



Macintosh 12 Monochrome Display



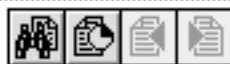
Basic Navigation Within Service Source

Plug-Ins:



Find

Searches the current document only



Search

Searches across all Acrobat documents



Service Source Main Menu



Service Source Help

- Product Name
- Basics
- Specifications
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- Parts
- Exploded View

When viewing Service Source Acrobat procedures with bookmarks active (the default setting), you can click a chapter title to go directly to that chapter. You can also click the triangle to reveal and directly access topics within the chapters.

When printing pages from Acrobat, use these numbers to specify the page range you wish to print. The page numbers at the top of procedure pages are relative to each chapter, not to the whole document.

Go to Next page
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Indicates the end of a topic

Indicates a topic that is two or more pages





Specifications

Macintosh 12" Monochrome
Display





Characteristics

Picture Tube

12-in. diagonal screen
Combination phosphor EIA Type P104 and P193 (white),
provides “page-white” phosphor screen
High-contrast, antiglare surface; dark glass

Screen Resolution

640x480; 76 dpi
Displays up to 256 grays simultaneously

Scan Rates

Vertical refresh rate: 66.75 Hz
Horizontal scan rate: 35.0 kHz
Rise and fall time: 16 ns maximum



**Active Video
Display Area**

8.35 in. by 6.26 in. (212 mm by 159 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: 90-132 and 190-270 VAC

Frequency: 47-63 Hz

Power: 30 W maximum

Size and Weight

Height: 12.2 in. (310 mm)

Width: 14.4 in. (365 mm)

Depth: 10.2 in. (259 mm)

Weight: 16 lb. (7.3 kg)





Operating Environment

Temperature

50°F–104°F (10°C–40°C)

Humidity

95% maximum, noncondensing

Altitude

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





Troubleshooting

Macintosh 12" Monochrome Display





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 connections.
- 4 Replace blown fuse.
- 5 Replace main board.

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 Adjust sub-brightness control.
- 4 Replace main board.
- 5 Replace contrast/brightness assembly.
- 6 Replace CRT.





Geometry

- | | |
|---|--|
| Cannot center raster | <ol style="list-style-type: none"><li data-bbox="446 211 1498 295">1 Verify that distortion is not due to environmental conditions.
Move monitor to different location.<li data-bbox="446 305 839 347">2 Replace main board. |
| Raster stretched or compressed on side or top of screen | <ol style="list-style-type: none"><li data-bbox="446 404 1498 486">1 Verify that distortion is not due to environmental conditions.
Move monitor to different location.<li data-bbox="446 497 839 538">2 Replace main board.<li data-bbox="446 549 716 582">3 Replace CRT. |



Synchronization

Picture breaks into diagonal lines

- 1 Connect another monitor and verify that video signal is coming from computer.
- 2 Replace main board.

Picture rolls vertically

- 1 Verify that video card in computer is working properly.
- 2 Replace main board.

One horizontal or vertical line appears on screen

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



Video

Flashing lines appear on screen

- 1 Verify connection of video board to neck of CRT.
- 2 Replace contrast/brightness assembly.
- 3 Replace main board.

Picture is too dark or too bright

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

Cannot adjust brightness

- 1 Replace contrast/brightness assembly.
- 2 Replace main board.
- 3 Replace CRT.





Video (Continued)

Out of focus

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





Miscellaneous

Picture jitters

- 1 Verify that grounding cables are attached to chassis.
- 2 Verify that adjacent computer equipment is properly grounded. Move electrical devices away from monitor. Temporarily shut off all fluorescent lights in area.
- 3 Replace main board.

Black spots on screen
(burnt phosphors)

Replace CRT.





Take Apart

Macintosh 12" Monochrome
Display

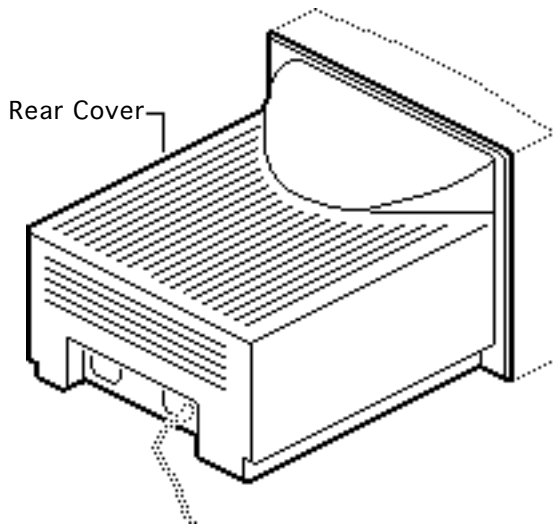


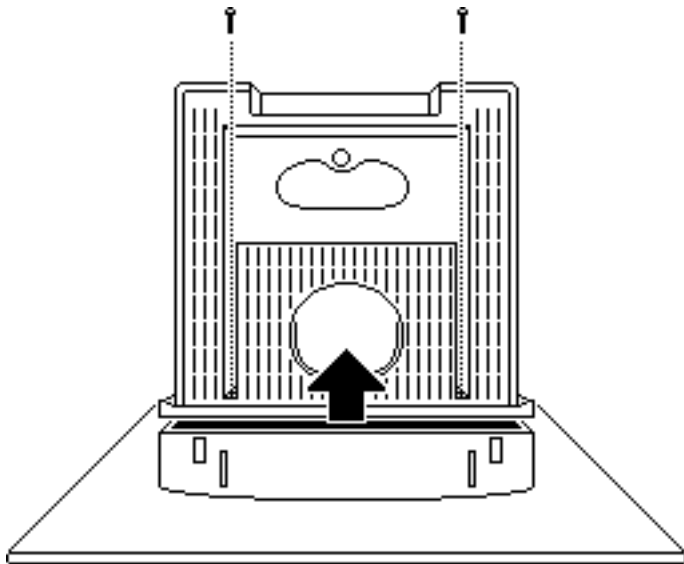


Rear Cover

No preliminary steps are required before you begin this procedure.

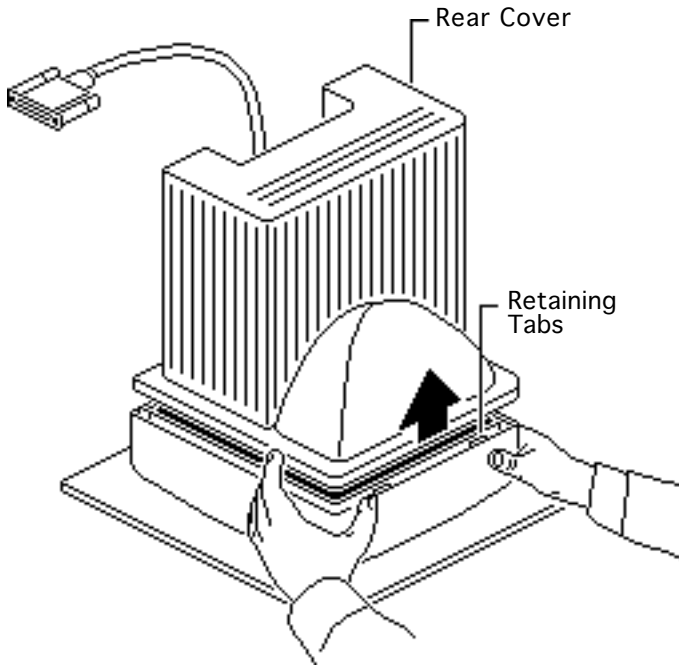
⚠ Warning: This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.





- 1 Using a Torx screwdriver, remove the two case screws.
- 2 Separate the bottom of the rear cover from the bezel.





- 3 Press on the rear edge of the bezel and at the same time press up on the rear cover. This will release the two retaining tabs on the top front of the rear cover.
- 4 Lift the rear cover off the front bezel and feed the attached video cable through its opening in the cover.



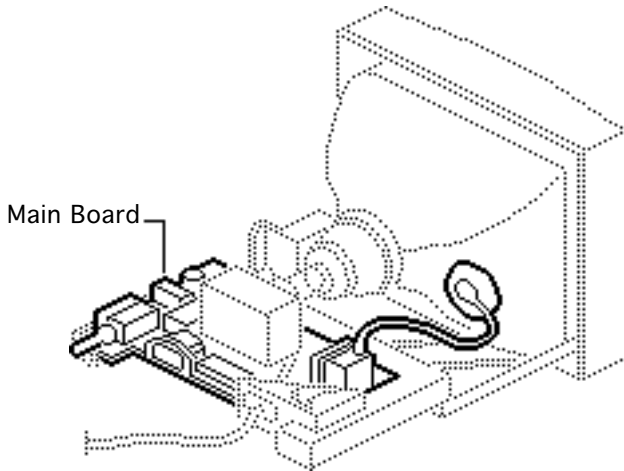
Main Board

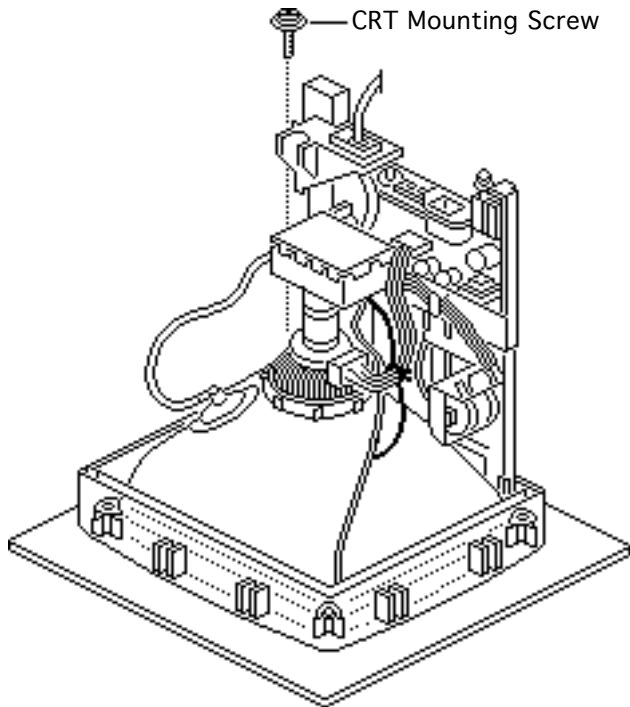
Before you begin,

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

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

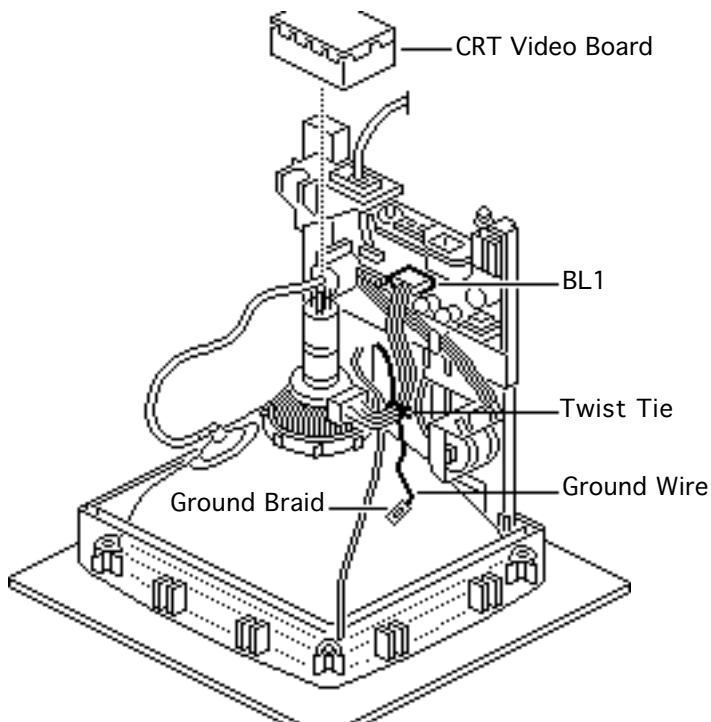
⚠ Warning: Never use a grounding wriststrap until after discharging the CRT.





- 1 Using a Phillips screwdriver, remove the CRT mounting screw shown. Loosen but do not remove the other three CRT mounting screws.



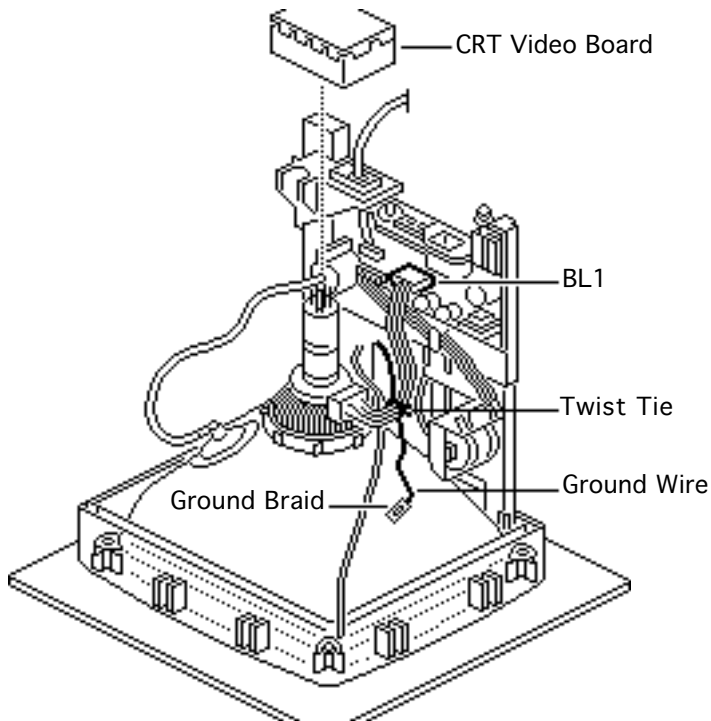


- 2 **Caution:** The neck of the CRT is easily damaged. Use caution when removing the CRT video board from the CRT neck. The cables between the board and the neck are very short.

Grasp the sides of the CRT video board and pull the board straight up to remove it from the neck of the CRT.

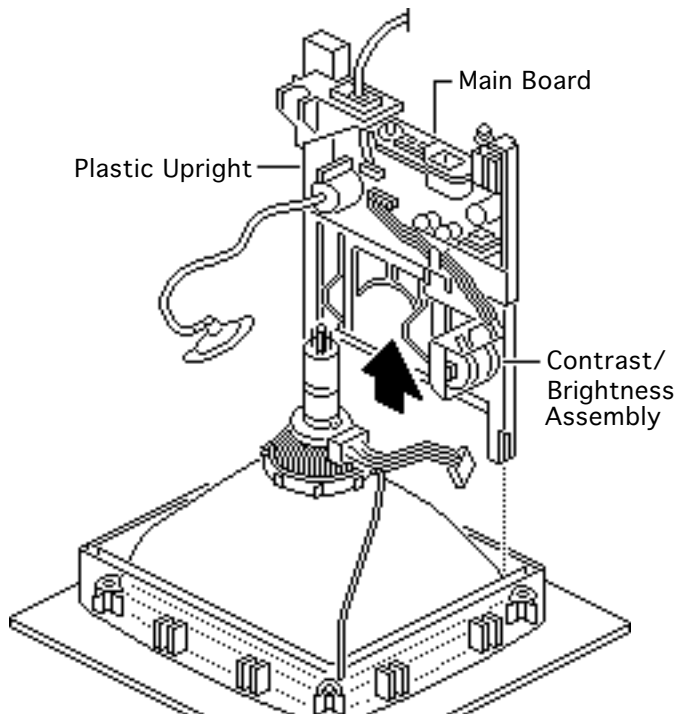
- 3 Carefully disconnect connector BL1 from the main board.





- 4 Remove the twist tie that holds the cable to the ground (black) wire.
- 5 Disconnect the black ground wire from the silver ground braid.





- 6 Grasp the contrast/brightness assembly with one hand and the plastic upright on the left. Pull straight up and remove the main board.

Replacement Note: If you replace the main board, perform the geometry and video adjustment procedures. See “Geometry” and “Video” in Adjustments.





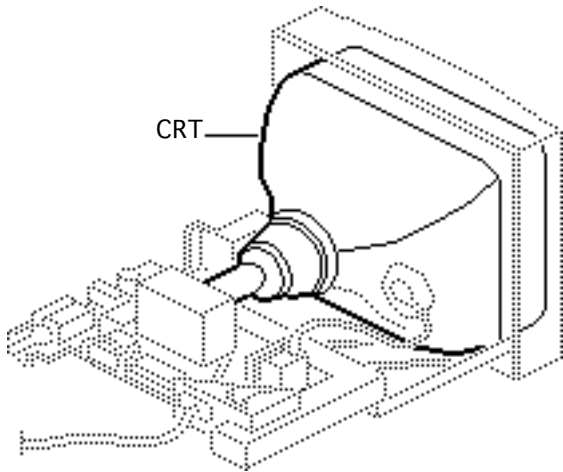
CRT

Before you begin,

- Remove the rear cover
- Discharge the CRT
- Remove the anode cap
- Remove the main board

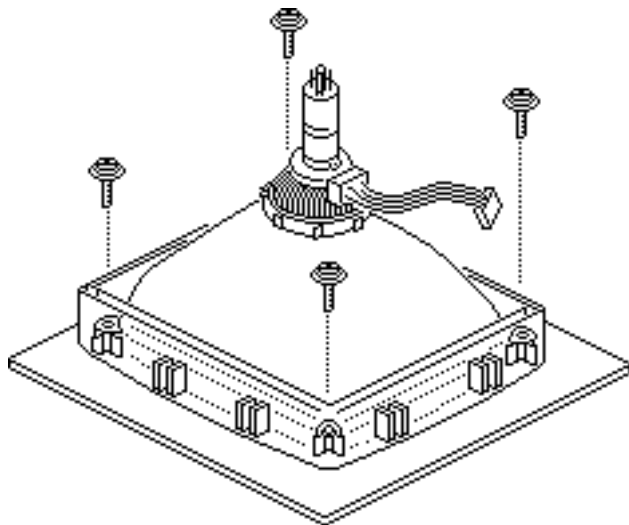
⚠ Warning: This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.

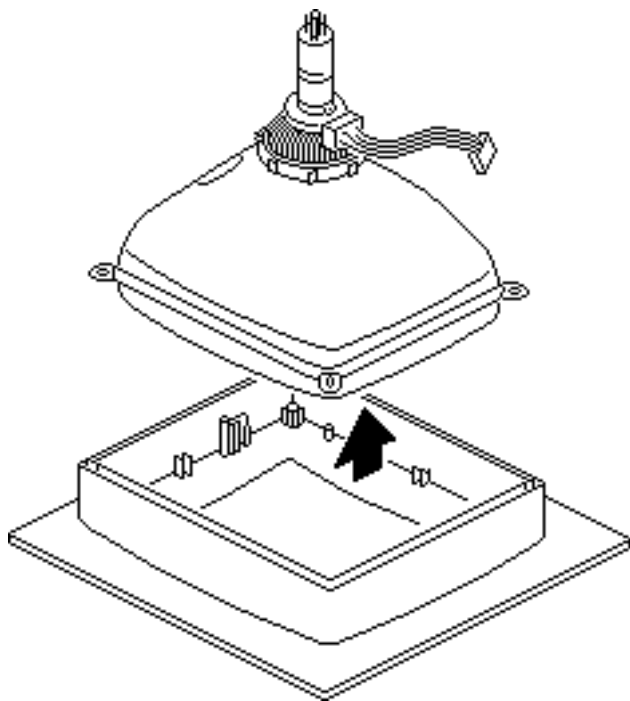
⚠ Warning: Never use a grounding wriststrap until after discharging the CRT.





- 1 Remove the four screws that hold the CRT to the front bezel.





- 2 **Caution:** The neck of the CRT is easily damaged. Do not grab the neck of the CRT to remove it from the bezel. If necessary, have a helper hold down the bezel while you hold the CRT by its edges and remove it.

Lift the CRT out of the bezel.

Note: If you intend to dispose of the CRT, review the CRT disposal instructions in Bulletins/Safety.





Replacement Note: If you replace the CRT, perform the video adjustment procedure. See “Video” in Adjustments.



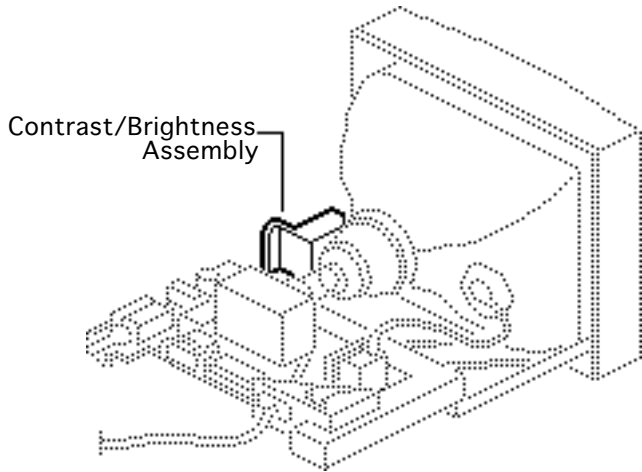


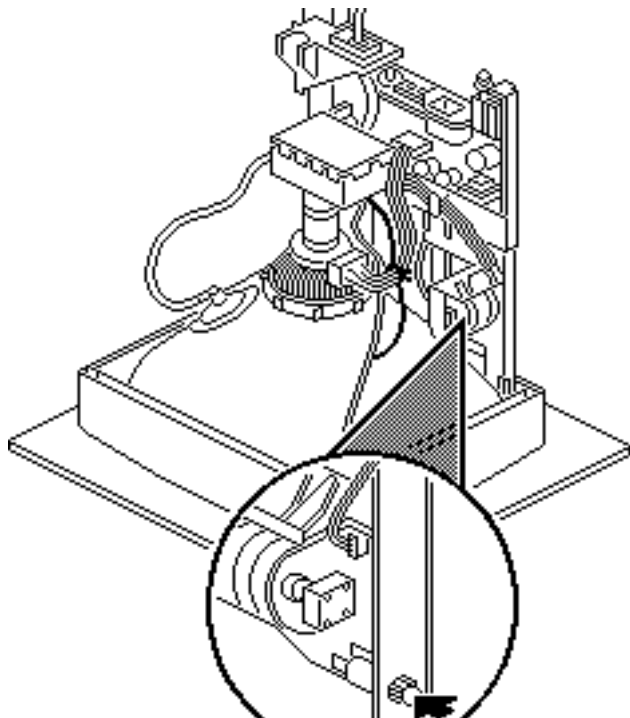
Contrast/ Brightness Assembly

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.





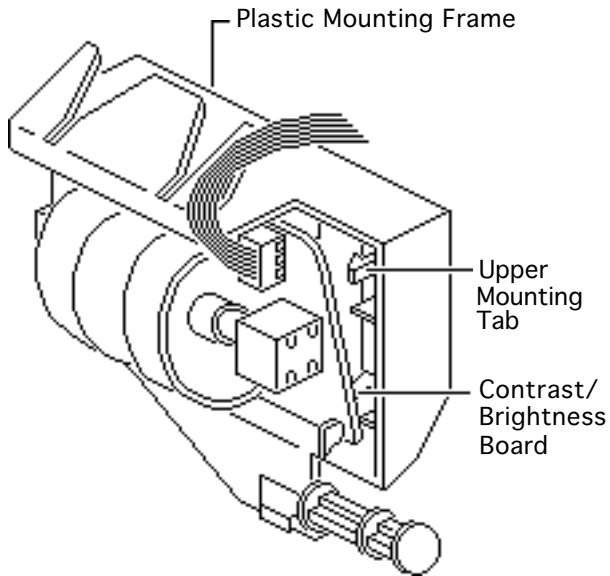
⚠ Warning: Never use a grounding wriststrap until after discharging the CRT.

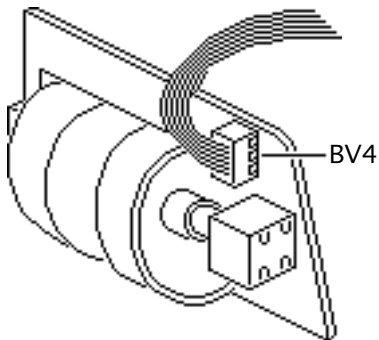
- 1 Push up on the plastic mounting post (see detail) and remove the contrast/brightness assembly from the deflection board. (The post will snap out of the deflection board mounting frame.)





- 2 Push out on the upper mounting tabs, pull up on the cable, and remove the contrast/brightness board from the plastic mounting frame.





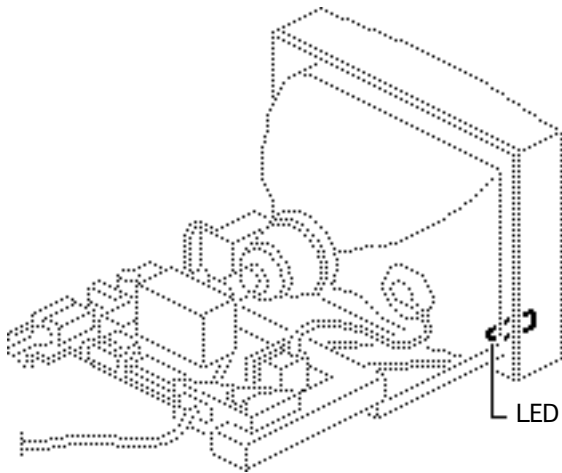
- 3 **Caution:** To avoid damaging the contrast/brightness board, be sure to contact only connector BV4 cable wires with the soldering iron. Desolder one wire at a time, and remove as much solder as possible after desoldering each wire.

Desolder the six cable wires from BV4 at the back of the contrast/brightness board.





- 4 Pull the six cable wires loose from the board.
Using a desoldering tool, remove all remaining solder from the holes in the board.



LED

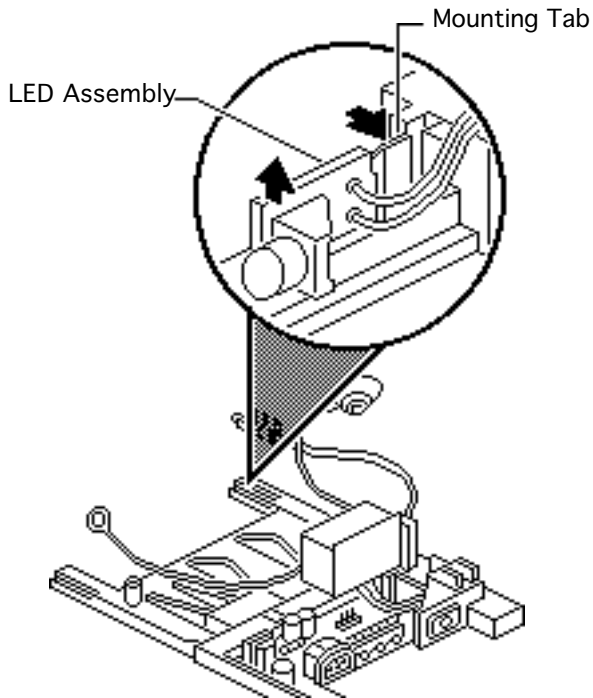
Before you begin,

- Remove the rear cover
- Discharge the CRT
- Remove the main board

⚠ 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.



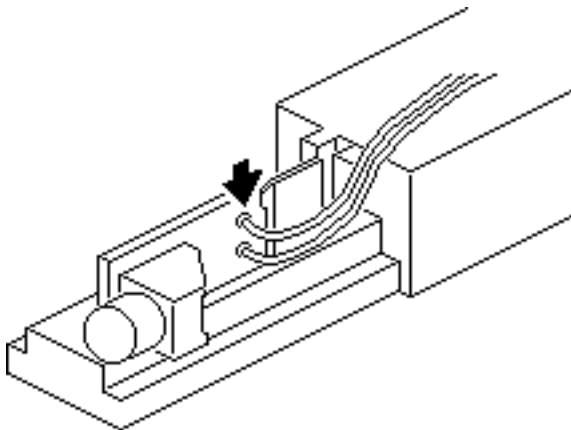


- 1 Push the mounting tab and pull up on the LED assembly to remove it.
- 2 Remove the two-wire cable from under the routing tab on the main board mounting frame.





- 3 Desolder the two wires from the back of the LED board. Using a desoldering tool, remove all solder from the mounting holes in the board.

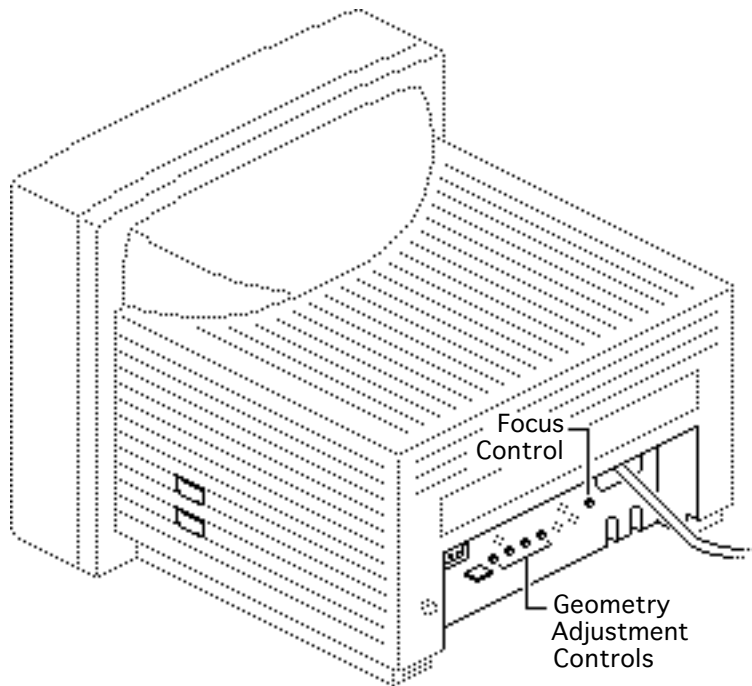




Adjustments

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Display





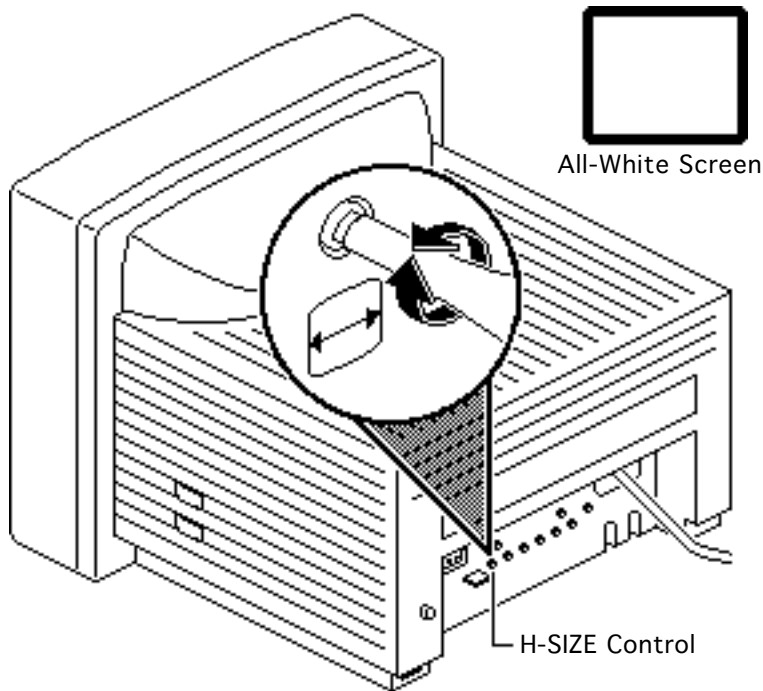
Geometry

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 injury, review CRT safety in Bulletins/Safety.

Caution: Do not attempt yoke adjustments on this display. The manufacturer performs all such adjustments.





Note: Perform geometry adjustments whenever you replace the main board.

Horizontal Size

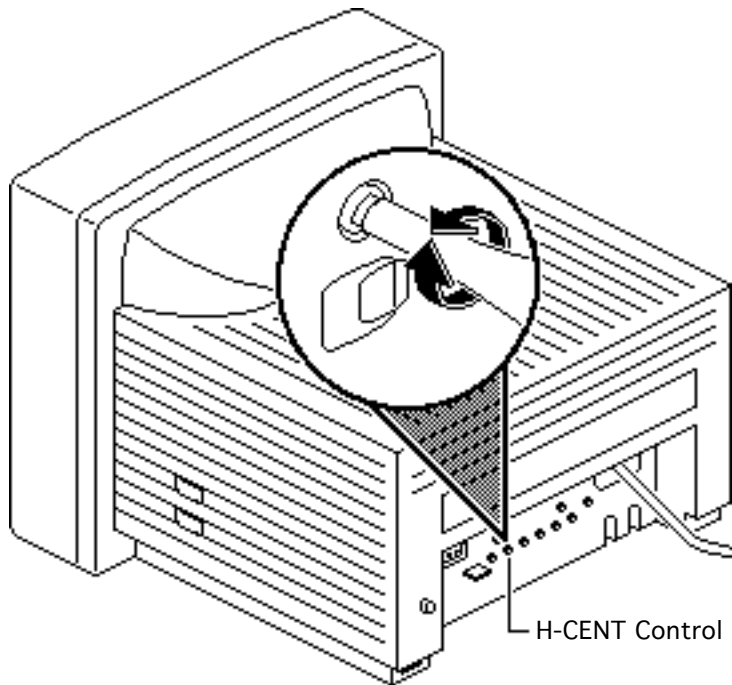
- 1 Use Display Service Utility to display the All-White Screen or Crosshatch II test pattern.
- 2 Using a plastic screwdriver, adjust the H-SIZE control until the raster is $8 \frac{7}{16}$ in. ($\pm 1/8$ in.) or 213.5 mm (± 2 mm) wide.





Horizontal Center

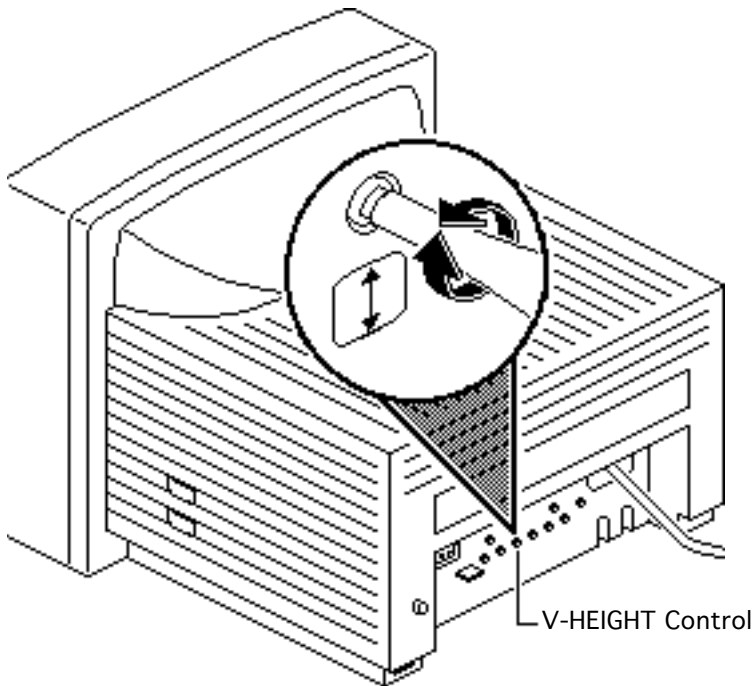
Using a plastic screwdriver, adjust the H-CENT control until the raster is positioned in the approximate center of the screen.

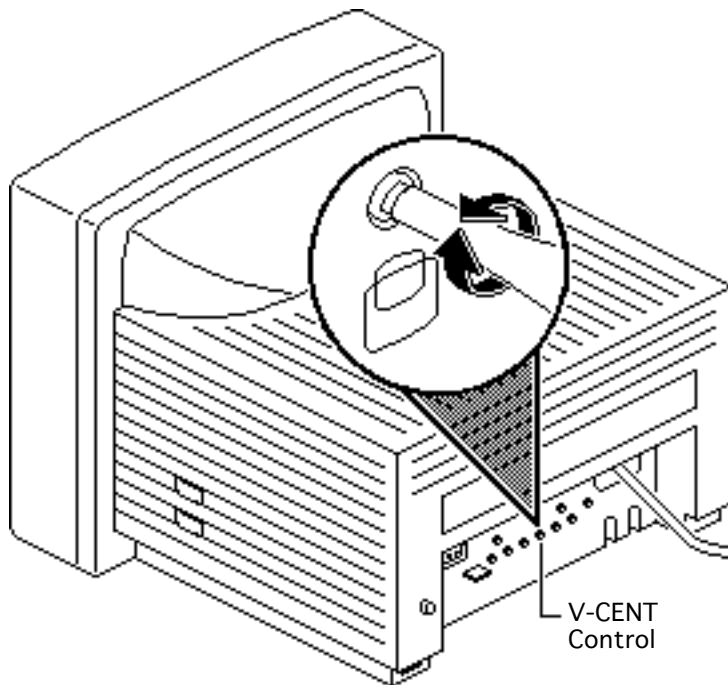




Vertical Size

Using the plastic screwdriver, adjust the V-HEIGHT control until the raster is $6 \frac{5}{16}$ in. ($\pm 1/8$ in.) or 159.5 mm (± 2 mm) high.





Vertical Center

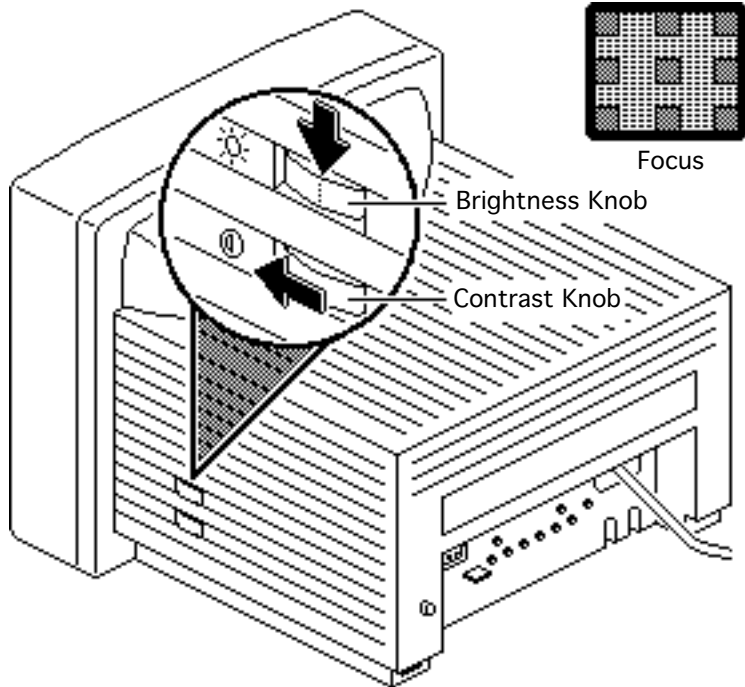
- 1 Using the plastic screwdriver, adjust the V-CENT control until the raster is positioned in the approximate center of the screen.
- 2 Verify that the raster height is $6 \frac{5}{16}$ in. ($\pm 1/8$ in.) or 159.5 mm (± 2 mm) high. If not, repeat the vertical size and vertical center adjustments.





Note: Vertical height and horizontal size affect each other. Recheck the horizontal and vertical specifications and, if necessary, repeat the adjustments.

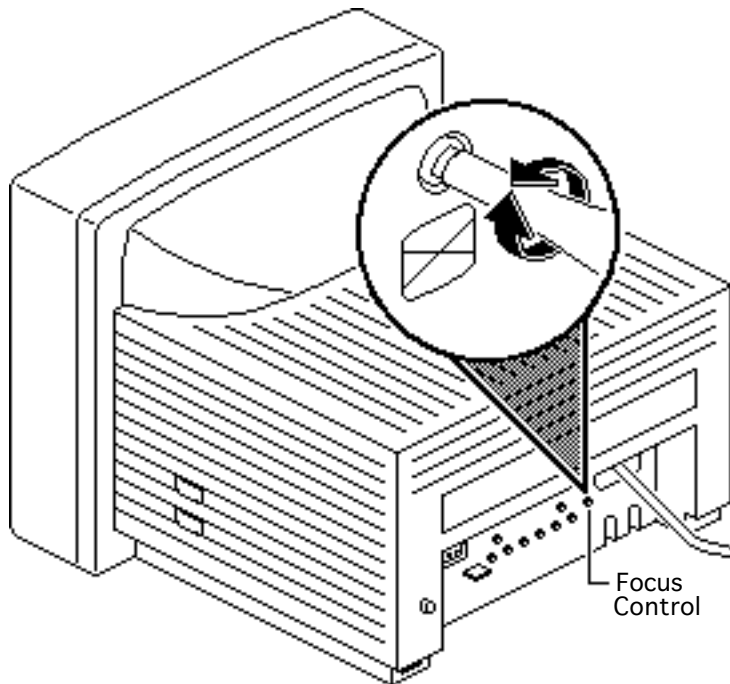




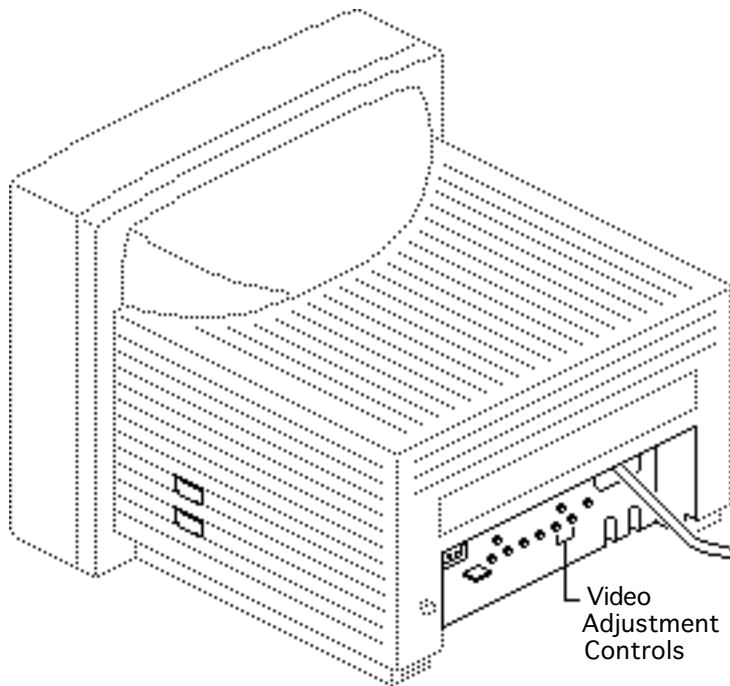
Focus

- 1 Use Display Service Utility to display the Focus test pattern.
- 2 Set the contrast knob to maximum and the brightness knob to the center (detent) position.





- 3 Using a plastic screwdriver, adjust the focus control until the Focus test pattern is as clear as possible.



Video

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 injury, review CRT safety in Bulletins/Safety.

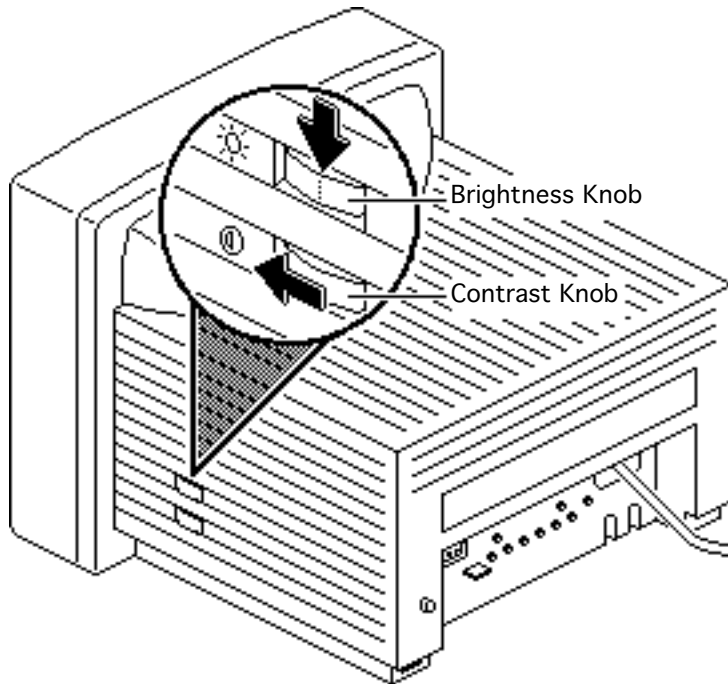




⚠ Warning: Because adjustments are made from the rear of the computer, position a mirror to view the computer screen. Do not reach around the computer to adjust the controls.

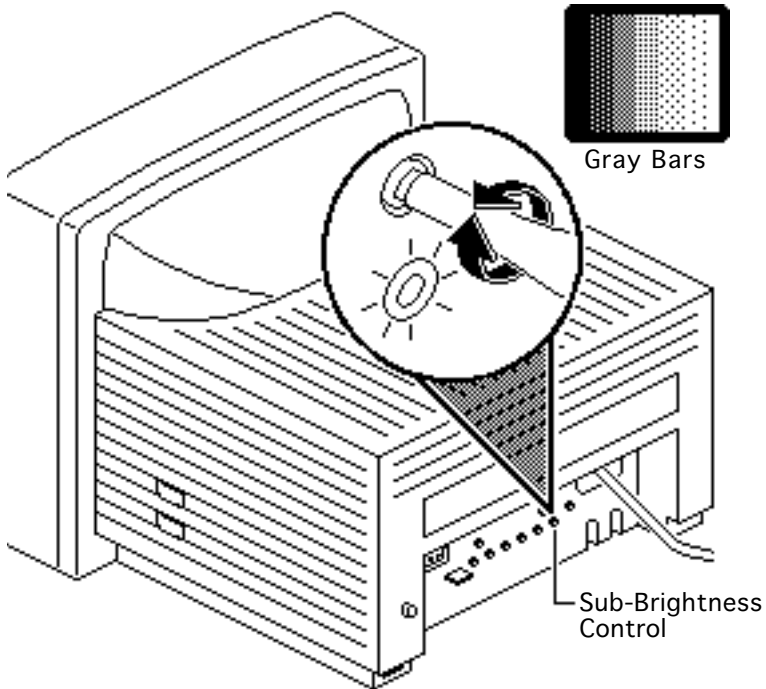
Note: Perform video adjustments whenever you replace the CRT or video board. You may need to perform video adjustments when you replace other modules.





- 1 Set the Control Panel to display 16 grays on the monitor.
- 2 Set the external (user) contrast knob to maximum and the external brightness knob to the center (detent) position.





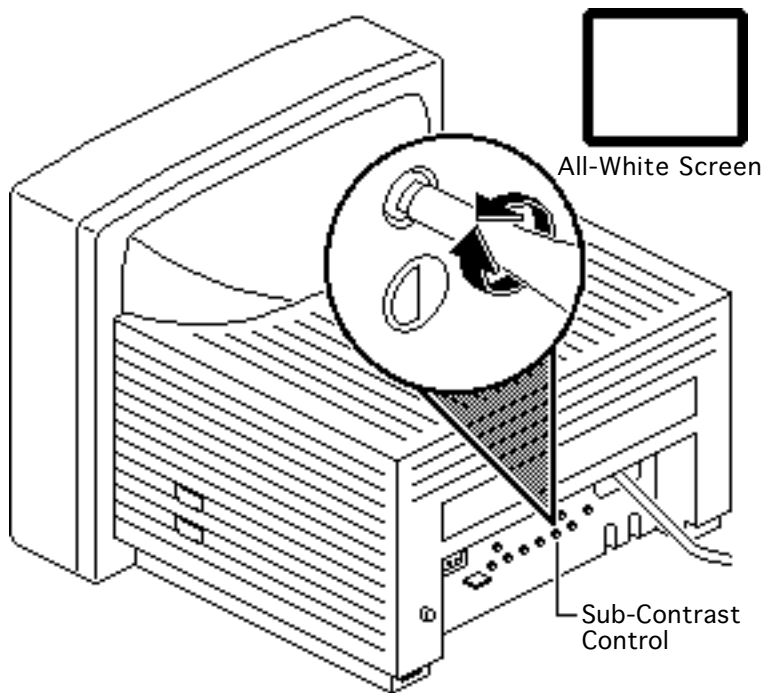
- 3 Use Display Service Utility to display the Gray Bars Screen test pattern.
- 4 Adjust the sub-brightness control until the left bar is black and the next bar is barely distinguishable from the black bar.





Note: If you adjust the sub-brightness control too high, the edges of the bars will appear dashed or irregular. To correct this problem, adjust the sub-brightness control down about a quarter-turn and then perform the sub-brightness adjustment.

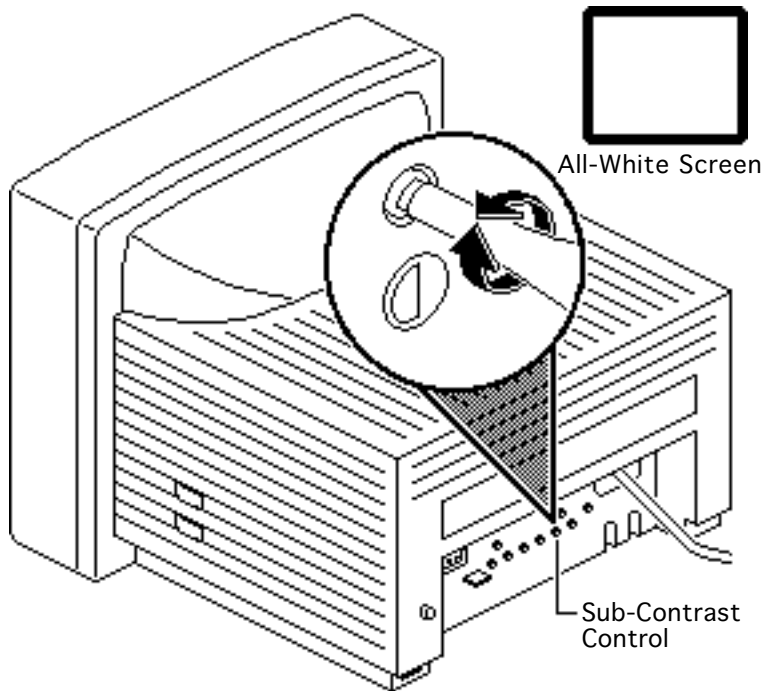




Important: Readings from light meter model L-248 and 246 differ. Please note which meter you are using before making adjustments. (See “Light Meter Setup.”)

- 5 Use Display Service Utility to display the All-White Screen test pattern.





- 6 Using the light meter and a plastic screwdriver, adjust the sub-contrast control until you get 33 foot lamberts (± 3 foot lamberts), which on the light meter is
- 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.

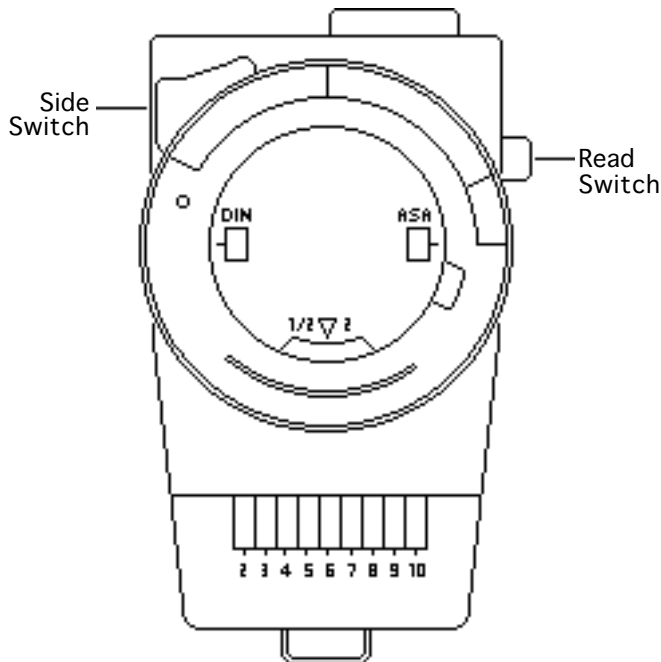


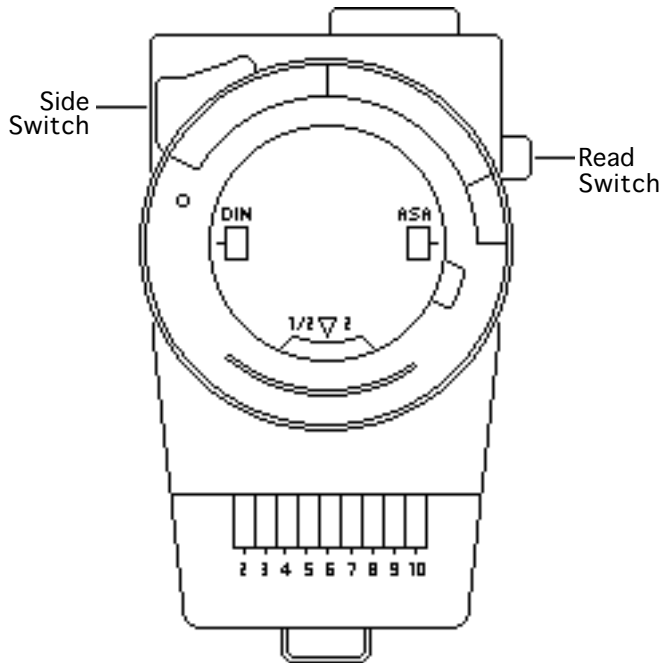
Light Meter Setup

Note: This topic covers setup for two light meters: Model L-248 and 246.

Model L-248

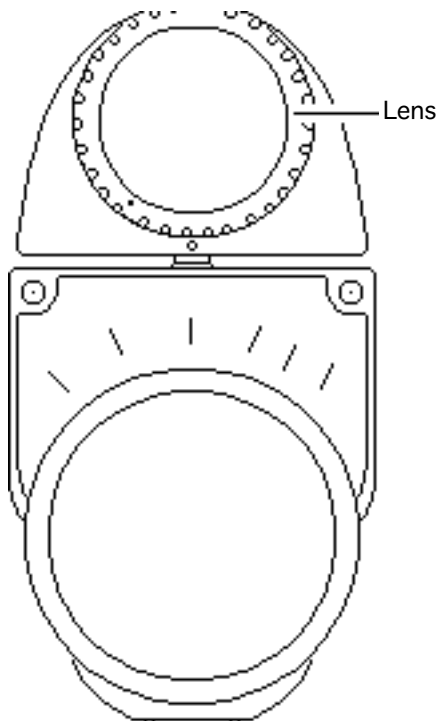
- 1 Press the red button on the back of the light meter. If the reading is out of the red area, replace the battery.





- 2 Move the side switch to its lower position so that the scale reads 10-18.
- 3 Uncover the lens of the meter.
- 4 Place the lens against the middle of the screen and press the Read switch.





Model 246

Note: Remove the metal slide, if installed, from the top of the light meter. Install the white lens with the red dot.

- 1 Rotate the lens of the meter to face the monitor.
- 2 Place the lens against the middle of the screen and read the scale.





Parts

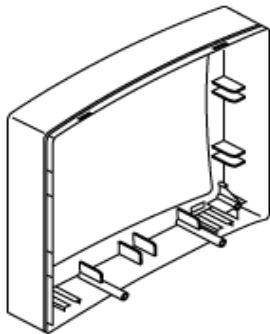
Macintosh 12 Monochrome
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Bezel, Plastic Case

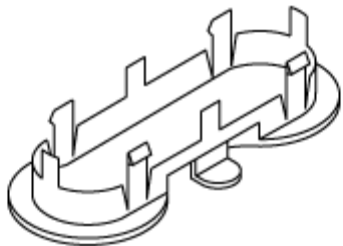
658-8351





Cable Storage Bobbin

815-1156





Cable, CPU to Monitor

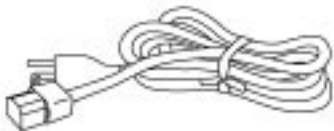
590-4510





Cable, External Power Hi-Res (1M)

590-0370





CRT Assembly, Domestic & Europe

076-0382





Facilitation Warranty Reimbursement, Per Repair

011-0083



Fuse, 2.5A, 250V, Slow Blow, 5 Pk.

941-5225





Macintosh 12" Monochrome Display

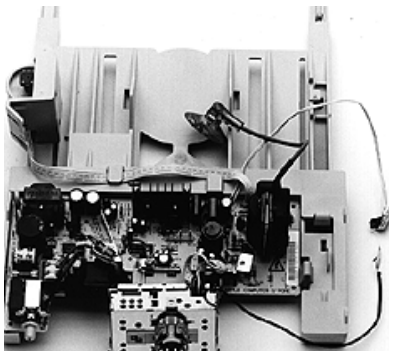
011-0424





Main Board

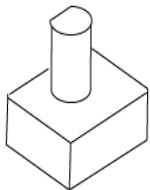
661-0615





Pot, 10K Ω 0.15W CC Brightness

109-1022





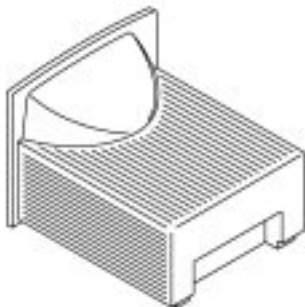
Pot, 10K Ω 0.15W Contrast

109-1020



Rear Cover, Plastic

658-8352



**Screw/Knob Set****956-0023**



Exploded View

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