



## Mac mini

Updated 6 December 2005



## What's New (July 2005)

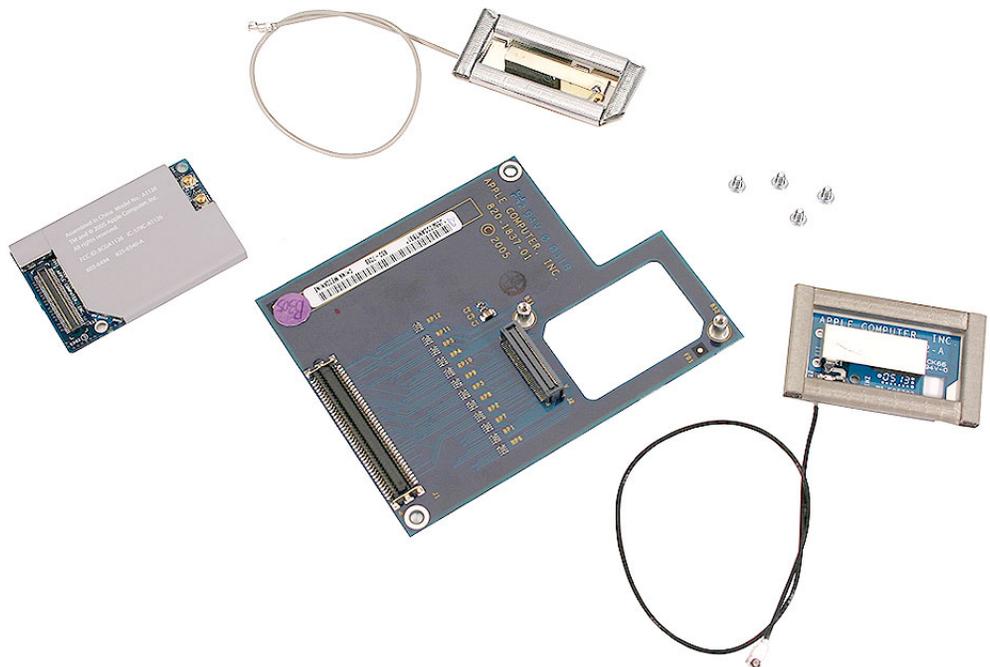
- 512 MB DDR SDRAM standard on all units
- On the better and best configurations, the wireless AirPort Extreme card and Bluetooth board are now built-in

## What's New (September 2005)

- 1.33GHz or 1.5GHz G4 processor
- Faster hard drive
- 8x double-layer SuperDrive
- AirPort Extreme and Bluetooth 2.0+EDR (Enhanced Data Rate)

## Visual Differences

There is a new mezzanine board (shown below in the middle) used with the AirPort Extreme/Bluetooth combo card (shown on the left). The antennas, also shown below, connect to the combo card, which connects to the mezzanine board. Refer to the topic: “Antennas, Mezzanine Board, AirPort Extreme/Bluetooth Card” in the Take Apart chapter for details.





Take Apart  
Mac mini



# General Information

## Tools

The following tools are required to service the computer:

- ESD wriststrap and mat
- Jeweler's #0 Phillips screwdriver
- Jeweler's #1 Phillips screwdriver
- Phillips #2 screwdriver
- Black stick (922-5065), or other nonconductive nylon or plastic tool
- Needlenose pliers
- Soft cloth (to protect removed parts from scratches)
- Screw tray
- Putty knife (922-6761), 1.5 inch (38 mm), flexible blade



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## Modify the Putty Knife

1. If you don't order a modified putty knife (922-6761) from Apple Service, purchase a putty knife with a 1.5-inch (38 mm), flexible metal blade.



2. Using sandpaper (150 grit), file down the end of the putty knife (on one side) until it's slightly beveled. Rub the edge of the putty knife back and forth for about 2 minutes on the sandpaper.



## Serial Number Location

The product serial number and Ethernet ID are located on the bottom housing.



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## Thermal Pad

The thermal pad is located on the bottom housing. A new thermal pad is included with the logic board and the bottom housing, and the pads can be ordered separately as a kit (part number 922-6749).

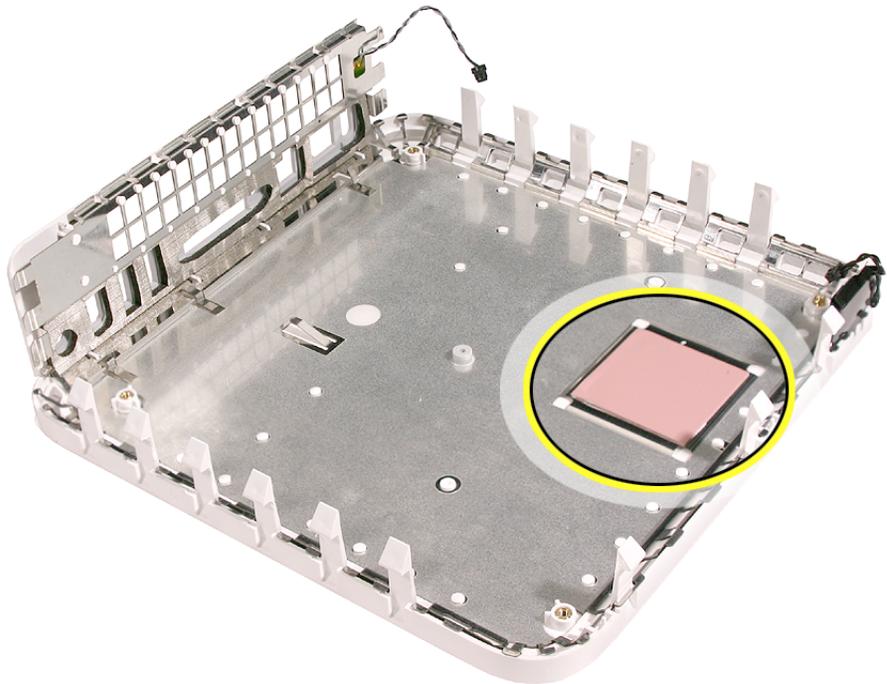
Replace the pad when:

- the logic board or the bottom housing is replaced
- the pad is torn, withered, or damaged

**Important:** Never use thermal paste in place of the thermal pad. You must replace the thermal pad with a new identical pad.

### Procedure

1. Remove the original pad from the bottom housing or the logic board using a black stick or other nonconductive nylon tool.
2. Remove the protective backing on the new thermal pad. **Note:** Avoid unnecessary contact with either side of the thermal pad as dirt and body oils reduce the thermal pad's conductivity.
3. Place the new thermal pad on the bottom housing (as shown). Make sure the thermal pad has even contact with the bottom housing. There should be no air pockets.



4. Replace the logic board.



# Top Housing

## Tools

The only tool required for this procedure is a modified putty knife (part number 922-6761)

## Preliminary Steps

1. Shut down the computer.

**Warning:** Always shut down the computer before opening it to avoid damaging its internal components or the components you are installing. Do not open the computer or attempt to install items inside it while it is on.

2. Unplug all external cables from the computer except the power cord.
3. Touch the metal case to discharge any static electricity from your body.

**Important:** Always discharge static 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 working and closed the computer.

4. Unplug the power cord.
5. Put on an ESD wrist strap.

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## Removal Procedure

**Caution:** To avoid scratching the case, use caution when using the putty knife.

1. Place the computer on a clean, flat surface.
2. Turn the computer over so the ports are facing you and the bottom of the computer (gray color) is facing up.
3. Hold the putty knife with the beveled edge facing the bottom housing. Insert the tool into the gap where the metal housing and the bottom assembly come together on the left side of the computer. **Important:** Be extremely careful not to scratch or dent the top or bottom housing when inserting the tool

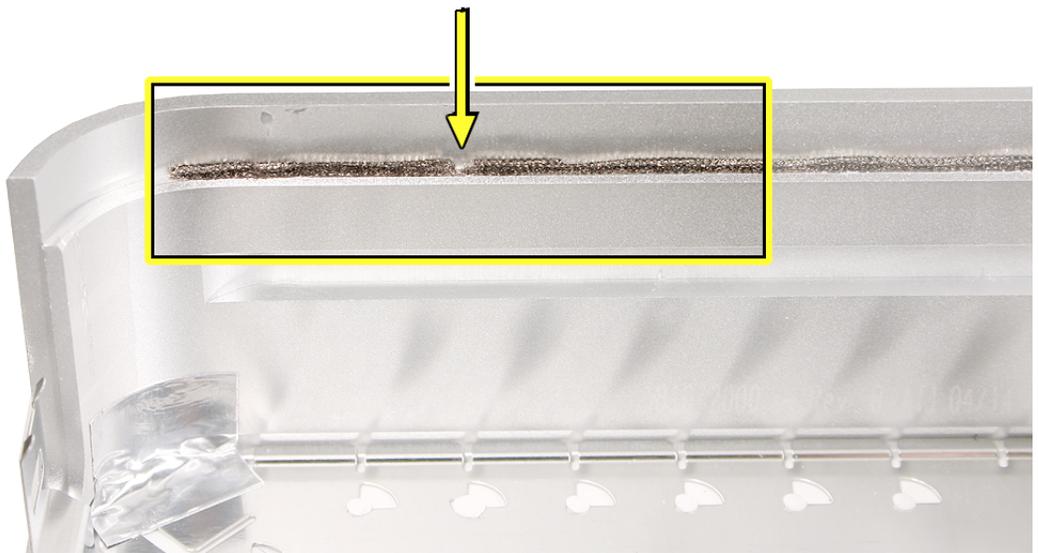


4. Gently release the internal latches by prying the tool away from the computer.

**Note:** You will hear little popping sounds as the latches release and the bottom moves away from the top housing, creating a gap at the top of the I/O panel.



5. Be careful not to damage the EMI foam on the inside of the top cover.



6. Repeat the procedure on the right side of the unit.



7. Push the I/O panel upward until the top housing is removed. The popping sounds will continue as you push the I/O panel; this is normal.



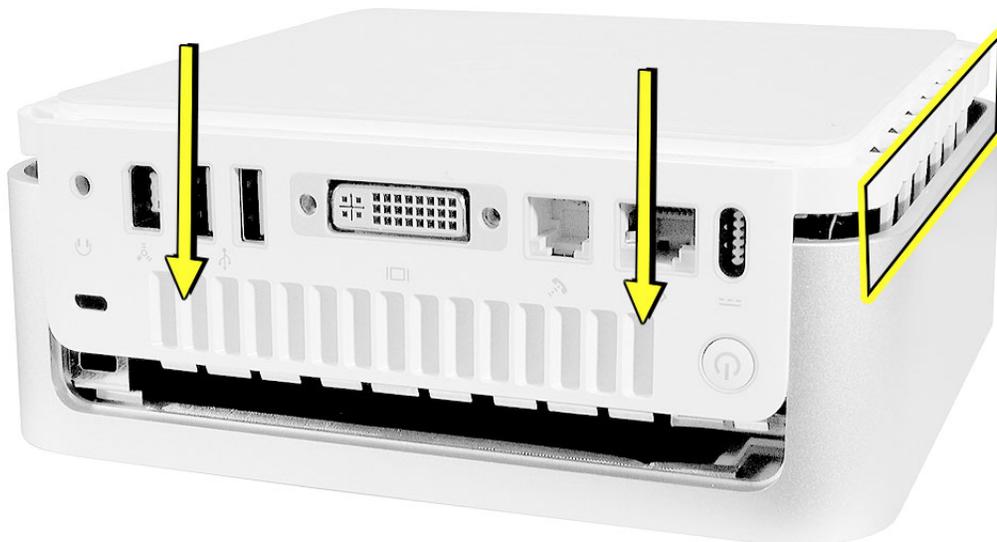
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8. Set the top housing aside.

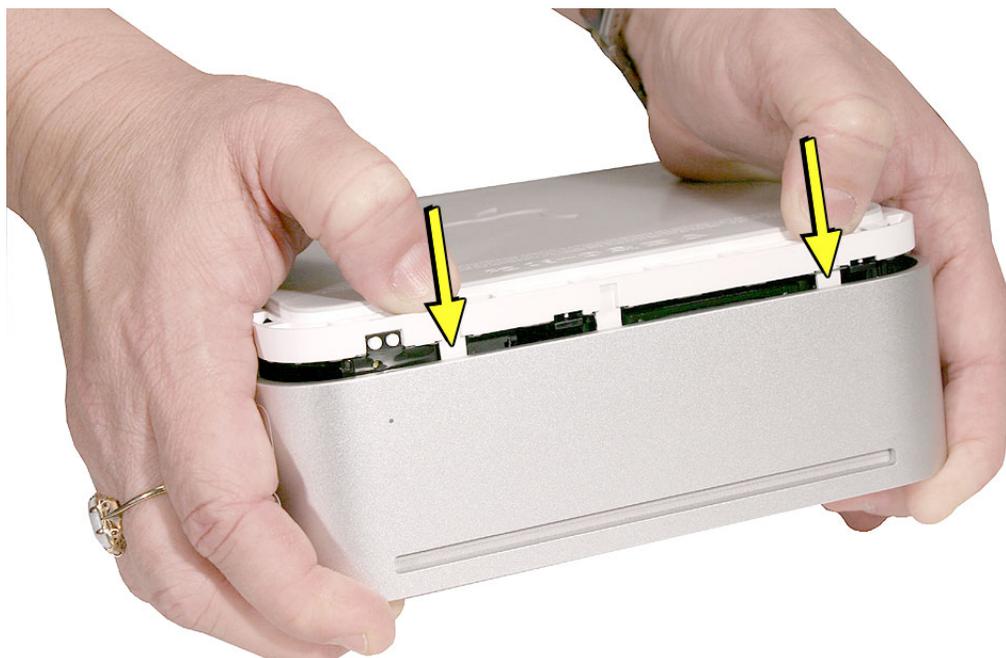


## Replacement Procedure

1. Align the rear I/O panel with the top housing. Make sure all the white latches on the sides of the unit are aligned as shown in the photo below.



2. Squeeze the unit together firmly as shown. Proceed to the next step.



3. If the computer doesn't go together, check the EMI tab alignment (outlined below) and try again. Check that the metal tabs aren't bent.

Work your hands around the unit squeezing the top and bottom until they snap together and there are no gaps.





# AirPort Antenna and AirPort Extreme Card

## Tools

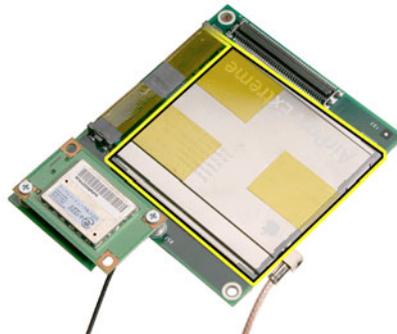
This procedure requires the following tools:

- Black stick (or other nonconductive nylon or plastic tool)
- Jeweler's #0 Phillips screwdriver
- Kapton tape

## Preliminary Steps

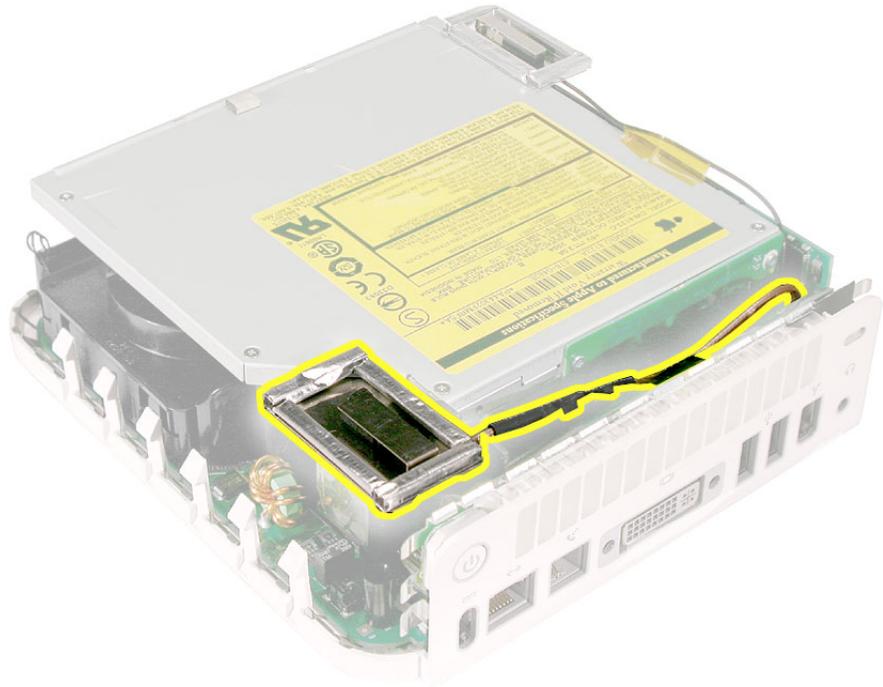
Before you begin, remove the top housing.

## Part Location

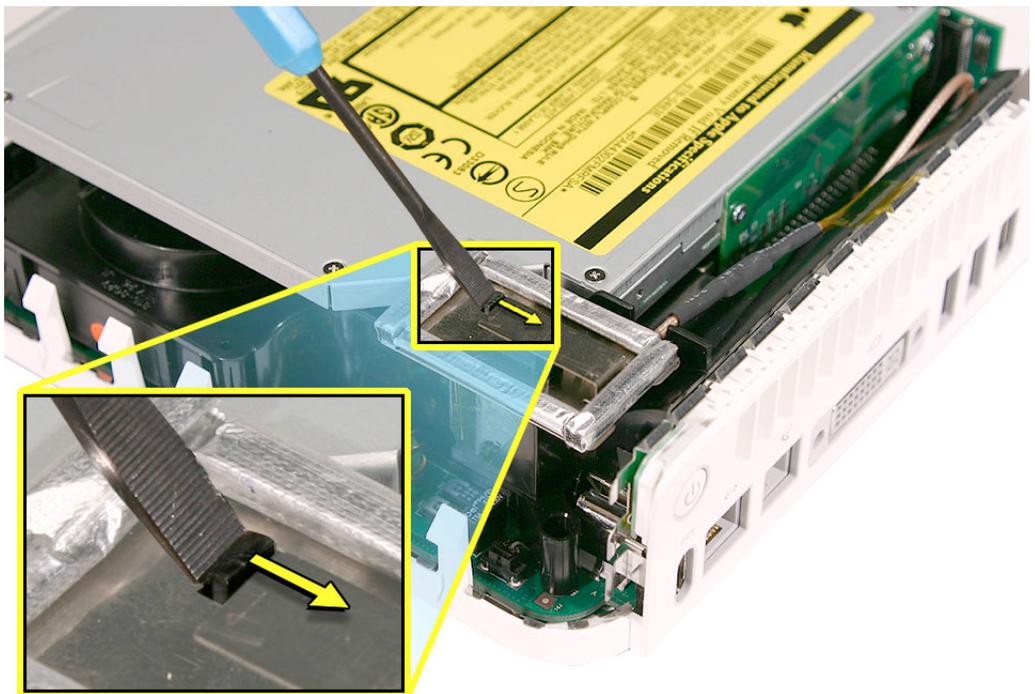


## Removal Procedure

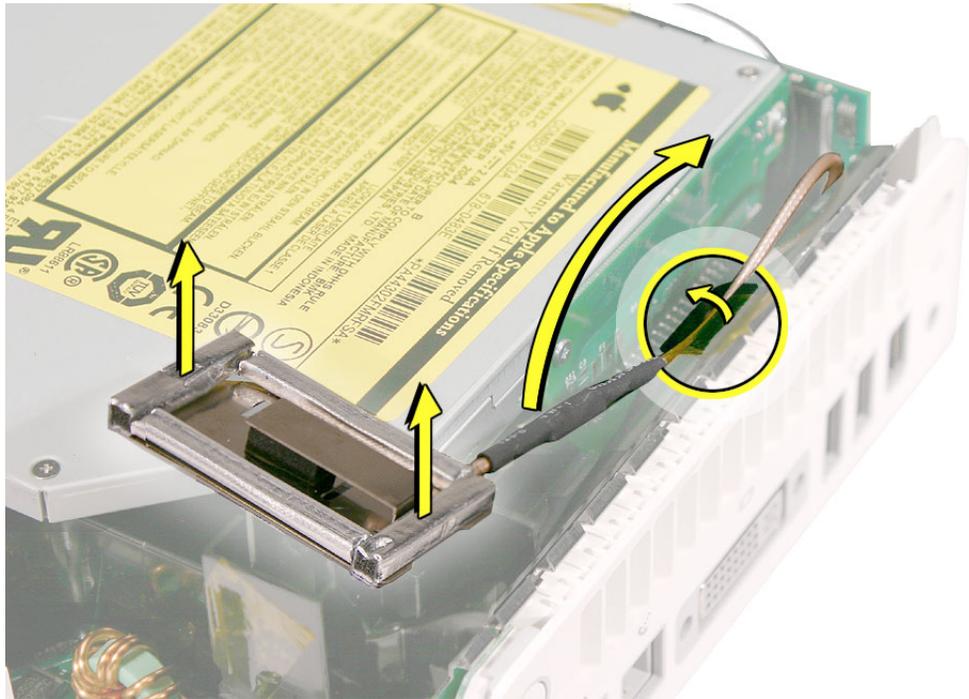
1. Locate the AirPort antenna.



2. Using a black stick, push the black latch (see inset) toward the I/O ports to release the antenna from the internal frame.



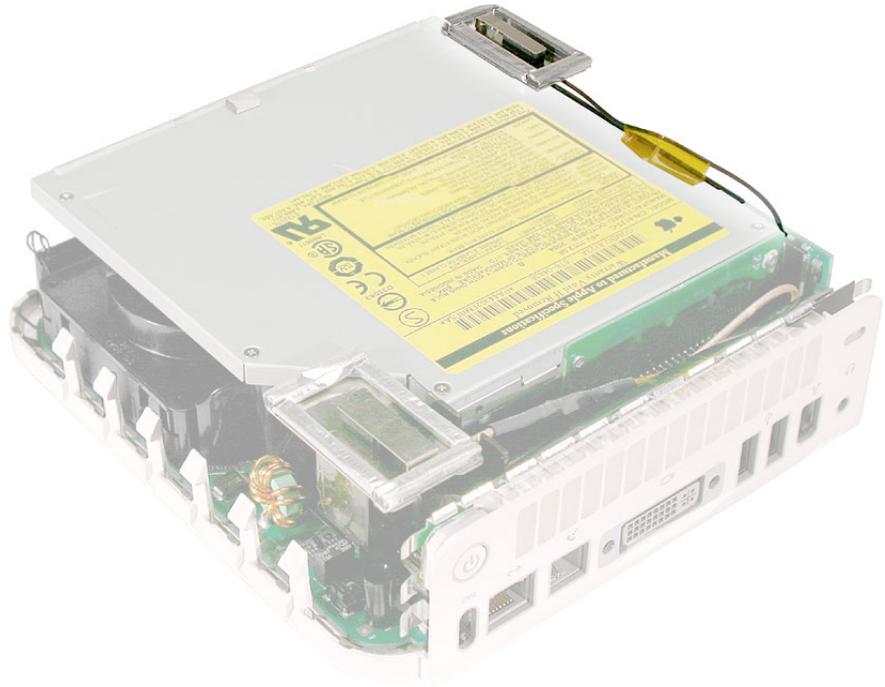
- Carefully lift the antenna up and off the internal frame. Free the antenna from the kapton tape (circled). **Important:** Take care handling the AirPort antenna as a bent or warped antenna will affect AirPort connectivity.



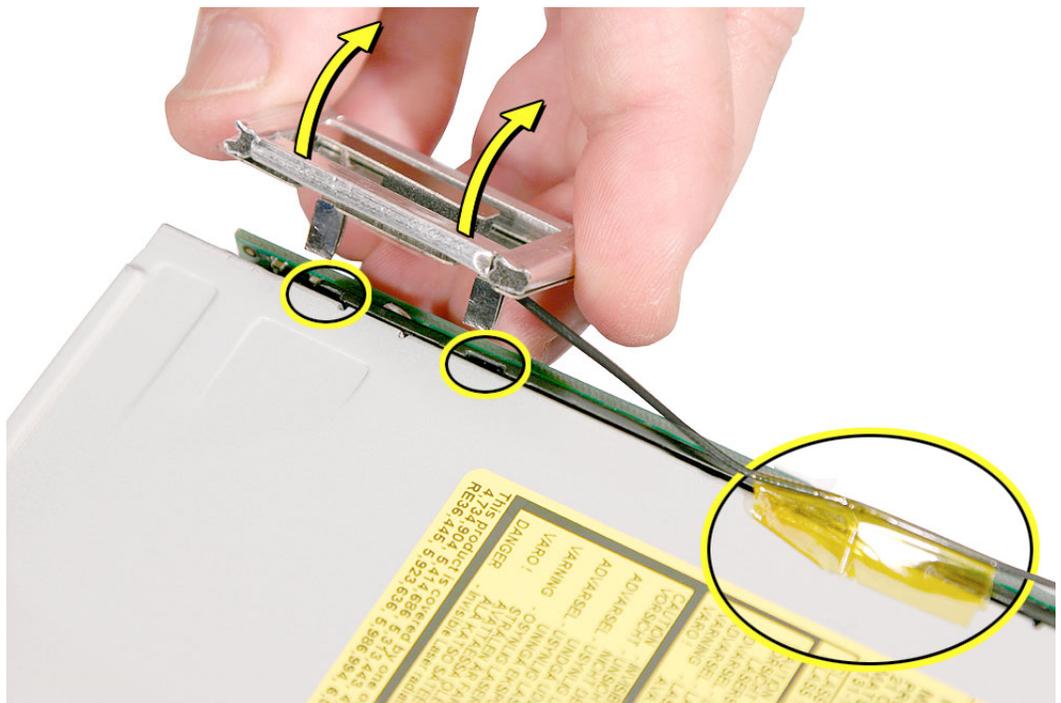
- Set the AirPort antenna off to the side. **Note:** The AirPort Extreme card and antenna cable are connected to the mezzanine board located under the internal frame.



6. Locate the Bluetooth antenna.



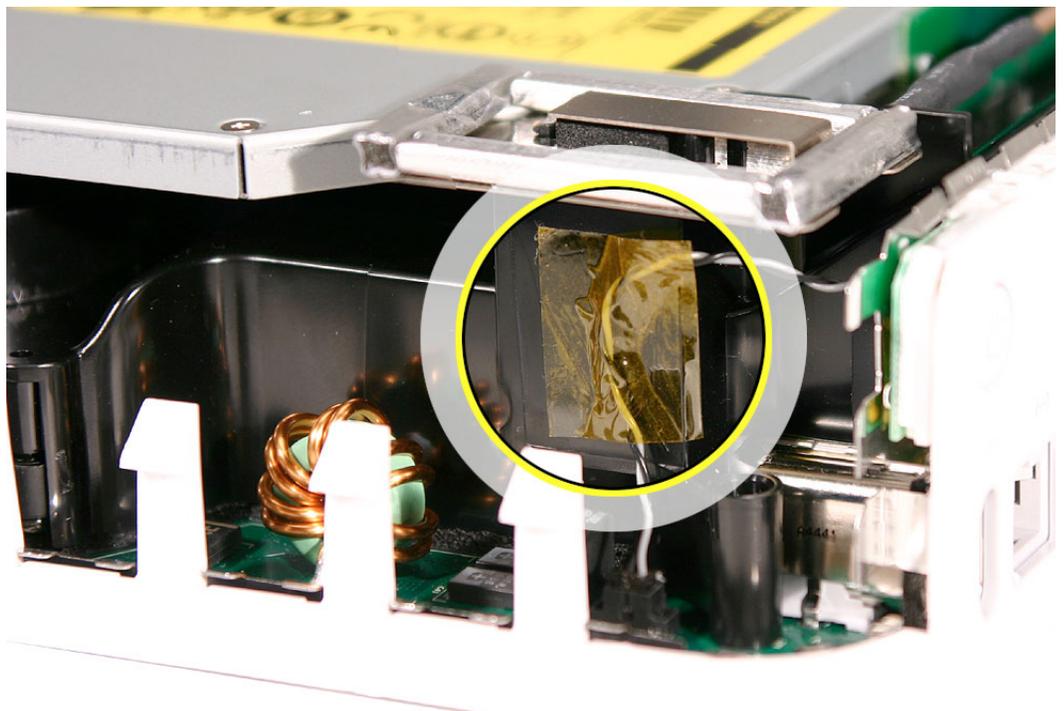
7. Pull the Bluetooth antenna up and out of the openings on the plastic rail. Free the antenna cable from the kapton tape. **Important:** Take care handling the Bluetooth antenna as a bent or warped antenna will affect Bluetooth connectivity.



8. Set the Bluetooth antenna off to the side and out of the way. **Note:** The Bluetooth board is connected to the mezzanine board located under the internal frame.



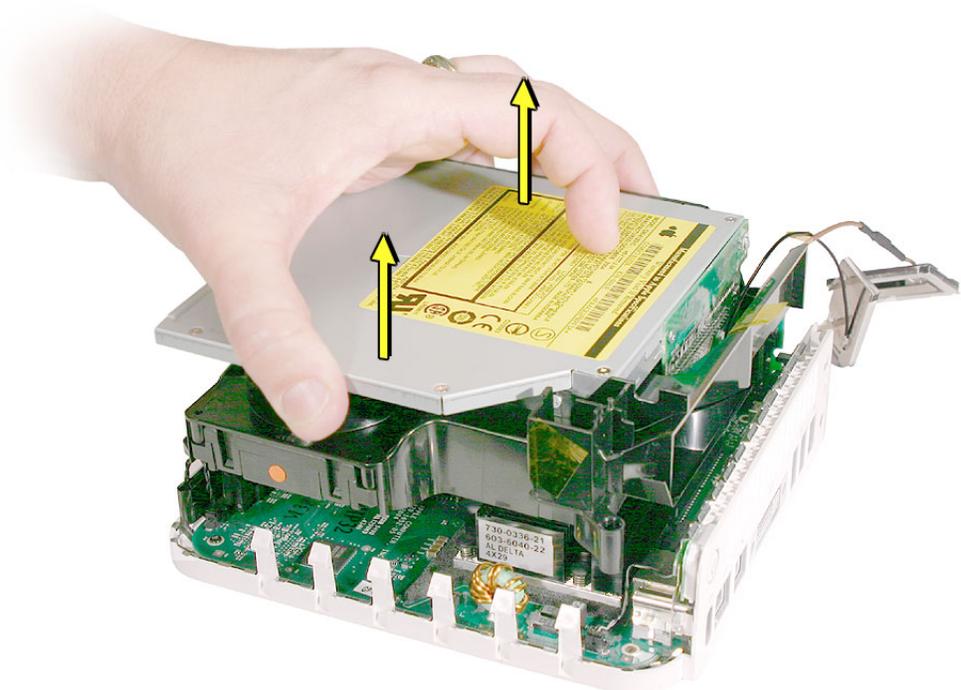
9. Free the power button cable from the kapton tape on the internal frame.



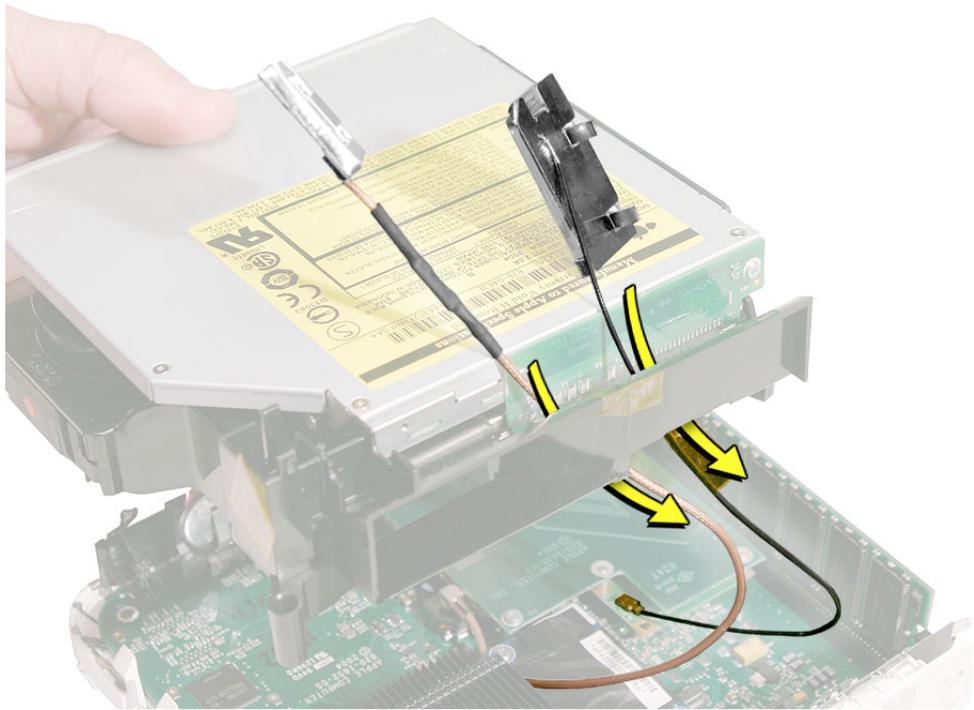
10. With a jeweler's # 0 Phillips screwdriver, remove 3 screws on the internal frame.



11. Lift the internal frame straight up.



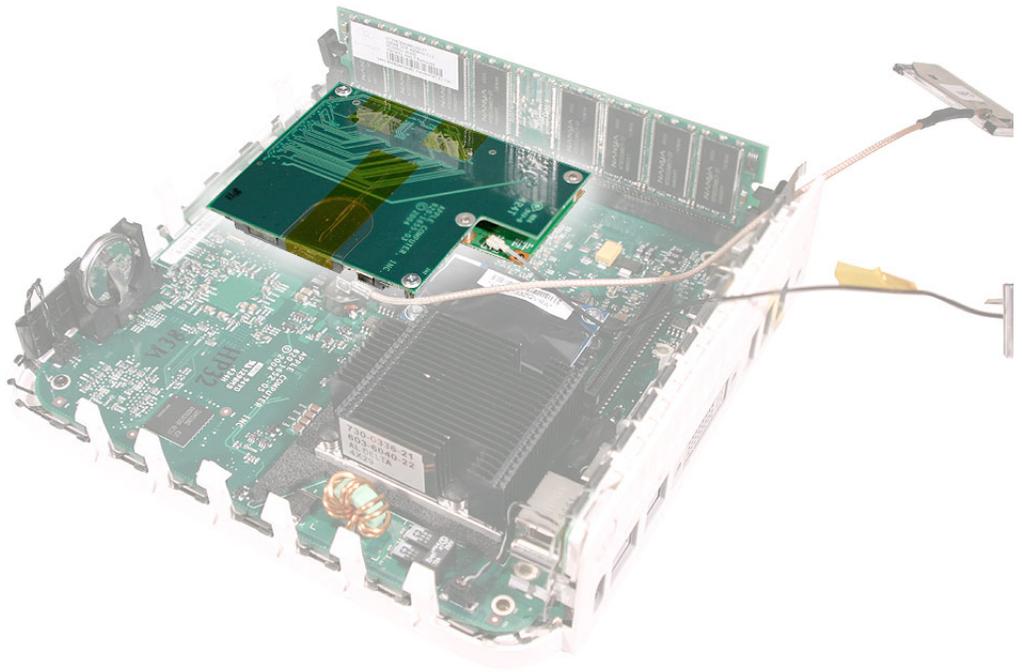
12. Gently guide the Bluetooth and Airport antenna cables down through the opening in the internal frame.



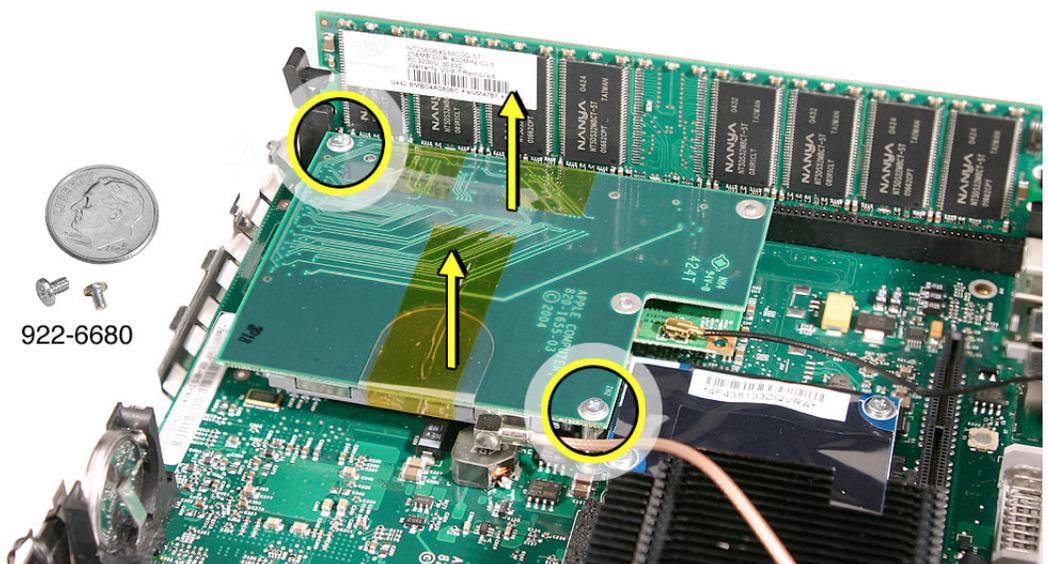
13. Set the internal frame aside.



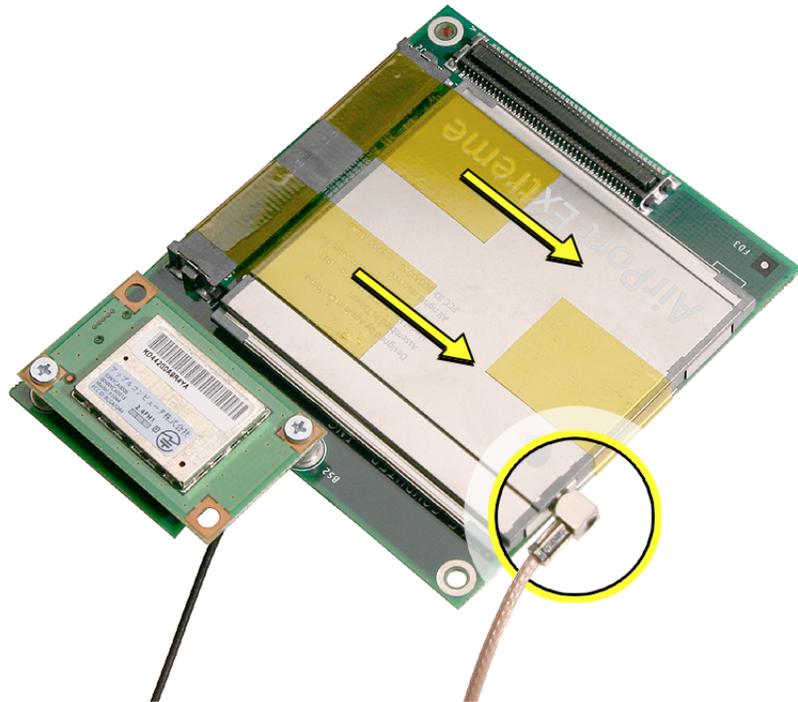
14. Locate the mezzanine board on the logic board.



15. To access the AirPort Extreme card remove the two screws on the mezzanine board with a jeweler's # 0 Phillips screwdriver. Pull the mezzanine board straight up and off the logic board connector.

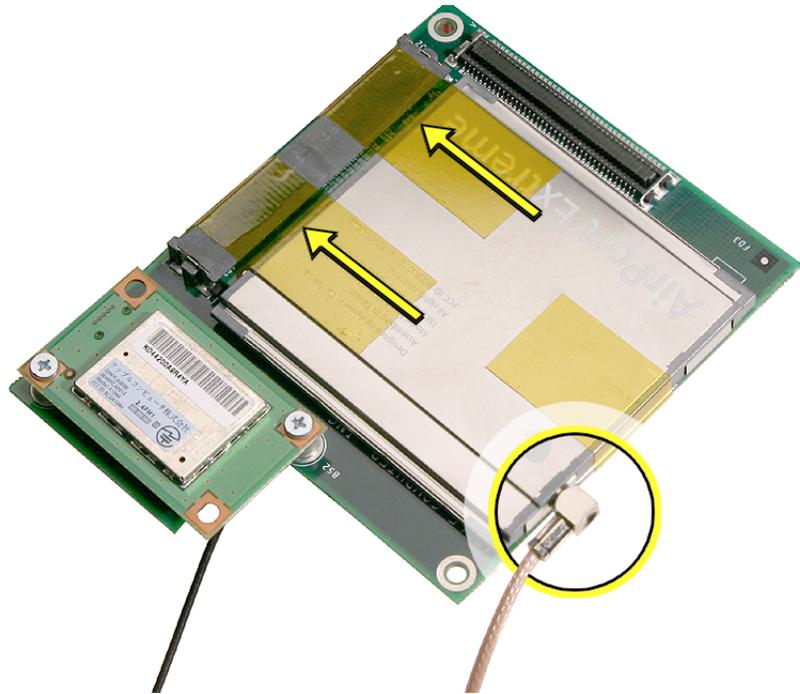


16. Turn over the mezzanine board. With your fingernail or black stick, remove the AirPort antenna cable (circled) from the AirPort Extreme card. Remove the kapton tape that secures the card to the mezzanine board. Pull the AirPort Extreme card out of the connector on the mezzanine board.

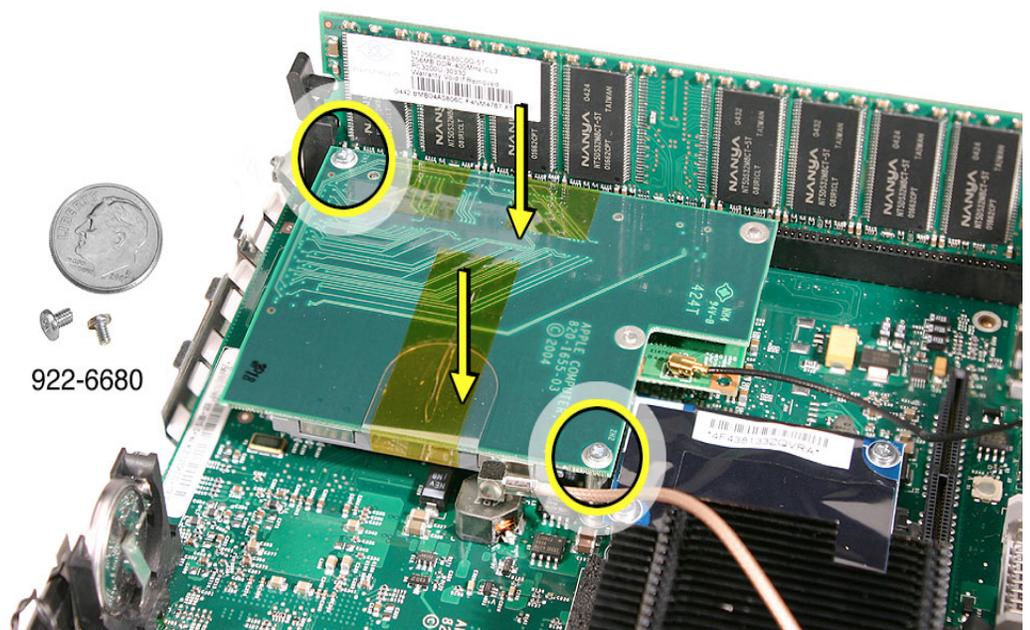


## Replacement Procedure

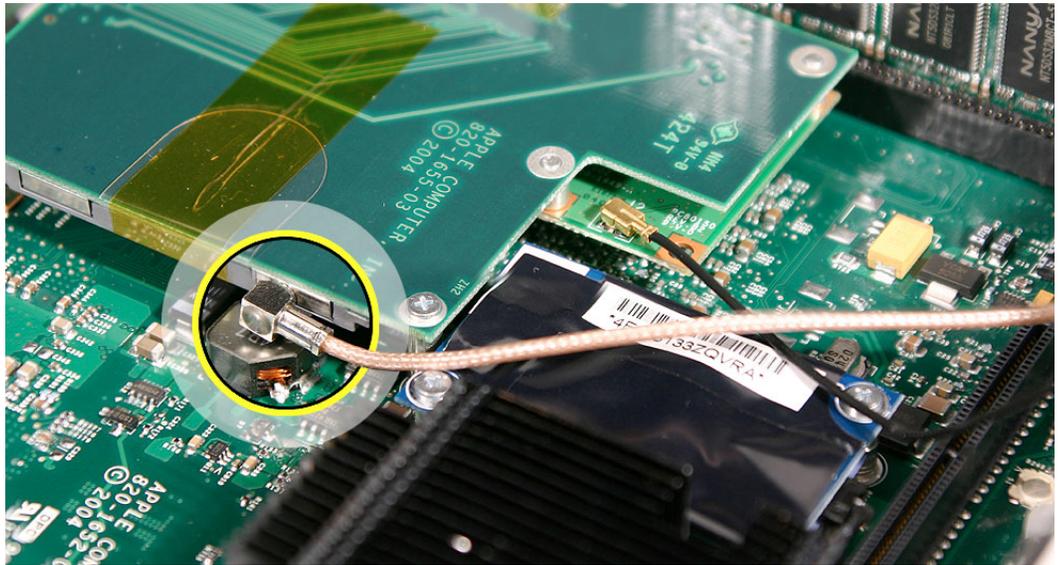
1. Install the AirPort Extreme card into the connector on the mezzanine board and replace the kapton tape as shown. Plug the AirPort antenna cable into the opening on the end of the AirPort Extreme card.



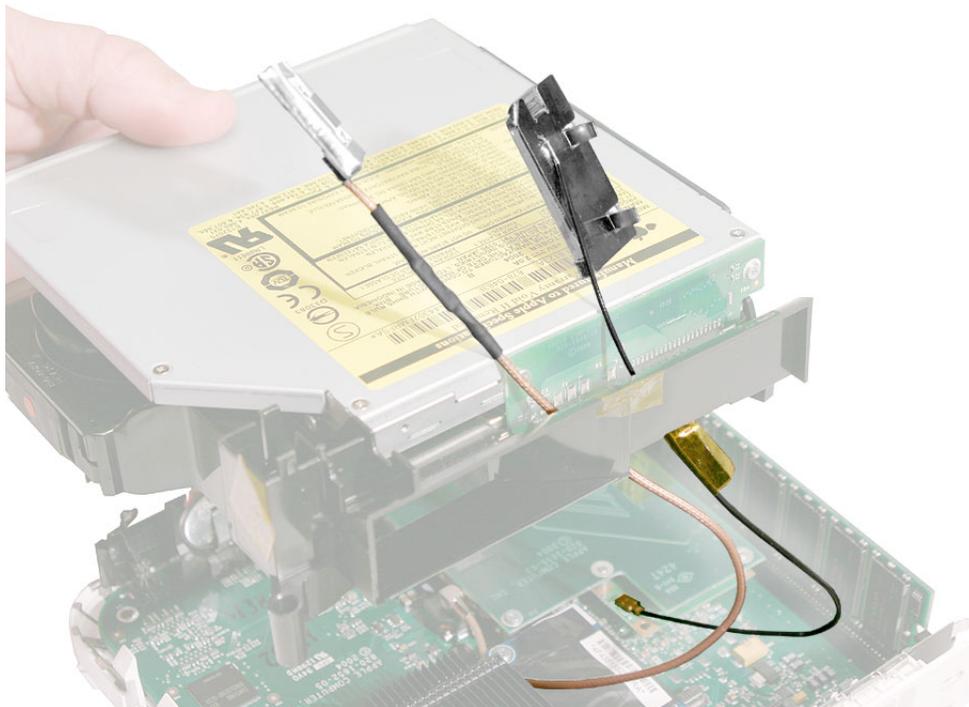
2. Turn over the mezzanine board so the AirPort Extreme card is facing down. Connect the mezzanine board to the connector on the logic board. Replace the two screws on the mezzanine board.



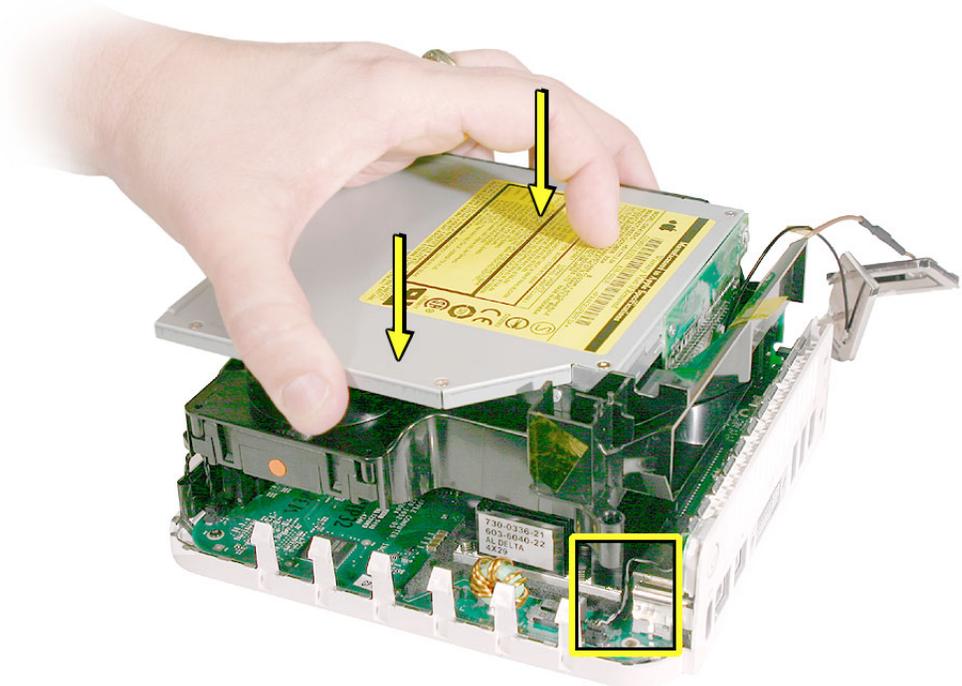
3. Make sure that the AirPort antenna cable is firmly inserted into the AirPort Extreme card. If the connector is not fully inserted, you'll see a large portion of the connector collar. For details see Knowledge Base article 108039, "Properly attaching the antenna on an AirPort Extreme card."



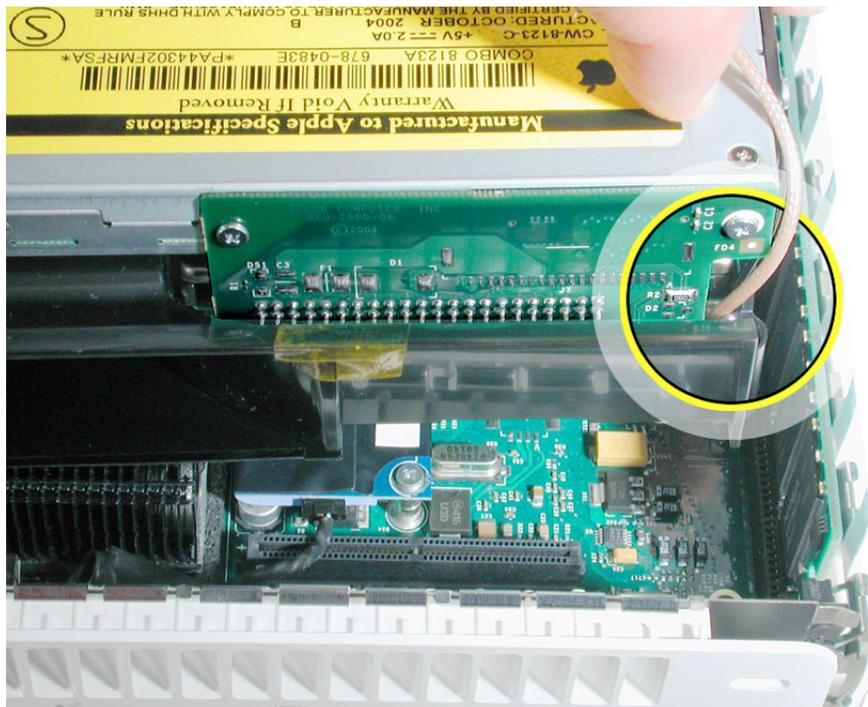
4. Hold the internal frame over the logic board as shown. Route the AirPort and Bluetooth antenna cables up through the opening in the internal frame.



5. Lower the internal frame into place. **Note:** Route the power button cable out of the way of the internal frame.



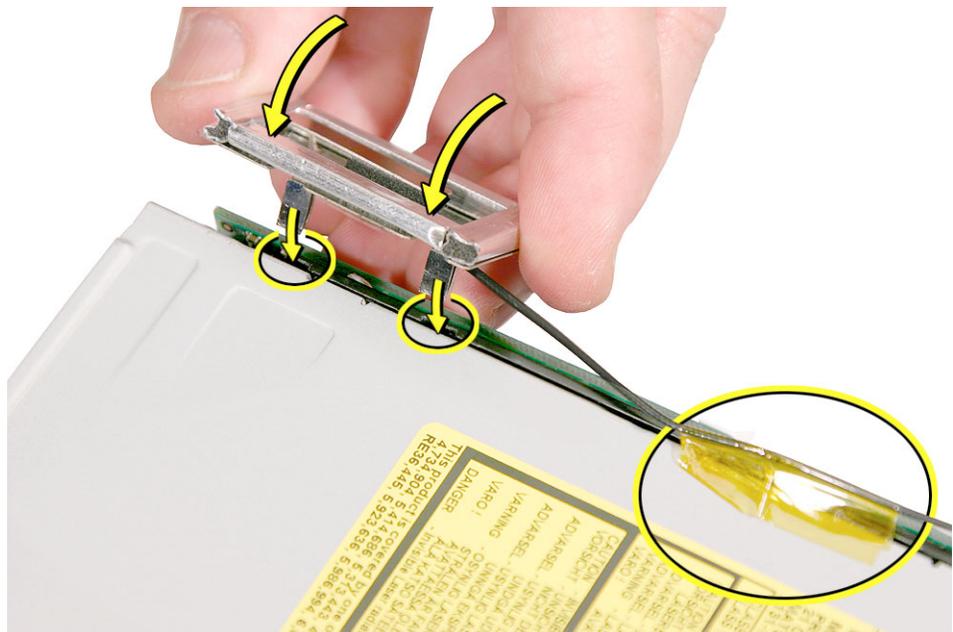
6. Route the antenna cables to the right side of the interconnect board on the internal frame as you continue lowering the internal frame onto the logic board.



7. Replace the three screws on the internal frame.

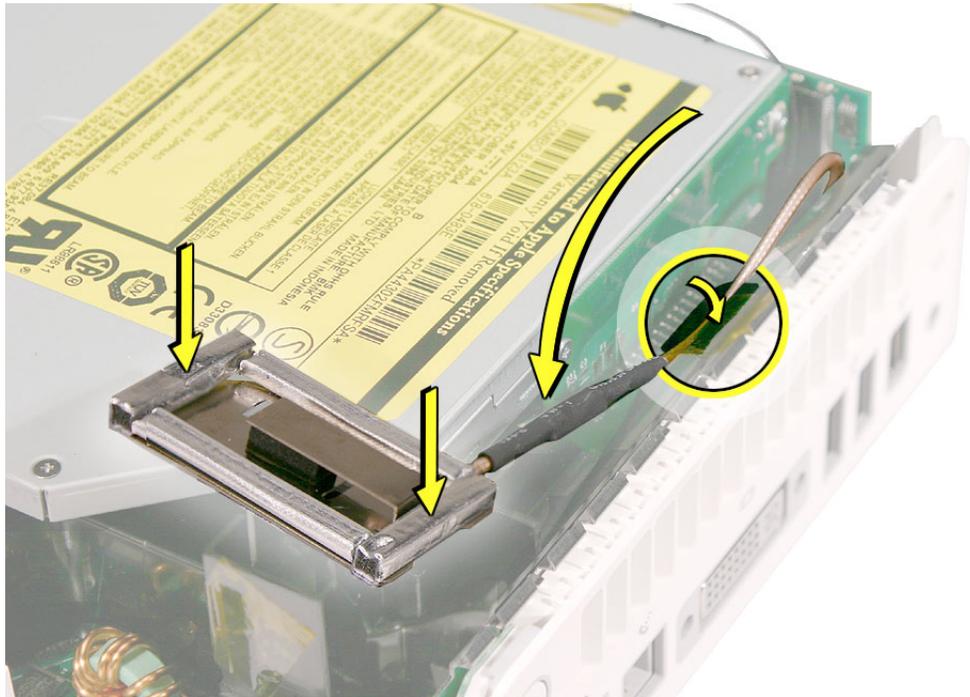


8. Replace the Bluetooth antenna. Secure the antenna cable with kapton tape.  
**Important:** Take care handling the Bluetooth antenna as a bent or warped antenna will affect Bluetooth connectivity.

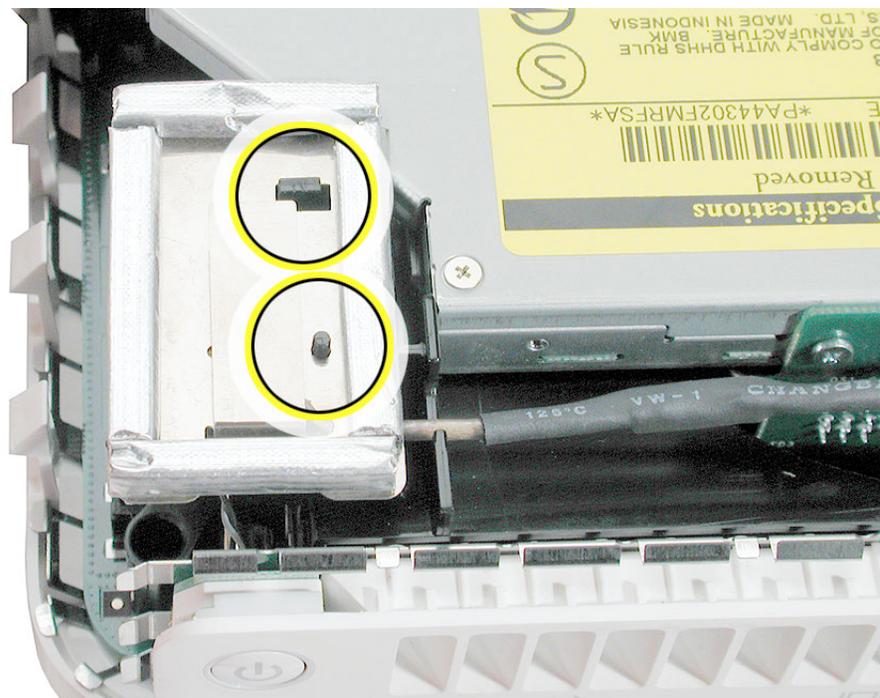


9. Replace the AirPort Extreme antenna. Secure the cable with kapton tape.

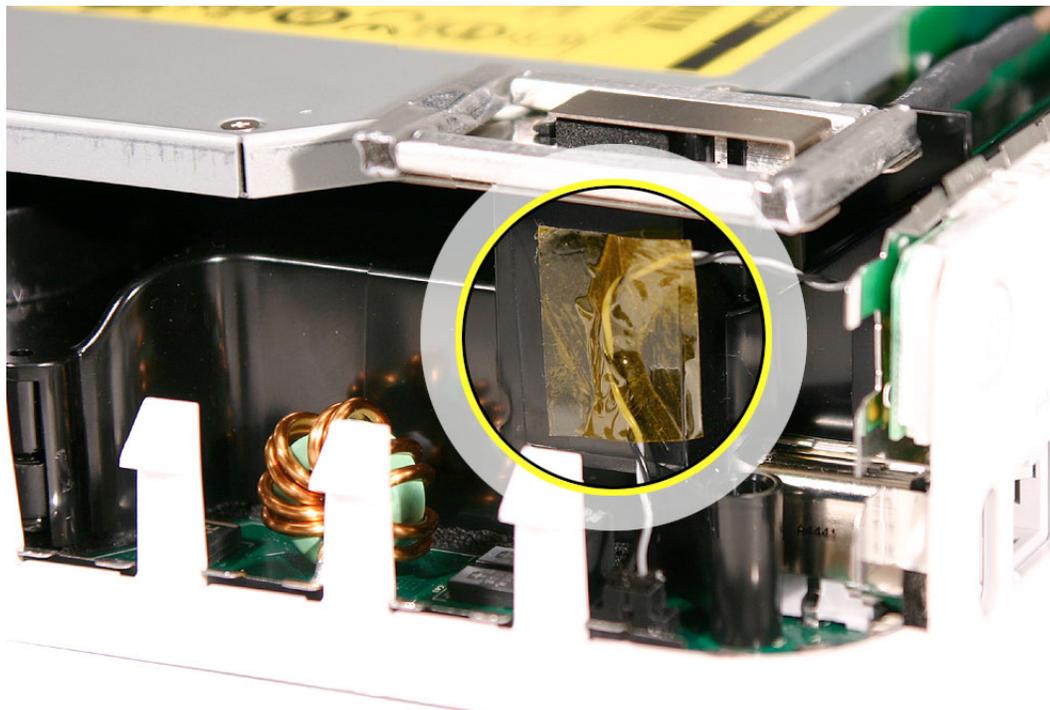
**Important:** Take care handling the AirPort antenna as a bent or warped antenna will affect AirPort connectivity.



10. Gently fasten the antenna onto the internal frame. The antenna is held in place by the black clip and black post (shown below).



11. Secure the power button cable to the internal frame with the kapton tape.



12. Replace the top housing.



# Bluetooth Antenna and Bluetooth Board

## Tools

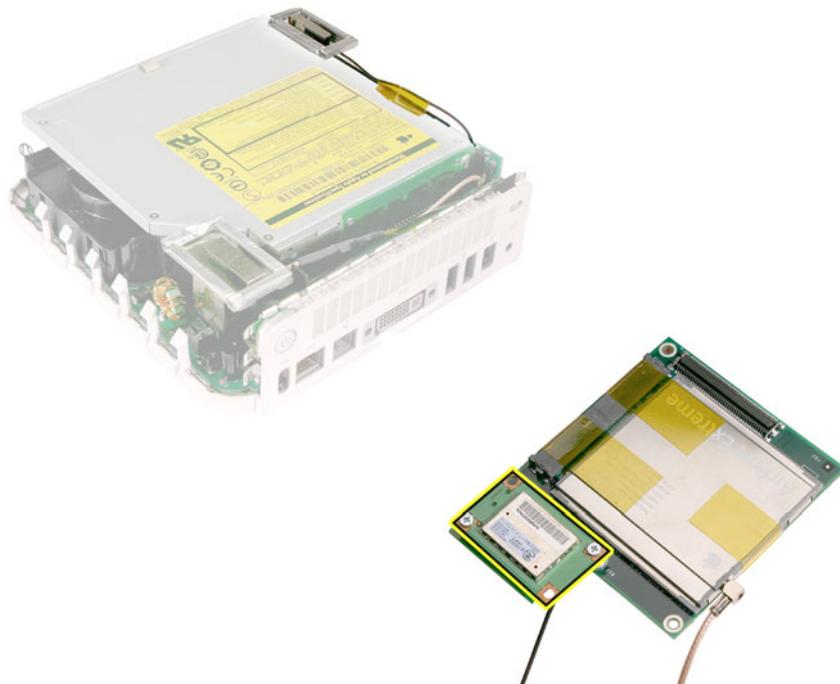
This procedure requires the following tools:

- Black stick (or other nonconductive nylon or plastic tool)
- Jeweler's #0 Phillips screwdriver
- Kapton tape

## Preliminary Steps

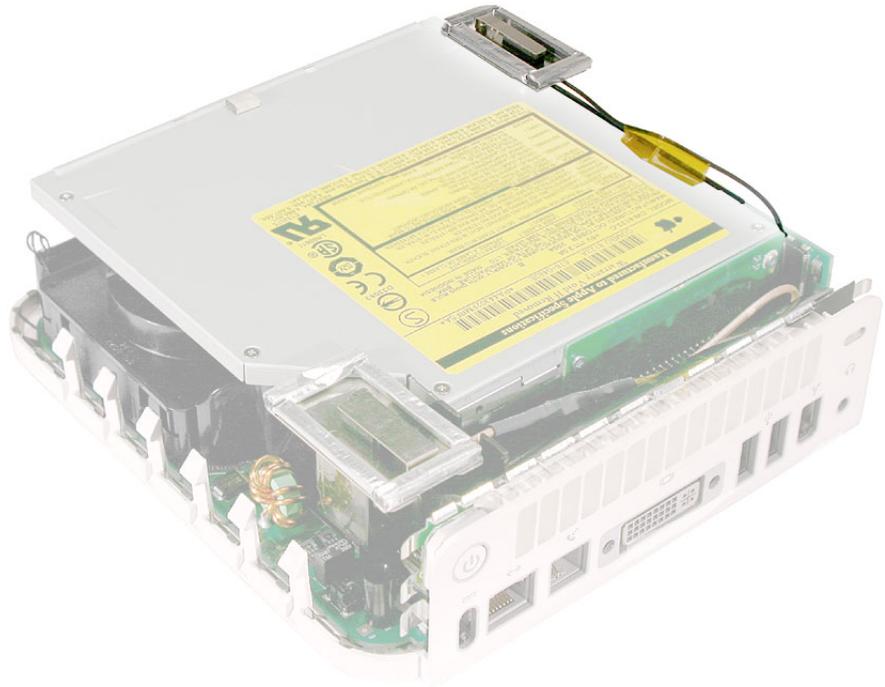
Before you begin, remove the top housing.

## Part Location

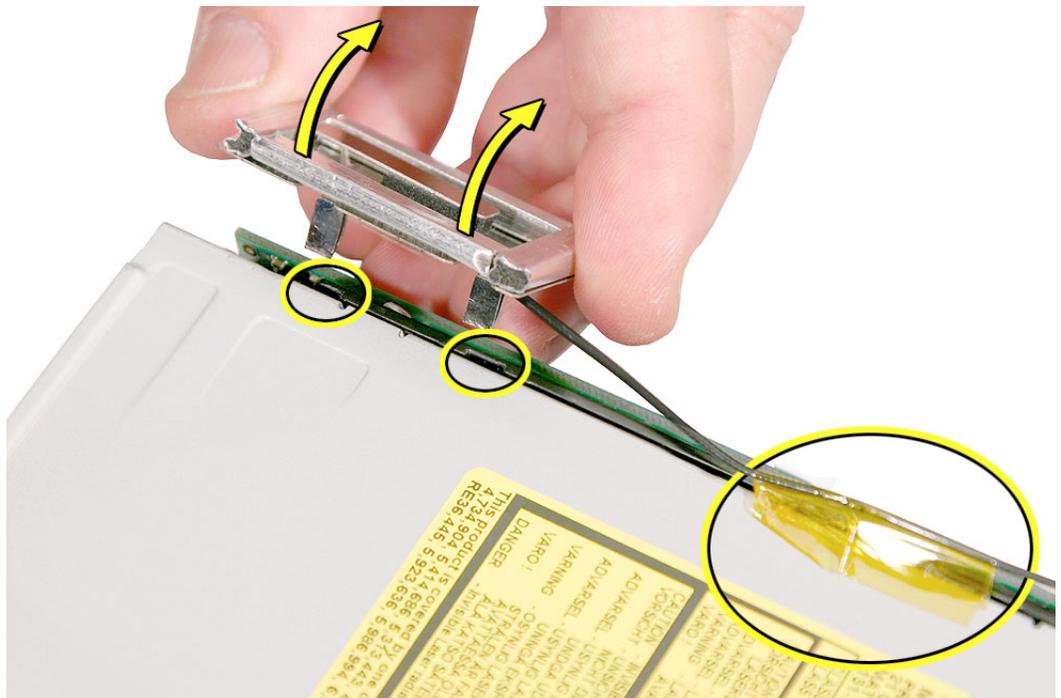


## Removal Procedure

1. Locate the Bluetooth antenna.



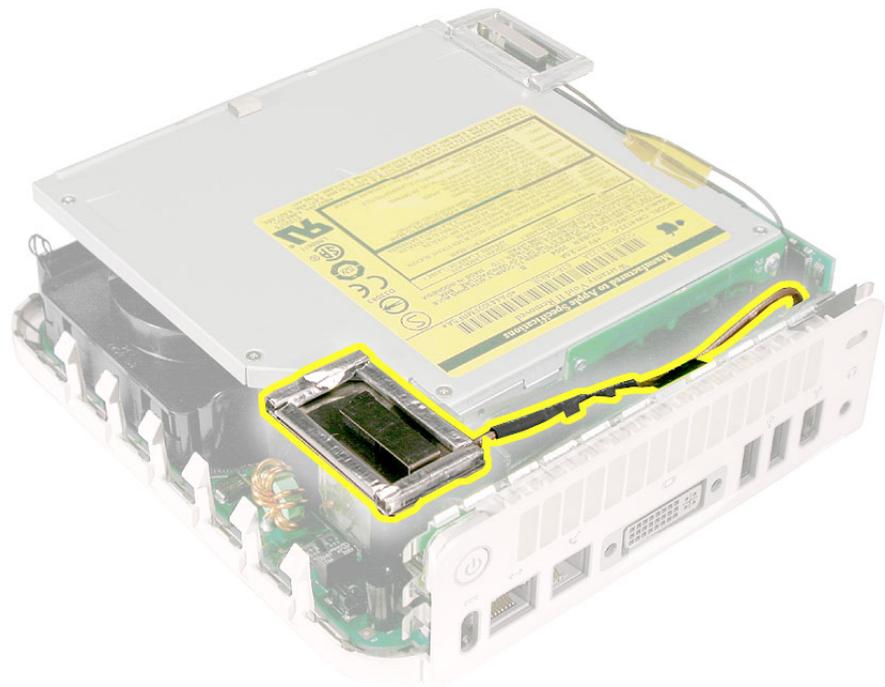
2. Pull the Bluetooth antenna up and out of the openings on the plastic rail. Free the antenna cable from the kapton tape. **Important:** Take care handling the Bluetooth antenna as a bent or warped antenna will affect Bluetooth connectivity.



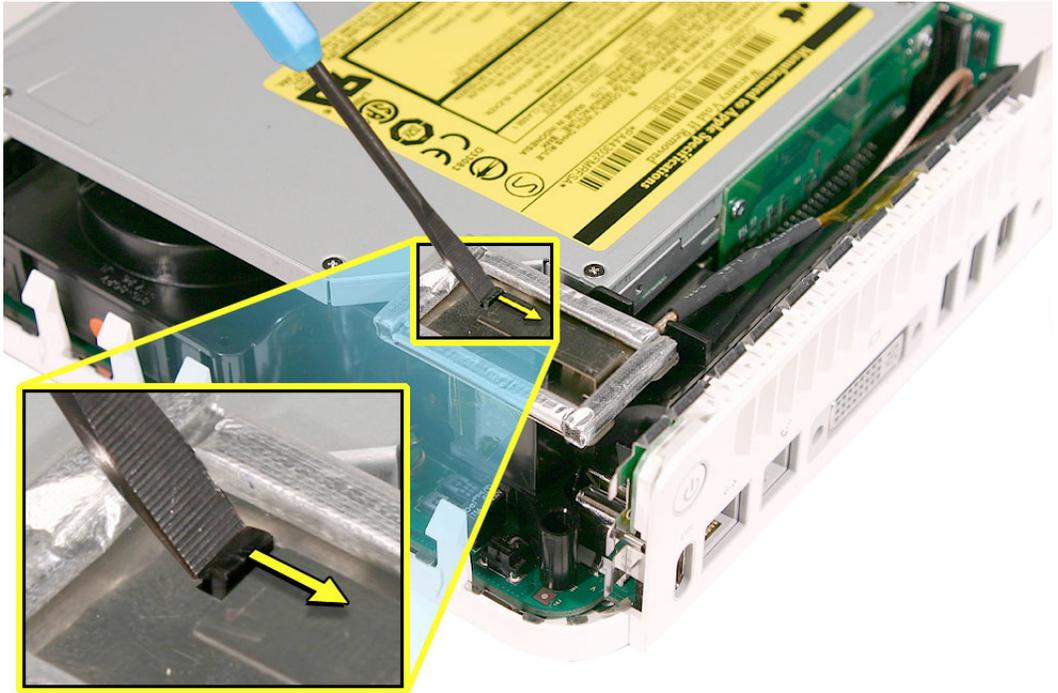
3. Set the Bluetooth antenna off to the side and out of the way. **Note:** The Bluetooth board is connected to the mezzanine board located under the internal frame.



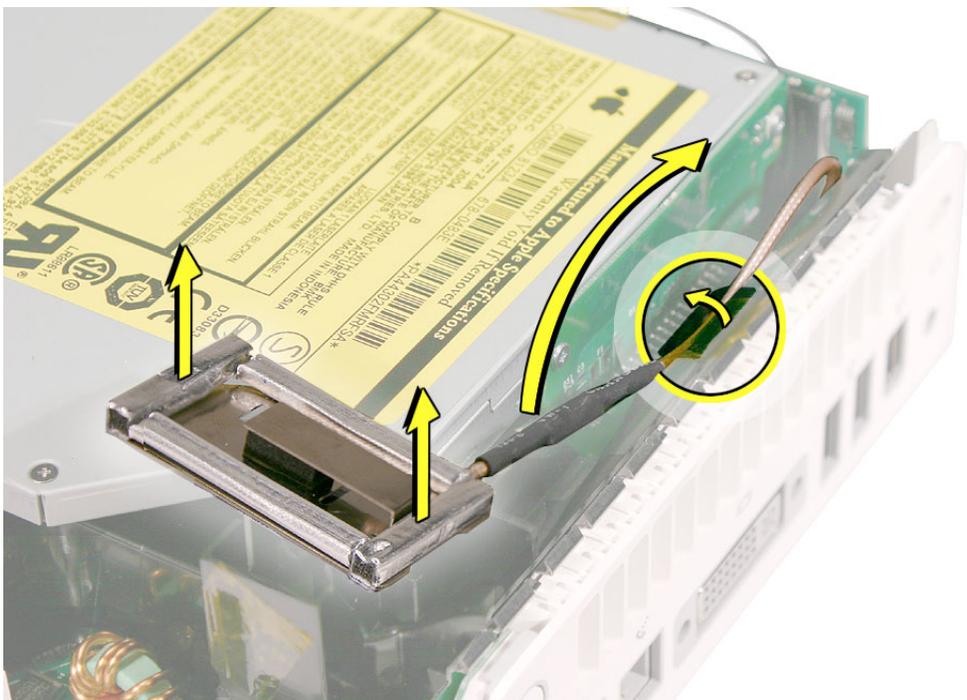
4. Locate the AirPort antenna.



- Using the black stick push the black latch (see inset) toward the I/O ports to release the antenna from the internal frame.



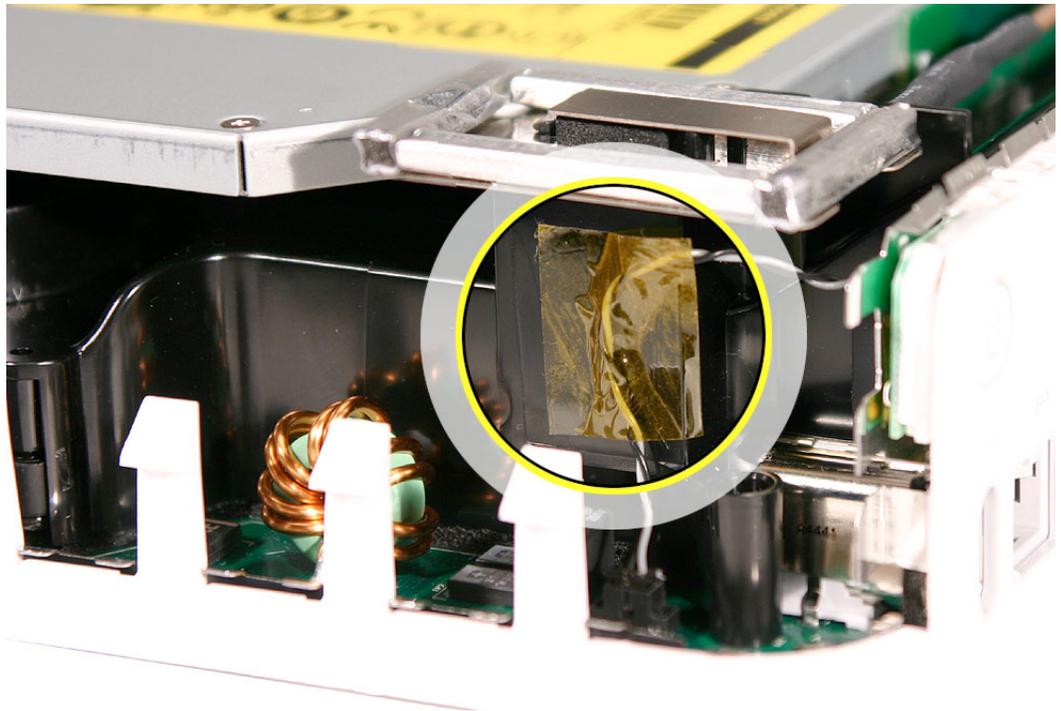
- Carefully lift the antenna up and off the internal frame. Free the antenna from the kapton tape (circled). **Important:** Take care handling the AirPort antenna as a bent or warped antenna will affect AirPort connectivity.



5. Set the AirPort antenna off to the side. **Note:** The AirPort Extreme card and antenna cable are connected to the mezzanine board located under the internal frame.



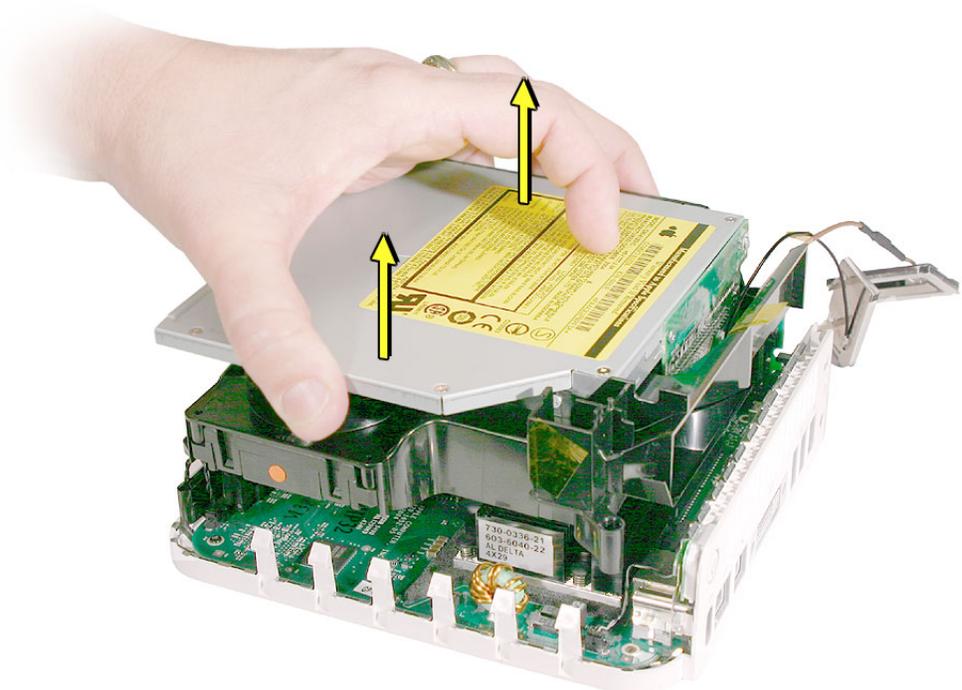
6. Free the power button cable from the kapton tape on the internal frame.



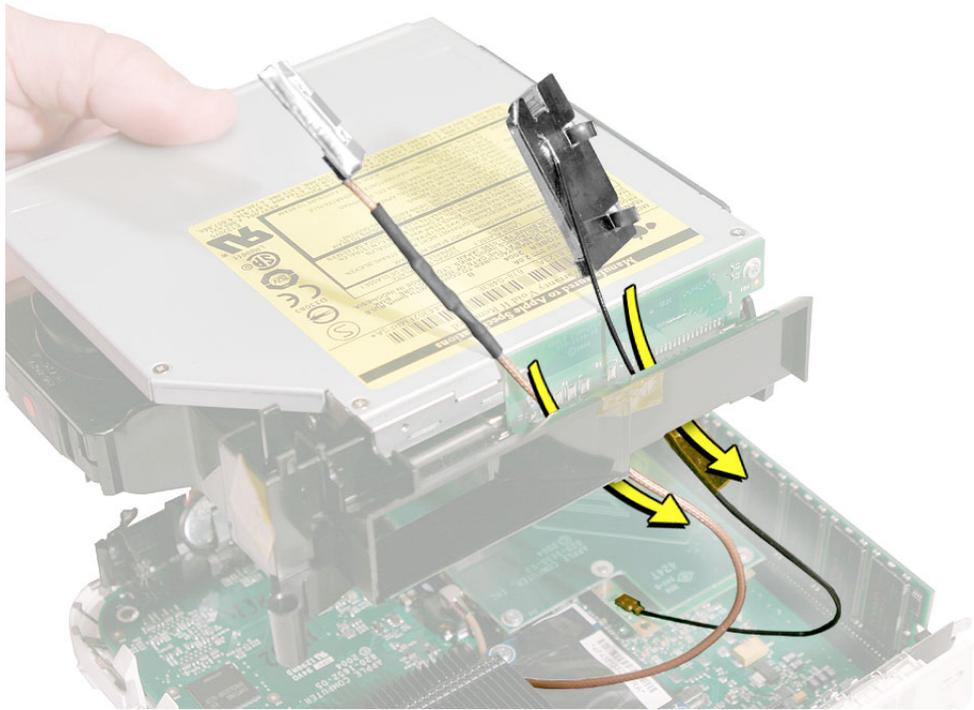
7. With a jeweler's #0 Phillips screwdriver, remove 3 screws on the internal frame.



8. Lift the internal frame straight up.



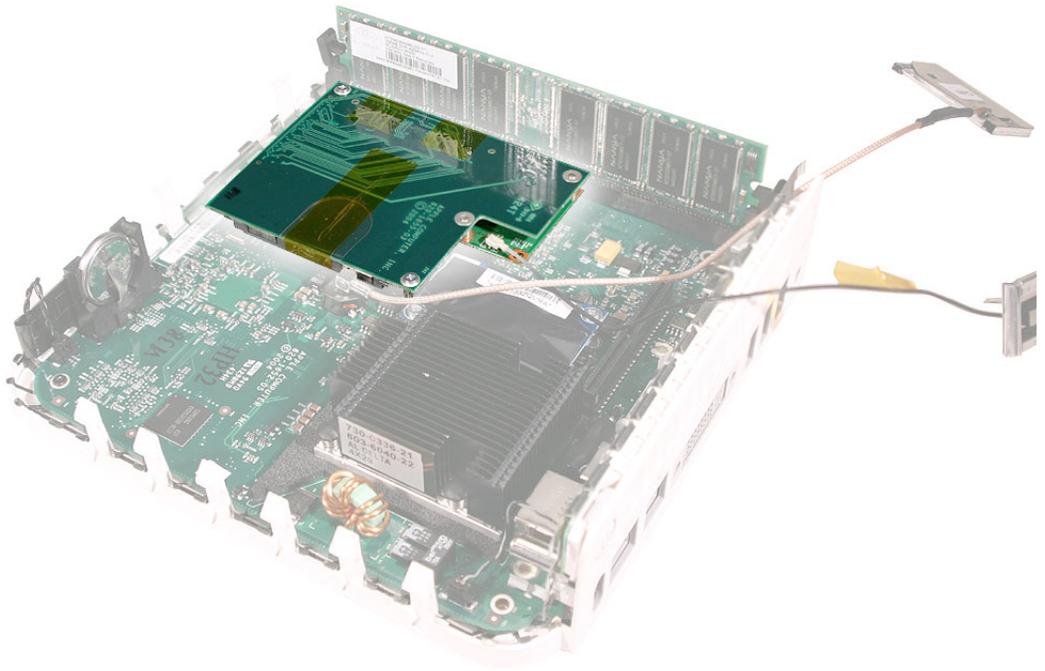
9. Gently guide the Bluetooth and Airport antenna cables through the opening in the frame.



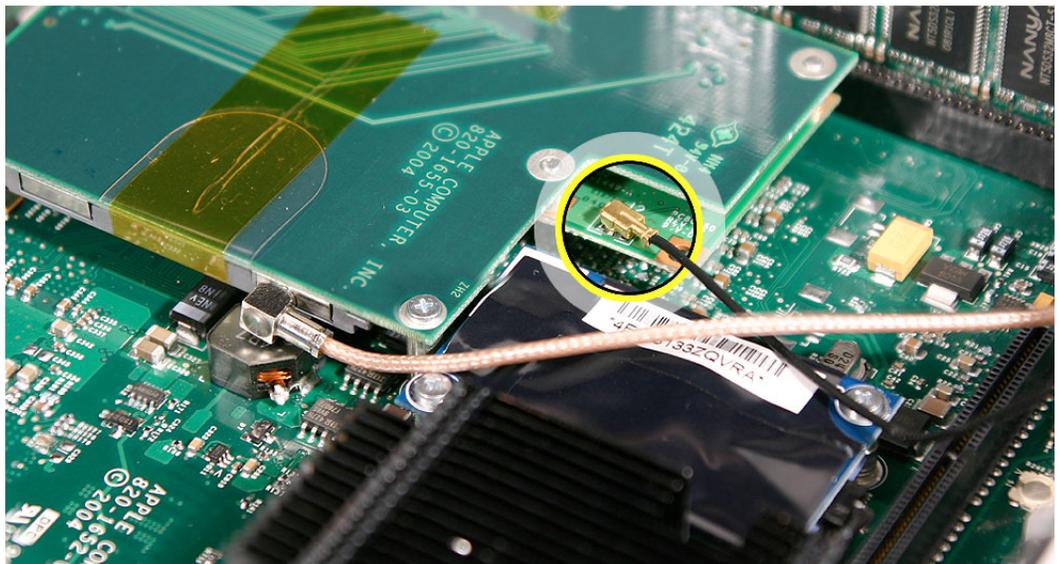
10. Set the internal frame aside.



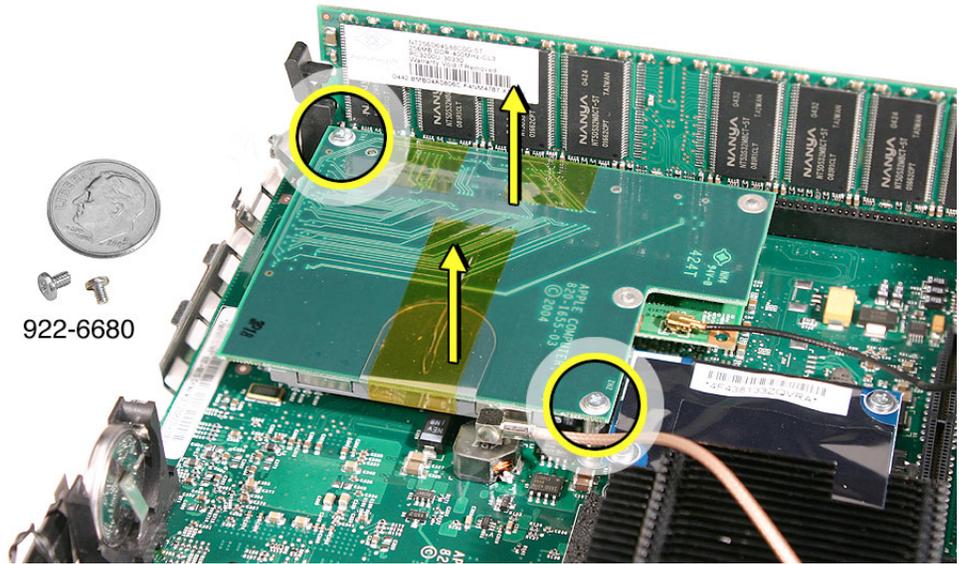
11. Locate the mezzanine board on the logic board.



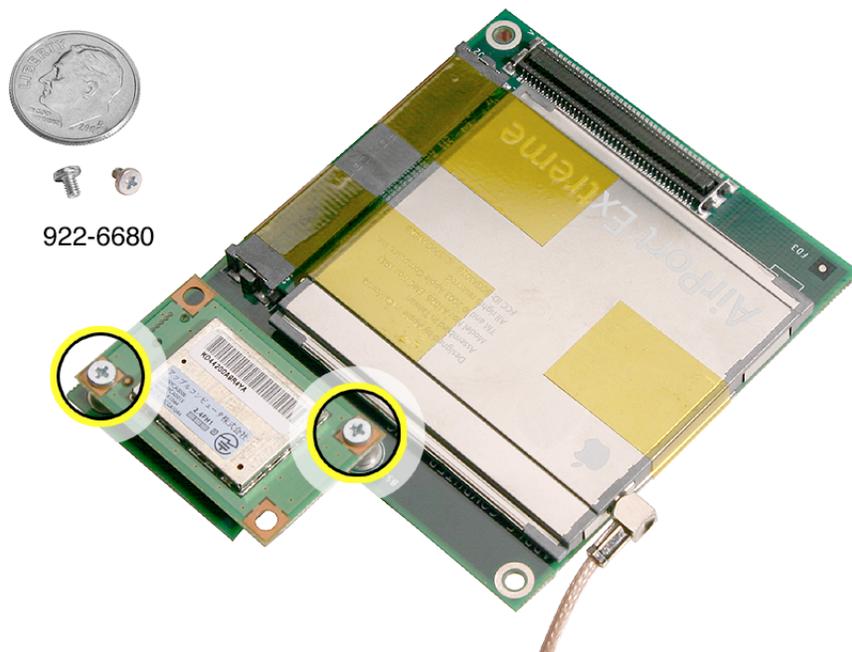
12. With your fingernail disconnect the Bluetooth antenna cable from the Bluetooth board.



13. Remove the two screws on the mezzanine board. Lift the mezzanine board straight up and off the logic board connector. **Caution:** The AirPort antenna cable is still attached to the mezzanine board. Remove the AirPort antenna cable if required to perform the repair.

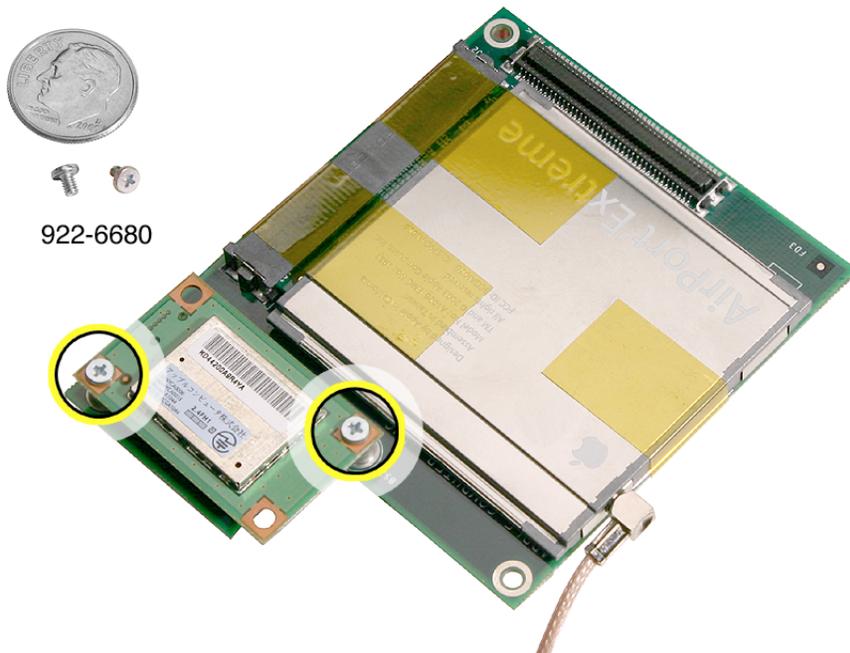


14. Turn over the mezzanine board. With a jeweler's #0 Phillips screwdriver remove the two screws on the Bluetooth board. Pull the Bluetooth board off the connector on the mezzanine board.

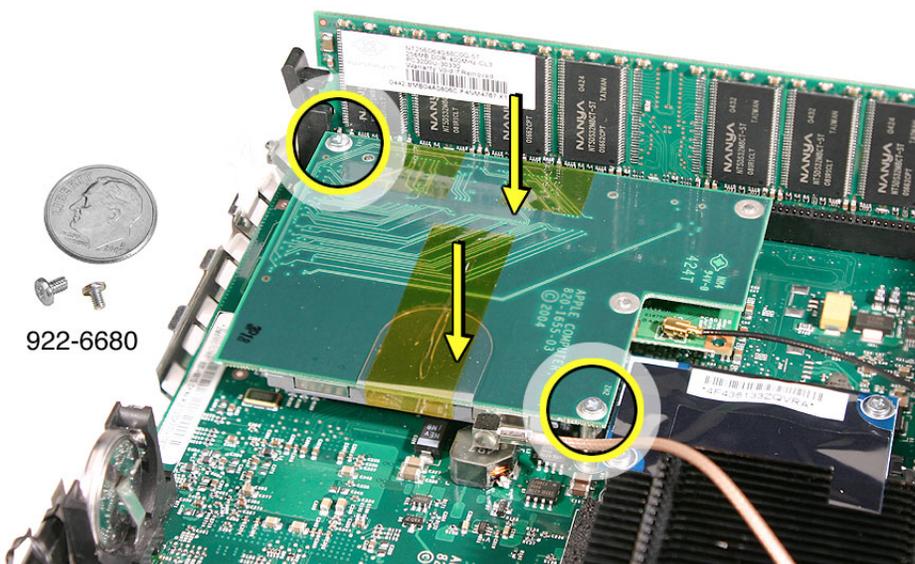


## Replacement Procedure

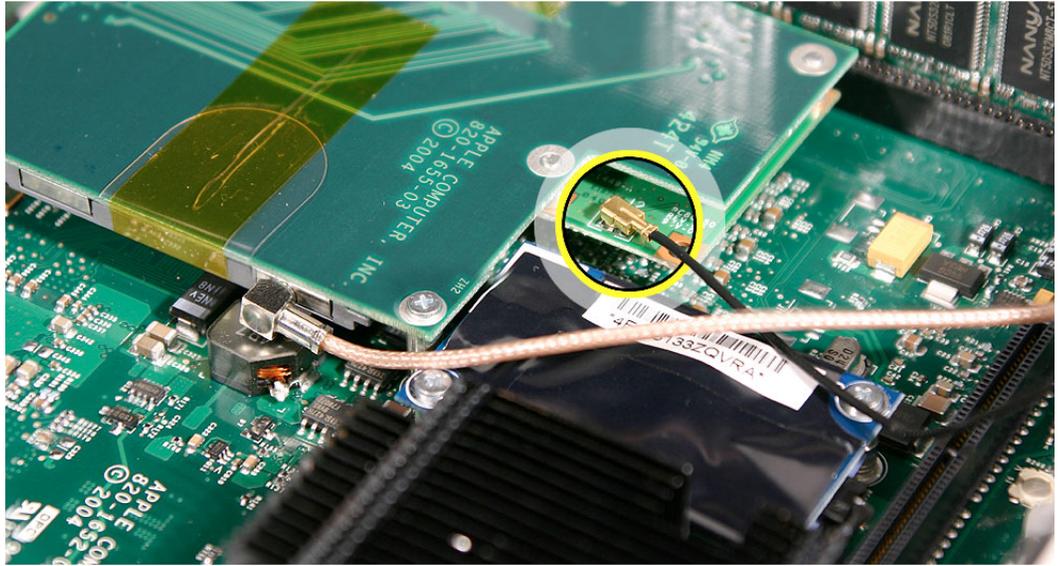
1. Install the Bluetooth board onto the mezzanine board. With a jeweler's #0 Phillips screwdriver replace the two screws.



2. Connect the mezzanine board to the logic board. With a jeweler's #0 Phillips screwdriver replace the two mezzanine board screws.



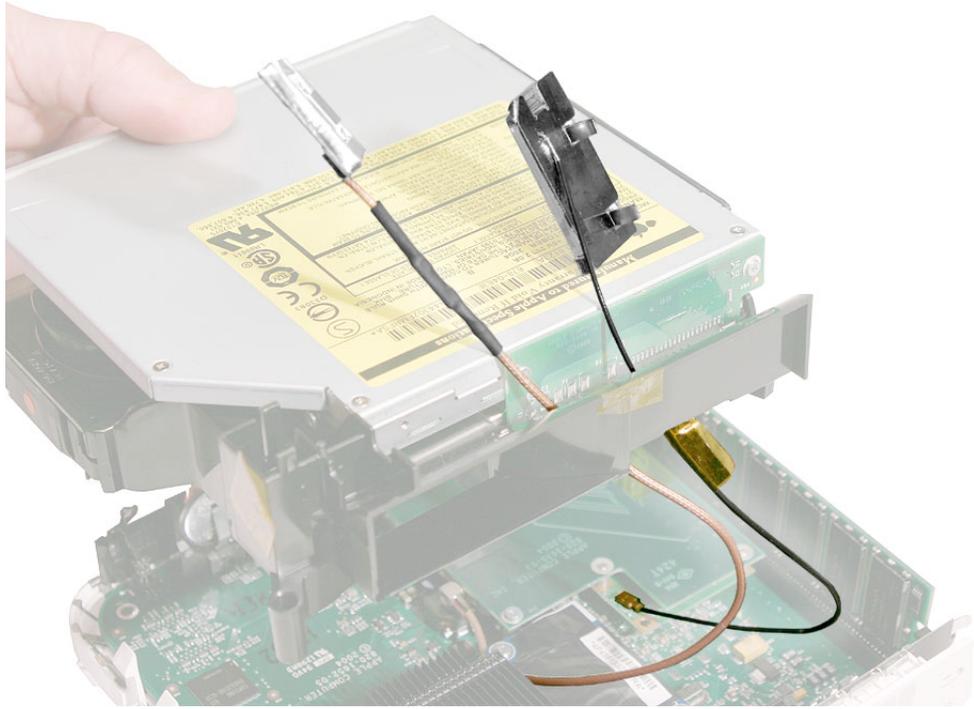
3. Connect the Bluetooth antenna cable to the Bluetooth board. Press the cable firmly onto the Bluetooth board, until it clicks into place. **Note:** The Bluetooth antenna can be connected before installing the mezzanine board.



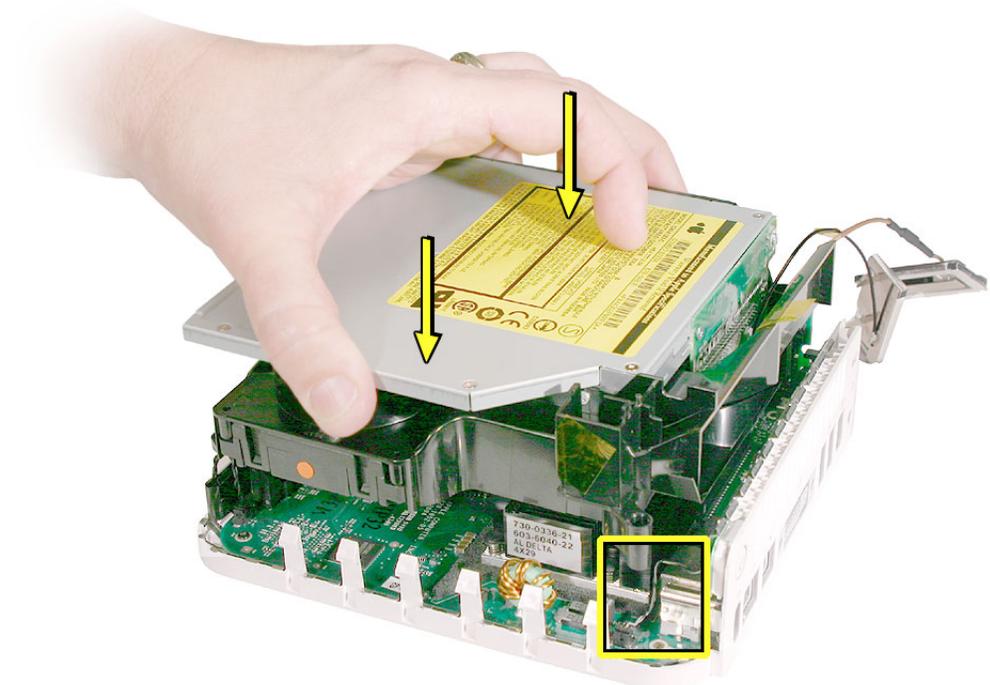
4. Locate the internal frame.



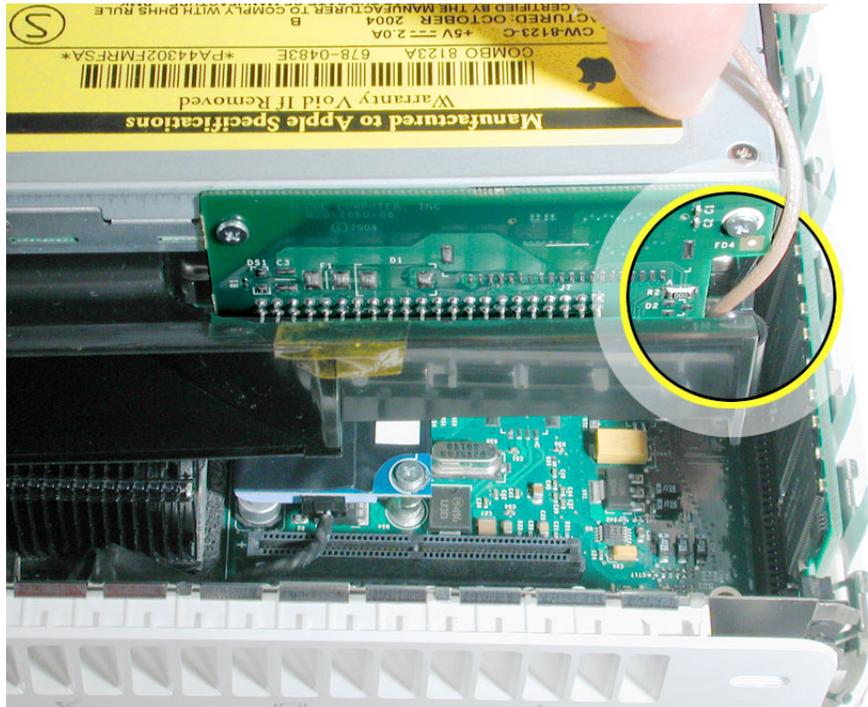
5. Hold the internal frame over the logic board as shown. Route the AirPort and Bluetooth antenna cables through the opening in the internal frame.



6. Lower the internal frame into place. **Note:** Route the power button cable out of the way of the internal frame.



7. Route the antenna cables to the right side of the interconnect board on the internal frame. Lower the internal frame onto the logic board.

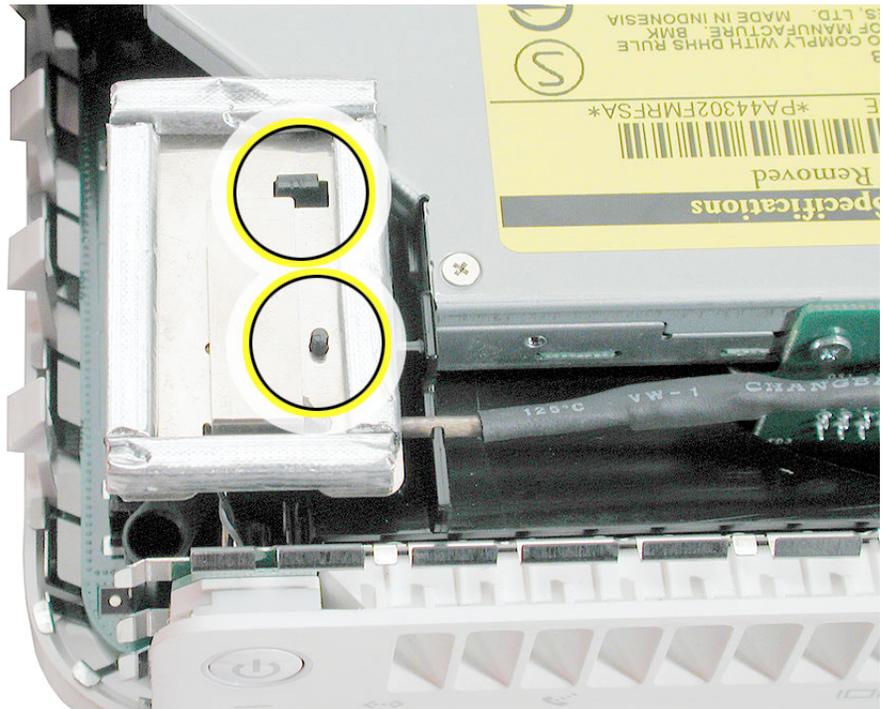


8. Replace the three screws on the internal frame.

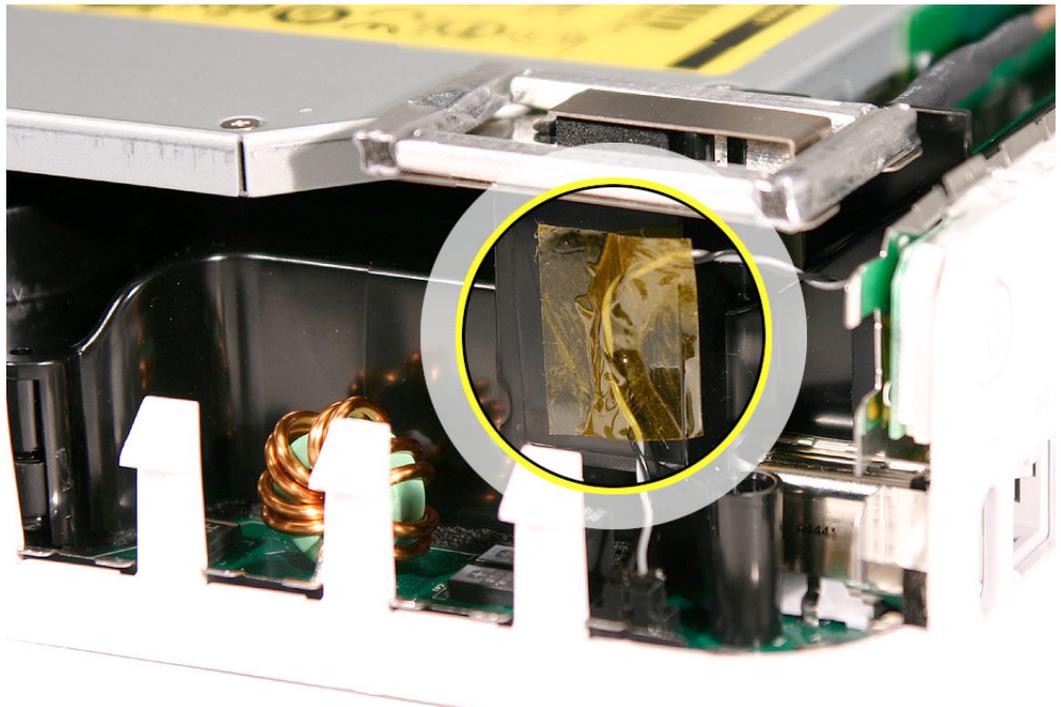




11. Gently fasten the antenna onto the internal frame. The antenna is held in place by the black clip and black post (shown below).



12. Secure the power button cable to the internal frame with the kapton tape.



13. Replace the top housing.



# Antennas, Mezzanine Board, AirPort Extreme/Bluetooth Card

## Tools

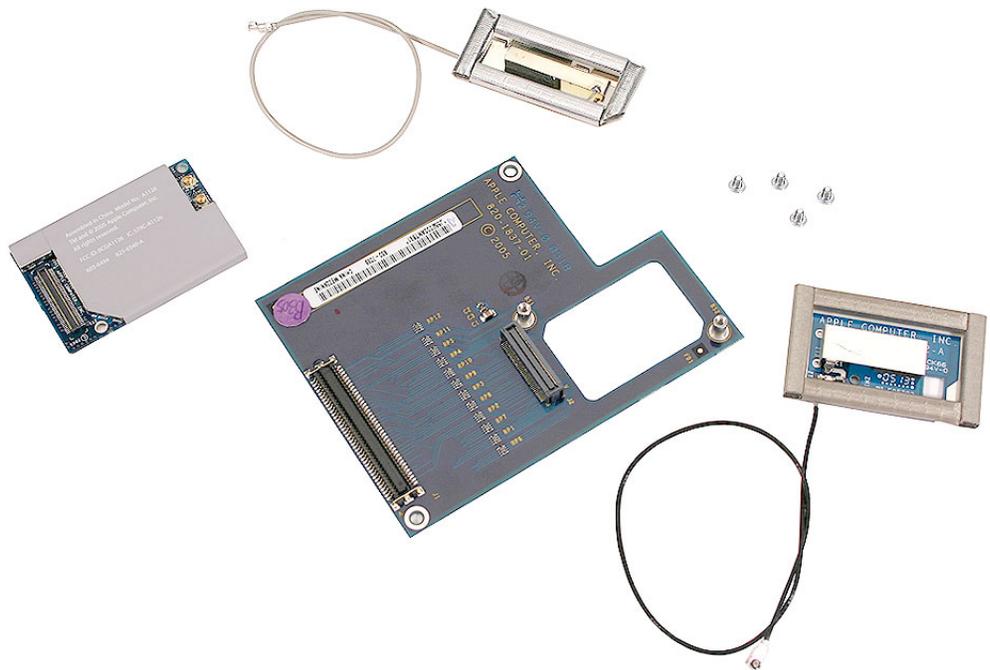
This procedure requires the following tools:

- Black stick (or other nonconductive nylon or plastic tool)
- Jeweler's #0 Phillips screwdriver

## Preliminary Steps

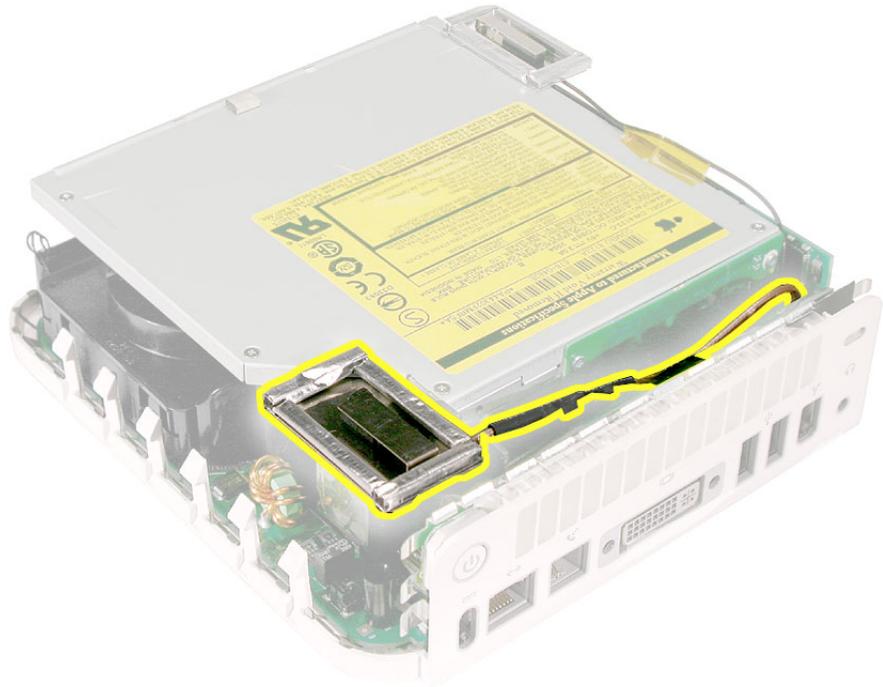
Before you begin, remove the top housing.

## Parts

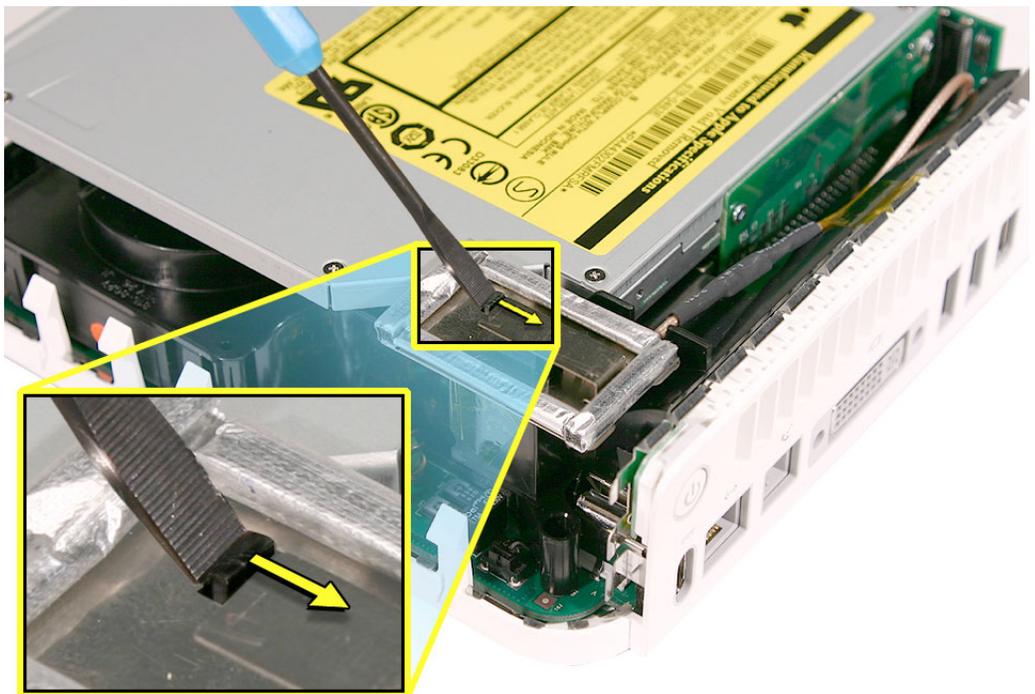


## Removal Procedure

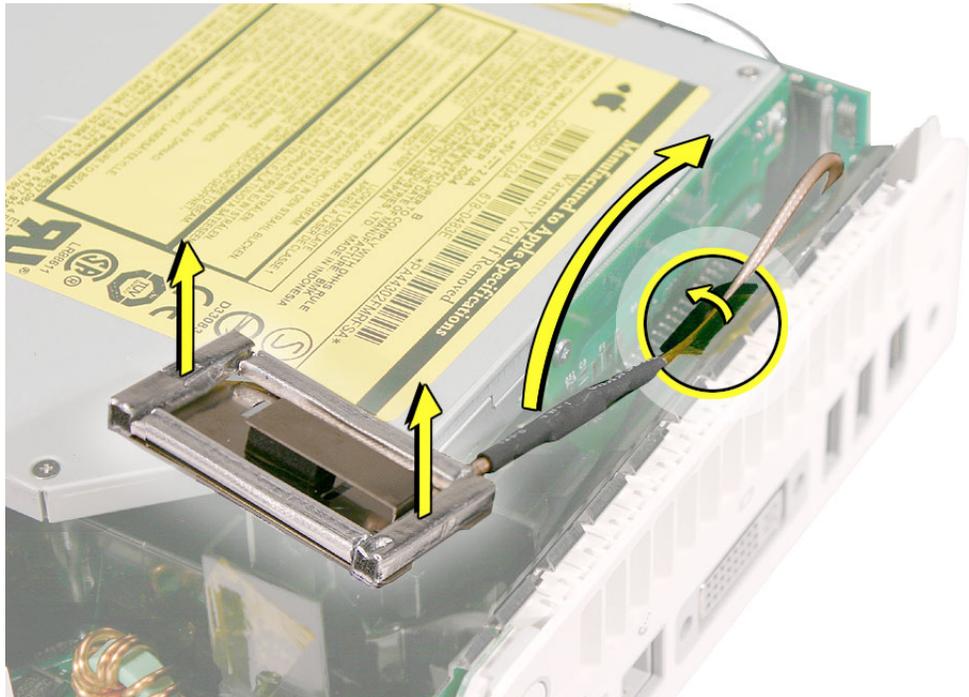
1. Locate the AirPort Extreme antenna.



2. Using a black stick, push the black latch (see inset) toward the I/O ports to release the antenna from the internal frame.



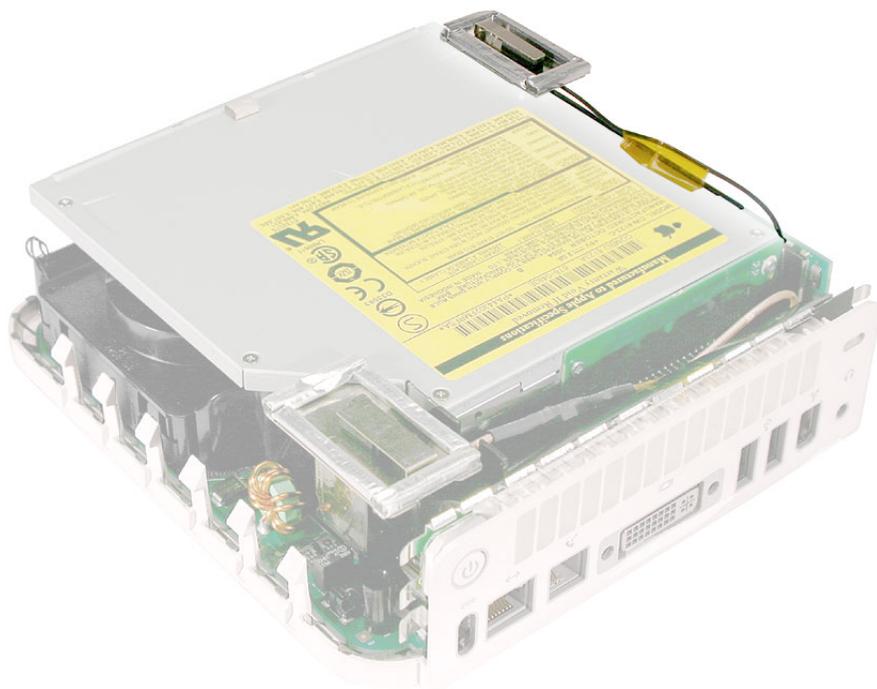
- Carefully lift the antenna up and off the internal frame. Free the antenna from the kapton tape (circled). **Important:** Take care handling the AirPort antenna as a bent or warped antenna will affect AirPort connectivity.



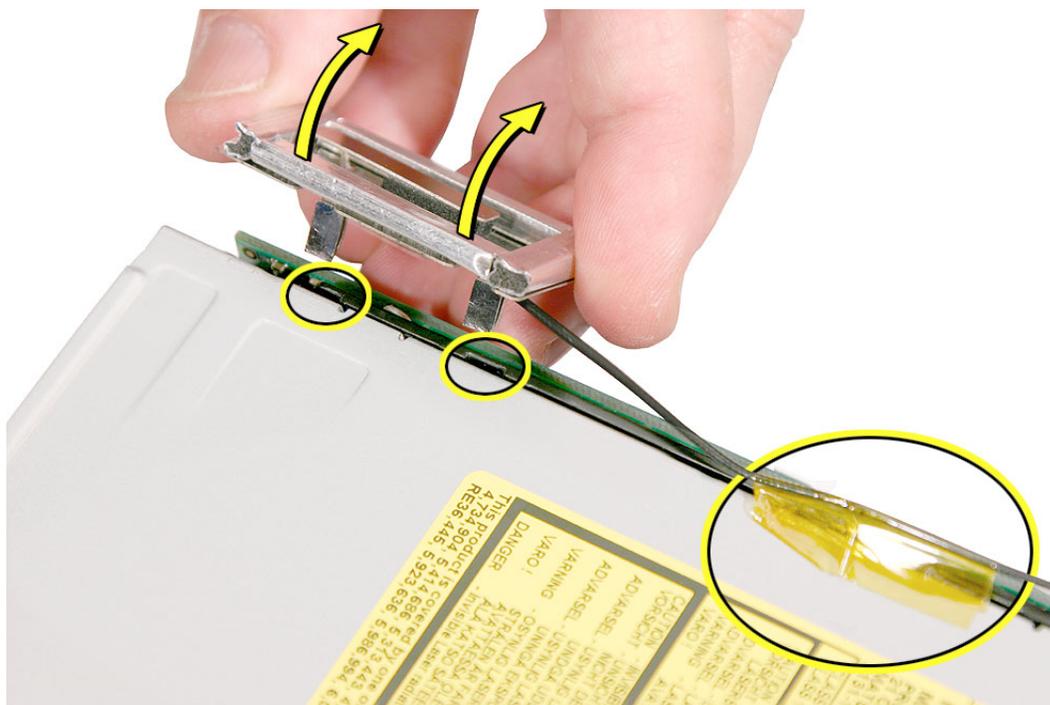
- Set the AirPort antenna off to the side. **Note:** The AirPort Extreme card and antenna cable are connected to the mezzanine board located under the internal frame.



6. Locate the Bluetooth antenna.



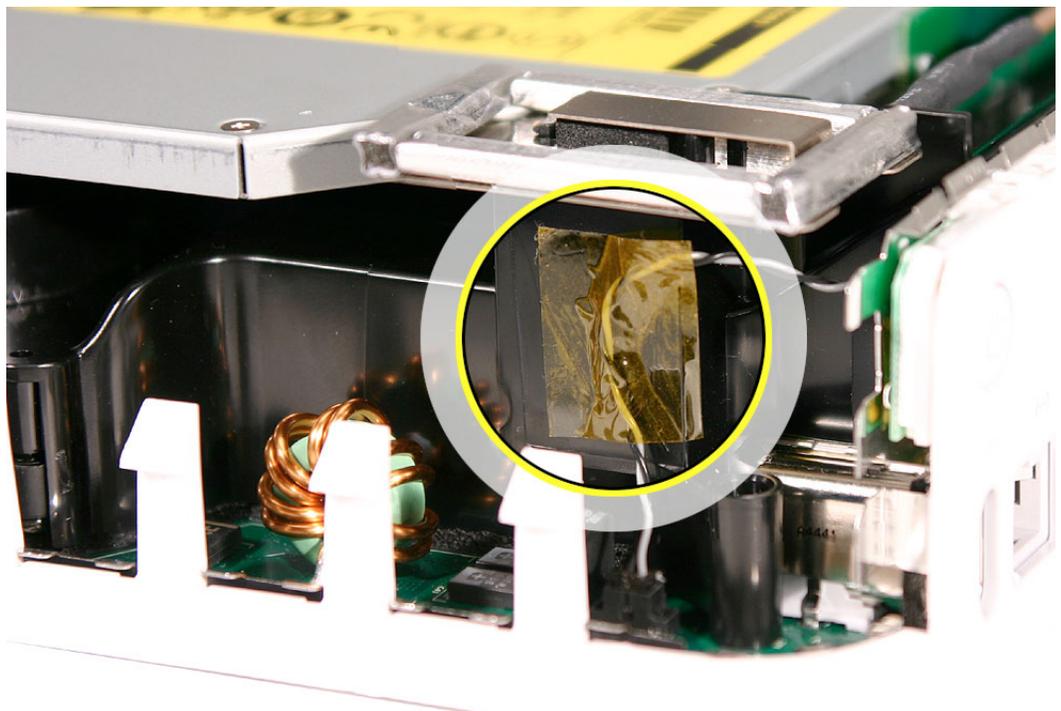
7. Pull the Bluetooth antenna up and out of the openings on the plastic rail. Free the antenna cable from the kapton tape. **Important:** Take care handling the Bluetooth antenna as a bent or warped antenna will affect Bluetooth connectivity.



8. Set the Bluetooth antenna off to the side and out of the way. **Note:** The Bluetooth board is connected to the mezzanine board located under the internal frame.



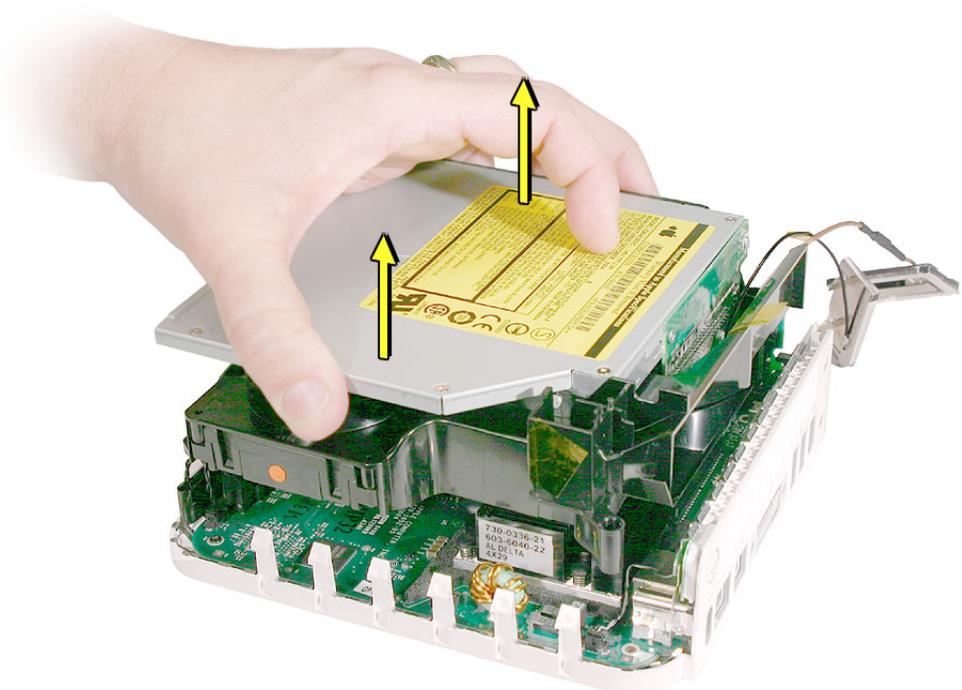
9. Free the power button cable from the kapton tape on the internal frame.



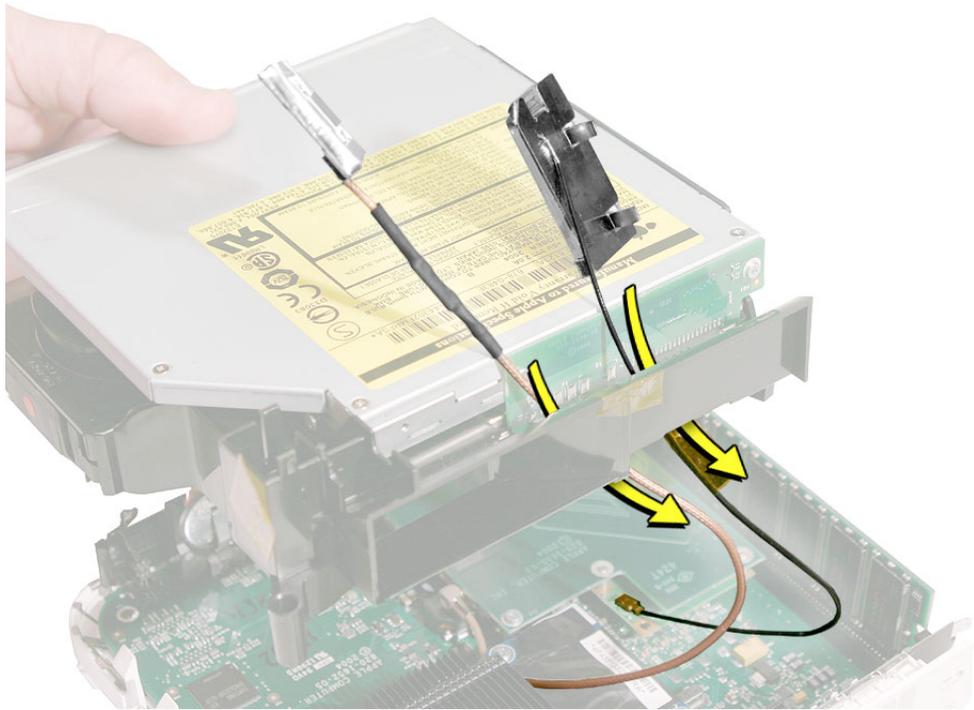
10. With a jeweler's # 0 Phillips screwdriver, remove 3 screws on the internal frame.



11. Lift the internal frame straight up.



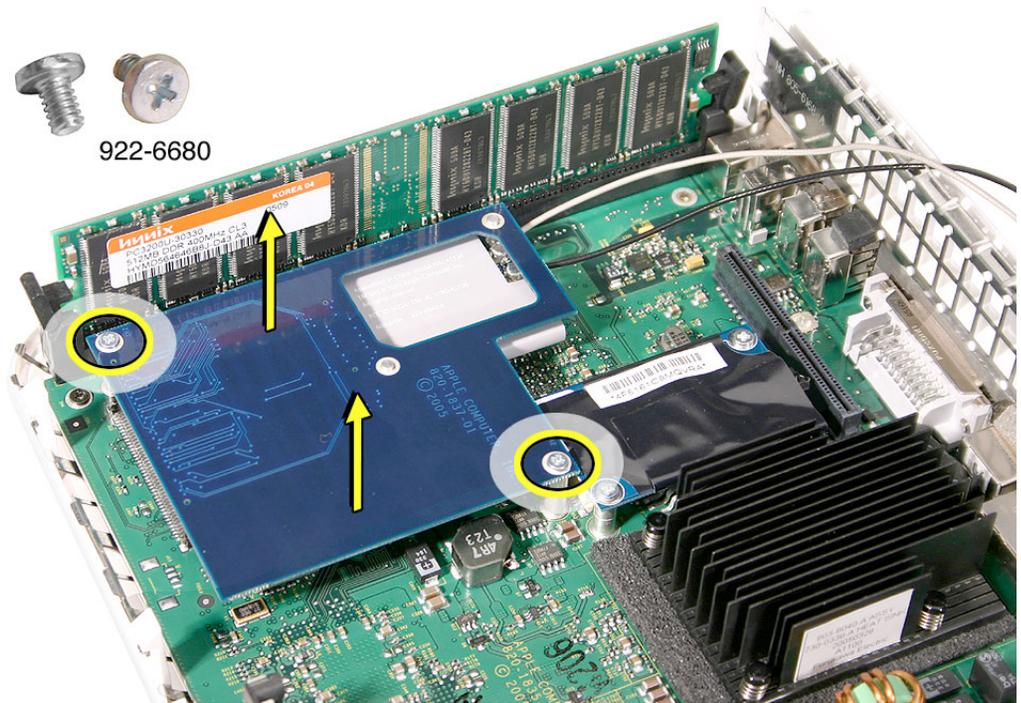
12. Gently guide the Bluetooth and Airport antenna cables down through the opening in the internal frame.



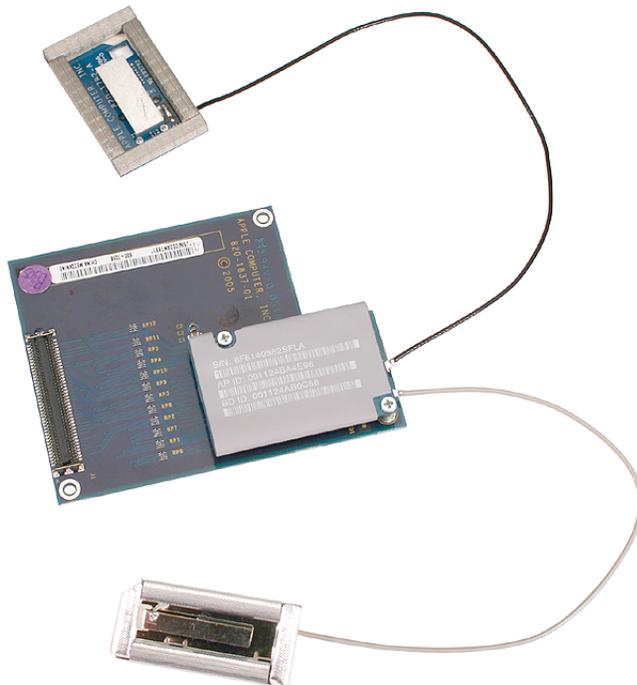
13. Set the internal frame aside.



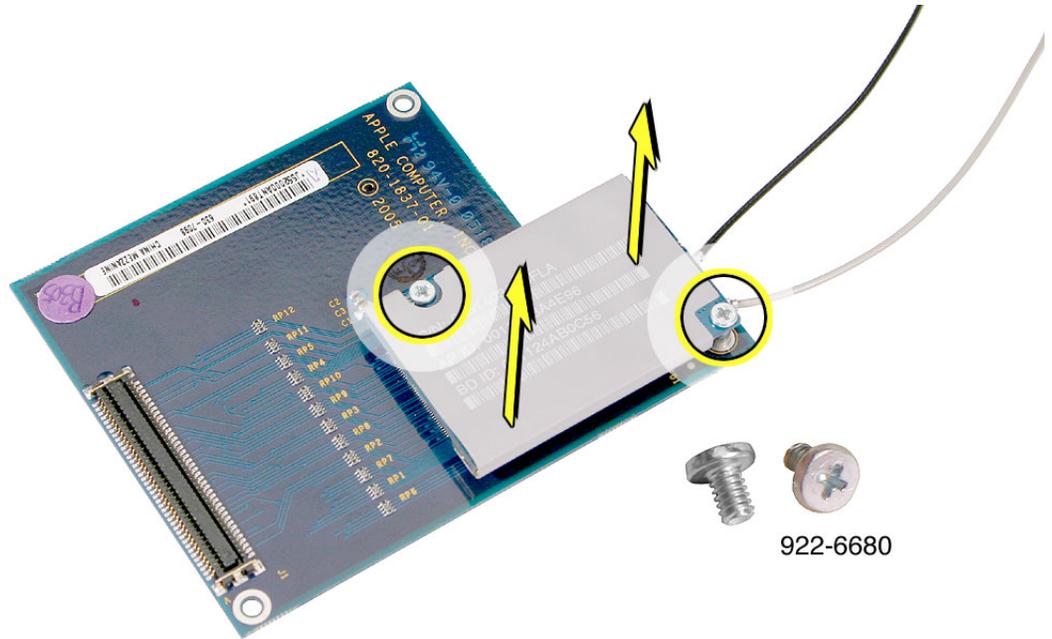
14. Locate the mezzanine board on the logic board. To access the AirPort Extreme/Bluetooth card remove the two screws on the mezzanine board with a jeweler's # 0 Phillips screwdriver. Pull the mezzanine board straight up and off the logic board connector.



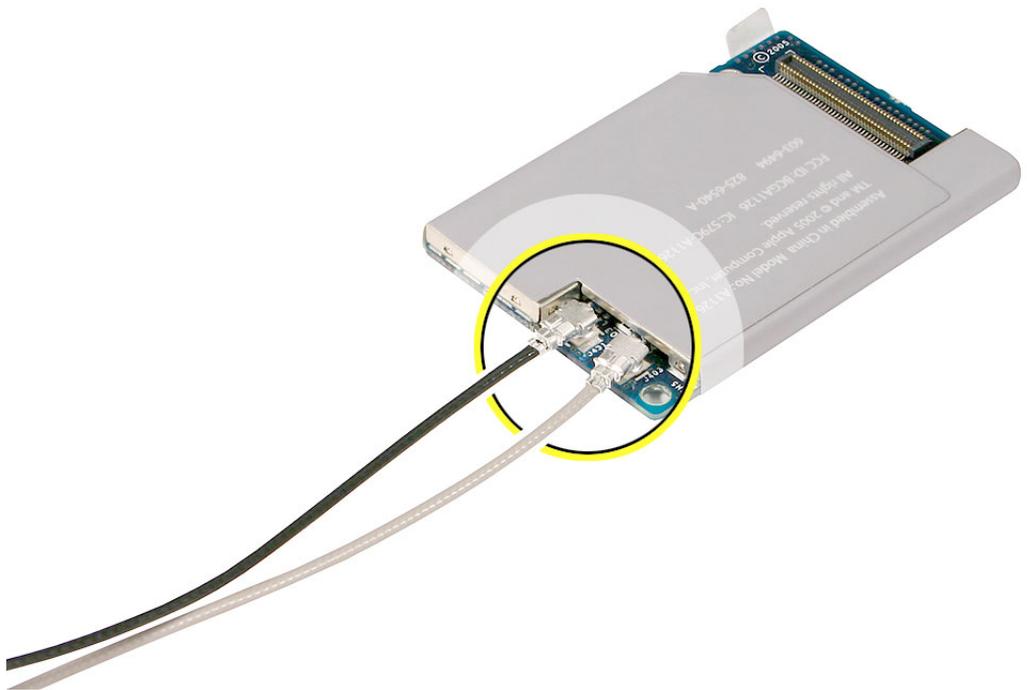
15. Turn the mezzanine board over to access the screws on the AirPort Extreme/Bluetooth card.



16. Remove the screws connecting the AirPort/Bluetooth card to the mezzanine board.

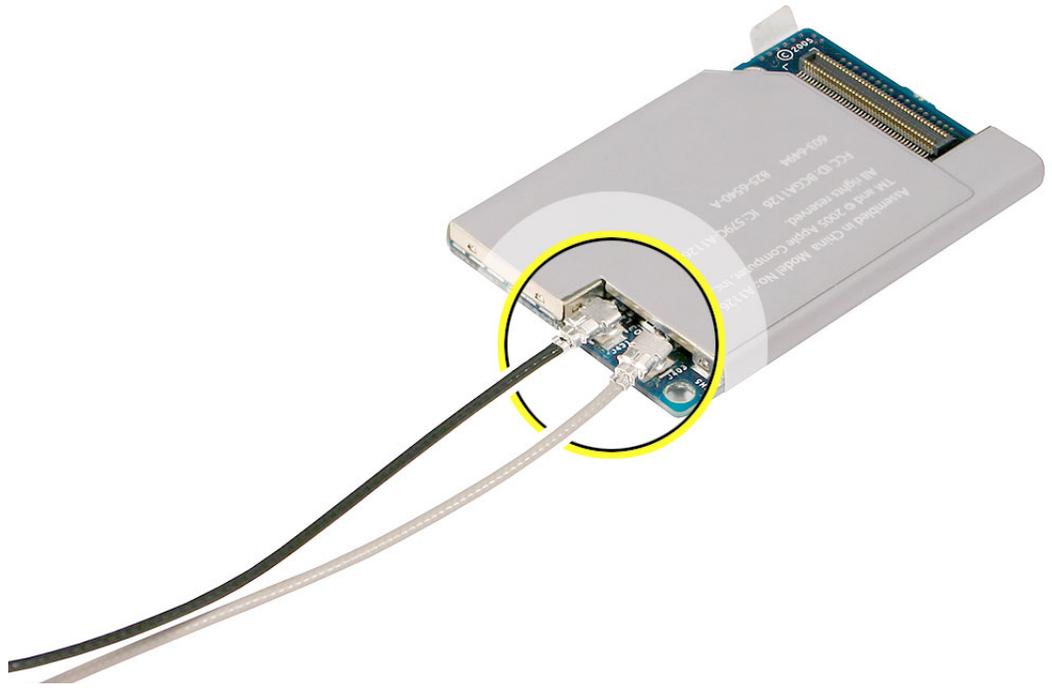


17. Disconnect the antenna(s) from the AirPort Extreme/Bluetooth card. The silver cable is for Bluetooth and the black cable is for AirPort Extreme.

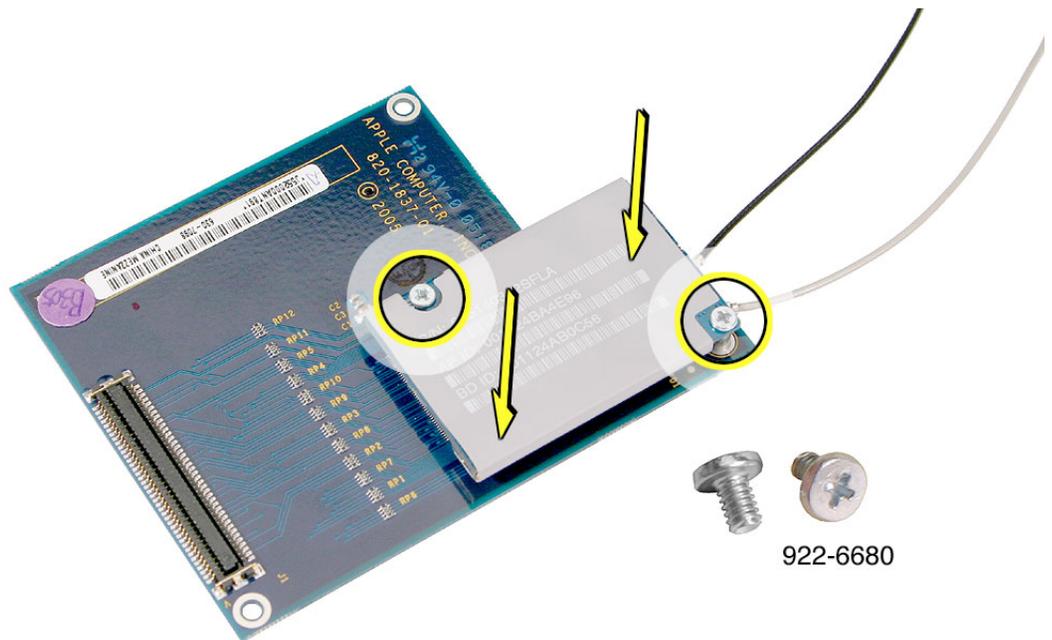


## Replacement Procedure

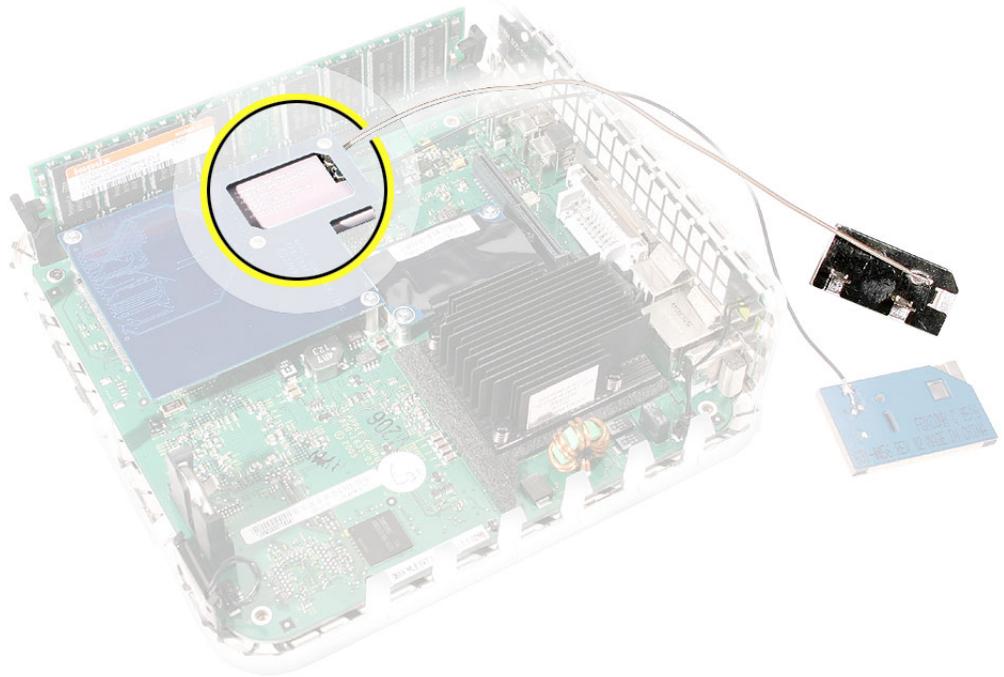
1. Connect the antennas to the AirPort Extreme/Bluetooth card.



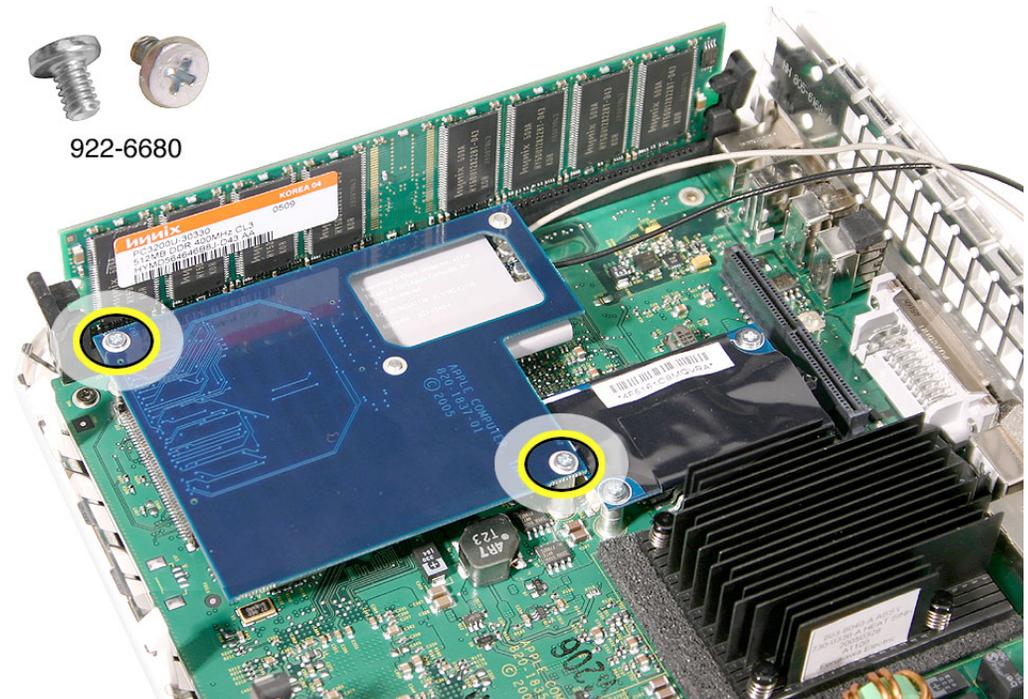
2. Connect the AirPort Extreme/Bluetooth card to the mezzanine board. Replace the two screws on the AirPort Extreme/Bluetooth card.



3. Position the AirPort/Bluetooth card onto the mezzanine board.

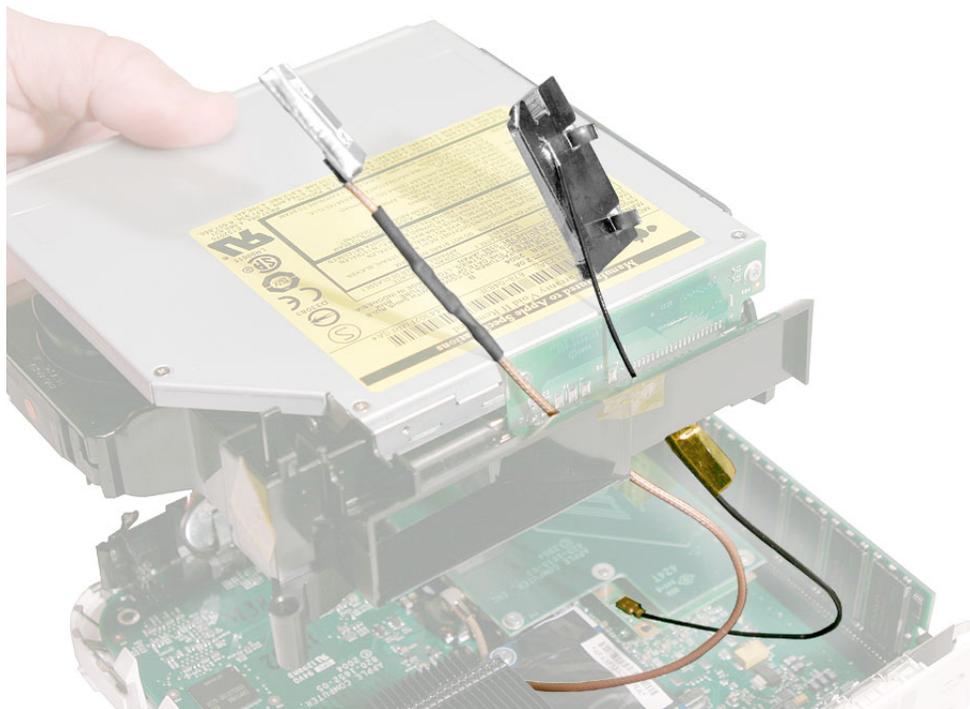


4. Replace the mezzanine board screws.

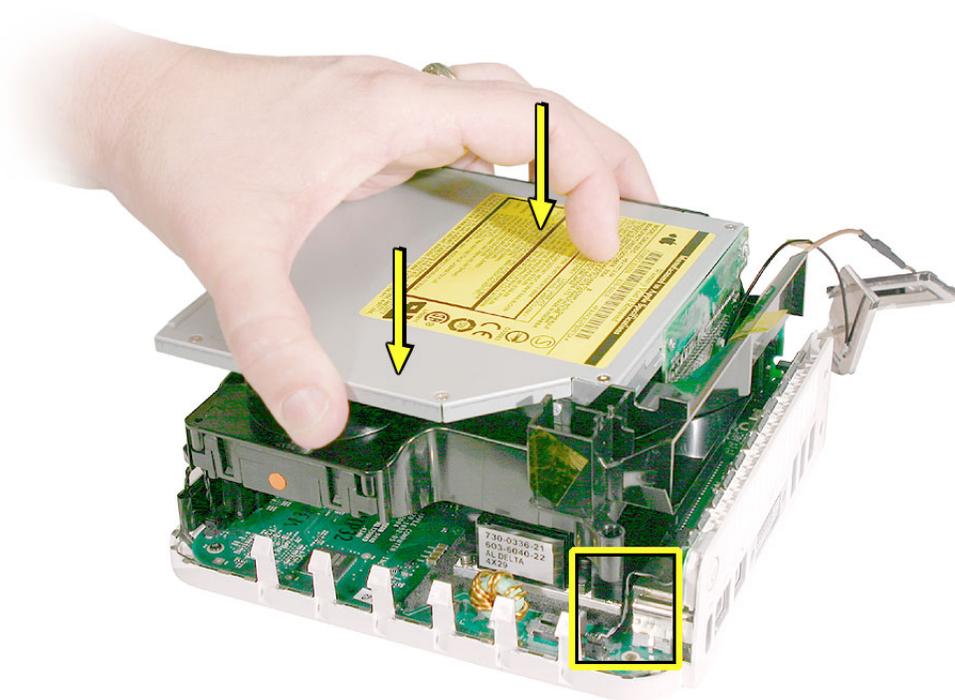


5. Replace the internal frame.

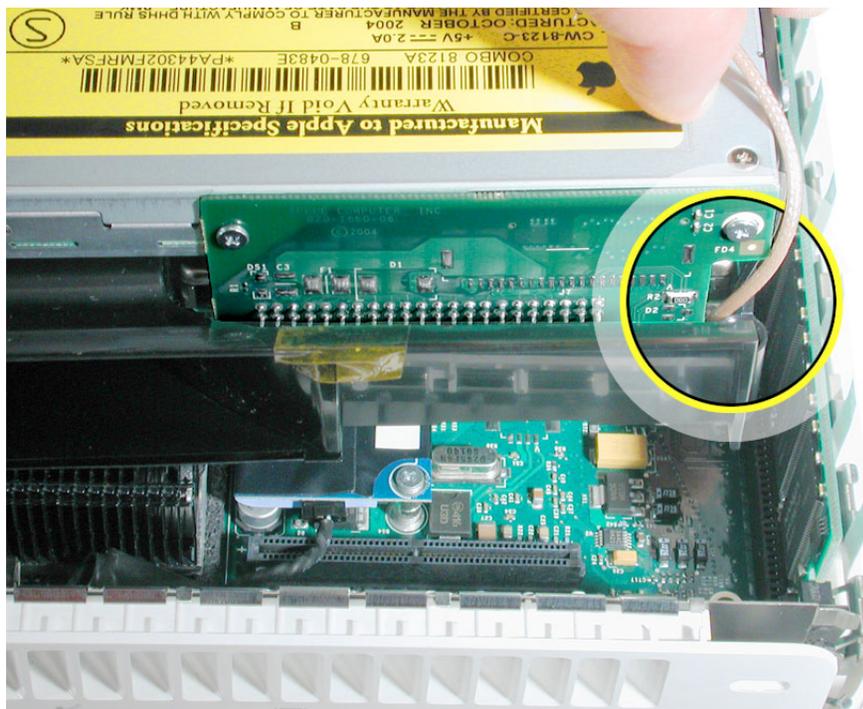
Hold the internal frame over the logic board as shown. Route the AirPort and Bluetooth antenna cables up through the opening in the internal frame.



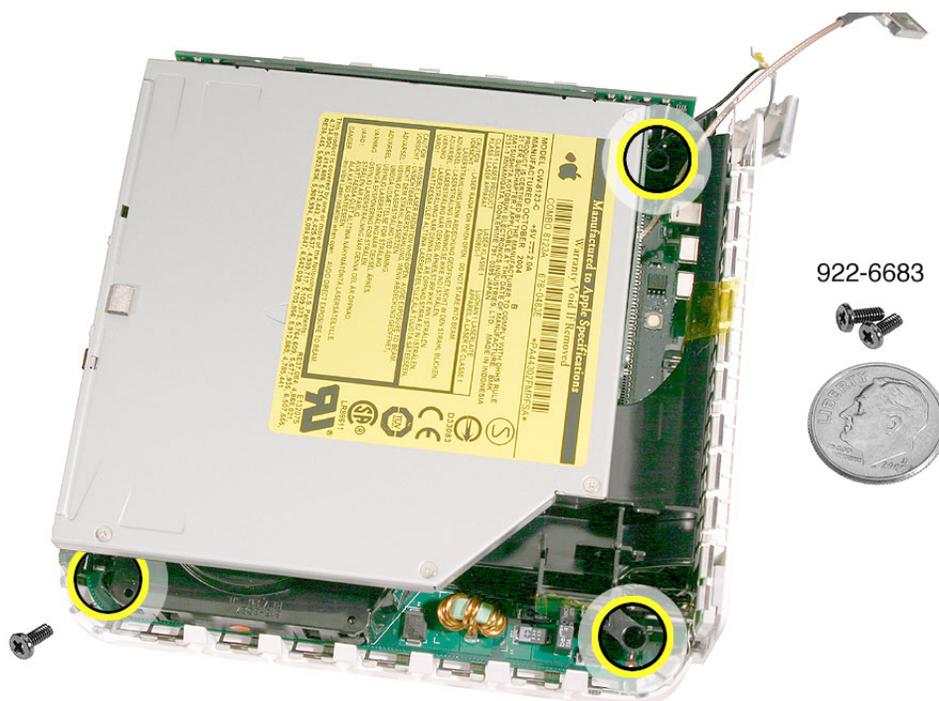
6. Lower the internal frame into place. **Note:** Route the power button cable out of the way of the internal frame.



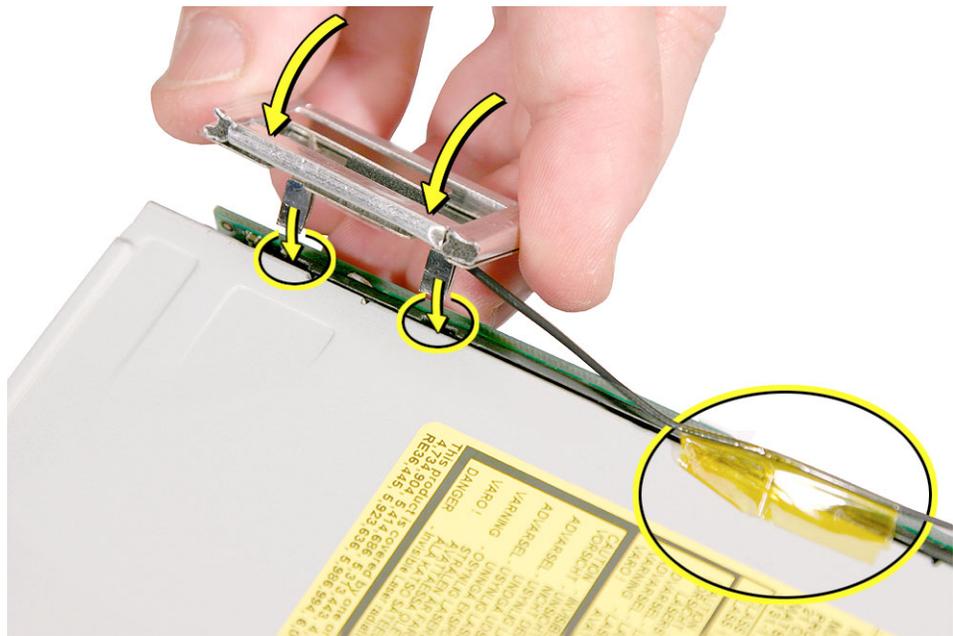
7. Route the antenna cables to the right side of the interconnect board on the internal frame as you continue lowering the internal frame onto the logic board.



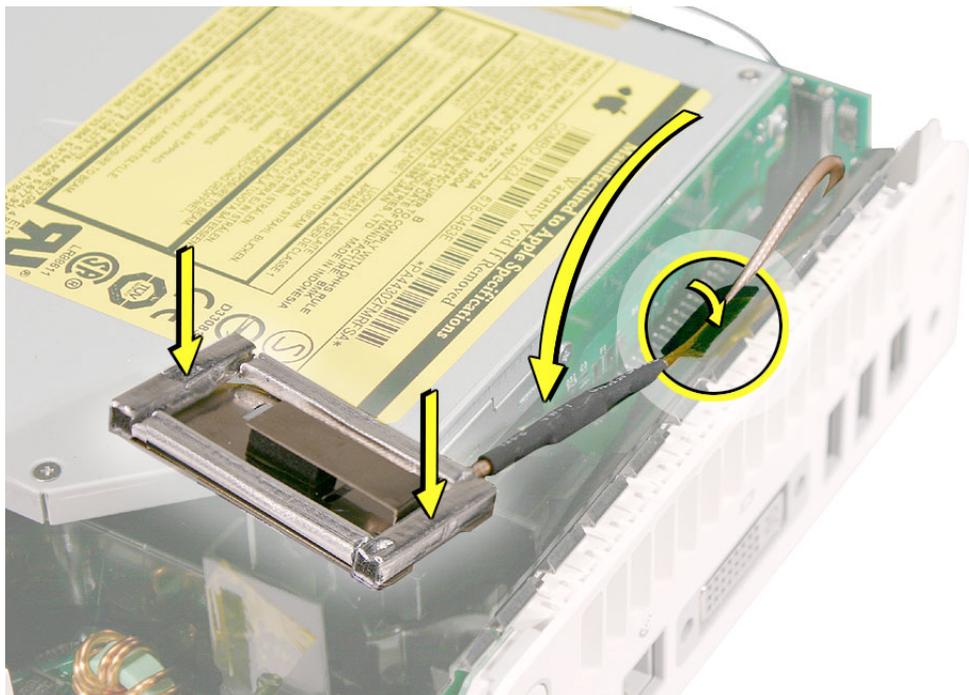
8. Replace the three screws on the internal frame.



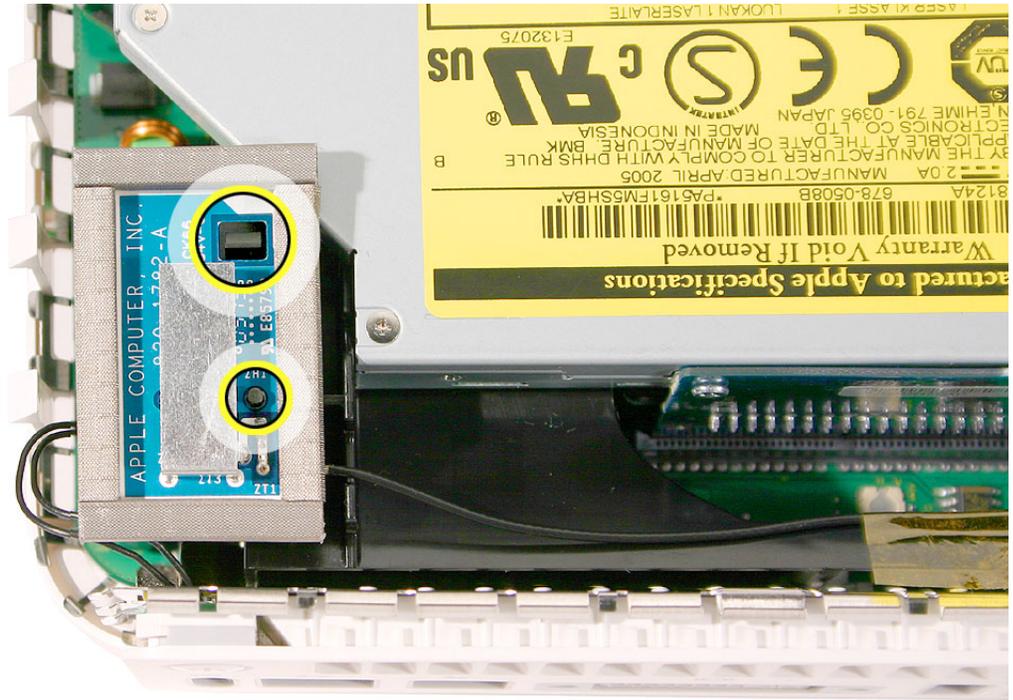
9. Replace the Bluetooth antenna. Secure the antenna cable with kapton tape. **Important:** Take care handling the Bluetooth antenna as a bent or warped antenna will affect Bluetooth connectivity.



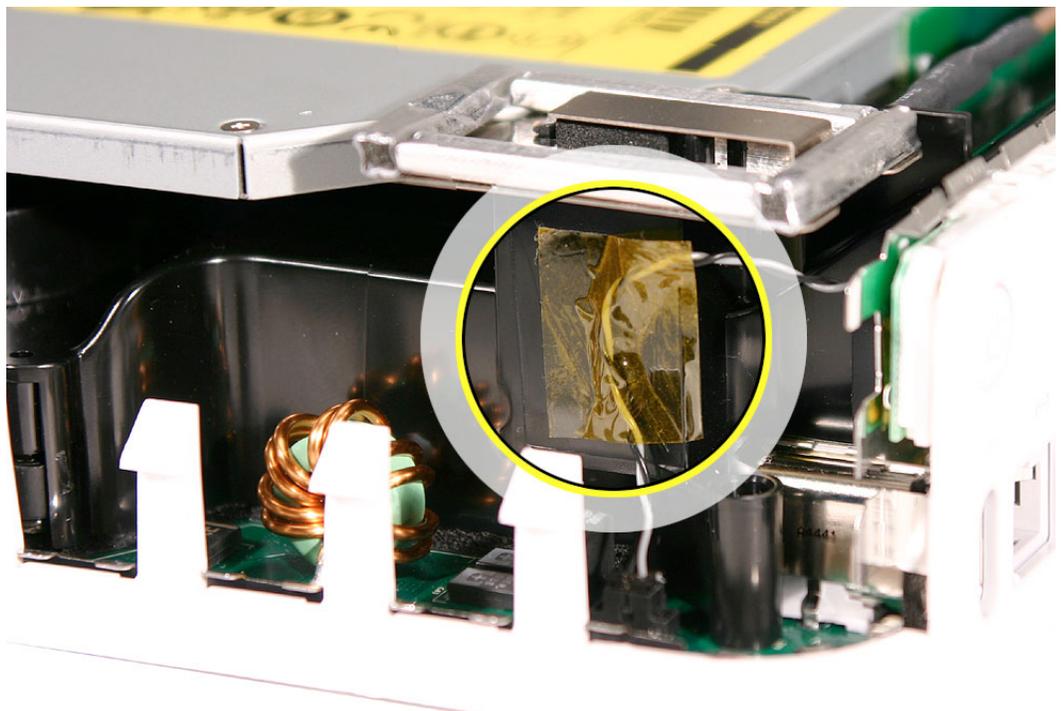
10. Replace the AirPort Extreme antenna. Secure the cable with kapton tape. **Important:** Take care handling the AirPort antenna as a bent or warped antenna will affect AirPort connectivity.



11. Gently fasten the antenna onto the internal frame. The antenna is held in place by the black clip and black post (shown below).



12. Secure the power button cable to the internal frame with the kapton tape.



13. Replace the top housing.



# Internal Frame

## Tools

The only tool required for this procedure is a Phillips #0 screwdriver.

## Preliminary Steps

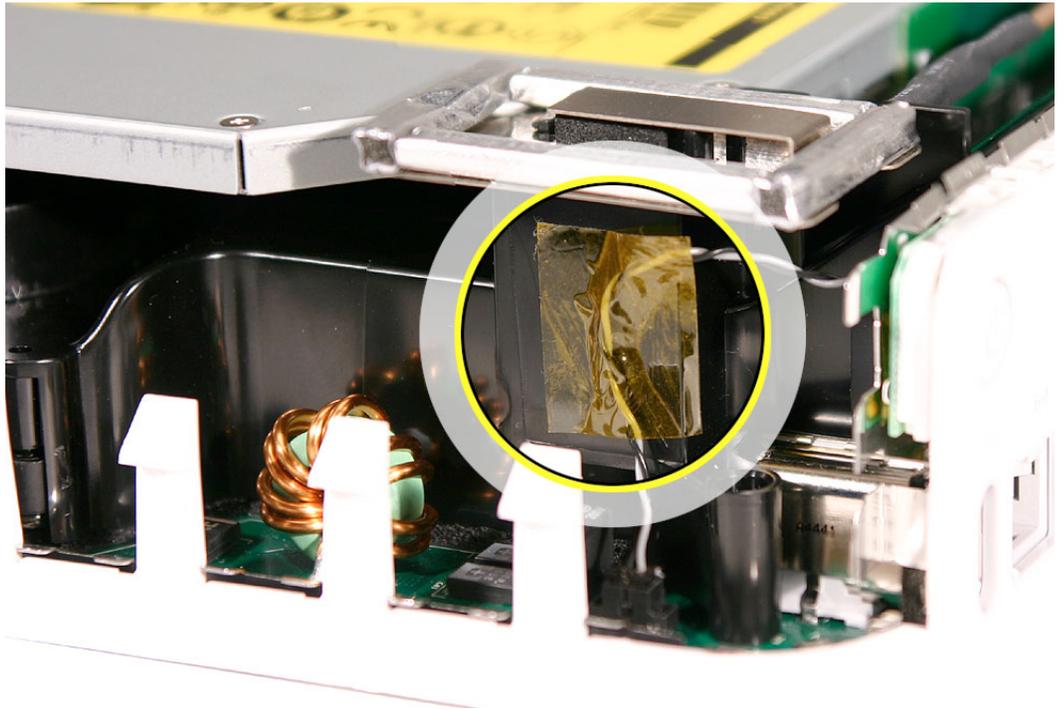
Before you begin, remove the top housing.

## Part Location

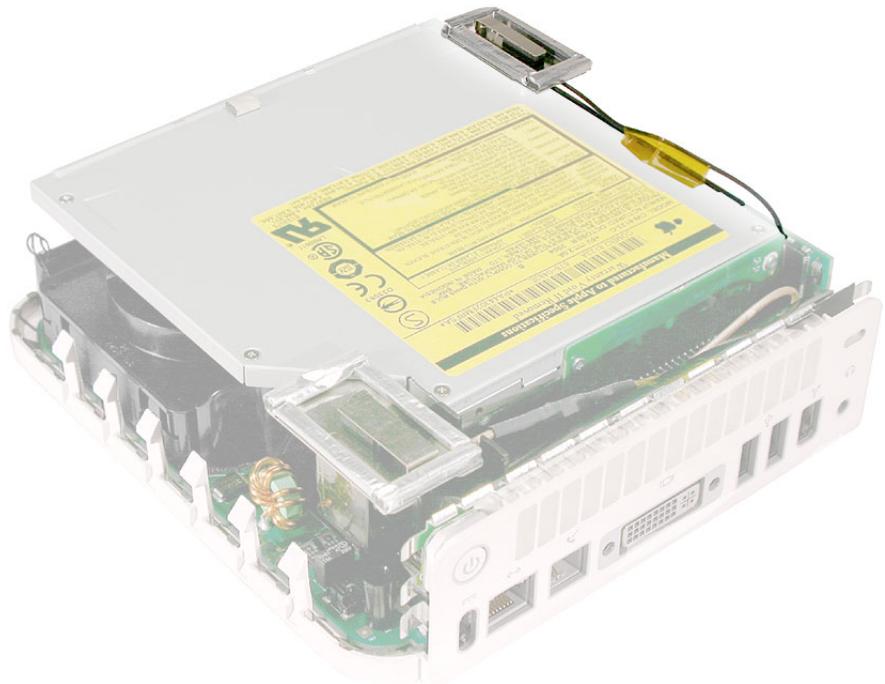


## Removal Procedure

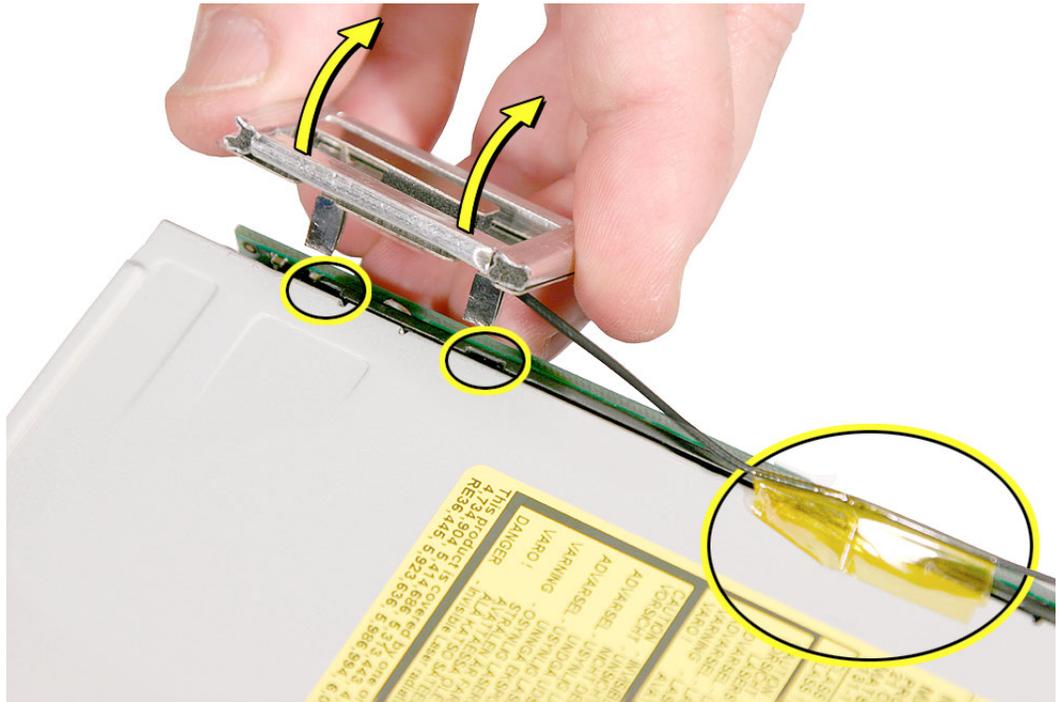
1. Free the power button cable from the kapton tape on the internal frame.



2. Locate the Bluetooth antenna.



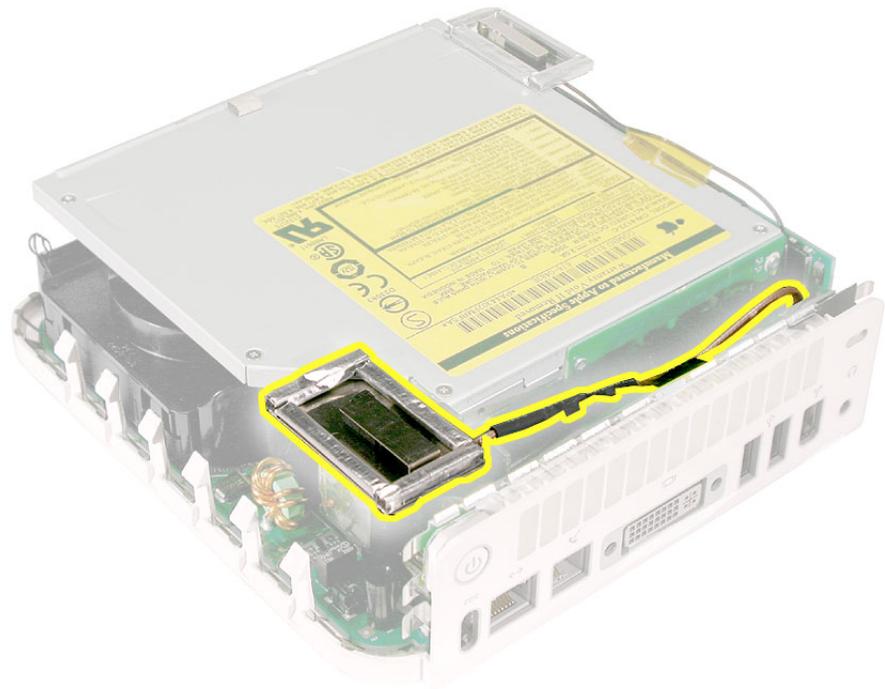
3. Pull the Bluetooth antenna up and out of the openings on the plastic rail. Free the antenna cable from the kapton tape. **Important:** Take care handling the Bluetooth antenna as a bent or warped antenna will affect Bluetooth connectivity.



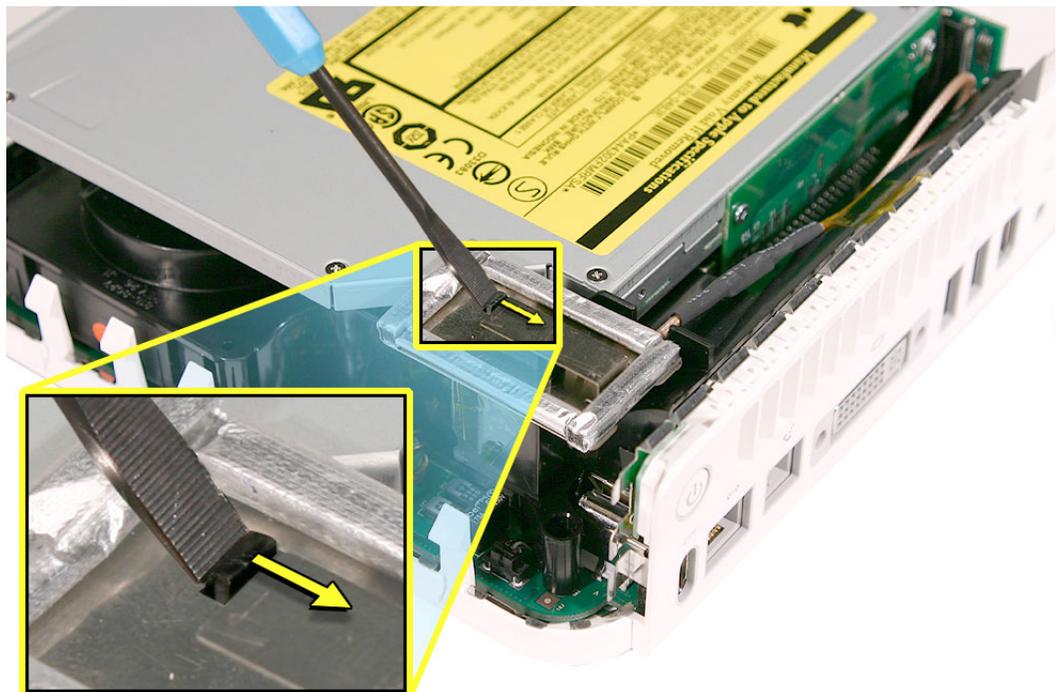
4. Set the Bluetooth antenna off to the side and out of the way. **Note:** The Bluetooth board and antenna cable are connected to the mezzanine board located under the internal frame.



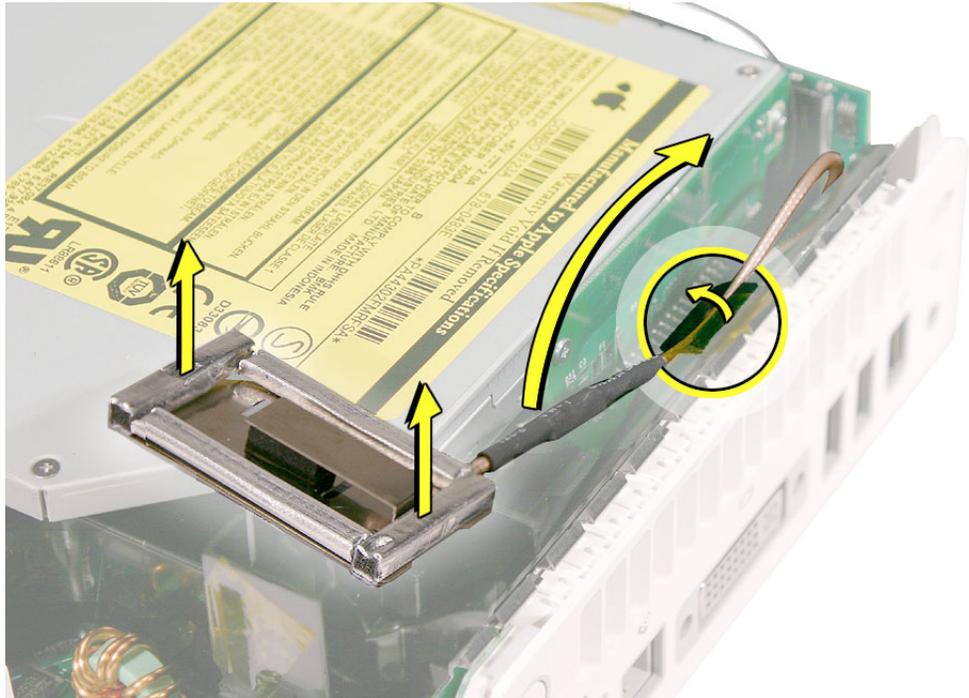
5. Locate the AirPort antenna.



6. Using the black stick push the black latch (see inset) toward the I/O ports to release the antenna from the internal frame.



- Carefully lift the antenna off the frame. Free the antenna from the kapton tape (circled). **Important:** Take care handling the AirPort antenna as a bent or warped antenna will affect AirPort connectivity



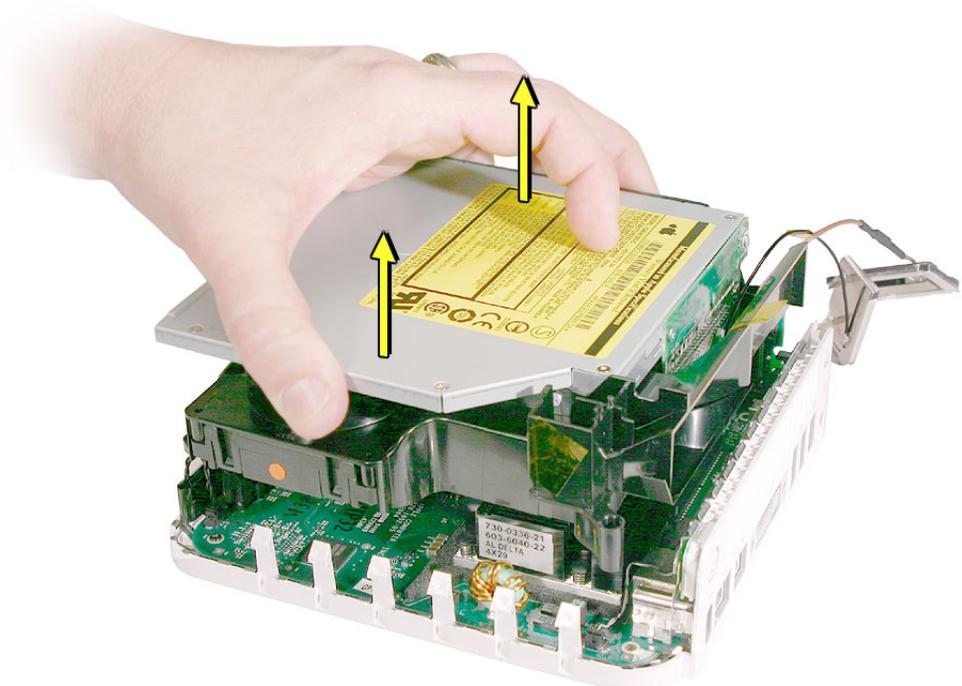
- Set the AirPort antenna off to the side. **Note:** The AirPort card and antenna cable are connected to the mezzanine board located under the internal frame.



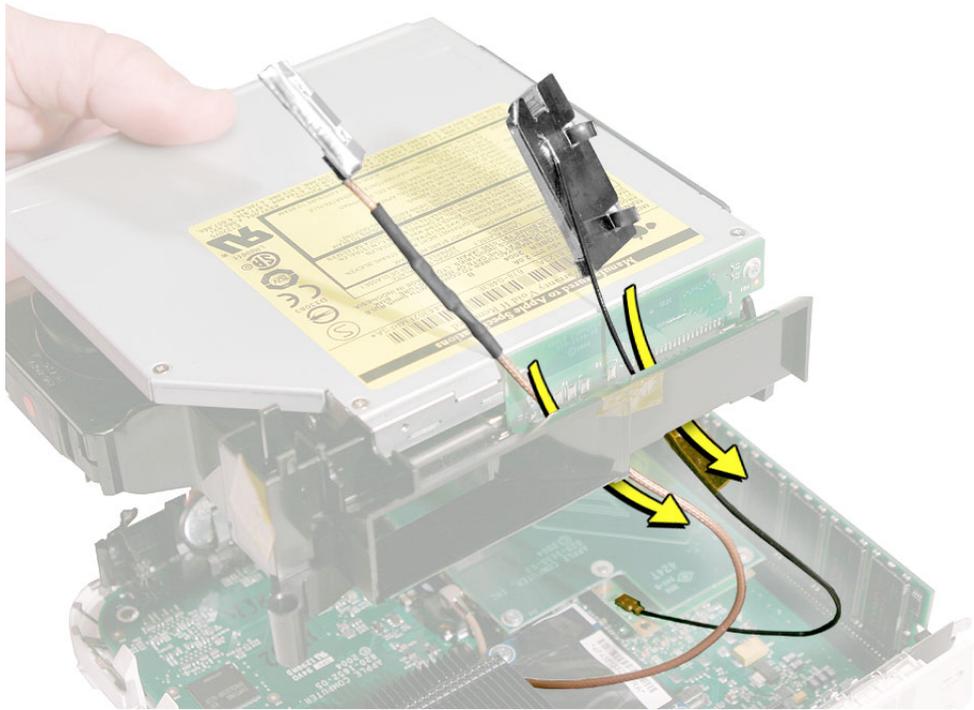
9. With a jeweler's # 0 Phillips screwdriver remove three screws on the internal frame.



10. Lift the internal frame straight up.



11. Gently guide the Bluetooth and Airport antenna cables down through the opening in the frame. Set the antenna cables off to the side.



12. The following parts are connected to the internal frame (black plastic):

- hard drive
- optical drive
- fan
- speaker
- interconnect board

Refer to the individual take-apart procedures to remove or replace any of these parts.



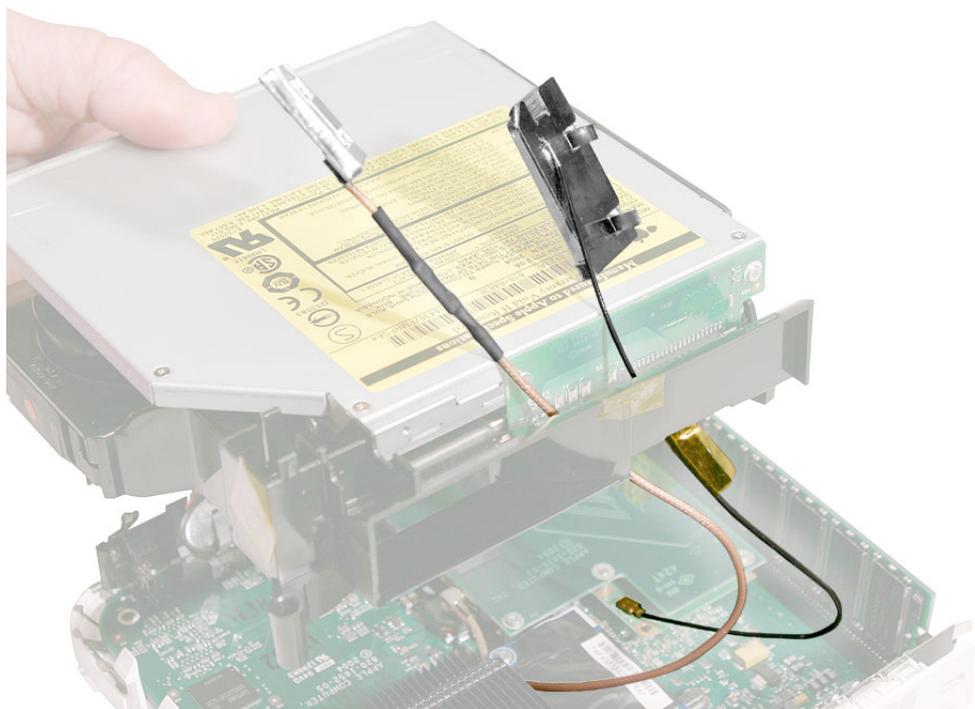
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## Replacement Procedure

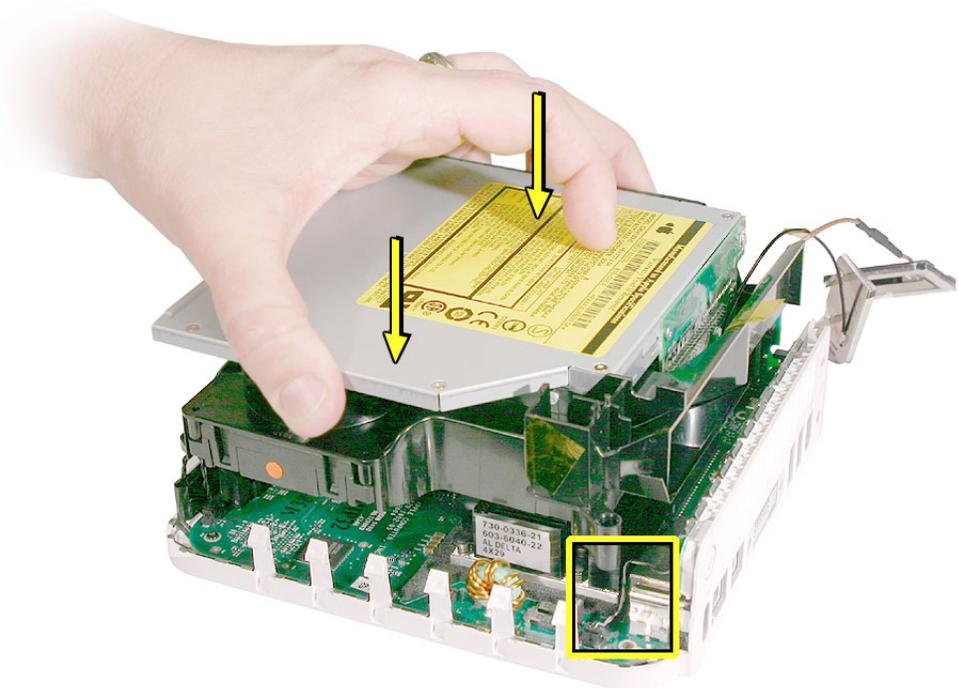
1. If you removed any service parts from the internal frame, replace them.



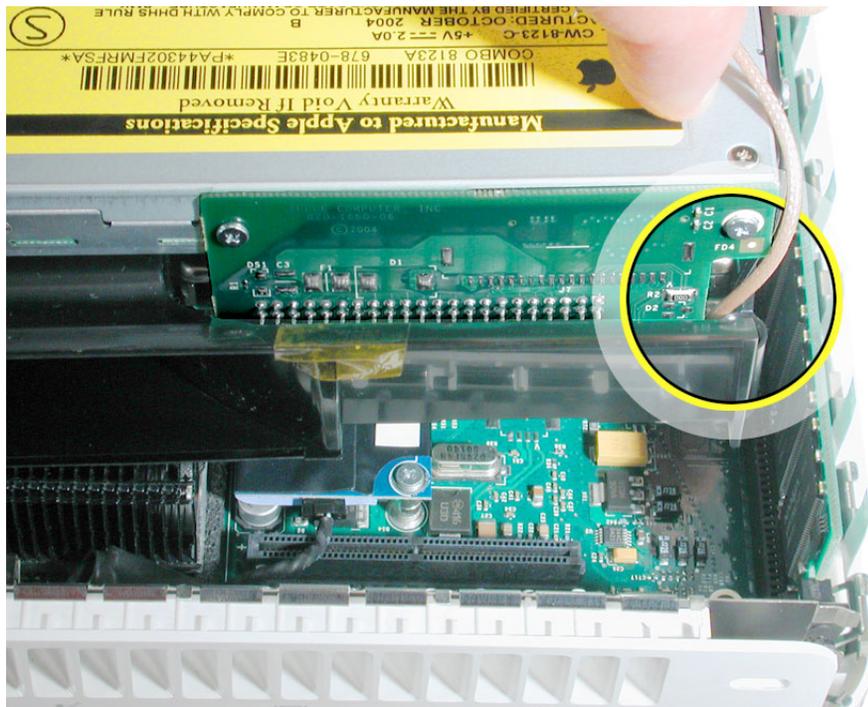
2. Hold the internal frame over the logic board as shown. Route the AirPort and Bluetooth antenna cables up through the opening in the internal frame.



3. Lower the internal frame into place. **Note:** Route the power button cable out of the way of the internal frame.

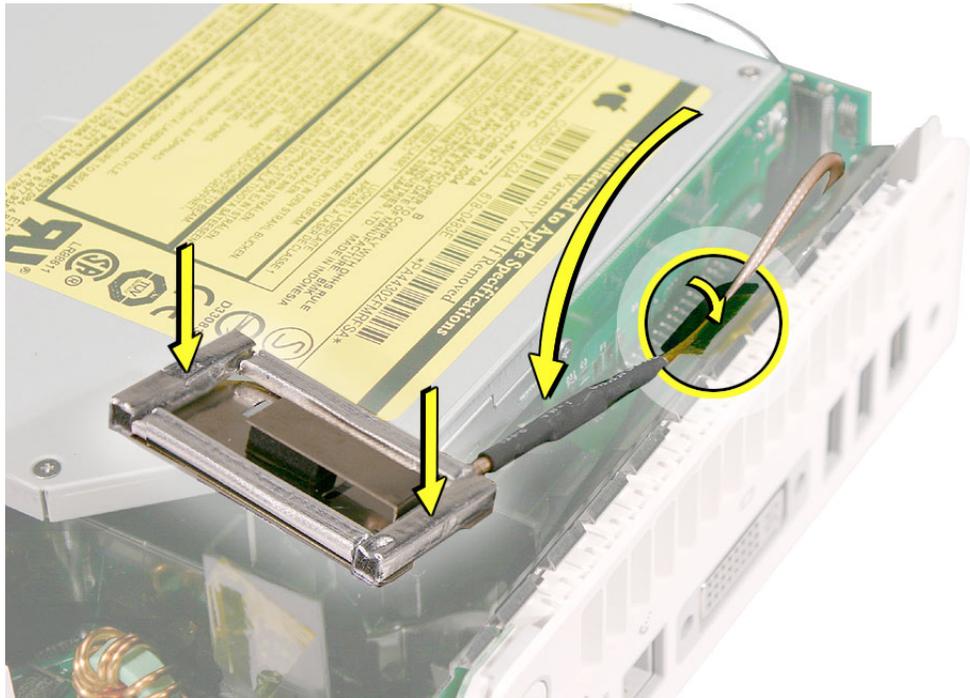


4. Route the antenna cables to the right side of the interconnect board on the internal frame as you continue lowering the internal frame onto the logic board.

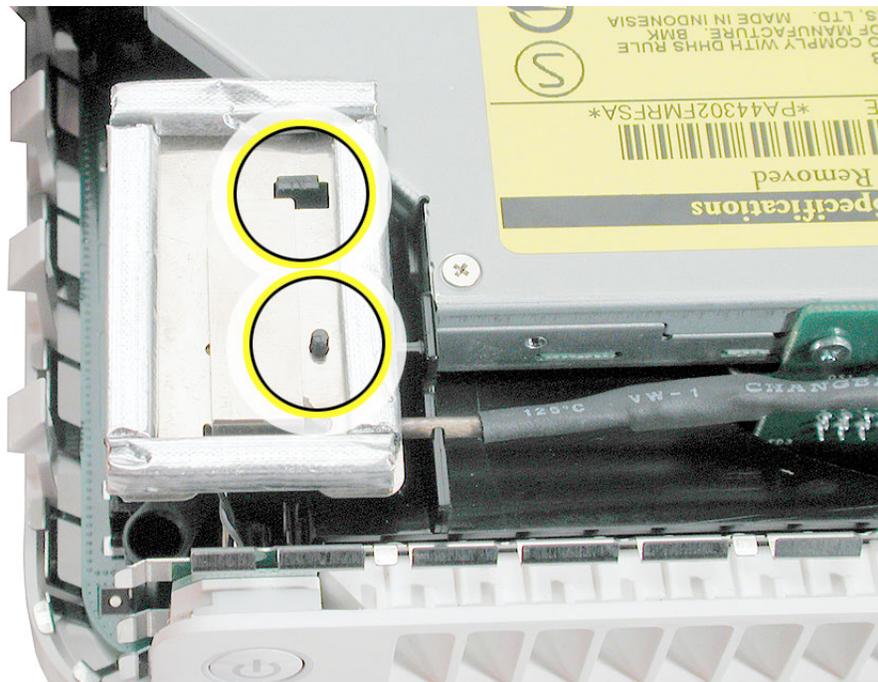




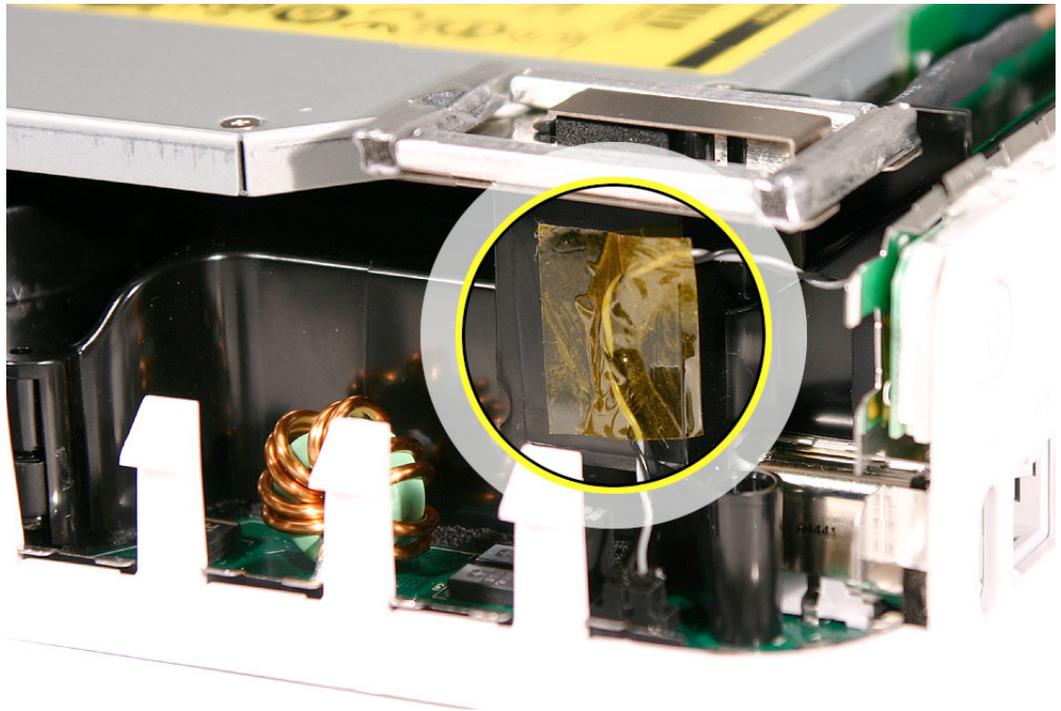
7. Replace the AirPort Extreme antenna and secure the cable with kapton tape  
**Important:** Take care handling the AirPort antenna as a bent or warped antenna will affect AirPort connectivity.



8. Gently fasten the antenna onto the internal frame. The antenna is held in place by the black clip and black post (shown below).



9. Secure the power button cable to the internal frame with the kapton tape.



10. Replace the top housing.



# Hard Drive

## Tools

This procedure requires the following tools:

- Phillips #2 screwdriver
- Phillips #2 screwdriver, angled
- Phillips #0 screwdriver

## Preliminary Steps

Before you begin, remove the top housing and the internal frame.

## Part Location



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## Removal Procedure

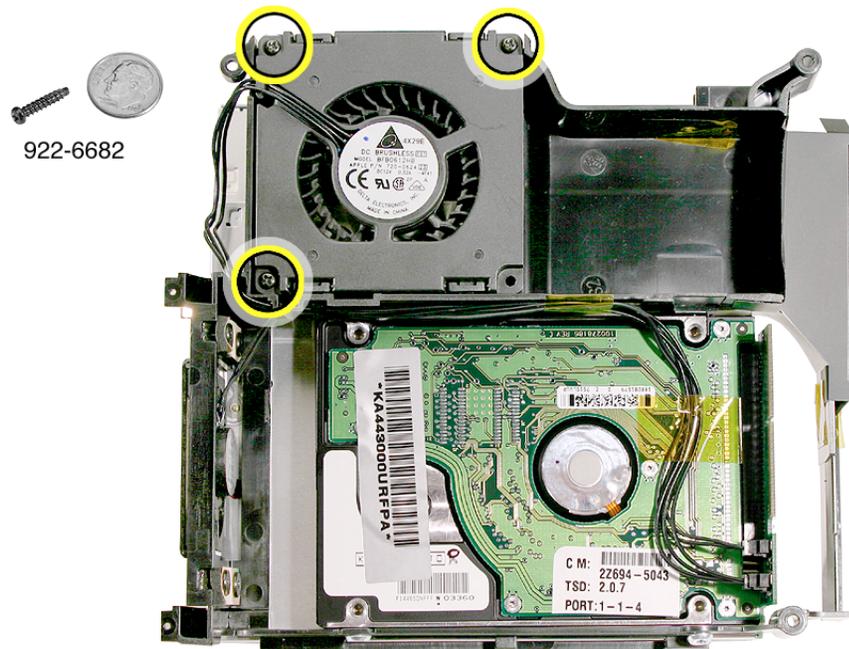
1. Locate the internal frame.



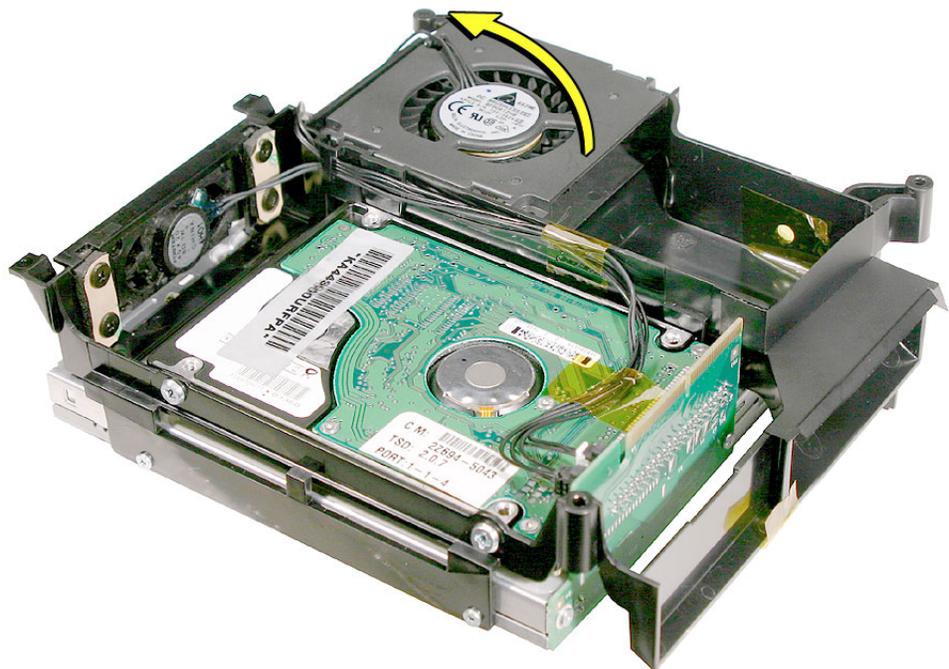
2. Turn over the internal frame to locate the hard drive.



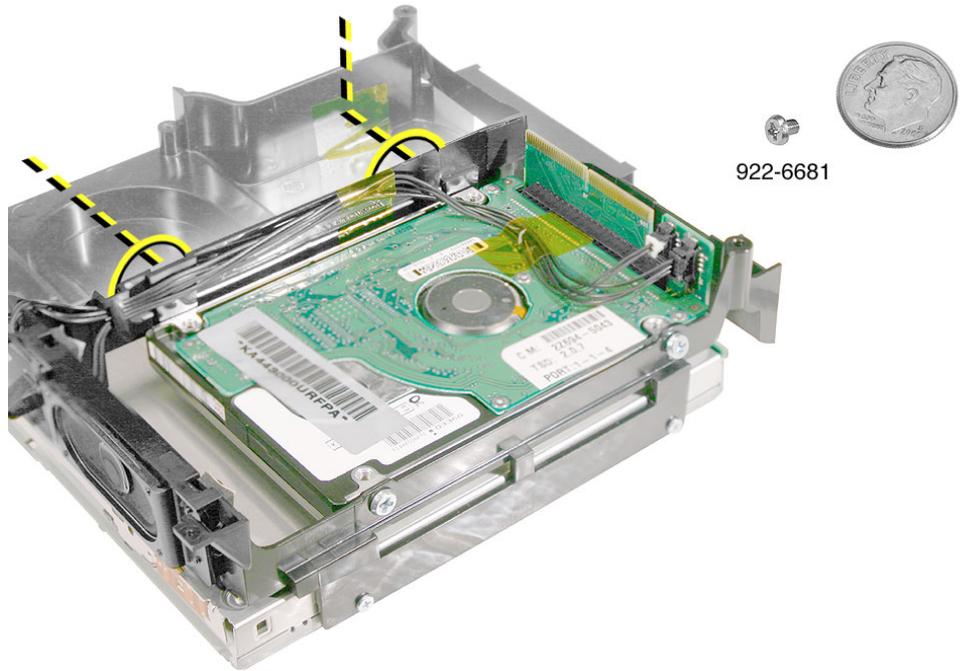
3. With a jeweler's #0 screwdriver remove the three fan screws.



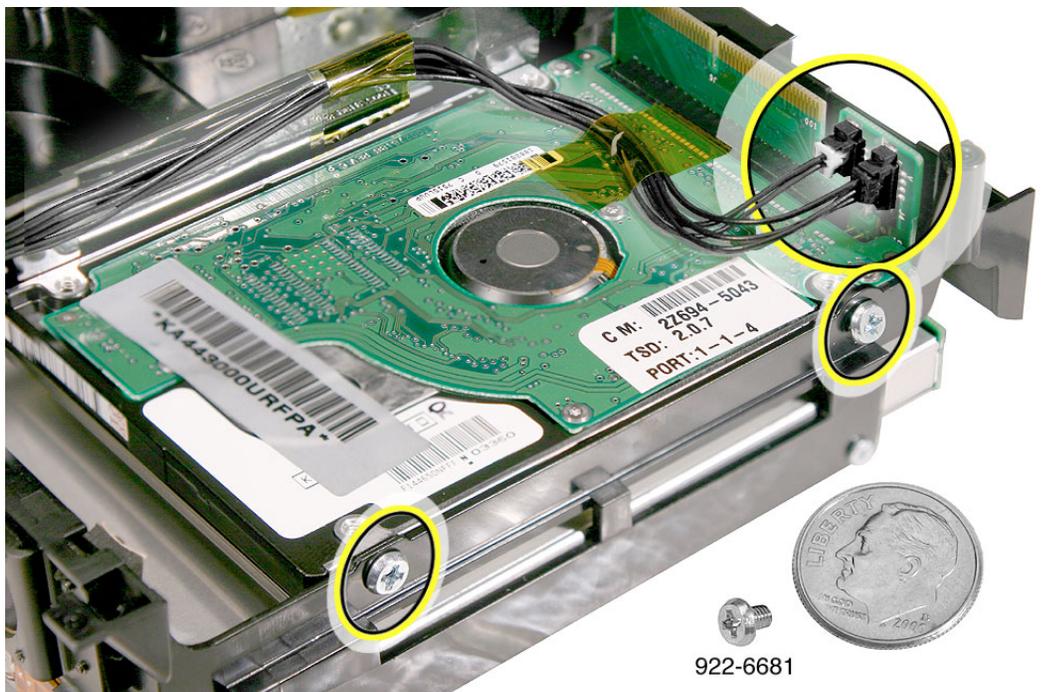
4. Flip the fan to the left to access the hard drive screws (see next step).



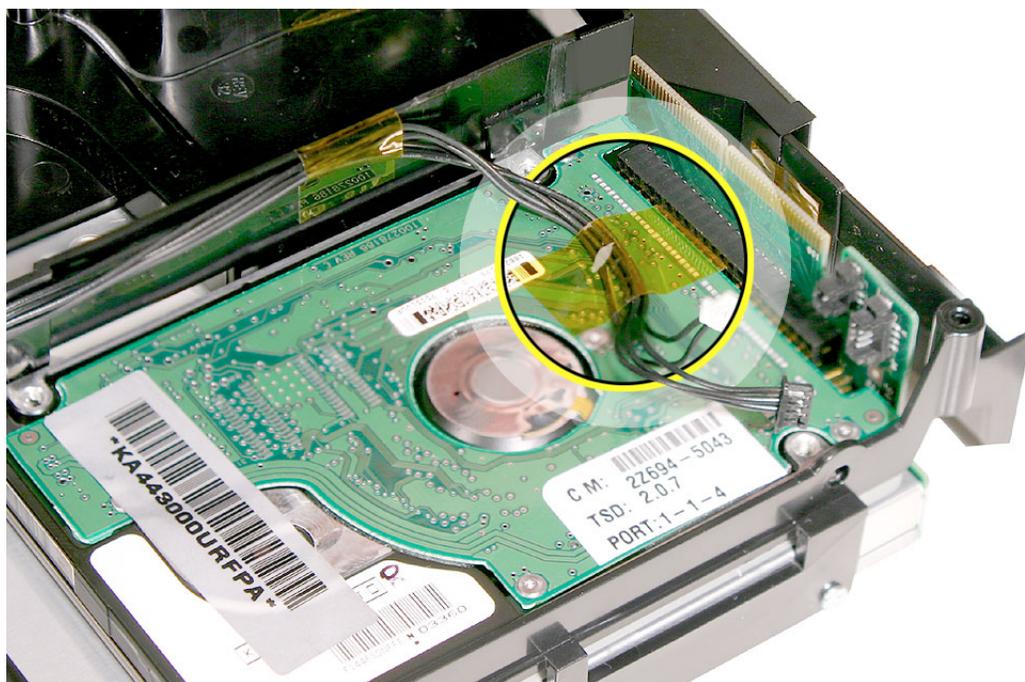
- Using a #2 Phillips screwdriver, remove the two hard drive screws (shown by the dotted line) on the internal frame. You may need an angled screwdriver to access the screw on the right. **Important:** Don't remove the kapton tape from the internal frame near the screw on the right. The hole is covered to direct airflow within the internal frame.



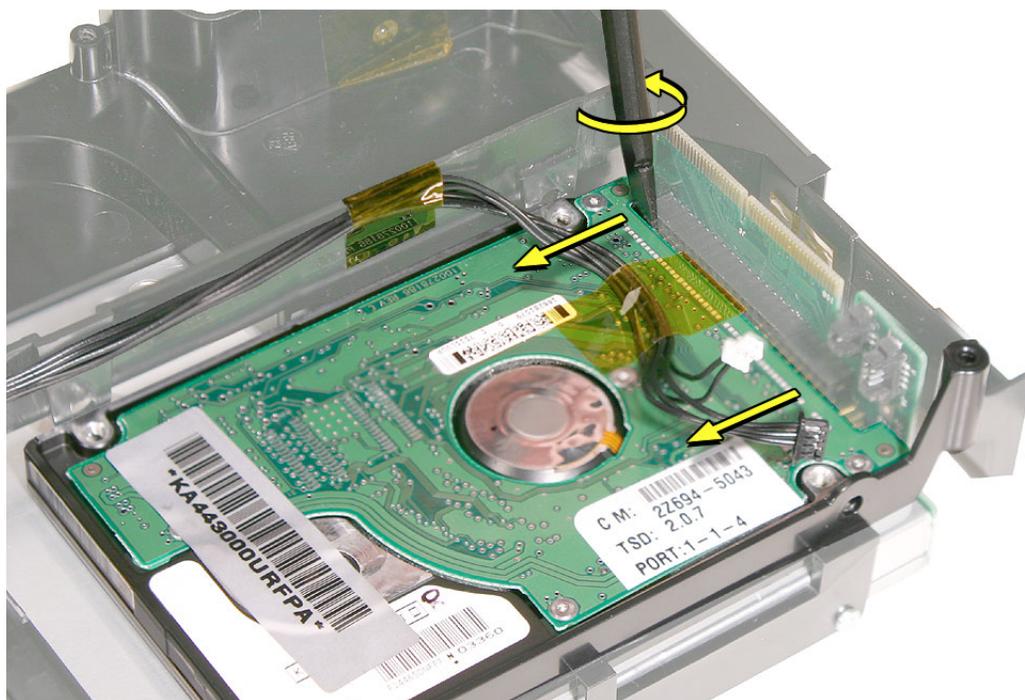
- Remove the remaining two hard drive screws and disconnect the fan and speaker cables.



5. Remove the kapton tape to release the cables.

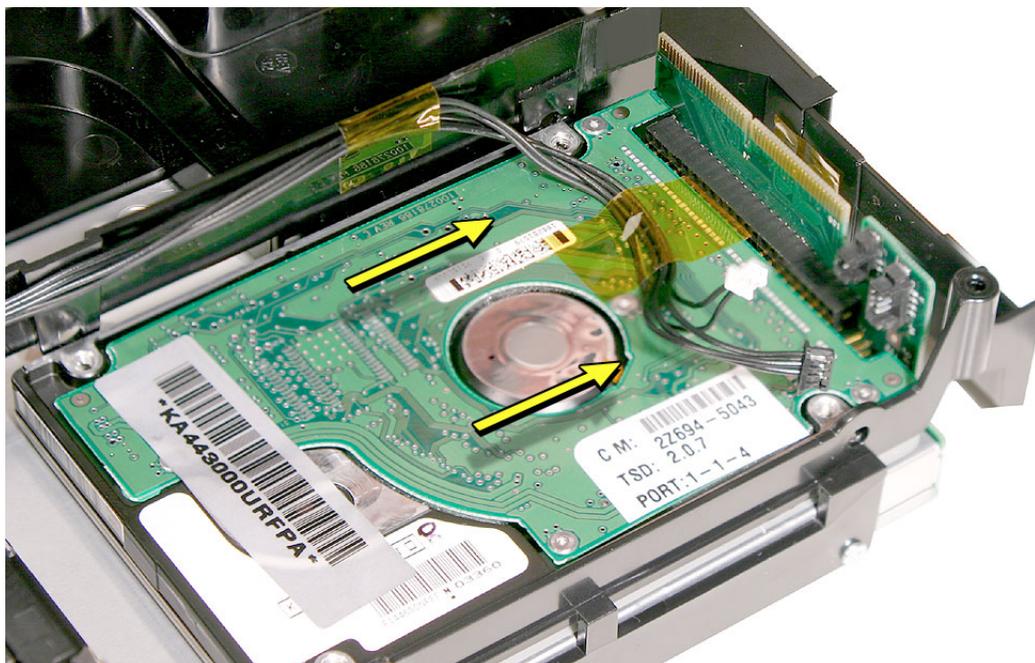


6. With a black stick or other nonconductive tool, pry the hard drive off the connector on the interconnect board. Lift the hard drive out of the internal frame and set it aside.



## Replacement Procedure

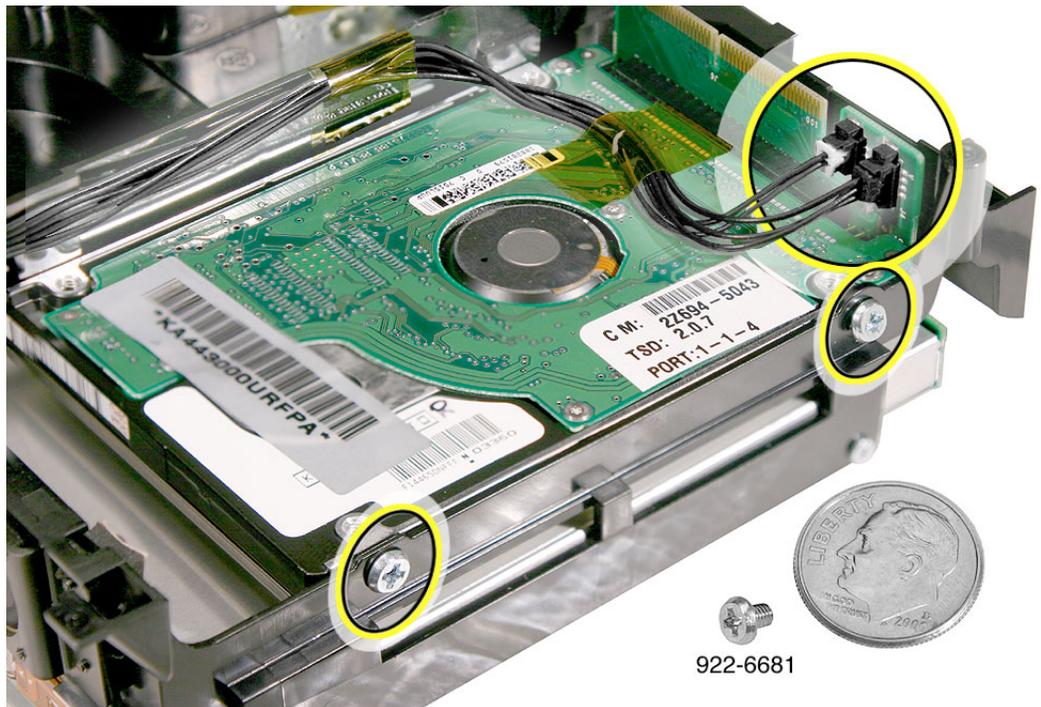
1. With the colored side of the hard drive face up, place the hard drive into the internal frame and connect it to the black connector on the interconnect board.



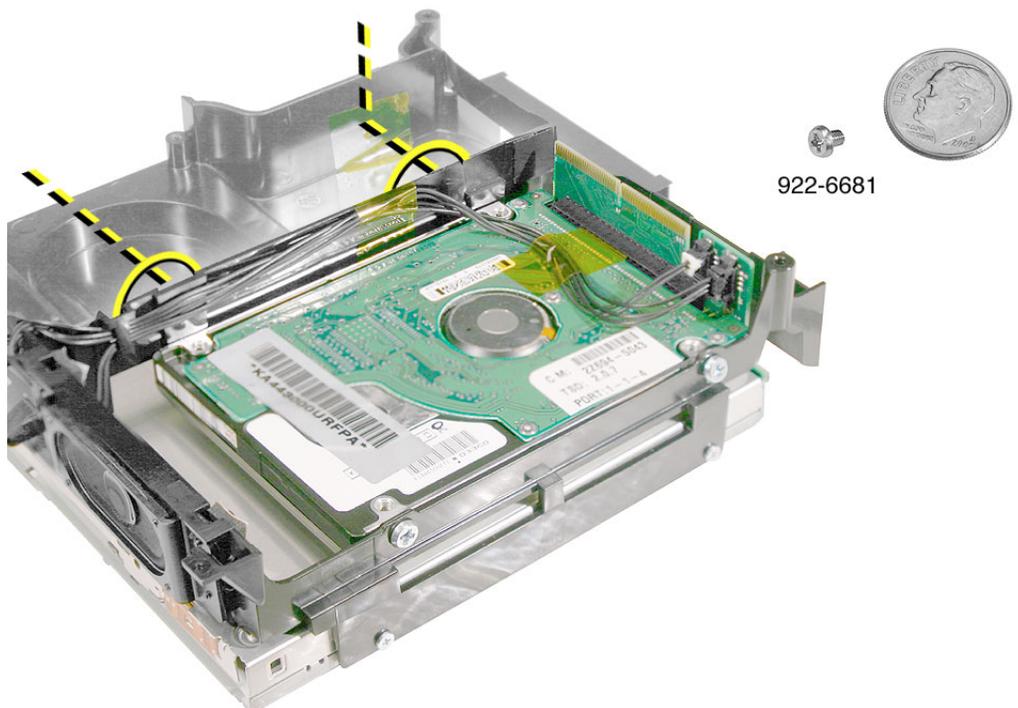
2. Replace the kapton tape.



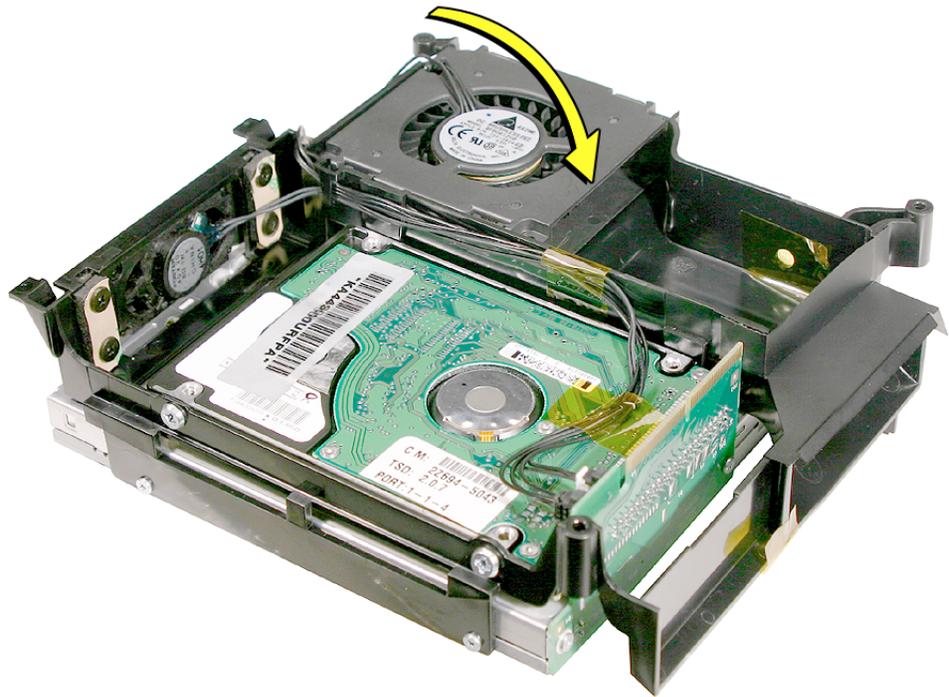
3. Replace two screws and connect the fan and speaker cables to the interconnect board.



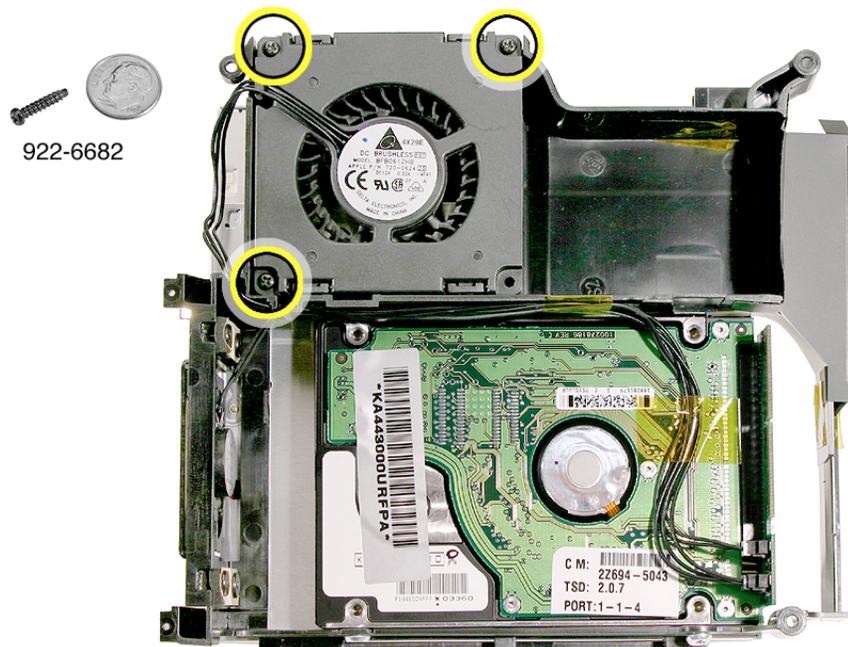
4. Replace the two hard drive screws on the inside of the internal frame.



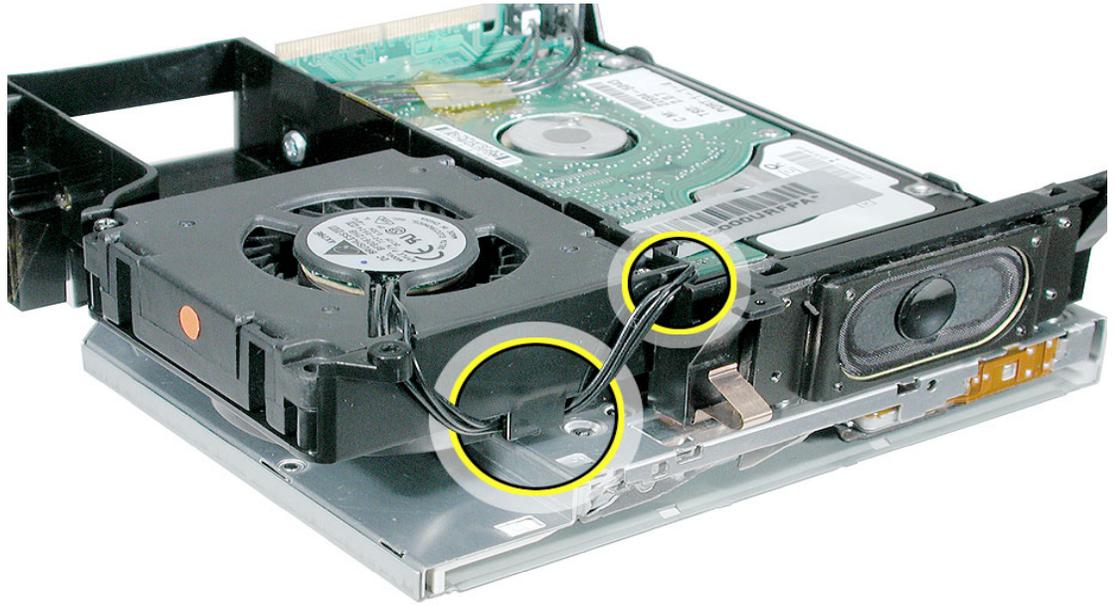
4. Flip the fan back into the internal frame.



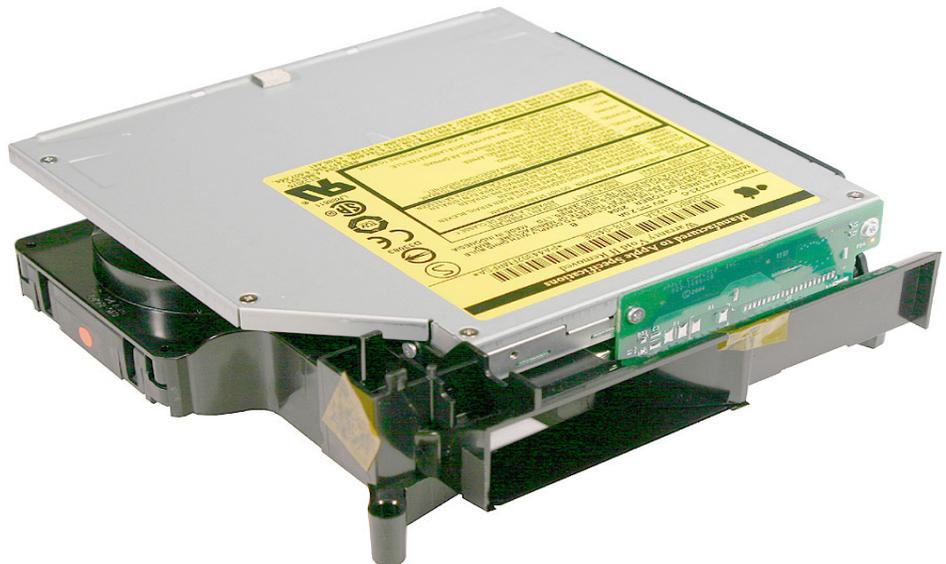
4. Replace the three fan screws.



5. Make sure the fan cables are routed and tucked under the clip as shown.



6. Turn the internal frame over

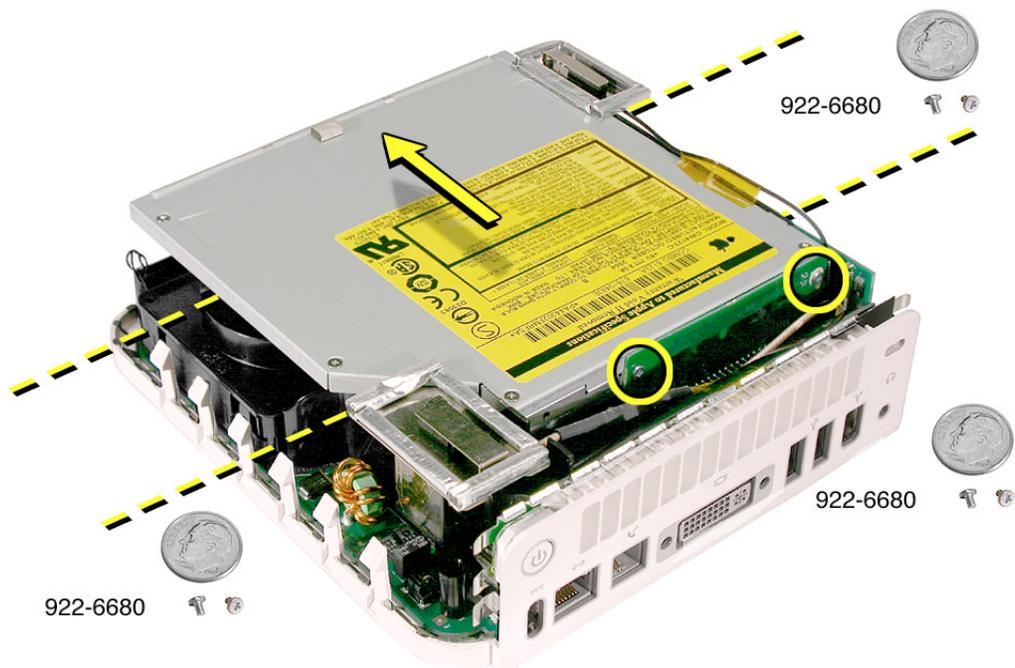


7. Replace the internal frame.
8. Replace the top housing.

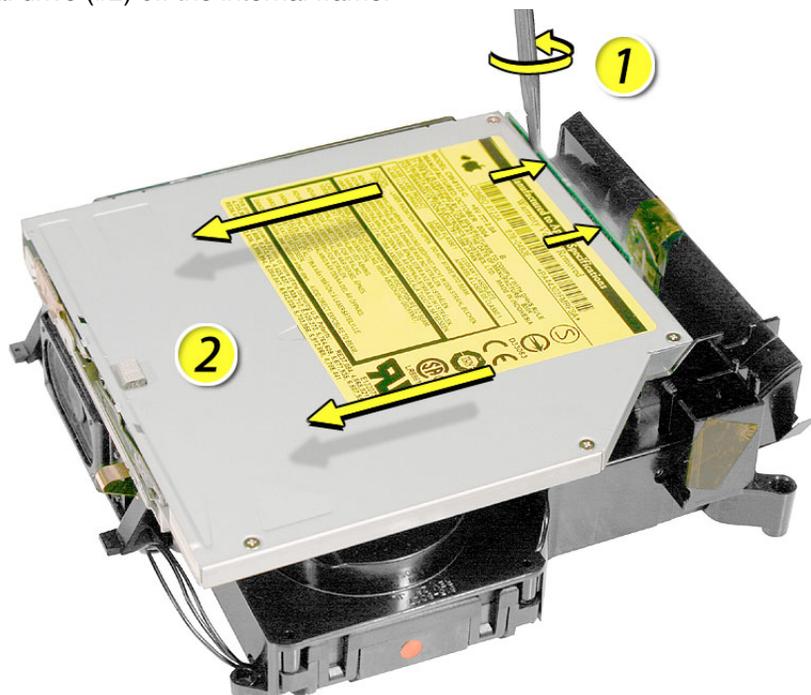


## Removal Procedure

1. Using a jeweler's #0 Phillips screwdriver, remove the four optical drive screws and the two interconnect board screws.

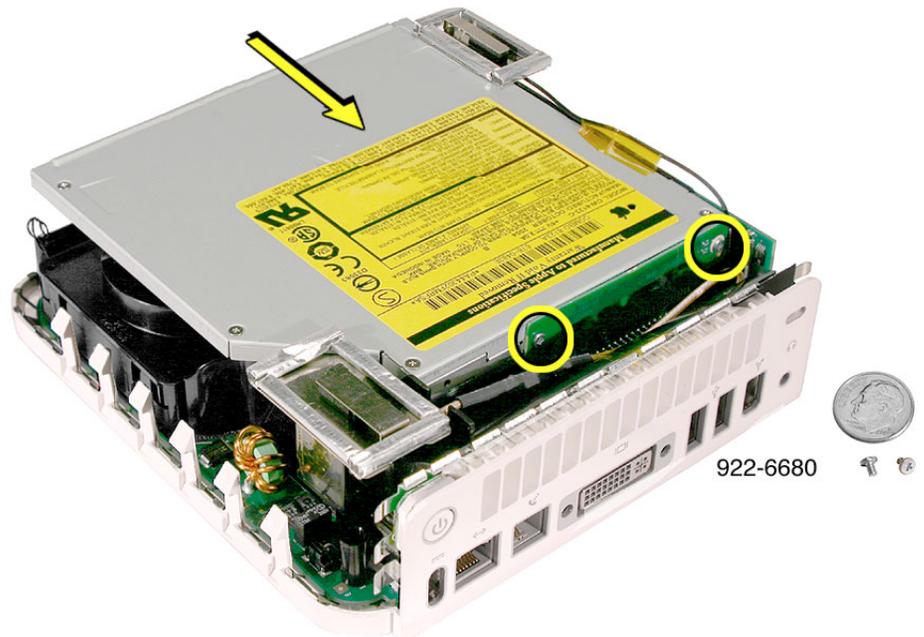


2. Using a black stick, pry the optical drive off the interconnect board (#1) and slide the optical drive (#2) off the internal frame.

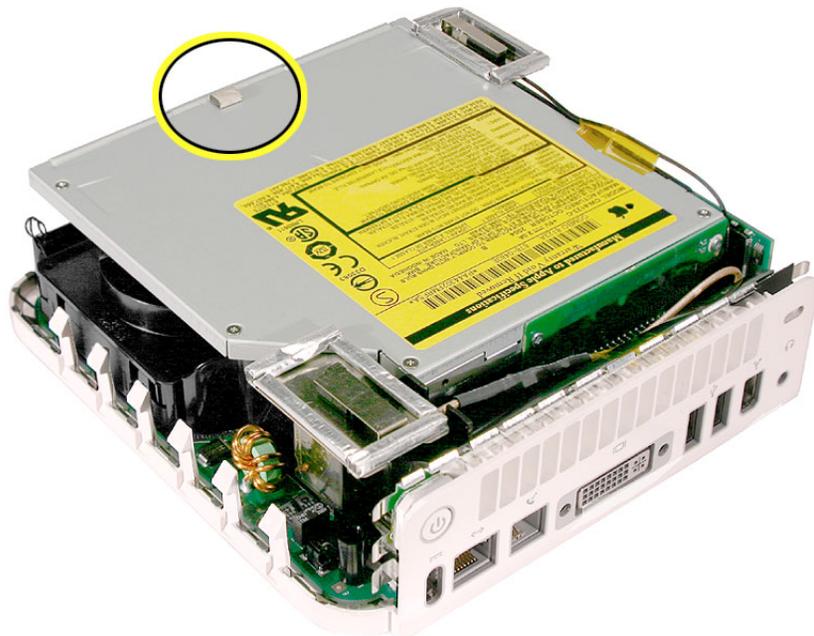


## Replacement Procedure

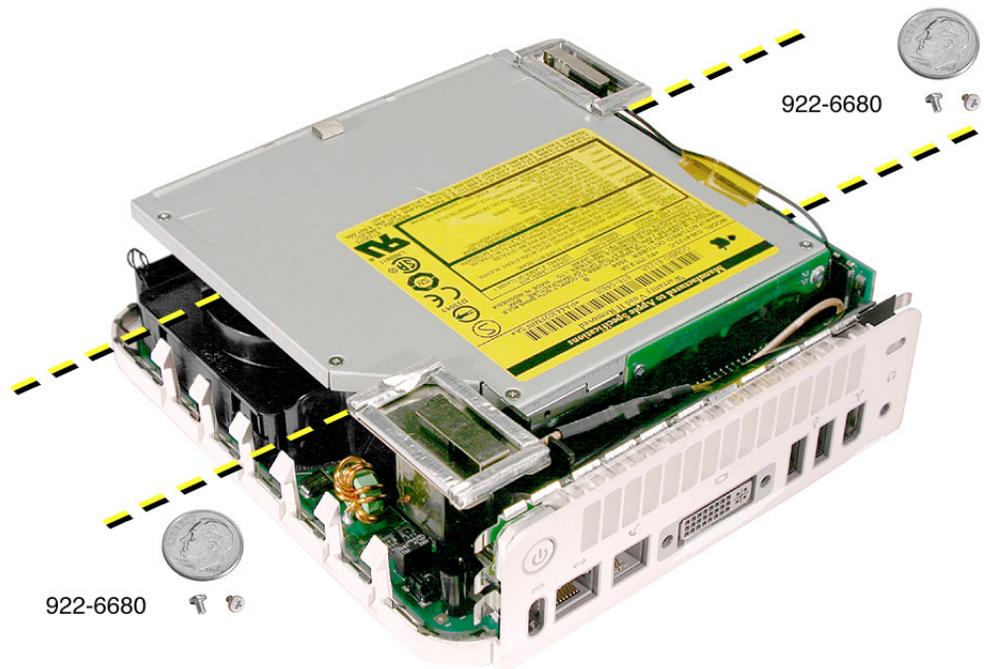
1. Connect the optical drive to the interconnect board and replace the two interconnect board screws.



2. **Note:** If you are installing a replacement drive, install the EMI gasket (that came with the replacement optical drive) on the top and center of the optical drive.



3. Replace the four optical drive screws.



4. Replace the Bluetooth antenna (if present).
5. Replace the AirPort antenna (if present).
6. Replace the top housing.



# Fan

## Tools

The only tool required for this procedure is a jeweler's #0 Phillips screwdriver.

## Preliminary Steps

Before you begin, remove the top housing and the internal frame.

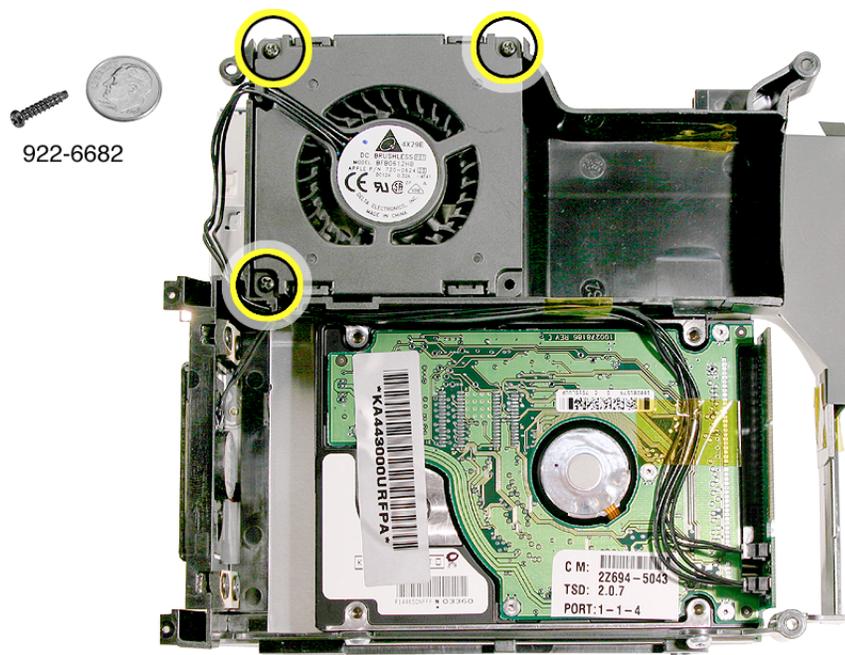
## Part Location

**Note:** The fan is located under the optical drive.

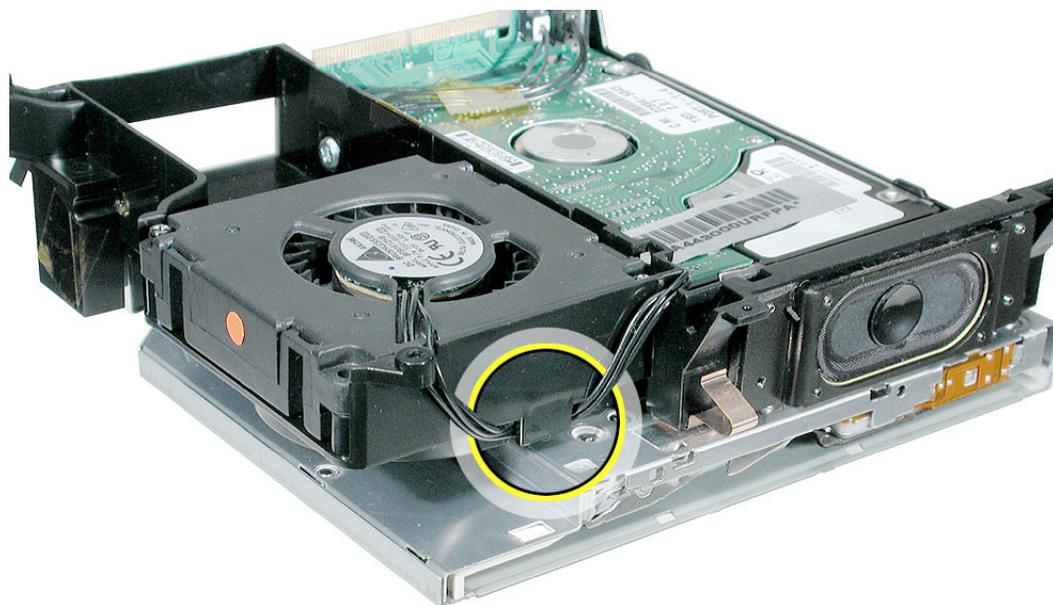


## Removal Procedure

1. Turn over the internal frame to locate the fan. Remove the three fan screws with a jeweler's #0 Phillips screwdriver.



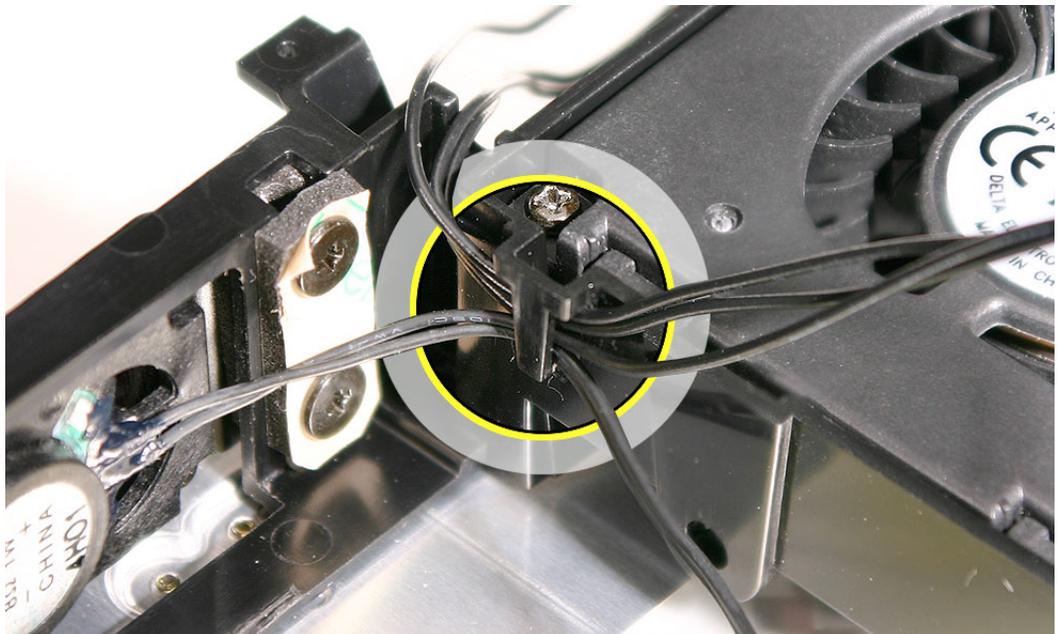
2. Free the fan cable from the clip on the internal frame.



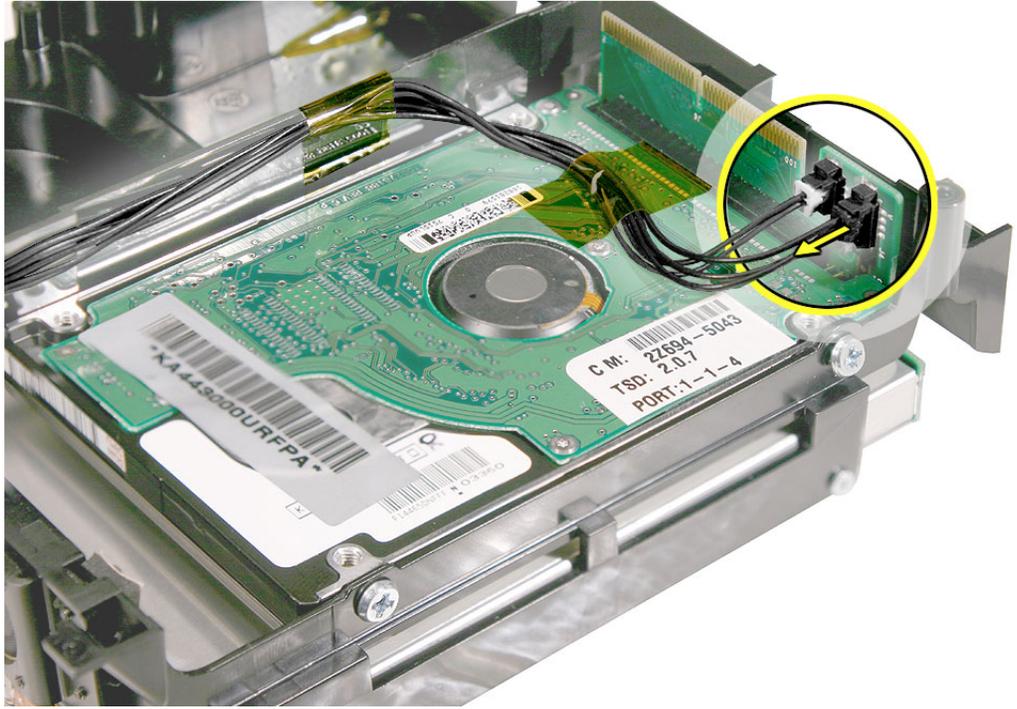
4. Remove the tape securing the fan and speaker cables.



4. Free the fan cable (top cable) from another clip on the inside of the internal frame.



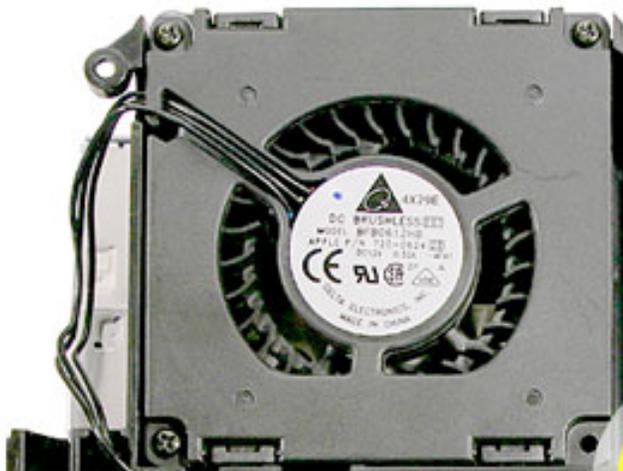
4. Disconnect the fan cable (on the right) from the interconnect board.



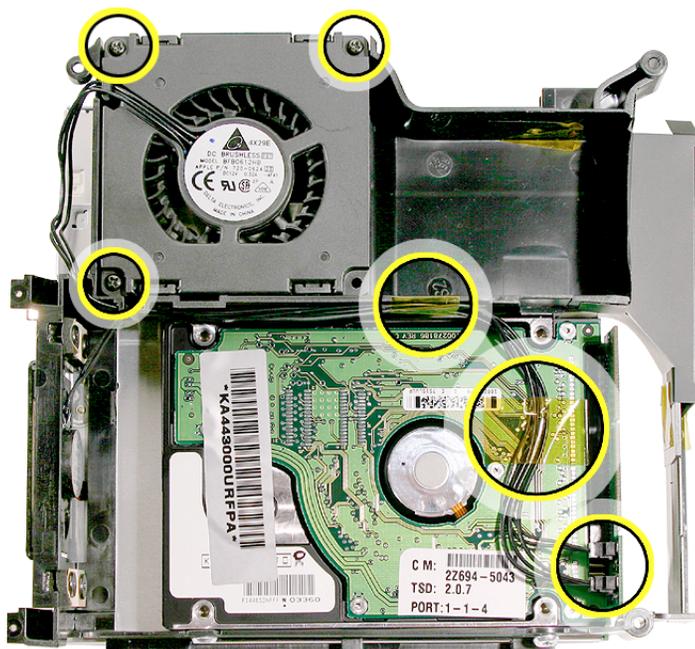
4. Lift the fan out of the internal frame.

## Replacement Procedure

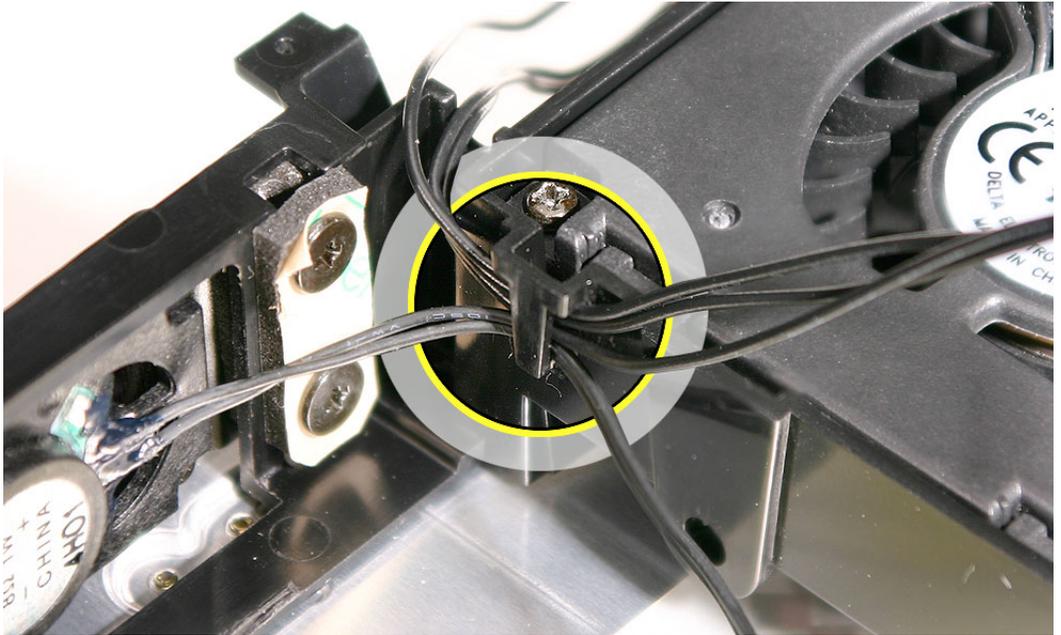
1. Locate the fan. Orient the fan with the cable on the left and the print on the label facing right-side-up (as shown below).



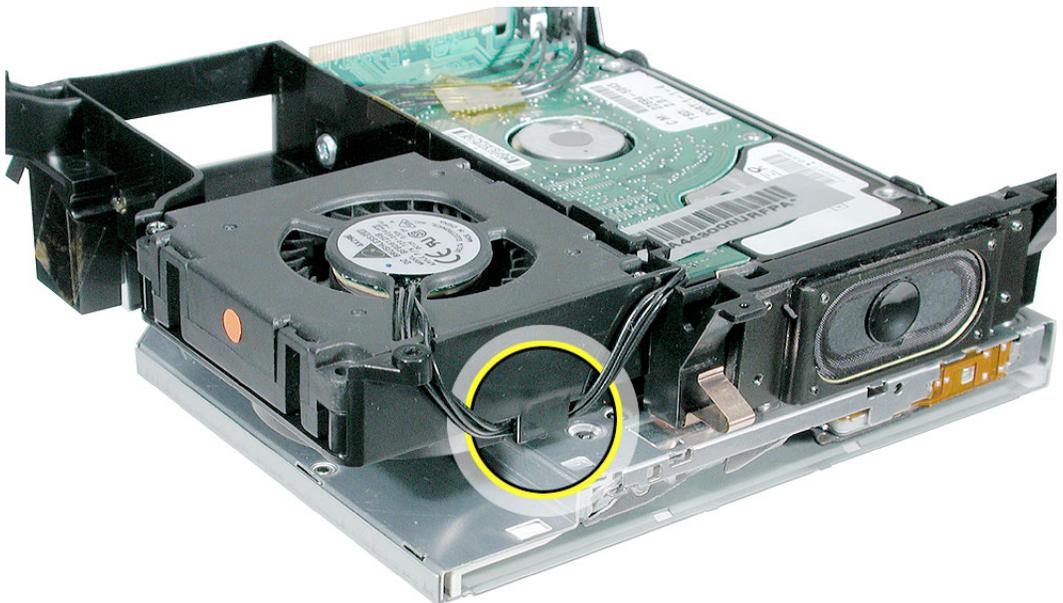
2. Place the fan in the internal frame.
3. Replace three fan screws, the kapton tape, and connect the fan cable (on the right) to the interconnect board.



4. Route the fan cable through the clip on the inside of the internal frame.



5. Route the fan cable under the clip on the outside of the internal frame.



6. Turn over the internal frame.



7. Replace the internal frame.
8. Replace the top housing.



# Interconnect Board

## Tools Required

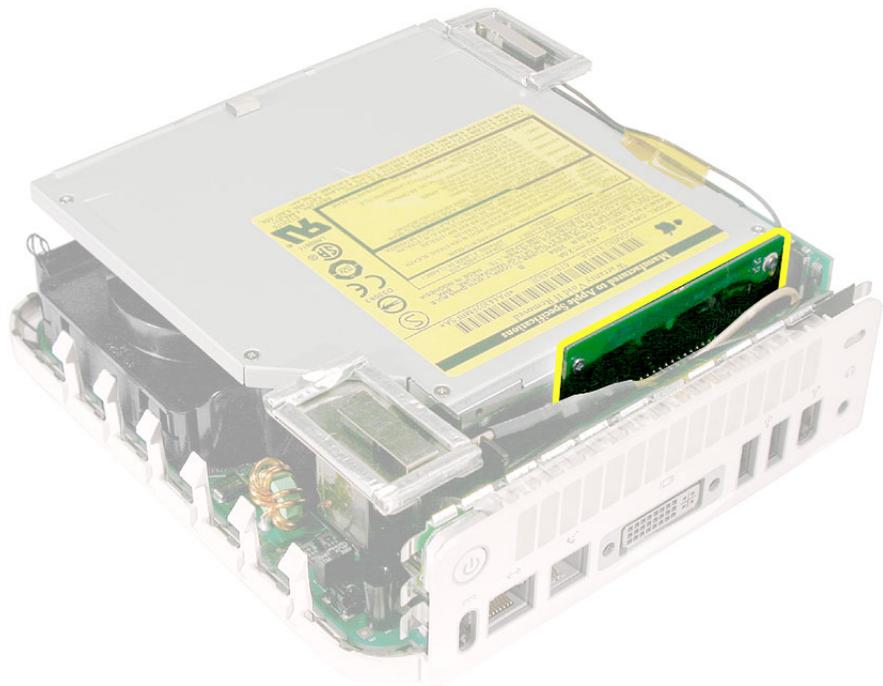
This procedure requires the following tools:

- Jeweler's #0 Phillips screwdriver
- Black stick or nonconductive tool

## Preliminary Steps

Before you begin, remove the top housing and the internal frame.

## Part Location

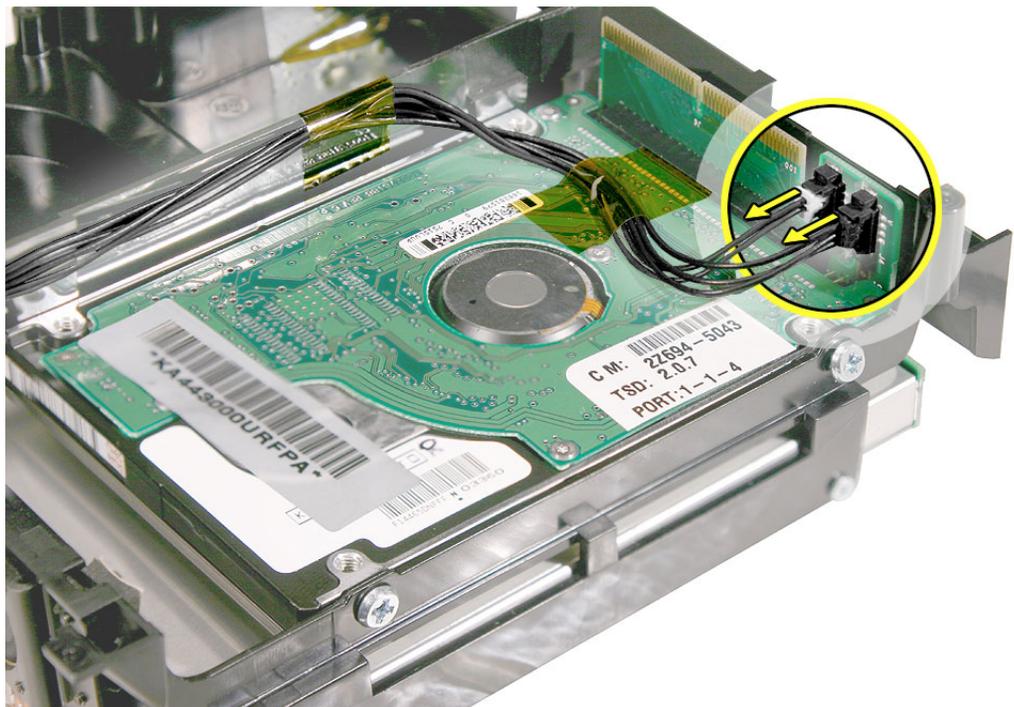


## Removal Procedure

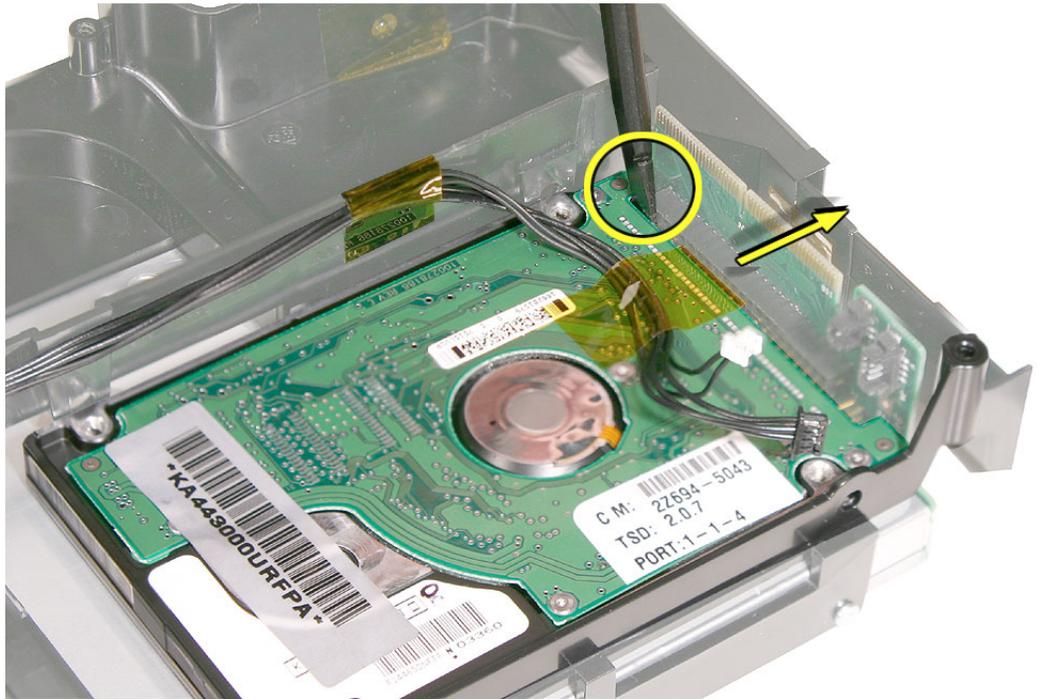
1. Locate the interconnect board. Using a jeweler's #0 Phillips screwdriver, remove the two screws.



2. Turn over the internal frame. Disconnect the speaker cable (on the left) and fan cable (on the right) from the interconnect board.

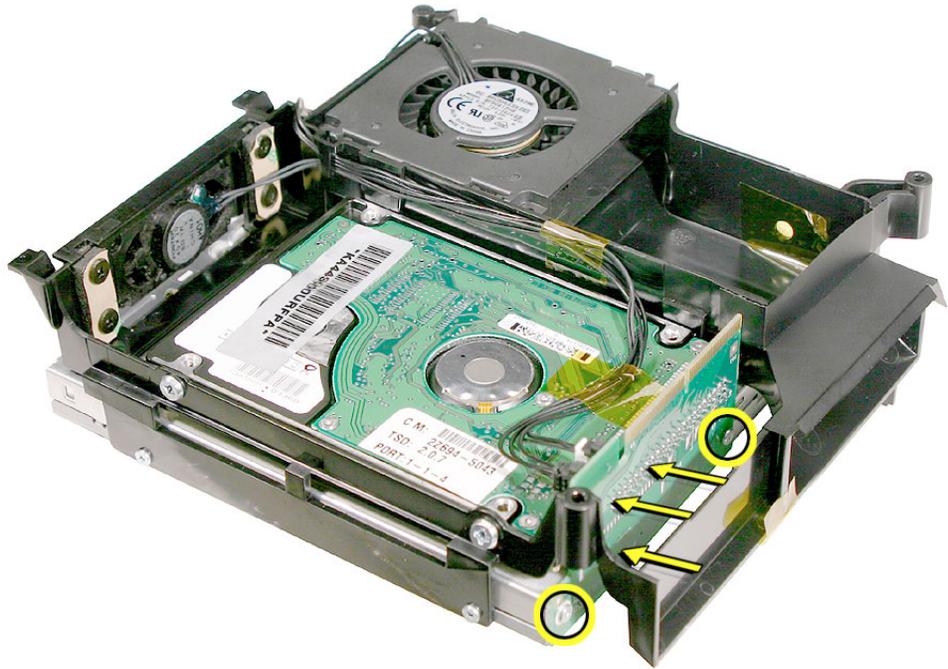


3. With a black stick or other nonconductive tool, slightly pry the interconnect board off hard drive pins. With your fingers wiggle the interconnect board off the hard drive pins.  
**Caution:** Be careful not to bend the hard drive pins.



## Replacement Procedure

1. With the gold pins on the interconnect board facing up, press the interconnect board onto the hard drive and optical drive connectors. Replace the optical drive screws (circled). **Caution:** Be careful not to bend the hard drive pins when connecting the interconnect board.



2. Connect the speaker cable (on the left) and fan cable (on the right) to the interconnect board.



3. Turn over the internal frame.



4. Replace the internal frame.
5. Replace the top housing.



# Memory

## Tools

The only tool required for this procedure is a Jeweler's #0 Phillips screwdriver.

## Preliminary Steps

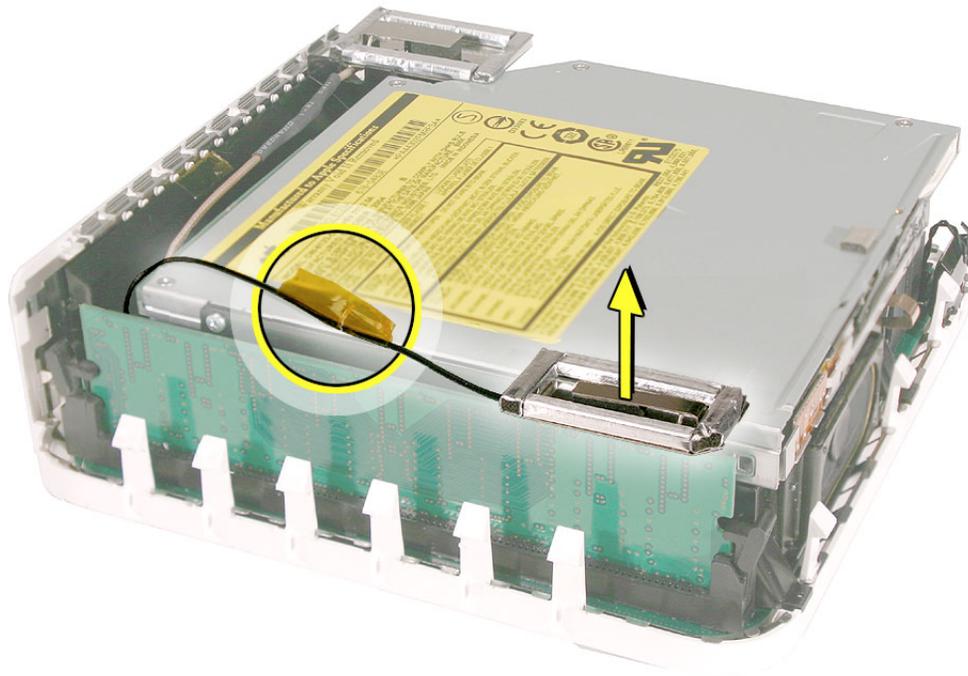
Before you begin, remove the top housing.

## Part Location

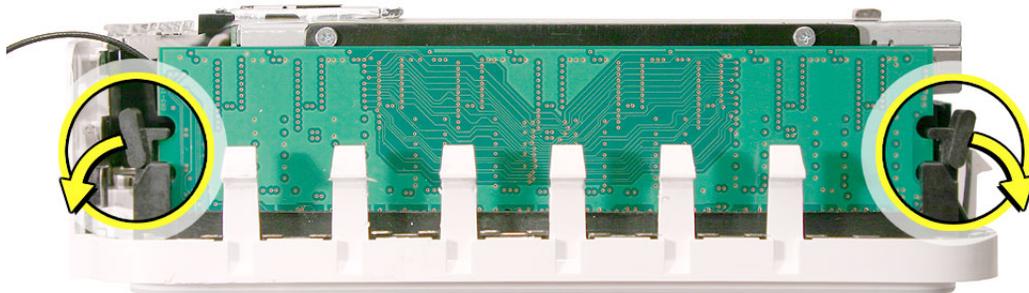


## Removal Procedure

1. Remove the Bluetooth antenna and the kapton tape. **Important:** Take care handling the Bluetooth antenna as a bent or warped antenna will affect Bluetooth connectivity. Set the antenna off to the side.

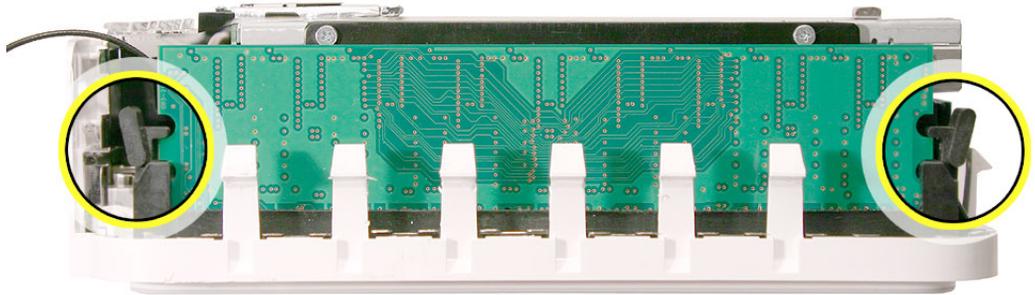


2. To release the memory from its slot, push down on the two side latches. Then pull the memory module out of the slot. **Caution:** Be careful that the latch on the left doesn't damage the EMI clip near the I/O port.

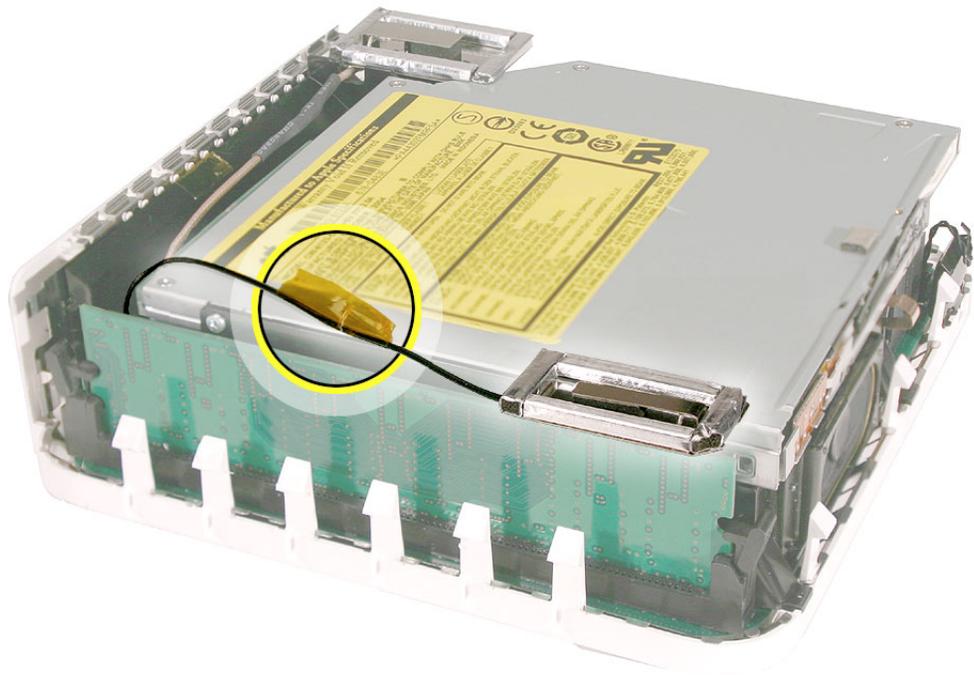


## Replacement Procedure

1. Replace the memory module by lining up the notch on the module with the notch on the slot.
2. Press firmly on the memory module until it clicks into place. Use your thumb and index finger to push the module into the slot. The clips will secure the memory in place.



3. Replace the Bluetooth antenna and kapton tape. **Important:** Take care handling the Bluetooth antenna as a bent or warped antenna will affect Bluetooth connectivity



4. Replace the top housing.



# Mezzanine Board

## Tools

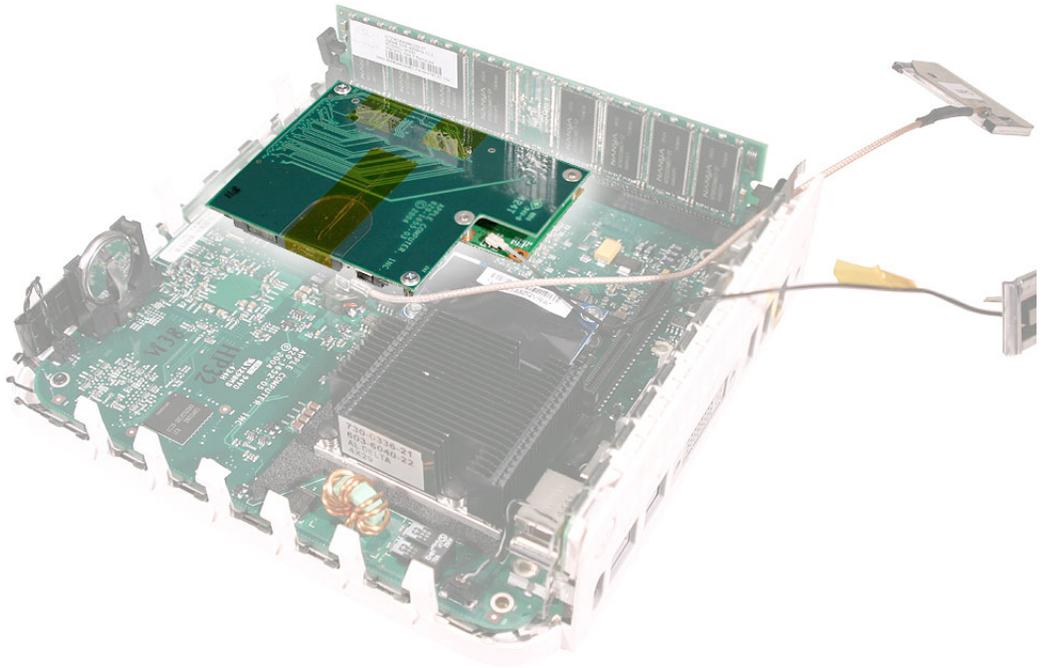
This procedure requires the following tools:

- Jeweler's #0 Phillips screwdriver
- Black stick (or other nonconductive nylon or plastic tool)

## Preliminary Steps

Before you begin, remove the top housing and the internal frame.

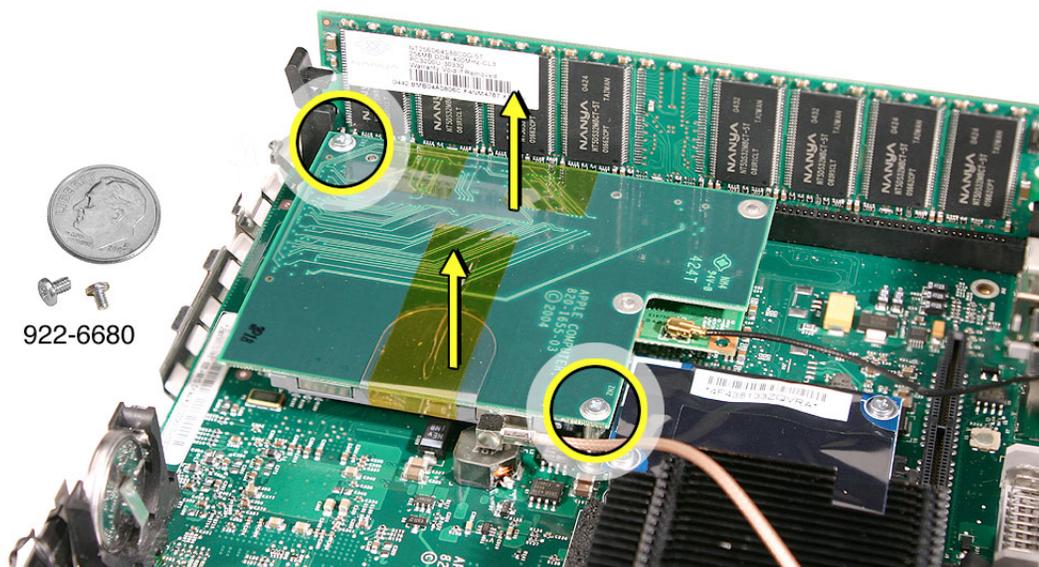
## Part Location



## Removal Procedure

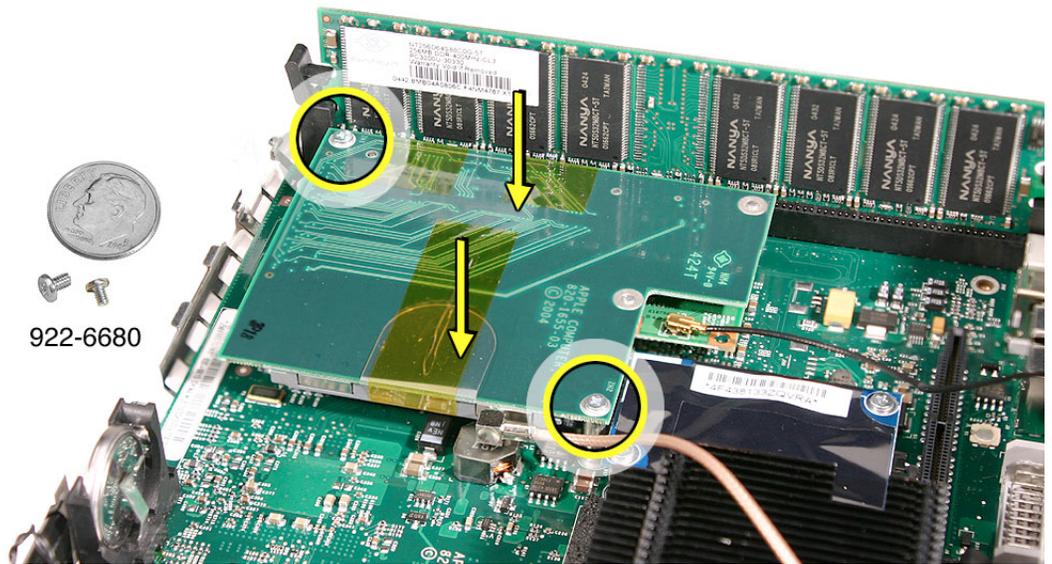
Using a jeweler's #0 Phillips screwdriver, remove the two screws from the mezzanine board. Pull the mezzanine board straight up and off the logic board.

**Note:** refer to Antennas, Mezzanine



## Replacement Procedure

1. Connect the mezzanine board to the logic board connector. Replace the two mezzanine screws.



2. Replace the internal frame.
3. Replace the top housing.



# Modem Board

## Tools

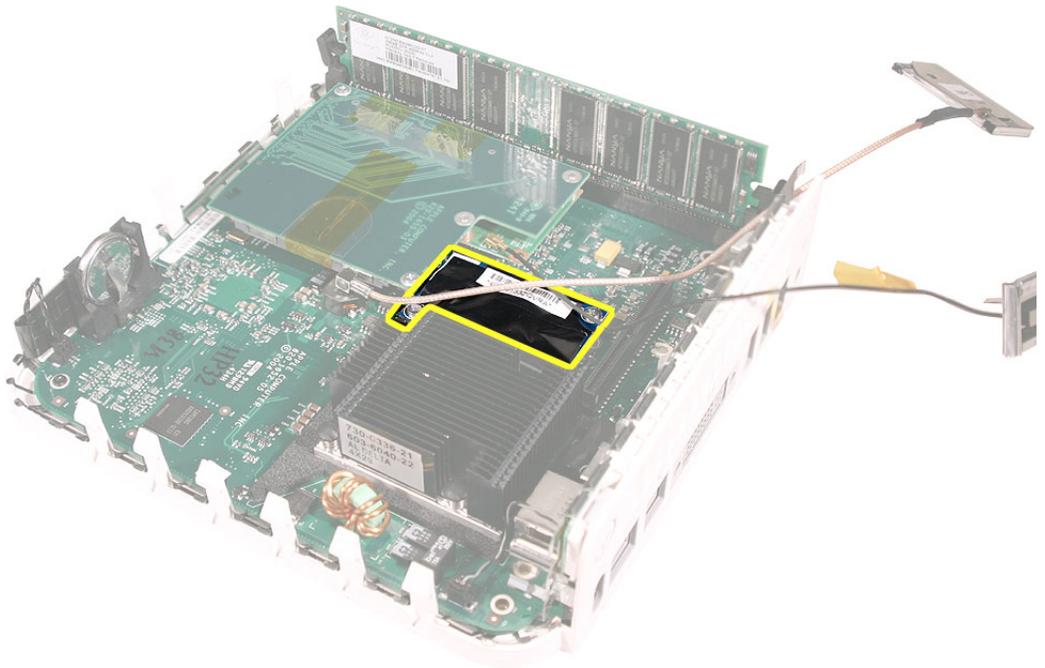
This procedure requires the following tools:

- Jeweler's #0 Phillips screwdriver
- Black stick (or other nonconductive nylon or plastic tool)

## Preliminary Steps

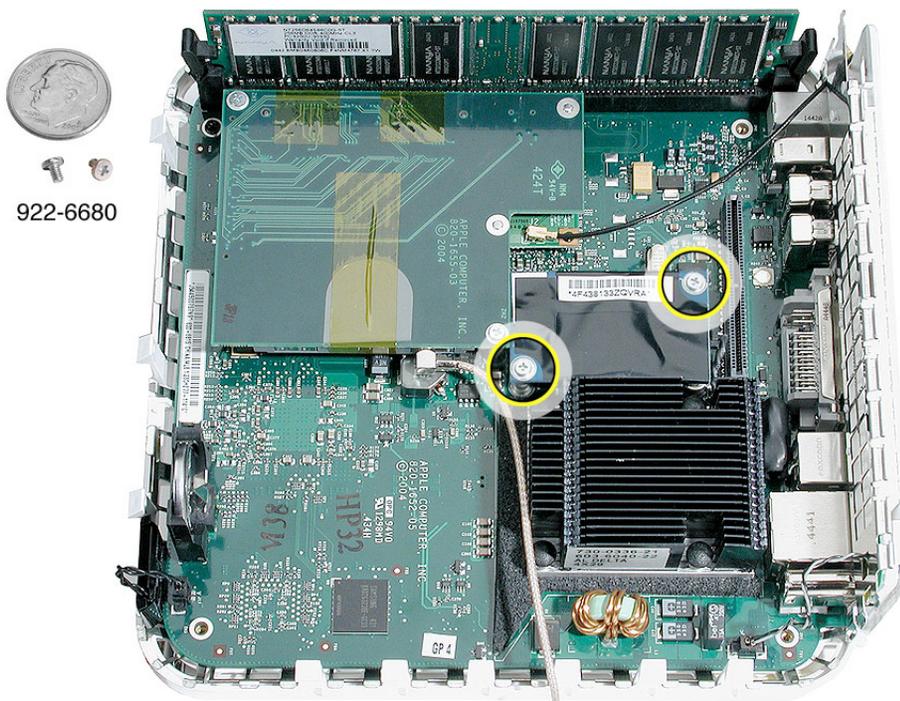
Before you begin, remove the top housing and the internal frame.

## Part Location

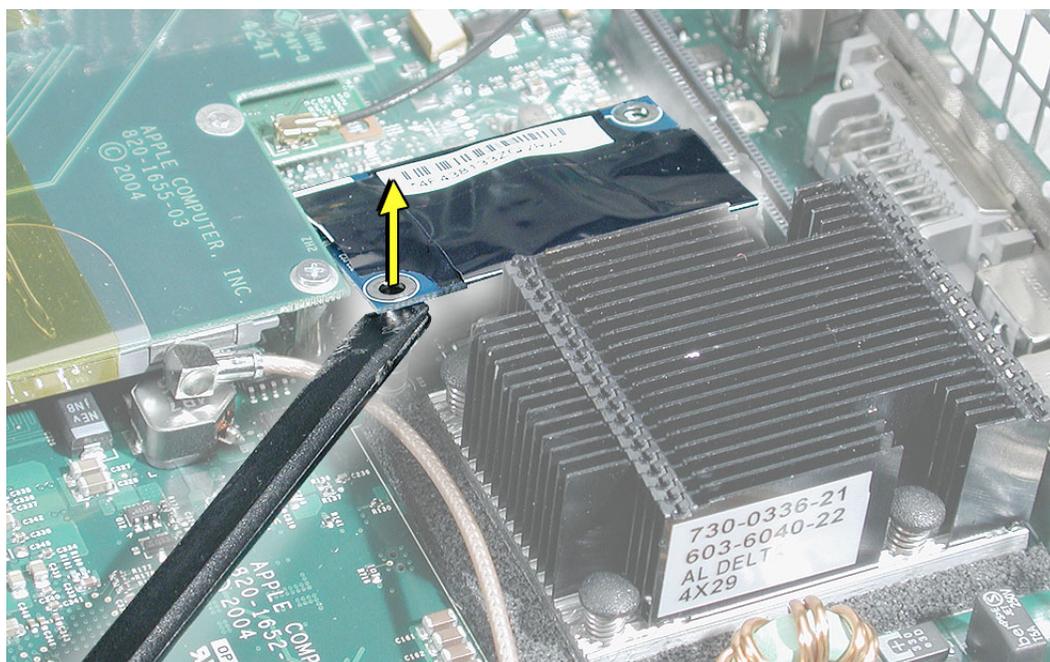


## Removal Procedure

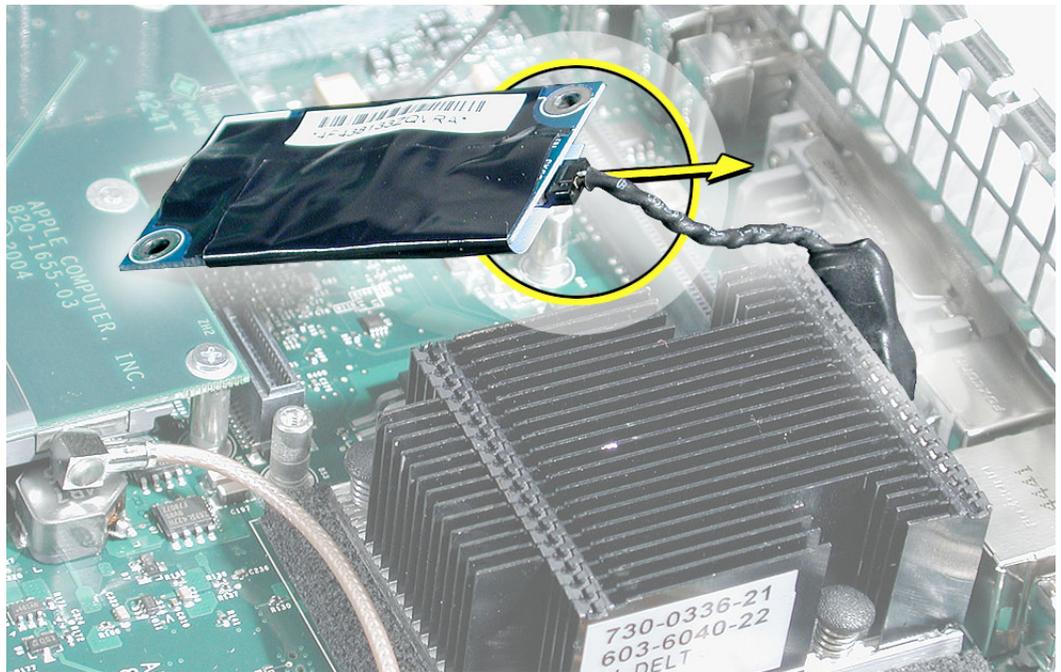
1. Using a jeweler's #0 Phillips screwdriver, remove the two screws from the modem board.



2. Using a black stick or other nonconductive nylon or plastic tool, pry the modem board off the logic board connector.



3. Disconnect the RJ-11 cable from the modem board. Set the modem board aside.

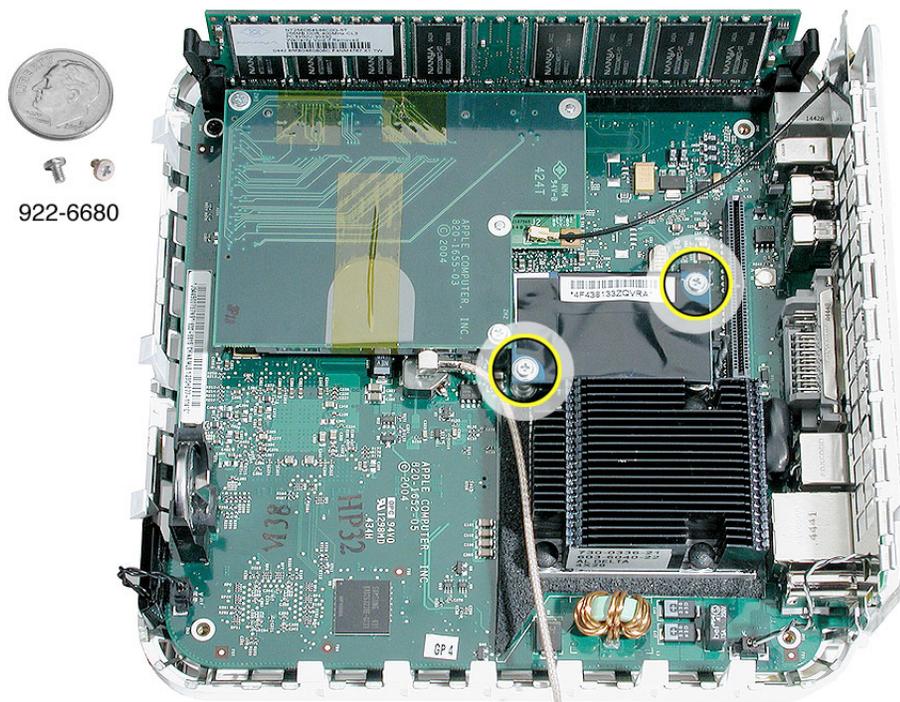


## Replacement Procedure

1. Connect the RJ-11 cable to the modem board.



2. Using a jeweler's #0 Phillips screwdriver, replace the two modem screws.



- 
3. Replace the internal frame.
  4. Replace the top housing.



# Logic Board

## Tools

This procedure requires the following tools:

- Jeweler's #0 Phillips screwdriver
- Black stick (or other nonconductive nylon or plastic tool)

## Preliminary Steps

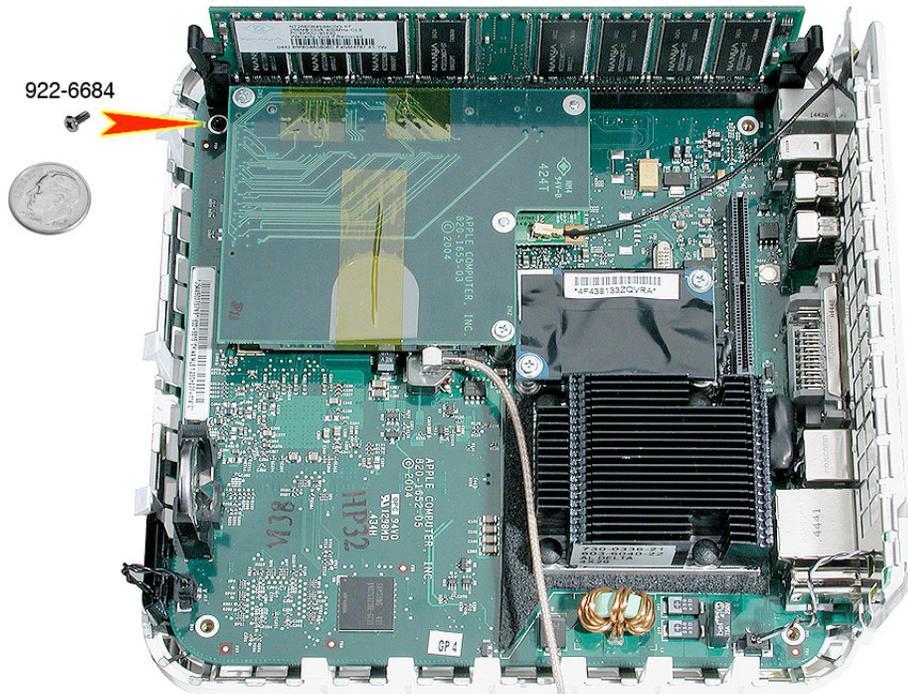
Before you begin, remove the top housing and the internal frame.

## Part Location

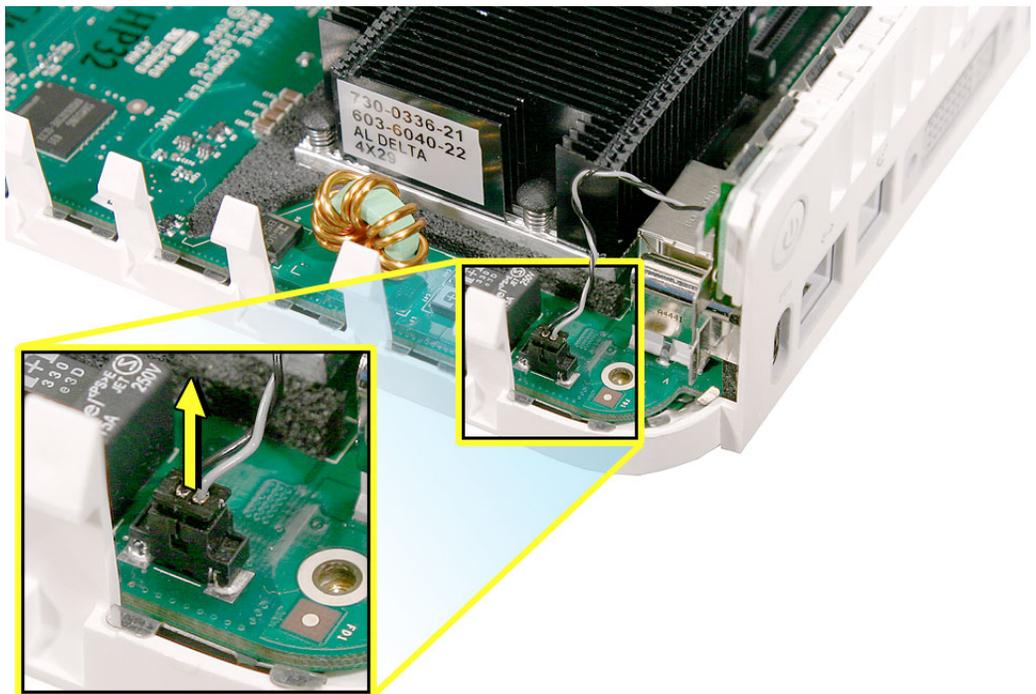


## Removal Procedure

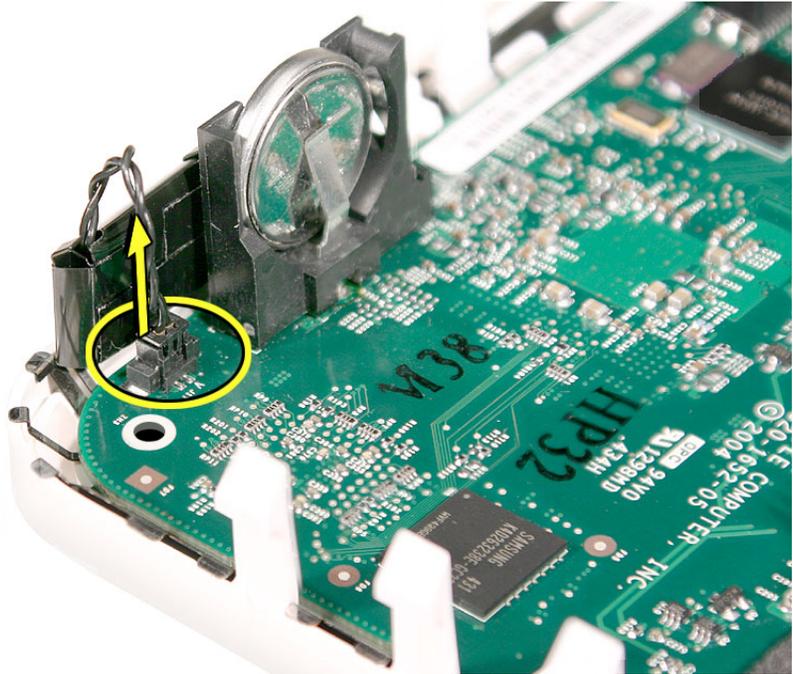
1. Using a jeweler's #0 Phillips screwdriver, remove the logic board screw. **Note:** The logic board screw and the internal frame screws look similar; however, the logic board screw is shorter than the screws used for the internal frame.



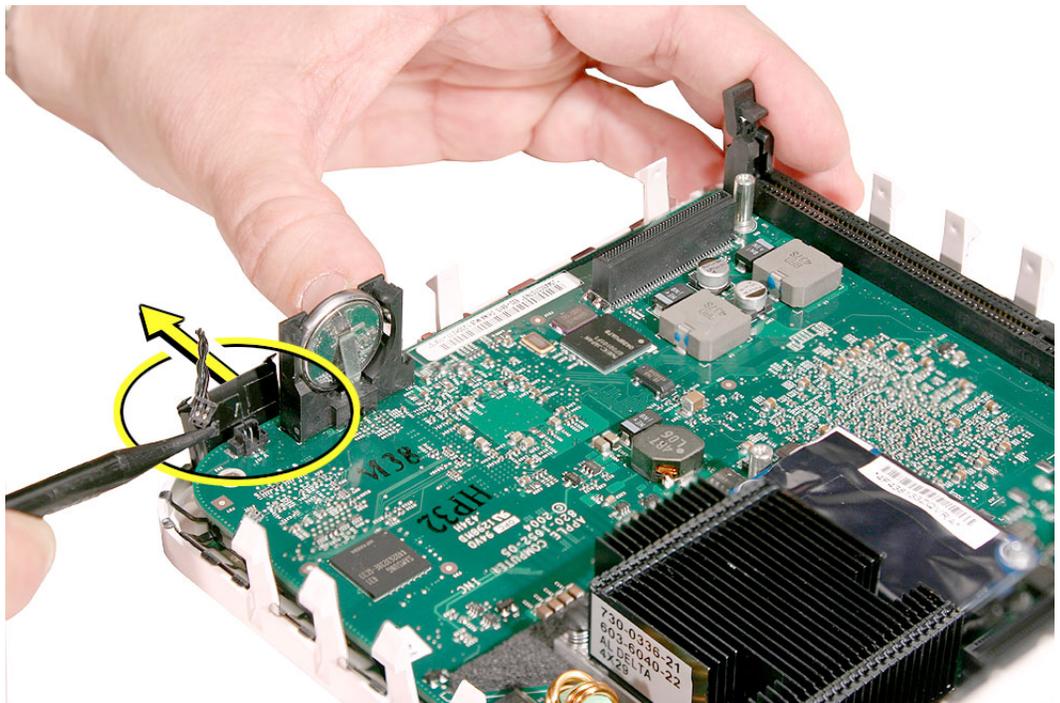
2. Disconnect the power-on cable from the connector on the logic board.



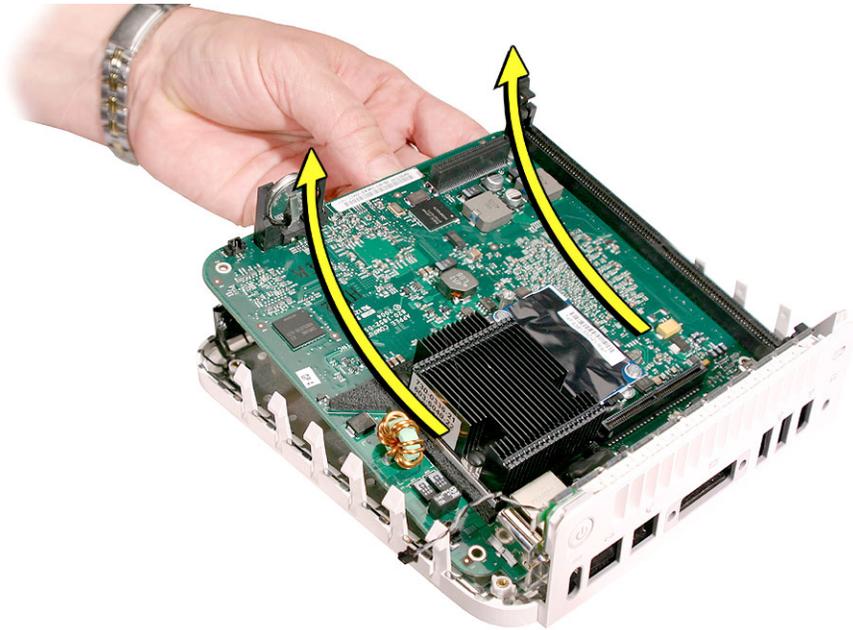
- Using a black stick or other nonconductive tool, disconnect the LED cable from the connector on the logic board. **Note:** This connector is very small. Don't pull on the cable; pull on the connector.



- After disconnecting the LED cable, gently push the LED away from the board to free the logic board from the bottom housing. **Note:** Don't bend the LED too much or it could snap off the bottom housing.



- 
5. Tilt the board at an angle and pull the logic board away from the ports.



**Note:** If you are returning the logic board to Apple service, remove the following:

- RJ-11 connector
- memory
- mezzanine board
- modem board

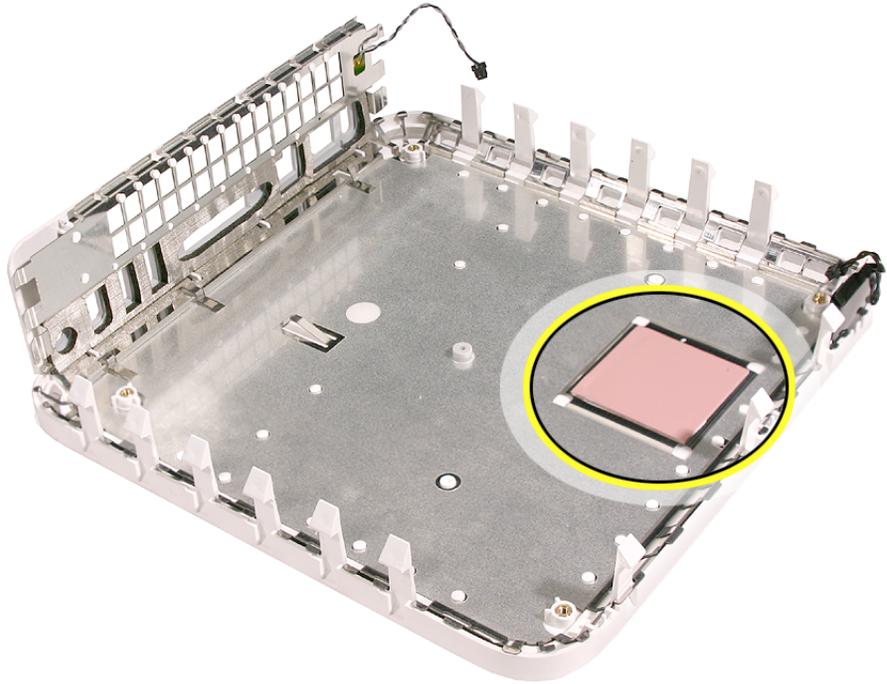
For instructions, refer to the replacement procedures for these individual parts.

---

## Replacement Procedure

1. Replace the thermal pad.

Replace the thermal pad on the bottom housing whenever you replace the logic board or the bottom housing, or if the pad is torn, withered, or damaged. For more information, refer to the “Thermal Pad” procedure in this chapter.

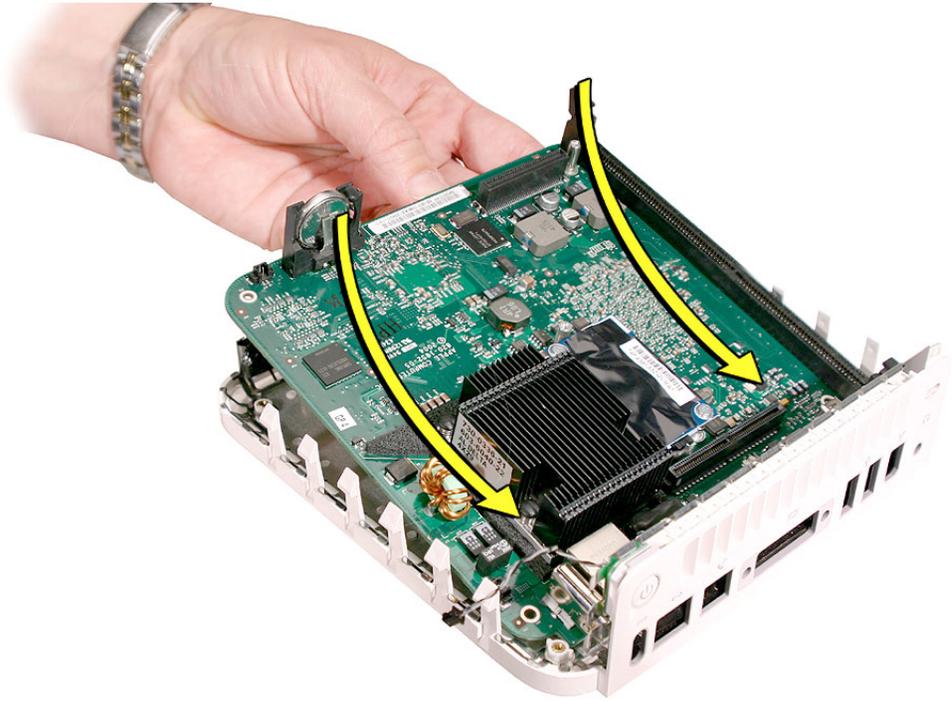


2. If necessary, install the following on the logic board:

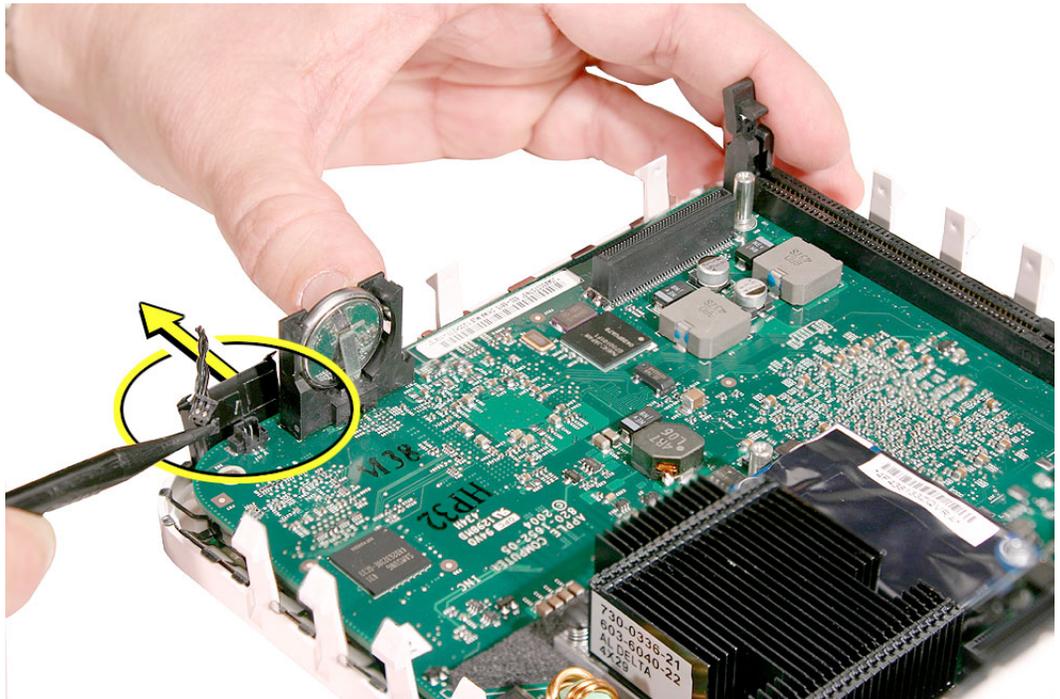
- RJ-11 connector
- modem board
- mezzanine board
- memory

For instructions, refer to the replacement procedures for these individual parts.

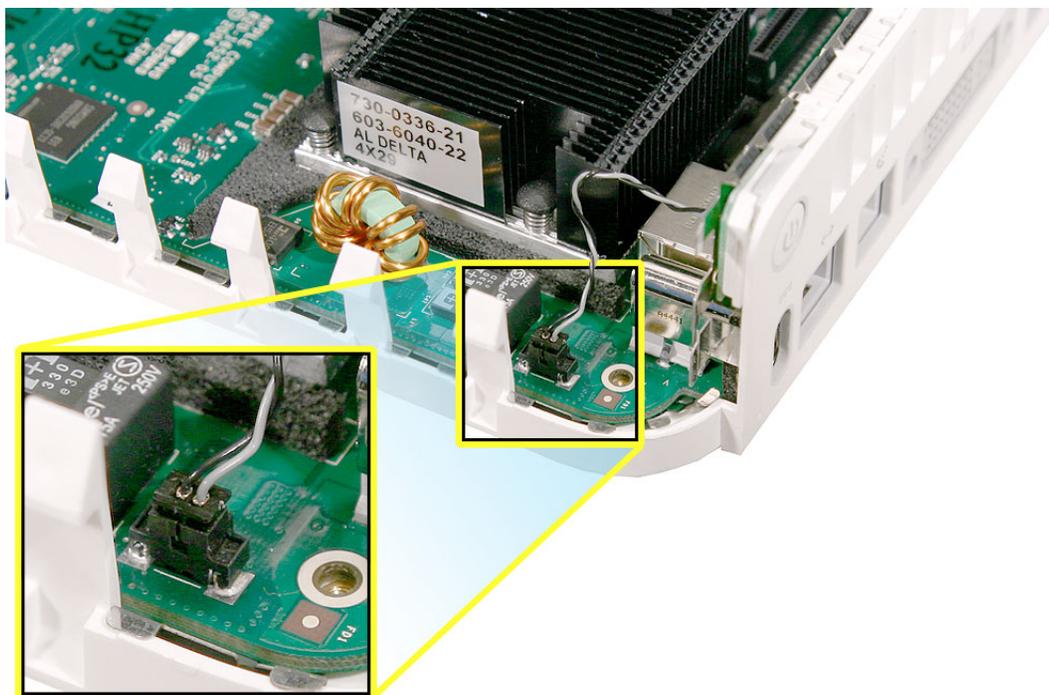
3. Insert the logic board into the bottom housing. Line up the ports on the board with the openings on the bottom housing.



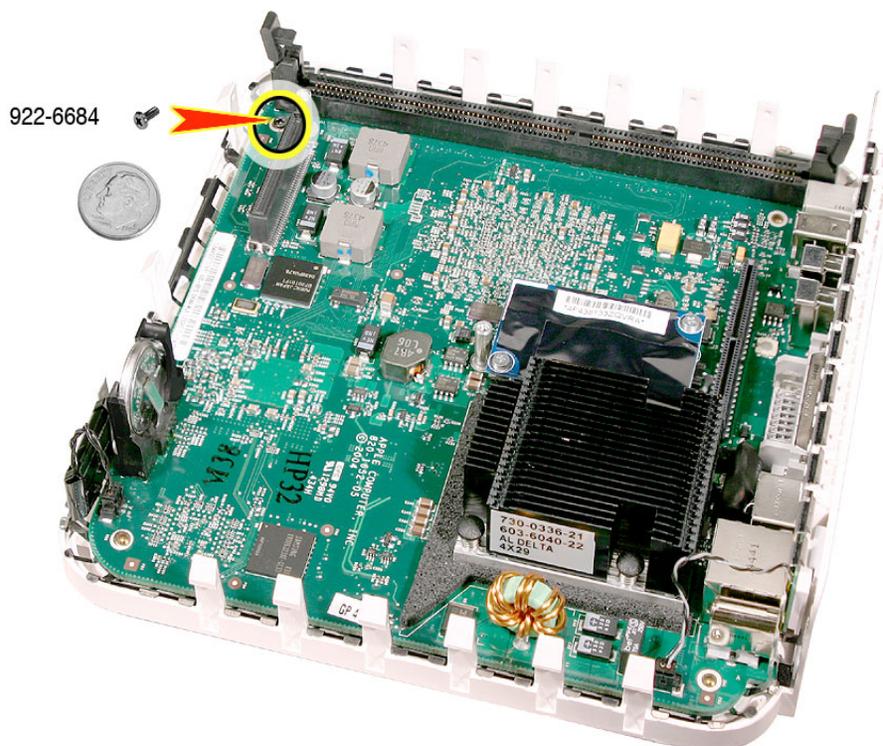
4. Gently push the LED away from the board as you lower the board into the bottom housing. **Note:** Don't bend the LED too much or it could snap off the bottom housing.



5. Connect the power-on cable to the logic board.



6. Replace the logic board screw.



- 
7. Replace the internal frame.
  8. Replace the top housing.



# Bottom Housing

## Tools

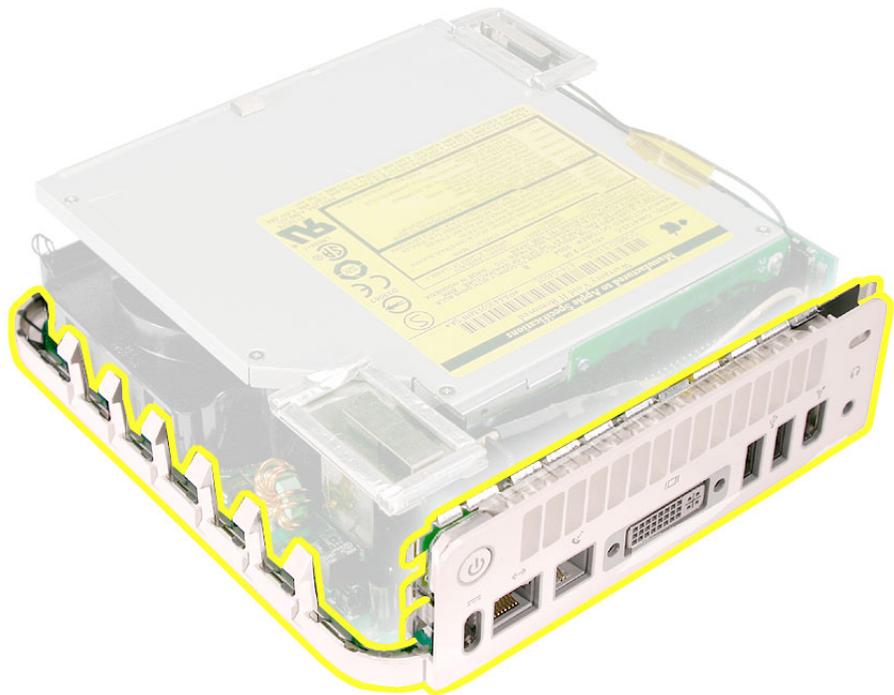
No tools are required for this procedure.

## Preliminary Steps

Before you begin, remove the following:

- top housing
- internal frame
- logic board

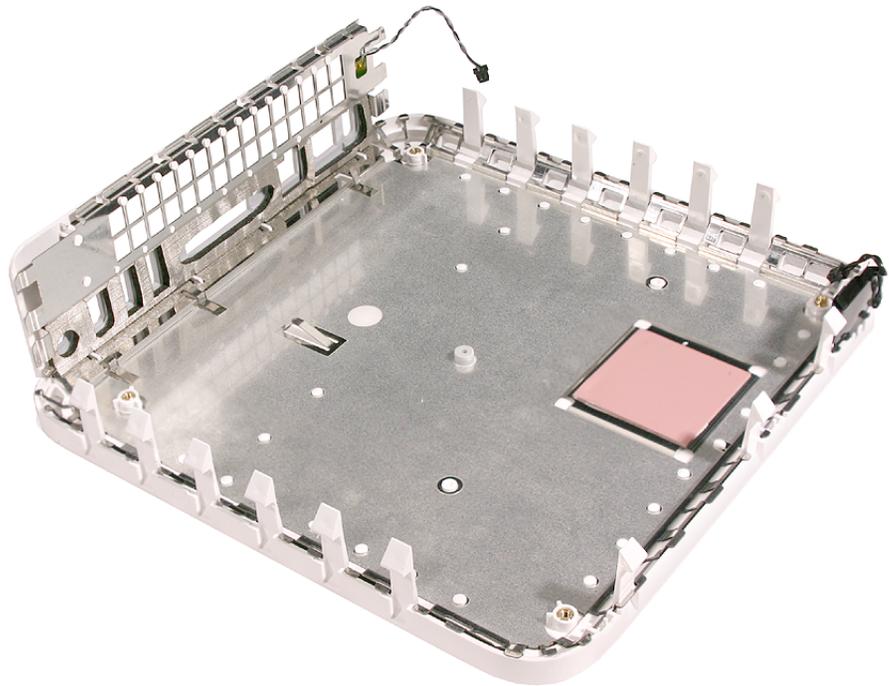
## Part Location



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## Removal Procedure

Once the logic board is removed you are left with the bottom housing.

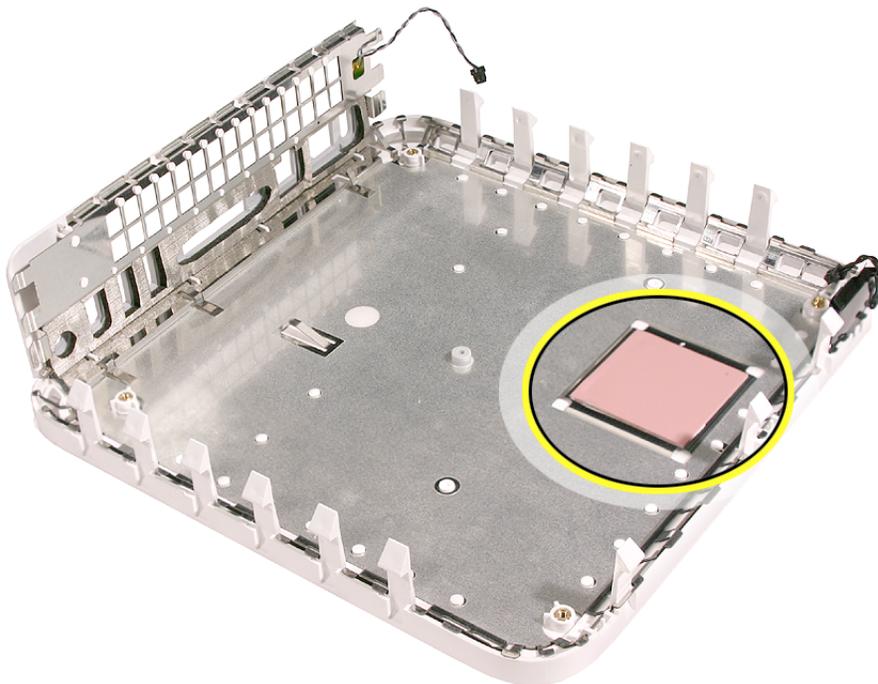


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## Replacement Procedure

1. Replace the thermal pad.

**Important:** Replace the thermal pad on the bottom housing whenever you replace the logic board or the bottom housing, or if the pad is torn, withered, or damaged. For more information, refer to the “Thermal Pad” procedure in this chapter.



2. If necessary, install the following on the logic board:
  - modem board
  - mezzanine board
  - memory

For instructions, refer to the replacement procedures for these individual parts.

3. Replace the logic board.
4. Replace the internal frame.
5. Replace the top housing.



# RJ-11 Connector

## Tools

This procedure requires the following tools:

- Black stick (or other nonconductive nylon or plastic tool)

## Preliminary Steps

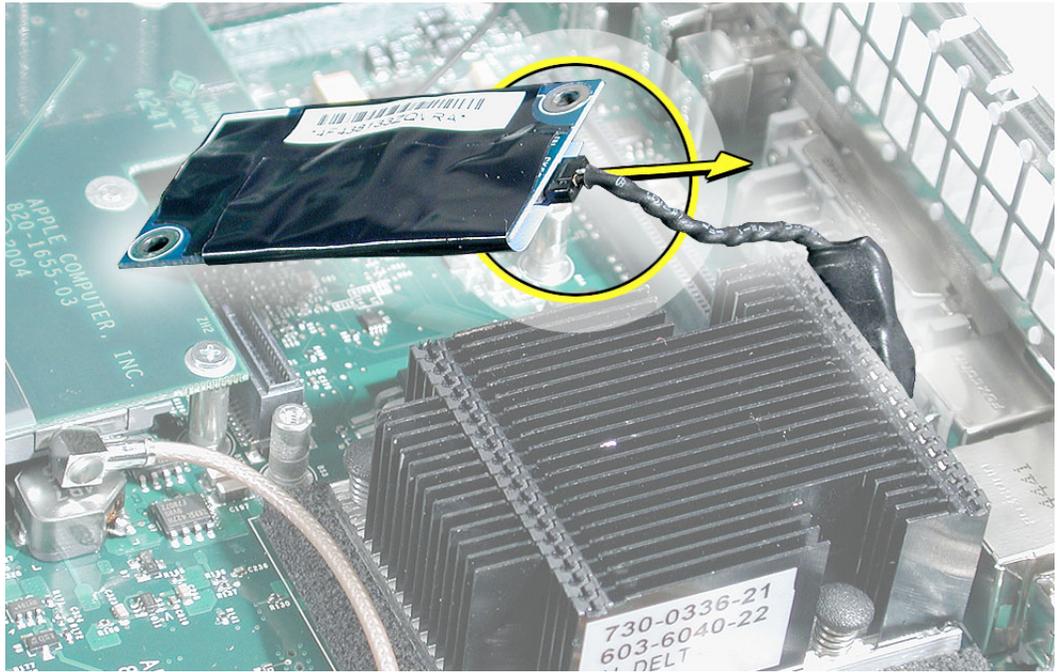
Before you begin, remove the following:

- top housing
- internal frame
- logic board
- modem board

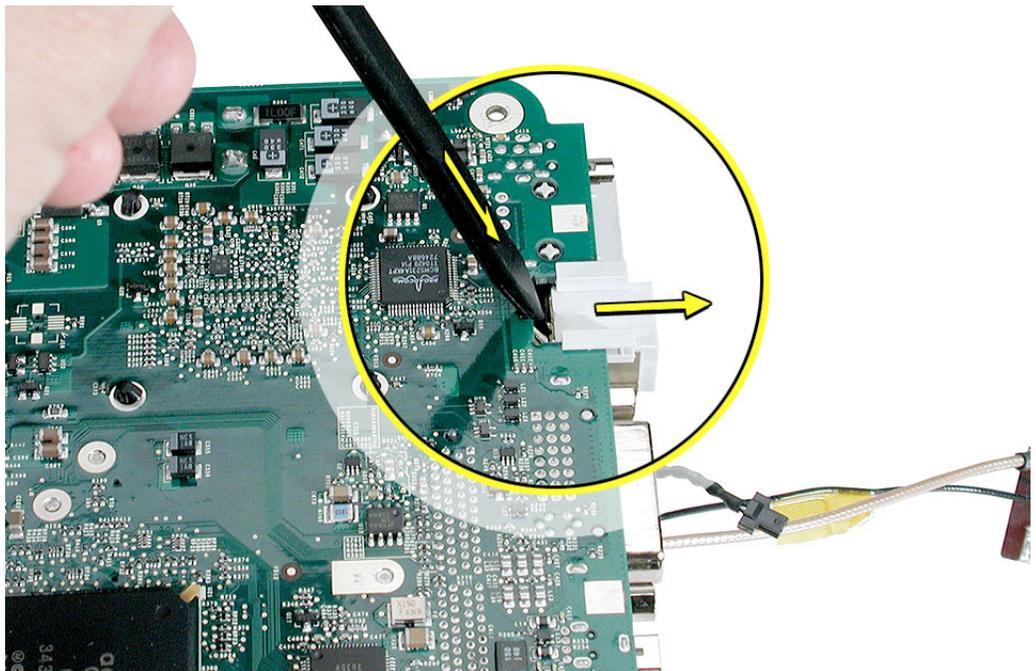
## Part Location

## Removal Procedure

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

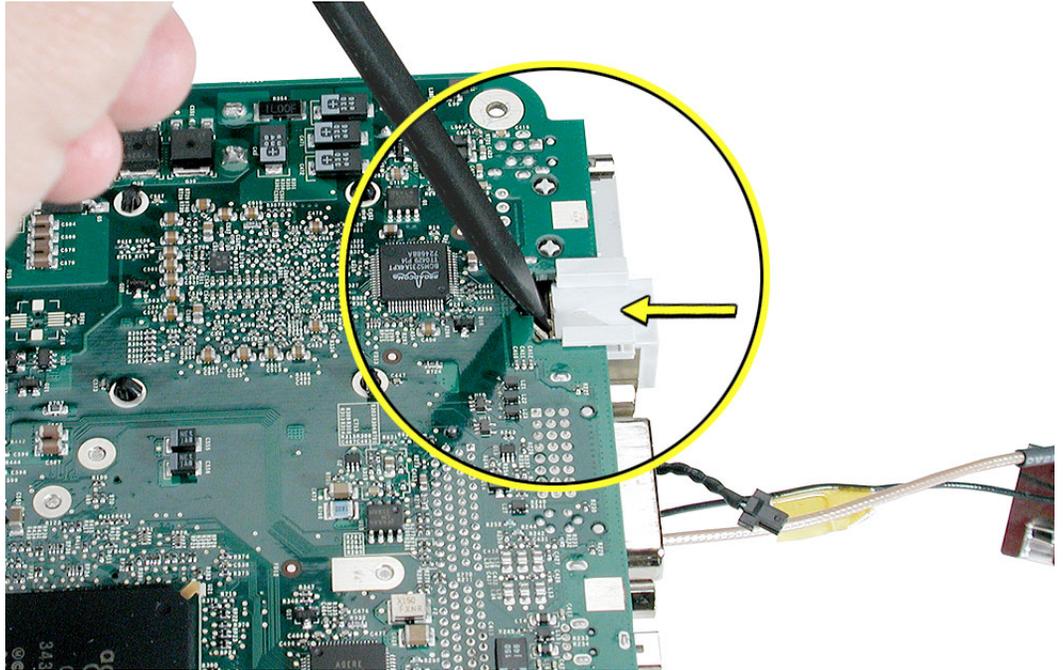


2. Turn over the logic board. Using a black stick, push the RJ-11 connector off the logic board.



## Replacement Procedure

1. Slide the RJ-11 connector onto the logic board.



2. Replace the modem.
3. Replace the logic board.
4. Replace the internal frame.
5. Replace the top housing.



# Battery

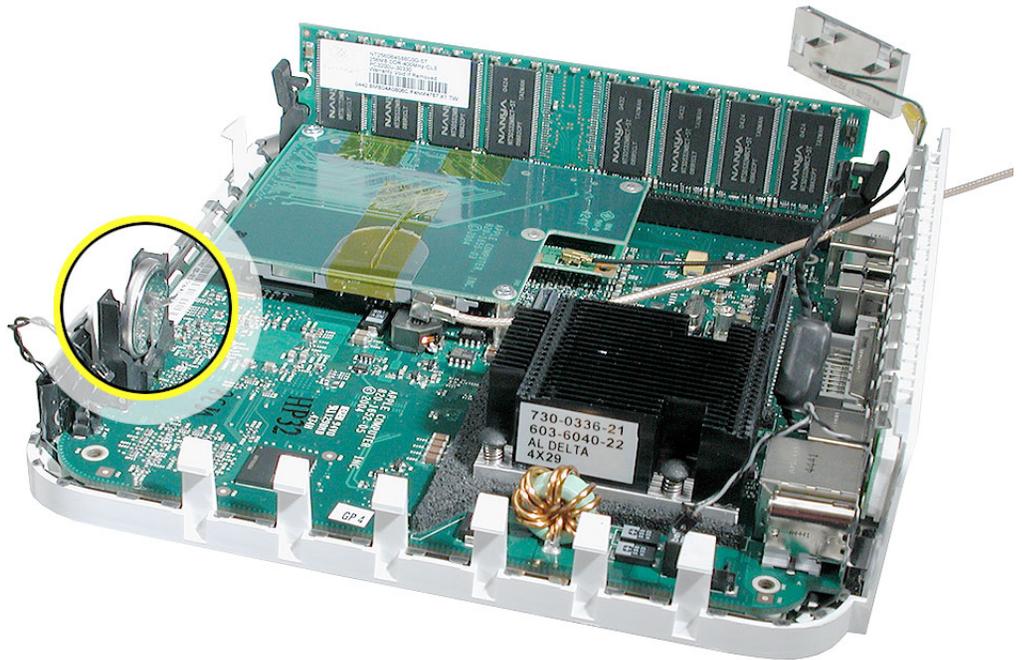
## Tools

No tools are required for this procedure.

## Preliminary Steps

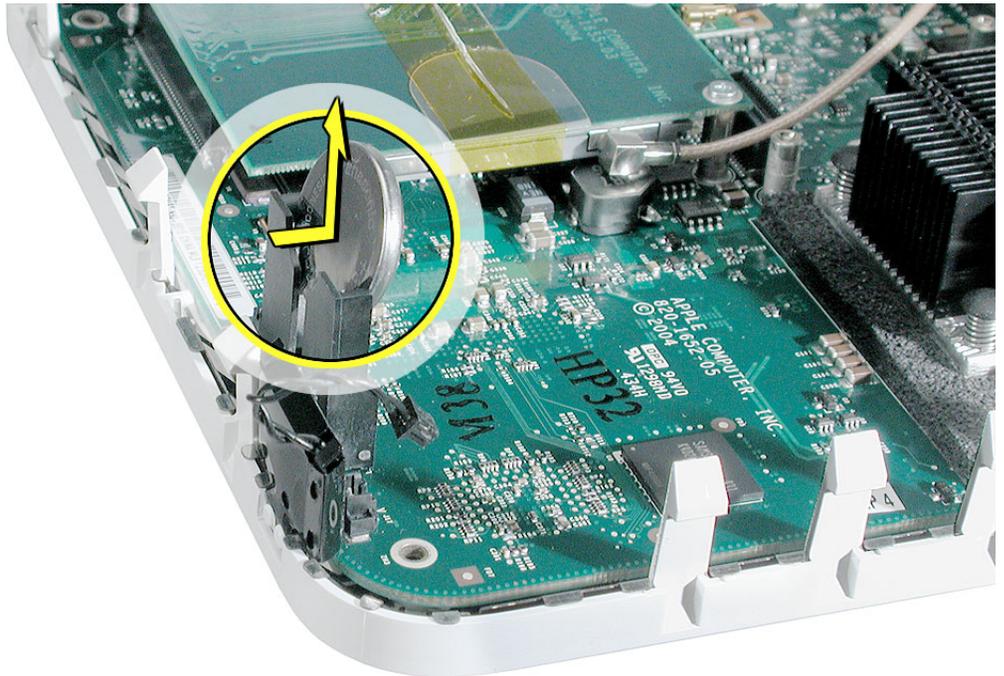
Before you begin, remove the top housing and the internal frame.

## Part Location



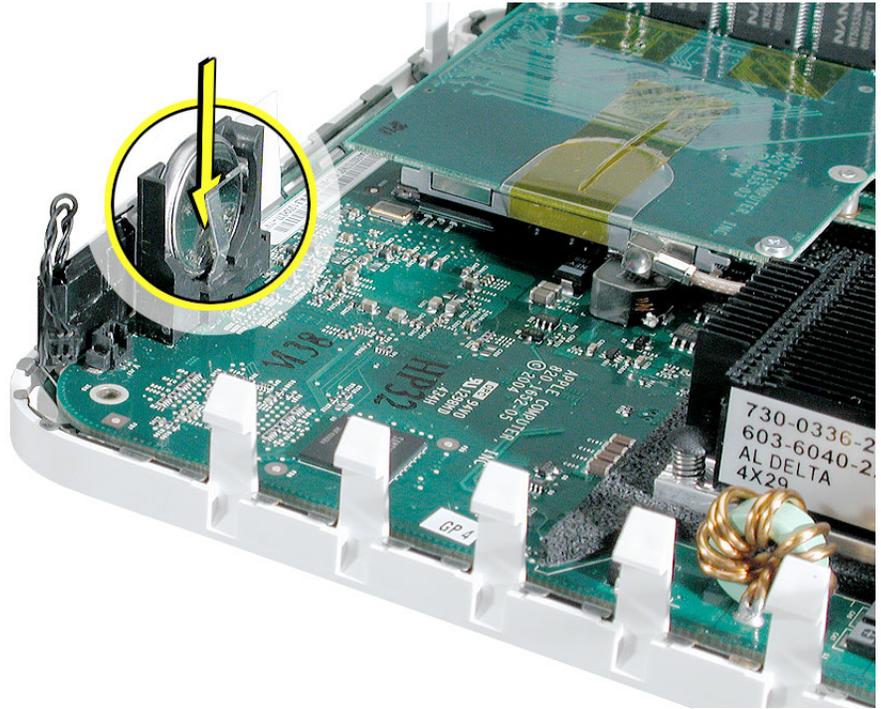
## Removal Procedure

Using your finger, push the battery in and up to release it from the battery holder.



## Replacement Procedure

1. Push the battery into the battery holder.



2. Replace the internal frame.
3. Replace the top housing.



# Speaker

## Tools

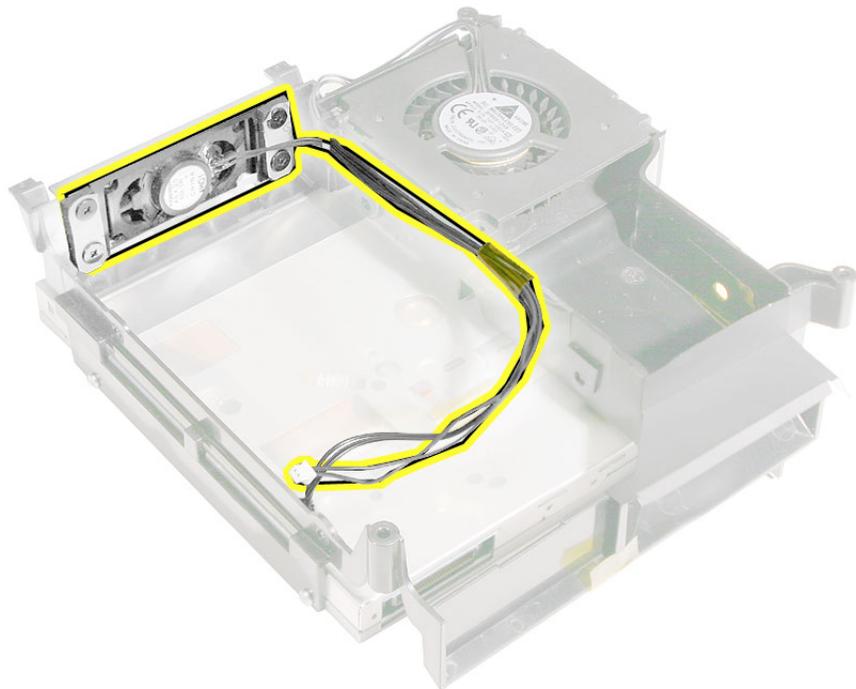
The following tools are required for this procedure:

- Jeweler's #1 Phillips
- black stick or other nonconductive tool

## Preliminary Steps

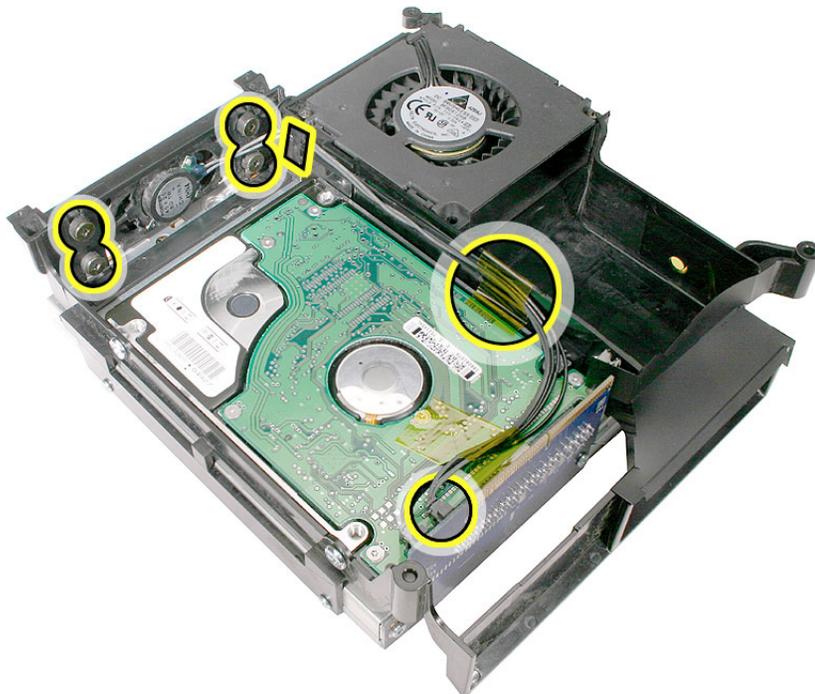
Before you begin, remove the top housing and the internal frame.

## Part Location

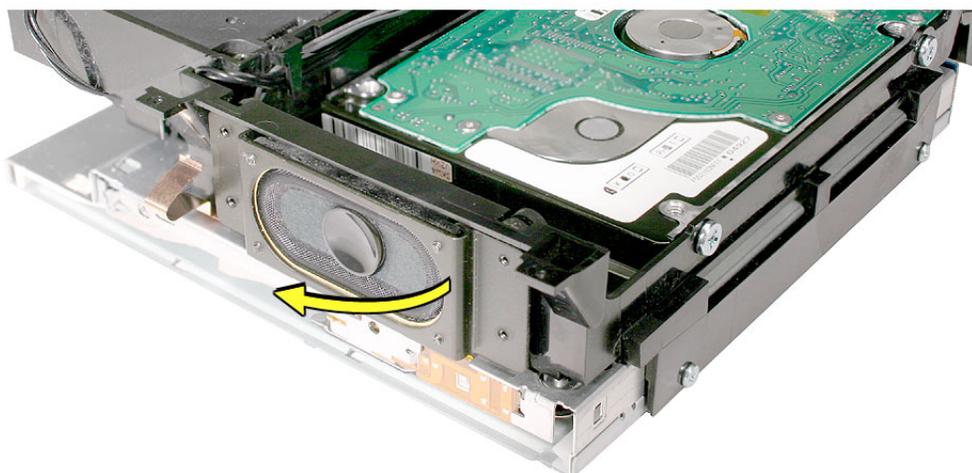


## Removal Procedure

1. Using a jeweler's #1 Phillips screwdriver, remove four screws, free the speaker cable from the cable clip, remove the kapton tape, and disconnect the speaker connector (on the right) from the interconnect board.



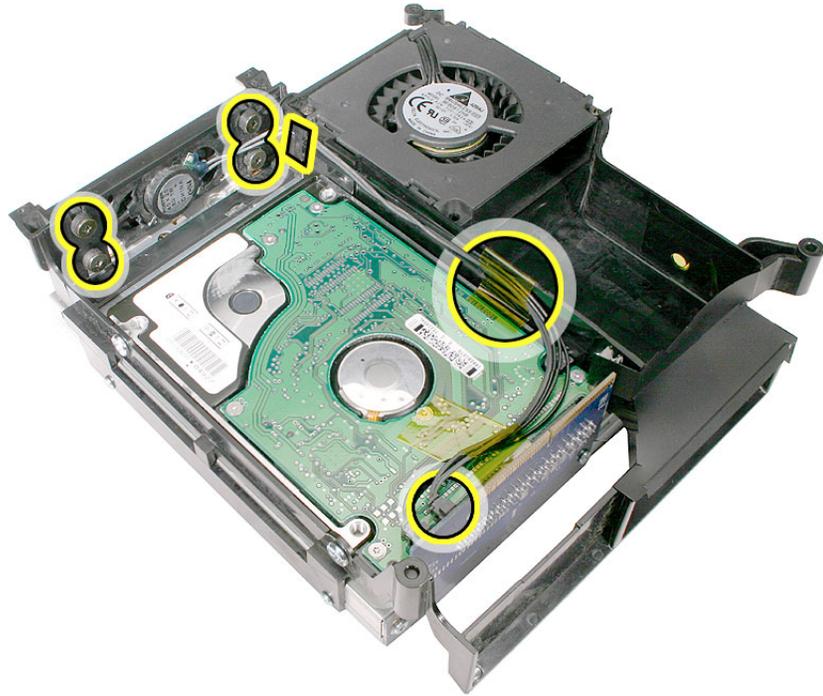
2. With your finger or black stick, pry the speaker off the internal frame. **Note:** Watch that the rubber grommets for the speakers don't fall off as you remove the speaker.



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## Replacement Procedure

1. Position the speaker into the internal frame. Replace the four screws, secure the cable under the cable clip, replace the kapton tape, and connect the speaker cable to the interconnect board.



2. Replace the internal frame.
3. Replace the top housing.





Troubleshooting  
Mac mini



# General Information

## System Serial Number Location

The product serial number and Ethernet ID are located on the bottom housing.



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## Power Adapter Serial Number



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## Thermal Pad

The thermal pad is located on the bottom housing. A new thermal pad is included with the logic board and the bottom housing, and the pads can be ordered separately as a kit (part number 922-6749).

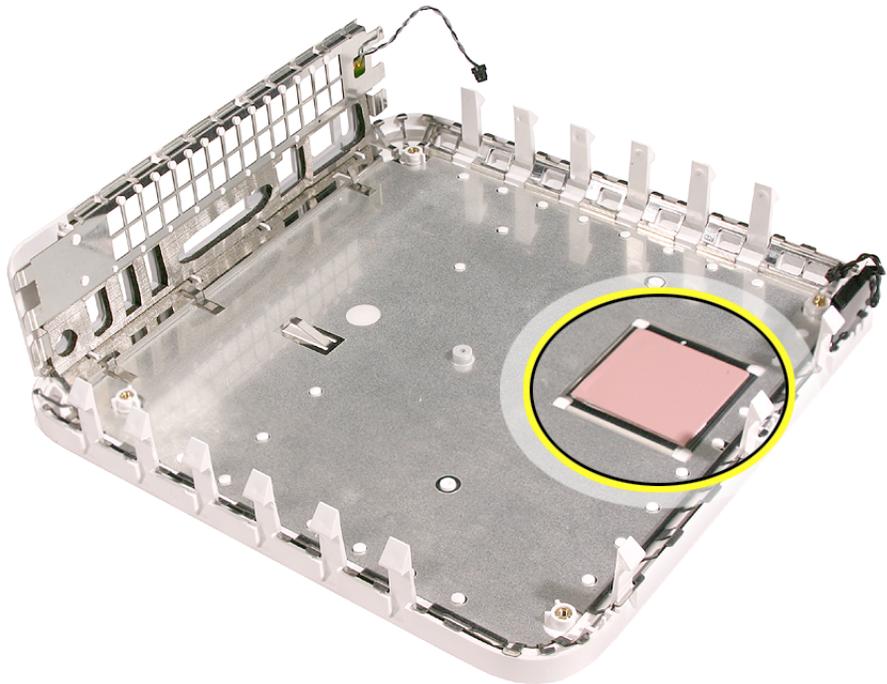
Replace the pad when:

- the logic board or the bottom housing is replaced
- the pad is torn, withered, or damaged

**Important:** Never use thermal paste in place of the thermal pad. You must replace the thermal pad with a new identical pad.

### Procedure

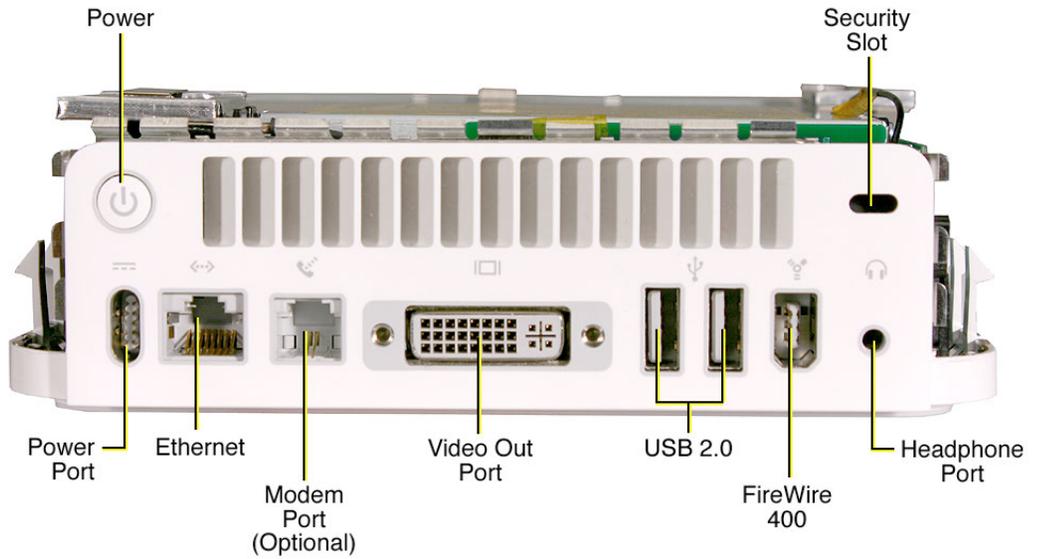
1. Remove the original pad from the bottom housing or the logic board using a black stick or other nonconductive nylon tool.
2. Remove the protective backing on the new thermal pad. **Note:** Avoid unnecessary contact with either side of the thermal pad as dirt and body oils reduce the thermal pad's conductivity.
3. Place the new thermal pad on the bottom housing (as shown). Make sure the thermal pad has even contact with the bottom housing. There should be no air pockets.



4. Replace the logic board.

## Ports

The Mac mini ports are shown below.



The Mac mini ports shown with the modem plug in place.



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## DVI to VGA Adapter

The Mac mini comes with a small DVI to VGA adapter in the box. This adapter allows you to use your Mac mini's DVI port with a VGA-compatible display.



### Replacement adapter

If you need to replace the DVI to VGA adapter that came with your Mac mini, this Apple DVI to VGA Display Adapter (model M8754G/A) is functionally equivalent, and can be purchased through the Apple Store. This is the same adapter that came with some other Macintosh computers.

### Other adapters

You can also use Apple's DVI to Video Adapter (model M9267G/A), which outputs S-Video and Composite video, allowing you to connect your Mac mini directly to a television or older projector.

## Compatible Apple Displays

The Mac mini has a DVI-I port on the back of the computer that allows you to connect any display that uses a DVI interface.

In addition, the Mac mini comes with a DVI to VGA adapter (shown below), if you prefer to connect a VGA monitor to your Mac mini.



If you connect a DVI monitor to the Mac mini, it can display digital resolutions up to 1920 x 1200 pixels, depending on your monitor. If you use the included DVI to VGA adapter, the display port supports analog resolutions up to 1920 x 1080 pixels, depending on your monitor.

The following Apple displays can be used with a Mac mini:

**Table 1: Compatible Displays**

Display Name	Marketing Part Number	Display Connector Type	Compatible?
Apple Cinema HD Display (23-inch DVI)	M9178LL/A	DVI	Compatible
Apple Cinema Display (20-inch DVI)	M9177LL/A	DVI	Compatible
Apple Cinema HD Display (23-inch flat panel)	M8537LL/A	ADC	Use DVI to ADC adapter
Apple Cinema Display (20-inch flat panel)	M8893LL/A	ADC	Use DVI to ADC adapter
Apple Cinema Display (22-inch ADC)	M8058LL/A	ADC	Use DVI to ADC adapter
Apple Studio Display 21	M6204LL/A	VGA	Use included DVI to VGA adapter
Apple Studio Display 17 (ADC)	M7649LL/A	ADC	Use DVI to ADC adapter
Apple Studio Display 17	M6221LL/A	VGA	Use included DVI to VGA adapter

**Table 1: Compatible Displays**

<b>Display Name</b>	<b>Marketing Part Number</b>	<b>Display Connector Type</b>	<b>Compatible?</b>
Apple Studio Display LCD (ADC)	M7928LL/A	ADC	Use DVI to ADC adapter
Apple Studio Display LCD (DVI)	M7612LL/A	DVI	Compatible
Apple Studio Display LCD	M6356LL/B	VGA	Use included DVI to VGA adapter

The following Apple displays are **not** compatible with a Mac mini:

**Table 2: Displays that are not Compatible**

<b>Display Name</b>	<b>Marketing Part Numbers</b>	<b>Display Connector type</b>	<b>Compatible ?</b>
Apple Cinema HD Display (30-inch DVI)	M9179LL/A	DVI	NOT compatible
Apple Cinema Display (22-inch)	M7478LL/A	DVI	NOT compatible

Refer to Knowledge Base article 300652 for updates to this table.

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## Memory Specifications and Upgrades

Mac mini computers have a single memory slot. This slot accepts a standard PC2700 or PC3200 184-pin DIMM with the following specifications:

- PC2700 or PC3200 Synchronous DRAM (SDRAM)
- 2.5 volt
- 8-byte
- non-parity
- 64-bit wide
- 184-pin module
- maximum of 16 memory devices on the DIMM
- unbuffered—do not use registered or buffered SDRAM
- maximum height of 50 mm

Using PC3200 memory does not provide additional speed benefits. Although the Mac mini supports PC3200 DIMMs, the PC3200 RAM will operate at PC2700 (333 MHz) speeds.

The Mac mini has a 256 MB base memory configuration, which can be expanded up to a maximum of 1 GB. The Mac mini can be configured to order (CTO) with 512 MB or 1 GB of SDRAM. Additional memory should be installed by an Apple Authorized Service Provider.

### Video memory

The Mac mini has 32 MB DDR of soldered SDRAM dedicated for video. Video memory cannot be upgraded.

### LED status

The Mac mini has a power light located on the front of the computer in the bottom right corner below the optical drive slot. The LED displays a steady light, no light, or pulses, depending on the computer's status. Here's what the Mac mini's LED is telling you.

**Table 3: Mac mini LEDs**

Model	Startup	Normal Operation	Display Sleep Mode	Energy Saver Mode
Mac mini	steady white	steady white	steady white	pulsing white

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## How to Clean Your Mac mini

Follow these general rules when cleaning the outside of your Mac mini:

- Use a damp, soft, lint-free cloth. Avoid getting moisture in any openings.
- Don't use aerosol sprays, solvents, or abrasives.

**Warning:** Do not use acetone, alcohol, or any alcohol-based cleaner on your computer. Never spray cleaner directly onto your computer. Liquid could drip inside the case and cause an electrical shock.

- Be sure to unplug the power adapter from the wall or power strip before you clean it.

### Procedure

To clean the Mac mini case, do the following:

1. Turn off the computer.
2. Disconnect the power cord and all accessory devices from the computer.
3. Wipe the surfaces lightly with a clean, soft cloth dampened with water.



# Reset the PMU

## How to Reset the PMU

The Power Management Unit (PMU) is an integrated circuit (computer chip) typically found on a computer's logic board. As its name implies, the PMU is responsible for managing all aspects of the computer's power. It controls hard disk spin down, sleep and wake, some charging aspects, and how any devices attached to the computer affect sleep.

If the settings in the PMU become corrupted, it can result in operational anomalies such as your computer not turning on, not displaying video, or not waking from sleep, among other things. In these situations, you may need to reset your computer's PMU.

Resetting the PMU will not resolve issues in which the computer stalls or is unresponsive. A PMU reset should only be used as a last resort in the case of a hardware failure or when the power management system is suspected. Resetting the PMU returns the computer hardware, including NVRAM, to default settings and forces the computer to shut down.

Before you reset the PMU, try restarting the computer instead, which may resolve the issue. If the computer has stopped responding, try these steps, in order, until the computer responds:

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

If none of the above steps resolved the situation, reset the PMU.

## Reset the PMU with the Top Housing On

1. Unplug all cables from the computer, including the power cord.
2. Wait 10 seconds.
3. Plug in the power cord while simultaneously pressing and holding the power button on the back of the computer.
4. Let go of the power button. Your computer should start up.

**Important:** This procedure also resets the computer's PRAM. Be sure to reset your computer's time, date, and other system parameter settings as necessary.

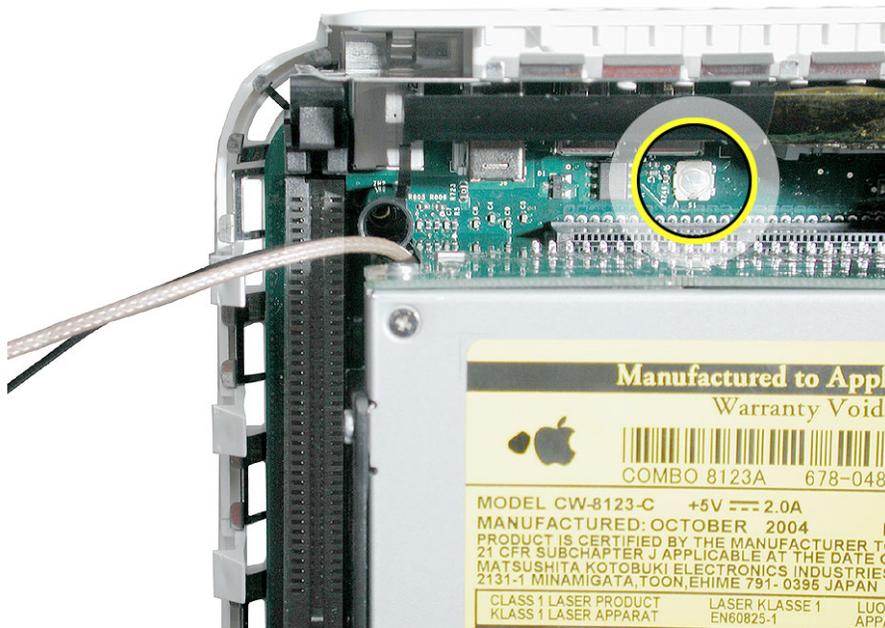
If none of the above steps resolved the situation, reset the PMU. Follow the procedures on the next page.

## Reset the PMU with the Top Housing Off

You can also reset the PMU by directly pressing the PMU reset switch located on the logic board. Follow these steps to access the PMU reset switch on the logic board.

1. Unplug all cables from the computer.
2. Remove the top housing.
3. If necessary, remove the internal frame to access the battery.
4. Measure the voltage of the battery in the battery holder. The battery should measure 2.6V to 3.0V. If the battery does not have minimum voltage, replace the battery. After replacing the battery, wait 10 seconds and then reset the PMU (refer to the next step). If the battery voltage is good, go on to the next step.
5. Press the PMU switch on the logic board, located in the rear right corner of the machine. Be sure to press it just once. Because of the restricted space, you may need to use a black stick to press this switch.

**Warning:** Do not press the PMU reset switch a second time because it could adversely affect the PMU chip.



6. This procedure also resets the computer's PRAM. Be sure to reset your computer's time, date, and other system parameter settings as necessary.



# Reset PRAM and NVRAM

## Procedure

1. Shut down the computer.
2. Locate the following keys on the keyboard: Command, Option, P, and R. You will need to hold these keys down simultaneously in step 4.
3. Turn on the computer.
4. Press and hold the Command-Option-P-R keys. You must press this key combination before the gray screen appears.
5. Hold the keys down until the computer restarts and you hear the startup sound for the second time.
6. Release the keys.
7. Your computer's PRAM and the NVRAM are reset to the default values. The clock settings may be reset to a default date on some models.



# 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.

**Note:** If you have replaced a module, reinstall the original module before you proceed to the next cure.

## No Power

### The Mac mini won't turn on, no startup chime, no drive or fan sound, maybe no power on LED

1. Make sure that the power cord is plugged into a working wall outlet, and that it's properly connected to the power adapter. (To check if the wall socket is working, plug in a lamp or other electrical device.)
2. Make sure that the power adapter is properly connected to the power port on the back of the computer.
3. Disconnect all accessories that are plugged into the computer, such as a printer, hub, or iPod.
4. Reset the PMU. (Refer to Reset the PMU mentioned in this chapter.)
5. Try plugging a different power cord into the computer (if you have a working one available). If the computer starts up, replace the old power cord.
6. Try connecting a different power adapter to the computer (if you have a working one available). If the computer starts up, replace the old power adapter.
7. Replace the logic board.

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## No Video

### **Computer starts up, but no video on display, there is a startup chime, fans and drive spins up, and the power LED is on**

1. Make sure that the monitor is turned on and has power. Make sure that the display's power cord is plugged into a working wall outlet, and that it's properly connected to the power adapter. (To check if the wall socket is working, plug in a lamp or other electrical device.)
2. Check that all video cable connections to the computer video port and to the monitor are properly connected.
3. Examine the pins on the video cable connector to make sure they are not bent or damaged in any way.
4. Connect a known working display (if you have an extra one available). If you see no video after doing so, proceed to the next symptom, "No video on the display." If you see video, go on to step 5.
5. Reset the computer's parameter RAM. (Refer to Reset the PRAM and NVRAM mentioned in this chapter.)
6. Reset the computer's PMU. (Refer to Reset the PMU mentioned in this chapter.)
7. Reseat the Mac mini's memory. Make sure the memory chip is a PC2700 (333) or PC3200 (400) DIMM.
8. Remove the DIMM and try replacing it with a working DIMM to test.
9. Reset the PMU on the logic board. (Refer to Reset the PMU mentioned in this chapter.)
10. Replace the logic board.

### **Other displays work with the Mac mini, but your display show a black screen or "Out of Range" message**

1. Verify that the monitor used in testing is known good and is supported by this computer. Refer to Apple Knowledge base article: 300652, "Mac mini: Compatible Apple Displays" and article 300985: "Mac mini Compatibility with Third-Party Displays."
2. If your display is not listed in either of the above documents, try using the steps in Apple Knowledge base article 301345, "Mac mini: Troubleshooting "Out of Range" Alert Message."
3. If you still have no video on your display when connected to a Mac mini, try another display of the same type (either same model or same connector and native resolution). If you have the same result with the same type of display then you are experiencing an incompatibility with the particular display.
4. Contact Tech Assist through Service Source if you require further assistance.

---

### **Display shows ghosting (signal reflection)**

1. Verify monitor that is used in testing is known-good and is supported by this computer.
2. Verify that the cables are correctly installed and firmly seated.
3. Connect a known-good display (if you have an extra one available). If it solves the issue, replace your display.
4. Try and known-good DVI to VGA adapter.
5. Replace the adapter cable.
6. Replace the logic board.

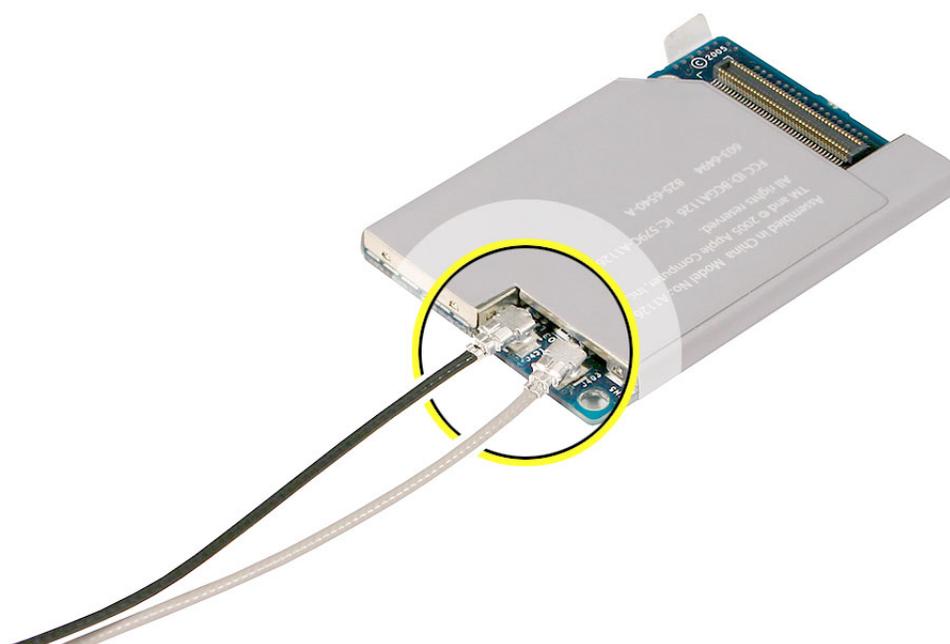
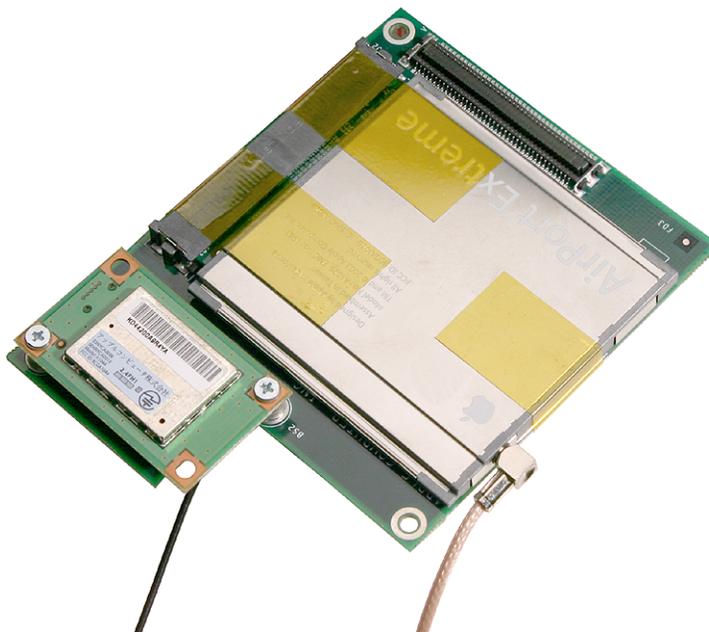
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## AirPort

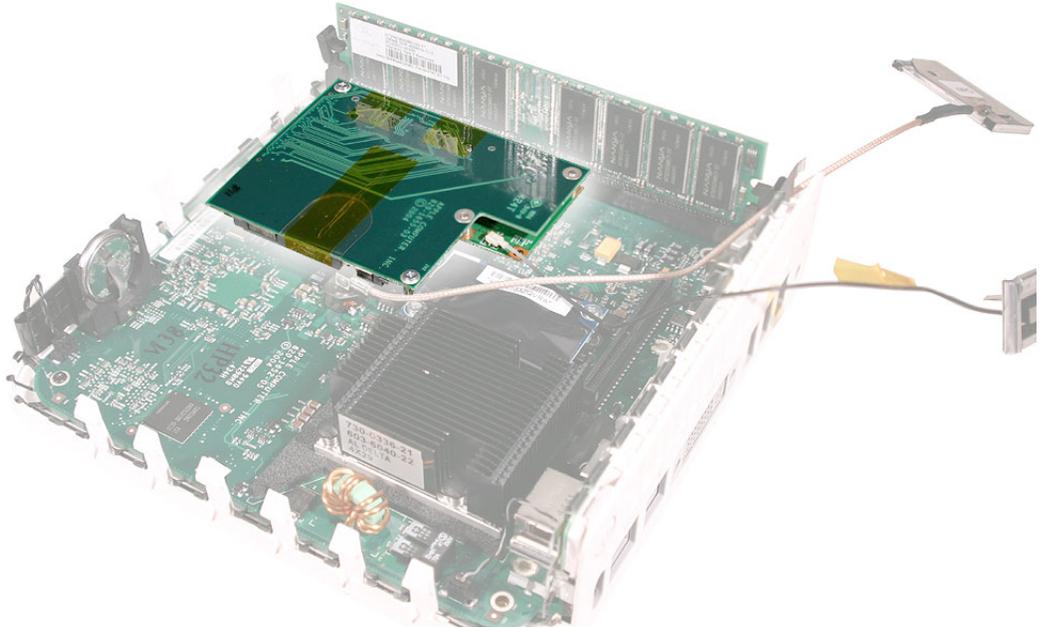
### AirPort Extreme card not recognized

If the Mac mini does not recognize an AirPort Extreme card, the card may not be seated correctly or it is inoperable.

1. Depending on which Mac mini model you have, reseal the AirPort Extreme card and/or cables making sure it is securely connected to the mezzanine card (top photo) or check the AirPort Bluetooth combo card cable connections shown in lower photo.



2. On the older Mac mini models, make sure the kapton tape is applied properly to hold the AirPort Extreme card in place.
3. Make sure that the mezzanine board is properly seated on the logic board. This shows the older mezzanine board, but the location is the same on the newer models.

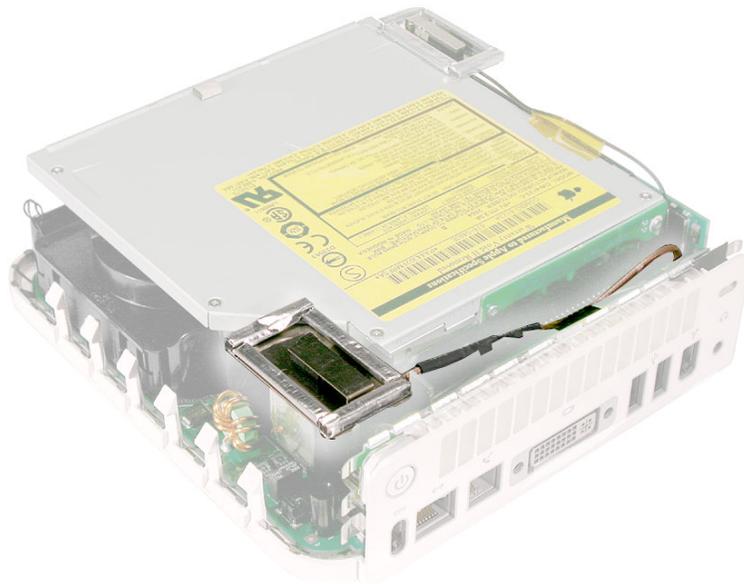


4. Reassemble the computer and test. Again, depending on the Mac mini model, if the AirPort Extreme card is still not recognized, test with a known good AirPort Extreme card or AirPort Extreme/Bluetooth card. If the known good card is recognized, replace the AirPort Extreme card or the AirPort Extreme/Bluetooth card.
5. If a known good AirPort Extreme card or the AirPort Extreme/Bluetooth card is still not recognized, replace the mezzanine board and test the computer again
6. If a known good AirPort Extreme card or AirPort Extreme/Bluetooth card and replacement mezzanine board does not resolve the issue, replace the logic board.

---

### **Poor AirPort reception, the Mac mini is able to connect to the network, but the signal strength is poor**

1. Don't put anything on top of your Mac mini or stack Mac minis on top of each other either. If the Mac mini is configured with AirPort or Bluetooth, it could hamper the signal strength since the antennas are located in the top of the computer.
2. If your Mac mini is still experiencing poor AirPort reception, try the steps outlined in Knowledge Base article 58543: AirPort: Potential sources of interference.
3. Remove the top housing and test the reception. If the reception is always good with the top housing removed, check to make sure that the antenna cable and receptors are not damaged or hindered when installing the top housing.

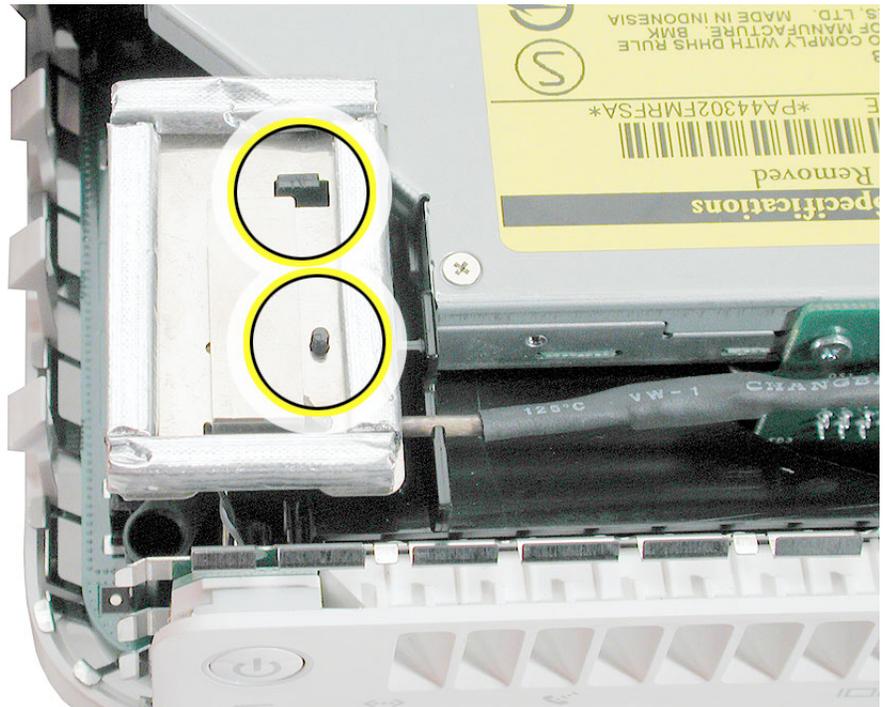


4. Reseat AirPort antenna and cable.
5. Try a known-good AirPort Extreme card or AirPort/Bluetooth combo card.
6. Reseat the mezzanine board.
7. Replace the AirPort antenna.
8. Replace the AirPort Extreme card or AirPort/Bluetooth combo card.
9. Replace the mezzanine board.
10. Replace logic board.

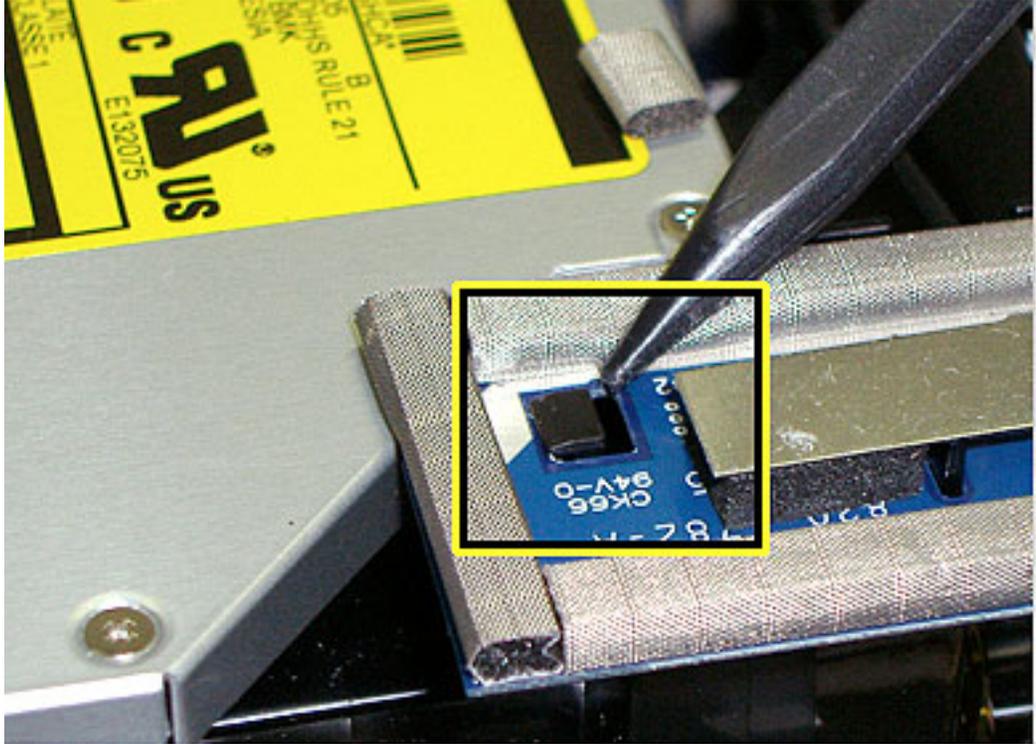
## Can't Connect to the Internet over AirPort

The Mac mini recognizes an AirPort Extreme Card installed, but cannot connect to the internet over AirPort.

1. If your Mac mini recognizes your AirPort Extreme card, but you are unable to connect to your network, try the steps outlined in Knowledge Base article 106858: AirPort Troubleshooting Guide.
2. Reseat and replace the AirPort antenna if the above information does not resolve the issue.
3. Make sure that the AirPort antenna is seated correctly to the AirPort Extreme Card. Refer to Knowledge Base article 108039: Properly attaching the antenna on an AirPort Extreme card.
4. Make sure that the AirPort antenna is not damaged or warped on the receiver end of the cable. Make sure that this end is properly seated to the internal frame (as shown below).



5. **Note:** The airport antenna board contained in the finished goods upgrade kit has too large a hole for the internal frames to clip onto. Use additional kapton tape to secure the antenna to the internal frame. Place a little kapton tape beneath the antenna or place a strip of tape going from the optical drive to the internal frame, where the antenna connects to the antenna board.



6. Replace the AirPort antenna and test.
7. If the issue persists, replace the AirPort Extreme card.

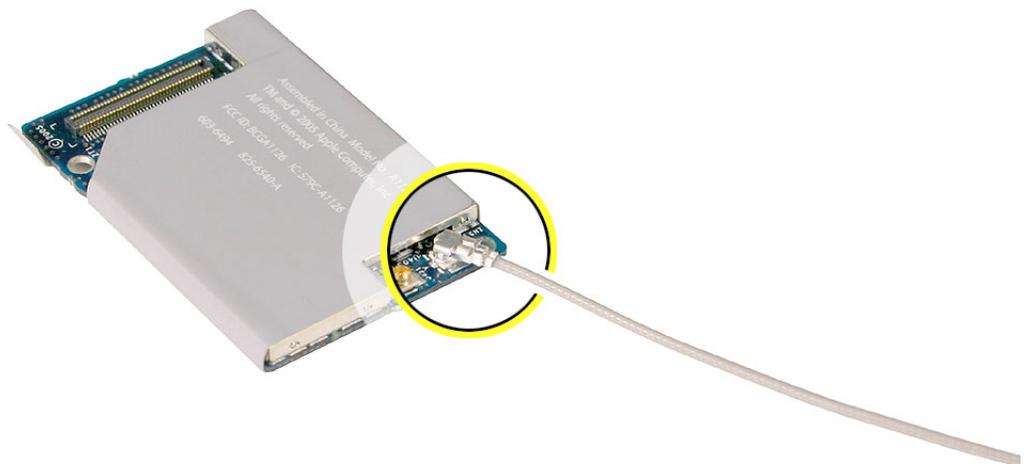
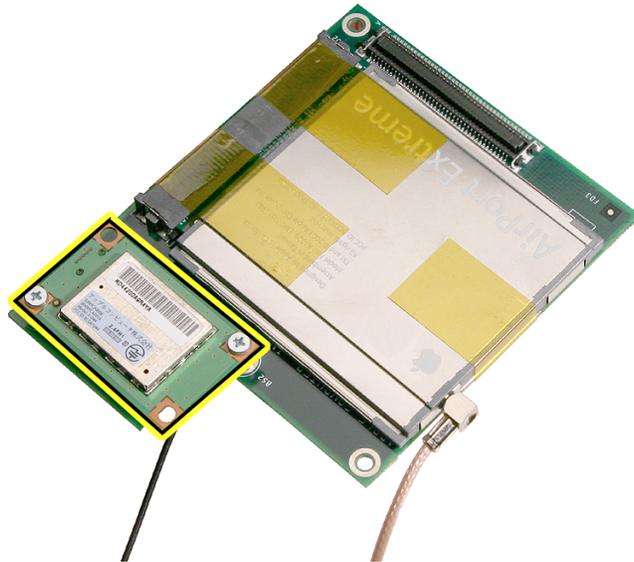
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## BlueTooth

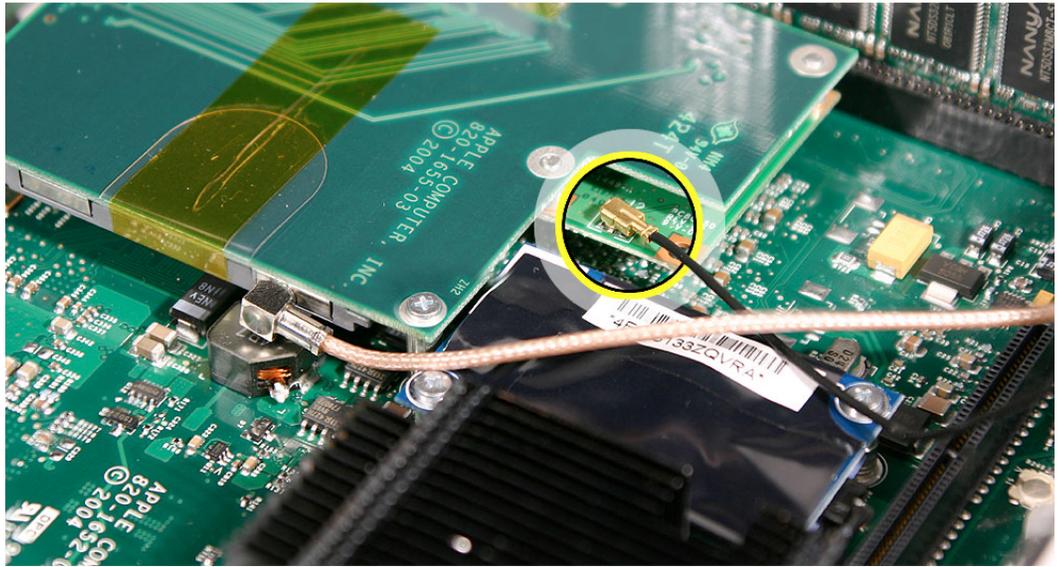
### The Mac mini does not recognize the Bluetooth board

If the Mac mini does not recognize Bluetooth, the board may not be seated correctly or is inoperable.

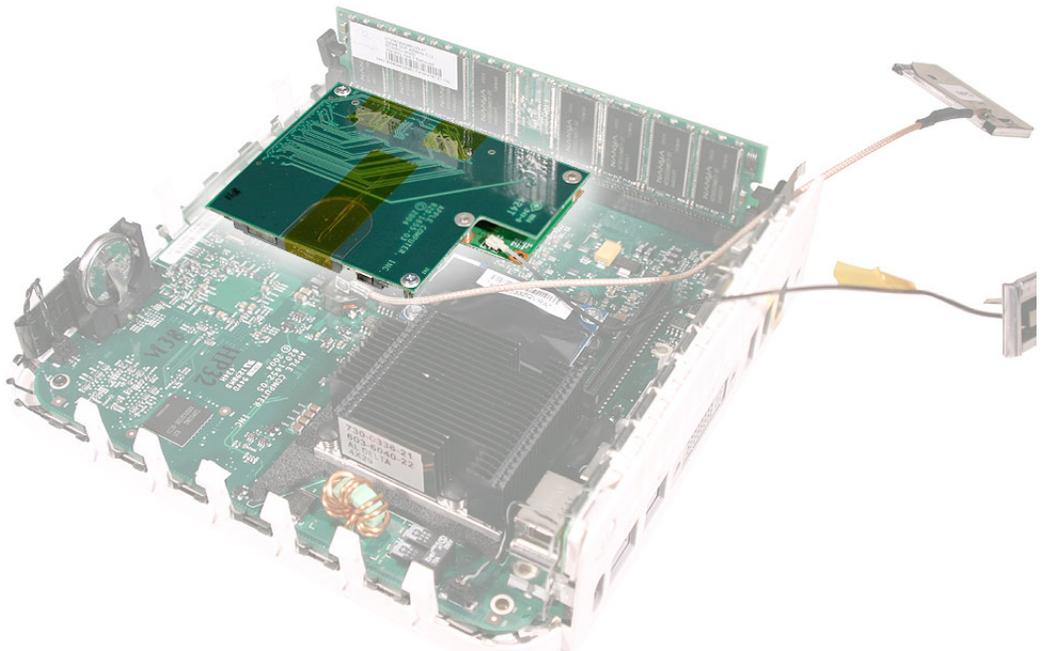
1. Depending on the Mac mini model, reseal the Bluetooth board or cable on the AirPort/Bluetooth combo card (lower photo), making sure they are securely connected.



2. On the older model, check that the Bluetooth antenna is securely connected to the Bluetooth board.



3. Make sure that the mezzanine board is properly seated on the logic board.



4. Reassemble the computer and test. If the Bluetooth board is still not recognized, test with a known good Bluetooth board. If the known good board is recognized, replace the Bluetooth board or the AirPort/Bluetooth combo card on the new Mac mini.

- 
5. Replace the mezzanine board and test the computer again.
  6. Replace the logic board.

**The Mac mini recognizes a Bluetooth board, but cannot pair with wireless devices.**

If the Mac mini recognizes the Bluetooth board, but you are unable to pair your Apple Wireless Keyboard and Wireless Apple Mouse, try the steps outlined in Knowledge Base article 86496: Apple Wireless Keyboard and Mouse: Troubleshooting Connection Issues.

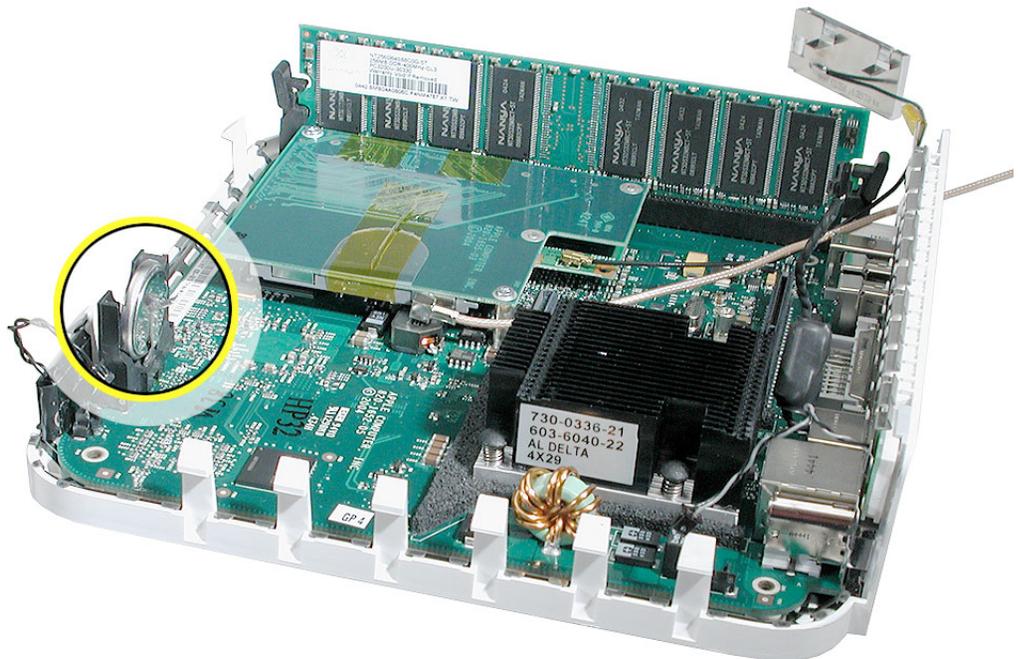
1. Make sure that the Bluetooth antenna is firmly connected to the Bluetooth board or the AirPort/Bluetooth combo card on the new Mac mini model.
2. With the top housing removed, make sure that the Bluetooth antenna is not damaged or warped on the receiver end of the cable. Make sure that this end is properly seated to the internal frame of the Mac mini.
3. Check to make sure that the antenna cable and receptors are not damaged or hindered when installing the top housing
4. Replace the Bluetooth antenna and test.
5. If the issue persists, replace the Bluetooth board or the AirPort/Bluetooth combo card on the new Mac mini model.
6. Replace the mezzanine board.
7. Replace the logic board.

---

## Battery

### **The computer won't keep date and time, the date and time reset when the computer is powered off or unplugged**

1. Make sure the electrical outlet works by plugging in a different device, or plug the computer into a different outlet.
2. Check the power cord. Use a known good power cord.
3. Check the connection of the power cord on both ends. Make sure that the plug is securely plugged into both the electrical outlet and the back of the computer.
4. Disconnect the keyboard, mouse, and all other peripherals such as speakers.
5. Remove the top housing and if necessary, remove the internal frame.
6. Measure the voltage of the battery in the battery holder (see graphic below). The battery should measure 2.6V to 3.0V. If the battery does not have minimum voltage, replace the battery. After replacing the battery, wait 10 seconds and then reset the PMU (refer to Reset the PMU mentioned in this chapter).



7. If the battery voltage is good, reset the Power Management Unit (PMU). Refer to: Reset the PMU mentioned in this chapter.
8. If the issue continues after resetting the PMU, replace the logic board.

---

## Error Beeps

The computer automatically performs a power-on self test when it is turned on after being fully shut down (not a restart). This section describes what to do if beeps are heard during the startup.

### Computer beeps at startup

1. Check that the memory DIMM is compliant. The Mac mini computers have a single memory slot. The slot accepts a standard PC2700 or PC3200 184-pin DIMM with the following specifications:
  - PC2700 or PC3200 Synchronous DRAM (SDRAM)
  - 2.5 volt
  - 8-byte
  - non-parity
  - 64-bit wide
  - 184-pin module
  - maximum of 16 memory devices on the DIMM
  - unbuffered—do not use registered or buffered SDRAM
  - maximum height of 50 mm

The Mac mini has a 256 MB base memory configuration, which can be expanded up to a maximum of 1 GB.

2. Reseat the memory into the slot.
3. Replace the memory.
4. Replace the logic board.

---

## Optical Drive

### **The optical disc drive does not accept discs (mechanical failure)**

1. Verify disc is not warped.
2. Try another known-good disc.
3. Reseat the optical drive to the interconnect board.
4. Replace optical drive.
5. Replace the interconnect board
6. Replace the logic board.

### **The disc icon does not show up on the desktop, or a dialog box appears to initialize disc**

1. Verify the correct type of disc is being used for the type of drive (a CD-ROM or CD-RW drive reads CD discs only; a DVD-ROM or Combo drive reads CD or DVD discs).
2. Try cleaning the disc. If it is dirty or scratched, it may not mount.
3. Try a different disc.
4. Reseat optical drive to the interconnect board.
5. Replace optical drive.
6. Replace the interconnect board.
7. Replace the logic board.

### **The optical drive does not eject the disc**

1. Check the disc. Nonstandard discs should not be used with the Mac mini. Refer to Knowledge Base article 58641: Using nonstandard discs in CD-ROM or DVD-ROM discs
2. Verify disc is not in use by quitting any applications that may be using the disc.
3. Press and hold Media Eject key at top right corner of Apple keyboard. If that does not work, hold down Function (fn) key and Media Eject key.
4. Drag disc icon to trash or select it and press Command-E.
5. Choose Restart from Apple menu while holding down the mouse button.
6. Refer to Take Apart to remove the stuck disc and replace the optical drive.

Related article:

106752: Macintosh: How to Eject a Disc When Other Options Do Not Work

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## Hard Drive

### Hard drive fails to boot to the desktop

1. Boot from Mac mini Mac OS X Install DVD and see if the hard drive mounts on the desktop.
2. Run Apple Hardware Test (AHT), located on the install DVD.
3. Run Disk Utility and correct any directory and permissions issues.
4. Erase and reformat the drive.
5. Verify that the hard drive is firmly connected to the interconnect board.
6. Try a known-good hard drive.
7. Erase and reformat the original drive.
8. Try a known-good interconnect board.
9. Replace hard drive.
10. Replace interconnect board.
11. Replace logic board.

### The internal hard drive does not spin

1. Disconnect any connected peripherals.
2. Try known-good power outlet.
3. Try known-good power cord.
4. Boot from a Mac mini Mac OS X Install DVD.
5. Run Apple Hardware Test (AHT), located on the install DVD.
6. Run Disk Utility and correct any directory and permissions issues.
7. Verify that the hard drive is connected to the interconnect board.
8. Try a known-good hard drive.
9. Erase and reformat the original drive.
10. Try a known-good interconnect board.
11. Replace hard drive.
12. Replace interconnect board.
13. Replace logic board.

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

1. Boot from the Mac mini Mac OS X Install DVD that came with the computer and see if the hard drive mounts on the desktop.
2. Run Apple Hardware Test (AHT), located on the install DVD.
3. Run Disk Utility and correct any directory and permissions issues.
4. Verify that the hard drive is connected to the interconnect board.
5. Try a known-good hard drive.
6. Erase and reformat the original drive.
7. Try a known-good interconnect board.
8. Replace hard drive.
9. Replace interconnect board.
10. Replace logic board.

### **Flashing question mark appears on the screen**

1. Boot from the Mac mini Mac OS X Install DVD that came with the computer and see if the hard drive mounts on the desktop.
2. Run Apple Hardware Test (AHT), located on the install DVD.
3. Run Disk Utility and correct any directory and permissions issues.
4. Verify that the hard drive is connected to the interconnect board.
5. Try a known-good hard drive.
6. Try a known-good interconnect board.
7. Replace hard drive.
8. Replace interconnect board.
9. Replace logic board.

---

## Keyboard

### **No response from any key on the USB keyboard**

1. Check that the mouse and keyboard are compliant. The Mac mini has two USB 2.0 ports, which can be used with any USB 1.1- or USB 2.0-compliant keyboard and mouse.
2. Remove any connected peripherals.
3. Boot from the Mac mini Mac OS X system DVD to verify that it is not a software problem.
4. Disconnect the keyboard connector and inspect connectors.
5. Replace the keyboard.
6. Replace the logic board.

### **No response from the Wireless keyboard**

1. Check System Profile to determine if the AirPort/Bluetooth are present.
2. Try a known-good wireless keyboard.
3. Replace the batteries in the wireless keyboard.
4. Replace the keyboard.
5. Remove the top housing.
6. Check for kinks in the Bluetooth antenna cable. Test the reception before replacing the top housing.
7. If the reception goes away when the top housing is replaced, remove the top housing and reseal the Bluetooth antenna on the internal frame. Test the reception again.
8. Make sure that the Bluetooth antenna is firmly connected to the Bluetooth board.
9. Make sure that the Bluetooth antenna is not damaged or warped on the receiver end of the cable. Make sure that the antenna is properly seated to the internal frame of the Mac mini.
10. Replace the Bluetooth antenna and test.
11. If the issue persists, replace the Bluetooth board.
12. Replace the mezzanine board.
13. Replace the logic board.

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## **Modem**

### **No modem dial tone**

1. Check that the internal modem is selected. Check System Preferences: Network setup.
2. Verify known-good analog (not digital) telephone line.
3. Verify known-good RJ-11 telephone cable.
4. Verify RJ-11 cable is not plugged into Ethernet port.
5. Inspect RJ-11 connector and modem port for pin damage.
6. Verify RJ-11 telephone cable is firmly installed in the modem port.
7. Verify RJ-11 connector is plugged into the modem board on the logic board.
8. Replace RJ-11 connector/cable.
9. Replace modem.
10. Replace the logic board.

### **Cannot send fax**

1. Check that Network connection in System Preferences is set to Internal Modem.
2. Refer to Knowledge Base article 25746: Mac OS X 10.3: Fax doesn't send.

### **Cannot receive fax**

Check that "Receive faxes on this computer" is selected in the Print & Fax area of System Preferences.

Related articles:

25731: Mac OS X 10.3: Receiving faxes and connecting to the Internet

25596: Mac OS X 10.3: About Receiving Faxes.

### **Modem drops connection**

1. Try known-good phone line.
2. Refer to Knowledge Base article 106748: Mac OS X: Troubleshooting a dial-up/PPP Internet connection.

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## Ports

### **The FireWire or USB port is not recognizing devices**

1. Completely shut down, then press the power button to start the computer.
2. Use Software Update in Mac OS X system preferences to verify that the latest software is installed.
3. Use Apple System Profile to verify that the computer is recognizing the bus.
4. For USB, test ports with a compliant keyboard or mouse.
5. For FireWire, test by connecting another computer in FireWire Target Disk Mode. Refer to article 58583: How to Use FireWire Target Disk Mode.
6. Verify that drivers are installed properly for third party, if needed.
7. Try a different cable.
8. Try known-good device.
9. If self-powered make sure that the power supply is connected and device's LED indicates that it is getting power.
10. Replace logic board.

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## Sound

### Distorted sound from speakers

1. Check balance in System Preferences: Sound: Output. Verify sound is correct with external speakers/headphones.
2. Check to see if the sound is the same from the internal speaker vs. external speakers.
3. Check that speakers are inserted correctly, and check cables for damage.
4. Compare same sound with two different units to make sure that sound is actually distorted.
5. Remove the top housing and internal frame.
6. Check that the speaker is seated correctly and screwed to the internal frame.
7. Check for speaker cable damage and that the cable is securely connected to the interconnect board.
8. Replace the speaker.
9. Replace the interconnect board.
10. Replace logic board.

### No sound from speaker(s)

1. Check balance in System Preferences: Sound: Output. Verify sound is correct with external speakers/headphones.
2. Check to see if the sound is the same from the internal speaker vs. external speakers.
3. Verify no external speakers or headphones are plugged in.
4. Shutdown computer and restart.
5. Reset PRAM (Press the power button, then hold down the Option-Command-P-R keys until you hear the startup chime at least one additional time after the initial startup chime).
6. Remove the top housing and internal frame.
7. Check that the speaker is seated correctly and screwed to the internal frame.
8. Check for speaker cable damage and that the cable is securely connected to the interconnect board.
9. Replace the speaker.
10. Replace the interconnect board.
11. Replace logic board.

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## Display

### **Dim display, but computer appears to operate correctly**

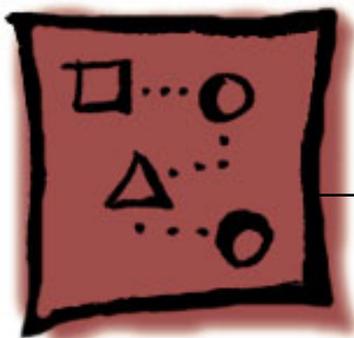
1. Check that the display is compatible with the Mac mini. Refer to Knowledge Base article 300652: Mac mini: compatible Apple displays.
2. Check the brightness level in Display pane of System preferences.
3. Make sure that the monitor is turned on and has power. Make sure that the display's power cord is plugged into a working wall outlet, and that it's properly connected to the power adapter. (To check if the wall socket is working, plug in a lamp or other electrical device.)
4. Check that all video cable connections to the computer video port and to the monitor are properly connected.
5. Examine the pins on the video cable connector to make sure they are not bent or damaged in any way.
6. Connect a known working display (if you have an extra one available). If you see video after doing so, replace your old display.
7. If the known-good display shows the same issue, replace logic board.

### **Scrambled or distorted video**

1. Check that the display is compatible with the Mac mini. Refer to Knowledge Base article 300652: Mac mini: compatible Apple displays.
2. Check connections on the back of the Mac mini.
3. Check that you are using the correct adapter (if necessary).
4. Try a known-good display. If the known-good display solves the issue, replace the display.
5. If the known-good display shows the same issue, replace logic board.

### **Fan Failure**

1. Remove the top housing and the internal frame.
2. Check fan cable connection to the interconnect board, and check cable for damage.
3. Replace fan.
4. Replace the interconnect board.
5. Replace logic board.



## Upgrades

Mac mini and Mac mini (Late 2005)



# AirPort and Bluetooth Upgrade

On the original Mac mini computer, Apple offered AirPort Extreme and Bluetooth as CTO (Configure to Order) options for Mac mini. For customers that bought the product in retail or want to add AirPort Extreme and Bluetooth later, Apple will provide an upgrade kit for service providers. The upgrade kit includes both AirPort Extreme and Bluetooth. They are not available as separate upgrades through service.

The upgrade kit is available to Authorized Resellers and Service Providers. Installation of the upgrade kit must be performed by an Apple Authorized Service Provider. Damage resulting from installing the parts by anyone other than Apple or an Apple Authorized Service Provider will not be covered under the product's warranty.

**Note:** If the Mac mini is ordered CTO (Configure to Order), AirPort and Bluetooth can be ordered separately. The customer can choose either one, or both if they order CTO.

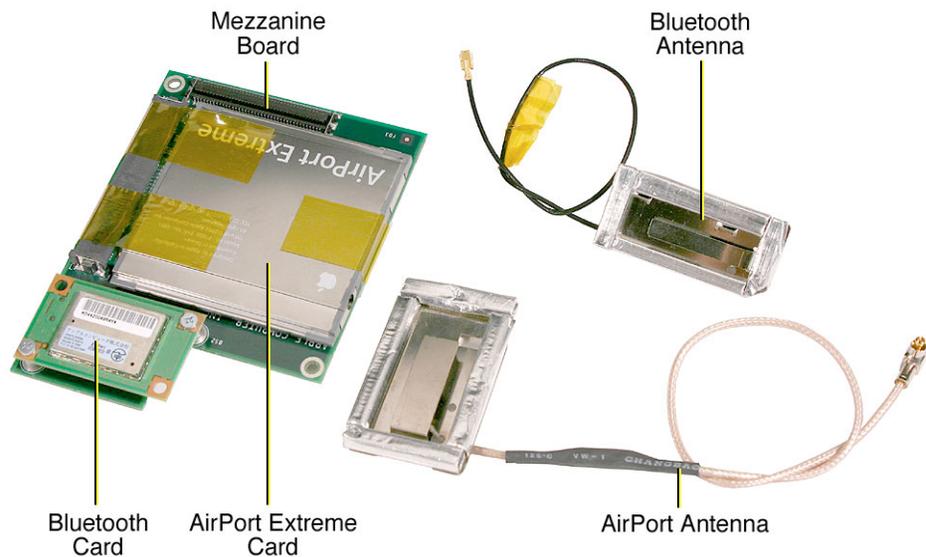
## Tools

This procedure requires the following tools:

- ESD wriststrap and mat
- Soft cloth (to protect the computer from scratches)
- Jeweler's #0 Phillips screwdriver
- Kapton tape
- A modified putty knife (or order service part number 922-6761)

---

## Upgrade Kit Contents (original Mac mini)



### Procedure

1. Shut down the computer.

**Warning:** Always shut down the computer before opening it to avoid damaging its internal components or the components you are installing. Do not open the computer or attempt to install items inside it while it is on.

2. Unplug all external cables from the computer except the power cord.
3. Touch the metal case to discharge any static electricity from your body.

**Important:** Always discharge static 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 working and closed the computer.

4. Unplug the power cord.
5. Put on an ESD wrist strap.
6. Place the computer on a clean, flat surface. **Caution:** To avoid scratching the case, use caution when using the putty knife.
7. Turn the computer over so the ports are facing you and the bottom of the computer (gray color) is facing up.

8. Hold the putty knife with the beveled edge facing the bottom housing. Insert the tool into the gap where the metal housing and the bottom assembly come together on the left side of the computer. **Important:** Be extremely careful not to scratch or dent the top or bottom housing when inserting the tool.



9. Gently release the internal latches by prying the tool away from the computer.

**Note:** You will hear little popping sounds as the latches release and the bottom moves away from the top housing, creating a gap at the top of the I/O panel.



10. Repeat the procedure on the right side of the unit.

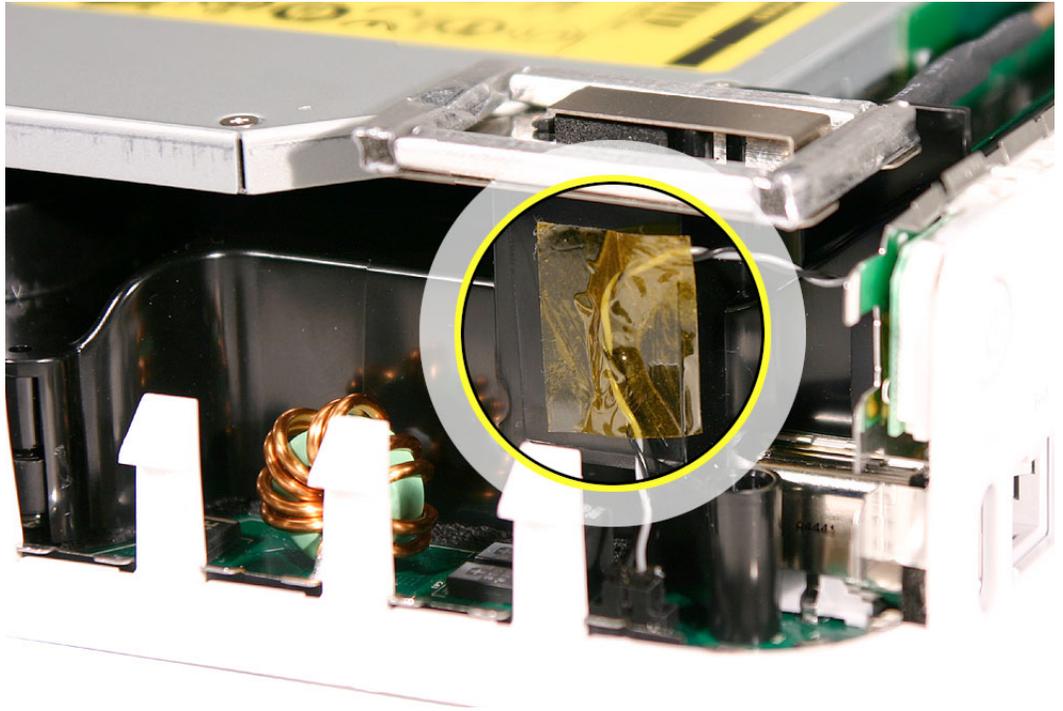


11. Push the I/O panel upward until the top housing is removed. The popping sounds will continue as you push the I/O panel; this is normal.

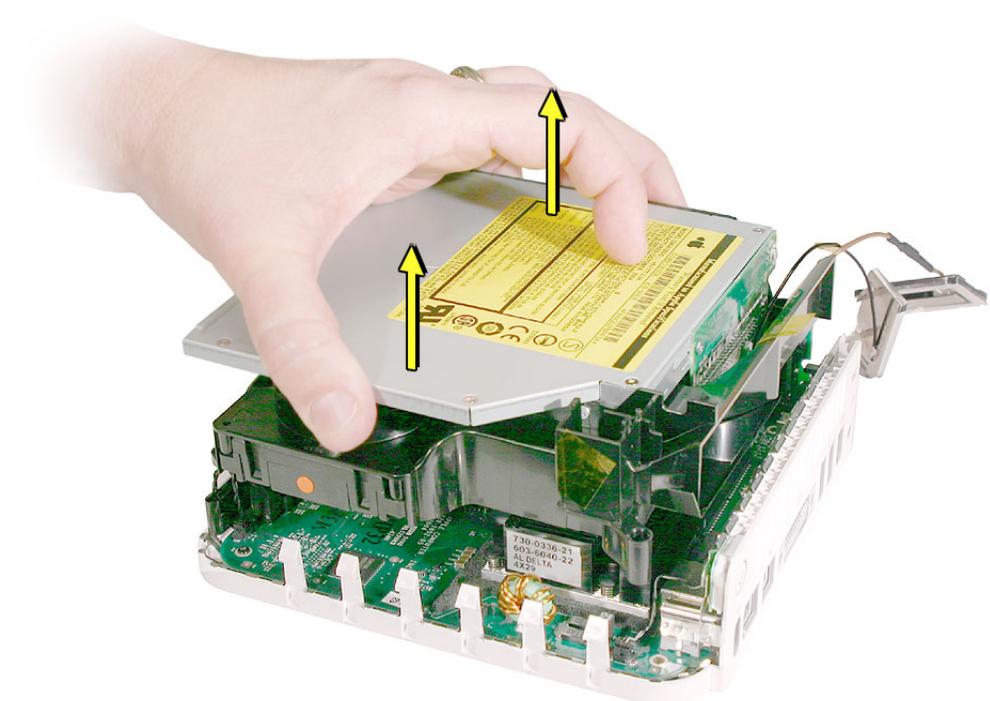




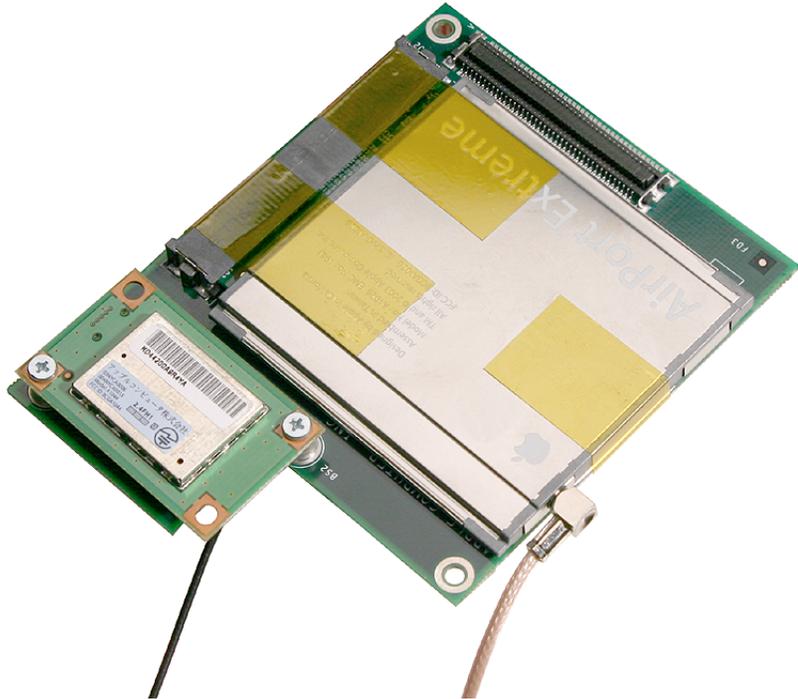
14. Free the power button cable from the kapton tape on the internal frame.



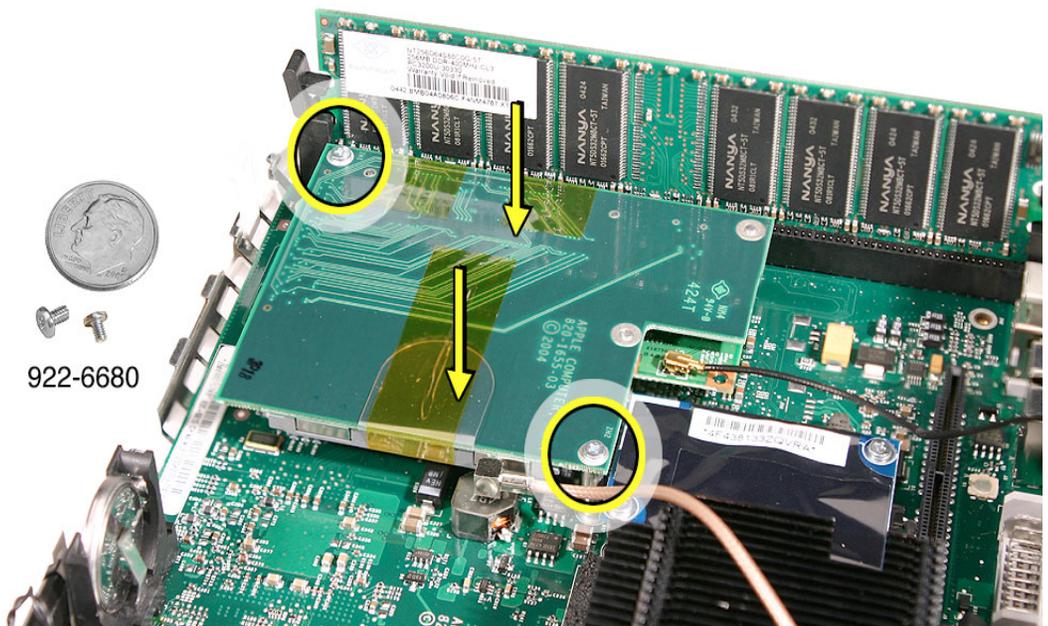
15. Lift the internal frame straight up and set it aside.



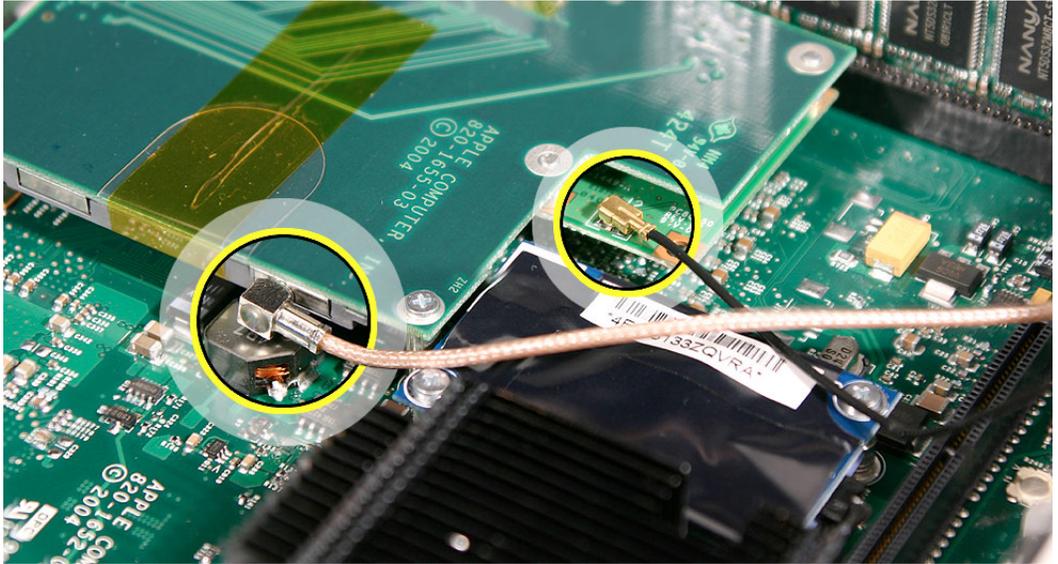
16. Locate the mezzanine board that contains the AirPort Extreme and Bluetooth card.



17. Turn over the mezzanine board so the AirPort Extreme card is facing down. Connect the mezzanine board to the connector on the logic board. Install the two screws on the mezzanine board.



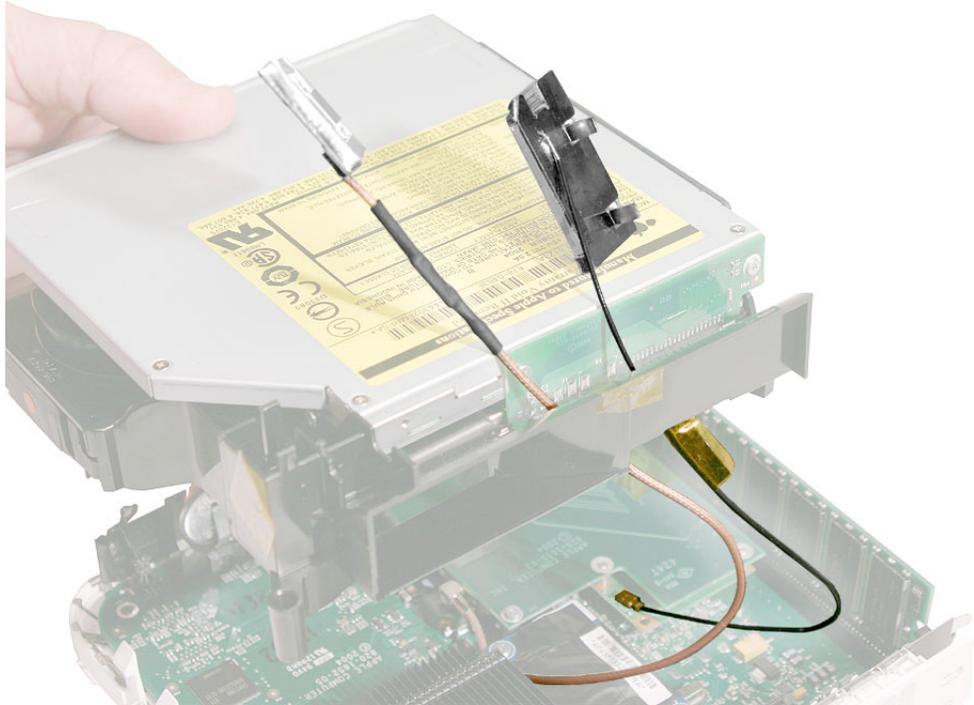
18. Double check that the AirPort and Bluetooth antenna cables are **firmly connected** before the internal frame is lowered into place.



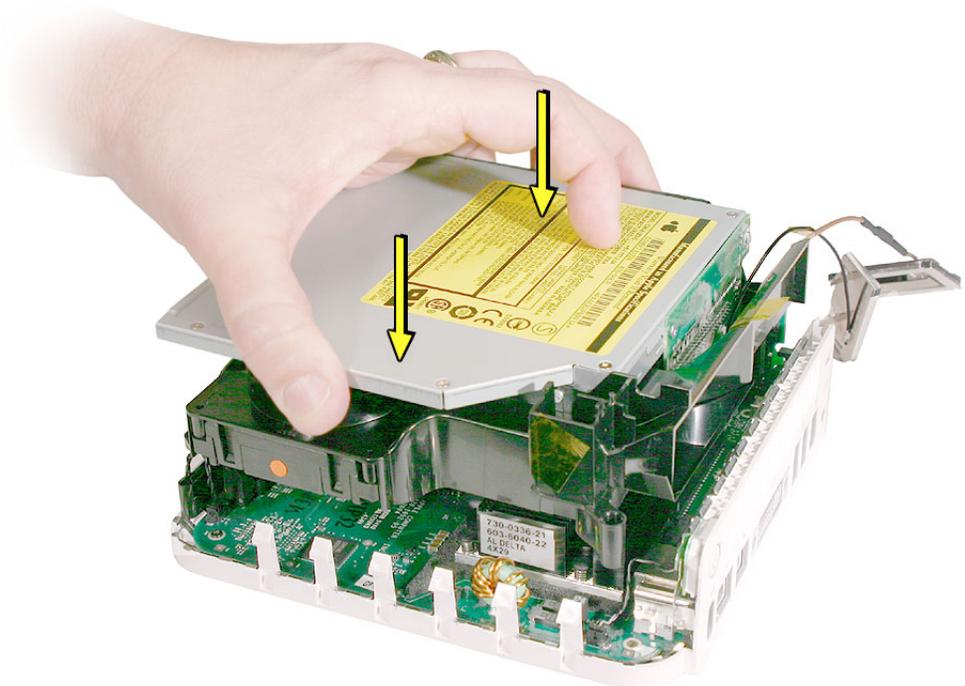
19. Locate the internal frame.



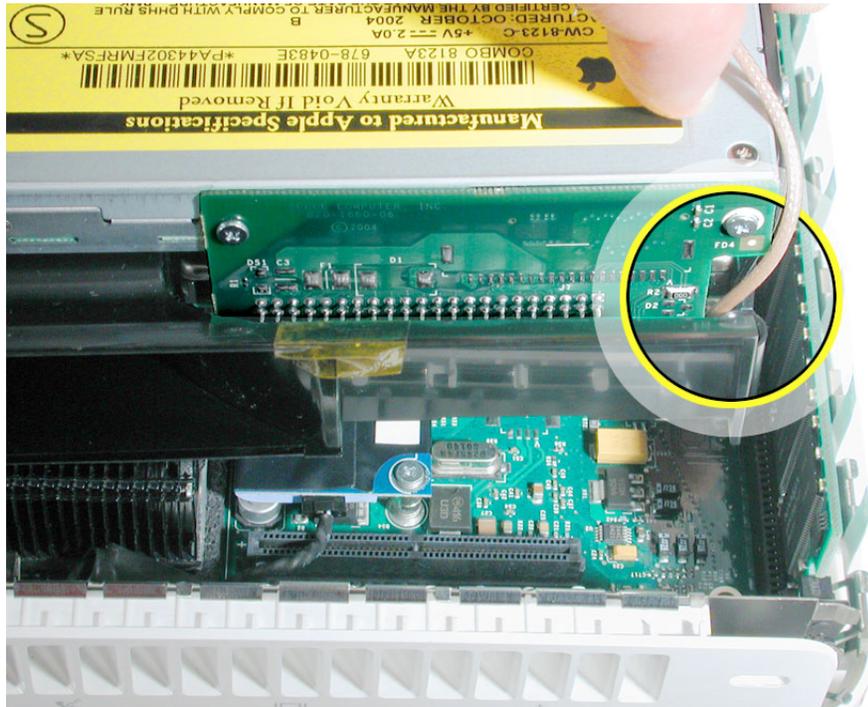
20. Hold the internal frame over the logic board as shown. Route the AirPort and Bluetooth antenna cables up through the opening in the internal frame.



21. Lower the internal frame into place.



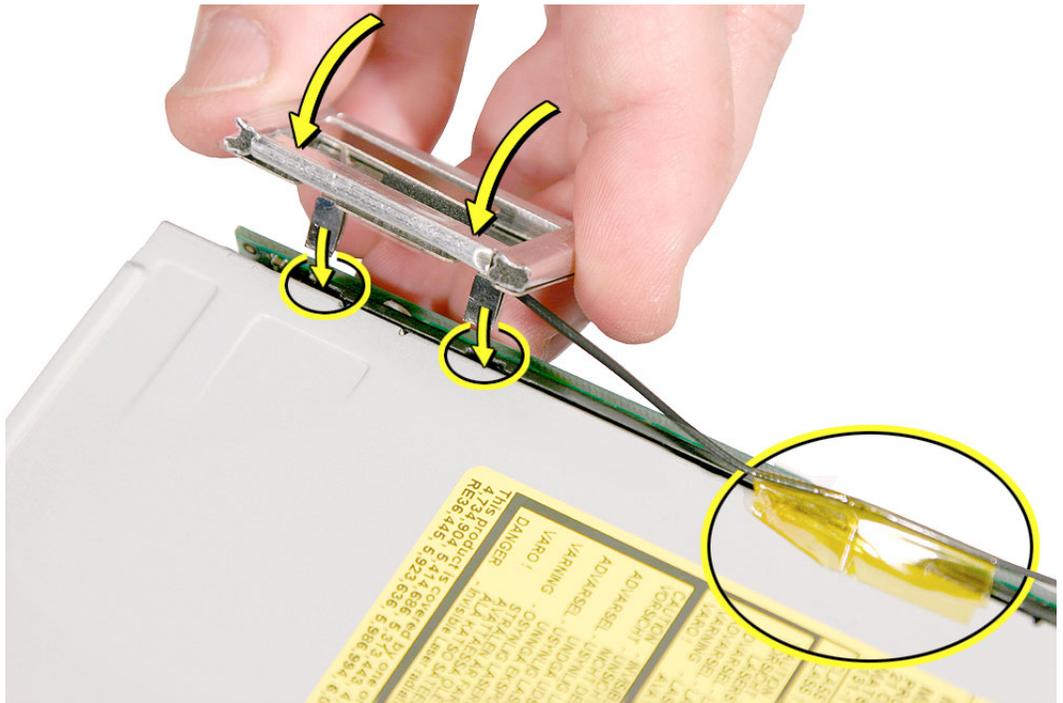
22. Route the antenna cables to the right side of the interconnect board on the internal frame as you lower the internal frame onto the logic board. **Note:** Be careful not to pinch the cables.



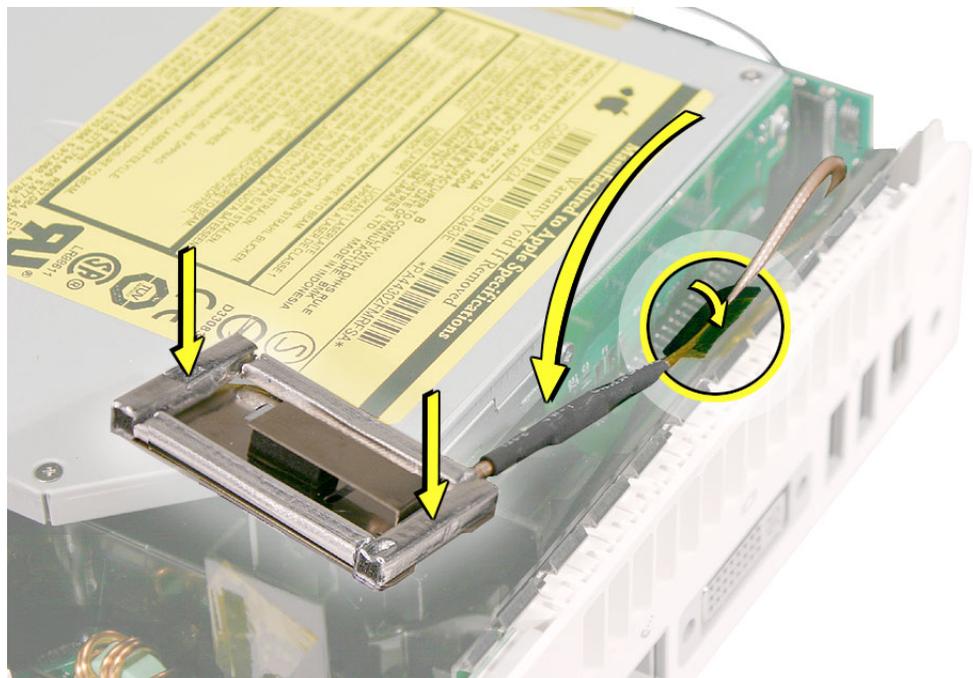
23. Replace the three screws on the internal frame.



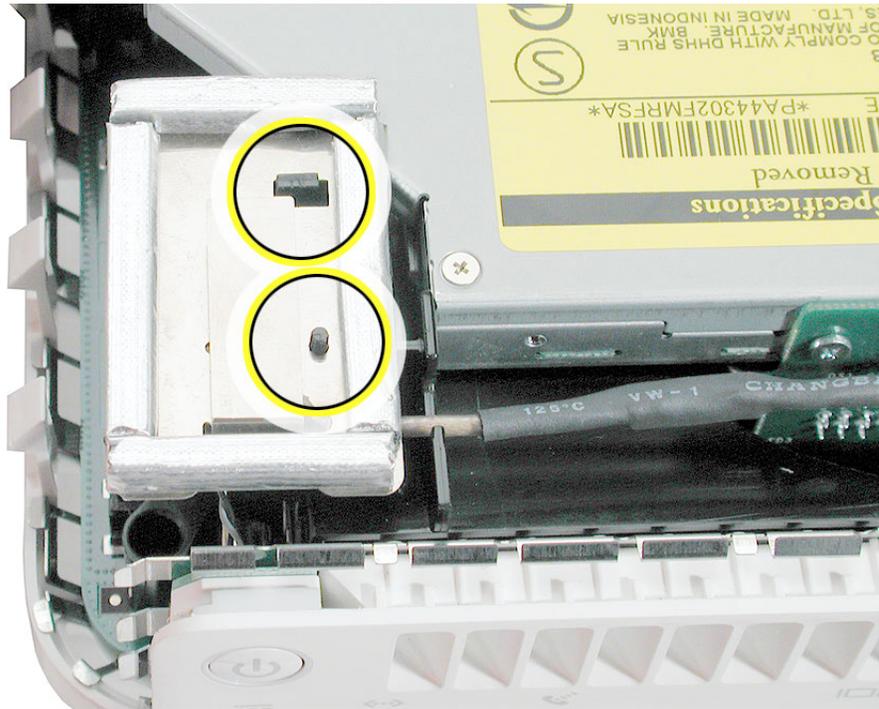
24. Insert the Bluetooth antenna into the slots on the frame. **Note:** Secure the antenna cable to the internal frame with kapton tape.



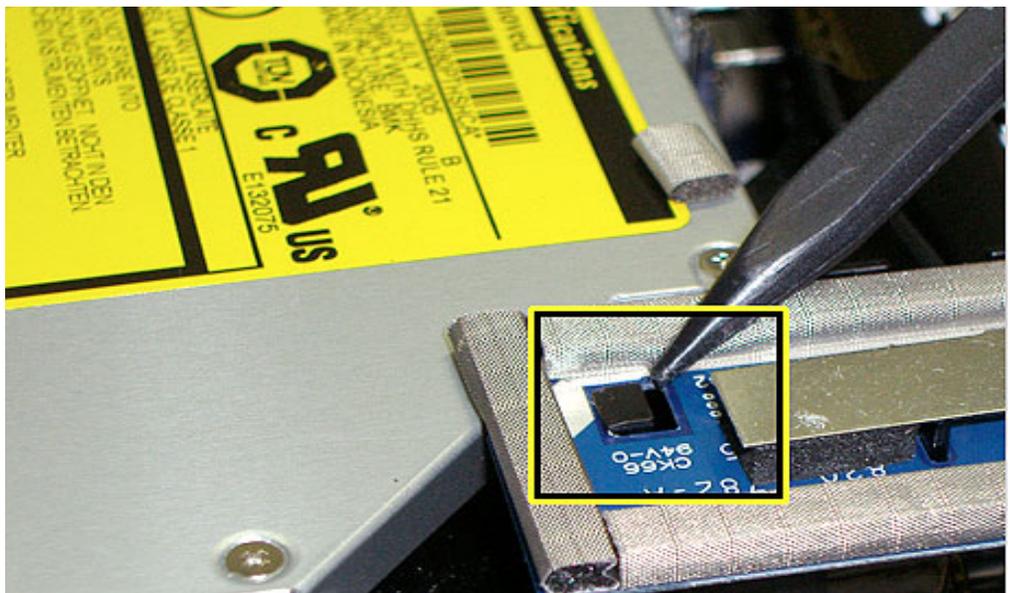
25. Fasten the AirPort Extreme antenna onto the internal frame. The antenna is held in place by the black clip. **Note:** If you are performing an upgrade, secure the antenna cable with kapton tape.



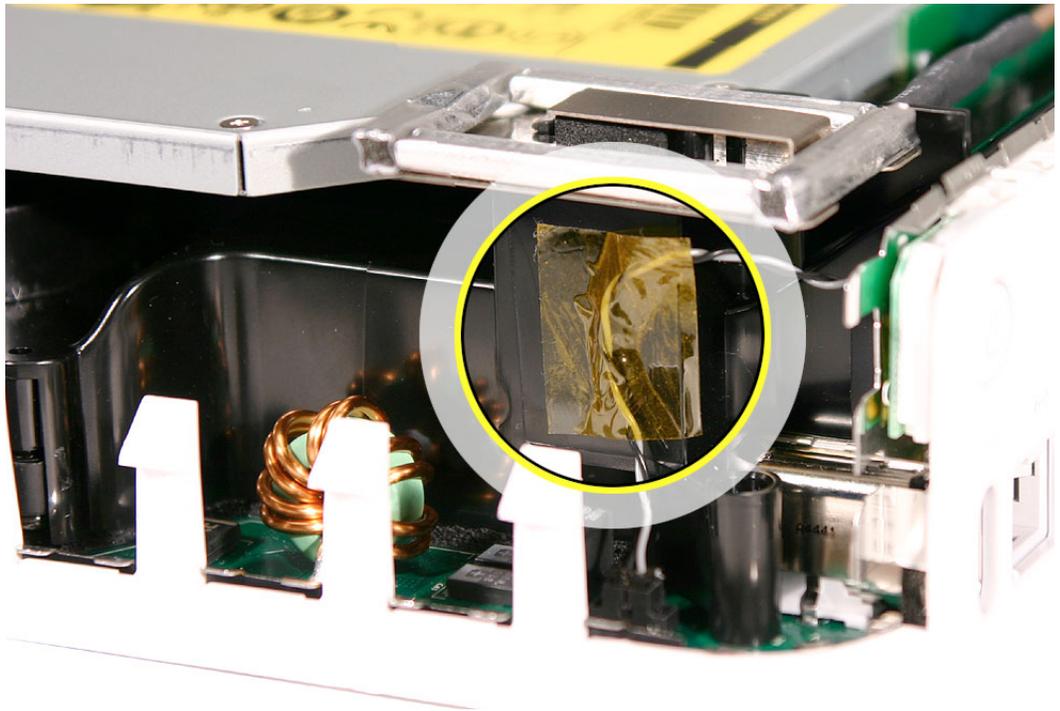
26. Lower the AirPort Extreme antenna over the black post and the clip (circled below) on the internal frame.



27. **Note:** If the airport antenna board contained in the finished goods upgrade kit has too large a hole (shown below) for the internal frame to clip onto, use additional kapton tape to secure the antenna to the internal frame. Either place a little kapton tape beneath the antenna board or place a strip of tape next to and running parallel to the antenna board, going from the optical drive across to the internal frame, securing the antenna cable to the internal frame.

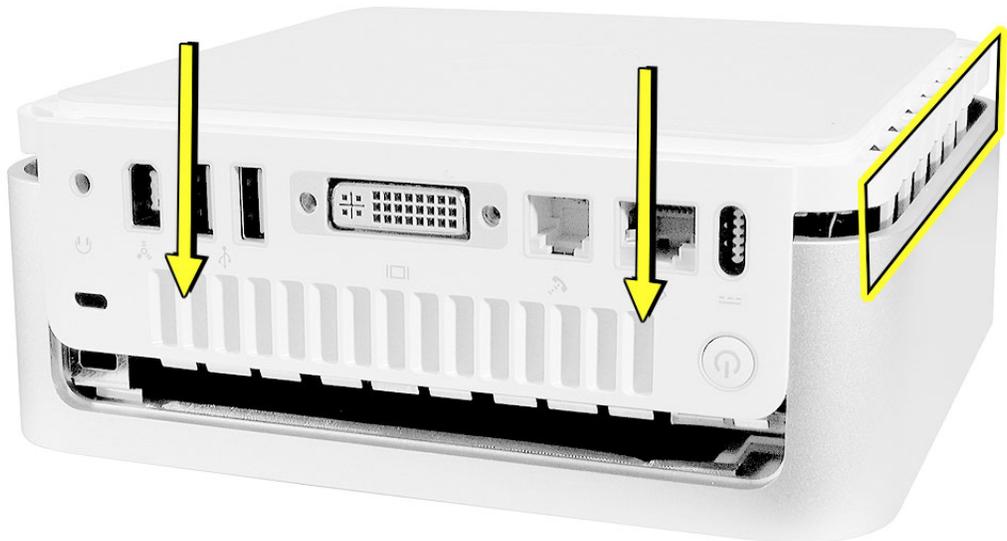


28. Secure the power button cable to the internal frame with the kapton tape.



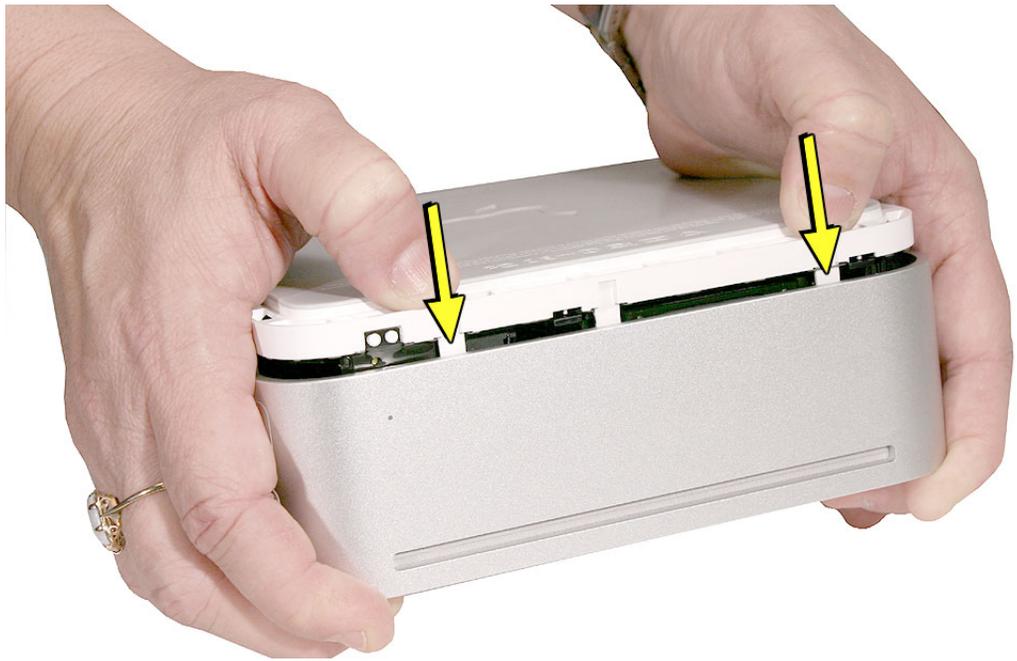
29. Replace the top housing.

30. Align the rear I/O panel with the top housing. Make sure all the white latches on the sides of the unit are aligned as shown in the photo below.



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31. Squeeze the unit together firmly as shown. Proceed to the next step.







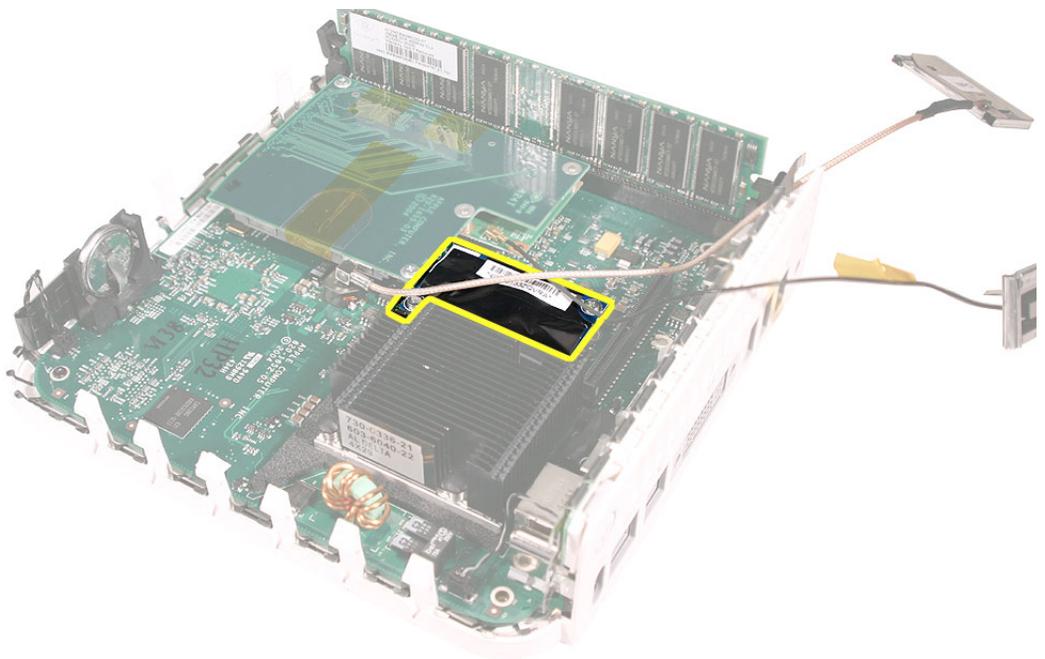
# Modem Upgrade Kit

Apple offers an internal modem kit as a service upgrade for Mac mini computers introduced in mid 2005. This modem can be installed only in this computer. Installation of the upgrade kit must be performed by an Apple Authorized Service Provider. Damage resulting from installation by anyone other than a service provider will not be covered under the products' warranty.

The upgrade kit is available on GSX. Authorized Service Providers that are also Apple Authorized Resellers may purchase the upgrade kit from the Apple Reseller store.

To differentiate among Mac mini models, check the processor speed on the label on the bottom of the Mac mini. The processor speeds for the Mac mini (Mid 2005) computers are 1.33 or 1.5 GHz.

## Part Location



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## Tools

This procedure requires the following tools:

- ESD wriststrap and mat
- Soft cloth (to protect the computer from scratches)
- Jeweler's #0 Phillips screwdriver
- A modified putty knife (service part number 922-6761)

## Preliminary Steps

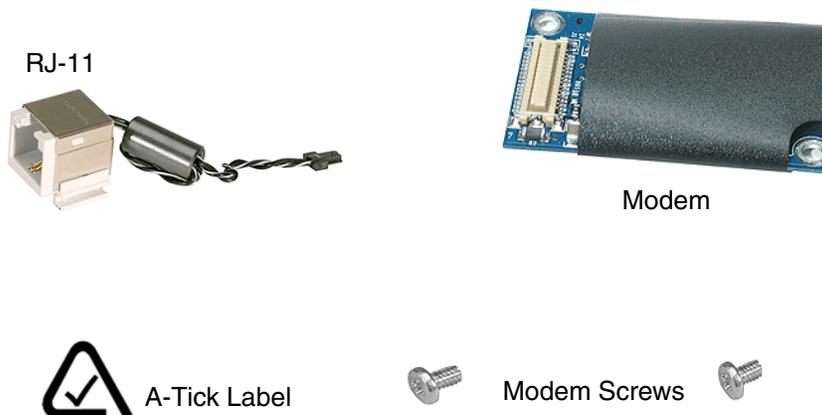
Before you begin, remove the following:

- top housing
- internal frame
- logic board

## Modem Kit Contents

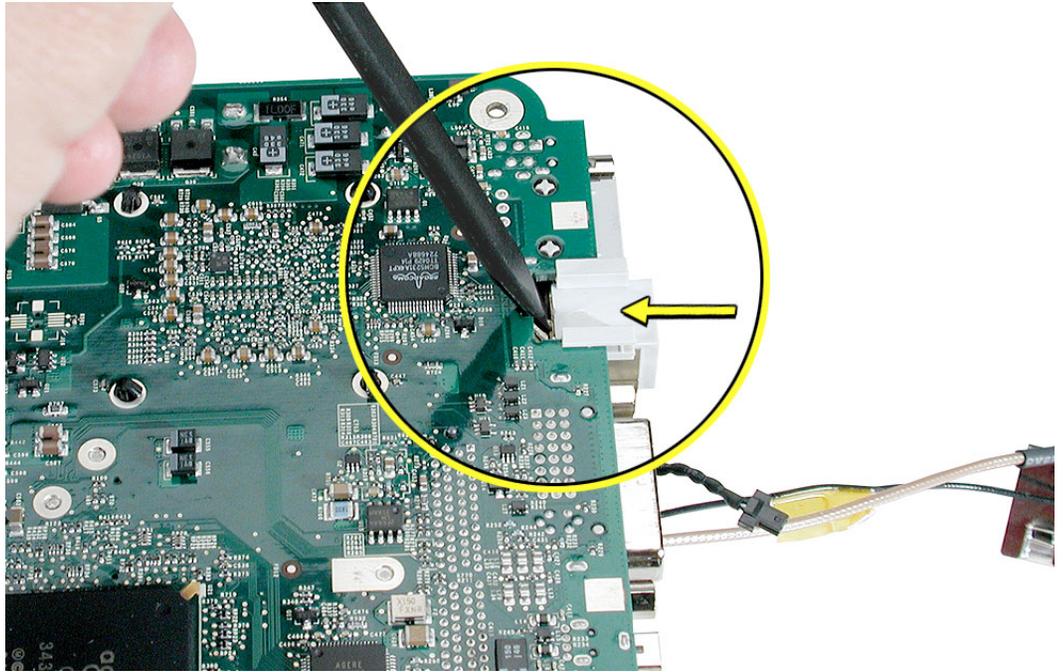
**Important Note for Australian Installations:** The Australian modem upgrade kit includes a special A-Tick label (see below). Refer to the last step in this procedure for details.

**Important Note for Chinese Installations:** The Chinese modem upgrade kit includes a special sticker for China. Refer to step 6 in this procedure for details.

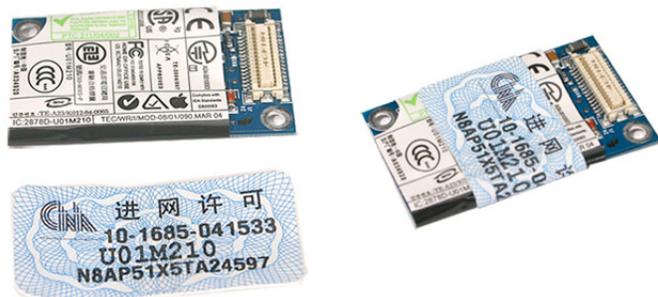


## Procedure

1. Turn over the logic board.
2. Slide the RJ-11 connector onto the logic board.



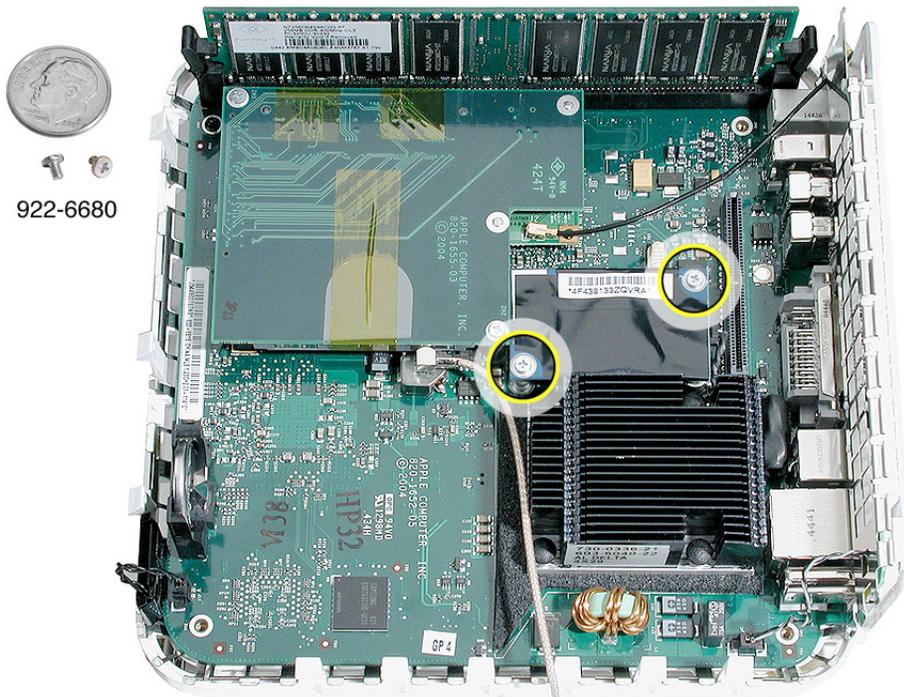
3. Reinstall the logic board into the bottom housing. Line up the ports on the board with the openings on the bottom housing.
4. Replace the logic board screw.
5. Connect the power and the LED cables to their connectors on the logic board.
6. **Note for Chinese Installations Only:** The Chinese upgrade kit includes a China-specific label that you must apply to the modem. To attach the label, remove the protective backing and wrap the label around the modem as illustrated below.



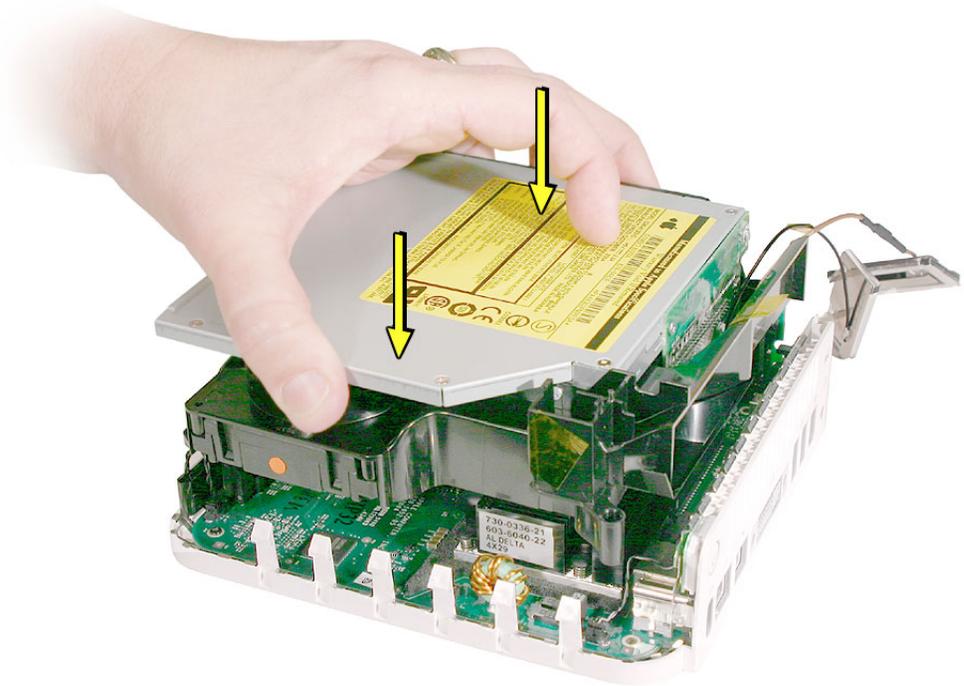
7. Connect the RJ-11 cable to the connector on the end of the modem board.



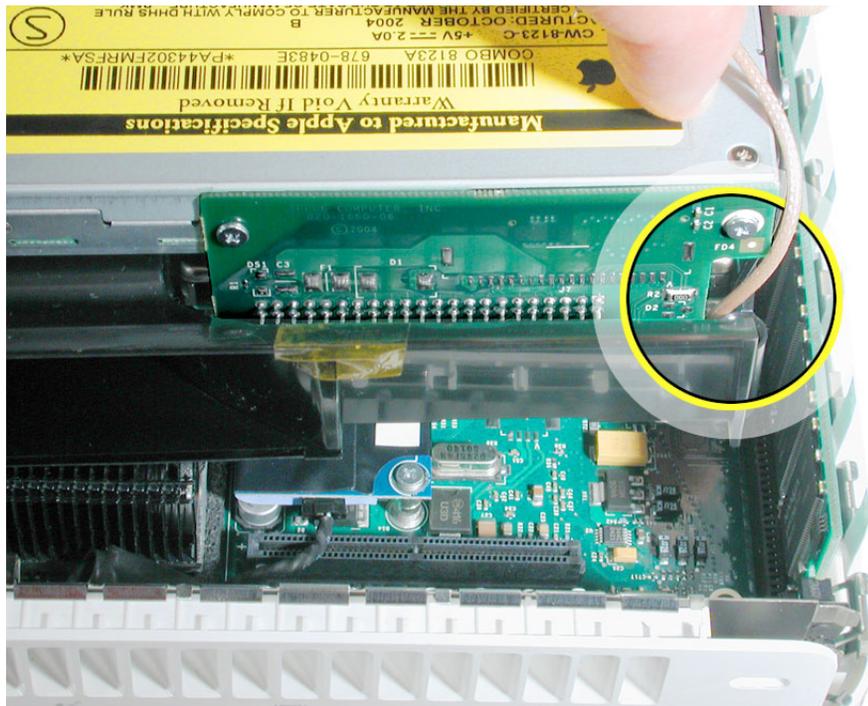
8. Connect the modem to the modem connector on the logic board, and install the two modem mounting screws.



9. Replace the internal frame.

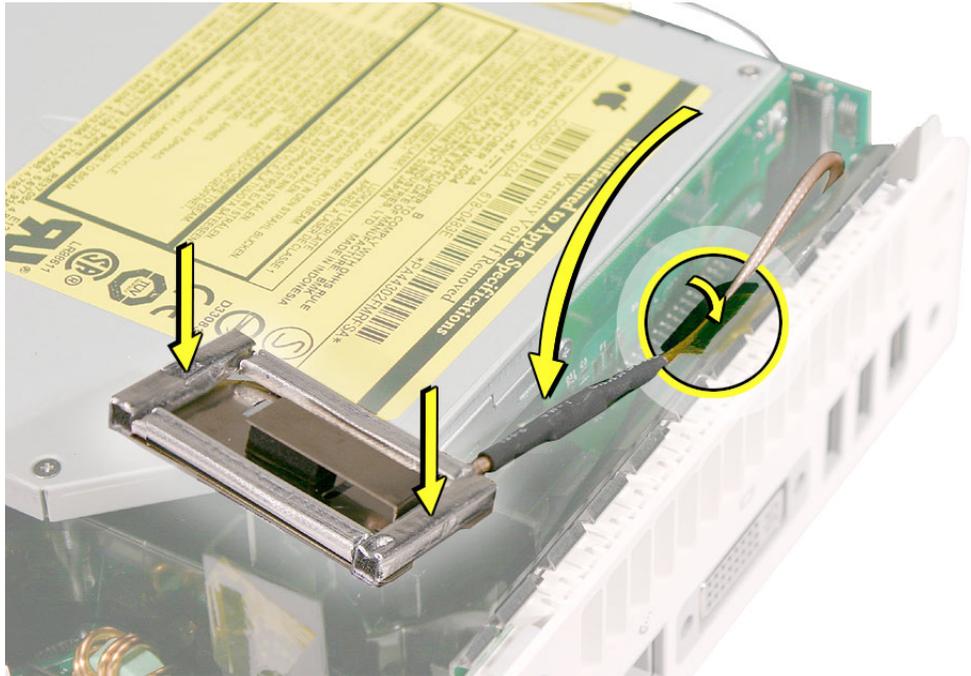


10. Route the antenna cables to the right side of the interconnect board on the internal frame as you lower the internal frame onto the logic board. **Note:** Be careful not to pinch the cables.

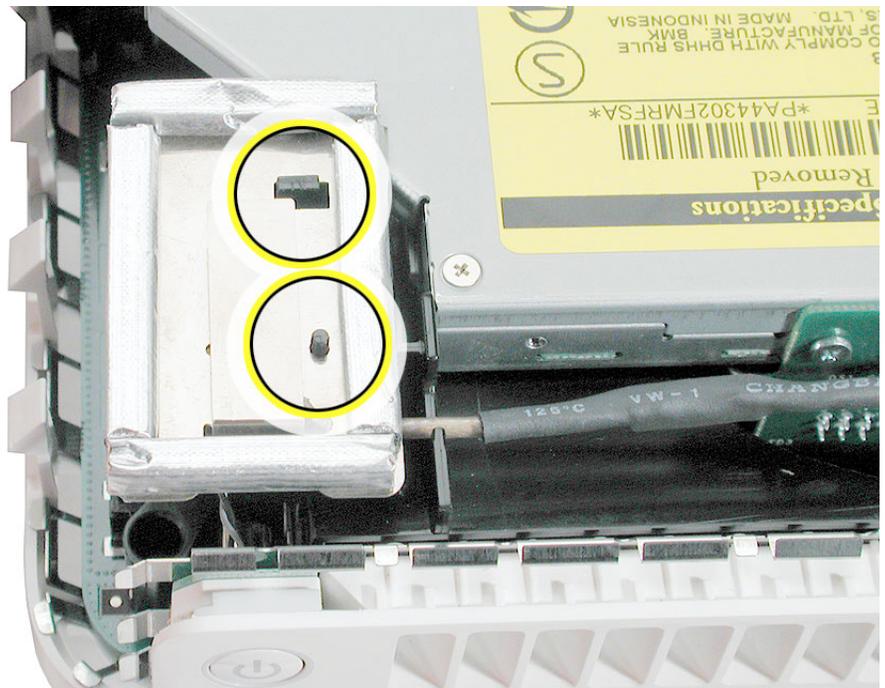




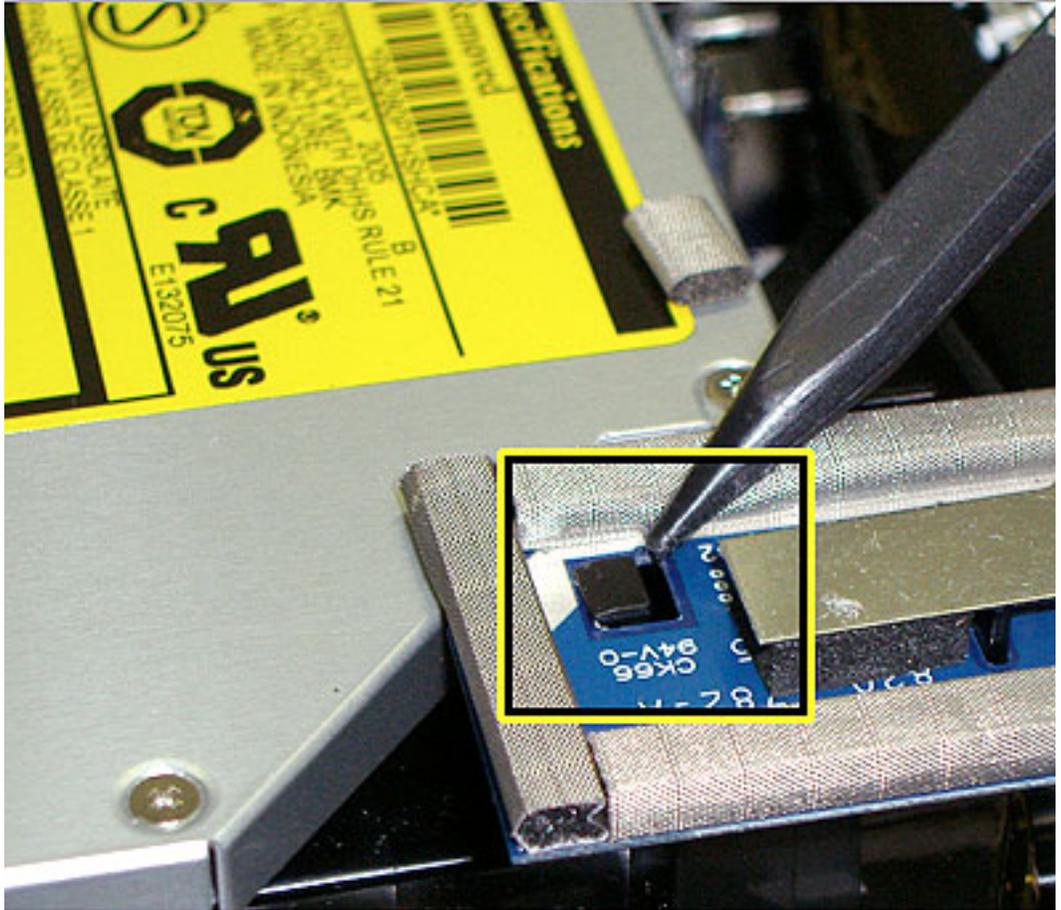
13. Fasten the AirPort Extreme antenna onto the internal frame. The antenna is held in place by the black clip. **Note:** If you are performing an upgrade, secure the antenna cable with kapton tape.



14. Lower the AirPort Extreme antenna over the black post and the clip (circled below) on the internal frame. Make sure that the AirPort antenna is not damaged or warped on the receiver end of the cable. Make sure that this end is properly seated to the internal frame (as shown below).



15. **Note:** If the airport antenna board contained in the finished goods upgrade kit has too large a hole (shown below) for the internal frame to clip onto, use additional kapton tape to secure the antenna to the internal frame. Either place a little kapton tape beneath the antenna board or place a strip of tape next to and running parallel to the antenna board, going from the optical drive across to the internal frame, securing the antenna cable to the internal frame.



16. Secure the power button cable to the internal frame with the kapton tape.
17. Replace the top housing. (For Australian installations, refer to the next step.)

18. **Important Note for Australian Installations:** The modem upgrade kits include a special A-Tick label  for Australia. This label must be applied to the compliance symbols on the bottom of the computer after the modem is installed.

There are two sizes of A-Tick labels included in the kit. Please apply the smaller of the two labels so that it covers the C-tick symbol  on the bottom of the Mac mini.

On the original Mac mini computers, the C-tick symbol can be found on the rubber foot on the bottom of the computer. On newer models the C-Tick symbol is part of the serial number (highlighted below in yellow) on the bottom of the computer. Please apply the label so that it covers the C-tick symbol.





# AirPort Extreme/Bluetooth Card for Mac mini (Late 2005)

Apple offers a finished goods AirPort/Bluetooth Upgrade kit for the Mac mini (Late 2005). For customers who purchase this computer in retail or want to add wireless technology after purchase, Apple will provide an upgrade kit for Apple Authorized Service Providers. Installation of the upgrade kit must be performed by an Apple Authorized Service Provider. Damage resulting from installation by anyone other than a service provider will not be covered under the product's warranty.

The upgrade kit is available on GSX. Authorized Service Providers that are also Apple Authorized Resellers may purchase the upgrade kit from the Apple Reseller store.

## **Tools**

This procedure requires the following tools:

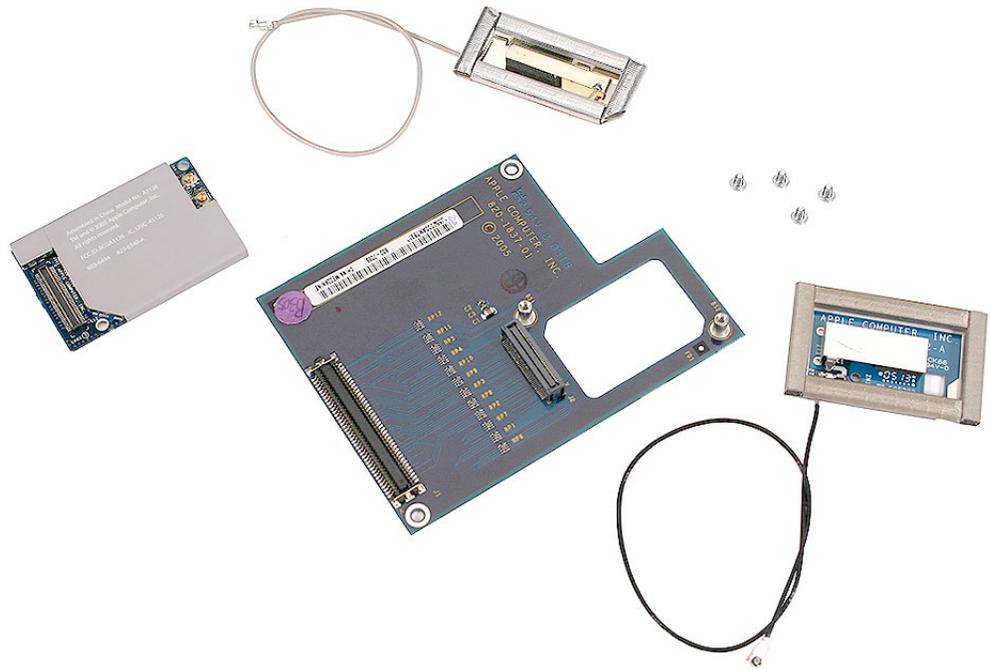
- Black stick (or other nonconductive nylon or plastic tool)
- Jeweler's #0 Phillips screwdriver

## **Preliminary Steps**

Before you begin, remove the top housing.

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## Upgrade Kit Contents (Mac mini (Late 2005))



### Procedure

1. Shut down the computer.

**Warning:** Always shut down the computer before opening it to avoid damaging its internal components or the components you are installing. Do not open the computer or attempt to install items inside it while it is on.

2. Unplug all external cables from the computer except the power cord.
3. Touch the metal case to discharge any static electricity from your body.

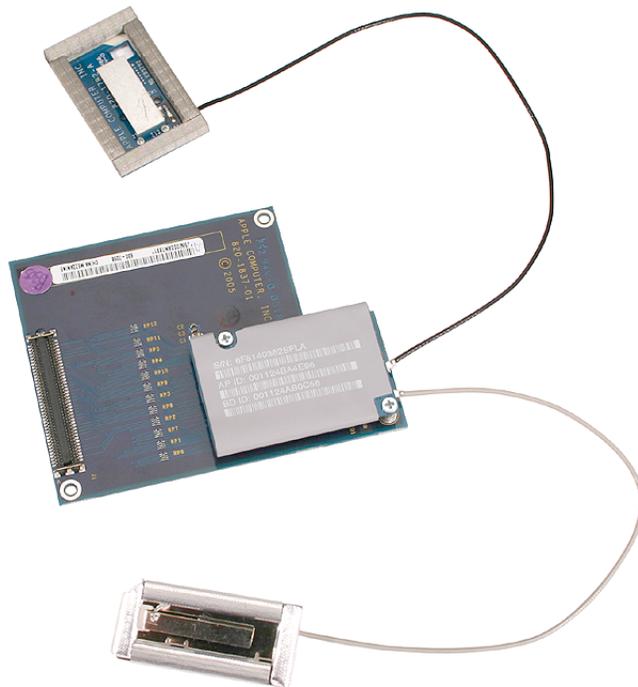
**Important:** Always discharge static before you touch any parts or install any components inside the computer. To avoid generating static electricity, do not walk around the room until you have finished working and closed the computer.

4. Unplug the power cord.
5. Put on an ESD wrist strap.
6. Open the case and remove the top cover.
7. With a jeweler's # 0 Phillips screwdriver, remove 3 screws on the internal frame.
8. Lift the internal frame straight up and off the bottom assembly.

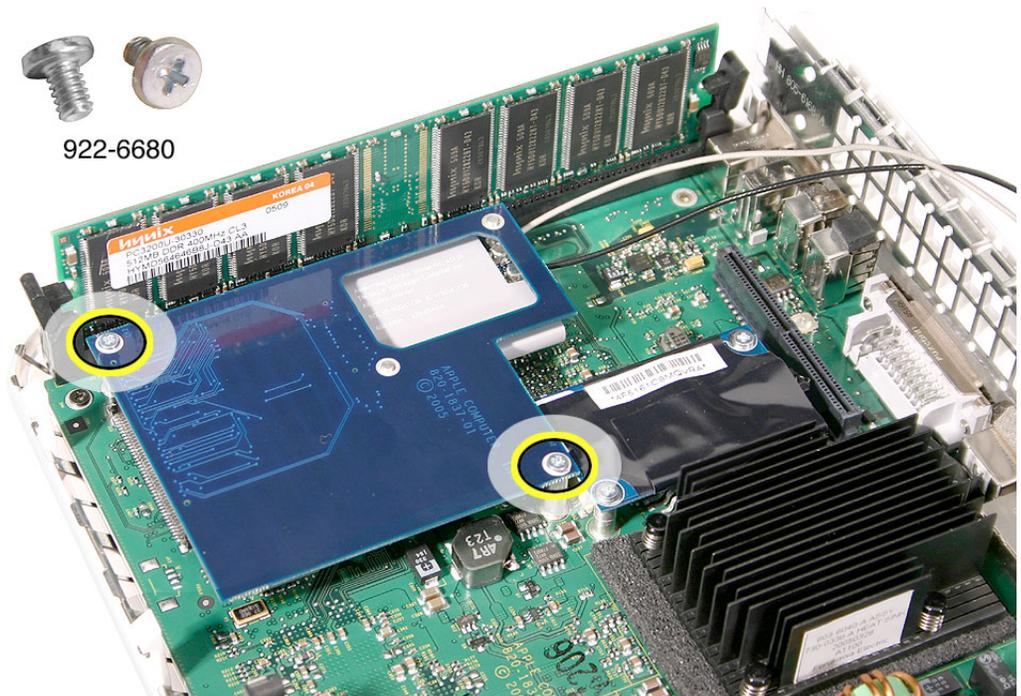
9. Set the internal frame aside.



10. Locate the wireless kit.

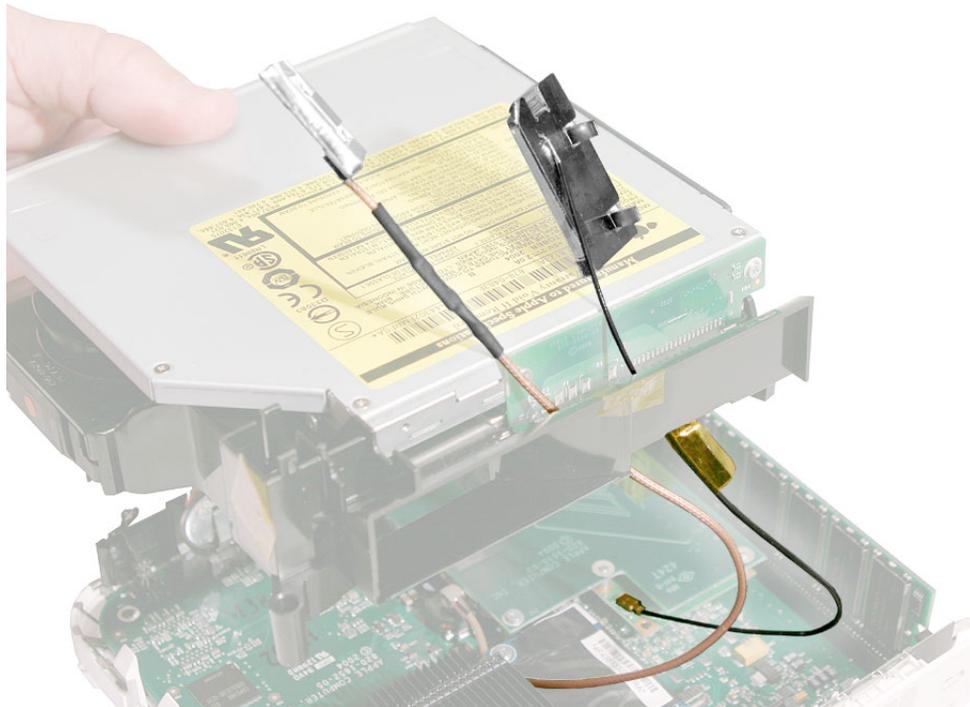


11. Connect the mezzanine board to the logic board connector. Make sure the antennas are securely connected to the wireless card. Attach the two Phillips screws.

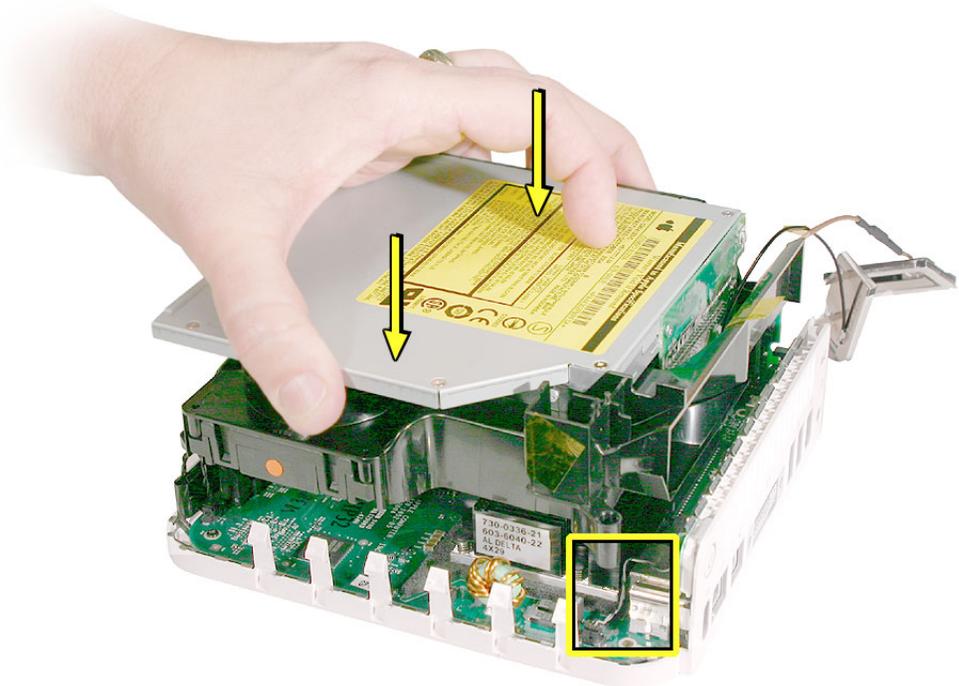


12. Replace the internal frame.

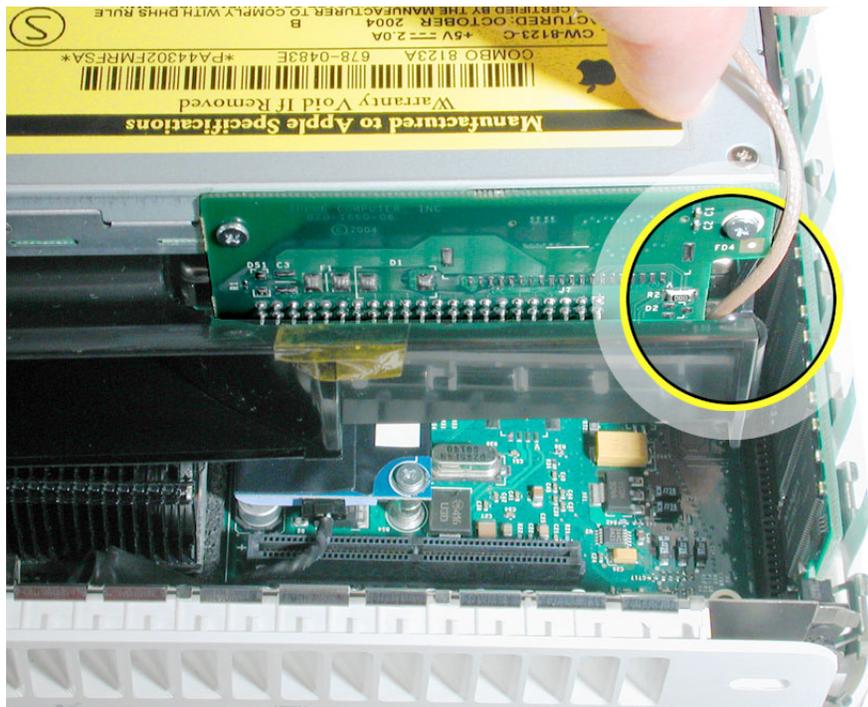
Hold the internal frame over the logic board as shown. Route the AirPort and Bluetooth antenna cables up through the opening in the internal frame.



13. Lower the internal frame into place. **Note:** Route the power button cable out of the way of the internal frame.



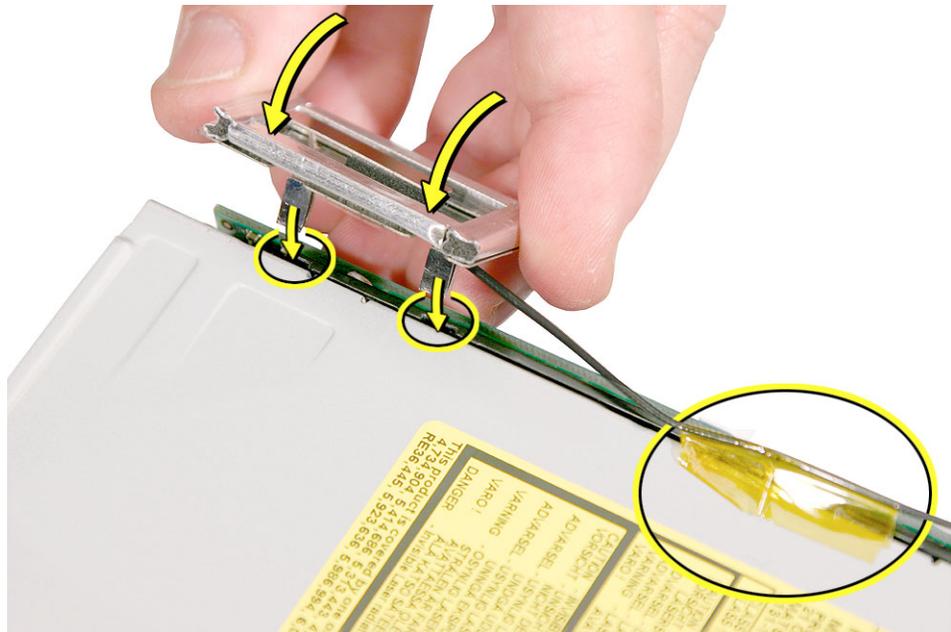
14. Route the antenna cables to the right side of the interconnect board on the internal frame as you continue lowering the internal frame onto the logic board.



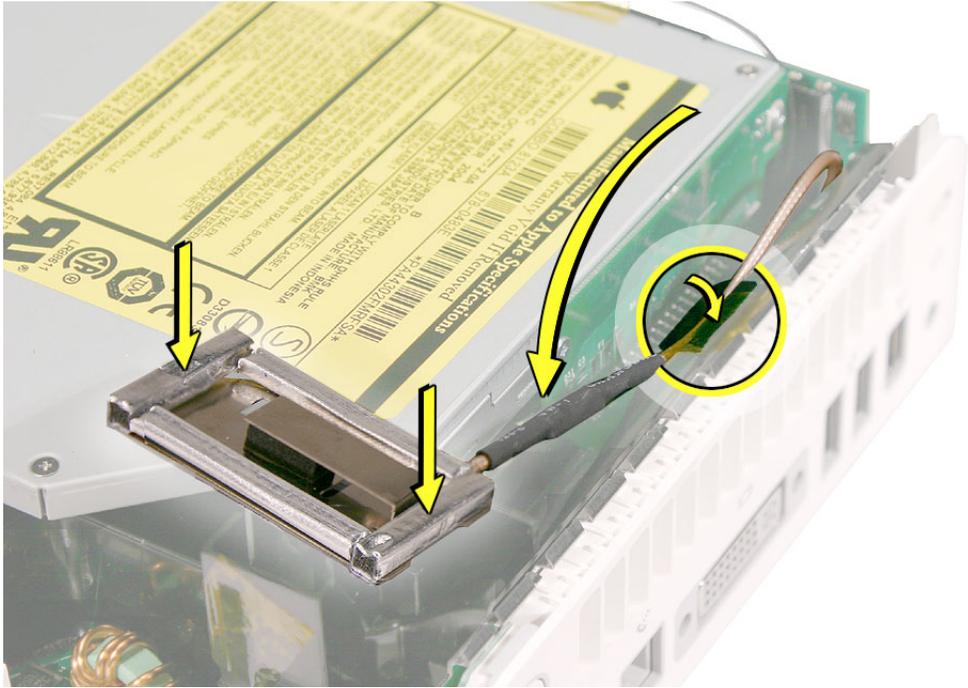
15. Replace the three screws on the internal frame.



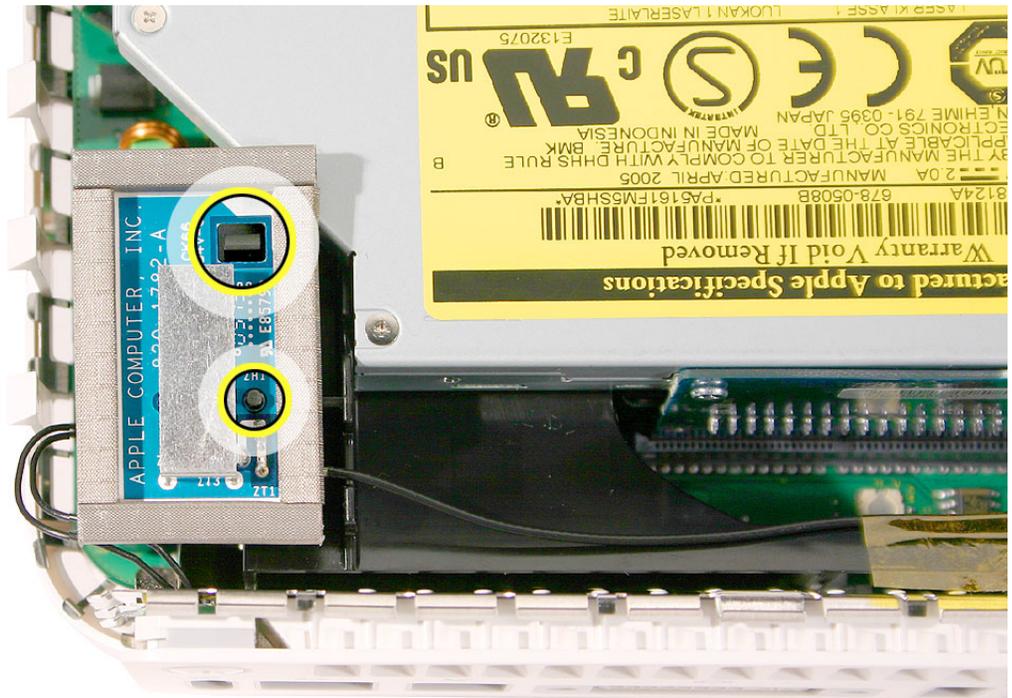
16. Replace the Bluetooth antenna. Secure the antenna cable with kapton tape.  
**Important:** Take care handling the Bluetooth antenna as a bent or warped antenna will affect Bluetooth connectivity.



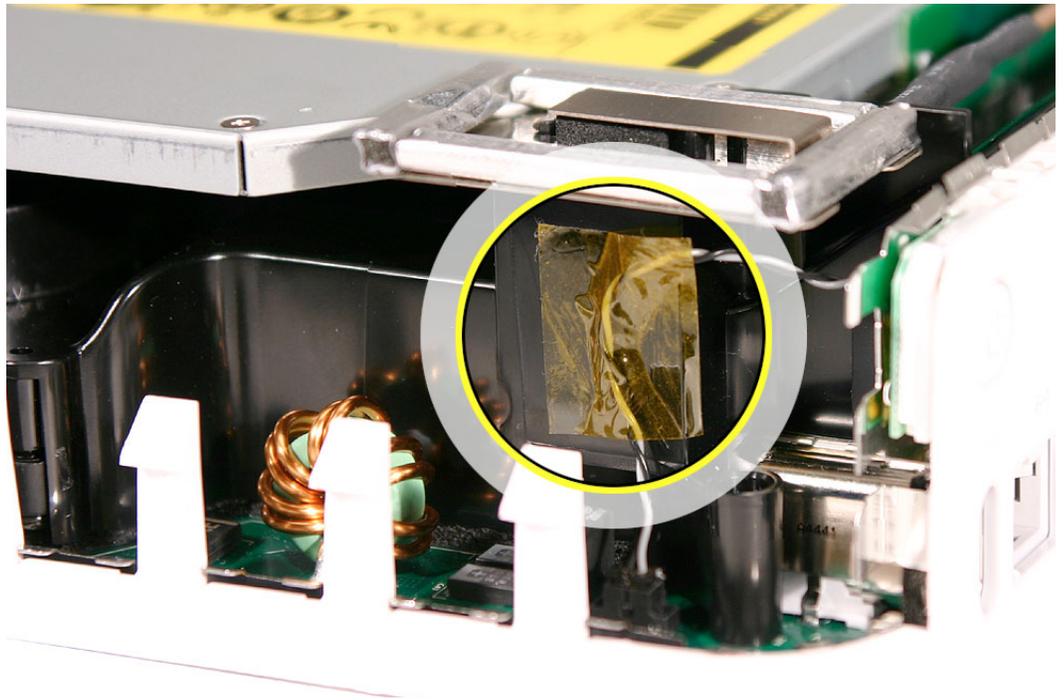
17. Replace the AirPort Extreme antenna. Secure the cable with kapton tape. **Important:** Take care handling the AirPort antenna as a bent or warped antenna will affect AirPort connectivity.



18. Gently fasten the antenna onto the internal frame. The antenna is held in place by the black clip and black post (shown below). Attach additional kapton tape to the internal frame to hold the AirPort antenna in place (if necessary).

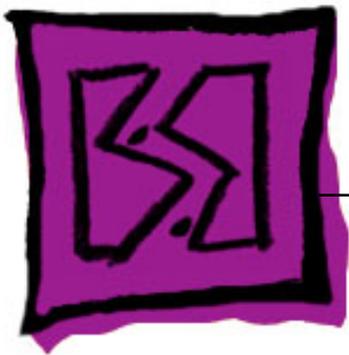


19. Secure the power button cable to the internal frame with the kapton tape.



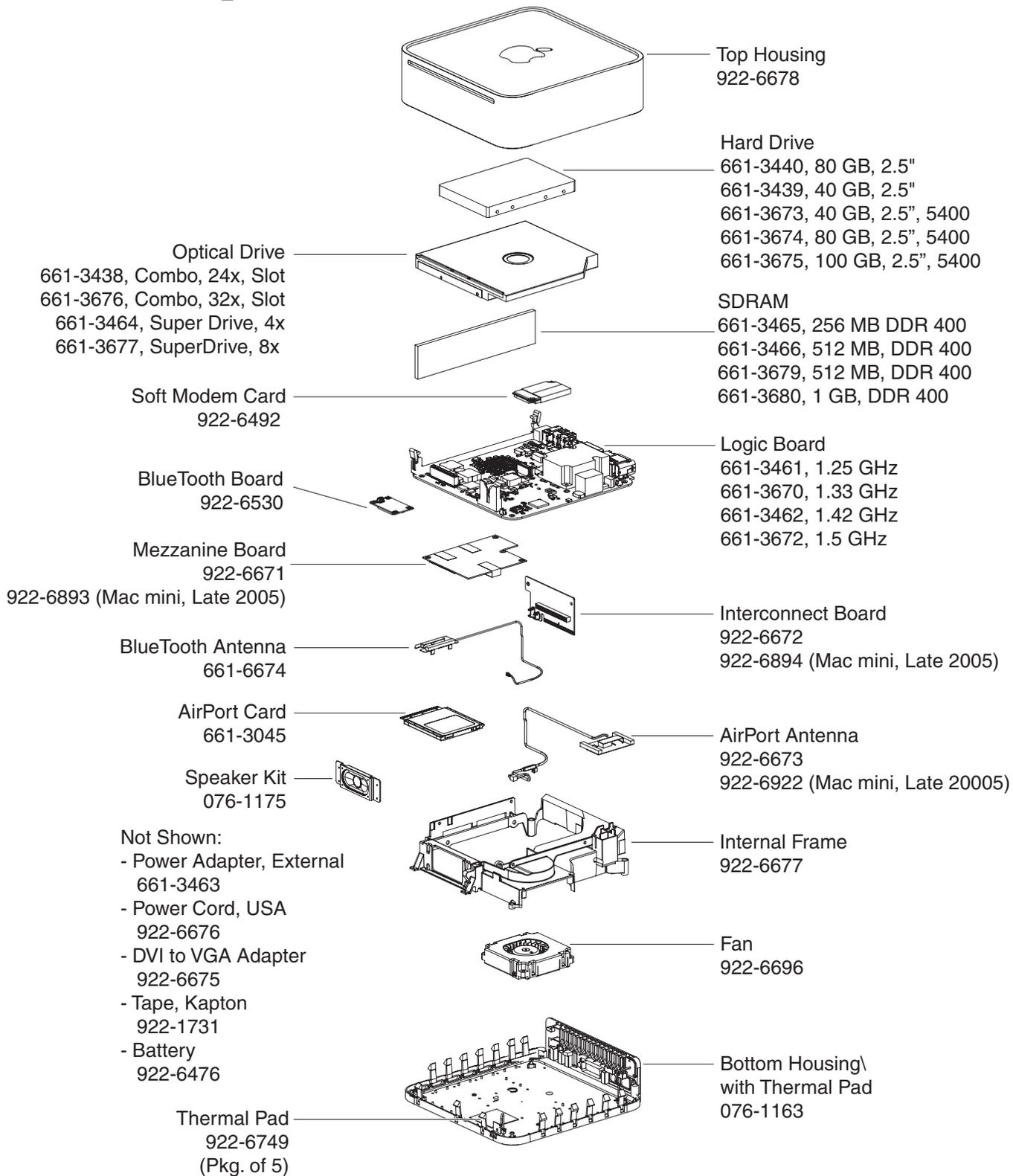
20. Replace the top housing.





Views  
Mac mini

# Exploded View



# Mac mini Screw Matrix

**Note:** These are not to scale.

<p><b>922-6682</b> <b>Jeweler's #0 Phillips</b></p>  <ul style="list-style-type: none"> <li>• Fan to internal frame (3)</li> </ul>	<p><b>922-6745</b> <b>Jeweler's #0 Phillips</b></p>  <ul style="list-style-type: none"> <li>• Internal frame to logic board (3)</li> </ul>	<p><b>922-6684</b> <b>Jeweler's #0 Phillips</b></p>  <ul style="list-style-type: none"> <li>• Logic board (1)</li> </ul>
<p><b>922-6681</b> <b>#2 Phillips</b></p>  <ul style="list-style-type: none"> <li>• Hard drive to internal frame (4)</li> </ul>	<p><b>922- 6680</b> <b>Jeweler's #0 Phillips</b></p>  <ul style="list-style-type: none"> <li>• Mezzanine board to logic board (2)</li> <li>• Interconnect board to the optical drive (2)</li> <li>• Modem to logic board (2)</li> <li>• Bluetooth board to the mezzanine board (2)</li> <li>• Optical drive to the internal frame (4)</li> </ul>	<p><b>076-1175 (kit)</b> <b>Kit includes grommets, screws, speaker, bracket</b> <b>Jeweler's #1 Phillips</b></p> <ul style="list-style-type: none"> <li>• Speaker to internal frame (4)</li> </ul> <p><b>922- 6924 (individual screw)</b></p> <ul style="list-style-type: none"> <li>• Speaker screw</li> </ul> <p><b>922- 6925 (individual screw)</b></p> <ul style="list-style-type: none"> <li>• Speaker shoulder screw</li> </ul>