**	

Noise/Hum/Vibration

Unlikely cause: Power supply, memory, processors, processor board, backplane board, PCIe cards, AirPort card, Bluetooth card

Quick Check

Symptoms	Quick Check
Noise/Hum/Vibration • Buzzing • Rattling • Ticking • Squeaking	**1.** Ensure the computer enclosure is undamaged; all enclosure parts are in good condition not loose or excessively worn. No foreign objects inside. **2.** Verify the computer is sitting on a sturdy flat surface. **3.** Verify all the air intake/outflow fans and vents are not obstructed. **4.** Various normal fan acceptable noises may be heard in a quiet location. **5.** Various normal hard drive and optical drive operational acceptable noises may be heard in a quiet location. **6.** Reset the SMC. Verify all applicable SMC, EFI and Software Updates have been applied. **7.** Play sound sample at loud and soft volume levels to determine if noise is caused by the speaker or the amplifier circuit. For more information, go to **Distorted Audio from Internal Speaker**. **8.** Some software processes may cause the fans RPM to increase allowing the computer to remain within normal operating temperature range. Quitting computer-intensive processes should allow the fans to slow after a brief period.

Deep Dive

Check	Result	Action	Code
1. Disconnect the speaker from backplane board. Power computer ON and verify noise disappears.	Yes	Audio issue with speaker or amplifier. Go to **Distorted Audio from Internal Speaker**	
	No	Go to step 2	
2. Verify temperature sensors and fans are securely connected to their respective locations. See Sensor and Fan Location Overview	Yes	Go to step 4	
	No	Disconnect/reconnect temperature sensors and Fans and retest.	
3. Determine if noise issue sounds like computer fans are running abnormally fast. Note: Ensure the computer did not have the power button pressed when adding the AC power cord.	Yes	Replace related temperature sensor or fan.	**P04**
	No	Go to step 4	
4. Remove fan(s) and inspect blades for damage or obstructions.	Yes	Replace affected fan(s)	**P04**
	No	Go to step 5	
5. Remove related fan(s) and rotate blades. Verify that fan blades spin smoothly without interference from fan housing.	Yes	Go to step 6	
	No	Replace affected fan(s)	**P04**
6. Reinstall fan; make sure there are no cables routed under or near fan assembly that might interfere with the fan blades. After reassembling display, verify that the noise issue is resolved.	Yes	Noise issue resolved	
	No	Replace affected fan assembly. Retest	

Burnt Smell/Odor

Unlikely cause: Enclosure

Quick Check

Symptoms	Quick Check
Burnt Smell/Odor Computer emits an odor or smell of smoke.	**1.** Disconnect the power cord from the computer. **2.** Identify the source of the odor. **3.** Some odors may be present when operating normally. Refer to **http://support.apple.com/kb/TA22044?viewlocale=en_US** **4.** Some visual clues may include brown marks on PCB's, and component damage i.e. transistors, IC's, inductors, capacitors, resistors etc. **5.** When certain components fail because of overheating, the smell or odor clues may not be evident after the time of the incident. **6.** Some components may not be easily accessible for visual identification of possible failure. **Important:** Components may emit brief non-continuous smoke or odor when the failure occurs. This does not typically suggest a safety issue. However, make a thorough inspection and if you feel there may be a safety issue with the computer, please notify Apple through the appropriate escalation route.

Deep Dive

Check	Result	Action	Code
1. Verify source of the odor i.e. foreign contaminant such as fluid ingress, dust, hair, etc	Yes	Cleanup foreign contaminant, replace any affected modules. Foreign contaminants are not covered by Apple warranties	**P08**
	No	Go to step 2	
2. Inspect PCB's and components for indications of a thermal event	Yes	Replace any affected modules	**P08**
	No	Go to step 3	

3. Verify computer is functioning correctly	Yes	Some odors may be present when operating normally. Refer to http://support.apple.com/kb/TA22044?viewlocale=en_US	
	No	Please refer to best related troubleshooting section.	

Uncategorized Symptom

Quick Check

Symptom	Quick Check
Uncategorized Symptom Unable to locate appropriate symptom code	Verify whether existing symptom code applies to the issue reported by the user. If not, document reported symptom and send feedback to smfeedback@apple.com stating that a suitable symptom code could not be found.

Communications

Follow the steps in the order indicated below. If an action resolves the issue, retest the computer to verify. If the issue persists after retesting, return to step 1.

Ethernet Port/Device Issue

Unlikely cause: power supply, fans, speaker, optical drives, hard drives, processor board, front panel board, memory

Quick Check

Symptom	Quick Check
Ethernet Port/Device Issue • One or both Ethernet ports may not function • No Ethernet device present • Unable to access network resources • Ethernet device shows no connection • Ethernet device unable to get an IP address • Slow network performance	**1.** Check the network cable for damage, try a known good Ethernet cable – CAT5 or better recommended for 100Mbps+ connections. **2.** Check both Ethernet ports on Mac and wall/switch for dust, debris, damage or bent pins. **3.** Ensure distance from networking infrastructure is less than 300 feet / 105 meters. **4.** Verify both Ethernet ports, cable and network hardware with a known good computer. Isolate firewall, MAC address filtering or hardware access control devices. **5.** Check system logs. Isolate OS by starting up from original install media (10.6.x) or compatible known good OS.

Deep Dive

Check	Result	Action	Code
1. Visually inspect Ethernet connector to ensure all pins will make physical contact with Cat5 network cable.	Yes	Ethernet interface contacts are good to go. Go to step 2.	
	No	Pins are damaged or bent flat, replace backplane board.	**M10**

2. Isolate OS by booting from original install media. Verify Network Link status active by using Network Utility on install DVD. If the ethernet interface (en0 or en1) Link Status is inactive, recheck physical connect and link activity indicator on hub/switch.	Yes	Ethernet interface (en0 or en1) Link Status is active, go to step 3.	
	No	If connection is ok on known good computer, replace backplane board.	**M10**
3. Verify if IP address is listed for the ethernet interface in System Preferences: Network. Connect computer to network with known good DHCP IP allocation, ensuring static DHCP maps or filtering is not preventing address allocation. Note: DHCP allocation may not be instantaneous depending on network. Retest.	Yes	go to step 4	
	No	If connection is OK on known good computer, replace backplane board.	**M10**
4. Verify connection by using Network Utility to ping another connected computer on the same subnet. Ensure the target computer's IP address is valid, on the same subnet and powered on. Ensure no MAC address filtering or hardware access control devices are present. Use a simple Hub/ Switch environment.	Yes	Go to step 5	
	No	If the symptoms do not change, replace the backplane board.	**M10**
5. Verify ethernet performance and reliability by booting from a known good OS install, and downloading a large file from a web site or file server.	Yes	If you cannot isolate the performance or connectivity issue to the computer under test, the problem may be the network environment. No repair is necessary.	
	No	If there are connection dropouts or poor performance not seen on a known good test computer, replace the backplane board.	**M10**

AirPort/Bluetooth: Defective Wireless Devices

Unlikely cause: power supply, fans, speaker, optical drives, hard drives, processor board, front panel board

Quick Check

Symptom	Quick Check
AirPort or Bluetooth: Defective Wireless Devices • Unable to join networks or pair devices • Card not available or recognized • Intermittent device or connection dropouts	**1.** Open System Preferences and make sure AirPort or Bluetooth is turned on and (for AirPort) that a network is selected. **2.** Check that base station is not using unsupported connection and encryption protocols. **3.** Check for nearby interference sources such as microwave ovens or cordless phones (http://support.apple.com/kb/HT1365) **4.** Check the number of users trying to use AirPort in the area for possible network congestion. **5.** Isolate OS by booting from original install media (10.6.x). Attempt to connect to base station (AirPort) or pair with wireless keyboard (Bluetooth). **6.** Reset PRAM. **7.** Refer to http://support.apple.com/kb/TS3048.

Deep Dive

Check	Result	Action	Code
1. Open System Profiler, check to see if AirPort or Bluetooth is recognized. Ensure software updates for AirPort/Bluetooth Software and Firmware have been applied.	Yes	(AirPort) Ensure MAC address filtering is not enabled on the Base Station (Bluetooth) Ensure target devices are set to discoverable.	
	No	If card is not detected or software updates do not resolve issue, go to step 2.	

2. Reseat the AirPort card and Bluetooth module on the backplane board.	Yes	Loose backplane board connection. Verify operation of AirPort card by connecting to a wireless network and downloading a large file from a website or file server.	**N04**
	No	AirPort issue, go to 3, Bluetooth issues go to 5.	
3. (AirPort) Verify the Antenna connections to the AirPort card are not reversed, loose, damaged or incorrectly attached to Bluetooth antenna. Reseat antenna connections.	Yes	Loose connections or crossed antenna	**N04**
	No	If the connectors are secure, antenna connections not reversed and shown no signs of damage or wear, go to step 4	
4. (AirPort) Try a known good AirPort card compatible with product	Yes	Replace AirPort card	**N12**
	No	Replace backplane board.	**M11**
5. (Bluetooth) Re-enable BT. Reseat the Antenna connection to the Bluetooth module. Verify the antenna connection is not loose, damaged or incorrectly attached to AirPort Antenna.	Yes	Loose connection or crossed antenna	**N04**
	No	If the connectors are secure, antenna connections not reversed and shown no signs of damage or wear, go to step 6.	
6. (Bluetooth) Try a known good Bluetooth module compatible with product.	Yes	Replace Bluetooth module	**N12**
	No	Use known good Bluetooth module. Go to step 7.	
7. (Bluetooth) Try a known good Bluetooth antenna board.	Yes	Replace Bluetooth antenna board.	**N14**
	No	Replace backplane board.	**M11**

No/Poor Wireless Signal

Unlikely cause: power supply, fans, speaker, optical drives, hard drives, processor board, front panel board, memory

Quick Check

Symptom	Quick Check
No/Poor Wireless Signal • Unable to find networks • Intermittent connection dropouts • Slow transfer speeds	**1.** Check for nearby interference sources in the 2.4/5GHz range such as microwave ovens and cordless phones (http://support.apple.com/kb/HT1365). **2.** Check that computer is within base station range – move closer to base station. **3.** Base station checks: a. Base station is not set to low-power transmission mode b. Base station is not using unsupported connection and encryption protocols c. Check for possible Wi-Fi channel overlap (nearby base stations using adjacent channel) **4.** Try a different wireless network. Check if other computers can connect to wireless network. **5.** Isolate OS by booting from original install media (10.6.x). Attempt to connect to base station (AirPort) or pair with wireless keyboard (Bluetooth).

Deep Dive

Check	Result	Action	Code
1. Open System Profiler, check to see if AirPort card is recognized under Network -> AirPort card	Yes	Use Software Update to make sure all AirPort Software and Firmware Updates have been applied. Ensure MAC address filtering is not enabled on the Base Station or using hidden network.	
	No	If card is not detected, go to AirPort/Bluetooth - Defective Wireless Devices.	

2. Verify the card is the correct part for the product and region by cross referencing the EEE code and GSX part number.	Yes	Incorrect AirPort card. Earlier revision AirPort cards from other computers may fit but not operate correctly.	**N04**
	No	Go to step 3	
3. Reseat the AirPort card on the backplane board.	Yes	Loose backplane board connection. Verify operation of AirPort card by connecting to a wireless network and downloading a large file from a website or file server.	**N04**
	No	Go to step 4.	
4. (AirPort) Verify the Antenna connections to the AirPort card are not reversed, loose, damaged or incorrectly attached to Bluetooth antenna. Reseat antenna connections.	Yes	Loose connections or crossed antenna	**N04**
	No	If the connectors are secure, antenna connections not reversed and shown no signs of damage or wear, go to step 5	
5. (AirPort) Try a known good AirPort Extreme card compatible with product	Yes	Replace AirPort Extreme card	**N12**
	No	Replace backplane board.	**M11**

Wireless Input Device Loses Connection

Unlikely cause: power supply, fans, speaker, optical drives, hard drives, processor board, front panel board, backplane board

Quick Check

Symptom	Quick Check
Wireless Input Device Loses Connection Drops connection	**1.** Check Bluetooth input device has fully charged batteries. **2.** Isolate OS by booting from original install media (10.6.x). Attempt to pair with wireless keyboard (Bluetooth) **3.** Check for nearby interference sources in the 2.4/5GHz range such as microwave ovens and cordless phones (kbase HT1365) **4.** Check device compatibility on manufacturers website or product documentation. **5.** Refer to http://support.apple.com/kb/TS3048.

Deep Dive

Check	Result	Action	Code
1. System Profiler should list Bluetooth radio device under system hardware. Is Bluetooth device available?	Yes	Bluetooth Radio present, verify BT preference settings, go to step 2.	
	No	Attempt Bluetooth repair, go to step 6.	
2. System Preferences has a Bluetooth preference panel. Ensure Bluetooth is on and discoverable. Attempt to pair devices. Are there any devices listed in the Bluetooth Setup Assistant pairing window?	Yes	Choose known good device and establish a connection. Go to step 4.	
	No	Attempt Bluetooth repair, go to step 6.	
3. Re-align graphics card and all PCI fence covers (refer to PCI Express/Graphics Card in Take Apart). Verify good wireless connection.	Yes	Issue resolved.	
	No	Go to step 4.	

4. Ensure a known good Bluetooth device is on, in close range and discoverable mode. Is computer's Bluetooth pairing with known good wireless device?	Yes	Pairing verified, connect with user's device, go to step 5.	
	No	Attempt Bluetooth repair, go to step 6.	
5. Is Bluetooth pairing with user's Bluetooth device?	Yes	Connection established, continue testing for connection loss, go to step 9.	
	No	Check for software updates for both computer & device.	**K07**
6. Reseat the Bluetooth module on the backplane board. Reseat and verify the Antenna connection to the Bluetooth card is not loose, damaged or incorrectly attached to AirPort antenna board.	Yes	Loose backplane board connection. Verify operation of Bluetooth module. Go to step 8.	**N04**
	No	Go to step 7.	
7. (Bluetooth) Try a known good Bluetooth module compatible with product.	Yes	Replace Bluetooth module.	**N12**
	No	Use known good Bluetooth module. Go to step 8.	
8. (Bluetooth) Try a known good Bluetooth antenna board.	Yes	Replace Bluetooth antenna board.	**N14**
	No	Replace backplane board.	**M11**
9. Continue to actively test user's Bluetooth device to determine if there is a disconnect. Do not allow computer to sleep during this test. Is link lost during test ? If link is lost during start up, turn on System Preferences: Bluetooth: Advanced: "Open Bluetooth Setup Assistant at start up when no input device is present".	Yes	Check for SW update, 2.4 GHz Radio interference, device low battery or user's device features list for explanation.	
	No	Customer's device not losing connection. Issue resolved or issue not repeatable.	

AirPort Card: Kernel Panic

Unlikely cause: power supply, fans, speaker, optical drives, hard drives, processor board, front panel board

Quick Check

Symptom	Quick Check
AirPort Card: Kernel Panic • Kernel panic on boot • Kernel panic or freezing while attempting to connect to AirPort/Wi-Fi networks • Kernel panic while transferring data on Wi-Fi networks.	**1.** Isolate OS by booting from original install media (10.6.x). Try to connect to base station (AirPort). **2.** Use Software Update to make sure all AirPort software and firmware updates have been applied.

Deep Dive

Check	Result	Action	Code
1. Use Software Update to make sure all AirPort/Bluetooth Software and Firmware Updates have been applied. Is the kernel panic resolved?	Yes	Software Issue	
	No	If the kernel panic symptom continues, go to step 2.	
2. Verify the card is the correct part for the product and region by cross referencing the EEE code and GSX part number.	Yes	Incorrect AirPort card. Earlier revision AirPort cards from other computers may fit but not operate correctly.	**N13**
	No	Go to step 3	
3. Reseat AirPort card, checking card and antenna cables for damage or incorrect antenna cable order. Verify if Kernel Panic condition still occurs.	Yes	Verify operation of AirPort card by connecting to a wireless network and downloading a large file from a website or file server.	
	No	If the kernel panic symptom continues, go to step 4	

4. Isolate AirPort card by removing the card from the backplane board. Verify if Kernel Panic condition still occurs.	Yes	If the kernel panic no longer occurs, continue to step 5	
	No	If the kernel panic still occurs with AirPort card isolated from computer, go to **Memory Issues/Kernel Panic and Freezes**.	
5. Install a known good AirPort Extreme Card compatible with computer. Verify if kernel panic condition still occurs.	Yes	If the kernel panic returns, replace backplane board.	**M11**
	No	If the computer does not kernel panic, replace the AirPort card.	**N13**

Wireless Performance Issue / Slow Connection

Unlikely cause: p.s., fans, speaker, optical and hard drives, processor board, front panel board

Quick Check

Symptom	Quick Check
Wireless Performance Issue / Slow Connection • Slow or stalled data transfers • Intermittent connection dropouts	**1.** Check for nearby interference sources in the 2.4/5GHz range such as microwave ovens or cordless phones (**http://support.apple.com/kb/HT1365**) **2.** (AirPort) Check the number of users trying to use AirPort in the area for possible network congestion. Move closer to base station to improve signal reception. **3.** (Bluetooth) Move devices closer together. **4.** Check performance with a known good computer **5.** (AirPort) Wireless base station checks: a. Base station is not set to low-power transmission mode. b. Base station is not set to a slower protocol mode (802.11b). c. Check for possible Wi-Fi channel overlap (nearby base stations using adjacent channel). **6.** Isolate OS by booting from original install media (10.6.x). Attempt to connect to base station (AirPort) or pair with wireless keyboard (Bluetooth) **7.** Use Software Update to make sure all AirPort and Bluetooth software and firmware updates have been applied.

Deep Dive

Check	Result	Action	Code
1. Inspect the AirPort and Bluetooth Antenna boards for damage or obstruction.	Yes	Record damage: Proceed to possibly repair damaged parts. Go to step 2.	**G + Code**
	No	No visible damage. Go to step 2.	
2. Verify the AirPort and Bluetooth Antenna boards are the the correct parts for the product.	Yes	Incorrect AirPort or Bluetooth antenna board. Antenna boards from earlier computers may fit but not operate correctly.	**N04**
	No	Go to step 3	
3. Turn off Bluetooth. Retest AirPort performance. Refer to Knowledge Base TS1809.	Yes	Possible AirPort interference from the Bluetooth card. Change AirPort Base station channel. Refer to **http://support.apple.com/kb/TS1809**.	**N04**
	No	Continue by checking connections, go to 4	
4. Reseat the AirPort card and Bluetooth module on the backplane board.	Yes	Loose backplane board connection. Verify operation of AirPort card by connecting to a wireless network and downloading a large file from a website or file server.	**N04**
	No	AirPort issue, go to 5, Bluetooth issues go to 7.	
5. (AirPort) Verify the Antenna connections to the AirPort card are not reversed, loose, damaged or incorrectly attached to Bluetooth antenna. Reseat antenna connections.	Yes	Loose connection or crossed antenna	**N04**
	No	If the connectors are secure, antenna connections not reversed and shown no signs of damage or wear. Go to step 6.	

6. (AirPort) Try a known good AirPort card compatible with product	Yes	Replace AirPort card.	**N12**
	No	Replace backplane board.	**M11**
7. (Bluetooth) Re-enable BT. Reseat the Antenna connection to the Bluetooth module. Verify the antenna connection is not loose, damaged or incorrectly attached to AirPort Antenna.	Yes	Loose connection or crossed antenna	**N04**
	No	If the connectors are secure, antenna connections not reversed and shown no signs of damage or wear, go to step 8.	
8. Re-align graphics card and all PCI fence covers (refer to **PCI Express/Graphics Card** in Take Apart). Verify good wireless connection.	Yes	Issue resolved.	
	No	Go to step 9.	
9. (Bluetooth) Try a known good Bluetooth module compatible with product	Yes	Replace Bluetooth module.	**N12**
	No	Use known good Bluetooth module. Go to step 10.	
10. (Bluetooth) Try a known good Bluetooth antenna board.	Yes	Replace Bluetooth antenna board.	**N14**
	No	Replace backplane board.	**M11**

Wireless Input Device Doesn't Pair

Unlikely cause: power supply, fans, speaker, optical drives, hard drives, processor board, front panel board, memory, backplane board

Quick Check

Symptom	Quick Check
Wireless Input Device Doesn't Pair Can't get the computer to recognize the Bluetooth keyboard, mouse, or trackpad	**1.** Check Bluetooth System Preference is set to Discoverable. **2.** Check Bluetooth device has fully charged batteries. **3.** Check for Bluetooth software updates for both the device and Mac OS X. **4.** Refer to http://support.apple.com/kb/TS3048. **5.** If the Bluetooth pairs with no problems, probe about potential interference issue at user's site. Refer to http://support.apple.com/kb/HT1365. **6.** Check device compatibility on manufacturers website or product documentation.

Deep Dive

Check	Result	Action	Code
1. System Profiler should list Bluetooth radio device under system hardware. Is Bluetooth device available?	Yes	Bluetooth Radio present, verify BT preference settings. Go to step 2.	
	No	Attempt Bluetooth repair, go to step 6.	
2. System Preferences has a Bluetooth preference panel. Ensure Bluetooth is on and discoverable. Attempt to pair devices. Are there any devices listed in the Bluetooth Setup Assistant pairing window?	Yes	Choose known good device and establish a connection. Go to step 4.	
	No	Attempt Bluetooth repair, go to step 6.	

3. Re-align graphics card and all PCI fence covers (refer to **PCI Express/Graphics Card** in Take Apart). Verify input device pairs.	Yes	Issue resolved.	
	No	Go to step 4.	
4. Ensure a known good Bluetooth device is on, in close range and discoverable mode. Is computer's Bluetooth pairing with known good wireless device?	Yes	Pairing verified, connect with user's device, go to step 5.	
	No	Attempt Bluetooth repair, go to step 6.	
5. Is Bluetooth pairing with user's Bluetooth device?	Yes	Connection established. Verify operation of Bluetooth module by pairing with compatible known good device and transferring data.	
	No	Check for software updates for both computer & device.	**K07**
6. Reseat the Bluetooth module on the backplane board. Reseat and verify the Antenna connection to the Bluetooth card is not loose, damaged or incorrectly attached to AirPort antenna board	Yes	Loose backplane board or antenna connection. Verify operation of Bluetooth module, by pairing with compatible known good device and transferring data.	**N04**
	No	Go to step 7.	
7. (Bluetooth) Try a known good Bluetooth module compatible with product	Yes	Replace Bluetooth module	**N12**
	No	Use known good Bluetooth module. Go to step 8.	
8. (Bluetooth) Try a known good Bluetooth antenna board.	Yes	Replace Bluetooth antenna board.	**N14**
	No	Replace backplane board.	**M11**

Uncategorized Symptom

Quick Check

Symptom	Quick Check
Uncategorized Symptom Unable to locate appropriate symptom code	Verify whether existing symptom code applies to the issue reported by the user. If not, document reported symptom and send feedback to **smfeedback@apple.com** stating that a suitable symptom code could not be found.

Mass Storage

Follow the steps in the order indicated below. If an action resolves the issue, retest the computer to verify. If the issue persists after retesting, return to step 1.

Hard Drive/SSD Read/Write Issue

Unlikely cause: speaker, fans, processor board, AirPort card, Bluetooth card, power supply

Quick Check

Symptom	Quick Check
Hard Drive/SSD Read/Write Issue **Bad Sector/Defective Drive Formatting Issue** • Cannot save documents • Read/Write error message • Hang when accessing or saving data • Intermittent, unexpected beach ball	**Note:** The RAID card does not support solid state drives. **1.** Remove all peripherals from the computer including third-party PCIe cards. **2.** Reseat any affected drives into other bays. **3.** Reseat memory, or test with known good compatible memory. **4.** Boot from Install DVD. Verify S.M.A.R.T. status of the affected drive using Disk Utility. **5.** Repair the affected drive using Disk Utility. **6.** Erase drive and reinstall Mac OS using Installer. **Note: Formatting erases all data. Ensure customer data is backed up prior to beginning this step.**

Deep Dive

Check	Result	Action	Code
1. Disconnect and reseat the affected drive. Start up from Restore DVD and launch Disk Utility. Is the affected drive available for Disk Utility to repair?	Yes	Go to step 2.	
	No	Go to step 3.	

2. Verify that Disk Utility is able to mount, and the affected drive is successfully repaired.	Yes	Restart the computer. Go to step 6.	
	No	If the computer has not been verified with a known good drive, go to step 3; otherwise take affected drive to step 6.	
3. Install a known good compatible Mac OS X bootable drive. Verify the computer boots to desktop.	Yes	Re-install the affected drive. Go to step 2.	
	No	Issue not hard drive or SSD related. Continue to use the known good bootable drive to determine computer root cause. Go to step 4.	
4. Install a known good compatible Mac OS X bootable drive into a different drive bay. Verify the computer boots to desktop.	Yes	Remove the known good drive. Re-install the original affected drive into the same bay. Go to step 2.	**H03**
	No	Replace backplane board. Go to step 5.	**M19**
5. Verify the computer boots to desktop and is able to successfully read/write data.	Yes	Issue resolved.	
	No	Affected drive repairs also necessary. Go to step 6.	
6. Format affected drive using GUID scheme, and clean install compatible Mac OS X on the drive. Verify the install completes without error and is able to start up the computer successfully. **Note: Formatting erases all data. Ensure customer data is backed up prior to beginning this step.**	Yes	Issue resolved.	
	No	Affected drive appears to be defective. Replace drive.	**H03**

Hard Drive/SSD Not Recognized/Not Mounting

Unlikely cause: speaker, fans, backplane board, processor board, processors, power supply, enclosure

Quick Check

Symptom	Quick Check
Hard Drive/SSD Not Recognized/ Not Mounting **Drive No Boot** • Flashing question mark • Boots to grey screen • Boots to blue screen	**Note:** The RAID card does not support solid state drives. **1.** Reseat all DIMMs. Refer to **Memory Diagnostic LEDs**. **2.** Remove all peripherals from the computer including third-party PCIe cards. Install a known good video card. **3.** Start up computer while holding down the Option key. If the drive is available, attempt to boot it. **4.** Reseat any affected drives into other bays. **5.** Reset RTC. **6.** Boot from Install DVD. Verify S.M.A.R.T. status of the affected drive using Disk Utility. **7.** Repair the affected drive using Disk Utility. **8.** Erase disk and reinstall Mac OS using Installer. **Note: Formatting erases all data. Ensure customer data is backed up prior to beginning this step.**

Deep Dive

Check	Result	Action	Code
1. Disconnect and reseat the affected drive. Start up from Restore DVD and launch Disk Utility. Is the affected drive available for Disk Utility to repair?	Yes	Go to step 2.	
	No	Go to step 3.	

2. Verify that Disk Utility is able to mount, and the affected drive is successfully repaired.	Yes	Restart the computer. Go to step 6.	
	No	If the computer has not been verified with a known good drive, go to step 3; otherwise take affected drive to step 6.	
3. Install a known good compatible Mac OS X bootable drive. Verify the computer boots to desktop.	Yes	Re-install the affected drive. Go to step 2.	
	No	Issue not hard-drive related. Continue to use the known good bootable drive to determine computer root cause. Go to step 4.	
4. Install a known good compatible Mac OS X bootable drive into a different drive bay. Verify the computer boots to desktop.	Yes	Remove the known good drive. Re-install the original affected drive into the same bay. Go to step 2.	**X03**
	No	Replace backplane board. Go to step 5.	**M19**
5. Verify the computer boots to desktop and is able to successfully read/write data.	Yes	Issue resolved.	
	No	Affected drive repairs also necessary. Go to step 6.	
6. Format affected drive using GUID scheme, and clean install compatible Mac OS X on the drive. Verify the install completes without error and is able to start up the computer successfully. **Note: Formatting erases all data. Ensure customer data is backed up prior to beginning this step.**	Yes	Issue resolved.	
	No	Affected drive appears to be defective. Replace drive.	**H01**

Hard Drive Noisy

Unlikely cause: speaker, backplane board, processor board, processors, SSD, memory, power supply, fans, Bluetooth card, AirPort card

Quick Check

Symptom	Quick Check
Hard Drive Noisy • Noise during start up • Noise during operation • Noise when drive is copying or saving data	**1.** Test with known good media to see if noise is optical drive related. **2.** Check with Activity Monitor for any hard drive access when assessing idle drive noise (example: Spotlight indexing in the background). **3.** Verify if operational noises are excessive when compared to another same model Mac Pro. **4.** Boot from a known good Mac OS source to eliminate possible software issues. **5.** Boot from Install DVD. Verify S.M.A.R.T. status of the affected internal hard drive using Disk Utility. **6.** Reseat any affected drives into other bays, ensuring all carrier screws are fastened securely. **7.** Repair any affected internal hard drives using Disk Utility.

Deep Dive

Check	Result	Action	Code
1. Boot from Restore DVD and launch Disk Utility. Is the affected hard drive available for Disk Utility to repair?	Yes	Go to step 2	
	No	Replace affected hard drive or branch to **Hard Drive Not Recognized/Not Mounting**	**H01**
2. Repair the affected hard drive using Disk Utility and verify it completed successfully	Yes	Restart the computer. Go to step 3	
	No	Go to step 4.	
3. Verify if the hard drive remains excessively noisy compared to other hard drives of the same vendor and model.	Yes	Go to step 4.	
	No	Issue resolved.	

4. Erase the affected hard drive and reinstall Mac OS using Installer (if it was a boot volume). Verify the process completed without any errors.	Yes	Restart the computer. Go to step 3	
	No	Replace the affected hard drive. Go to step 5.	**H06**
5. After replacing with a known good hard drive verify excessive noise levels no longer occur	Yes	Issue resolved.	
	No	Go to step 6	
6. Remove the customer hard drive(s), boot the computer from an external drive, verify if the computer remains excessively noisy.	Yes	Fan noise or optical drive noise likely to be the cause. See **Optical Drive Noisy** and **Mechanical Issues: Thermals and Enclosure**.	
	No	Go to step 7	
7. Install a known good hard drive and verify if the noise level is similar to customer's hard drives.	Yes	Customer 's hard drive(s) noise levels are similar to a known good drive. No repair required	
	No	Replace the affected customer's hard drive. Go to step 5.	**H06**

Optical Drive Won't Accept/Reject Media

Unlikely cause: speaker, backplane board, processor board, processors, memory, power supply, fans, Bluetooth card, AirPort card

Quick Check

Symptom	Quick Check
Optical Drive Won't Accept/ Reject Media • Cannot insert a disc into the drive • Cannot eject a disc placed into the drive	**1.** Verify in Apple System Profiler that the Serial-ATA section lists any optical drive in the device tree. **2.** Restart computer and hold down mouse button or keyboard eject key to cycle optical drive. **3.** Inspect optical drive enclosure door and drive tray for obstructions.

Deep Dive

Check	Result	Action	Code
1. Is optical drive listed in the device tree for SATA devices with System Profiler?	Yes	Optical drive has power and is communicating with the computer. Inspect disc load/ eject operation. Go to step 2	
	No	Go to **Optical Drive Not Recognized/ Not Mounting**	
2. Inspect computer enclosure optical drive door and the optical drive tray. Verify there are no obstructions, the drive tray is undamaged, and the tray does eject/inject on command. Note: To isolate issues to the enclosure vs. a drive, pull the optical drive carrier out of the enclosure, position it so the drives eject to the side of the computer, and attempt to eject the drive(s).	Yes	Go to step 3	
	No	Replace damaged optical drive or computer enclosure that interferes with disc use. Won't inject Won't eject Optical drive damaged Enclosure damaged	 **J01** **J02** **J05** **X13**
3. Insert known good media and test affected optical drive for load operation of disc. Does media auto eject?	Yes	Replace the optical drive. (Mechanical damage to optical drive if found)	**J03** **(J05)**
	No	Go to step 4	
4. Does media mount on the desktop?	Yes	Go to Eject Test step 5	
	No	Go to **Optical Drive Read/ Write Data Error**.	
5. Does media eject from the optical drive on command?	Yes	Issue resolved.	
	No	Replace damaged optical drive or computer enclosure that interferes with disc use. Won't eject Optical drive damaged Enclosure damaged	 **J02** **J05** **X13**

Optical Drive Read/Write Data Error

Unlikely cause: speaker, fans, backplane board, processor board, processors, memory, power supply, enclosure

Quick Check

Symptom	Quick Check
Optical Drive Read/Write Data Error • Read or write speeds slower than expected. • Unreliable recorded media • Failure to complete recording on high quality media	**1.** Check with known good optical media such as the Install media that came with the computer. Verify the media in another same-model computer. Low quality and consumer-recorded media where the recording has not been optimized may cause excessive seek and read/write retries, which slows performance. For information regarding factors affecting writing to or reading from optical media, review http://support.apple.com/kb/HT2882?viewlocale=en_US. **2.** For Write issues, check with Known Good media that performs well in another machine and drive of the same model. **3.** Verify Audio CD's without Copy Control are used during testing as computer optical drives may have difficulty reading the content. **4.** Check both CD and DVD media. If only one type of media is producing errors, there is a laser issue. (J99)

Deep Dive

Check	Result	Action	Code
1. Is media free to spin without optical drive scraping edge or surface of media?	Yes	Continue and verify media read. Go to step 2.	
	No	Mechanical interference internal to optical drive is affecting rotational spin of media, replace optical drive..	**J03**

2. Can customer's optical drive read both known good CD and DVD media?	Yes	Read functional, verify write to disc. Go to step 6.	
	No	Optical drive reads CD only, or optical drive reads DVD only indicates optical laser issue. Replace optical drive. Go to step 6	**J03**
		Optical drive can not read any media reliably, Go to step 3	
3. Reseat SATA/Power cable connections between backplane board and optical drive (check for any cable and connector damage). Verify the media is now recognized in System Profiler and reads/writes reliably.	Yes	Reseat cables. Resolved issue.	
	No	Go to step 4	
4. Disconnect SATA/Power cable at backplane board. Use spare SATA/Power cable as alternate. Connect the spare cable to the port. Connect the alternate cable to the optical drive. Verify the media is now recognized and reads/writes reliably.	Yes	SATA/Power cable defective. Replace SATA/Power cable. Issue resolved.	**X03**
	No	Go to step 5	
5. Use alternate backplane board SATA port and retest. Test write data to compatible CD and DVD media. Verify burned media is recognized and reads reliably.	Yes	Backplane board defective. Replace backplane board. Go to step 6.	**M19**
	No	Replace the optical drive. Go to step 6.	**J03**
6. Test write data to compatible CD and DVD media. Verify recorded media is recognized and reads reliably.	Yes	Issue resolved.	
	No	Go to step 3	

Optical Drive Not Recognized/Not Mounting

Unlikely cause: speaker, fans, backplane board, processor board, processors, memory, power supply, enclosure, Bluetooth card, AirPort card

Quick Check

Symptom	Quick Check
Optical Drive Not Recognized/ Not Mounting • Discs inject and eject, but do not appear in Finder	**1.** Verify in Apple System Profiler the Serial-ATA section lists any optical drive in the device tree. **2.** The Disc Burning section of Apple System Profiler will show any media inserted. **3.** Check Finder Preferences: General, and make sure "CD's, DVD's and iPods" is checked under "Show these items on the desktop." **4.** Verify Audio CD's without Copy Control are used during testing, as computer optical drives may have difficulty reading the content. **5.** Check both CD and DVD media. If only one type of media is recognized, there is a laser issue. (J99) **6.** Remove optical drive (with its carrier) and verify cables are securely connected to the drive and to the backplane board.

Deep Dive

Check	Result	Action	Code
1. Is the optical drive listed in the device tree for SATA devices with System Profiler?	Yes	Optical drive hardware recognized. Check Finder Preferences: General, and make sure "CD's, DVD's and iPods" is checked under "Show these items on the desktop."	
	No	Go to step 2	

2. Reseat all connections between backplane board, SATA/Power cables, and optical drive are secure. Visually inspect cables and connectors for any debris, damage, or bent pins. Verify the media is now recognized in System Profiler and reads/writes reliably.	Yes	Issue resolved. Optical drive recognized.	
	No	Replace any damaged cables and retest. If connections are good and with no visible cable damage, go to step 3	**X03 for cable damage**
3. Disconnect SATA/Power cable at backplane board. Use spare SATA/Power cable as alternate. Connect the spare cable to the port. Connect the alternate cable to the optical drive. Verify the media is now recognized in System Profiler and reads/writes reliably.	Yes	SATA/Power cable defective. Replace SATA/Power cable. Issue resolved.	**X03**
	No	Go to step 4	
4. Use alternate backplane board SATA port and retest. Test read/write data to compatible CD and DVD media. Verify burned media is recognized and reads reliably.	Yes	Backplane board defective due to connector issue. Replace backplane board	**M19**
	No	Replace the optical drive.	**J03**

Optical Drive Noisy

Unlikely cause: speaker, fans, backplane board, processor board, processors, memory, power supply, hard drives

Quick Check

Symptom	Quick Check
Optical Drive Noisy • Noise during boot • Noise during operation • Noise when drive is copying or writing data	**1.** Check using known good optical media such as the Install media that came with the computer. Verify the media in another same-model computer. **2.** For baseline testing, it is important to use known good factory-pressed media such as Install media. Do not use consumer-recorded media. **3.** Most mechanism seeking sounds of various media are normal **4.** Verify if noise occurs without media in the drive. If so, check if other drives and fans maybe causing the noises. **5.** Verify Audio CD's without Copy Control are used during testing as computer optical drives may have difficulty reading the content. Common causes of excessive drive noise and vibrations • Non uniform screen-printing on discs (including stickers and labels) may cause misbalance • Scratches, chips, warping, delaminating disc surfaces • Low quality and consumer-recorded media where the recording has not been optimized may cause excessive seeking and read/write retries.

Deep Dive

Check	Result	Action	Code
1. Insert known good media. Verify media free to spin without optical drive scraping edge or surface of media. Ensure there are no contaminants, obstructions, or debris in the tray. For media compatibility, refer to the following article: **http://support.apple.com/kb/HT2446**	Yes	Initial disc/tray ingest noise is normal. Disc spinning and head seek indicate computer is attempting to mount the media on the Desktop. Seek noise should settle down once mounted. Go to step 2	
	No	Mechanical interference internal to optical drive is affecting rotational spin of media. Replace optical drive.	**J04**
2. Verify if the seek activity noise is excessive compared to another same vendor/model optical drive when using known good and compatible media.	Yes	Replace excessively noisy optical drive.	**J04**
	No	Go to step 3	
3. Disc spin should cease approximately 30 seconds after mounting the media on the Desktop if the volume is not being accessed by applications. Verify the excessive noise is related to disc spin	Yes	Noise related to disc spin or disc surface contact, go to step 4	
	No	Noise related to possible disc load/eject issue, go to step 5	
4. Remove the optical drive. Verify the optical drive is correctly aligned with the carrier and securely fastened to minimize any vibrations. Ensure spare optical drive screws are not loose in the carrier. Reinstall the optical drive. Verify the carrier slides into the enclosure smoothly to ensure correct positioning and locking on the posts of the computer enclosure. Verify if optical drive is still noisy.	Yes	Verify tray eject mechanism. Go to step 5	
	No	Noise issue resolved. Optical drive was not properly mounted in the computer enclosure. (Possible mechanical damage to optical drive.)	**(J05)**

5. Disc handling noise is typically motor gear sounds driving disc tray out of optical drive, with the enclosure door opening. Verify if the ejection noises are excessive compared to another same vendor/model optical drive using known good media.	Yes	Replace noisy optical drive for load/eject related disc handling.	**J04**
	No	Noise is not load/eject related. Go to step 6	
6. Disc spin should cease 30 seconds after mounting on the desktop if the volume is not being accessed by applications. Media may be mounting on a defective internal spindle hub. Is the noise related to disc spin?	Yes	Replace optical drive due disc spin noisy operation.	**J04**
	No	Noise does not appear to be optical drive related. Go to another noise related flow	

Optical Drive Not Performing to Specs

Unlikely cause: speaker, fans, backplane board, processor board, processors, memory, power supply, enclosure, Bluetooth card, AirPort card

Quick Check

Symptom	Quick Check
Optical Drive Not Performing to Specs • Read or write speeds slower than expected. • Unreliable recorded media • Failure to complete recording on high quality media	**1.** Check with known good optical media such as the Install media that came with the computer. Verify the media in another same-model computer. Low quality and consumer-recorded media where the recording has not been optimized may cause excessive seek and read/write retries, which slows performance. For information regarding factors affecting writing to or reading from optical media, review http://support.apple.com/kb/HT2882?viewlocale=en_US. **2.** For Write issues, check with Known Good media that performs well in another machine and drive of the same model. **3.** Verify Audio CD's without Copy Control are used during testing as computer optical drives may have difficulty reading the content. **4.** Check both CD and DVD media. If only one type of media is producing errors, there might be a laser related issue. (J99)

Deep Dive

Check	Result	Action	Code
1. Verify the optical drive is able to read both known good CD and DVD media?	Yes	Reading is functional. Verify write to disc, go to step 5	
	No	Optical drive reads CD only, or optical drive reads DVD only indicates optical laser issue. Replace optical drive.	**J03**
		Optical drive cannot read any media reliably, Go to step 2	

2. Reseat SATA/Power cable connections between backplane board and optical drive (check for any cable and connector damage). Verify the media is now recognized and reads reliably.	Yes	Reseat cables resolved issue.	
	No	Go to step 3	
3. Disconnect SATA/Power cable at backplane board. Use spare SATA/Power cable as alternate. Connect the spare cable to the port. Connect the alternate cable to the optical drive. Verify the media is now recognized and reads/writes reliably.	Yes	SATA/Power cable defective. Replace SATA/Power cable. Issue resolved.	**X03**
	No	Go to step 4	
4. Use alternate backplane board SATA port and retest. Test write data to compatible CD and DVD media. Verify burned media is recognized and reads reliably.	Yes	backplane board defective. Replace backplane board	**M19**
	No	Replace the optical drive. Go to step 5	**J03**
5. Test write data to compatible CD and DVD media. Verify recorded media is recognized and reads reliably.	Yes	Issue resolved.	
	No	Go to step 2	

Uncategorized Symptom

Quick Check

Symptom	Quick Check
Uncategorized Symptom Unable to locate appropriate symptom code	Verify whether existing symptom code applies to the issue reported by the user. If not, document reported symptom and send feedback to **smfeedback@apple.com** stating that a suitable symptom code could not be found.

Input/Output Devices

Follow the steps in the order indicated below. If an action resolves the issue, retest the computer to verify. If the issue persists after retesting, return to step 1.

USB Port Does Not Recognize Known Devices

Unlikely cause: Power supply, fans, speaker, hard drives, optical drives, processor board, memory, backplane board

Quick Check

Symptom	Quick Check
USB Port Does Not Recognize Known Devices USB devices such as wired keyboard/mice and third-party devices not recognized	**1.** Check the for latest software updates for Apple and especially third party devices. **2.** Use Apple System Profiler to verify the computer recognizes each of the USB buses in the USB device tree. **3.** Test front and rear ports with known good Apple keyboard or mouse. **4.** Verify any external USB device with large power requirements have their own external power supplies. **5.** Verify external USB device cables by using known good cables.

Deep Dive

Check	Result	Action	Code
1. Disconnect all peripherals except for a known good Apple USB device.	Yes	Go to step 2	
	No	Repeat step 1	

2. Verify the USB ports are free from contaminants and debris.	Yes	Go to step 3	
	No	Remove contaminants and debris. Replace affected modules if necessary. Defects caused by contaminants or debris are not covered by Apple warranty. Go to step 3.	
3. Reset SMC. Verify each of the USB buses are recognized, and a known good connected USB device is recognized.	Yes	Issue resolved. Issue maybe caused by another peripheral device.	
	No	Go to step 4.	
4. Disconnect the front panel board. Verify a known good USB device connected to a rear port on the computer is recognized.	Yes	Front panel board failure. Replace front panel board	**M15**
	No	Backplane board failure. Replace backplane board.	**M15**

FireWire Port Does Not Recognize Known Good Devices

Unlikely cause: Power supply, fans, speaker, hard drives, optical drives, processor board, memory

Quick Check

Symptom	Quick Check
FireWire Port Does Not Recognize Known Good Devices FireWire devices such as video cameras, etc. not recognized	**1.** Check for latest software updates for Apple and especially third party devices. **2.** Use Apple System Profiler to verify the computer recognizes each of the FireWire busses in the FireWire device tree. **3.** Test front and rear ports with known good FireWire device and cable. **4.** Verify any external FireWire devices with large power requirements have their own external power supplies. **5.** Verify external FireWire device cables by using known good cables.

Deep Dive

Check	Result	Action	Code
1. Disconnect all peripherals except for a known good FireWire device and cable.	Yes	Go to step 2	
	No	Repeat step 1	
2. Verify the FireWire ports are free from contaminants and debris.	Yes	Go to step 3	
	No	Remove contaminants and debris. Replace affected modules if necessary. Defects caused by contaminants or debris are not covered by Apple warranty. Go to step 3.	
3. Reset SMC. Verify each of the FireWire buses are recognized, and a known good connected FireWire device is recognized?	Yes	Issue resolved. Issue maybe caused by another peripheral device.	
	No	Go to step 4.	
4. Disconnect the front panel board. Verify a known good FireWire device connected to a rear port on the computer is recognized	Yes	Front panel board failure. Replace front panel board.	**M12**
	No	Backplane board failure. Replace backplane board.	**M12**

No Audio from Internal Speaker

Unlikely cause: Power supply, fans, hard drives, optical drives, processors, processor board, front panel board, memory

Quick Check

Symptom	Quick Check
No Audio from Internal Speaker Can't hear any audio from the computer's internal speaker	**1.** Disconnect all external audio peripherals. **2.** Ensure volume is not at a low/muted setting. **3.** Boot from Install media or external compatible Mac OS X. Listen for sound from internal speaker when adjusting volume setting. **4.** Connect headphones to rear Audio Line Out jack. Listen for sound from headphones when adjusting volume setting. **5.** Connect headphones to front headphone jack. Listen for sound from headphones when adjusting volume setting. **6.** Reset PRAM

Deep Dive

Check	Result	Action	Code
1. Check System Profiler for audio devices (Audio (Built In) Intel High Definition Audio). Look for Internal Speaker Connection	Yes	Built-in audio devices available. Go to step 2	
	No	No built in Audio devices available. Replace backplane board	**M09**
2. Check Output in System Preferences (Sound pref pane) has 'Internal Speaker' selected.	Yes	Set to Internal Speaker. Go to step 3	
	No	The wrong output device shown. ie headphones. Go to step 6	
3. Verify sound is heard from internal speaker.	Yes	Issue resolved	
	No	No audio heard. Go to step 4	

4. Reseat internal speaker connection. Verify sound is heard from internal speaker.	Yes	Issue resolved	
	No	Replace speaker. Go to step 5	**X08**
5. Verify sound is heard from internal speaker.	Yes	Issue resolved	
	No	Go to step 6	
6. Insert and disconnect known good headphones or external speakers in the front headphone jack several times. There are mechanical switches inside the headphone connector. Verify sound is heard on the internal speaker.	Yes	Issue resolved	
	No	Go to step 7	
7. Disconnect front panel board. Verify sound is heard from internal speaker	Yes	Problem is with front panel board. Replace front panel board	**M09**
	No	Replace backplane Boarb	**M09**

Distorted Audio from Internal Speaker

Unlikely cause: Power supply, fans, hard drives, optical drives, processor board, front panel board, memory

Quick Check

Symptom	Quick Check
Distorted Audio from Internal Speaker Distorted audio	**1.** Reset PRAM . **2.** Adjust sound output level in System Preferences: Sound Output to assist identification of speaker distortion source. **3.** Ensure customer audio files are not the source. **4.** Compare the same sound and the audio output settings against another known good computer to make sure the sound file is the cause, and not the hardware.

Deep Dive

Check	Result	Action	Code
1. Do external speakers or headphones distort when compared with the same settings and volume as the distorting internal speaker?	Yes	Audio source or volume issue. Reduce volume and retest with known good audio source. Note some audio source frequencies may be outside the frequency response of the internal speaker which may lead to distortion. Go to step 5.	
	No	Internal speaker issue. Go to step 2.	
2. Verify the internal speaker cable connector is not damaged and correctly seated to the backplane board connector.	Yes	Go to step 3.	
	No	Reseat the cable, or if damaged replace internal speaker. Go to step 5	**X09**
3. Verify the speaker membrane is free from contamination and debris, and not deformed or damaged.	Yes	Go to step 4.	
	No	Clean any contamination and debris. Go to step 5. If membrane is damaged, replace the defective speaker. Go to step 5.	**X09**
4. Ensure the speaker assembly is securely attached in the computer. Verify if the speaker assembly causes any vibration when a sound is played.	Yes	Replace speaker assembly. Go to step 5.	
	No	Clean any dust or debris. Go to step 5.	
5. Using a known good audio source verify the internal speaker no longer produces distorted sound.	Yes	Issue resolved.	
	No	Replace the backplane board.	**M09**

Front Headphone Jack Has No Audio

Unlikely cause: Power supply, fans, hard drives, optical drives, processors, heatsinks, processor board, memory

Quick Check

Symptom	Quick Check
Front Headphone Jack Has No Audio Can't hear any audio from the computer's front headphone jack	**1.** Disconnect all external audio peripherals. **2.** Ensure volume is not at a low/muted setting. **3.** Boot from Install media or external compatible Mac OS X. Listen for sound from internal speaker when adjusting volume setting. **4.** Connect known good headphones to rear Audio Line Out jack. Listen for sound from headphones when adjusting volume setting. **5.** Connect known good headphones to front headphone jack. Listen for sound from headphones when adjusting volume setting. **6.** Reset PRAM

Deep Dive

Check	Result	Action	Code
1. Check System Profiler for audio devices: Audio (Built In) Intel High Definition Audio. Look for Internal Headphone Connection: 1/8 inch Jack	Yes	Built-in audio devices available. Go to step 2	
	No	No built -in audio devices available. Replace backplane board	**M09**
2. Connect known good headphones to front headphone jack. Check Output in System Preferences (Sound pref pane) has Headphones selected.	Yes	Set to Headphones. Go to step 3	
	No	The wrong output device shown, e.g., internal speaker. Go to step 6	
3. Verify sound is heard from headphones.	Yes	Issue resolved	
	No	No audio heard. Go to step 4	

4. Reseat front panel board cable and confirm the cable is not damaged. Verify sound is heard from headphones.	Yes	Issue resolved	
	No	If cable is damaged, replace cable. Go to step 5	**X03**
5. Insert and disconnect known good headphones or external speakers in the front headphone jack several times. There are mechanical switches inside the headphone connectors. Verify sound is heard from the headphones	Yes	Issue resolved	
	No	Replace front panel board. Go to step 6	**M09**
6. Verify sound is heard in the headphones	Yes	Issue resolved	
	No	Replace backplane board	**M09**

Line-In Jack Has No Input

Unlikely cause: Power supply, fans, hard drives, optical drives, processors, heatsinks, processor board, memory

Quick Check

Symptom	Quick Check
Line-In Jack Has No Input Can't receive any audio input from the computer's line-in jack	**1.** Disconnect all external audio peripherals. **2.** Ensure volume is not at a low/muted setting. **3.** Boot from Install media or external compatible Mac OS X. Listen for sound from internal speaker when adjusting volume setting. **4.** Connect known good line-level microphone or other line-level device to the Audio Line In jack. For information on supported devices, review http://support.apple.com/kb/TA25159. **5.** Go to 'Input' of the Sound pane System Preferences. Select 'Line In'. **6.** Adjust Input volume slider to maximum and play sound into Line In. Verify if the Input level shows moving bars relating to the sound being input. **7.** Reset PRAM

Deep Dive

Check	Result	Action	Code
1. Check System Profiler for audio devices: Audio (Built In) Intel High Definition Audio. Look for Internal Line-In Connection: 1/8 inch Jack.	Yes	Built-in audio devices available. Go to step 2	
	No	No built-in audio devices available. Replace backplane board.	**M09**
2. Connect a known good line-level microphone or other line-level device to the line-in jack. Manually switch System Preference Sound Input to Line In.	Yes	Set to Line In. Go to step 3	
	No	The wrong input device shown, e.g. internal microphone. Manually switch System Preference Sound Input to Line In. Go to step 3	
3. Verify the Input level shows moving bars relating to the sound being input.	Yes	Issue resolved	
	No	Replace backplane board.	**M09**

Line-In Jack Has Distorted Input

Unlikely cause: Power supply, fans, hard drives, optical drives, processors, heatsinks, processor board, memory

Quick Check

Symptom	Quick Check
Line-In Jack Has Distorted Input Distorted input in the computer's line-in jack	**1.** Disconnect all external audio peripherals. **2.** Ensure volume is not at a low/muted setting. **3.** Boot from Install media or external compatible Mac OS X. Listen for sound from internal speaker when adjusting volume setting. **4.** Connect known good line-level microphone or other line-level device to the Audio Line In jack. For information on supported devices, review http://support.apple.com/kb/TA25159. **5.** Go to 'Input' of the Sound pane System Preferences. Select 'Line In'. **6.** Reduce Input volume slider so the sound into Line In jack is not too loud or distorting. Verify the Input level shows moving bars relating to the sound being input. **7.** Reset PRAM

Deep Dive

Check	Result	Action	Code
1. Check System Profiler for audio devices: Audio (Built In) Intel High Definition Audio. Look for Internal Line-In Connection: 1/8 inch Jack.	Yes	Built-in audio devices available. Go to step 2	
	No	No built-in audio devices available. Replace backplane board.	**M09**
2. Connect a known good line-level microphone or other line-level device to the line-in jack. Manually switch System Preference Sound Input to Line In.	Yes	Set to Line In. Go to step 3	
	No	The wrong input device shown, e.g. internal microphone. Manually switch System Preference Sound Input to Line In. Go to step 3	

3. Reduce Input volume slider so the sound into the line-In jack is not too loud or distorting. Verify the Input level shows moving bars relating to the sound being input..	Yes	Issue resolved	
	No	Replace backplane board.	**M09**

Rear Line-Out Jack Has No Audio

Unlikely cause: Power supply, fans, hard drives, optical drives, processors, heatsinks, processor board, memory

Quick Check

Symptom	Quick Check
Rear Line-Out Jack Has No Audio Can't hear any audio from the computer's line-out jack	**1.** Disconnect all external audio peripherals. **2.** Ensure volume is not at a low/muted setting. **3.** Boot from Install media or external compatible Mac OS X. Listen for sound from internal speaker when adjusting volume setting. **4.** Connect known good headphones to rear Audio Line Out jack. Listen for sound from headphones when adjusting volume setting. **5.** Connect known good headphones to front headphone jack. Listen for sound from headphones when adjusting volume setting. **6.** Reset PRAM

Deep Dive

Check	Result	Action	Code
1. Check System Profiler for audio devices: Audio (Built In) Intel High Definition Audio. Look for Internal Line-Out Connection: 1/8 inch Jack.	Yes	Built-in audio devices available. Go to step 2	
	No	No built-in audio devices available. Replace backplane board.	**M09**

2. Connect headphones or external speakers to the rear line-out jack. Manually switch System Preference Sound Output to Line Out.	Yes	Set to Line Out. Go to step 3	
	No	The wrong output device shown, e.g. internal microphone. Manually switch System Preference Sound Output to Line Out. Go to step 3	
3. Verify sound can be heard from headphoe or external speakers.	Yes	Issue resolved	
	No	Replace backplane board.	**M09**

Optical Digital Audio In Has No Input

Unlikely cause: Power supply, fans, hard drives, optical drives, processors, heatsinks, processor board, memory

Quick Check

Symptom	Quick Check
Optical Digital Audio In Has No Input Can't receive any signal input from the computer's optical digital audio in jack	**1.** Reset PRAM **2.** Disconnect all external audio peripherals. **3.** Connect optical-in on computer to optical-out on another Mac computer via a known good TOSLINK cable. Ensure the optical TOSLINK cables and connectors are in good condition so there is minimal loss or degradation of the digital signal. **4.** Do not use a 1/8 inch optical jack to TOSLINK adapter and connect to the line-in port. **5.** It is not within the feature set of the computer to decode a DTS, AC3, or 5.1 signal on digital optical input. **6.** Set preferences for the other Mac computer: System Prefs - > Sound -> Output -> Digital Out **7.** Start playback of iTunes track or audio source on the other computer **8.** Set preferences for the computer you are testing: System Prefs - > Sound -> Input -> Digital In **9.** Observe input level meter on the computer you are testing. There should be some kind of activity. **10.** Note: A red light shines from the rear optical digital audio out connector, whether or not a device is connected to it. This is a normal condition.

Deep Dive

Check	Result	Action	Code
1. Check System Profiler for audio devices: Audio (Built In) Intel High Definition Audio. Look for Optical Digital In Connection: S/P - DIF IN.	Yes	Built-in audio devices available. Go to step 2	
	No	No built-in audio devices available. Replace backplane board	**M09**

2. From Quickchecks: To test the actual audio quality, create a new GarageBand project on the computer being tested, and add a new track -> Real Instrument, Vocals, No Effects, monitor on. Verify that you hear the audio being played back through the computer's speaker and see VU meter activity for that instrument.	Yes	Issue resolved. No issue with the optical output or input at a hardware level.	
	No	Rule out software on the computer. If it still fails, replace backplane board.	**M09**

Optical Digital Audio Out Has No Output

Unlikely cause: Power supply, fans, hard drives, optical drives, processors, heatsinks, processor board, memory

Quick Check

Symptom	Quick Check
Optical Digital Audio Out Has No Output Can't transmit any signal output from the computer's optical digital audio out jack.	**1.** Reset PRAM **2.** Disconnect all external audio peripherals. **3.** Connect optical-out on computer to optical-in on another Mac computer via a known good TOSLINK cable. Ensure the optical TOSLINK cables and connectors are in good condition so there is minimal loss or degradation of the digital signal. **4.** Do not use a 1/8 inch optical jack to TOSLINK adapter and connect to the line-out port. **5.** Where there is DTS, AC3, or 5.1 playback being used, ensure the receiving device connected to the computer supports these formats. **6.** Set preferences for the computer you are testing: System Prefs - > Sound -> Output -> Digital Out **7.** Start playback of iTunes track or audio source on computer you are testing **8.** Set preferences for the other Mac computer: System Prefs - > Sound -> Input -> Digital In **9.** Observe input level meter on the other computer. There should be some kind of activity. **10.** Understand a red light shines from the rear optical digital audio out connector, whether or not a device is connected to it. This is a normal condition.

Deep Dive

Check	Result	Action	Code
1. Check System Profiler for audio devices: Audio (Built In) Intel High Definition Audio. Look for Optical Digital Out Connection: S/P - DIF OUT.	Yes	Built-in audio devices available. Go to step 2	
	No	No built-in audio devices available. Replace backplane board	**M09**

2. From Quickchecks: To test the actual audio quality, create a new GarageBand project on another Mac computer, and add a new track -> Real Instrument, Vocals, No Effects, monitor on. Verify that you hear the audio being played back through the other computer's speaker and see VU meter activity for that instrument.	Yes	Issue resolved. No issue with the optical output or input at a hardware level.	
	No	Rule out software on the computer. If it still fails, replace backplane board.	**M09**

Apple Wireless Mouse/Magic Trackpad Erratic Tracking

Quick Check

Symptoms	Quick Check
Apple Wireless Mouse/Magic Trackpad Erratic Tracking • Cursor tracking is jumpy • Tracking /Clicking/Tapping actions not working	**1.** Verify all software and firmware updates have been installed to take advantage of any available bug fixes. **2.** Verify the Bluetooth device software has been installed. **3.** Verify that customer is not using more than three Dual Link Bluetooth input devices at the same time on same computer. **4.** Cover the entire pad surface for some seconds to reset it. **5.** Clean mouse sensor/ pad surface. **6.** Review **kBase #TS3048: Troubleshooting wireless mouse and keyboard issues**. **7.** Use a known-good up-to-date Mac OS X computer with Bluetooth enabled in Bluetooth Preferences, where a known-good similar Bluetooth device could be previously paired, and where a wired mouse is connected. **8.** (Apple Wireless Keyboard , Magic Mouse or Magic Trackpad) Download and run the Bluetooth Service Diagnostic utility (available in the Disk Images page of GSX/Service Source), checking the Restore Defaults Settings option. **9.** (Apple Wireless Keyboard , Magic Mouse or Magic Trackpad) If Bluetooth Service Diagnostic utility passes, try to pair again the device using the Bluetooth Setup Assistant. **10.** Replace defective Bluetooth device specifying the code provided by Bluetooth Service Diagnostic.

Apple Battery Charger Does Not Charge Batteries

Quick Check

Symptoms	Quick Check
Apple Battery Charger Does Not Charge Batteries • No Amber/Green status LED visible on charger when batteries are installed and charger is connected to AC • Amber status LED is flashing • When installed in the input device, batteries don't power it • Batteries only provide limited run time when used • Batteries show leak/inflation signs	**1.** Verify that only NiMH AA rechargeable batteries are used with the Apple Battery Charger and that they are correctly installed, with correct polarity orientation. If Amber status LED still flashes when these batteries are installed, they are likely defective. **2.** Verify that only NiMH AA rechargeable batteries are used with the Apple Battery Charger and that they were left charging for at least 5 hours. (LED will go green when a full charge has been reached, then will turn off to conserve energy.) **3.** Test with known-good AC duckhead plug. **4.** Quickly test customer's Apple Battery Charger for charge of a known-good set of NiMH AA rechargeable batteries . If no Amber or Green status LED is seen, replace battery charger (P01). **5.** Quick check customer's NiMH AA rechargeable batteries for charge status when installed in a known-good Apple Battery Charger. If no Amber/Green status LED is seen, replace Apple battery set (P01).

Deep Dive

Check	Result	Action	Code
1. Verify if the charger LED goes ON (Green or Amber) when a known-good set of NiMH AA batteries is installed and charger is connected to AC outlet.	Yes	Go to step 2	
	No	Check that batteries fit and are correctly seated in case. If issue persists, replace defective Apple Battery Charger	**P01**

2. Verify if the charger LED goes Amber when a set of known-good discharged or only partly-charged NiMH AA batteries is installed.	Yes	Go to step 3	
	No	LED remains Green while known-good inserted batteries are still not fully charged (charger never initiates a charge): Replace defective Apple Battery Charger.	**P10**
3. Verify if the charger LED goes green when a known-good set of partly charged NiMH AA batteries is installed and has been left for some hours (up to 5 hours if a fully discharged set was installed in charger). **Note**: Status LED may turn OFF after batteries are charged and ready to use—green LED shuts off after six hours.	Yes	When charge of the known-good batteries set has ended (Green LED), insert them in a known-good input device and go to step 4.	
	No	LED remains Amber (never stops charging). Replace defective Apple Battery Charger.	**P10**
4. Check battery level in System Preferences Trackpad or Mouse. Depending on device type, battery type, and time since last full charge, the battery level displayed should vary from 80% to almost full. Verify that battery level shows more than 80% charge	Yes	Charge functionality confirmed. Return Apple Battery Charger to customer and recommend customer check rechargeable batteries.	
	No	Charger does not correctly charge batteries Replace defective Apple Battery Charger.	**P10**

Uncategorized Symptom

Quick Check

Symptom	Quick Check
Uncategorized Symptom Unable to locate appropriate symptom code	Verify whether existing symptom code applies to the issue reported by the user. If not, document reported symptom and send feedback to smfeedback@apple.com stating that a suitable symptom code could not be found.

Mechanical Issues: Thermals and Enclosure

Follow the steps in the order indicated below. If an action resolves the issue, retest the computer to verify. If the issue persists after retesting, return to step 1.

Computer Runs Slow with Fast/Failed Fans

Unlikely cause: Hard drive(s), optical drive(s)

Quick Check

Symptom	Quick Check
Computer Runs Slow with Fast/ Failed Fans • Computer feels very warm • Computer is sluggish • Fan(s) run fast • Fan(s) do not run at all • Peripheral card fan(s) run fast • Peripheral card fan(s) do not run at all	**1.** Reseat all DIMMs. Refer to Memory Diagnostic LEDs. **2.** Verify the computer has adequate airflow around the enclosure, front and rear vents not blocked. **3.** Verify issue is not user perception; computer functions correctly, doesn't run any warmer than expected. Compare to similarly configured computer. Spotlight Indexes in the background and may go unnoticed by the user. **4.** Note: Temperatures/fan speed fluctuate within a normal range depending on processes running and attached peripherals. Fan(s) speeds may take several minutes to return to idle after heavy processor or I/O activity has ceased. **5.** Check for any 'runaway' applications or processes consuming the processors. **6.** Verify correct specification memory is used: http://support.apple.com/kb/HT2813. Ensure the installed memory is configured correctly to optimize performance. **7.** Reset SMC. **Note:** Ensure the power button is not pressed when connecting the AC power cord or all fans will run fast. **8.** If peripheral card fan related, verify using a known good peripheral card. **9.** If there is abnormal temperature, overall computer speed will be noticeably reduced. If abnormal temperature can't be lowered to within normal range, a force shutdown will occur. .

Deep Dive

Check	Result	Action	Code
1. Very if the issue is user perception of intermittent noisy fans. Is the computer running as expected (compared to a similar computer)?	Yes	No problem found. Inform the customer the computer is operating normally.	
	No	Go to step 2.	
2. Determine if there are runaway applications or processes consuming the processors. Verify using 'Activity Monitor'	Yes	The application or process may have crashed. Alternatively check with the software vendor for compatibility and software update.	
	No	There are no runaway applications or processes. Go to step 3.	
3. Reset the SMC. Turn the computer back ON and verify all fans are rotating at close to minimum speed within a few minutes after the computer is idle.	Yes	Corrupt SMC state causing power and stability issues. Reset SMC has resolved.	
	No	Fan(s) not running or always running at full speed. Go to step 4.	
4. Boot the computer from a known good compatible Mac OS X. Verify the computer fans are rotating at close to minimum speed within a few minutes after computer is idle.	Yes	Suspect issue is caused by customer software or Mac OS X install. Clean install and restest.	
	No	Go to step 5	
5. Clear out any obstructions such as dust or internal cables from the fans and heatsinks. Reseat all fan connections to backplane board and processor board. Ensure no damage to heatsinks, e.g., bent or crushed fins and heatsink/ processor board connectors. Replace adequate thermal grease between processor(s) and heatsink(s). Reseat all fan connections in the system. Run Apple Service Diagnostic to verify the thermal sensor and fan circuity are functioning correctly.	Yes	Go to step 6	
	No	Replace affected fan, peripheral card, backplane board, or processor board based on Apple Service Diagnostic finding. - Fan failures - Peripheral card, backplane board, and processor board won't cause fan to spin, or cause it to spin too fast - Sensor related failures - For Heatsink failures	**X18** **M18** **M23** **M99**

6. Boot the computer from a known good compatible Mac OS X. Verify the computer fans are rotating at close to minimum speed within a few minutes after the computer is idle.	Yes	Issue resolved	
	No	Go to step 5	

Power Button Stuck

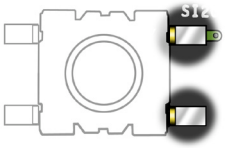
Unlikely cause: Hard drive(s), optical drive(s)

Quick Check

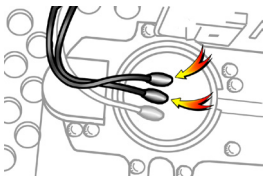
Symptom	Quick Check
Reset/Power Button Stuck • Computer will not power on • Computer has full speed fans at start up	**1.** Reset SMC. **2.** Inspect power button for any debris that may be obstructing its movement **3.** Press power button a few times ensuring a clicking actuation can be felt and heard.

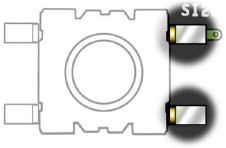
Deep Dive

Check	Result	Action	Code
1. After connecting the AC power cord verify the Trickle Power/ Standby LED from the power supply to the backplane board is illuminated when pressing the DIAG_LED button.	Yes	Go to step 2	
	No	Go to **No Power**.	
2. Reset SMC by disconnecting the power cord 15 seconds. Reconnect power cord. Wait 5 seconds. Verify the computer turns ON when you press the power button.	Yes	Corrupt SMC state causing power stability issues. Reset SMC has resolved the issue.	
	No	Go to step 3	



3. Momentarily jumper SYS_PWR pads on the backplane board. Verify the computer turns ON.	Yes	Go to step 4	
	No	Issue lies elsewhere. Go to **Startup and Power Issues**.	
4. Disconnect the front power button from the front panel board. Using a resistance/Ohms function on a MultiMeter, measure resistance/Ohms between pins while actuating the button. Verify the switch resistance changes between infinite to ≤ 5 Ohms when actuating.	Yes	Go to step 6	
	No	Power button is defective. Replace power button. Go to step 5.	**X14**
5. Verify replacement switch turns ON the computer when actuating the power button.	Yes	Defective power button replaced. Issue resolved.	
	No	Go to step 6	
6. Disconnect the front panel board and related cable from the backplane board. Note the processor tray and cage will need to be removed to gain access to the front panel board and cable. The processor tray and cage will need to be re-installed securely after cable disconnect otherwise damage may occur to the backplane board and processor board connector. Momentarily jumper SYS PWR pads to power the computer on. Verify the computer turns ON.	Yes	Front panel board is defective. Replace front panel board.	**M01**
	No	Issue lies elsewhere. Go to **Startup and Power Issues**.	





Internal Cables and Connectors Defective

Unlikely cause: Enclosure

Quick Check

Symptom	Quick Check
Internal Cables and Connectors Defective Various symptoms	**1.** Inspect for any Open / short circuits, torn, cut, pinched, melted, crushed, water or other fluid, corrosion, snapped cables and connectors. **2.** Gently tug on each conductor ensuring they have not pulled from its respective connector. **3.** Inspect the connectors for any corroded missing or bent pins, snapped off printed circuit boards. **4.** Never use tape or re-solder damaged cables and connectors. Always replace the affected part.

Deep Dive

Check	Result	Action	Code
1. Determine whether fault has already been isolated to a single cable or connector.	Yes	Go to step 2	
	No	Jump to appropriate symptom code flow most closely related to the customer reported symptom(s).	
2. Determine whether damaged connector/port/cable caused by customer abuse.	Yes	Replace affected part. Customer abuse and accidental damage is not covered under warranty. For cables For cables and connectors on boards For power supply For mass storage	 **X03** **M24** **P16** **H04**
	No	Replace affected part. For cables For cables and connectors on boards For power supply For mass storage	 **X03** **M24** **P16** **H04**

Mechanical/Physical Damage

Quick Check

Symptom	Quick Check
Mechanical/Physical Damage • Damaged ODD door(s) • Damaged side access door • Damaged latch mechanism • Stripped screw/head • Stripped screw boss • Dent or scratch to enclosure • Bent feet or handles • Fluid damage or rust • Damaged processor tray latches • Damaged processor cage • Damaged PCI port bracket and covers • Damaged PCI slider	1. Determine damage caused by customer/technician environment, accidental damage, or abuse. 2. Inform customer/technician the failures are not covered by Apple warranties. Refer to http://www.apple.com/legal/warranty

Uncategorized Symptom

Quick Check

Symptom	Quick Check
Uncategorized Symptom Unable to locate appropriate symptom code	Verify whether existing symptom code applies to the issue reported by the user. If not, document reported symptom and send feedback to smfeedback@apple.com stating that a suitable symptom code could not be found.

Apple Technician Guide

Take Apart

Mac Pro (Mid 2010)

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General Information

Orientation

For most take-apart procedures, Apple recommends laying the computer on its side before removing or installing the part. For proper operation, however, Apple recommends running the unit in the upright position. Never operate the computer on its side with the access panel facing down.

Tools

The following tools are required to service all configurations of the computer:

- Magnetized Phillips #1 screwdriver
- Long-handled, magnetized Phillips #2 screwdriver
- Magnetized jeweler's Phillips #1 screwdriver
- Long-handled, magnetized 3 mm flathead hex screwdriver (Apple part number 922-7122)
- Long-handled, magnetized T8 torx screwdriver
- Right-angle or short-handled, magnetized 2.5 mm hex screwdriver
- Flatblade screwdriver
- Jeweler's flatblade screwdriver
- Thermal grease kit (Apple part number 076-1225)
- Soft cloth (for protecting processor tray)

Parts Requiring Enclosure Replacement

The following are not separate, orderable parts. To replace them, you must replace the enclosure.

- Media shelf
- Media fan
- AirPort antenna board and cables
- Rear panel latch

How to Identify Single- and Dual-Processor Configurations

See "How to Identify Single- and Dual-Processor Configurations" in the Basics chapter.

Icon Legend

The following icons are used in this chapter:

Icon	Meaning
	Warning or caution
	Check; make sure you do this

Note on Illustrations

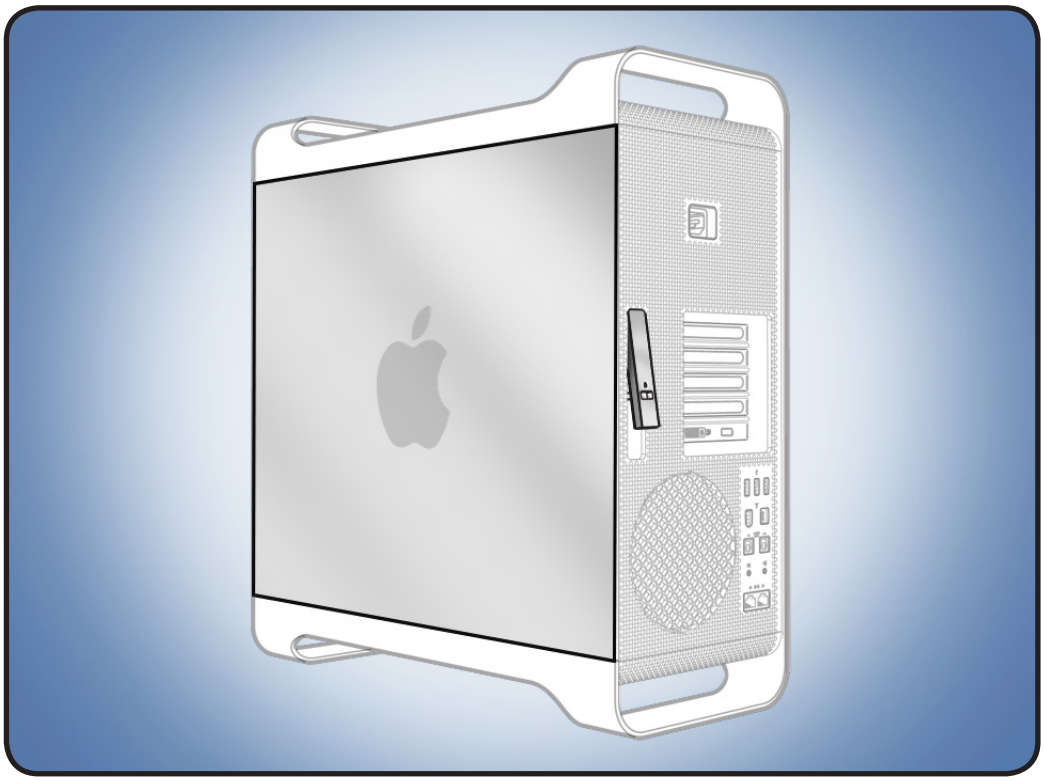
Because a pre-production model was used for the illustrations in this manual, you may notice small differences between the image pictured and the computer you are servicing.

Opening the Computer

First Steps

- Shut down computer.
- Wait 10 minutes

- **Warning:** After you shut down the system, the internal components can be very hot. You must let the computer cool down before continuing.
- Unplug all external cables except power cord.
- Touch metal PCI cover on back of computer.
- Unplug power cord.
- Put on ESD strap.



Tools

- ESD wrist strap

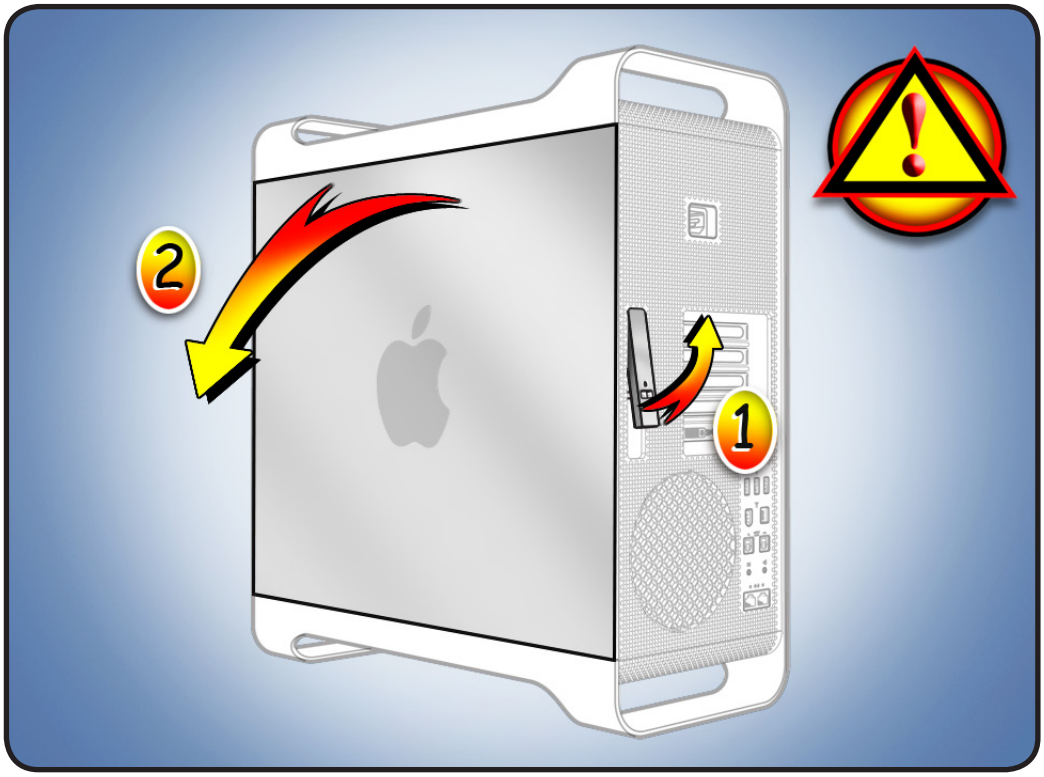
Removal

1. Lift latch on back of computer.

Warning: Panel edges can be sharp. Use care when handling.

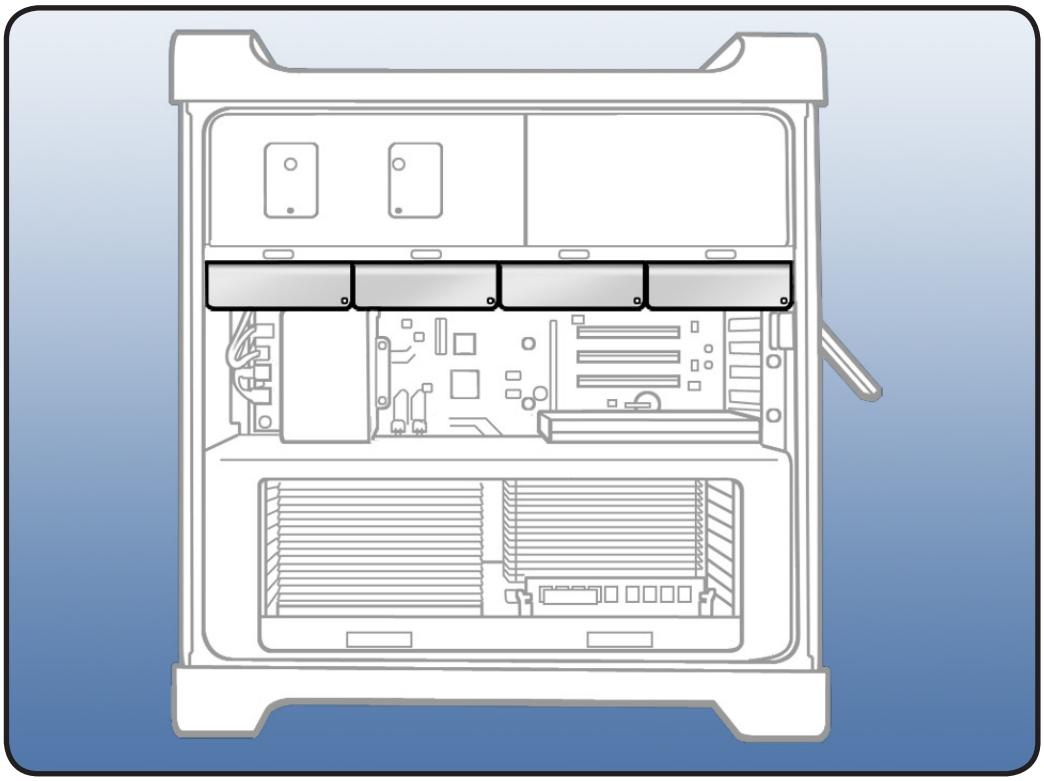
2. Remove access panel and place on flat surface covered by soft, clean cloth.

Reassembly Note: Make sure latch is in up position before replacing access panel. Otherwise, panel will not seat correctly in enclosure.



Hard Drive/Solid-State Drive and Drive Carrier

First Steps



Open computer.

Important: This computer includes four hard drive bays. If computer has only one drive, install it in far left bay (bay 1). Hard disk or solid-state drives can be installed in all four bays.

SATA drive specifications:

- Type: SATA 3 Gb/s
- Width: 3.9 in. (102mm)
- Depth: 5.7 in. (147mm)
- Height: 1.0 in. (25.4mm)

Solid-state drive (SSD) specifications:

- Type: SATA 3 Gb/s
- Width: 2.5 in. (63.5mm)

Note: The same drive carrier is used for both SATA and SSD drives. To accommodate the smaller SSD, the carrier is equipped with an adapter.

Tools

- ESD wrist strap
- Phillips #1 screwdriver

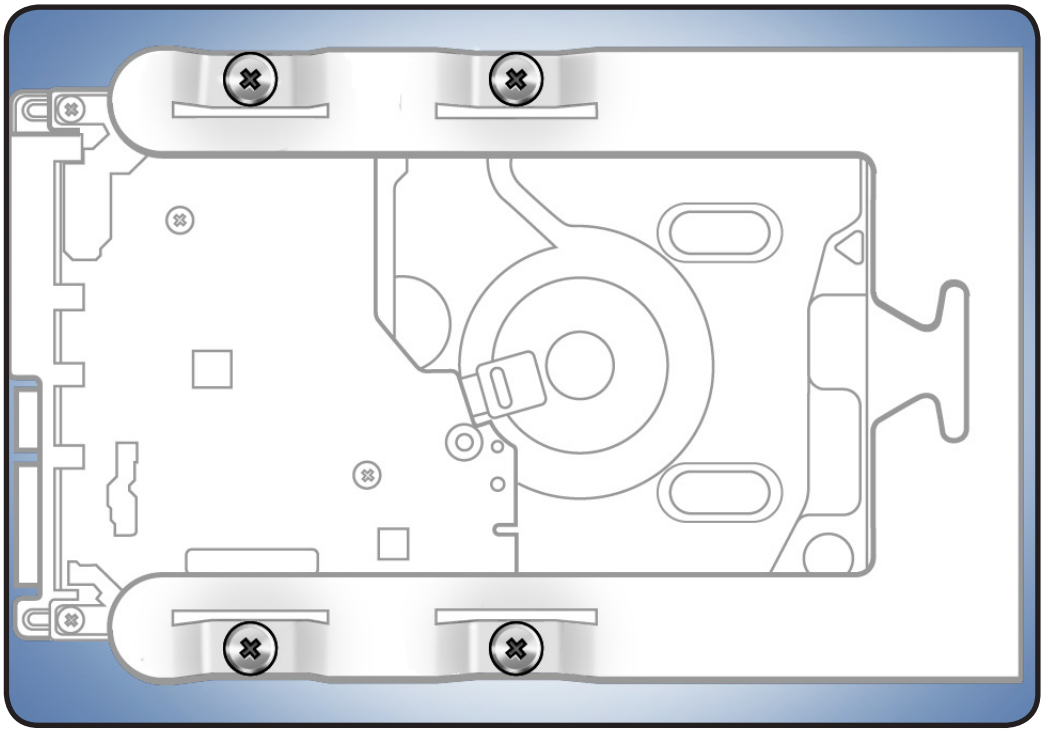
Removal

1 Make sure latch on back panel is up, so that drives and carriers are unlocked.

2 Pull hard drive out of drive bay.

Reassembly, SATA Drive and Carrier

Note: Latch on back panel must be up before you replace hard drive.



1 If replacing hard drive with new drive, remove **4** carrier screws and mount new drive in carrier.

Important: Hold drive by its sides. Do not touch circuit board.

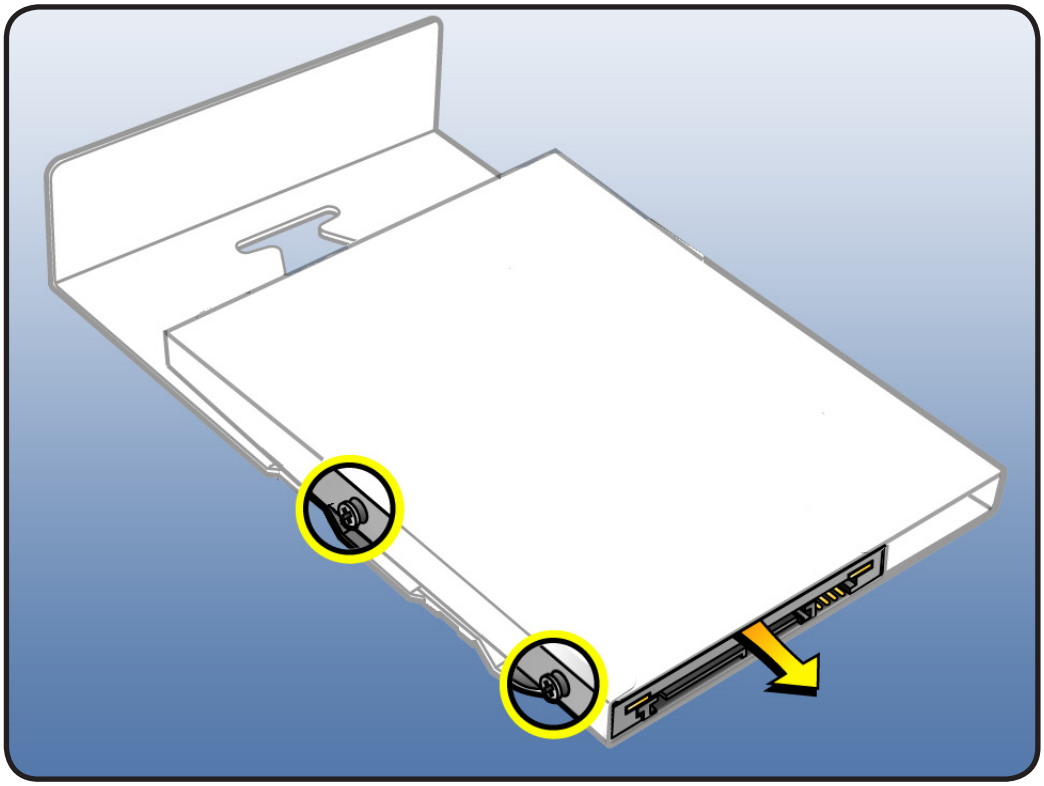
2 Slide drive carrier over guides and into drive bay until drive snaps into place.

Reassembly, SSD Drive and Carrier

Note: Latch on back panel must be up before you replace hard drive.

1 If replacing SSD drive with new SSD drive, remove **1** screw on side of carrier adapter.

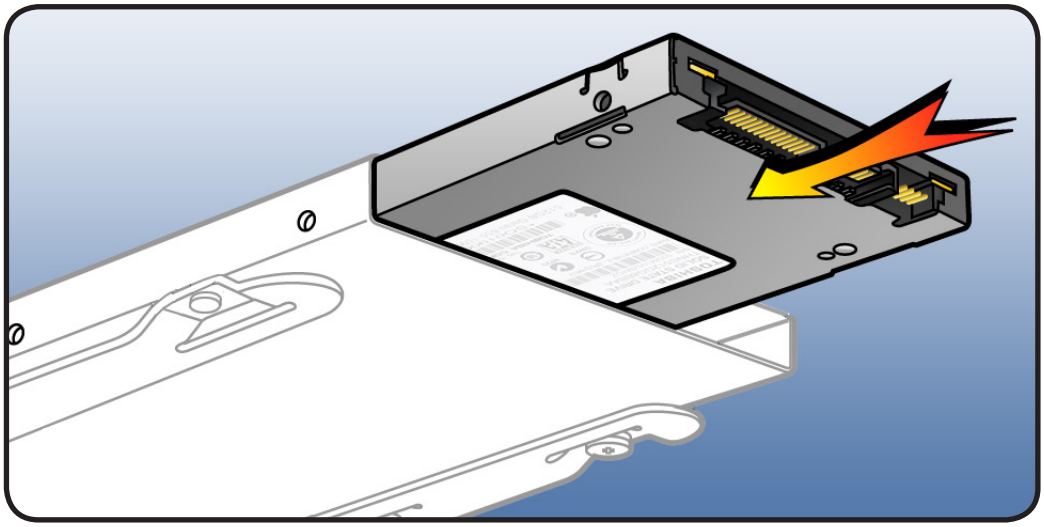
2 Slide drive out of adapter.



3 Slide replacement drive into carrier adapter as shown, label side down and connector facing out.

4 Replace mounting screw.

5 Slide drive carrier over guides and into drive bay until drive snaps into place.



Note: If you are replacing a carrier that holds an SSD, you must transfer the carrier adapter to the new carrier. Refer to **SSD Carrier Adapter**.

Formatting a New Drive

After installing a new (replacement) drive, format it using these steps:

1. Open Disk Utility and select the drive in list to the left.
   Note: If you are formatting the primary drive, use Disk Utility program on Install Disk.
2. Click on Partition tab.
3. Click on "Options" and verify GUID is selected if this is a bootable drive.
4. Apply change by clicking on "Partition" button.

Reinstalling Software that Came with the Computer

Use the software install discs that came with the computer to reinstall Mac OS X and any applications that came with the computer.

Important: Apple recommends backing up data on the hard disk before restoring software. Back up essential files before installing Mac OS X and other applications. Apple is not responsible for any lost data.

For more details, refer to **http://support.apple.com/kb/HT3910**.

This procedure has four parts:

- Erasing the hard drive/formatting the hard drive
- Installing the Mac OS X operating system using the Mac OS X Install DVD.
- Completing the Mac OS X Setup Assistant.
- Restoring the bundled applications using the Applications Install Disc.

Important: This procedure will completely erase your hard drive. If you have installed Microsoft Windows using Boot Camp, or have multiple partitions, this procedure will erase the partition you select.

Part One: Erasing the hard drive/formatting the hard drive

1. Turn on the computer.
2. Insert the Mac OS X Install DVD into the optical drive.
3. Press and hold the "C" key while the computer starts up. The computer will start up using the Mac OS X Install DVD.
4. If your are using a wireless mouse, a mouse icon should appear asking you to turn the mouse on so that the computer can discover it.
5. Select a language, then press the right arrow key.
6. Click the Utilities menu, the choose Disk Utility.
7. Select a volume to erase (usually called Macintosh HD).
8. Click the Erase tab.

9. Click Erase... Important: This step will completely erase your hard drive. If you have installed Microsoft Windows using Boot Camp, or have multiple partitions, this procedure will erase the partition you select.
10. A dialog box appears asking if you want to erase the partition: click Erase.
11. After the partition is erased, choose Quit Disk Utility from the Disk Utility menu.

Part Two: Installing the operating system

1. When the Mac OS X Installer screen appears, click Continue.
2. When the license agreement appears, click Agree.
3. Select the disk you erased. It should now be highlighted with a green arrow.
4. Click Install. A status bar appears on the bottom of the screen while Mac OS X installs.
5. An Additional Information screen appears, advising you that you operating system has been installed. Click Continue.
6. An Install Succeeded screen appears. Click Restart.

Part Three: Completing the Mac OS X Setup Assistant

1. When the restart has completed, a welcome video plays, then country/region selection screen appears.
2. Select your country or region and click Continue.
3. Select a keyboard layout and click Continue.

- A migration screen appears. If you wish to migrate your data from another Macintosh, see Migration tips and tricks **http://support.apple.com/kb/HT1291**. If you do not wish to migrate, or want to migrate later, select "Do not transfer my information now" and click Continue.

4. A Wireless Service screen appears if you have wireless services available within range of your computer. Select "On" and click Continue.
5. If the network is password protected, you be asked for a password when you select it. Type the password and click Continue.
6. An Apple ID screen appears. This is used to purchase content from the iTunes store. You can use MobileMe or .Mac usernames here as well. When complete, click Continue.
7. If you do not have an Apple ID or MobileMe account, click Continue to move to the next screen.
8. A Registration Information screen appears. You are not required to fill this out, but it is helpful if you do. When complete, click Continue and your product registration will be sent immediately.
9. If Mac OS X servers are available on your network, you'll be asked if you'd like to log on to them. If not, click Continue.
10. A Create Your Account screen appears. This will be used to create a User Account with Login ID and Password for you computer. You should remember this password. You'll be

asked for it when you install new software or perform other administrative tasks on your computer. When complete, click Continue and your account will be created immediately.

11. A screen to select your user picture appears. Take a snapshot with the built-in camera or select a picture from your Library. When complete, click Continue.
12. A MobileMe screen appears. Select an option and click Continue.
13. A Thank You screen appears. Click Go to complete the Mac OS X Setup Assistant.
14. Eject the Mac OS X Install DVD by dragging its icon to the Trash.

Part Four: Restoring the bundled applications

1. To install the bundled applications, locate the Applications Install Disc that came with your computer.

   Note: You may see a Software Update icon bouncing up and down in your dock. You can quit this for now.
2. Insert the Applications Install Disc into the optical drive.
3. The disc will mount and an Applications Install Disk dialog appears. Double-click on Install Bundled Software to install your iLife applications.
4. A dialog appears asking if you want to run the package. Click Continue.
5. The Bundled Software Applications Installer screen appears. Click Continue.
6. A software license screen appears. Click Continue, then click Agree to accept the terms.
7. A select destination dialog appears. Make sure the partition with the green arrow is the correct destination, then click Continue.
8. To install all the bundled applications, click Install.
9. To select individual applications, click Customize. Click the disclosure triangle next to Bundled Applications to select individual applications, then click Install. Clicking Standard Install on the Customize screen installs all the applications.
10. Type the password you created in Part Three, step 11 to start the installation.
11. A restart dialog appears. Click Continue Installation.
12. An Install was Successful screen appears. Click Restart.

The restore process is now complete.

It is a good idea to make sure you've updated all the software after performing this procedure. From the Apple (apple) menu, choose Software Update to find the updates currently available for your computer.

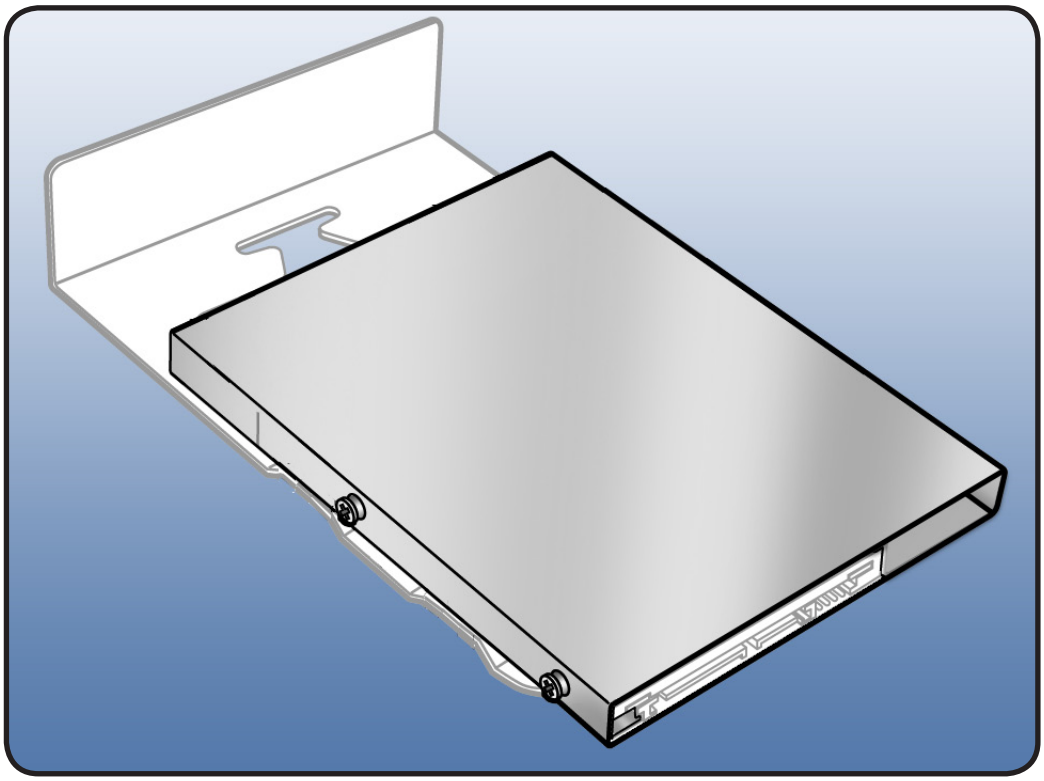
SSD Carrier Adapter

The same hard drive carrier is used for both SATA hard drives and solid-state drives. To accommodate the smaller SSD drive, the carrier is equipped with an adapter.

First Steps

Open computer, lay it down with access side facing up, and remove:

- Hard drive and drive carrier from enclosure



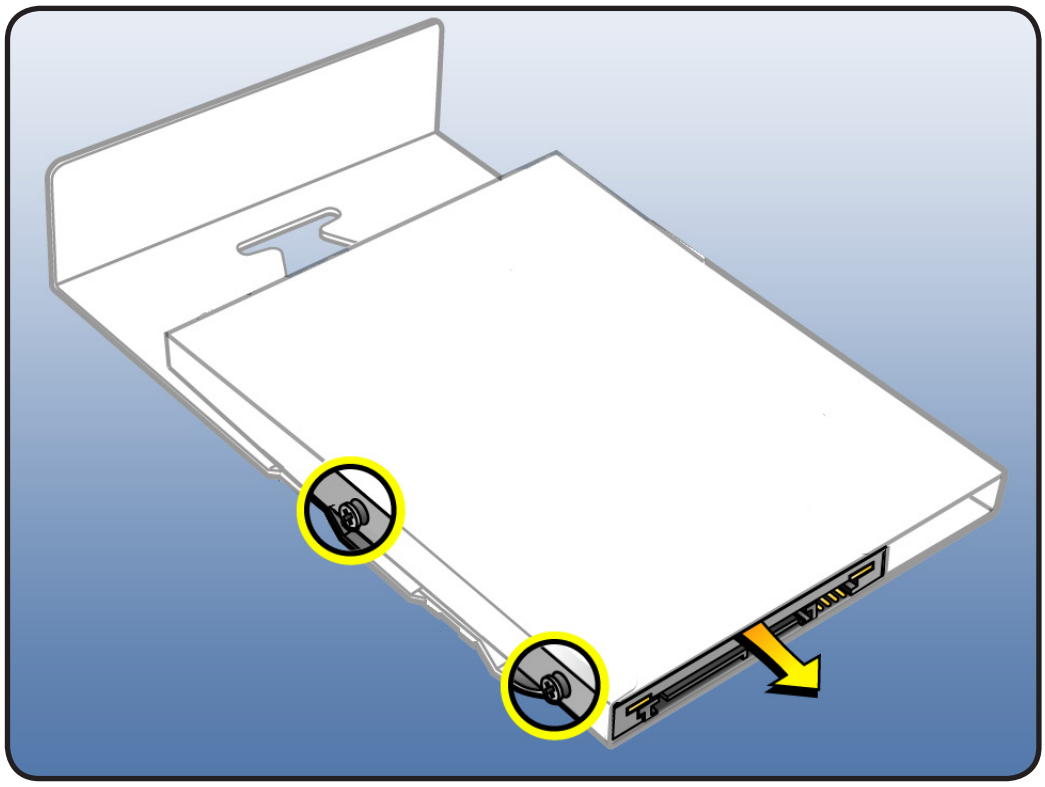
Tools

- ESD wrist strap
- Phillips #1 screwdriver

Removal

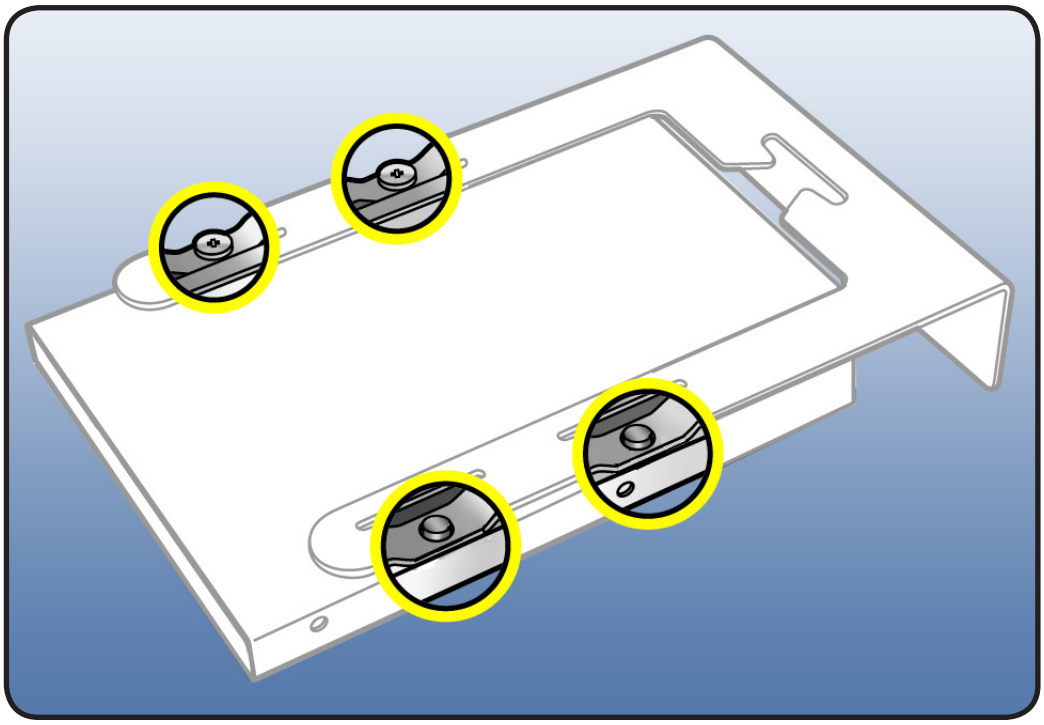
1 Remove **2** screws on side of carrier adapter.

2 Slide SSD out of adapter.



3 Remove **2** screws mounting adapter to carrier.

4 Detach carrier from **2** adapter hooks and remove adapter from carrier.

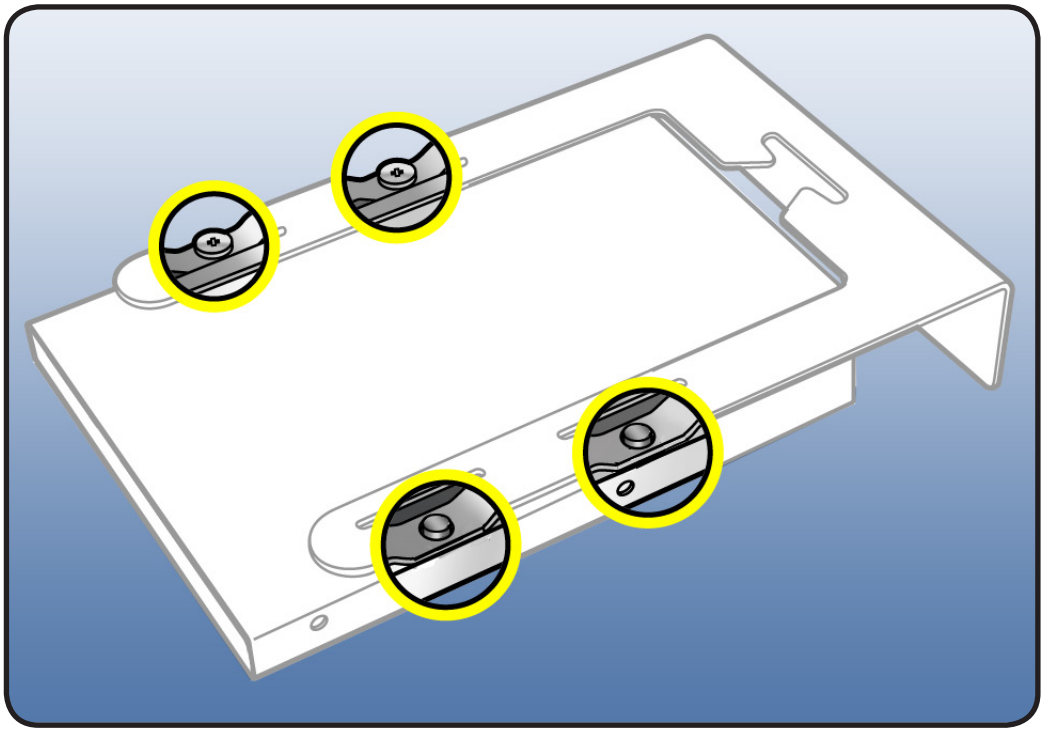


Reassembly

1 Position drive carrier over replacement adapter as shown.

2 Align holes in lower arm of carrier over **2** hooks on adapter.

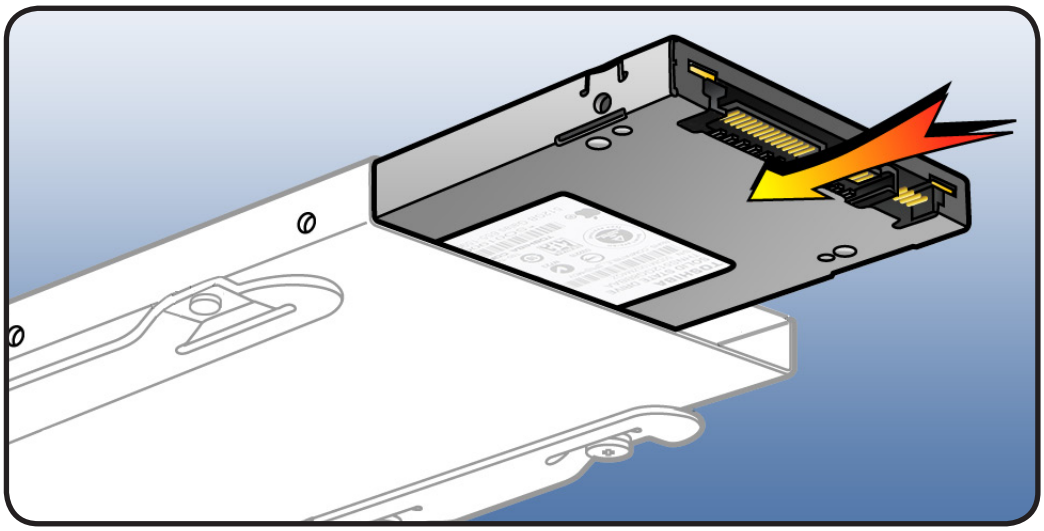
3 Align **2** screws on upper arm of carrier with holes in adapter and secure screws.



4 Slide drive into adapter as shown, label side down and connector facing out.

5 Replace mounting screws.

6 Slide carrier over guides and into drive bay until drive snaps into place.

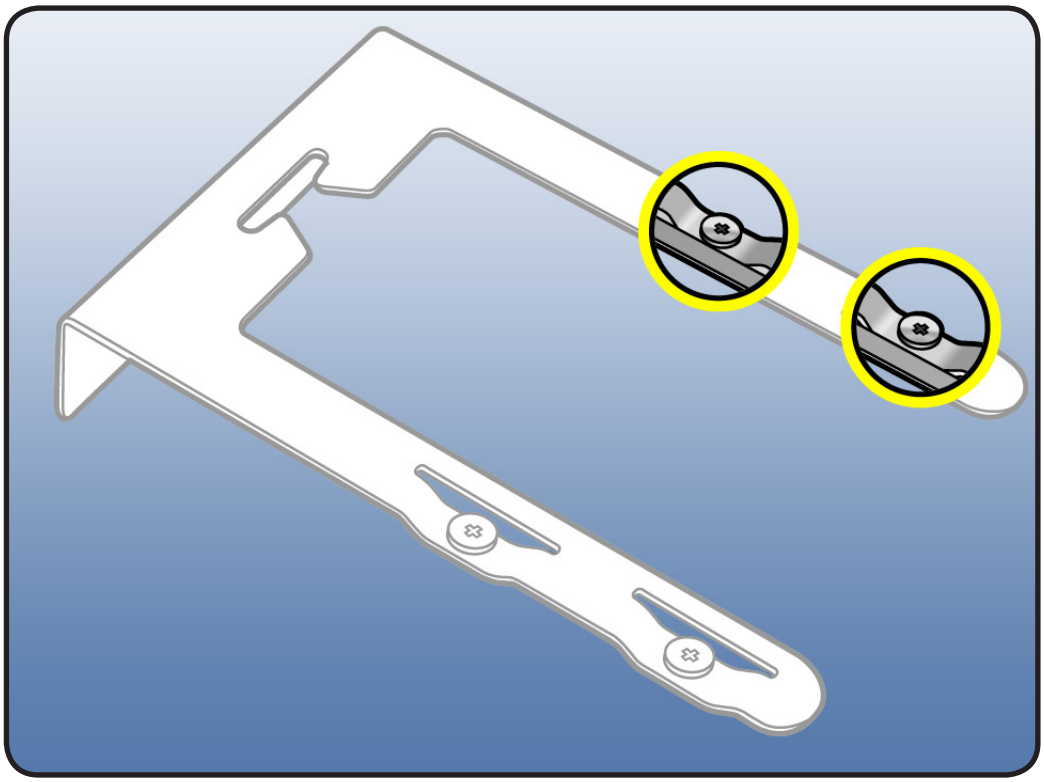


Replacing the Carrier for SSD

If you need to replace a carrier that holds an SSD, you must transfer the carrier adapter and drive to the new carrier. For this procedure, you do not need to remove the drive from the adapter.

1 Remove adapter with drive from carrier. See Removal steps 3–4.

2 Remove two screws from replacement carrier, as shown.



3 Transfer adapter with drive to replacement carrier. See Reassembly steps 1–3.

Optical Drive Carrier and Optical Drive

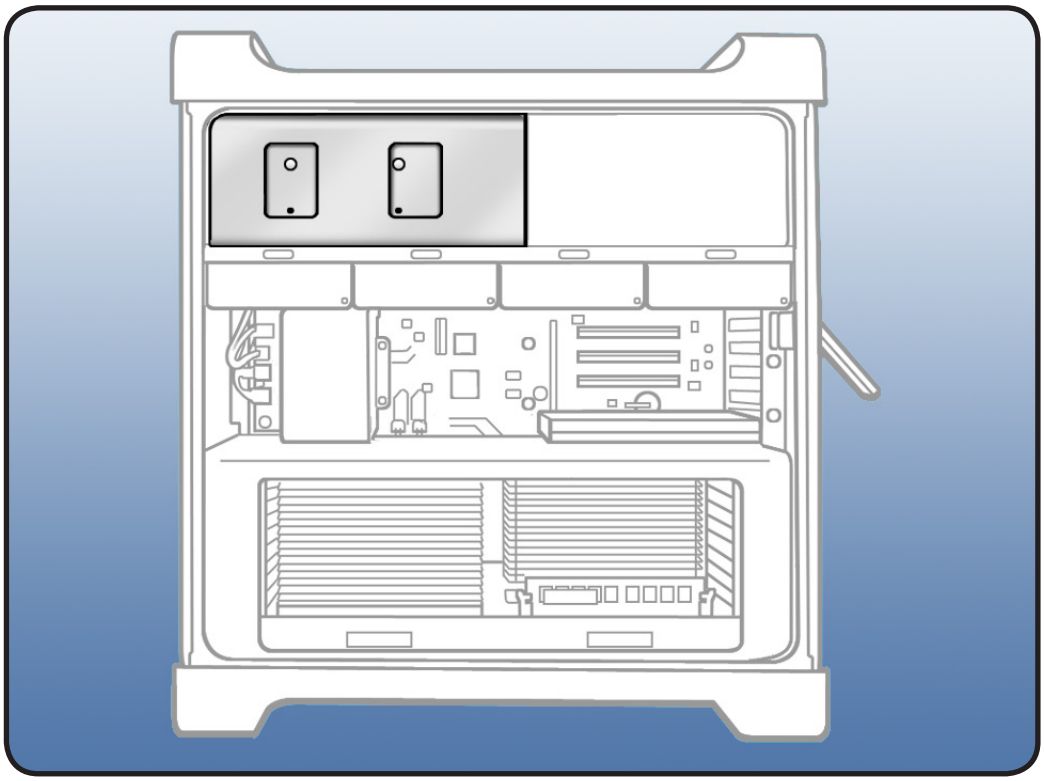
First Steps

Open computer and lay it down with access side facing up.

Important: Optical drive bay allows two drives. If computer has only one optical drive, install it in top position.

Note: To eject media in drives:

- Top — Press Eject key.
- Bottom— Press Option and Eject keys.



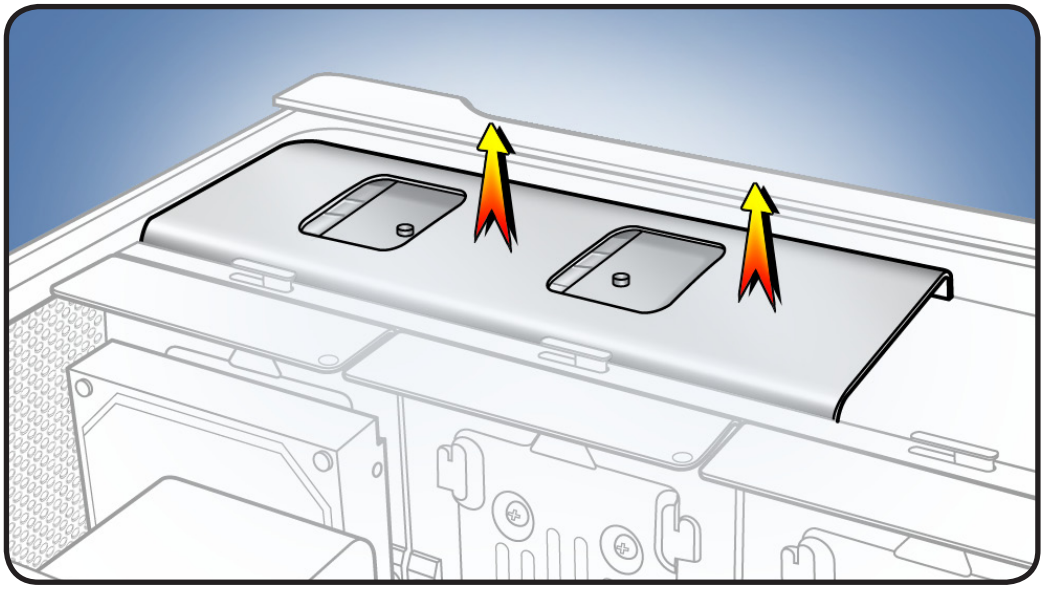
Tools

- ESD wrist strap
- Phillips #1 screwdriver

Removal

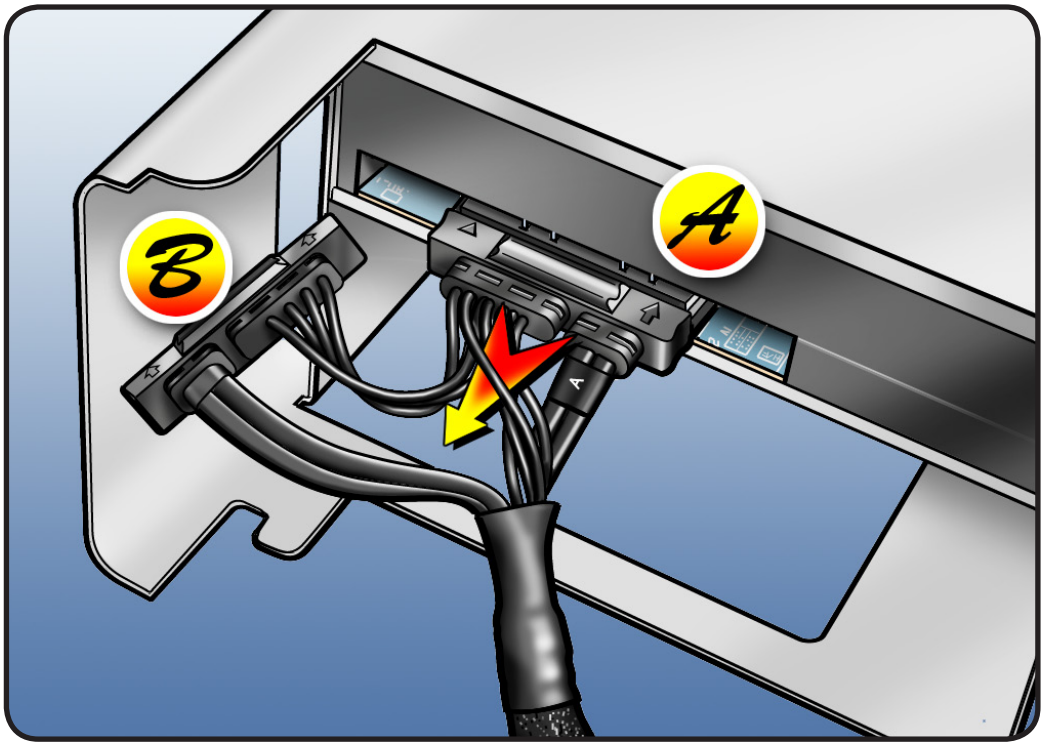
1 Make sure latch on back panel is up, so that drives and carriers are unlocked.

2 Pull optical drive carrier part way out of computer.



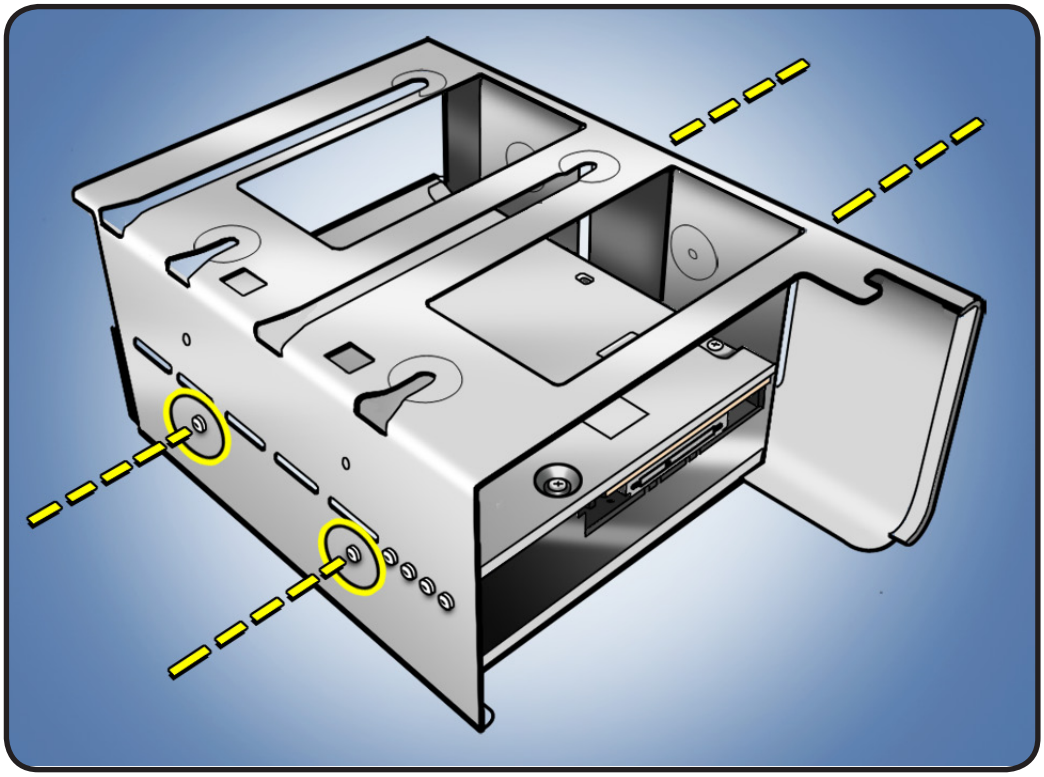
3 Disconnect optical drive cable from drive(s) and remove carrier.

Note: Middle connector (marked **A**) disconnects from top drive and end connector (marked **B**) disconnects from bottom drive (if installed).



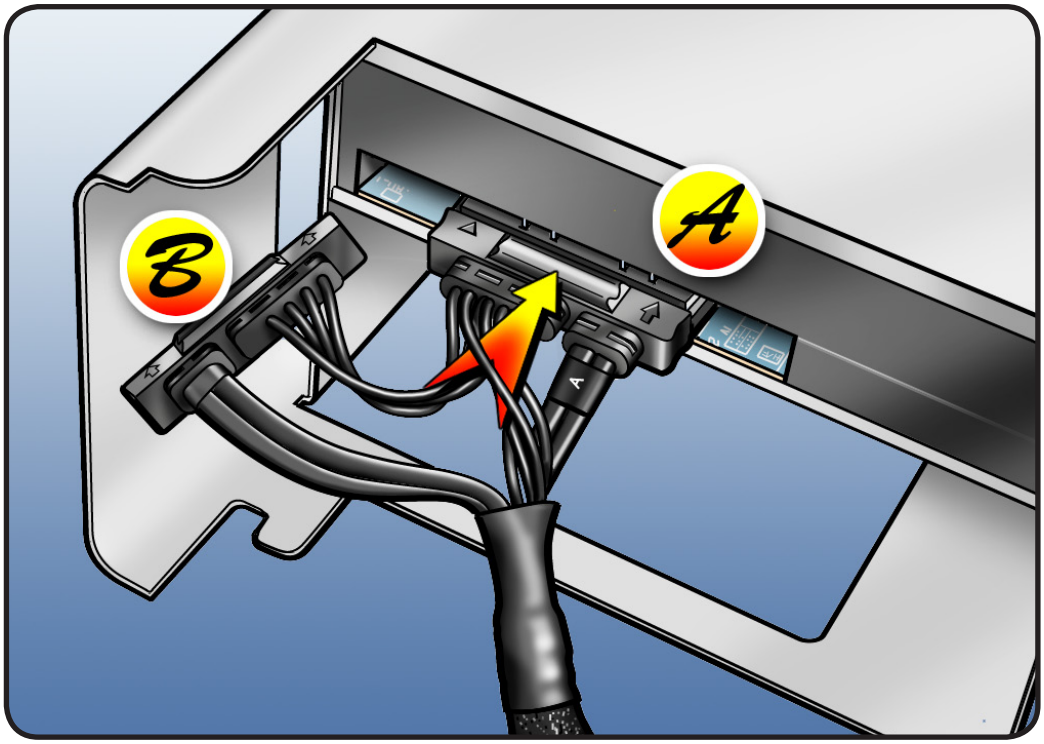
Reassembly

Note: Latch on back panel must be up before you replace optical drive carrier and optical drives.



1 If replacing optical drive with new drive, remove **4** carrier screws and mount new drive in carrier.

Note: If adding a second drive to carrier, mount drive using **4** screws stored on back of carrier.



2 Attach optical drive cable to back of drive(s).

Note: Middle connector (marked **A**) goes to top drive and end connector (marked **B**) goes to bottom drive (if installed).

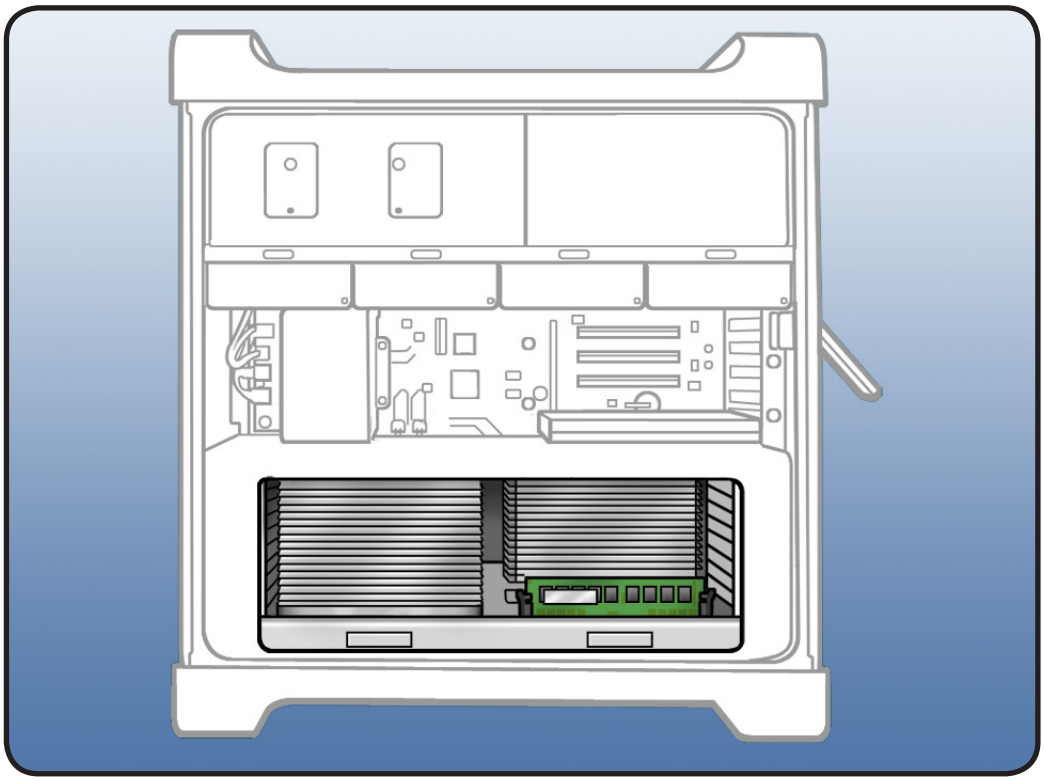
3 Slide carrier over guides and into place in optical drive bay.

Important: Do not catch cable under carrier as you slide it into bay.

Processor Tray

First Steps

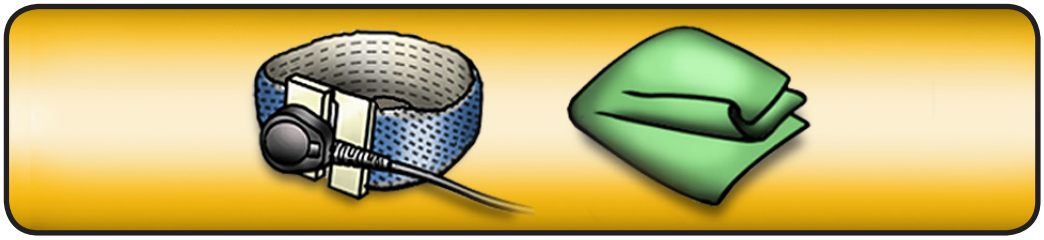
Open computer and lay it down with access side facing up.



Note: Processor tray includes processor heatsink(s), processor(s), DIMMs, processor board, and processor tray support plate.

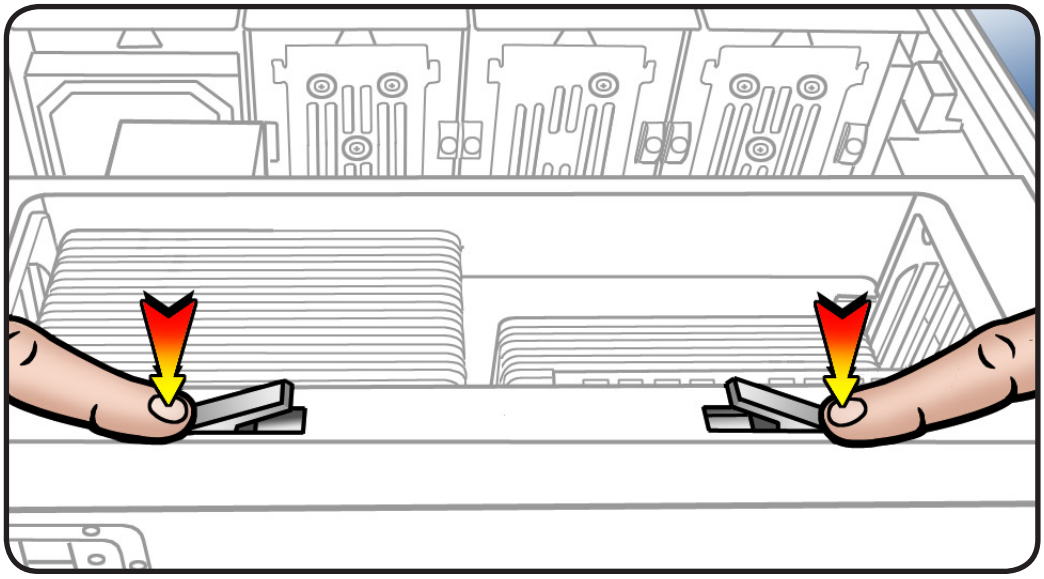
Tools

- ESD wrist strap
- Soft, clean cloth



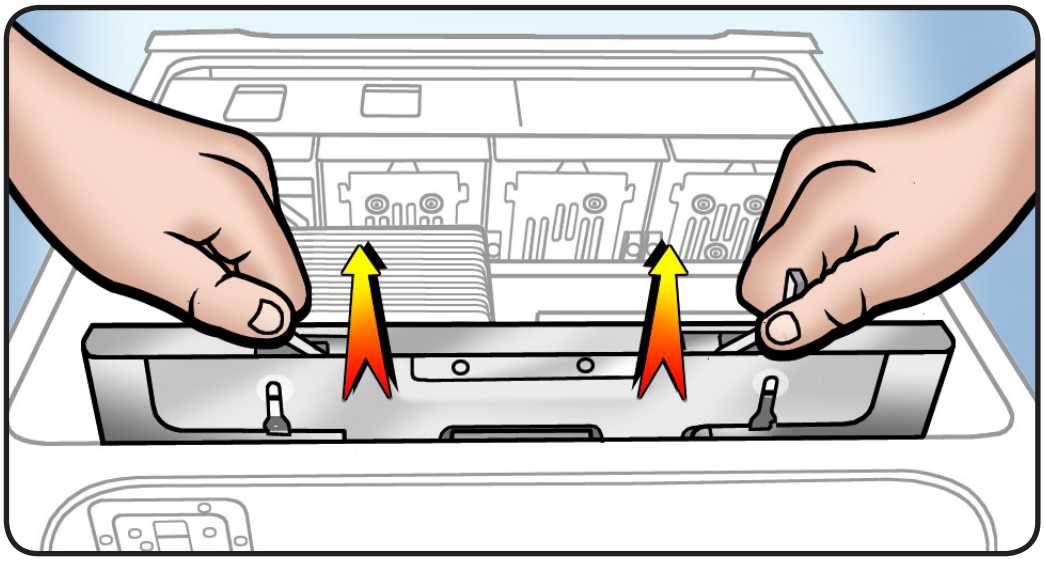
Removal

1 Press down and release **2** latches on front of processor tray.



2 Holding tray by latches, lift it out of computer.

3 Place tray DIMM side up on soft, clean cloth.



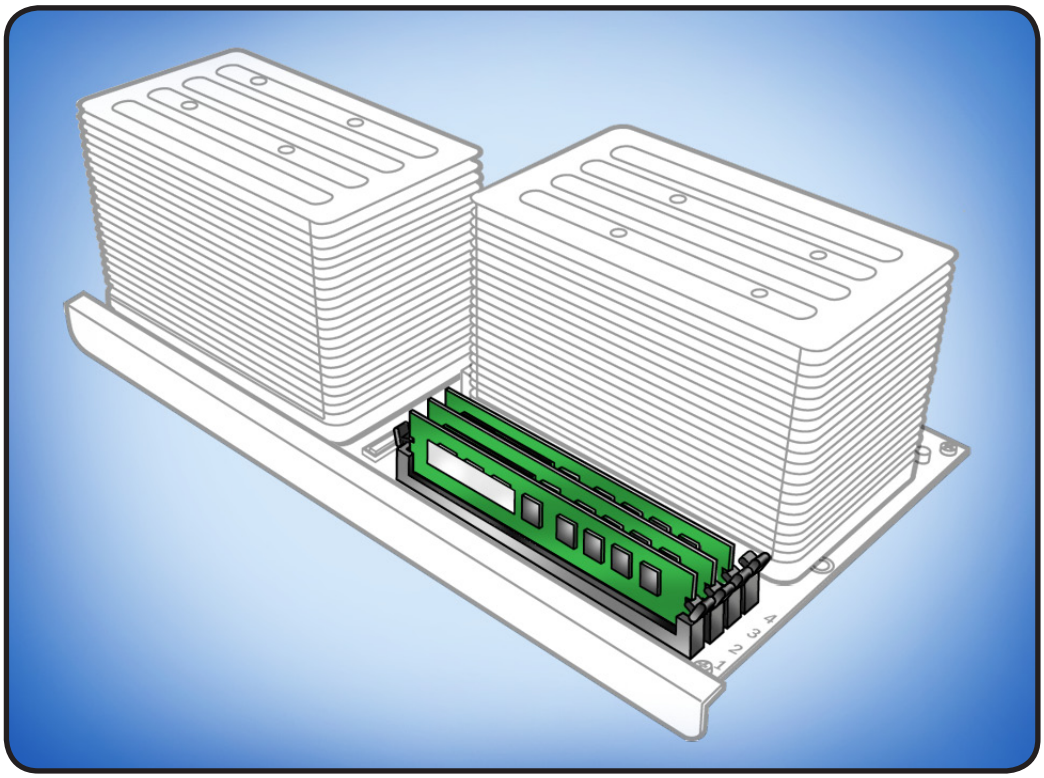
Memory DIMMs

First Steps

Open computer, lay it down with access side facing up, and remove:

- Processor tray

Warning: DIMMs may be very hot. Always wait 5–10 minutes for computer to cool down before removing or installing memory.



Tools

- ESD wrist strap

Memory Configuration

Mac Pro (Mid 2010) comes with a minimum of 3 GB of memory in single-processor configurations, or a minimum of 6 GB memory in dual-processor configurations, installed as 1 GB unbuffered ECC dual inline memory modules (UDIMMs).

DIMMs must fit these specifications:

- PC3-10600E,1333 MHz, DDR3 SDRAM UDIMMs
- Error-correcting code (ECC)
- 72-bit wide, 240-pin ECC modules
- 36 memory ICs maximum per ECC UDIMM

For proper operation of Mac Pro (Mid 2010) computers, Apple recommends using only Apple-approved DIMMs. Refer to GSX for Apple DIMM service part numbers. Memory from older Macintosh computers is not compatible with Mac Pro (Mid 2010).

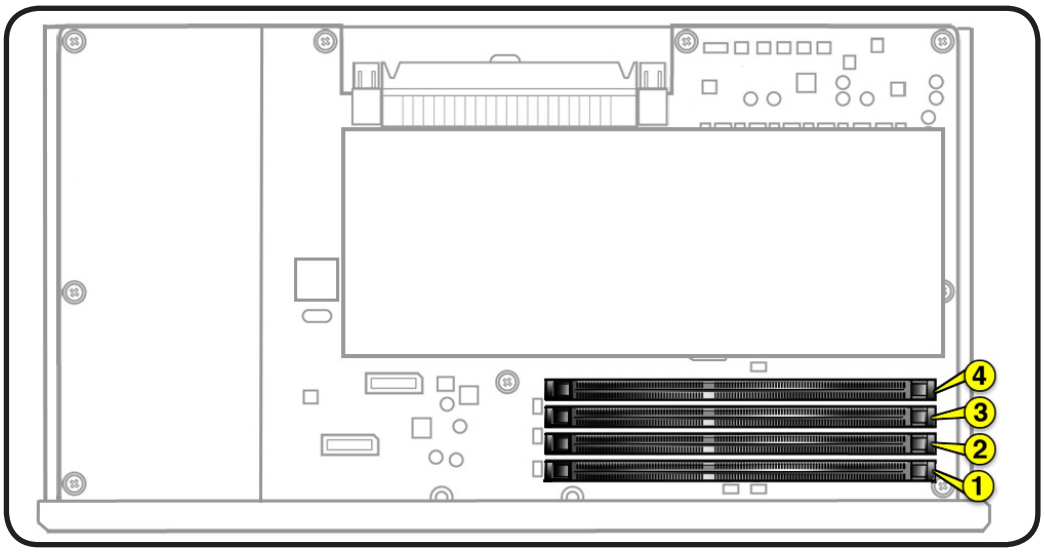
Single-Processor Configuration

A quad-core or 6-core Mac Pro (Mid 2010) has one processor and four memory slots. You can install 1 GB, 2 GB, or 4 GB DIMMs for a total of up to 16 GB of memory.

You can install different size DIMMs in Mac Pro (Mid 2010). However, for best performance, Apple recommends you install equal-size DIMMs (all 1 GB, all 2 GB, or all 4 GB) filling the slots in the order listed in this table.

If you have	Fill these slots
Two DIMMs	1 and 2
Three DIMMs	1, 2, and 3
Four DIMMs	1, 2, 3, and 4

See also "Memory Slot Utility" below.



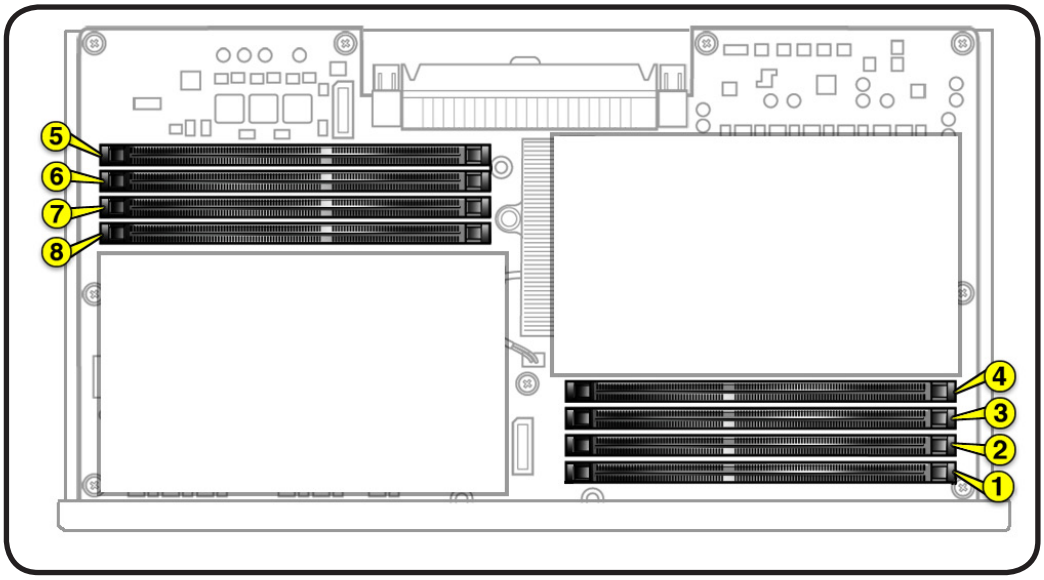
Dual-Processor Configuration

An 8-core or 12-core Mac Pro (Mid 2010) has one processor and eight memory slots. You can install 1 GB, 2 GB, or 4 GB DIMMs for a total of up to 32 GB of memory.

You can install different size DIMMs in Mac Pro (Mid 2010). However, for best performance, Apple recommends you install equal-size DIMMs (all 1 GB, all 2 GB, or all 4 GB) filling the slots in the order listed in this table.

If you have	Fill in these slots
Two DIMMs	1 and 2
Three DIMMs	1, 2, and 3
Four DIMMs	1, 2, and 5, 6
Six DIMMs	1, 2, 3 and 5, 6, 7
Eight DIMMs	1, 2, 3, 4 and 5, 6, 7, 8

See also "Memory Slot Utility" below.



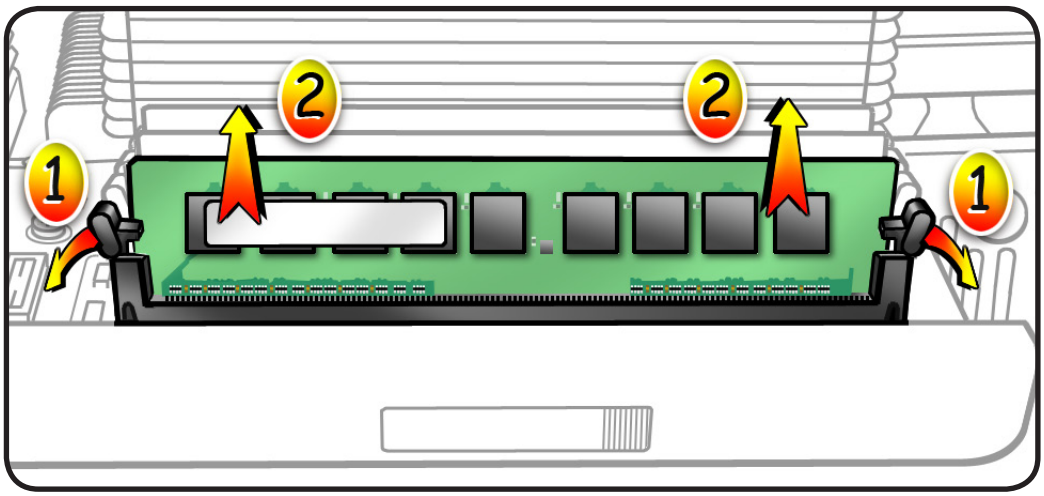
Memory Slot Utility

If you install different-size DIMMs in single-processor or dual-processor Mac Pro (Mid 2010) computers, follow the order in the tables above. If the DIMM configuration you install doesn't provide optimized performance, the Memory Slot Utility appears on screen and recommends an improved configuration.

To use the Memory Slot Utility again, go to /System/Library/Core Services.

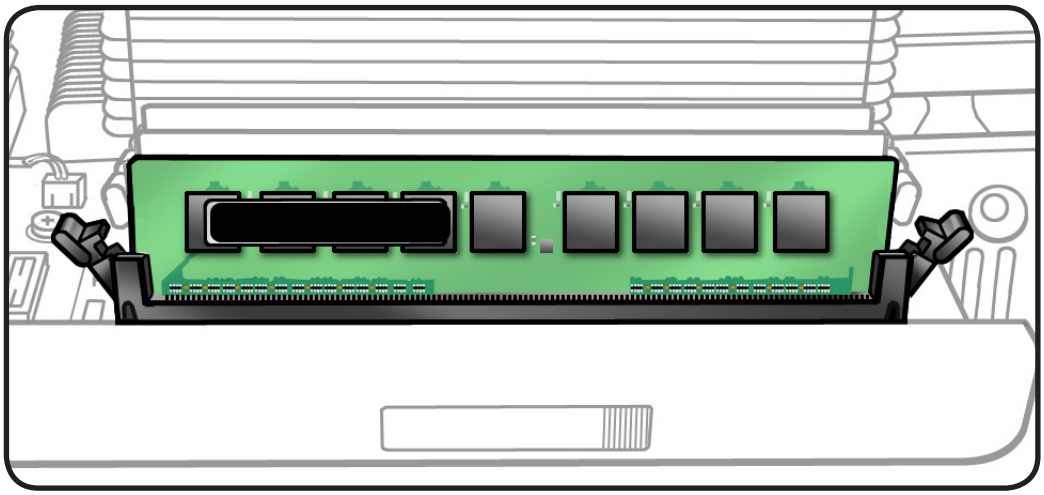
Removal

Important: When removing or installing DIMM, be careful of nearby heatsink fins, as they can be sharp. Always handle DIMM only by the edges. Do not touch its connectors or any components.



1 Open ejectors on DIMM slot by pushing them out to the sides.

2 Holding DIMM by edges, remove it from processor board.



Note: If a black sticker covers barcode label on DIMM you are replacing, remove sticker before returning DIMM to Apple. (Service DIMMs do not include black sticker.)

Important: After re-installing or replacing DIMM, use **Memory Diagnostic LEDs** to verify DIMM is correctly seated.

PCI Express/Graphics Card

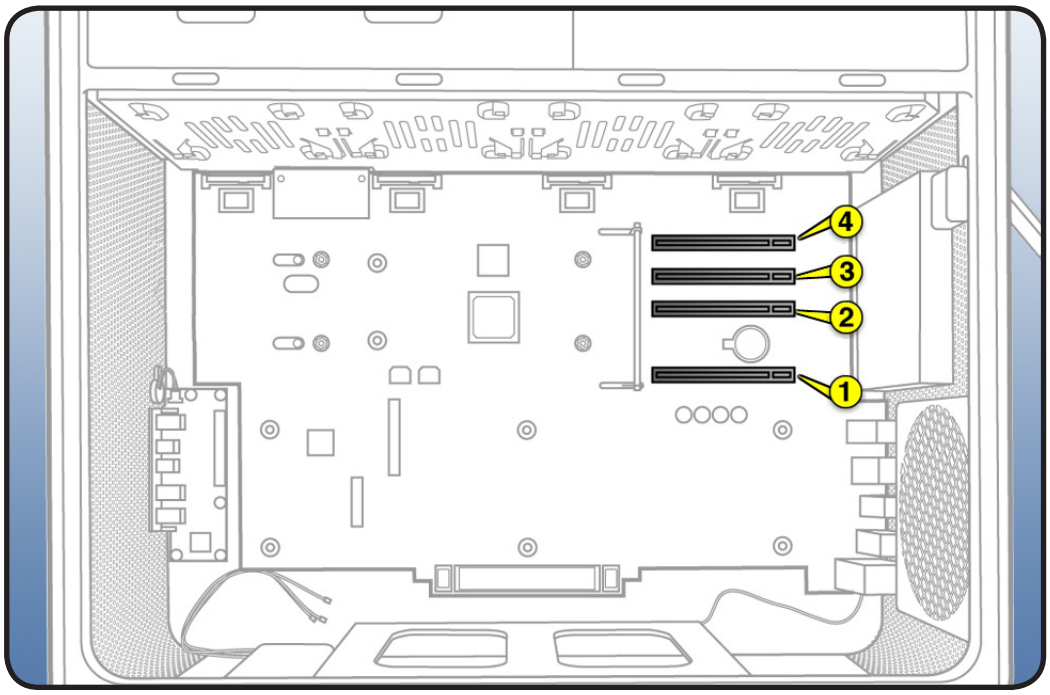
The Mac Pro (Mid 2010) backplane board includes one double-wide PCI Express (PCIe) graphics slot and three PCIe expansion slots, for a total of four slots. The computer comes with a graphics card installed in slot 1. You can install additional PCIe graphics and expansion cards in the remaining three expansion slots.

All four slots support 16-lane cards.

Slot electrical specifications:

- **Slots 1 and 2:** x16 PCIe 2.0
- **Slots 3 and 4:** x4 PCIe 2.0

For more information on Mac Pro (Mid 2010) graphics cards, refer to http://support.apple.com/kb/HT4279.



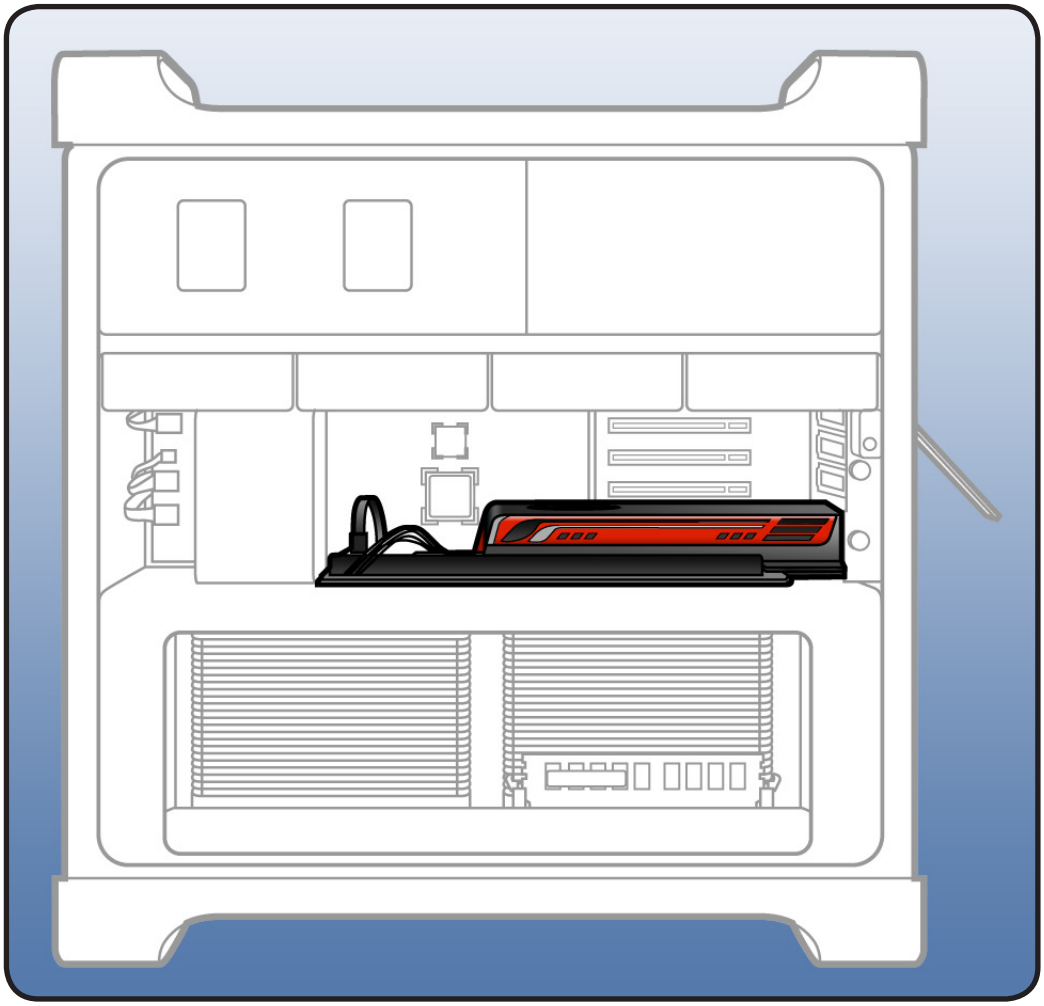
Important: Graphics cards from previous Power Mac G5 and Mac Pro models are not software-compatible with Mac Pro (Mid 2010) models.

Important: Combined maximum power consumption for all four PCIe slots must not exceed 300 W.

First Steps

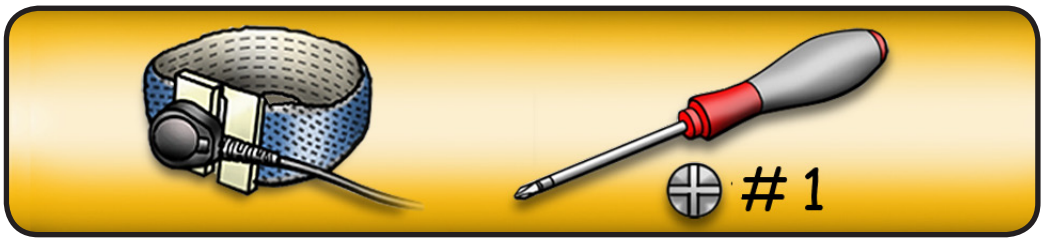
Open computer and lay it down with access side facing up:

Note: It may help to remove hard drives and carriers and any adjacent PCI Express cards before beginning this procedure.



Tools

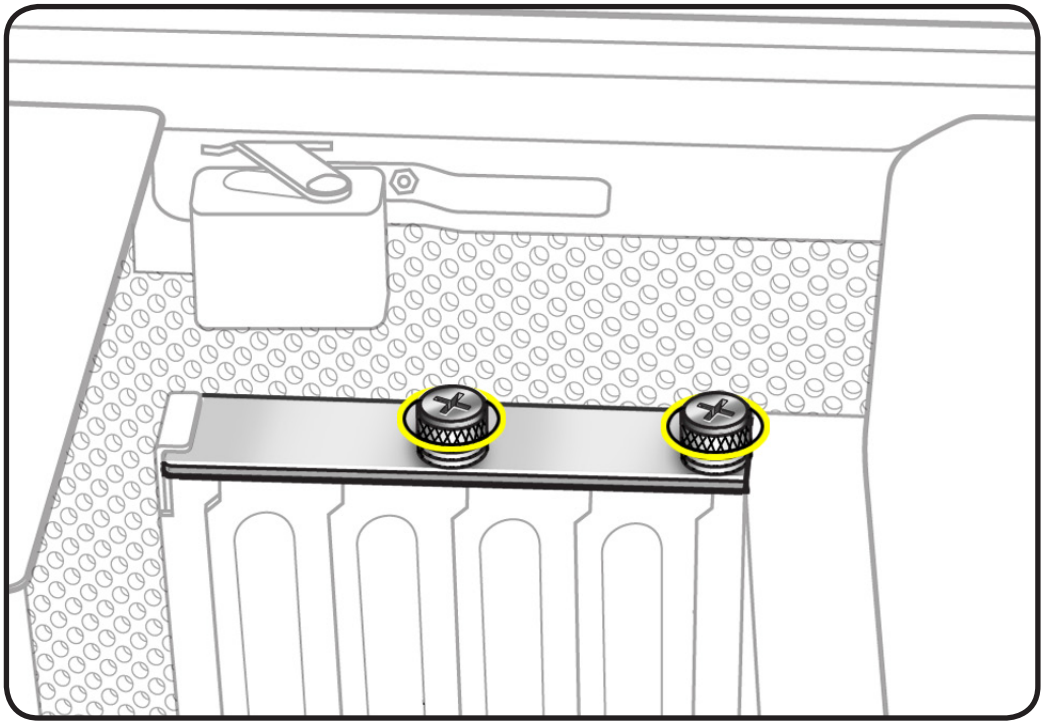
- ESD wrist strap
- Phillips #1 screwdriver



Removal

1 Using Phillips #1 screwdriver, loosen **2** captive screws securing card's bracket to enclosure.

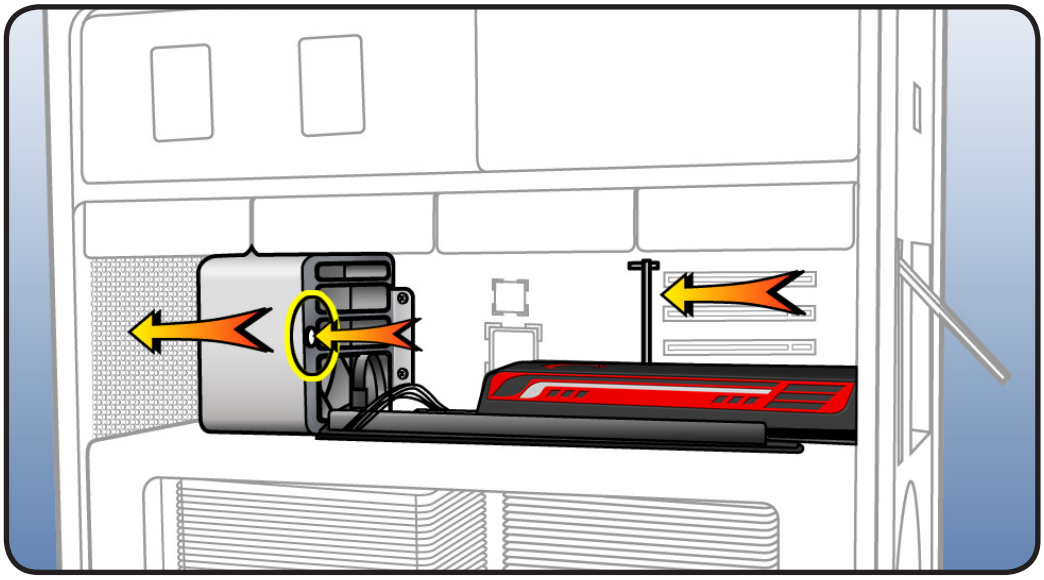
2 Remove bracket from enclosure.



Note: If card is held in place by retention bar, complete steps 4 and 5. Otherwise, release small locking clip at front of card's connector by pushing clip up. Then go to step 6.

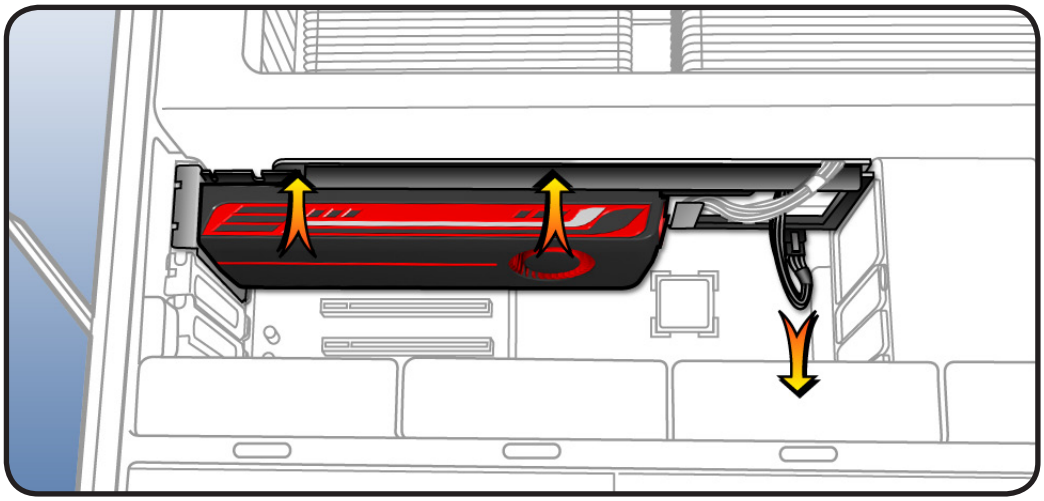
3 Press button on PCI slider.

4 Move slider to left, which releases the retention bar.



5 Disconnect card's power cable(s) from backplane board.

6 Holding card by top corners, pull it up out of slot and remove card from computer.



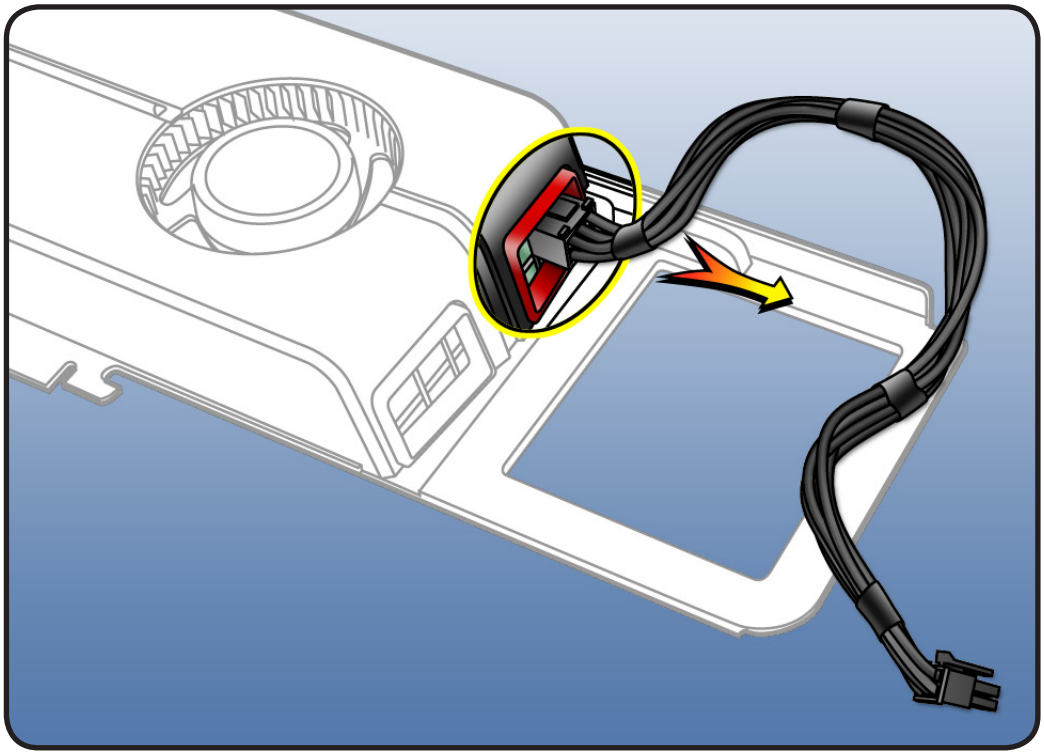
Checklist for handling card:

- When removing or installing card, handle it only by the edges. Do not touch its connectors or any components.
- Don't rock card from side to side; instead, lift card straight up from connector to remove it, and press card straight into slot to install it.
- Don't force card. If you meet a lot of resistance, pull card out. Check connector and slot for damage or obstructions, then try inserting card again.
- Pull card gently to see if it is properly connected. If it resists and stays in place and its gold connectors are barely visible, card is connected.

Reassembly

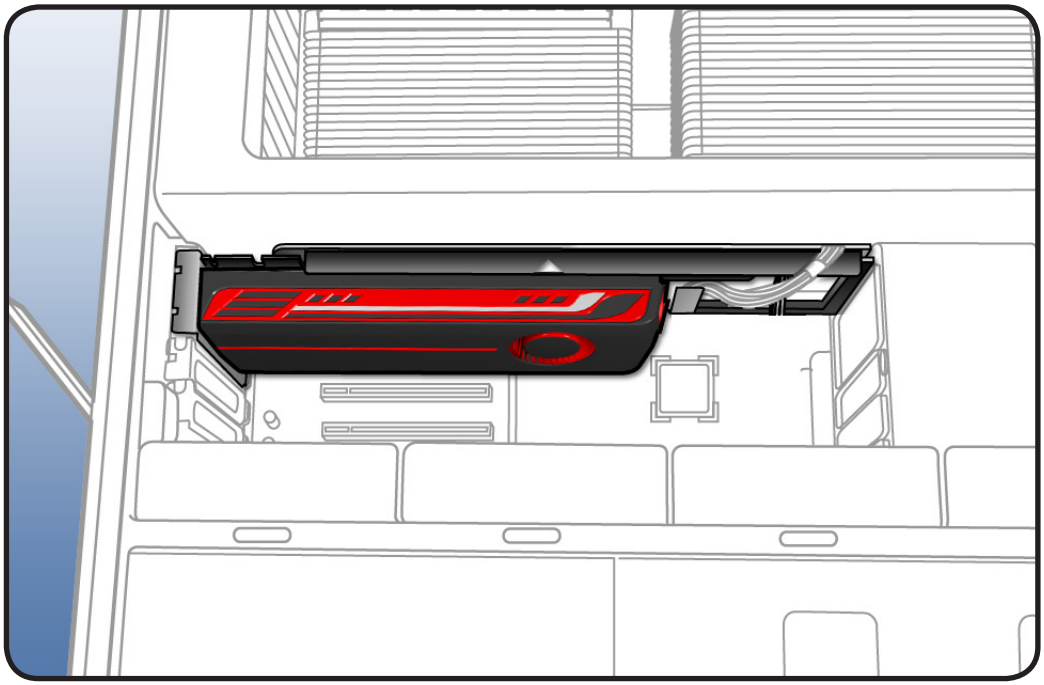
Note: You can install card in PCI slot 1, 2, or 3. Installed in slot 2, it blocks slot 3. Installed in slot 3, it blocks slot 4. Because of card's height, do not install it in slot 4.

1 Transfer original card's cable(s) to replacement card.



2 Holding card with both hands, position fence end of card inside enclosure just above PCI fence cage.

3 Rotate other end of card into correct slot of card guide.

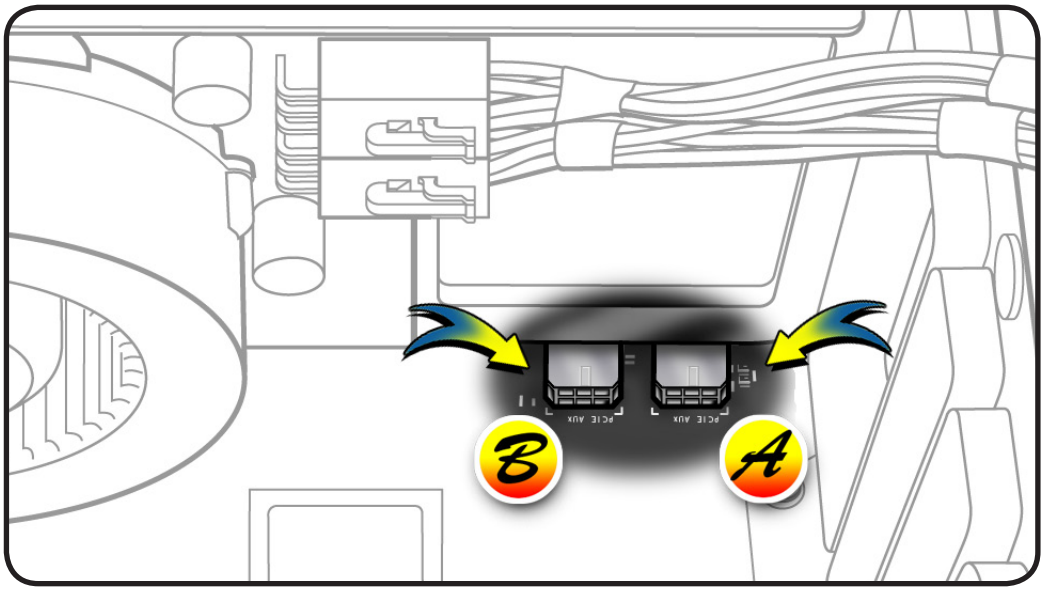


4 Connect card's power cable(s) to connectors on backplane board.

Card with 1 Cable: Connect cable for card in PCI slot 1 to connector A. Connect cable for card in slot 2 to connector B.

Card with 2 Cables: Connect both cables to the **2** power connectors.

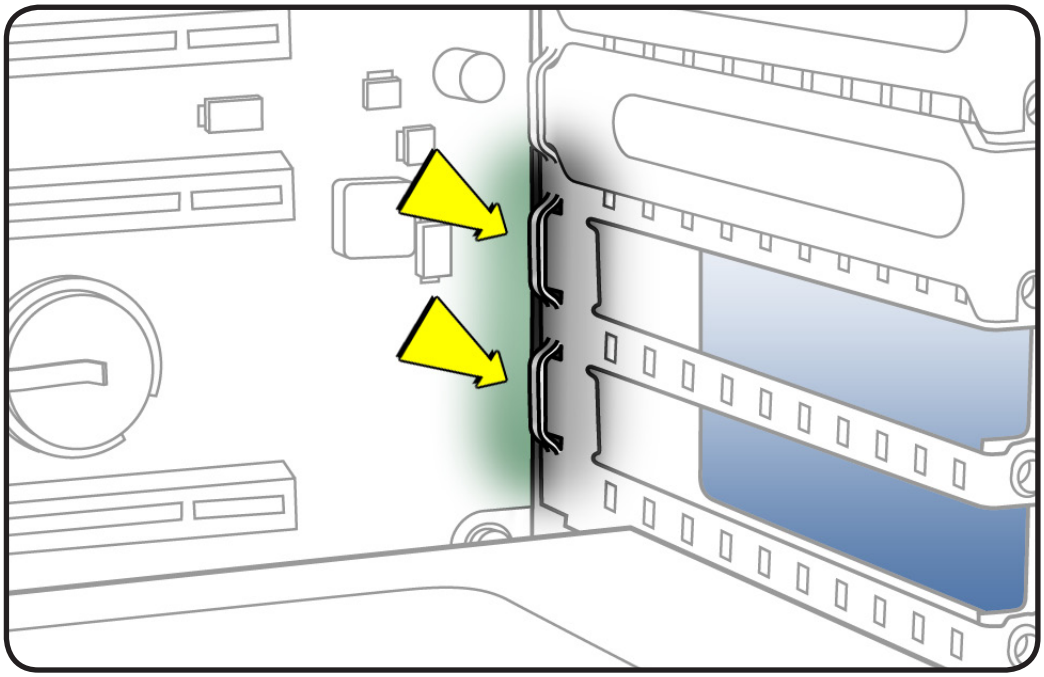
Note: If more than one card is installed, you may find it easier to connect the cable(s) to the backplane board before connecting them to the card.



5 With both hands, level card horizontally.

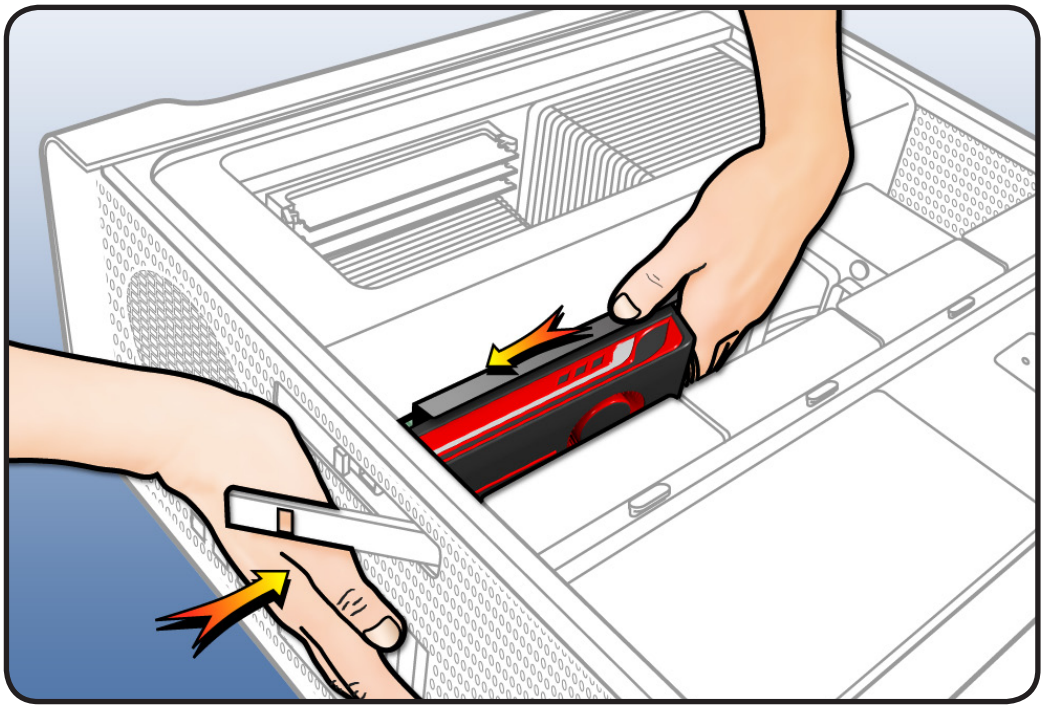
6 Guide card fence into enclosure's fence retainer(s) and gently rotate card toward slot.

7 Continue lowering card into slot. Use both hands to press down carefully with an even force until connector is inserted all the way into slot.

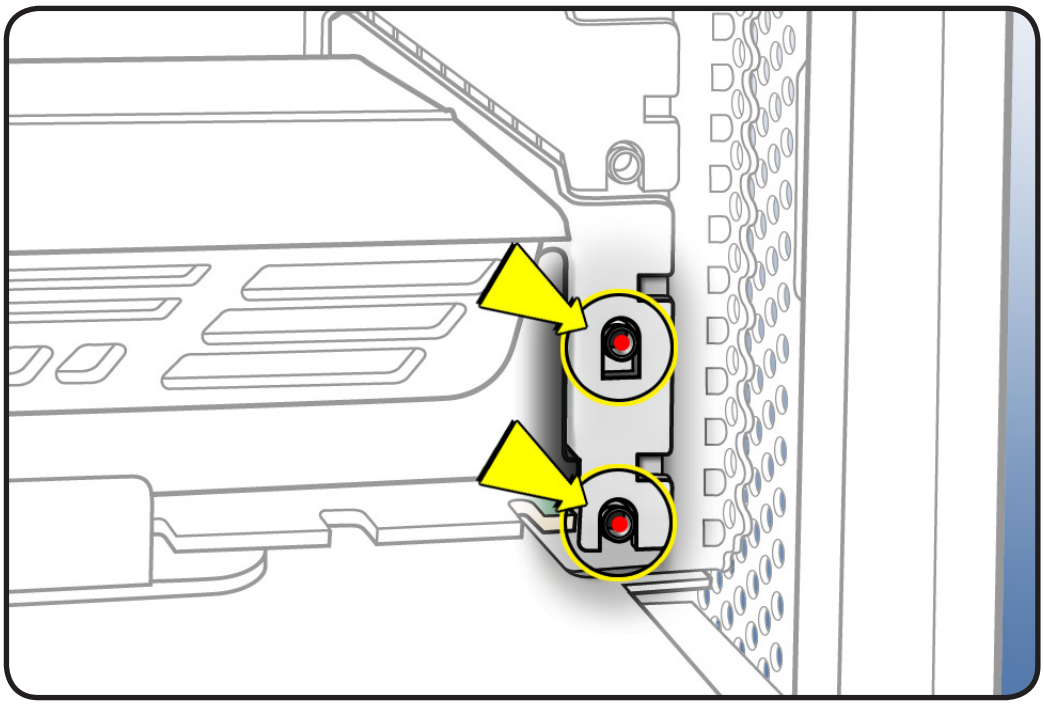


8 Place right hand outside enclosure opposite card.

9 Gently adjust card toward rear of enclosure while holding enclosure with an inward counter force.

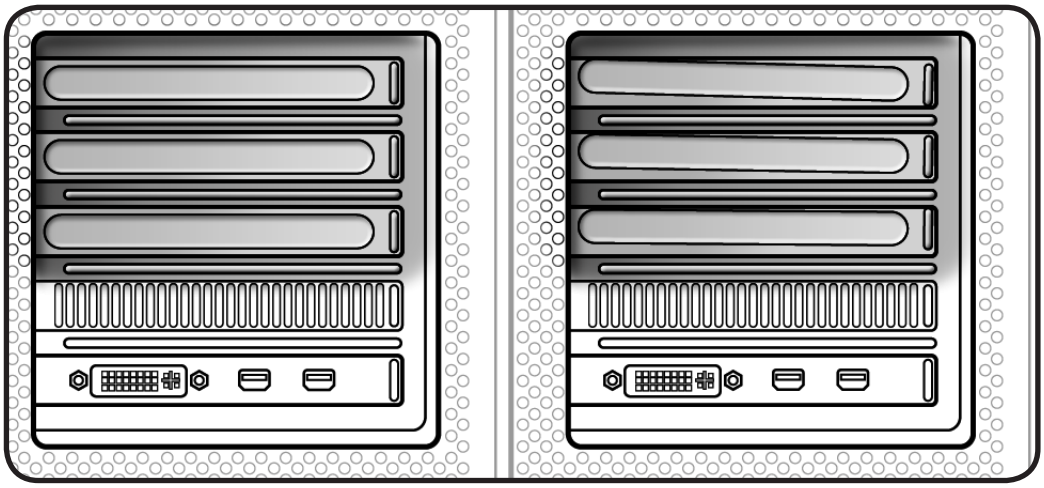


10 Make sure openings in card fence align with holes in top of PCI fence cage, as shown.

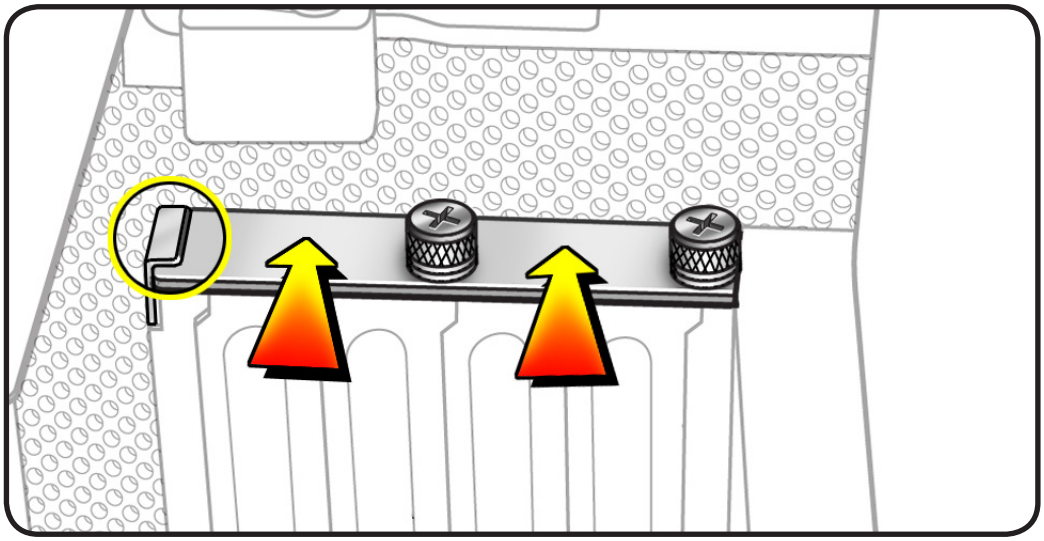


Important: The following step is critical for correct Bluetooth performance.

Correct Alignment: Covers are parallel **Incorrect Alignment: Covers are not parallel**



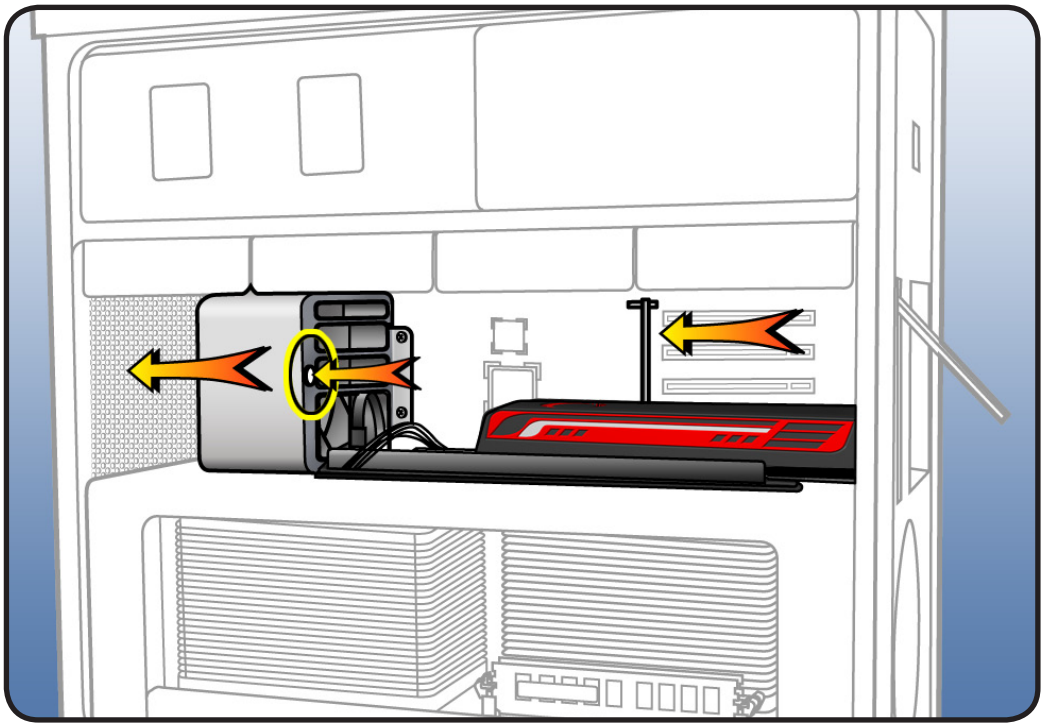
11 Verify that all PCI fence covers are properly seated as in step 10. Then view alignment of covers from rear of enclosure. If aligned correctly, all covers should be parallel and show even gaps from slot to slot. If gaps are uneven, re-adjust fence covers.



12 Replace PCI bracket and tighten screws.

Note: Slide bracket under circled tab before securing screws.

13 Slide PCIe fan to the right to lock card in place.

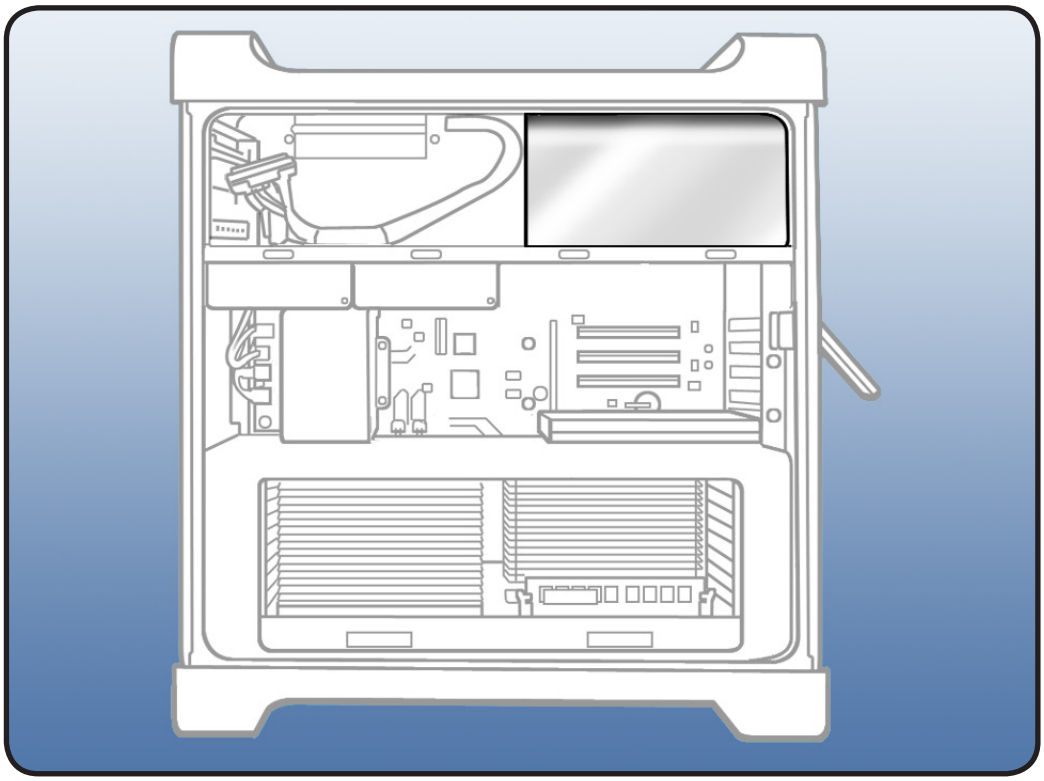


Power Supply

First Steps

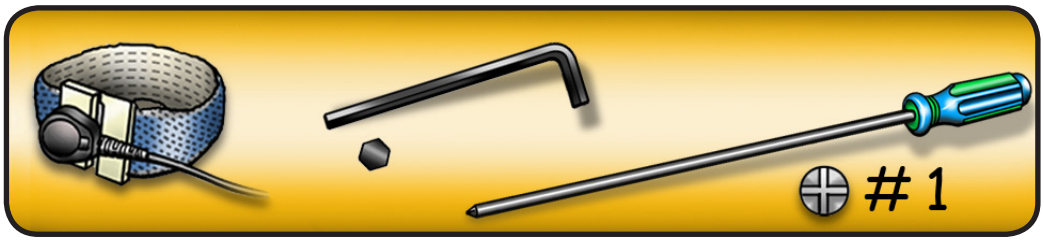
Open computer, lay it down with access side facing up, and remove:

- Hard drives and hard drive carriers in drive bays 3 and 4
- Optical drive carrier and optical drives
- Any PCI Express cards blocking access to power supply mounting screws



Tools

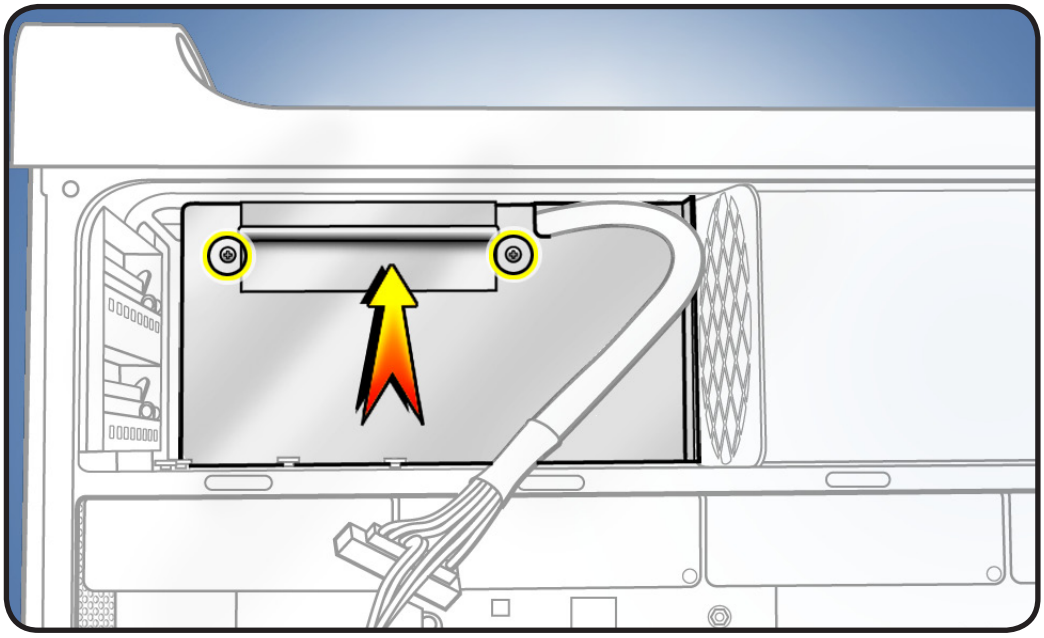
- ESD wrist strap
- RIght-angle, magnetized 2.5 mm hex driver
- Long-handled, magnetized Phillips #1 screwdriver



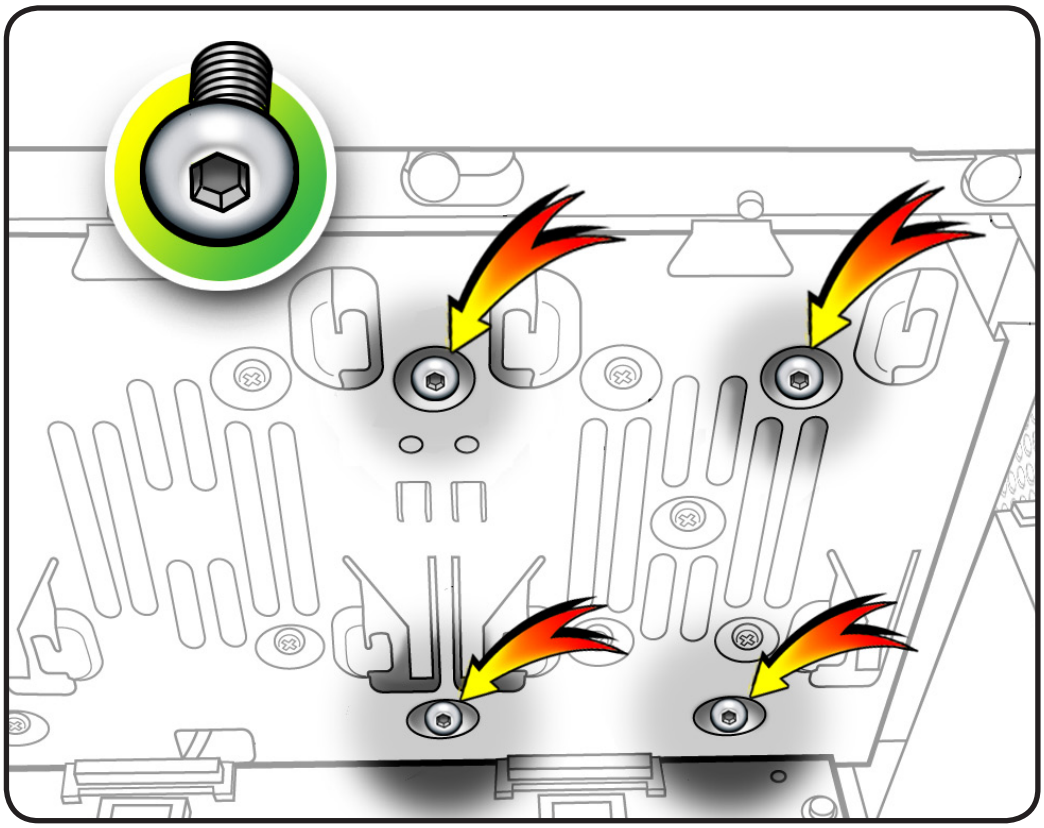
Removal

1 Remove **2** Phillips screws on power supply cable cover.

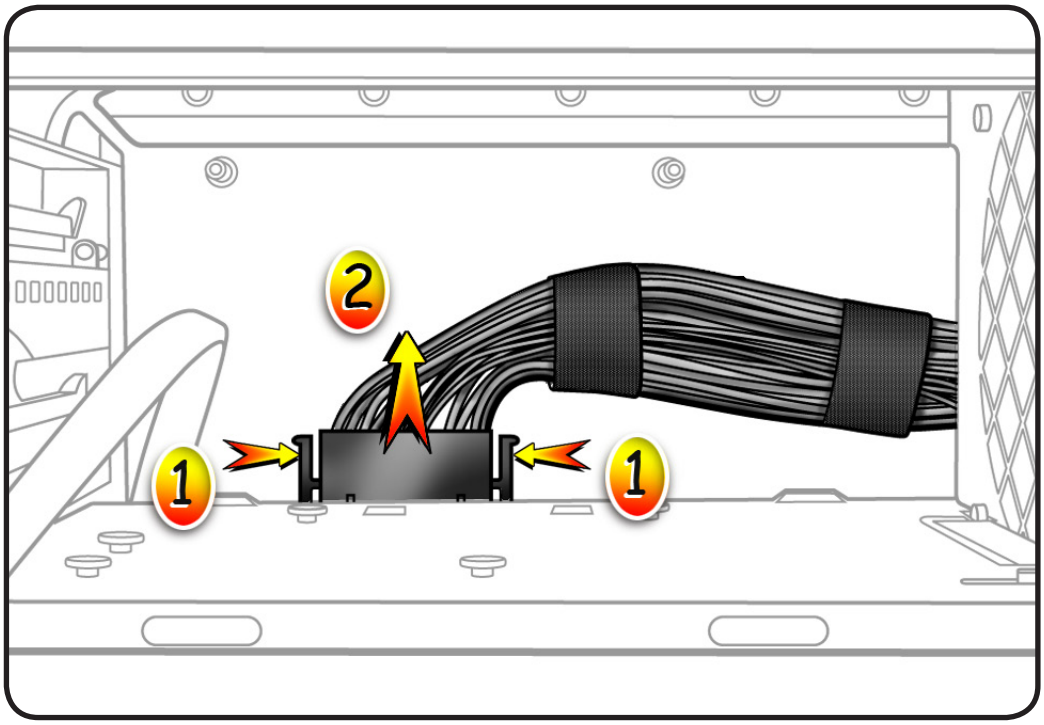
2 Remove cover from computer.



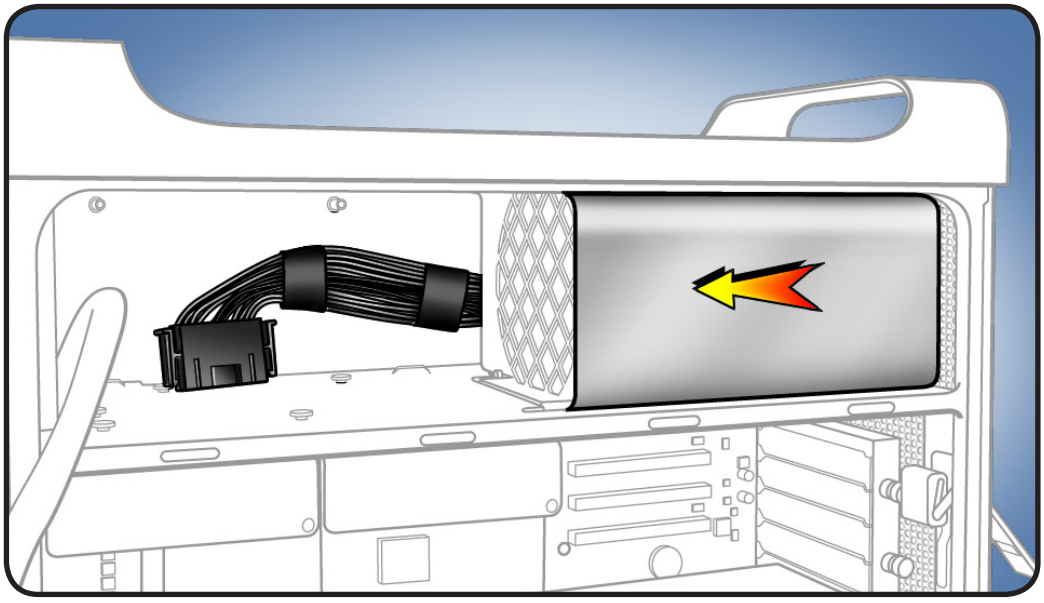
3 Remove **4** hex screws from underside of media shelf



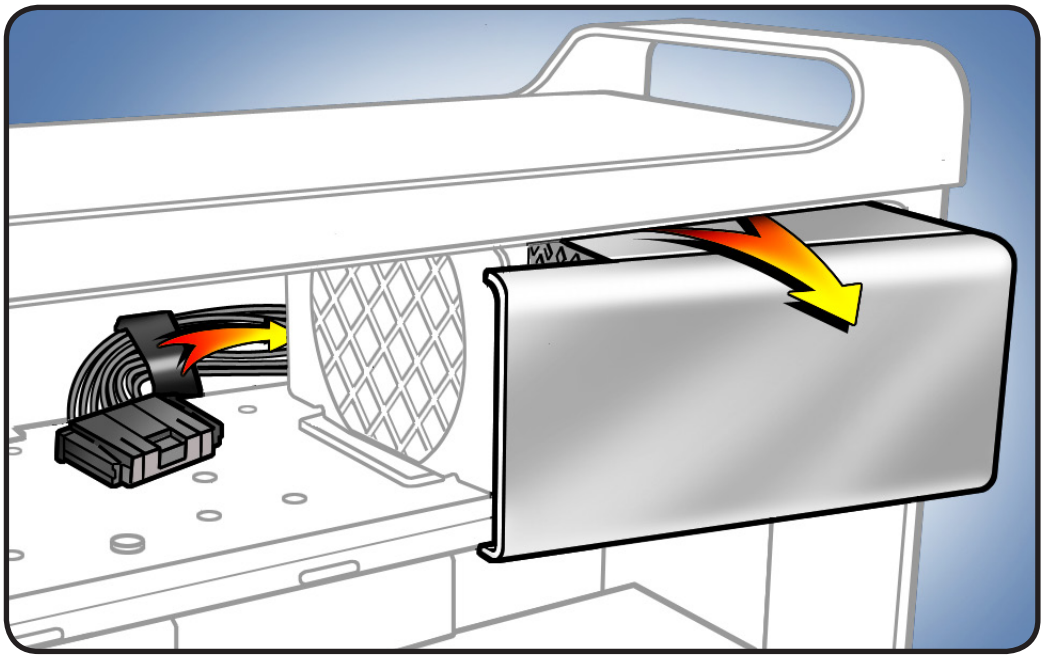
4 Disconnect power supply cable.



5 Slide power supply to left.



6 Remove power supply and cable from enclosure, routing cable as shown.



Reassembly Note: When placing power supply back into enclosure, slide it toward back of computer as far as possible. Power receptacle must align with opening in enclosure's back panel and **4** screw holes in power supply must align with screw holes in media shelf.

AirPort Extreme Card

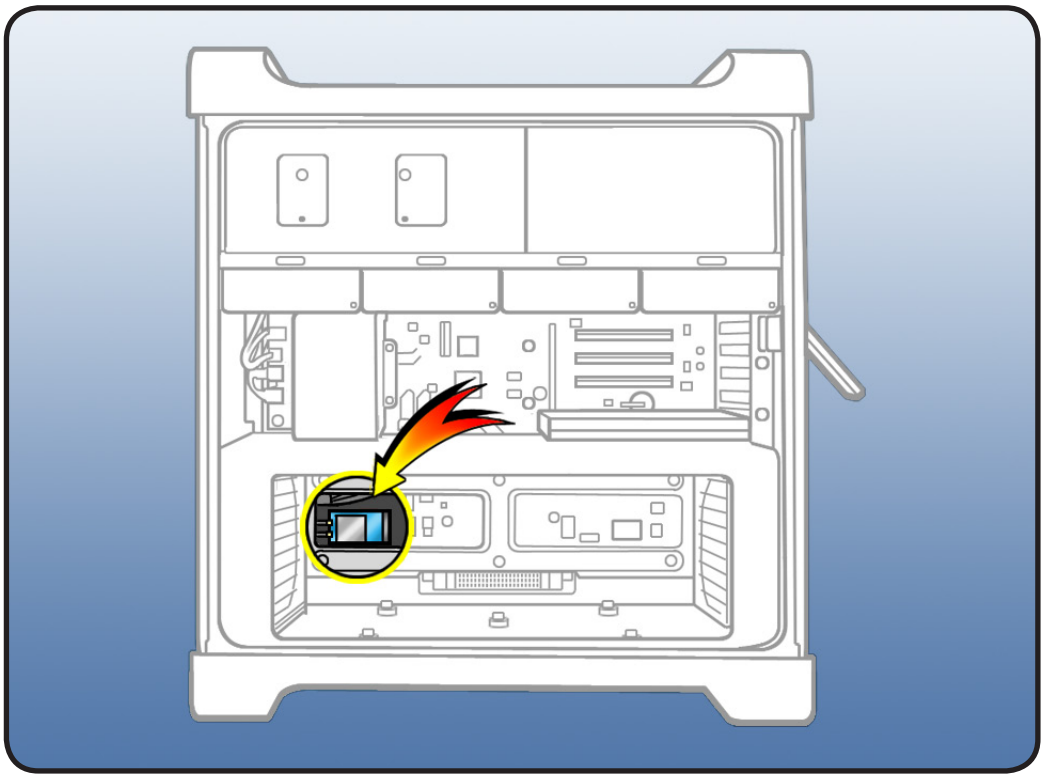
First Steps

Open computer, lay it down with access side facing up, and remove:

- Processor tray

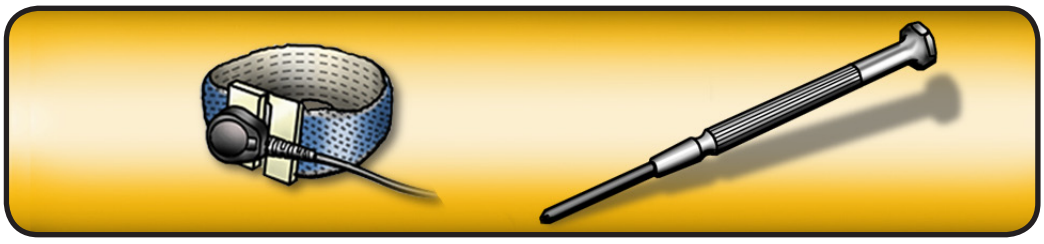
Important: Enclosure includes **3** AirPort antenna wires and **1** Bluetooth antenna wire. Wires look similar, except Bluetooth wire includes "BT" label. For proper operation, do not connect Bluetooth antenna wire to AirPort card or any AirPort wire to Bluetooth card.

Note: Connect AirPort antenna wires labeled #1 and #3 to AirPort card. (You may connect either of these wires to either AirPort connector.) The third wire, #2, is not used for this AirPort card.

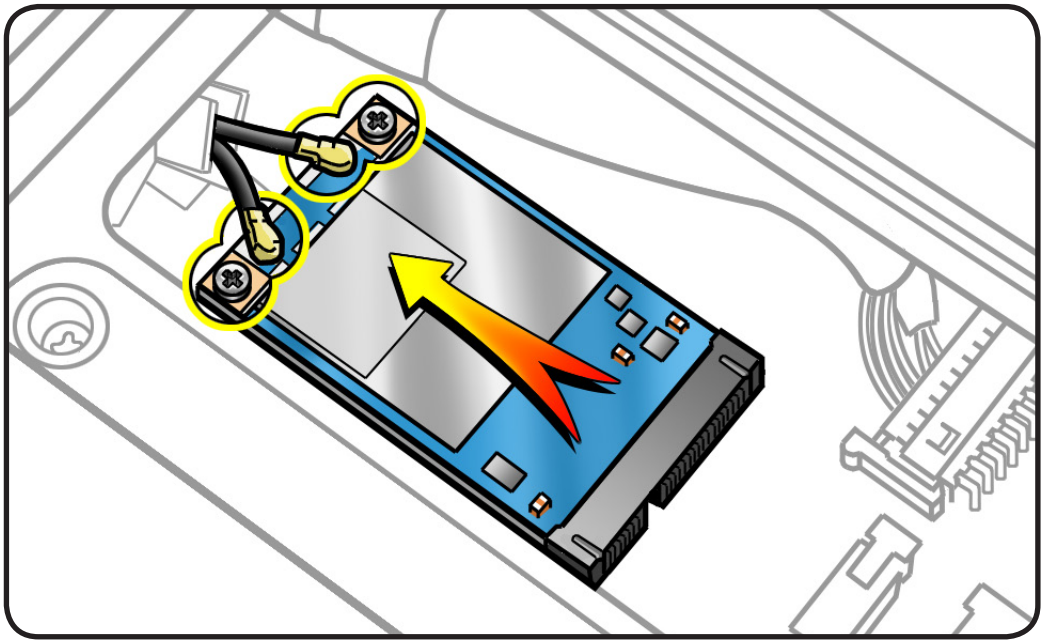


Tools

- ESD wrist strap
- Jeweler's Phillips #1 screwdriver



Removal



1 Disconnect **2** antenna wires.

2 Remove **2** screws.

3 Slide card out of connector and remove card from computer.

Note: If you are not replacing AirPort card, cover connectors on AirPort antenna wires with Kapton or other non-conductive tape to prevent wires from shorting out components on processor board or backplane board.

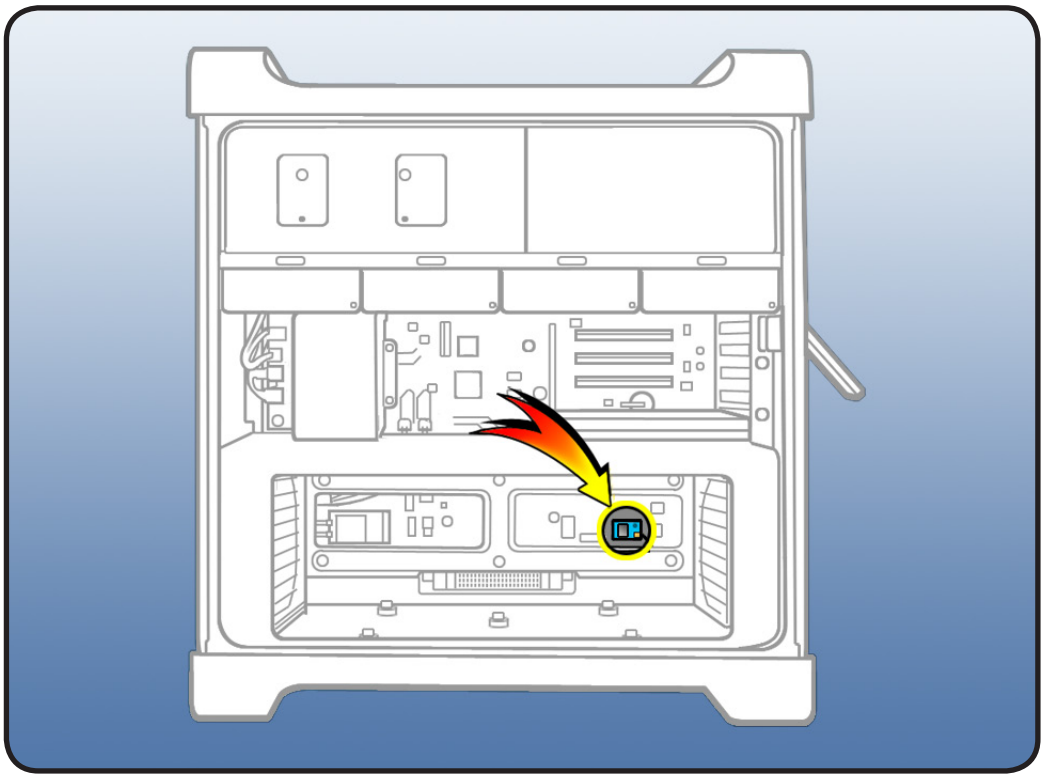
Bluetooth Card

First Steps

Open computer, lay it down with access side facing up, and remove:

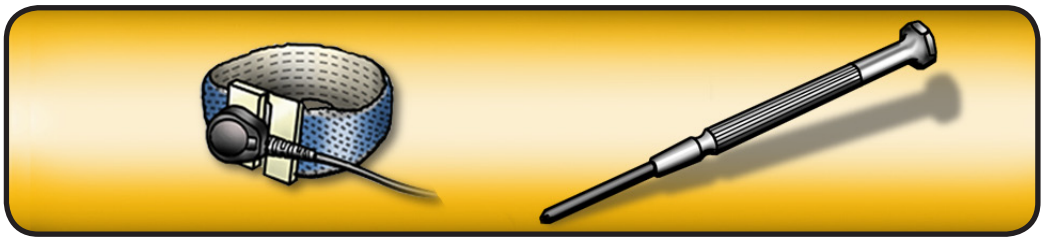
- Processor tray

Important: Enclosure includes **3** AirPort antenna wires and **1** Bluetooth antenna wire. Wires look similar, except Bluetooth wire includes "BT" label. For proper operation, do not connect Bluetooth antenna wire to AirPort card or any AirPort wire to Bluetooth card.



Tools

- ESD wrist strap
- Jeweler's Phillips #0 screwdriver



Removal

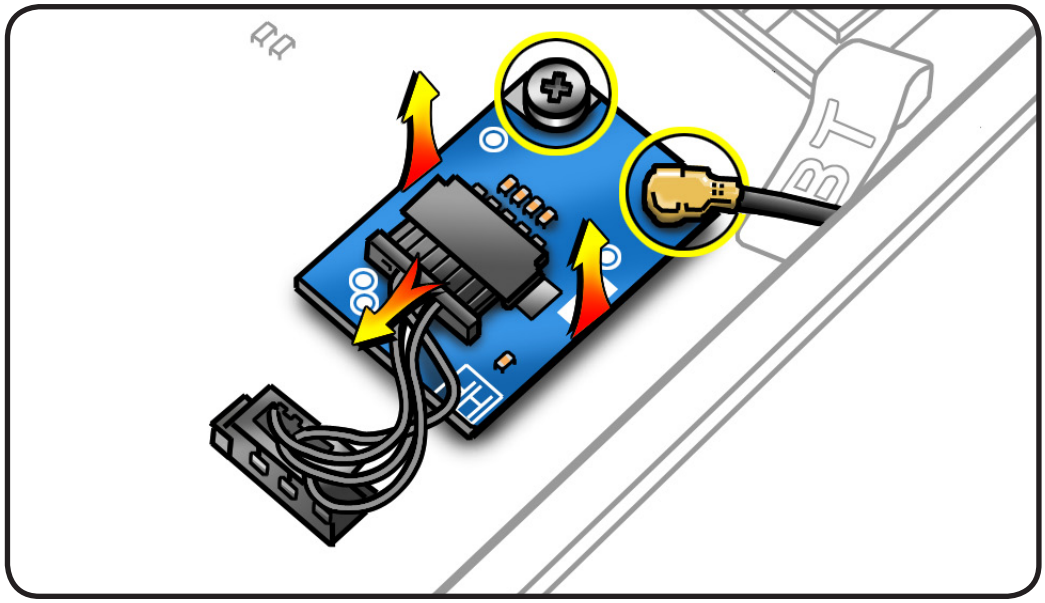
1 Disconnect Bluetooth cable from card.

2 Disconnect antenna wire from card.

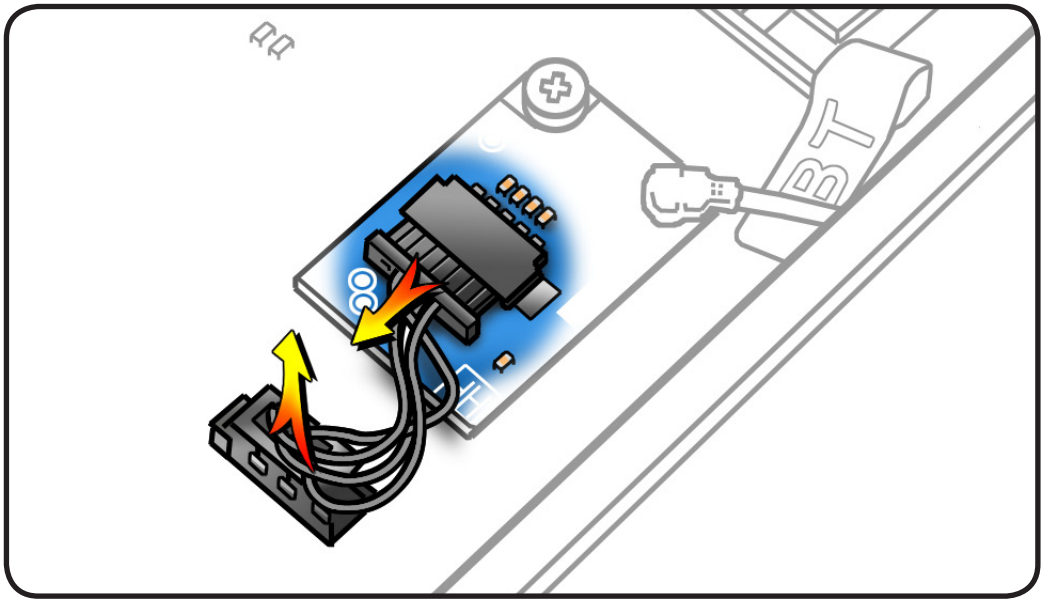
3 Remove screw.

4 Lift card out of computer.

Note: You may need to lift firmly. Card is connected by adhesive foam pad below it. Adhesive and pad may be reused if you reinstall the card.



5 If you are replacing Bluetooth-to-backplane-board cable, disconnect cable from backplane and remove from computer.



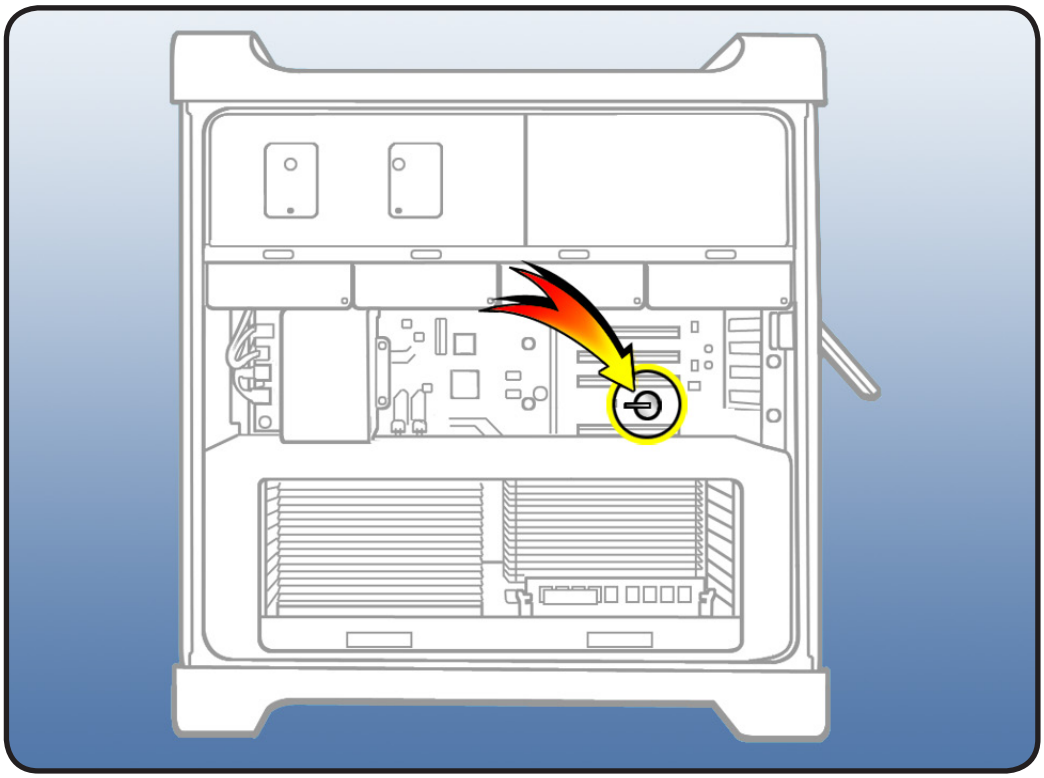
Important: If you are not replacing Bluetooth card, cover connector on Bluetooth antenna wire with Kapton or other non-conductive tape to prevent wire from shorting out components on processor board or backplane board.

Battery

First Steps

Open computer, lay it down with access side facing up, and remove:

- Any PCIe cards blocking access to battery



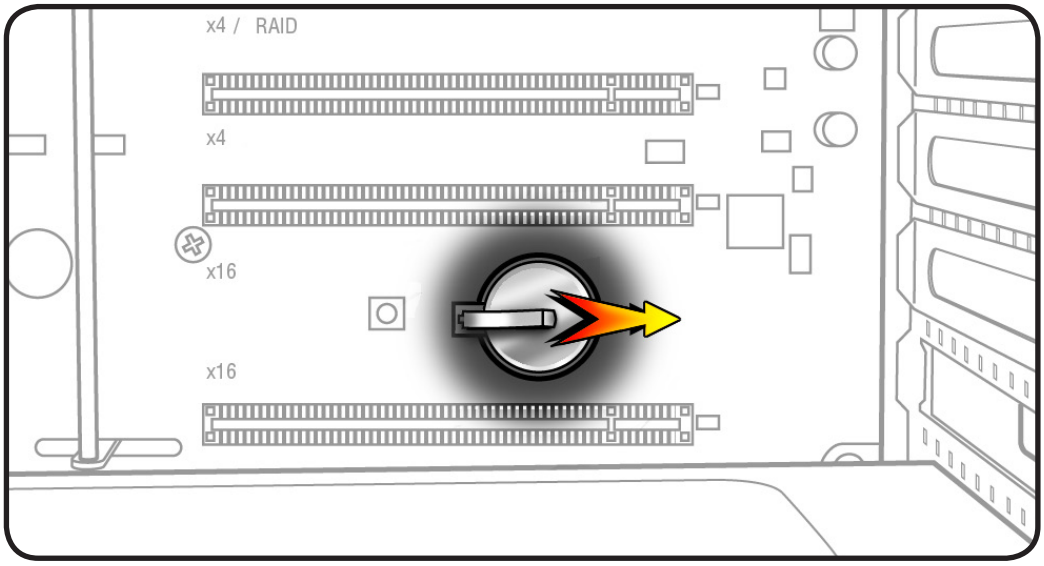
Tools

- ESD wrist strap

Removal

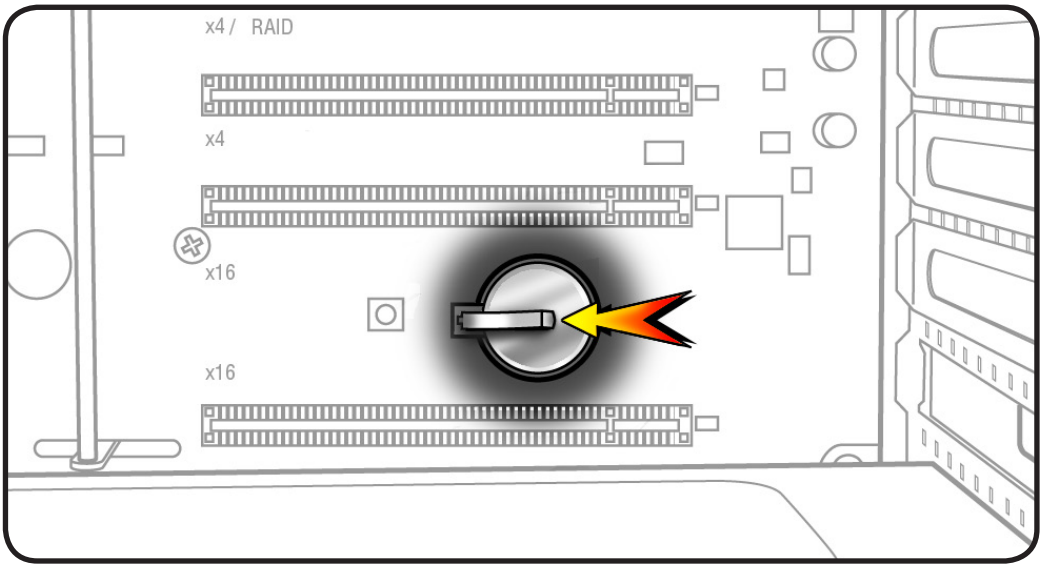
1 Slide battery out from underneath battery holder's metal clip.

2 Remove battery from holder.



Reassembly

Insert new battery into holder, making sure battery's positive symbol (+) faces up.



Warning: Installing the battery incorrectly may cause an explosion. Be sure battery's positive and negative sides are correctly oriented in holder. Use only the same type of battery or equivalent recommended by manufacturer of original battery.

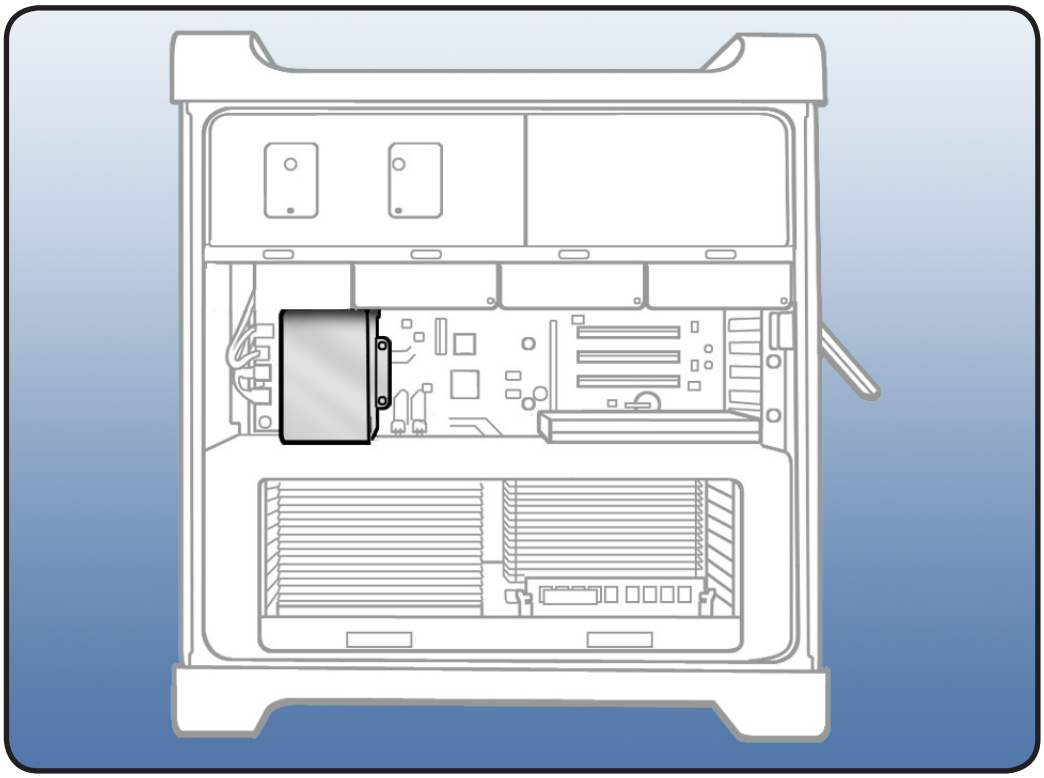
Important: Batteries contain chemicals, some of which may be harmful to the environment. Please dispose of used batteries according to your local environmental laws and guidelines.

PCIe Fan

First Steps

Open computer, lay it down with access side facing up, and remove:

- Hard drive and drive carrier in drive bay 1



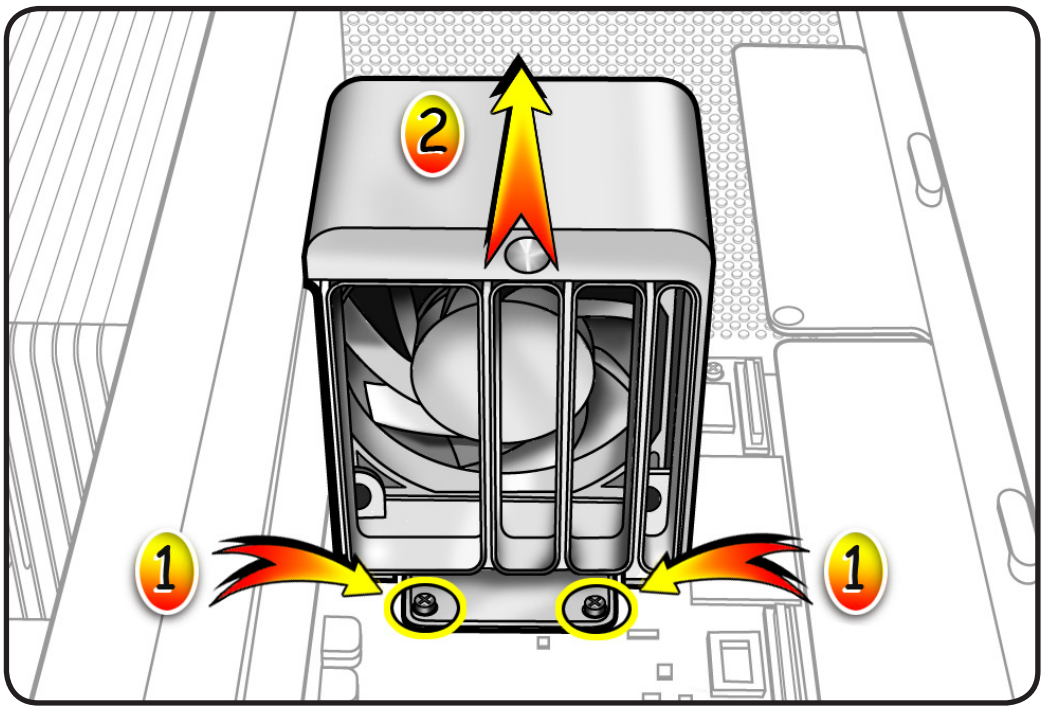
Tools

- ESD wrist strap
- Phillips #2 screwdriver

Removal

1 Remove **2** screws.

2 Slide fan up and out of computer.

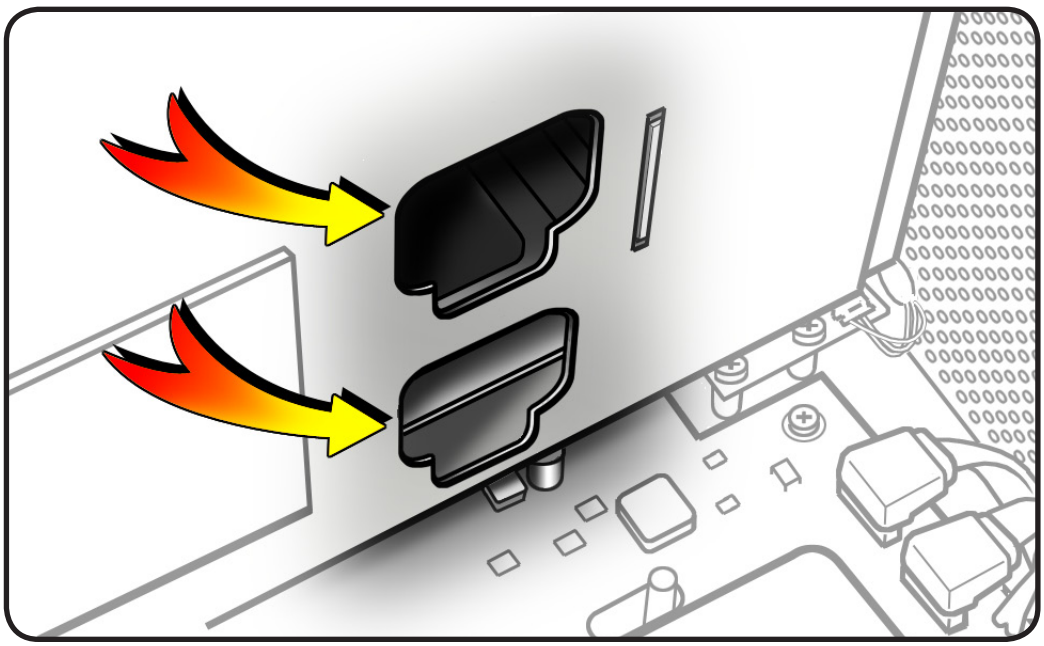


Reassembly

1 Slide fan into enclosure so that fan tabs engage with slots on processor cage.

2 Press down until fan clicks into place in backplane board connector.

3 Replace **2** screws.

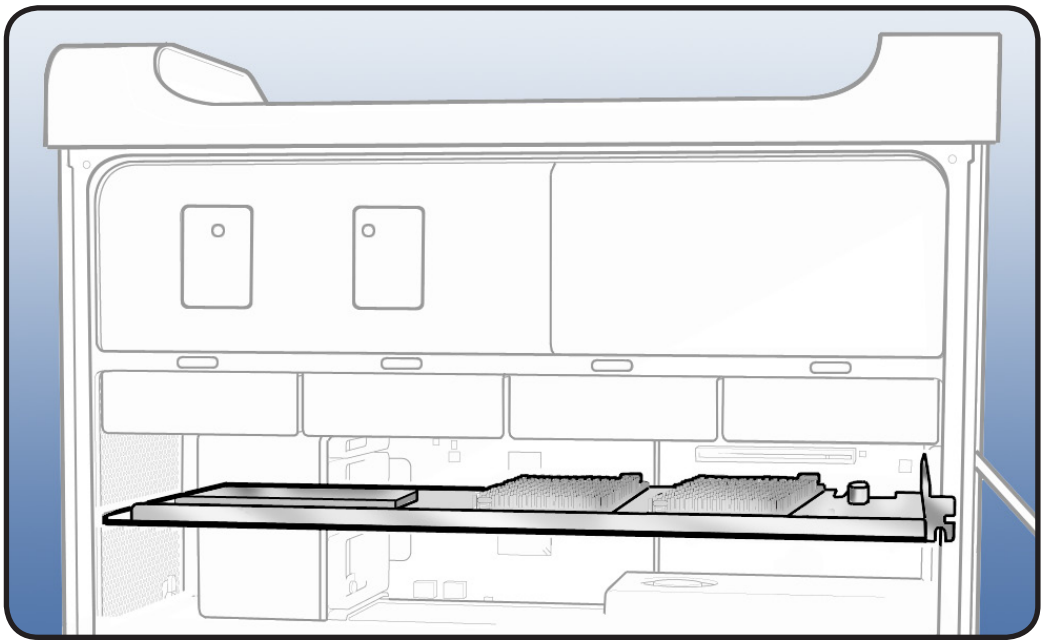


Mac Pro RAID Card and Battery

First Steps

Open computer, lay it down with access side facing up, and remove:

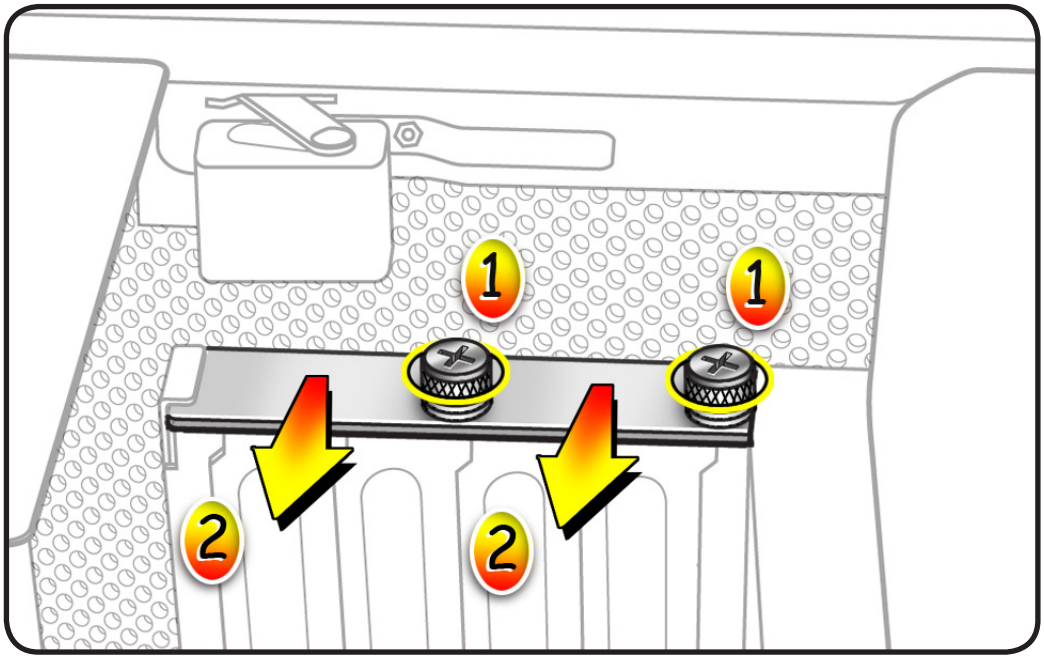
- All hard drives and hard drive carriers
- Any 12-inch PCI Express cards



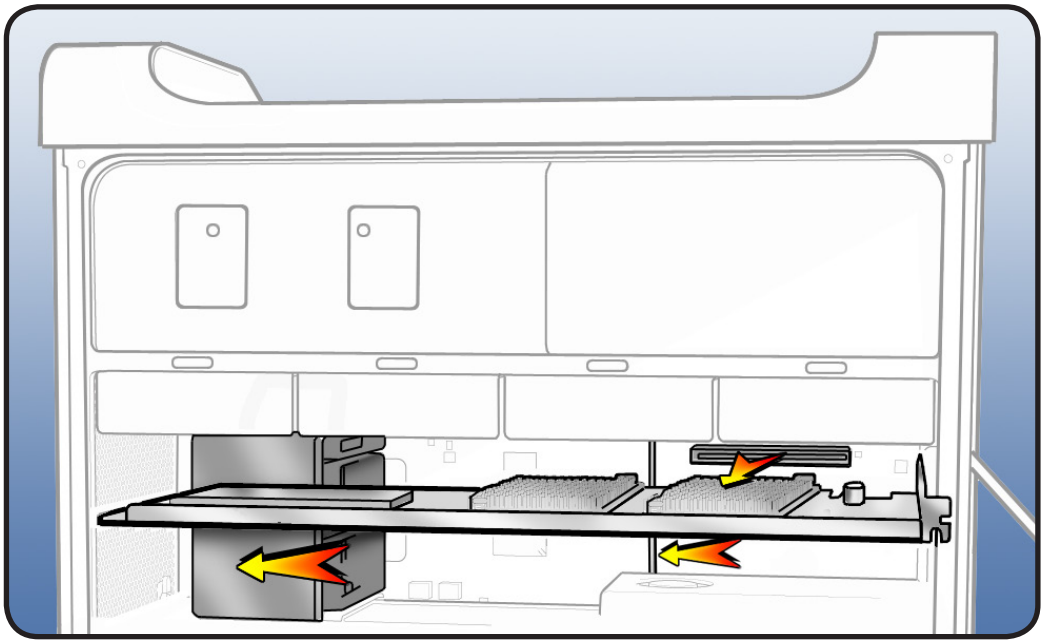
Tools

- ESD wrist strap
- Phillips #1 screwdriver

Removal



1 If you have not already done so, loosen **2** captive screws securing PCI bracket to enclosure and remove bracket from computer.



2 Press button on PCI slider.

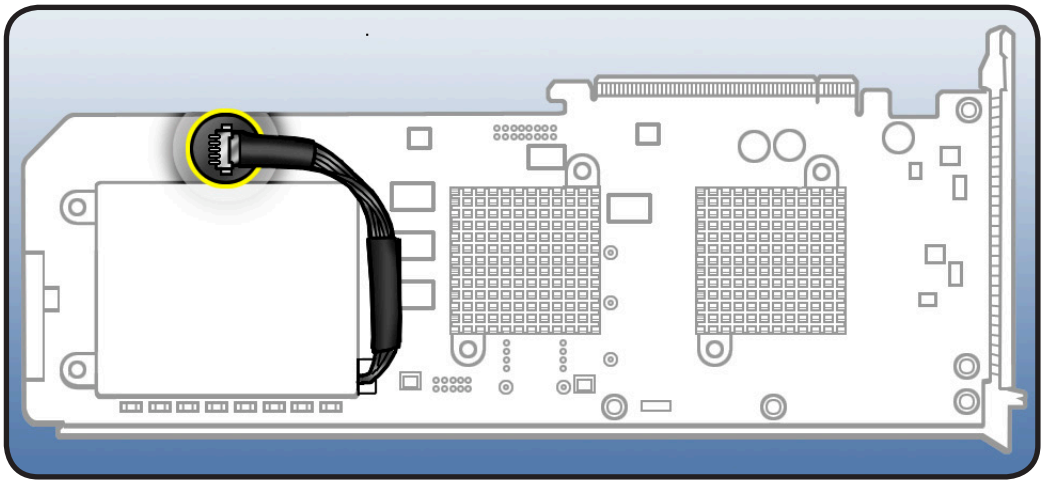
3 Move slider to left, which releases card's retention bar.

4 Holding card by top corners, gently pull up and remove card from computer.

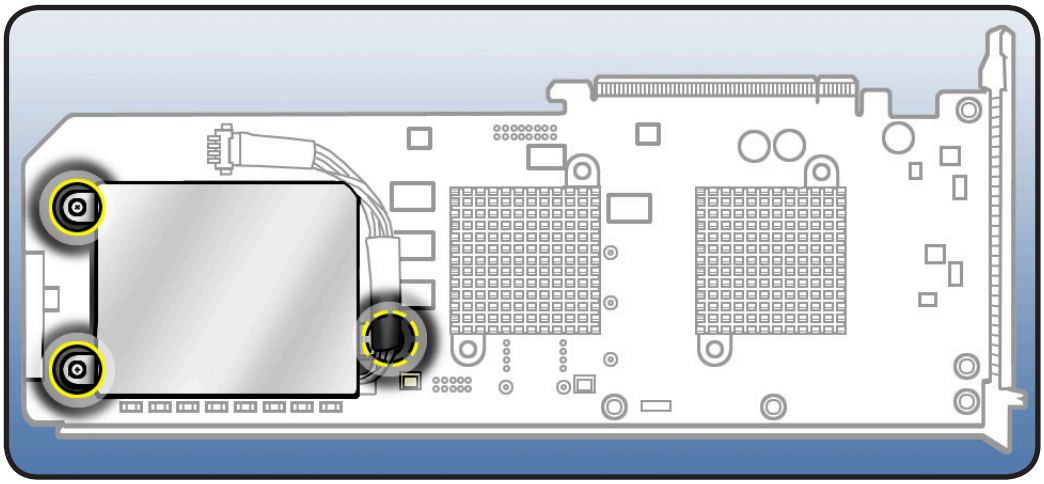
Note: When removing or installing card, handle it only by the edges. Do not touch its connectors or any components. Lift card straight out from connector to remove it, and insert it straight into connector to install it.

5 If replacing card's battery:

- Disconnect battery cable from card.



- Remove **3** screws and lift battery from card.



Reassembly

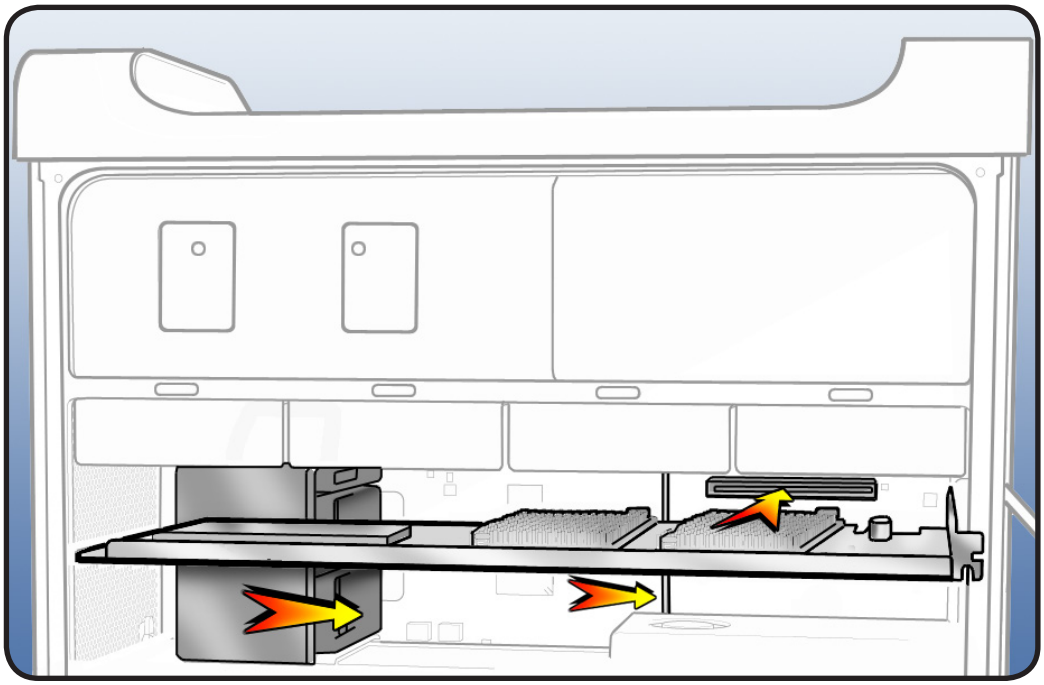
Note: Mac Pro RAID Card must always be installed in PCI slot 4.

1 If installing a new RAID card, transfer battery from original card to new card and connect battery cable to card.

2 Align card's connector with PCI slot 4 and press until connector is inserted all the way into slot. Make sure card also engages in slot 4 of PCI card guide.

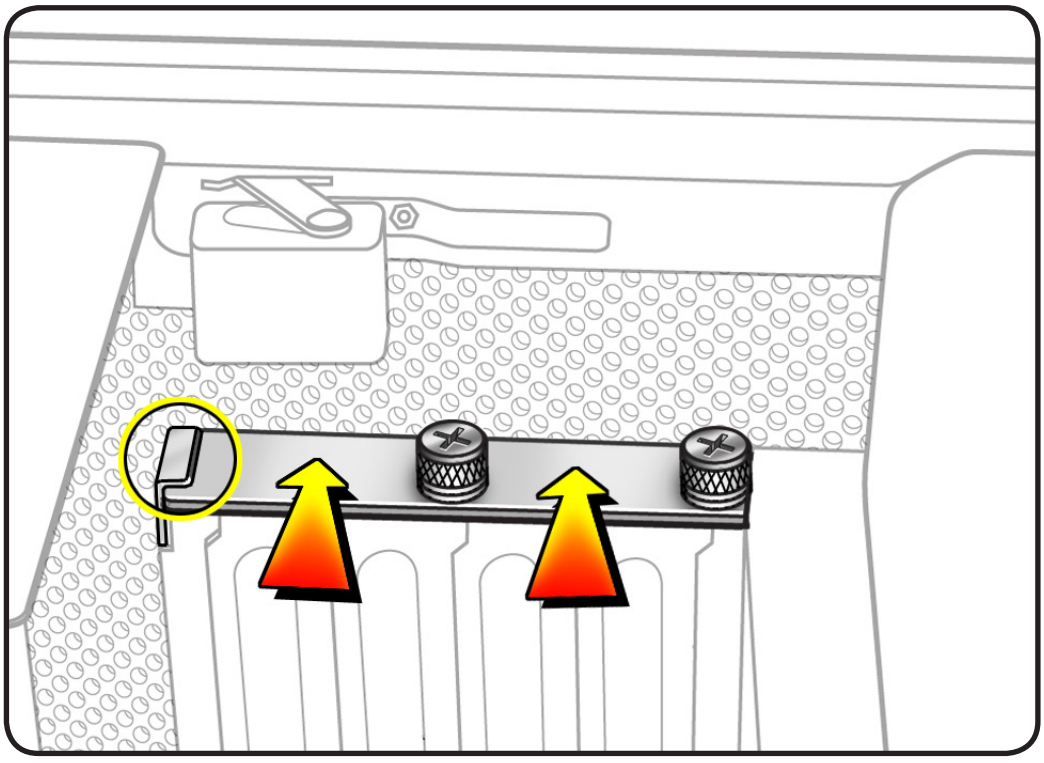
3 Press button on PCI slider.

4 Move slider to right to secure card.



5 Replace PCI bracket and tighten captive screws.

Note: System Profiler does not display the serial number for the Mac Pro RAID Card. You can find the serial number by checking the serial number sticker on the back of the card.

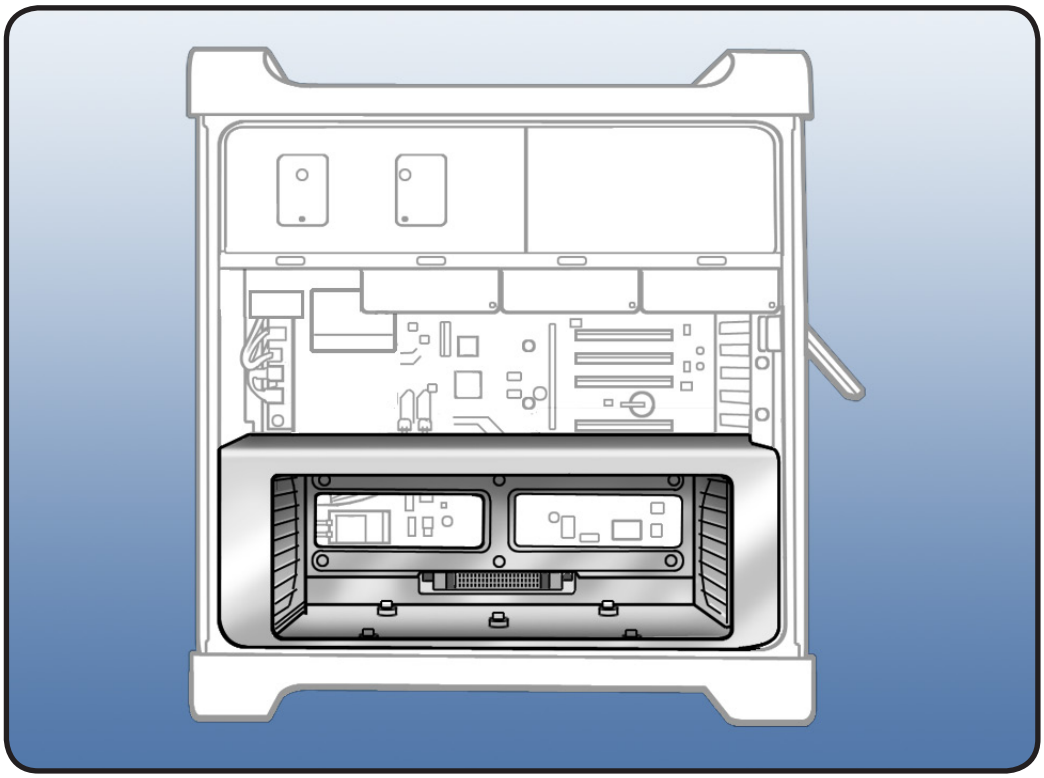


Processor Cage

First Steps

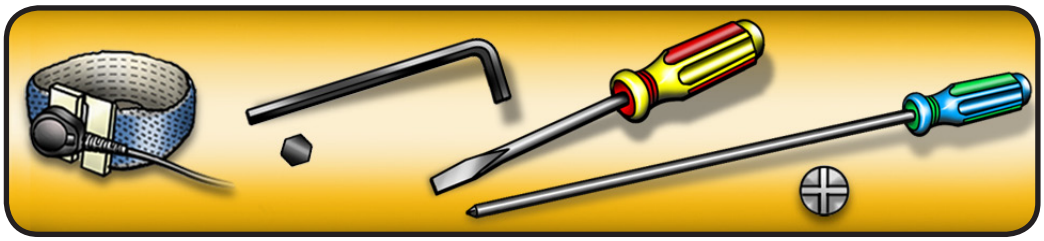
Open computer, lay it down with access side facing up, and remove:

- Hard drive and drive carrier in drive bay 1
- Graphics card in slot 1
- PCIe fan
- Processor tray



Tools

- ESD wrist strap
- RIght-angle, magnetized 2.5 mm hex driver
- Flatblade screwdriver
- Long-handled, magnetized Phillips #1 screwdriver

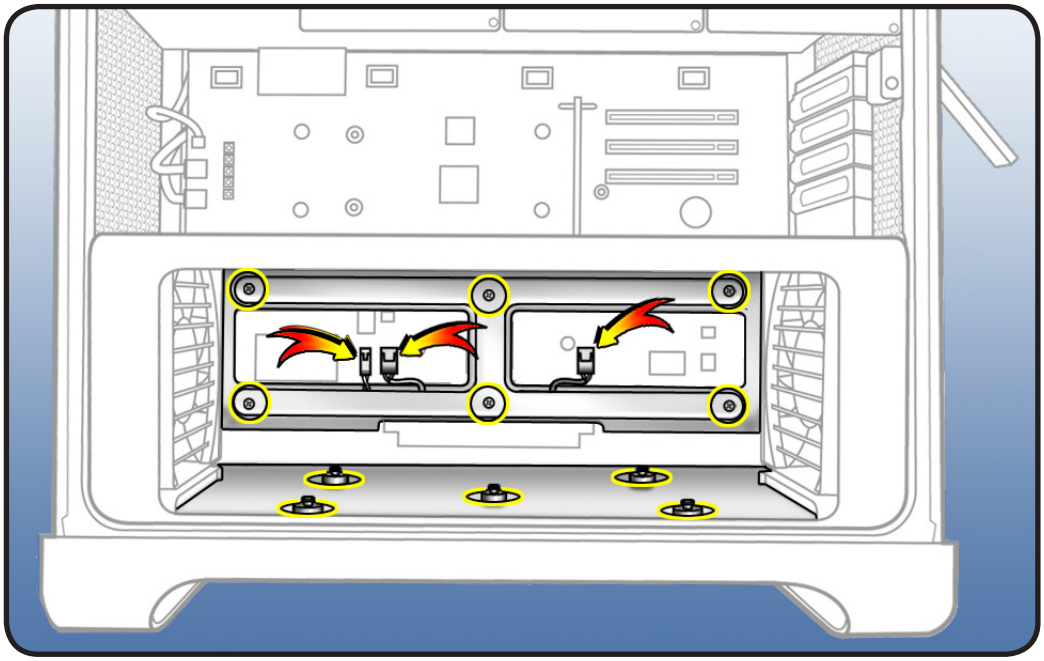


Removal

1 Disconnect **3** cables from logic board.

2 Using long-handled Phillips #1 screwdriver, loosen **6** captive screws.

3 Rotate computer to stand vertically. Using 2.5 mm hex driver, remove **5** mushroom-head screws.

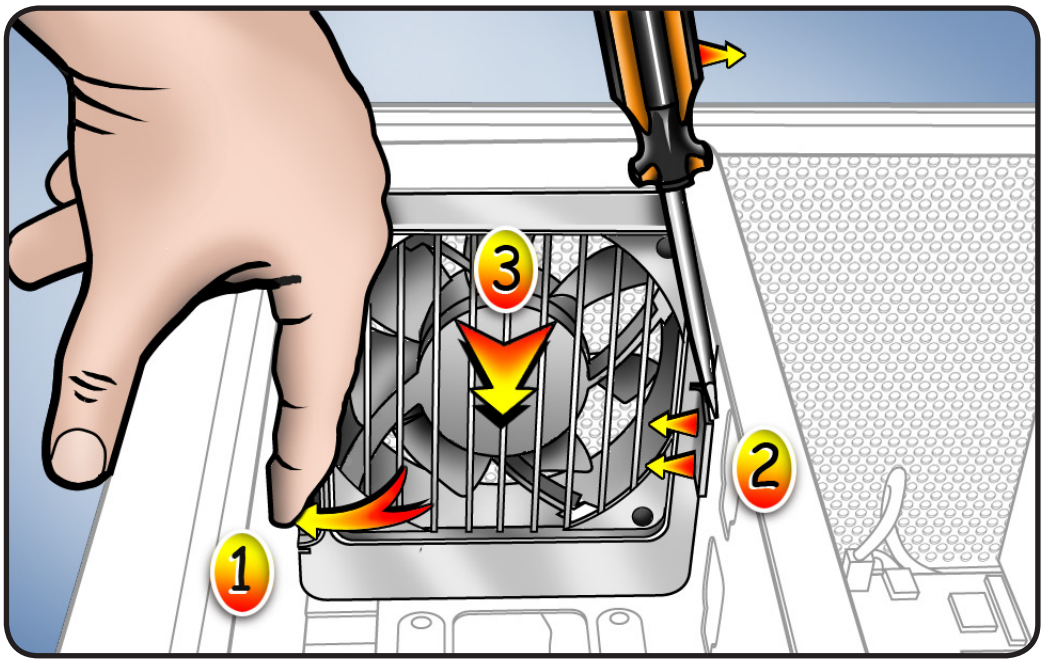


Note: Processor cage includes two fans, one at each end of cage. Before removing cage from enclosure, you must release 2 latches on each fan and push fans partway into cage.

4 To release **2** latches holding front fan to cage, press down on bottom of cage while using flatblade screwdriver to release latch from top of cage.

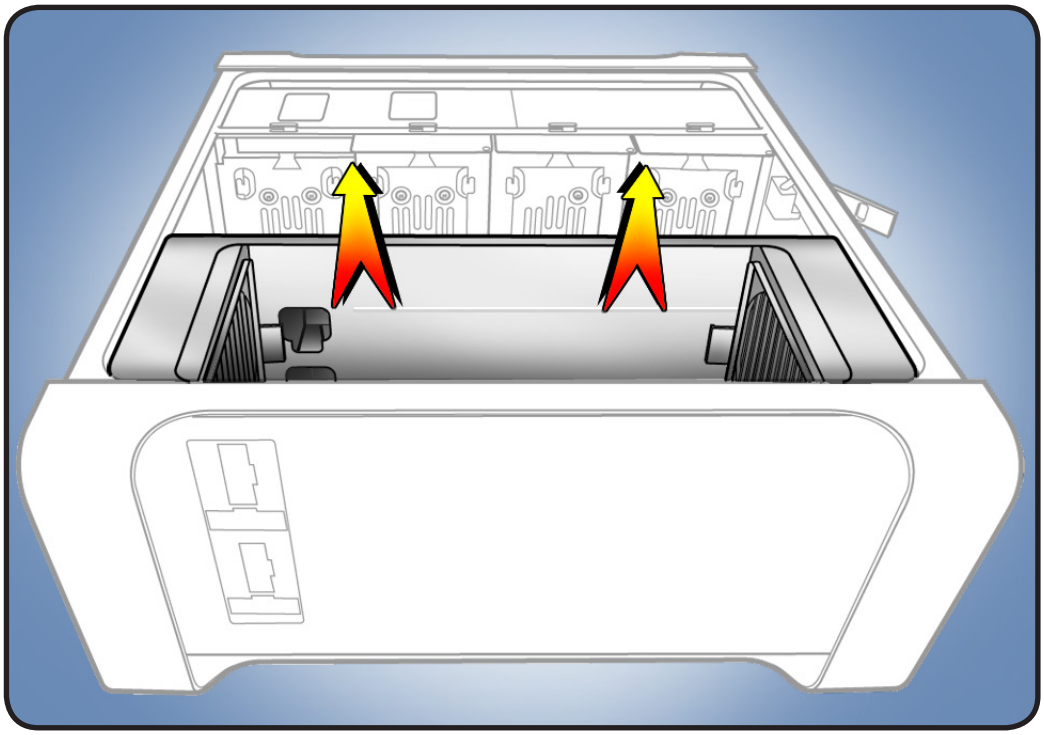
5 Slide fan partway into cage, so that fan clears enclosure.

6 Repeat steps 4 and 5 for rear fan.

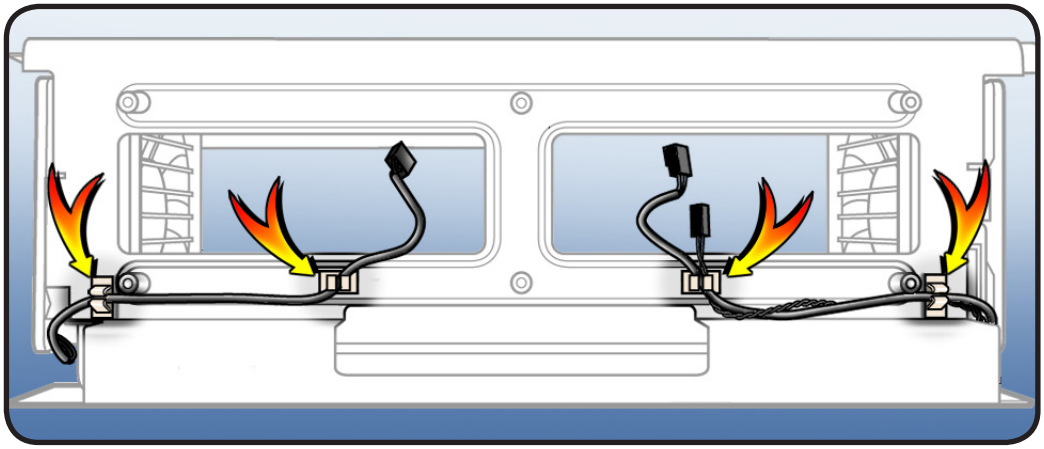


7 Lift cage out of enclosure.

Important: Before you re-install cage in enclosure, fans must be inserted partway into cage.



Note: The clips on the bottom of the processor cage are replaceable. New clips are available as a set of four; order part number 922-8963.

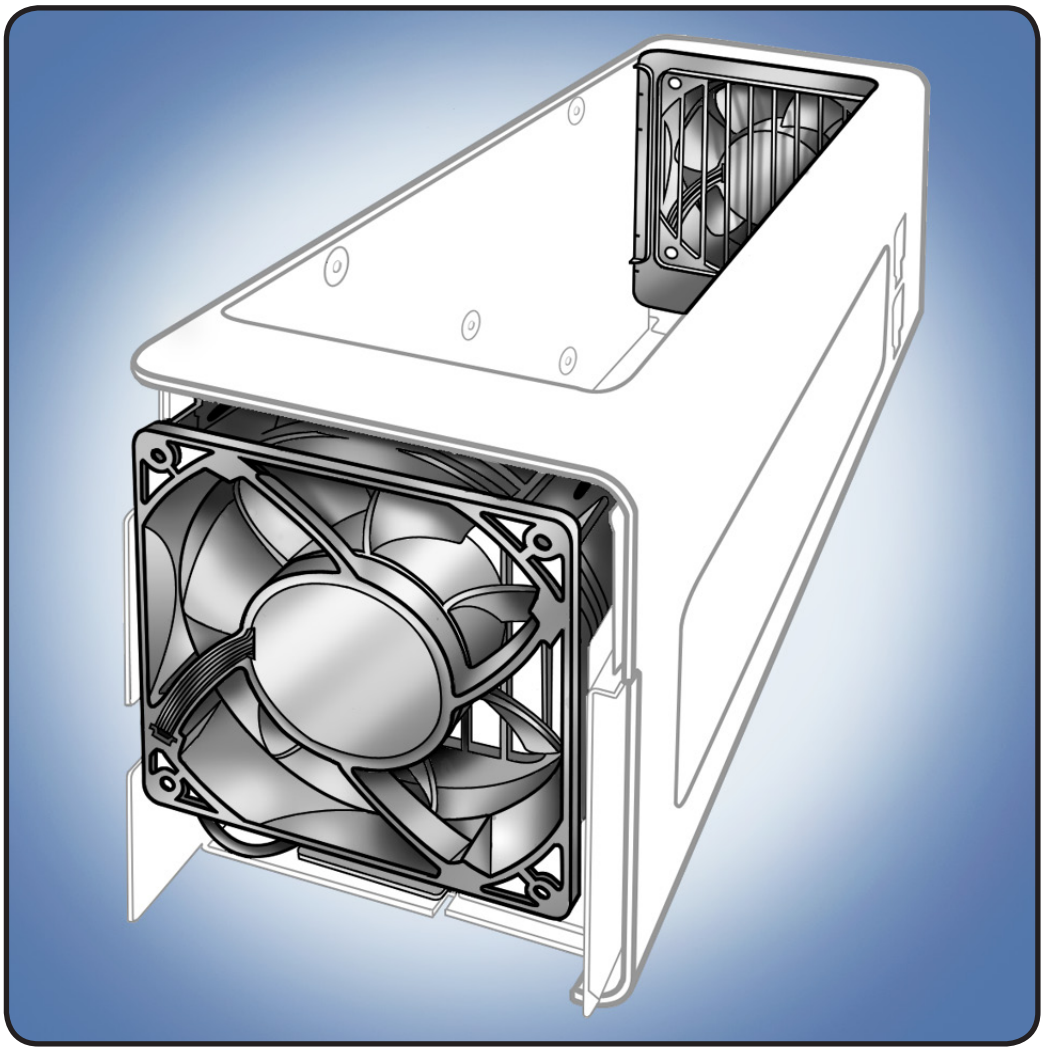


Processor Cage Fans, Front and Rear

First Steps

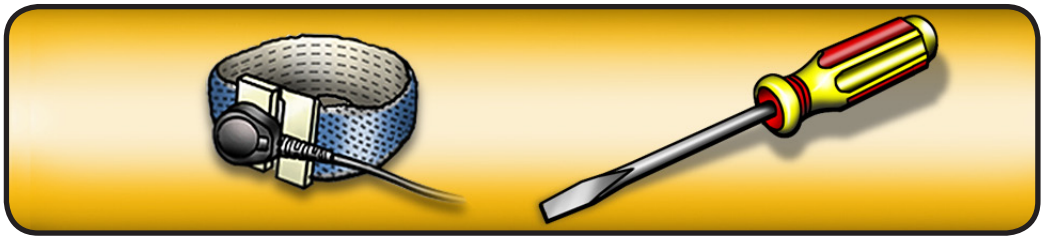
Open computer, lay it down with access side facing up, and remove:

- Hard drive and drive carrier in drive bay 1
- Graphics card in slot 1
- PCIe fan
- Processor tray
- Processor cage



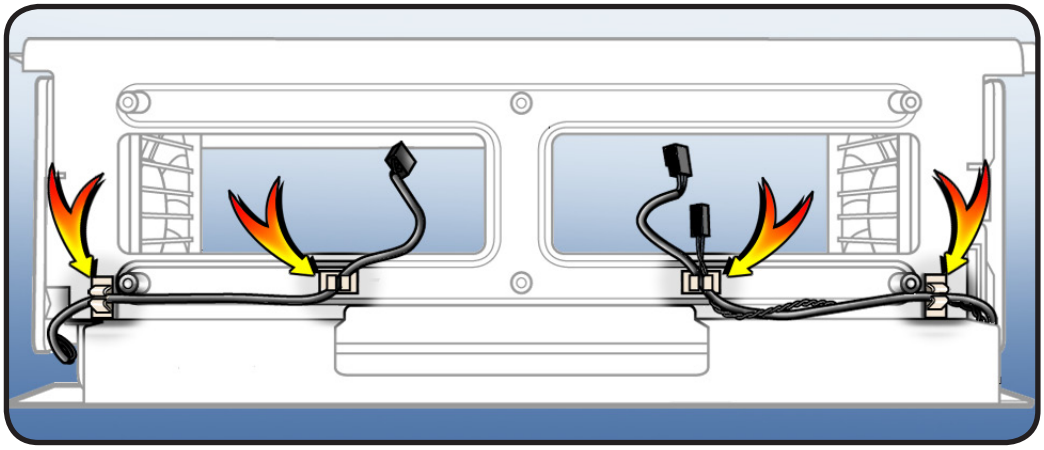
Tools

- ESD wrist strap
- Flatblade screwdriver



Removal

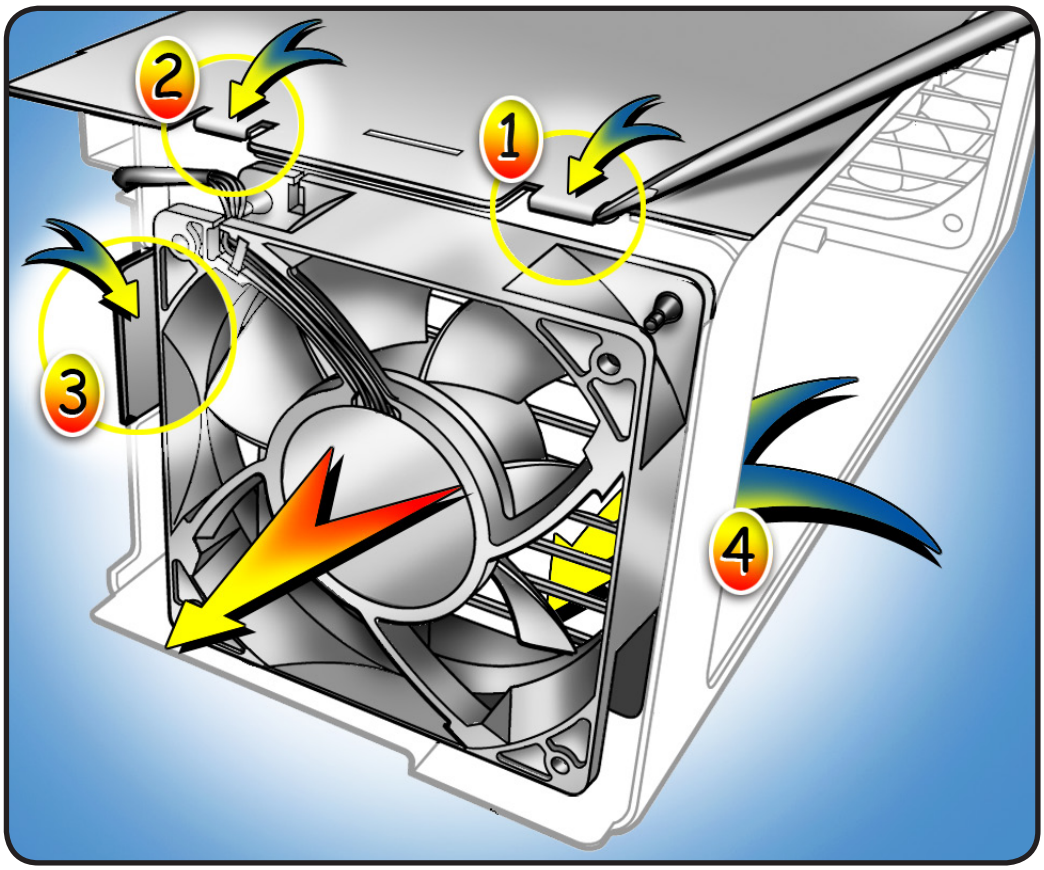
1 Release fan cables from clips on bottom of processor cage.



2 Release **4** latches on front fan and slide fan out of cage.

Note: Latch #4 is on inside of cage.

3 Repeat step 2 for rear fan.



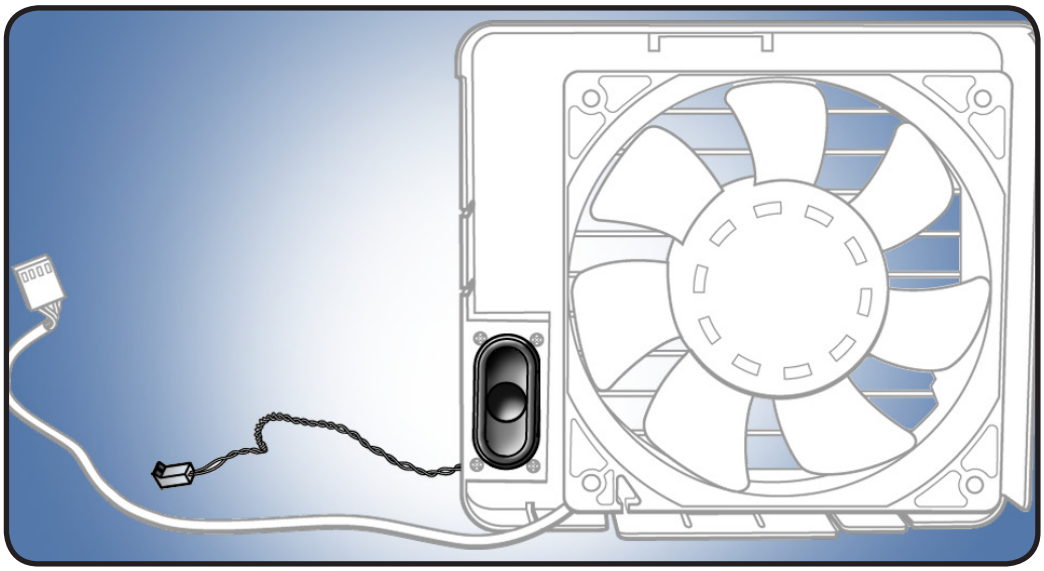
Speaker Assembly

First Steps

Open computer, lay it down with access side facing up, and remove:

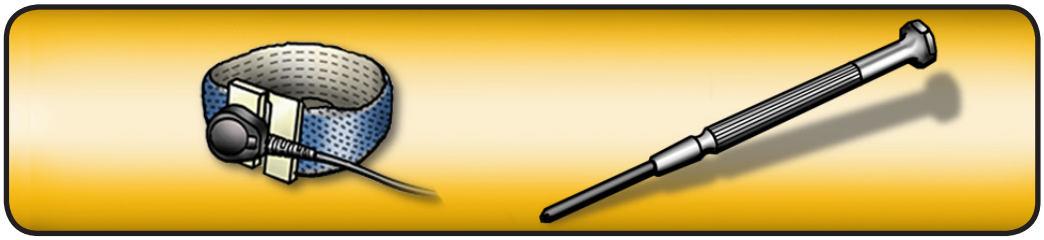
- Hard drive and drive carrier in drive bay 1
- Graphics card in slot 1
- PCIe fan
- Processor tray
- Processor cage
- Front processor cage fan

Note: Speaker is installed on front processor cage fan. To access speaker, you must remove fan from cage.



Tools

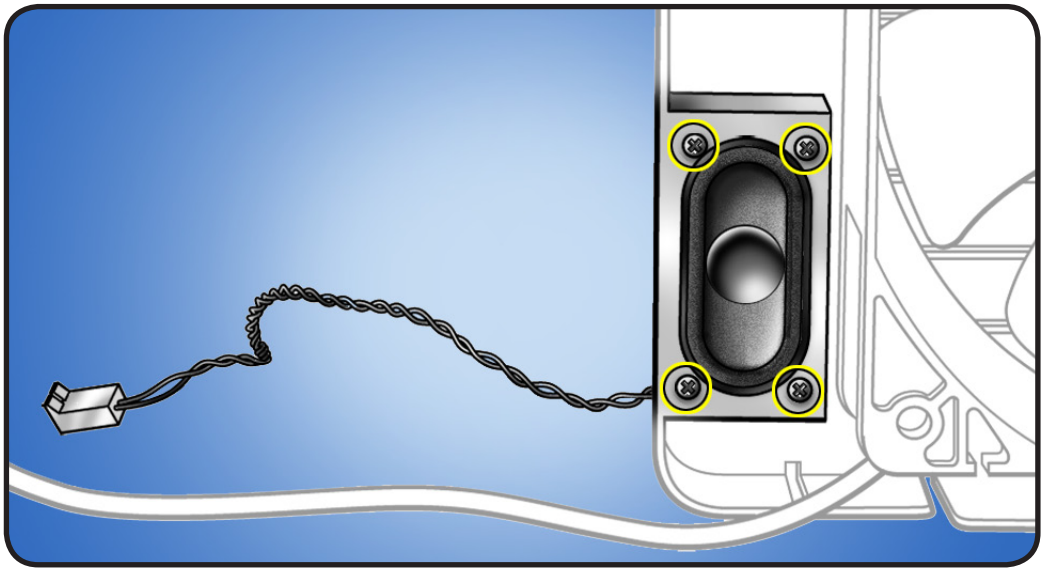
- ESD wrist strap
- Jeweler's Phillips #1 screwdriver



Removal

1 Remove **4** screws.

2 Remove speaker assembly from fan.

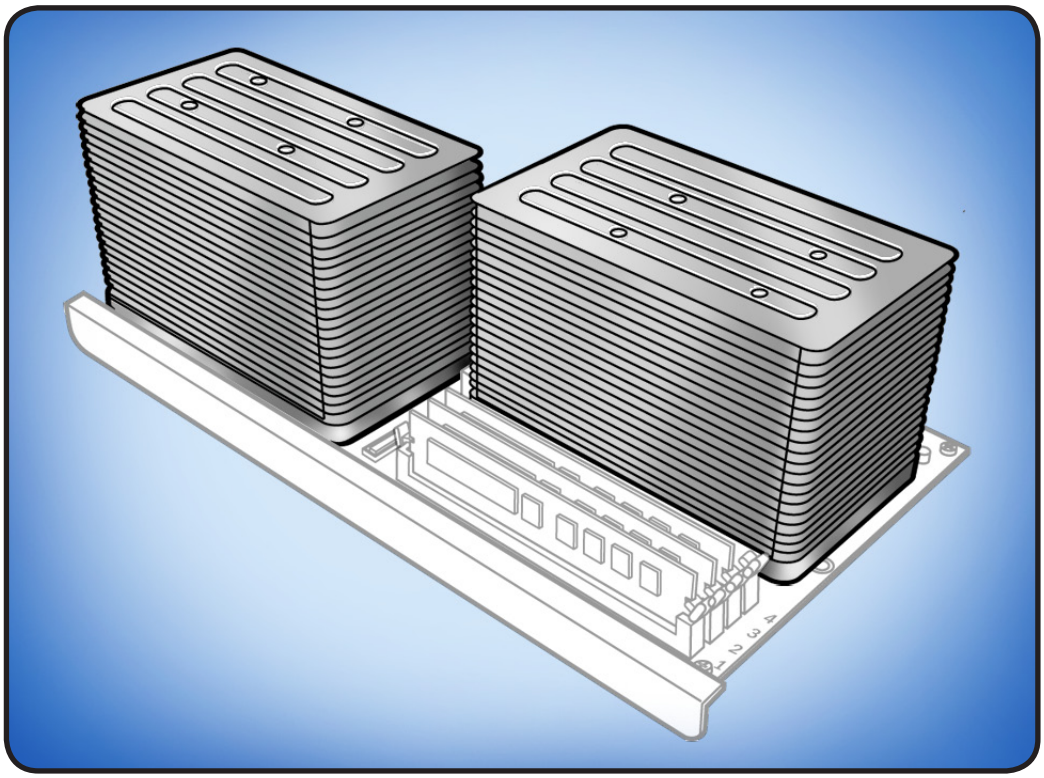


Processor Heatsinks, Dual

First Steps

Open computer, lay it down with access side facing up, and remove:

- Processor tray

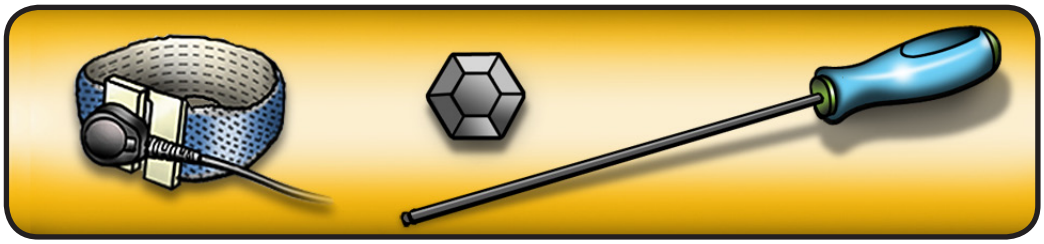


Note: This procedure applies to Mac Pro (Mid 2010) dual-processor configurations. For single-processor configuration, see "Processor Heatsink, Single."

Important: Mac Pro (Mid 2010) processors require thermal grease for proper operation. Every time you remove a processor heatsink, you must replace the thermal grease on the processor below it. New grease and alcohol wipes for cleaning off the previous grease are included with replacement heatsinks, processors, and processor boards.

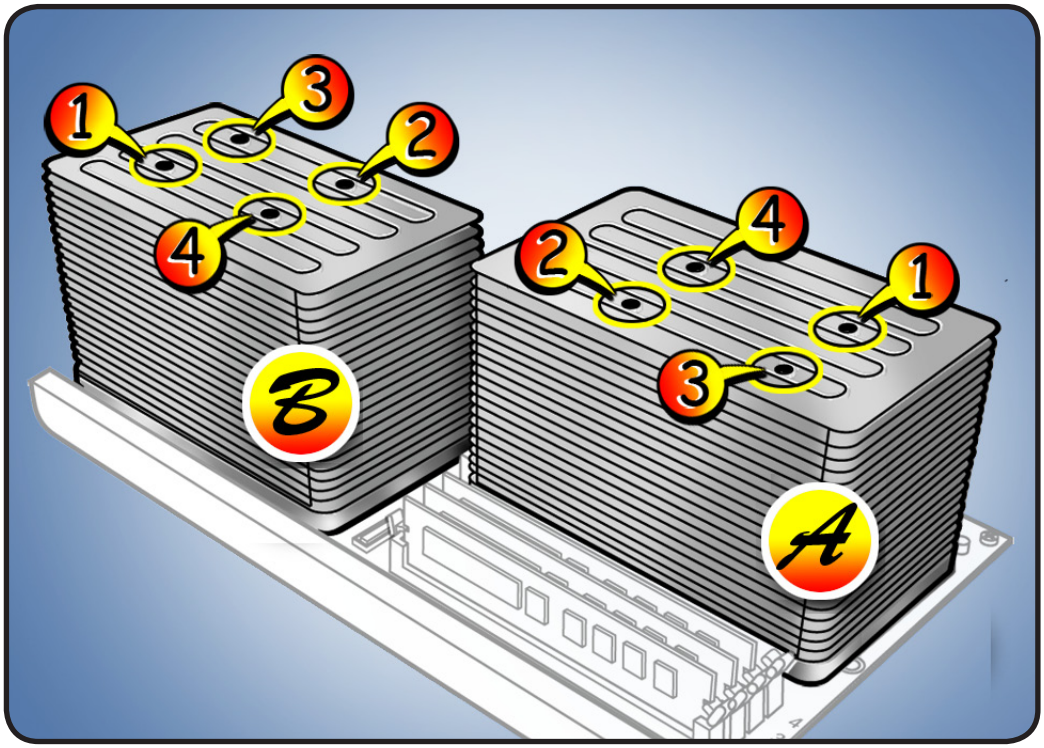
Tools

- ESD wrist strap
- Long-handled, 3 mm flathead hex driver



Removal

Note: See illustration for position of CPU A and CPU B heatsinks. When processor board is installed in computer, CPU A heatsink sits toward rear of computer and CPU B heatsink sits toward front of computer.

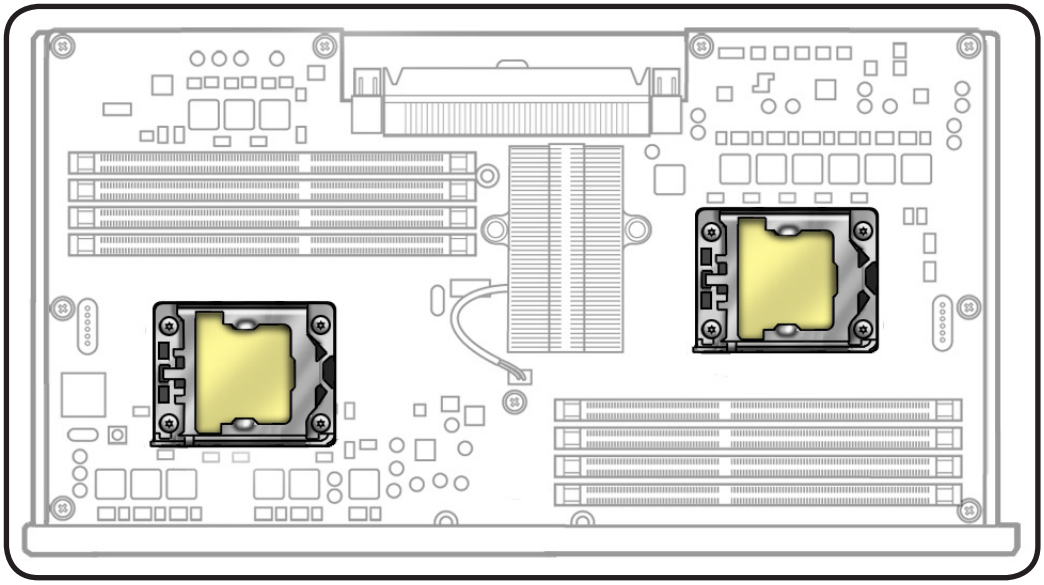


1 Using hex screwdriver, loosen **4** captive mounting screws in order shown.

2 Holding processor tray steady with one hand, lift heatsink straight up out of enclosure.

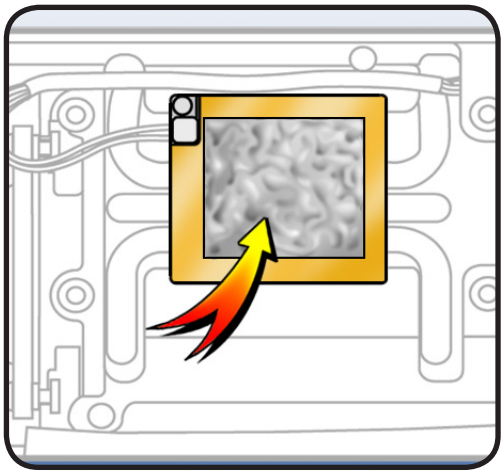
Reassembly

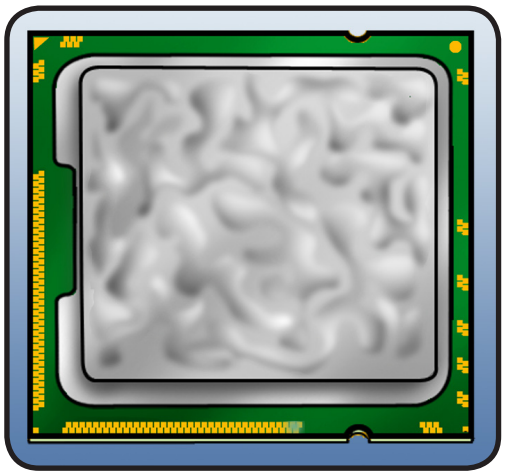
Important: Do steps 1–3 with processor REMOVED from processor board. See "Processor, Dual."



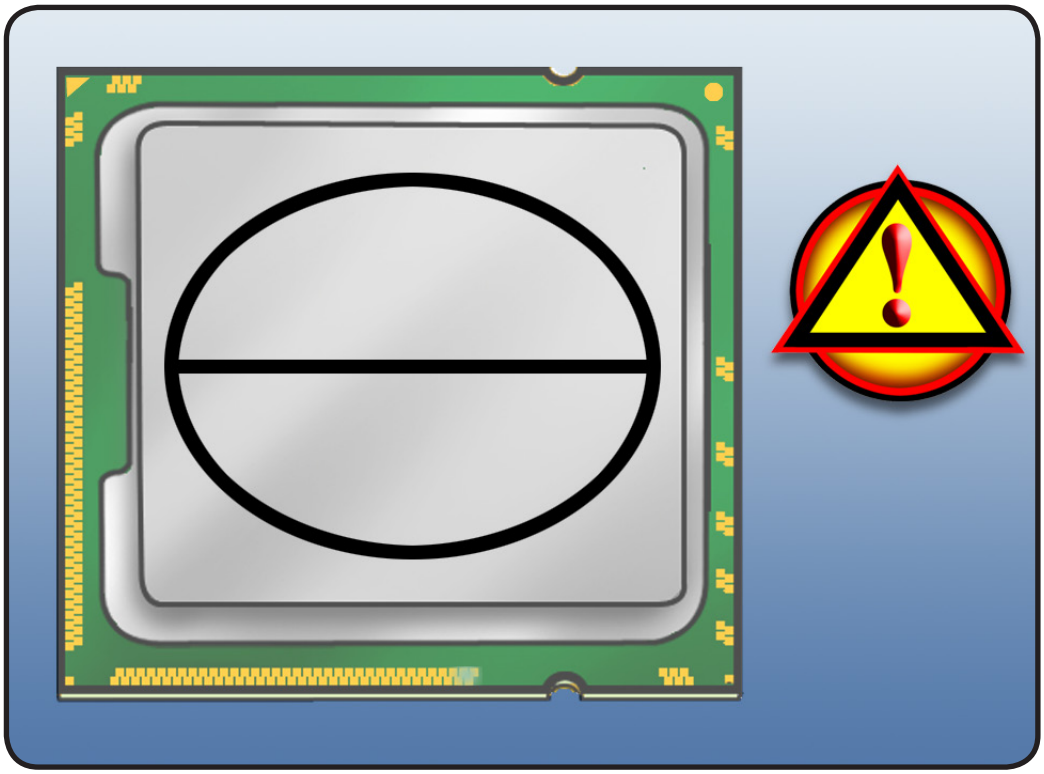
Every time you remove a processor, even for a few seconds, cover the processor socket with a connector cap. Spare caps are packed with replacement parts.

1 Using alcohol pad included with replacement part, clean off thermal grease from underside of heatsink and top of processor.





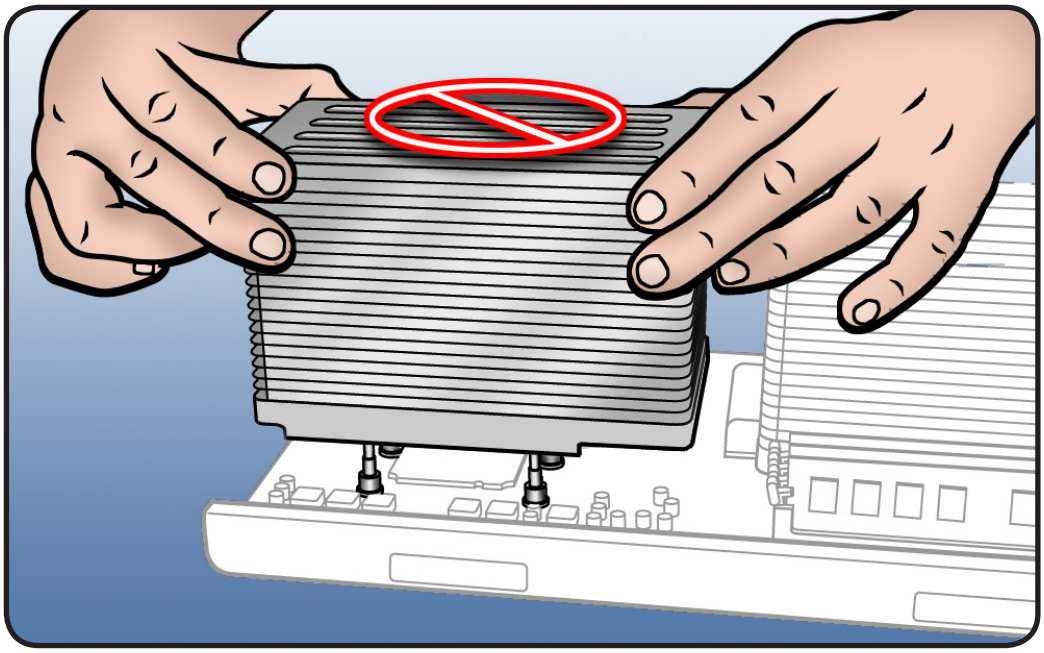
2 Using syringe of thermal grease included with replacement part, apply narrow bead of grease to processor chip (raised square on top of processor). Apply in pattern illustrated, using approximately 0.2 cc.



Warning: Do not apply more grease than recommended. Grease must not overflow into processor connector.

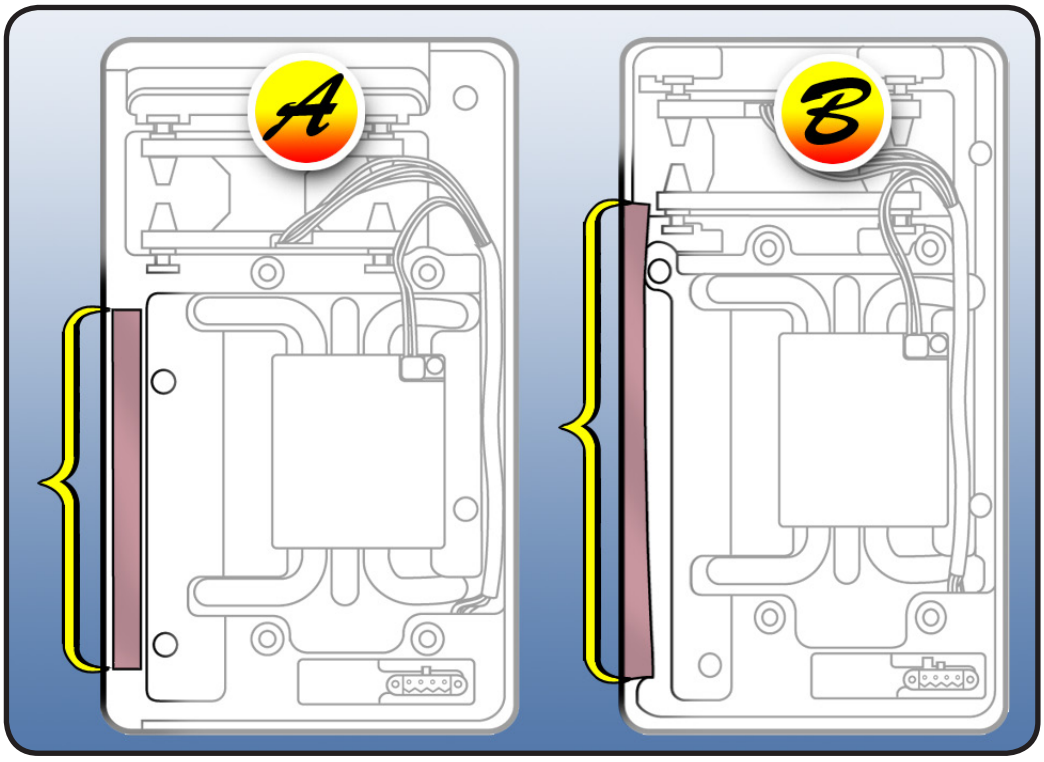
3 Reinstall processor.

4 Carefully align holes on underside of heatsink with mounting posts in processor board, and lower heatsink straight down onto processor. Double-check posts to make sure heatsink is seated properly.



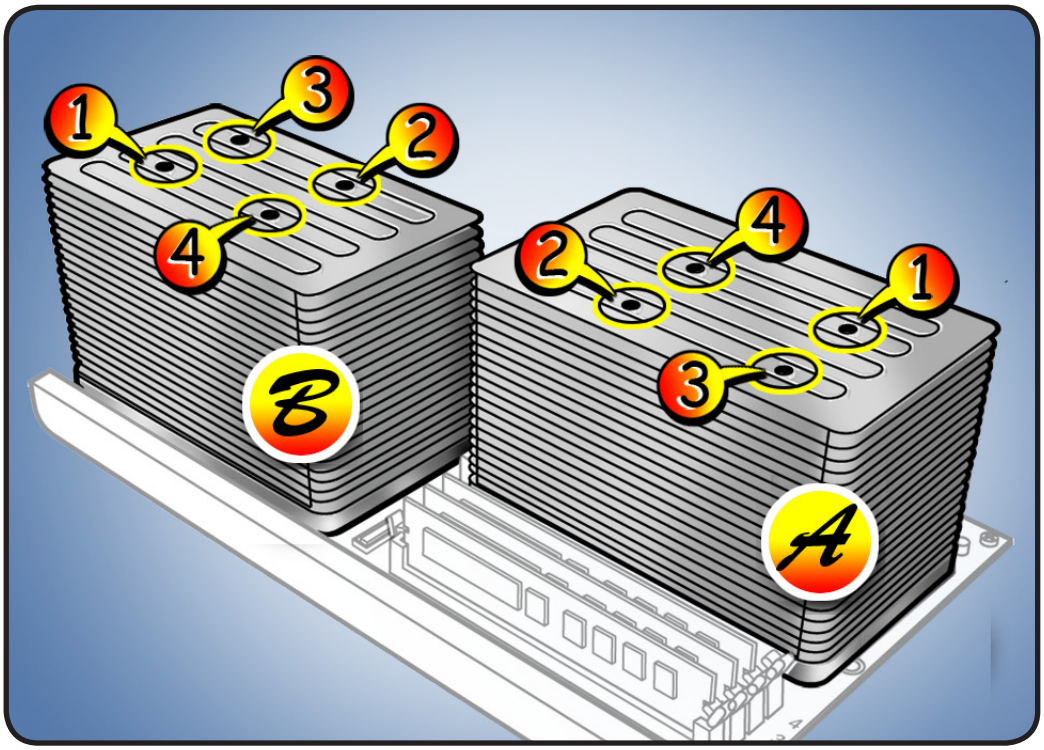
Warning: Use two hands to hold heatsink by its sides. Be careful of heatsink fins, as they can be sharp. Do not press down on the top of the heatsink.

Important: CPU A heatsink (rear) and CPU B heatsink (front) are different parts; they can be identified by their undersides (see illustration). Be sure to install the correct heatsink on each processor.



5 To position heatsink screws, lightly tighten them (4 lb.-in. or 0.452 Nm torque) in order shown, using no more than two turns of driver per screw.

Note: While positioning screws, keep heatsink level by holding it in place with one hand. **Reminder:** Hold heatsink by its sides. Never press down on the top of the heatsink.



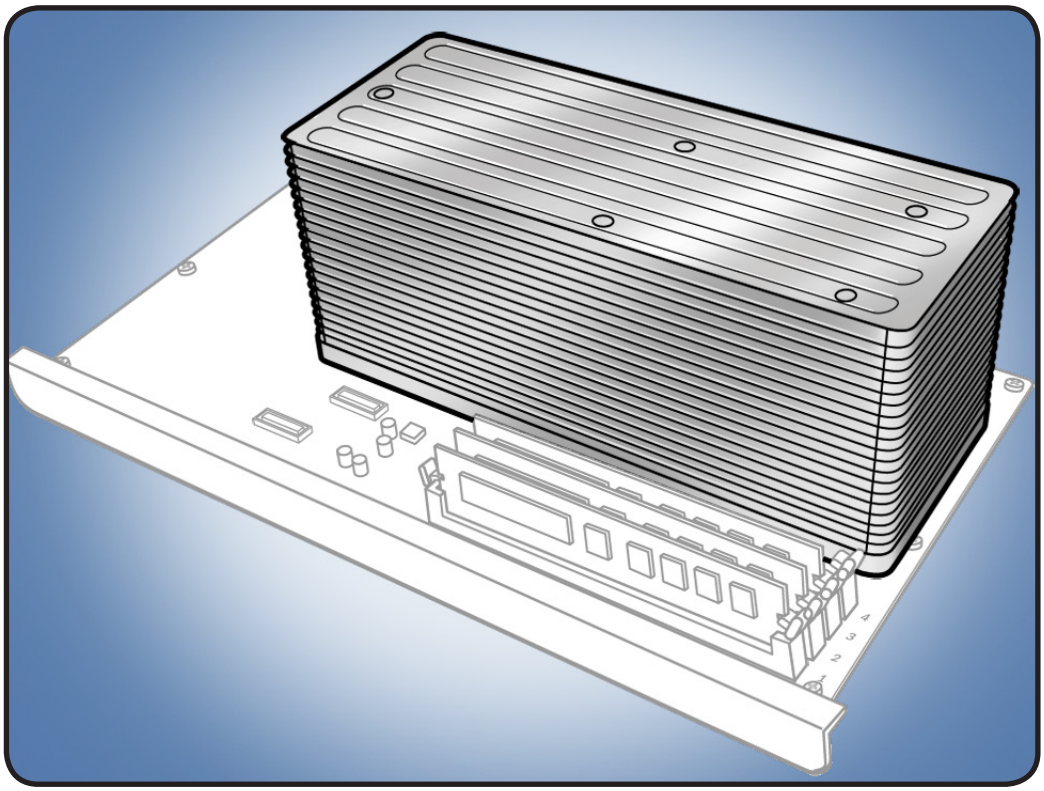
6 To secure heatsink to processor, again tighten screws (8 lb.-in. or 0.904 Nm torque) in order shown until they are "finger tight." Then turn each screw (in order shown) 1/4 turn more.

Processor Heatsink, Single

First Steps

Open computer, lay it down with access side facing up, and remove:

- Processor tray

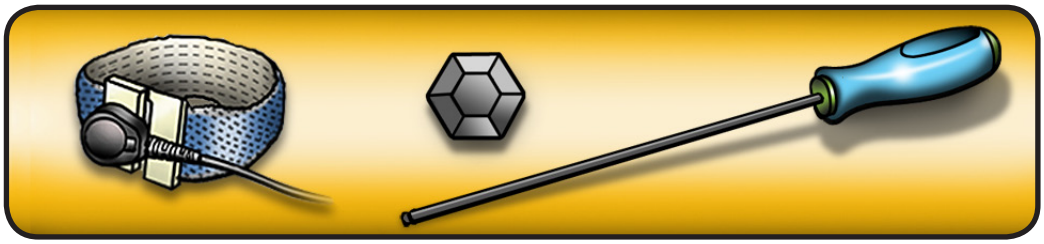


Note: This procedure applies to the Mac Pro (Mid 2010) single-processor configuration. For the dual-processor configuration, see "**Processor Heatsinks, Dual**."

Important: Mac Pro (Mid 2010) processors require thermal grease for proper operation. Every time you remove a processor heatsink, you must replace the thermal grease on the processor below it. New grease and alcohol wipes for cleaning off previous grease are included with new heatsinks, processors, and processor boards.

Tools

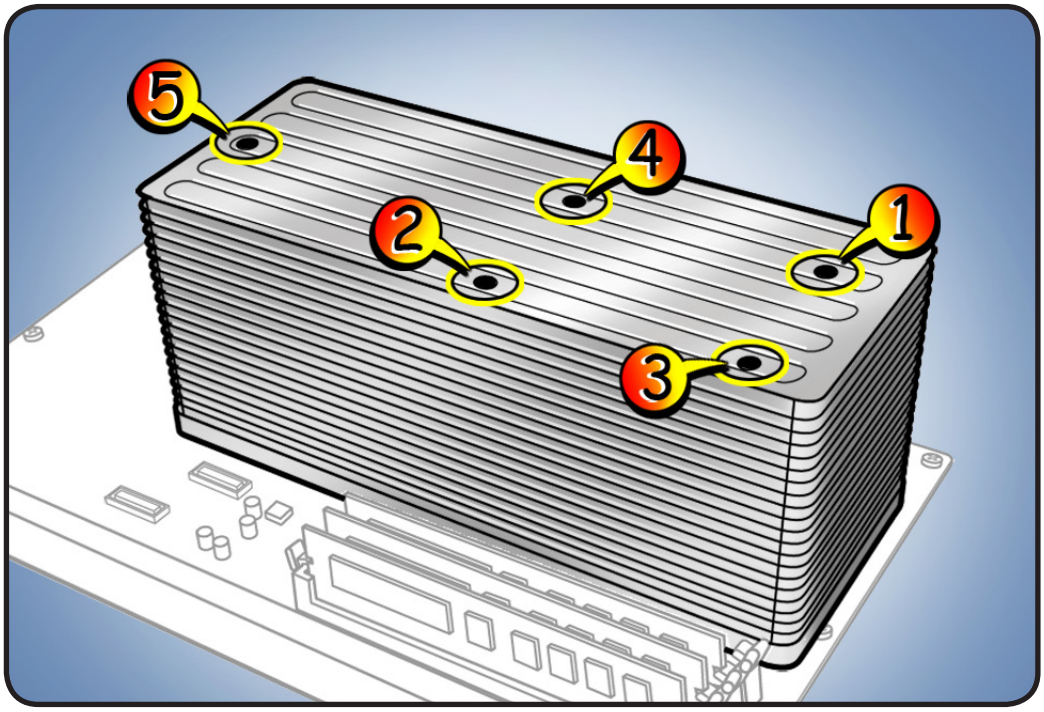
- ESD wrist strap
- Long-handled, magnetized 3 mm flathead hex driver



Removal

1 Using hex screwdriver, loosen **5** captive mounting screws in order shown.

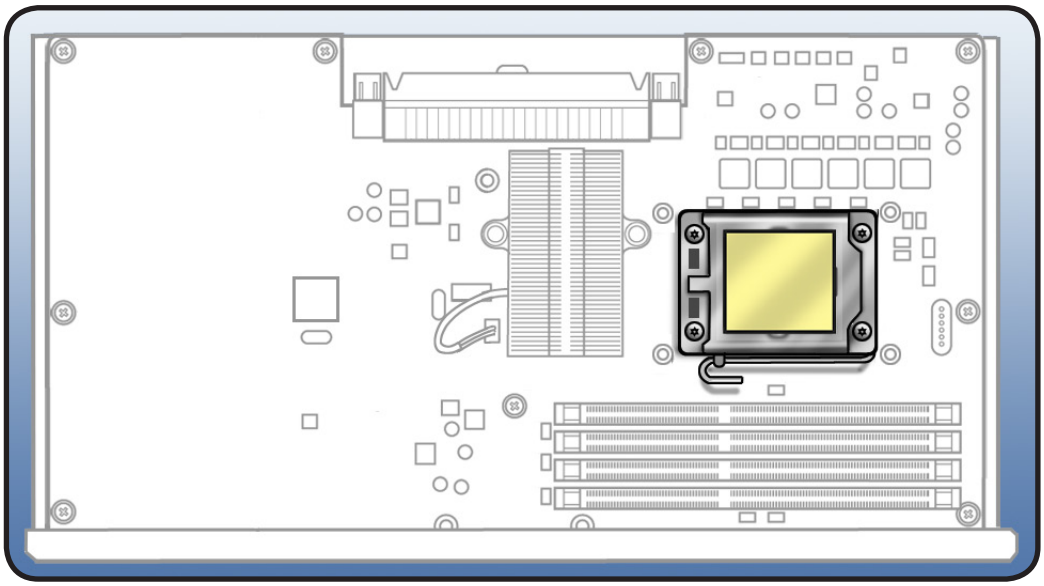
2 Lift heatsink straight up out of enclosure.



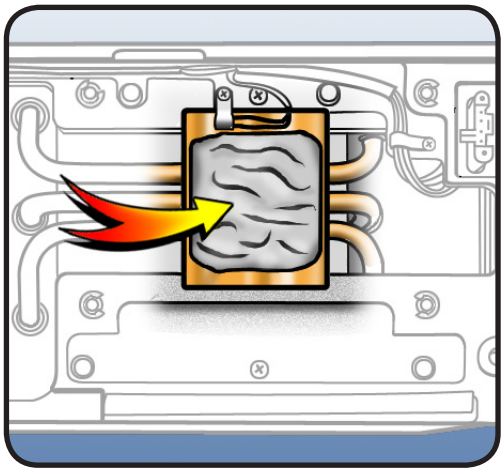
Reassembly

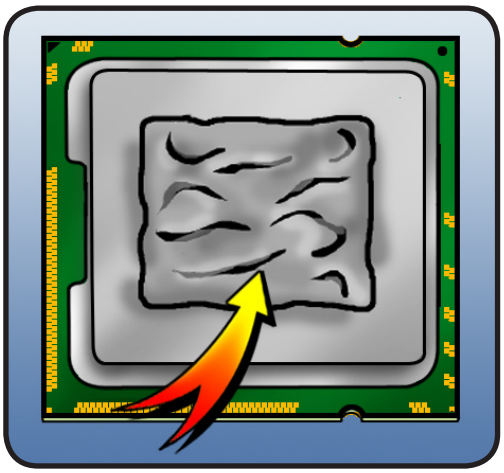
Important: Do steps 1–3 with processor REMOVED from processor board. See "Processor, Single."

Every time you remove a processor, even for a few seconds, cover the processor socket with a connector cap. Spare caps are packed with replacement parts.

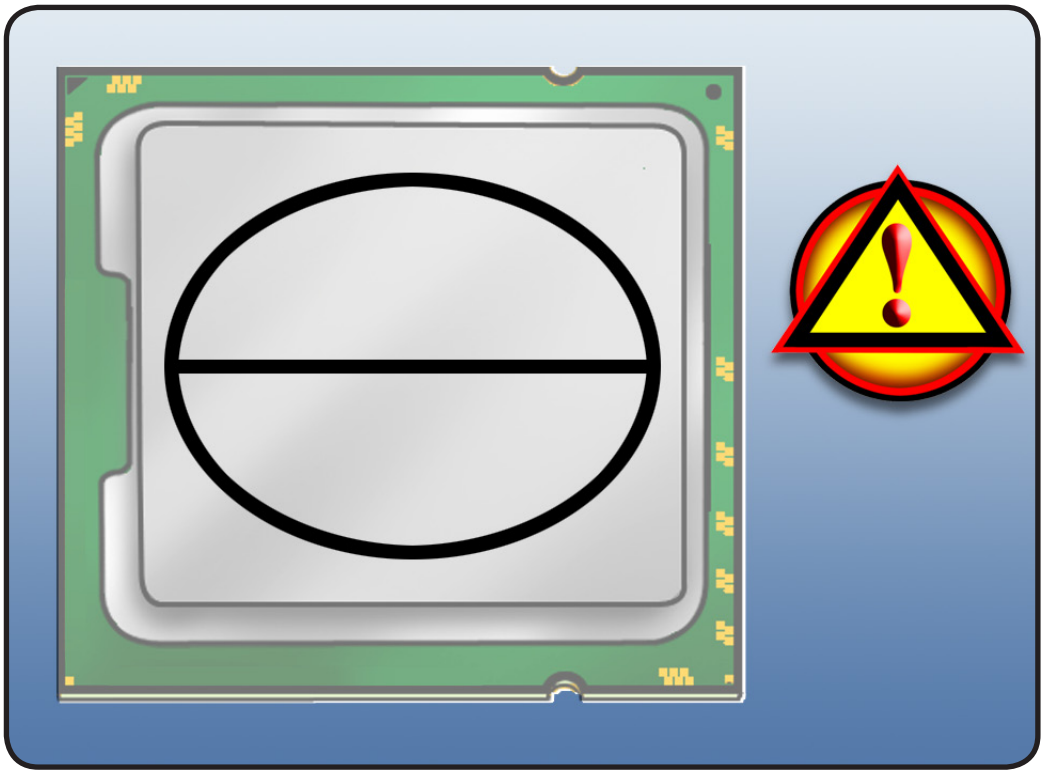


1 Using alcohol pad included with replacement part, clean off thermal grease from underside of heatsink and top of processor.





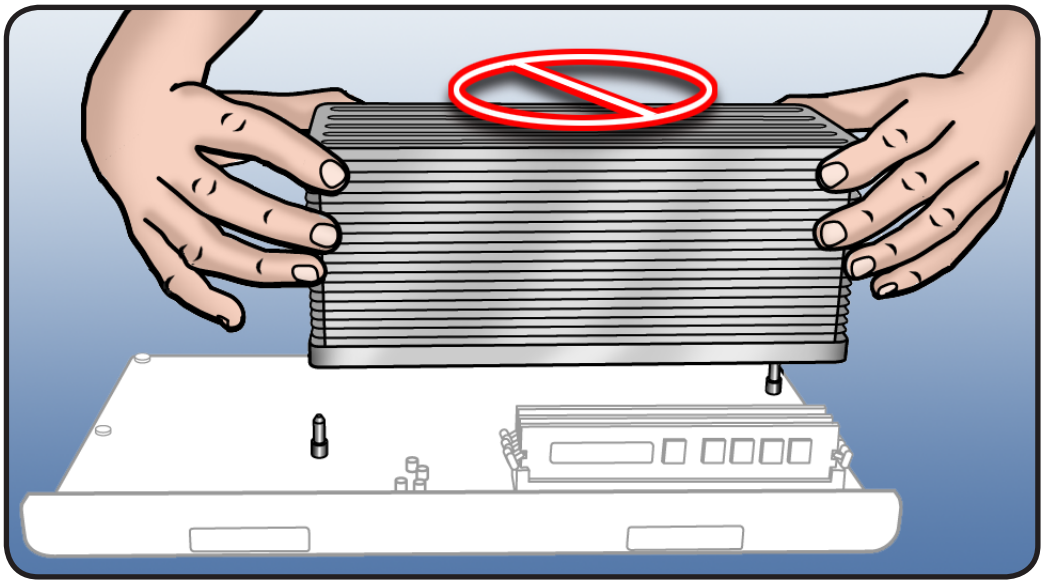
2 Using syringe of thermal grease included with replacement part, apply narrow bead of grease to processor chip (raised square on top of processor). Apply in pattern illustrated, using approximately 0.2 cc.



Warning: Do not apply more grease than recommended. Grease must not overflow into processor connector.

3 Reinstall processor.

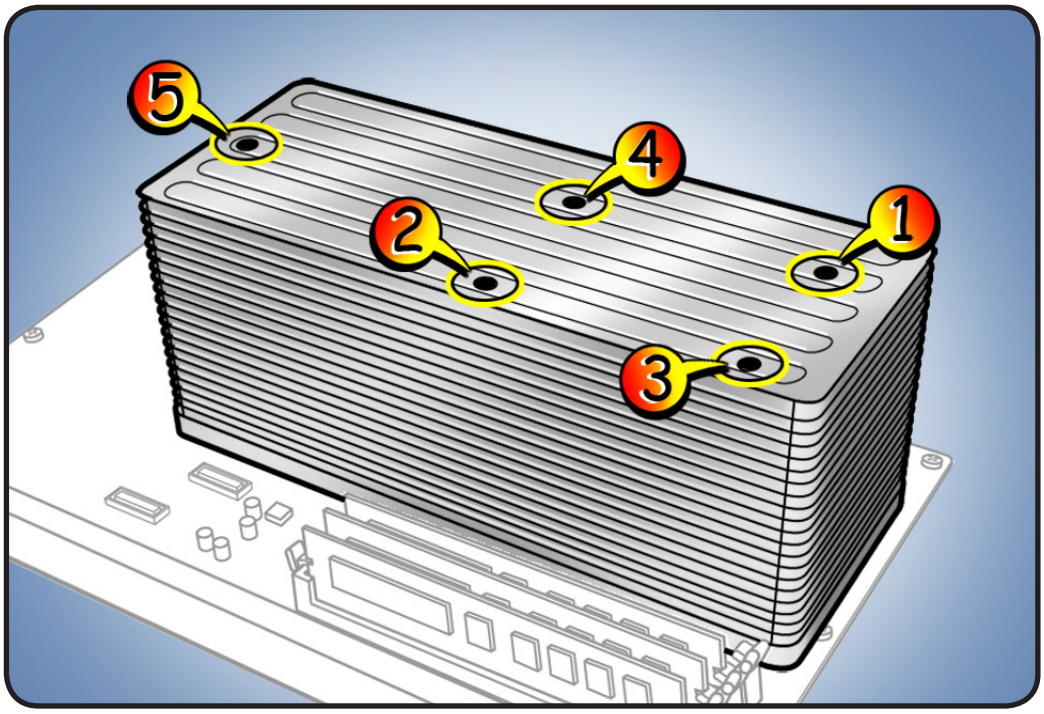
4 Carefully align holes on underside of heatsink with mounting posts in processor board, and lower heatsink straight down onto processor. Double-check posts to make sure heatsink is seated properly.



Warning: Use two hands to hold heatsink by its sides. Be careful of heatsink fins, as they can be sharp. Do not press down on the top of the heatsink.

5 To position heatsink screws **1–5**, lightly tighten them (4 lb.-in. or 0.452 Nm torque) in order shown, using no more than two turns of driver per screw.

Note: While positioning screws, keep heatsink level by holding it in place with one hand. **Reminder:** Hold heatsink by its sides. Never press down on the top of the heatsink.



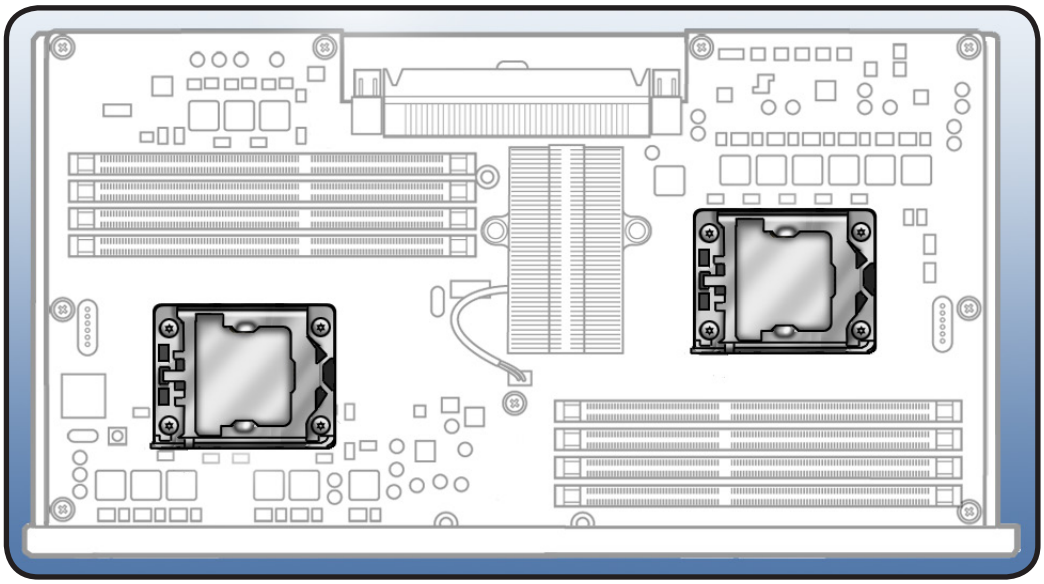
6 To secure heatsink to processor, again tighten screws **1–4** (8 lb.-in. or 0.904 Nm torque) in order shown until they are "finger tight." Then turn each screw (in order shown) 1/4 turn more.

Processor, Dual

First Steps

Open computer, lay it down with access side facing up, and remove:

- Processor tray
- Processor heatsink, dual

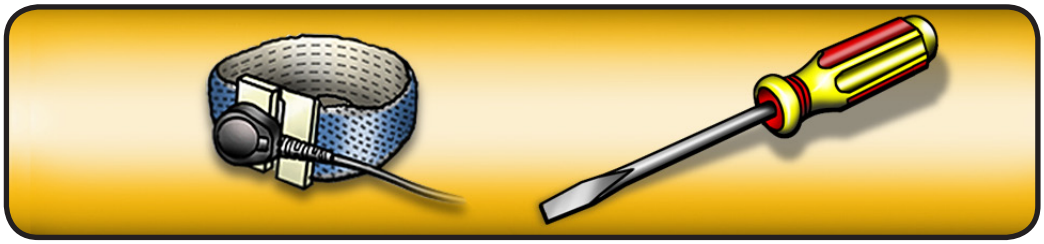


Note: This procedure applies to Mac Pro (Mid 2010) dual-processor configurations. For single-processor configuration, see "**Processor, Single**."

Important: Mac Pro (Mid 2010) processors require thermal grease for proper operation. Every time you remove a processor heatsink, you must replace the thermal grease on the processor below it. New grease and alcohol wipes for cleaning off the previous grease are included with replacement heatsinks, processors, and processor boards.

Tools

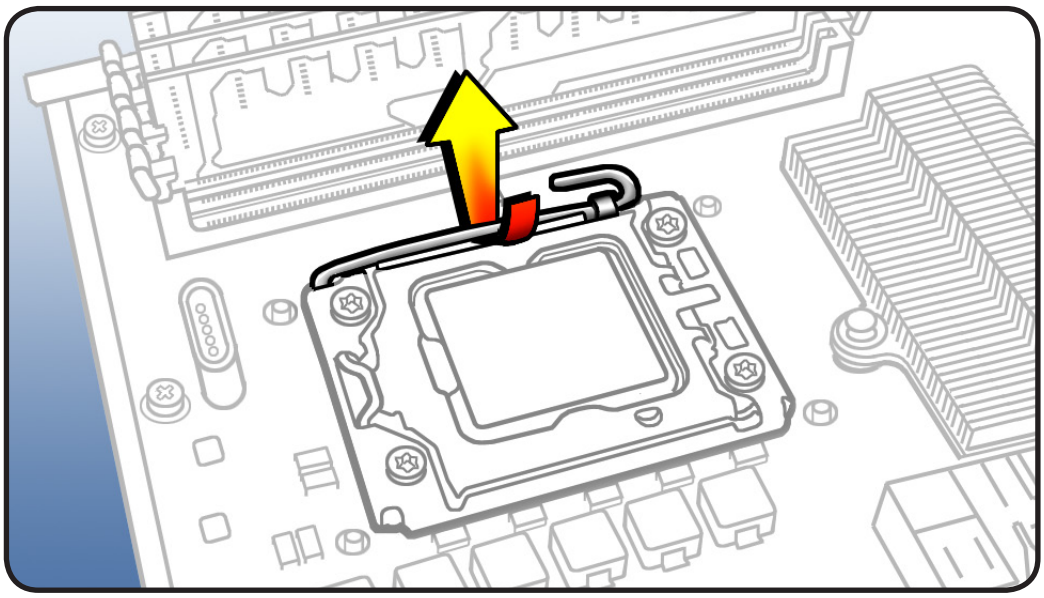
- ESD wrist strap
- Flatblade screwdriver



Removal

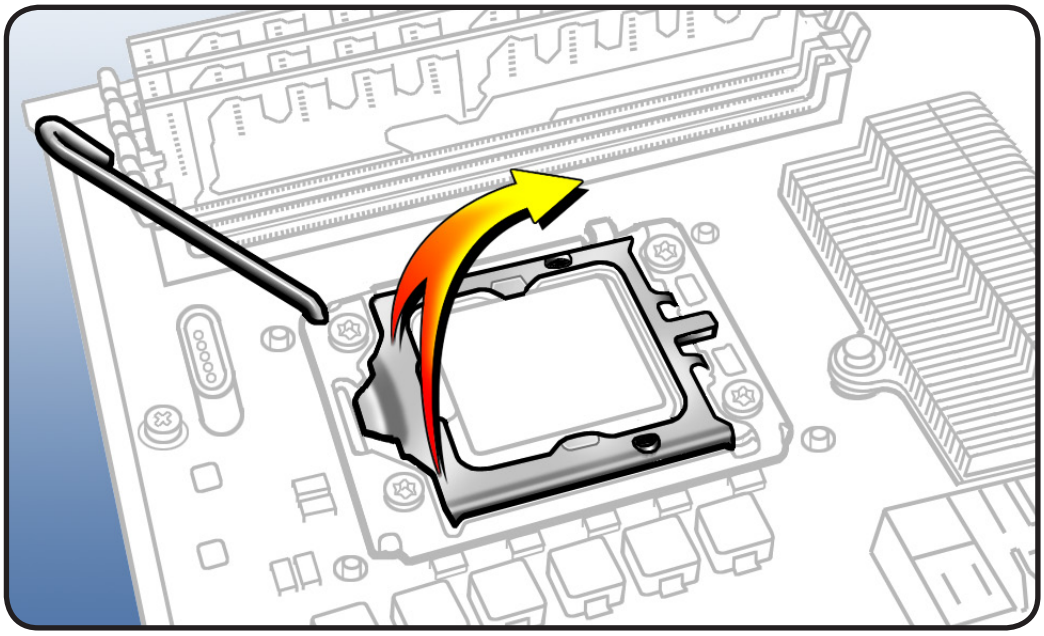
Note: You can identify the processor by the speed etched on the processor can. You must clean off the thermal grease from installed processors to see the speed.

1 Release latch on metal processor holder.

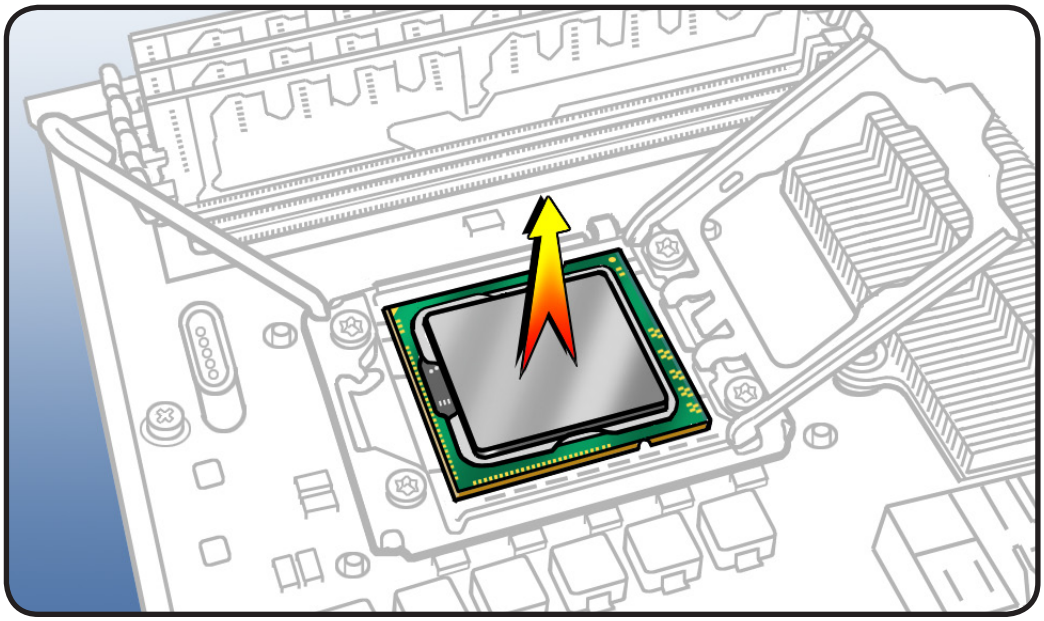


Note: You may use a flatblade screwdriver to help release latch.

2 Rotate top of holder to open position.

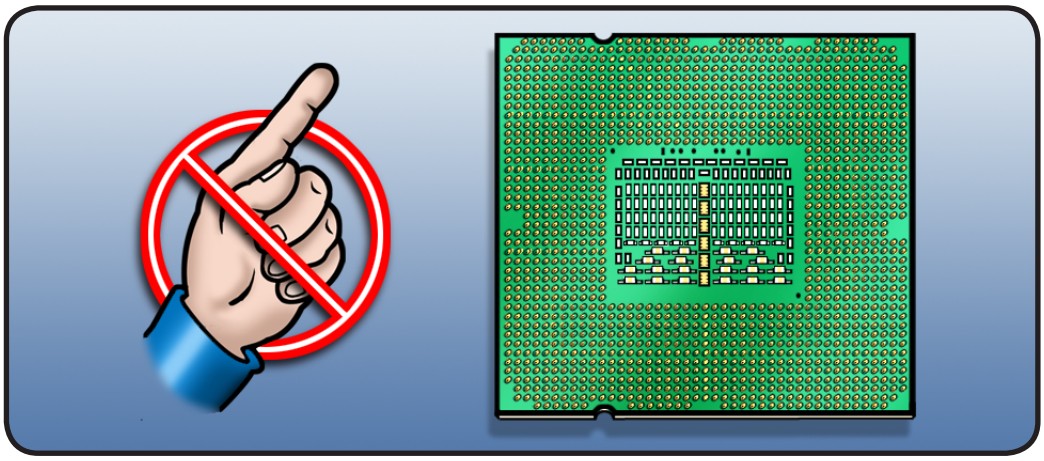


3 Lift processor straight up out of holder.



Important: Do not touch components on processor top or bottom. Hold processor only by the edges.

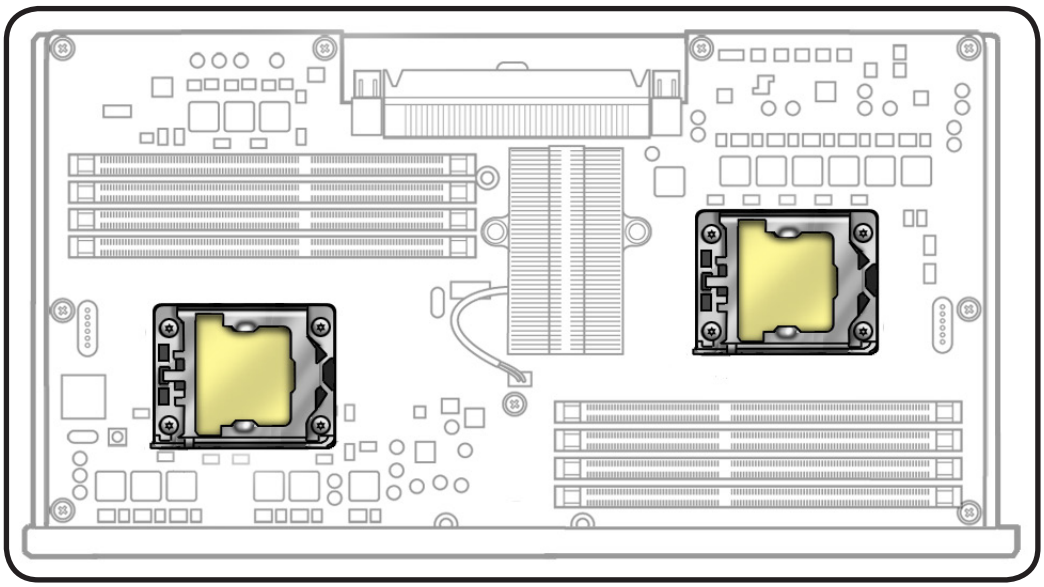
Also be careful not to touch gold pins in processor connector on processor board.



Reassembly

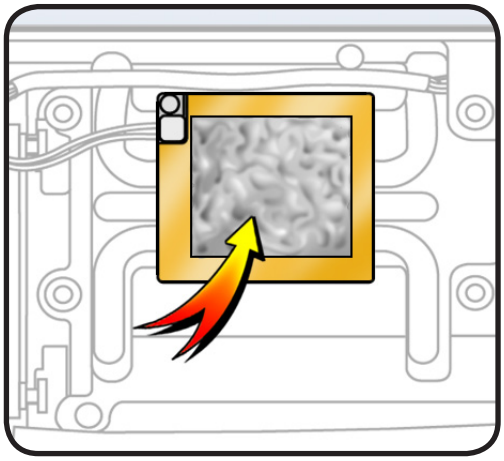
Important: Do steps 1–3 with processor REMOVED from processor board.

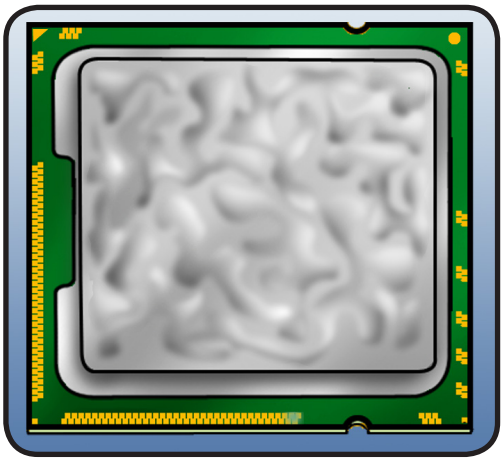
Every time you remove a processor, even for a few seconds, cover the processor socket with a connector cap. Spare caps are packed with replacement parts.



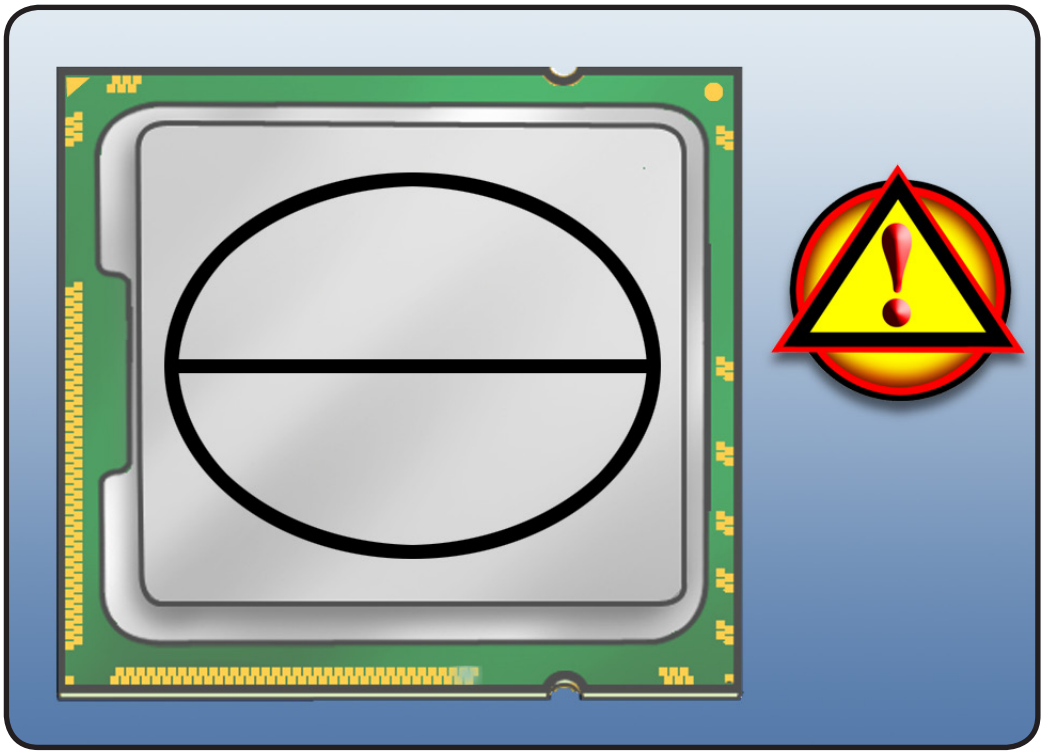
1 Using alcohol pad included with replacement part, clean off thermal grease from underside of heatsink and top of processor.

Note: You do not need to clean a new replacement processor with alcohol. Instead, just remove the protective cap covering the processor's connector.



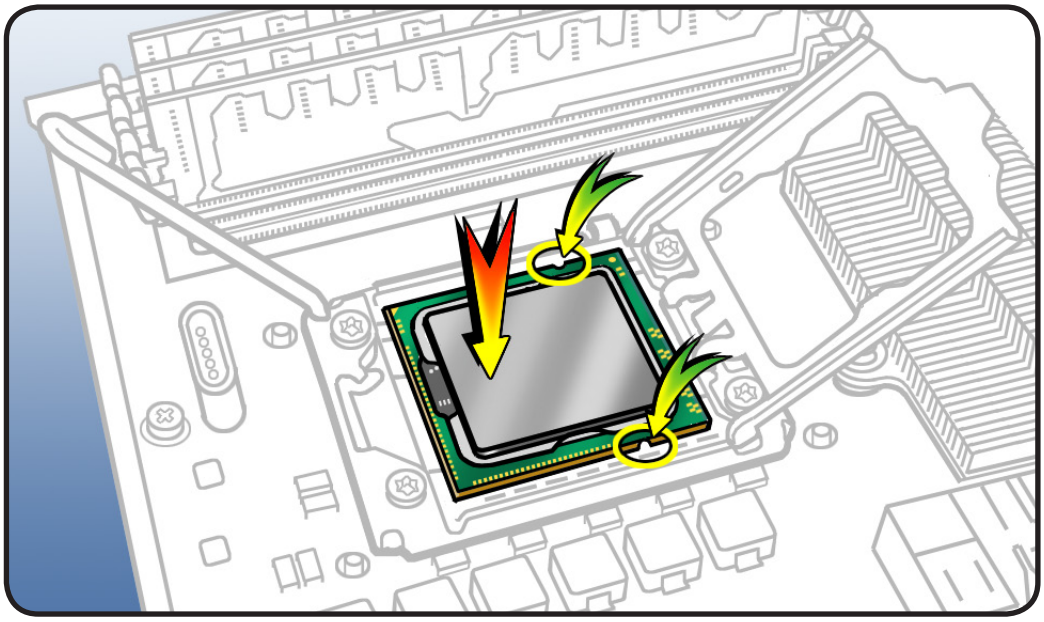


2 Using syringe of thermal grease included with replacement part, apply narrow bead of grease to processor chip (raised square on top of processor). Apply in pattern illustrated, using approximately 0.2 cc.

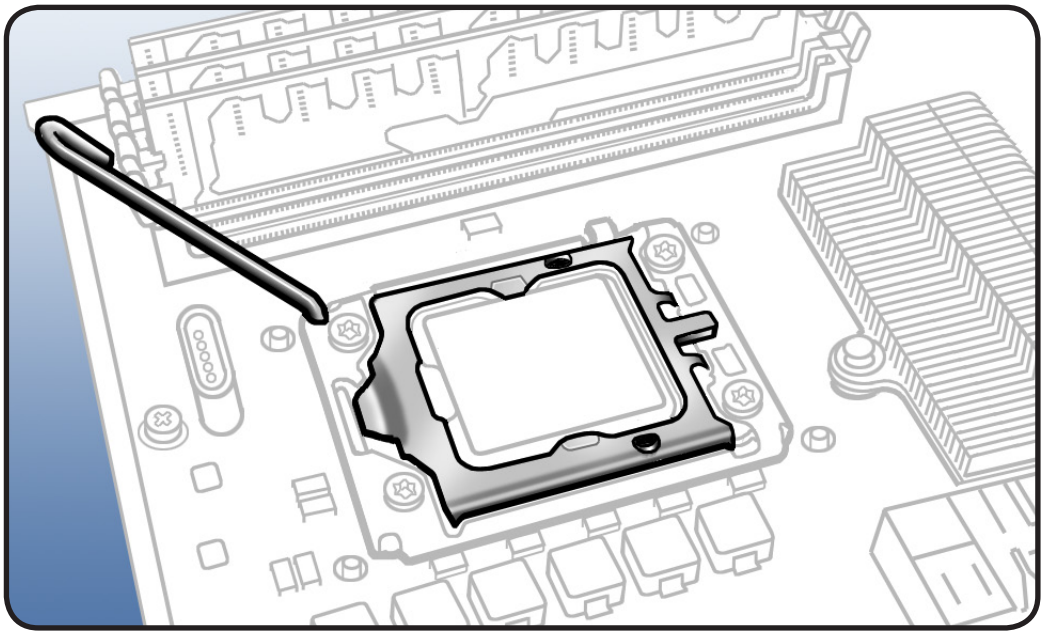


Warning: Do not apply more grease than recommended. Grease must not overflow into processor connector.

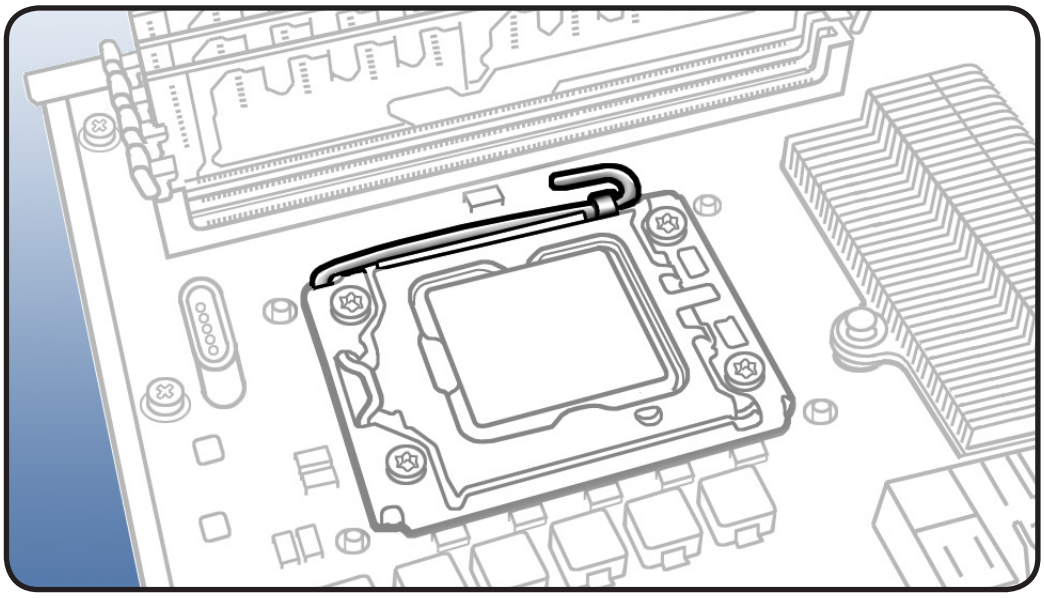
3 Align processor notches with tabs on processor holder, as shown. Then lower processor straight down onto connector.



4 Rotate top of holder to closed position.



5 Close latch on metal processor holder.

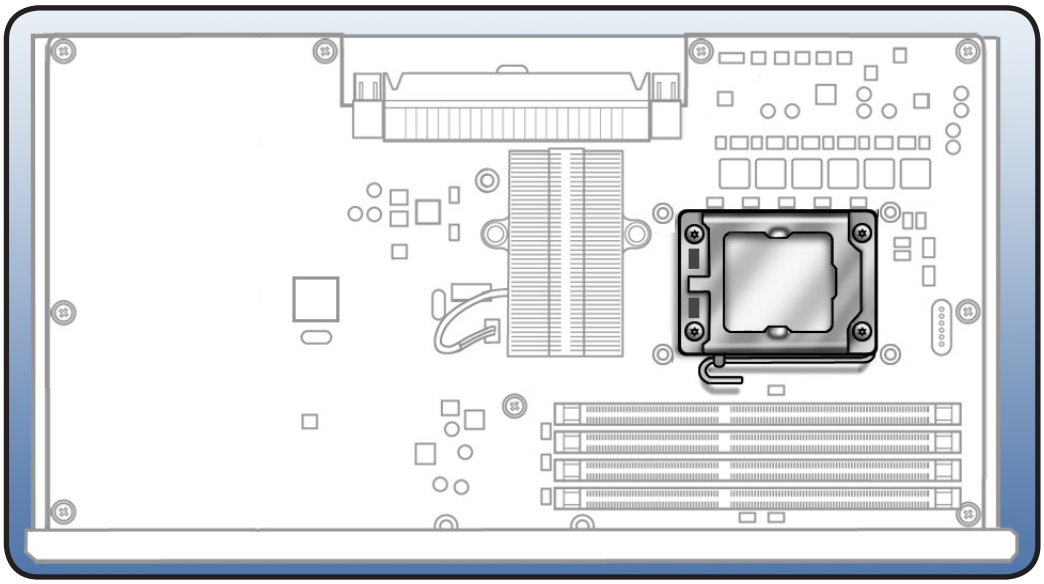


Processor, Single

First Steps

Open computer, lay it down with access side facing up, and remove:

- Processor tray
- Processor heatsink, single

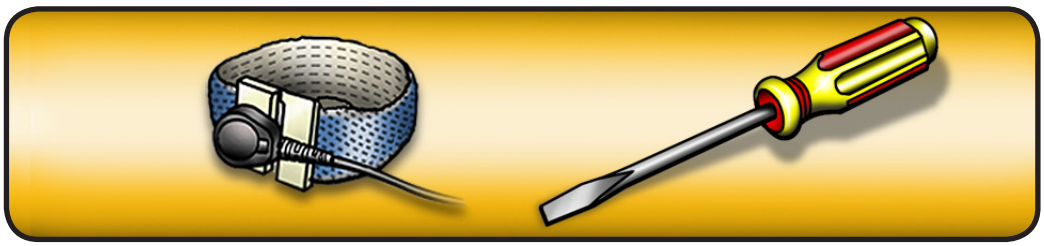


Note: This procedure applies to the Mac Pro (Mid 2010) single-processor configuration. For dual-processor configurations, see "**Processor, Dual**."

Important: Mac Pro (Mid 2010) processors require thermal grease for proper operation. Every time you remove a processor heatsink, you must replace the thermal grease on the processor below it. New grease and alcohol wipes for cleaning off the previous grease are included with replacement heatsinks, processors, and processor boards.

Tools

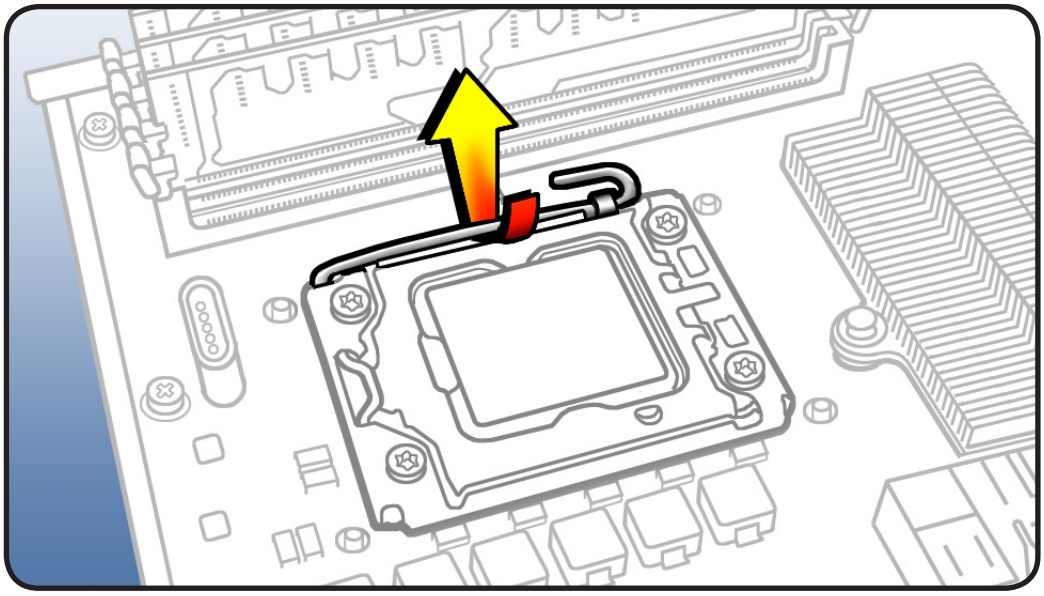
- ESD wrist strap
- Flatblade screwdriver



Removal

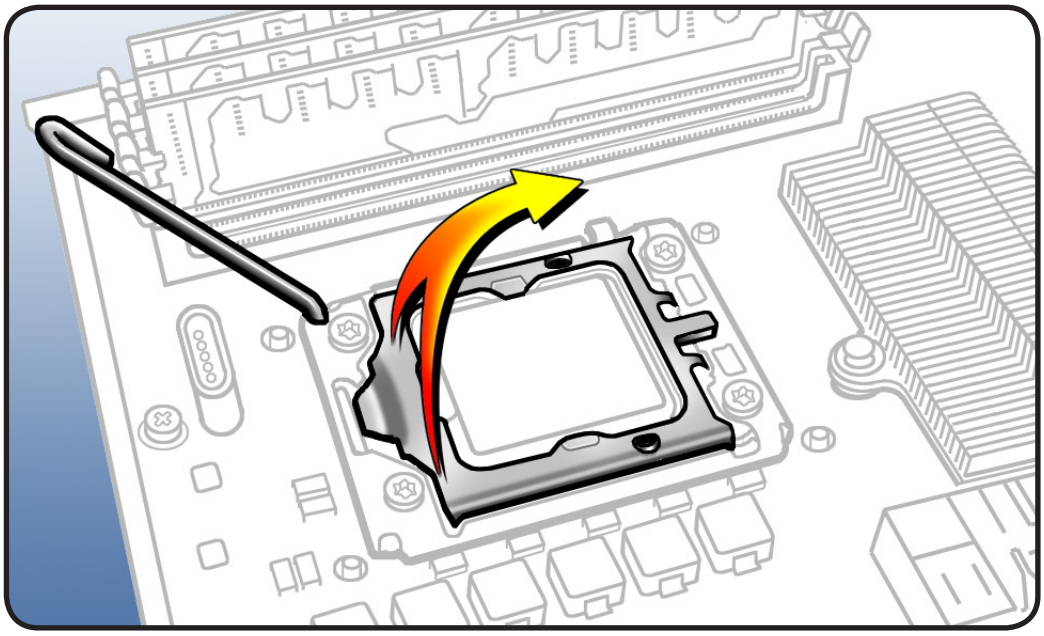
Note: You can identify the processor by the speed etched on the processor can. You must clean off the thermal grease from installed processors to see the speed.

1 Release latch on metal processor holder.

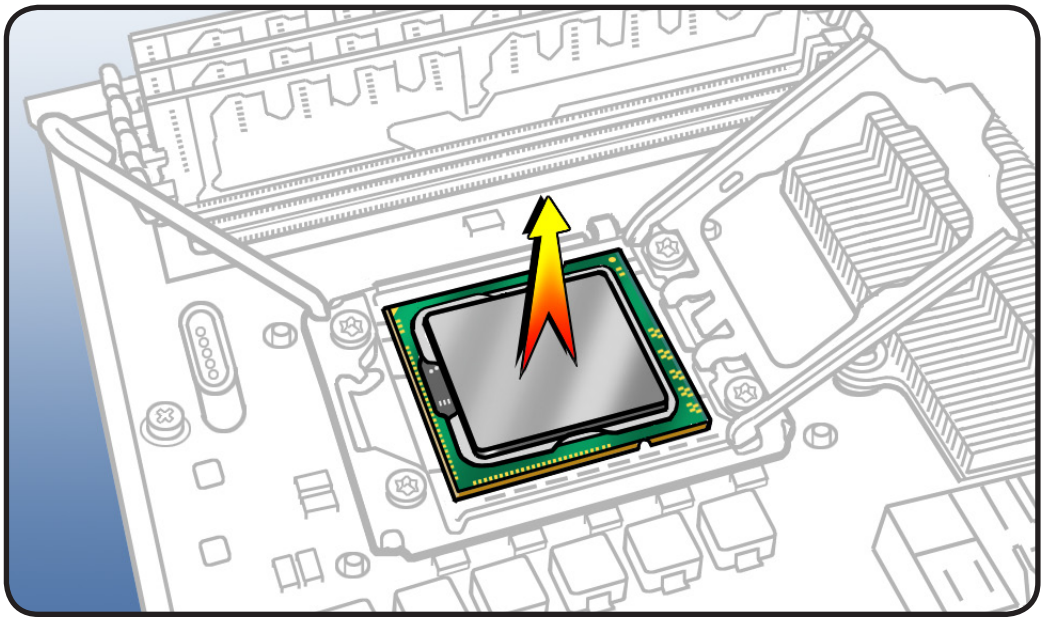


Note: You may use a flatblade screwdriver to help release latch.

2 Rotate top of holder to open position.

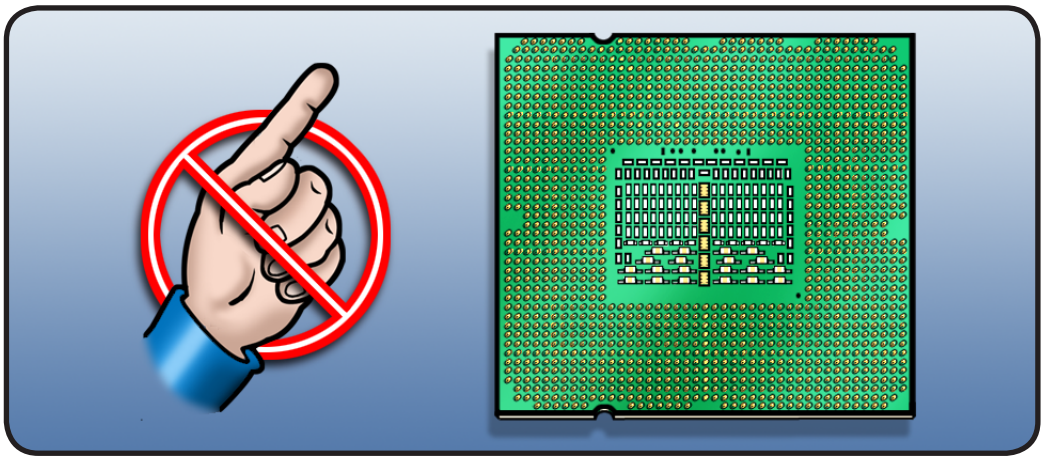


3 Lift processor straight up out of holder.



Important: Do not touch components on processor top or bottom. Hold processor only by the edges.

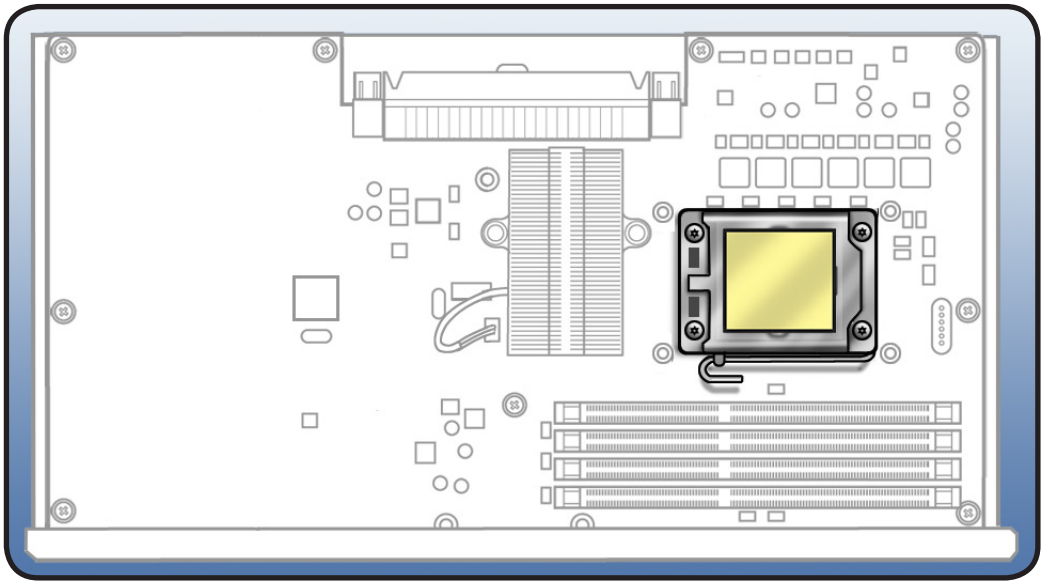
Also be careful not to touch gold pins in processor connector on processor board.



Reassembly

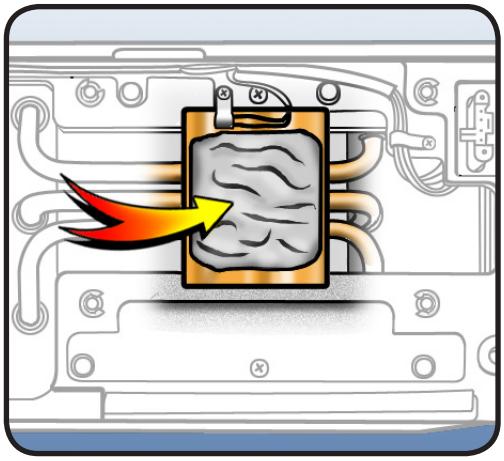
Important: Do steps 1–3 with processor REMOVED from processor board.

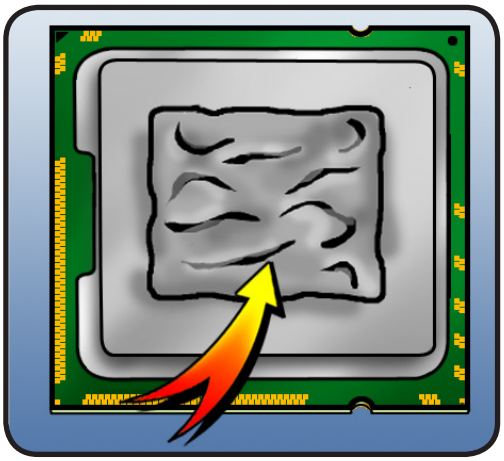
Every time you remove a processor, even for a few seconds, cover the processor socket with a connector cap. Spare caps are packed with replacement parts.



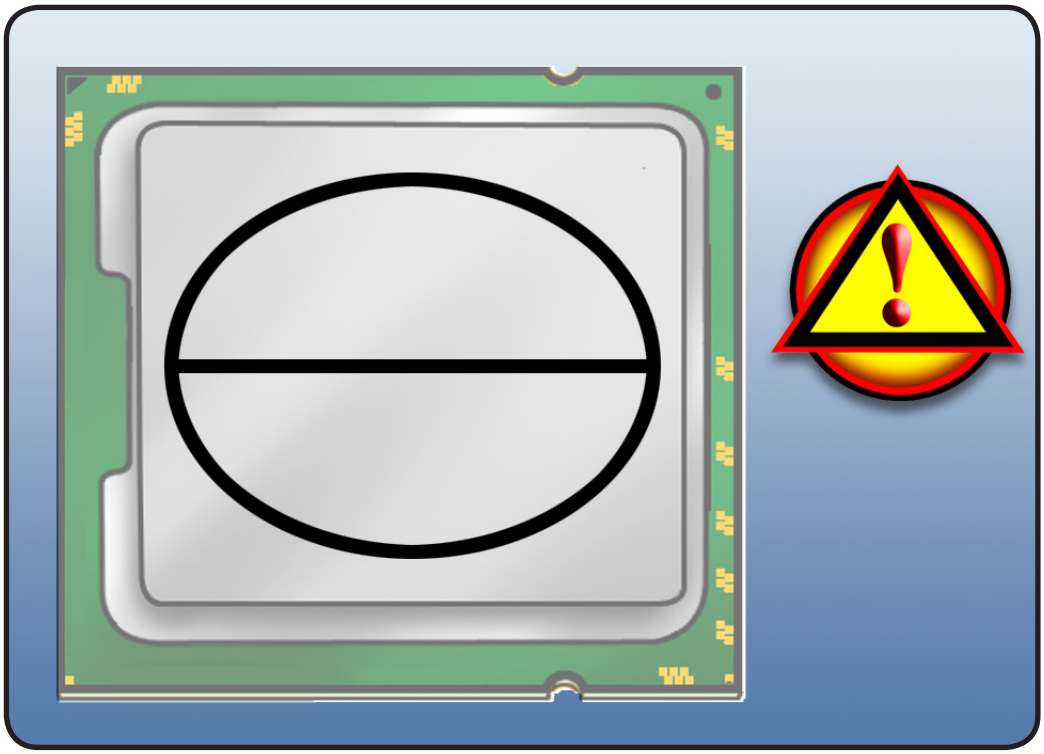
1 Using alcohol pad included with replacement part, clean off thermal grease from underside of heatsink and top of processor.

Note: You do not need to clean a new replacement processor with alcohol. Instead, just remove the protective cap covering the processor's connector.



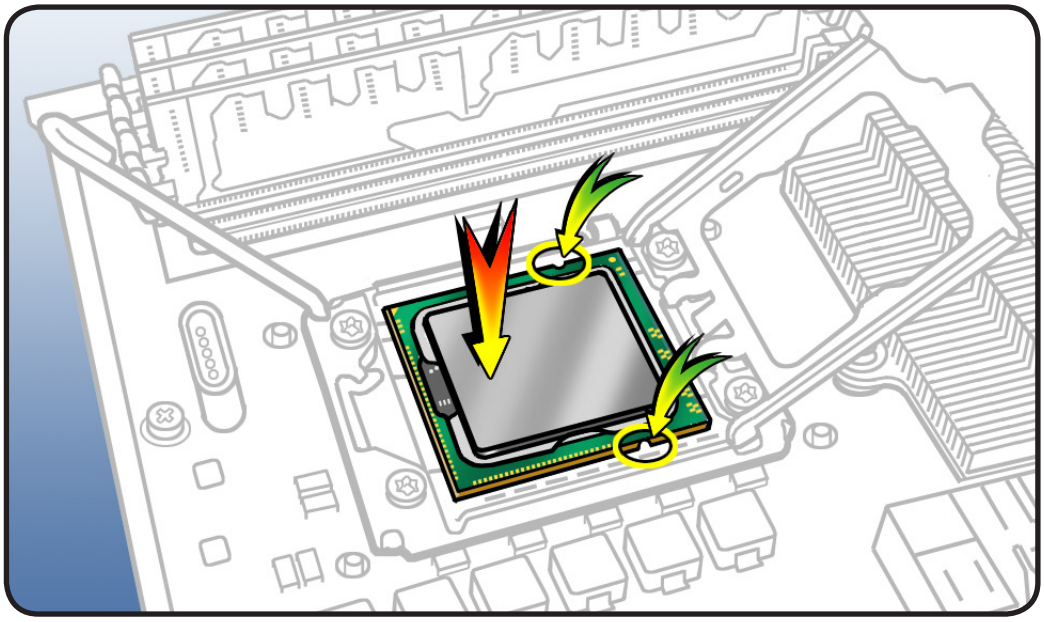


2 Using syringe of thermal grease included with replacement part, apply narrow bead of grease to processor chip (raised square on top of processor). Apply in pattern illustrated, using approximately 0.2 cc.

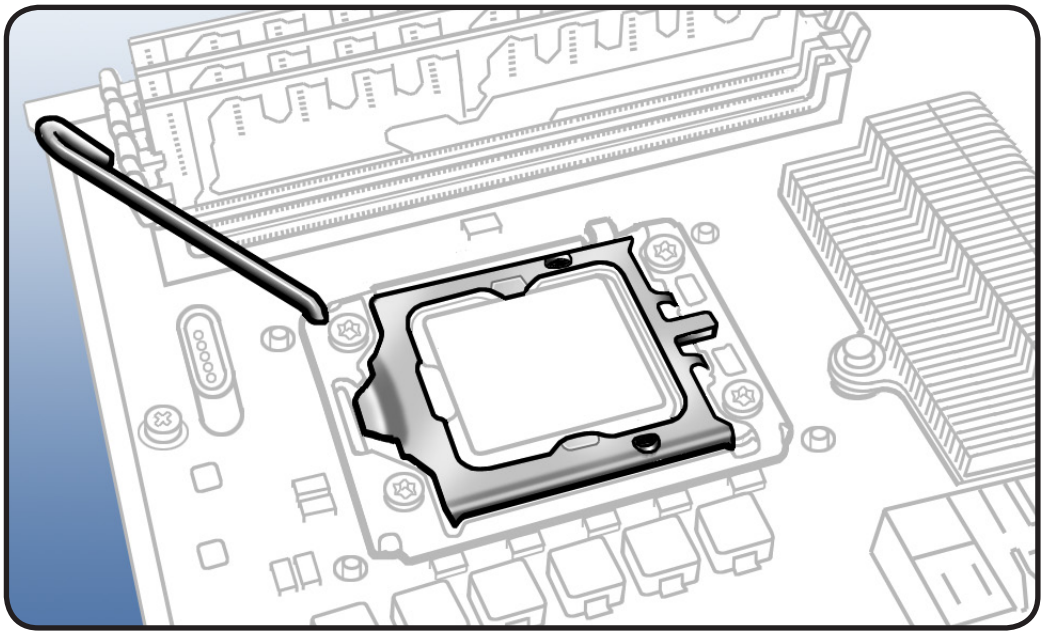


Warning: Do not apply more grease than recommended. Grease must not overflow into processor connector.

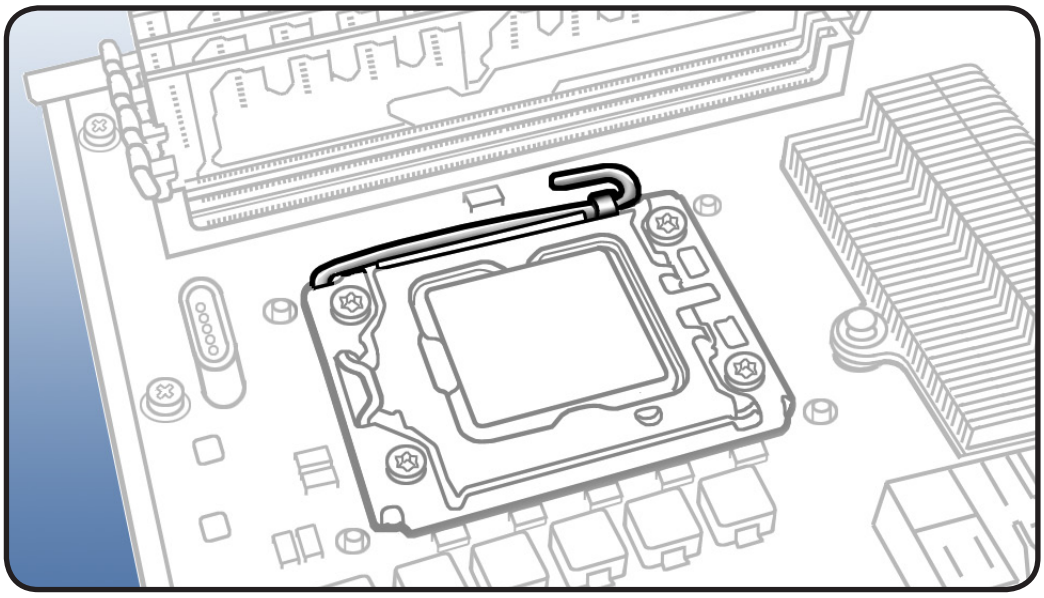
3 Align processor notches with tabs on processor holder, as shown. Then lower processor straight down onto connector.



4 Rotate top of holder to closed position.



5 Close latch on metal processor holder.

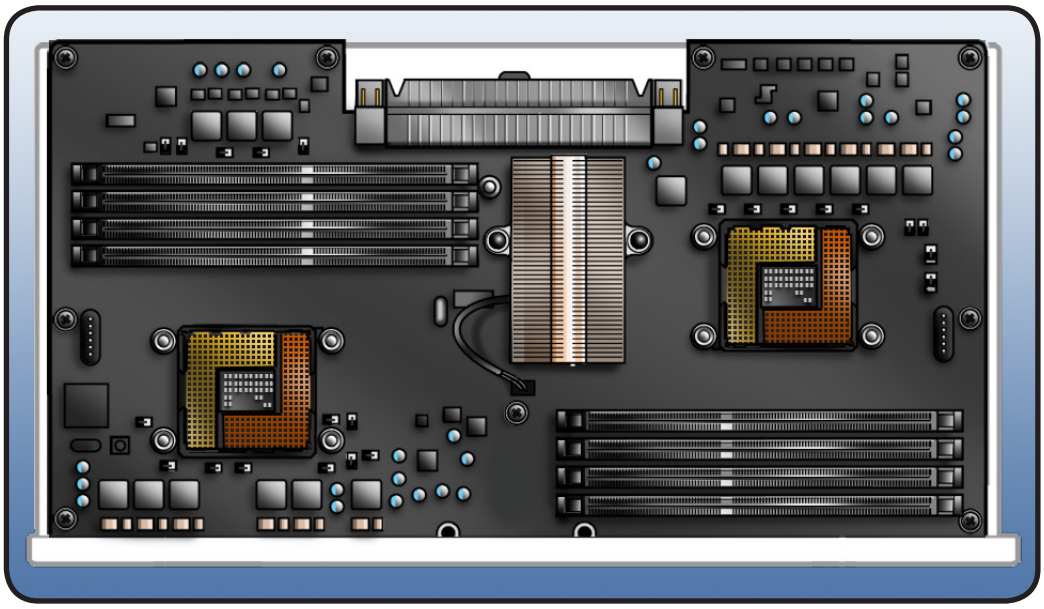


Processor Board, Dual

First Steps

Open computer, lay it down with access side facing up, and remove:

- Processor tray
- All memory DIMMs
- Processor heatsinks, dual
- Processors, dual



Important: Every time you remove a processor heatsink, you must replace the thermal grease on the processor below it. See "**Processor Heatsink, Dual**."

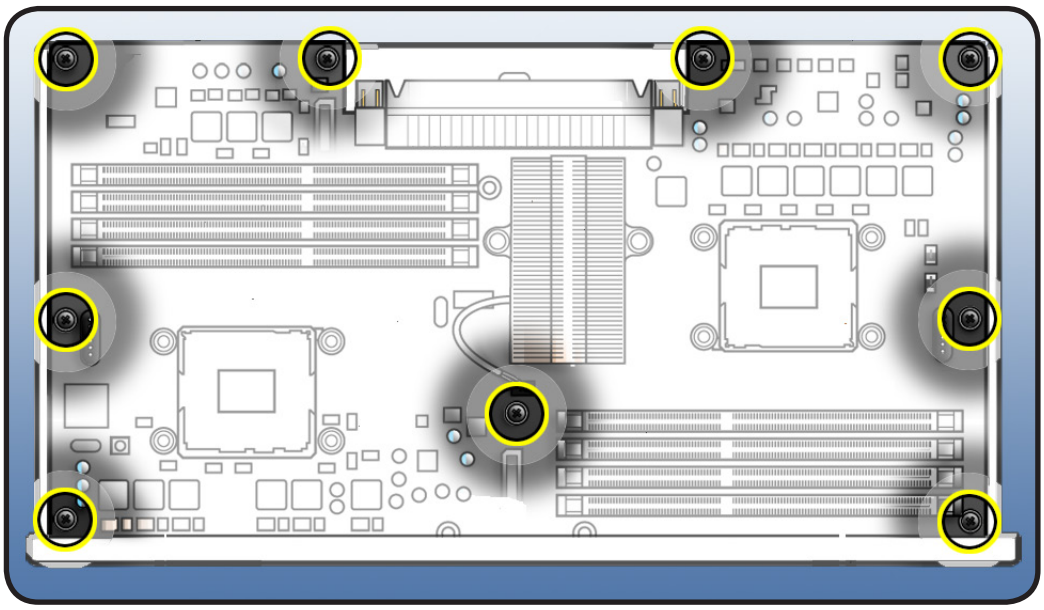
Tools

- ESD wrist strap
- Phillips #2 screwdriver

Removal

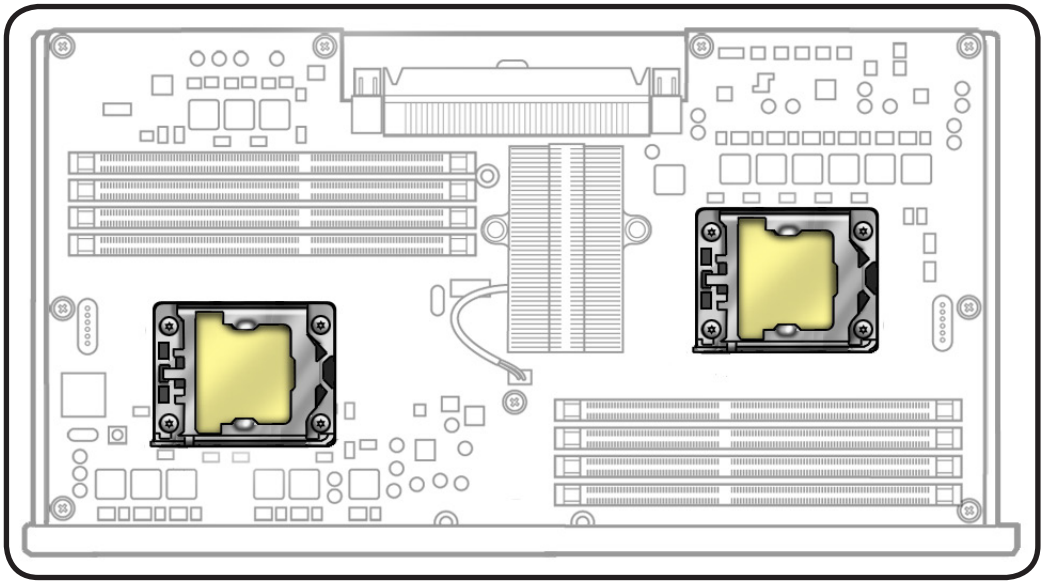
1 Remove **9** screws.

2 Remove board from tray.



Reassembly Note: If you are installing new processor board, remove protective caps from new board's processor connectors and transfer caps to original board's connectors. Note that processor boards returned to Apple without protective caps may be rejected.

Warning: Be careful not to touch gold pins in processor connectors on board.

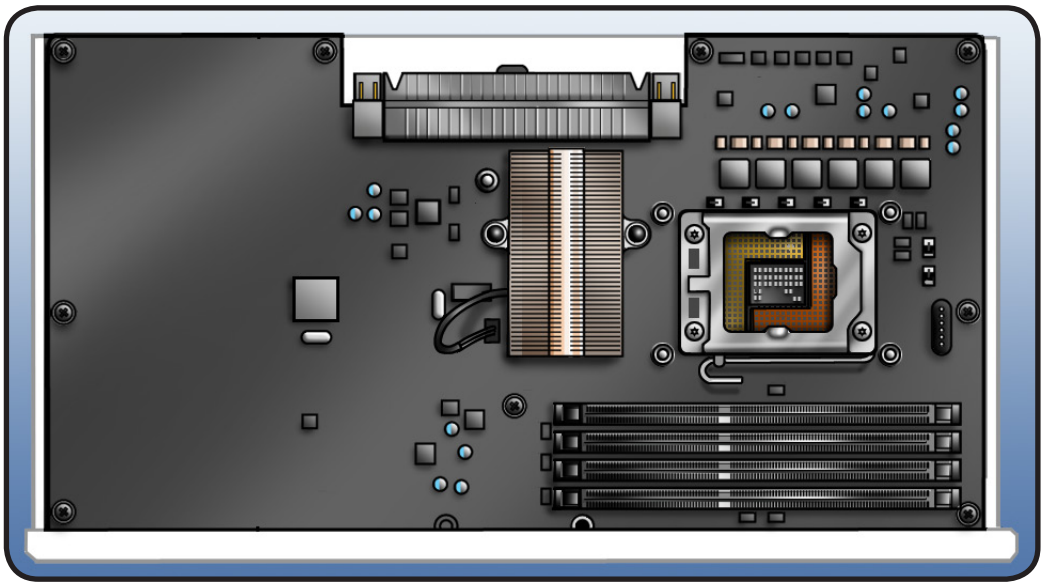


Processor Board, Single

First Steps

Open computer, lay it down with access side facing up, and remove:

- Processor tray
- All memory DIMMs
- Processor heatsink, single
- Processor, single



Important: Every time you remove a processor heatsink, you must replace the thermal grease on the processor below it. See "**Processor Heatsink, Single**."

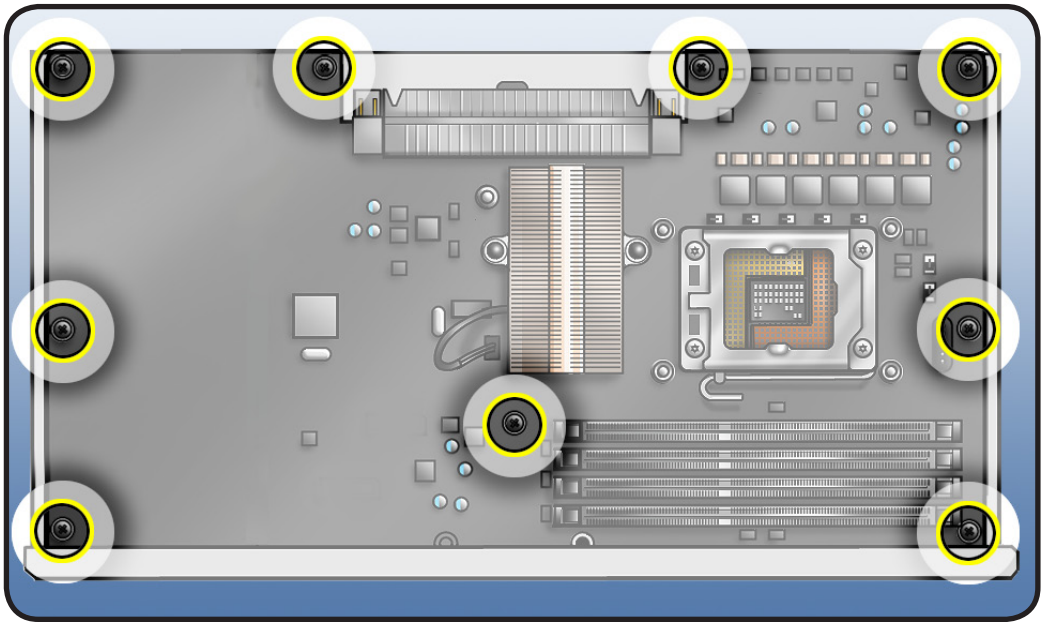
Tools

- ESD wrist strap
- Phillips #2 screwdriver

Removal

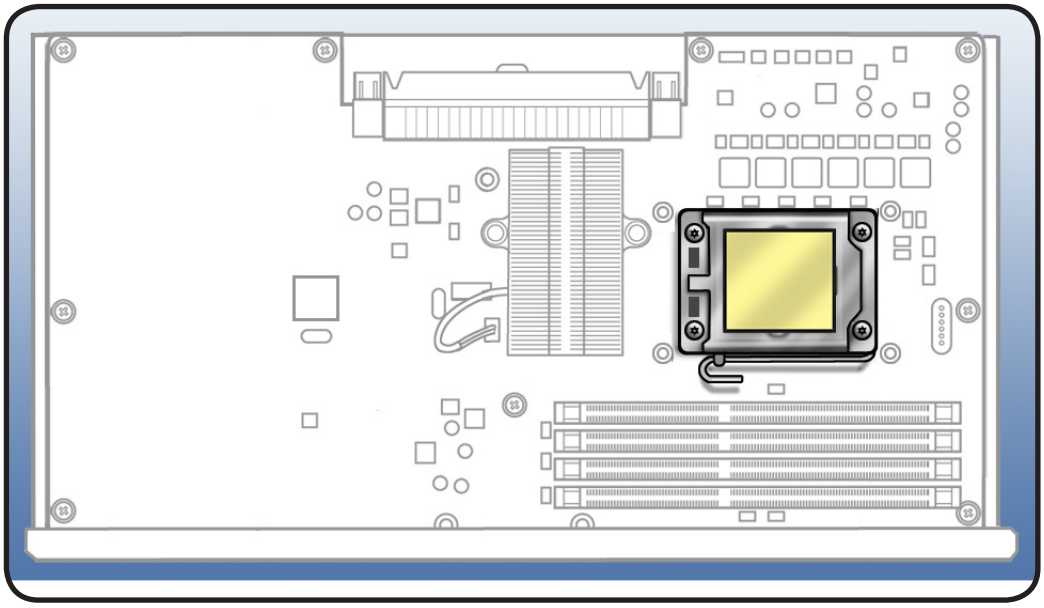
1 Remove **9** screws.

2 Remove card from board.



Reassembly Note: If you are installing new processor board, remove protective cap from new board's processor holder and transfer cap to original board's processor holder. Note that processor boards returned to Apple without protective caps may be rejected.

Warning: Be careful not to touch gold pins in processor connector on board.



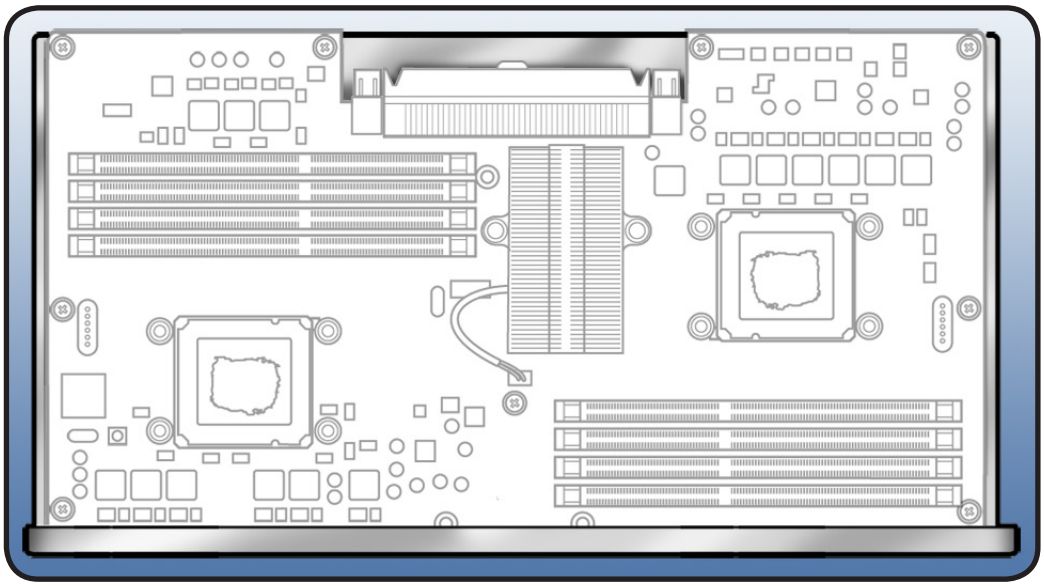
Processor Tray Support Plate

First Steps

Open computer, lay it down with access side facing up, and remove:

- Processor tray
- Processor heatsink, single
- Processor heatsink, dual

Note: Illustrations show Mac Pro (Mid 2010) dual-processor board. Procedure for single-processor configuration is the same. Support plate is identical for both configurations.



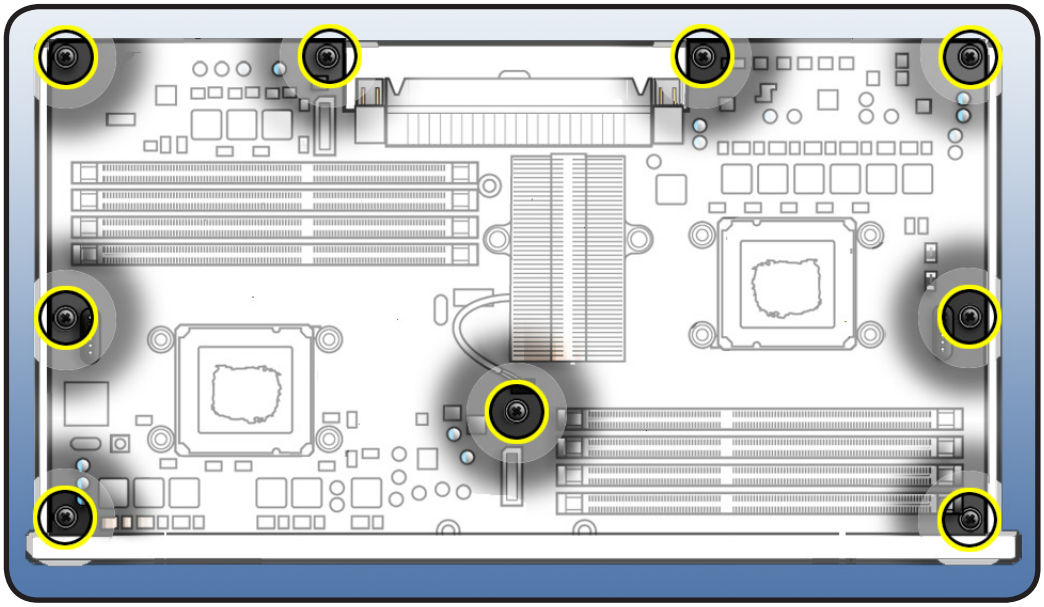
Tools

- ESD wrist strap
- Phillips #2 screwdriver

Removal

1 Remove **9** screws.

2 Remove support plate from board.

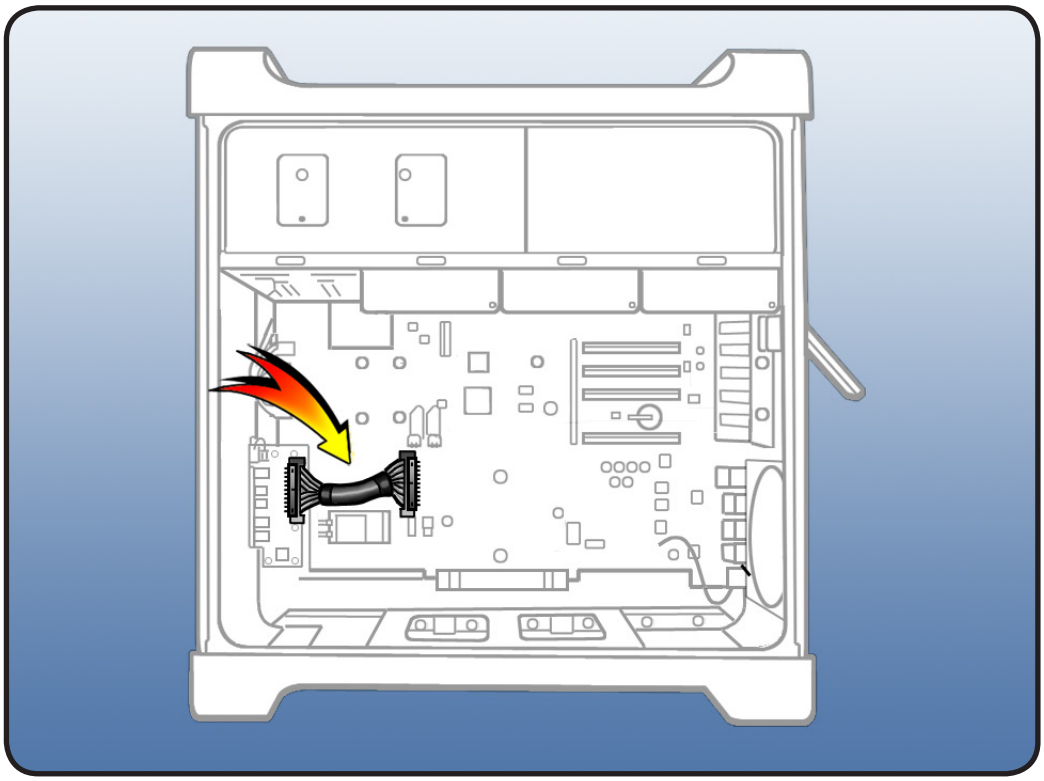


Front-Panel-Board-to-Backplane-Board Cable

First Steps

Open computer, lay it down with access side facing up, and remove:

- Hard drive and drive carrier in drive bay 1
- Graphics card in slot 1
- PCIe fan
- Processor tray
- Processor cage



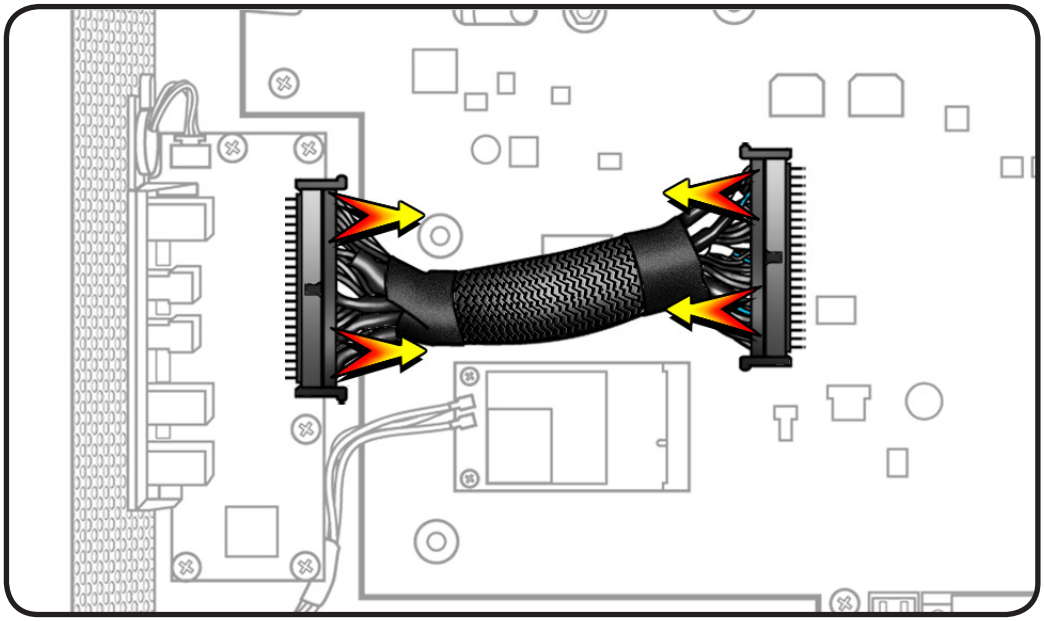
Tools

- ESD wrist strap

Removal

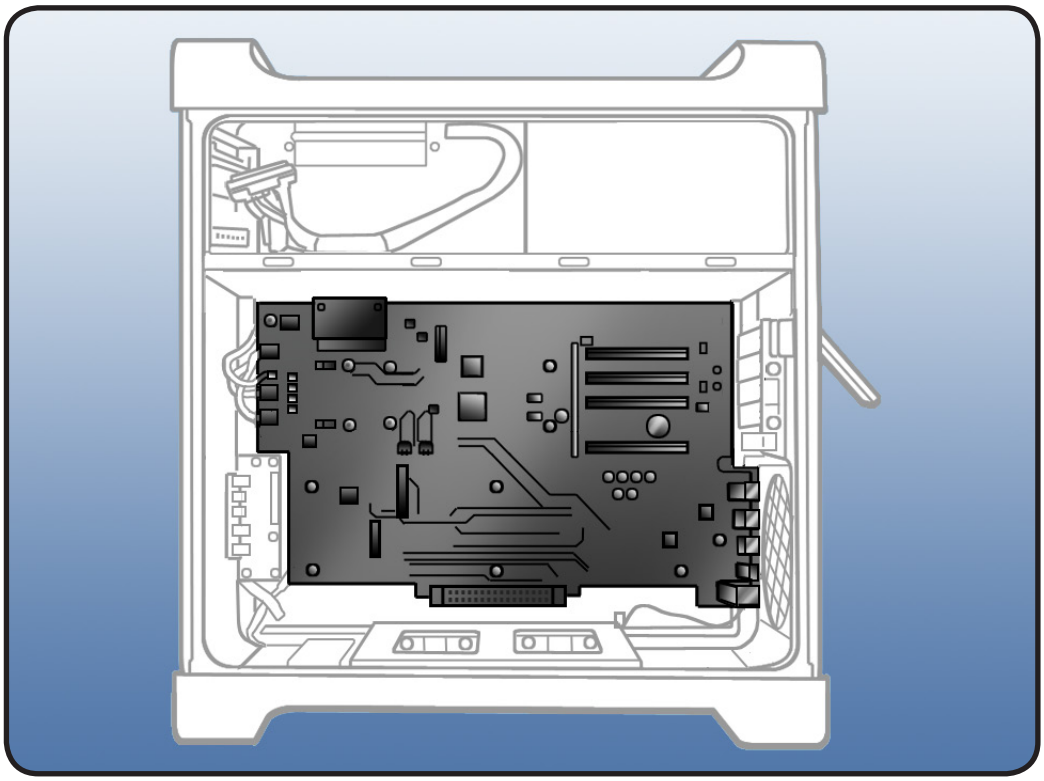
1 Disconnect cable from front panel board and backplane board.

2 Remove cable from enclosure.



Backplane Board

First Steps



Open computer, lay it down with access side facing up, and remove:

- All hard drives and drive carriers
- Optical drive carrier and optical drives
- PCIe fan
- All PCI Express cards
- Processor tray
- Processor cage
- Front-panel-board-to-backplane-board cable

Disconnect power supply cable from backplane board. Refer to Power Supply in Take Apart.

In addition, disconnect the antenna wires from the following:

- AirPort Card
- Bluetooth card

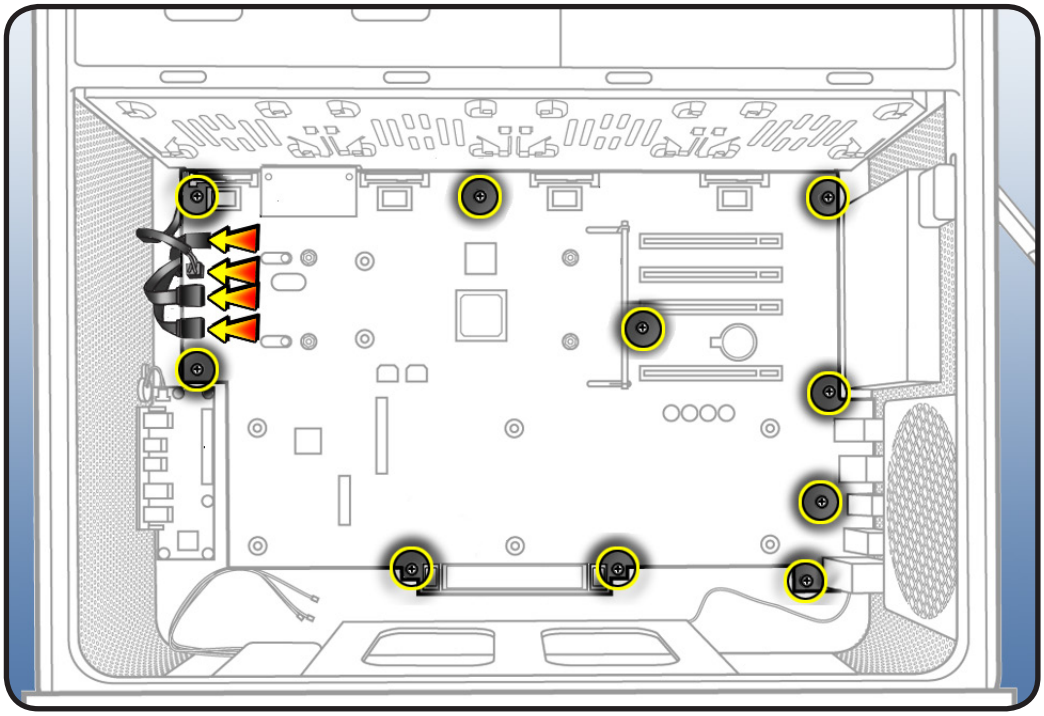
Tools

- ESD wrist strap
- Phillips #2 screwdriver

Removal

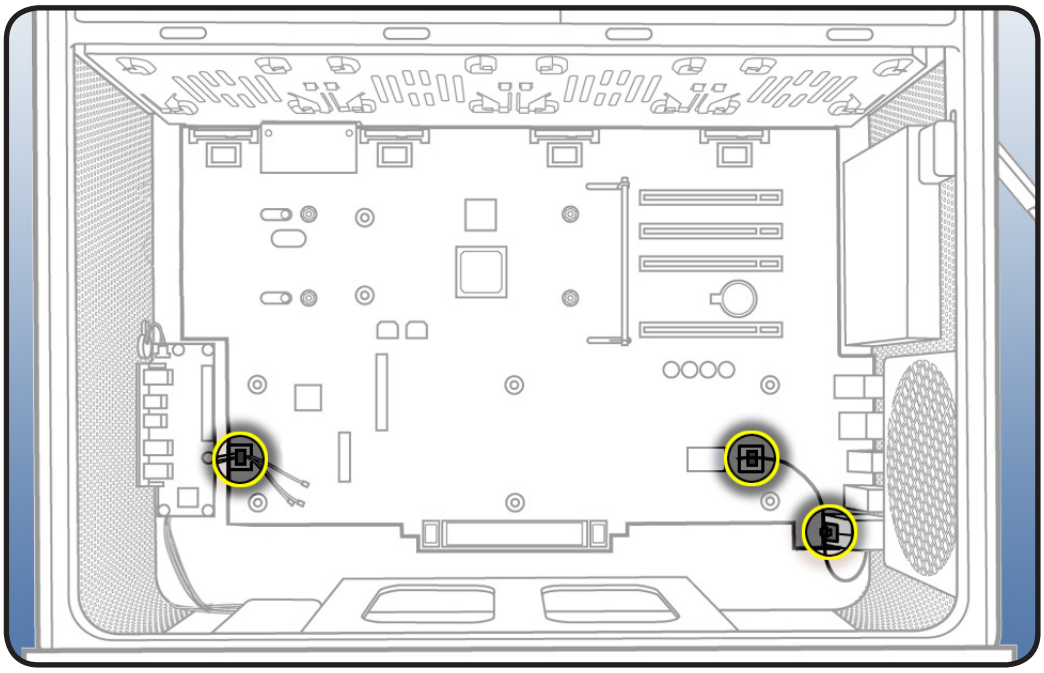
1 Disconnect **4** cables.

2 Remove **10** screws.



3 Release AirPort antenna wires from **1** clip on backplane board.

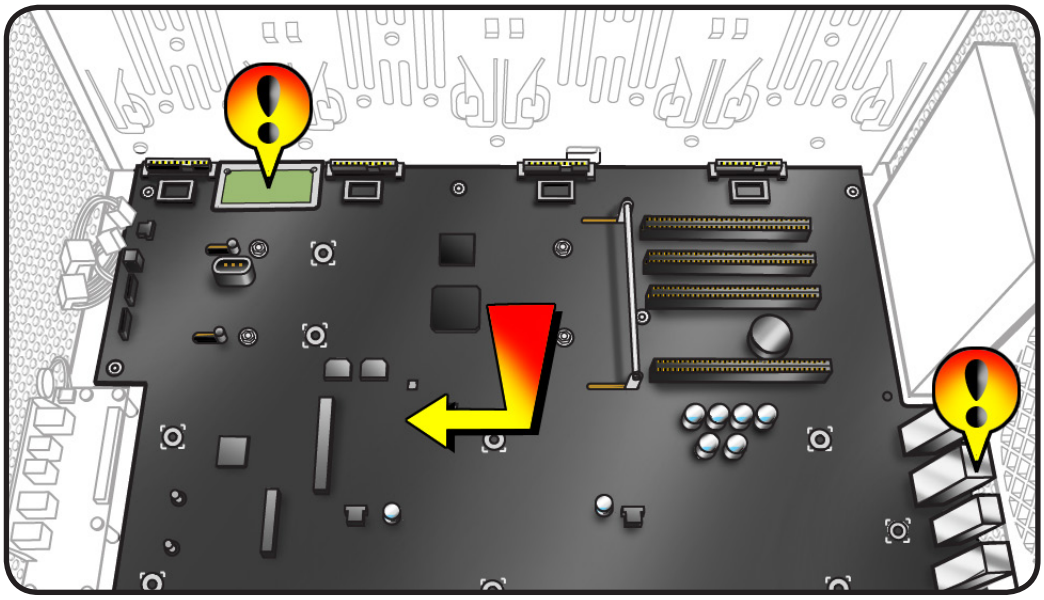
4 Release Bluetooth antenna wire from **2** clips on backplane board.



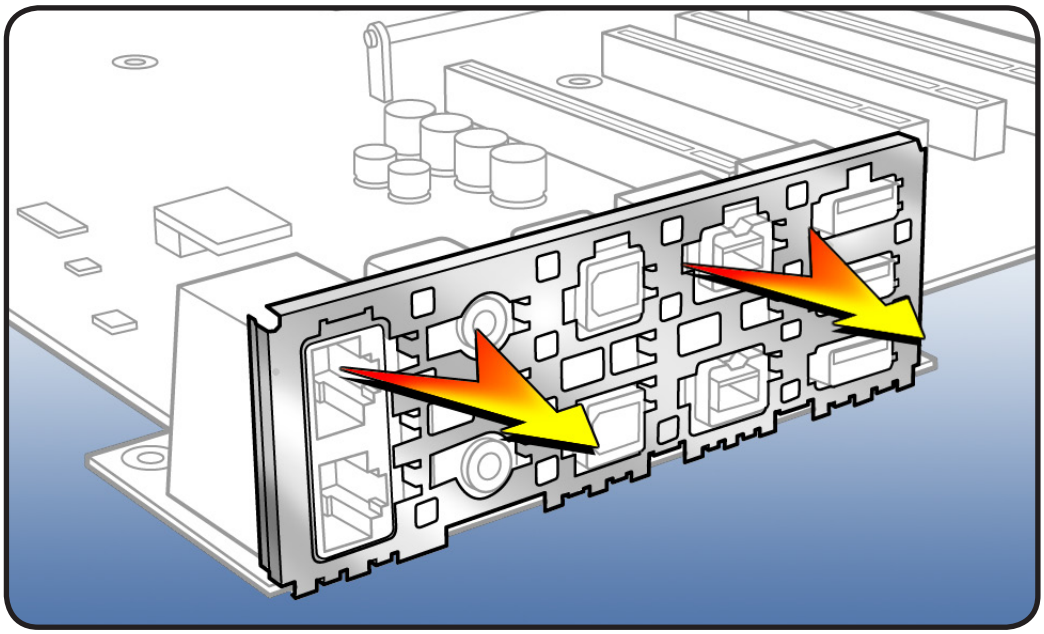
5 Slide board down so that its power connector clears media shelf.

6 Slide board toward front of computer, so that its ports clear openings in back panel.

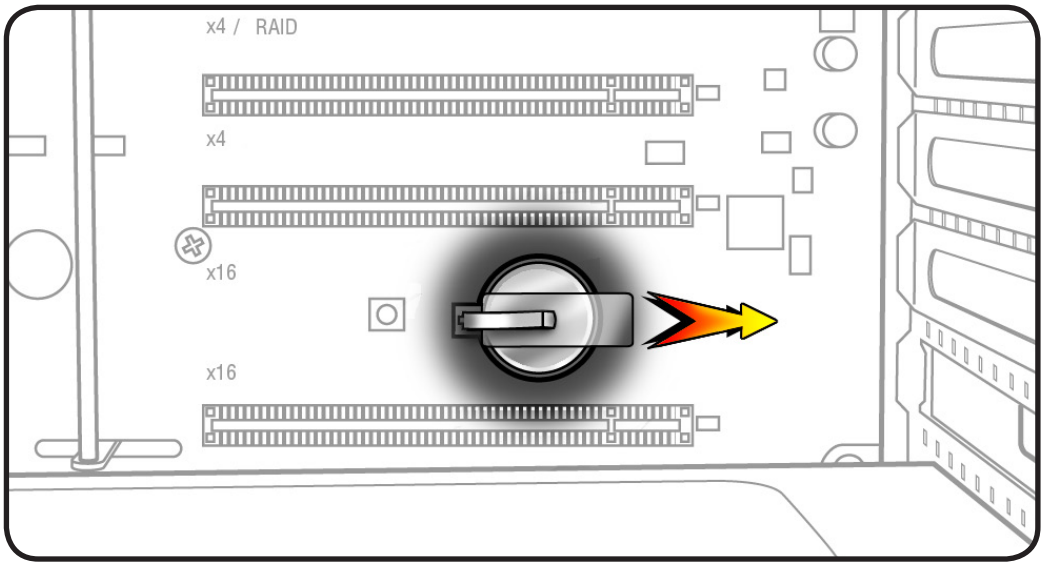
7 Lift board out of enclosure.



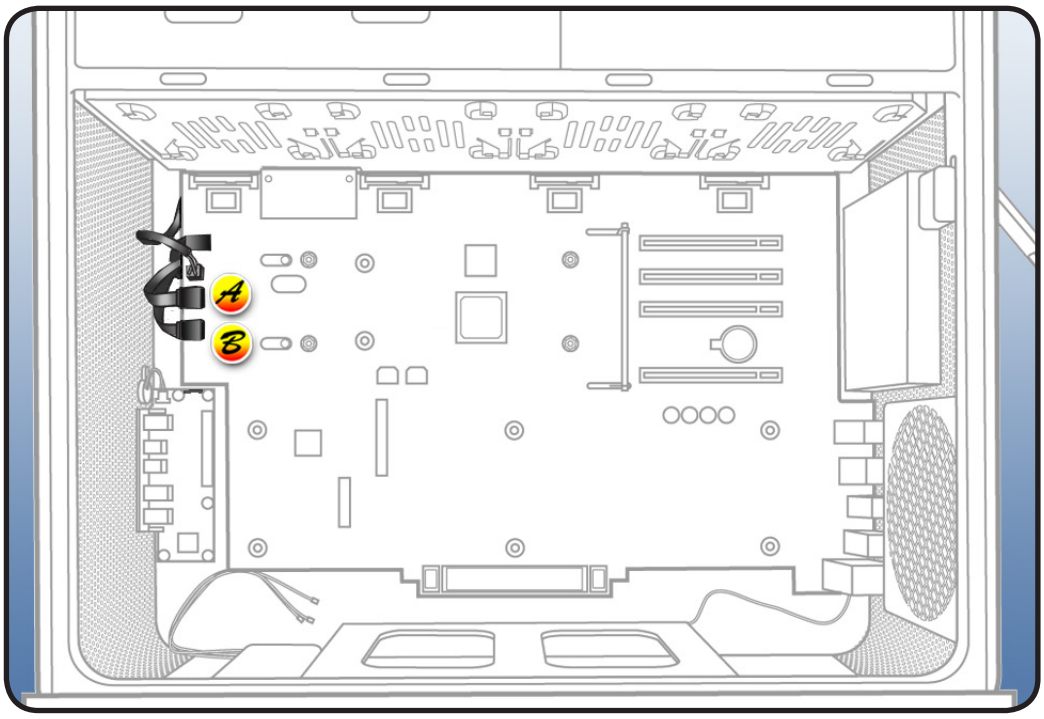
Note: If you are replacing backplane board with a new board, transfer back ports EMI shield from original board to replacement board. Also transfer PCI cards and AirPort card (if installed). You do not need to transfer Bluetooth card to new board; it comes with Bluetooth card already installed.



Note: If you are replacing backplane board with a new board, remove protective film from top of battery.



Reassembly Note: Connect optical drive cable **A** to connector **A** on backplane board; connect optical drive cable **B** to connector **B** on backplane board

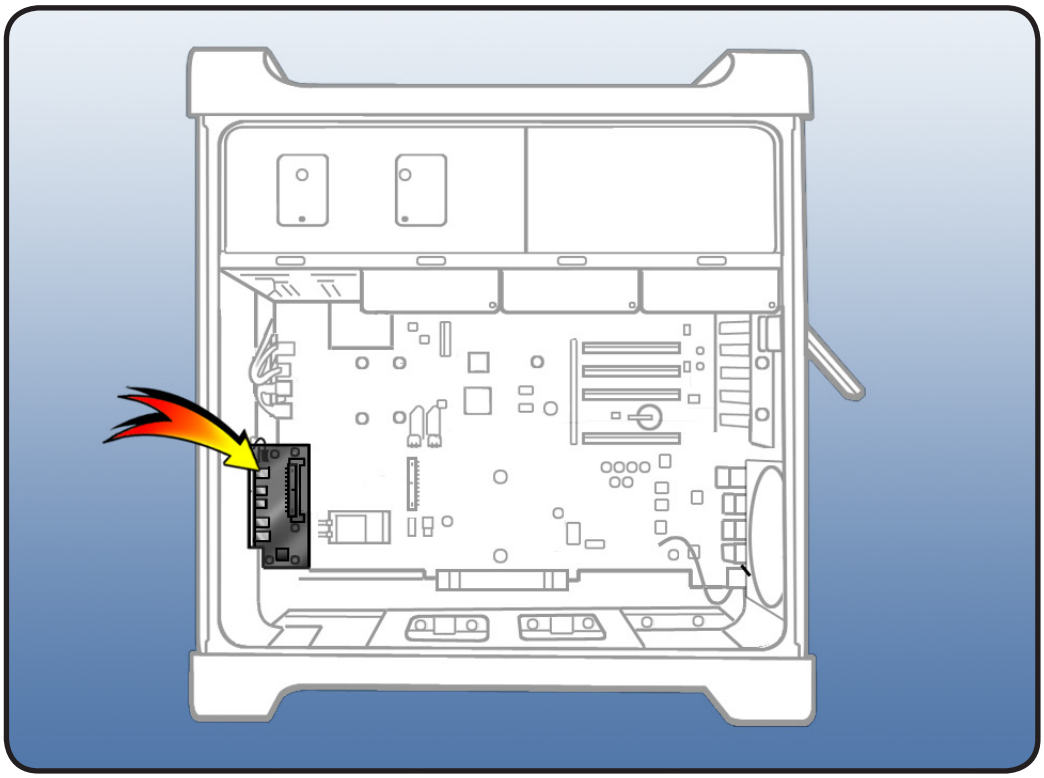


Front Panel Board

First Steps

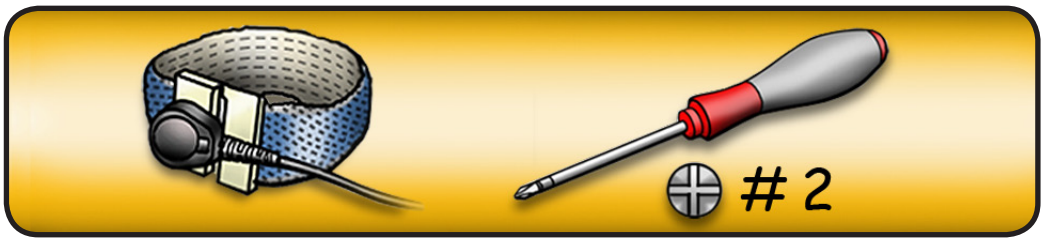
Open computer, lay it down with access side facing up, and remove:

- Hard drive and drive carrier in drive bay 1
- Graphics card in slot 1
- PCIe fan
- Processor tray
- Processor cage
- Front-panel-board-to-backplane-board cable



Tools

- ESD wrist strap
- Phillips #2 screwdriver

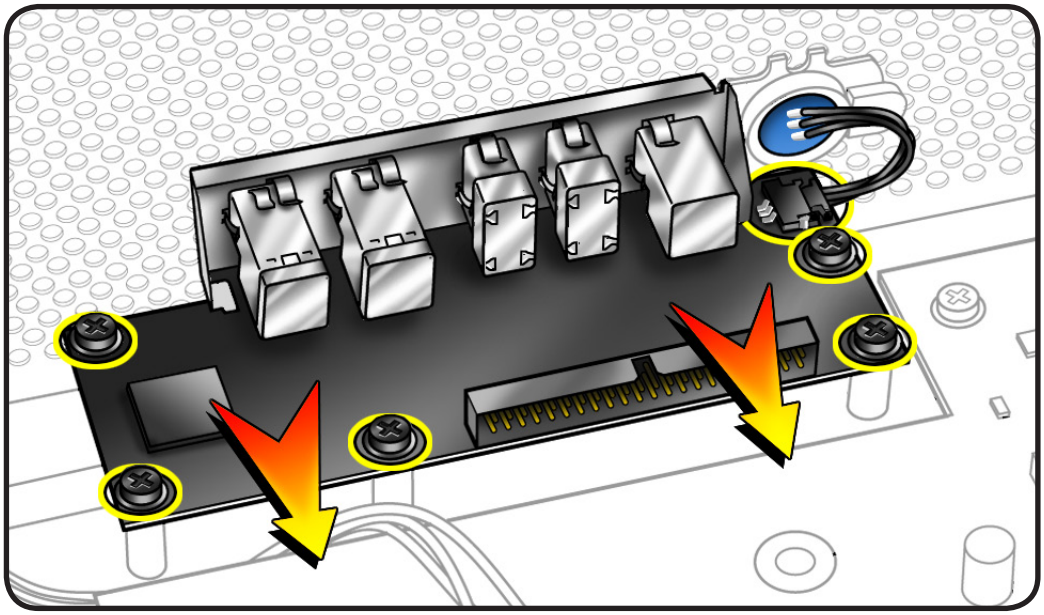


Removal

1 Disconnect power button cable from front panel board.

2 Remove **5** screws.

3 Remove board from enclosure.

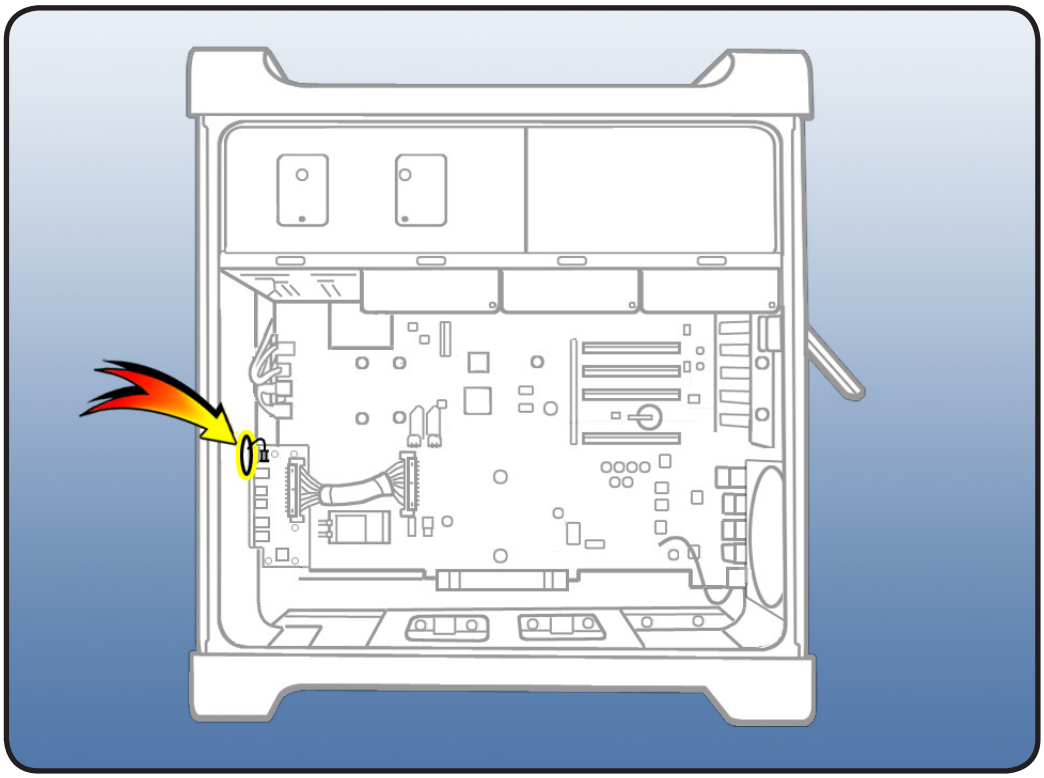


Power Button

First Steps

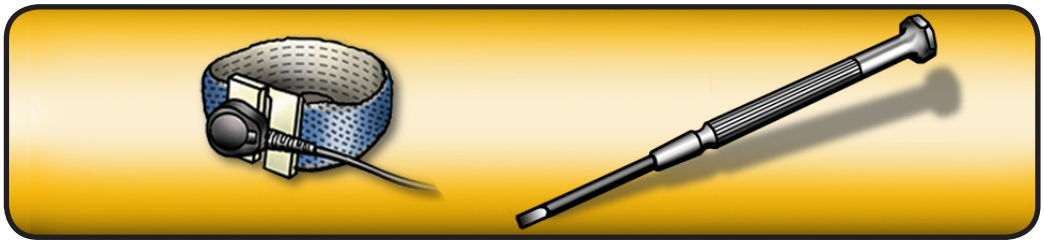
Open computer, lay it down with access side facing up, and remove:

- Hard drive and drive carrier in drive bay 1
- Graphics card in slot 1
- PCIe fan
- Processor tray
- Processor cage
- Front-panel-board-to-backplane-board cable



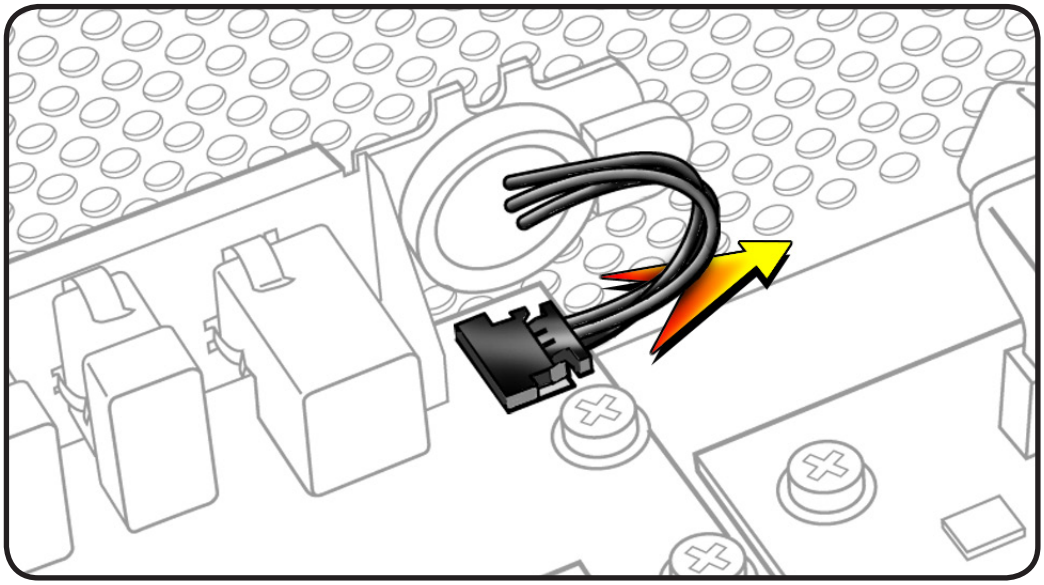
Tools

- ESD wrist strap
- Jeweler's flatblade screwdriver



Removal

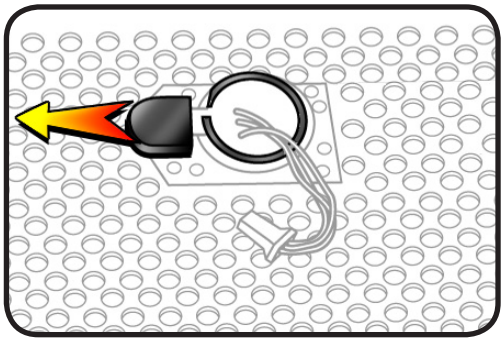
1 Disconnect power button cable from front panel board.

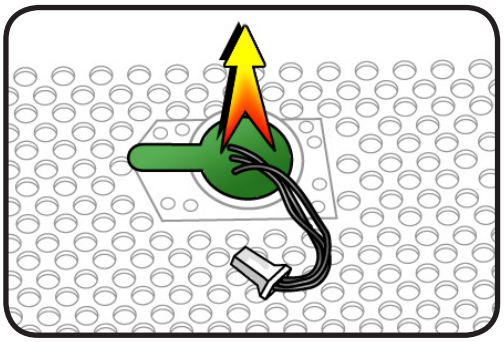


2 Lay computer so that front panel is facing down.

3 Remove black cap.

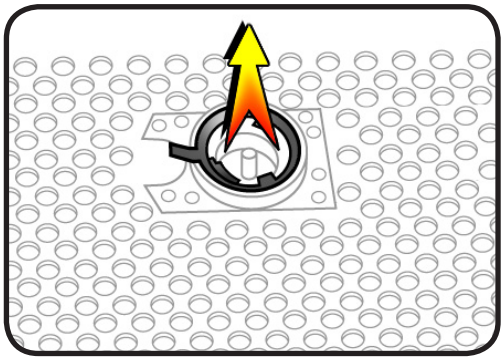
4 Using jeweler's flatblade screwdriver, pry up metal C-ring.

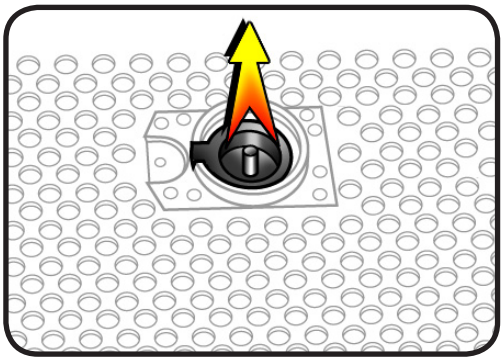




5 Remove power button board.

6 Remove metal activation ring.





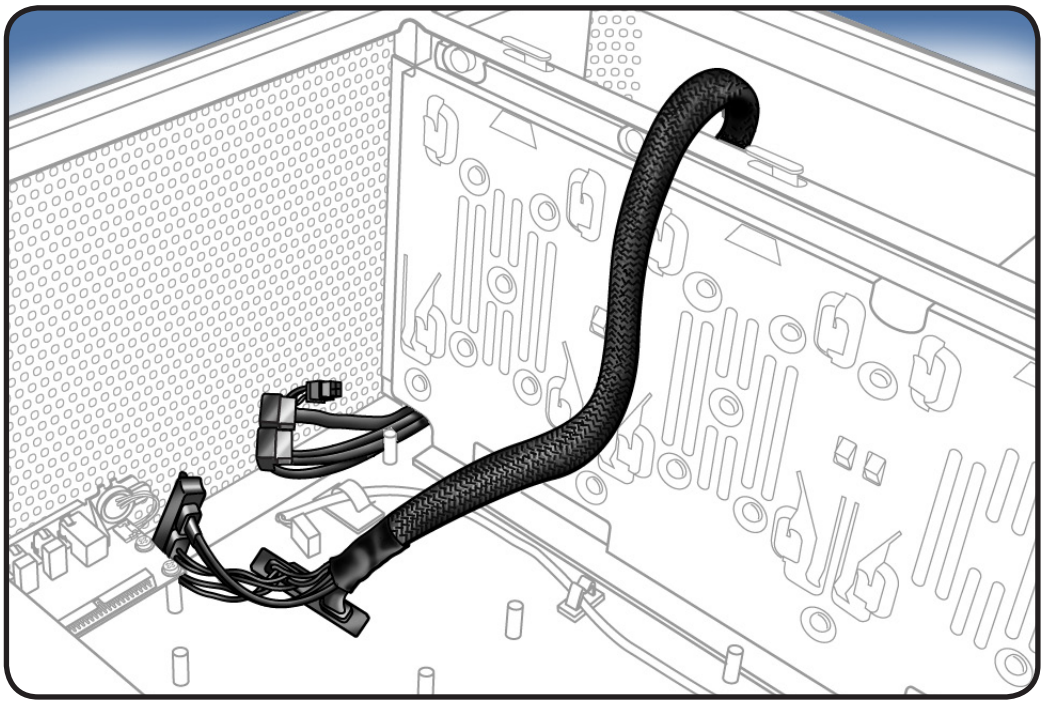
7 Remove power button.

Optical Drive Cable Harness

First Steps

Open computer, lay it down with access side facing up, and remove:

- All hard drives and drive carriers
- Optical drive carrier and optical drives
- PCIe fan
- All PCI Express cards
- Processor tray
- Processor cage
- Front-panel-board-to-backplane-board cable
- Backplane board



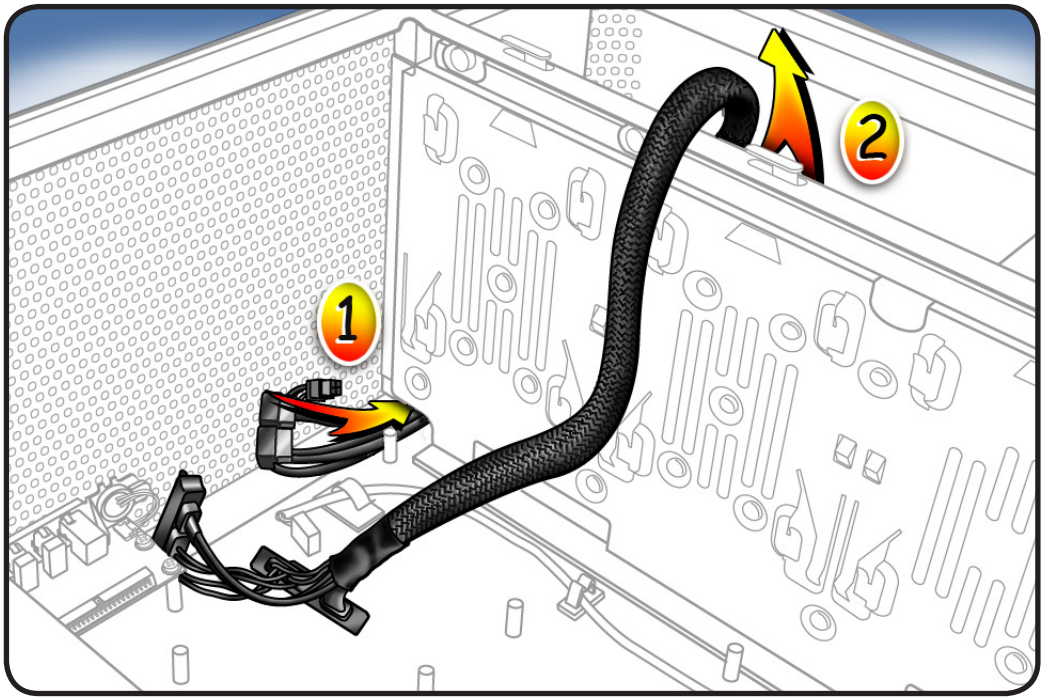
Tools

- ESD wrist strap

Removal

1 Insert backplane-board connectors on cable harness through opening in media shelf.

2 Remove cable harness from enclosure.

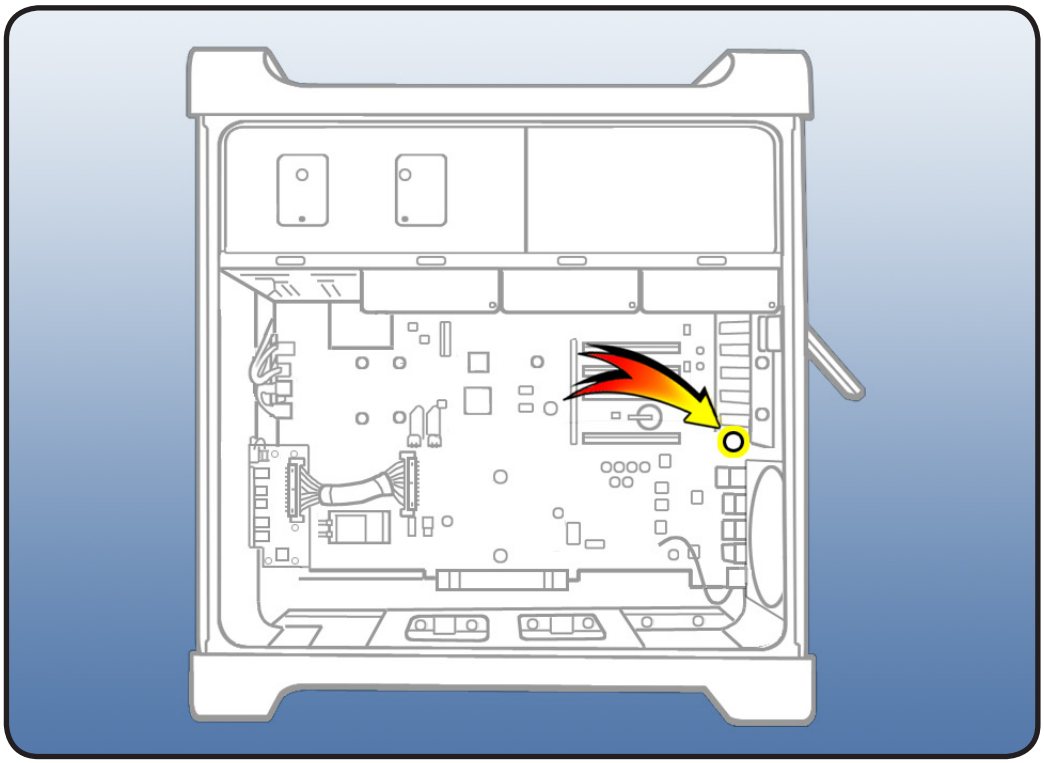


Bluetooth Antenna Board with Cable

First Steps

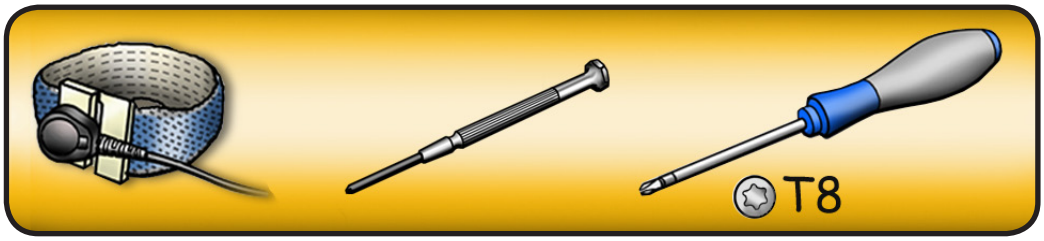
Open computer, lay it down with access side facing up, and remove:

- All hard drives and drive carriers
- Optical drive carrier and optical drives
- PCIe fan
- All PCI Express cards
- Processor tray
- Processor cage
- Front-panel-board-to-backplane-board cable
- Backplane board



Tools

- ESD wrist strap
- Jeweler's Phillips screwdriver
- Long-handled, magnetized T8 torx screwdriver

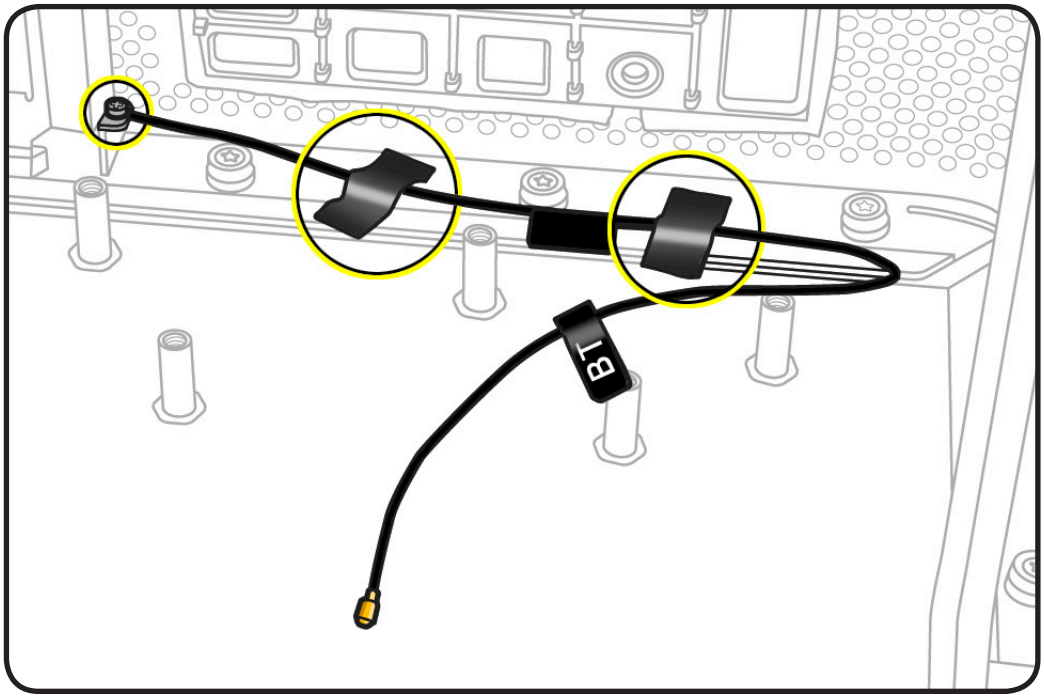


Removal

1 Remove antenna board mounting screw.

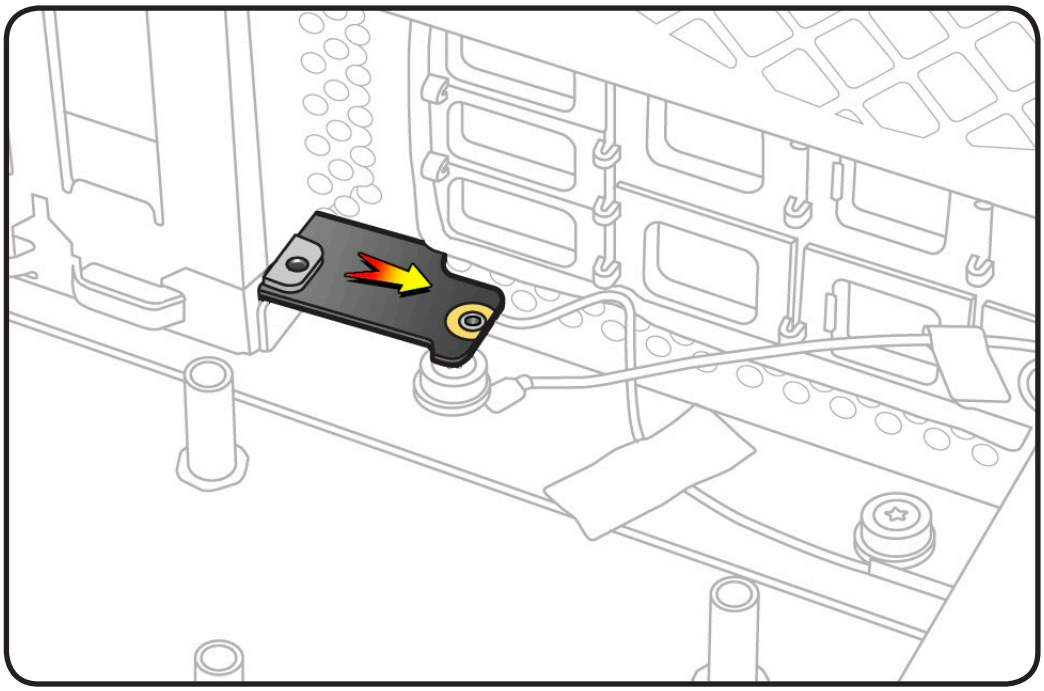
2 Remove tape holding Bluetooth cable to enclosure.

Note: If a metal loop is attached to Bluetooth antenna cable, remove enclosure screw that secures loop. See **Reassembly steps 3-6**.



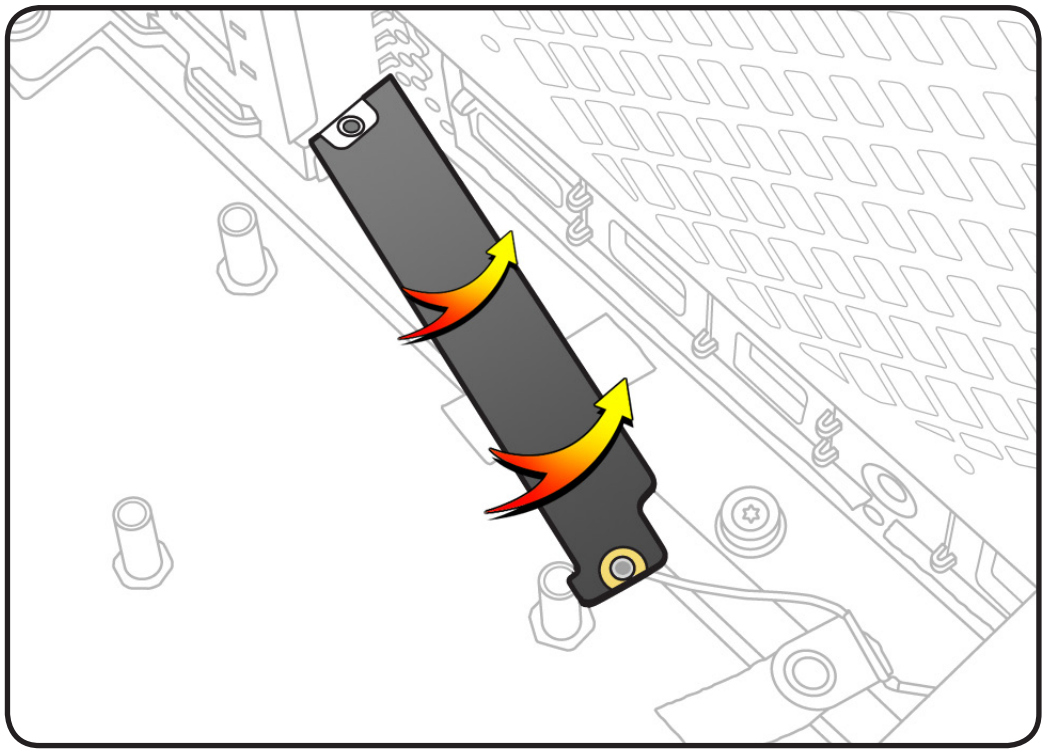
3 Gently grasp Bluetooth antenna board and pull it out of its mounting.

4 Remove antenna board and cable from enclosure.

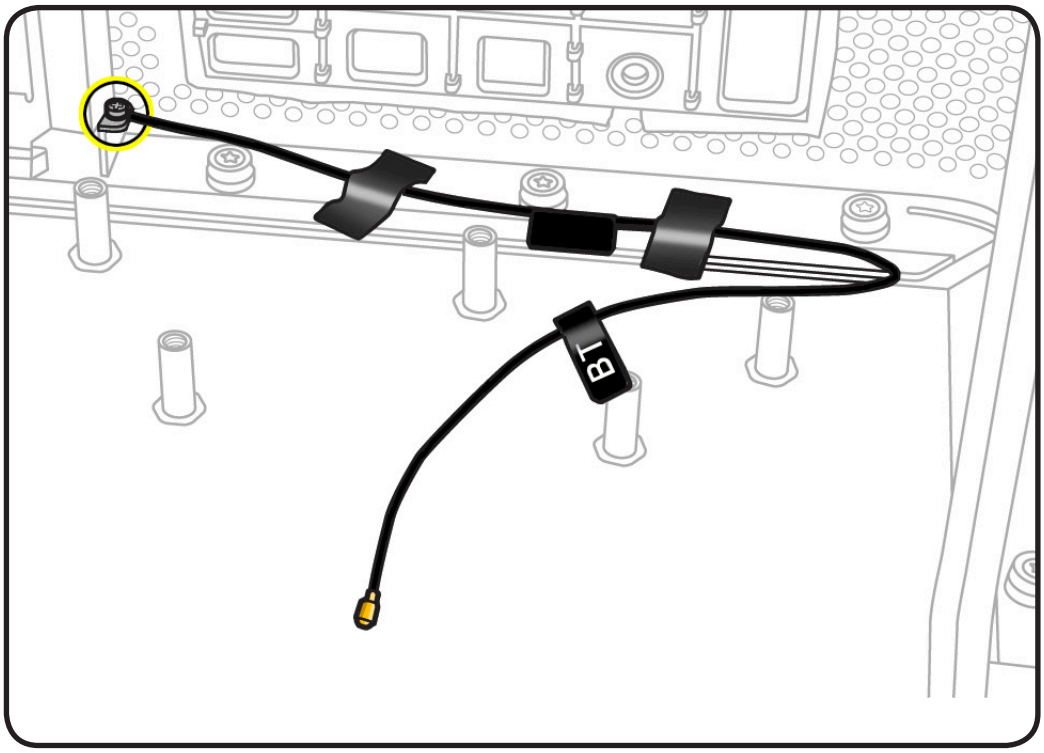


Reassembly

1 Insert replacement antenna board at an angle into its mounting. Then straighten out board and insert fully.

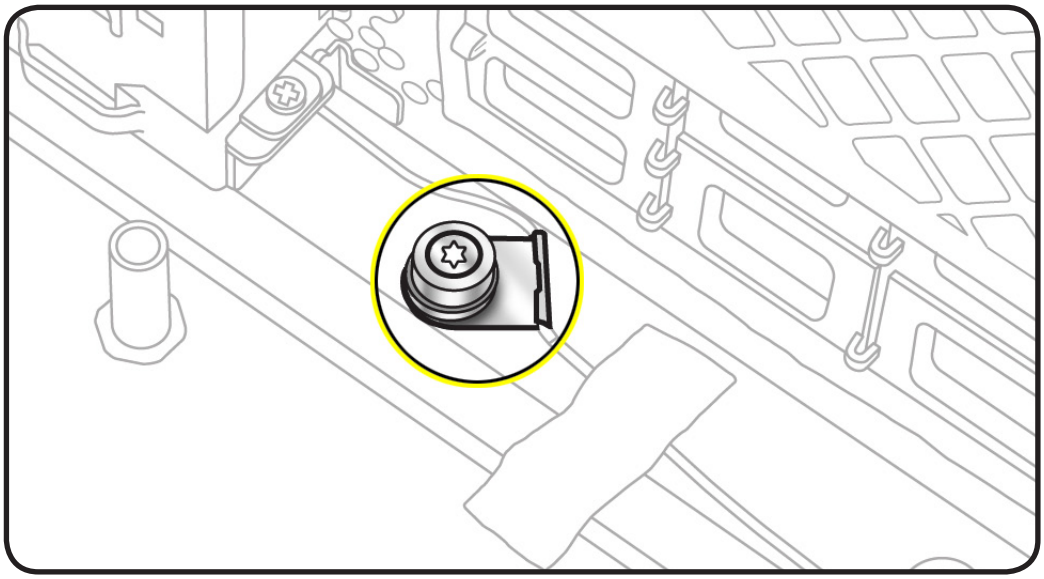


2 Replace antenna board mounting screw.

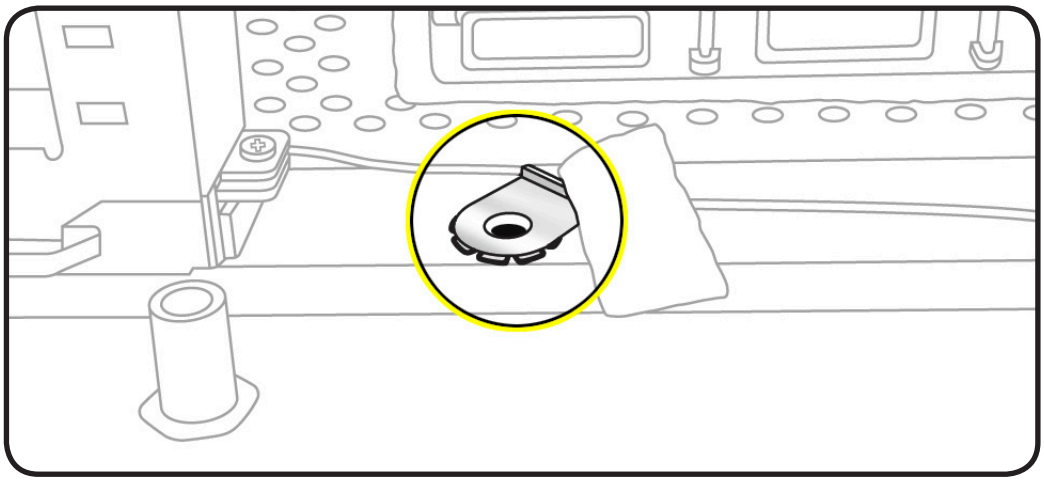


Note: A metal grounding loop is attached to the replacement antenna board cable. Do the following to ground the loop to the enclosure:

3 Using a T8 torx screwdriver, remove the enclosure screw indicated.



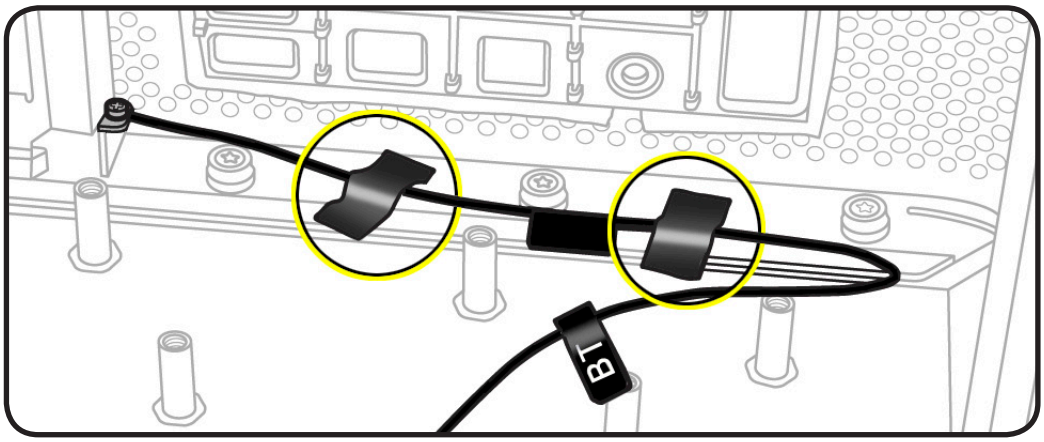
4 Place washer (included with replacement antenna board) face up over screw hole.



5 Place grounding loop over washer.

6 Reinstall enclosure screw.

7 Replace tape that secures cable to enclosure. If you cannot reuse the original tape, use Kapton tape.



Apple Technician Guide

Views

Mac Pro (Mid 2010)

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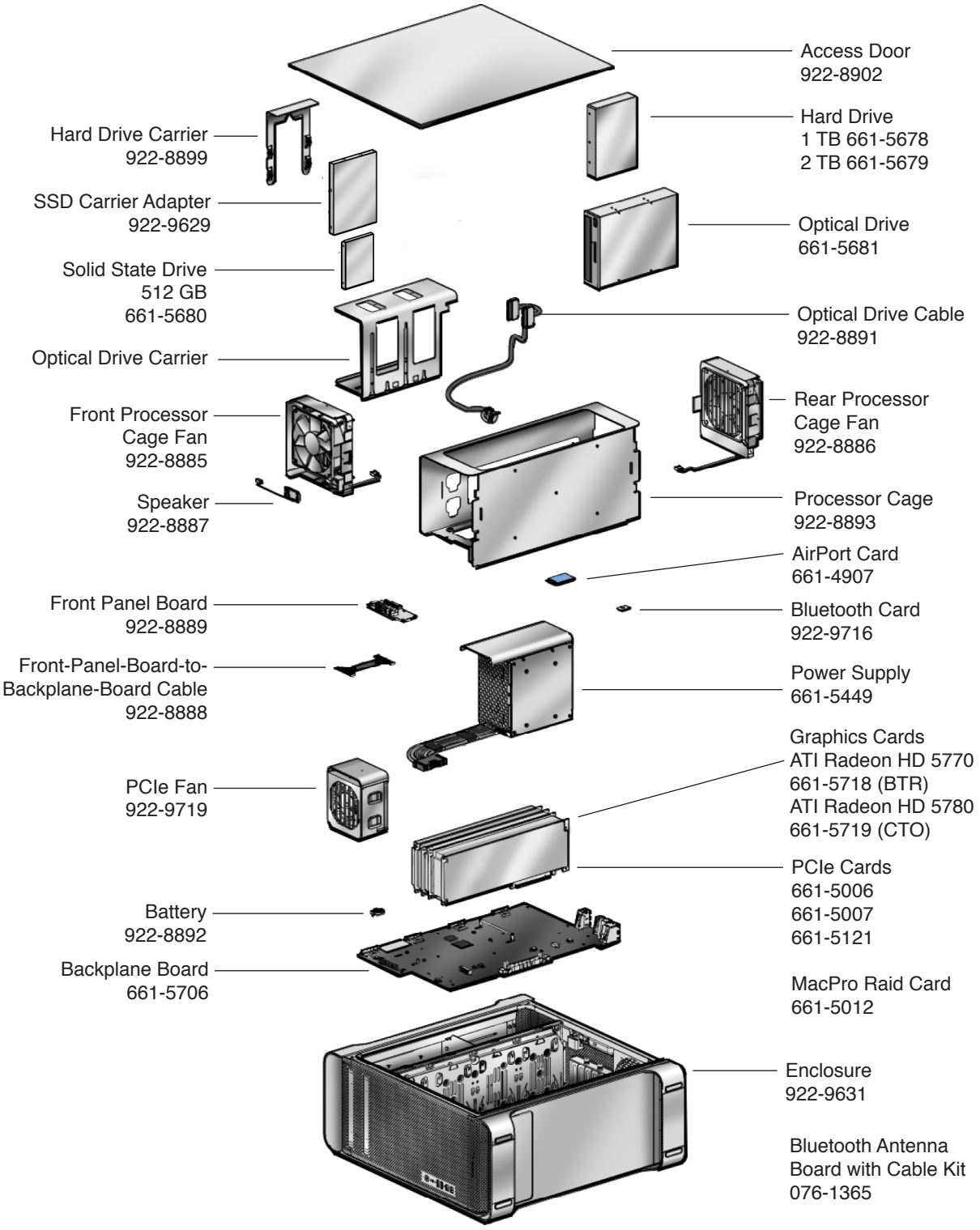
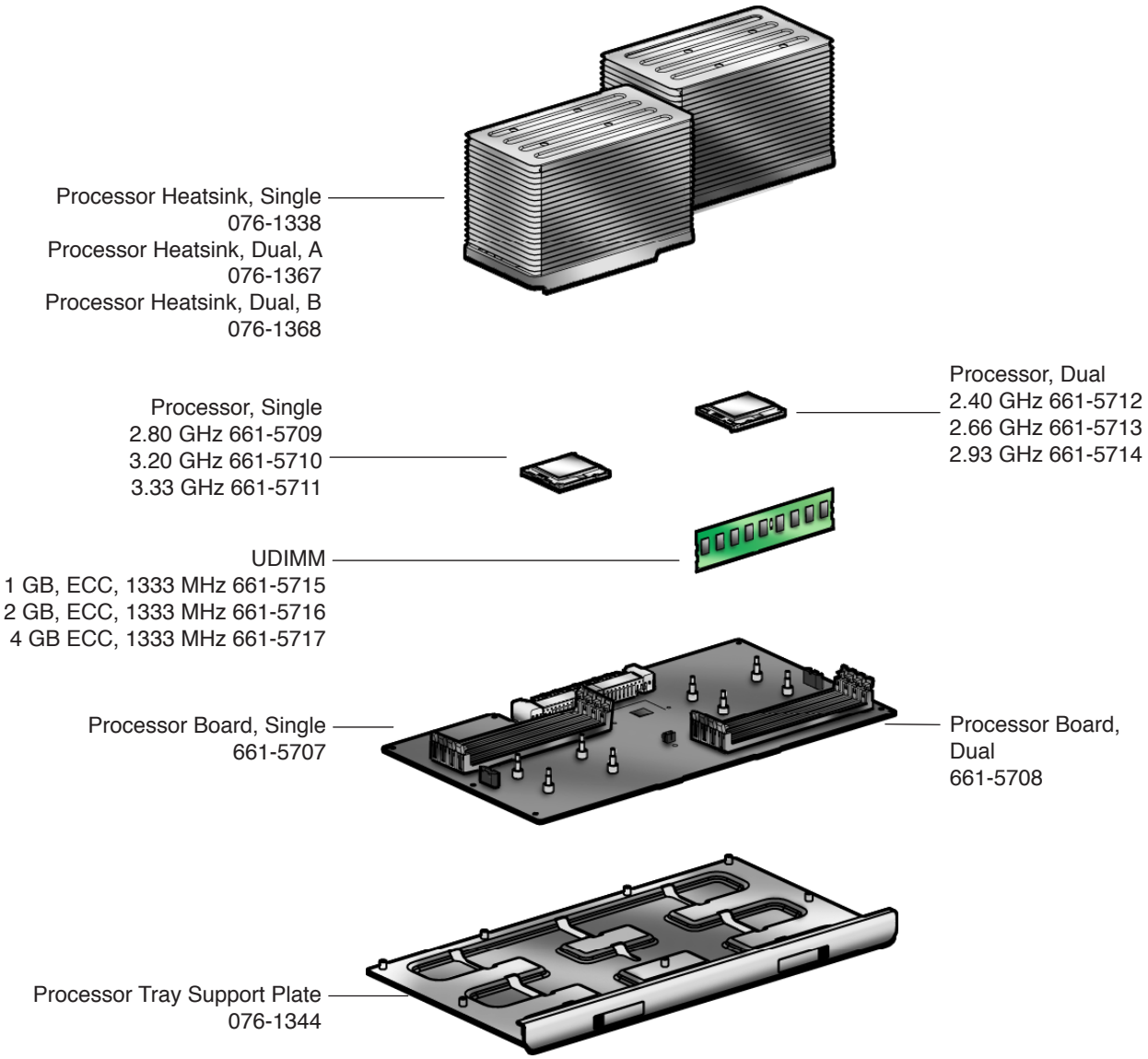
Exploded Views

Exploded View 1

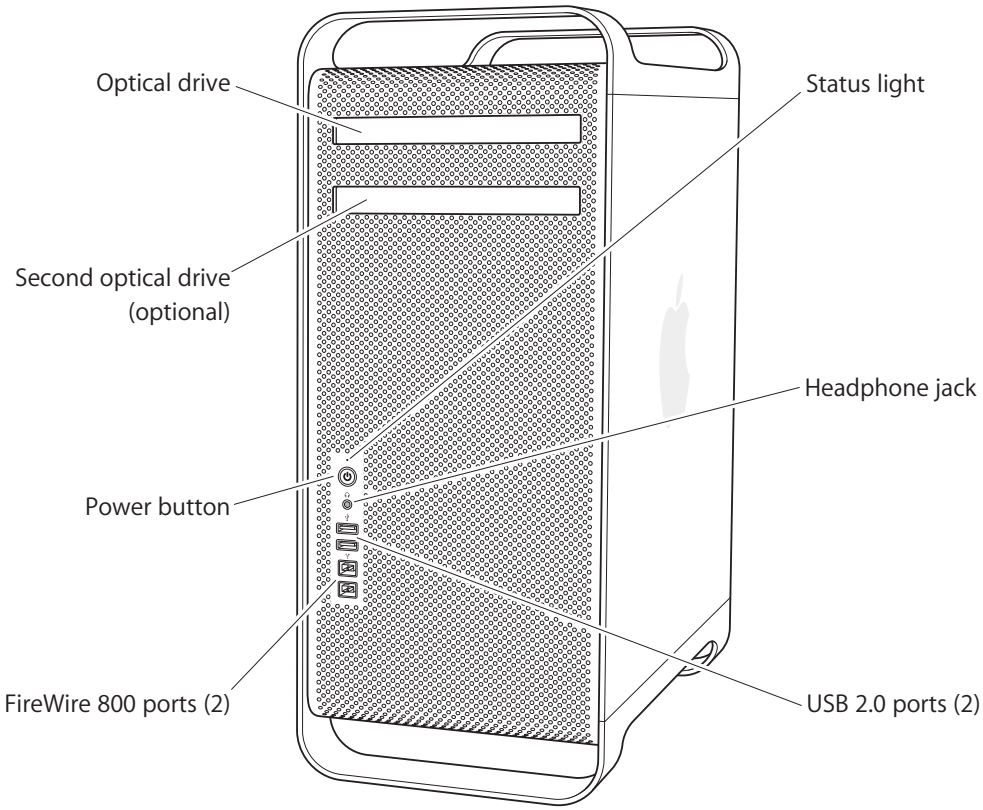


Exploded View 2

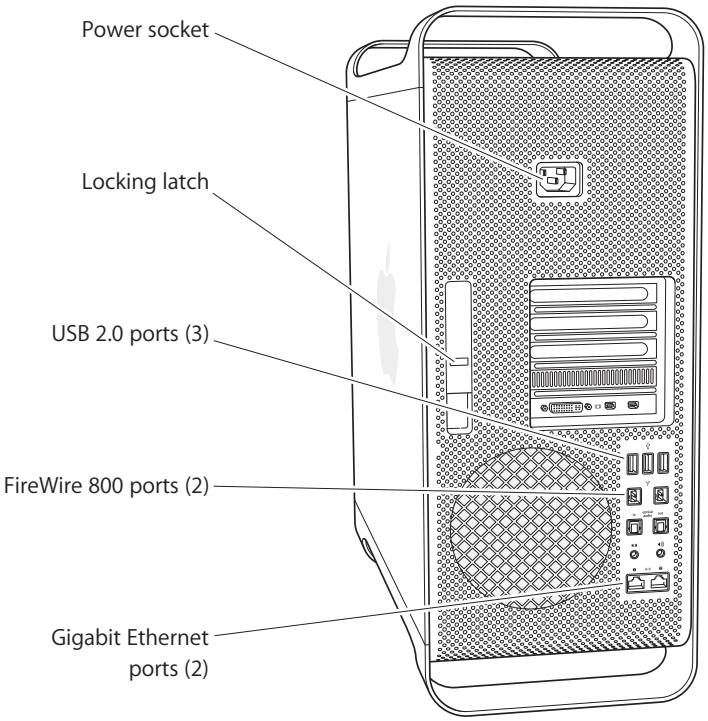


External Views

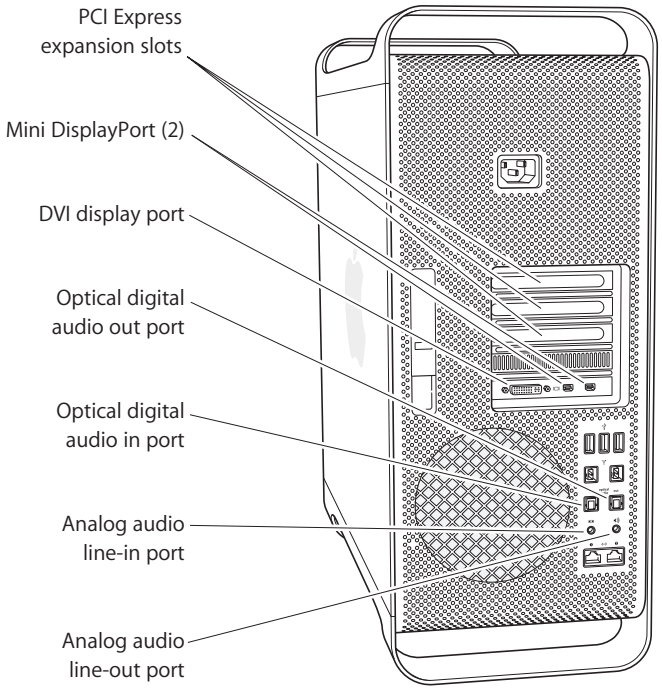
Front View



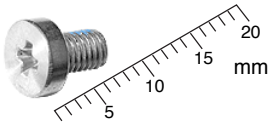
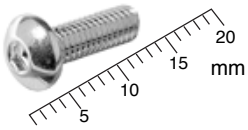
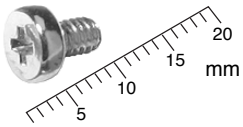
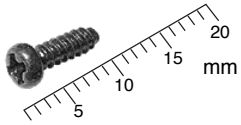
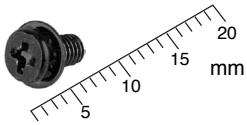
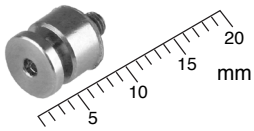
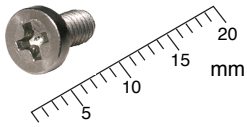
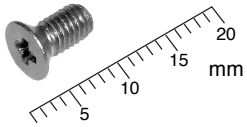
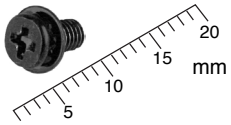
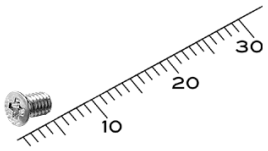
Rear View 1



Rear View 2



Screw Matrix

922-7703  Optical drive	**922-7704**  Power supply	**922-7734**  AirPort/Bluetooth card
922-7756  Speaker	**922-8896**  Backplane board, processor board	**922-9011**  Processor board cage
922-9007  Cover for power supply cables	**922-9630**  SSD Carrier Adapter	**922-9706**  PCIe Fan
922-7705  Antenna Board		