



Macintosh Classic/  
Classic II/Performa 200

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## Basics

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Macintosh Classic/Classic II/  
Performa 200





**Figure: Macintosh Classic/Classic II and Performa 200**

## Overview

This manual includes complete repair procedures for the Macintosh Classic, Classic II, and Performa 200.





## Specifications

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Macintosh Classic/Classic II/  
Performa 200





## Processor

### **Classic CPU**

Motorola 68000 microprocessor  
7.8336 MHz  
32-bit internal data bus  
256-byte instruction and data caches

### **Classic II/Per 200 CPU**

Motorola 68030 microprocessor  
16 MHz  
32-bit internal data bus  
256-byte instruction and data caches





# Memory

## RAM

<b>Classic:</b>	1 MB, expandable to 4 MB (120 ns or faster SIMMs)
<b>Classic II/Per 200:</b>	2 MB, expandable to 10 MB (120 ns or faster SIMMs)

## ROM

512K

## PRAM

256 bytes of parameter memory

## Cache Connector

44-pin connector for optional memory expansion  
256K by 4-bit DRAMs  
Includes two SIMM connectors for additional RAM expansion





## Disk Storage

### Floppy Drive

Internal 1.4 MB floppy drive  
Optional external 800K or 1.4 MB floppy drive

### Hard Drive

**Classic:** Optional internal 40 MB hard drive; optional external SCSI drive  
**Classic II/Per 200:** Internal 40 MB or 80 MB hard drive; optional external SCSI drive





## I/O Interfaces

### **Floppy Drive**

External drive port; DB-19 connector

### **SCSI**

One SCSI parallel port; DB-25 connector

### **Apple Desktop Bus**

One Apple Desktop Bus (ADB) port; mini DIN-4 connector

### **Serial**

Two RS-422 serial ports; mini DIN-8 connectors

### **Sound**

Dual-channel headphone connector

Connected to the monophonic sound output

Macintosh Classic does not provide true two-channel output  
(although stereo jack may be used)







## I/O Devices

### **Keyboard**

80 keys, with numeric keypad; ADB connector

### **Mouse**

Mechanical tracking; ADB connector

### **Classic II/Per 200 Microphone**

Electret, omnidirectional; output voltage is 4 mV, peak to peak, at normal volume





# Sound and Video

## Sound Generator

**Classic:** Four-voice sound with 8-bit digital/analog conversion, using 22-kHz sampling rate

## Video Display

**Classic II/Per 200:** Monophonic, 8-bit digital/analog conversion using 22-kHz sampling rate; capable of driving stereo headphones or other stereo equipment through the sound jack  
9-in. (diagonal) screen; high-resolution, 512 by 342 pixel, bit-mapped, monochrome display





## Electrical

<b>Line Voltage</b>	100-120 V AC
<b>Frequency</b>	47-63 Hz, single phase
<b>Maximum Power</b>	100 W





## Physical

### **Dimensions**

Height: 13.2 in. (33.6 cm)

Width: 9.7 in. (24.6 cm)

Depth: 11.2 in. (28.5 cm)

### **Weight**

16–17.1 lb. (7.3-7.8 kg) not including internal hard drive





## Troubleshooting

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Macintosh Classic/Classic II/  
Performa 200





## General

The Symptom Charts included in this chapter will help you diagnose specific symptoms related to your product. Because cures are listed on the charts in the order of most likely solution, try the first cure first. 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.)

If you are not sure what the problem is, or if the Symptom Charts do not resolve the problem, refer to the Flowchart for the product family.

For additional assistance, contact Apple Technical Support.





# Symptom Charts

## Video

Screen is dark; audio and drive operate

- 1 Readjust brightness (see Adjustments).
- 2 Readjust contrast (see Adjustments).
- 3 Check yoke cable connection.
- 4 Replace power/sweep board.
- 5 Replace logic board. Retain customer's SIMMs.
- 6 Replace CRT.

Screen is bright and audio is present, but no video information is visible

- 1 Replace power/sweep board.
- 2 Replace logic board. Retain customer's SIMMs.





## Video (Continued)

Screen is dark; fan is not running	Replace power/sweep board.
Single vertical line is displayed	<ol style="list-style-type: none"><li>1 Replace power/sweep board.</li><li>2 Replace logic board. Retain customer's SIMMs.</li><li>3 Replace CRT.</li></ol>
Single horizontal line is displayed	<ol style="list-style-type: none"><li>1 Replace power/sweep board.</li><li>2 Replace logic board. Retain customer's SIMMs.</li><li>3 Replace CRT.</li></ol>
Vertical bars or stripes are displayed	<ol style="list-style-type: none"><li>1 Replace power/sweep board.</li><li>2 Replace logic board. Retain customer's SIMMs.</li></ol>







## Video (Continued)

- |  |   |
|--|---|
| Horizontal bars or stripes are displayed   | <ol style="list-style-type: none"><li>1 Replace power/sweep board.</li><li>2 Replace logic board. Retain customer's SIMMs.</li></ol>  |
| White dot is displayed in center of screen | <ol style="list-style-type: none"><li>1 Verify that yoke cable is connected.</li><li>2 Replace power/sweep board.</li><li>3 Replace CRT.</li></ol>  |
| Screen jitters                             | <ol style="list-style-type: none"><li>1 Move computer away from adjacent monitors or other electrical equipment that may cause interference.</li><li>2 Replace power/sweep board.</li></ol> |





## Video (Continued)

After replacement of failed hard drive, video distortion appears in upper and lower corners of screen

Check whether hard drive replacement was like-for-like. If not, install a like drive.





## Floppy Drives

Audio and video are present, but internal floppy drive does not operate

- 1 Replace bad disk with known-good disk.
- 2 Replace floppy drive cable.
- 3 Replace floppy drive.
- 4 Replace logic board. Retain customer's SIMMs.

External floppy drive does not operate

- 1 Replace bad disk with known-good disk.
- 2 Be sure external floppy drive is placed on right side of computer.
- 3 Replace external floppy drive.
- 4 Replace logic board. Retain customer's SIMMs.

Disk ejects; display shows icon with blinking "X"

- 1 Replace bad disk with known-good system disk.
- 2 Replace floppy drive.
- 3 Replace logic board. Retain customer's SIMMs.





## Floppy Drives (Continued)

Unable to insert disk  
all the way

- 1 Insert opened paper clip into hole beside floppy drive.
- 2 Switch off system and hold mouse button down while switching system on (to complete eject cycle).
- 3 Replace floppy drive.

Does not eject disk

- 1 Insert opened paper clip into hole beside floppy drive.
- 2 Switch off system and hold mouse button down while switching system on (to complete eject cycle).
- 3 Replace floppy drive.

Internal floppy drive  
runs continuously

- 1 Replace bad disk with known-good disk.
- 2 Replace floppy drive.
- 3 Replace logic board. Retain customer's SIMMs.
- 4 Replace floppy drive cable.





## Hard Drives

Internal or external hard drive does not operate

- 1 Verify that SCSI loopback card is not attached.
- 2 Check that internal SCSI terminator is positioned in connector properly.
- 3 Verify that internal hard drive has all three terminating resistor packs on circuit board.
- 4 Replace hard drive data cable.
- 5 Replace hard drive.
- 6 Replace logic board. Retain customer's SIMMs.

Works with internal or external SCSI device but does not work with both.

- 1 Verify that SCSI device ID switch setting on external device is higher than 0. Also verify that ID switch setting on external SCSI device does not duplicate ID switch settings on any other attached external SCSI devices.
- 2 Replace terminator on external SCSI device.
- 3 Verify that terminator is installed on internal SCSI drive.
- 4 Replace SCSI select cable.





## Peripheral

Cursor does not move

- 1 Check mouse connection.
- 2 If mouse was connected to keyboard, connect it to rear ADB port instead. If mouse works, replace keyboard.
- 3 If mouse does not work in any ADB port, replace mouse.
- 4 Replace logic board. Retain customer's SIMMs.

Cursor moves, but clicking the mouse button has no effect

- 1 Replace mouse.
- 2 Replace logic board. Retain customer's SIMMs.





## Peripheral (Continued)

Cannot double-click to open application, disk, or server

- 1 Remove extra system files on hard drive.
- 2 Clear parameter RAM. Hold down <Shift> <Option> <Command> keys and select Control Panel from Apple pull-down menu. Reset mouse controls.
- 3 If mouse was connected to keyboard, connect it to rear ADB port instead. If mouse works, replace keyboard.
- 4 If mouse does not work in any ADB port, replace mouse.
- 5 Replace logic board. Retain customer's SIMMs.

No response to any key on keyboard

- 1 Check keyboard connection to ADB port.
- 2 Replace keyboard cable.
- 3 Replace keyboard.
- 4 Replace logic board. Retain customer's SIMMs.





## Peripheral (Continued)

Known-good  
ImageWriter or  
ImageWriter II does  
not print

- 1 Make sure that Chooser and Control Panel are set correctly.
- 2 Replace printer driver and system software with known-good.
- 3 Replace printer interface cable.
- 4 Replace logic board. Retain customer's SIMMs.

Known-good  
LaserWriter does not  
print.

- 1 Make sure that Chooser and Control Panel are set correctly.
- 2 Replace printer driver and system software with known-good.
- 3 Refer to Networks manual.







## Miscellaneous

Clicking, chirping,  
or thumping sound

- 1 Verify that logic board power cable is connected at J12 on logic board.
- 2 Replace power/sweep board.
- 3 Replace logic board. Retain customer's SIMMs.

Smoke/odor

Replace power/sweep board.

No video, no audio, and  
no drive operation

- 1 Connect power cord.
- 2 Switch power on.
- 3 Replace power cord.
- 4 Replace fuse.
- 5 Replace power/sweep board.
- 6 Replace logic board. Retain customer's SIMMs.





## Miscellaneous (Continued)

- “Sad Macintosh” icon
- 1 Replace bad disk with known-good disk.
  - 2 Verify that jumper on memory expansion board is configured correctly for “SIMMs” or “No SIMMs.” (See “Memory Upgrade” in Additional Procedures.)
  - 3 On 4 MB Macintosh Classic, confirm SIMMs used are eight-chip SIMMs. (See Memory manual.) Any 1 MB SIMMs with fewer than eight chips won’t work in the Macintosh Classic.
  - 4 On Macintosh Classic, replace optional memory expansion board; on Macintosh Classic II/Performa 200, replace optional SIMMs in two SIMMs slots on logic board.
  - 5 Replace logic board. Retain customer’s SIMMs.





## Miscellaneous (Continued)

Screen shows “Sad Macintosh” icon and black vertical lines; screeching sound

- 1 Verify that jumper on memory expansion board is configured correctly for “SIMMs” or “No SIMMs.” (See “Memory Upgrade” in Upgrades.)
- 2 On 4 MB Macintosh Classic, confirm SIMMs used are eight-chip SIMMs. (See Memory manual.) Any 1 MB SIMMs with fewer than eight chips won’t work in the Macintosh Classic.
- 3 On Macintosh Classic, replace optional memory expansion board; on Macintosh Classic II/Performa 200, replace optional SIMMs in two SIMMs slots on logic board.
- 4 Replace logic board. Retain customer’s SIMMs.





## Miscellaneous (Continued)

No power

- 1 Connect power cord.
- 2 Switch power on.
- 3 Replace power cord.
- 4 Replace fuse.
- 5 Replace power/sweep board.
- 6 Replace logic board. Retain customer's SIMMs.

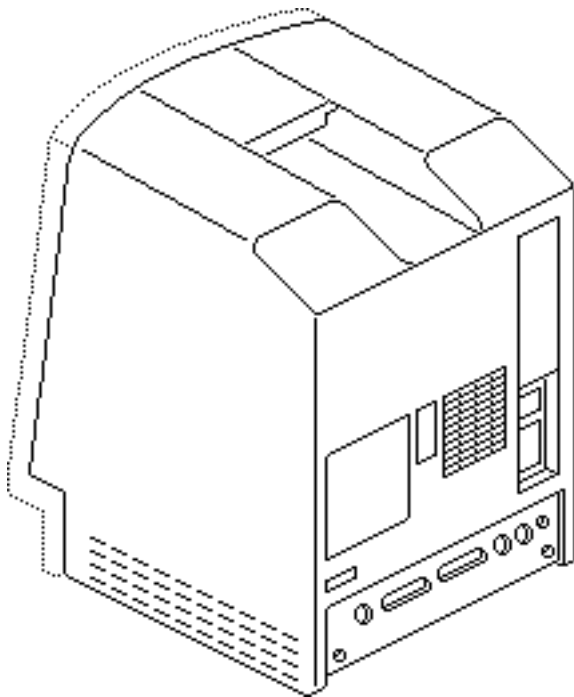




## Take Apart

Macintosh Classic/Classic II/  
Performa 200



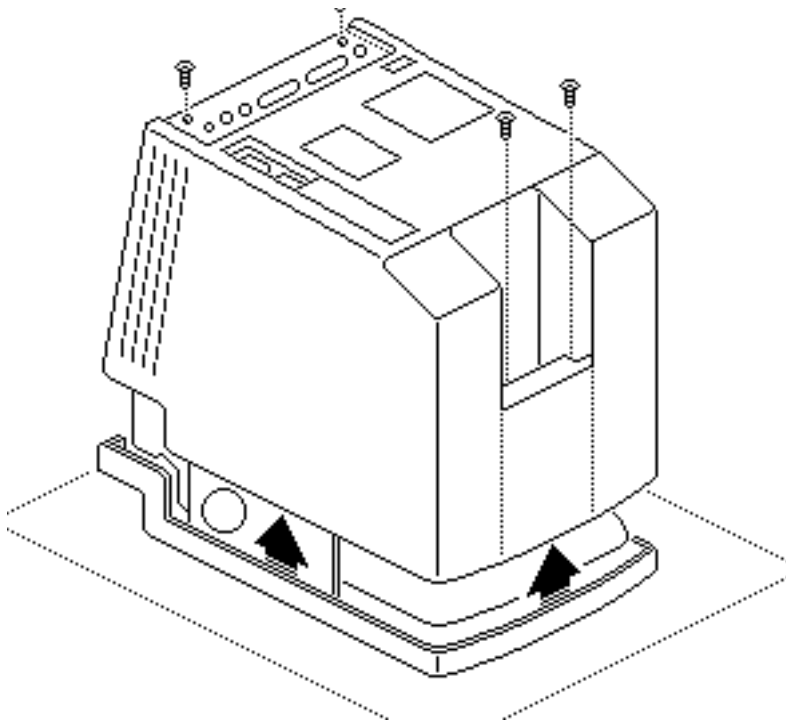


## Cover

No preliminary steps are required before you begin this procedure.

**⚠ Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious personal injury or equipment damage, review CRT safety and discharge instructions in Bulletins/Safety.





- 1 Using a Torx screwdriver, remove the four case screws. Using a case spreader or pull-apart tool, separate the cover from the chassis.
- 2 Carefully lift the cover and set it aside.

**⚠ Warning:** The edges of the metal chassis may be sharp. When moving the computer with the cover off, be sure to handle the chassis carefully.

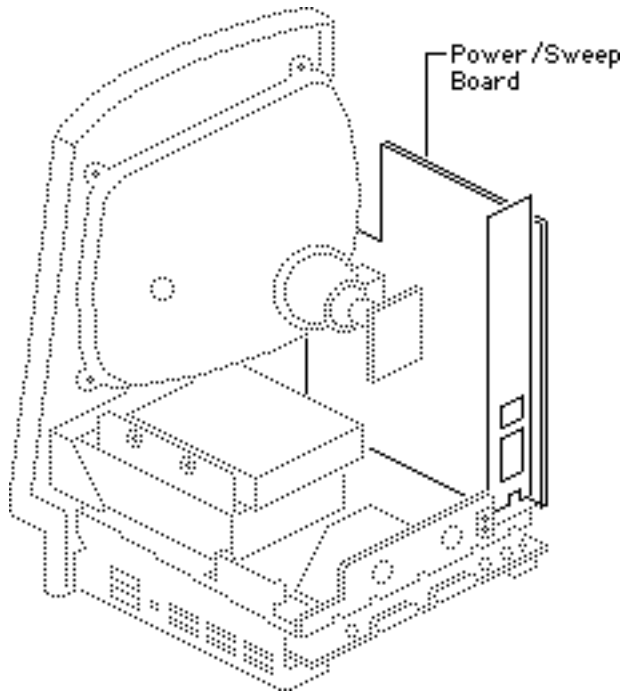




**Note:** When replacing the cover, be sure to install the two black case screws in the bottom of the cover and the two silver-colored case screws in the top of the cover.







## Power/Sweep Board

Before you begin:

- Remove the cover
- Discharge the CRT
- Remove the anode cap

**⚠ Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious personal injury or equipment damage, review CRT safety and discharge instructions in Bulletins/Safety.

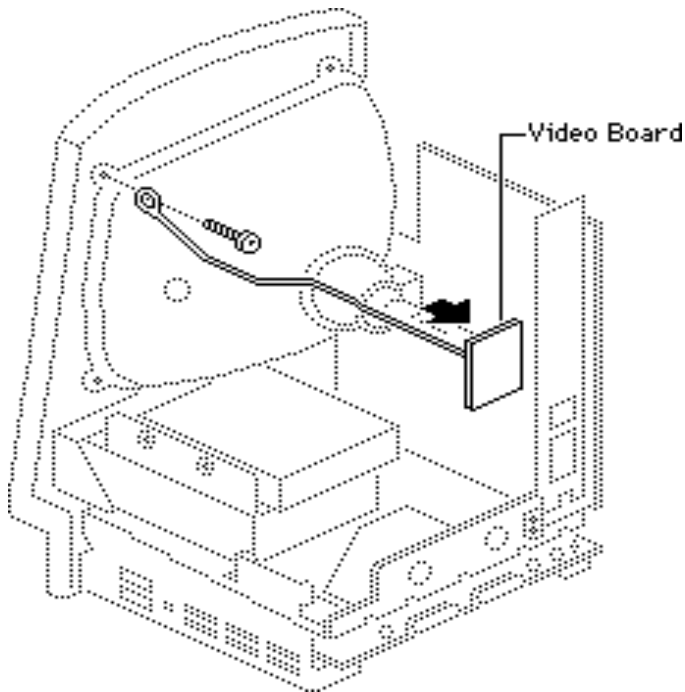
**Caution:** To prevent ESD





damage to components, wear a grounding wriststrap. Never use a grounding wriststrap until after discharging the CRT.

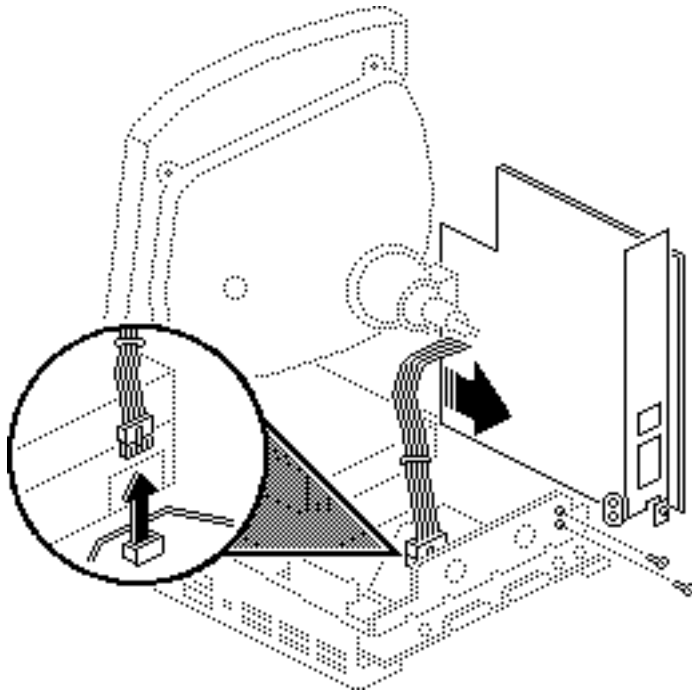




- 1 Using a Torx screwdriver, remove the screw that secures the ground wire to the upper corner of the CRT.
- 2 Carefully pull off the video board from the neck of the CRT.

**Note:** If sealant holds the board in place, cut the sealant with an art knife.





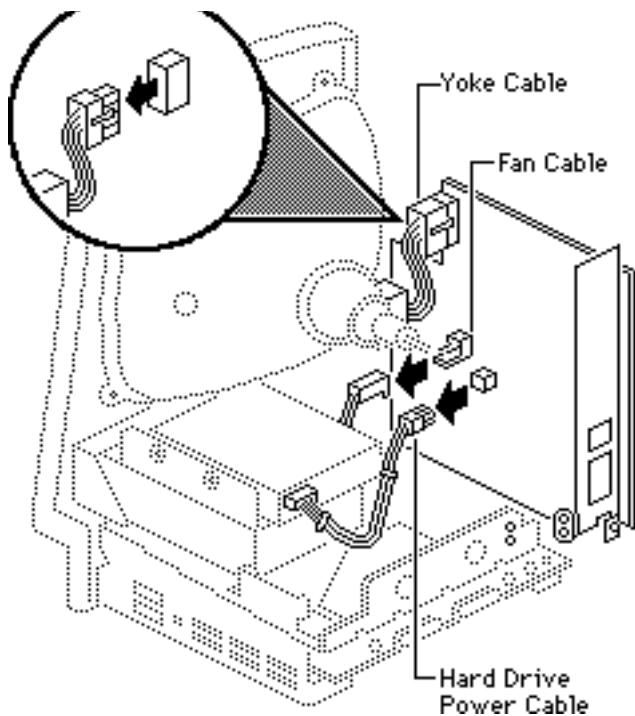
- 3 Remove the logic board power cable from the logic board. Remove the Phillips screws that secure the power/sweep bracket to the chassis and pull the board slightly away from the chassis.

**Note:** Most power/sweep brackets are secured by two screws; however, some are secured by three.



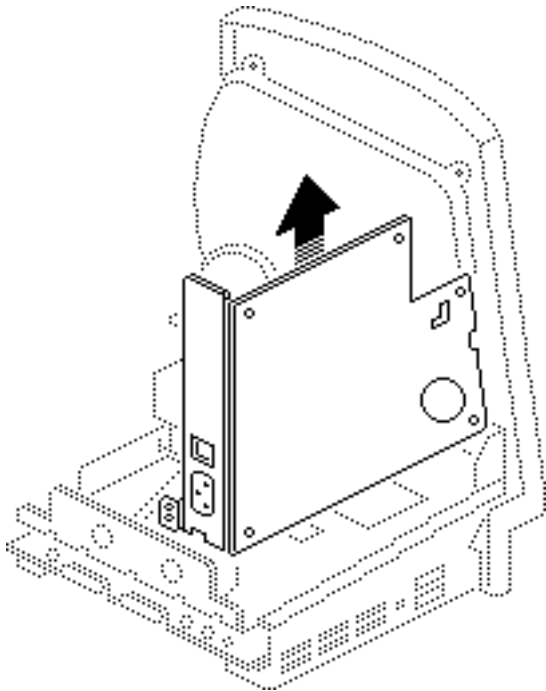


- 5 Remove the following cable connectors from the power/sweep board:
- Yoke cable
  - Fan cable
  - Hard drive power cable (if present)



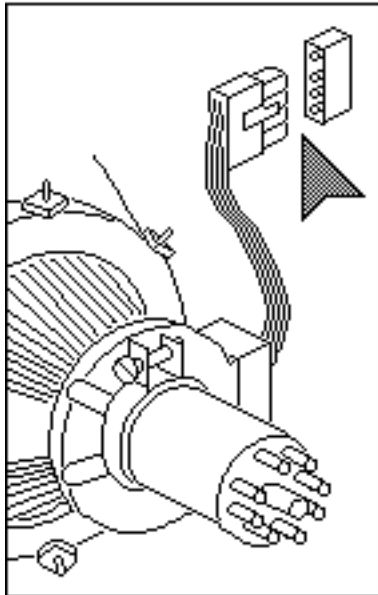


- 6 Lift the board free.

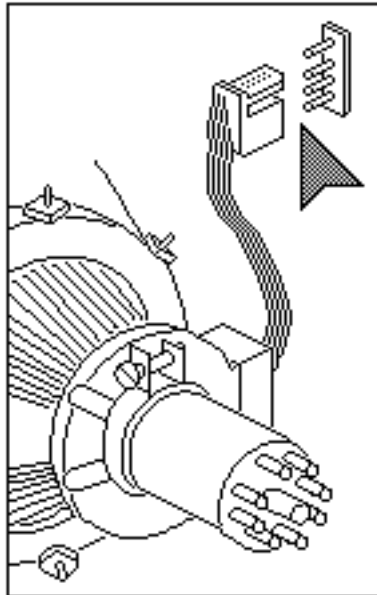




Revision A



Revision B



**Note:** The two versions of the power/sweep board, Rev A and Rev B, are functionally equivalent, but they are not interchangeable.

In addition, a Rev A power/sweep board must be used with a Rev A CRT yoke assembly and a Rev A or Rev B cover. A Rev B power/sweep board must be used with a Rev B CRT yoke assembly and a Rev B cover.





To identify compatible versions of the power/sweep board, CRT assembly, and cover, examine the CRT yoke connector. Power/sweep board Rev A has plastic sleeves surrounding the prongs; the prongs are exposed on power/sweep board Rev B.





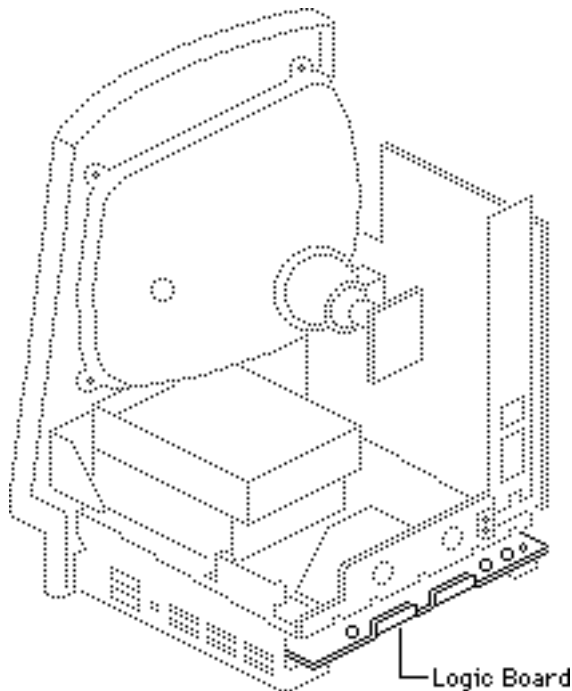


## Logic Board

Before you begin:

- Remove the cover
- Discharge the CRT
- Remove the memory expansion board

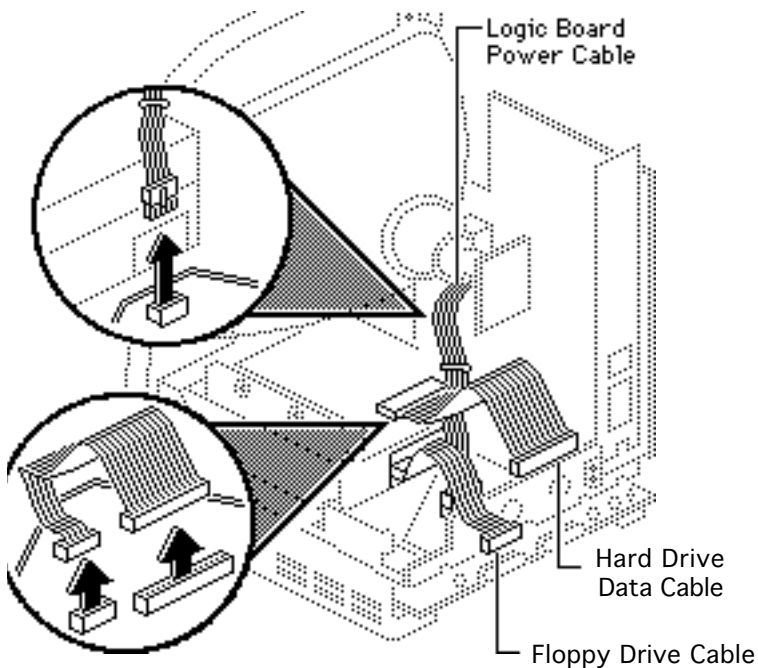
**⚠ Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious personal injury or equipment damage, review CRT safety and discharge instructions in Bulletins/Safety.





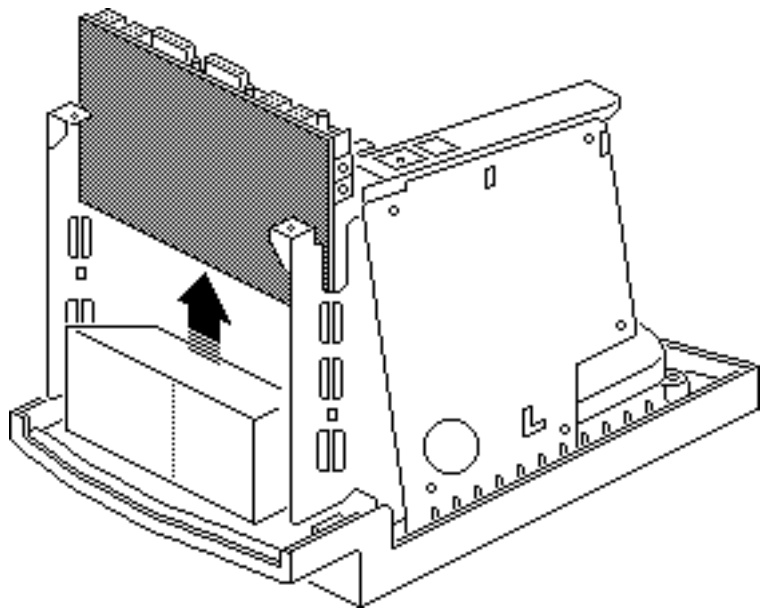
**Caution:** To prevent ESD damage to components, wear a grounding wriststrap. Never use a grounding wriststrap until after discharging the CRT.





- 1 Remove the following cable connectors from the logic board:
  - Logic board power cable
  - Floppy drive cable
  - Hard drive data cable (if present)





- 2 Grasp the logic board by the corners and slide it straight up and out of the chassis.

**Replacement Note:** Remove the SIMMs from the defective logic board and install them in the replacement logic board. (See Memory manual.)



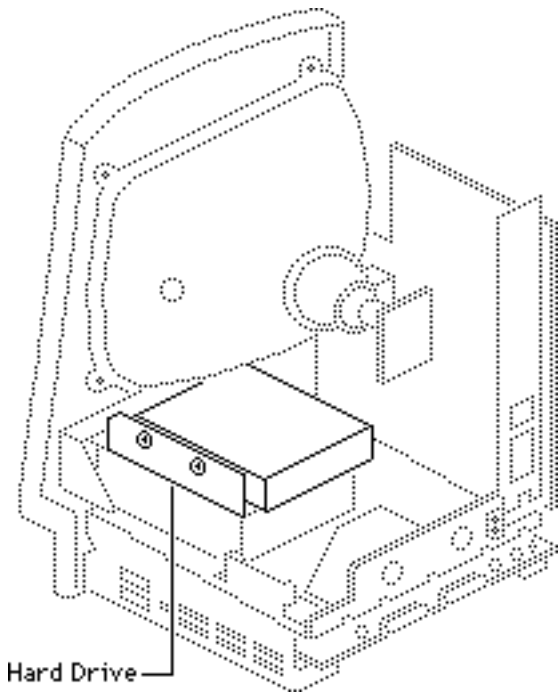


## Hard Drive

Before you begin:

- Remove the cover
- Discharge the CRT

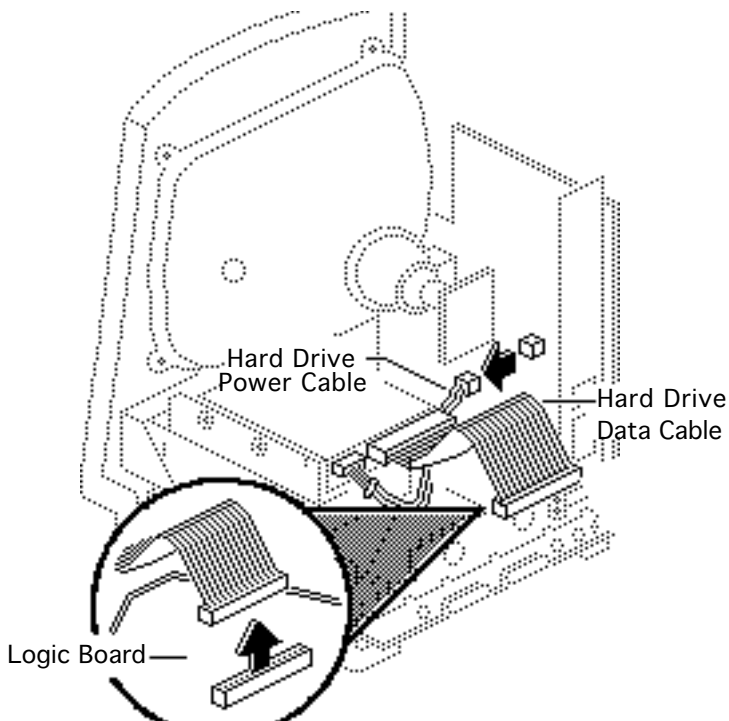
**⚠ Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious personal injury or equipment damage, review CRT safety and discharge instructions in Bulletins/Safety.





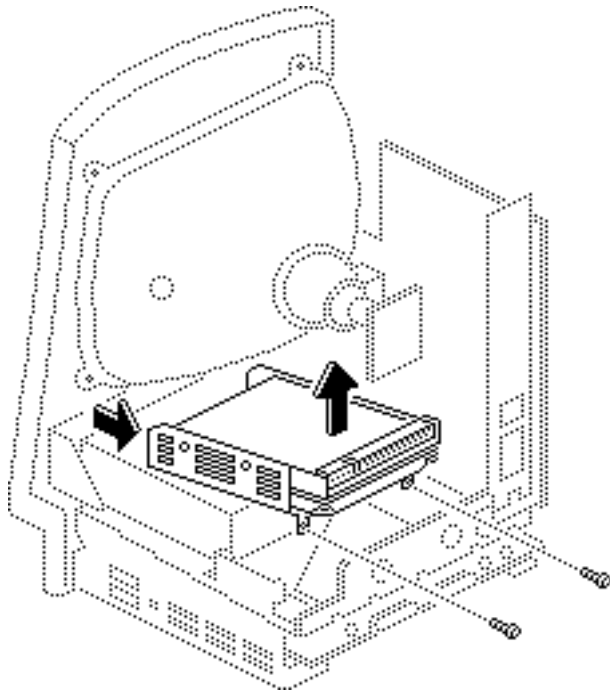
**Caution:** To prevent ESD damage to components, wear a grounding wriststrap. Never use a grounding wriststrap until after discharging the CRT.





- 1 Disconnect the hard drive data cable from the logic board.
- 2 Disconnect the hard drive power cable from the power/sweep board.





- 3 Remove the two Phillips screws that secure the hard drive housing to the floppy drive housing and lift out the hard drive assembly.

**Replacement Note:** If you are removing a hard drive from the system but not installing a new one, install a SCSI terminator on the logic board SCSI connector. To insert the terminator, line up the white key icon with the notch in the cable connector.







**Replacement Note:** For information on removing the hard drive from the carrier and returning drives, cables, and carriers to Apple, refer to Hardware/ Service Manuals/ SCSI Hard Drives Manual.





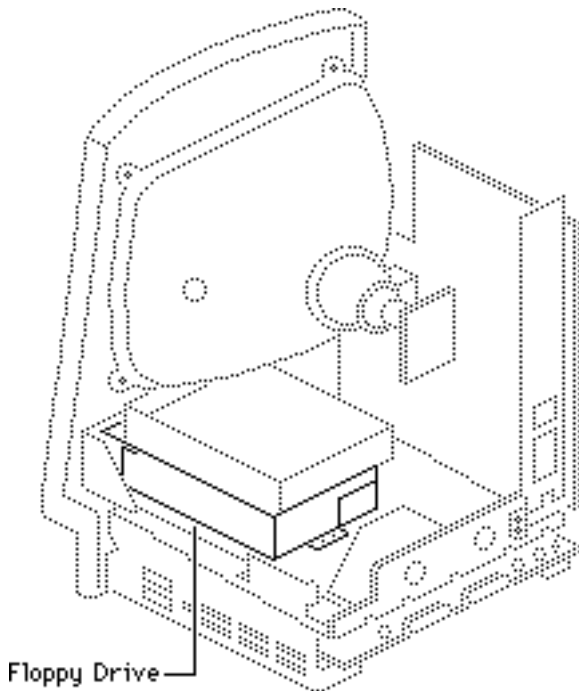
## Floppy Drive

Before you begin:

- Remove the cover
- Discharge the CRT
- Remove the hard drive
- Remove the logic board

**⚠ Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious personal injury or equipment damage, review CRT safety and discharge instructions in Bulletins/Safety.

**Caution:** To prevent ESD



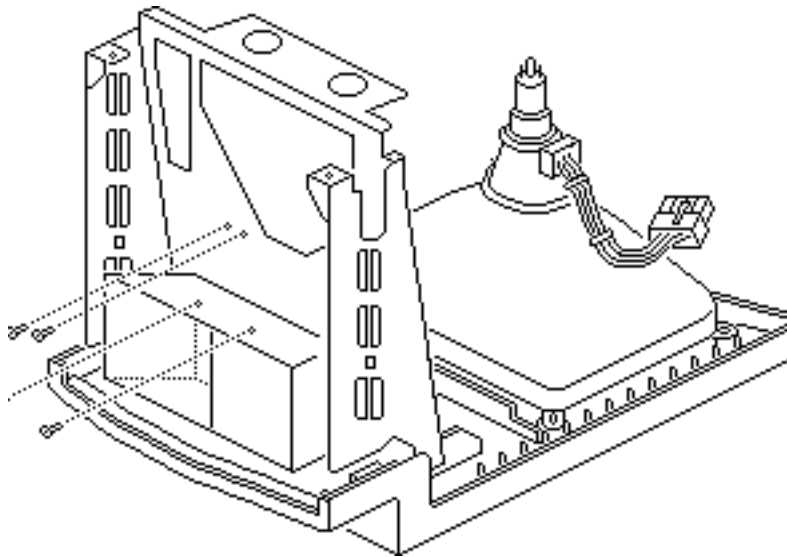


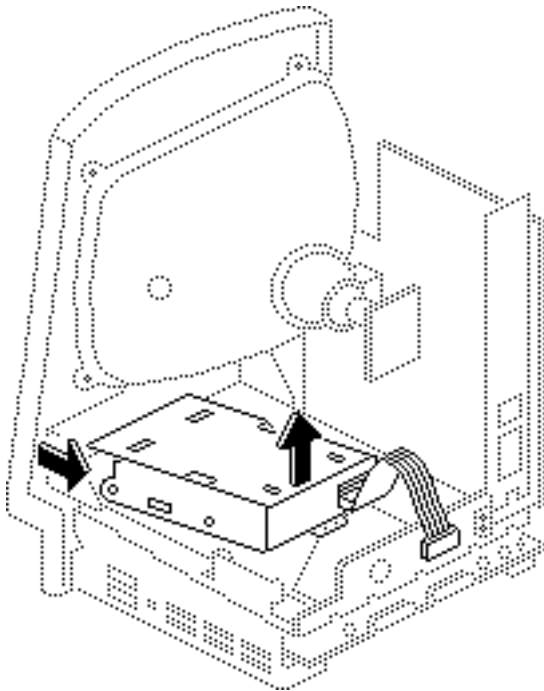
damage to components, wear a grounding wriststrap. Never use a grounding wriststrap until after discharging the CRT.





- 1 Remove the four Phillips screws that secure the floppy drive housing to the bottom of the chassis.

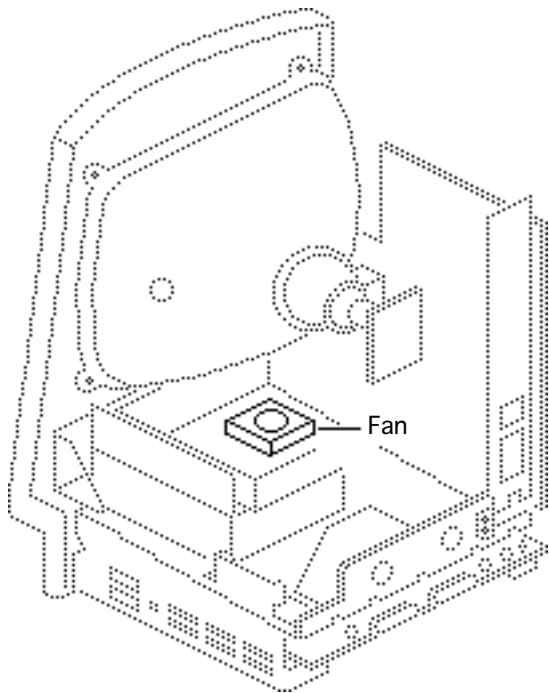




- 2 Lift out the floppy drive mechanism.

**Replacement Note:** Before you install a replacement 1.4 MB SuperDrive, you must remove the dust shield.





## Fan

Before you begin:

- Remove the cover
- Discharge the CRT
- Remove the anode cap
- Remove the power/sweep board

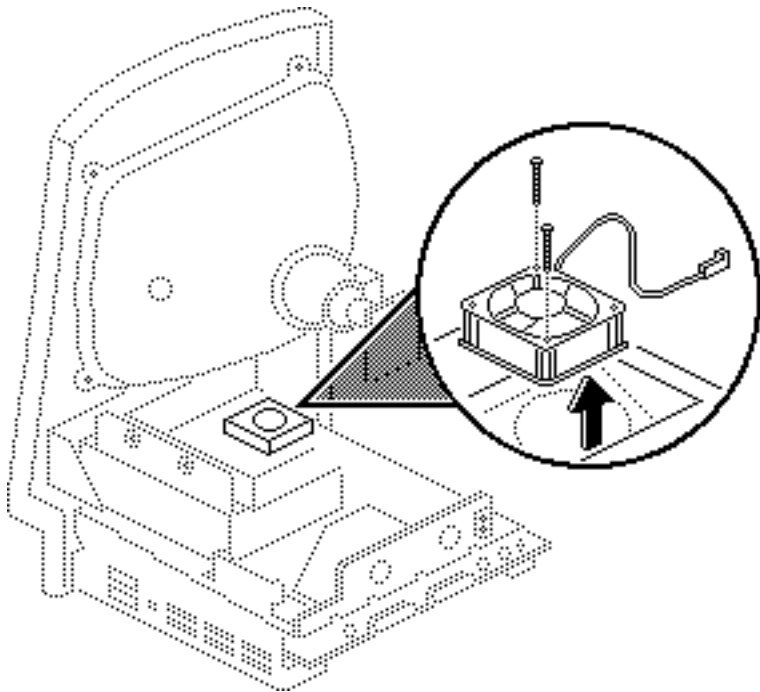
**⚠ Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious personal injury or equipment damage, review CRT safety and discharge instructions in Bulletins/Safety.





**Caution:** To prevent ESD damage to components, wear a grounding wriststrap. Never use a grounding wriststrap until after discharging the CRT.

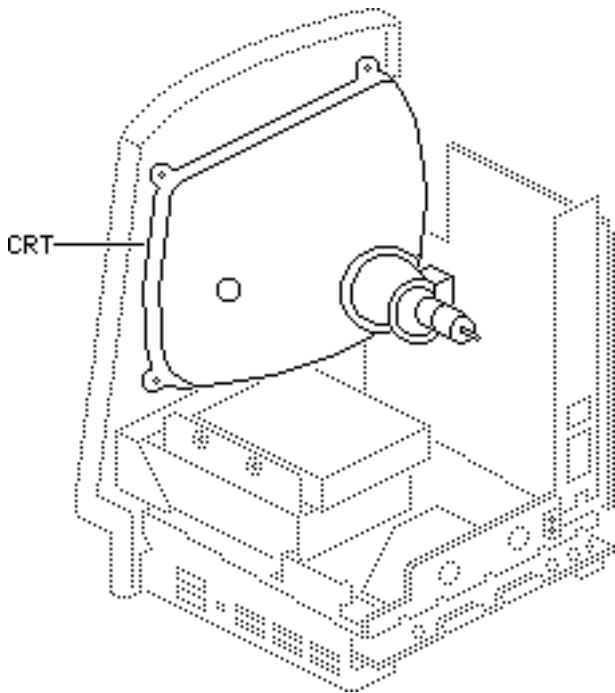




- 1 Using a small, stump-handled Phillips screwdriver, remove the two screws that mount the fan to the chassis.
- 2 Lift out the fan.







## CRT

Before you begin:

- Remove the cover
- Discharge the CRT
- Remove the anode cap
- Remove the power/sweep board

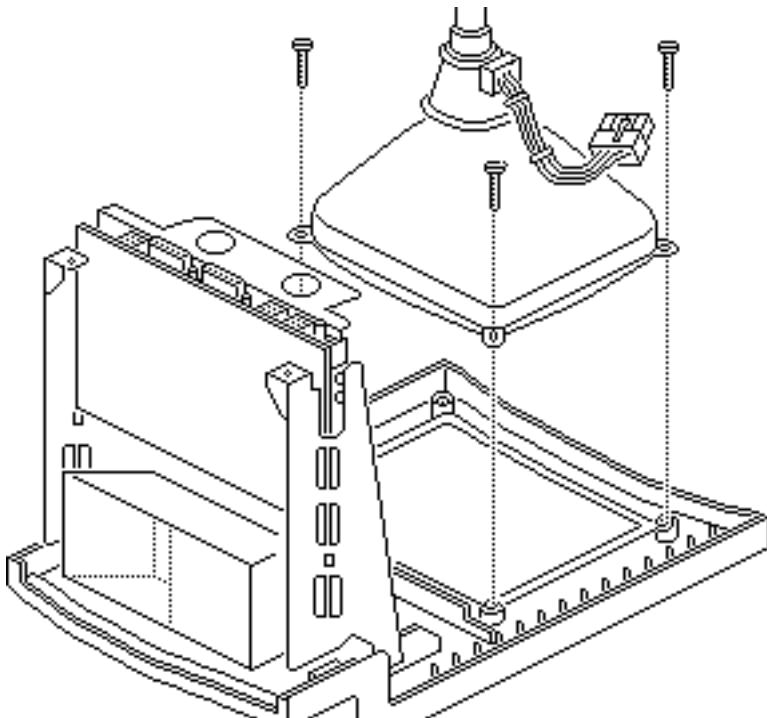
**⚠ Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious personal injury or equipment damage, review CRT safety and discharge instructions in Bulletins/Safety.





**Caution:** To prevent ESD damage to components, wear a grounding wriststrap. Never use a grounding wriststrap until after discharging the CRT.





- 1 Remove the three Torx screws from the corners of the CRT.
- 2 Carefully lift the CRT free from the bezel.

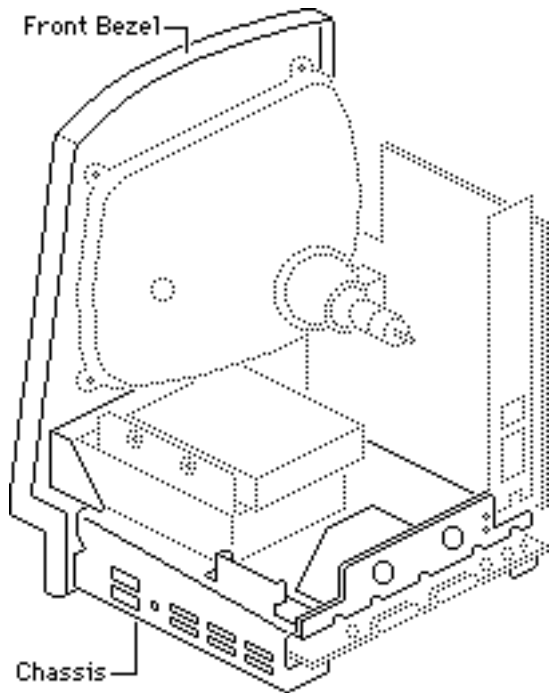
**Note:** The CRT yoke assembly must be compatible with the power/sweep assembly, which is available in two versions, Rev A and Rev B. CRT yoke assembly Rev A requires power/sweep board Rev A. CRT yoke assembly Rev B requires power/sweep board Rev B.





Refer to “Power/Sweep Board” in Take Apart to identify CRT and power/sweep revisions and to verify compatibility.





## Chassis & Front Bezel

Before you begin:

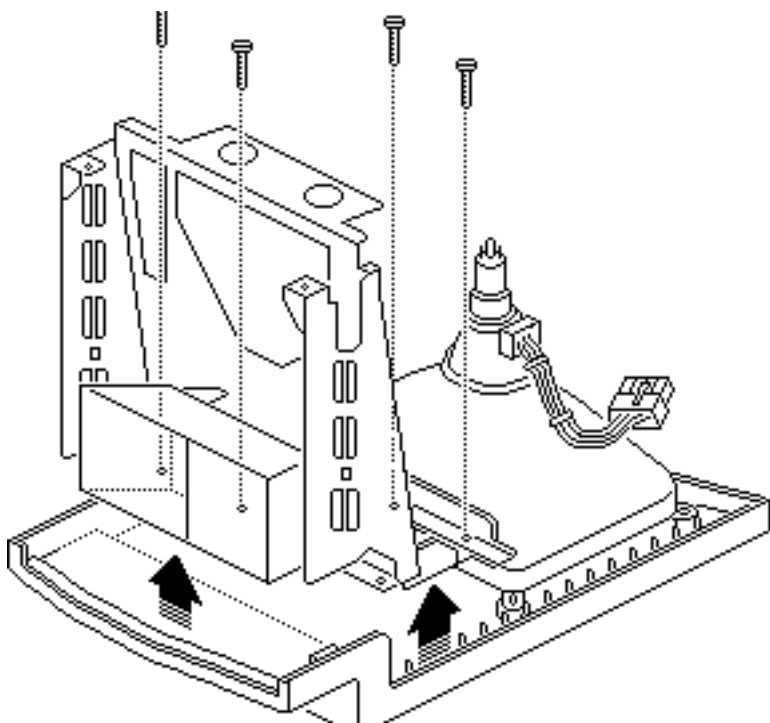
- Remove the cover
- Discharge the CRT
- Remove the anode cap
- Remove the power/sweep board
- Remove the memory expansion board
- Remove the logic board
- Remove the hard drive
- Remove the floppy drive
- Remove the fan





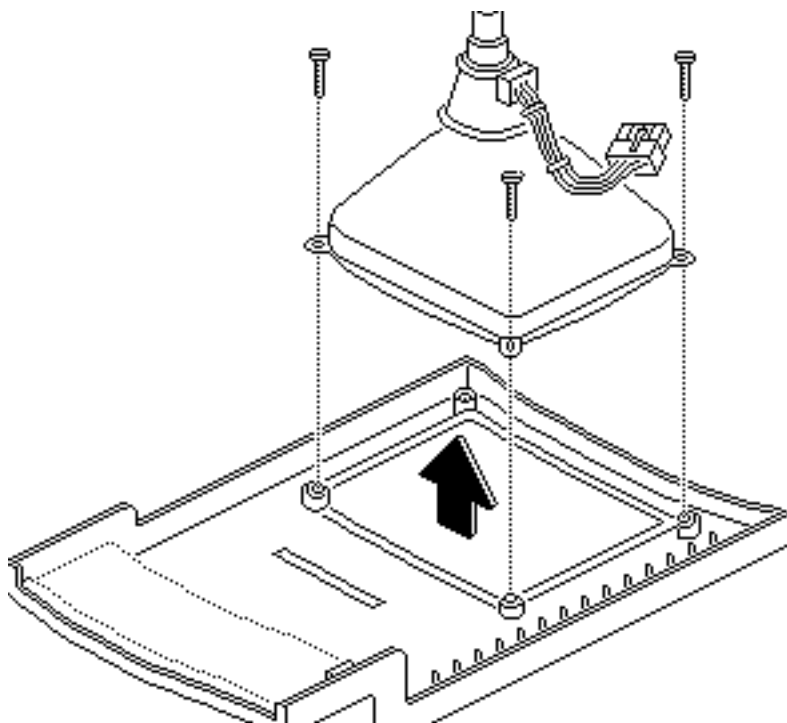
**⚠ Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious personal injury or equipment damage, review CRT safety and discharge instructions in Bulletins/Safety.





- 1 Remove the four Torx screws from the front bezel.
- 2 Lift out the metal chassis.

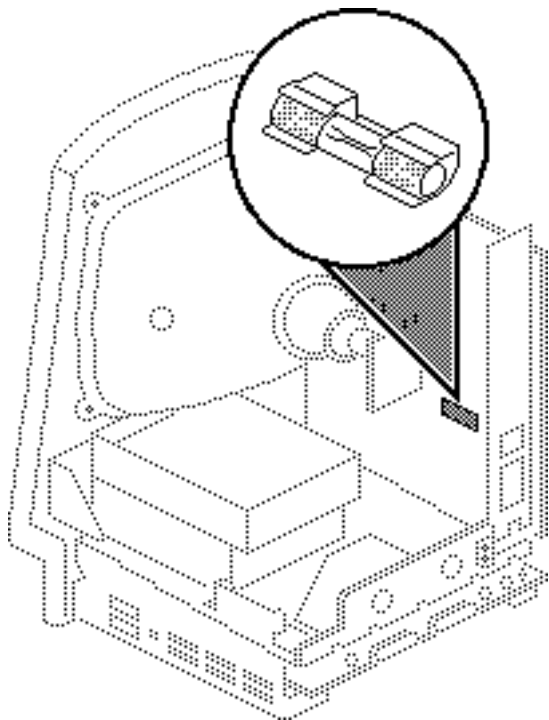




- 3 Remove the three Torx screws from the corner of the CRT, and remove the CRT.







## Fuse

Before you begin:

- Remove the cover
- Discharge the CRT

**⚠ Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious personal injury or equipment damage, review CRT safety and discharge instructions in Bulletins/Safety.





**Caution:** To prevent ESD damage to components, wear a grounding wriststrap. Never use a grounding wriststrap until after discharging the CRT.

Using a fuse puller or small flat-blade screwdriver, carefully remove the fuse from its holder.





## Upgrades

Macintosh Classic/Classic II/  
Performa 200



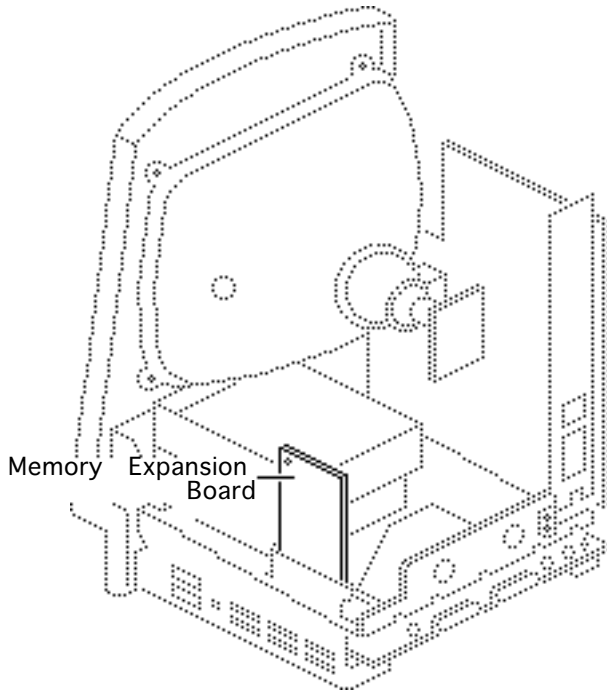


## Memory Exp. Bd.

Before you begin:

- Remove the cover
- Discharge the CRT

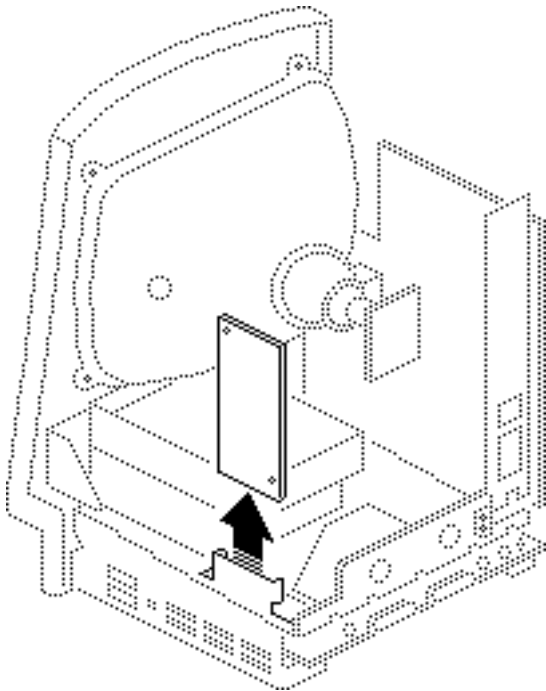
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**Caution:** To prevent ESD damage to components, wear a grounding wriststrap. Never use a grounding wriststrap until after discharging the CRT.





**Note:** The memory expansion board is an option for the Macintosh Classic only. It contains 1 MB of soldered RAM plus one pair of SIMM connectors.

Carefully slide the memory expansion board up to free it from the logic board and the chassis.



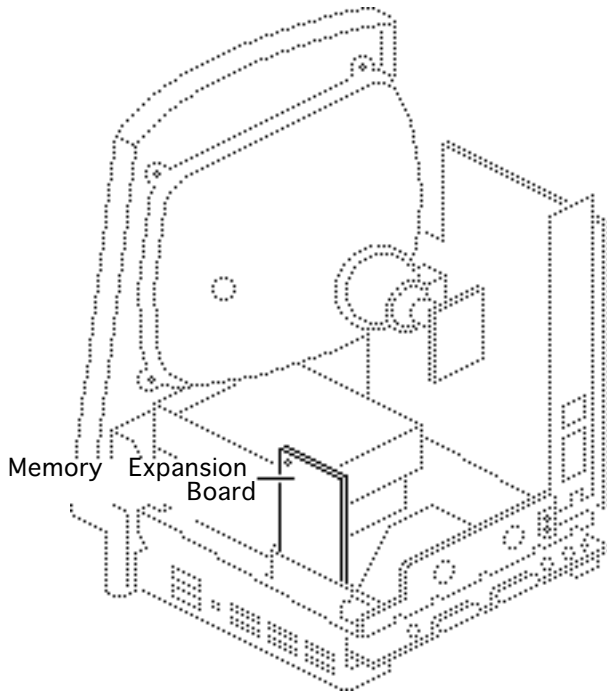


## Memory Upgrade

Before you begin:

- Remove the cover
- Discharge the CRT
- Remove the memory expansion board

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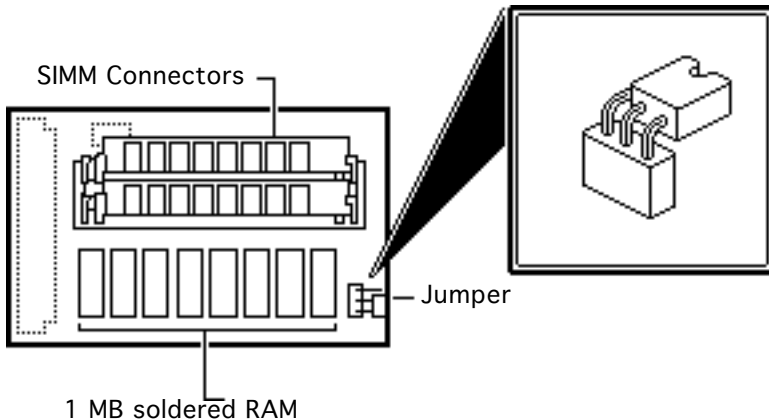




**Caution:** To prevent ESD damage to components, wear a grounding wriststrap. Never use a grounding wriststrap until after discharging the CRT.

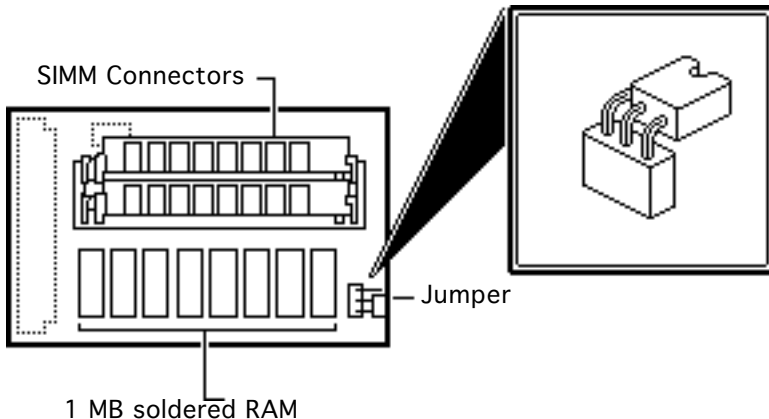






**Note:** The memory expansion board is an option for the Macintosh Classic only. It contains 1 MB of soldered RAM plus one pair of SIMM connectors. You can upgrade the system further by adding two 256K or two 1 MB SIMMs to the memory expansion board and moving the jumper. You must use 120-ns (or faster) SIMMs.





**Note:** Install the memory board without additional SIMMs for a 1 MB RAM upgrade. Install two 256K SIMMs onto the memory expansion board for a 2.5 MB RAM upgrade or two 1 MB SIMMs for a 4 MB RAM upgrade.

- 1 Install the SIMMs in the SIMM slots on the memory expansion board.
- 2 Position the jumper as shown.





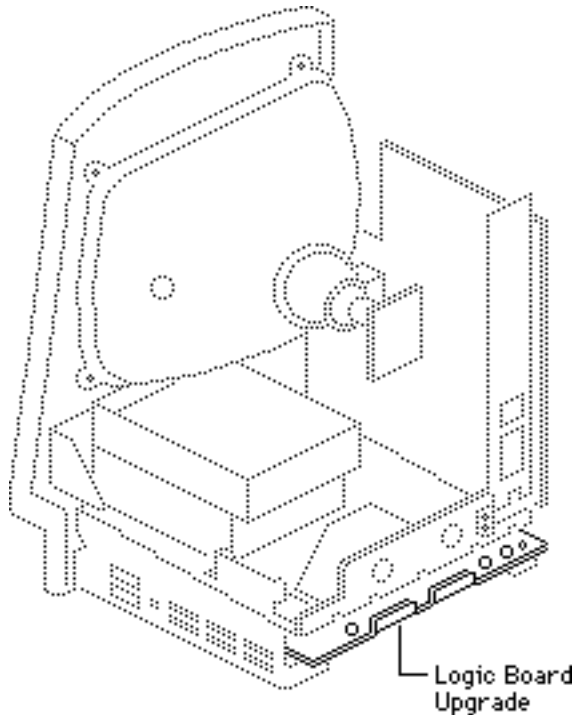
## Classic II Upgrade

Before you begin:

- Remove the cover
- Discharge the CRT
- Remove the logic board

**⚠ Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious personal injury or equipment damage, review CRT safety and discharge instructions in Bulletins/Safety.

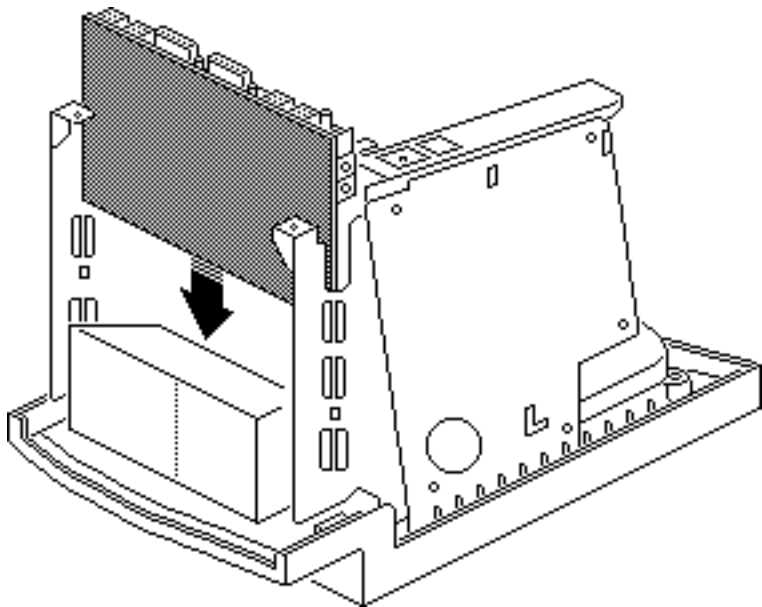
**Caution:** To prevent ESD damage to components, wear





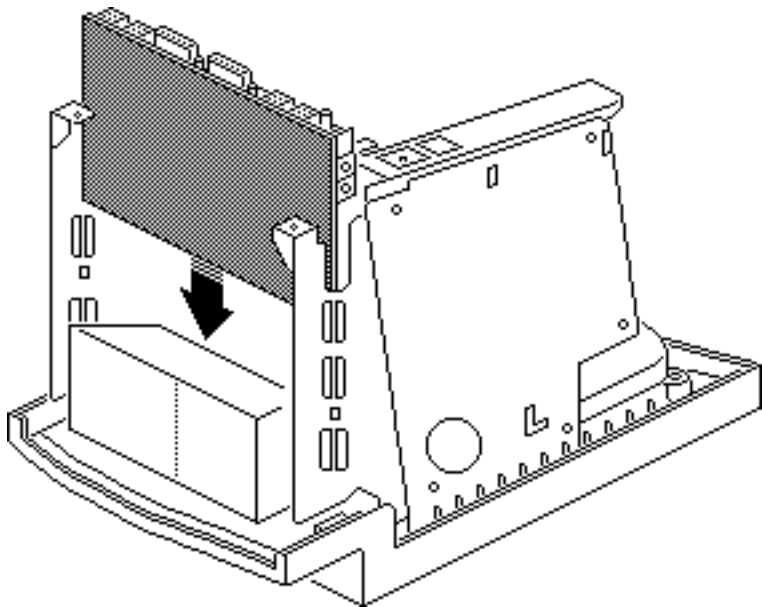
a grounding wriststrap.  
Never use a grounding  
wriststrap until after  
discharging the CRT.





**Note:** A Macintosh Classic II upgrade kit upgrades a Macintosh Classic to a Macintosh Classic II. The upgrade kit includes a Classic II logic board, a Classic II cover, a microphone, and an accessory kit.

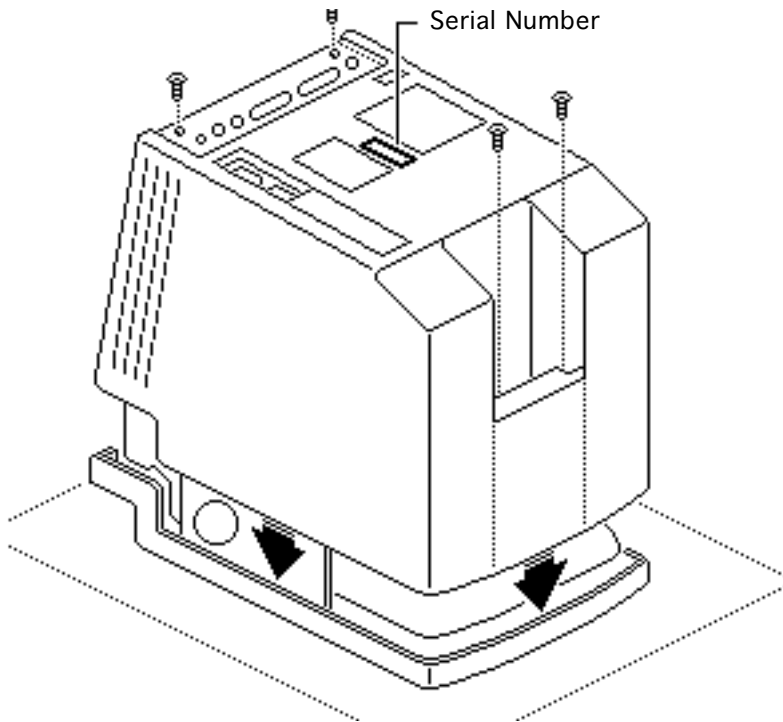




**Caution:** Take care that the connections to the sound output and sound input ports are correct. Inserting the wrong equipment into the wrong port could damage the Macintosh Classic II or external equipment.

- 1 Install the Macintosh Classic II logic board.





- 2 Install the Classic II cover.
- 3 Read the customer's original serial number from the label on the back of the old rear housing and record the number with indelible ink or engrave it onto the new rear housing.





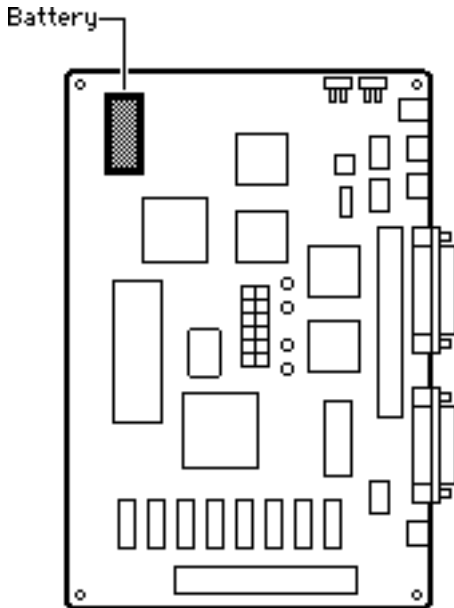
## Additional Procedures

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Macintosh Classic/Classic II/  
Performa 200







## Battery Verification

Before you begin:

- Remove the cover
- Discharge the CRT
- Remove the logic board

**⚠ Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious personal injury or equipment damage, review CRT safety and discharge instructions in Bulletins/Safety.

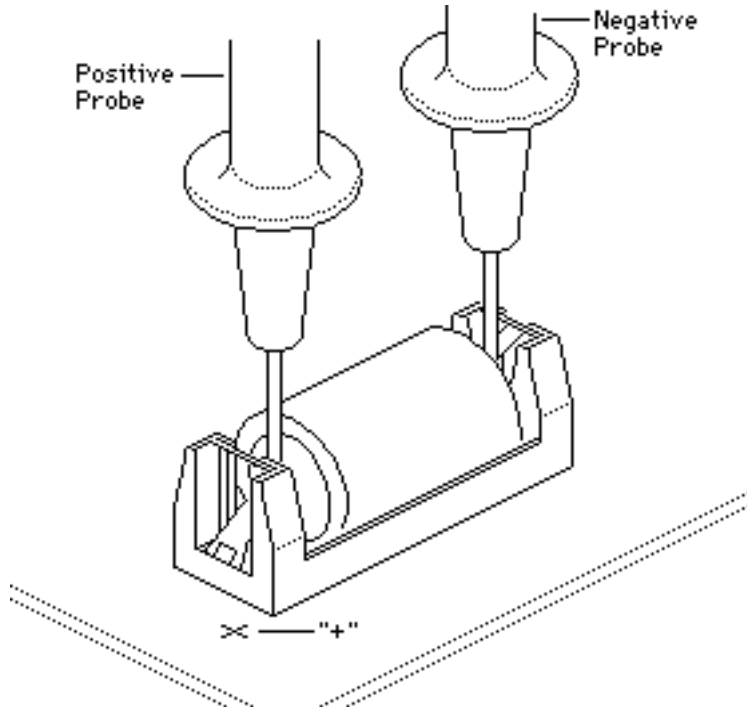
**Caution:** To prevent ESD





damage to components, wear a grounding wriststrap. Never use a grounding wriststrap until after discharging the CRT.





**⚠ Warning:** If handled or discarded improperly, the lithium battery in the computer could explode. Review battery handling and disposal instructions in Bulletins/Safety.

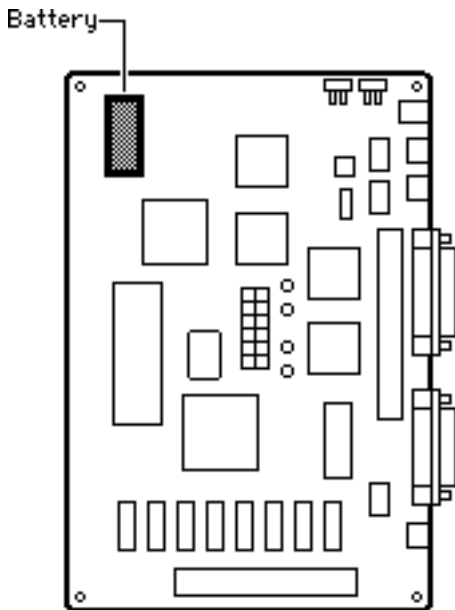
- 1 Set the voltmeter range to the 10 volts DC scale.
- 2 Hold the positive probe of the voltmeter to the positive "+" side of the battery. Hold the ground probe of the voltmeter to the negative (-) side of the battery.





- 3 If the battery voltage is below 3.0 volts, replace the battery. See “Battery Replacement” in this chapter.





## Battery Replacement

Before you begin:

- Remove the cover
- Discharge the CRT
- Remove the logic board

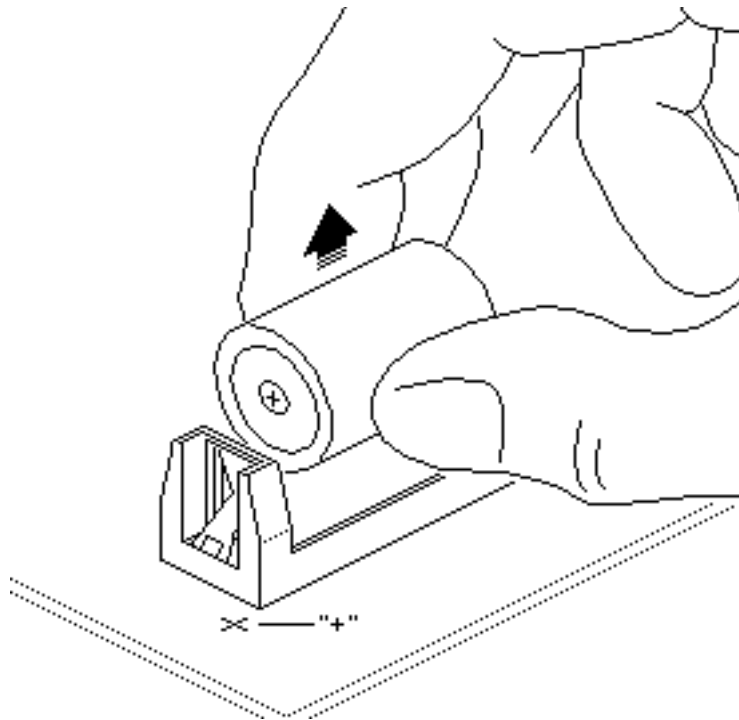
**⚠ Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious personal injury or equipment damage, review CRT safety and discharge instructions in Bulletins/Safety.





**Caution:** To prevent ESD damage to components, wear a grounding wriststrap. Never use a grounding wriststrap until after discharging the CRT.





**⚠ Warning:** If handled or discarded improperly, the lithium battery in the computer could explode. Review battery handling and disposal instructions in Bulletins/Safety.

- 1 Pull the old battery out of the battery holder.
- 2 Replacement Note:  
Orient the new battery so that the end marked “+” matches the “+” on the logic board, and insert the battery into the battery holder.





**Note:** For information about properly disposing of the old battery, refer to battery disposal instructions in Bulletins/Safety.







## Adjustments

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Macintosh Classic/Classic II/  
Performa 200





## Light Meter Setup

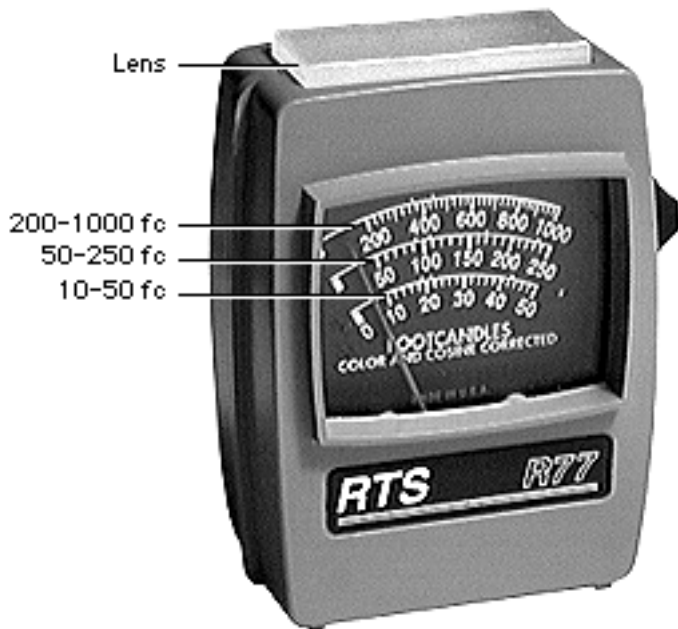
This topic covers setup for three light meter models: R77, L-248, and 246. Model R77 (Apple part number 076-0310) is the newest model available.

### Model R77

The R77 light meter is capable of reading luminance from 10 to 1,000 footcandles (fc).

Before you begin, remove the 10X multiplier plate





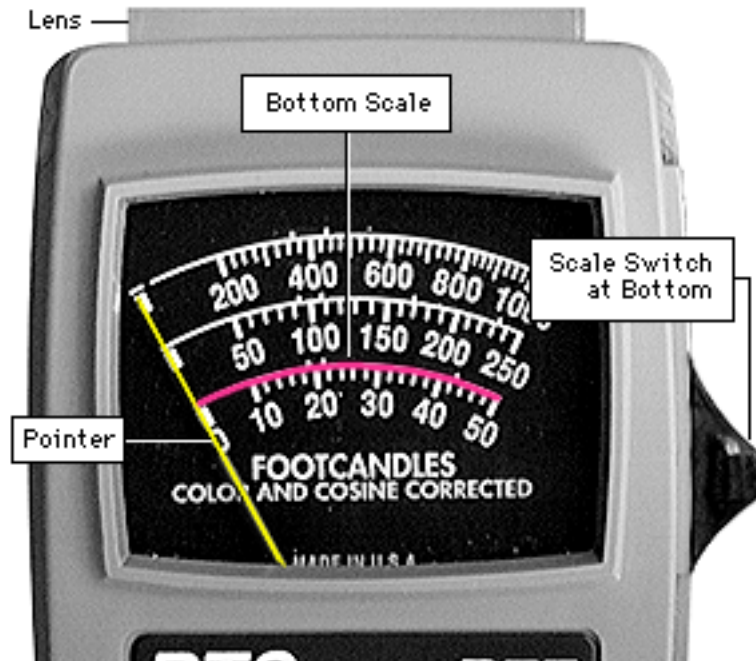
from the lens.

Three scales are shown on the light meter:

- 200-1000 fc
- 50-250 fc
- 10-50 fc

Because display screen luminance typically ranges from 10 to 50 fc, take readings from the bottom scale only.





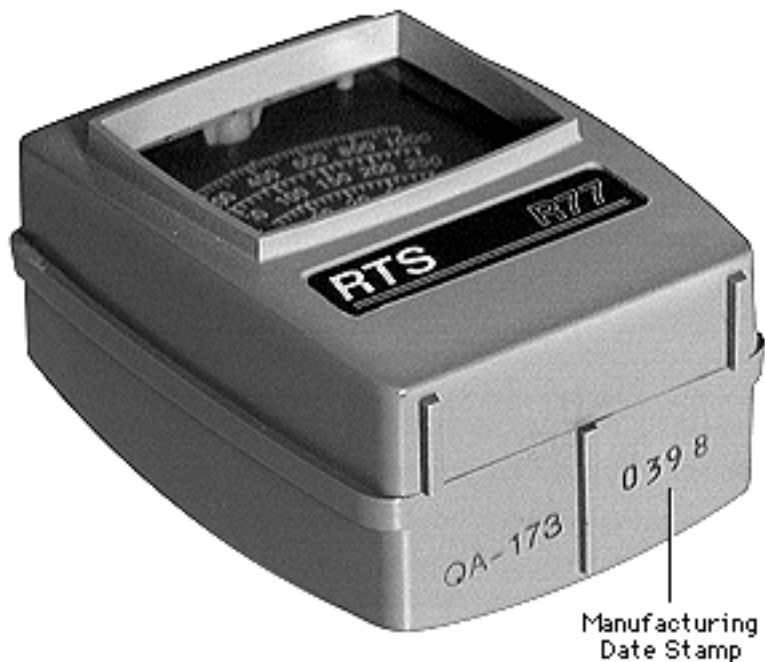
To measure a display screen's luminance,

- 1 Set the scale switch to the bottom position (to set up the 10-50 fc scale).
- 2 Place the lens against the middle of the screen and read the bottom scale.

**Note:** When the light meter is not in use, slide the scale switch to its top position, and store the meter in its protective case.

**Important:** If you suspect the light meter is giving false

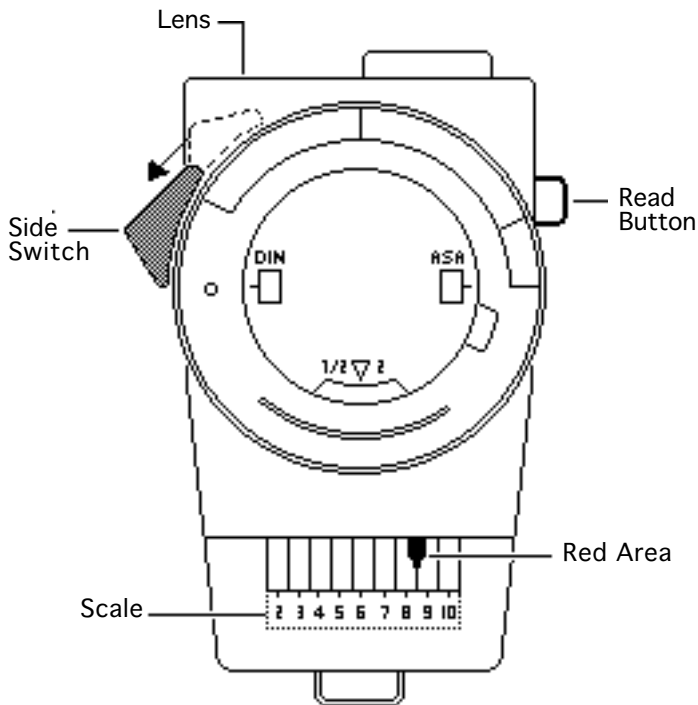




readings, verify the readings with a known-good light meter or photometer. Also check the age of the R77 light meter by its four-digit manufacturing date stamp (such as 0398 for March 1998).

**Caution:** Dropping the meter can permanently damage its accuracy. A shock-damaged meter might read incorrectly or its pointer may not drop to zero.

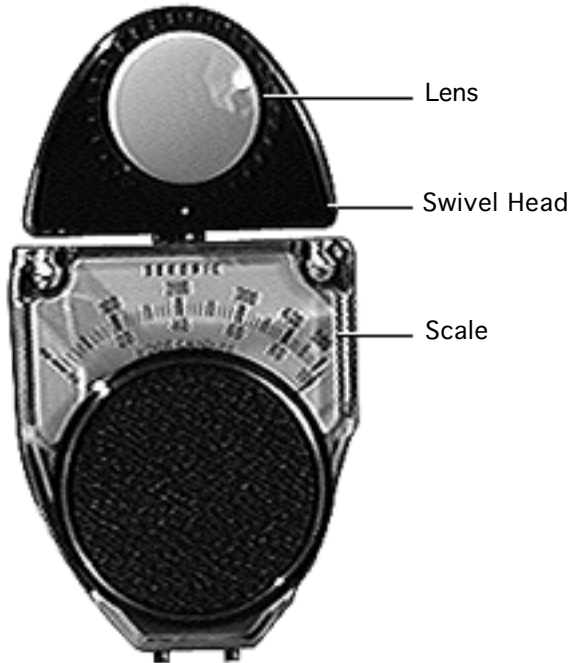




## Model L-248

- 1 Press the red button on the back of the light meter. If the reading is out of the red area, replace the battery.
- 2 Move the side switch to its lower position so that the scale reads 2 through 10.
- 3 Uncover the lens of the meter.
- 4 Place the lens against the middle of the screen and press the read button to read the scale.





## Model 246

- 1 Remove the metal slide, if installed, from the top of the light meter.
- 2 Install the white lens with the red dot.
- 3 Rotate the swivel head so the lens of the meter faces the monitor.
- 4 Place the lens against the middle of the screen and read the scale.

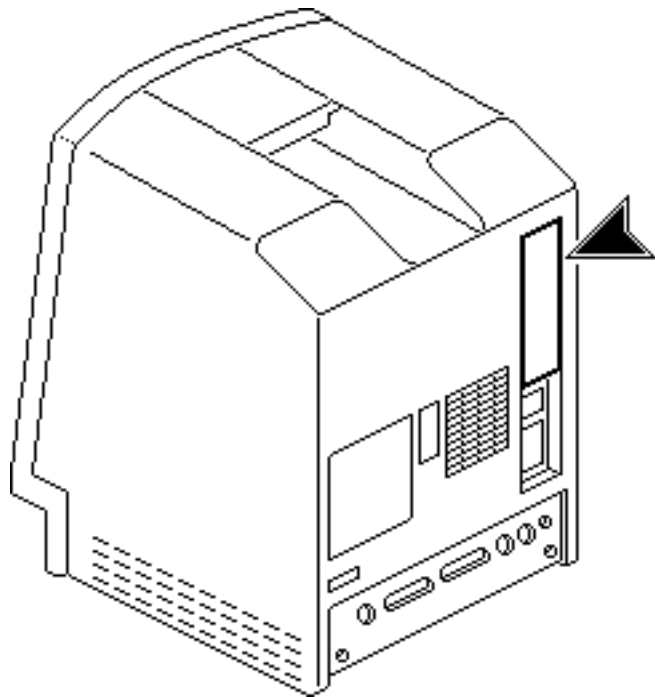




## Video

**Note:** After you replace the CRT or power/sweep board, you may need to perform video adjustments.

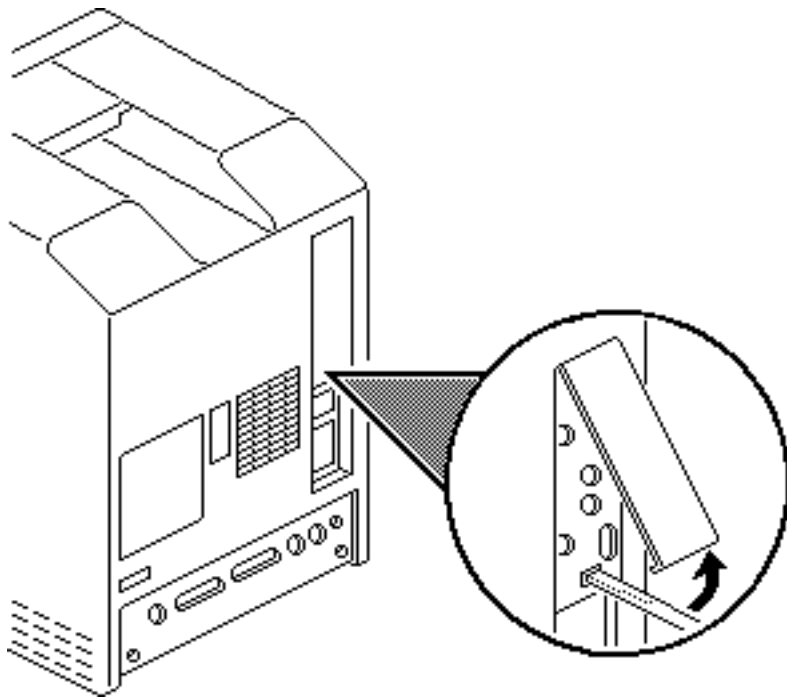
- 1 **Caution:** Because you must make adjustments from the rear of the computer, position a mirror to view the computer screen.

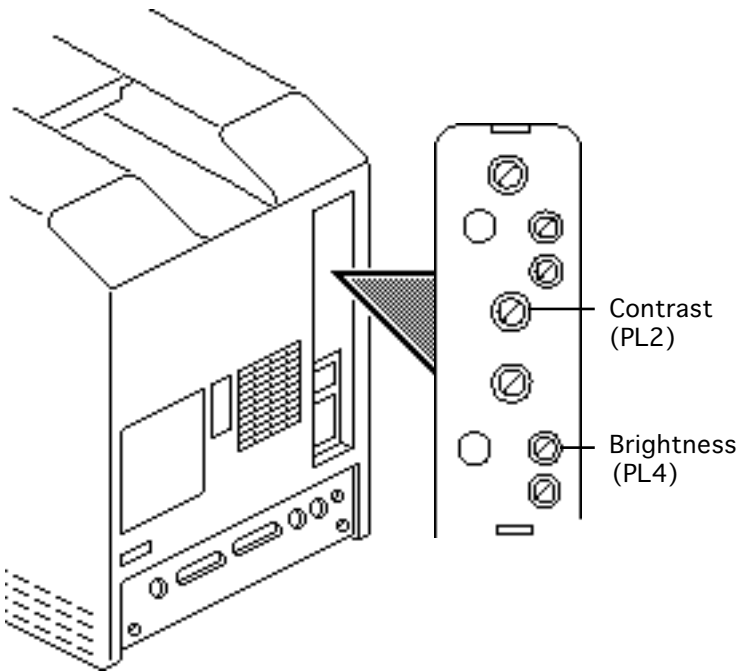






- 2 Using a small flat-blade screwdriver, depress the center tab and lift out the service door.





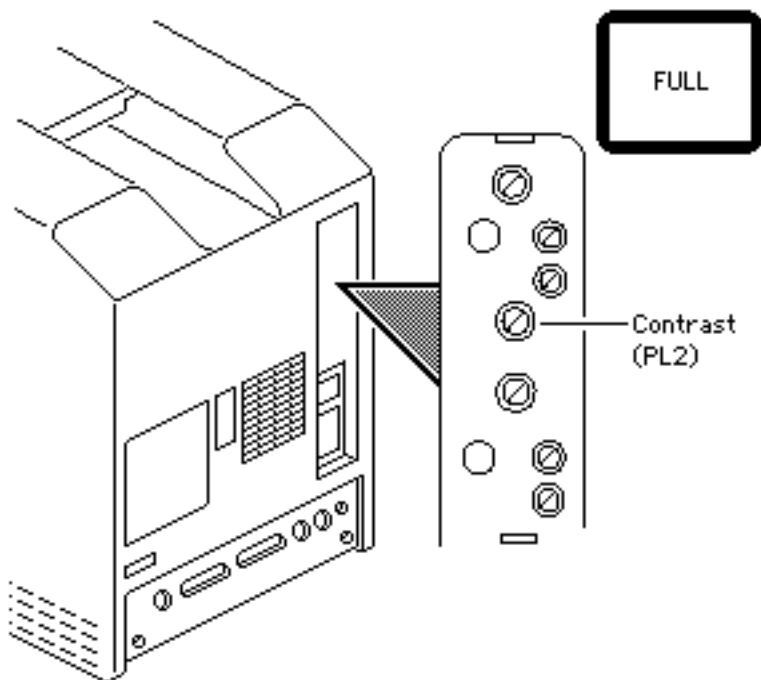
## Brightness & Contrast

**Important:** Readings from light meters may differ between models. Please note the type of meter you are using (Model R77, L-248, or 246) before making an adjustment. (See “Light Meter Setup.”)

**Note:** Be sure the computer has been on for at least 30 minutes.

- 1 Run the Display Service Utility from the Utilities folder on the MacTest Pro CD.





- 2 From the pattern selections screen, select the Full brightness screen.
- 3 Hold the light meter lens against the center of the screen.
- 4 Using an insulated flat-blade screwdriver, adjust the contrast control until you measure luminance at 40 foot lamberts ( $\pm 3$  foot lamberts), which on the light meter is
  - Model R77: 29 on the bottom scale



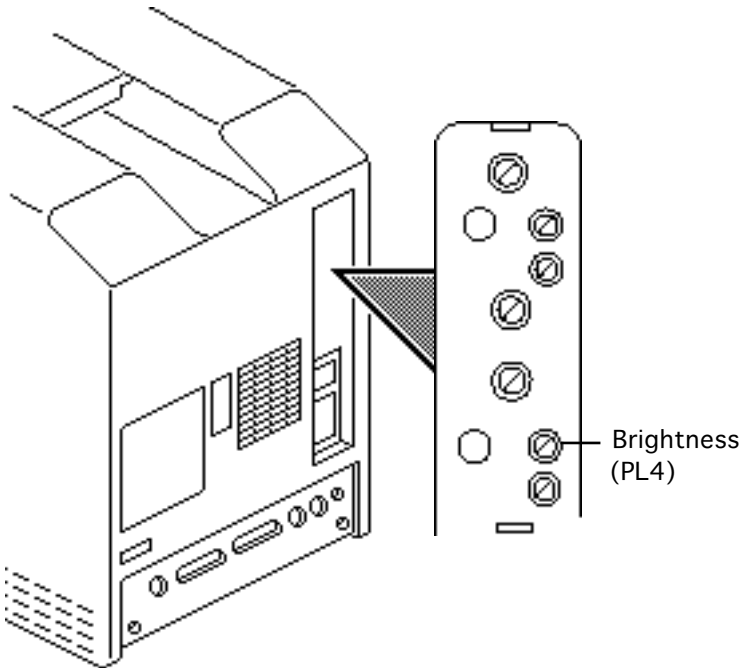


- Model L-248: 10 to 11 on the 10-18 scale
- Model 246: 29 on the red scale

**Important:** Over time, light meter tolerance can vary. If you doubt your meter's accuracy, verify the readings with a known-good light meter or photometer.

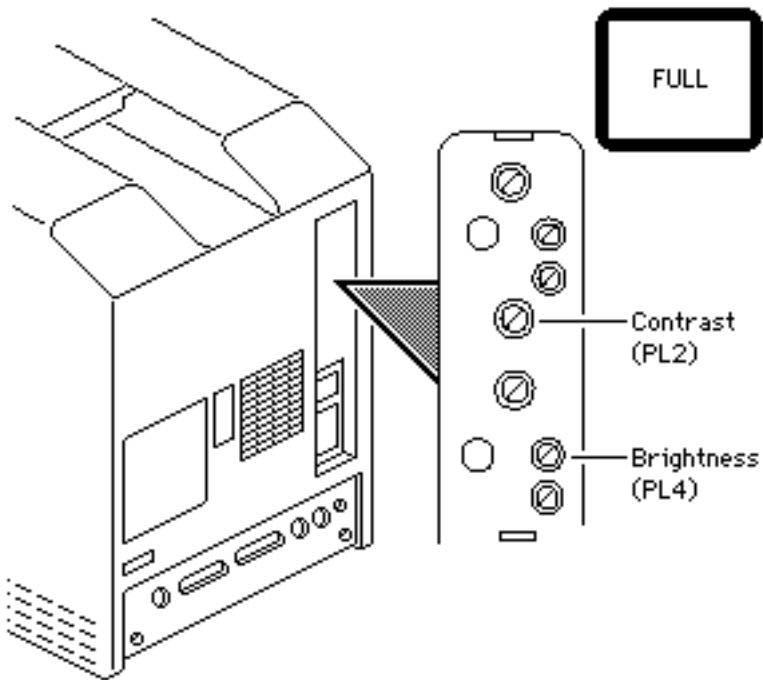
- 5 Press a key to return to the pattern selections screen. Select the Half brightness screen.





- 6 Using a plastic hex alignment tool, adjust the brightness control until the luminance at the center of the screen measures 5 foot lamberts ( $\pm 1$  foot lambert), which on the light meter is
- Model R77: halfway between zero and 10 on the bottom scale
  - Model L-248: high end of 7 on the 2-10 scale
  - Model 246: 5 on the red scale

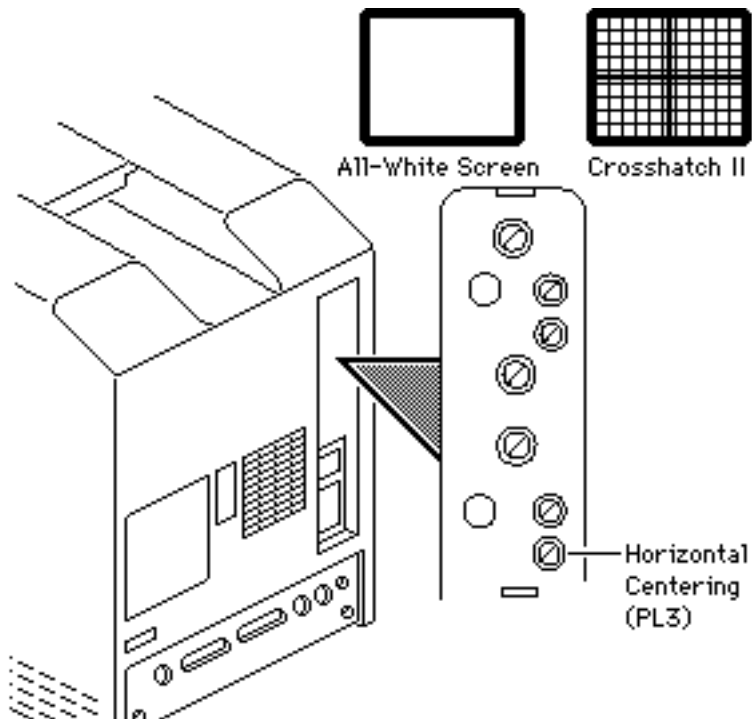




- 7 Press a key to return to the pattern selections screen. Select the Full brightness screen.
- 8 Recheck the luminance at the center of the screen:
  - Model R77: 29 on the bottom scale
  - Model L-248: 10 to 11 on the 10-18 scale
  - Model: 246: 29 on the red scale

If the light meter reading does not match the measurement shown, repeat the brightness & contrast procedure.

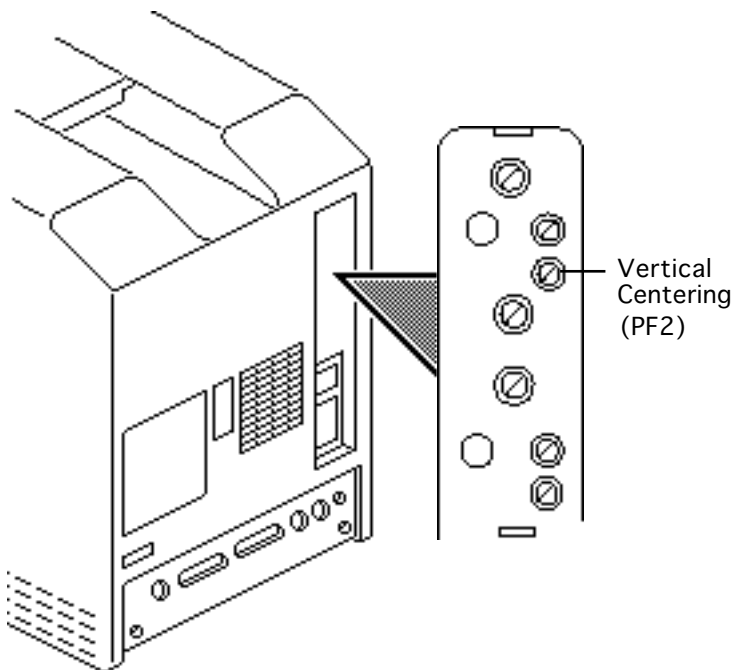




## Centering

- 1 Run the Display Service Utility.
- 2 Select the Crosshatch pattern or the All-White pattern.
- 3 Using the plastic hex alignment tool, adjust the horizontal centering control to center the display image horizontally within the bezel.

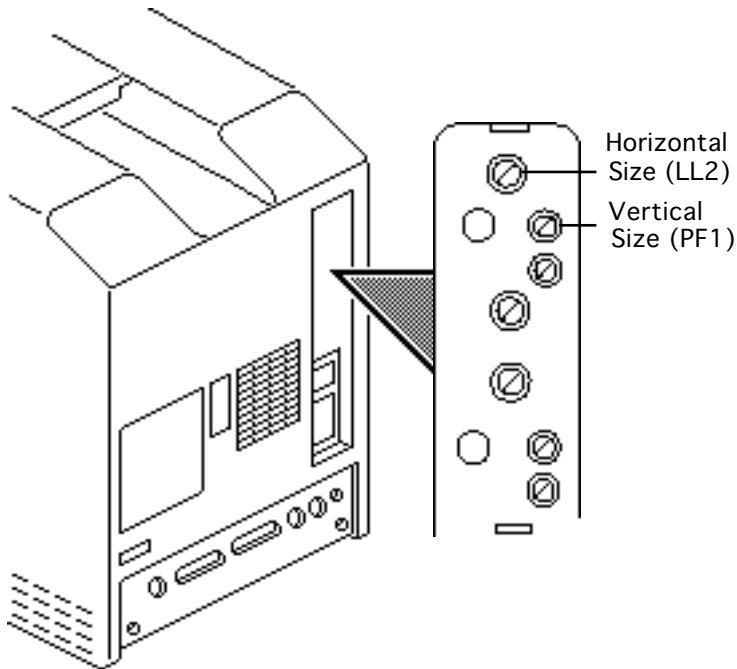




- 4 Using the plastic hex alignment tool, adjust the vertical centering control to center the image vertically within the bezel.



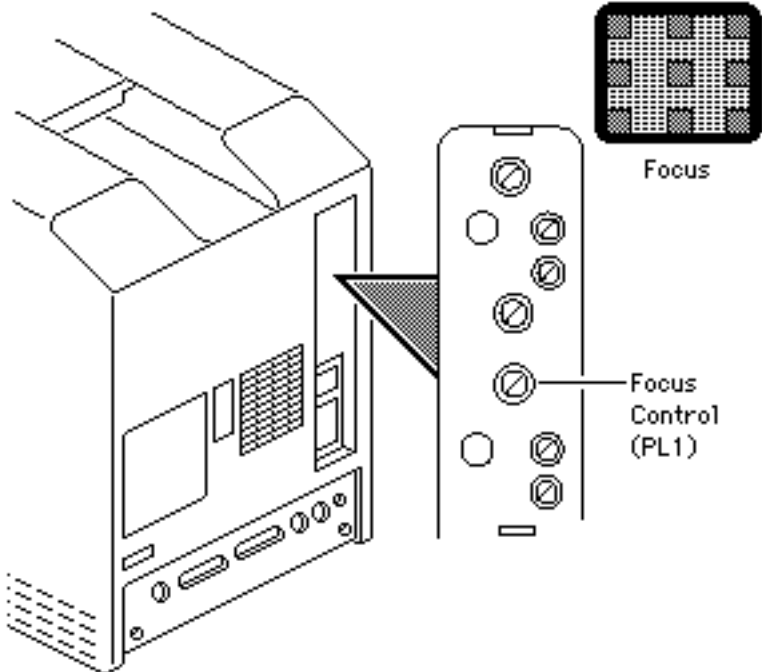




## Size Adjustments

- 1 Using the plastic hex alignment tool and a ruler, adjust the horizontal size control until the display image is 7 inches (177.8 mm) wide.
- 2 Using the plastic hex alignment tool, adjust the vertical size control until the display image is 4.7 inches (119.38 mm) high.

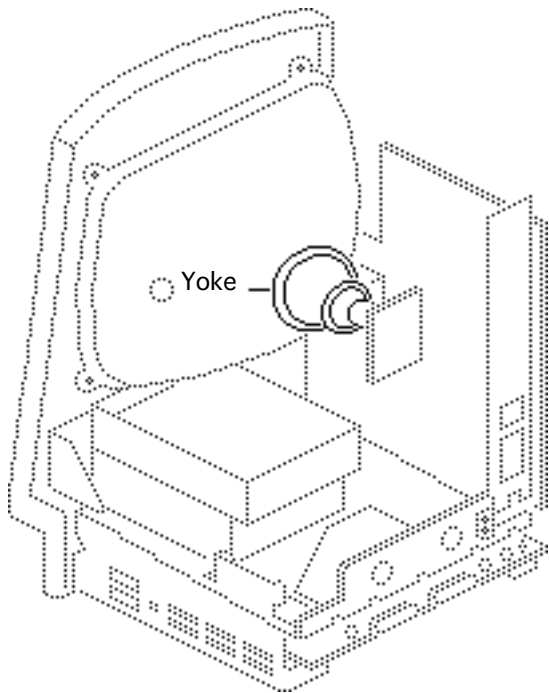




## Focus Adjustments

- 1 Display the Focus test pattern using Display Service Utility.
- 2 Using an insulated flat-blade screwdriver, adjust the focus control for the best overall focus.





## Yoke

Before you begin:

- Remove the cover
- Discharge the CRT

**⚠ Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious personal injury or equipment damage, review CRT safety and discharge instructions in Bulletins/Safety.

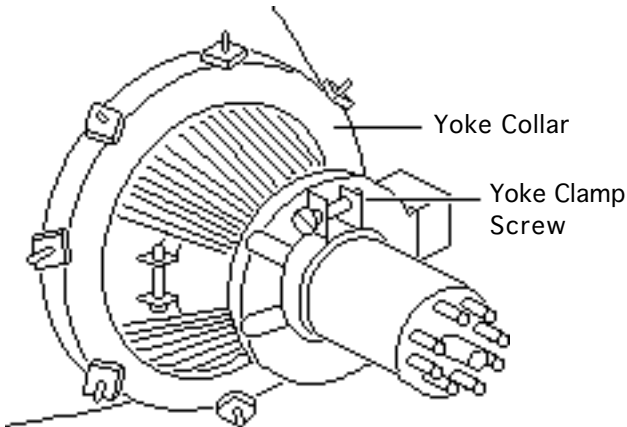




**Caution:** Because you must make adjustment from the rear of the computer, position a mirror to view the computer screen. Do not reach around the computer to adjust collars and rings.

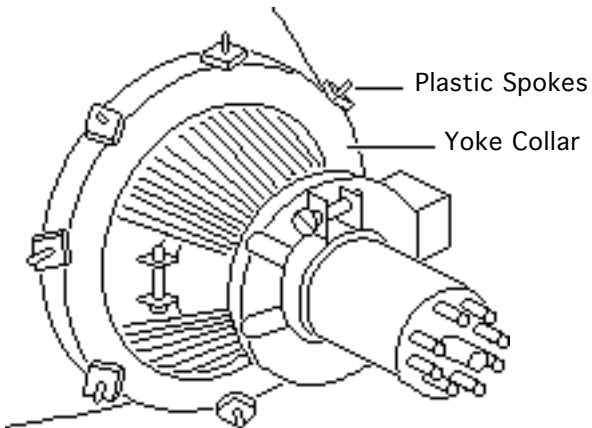
**Note:** After you replace the CRT, you may need to adjust the yoke.





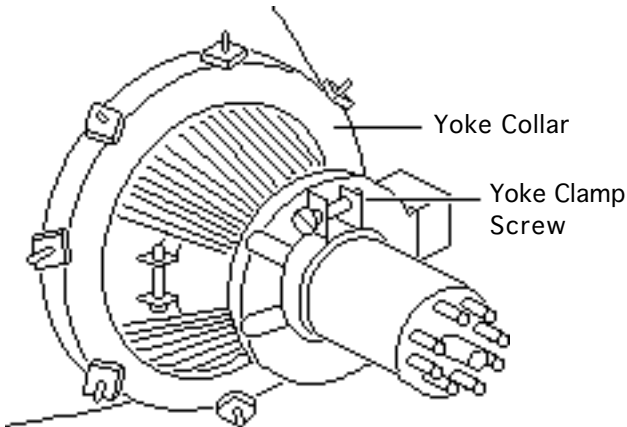
- 1 **Note:** If glue holds the yoke collar in place, use an art knife to cut through the glue.  
  
Loosen the yoke clamp screw two or three turns.
- 2 Switch on the computer.





- 3 With one hand, grasp the plastic spokes of the yoke collar and rotate the yoke collar until the top and bottom edges of the picture are parallel with the top and bottom of the bezel.





- 4 Switch off and unplug the computer.
- 5 Discharge the CRT.
- 6 **Caution:** Do not overtighten the yoke clamp screw.

Hold the plastic collar in position and carefully tighten the yoke clamp screw so that the collar cannot slip.





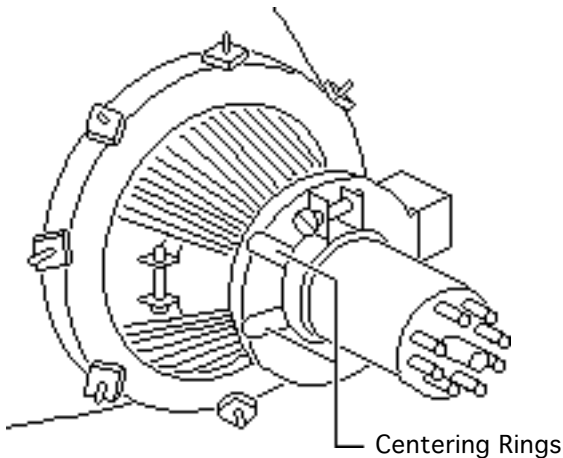
- 7 Replace the cover and switch on the computer. Make sure the top and bottom edges of the picture are parallel with the top and bottom of the bezel.







## Centering Ring Adjustment



- 1 **Note:** If glue holds the yoke collar in place, use an art knife to cut through the glue.

Switch on the computer.

- 2 To center the picture within the bezel: Hold the front centering ring steady and move the rear ring; then hold the rear centering ring steady and move the front ring.





## Exploded View

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Macintosh Classic/Classic II/  
Performa 200





# Exploded View

