



Macintosh LC 580/
Performa 580CD





Basics

LC580/Performa 580CD





General Information

Overview

These computers are higher-performance versions of the Macintosh LC 575. Each features a 33 MHz 68040 logic board with 4 MB of soldered DRAM (expandable to 52 MB with two 72-pin SIMMs, 80 ns or less).

Macintosh LC 580

The Macintosh LC 580 supports various options, including an IDE hard drive and a trayloading double-speed CD-ROM drive.





Performa 580CD

Performa versions of Macintosh products include specific bundles of software and hardware configurations.

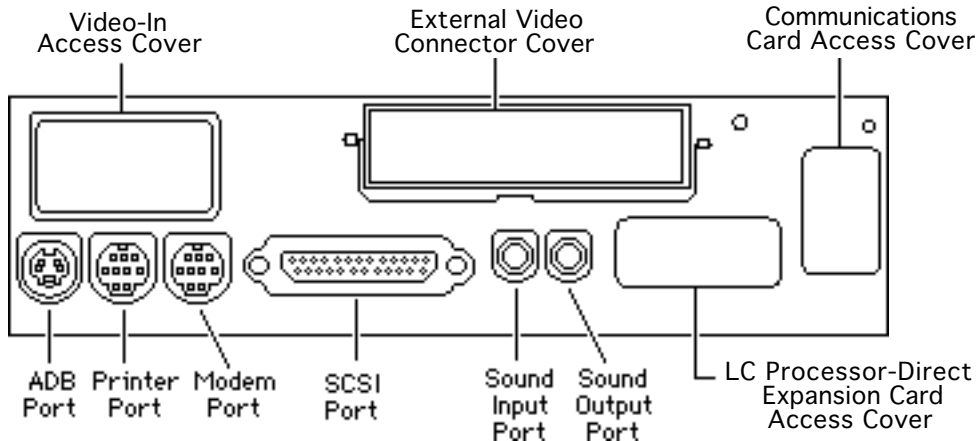
The Performa 580CD is bundled with a 500 MB IDE hard drive and a trayloading double-speed CD-ROM drive.

The information in this manual is applicable to both the Macintosh and Performa versions unless specified otherwise.



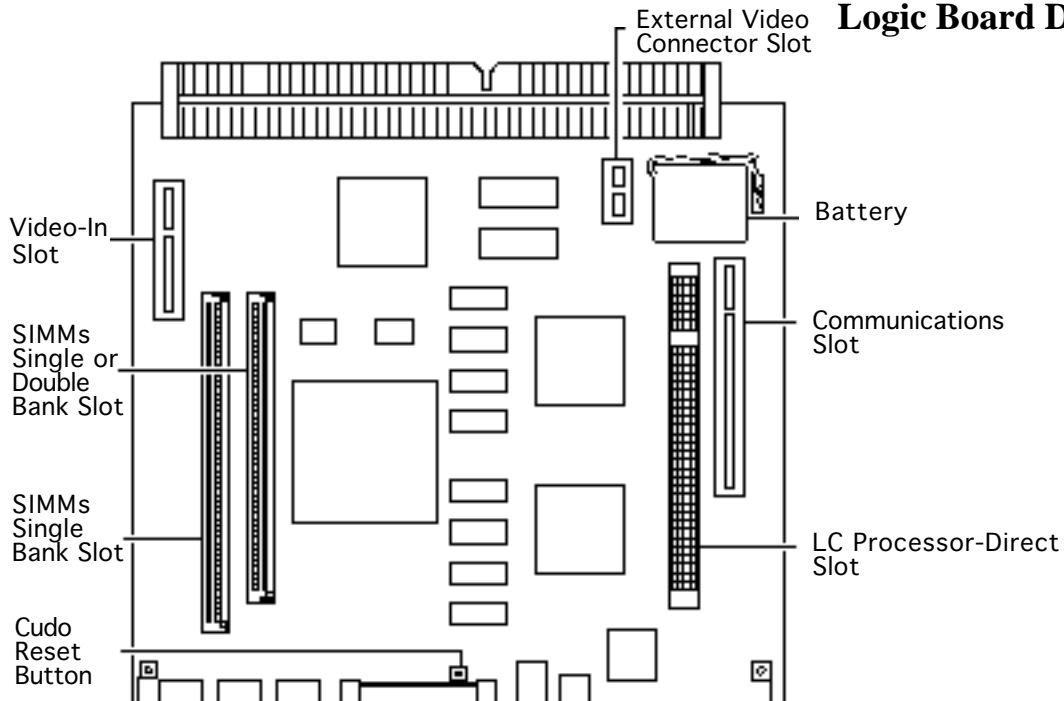


Rear View Diagram





Logic Board Diagram





Specifications

LC 580/Performa 580CD





Processor

Motorola 68LC040 microprocessor

33 MHz

Built-in memory management unit (MMU)





Memory

RAM	4 MB of dynamic RAM on board Expandable to 52 MB (fast-paced mode 80 ns DRAM SIMMs) Two 72-pin SIMM connectors
ROM	1 MB of ROM
PRAM	256 bytes of parameter memory Long-life lithium battery
VRAM	1 MB of DRAM soldered to logic board Can display thousands of colors (16-bit)





Disk Storage

Floppy Drive

Built-in 1.4 MB Apple SuperDrive, manual-inject

Hard Drive

Internal IDE hard drive

CD-ROM Drive

Optional internal CD-ROM drive





I/O Interfaces

Serial

Two RS-232/RS-422 serial ports for external modem and printer

Modem port uses a 9-pin mini-DIN connector

Printer port uses an 8-pin mini-DIN connector

SCSI

One SCSI port for expansion

Accommodates up to six external SCSI devices

Apple Desktop Bus

One AppleDesktop (ADB) port for keyboard and mouse

Maximum of three ADB devices recommended

Maximum current draw: 500 mA(Mouse draws 10 mA; keyboard draws 25 mA.)





Sound	Sound-input port for monaural sound input Sound-output port capable of delivering 8-bit stereo sound Stereo headphone jack capable of delivering 8-bit stereo sound
Processor-Direct Slot	Internal expansion slot for 114-pin processor-direct expansion card
Communications Slot	Internal expansion slot for optional 112-pin fax modem or Ethernet card
Video-In Slot	Internal, 60-pin video-in slot for optional expansion card that provides real-time video display, capture, and overlay
External Video Connector Slot	One 22-pin connector for a second monitor





I/O Devices

Keyboard

Supports all Apple Desktop Bus (ADB) keyboards

Mouse

Apple Desktop Bus Mouse II
Mechanical tracking, optical shaft, or contact encoding

Microphone

Integrated microphone for mono sound input

Speaker

Integrated stereo speakers capable of delivering 8-bit stereo sound





Sound and Video

Sound Generator

Records at 11 kHz or 22 kHz sample rate

Plays back at 11 kHz or 22 kHz sample rate

Two speakers with enhanced stereo sound

With optional CD-ROM drive, allows playback of ordinary audio compact discs





Video Display

14-in. diagonal, high-resolution screen (11.5-in. viewable image)

Gun Configuration: Horizontal inline

Phosphor (aluminized): P22 derivative

Phosphor CIE Coordinates:

Red $x = 0.625 \pm 0.020$, $y = 0.340 \pm 0.020$

Green $x = 0.280 \pm 0.020$, $y = 0.595 \pm 0.020$

Blue $x = 0.155 \pm 0.015$, $y = 0.070 \pm 0.015$

Dot Pitch: 0.28 mm dot pitch shadow mask

Vertical Frequency: 66.7 Hz

Active Raster Size (nominal): 9.5 in. by 7.3 in. (240 mm by 180 mm)

White Point: 9300° K

Shipping Brightness (nominal): 30 ± 5 foot lamberts



**Video Timings**

640 x 480 Resolution @ 66.67 Hz

Horizontal Timing

Back Porch: 96 dots

H SYNC: 64 dots

Front Porch: 64 dots

1 dot: 33.06878 ns

1 H: 28.5714 μ s

1/dot: 30.24 MHz

Vertical Timing

Back Porch: 39 H

V SYNC: 3 H

Front Porch: 3 H

1 H: 28.5714 μ s

1/H: 35.000 kHz

1 V: 15.000 ms





External Video Connector (Optional)

Supports video mirroring on the following external monitors (at product introduction):

- 640 x 480 resolution: Macintosh 12" Color Display, Apple Color Plus 14" Display, Apple Performa Plus Display, Apple Multiple Scan 15 Display, Apple Multiple Scan 17 Display, Apple Multiple Scan 20 Display
- 800 x 600 resolution: Apple Multiple Scan 15 Display, Apple Multiple Scan 17 Display, Apple Multiple Scan 20 Display, and SVGA monitors





Physical and Electrical

Dimensions

Height: 17.9 in. (45.5 cm)

Width: 13.5 in. (34.4 cm)

Depth: 16.5 in. (42.0 cm)

Weight

40.5 lb. (18.4 kg)

Power Supply

Voltage: 90 to 264 V rms

Frequency: 50–60 Hz, plus or minus 3 Hz, single phase

Surge Voltage: 300 V rms for 100 ms

Peak Inrush Current: 40 amps pk

Current: 2.0 amps maximum for all line and load conditions

Power: 120 W maximum for all line and load conditions

Line voltage: 100–240 VAC; RMS automatically configured





Audio Amplifier

Amplifier drives a 16-ohm speaker

Audio Input Voltage: 0.707 V rms

Audio Input Impedance: 10 K ohms

Output Power at 1 kHz: 250 mW

Bandwidth 3 dB: 200 Hz to 15 kHz

Total Harmonic Distortion: $\leq 1\%$





Environmental

Temperature

Operating: 50–104° F (10–40° C)

Transit: (72 hours): -40° F to +149° F (-40° C to +65° C)

Storage (6 months): -40 to 116.6° F (-40 to 47° C)

Relative Humidity

20–95% noncondensing

Operating Altitude

0–10,000 ft. (0–3,000 m)





Troubleshooting

LC 580/Performa 580CD





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.





First Checklist

Important: Read this checklist before you replace a module. Avoid needless module replacement.

Do you know that...

- The CRT raster will not always resemble a perfect rectangle. CRT tolerances allow for some distortion. Additional distortion can be caused by magnetized metal objects (desks, file cabinets, etc.). Move the unit to a different location if you notice raster bowing or bent raster edges.
- Jitter, faint lines, or screen movement can be caused by external interference such as electronic devices and fluorescent lights. Move the unit to another room or building to help determine if external interference is the source of the problem.
- A misadjusted screen can mimic the same symptoms as analog





board or CRT failures. By performing the adjustment procedures, you might determine if one or more of the adjustments is the cause of the problem.

- CRTs rarely fail. Needless CRT replacements can be prevented by checking display adjustments, checking the possibility of other defective modules, and accepting small imperfections in screen display.

If you have any doubts about whether a CRT needs replacement, contact Apple Technical Support.





Symptom Charts

Audio

Sound distortion with
MPEG board installed

Replace MPEG board with modified MPEG board. A modified board should have a jumper present from U5 Pin 2 to D1 Pin 1.





Video

Screen is black, too dark, or too bright; audio and drive operate

- 1 Adjust contrast button on front bezel.
- 2 Adjust brightness button on front bezel.
- 3 Check yoke cable connection.
- 4 Perform video adjustments. Refer to “Video” in Adjustments chapter.
- 5 Replace analog board.
- 6 Replace CRT.

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

- 1 Perform video adjustments. Refer to “Video” in Adjustments chapter.
- 2 Replace analog board.





Video (Continued)

Screen is completely black except for single vertical or horizontal line displayed

- 1 Check yoke cable connection with power off.
- 2 Replace analog board.
- 3 Replace CRT.

Predominant color tint or color cannot be adjusted

Perform video adjustments. Refer to “Video” in Adjustments chapter.

Picture breaks into diagonal lines, or picture rolls vertically or horizontally

- 1 Perform geometry adjustments. Refer to “Geometry” in Adjustments chapter.
- 2 Replace analog board.





Video (Continued)

Out of convergence
(color bleeds from
text or lines)

- 1 Perform convergence adjustment. Refer to “Convergence” in Adjustments chapter. Note that some misconvergence is normal, especially around edges of screen. Contact Apple Technical Support if you’re uncertain whether the misconvergence is within specification.
- 2 Replace analog board.

Black screen spots
(burnt phosphors)

Replace CRT.





Video (Continued)

Screen jitters or flashes

- 1 Refer to “First Checklist” in this chapter. Move electrical devices (other monitors, scanners, etc.) away from monitor. Temporarily shut off all fluorescent lights in area.
- 2 Move unit to another room or building and check if symptom persists.
- 3 Replace analog board.

Out of focus

- 1 Perform focus adjustment. Refer to “Focus” in Adjustments chapter. Note that misconvergence can also produce an out-of-focus symptom.
- 2 Check for proper screen luminance. If luminance is off, perform cutoff and white balance adjustments. Refer to “Video” in Adjustments chapter.
- 3 Replace analog board.





Video (Continued)

Raster size too short/
tall or narrow/wide

- 1 Perform geometry adjustment. Refer to “Geometry” in Adjustments chapter.
- 2 Replace analog board.

Linearity bad (size of
text/graphics differs
at top, bottom, or
sides of screen)

Replace analog board.





Video (Continued)

Raster tilted or shifted

- 1 Refer to “First Checklist” in this chapter. Move metal objects away from monitor.
- 2 If symptom appears immediately after CRT replacement, reinstall CRT and align it according to CRT guidelines in the Take Apart chapter
- 3 Perform appropriate geometric adjustments (see Adjustments chapter).
- 4 Replace analog board.

Raster distorted (barrel-shaped, corners not square, stretched or compressed at top of display, or sides not perpendicular)

- 1 Refer to “First Checklist” in this chapter. Move metal objects away from monitor.
- 2 Perform appropriate geometric adjustments (see Adjustments chapter).
- 3 Replace analog board.





Video (Continued)

Raster not centered

- 1 Adjust horizontal or vertical shift control. Refer to Adjustments chapter.
- 2 Refer to “First Checklist” in this chapter.





Floppy Drive

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

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

Disk ejects; display shows icon with blinking "X"

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

Unable to insert disk all the way

- 1 To eject previously inserted disk, 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.





Floppy Drive (Continued)

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.





Hard Drive

Internal or external hard drive does not operate

- 1 Verify that SCSI loopback card is not attached.
- 2 Verify that external drive is properly terminated.
- 3 Replace hard drive.
- 4 Replace logic board. Retain customer's SIMMs.
- 5 Replace hard drive.





CD-ROM Drive

- | | |
|---|--|
| CD-ROM drive does not accept disc | <ol style="list-style-type: none">1 Replace disc (if dirty or damaged).2 Replace CD-ROM drive mechanism. |
| Volume control does not operate correctly | <ol style="list-style-type: none">1 Reseat CD adapter connector.2 Replace CD adapter connector.3 Replace CD-ROM drive.4 Replace chassis harness assembly. |
| Macintosh cannot mount CD-ROM drive | <ol style="list-style-type: none">1 Reseat CD adapter connector.2 Check SCSI ID setting. (Internal CD-ROM was originally set to 3 at factory.)3 Test CD-ROM drive on known-good Macintosh; if CD-ROM drive doesn't work, replace it.4 Replace chassis harness assembly. |





CD-ROM Drive (Continued)

When an internal and external SCSI device are present, only one powers up

- 1 Verify that SCSI device ID switch setting on external device is higher than 0. Verify that ID switch setting on external SCSI device does not duplicate ID switch settings on other external SCSI devices.
- 2 Replace terminator on external SCSI device.
- 3 Replace SCSI select cable.





CD-ROM Drive (Continued)

A Macintosh LC 580 starts up from a backup CD-ROM disc, but won't eject the disc and gives a -50 error. Or the computer starts up from backup CD-ROM, but won't mount discs after restart.

Early Macintosh LC 580 computers shipped with AppleCD 300i plus CD-ROM drives. Later LC 580 computers shipped with AppleCD 600i CD-ROM drives. Using a backup CD-ROM intended for the AppleCD 300i in an AppleCD 600i (or vice versa) will cause these symptoms.

- Identify the backup CD-ROM discs by their part numbers. Backup discs for AppleCD 300i have the part numbers 691-0462-B or 691-3305-A. Backup discs for AppleCD 600i have the part number 691-0793-A.
- Identify the CD-ROM drive installed in the Macintosh LC 580. Remove any CD-ROM disc present in the drive. Open the PC Exchange control panel and click Options. You will see the product code CR-8004x if the drive is a 300i or the code CR-8005x if the drive is a 600i.
- Use only 300i backup CD-ROM discs in 300i drives, and only 600i backup discs in 600i drives.





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 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 <Command> <Option> <P> <R> keys during system startup but before “Welcome to Macintosh” appears.
- 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, if detachable.
- 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 Choose and Control Panel are set correctly.
- 2 Replace printer driver and system software with known-good.
- 3 Troubleshoot by referring to Apple Service Guide for Networking and Communications.





Peripheral (Continued)

When an internal and external SCSI device are present, only one powers up

- 1 Verify that SCSI device ID switch setting on external device is higher than 0. Verify that ID switch setting on external SCSI device does not duplicate ID switch settings on other external SCSI devices.
- 2 Replace terminator on external SCSI device.
- 3 Replace SCSI select cable.





Global Village Modem “Busy Serial Port”

Using modem gives message: “Can’t find or can’t access a modem to use for registration. Make sure you have Global Village software installed correctly, reboot your computer, and try again. If you want to use a specific modem for registration, select it from Chooser.”

The TelePort Control Panel becomes corrupted when a Performa 580CD is restarted while AppleTalk is set to “Inactive” in the Chooser or LocalTalk is not the selected AppleTalk Connection in the Network Control Panel. Follow these steps;

- 1 Obtain GlobalFax 2.5.2P Update.
- 2 Restart the computer with extensions off.
- 3 Double-click Performa GlobalFax 2.5.2 Update icon.
- 4 Click Update button and watch for update confirmation window.
- 5 Restart computer.
- 6 Customer should keep backup copy of 2.5.2 Update program and run it after reinstalling software from backup CD.





Global Village Modem “Busy Serial Port”

Resetting modem in TelePort Control Panel gives message: “The current port is busy and cannot be opened. Quit any open communication application, or turn off AppleTalk in the Chooser (if the modem is connected to the Printer port), and then reopen the TelePort control panel.”

Here’s an alternative fix that doesn’t require GlobalFax 2.5.2P Update:

- 1 Replace corrupted control panel in System Folder with uncorrupted copy of TelePort Control Panel found in Control Panels folder on backup CDs.
- 2 Set AppleTalk to “Active” and select LocalTalk as the AppleTalk Connection in Network Control Panel.





Miscellaneous

Clicking, chirping, or thumping sound	<ol style="list-style-type: none">1 Replace analog board.2 Replace logic board. Retain customer's SIMMs.
Smoke/odor	Replace analog board.
No video, no audio, and no drive operation	<ol style="list-style-type: none">1 Connect power cord.2 Switch power on.3 Replace power cord.4 Replace analog board.5 Replace logic board. Retain customer's SIMMs.
"Sad Macintosh" icon	<ol style="list-style-type: none">1 Replace bad disk with known-good disk.2 Replace RAM SIMMs on logic board.3 Replace logic board. Retain customer's SIMMs.





Miscellaneous (Continued)

- | | |
|--|---|
| Screen shows “Sad Macintosh” icon and black vertical lines; screeching sound | <ol style="list-style-type: none">1 Replace RAM SIMMs on logic board.2 Replace logic board. Retain customer’s SIMMs. |
| Headphone jack does not operate correctly | <ol style="list-style-type: none">1 Verify that headphone jack is seated properly.2 Replace front panel control board.3 Replace chassis harness assembly. |
| No sound from external speakers | <ol style="list-style-type: none">1 Check that volume is turned on (manually or through Control Panel).2 Verify that headphones are unplugged.3 Verify that speaker connectors are properly connected.4 Test speakers with known-good Macintosh; if speakers do not work, replace them.5 Replace logic board. |





Take Apart

LC 580/Performa 580CD

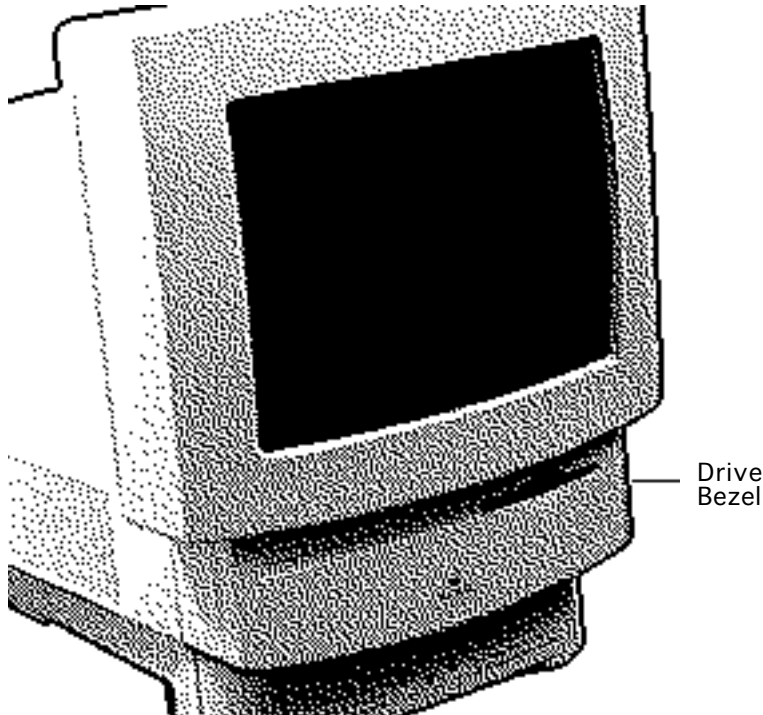


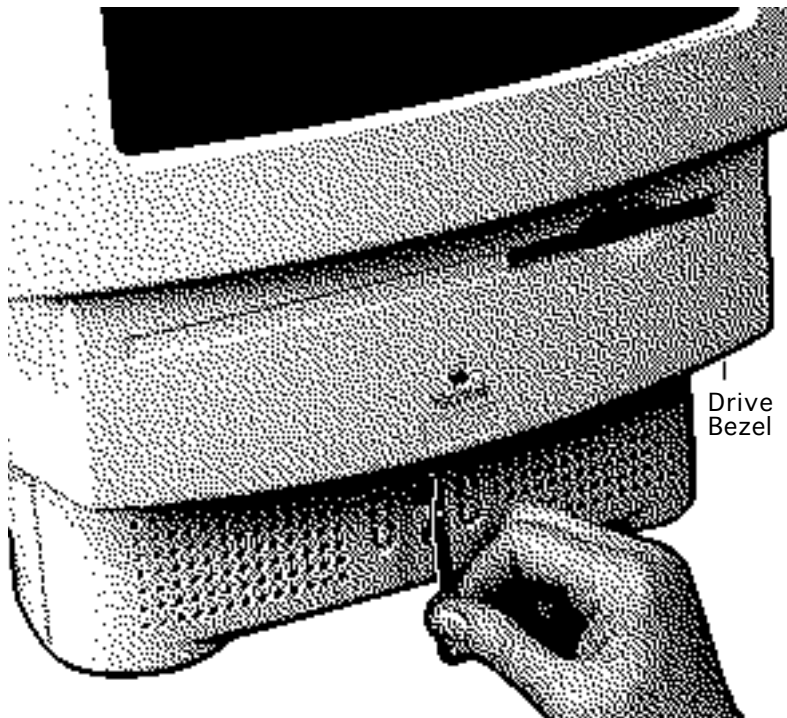


Drive Bezel

No preliminary steps are required before you begin this procedure.

Caution: Review ESD precautions in Bulletins/ Safety.

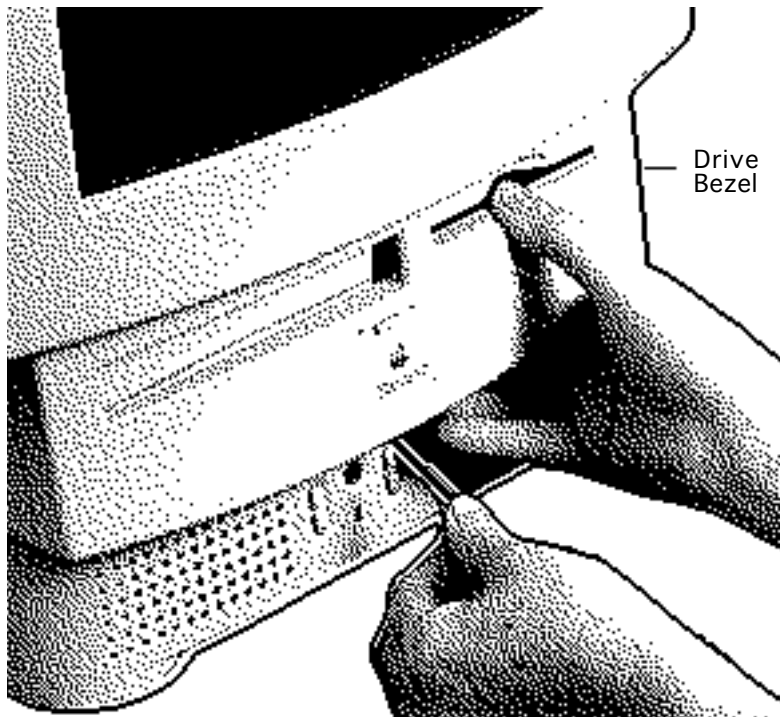




- 1 **Note:** Place the unit near the edge of the work table.

Insert a flat-blade screwdriver into the opening on the bottom of the drive bezel.

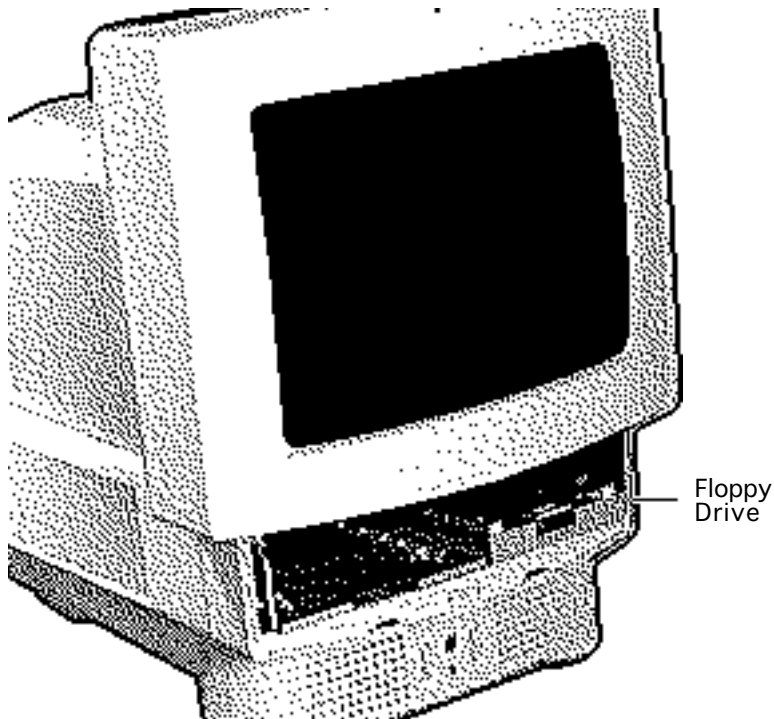




- 2 Push the blade away from you, twisting it to release the interior latch on the bezel.
- 3 Pull the bezel down and remove it.

Replacement Note: Slide the bezel up and firmly snap it into place.



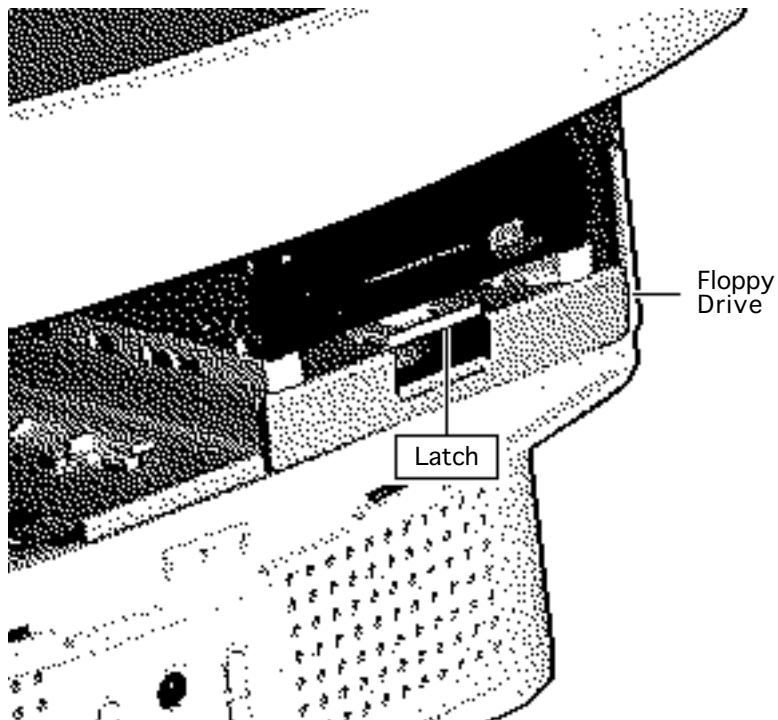


Floppy Drive

Before you begin, remove the drive bezel.

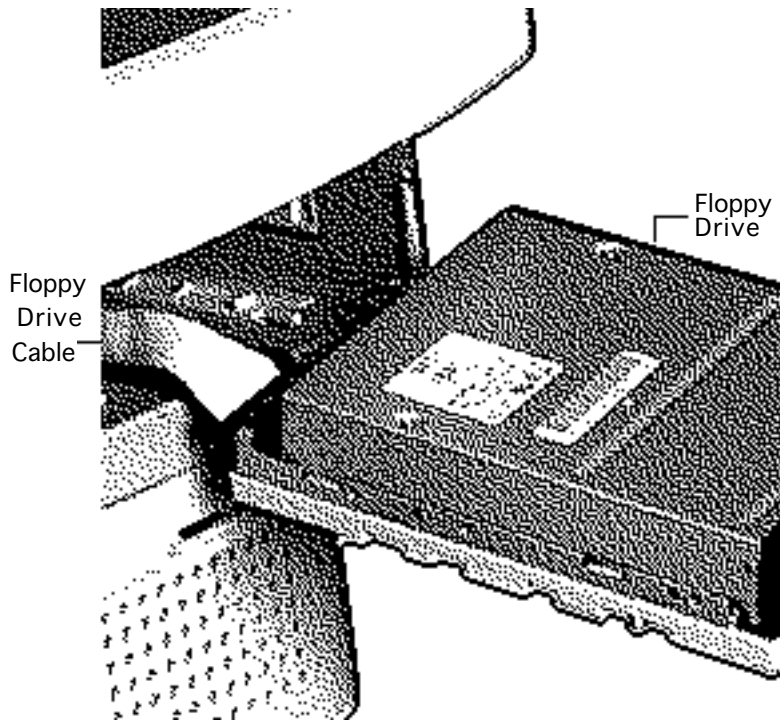
Caution: You can access and remove the floppy drive merely by removing the drive bezel at the front of the machine. Although replacing the floppy drive is now extremely easy, do not neglect to follow proper ESD precautions: Use a grounded workbench pad and always wear a grounding wriststrap.





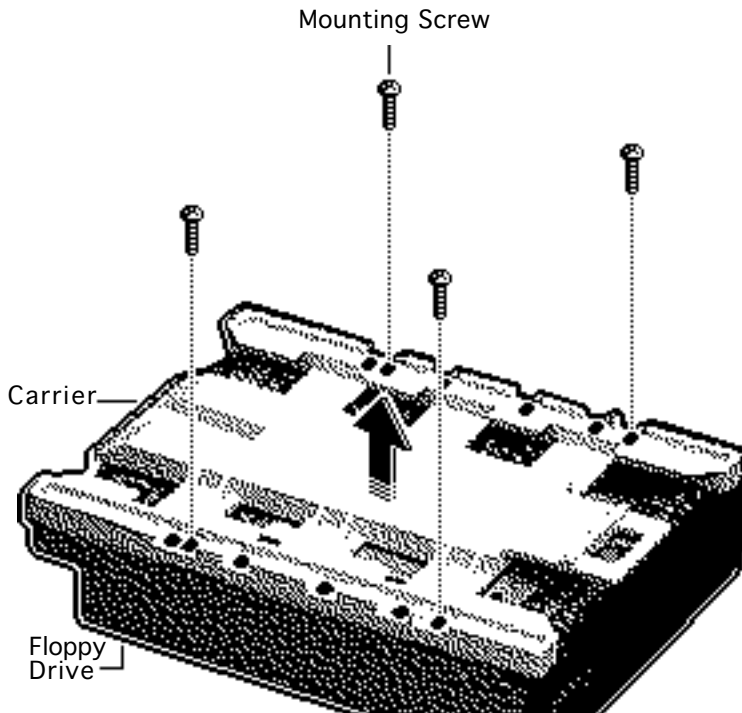
- 1 Push up the latch and pull out the floppy drive.





- 2 Disconnect the floppy drive cable.





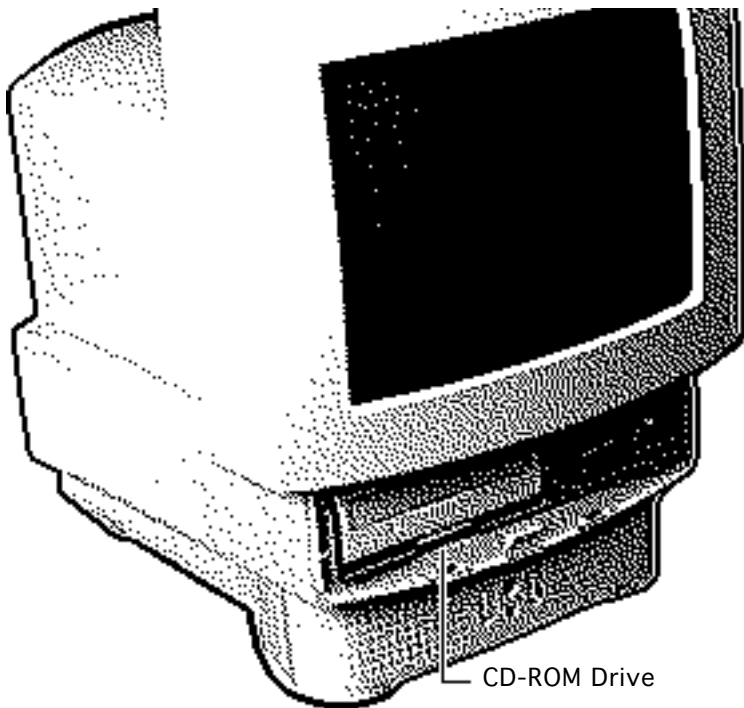
Note: Perform the following steps only if you are replacing the floppy drive.

3 **Note:** Notice the placement of the carrier and screws before removing them. Retain the carrier and screws and install them on the new floppy drive.

Remove the four mounting screws.

4 Remove the carrier from the floppy drive.



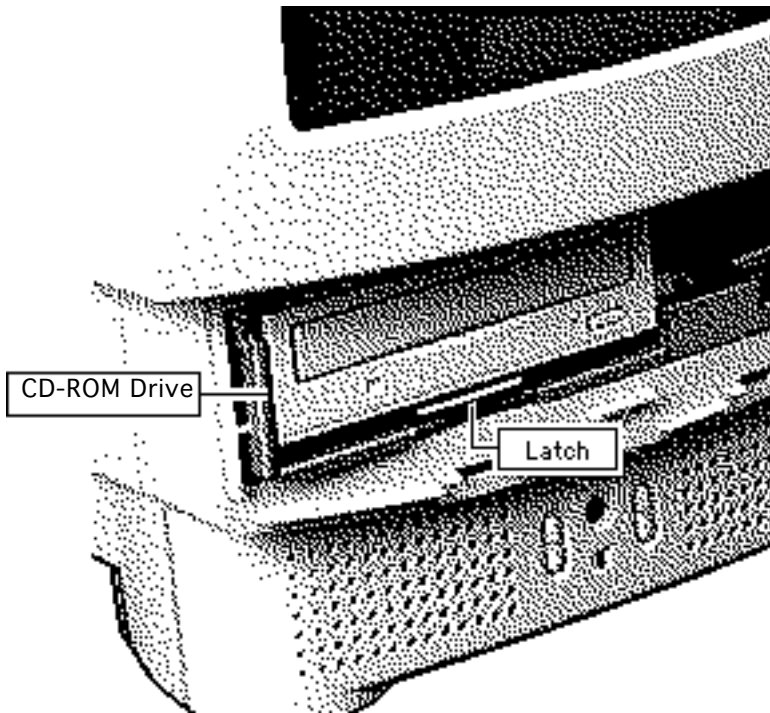


CD-ROM Drive

Before you begin, remove the drive bezel.

Caution: You can access and remove the CD-ROM drive merely by removing the drive bezel at the front of the machine. Although upgrading the CD-ROM drive is now extremely easy, do not neglect to follow proper ESD precautions: Use a grounded workbench pad and always wear a grounding wriststrap.

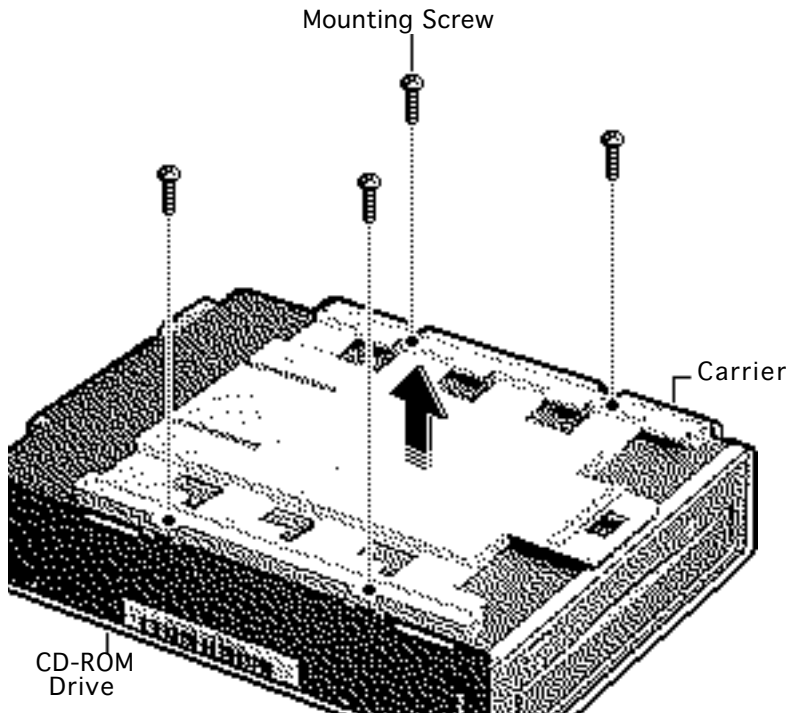




Note: A CD-ROM drive is optional.

- 1 Using a screwdriver, push up the latch and slide out the CD-ROM drive.





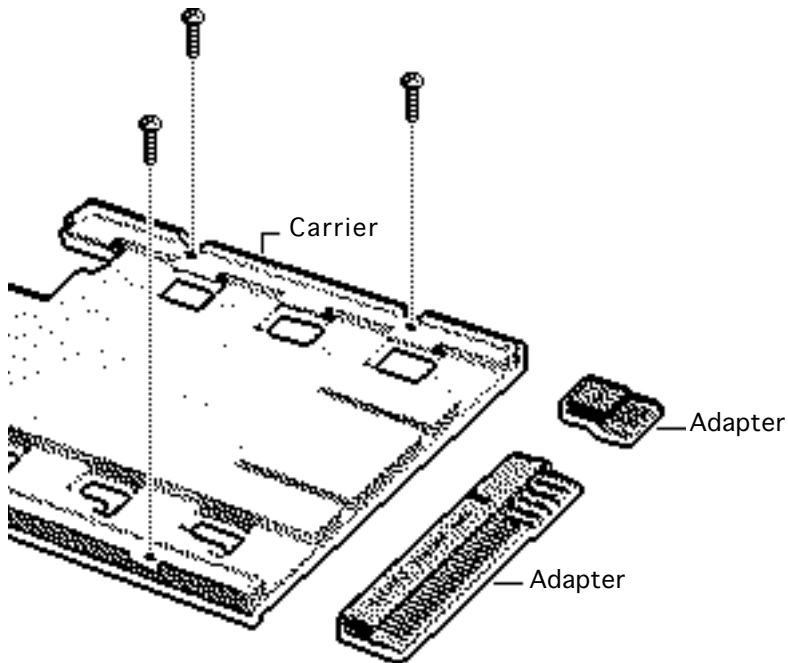
Note: Perform the following steps only if you are replacing the CD-ROM drive.

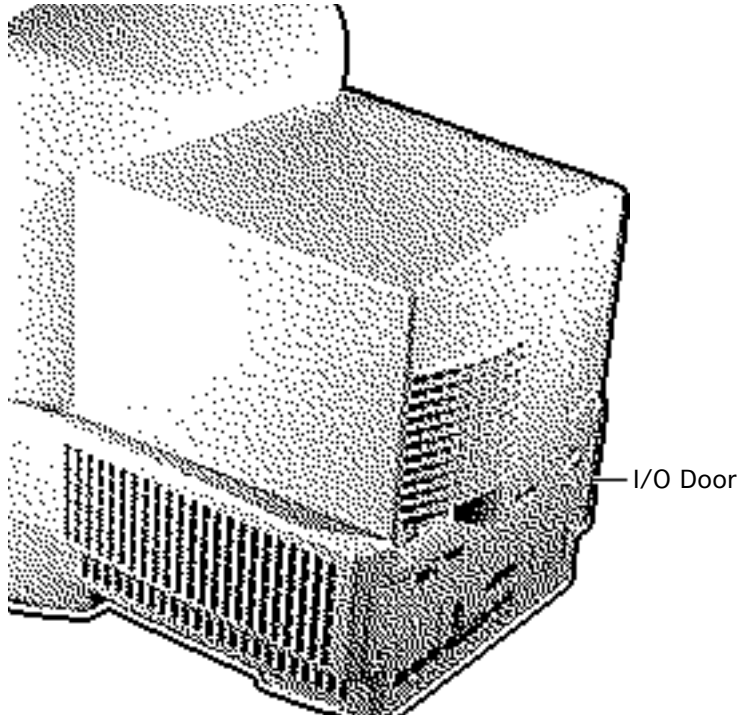
- 2 Remove the four mounting screws.
- 3 Remove the carrier from the CD-ROM drive.





Note: Retain the carrier, screws, and adapters for installation on the new CD-ROM drive.



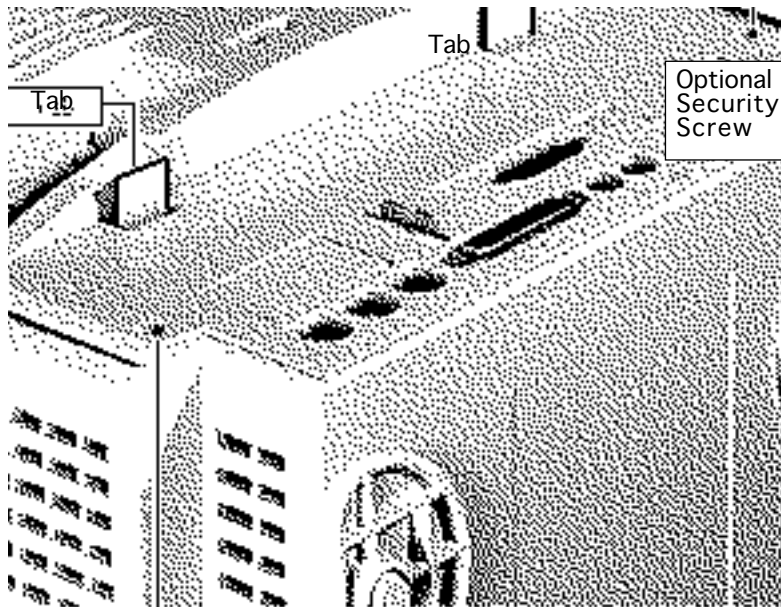


I/O Door

No preliminary steps are required before you begin this procedure.

Caution: To prevent ESD damage to components, wear a grounding wriststrap. Review ESD precautions in Bulletins/Safety.



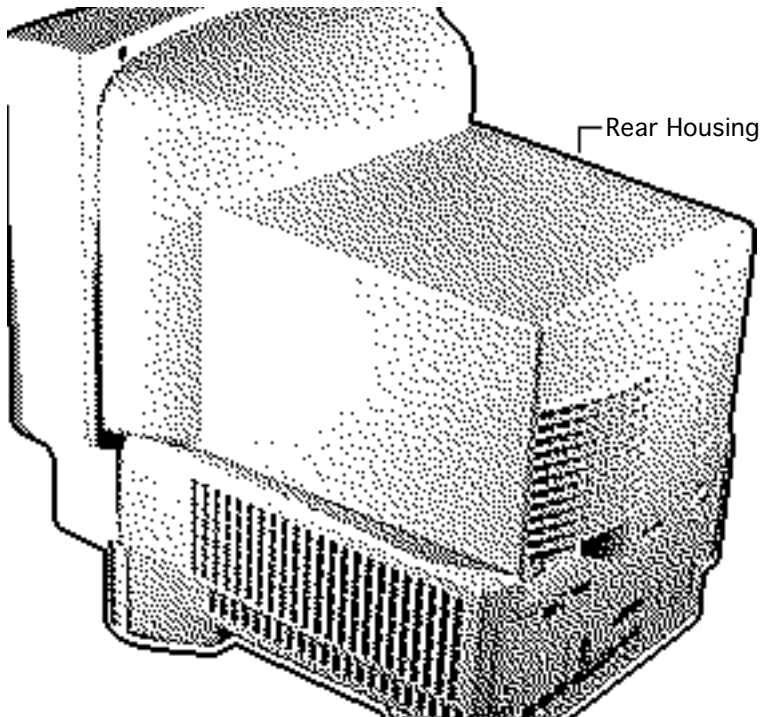


- 1 Place the unit face-down on a clean, soft surface.
- 2 **Note:** If the optional security screws are installed on the I/O door, remove them.
- 3 Pull down the two tabs and remove the I/O door.

Replacement Note: Engage the three interior tabs along the bottom of the I/O door and snap the door closed.

Optional Security Screw





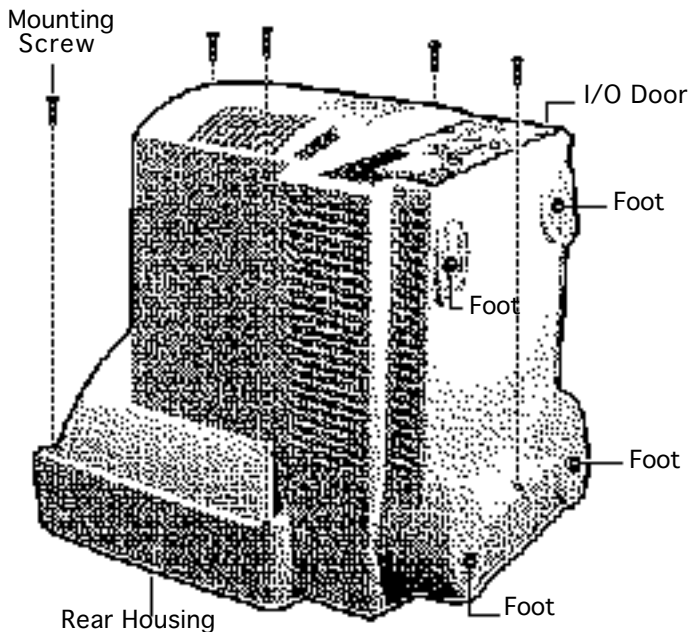
Rear Housing

Before you begin, remove the I/O door (if security screws are installed)

⚠ 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 Place the unit face-down on a clean, soft surface.

Note: If the I/O door is not secured by screws, leave it in place and it will automatically be removed with the rear housing.

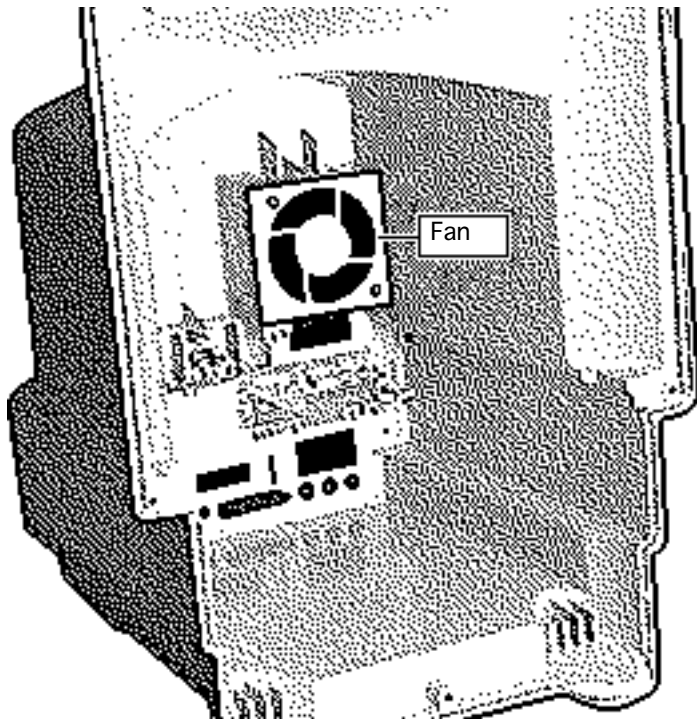
- 2 Using a Torx screwdriver, remove the five mounting screws.
- 3 Pry open the unit with a case cracker and lift off the rear housing.





Replacement Note: If the feet on the rear housing are worn, replace them.





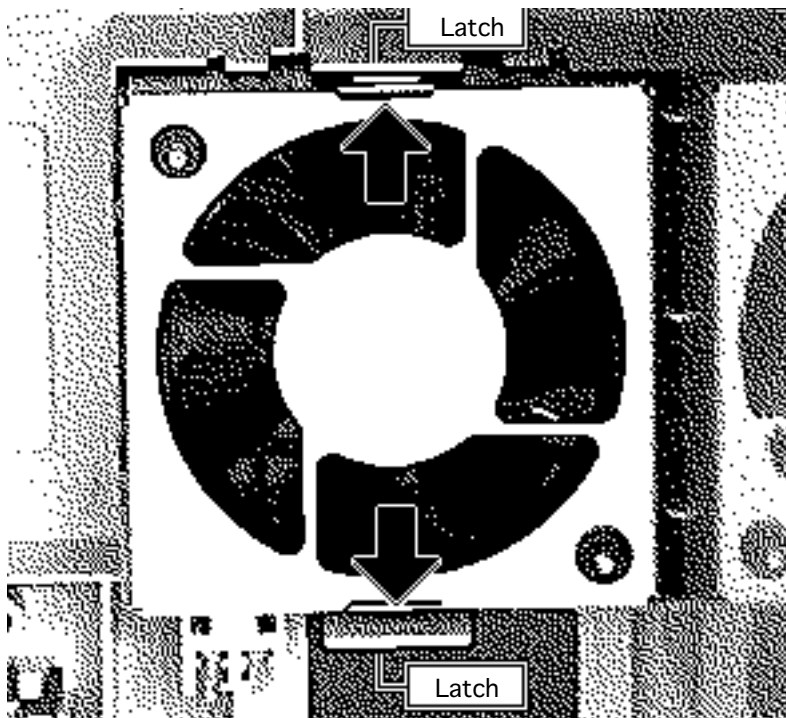
Fan

Before you begin, remove the following:

- I/O door (if security screws are installed)
- Rear housing

⚠ 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.

Push the latches outward and remove the fan assembly.



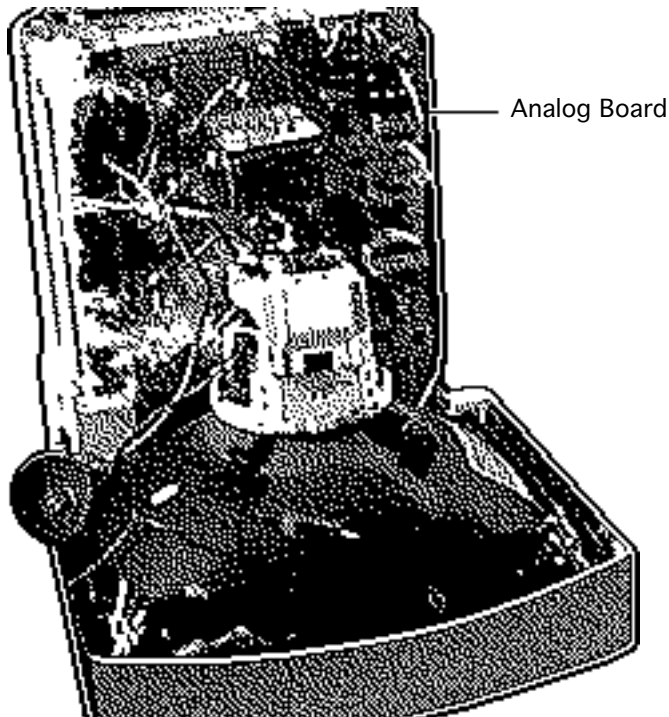


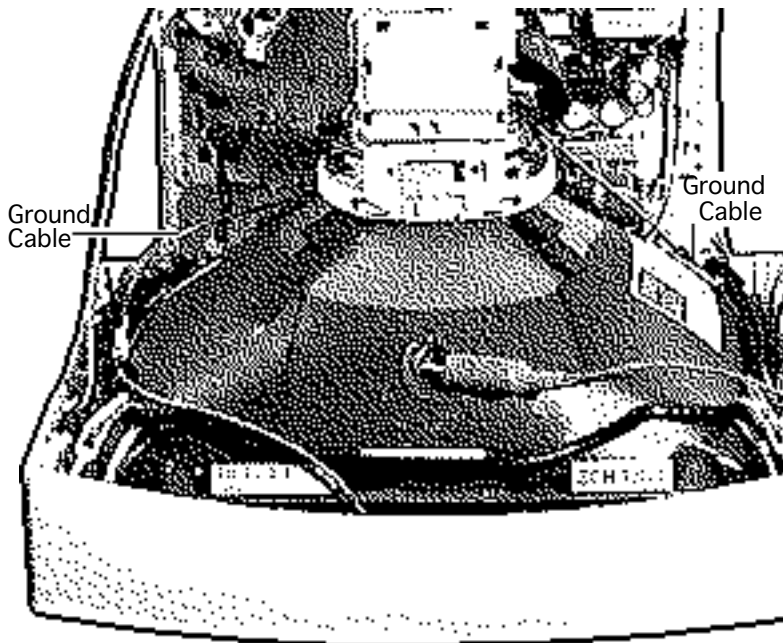
Analog Board

Before you begin, do the following:

- Remove the I/O door (if security screws are installed)
- Remove the rear housing
- 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, discharge the CRT and remove the anode cap.



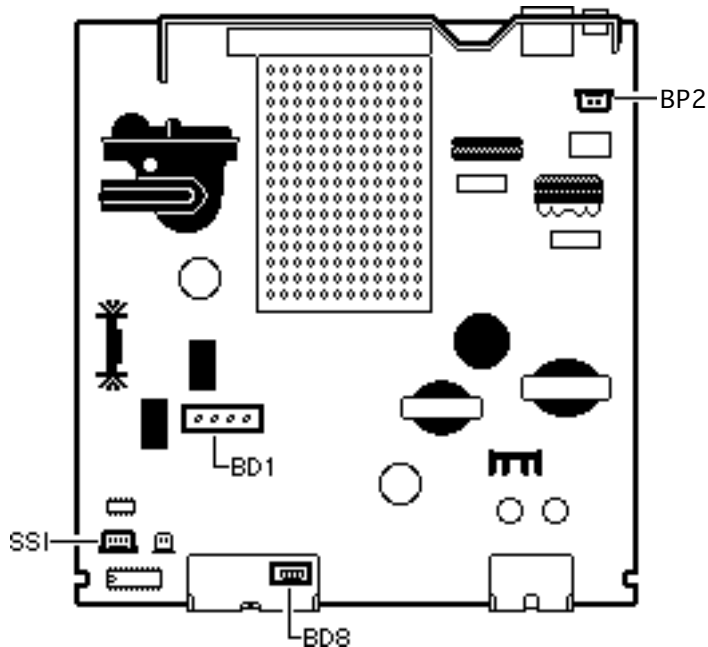


Review CRT safety in Bulletins/Safety. Unlike other monitors, the LC 580 monitor must be face-down when the CRT is discharged.

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

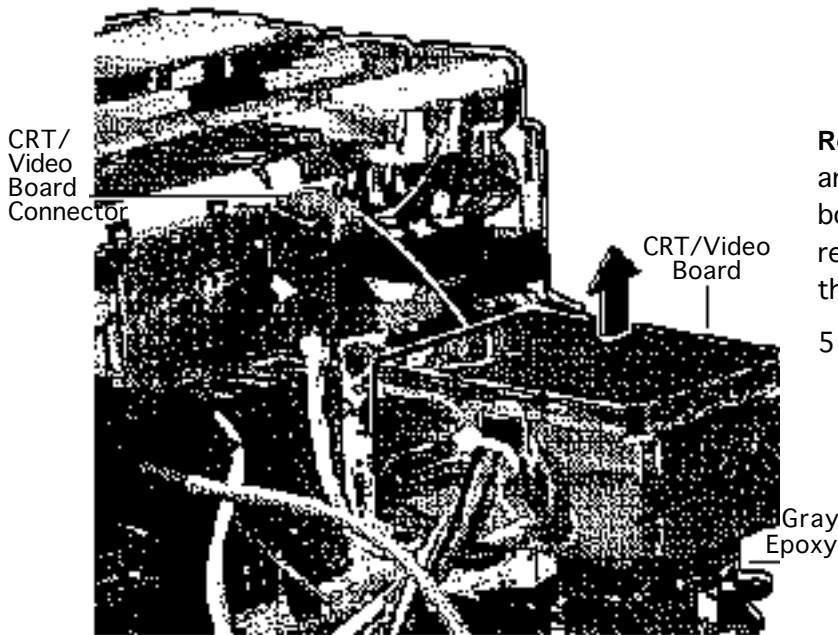
- 1 **Caution:** Place the unit face down on a clean, soft surface. This will prevent stress on the front bezel, which could cause the bezel to crack.
- 2 Disconnect the two ground cables.





- 3 Disconnect the following analog board cables:
- Degauss cable from BP2 (Black and white, with white connector)
 - CRT cable from BD1 (Long and multi-colored, with gray connector)
 - Microphone cable from BD8 (Gray, with white connector)
 - Speaker cable from SSI (Short and multi colored, with brown connector)



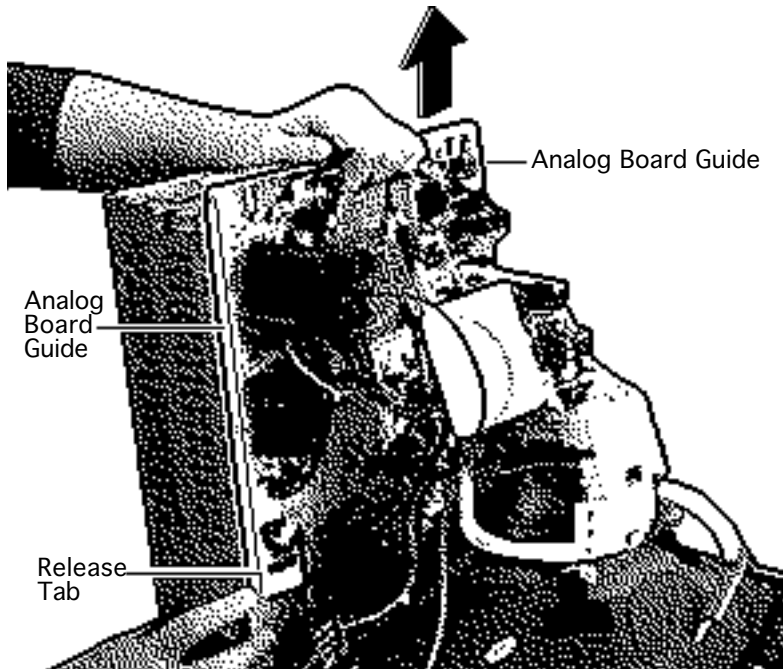


- 4 Remove the degauss wires from the cable retainer, located at HLD3.

Replacement Note: If you are replacing the analog board, remove the cable retainer and reinstall it on the new board.

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



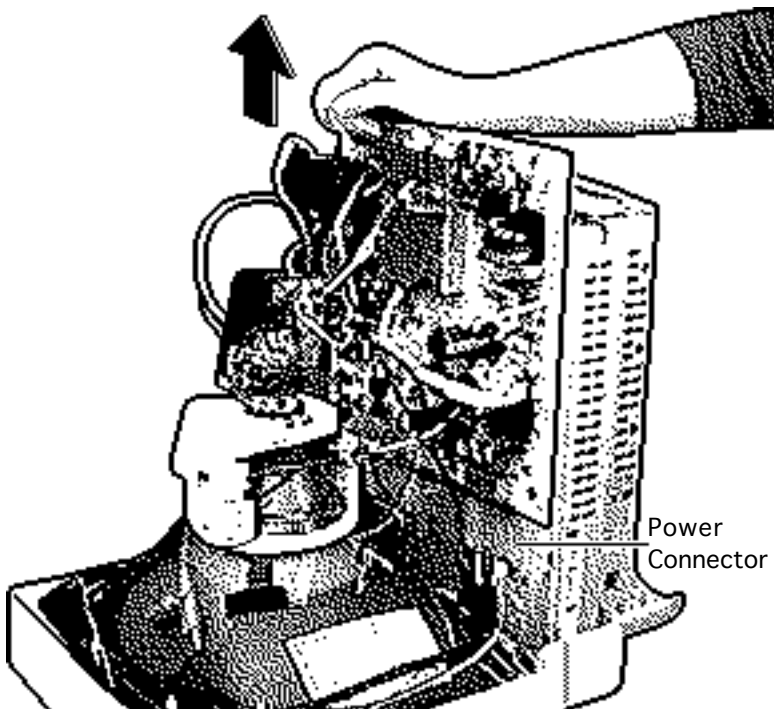


Note: If gray epoxy secures the CRT/video board, cut and peel it off before removing the board.

Remove the CRT/video board from the neck of the CRT.

- 6 Disconnect the small, pink CRT/video board connector.
- 7 **Note:** The analog board is supported by a plastic guide on each side.





- 8 Push in the release tab on one of the analog board guides.
- 9 Grasp the fence and pull the board up slightly.
- 10 Perform the same procedure on the other release tab.
- 11 Pull up the board slightly to expose a connector and a cable.

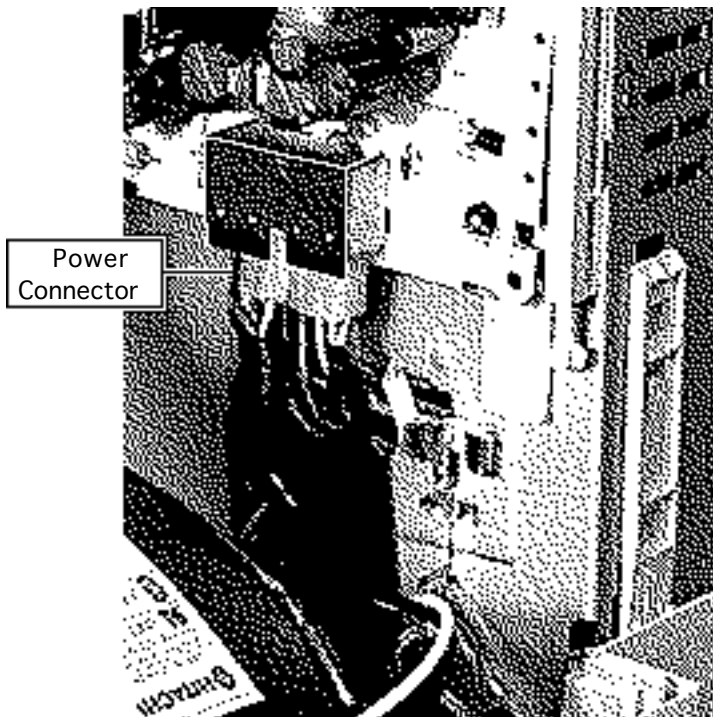


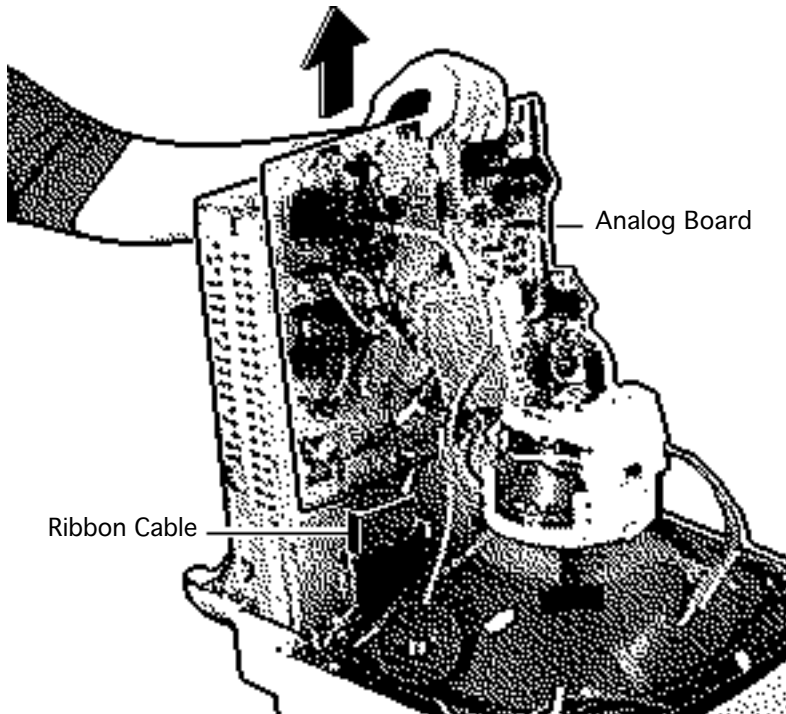


12 Disconnect the white power connector.

Replacement Note: Move aside the loose analog board cables so they do not extend below the board as you slide it in.

Replacement Note: Push the power connector cables fully into the EMI shielding. Failure to do so could cause the wires to wear.





13 Disconnect the ribbon cable.

14 Slide the analog board out of the chassis assembly.

Replacement Note: The ribbon cable hangs on a wire hinge inside the chassis harness assembly. If the cable falls off this hinge, rehang the cable.

Replacement Note: Make sure you connect the ribbon cable and the power connector before sliding the analog board completely in.





Replacement Note:

Perform the cutoff adjustment whenever you replace the analog board. See “Video” in the Adjustments chapter.

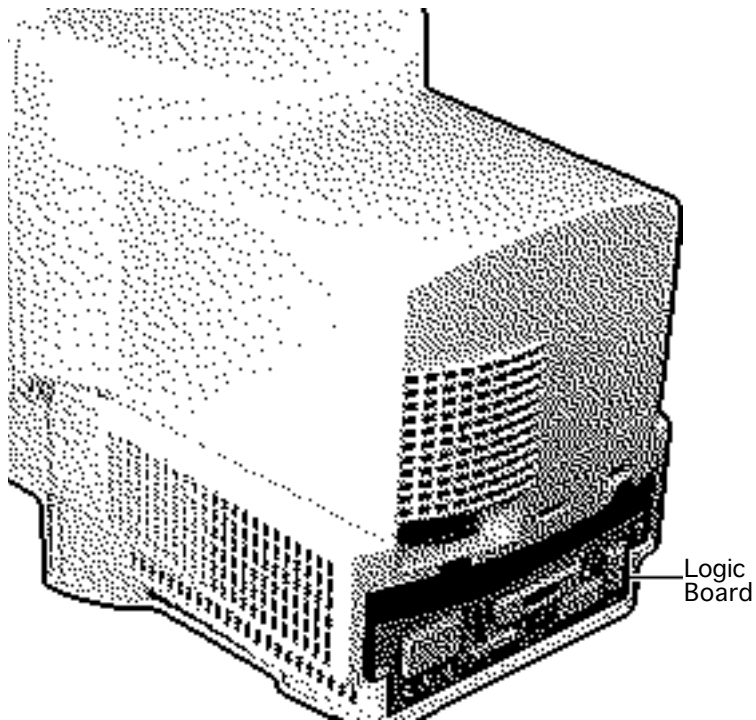


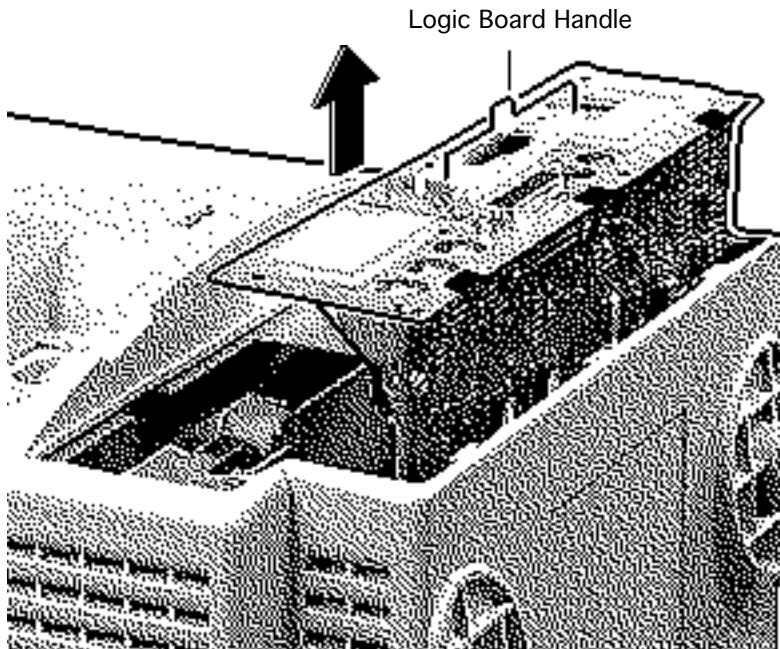


Logic Board

Before you begin, remove the I/O door.

Caution: You can access and remove the logic board merely by removing the I/O door at the rear of the machine. Although upgrading the logic board is now extremely easy, do not neglect to follow proper ESD precautions: Use a grounded workbench pad, and always wear a grounding wriststrap.





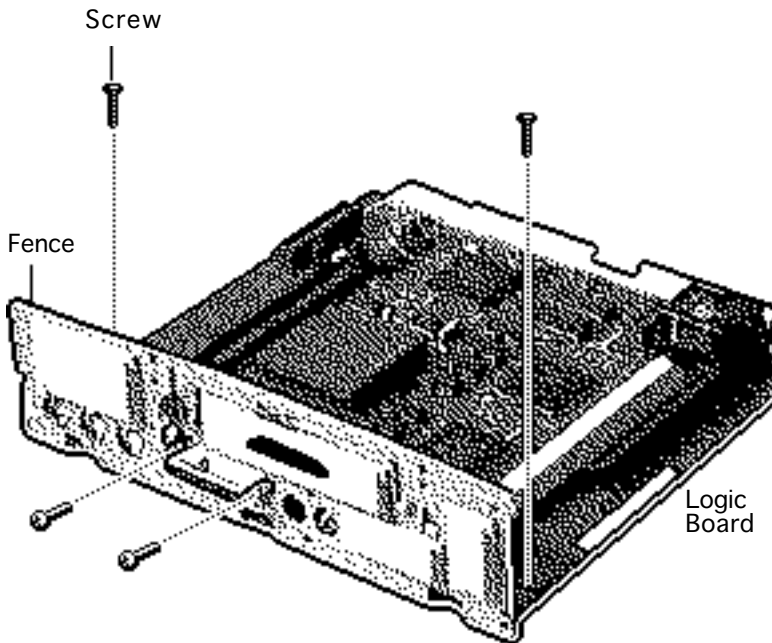
Logic Board Handle

Note: If you are replacing a logic board that has one SIMM slot, replace it with P/N 661-0158. If you are replacing a logic board that has two SIMM slots, replace it with P/N 661-1114.

- 1 Place the unit face-down on a clean, soft surface.
- 2 Swing the logic board handle out from its storage position and pull out the logic board.

Replacement Note: Snap the handle into its slot.

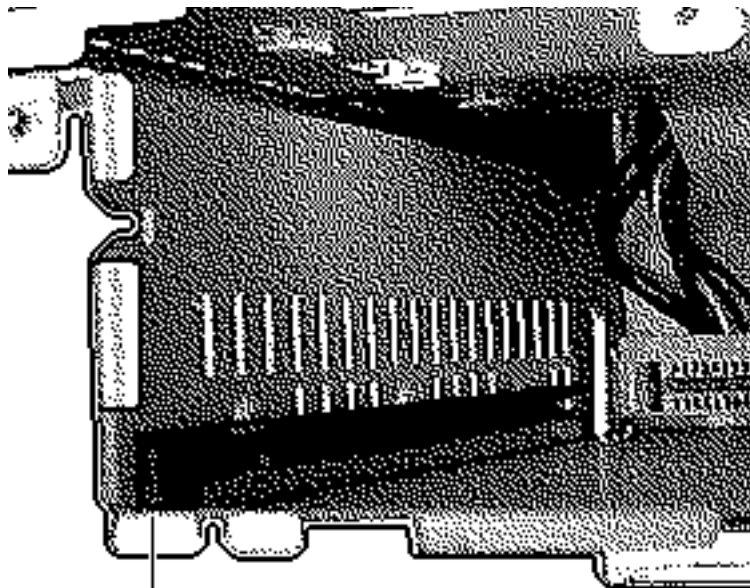




Replacement Note: If you replace the logic board, make sure the battery cable on the new board is connected.

- 3 Remove the screws that attach the fence to the logic board.
- 4 Remove the fence.



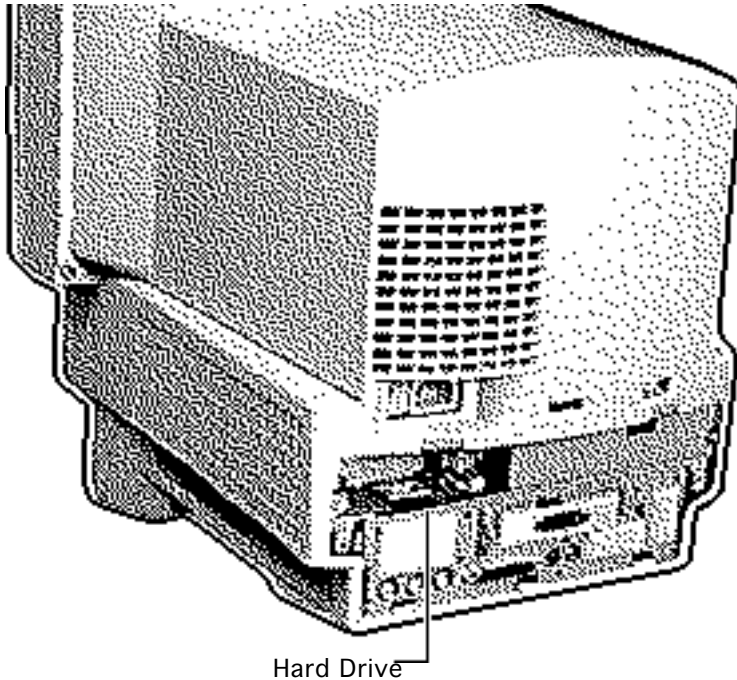


Logic Board Rail

Chassis Harness
Assembly

Replacement Note: If the logic board rails are damaged, replace them. You will need to remove the rear housing in order to access the rails.



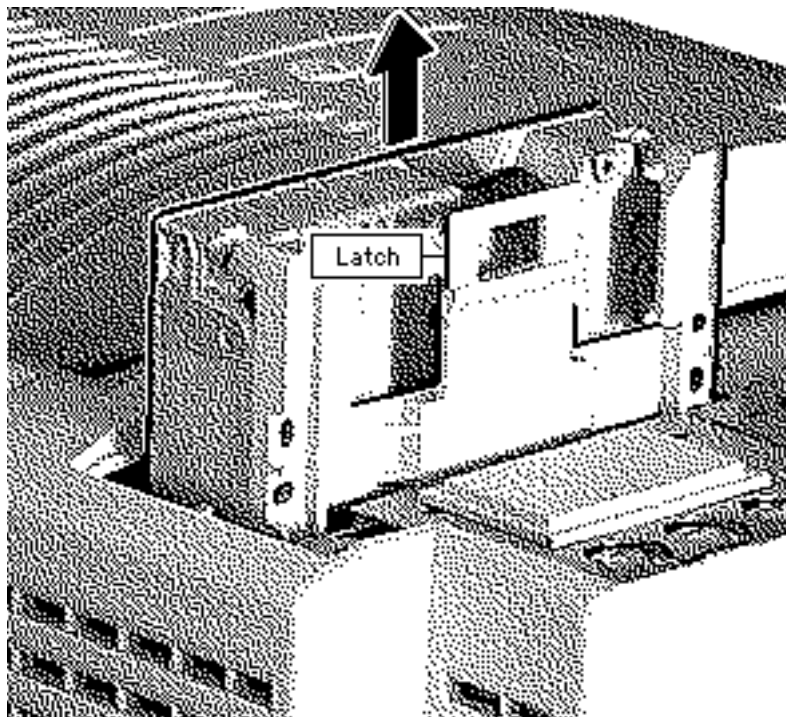


Hard Drive

Before you begin, remove the I/O door.

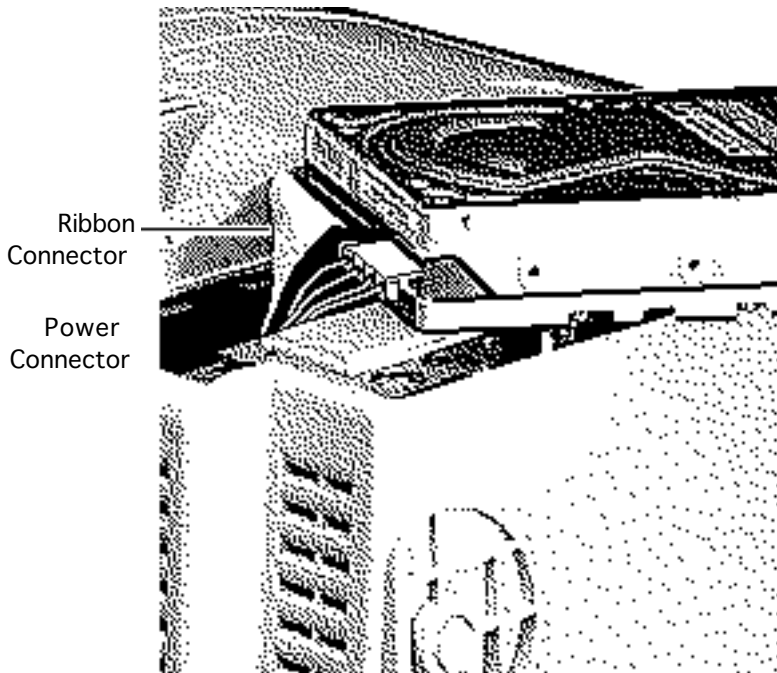
Caution: You can access and remove the hard drive merely by removing the I/O door at the rear of the machine. Although upgrading the hard drive is now extremely easy, do not neglect to follow proper ESD precautions: use a grounded workbench pad, and always wear a grounding wriststrap.





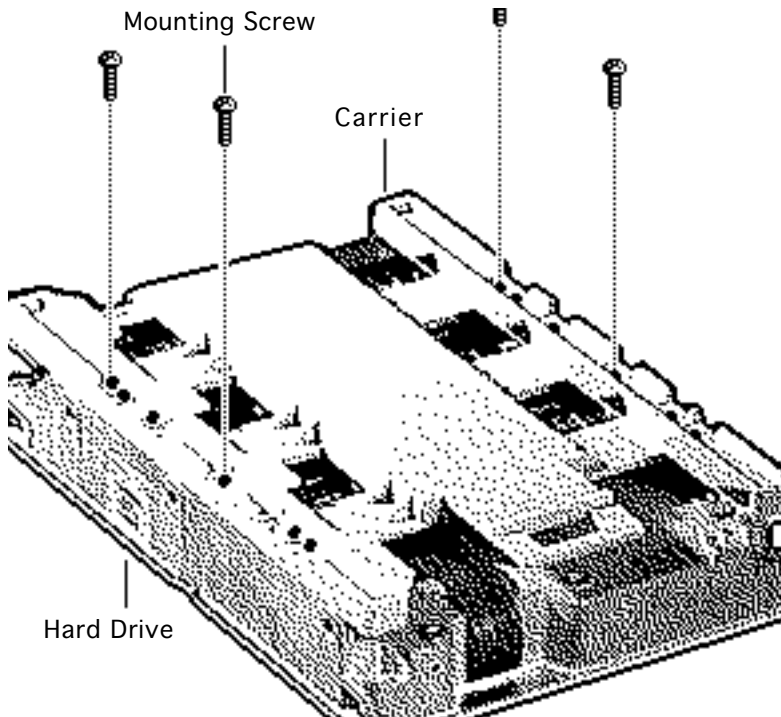
- 1 Place the unit face-down on a clean, soft surface.
- 2 Push the latch and slide out the hard drive.





- 3 Disconnect the ribbon connector and the power connector.





Note: Perform the following steps only if you are replacing the hard drive.

Note: Notice the placement of the carrier and screws before removing them. Retain the carrier and screws and install them on the new hard drive.

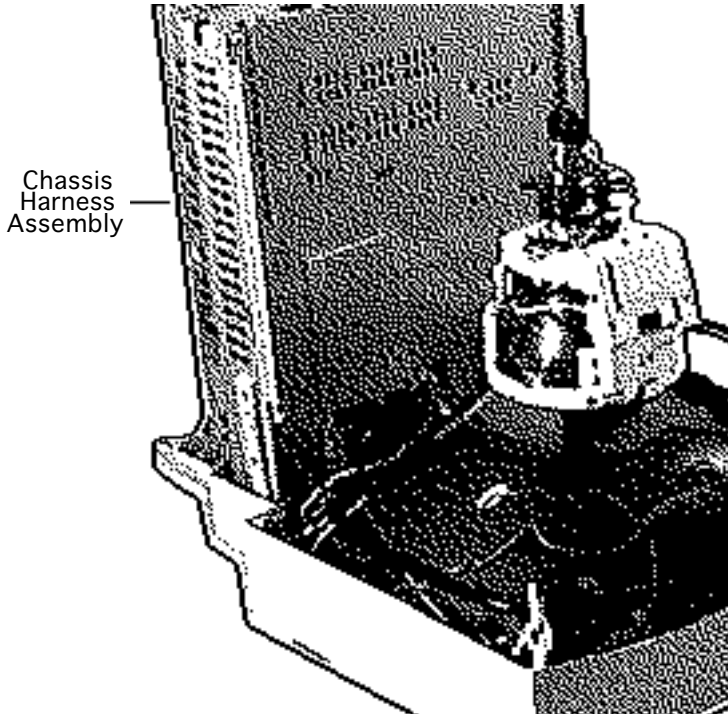
- 4 Remove the four screws.
- 5 Remove the carrier from the hard drive.





Replacement Caution: Some hard drives have jags near the cable connector that can rub and, therefore, damage the cable. When reinstalling one of these drives, fold the cable and slide it in so that it precedes the drive into the chassis harness assembly.





Chassis Harness Assembly

Before you begin, do the following:

- Remove the drive bezel
- Remove the CD-ROM drive (if installed)
- Remove the floppy drive
- Remove the I/O door (if security screws are installed)
- Remove the rear housing
- Remove the hard drive
- Remove the logic board
- Discharge the CRT
- Remove the anode cap



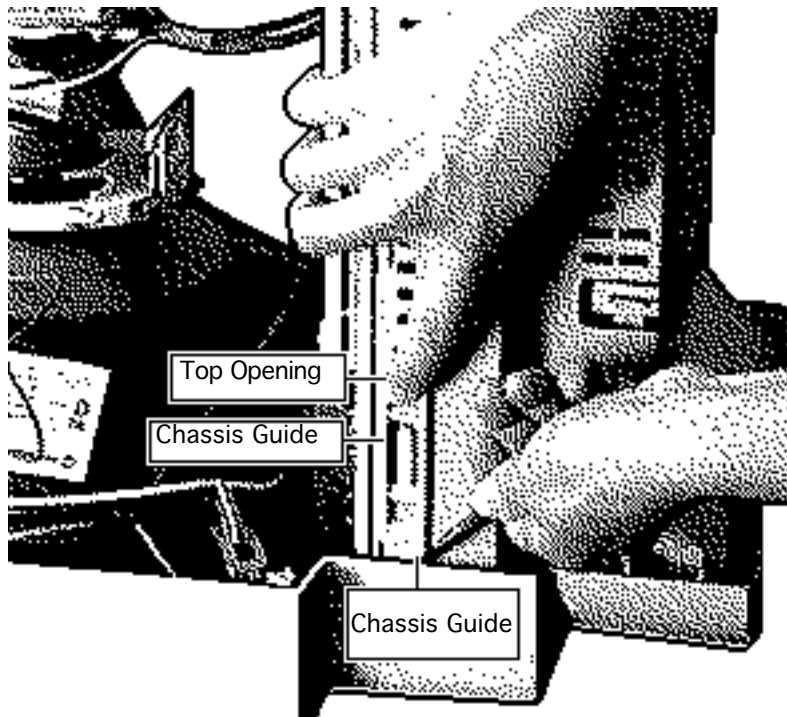


- Remove the analog board

⚠ 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.





Caution: Place the unit face down on a clean, soft surface. This will prevent stress on the front bezel, which could cause the bezel to crack.

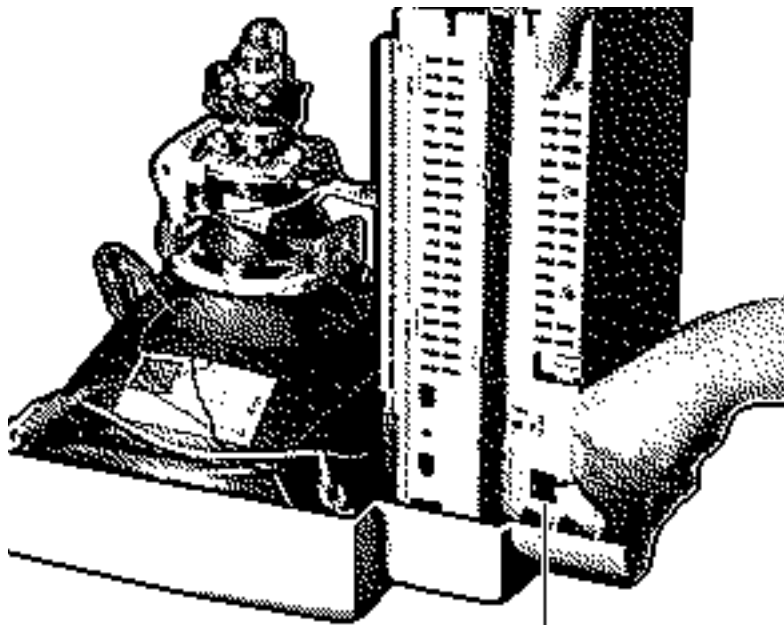
Note: A chassis guide and a plastic tab secure each side of the chassis to the front housing. Before lifting off the chassis, you must remove the guides and release the tabs.





- 1 Using a flat-blade screwdriver, press in the bottom of the chassis guide and release its latch.
- 2 Without removing the screwdriver, place a finger in the top opening and firmly slide the guide up and off.
- 3 Perform the same procedure on the other chassis guide.

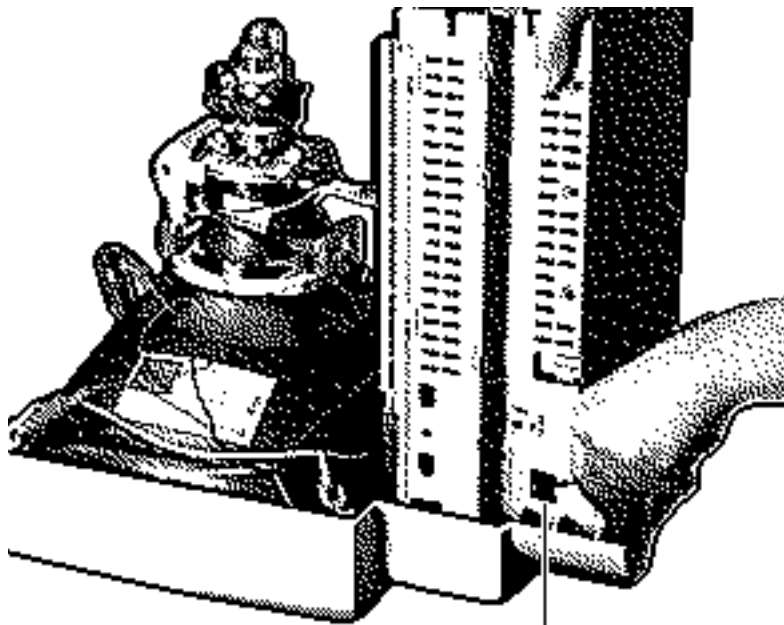




Chassis Opening
for Interior Tab

- 4 Slide your hand from the far side of the assembly to the section closest to you. Locate the plastic tab hidden inside the chassis opening.
- 5 Insert a flat-blade screwdriver into the chassis opening. Push in and release the interior tab.
- 6 Pull the chassis up slightly and hold it in that position.
- 7 Perform the same procedure on the other side.





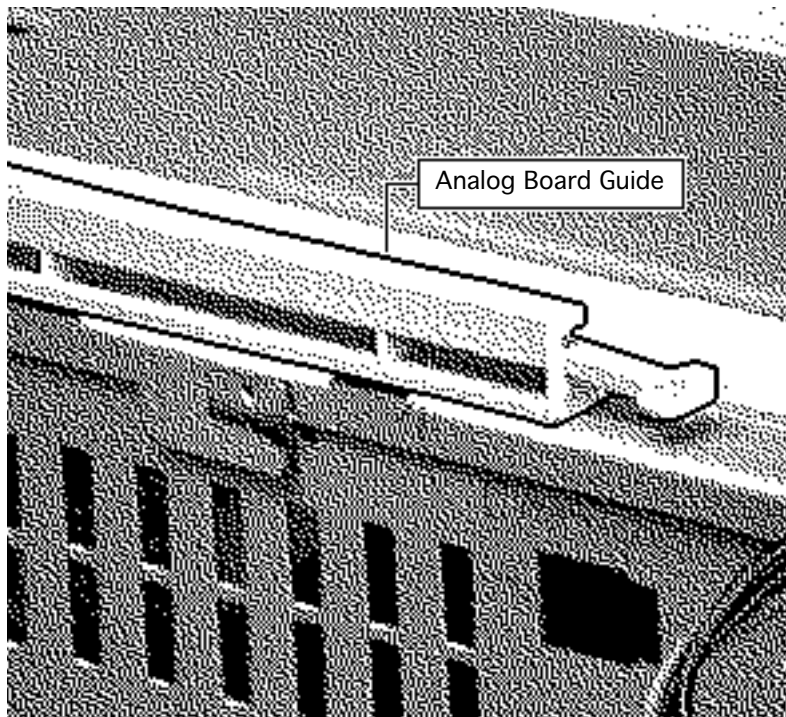
Chassis Opening
and Interior Tab

- 8 Lift off the chassis harness assembly.

Replacement Note: To prevent the speaker cable from getting caught beneath the chassis, move the cable to the side.

Replacement Note: Align the chassis opening with the plastic tab on the front housing.





Replacement Note: If the analog board guides are damaged, replace them. Before removing them, notice how they are installed, since there is a left-side and a right-side guide. Insert a flat-blade screwdriver under the analog board guide and push the guide up. Slide the guide forward and remove it.

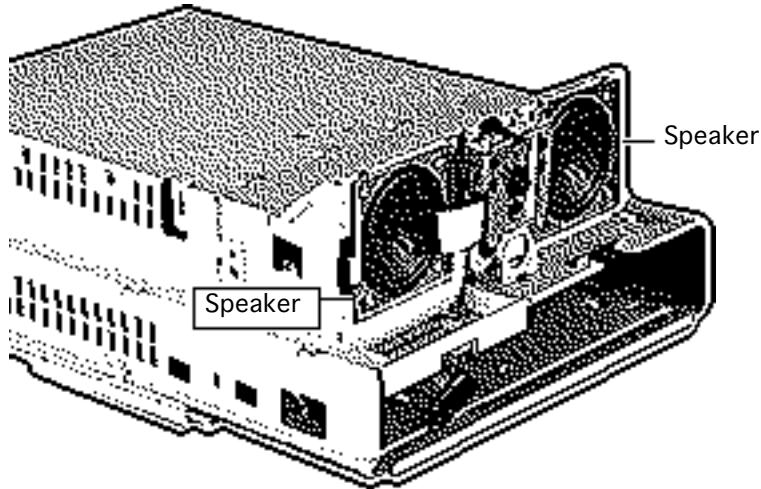


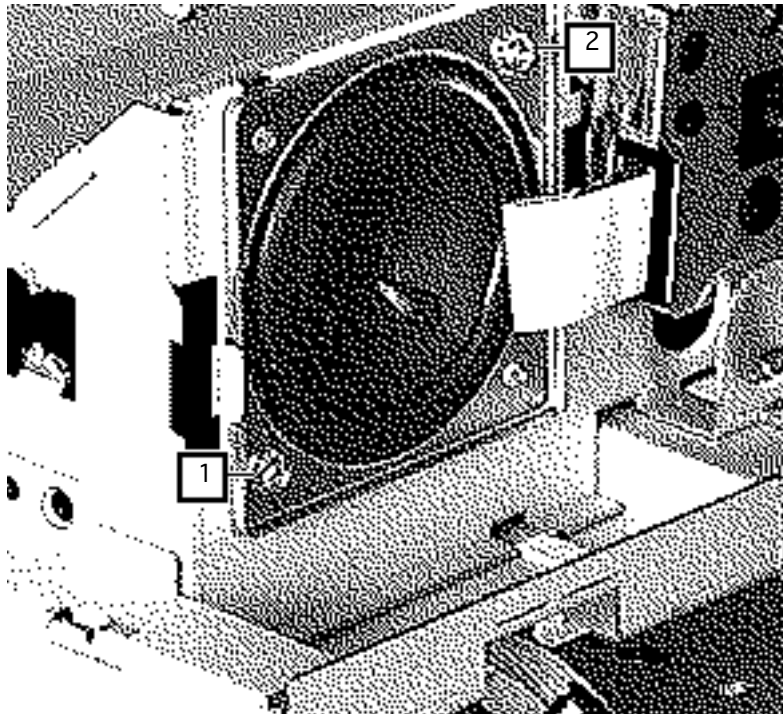


Speakers

Before you begin, do the following:

- Remove the drive bezel
- Remove the CD-ROM drive (if installed)
- Remove the floppy drive
- Remove the I/O door (if security screws are installed)
- Remove the rear housing
- Remove the hard drive
- Remove the logic board
- Discharge the CRT
- Remove the anode cap
- Remove the analog board



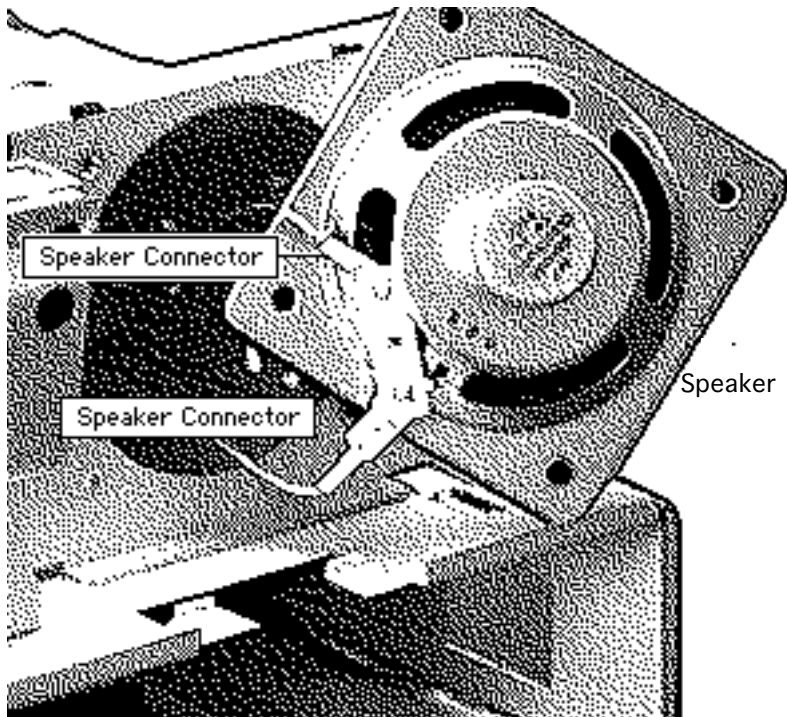


- Remove the chassis harness assembly

Note: Perform the following steps on each speaker.

- 1 Remove two screws from the speaker.





- 2 Disconnect the speaker connectors and remove the speaker.

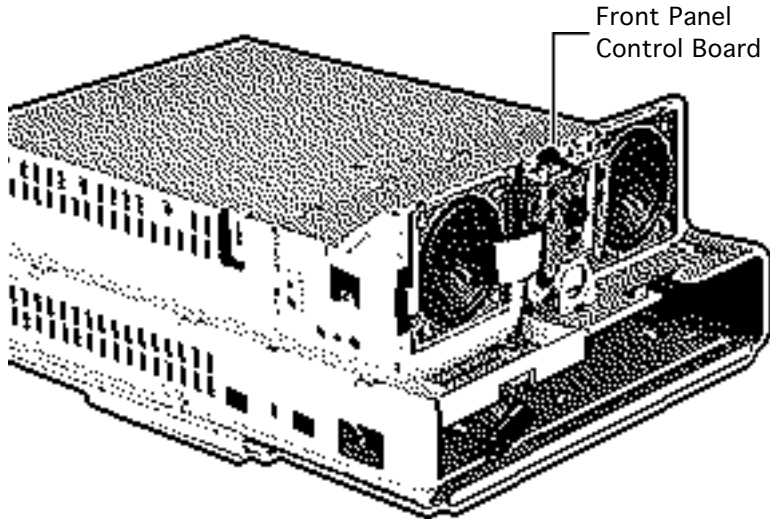


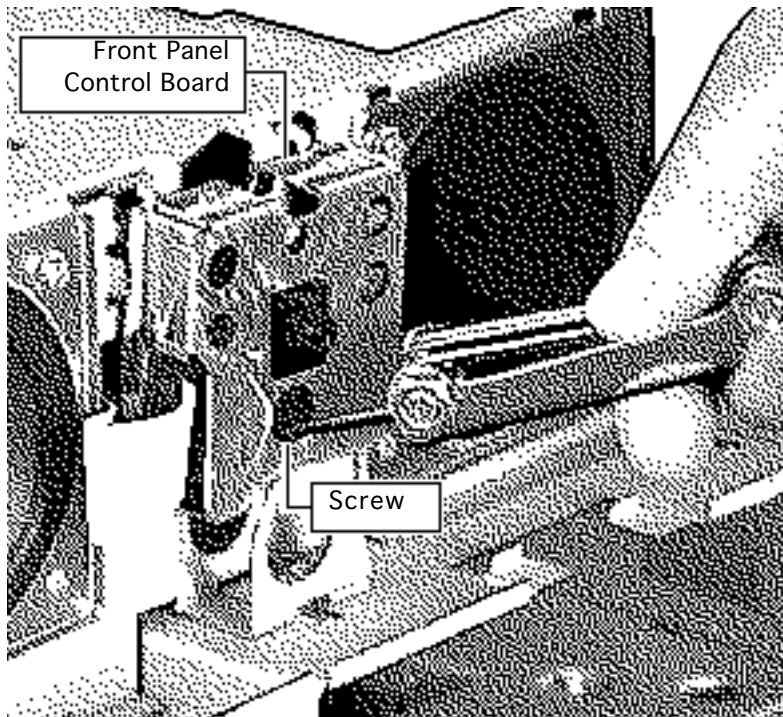


Front Panel Control Board

Before you begin, do the following:

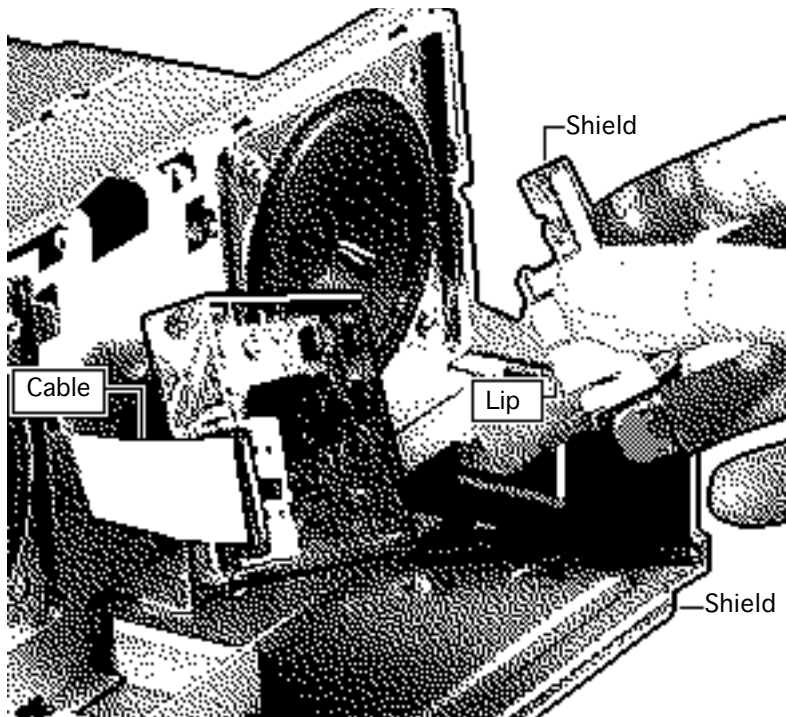
- Remove the drive bezel
- Remove the CD-ROM drive (if installed)
- Remove the floppy drive
- Remove the I/O door (if security screws are installed)
- Remove the rear housing
- Remove the hard drive
- Remove the logic board
- Discharge the CRT
- Remove the anode cap





- Remove the analog board
 - Remove the chassis harness assembly
- 1 Remove the screw.
 - 2 Lift off the front panel control board.





- 3 **Note:** Notice how the shield is installed—with the lip covering the cable—before removing it.

Remove the shield from the board and disconnect the cable.

Replacement Note: Make sure you connect the cable before installing the shield.

Replacement Note: Slide the board onto the two front metal tabs on the chassis. Push the board firmly into place and install the screw.

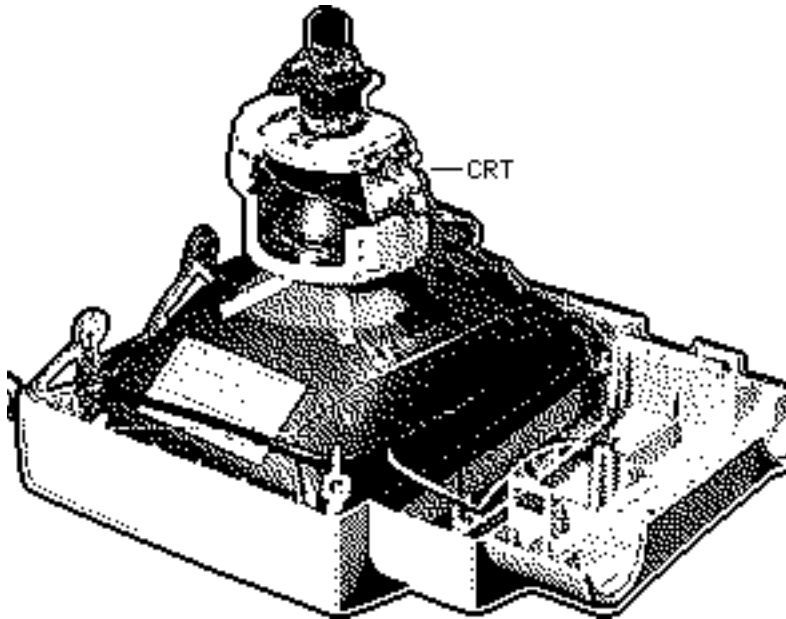




CRT

Before you begin, do the following:

- Remove the drive bezel
- Remove the CD-ROM drive (if installed)
- Remove the floppy drive
- Remove the I/O door (if security screws are installed)
- Remove the rear housing
- Remove the hard drive
- Remove the logic board
- Discharge the CRT
- Remove the anode cap
- Remove the analog board





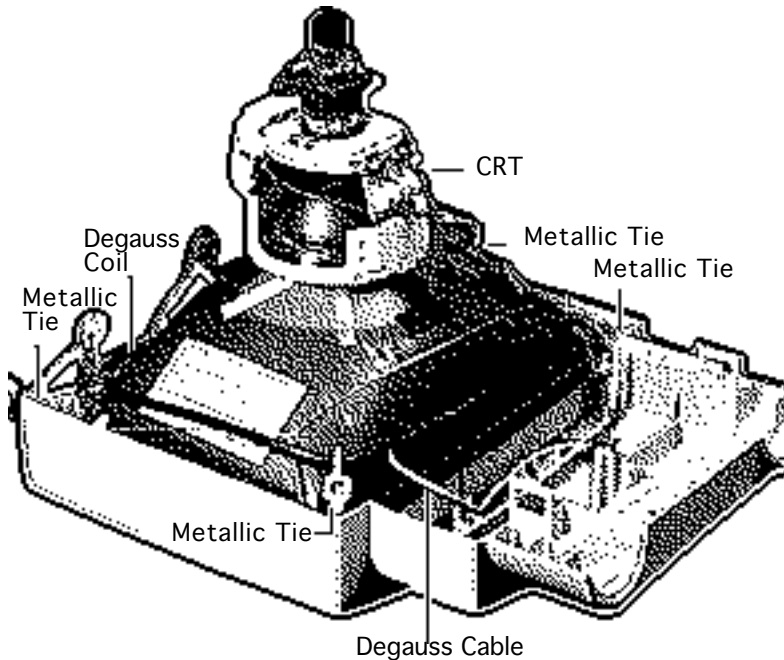
- Remove the chassis harness assembly

⚠ 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 Place the unit face-down on a clean, soft surface.



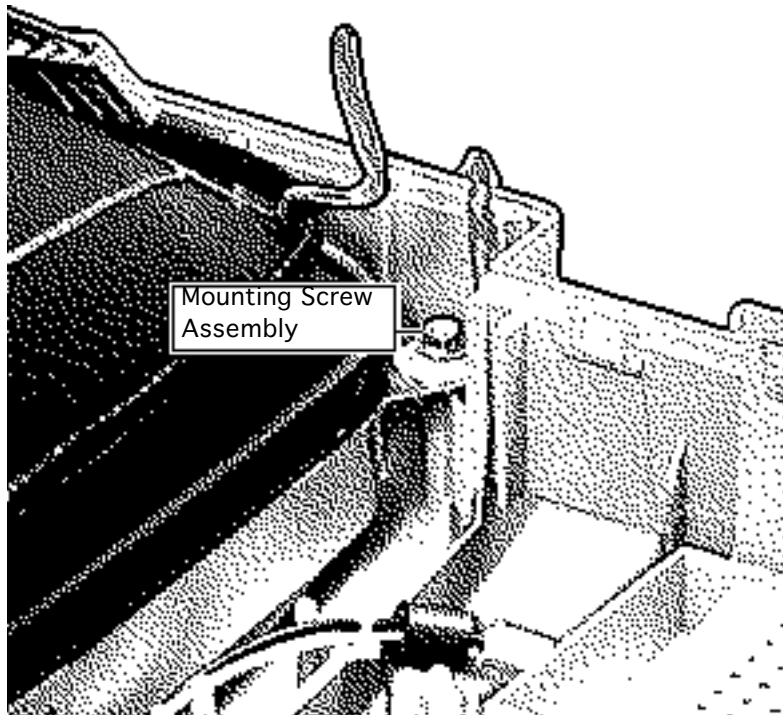


- 2 Unhinge the four metallic ties and remove the degauss coil.

Replacement Note: Replace the degauss coil so that its cable hangs on the left side.

Replacement Note: Re-hinge the metallic ties snugly so they hold the CRT firmly in place.





- Note:** When you remove the CRT, place it on a clean, soft surface.

Using a 5/16 ratchet, remove the four mounting screw assemblies and carefully lift out the CRT.

Replacement Note: If you are replacing the CRT, retain the degauss coil and mounting screw assemblies and install them on the new CRT. These parts are not packaged with the new CRT





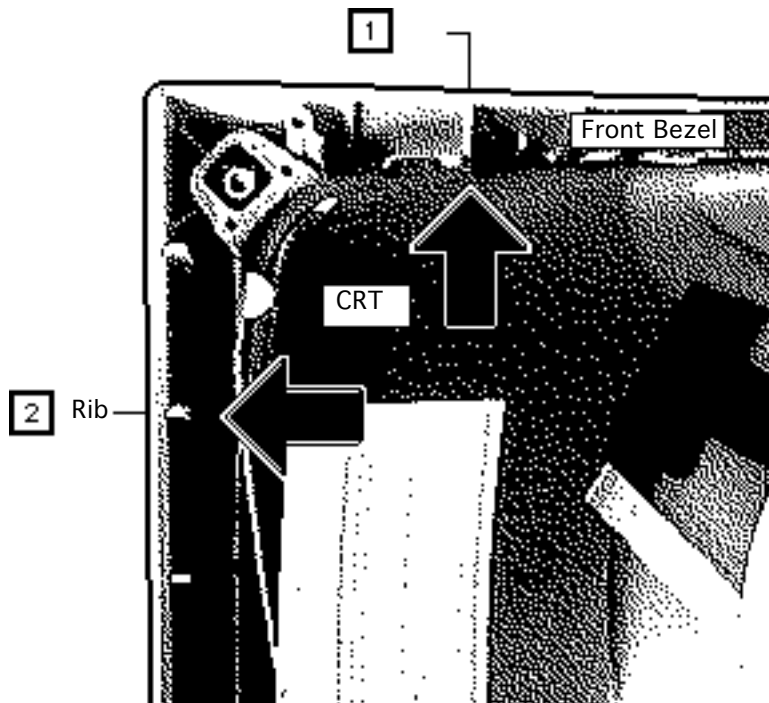
and are not available individually.

Replacement Note: If the rubber washers on the front housing are worn, replace them.

Replacement Note: Before installing the CRT, be sure the microphone cable is not caught under the CRT.

Replacement Note: Make sure the CRT is replaced correctly, with the anode cap near the top of the front bezel.



**Replacement Caution:**

Failure to install the CRT correctly will make it difficult to perform video adjustments. To align the CRT, push it against the second rib in the front bezel top. Next, slide the CRT against the second rib in the bezel side. Holding the CRT firmly in place, install a mounting screw assembly, which will partially secure the CRT to the bezel. Install mounting assemblies in the remaining corners.

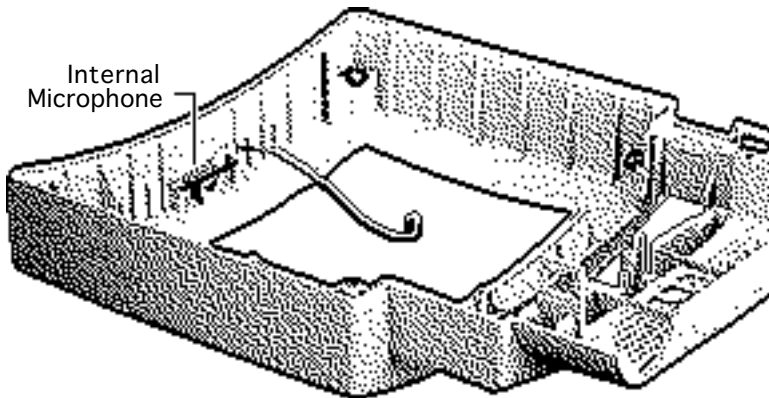




Internal Microphone

Before you begin, do the following:

- Remove the drive bezel
- Remove the CD-ROM drive (if installed)
- Remove the floppy drive
- Remove the I/O door (if security screws are installed)
- Remove the rear housing
- Remove the hard drive
- Remove the logic board
- Discharge the CRT
- Remove the anode cap



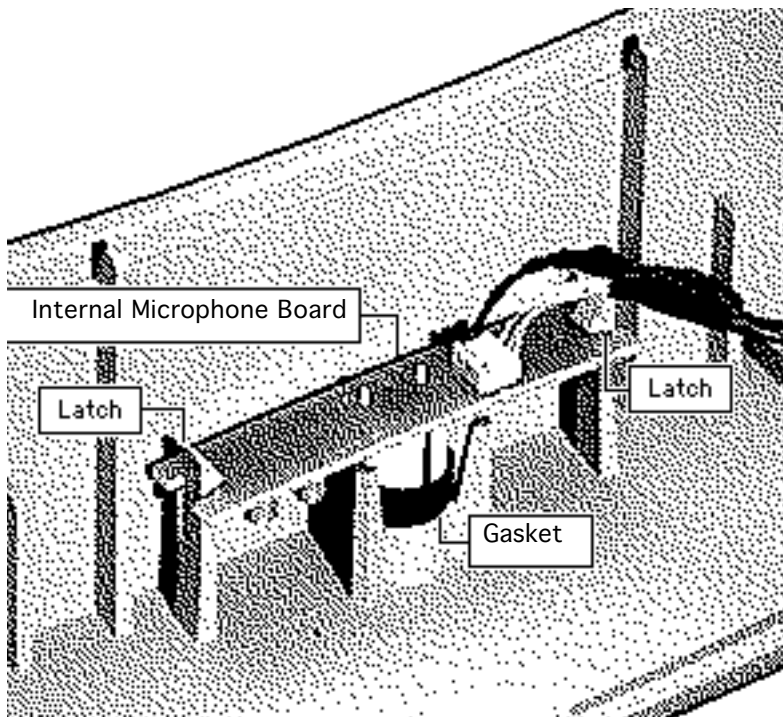


- Remove the analog board
- Remove the chassis harness assembly
- Remove the CRT

⚠ 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.





Push out the two latches and remove the internal microphone board and the rubber microphone gasket.

Replacement Caution:

Failure to install the rubber gasket snugly could cause excess noise through the microphone.

Replacement Note: Install the microphone board so the cable is on the correct side of the front bezel.

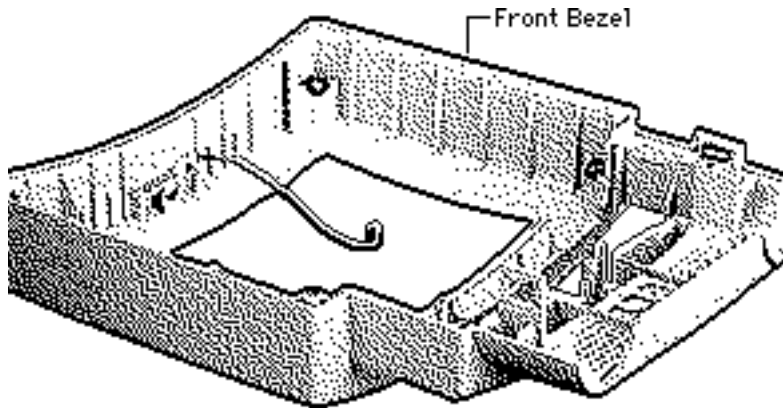




Front Bezel

To remove the front bezel, do the following:

- Remove the drive bezel
- Remove the CD-ROM drive (if installed)
- Remove the floppy drive
- Remove the I/O door (if security screws are installed)
- Remove the rear housing
- Remove the hard drive
- Remove the logic board
- Discharge the CRT
- Remove the anode cap
- Remove the analog board





- Remove the chassis harness assembly
- Remove the CRT
- Remove the internal microphone

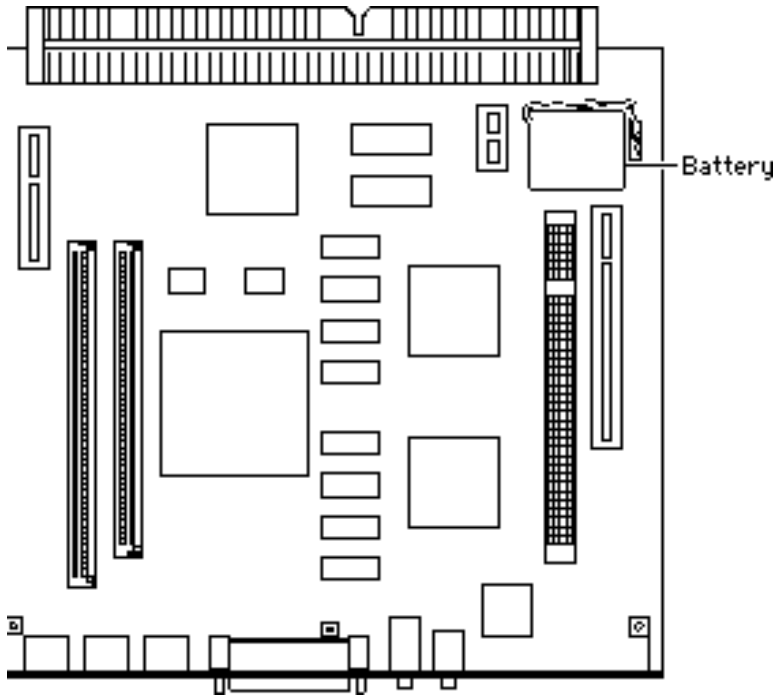




Additional Procedures

LC 580/Performa 580CD





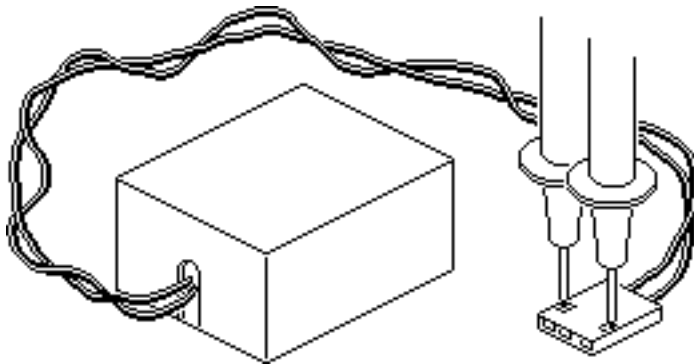
Battery Verification

Before you begin, remove the following:

- I/O door
- Logic board
- Battery

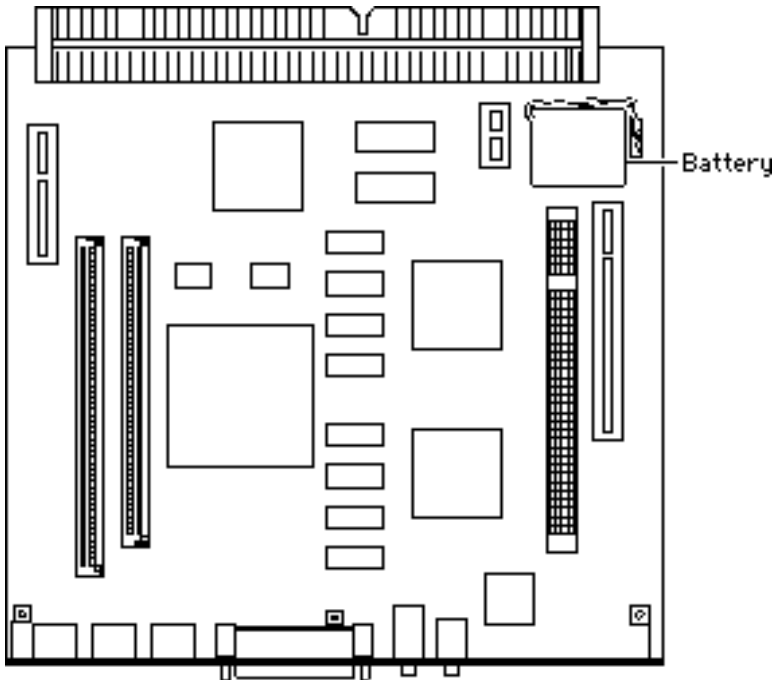
Caution: Review the ESD precautions in Bulletins/ Safety.





- 1 Set the voltmeter to the 10 volts DC scale.
- 2 Hold the positive probe of the voltmeter to the positive end of the battery and the negative probe to the negative end of the battery.
- 3 If the battery voltage is below 3.0 volts, replace the battery. Refer to “Battery Replacement” in this chapter.





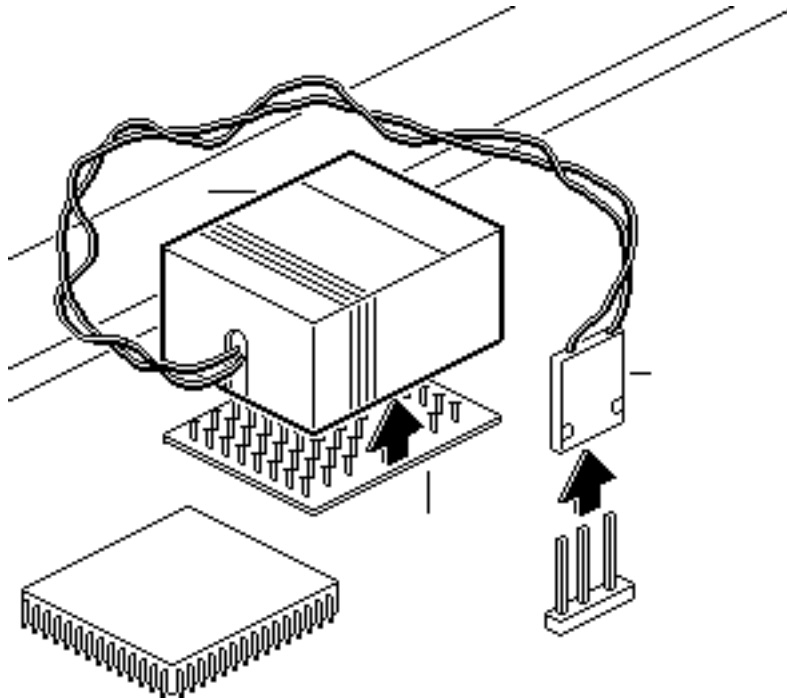
Battery Replacement

Before you begin, remove the following:

- I/O door
- Logic board
- Battery

Caution: Review the ESD precautions in Bulletins/ Safety.





- 1 Pull up and disconnect the connector.
- 2 Pull up and remove the battery from its hook-and-loop base.





Adjustments

LC 580/Performa 580CD





Light Meter Setup

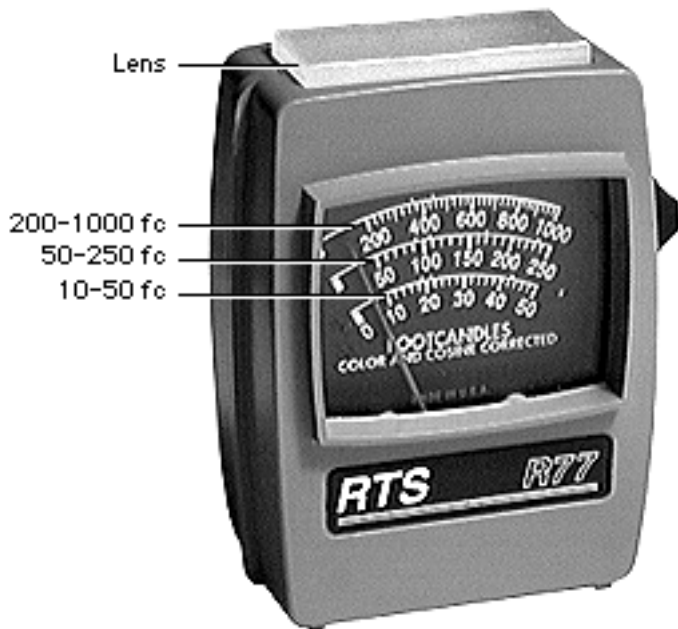
This topic covers setup for three light meter models: R77, L-248, and 246. Model R77 (Apple part number 076-0310) is the newest model available.

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





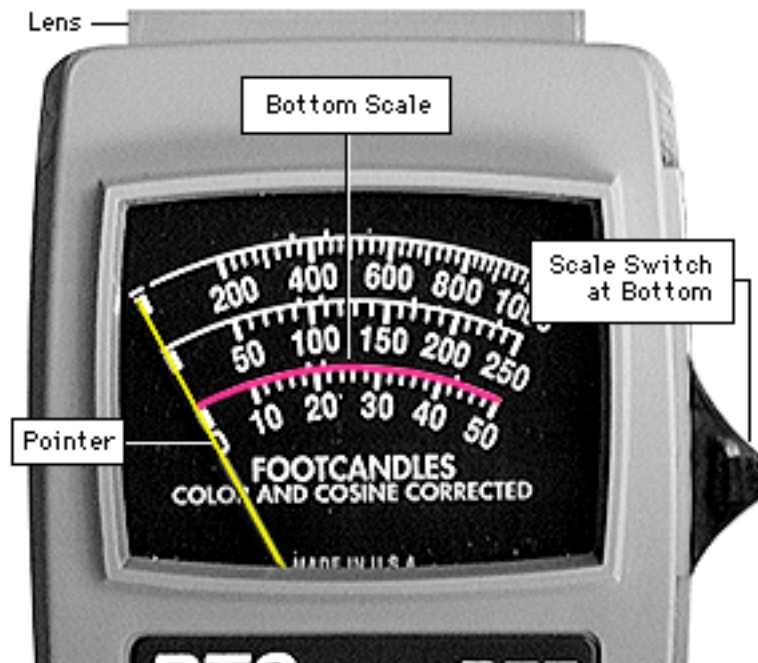
from the lens.

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.





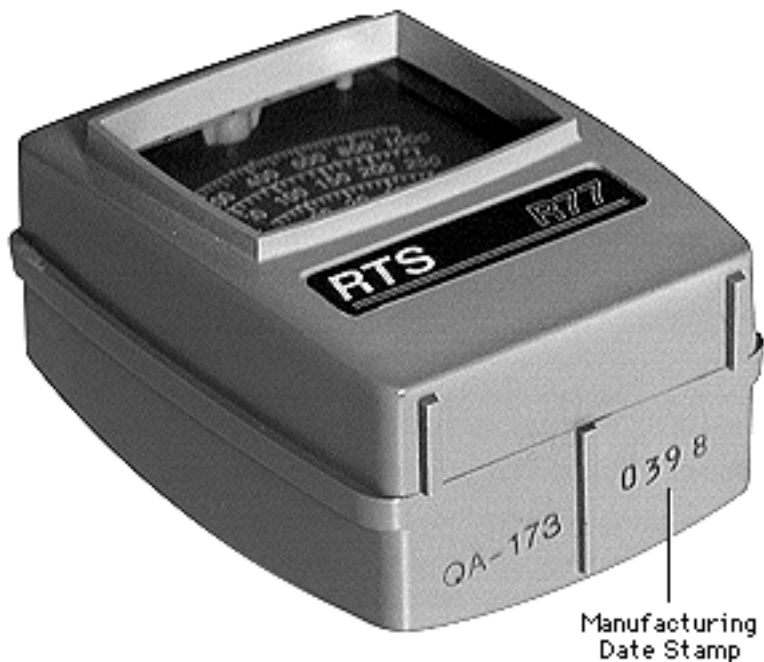
To measure a display screen's luminance,

- 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).

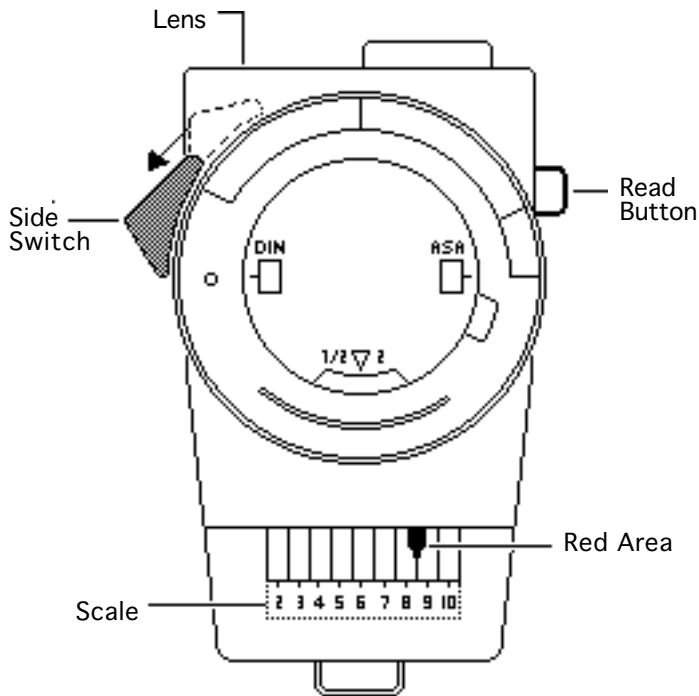
Caution: Dropping the meter can permanently damage its accuracy. A shock-damaged meter might read incorrectly or its pointer may not drop to zero.

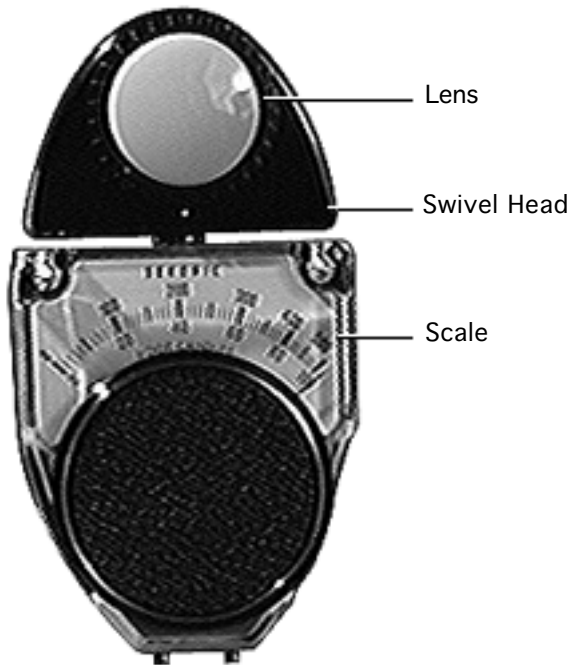




Model L-248

- 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.

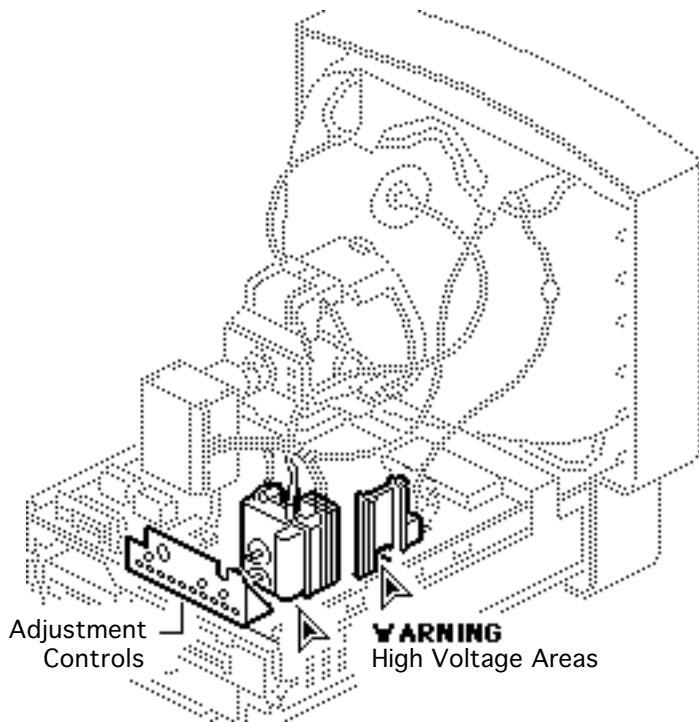




Model 246

- 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.





Geometry

Before you begin, remove the rear housing.

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

Caution: When placed upright without the rear housing, the front bezel becomes vulnerable to breakage. Avoid



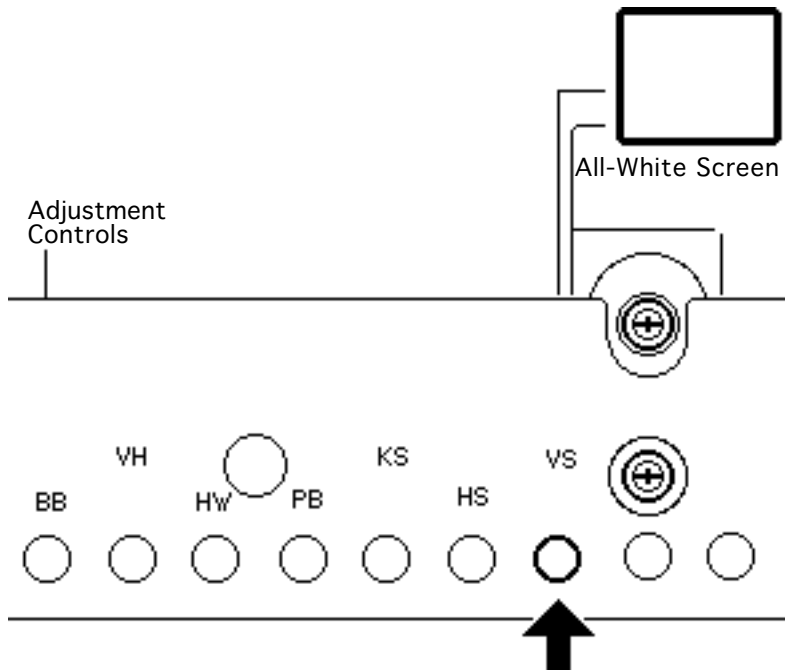


overhandling the unit in this condition.

Note: The controls on this monitor require a small hex-head plastic tool to make adjustments. If the tool is long, it will be too flexible, which will make fine adjustments difficult. Use a short hex-head plastic tool to minimize flexing.

⚠ Warning: Do not use metal alignment tools—they are a shock hazard.



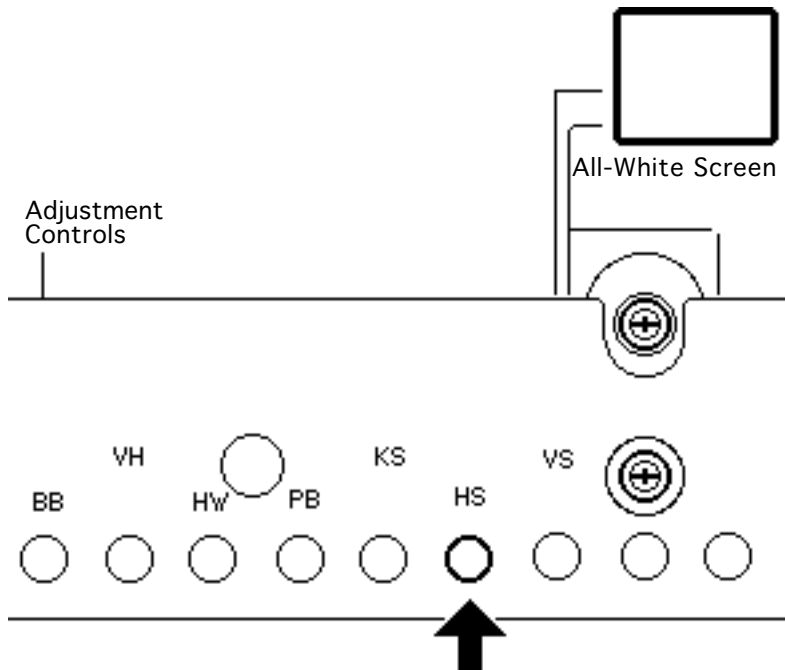


Vertical Shift

- 1 Run Display Service Utility to display the All-White Screen test pattern.
- 2 Using a hex-head plastic adjustment tool, adjust the VS (vertical shift) control until the raster is centered (top to bottom) in the screen.

Note: The VS (vertical shift) and HS (horizontal shift) controls on this monitor are also accessible when the rear housing is on.



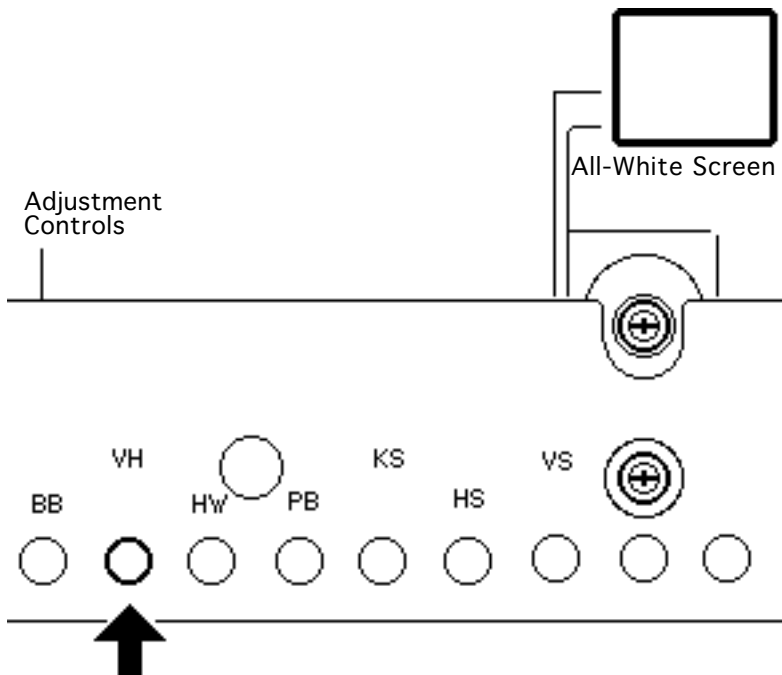


Horizontal Shift

Using a hex-head plastic adjustment tool, adjust the HS (horizontal shift) control until the raster is centered (side to side) in the display area.

Note: The VS (vertical shift) and HS (horizontal shift) controls on this monitor are also accessible when the rear housing is on.





Vertical Height

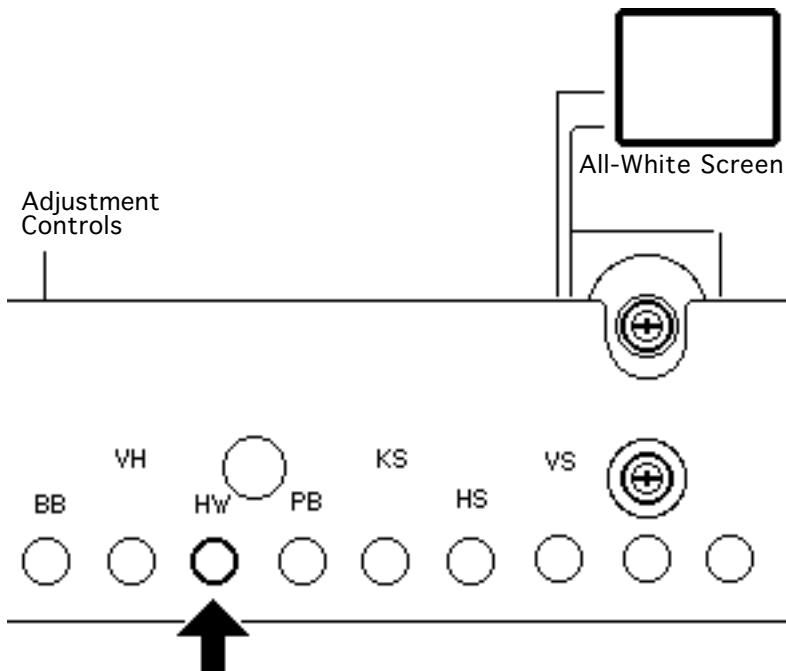
- 1 Using a hex-head plastic adjustment tool, adjust the VH (vertical height) control until the raster height is 7-1/8 inches ($\pm 1/8$ inch) or 180 mm (± 2 mm).
- 2 Verify this height. If it is off, repeat the vertical height adjustment and, if necessary, the vertical shift adjustment.

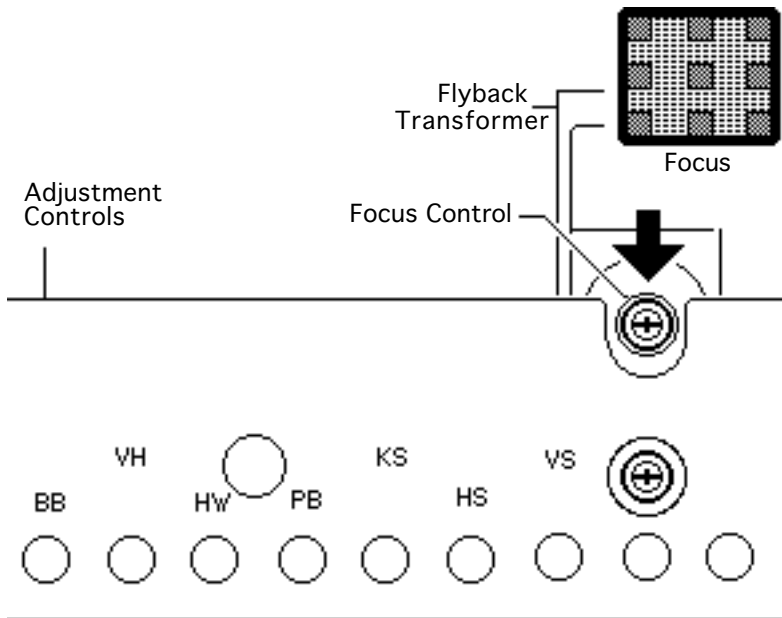




Horizontal Width

Using a hex-head plastic adjustment tool, adjust the HW (horizontal width) control until the raster width is 9-1/2 inches ($\pm 1/8$ inch) or 240 mm (± 2 mm).





Focus

- 1 Run Display Service Utility to display the Focus test pattern.
- 2 Using a flat-head plastic adjustment tool, adjust the focus control on the flyback transformer until the Focus test pattern reaches the best center-of-screen performance.

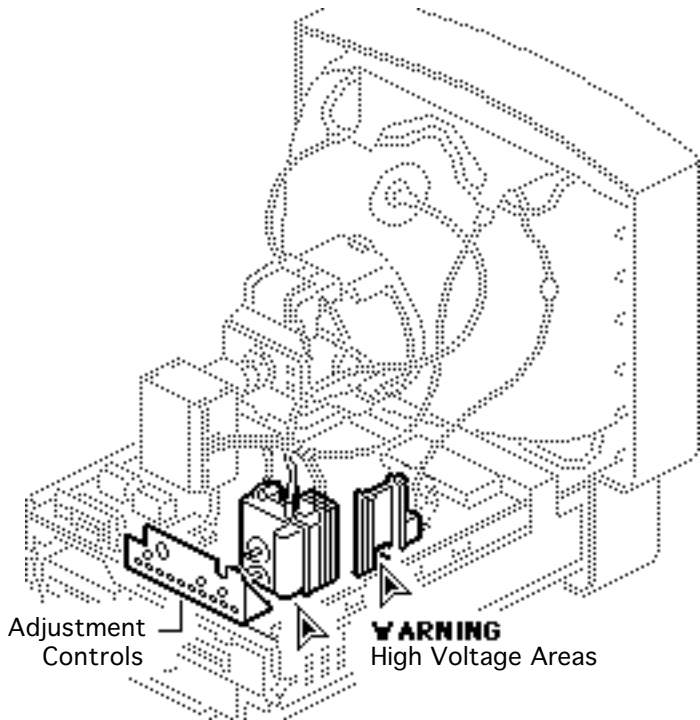




Video

Before you begin, remove the rear housing.

⚠ 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 monitor, position a mirror to view the monitor screen. Do not reach around the monitor to adjust the controls.

Caution: When placed upright without the rear housing, the front bezel becomes vulnerable to breakage. Avoid overhandling the unit in this condition.

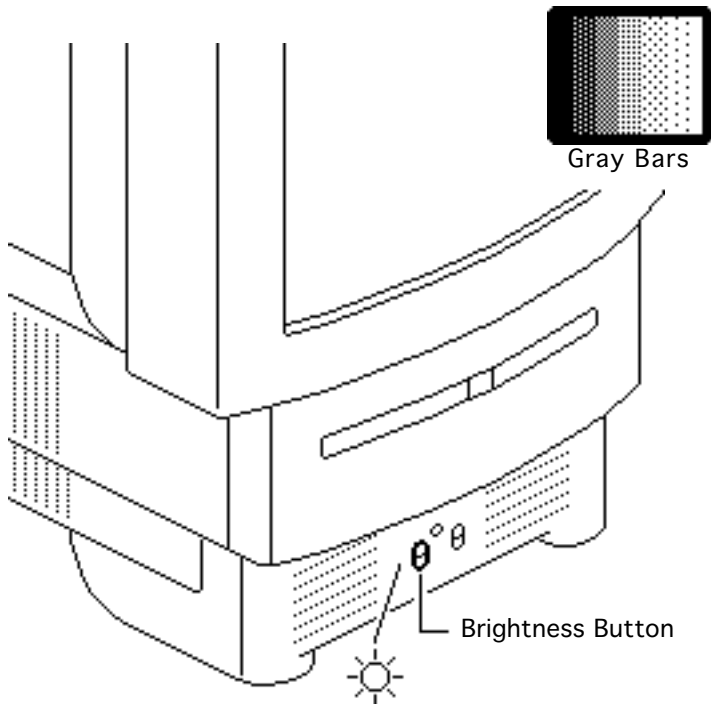




Note: Perform the cutoff adjustment prior to adjusting the white balance.

Replacement Note: Perform the cutoff adjustment whenever you replace the CRT or the analog board.



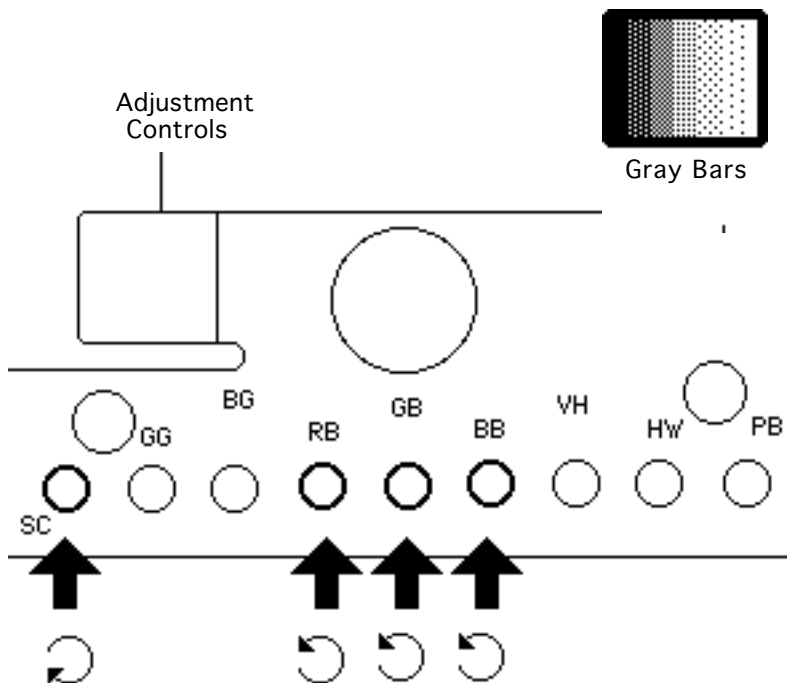


Cutoff

Note: Perform the cutoff and white balance adjustments after the monitor has been on for at least 10 minutes.

- 1 Run Display Service Utility to display the Gray Bars test pattern.
- 2 Press and hold the upper half of the brightness button until the screen brightness is set to maximum.

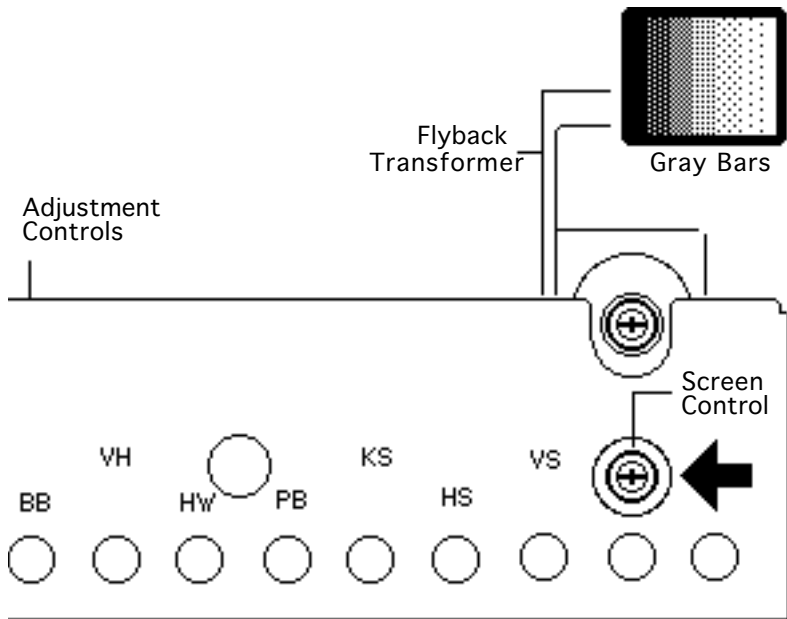




- Using a hex-head plastic adjustment tool, set the SC (sub-contrast) control to maximum (turn clockwise).
- Set the RB (red bias), GB (green bias), and BB (blue bias) controls to their minimum (counterclockwise) positions.

Note: Setting the bias controls to minimum causes the three leftmost bars to darken or turn completely black.

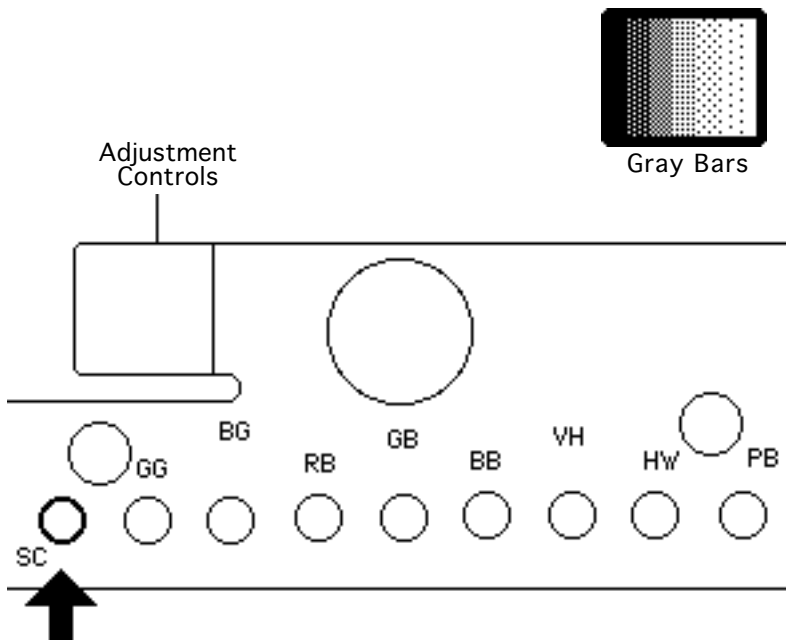




- 5 Using a plastic screwdriver, adjust the screen control on the flyback transformer very slowly until the third darkest bar from the left is just faintly visible.

Note: The screen control is now set correctly and shouldn't have to be readjusted unless inadvertently altered.



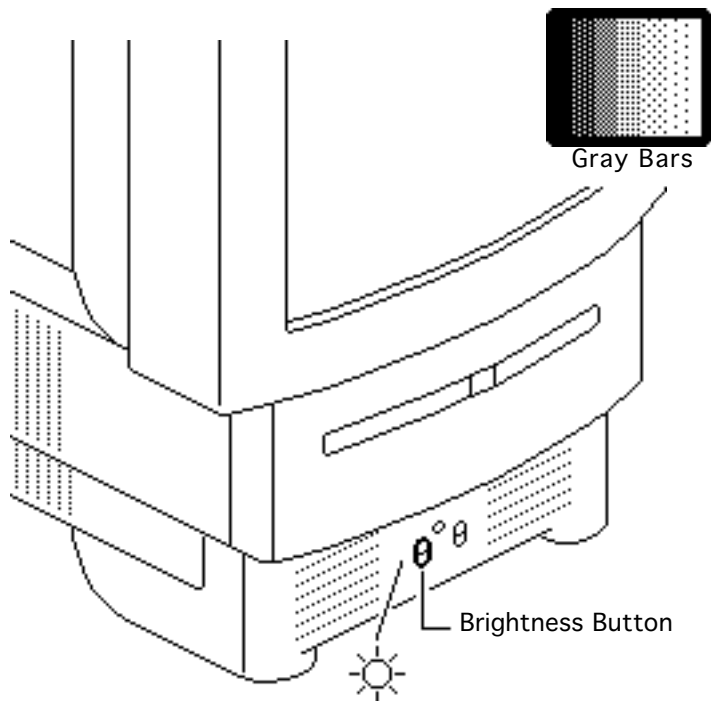


White Balance

Note: Perform the white balance adjustments after the monitor has been on for at least 10 minutes and the cutoff adjustments have been performed.

- 1 Run Display Service Utility to display the Gray Bars test pattern.
- 2 Using a hex-head plastic adjustment tool, set the SC (sub-contrast) control to its approximate midpoint.

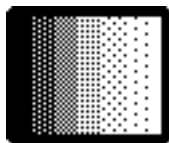




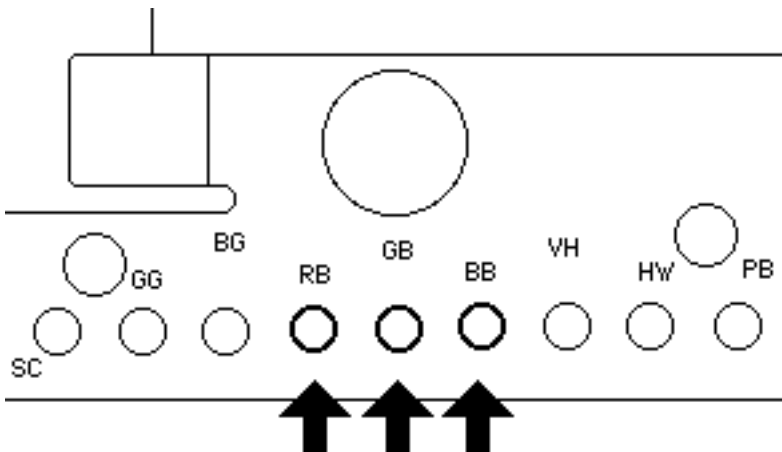
- 3 Press and hold the lower half of the brightness button until the screen brightness is set to minimum.

Note: This step causes the screen to darken or turn completely black. As you begin the following adjustments to the bias controls, notice how each control changes its particular hue as well as the screen's overall luminance. Increase any of the bias controls as long as the





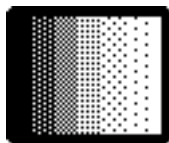
Gray Bars

Adjustment
Controls

leftmost (darkest) bar remains completely black.

- 4 If the screen shows a predominant color, start by adjusting the bias control that will offset that color. Otherwise, start with the GB (green bias) control.
- 5 Using a hex-head plastic adjustment tool, alternately adjust the RB (red), GB (green), and BB (blue) bias controls until the leftmost bar is



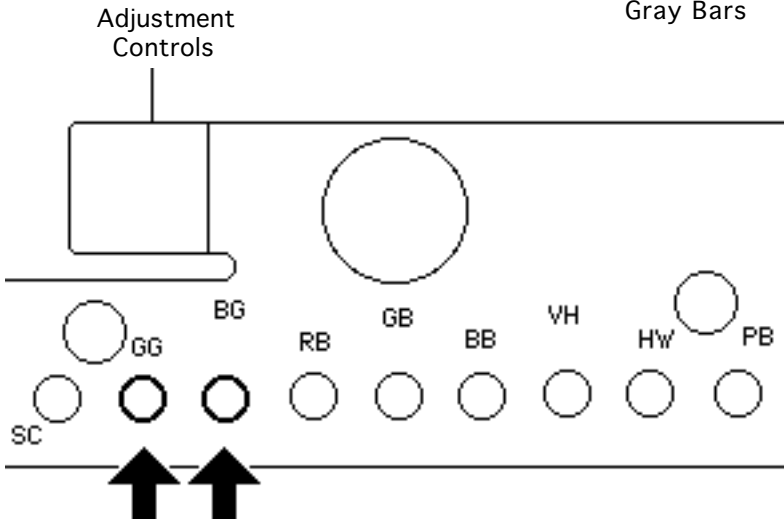


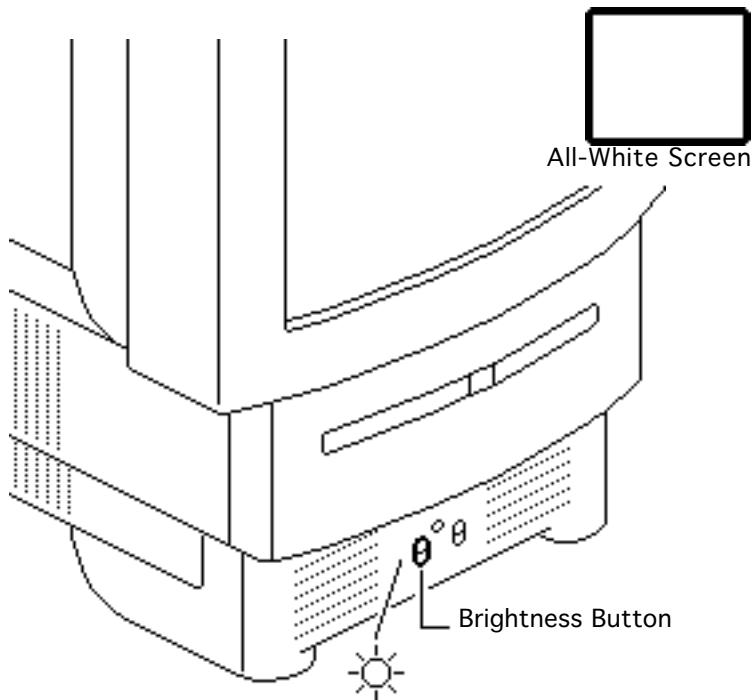
Gray Bars

black and the eight darkest bars are neutral in color (appear to be shades of gray).

Note: The darkest bar must remain completely black throughout the rest of the procedure. If you notice a predominant color in the darkest bar, readjust the appropriate bias control.

- In most cases the eight brightest bars will appear to be shades of gray. If not, adjust the BG (blue gain) and GG (green gain) controls





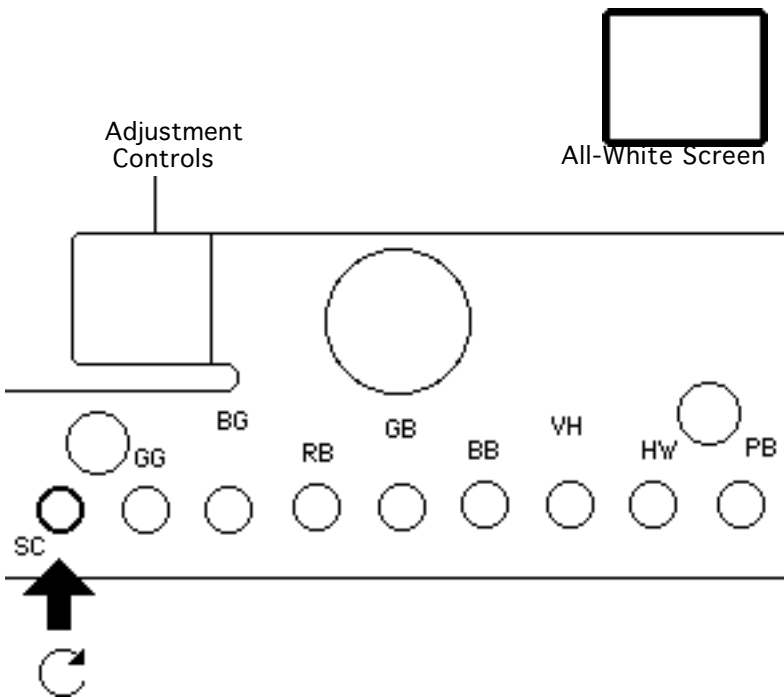
- until the color of the eight brightest bars is neutralized.
- 7 Check to see that there is no predominant color in the eight darkest bars. If there is predominant color, adjust the bias controls until the leftmost bar is black and the other bars display neutral shades of gray.
 - 8 Run Display Service Utility to display the All-White Screen test pattern.





- 9 Hold a light meter or photometer against the center of the screen.
- 10 Press the upper half of the brightness button to increase the brightness until the screen luminance measures:
 - 24 on the bottom scale of light meter Model R77
 - 10 on the 2 through 10 scale of light meter Model L-248
 - 24 footcandles on the red scale of light meter Model L-246





- 30 fL (foot lamberts) on a photometer
- 11 To reach the correct luminance level, you might need to adjust the SC (sub-contrast) control as well. If so, set the SC (sub-contrast) control higher (turn clockwise).
 - 12 Check the resulting screen by running Display Service Utility to display the Gray Bars test pattern.



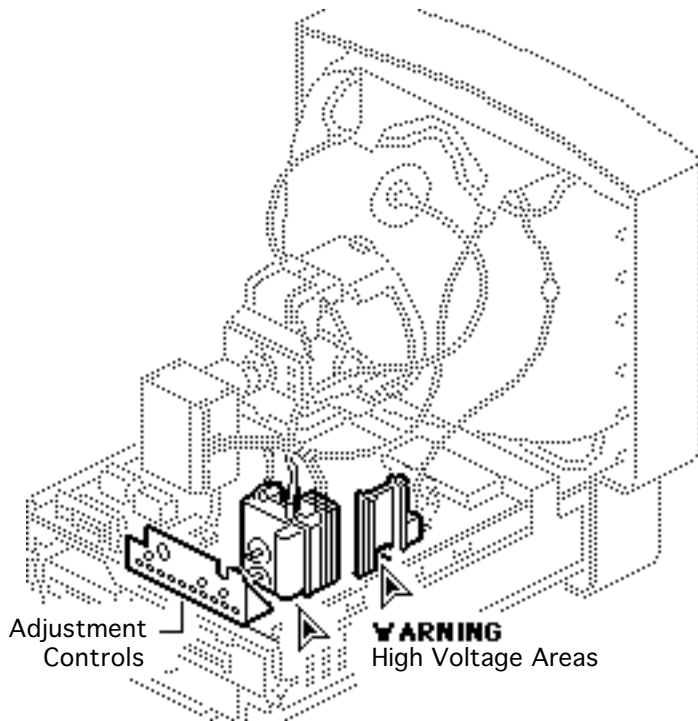


Convergence

Before you begin, remove the rear housing.

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Caution: When placed upright without the rear housing, the front bezel becomes vulnerable to breakage.





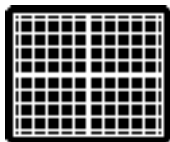
Avoid overhandling the unit in this condition.

Important: Two types of CRTs can be used in this product, so you can adjust the convergence one of two ways. To determine the correct procedure, check the number of convergence controls on the yoke of the CRT.

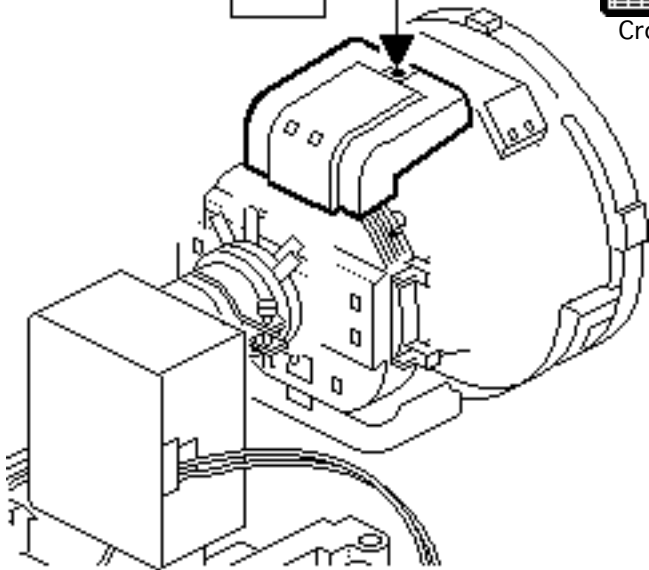




Convergence Control



Crosshatch I



One Control

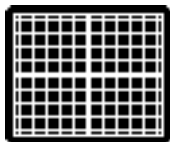
If the CRT yoke has one convergence control,

- 1 Run Display Service Utility to display the Crosshatch I test pattern.
- 2 Using a flat-head plastic adjustment tool, adjust the convergence control for best convergence of the horizontal lines at the top of the screen and the horizontal lines at the bottom of the screen.





YCH or VR1



Crosshatch I

Two Controls

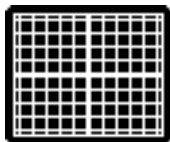
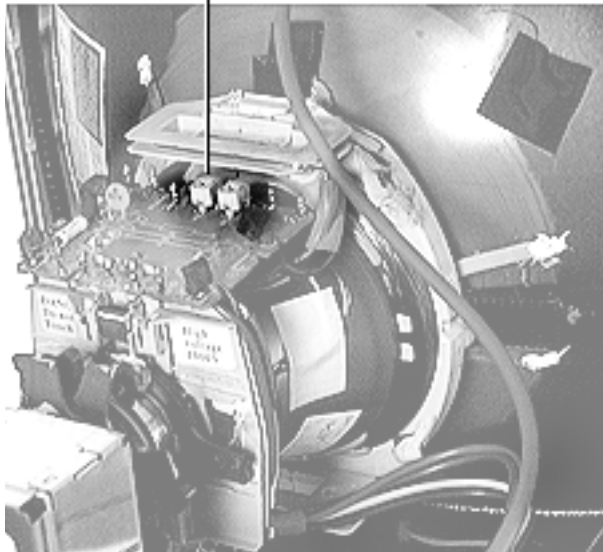
If the CRT yoke has two convergence controls,

- 1 Start up the unit and allow it to warm up for at least 15 minutes.
- 2 Run the Display Service Utility and select the Crosshatch I test pattern.
- 3 Using a flat-head plastic adjustment tool, adjust the control labeled YCH or VR1 for the best convergence of the horizontal lines at the





TLV or VR2



Crosshatch I

top and bottom of the screen.

- 4 Using a flat-head plastic adjustment tool, adjust the control labeled TLV or VR2 for the best convergence of the vertical lines on the left and right sides of the screen.



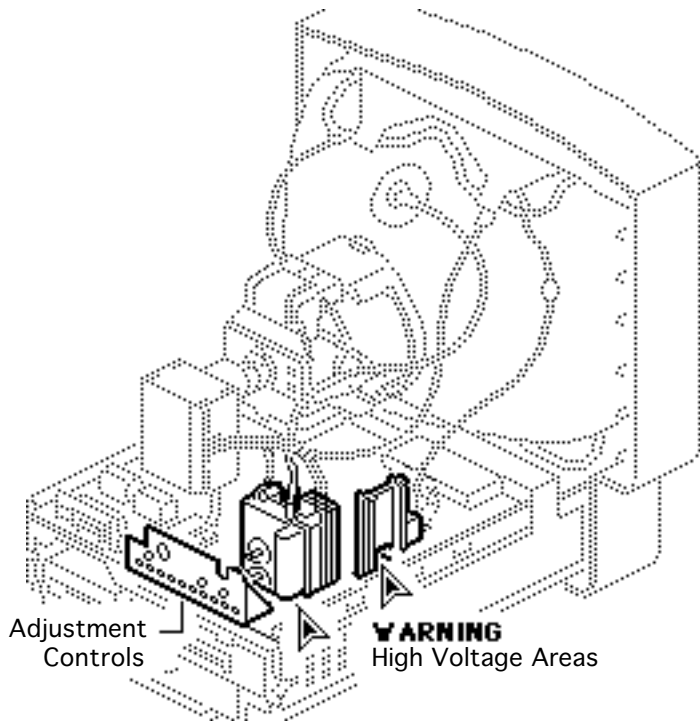


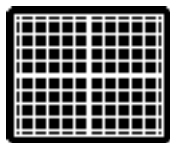
Geometric Distortion

Before you begin, remove the rear housing.

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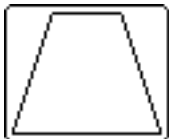
Caution: When placed upright without the rear housing, the front bezel becomes vulnerable to breakage. Avoid



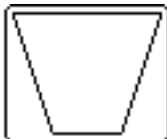


Crosshatch I

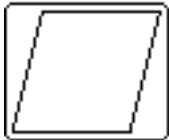
Keystone



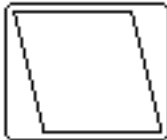
or



Trapezoid



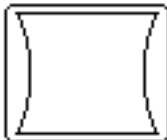
or



Horizontal Bow



or



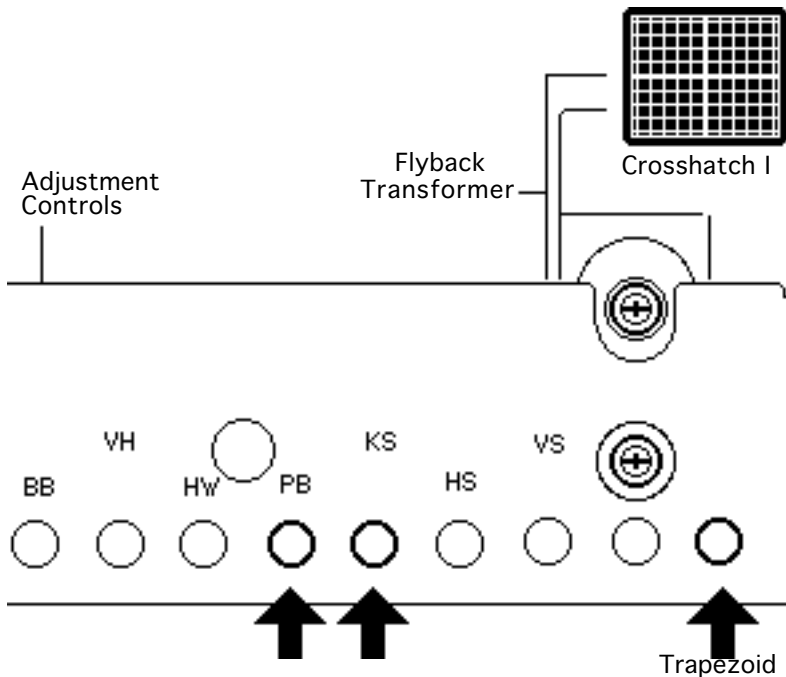
overhandling the unit in this condition.

Note: The raster, when adjusted properly, might not appear to be a perfect rectangle. CRT tolerances allow for some raster bowing and unstraight edges.

- 1 Run Display Service Utility to display the Crosshatch I test pattern.

Warning: The entire yoke assembly has very high voltage. To prevent electrical shock, do not

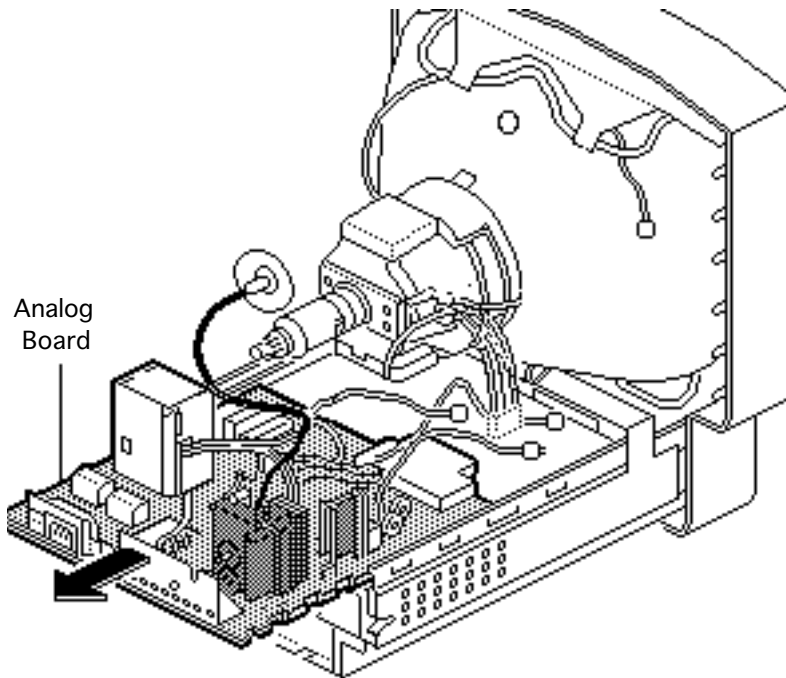




touch the yoke assembly, the anode wire, or the yoke wires.

- 2 To determine which control to adjust, compare the display with the distortions shown.
- 3 Using a hex-head plastic adjustment tool, adjust the control (see next step for control locations).
- 4 Using a hex-head plastic adjustment tool, adjust the control that is appropriate for the distortion.





- 5 If the display is so distorted that you can't tell which adjustments to make, perform the adjustments in the following sequence:
 - KS (Keystone)
 - Trapezoid (last unlabeled opening)
 - PB (Horizontal Bow)
- 6 If the display is still distorted, repeat all three adjustments.
- 7 **Note:** Some geometric distortion is normal. Before replacing the analog board, contact





Apple Technical Support if you're uncertain if the distortion is within specification.

If you can't correct the distortion, replace the analog board. See "Analog Board" in the Take Apart chapter.





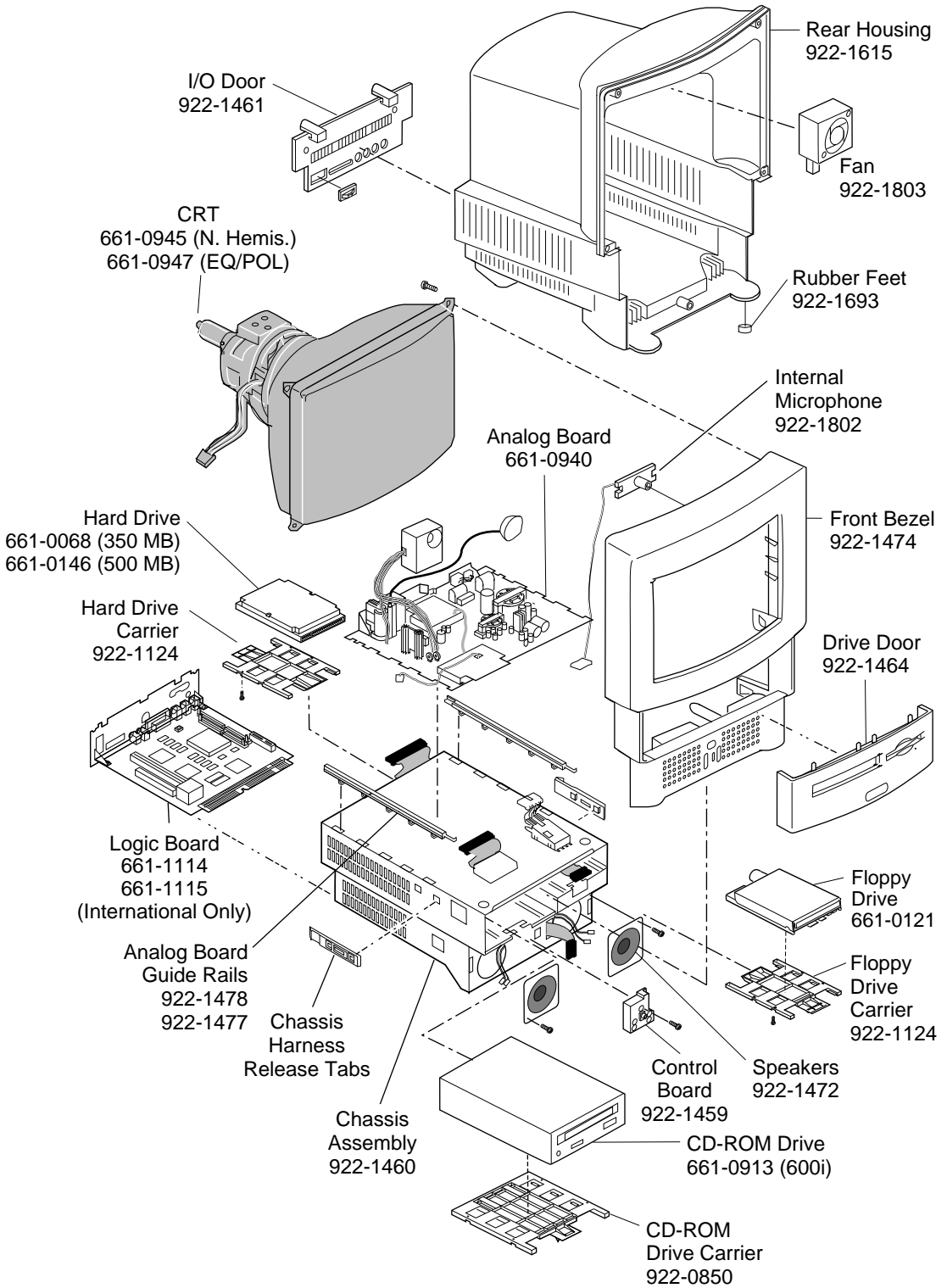
Exploded View

Macintosh LC 580, Performa 580





Exploded View



This is a generic representation of a product family. Configurations may vary.

