Apple Technician Guide

iMac (20-inch, Early/Mid 2009)

iMac (20-inch, Early 2009), iMac (20-inch, Mid 2009)

Updated: 2009-05-01

iMac (20-inch, Early/Mid 2009)

Take Apart

Views

Manual Updates

Updated 1 May 2009

Views:
• Exploded Views: Corrected rear housing information for Mid 2009 model.

Updated 28 April 2009

Basics:
• Added section about differences between Early 2009 and Mid 2009 models.

Troubleshooting:
• General Troubleshooting: Added sections about Apple Hardware Test and Apple Service Diagnostic, how to determine which version to use.
• Block Diagram: Added note that Mid 2009 model does not have IR or Bluetooth.

Take Apart:
• Front Bezel: Added reassembly note to install bottom of bezel first.
• Camera Board: Corrected screw size and part number.
• IR Board: Added note that Mid 2009 model does not have an IR Board.
• Bluetooth Board: Added note that Mid 2009 model does not have a Bluetooth Board.
• Optical Drive: Added reassembly note to avoid trapped inverter cables.
• Hard Drive Sensor Cable, Optical Drive Sensor Cable, Hard Drive Fan: Added details about connector pin sizes.
• Logic Board: Added note that Mid 2009 model does not have IR or Bluetooth boards. Added note to route camera cable over, not under, the logic board. Removed note to transfer black plastic airdam from old board to new board, as it should be included with new board.

Views:
• Exploded Views: Added 1 logic board part number for Early 2009 model. Added new exploded views for Mid 2009 model.
• Screw Chart: Corrected camera screw size and part number.

Manual introduced 3 March 2009

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Basics

iMac (20-inch, Early/Mid 2009)

Overview

Product Features

The iMac (20-inch, Early 2009) and iMac (20-inch, Mid 2009) computers have the same overall look as the previous generation aluminum iMac. Distinguishing exterior features are Mini DisplayPort (instead of mini DVI port) and 4 USB ports (instead of 3) on the rear, and a tapered front edge on the stand.

New features:
- Increased processor speed: 2.66GHz
- Mini DisplayPort
- 4 USB 2.0 ports
- Increased RAM capacity: 2GB min, 8GB max
- Increased hard drive capacity in Early 2009 model: 320/640/1TB

Differences Between Models

The iMac (20-inch, Early 2009) and iMac (20-inch, Mid 2009) computers are very similar. The differences are that the Mid 2009 model does not have IR (Infrared) or Bluetooth, and has a smaller capacity hard drive (160GB).

Product Configuration

To confirm the configuration from the Apple menu, choose About This Mac. The processor listing will show the speed of the processor followed by the processor type. The following table shows the configuration at introduction:

Feature	Specification
Processor	2.66 GHz Intel Core 2 Duo 6MB shared L2 cache, 1066MHz frontside bus
Memory	2GB (2 x 1GB) 1066MHz DDR3 (optional 4GB, 8GB CTO)
Hard Drive	**Early 2009:** 320GB Serial ATA 7200-rpm (optional 640GB, 1TB) **Mid 2009:** 160GB Serial ATA 7200-rpm
Optical Drive	8x SATA SuperDrive
Display	20-inch, 1680x1050 resolution, 800:1 contrast ratio, 290 cd/m brightness, 160-degree viewing angle, glossy
Graphics	NVIDIA GeForce 9400M with 256MB shared memory
Wireless	AirPort Extreme 802.11a/b/g/n, **Bluetooth 2.1 + EDR (only in Early 2009)**
Input Devices	wired keyboard, wired mouse, no remote, no modem
I/O	Gigabit Ethernet, (4) USB 2.0, (1) FireWire 800
Audio I/O	iPhone headset connector, microphone, stereo speakers, combo digital in
Video I/O	Mini-DisplayPort (HDCP, dual-link, dual display; simultaneously supports full native resolution on built-in display and up to 2560x1600 on an external 30-inch display), iSight camera
Power Supply	180W universal

Serial Number Location

The iMac (20-inch, Early/Mid 2009)'s serial number is located on the base of the stand. When replacing a stand, transfer the serial number to the new stand.

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Troubleshooting

iMac (20-inch, Early/Mid 2009)

General Troubleshooting

Update System Software

Important: Whenever possible before beginning troubleshooting, ensure the latest software and firmware updates have been applied.

Firmware Updates

Firmware is the name given to software that is 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.

Information about firmware versions for Intel Macs can be found in the following Apple Knowledge Base article:

kBase #HT1237: EFI and SMC firmware updates for Intel-based Macs

Troubleshooting Theory

For a review of basic troubleshooting theory, refer to:

http://service.info.apple.com/service_training/en/006/troubleshoot/

Hardware vs. Software

For information on how to isolate a hardware issue from a software issue, refer to the following Apple Knowledge Base article:

kBase #TS1388: Isolating issues in Mac OS X

For information on how to troubleshoot a software issue, refer to the following Apple Knowledge Base articles:

kBase #HT1199: Mac OS X: How to troubleshoot a software issue

kBase #HT2956: Troubleshooting Mac OS X installation from CD or DVD

kBase #TS1394: Mac OS X: Troubleshooting installation and software updates

Apple Hardware Test

There are two versions of Apple Hardware Test (AHT) for the iMac (20-inch, Early 2009). To identify which version of AHT to use, check the third, fourth, and fifth digits in the system serial number. See examples below.

- **Apple Hardware Test 3A156** to be used on systems with the third, fourth, and fifth serial number digits **below 913**. Example: Serial number W 8 **9 1 0** S M R D W K
- **Apple Hardware Test 3A168** to be used on systems with the third, fourth, and fifth serial number digits **equal to or higher than 913**. Example: Serial number W 8 **9 1 3** 8 M T 0 T F

The iMac (20-inch, Mid 2009) uses **Apple Hardware Test 3A168.**

Apple Service Diagnostic

The correct version of ASD for all iMac (20-inch, Early 2009) and iMac (20-inch, Mid 2009) is **Apple Service Diagnostic 3S131**.

Power On Self Test (POST)

Intel-based Mac computers such as the iMac rely on a combination of tones and blinking LEDs to display Power On Self Test (POST) error codes.

- If the computer detects out-of-specification or no SDRAM or the RAM installed does not meet the appropriate specifications, the screen will remain black but the computer will beep. This error condition may be due to physically damaged RAM, installing the incorrect type of RAM, or not having RAM installed.
- Some RAM may appear to pass the Power-On-Self-Test (POST) but still cannot be used by the operating system. In this case, the computer will display a gray screen, sound three tones and repeat the tones until the computer is turned off.
- The solution to both of these situations is to first re-seat the memory and test the computer again. If the memory fails the POST test again, try memory that has been verified to work correctly on another system (i.e., "known-good") or order new memory.

Starting Up in Safe Mode

A Safe Boot is a special way to start Mac OS X when troubleshooting. Safe Mode is the state Mac OS X is in after a 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 about Safe Mode, refer to the following Apple Knowledge Base articles:

kBase #HT1564: What is Safe Boot, Safe Mode? (Mac OS X)

kBase #TS1884: Safe Boot takes longer than normal startup

Resetting the Parameter RAM (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.

    Note: If the keyboard does not have an Option key, use the Alt key instead.

3. Turn on the computer.

4. Press and hold the Command-Option-P-R keys. A simple way to do this with one hand is to put your right pinky finger on P, your right index finger on R, and your right thumb over both the Command and Option 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.

Resetting the System Management Controller (SMC)

The System Management Controller (SMC) is a chip on the logic board that controls all power functions for your computer. If your 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; and
• controlling the fans.

Note that resetting the SMC does not reset the PRAM. Resetting the SMC will not resolve issues in which your computer is unresponsive—in these situations, restarting your computer will generally suffice. If your computer isn't responding, perform these steps one at a time, in this 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 your computer still exhibits these types of issues after you've restarted the computer, try resetting the SMC.

How to Reset the SMC on an iMac

1. From the Apple menu, choose Shut Down (or if the computer is not responding, hold the power button for approximately ten seconds until it powers off).

2. Unplug all cables from the computer, including the power cord.

3. Wait at least 15 seconds. The SMC reset occurs automatically once the iMac has been unplugged from the AC power source for several seconds.

4. Plug power cord back in, making sure the power button is not being pressed at the time.

5. Reconnect keyboard and mouse to the computer.

6. Press power button on the back to start up the computer.

Note: The iMac does not have a button on the logic board for resetting the SMC, which eliminates the need to open the computer to reset it (as is required for some other models).

Diagnostic LEDs

The iMac has built-in diagnostic LEDs on the main logic board that can help you to troubleshoot the computer. The LEDs are located to the right of the battery (see photo below).

LED #1

> Indicates the trickle voltage from the power supply has been detected by the logic board. This LED will remain ON whenever the iMac is connected to a working AC power source. The LED will remain on even when the computer has been shut down or put to sleep. The LED will turn off only if the AC power source is disconnected or the power supply is faulty.

LED #2

> Indicates the main logic board has detected proper power from the power supply when the computer is turned on. This LED will be ON when the computer is turned on and the power supply is working correctly.

LED #3

> **Note:** This LED is not used on systems that have integrated graphics, which includes all configurations of the iMac (20-inch, Early/Mid 2009).

LED #4

> Indicates the computer and the LCD display panel are communicating. This LED will be ON when the computer is turned on and video signal is being generated. If the LED is ON and there is no image on the LCD display panel, the LCD display panel or inverter might be installed incorrectly or need replacement.
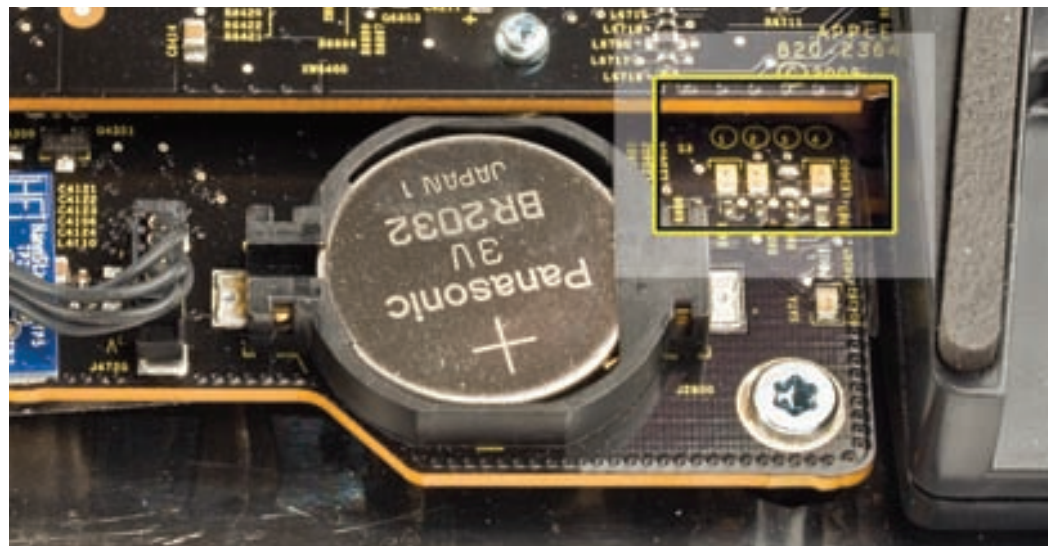
Sensor and Fan Connector Locations

Ambient temp sensor and fan connector locations are shown below. Ensure cables are correctly routed and the sensors and fans are properly connected. If a sensor or fan is faulty or not connected, Apple Hardware Test will generate an error code.
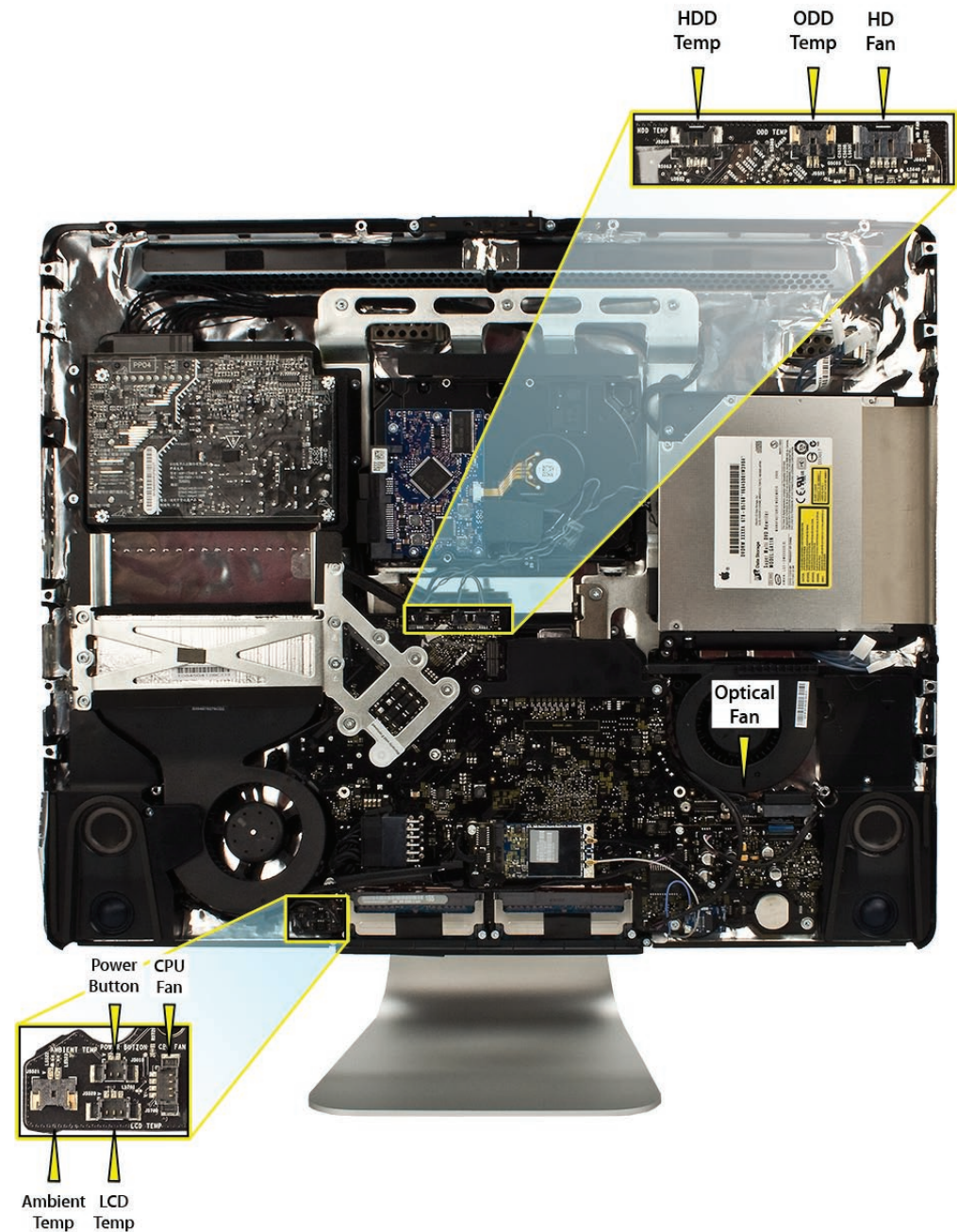
Block Diagram

Refer to this diagram to see how modules are interrelated. Note the iMac (20-inch, Mid 2009) does not have IR or Bluetooth.

12V in 20"

AC Inlet

AC/DC

Temperature Sensor

Optical Drive
SATA II

Temperature Sensor

Camera
USB 2.0

Microphone

Hard Drive
SATA II

Temperature Sensor

ODD Fan

Inverter

HD Fan

Display

Temperature Sensor

MLB

Power Button

IR Sensor
USB 2.0

802.11n
PCIe x1

Antenna

Antenna

Bluetooth
USB 2.0

Antenna

CPU Fan

Ambient Temperature Sensor

SO-DIMM
DDR3-1066

SO-DIMM
DDR3-1066

Audio Board

Speaker

Speaker

Symptom Charts

Follow the steps in the order indicated below. If an action resolves the issue, retest the system to verify.

Note: A compilation of Quick Check tables is available at:

http://service.info.apple.com/QRS/en/quickreference.pdf

Startup and Power

No Power, Dead Unit

Unlikely cause: speakers

Quick Check

Symptoms	Quick Check
No Power, Dead Unit • No power • No fan spin • No startup chime • No image on external display • No hard drive or optical drive activity • Caps Lock LED on wired keyboard doesn't light when pressed.	1. Verify power source. 2. Verify power cable. 3. Listen closely for signs of activity from system including: rotating fans, hard drive or optical drive activity, startup chime, etc.

Deep Dive

Check	Result	Action	Code
1. Power ON system. Verify if there is any indication that the system has powered up (fan rotation, hard drive or optical drive noise, backlight turns on).	Yes	The symptom is powering up. Jump to **Won't Start Up** symptom flow.	
	No	Go to step 2.	

2. Remove front bezel and locate diagnostic LED's on logic board. Plug power cord into system. Verify whether diagnostic LED #1 turns ON.	Yes	Trickle voltage being supplied by power supply. Go to step 3.	
	No	Replace power supply.	
3. Press power button while monitoring diagnostic LED's. Does diagnostic LED #2 turn ON and remain ON after pressing the power button?	Yes	Power supply functioning and logic board detects supply voltages. Jump to **Won't Start Up** symptom flow.	
	No	Go to step 5.	
4. Disconnect power then remove power supply and carefully inspect AC inlet and DC output connectors and cables for damage or poor connections. Were any problems identified?	Yes	Replace damaged part.	**P16**
	No	Go to step 5.	
5. Inspect power button and verify that it is properly connected to the logic board.	Yes	Visual inspection OK. Go to step 6.	
	No	Reconnect power button. Replace rear housing (which includes power button) or logic board if damage is present.	**X14**
6. Disconnect power button from logic board and verify continuity between two pins when power button is pressed.	Yes	Power button is functioning correctly. Go to step 6.	
	No	Power button faulty. Replace rear housing which includes power button.	**X16**
7. Press power button and verify whether system turns ON.	Yes	Power supply is functioning. If system still does not boot jump to **Won't Start Up** symptom flow.	
	No	Replace power supply. Retest.	**P01**

Note: If No Power symptom persists after all steps have been followed use Minimum Configuration troubleshooting to proceed. Try disconnecting the hard drive, optical drive, AirPort, and Bluetooth modules to determine if one of them is preventing the power supply from functioning.

Won't Start Up

Quick Check

Symptoms	Quick Check
Won't Start Up • No startup chime. • Error tones during startup. • Grey screen with fan noise, or other noise. • Will not progress beyond Apple logo or spinning gear.	1. Isolate OS by starting up from original install media for the computer, the same make and model computer in Target Disk Mode, or compatible known-good OS on an external drive. Both AirPort and Bluetooth services are available when booted from the Install disk. 2. Reset SMC and PRAM to clear any stored, corrupted information. 3. Start up in Safe Mode by holding the shift key down during startup to load only required kernel extensions and disable all startup and login items. See KBase article **http://support.apple.com/kb/HT1564** 4. If system generates error tones there may be an issue with the SDRAM. See KBase article **http://support.apple.com/kb/HT2341** 5. Identifying when in the startup process the computer hangs can help isolate the issue. See KBase article **http://support.apple.com/kb/HT2674** for information on the Macintosh startup sequence, error codes and symbols used.

Deep Dive

Check	Result	Action	Code
1. Boot the computer to Apple Hardware Test on the Install DVD. Does the computer boot up to this volume?	Yes	Run the extended tests and proceed with results. If AHT passes or boots with a memory error, go to step 2.	
	No	Go to step 2.	
2. Remove the installed SDRAM, and test with known-good SDRAM. Does the computer startup properly now?	Yes	SDRAM issue. Replace SDRAM. Issue resolved.	**X02**
	No	Go to step 3.	

3. Remove the coin battery on the logic board, and leave out for approximately 1 minute. Then reinstall the battery. This will reset the logic board. Does the computer startup properly now?	Yes	Issue resolved by logic board reset. Measure DC voltage on the battery touching the battery with the red probe, and grounding with the black probe. If voltage is 2.7v or less, replace the battery. See KBase article **http://support.apple.com/kb/HT3250** for details on using a digital multi-meter.	
	No	Go to step 4.	
4. Remove AirPort card and test. Does the computer startup properly now?	Yes	Go to **AirPort Card Kernel Panic** symptom flow.	
	No	Go to step 5.	
5. Disconnect the hard drive SATA cable and startup to the Install DVD on the optical drive, or an external volume. Does the computer startup properly now?	Yes	Go to **Hard Drive Not Recognized** symptom flow.	
	No	Go to step 6.	
6. Disconnect the optical drive and test. Does the computer start without kernel panic now?	Yes	Go to **Optical Drive Not Recognized** symptom flow.	
	No	Replace logic board.	**M02**

Intermittent Shutdown

Quick Check

Symptoms	Quick Check
Intermittent Shutdown • Powers off during startup. • Powers off during desktop use. • Computer restarts spontaneously. • Powers off when waking from sleep.	1. Isolate OS by starting up from original Install media for the computer, the same model computer in Target Disk Mode, or compatible known-good OS on an external drive. Both AirPort and Bluetooth services are available when booted from the Install disc. 2. Reset SMC and PRAM to clear any stored, corrupted information. 3. Start up in Safe Mode by holding the shift key down during startup to load only required kernel extensions and disable all startup and login items. See KBase article **http://support.apple.com/kb/HT1564** 4. Open System Preferences > Energy Saver > Schedule and make sure that a 'Shut Down' event is not scheduled. 5. Make sure that power cord is securely attached to the back of the computer, and is not hindered by a desk or other furniture. 6. Plug the computer directly into an AC outlet to test whether a surge protector, outlet strip, or UPS is causing the issue.

Deep Dive

Check	Result	Action	Code
1. Verify improper shutdown by opening the system.log located in /var/log. Filter the log for "shutdown cause". Entries of value "0" or a negative value indicate an improper shutdown. Did you find entries of improper shutdown?	Yes	Determine if user caused improper shutdown. Use known-good AC power cord and AC outlet. Go to step 2.	
	No	Revisit Quick Check examples for possible software issues. Check if user is running other automating software that may be shutting down system. Verify issue and jump to appropriate symptom flow. No repair needed under current symptom flow.	

2. With known-good AC power cord and AC outlet, does the unit continue to shutdown?	Yes	Go to step 3.	
	No	AC power cord/ outlet issue. Issue resolved.	**X03**
3. Disconnect the hard drive power cable from the hard drive and start the machine from the Install DVD, the same make and model computer in Target Disk Mode, or compatible known-good OS on an external drive. Does the computer continue to shutdown?	Yes	Go to step 4.	
	No	Possible bad software or hard drive. Go to **Hard Drive Not Recognized** symptom flow.	
4. Inspect and reseat DC power cable and AC inlet connections to power supply and logic board. Was damage observed on the cables or connectors.	Yes	Replace damaged cable. Retest. Return to step 1 if problem continues.	**X03**
	No	Go to step 5.	
5. Install known-good power supply. Does system continue to restart or shutdown?	Yes	Reinstall original power supply. Replace logic board. Go to step 6.	
	No	Power supply issue. Issue resolved.	**P02**
6. After logic board replacement. does the computer continue to shutdown?	Yes	Use Minimum Configuration troubleshooting to isolate failed module.	
	No	Logic board issue. Issue resolved.	**M08**

Kernel Panic, System Crashes

Quick Check

Symptoms	Quick Check
Kernel Panic, System Crashes • Kernel panic on startup or desktop use. • System freeze during use. • System freeze upon wake from sleep.	1. Isolate OS by starting up system from original Install media for the computer, the same make and model computer in Target Disk Mode, or compatible known-good OS on an external drive. Both AirPort and Bluetooth services are available when booted from the Install disc. 2. Ensure that all software and firmware updates for the computer have been installed. 3. Reset SMC and PRAM to clear any stored, corrupted information. 4. Start up in Safe Mode by holding the shift key down during startup to load only required kernel extensions and disable all startup and login items. See KBase article **http://support.apple.com/kb/HT1564** 5. Check the panic.log, located /Library/Logs/Panicreporter, for information in the backtrace that may give clues about the kernel panic. 6. For more information on kernel panics refer to KBase article **http://support.apple.com/kb/HT1392**

Deep Dive

Check	Result	Action	Code
1. Boot the machine to Apple Hardware Test on the Install DVD. Does the computer boot up to this volume?	Yes	Run the extended tests and proceed with results. If AHT passes or boots with a kernel panic, go to step 2.	
	No	Go to step 2.	
2. Remove all peripheral devices including the keyboard and mouse. Does computer start without kernel panic?	Yes	Add peripheral devices one at a time until the kernel panic repeats. Replace the device causing the issue.	
	No	Go to step 3.	

|			
3. Use known-good SDRAM in the system. Does the computer start without kernel panic now?	Yes	Install user's SDRAM and test. If kernel panic repeats, replace SDRAM. Verify that the correct SDRAM is being used.	**X01**
	No	Go to step 4.	
4. Remove AirPort card and test. Does the computer start without kernel panic now?	Yes	Go to **AirPort Card Kernel Panic** symptom flow.	
	No	Go to step 5.	
5. Disconnect the hard drive SATA cable and startup to the Install DVD on the optical drive, or an external volume. Does the computer start without kernel panic now?	Yes	Go to **Hard Drive Not Recognized** symptom flow.	
	No	Go to step 6.	
6. Disconnect the camera/ microphone cable. Does the computer start without kernel panic now?	Yes	Go to **Camera Issues** symptom flow.	
	No	Go to step 7.	
7. Disconnect the audio board and test. Does the computer start without kernel panic now?	Yes	Replace audio board.	**X99**
	No	Go to step 8.	
8. Disconnect the optical drive and test. Does the computer start without kernel panic now?	Yes	Go to **Optical Drive Not Recognized** symptom flow	
	No	Replace logic board.	

No Video

Unlikely cause: hard drive, optical drive, speakers, camera, microphone

Quick Check

Symptoms	Quick Check
No Video • No image. • Backlight failure.	1. Check brightness setting. 2. For no-video issues, connect an external display to verify whether iMac video circuitry is functioning. If image appears on external display go to **Backlight Issue/No Backlight** symptom flow. 3. Reset SMC.

Deep Dive

Check	Result	Action	Code
1. Verify boot chime present and fans running when system powered ON. (Reset SMC and clear PRAM if necessary for proper boot up.)	Yes	Power ON self test OK. Boot sequence started. Go to step 2.	
	No	Go to **Won't Start Up** symptom flow.	
2. Verify whether image is visible on LCD panel.	Yes	Video present. Verify system functionality and return to user or jump to appropriate troubleshooting flow.	
	No	Go to step 3.	
3. Connect supported external display. Verify whether image appears on external display when system is booted.	Yes	External display detected by system. Video circuitry on logic board functional. Go to **Backlight Issue/No Backlight** symptom flow.	
	No	Go to step 4.	
4. Remove glass panel and front bezel. Do all three diagnostic LED's turn ON shortly after the system is powered ON?	Yes	Internal video circuitry functional and communicating with LCD panel. Go to **Backlight Issue/ No Backlight** symptom flow.	
	No	Replace logic board. Retest.	**M03**
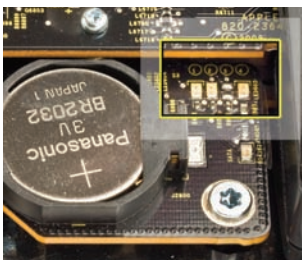
Corrupted Video

Unlikely cause: power supply, hard drive, optical drive, fans, speakers, camera, microphone

Quick Check

Symptoms	Quick Check
Corrupted Video • Text and graphics appear fuzzy • Image corrupted	1. Set System Preferences/Display LCD panel to native resolution. Non-native resolutions are unable to produce optimal clarity. 2. Make sure all relevant software updates have been applied. Graphics driver updates may be included with software updates. 3. When the issue occurs take a screenshot of the display (Command-Shift-3). View the screen shot file on another known-good computer. If the image corruption can be seen in the screenshot then the issue is with the video drivers, software, or video/logic board. If the issue cannot be seen in the screenshot then the LCD panel and LVDS cable should be tested further. 4. Clean the outside surface of glass panel using provided cleaning cloth. 5. Boot from install DVD or another known-good volume to determine whether a potential software/driver issue exists.

Deep Dive

Check	Result	Action	Code
1. Boot from Install DVD and verify whether issue is still visible.	Yes	Go to step 2.	
	No	Issue likely caused by software or driver issue. Troubleshoot for software issues. Make sure all software updates have been installed.	
2. Verify whether issue is visible on an external display attached to the DisplayPort.	Yes	Issue is NOT caused by internal LCD panel. Go to step 3.	
	No	Go to step 5.	

3.	Remove logic board, inspect connectors for damage or corrosion then reinstall. Verify whether issue still occurs.	Yes	Replace logic board. Go to step 4.	**M04**
		No	Issue likely caused by poor connection. Return computer to user.	**M04**
4.	Verify whether issue is still present with replacement logic board installed.	Yes	Return to step 1 and retest.	**X04**
		No	Issue resolved with replacement logic board. Return computer to user.	**M04**
5.	Remove LVDS cable from LCD panel and logic board and carefully verify whether there is damage to the cable or connectors.	Yes	Replace LVDS cable.	
		No	Reinstall LVDS cable. Go to step 6.	
6.	Verify whether issue is still visible after reinstalling LVDS cable.	Yes	Replace LCD panel. Go to step 7.	
		No	Issue resolved with replacement logic board. Return computer to user.	**M04**
7.	Verify whether issue is still present with replacement LCD panel installed.	Yes	Return to step 1 and retest.	
		No	Issue resolved with replacement LCD panel. Return computer to user.	**L04**

Burnt Smell/Odor

Unlikely cause: speakers, microphone, enclosure

Quick Check

Symptoms	Quick Check
Burnt Smell/Odor • Burning smell • Unusual odor	1. Verify source of smell/odor is emanating from the system. 2. If system is new refer to KBase article **http://support.apple.com/kb/TA22044** for information on new computer odors. 3. Disconnect all third-party devices and confirm whether the odor is being generated by the device. 4. Inspect air intake and air outlets for obstructions. To prevent overheating make sure there is sufficient clearance to allow air to flow unobstructed into and out of the system. 5. Verify whether system is functional.

Deep Dive

Check	Result	Action	Code
1. Verify whether the source of the odor can be identified by visually inspecting each module and its associated cables for signs of burned or damaged components, smoke residue, burned traces, or melted or damaged wiring,	Yes	Replace affected module(s). Go to step 2	**P08**
	No	Unable to locate source of odor. Go to step 3.	
2. Disconnect all third-party devices and cables. Power ON system and verify whether smoke or strong odor returns.	Yes	Power down system immediately. Go to step 3.	
	No	System functions correctly. Verify system functionality with third-party devices and cables and return system to user if problem has been resolved. Consult third-party companies as needed for issues with those products.	

3. Can the source of the odor be located using nose?	Yes	Replace affect module(s) and retest system.	**P08**
	No	Contact Apple for assistance if you feel that there is a possible safety issue with the computer that has not been resolved in the previous steps.	

Uncategorized Symptoms

Quick Check

Symptoms	Quick Check
Uncategorized Symptoms • Unable to locate appropriate symptom code.	**1.** Make sure system is plugged into a known-good outlet. **2.** Listen for boot chime, fan, optical drive, or hard drive noise which indicates system is powering up. If noise is heard, go to **Won't Start Up** symptom flow. If no noise is heard go to **No Power, Dead Unit** symptom flow. **3.** Attempt to boot from Install DVD to isolate possible software issues.

Deep Dive

Check	Result	Action	Code
1. Verify whether existing symptom code applies to the issue reported by the user.	Yes	Jump to appropriate symptom code flow.	
	No	Document reported failure and send feedback to **smfeedback6@apple.com** stating that a suitable symptom code wasn't found. Provide as much detail as possible.	**N99**

Display

Backlight Issue/No Backlight

Unlikely cause: hard drive, optical drive, speakers, camera, microphone

Quick Check

Symptoms	Quick Check
Backlight Issue/No Backlight • No image • Partial backlight failure • Backlight flickers • Display dim	**1.** Check System Preferences > Displays > Brightness control setting is above minimum. **2.** For no-image issues connect an external display to verify whether iMac video circuitry is functioning. Go to **No Video** symptom flow if no image is visible on external display.

Deep Dive

Check	Result	Action	Code
1. Verify boot chime present and fans running when system powered ON. (Reset SMC and clear PRAM if necessary for proper boot up.)	Yes	Power ON self test OK. Boot sequence started. Go to step 2.	
	No	Go to **Won't Start Up** symptom flow.	
2. Verify whether image is visible on LCD panel.	Yes	Video present. Verify system functionality and return to user or jump to appropriate troubleshooting flow.	
	No	Go to step 3.	
3. Connect supported external display. Verify whether image appears on external display when system is booted.	Yes	External display detected by system. Video circuitry on logic board functional. Go to step 4.	
	No	Go to **No Video** symptom flow.	

4.	Verify if LCD backlight is ON by looking for faint glow from display when viewed in darkened room with brightness set at maximum.	Yes	Internal LCD panel backlight is functioning. Go to step 6.	
		No	Go to step 5.	
5.	Shine bright (low heat) flashlight onto the front of the LCD. With the system powered ON verify whether a faint image is visible.	Yes	LCD panel functional but backlight is not ON. Inspect and reseat four backlight bulb connectors connecting LCD panel to inverter, and inverter connection to logic board. Go to step 6.	
		No	No image or backlight. Go to step 7.	
6.	Power ON system. Verify whether image is visible on LCD panel.	Yes	Issue resolved by cable reseat. Return computer to user.	**M24**
		No	Replace inverter. Retest. Go to step 7 if issue is still present.	**L03**
7.	Remove screws securing LCD panel and inspect LVDS cable and connections for damage. Reinstall. Power ON system. Verify whether image is visible on LCD display.	Yes	Issue cause by loose LVDS connection. Verify system functionality and return system to user.	**M24**
		No	Connecting external display in earlier step confirmed that logic board video circuitry is functioning. Replace LVDS cable first, then LCD panel if the issue persists. Retest.	**L03**

Noise / Unstable Flickering

Unlikely cause: camera, microphone

Quick Check

Symptoms	Quick Check
Noise / Unstable Flickering • Unstable image • Flickering image • Humming noise from display • High frequency noise from display	1. Verify that intake vent on the bottom of the system is not obstructed. 2. Inspect system for 3rd party software that is being used to set fan speeds to a higher than normal RPM. Some users may use this software to monitor and control internal temperatures potentially causing higher fan speeds to generate higher than expected noise levels.

Deep Dive

Check	Result	Action	Code
1. Verify if user issue is due to flickering or an unstable image on the LCD.	Yes	Suspected flickering issue, go to step 2.	
	No	For audible noise issues go to step 8. All other issues go to appropriate symptom flow.	
2. Connect a supported external display to the DisplayPort. Verify whether issue occurs with external display.	Yes	Suspect issue with video circuitry. Go to **Corrupted Video** symptom flow.	
	No	Video circuitry OK. Go to step 3.	
3. Disconnect and carefully inspect the LVDS and backlight bulb connections for signs of damage, corrosion, or pinched wires. Were any problems observed?	Yes	Replace damaged cable(s) where needed, otherwise reattach connectors. Retest.	**L06**
	No	Go to step 4.	

4. Power ON system and verify whether the issue still occurs.	Yes	If connections are secure and the display is still flickering, go to step 5.	
	No	Issue was caused by a poor connection between display and logic board or inverter. Return computer to user.	
5. Shine bright (low heat) flashlight into the front of the LCD. Verify if an image is being displayed when flickering issue is occurring.	Yes	Image present but backlight is flickering. Replace inverter then retest.	**L06**
	No	Replace LCD panel then retest.	**L06**
6. Verify whether noise varies when adjusting the brightness level up and down.	Yes	Noise appears to be generated by the LCD panel or backlight circuitry. Go to step 7.	
	No	Noise is from another source. Go to **Noise/Hum/Vibration** symptom flow.	
7. Verify whether noise can be heard when computer is set up with user seated in normal user position. Adjusting the brightness level up and down may be necessary to recreate the issue.	Yes	Replace inverter. Go to step 8.	**L06**
	No	Noises that are not audible from the normal user position are considered acceptable. Return computer to user.	
8. Verify whether noise is still present.	Yes	Replace LCD display. Retest.	**L06**
	No	Noise issue resolved. Return computer to user.	**L06**

LCD Image Issues

Unlikely cause: power supply, hard drive, optical drive, fans, speakers, camera, microphone

Quick Check

Symptom	Quick Check
LCD Issues • Incorrect/missing colors • Distorted/blurred image • Pixel anomalies • Vertical/horizontal lines • Non-uniform brightness	1. Allow display to reach normal operating temperature for about 15 minutes before evaluating front-of-screen performance. 2. Check display preferences for use of custom display profile. 3. Check brightness setting. 4. Clean glass panel while checking for dust/debris.

Deep Dive: General

Check	Result	Action	Code
1. Verify if issue is incorrect/ missing colors.	Yes	Go to **incorrect/missing colors.**	
	No	Go to step 2.	
2. Verify if issue is distorted/ blurred image.	Yes	Go to **distorted/blurred image.**	
	No	Go to step 3.	
3. Verify if issue is bright or dark pixel anomalies.	Yes	Go to **pixel anomalies.**	
	No	Go to step 4.	
4. Verify if issue is vertical or horizontal lines.	Yes	Go to **vertical/horizontal lines.**	
	No	Go to step 5.	
5. Verify if issue is non-uniform brightness.	Yes	Go to **non-uniform brightness.**	
	No	LCD functioning OK. Return to appropriate symptom chart if user issue is still present.	

Incorrect/Missing Colors

Unlikely cause: power supply, hard drive, optical drive, fans, speakers, camera, microphone

Quick Check

Symptoms	Quick Check
Incorrect/Missing Colors • Wrong color display • Color/contrast issues	1. Allow display to reach normal operating temperature for about 15 minutes before evaluating front-of-screen performance. 2. Verify that System Preferences/Display settings are configured to use the default display profile. 3. Verify System Preferences/Universal Access/ Display "Enhance contrast", "Use grayscale", and "Black on White/White on Black" settings are set to defaults.

Deep Dive

Check	Result	Action	Code
1. Verify system has been warmed up for ~15 minutes to stabilize backlight before continuing.	Yes	Go to step 2.	
	No	Allow system to warm up for approximately 15 minutes then go to step 2.	
2. Verify that the LVDS and backlight connections between the logic board and LCD are secure.	Yes	Go to step 3.	
	No	Reseat connections, replace damaged cable(s) if needed. Retest.	**L14**
3. Set desktop pattern in system preferences to 'Solid Gray Light'. Verify if incorrect/missing color issue affects entire display.	Yes	Suspect poor video connection. Replace LVDS cable.	**L14**
	No	Go to step 4.	
4. Set up display under test side by side with another known-good display showing the same image. Verify if issue is noticeably worse on the display being tested.	Yes	Replace LCD panel.	**L02**
	No	Small variations in color uniformity across display are normal and do not warrant replacement or repair of the display. Return computer to user.	

Distorted/Blurred Image

Unlikely cause: power supply, hard drive, optical drive, fans, speakers, camera, microphone

Quick Check

Symptoms	Quick Check
Distorted/Blurred Image • Text and graphics appear fuzzy • Image corrupted	1. Set System Preferences/Display LCD panel to native resolution. Non-native resolutions are unable to produce optimal clarity. 2. Clean outside surface of glass panel using provided cleaning cloth. 3. Boot from install DVD to determine whether potential software issue exists.

Deep Dive

Check	Result	Action	Code
1. Boot from Install DVD and verify whether issue is still visible.	Yes	Go to step 2.	
	No	Issue likely caused by software or driver issue. Troubleshoot for software issues. Make sure all software updates have been installed.	
2. Verify whether issue is visible on an external display attached to the DisplayPort.	Yes	Issue is NOT caused by internal LCD panel. Go to step 3.	
	No	Go to step 5.	
3. Remove logic board, inspect connectors for damage or corrosion then reinstall. Verify whether issue still occurs.	Yes	Replace logic board. Go to step 4.	**M04**
	No	Issue likely caused by poor connection. Return computer to user.	**M04**
4. Verify whether issue is still present with replacement logic board installed.	Yes	Return to step 1 and retest.	**X04**
	No	Issue resolved with replacement logic board. Return computer to user.	**M04**

5. Remove LVDS cable from LCD panel and logic board and carefully verify whether there is damage to the cable or connectors.	Yes	Replace LVDS cable.	
	No	Reinstall LVDS cable. Go to step 6.	
6. Verify whether issue is still visible after reinstalling LVDS cable.	Yes	Replace LCD panel. Go to step 7.	
	No	Issue resolved with replacement logic board. Return computer to user.	**M04**
7. Verify whether issue is still present with replacement LCD panel installed.	Yes	Return to step 1 and retest.	
	No	Issue resolved with replacement LCD panel. Return computer to user.	**L04**

Pixel Anomalies

Unlikely cause: logic board, power supply, hard drive, optical drive, fans, speakers, camera, microphone

Quick Check

Symptoms	Quick Check
Pixel Anomalies • Dark dot anomalies • Bright dot anomalies • Debris on inside surface of glass panel • Debris on surface of LCD panel	1. Clean outside surface of glass panel using provided cleaning cloth. 2. For information about pixel anomalies, see kBase article: **http://support.apple.com/kb/HT1721**

Deep Dive

Check	Result	Action	Code
1. Determine if "defects" are dust/ debris on surface of glass panel or LCD.	Yes	**Clean LCD/glass panel.**	
	No	Go to step 2.	
2. Determine if bright pixel defects exceed the acceptable number. See kBase article **http://support.apple.com/kb/ HT1721**	Yes	Replace LCD panel.	**L08**
	No	LCD panel meets bright pixel defect specifications. Go to step 3.	
3. Determine if dark pixel defects exceed the acceptable number. See kBase article **http:// support.apple.com/kb/ HT1721**	Yes	Replace LCD panel	**L08**
	No	LCD panel meets dark pixel defect specifications. Go to step 3.	
4. Determine if the combination of bright/dark pixel defects exceed the acceptable number. See kBase article **http://support.apple.com/kb/ HT1721**	Yes	Replace LCD panel.	**L08**
	No	Explain to user that LCD panel is operating within specifications for pixel defects. Do not replace LCD panel.	

Vertical/Horizontal Lines

Unlikely cause: power supply, hard drive, optical drive, fans, speakers, camera, microphone

Quick Check

Symptoms	Quick Check
Vertical/Horizontal Lines • Vertical lines • Horizontal lines	1. Boot from install DVD to determine whether potential software issue exists. 2. Verify if issue is visible on an external display.

Deep Dive

Check	Result	Action	Code
1. Boot from Install DVD and verify whether issue is still visible.	Yes	Go to step 2.	
	No	Issue likely caused by software or driver issue. Troubleshoot for software issues. Make sure all software updates have been installed.	
2. Verify whether issue is visible on an external display attached to the DisplayPort.	Yes	Issue is NOT caused by internal LCD panel. Go to step 3.	
	No	Go to step 5.	
3. Remove logic board, inspect connectors for damage or corrosion then reinstall. Verify whether issue still occurs.	Yes	Replace logic board. Go to step 4.	**M04**
	No	Issue likely caused by poor connection. Return computer to user.	**M04**
4. Verify whether issue is still present with replacement logic board installed.	Yes	Return to step 1 and retest.	**X04**
	No	Issue resolved with replacement logic board. Return computer to user.	**M04**
5. Remove LVDS cable from LCD panel and logic board and carefully verify whether there is damage to the cable or connectors.	Yes	Replace LVDS cable.	
	No	Reinstall LVDS cable. Go to step 6.	

6. Verify whether issue is still visible after reinstalling LVDS cable.	Yes	Replace LCD panel. Go to step 7.	
	No	Issue resolved with replacement logic board. Return computer to user.	**M04**
7. Verify whether issue is still present with replacement LCD panel installed.	Yes	Return to step 1 and retest.	
	No	Issue resolved with replacement LCD panel. Return computer to user.	**L04**

Non-Uniform Brightness

Unlikely cause: power supply, hard drive, optical drive, fans, speakers, camera, microphone

Quick Check

Symptoms	Quick Check
Non-Uniform Brightness • Brightness not uniform • Color not-uniform	1. Verify System Preferences > Displays > Brightness level control is set above minimum. 2. Allow 15 minutes for backlight bulbs to reach normal operating temperature and output before evaluating display. 3. Visually inspect glass panel for presence of dust, cigarette smoke, or other contaminants. Clean glass panel if needed.

Deep Dive

Check	Result	Action	Code
1. Determine if brightness uniformity issue is visible after display has warmed up for ~15 minutes.	Yes	Go to step 2.	
	No	Display backlight can take several minutes to stabilize. Retest. If issue still not visible return computer to user.	
2. Use user provided examples showing brightness uniformity issue. Determine if variation in uniformity appears excessive when compared to another similar unit.	Yes	Go to step 3.	
	No	Demonstrate to user that LCD performs similarly to another unit of the same make and model.	
3. Remove front bezel and loosen screws securing LCD. Determine if brightness uniformity improves.	Yes	Inspect for mechanical interference with screws, chassis, wires making contact with back of LCD. Reseat components & cables; retest.	
	No	Go to step 4.	
4. With LCD panel screws removed inspect and then reconnect the backlight cables. Determine if brightness uniformity improves.	Yes	One or more backlight connections were loose. Return computer to user.	**L14**
	No	Replace LCD panel.	**L07**

Cosmetic Defects

Quick Check

Symptoms	Quick Check
Cosmetic Defects to LCD • Cracked LCD • Scratched LCD polarizer • Scorched or melted LCD • LCD impact damage • Foreign material on LCD or back side of glass panel.	1. Determine whether damage was caused by user environment, accidental damage, or abuse. If applicable, inform the user that Apple does not warrant damage caused by accident, abuse, misuse, flood, fire, earthquake, or other external causes. For more information refer to: **http://www.apple.com/legal/warranty** 2. For dark and bright pixel anomalies, go to **Pixel Anomalies** symptom flow.

Uncategorized Symptoms

Quick Check

Symptoms	Quick Check
Uncategorized Symptoms • Unable to locate appropriate symptom code.	1. Make sure brightness level is set above minimum. 2. Clean glass panel using provided cleaning cloth to make sure that external contaminants are removed prior to evaluating display performance. 3. Allow the iMac display to warm up approximately 15 minutes before evaluating display color and brightness uniformity performance.

Deep Dive

Check	Result	Action	Code
1. Verify whether existing symptom code applies to the issue reported by the user.	Yes	Jump to appropriate symptom code flow.	
	No	Document reported failure and send feedback to **smfeedback6@apple.com** stating that a suitable symptom code wasn't found. Provide as much detail as possible.	**N99**

Mass Storage

Hard Drive Not Recognized

Unlikely cause: LCD panel, power supply, fans, speakers, camera, microphone

Quick Check

Symptoms	Quick Check
Drive Not Recognized (H01) **Drive No Boot (H02)** • Flashing Question Mark • Boots to Grey Screen • Boots to Blue Screen	1. Use a known-good mouse. A stuck mouse button will not allow boot. 2. Boot from Install DVD. Verify S.M.A.R.T. status of drive using Disk Utility. 3. Repair disk using Disk Utility. 4. Erase disk and reinstall Mac OS using Install DVD. 5. Use Target Disk Mode to attempt to mount user's hard drive on a known-good computer. If mounted, use Disk Utility on host computer for Quick Checks 2, 3 and 4.

Deep Dive

Check	Result	Action	Code
1. Boot from Install DVD and run Disk Utility. Verify that user hard drive is available for Disk Utility to repair.	Yes	Go to step 2.	
	No	Go to step 5.	
2. Run Disk Utility 'Repair Disk' function and verify that it completes successfully.	Yes	Go to step 3.	
	No	Go to step 4.	
3. Reboot computer. Verify that system boots successfully and that Disk Utility 'Verify' function reports no errors.	Yes	Data error Issue resolved. Return computer to user.	**H07**
	No	Go to step 4.	
4. Erase disk and reinstall Mac OS using Install DVD. Verify that installation process completes.	Yes	Go to step 8.	
	No	Go to step 5.	

5. Inspect hard drive SATA and power cables and connectors for bent pins, or other damage to the cable.	Yes	Replace damaged cable. Go to step 8.	**H04**	
	No	Go to step 6.		
6. Reseat SATA and logic board hard drive connections and verify whether computer starts up.	Yes	Go to step 8.		
	No	Replace SATA cable. Go to step 8.	**H04**	
7. Test with known-good hard drive. Verify that system boots successfully and that Disk utility 'Verify' function reports no errors.	Yes	Install user drive. Go to step 9.		
	No	SATA cable verified or replaced and known-good hard drive installed. Suspect possible SATA controller issues. Replace logic board. Go to step 1.		
8. Reboot computer. Verify that system boots successfully and that Disk Utility 'Verify' function reports no errors.	Yes	Issue resolved. Return system to user.		
	No	Go to step 7.		
9. Reboot computer. Verify that system boots successfully and that Disk Utility 'Verify' function reports no errors.	Yes	Issue resolved.		
	No	Hard drive appears to be defective. Go to step 10.		
10. Replace hard drive. Does drive format correctly with a GUID partition map and install Mac OS X without errors?	Yes	Issue resolved by replacing hard drive.	**H05**	
	No	SATA cable verified or replaced and new hard drive installed. Replace logic board.	**M19**	

Hard Drive Read/Write Error

Unlikely cause: LCD panel, power supply, fans, speakers, camera, microphone

Quick Check

Symptoms	Quick Check
Drive Read/Write Error (H03) **Drive Bad Sector/Defective (H05)** **Drive Formatting Issues (H07)** • Cannot save documents • Read/write error message • Hang when accessing or saving data	1. Boot from Install DVD. Verify S.M.A.R.T. status of drive using Disk Utility. 2. Repair disk using Disk Utility. 3. Erase disk and reinstall Mac OS using Install DVD. 4. Use Target Disk Mode to mount user's hard drive on a known-good computer. Use Disk Utility on host computer for Quick Checks 1 through 4.

Deep Dive

Check	Result	Action	Code
1. Run Disk Utility 'Repair Disk' function and verify that it completes successfully.	Yes	Go to step 2.	
	No	Go to step 3.	
2. Reboot computer. Verify that system boots successfully and that Disk Utility 'Verify' function reports no errors.	Yes	Data error. Issue resolved. Return computer to user.	**H07**
	No	Go to step 3.	
3. Erase disk and reinstall Mac OS using Install DVD. Verify that installation process completes.	Yes	Go to step 7.	
	No	Go to step 4.	
4. Inspect hard drive SATA and power cables and connectors for bent pins, or other damage to the cable.	Yes	Replace damaged cable. Go to step 7.	**H04**
	No	Go to step 5.	
5. Reseat SATA and logic board hard drive connections and verify whether computer starts up.	Yes	Go to step 7.	
	No	Replace SATA cable. Go to step 7.	**H04**
6. Test with known-good hard drive. Verify that system boots successfully and that Disk Utility 'Verify' function reports no errors.	Yes	Install user drive. Go to step 8.	
	No	SATA cable verified or replaced and known-good hard drive installed, Replace logic board.	

7. Reboot computer. Verify that system boots successfully and that Disk Utility 'Verify' function reports no errors.	Yes	Issue resolved. Return system to user.	
	No	Go to step 6.	
8. Reboot computer. Verify that system boots successfully and that Disk Utility 'Verify' function reports no errors.	Yes	Issue resolved.	
	No	Hard drive appears to be defective Go to step 9.	
9. Replace user hard drive. Does drive format correctly with a GUID partition map and install Mac OS X without errors?	Yes	Issue resolved by replacing hard drive.	
	No	SATA cable verified or replaced and new hard drive installed. Replace logic board.	

Hard Drive Noisy

Unlikely cause: LCD panel, logic board, power supply, speakers, camera, microphone

Quick Check

Symptoms	Quick Check
Hard Drive Noisy (H06) • Noise during start up • Noise during operation • Noise when drive is copying or saving data	1. Start up from Install DVD. Verify S.M.A.R.T. status of drive using Disk Utility. 2. Repair disk using Disk Utility. 3. Determine if noise is comparable to another machine of the same model.

Deep Dive

Check	Result	Action	Code
1. Boot from the Install DVD and run Disk Utility. Verify that user hard drive is available for Disk Utility to repair.	Yes	Go to step 2.	
	No	Go to **Hard Drive Not Recognized** symptom flow	
2. Run Disk Utility 'Repair Disk' function and verify that it completes successfully.	Yes	Go to step 3.	
	No	Go to step 4.	

3.	Restart the computer. Verify whether the noise is still present.	Yes	Go to step 6.	
		No	Data error issue resolved by Disk Utility. Return system to user.	**H06**
4.	Erase disk and reinstall Mac OS using Install DVD. Verify that installation process completes. Note: Make sure data has been backed up before erasing hard drive.	Yes	Go to step 3.	
		No	Replace hard drive. Go to step 5.	**H06**
5.	With replacement hard drive installed reboot computer. Verify whether noise is still present.	Yes	Go to step 6.	
		No	Issue resolved by replacing hard drive.	
6.	With hard drive removed verify that rubber vibration isolation grommets are properly installed in hard drive mounting bracket.	Yes	Go to step 8.	
		No	Replace hard drive mounting bracket. Go to step 7.	**H06**
7.	Reboot computer. Verify whether noise is still present.	Yes	Replace hard drive. Go to step 6.	
		No	Noise caused by chassis/ hard drive bracket. Return system to user.	
8.	Disconnect hard drive SATA and power connections then boot from the Install DVD. Determine if noise is caused by the fans in the computer.	Yes	Go to **Fan Failures/Thermal Issues** symptom flow.	
		No	Go to step 9	
9.	Disconnect the hard dive SATA and optical drive then boot from an external volume. Determine if the noise disappears when the optical drive has been disconnected.	Yes	Posible optical drive or media issue. Go to **Optical Drive Noisy** symptom flow.	
		No	Noise issue still present, but does not appear to be caused by hard drive. Go to **Noise/ Hum/Vibration** symptom flow.	

Optical Drive Not Recognized

Unlikely cause: LCD panel, power supply, fans, speakers, camera, microphone

Quick Check

Symptoms	Quick Check
Drive Not Recognized/Mount (J05) • Discs inject and eject, but do not appear in Finder	1. Use Apple System Profiler Serial-ATA section to see if the optical drive and any inserted media appears. 2. Check Finder Preferences and make sure "CD's, DVD's and iPods" is checked under "Show these items on the desktop" in the General section. 3. Check both CD and DVD media. If only one type of media is recognized, there is a laser issue. Replace optical drive (J03).

Deep Dive

Check	Result	Action	Code
1. Is the optical drive listed in the Serial-ATA section of the Apple System Profiler?	Yes	Go to step 2.	
	No	Go to step 3.	
2. Test both CD and DVD media. Can drive read both CD media and DVD media?	Yes	Go to step 6.	
	No	Drive has a laser issue. Replace the optical drive. If both types media fail, check Finder Preferences then go to step 3.	**J03**
3. Reseat SATA cable connections at logic board and optical drive. Do both types of media read reliably now?	Yes	Go to step 6.	
	No	Go to step 4.	
4. Connect known-good optical drive to SATA cable. Do both types of media reliably read now?	Yes	SATA cable and port on logic board good. Go to step 5.	
	No	Replace SATA cable and test (**X03**). If issue persists, replace logic board (**M19**). Go to step 6.	

5. Connect original optical drive to known-good SATA cable. Do both types of media reliably read now?	Yes	SATA cable issue. Replace SATA cable. Go to step 6.	**X03**
	No	Go to step 2.	
6. Test read compatible known-good CD and DVD media (Install DVD). Verify media is recognized and reads reliably.	Yes	Issue resolved.	
	No	Replace optical drive.	**J03**

Optical Drive Won't Accept/Eject Media

Unlikely cause: LCD panel, power supply, fans, speakers, camera, microphone

Quick Check

Symptoms	Quick Check
Drive Won't Accept Media (J01) **Drive Won't Eject Media (J02)** • Cannot insert a disc into the drive • Cannot eject a disc placed into the drive	1. Use Apple System Profiler Serial-ATA section to see if the optical drive appears. If not, go to **Optical Drive Not Recognized** symptom flow. 2. Restart computer and hold down mouse button or keyboard eject key to cycle optical drive. 3. Inspect optical drive slot for obstructions.

Deep Dive

Check	Result	Action	Code
1. Verify that optical drive is listed in the System Profiler device tree for Serial-ATA devices.	Yes	Optical drive communicating with logic board. Go to step 5.	
	No	Logic board not communicating with optical drive. Go to step 2.	
2. Verify all connection between logic board, flex cable, and optical drive are secure. Visually inspect cables and connectors for any debris, damage or bent pins. Verify that the optical drive is listed in the System Profiler device tree.	Yes	Optical drive communicating with logic board. Go to step 5.	
	No	Replace damaged cables and retest. If connections are good and with no visible cable damage, go to step 3.	**X03**

3. Connect known-good optical drive to SATA cable. Verify that known-good optical drive is listed in the System Profiler device tree.	Yes	Go to step 4.	
	No	Suspect SATA cable. Go to step 7.	
4. With known-good optical drive installed, test for media inject/eject. Verify drive accepts and ejects known-good media.	Yes	Known-good optical drive resolved inject/eject issue. Replace optical drive.	**J03**
	No	Go to step 7.	
5. Inspect optical drive slot during disc insert/ eject. Verify that discs can be inserted easily.	Yes	Go to step 6.	
	No	Replace damaged optical drive. Note: It may be possible to reinstall the optical drive bezel to correct this issue.	**J03**
6. With known-good optical media (Install disc), test for media inject/eject. Does drive accept and eject known-good media?	Yes	Media issue. No repair necessary. Suggest user investigate use of different media.	
	No	Go to step 3.	
7. Replace SATA cable then test for media inject/eject. Does drive inject and eject known-good media?	Yes	SATA cable resolved issue. Return system to user.	**X03**
	No	SATA cable verified or replaced, and optical drive verified or replaced. Replace logic board and retest.	**M19**

Optical Drive Read/Write Error

Unlikely cause: LCD panel, power supply, fans, speakers, camera, microphone

Quick Check

Symptoms	Quick Check
Drive Read/Write Data Error (J03) • Errors when writing optical media. • Errors when reading optical media. • Hang when accessing or preparing to write data.	1. Test optical media in another drive of the same type in the same type of computer to rule out media issue. 2. Check with known-good discs like the Install discs that came with the computer. 3. For write issues, check with known-good media that performs well in another computer and optical drive of the same type. 4. Check both CD and DVD media. If only one type of media is producing errors, there is a laser issue. Replace optical drive (**J03**).

Deep Dive

Check	Result	Action	Code
1. Is media free to spin without optical drive scraping edge or surface of media?	Yes	Go to step 2.	
	No	Replace optical drive.	**J05**
2. Test both CD and DVD media. Can drive read both CD media and DVD media?	Yes	Go to step 6.	
	No	Drive has a laser issue. Replace the optical drive. If both types media fail, go to step 3.	**J03**
3. Reseat SATA cable connections at logic board and optical drive. Do both types of media read reliably now?	Yes	Go to step 6.	
	No	Go to step 4.	
4. Connect known-good optical drive to SATA cable. Do both types of media reliably read now?	Yes	SATA port on logic board good. Go to step 5.	
	No	SATA port on logic board bad. Replace logic board.	**M19**

5.	Connect original optical drive to known-good SATA cable. Do both types of media reliably read now?	Yes	SATA cable issue. Replace SATA cable. Go to step 6.	**X03**
		No	Replace optical drive.	**J03**
6.	Test write data to compatible CD and DVD media. Verify burned media is recognized and reads reliably.	Yes	Issue resolved.	
		No	Replace optical drive.	**J03**

Optical Drive Not Performing to Specifications

Unlikely cause: LCD panel, power supply, fans, speakers, camera, microphone

Quick Check

Symptoms	Quick Check
Optical Drive Not Performing to Specifications (J07) • Read or write speeds slower than expected	1. Test optical media in another drive of the same type in same type of computer to rule out media issue. 2. For write issues, check with known-good media that performs well in another computer and drive of the same type. 3. Check both CD and DVD media. If only one type of media is producing errors, you have a laser issue. Replace the optical drive (**J05**)

Deep Dive

Check	Result	Action	Code
1. Test both CD and DVD media. Can drive read both CD media and DVD media?	Yes	Go to step 6.	
	No	Drive has a laser issue. Replace the optical drive. If both types media fail, go to step 3.	**J03**
2. Reseat SATA cable connections at logic board and optical drive. Do both types of media read reliably now?	Yes	Go to step 6.	
	No	Go to step 4.	

3. Connect known-good optical drive to SATA cable. Do both types of media reliably read now?	Yes	SATA cable and port on logic board good. Go to step 5.	
	No	Replace SATA cable and test (**X03**). If issue persists, replace logic board (**M19**). Go to step 6.	
4. Connect original optical drive to known-good SATA cable. Do both types of media reliably read now?	Yes	SATA cable issue. Replace SATA cable. Go to step 6.	**X03**
	No	Replace optical drive.	**J03**
5. Test write data to compatible CD and DVD media. Verify burned media is recognized and reads reliably.	Yes	Issue resolved.	
	No	Go to step 7.	**J03**
6. The balance of some media may not perform at higher speeds supported by the drive. Does slowing the requested burn speed allow the discs to write reliably?	Yes	Media issue. No repair necessary.	
	No	Replace optical drive.	**J07**

Optical Drive Noisy

Unlikely cause: LCD panel, power supply, fans, speakers, camera, microphone

Quick Check

Symptoms	Quick Check
Optical Drive Noisy (J04) • Noise during boot • Noise during operation • Noise when drive is copying or writing data	1. Test optical media in another drive of the same type in same model of computer to rule out media issue. 2. Test with known-good discs like the Install discs that came with the computer. 3. Check to see if noise occurs without media in the drive. If so, check if hard drive (**H06**) or fan (**M18**) caused noise.

Deep Dive

Check	Result	Action	Code
1. Test both CD and DVD media. Can drive read both CD media and DVD media?	Yes	Go to step 6.	
	No	Drive has a laser issue. Replace the optical drive. If both types media fail, go to step 3.	**J03**
2. Reseat SATA cable connections at logic board and optical drive. Do both types of media read reliably now?	Yes	Go to step 6.	
	No	Go to step 4.	
3. Connect known-good optical drive to SATA cable. Do both types of media reliably read now?	Yes	SATA cable and port on logic board good. Go to step 5.	
	No	Replace SATA cable and test (**X03**). If issue persists, replace logic board (**M19**). Go to step 6.	
4. Connect original optical drive to known-good SATA cable. Do both types of media reliably read now?	Yes	SATA cable issue. Replace SATA cable. Go to step 6.	**X03**
	No	Replace optical drive.	**J03**
5. Test write data to compatible CD and DVD media. Verify burned media is recognized and reads reliably.	Yes	Issue resolved.	
	No	Go to step 7	**J03**
6. The balance of some media may not perform at higher speeds supported by the drive. Does slowing the requested burn speed allow the discs to write reliably?	Yes	Media issue. No repair necessary.	
	No	Replace optical drive.	**J07**

Uncategorized Symptoms

Check	Result	Action	Code
1. Verify whether existing symptom code applies to the issue reported by the user.	Yes	Jump to appropriate symptom code flow.	
	No	Document reported failure and send feedback to **smfeedback6@apple.com** stating that a suitable symptom code wasn't found. Provide as much detail as possible.	**N99**

Communications

AirPort/Bluetooth Issues

Quick Check

Symptoms	Quick Check
AirPort/Bluetooth Issues • Unable to join networks or pair devices • AirPort card not available • Intermittent device or connection dropouts • Limited wireless range	1. Verify that AirPort or Bluetooth is turned ON and for AirPort issues make sure that a network is selected. 2. For AirPort, check if the wireless access point requires special connection and encryption protocols. 3. Check for nearby sources of interference such as microwave ovens or cordless phones. See kBase article **http://support.apple.com/kb/HT1365** 4. Check the number of users trying to use AirPort in the area for possible network congestion (available bandwidth). 5. Isolate potential OS issues by starting up from the original Install media for the computer, the same model computer in Target Disk Mode, or compatible known-good OS on an external drive. Both AirPort and Bluetooth services are available when booted from the Install disc.

Deep Dive

Check	Result	Action	Code
1. Open System Profiler. AirPort is listed under Network, while Bluetooth is listed under USB. Is AirPort/Bluetooth recognized?	Yes	Install all software updates for AirPort/Bluetooth. AirPort, go to step 3. Bluetooth, go to step 4.	
	No	Remove and reinstall the AirPort/Bluetooth card and retest. If still unrecognized, replace the AirPort/Bluetooth card. Go to step 2.	**M11**

2.	Ensure that antenna cable(s) are connected properly and not damaged, and all software updates available for AirPort/Bluetooth have been installed. Do connection issues persist?	Yes	AirPort, go to step 3. Bluetooth, go to step 4.	
		No	Issue resolved.	
3.	Create a computer-to-computer network with another Macintosh computer using AirPort. See kBase article **http://docs.info.apple.com/article.html?path=AirPort/5.0/en/ap2110.html**. Can you connect successfully?	Yes	Network or channel issue. Go to step 5.	
		No	Double check any password required. Try connecting another known-good computer to the network. If test computers connect, replace AirPort card. Go to step 6.	**M11**
4.	Make sure that your Bluetooth device is in discoverable mode, and that your computer is also in discoverable mode. Can you successfully and reliably pair a device now?	Yes	Issue resolved.	
		No	Replace Bluetooth card. Go to step 6.	**M11**
5.	Try connecting to a known-good network that does not require password or has MAC address filtering enabled. Can you connect to a network reliably now?	Yes	Troubleshoot local network. Possible password or MAC address filtering issue.	
		No	Replace AirPort card. Go to step 6	**M11**
6.	With the AirPort/Bluetooth card replaced and antenna cable inspected for damage and replaced if necessary, are the connection issues resolved?	Yes	Issue resolved.	
		No	Replace logic board.	**M11**

AirPort Card Kernel Panic

Quick Check

Symptoms	Quick Check
AirPort Card Kernel Panic • Kernel panic on startup • Kernel panic or freezing while attempting to connect to wi-fi networks • Kernel panic while transferring data on wi-fi networks	1. Isolate OS by starting up from original Install media for the computer, the same model computer in Target Disk Mode, or compatible known-good OS on an external drive. AirPort service is available when booted from the Install disc. 2. Ensure that all software and firmware updates for the computer and AirPort been installed.

Deep Dive

Check	Result	Action	Code
1. Remove AirPort card. Does computer start without kernel panic?	Yes	Reseat AirPort card and retest. If problem continues replace AirPort card. Go to step 2.	
	No	Possible logic board issue. Go to **Kernel Panic/System Crashes** symptom flow.	
2. With replacement AirPort card installed, does computer start without kernel panic?	Yes	AirPort card issue. Issue resolved.	**N13**
	No	Possible logic board issue. Go to **Kernel Panic/System Crashes** symptom flow.	

Ethernet Port/Device Issue

Unlikely cause: LCD display, power supply, hard drive, optical drive, fans

Quick Check

Symptoms	Quick Check
Ethernet Port/Device Issue • No ethernet device present • Unable to access network resources • Ethernet device shows no connection • Ethernet device unable to an IP address • Slow network performance	1. Check the ethernet cable for damage, try a known-good ethernet cable – CAT5 or better recommended for 100Mbps+ connections. 2. Check ethernet ports on the 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 port, cable and network hardware with a known-good system. Isolate firewall, MAC address filtering or hardware access control devices 5. Isolate OS by starting up from original Install media for the computer, the same model computer in Target Disk Mode, or compatible known-good OS on an external drive.

Deep Dive

Check	Result	Action	Code
1. Visually inspect the ethernet port of the computer to ensure that all pins will make physical contact with the CAT5 ethernet cable.	Yes	Go to step 2.	
	No	Pins are damaged, bent flat or missing. Replace logic board.	**M24**
2. Boot from original Install media. Verify Network Link status active by using Network Utility under the "Info" tab. Is the Link Status "Active"?	Yes	Go to step 3.	
	No	If same ethernet cable gives an "Active" link status on a known-good computer of same model, replace logic board	**M10**

3. Connect the computer to another Macintosh computer using CAT5 ethernet cable. See kBase article **http://docs.info.apple.com/article.html?path=Mac/10.5/en/8429.html**. Can you connect successfully?	Yes	Ethernet communication good. Go to step 4.	
	No	If same ethernet cable and computer connects to a known-good computer of same model, replace logic board.	**M10**
4. Check for speed and duplex issues on the network. Open System Preference > Network; click the Advanced button, then the Ethernet tab. Is the speed and duplex reported what is expected?	Yes	Go to step 5.	
	No	Change the speed and duplex settings. See kBase article **http://docs.info.apple.com/article.html?path=Mac/10.5/en/8711.html**. Go to step 6.	
5. Check for MTU (Maximum Transmission Unit) issues. See article **http://support.apple.com/kb/HT2532**. Does changing the MTU settings on the computer resolve the issue?	Yes	Go to step 6.	
	No	Ethernet controller damaged. Replace logic board.	**M10**
6. If changing the speed, duplex or MTU settings allows connectivity, check with another computer of same model. Does the known-good computer produce the same results?	Yes	Check with ISP or Network Administrator concerning speed, duplex and MTU settings.	
	No	Verify with known-good OS. If the issue persists, replace the logic board.	**M10**

Wireless Input Device Doesn't Pair

Quick Check

Symptoms	Quick Check
Wireless Input Device Doesn't Pair • Can't get system to recognize the Bluetooth keyboard or mouse	1. Remove and reinstall the batteries for the device. 2. Check that device is powering on. 3. Use known-good batteries with the device. 4. Ensure that device is being used within 30-foot range for Bluetooth devices. 5. Ensure that the latest Software Updates have been applied.

Deep Dive

Check	Result	Action	Code
1. Without any wired input devices connected, start the computer. Does the computer show the Bluetooth Mouse Setup assistant?	Yes	Bluetooth hardware is active. Go to step 4.	
	No	Inspect and reseat Bluetooth cable to Bluetooth card. Replace a damaged cable. Go to step 2.	
2. Restart the machine without any wired input devices attached. Does the computer show the Bluetooth Mouse Setup assistant?	Yes	Bluetooth hardware is active. Go to step 4.	
	No	Reseat the Bluetooth card to the logic board. Go to step 3.	
3. Restart the machine without any wired input devices attached. Does the computer show the Bluetooth Mouse Setup assistant?	Yes	Bluetooth hardware is active. Go to step 4.	
	No	Replace the Bluetooth card.	
4. With a wireless mouse on, and in discoverable mode, can you successfully pair the mouse with the assistant?	Yes	Check for stability. Go to step 5.	
	No	Go to **Wireless Input Device Loses Connection** symptom flow.	
5. With the wireless mouse paired, does the mouse stay connected?	Yes	Issue resolved.	
	No	Inspect and reseat the Bluetooth antenna cable. Replace a damaged antenna cable (only available as part of rear housing) or Bluetooth card if the antenna connector is damaged. Go to step 6.	
6. With the wireless mouse paired, does the mouse stay connected?	Yes	Antenna issue. Issue resolved.	
	No	Go to **Wireless Input Device Loses Connection** symptom flow.	

Wireless Input Device Loses Connection

Quick Check

Symptoms	Quick Check
Wireless Input Device Loses Connection • Wireless keyboard, mouse, or other wireless input device loses connection.	1. Remove and reinstall the batteries for the device. 2. Check that device is powering on. 3. Use known-good batteries with the device. 4. Ensure other devices pair and keep connection without issue. If not, go to **AirPort/Bluetooth Issues** symptom flow. 5. Ensure that device is being used within 30-foot range for Bluetooth devices. 6. Ensure that the latest Software Updates have been applied.

Deep Dive

Check	Result	Action	Code
1. Open System Preferences > Bluetooth. Paired items and their connection status are shown. Is the device listed?	Yes	Device has been paired. Go to step 2.	
	No	The device is not paired. Make device discoverable and open Bluetooth Setup Assistant. Go to step 3.	
2. Make sure device is on. In System Preferences > Bluetooth, select the device and from the Action menu (gear icon) choose "Connect". Does the device connect successfully?	Yes	Go to step 7.	
	No	Delete pairing in System Preferences. Go to step 3.	
3. With the device on, run the Bluetooth Setup Assistant. Can you successfully pair the device?	Yes	Go to step 7.	
	No	Restart the machine. Go to step 4.	
4. With the device on, run the Bluetooth Setup Assistant. Can you successfully pair the device?	Yes	Go to step 7.	
	No	Create a new Admin User. Go to step 5.	

5. Log into new Admin User account. With the device on, run the Bluetooth Setup Assistant. Can you successfully pair the device with the New User?	Yes	User-based issue. Troubleshoot software on User account. No repair needed.	
	No	Remove the following file: / Library/Preferences/com. apple.Bluetooth.plist Go to step 6.	
6. Restart the computer. With the device on, run the Bluetooth Setup Assistant. Can you successfully pair the device?	Yes	Go to step 7.	
	No	Go to **AirPort/Bluetooth Issues** symptom flow.	
7. With the device paired and connected, is the device connection stable if used normally?	Yes	Issue resolved.	
	No	Check device documentation on standard length of operation, and other operational factors. Go to step 8.	
8. Is the device performing to stated specifications?	Yes	Educate user. Issue resolved.	
	No	Replace device.	

Uncategorized Symptoms

Quick Check

Symptoms	Quick Check
Uncategorized Symptoms • Unable to locate appropriate symptom code.	1. Verify System Preferences/Network settings are configured appropriately to support communication method. 2. For ethernet connection issues verify that the cable being used functions when used with another known-good system. 3. For wireless connection issues review user environment to determine whether possible interference from other 2.4GHz communications devices might be contributing to issue. **http://support.apple.com/kb/HT1365**

Deep Dive

Check	Result	Action	Code
1. Verify whether existing symptom code applies to the issue reported by the user.	Yes	Jump to appropriate symptom code flow.	
	No	Document reported failure and send feedback to **smfeedback6@apple.com** stating that a suitable symptom code wasn't found. Provide as much detail as possible.	**N99**

Input/Output Devices

Apple Remote Inoperable

Unlikely cause: LCD display, power supply, hard drive, optical drive, fans

Quick Check

Symptoms	Quick Check
Apple Remote Inoperable • Apple Remote doesn't bring up Front Row • Apple Remote doesn't control iTunes • Apple Remote doesn't control computer volume	1. Make sure you're using the Apple Remote within 30 feet of the computer, and have an unobstructed line-of-sight to the computer. 2. Make sure you're pointing the lens end of the Apple Remote directly at the front of the computer. 3. Make sure "Disable remote control infrared receiver" checkbox in the Security preference pane is not checked. 4. Ensure that all available Software Updates have been applied to the computer.

Deep Dive

Check	Result	Action	Code
1. Open Photo Booth or iChat's video preview window. Point the Apple Remote at the built-in iSight camera and press any button on the Apple Remote. Do you see a white, flashing light in the video preview?	Yes	The Apple Remote is functioning. Go to step 2.	
	No	The Apple Remote is not functioning. Replace the Apple Remote battery. Go to step 3.	
2. Open System Preferences > Security. Is "Unpair" available in this preference pane?	Yes	Click the "Unpair" button to disable possible pairing with another Apple Remote. Go to step 4.	
	No	Possible IR board issue. Go to step 5.	
3. With a replacement battery, do you now see a white flashing light from the Apple Remote in the video preview window?	Yes	Battery issue. Issue resolved.	**X05**
	No	Apple Remote defective. Replace the Apple Remote.	**X04**

4. After clicking "Unpair", does the computer now respond to the Apple Remote?	Yes	Pairing issue. Issue resolved.	
	No	Possible IR board issue. Go to step 5.	
5. Open the Apple System Profiler. Selecting USB, do you see "IR Receiver" listed?	Yes	IR Receiver reporting on USB bus. Check for lens block. Go to step 6.	
	No	Inspect and reseat IR cable to IR board. If necessary, replace damaged IR cable. Go step 7.	
6. After clearing lens, does the computer now respond to the Apple Remote?	Yes	Lens blocked. Issue resolved.	
	No	Lens damaged or inoperable. Replace IR board.	
7. After reseating or replacing the IR cable, does the computer now respond to the Apple Remote?	Yes	IR cable issue. Issue resolved.	**X03**
	No	IR Receiver failure. Replace IR board.	

Audio: Microphone

Unlikely cause: LCD display, power supply, hard drive, optical drive, fans

Quick Check

Symptoms	Quick Check
Audio: Microphone • Microphone not working • Microphone audio garbled • No sound	1. Verify that no tape, sticky notes, or other objects are blocking the microphone port that is located on top of the front bezel above the camera. The microscopic perforations on top of the front bezel must be free of obstructions in order for the microphone to function. 2. Launch System Preferences and select Sound/Input options. Verify that the sound input option is set to system's internal microphone. 3. Launch System Preferences and select Sound/Input options. Verify that the 'Input Volume' setting is not set at the minimum level. 4. Launch System Preferences and select Sound/Input options. Verify that 'Input Level' indicator moves when speaking into the microphone.

Deep Dive

Check	Result	Action	Code
1. Verify that boot chime is present when system is powered on. Note: make sure audio output preferences are not set to mute.	Yes	Go to step 2.	
	No	Audio board not detected by system. Reseat audio board, then replace audio board if problem persists.	**M09**
2. Launch System Preferences and select Sound/Input options. Verify that system's Internal Microphone is selected.	Yes	Go to step 3.	
	No	Select display's internal microphone. Retest.	
3. Launch System Preferences and select Sound/Input options. Verify that 'Input Volume' is set above minimum sensitivity.	Yes	Go to step 4.	
	No	Set 'Input Volume' slider to the middle position. Retest.	
4. Launch System Preferences and select Sound input options. Verify that 'Input Level' indicator moves when speaking into the microphone.	Yes	Microphone and audio board functioning. Go to step 6.	
	No	Suspect bad microphone. Replace front bezel which contains the microphone.	**M09**
5. Disconnect, carefully inspect, then reconnect the microphone cable and connectors where they mate with the front bezel and the audio board. Was any damage to the cabling or connectors observed?	Yes	Replace damaged part (front bezel, audio board, or microphone cable). Go to step 7.	**L14**
	No	Go to step 6.	
6. Record sound sample using Garageband or iMovie HD. Verify that sound quality of sound sample is normal during playback.	Yes	Microphone circuitry OK. Return system to user.	
	No	Replace front bezel which includes the microphone.	**M09**

Audio: Built-in Speakers Have Distorted Sound

Unlikely cause: LCD display, power supply, hard drive, optical drive, fans

Quick Check

Symptoms	Quick Check
Audio: Built-in Speakers Have Distorted Sound • No audio from one or both speakers • Audio from speakers distorted	1. Launch System Preferences and select Sound/Output options. Verify that the sound output option is set to system's internal speakers and the balance control is set to the center position. 2. Obtain known-good high-quality sound file or use iTunes music store sound samples to evaluate sound quality. Verify suspect sound files on another system to determine whether the distortion is caused by the system or the sound file. 3. Set volume control to mid-range. Overdriving the built-in speakers can cause distortion.

Deep Dive

Check	Result	Action	Code
1. Launch System Preferences and select Sound/Output options. Set speaker balance 100% to LEFT speaker then play a sound file. Verify that sound is generated by the LEFT speaker and that the sound quality is acceptable.	Yes	LEFT speaker and amplifier circuitry OK. Go to step 2.	
	No	Distortion detected in LEFT speaker. Set 'Balance' slider to the middle position. Go to step 3.	
2. Set speaker balance 100% to RIGHT speaker then play a sound file. Verify that sound is generated by the RIGHT speaker and that the sound quality is acceptable.	Yes	RIGHT speaker and amplifier circuitry OK. Set 'Balance' slider to the middle position. Go to step 3.	
	No	Distortion detected in RIGHT speaker. Go to step 4.	
3. Connect external speakers or headphones to Headphone Out port then play a sound file. Verify that sound quality is acceptable.	Yes	Suspect bad speaker. Go to step 4.	
	No	Audio CODEC or amplifier issue suspected. Replace audio board. Retest.	**M09**

4. Inspect LEFT and RIGHT speaker cones and speaker connection cable for damage. Do speakers have visible damage?	Yes	Replace damaged speaker. Retest.	**M09**
	No	Go to step 5.	
5. Install known-good speaker into location where distorted sound was heard. Verify that sound quality improves.	Yes	Speaker bad. Replace speaker and retest.	**M09**
	No	Suspect speaker amplifier. Replace audio board.	**M09**

Audio: Built-in Speakers Have No Audio

Unlikely cause: LCD display, power supply, hard drive, optical drive, fans

Quick Check

Symptoms	Quick Check
Audio: Built-in Speakers Have No Audio • No audio from one or both speakers • Audio from speakers distorted	1. Launch System Preferences and select Sound/Output options. Verify that the sound output option is set to system's internal speakers. 2. Launch System Preferences and select Sound/Output options. Verify that the 'Output Volume' setting is set above the minimum level and that the 'mute' option is not selected. 3. Launch System Preferences and select Sound/Output options. Verify that 'Balance' is set to middle position so that the left and right speakers are utilized.

Deep Dive

Check	Result	Action	Code
1. Verify whether boot chime is present when system is powered on. Note: make sure audio output preferences are not set to mute and volume is set to mid-range.	Yes	Go to step 2.	
	No	Audio board not detected by system. Reseat audio board, then retest. Replace audio board if problem persists.	**M09**

2. Launch System Preferences and select Sound/Output options. Set speaker balance 100% to LEFT speaker then play a sound file. Verify that sound is generated by the LEFT speaker and that the sound quality is acceptable.	Yes	LEFT speaker and amplifier circuitry OK. Go to step 3.	
	No	Go to step 6.	
3. Set speaker balance 100% to RIGHT speaker then play a sound file. Verify that sound is generated by the RIGHT speaker and that the sound quality is acceptable.	Yes	RIGHT speaker and amplifier circuitry OK. Set 'Balance' slider to the middle position. Go to step 4.	
	No	Go to step 6.	
4. Verify whether user-reported audio issue has been resolved.	Yes	Issue no longer present. Return system to user.	
	No	Go to step 5.	
5. Boot system from Install DVD or another known-good bootable volume. Verify whether issue still occurs.	Yes	Go to step 6.	
	No	Known-good boot volume works OK. Troubleshoot for software issue. Isolate whether issue is application specific or whether possible operating system conflict. Make sure user data backed up before removing or reinstalling software.	
6. Connect external speakers to Headphone Out port and set System Preferences Sound/Output to external speakers, then play a sound file. Verify that sound quality is acceptable.	Yes	Audio board, internal speakers, and external headphone port functioning correctly. Return system to user.	
	No	Go to step 7.	
7. Disconnect and carefully inspect flexible cable and connectors connecting audio board to MLB for damage such as bent pins or pinched/cut wires.	Yes	Replace damaged part(s) then retest. Return to step 1 if problem continues to verify whether symptom has changed.	**M09**
	No	Replace audio board then retest.	**M09**

Camera Issues

Unlikely cause: LCD display, power supply, hard drive, optical drive, fans, speakers, microphone

Quick Check

Symptoms	Quick Check
Camera Issues • Camera not detected • No green LED for camera • Excessive blooming • Poor white balance • Poor focus • Green image • Image distortion	1. Launch System Profiler and confirm that system's USB hub and built-in camera are visible. 2. Verify camera lens and glass panel are clean and free of contaminants. Use cleaning cloth to clean glass panel if needed. 3. Launch PhotoBooth to verify that the green indicator LED near the camera lens turns on and that the image quality is acceptable.

Deep Dive

Check	Result	Action	Code
1. Launch System Profiler and confirm that the display's USB hub is visible in the USB tree.	Yes	USB hub recognized. Go to step 2.	
	No	USB hub not recognized. Go to **USB Devices Not Recognized** symptom flow.	
2. Verify that camera is visible in display's USB tree.	Yes	Camera recognized. Go to step 3.	
	No	Inspect and reseat camera cable and connectors at the camera and the logic board. Retest. Replace camera cable if problem persists.	**L14**
3. Launch PhotoBooth. Verify that green LED near camera lens turns ON and image appears normal.	Yes	Camera functioning. Obtain additional information from user. Return system to user.	
	No	Replace camera. Retest.	**M13**

FireWire Devices Not Recognized

Unlikely cause: LCD display, power supply, hard drive, optical drive, fans

Quick Check

Symptoms	Quick Check
FireWire Devices Not Recognized • FireWire external drive not recognized • FireWire printer not recognized	1. For external FireWire drives, make sure any external power source is plugged in and operating to isolate a power issue with the device. 2. Test with a known-good FireWire device to isolate a failed peripheral issue. 3. Test with a known-good FireWire cable to isolate a FireWire cable issue. 4. Ensure that all available Software Updates have been applied to the computer.

Deep Dive

Check	Result	Action	Code
1. Unplug all FireWire devices from the computer. Start the computer and reset PRAM. Reconnect the FireWire device in question. Is the FireWire device recognized?	Yes	Issue resolved.	
	No	Possible logic board failure. Go to step 2	
2. Use a known-good FireWire cable with a known-good FireWire device (another Mac in FireWire Target Disk mode is good). Is this device recognized?	Yes	Try the FireWire device in question with a known-good computer of the same model. Go to step 3	
	No	FireWire not recognized. Replace logic board.	**M12**
3. Is the FireWire device recognized on a known-good computer of the same model?	Yes	Test the FireWire device with a known-good cable on user's computer. Go to step 4	
	No	FireWire device may need additional power. Use a powered FireWire hub. Go to step 5.	

4. Is the FireWire device recognized with a known-good FireWire cable on the user's computer?	Yes	FireWire cable issue. Issue resolved.	
	No	FireWire device may need additional power. Use a powered FireWire hub. If the issue persists, check for any firmware updates for the FireWire device. Go to step 5.	
5. Using a powered FireWire hub, and having installed any software or firmware update for the device, is the FireWire device recognized now?	Yes	Device recognized. Required additional power from hub or update. Issue resolved.	
	No	Device may require additional software, or there may be a conflict in the Mac OS. Test in New User. Go to step 5	
6. Is the FireWire device recognized with a New User?	Yes	Software Issue. Troubleshoot software on User account. Issue resolved.	
	No	Apply all Mac OS updates. If the issue persists, replace the FireWire device.	

USB Devices Not Recognized

Unlikely cause: LCD display, power supply, hard drive, optical drive, fans

Quick Check

Symptoms	Quick Check
USB Devices Not Recognized • USB wired keyboard/mouse not recognized • USB external drive not recognized • USB printer not recognized	1. For printers and external USB drives, make sure any external power source is plugged in and operating to isolate a power issue with the device. 2. The iMac has 4 USB ports on the rear of the computer. Make sure to try each port to isolate a particular port malfunction. 3. Test with a known-good wired keyboard or mouse to isolate a failed peripheral issue. 4. Test with a known-good USB cable when dealing with a printer or external USB drive, to isolate a USB cable issue. 5. Ensure that all available Software Updates have been applied to the computer.

Deep Dive

Check	Result	Action	Code
1. Unplug all USB devices from the computer except for the keyboard and mouse. Start the computer and reset PRAM. Are the keyboard and mouse recognized?	Yes	Test in all USB ports to ensure all USB ports working as expected. Replace logic board for any port failures.	
	No	Possible logic board failure. Go to step 2.	
2. Did Bluetooth Mouse Setup assistant launch after startup?	Yes	Bluetooth detected via Internal USB, but external USB devices not recognized. Go to step 3	
	No	Bluetooth not recognized via internal USB. Disconnect mouse and keyboard. Go to step 4	

3.	Are known-good mouse and keyboard recognized?	Yes	Test original mouse and keyboard. Replace if still not recognized. Go to step 5.	
		No	External USB ports not functioning. Replace logic board.	
4.	With no USB devices connected, restart the computer. Did Bluetooth Mouse Setup assistant launch after startup?	Yes	Bluetooth detected via Internal USB. Go to step 3.	
		No	Bluetooth not recognized via internal USB. Internal and external USB not functioning. Replace logic board.	**M15**
5.	With known-good mouse and keyboard working, test other USB peripheral in question (USB external drive or printer, etc.). Is the device recognized via Apple System Profiler under USB?	Yes	Device recognized. Test in all USB ports to ensure all USB ports working as expected. Replace logic board for any port failures.	
		No	Device may require more power than supplied by USB ports. Try powered USB hub. Go to step 6.	
6.	Does powered USB hub resolve issue?	Yes	Test device on another computer of the model. If another computer does not require a powered USB hub to allow functionality, replace the logic board	
		No	Test device on another computer of the same model. If another computer does not recognize the device, replace the device.	

Wired Keyboard Does Not Function Properly

Unlikely cause: LCD display, power supply, hard drive, optical drive, fans

Quick Check

Symptoms	Quick Check
Wired Keyboard Does Not Function Properly • Some or all keys on the keyboard don't work • Eject key or Caps Lock key doesn't seem to work • Some keys don't work as expected	1. The iMac has 4 USB ports on the rear of the computer. Make sure to try each port to isolate a particular port malfunction. 2. Test with a known-good wired keyboard to isolate a failed peripheral issue. 3. Test the keyboard on another Mac. If it works here, you may have bad USB port if the keyboard doesn't work at all, or a software issue if the keyboard is working but not as expected. 4. Ensure that all available Software Updates have been applied to the computer.

Deep Dive

Check	Result	Action	Code
1. Do any of the keys on the keyboard work?	Yes	Go to step 2.	
	No	Go to **USB Devices Not Recognized** symptom flow.	
2. Is Caps Lock working as expected?	Yes	Go to step 3.	
	No	Go to **Keyboard: Specific Keys Do Not Respond** symptom flow.	
3. Is the Media Eject key working as expected?	Yes	Go to step 4.	
	No	To prevent accidentally ejecting media, Mac OS X adds a slight delay to the Media Eject key before it takes effect. Go to step 5.	

4. Open System Preferences > Speech. Is "Speak selected text when the key is pressed" enabled?	Yes	The key combination to speak text cannot be used for any other purpose. Either disable or change to a more rare key combination (including Shift, Command, Option and Control).	
	No	Go to step 6.	**M15**
5. With optical media in the drive, hold the Media Eject key. Does the disc eject normally and the eject symbol appear?	Yes	Media Eject key delay. No repair necessary.	
	No	Go to **Optical Drive Won't Accept/Eject Media** symptom flow.	
6. Open System Preferences > Universal Access > Keyboard. Is "Slow Keys" enabled?	Yes	With "Slow Keys" on, you need to press a key for a longer period of time for it to be recognized.	
	No	Go to step 7.	
7. Open System Preferences > Universal Access > Keyboard. Is "Mouse Keys" enabled?	Yes	With "Mouse Keys" on, you cannot use the Numeric Keypad to enter numbers. It will move the mouse pointer instead.	
	No	Go to step 8.	
8. Open System Preferences > International > Input Menu. Check "Keyboard Viewer". Then, from the Input Menu in the Menu Bar (flag), choose "Show Keyboard Viewer". When typing on the keys that are not responding, do they show in the Keyboard Viewer?	Yes	The keys are being recognized. Go to step 9	
	No	The keys are not being recognized. Replace keyboard.	**K01**
9. Open TextEdit or another text application and try typing something using the non-responding keys. Do they type in another application?	Yes	Application-specific issue. Troubleshoot the application.	
	No	Test another User to isolate a User account issue. If the issue persists in multiple User accounts, reinstall Mac OS X from the Install DVD.	

Keyboard: Specific Keys Do Not Respond

Unlikely cause: LCD display, power supply, hard drive, optical drive, fans

Quick Check

Symptoms	Quick Check
Keyboard: Specific Keys Do Not Respond • One or more keys do not respond when pressed • Key sticks • Keycap missing	1. If wireless keyboard is being used verify that it is properly paired with the system. Jump to **Wireless Input Device Doesn't Pair** symptom flow to resolve pairing issues. 2. The caps lock key has a built-in delay to reduce accidental activation and must be held for approximately ½ second for it to be activated. Refer to **http://support.apple.com/kb/TS1578** for additional information. 3. Inspect the keyboard for signs of liquid spills or other contamination. Apple's warranty does not cover accidental damage. 4. If the keycap is loose attempt to reattach it. 5. For other keyboard issues jump to the appropriate symptom flow.

Wired Keyboard/Mouse Not Recognized

Unlikely cause: LCD display, power supply, hard drive, optical drive, fans

Quick Check

Symptoms	Quick Check
Wired Keyboard/Mouse Not Recognized • USB wired keyboard/mouse not recognized when plugged in. • Mighty Mouse scroll ball not working or not working as expected. • Mighty Mouse buttons not working or not working as expected.	1. The iMac has 4 USB ports on the rear of the computer. Make sure to try each port to isolate a particular port malfunction. 2. Test with a known-good wired keyboard or mouse to isolate a failed peripheral issue. 3. Test a mouse when connected directly to ports on the back of the iMac to isolate a keyboard USB port issue. 4. Ensure that all available Software Updates have been applied to the computer.

Deep Dive

Check	Result	Action	Code
1. Does the computer recognize at all the keyboard or mouse when plugged into the rear USB ports on the back of the iMac?	Yes	Test in all USB ports to ensure all USB ports working as expected. Replace logic board for any rear port failures. Replace keyboard for any keyboard USB port failures. Go to step 2.	
	No	Go to **USB Devices Not Recognized** symptom flow.	
2. Is keyboard working as expected?	Yes	Go to step 3.	
	No	Go to **Wired Keyboard Does Not Function Properly**.	
3. Does the Mighty Mouse have an issue with the scroll ball?	Yes	See KBase article **http://support.apple.com/kb/HT1537** for steps to correct.	
	No	Go to step 4	
4. Doe the Mighty Mouse have an issue with the buttons?	Yes	See KBase article **http://support.apple.com/kb/HT1581** for steps to determine expected behavior. Go to step 7.	
	No	Go to step 5.	
5. Does the Mighty Mouse have an issue with tracking?	Yes	Try using the mouse on another surface. Non-reflective, opaque surfaces without repetitive patterns work best. The surface should be clean but not shiny. Go to step 6.	
	No	Go to step 7.	
6. When used on another surface does the mouse track correctly?	Yes	Surface issue. Issue resolved.	
	No	Go to step 7.	
7. See KBase article **http://support.apple.com/kb/HT1581** to further determine expected behavior. Did this article resolve the issue?	Yes	Issue resolved.	
	No	Replace Mighty Mouse.	**K99**

Uncategorized Symptoms

Quick Check

Symptoms	Quick Check
Uncategorized Symptoms • Unable to locate appropriate symptom code.	1. Verify that external I/O device (where applicable) works on another system. 2. For third party I/O devices make sure necessary software is installed and up to date, and that the device is supported with the user's system.

Deep Dive

Check	Result	Action	Code
1. Verify whether existing symptom code applies to the issue reported by the user.	Yes	Jump to appropriate symptom code flow.	
	No	Document reported failure and send feedback to **smfeedback6@apple.com** stating that a suitable symptom code wasn't found. Provide as much detail as possible.	**N99**

Mechanical

Noise/Hum/Vibration

Unlikely cause: LCD panel, glass panel, enclosure, cables

Quick Check

Symptoms	Quick Check
Noise/Hum/Vibration • Buzzing noise • Rattling noise • Ticking noise • Squeaking noise	**1.** Verify the vents on the bottom and back of the computer are free of dust and other obstructions that might inhibit proper airflow. **2.** Launch Applications/Utilities/Activity Monitor. Determine whether an application or process is consuming a high percentage of CPU bandwidth. CPU-intensive applications can cause the fans to run fast in order to maintain the proper internal system temperatures. If needed, quit the application or restart the computer. **3.** Eject optical media from optical drive. Out-of-balance optical media can generate audible noise. Try a different brand of media. For additional info jump to **Optical Drive Noisy** symptom flow. **4.** Tilt display to hinge limits to determine if noise is generated by the hinge mechanism. For additional info, jump to **Stand/Hinge Issues** symptom flow. **5.** Play sound sample at loud and soft volume levels to determine if the noise is caused by the left/right speakers or the amplifier circuit. For additional info, jump to **Audio: Built-in Speakers Have Distorted Sound** symptom flow. **6.** Adjust the display brightness to determine whether the noise is related to the brightness level. For additional info, jump to **Noise/Unstable Flickering** symptom flow.

Deep Dive

Check	Result	Action	Code
1. Run Apple Hardware Test from system or Install DVD. Did AHT generate any errors?	Yes	Go to Apple Hardware Test (AHT) Error Codes table to decode error. Follow instructions in table for resolving error, then retest.	
	No	Go to step 2.	
2. Does noise sound like one or more fans running faster than expected?	Yes	Reset SMC by disconnecting power cord for ~15 seconds, then retest. If issue continues go to step 3.	
	No	Go to step 5.	
3. Does the noise change when the optical drive is being accessed or media is inserted or ejected?	Yes	Suspect issue with optical drive or the media being used. For additional info, jump to **Optical Drive Noisy** symptom flow.	
	No	Go to step 4.	
4. Mute the system volume. Verify whether the issue still occurs.	Yes	Go to step 5.	
	No	Suspect issue with speakers or audio amplifier circuitry. For additional info, jump to **Audio: Built-in Speakers Have Distorted Sound** symptom flow.	
5. Adjust the brightness on the display between the maximum and minimum settings. Determine whether the issue changes depending on the brightness level.	Yes	Suspect issue with LCD display or inverter. For additional info, jump to **Noise/Unstable Flickering** symptom flow.	
	No	Go to step 6.	
6. Remove fans and rotate the blades. Verify that fan blades spin smoothly without interference from fan housing.	Yes	Go to step 7.	
	No	Replace affected fan(s).	**P04**

7. Reinstall fans while carefully ensuring that there are no cables routed under or near fan assembly that might cause interference with the fan blades. After reassembling system verify that the noise issue is resolved.	Yes	Noise issue resolved. Suspect issue cause by interference from wiring or possible distortion or fan housing when installed in system. Proper reassembly resolved issue.	**P04**
	No	Go to step 8.	
8. Temporarily remove LCD display then power ON system. Determine whether source of noise can be located. **Caution:** The exposed power supply poses a serious shock hazard. Take proper precautions when working around an energized system.	Yes	Identify, inspect, and if necessary replace the part that caused the noise issue.	**P04**
	No	Go to step 9.	
9. Disconnect these major modules/parts (hard drive, optical drive, fans, LCD display one at a time then power ON the system. Determine if noise issue goes away when one of the modules is disconnected. **Caution:** The exposed power supply poses a serious shock hazard. Take proper precautions when working around an energized system.	Yes	Identify, inspect, and if necessary, replace part that caused the noise to disappear when it was disconnected from the system.	**P04**
	No	All parts verified. Verify that the correct symptom flow is being used.	

Fan Failures / Thermal Issues

Unlikely cause: speakers

Quick Check

Symptoms	Quick Check
System Runs Hot • System feels very hot • Fan(s) not operating • Fan(s) running fast • System is noisy	1. Verify the vents on the bottom and back of the system are free of dust and other obstructions that might inhibit proper airflow. 2. Verify the computer is not exposed to direct sunlight which may heat up the enclosure, making it feel hot to the touch. 3. Verify the computer is not running hotter than expected for normal operation. If possible, compare to a similarly configured system. Note: The power supply is located in the upper left corner where the highest temperatures can usually be felt. 4. Launch Applications/Utilities/Activity Monitor. Determine whether an application or process is consuming a high percentage of CPU bandwidth. CPU intensive applications can cause fans to run fast in order to maintain the proper internal system temperatures. If needed, quit the application or restart the system. 5. Reset SMC by unplugging power cord for ~15 seconds.

Deep Dive

Check	Result	Action	Code
Run Apple Hardware Test from system or Install DVD. Did AHT generate any errors?	Yes	Suspect possible fan or sensor error. Go to Apple Hardware Test (AHT) Error Codes table to decode error. Follow instructions in table for resolving error, then retest.	
	No	Go to step 2.	

Does noise sound like one or more fans running faster than expected?	Yes	Fans running fast. Reset SMC by disconnecting power cord for ~15 seconds then retest. If issue continues go to step 3.	
	No	Go to step 3.	
Remove fans and rotate the blades. Verify that fan blades spin smoothly without interference from fan housing and that the fan blades are all intact.	Yes	Go to step 7.	
	No	Replace affected fan(s).	**P06**

Stand/Hinge Issues

Quick Check

Symptoms	Quick Check
Stand/Hinge Issues • Bent stand • Broken hinge • Stripped screw/head • Stripped screw boss	1. Determine whether damage caused by user / technician environment, accidental damage, or abuse. If so, inform user/technician the failures are not covered by Apple warranties. Refer to **http://www.apple.com/legal/warranty** 2. For hinge noise issues replace mechanism.

Physical Damage

Quick Check

Symptoms	Quick Check
Physical Damage • Broken glass • Bent stand • Broken hinge • Stripped screw/head • Stripped screw boss • Dent or scratch to chassis	1. Determine whether damage caused by user environment, accidental damage, or abuse. If applicable inform the user that Apple does not warrant damage caused by accident, abuse, misuse, flood, fire, earthquake, or other external causes. For more information refer to: **http://www.apple.com/legal/warranty**

Uncategorized Symptoms

Check	Result	Action	Code
1. Verify whether existing symptom code applies to the issue reported by the user.	Yes	Jump to appropriate symptom code flow.	
	No	Document reported failure and send feedback to **smfeedback6@apple.com** stating that a suitable symptom code wasn't found. Provide as much detail as possible.	**N99**

Apple Technician Guide

Take Apart

iMac (20-inch, Early/Mid 2009)

General Information

General Tools

The following tools are required to service the computer:
- ESD-safe workstation, including an ESD mat and wrist or heel strap
- ESD bags
- Magnetized Torx T10 screwdriver
- Magnetized Torx T8 screwdriver
- Magnetized Torx T6 screwdriver
- Magnetized Phillips #2 screwdriver
- Black stick (nylon probe, Apple part #922-5065) or other non-conductive nylon or plastic flat-blade tool
- EMI tape (Apple part #922-8691)
- Soft, clean towel or cloth (to protect the display and removed parts from scratches)

Refer to the following Apple Knowledge Base article to purchase tools:

kBase #HT3452: Hand Tools for Desktop and Portable Repairs

Opening the Unit

- The iMac (20-inch, Early/Mid 2009) has a glass panel that attaches to the front, which must be removed prior to replacing any module on the unit.
- **Important:** The glass panel should only be removed by Apple-authorized technicians. Read and follow all of the cleaning and handling recommendations to prevent damaging the glass and LCD panel.
- Follow ESD precautions when the front bezel and the LCD display are removed.

Required Special Tools for Glass Panel

Special tools are required to remove, handle and clean the glass panel, such as the following. These are available as a starter kit, too.
- 922-8252 – Suction cups, Pkg of 2
- 922-8253 – Gloves, lint-free, anti-static, Pkg of 2
- 922-8258 – ESD bags, 24"x20", Pkg of 5. To prevent the buildup of static charges which may attract dust particles, store the LCD panel in an ESD bag when it is removed from the unit.
- 922-8259 – Microfoam bag to store the glass panel, Pkg of 5
- 922-8261 – Sticky silicone roller (6-inch) to clean the glass panel
- 922-8262 – Sticky sheet pads to clean the silicone roller
- 922-8263 – Polishing cloths, anti-static, optical-grade micro-terry, Pkg of 5
- iKlear Apple Polish or Brillianize anti-static spray cleaning solution. If you are unable to source iKlear or Brillianize, IPA (isopropyl alcohol) can be used to clean the glass.

Cleaning Tools Starter Kit

The following tools are offered in the starter kit (076-1277):
- Suction cups, 1 pair
- Gloves, lint-free, anti-static, 2 pairs
- Sticky silicone roller (6-inch) to clean the glass panel
- Sticky sheets to clean the silicone roller, 2 pads
- Polishing cloths, clean, anti-static, optical-grade micro-fiber "terry" style, 5 cloths
- Microfoam bag to store the glass panel, 5 bags
- ESD bag for LCD panel storage, 5 bags

Cleaning Tool Resources

Note: Apple Retail technicians should refer to standard internal resources for tool ordering.

- MCM Portal
  http://www.mcmb2b.com/appleasp

- LENSPEN: the LapTop Pro or the VidiMax are very effective in removing fingerprint smudges on the LCD and on the inside surface of the glass.
  http://www.lenspen.com/

- iKlear
  http://www.klearscreen.com/iKlear.aspx
  iKlear US/Canada dealer finder
  http://www.klearscreendealers.com/default.html
  iKlear International dealer listing
  http://meridrew.com/international.html

- Brillianize
  http://www.brillianize.com/
  Brillianize dealer locator
  http://www.brillianize.com/Pages/lookup.html

Cleaning & Handling the Glass Panel

Follow the cleaning procedures in this manual to ensure the glass panel is free of dust and other particles before returning the computer to the customer.
- The glass panel is not tempered and will break into sharp pieces of mishandled. A scratched or broken glass panel is not covered under warranty.
- Removing the glass panel requires special tools such as lint-free gloves, rubber suction cups, microfoam storage bags, and the iKlear cleaning solution.
- To prevent contamination, wear lint-free gloves and handle the glass only by the edges.

Do's and Don'ts

DO
- Handle glass panel using lint-free gloves.
- Use only a sticky silicone roller to clean the inside surface of the glass and the LCD panel.
- Use iKlear ONLY on the outside surface of the glass panel.
- Place the glass panel into a clean protective microfoam bag when removed from the unit.
- Store the glass panel in a safe area where it will not be broken or damaged.
- Store the LCD panel in an anti-static bag to prevent the buildup of static charges which may attract dust particles to the display's surface.
- Store the silicone roller and sticky paper within a temperature range of 39-104 F (5-40 C).
- If the silicone roller is no longer tacky, wash it in warm soapy water or wipe with isopropyl alcohol. If the tackiness does not return, replace the silicone roller.

DON'T
- Touch the inside of the glass with bare hands or dirty gloves. Fingerprints will be difficult to remove.
- Place the glass panel onto a work surface where it may collect dust and other contaminants unless it has first been placed into a protective microfoam bag.

Handling a Broken Glass Panel

The glass panel is not tempered and will break into sharp pieces if mishandled.

If the glass is broken it must be carefully removed from the unit to prevent irreparable damage to the front surface of the LCD. If the front surface of the LCD is scratched by broken glass, the LCD may need to be replaced.

Do not handle broken glass unless you are wearing protective cut-resistant gloves. The lint-free gloves used to prevent contamination of the glass panel are not suitable for handling broken glass.

Use a broom and dust pan to sweep up as much of the broken glass as possible. Glass fragments may have travelled several feet from the location of the glass panel, so be sure to thoroughly clean the entire area. Use a vacuum to remove the smaller fragments not picked up by the broom.

Safety

Warning: HIGH VOLTAGE: The AC/DC power supply PCB remains powered up whenever the system is plugged in, whether or not the system has been turned on. Use extreme caution when troubleshooting the system with the front bezel removed.

- **Don't work alone. In the event of an electrical shock it is important to have another individual present who can provide assistance.**
- **Keep one hand in your pocket when working on any iMac system that is plugged in. This will help ensure that your body does not provide a path to ground in the event that you accidentally make contact with the line voltage.**
- **Don't wear jewelry, watches, necklaces, or other metallic articles that could present a risk if they accidentally make contact with the power supply circuitry.**

Use extreme caution when working around the power supply. The power supply contains a high voltage capacitor that may remain charged for several minutes even when the computer is unplugged. Never touch the leads on the top side of the power supply, especially the capacitor leads located near the warning sign.

Important: If the computer is shut down by removing the power cord, allow the power supply a good 2-3 minutes to discharge the capacitors before handling it. However, if you select "Shut Down" via the Apple menu, the computer will discharge the power supply capacitor almost immediately.

Logic Board Handling

IMPORTANT: Always use two hands to support the logic board and heatsink. Handling the board incorrectly could flex the board and damage the chips and circuitry.
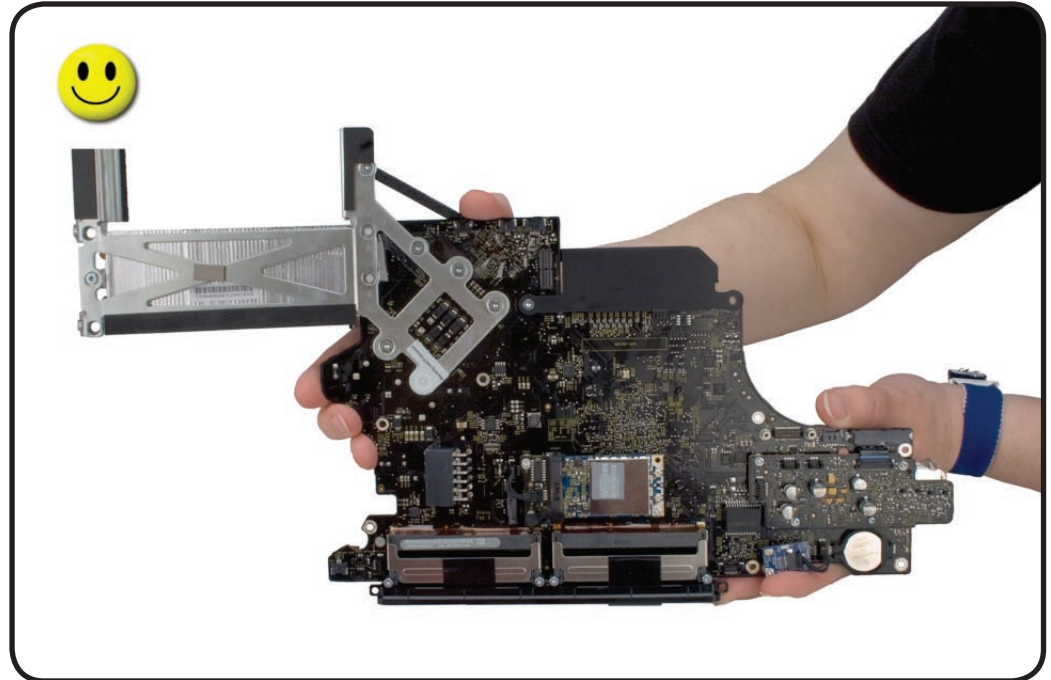
Never handle the board by the heatsink.
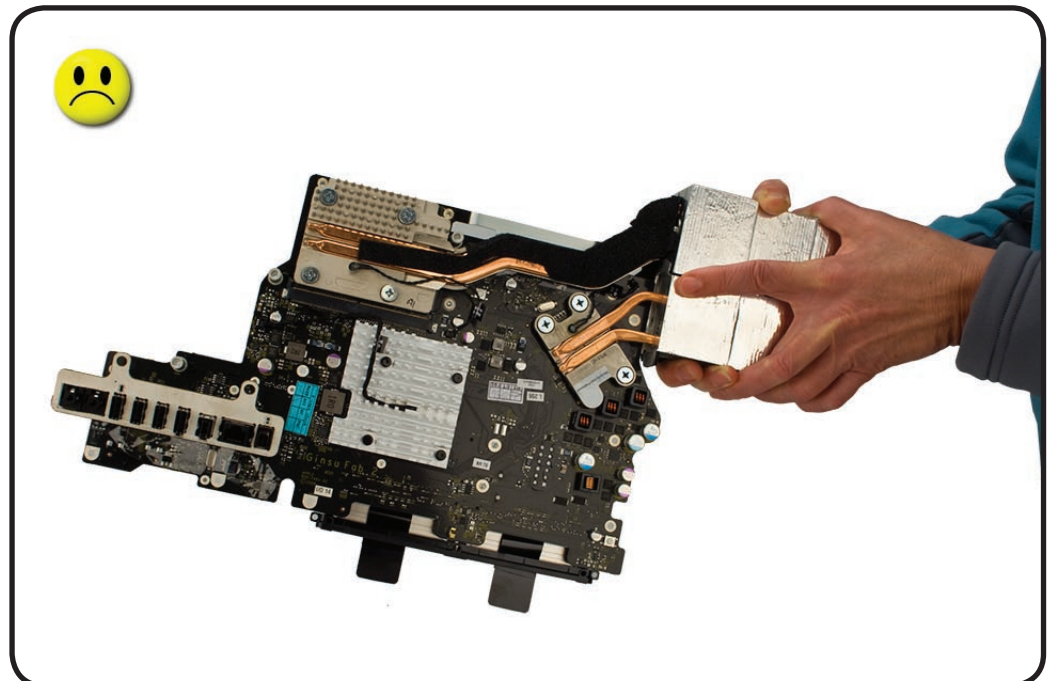
ESD Precautions

Static electricity, a normal and natural phenomenon, builds up on your body as you walk around. In fact, static electricity is created any time two dissimilar materials rub against each other (such as shoes and carpet) and then pull apart. The word "static" simply means that the electrical charge builds up on one of the two materials because it has nowhere to go. That is, until the charged material (this could even be your body) comes close to another material that has a different charge, or no charge at all. Then, like water trying to seek its own level, the accumulated electrical charge immediately discharges between the two materials in a tiny spark. This is what is known as Electro-Static Discharge (ESD).

The discharge of static electricity near active electronic systems can cause memory corruption or temporary failure of systems. It can cause irreparable damage to sensitive chips and printed circuitry of electronic components. Such damage is basically a hole blasted in the integrated circuit by the ESD. It can be a very small hole, but can result in hard-to-trace behaviors in the system. The part may be immediately inoperable, or it may be the cause of extremely difficult troubleshooting problems in the future.

While only a few volts of static electricity can damage an integrated circuit, you can pick up a static charge of several hundred volts by simply walking across a room. In contrast, you will only feel a static shock if it is in the range of thousands of volts. This means you can be damaging the equipment you work on and not even know you are doing so.

ESD Guidelines

Follow these guidelines to reduce the risk of ESD damage:

1. Handle ALL circuit boards, such as logic boards, video cards, memory DIMMs, hard drive assemblies, optical drive assemblies, etc. by the board's or assembly's edges only. Avoid touching any edge connectors, exposed circuitry, printed circuits or surface components on any boards or assemblies.

2. Before working on any circuit board or assembly containing ESD-sensitive circuits, ground yourself and the equipment you are working on to an earth or building ground. Use a grounded conductive workbench mat and a grounding wrist strap, and ground the equipment to the mat.

3. Make sure you are NOT grounded when you work on plugged-in equipment, discharge a cathode-ray tube (CRT), work on an unplugged CRT that has not been discharged, or are performing live adjustments (such as checking voltage on logic board test points).

4. Never place components on any metal surface. Always place unshielded components on a grounded ESD mat.

5. Do not touch anyone who is working on ESD-sensitive circuits or circuit boards of any kind. If you touch someone who is properly grounded, your "zap" or body charge could affect the components they are working on.

6. Use static-shielding storage bags for modules with circuit boards on them. Before you leave your bench to take a board to a storage place, put the board in a static-shielding bag. Leave

all Apple replacement modules in their ESD-safe packaging until you need them.

7. Do not wear polyester clothing or bring plastic, vinyl, or Styrofoam into the work environment. The electro-static field surrounding these materials can't be totally removed.

8. If possible, keep the humidity in the service area between 70% and 90%, and use an ion generator. Charge levels are reduced (but not eliminated) in high-humidity environments. Using an ion generator helps neutralize the charge surrounding nonconductors, however, this type of device cannot provide total protection.

9. If you have ESD mats in your service area, it is important to clean them at least once a week. To clean them you need a cleaner that is specifically designed for ESD mats. Otherwise the mats will not properly ground equipment placed on them.

10. When you work at a user's site, you must take the same precautions to avoid ESD damage. Take time to make the work area ESD-safe. Use a workbench mat and wrist strap. Be sure everything is properly grounded, and never set parts on the floor.

More information about ESD, including details on how to setup an ESD-safe workstation, can be found in the Apple Knowledge Base:

   kBase #HT3451: Electrostatic Discharge Precautions and Myths

Reassembly Steps

When there are no replacement steps listed, replace parts in the exact reverse order of the Removal procedure.

Images in This Guide

Small differences in appearance between the images pictured and the actual computer you are servicing may exist, however the steps and sequence are the same unless otherwise noted.

Screw Sizes

All screw sizes shown are approximate and represent the total length of the screw.

Access Door

First Steps

- Shut down computer.
- Wait 10 minutes.
- Unplug all cables and the power cord.
- Put on ESD strap.
- Place computer face down on a clean, soft, lint-free cloth so the bottom is facing you.

Tools

- ESD wrist strap
- Clean, lint-free cloth
- Phillips #2 screwdriver
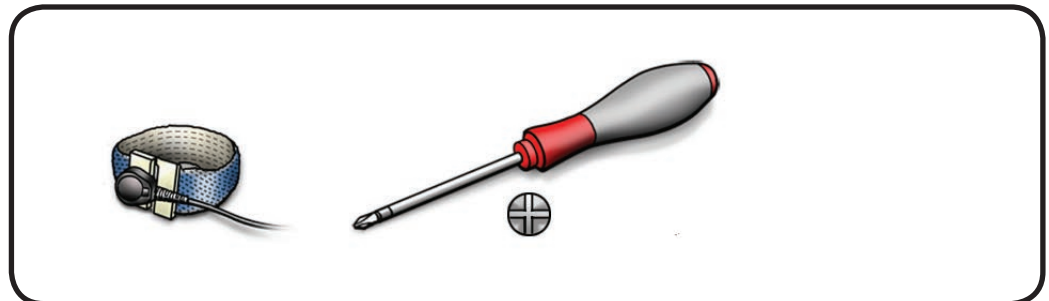
Removal

1 Loosen captive Phillips #2 screw.

2 Remove access door (922-8186).
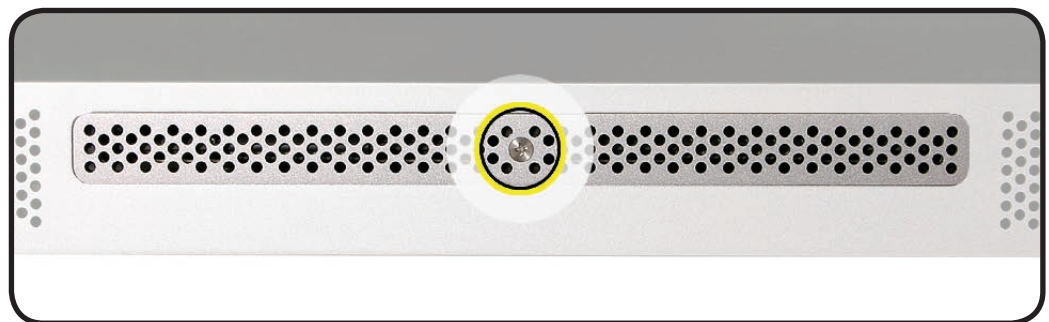
Memory

First Steps

Remove:
*   **Access Door**

Tools

*   ESD wrist strap
*   Clean, lint-free cloth
*   Black stick
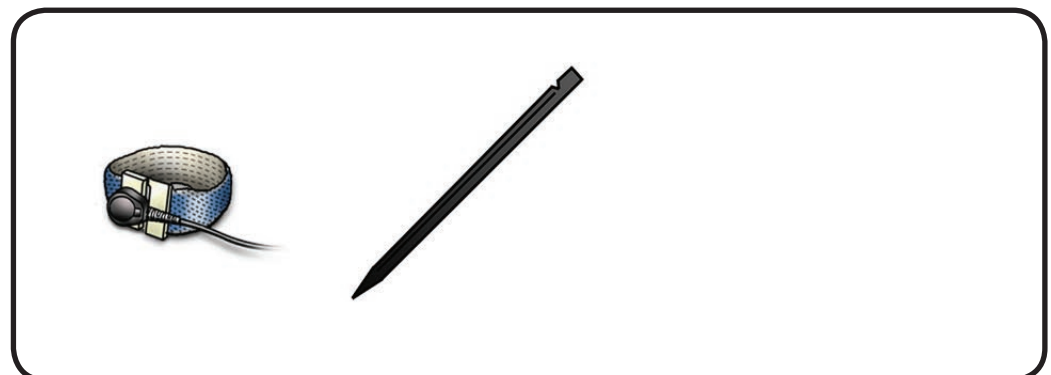
Removal

1 Untuck tab in memory compartment (a black stick can help) and pull it to eject installed memory module.

Reassembly

1 Orient notch on memory module with notch in memory slot.

2 Press memory module fully into slot until you hear a click.

3 Fold black plastic tab over each memory module.

4 Replace access door and tighten captive screw.
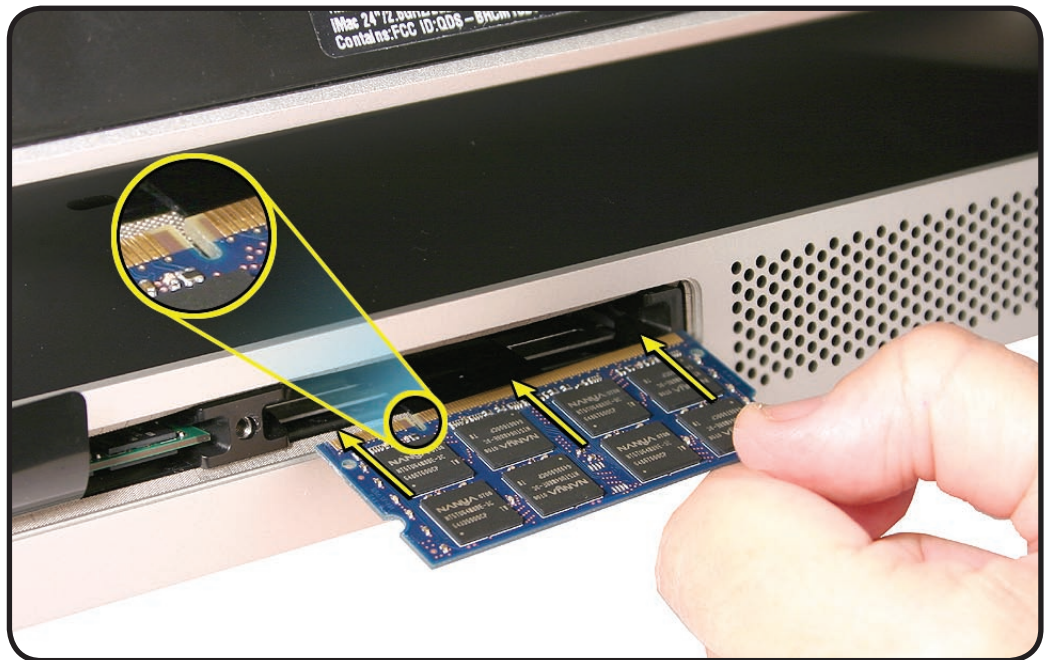
Glass Panel

First Steps

- Shut down computer.
- Wait 10 minutes.
- Unplug all cables and the power cord.
- Put on ESD strap.

Caution: The glass panel is not tempered and will break into sharp pieces if mishandled. A scratched or broken glass panel is not covered by warranty. **How to handle a broken glass panel**

Important:
This procedure requires **special tools**, which are offered individually or as part of a **cleaning kit.**
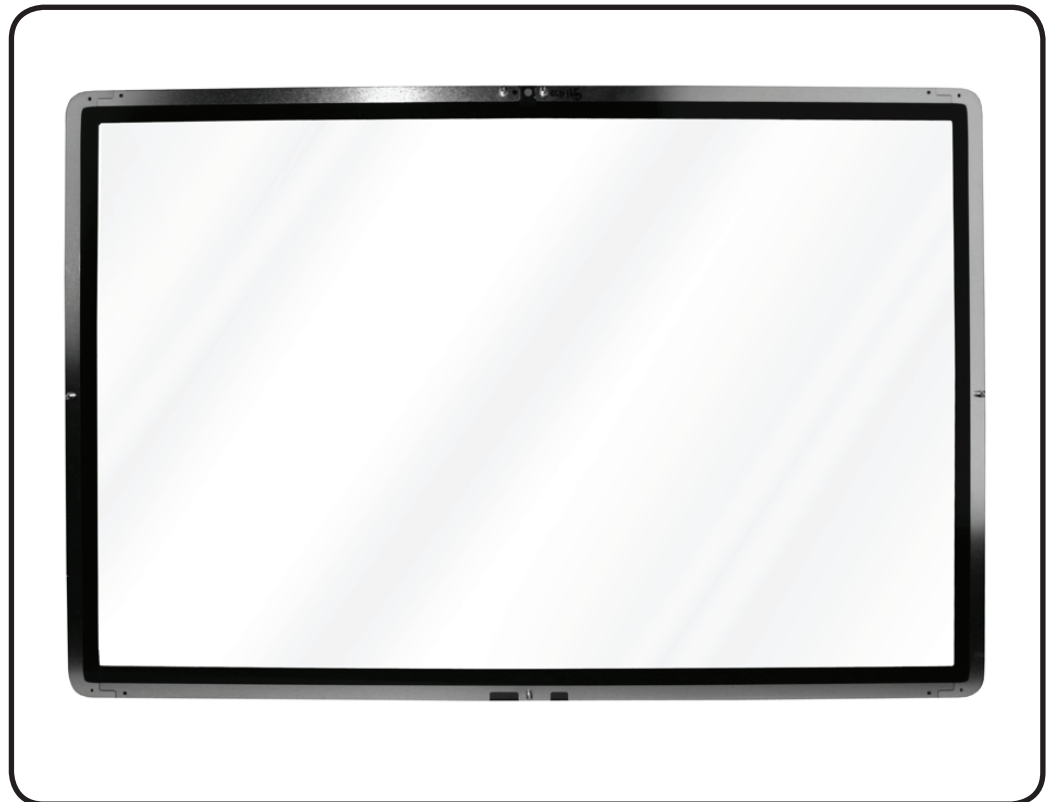
Tools

- ESD wrist strap
- lint-free gloves
- suction cups
- sticky silicone roller
- sticky sheets to clean the silicone roller
- microfoam bag to store glass panel
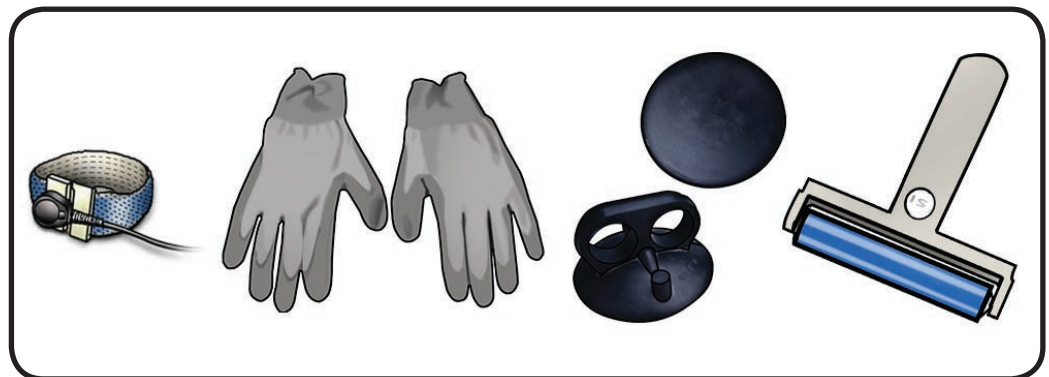
Removal

Glass panel is held in place by magnets in front bezel.

1 Lay computer on its back and press clean suction cups in opposite corners on glass panel.

Apple strongly recommends wearing clean, lint-free gloves whenever handling the glass panel, to reduce cleaning required on reassembly.

Handling and cleaning tips for the glass panel.

2 Lift panel straight up and off.

3 Remove suction cups and slide glass into protective microfoam bag (922-8259).
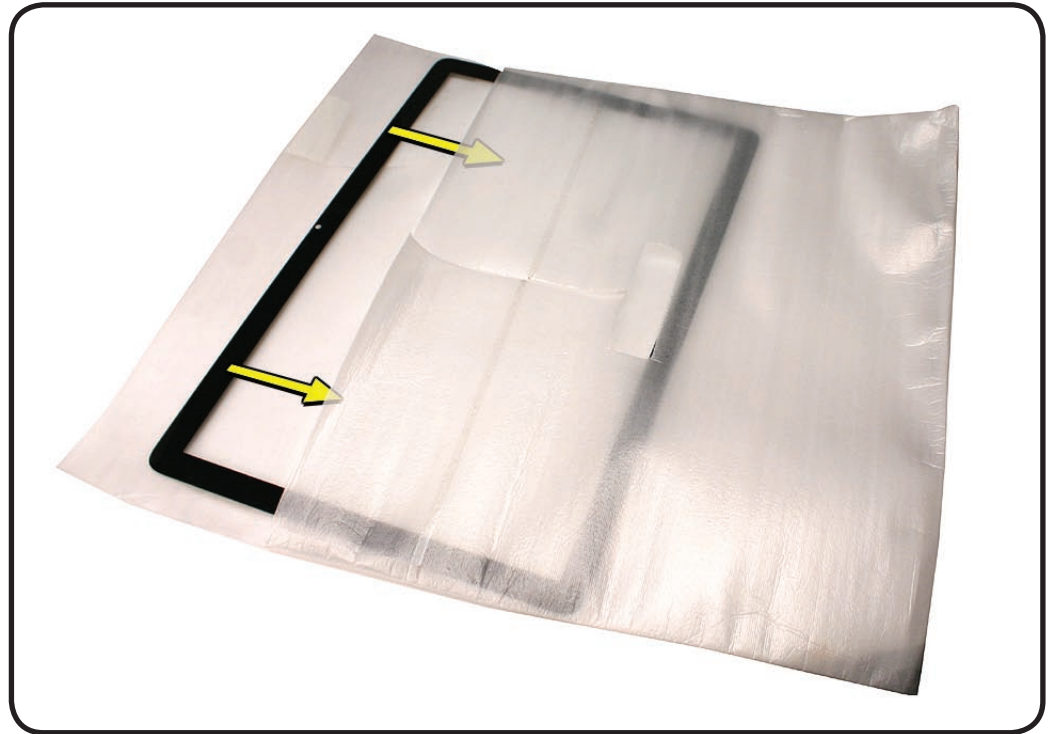
Reassembly

1 Remove protective covering from silicone roller and sticky sheet.

2 Clean silicone roller by rolling it back and forth a few times on sticky sheet.

If sticky sheet looks dirty, use a new one. If roller is no longer tacky, wash it in warm soapy water.
If tackiness does not return, replace silicone roller.

3 Wearing clean gloves, set display in upright position to minimize settling of dust.

4 Roll silicone roller over LCD panel to remove any particles.
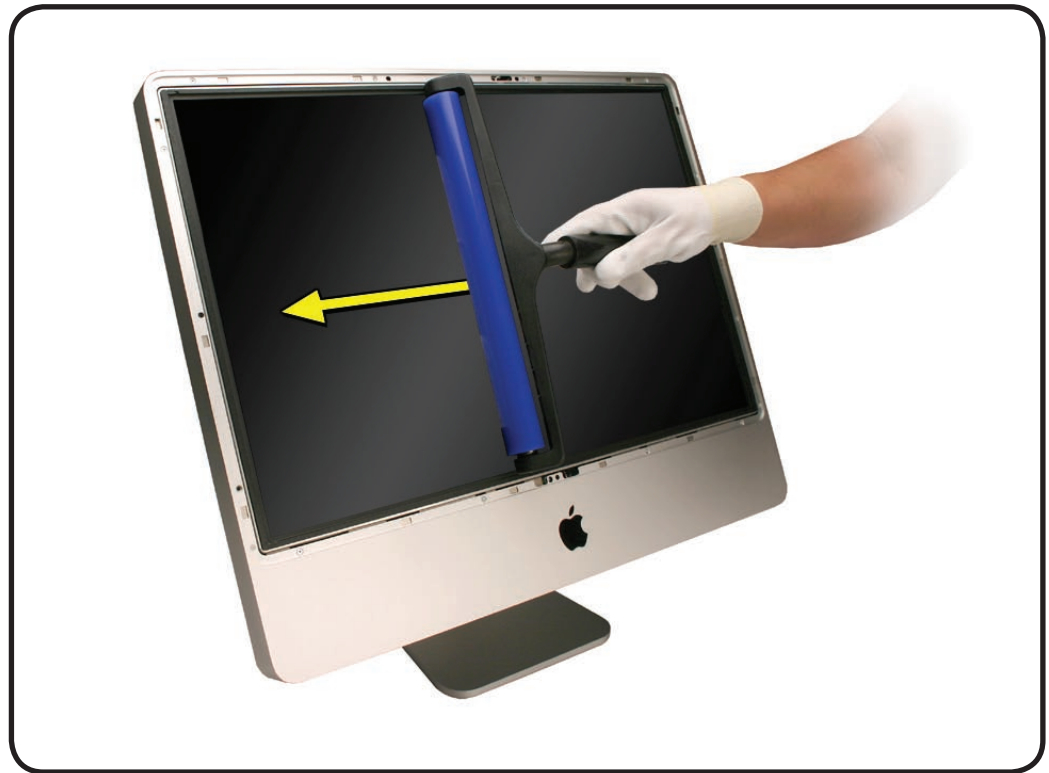
5 Remove glass panel from microfoam bag.

6 Clean INSIDE of glass panel with the silicone roller to remove dust.

   Note: If fingerprints or oils are on inside of glass, clean first with isopropyl alcohol.

7 Note alignment pins on inside of glass panel.

Caution: Pins can break off if glass panel is removed or installed at an improper angle.
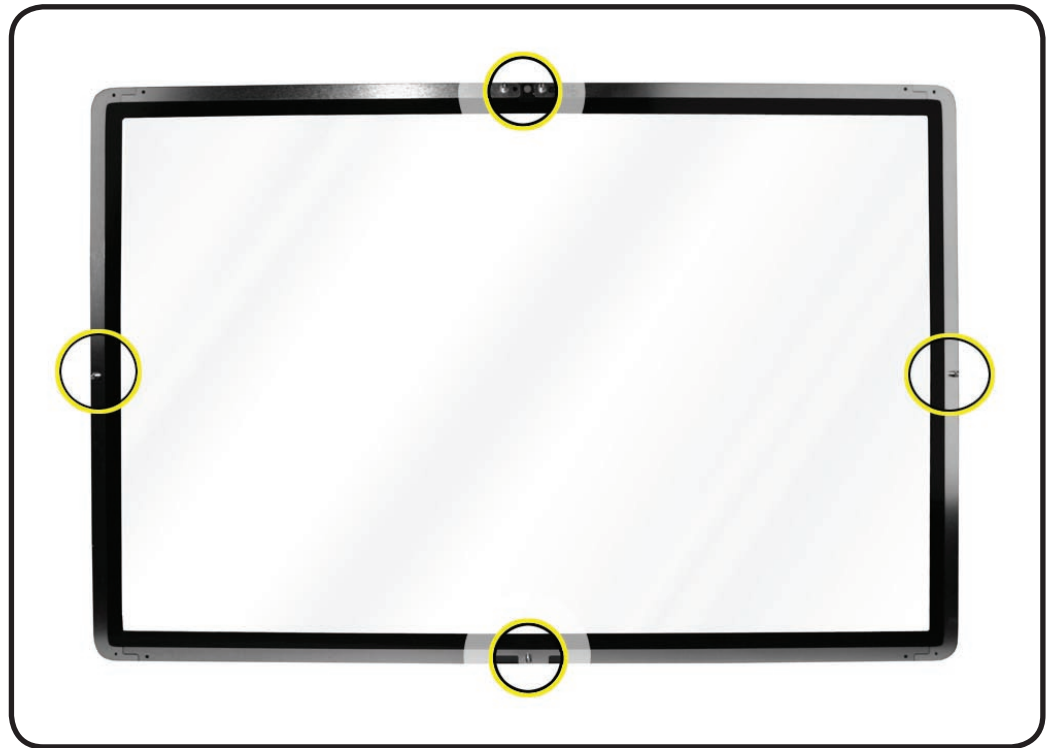
8 Wearing clean gloves, place glass directly onto unit. Magnets will catch it and hold it in place.

Make sure the glass is flush with the rear housing after it is reinstalled.

9 Clean outside of glass panel with a clean microfiber cloth. If necessary, use a small amount of iKlear polish. Wipe glass until there is no longer any residue or haze.

10 Once glass has been cleaned and polished, inspect glass for any remaining dust, fingerprints, or a hazy residue. If there are contaminants trapped between LCD panel and glass panel, repeat cleaning procedure above before returning unit to user.

Front Bezel

First Steps

Remove:
* **Access Door**
* **Glass Panel**

Tools

* ESD wrist strap
* Torx T8 screwdriver
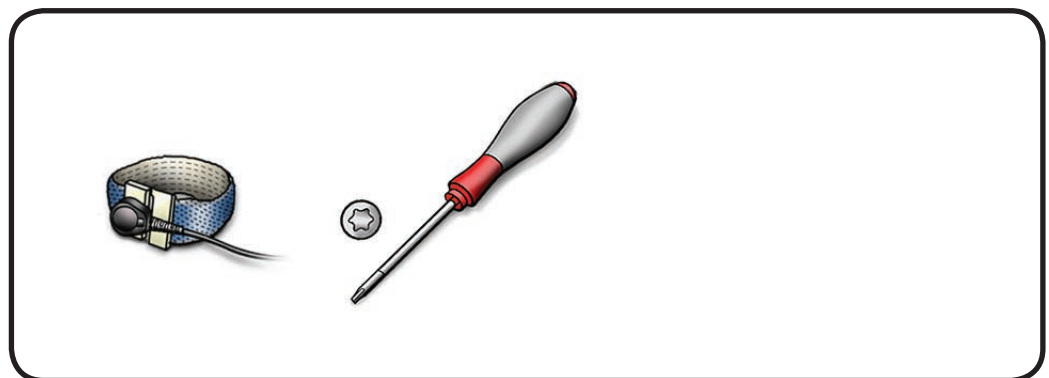
Removal

1 Lay computer down with rear cover and stand on a soft, protective surface.

2 Remove T8 screws:
(8) 922-8206, 13mm

(4) 922-8207, 25mm

Reassembly Note:
The 4 longer screws attach along bottom of bezel.

25mm   25mm   25mm   25mm

3 Slowly lift bezel from top, without straining microphone cable.

4 Unwrap any Kapton tape and disconnect microphone cable from cable extension at top of front bezel.
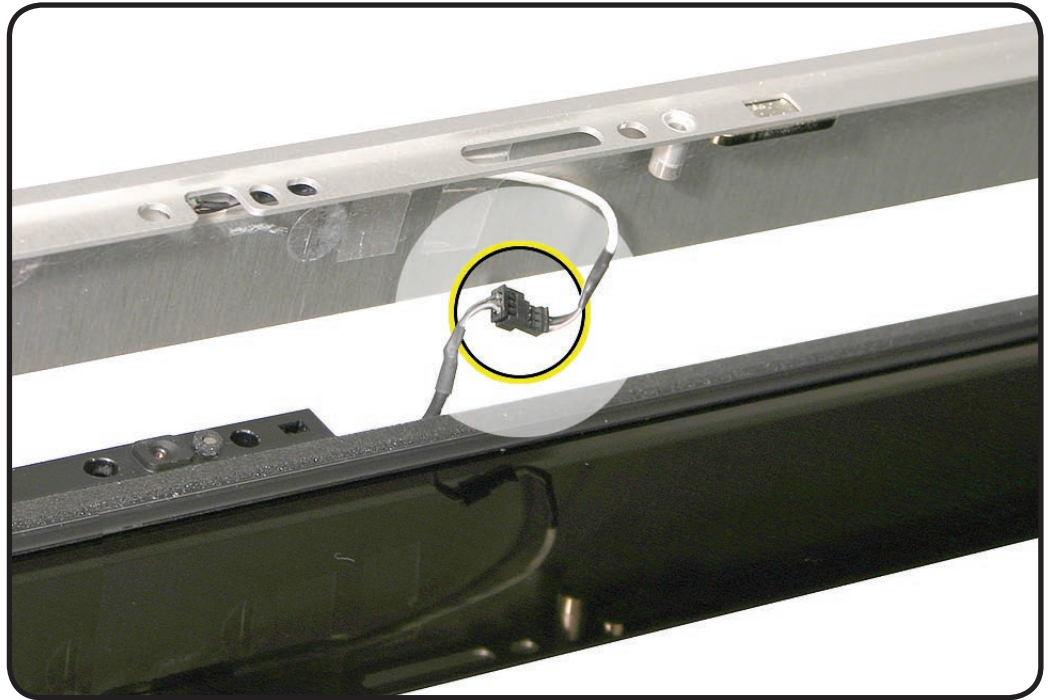
5 Lift front bezel off rear housing.

Reassembly Note: Secure bottom part of front bezel first and then lower top part, the reverse of the action shown here.

Camera

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**

Tools

- ESD wrist strap
- Torx T8 screwdriver
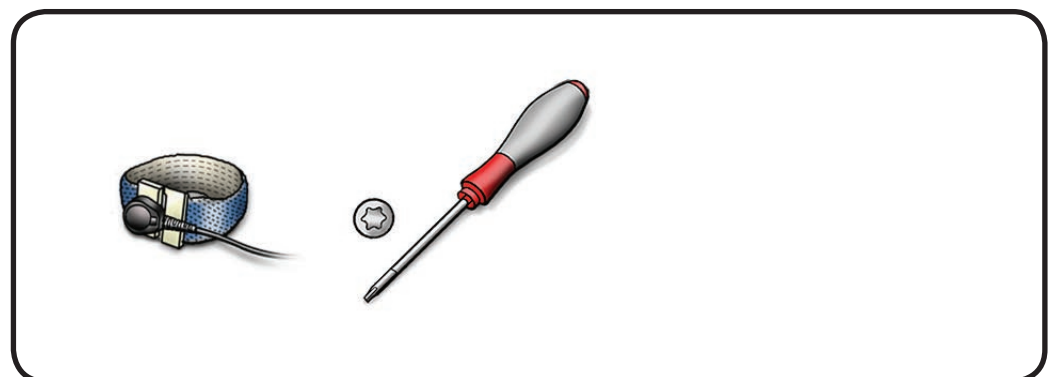
Removal

1 Remove T10 screws:
(2) 922-8850
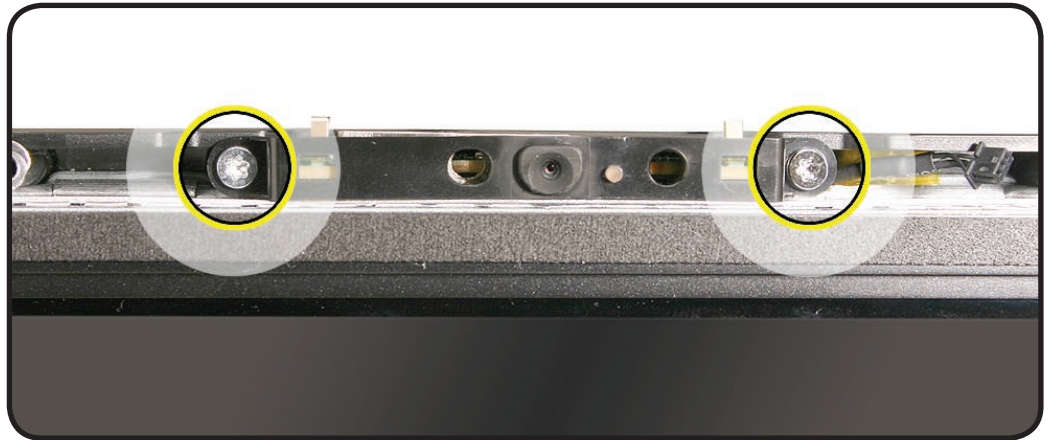
2 Lift camera bracket out of rear housing.

3 Unwrap Kapton tape covering camera cable and connector.

4 Disconnect camera cable from camera board.
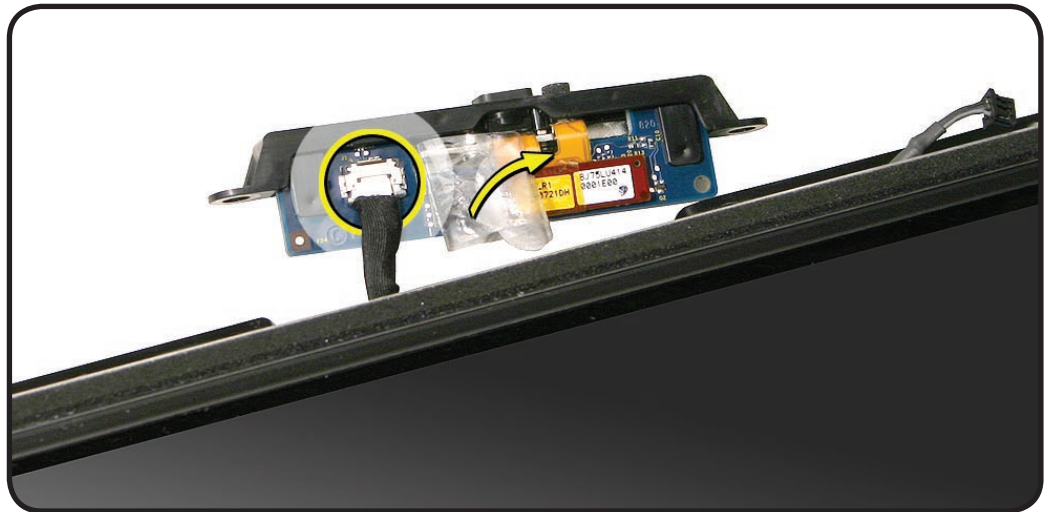
Battery

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**

Tools

- ESD wrist strap
- Black stick

Removal

1 Use a black stick to pry battery from battery socket on logic board.
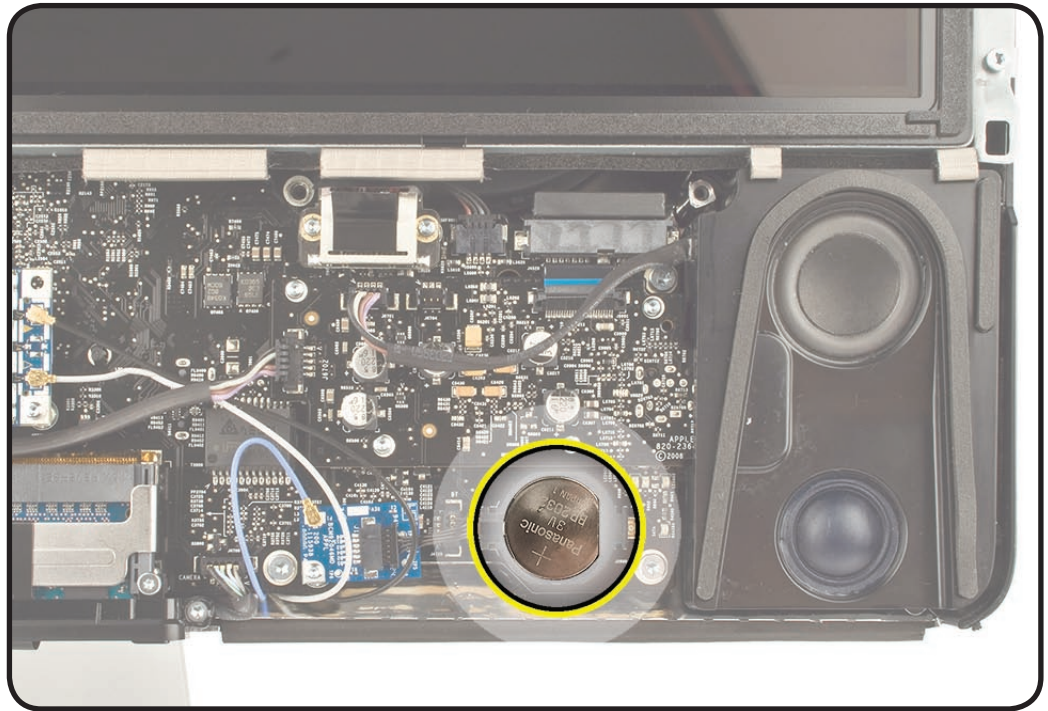
Reassembly

1 Make sure battery socket is open and free of dust.

2 Press battery (922-8892) into socket with engraved markings (+ side) facing up.

IR (Infrared) Board
(Early 2009)

First Steps

Remove:
* **Access Door**
* **Glass Panel**
* **Front Bezel**

Note: iMac (20-inch, Mid 2009) model does not have an IR Board.

Tools

* ESD wrist strap
* Torx T6 screwdriver
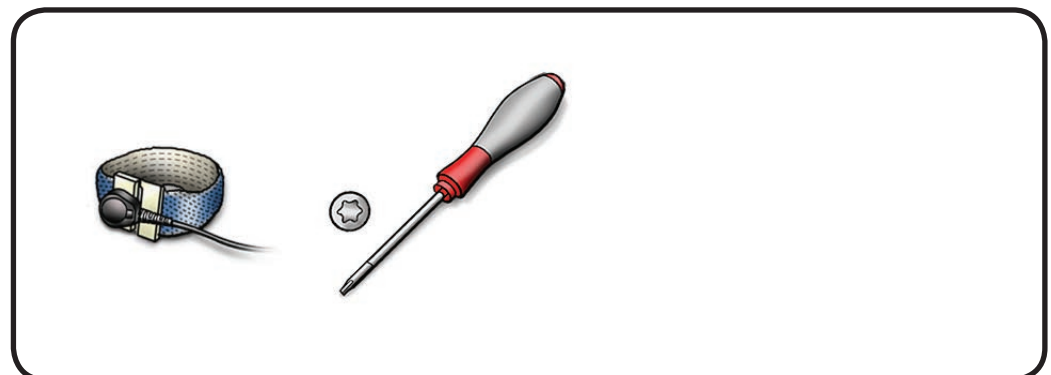
Removal

1 Remove T6 screws:
(2) 922-8579

2 Disconnect IR cable
(922-8832) from logic
board.

3 Lift IR board and
cable off logic board.

Replacement Note:
If installing a new IR
board, transfer IR cable
from old board to new
board.
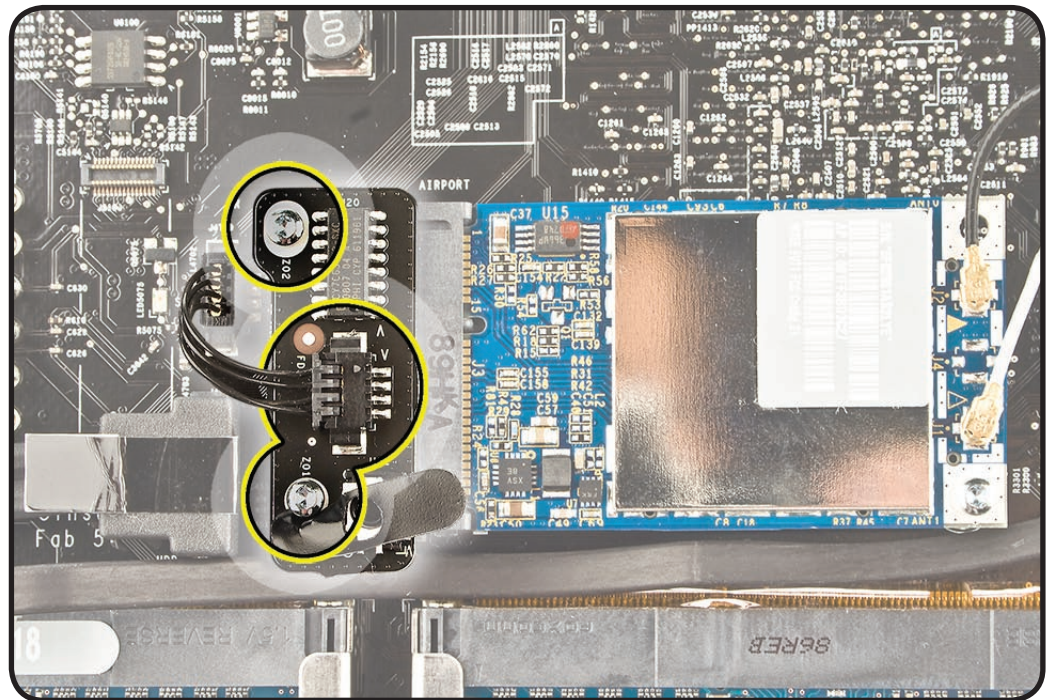
AirPort Extreme Card

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**

Tools

- ESD wrist strap
- Torx T6 screwdriver
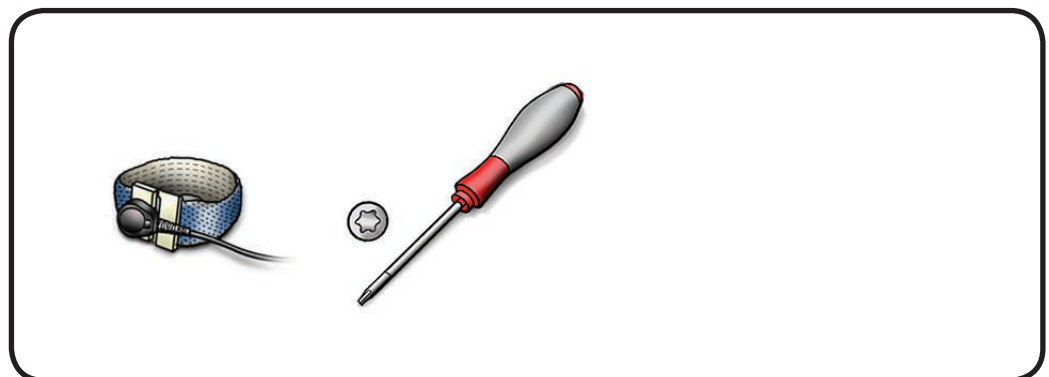
Removal

1 Remove T6 screw:
(1) 922-8579

2 Disconnect 2 antenna
cables.

Note: The antenna cables
and connectors are very
delicate and should be
carefully removed by
pulling on the connector
rather than the cable.
If an antenna cable is
damaged, replace rear
housing.

Reassembly Note: Either
cable can be attached to
either connector with no
change in performance.

3 Hold AirPort card by
edges and pull it out
of the slot.
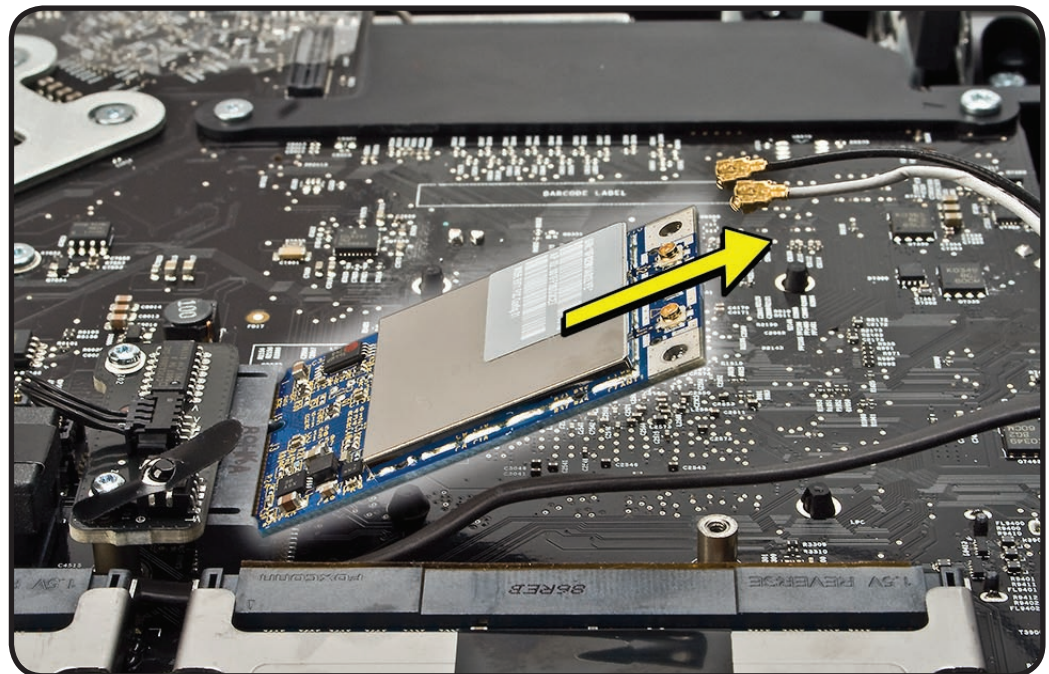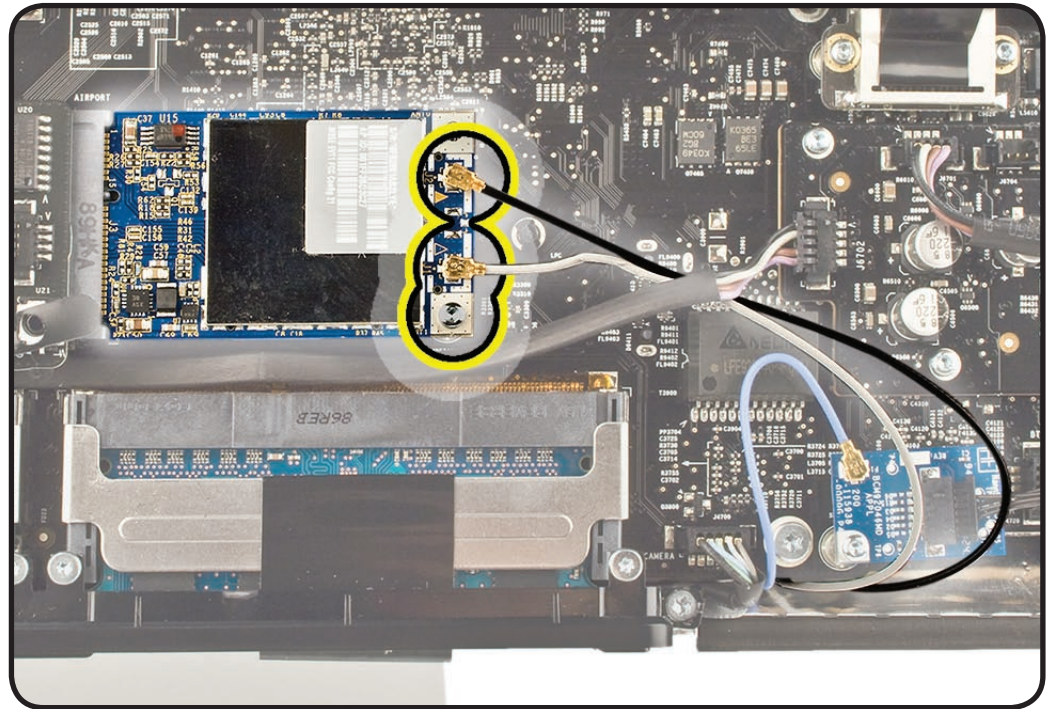
Bluetooth Board
(Early 2009)

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**

Note: iMac (20-inch, Mid 2009) model does not have a Bluetooth Board.

Tools

- ESD wrist strap
- Torx T6 screwdriver
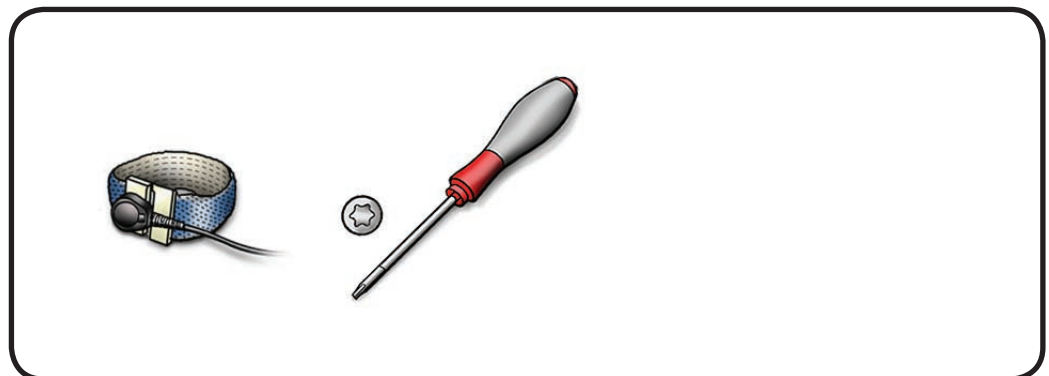
Removal

1 Remove T6 screw:
(1) 922-8579

2 Disconnect blue antenna cable.

Note: The antenna cable and connector are very delicate and should be carefully removed by pulling on the connector rather than the cable. If the antenna cable is damaged, replace rear housing.

3 Disconnect black cable (922-8836) from logic board.

4 Lift Bluetooth board off logic board.

Replacement Note: If installing a new Bluetooth board, transfer black cable from old board to new board.
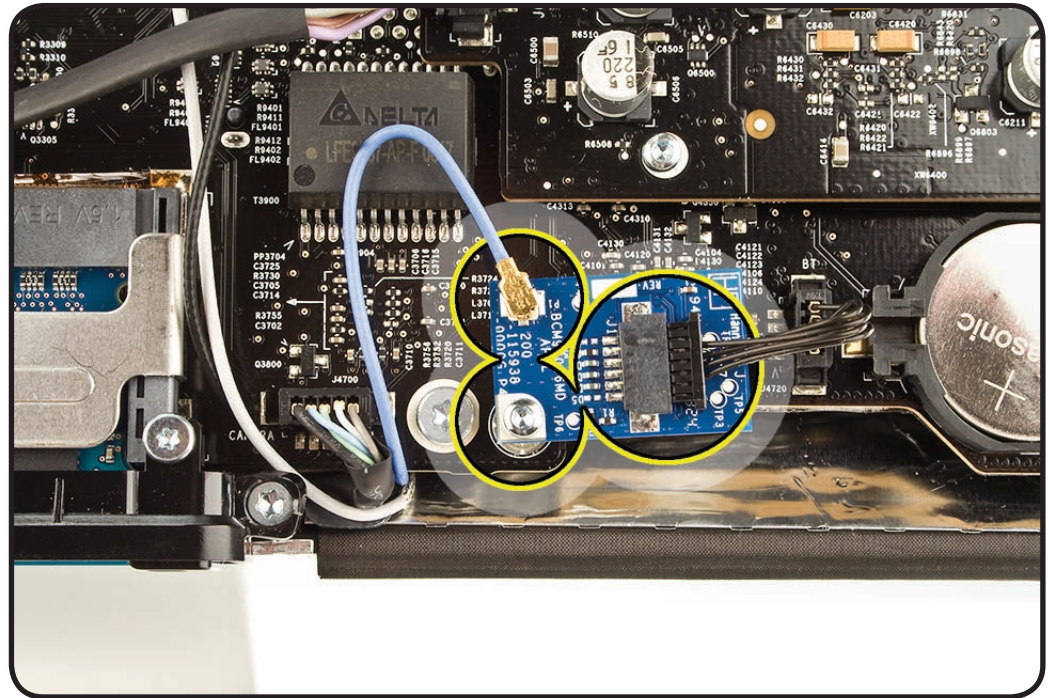
LCD Panel

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**

Tools

- ESD wrist strap
- lint-free gloves
- Torx T6 screwdriver
- Torx T8 screwdriver
- ESD bag to store LCD panel
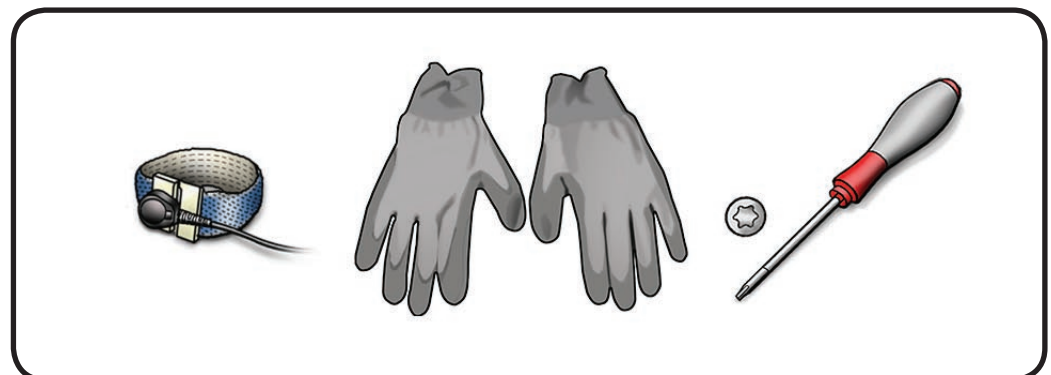
Removal

1 Remove T6 screws from LVDS connector: (2) 922-8579
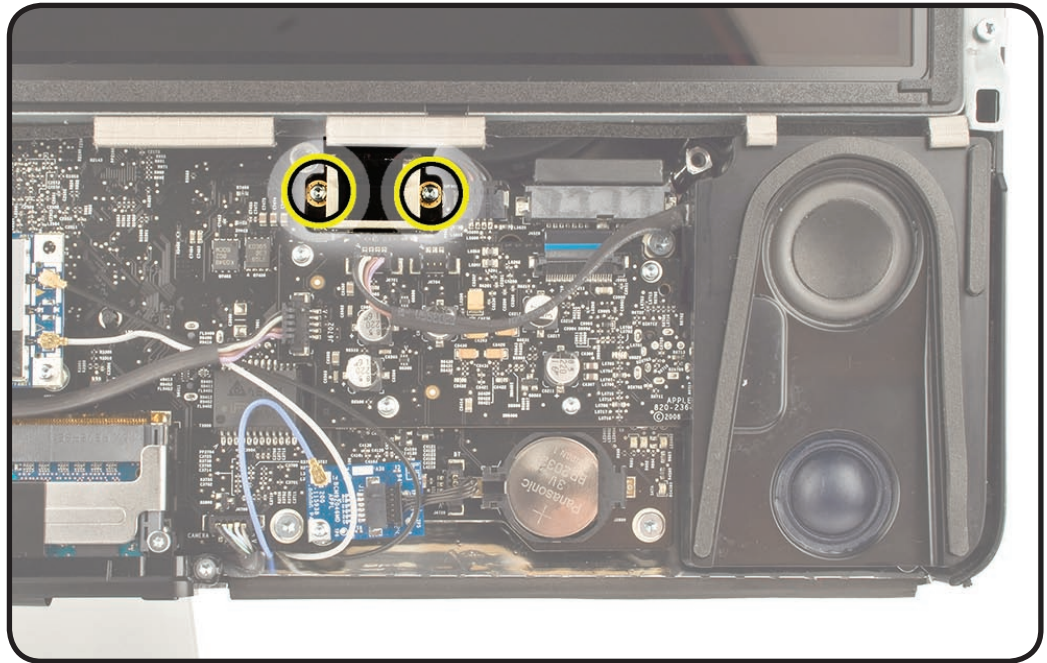
2 Remove T8 screws: (8) 922-8172

3 Disconnect LCD temp sensor cable from bottom left of the logic board.

4 Disconnect LVDS cable from right side of the logic board by pulling on black tab.

5 Grasp LCD panel at bottom edge and slowly tilt up.

6 Disconnect 4 inverter cable connectors on right side under LCD panel.

Note: Pull connectors straight out. DO NOT pull on wires.

Reassembly Note: Tuck inverter cables into open cavities in rear housing. Otherwise LCD panel may not lower into place correctly.
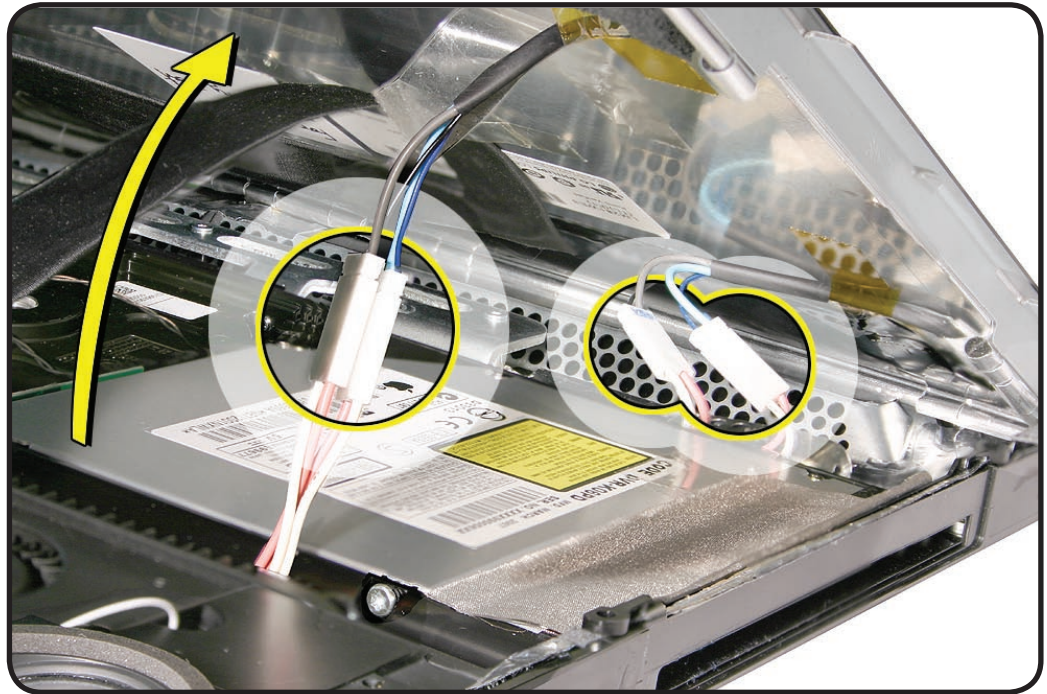
7 Lift LCD panel up and off rear housing.

Important: To prevent buildup of static charges which may attract dust particles to the surface of the display, store LCD panel in an anti-static bag whenever it has been removed from computer.
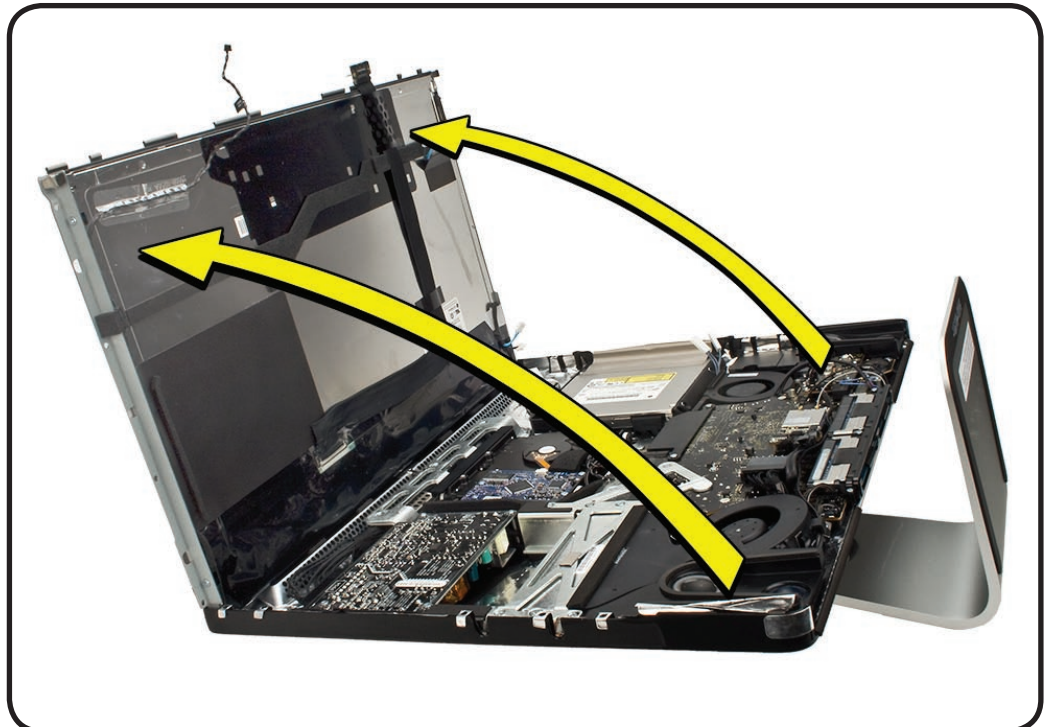
Replacement Note:
If installing a new LCD panel, disconnect **LVDS cable** and transfer to new panel. Secure with black cable stays.

A replacement LCD panel includes display temp sensor cable & retaining clip, mounting brackets, foam strips & gaskets, and 2 black cable stays.
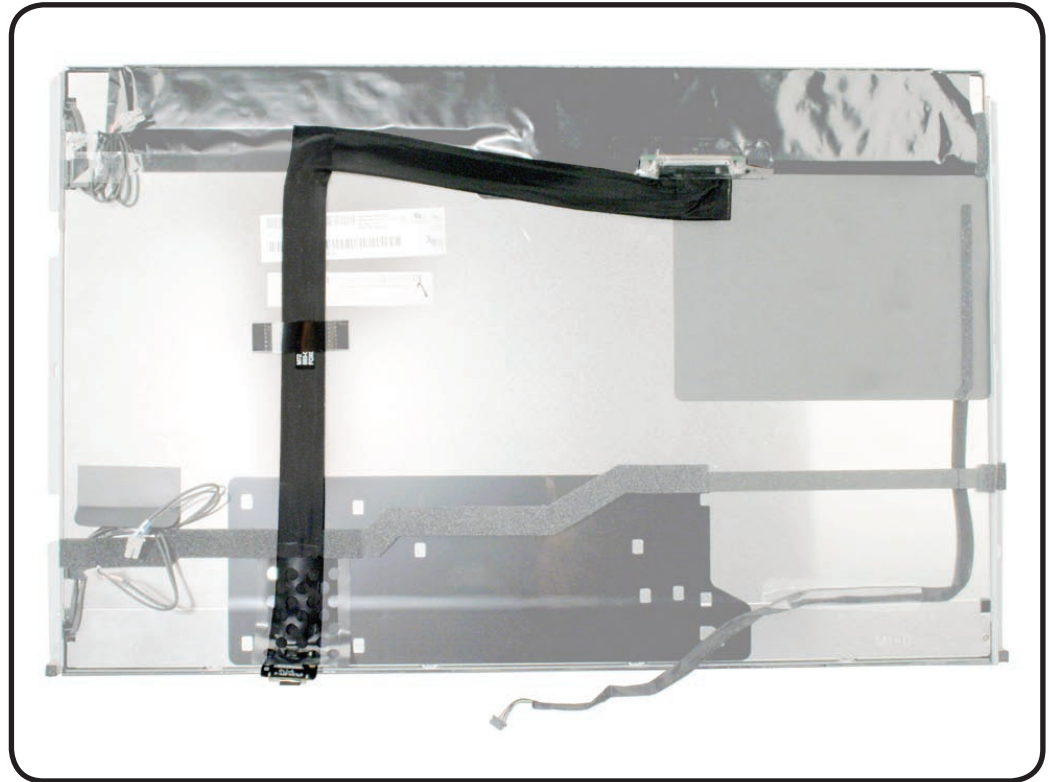
Reassembly Note: Image at right shows a map of connectors on bottom left of logic board. LCD temp sensor cable connects to the center bottom of the 4 connectors.
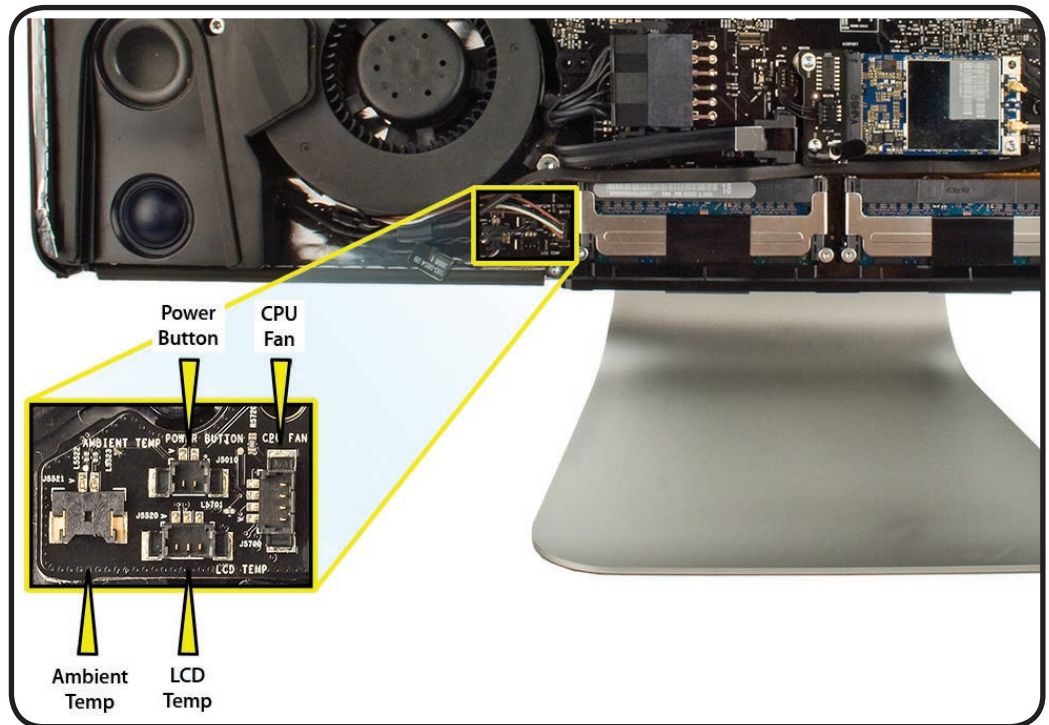
LVDS Cable

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
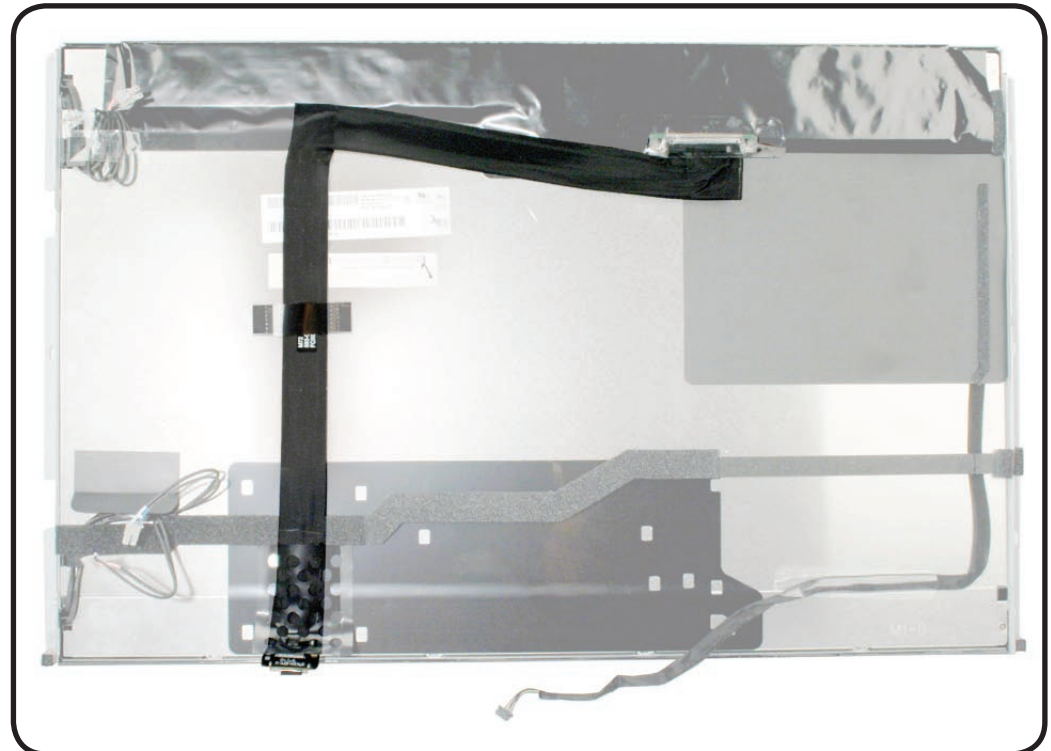
Tools

- ESD wrist strap
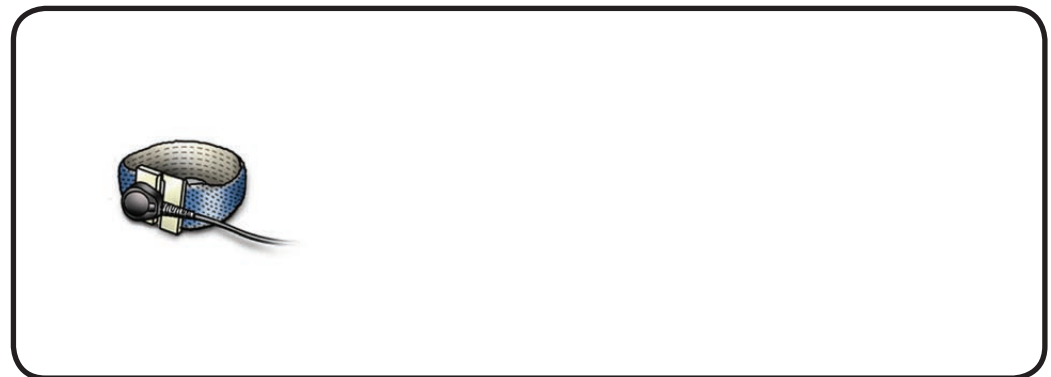
Removal

1 Lay LCD panel face down on a clean, soft cloth.

2 Peel up 2 strips of black tape from LVDS cable on back of LCD panel. Save strips for use when reinstalling.
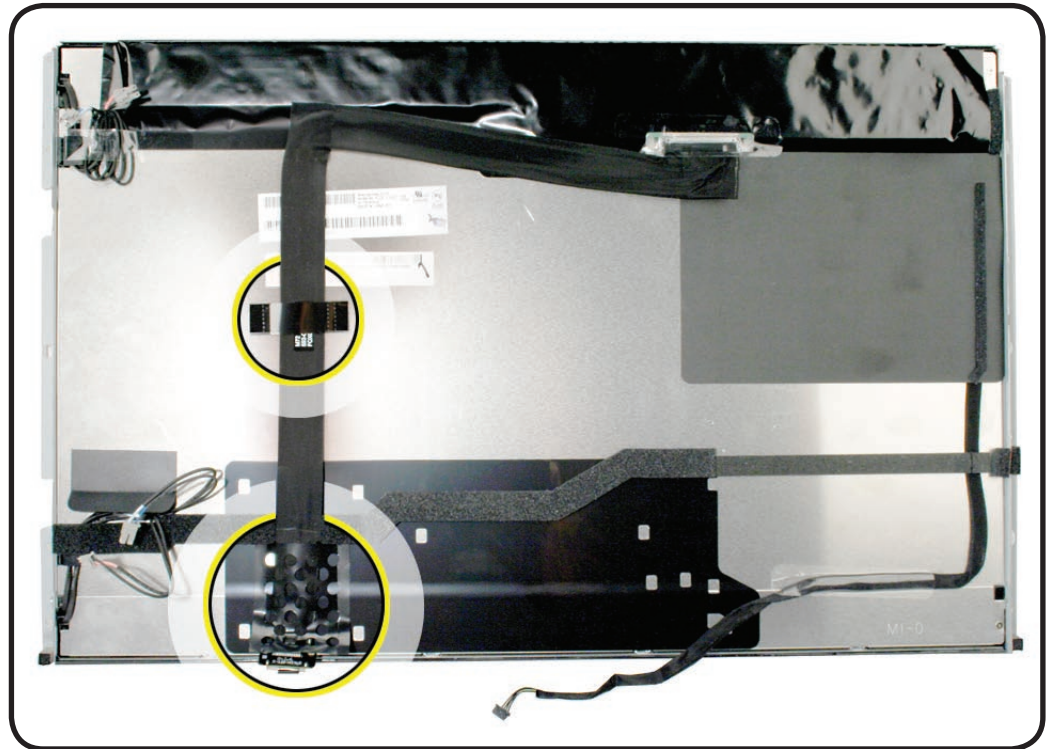
3 Remove clear tape from LVDS cable where it attaches to LCD panel.

4 Disconnect LVDS cable by pressing in on the side release clips (1) and then gently pull down (2).
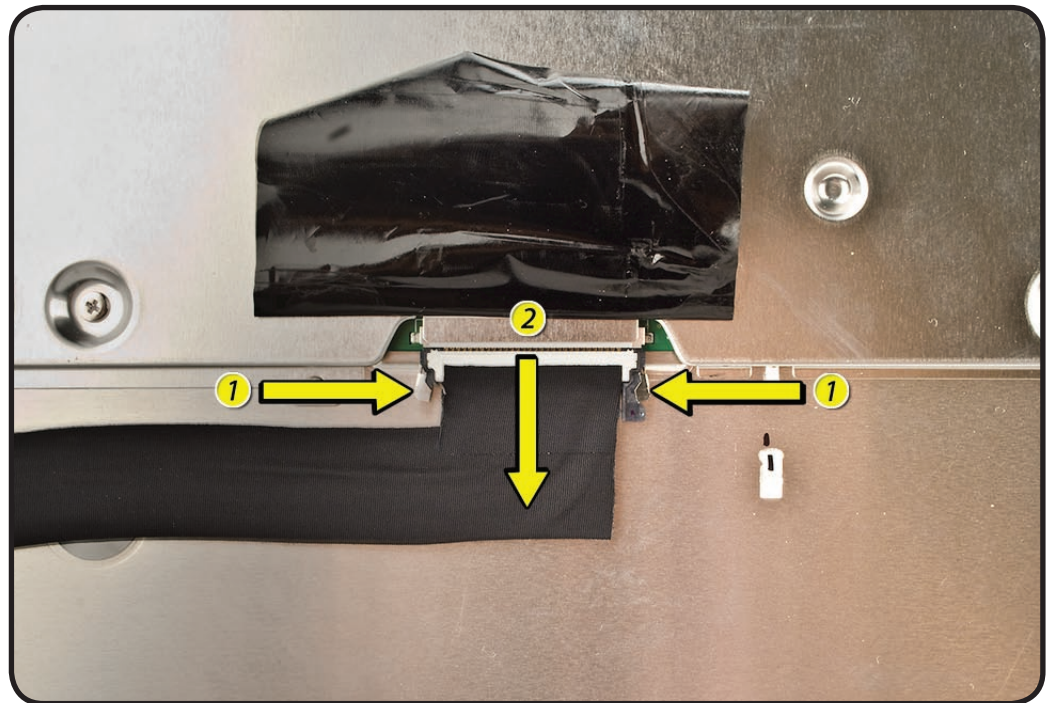
Hard Drive

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**

Tools

- ESD wrist strap
- Torx T10 screwdriver (only needed if installing a new replacement hard drive)
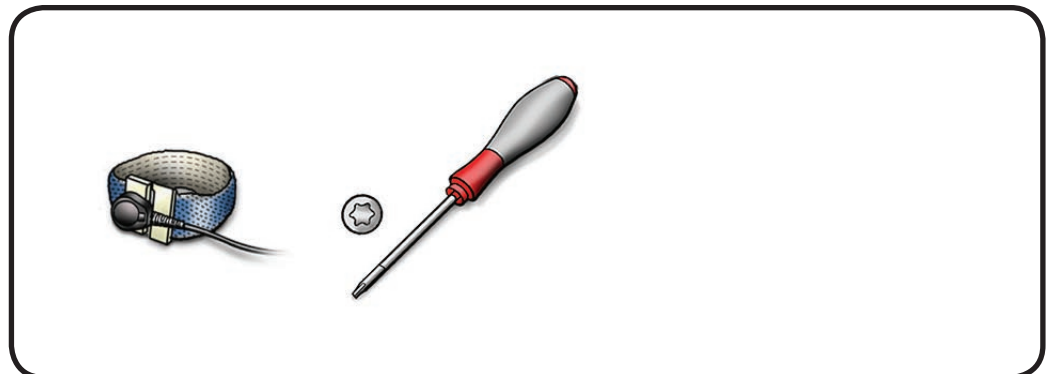
Removal

1 Disconnect hard drive temp sensor cable from top of logic board.

Replacement Note:
If installing a new hard drive, also peel back foam and disconnect temp sensor cable. Save cable to install on new hard drive, which will include the clip and a new foam gasket.
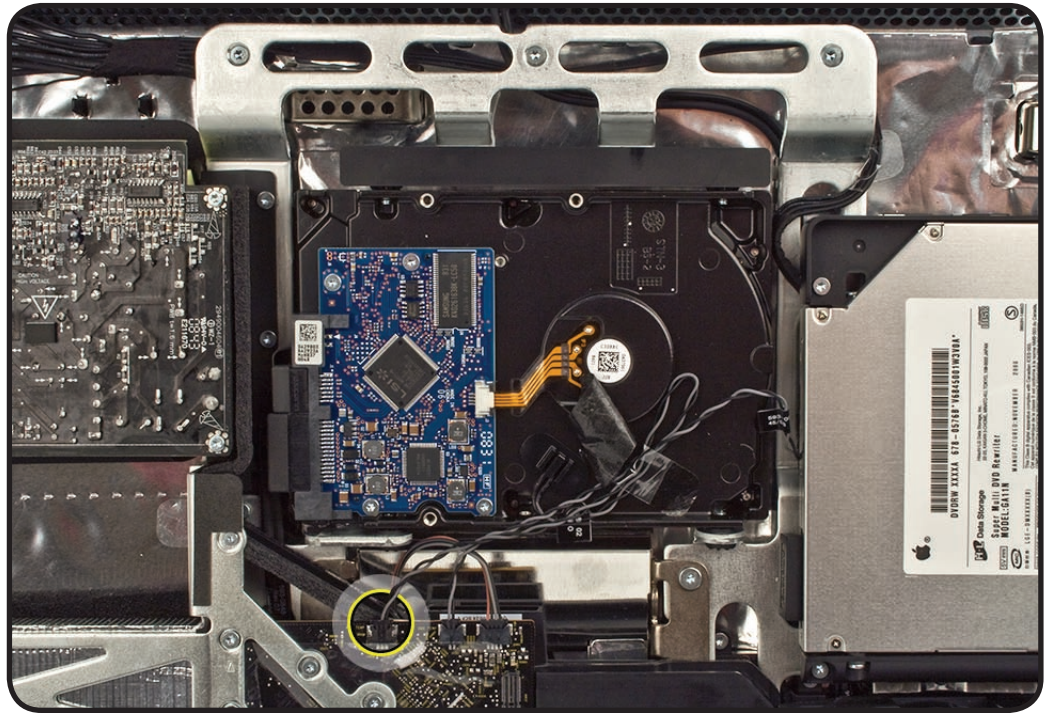
2 Release black plastic clip (922-8854):
(1) rotate clip towards hard drive; and
(2) swing clip up towards optical drive.
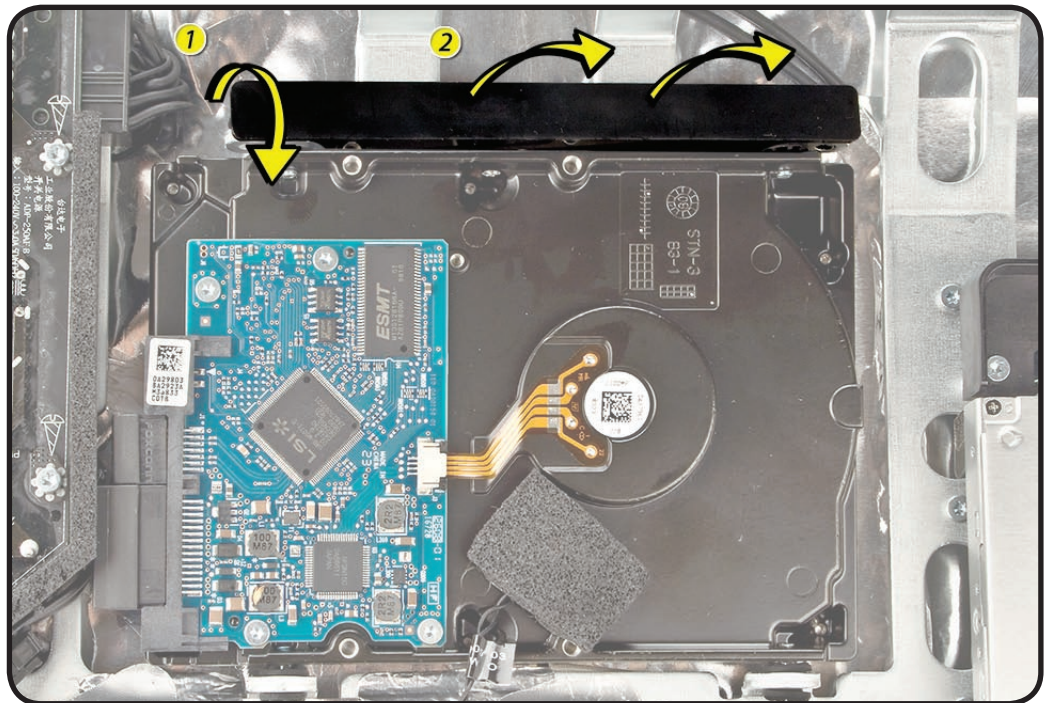
3   Slide pin of black plastic clip out of hole in chassis frame.

Reassembly Note: Insert pin in hole and lower retaining clip until it snaps into second hole.
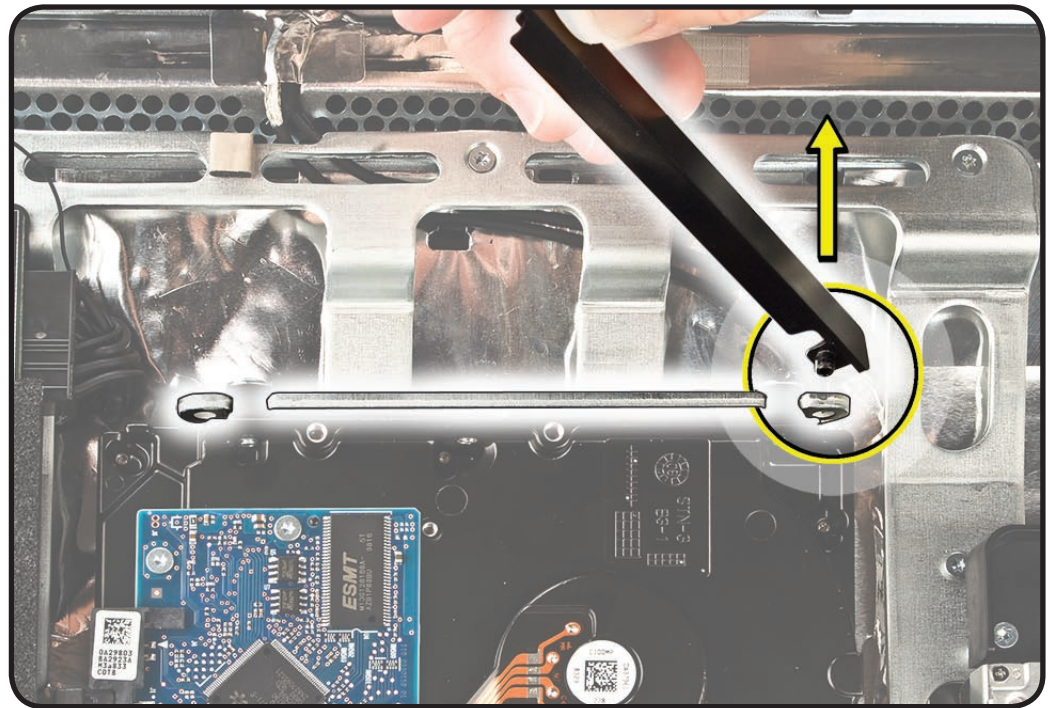
4   Lift hard drive up slightly to disconnect power and data cables from hard drive.
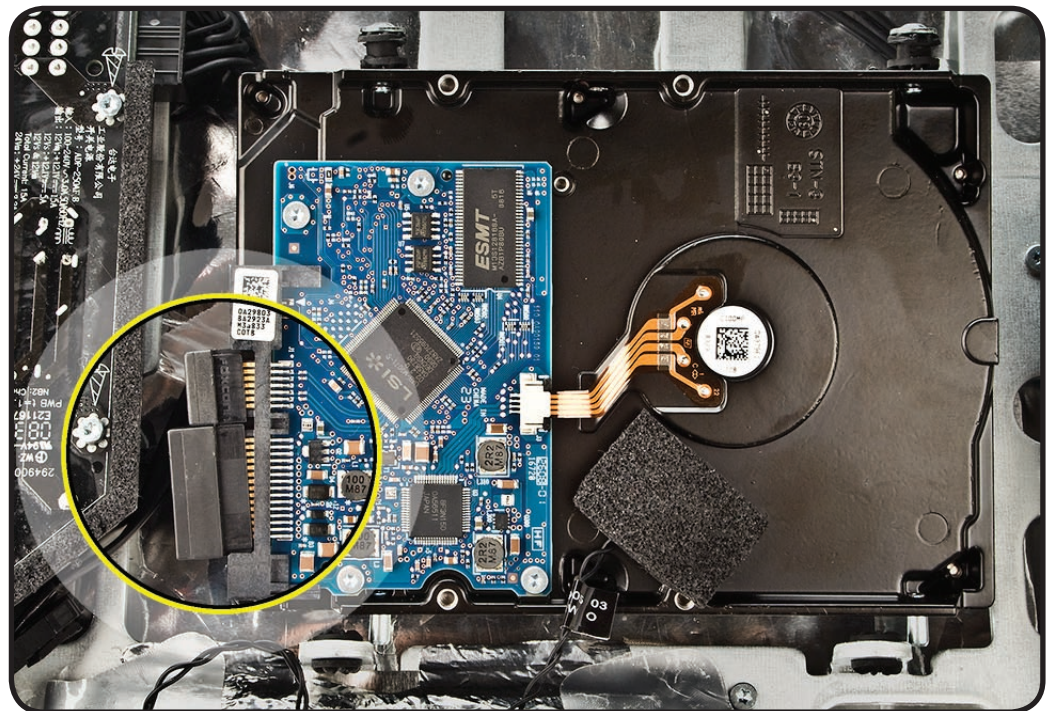
5 Slide 2 pins on the side of hard drive out of 2 rubber grommets in chassis, and remove hard drive assembly from computer.
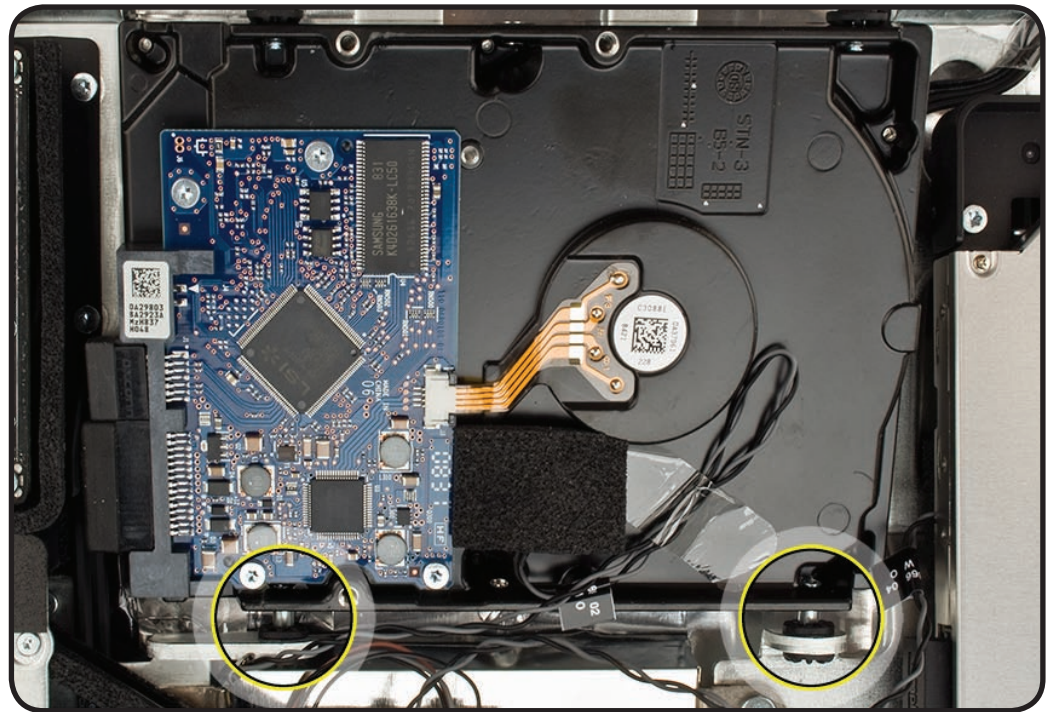
6 If installing a new hard drive, transfer the following to the replacement drive:
- temp sensor cable
- (2) T10 screws 922-8580

- (2) T10 pins 922-7001

The screw pins go on the side closest to the power & data cable connectors.
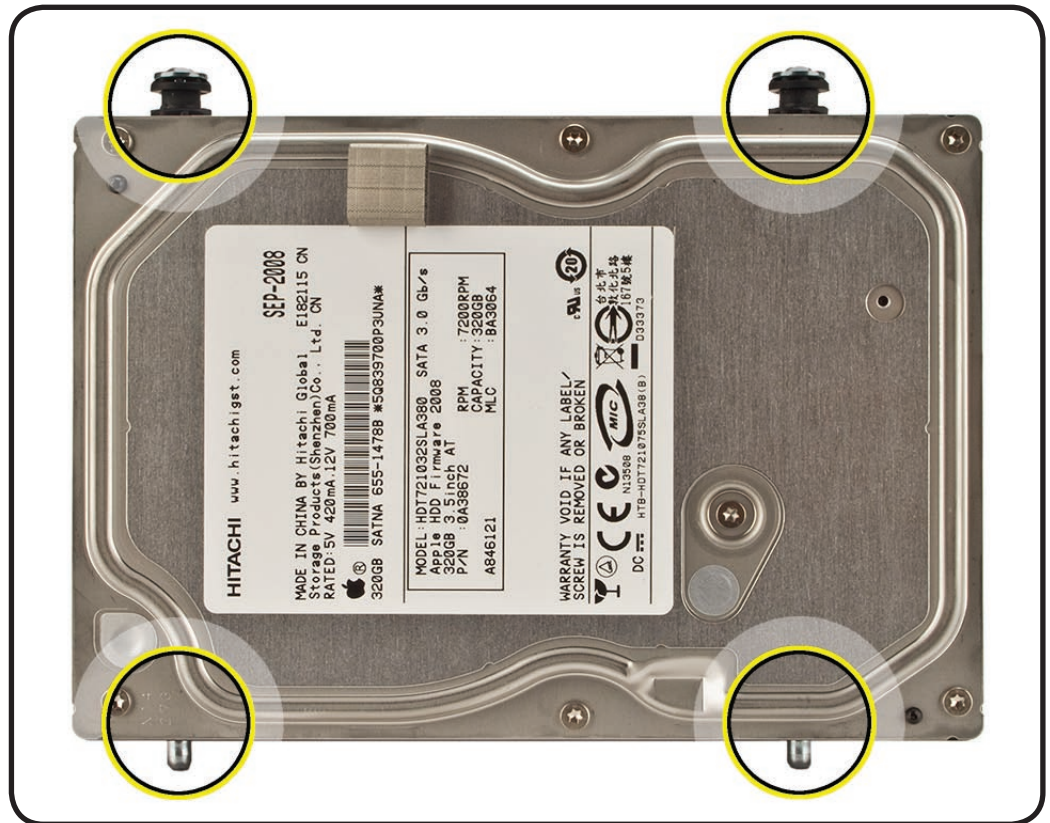
Hard Drive Sensor Cable

First Steps

Remove:

- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**

Tools

- ESD wrist strap

Removal

1 Disconnect temp sensor cable from its connector on top of logic board.

2 Peel back foam gasket on top of hard drive and disconnect sensor cable from retaining clip (922-8183).
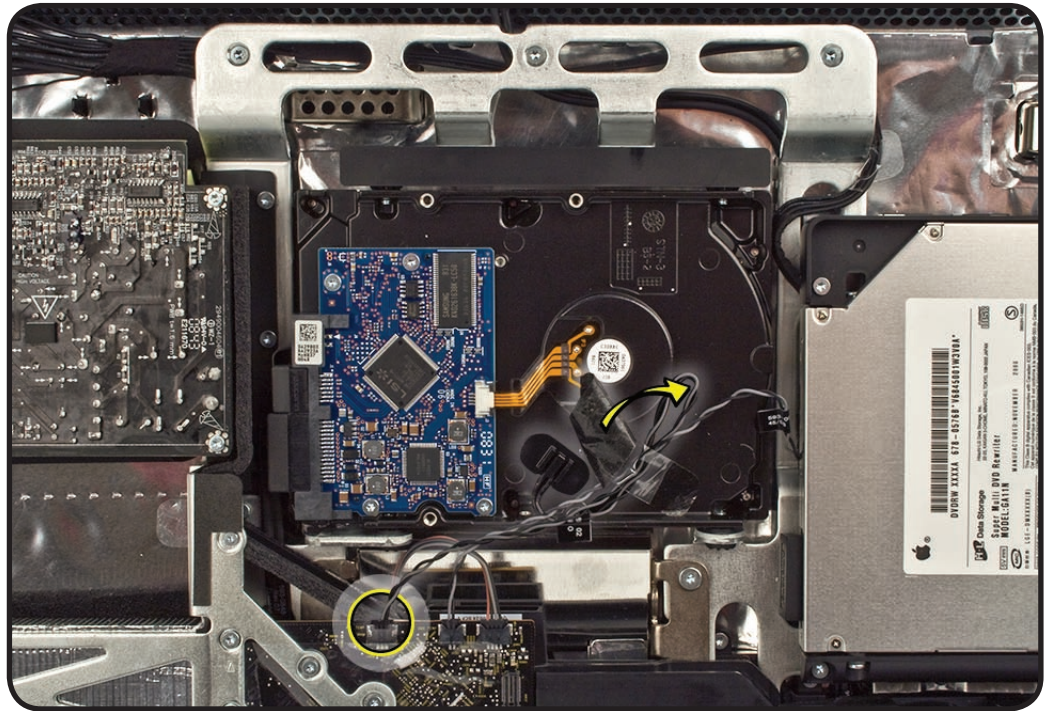
Note: Image at right shows a map of connectors on top of logic board. Hard drive sensor cable connects to the furthest left of the 3 connectors.

Hard drive sensor has a 3-pin connector. Optical drive sensor has a 2-pin connector. Hard drive fan has a 4-pin connector.
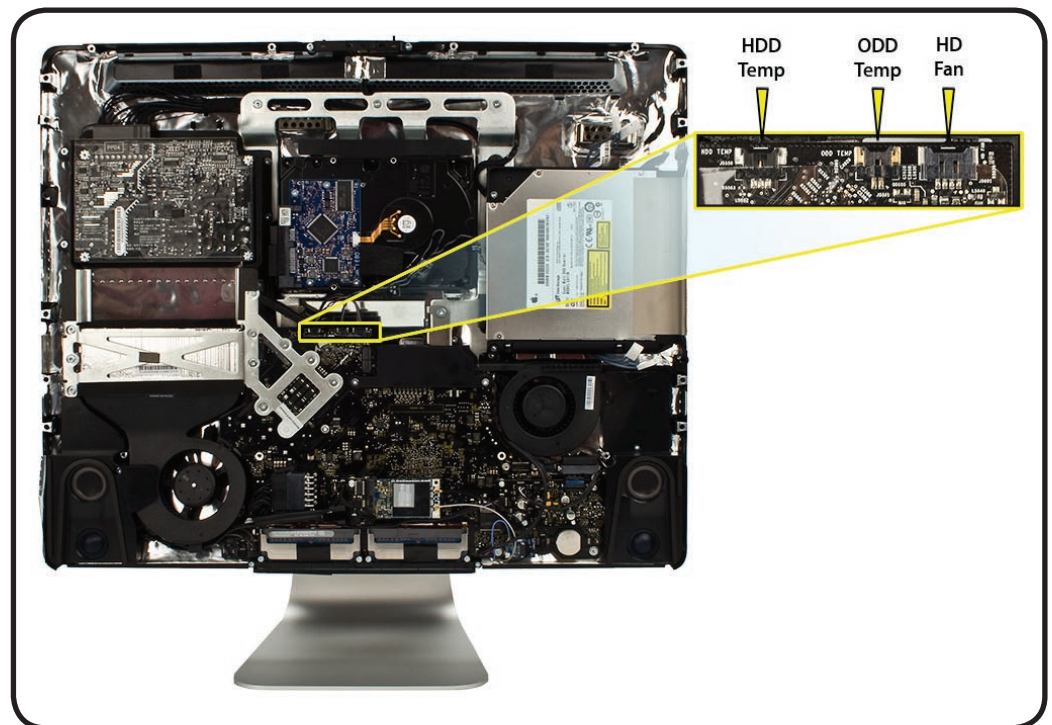
Optical Drive

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**

Important: When servicing optical drive, handle it by edges only. Pressing elsewhere on drive could damage internal mechanism.
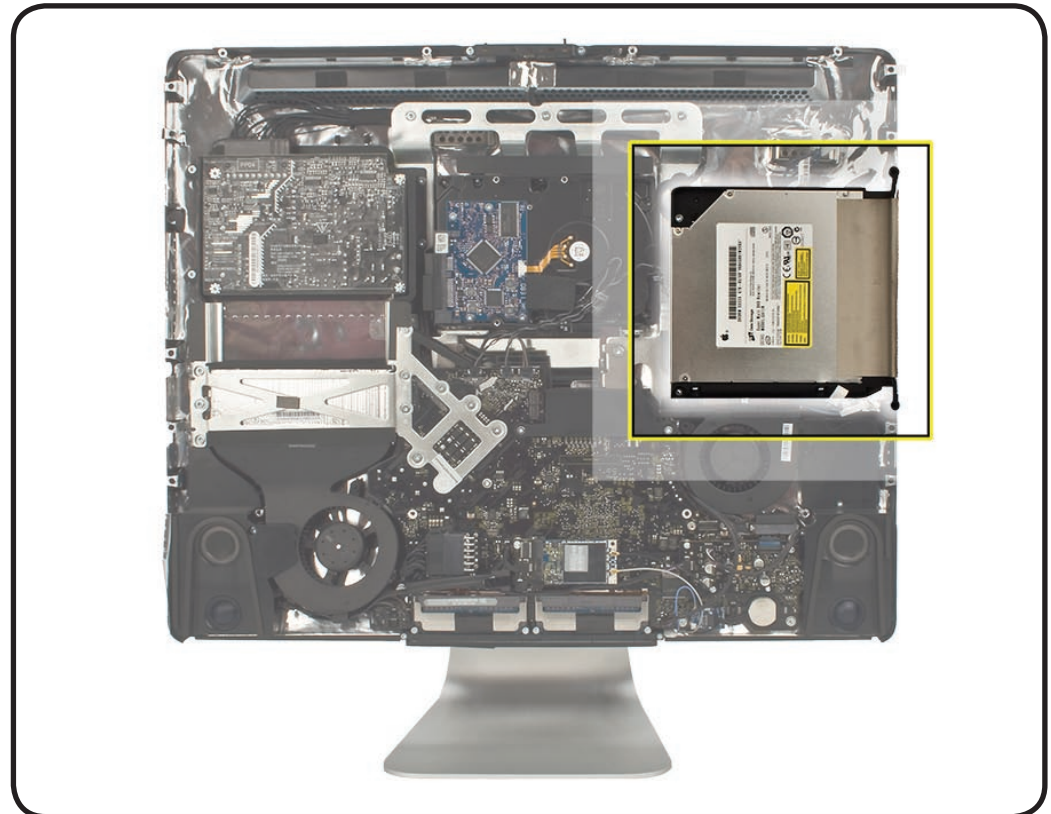
Tools

- ESD wrist strap
- Torx T10 screwdriver
- Black stick
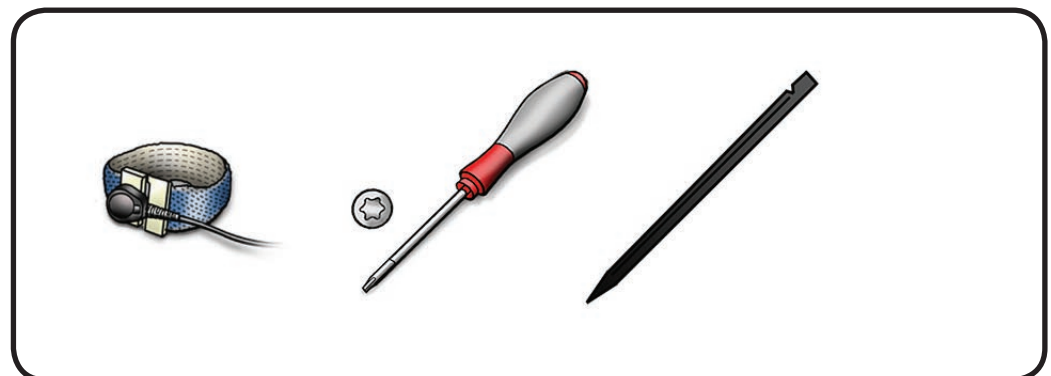
Removal

1 Remove T10 machine screws:
(2) 922-6842

2 Carefully peel back strip of EMI mesh tape from rear housing.

Reassembly Notes:
Make sure EMI mesh does not cover any of the slot-load opening on rear housing. Also, make sure 4 inverter cables do not get trapped under optical drive.

3 Wiggle optical drive data cable connector away from optical drive. A black stick may be helpful.
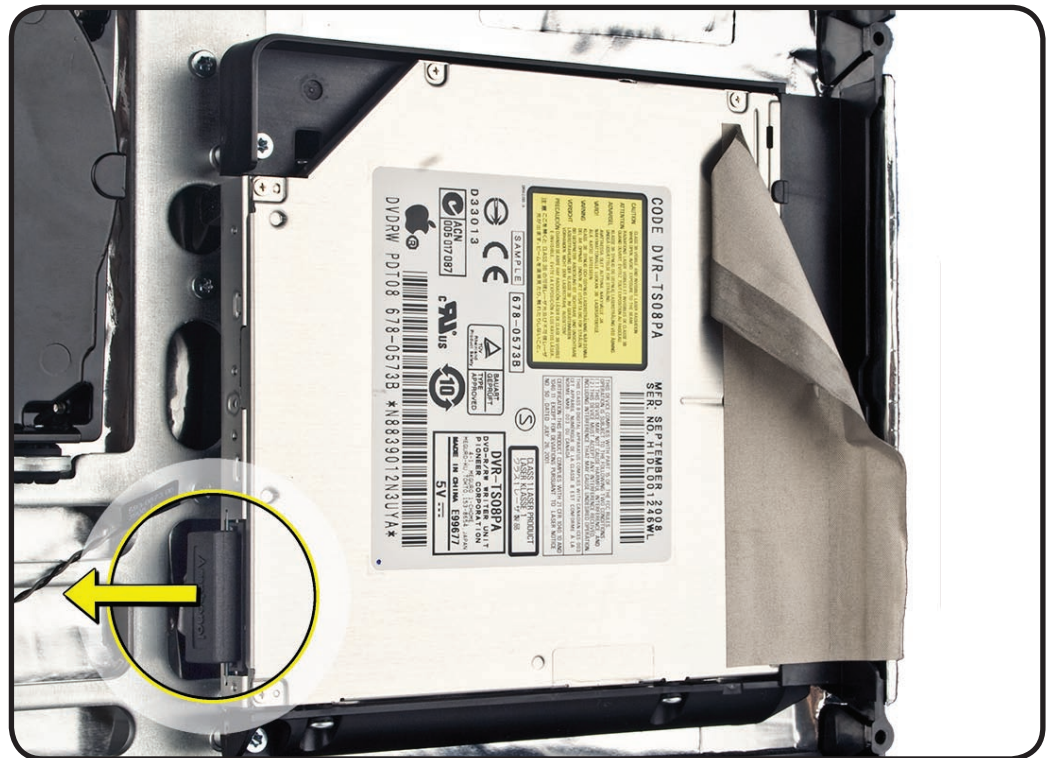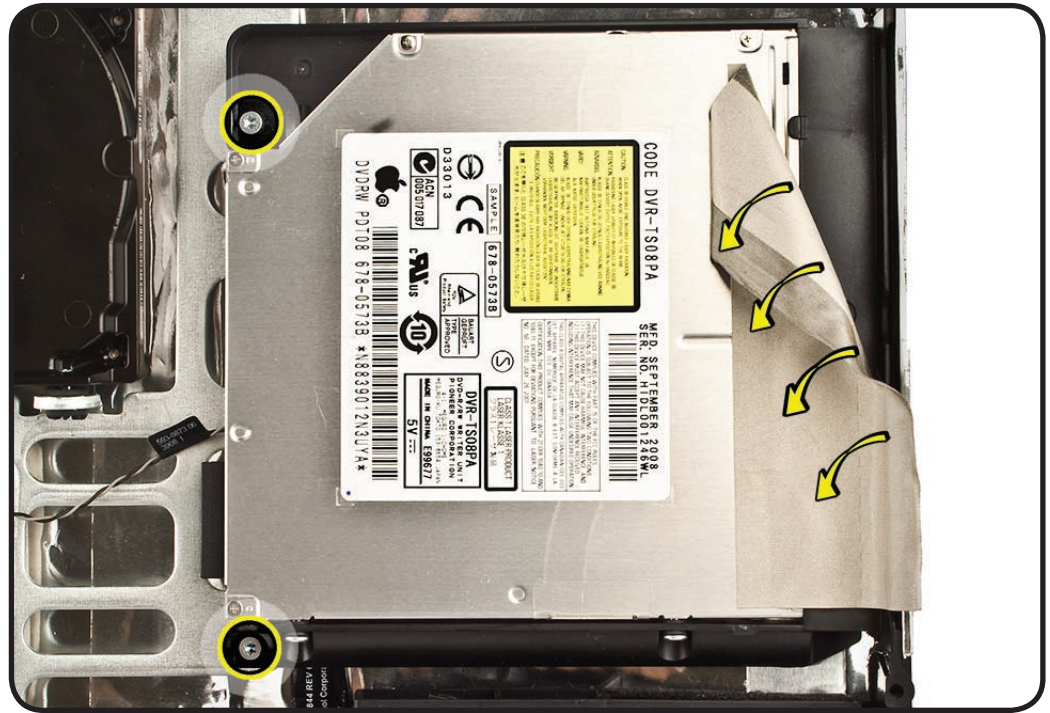
4 Disconnect temp sensor cable from connector on top edge of logic board.

5 Lift optical drive out of rear housing.

Warning: Handle optical drive by the edges only! Pressing or squeezing elsewhere could damage its internal mechanism.
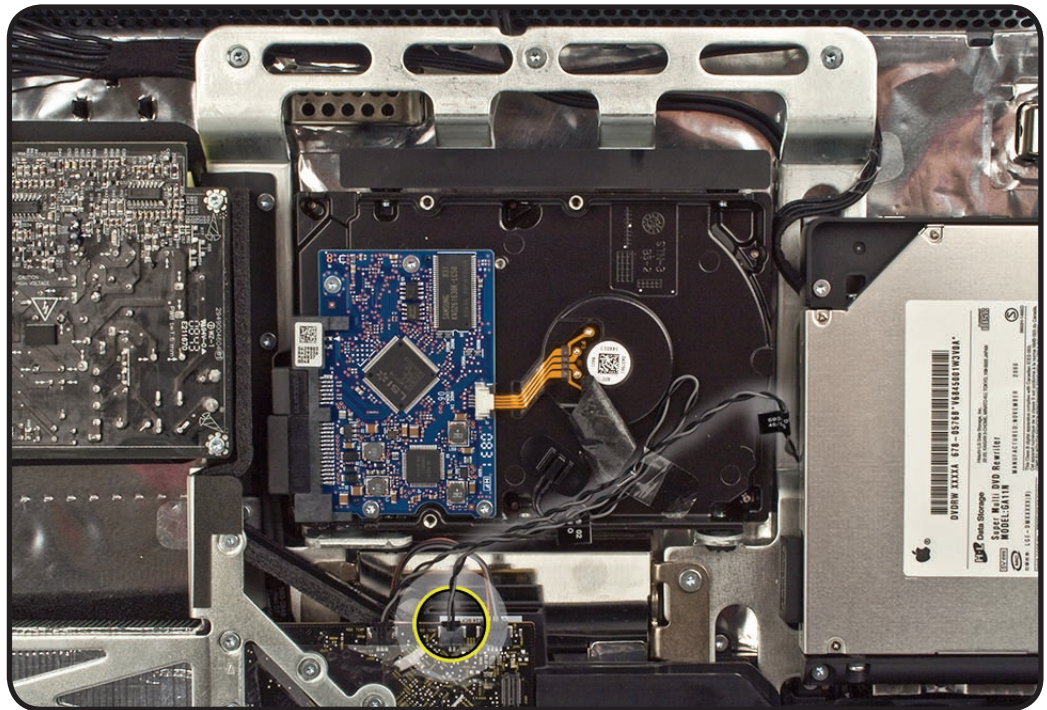
Replacement Note: If installing a new optical drive, peel back foam gasket and disconnect temp sensor cable from retaining clip on reverse side of drive.

Transfer the following to the replacement drive:
- temp sensor cable
- EMI mesh tape
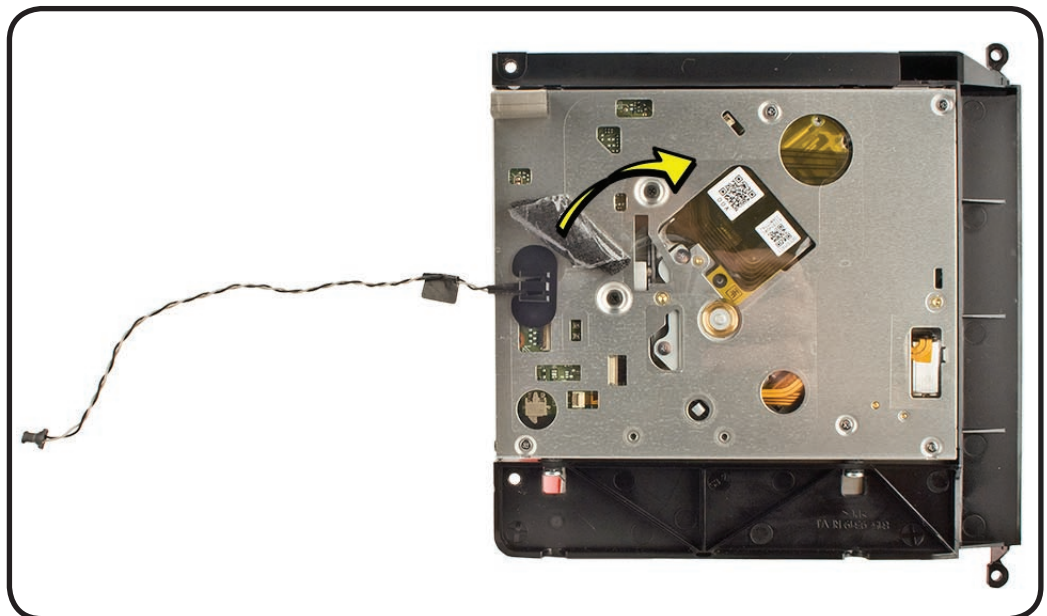
Optical Drive Sensor Cable

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
- **Optical Drive**

Tools

- ESD wrist strap

Removal

1 On reverse side of optical drive, peel back foam gasket and remove temp sensor cable (922-8827) from retaining clip (922-8183).
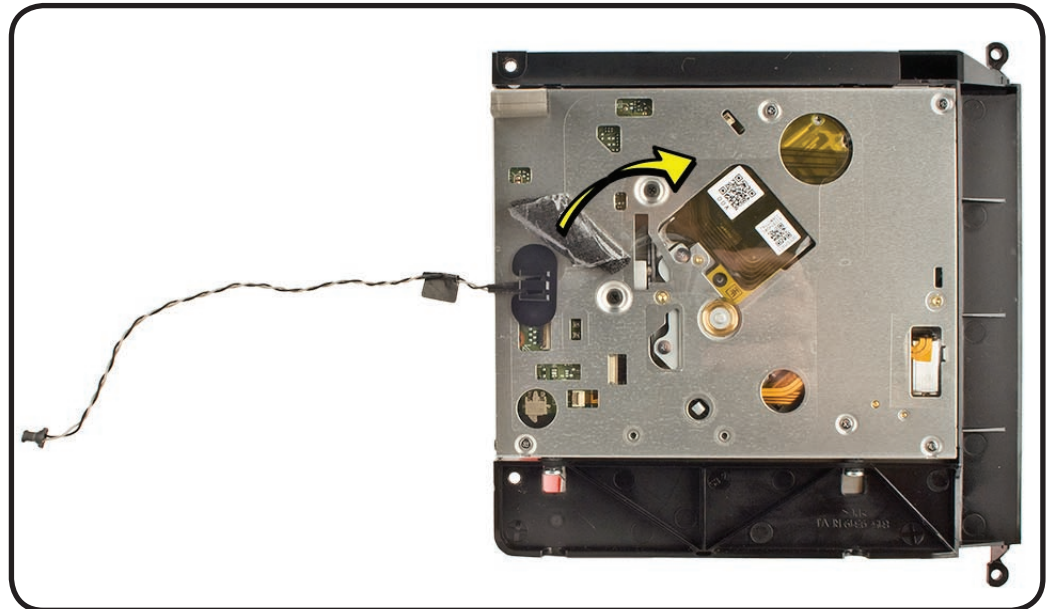
Note: Image at right shows a map of connectors on top of logic board. Optical drive sensor cable connects to the middle one of the 3 connectors.

Hard drive sensor has a 3-pin connector. Optical drive sensor has a 2-pin connector. Hard drive fan has a 4-pin connector.
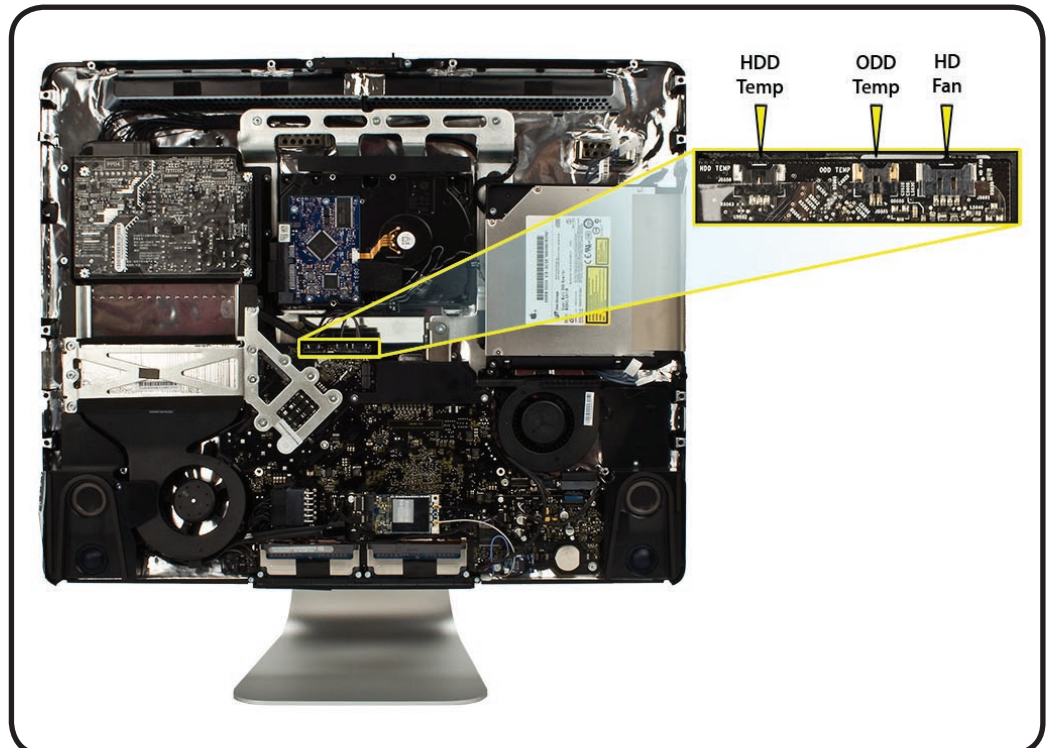
Optical Drive Fan

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**

Tools

- ESD wrist strap

Removal

1 Disconnect cable from logic board.

2 Lift fan off 3 guide posts in the rear housing.
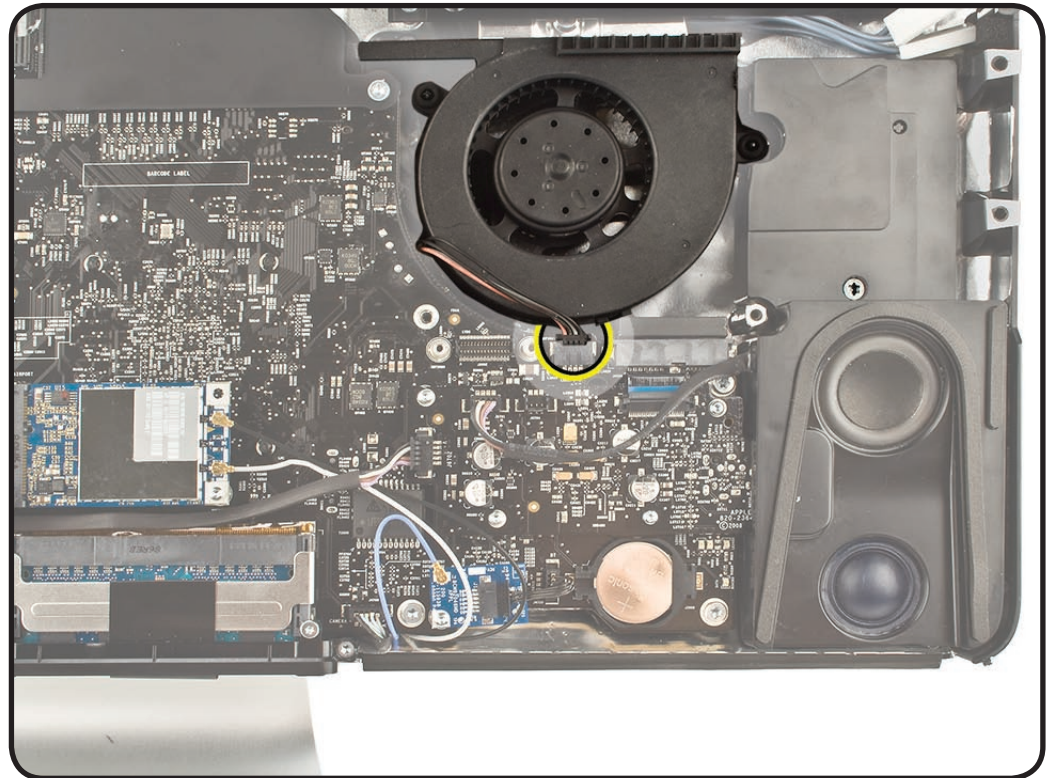
Optical Drive Data Cable

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
- **Optical Drive**
- **Optical Drive Fan**
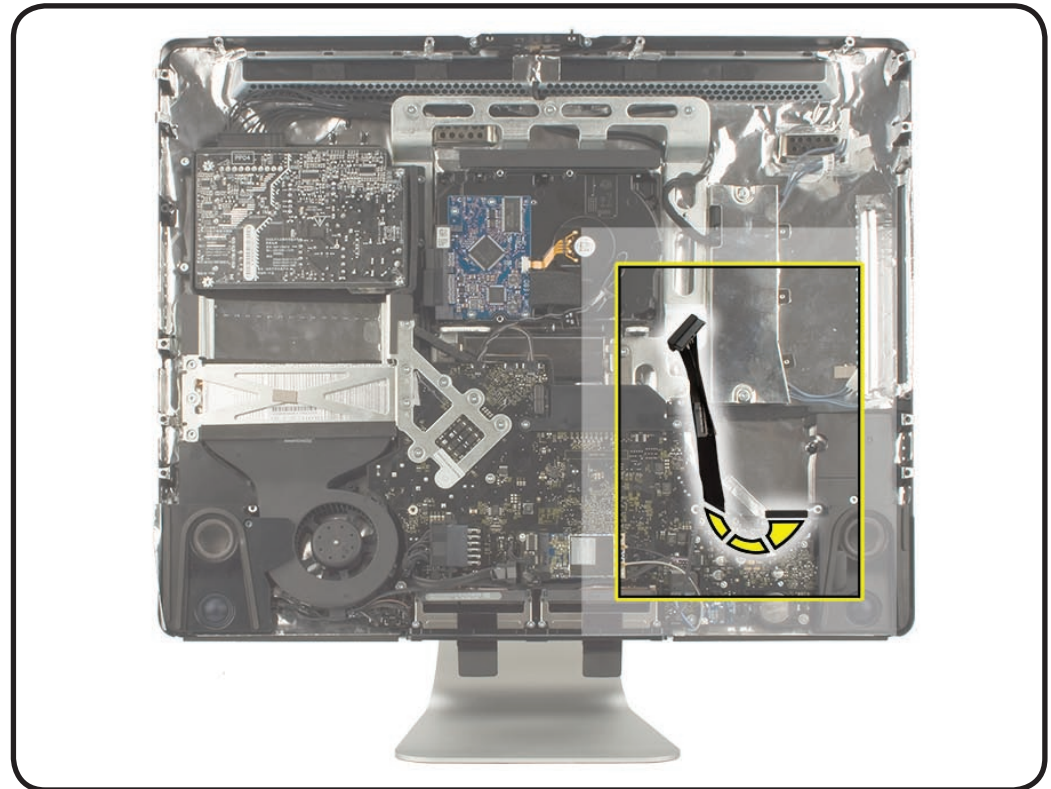
Tools

- ESD wrist strap

Removal

1 Disconnect cable from logic board above audio board.

2 Lift cable from adhesive securing it to rear housing.
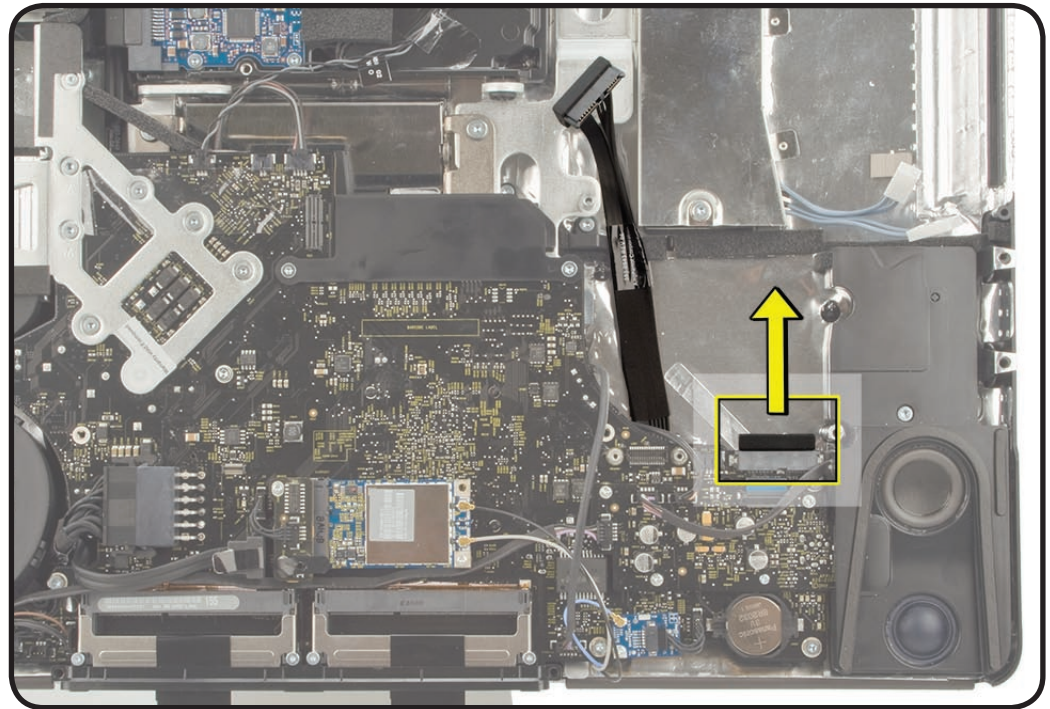
Inverter

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
- **Optical Drive**

Tools

- ESD wrist strap
- Torx T10 screwdriver
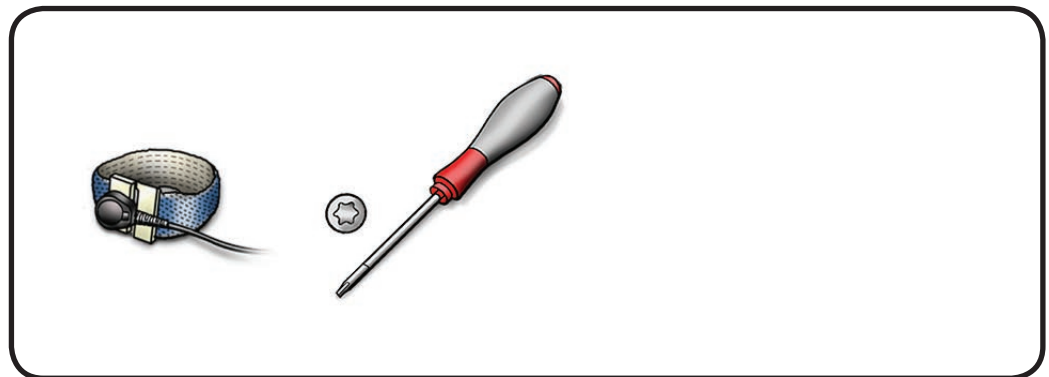
Removal

1 Remove T10 screws: (2) 922-8251

2 Disconnect inverter power connector (pull in direction of hard drive).

3 Lift inverter cover and inverter board out of rear housing.
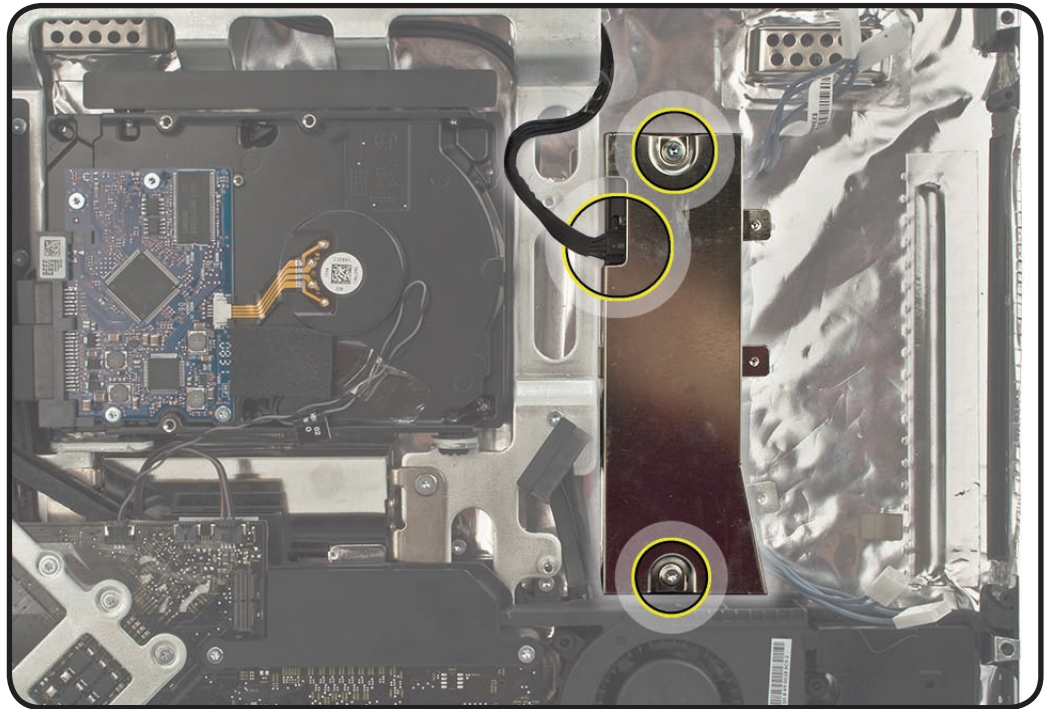
Power Supply

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**

⚠️

Warning: HIGH VOLTAGE: **Use extreme caution when working around the power supply,** which contains a high-voltage capacitor that may remain charged for several minutes even when the computer is unplugged. Never touch the leads on the top side of the power supply, especially those near the warning sign.

Tools

- ESD wrist strap
- Torx T10 screwdriver
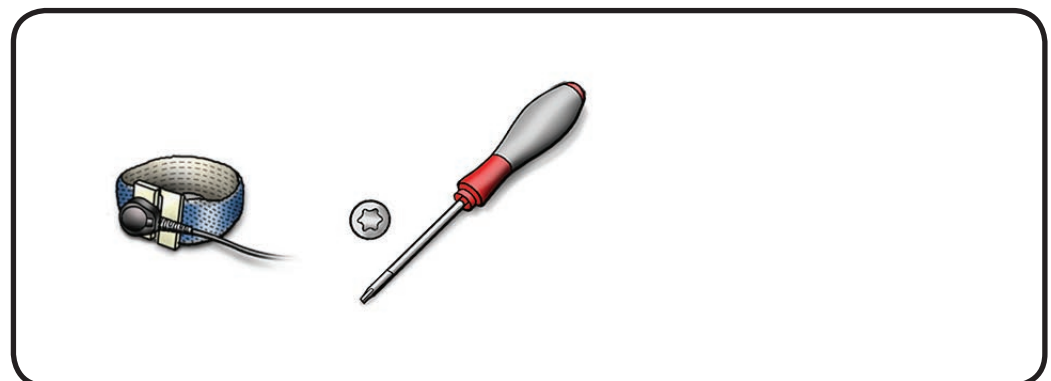
Removal

1 Remove T10 screws:
(2) 922-6800, self-tap

(2) 922-6842, machine

Reassembly Note: Install self-tapping screws on left side and machine screws on right side.
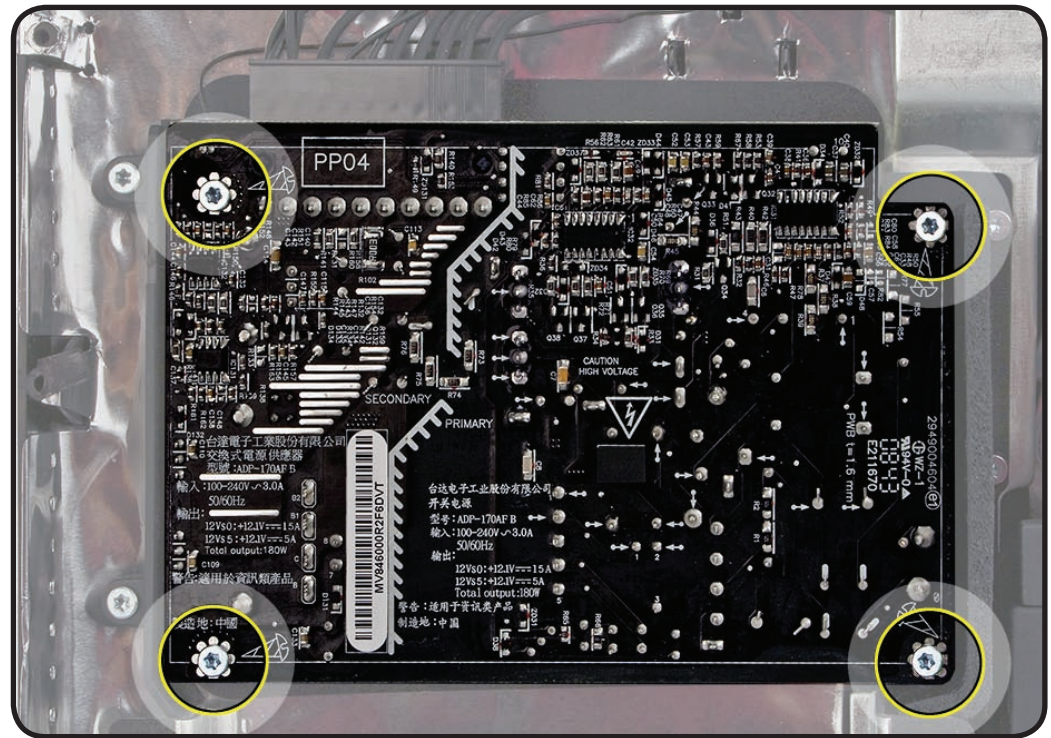
2 Disconnect 3 cables:
- large DC power supply cable
- small 2-pin ground connector
- AC inlet cable (protruding from pressure wall)

3 Lift power supply out of rear housing.
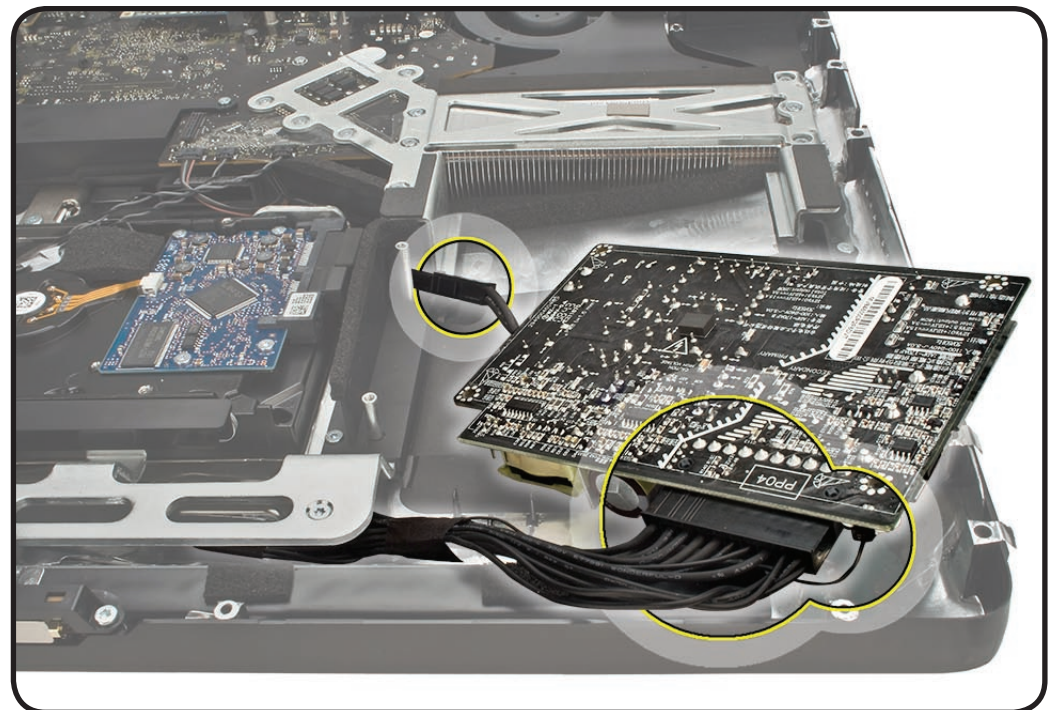
Reassembly Note:
Make sure pressure wall is in place. If it was removed, slip pressure wall over 2 posts on chassis and replace 2 screws.

Left Speaker

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
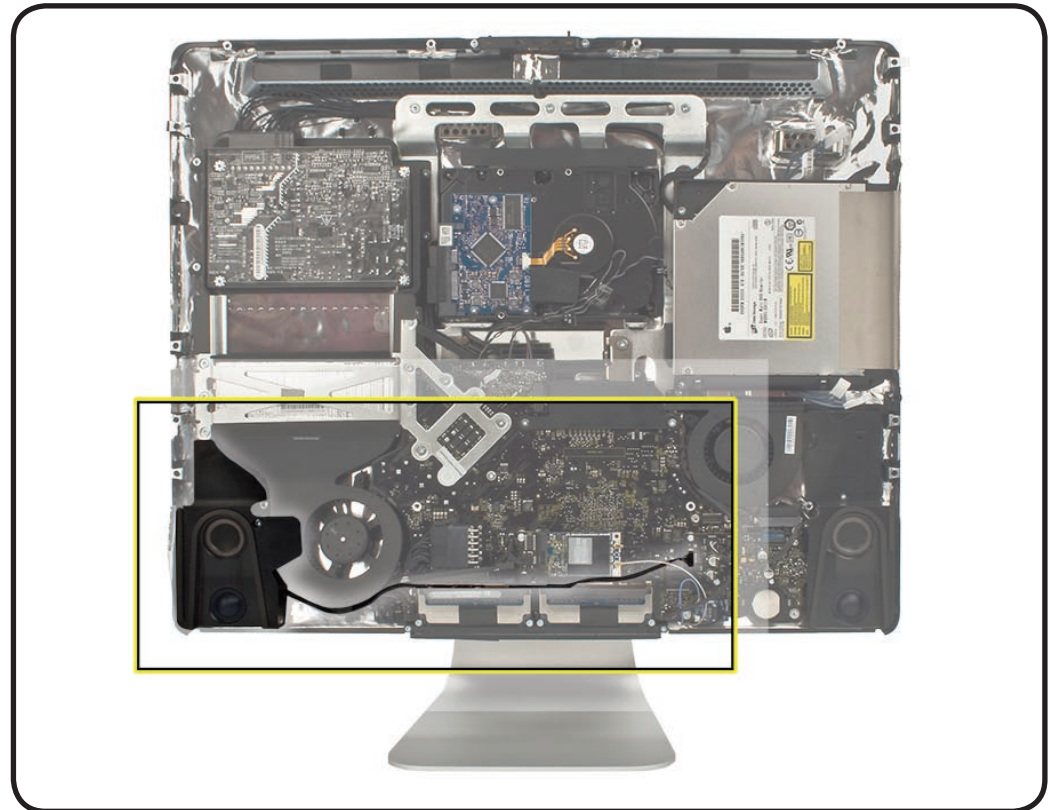
Tools

- ESD wrist strap
- Torx T10 screwdriver
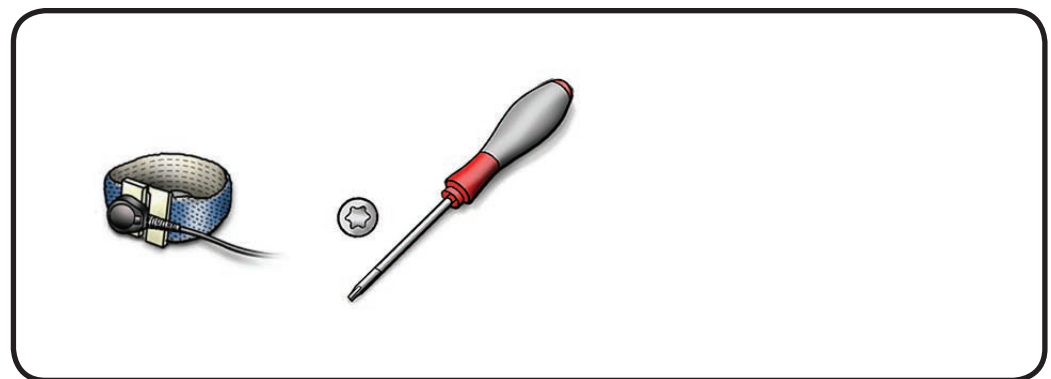
Removal

1 Remove T10 screw:
(1) 922-8249

2 Disconnect speaker cable from audio board.

Reassembly Note: Tuck speaker cable under cable clip on CPU fan and route as shown.

3 Lift speaker up and out of computer.
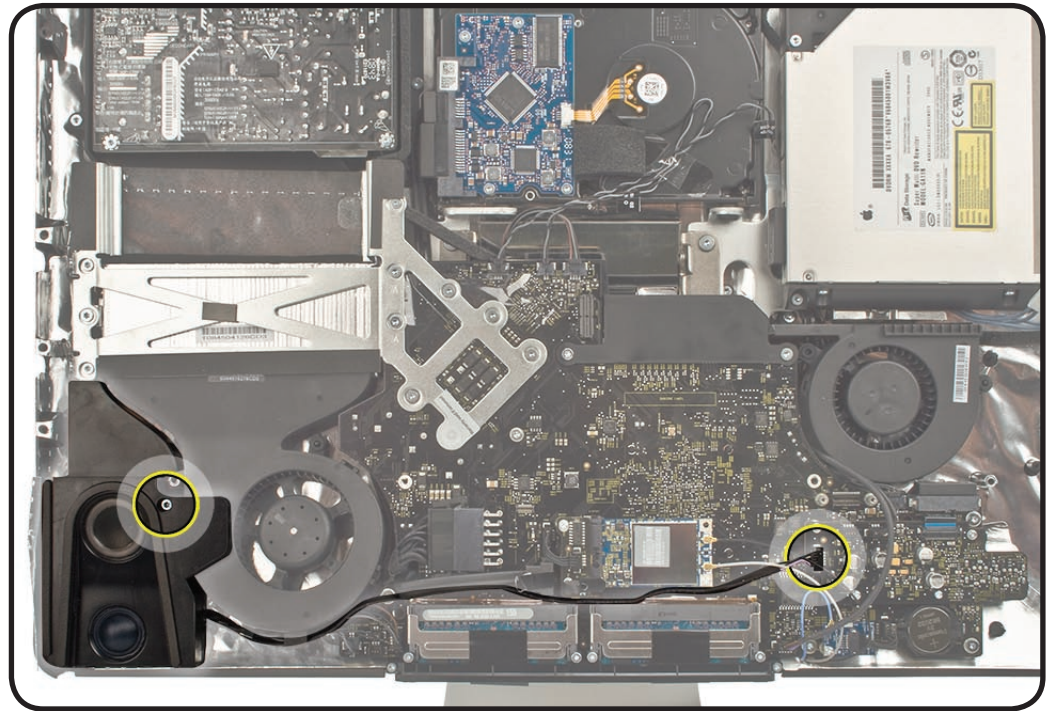
Ambient Temp Sensor Cable

First Steps

Remove:
* **Access Door**
* **Glass Panel**
* **Front Bezel**
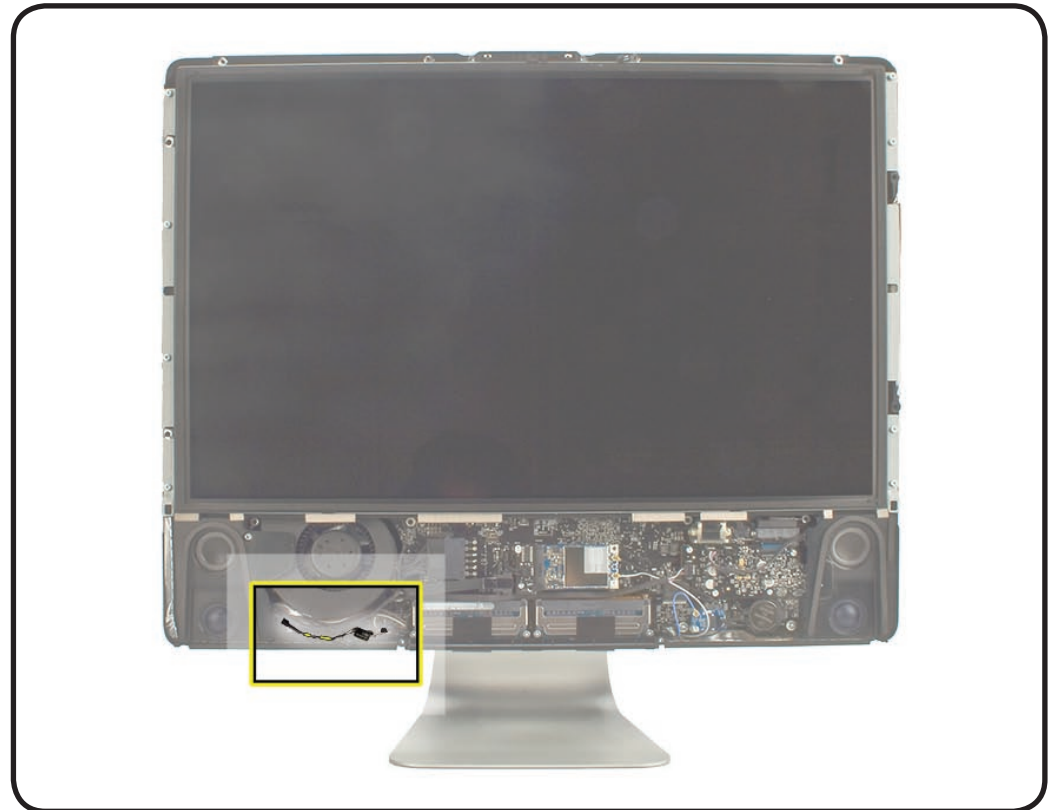
Tools

* ESD wrist strap

Removal

1 Disconnect ambient temp sensor cable (922-8826) from logic board.

2 Release cable from retaining clip on side of CPU fan.
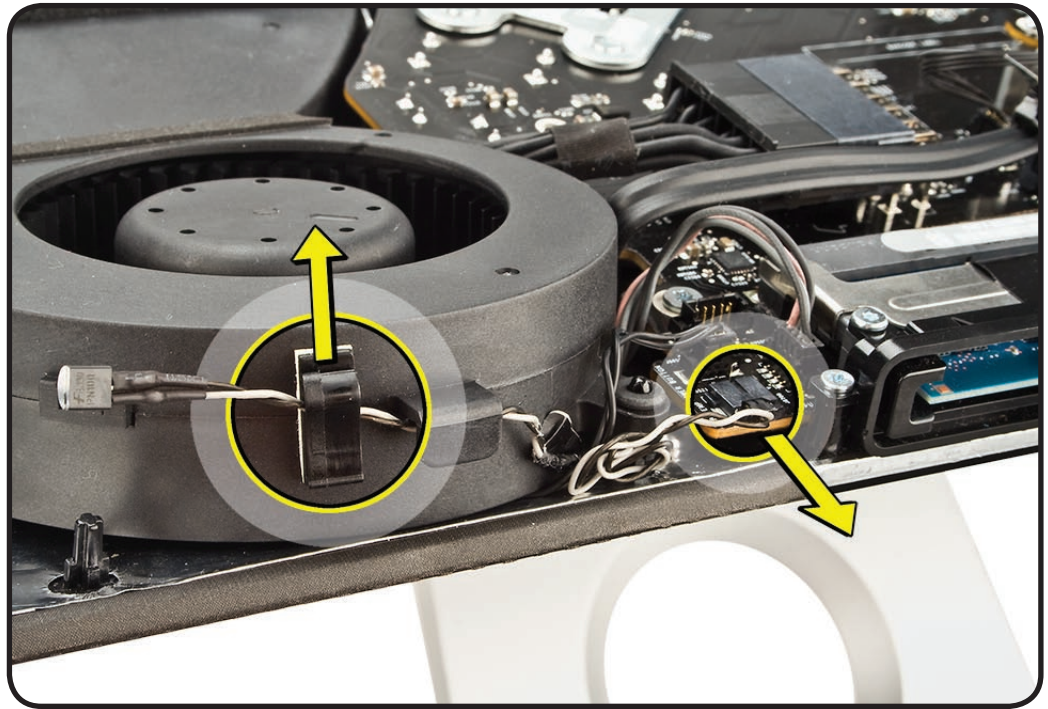
Note: Image at right shows a map of connectors on bottom left of logic board. Ambient temp sensor cable connects to the furthest left of the 4 connectors.

Power Button

CPU Fan

Ambient Temp

LCD Temp
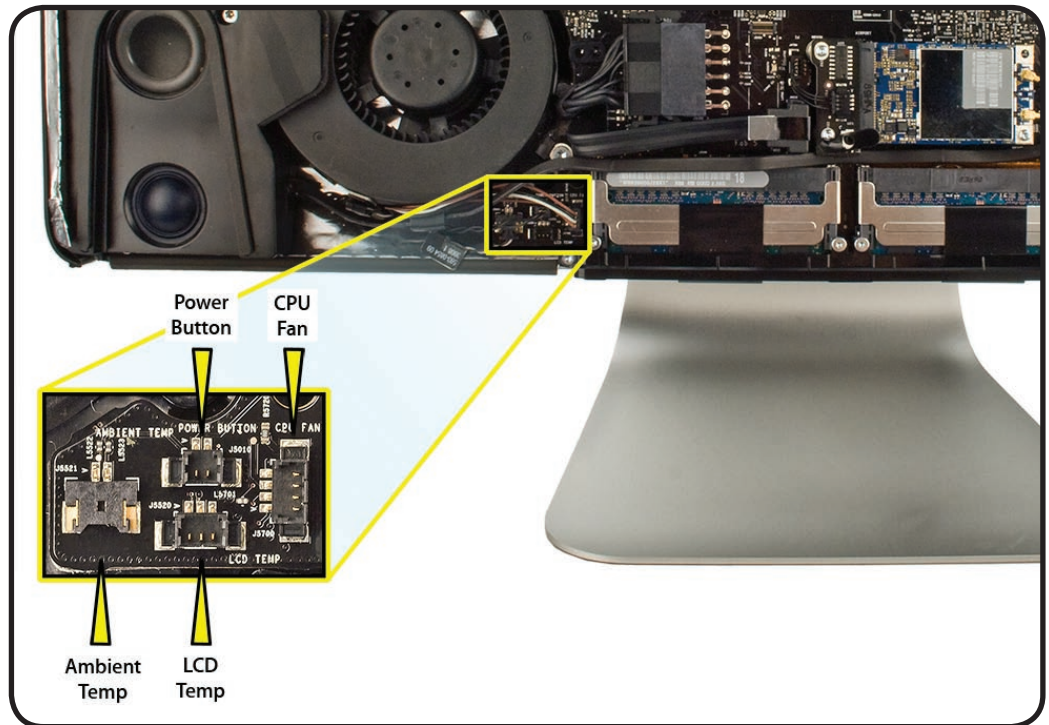
CPU Fan

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
- **Left Speaker**
- **Ambient Temp Sensor Cable**

Tools

- ESD wrist strap

Removal

1 Disconnect cable from logic board near memory slots.

2 Lift fan straight up and off 3 guideposts in rear housing.
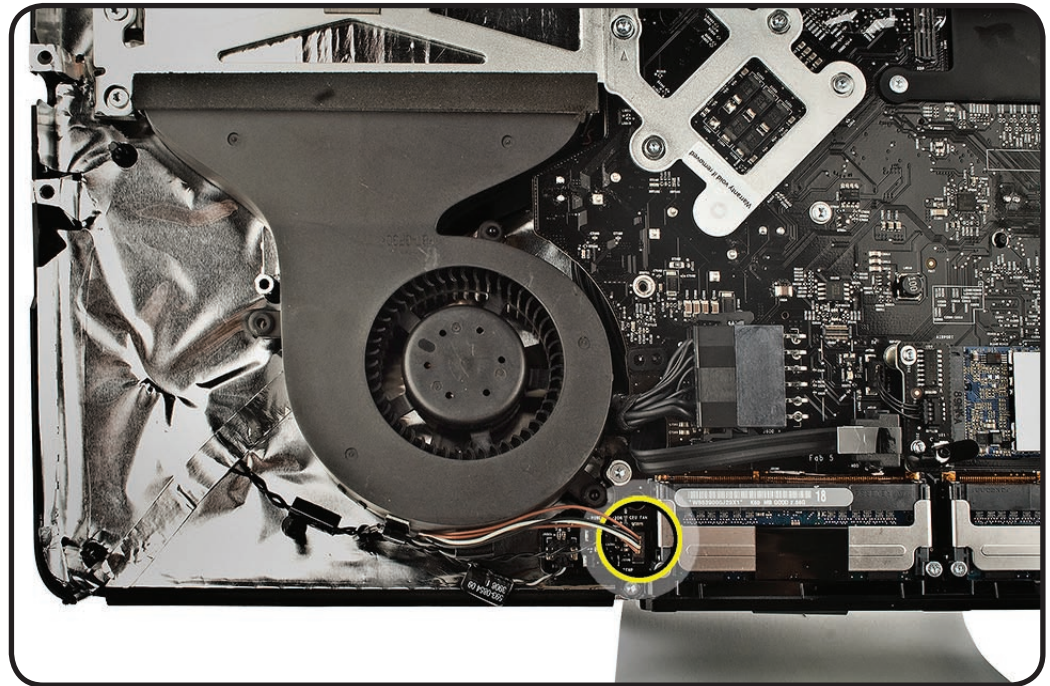
Note: Image at right shows a map of connectors on bottom left of logic board. CPU fan cable connects to the furthest right of the 4 connectors.
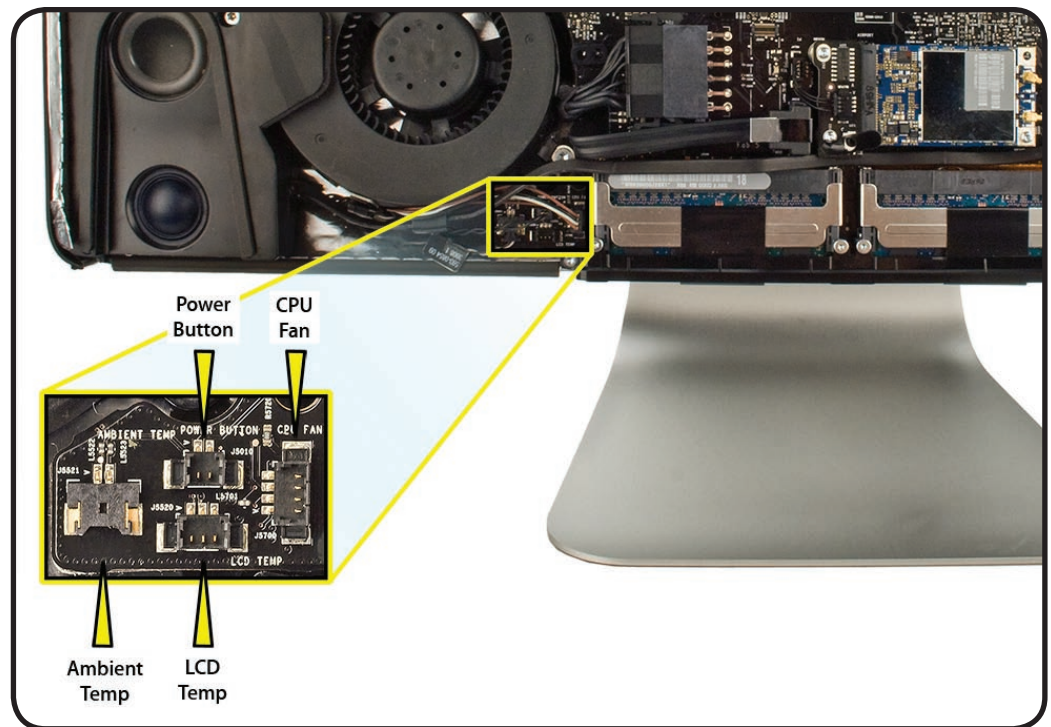
Right Speaker

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
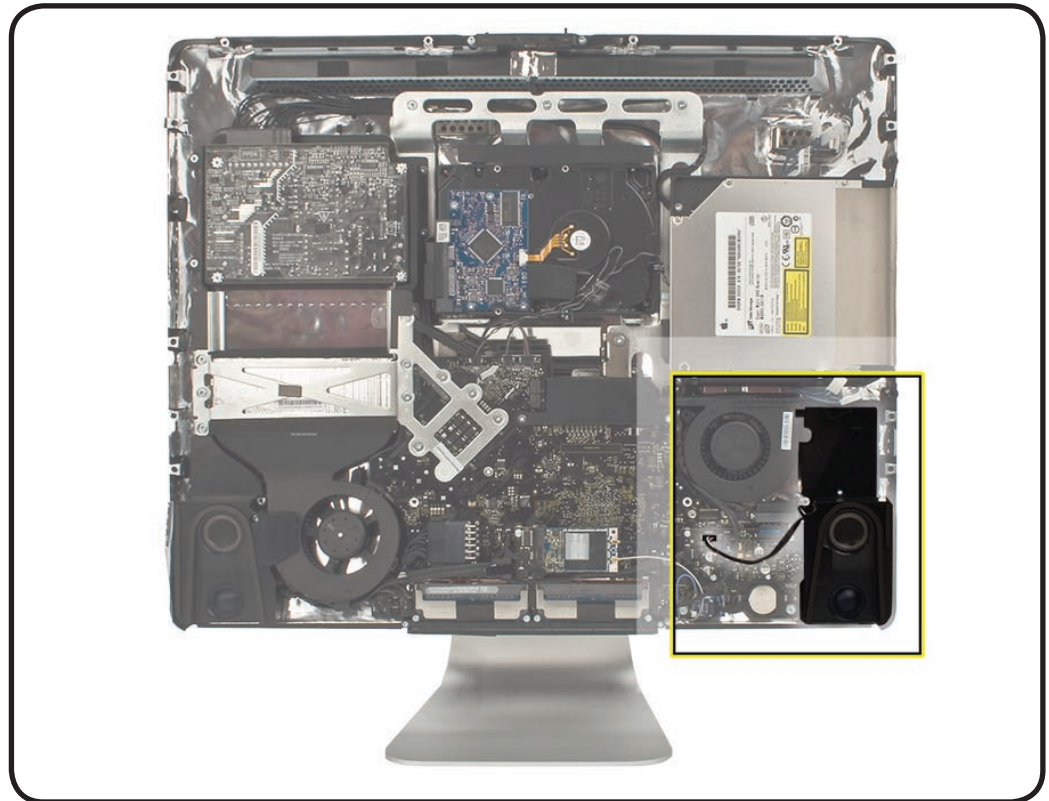
Tools

- ESD wrist strap
- Torx T10 screwdriver
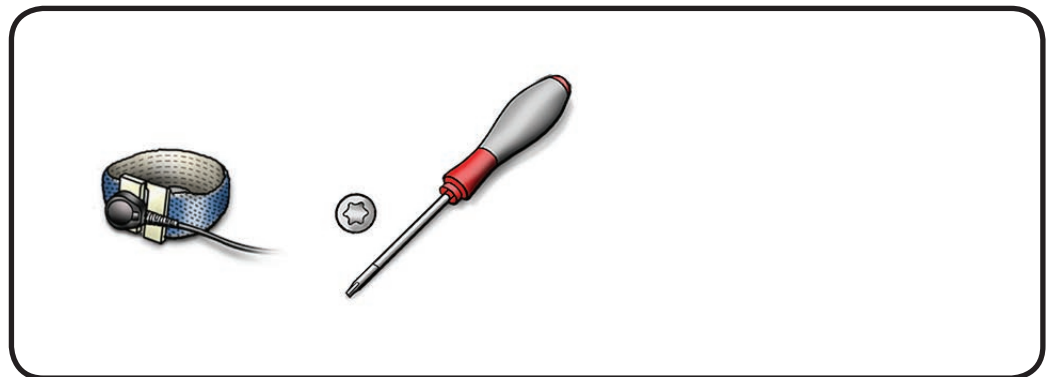
Removal

1 Remove T10 screw:
(1) 922-8208

2 Disconnect cable
from audio board.

3 Lift speaker up and
out of computer.
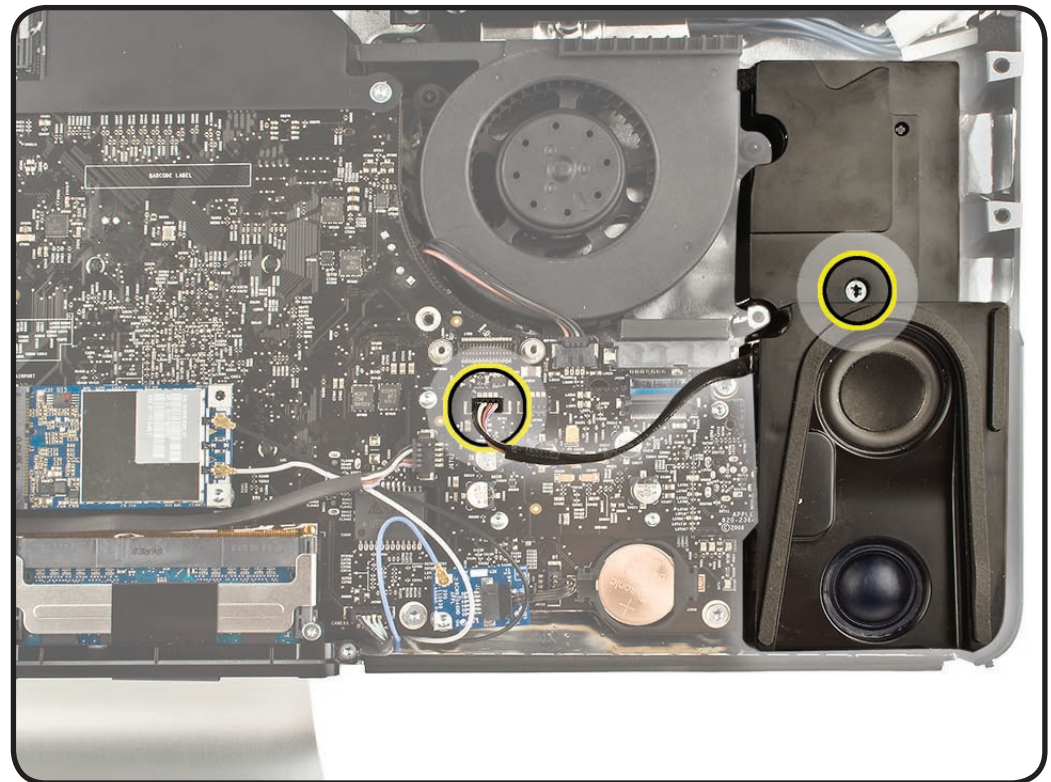
Audio Board

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
- **Right Speaker**

Tools

- ESD wrist strap
- Torx T6 screwdriver
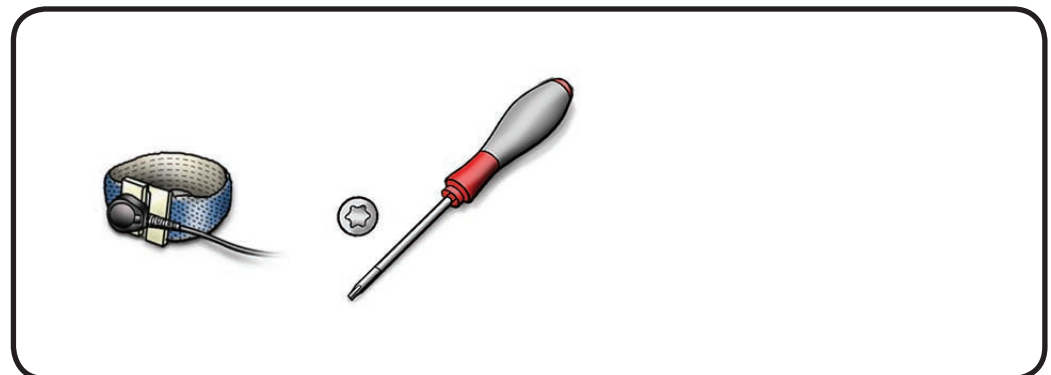
Removal

1 Disconnect 3 cables:
- left speaker (5-pin)
- microphone (3-pin)
- audio-to-logic board (922-8835)

Right speaker cable (4-pin) should have been previously disconnected.
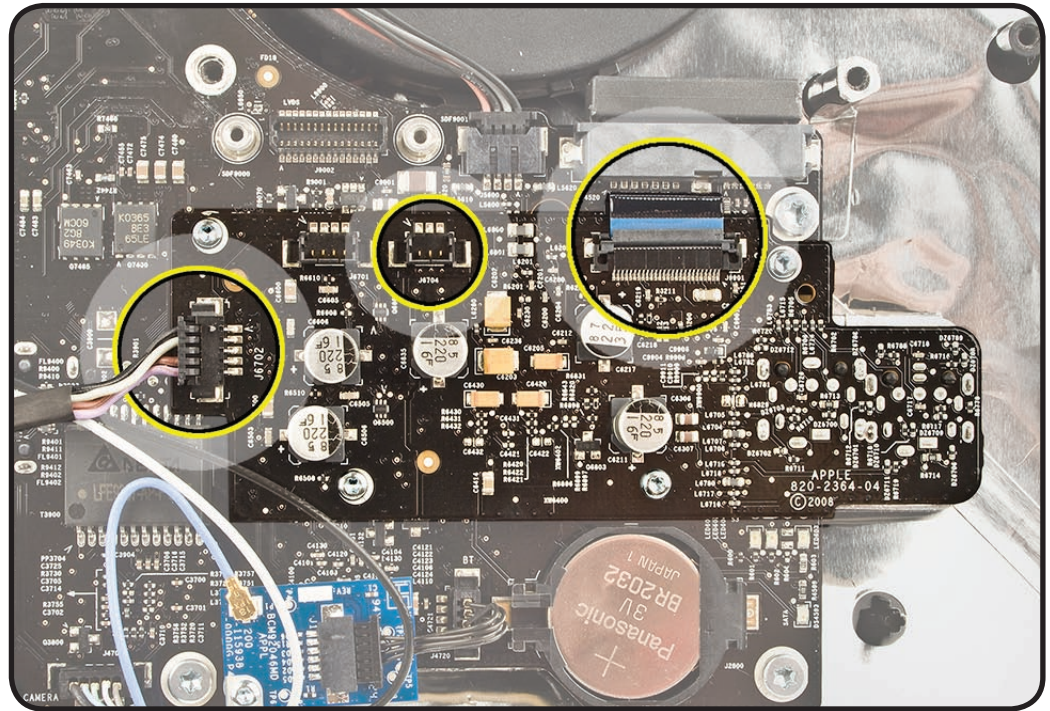
2 Remove T6 screws: (4) 922-8579
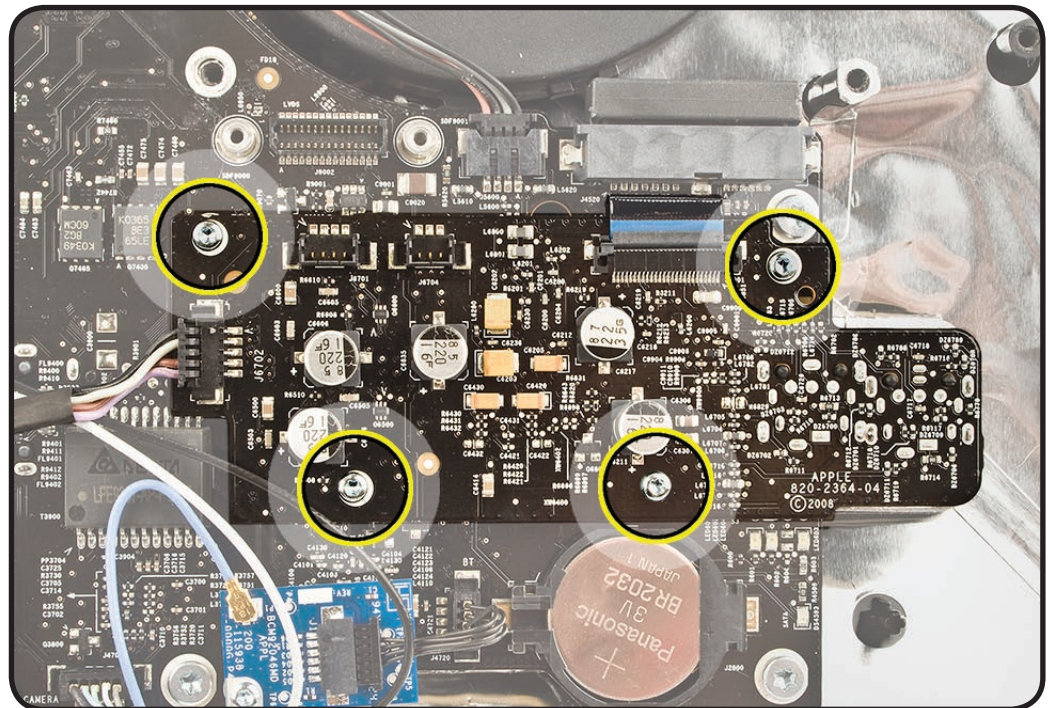
3 Remove EMI tape on back side of board.

4 Lift audio board off logic board.
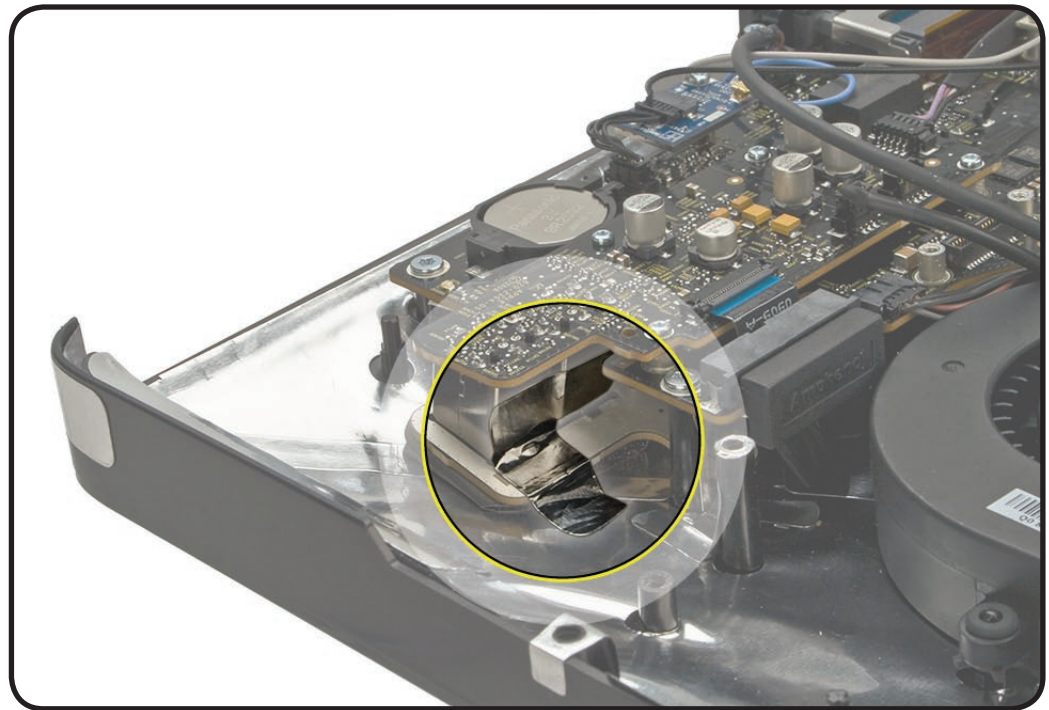
Logic Board

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
- **Right Speaker**

Note: The iMac (20-inch, Mid 2009) does not have an IR Board or Bluetooth Board.

Note: The audio board is part of the logic board. If returning logic board to Apple, make sure audio board is attached to old logic board.
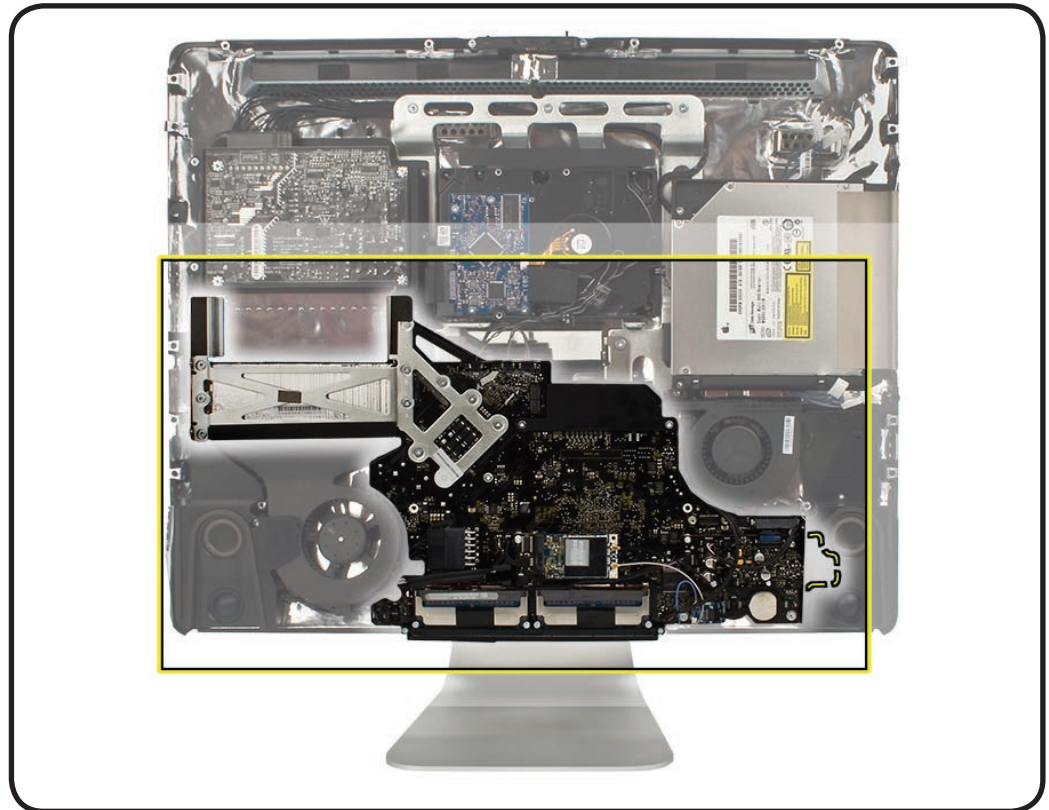
Tools

- ESD wrist strap
- Torx T8 screwdriver
- Torx T10 screwdriver
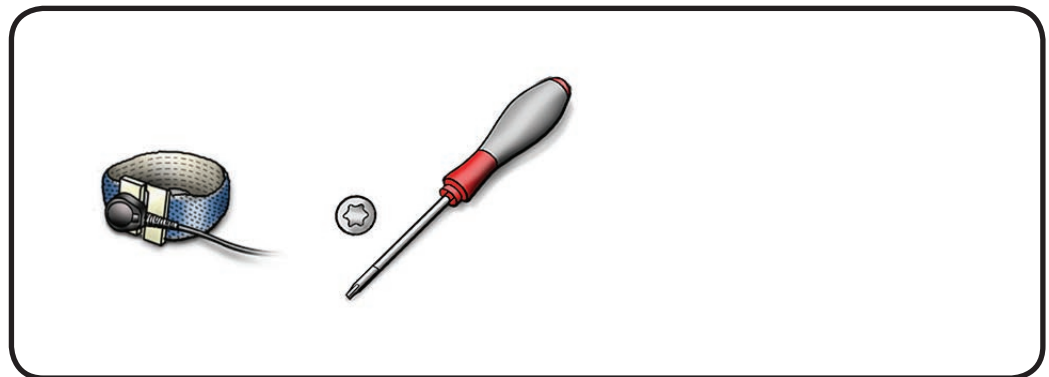
Removal

1 Disconnect 16 cables from logic board.

1. hard drive temp
2. optical drive temp
3. hard drive fan
4. ambient temp
5. power button
6. CPU fan
7. power
8. hard drive data
9. AirPort antenna
10. AirPort antenna
11. camera **(routes over, not under, the logic board.)**
12. Bluetooth antenna **(Early 2009 only)**
13. left speaker
14. microphone
15. optical drive fan
16. optical drive data
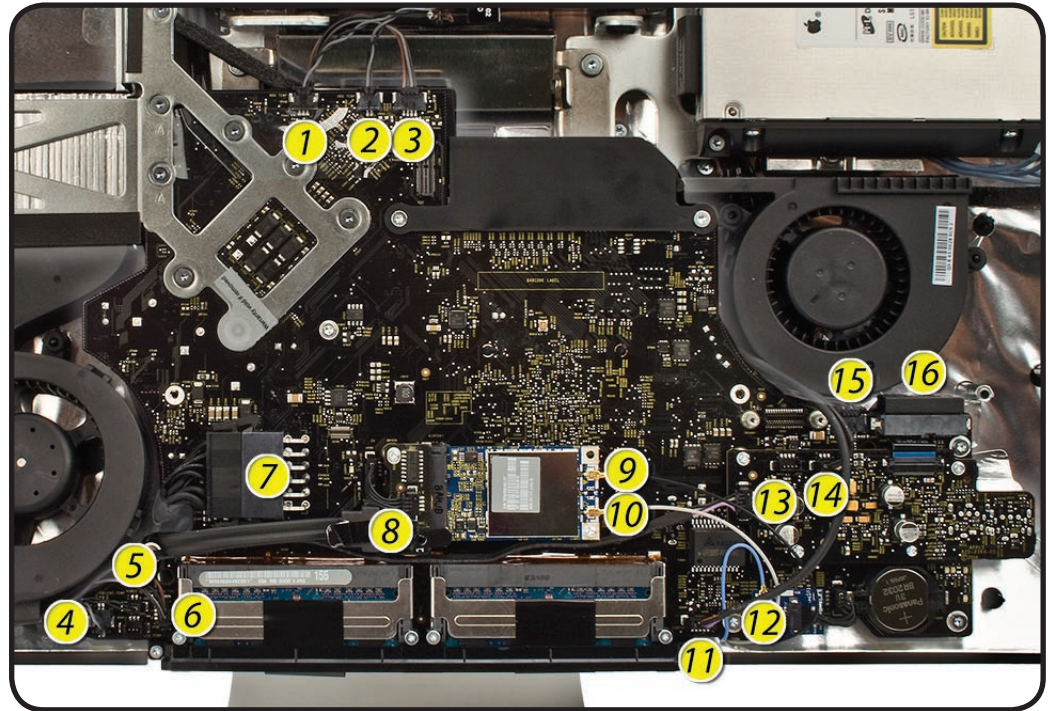
2 Remove T10 screws:

(6) 922-6800, self-tap

(3) 922-6842, machine, indicated by arrow in metal or plastic

(1) 922-8173, long

3 Remove T8 screws:

(2) 922-8175
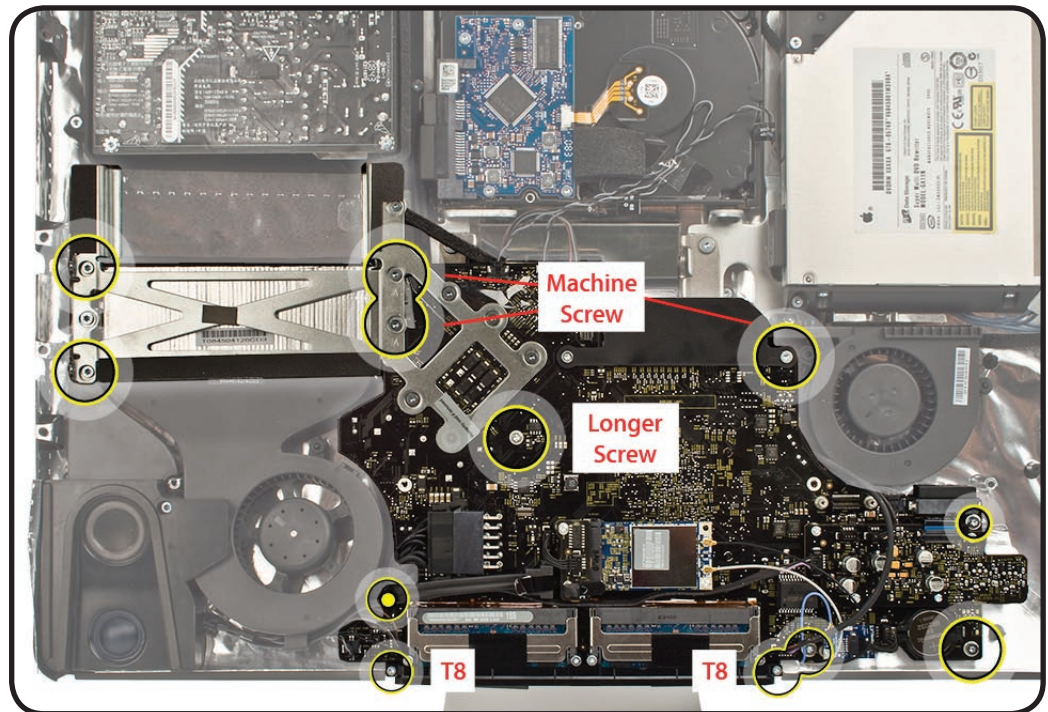
4 Lift logic board up and out of rear housing.

Important: Always handle logic board by edges of circuit board only. Never handle by heatsink or metal frame!
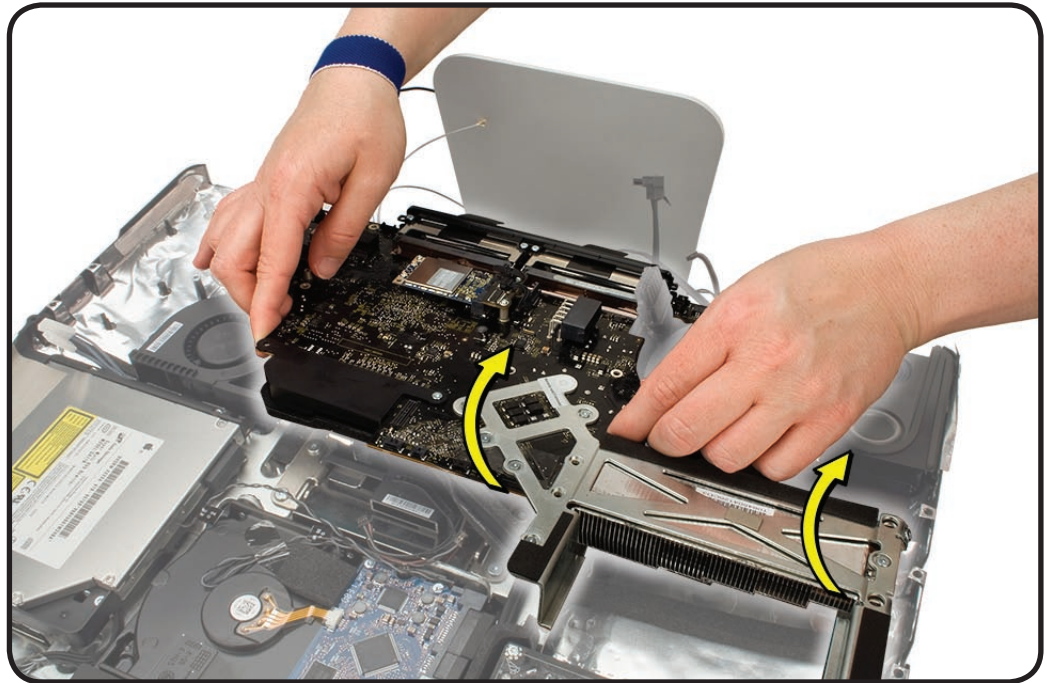
Reassembly

If you removed logic board to access another module, reassembly is an exact reversal of the steps.

If installing a new replacement logic board, note 4 things:

1 Verify that tamper indicator labels on front and back of heatsink assembly are intact. If labels have been removed or tampered with, the logic board is not eligible for exchange.
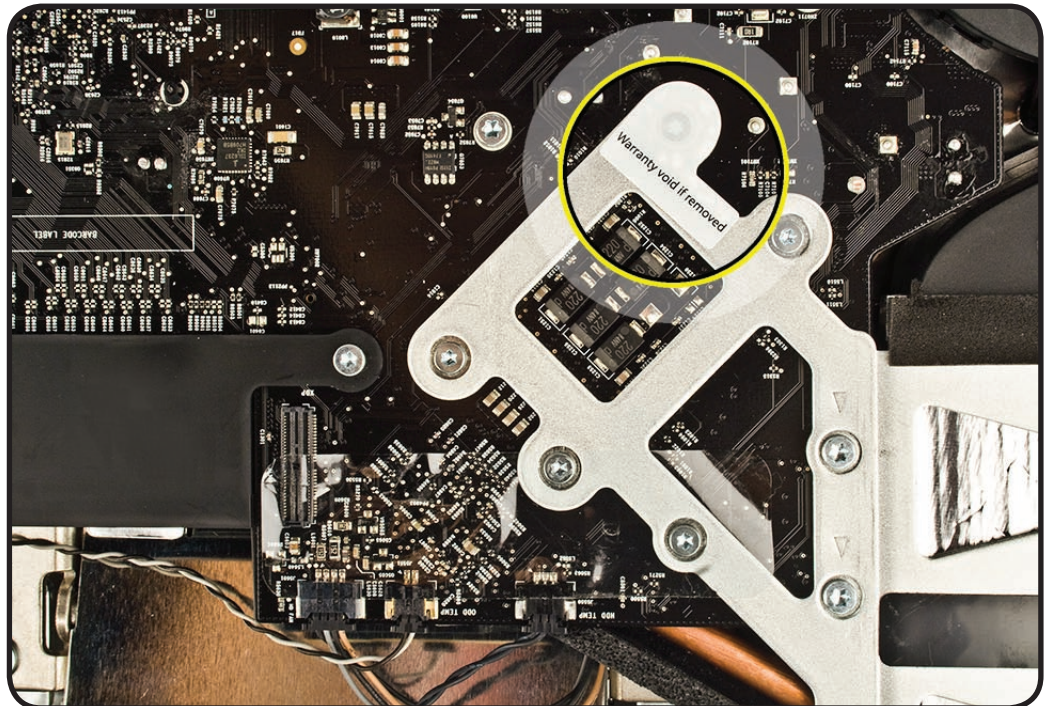
2 Transfer the following items from old logic board to new logic board:

- **memory** DIMMs
- **AirPort card**

For the Early 2009 model, also transfer:

- **Bluetooth board** and cable
- **IR board** and cable
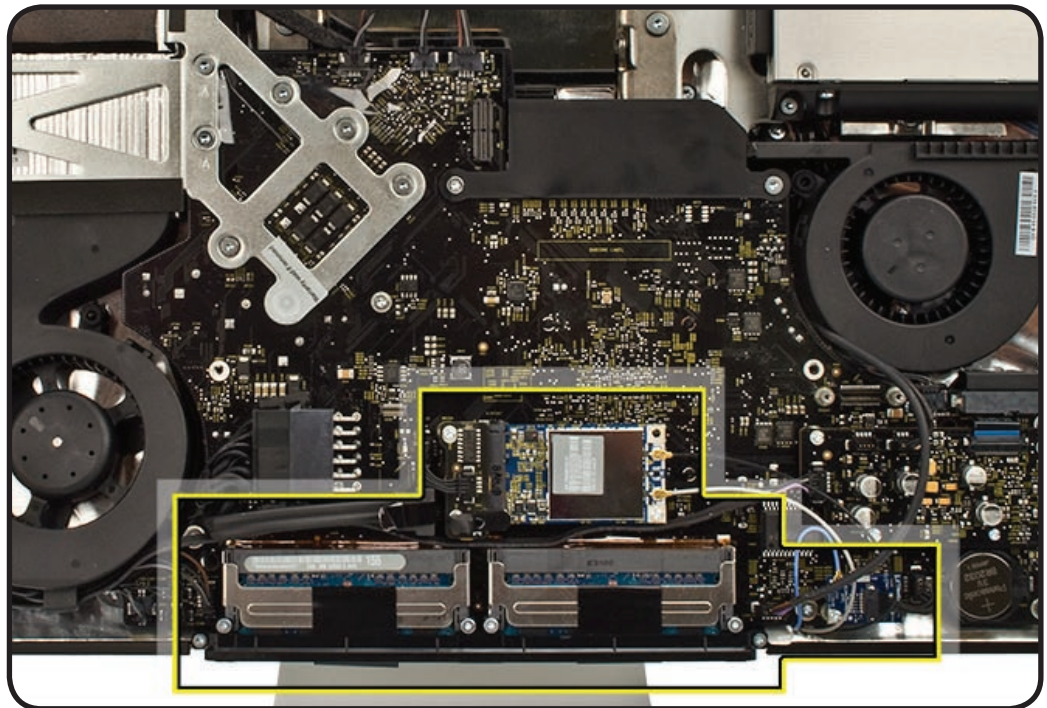
3 Replace 2 pieces of EMI tape onto I/O ports and rear housing as shown. The EMI tape is included in the box with a new logic board.

4 **Important:** Make sure to return old logic board with audio board attached.
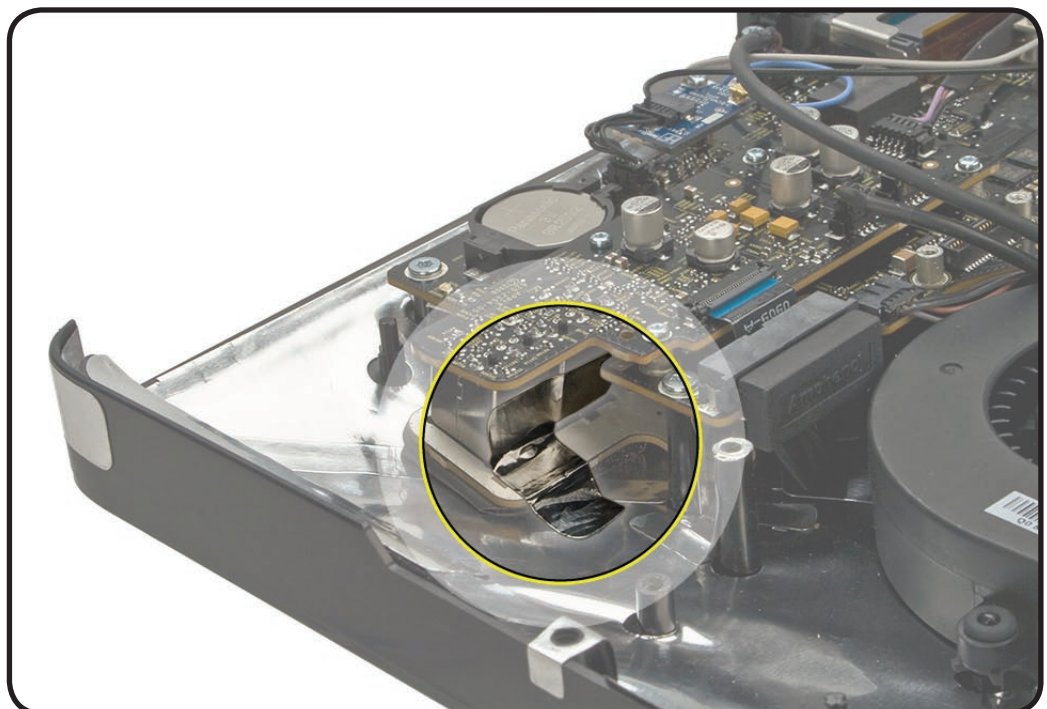
Handling Logic Boards

1 **IMPORTANT:** Always use 2 hands to support logic board and heatsink. Handling board incorrectly could flex board and damage chips and circuits.
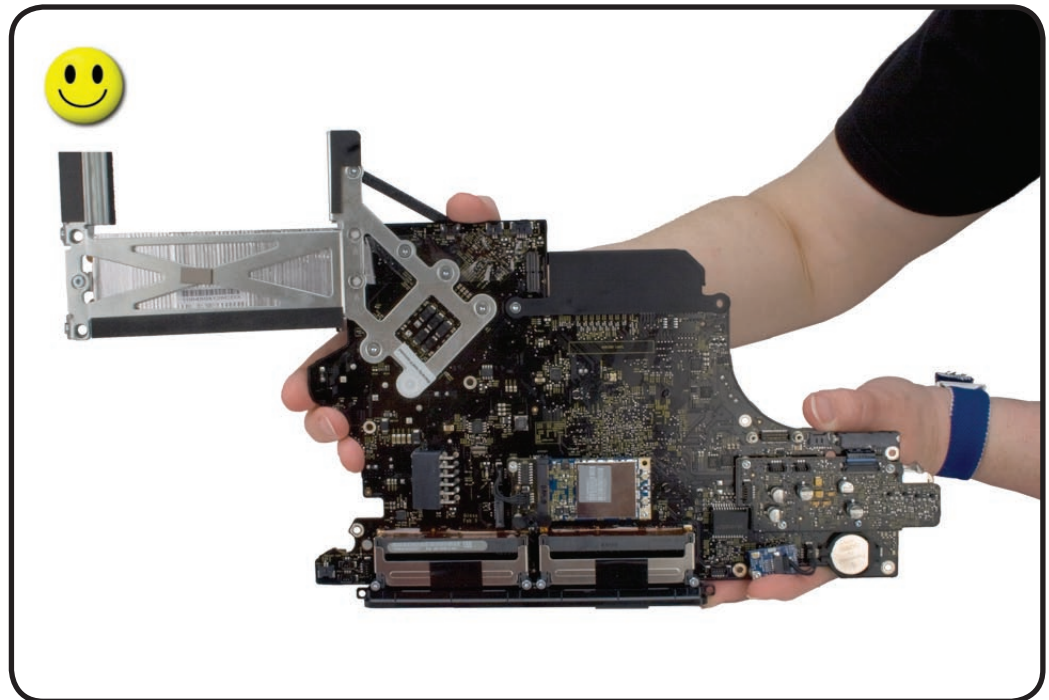
2 **Never** handle board by heatsink.
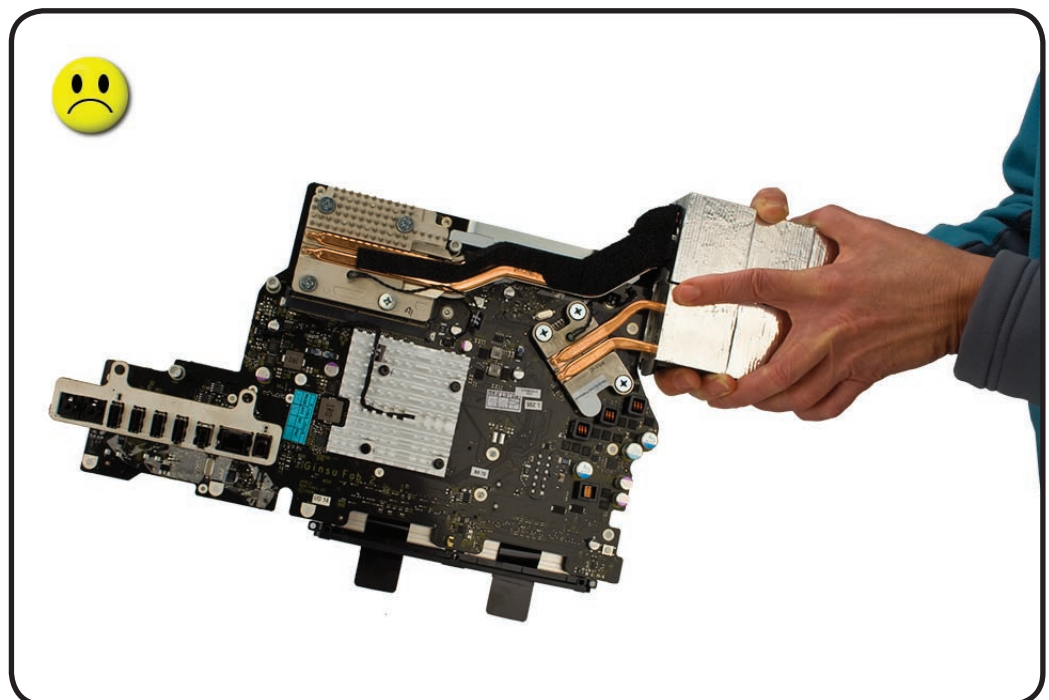
Hard Drive Fan

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
- **Right Speaker**
- **Logic Board**
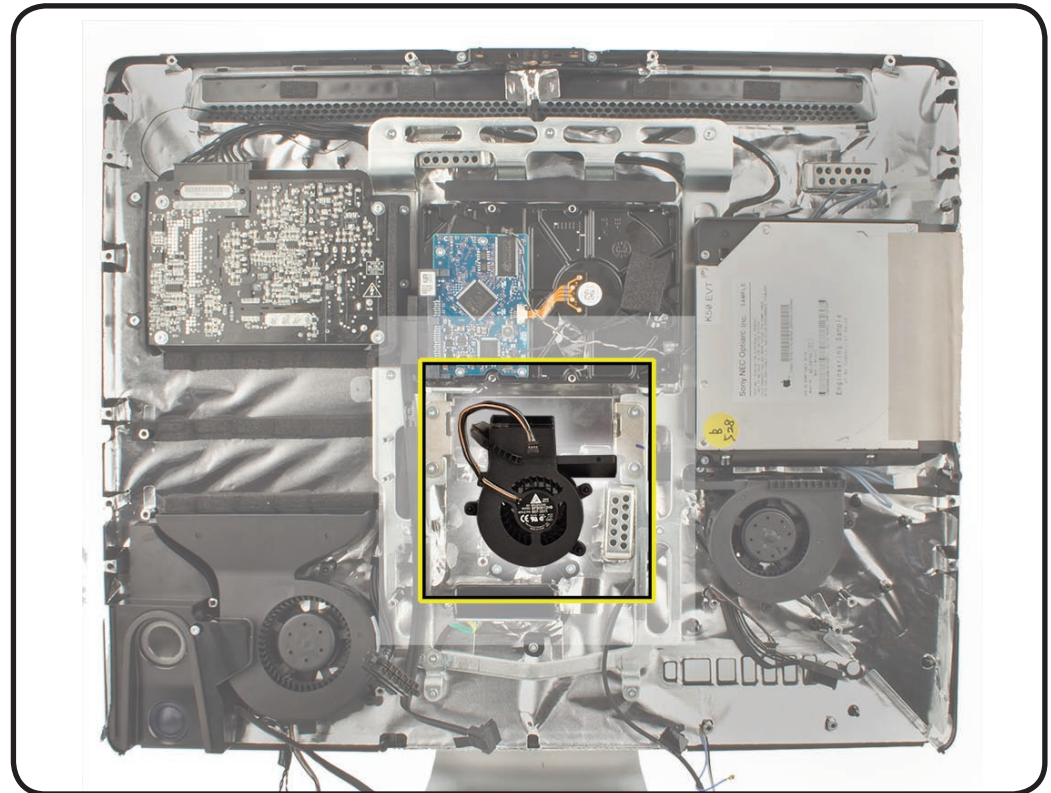
Tools

- ESD wrist strap

Removal

1 Lift fan straight up and off the 3 guideposts.
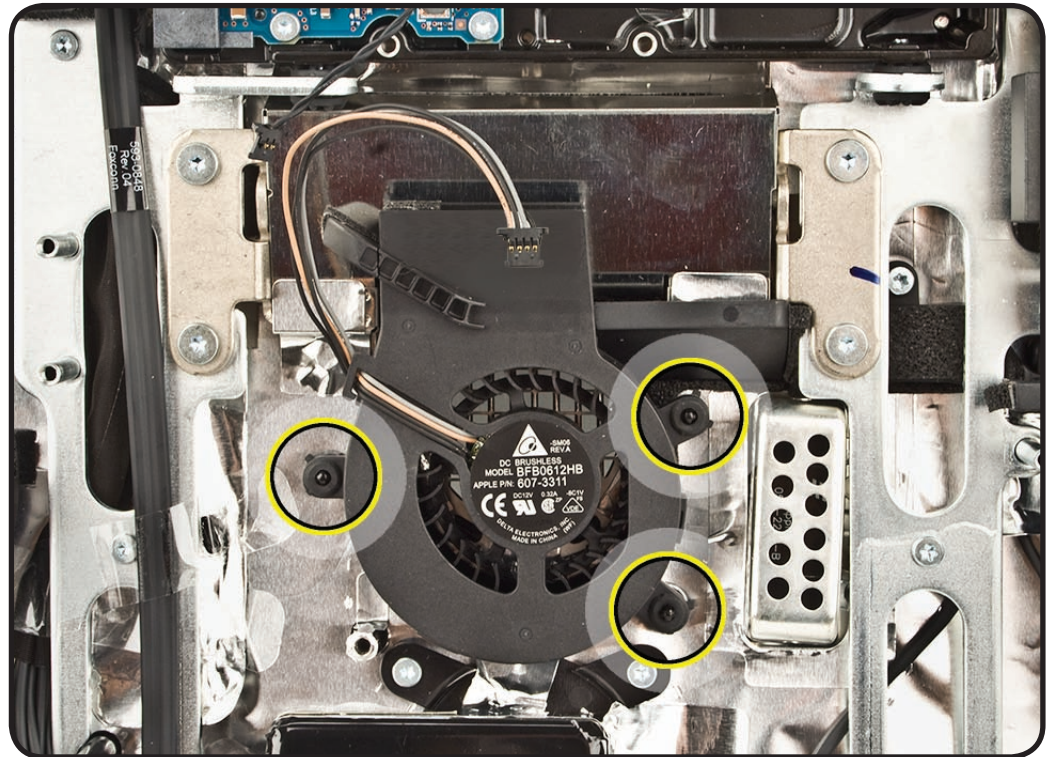
Note: Image at right shows a map of connectors on top of logic board. Hard drive fan cable connects to the furthest right of the 3 connectors.

Hard drive sensor has a 3-pin connector. Optical drive sensor has a 2-pin connector. Hard drive fan has a 4-pin connector.

HDD Temp   ODD Temp   HD Fan
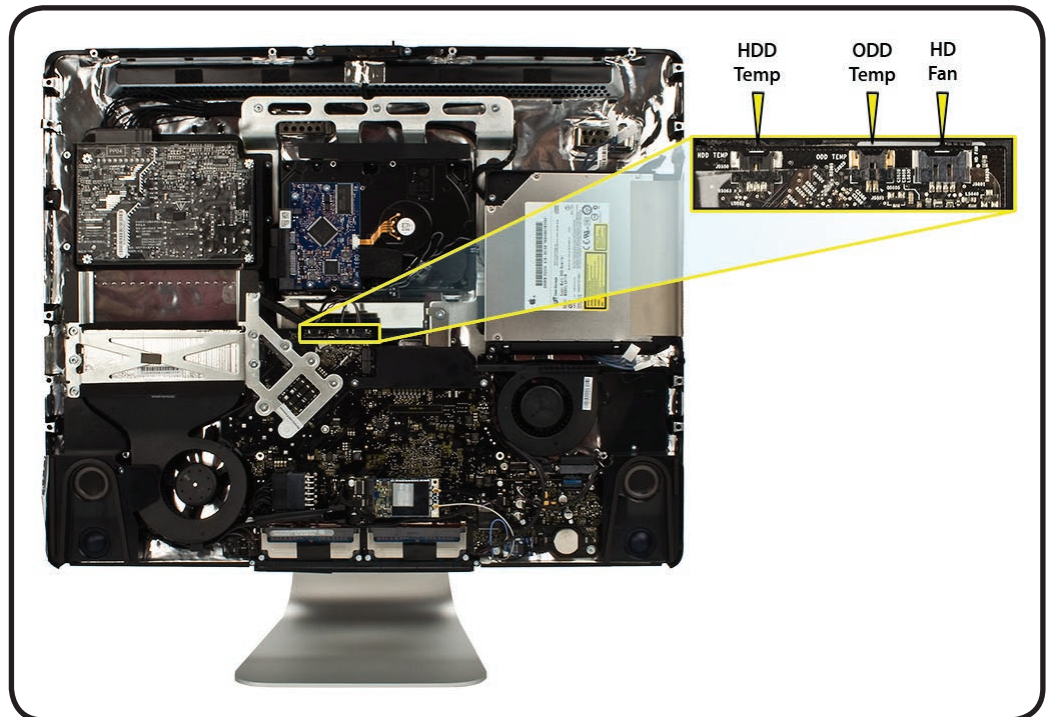
Hard Drive Data Cable

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
- **Right Speaker**
- **Hard Drive**
- **Logic Board**

Removal

1 Remove clear tape securing cable to chassis.

2 Lift cable out of computer.
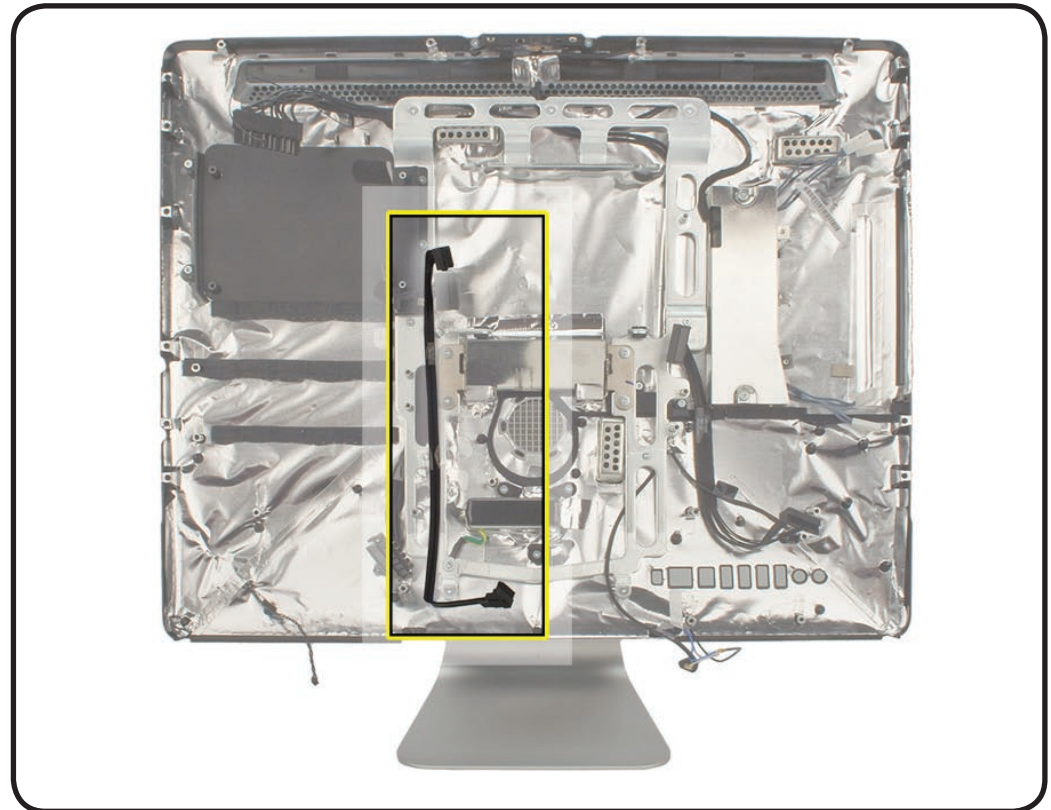
Mechanism Cover

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
- **Right Speaker**
- **Logic Board**
- **Hard Drive**
- **Hard Drive Fan**
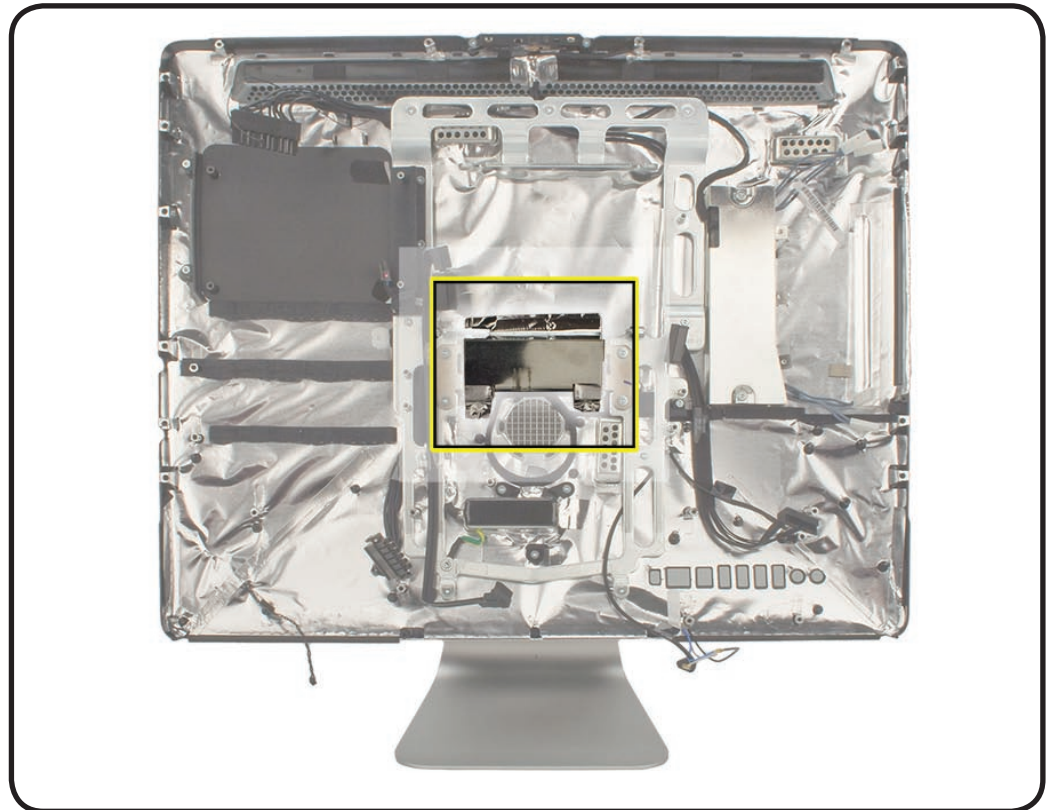
Removal

1. Peel up EMI tape from top and bottom of mechanism cover.

2. Lift cover off mechanism.

.
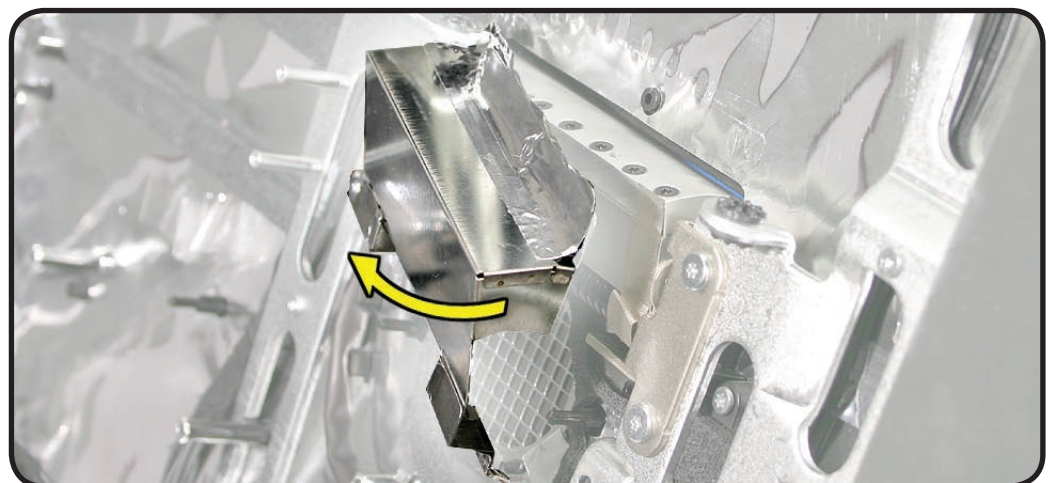
Stand

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
- **Right Speaker**
- **Logic Board**
- **Hard Drive**
- **Hard Drive Fan**
- **Mechanism Cover**

Tools

- ESD wrist strap
- Torx T10 screwdriver
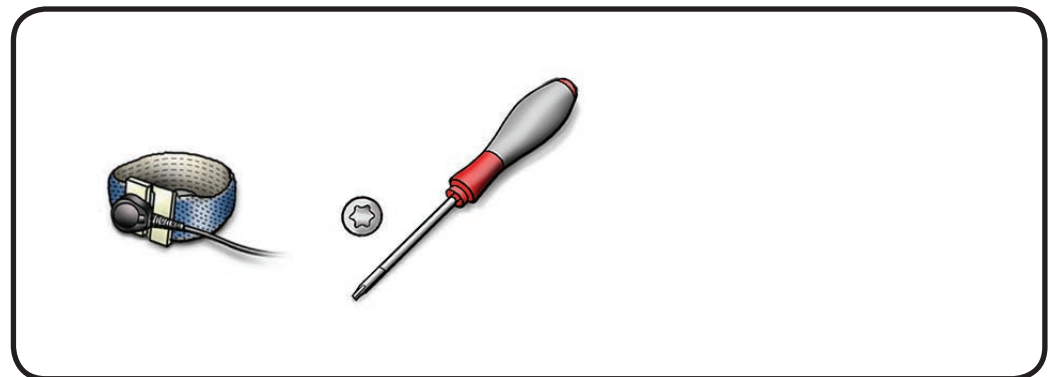
Removal

1 Remove T10 screws:
(7) 922-8209
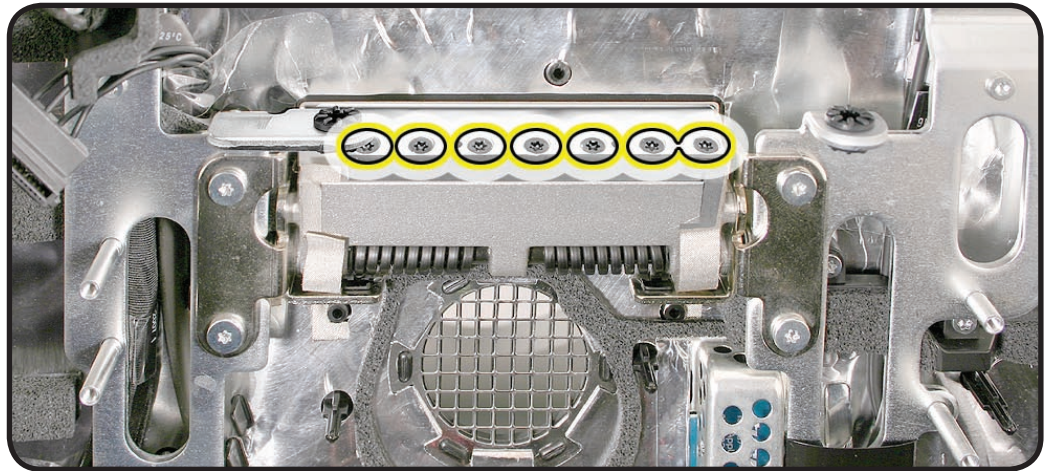
2 Lift stand off 2 pins on
mechanism.

3 Carefully separate
stand from mechanism
and rear housing.
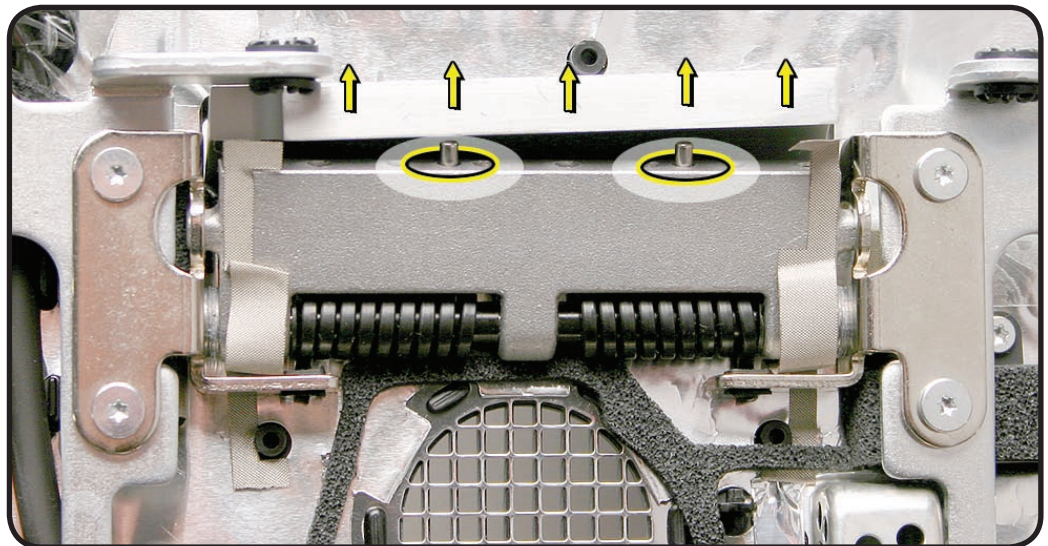
Replacement Note:
If installing a new
replacement stand,
transfer U-shaped black
plastic piece with serial
number to new stand.

Mechanism

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
- **Right Speaker**
- **Logic Board**
- **Hard Drive**
- **Hard Drive Fan**
- **Mechanism Cover**
- **Stand**
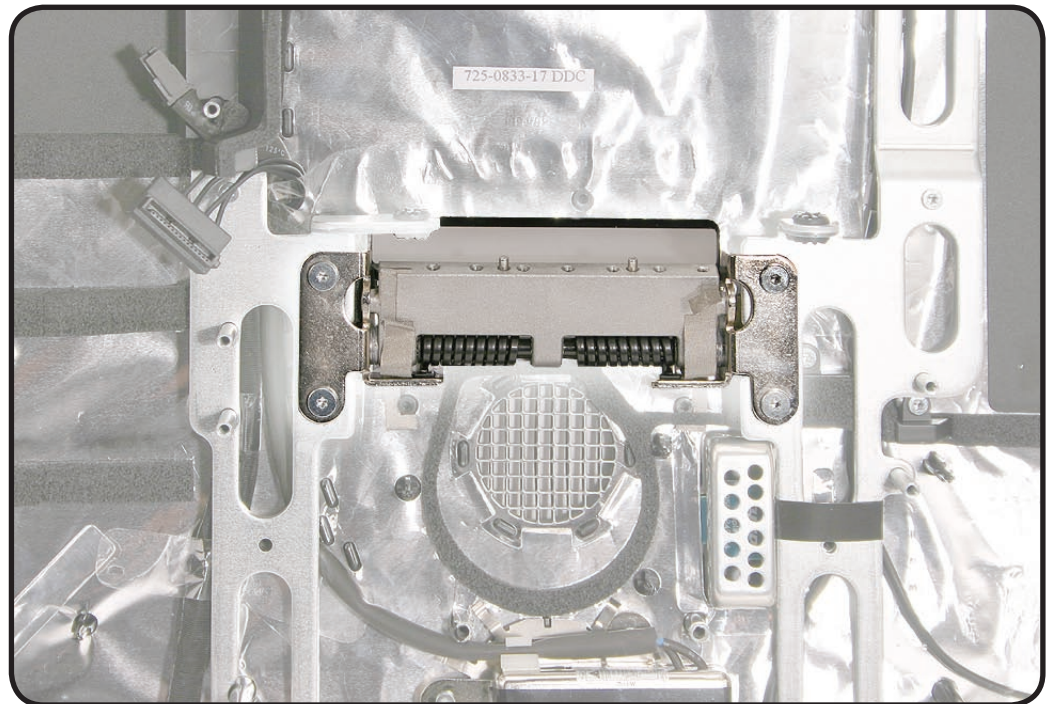
Tools

- ESD wrist strap
- Torx T10 screwdriver
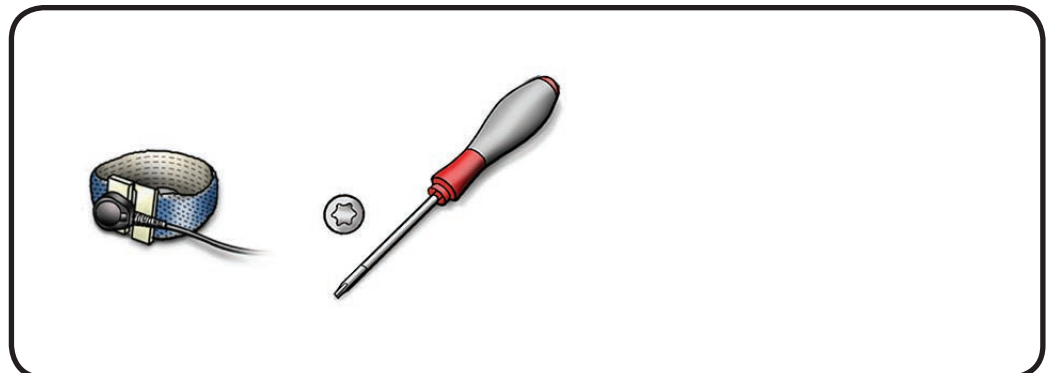
Removal

1 Remove T10 screws:
(4) 922-8849
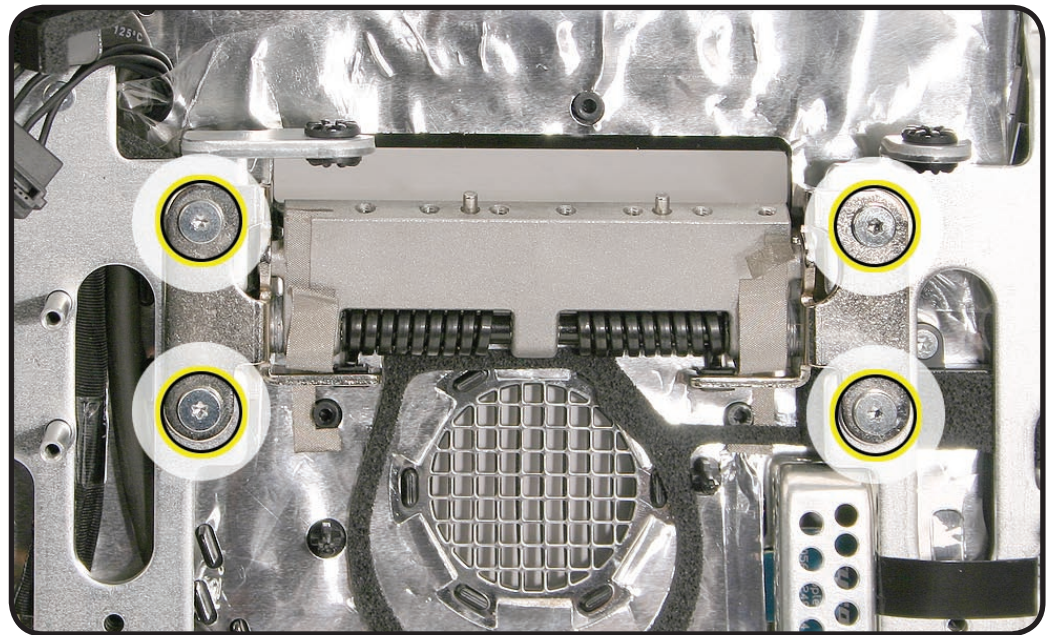
2 Peel back EMI mesh tape on mechanism.

3 Lift mechanism off chassis.
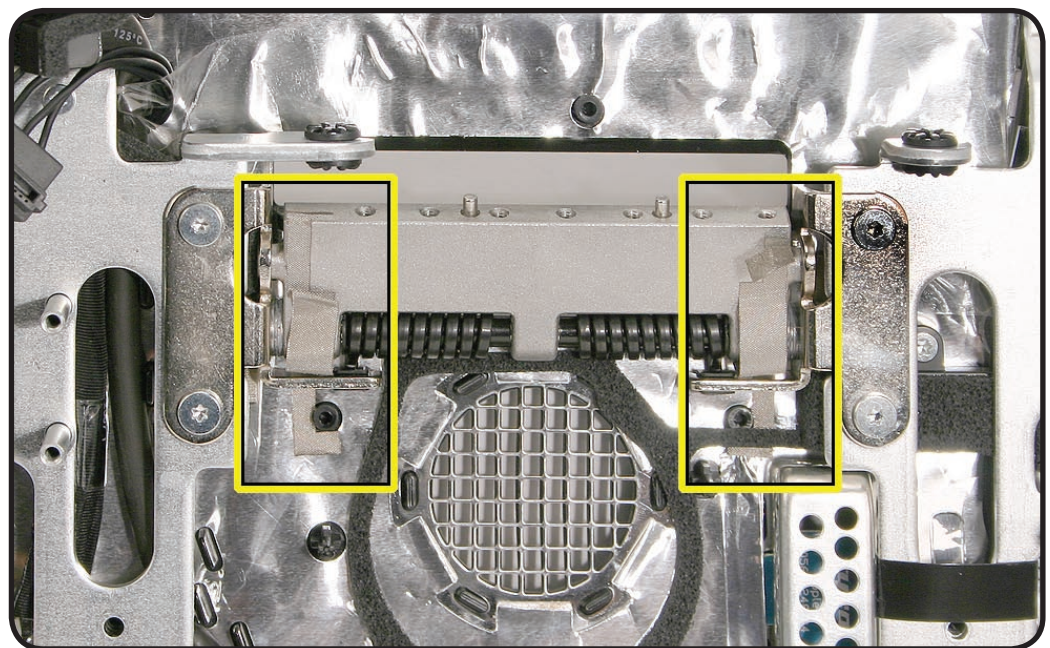
Chassis

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
- **Right Speaker**
- **Logic Board**
- **Power Supply**
- **Hard Drive**
- **Hard Drive Fan**
- **Hard Drive Data Cable**
- **Optical Drive**
- **Optical Drive Fan**
- **Mechanism Cover**
- **Stand**

Tools

- ESD wrist strap
- Torx T10 screwdriver
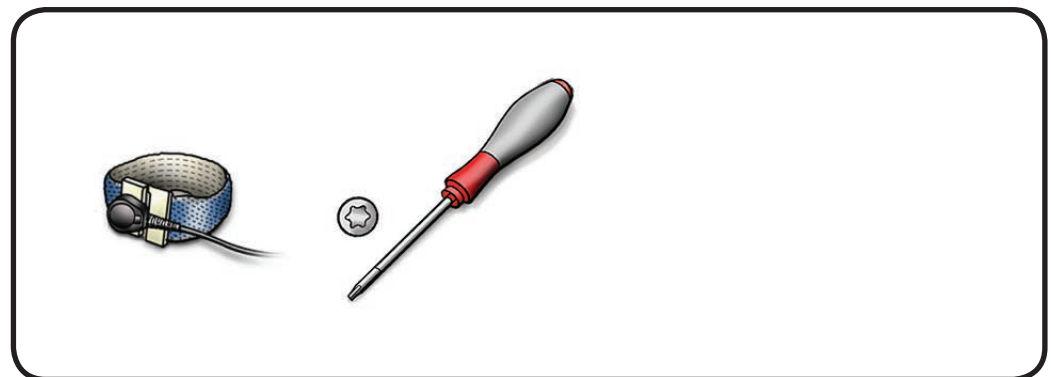
Removal

1 Slide AC connector out from under the pressure wall. The pressure wall does not need to be removed.
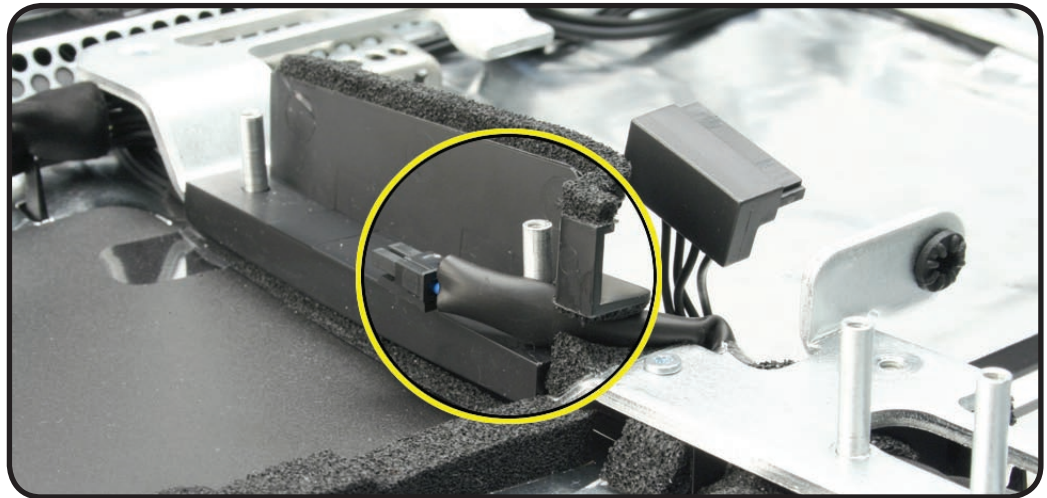
2 Remove T10 screws: (3) 922-8250, at top; slightly longer, slightly larger head

(6) 922-6850

(1) 922-7069, ground

Reassembly Note: Secure green/yellow grounding cable from AC inlet to chassis with short, stubby ground screw.

Longer Screw

Ground Screw
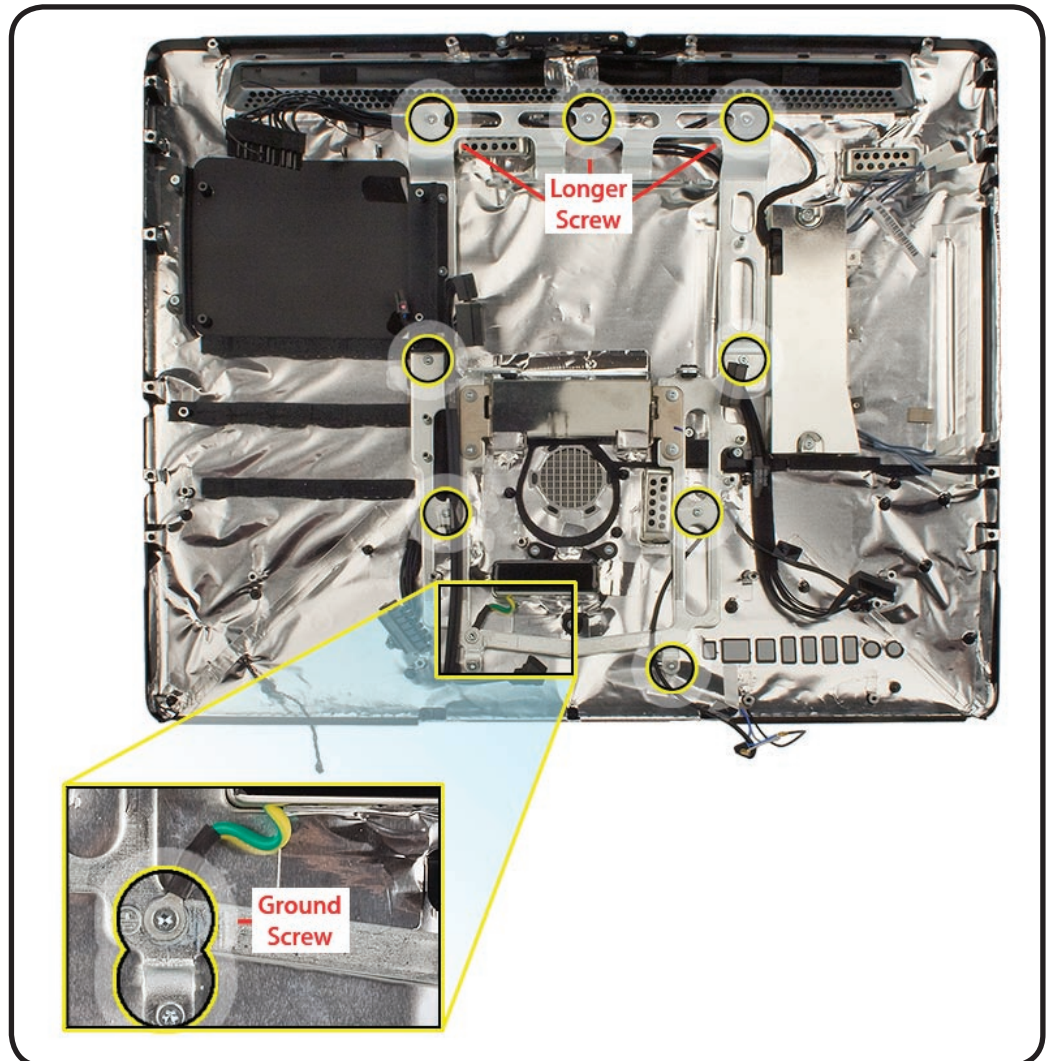
3 If mechanism is still installed, peel back EMI mesh tape on mechanism attached to rear housing.

Note: Mechanism can stay attached to chassis if you removed them to get to lower modules.

4 Lift chassis out of rear housing.
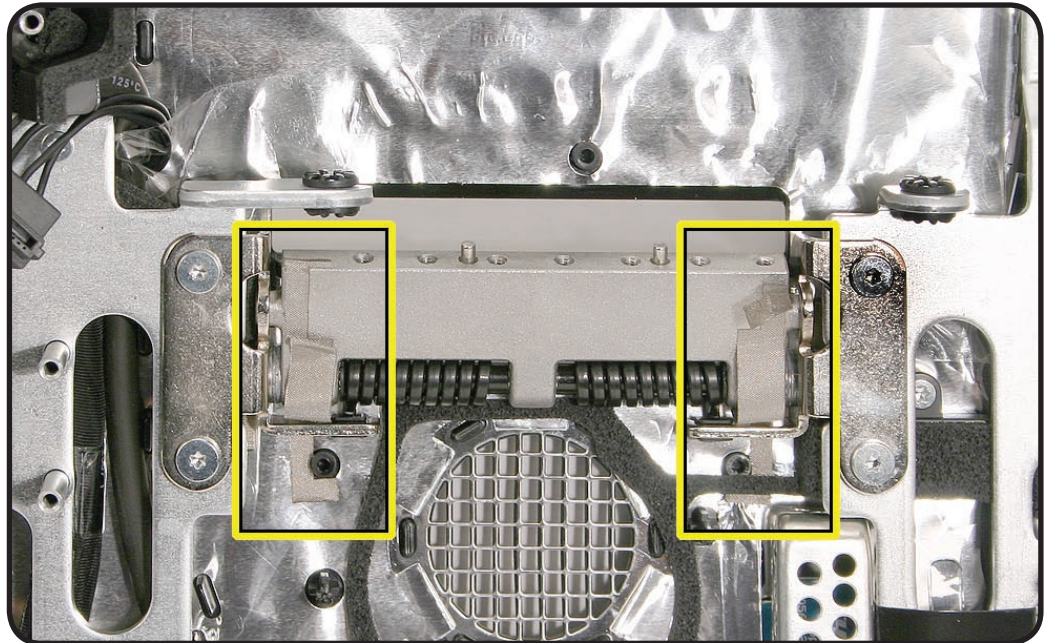
Reassembly

Reassembly is an exact reversal of the steps, with two notes:

1 Make sure the DC power supply/ SATA/ inverter cable is properly routed in rear housing before replacing chassis. Position cable between black tabs on rear housing.

2 Be careful not to pinch camera or microphone cables when reinstalling chassis.
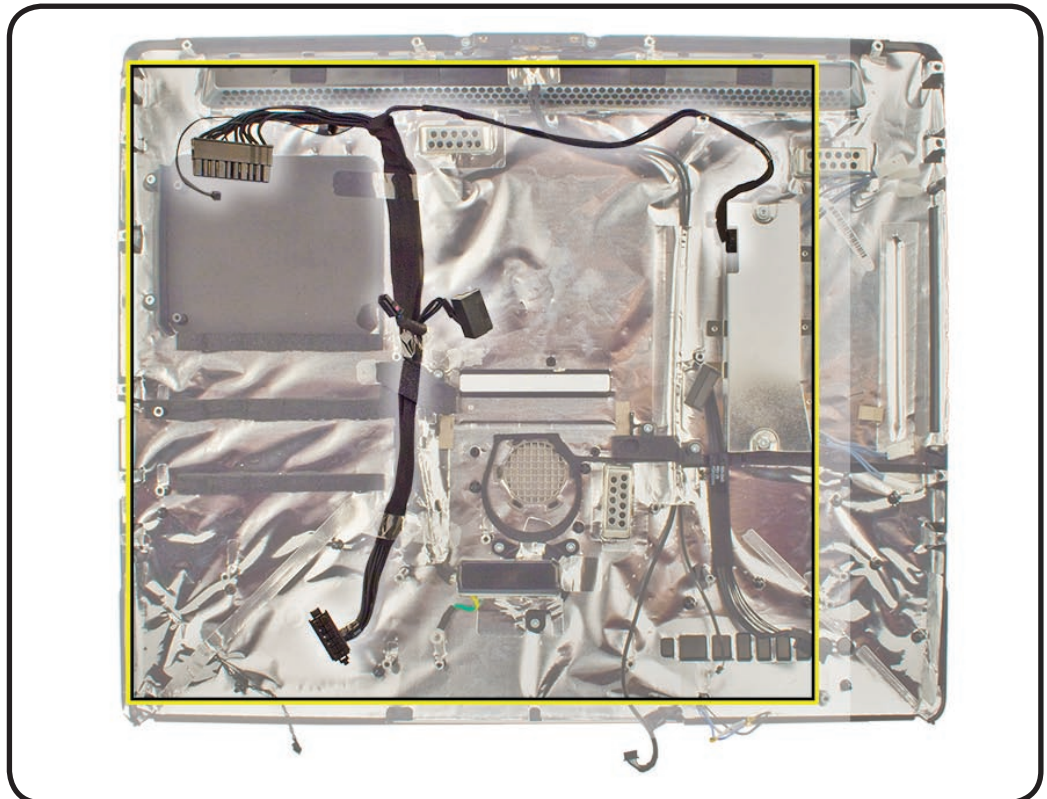
Cable, DC, Power Supply/SATA/Inverter

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
- **Right Speaker**
- **Logic Board**
- **Power Supply**
- **Hard Drive**
- **Hard Drive Fan**
- **Hard Drive Data Cable**
- **Optical Drive**
- **Optical Drive Fan**
- **Mechanism Cover**
- **Stand**
- **Chassis**
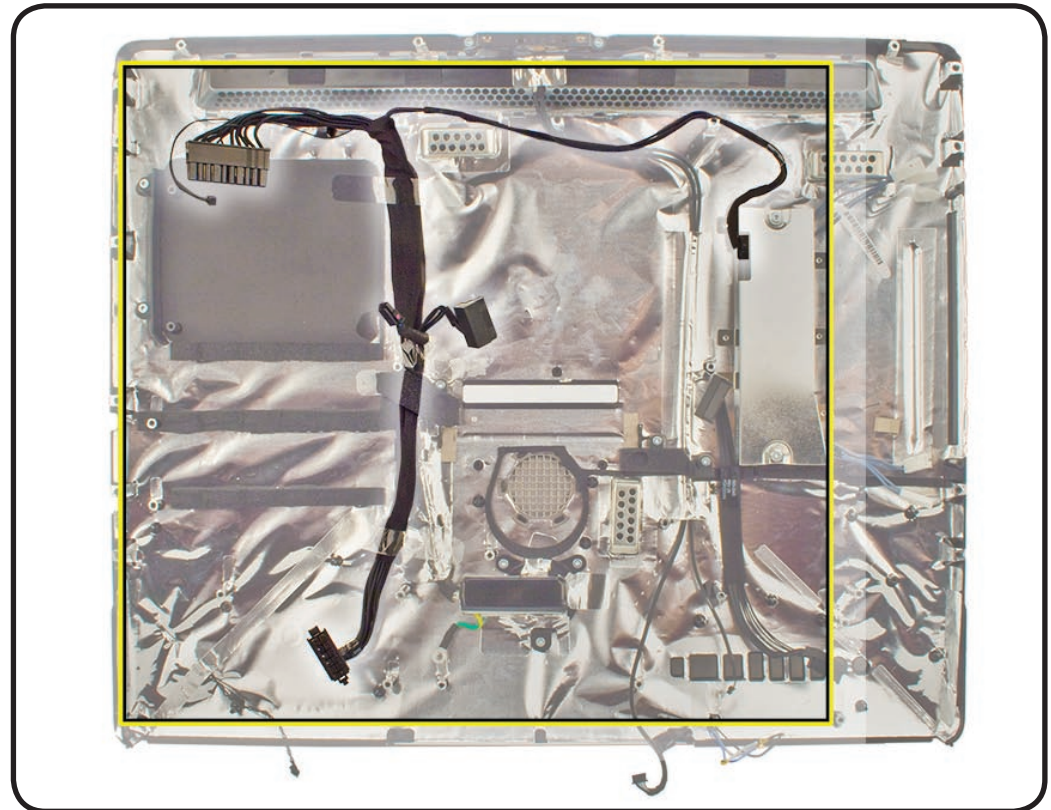
Tools

- ESD wrist strap
- Torx T10 screwdriver
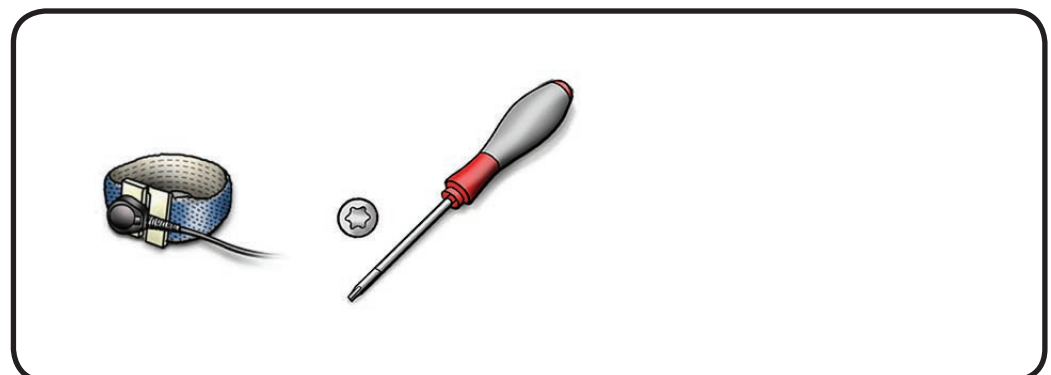
Removal

1 Tape microphone cable to top of rear housing, to keep it out of the way
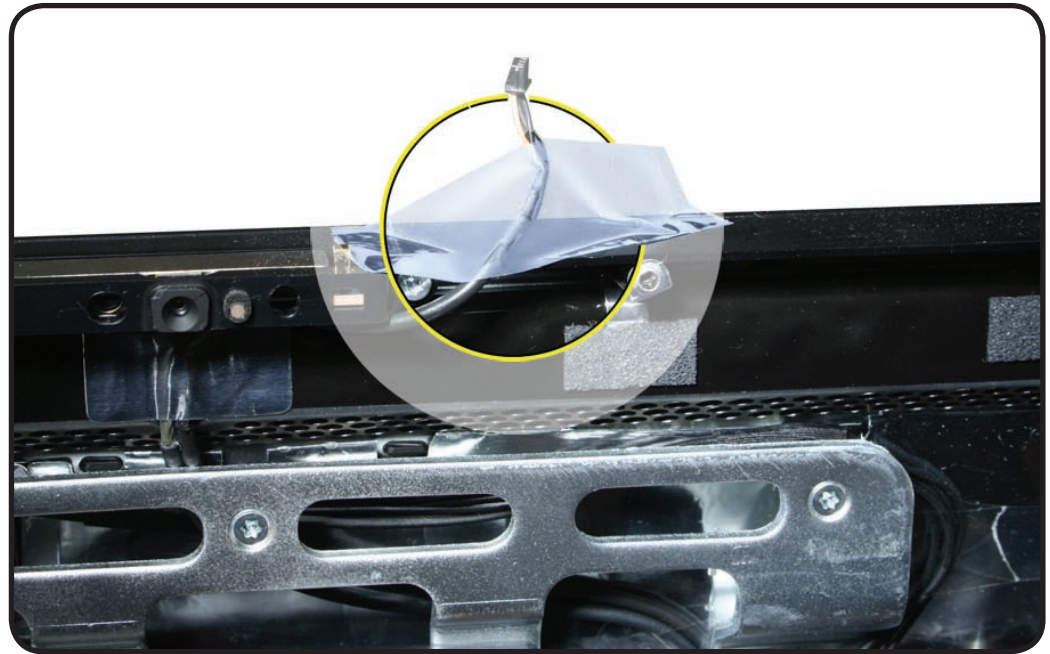
2 Disconnect inverter cable.
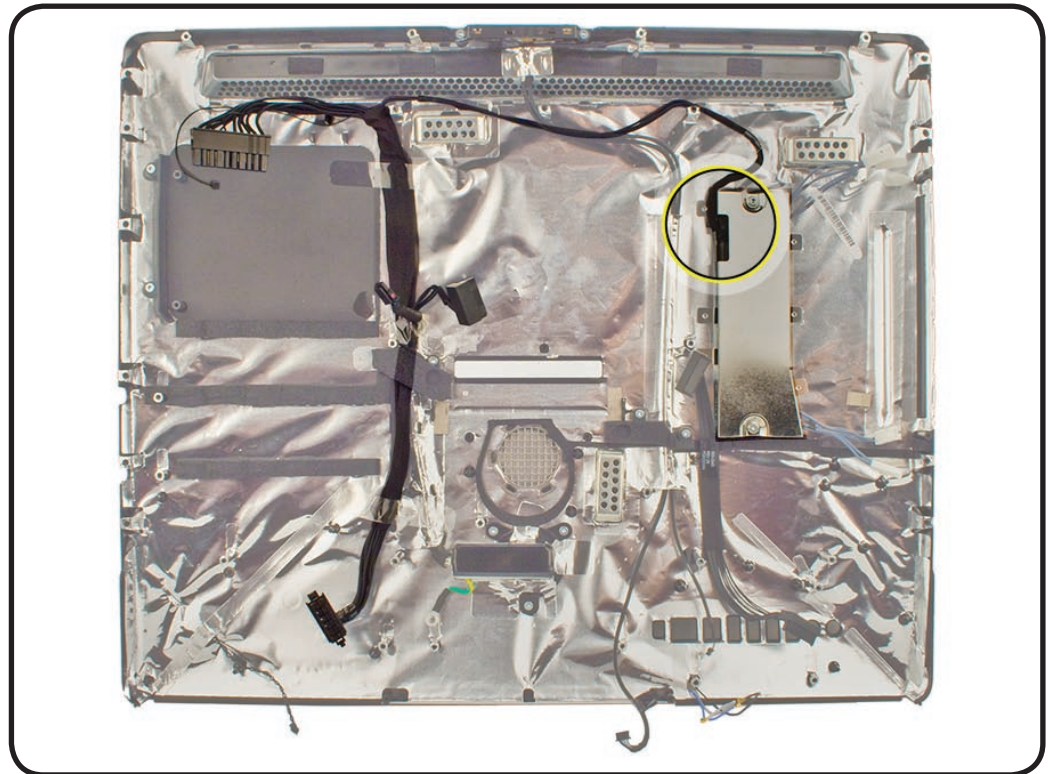
3 Remove clear Kapton tape securing DC power cable to rear housing.
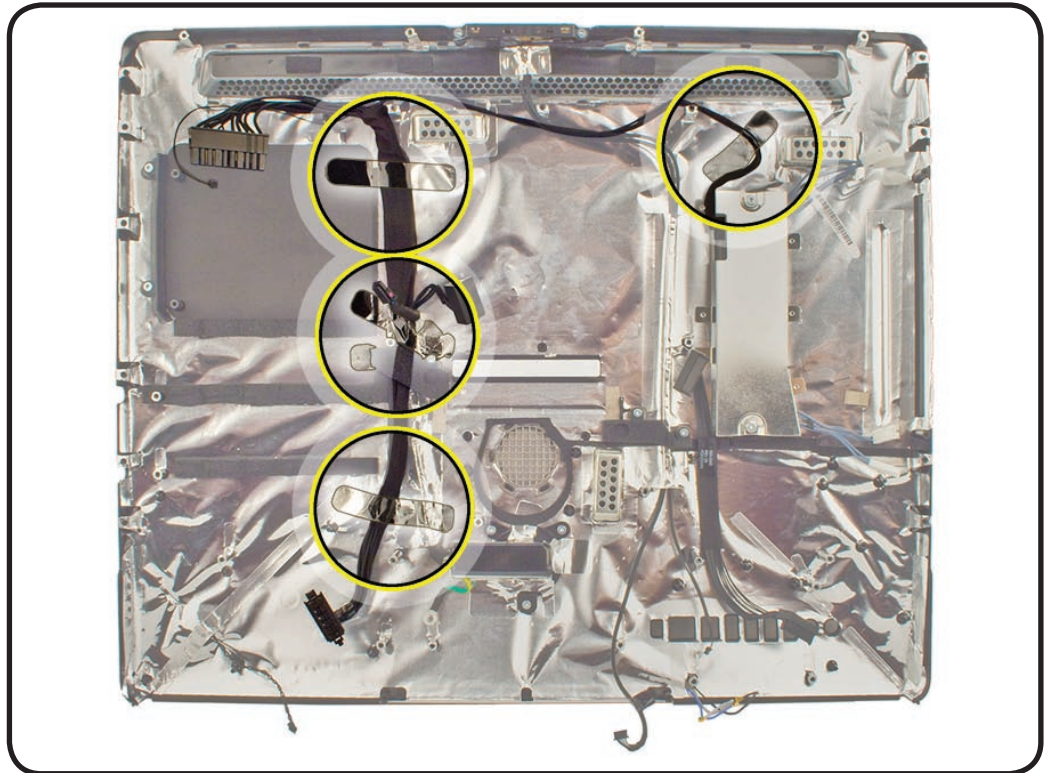
4 Remove T10 screw on cable guide in middle of rear housing:
(1) 922-6800
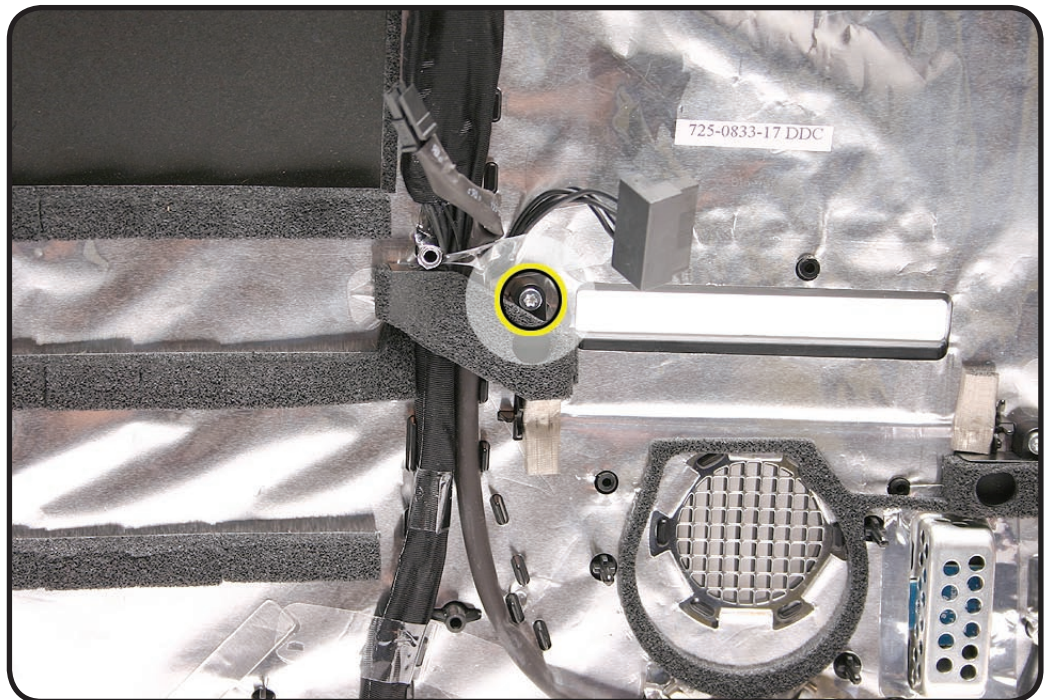
5 Before removing
cable, note how it
routes between black
guideposts in rear
housing.
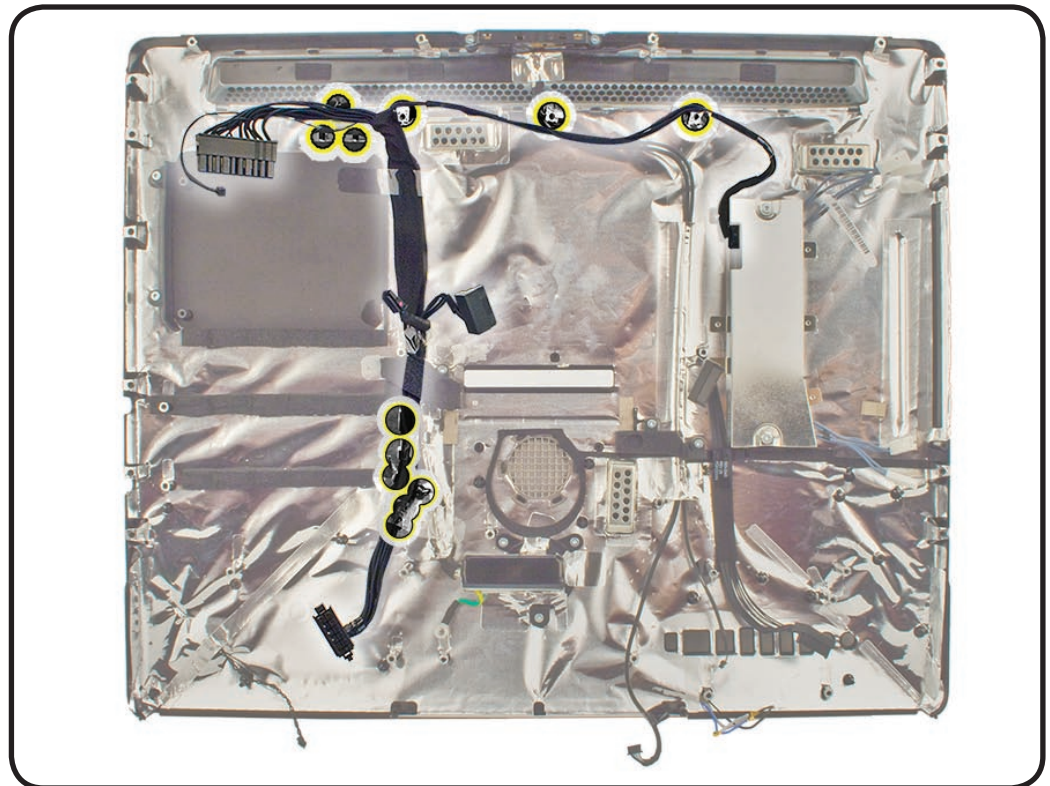
Reassembly

1 Install DC power cable
into rear housing
as shown above in
removal step 5.

2 In top left corner of
rear housing, position
cable between black
guideposts and
secure cable with
clear Kapton tape.
Route inverter power
cable off to the right.
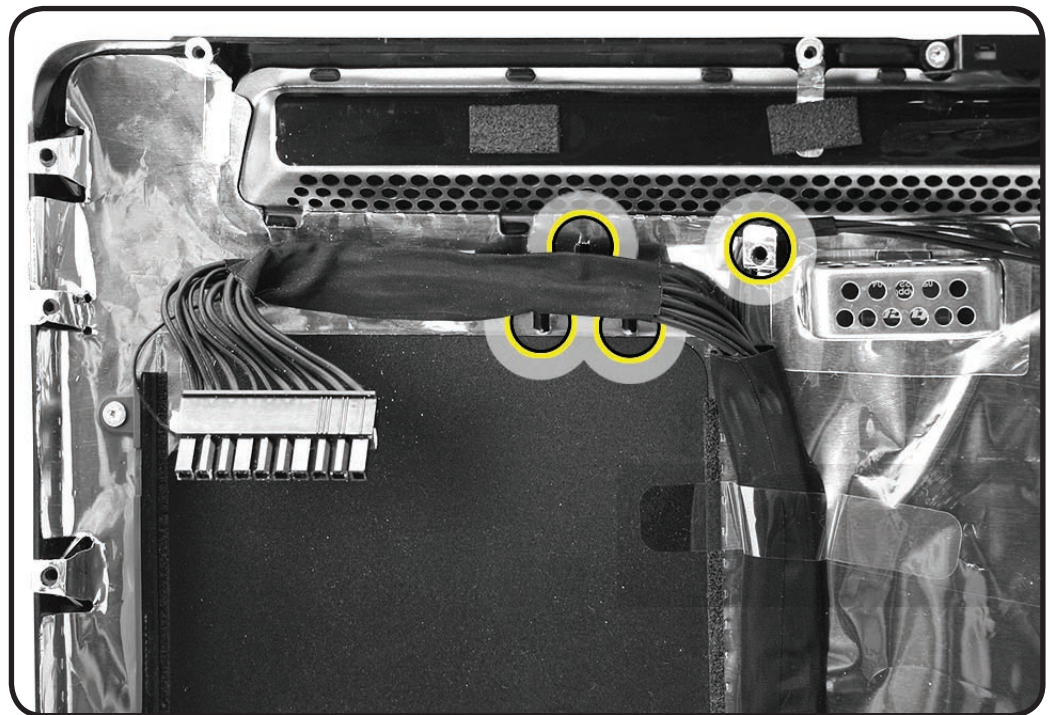
3 In the middle of rear housing, continue laying cable between black guideposts and secure cable with clear Kapton tape.
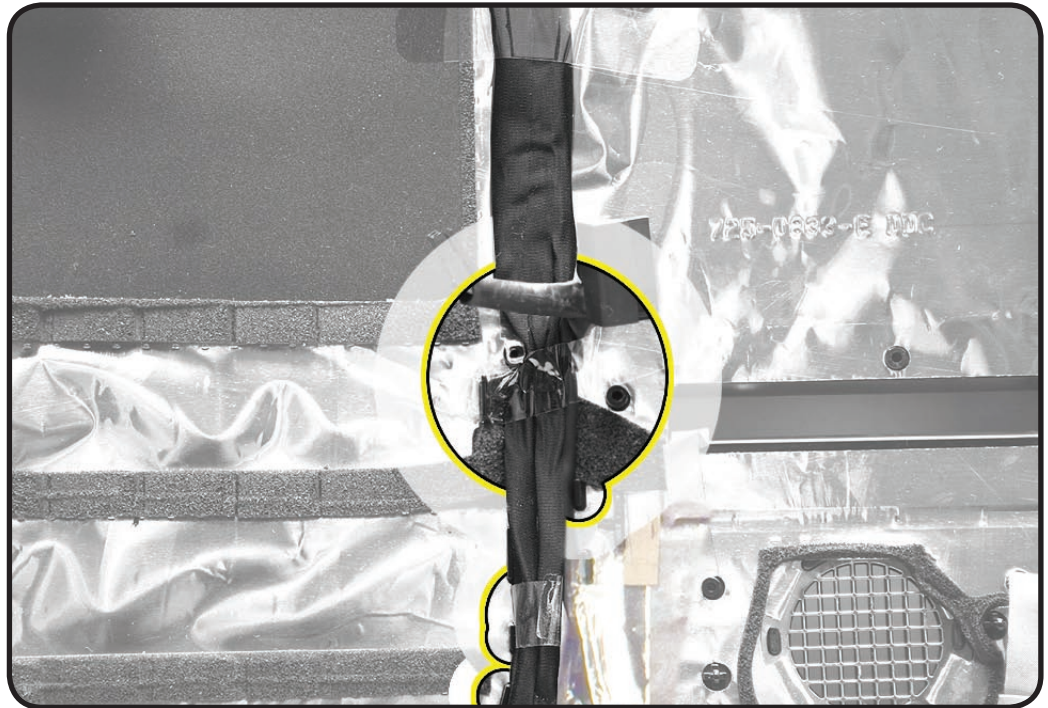
4 Position plastic cable guide (with foam) over the cable.

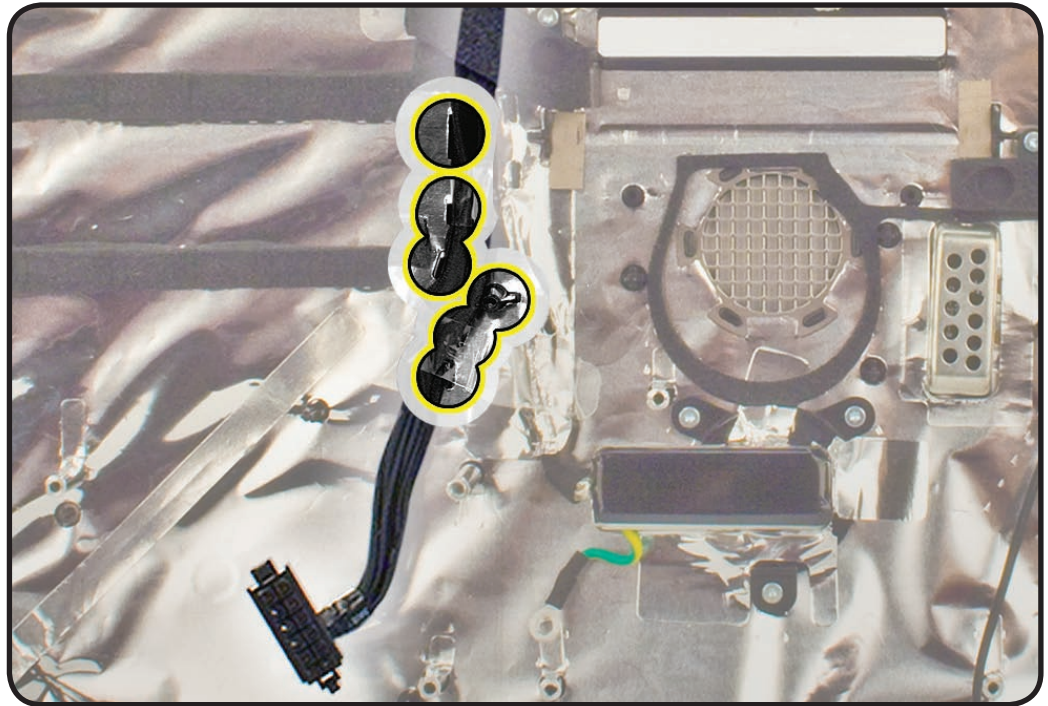**5** Replace T10 screw: (1) 922-6800

Note: Make sure cable guide is flush with rear housing. If cable guide is not seating properly, double check that cable is situated properly between black guideposts.
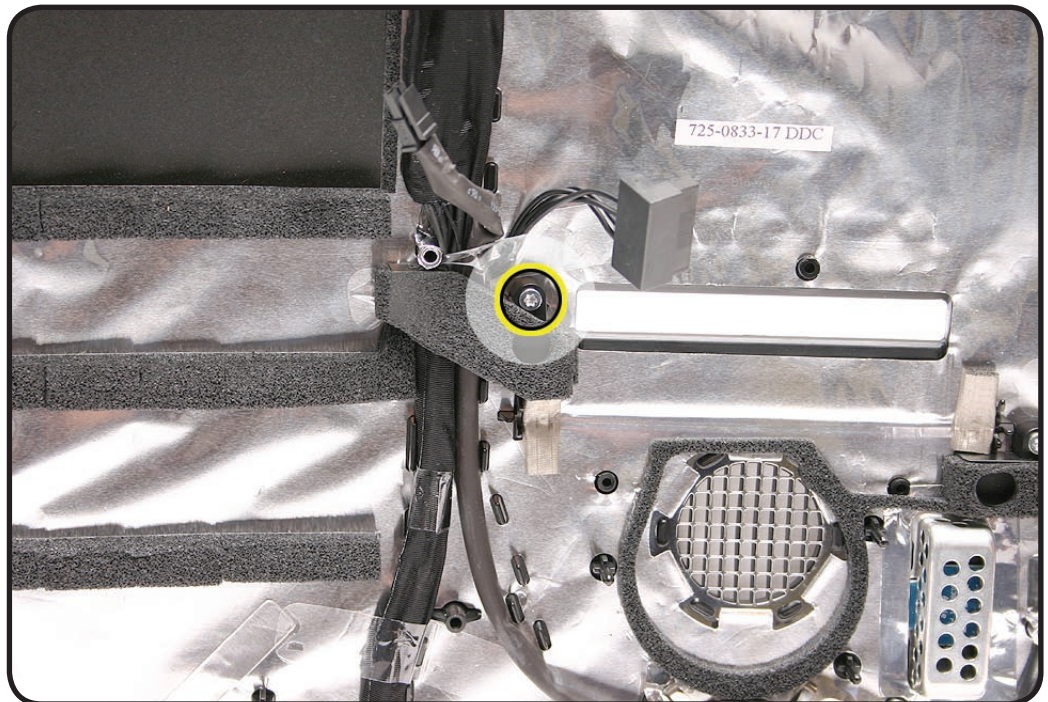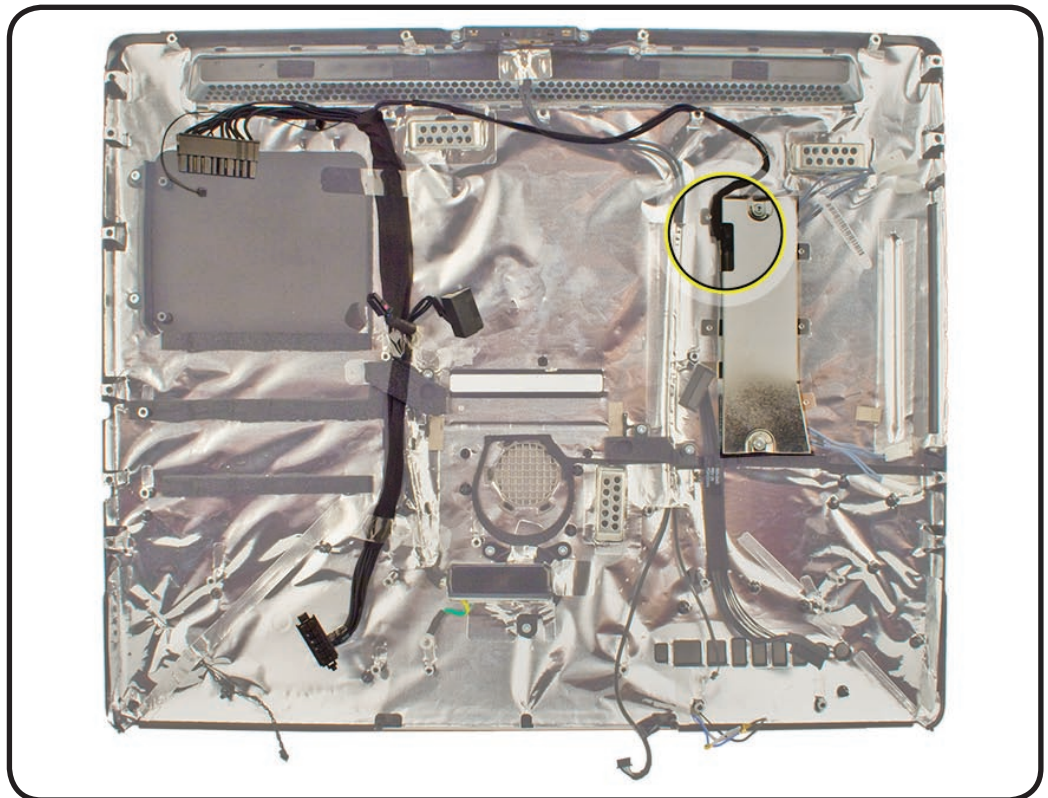
6 Toward bottom of rear housing, continue laying cable between black guideposts and secure cable with clear Kapton tape.

7 Secure inverter cable to rear housing with clear Kapton tape.

8 Reconnect cable to inverter.

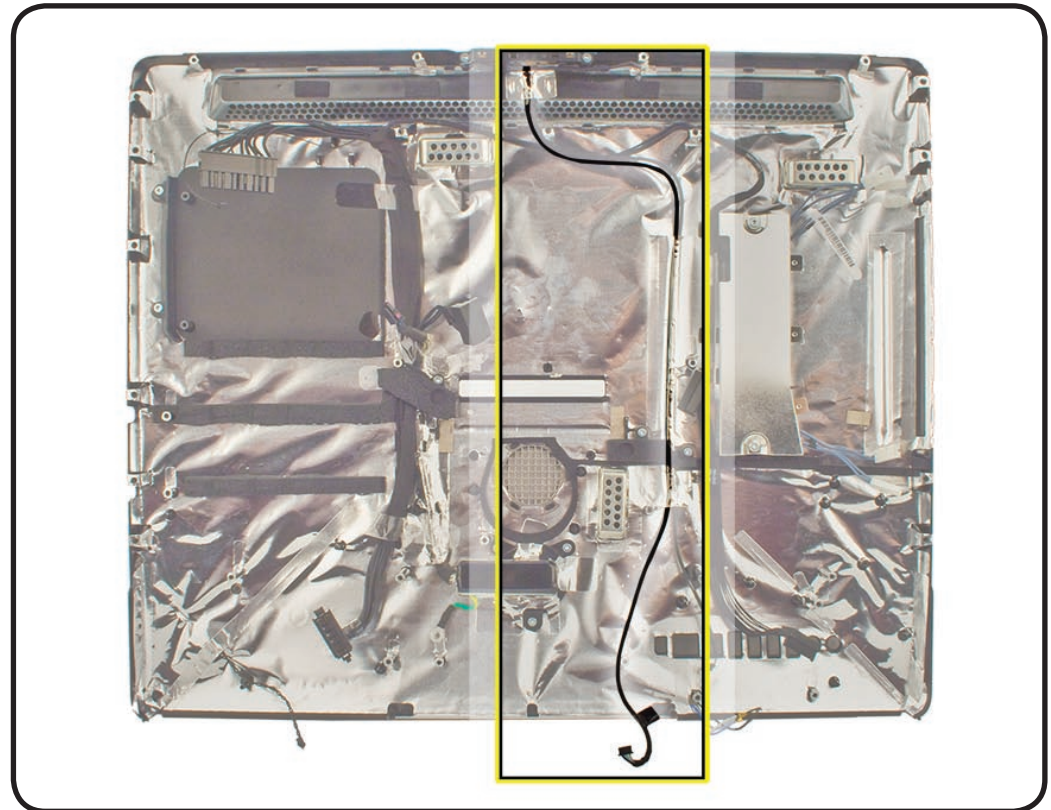**9** Continue with reassembly of chassis and other removed modules.
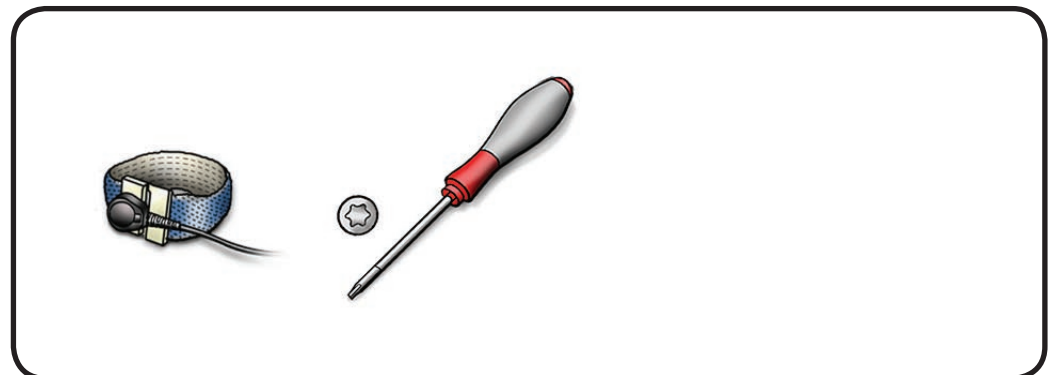
Camera Cable

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
- **Right Speaker**
- **Logic Board**
- **Power Supply**
- **Hard Drive**
- **Hard Drive Fan**
- **Hard Drive Data Cable**
- **Optical Drive**
- **Optical Drive Fan**
- **Mechanism Cover**
- **Stand**
- **Chassis**
- **Camera**

Tools

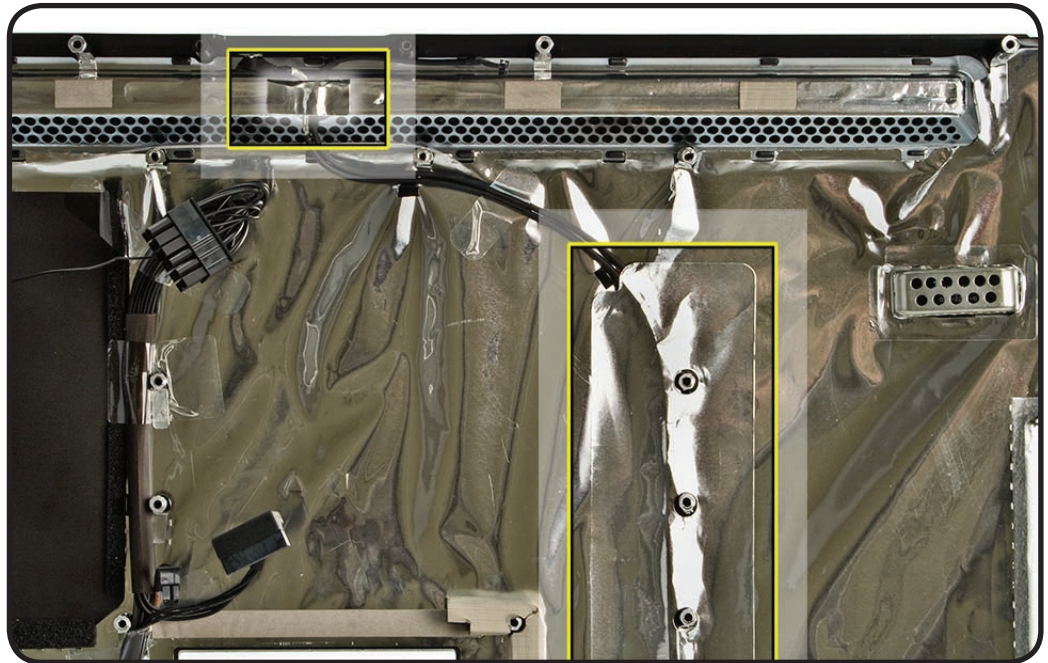- ESD wrist strap
- Torx T10 screwdriver
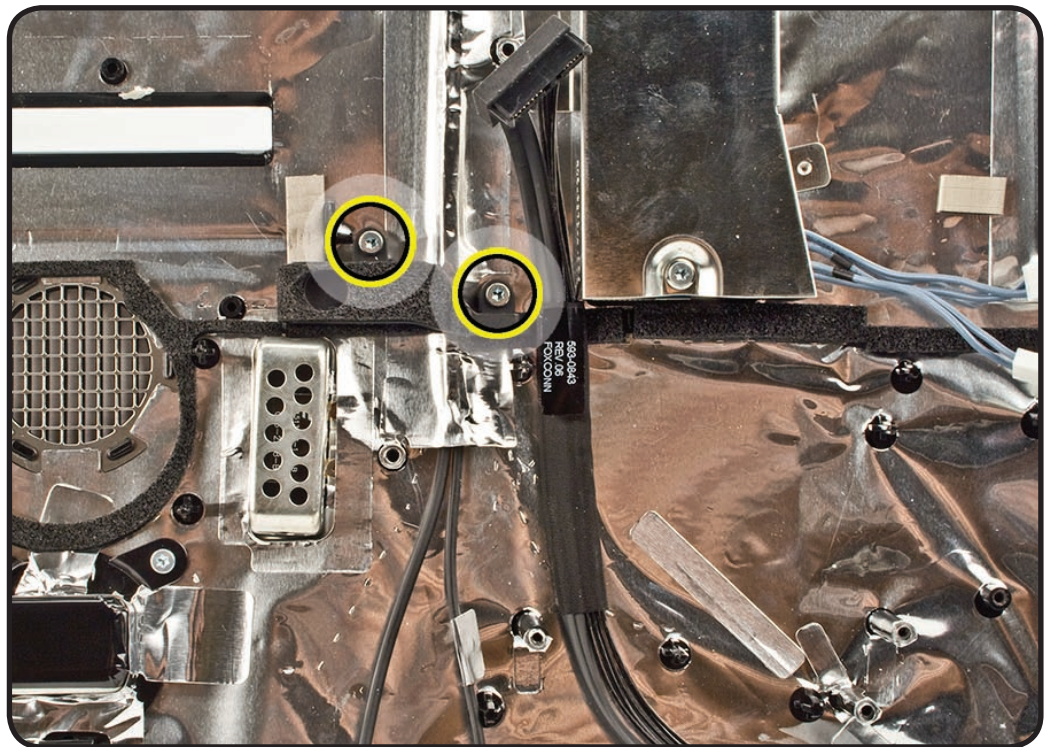
Removal

1 Remove EMI tape securing cable to rear housing.

2 Remove clear tape securing cable.

3 Remove T10 screws on cable bracket in middle of rear housing: (2) 922-6800

4 Note cable routing in rear housing before removing cable.

Microphone Cable

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
- **Right Speaker**
- **Logic Board**
- **Power Supply**
- **Hard Drive**
- **Hard Drive Fan**
- **Hard Drive Data Cable**
- **Optical Drive**
- **Optical Drive Fan**
- **Mechanism Cover**
- **Stand**
- **Chassis**
- **Camera**

Tools

- ESD wrist strap
- Torx T10 screwdriver

Removal

1 Remove EMI tape securing cable to rear housing.

2 Remove clear tape securing cable.

3 Remove T10 screws on cable bracket in middle of rear housing:
(2) 922-6800

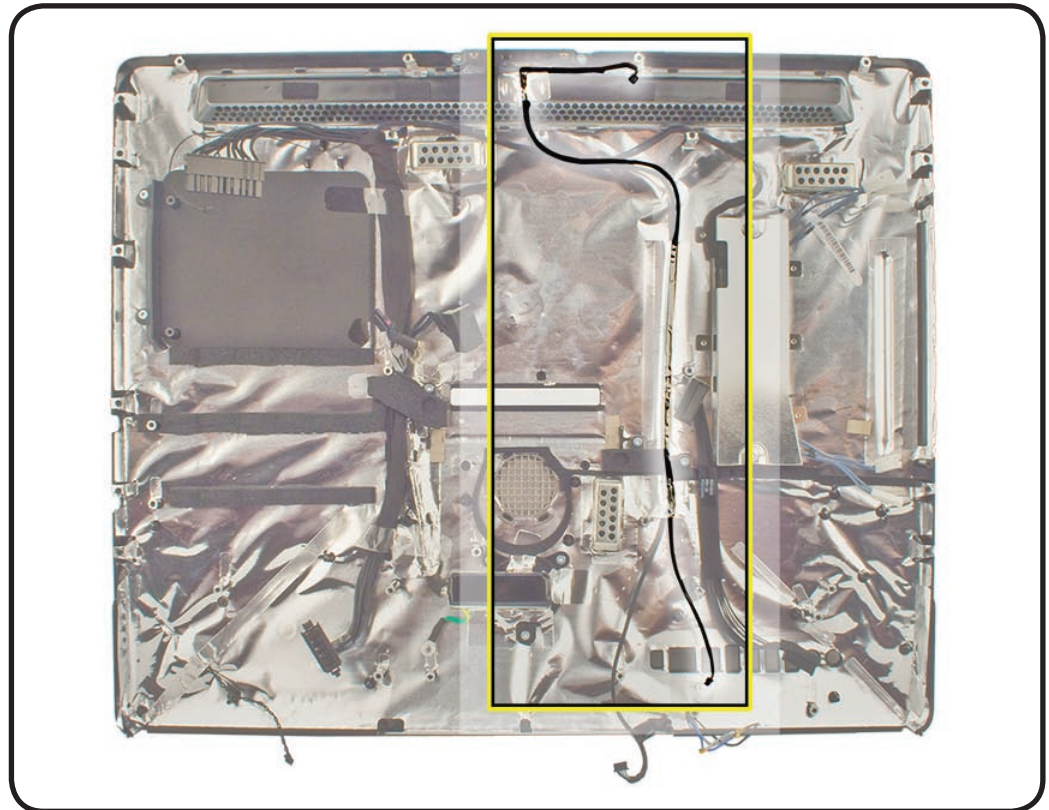**4** Note cable routing in rear housing before removing cable.
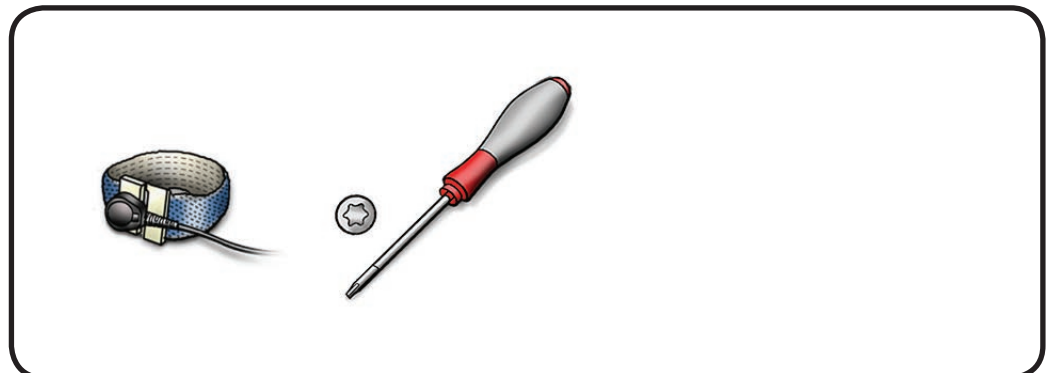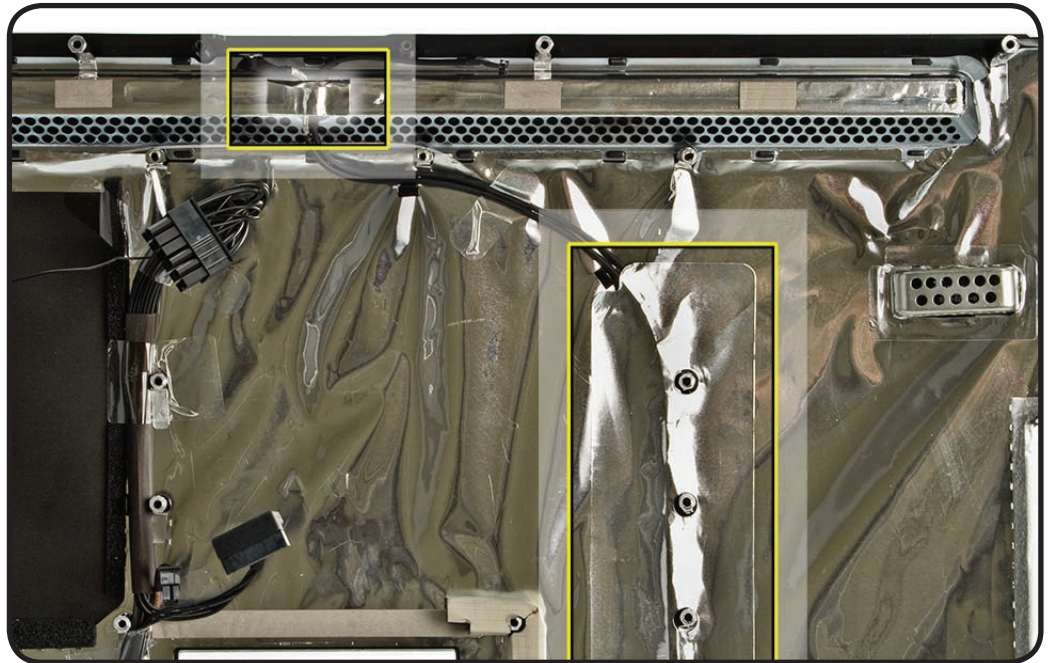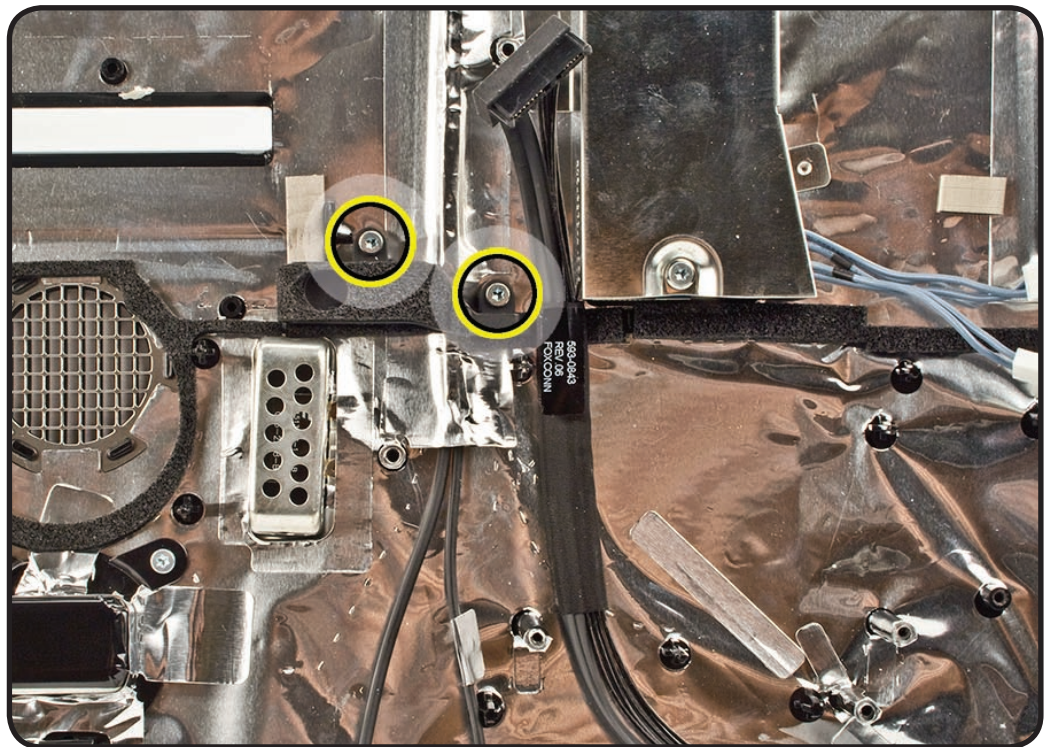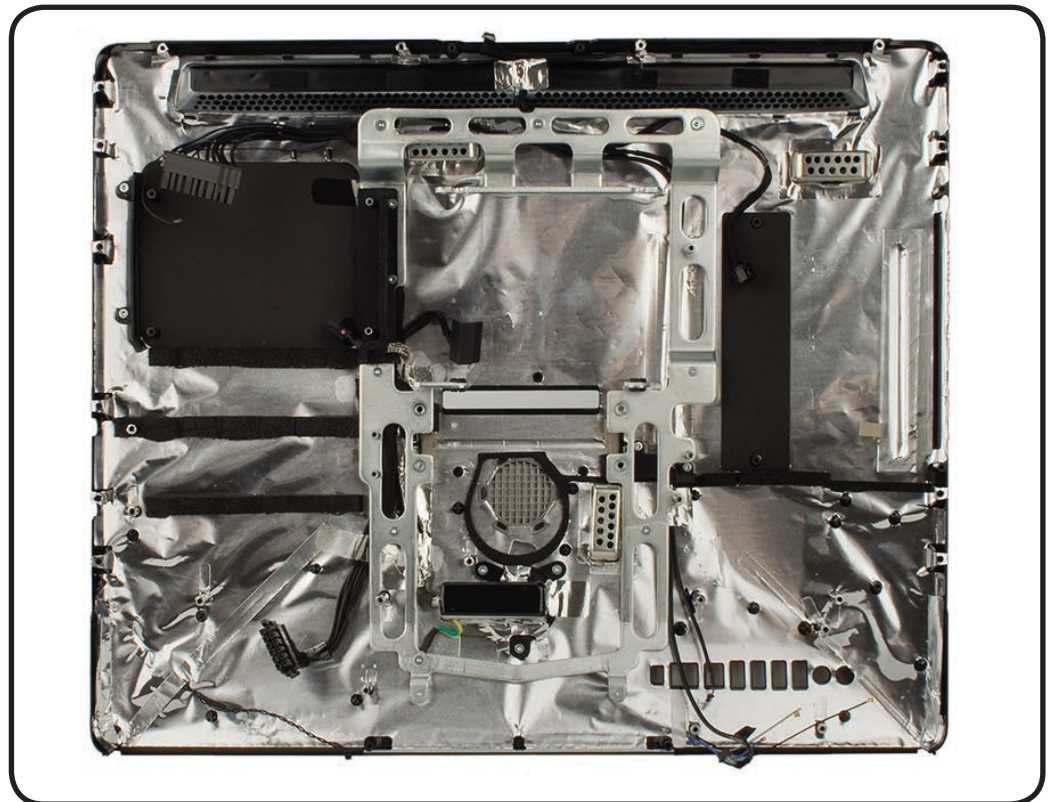
Rear Housing

First Steps

Remove:
- **Access Door**
- **Glass Panel**
- **Front Bezel**
- **LCD Panel**
- **Right Speaker**
- **Left Speaker**
- **CPU Fan**
- **Logic Board**
- **Power Supply**
- **Hard Drive**
- **Hard Drive Fan**
- **Hard Drive Data Cable**
- **Optical Drive**
- **Optical Drive Fan**
- **Optical Drive Data Cable**
- **Inverter**
- **Mechanism Cover**
- **Stand**
- **Mechanism**

With all other modules removed, rear housing is the remaining assembly.

Rear housing replacement part includes:
- DC power supply/ SATA/ inverter cable (922-8837)
- camera cable (922-8829)
- microphone cable (922-8830)

Rear housing also includes the following parts, which are not available separately:
- AirPort/Bluetooth antennas
- power button cable
- AC inlet
- chassis
- pressure walls
- EMI shielding, foam & gaskets

Apple Technician Guide

Views

iMac (20-inch, Early/Mid 2009)

Exploded Views

iMac (20-inch Early 2009), Part 1

Front Bezel
922-8847

Glass Panel
922-8848

LCD Panel, 20"
661-4983

LVDS Cable
922-8828

Power Supply
661-4987, 180W

Clip, Hard Drive
922-8854

Hard Drive, SATA, 7200rpm
661-4842, 320 GB
661-4843, 640 GB
661-4844, 1 TB
Cable, HD Temp Sensor
922-8831

Cable, HD Data
922-8825

Clip, Temp Sensor
922-8183

Optical Drive, 8x
661-4845
Cable, ODD Temp Sensor
922-8827

Hard Drive Fan
922-8843

CPU Fan
922-8842

Cable, ODD Data
922-8824

Optical Fan
922-8841

Cable, Ambient
Temp Sensor
922-8826

Speaker, Left
922-8839

Speaker, Right
922-8840

iMac (20-inch, Early 2009), Part 2

Audio Board
922-8838

Cable, Audio to Logic Board
922-8835

Camera
922-8845

AirPort Card (US/CA/LA)
661-4906

Bluetooth Board
922-8823

Cable, Bluetooth
922-8836

Logic Board, 2.66GHz
661-4984 or 661-5136
Battery, 3v
922-8892

Cable, IR
922-8832

IR Board
922-8846

Inverter Cover
922-8853

Inverter
922-8844

Microphone Cable
922-8830

Camera Cable
922-8829

Mechanism Cover
922-8220

Cable, DC/ Power Supply/
SATA/ Inverter
922-8837

Rear Housing
922-8851

Access Door
922-8186

Mechanism
922-8967

Stand
922-8852
Power Cord
922-7139

SDRAM, DDR3-1066, SO-DIMM
661-4985 1GB
661-4986 2GB

iMac (20-inch, Mid 2009), Part 1

Glass Panel
922-8848

Front Bezel
922-8847

LCD Panel, 20"
661-4983

LVDS Cable
922-8828

Power Supply
661-4987, 180W

Clip, Hard Drive
922-8854

Hard Drive, SATA, 7200rpm
661-4841, 160 GB
Cable, HD Temp Sensor
922-8831

Cable, HD Data
922-8825

Clip, Temp Sensor
922-8183

Optical Drive, 8x
661-4845
Cable, ODD Temp Sensor
922-8827

Hard Drive Fan
922-8843

CPU Fan
922-8842

Cable, ODD Data
922-8824

Optical Fan
922-8841

Cable, Ambient
Temp Sensor
922-8826

Speaker, Left
922-8839

Speaker, Right
922-8840

iMac (20-inch, Mid 2009), Part 2

Audio Board
922-8838

Cable, Audio to Logic Board
922-8835

Camera
922-8845

AirPort Card (US/CA/LA)
661-4906

Logic Board
661-5193
Battery, 3v
922-8892

SDRAM, DDR3-1066, SO-DIMM
661-5194 1GB
661-5195 2GB

Inverter Cover
922-8853

Inverter
922-8844

Microphone Cable
922-8830

Camera Cable
922-8829

Mechanism Cover
922-8220

Cable, DC/ Power Supply/
SATA/ Inverter
922-8837

Rear Housing
922-xxxx
(unknown at time of writing)

Access Door
922-8186

Mechanism
922-8967

Stand
922-9012
Power Cord
922-7139

Screw Chart

Note: Screws are not to scale.

922- 8206 T8	922-8207 T8	922-8850 T10
Front bezel, 13mm (8)	Front bezel, 25mm (4)	Camera (2)
922-8579 T6	922-8172 T8	922-8580 T10
IR board (2), AirPort card (1), Bluetooth board (1), LVDS cable (2), Audio board (4)	LCD panel (8)	Hard drive (2)
922-7001 T10	922-6842 T10, machine	922-8251 T10
Hard drive pins (2)	Optical drive (2), Power supply (2), Logic board (3)	Inverter (2)
922-6800 T10	922-8208 T10	922-8249 T10
Power supply (2), Logic board (6), DC power cable guide (1), Camera/Mic cable guide (2)	Right speaker (1)	Left speaker (1)

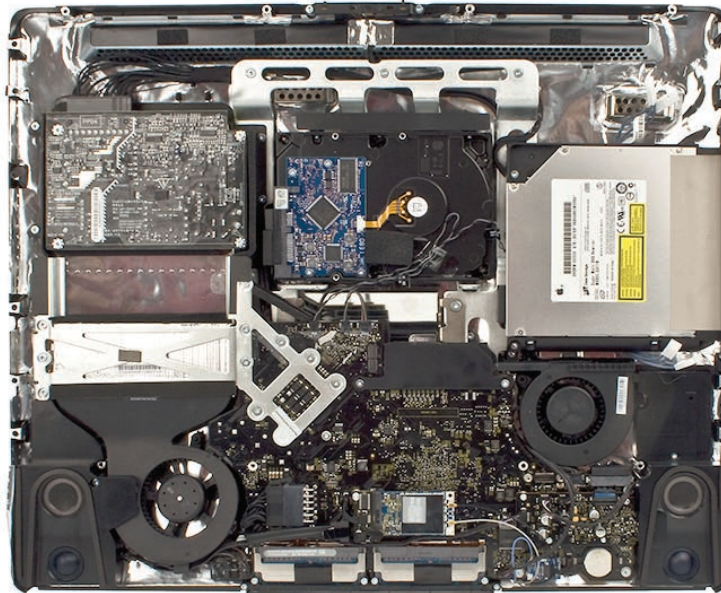| 922-8173 T10	922- 8175 T8	922-8209 T10
Logic board (1)	Logic board (2)	Stand to mechanism (7)
922-8849 T10	922-8250 T10	922-6850 T10
Mechanism to chassis (4)	Chassis, at top (3)	Chassis (6)
922-7069 T10		
Chassis, ground to AC inlet (1)		

Internal Views
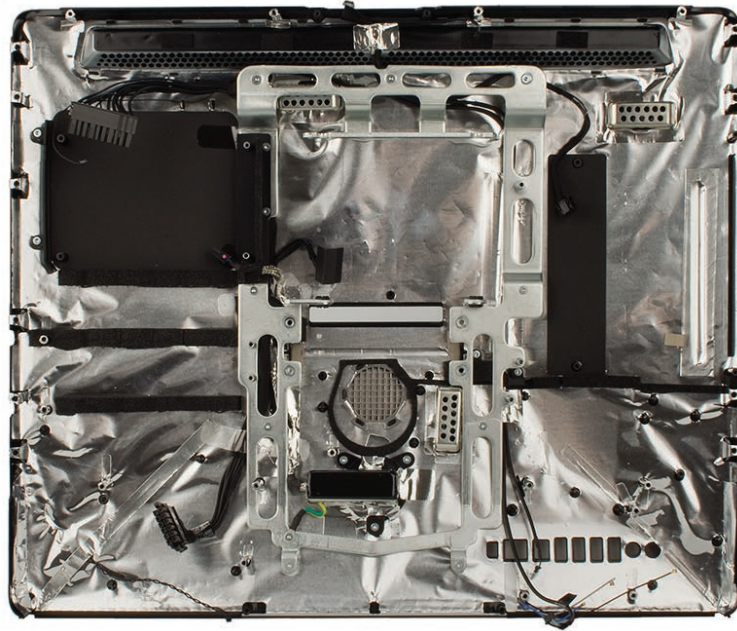
A view inside the computer with the front bezel removed.
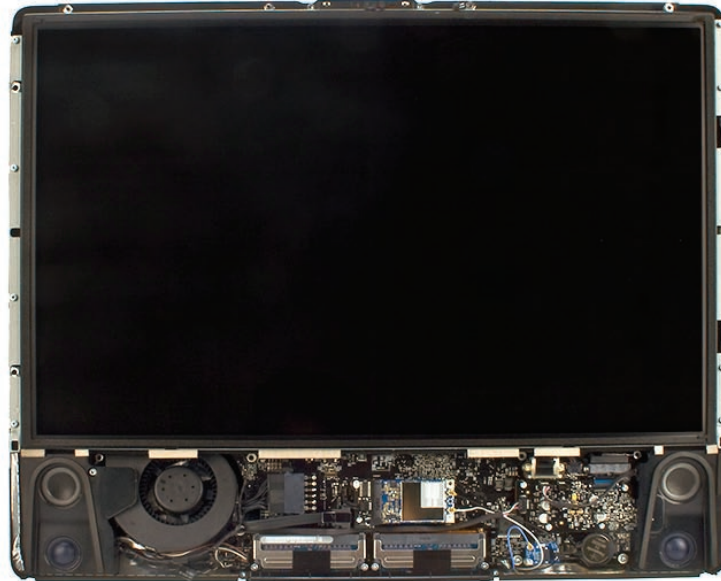
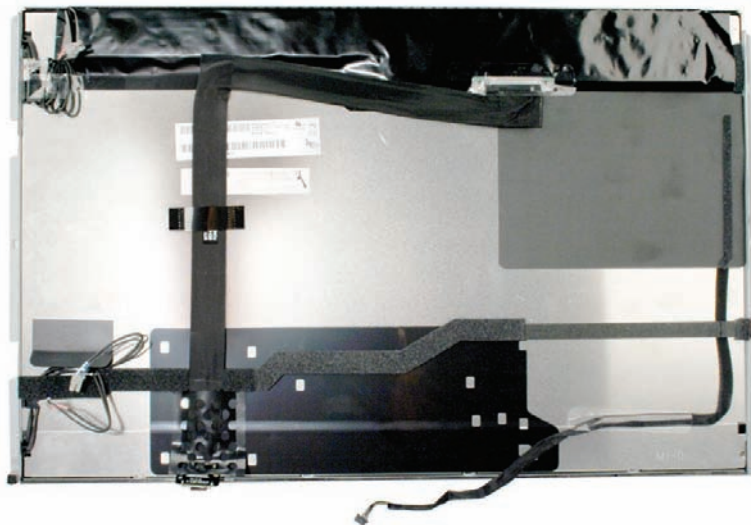A view inside the computer with the front bezel and LCD panel removed.

A view inside the rear housing with all main modules removed.
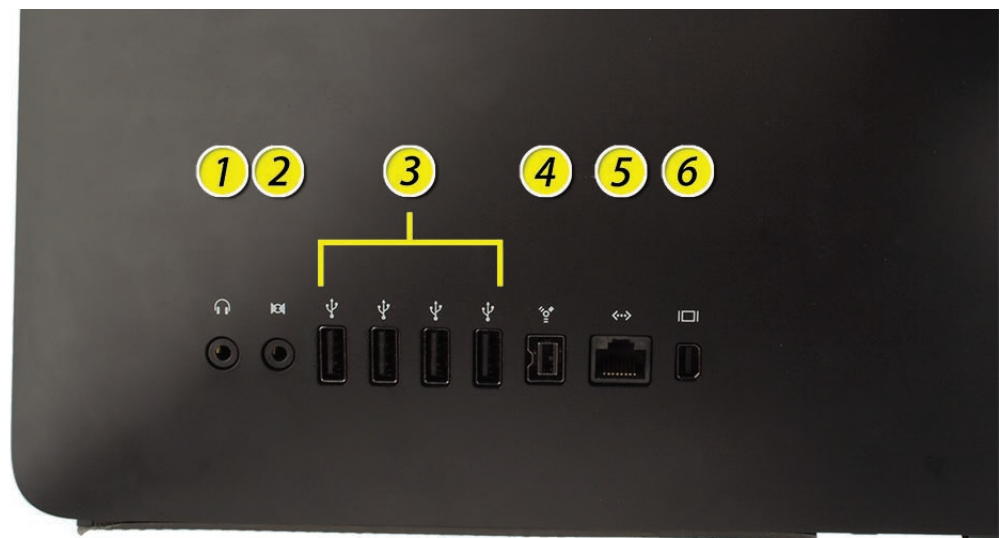

A view of the back of the LCD panel.

I/O Ports

The input/output ports on the back of the computer are:

1. Headphone-out/optical digital audio-out

2. Audio-in/optical digital audio-in

3. (4) USB 2.0

4. FireWire 800

5. Gigabit Ethernet

6. Mini DisplayPort

Feedback

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

Please email any comments to:

smfeedback6@apple.com