



# Apple High-Res Monochrome Monitor

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## Specifications

Apple High-Resolution  
Monochrome Monitor





## Characteristics

**Picture Tube**

12-in. diagonal screen  
Phosphor EIA Type P4 (white)  
Flat, high-contrast, antiglare surface

**Screen Resolution**

640x480; 76 dpi

**Scan Rates**

Vertical refresh rate: 66.7 Hz  
Horizontal scan rate: 35.0 kHz

**Active Video  
Display Area**

8.38 in. by 6.3 in. (213 mm by 160 mm)





**Input Signal**

Video: analog; RS-343 standard





## Controls

### **User Controls**

Rear panel: power switch

Right side: brightness and contrast controls





## Physical and Electrical

### **Power Supply**

Universal power supply

Voltage: 85–270 VAC

Frequency: 50–60 Hz

Power: 40 W maximum

### **Size and Weight**

Height: 10 in. (254 mm)

Width: 12.2 in. (310 mm)

Depth: 14.4 in. (365 mm)

Weight: 17 lb. (7.7 kg)





## Operating Environment

**Temperature**

50°C–104°F (10°C–40°C)

**Humidity**

90% maximum, noncondensing

**Altitude**

10,000 ft. (3,048 m) maximum





## Troubleshooting

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Apple High-Resolution  
Monochrome Monitor







## 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

### No Raster

No raster, LED off

- 1 Ensure monitor's video cable is connected to the computer or the video card in the computer.
- 2 Verify that power cord is connected.
- 3 Check internal power connectors.
- 4 Replace fuse.
- 5 Replace power supply.
- 6 Replace power switch.

No raster, LED on

- 1 Ensure monitor's video cable is connected to the computer or the video card in the computer.
- 2 Adjust brightness and contrast knobs.
- 3 Replace video card (if present) in computer.
- 4 Adjust sub-brightness (cutoff) control.
- 5 Check logic board connection to power supply.
- 6 Replace fuse.
- 7 Replace main board.
- 8 Replace power supply.
- 9 Replace power switch assembly.
- 10 Replace video board C.
- 11 Replace contrast control board.





## Geometry

Raster stretched or compressed on side or top of screen

- 1 Verify that distortion is not due to environmental conditions.
- 2 Perform appropriate geometric adjustments.
- 3 Replace main board.
- 4 Replace CRT.





## Synchronization

Picture breaks into diagonal lines

- 1 Connect another monitor to computer and verify presence of video signal.
- 2 Replace main board.

Picture rolls vertically

- 1 Verify that video card in computer is working properly.
- 2 Adjust vertical hold.
- 3 Check connector on I/O connector board.
- 4 Replace main board.

One horizontal or vertical line appears on screen

- 1 Check yoke connectors.
- 2 Replace main board.
- 3 Replace CRT.





## Video

Picture too dark or too bright

- 1 Adjust brightness knob.
- 2 Verify that video card in computer is working properly.
- 3 Adjust sub-brightness (cutoff) control.
- 4 Replace main board.
- 5 Replace video board C.
- 6 Replace CRT.

Brightness unadjustable

- 1 Replace contrast control board.
- 2 Replace main board.
- 3 Replace video board C.
- 4 Replace CRT.

Out of focus

- 1 Perform focus adjustments.
- 2 Replace main board.
- 3 Replace video board C.
- 4 Replace CRT.





## Miscellaneous

Picture jitters

- 1 Check grounding cable connections to chassis.
- 2 Confirm that adjacent computer equipment is properly grounded. Move electrical devices away from monitor. Temporarily shut off fluorescent lights in area.
- 3 Replace main board.

Flashing lines on screen

- 1 Confirm contact of video connector to neck of CRT.
- 2 Replace contrast control board.
- 3 Replace main board.

Black spots on screen  
(burnt phosphors)

Replace CRT.





## Take Apart

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Apple High-Resolution  
Monochrome Monitor

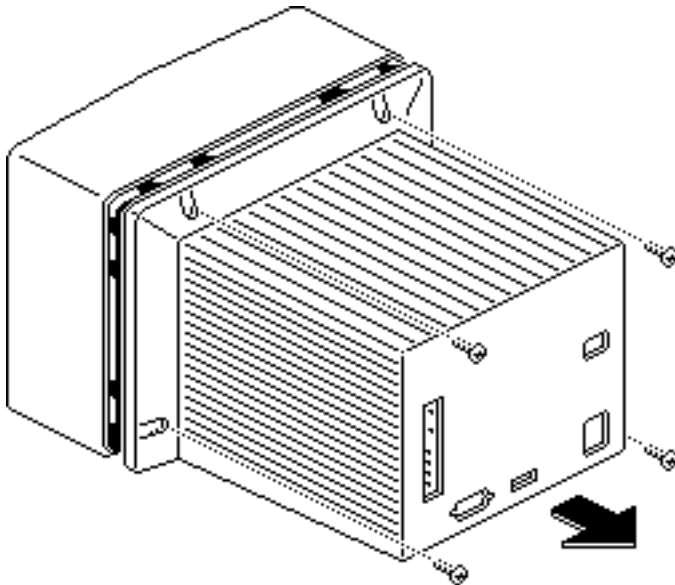




## Rear Cover

No preliminary steps are required before you begin this procedure.

Remove the four case screws and lift off the rear cover.







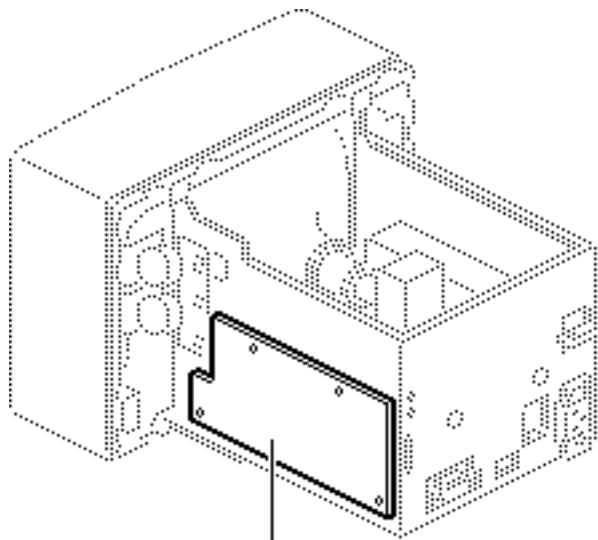
## Main Board

Before you begin:

- Remove the rear cover
- Discharge the CRT

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

**⚠ Warning:** Never use a grounding wriststrap until after discharging the CRT.

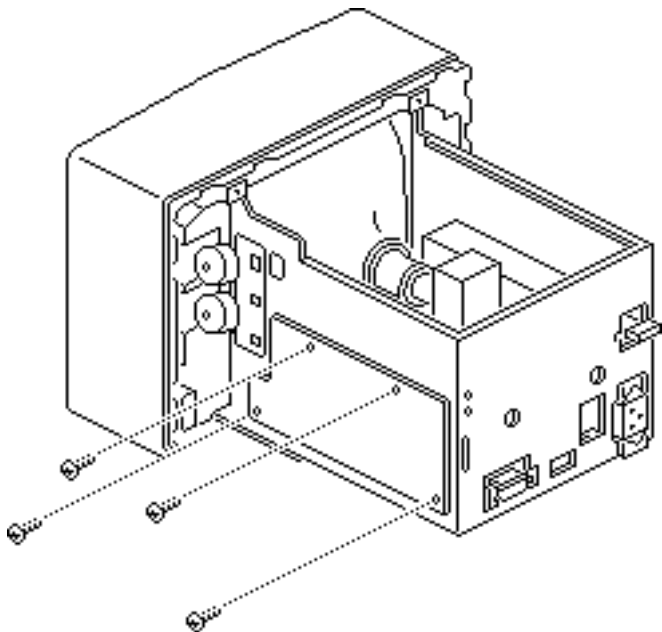


Main Board



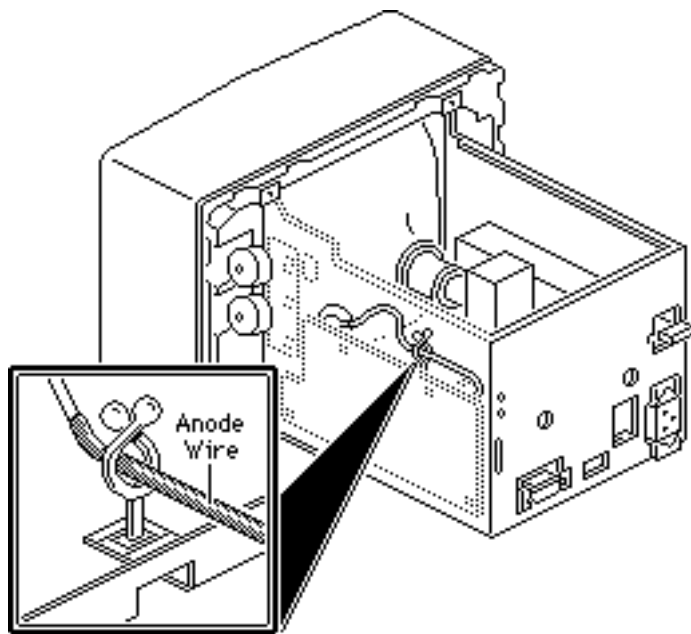


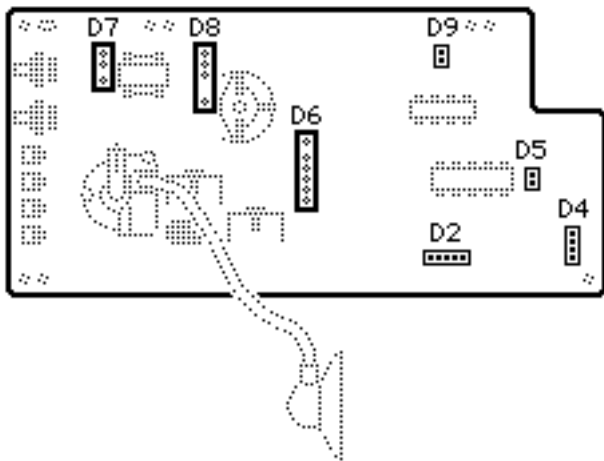
- 1 Remove the four screws that fasten the main board to the chassis.





- 2 Remove the anode wire from the cable clamp.





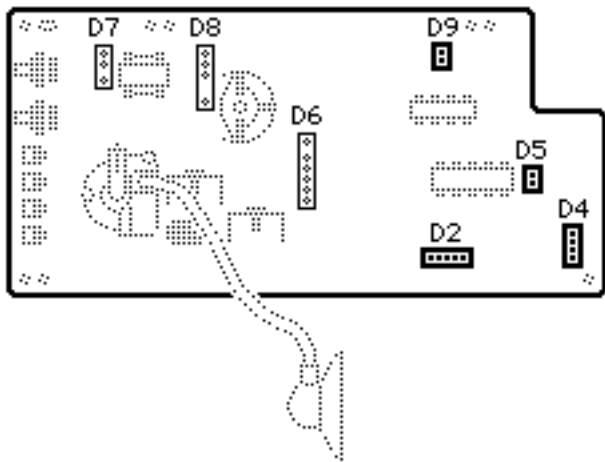
**Note:** Connectors D2, D4, D5, and D9 fit tightly and are difficult to reach, so pull the main board away from the chassis before you try to remove these connectors.

- 3 Remove the following cable connectors from the main board:
  - D7 (large 3-pin connector)
  - D8 (large 4-pin connector)
  - D6 (large 6-pin connector)



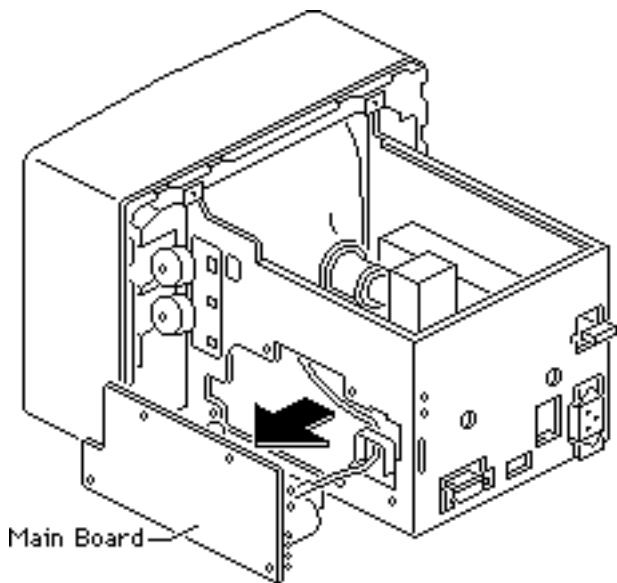


- D9 (2-pin connector)
- D2 (5-pin connector)
- D5 (2-pin connector)
- D4 (4-pin connector)





- 4 Lift the main board from the chassis.





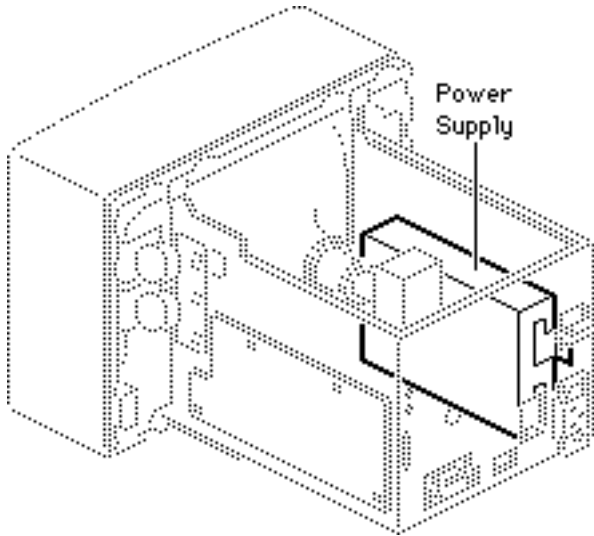
## Power Supply

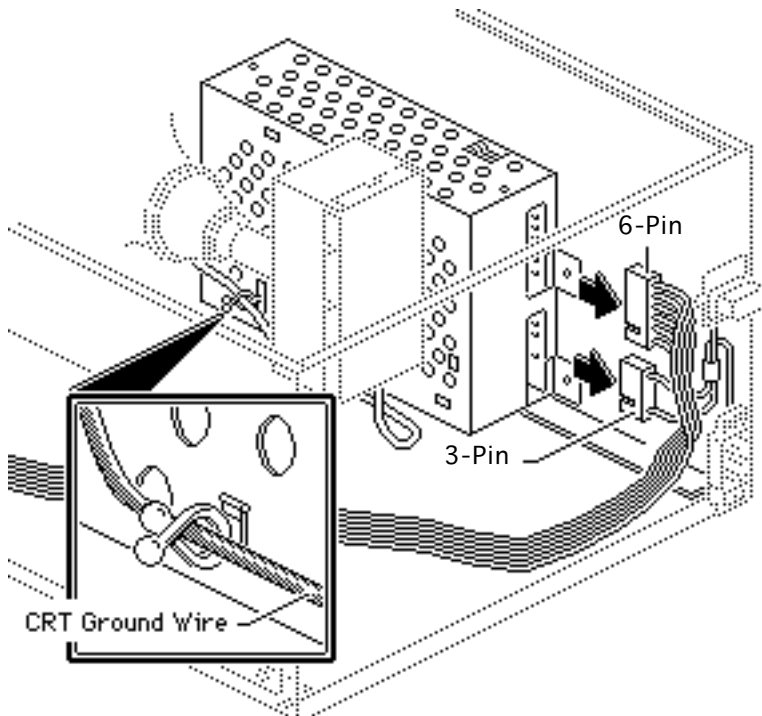
Before you begin:

- Remove the rear cover
- Discharge the CRT

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**⚠ Warning:** Never use a grounding wriststrap until after discharging the CRT.



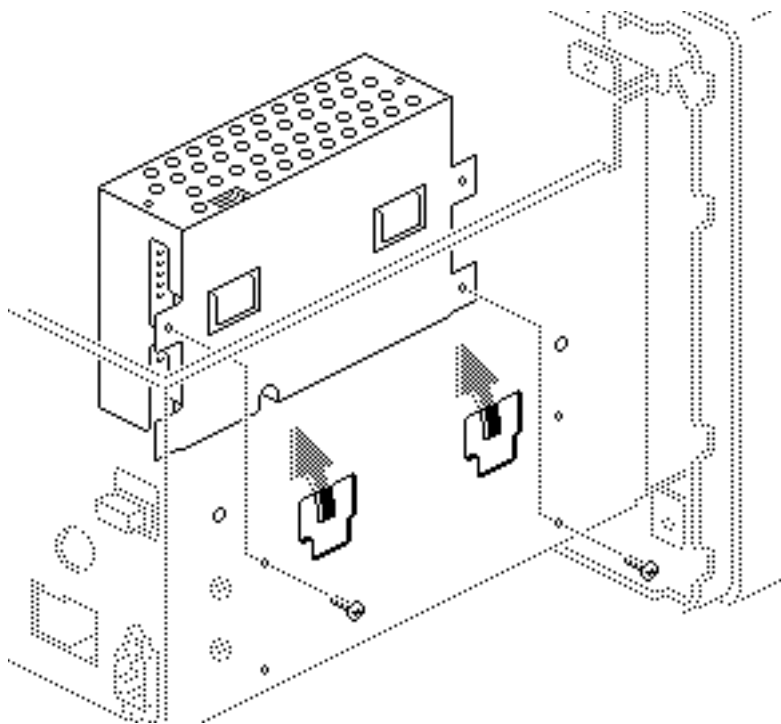


**Note:** To disconnect the 3-pin connector from the power supply, you may need to remove tie-wraps from the power supply cable. Then lift the chassis and reach beneath the power supply.

- 1 Disconnect the 6-pin connector and the 3-pin connector from the rear of the power supply.
- 2 Release the CRT ground wire from the plastic cable clamp on the side of the power supply.







- 3 Remove the two power supply mounting screws.
- 4 Lift the power supply until its tabs clear the holes in the chassis and remove the power supply.





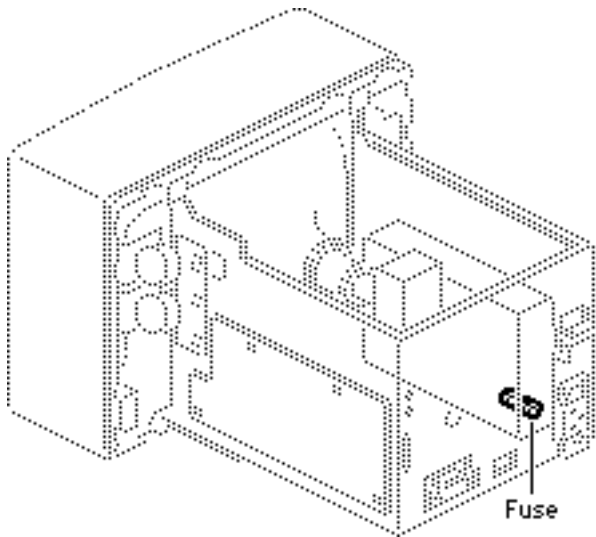
## Fuse

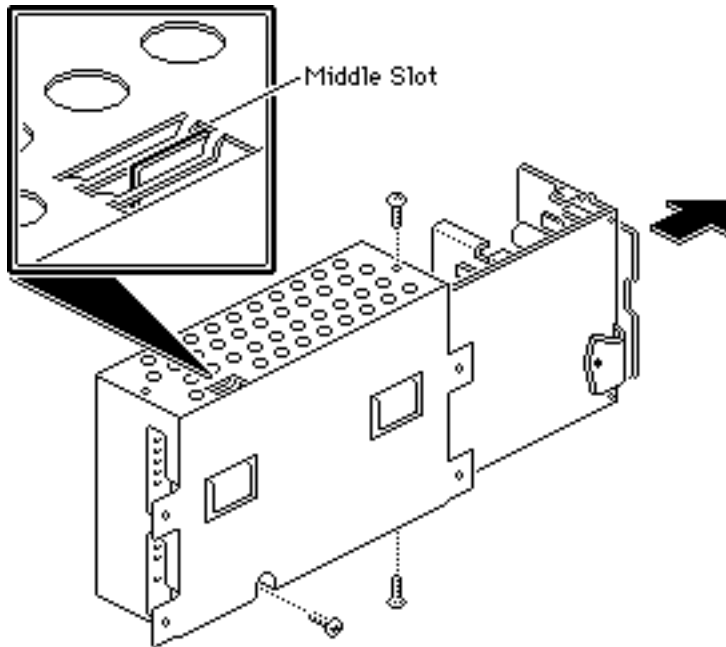
Before you begin:

- Remove the rear cover
- Discharge the CRT
- Remove the power supply

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

**⚠ Warning:** Never use a grounding wriststrap until after discharging the CRT.

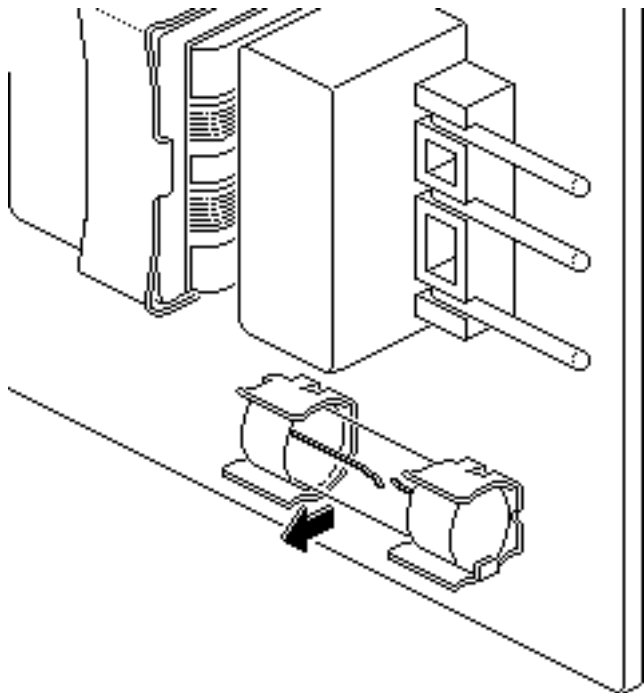




- 1 Remove the two screws from the sides of the power supply housing and the screw in the indentation on the bottom.
- 2 Slide the power supply board from the power supply housing.

**Replacement Note:** When replacing the power supply board, make sure it slides into the middle slot on the side of the housing. The board should not touch the bottom of the housing.





- 3 If the wire inside the fuse is broken, replace the fuse (250 V, 2 A).





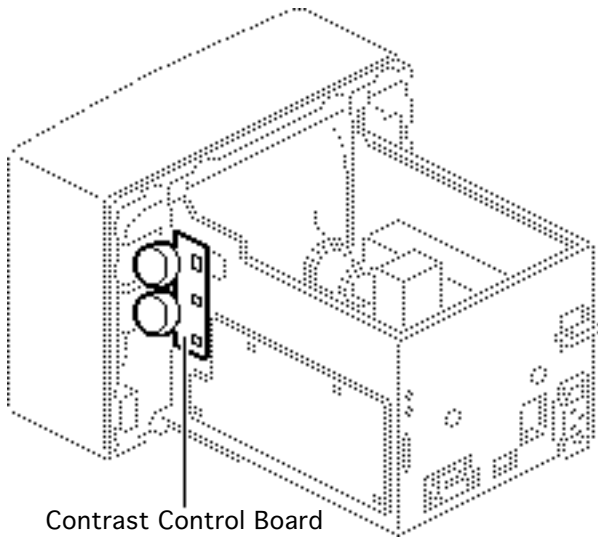
## Contrast Control Board

Before you begin:

- Remove the rear cover
- Discharge the CRT

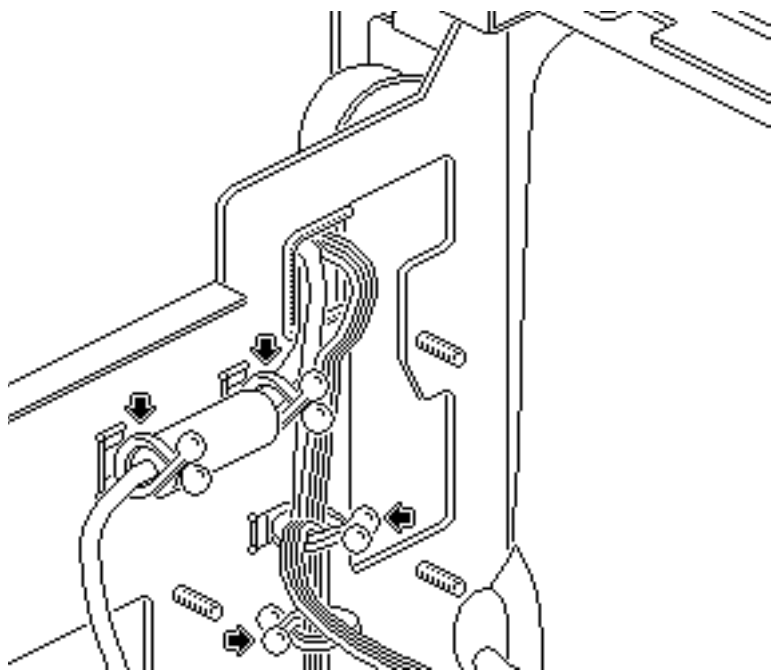
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**⚠ Warning:** Never use a grounding wriststrap until after discharging the CRT.



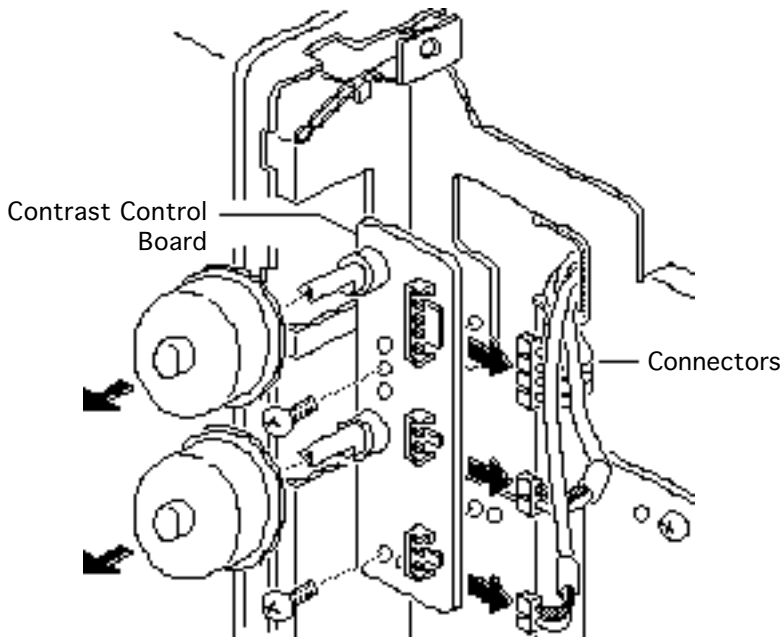
Contrast Control Board





- 1 Remove the wires from the four cable clamps.





- 2 Disconnect the upper, middle, and lower connectors from the contrast control board, and pull off the two knobs.
- 3 Remove the two mounting screws and lift out the contrast control board.





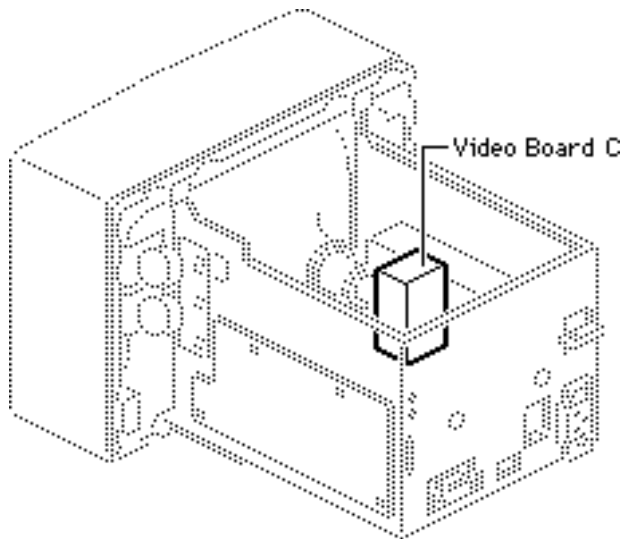
## Video Board C

Before you begin:

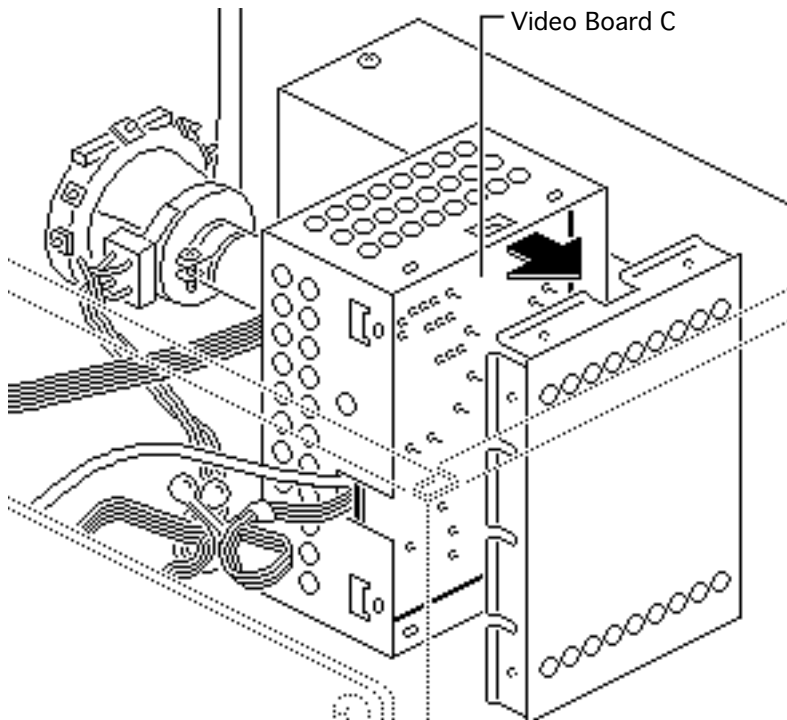
- Remove the rear cover
- Discharge the CRT

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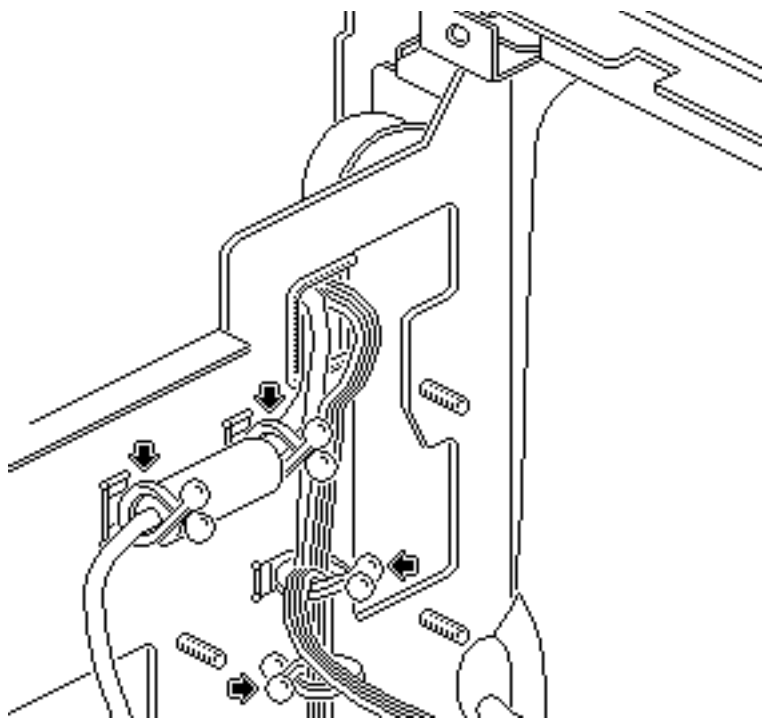




**Replacement Note:** Video board C is in a metal box. When replacing a defective board, retain the back cover of the metal box and send the rest of the module, including cables, back to Apple.

- 1 Pull off the back of the metal box that holds video board C.



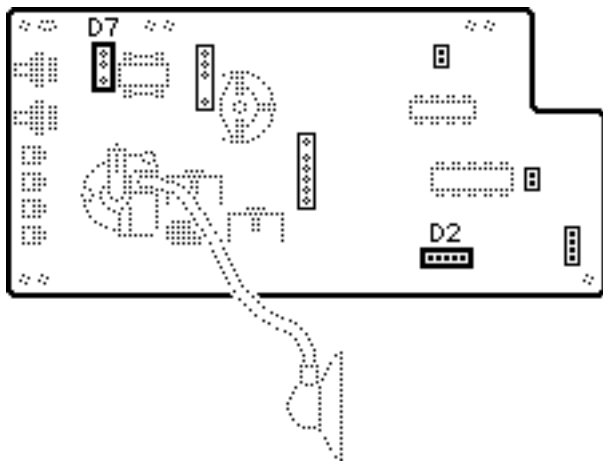


- 2 Remove the cables from the four plastic clamps.



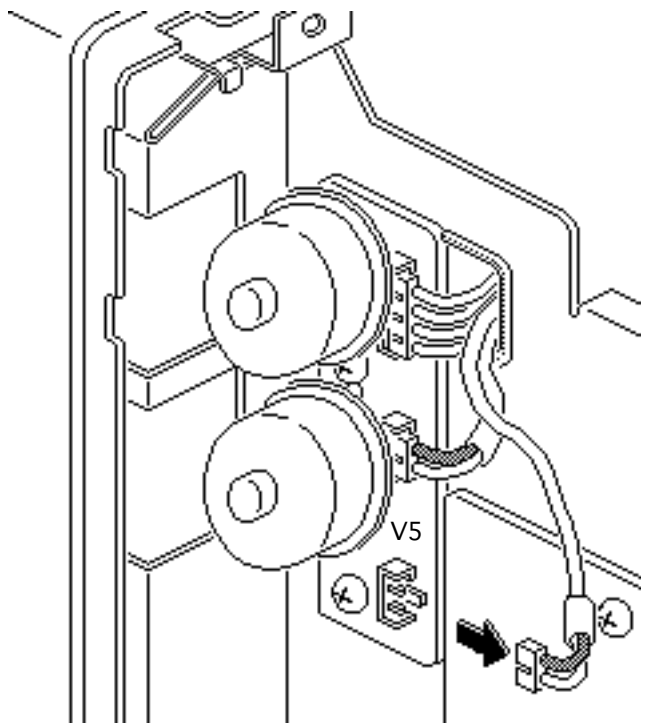


- 3 Disconnect connectors D2 and D7 from the logic board.



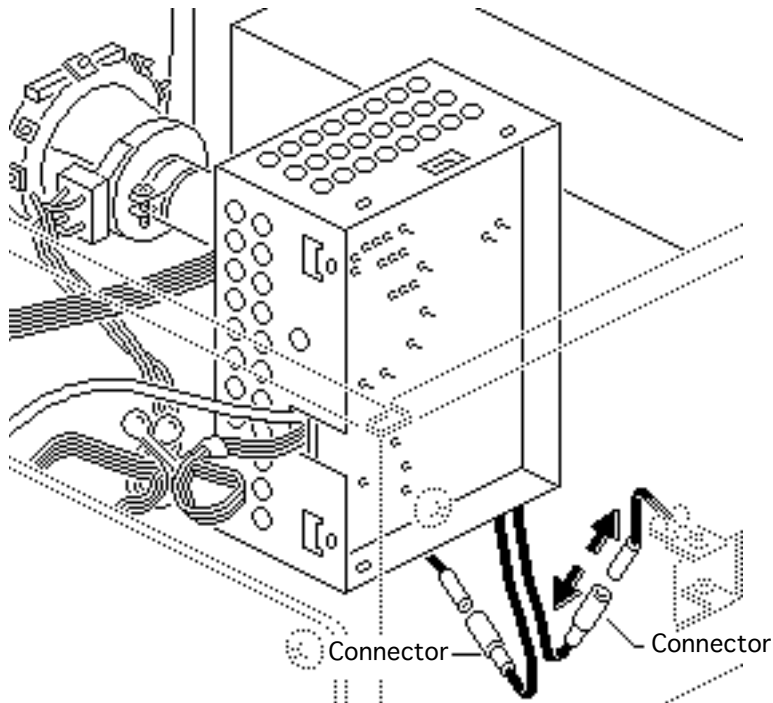


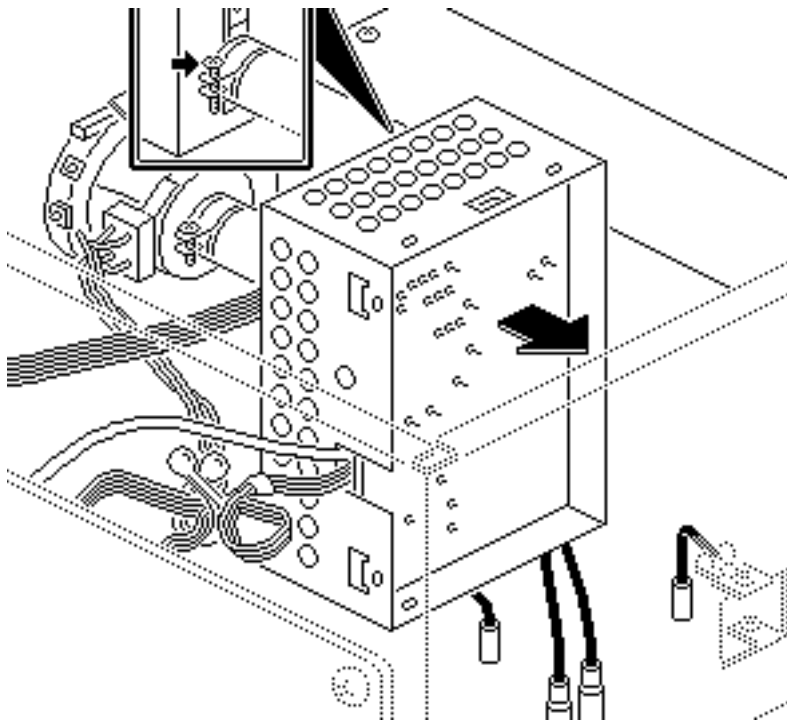
- 4 Disconnect the cable at location V-5 from the contrast control board.





- 5 Disconnect the two black cables from the bottom of video board C at their midpoint connectors.





**Caution:** Twisting, bending, or applying force to video board C could damage the neck of the CRT. Be sure to pull video board C straight off the neck of the CRT.

- 6 Firmly grasp video board C to support the neck of the CRT and loosen the screw on the metal clamp that holds video board C to the CRT.

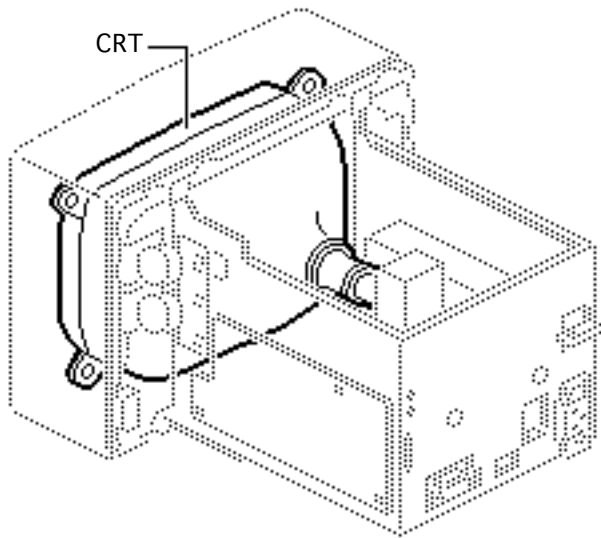




**Caution:** If the tape under the metal clamp is sticky and difficult to loosen, use an art knife to very carefully cut away the tape. Do not put pressure on the neck of the CRT.

- 7 Carefully pull video board C straight off the neck of the CRT.





## CRT

Before you begin:

- Remove the rear cover
- Discharge the CRT
- Remove video board C

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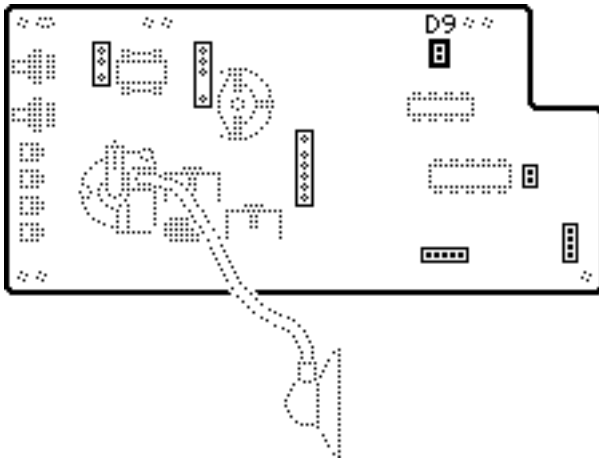
**⚠ Warning:** Never use a grounding wriststrap until after discharging the CRT.





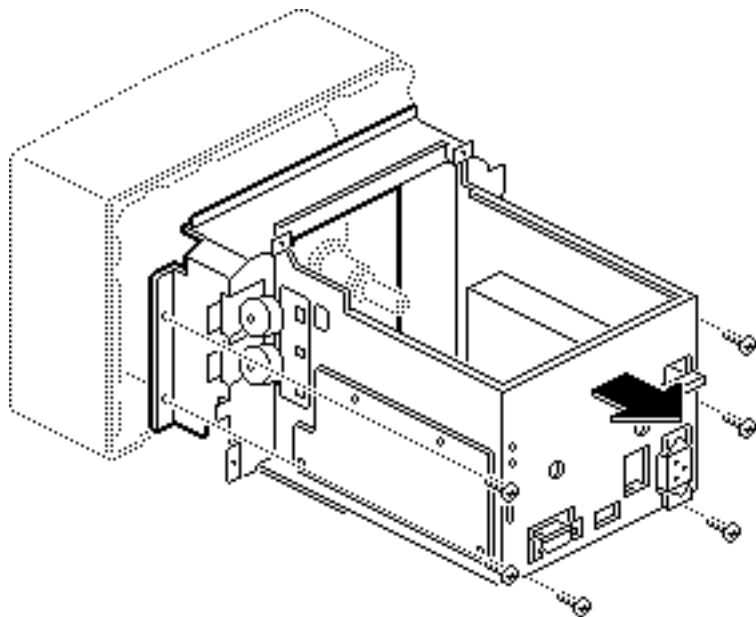


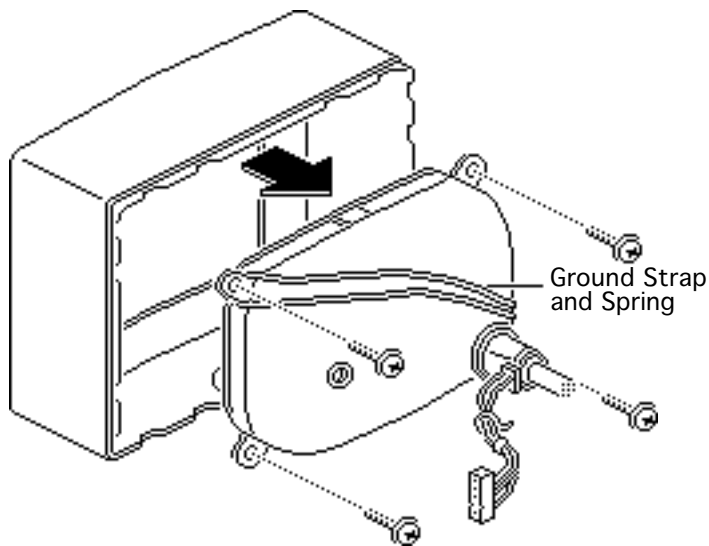
- 1 Disconnect the two-pin connector from location D9 on the main board.





- 2 Remove the six chassis mounting screws and pull the chassis off the bezel.



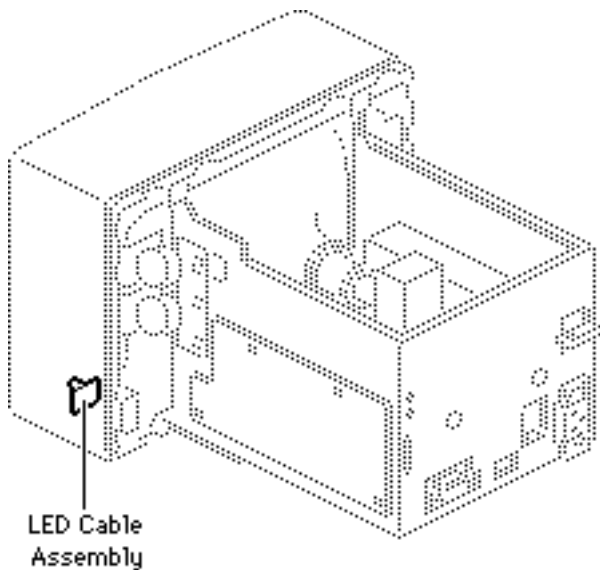


- 3 Remove the four CRT mounting screws and lift the CRT out of the bezel.

**Replacement Note:** If you are replacing a defective CRT, remove the ground strap and the spring. Reinstall them on the replacement CRT.

**⚠ Warning:** If you need to dispose of the CRT, refer to the CRT disposal instructions in Bulletins/ Safety.





## LED Cable Assembly

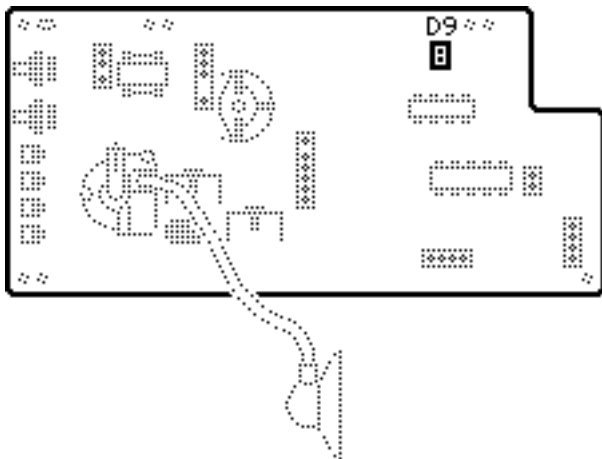
Before you begin:

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- Discharge the CRT

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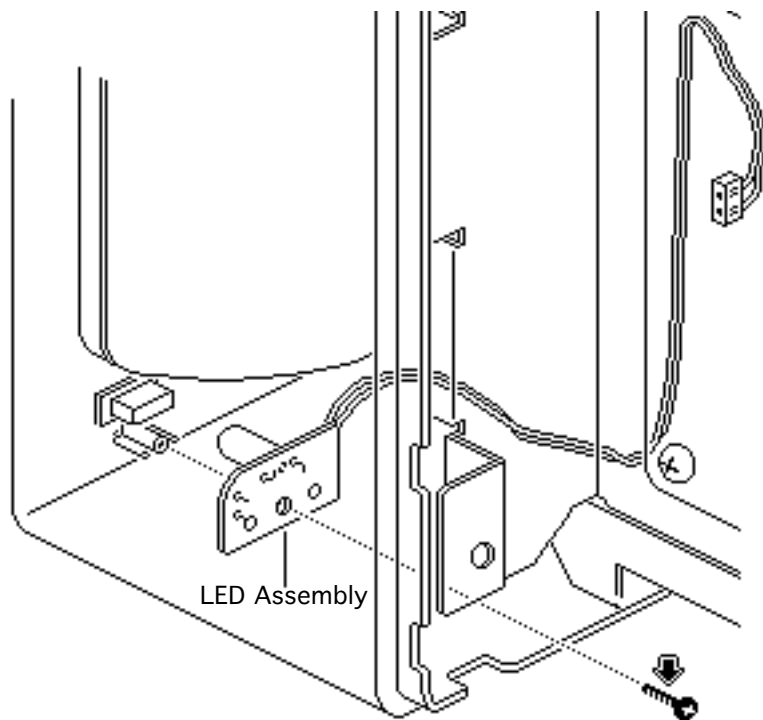
**⚠ Warning:** Never use a grounding wriststrap until after discharging the CRT.





- 1 Disconnect the two-pin connector from location D9 on the main board.
- 2 Remove the cable from the cable clamps.





- 3 Remove the LED mounting screw and lift the LED assembly free.





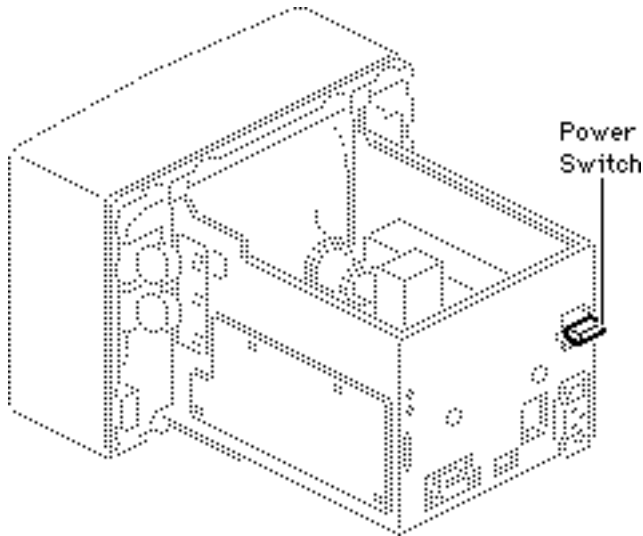
## Power Switch

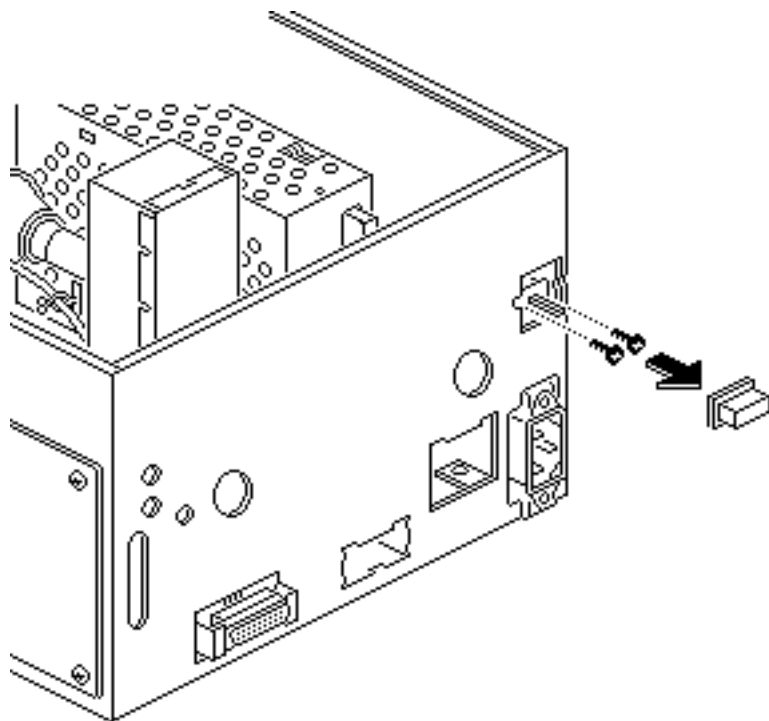
Before you begin:

- Remove the rear cover
- Discharge the CRT

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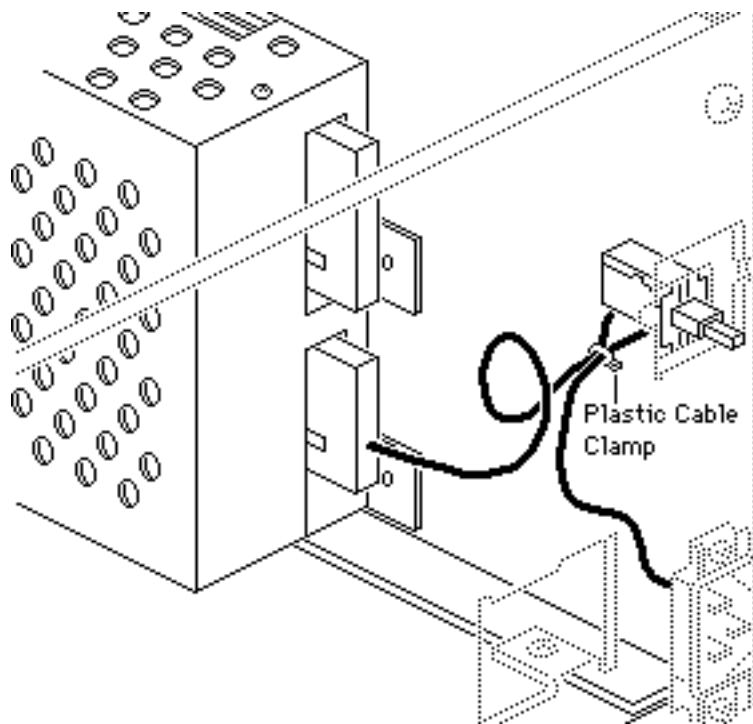




- 1 Pull the plastic knob from the power switch stem.
- 2 Remove the two screws from the metal bracket.







- 3 Remove the two wires from the plastic cable clamp and desolder the wires from the switch.





## Adjustments

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Monochrome Monitor

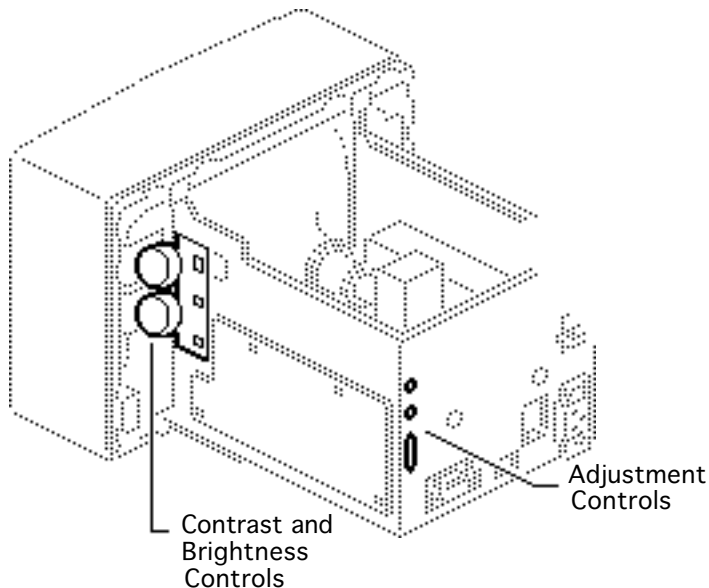




## Geometry

No preliminary steps are required before you begin this procedure.

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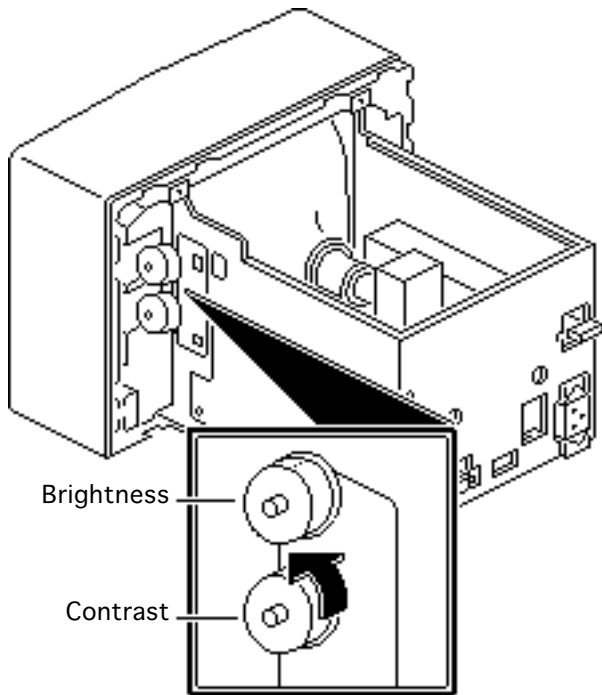




**⚠ Warning:** Because you must make adjustments from the rear of the computer, position a mirror to view the computer screen. Do not reach around the computer to make adjustments.

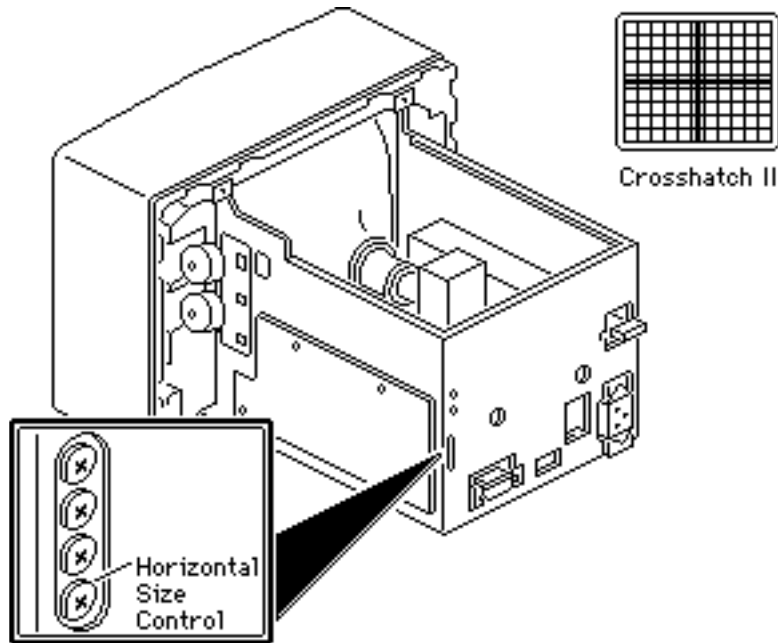
**Note:** Do not attempt yoke adjustments on this monitor. The geometry adjustment controls are behind the service access panel. Geometry adjustments may be necessary whenever you replace the main deflection board, CRT, or video board.





Set the contrast knob to maximum and the brightness knob to the center (detent) position.



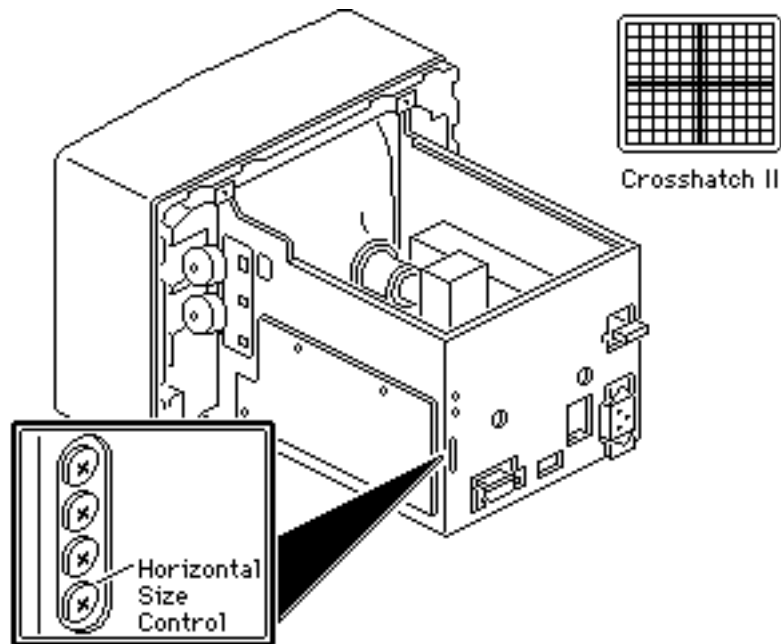


## Horizontal Size

**Note:** Always adjust the horizontal size before you adjust the vertical size. The horizontal adjustment can affect the height of the raster.

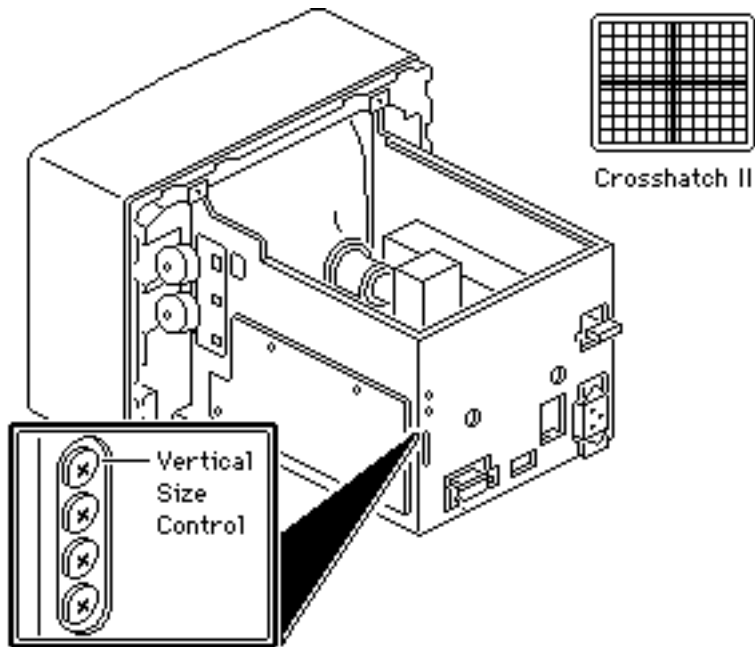
- 1 Use Display Service Utility to display the Crosshatch II (white background) test pattern.





- Using a plastic screwdriver, adjust the horizontal size control until the raster is 8.4 inches (213.5 mm) wide.





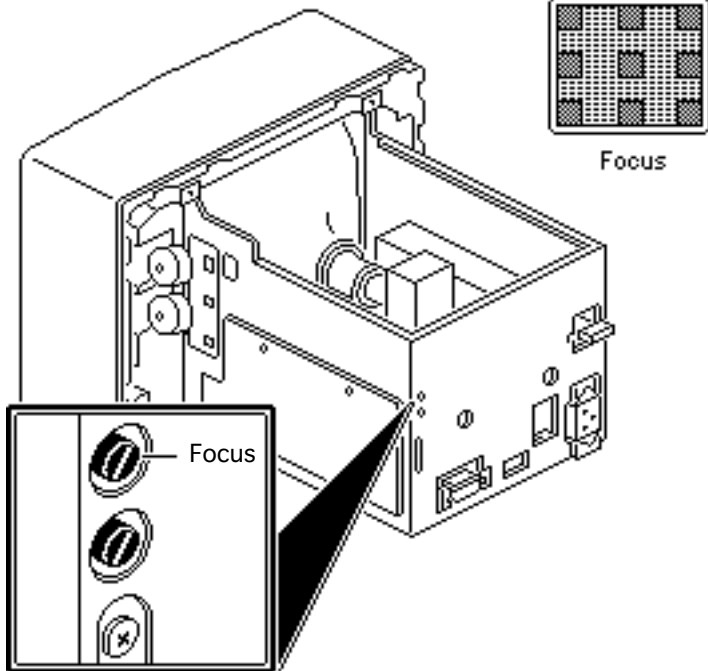
## Vertical Size

**Note:** Always adjust the horizontal size before you adjust the vertical size. The horizontal adjustment can affect the height of the raster.

Using the Crosshatch II test pattern and a plastic screwdriver, adjust the vertical size control until the raster is 6.3 inches (160 mm) high.







## Focus

- 1 Use Display Service Utility to display the Focus test pattern.
- 2 Using a plastic screwdriver, adjust the focus control for the best clarity at the center of the screen.



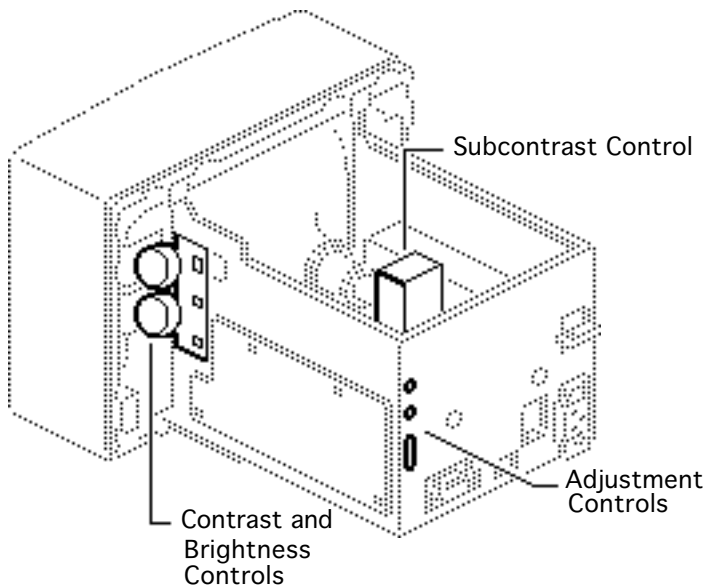


## Video

Before you begin:

- Remove the rear cover
- Connect the video cable
- Connect the power cord

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**⚠ Warning:** Because you must make adjustments from the rear of the computer, position a mirror to view the computer screen. Do not reach around the computer to make adjustments.

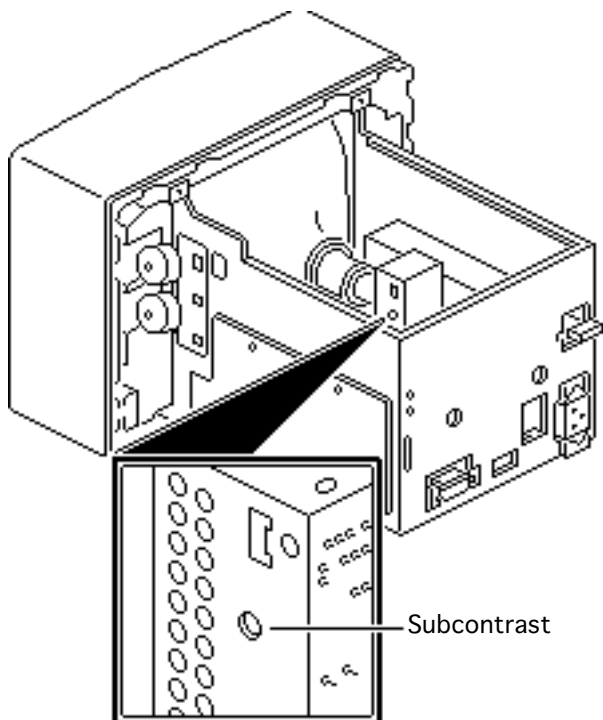
**Note:** After you replace the contrast control board, main deflection board, or video board, you may need to perform video adjustments.

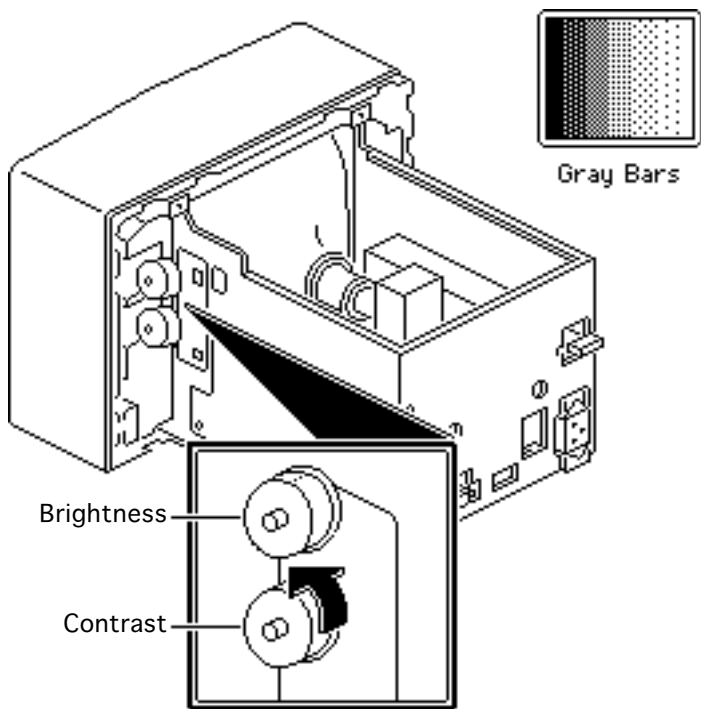




## Subcontrast

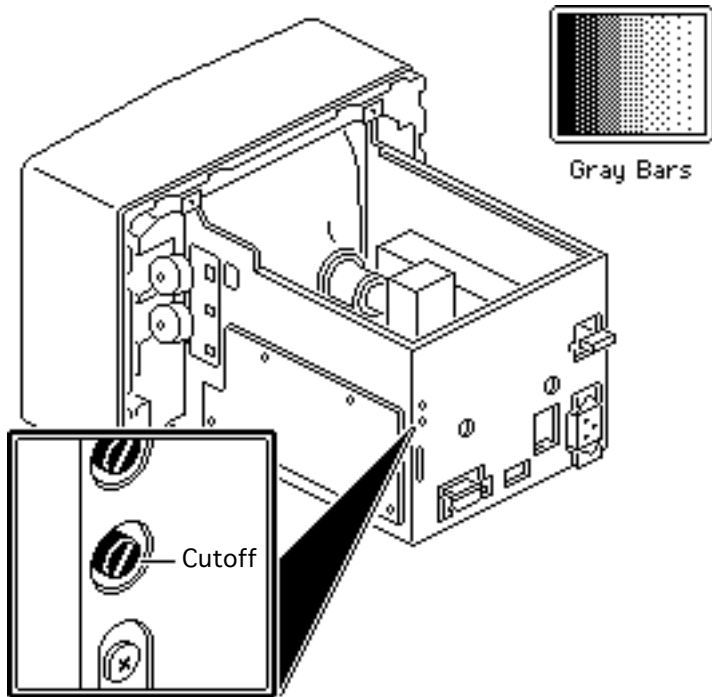
- 1 Using a plastic screwdriver two inches in length, adjust the subcontrast control until the control is midway between the high and low stops.





- 2 Make sure the Control Panel is set to 16 Grays.
- 3 Use Display Service Utility to display the Gray Bars test pattern.
- 4 Set the contrast knob to maximum and the brightness knob to the center (detent) position.

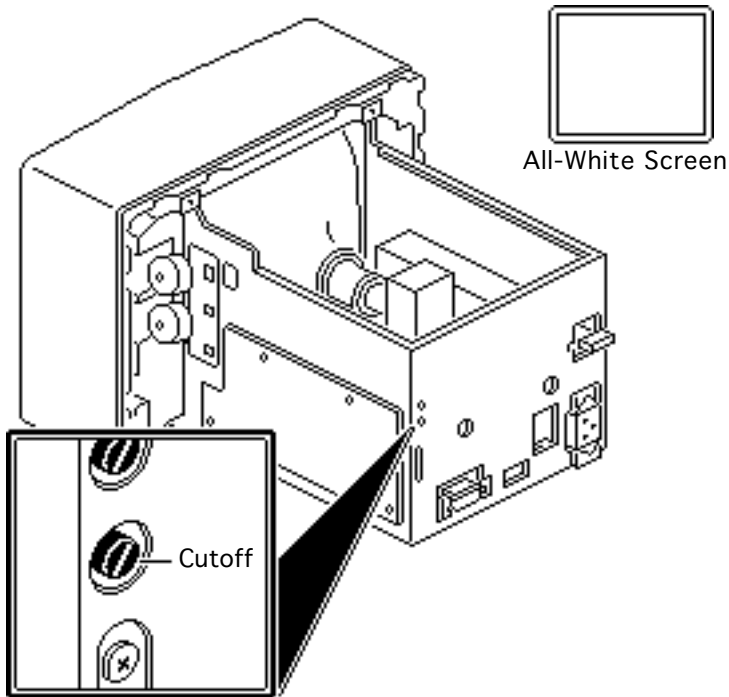




- 5 If you adjust the cutoff control (RV506) up (clockwise) too far, the monitor may shut down. If this happens, turn off the monitor and turn down the cutoff control fully counterclockwise. Wait 30 seconds, turn on the monitor, and resume the adjustment.

Using the plastic screwdriver, adjust the cutoff control until the leftmost bar is black and the second bar is just visible.



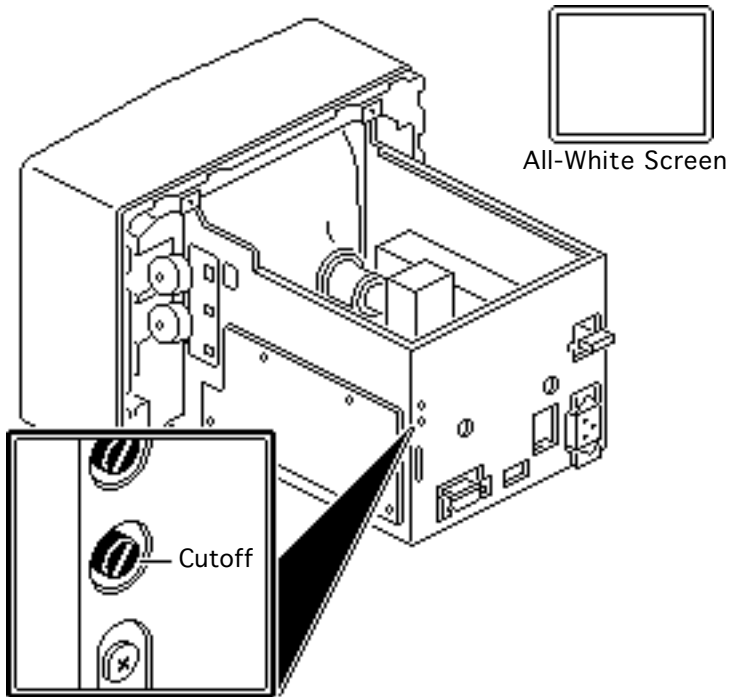


## Cutoff

**Important:** Readings from light meter models R77, L-248, and 246 differ. Please note which meter you are using before making adjustments. (See “Light Meter Setup.”)

- 1 Using Display Service Utility, display the All-White Screen test pattern.





- 2 Using the light meter and a plastic screwdriver, adjust the cutoff control until you get 33 foot lamberts ( $\pm 3$  foot lamberts), which on the light meter is
- Model R77: 25 on the bottom scale
  - Model L-248: middle of the 10 scale
  - Model 246: 25 on the red scale

**Important:** Over time, light meter tolerances can vary. If you doubt your meter's accuracy, verify the







readings with a known-good  
light meter or photometer.





## Light Meter Setup

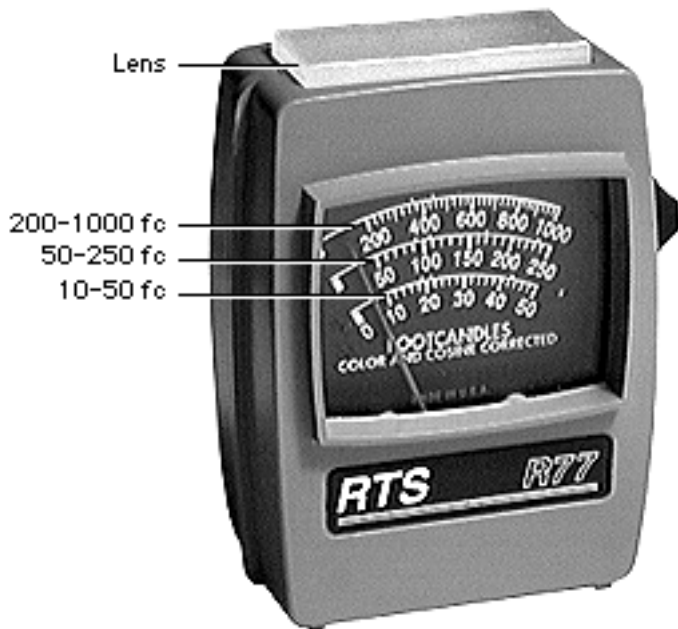
This topic covers setup for three light meter models: R77, L-248, and 246. Model R77 (Apple part number 076-0310) is the newest model available.

### 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





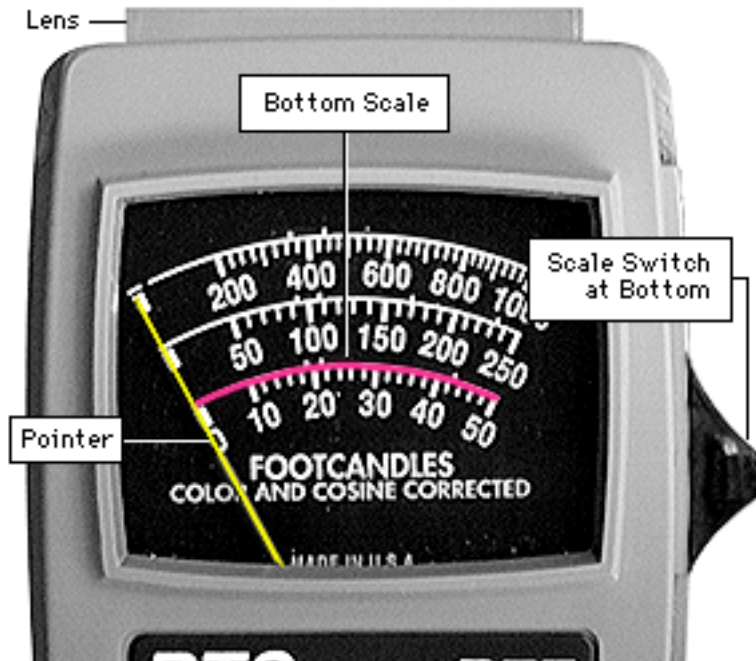
from the lens.

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

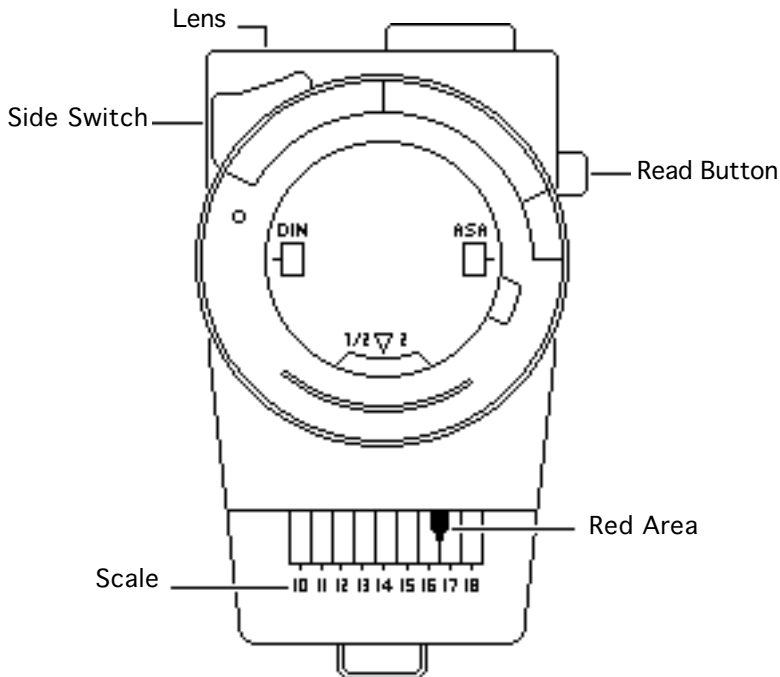




readings, verify the readings with a known-good light meter or photometer. Also check the age of the R77 light meter by its four-digit manufacturing date stamp (such as 0398 for March 1998).

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

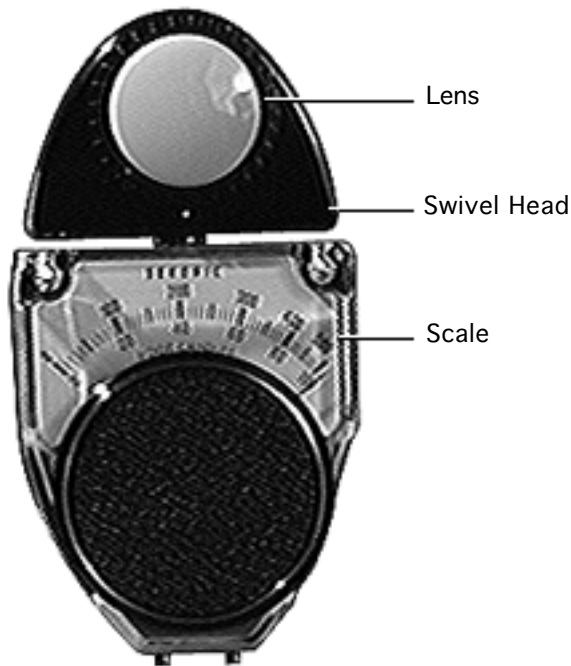




## Model L-248

- 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 upper position so that the scale reads 10 through 18.
- 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.





Exploded View

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Apple High-Resolution  
Monochrome Monitor





