Apple Technician Guide

Mac mini (Mid 2010)

Mac mini (Mid 2010) and Mac mini Server (Mid 2010)

Updated 2010-/8-/3

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

Mac mini (Mid 2010)

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Manual Updates

Update 3 August 2010

Take Apart:

- Added information and replacement procedures for thermal sensors to the General Information, Hard Drive, Optical Drive and Views chapters.
- Added additional graphic to Memory chapter showing a pulling action with fingers to verify fully seated memory.

Apple Technician Guide introduced 15 June 2010

This manual covers the two Mac mini products developed in Mid 2010:

- Mac mini (Mid 2010)
- Mac mini Server (Mid 2010)

Feedback

We want your feedback to help improve this and future Technician Guides!
Please email any comments to: **smfeedback5@apple.com**

Apple Technician Guide

Basics

Mac mini (Mid 2010)

Mac mini (Mid 2010) and Mac mini Server (Mid 2010)

Overview

Introducing the Mac mini (Mid 2010) with a completely new slimline aluminum housing design, HDMI port, SD card slot, integrated power supply, and easy access to memory and internal parts.

This manual covers the two Mac mini products developed in Mid 2010:

- Mac mini (Mid 2010), shown above on left
- Mac mini Server (Mid 2010), shown above on right

The Mac mini (Mid 2010) is a follow-on product to the Mac mini (Late 2009).

- Main changes from the previous model (Mac mini (Late 2009)) are:
  - Easy customer-installable RAM access
  - Logic board assembly removal requires a special tool:
    - Logic board removal tool: 922-9588
  - HDMI port (instead of Mini-DVI)
  - SD card slot
  - 4 USB ports (instead of 5)
  - No Interconnect board
  - Internal power supply
- Take Apart:
  - Take apart method is completely different
  - All parts are new and specific to the Mid 2010
  - No-tool access through the bottom cover
  - A new tool is required to remove the logic board assembly

Identifying Features

The Mac mini (Mid 2010) computer features include:

- Low-profile housing design
- Service access is through the bottom cover, which is removed without tools.
- HDMI port
- SD card slot
- 4 USB ports
- Internal power supply
- Increased processor speeds:
  - 2.4 GHz Dual-Core
  - 2.66 GHz Dual-Core (CTO and Server)
- NVDIA GeForce 320M graphics
- Memory:
  - 2GB
  - 4GB (CTO)
  - 8GB (CTO and Server)
- Hard drives:
  - 320 GB, SATA, 5400
  - 500 GB, SATA, 5400 (CTO)
  - dual 500 GB SATA, 7200 (Server)
- Mac OS X Snow Leopard

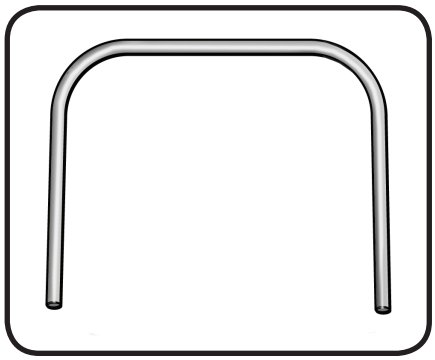
Product Configurations

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.

For product configurations, refer to Apple Support Tech Specs: **http://support.apple.com/specs/**

Service Part Configurations

- Logic board assembly removal requires a special tool:
  - Logic board removal tool (922-9588)



- Although the thermal sensor on the flex cable of the top hard drive can be replaced by replacing the flex cable, the other thermal sensors on the hard drives or optical drive are not replaceable. To replace the sensor, a replacement drive must be ordered.
- The logic board assembly consists of:
  - logic board, with battery
  - I/O wall, including two antennas
  - speaker and screws
  - wireless card flex cable
  - wireless card screws
  - cowling snap screw

System Serial Number Location

The Mac mini (Mid 2010) serial number is located on the bottom of the housing.

Apple Technician Guide

Troubleshooting

Mac mini (Mid 2010)

Mac mini (Mid 2010) and Mac mini Server (Mid 2010)

General Troubleshooting

Update System Software

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

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 by running the Mac OS X Software Update check (available in the Apple menu) while the computer is connected to the Internet. For more information about firmware updates, refer to:
About firmware updates for Intel-based Macs—kBase # HT1557

Apple Diagnostics

Run diagnostics to determine if any of the modules are malfunctioning.

- Mac mini (Mid 2010): Apple Diagnostics: 3S139
- Mac mini Server (Mid 2010): Apple Server Diagnostics: 3X107
- Apple Hardware Test: 3A191 (not used for server)

Troubleshooting Theory

For general information on troubleshooting theory, go to GSX and find the **Service Training** course menu link. From there you can access the Troubleshooting Theory self-paced course.

Hardware vs. Software

For information on how to isolate a hardware issue from a software issue, refer to:
Isolating issues in Mac OS X—kBase #TS1388

For information on how to troubleshoot a software issue, refer to:
Mac OS X: How to troubleshoot a software issue—kBase #HT1199
Mac OS X: Troubleshooting installation and software updates—kBase #TS1394
Troubleshooting Mac OS X installation from CD or DVD—kBase #HT2956

Common Reset Procedures

When a reset procedure is required for troubleshooting, follow the applicable steps:

Resetting the System Management Controller (SMC)

To reset power management via the SMC chip:

1. Unplug all cables from computer, including power cord.
2. Wait at least 15 seconds. The SMC reset occurs automatically once the Mac mini has been unplugged from AC power source for several seconds.
3. Plug power cord back in, making sure power button is not being pressed.
4. Reconnect keyboard and mouse to computer.
5. Press power button on back to start up computer.

Resetting the SMC means you will also need to reset the date and time (using the Date & Time pane of System Preferences).

Resetting the Parameter RAM (PRAM)

To reset PRAM,

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

   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.

   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.

Starting Up in Safe Mode

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

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

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

For more information:
http://www.apple.com/support
Mac OS X: What is Safe Boot, Safe Mode?—kBase #HT1564
Safe Boot takes longer than normal startup—kBase #TS1884

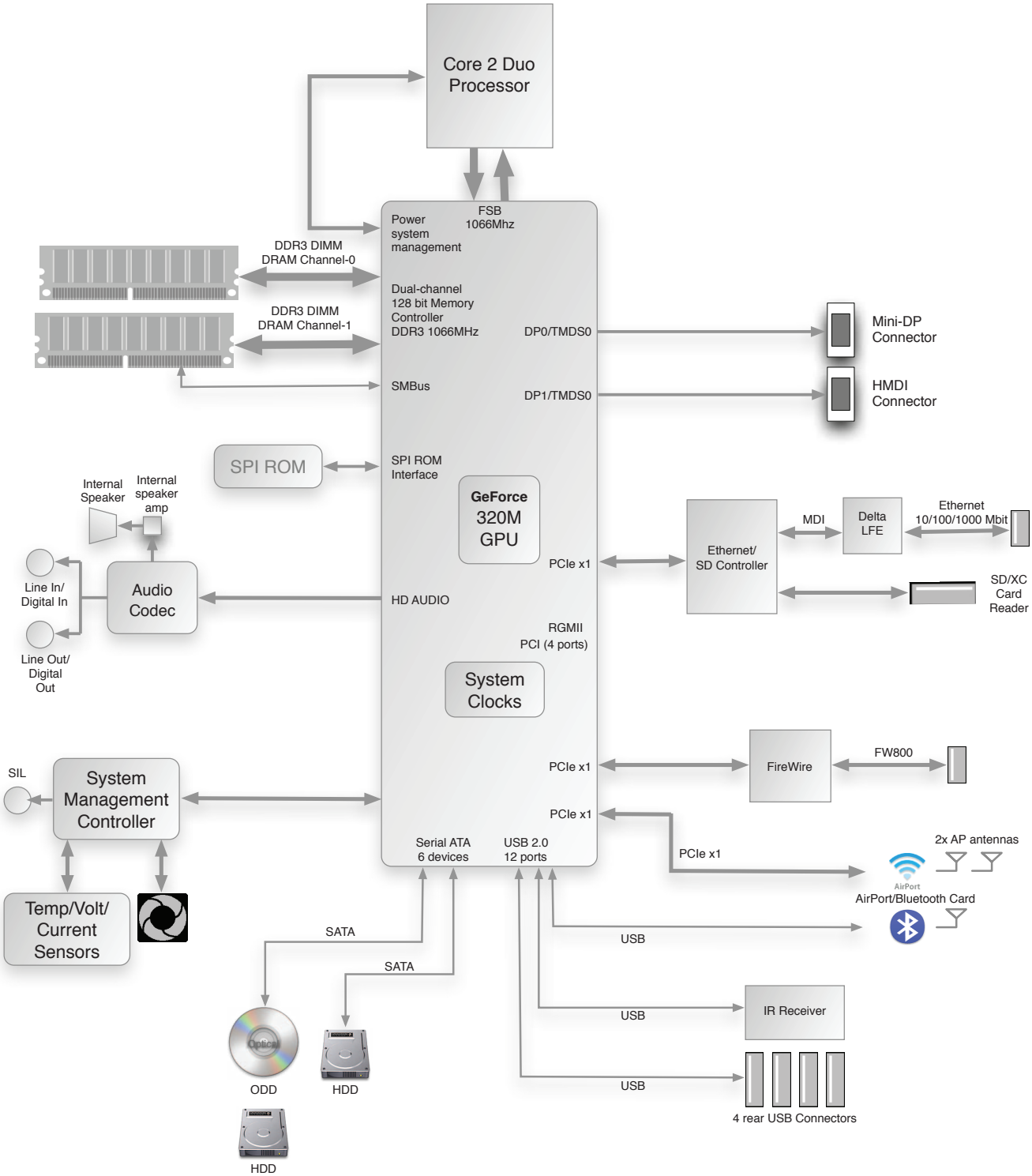
Wireless Troubleshooting

If you're having issues with AirPort and wireless mouse or keyboard connectivity issues, refer to the following Knowledge Base articles:

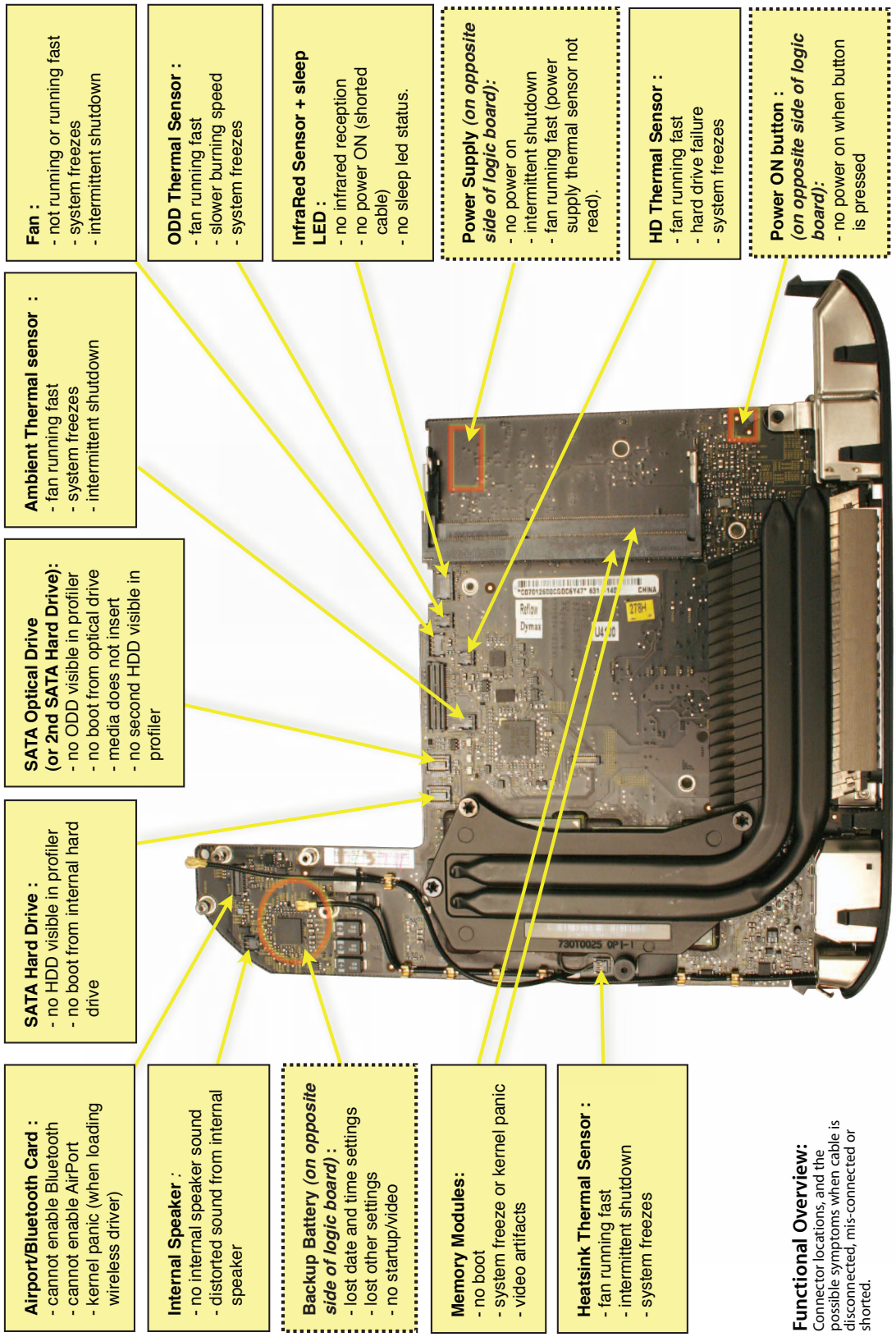
- **Troubleshooting wireless mouse and keyboard issues—kBase #TS3048**
- **AirPort and Bluetooth: Potential sources of interference for wireless devices and networks—kBase #HT1365**
- **Apple Wireless Keyboard and Mouse: How to install batteries—kBase #HT3903**

Block Diagram

Refer to this diagram to see how modules are interrelated.



Functional Overview



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 LED • No fan spin • No startup chime • No image on external display • No hard drive or optical drive activity	**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. If there is activity then go to the 'Startup and Power Issues' symptom flow.

Deep Dive

Unlikely cause: speakers

Check	Result	Action	Code
1. Connect AC to computer and press the power button on system. Verify if there is any indication that the system has powered up (fan rotation, hard drive or optical drive noise, ...).	Yes	The system is powering up. Jump to **Won't Start Up symptom flow.**	
	No	Go to step 2.	
2. Reseat the installed SDRAM memory module(s) and retest. Does the computer start up properly now?	Yes	Badly seated SDRAM memory module. Reseating it resolved issue.	
	No	Go to step 3	
3. Replace installed SDRAM memory module(s) with known-good one. Does the computer start up properly now?	Yes	Replace defective user's SDRAM memory module.	
	No	Go to step 4	
4. Remove bottom cover, disconnect AirPort antenna and remove shield, disconnect and remove fan and cowling, then disconnect the following cables from logic board before being able to extract it :HDD, ODD/HDD, Ambient sensor, HD sensor, ODD/HD sensor, IR/LED cable. Check and reseat power button cable connection to logic board and verify if the unit powers on.	Yes	Reseating the power button connector on logic board resolved the issue.	
	No	Go to step 5.	
5. 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.	**M20**
	No	Go to step 6.	

6. Disconnect power button connector from logic board and short the two power button connector pins on logic board. Verify if the unit powers on.	Yes	Replace Power Button assembly	**X03**
	No	Go to step 7	
7. Disconnect AirPort/Bluetooth card, Hard Drive, Optical Drive and LED/IR Sensor cables from logic board. Connect AC cable and press the power button to verify if a startup error tone is heard.	Yes	Reconnect one by one each device and retest to identify the shorting one. When found, replace affected device cable first, and retest.	**X03**
	No	Go to step 8	
8. Disconnect the power supply cable from logic board , connect AC cable and use a multimeter to verify that a 12 Volts voltage is present between the two outer pins of cable. See KBase article **http://support.apple.com/kb/HT3250** for details on using a digital multi-meter	Yes	Power supply is present. Replace logic board and retest.	**M01**
	No	Replace cable between power supply and logic board and retest. If issue persists after cable was replaced, replace power supply and retest.	**X03** **P01**

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 by starting up from : -the original install DVD media inserted in Mac mini optical drive or in the optical drive of another computer set up in FireWire Target Disk Mode , -from the same Mac mini model setup in FireWire Target Disk Mode, -from a compatible known-good OS on an external drive. Note that both AirPort and Bluetooth services are available when booted from the Mac mini Install DVD. **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 or backup battery. 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. Insert Mac mini Install DVD in optical drive (or in the optical drive of another computer set up in FireWire Target Disk Mode) and boot the computer with the D keyboard key pressed to run Apple Hardware Test. 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. Connect a known-good 10.6.X up-to-date bootable external USB drive, FireWire drive, or similar system setup in FireWire Target Disk Mode, and press the Alt key on startup to select and attempt to boot from it. Does it boot?	Yes	Use the Apple System Profiler to check for presence of both Hard Drive and Optical SATA drives. Run Disk First Aid to check internal hard drive health and repair (check SMART Status, Repair disk and Privileges). If the hard drive in not recognized, go to **Hard Drive Not Recognized** If the optical drive is not recognized, go to **Optical Drive not recognized**.	
	No	Go to Step 4.	
4. Remove bottom cover, disconnect AirPort antenna and remove shield, disconnect and remove fan and cowling, then disconnect the following cables from logic board before being able to extract it :HDD, ODD/HDD, Ambient sensor, HD sensor, ODD/HD sensor, IR/LED cable. Is there a gray screen with a flashing folder?	Yes	Reconnect only the optical / second hard drive cable to logic board and go to Step 5	
	No	Replace logic board.	**M02**

5. Power on system, press the C key on keyboard , insert the original Mac mini 10.6.X Install DVD in internal optical drive (or in the optical drive of another computer set up in FireWire Target Disk Mode) and attempt to boot from it. Does it boot?	Yes	Reconnect the hard drive cable to logic board and go to step 6	
	No	If the optical drive is not recognized, go to **Optical Drive not recognized**.	
6. Power on system, press the Alt key on keyboard and attempt to boot the system from the Internal hard drive. Does it boot?	Yes	System is booting. Issue does not happen anymore.	
	No	If the hard drive in not recognized, go to **Hard Drive Not Recognized**	

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 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.** 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.

Intermittent Shutdown

Unlikely cause: hard drive, optical drive

Troubleshooting Shutdown Causes

Always run the latest available service utilities, to look for the possible cause of a previous shutdown. These utilities will permit to isolate any abnormal value readings from the thermal, voltage, or current sensor(s), and from the fan(s) speed meter(s).

Collect all available info from user on shut down occurrence details: periodicity, connected devices, running applications, running time before shutdown.

Shutdown events could be categorized between four different types of causes.

User-related shut downs :
A computer shut down event may be caused by user operation. Shutting down the computer (by selecting the Shutdown menu, by keeping pressed the Power button for at least 4 seconds, or by programming a timed shutdown in the Energy Saver preferences) should not be considered as a failure unless the power button is found to be defective, so the suggested steps for troubleshooting will be:
- to reset the SMC,
- to check Energy Saver preferences settings,
- to check the Power On button functionality, and its secure connection to logic board.

Activity-related system shut downs :
- system could not succeed the standard shutdown process and had to force shutdown,
- an installed watchdog detected that an application did not respond within specified time (this watchdog can be enabled on Mac OS X Server Energy Saver preferences)
These shut downs may be linked to system settings, devices drivers, applications or operating system freezes, so the suggested steps for troubleshooting will be:
- to check the system logs and activity monitor utility for clues on the freezing process,
- to check for available software and firmware updates for installed device drivers, applications, or operating system,
- to start the system from a known-good and up-to-date bootable drive for issue reproduction.

Power-related system shut downs :
-External AC power source was removed,
-External AC power source was removed and UPS battery went empty.
These shut downs are due to power management, poor connections or defective power sources so the suggested steps for troubleshooting will be :
- to reset SMC,
-to check secure AC cable and power supply connection to logic board,
-

Hardware-related system shut downs:
- one of the temperature sensors reached a specified temperature limit,
- one of the voltage sensors reached a specified voltage limit,

- one of the current sensors reached a specified current limit,
These shut downs are due to temperature, voltage, current, fan speed or other hardware related sensor values getting out of range, so the suggested steps for troubleshooting will be:
- to check for all sensors connections and values using the latest available service utilities and Apple Service Diagnostics,
- to check for fan(s) operation,
- to check for cleanliness of the heatsink fins and the air flows,
- to check for correct seating of the heatsink on logic board and presence of adequate thermal material.

Quick Check

Symptom	Quick Check
Intermittent shutdown • Powers off during startup • Powers off during desktop use	**1.** Collect details from customer on shutdown occurrence and system configuration when it happens (on startup, when running for a while, frequency of shutdowns, running applications, shutdown repeatability). If shutdown can be easily reproduced, check next steps: **2.** Check AC cable connection with system **3.** Reset SMC and PRAM **4.** Start up with shift key down for safe mode check **5.** Startup from known-good bootable device **6.** Run latest available service utilities for sensors + thermal tests

Deep Dive

Check	Result	Action	Code
1. Power related shutdown : Check with known-good AC cable. Verify if the shutdown issues disappear with known-good AC cable.	Yes	Faulty user's AC cable. Replace user's AC cable.	**X03**
	No	Symptoms unchanged - Go to step 2	

2. Activity related shutdowns: Reset SMC and PRAM and verify that shutdown issue still happens.	Yes	Check with booting from known-good bootable drive: go to step 3	
	No	Shutdown cause was related to SMC or Pram programmed shutdown settings or corruption, and was resolved by reverting them to default settings.	
3. Boot from a known-good bootable drive (external bootable drive or similar system set as FireWire Target mode) , verify that shutdown issue still happens.	Yes	Go to step 4	
	No	Shutdown events do not happen on known-good OS. Reinstall Mac OS on customer hard drive, update OS with latest version and check if any firmware update is available.	
4. Hardware-related shutdowns: Run the latest available service diagnostics and verify if a sensor failure is reported.	Yes	-If a Temperature or a Fan sensor failure is reported, go to step 5 -If a Voltage or a Current sensor failure is reported, replace logic board.	**M23**
	No	Setup ASD to loop test suite for burn in tests and go to step 5. If no failure is found after burn in tests, return unit to customer for no failure found.	

5. Verify if a thermal sensor or fan failure is reported by latest available service diagnostics.	Yes	- If a fan failure is reported, check for fan cable seating and retest. If same failure happens when retesting, replace fan with known-good one and retest. If issue does not happen anymore with the known-good fan, replace user's fan. - If a thermal failure is reported, check for cause of excessive temperature, (like clogged fan, disconnected sensor cable, obstructed vent, dust in heatsink fin) and retest. If still failing locate affected sensor and replace it if available as a standalone part, or replace part where sensor is integrated (logic board, power supply, heatsink) according to the sensor location table . Go to step 6	**X22** **X03** **M23** **P17** **X10**
	No	Replace Thermal module Go to step 6	**X10**
6. Isolate if issue solved. Verify if shutdown/issue does not happen anymore after part exchange.	Yes	Issue fixed	
	No	Replace logic board with corresponding symptom: -if for thermal error cause -if for other cause	 **M18** **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 Mac mini Install DVD, from the same model of computer setup in Target Disk Mode, or from compatible known-good OS on an external drive. Both AirPort and Bluetooth services are available when booted from the Install disk. **2.** Ensure that all software and firmware updates for the computer have been installed to take advantage of any available bug fixes. **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 which hardware driver was loading when kernel panic occurred. **6.** For more information on kernel panics refer to KBase article http://support.apple.com/kb/HT1392

Deep Dive

Check	Result	Action	Code
1. Run the latest available service utilities, or try to run the Apple Hardware Test (with or without the Install DVD available) by pressing the D keyboard key on startup. Does the computer boot up to any of these diagnostics?	Yes	Run all available tests and proceed with results. If diagnostics still boot with a kernel panic, go to step 2.	
	No	Go to step 2.	

2. Remove all external peripheral devices including keyboard and mouse. Does computer now start without any kernel panic?	Yes	Add peripheral devices one at a time and restart each time until the kernel panic repeats. Replace device whose addition causes 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 type is being used.	**X01**
	No	Go to step 4.	
4. Remove bottom cover, disconnect AirPort antenna and remove shield, disconnect and remove fan and cowling, then disconnect the following cables from logic board before being able to extract it :HDD, ODD/HDD, Ambient sensor, HD sensor, ODD/HD sensor, IR/LED cable. Disconnect the AirPort / Bluetooth card flex cable and retest. Does the computer start without kernel panic now?	Yes	Go to **AirPort Card Kernel Panic** symptom flow.	
	No	Go to step 5.	
5. Reconnect the Optical drive (if present), but do not reconnect the Hard Drive cable on logic board and startup from the original Mac mini Install DVD inserted in internal optical drive (if present, or in the optical drive from another computer setup in Target Disk Mode), or from and 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 Optical Drive/ Second Hard Drive cable from logic board and test. Does the computer start without kernel panic now?	Yes	Go to **Optical Drive not recognized** symptom flow if an optical drive is present, Go to **Hard Drive Not Recognized** symptom flow. If a second hard drive is present	
	No	Replace logic board.	**M06**

No Video

Unlikely cause: hard drive, optical drive, speakers

Quick Check

Symptoms	Quick Check
No Video • No image.	**1.** Inquire which video port and cable is used by customer. **2.** Check connectors and cables for pin damage. **3.** Check both computer DisplayPort and HDMI connections with known-good displays. **4.** (DisplayPort) If DisplayPort to DVI adapter cable is used in customer's configuration, check it on a known-good computer **5.** (HDMI) If issue only happens on customer's HDMI display, make sure that he selected the correct AV input, that he connected directly the computer to display and that he is using known-good HDMI cable. **6.** Reset SMC. **7.** Go to Deep Dive.

Deep Dive: No Video

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. (DisplayPort) Connect supported external display via mini DisplayPort. Verify whether image appears correctly on external display when system is booted.	Yes	Video present. Verify system functionality and return to user or jump to appropriate display troubleshooting flow.	
	No	Go to step 3.	

3. (HDMI) Connect supported known-good external display on HDMI port. Select HDMI input on display and verify whether image appears correctly on external display when system is booted.	Yes	Video circuitry on logic board functional. Return to customer or jump to appropriate display issue troubleshooting flow.	
	No	Go to step 4	
4. Replace with known-good SDRAM and verify that the computer displays video.	Yes	Install user's SDRAM and test. If no video issue reoccurs, replace SDRAM. Verify that the correct SDRAM type is being used.	**X01**
	No	Replace logic board. Retest.	**M03**

Corrupted Video

Unlikely cause: Adapter, hard drive, optical drive, fan, or speaker.

Quick Check

Symptoms	Quick Check
Corrupted Video • Text and graphics appear fuzzy • Image corrupted	**1.** Set System Preferences/Display to a 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 display and cable should be tested further. **4.** Boot from install DVD or another known-good volume to determine whether a potential software/driver issue exists. **5.** Verify if issue can be reproduced on both DisplayPort and HDMI ports. **6.** Go to Deep Dive.

Deep Dive

Check	Result	Action	Code
1. Boot from Original Mac mini Install DVD inserted in internal optical drive (or in optical drive of another computer setup in Target Disk Mode), and verify whether issue is still visible.	Yes	Go to step 2.	
	No	Issue likely caused by installed software or driver issue. Troubleshoot for software issues. Make sure all software updates have been installed.	
2. Use known-good SDRAM in the system. Does the corrupted video issue still appears?	Yes	Go to step 3.	
	No	Reinstall user's SDRAM and test. If corrupted video issue repeats, replace SDRAM. Verify that the correct SDRAM type is being used.	**X01**
3. Connect a known-good external DisplayPort display, then an HDMI display (or a DVI display via an HDMI to DVI adapter) to each video ports and verify if issue only happens to one of the ports.	Yes	Issue is isolated to one of the display ports. Go to step 4.	
	No	Replace Logic board and go to step 5	**M04**
4. Inspect display connectors and display cables and reseat them. Does the issue persist?	Yes	Replace Logic board and go to step 5.	**M04**
	No	Issue likely caused by poor connection/cable. Replace cable if Apple, and return computer to user.	**X03**
5. After logic board exchange, customer returns system with same video issue.	Yes	User's display or display cable may be incompatible(s) with the Mac mini. Recommend user to direct connect the display to computer, and contact the display/cable/switcher manufacturer for support and service.	
	No	Issue resolved with replacement logic board.	

Burnt Smell/Odor

Unlikely cause: speakers, microphone, housing

Quick Check

Symptoms	Quick Check
Burnt Smell/Odor • Burning smell • Unusual odor	**1.** Verify source of smell/odor is emanating from the system. **2.** Refer to KBase articles: http://support.apple.com/kb/TA22044 or http://support.apple.com/kb/TA22045. **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. **6.** Go to Deep Dive.

Deep Dive

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

3. Can the source of the odor be located using nose?	Yes	Replace affected 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.	

Noise, Hum, Vibration

Unlikely cause: enclosure, cables.

Quick Check

Symptoms	Quick Check
Noise/Hum/Vibration • Buzzing noise • Rattling noise • Ticking noise • Squeaking	**1.** Verify that the vents on the bottom and back of the system are free of dust and other obstructions that might inhibit proper airflow through the system. **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 system to resolve the issue. **3.** Eject optical media from optical drive. Out of balance optical media can generate audible noise. To resolve try a different brand of media. For additional information jump to ' Optical Drive Noisy' symptom flow. Disconnect all third party devices and confirm whether the odor is being generated by the device. **4.** Play sound sample at loud and soft volume levels to determine if the noise is caused by the speaker or the amplifier circuit. Jump to 'Distorted sound from built-in speaker symptom flow for additional information. **5.** Go to Deep Dive.

Deep Dive

Check	Result	Action	Code
1. Run latest available service diagnostics. Was an error reported?	Yes	Suspect possible fan or sensor error. Check fan cable connection to the logic board.	
	No	Go to step 2.	
2. Does the noise sound like fan running faster than expected?	Yes	Reset SMC by disconnecting power cord for ~15 seconds then retest. If issue persists 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 media being used. Jump to 'Optical Drive Noisy' symptom flow.	
	No	Go to step 4.	
4. Mute the system volume. Connect a pair of headphones to audio out port. Verify whether the issue still occurs.	Yes	Go to step 5.	
	No	Suspect issue with speaker or audio circuitry. Jump to 'Distorted Sound From Internal Speaker' symptom flow.	
5. Remove fan and rotate the blades. Verify that fan blades spin smoothly without interference with fan housing.	Yes	Go to step 6.	
	No	Replace fan.	**X23**
6. Reinstall fan, carefully ensuring that its cable is routed properly and there's no interference with the fan blades. After reassembling system verify that the noise issue is resolved.	Yes	Proper reassembly resolved noise issue. Suspect issue was caused by interference from wiring, or possible fan housing distortion when installed in system.	
	No	Go to step 7.	

7. Remove bottom cover, disconnect AirPort antenna and remove shield, disconnect and remove Fan and cowling, then disconnect one at a time each following cable and retest :HDD, ODD/HDD, then power ON the system each time . Determine if noise issue goes away when one of these modules is disconnected. Note: Do not keep system On for long, when fan is disconnected.	Yes	Identify, inspect, and if necessary, replace the part that caused the noise until it was disconnected from the system.	
	No	All parts verified. Verify that the correct symptom flow is being used.	

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 symptom flow.** **3.** Attempt to boot from Install DVD inserted in internal optical drive (or in optical drive of another computer setup in Target Disk Mode) 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 **smfeedback@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 • AirPort or Bluetooth cannot be enabled. • AirPort/Bluetooth card not available in System Profiler • Unable to join networks or pair devices • Intermittent device or connection dropouts • Limited wireless range	**1.** Verify that AirPort or Bluetooth is turned ON , **2.** (AirPort) Make sure that a network is available and selected. **3.** (AirPort) Run the Apple System Profiler and verify that installed AirPort card supports the channel number used by the wireless access point. **4.** (AirPort) Check if the wireless access point requires special connection and encryption protocols. **5.** (AirPort) Check the number of users trying to use AirPort in the area for possible network congestion (available bandwidth). **6.** (Bluetooth) If customer complaints about a Bluetooth issue with his input device, first use a known-good Bluetooth input device to perform tests with computer. Then test customer's Bluetooth device on known-good computer to define which side is creating the communication issue. **7.** (Bluetooth) Make sure that customer is not using too many Bluetooth devices, and that disabling one of them does not solve the issue. **8.** Isolate potential OS related issues by starting up from another bootable drive like the original Mac mini Install DVD inserted in internal optical drive (or in optical drive of another computer setup in Target Disk Mode), an up -to-date Mac OS X 10.6.X external bootable drive, or from a same model of Mac mini setup as FireWire Target Disk Mode. **9.** Check for nearby sources of interference such as microwave ovens or cordless phones. See article <http://support.apple.com/kb/HT1365>

Deep Dive

Check	Result	Action	Code
1. Open System Profiler. AirPort is listed under Network, while Bluetooth is listed under USB. Are AirPort and Bluetooth ports recognized?	Yes	Install all available software updates for AirPort/Bluetooth and go to step 4.	
	No	Remove the AirPort/Bluetooth card and examine card and logic board connectors for damage: -If no damage is found, reseat cable on logic board and on AirPort/Bluetooth card ends and retest. If both AirPort and USB Bluetooth devices are still unrecognized in System Profiler, replace the AirPort/Bluetooth flex cable and retest. Go to step 2 .-If any AirPort/Bluetooth card connector is damaged replace card and retest. -If the corresponding connector on logic board is damaged replace logic board and retest.	**X03** **N17** **M24**
2. After AirPort/Bluetooth flex cable has been replaced, are the AirPort and USB Bluetooth devices visible in System Profiler?	Yes	Issue resolved	
	No	Replace AirPort/Bluetooth card	**N18**
3. After AirPort/Bluetooth card has been replaced, are the AirPort and Bluetooth devices visible in System Profiler?	Yes	Issue resolved	
	No	Replace Logic Board	**M24**
4. Ensure that the Bluetooth antenna and the AirPort antennas cables are connected properly and not damaged. Do connection issues persist?	Yes	- For AirPort related issue, go to step 5, - For Bluetooth related issue, go to step 6.	
	No	Issue resolved.	

5. (AirPort) Create a Computer to Computer network with another known-good Mac computer using AirPort. See article **http://docs.info.apple.com/article.html?path=AirPort/5.0/en/ap2110.html**. Can you connect to this computer successfully?	Yes	Network or channel issue. Go to step 7	
	No	Double check any password required. Try connecting another known-good computer to the created network. If known-good test computer connects, replace the round AirPort antenna assembly and go to step 7	**X03**
6. (Bluetooth) Make sure that your known-good Bluetooth device is in discoverable mode, and that your computer is also in discoverable mode. Can you successfully and reliably pair the device now?	Yes	Issue resolved.	
	No	Replace the AirPort/Bluetooth card and retest. Go to step 8	**N15**
7. (AirPort) 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 the AirPort/Bluetooth card and retest. Go to step 8	**N14**
8. With the antenna(s) or card replaced, are the connection issues resolved?	Yes	Issue resolved.	
	No	Replace the logic board (Bluetooth antenna and second Airport antenna are both part of Logic Board I/O wall).	**M11**

AirPort/Bluetooth Card Kernel Panic

Quick Check

Symptoms	Quick Check
AirPort/Bluetooth 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, from same model computer setup in Target Disk Mode, or from compatible known good up-to date Mac OS X 10.6/X loaded on an external drive. Note: AirPort and Bluetooth services are available when booted from the Install disk. **2.** Ensure that all software and firmware updates for the computer and AirPort been installed.

Deep Dive

Check	Result	Action	Code
1. Remove bottom cover, disconnect AirPort antenna and remove shield, disconnect and remove fan and cowling, then disconnect the following cables from logic board before being able to extract it: HDD, ODD/HDD, Ambient sensor, HD sensor, ODD/HD sensor, IR/LED cable, Power supply cable. Disconnect AirPort/Bluetooth flex cable from logic board. Reconnect power supply and hard drive cable and retest. Does computer start without kernel panic?	Yes	Possible logic board issue. Go to Kernel Panic/System crashes symptom.	
	No	Reseat AirPort/Bluetooth flex cable to the logic board and to the AirPort/Bluetooth card and retest. If problem persists, replace AirPort/Bluetooth flex cable. Go to step 2	
2. With replacement AirPort/Bluetooth flex cable installed, does computer start without kernel panic?	Yes	AirPort/Bluetooth flex cable issue. Issue resolved.	
	No	Replace AirPort/Bluetooth card. Go to step 3.	**N13**
3. With replacement AirPort/Bluetooth card installed, does computer start without kernel panic?	Yes	AirPort/Bluetooth card issue. Issue resolved.	
	No	Possible logic board issue. Go to Kernel Panic/System crashes symptom.	

Ethernet Port/Device Issue

Unlikely cause: Adapter, hard drive, optical drive, fan

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 make and 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 on computer and verify 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 make and model, replace logic board	**M10**

3. Connect the computer to another Macintosh computer using CAT5 Ethernet cable. See article <http://docs.info.apple.com/article.html?path=Mac/10.6/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 make and 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 article <http://docs.info.apple.com/article.html?path=Mac/10.6/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 make and 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 up to date Mac OS X 10.6.X. 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 a 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 range. 30 ft. 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 Setup assistant?	Yes	Bluetooth hardware is active. Go to step 3.	
	No	Inspect and reseat AirPort/ Bluetooth card flex cable connections to logic board and to AirPort/Bluetooth card. Go to step 2	**X03**
2. Restart the machine without any wired input devices attached. Does the computer show the Bluetooth Setup assistant?	Yes	Bluetooth hardware is active. Go to step 3.	
	No	Replace the AirPort/Bluetooth flex cable.	**M11**
3. With a known-good wireless mouse on, and in discoverable mode, can you successfully pair the mouse with the assistant?	Yes	Check for stability. Go to step 4	
	No	Go to **Wireless Device Loses Connection** symptom.	

4. With the known-good wireless mouse paired, does the mouse stay connected?	Yes	Issue resolved	
	No	Inspect and reseat the Bluetooth antenna cable on the AirPort/Bluetooth card. Replace any damaged AirPort/Bluetooth card if its antenna connector is damaged, or logic board if the Bluetooth antenna is damaged (Bluetooth antenna is part of logic board I/O wall) Go to step 5	**N17** **M11**
5. With the wireless mouse paired, does the mouse stay connected?	Yes	Antenna issue. Issue resolved.	
	No	Go to **Wireless Device Loses Connection** symptom	

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, see AirPort/Bluetooth: Defective Wireless Device symptom. **5.** Ensure that device is being used within range, 30 feet for Bluetooth devices. **6.** Ensure that customer is not using too many Bluetooth devices, and that disabling one of them does not solve the issue (some Bluetooth devices, when used together, may limit the needed bandwidth for an additional one). **7.** 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 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: Defective Wireless Device symptom	
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 smfeedback@apple.com stating that a suitable symptom code wasn't found. Provide as much detail as possible.	**N99**

Display

No Video

Unlikely cause: hard drive, optical drive, speakers

Quick Check

Symptoms	Quick Check
No Video • No image.	**1.** Check display DisplayPort or HDMI connections **2.** Connect known-good display and cables, **3.** For HDMI display, power on the display first and set AV input to HDMI, then power on the Mac mini. **4.** Check that customer display is directly connected to computer with known-good cables. **5.** Check connections for pin damage. **6.** Reset PRAM. **7.** Reset SMC. **8.** Go to Deep Dive.

Deep Dive: No Video

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. (DisplayPort) Connect known-good external display via Mini DisplayPort. Verify if image appears correctly on external display when system is booted.	Yes	Video present. Verify system functionality and return to user or jump to appropriate display troubleshooting flow.	
	No	Go to step 3.	
3. (HDMI) Connect known-good external display via HDMI port. Select correct HDMI input on display and verify if image appears correctly on external display when system is booted.	Yes	Video circuitry on logic board functional. Return to customer or jump to appropriate display issue troubleshooting flow.	
	No	Go to step 4	

4. Install known-good SDRAM in the system. Does the computer start with video?	Yes	Install user's SDRAM and test. If no video issue persist, replace user's SDRAM. Verify that the correct SDRAM type is being used.	**X01**
	No	Go to step 5	
5. Take apart system to access, remove battery, check battery voltage , reinstall good backup battery and retest. Does the computer start with video?	Yes	Issue solved. Corrupted power management or depleted backup battery caused the issue. Return system to customer.	
	No	Replace logic board. Retest.	**M03**

Corrupted Video

Unlikely cause: Adapter, hard drive, optical drive, fan, or speaker.

Quick Check

Symptoms	Quick Check
Corrupted Video • Text and graphics appear fuzzy • Image corrupted	**1.** Connect known-good display and cables, Power on the display first, then power on the Mac mini. Set System Preferences/Display 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 display and cable should be tested further. **4.** Verify if video issue can be reproduced on both DisplayPort and HDMI ports. **5.** Verify if issue can be reproduced with every resolution and frequency setting Display in System Preferences. **6.** Boot from install DVD or another known-good volume to determine whether a potential software/driver related issue exists. **7.** Go to Deep Dive.

Deep Dive

Check	Result	Action	Code
1. Boot from Original Mac mini Install DVD and verify whether issue is still visible.	Yes	Go to step 2.	
	No	Issue likely caused by installed software or driver issue. Troubleshoot for software issues. Make sure all software updates have been installed.	
2. Use known-good SDRAM in the system. Does the corrupted video issue still appears?	Yes	Go to step 3.	
	No	Reinstall user's SDRAM and test. If corrupted video issue repeats, replace SDRAM. Verify that the correct SDRAM type is being used.	**X01**
3. Connect a known-good external DisplayPort display, then an HDMI display (or a DVI display via an HDMI to DVI adapter) to each video ports and verify if issue only happens to one of the ports.	Yes	Issue is isolated to one of the display ports. Go to step 4.	
	No	Replace Logic board and go to step 5	**M04**
4. Inspect display connector and display cables and reseat them. Does the issue persist?	Yes	Replace Logic board and go to step 5.	**M04**
	No	Issue likely caused by poor connection/cable. Replace cable if Apple, and return computer to user.	**X03**
5. After logic board exchange, customer returns system with same video issue.	Yes	User's display or display cable may be incompatible(s) with the Mac mini. Recommend user to contact the display/ cable/switcher manufacturer for support and service.	
	No	Issue resolved with replacement logic board.	

Uncategorized Symptom

Quick Check

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

Mass Storage

Hard Drive(s) Not Recognized

Unlikely cause: power supply, wireless card, fan, speaker

Quick Check

Symptoms	Quick Check
Drive Is Not Recognized **Drive Does Not Boot** • 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 original Mac mini Install DVD inserted in internal optical drive (or in the optical drive of another computer setup in Target Disk Mode), or from and external up to date Mac OS X10.6.X drive. 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. Note: Make sure data has been backed up before erasing hard drive. **5.** Use Target Disk Mode to attempt to mount user's hard drive on a known-good similar 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 inserted in internal optical drive (or in the optical drive of another computer setup in Target Disk Mode), or from an external drive 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 rerun Disk utility 'Verify' function to verify that it 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 original Mac mini Install DVD. Verify that installation process completes. Note: Make sure data has been backed up before erasing hard drive.	Yes	Go to step 9	
	No	Go to step 5	
5. Inspect both ends of the hard drive cable and connectors for bent pins, or other damage to the cable. Does cable seem in good shape?	Yes	Reseat hard drive cable and go to step 6.	
	No	Replace hard drive cable and retest.	**X03**
6. After cable was reseated, verify that system boots successfully to hard drive, and that Disk utility 'Verify' function reports no errors.	Yes	Issue resolved by cable reseat.	
	No	Replace hard drive cable and go to step 7.	**X03**
7. After hard drive cable was replaced, verify that system boots successfully to hard drive, and that Disk utility 'Verify' function reports no errors.	Yes	Issue resolved by cable replacement.	
	No	Remove user's hard drive and install a known good up to date Mac OS X 10.6 bootable hard drive, or blank hard drive that you'll first restore by booting from the original Mac mini Install DVD. Go to step 8	
8. After hard drive was restored or replaced with known-good one, verify that system boots successfully to hard drive, and that Disk utility 'Verify' function reports no errors.	Yes	Replace defective user's drive.	**H05**
	No	Cable was replaced and installed known-good Hard Drive did not fix the issue: replace logic board.	**M19**

Hard Drive Read/Write Error

Unlikely cause: power supply, wireless card, fan, speaker

Quick Check

Symptoms	Quick Check
Drive Read/Write Error **Drive Bad Sector/Defective** **Drive Formatting Issues** • Cannot save documents • Read/write error message • Hang when accessing or saving data	**1.** Boot from Install DVD inserted in internal optical drive (or in the optical drive of another computer setup in Target Disk Mode), or from an external bootable drive. 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 original Mac mini Install DVD. **4.** Use Target Disk Mode to mount user's hard drive on a known good similar computer. Use Disk Utility on host computer for Quick Checks 1 through 4.

Deep Dive

Check	Result	Action	Code
1. Boot from Mac mini Install DVD, 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 from internal hard drive 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 original Mac mini Install DVD. Verify that installation process completes. Note: Make sure data has been backed up before erasing hard drive.	Yes	Go to step 7	
	No	Go to step 4	
4. Inspect both ends of the hard drive cable and connectors for bent pins, or other damage to the cable. Does cable seem in good shape?	Yes	Reseat hard drive cable and go to step 5.	
	No	Replace hard drive cable and retest.	**X03**

5. After cable was reseated, verify that system boots successfully to hard drive, and that Disk utility 'Verify' function reports no errors.	Yes	Issue resolved by cable reseat.	
	No	Replace hard drive cable and go to step 6.	**X03**
6. After hard drive cable was replaced, verify that system boots successfully to hard drive, and that Disk utility 'Verify' function reports no errors.	Yes	Issue resolved by cable replacement.	
	No	Remove user's hard drive and install a known good up to date Mac OS X 10.6 bootable hard drive, or blank hard drive that you'll first restore by booting from the original Mac mini Install DVD. Go to step 7	
7. After hard drive was restored or replaced with known-good one, verify that system boots successfully to hard drive, and that Disk utility 'Verify' function reports no errors.	Yes	Replace defective user's drive.	**H05**
	No	Cable was replaced and installed known-good Hard Drive did not fix the issue: replace logic board.	**M19**

Hard Drive Noisy

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

Quick Check

Symptoms	Quick Check
Hard Drive Noisy • Noise during start up • Noise during operation • Noise when drive is copying or saving data	**1.** Start up from original Mac Mini 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. Disconnect hard drive and optical drive (or second hard drive) cables from logic board, and startup computer to determine if noise is caused by the computer fan.	Yes	Go to Fan Failures/Thermal issues symptom flow.	
	No	Go to step 2	
2. If an optical drive is present, reconnect optical drive cable to logic board, insert the Mac mini Install DVD in optical drive and startup computer to verify if noise is caused by optical drive.	Yes	Go to Optical Drive Noisy symptom flow.	
	No	Go to step 3	
3. Reconnect hard drive cable on logic board and boot from original Mac mini Install DVD inserted in internal optical drive (or in the optical drive of another computer setup in Target Disk Mode) or from an external drive with Mac OS 10.6.3 and run Disk Utility. Verify that user hard drive is available for Disk Utility to repair.	Yes	Go to step 4	
	No	Go to Drive not recognized/ mount symptom flow.	
4. Run Disk Utility 'Repair Disk' function and verify that it completes successfully.	Yes	Go to step 5	
	No	Go to step 6	
5. Re-start 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.	
6. Erase disk and reinstall Mac OS using original Mac mini Install DVD. Verify whether the noise is still present. Note: Make sure data has been backed up before erasing hard drive.	Yes	Replace hard drive. Go to step 7.	
	No	Data error issue resolved by Disk Utility. Return system to user.	

7. With replacement hard drive installed verify whether noise level is noticeably quieter than customer's hard drive.	Yes	Customer's drive appears noisy: Replace customer's hard drive and return system to customer.	**H06**
	No	Customer hard drive noise level is similar to a known-good one and does not require repair. Reinstall user's hard drive and return system to customer.	

Uncategorized Symptom- Hard Drive

Quick Check

Symptoms	Quick Check
Uncategorized Symptom • Unable to locate appropriate symptom	**1.** Run latest available service utilities to check for presence of both SATA devices communicating with the logic board. **1.** Try starting the system with the "D" key held down on keyboard to check if Apple Hardware Test is present on hard drive and does boot. **2.** Try starting the system with the "D" key held down on keyboard while the Mac mini Install DVD is inserted in the internal optical drive (or in the optical drive of another computer setup in Target Disk Mode), to run the Apple Hardware Test from Install DVD. **3.** Remove SDRAM and install Known Good SDRAM and start system. This will verify the SDRAM is not the cause of a startup issue. **4.** Set up Mac mini to test in FireWire Target Disk Mode, and connect it to another known-good computer with Mac OS 10.6.3 to run Disk Utility and repair directory structure. **5.** Setup another similar computer in FireWire Target Disk Mode, and boot Mac mini from its drive (or from an external FireWire drive with compatible Mac OS 10.6.3) to run Disk Utility and verify the Mac mini hard drive SMART status and repair directory structure.

Deep Dive-Hard Drive Uncategorized Symptoms

Check	Result	Action	Code
1. Verify whether an existing symptom chart applies to the issue reported by the customer.	Yes	Jump to appropriate symptom chart flow.	
	No	Document failure symptom and send feedback to **smfeedback@apple** stating that a suitable symptom code could not be found.	

Optical Drive Not Recognized

(For systems with optical drives)

Quick Check

Symptoms	Quick Check
Drive Not Recognized/Mount • Discs inject and eject, but do not appear in Finder	**1.** Use Apple System Profiler Serial-ATA section to see if the optical drive appears. **2.** Apple System Profiler Serial-ATA section will show any media inserted. **3.** 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. **4.** Check that issue happens with both CD and DVD types of media. If only one type of media is recognized, the optical drive may suffer from a laser issue.

Deep Dive

Check	Result	Action	Code
1. Is the optical drive listed in the Serial-ATA section of the Apple System Profiler?	Yes	Optical drive communicating with logic board Go to step 2	
	No	Logic board not communicating with optical drive. Go to step 3	

2. Test both CD and DVD media. Verify that optical drive can read both types of CD media and DVD media.	Yes	Go to step 6	
	No	Drive has a laser issue. Replace the optical drive and retest	**J03**
3. Remove bottom cover, disconnect AirPort antenna and remove shield, disconnect and remove fan and cowling, then reseat the optical drive flex cable on logic board and optical drive ends. Reinsert logic board and verify that optical drive is listed in the Serial-ATA section of the Apple System Profiler?	Yes	Go to step 6	
	No	Go to step 4	
4. Disconnect cables from logic board, remove hard drive, power supply, and optical drive and replace optical drive cable with known-good one. Verify that optical drive is listed in the Serial-ATA section of the Apple System Profiler?	Yes	Replace defective user's optical drive cable and retest.	**X03**
	No	Replace optical drive. Go to step 5.	
5. With replacement optical drive installed, verify that optical drive is listed in the Serial-ATA section of the Apple System Profiler?	Yes	Optical drive issue. Replace user's optical drive . Go to step 6.	**J09**
	No	Replace logic board. Go to step 6.	**M19**
6. Test read compatible known good CD and DVD media (Install DVD). Verify media is recognized and reads reliably.	Yes	Issue does not happen or was resolved since.	
	No	Check optical drive flatness and correct installation in the computer case. Jump to Optical Drive Won't Accept/ Eject Media symptom flow.	

Optical Drive Won't Accept/Eject Media

Quick Check

Symptoms	Quick Check
Drive Won't Accept Media **Drive Won't Eject Media** • 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 see Optical Drive not recognized. **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. Remove bottom cover, disconnect AirPort antenna and remove shield, disconnect and remove fan and cowling, then check the optical drive flex cable on logic board. Visually inspect connectors for any debris, damage or bent pins. If no damage, reseat optical drive flex cable on logic board, reinsert logic board and verify that optical drive is listed in the Serial-ATA section of the Apple System Profiler?	Yes	Go to step 5.	
	No	Replace optical drive cable and retest. If still not visible in System Profiler go to step 3	**X03**
3. Connect a known-good optical drive and flex cable to logic board. Verify that known-good optical drive is listed in the System Profiler device tree.	Yes	Go to step 4.	
	No	Suspect logic board. 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 issue Replace user's optical drive: -for an inject issue, -for an eject issue.	**J01** **J02**
	No	Optical drive cable verified or replaced, optical drive verified or replaced. Replace logic board and retest.	**M19**
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.	**J05**
6. With known good optical media (Install disc), test for media inject/eject. Does drive accept and eject known good media?	Yes	User media issue. No repair necessary. Suggest user to investigate use of different media.	
	No	Go to step 3	

Optical Drive Read/Write Error

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 optical drive of the same type. **4.** Check both CD and DVD media types. If only one type of media is producing errors, there maybe a laser issue.

Deep Dive

Check	Result	Action	Code
1. Verify if media is free to spin without optical drive scraping edge or surface of media?	Yes	Go to step 2	
	No	Check drive correct geometry while installed. 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 if only one media is read. Replace the optical drive. If both types media fail, go to step 3	**J03**
3. Remove bottom cover, disconnect AirPort antenna and remove shield, disconnect and remove fan and cowling, then check the optical drive flex cable on logic board. Visually inspect connectors for any debris, damage or bent pins. If no damage, reseat optical drive flex cable on logic board, reinsert logic board and verify that both types of media read reliably now.	Yes	Go to step 6	
	No	Go to step 4	
4. Connect known good optical drive and cable to logic board. Do both types of media reliably read now?	Yes	Logic board not in cause. Go to step 5	
	No	Issue also happens with known-good optical drive and cable: Suspect Logic board. Replace logic board.	**M19**
5. Connect known-good optical drive with original cable. Do both types of media reliably read now?	Yes	Cable not in cause, replace user's defective optical drive.	**J03**
	No	Replace optical drive cable an reinstall user's optical drive.	**X03**

6. Test write data to compatible CD and DVD media. Verify burned media is recognized and reads reliably.	Yes	Issue resolved.	
	No	Issue may be media -related. Check other sources of media on computer, and check suspected media on other similar Mac mini model.	

Optical Drive Not Performing to Specifications

Quick Check

Symptoms	Quick Check
Optical Drive Not Performing to Specifications • 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 types. If only one type of media is producing errors, you may have a laser issue.

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 if only one media is read. Replace the optical drive. If both types of media fail, go to step 3	**J03**

2. Remove bottom cover, disconnect AirPort antenna and remove shield, disconnect and remove fan and cowling, then check the optical drive flex cable on logic board. Visually inspect connectors for any debris, damage or bent pins. If no damage, reseat optical drive flex cable on logic board, reinsert logic board and verify that both types of media are read reliably now.	Yes	Go to step 5	
	No	Go to step 3	
3. Connect known good optical drive and cable to logic board. Do both types of media reliably read /write now?	Yes	Go to step 4	
	No	Go to step 5	
4. Test write data to compatible CD and DVD media. Verify burned media is recognized and reads reliably.	Yes	Issue resolved.	
	No	Go to step 5	
5. The balance of some media may not perform at the 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 user's optical drive.	**J07**

Optical Drive Noisy

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 type of machine to rule out media issue. **2.** Check with Known Good Discs like the Install disks that came with the computer. **3.** Check to see if noise occurs without media in the drive. If so, check hard drive and fan caused noise.

Deep Dive

Check	Result	Action	Code
1. Optical drive should perform a single reset sequence. Is optical drive constantly seeking or cycling eject mechanism without an optical disc installed??	Yes	Drive mechanism damaged. Replace optical drive.	**J05**
	No	Go to step 2	
2. Verify media does not exceed maximum thickness specification <**http://support.apple.com/kb/HT2446**> Using known good CD and DVD media, does media spin without optical drive scraping edge or surface of media?	Yes	Go to step 3	
	No	Drive mechanism damaged. Replace optical drive.	**J05**
3. Noise when spinning discs before mounting on the desktop and reading data is normal. Disc spin should cease 30 seconds after mounting on the desktop. Is the noise related to disc spin and is it louder than another computer of the same type and drive?	Yes	Go to step 4	
	No	Go to step 5	
4. Remove the optical drive and reseat the drive into it's drive mounting bracket. Reinstall the drive and verify if the drive is still noisy.	Yes	Drive mechanism damaged. Replace optical drive.	**J04**
	No	Optical drive not mounted correctly. Issue resolved	
5. Noise when ejecting media is normal. Eject known good media and listen to noises. Is the noise related to eject activity and is it louder than another computer of the same type and drive?.	Yes	Drive mechanism damaged. Replace optical drive.	**J04**
	No	Noise not related to optical drive. Check for hard drive noise or fan noise.	

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 **smfeedback@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: power supply, fan, optical drive, hard drive

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, and run PhotoBooth to check that invisible IR signal is coming from remote. **3.** Make sure "Disable remote control infrared receiver" checkbox in the Security **4.** Ensure that all available Software Updates have been applied to the computer for access to the latest bug fixes.

Deep Dive

Check	Result	Action	Code
1. 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 3	
	No	Possible IR board issue. Go to step 4	
2. With a replacement battery, can you see a white flashing light from the Apple Remote in the PhotoBooth video preview window?	Yes	Battery issue. Issue resolved	**X05**
	No	Apple Remote defective. Replace the Apple Remote.	**X04**
3. 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 4	

4. Open the Apple System Profiler. Selecting USB, do you see "IR Receiver" listed?	Yes	IR Receiver reporting on USB bus. Check for IR cable. Go to step 5	
	No	Remove bottom cover, and fan, and reseat the IR sensor connection to logic board. Replace any damaged IR sensor cable assembly. Go to step 5.	**X03**
5. Remove bottom cover, disconnect AirPort antenna and remove shield, disconnect and remove fan and cowling, then disconnect IR/LED sensor cable and connect a known-good sensor assembly to logic board to verify that IR sensor functionality is restored.	Yes	Take apart system to access the IR lens and sensor ,and verify that they are correctly installed and not blocked by any foreign element. If correctly installed, replace IR sensor cable assembly.	**X13**
	No	Replace logic board (IR controller is located on logic board).	**M99**

Audio: Built-in Speaker Has Distorted Sound

Quick Check

Symptoms	Quick Check
Audio: Built-in Speakers Have Distorted Sound • No audio from built-in speaker. • Audio from speaker is distorted	**1.** Launch System Preferences and select Sound/Output options. Verify that the sound output option is set to system's internal speaker and that 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 speaker can cause distortion.

Deep Dive

Check	Result	Action	Code
1. Launch System Preferences and select Sound/Output options. Set speaker balance to the middle, then play a sound file. Verify that sound is generated by the speaker and that the sound quality is acceptable.	Yes	Speaker and amplifier circuitry OK. Go to step 3.	
	No	Distortion detected in speaker. Go to step 2	
2. 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 3.	
	No	Audio CODEC or amplifier issue suspected. Replace logic board. Retest.	**M09**
3. Visually inspect speaker cone and speaker connection cable for damage. Does the speaker have visible damage?	Yes	Replace damaged speaker. Retest.	**X09**
	No	Go to step 4.	
4. Install known-good speaker. Verify that sound quality improves.	Yes	Speaker bad. Replace speaker and retest.	**M09**
	No	Suspect speaker amplifier. Replace logic board.	**M09**

Audio: Built-in Speaker Has No Audio

Quick Check

Symptoms	Quick Check
Audio: Built-in Speakers Have No Audio • No audio from speaker. • Audio from speaker distorted	**1.** Launch System Preferences and select Sound/Output options. Verify that the sound output option is set to system's internal speaker. **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 **4.** Reset PRAM. **5.** Go to Deep Dive.

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	Insert headphones into audio out jack and retest. If issue persists, replace logic board	**M09**
2. Launch System Preferences and select Sound/Output options. Set speaker balance to the middle, then play a sound file. Verify that sound is generated by the speaker and that the sound quality is acceptable..	Yes	Speaker and amplifier circuitry OK. Go to step 3.	
	No	Replace speaker.	**X08**
3. Verify whether customer reported audio issue has been resolved.	Yes	Issue no longer present. Return system to customer.	
	No	Go to step 4.	
4. Boot system from Mac mini Install DVD, from a similar Mac mini setup as FireWire Target Disk mode, or from another bootable volume with an up to date system software. Verify whether issue still occurs.	Yes	Go to step 5.	
	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.	
5. 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	Logic board, internal speaker, and external headphone port functioning correctly. Return system to user.	
	No	replace logic board	**M09**

Audio: No Audio through HDMI or Mini DisplayPort connection.

Quick Check

Symptoms	Quick Check
Audio: No audio through HDMI or DisplayPort connection. • No audio from external display speaker.	**1.** Reset PRAM. **2.** Connect a known-good HDMI/Mini DiplayPort display and cables, Power on the display first then power on the Mac mini. Launch System Preferences and select Sound/Output options. Verify that the HDMI /DisplayPort audio sound output option is available and selected. **3.** Check that issue happens with every media type (some copy protected media may not be playable). **4.** Check that customer is not using an additional HDMI to DVI adapter or Mini DisplayPort to HDMI adapter (some adapters may not carry the audio signals) **5.** Check that customer verified his display volume level was above zero and not muted. **6.** (HDMI) Check that customer verified that his HDMI display model audio compatibility (early HDMI displays do not support audio, or only some audio modes) **7.** Go to Deep Dive.

Deep Dive

Check	Result	Action	Code
1. Using known-good HDMI or Mini DisplayPort display and cables, select external display audio output in System Preferences Sound Output , and verify that you can set System Alert Sounds to same audio port. Note: make sure that audio output preferences are not set to Mute.	Yes	Go to step 3	
	No	Go to step 2.	

2. Insert headphones jack into audio out jack , them remove it and verify that external display audio out port becomes available in System preferences Sound Output, and sound can be played on the external display speakers.	Yes	Issue no longer present. Return system to customer.	
	No	Go to step 3.	
3. Disconnect and reconnect HDMI /Mini DisplayPort cables from computer, and verify whether external display audio out becomes available in System preferences Sound Output, and sound can be played on the external display speakers.	Yes	Issue no longer present. Return system to customer.	
	No	Go to step 4	
4. Boot system from this model of Mac mini Install DVD, from a similar Mac mini setup as FireWire Target Disk mode, or from another bootable volume with an up to date system software. Verify whether external audio issue still occurs.	Yes	Replace logic board	**M09**
	No	Known good boot volume works OK. Troubleshoot for software related issue. Isolate whether issue is application specific or whether possible operating system conflict. Make sure user data backed up before removing or reinstalling software.	

FireWire Devices Not Recognized

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 for access to the latest bug fixes.

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 make and model. Go to step 3	
	No	FireWire not recognized. Replace main logic board.	**M12**
3. Is the FireWire device recognized on a known good computer of the same make and 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.	

SD (Secure Digital) Memory Card Will Not Insert Into Slot

Unlikely cause: Optical drive, hard drive, power supply

Quick Check

Symptom	Quick Check
SD Memory Card will not insert into SD Slot SD Memory Card does not fully seat into the slot Card slot does not align with enclosure.	**1.** The SD memory card must be a 32 mm by 24 mm by 2.1 mm. You can also use thinner cards, such as MultiMediaCards (MMC). **2.** Clear any obstruction in the slot.

Deep Dive

Check	Result	Action	Code
1. Verify whether a known-good SD card fits in slot.	Yes	Ask customer to replace defective or out-of-spec SD card.	
	No	Make sure that SD card reader slot is aligned with rear cover, with no foreign material obstructing the slot, then try to insert a known-good SD card again. Go to Step 2.	
2. Verify if the memory card now fits in the SD slot.	Yes	Issue resolved. Go to step 3	
	No	Replace logic board (SD card reader is part of logic board).	**M17**
3. Verify whether the SD card now ejects and inserts without issue.	Yes	Issue resolved.	
	No	Replace logic board (SD card reader is part of logic board). .	**M17**

SD (Secure Digital) Memory Card Not Recognized By System

Unlikely cause: optical drive, hard drive, power supply

Quick Check

Symptom	Quick Check
SD Memory Card is not recognized by the system. Card does not show up on the desktop or in System Profiler	**1.** Insert customer's SD card into a known-good system and verify that it functions properly. If the card cannot be read, contact the manufacturer for support options. **2.** Verify with known-good SD Memory card that issue remains. **3.** Check correct drivers are installed for the customer's SD card type. Standard SD memory cards are supported by OS Software, but other may require specific driver software to be used. **4.** SDHC cards may require that all latest system software updates have been applied.

Deep Dive

Check	Result	Action	Code
1. Verify whether SD card inserts correctly in SD slot.	Yes	Go to step 2.	
	No	Go to SD Memory card Will Not Insert Into Slot" Symptom flow..	
2. Unlock and insert the SD card and verify whether it shows up on the desktop or in System Profiler.	Yes	Go to step 7	
	No	Go to step 3.	
3. Insert a known-good (NON SDHC) unlocked SD Memory card and verify whether Read/Write capabilities are working.	Yes	Go to step 5.	
	No	Go to step 4.	
4. Run Apple System Profiler and verify whether the SD Card reader is now listed in the USB devices	Yes	SD card reader seen. Go to step 5 .	
	No	Replace logic board (SD card reader is part of logic board). .	**M17**

5. Check that all system software have been applied before insert a known-good unlocked SDHC Memory card and verify that it can now be correctly read and written on system.	Yes	Go to step 6	
	No	Replace Logic board.	**M17**
6. Retry with customer's SD card and verify that it can now be correctly read and written on system	Yes	Issue fixed by software update. Go to step 7.	
	No	Only customer's SD card is not functioning properly. Contact vendor for support options.	
7. Lock the customer SD Card and verify whether it can't anymore be written..	Yes	System is functional.	
	No	Replace logic board.	**M17**

USB Devices Not Recognized

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 system 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 for access to the latest bug fixes.

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 same make and 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 make and model. If another computer does not recognize the device, replace the device	

Wired Keyboard Does Not Function Properly

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 system 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 for access to the latest bug fixes.

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 Port Doesn't Recognize Devices symptom	
2. Is the Caps Lock working as expected?	Yes	Go to step 3	
	No	Go to Keyboard: Specific keys do not respond symptom	
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/Reject Media	
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 the 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, reinstall Mac OS X from the Install DVD.	

Keyboard: Specific Keys Do Not Respond

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. Go 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

Quick Check

Symptoms	Quick Check
Wired Keyboard/Mouse Not Recognized • USB wired keyboard/mouse not recognized when plugged in. • Mouse scroll ball not working or not working as expected. • Mouse buttons not working or not working as expected.	**1.** The Mac mini 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.** Ensure that all available Software Updates have been applied to the computer for access to the latest bug fixes.

Deep Dive

Check	Result	Action	Code
1. Does the computer recognize the keyboard or mouse when plugged into the USB ports?	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 Port Doesn't Recognize Devices symptom	
2. Is keyboard working as expected?	Yes	Go to step 3	
	No	Go to Wired Keyboard Does Not Work Properly symptom	
3. Does the Mouse have an issue with the scroll?	Yes	See KBase article <http://support.apple.com/kb/HT1537> for steps to correct	
	No	Go to step 4	
4. Doe the 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 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 the 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. **3.** Go to Deep Dive.

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 smfeedback@apple.com stating that a suitable symptom code wasn't found. Provide as much detail as possible.	**N99**

Mechanical

Noise/Hum/Vibration

Quick Check

Symptoms	Quick Check
Noise/Hum/Vibration • Buzzing noise • Rattling noise • Ticking noise • Squeaking noise	**1.** Verify that the vents on the bottom system are free of dust and other obstructions that might inhibit proper airflow through the system. . **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 system to resolve the issue. **3.** Play sound sample at loud and soft volume levels to determine if the noise is caused by the speaker or the amplifier circuit. Jump to 'Distorted sound from built-in speaker' symptom flow for additional information.

Deep Dive

Check	Result	Action	Code
1. Run latest available service utilities to check the thermal sensors and fan functional states. Was an error generated?	Yes	Check fan connection to logic board and retest.	
	No	Go to step 2.	
2. Does noise sound like fan is 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. If an optical drive is present, 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. Jump to 'Optical Drive Noisy symptom flow for additional information.	
	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 speaker or audio amplifier circuitry. Go to 'Distorted Sound From Internal Speaker' symptom flow for additional information.	
5. Remove bottom cover, disconnect AirPort antenna and remove shield, disconnect and remove fan and rotate its blades. Verify that fan blades spin smoothly without interference from fan housing and does not produce abnormal noise.	Yes	Fan reseated, blades rotate, noise gone.	
	No	Reinstall fan , making sure that the blades do not interfere with other elements or cable routings when installed and retest. If fan does not correctly spin or has broken blade, replace affected fan.	**X23**

System Runs Hot

Quick Check

Symptoms	Quick Check
System Runs Hot • System feels very hot • Fan not operating • Fan running fast • System is noisy	**1.** Verify that the vents on the bottom are free of dust and other obstructions that might inhibit proper airflow through the system. **2.** Verify that 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. **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 the fans to run fast in order to maintain the proper internal system temperatures. If needed, quit the application or restart the system to resolve the issue. **5.** Reset SMC by unplugging power cord for ~15 seconds.

Deep Dive

Check	Result	Action	Code
1. Run latest available service utilities for thermal sensor or fan functional state. Was an error generated?	Yes	Suspect possible fan or sensor error. Check fan cable connection to the interconnect board.	
	No	Go to step 2.	
2. Does noise sound like fan is running faster than expected?	Yes	Fan 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.	
3. Remove bottom cover, disconnect AirPort antenna and remove shield, disconnect and remove fan and rotate its blades. Verify that fan blades spin smoothly without interference from fan housing.	Yes	Fan reseated, blades rotate.	
	No	Replace affected fan. Go to step 4.	**X22**

4. With replaced fan verify temperature issue is gone.	Yes	Issue resolved	
	No	Go to step 5.	
5. Using latest service utilities, verify that all thermal sensors have correct values.	Yes	Issue resolved	
	No	-If a TG0H heatsink sensor is reported failing, reseat the sensor cable on logic board. If issue persists, replace heatsink assembly -If a TH0x Hard drive, or TO0x Optical drive, TA0P Ambient sensor failure is reported, replace affected sensor assembly -If aTCxx ,TGXX , or TMxx sensor is reported failing, replace logic board module, -If a TPxx is reported failing, replace power supply module, -If a TWxx is reported failing, replace AirPort/Bluetooth card. Retest computer after part/ module has been replaced.	**X10** **M18** **P05** **N03**

Physical Damage

Quick Check

Symptoms	Quick Check
Physical Damage • 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 **smfeedback@apple.com** stating that a suitable symptom code wasn't found. Provide as much detail as possible.	**N99**

Service Source

Take Apart

Mac mini (Mid 2010)

Mac mini (Mid 2010) and Mac mini Server (Mid 2010)

General Information

Tools

The following tools are required to service the computer:

- ESD wriststrap and mat
- Torx T6, magnetized
- Torx T8, magnetized
- Torx T9, magnetized
- Hex 2mm (or 5/64-inch) wrench
- #0 Phillips screwdriver
- Logic board removal tool (922-9588)
  Important: This is a required tool to service the Mac mini (Mid 2010)
- Tweezers (optional)
- Black stick (922-5065), or other non-conductive nylon or plastic tool
- Soft cloth (to protect removed parts from scratches)
- Isopropyl alcohol and cleaning cloth (if needed)
- Scissors or razor knife to cut tape to size (if needed)
- Screw tray

Note: The logic board removal tool is required to dislodge the logic board assembly. Dislodging or removing the logic board assembly is required to access many parts (see the **First Remove Hierarchy** heading).

Refer to Knowledge Base article "Hand Tools for Desktop and Portable Repairs--AP/CA/EU/JP/LA/US" to purchase tools:

http://support.apple.com/kb/HT3452

Cosmetic Care

Cosmetic surfaces have a high exposure to potential damage or scratching, due to the method of working on the Mac mini (Mid 2010). Be extremely careful not to damage the housing and other cosmetic surfaces with inadvertent tool movements, or to damage the cosmetic Mylar on the top hard drive when removing or installing. In general, avoid scratching interior or exterior surfaces, and avoid leaving fingerprints.

Reassembly Steps

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

Important: Do not overtighten screws. Install all screws by hand. Do not use power tools.

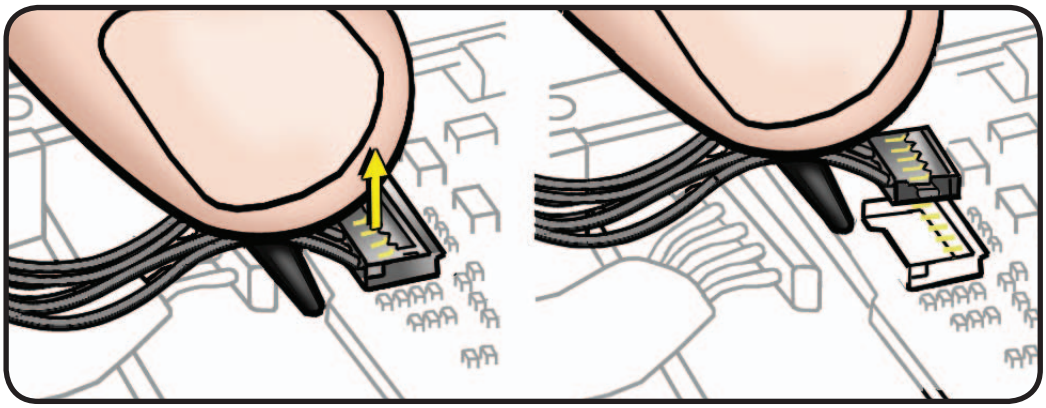
Connector Types on Logic Board

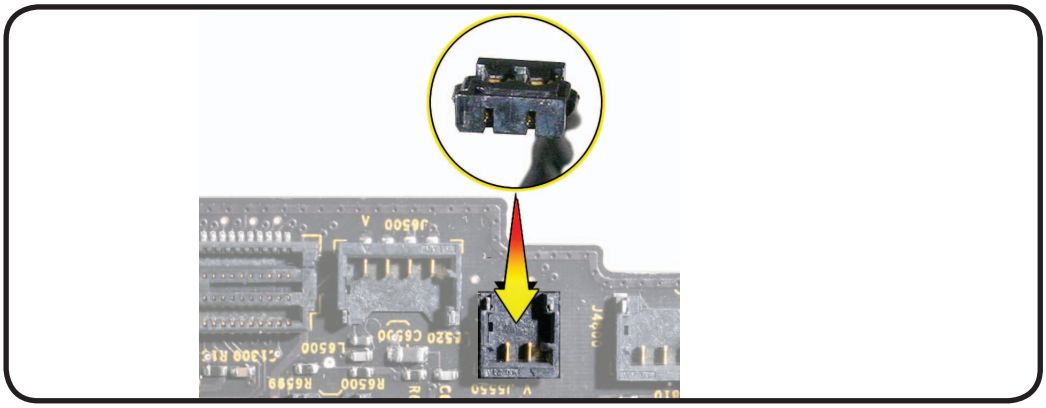
The Mac mini (Mid 2010) has many small and delicate cable connectors and screws. Use extra care and finesse to avoid damaging components.

On the logic board are two types of connectors, each requiring special handling. Make sure you read these tips before disconnecting and installing the connectors.

Vertical Insertion (JST)

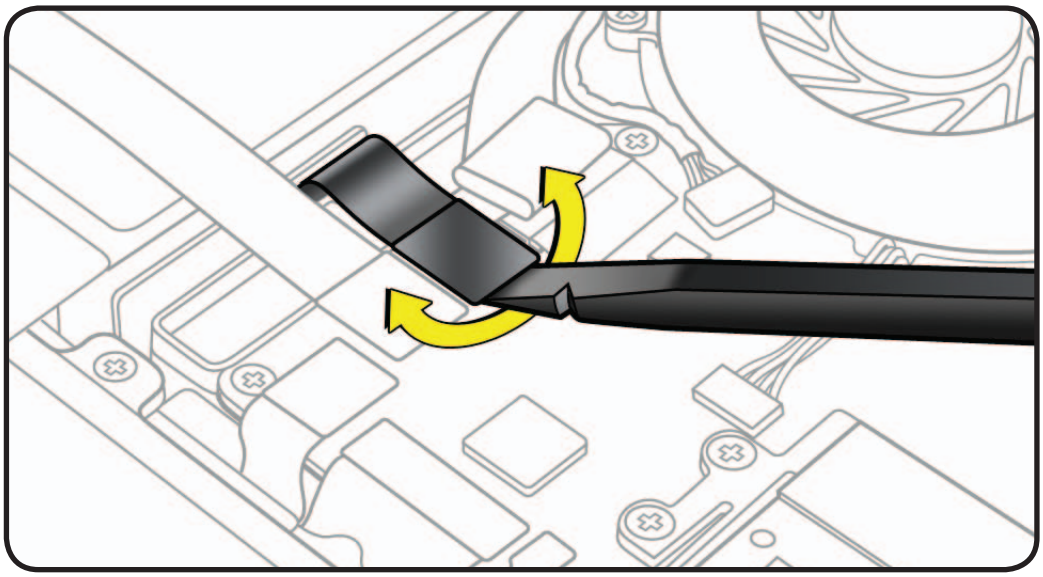
- **Important:** These connectors are extremely fragile. Use extreme care. Major repairs may be needed if damaged.
- Use a black stick under the cable, next to the connector, with a finger over the top for support, or grasp cables with tweezers, and lift straight up to remove.
- Keep connector level to board when disconnecting and reconnecting.
- When connecting, verify that the grooves in the connector face down.
- Press evenly when reconnecting or connector can be tipped up and not fully seated.





Low-Profile Solid Platform Flex

- Use black stick and gentle rocking motion to release tension to remove cable.
- Keep connector level to board and press evenly to install cable.
-



Thermal Sensor Replacement

If a replaceable thermal sensor is damaged or defective, follow the procedures below to replace.

There are three locations where thermal sensors are replaceable separately.

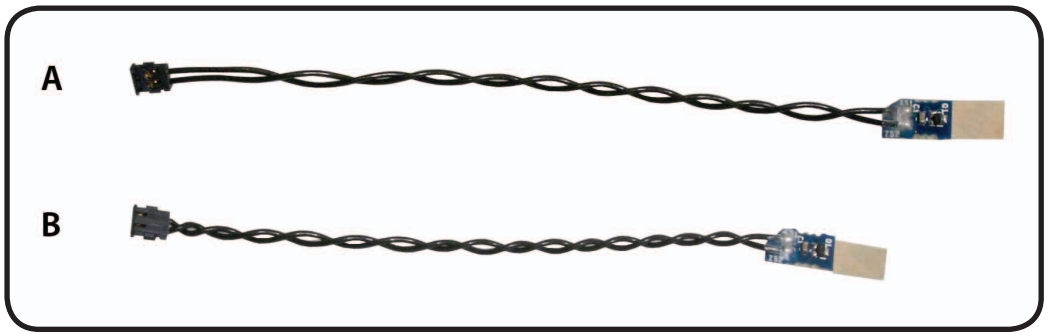
- the top hard drive flex cable (this sensor is referred to as "Ambient")
- the corner of the top hard drive
- the bottom drive (either an optical, or a server hard drive)

Notes:

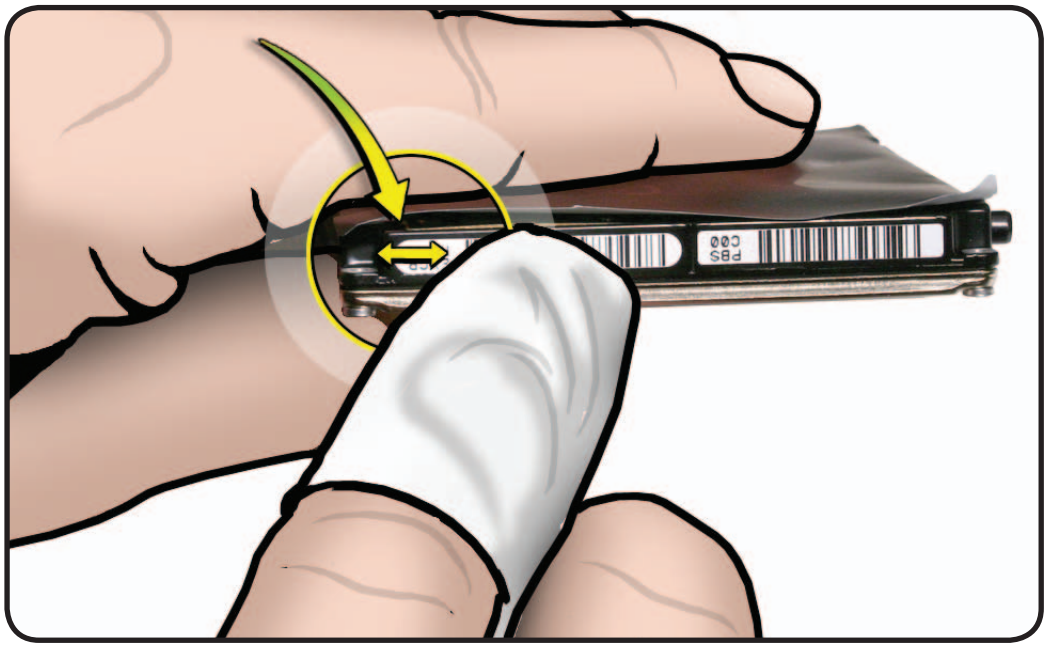
- The sensors are the same except for cable length. Make sure to use the correct sensor for the location.
- The sensors come with black Kapton tape. Use the appropriate tape for the location, as described below.

A: 076-1369 (approx. 8 cm)
- top hard drive (at corner)
- bottom hard drive (server)

B: 076-1370 (approx. 6.8 cm)
- top hard drive flex cable (Ambient)
- optical drive

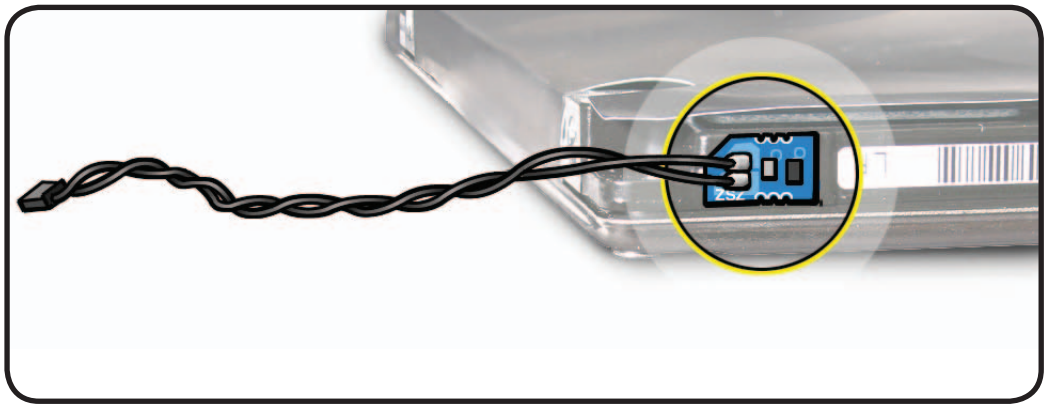


- Rub off any adhesive residue and clean the location where the sensor will be attached with isopropyl alcohol, before installing the replacement sensor.

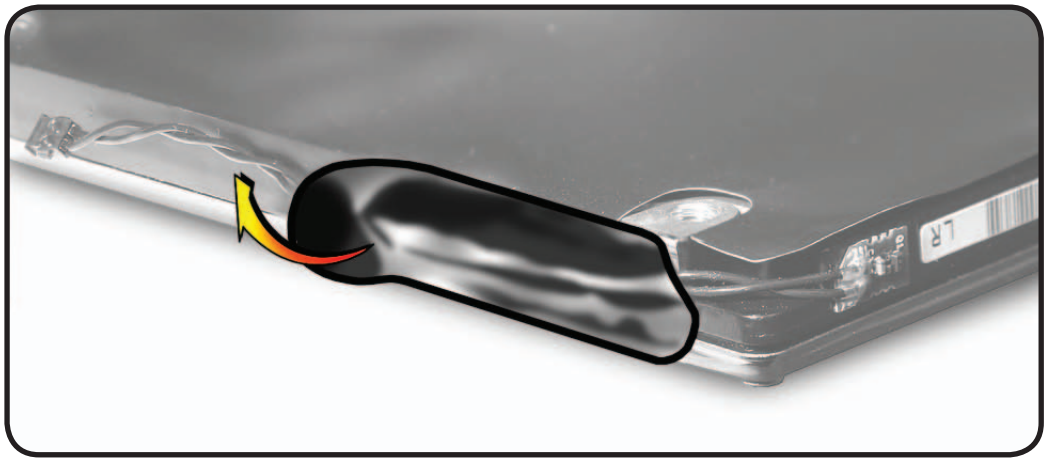


Top hard drive thermal sensor (at corner) (076-1369):

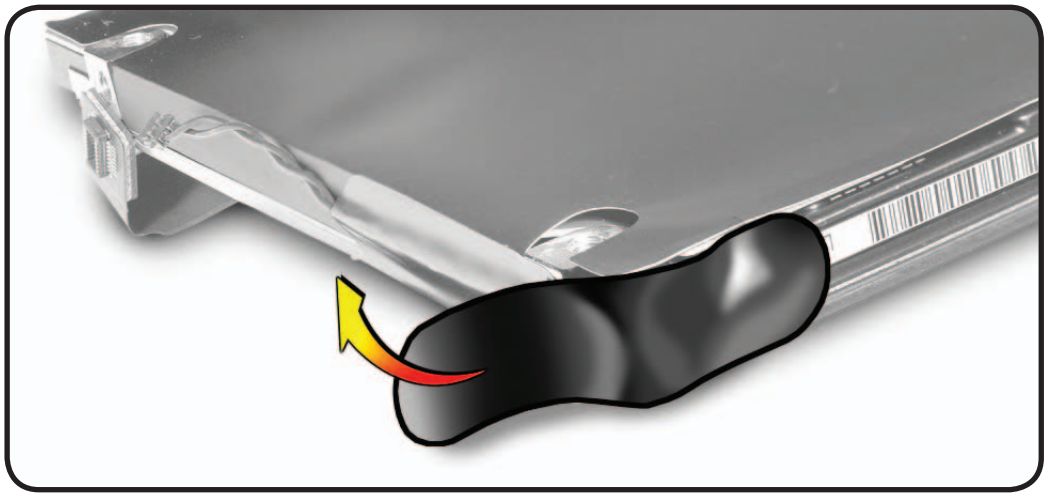
1. Remove the adhesive cover and attach the sensor pad to the location shown.



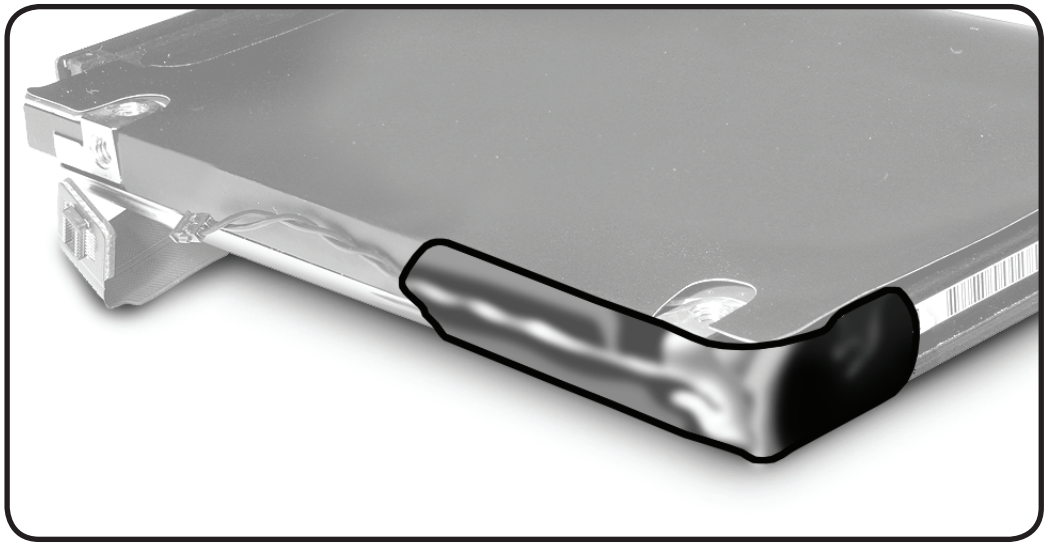
2. Guide the cable around the corner of the hard drive and secure with tape, as shown.



3. Secure the sensor with tape and fold around corner.



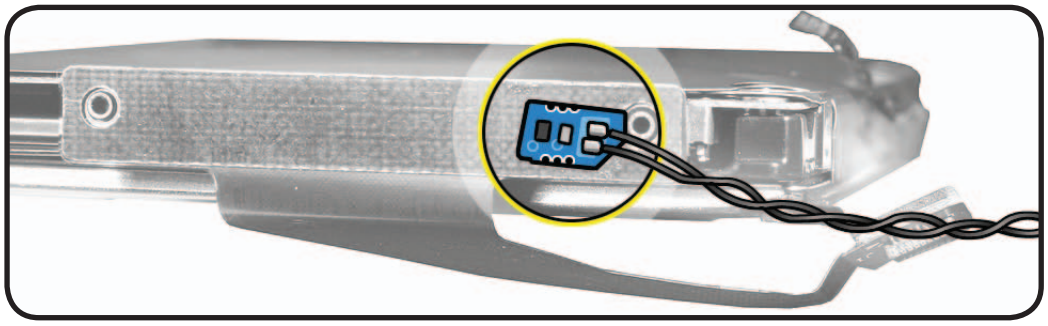
4. The finished installation should look like this.



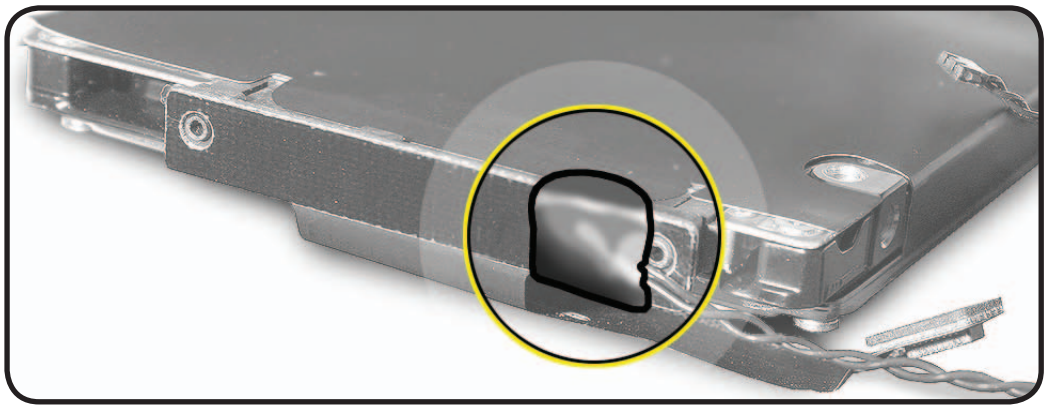
Top hard drive ambient thermal sensor (flex cable) (076-1370):

(This sensor is also replaceable by replacing the flex cable, which comes with the sensor installed.)

1. Remove the adhesive cover and attach the sensor pad to the flex cable where shown below.



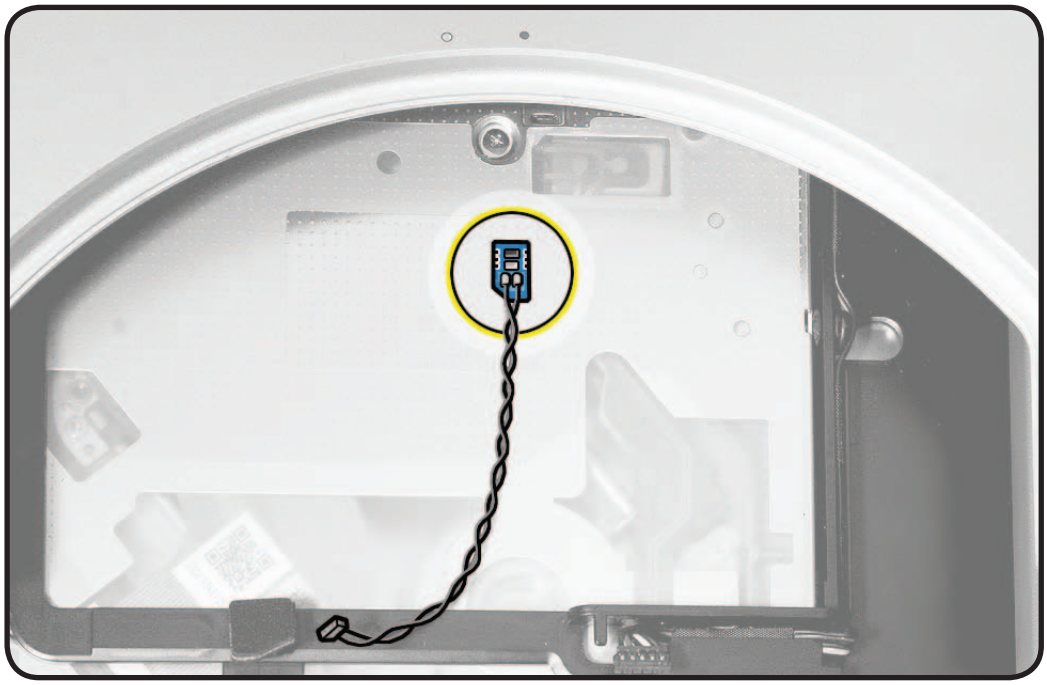
2. Verify the flex cable is installed on the hard drive.
3. Cut approximately a 1.5 cm length of the supplied black Kapton tape.
4. Orient the round end of the tape up, center the tape over the sensor and press to secure the tape over the sensor and to the flex cable, then wrap the ends of the tape over the top and bottom of the hard drive, as shown.



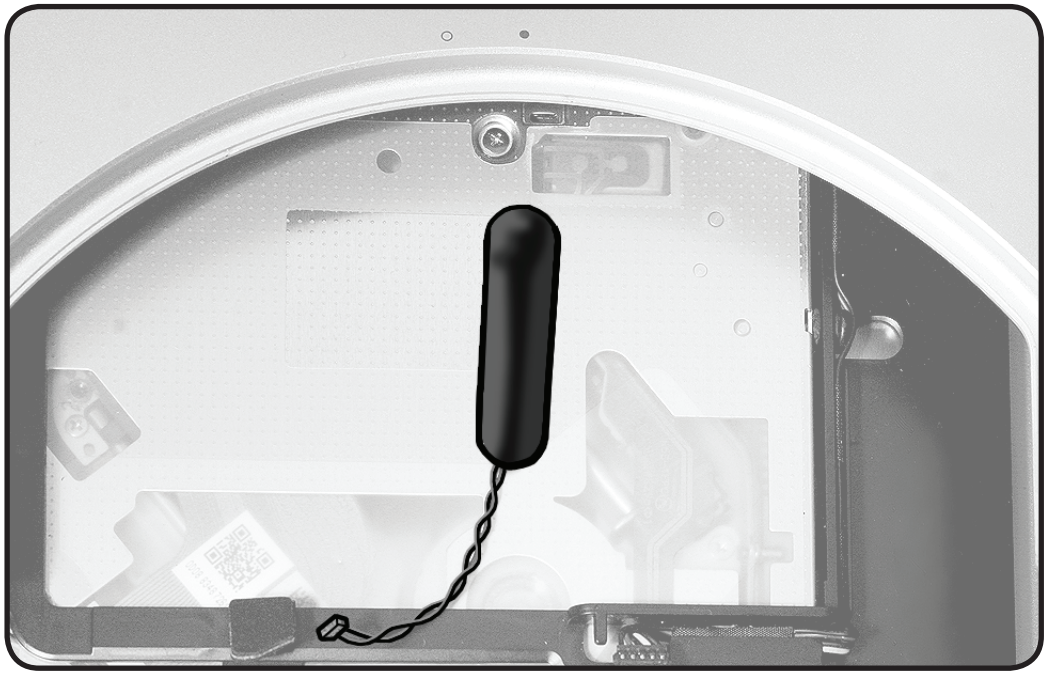
Optical drive thermal sensor (076-1370):

The thermal sensor may be replaced without removing the optical drive.

1. Remove the adhesive cover and attach the sensor pad where shown below.



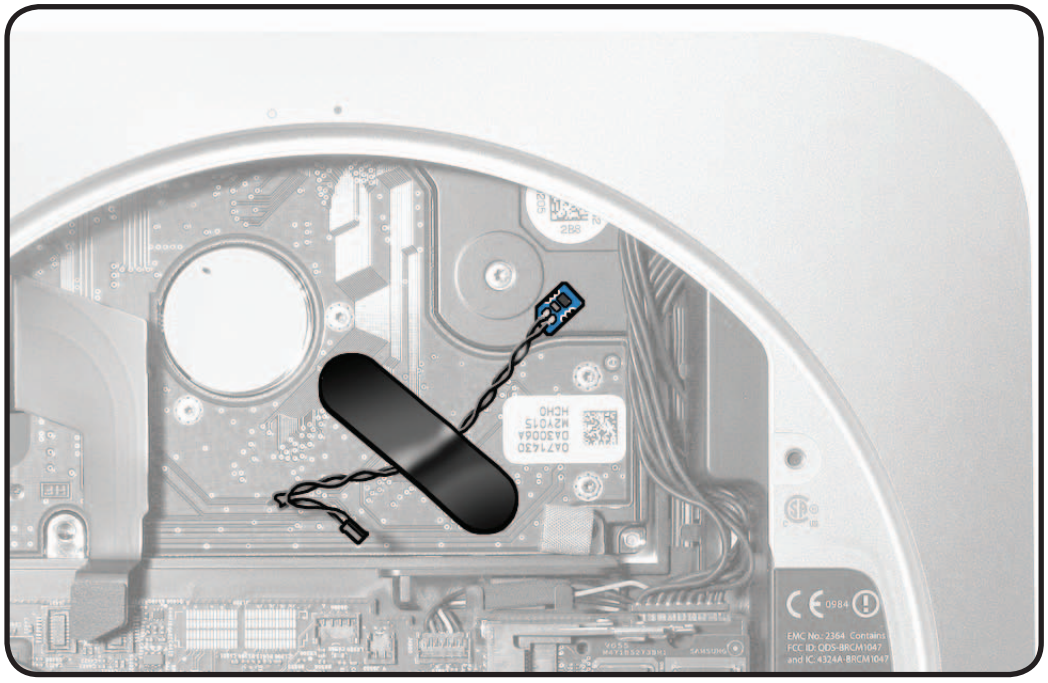
2. Secure the sensor and cable with tape, as shown here.



Bottom hard drive thermal sensor (server) (076-1369):

The thermal sensor may be replaced without removing the hard drive.

1. Remove the adhesive cover then attach the sensor pad and secure the cable with tape where shown below.



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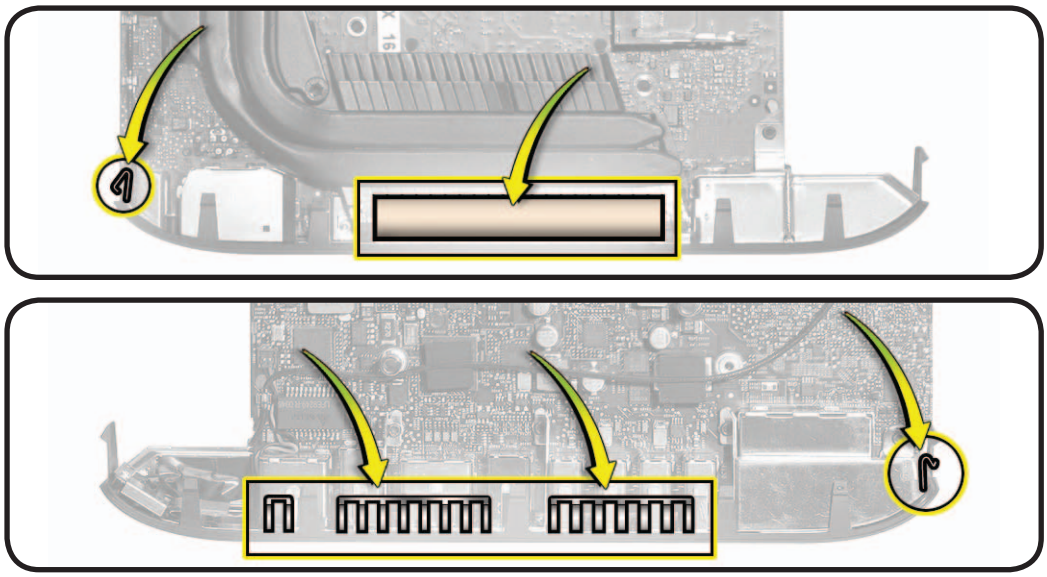
Logic Board EMI Fingers and Gaskets

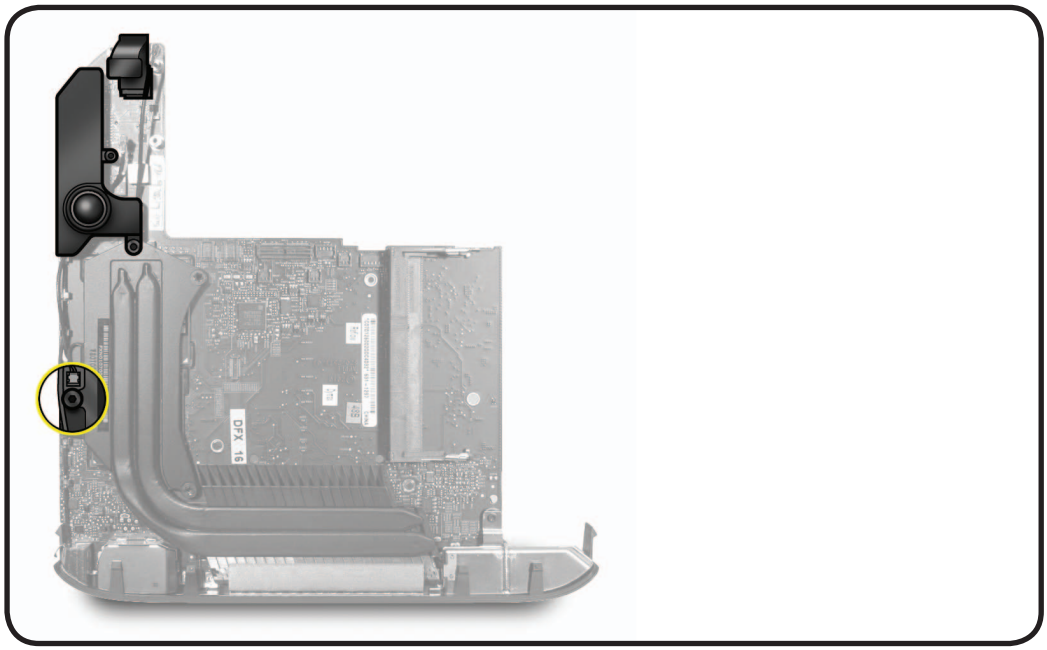
Be careful not to touch or damage the EMI fingers or gaskets on the logic board assembly, the housing opening, or on the bottom cover.



Logic Board Return

Important: Return the logic board to Apple in the correct packaging and in the same configuration as the replacement board (as shown below)

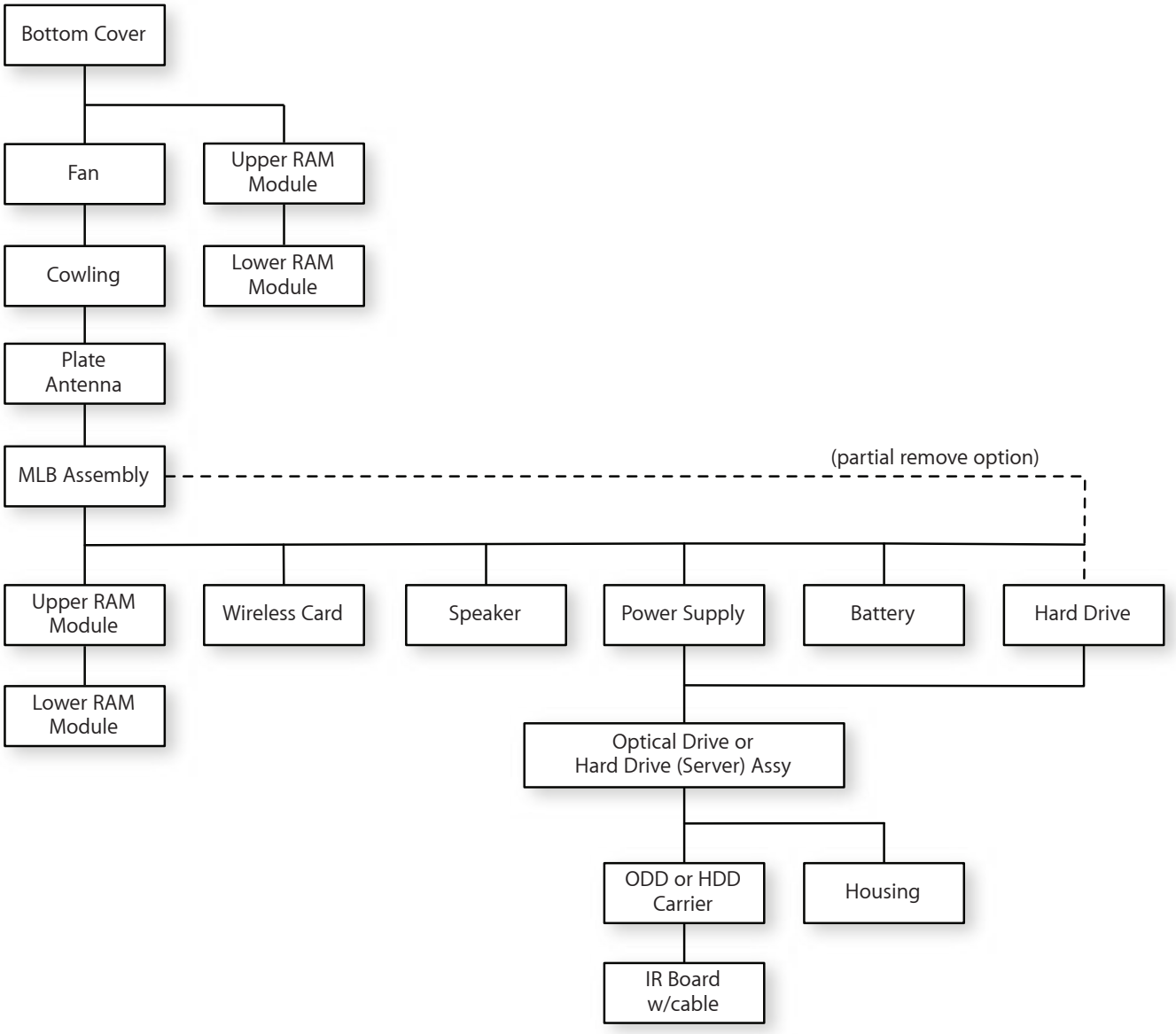
- Speaker
- Wireless card flex cable
- Screws



First Remove Hierarchy

Some parts must be removed before others can be removed. Here is a chart of the progression of part removal.

Parts above must be removed before the part below. Parts on the same level can be removed independently of others on that level.



Icon Legend

The following icons are used in this chapter:

Icon	Meaning
	Warning or Caution
	Check mark; make sure you do this
	Do not touch

Note About Images In This Guide

Because a pre-production model was used for many of the images shown in this manual, you may notice small differences in appearance between the image pictured and the computer you are servicing. However, although the appearance may differ, the steps and sequence are the same unless noted.

Bottom Cover

First Steps

- Shut down the computer.
- Place the computer on a clean, flat surface.

Tools

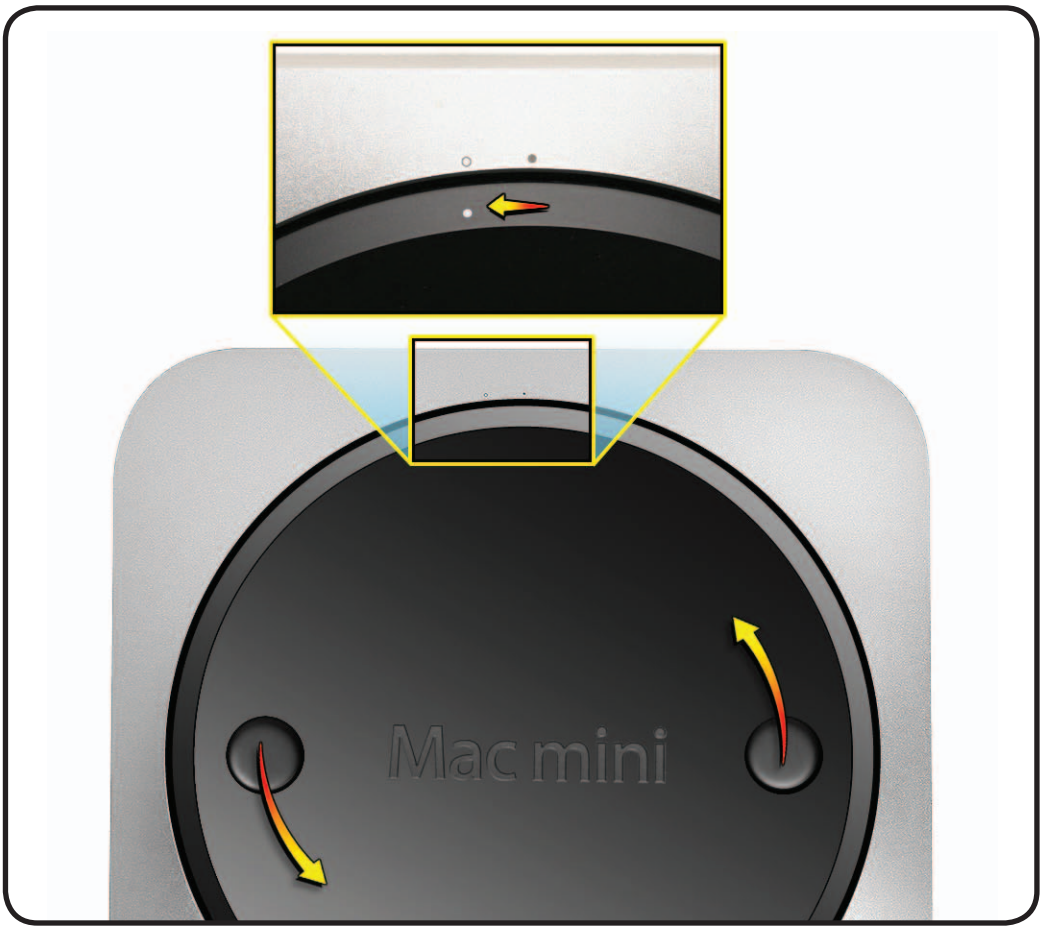
No tools are required for this procedure.

Black stick (optional)

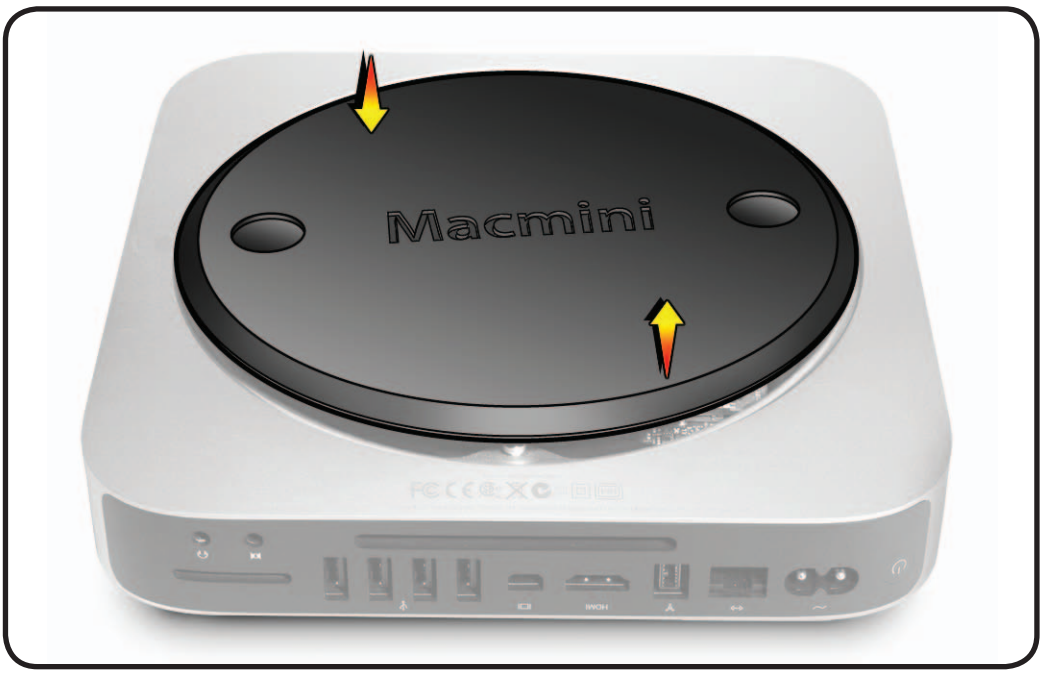
Removal

1 Lay the Mac mini upside down.

2 Rotate the bottom cover counterclockwise to the unlocked position.



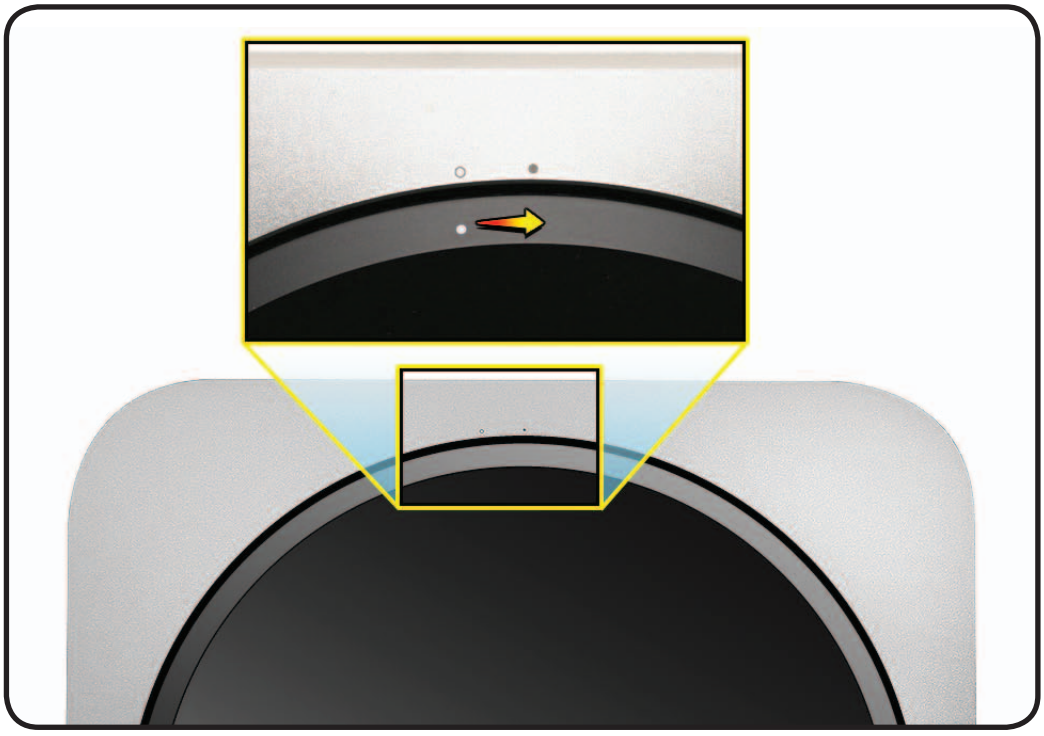
3 Press on the cover to pop up the opposite side and remove it.



Reassembly

1 Replace the bottom cover using the aligning dots to place it in the unlocked position.

2 Rotate the cover clockwise to lock it in place.



Memory

First Steps

Remove:

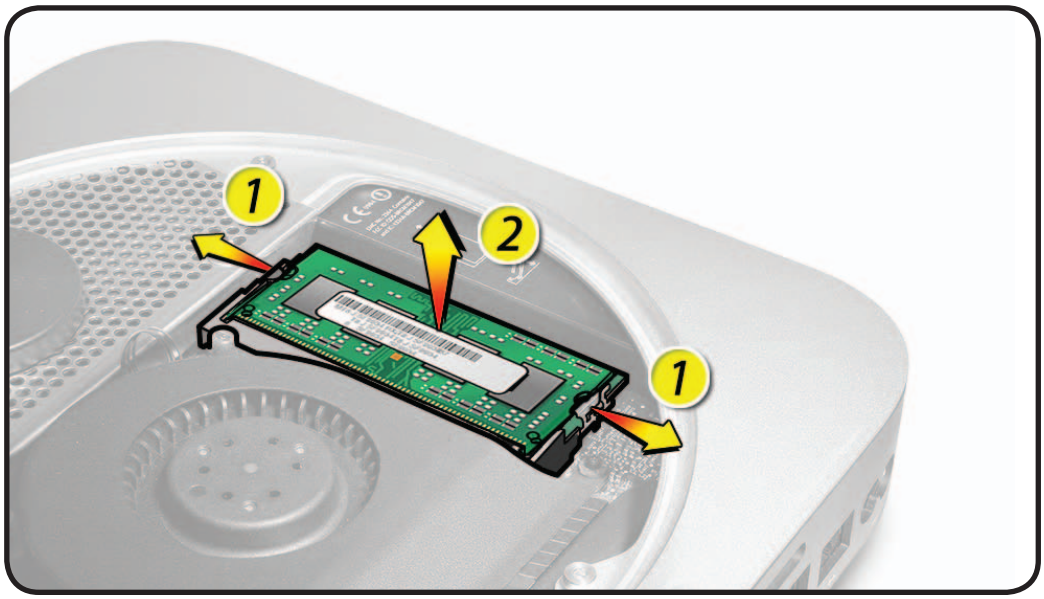
- Bottom cover

Tools

- Black stick (optional)

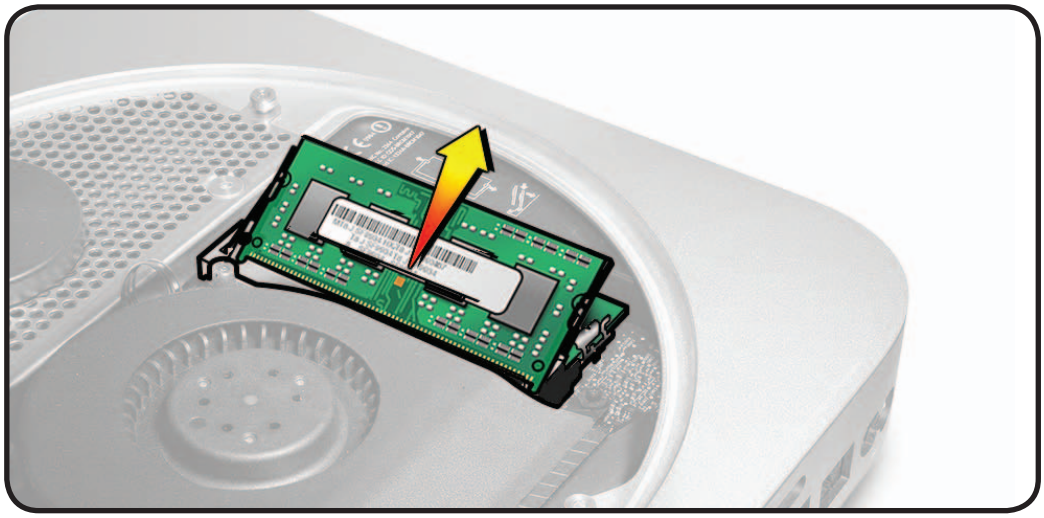
Removal

Caution: The bracket clips can bend or components can break if too much force is used.



1 Gently spread the clips at the ends of the memory module just enough to let the free edge pop up.

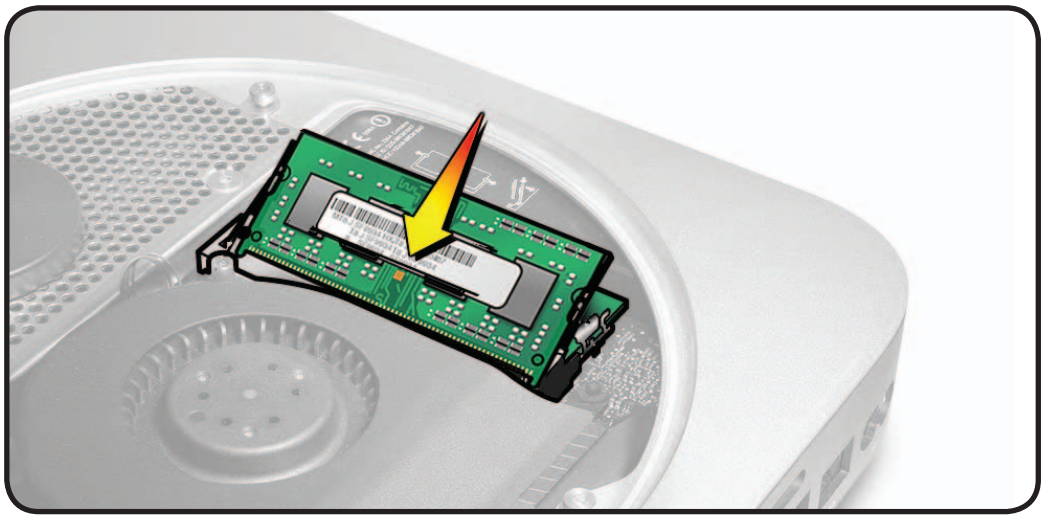
2 Pull the module out of the slot.



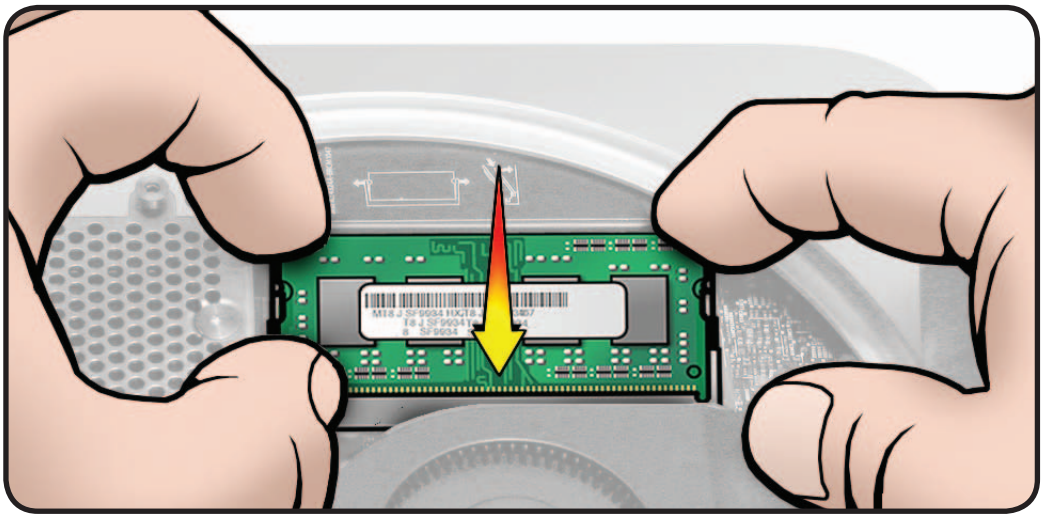
3 Repeat to remove the second module, located under the first .

Installation

1 Carefully press the notched edge of the memory module into the slot while keeping the opposite edge slightly raised.

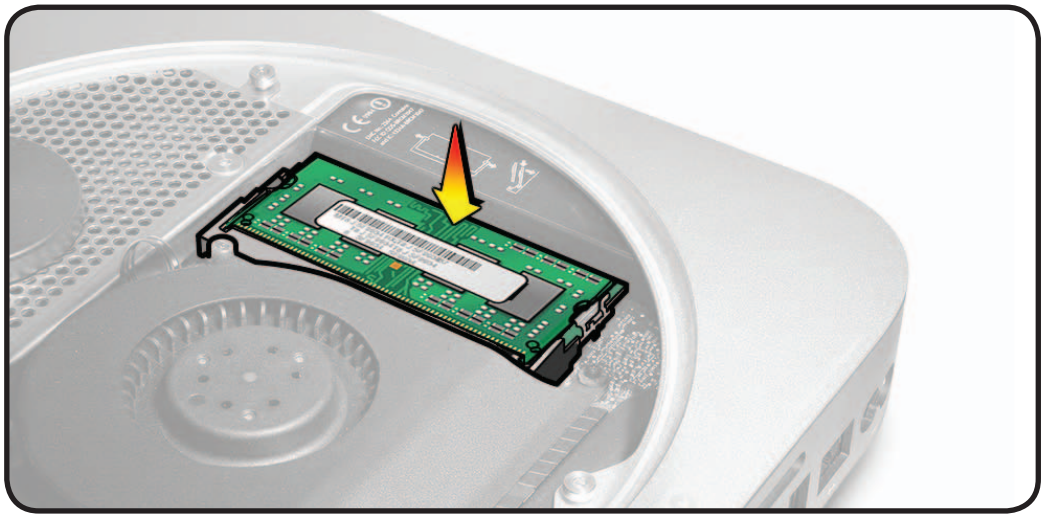


2 Pull the module into place with your fingers, as shown, to verify that it is fully seated.



3 Press down on the raised edge until the clips snap into place.

4 Repeat to install the top memory module.



Fan

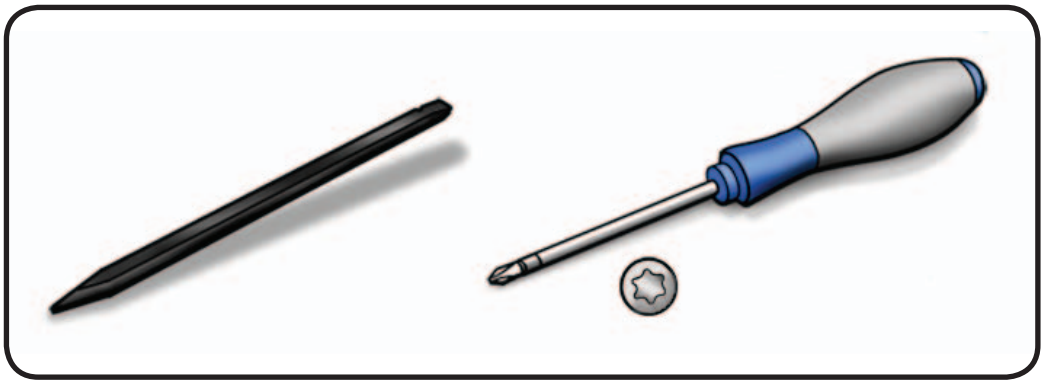
First Steps

Remove:

- Bottom cover

Tools

- Torx 6 screwdriver
- Black stick



Removal

1 Remove 2 T6 fan screws (with bumpers)

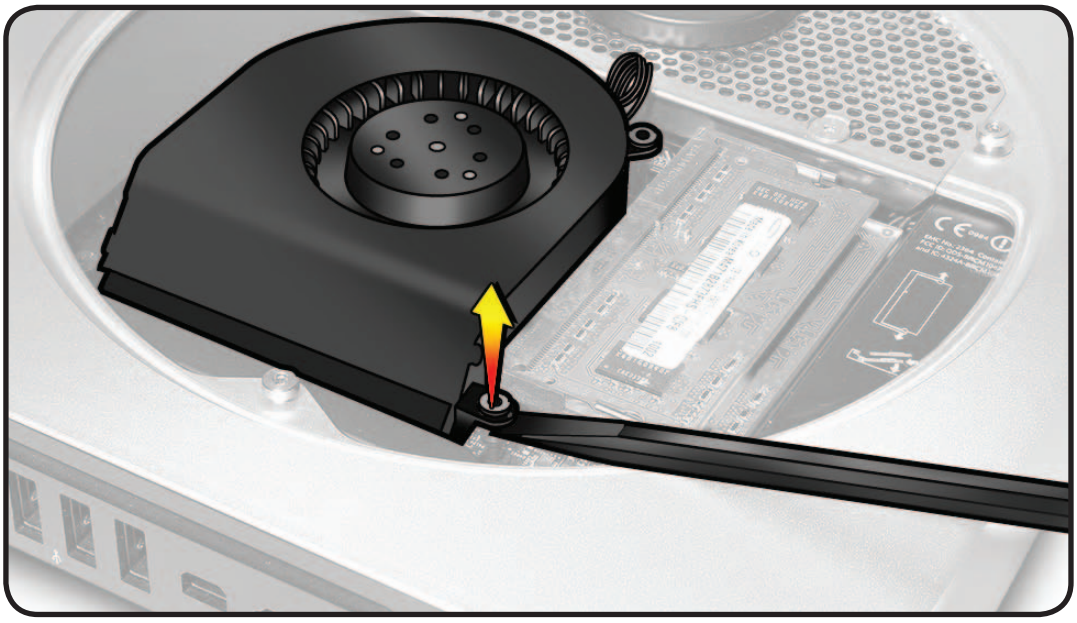
- 922-9582

- 922-9581

- 922-9572

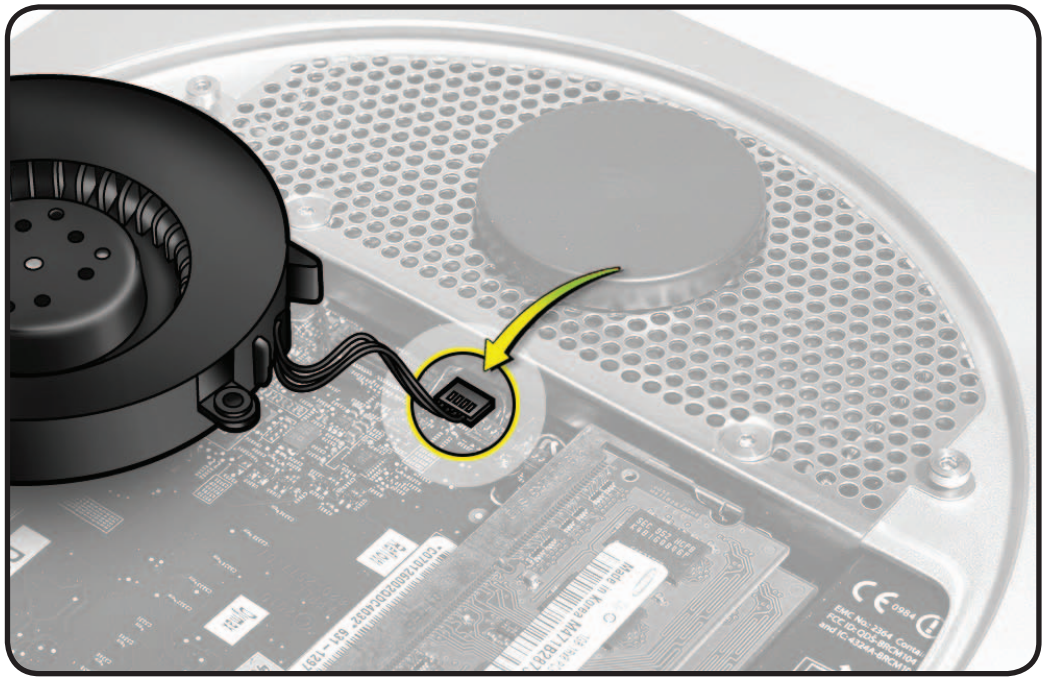
2 Carefully lift the fan off the standoff to reveal the fan connector on the logic board.

Note: You can optionally loosen all three screws and lift off the fan with the screws attached.



3 Disconnect the fan cable from connector on the logic board.

Replacement Note: Make sure to connect the fan cable.



Reassembly

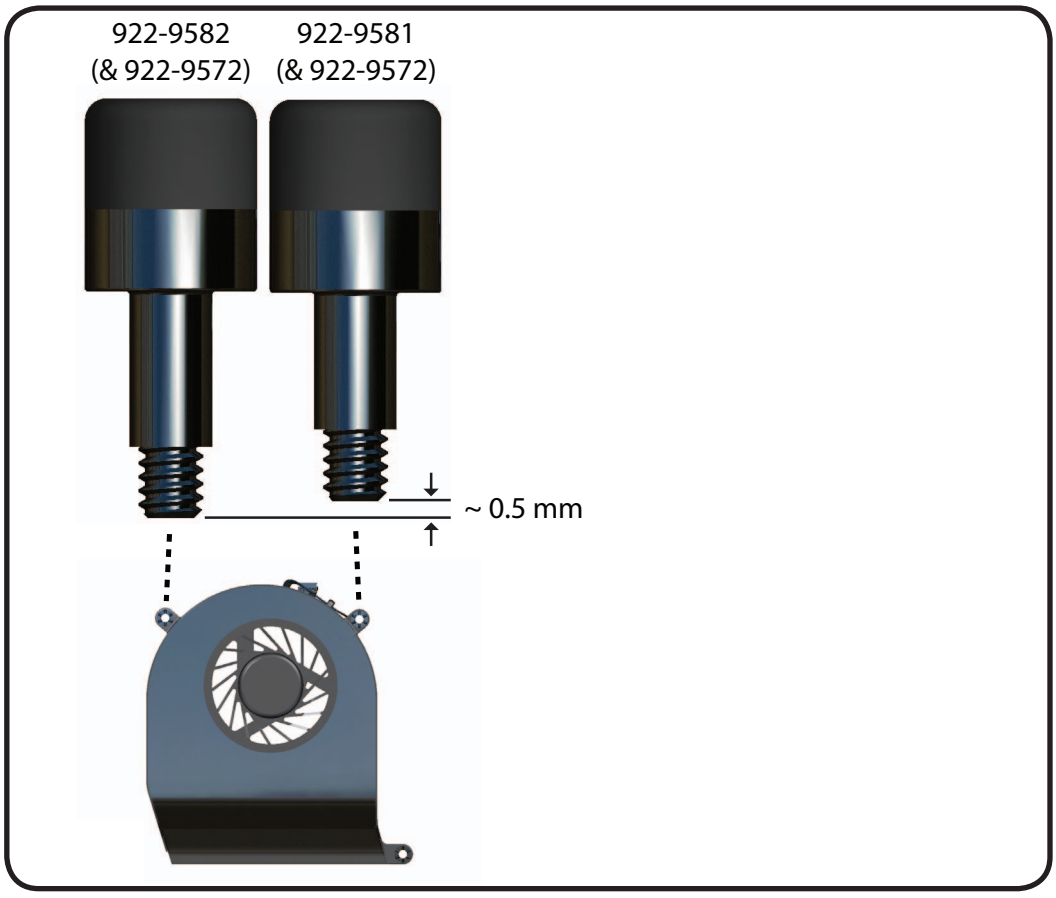
Important: The two top screws are different sizes. Make sure to use the correct size in the correct location.

- 922-9582 is longer and goes on the left attaching to the heatsink
- 922-9581 goes on the right, to the standoff on the logic board.

Make sure to install a bumper (922-9572) to the top of these screws.

Important:

Do not overtighten screws. Install all screws by hand. Do not use power tools.



Cowling

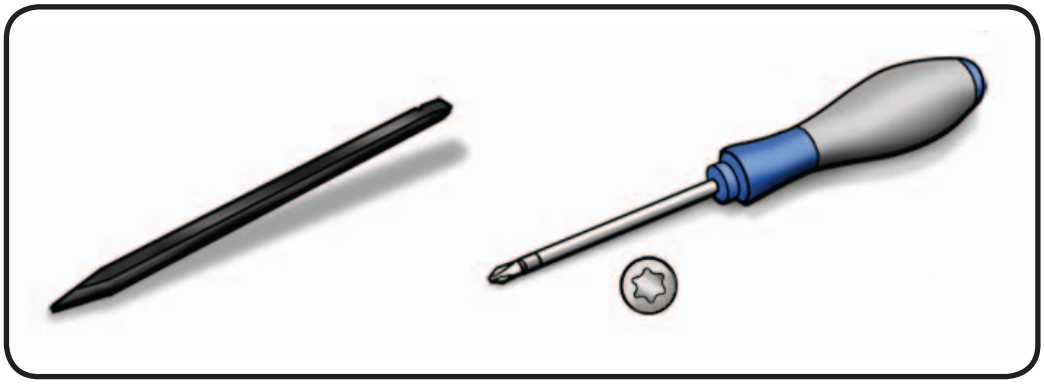
First Steps

Remove:

- Bottom cover
- Fan

Tools

- Torx T6 screwdriver
- Black stick



Removal

1 Remove the T6 screw shown:

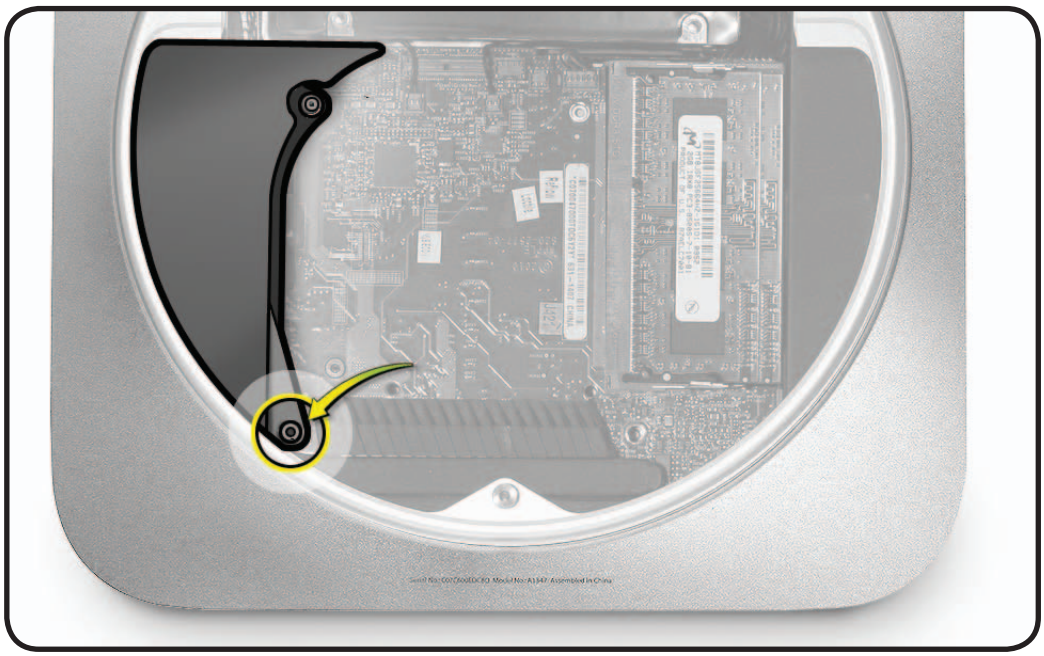
- 922-9580

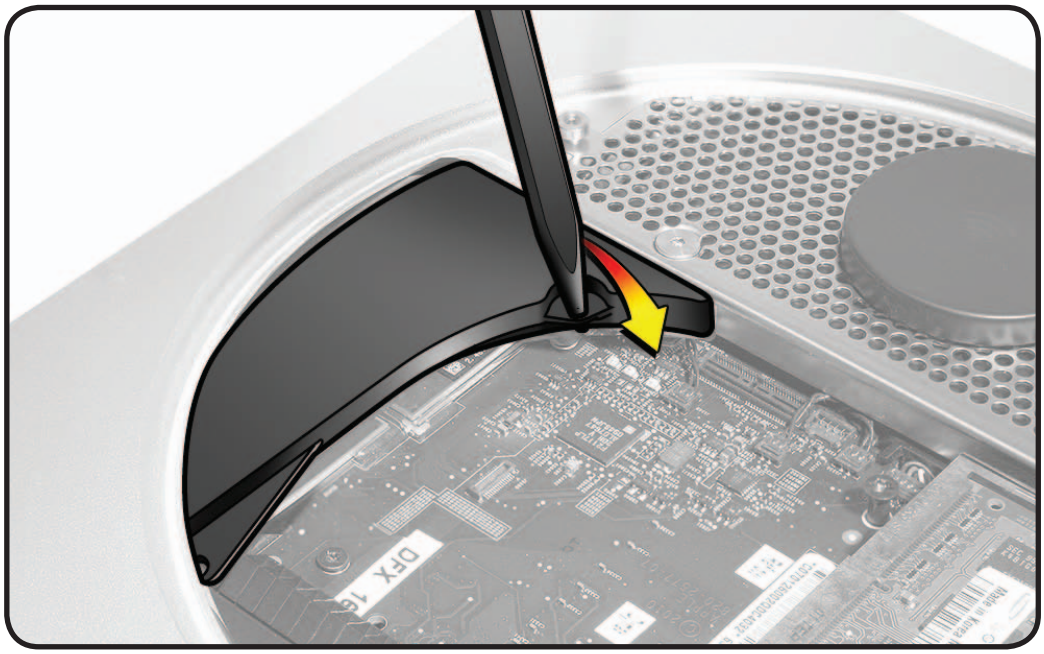
2 Lift the cowling up slightly to clear other hardware and pull straight out, rotating slightly clockwise, to disengage it.

Inserting the pointed end of a black stick into the top screw hole may help to pull out the cowling.

Be careful not to catch on components underneath.

Note: The left side of the cowling clips onto a clip screw on the heatsink inside the housing.





Reassembly

Important: Make sure that the Ambient sensor cable does not go over the top of the drives flex cable connectors, as the cowling helps to hold them in place.

Important: Do not overtighten screws. Install all screws by hand. Do not use power tools.

Antenna Plate

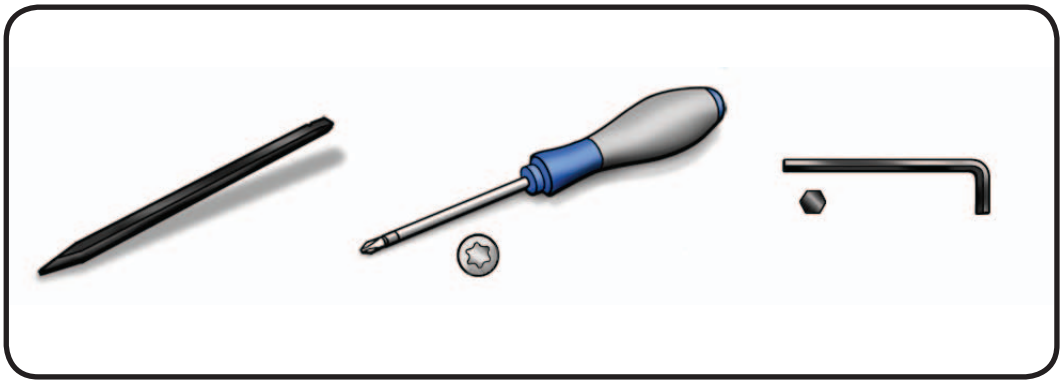
First Steps

Remove:

- Bottom cover
- Fan
- Cowling

Tools

- Torx T8 screwdriver
- 2 mm (9/64-inch) Hex wrench
- Black stick



Removal

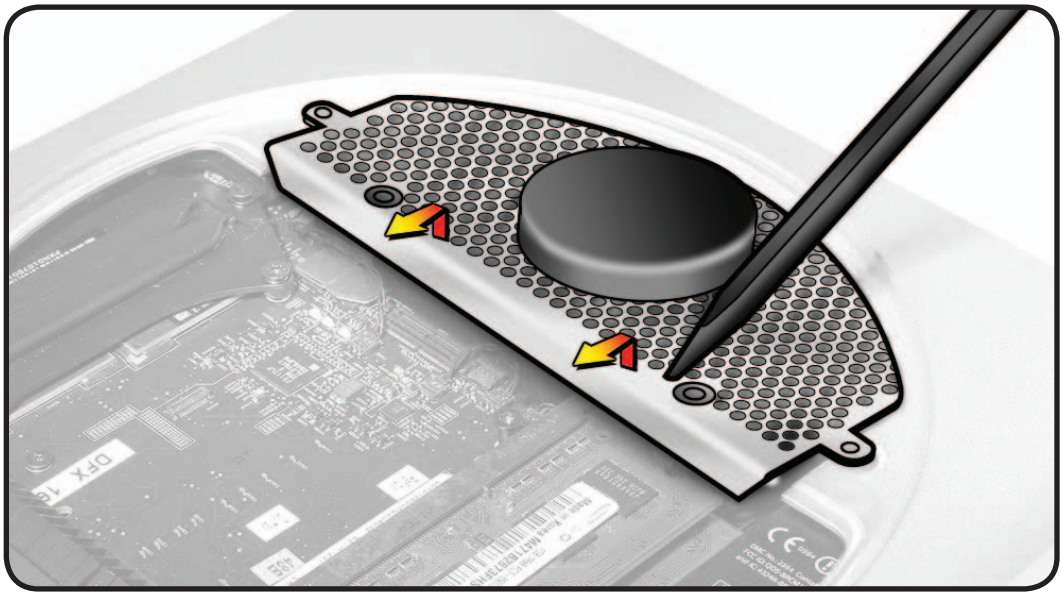
1 Remove 4 screws.

- (2) 922-9577 T8

- (2) 922-9574 2mm Hex

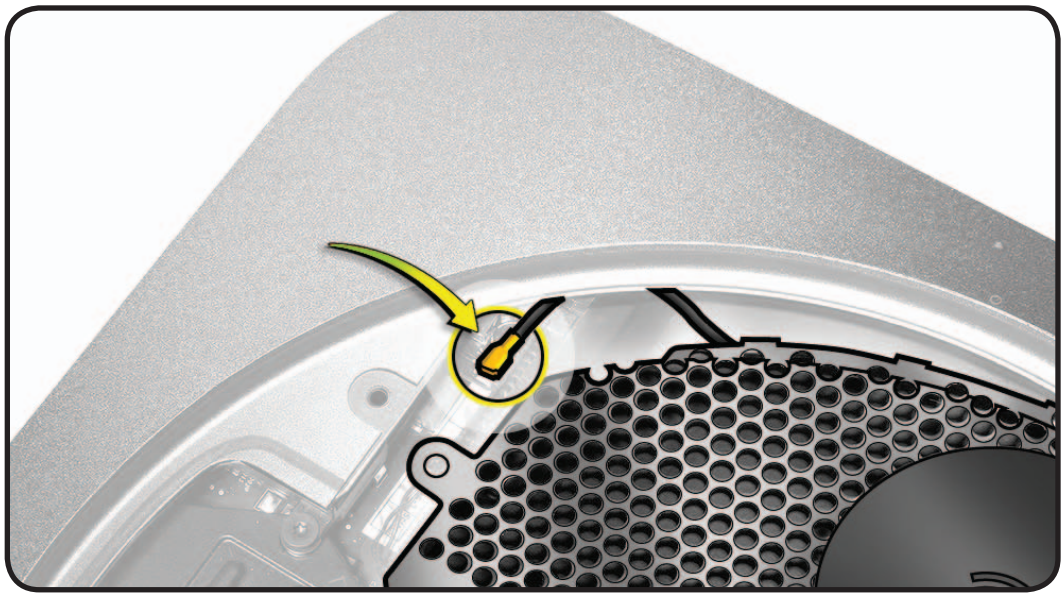
2 Carefully lift the antenna assembly up slightly and slide it to the right to reveal the antenna cable attached to the wireless card.

A black stick may help to maneuver it.



Warning: The edge of the shield is sharp. Use care to avoid injury and to avoid damaging the antenna cable.

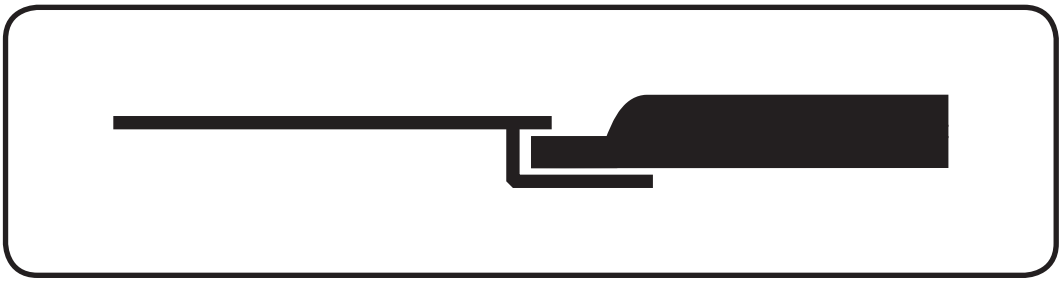
3 Disconnect the antenna cable.



Reassembly

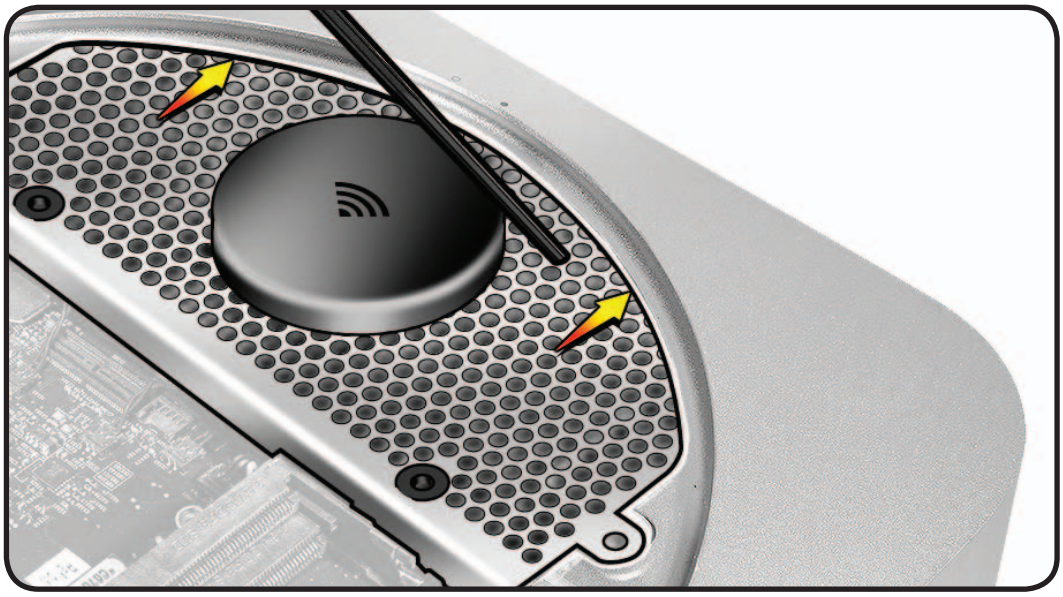
1 Connect the antenna cable. Before seating, make sure the cable is aligned in the channel, parallel with the edge of the hard drive and under the edge of the case, as shown above.

2 Slide the antenna plate into place on the housing.
Note: The edge of the plate has a slot that the edge of the housing must fit into for the plate to sit flat and the screw holes to align. (see rough cross-section example at right)



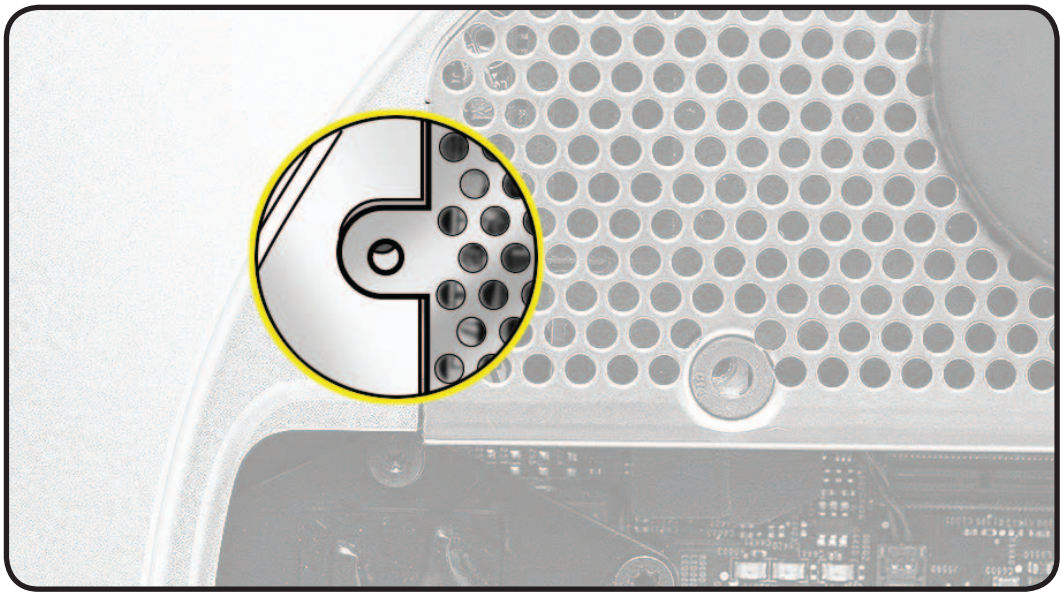
3 A tool, such as the hex wrench, inserted slightly into one of the plate holes may help to maneuver.

Be careful not to damage the cosmetic Mylar on the hard drive, or allow the tool to damage the housing.



4 If the plate is not seated properly you will see that it is not resting in the recess on the housing and the screw holes are not aligned.

5 Install the 4 screws.



Logic Board

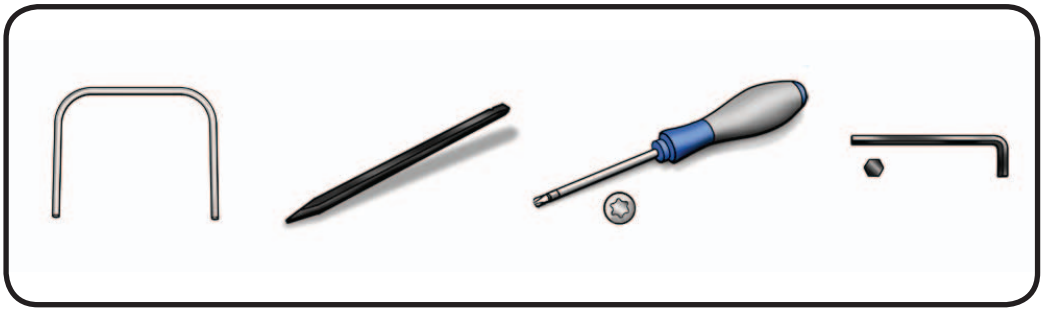
First Steps

Remove:

- Bottom cover
- RAM (at least the top level)
- Fan
- Cowling
- Antenna plate

Tools

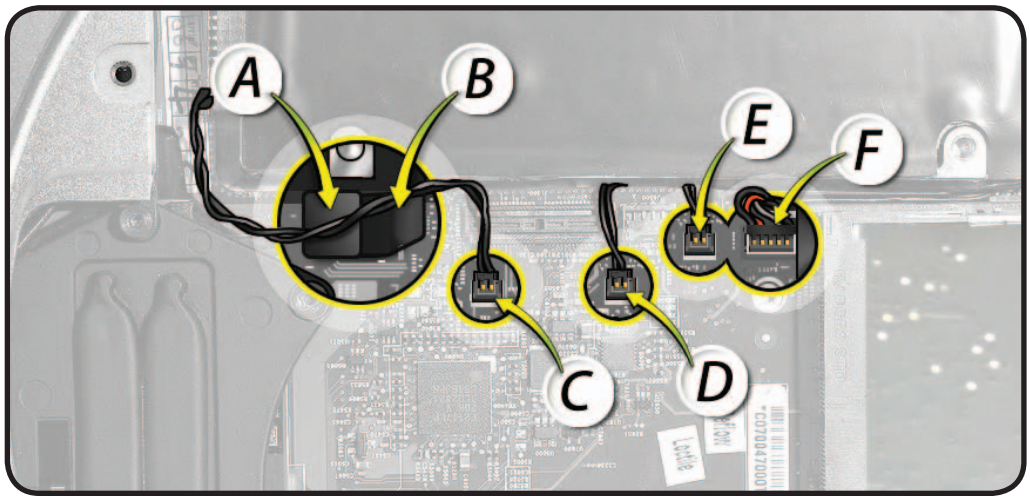
- Logic board removal tool: 922-9588
- Torx T6, T8 & T9 screwdrivers
- 2 mm (9/64-inch) Hex wrench
- Black stick



Removal

Important: The small JST connectors (C, D, E, F) are extremely fragile. Use extreme care and finesse to lift them carefully straight up and out of their sockets on the logic board. See **Vertical Insertion (JST) instructions** in the General Information section of the Take Apart chapter.

Note: Some of these cables are not replaceable and require drive replacement if damaged.



1 Carefully disconnect the cables connected to the logic board.

A - Hard drive flex cable

B - Optical drive or Server bottom hard drive flex cable

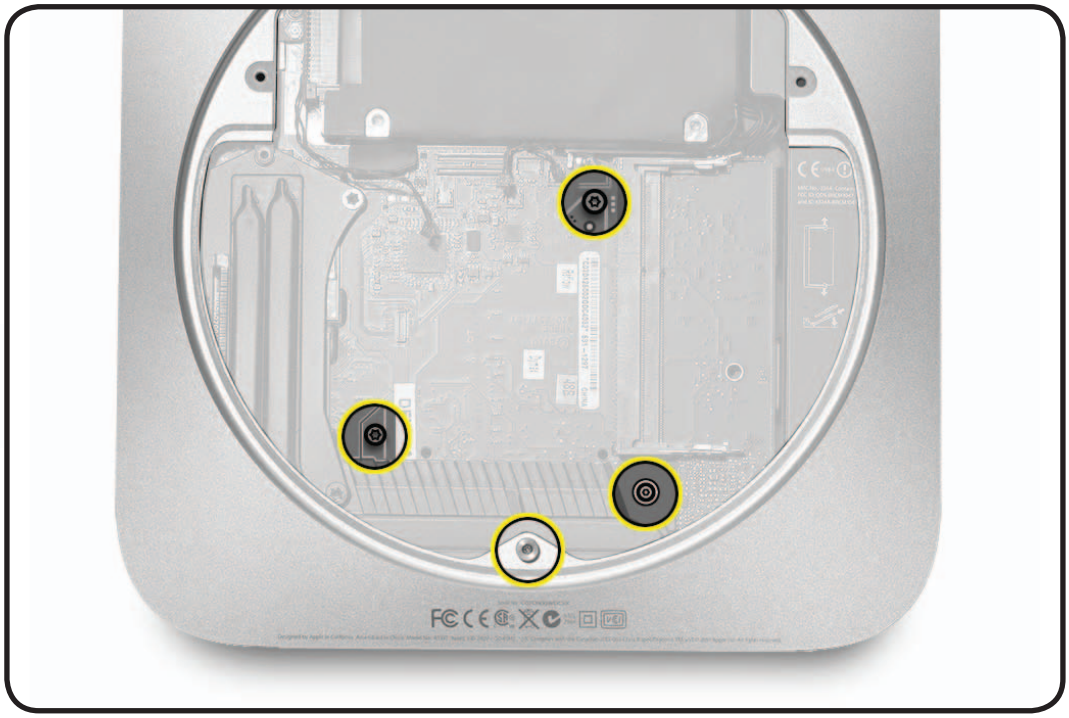
C - Ambient thermal sensor (on top hard drive data cable)

D - Top hard drive thermal sensor

E - Optical drive or Server bottom hard drive thermal sensor

F - Infrared board cable

2 Make sure that at least the top level of RAM has been removed. This is to avoid the potential for damaging the EMI gasket on the housing.



3 Remove 2 T6 screws:

- 922-9579

- 922-9575 (if not previously removed with the fan)

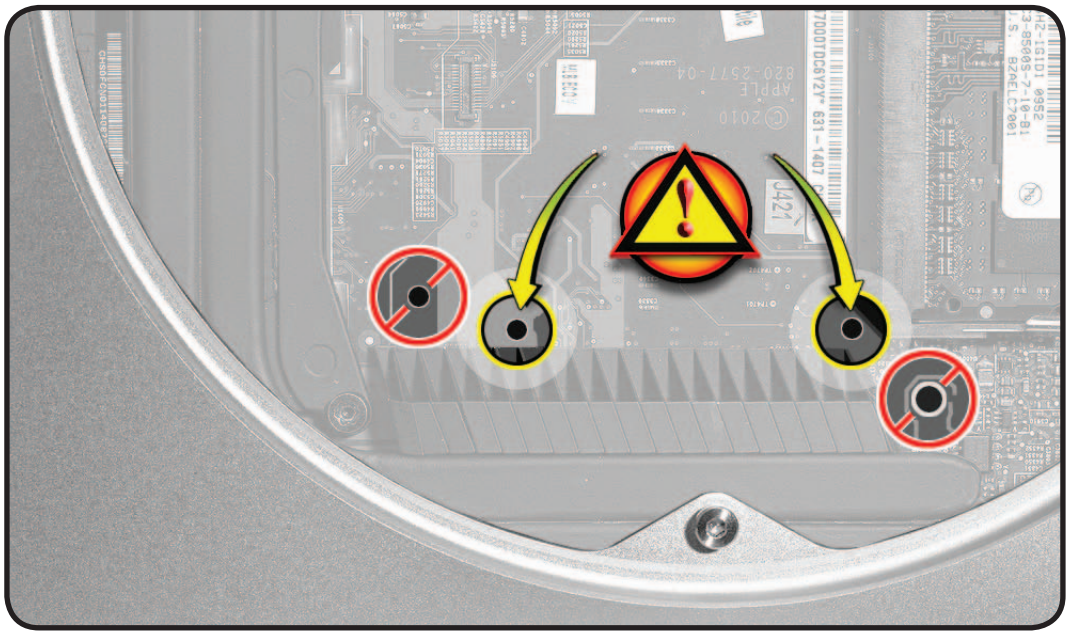
And 1 T9 standoff:

- 922-9576

4 Remove the 2 mm Hex screw on the housing. This is to reduce the possibility of scratching the fan channel area.

- 922-9574

5 Insert the logic board removal tool straight down into the holes shown.
Make sure that it is firmly seated to the capture holes on the bottom of the housing.



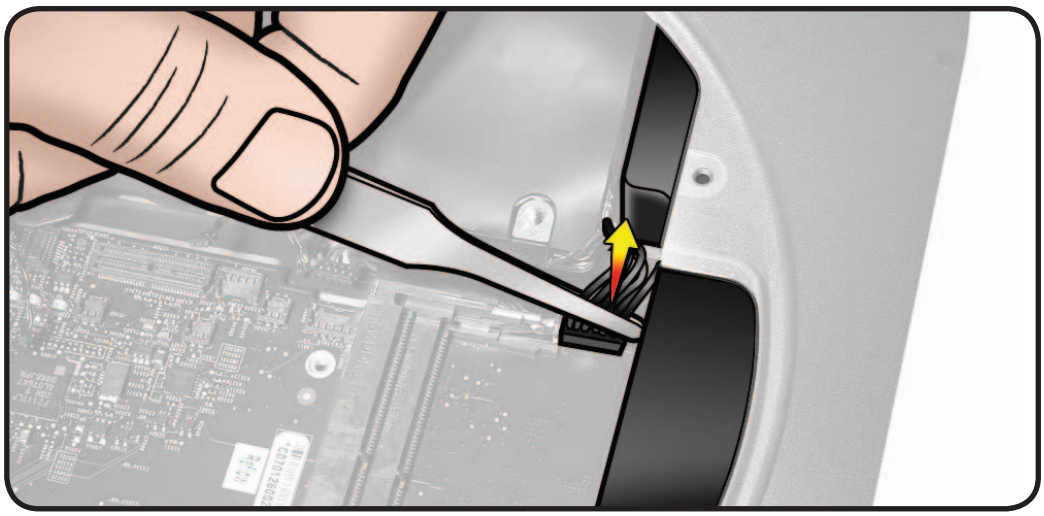
Warning: Do NOT insert the removal tool, or anything else, into screw holes. This will damage the logic board by displacing the screw guides underneath.

6 Carefully push down and pull back on the tool until the I/O wall separates from the housing slightly.

7 Remove the tool.

Important: Do not remove the assembly.

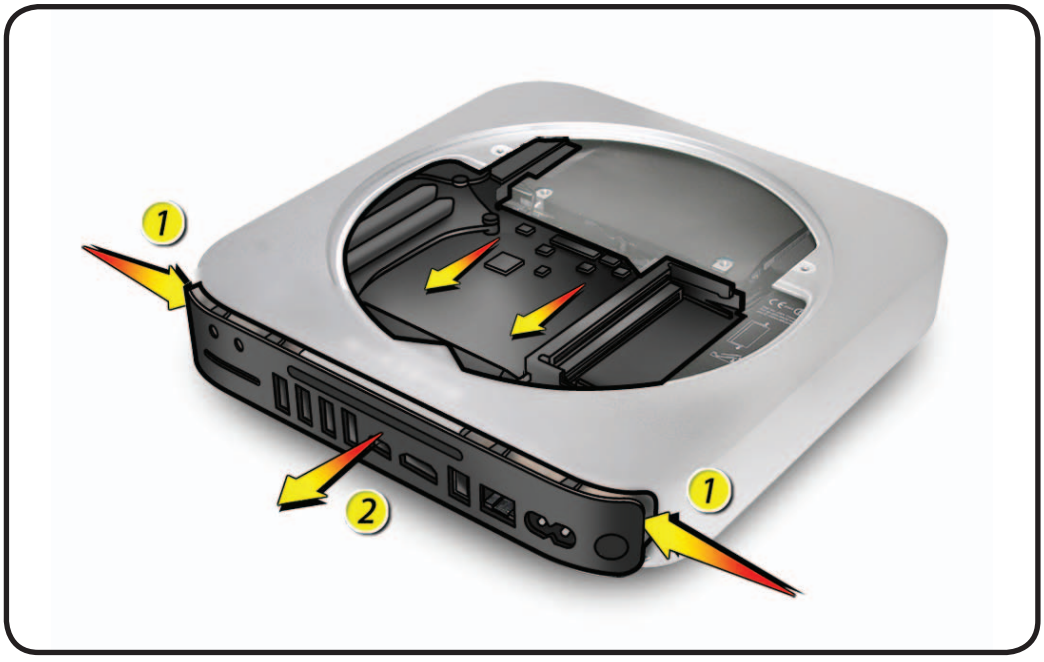
8 Disconnect the power cable. Wiggle it out from its logic board socket. Tweezers may be helpful.



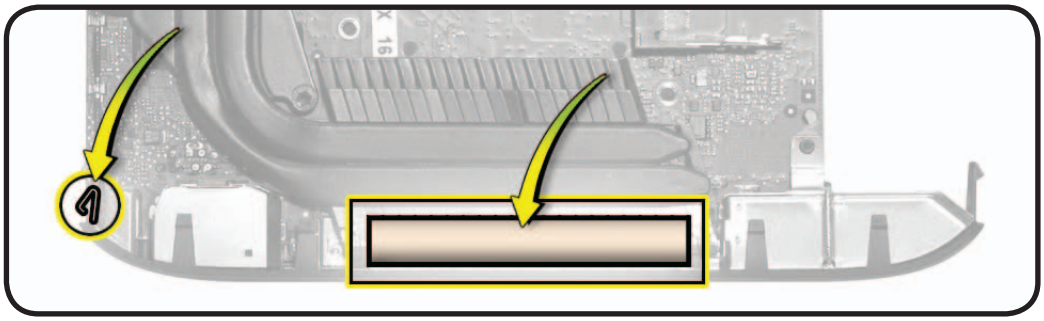
9 **Important:** If thermal cables are damaged it requires replacing the optical or hard drive. Verify that all cables are disconnected from the logic board and no connectors will catch or snag when removing the assembly.

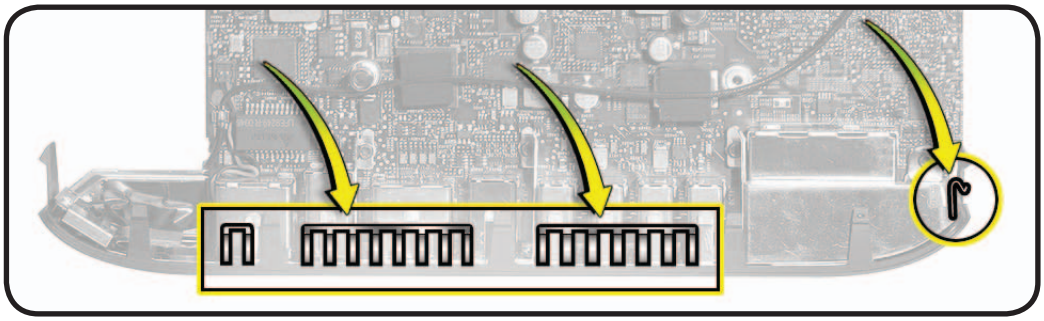
10 Push in on the catch tabs on each side of the I/O wall to release the logic board assembly and begin to slowly guide it out.

Check to make sure nothing is caught or bending, such as EMI clips, especially at the left side.



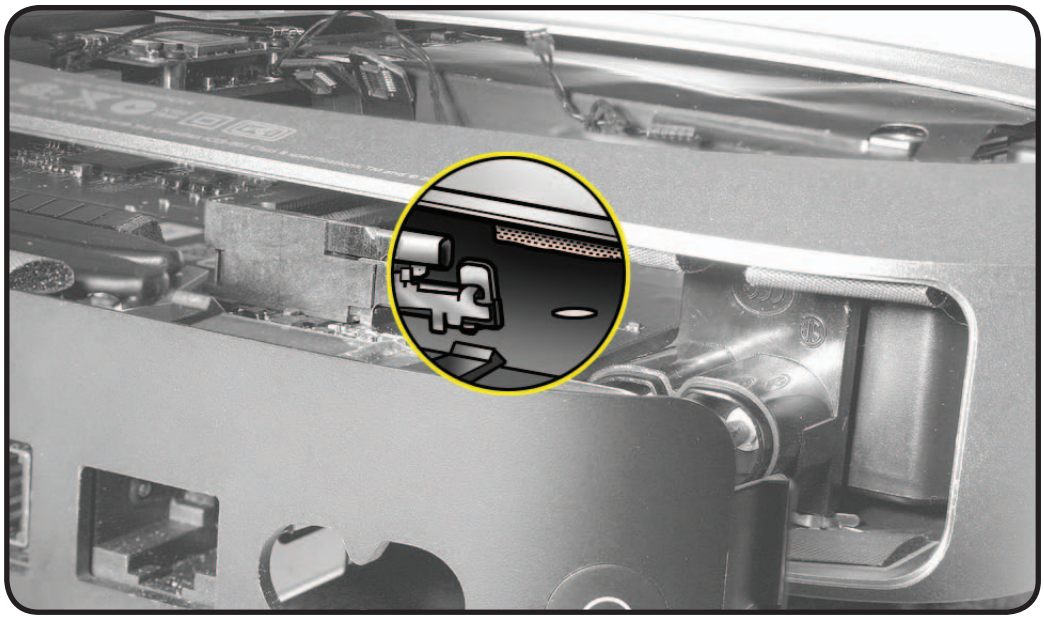
Important: When handing the logic board assembly, avoid touching EMI fingers and gaskets. Oil from your fingers can reduce connectivity and wireless performance.





11 Once the I/O wall is free, continue to carefully guide the assembly straight out of the housing. Do not force or lift.

As the memory bracket approaches the housing opening, make sure the bracket clip does not catch or damage the EMI gasket at the top of the housing interior.

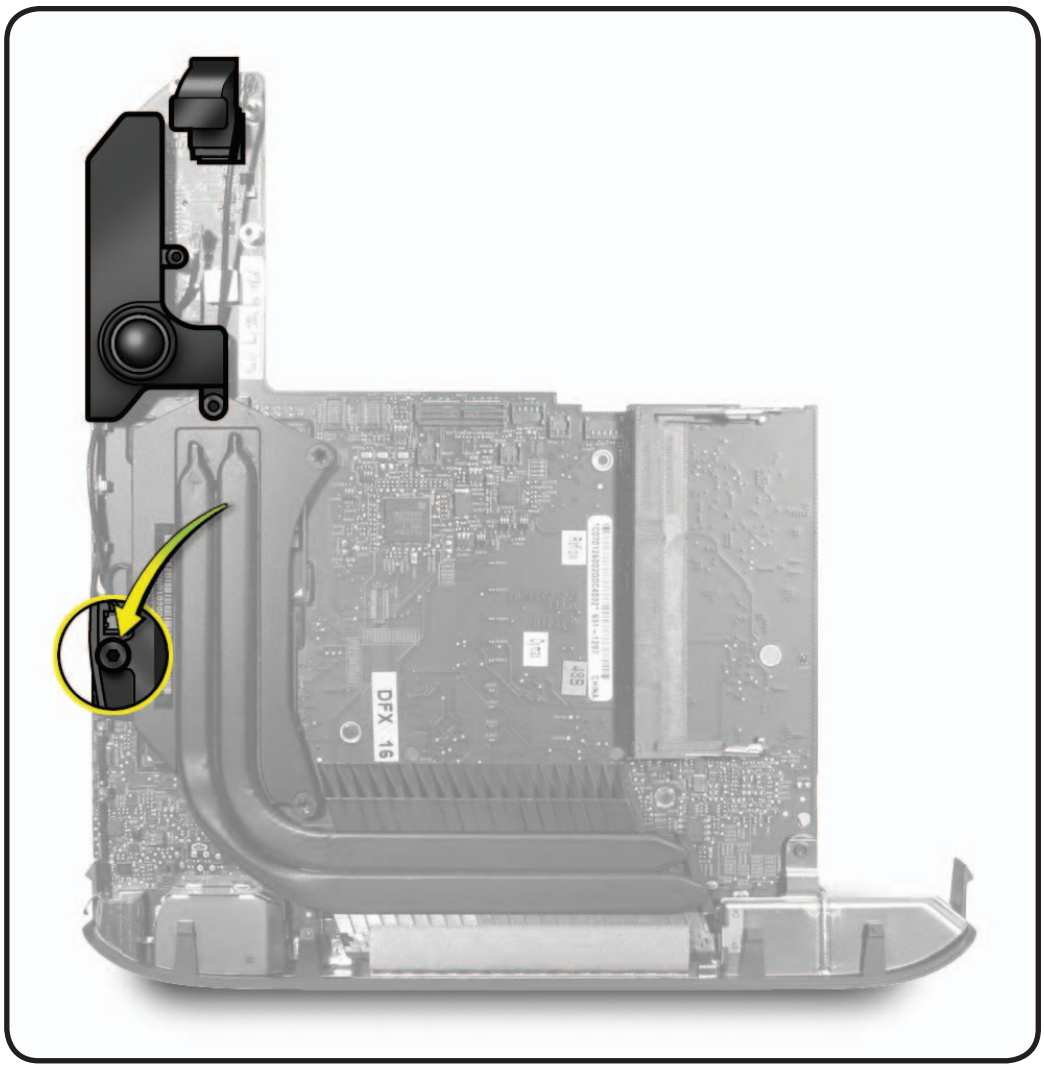


Important: When returning the board to Apple, make sure to **include**:

- AirPort/Bluetooth flex cable
- Speaker
- Cowling clip screw

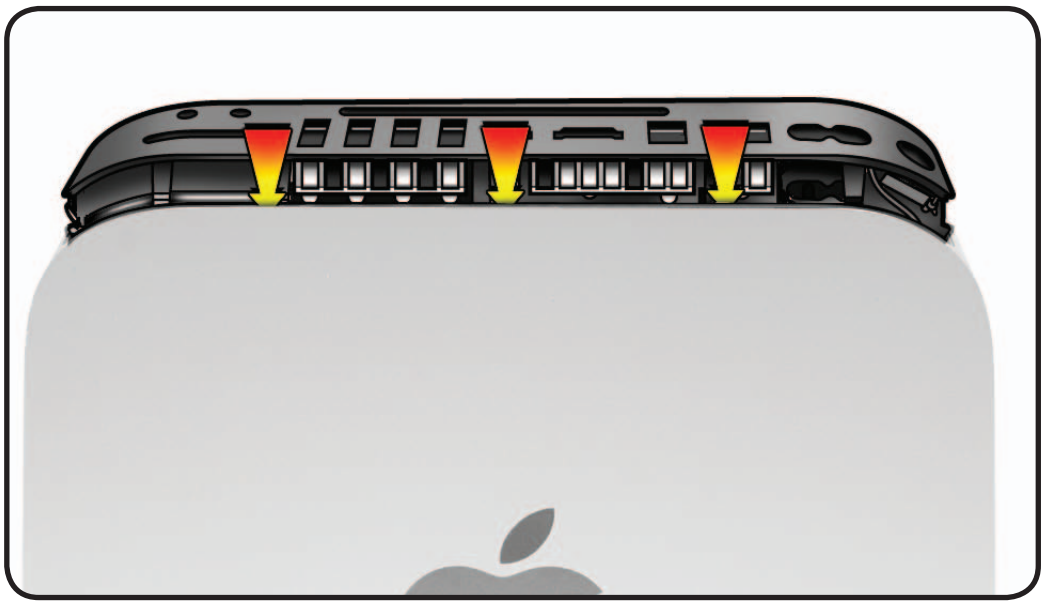
Make sure to **remove**:

- Memory DIMMs
- AirPort/Bluetooth card



Reassembly

1 Position the housing vertically and insert the logic board assembly into the housing.
This allows easier verification that all EMI gaskets and clips are entering into the housing properly.



Note: If resistance is encountered, it may be where the left side of the logic board bumps against the drive carrier. Maneuver the board to clear the carrier.

2 Reconnect the power supply cable before seating the logic board assembly completely.
Tweezers and a black stick may be helpful.

3 Make sure no cables are hidden or caught, then fully seat the logic board.

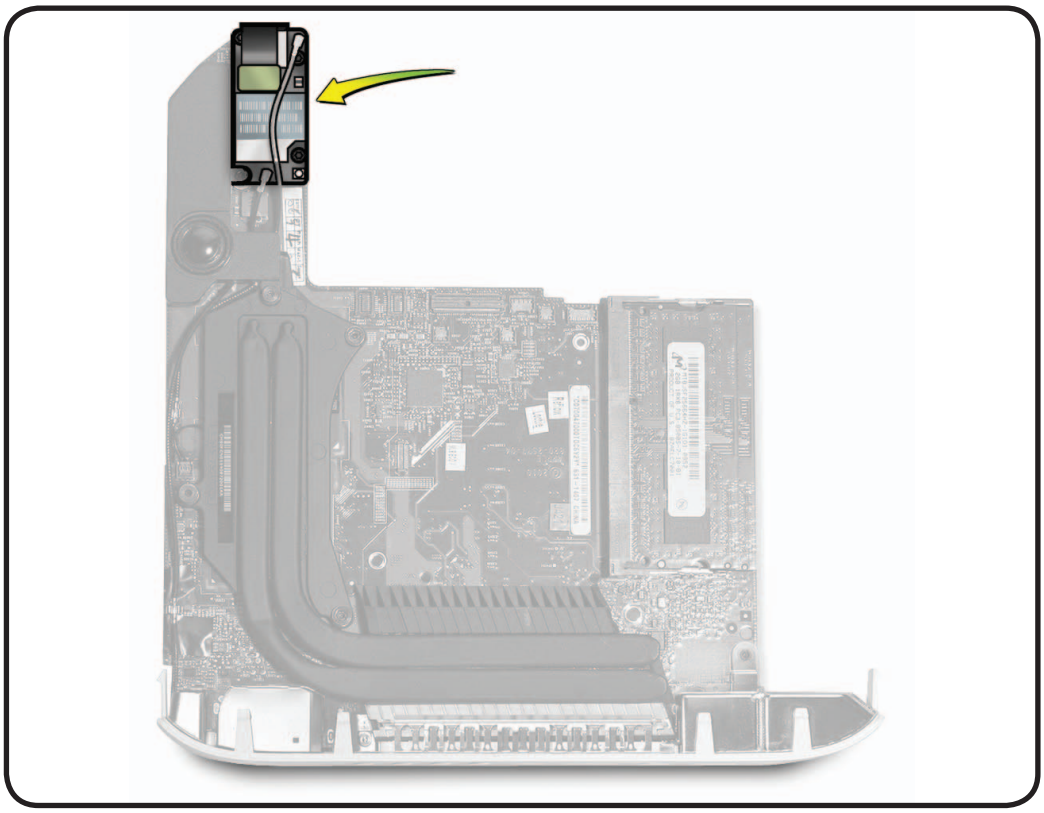
4 Reconnect all cables.

AirPort/Bluetooth Combo Card

First Steps

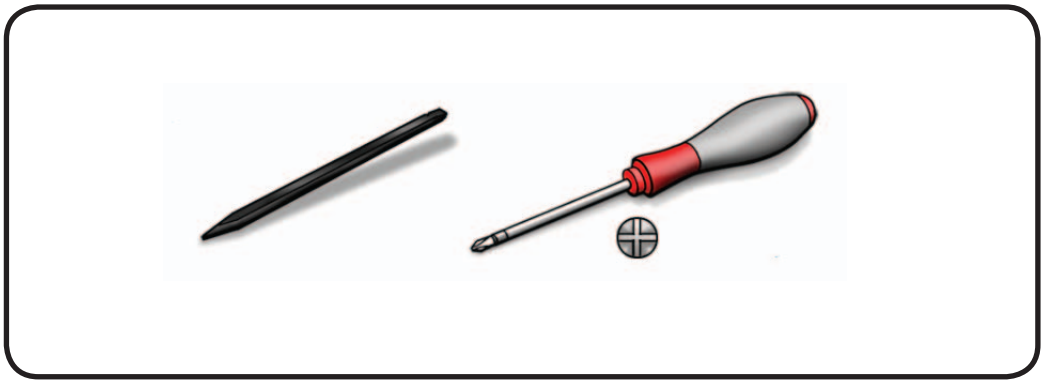
Remove:

- Bottom cover
- Fan
- Cowling
- Antenna plate
- Logic board assembly



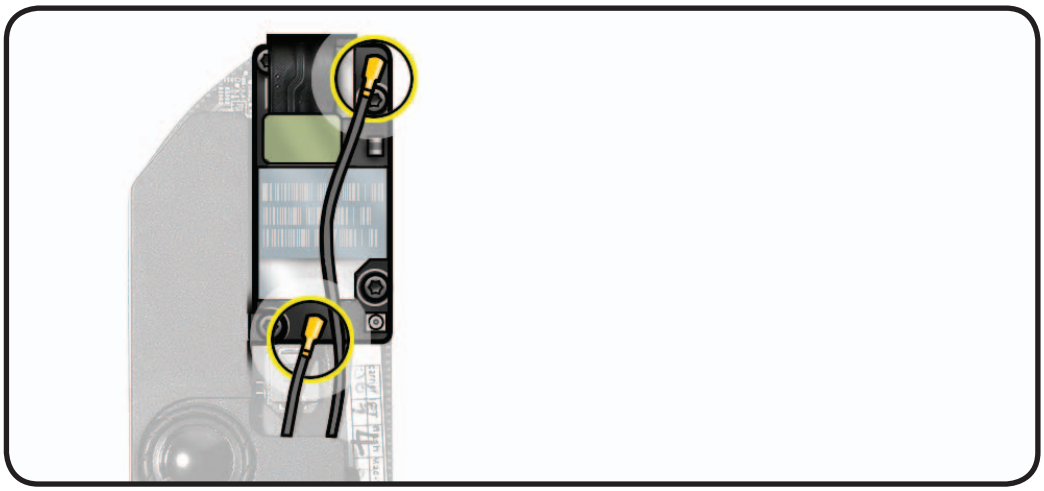
Tools

- Torx T6 screwdriver
- Black stick



Removal

1 Disconnect the two antenna cables shown.

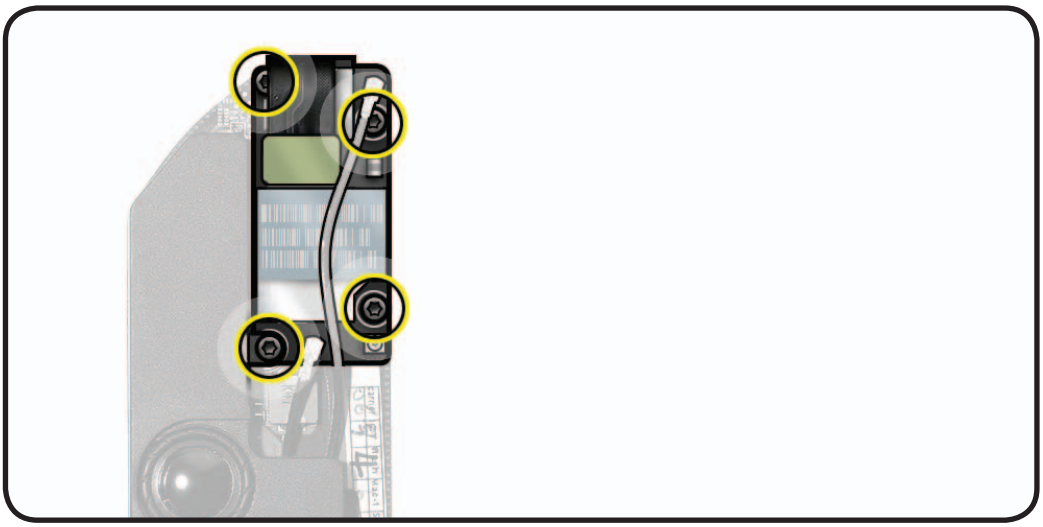


2 Disconnect the flex cable.

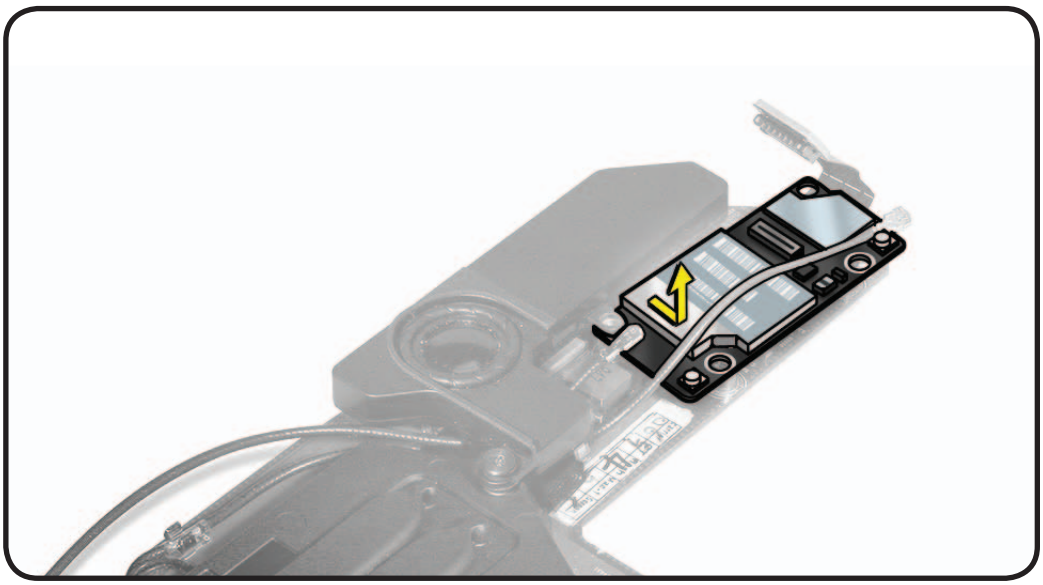
3 Remove 4 screws:

- (3) 922-9596

- (1) 922-9597 (through speaker)

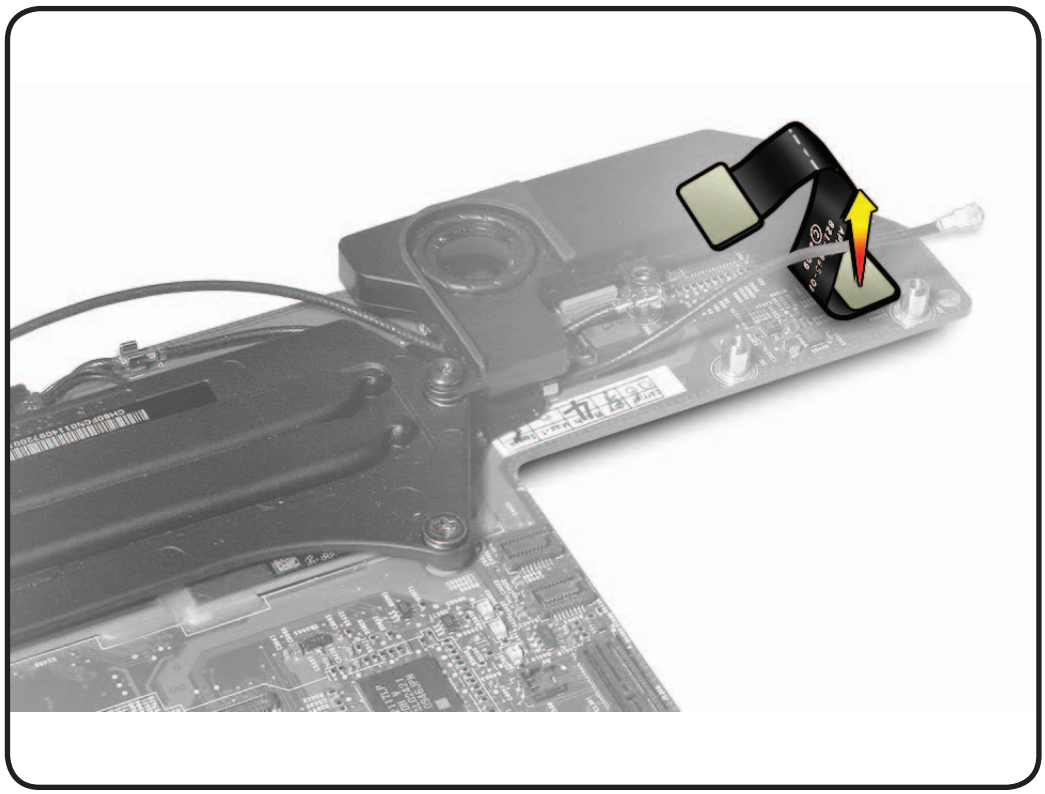


4 If the speaker has not previously been removed, lift the AirPort/Bluetooth card slightly to clear the screw boss, then slide out from under the speaker screw tab.



5 If replacing the flex cable, use a black stick to lift its connector straight up to remove.

Note: If replacing the logic board, do not remove the flex cable as it is returned with the logic board.

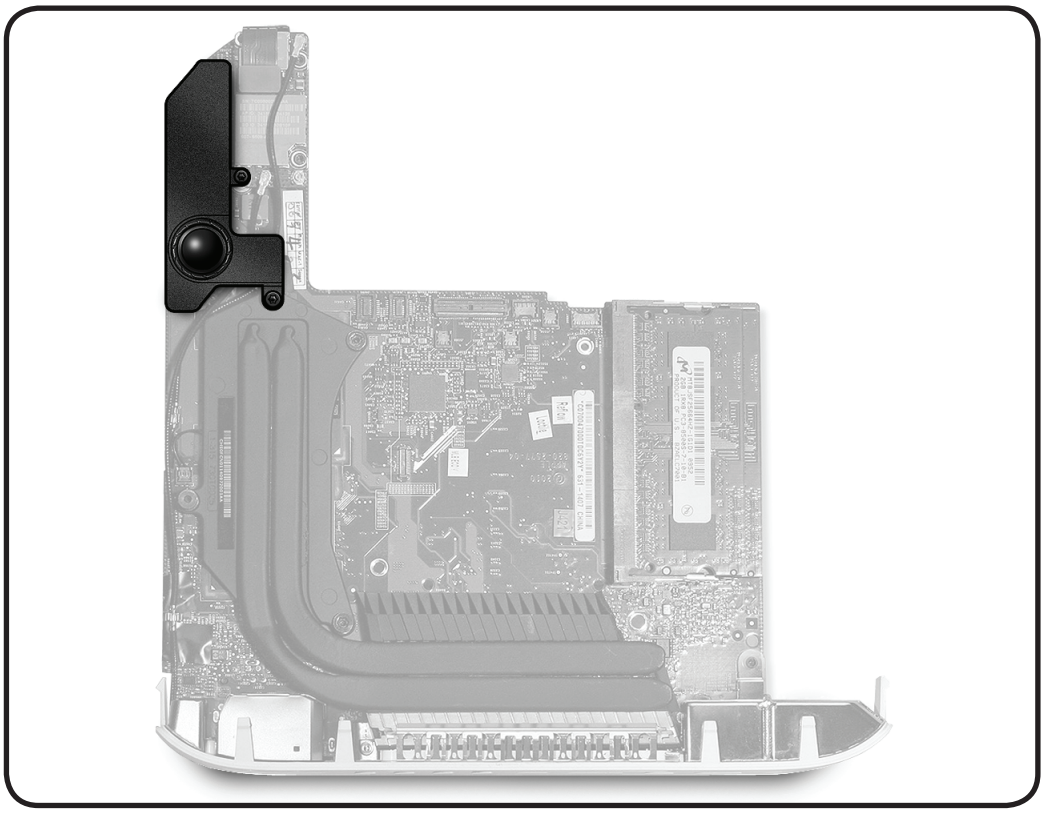


Speaker

First Steps

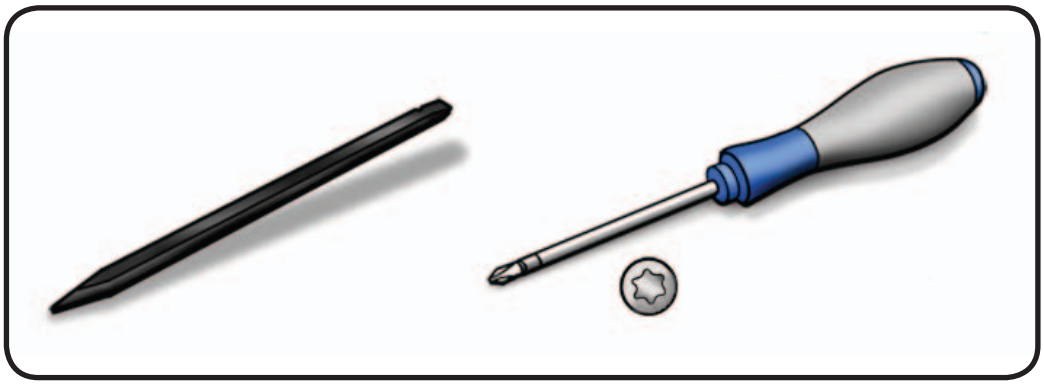
Remove:

- Bottom cover
- Fan
- Cowling
- Antenna plate
- Logic board assembly

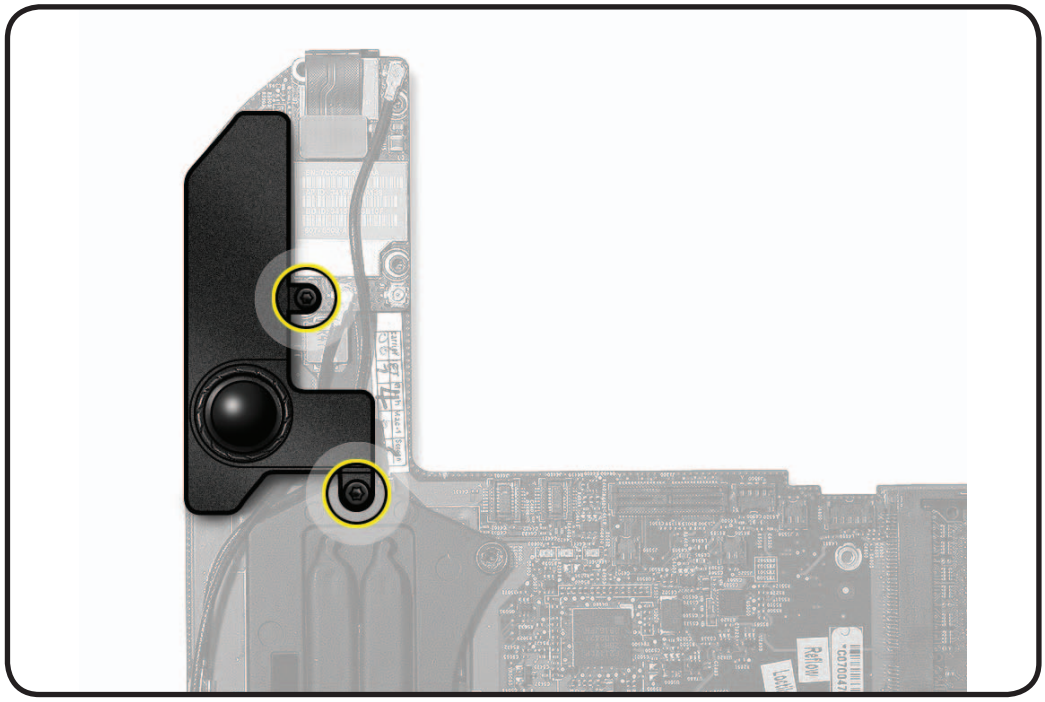


Tools

- Torx T6 screwdriver
- Black stick



Removal

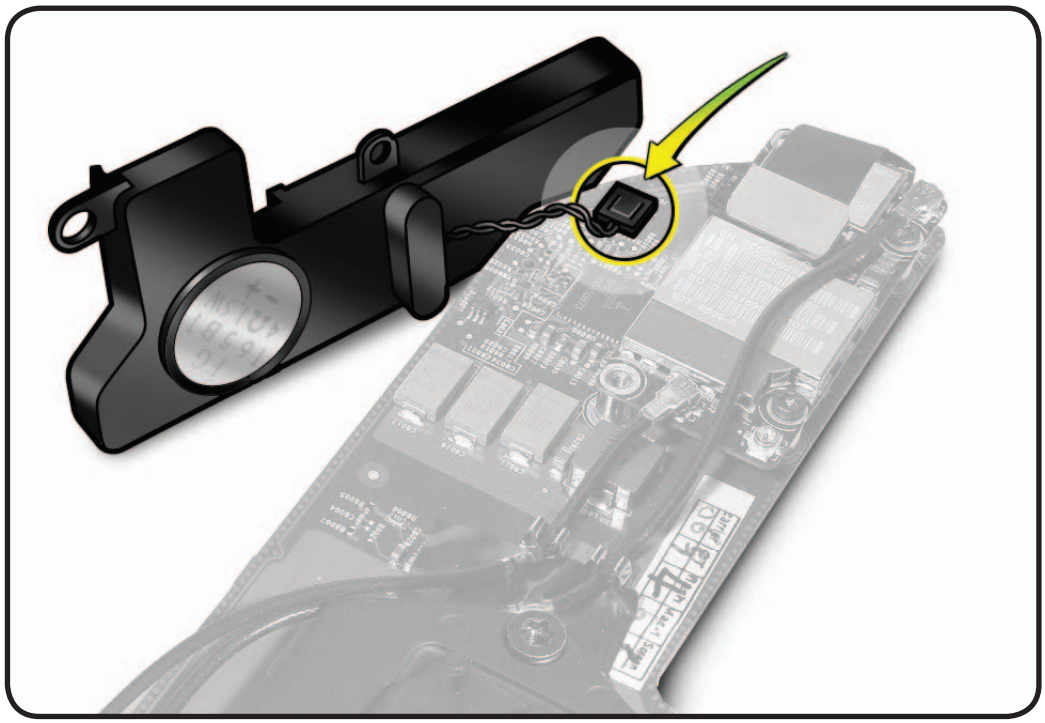


1 Remove 2 screws:

- 922-9597 (this screw may have already been removed if the AirPort/Bluetooth board has been removed).

- 922-9598

Important: When reinstalling, make sure to install this screw at the heatsink, or damage can result.



2 Carefully lift the speaker to reveal the speaker cable connected to the logic board, and disconnect.

3 **Note:** Check the speaker magnet for missing screws before reassembly.

Important:

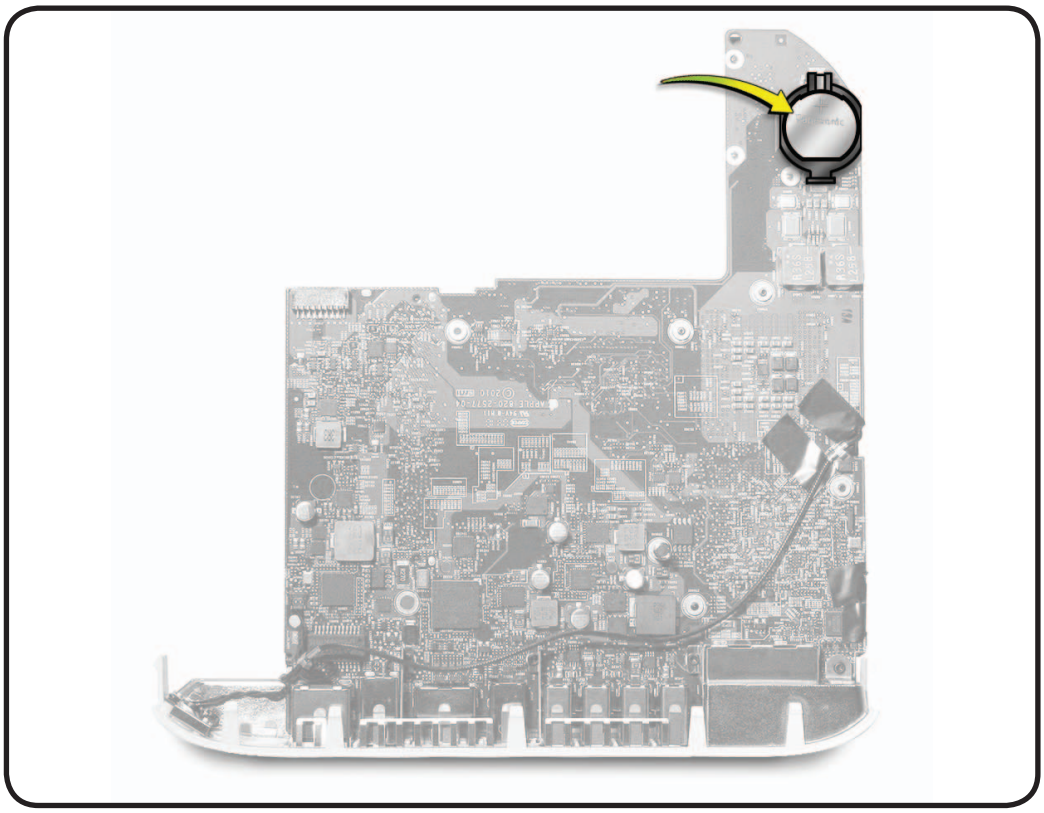
Do not overtighten screws. Install all screws by hand. Do not use power tools.

Battery

First Steps

Remove:

- Bottom cover
- Fan
- Cowling
- Antenna plate
- Logic board assembly



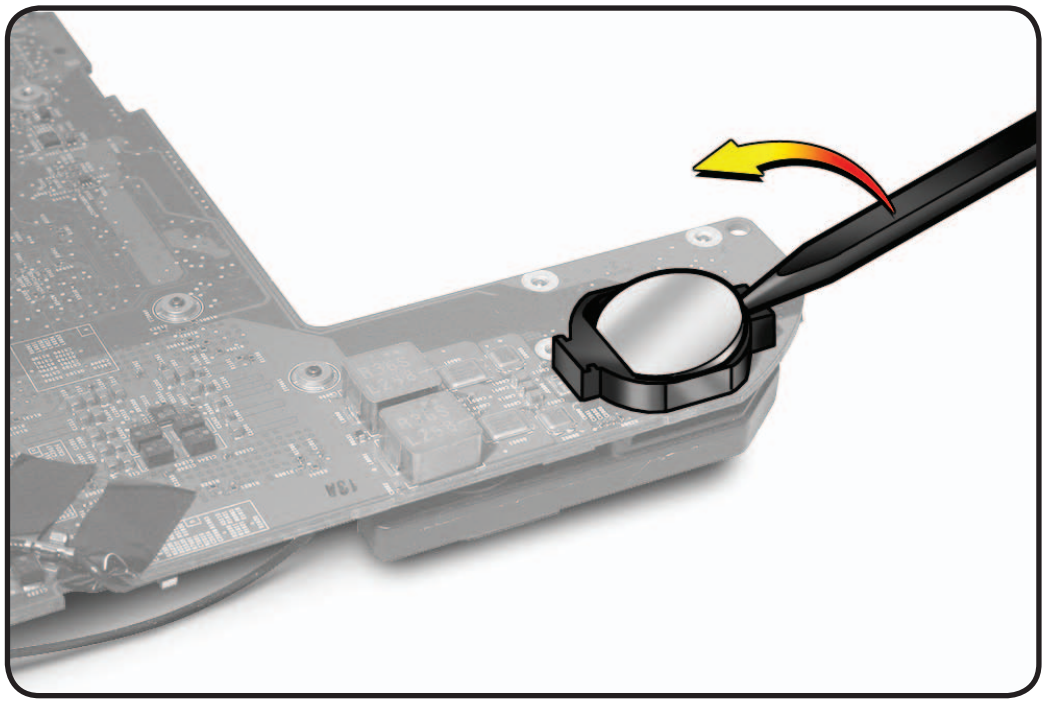
Tools

- Black stick

Removal

1 Insert a black stick under the battery and push it up and out.

2 Grab the battery as it slips up and out of the battery holder.



Hard Drive

First Steps

Remove:

- Bottom cover
- Fan
- Cowling
- Antenna plate
- Logic board assembly (partial remove)

Server Note:

- For the lower hard drive on the server, follow the procedures to remove the optical drive.

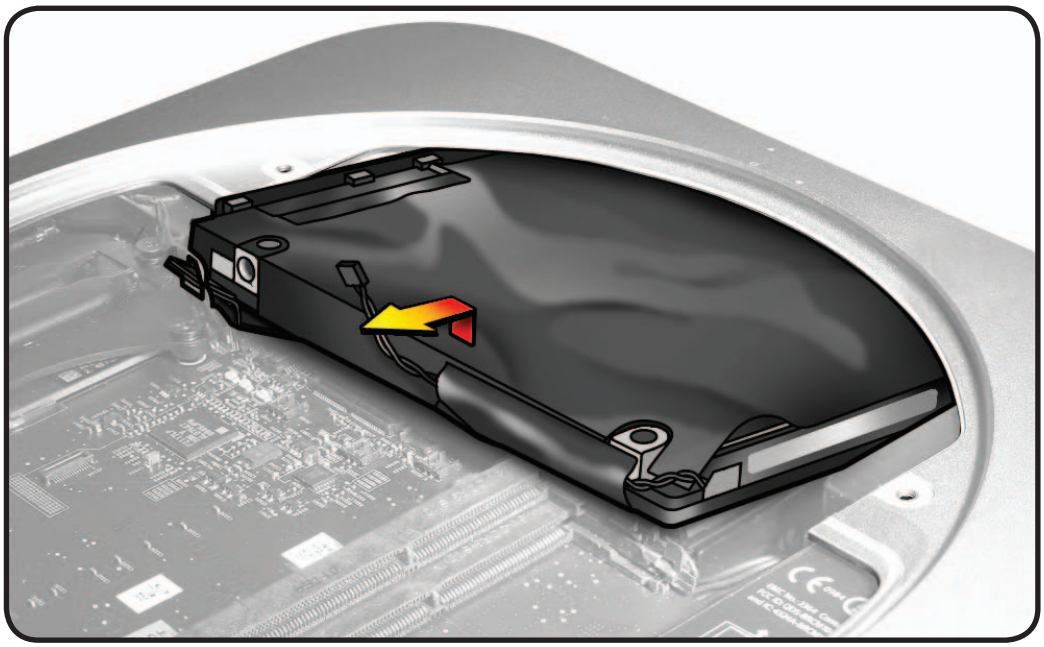
Tools

- Black stick

Removal

1 Dislodge the logic board assembly partially. (You do not need to disconnect the power supply cable.)

2 Slide out the hard drive.



Thermal Sensor Note:

- Thermal sensors on replacement drives are pre-installed, but are also replaceable separately. See the **Thermal Sensor Replacement** section.

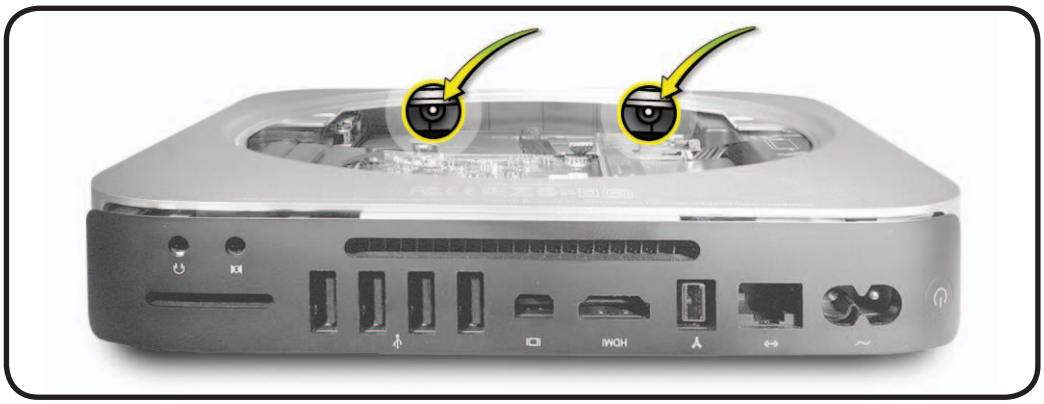
Part Note:

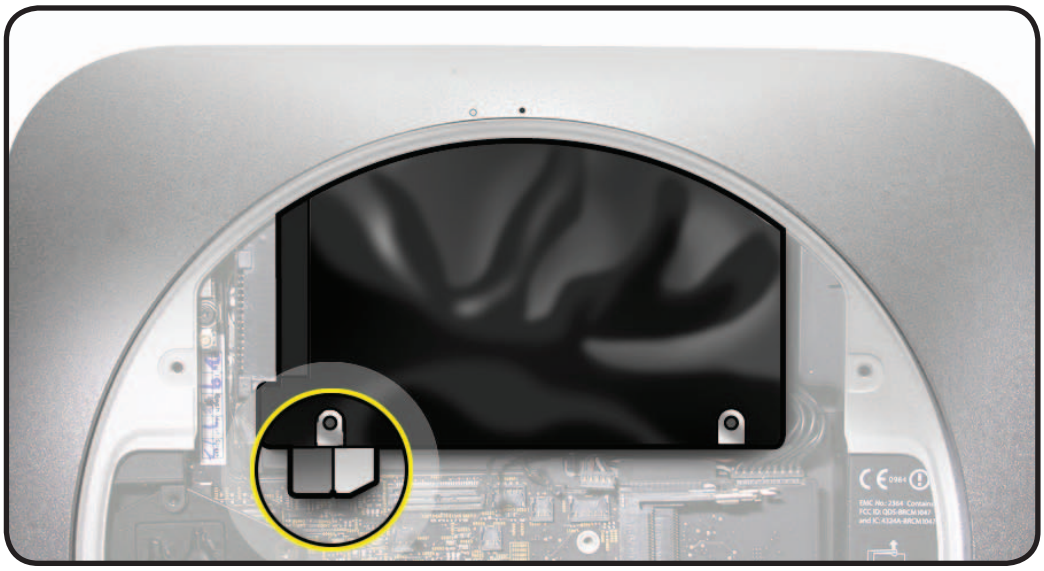
- To install the flex cable, connect it to the hard drive, then use the included tape to secure the connector to the top of the hard drive.

Reassembly

Be very careful not to damage the cosmetic Mylar cover or catch it on the edge of the housing opening.

Note: The hard drive has two pins that secure it to the internal side wall of the case.





1. Slide hard drive assembly into the case.
2. Maneuver the hard drive until the pins secure to the holes in the case. .
   Wiggling the drive with a black stick inserted into one of the top hard drive screw holes may be helpful.
   The drive should not move sideways once secure.
   Note the flex cable proximity to the bottom drive flex cable to help align.
3. Make sure the power supply cable is connected, then slide the logic board assembly back in place and secure with screws.
4. Connect all cables to the logic board.

Power Supply

First Steps

Remove:

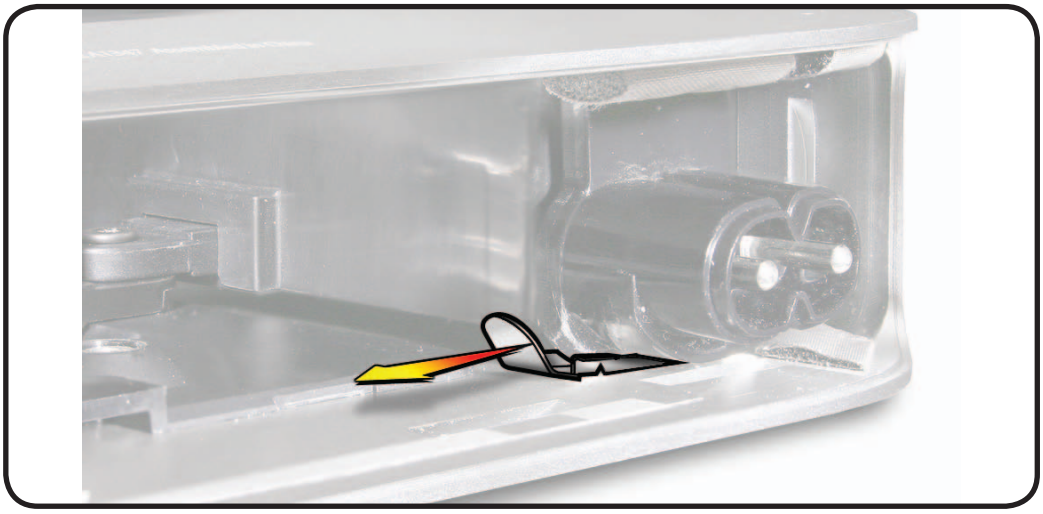
- Bottom cover
- Fan
- Cowling
- Antenna plate
- Logic board assembly
- Hard drive

Tools

- Torx T6 screwdriver
- Black stick
- Tweezers (optional)
- Power cord (optional)

Removal

1 Slide the power cord socket retention clip left to release the socket.

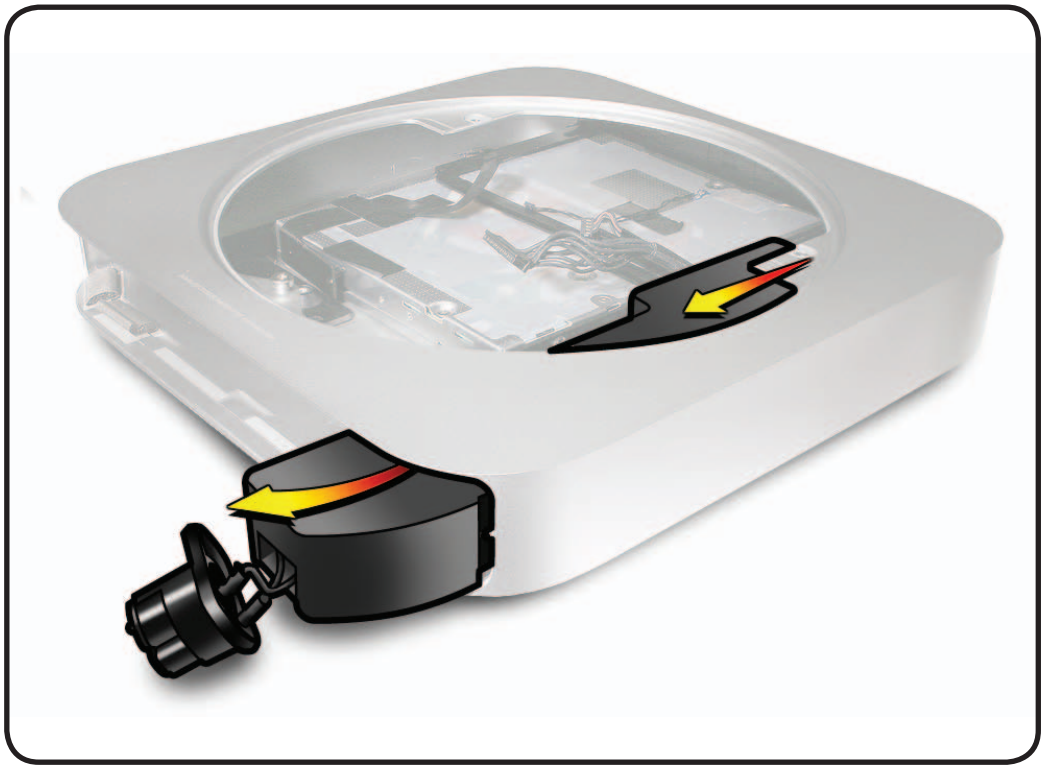


2 Rotate the power cord socket 90-degrees counterclockwise, to disengage.

3. Remove one screw:

- 922-9578

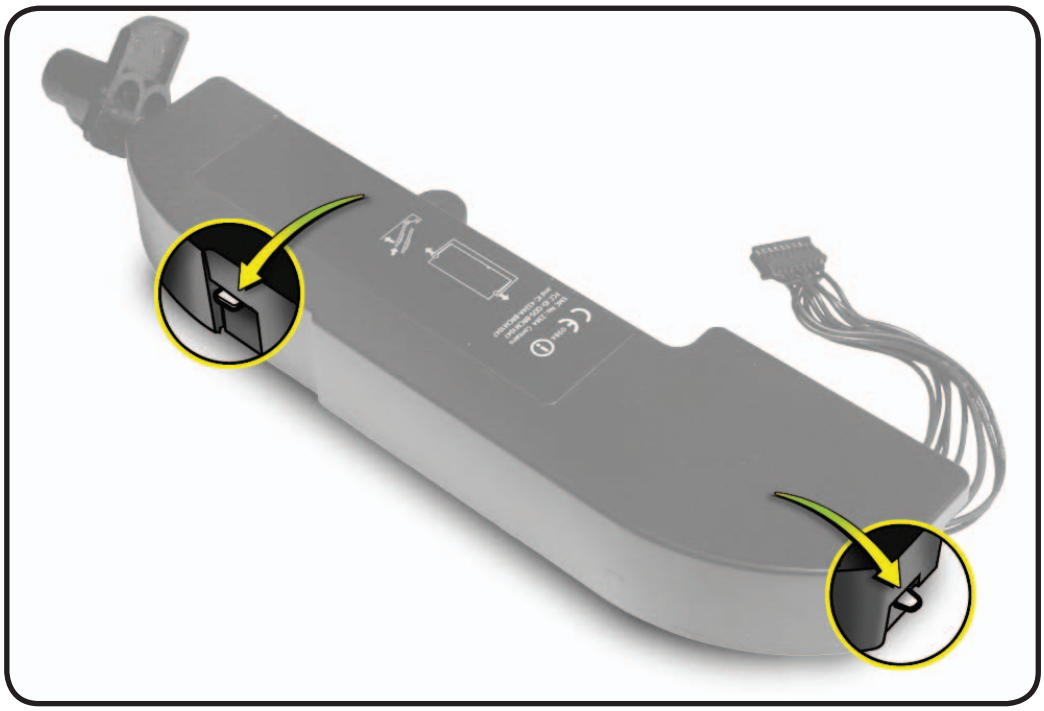
4 Pull out power supply assembly, rotating slightly left.



Reassembly

Notes:

- The power supply has alignment pins that must fit into their recesses inside the housing.
- The power cord socket rotates within groves in the housing and must be aligned straight before the retention clip can be inserted.
- An unplugged power cord inserted into the socket may be helpful to straighten the socket.

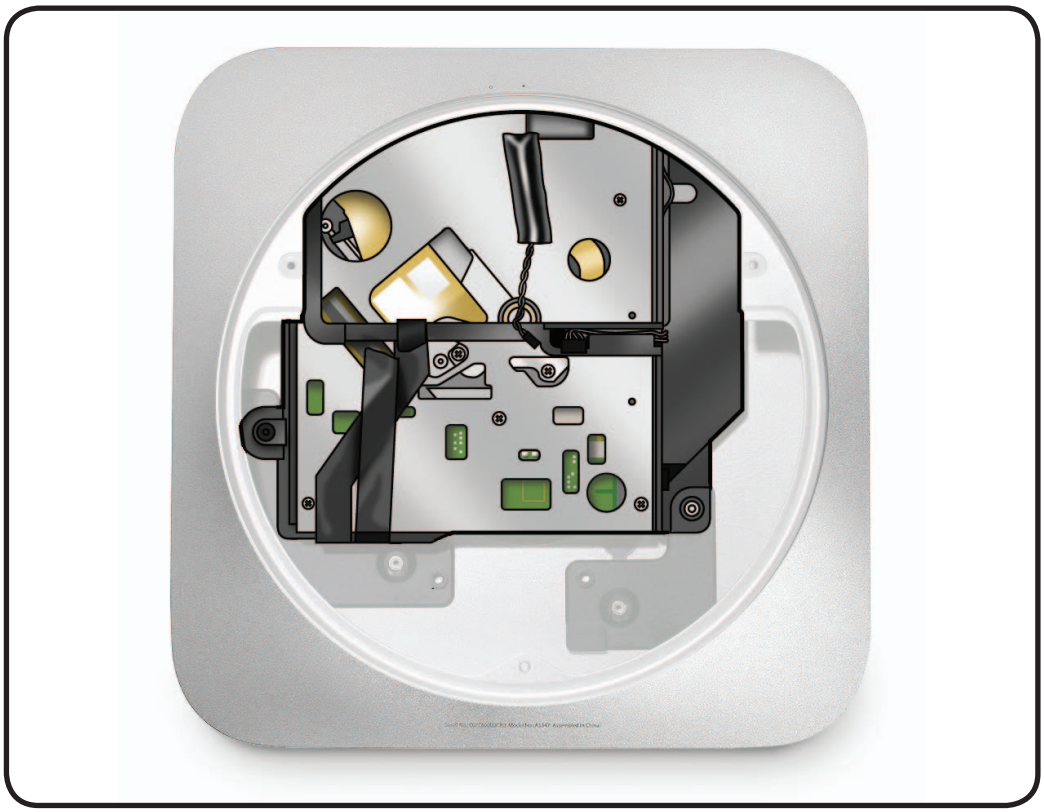


Optical Drive / Hard Drive (Server)

First Steps

Remove:

- Bottom cover
- Fan
- Cowling
- Antenna plate
- Logic board assembly
- Power supply

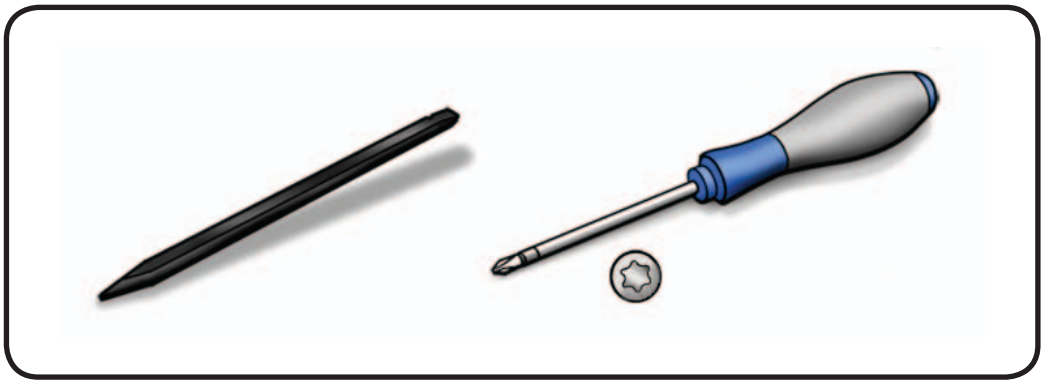


Thermal Sensor Note:

- Thermal sensors on replacement drives are pre-installed, but are also replaceable separately. See the Thermal Sensor Replacement section.

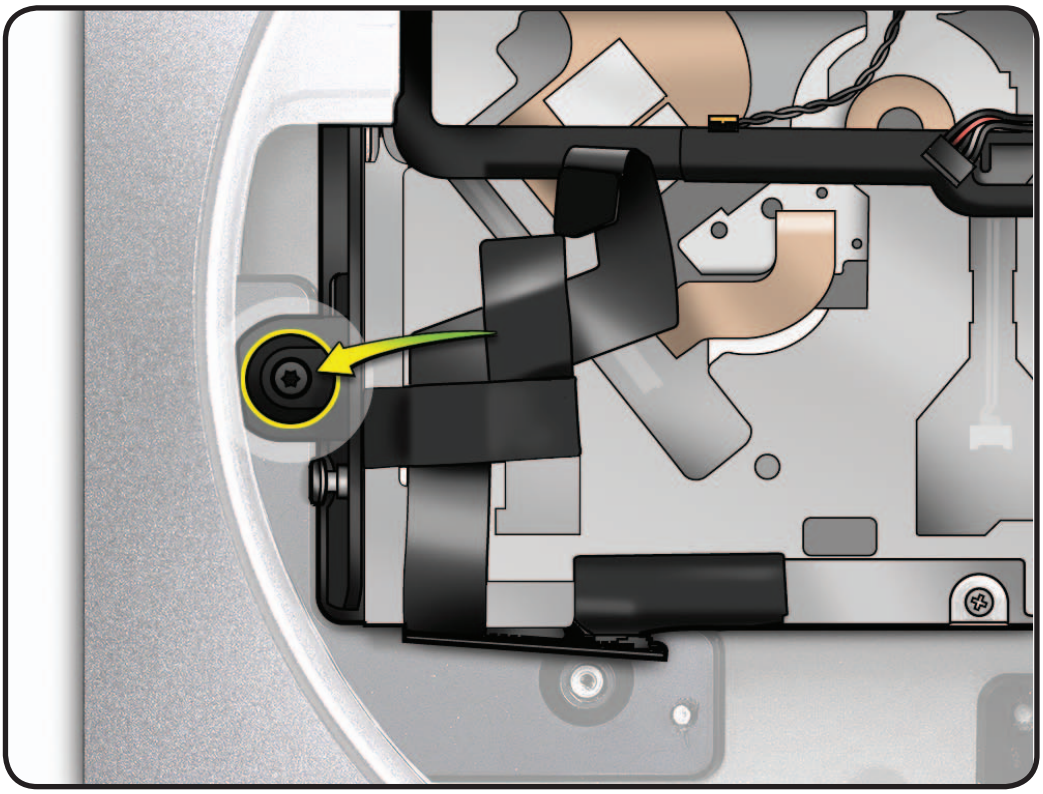
Tools

- Torx T6 & T8 screwdrivers
- Black stick



Removal

1 Remove the T6 screw, 922-9578.



2 Lift the drive and carrier assembly out of the case.

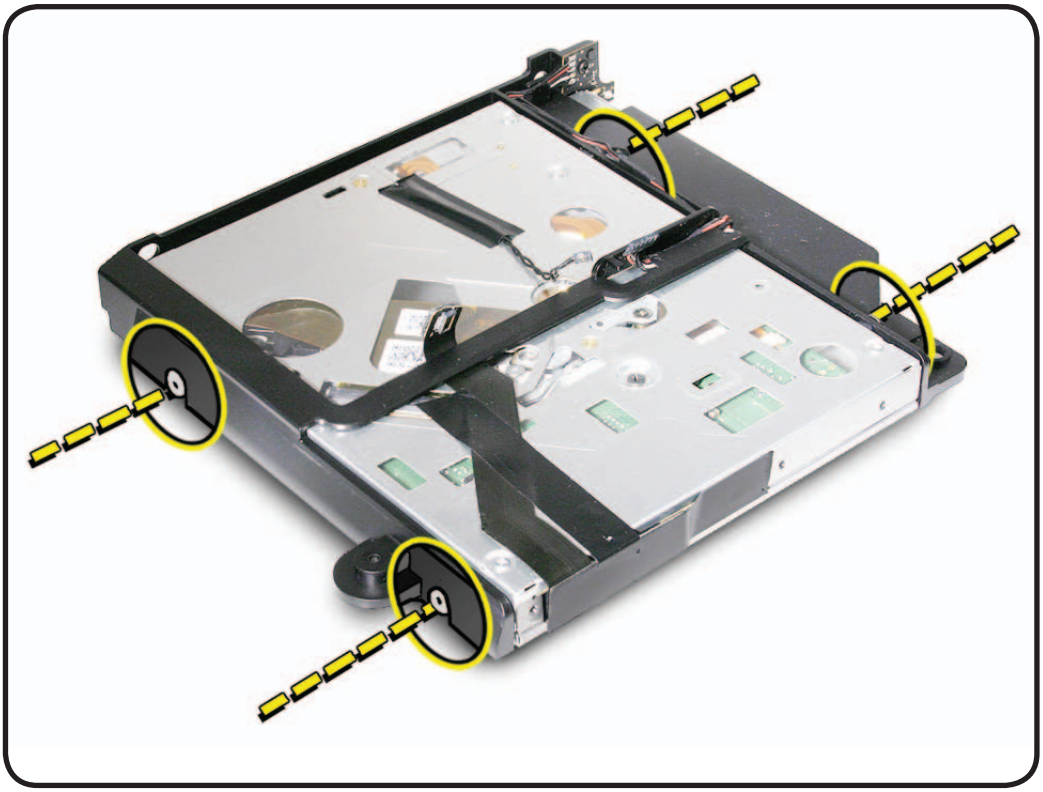
3 Remove 4 T8 screws in the drive carrier:

- 922-9583

Server Note: For the lower hard drive on the server, the screws are located in front and back of the carrier.

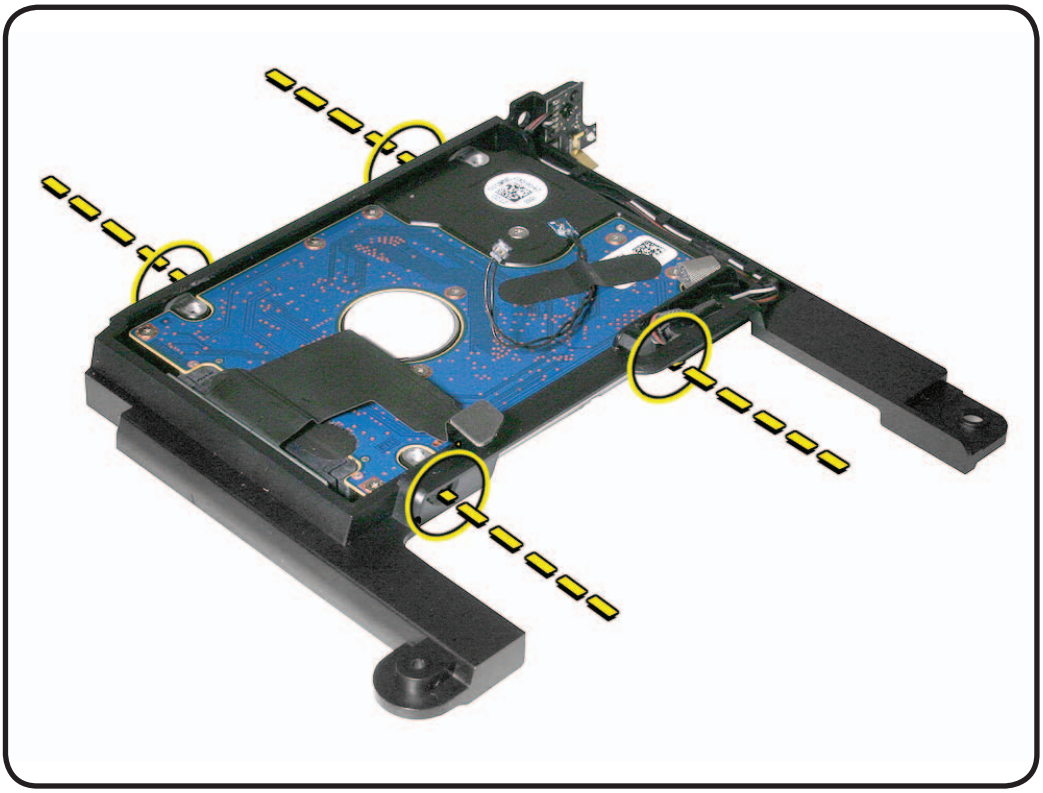
- 922-9585

4 Lift the drive from the carrier.



5 If replacing the optical drive flex cable, install and align the cable carefully. Apply the straight edge of the included tape to the flex connector then fold over onto the top of the flex cable to secure to the drive.

Server Note: To install the bottom hard drive flex cable, connect it to the hard drive, then re-use the black tape, if any, to secure the connector to the top of the hard drive.

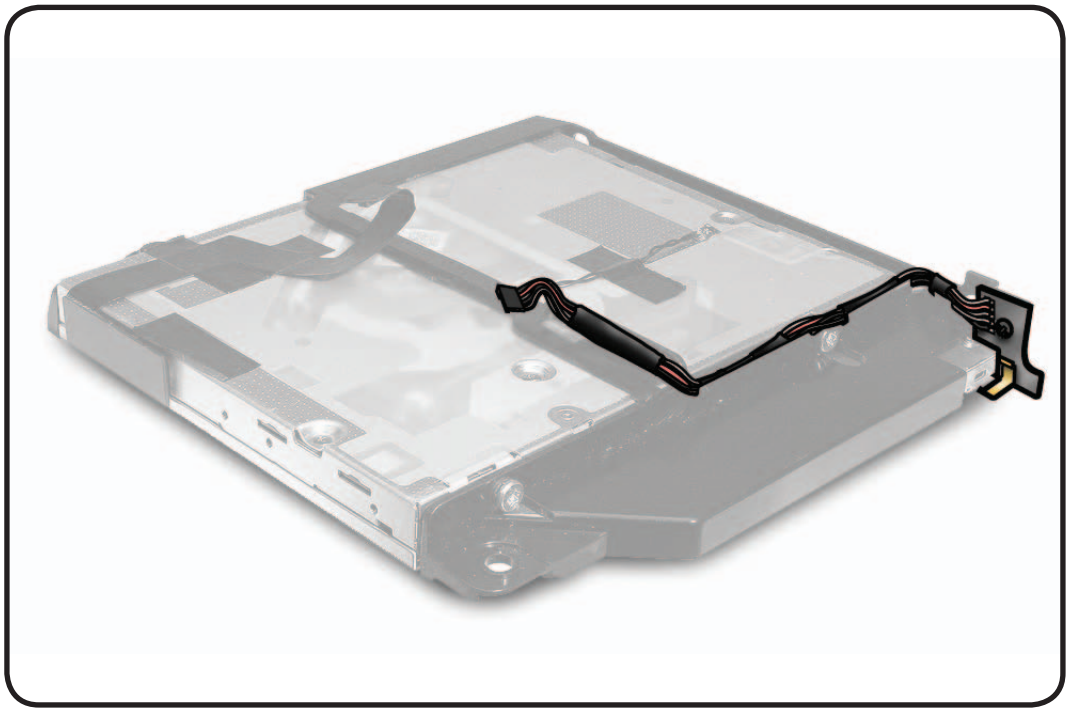


IR Board and Cable

First Steps

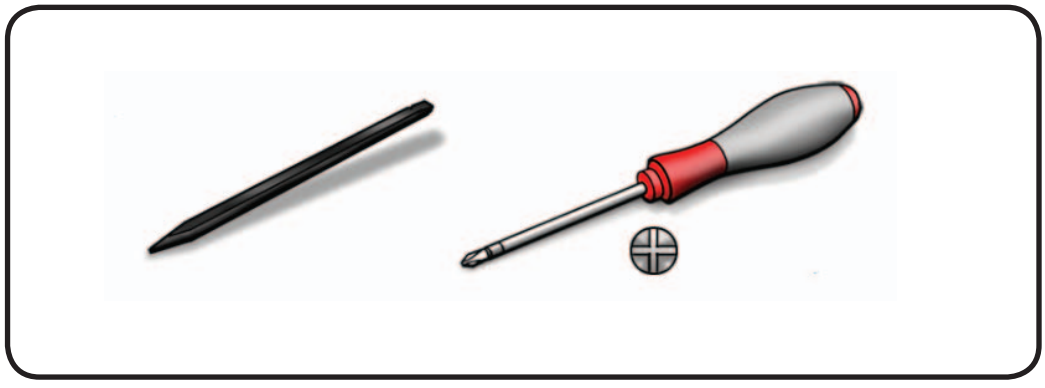
Remove:

- Bottom cover
- Fan
- Antenna plate
- Logic board assembly
- Power supply
- Optical drive



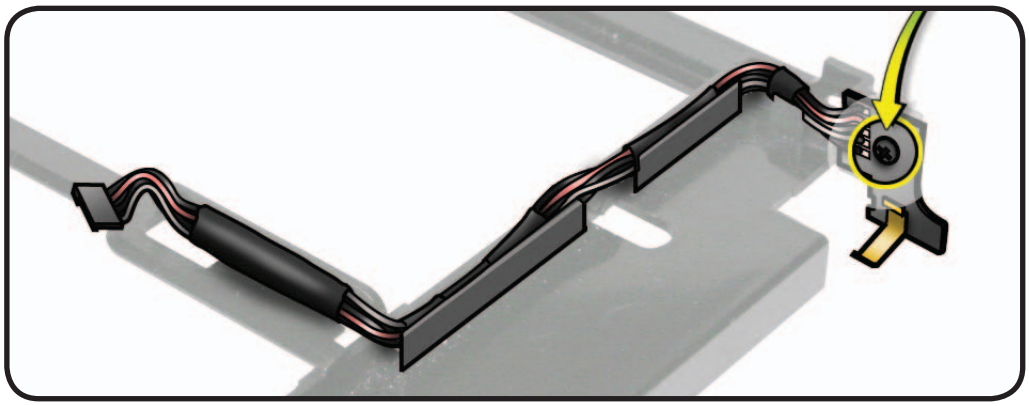
Tools

- Phillips #0 screwdriver
- Black stick



Removal

1 Remove 1 screw 922-8820.



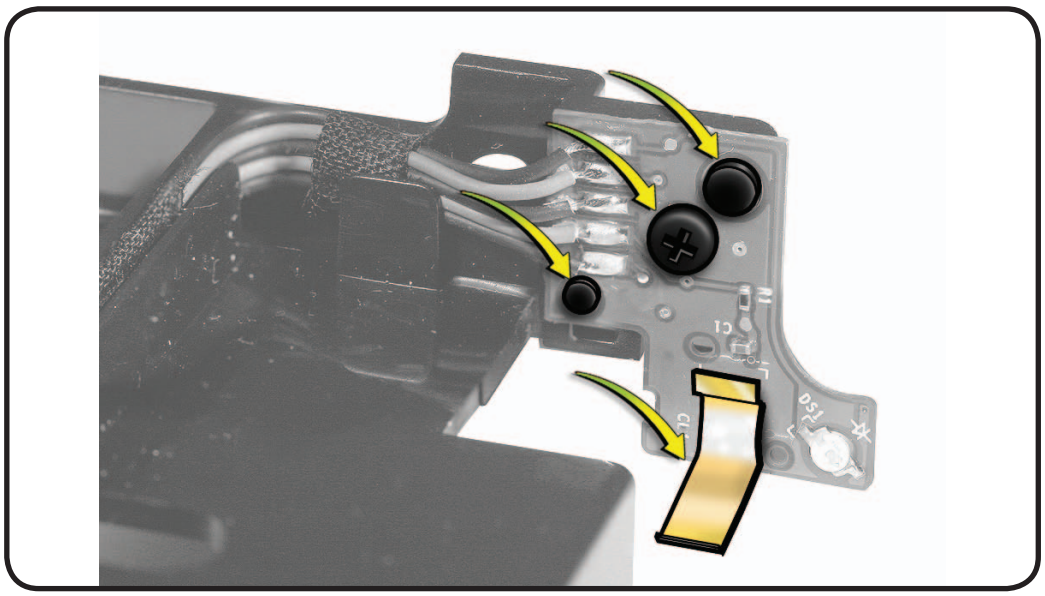
2 Note the IR cable routing on the drive carrier.

3 Remove the IR cable from the cable channel.

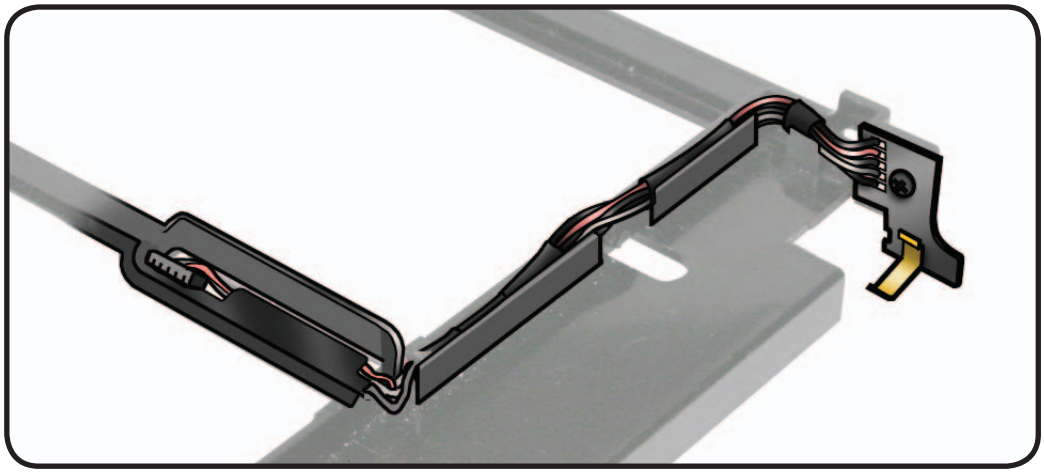
Reassembly

The IR board must fit over the pin on the drive carrier before securing the screw.

Important: Make sure the grounding clip has not been damaged and will make contact with the case.



1 Insert the IR cable into the cable channel, as shown.



Housing

First Steps

- Remove all other parts.
- The housing is what's left after all other parts have been removed.

Tools

No tools are required for this procedure.

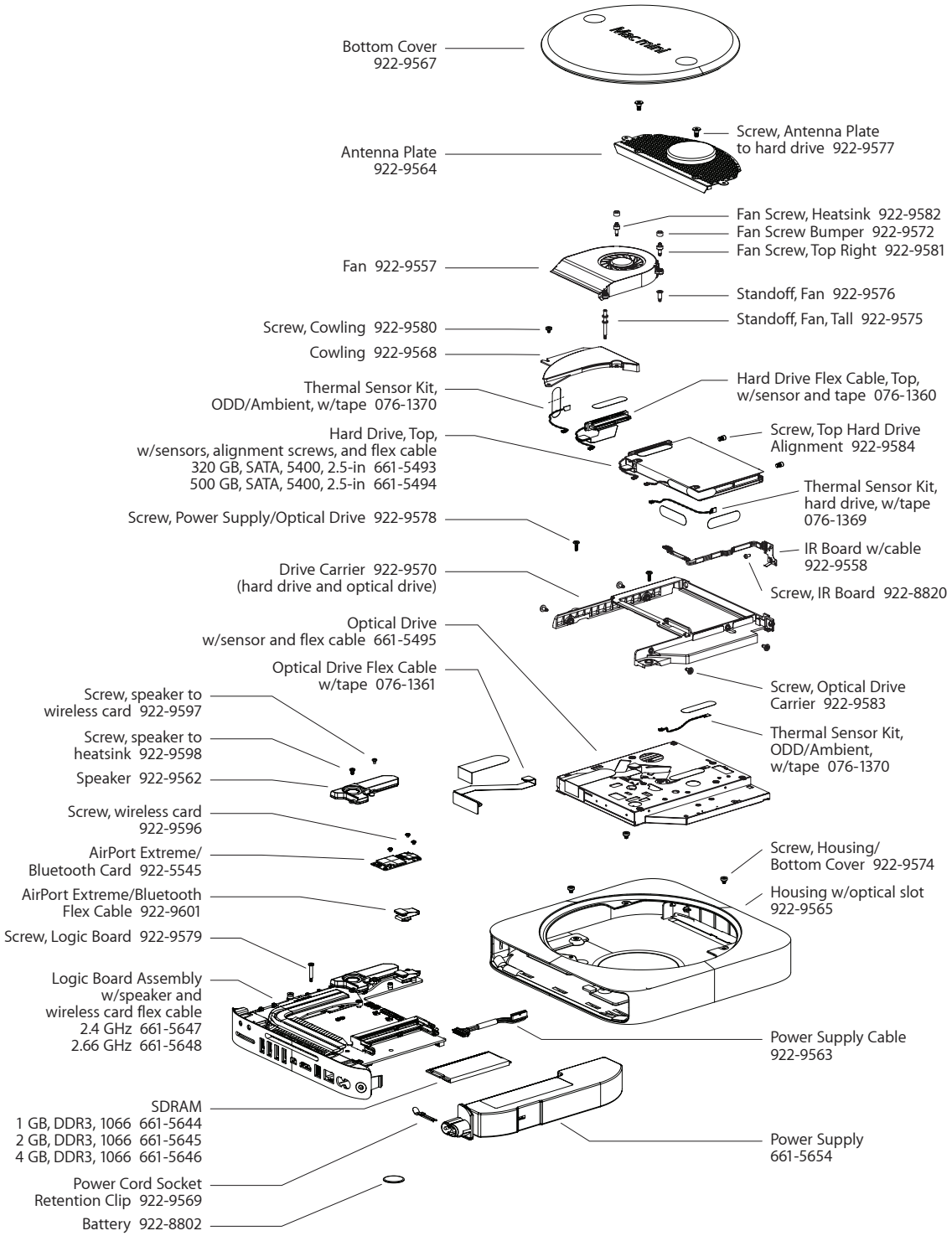
Service Source

Views

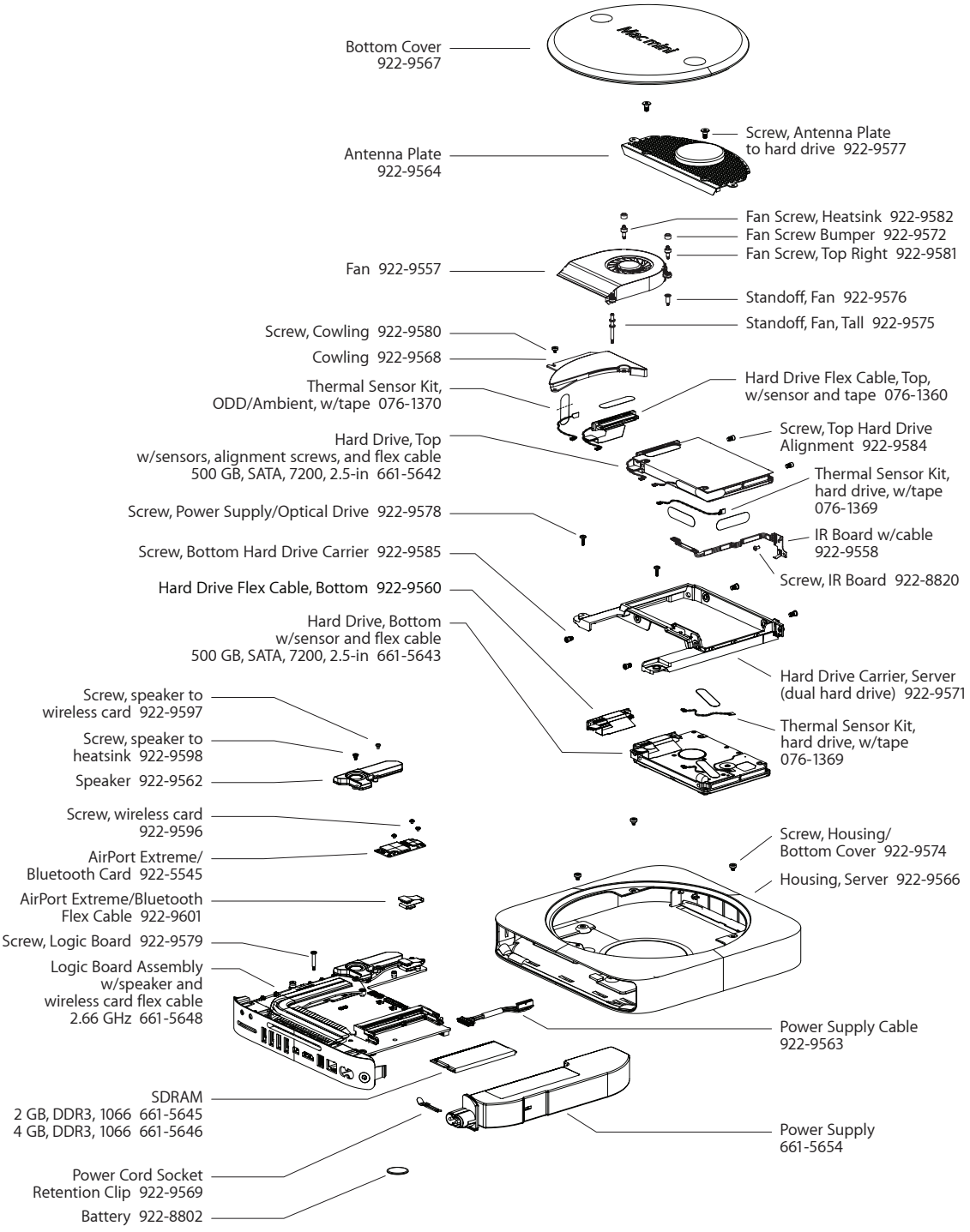
Mac mini (Mid 2010)

Mac mini (Mid 2010) and Mac mini Server (Mid 2010)

Exploded View



Exploded View (Server)



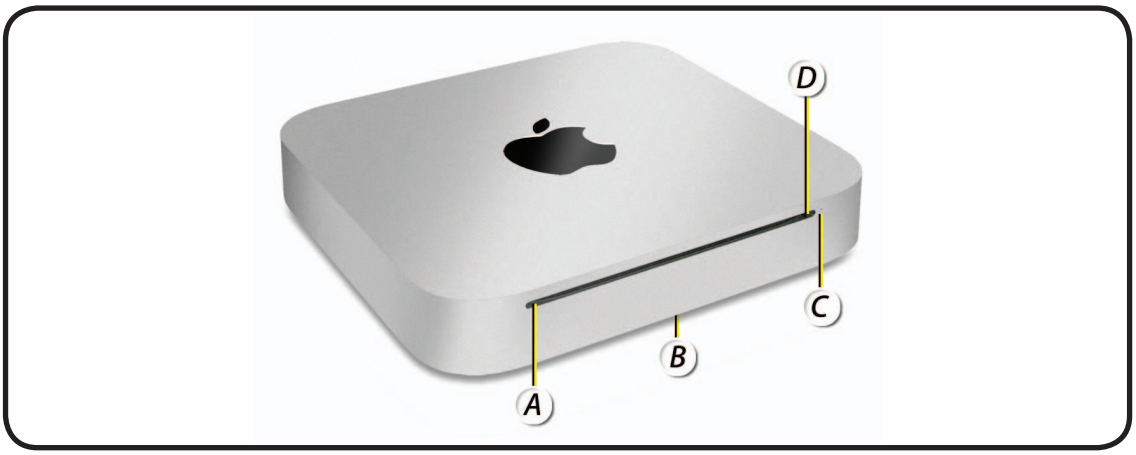
Screw Chart

Note: Screws are not to scale.

922-9582 **Torx T6**  - Fan to heatsink (1).	**922-9581** **Torx T6**  - Fan to standoff, top right (1)	**922-9572** **Bumper**  - Top of fan screws (2)
922-9575 **Torx T6**  - Standoff, fan, tall (1)	**922-9576** **Torx T9**  - Standoff, fan, top right (1)	**922-9580** **Torx T6**  - Cowling (1)
922-9577 **Torx T8**  - Antenna Plate, to hard drive (2)	**922-9574** **2 mm (5/64-in.) Hex**  - Housing/Bottom Cover (3)	**922-9579** **Torx T6**  - Logic Board (1)
922-9584 **Torx T8**  - Hard Drive, top, alignment (4)	**922-9578** **Torx T6**  - Power Supply/Optical Drive (2)	**922-9585** **Torx T8**  - Hard Drive, bottom, carrier (4)
922-9583 **Torx T8**  - Optical Drive Carrier (4)	**922-8820** **#0 Phillips**  - IR Board (1)	**922-9598** **Torx T6**  - Speaker to heatsink (1)
922-9597 **Torx T6**  - Speaker/AirPort Card (1)	**922-9596** **Torx T6**  - AirPort Card (3)	**922-9569** **Retention Clip**  - Power Cord Socket (1)

External Views

Front View



A = Slot-loading optical disc drive

B = Bottom cover

C = Power indicator light

D = Built-in infrared (IR) receiver

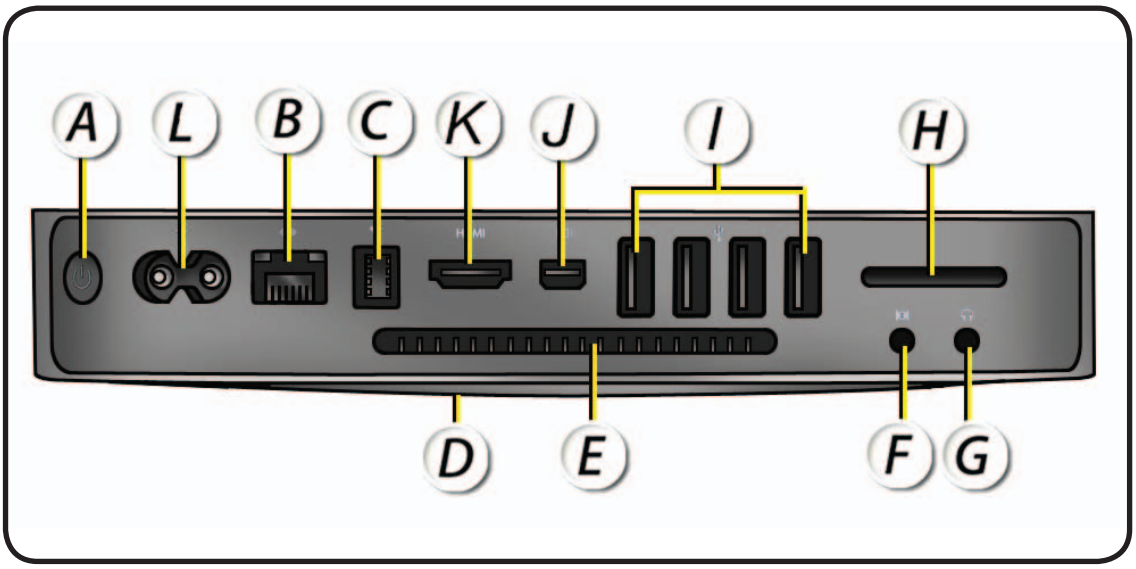
Front View - Server

A = Bottom cover

C = Power indicator light

D = Built-in infrared (IR) receiver

Port View



A = Power button

B = Gigabit Ethernet port (10/100/1000 Base-T)

C = FireWire 800 port

D = Cool air inlet (around bottom cover)

E = Exhaust vent

F = Audio in port

G = Audio out port

H = SD card slot

I = USB 2.0 ports (4)

J = Mini DisplayPort

K = HDMI port

L = Power port