
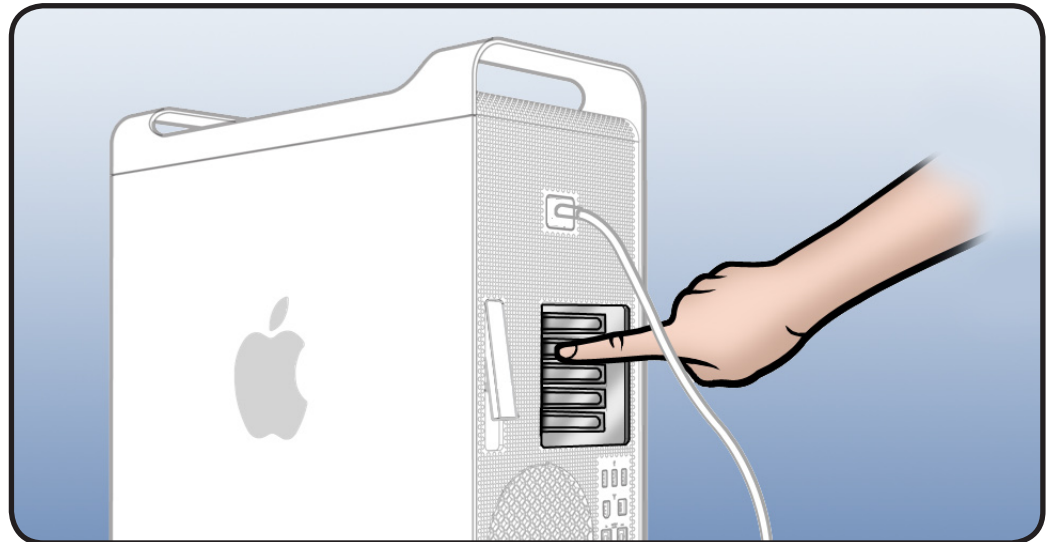


# Memory DIMMs Replacement Instructions


## First Steps

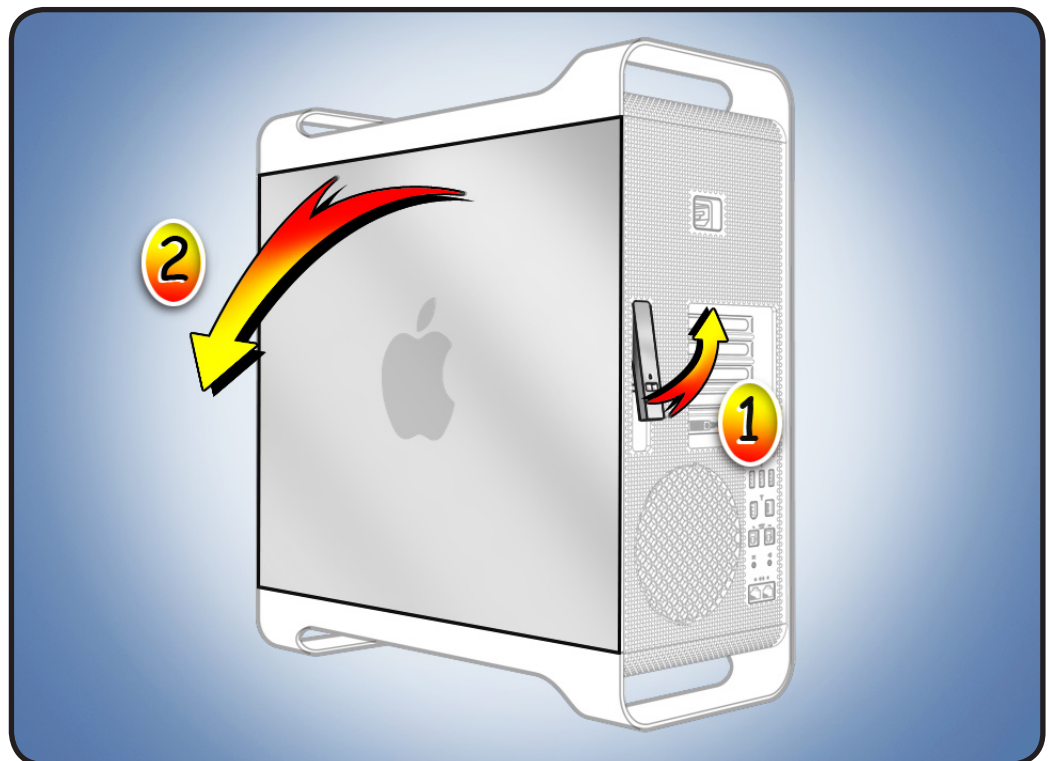
**Note:** Follow these instructions carefully. Failure to do so could damage your equipment and void its warranty.

- 1 Shut down computer.
- 2 Wait 10 minutes.
-  **Warning:** Parts inside computer can be very hot. Allow computer to cool down before continuing.
- 3 Unplug all external cables except power cord.
- 4 Touch metal PCI cover on back of computer.
- 5 Unplug power cord.



## Opening the Computer

- 1 Hold side access panel and lift latch on back of computer.
-  **Warning:** Edges of access panel and enclosure can be sharp. Be careful when handling.
- 2 Remove access panel and place it on flat surface covered by soft, clean cloth.



## Memory Configuration

DIMMs reside on the computer's processor board, which is laid out in two configurations. Check the illustrations on this page to determine if you have a quad-core or 8-core configuration.

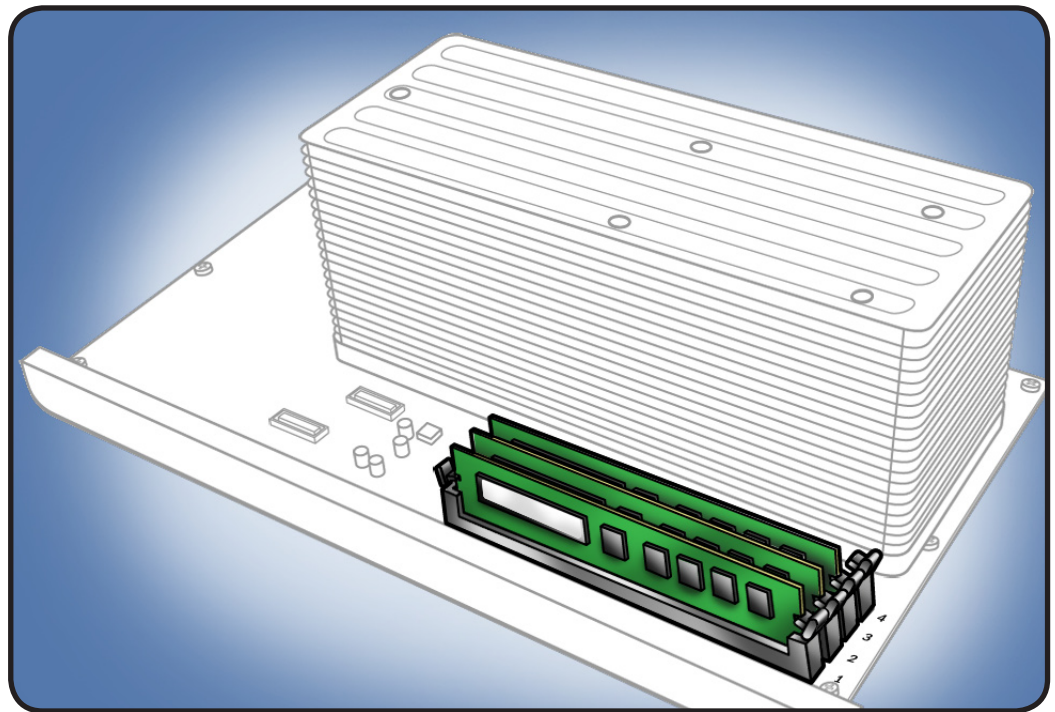
### Specifications

DIMMs for your computer must fit these specifications:

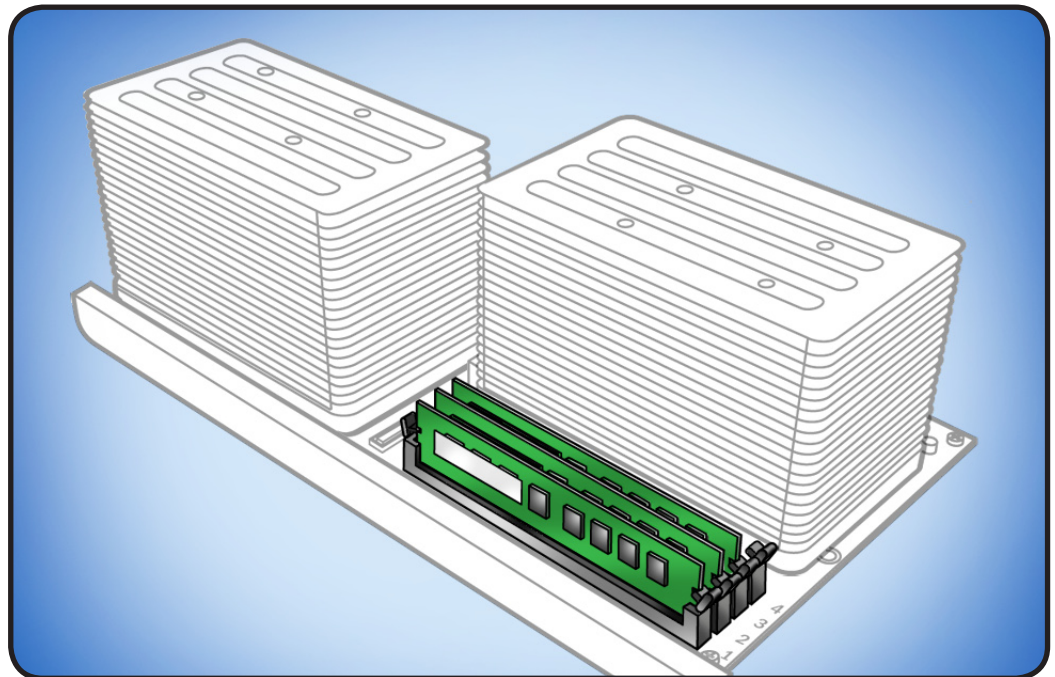
- PC3-8500, 1066 MHz, DDR3 SDRAM UDIMMs
- 72-bit wide, 240-pin modules
- 18 memory ICs maximum per UDIMM
- Error-correcting code (ECC)

**Note:** Memory from older Apple computers is not compatible with your computer.

### Quad-Core Configuration



### 8-Core Configuration



## Filling Slots

If you are installing DIMMs that are of the same size, follow the order in the tables on pages 3 and 4.

If you are installing different-size DIMMs, also refer to "Memory Slot Utility" on page 4.

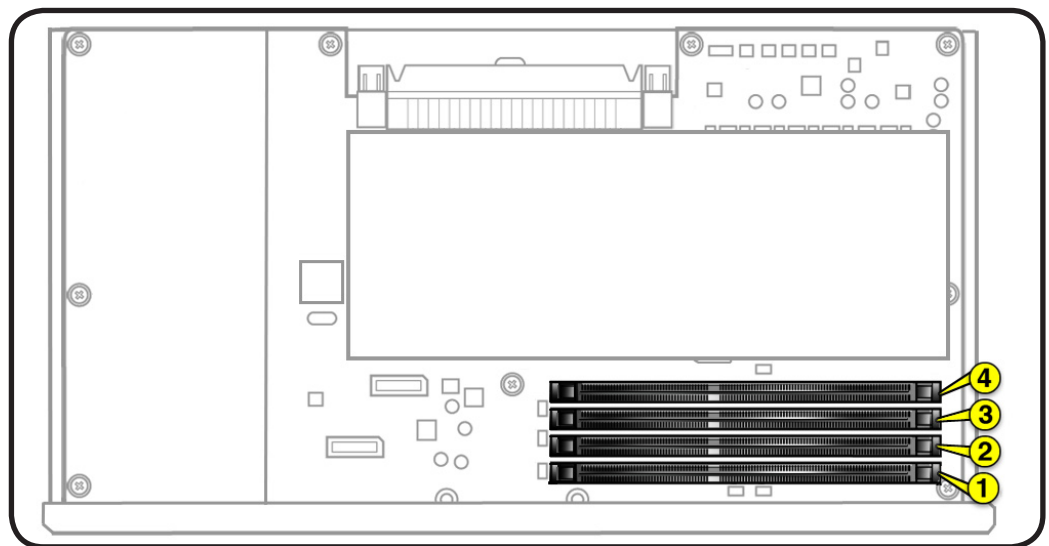
## Quad-Core Memory

Quad-core computers have four memory slots. You can install 1 GB or 2 GB DIMMs for a total of up to 8 GB of memory.

The processor's memory controller has three memory channels. DIMM slots 1 and 2 have their own channels; slots 3 and 4 share a channel.

For optimal memory bandwidth, all three memory channels should be used, and memory should be balanced across the three channels.

**Note:** Populating slot 4 slightly drops maximum memory bandwidth, but depending on the applications used, overall system performance may benefit from the larger amount of memory.



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

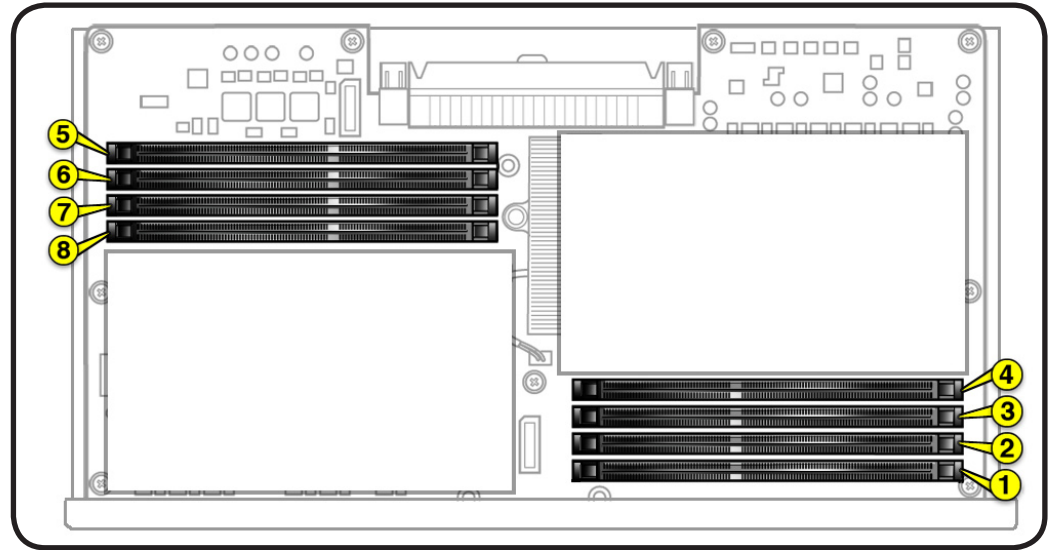
## 8-Core Memory

Eight-core computers have eight memory slots, four per processor. You can install 1 GB, 2 GB, or 4 GB DIMMs for a total of up to 32 GB of memory.

Each processor's memory controller has three memory channels. DIMM slots 1, 2, 5, and 6 have their own channels; slots 3 and 4 share a channel and slots 7 and 8 share a channel.

For optimal memory bandwidth, all six memory channels should be used, and memory should be balanced across the six channels.

**Note:** Populating slot 4 or 8 slightly drops maximum memory bandwidth, but depending on the applications used, overall system performance may benefit from the larger amount of memory.



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

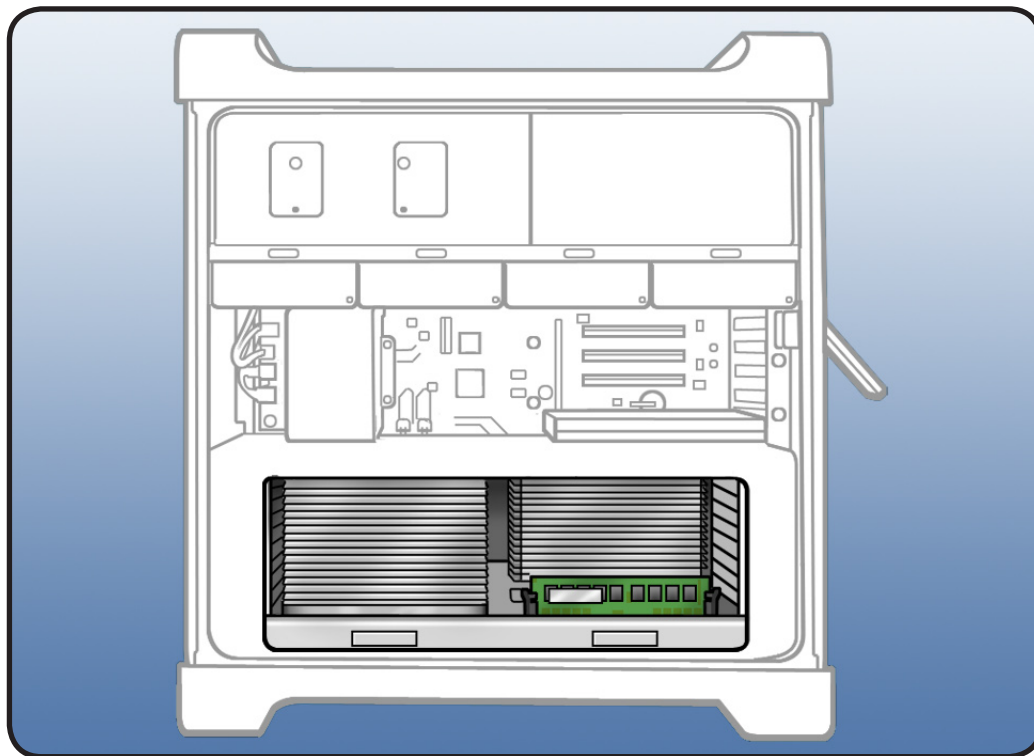
## Memory Slot Utility

If you install different-size DIMMs in your computer, follow the order in the tables above. If the DIMM configuration you install doesn't provide optimized performance, the Memory Slot Utility will appear on screen and recommend an improved configuration. To use the Memory Slot Utility again, go to /System/Library/Core Services.

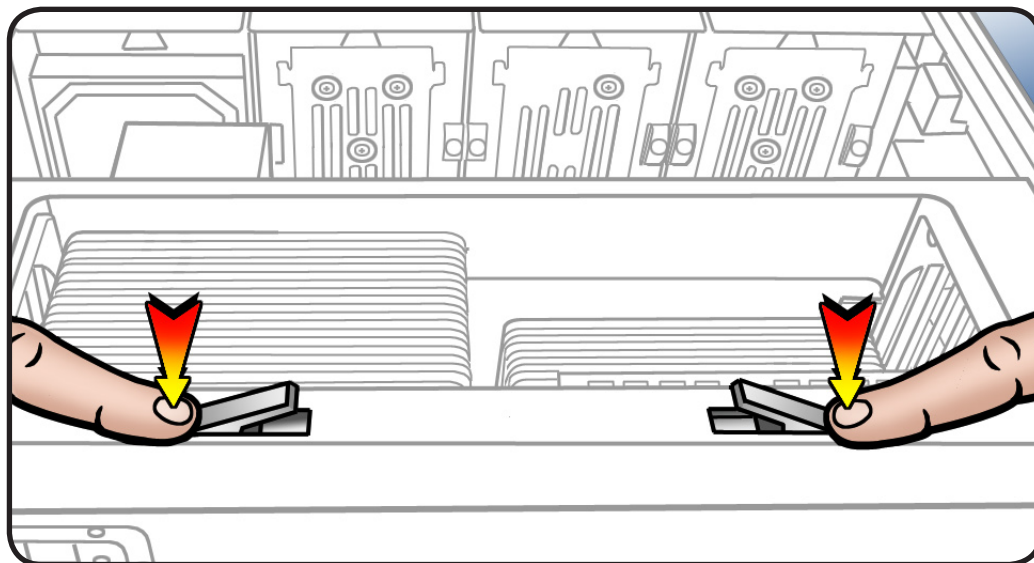
## Removing the Installed DIMM

Because memory DIMMs are installed on the computer's processor board, before you can remove a DIMM, you must remove the processor tray.

- 1 Locate processor tray.



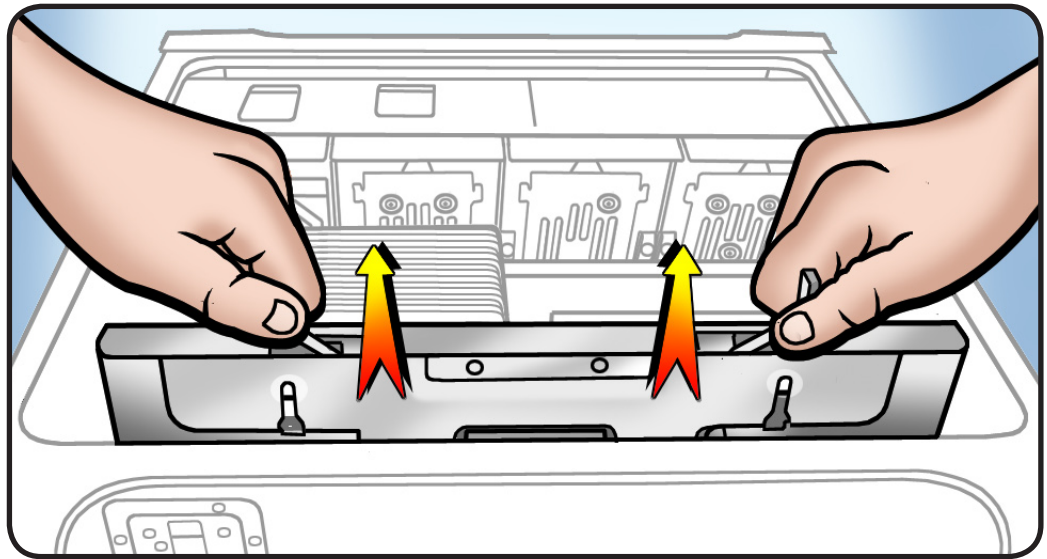
- 2 Press down and release 2 latches on front of processor tray.



**3** Holding tray by latches, lift it out of computer.

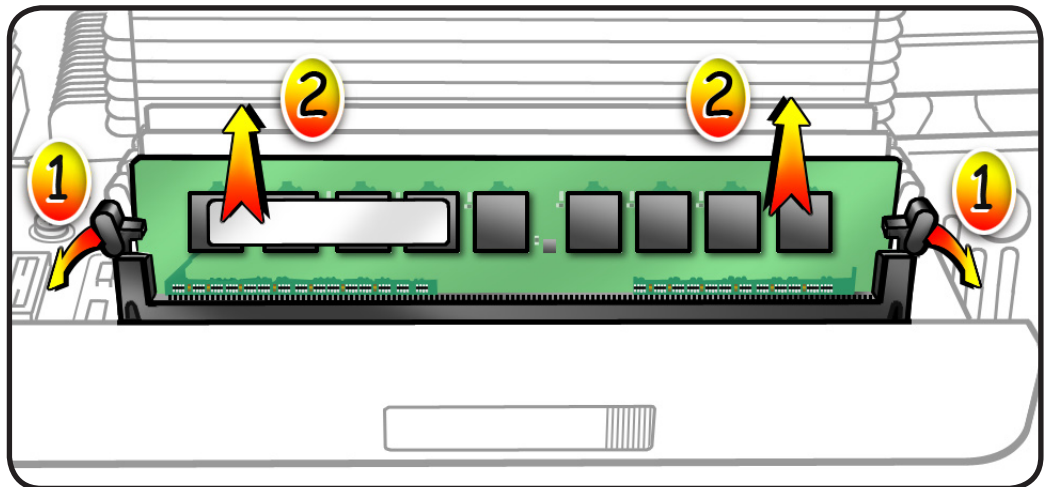
**4** Place tray DIMM side up on soft, clean cloth.

**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.



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

**6** Holding DIMM by edges, remove it from processor board.

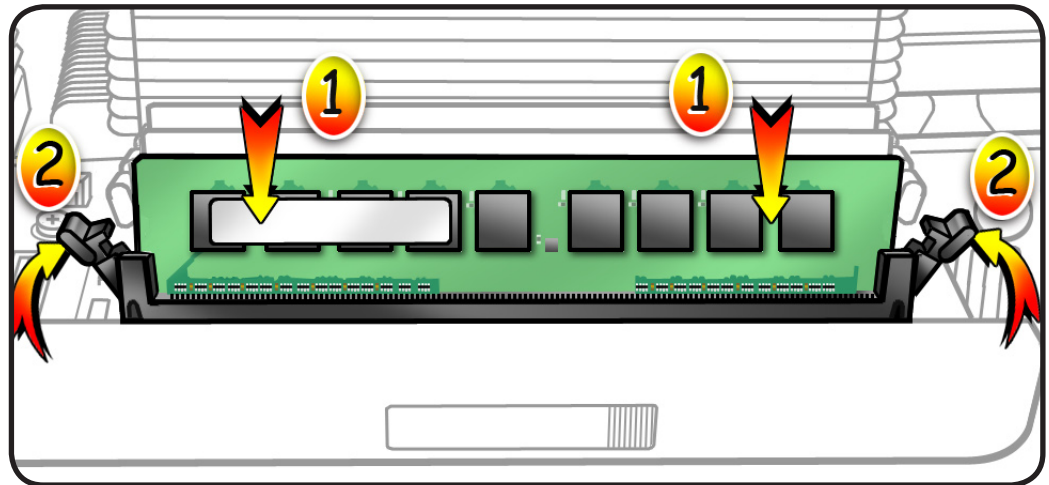


## Installing the Replacement DIMM

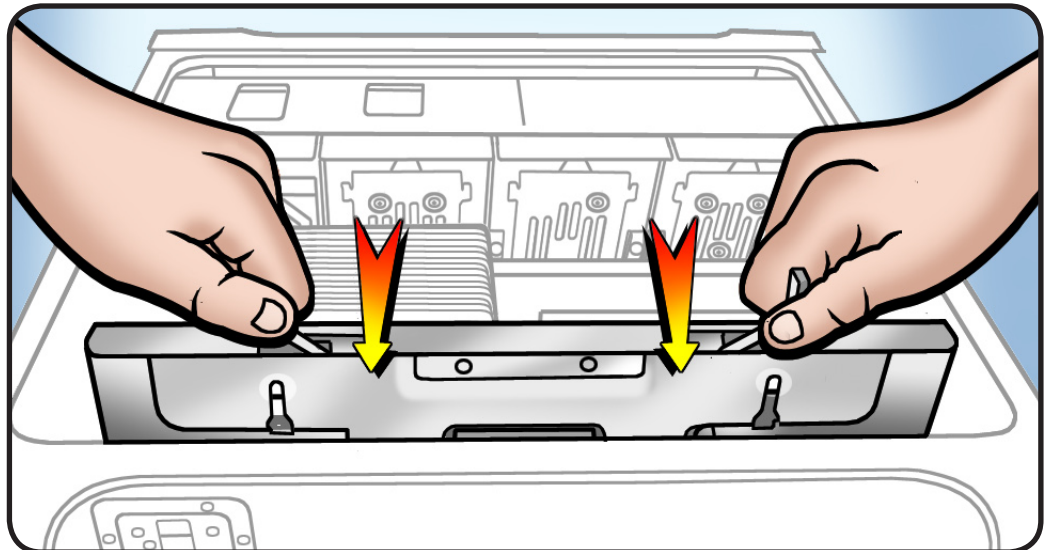
- 1 Align DIMM in slot on processor board.
- 2 Push both ends of DIMM down until ejectors snap back up into place.



**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.)



- 3 Holding processor tray by latches, lower it back into computer.
- 4 Make sure latches are closed flush with front of processor tray.



## Closing the Computer

- 1 Replace access panel.

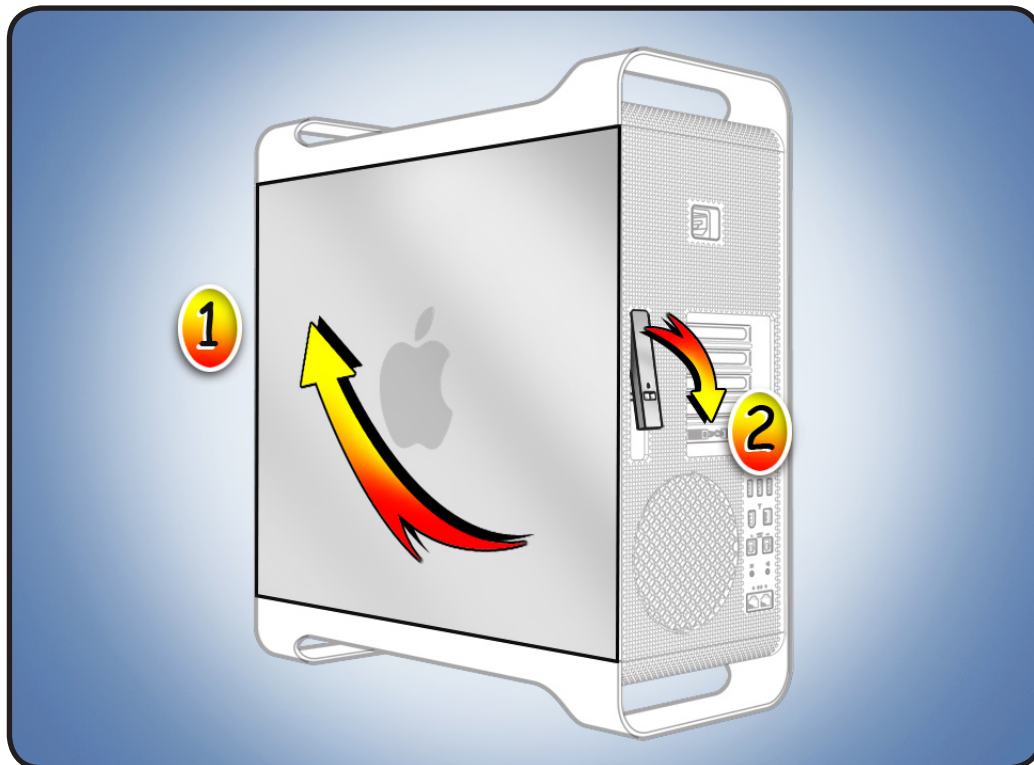
**Note:** Make sure latch is up before you replace panel. If latch is down, panel will not seat correctly.

- 2 Push latch down to close and secure access panel.



**Warning:** Never turn on computer unless all its internal and external parts are in place and it is closed. Operating computer when open or missing parts can cause damage or injury.

- 3 Verify DIMM installation using “Memory Diagnostic LEDs” information on next page.





## Memory Diagnostic LEDs

**Important:** The quad-core and 8-core processor boards include a set of diagnostic memory LEDs. After re-installing or replacing a DIMM, always use the LEDs to verify the DIMM is correctly seated.

To verify your DIMM installation, do this:

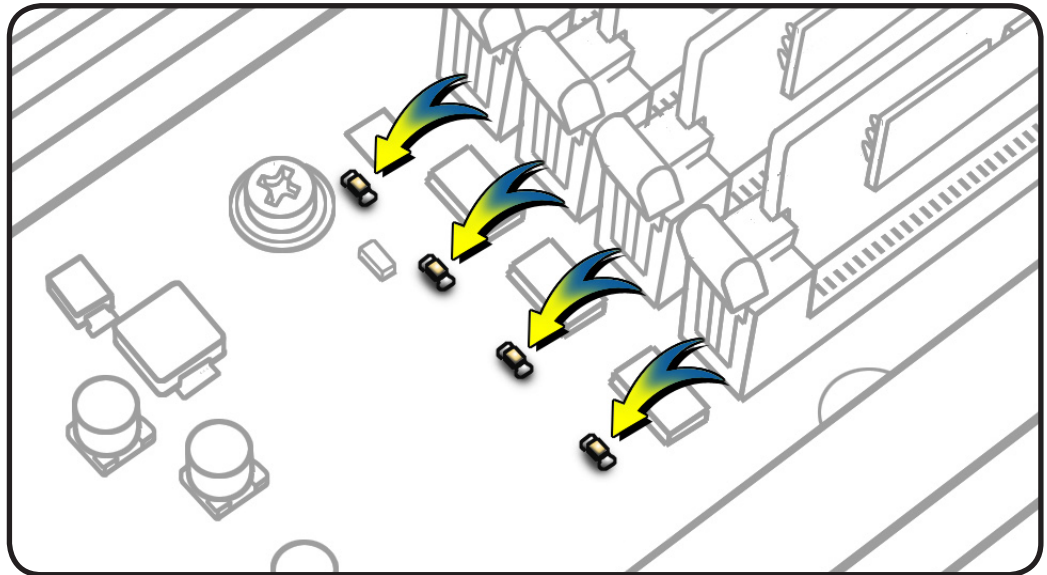
- 1 Start up the computer.
- 2 Remove the side access panel.
- 3 Check the bank of memory LEDs.

An illuminated, red LED indicates its associated DIMM may be poorly seated or failed.

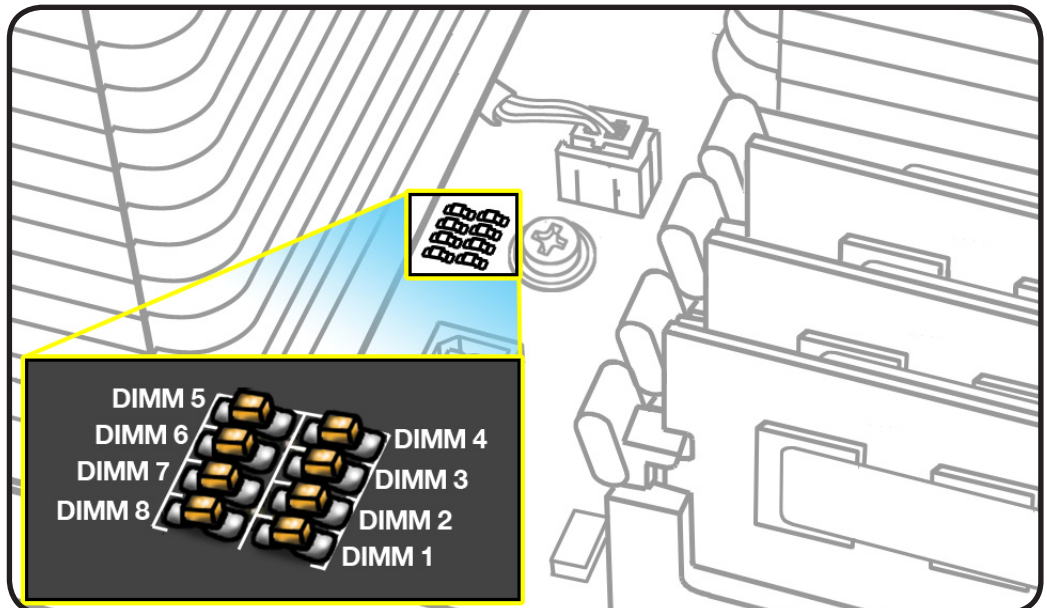
- 4 If you see a red LED, refer to "[How to Troubleshoot Memory LEDs](#)" on the next page.

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

### Quad-Core LEDs



### 8-Core LEDs



## How to Troubleshoot Memory LEDs

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

1. Remove and reseal 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 reseal 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.

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