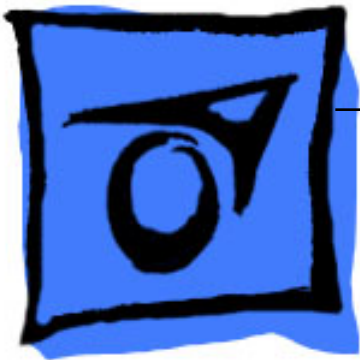


eMac ATI Graphics/  
USB 2.0/2005

Updated 12 July 2006



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Apple Service Source



Repair Extension Program

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eMac (USB 2.0)



# eMac Repair Extension Program for Video and Power Issues

The eMac Repair Extension Program (REP) for Video and Power Issues covers repairs for eMac (USB 2.0) computers exhibiting issues due to specific component failure. Program instructions and the CompTIA code for eMac REP repairs are provided in this chapter.

## Overview

The eMac REP for Video and Power Issues covers eMac (USB 2.0) models that exhibit one of the following video- or power-related symptoms:

- Scrambled or distorted video
- No video
- No power
- Intermittent system freezes or crashes
- System crashes during the startup process

If an eMac (USB 2.0) computer exhibits any of these symptoms and falls within the eligible number range noted below, Apple service providers should inspect the capacitors on the logic board. If the capacitors show signs of bulging and/or venting, the logic board should be replaced.

This program covers affected eMacs for up to three years from the original date of purchase. Apple will continue to evaluate the repair data and will provide further repair extensions as needed.

**Note:** Customers are responsible for the repair cost of any damage caused by accident or misuse, or for issues that do not relate directly to the specific logic board issues covered by this program.

## Eligible Products

The program is available for eMac (USB 2.0) models that were sold between approximately April 2004 and June 2005. The affected eMac computers have serial numbers with the first five digits falling into the ranges noted below:

- G8412xxxxxx – G8520xxxxxx
- YM412xxxxxx – YM520xxxxxx
- VM414xxxxxx – VM518xxxxxx \*

\* updated as of July 12, 2006

Some remanufactured or refurbished eMac computers (serial numbers beginning with “RM”) that exhibit the symptoms listed above may also be eligible for repair under this program. Inform customers that a more thorough inspection will be required to determine if the computer

qualifies. If the computer does not qualify, contact the customer for resolution.

**Note:** Some eMac (2005) models were manufactured with serial numbers within the same upper number ranges noted above, but these models are **not** covered under the eMac REP for Video and Power Issues.

The eMac REP covers computers based on their system serial number and the symptoms diagnosed, not on the serial numbers of the logic boards. All eMac computer serial numbers are printed inside the optical drive door. You can see this number when you eject the optical drive tray by pressing the eject key on the keyboard.



Customers are responsible for the repair cost of any damage caused by accident or misuse. For example, computers that show signs of having been dropped or of liquid spills into the case are not eligible for the eMac REP.

Customers are also responsible for issues that do not relate directly to the specific logic board issues covered by this program. For example, if an eMac is taken to an Apple service provider with a cracked display and a component failure eligible under the program, Apple will cover the component failure repair, but the cost of replacing the cracked display is the customer's responsibility.

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## Repair Strategy

Required service parts for this program are available so that certified technicians may repair eligible eMac (USB 2.0) computers at an Apple service provider location.

Service providers should create the repair for an eligible eMac in the usual manner, whether or not the computer is covered by an Apple warranty or extended service agreement. However, it is extremely important that you select the specific CompTIA code created for this program (see “Special CompTIA Code”).

## Reimbursement Strategy

Apple is aware that some customers may have paid for out-of-warranty repairs that qualify under this program. If your customers’ eMac was repaired out of warranty and they believe the repair qualified under the eMac REP for Video and Power Issues, Apple will review their claim and determine if the customers qualify for reimbursement of the repair cost.

If the claim is determined to be eligible for repair under the eMac REP for Video and Power Issues, Apple will reimburse your customer directly.

Apple will work with service providers to inform affected customers (where contact information is available) about details on the reimbursement process. If your service location has conducted any out-of-warranty repairs that are eligible under this program, Apple will contact you in the near future to coordinate communications to affected customers.

**Note:** Service that was performed to repair damage caused by accident or misuse is not covered under this program.

## Replacement Parts

If a logic board must be replaced, order on a like-for-like basis only. The following parts are eligible to be replaced under this repair extension program:

- 661-3279 Board, Logic, 1 GHz, USB 2.0
- 661-3280 Board, Logic, 1.25 GHz, USB 2.0

The parts listed above are the only approved logic board replacements covered under the eMac REP for Video and Power Issues. Apple will charge service accounts for any parts ordered for repairs involving units eligible for the eMac REP that are not related to this program and are not covered by warranty or an extended AppleCare service agreement.

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## Special CompTIA Code

Apple has created the following CompTIA code to use for repair on eMac (USB 2.0) computers eligible under the eMac REP for Video and Power Issues.

Use **CompTIA Code 559: eMac MLB REP** when replacing a logic board under the eMac REP, whether or not the computer is covered by warranty or an extended service agreement.

### Europe

For repairs covered under the eMac REP for Video and Power Issues, IMCs in Europe must order logic boards as stock parts using the part numbers listed above. To receive credit for the covered logic boards, IMCs must request an RMA number from the SPS team and return the defective parts to Apple with the RMA number.

### Japan

Service providers in Japan who create a mail-in repair for eMac products eligible under the eMac REP for Video and Power Issues should select one of the following two CompTIA codes:

- Use **CompTIA Code 559: eMac MLB REP** for logic board repairs covered under the eMac REP for Video and Power Issues.
- Use **CompTIA Code 558: eMac MLB REP (multiple issues)** for products exhibiting the symptoms listed above, but requiring repairs in addition to those covered by the eMac REP for Video and Power Issues.

### Latin America

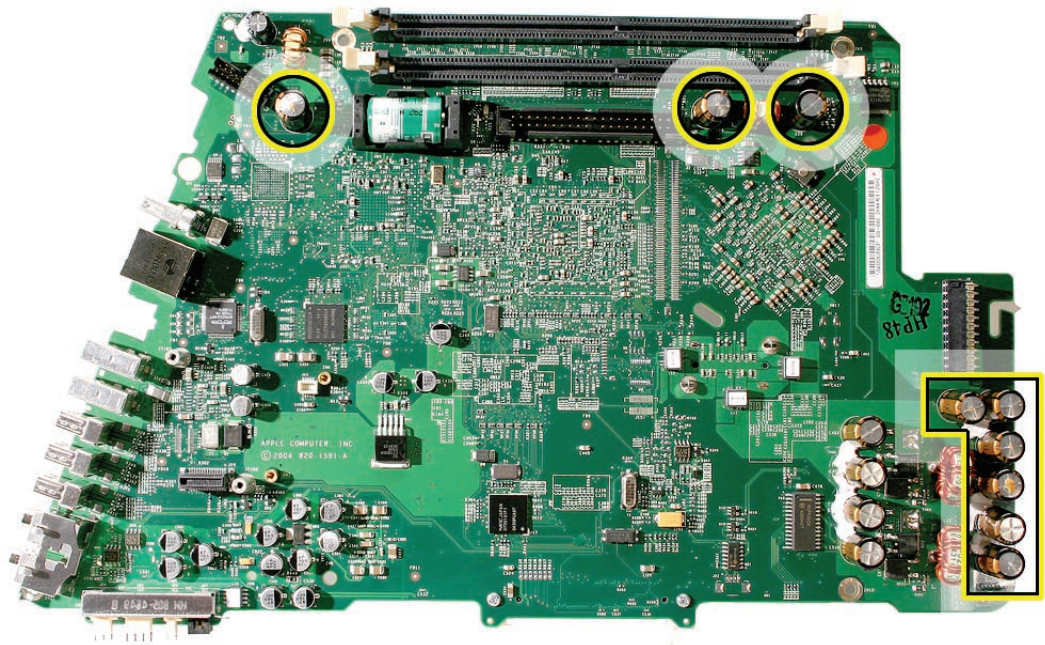
Latin American service providers should order parts for this repair extension program in the usual manner.



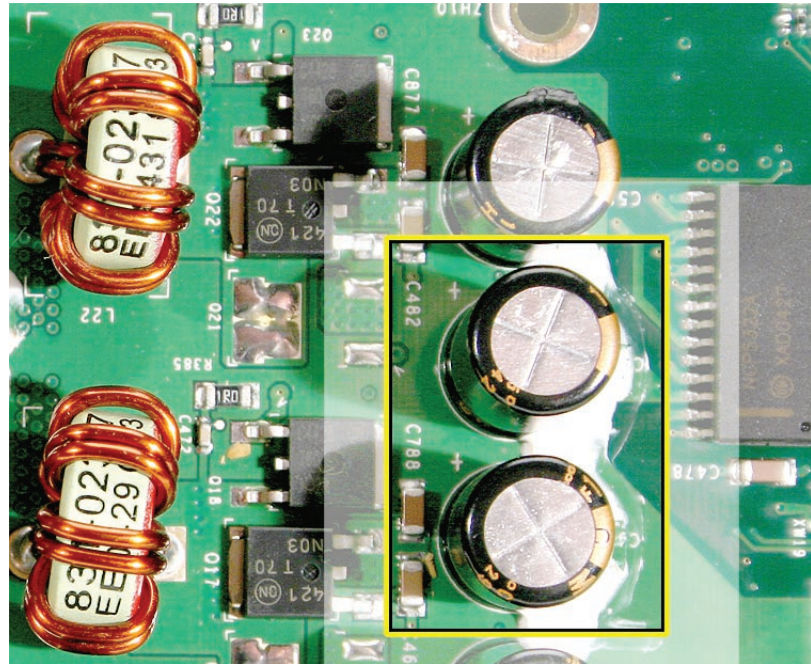
# Verification and Repair Procedure

To verify whether the eMac REP for Video and Power Issues covers the repair of an eMac (USB 2.0) computer, do the following.

1. Verify that the eMac (USB 2.0) computer exhibits one or more of the following symptoms:
  - Scrambled or distorted video
  - No video
  - No power
  - Intermittent system freezes or crashes
  - System crashes during the startup process
2. Verify that the computer is eligible for the eMac REP for Video and Power Issues. Refer to the topic “Eligible Products” earlier in this chapter.
3. Inspect the capacitors on the logic board (highlighted below), looking for signs of bulging and/or venting.



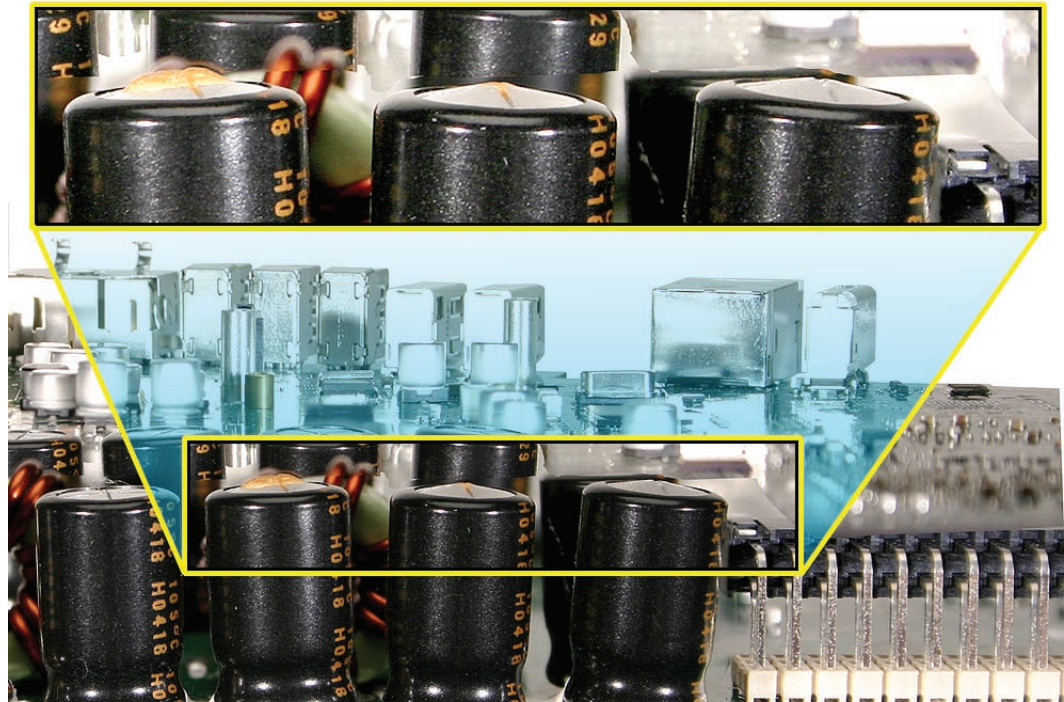
- Affected capacitors have a "+" sign stamped into the top of the capacitor.  
**Note:** Not all capacitors stamped with a "+" sign are faulty, so further inspection is required to determine whether any capacitors are faulty.





- Failed capacitors no longer have a flat top and can be identified by signs of bulging or venting (shown below). The top may bulge upward. In severe cases, the top of the capacitor may also show signs of electrolyte venting, which appears as a small amount of tan-colored paste around the top of the capacitor. One or both of these signs indicate that the capacitor has failed or will likely fail.

**Warning:** Use caution when handling failed electronic components, and be sure to wash your hands afterwards.



- If the logic board has bulged or vented capacitors, replace the logic board.



## Basics

eMac ATI Graphics/USB 2.0/  
2005



# Overview

## What's New (May 2005)

### eMac (2005)

Apple introduced new eMac models, featuring faster PowerPC G4 processors, more RAM, larger hard drives, faster graphics and more graphics memory, and an improved SuperDrive.

- Revised logic boards
  - 661-3539 1.42 GHz board:
  - 661-3610 1.25 GHz board: EEE code T6C, T6D, T6G, T6H, T6J, T6K
- New optical drives:
  - 661-3538, Combo, 32x
  - 661-3536, SuperDrive, 8x
- New hard drives:
  - 661-3534, 80 GB
  - 661-3535, 160 GB
- Memory, 333 MHz DDR
  - 661-3541, 512 MB

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## What's New (April 2004)

### eMac (USB 2.0)

Apple announced a revision to the eMac product family. Powered by G4 processors running at up to 1.25GHz, with a system bus of 167 MHz, the new eMac models come with Mac OS X v.10.3 and include Apple's iLife application suite, providing iMovie, iPhoto, and iTunes as a standard software configuration.

The changes include the following:

- No-optical drive configuration: This computer is available in a low-cost no-optical drive configuration
- Mac OS X 10.3
- Modem: except for the educational configuration, the eMac (USB 2.0) has an internal, fax modem (soft modem). The modem appears to the system as a serial port that responds to AT commands.
- Bluetooth (optional): Fully integrated Bluetooth is available as a build-to-order option
  - 922-6201 Bluetooth board
  - 922-6402 Bluetooth antenna
- USB 2.0 ports: This computer has three USB 2.0 ports
- Revised logic boards
  - 661-3279 1 GHz board: EEE code QDJ or QHL.
  - 661-3280 1.25 GHz board: EEE code QDK or QHM
- New optical drives:
  - 661-3281, CD-ROM, 32x
  - 661-3282, Combo, 32x
  - 661-3283, SuperDrive, 8x
- New hard drives:
  - 661-3209, 80 GB
  - 661-3266, 160 GB (CTO)
- Memory, 333 MHz DDR
  - 661-3322, 512 MB

The RAM expansion modules used in the eMac (USB 2.0) computers are 184-pin SDRAM DIMMs (dual inline memory modules) that are 2.5 V, unbuffered, 8-byte, non-parity, and PC2700 compliant. The speed of the SDRAM devices must be rated at 167 MHz (7 ns) or faster. Refer to Kbase article 86718 for more information.

**Important:** The memory expansion cards (DIMMs) must use SDRAM devices as specified above. DIMMs for previous models of eMac or DIMMs that use EDO or SGRAM devices will not work. If they are installed, the computer will beep, and the power light will flash several times when you turn on the computer. This indicates that the computer cannot find any useable RAM.

- Faraday Shield
  - 922-6407
- Optical Plate (used on the no-optical drive configuration only)
  - 922-6408

- 
- Inner AirPort Door (blank, used on the no-optical drive configuration only)
    - 922-6406
  - Heatsink with/clip
    - 076-1079
  - Wireless Antenna
    - 922-6401
  - Wireless Antenna clips
    - 922-6405
  - Kit, Feet, Captive Screws
    - 076-1034

## **Service and Support**

The service and support strategy for the new eMacs is the same as previous eMac models.

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## What's New (October 2003)

Apple announced a revision to the eMac product family. Powered by G4 processors running at up to 1GHz, the new eMacs come with Mac OS X v.10.3 "Panther," and include Apple's iLife application suite, providing iMovie, iPhoto, and iTunes as a standard software configuration.

The revision to the eMac (ATI Graphics) includes the following:

- Revised logic board, part number 661-3014, 1 GHz, Ver. 2 (EEE code Q11) Refer to the Take Apart chapter, Logic Board/Logic Board Information for details on how to identify the Version 2 board.
- New optical drives:
  - 661-3012, CD-ROM, 32x, drive
  - 661-3015, Combo, 32x, drive
  - 661-3013, SuperDrive, 4x
- New hard drives:
  - 661-3011, 80 GB
  - 661-3016, 160 GB (CTO)
- Mac OS X 10.3
- Updated Apple and third-party bundled software

## Service and Support

The service and support strategy for the new eMacs is the same as previous eMac models.



Take Apart  
eMac ATI Graphics/  
USB 2.0/2005







# Tools

The following tools are recommended for the take apart procedures.

- 2.5 mm hex (for rear housing)
- Nylon probe tools (922-5065)
- Phillips #1 screwdriver
- Phillips #2 screwdriver
- Jeweler's screwdriver set
- Needlenose pliers
- ESD wriststrap and mat
- CRT discharge tool

**Note:** Do not use a power driver on the rear housing screws.



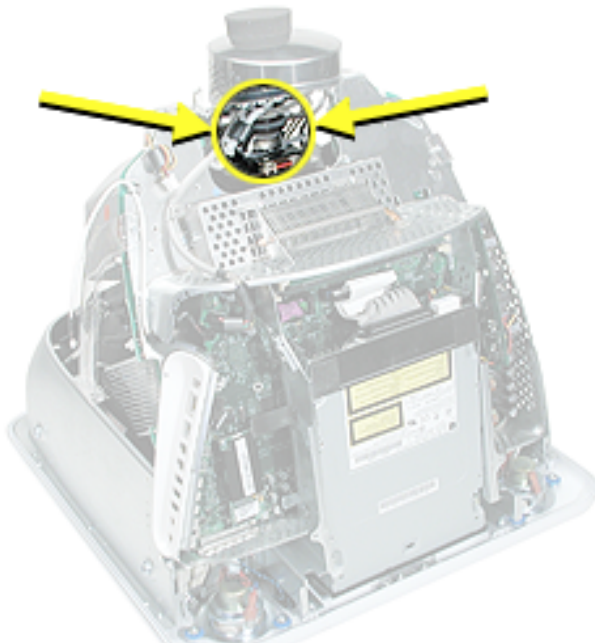
# CRT Neck/Display/Analog Assembly Handling Information

## Handling

**Important:** It is imperative that proper handling and packaging guidelines be followed when working with the display/analog assembly.

Do NOT lift, handle, bump, or manipulate the CRT neck/neck board (see arrows below) on the Display/Analog assembly. Modules damaged by mishandling are NOT covered by Apple Warranty. Apple Authorized Service Providers can be liable for broken CRT necks due to improper handling.

**Caution:** The metal chassis has sharp edges, you may want to wear gloves when handling the assembly. Lift the assembly from the metal chassis; never lift the assembly from the neck. I



## Packing a Defective Display/Analog Assembly

The packing procedure is included with the replacement display/analog assembly. Incorrect packaging can result in damaged eMac (ATI Graphics) displays. Please read and follow the directions enclosed in the shipping box of the new display prior to packaging the defective assembly. AASPs can be liable for broken CRT necks due to improper packing and handling.



# Rear Housing

## Tools

- 2.5 mm hex (for the rear housing)
- Phillips #2 screwdriver

## Part Location



## Preliminary Steps

Before you begin, do the following:

- Place the computer face down on an ESD mat.

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## Procedure

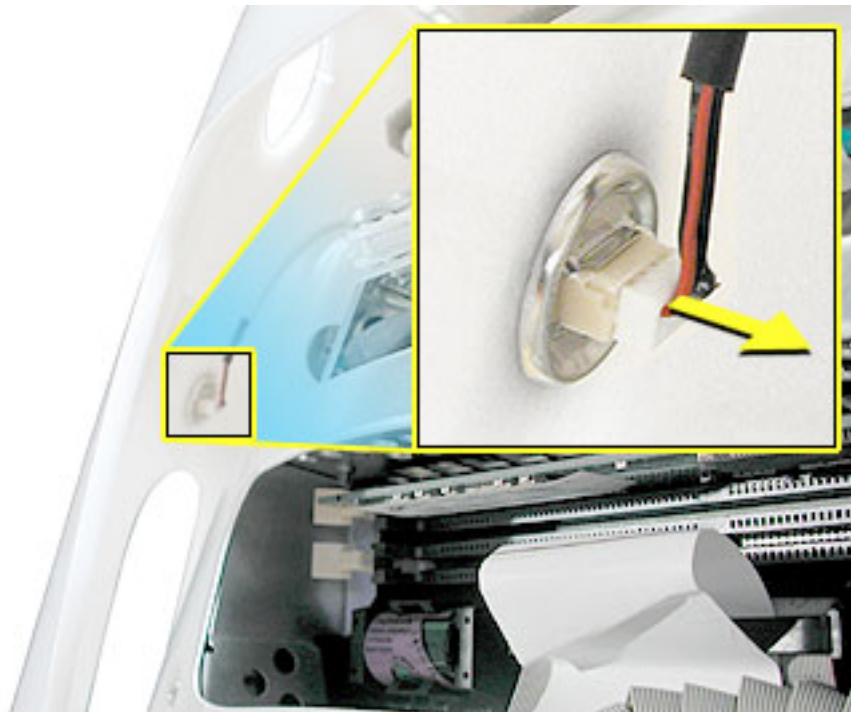
1. Remove seven hex screws around the perimeter of the rear housing.
2. Remove the three Phillips screws; one used for the user access door, and two used for the feet. **Note:** Newer models have a captive screws.



3. Gently lift the rear housing up about four inches.



4. Disconnect the power button cable located on the inside the rear housing.



5. Lift the rear housing off the computer.



# User Access Door

## Tools

This procedure requires the following tools:

- Phillips #2 screwdriver

## Part Location



## Preliminary Steps

Before you begin, do the following:

- Place the computer face down on an ESD mat.

---

## Procedure

1. Remove the screw on the user access door (shown below). **Note:** Newer models have a captive screw.
2. Gently remove the access door.





# Feet

## Tools

This procedure requires the following tools:

- Phillips #2 screwdriver

## Part Location



## Preliminary Steps

Before you begin, do the following:

- Place the computer face down on an ESD mat.



---

## Procedure

1. Remove the two foot screws. **Note:** Newer models use captive screws.





# Power Button

## Tools

- Needlenose pliers

**Note:** Follow the Replacement Note procedure (step 2) only if you are replacing a defective power button.

## Part Location



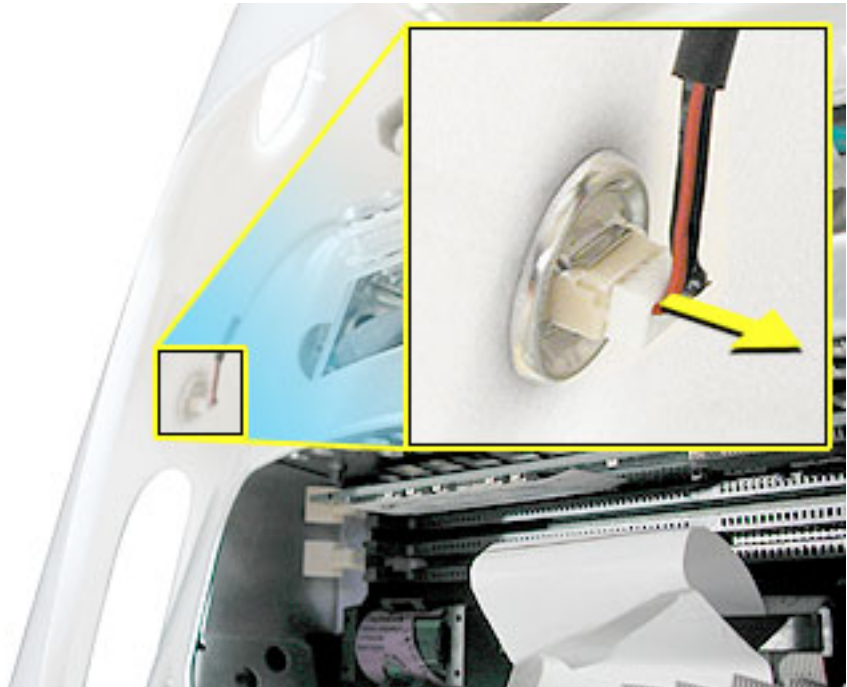
## Preliminary Steps

Before you begin, do the following:

- Place the computer face down on an ESD mat.
- Remove the user access panel.
- Remove the feet.
- Remove the rear housing.

## Procedure

1. Disconnect the power button cable from the power button located inside the rear housing.



2. Lift the rear housing off the bezel. **Replacement Note:** Refer to the topic on the next page, “Power Button Cable Check” before replacing the rear housing.

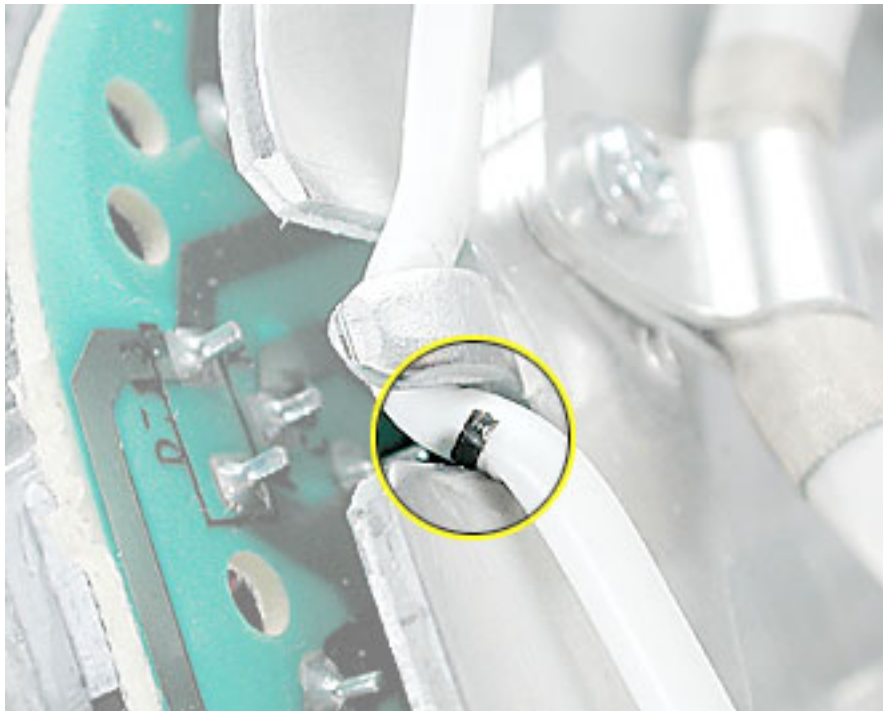


## Power Button Cable Check

1. Check that the power button cable is drawn tight before you attach the other end of the cable to the power button (located inside the rear housing).

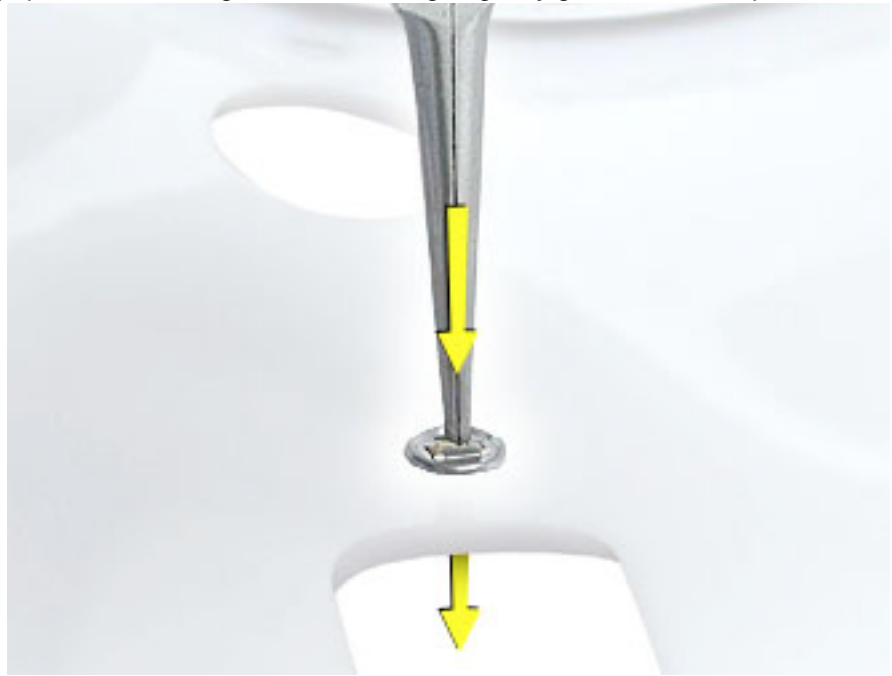


2. Also, check that the cable is tucked under the chassis tab (as shown) and that the black mark on the cable lines up with the chassis (circled below).

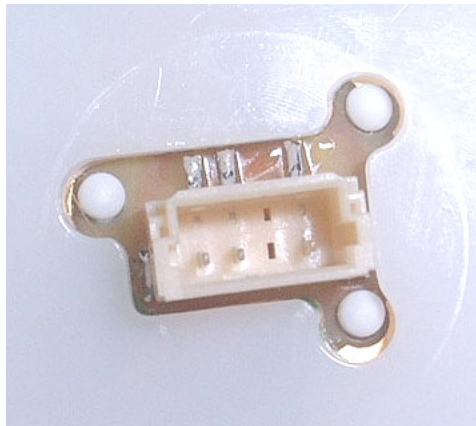


## Power Button Replacement

1. Continue with this procedure only if you are replacing a defective power button. With a needlenose pliers, push the power button through the retaining ring. The power button will pop off rear housing and the retaining ring may get stuck on the pliers.



2. Obtain the new power button and peel the sticky backing off the power button. Position the power button into the hole on the rear housing (as shown below). **Note:** The picture below is looking at the power button from the inside of the rear housing.



3. Place the retaining ring over the power button connector and press down firmly.



# CRT Discharge

**Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent injury, always review the Service Foundations: CRT Displays course for safety information. It can be found at: [http://service.info.apple.com/service\\_training/training.html](http://service.info.apple.com/service_training/training.html). Click on Desktop Certification Courses and select the Service Foundations: CRT Displays link.

**Warning:** Never use a grounding wriststrap until after discharging the CRT and setting up an ongoing ground connection.

## Safety Guidelines:

Whenever the rear housing of the computer is removed and before replacing a module, you must

1. Discharge the CRT (shown below) and remove the anode cap.



2. Establish an ongoing ground by using a cable with alligator clips at both ends. Connect one end to the anode aperture, and connect the other end to the metal CRT frame (as shown below).
3. With the CRT discharged and the ongoing ground in place wear a grounding wriststrap to prevent equipment damage from static electricity.



# Faraday Plate

## Tools

This procedure requires the following tools:

- Phillips #2

## Part Location

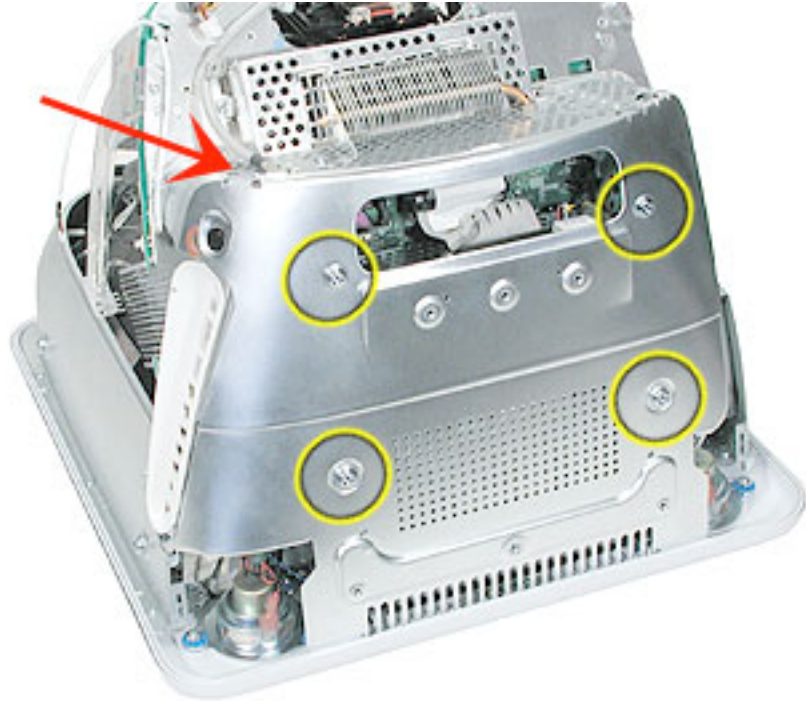


## Preliminary Steps

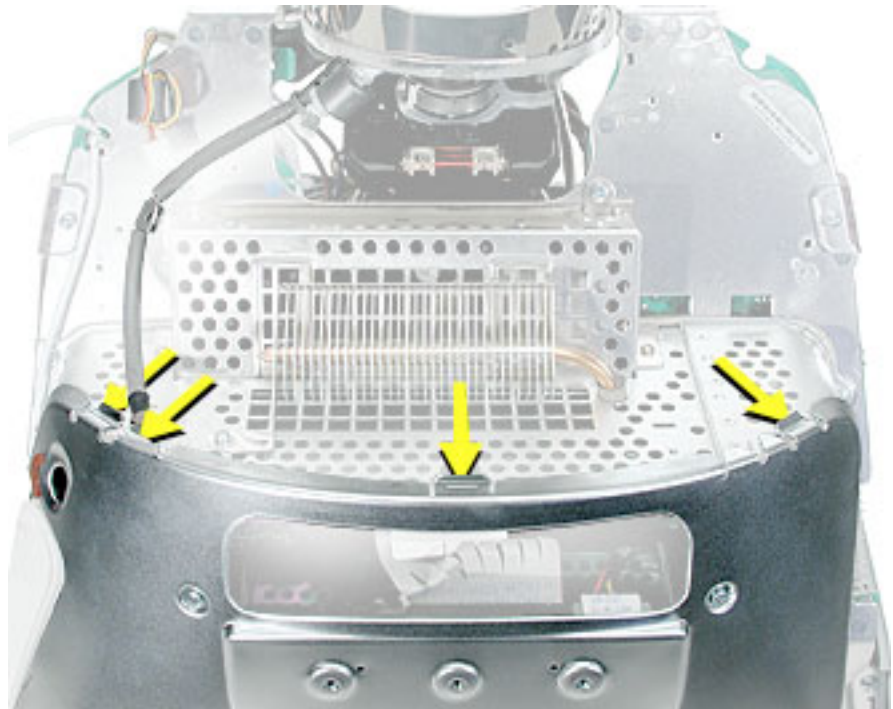
- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.

## Procedure

1. Remove the four screws on the Faraday plate. **Replacement Note:** Note the position of the gray cable (see red arrow) on the top left side of the Faraday plate. Be careful the cable doesn't get pinched when the Faraday plate is replaced.



2. Gently pry the top half of the Faraday plate away from the chassis in the direction of the arrows. **Note:** The gray cable (on left) rests in a groove under the Faraday plate.

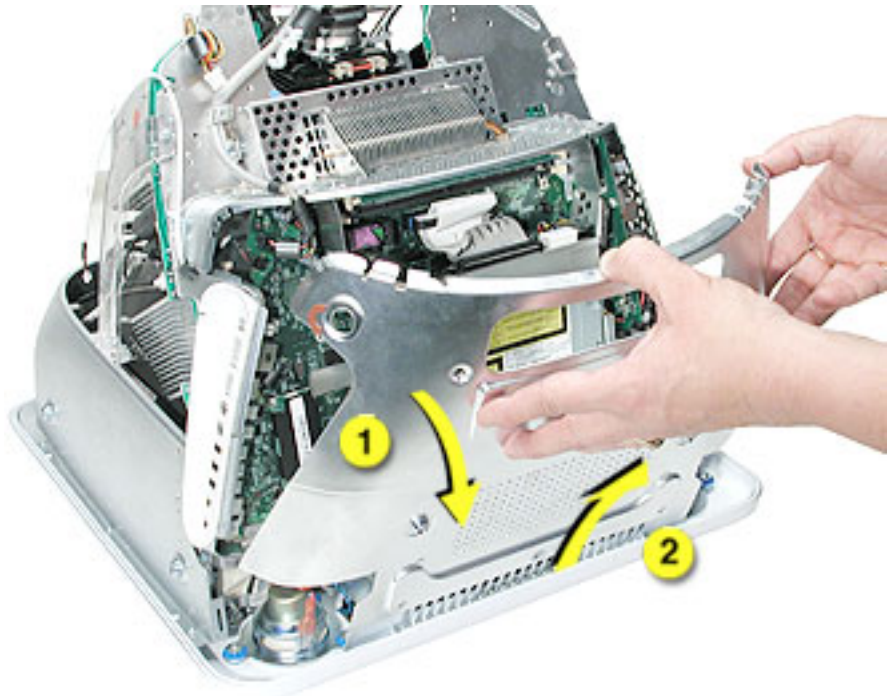




3. Pull the Faraday plate back (#1) and then push it down (#2) to unhook the metal tabs on the Faraday plate from the cutouts (see graphic on the next page) in the chassis.

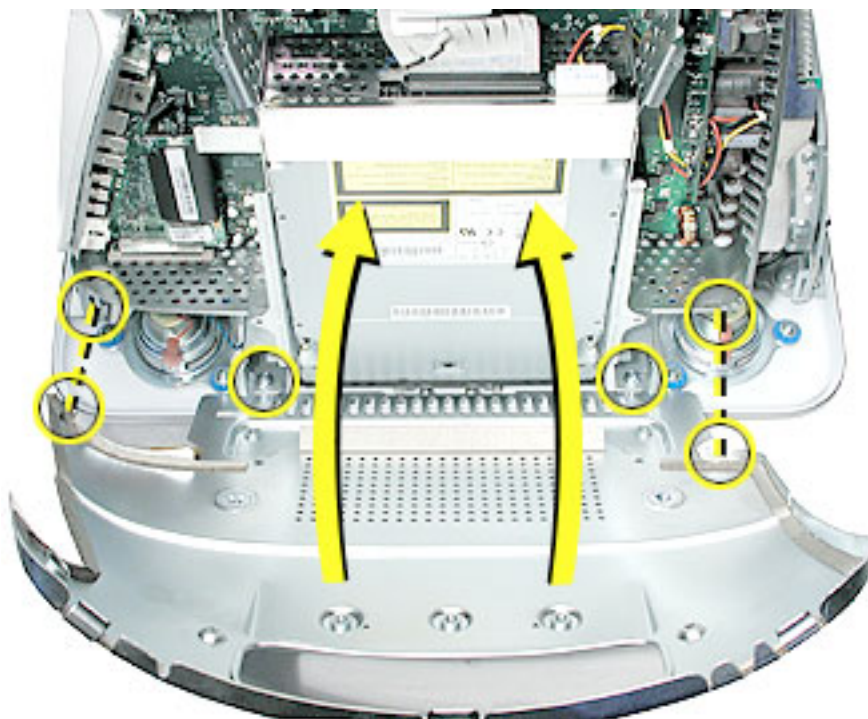


4. Continue to pull the Faraday plate back (#1) to unhook the tabs from the chassis. Pull the Faraday plate up (#2) to remove it from the chassis.



## Faraday Replacement

1. Looking from the top down, line up the metal tabs with the cutouts in the chassis (circled on the right and left) and the slots on the Faraday plate with the white plastic guides on the bezel (circled on the right and left sides of the optical drive).
2. Raise the Faraday plate up and attach it to the frame on the digital assembly. Be careful that the gray cable (shown in step 2 on the previous page) does not get pinched in the Faraday plate.





# Speakers

## Tools

This procedure requires the following tools:

- Phillips #2 screwdriver

## Part Location



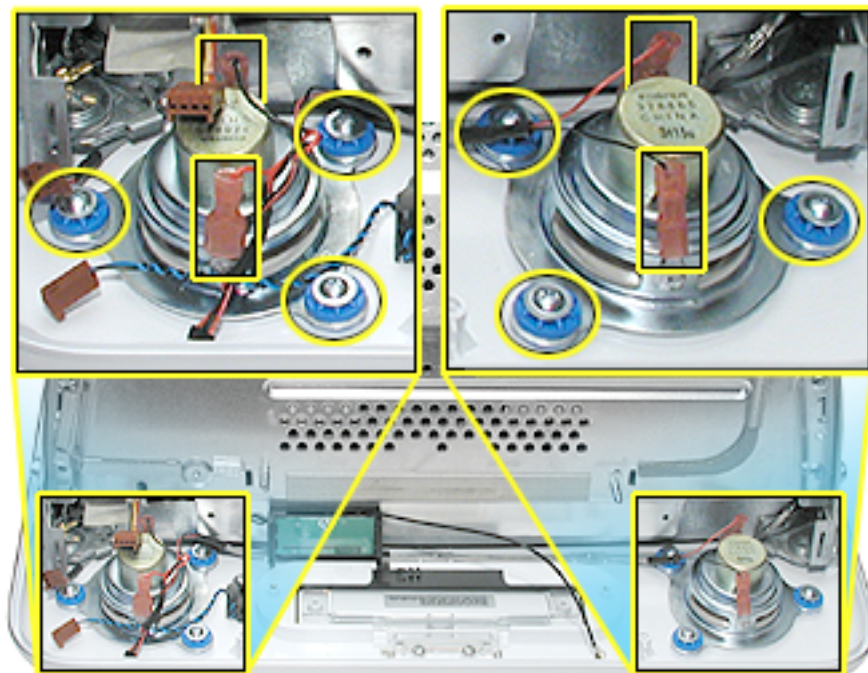
## Preliminary Steps

Before you begin, do the following:

- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.
- Remove the Faraday plate

## Procedure

1. Remove the left and right speaker screws (circled in the top photos). There are three screws per speaker.
2. Disconnect the two spade connectors (see rectangles in the top photos) on each speaker.



3. Lift the speakers out of the front bezel.



# Fan

## Tools

This procedure requires the following tools:

- Phillips #2

## Part Location



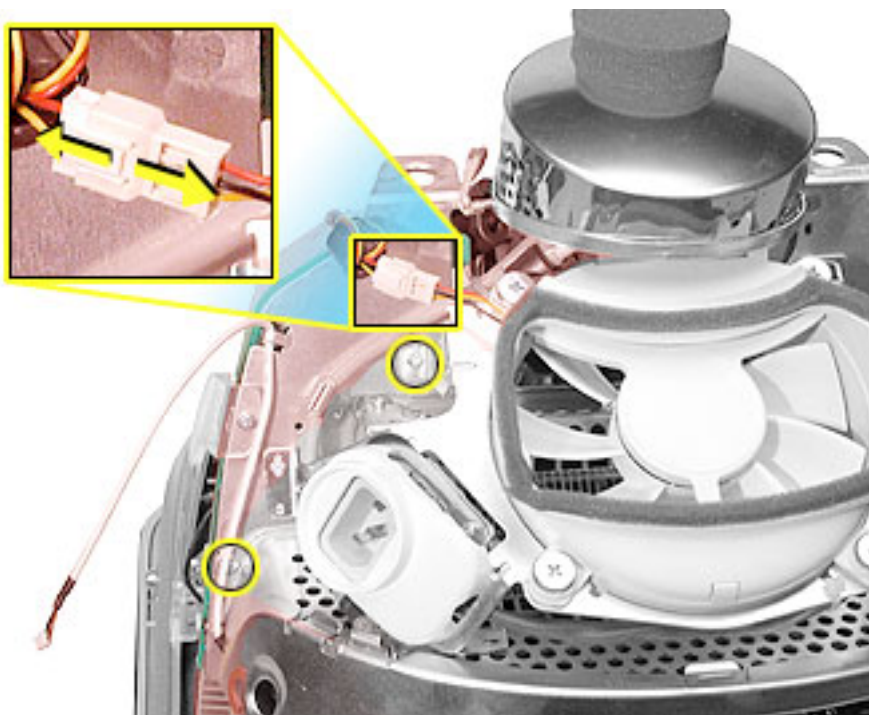
## Preliminary Steps

Before you begin, do the following:

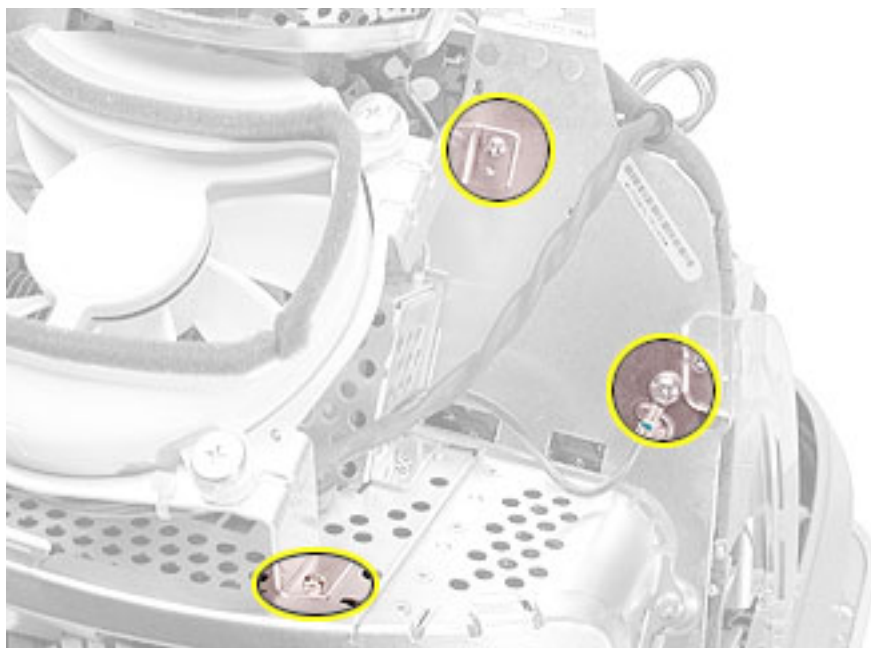
- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.

## Procedure

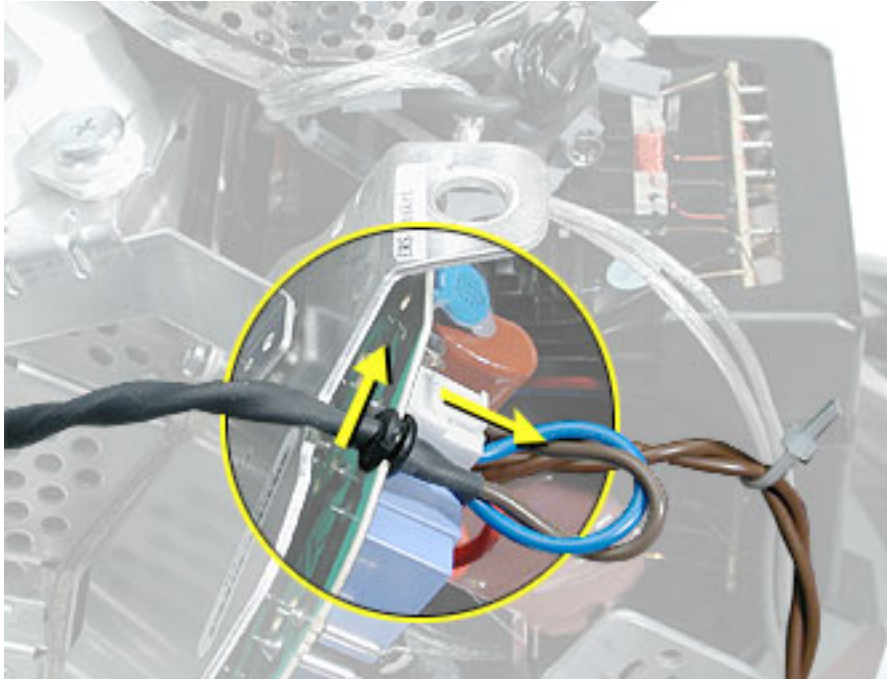
1. On the left side of the fan, disconnect the fan cable and remove the two screws (circled).



2. On the right side of the fan, remove three screws (the green cable goes to the ground screw). **Replacement Note:** The screw circled on the top left is a self-tapping screw, and the screw on the bottom left is a fine thread screw.



3. Wiggle the fan cable up and out of the groove in the chassis and then disconnect the fan connector from the board.



4. To remove the fan, turn the computer so the fan is facing you. Grab onto the fan near the AC plug and the bottom right corner of the fan. Gently pull the fan toward you and away from the chassis. Be very careful of the CRT neck.



# Optical Drive

## Tools

This procedure requires the following tools:

- Phillips #2 screwdriver

## Part Location



## Preliminary Steps

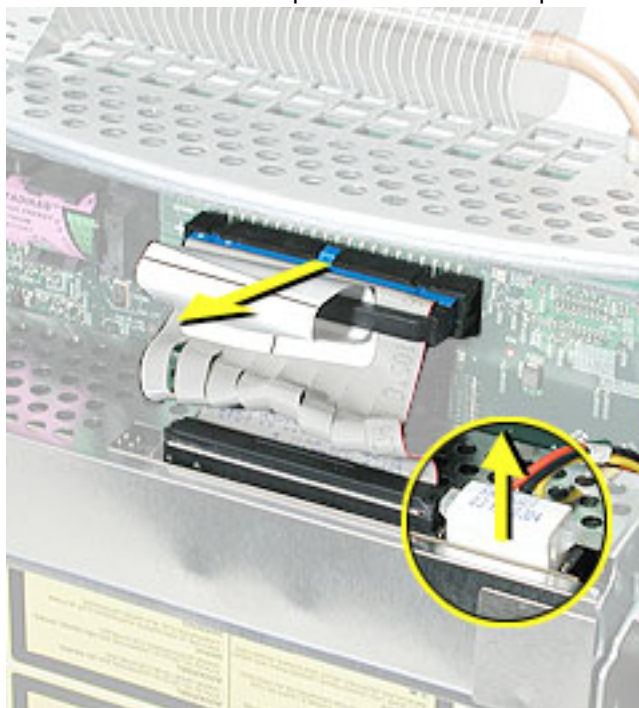
Before you begin, do the following:

- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.
- Remove the fan.
- Remove the Faraday plate.

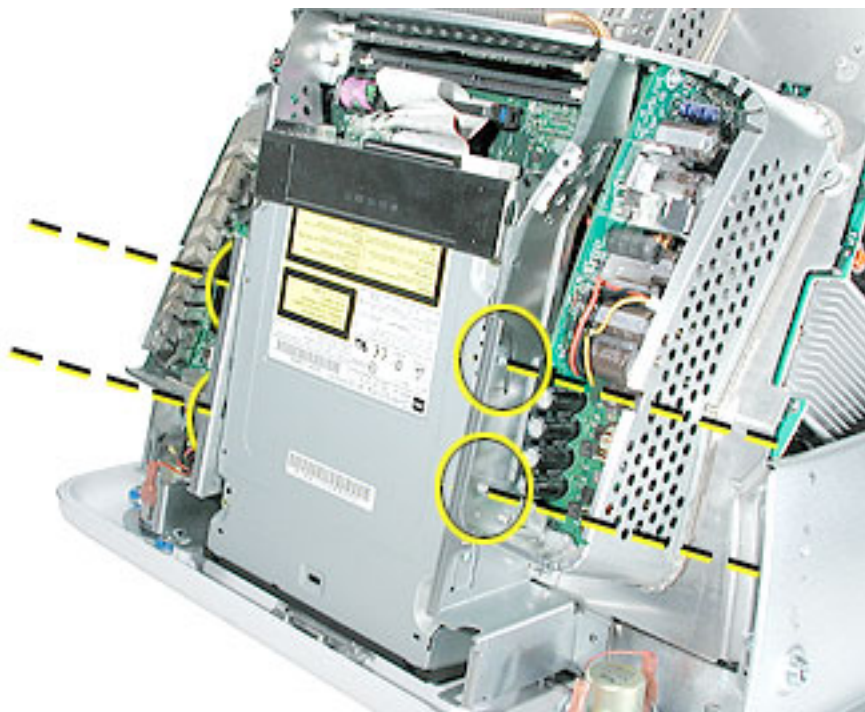


## Procedure

1. Disconnect the data cable and the power cable at the top of the optical drive.



2. Remove the four screws connecting the optical drive to the chassis.



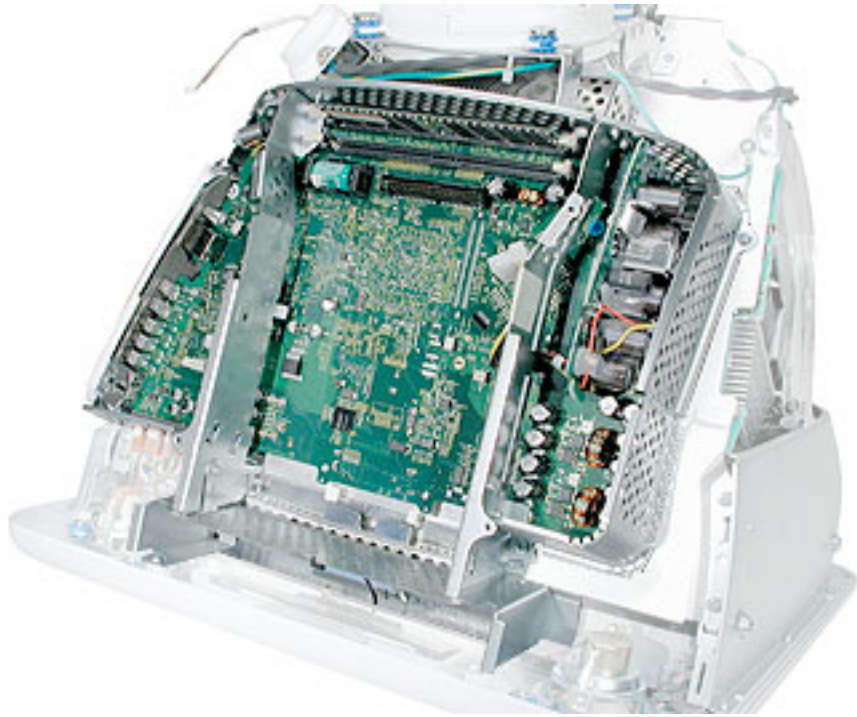
3. Holding the optical drive by the top or bottom end, tilt the optical drive out of the chassis. **Replacement Note:** Remove the EMI shield off the end of the defective optical drive. Place the EMI shield on the replacement drive.

---

## No Optical Configuration

**Note:** There is new configuration on the eMac (USB 2.0) that is sold without an optical drive (shown below).

If you decide to add an optical drive at a later date, order the parts mentioned in the Upgrades chapter under the topic “Optical Drive Installation.”





# Bluetooth

## Tools

This procedure requires the following tools:

- Phillips #2

## Part Location



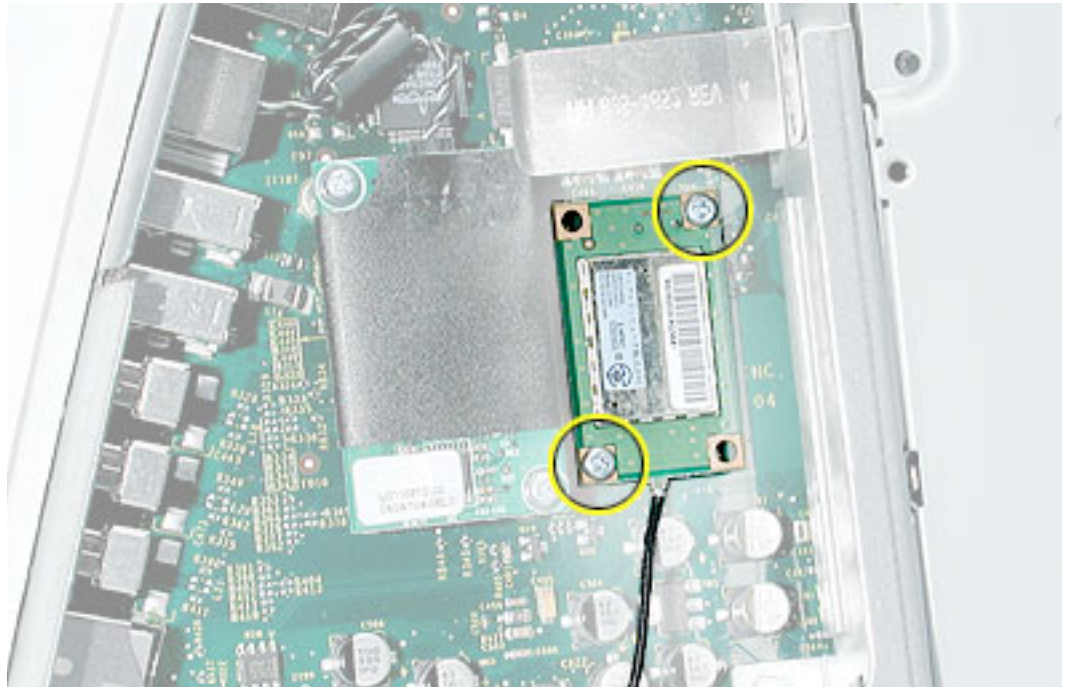
## Preliminary Steps

Before you begin, do the following:

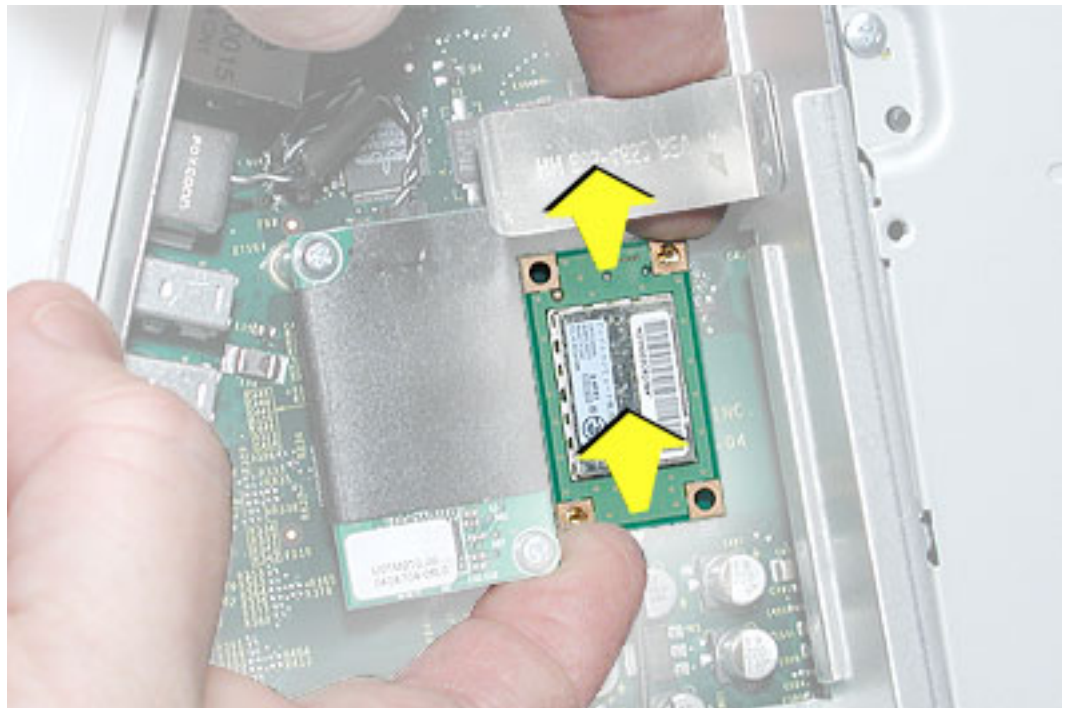
- Place the computer face down on an ESD mat
- Remove the user access door
- Remove the feet
- Remove the rear housing
- Discharge the CRT
- Remove the Faraday plate

## Procedure

1. Remove the two screws on the Bluetooth board.



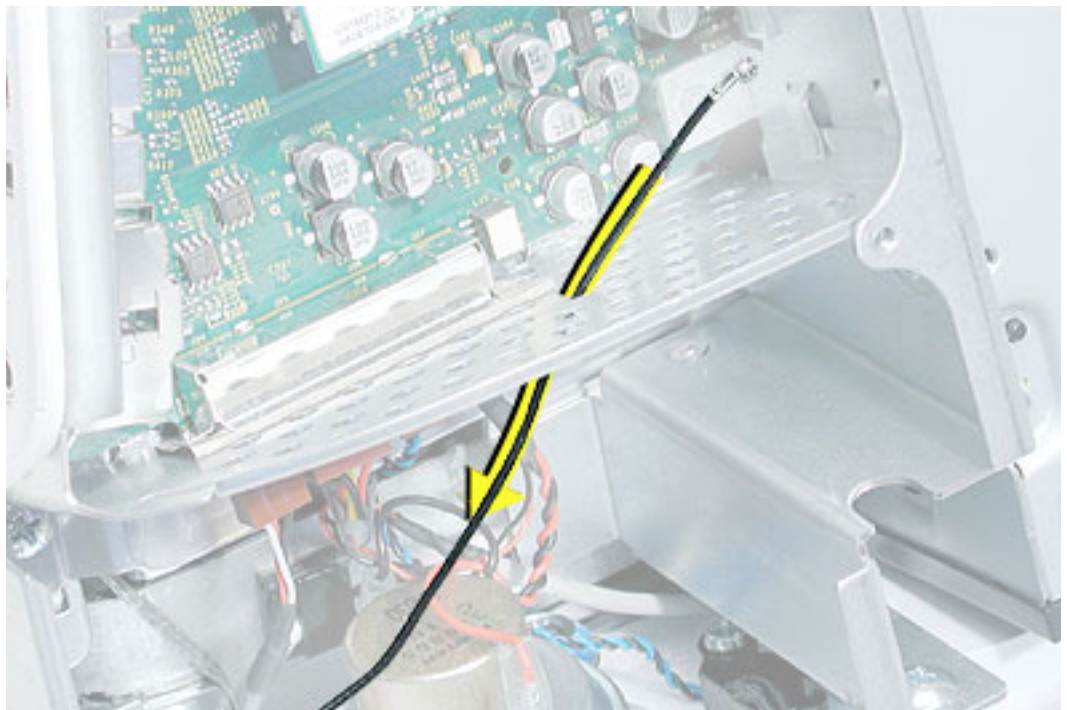
2. With two fingers, gently wiggle the Bluetooth board off the connector on the logic board.



3. Turn the Bluetooth board over and carefully disconnect the Bluetooth antenna cable from the board.



4. To remove the Bluetooth antenna cable, pull the cable through the hole in the chassis.



5. With the nylon tool (922-5065), pry the antenna fixture off the front bezel. The antenna is attached to the front bezel with double-stick tape.





# Digital Assembly

## Tools

This procedure requires the following tools:

- Phillips #2

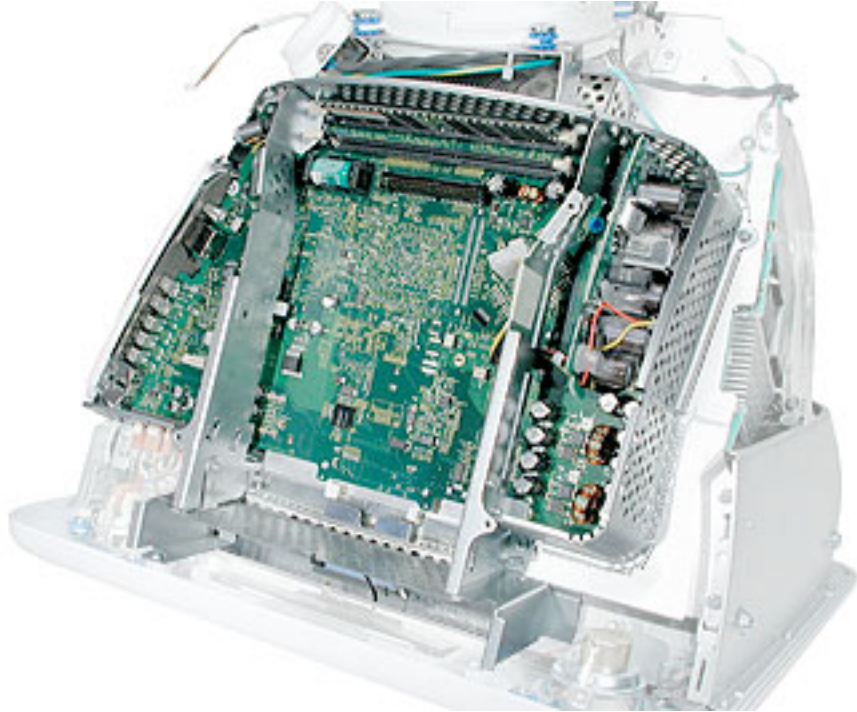
## Part Location



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## Part Location (without optical drive)

**Note:** There is new configuration on the eMac (USB 2.0) that is sold without an optical drive (shown below). The take apart for the digital assembly is the same.



## Preliminary Steps

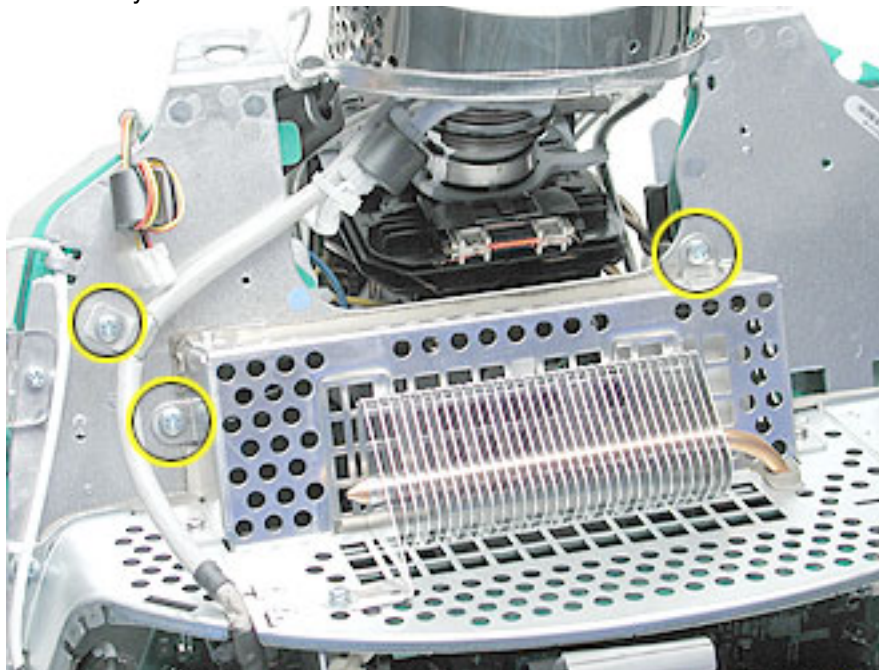
Before you begin, do the following:

- Place the computer face down on an ESD mat
- Remove the user access door
- Remove the feet
- Remove the rear housing
- Discharge the CRT
- Remove the fan
- Remove the Faraday plate
- Remove the AirPort Extreme Card (if present)
- Remove the Bluetooth board (if present)



## Procedure

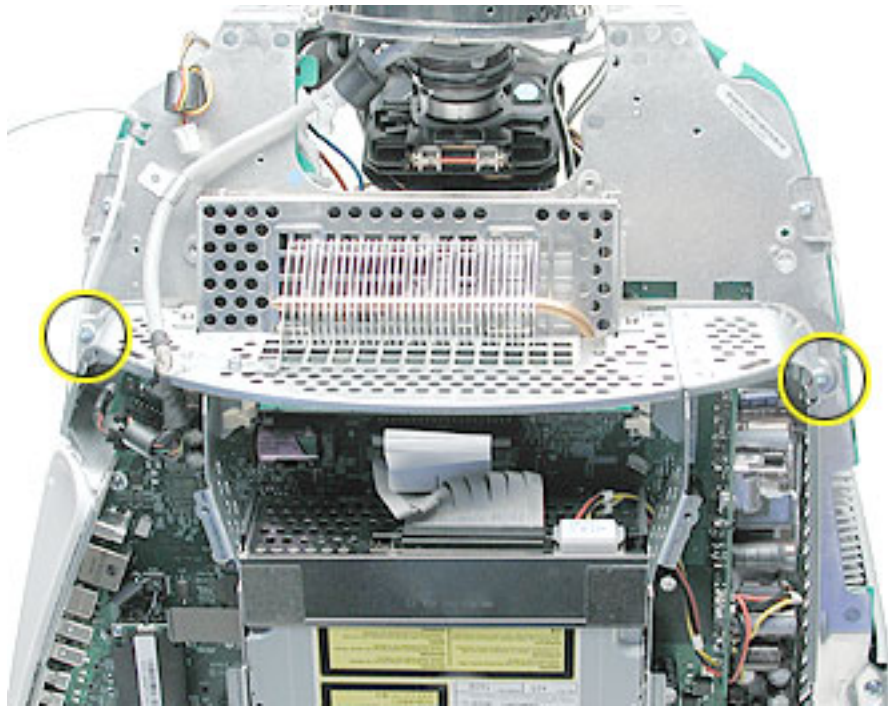
1. With the back of the computer facing you, remove the three screws near the top of the digital assembly.



2. On the top left side of the digital assembly, disconnect the power button cable and the video cable **Note:** The power connector (the smaller connector) was on the other side of the board on previous eMac models. This picture shows the most recent model.



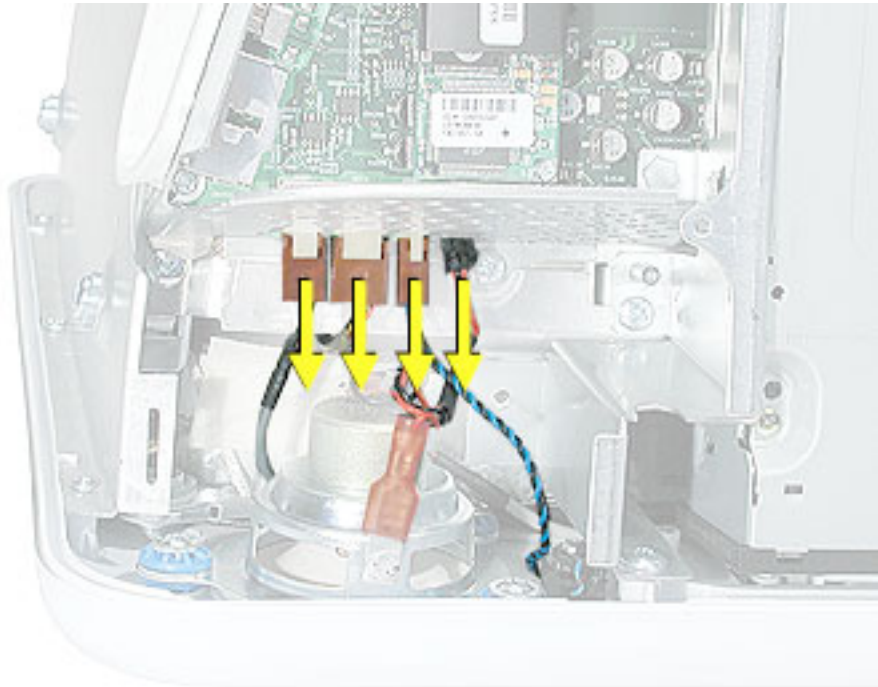
3. Remove two screws; one on each side of the digital assembly.



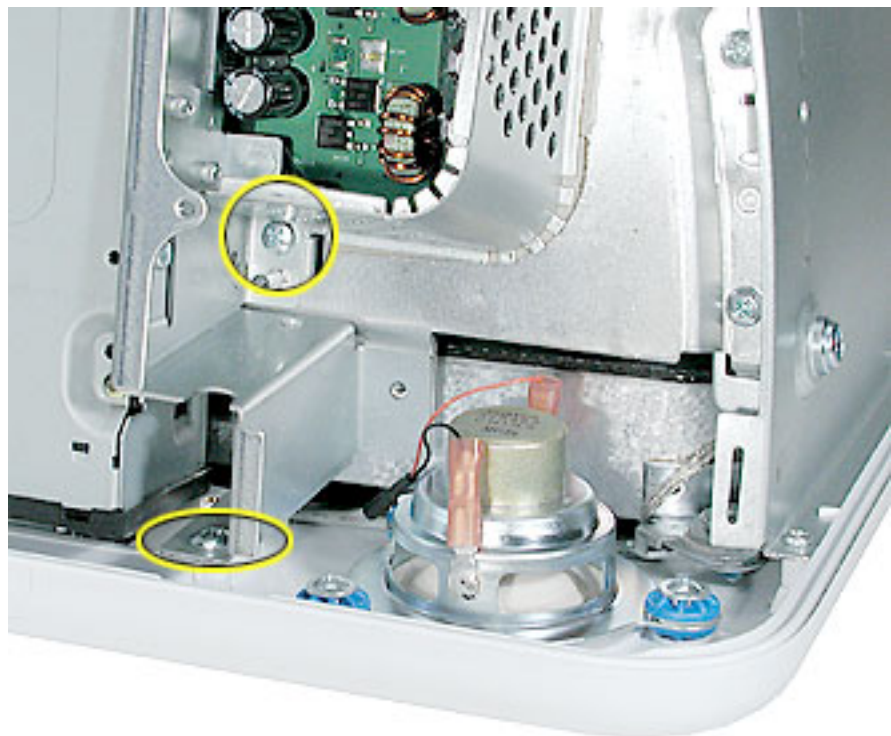
4. On the bottom left side of the digital assembly, remove three screws. **Note:** The two screws (towards the top of this photo) are the same type screw; the third screw is a larger, self-tapping screw that attaches to the front bezel.



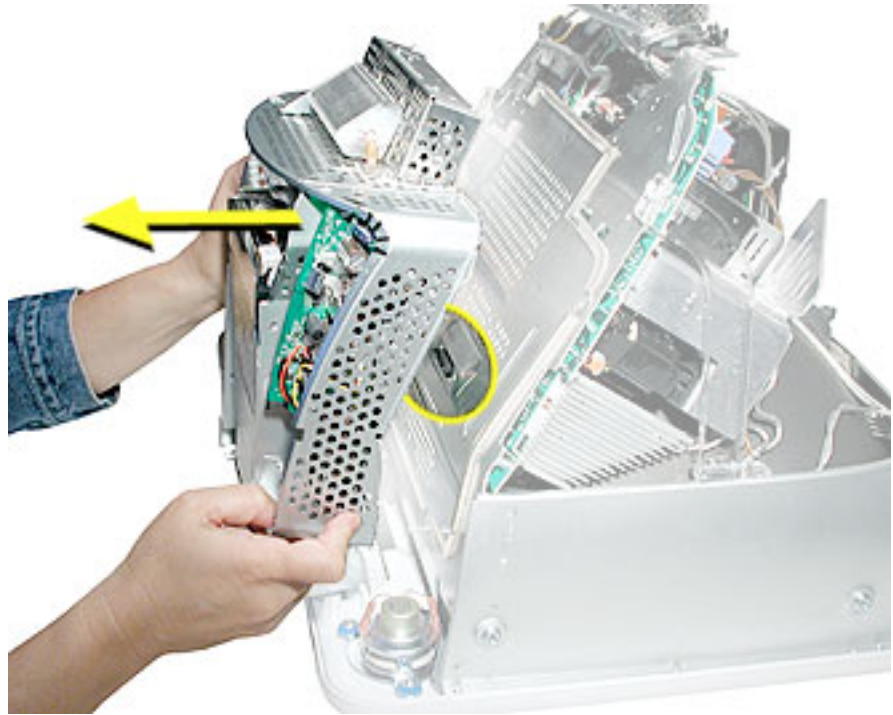
5. Disconnect the four cable connectors on the bottom left side of the assembly. From left to right the connectors are: microphone, fan, LED, and speakers.



6. Remove the two screws on the bottom right side of the assembly. **Note:** The screw that attaches to the plastic bezel is a larger, self-tapping screw.



7. Hold the digital assembly by the sides and pull the assembly straight back. The digital assembly disconnects from the blind mate connector (circled) on the chassis. Set the digital assembly aside.





# Hard Drive

## Tools

This procedure requires the following tools:

- Phillips #2
- Phillips #1

## Part Location



## Preliminary Steps

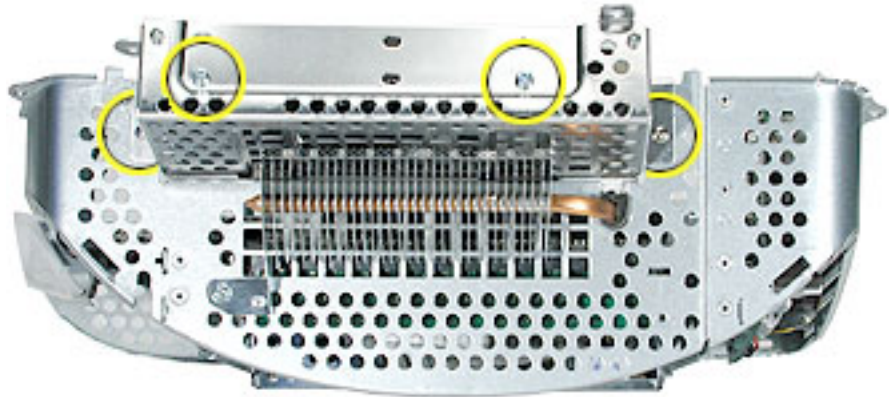
Before you begin, do the following:

- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.

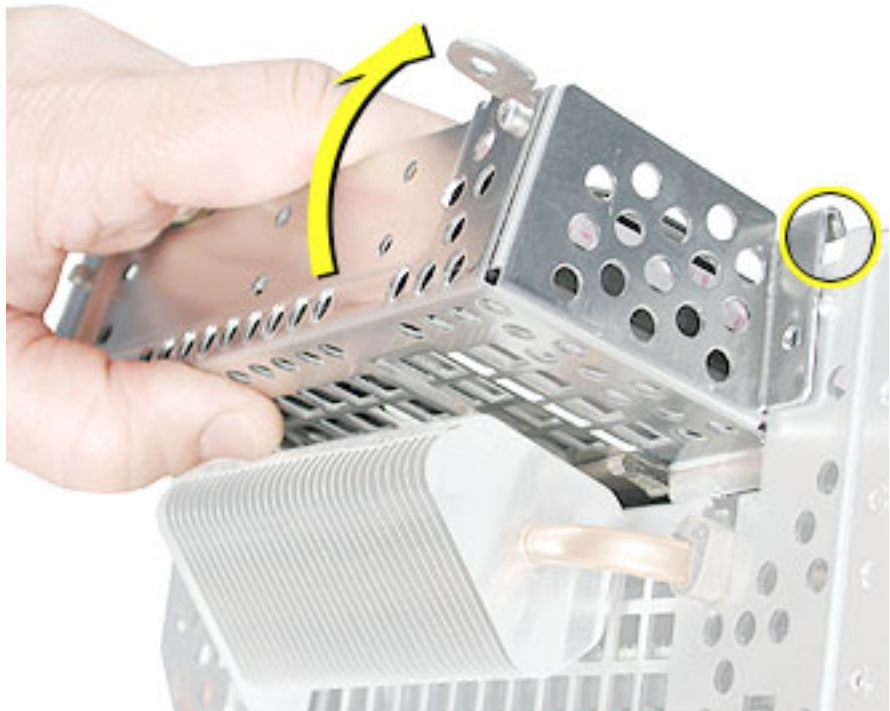
- 
- Remove the fan.
  - Remove the Faraday plate.
  - Remove the digital assembly.

## Procedure

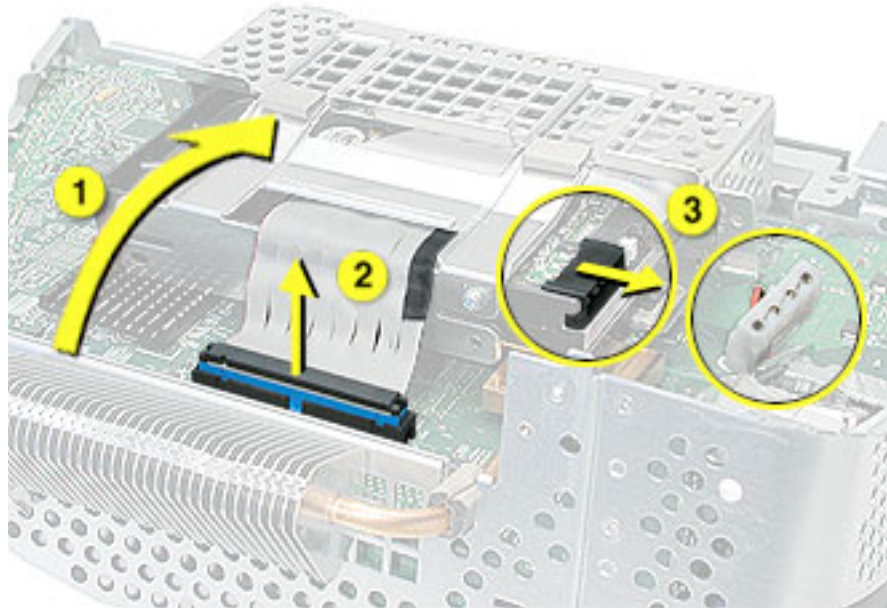
1. Remove the four screws along the back of the metal chassis. **Note:** The two outer screws are fine thread screws.



2. Gently unhook (see circle) and lift the hard drive carrier up and off the chassis. Flip the drive carrier over to access the data and power cables.



3. With the drive carrier flipped over (#1), disconnect the data cable (#2) and the power cable (#3) from the hard drive.

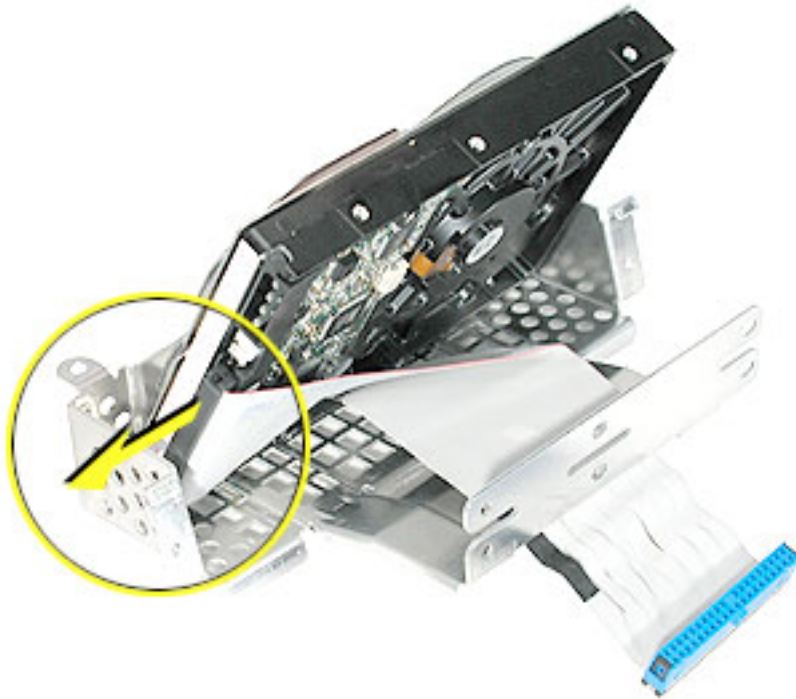


4. To remove the hard drive from the carrier, remove two screws on the side of the carrier.





5. Tilt the drive to access the cable. Disconnect the cable from the hard drive. **Note:** If you are replacing the drive carrier, review the procedure “Thermal Pad and EMI Replacement” below.

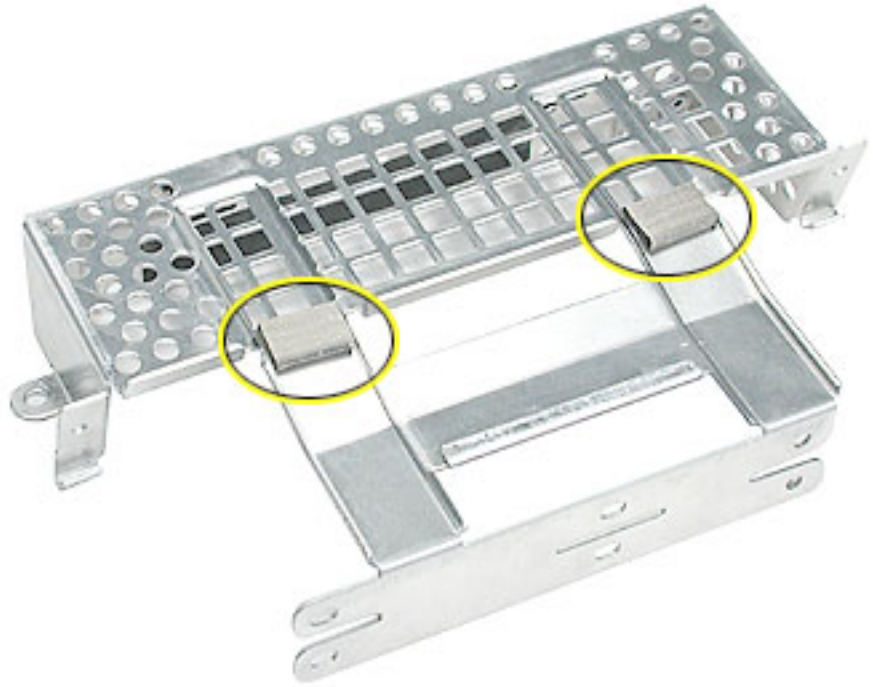


### **Thermal Pad and EMI Replacement**

1. If you are replacing the hard drive carrier, attach the thermal pad, and two rubber bumpers to the top side of the carrier. **Note:** These pieces come with the replacement carrier. Then, go on to the next step.



- 
2. Attach two the EMI pads to the bottom side of the carrier.





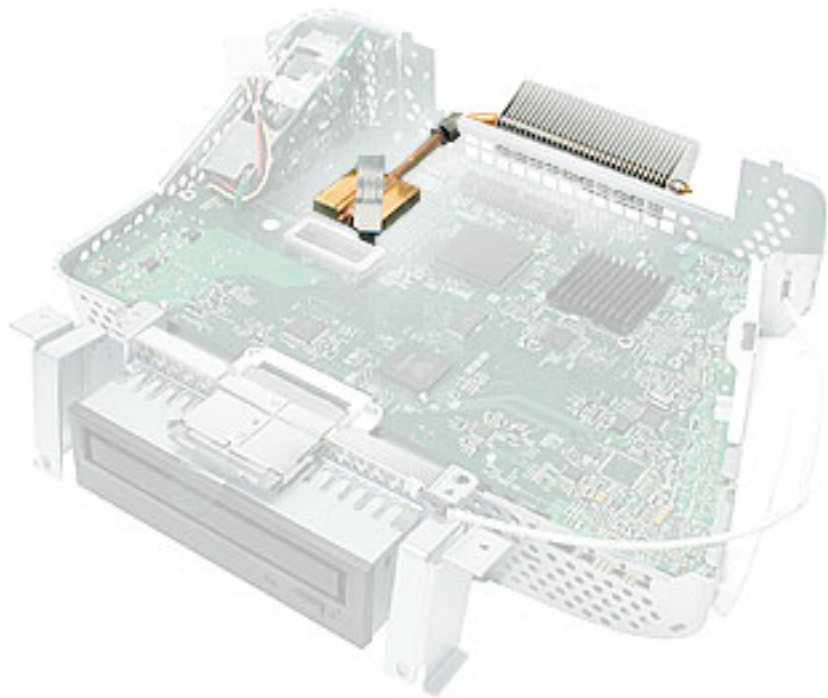
# Logic Board Heatsink

## Tools

This procedure requires the following tools:

- Screwdriver to pry the heatsink clip

## Part Location



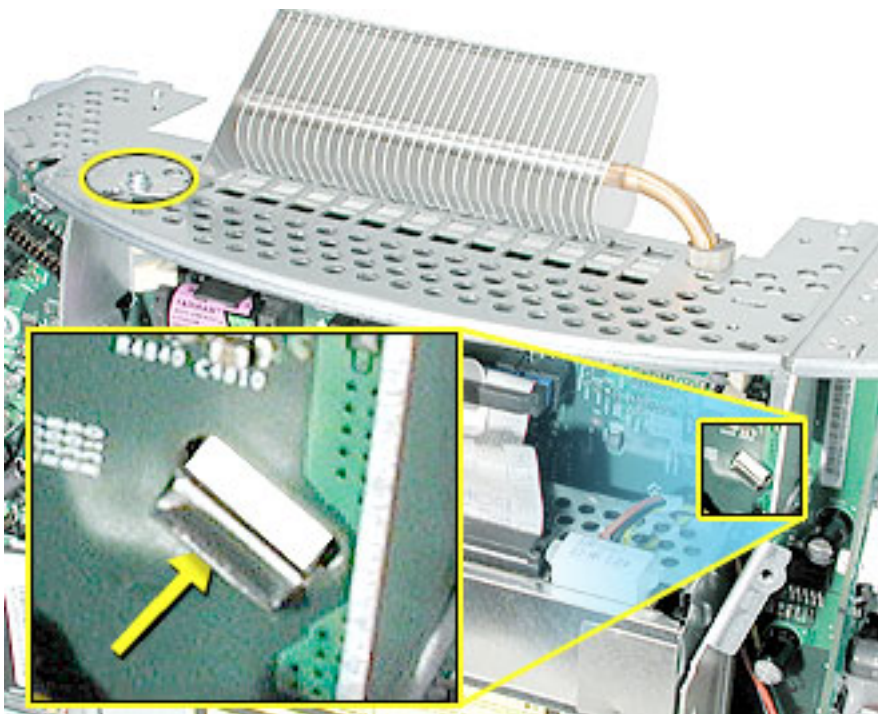
## Preliminary Steps

Before you begin, do the following:

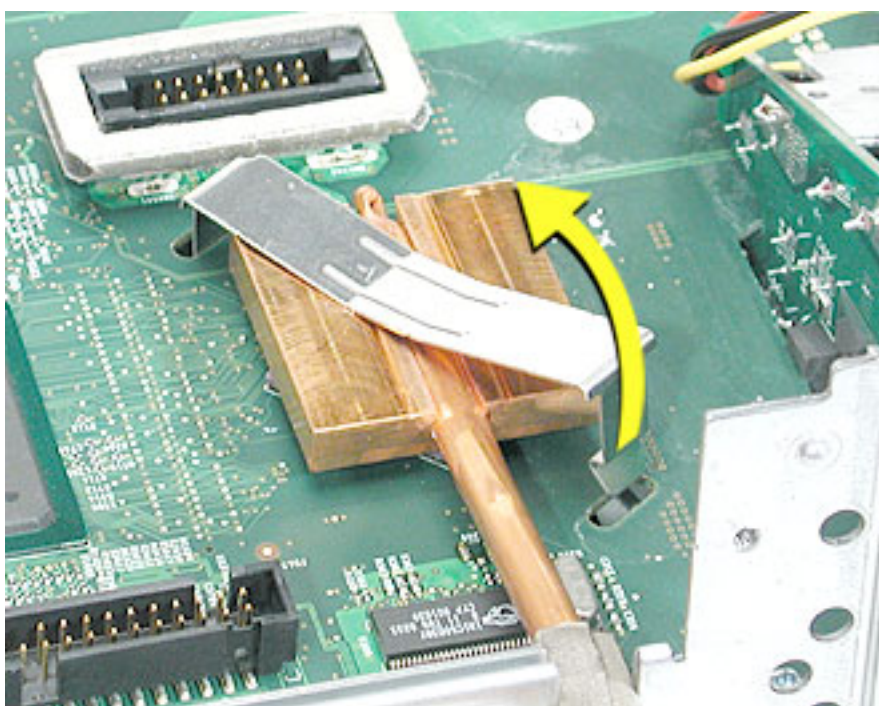
- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.
- Remove the fan.
- Remove the Faraday plate.
- Remove the digital assembly.
- Remove the hard drive carrier.

## Procedure

1. Remove the one screw attaching to the chassis (on the top left side). Next, with a nylon probe tool (922-5065), push the heatsink clip through the hole in the logic board. The clip will come loose on the top side of the logic board.

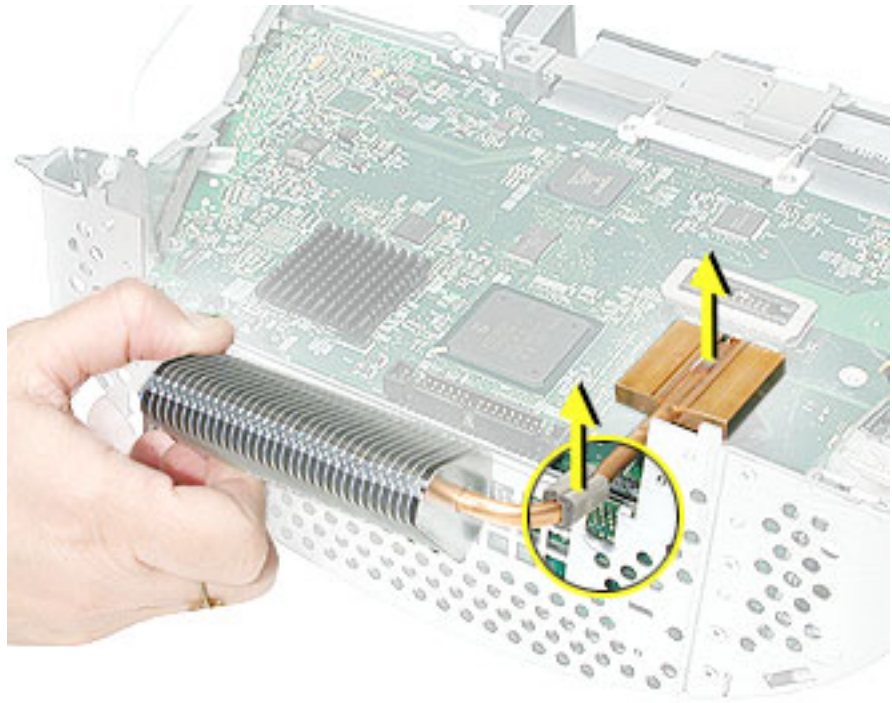


2. Unclip the other end of the heatsink clip on the top side of the logic board.



3. Lift the heatsink from the logic board. **Warning:** The the CPU heatsink should have minimum handling of the fins. Be very careful when handling this part.

**Replacement Note:** Whenever the heatsink is removed, the bottom side of the heatsink and the top of the microprocessor must be cleaned and new thermal paste must be applied to the microprocessor. If the mating surfaces are not cleaned and thermal paste is not applied, the CPU may overheat and become damaged. Refer to the next topic, “Thermal Paste Application”.





# Thermal Paste Application

The microprocessor uses a heatsink/thermal pipe to transfer heat away. Whenever the heatsink is removed, the bottom side of the heatsink and the top of the microprocessor must be cleaned and thermal paste must be applied. If the mating surfaces are not cleaned and thermal paste is not applied, the CPU may overheat and become damaged.

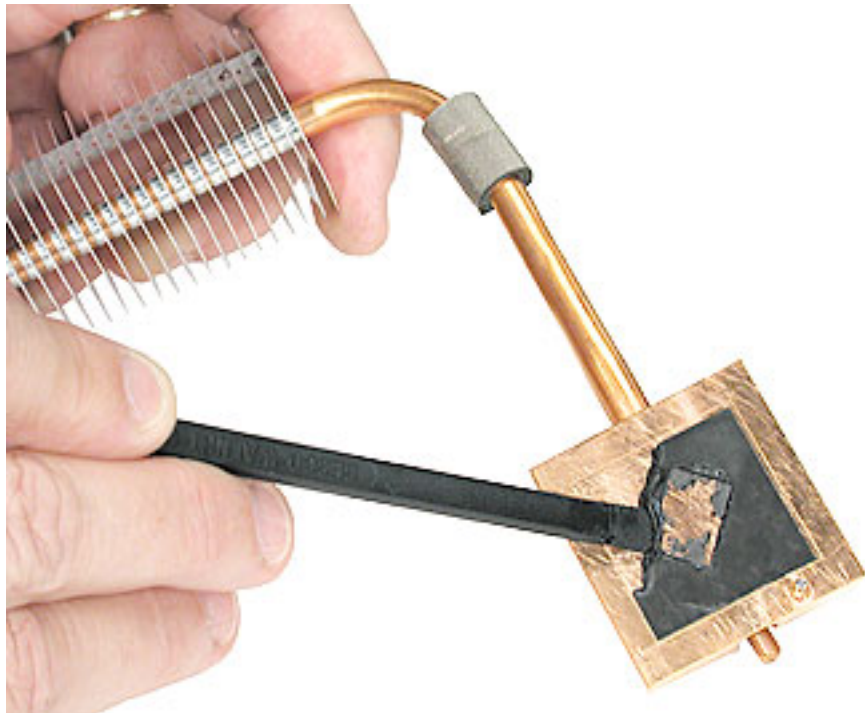
## Tools

This procedure requires the following tools:

- Plastic stylus or nylon probe tool (922-5065) to remove the old thermal paste
- Thermal paste (922-4757), each tube contains 4-5 applications

## Procedure

1. Thoroughly clean the thermal film from the heatsink surface with a plastic stylus or the nylon probe tool. Do not use an abrasive material or liquid cleaner. **Important:** Be extremely careful not to bend the fins on the heatsink.



2. Carefully remove the old thermal paste from the surface of the microprocessor. Gently remove the paste with a plastic stylus or nylon probe tool.



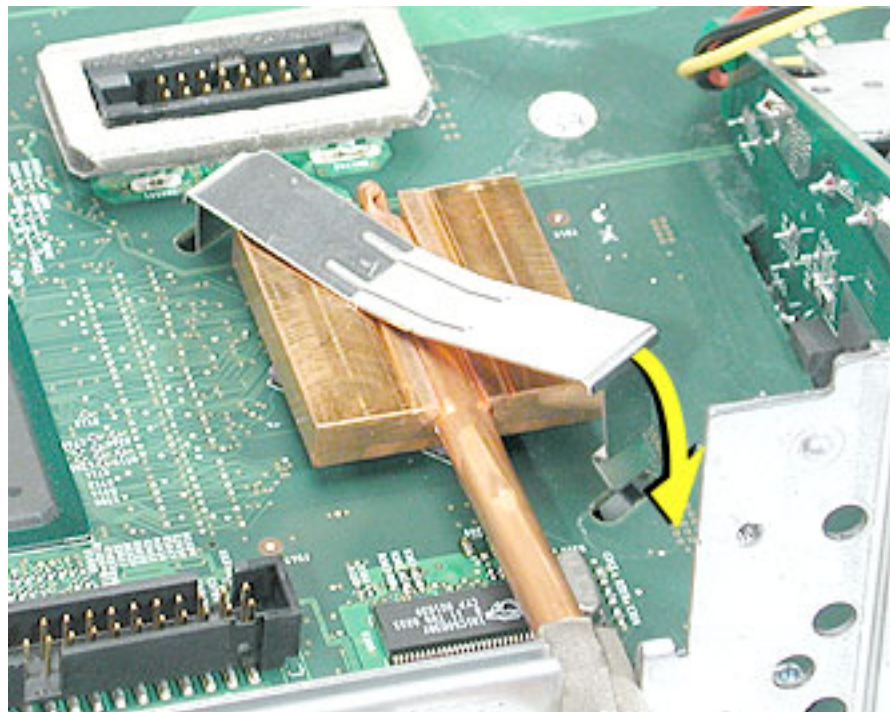
3. Squeeze a drop of thermal paste onto the middle of the microprocessor as shown.



4. Spread the paste evenly over the processor. **Important:** On this product, it is critical to spread the paste over the processor, or the chip could overheat.



5. Reinstall the heatsink and the heatsink clip.







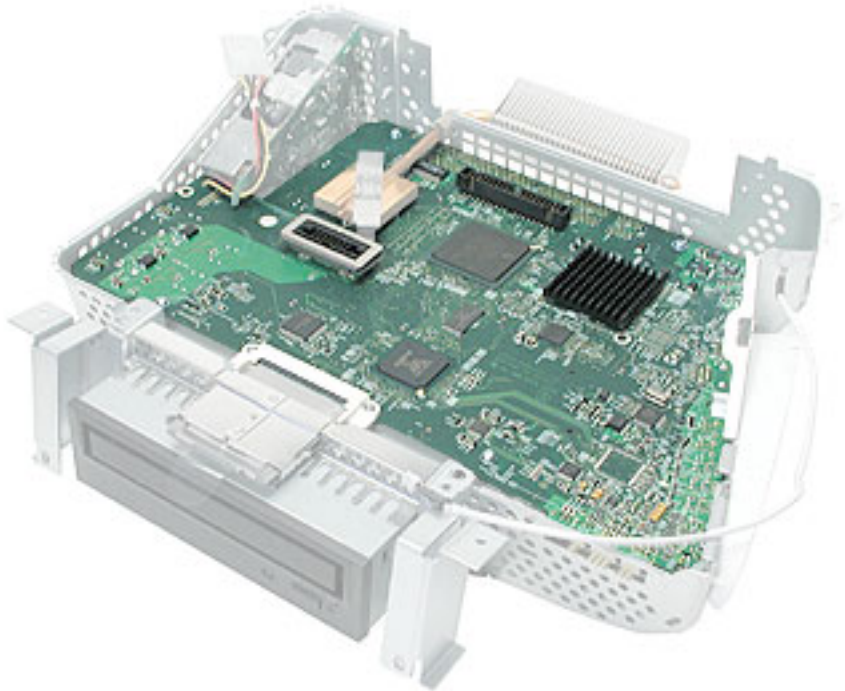
# Logic Board

## Tools

This procedure requires the following tools:

- Phillips #2 screwdriver

## Part Location



## Preliminary Steps

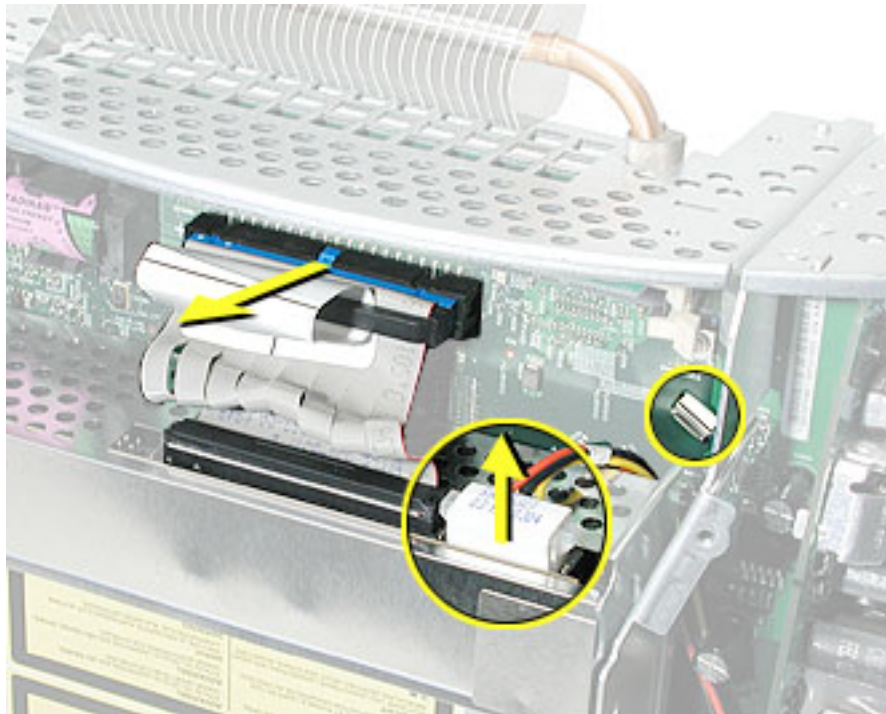
Before you begin, do the following:

- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.
- Remove the fan.
- Remove the Faraday plate.

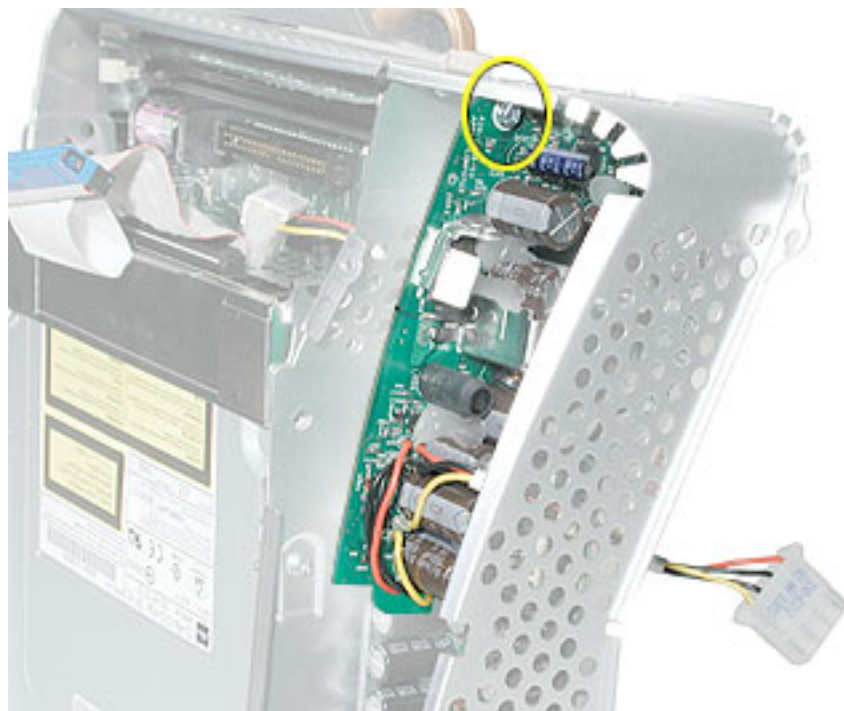
- 
- Remove the digital assembly.
  - Remove the hard drive carrier
  - Remove the AirPort Extreme Card (if present)

## Procedure

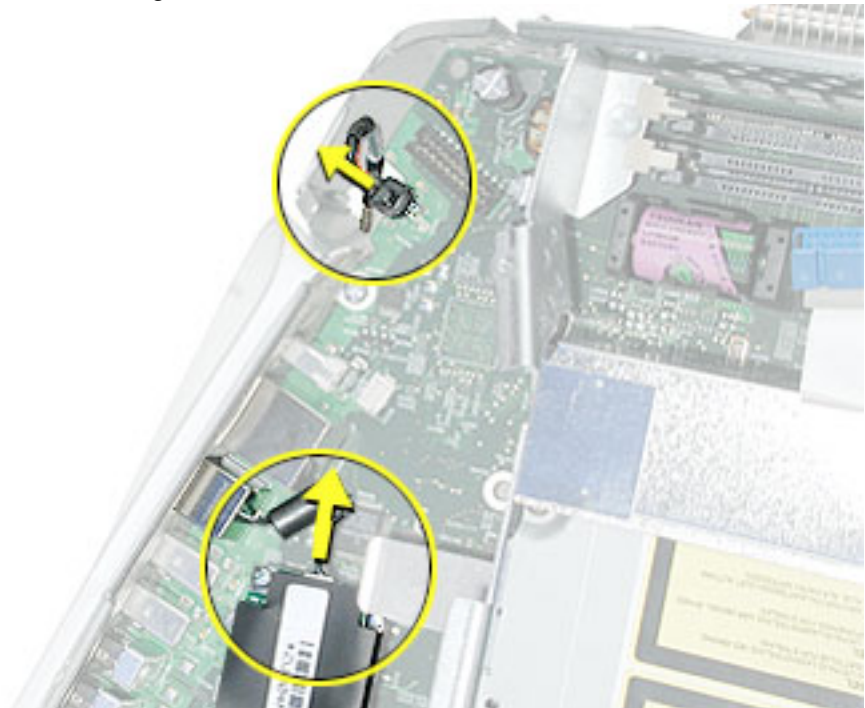
1. Disconnect the optical data cable, the optical power cable and release the heatsink clip. **Note:** On education models the optical cables are not present because there isn't an optical drive.



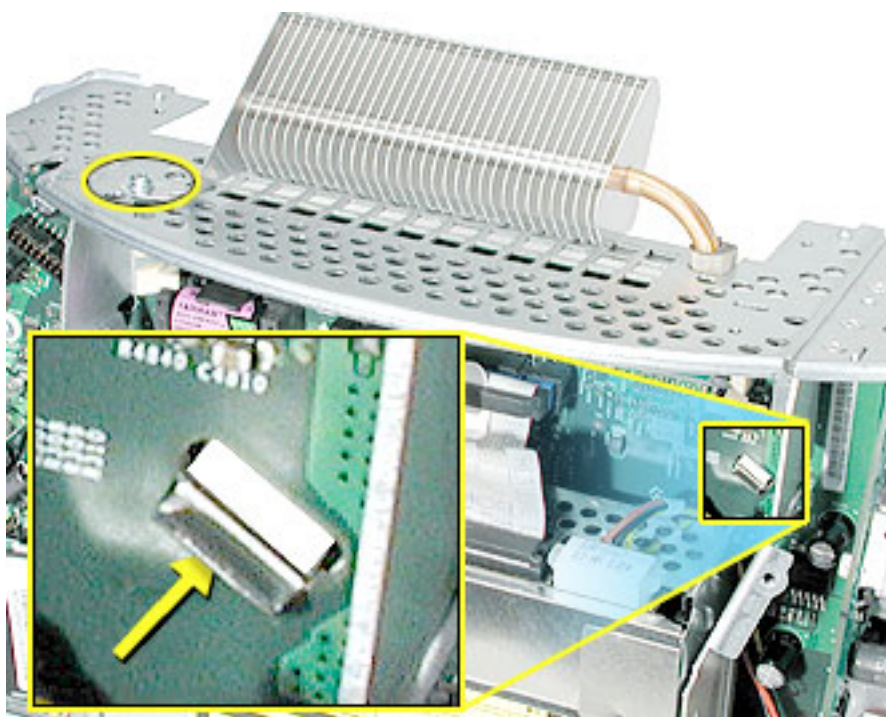
2. Remove the down converter screw that attaches to the chassis frame.



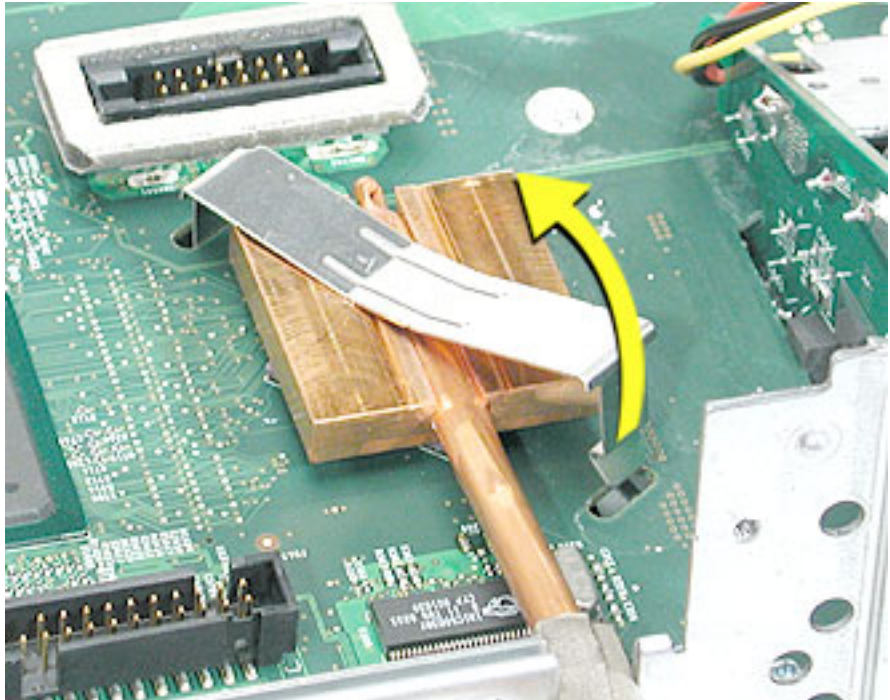
3. On the left side, disconnect the power button cable and the modem cable. **Note:** On newer models the power button connector is in the same general location, but on the other side of the logic board.



4. Remove the one screw attaching to the chassis (on the top left side). Push the heatsink clip through the hole in the logic board. The clip will come loose on the top side of the logic board.

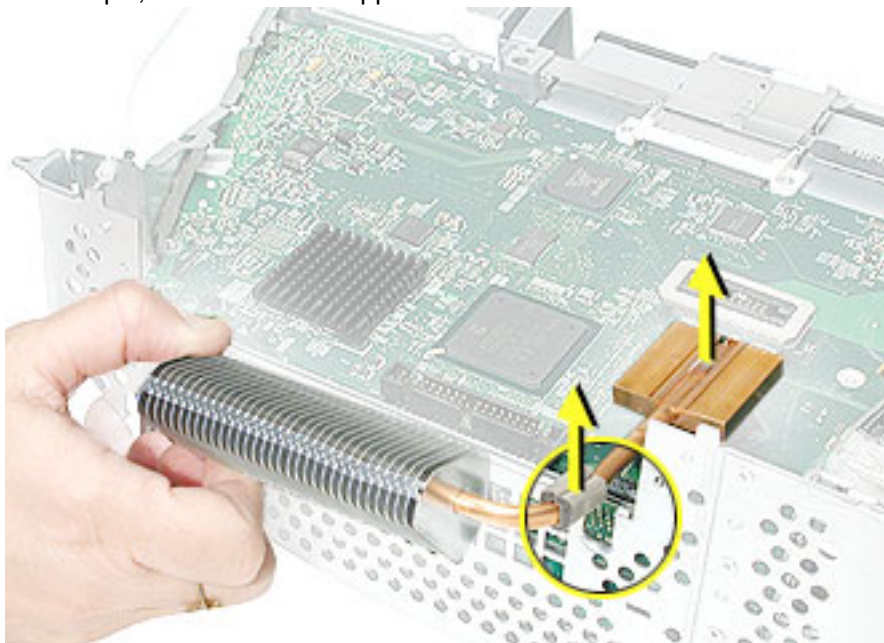


5. Unclip the heatsink clip on the top side of the logic board.

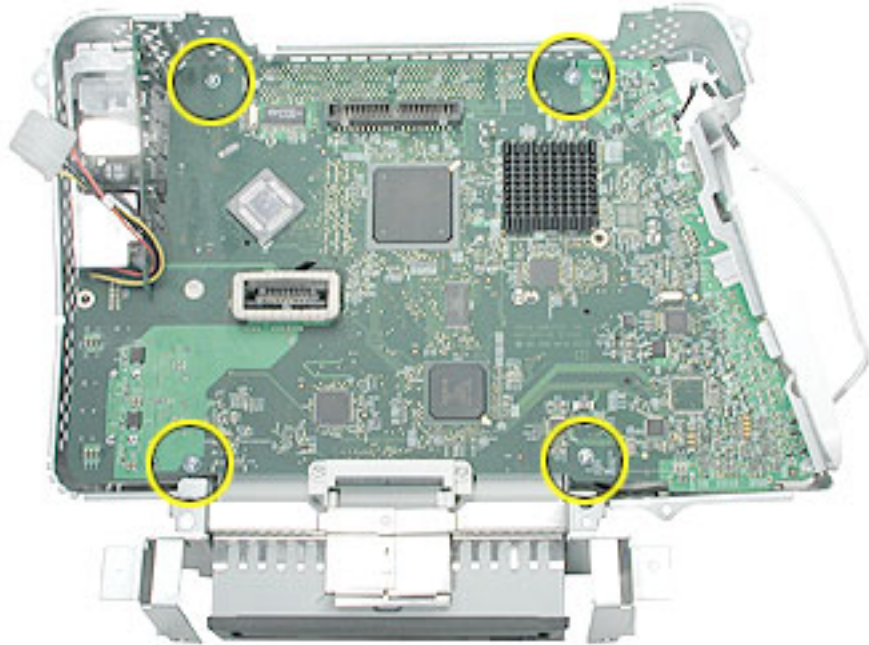


6. Lift the heatsink from the logic board. **Warning:** The the CPU heatsink should have minimum handling of the fins. Be very careful when handling this part.

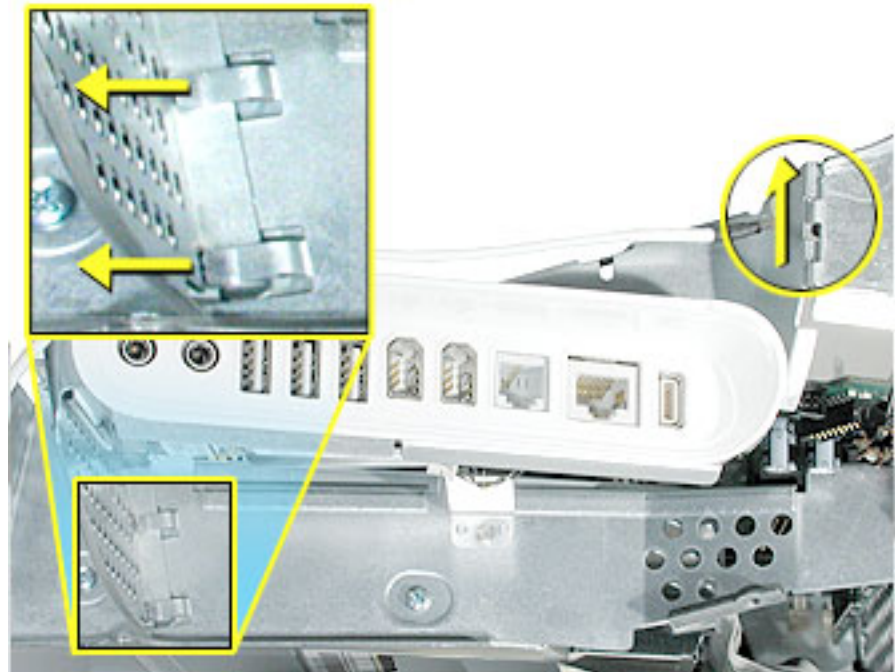
**Replacement Note:** Whenever the heatsink is removed, the bottom side of the heatsink and the top of the microprocessor must be cleaned and new thermal paste must be applied to the microprocessor. If the mating surfaces are not cleaned and thermal paste is not applied, the CPU may overheat and become damaged. Refer to the next topic, “Thermal Paste Application”.



7. Remove the four screws on the logic board.

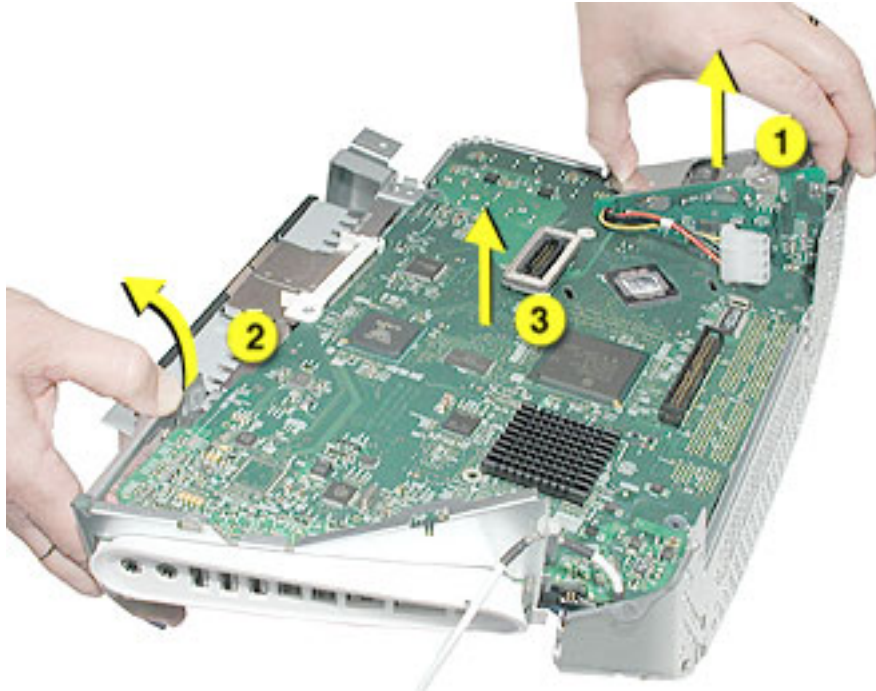


8. To remove the logic board from the chassis frame, unhook the chassis clips under the I/O panel and on the top right side of the chassis frame.



9. Hold the board by the down converter (#1) and gently pull the chassis frame (#2) forward, away from the board. Remove the logic board (#3) from the chassis frame. Carefully maneuver the board out of the frame.

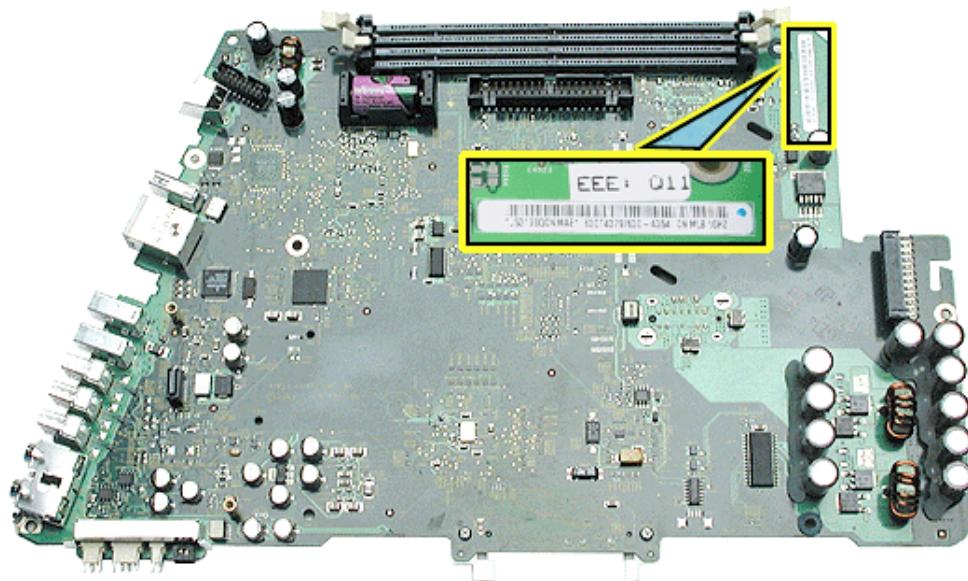
**Important:** The microprocessor uses a heatsink/thermal pipe to transfer heat away. Whenever the heatsink is removed, the bottom side of the heatsink and the top of the microprocessor must be cleaned and thermal paste must be applied to the microprocessor. If the mating surfaces are not cleaned and thermal paste is not applied, the CPU may overheat and become damaged. Refer to “Thermal Paste Application” in this chapter.



## Logic Board Identification:

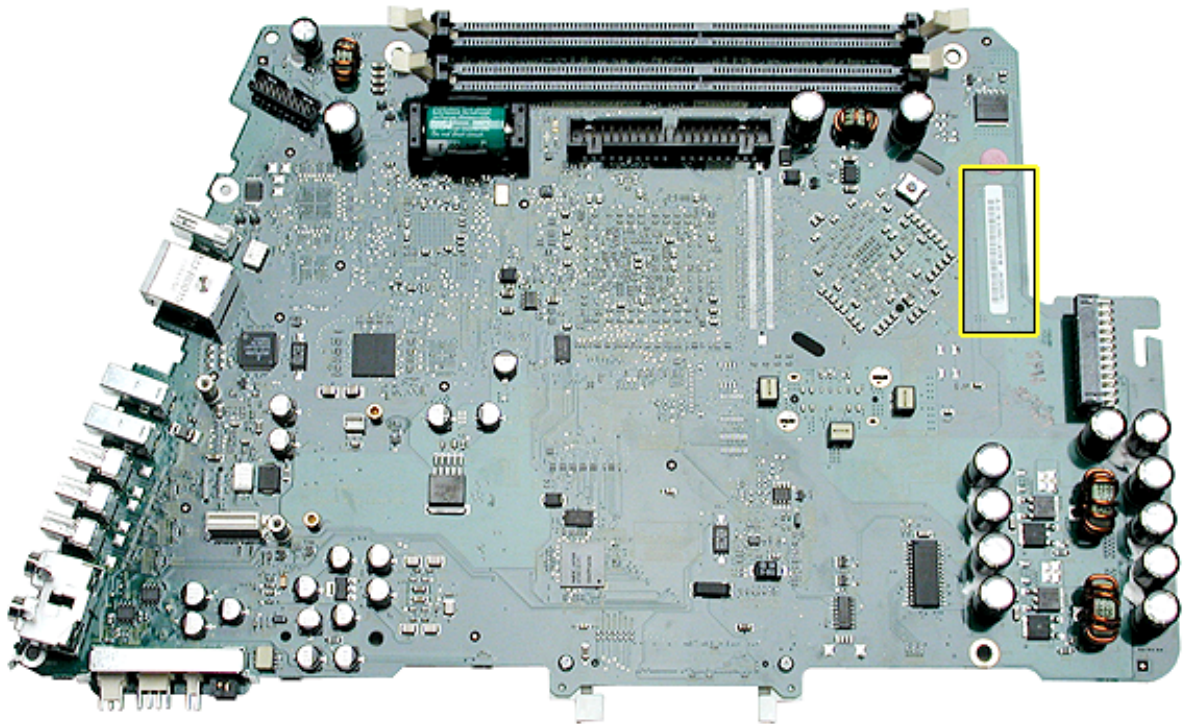
There is one 800 MHz board, three 1 GHz logic boards, and one 1.25 GHz board for this product. The boards need to be exchanged like-for-like. Use the EEE codes to identify the boards. The graphic below shows the general location of the barcode label for the logic boards.

- 661-2853, 800 MHz: EEE code PLB
- 661-2854, 1 GHz: EEE code, NMA
- 661-3014, 1 GHz, Ver. 2: EEE code, Q11, which will either be a sticker above the barcode (shown below), or Q11 will be embedded in the barcode.
- 661-3279 1 GHz board, USB 2.0: EEE code QDJ or QHL.
- 661-3280 1.25 GHz board, USB 2.0: EEE code QDK or QHM



**eMac (ATI Graphics) 1 GHz logic board 661-3014**





**eMac (USB 2.0) 1.25 GHz logic board, 661-3280**

**Replacement Note:** Before returning the logic board to Apple, remove the following items:

- I/O panel frame
- RJ-11 connector (if present)
- Modem board
- Memory
- Heatsink
- Down converter
- AirPort Extreme Card (if present)
- Bluetooth board (if present)



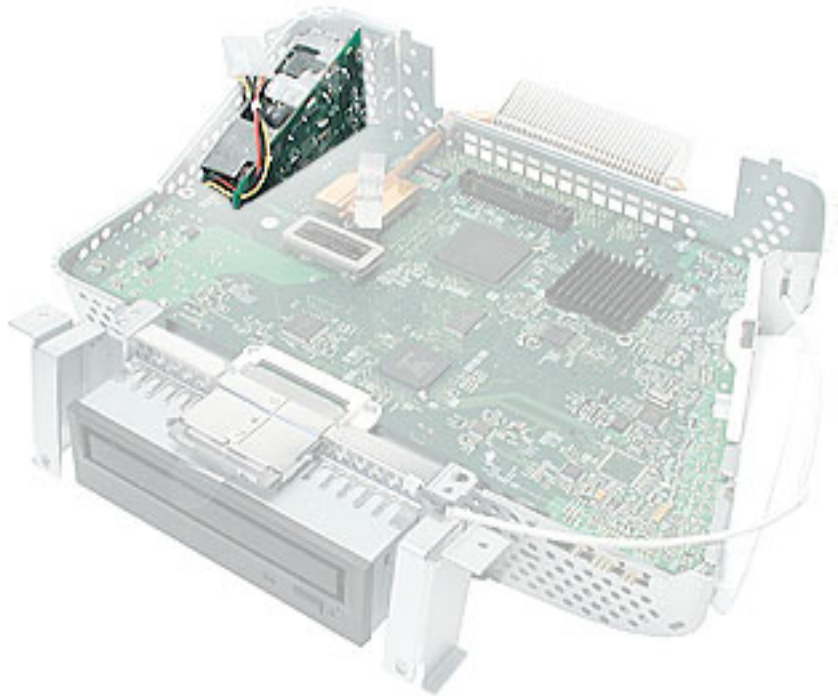
# Down Converter

## Tools

This procedure requires the following tools:

- Phillips #2

## Part Location



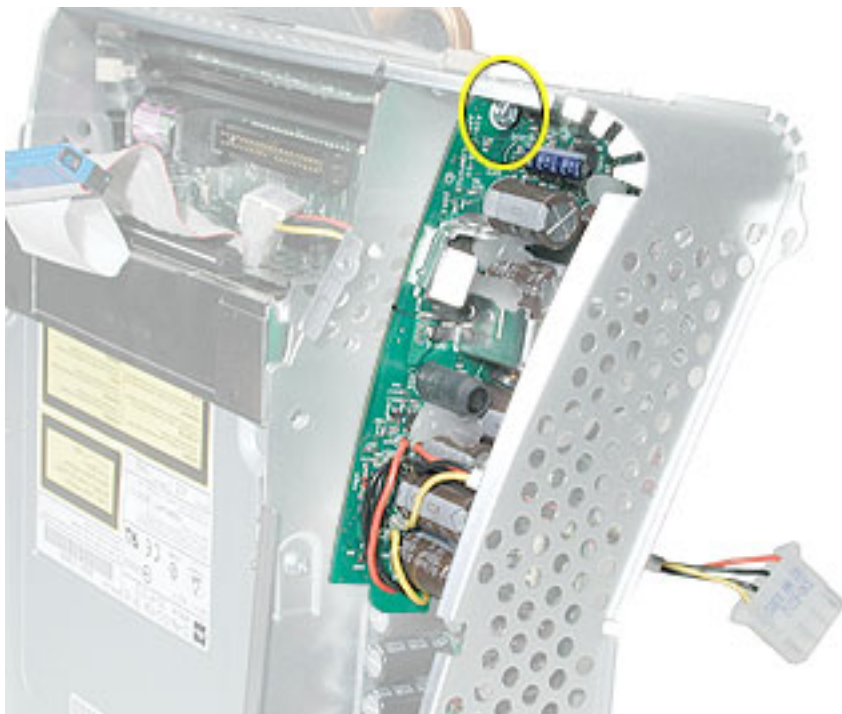
## Preliminary Steps

Before you begin, do the following:

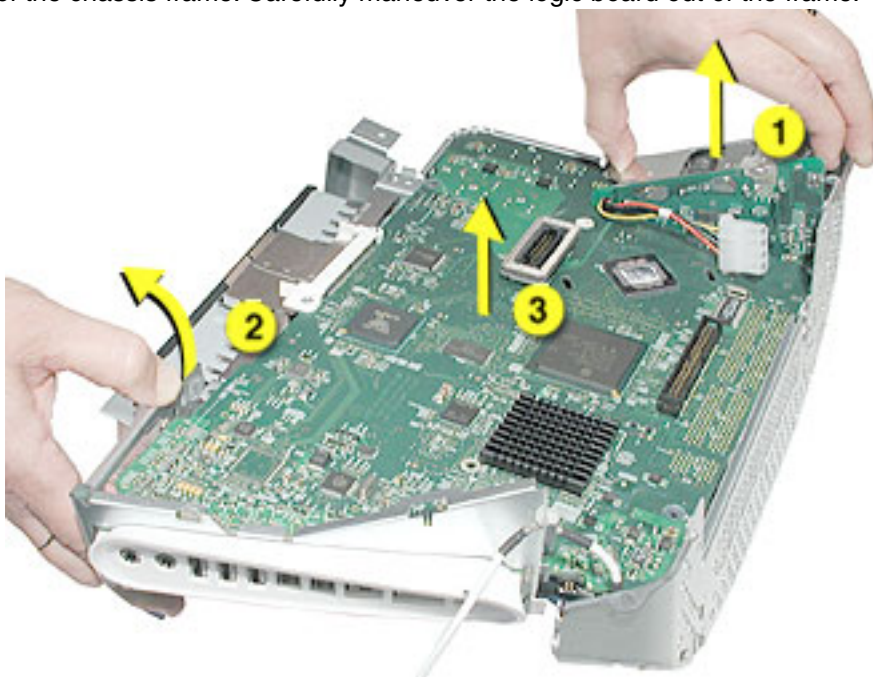
- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.
- Remove the fan.
- Remove the Faraday plate.
- Remove the digital assembly.

## Procedure

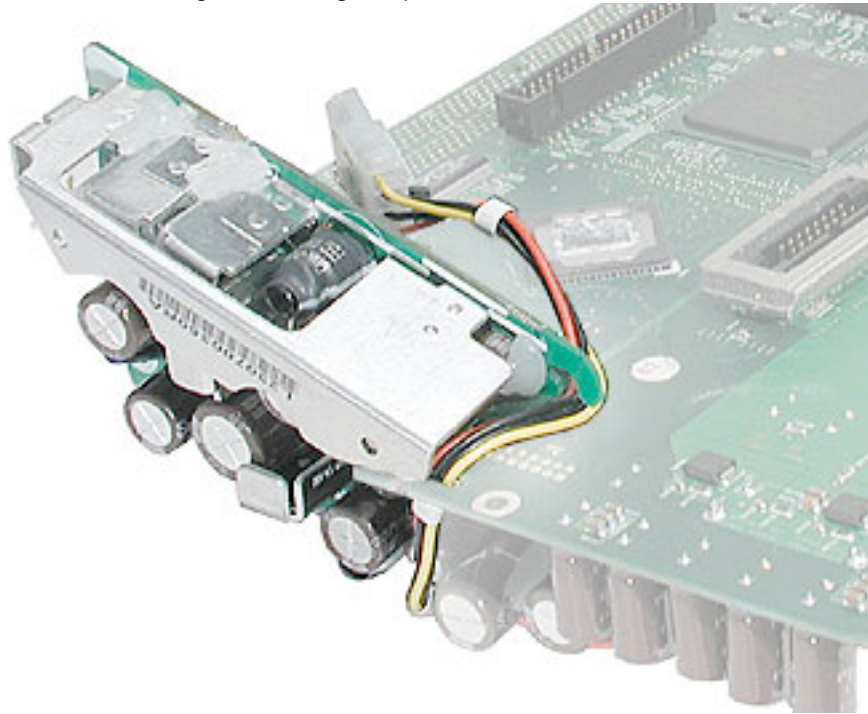
1. Remove the screw attaching the down converter to the chassis frame.



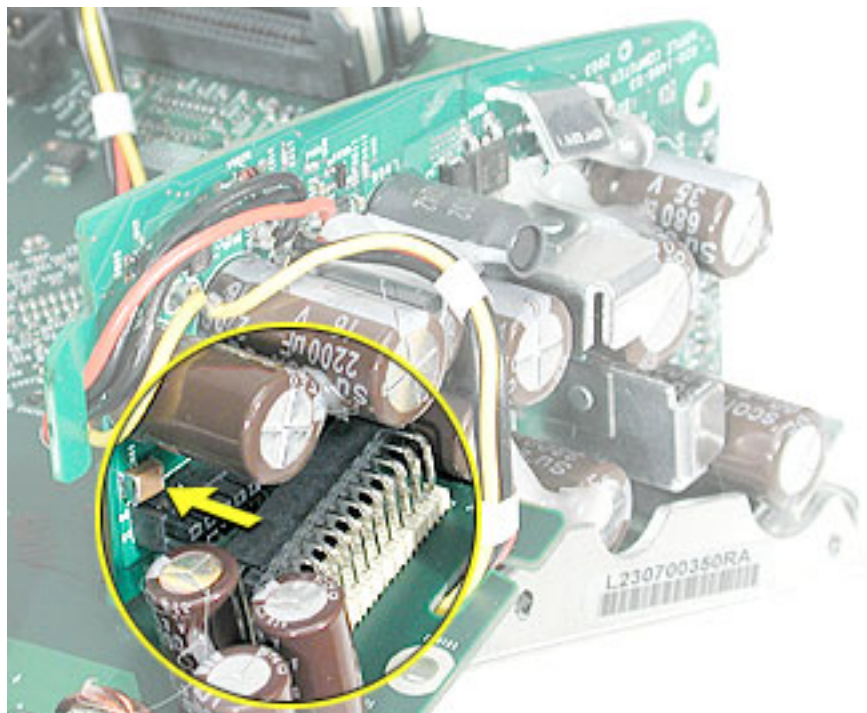
2. Turn the logic board right side up. Hold the board by the down converter (#1) and gently pull the chassis frame (#2) away from the board. Remove the logic board (#3) out of the chassis frame. Carefully maneuver the logic board out of the frame.



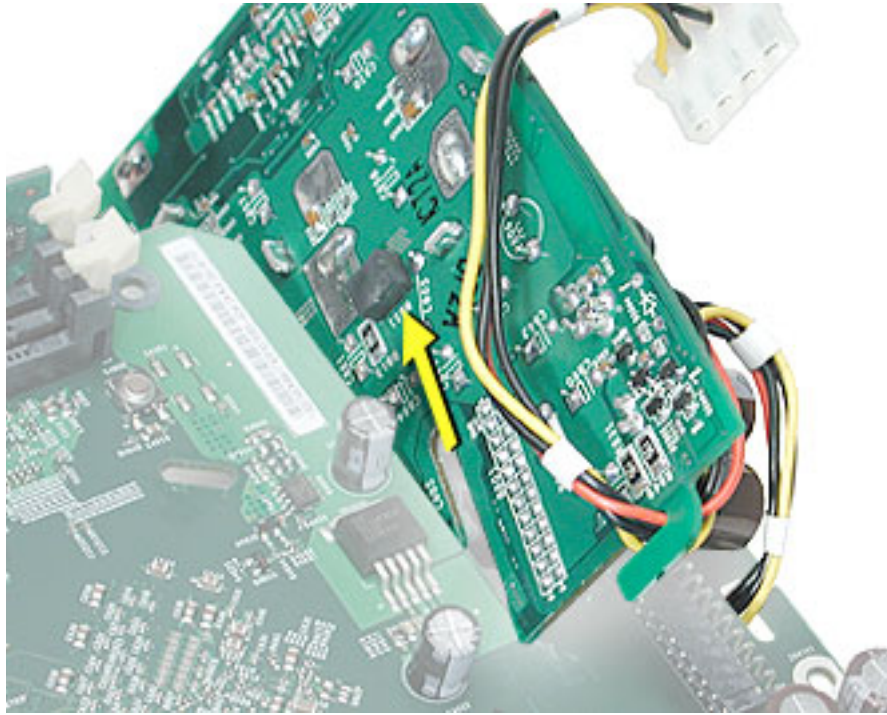
3. **Important:** The down converter board is fragile. Be careful not to flex the board too much when removing or inserting a replacement down converter.



4. Turn the logic board over so you can see the logic board-to-down converter connector. Pull the down converter in the direction of the arrow to disconnect the board from the logic board.

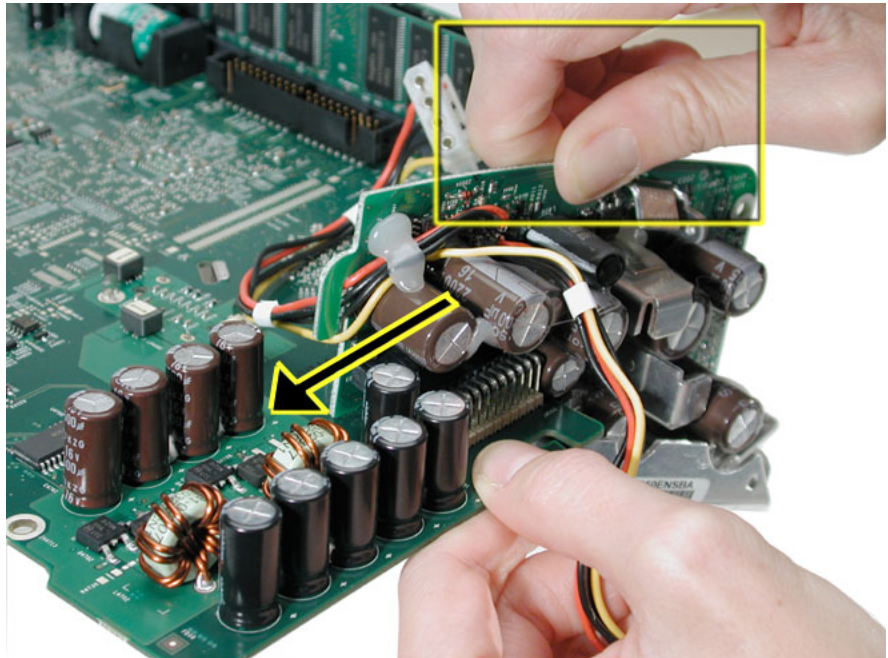


5. Slide the down converter off the logic board in the direction of the arrow. **Important:** For replacement instructions, refer to the next topic.

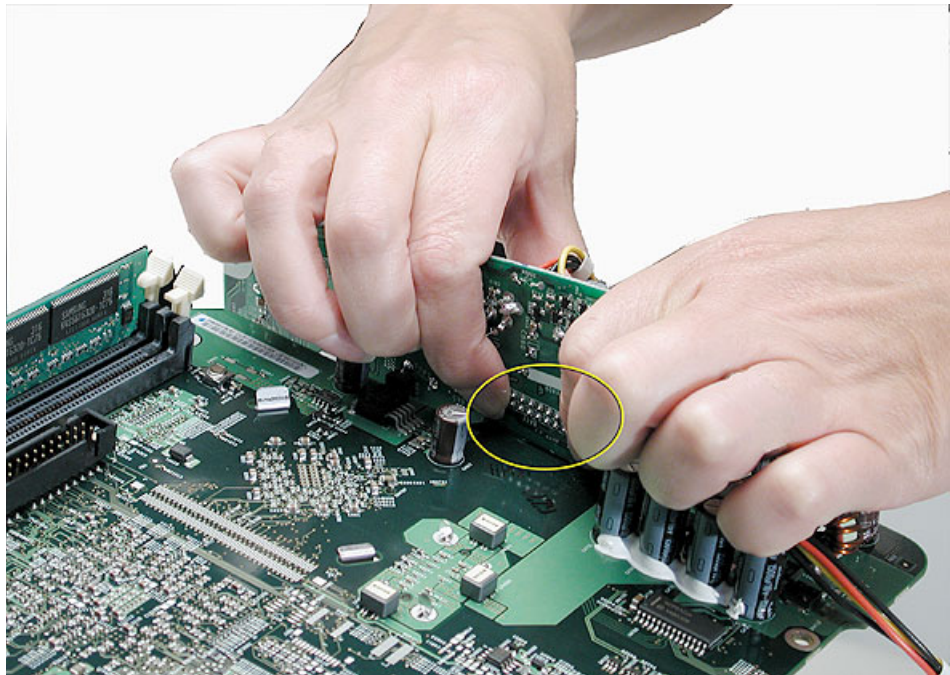


## Replacing the Down Converter

1. **Important:** Be careful when installing the down converter; the board is fragile. Hold the down converter by the top of the board (as shown below). Carefully slide the down converter onto the logic board in the direction of the arrow.



2. With the down converter in place, squeeze the pins (circled below) and the connector together for a solid connection.





# I/O Panel

## Tools

This procedure requires the following tools:

- Phillips #2 screwdriver

## Part Location



## Preliminary Steps

Before you begin, do the following:

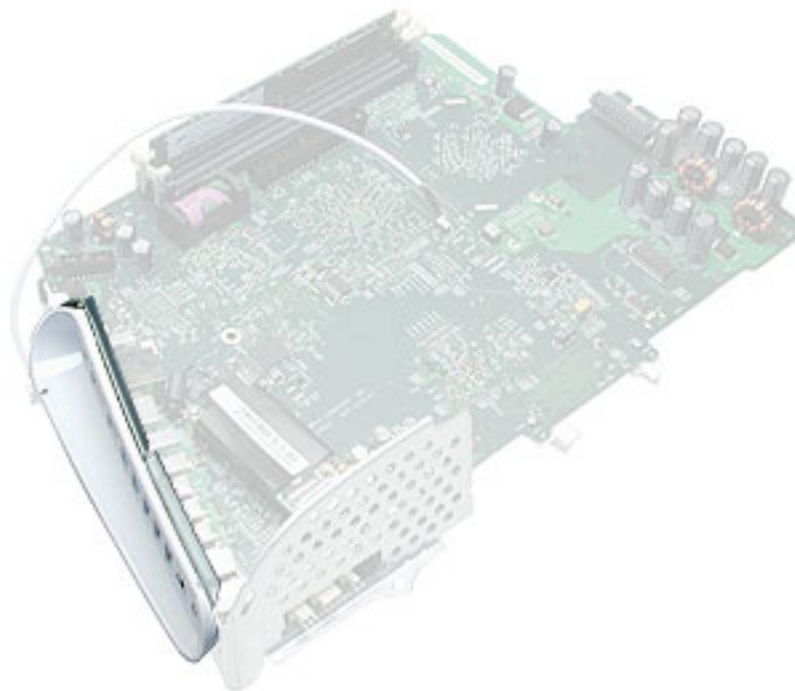
- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.
- Remove the fan.
- Remove the Faraday plate.

- 
- Remove the digital assembly.
  - Remove the logic board.

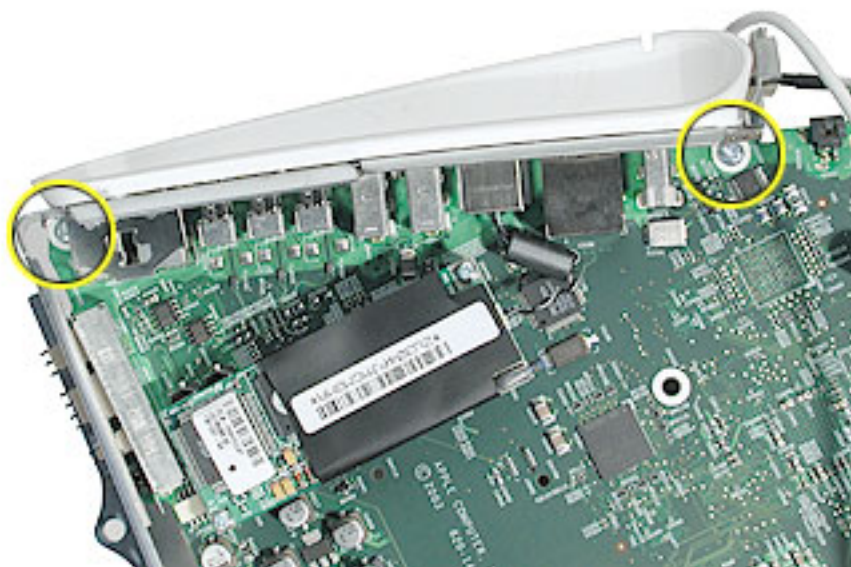


## Procedure

1. Remove the logic board from the chassis frame to access the I/O panel.



2. Remove the two I/O panel screws.



3. First, pull the I/O panel away from the ports (#1) on the logic board. Next, carefully pull the I/O fence away from the connectors on the end of the board (#2).



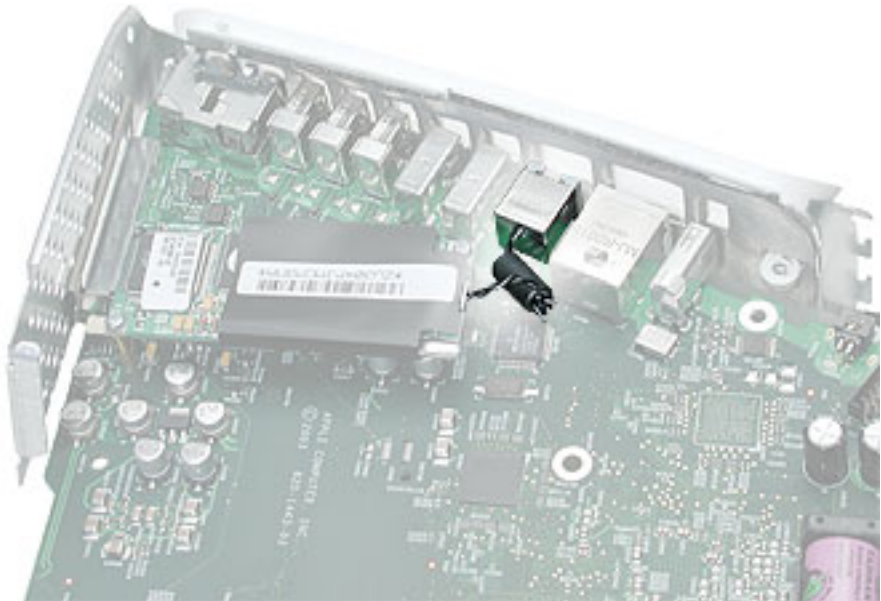


# RJ-11 Cable

## Tools

- Nylon probe tool (922-5065)

## Part Location



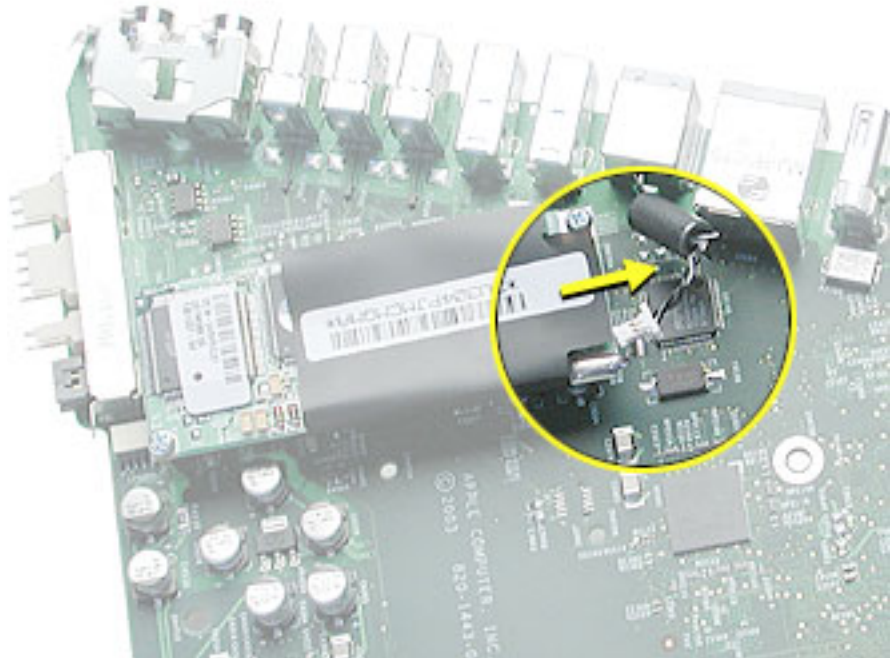
## Preliminary Steps

Before you begin, do the following:

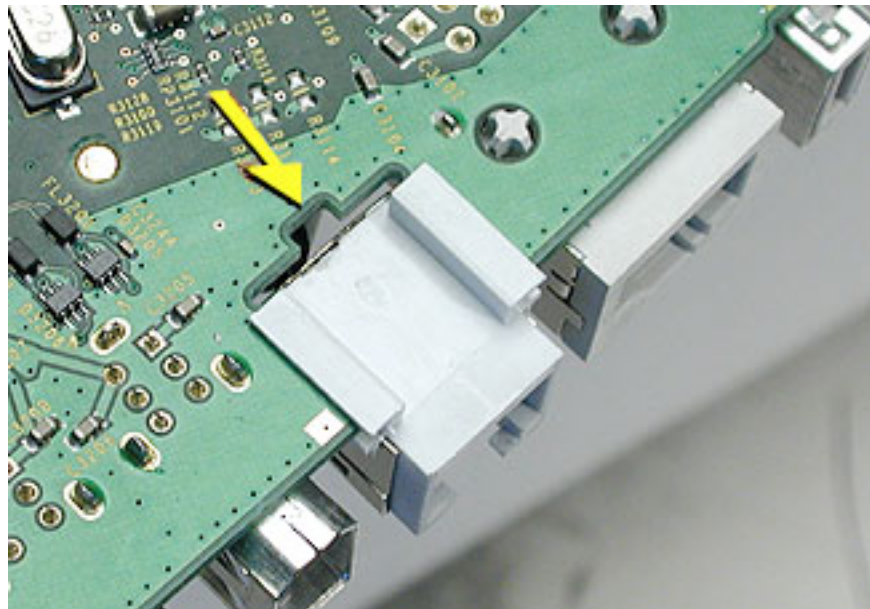
- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.
- Remove the fan.
- Remove the Faraday plate.
- Remove the digital assembly.
- Remove the logic board
- Remove the I/O panel

## Procedure

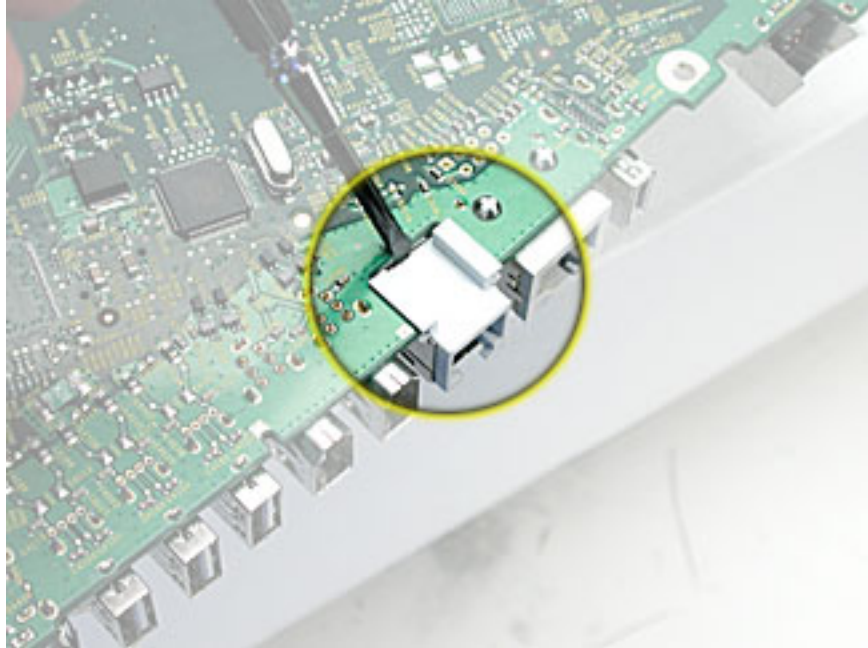
1. Disconnect the RJ-11 cable from the modem.



2. Turn over the logic board. There is a small pry slot on the board for a screwdriver blade to get behind the connector. See the next step.



- Carefully push the RJ-11 port connector off the logic board with a nylon probe tool or screwdriver.





# AirPort Extreme Card

## Tools

This procedure requires the following tools:

- Phillips #2

## Part Location



## Preliminary Steps

Before you begin, do the following:

- Place the computer so that the front of the computer faces you.

---

## Procedure

1. Press the optical door in on one side and pull the door open on the other side to access the AirPort access panel.



2. Loosen the two captive screws on the access panel. Remove the access panel. **Note:** On entry level models you won't see the optical tray when you remove the access panel. The access panel is a "blank" piece of plastic that covers the hole where an optical drive would be present (see next graphic).



3. The picture below shows the entry level eMac model Airport access door. Notice the absence of the optical drive.





4. Remove the access panel.



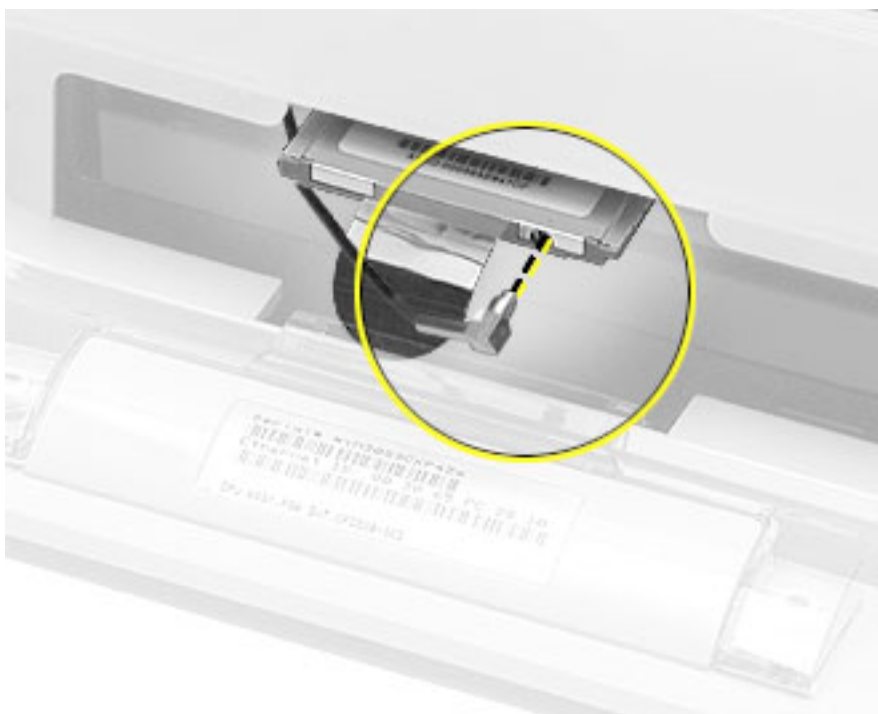
5. Untuck the clear tab attached to the AirPort Extreme Card.



6. Pull the AirPort Extreme Card out of the slot a little bit to access the antenna connected to the card.

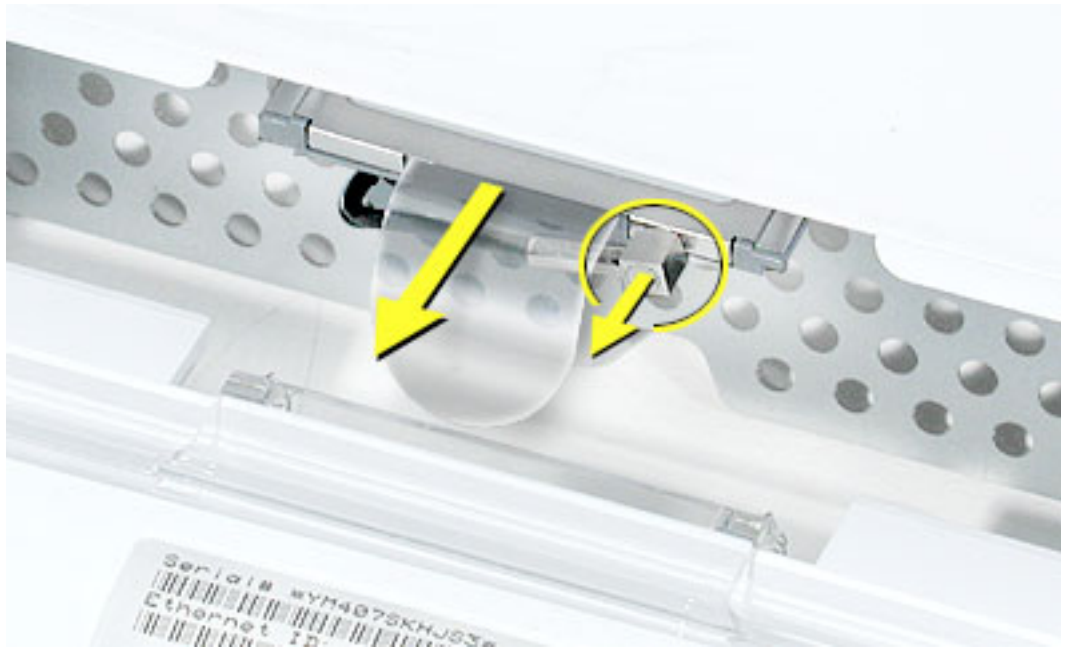


7. Disconnect the antenna cable from the AirPort Extreme card.



8. Pull the tab to remove the AirPort Extreme card from the slot. Refer to the next page to see the internal difference of the entry level eMac.

9. This picture shows removing the AirPort card from the entry level eMac model. Notice the metal optical plate covering the location where the optical drive would be present.





# LED

## Tools

This procedure requires the following tools:

- Phillips #2

## Part Location



## Preliminary Steps

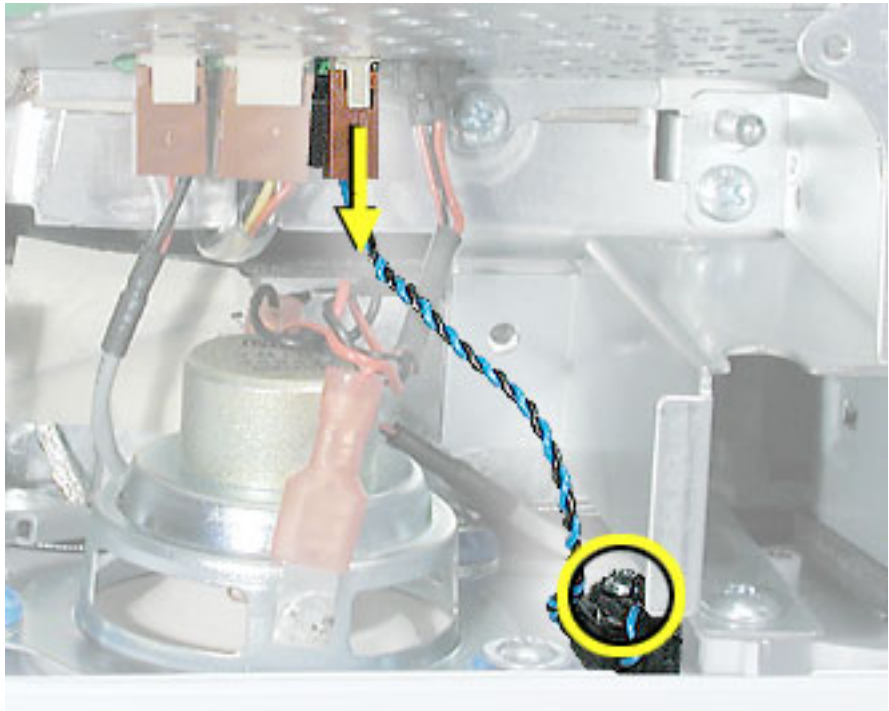
Before you begin, do the following:

- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.

- 
- Remove the fan.
  - Remove the Faraday plate.

## Procedure

1. Remove one screw and disconnect the LED cable. **Important:** The connector is very fragile, remove it gently. Lift the LED board off the front bezel.





# Front Bezel

## Tools

This procedure requires the following tools:

- Phillips #2

## Part Location



## Preliminary Steps

Before you begin, do the following:

- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.
- Remove the fan.

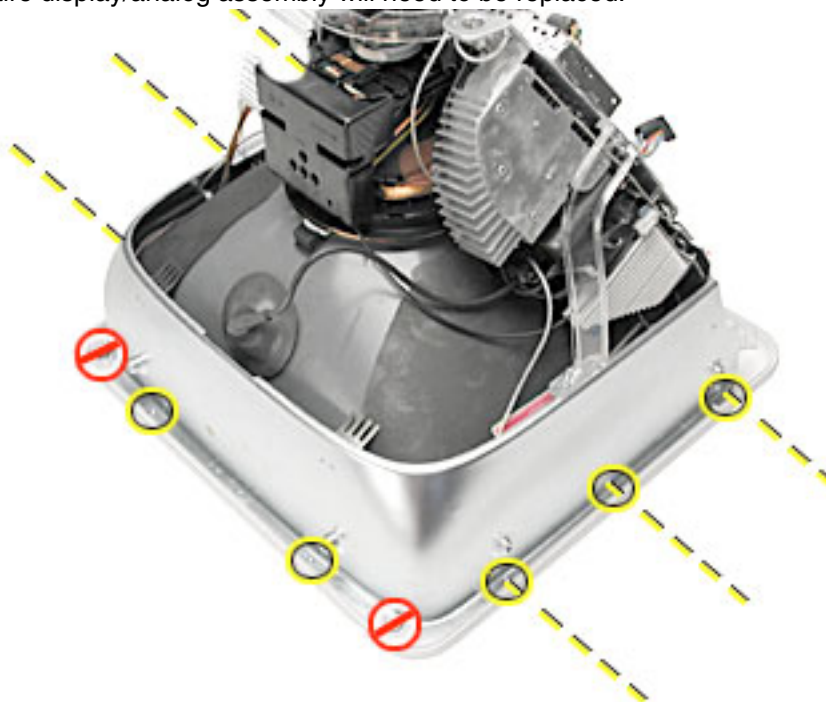
- 
- Remove the Faraday plate.
  - Remove the digital assembly
  - Remove the display/analog assembly



## Procedure

1. Remove the eight bezel screws. There are three on each side and two at the top of the bezel.

**Important:** DO NOT remove the two larger screws circled below, or the two screws shown in the next photo. If they are removed, the CRT will be out of alignment and the entire display/analog assembly will need to be replaced.



2. **Important:** On this side of the computer, do NOT remove the CRT screws located under the red circles. The CRT will be out of alignment if these screws are removed.



- 
3. **Carefully** lift the display/analog assembly off the bezel.
  4. Remove the microphone, speakers, and LED from the bezel.



5. **Note:** Remove the antenna board from the display/analog assembly before returning the display/analog assembly to Apple. Refer to the next procedure, “Antenna Board” for details.



# Antenna Board (eMac ATI Graphics)

## Tools

This procedure requires the following tools:

- Phillips #2 screwdriver
- Needlenose pliers or flat blade screwdriver

## Part Location



## Preliminary Steps

Before you begin, do the following:

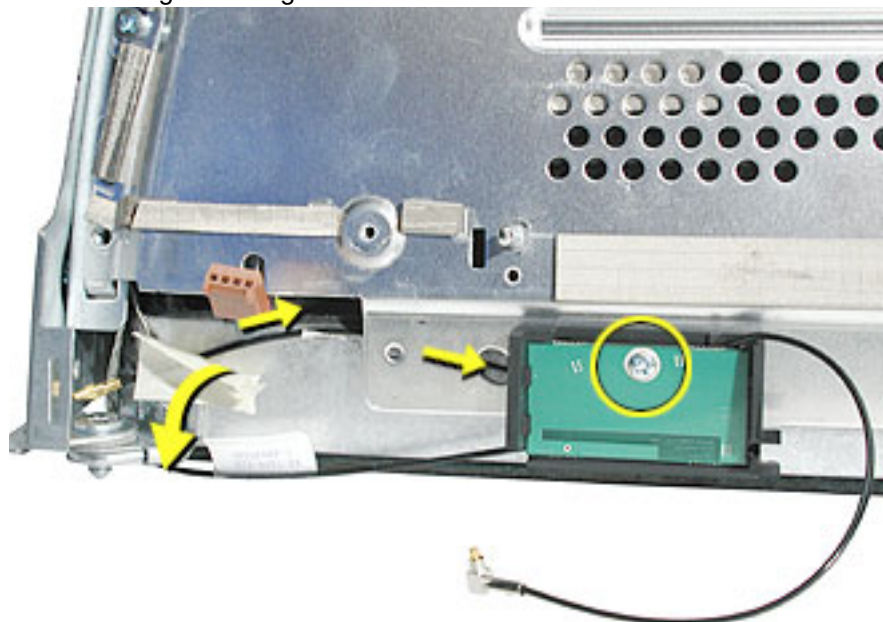
- Remove the AirPort Extreme card
- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.
- Remove the fan.

- 
- Remove the Faraday plate.
  - Remove the digital assembly.
  - Remove the display/analog assembly.

## Procedure

1. Remove one screw on the antenna board.

Next, peel back the masking tape and pull the unused end of the antenna through the hole in the digital/analog chassis.



2. Carefully position the computer so that the CRT faces you.

Locate the metal antenna bracket at the top of the CRT. Remove the screw on the bracket, then pry the antenna cable from the two clips on the side of the CRT.





# Antenna Board (eMac USB 2.0)

## Tools

This procedure requires the following tools:

- Phillips #2 screwdriver
- Needlenose pliers or flat blade screwdriver

## Part Location



## Preliminary Steps

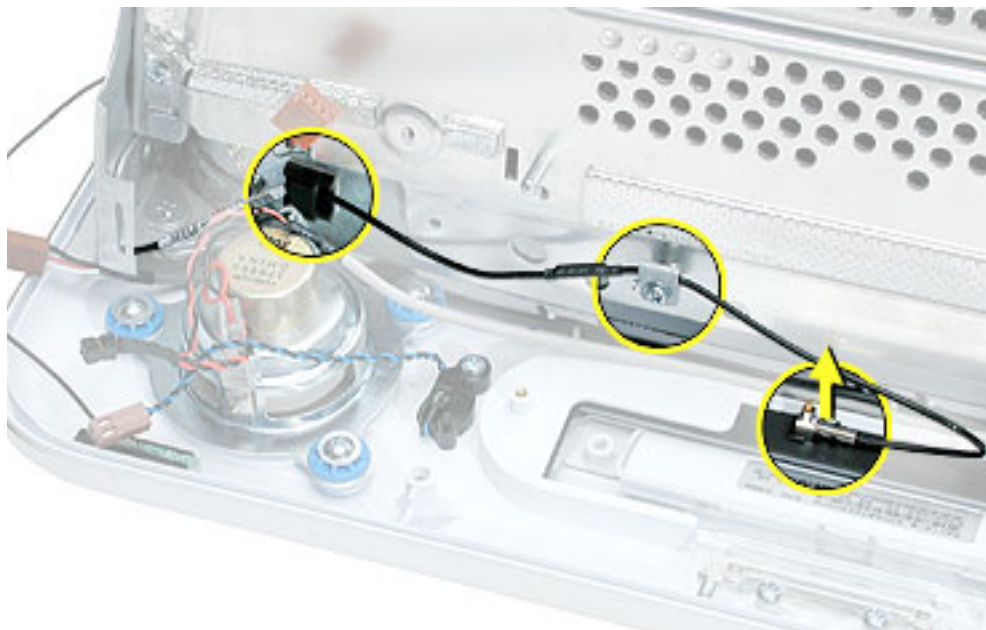
Before you begin, do the following:

- Remove the AirPort Extreme card
- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.
- Remove the fan.

- 
- Remove the Faraday plate.
  - Remove the digital assembly.
  - Remove the digital/analog assembly.

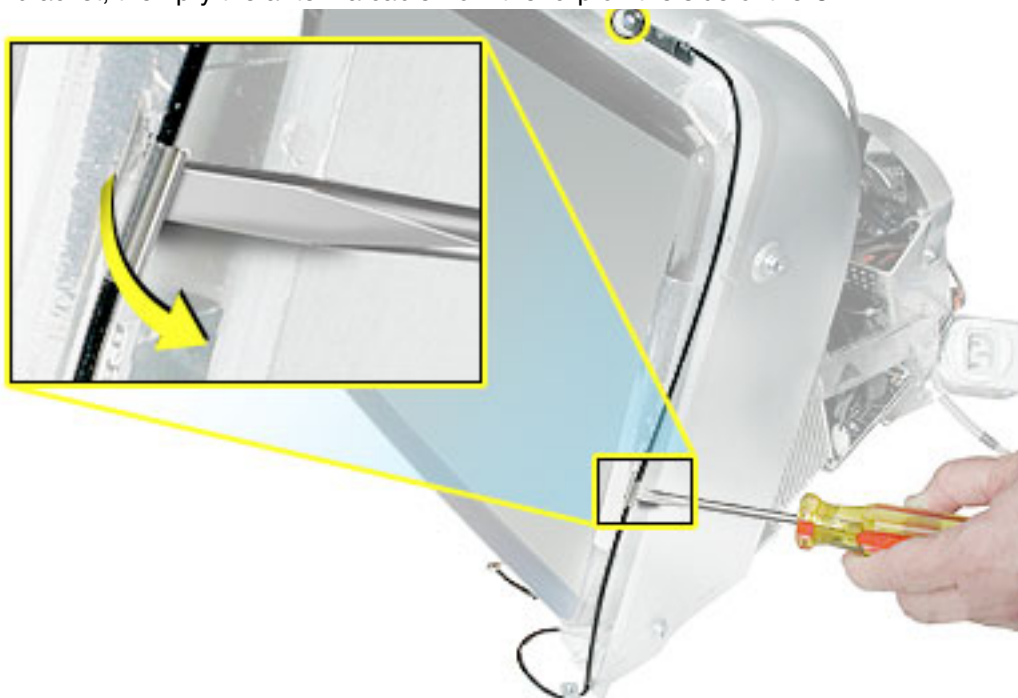
## Procedure

1. Remove the cable from the black clip, remove one screw, and pry the AirPort antenna from the AirPort access door plate. This is shown with the display/analog assembly still attached to the front bezel, in a repair situation it would have to be removed.



2. Carefully position the computer so that the CRT faces you.

Locate the metal antenna bracket at the top of the CRT. Remove the screw on the bracket, then pry the antenna cable from the clip on the side of the CRT.







# Microphone

## Tools

This procedure requires the following tools:

- Phillips #2

## Part Location



## Preliminary Steps

Before you begin, do the following:

- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.
- Remove the fan.

- 
- Remove the Faraday plate.
  - Remove the digital assembly.
  - Remove the display/analog assembly.

## Procedure

1. Carefully lift the display/analog assembly from the bezel to access the microphone.
2. Remove the microphone cable from the bezel.





# Door Assembly

## Tools

This procedure requires the following tools:

- Phillips #2

## Part Location



## Preliminary Steps

Before you begin, do the following:

- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.
- Remove the fan.

- Remove the Faraday plate.
- Remove the digital assembly.

## Procedure

1. Remove the two screws connecting the door to the front bezel. Remove the door from the front bezel.



2. **Replacement Note:** Transfer the serial number label on the inside of the door to the replacement door.





# Memory

## Tools

- No tools are required for this procedure

## Part Location



## Preliminary Steps

Before you begin, do the following:

- Place the computer face down on an ESD mat.
- Unplug all cables except the power cord, from the computer.
- Remove the user access door.

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## Procedure

1. Touch a metal surface inside the computer. Then unplug the computer.

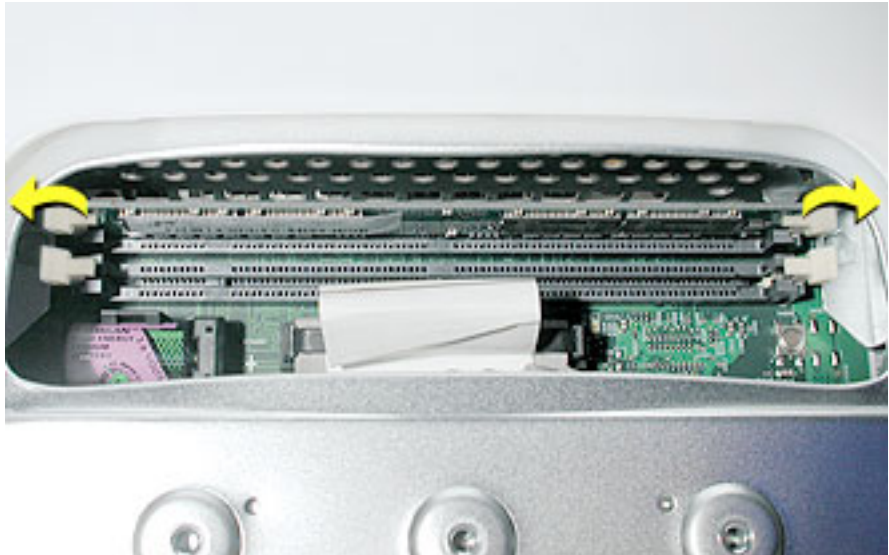
**Important:** Always ground yourself before you touch any parts, or remove/install any components inside the computer. To avoid generating static electricity, do not walk around until you have finished removing or installing the memory and closed the computer.



2. Push the ejectors on the memory slot outward and down so they are in the open position. Remove the memory module. **Replacement Note:** The memory is designed to fit into the slot only one way. Be sure to align the notches on the module with the small notches inside the slot.

**Note:** The RAM expansion modules used in the eMac (USB 2.0) computers are 184-pin SDRAM DIMMs (dual inline memory modules) that are 2.5 V, unbuffered, 8-byte, non-parity, and PC2700 compliant. The speed of the SDRAM devices must be rated at 167 MHz (7 ns) or faster. Refer to Kbase article 86718 for more information.

**Important:** The memory expansion cards (DIMMs) in the eMac (USB 2.0) computers must use SDRAM devices as specified above. DIMMs for previous models of eMac or DIMMs that use EDO or SGRAM devices will not work. If they are installed, the computer will beep, and the power light will flash several times when you turn on the computer. This indicates that the computer cannot find any useable RAM.





# Battery

## Tools

- No tools are required for this procedure

## Part Location

**Note:** The battery can be accessed through the user access door on the back of the computer.



## Preliminary Steps

Before you begin, do the following:

- Place the computer face down on an ESD mat.
- Unplug all cables except the power cord, from the computer.
- Remove the user access door.

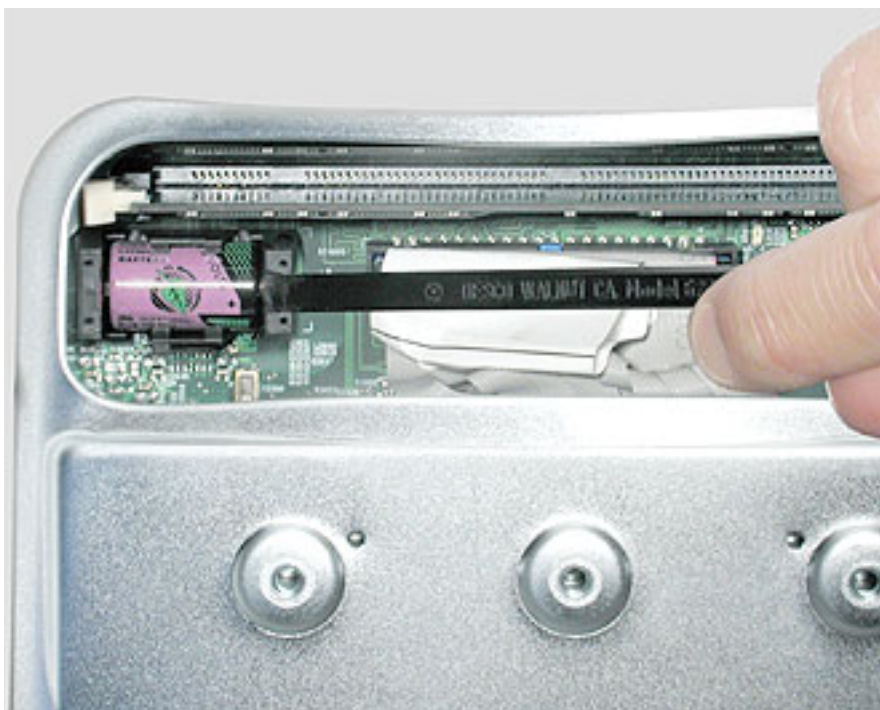


## Procedure

1. Touch a metal surface inside the computer. Then unplug the computer. **Important:** Always do this before you touch any parts, or remove/install any components inside the computer. To avoid generating static electricity, do not walk around until you have finished removing or installing the battery and closed the computer.



2. With the nylon probe tool, carefully pry the battery out of the battery holder.





## Modem (eMac ATI Graphics)

### Tools

This procedure requires the following tools:

- Phillips #1 or jeweler's screwdriver

### Part Location



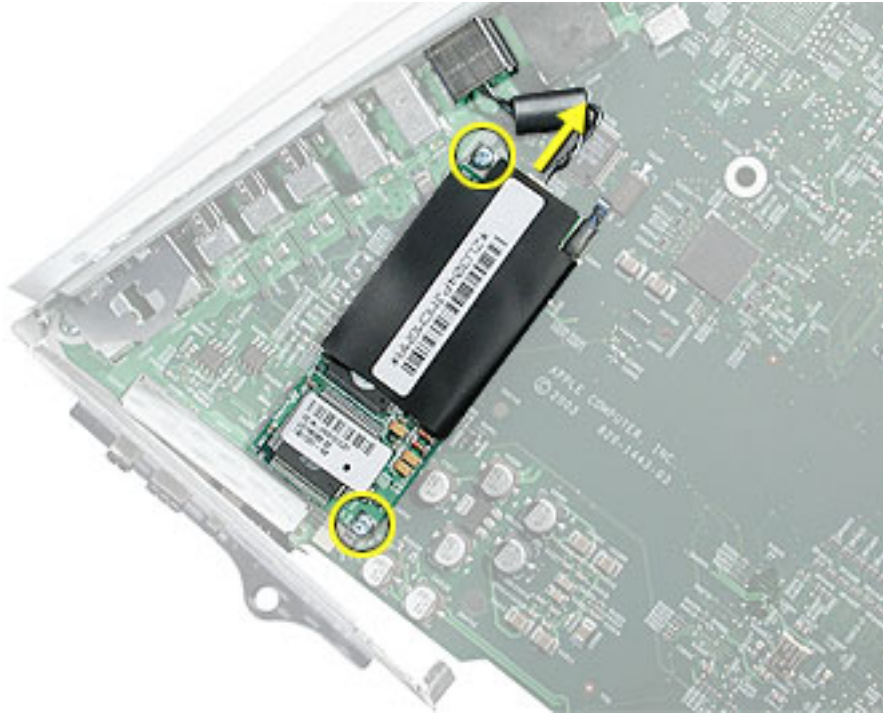
### Preliminary Steps

Before you begin, do the following:

- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.
- Remove the Faraday plate.

## Procedure

1. Remove the two modem screws and disconnect the RJ-11 cable from the modem.



2. Lift the modem from the connector on the logic board.



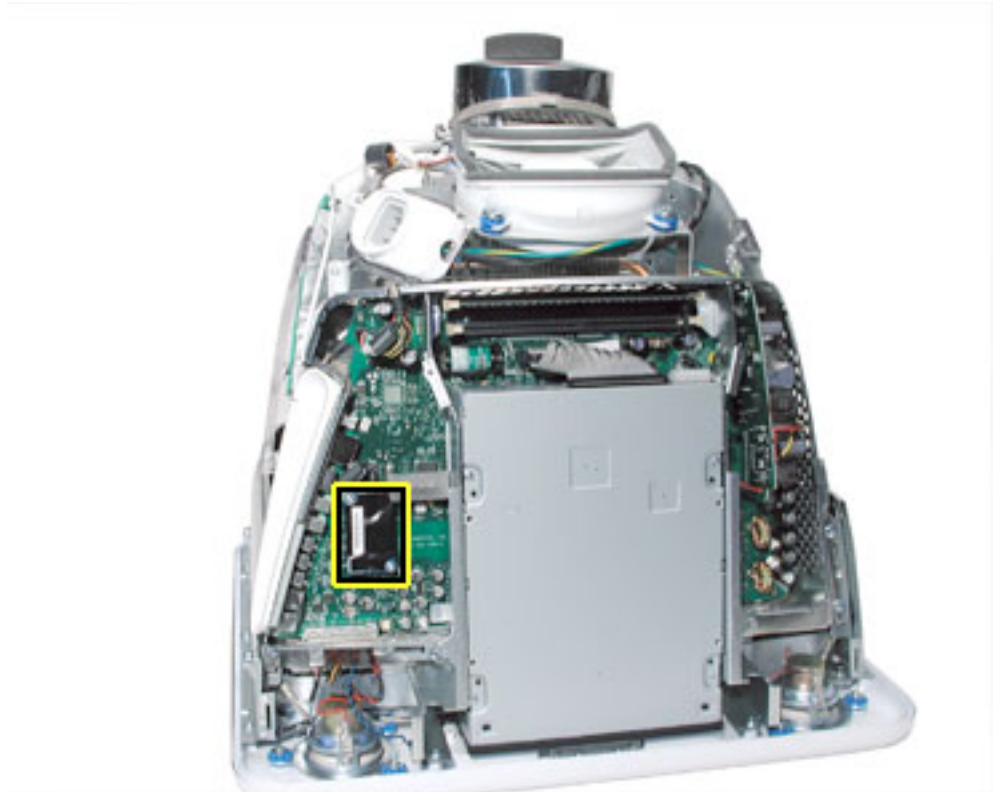
## Modem (eMac USB 2.0)

### Tools

This procedure requires the following tools:

- Phillips #1

### Part Location



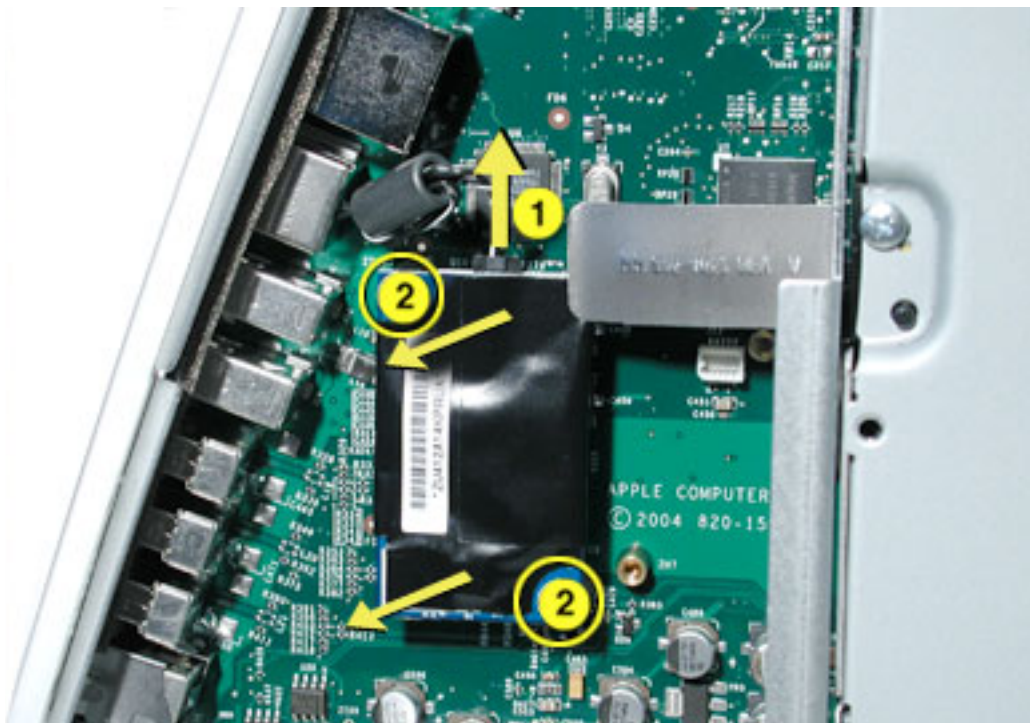
### Preliminary Steps

Before you begin, do the following:

- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.
- Remove the Faraday plate.

## Procedure

1. Disconnect the RJ-11 cable (#1) from the top of the modem. Remove the two modem screws (#2) and gently pry the board off its connector. The board is fragile; pry the board from the top and bottom.



**Replacement Note:** When replacing the modem, don't apply pressure to the middle of the board. The board should be pressed into place by holding the modem by the top and bottom.



# Display/Analog Assembly

## Tools

This procedure requires the following tools:

- No tools are required

**Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent injury, always review CRT Safety on Service Source online. This link can be found under the list of topics under the iMac icon. Remember, never use a grounding wriststrap until after discharging the CRT and setting up an ongoing ground connection.

**Note:** The eMac (ATI Graphics) display/analog assembly requires no voltage calibration or geometry adjustment. Should the display require adjustment (color or brightness) use the “Displays” pane under System Preferences if using Mac OS X. If using Mac OS 9, use the Monitor Control Panel to make adjustments. If you can not make satisfactory corrections with these tools, replace the display/analog assembly.

## Part Location



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## Preliminary Steps

Before you begin, do the following:

- Place the computer face down on an ESD mat
- Remove the user access door
- Remove the feet
- Remove the rear housing
- Discharge the CRT.
- Remove the fan
- Remove the Faraday plate
- Remove the digital assembly
- Remove the AirPort Extreme Card
- Remove the front bezel
- Remove the antenna.

If you remove everything listed in the steps above, you are left with the display/analog module. There is nothing more to remove from this module.

**Note:** The display/analog assembly contains a non-switching power supply which is preset at a 220V configuration. The voltage selection needs to be manually set by the way of a voltage jumper. This means if you are operating the computer in a 110V environment, you will have to install the voltage jumper. Refer to the Troubleshooting chapter, “Digital/Analog”

**Replacement Note:** If you are returning a defective display/analog module, it is imperative that proper packaging guidelines be followed. The packing procedure is included with the replacement assembly. Incorrect packaging can result in damaged eMac (ATI Graphics) displays. Please read and follow the directions enclosed in the shipping box of the new display prior to packaging the defective module.

Failure to package the defective module according to the instructions may result in liability for the cost of the damaged display.



# LHR Coil

## Tools

This procedure requires the following tools:

- Phillips #2 AirPort Extreme Card screwdriver

## Part Location

**Note:** This part is used in Europe for line conditioning. If your computer does not have the LHR coil, skip this procedure.



## Preliminary Steps

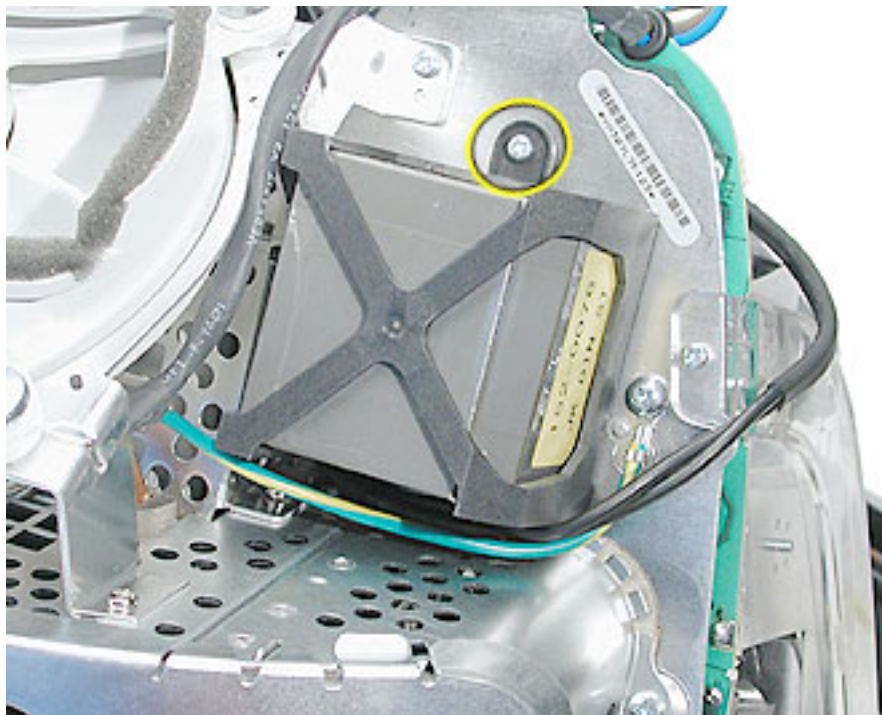
Before you begin, do the following:

- Place the computer face down on an ESD mat.
- Remove the user access door.
- Remove the feet.
- Remove the rear housing.
- Discharge the CRT.

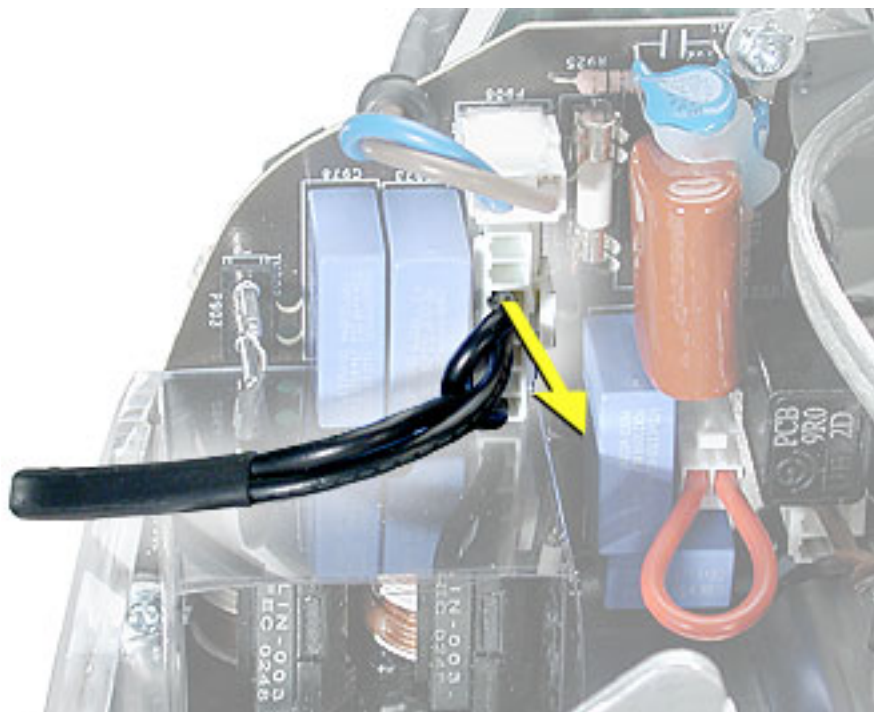


## Procedure

1. Remove the screw located at the top of the LHR coil.



2. Disconnect the LHR connector located next to the fuse.



3. Lift the LHR coil from the display/analog frame.



## Troubleshooting

eMac ATI Graphics/USB 2.0/2005



# General Information

## What's New (May 2005)

### eMac (2005)

- Revised logic board
  - 661-3539 1.42 GHz board:
- New optical drives:
  - 661-3538, Combo, 32x
  - 661-3536, SuperDrive, 8x
- New hard drives:
  - 661-3534, 80 GB
  - 661-3535, 160 GB
- Memory, 333 MHz, DDR
  - 661-3540, 256 MB
  - 661-3541 512 MB

## What's New (April 2004)

### eMac (USB 2.0)

Apple announced a revision to the eMac product family. Powered by G4 processors running at up to 1.25GHz, with a system bus of 167 MHz, the new eMac models come with Mac OS X v.10.3 and include Apple's iLife application suite, providing iMovie, iPhoto, and iTunes as a standard software configuration.

The changes include the following:

- No-optical drive configuration: This computer is available in a low-cost no-optical drive configuration
- Mac OS X 10.3.3
- Modem: except for the educational configuration, the eMac (USB 2.0) has an internal, fax modem (soft modem). The modem appears to the system as a serial port that responds to AT commands.
- Bluetooth (optional): Fully integrated Bluetooth is available as a build-to-order option
  - 922-6201 Bluetooth board
  - 922-6402 Bluetooth antenna
- USB 2.0 ports: This computer has three USB 2.0 ports
- Revised logic boards
  - 661-3279 1 GHz board: EEE code QDJ or QHL.
  - 661-3280 1.25 GHz board: EEE code QDK or QHM
- New optical drives:
  - 661-3281, CD-ROM, 32x
  - 661-3282, Combo, 32x
  - 661-3283, SuperDrive, 8x

- 
- New hard drives:
    - 661-3209, 80 GB
    - 661-3266, 160 GB (CTO)
  - Memory, 333 MHz, DDR
    - 661-3322, 512 MB

The RAM expansion modules used in the eMac (USB 2.0) computers are 184-pin SDRAM DIMMs (dual inline memory modules) that are 2.5 V, unbuffered, 8-byte, non-parity, and PC2700 compliant. The speed of the SDRAM devices must be rated at 167 MHz (7 ns) or faster.

**Important:** The memory expansion cards (DIMMs) must use SDRAM devices as specified above. DIMMs for previous models of eMac or DIMMs that use EDO or SGRAM devices will not work. If they are installed, the computer will beep, and the power light will flash several times when you turn on the computer. This indicates that the computer cannot find any useable RAM.

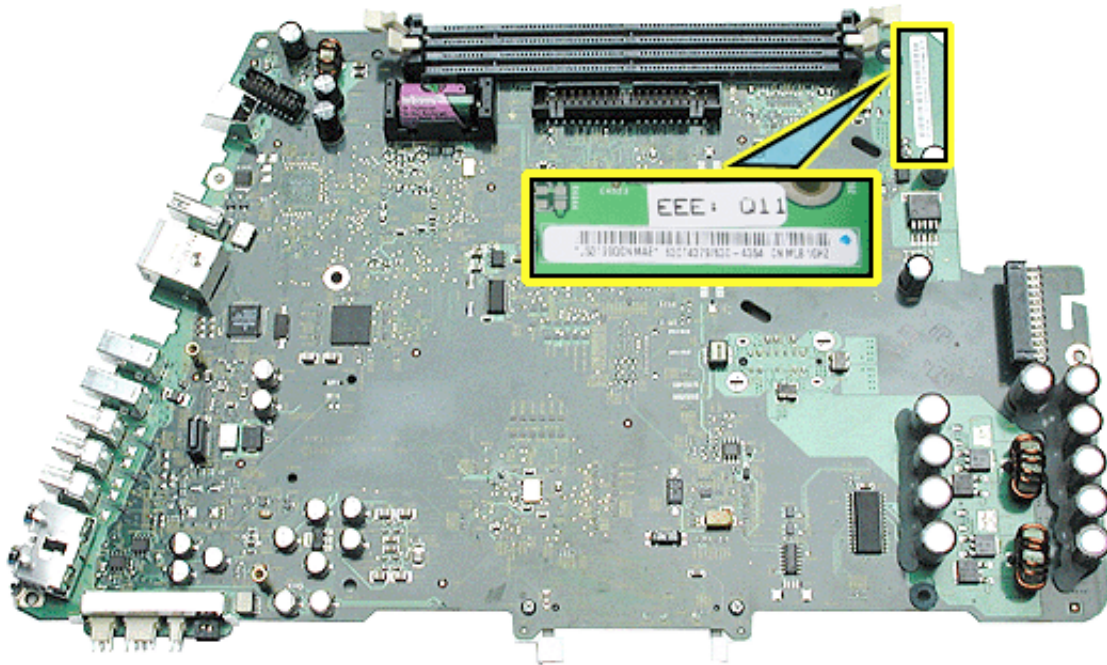
- 
- Faraday Shield
    - 922-6407
  - Optical Plate (used on the no-optical drive configuration only)
    - 922-6408

- 
- Inner AirPort Door (blank, used on the no-optical drive configuration only)
    - 922-6406
  - Heatsink with/clip
    - 076-1079
  - Wireless Antenna
    - 922-6401
  - Wireless Antenna clips
    - 922-6405
  - Kit, Feet, Captive Screws
    - 076-1034

## What's New (October 2003)

The eMac (ATI Graphics) computer was updated in October 2003. The changes include the following:

- Revised logic board, part number 661-3014, 1 GHz, Ver. 2 (EEE code Q11) The EEE code/barcode location is shown below.



- New optical drives:
  - 661-3012, CD-ROM, 32x, drive
  - 661-3015, Combo, 32x, drive
  - 661-3013, SuperDrive, 4x
- New hard drives:
  - 661-3011, 80 GB
  - 661-3016, 160 GB (CTO)
- Mac OS X 10.3
- Updated Apple and third-party bundled software

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## What's New (May 2003)

### eMac (ATI Graphics)

1. To quickly identify the eMac (ATI Graphics) computer from the original eMac, look at the user access door on the back of the computer. The user access door on the eMac (ATI Graphics) computer is white. The original eMac has a silver user access door.
2. There are two new logic boards with faster processors: 661-2854 (1GHZ) with EEE code NMA and the 661-2853 (800 MHz).
3. The eMac (ATI Graphics) uses the AirPort Extreme Card for wireless networking. The original AirPort card can not be used in this computer. Previous models of eMac used the original AirPort card. For compatibility information, see AppleCare Knowledge Base article 107440: AirPort Extreme Card: Compatible Macintosh Computers.
4. Note: The AirPort Extreme Card can not be used under Mac OS 9.
5. The PMU reset button is in a new location. Refer to the topic, "The PMU Chip" or "How to Reset the PMU on the Logic Board" in this chapter.
6. The digital module assembly has been redesigned allowing easier removal and access to the optical drive without removing the digital module.
7. The heatsink has been redesigned.
8. The voltage jumper and LHR jumper are in new locations on the digital/analog assembly. Refer to "Display/Analog Voltage Setting and LHR Module Instructions" in this chapter for more information.
9. The hard drive carrier has one thermal pad and two rubber bumpers on the top side of the carrier. On the underside of the carrier there are two EMI pads. If you replace the carrier, these pieces come with the replacement carrier and need to be attached before inserting the hard drive.
10. The power button of the eMac (ATI Graphics) replaces the power reset button and programmer's switch (NMI button, also known as a NMI or nonmaskable interrupt button). You can use the power button for the following functions:

#### **Sleep**

Press the power button for 1 second to put the computer to sleep. To wake the computer from sleep, press the power button for less than one second or press any key on the keyboard.

#### **Shut down**

To shut down the computer, select Shut Down from the Apple menu (Mac OS X) or from the Special menu (Mac OS 9). You will be prompted to save any unsaved documents.

If the computer is unresponsive, you can force the computer to shut down by pressing the power button and holding it for at least 5 seconds. Important: Information in any unsaved documents may be lost.

#### **Firmware updates**

From time to time, Apple has provided firmware updates to address certain issues that



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cannot be addressed in updates to software. On earlier computers, the programmer's switch was used to install a firmware update.

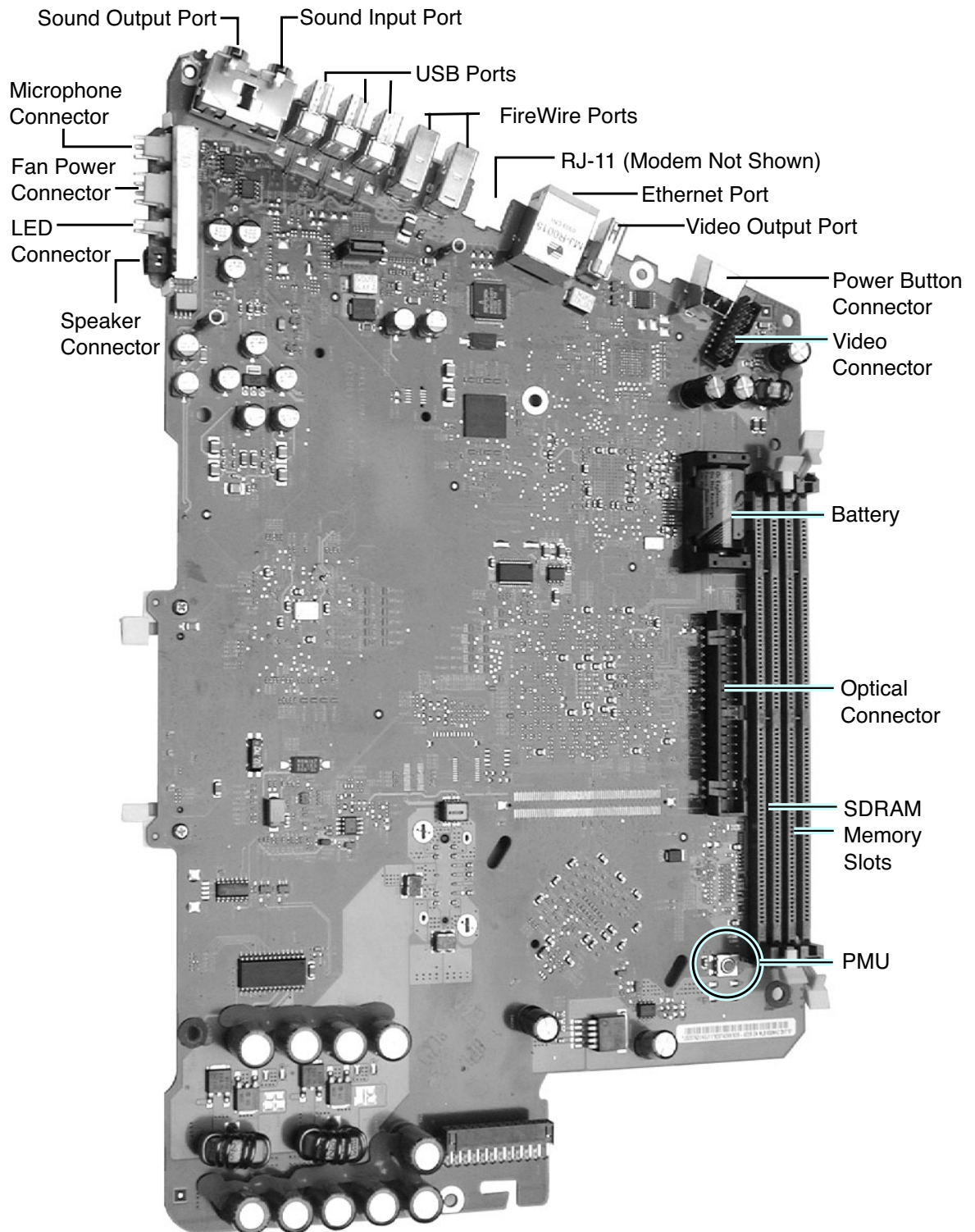
Follow these steps in the event that a firmware update is needed for these computers:

1. Shut down the computer.
2. Wait until the computer is shut down and the power button light is off.
3. Press and hold the power button for several seconds.
4. The computer will signal that a firmware update is ready to be installed by a making a steady tone and the power button light will quickly flash several times for several seconds.

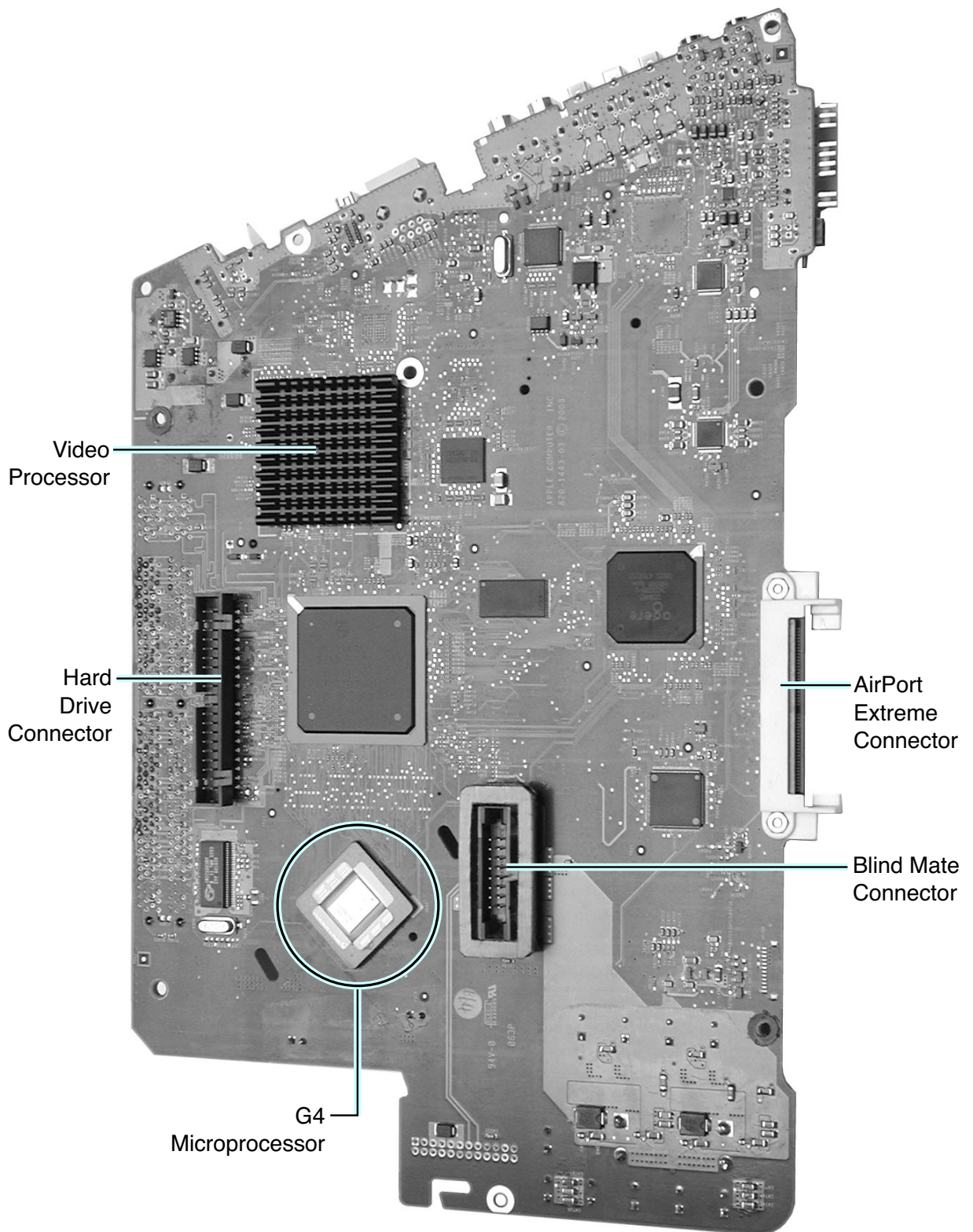
## What's Important

1. **Important:** The display/analog (service module) contains a non-switching power supply which is preset at a 220V configuration. The voltage selection is manually set by way of a voltage jumper. This means if you are replacing the display/analog assembly and you will be operating the computer in a 110V environment, you will have to install the voltage jumper on the replacement module. Refer to the inbox instruction included with the display/analog service module, or refer to "Display/Analog Voltage Setting and LHR Module Instructions" discussed later in this chapter.  
**Note:** The LHR coil (line conditioning module) is used in some international countries. Refer to the Take Apart chapter, LHR topic, for take-apart information.
2. **Important:** If you are returning a defective display/analog assembly, it is imperative that proper packaging guidelines be followed. The packing procedure is included with the replacement assembly. Incorrect packaging can result in damaged eMac displays. Please read and follow the directions enclosed in the shipping box of the new display prior to packaging the defective module. Failure to package the defective module according to the instructions may result in liability for the cost of the damaged display.
3. **Important:** Do NOT lift, handle, bump, or manipulate the CRT neck/neck board on the Display/Analog assembly. Modules damaged by mishandling are NOT covered by Apple Warranty. Apple Authorized Service Providers can be liable for broken CRT necks due to improper handling. Refer to "CRT Neck/ Display/Analog Assembly Handling Information" topic in this chapter for more information.
4. The eMac (ATI Graphics) display/analog assembly requires no voltage calibration or geometry adjustment. Should the display appear to require adjustment (color or brightness) use the "Displays" pane under System Preferences if using Mac OS X. If using Mac OS 9, use the Monitor Control Panel. If you can not make satisfactory corrections with these tools, replace the display/analog assembly.
5. **Important:** The microprocessor uses a heatsink/thermal pipe to transfer heat away. Whenever the heatsink is removed, the bottom side of the heatsink and the top of the microprocessor must be cleaned and thermal paste must be applied to the microprocessor. If the mating surfaces are not cleaned and thermal paste is not applied, the CPU may overheat and become damaged. Refer to "Thermal Paste Application" in this chapter.

## Logic Board, eMac (ATI Graphics), Top Side

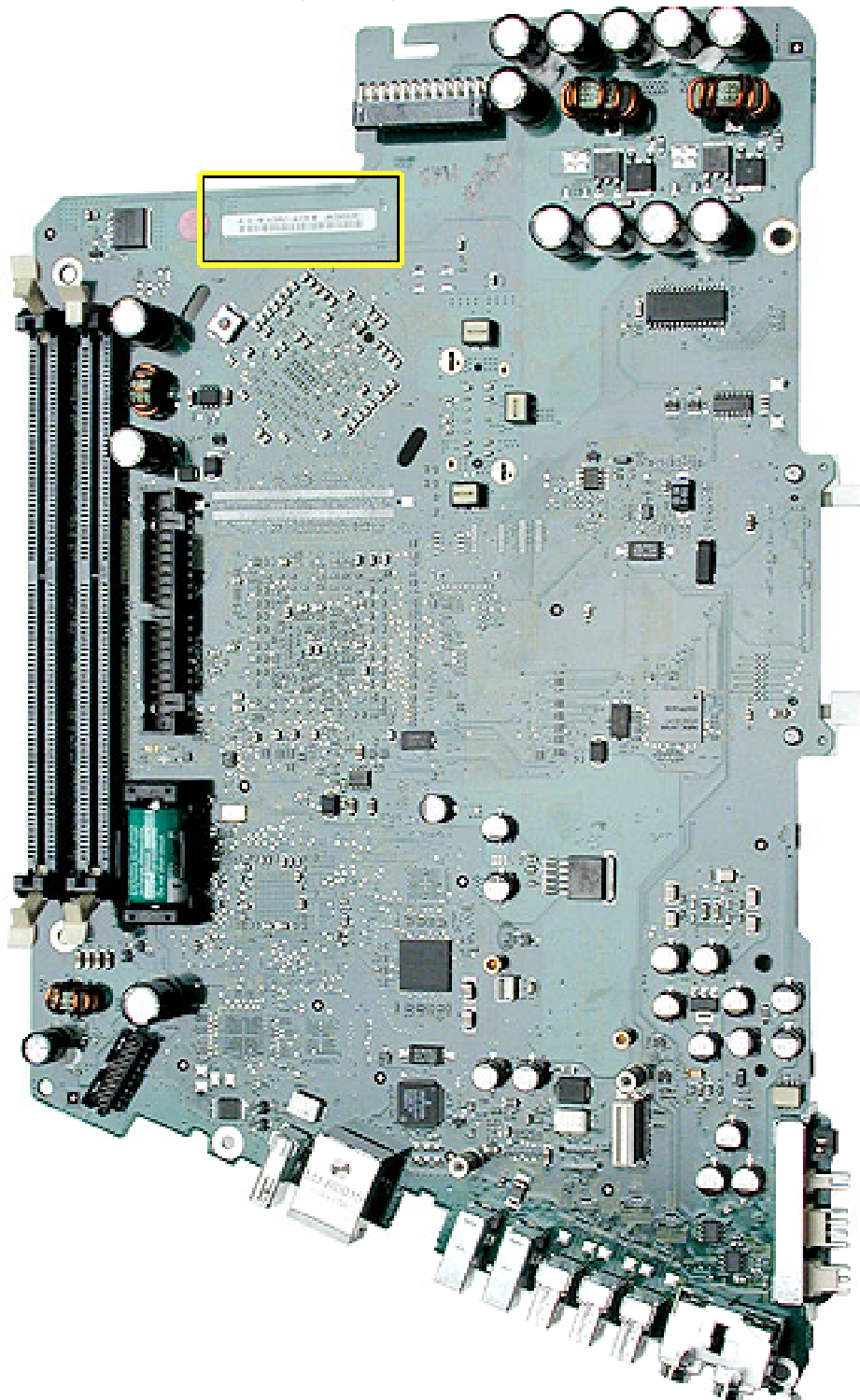


## Logic Board, eMac (ATI Graphics), Bottom Side

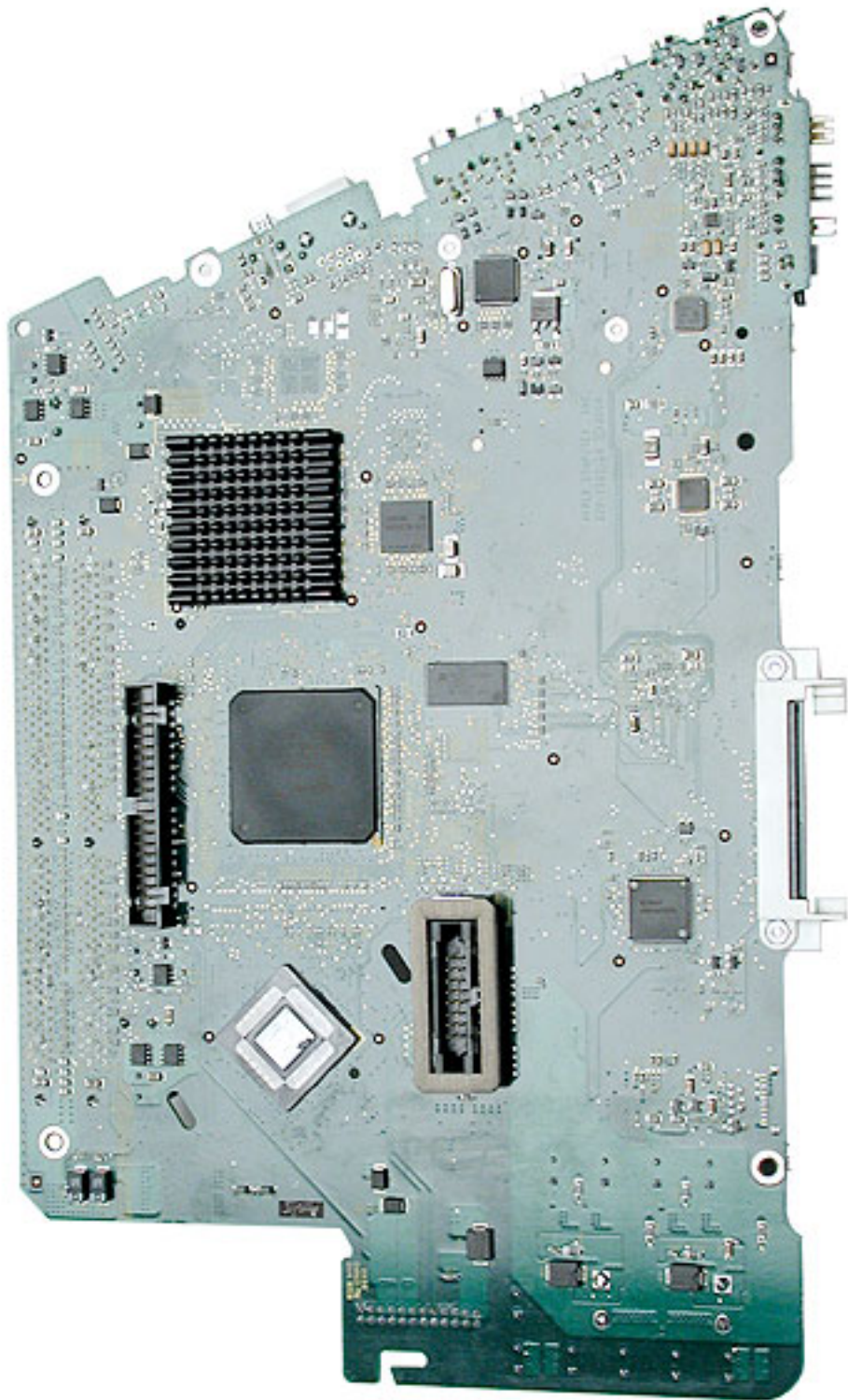


## Logic Board, eMac (USB 2.0), Top Side

The yellow rectangle below shows the location of the board's serial number. Embedded within the serial number is the EEE code for the board. The 1 GHz board has a EEE code of either QDJ or QHL and the 1.25 GHz board has a EEE code of QDK or QHM.



## Logic Board, eMac (USB 2.0), Bottom Side



## I/O Ports



The ports listed from left to right are:

- Headphone
- Sound out port
- USB ports (3)
- FireWire ports (2)
- Modem
- Ethernet
- Video out port

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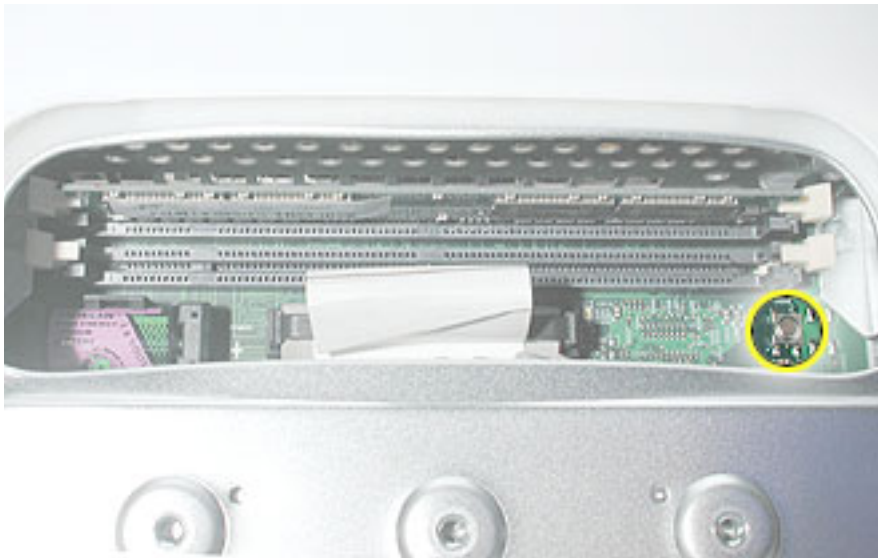
## The PMU Chip

The PMU (Power Management Unit) is a micro controller chip that controls all power functions for the computer. The PMU is a computer within a computer. It has memory, software, firmware, I/O, two crystals, and a CPU. Its function is to:

- Tell the computer to turn on, turn off, sleep, wake, idle, etc.
- Manage system resets from various commands.
- Maintain parameter RAM (PRAM).
- Manage the real-time clock.

**Important:** The PMU is **very** sensitive and touching the circuitry on the logic board can cause the PMU to crash. If the PMU crashes, the battery life goes from about five years to about two days if the PMU is not reset. Refer to the next topic, “How to Reset the PMU on the Logic Board” for the procedure.

Many system problems can be resolved by resetting the PMU chip. The PMU reset button is located behind the user access door, refer to the graphic below.



**Location of the PMU Reset Button on the eMac (ATI Graphics)**

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## How to Reset the PMU on the Logic Board

Resetting the PMU (Power Management Unit) on the logic board can resolve many system problems. **Note:** Whenever you have a unit that fails to power up, follow this procedure, starting with step 3, before replacing any modules.

1. Save open documents and quit all open applications.
2. Turn the computer off by choosing Shut Down from the Special menu (if using Mac OS 9), or choose Shut Down from the Apple menu if using OS X.
3. Unplug all cables, except the power cord, from the computer.





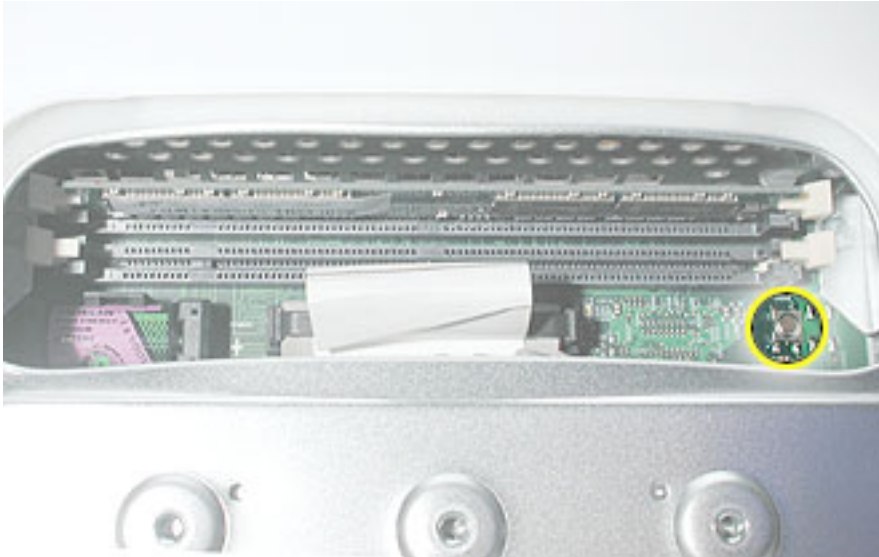
- 
4. Place the computer face down on an ESD matt or soft cloth. Remove the user access door screw.



5. Touch the metal surface inside the computer. **Important:** Always ground yourself by touching metal before you touch any parts or install components inside the computer. To avoid generating static electricity, do not walk around the room until you have finished the procedure and closed the computer



- 6 Unplug the power cord. Remember, to avoid generating static electricity, do not walk around the room until you have finished the procedure and closed the computer
- 7 Press the PMU reset button (circled below) once and then proceed to step 8. Do **NOT** press the PMU reset button a second time because it could crash the PMU chip.



- 8 WAIT ten seconds before connecting the power cord and powering the computer on. If the computer powers on, go to the next step. If the computer does not power on, there is something else wrong with the computer, refer to the symptom/cure, “No Power” in this chapter.
- 9 Run Apple Service Diagnostics and then return the computer to the customer.

**Note:** This entire procedure resets the computer’s PRAM. Be sure to reset the computer’s time, date and other system parameter settings before returning the computer to the customer.

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## Power-On Self Test

There is a power-on self test that resides in the ROM of the eMac. This test automatically runs whenever the eMac is powered on after being fully shut down (the power-on self test does not run if the machine is only restarted).

If a problem is detected during the test, you will not hear a normal startup chime. Instead, the system will beep as explained below. Refer to “Error Beeps” later in this chapter for instructions on how to troubleshoot and repair an eMac that sounds error beeps at startup time.

Following is a definition of what the error beeps at startup time signify.

**One Beep:** No RAM is installed or detected.

**Two Beeps:** Incompatible memory is installed. (The slots accept standard PC-100 or PC-133, 168-pin DIMMs).

**Three Beeps:** No RAM banks passed memory testing.

**Four or Five Beeps:** Bad checksum for the remainder of the boot ROM. The ROM is bad.

---

## Logic Board Battery

**Important:** Apple highly recommends removing the battery when handling the logic board. Make sure to use proper ESD protection when handling modules.

The battery on the logic board controls the stored system settings, such as date and time. It is only necessary to test the battery when you can't power on the computer, or the date and time are reset every time the AC power is removed.

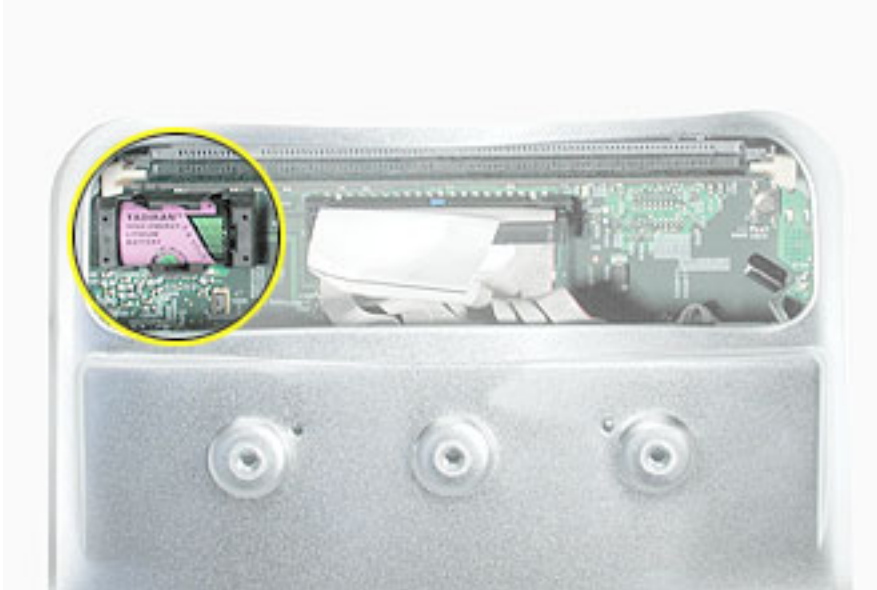
The battery is also used to power the PMU chip (because the PMU chip keeps time and must always be running) when the computer is unplugged from the wall (AC power). The PMU is **very** sensitive and touching any circuitry that is connected to the PMU can cause it to crash. If the PMU crashes, the battery life goes from about five years to about two days if the PMU is not reset. Once the battery goes dead, the PMU will reset the time and date every time the AC power is removed. To fix this situation, replace the battery and reset the PMU (refer to "How to Reset the PMU on the Logic Board" mentioned earlier in this chapter).

---

## Testing the Battery

If the computer has a “No Power” situation, check the battery before replacing modules. A drained battery may be indicative of a crashed Power Management Unit.

With the battery in the battery holder (under load), measure the voltage across the battery’s positive and ground terminals.



Does the battery measure at least +3.5v? If not, replace the battery and reset the PMU. If the battery does measure over +3.5v, reinstall the battery and reset the PMU as above

Connect the power cord and power up the system again.

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## Display/Analog Voltage Setting and LHR Module Instructions

The display/analog (service module) contains a non-switching power supply which is preset at a 220V configuration. The voltage selection is manually set by way of a voltage jumper. This means if you are replacing the display/analog assembly and you will be operating the computer in a 110V environment, you will have to install the voltage jumper on the module.

The following instructions explain how to configure the voltage and LHR jumpers on the digital/analog assembly. **Note:** The LHR coil (a line conditioning module) is required in some international countries.

Refer to Table 1 for jumper settings and the following photos for jumper and LHR locations.

### Tools

This procedure requires the following tools:

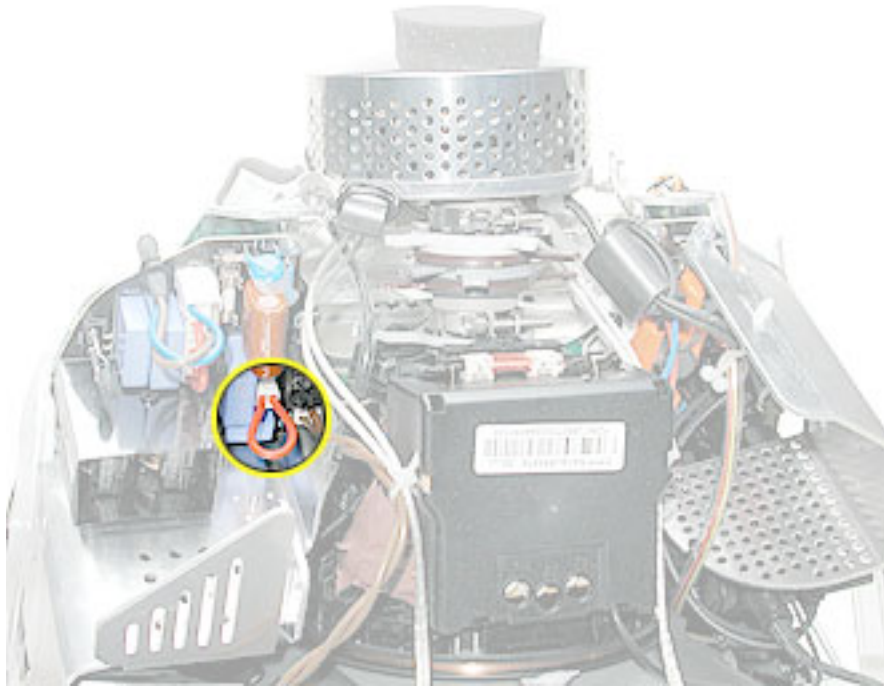
- needlenose pliers to remove/attach the voltage jumper
- phillips #2 screwdriver if attaching the LHR module

**Table 1: Jumper Settings**

Voltage Environment	Voltage Jumper Setting	LHR Jumper Setting
110 V	Jumper is on	Jumper is on
220 V no LHR module	Jumper is off	Jumper is on
220 V with LHR module	Jumper is off	Jumper is off, LHR module installed

## Procedure

1. Locate the voltage jumper circled below. **Note:** This jumper won't be installed on a 220V computer.



2. Next, refer to Table 1 (on the previous page) for the voltage jumper setting and set the jumper accordingly. **Warning: Be careful around the CRT. Discharge the CRT before removing or replacing the jumper.**
3. Locate the LHR coil jumper circled below. Then refer to Table 1 for the LHR jumper setting and set the jumper accordingly.



- 
4. Identify if you have the LHR coil (shown below) on the computer. **Note:** The LHR coil (a line conditioning module) is required in some international countries.



5. If you don't have an LHR module, install the replacement display/analog assembly and ensure the jumpers are set correctly. If you have an LHR, go on to step 6.
6. If you have an LHR coil, remove the LHR from the faulty display/analog assembly, place the LHR on the replacement digital/analog assembly, and set the jumpers according to Table 1.



---

## Thermal Paste Application

The microprocessor uses a heatsink/thermal pipe to transfer heat away. Whenever the heatsink is removed, the bottom side of the heatsink and the top of the microprocessor must be cleaned and thermal paste must be applied. If the mating surfaces are not cleaned and thermal paste is not applied, the CPU may overheat and become damaged.

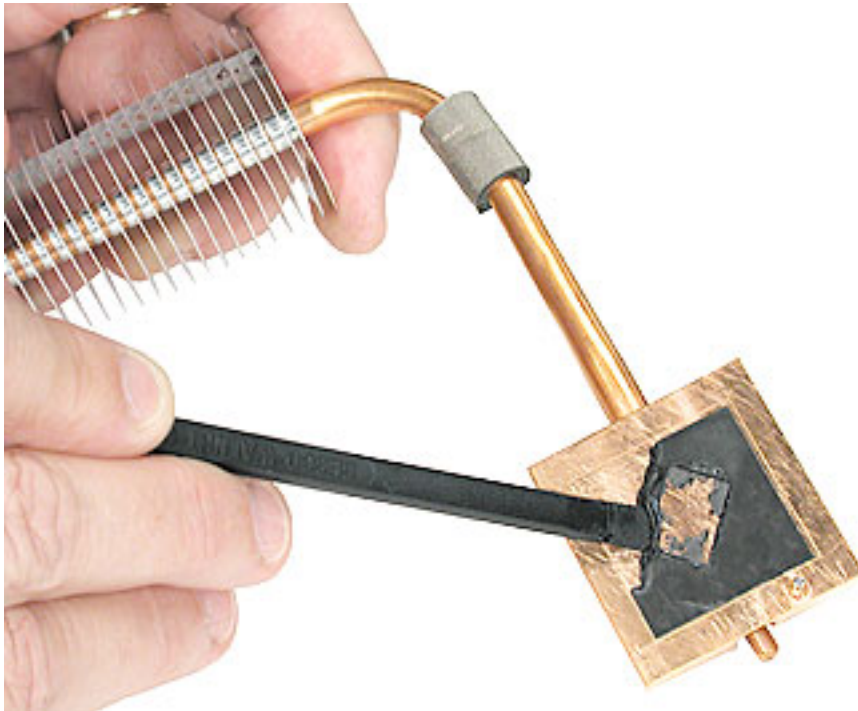
### Tools

This procedure requires the following tools:

- Plastic stylus or nylon probe tool (922-5065) to remove the old thermal paste
- Thermal paste (922-4757), each tube contains 4-5 applications

### Procedure

1. Thoroughly clean the thermal film from the heatsink surface with a plastic stylus or the nylon probe tool. Do not use an abrasive material or liquid cleaner. **Important:** Be extremely careful not to bend the fins on the heatsink.



- Carefully clean the surface of the microprocessor with a plastic stylus or nylon probe tool (922-5065) to remove the old thermal paste.



- Squeeze a drop of thermal paste onto the middle of the microprocessor as shown.



4. Spread the paste evenly over the processor.



5. Reinstall the heatsink and heatsink clip.



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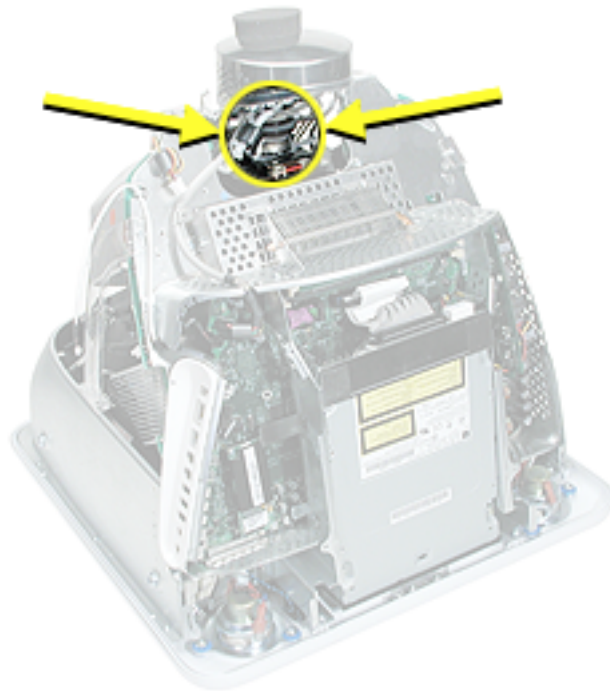
## CRT Neck/Display/Analog Assembly Handling Information

### Handling

**Important:** It is imperative that proper handling and packaging guidelines be followed when working with the display/analog assembly.

Do NOT lift, handle, bump, or manipulate the CRT neck/neck board (see arrows below) on the Display/Analog assembly. Modules damaged by mishandling are NOT covered by Apple Warranty. Apple Authorized Service Providers can be liable for broken CRT necks due to improper handling.

**Caution:** The metal chassis has sharp edges, you may want to wear gloves when handling the assembly. Lift the assembly from the metal chassis; never lift the assembly from the neck. I



### Packing a Defective Display/Analog Assembly

The packing procedure is included with the replacement display/analog assembly. Incorrect packaging can result in damaged eMac (ATI Graphics) displays. Please read and follow the directions enclosed in the shipping box of the new display prior to packaging the defective assembly. AASPs can be liable for broken CRT necks due to improper packing and handling.



# Symptom Charts

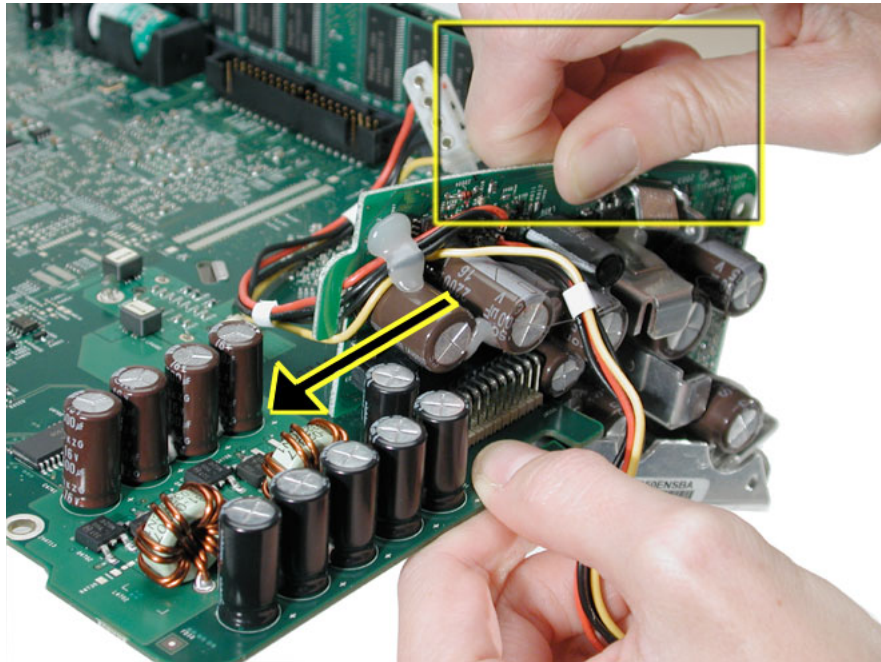
## **How to Use the Symptom Charts**

The Symptom Charts included in this chapter will help you diagnose specific symptoms related to the product. Because cures are listed on the charts in the order of most likely solution, try the cures in the order presented. Verify whether or not the product continues to exhibit the symptom. If the symptom persists, try the next cure. If you have replaced a module, reinstall the original module before you proceed to the next cure.

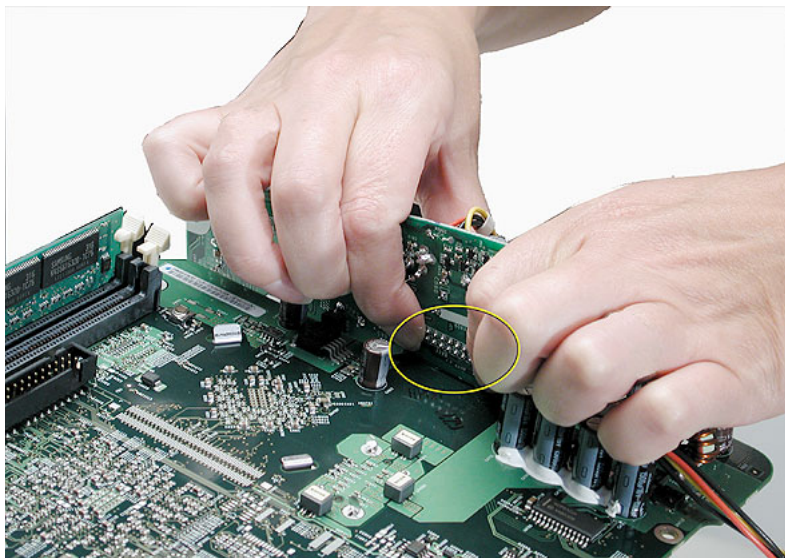
## No Power

**The fan clicks (and may spin briefly), but does not turn on and you may hear the degauss cable fire.**

1. Replace the down converter. Hold the down converter by the top of the board (as shown below). Carefully slide the down converter onto the logic board in the direction of the arrow. **Important:** The down converter board is fragile. Be careful not to flex the board sideways when removing or installing the board.



2. With the down converter in place, squeeze the pins and the connector together for a solid connection.



3. Assemble the computer and test for power. Do you have power now? If yes, test the system and return the computer to the customer. If no, proceed to the next symptom, "The computer will not power on".

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## The computer will not power on.

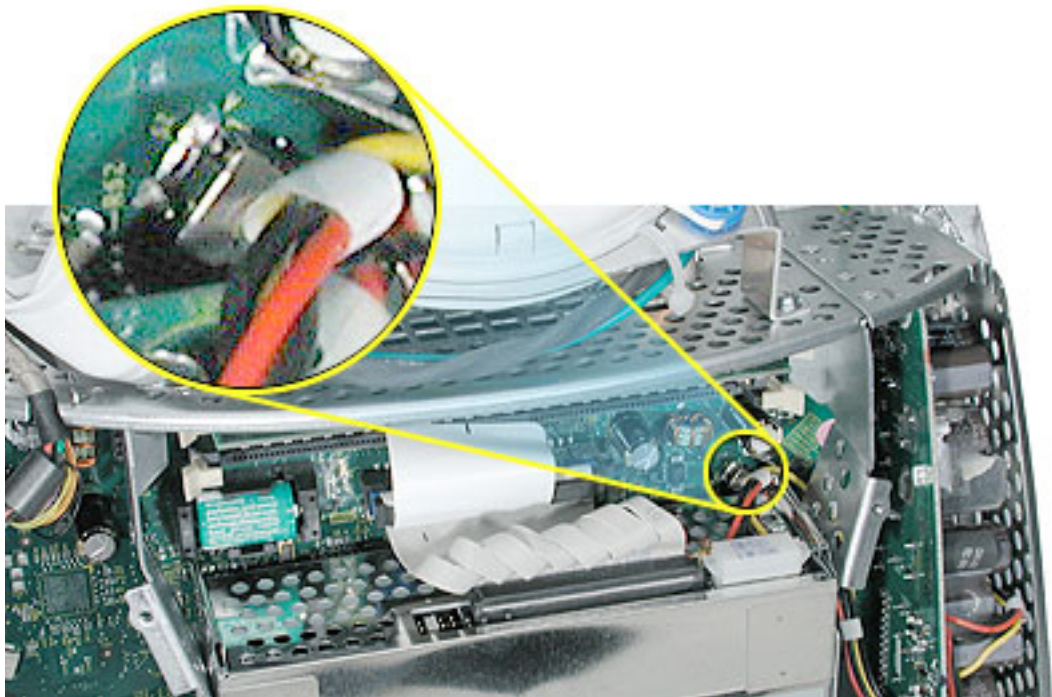
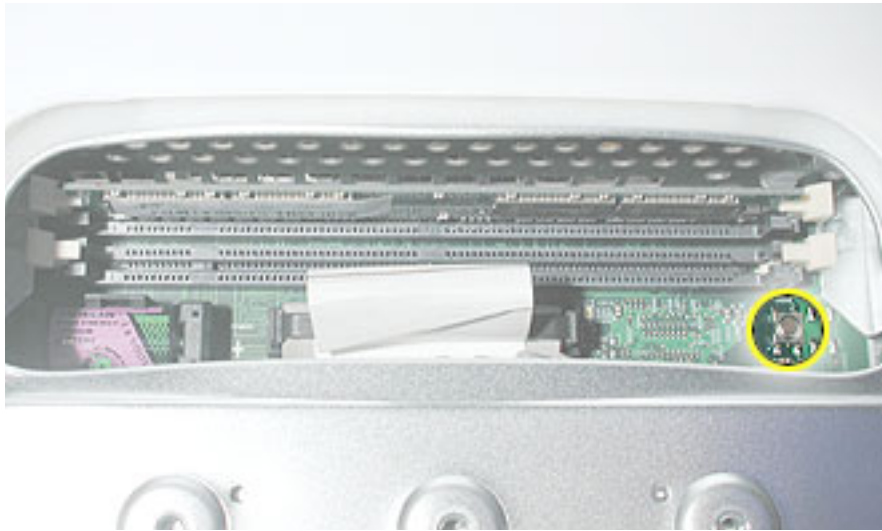
**Note: During these steps we may ask you to check for power. Whenever you check for power, plug in the computer and follow the steps.**

1. Plug the computer into a known good power outlet.
2. Check the power cord. Use a known good power cord.
3. Verify that the power cord is securely plugged into both the A/C outlet and back of the computer.
4. Disconnect the keyboard, mouse, and all other peripherals (such as speakers).
5. Position the computer face down, so it rests on the CRT.
6. Remove the user access door.
7. Touch a metal surface inside the computer to ground yourself.



8. Unplug the computer.
9. Verify the battery is good. A drained battery may be indicative of a crashed Power Management Unit. Does the battery measure at least +3.5v? If not, replace the battery and reset the PMU (see next step).

10. Reset PMU (circled below). **Note:** On newer models the PMU may be hidden by the optical power cable (see second graphic below). For information on resetting the PMU refer to “How to Reset the PMU on the Logic Board” mentioned earlier in this chapter. Start at step 7 in the PMU procedure. If resetting the PMU doesn’t solve the problem, go on to the next step.

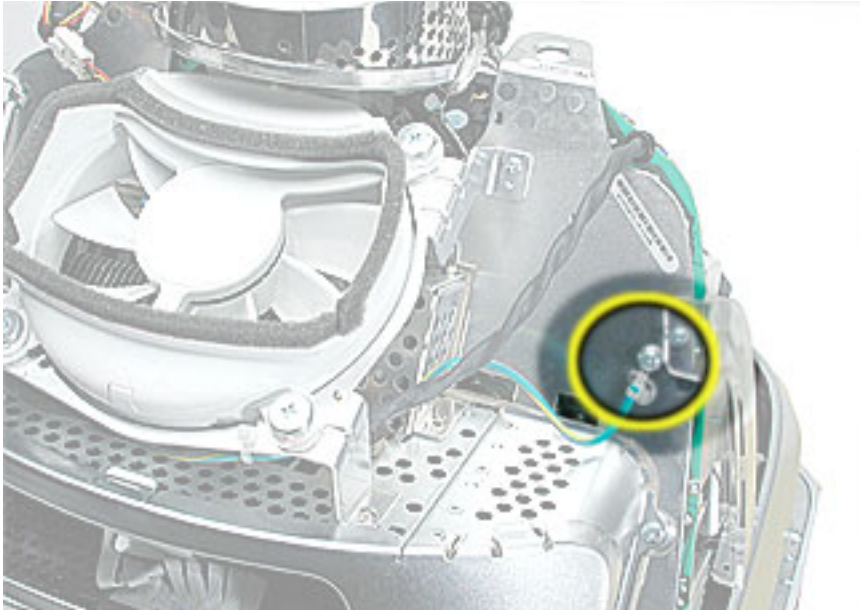




**Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious injury:

- Review the CRT safety information on Service Source online.
- Discharge the CRT.
- Never use a grounding wriststrap until after discharging the CRT and setting up an ongoing ground connection.

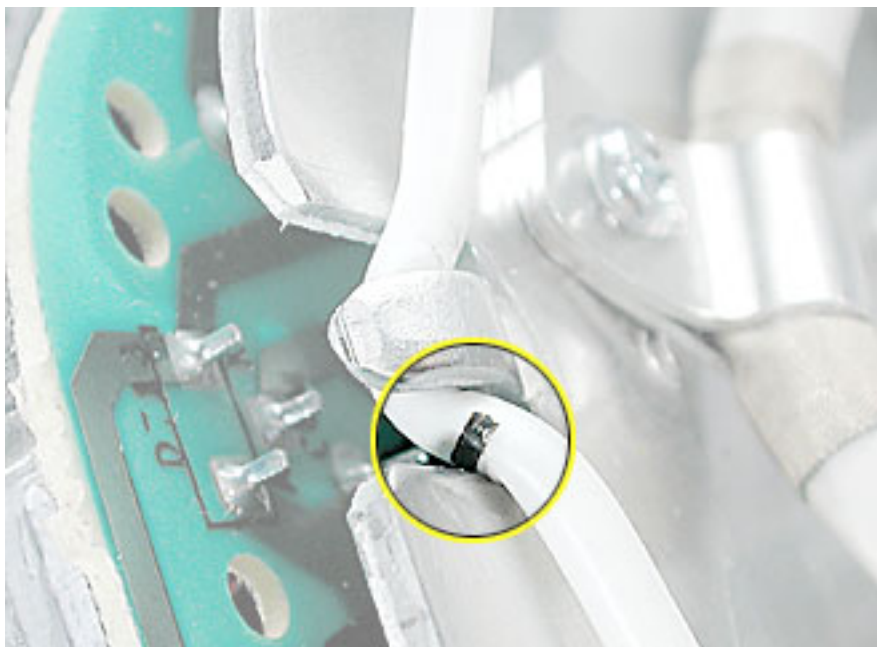
11. Remove the rear housing. **Warning:** Make sure the ground screw (see below) is attached to the frame when testing power. Go on to the next step.



12. Check the power button cable. It should be routed as shown below.



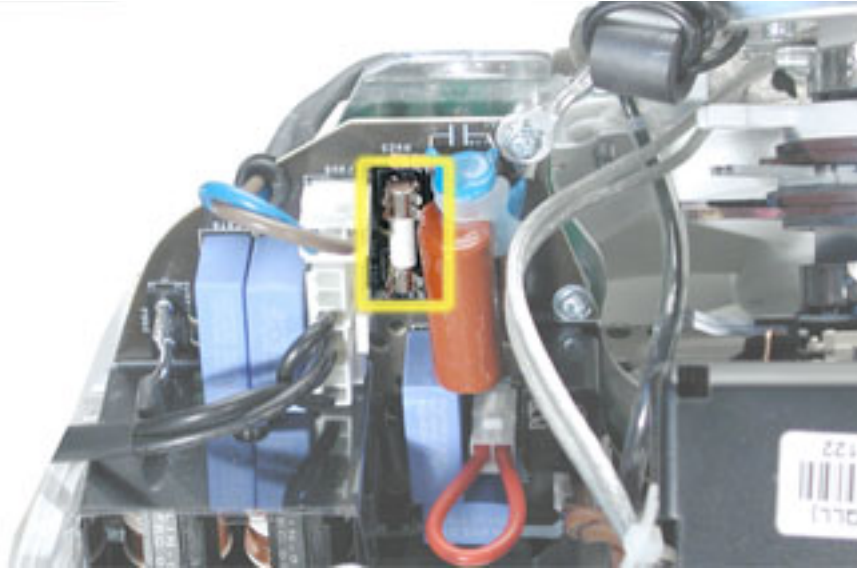
13. Make certain the power button cable is tucked under the metal tab and the black mark on the cable is lined up with the chassis as shown below.



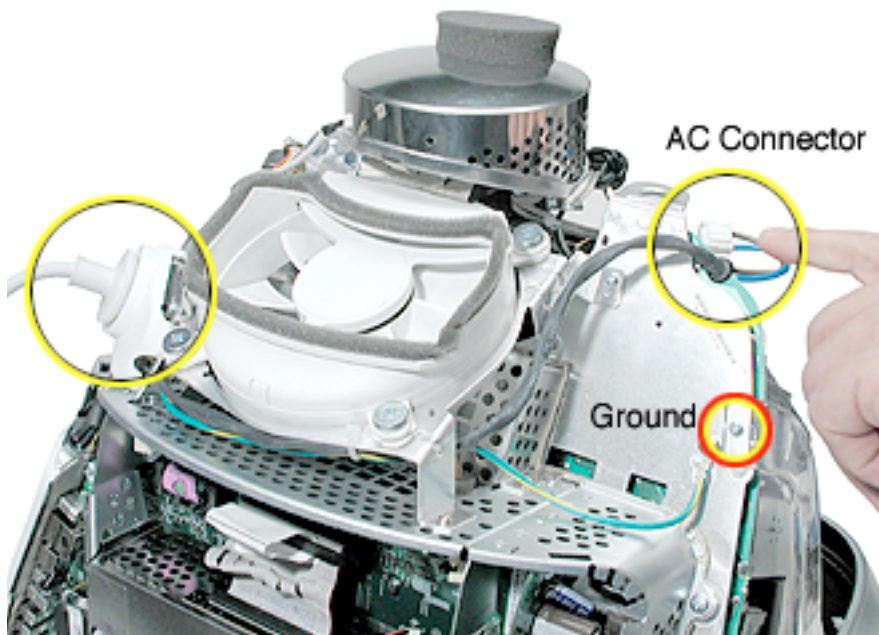
14. Check the power button. Attach a known good power button to the unit and plug in the computer. Do you have power now? If yes, replace the power button. If no, go to the next step.
15. Unplug the unit.
16. Check the AC connector. Make sure it's connected. Do you have power now? If yes, test the unit and return it to the customer. If no, go to the next step.



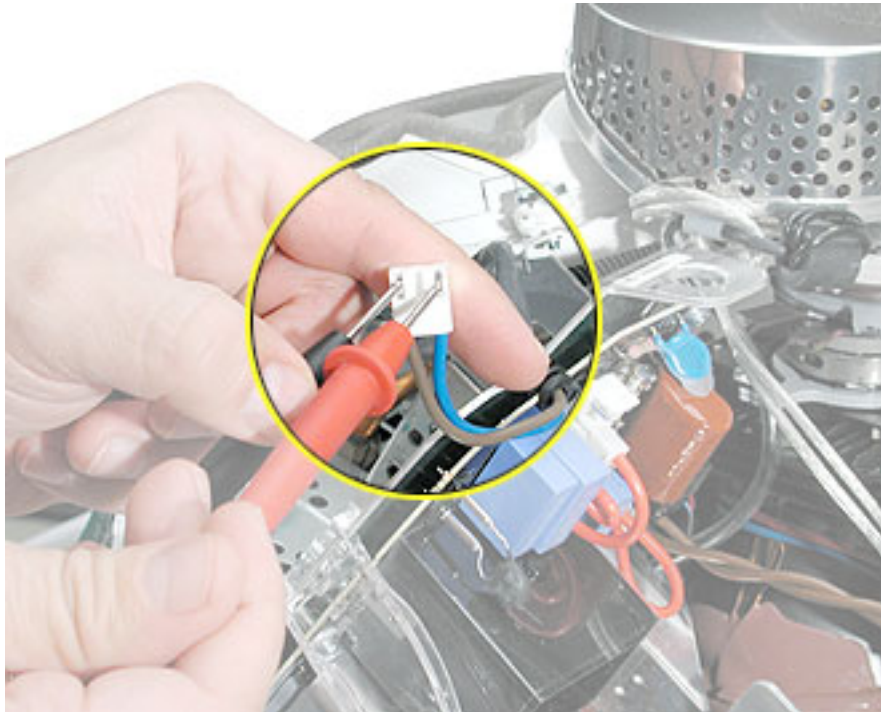
17. Unplug the computer. Check the fuse (see graphic below). You will need an Ohm meter to do a continuity test on the fuse. Using an ohm meter, touch the red and black probes to the two metal points at location F901 and check for continuity (reading of “0”). If the ohm meter registers “0”, the fuse is good. If the meter registers “infinite”, the display/analog assembly should be replaced.



18. Unplug the computer and disconnect the AC connector shown in the photo below.
19. Plug the computer back in. **Warning: Make sure that the ground screw (see below) is attached before proceeding to the next step.**

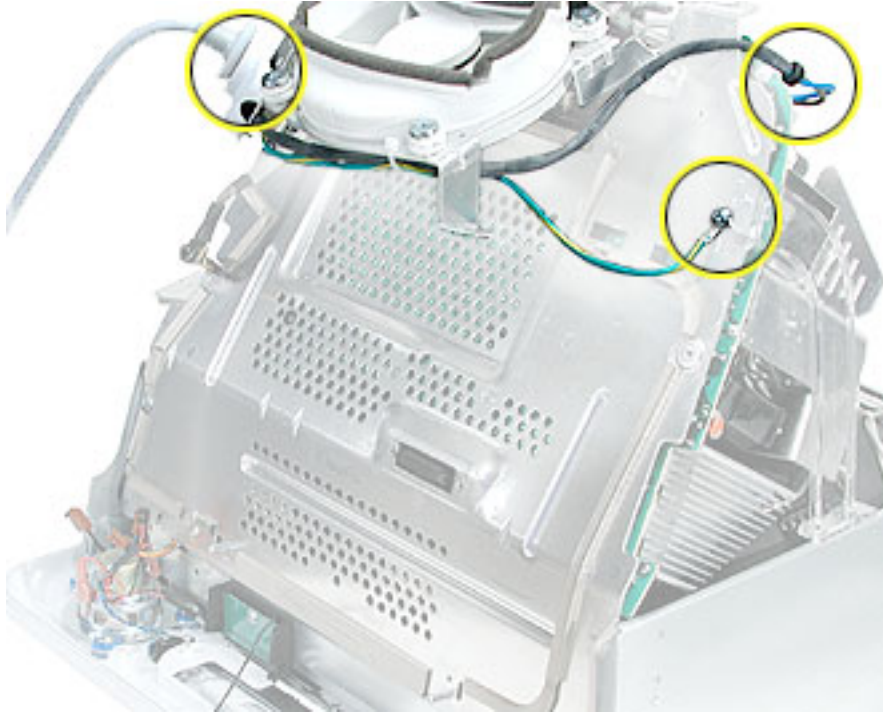


- 
20. Check for AC voltage. Touch the red probe to the contact for the blue wire, and the black probe to ground or the contact to the brown wire of the AC connector. Do you measure 120V (line voltage)? If yes, go on to the next step. If no, replace the fan assembly.

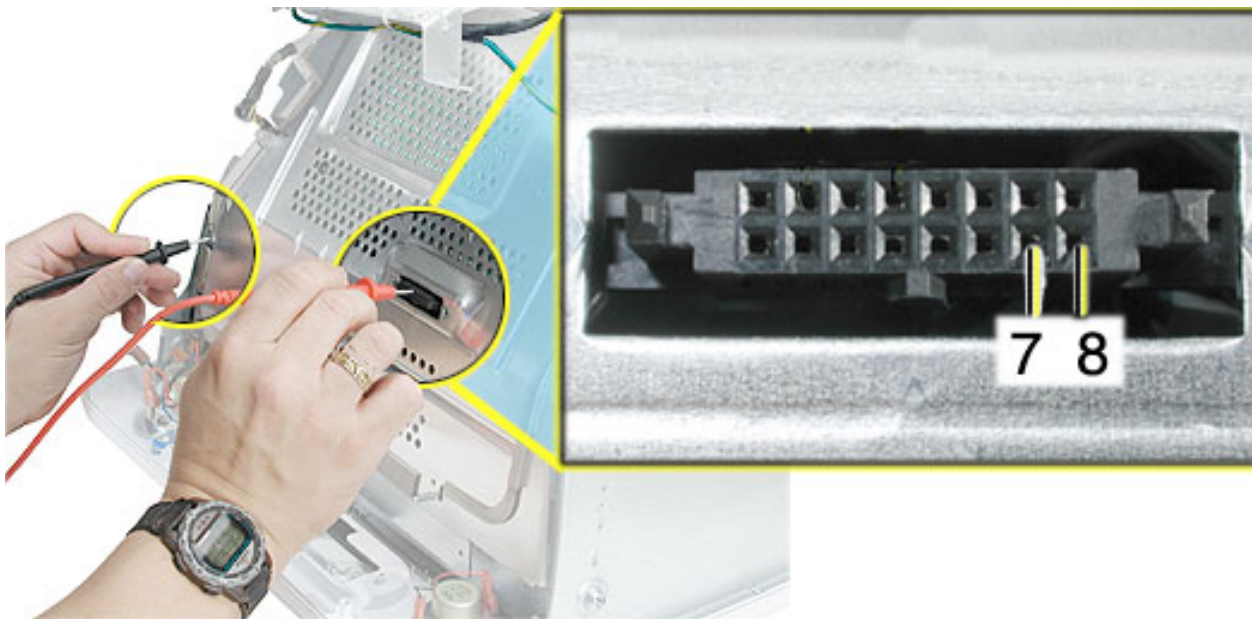


21. With the computer unplugged, remove the fan assembly.
22. Remove the digital assembly (see the Take Apart chapter for instructions).
23. Reinstall the fan assembly and go on to the next step.

24. Reconnect the AC cable connector, the ground wire, and the power cord. **Warning:** Make sure that the ground screw is attached to the frame before proceeding to the next step.



25. Locate the blind mate connector. **Note:** You may need a slim or pointed probe to measure voltages. With your black probe grounded, touch the red probe to pins 7 and 8, on the blind mate connector (bottom row of pins). Pins 7 and 8 should read 12.25v.



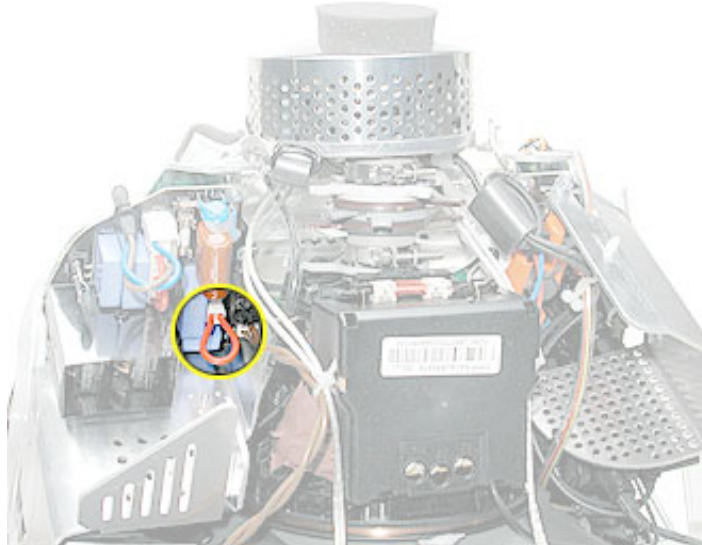
- 
26. Did you measure the correct voltages at the blind mate connector? If yes, replace the logic board. If no, replace the display/analog assembly.
  27. If the issue persists after the logic board replacement, replace the down converter board.

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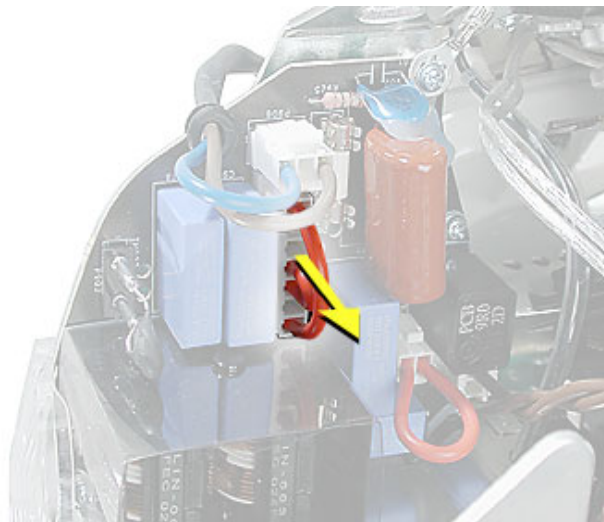
## Random Shut Down

**While using the computer it just shuts down for no reason.**

1. Check the jumper settings, make sure they are set correctly. Refer to the “Digital/Analog Voltage Setting and LHR Module Instructions” mentioned earlier in this chapter. **Note:** There is one jumper for the voltage and one jumper for the LHR coil. Both jumpers should be installed when the computer is operating in the 110V environment. If the jumpers are set correctly, go on to the next step.



**Voltage Jumper Location**



**LHR Coil Jumper Location**

2. Check the power button. Attach a known good power button to the unit and test. If you can't reproduce the random shut down symptom, replace the power button.

## No Video

### No video to the internal display, the fan is spinning, there is drive activity

1. Reset parameter RAM. Press Command-Option-P-R during startup.
2. The system software could be damaged. Start up from the system CD that came with the computer.
3. Remove the user access door.
4. Touch a metal surface inside the computer.



5. Disconnect the A/C power cord. Press the PMU reset (circled below) on the logic board. Refer to “How to Reset the PMU on the Logic Board” mentioned earlier in this chapter.



6. Check for external video. Connect an external monitor to the video out port. Did you get external video? If yes, replace the display/analog assembly. If no, go on to the next step.
7. Replace the logic board.



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## Mass Storage

### Flashing question mark appears on the screen

1. Boot from the system CD that came with the computer and see if the hard drive mounts on the desktop.
2. Boot from Apple Hardware Test (hold down the “C” key at startup). Run both quick and extended tests. Proceed based on any error codes given. See AppleCare Knowledge Base article 112125 - Service Diagnostics Matrix for Error Code information.
3. If no hard drive is found in Drive Setup, verify the hard drive cable connections.
4. Replace the hard drive cable.
5. Reinstall the software drivers for the hard drive.
6. Reinstall system software. **Note:** Backup the data first.
7. Reinitialize the hard drive.
8. Replace the hard drive.
9. Replace the logic board.

### Alternating flashing question mark and a flashing Mac OS face on a folder.

1. This symptom could indicate damaged system software or non-compatible system software. Boot from the system CD that came with the computer and see if the hard drive mounts on the desktop.
2. Boot from Apple Hardware Test (hold down the “C” key at startup). Run both quick and extended tests. Proceed based on any error codes given. See AppleCare Knowledge Base article 112125 - Service Diagnostics Matrix for Error Code information.
3. If no hard drive is found in Drive Setup, verify the hard drive cable connections.
4. Replace the hard drive cable.
5. Reinstall the software drivers for the hard drive.
6. Reinstall system software. **Note:** Backup the data first.
7. Reinitialize the hard drive.
8. Replace the hard drive.
9. Replace the logic board.

### Hard drive spins, but won't mount to the desktop

1. Disconnect any connected peripherals.
2. Boot from Apple Hardware Test (hold down the “C” key at startup). Run both quick and extended tests. Proceed based on any error codes given. See AppleCare Knowledge Base article 112125 - Service Diagnostics Matrix for Error Code information.
3. If no hard drive is found in Drive Setup, verify the hard drive cable connections.
4. Replace the hard drive cable.

- 
5. Replace the hard drive.
  6. Replace the logic board.

### **Hard drive does not spin.**

1. Disconnect any connected peripherals.
2. Boot from Apple Hardware Test (hold down the “C” key at startup). Run both quick and extended tests. Proceed based on any error codes given. See AppleCare Knowledge Base article 112125 - Service Diagnostics Matrix for Error Code information.
3. Launch Drive Setup and update the hard drive driver.
4. If no hard drive is found in Drive Setup, verify the hard drive cable connections.
5. Replace the hard drive cable.
6. Replace the hard drive.
7. Replace the down converter.
8. Replace the logic board.

### **System hangs during normal startup process**

1. Boot from the system CD that came with the computer and see if the hard drive mounts on the desktop. Boot from Apple Hardware Test (hold down the “C” key at startup). Run both quick and extended tests. Proceed based on any error codes given. See AppleCare Knowledge Base article 112125 - Service Diagnostics Matrix for Error Code information.
2. Using Drive Setup, reinitialize the hard drive.
3. Check all cable connections to and from the hard drive.
4. Replace the hard drive cable.
5. Replace the hard drive.
6. Replace the logic board.

### **CD or DVD tray won't open**

1. Check for obstructions on the optical drive door.
2. Replace the optical drive cable.
3. Replace the optical drive.
4. Replace the down converter.
5. Replace the logic board.

---

## **Optical drive tray won't accept a CD or DVD**

1. Check for obstructions on the optical drive door.
2. Replace the optical drive cable.
3. Replace the optical drive.
4. Replace the down converter.
5. Replace the logic board.

## **CD or DVD disc constantly ejects at startup**

1. Try cleaning the disc. If it is dirty or scratched, it may not mount.
2. Try a known good disc.
3. Disconnect all peripheral devices, especially the mouse in cases where the disc is constantly ejecting. This symptom may be an indication of a failed mouse giving a signal that the mouse is stuck in the down position. Try a known good mouse.
4. Boot from Apple Hardware Test (hold down the "C" key at startup) or boot from the system install CD (use Startup Manager, hold down the Option key at startup).
5. Perform a clean install with the CD that came with the computer.
6. Replace the optical drive cable.
7. Replace the optical drive.
8. Replace the down converter.
9. Replace the logic board.

## **Optical drive doesn't spin**

1. Replace the optical drive cable.
2. Replace the optical drive.
3. Replace the down converter.
4. Replace the logic board.

---

## **CD or DVD won't mount to the desktop**

1. Try cleaning the disc. If it is dirty or scratched, it may not mount.
2. Boot from Apple Hardware Test (hold down the "C" key at startup). Run both quick and extended tests. Proceed based on any error codes given. See AppleCare Knowledge Base article 112125 - Service Diagnostics Matrix for Error Code information.
3. Try a known good disc.
4. Refer to the "Flashing Question Mark" symptoms mentioned in this section.
5. Perform a clean install with the CD that came with the computer.
6. Replace the optical drive cable.
7. Replace the optical drive.
8. Replace the logic board.

---

## Sound Out

### No sound from either internal or external speakers

1. Verify volume setting is correct in system preferences.
2. Verify the computer is not set to “mute”. Press the mute key on the Apple keyboard.
3. Reset parameter RAM. Press Command-Option-P-R during startup.
4. Boot from Apple Hardware Test (hold down the “C” key at startup). Run both quick and extended tests. Proceed based on any error codes given. See AppleCare Knowledge Base article 112125 - Service Diagnostics Matrix for Error Code information.
5. Test the computer with known-good headphones. Do you get sound? If yes, go on to step 6. If no, replace the main logic board.
6. Verify that the speaker cable is connected.
7. Replace the speaker assembly.
8. Replace the logic board.

### No sound from the headphones

1. Verify the problem with known-good headphones.
2. Verify the computer is not set to “mute”. Press the mute key on the Apple keyboard.
3. Verify volume setting is correct in Mac OS X system preferences. If the preferences are set correctly, replace the logic board.
4. In Mac OS 9, check the Sound Control panel, Speakers tab. When headphones are connected, a headphone icon will be present. If the headphone jack is malfunctioning it may indicate that headphones are connected when none are connected. In this case, replace the logic board.

---

## Date and Time

### The computer won't keep the date and time

1. Turn your computer off by choosing Shut Down from the Apple menu. Unplug all cables, except the power cord, from your computer.

**Warning:** If your internal modem (included on some models) is connected to a telephone line, disconnect the telephone line from the internal modem port before you open the access panel. This prevents electric shock.

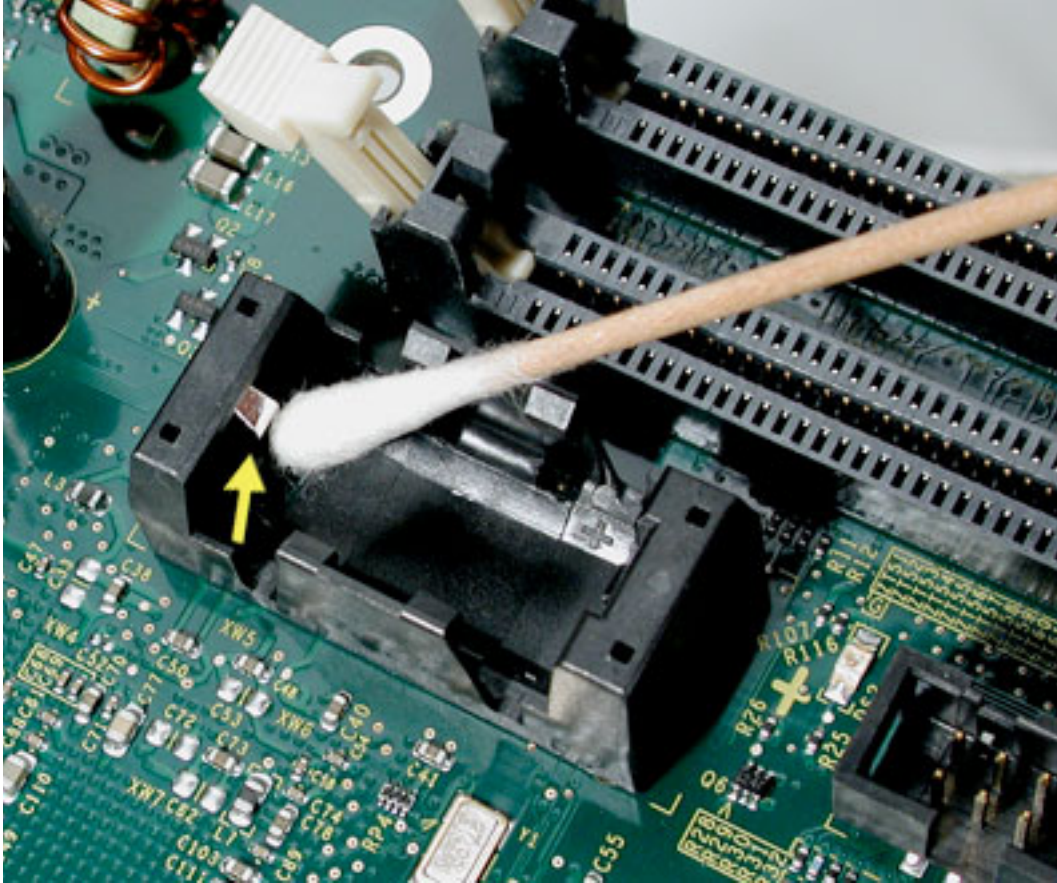
2. Place a soft, clean towel or cloth on the desk or surface. Slowly lift up and turn the computer so the screen is facing down on the cloth.
3. Use a Phillips screwdriver to remove the screw on the memory access panel. Then gently remove the access panel.
4. Touch metal inside the computer. This helps protect the computer from damage caused by electrostatic discharge. **Note:** Always do this before you touch any parts, or install any components, inside the computer. To avoid generating static electricity, do not walk around the room until you have finished installing the memory and closed the computer.



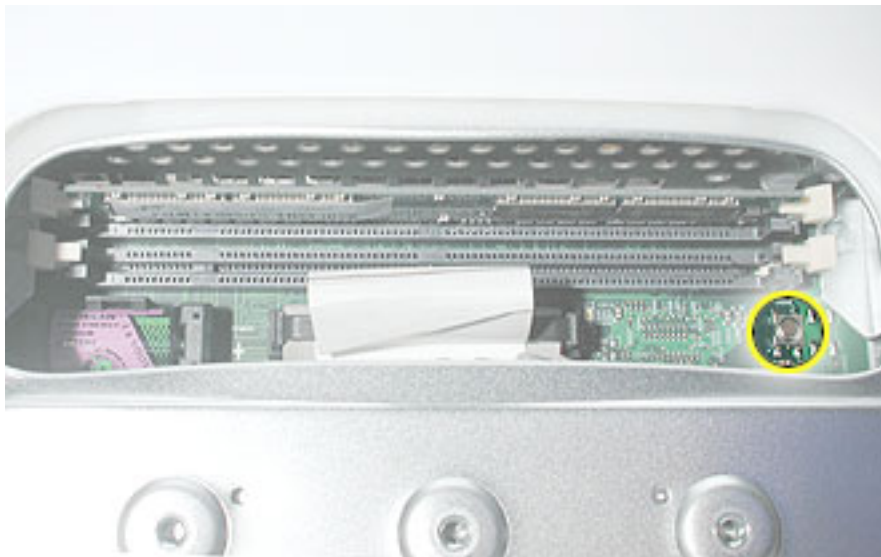
5. Disconnect the power cord from the computer.



- Using the cotton swab or Q-tip, wipe off the terminals of the battery socket.



- Place the battery back into the battery holder socket. Make sure to align the plus sign (+) on the battery with the one inside the computer.
- Press the reset button. Locate the PMU reset button inside the computer. Push the button for one second using a pen or pencil.





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11. Replace the user access panel.
  12. Reposition the computer and connect the cables.
  13. Gently turn the computer right side up. Then reconnect the cables you disconnected from the computer.
  14. Turn the computer on. Press the power button on the side of your computer to turn it on. **Warning:** Never turn on your computer unless all of its internal and external parts are in place. Operating the computer when it is open or missing parts can be dangerous and could damage your computer.

---

## Sound In

### No sound is recorded

1. Check setup of the system preferences for the microphone.
2. Check that the microphone is picking up sound by testing the audio in iMovie. Click on the Audio button. Record something. The audio bar on the screen should indicate if the microphone is working.
3. Boot from Apple Hardware Test (hold down the “C” key at startup). Run both quick and extended tests. Proceed based on any error codes given. See AppleCare Knowledge Base article 112125 - Service Diagnostics Matrix for Error Code information.
4. Check the microphone cable connection.
5. Replace the internal microphone.
6. Replace the main logic board.

---

## **Error Beep(s)**

### **Computer beeps at startup.**

1. RAM expansion DIMMs for the eMac must be PC133 compliant and use SDRAM devices. If the user installs a DIMM that uses EDO or SGRAM devices, the computer will beep several times when the user attempts to restart the computer.
2. Refer to “Power-On Self Test” mentioned earlier in this chapter.

### **Long tone at startup**

A long tone at startup can indicate that the power button is being held in, or is malfunctioning. This tone is normal when purposely holding the button in during startup.

1. Attach a known good power button to the unit and test. If the tone no longer sounds at startup, replace the power button.

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## Modem

### No modem dial tone

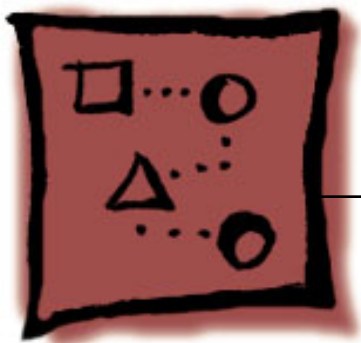
1. Verify known-good analog (not digital) telephone line.
2. Verify known-good RJ-11 telephone cable.
3. Verify RJ-11 cable is not plugged into Ethernet port.
4. Inspect RJ-11 connector and modem port for pin damage.
5. Verify RJ-11 cable is firmly installed in the modem port.
6. Boot from Apple Hardware Test (hold down the “C” key at startup). Under “Test Result”, check to see if the Modem reports 'Device found'. If it reports “No Device Found”, proceed as the Error Code list recommends for Apple Hardware Test. See AppleCare Knowledge Base article 112125 - Service Diagnostics Matrix for Error Code information.
7. Open the bottom housing. Verify the internal RJ-11 modem cable is connected to the modem.
8. Replace the RJ-11 cable/ jack.
9. Replace the modem.
10. Replace the logic board.

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## USB Printing Problems

### **eMac cannot print to attached known-good printer.**

1. Verify that the printer is Macintosh compatible.
2. Verify that you have setup the printer correctly in OS X.
3. Refer to Knowledge Base article 106714, Mac OS X: How to Print
4. Reinstall the printer driver.
5. Switch the printer to another USB port.
6. Check the USB port with a known good USB device like the keyboard or mouse.
7. Replace the printer interface cable.
8. System software is corrupted. Reinstall the system software.
9. Replace the logic board.



## Upgrades

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eMac ATI Graphics/USB 2.0/2005



# Memory

## Tools Required

- #2 Phillips screwdriver

## Opening the User Access Door

1. Save all open documents and quit all open applications.
2. Turn the computer off by choosing Shut Down from the Special menu (if using Mac OS 9), or choose Shut Down from the Apple menu (if using OS X).
3. Unplug all cables, except the power cord, from the computer. (Figure 1)  
**Warning:** If the internal modem is connected to a telephone line, disconnect the telephone line from the internal modem port before you open the user access door. This prevents electric shock.

**Figure 1**



4. Place a soft towel or cloth on the desk or surface. Position the computer so the screen is facing down on the cloth.
5. Use a Phillips screwdriver to remove the screw on the user access door. Set the user access door aside. (Figure 2)

**Figure 2**





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6. **Important:** To avoid electrostatic discharge, always ground yourself by touching metal before you touch any parts or install components inside the computer. To avoid generating static electricity, do not walk around the room until you have finished installing the memory and closed the computer.

Touch the metal surface on the back of the computer. (Figure 3) This helps protect the computer from damage caused by electrostatic discharge.

**Figure 3**



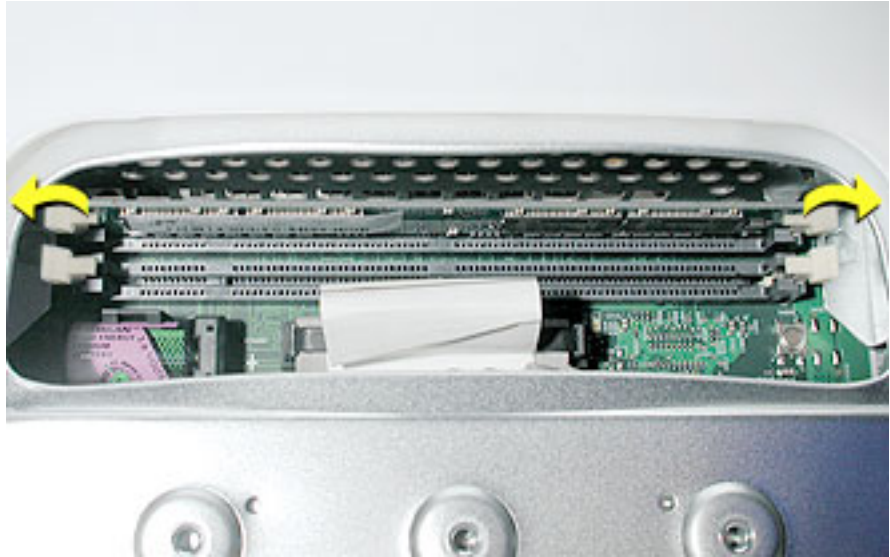
7. Unplug the power cord.

---

## Removing the Installed Memory

1. Push down the ejectors on the slot of the memory module you want to replace. (Figure 4)

**Figure 4**



2. Holding the memory by both top corners, pull it straight out of the computer.

---

## Installing Memory

**Note:** The RAM expansion modules used in the eMac (USB 2.0) computers are 184-pin SDRAM DIMMs (dual inline memory modules) that are 2.5 V, unbuffered, 8-byte, non-parity, and PC2700 compliant. The speed of the SDRAM devices must be rated at 167 MHz (7 ns) or faster. Refer to Kbase article 86718 for more information.

**Important:** The memory expansion cards (DIMMs) must use SDRAM devices as specified above. DIMMs for previous models of eMac or DIMMs that use EDO or SGRAM devices will not work. If they are installed, the computer will beep, and the power light will flash several times when you turn on the computer. This indicates that the computer cannot find any useable RAM.

## Procedure

1. Remove the replacement memory from its static-proof bag, taking care not to touch the connectors or chips.
2. Push down the ejectors on the slot of the memory module you want to install or replace memory. (Figure 5)

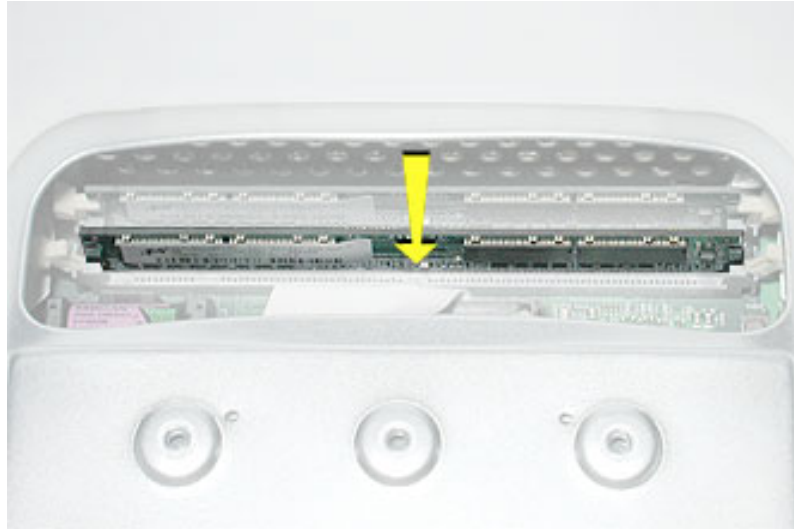
**Figure 5**



3. Align the replacement memory module in the memory slot, apply pressure evenly to both top corners, and push the memory into the slot until the ejectors lock it into place. (Figure 6)

**Warning:** The memory is designed to fit into the slot only one way. Be sure to align the notches in the memory module with the small ribs inside the slot.

**Figure 6**



---

## Closing the User Access Door

1. Replace the screw on the user access panel. (Figure 7)

**Figure 7**



2. Carefully turn the computer right side up.
3. Reconnect the power cable. **Important:** When connecting the power cord, first plug the cord into your eMac, then plug the other end into an electrical outlet or power strip.
4. Press the power button to restart your computer.

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



# Optional Stand Installation

## Tools

- The tool is included with the stand.

## To install the eMac (ATI Graphics) stand:

1. Save open documents and quit all open applications.
2. Turn the computer off by choosing Shut Down from the Special menu (if using Mac OS 9), or choose Shut Down from the Apple menu if using OS X.
3. Unplug all cables.
4. Place a soft towel or cloth on the desk or surface.
5. Turn the computer over to access the screw holes on the bottom.



6. The stand attaches to the locations circled below.



7. Remove the screw circled below.



8. Position the stand in place over the screw holes.



9. **Note:** The stand slides back and forth. To attach the first screw, slide the stand toward the back of the computer.





10. Push the stand forward. Tighten the second screw.



11. Tighten the third screw.



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12. Carefully turn the computer over.





# AirPort Extreme Card

## Tools Required

- #2 Phillips screwdriver.

## Opening the AirPort Access Door

1. Save all open documents, quit all open applications, and shut down the computer.
2. Press the optical drive door in on one side and pull the door open on the other side to access the AirPort access panel. (Figure 1)

**Figure 1**



3. Loosen the captive screws on the AirPort access panel using a Phillips screwdriver. (Figure 2)

**Figure 2**



4. Remove the access panel.



## Removing the Installed Card

1. Untuck the clear plastic tab on the AirPort Extreme card. (Figure 3)

**Figure 3**



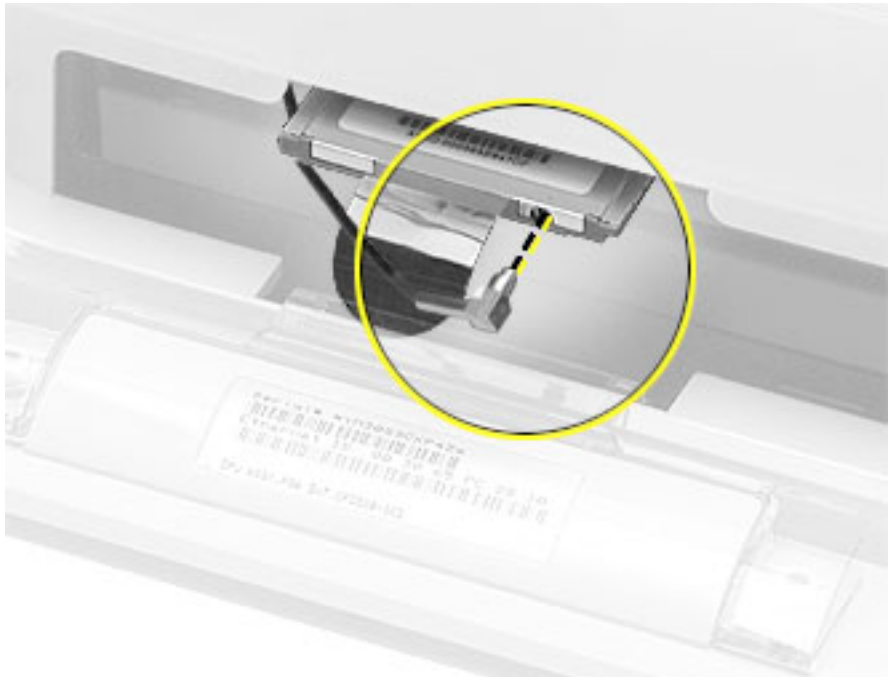
2. Pull the AirPort Extreme card out of the slot a little bit to access the antenna cable. (Figure 4)

**Figure 4**



3. Disconnect the AirPort Extreme cable from the port on the card, then completely remove the card from the slot. (Figure 5)

**Figure 5**



## Installing the Replacement Card

1. The original AirPort Card can not be used in this computer. You must use the AirPort Extreme card. (Figure 6)

**Note:** Previous models of eMac used the original AirPort card. For compatibility information, see AppleCare Knowledge Base article 107440: AirPort Extreme Card: Compatible Macintosh Computers.

**Figure 6**



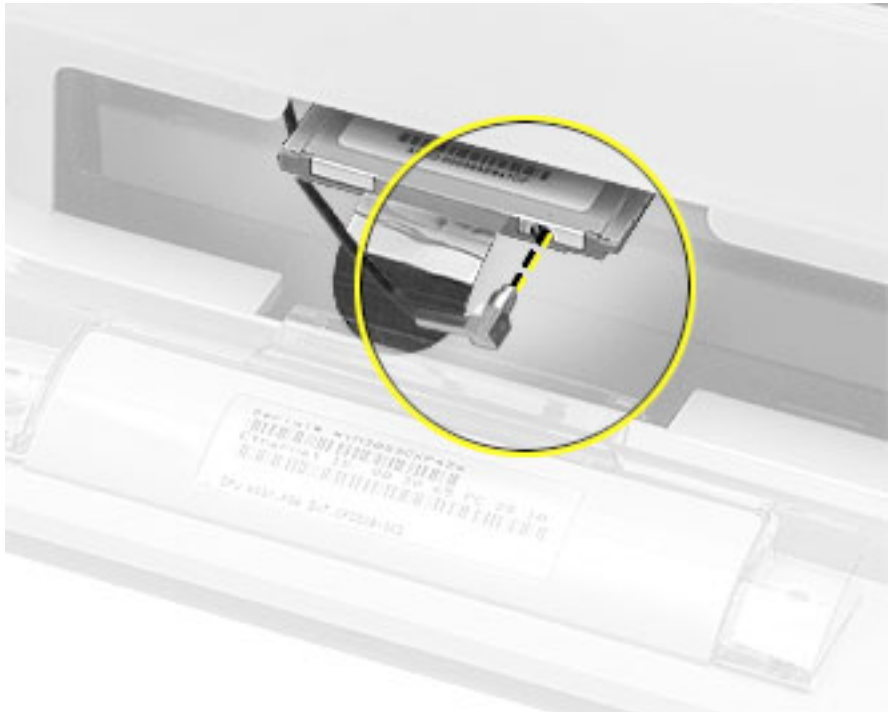
2. Insert the AirPort Extreme Card, barcode facing up into the AirPort Extreme card slot. (Figure 7)

**Figure 7**

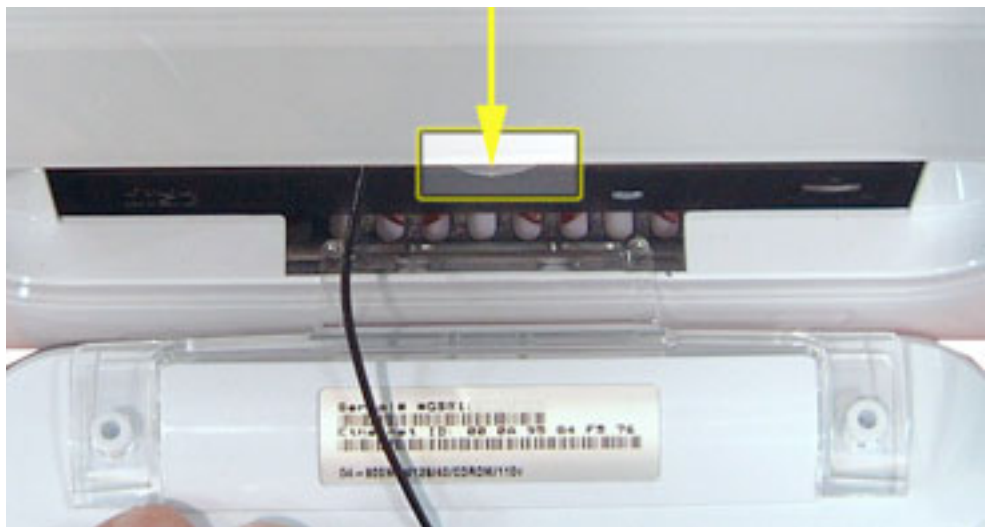


3. Attach the antenna cable firmly to the port on the end of the card. (Figure 8)

**Figure 8**



4. Push the AirPort Extreme card firmly into the slot until you feel the card “snap” into the logic board connector. **Note:** One quick check to identify if the card is properly installed is to check the plastic tab on the card. The edge of the tab should be almost flush (Figure 9) with the face of the bezel. If the card isn't fully snapped in, more of the tab will be easily visible.



**Figure 9**



5. Tuck the clear plastic pull-tab on the AirPort Extreme Card into the computer. The tab should tuck over the antenna cable (Figure 10).

**Figure 10**



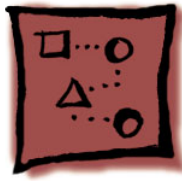
### **Closing the AirPort Access Door**

1. Replace the AirPort access panel and tighten the captive screws. (Figure 11)

**Figure 11**



2. Reconnect the power cable and restart your computer.



# Optical Drive Installation

The eMac (USB 2.0) is available in a low-cost, no-optical drive configuration. When connected to a network, software can be installed from another computer on the network.

If you choose to install an optical drive at a later date, the following parts are required and need to be ordered through Apple Service. Refer to the photographs in the Take Apart chapter or to the Exploded View diagrams for assistance.

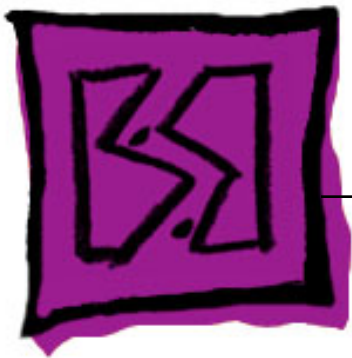
The following parts are required to update a no-optical model to an optical model.

- 661-3282, Combo optical drive
- 922-5251, Screws, optical-to-chassis
- 922-5891, EMI optical cap
- 922-5870, Optical data cable
- 922-5123, Inner AirPort Door

The following parts need to be removed from the no-optical model before installing the optical drive:

- 922-6406, Inner AirPort Door, Blank
- 922-6408, Optical Plate





## Views

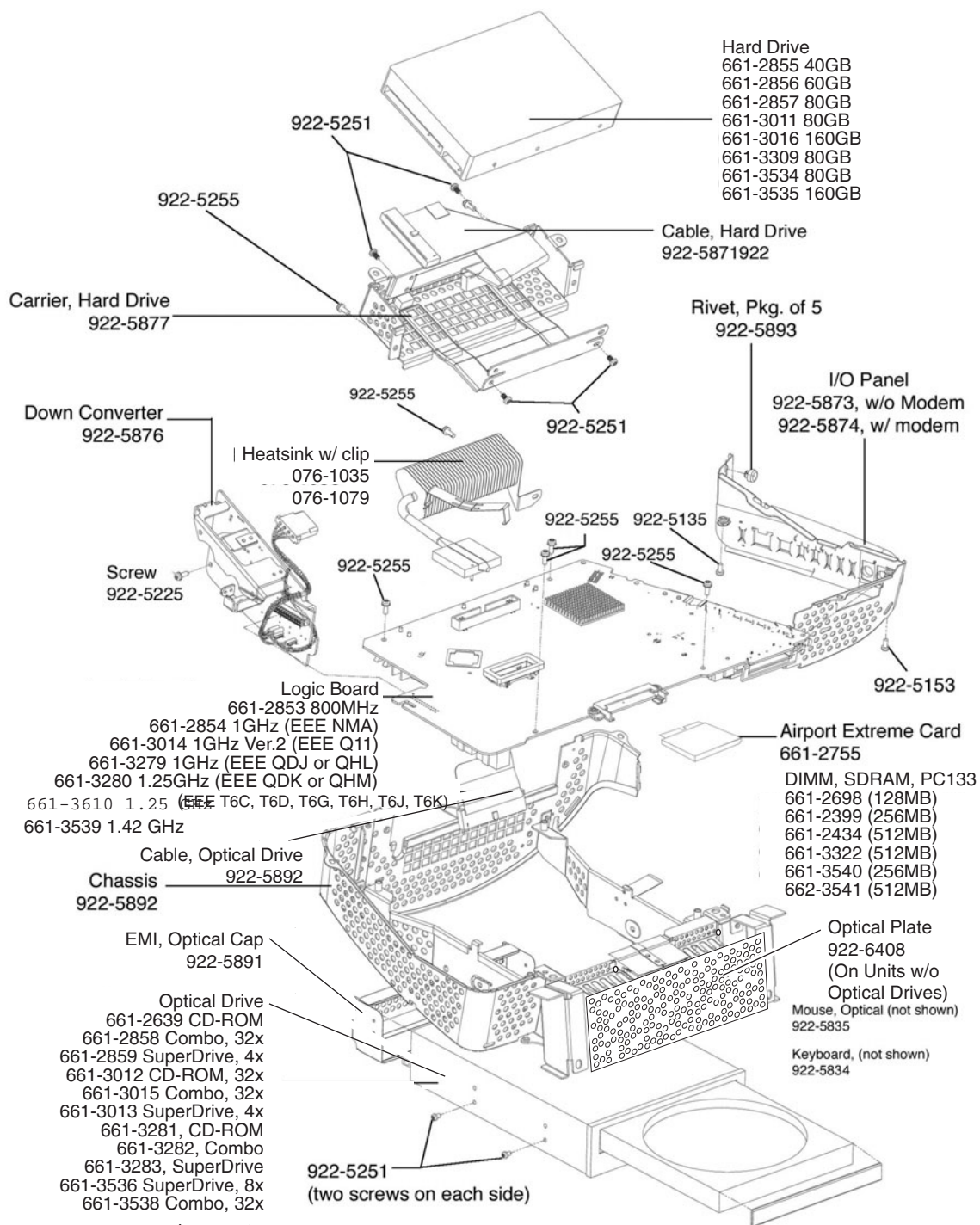
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eMac ATI Graphics/USB 2.0/  
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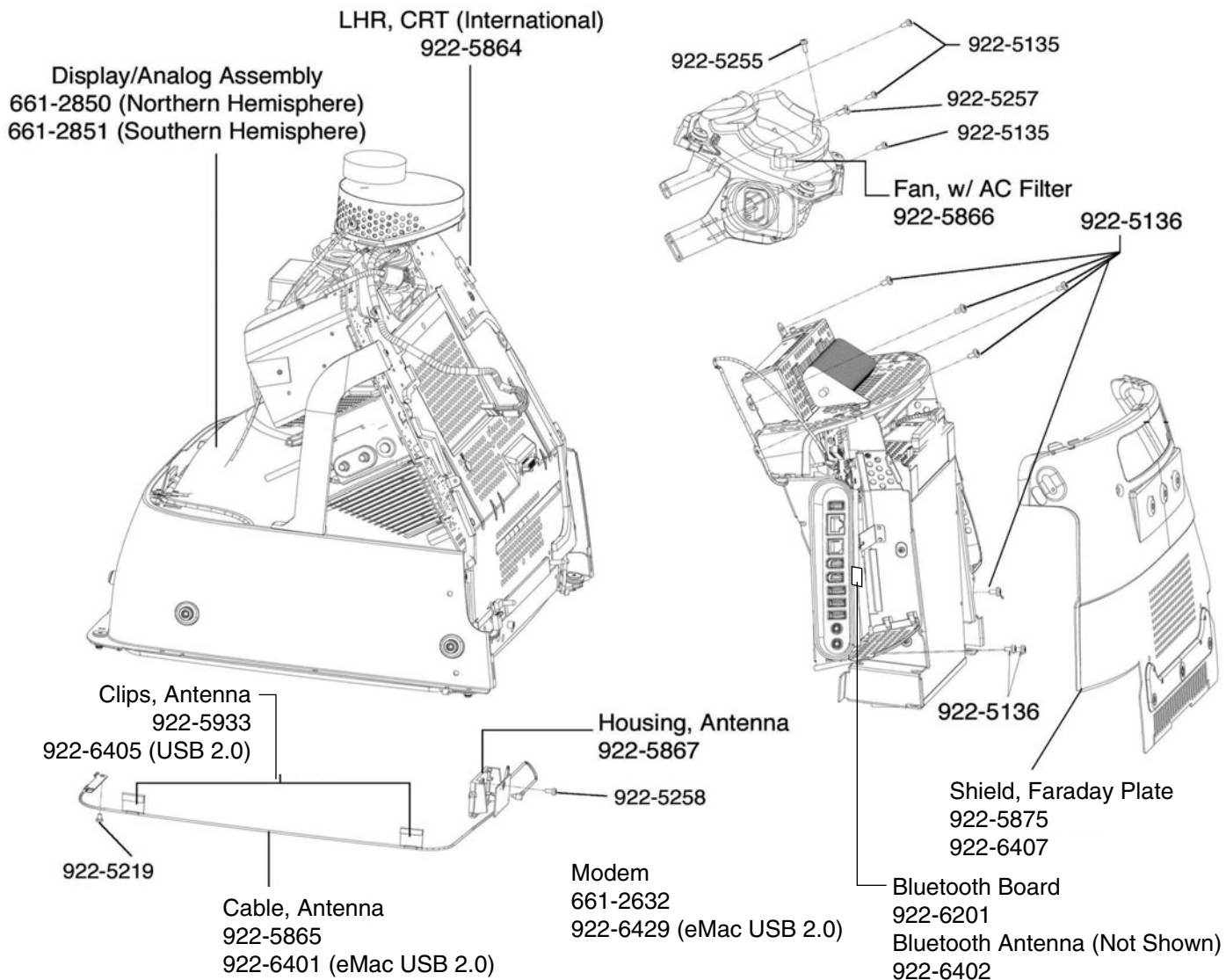


# Exploded Views

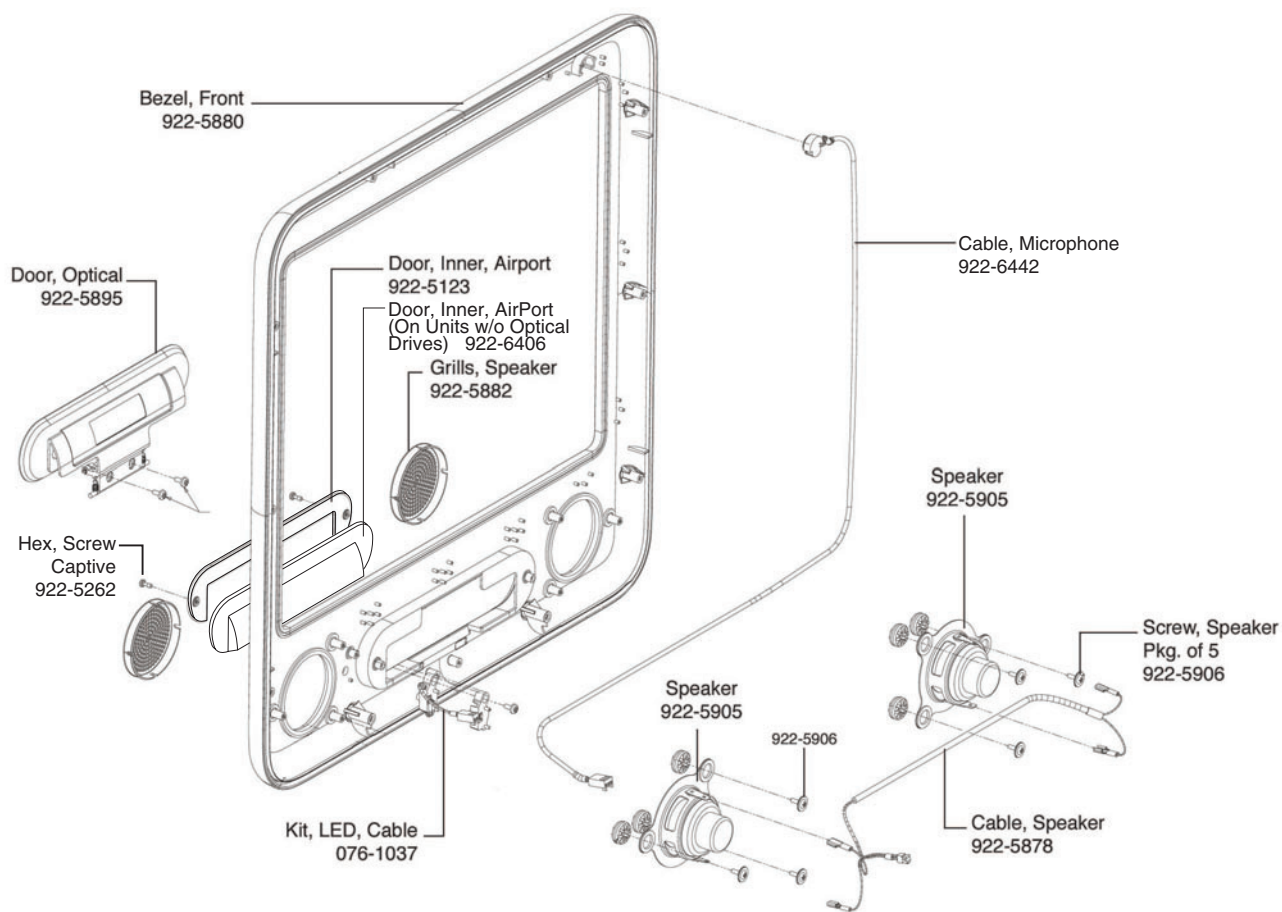
# Exploded View 1



## Exploded View 2



# Exploded View 3



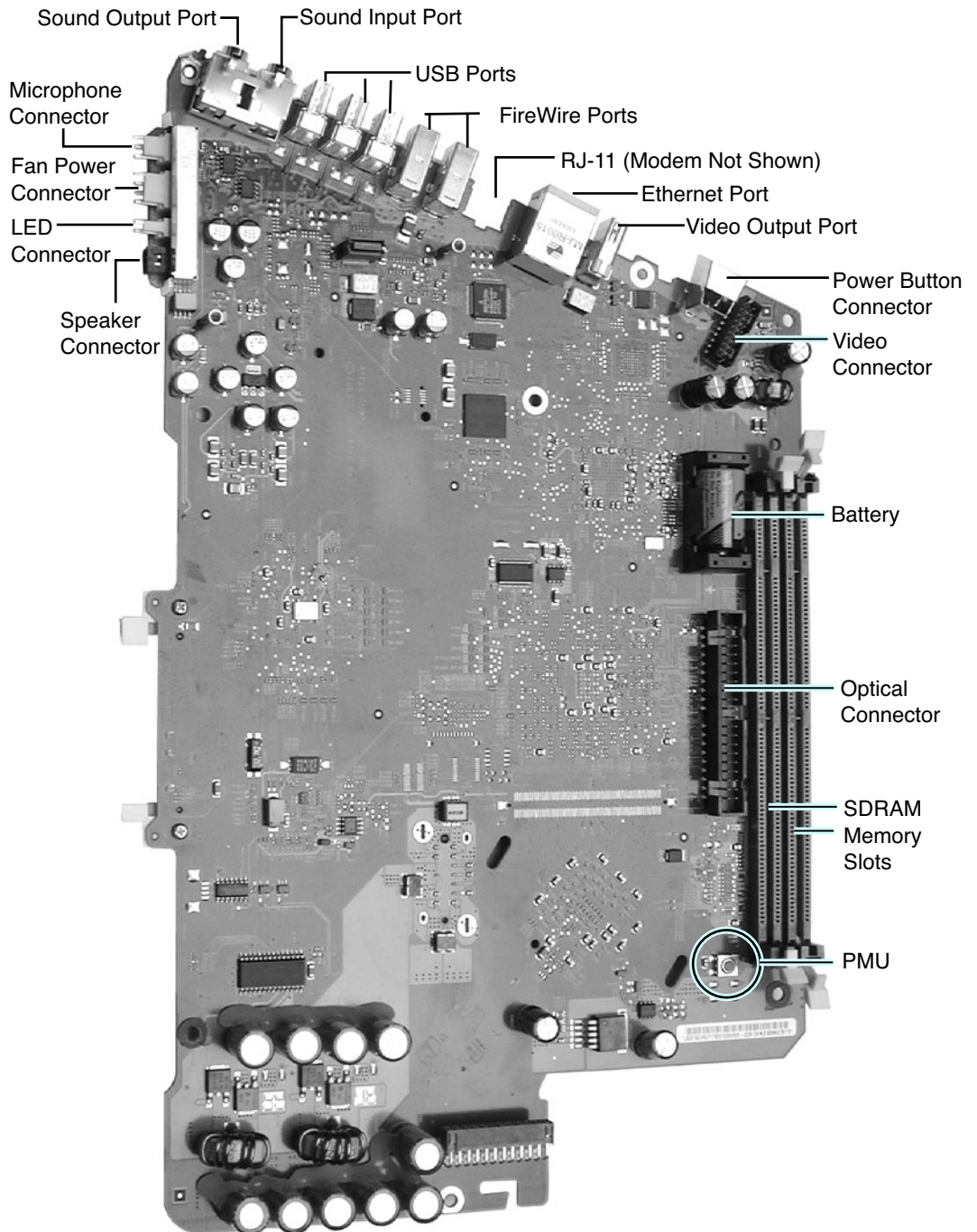






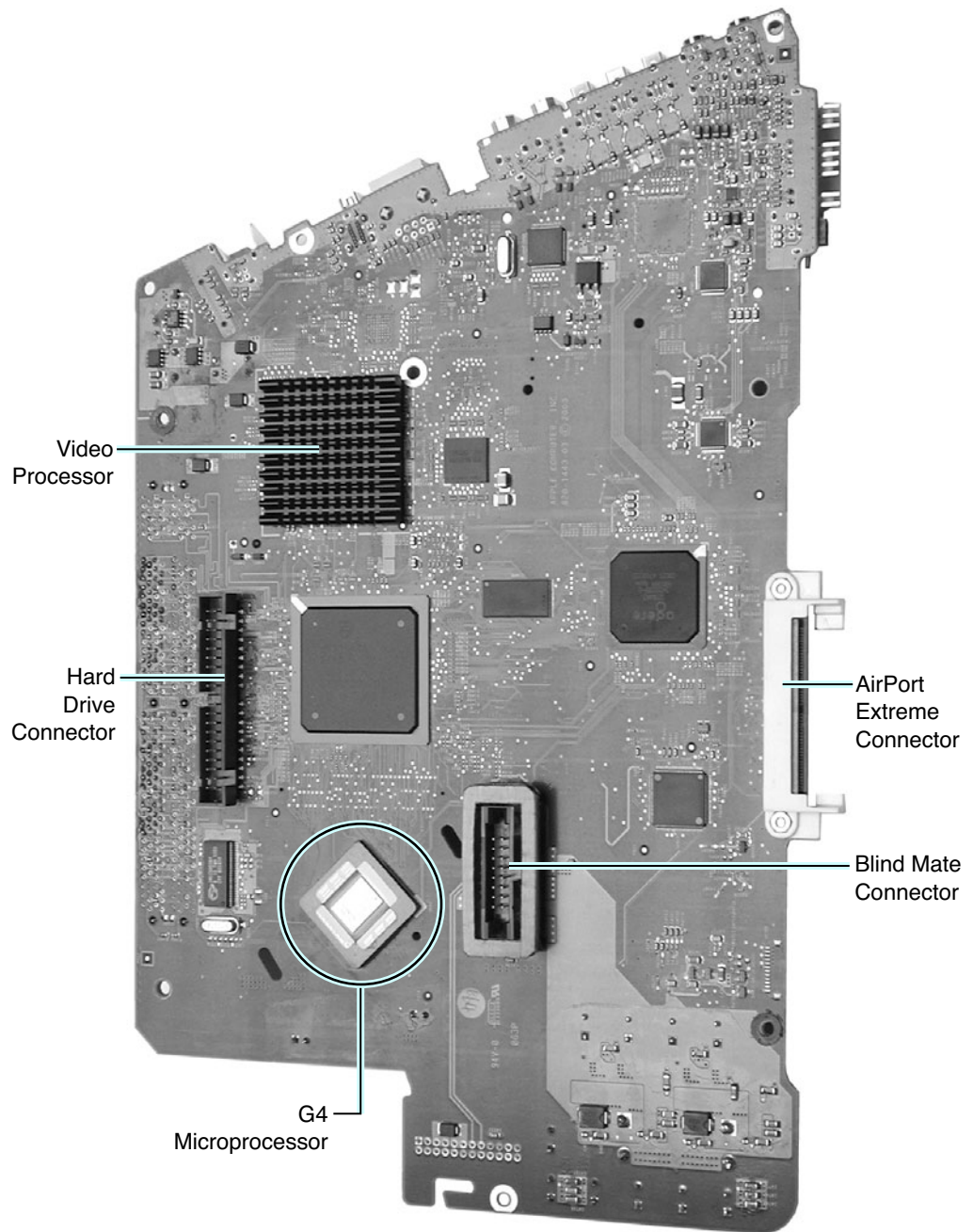
# Logic Boards

## Logic Board, Front, eMac (ATI Graphics)

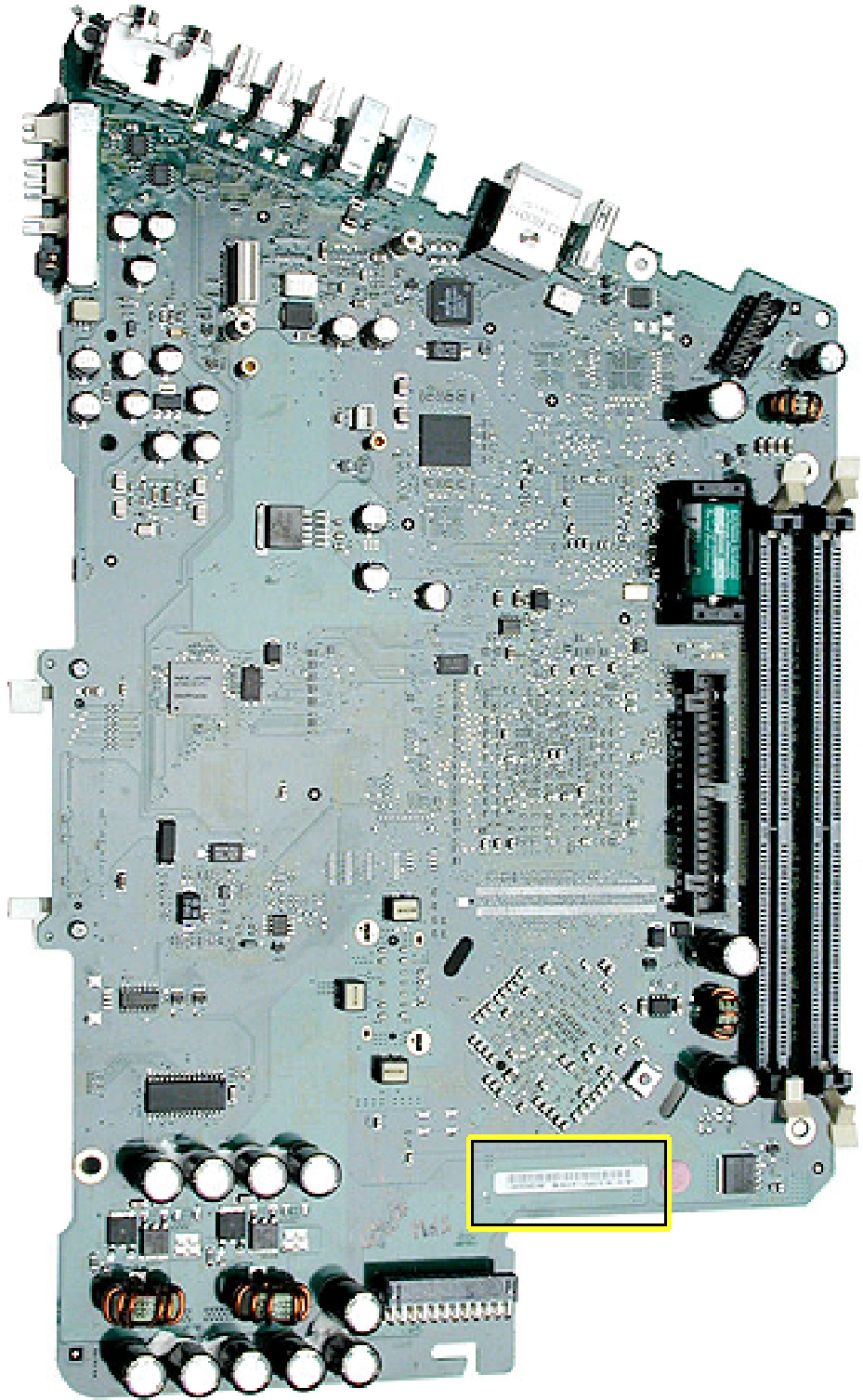


Identify the eMac (ATI Graphics) boards by the EEE codes located on the barcode label. The 800 MHz board has a EEE code of PLB, and the 1GHZ boards have a EEE code of NMA or Q11.

## Logic Board, Back, eMac (ATI Graphics)



## Logic Board, Front, eMac (USB 2.0)



Identify the USB 2.0 boards by the EEE codes located on the barcode label. The 1GHz board has a EEE code of QDJ or QHL; the 1.25 GHz board EEE code is QDK or QHM.

## Logic Board, Back, eMac (USB 2.0)

