



# Power Macintosh/Performa 5000 Series

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Power Macintosh 5400/120, 5400/180, 5400/200,  
5500/225

International Performas 5400/160, 5400/180,  
5420, 5420/180





## Basics

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Power Macintosh/Performa  
5400 and 5500 Series

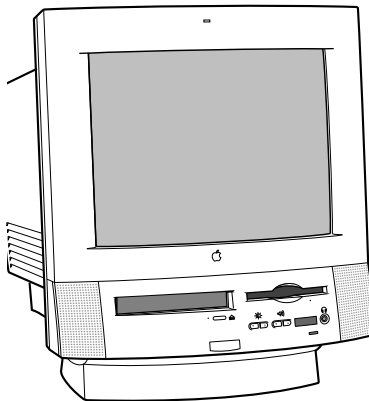




## System Overview

The Power Macintosh 5400/5500 computer series combines RISC-based PowerPC performance, full multimedia features, and low cost in a sleek all-in-one design.

The design includes expansion slots for communications and PCI cards, as well as other video-in, video tuner, and video-out options. Disk storage includes an IDE hard drive in a variety of capacities and a trayloading CD-ROM drive.





## Rev. B, 5000 Series

Apple introduced an updated 5000 series version several months after introduction. Referred to in this manual as “Rev. B,” the updated version incorporates design changes that are not backward-compatible. Models in the 5500 series are made entirely with Rev. B parts.

To determine which version you are servicing, remove the front bezel and note the location of the speakers. If the speakers are part of the front bezel, the unit is the original version. To service the original version, follow the manual for take-apart procedures and parts information, unless the procedures specify Rev. B.

If the speakers are attached to the sides of the metal chassis, the unit is Rev. B. To service Rev. B models, follow the manual, substituting Rev. B procedures and parts.





# Configurations

## **Power Macintosh 5400/120**

A configuration of the Power Macintosh 5400/120 for the Education channel includes the AppleCD 1200i 8x-speed CD-ROM drive. All other hardware features are the same as the original Power Macintosh 5400/120.

## **Performa 5400/160**

The Performa 5400/160 configuration includes 16 MB of RAM, a 1.6 GB hard drive, an 8X-speed CD-ROM drive, and a PowerPC microprocessor running at 160 MHz. It is sold in Japan, Australia, and Europe.





## Power Macintosh 5400/180

The Power Macintosh 5400/180 is similar to the 5400/120, but differs with these features:

- PowerPC 603ev processor at 180 MHz clock frequency
- AppleCD 1200i CD-ROM

Some Power Macintosh 5400/180 computers sold to the education market in the U.S. have these additional features:

- 16 MB DRAM
- 12X-speed CD-ROM drive
- Mac OS 7.6.1





## **Performa 5400/180, 5420/180**

These Performa computers are graphite-colored units sold internationally. The Performa 5400/180 is sold in Europe and Asia. The Performa 5420/180 is sold in Japan and Australia. The logic board comes with 16 MB of RAM. Plastic exterior parts are in the graphite color, and all other hardware features are the same as the Power Macintosh 5400/180.

## **Performa 5420**

The Performa 5420 is a graphite-colored Power Macintosh 5400/120 initially sold in Japan only. Plastic exterior parts for the Performa 5420 are in the graphite color, and all other hardware features are the same as the Power Macintosh 5400/120.





## Power Macintosh 5400/200

The Power Macintosh 5400/200 is sold to the education (K-12) market in the United States. It is similar to the 5400/180, but differs with these features:

- PowerPC 603e processor at 200 MHz clock frequency
- 24 MB DRAM
- EDO memory

Some Power Macintosh 5400/200 computers sold to the education market in the U.S. have these additional features:

- 32 MB DRAM
- 12X-speed CD-ROM drive
- MacOS 7.6.1
- Ethernet







## Power Macintosh 5500/225

The Power Macintosh 5500/225 is sold worldwide. The Energy Saver control panel schedules sleep, starting up, and shutting down. The fan speed varies according to the temperature inside the enclosure, and automatically runs at the lowest speed possible to minimize noise. For additional cooling, the PowerPC processor has a small fan.

The 5500 has the same feature set as the 5400, but differs with these features:

- Power PC CPU running at 225 MHz
- 16 MB DRAM (no DRAM soldered on board) expandable to 128 MB using 5-volt buffered EDO DIMMs
- 2 MB SGRAM frame buffer
- 2 GB or larger IDE hard drive
- 12X-speed CD-ROM drive
- Stereo speakers with SRS surround-sound mode





- Support for video modes up to 1280x1024
- 2D and 3D built-in hardware graphics acceleration

The two DIMM slots on the logic board support both 5-volt fast-page mode and 5-volt EDO DRAM DIMMs. If the two are mixed, the logic board may not operate at fast-paged mode timings.

A configuration sold to the education market in the U.S. has these additional features:

- 32 MB DRAM
- 24X-speed CD-ROM drive
- Ethernet
- Mac OS 8.0





A configuration sold in Japan has these additional features:

- 32 MB DRAM
- 4 GB hard drive
- 24X-speed CD-ROM drive
- 33.6 modem
- Mac OS 8.0

A configuration sold in Europe has these additional features:

- 32 MB DRAM
- 2 GB hard drive
- 24X-speed CD-ROM drive
- 33.6 modem
- Mac OS 8.0





## Power Macintosh 5500/250

The Power Macintosh 5500/250 sold in Japan and Australia has the same feature set as the 5500/225, with the exception of the Power PC CPU running at 250 MHz. Another configuration of this computer sold in Japan and Australia has these additional features:

- Graphite-colored exterior plastic parts
- 32 MB DRAM
- 4 GB hard drive
- 24X-speed CD-ROM drive
- Video In
- 33.6 modem
- Mac OS 8.0





A configuration of the 5500/250 sold to the education market in the U.S. has these additional features:

- 32 MB DRAM
- 24X-speed CD-ROM drive
- Video in
- NTSC out
- Ethernet
- Mac OS 8.0





## Power Macintosh 5500/275

The Power Macintosh 5500/275 is sold in Europe, and it has the same feature set as the 5500/225, with the exception of the Power PC CPU running at 275 MHz. Another configuration of this computer has these additional features:

- Graphite-colored exterior plastic parts
- 32 MB DRAM
- 4 GB hard drive
- 24X-speed CD-ROM drive
- 512K Level 2 cache
- TV/FM tuner
- Video In
- 33.6 modem
- Mac OS 8.0





## Service Strategy

Service the Power Macintosh/Performa 5000 series through module exchange and parts replacements. Customers can request on-site service from an Apple Authorized Service Provider Plus (AASP+) or Apple Assurance. They can also choose carry-in service from an Apple Authorized Service Provider (AASP).

### Ordering

AASPs planning to support the Power Macintosh/Performa 5000 series may purchase service modules and parts to develop servicing capability. To order parts, use the AppleOrder system, or refer to the "Service Price Pages." Large businesses, universities, and K-12 accounts must provide a purchase order (PO) on all transactions, including





orders placed through the AppleOrder system. Service Providers not enrolled in AppleOrder may fax their orders to Service Provider Support (512-908-8125) or mail them to

Apple Computer, Inc.  
Service Provider Support  
MS 212-SPS  
Austin, TX 78714-9125

## **Warranty and AppleCare**

These new computers are covered under the Apple One-Year Limited Warranty. The AppleCare Service Plan is also available. Service Providers are reimbursed for warranty and AppleCare repairs made to these computers. For pricing information, refer to the AppleCare section in the "Service Price Pages."







## **Diagnostics**

Use MacTest Pro for Power Macintosh to perform diagnostics on the Power Macintosh/Performa 5000 series.

## **Design for Serviceability**

To access the floppy drive, CD-ROM drive, or front panel control board, remove the drive and controls bezel. To service the logic board, hard drive, or video options, remove the I/O door. The logic board slides out from a connector similar to the connector on Macintosh LC 630 and LC 500.

The CRT and degauss frame are matched at the factory and are removed and replaced as a unit. The chassis harness is one service module, including the metal chassis and logic board connector with cables.





# User Controls

User controls include

- Soft power-on control from keyboard
- Front-panel sound-control pushbuttons
- Front-panel brightness-control pushbuttons
- Optional infrared remote control





## Internal Expansion Connections

Expansion connections on the logic board include

- 2 DRAM DIMM expansion slots
- Communications slot for modems and Ethernet
- Video-in slot for real-time video display, capture, and overlay
- External video port
- PCI expansion slot

An expansion ribbon connector for an optional TV Tuner card provides NTSC and PAL input from an external TV antenna or cable.





## Intelligent Device Electronics (IDE) Hard Drive

The internal hard drive uses Intelligent Device Electronics (IDE) technology, commonly used in DOS-compatible systems. The IDE hard drive functions the same as a typical SCSI hard drive. You must replace IDE drives like-for-like.

The IDE drive does not affect SCSI ID selections or SCSI termination schemes. Seven external SCSI devices may be daisy-chained through the external SCSI port.





## Video-In Card

The Video-In Card is an optional card included with the Apple Video System. It allows users to digitize video from the TV Tuner and external composite or S-video inputs. It accepts NTSC, PAL, or SECAM format video and also provides stereo audio inputs.

Install the Video-In Card into the dedicated 60-pin, 1.75-inch video slot.





## TV Tuner Module

The TV Tuner, an optional module included with the Apple TV/Video System, turns the computer into a television receiver. The TV Tuner requires the Video-In Card, which is also included with the Apple TV/Video System. The TV Tuner receives incoming television signals from cable or antenna television inputs, and then sends the information to the Video-In Card, which converts the data for display on the screen. In the United States, only NTSC is supported, but PAL and SECAM are available internationally.

Install the TV Tuner in a separate bay at the rear of the computer, below the logic board.





## TV/FM Radio Tuner Card

The TV/FM radio tuner card turns the computer into a television and FM radio receiver, complete with remote control. An expansion ribbon connector for the optional TV/FM radio tuner card provides NTSC and PAL input from an external TV antenna or cable. Change channels by typing the channel number on the keyboard or with the remote control. Switch between the current and previous channel by pressing the Tab key. The computer displays the user-assigned channel name on the picture in the video window.

Apple Video Player software supports the TV/FM tuner card. The user can disable channels and require a password to access the disabled channels. Users can also capture or freeze a single frame of video or record a segment of video as a QuickTime movie. It isn't possible to resize the window while recording a movie.





The TV picture is in its own window on the desktop, and the default size of the window is 320x240 pixels. The picture can be resized from 160x120 pixels up to 640x480 pixels. The resolution of the picture does not increase at larger window sizes, but the image is expanded by doubling the pixel size or by two-dimensional linear interpolation.

The TV signal is carried in YUV format for improved picture clarity. The YUV format is 16-bit, with 8 bits for the Y (luminance) channel and 8 bits for the U and V (chrominance) channels to share by multiplexing. The picture is clearer because the YUV format carries more levels of luminance information.







The card is available in versions for NTSC, PAL, and SECAM television systems. The features of the TV tuner include the following:

- Remote tuner for 181 broadcast and cable channels (U.S. version)
- Coaxial connector for TV antenna or cable input (F-type connector in U.S. and Japanese version, IEC-type connector in Europe)
- TV picture in a resizable and movable window
- YUV format for improved clarity
- Closed captioning and teletext support
- Software password protection
- Automatic and manual channel programming
- Single remote control for TV and for playback of audio CDs





The features of the FM radio tuner include the following:

- FM radio frequencies received and displayed
- Stations scanned and searched up and down the frequency spectrum
- Step frequency
- DX mode to tune out harmonic spillover from other stations
- Stereo/mono station indicator
- Preset station programming



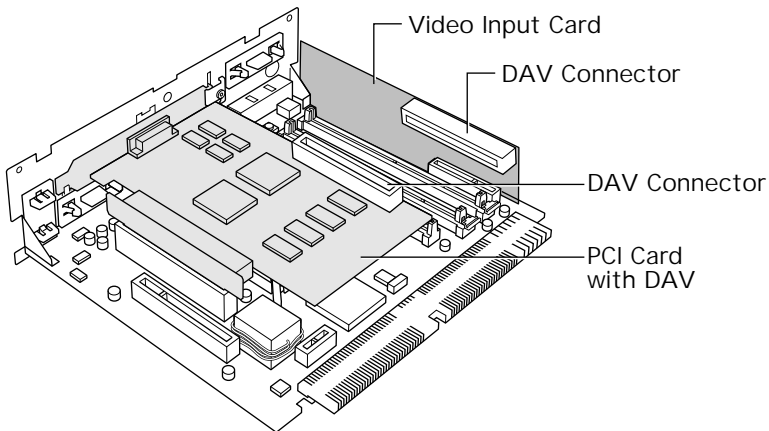


## Digital Audio Video (DAV) Technology

The optional video input card has a separate connector called the DAV connector. The DAV connector provides access from a PCI card to the video input card by means of a 60-pin cable. This allows the PCI expansion card to use the video card to transfer real-time video data to the computer. The video card accepts video from an external source and displays it in a window on the computer's monitor.

**Note:** The interface of the 60-pin DAV connector is a superset of the interface on the 34-pin DVA connector on the Power Macintosh 5200, Power Macintosh 6200, and Quadra 630 computers. An adapter cable is provided with the Performa 6400 video-in cards to connect 34-pin DVA compatible cards developed for the Power Macintosh 5200 and 6200 computers to the new 60-pin DAV connector.





**Note:** The DAV connector on the video input card provides some of the functionality of the DAV connectors found on the Power Macintosh 7100 and 8100 models, and the Macintosh Quadra AV models, but it is not compatible with any of those connectors.





## External Video Connector

The External Video Connector is an optional module that provides the computer with video output (mirroring). Install the External Video Connector in a dedicated 3/4-inch, 22-pin slot on the logic board.





# Apple Presentation System

The Apple Presentation System (APS) is an external module that uses the 15-pin video output connector on the computer, and then provides a video signal for a separate television display or for recording on a VCR. The APS supports video mirror mode, where the image on the television display is the same as the computer's primary video monitor. The APS is required for video mirroring.





## Peripheral Component Interconnect (PCI)

The 5400 and 5500 series offer a Peripheral Component Interconnect (PCI) expansion bus. Because the PCI bus is an industry standard, most existing PCI 2.0-compliant cards (with the addition of a Mac OS-specific software driver) will work in these computers.

PCI offers significantly higher performance than the NuBus architecture used in previous Macintosh models. Running at 33 MHz, the PCI bus is up to three times faster than NuBus, offering overall enhanced system performance (particularly in the areas of video and networking).





# GeoPort Technology

GeoPort is a hardware and software communications architecture that has been optimized for computer-telephony integration. It has the following attributes:

- It allows you to connect any GeoPort-compatible computer to any telephone (analog or digital, public, or private) anywhere in the world.
- Once connected, it supports an arbitrary number of independent data streams up to a total bandwidth of 2 MB/second.







- Unlike traditional asynchronous data communications (such as AppleTalk), GeoPort also supports isochronous data streams (such as real-time voice and video), and provides the real-time Application Program Interfaces (APIs) necessary to hide the implementation details from both the recipient and the sender.



## The Cuda Chip

The Cuda is a microcontroller chip. Its function is to

- Turn system power on and off
- Manage system resets from various commands
- Maintain parameter RAM (PRAM)
- Manage the Apple Desktop Bus (ADB)
- Manage the real-time clock

Many system problems can be resolved by resetting the Cuda chip. Press the Cuda reset button on the logic board to reset the Cuda chip. See the logic board diagram later in this chapter to locate the Cuda reset button.





## Dual In-Line Memory Modules (DIMMs)

The 5400 series and 5500 use DRAM Dual In-Line Memory Modules (DIMMs) instead of DRAM Single In-Line Memory Modules (SIMMs). Whereas SIMMs have 72 pins, DIMMs have 168 pins. The extra pins provide a 64-bit data path, compared to a 32-bit data path for SIMMs. In addition, DIMMs do not have to be installed in pairs like the SIMMs on earlier Macintosh models.

**Important:** The SIMMs used in previous Macintosh models are **not** compatible with the 5400 series or the 5500. The 5400 series requires DIMMs with refresh rate of 2K.





## Power Macintosh/Performa 5400 Series

DRAM DIMMs can be installed individually. However, to take advantage of the computer's interleaving capability (which provides maximum performance), you must install the DIMMs in matching pairs. Memory interleaving allows the computer to read or write to its memory while other memory reads or writes are occurring, providing faster performance.

**Note:** DIMMs purchased from different manufacturers can be paired as long as they are the same size and speed.





## **Power Macintosh/Performa 5500 Series**

DIMM slots on the 5500 logic board accommodate 168-pin 5-volt EDO DRAM DIMMs. However, 3.3-volt EDO DIMM cards are not supported and will not mechanically fit into the DIMM connectors on the logic board.

The 8-byte DIMMs can be installed one or more at a time. The 5500 logic board supports only linear memory organization, and no performance gains result when two DIMMs of the same size are installed. Any supported size DIMM can be installed in either DIMM slot, and the combined memory of all the DIMMs installed will be configured as a contiguous array of memory. The largest DIMM supported is a two-bank DIMM holding 64 MB.





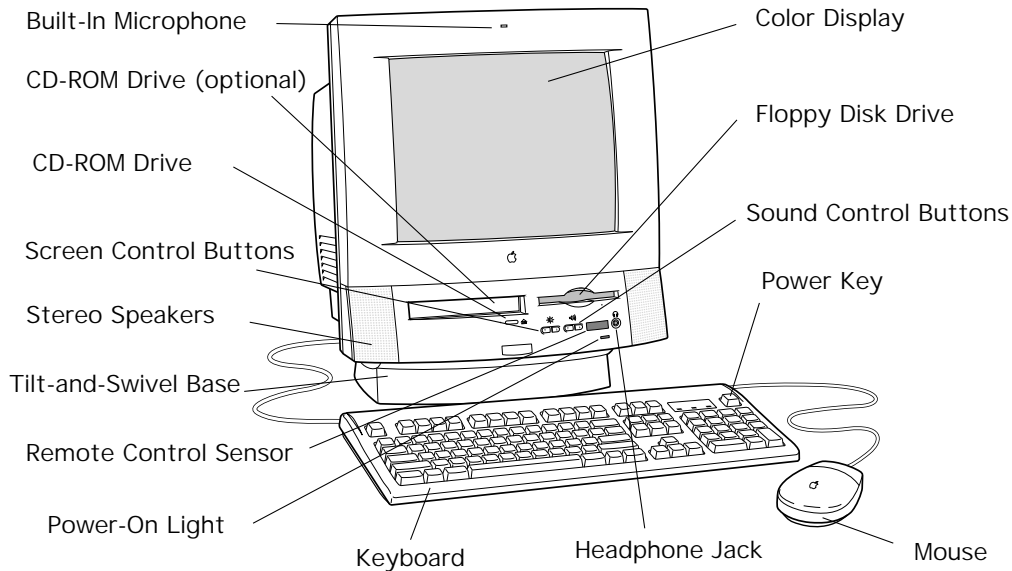
## CRT and Degauss Frame

The CRT and degauss frames are precisely matched at the factory and must be removed and replaced as a unit.



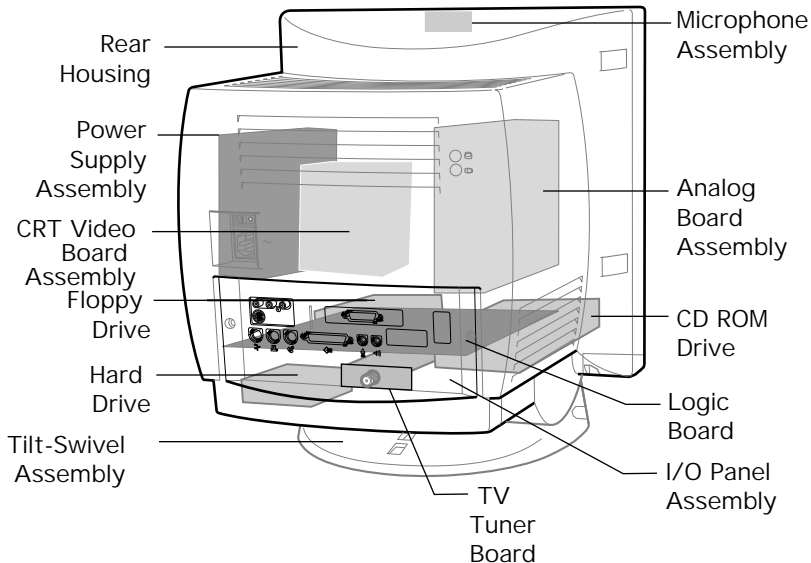


## Front View





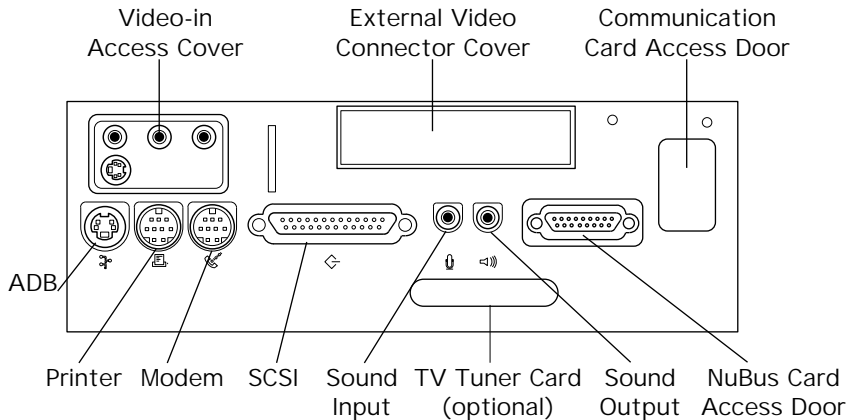
## Rear View





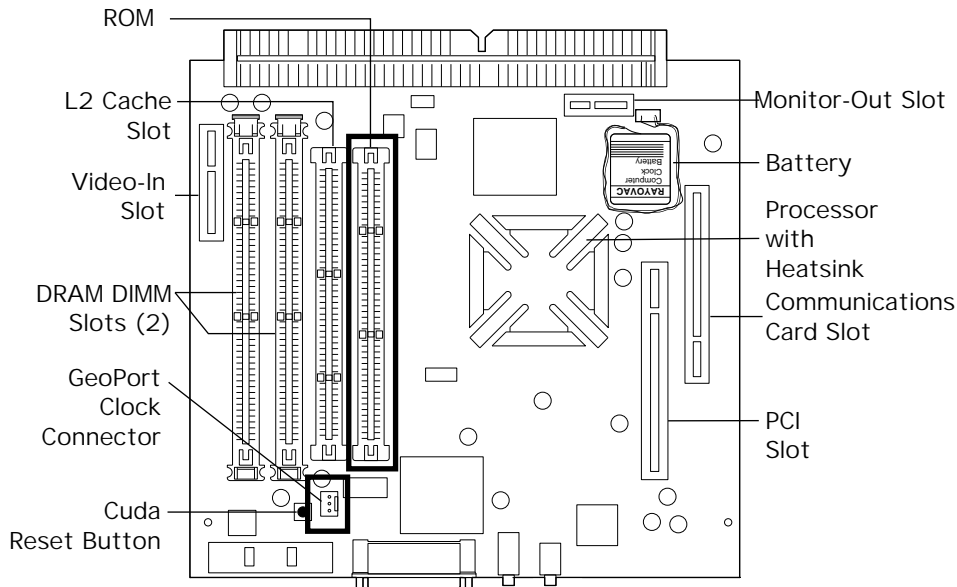


## I/O Panel





## 5400/5500 Logic Board





## Specifications

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Power Macintosh/Performa  
5400 and 5500 Series



# Introduction

Specifications information for this product can be found in this chapter and also in the Spec Database, which you can access in one of three ways:

- Launch it directly by double-clicking the Apple Spec Database runtime alias at the top level of the Main Service Source CD.
- Select "Apple Spec Database" from the Service Source drop-down main menu.
- Click the Acrobat toolbar icon for the database, which is near the right end of the toolbar with the letters "SP."





# Processor

## CPU

<b>5400/120</b>	PowerPC 603e processor 120 MHz
<b>5400/160</b>	PowerPC 603e processor 160 MHz
<b>5400/180</b>	PowerPC 603e processor 180 MHz
<b>5400/200</b>	PowerPC 603e processor 200 MHz
<b>5500/225</b>	PowerPC 603e processor 225 MHz





**5500/250**

PowerPC 603e processor  
250 MHz

**5500/275**

PowerPC 603e processor  
275 MHz

**Addressing**

64-bit PowerPC bus





# Memory

## DRAM

### **5400/120**

8 MB DRAM soldered on board

Expandable to 136 MB in two JEDEC standard DIMM slots  
(168-pin, 70 ns or faster, 2K refresh rate DIMMs)

### **5400/180**

8 or 16 MB DRAM soldered on board

Expandable to 136 MB in two JEDEC standard DIMM slots  
(168-pin, 70 ns or faster, 2K refresh rate DIMMs)

### **5400/160, 5420/180**

16 MB DRAM soldered on board

Expandable to 136 MB in two JEDEC standard DIMM slots  
(168-pin, 70 ns or faster, 2K refresh rate DIMMs)





## DRAM

### **5400/200**

24 or 32 MB DRAM (8 MB DRAM soldered on board)

Expandable to 136 MB in two JEDEC-standard DIMM slots (168-pin, 60 ns or faster, 2K refresh rate, 5-volt buffered EDO DIMMs)

### **5500 Series**

16 or 32 MB (No DRAM soldered on board)

Expandable to 128 MB in two JEDEC-standard DIMM slots (168-pin, 60 ns or faster, 2K refresh rate, 5-volt buffered EDO DIMMs)







## Frame Buffer

**5400** 1 MB DRAM on board, for video support

**5500** 2 MB SGRAM

**ROM** 4 MB

**Cache Memory** Optional 256K Level 2, on a 160-pin DIMM card

**5500/275** 512K Level 2 cache





## Disk Storage

### Floppy Drive

1.4 MB Apple SuperDrive Manual Insert

### Hard Drive

**5400 Series (except  
5420/180)**

1.2 GB IDE or 1.6 GB IDE hard drive

**5420/180**

1.6 GB IDE or 2.4 GB IDE hard drive

**5500**

2 GB or larger IDE hard drive





## CD-ROM Drive

**5400/120**

Standard AppleCD 600i drive

**5400/120 education  
configuration,  
5400/180, 5400/200**

AppleCD 1200i drive  
or 12X-speed CD-ROM drive on some 5400/180 and 5400/200  
computers

**5500**

12X-speed or 24X-speed CD-ROM drive





## I/O Interfaces

**Serial** Two serial ports: LocalTalk and GeoPort supported

**SCSI** One external SCSI port (DB-25 connector)  
Supports up to seven SCSI devices

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

**Controls** Soft-power control from keyboard  
Front panel pushbutton control for sound volume  
Front panel pushbutton control for display brightness  
Infrared remote control option





## Sound Input

Built-in microphone.

Sound input port for stereo sound input. The sound input port supports the Apple PlainTalk Microphone that comes with some Macintosh computers. (You can also connect non-Apple microphones.) In addition, the sound input port supports a standard stereo (miniplug-to-RCA) cable adapter for connecting stereo equipment to your computer. It does not support the Apple Omni microphone or the attenuated RCA adapter provided with some models of Macintosh.

## Sound Output

Two stereophonic sound output ports, level nominally 0.5 V RMS into 39 ohms

One front headphone jack, one rear stereo mini phonejack

Internal stereo speakers



**External Video Connector**

One DB-15 mirror video out connector using optional video connector kit. This feature provides “mirroring” (or display of the system’s monitor’s screen on a presentation screen). (Note: the external video display is presentation only. It cannot be manipulated directly by mouse or other input signals.)

**PCI Expansion**

PCI expansion slot (32-bit PCI bus) for 7-inch cards, compatible with all PCI 2.0 specification-compliant cards with the addition of Macintosh OS-specific software driver. Nubus cards cannot be used in this expansion slot.

**DMA I/O**

10 DMA channels

**TV Tuner**

Optional internal TV/FM tuner





## Video-in Slot

### **Digital Audio Video (DAV) Slot**

60-pin video-in slot for optional expansion card providing real-time video display, capture, and overlay.

The digital video application (DVA) connector allows adding a video processor on an expansion card. It makes the digitized video data available to a card in the I/O expansion slot.

The video input card uses a digital YUV format to produce a clearer picture. It accepts video input from an external VCR or camcorder, or internal TV Tuner module (in NTSC, PAL, or SECAM format). The card is not compatible with the DAV slot in the Macintosh Quadra 660AV/840AV, Power Macintosh 6100/7100/8100.

With an adapter cable you can use Power Macintosh 5200/6200 cards.

## Communications

One slot for optional modem or Ethernet card (PCI-bus configuration)





## I/O Devices

### **Keyboard**

AppleDesign Keyboard (other ADB keyboards supported)

### **Mouse**

Apple Desktop Bus Mouse

Mechanical tracking, optical shaft, or contact encoding

### **Microphone**

Integrated microphone for monophonic sound input







## Speaker

### **5400 Series**

Integrated stereo speakers capable of delivering 8-bit and 16-bit stereo sound

### **5500**

Integrated stereo speakers capable of delivering 8-bit and 16-bit stereo sound, SRS surround-sound mode





## Sound and Video

### **Sound Generator**

Digitizes and records sound as 16-bit samples at 11-kHz, 22-kHz, or 44-kHz sample rate

Plays back at sampling rate specified in Sound control panel

16 bits/channel SRS stereo surround sound input and output

Stereophonic sound input, record, and output

External jack for sound in, front jack for headphones, rear jack for stereophonic speakers

Two built-in speakers

Built-in microphone

### **Graphics Acceleration (5500)**

2D and 3D built-in hardware graphics acceleration. Software support through Macintosh QuickDraw 3D and QuickDraw 3D rendering acceleration virtual engine (RAVE) APIs.





## **Built-in Video Display**

Dot Pitch: 0.28 mm

Vertical Frequency: 66.7 Hz

Active Raster Size (nominal): 9.5 in. by 7.3 in.  
(240 mm by 185 mm)

White Point: 9,300° K

Shipping Brightness (nominal): 25-foot lamberts

15-inch Shadow Mask display (12.8-inch 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  $x = 0.155 \pm 0.015$ ,  $y = 0.070 \pm 0.015$





## Video Modes

### 5400 Series

Supports these video modes:

640x480 resolution with 16-bit color at 67 Hz or 60 Hz (VGA)

800x600 resolution with 16-bit color at 60 Hz or 72 Hz

832x624 resolution with 8-bit color (does not support video input) at 75 Hz

### 5500

Supports these video modes:

640x480, 800x600, 832x624 at 32 bits per pixel

1024x768, 1152x870 at 16 bits per pixel

1280x1024 at 8 bits per pixel





## Monitor Timings

### 640x480 Resolution at 60 Hz

#### Horizontal Timing

Back Porch: 48 dots  
H SYNC: 96 dots  
Front Porch: 16 dots  
1 dot: 39.72 ns  
1 H: 31.77 ms  
1/dot: 25.175 MHz

#### Vertical Timing

Back Porch: 33 H  
V SYNC: 2 H  
Front Porch: 10 H  
1 H: 31.77 ms  
1/H: 31.5 kHz  
1V: 16.67 ms  
1/V: 59.988 Hz





## **Monitor Timings**

### **640x480 Resolution**

### **at 66.67 Hz**

#### **Horizontal Timing**

Back Porch: 96 dots  
H SYNC: 64 dots  
Front Porch: 64 dots  
1 dot: 33.06878 n  
1 H: 28.5714 ms  
1/dot: 30.24 MHz

#### **Vertical Timing**

Back Porch: 39 H  
V SYNC: 3 H  
Front Porch: 3 H  
1 H: 28.5714 ms  
1/H: 35.000 kHz  
1V: 15.000 ms  
1/V: 66.666 Hz





## **Monitor Timings**

### **800x600 Resolution**

### **at 60 Hz**

#### **Horizontal Timing**

Back Porch: 88 dots  
H SYNC: 128 dots  
Front Porch: 40 dots  
1 dot: 25.000 ns  
1 H: 26.4 ms  
1/dot: 40.000 MHz

#### **Vertical Timing**

Back Porch: 23 H  
V SYNC: 4 H  
Front Porch: 1 H  
1 H: 37.879 ms  
1/H: 16.58 kHz  
1 V: 60.3165 ms  
1/V: 60.3165 Hz





## **Monitor Timings**

### **800x600 Resolution**

### **at 72 Hz**

#### **Horizontal Timing**

Back Porch: 64 dots  
H SYNC: 120 dots  
Front Porch: 56 dots  
1 dot: 20.000 ns  
1 H: 20.800 ms  
1/dot: 50.000 MHz

#### **Vertical Timing**

Back Porch: 23 H  
V SYNC: 6 H  
Front Porch: 37 H  
1 H: 20.800 ms  
1/H: 48.077 kHz  
1 V: 13.853 ms  
1/V: 72.186 Hz







## **External Video**

### **Connector (Optional)**

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

- 640x480 resolution: 14-inch color, VGA
- 800x600 resolution: Apple Multiple Scan 15 Display, SVGA
- 832x624 resolution: 16-inch color





## Electrical

**Line Voltage**

100–240 VAC

**Frequency**

47–63 Hz

**Power**

125 W

Surge Voltage: 300 V rms for 100 ms

Peak Inrush Current: 40 A pk

Current: 2.5 A maximum for all line and load conditions

Power: 220 W maximum for all line and load conditions





## Physical

### **Dimensions**

Height: 17.5" (445 mm)

Width: 16" (406 mm)

Depth: 15.1" (383 mm)

### **Weight**

Without CD-ROM: 17 lb.

With CD-ROM: 19 lb. (21.15 kg)

Weight varies with options





## 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° F to +116° F (–40° C to +47° C)

### **Humidity**

Noncondensing, 20–95%

### **Altitude**

0–10,000 ft. (0–3,000 m)





## Troubleshooting

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Power Macintosh/Performa  
5400 and 5500 Series





## 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 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

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.





# Symptom Charts

## System

System intermittently crashes or hangs

- 1 Verify that system software is version 7.5 or later.
- 2 Verify that software is compatible with system.
- 3 If Ethernet card is installed, verify that it is fully seated.
- 4 Check that system has enough memory installed for application.

System does not start up

- 1 Reset logic board. Refer to Additional Procedures.
- 2 Replace power supply.
- 3 Check power cord connection.
- 4 Replace logic board. Retain customer's DIMMs.







System will not start up from keyboard, but will start up from rear power switch	1	Verify keyboard as known-good.
	2	Replace analog board.
System continually restarts after Shutdown from Special menu	1	Verify keyboard as known-good.
	2	Replace analog board.
Menu bar constantly flashes or system constantly beeps	1	Verify that front-panel control buttons are not jammed.
	2	Verify "mute" is not selected in the Sound control panel.
	3	Reseat drive bezel and front-panel control board.



## Audio

Distorted or garbled sound from both speakers

Replace analog/video board assembly.

Distorted or garbled sound from one speaker

- 1 Replace defective speaker.
- 2 Replace analog/video board assembly.

No sound output from speakers

- 1 Check sound source.
- 2 Check that speaker cable at connector P803 on analog board is plugged in and not defective.
- 3 Reseat drive bezel and front-panel control board.





Crackling noise is present when playing sounds other than system beeps and not in “play through” mode

- 1 If static noise varies while adjusting volume with Sound control panel, use Audio Volume Extension 1.1 or later. **Note:** Audio Volume Extension is available from standard Apple software update sites.
- 2 Replace logic board.





## Video

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

- 1 Adjust contrast button on front bezel.
- 2 Adjust brightness. Use Screen control panel.
- 3 Check yoke cable connection.
- 4 Perform video adjustments. Refer to "Video" in Adjustments chapter.
- 5 Replace analog/video board assembly.
- 6 Replace power supply board.
- 7 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/video board assembly.





Single vertical or horizontal line is displayed	1	Replace analog/video board assembly.
	2	Replace CRT.
Predominant color tint or color cannot be adjusted	1	Verify that video board is securely connected to CRT socket.
	2	Check cable connections to analog/video board.
	3	If analog/video board is Rev A, replace internal RGB cable.
	4	Replace analog/video board assembly. Perform video adjustments (refer to "Video" in Adjustments chapter).
	5	Replace CRT.
Picture breaks into diagonal lines, or picture rolls vertically or horizontally	1	Perform geometry adjustments. Refer to "Geometry" in Adjustments chapter.
	2	Replace analog/video board assembly.





Out of convergence  
(color bleeds from  
text or lines)

- 1 This problem rarely indicates a defective module. Some misconvergence is normal, especially around edges of screen. Contact Apple Technical Support if you're uncertain whether misconvergence is within specification.
- 2 Replace analog/video board assembly.

Black screen spots  
(burnt phosphors)

Replace CRT.

Screen jitters or  
flashes

- 1 Refer to "First Checklist" in Troubleshooting chapter. Move electrical devices (other monitors, scanners, and so on) 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/video board assembly.





Out of focus

- 1 Perform focus adjustment. Refer to "Focus" in Adjustments chapter.
- 2 Check for proper screen luminance. If luminance is off, perform Cutoff and White Balance procedures. Refer to "Video" in Adjustments chapter.
- 3 Replace analog/video board assembly.

Raster size too short/  
tall or narrow/wide

Install monitor adjustment cable, and set appropriate on-screen video adjustment controls to vertical height of 185 mm (7.3 inches) and to horizontal width of 240 mm (9.5 inches).

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

Replace analog/video board assembly.





Raster tilted or shifted

- 1 Refer to "First Checklist" in Troubleshooting chapter. Move metal objects away from monitor.
- 2 Perform appropriate geometric adjustments. Refer to "Geometry" in Adjustments chapter.
- 3 Replace analog/video board assembly.

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

- 1 Refer to "First Checklist" in Troubleshooting chapter.
- 2 Perform appropriate geometric adjustments. Refer to "Geometry" in Adjustments chapter.
- 3 Install monitor-adjustment cable and use on-screen video adjustment controls to eliminate distortion. Based on video tolerances, some distortion is allowed and setting need not be perfect. Contact Apple Technical Support if you're unsure about tolerance level.
- 4 Replace analog/video board assembly.







- |   |  |
|---|--|
| Raster not centered                           | <ol style="list-style-type: none"><li>1 Adjust horizontal or vertical shift control. Refer to Adjustments chapter.</li><li>2 Refer to "First Checklist" in Troubleshooting chapter.</li><li>3 Install monitor-adjustment cable and use on-screen video adjustment controls to center raster. If centering range is insufficient, change the setting of switch SW701 (three-position switch).</li></ol> |
| Screen has white areas with blotches of color | <ol style="list-style-type: none"><li>1 Refer to "First Checklist" in Troubleshooting chapter.</li><li>2 Because this purity problem can be caused by magnetic fields, move unit to another location.</li><li>3 Degauss display with manual degaussing coil. (Degaussing coils can be purchased at most major electronic parts stores.)</li></ol>  |





Video output from the NTSC Video Out Card intermittently turns black and white.

- 1 Zap PRAM.
- 2 Use a contact cleaner to clean the contacts at the end of the ribbon cable (on the NTSC video out card) that fits in the external video slot.
- 3 Replace the NTSC Video Out Card.

Video coming from the NTSC Video Out Card exhibits flickering lines shooting across the screen.

- 1 Zap PRAM.
- 2 Replace the NTSC Video Out Card.



Pixels shimmer at edge of screen, dialog boxes, or windows.

If Power Macintosh 5500/225 serial number falls within the range from TY705xxxxx to TY715xxxxx, replace the logic board with a reworked logic board, P/N 661-1322. To identify a reworked logic board, see Additional Procedures chapter.

Power Macintosh 5500/225 computers with the Apple Video System card running Mac OS 7.6.1, 8.0, and 8.1 freeze during a video capture and restart with less hard drive space available.

- 1 Refrain from moving or clicking the mouse repeatedly while doing a video capture.
- 2 Restart with the Mac OS system software or the Disk Tools diskette. Repair the hard drive with Disk First Aid to restore any space that was lost in the system freeze.
- 3 Verify the I/O controller chip at location U5 on the logic board has the silk-screen number 34S0185 on the chip. If so, replace the logic board.





## 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 DIMMs.

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 DIMMs.

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.





Disk does not eject

- 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 DIMMs.





## Hard Drive

Internal or external hard drive does not operate

- 1 Verify that all hard drive connections are secure.
- 2 Verify that external drive is properly terminated.
- 3 Reseat logic board.
- 4 Replace internal IDE hard drive.
- 5 Replace chassis/wiring harness.
- 6 Replace logic board. Retain customer's DIMMs.

Internal hard drive runs continuously

- 1 Verify that system software is version 7.5 or later.
- 2 Replace hard drive cable.
- 3 Replace internal hard drive.
- 4 Replace logic board. Retain customer's DIMMs.

Hard drive not found when booted from CD-ROM drive

Use Drive Setup 1.03 to attempt mounting the hard drive.





Flashing? appears at startup in 5400/120, 5400/180, or 5400/200 with 1.6 GB ATA hard drive (p/n 661-1107), and may be corrected with restart.

- 1 Be sure system software is not corrupted. See the Software Troubleshooting document in the HW-SW Procedures topic under the Troubleshooting tab on the Service Source CD startup screen.
- 2 Remove the 1.6 GB ATA hard drive and look at the serial number on the bar code label.
- 3 If serial number is within range XXX**6099**XXXXX to XXX**6131**XXXXX, replace hard drive.





## CD-ROM Drive

CD-ROM drive does not accept disc

- 1 Exchange compact disc (if disc is dirty or damaged).
- 2 Replace CD-ROM drive mechanism.
- 3 Replace SCSI data cable.

Volume control does not operate correctly

- 1 Check Sound control panel setting.
- 2 Check front-panel controls.
- 3 Reseat the drive and control bezel.
- 4 Verify that the front-panel control board is completely installed.
- 5 Reseat CD adapter connector.
- 6 Replace CD adapter connector.
- 7 Replace CD-ROM drive.
- 8 Replace chassis/wiring harness.







Computer cannot  
mount known-good  
CD-ROM drive

- 1 Reseat CD-ROM drive adapters.
- 2 Check SCSI ID setting. (Internal CD-ROM drive was originally set to 3 at factory.)
- 3 Replace CD-ROM drive.
- 4 Replace chassis/wiring harness

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

- 1 Verify that ID switch setting on external SCSI 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 Plus (CD+)  
format CD-ROM disc  
causes stuttering  
sound, and may not  
mount.

Replace CD-ROM drive.





Eject button sticks.

Replace the front bezel P/N 922-1857.

Spinning disc causes vibration sounds in 12x CD-ROM drive.

The 12x CD-ROM drive reads CD-ROM discs very quickly, and because of the drive's high rotation speed, unexpected vibration sounds may occur. This sound is normal for a 12-speed (12x) CD-ROM drive.





## Peripheral

Cursor does not move

- 1 Restart system.
- 2 Check mouse connection.
- 3 If mouse was connected to keyboard, connect mouse to rear ADB port and disconnect keyboard. If mouse works, replace keyboard. If mouse does not work in ADB port, replace mouse.
- 4 Reseat logic board.
- 5 Replace logic board. Retain customer's DIMMs.

Cursor moves, but  
clicking mouse  
button has no effect

- 1 Replace mouse.
- 2 Reseat logic board.
- 3 Replace logic board. Retain customer's DIMMs.





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

- 1 Remove extra system files on hard drive.
- 2 Check mouse speed on Control Panel.
- 3 Unplug 4.5 battery, wait 20 seconds, plug in battery, and restart computer.
- 4 If mouse was connected to keyboard, connect mouse to rear ADB port and disconnect keyboard. If mouse works, replace keyboard. If mouse does not work in ADB port, replace mouse.
- 5 Replace logic board. Retain customer's DIMMs.

No response to any  
key on keyboard

- 1 Verify that system software is version 7.5 (or later).
- 2 Check keyboard connection to ADB port.
- 3 Replace keyboard.
- 4 Reseat logic board.
- 5 Replace logic board. Retain customer's DIMMs.





Known-good  
StyleWriter,  
ImageWriter, or  
ImageWriter II does  
not print

- 1 Verify that Chooser and Control Panel are set correctly.
- 2 Verify that printer driver and system software are not corrupt.
- 3 Verify system software is version 7.5 (or later).
- 4 Check printer DIP switches.
- 5 Replace printer interface cable.
- 6 Replace logic board. Retain customer's DIMMs.

Known-good  
LaserWriter does not  
print

- 1 Verify that Chooser and Control Panel are set correctly.
- 2 Verify that printer driver and system software are not corrupt.
- 3 Replace printer interface cable(s).

Doesn't recognize  
SCSI device

- 1 Check for proper SCSI termination.
- 2 Check that the SCSI cable is good and firmly connected.
- 3 Check the SCSI device manual for required software.
- 4 If repairing a 5400, use the 6360/64xx/54xx Update disk to correct a possible SCSI timing problem.





## Miscellaneous

Clicking, chirping, or thumping sound	1	Replace analog board.
	2	Replace logic board. Retain customer's DIMMs.
Smoke or Odor Present	1	Replace Analog board.
	2	Replace Power Supply.
	3	Replace Logic Board.
No video, no audio, and no drive operation	1	Connect power cord.
	2	Switch power on.
	3	Replace power cord.
	4	Replace analog board.
	5	Replace logic board. Retain customer's DIMMs.





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

- 1 Replace DRAM DIMMs on logic board.
- 2 Replace logic board. Retain customer's DIMMs.

Rattling sound at startup in system with Apple External Video Connector

Press or fold Apple External Video cable to prevent it from contacting fan blades.

Headphone jack does not operate correctly

- 1 Verify that headphone jack is seated properly.
- 2 Replace front panel control board.
- 3 Replace chassis/wiring harness.





"Sad Macintosh" icon

- 1 Verify that no disc is in CD-ROM drive.
- 2 Disconnect all external SCSI devices and attempt to restart computer.
- 3 Disconnect internal SCSI device and attempt to start computer with known-good floppy disk.
- 4 Replace bad SCSI drive with known-good SCSI drive.
- 5 Replace DRAM DIMMs on logic board.
- 6 Replace logic board. Retain customer's DIMMs.

No sound from  
known-good external  
speakers

- 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 Replace logic board. Retain customer's DIMMs.







System with internal modem unable to recognize graphics or Ethernet card in communications slot

- 1 Replace internal modem.
- 2 Replace graphics or Ethernet card.

When installing software, error message appears: "Unable to decompress file 'xxxxx' because of a data mismatch error." System hangs, freezes, or Type 10 error requires restart.

If serial number of Power Macintosh 5500 falls within the range from TY705xxxxx to TY716xxxxx, and logic board is manufactured by OPC, and L2 cache DIMM is incompatible with OPC boards, replace L2 cache with P/N 661-1477. See details for identifying OPC logic boards and incompatible L2 cache DIMMs in "Additional Procedures" chapter.





## Take Apart

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Power Macintosh/Performa  
5400 and 5500 Series





## Drive and Control Bezel

No preliminary steps are required before you begin this procedure.

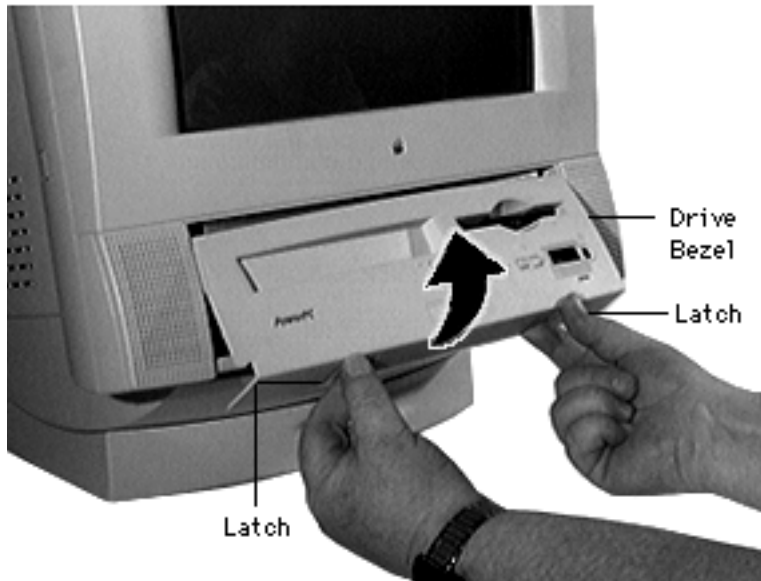


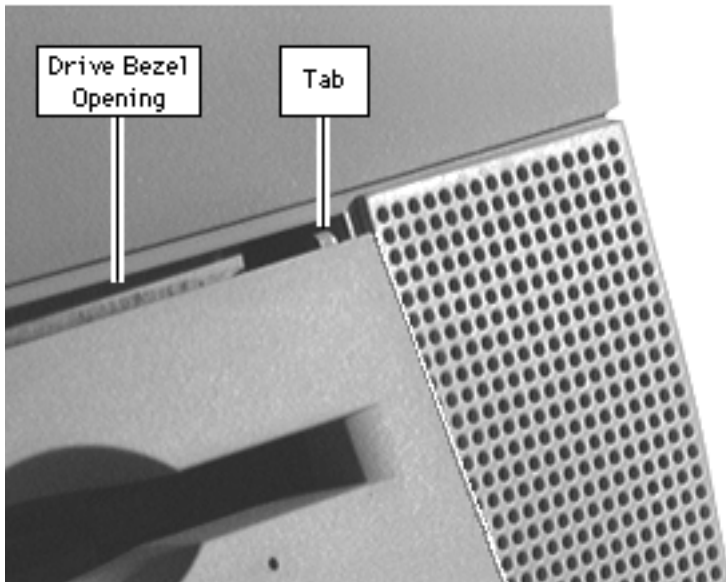
Drive  
Bezel





- 1 Placing your fingertips in the holes of the finger latches, pull the two finger latches down.
- 2 Swing the drive and control bezel up and off.





**Replacement Note:** Insert the drive bezel hinge tabs behind the upper corners of the front bezel opening. Swing the drive bezel down until it snaps closed.



## Floppy Drive

Before you begin, remove the drive and control bezel.

**Caution:** Review the ESD precautions in Bulletins/ Safety.

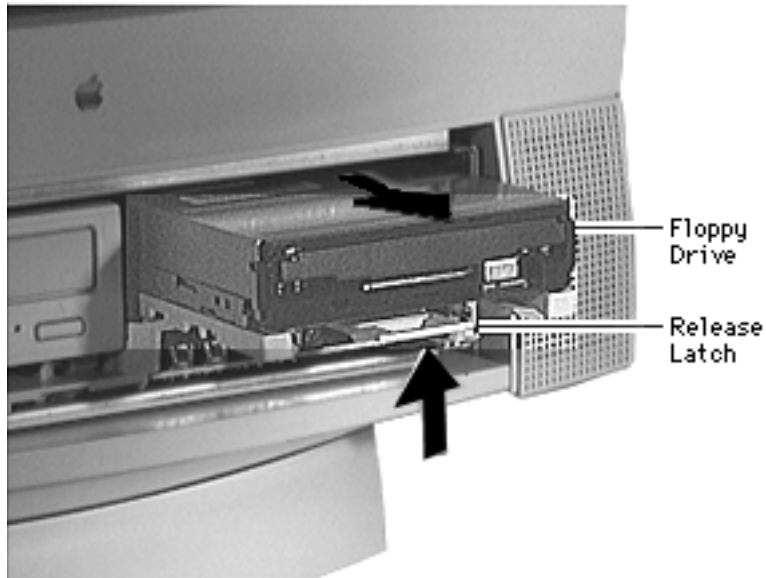


Floppy Drive





- 1 Pull up the release latch, and pull out the floppy drive far enough to reach the ribbon cable connector.

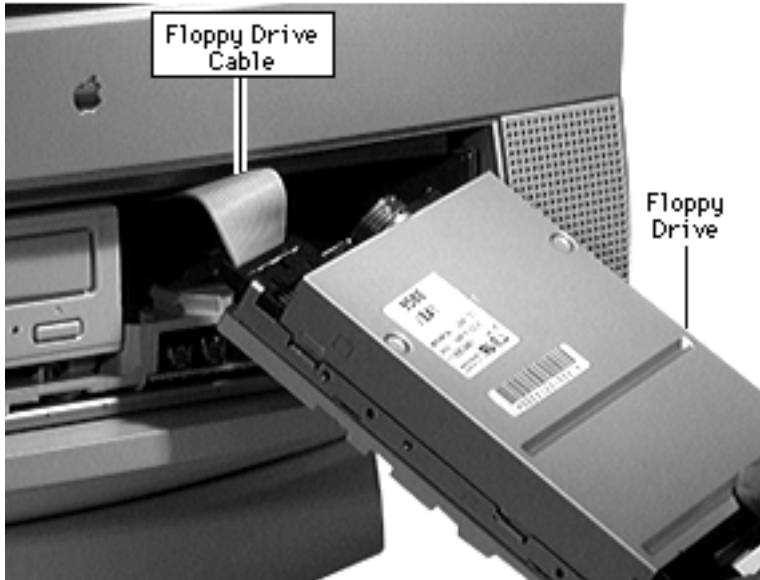




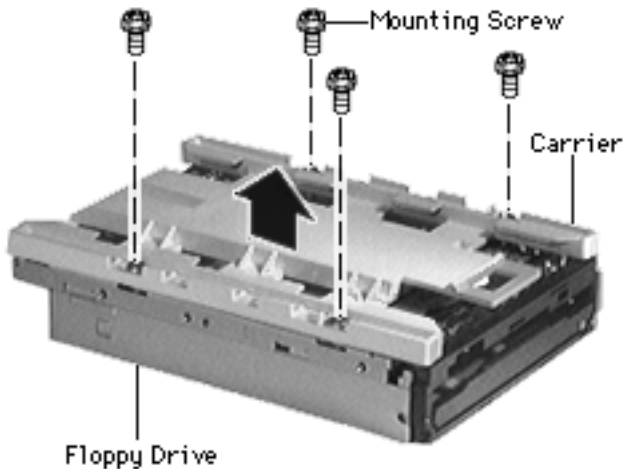
- 2 Disconnect the floppy drive from the floppy drive cable.

**Note:** Remove the drive carrier if you are replacing the floppy drive.

**Note:** Because screw placement varies according to the type of drive used with the carrier, note the placement of the screws before removing them. Retain the carrier and screws, and install them on the new floppy drive.







- 3 Remove the four mounting screws.
- 4 Remove the carrier from the floppy drive.



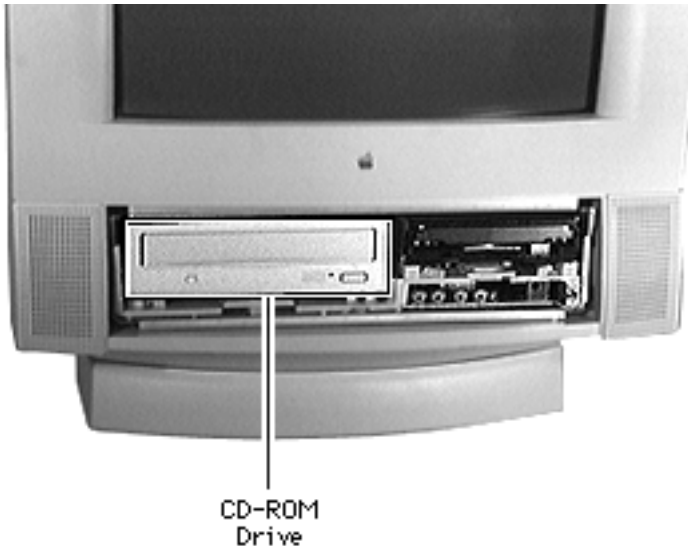
## CD-ROM Drive

Before you begin, remove the following:

- Drive and control bezel
- Floppy drive

**Note:** The CD-ROM drive is optional.

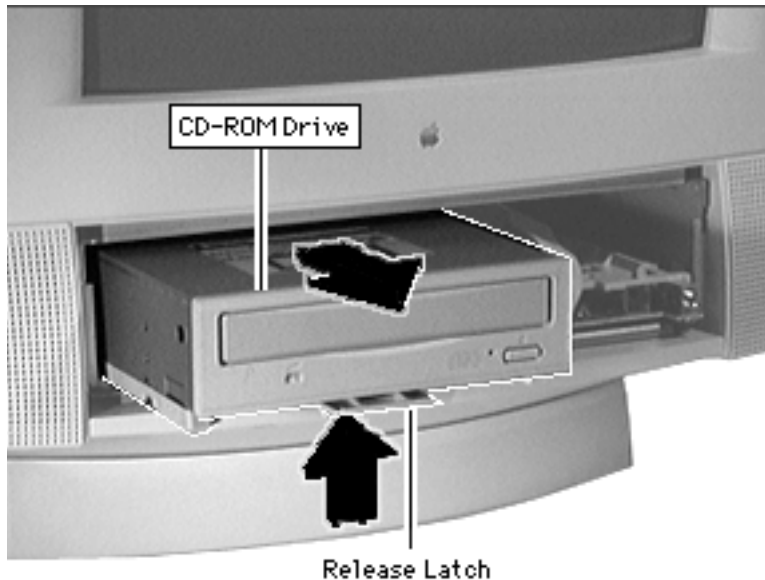
**Caution:** Review the ESD precautions in Bulletins/ Safety.





Push up the release latch and pull the CD-ROM drive from the chassis.

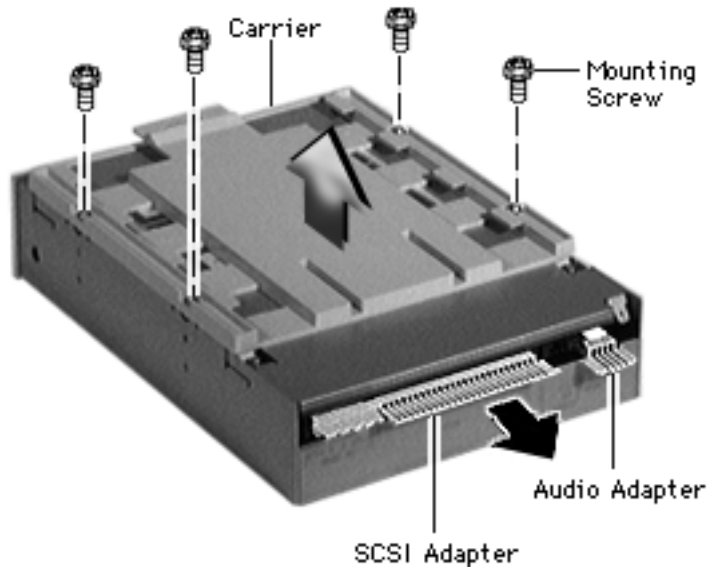
**Note:** You may need to use some initial force to disconnect the CD-ROM drive from the internal chassis/wiring harness.

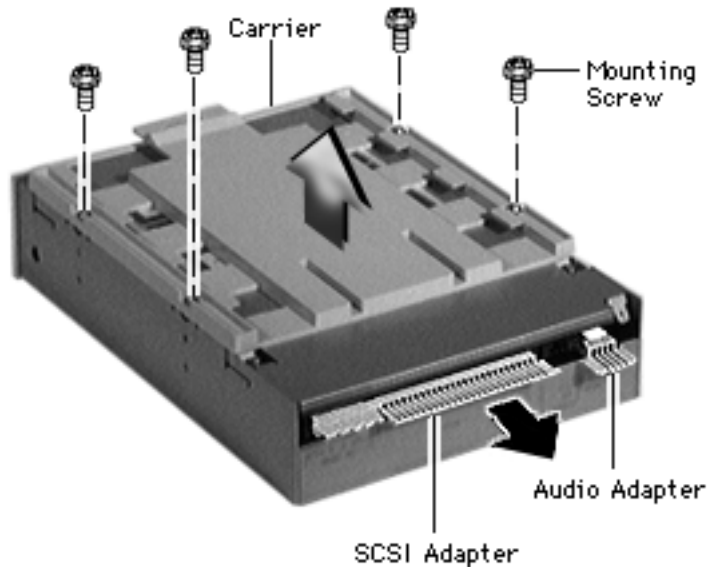




**Note:** Perform the following steps only if you are replacing the CD-ROM drive.

- 1 Disconnect the CD-ROM audio adapter from the drive.
- 2 Disconnect the SCSI adapter
- 3 Remove the four mounting screws and carrier from the CD-ROM drive.





**Replacement Note:** Retain the carrier, screws, and adapters for installation on the new drive.

**Replacement Caution:** Before replacing the SCSI adapter, verify that the SCSI drive connector pins are not bent.



## Front Panel Control Board

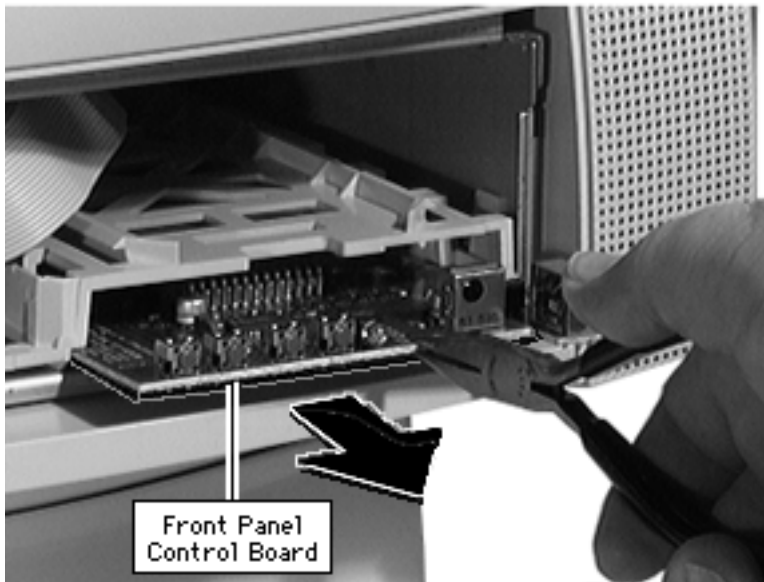
Before you begin, remove the drive and control bezel.

**Caution:** Review the ESD precautions in Bulletins/ Safety.



Front Panel  
Control Board





**Caution:** Be sure to grip the front panel in the area shown to avoid harming circuit tracings.

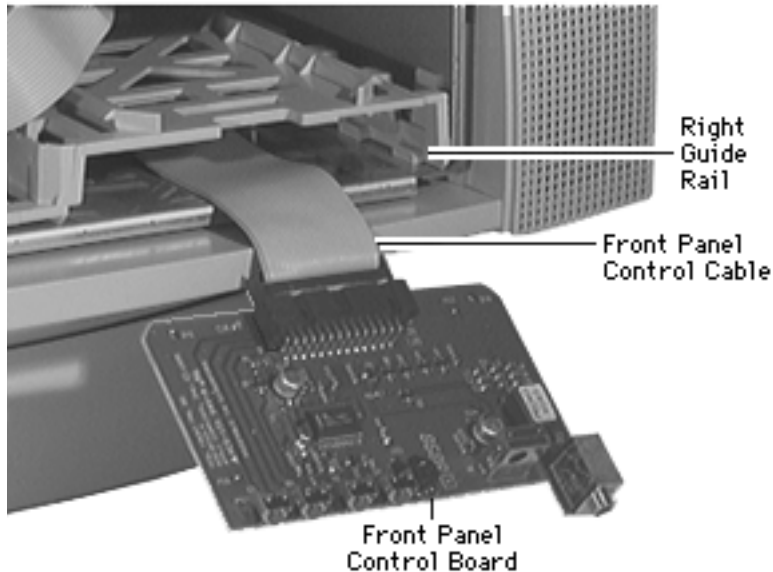
- 1 Using needle-nose pliers, grip the front edge of the front-panel control board.
- 2 Pull firmly and slide the front panel control board out far enough to reach the ribbon cable connector.





- 3 Disconnect the cable from the front-panel control board.

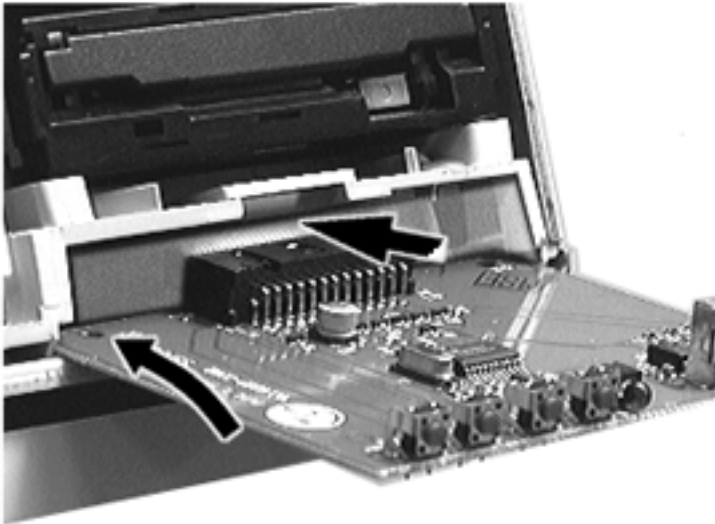
**Replacement Note:** Using a flat-blade screwdriver, press the front-panel control cable back and down.

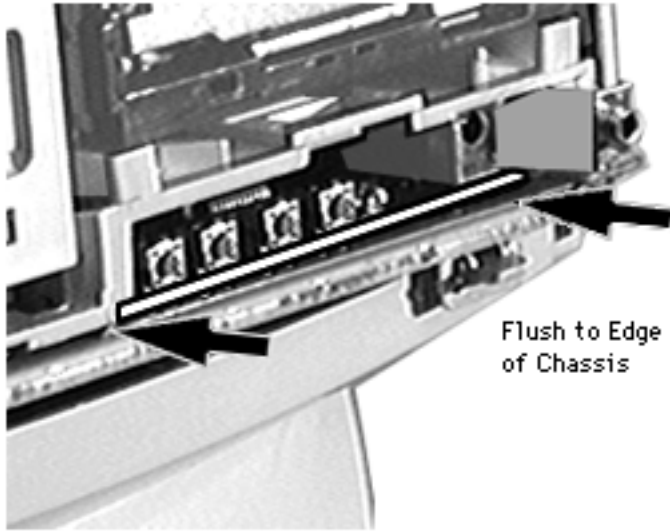






**Replacement Note:** Tilt the board up slightly to insert it into the guide rails.



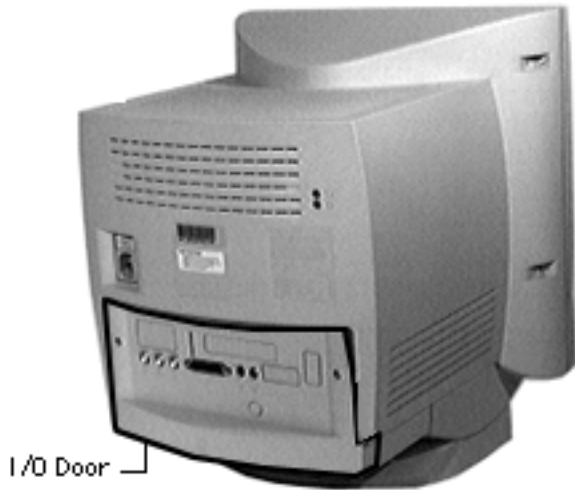


**Replacement Note:** The front edge of the reinstalled front-panel control board must be flush with the front edge of the plastic chassis.



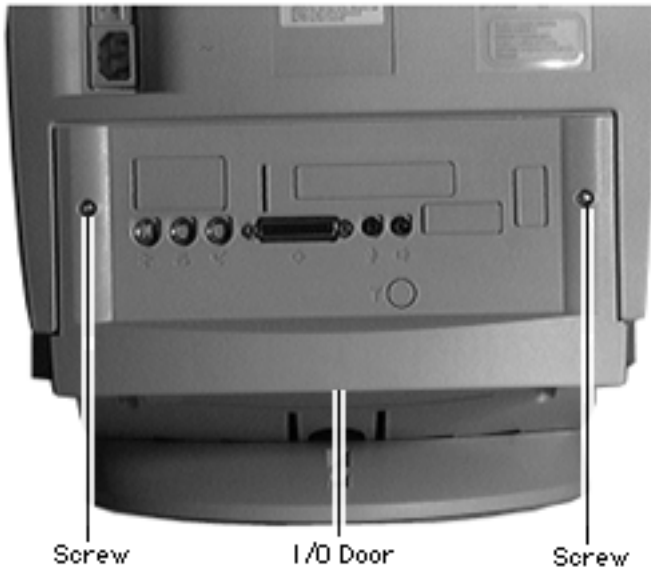
## I/O Door

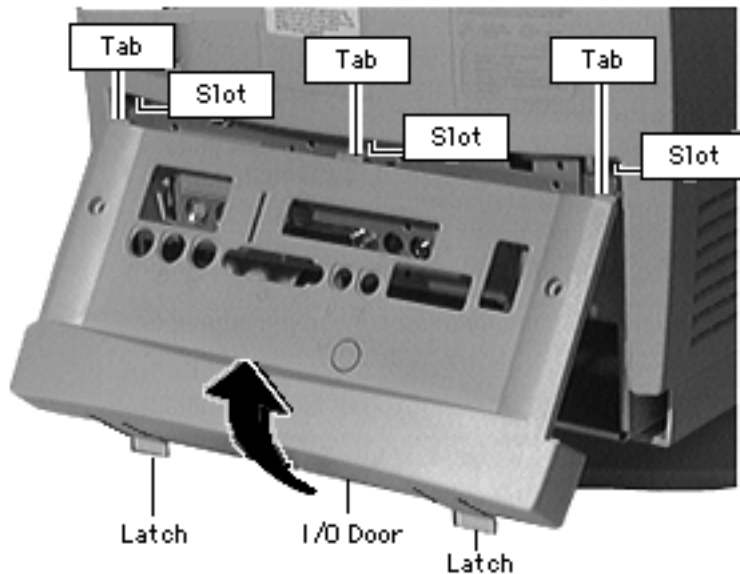
No preliminary steps are required before you begin this procedure.





- 1 Remove the two security screws.





- 2 Using your fingertips, pull the two finger latches down.
- 3 Swing the door up and off.

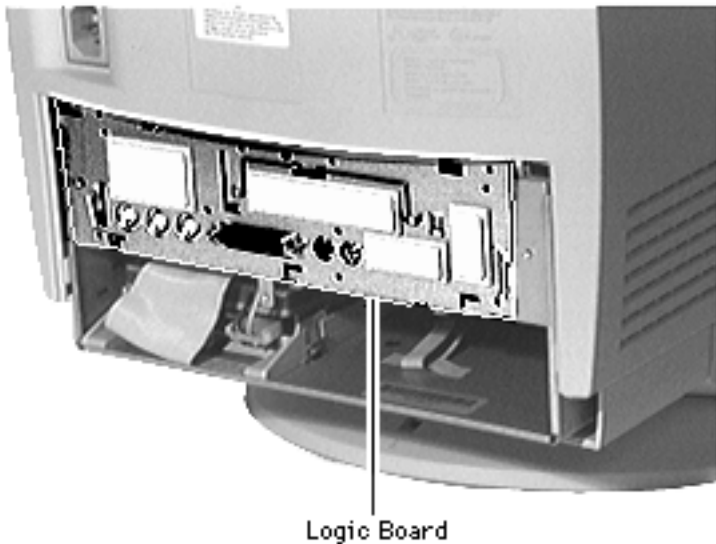
**Replacement Note:** Align the I/O door hinge tabs and slide the door up into position. Swing the door down until it snaps closed.

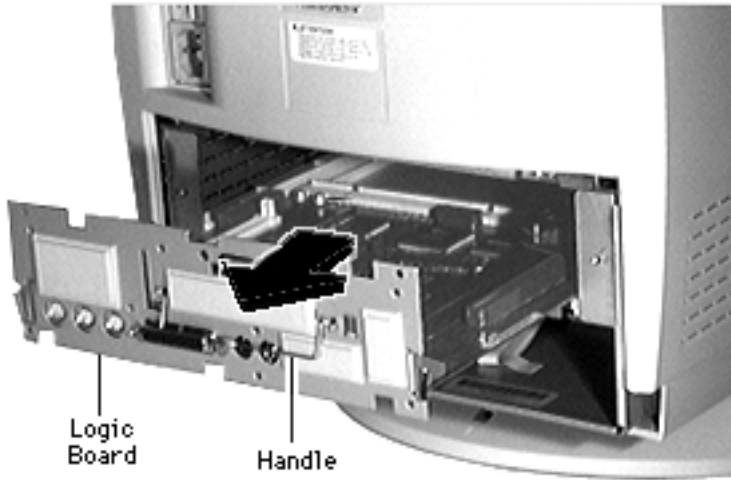


## Logic Board

Before you begin, remove the I/O door.

**Caution:** Review the ESD precautions in Bulletins/ Safety.

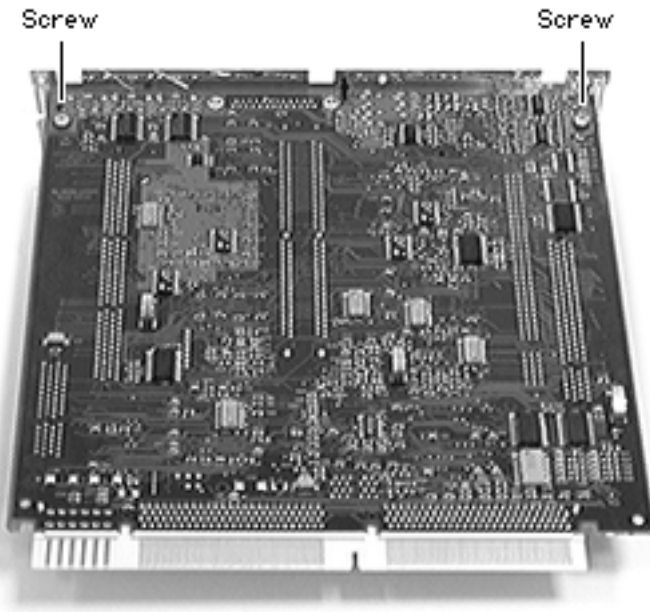




- 1 Swing out the handle from its storage position.
- 2 Pull out the logic board.

**Note:** When installing cards, cover the two screws (for fan support and ground thermistor mounting) with tape. These screws are below the upper chassis, in the area of the logic board. Stretching a length of strong tape (fiber-reinforced, if possible) from front to back over the screws protects cables from damage.



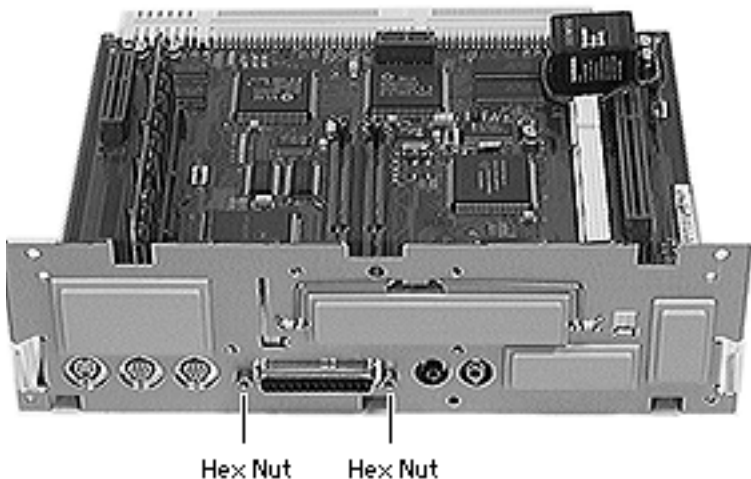


**Note:** Perform the following steps only if you are replacing a defective logic board.

- 3 Remove the two Phillips screws that secure the fence to the solder side of the logic board.

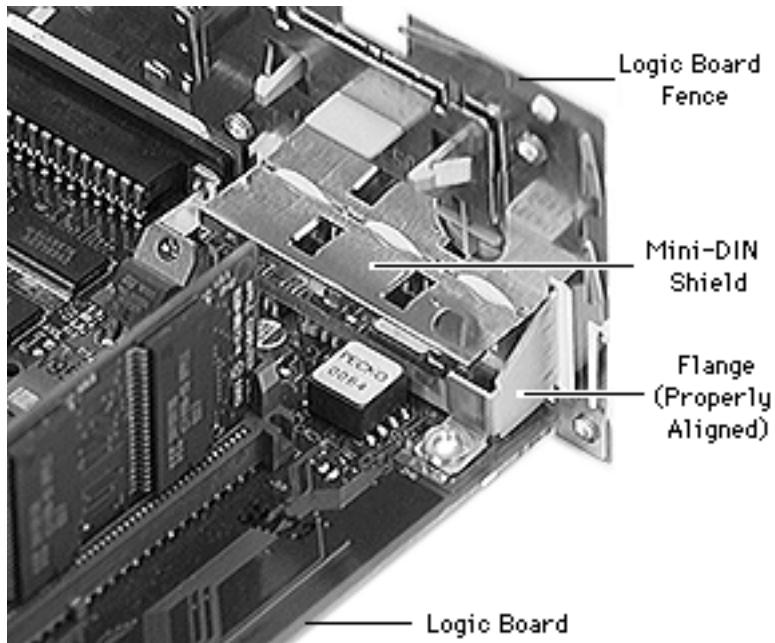






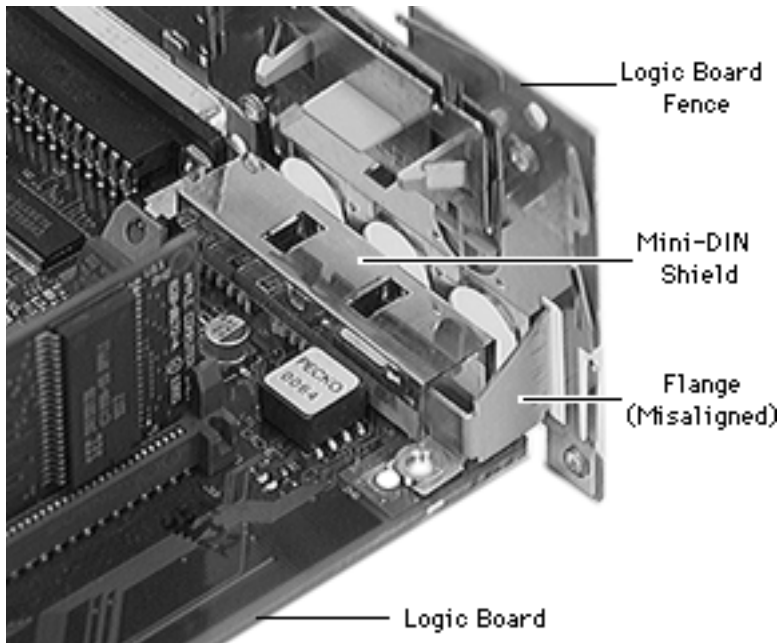
- 4 Using a hex nut driver, remove the two hex nuts that secure the logic board fence to the SCSI connector.
- 5 Separate the logic board fence from the logic board.





**Replacement Note:** Verify that the flange on the logic board fence is properly aligned with the mini-DIN shield.





Align the flange around the mini-DIN shield first, then swing the rest of the logic board fence into place.

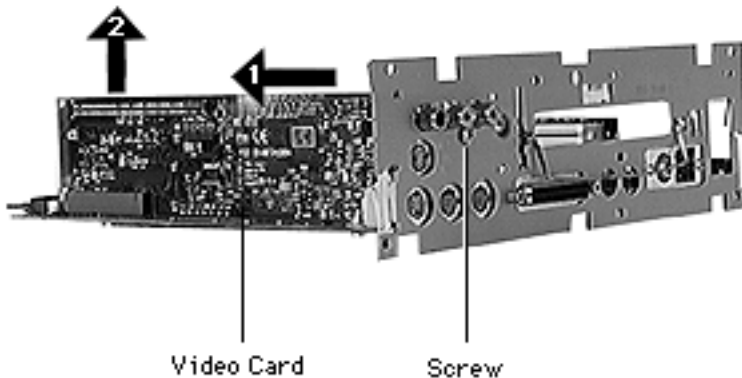




## Video Card

Before you begin, remove the following:

- I/O door
- Logic board



- 1 Remove the screw that secures the video card to the logic board fence.
- 2 Pull the video card out of the video-in slot.

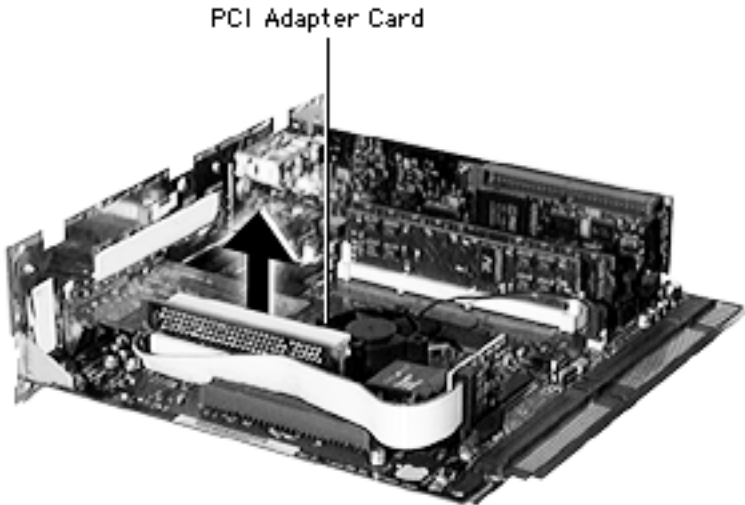


## PCI Adapter

Before you begin, remove the following:

- I/O door
- Logic board

Pull up on the PCI adapter to remove it from the PCI slot.

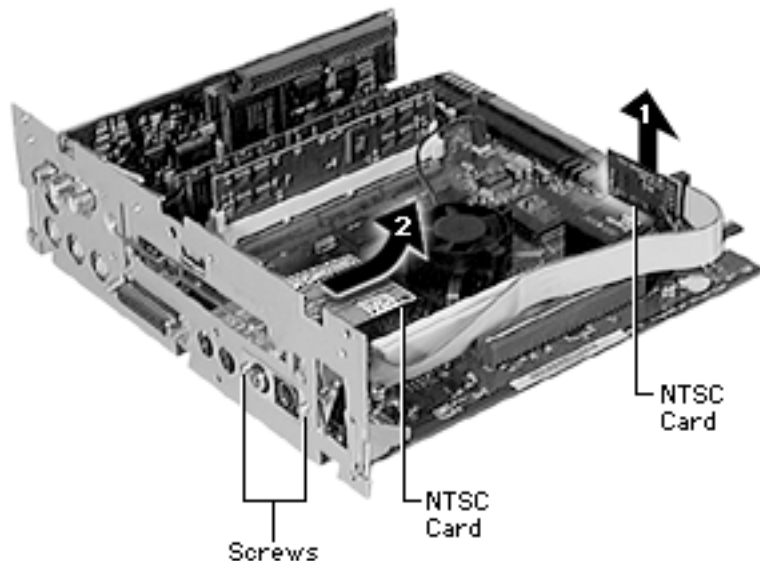




## NTSC Video-Out Card (5500)

Before you begin, remove the following:

- I/O door
- Logic board
- PCI adapter

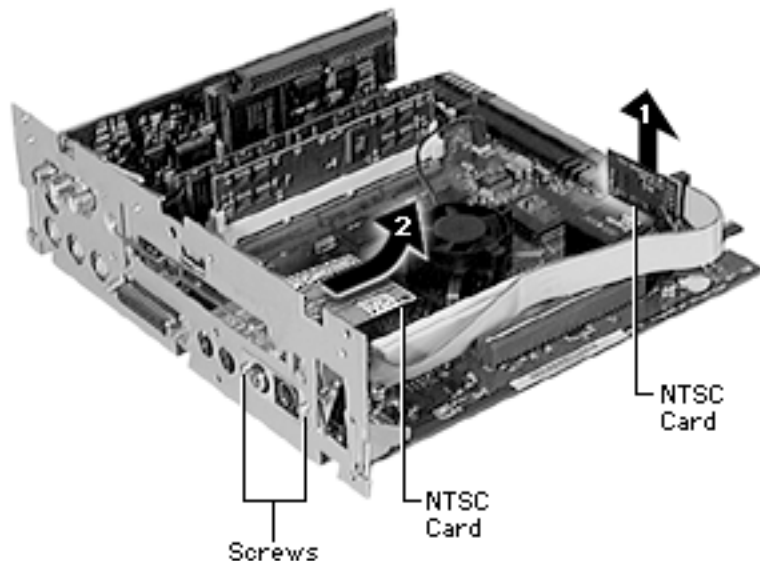


- 1 Pull out the card that is plugged into the monitor-out slot.
- 2 Remove the two screws that secure the card to the logic board fence.





- 
- 
- 3 Pull the card away from the logic board fence to remove it from the logic board.

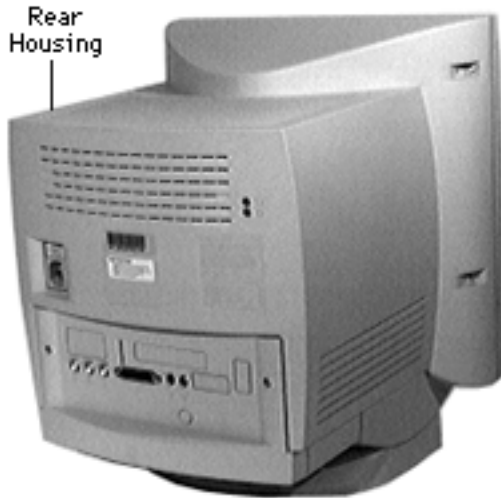




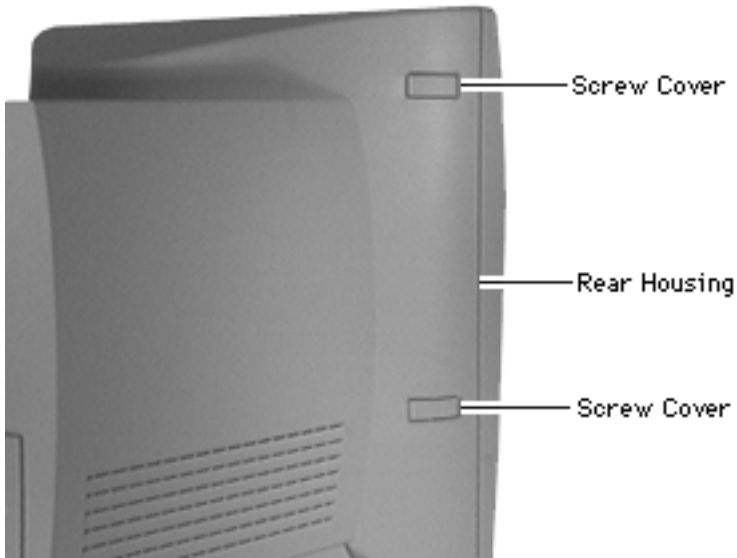
## Rear Housing

Before you begin, remove the I/O door.

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







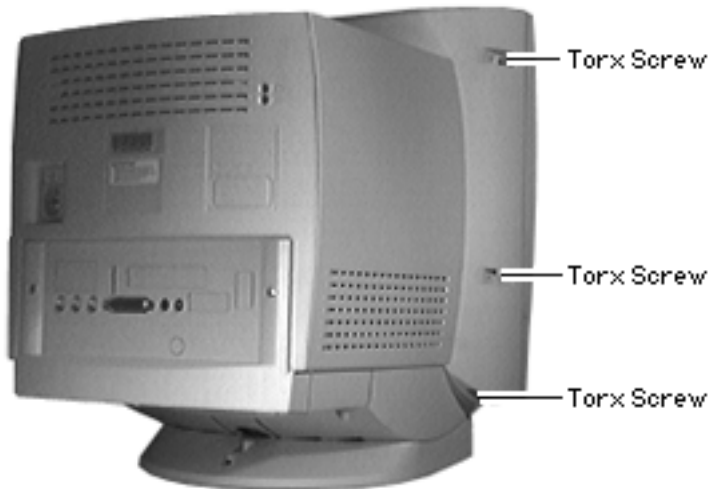
- 1 Pry off the two screw covers on each side of the rear housing.

**Tip:** Pry up from the rear edge of the screw cover.





- 2 Remove the three torx screws on each side of the rear housing.





- 3 **⚠ Warning:** This step exposes high voltage components. Follow CRT safety precautions.

Slide the rear housing back and off.





## Front Bezel

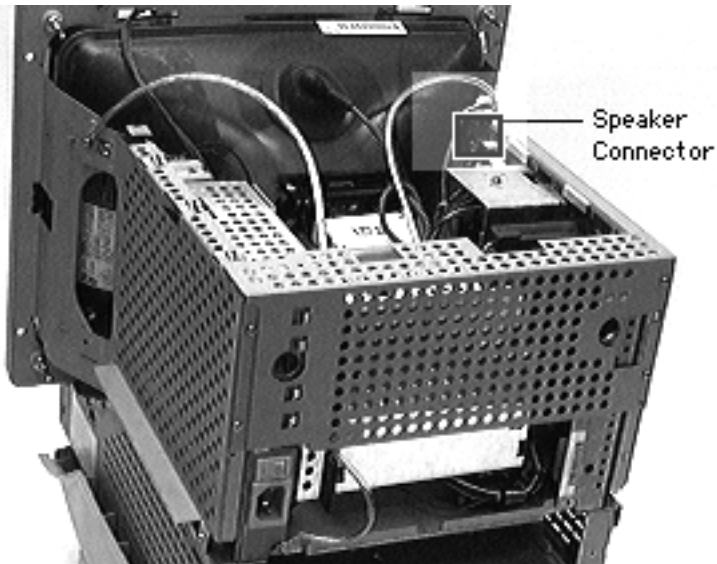
Before you begin, remove the following:

- I/O door
- Rear housing

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

**Note:** See Rev. B topic of the Basics chapter to determine whether you are servicing





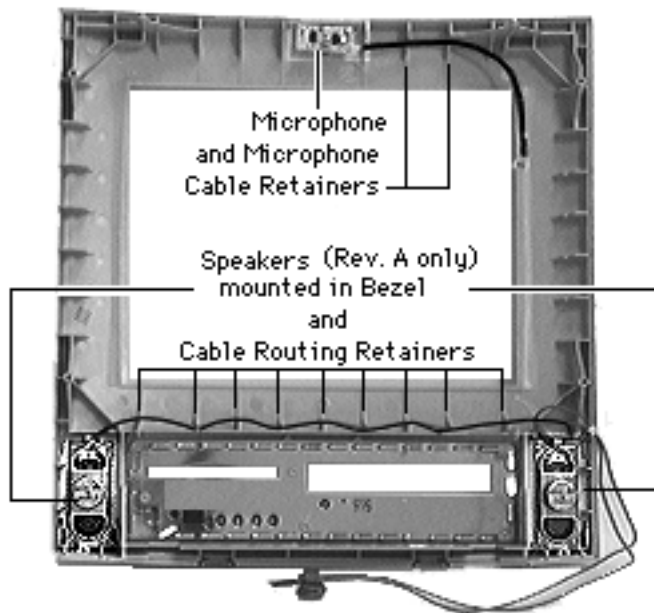
an original or Rev. B version.

**Caution:** The Rev. B and original versions of the front bezels are not interchangeable.

- 1 **Note:** The speaker cable is the set of two gray, round cables wrapped around the ferrite bead.

Disconnect the speaker cable and guide it down and under the metal CRT frame.





- 2 Disconnect the microphone cable and guide the cable to the microphone side of the metal CRT frame.
- 3 Pull off the front bezel.





**Replacement Note:** Guide the microphone cables through the plastic retainers before replacing the front bezel.

**Replacement Note:** Guide the speaker cable connector behind the metal CRT frame, and then up to the speaker connector on the main deflection board.





## Internal Microphone

Before you begin, remove:

- I/O door
- Rear housing
- Front bezel

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

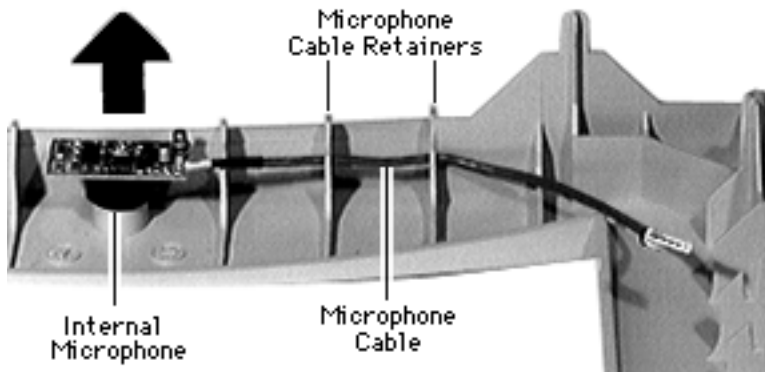






Lift off the microphone.

**Replacement Note:** Guide the microphone cable through the plastic cable retainers.

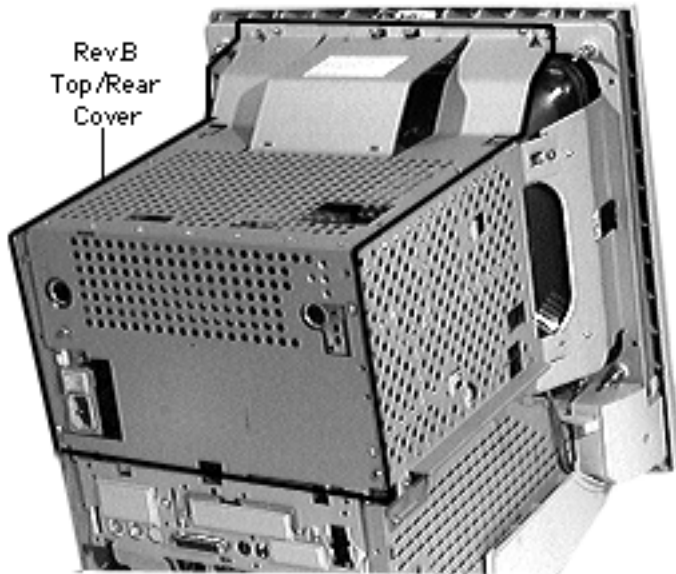


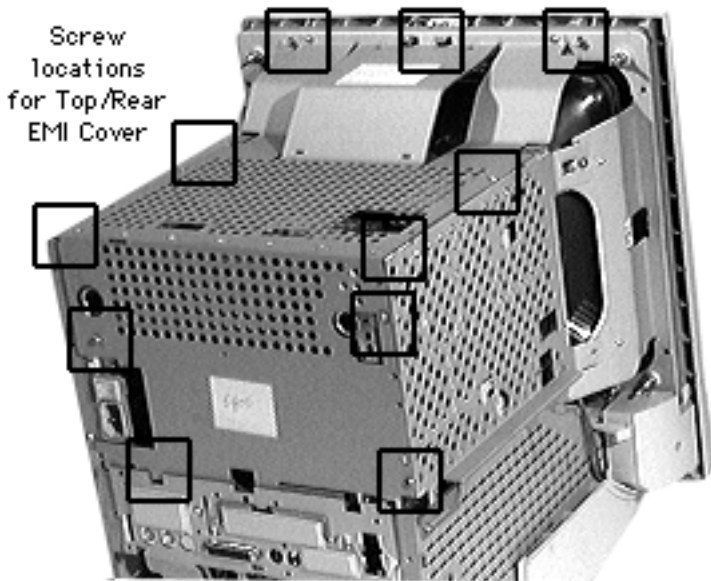


## Rear EMI Shield

Before you begin, remove the following:

- I/O door
- Rear housing
- Front bezel





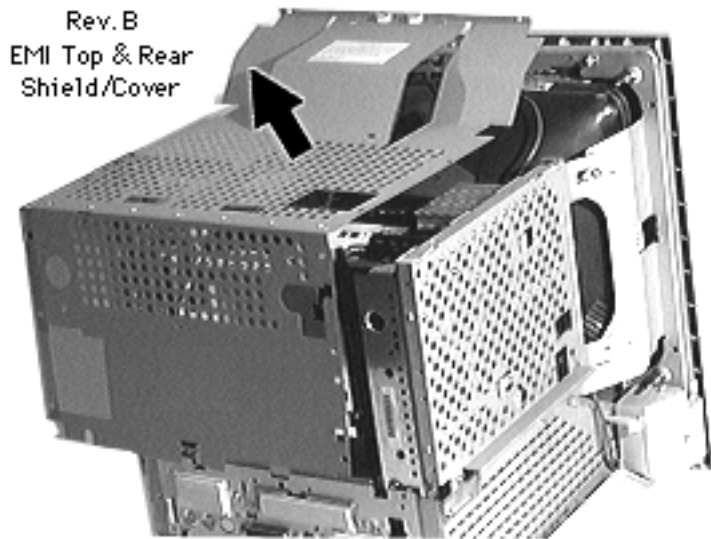
**⚠ Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.

- 1 Remove the screws from the rear shield.





- 2 Pull the rear shield up and lift off.





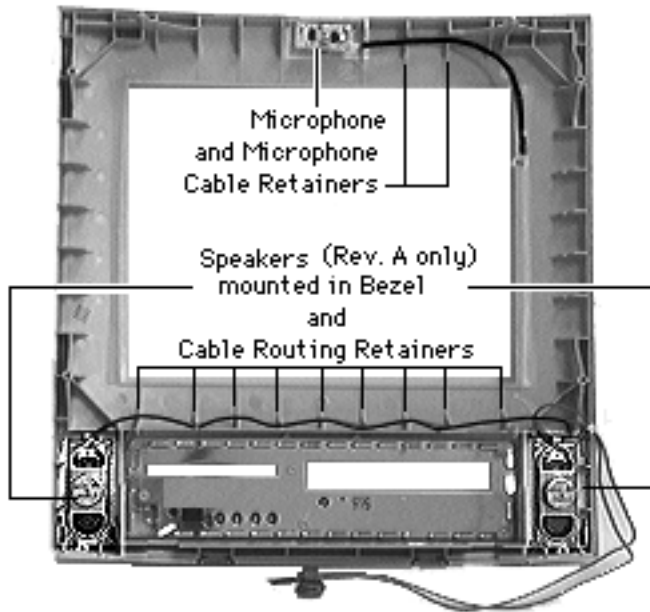
## Speakers, Original Version

Before you begin, remove the following:

- I/O door
- Rear housing
- Front bezel

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





**Note:** The Power Macintosh/Performa 5000 series includes two versions, the original version and Rev. B. See the Rev. B topic of the Basics chapter to identify the version you are servicing.

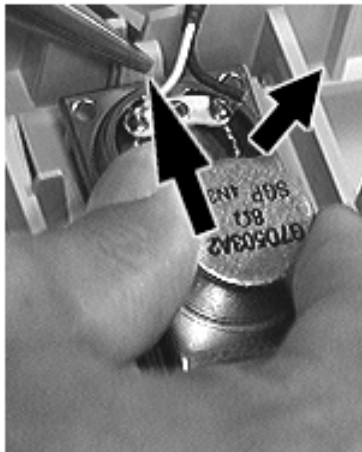
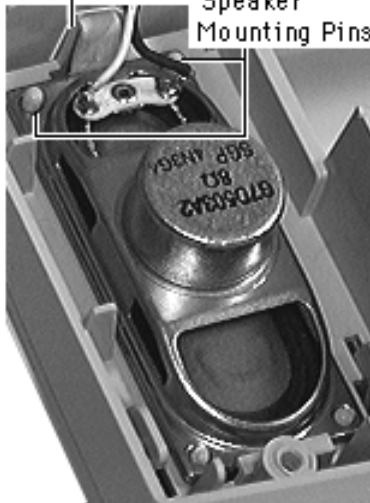
**Caution:** The speakers of the two versions are not interchangeable and the Take Apart procedures differ significantly. If you are servicing an original version, use the following procedures. If you are servicing a Rev. B version,





Speaker  
Locking Tab

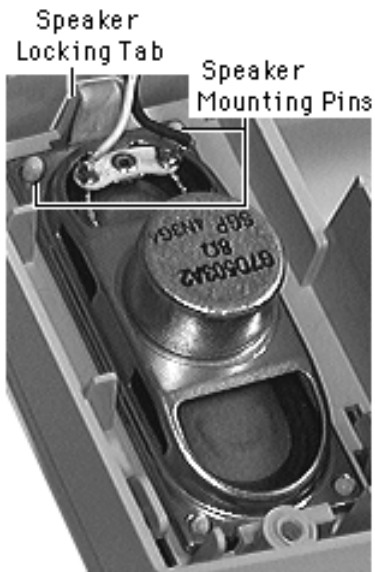
Speaker  
Mounting Pins



follow the procedures in  
"Speakers, Rev. B."

- 1 Place the front bezel face down.
- 2 Remove the speaker cables from the plastic cable retainers on the inside of the front bezel.
- 3 Pry up the top edge of each speaker to clear the security pins and lift off.





**Replacement Note:** Place the speaker with the longer cable on the floppy drive side of the unit. Align and secure the speaker with the bottom tabs inside the bezel. Then snap the top of the speaker over the two security pins.







## Speakers, Rev. B

Before you begin, remove the following:

- I/O door
- Rear housing
- Front bezel
- Rear EMI shield

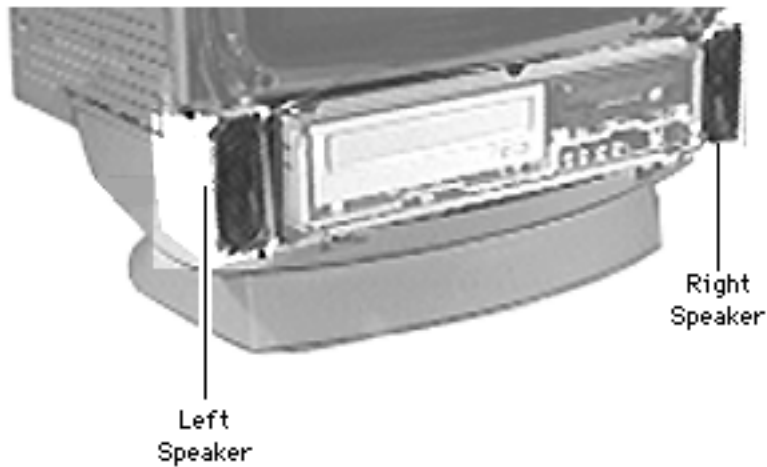




**Note:** The Power Macintosh/Performa 5000 series includes two versions, the original version and Rev. B. See the Rev. B topic of the Basics chapter to identify the version you are servicing.

**Caution:** The speakers of the two versions are not interchangeable and the Take Apart procedures differ significantly. If you are servicing an original version, refer to "Speakers, Original Version."

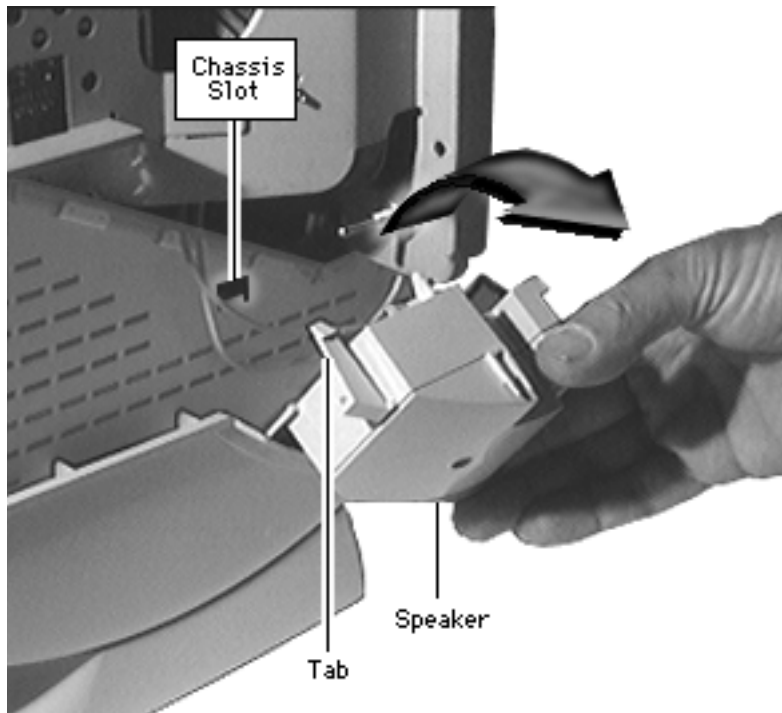




- 1 **Note:** Remove the left speaker first.

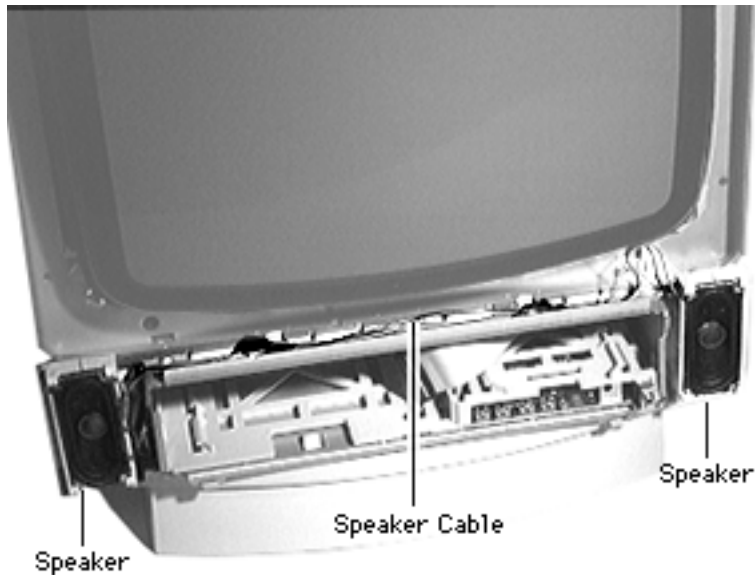
Press the tab and release the speaker from the chassis slot.





- 2 Tilt the speaker and remove it.





### Replacement Note:

- The plastic speakers are printed "right" and "left." Place the speakers accordingly as you face the monitor.
- Guide the wire connecting the speakers in the channel between the monitor and chassis.
- Be careful not to crimp the speaker wire as you guide it from the speaker to its analog board connection.

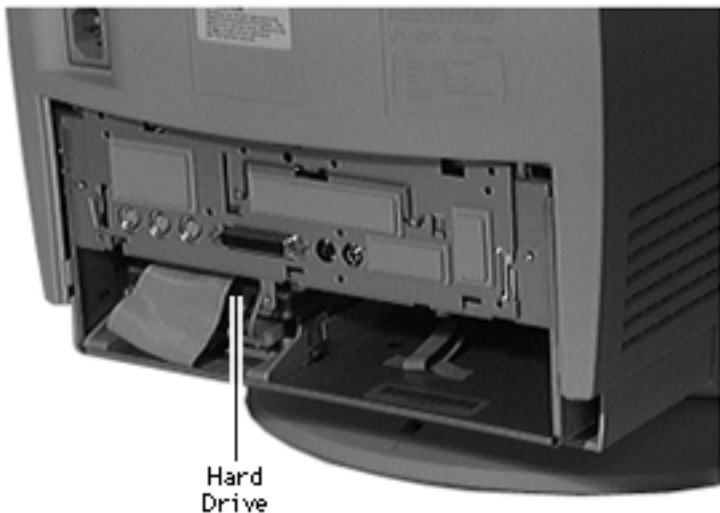




## Hard Drive

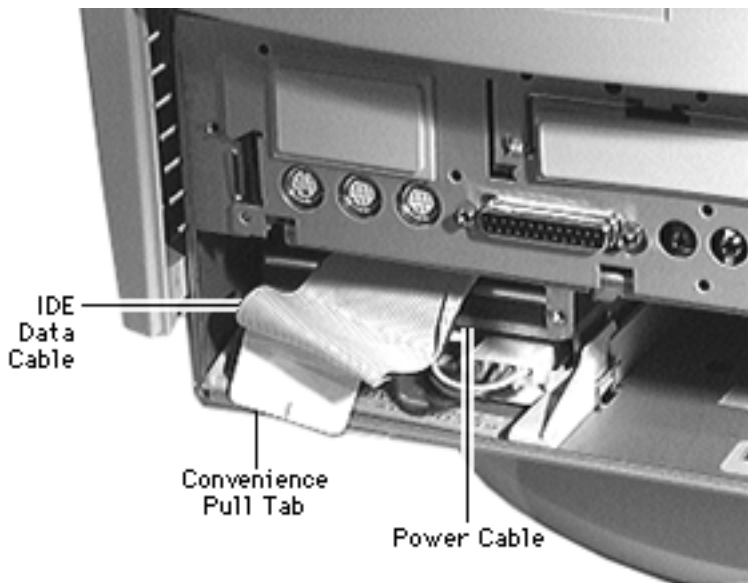
Before you begin, remove the I/O door.

**Caution:** Review the ESD precautions in Bulletins/ Safety.





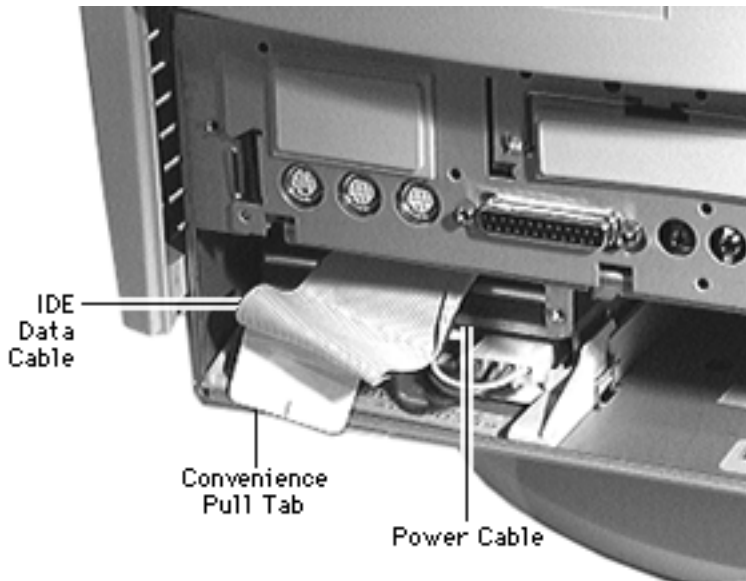
- 1 Using the convenience pull tab, disconnect the IDE data cable from the hard drive connector.
- 2 Disconnect the power cable.



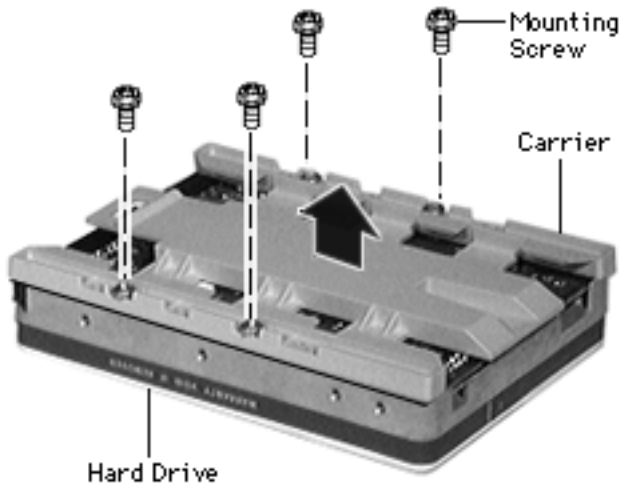


- 3 Using needle-nose pliers, pull up the release latch and slide the IDE hard drive from the chassis.

**Replacement Caution:** Some hard drives have sharp edges near the cable connector that can rub and, therefore, damage the cable. Avoid rubbing the cable against the edge of the drive.







**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.





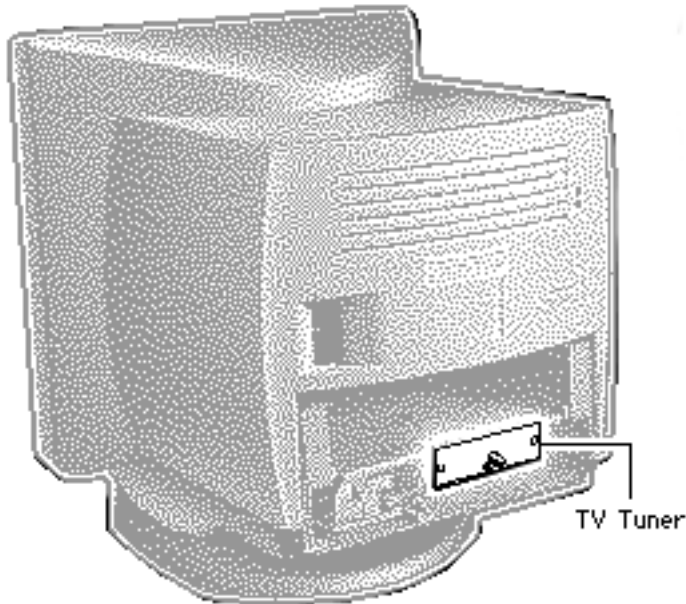
## TV Tuner

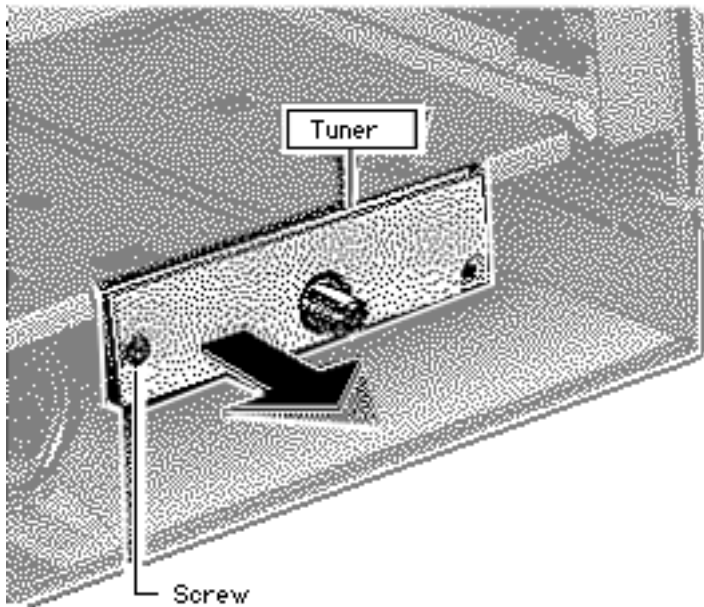
Before you begin, remove the following:

- I/O door
- Logic board

**Note:** The TV Tuner is an option.

**Caution:** Review the ESD precautions in Bulletins/ Safety.



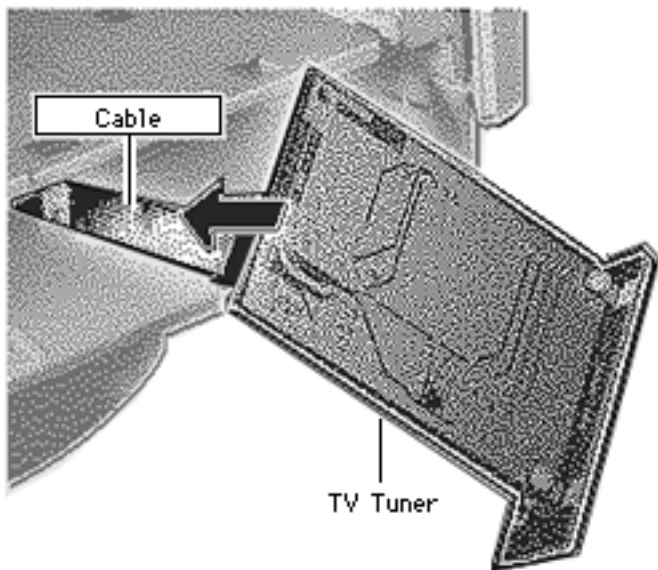


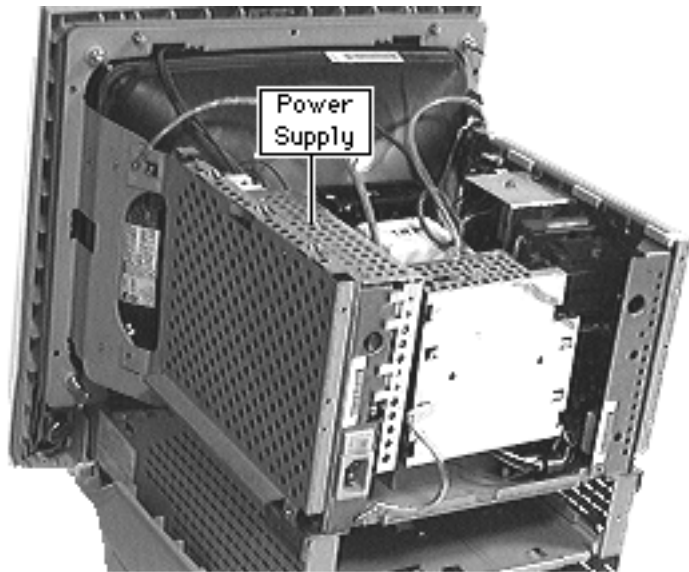
- 1 Remove the Phillips screw.
- 2 Slide out the TV Tuner far enough to reach the TV Tuner cable.





- 3 Disconnect the TV Tuner cable and remove the TV Tuner.





## Power Supply, Original Version

Before you begin, remove the following:

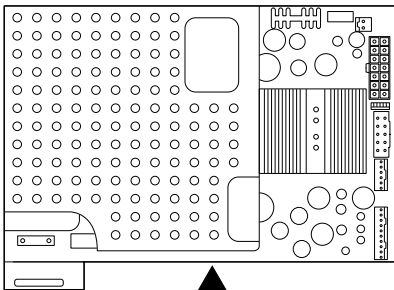
- I/O door
- Rear housing
- Front bezel
- Logic board
- Rear EMI shield

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

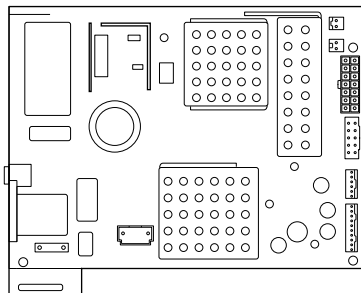




Rev. A Power Supply  
5200/5400)



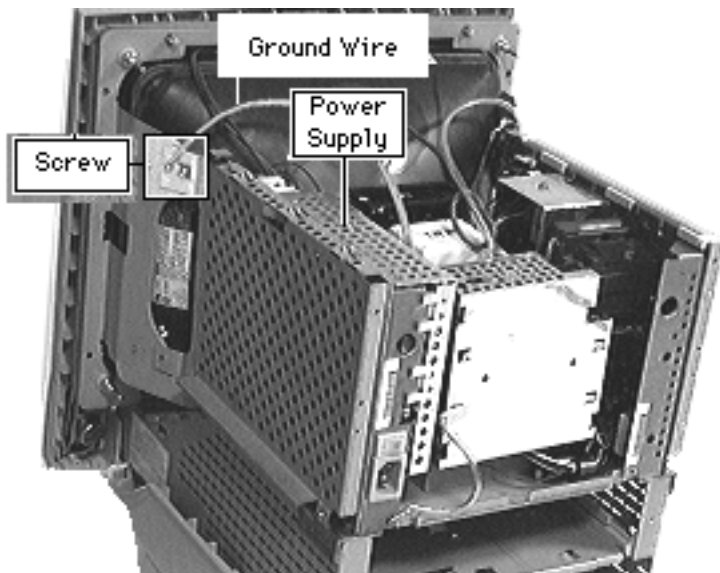
Rev. B Power Supply  
(5200/5300/5400/5500)



**Note:** The Power Macintosh/Performa 5000 series includes the original version and Rev. B. See the Rev. B topic of the Basics chapter to identify the version you are servicing.

**Caution:** The power supplies of the two versions are not interchangeable. If you are servicing an original version, use the following procedures. If you are servicing a Rev. B version, follow the procedure in "Power Supply, Rev. B."



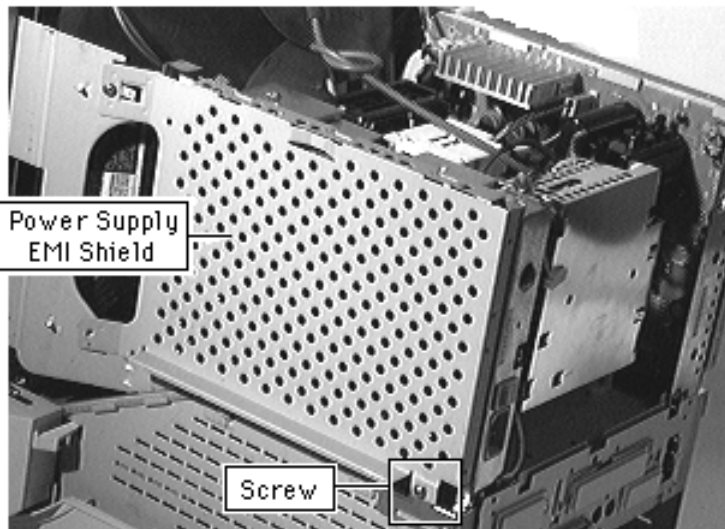


- 1 Remove the screw and grounding cable from the upper front corner of the power supply shield.

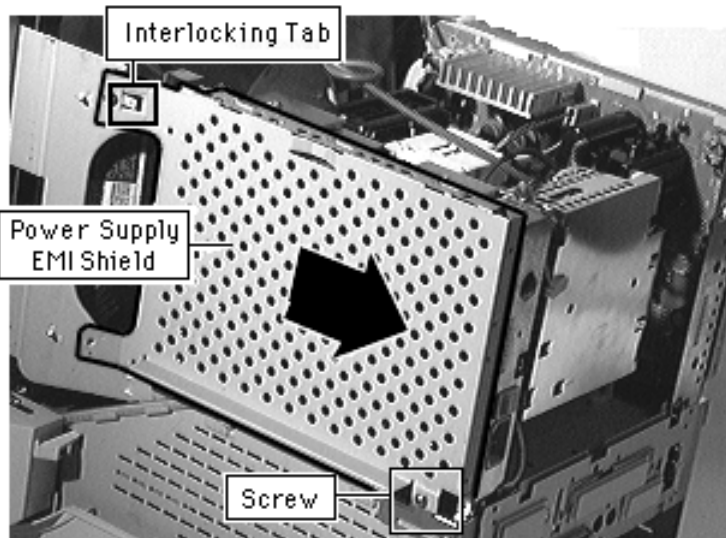




- 2 Remove the screw from the lower rear corner of the power supply shield.







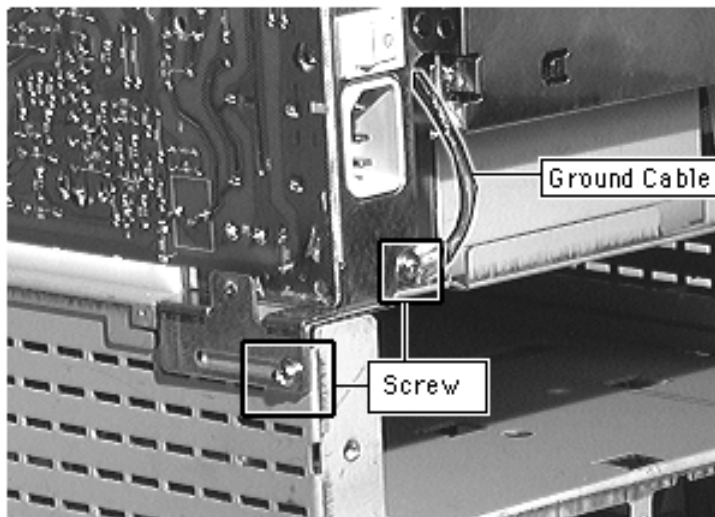
- 3 Slide the power supply shield back to clear the interlocking tab and remove the shield.

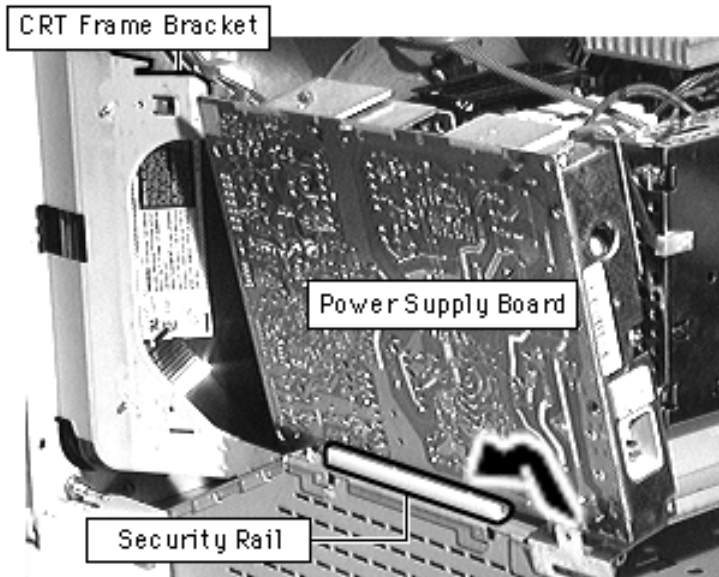
**Replacement Note:** Slide the interlocking tab into the slot of the CRT metal frame.





- 4 Remove the screw and short grounding cable from the lower rear corner of the power supply.



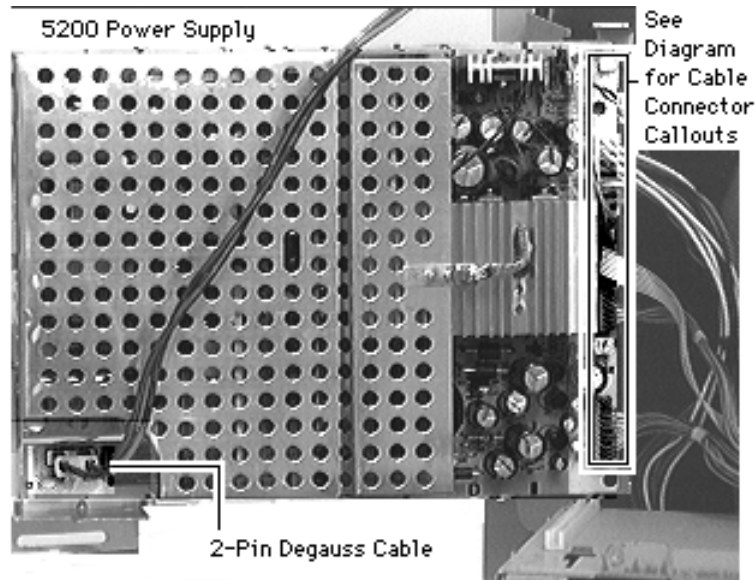


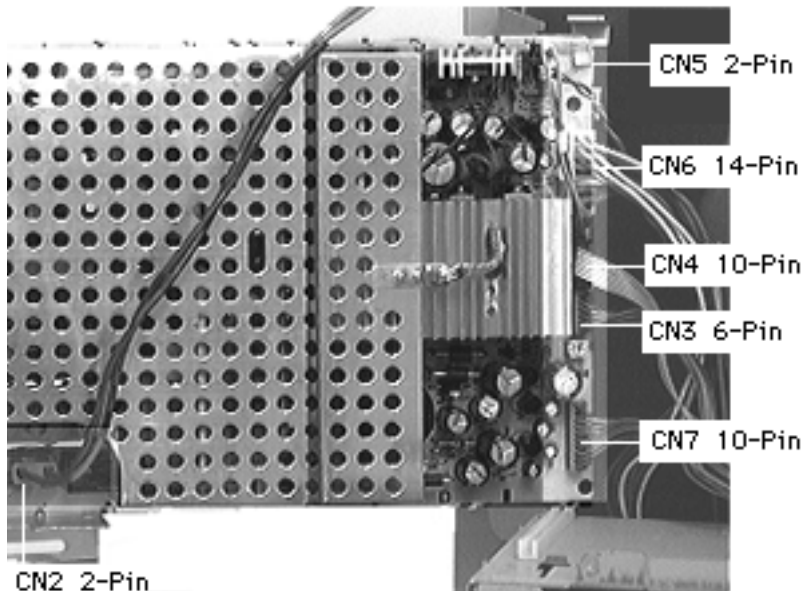
- 5 Lift the lower rear corner of the power supply board to disengage the lower rear bracket.
- 6 Slide the top front corner from the CRT frame bracket. Lift the power supply enough to clear the security rail.





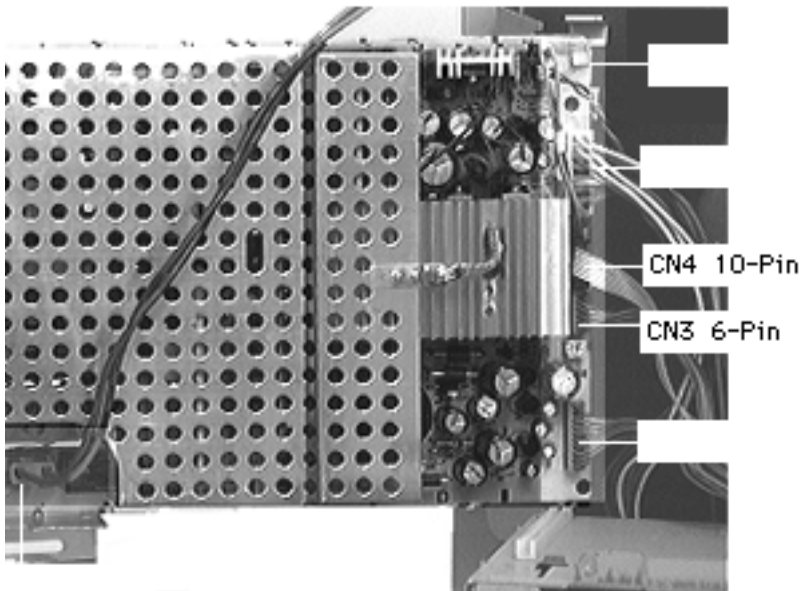
- 7 Disconnect the 2-pin degauss cable.





- 8 Disconnect these cables:
- 2-pin fan cable (CN5)
  - 14-pin power cable (CN6)
  - 10-pin video cable (CN7)





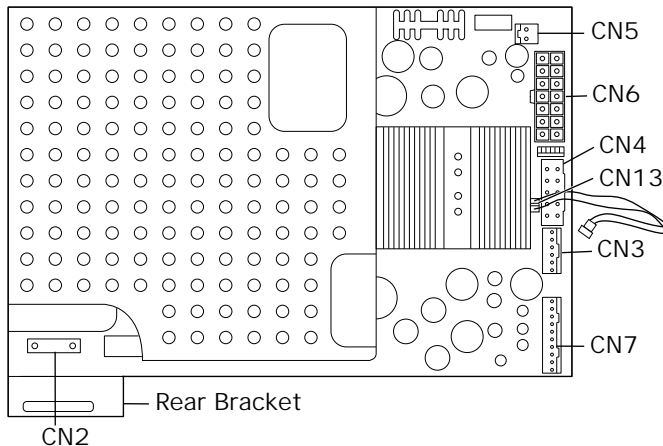
**Note:** The power supply-to-analog-board connectors are keyed and fit very tightly. You may need to use a jeweler's screwdriver to loosen the sockets of these connectors.

- 6-pin power-supply-to-analog-board cable (CN3)
- 10-pin power-supply-to-analog-board cable (CN4)





Rev A Power Supply Diagram



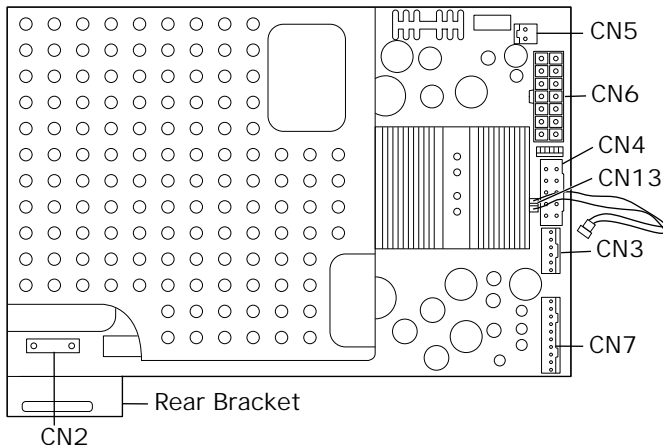
**Replacement Note:** This diagram shows the location of the rear bracket and the power supply cable connections for the original version. For Rev. B diagram, See “Power Supply, Rev. B”

- Rear bracket
- 2-pin fan cable (CN5)
- 14-pin power cable (CN6)
- 10-pin video cable (CN4)
- 6-pin power-supply-to-analog-board cable (CN3)



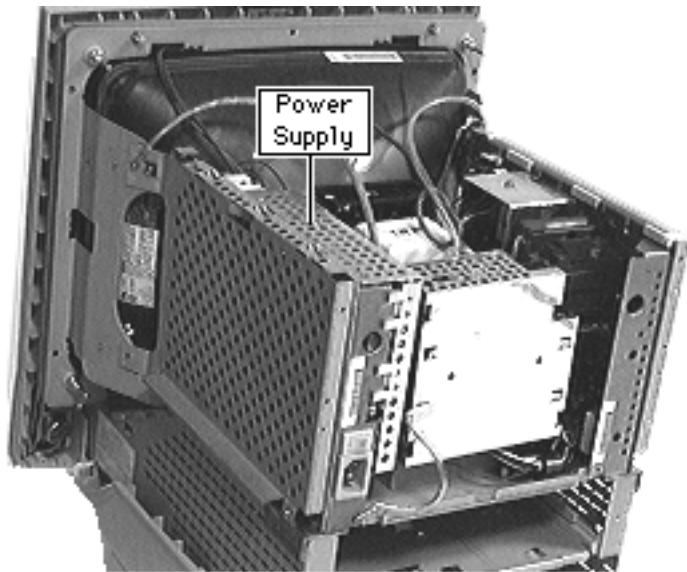


Rev A Power Supply Diagram



- 10-pin power-supply-to-analog-board cable (CN7)
  - 2-pin degauss cable (CN2)
  - 2-pin fan thermister cable (CN13)
- Note:** Not present on some Rev. A power supply boards.





## Power Supply, Rev. B

Before you begin, remove the following:

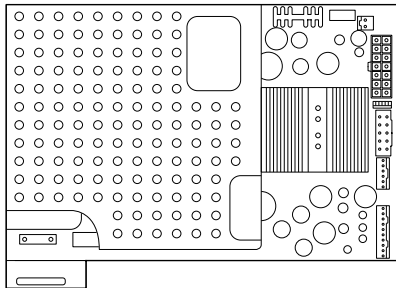
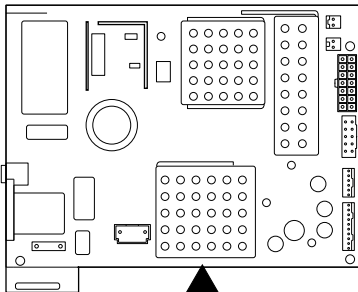
- I/O door
- Rear housing
- Front bezel
- Logic board
- Rear EMI shield

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





Rev A Power Supply (5200/5400)

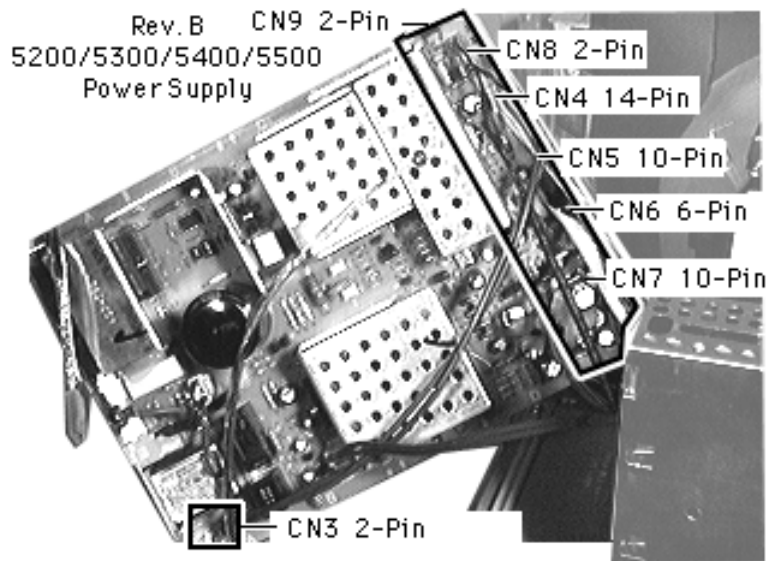
Rev B Power Supply  
(5200/5300/5400/5500)

Follow the procedures in "Power Supply, Original Version," but use the diagram of power supply connections.

**Note:** The Power Macintosh/Performa 5000 series includes two versions, the original version and Rev. B. See the Rev. B topic of the Basics chapter to identify the version you are servicing.

**Caution:** The power supplies of the two versions are not interchangeable. If



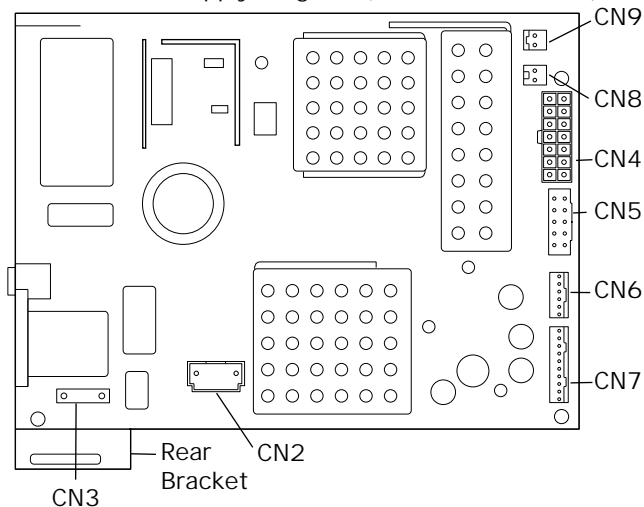


you are servicing an original version, use the procedure in "Power Supply, Original Version."





Rev. B Power Supply Diagram (5300/5400/5500)



Disconnect:

- 2-pin degauss cable (CN3)
- 2-pin cable (CN2)
- 2-pin fan thermister cable (CN9)
- 2-pin fan connector (CN8)
- 14-pin power supply cable (CN4)

**Note:** The pull-up tab (CN5) is fragile.

- 10-pin ribbon cable (CN5)
- 6-pin cable (CN6)
- 10-pin cable (CN7)

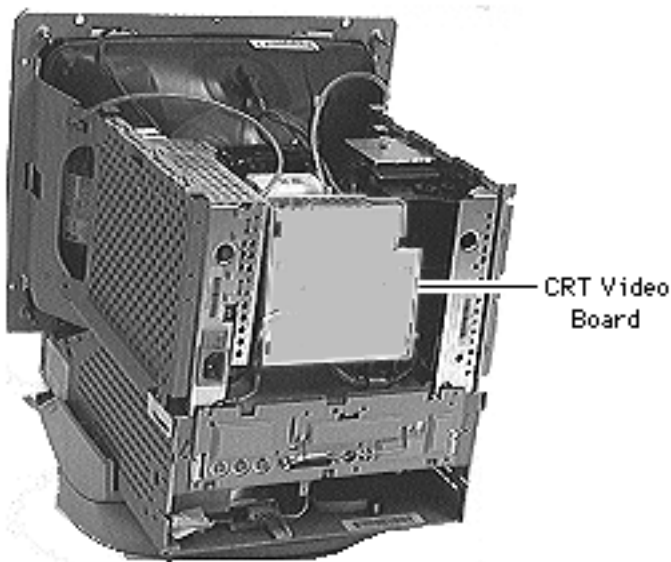




## Video Board

Before you begin,

- Remove the rear housing
- Remove the front bezel
- Remove the logic board
- Remove the rear EMI shield
- Discharge the CRT
- Remove the anode cap



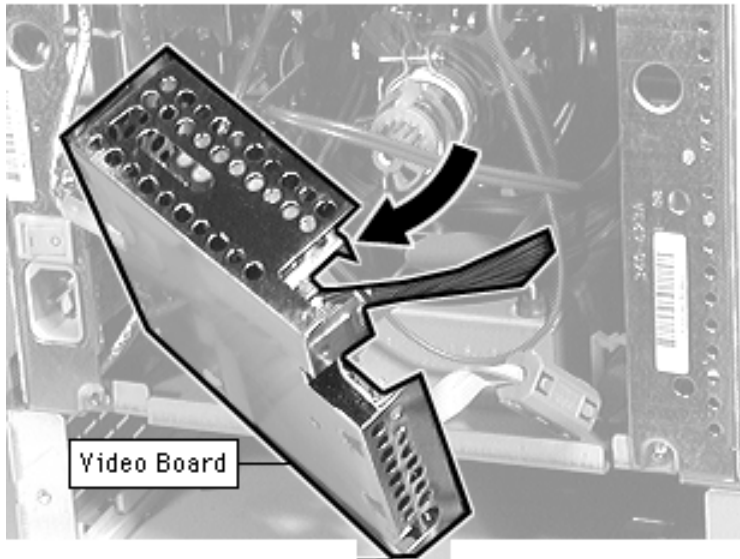


**⚠ Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.

**Note:** Do not disconnect the cables connecting the video board and the analog board.

**Note:** The Power Macintosh/Performa 5000 series includes the original version and Rev. B. See "Rev. B" in the Basics chapter to identify the version you are servicing.

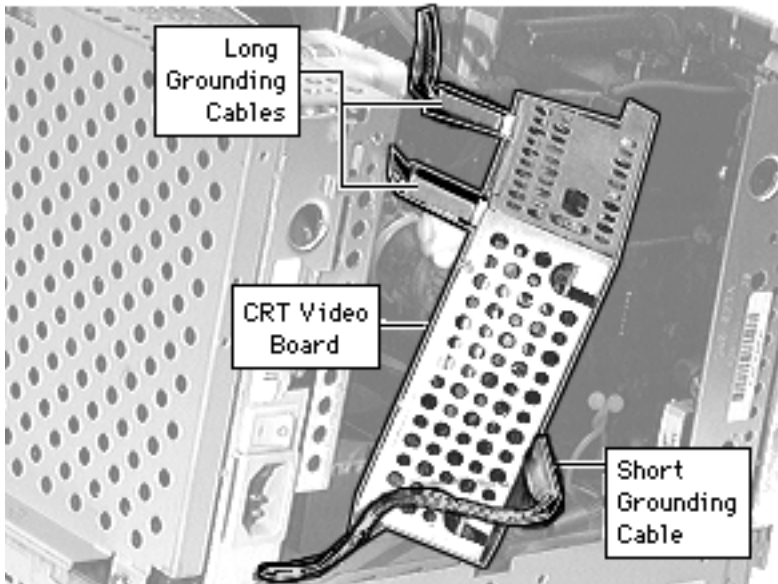




**Caution:** The analog/video board assemblies of the two versions are not interchangeable.

- 1 If an adhesive glue secures the video board to the CRT, cut and peel it off before removing the board.
- 2 **Caution:** Do not attempt to disconnect the video board from the analog board. The video board and the analog board are permanently connected by several cables and form one service unit.





Pull off the video board.

- 3 Remove the two long grounding cables from the video board.
- 4 Remove the single short grounding cable from the video board.



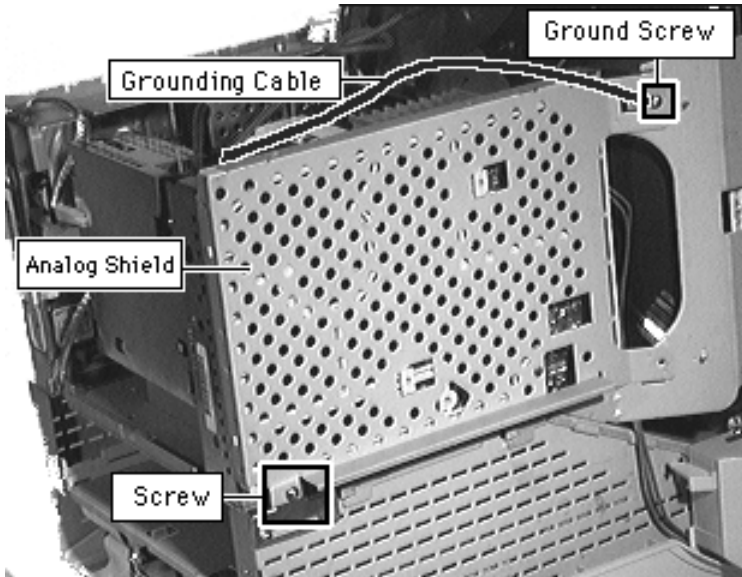


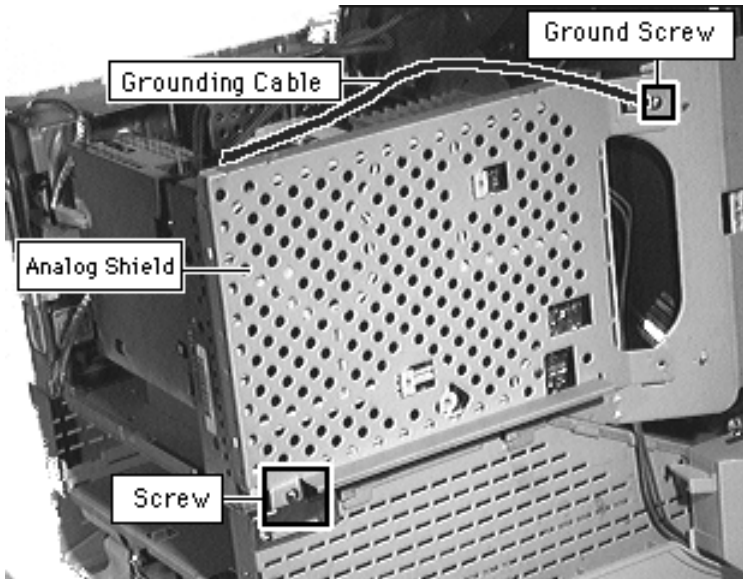
## Analog Shield

Before you begin,

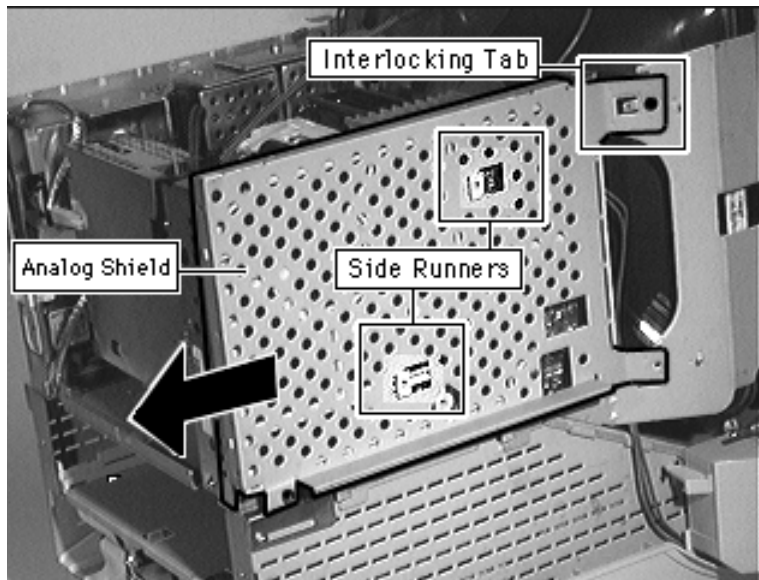
- Remove the rear housing
- Remove the front bezel
- Remove the logic board
- Remove the rear EMI shield
- Discharge the CRT
- Remove the anode cap
- Remove the video board

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





- 1 Remove the grounding cable and screw from the upper front corner of the analog board shield.
- 2 Remove the screw from the lower rear side of the analog board shield.



- 3 Slide the analog board shield back to clear the interlocking tabs and side runners.
- 4 Remove the analog board shield.

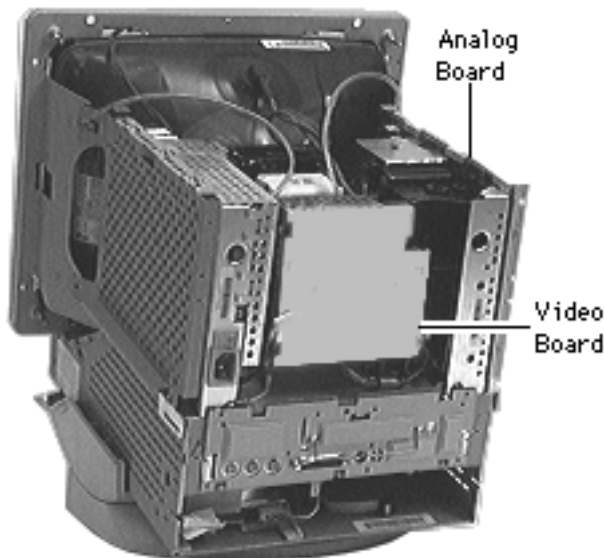




## Analog Board, Original Version

Before you begin,

- Remove the front bezel
- Remove the I/O door
- Remove the rear housing
- Remove the logic board
- Remove the rear EMI shield
- Discharge the CRT
- Remove the anode cap
- Remove the video board
- Remove the analog shield





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

**Note:** Do not disconnect the cables connecting the video board and the analog board.

**Note:** The Power Macintosh/Performa 5000 series includes the original version and Rev. B. See “Rev. B” in the Basics chapter to identify the version you are servicing.



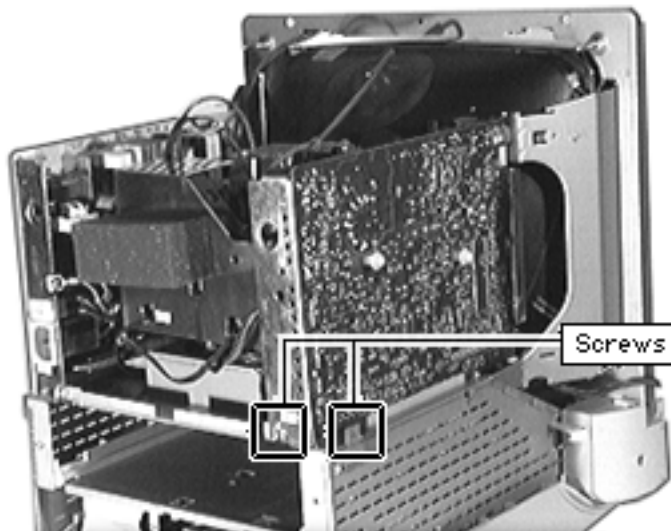


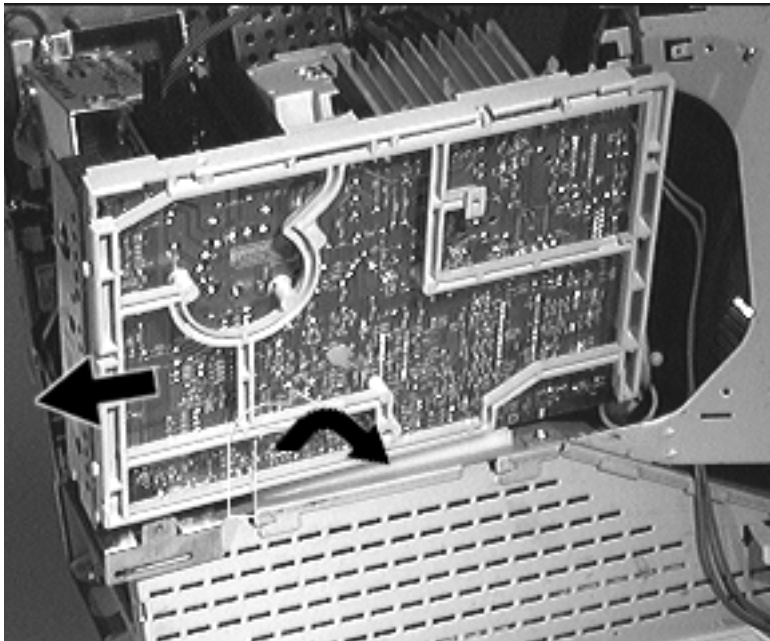
**Caution:** The analog/video board assemblies of the two versions are not interchangeable. If you are servicing an original version, use the following procedures. If you are servicing a Rev. B version, use the following procedures, but substitute the cable locations in "Analog Board, Rev. B."





- 1 Remove the screws at the lower rear of the analog board.





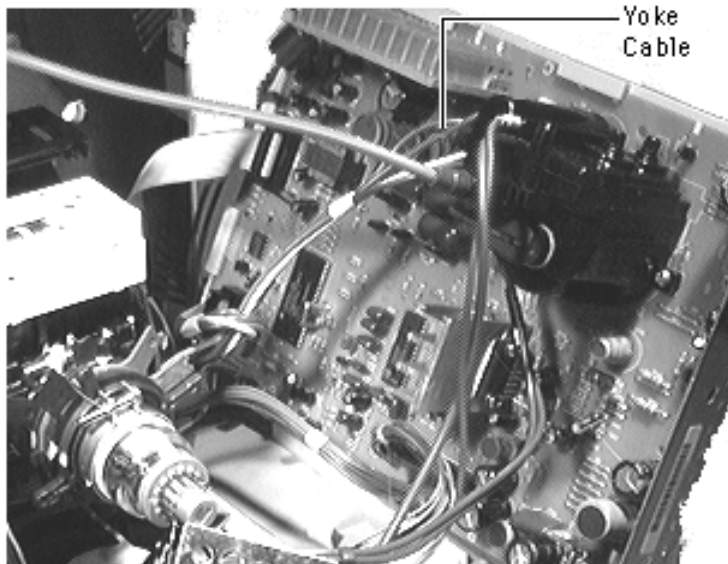
- 2 Lift up the lower back corner of the analog board to disengage the rear bracket from the chassis slot.
- 3 Slide the analog board back to clear the interlocking tab and lift it from the guide rail.

**Important:** At this point, you may need to disconnect the microphone cable to be able to slide the analog board completely out.

- 4 Lift up the analog board just enough to clear the







security rail and rest the analog board on the top of the chassis.

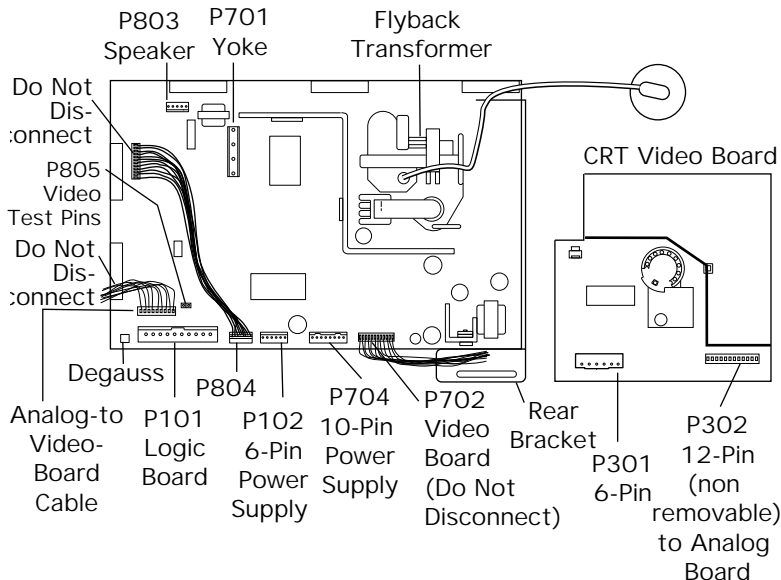
- 5 **Note:** For a diagram of analog board cable connections, refer to the replacement note at the end of this topic.

Disconnect the yoke cable at the power supply.





Rev. A Analog Board

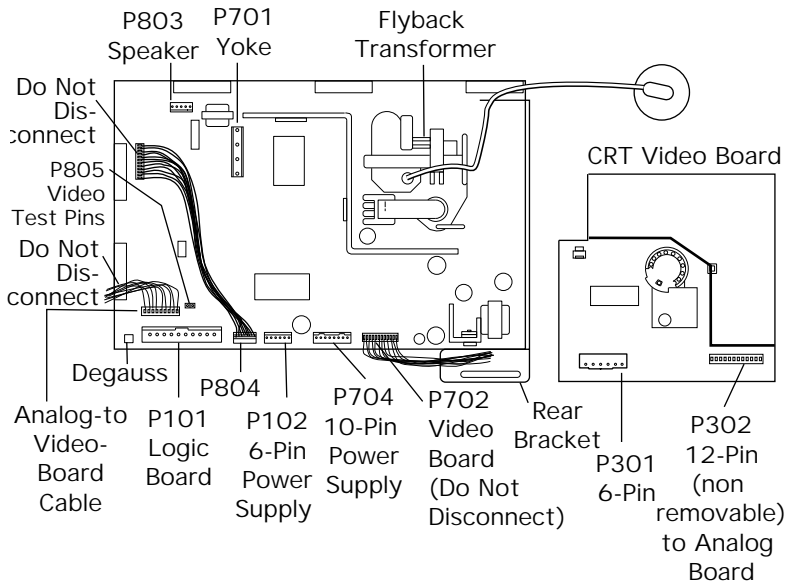


- 6 Disconnect these cables from the analog board:
  - 6-pin power-supply-to-analog-board cable (P102)
  - 10-pin power-supply-to-analog-board cable (P704)
  - Logic board connector cable (P101)
  - Single-pin degauss cable
- 7 Remove the analog and video boards assembly.





Rev. A Analog Board



**Replacement Note:** This diagram shows the location of the rear bracket and the analog board cable connections:

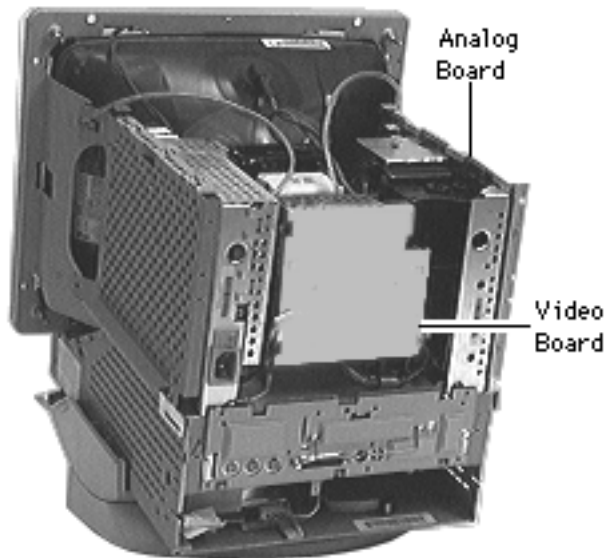
- Rear bracket
- Degauss cable
- Logic board connector cable (P101)
- 6-pin power-supply-to-analog-board cable (P102)
- 10-pin power-supply-to-analog-board cable (P704)
- Yoke cable (P701)
- Speaker cable (P803)

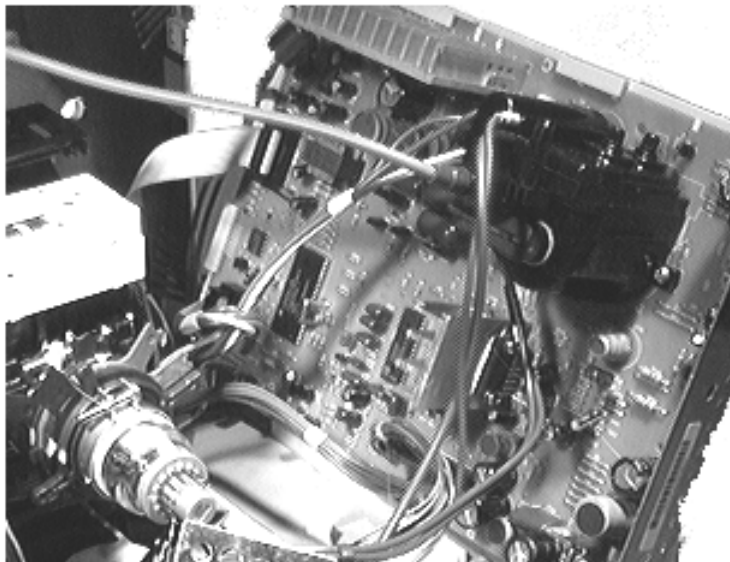




## Analog Board, Rev. B

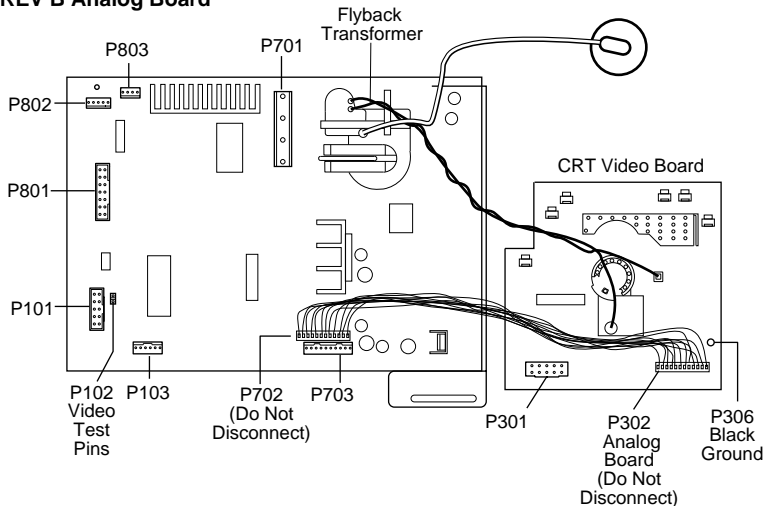
**Note:** The Power Macintosh/Performa 5000 series includes two versions, the original version and Rev. B. See the Rev. B topic in the Basics chapter to identify the version you are servicing.





**Caution:** The analog and video boards of the two versions are not interchangeable. If you are servicing a Rev. B version, use the procedures in “Analog Board, Original Version” and substitute the following cable locations.

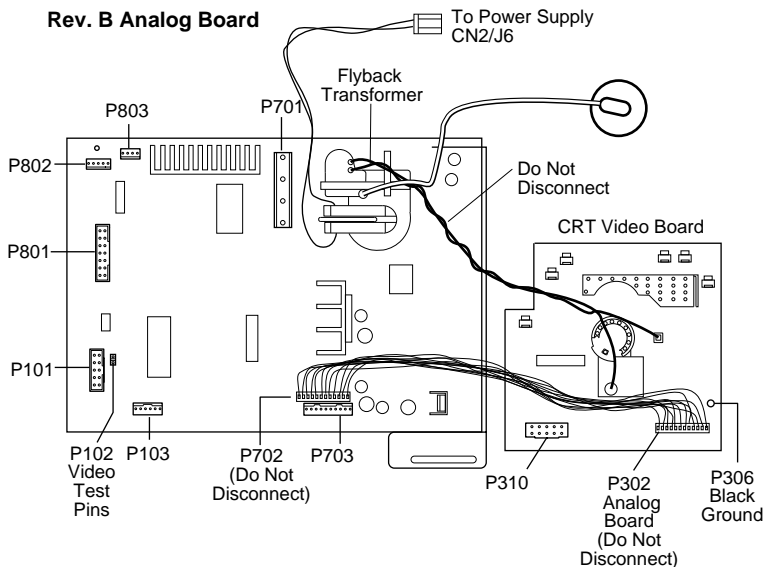


**REV B Analog Board**

Disconnect these video board cables:

- Ground cable from the exterior tab of the video board
- Black grounding connection (P306)
- 10-pin ribbon cable (P301)



**Rev. B Analog Board**

Disconnect these cables:

- 2-pin flyback connector from power supply location CN2/J6
- 4-pin yoke cable (P701)
- 4-pin speaker wire (P803)
- 4-pin mic cable (P802)
- 10-pin ribbon cable (P101)
- 14-pin ribbon cable (P801)
- 6-pin power supply-to-analog board cable (P103)
- 10-pin power supply-to-analog board cable (P703)

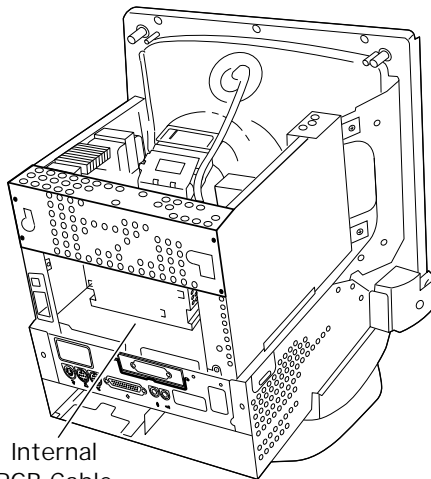




## Internal RGB Cable

Before you begin,

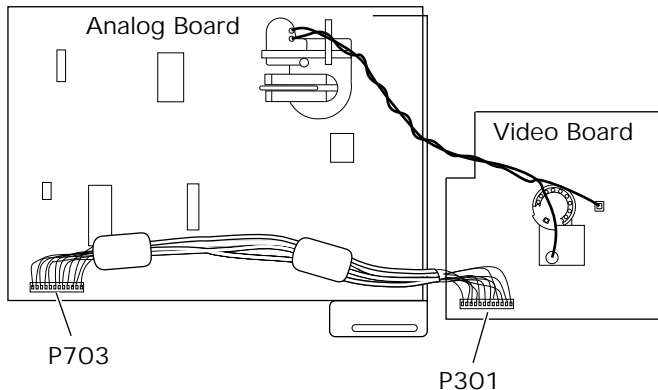
- Remove the I/O door
- Remove the rear housing
- Remove the rear EMI shield
- Discharge the CRT
- Remove the anode cap
- Pull off the video board
- Tilt back the analog shield and analog board



Internal  
RGB Cable







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

- 1 Disconnect the internal RGB cable at the P703 connector on the analog board and at the P301 connector on the video board.

**Note:** You may need to pry up one or both ferrite beads if they are glued to the chassis.





## Fan

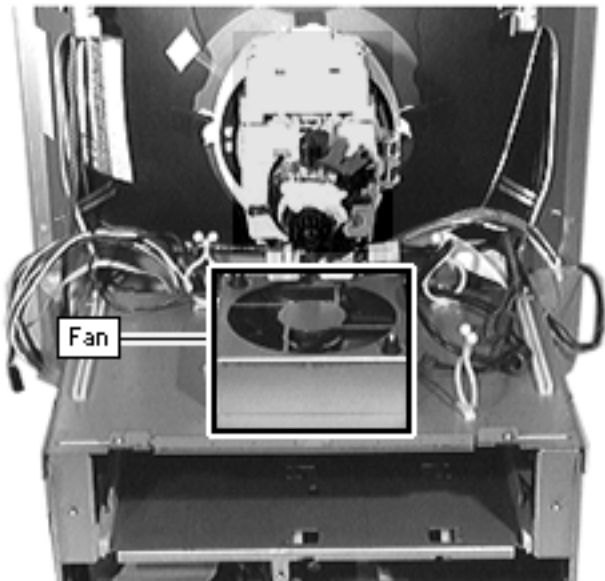
Before you begin,

- Remove the I/O door
- Remove the rear housing
- Remove the front bezel
- Remove the rear EMI shield
- Discharge the CRT
- Remove the anode cap
- Remove the video board
- Remove the power supply



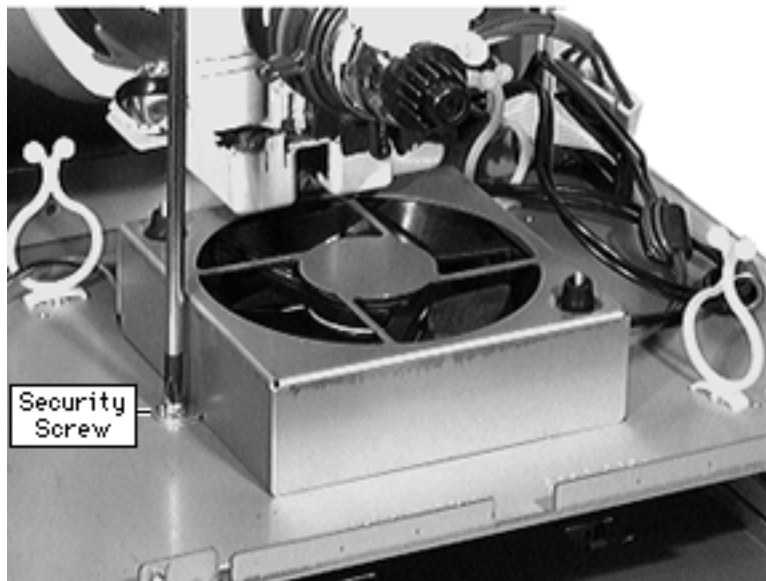


**⚠ Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.



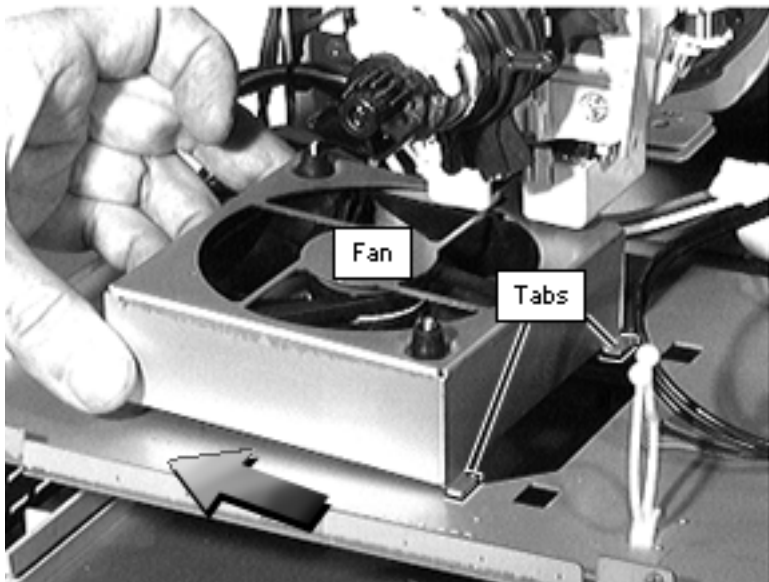


- 1 Remove the fan security screw.





- 2 Slide the fan toward the power supply to release the two tabs.
- 3 Remove the fan.





## Tilt/Swivel Base

Before you begin, remove the following:

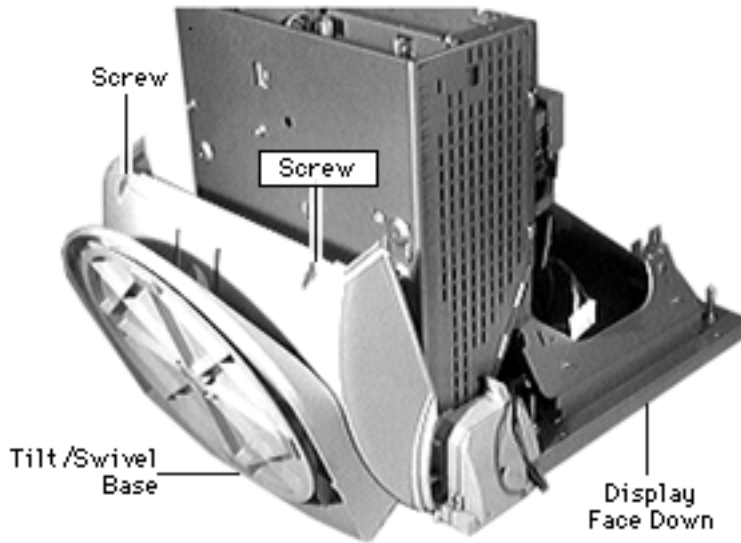
- Front bezel
- Rear housing

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



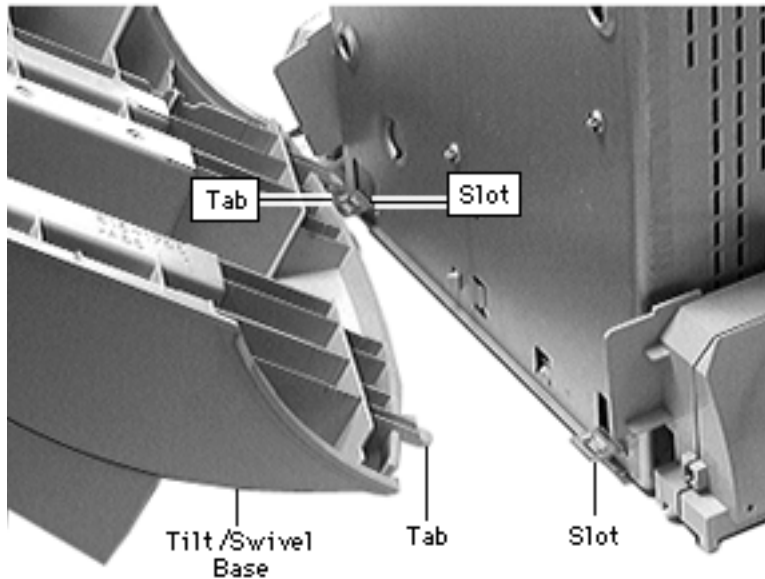
Tilt/Swivel Base





- 1 Place the display face down on a padded surface.
- 2 Remove the two screws at the back of the tilt/swivel base.
- 3 Separate the back of the base from the metal chassis by a few inches.
- 4 Slide the tilt/swivel base up and remove it from the chassis.





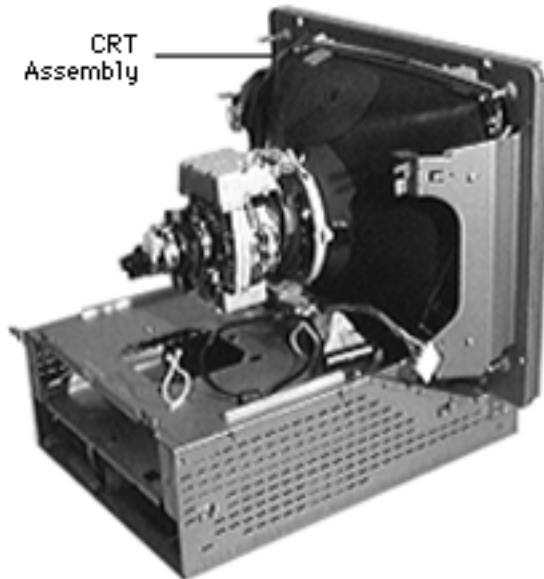
**Replacement Note:** Align the tabs at the front of the tilt/swivel base with the slots in the chassis. Angle the tilt/swivel base and slide in the tabs.







## CRT



Before you begin,

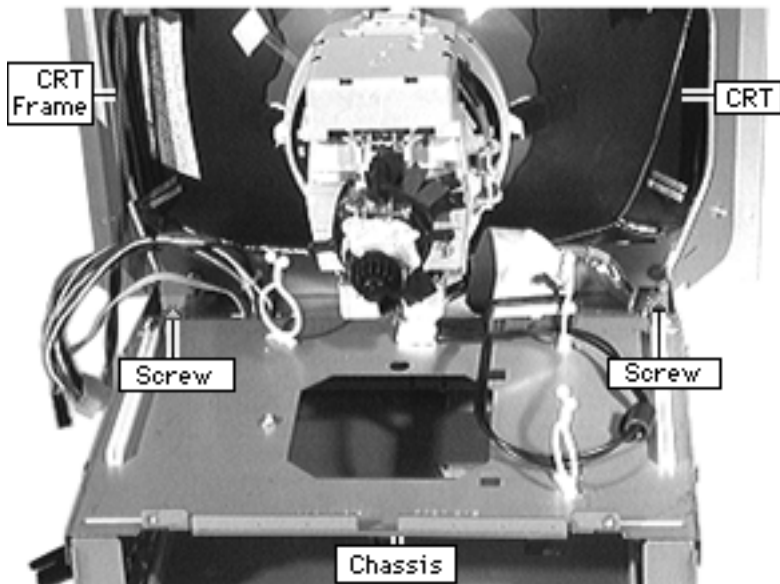
- Remove the I/O door
- Remove the rear housing
- Remove the front bezel
- Remove the logic board
- Discharge the CRT
- Remove the rear EMI shield
- Remove the analog shield
- Remove the analog/video board assembly
- Remove the power supply
- Remove the tilt/swivel base





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





**⚠ Warning:** Support the top of the CRT. The CRT is very heavy and may fall forward as you complete this procedure.

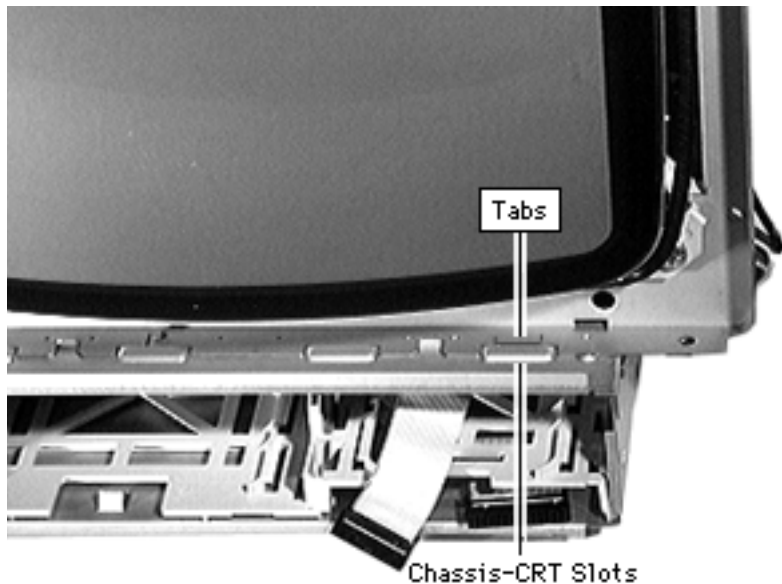
- 1 Remove the two screws securing the metal CRT frame to the chassis.

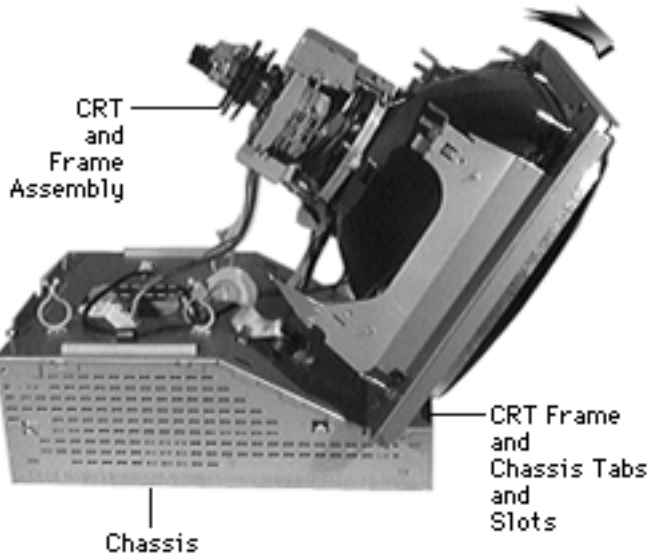
**Note:** If you are servicing a 5400 or 5500, remove the two plastic pieces at the bottom corners of the CRT.





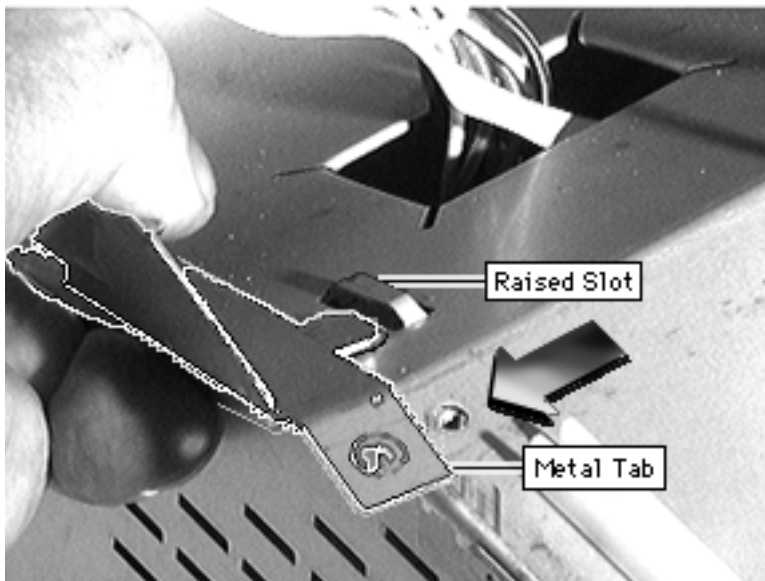
- 2 Pry back the metal tab from the raised slot on each side of the chassis.





- 3 Tilt the top of the CRT and frame assembly forward.
- 4 Push back the bottom of the CRT frame to disengage the line of CRT frame and chassis tabs and slots.
- 5 Lift off the CRT assembly.





**Replacement Note:** Align the line of tabs on the CRT frame with the line of slots on the front of the chassis.

**Important:** When replacing the CRT, move the degaussing cable from the old CRT to the new CRT assembly to ensure full functionality of the unit after the repair.

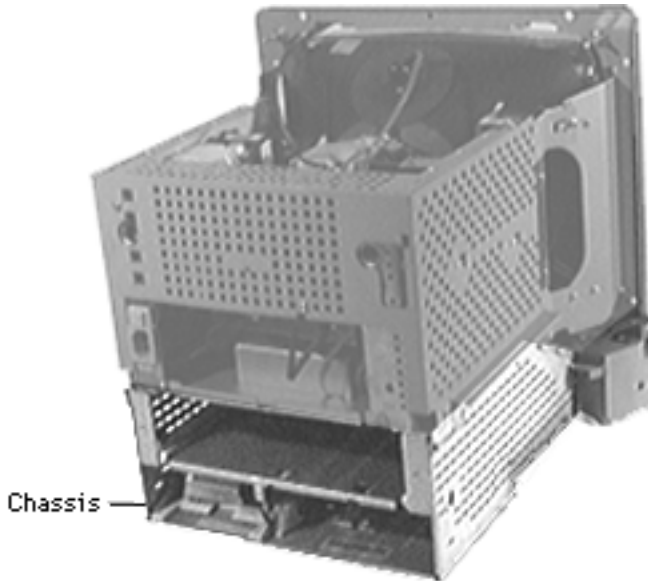




## Chassis/Wiring Harness

Before you begin,

- Remove the I/O door
- Remove the rear housing
- Remove the front bezel
- Remove the CD-ROM drive, if any
- Remove the TV Tuner, if any
- Remove the floppy drive
- Remove the front-panel control board
- Remove the logic board
- Remove the rear EMI shield





- Discharge the CRT
- Remove the analog shield
- Remove the analog/video board assembly
- Remove the power supply
- Remove the tilt/swivel base
- Remove the CRT
- Remove the fan

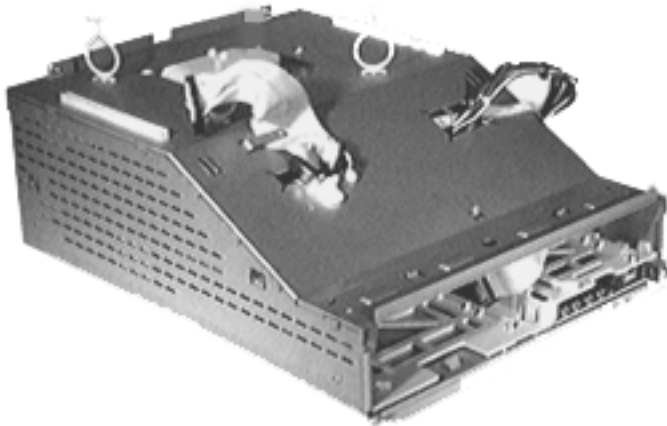
**Note:** The Power Macintosh/Performa 5000 series includes two versions, the original version and Rev. B. See the Rev. B topic of the Basics chapter to identify the version you are servicing.







Chassis  
Harness



Remove the chassis/wiring harness.

**Note:** The chassis/wiring harness includes the metal chassis, plastic drive bays, and the logic board connector with cables.





## Upgrades

Power Macintosh/Performa  
5400 and 5500 Series





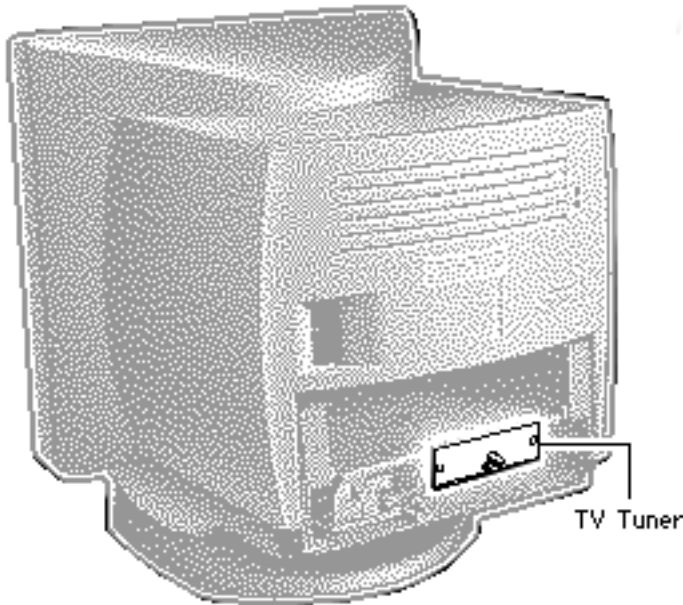
## TV or TV/FM Tuner

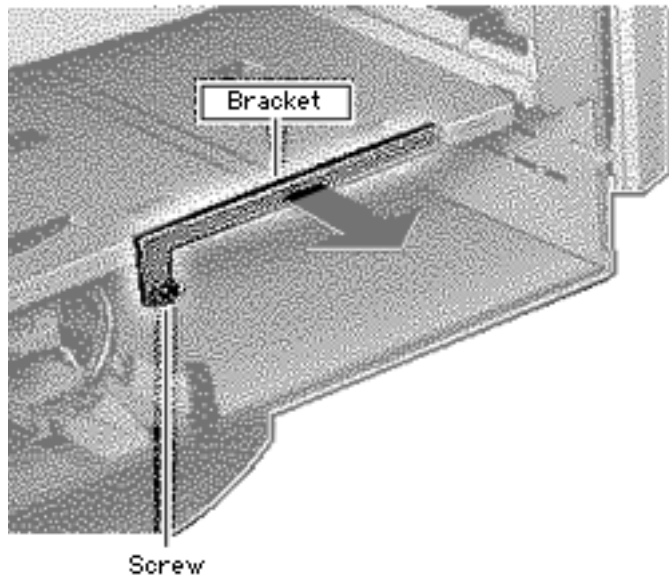
Before you begin, remove the following:

- I/O door
- Logic board

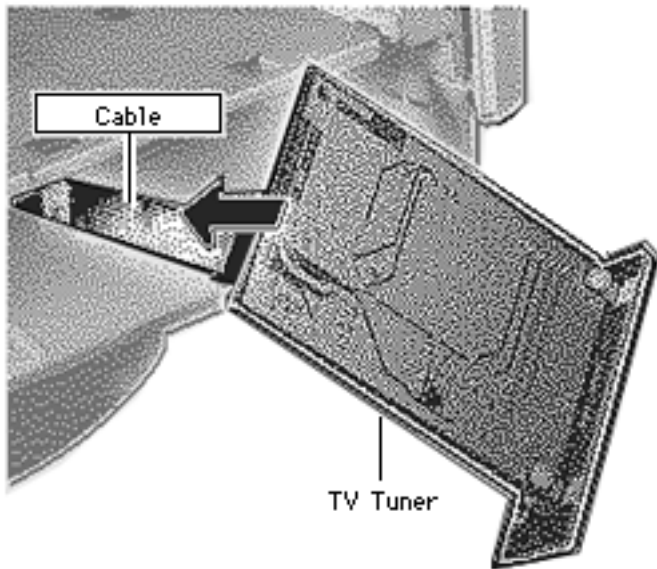
**Note:** The TV Tuner is an option.

**Caution:** Review the ESD precautions in Bulletins/ Safety.





- 1 Remove the Phillips screw.
- 2 Lift off the metal bracket from the chassis.



- 3 Connect the TV Tuner cable.
- 4 Slide the TV Tuner into place.



## 5400/5500 DIMM Upgrade

Before you begin, remove the following:

- I/O door
- Logic board

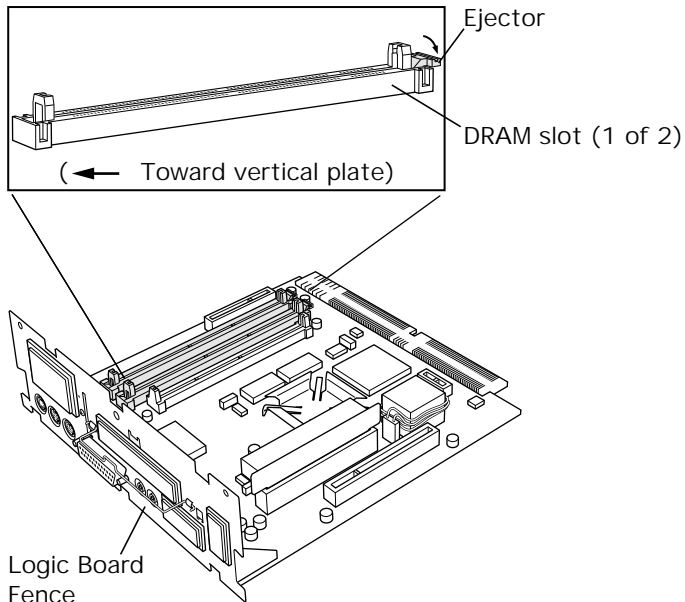
**Caution:** Review the ESD precautions in Bulletins/ Safety.

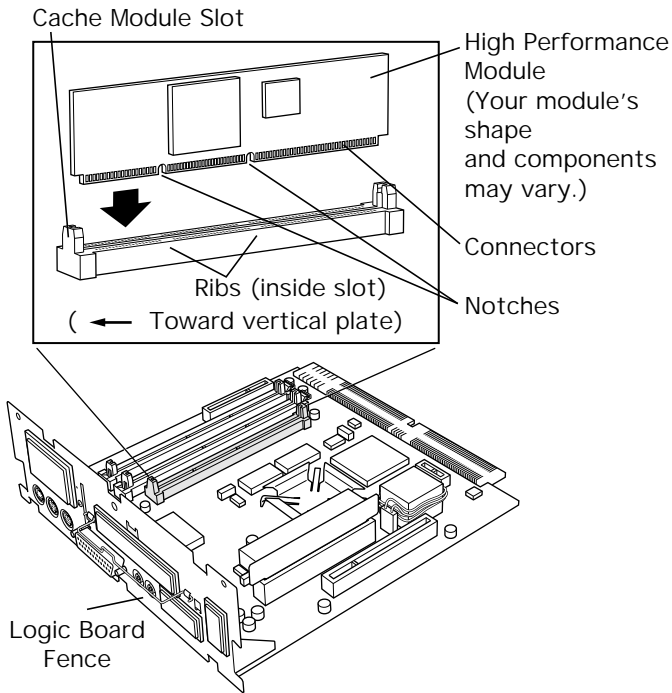
**Note:** Before servicing a 5400, read the “EDO-Compatible Logic Board Identification” topic at the end of this section.





- 1 Push the ejector outward and down to open it.





- 2 **Note:** The DRAM DIMM is designed to fit into the slot only one way.

With the ejector still pushed outward and down, position the DIMM with notches aligned with the small ribs inside the slot.







## EDO-Compatible Logic Board Identification

Before you install extended data out (EDO) memory in a Performa or Power Macintosh 5400 computer, you must verify that the logic board is EDO-compatible.

There are four ways to verify that a logic board from a Performa or Power Macintosh 5400 computer is compatible with EDO memory:

- The logic board has soldered-on EDO DRAM
- The logic board has a resistor present at chip U34
- The logic board has **no** resistor present at location R77

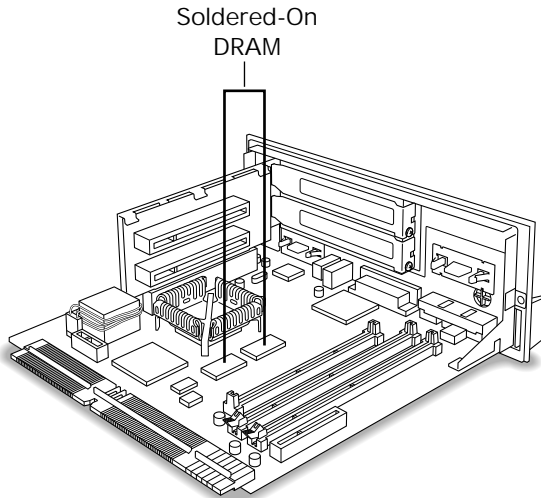
The details for identifying an EDO-compatible logic board by these methods are presented in the following sections.





## **Soldered-On DRAM is EDO**

- 1 Locate the two soldered-on DRAM chips.
- 2 Compare the markings on these chips to the examples in the EDO Chip Identification table on the next page. If the soldered-on DRAM chip markings meet the criteria of an example here, the logic board supports EDO memory.





**Important:** Apple may use vendors not listed on this table. If the DRAM markings don't match the table criteria, use another identification method.

### EDO Chip Identification

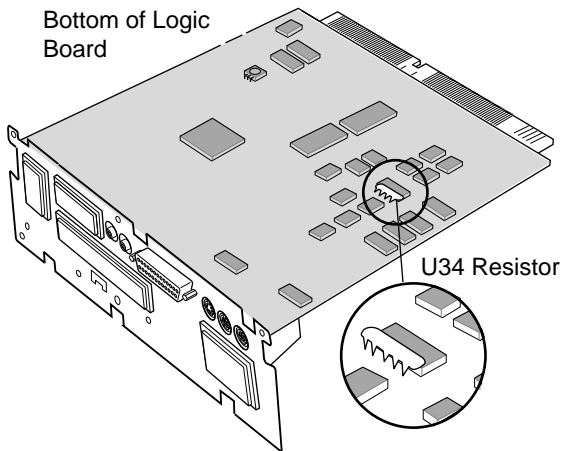
Vendor	Marking Example
SEC	The third character from the right is a non-zero number (for example, KM44C400 <b>4</b> -60)
SEC	The fourth character from the right is a non-zero number (for example, KM416C120 <b>4</b> BJ-6)
Hyundai	The second character from the right is a non-zero number (for example, HY511816 <b>4</b> B)
Micron	A space and a capital X are present at the end of the marking (for example, MT8D264G-xx <b>X</b> )

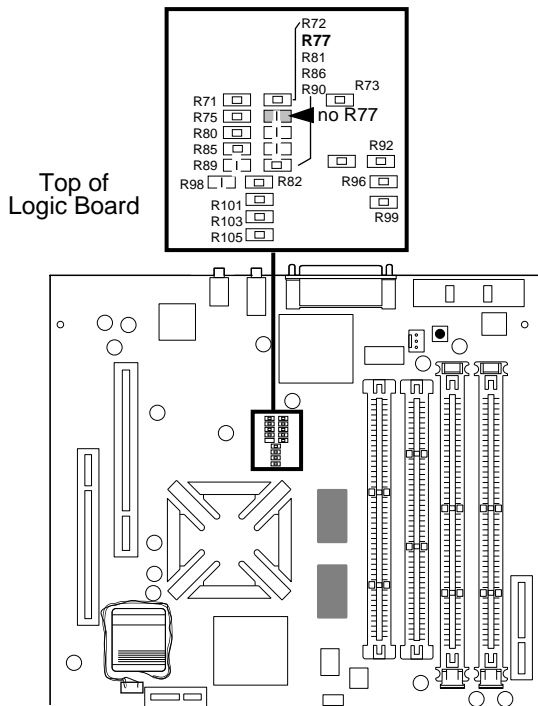




## Resistor Present at U34

- 1 Turn the logic board over so that you are looking at the soldered-side of the board.
- 2 Locate chip U34 as pictured in the graphic. If a resistor package (SIP network) is on top of the U34 chip, as seen in this picture, the logic board supports EDO memory.





## No Resistor at R77

- 1 Use the graphic here to locate the R77 resistor space near the SCSI port on the logic board.
- 2 If a resistor does not occupy the R77 location, as seen in the picture, the logic board supports EDO memory.





## Communications Card Installation

Before you begin, remove the following:

- I/O door
- Logic board

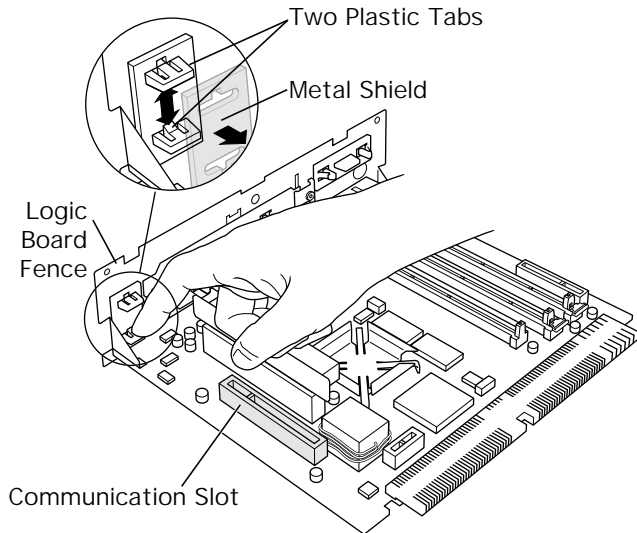
**Caution:** Review the ESD precautions in Bulletins/ Safety.

**Note:** This procedure shows installing a modem card, but the steps are similar for other communications cards you might be installing.



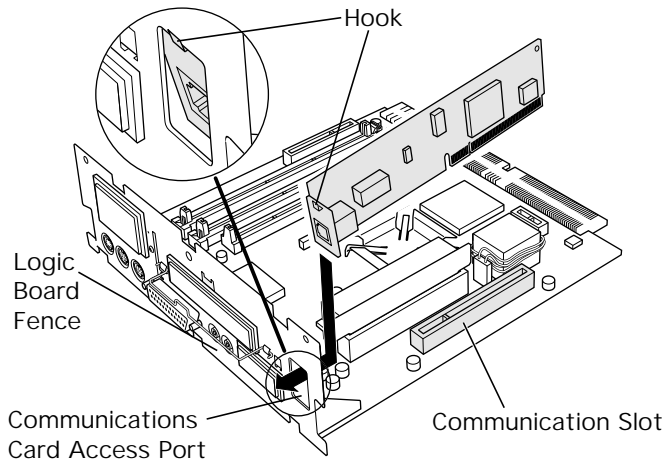


- 1 Remove the communications card access cover by pushing the two plastic tabs apart and removing the metal shield.

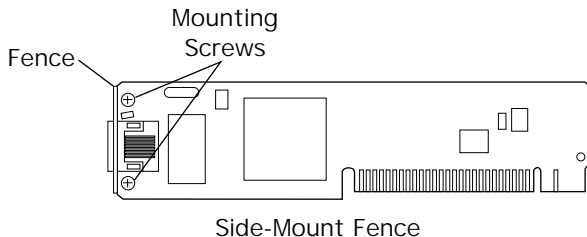
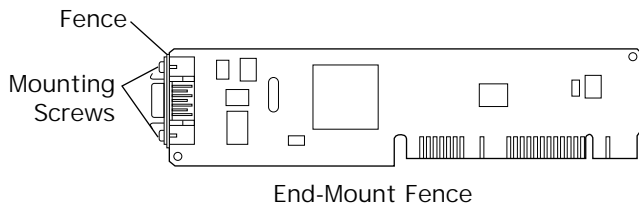




- 2 Angle the hook-end of the card down and bring the hook under and up through the communications card access port. The hook should rest against the outside of the logic board fence.







**Replacement Note:** If you are installing an Ethernet card and its fence does not include a hook, replace the fence.

- 3 Remove the card.
- 4 Remove the two card fence screws.
- 5 Remove the old fence.
- 6 Install the replacement fence on the card.

**Note:** If the Ethernet card fence does not include a hook and is riveted onto the card, replace the card.

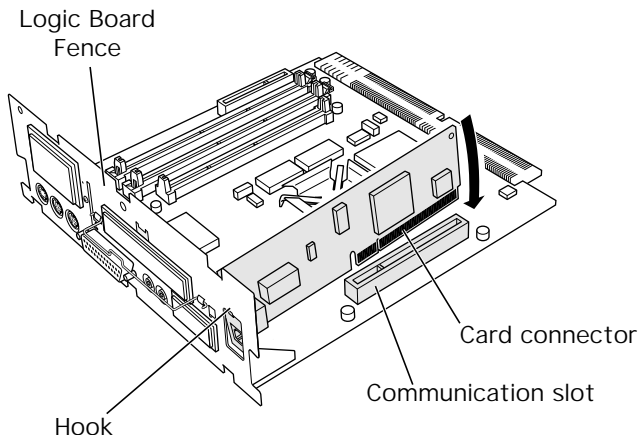




- 7 Insert the card connector into the communications slot.

**Note:** Be sure the hook remains against the outside of the logic board fence.

- 8 Reset the logic board following the procedure in "Logic Board Reset" in the Additional Procedures chapter.





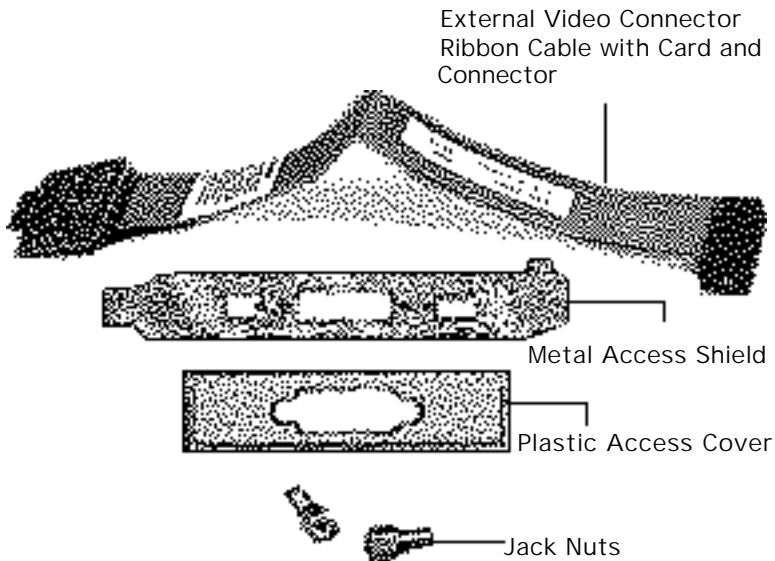
## External Video Connector

Before you begin, remove the following:

- I/O door
- Logic board

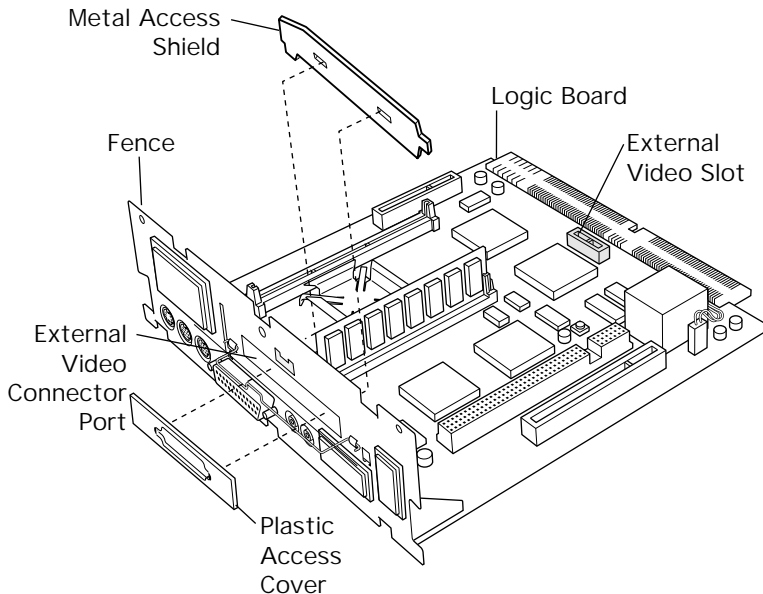
**Caution:** Review the ESD precautions in Bulletins/Safety.





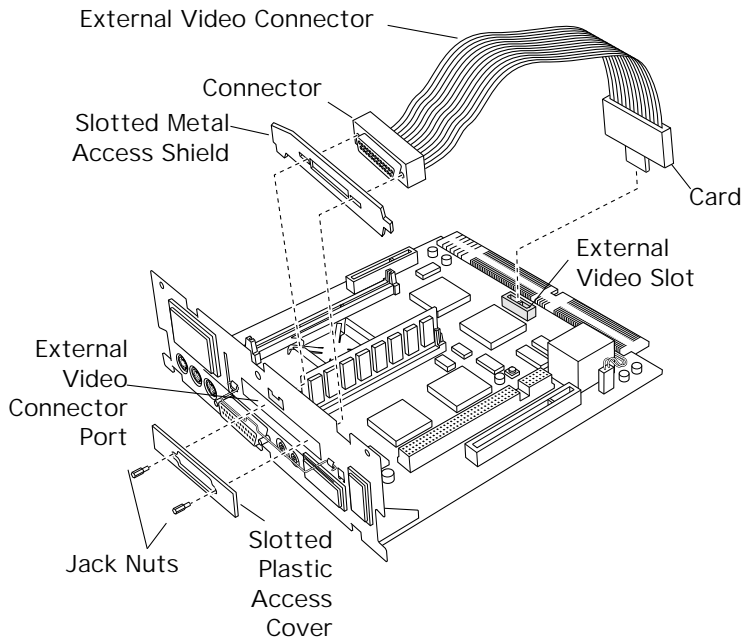
**Note:** The Apple External Video Connector provides “mirroring” or display of the system’s monitor screen on a presentation screen. In addition to the ribbon cable with card and the connector, the Apple External Video Connector kit includes a metal access shield, a plastic access cover, and two jack nuts.





- 1 Remove the plastic access cover from the logic board fence.
- 2 Lift the metal access shield up and out.





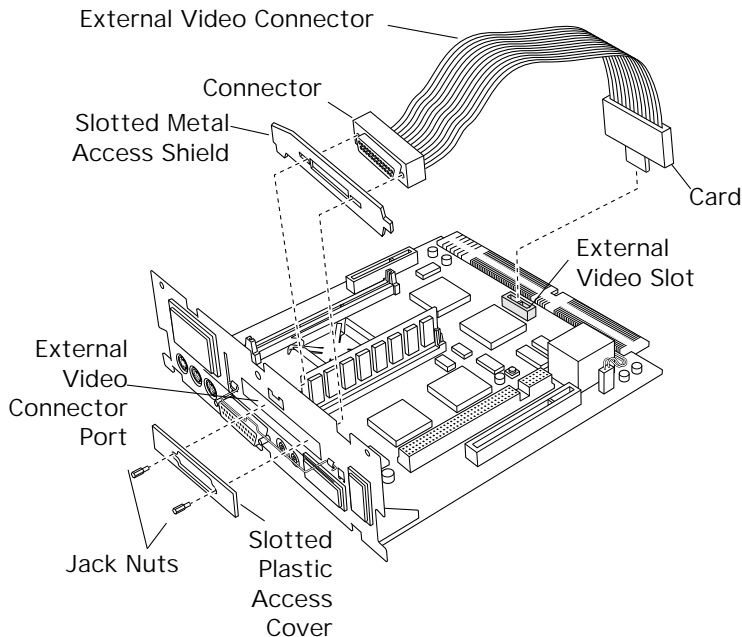
- 3 Insert the slotted metal access shield that came with the External Video Connector kit.

**Note:** Make sure the bottom of the metal shield engages the two small hooks on the logic board fence.

- 4 Insert the card at the end of the ribbon cable into the external video slot on the logic board.

**Note:** The pins will fit only one way; do not force them.





- 5 Insert the connector end of the ribbon cable through the slotted opening of the shield and fence.
- 6 Secure it with the jack nuts.

**Note:** Fold the ribbon cable to avoid crimping.

- 7 Insert the slotted plastic access cover that came with the kit.

**Caution:** The external video connector cable can sometimes rise up and contact the exposed blades of





the fan, which causes a rattling sound. To avoid this, be sure to fold or press the cable down flat.





## PCI Card

Before you begin, remove the following:

- I/O door
- Logic board

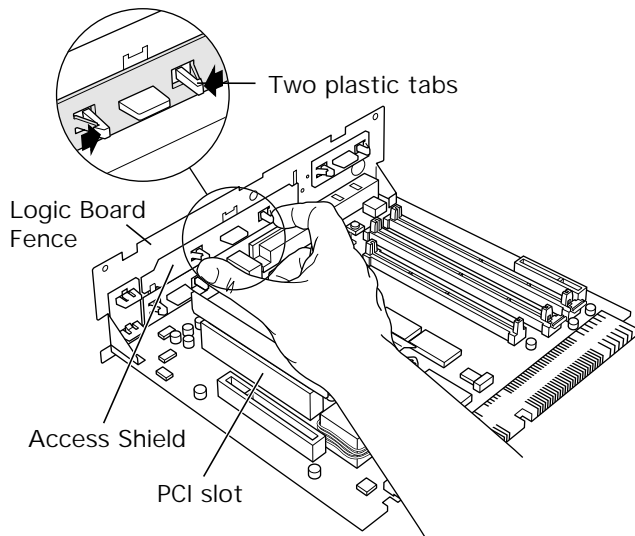
**Note:** If you are installing a PC compatibility card, see "Upgrades" in the PC Compatibility Cards manual under the Cards topic.

**Caution:** Review the ESD precautions in Bulletins/ Safety.





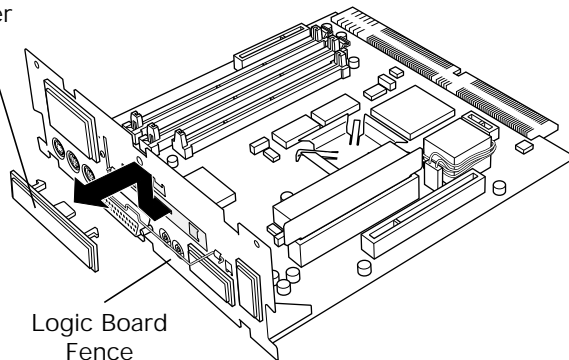
- 1 On the inside of the logic board fence, squeeze together the two plastic tabs of the plastic access cover





- 2 Remove the plastic access cover from the logic board fence.

Plastic Access  
Cover

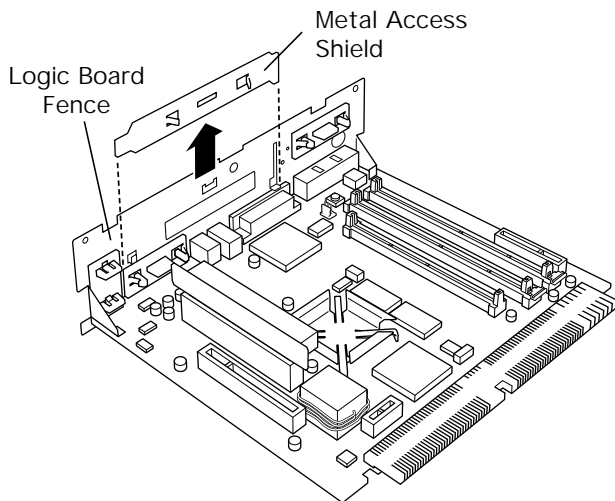


Logic Board  
Fence



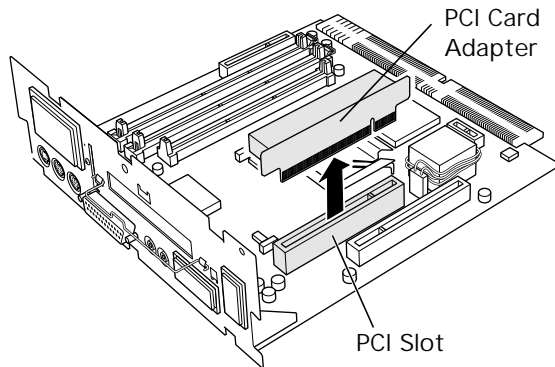


- 3 Pull up on the metal access shield to remove it from the logic board fence.



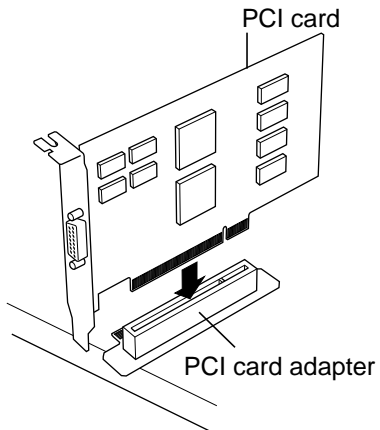


- 4 Pull up on the PCI card adapter to remove it from the PCI slot.





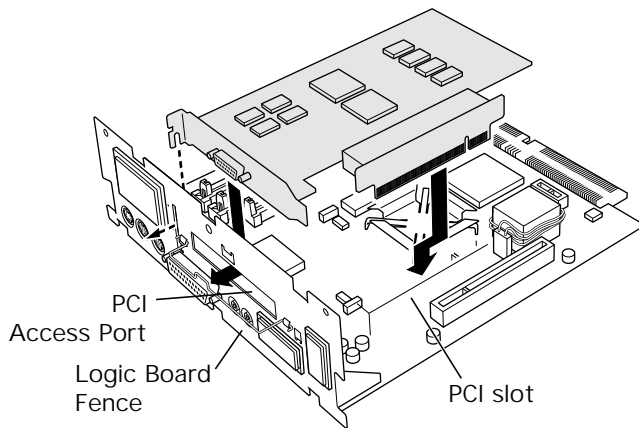
- 5 Press the PCI card connector into the PCI card adapter.





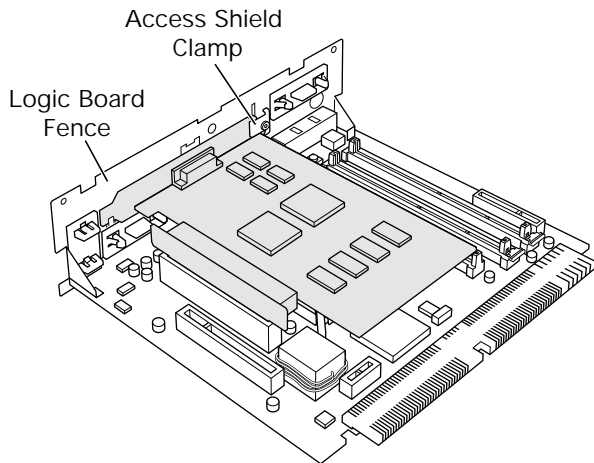
- 6 Press the PCI card adapter contact points into the PCI slot on the logic board.

Be sure the PCI connector is in the access port and accessible outside the logic board fence.





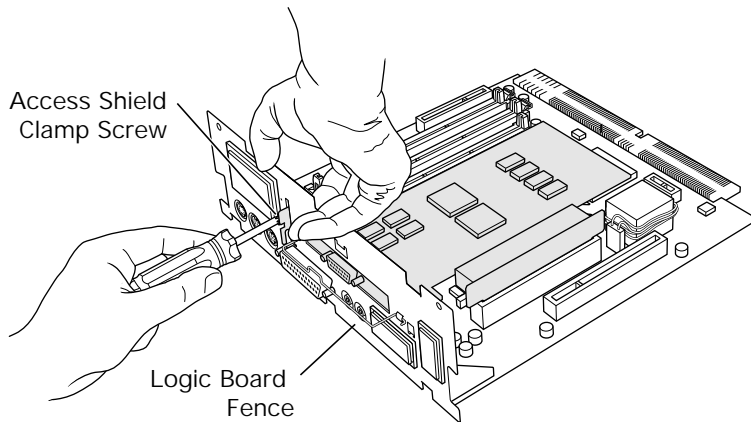
- 7 Replace the access shield clamp inside the logic board fence.

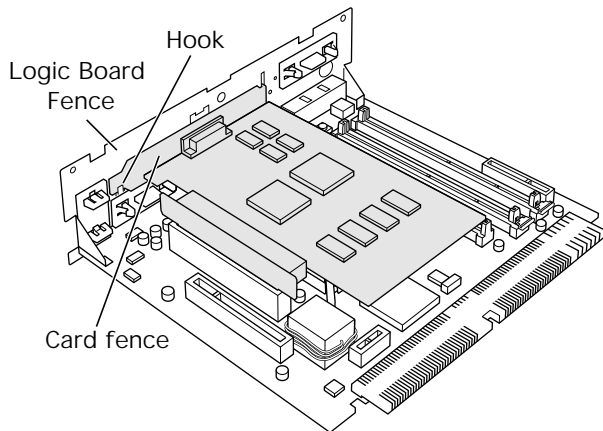






- 8 Secure the clamp with a screw on the outside of the logic board fence.





- 9 Seat the PCI card by engaging the card fence with the hook inside the logic board fence.
- 10 Reset the logic board following the procedure in "Logic Board Reset" in the Additional Procedures chapter.





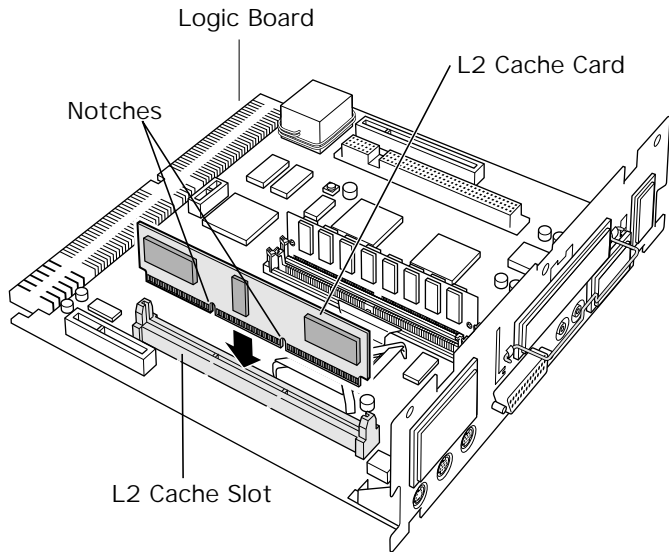
## L2 Cache Installation

Before you begin, remove the following:

- I/O door
- Logic board

**Caution:** Review the ESD precautions in Bulletins/ Safety.

Align the notches in the L2 cache card with the small ribs inside the L2 cache slot. Snap the card into place on the logic board.





## Additional Procedures

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Power Macintosh/Performa  
5400 and 5500 Series



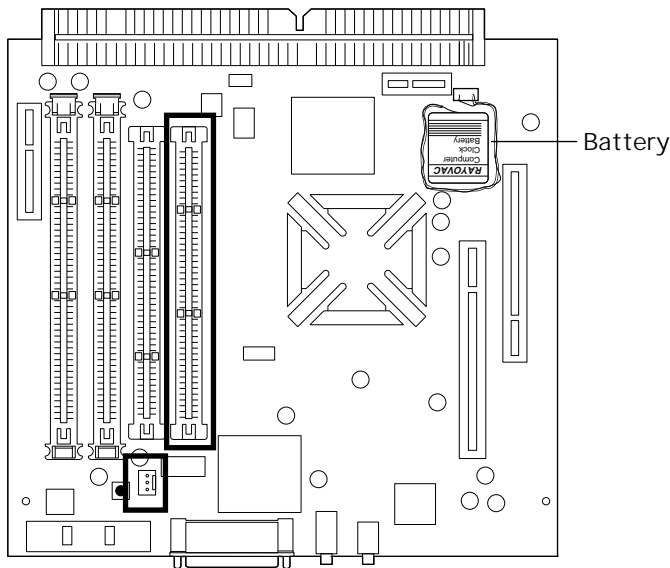


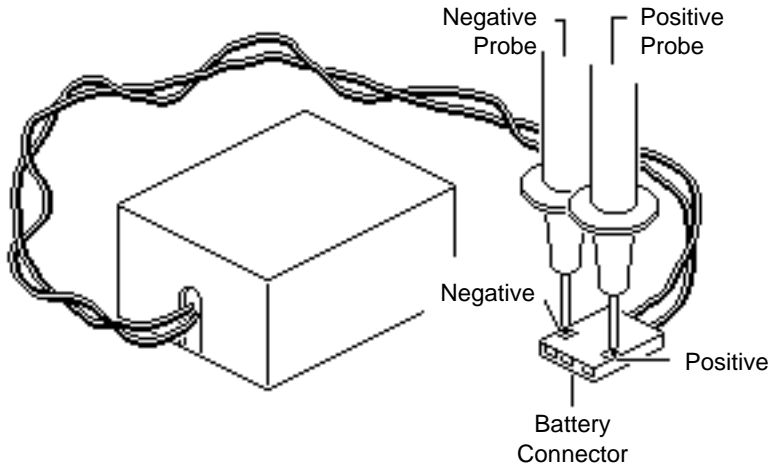
## Battery Verification

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 V 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 V, replace the battery. Refer to "Battery Replacement" in this chapter.

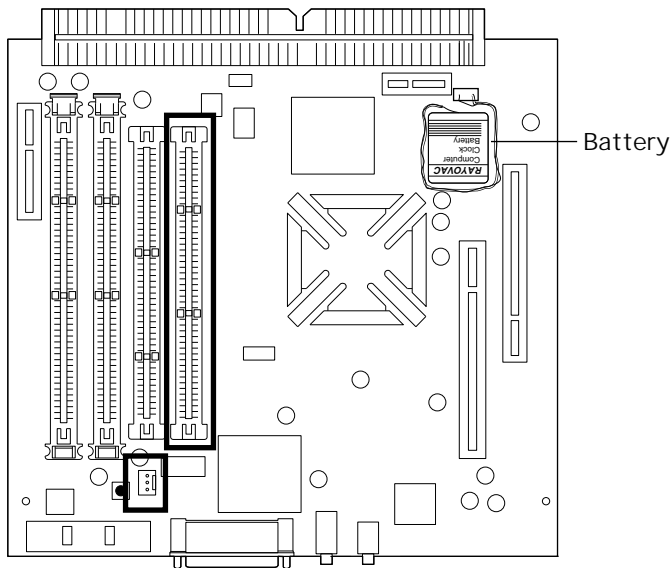


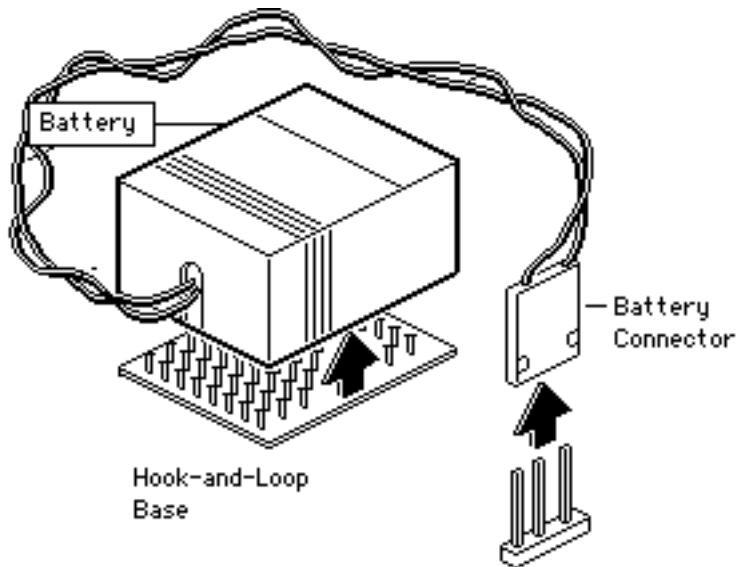
## Battery Replacement

Before you begin, remove the following:

- I/O door
- Logic board

**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.





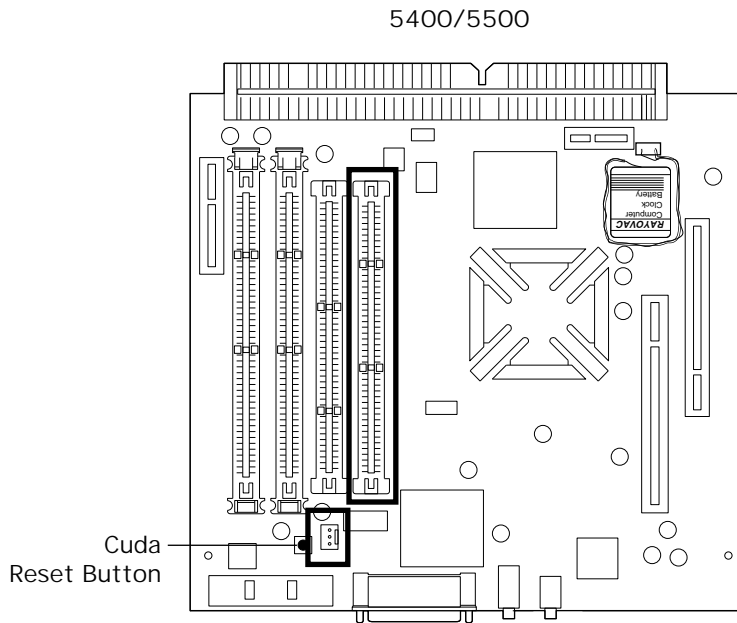
## Cuda Chip Reset

Before you begin, remove the following:

- Power cord
- I/O door
- Logic board

**Caution:** Review the ESD precautions in Bulletins/ Safety.

Press the Cuda reset switch on the logic board using a flat plastic tool.



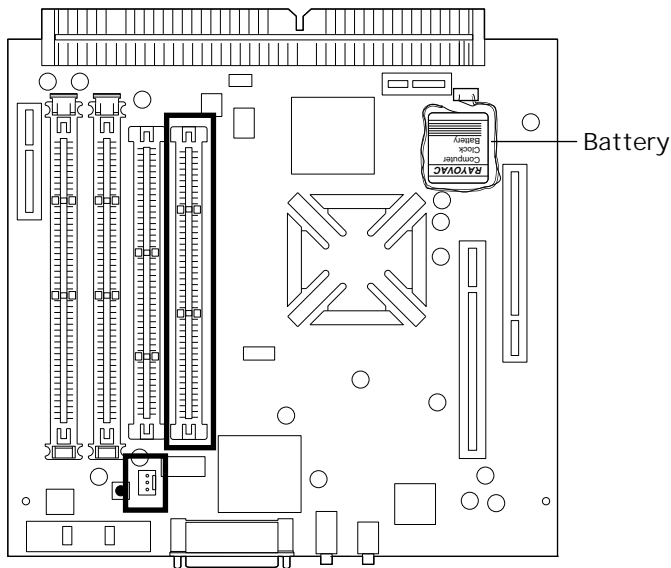


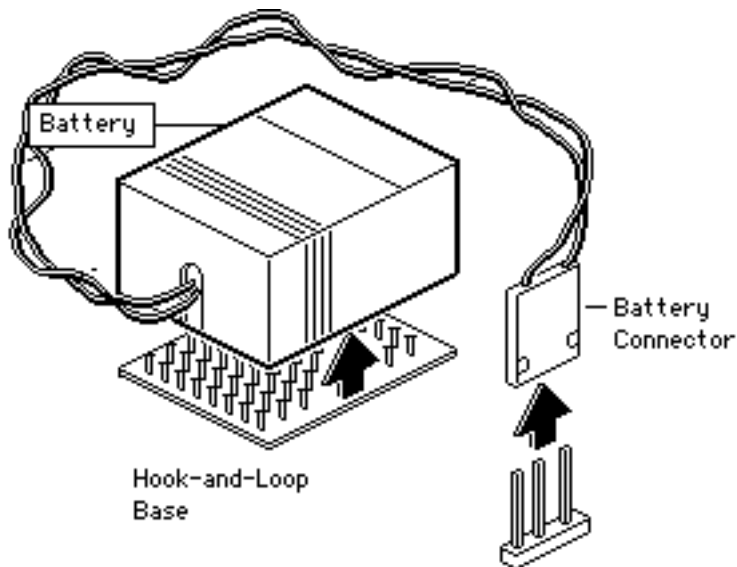
## Logic Board Reset

Before you begin, remove the following:

- Power cord
- I/O door
- Logic board

**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.
- 3 Wait 5 to 10 minutes, and then replace battery.
- 4 Press the Cuda reset switch on the logic board using a flat plastic tool.
- 5 Align the logic board at an upward angle to clear EMI clips.
- 6 Fully seat the logic board in the enclosure.



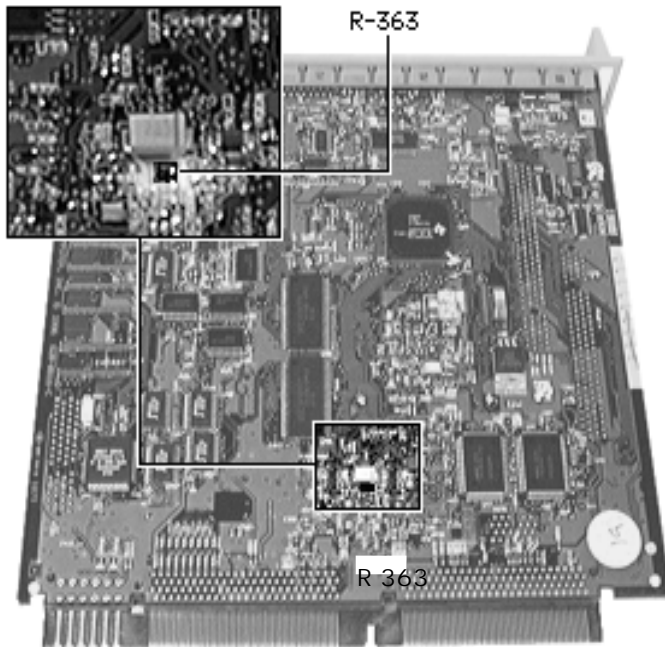


- 7 Replace the I/O door and power cable.

**Note:** This procedure resets PRAM. Be sure to check the computer's time/date and other system parameter settings.

**Note:** If this procedure resolves the problem, claim an adjustment on an SRO. If not, replace defective component and **do not** claim the adjustment.





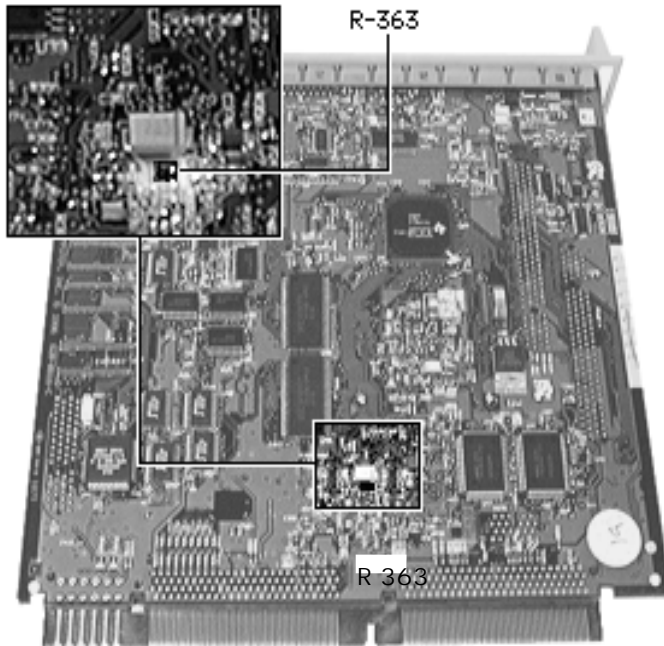
## PM 5500/225 Logic Board Identification

Apple has reworked 225 MHz (P/N 661-1322) logic boards.

Before you begin, remove the logic board.

- 1 Look at the resistor located at R-363 on the bottom of the board.





- 2 **Note:** You may need to use a magnifying glass to see the print on this resistor.

If 100 is printed on the resistor, the board has not been reworked.

If 101 is printed on the resistor, the board has been reworked.

- 3 Replace a board that has not been reworked with a reworked logic board.





## 5500—Software Installation Errors and L2 Cache Identification

The symptoms during software installation on a Power Macintosh 5500 may appear as follows:

- The installation is interrupted by a dialog box displaying a message like this: “Unable to decompress file ‘xxxx’ because of a data mismatch error.” After dismissing the dialog box, the user may be able to continue installing or may only have the option to stop the installation, depending on the type of installer.
- During software installation, the system hangs (cursor arrow still moves), system freezes (cursor arrow does not move), or Type 10 errors are displayed requiring a reboot.





These symptoms may appear with any software, installer, and installation from CDs, floppy disks, Zip disks, or external hard drives.

### **Identifying Suspect Units**

This problem is caused by a combination of a certain logic board manufacturer (OPC) together with a certain L2 cache in a small percentage of Power Macintosh 5500 computers that fall within this serial number range:

PM 5500 from TY705xxxxx to TY716xxxxx







### **Recommended Action**

If the symptom occurs on a 5500 computer in the specified serial number range, inspect the logic board for “OPC” printed along the edge. If the logic board has “OPC” on it, verify the cache is a compatible L2 cache DIMM. If the logic board is an OPC with an incompatible L2 cache, replace the incompatible L2 cache with part number 661-1477.

### **Identifying an OPC Logic Board**

Here is how to positively identify an OPC logic board:

- 1 With the logic board connector closest to you, examine the right and left edges of the board.
- 2 Along the right or left side you may see the letters OPC.





## Identifying L2 Cache DIMM

If the logic board is an OPC, follow these instructions to positively identify the L2 cache DIMM as compatible or incompatible:

- 1 View the back of the cache DIMM.
- 2 Notice that there is one larger chip and eight smaller chips. The eight smaller chips are organized in two groups of four at each end of the DIMM.
- 3 Look at the markings on any one of the smaller chips. They will look similar to this:

IDT 74FST

32384Q (This number is the identifying factor.)

F9637BFU

If this number, not counting the Q or any other letters present, has five digits, it is compatible with OPC.





IDT 74FST  
3384Q (Use this number to identify a problem DIMM.)  
F9637BFU

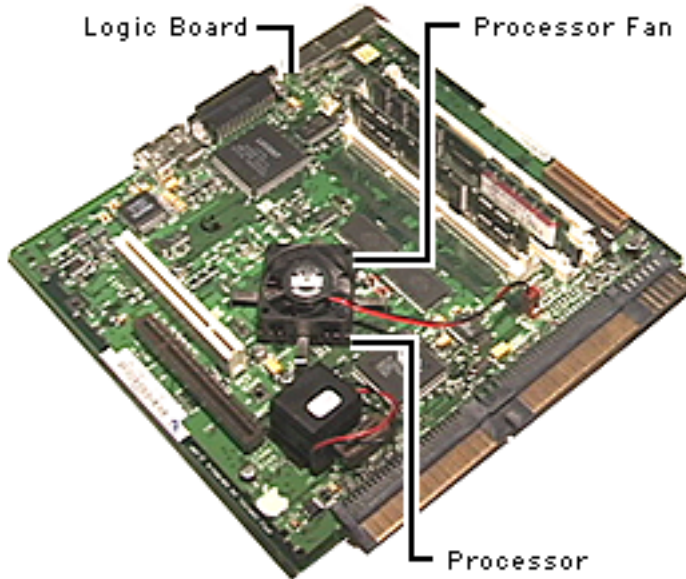
If this number, not counting the Q or any other letters present, has four digits, the cache is incompatible with an OPC logic board. Replace this L2 cache DIMM with part number 661-1477.

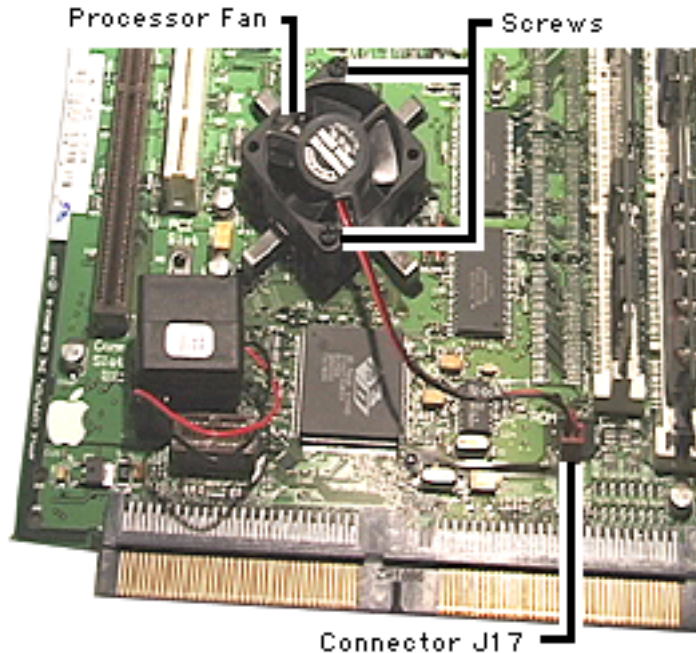


## Processor Fan

If the processor fan fails, the fan (922-3859) can be ordered separately and replaced.

- 1 Remove the I/O door.
- 2 Pull out the logic board.
- 3 Remove the defective processor fan.





- 4 Replace the defective fan with the replacement part.
- 5 Position the fan as shown in the graphic. Attach the two black plastic screws.
- 6 Connect the fan to the logic board at J17.
- 7 Replace the logic board.
- 8 Replace the I/O door.





## Adjustments

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Power Macintosh/Performa  
5400 and 5500 Series



## Light Meter Setup

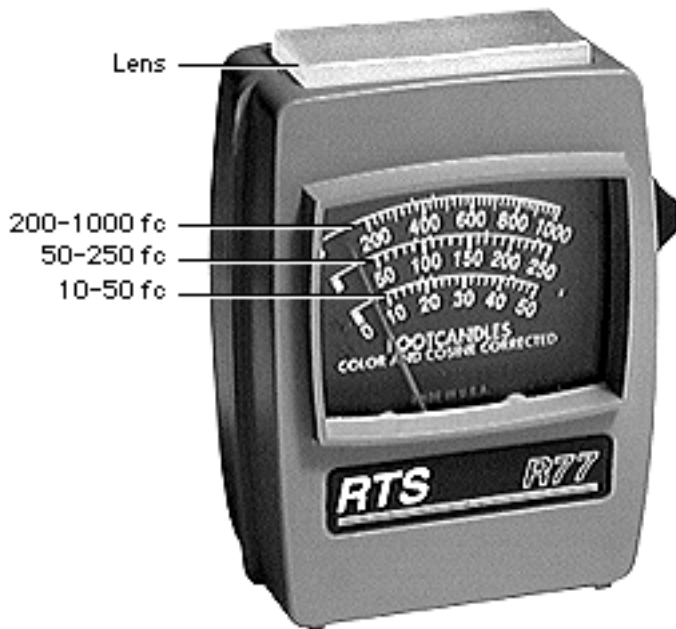
This topic covers setup for three light meter models: R77, L-248, and 246. Model R77 (Apple part number 076-0310) is the newest model available.

### Model R77

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

Before you begin, remove the 10X multiplier plate





from the lens.

Three scales are shown on the light meter:

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

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







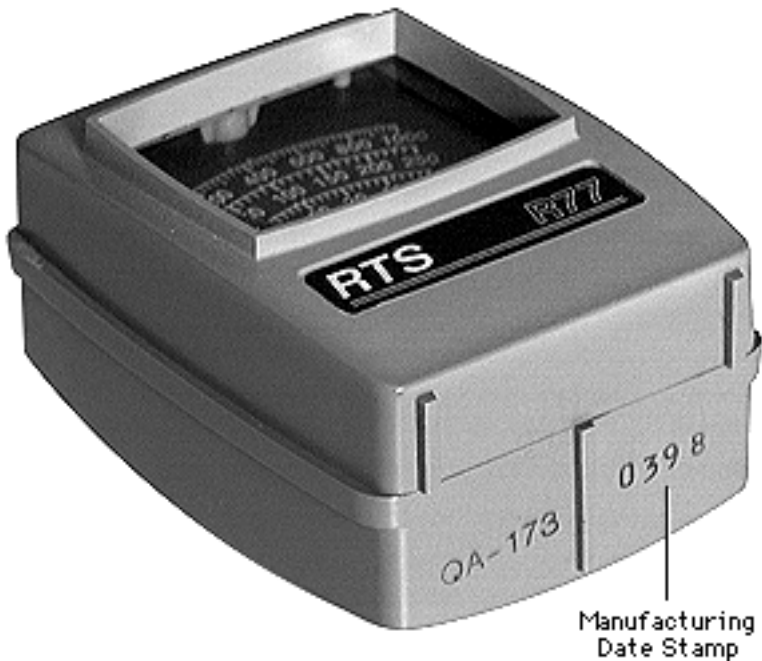
To measure a display screen's luminance,

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

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

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

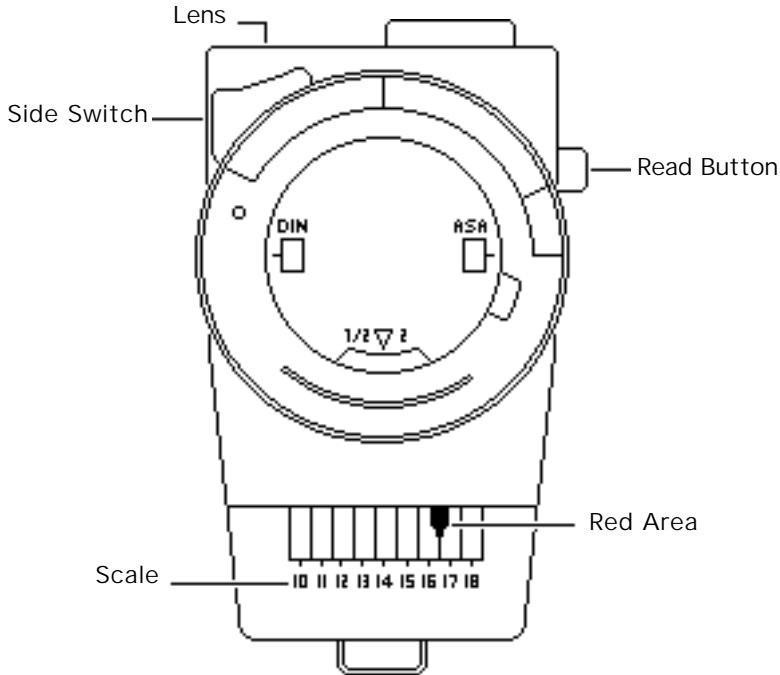




readings, verify the readings with a known-good light meter or photometer. Also check the age of the R77 light meter by its four-digit manufacturing date stamp (such as 0398 for March 1998).

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

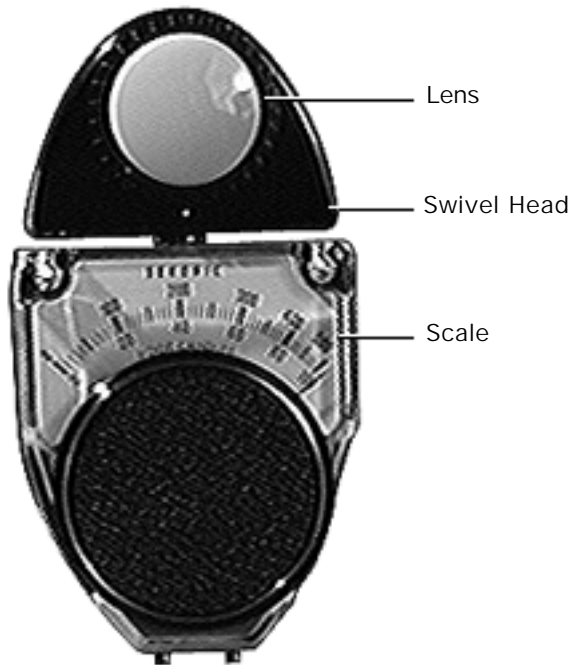




## Model L-248

- 1 Press the red button on the back of the light meter. If the reading is out of the red area, replace the battery.
- 2 Move the side switch to its upper position so that the scale reads 10 through 18.
- 3 Uncover the lens of the meter.
- 4 Place the lens against the middle of the screen and press the read button to read the scale.

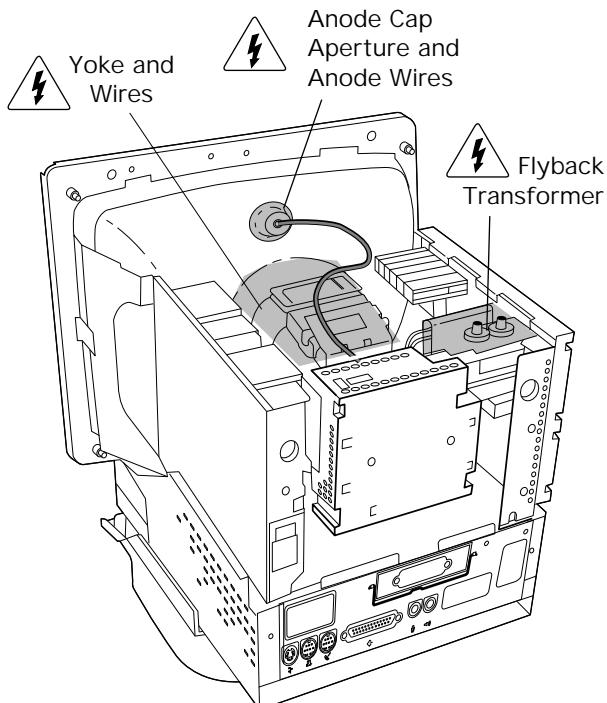




## Model 246

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





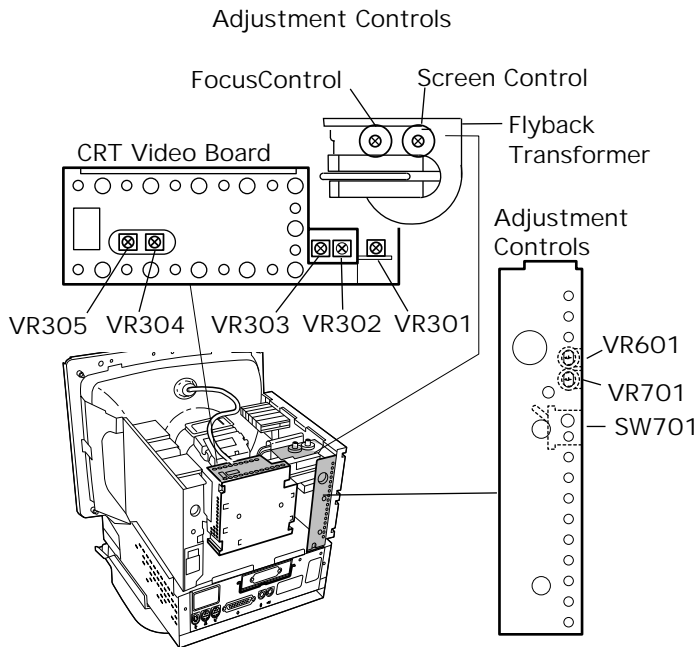
## Geometry

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.

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





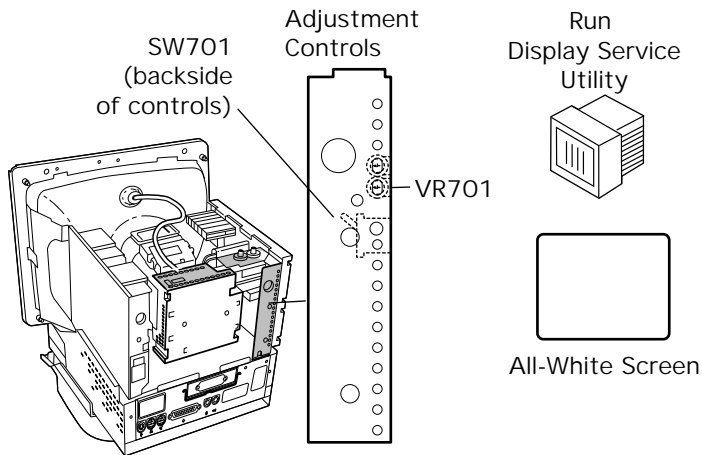
**Note:** The controls on this monitor require a small plastic Phillips-head tool or a small plastic flat-head tool to make adjustments.

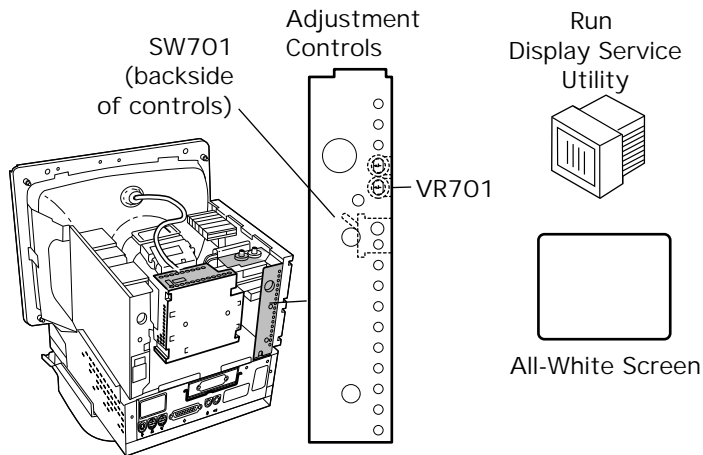




## Horizontal Shift

- 1 Run Display Service Utility from the Utilities folder of the MacTest Pro CD to display the All-White Screen.
- 2 Using a flat-blade plastic tool, adjust the horizontal shift control (VR701) until the raster is centered.





- 3 If necessary, use a plastic tool to reposition the arm of the horizontal centering switch (SW701).

**Note:** Switch SW701 has three positions. You can control the horizontal centering of the display either by using SW701 together with the horizontal shift control (VR701) or by using VR701 alone.

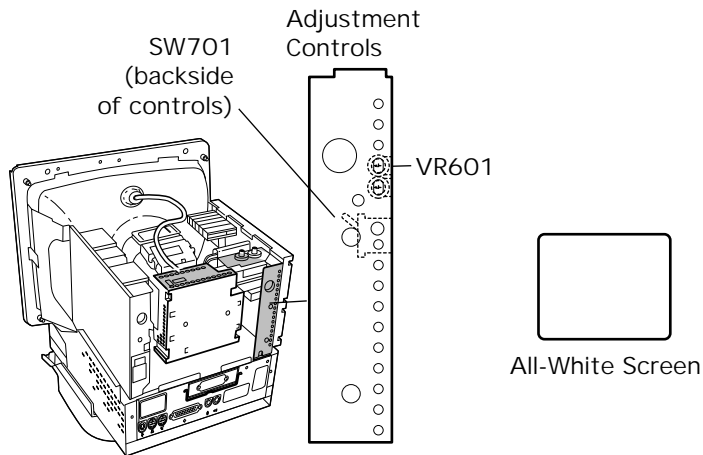


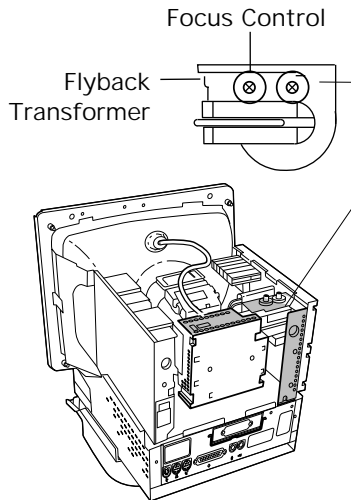




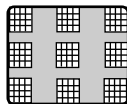
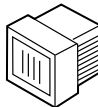
## Vertical Shift

- 1 Run Display Service Utility from the Utilities folder of the MacTest Pro CD to display the All-White Screen.
- 2 Using a flat-head plastic adjustment tool, adjust the vertical shift (VR601) control until the raster is centered (top to bottom) in the display area.





Run  
Display Service  
Utility

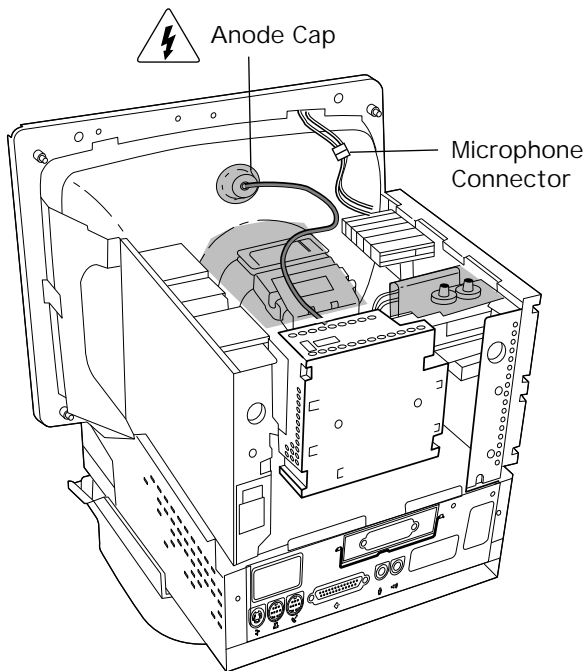


Focus  
Test Pattern

## 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.



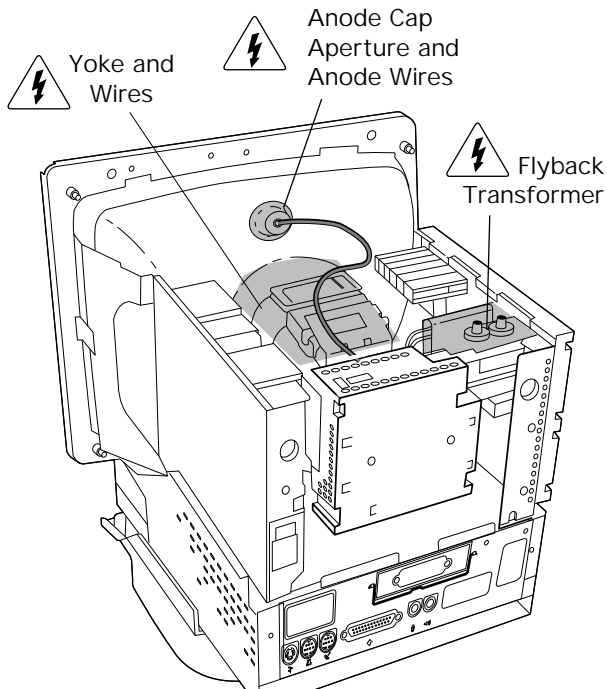


## On-Screen Video

Before you begin,

- Turn off virtual memory
- Turn off the power
- Remove the I/O door
- Remove the rear housing
- Discharge the CRT
- Remove the anode cap
- Disconnect the microphone cable
- Remove the rear EMI shield
- Remove the modem card (if present)



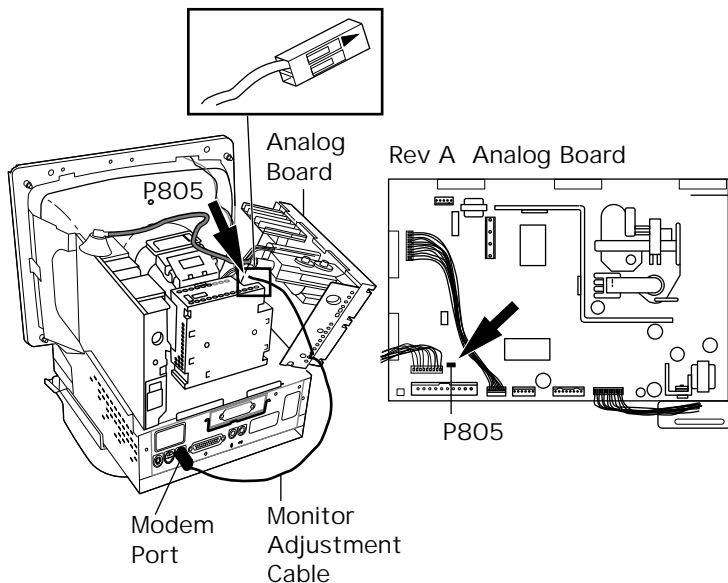


**⚠ Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.

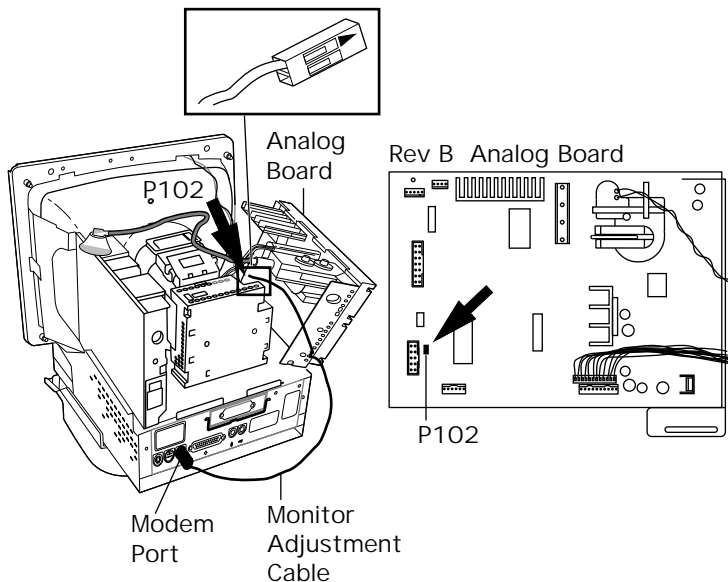
**⚠ Warning:** Never use an antistatic wriststrap until after discharging the CRT.

**Note:** The 5500 is made with Rev. B parts.



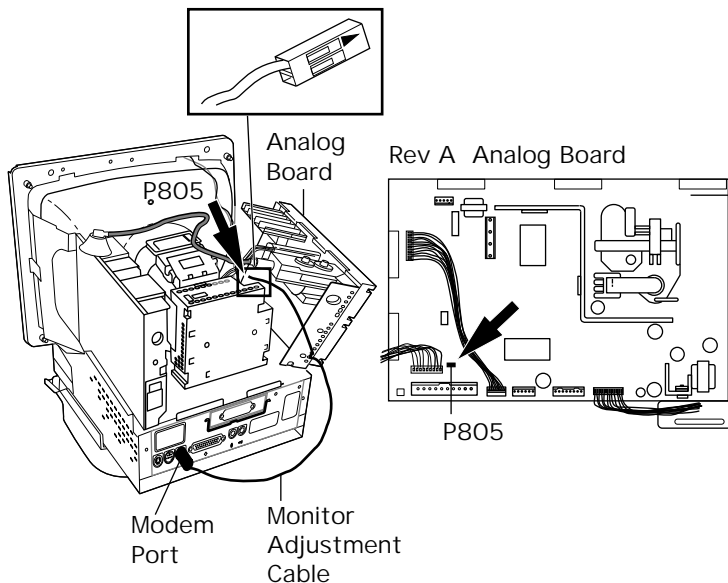


- 1 Remove the three Phillips screws that secure the analog board to the chassis.
- 2 Tilt the analog board back, being careful not to put stress on the cables.
- 3 Locate jumper P805 (Rev. A) or P102 (Rev. B) near the logic board connector on the lower left corner of the analog board.



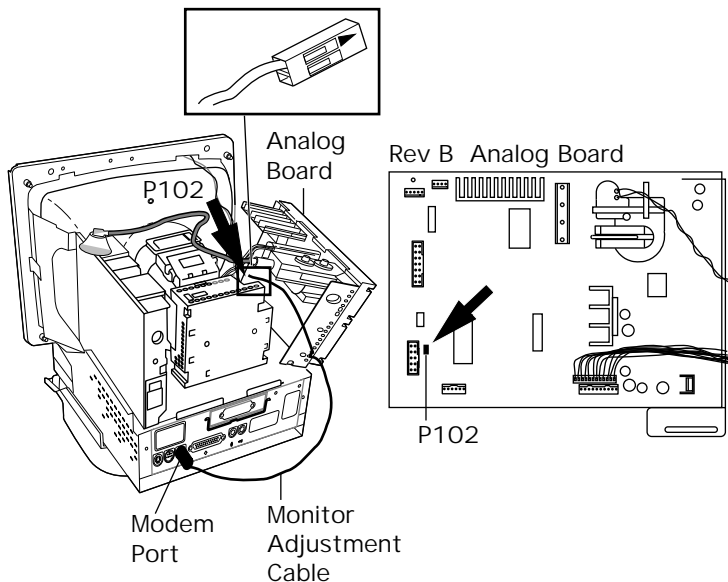
- 4 Remove the shunt that covers the pins of jumper P805 (Rev. A) or P102 (Rev. B).
- 5 **Note:** It is very important to perform this step correctly according to the Rev. A or Rev. B instructions.





- The square silkscreened marking at P805 (Rev. A only) indicates pin 1 on the analog board. For Rev. A, connect one end of the monitor adjustment cable (922-1513) to P805. Be sure to position the connector so the pin 1 opening is aligned over pin 1 (square marking) on the analog board.

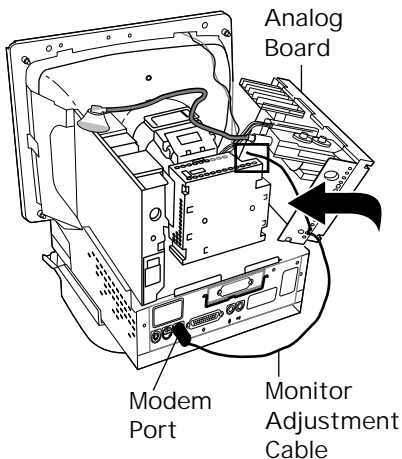




- For Rev. B, connect one end of the monitor adjustment cable (922-1513) to P102. The arrow mark on the plug connector (see graphic) must go over the pin closer to the top of the analog board. Hold the connector with gold connectors facing you, and place the connector on the two pins at P102.







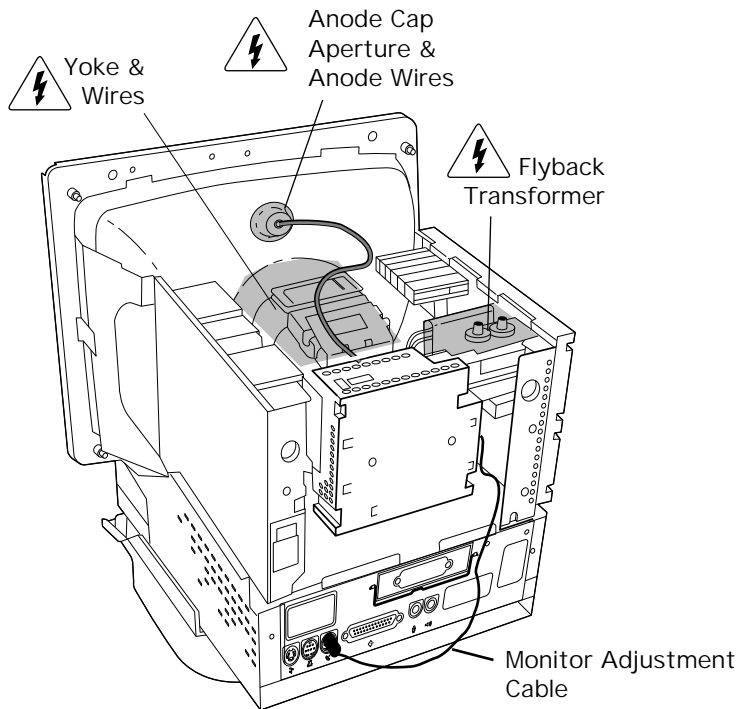
**Important:** The adjustment won't work if the plug is incorrectly placed on the pins.

- 6 Connect the other end of the monitor adjustment cable (922-1513) to the modem port.

**Note:** You must use the modem port. Remove the internal modem and plastic modem port cover, if present.

- 7 Route the monitor adjustment cable so it stays clear of sharp edges and remains slack.





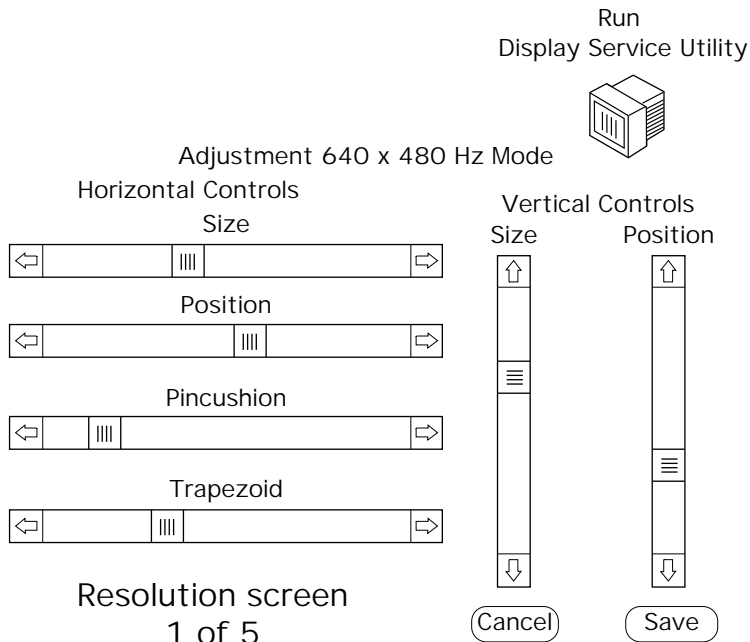
reconnect the grounding screw to the EMI shield.

- 9 **⚠ Warning:** Be sure to remove the antistatic wriststrap before replacing the anode cap.

Replace the anode cap.

- 10 Position the monitor so you can see the screen.





- 11 Turn on the power.
- 12 Run Display Service Utility to display the on-screen video adjustment controls. The controls appear after selecting PowerPC 5200/5300/5400/5500 in the pattern selection box and then select adjust geometry.
- 13 Use the scroll bars to adjust the horizontal and vertical controls.
- 14 To cancel settings (and revert to the last saved setting) click Cancel.





- 15 To save your settings (in the monitor's selected resolution) click Save.
- 16 **Important:** After you click Save or Cancel, the name of the next screen resolution appears at the top of the screen. You must set and save the on-screen video adjustments for each remaining screen resolution. Otherwise, if you change from a saved resolution to an unsaved resolution, the



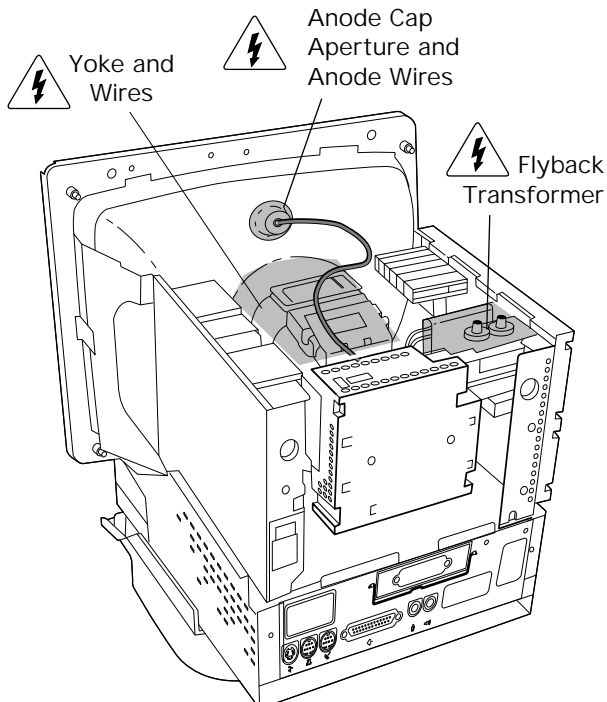


display will appear  
misadjusted.

Set and save the settings  
for each screen  
resolution.

After saving the last screen  
resolution, exit Display  
Service Utility.





## 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.

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





**Replacement Note:** Perform the cutoff adjustment whenever you replace the CRT or the deflection board, or whenever the screen control has been inadvertently changed.

**⚠ 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.

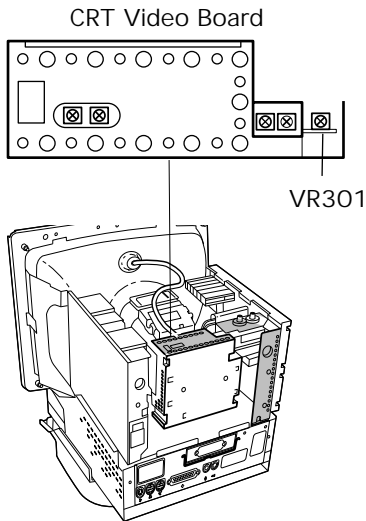




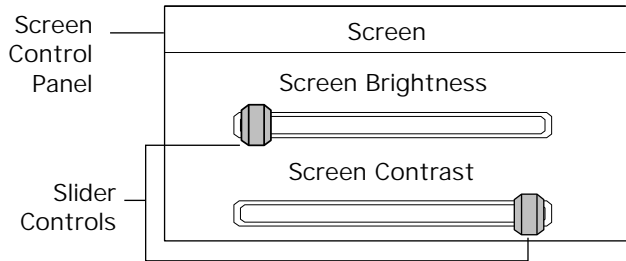
## Cutoff

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

- 1 Using a fine-tip plastic adjustment tool, set the sub-contrast control (VR301) on the CRT/ video board to its maximum (fully clockwise) position. The screen becomes brighter.





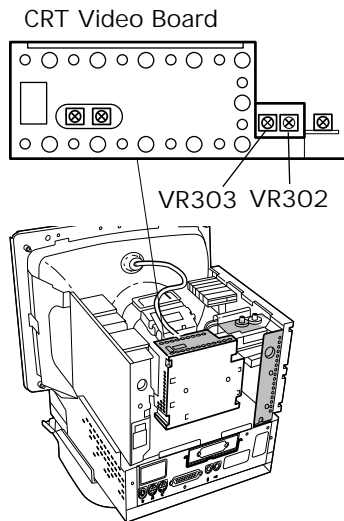


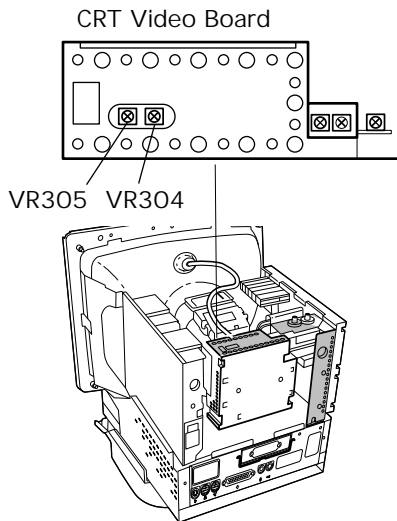
- 2 From the desktop, select and open the Screen icon to open the on-screen control panel.
- 3 Set the Screen Brightness slider control to its minimum (far left) position.
- 4 Set the Screen Contrast slider control to its maximum (far right) position.



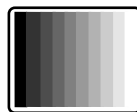
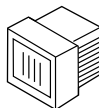


- 5 Using a fine-tip plastic adjustment tool, set the green gain (VR303) and red gain (VR302) controls to their middle positions.





Run  
Display Service  
Utility



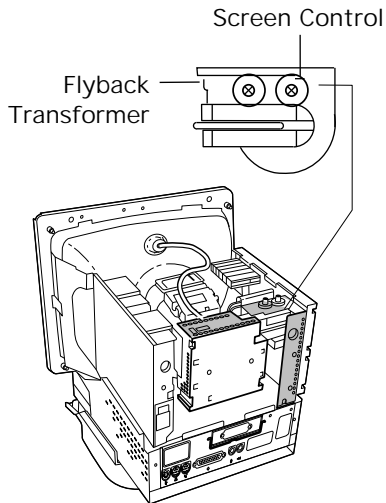
Gray Bars  
Test Pattern

- 6 **Note:** Verify that the display resolution is set to 640 x 480.

Run Display Service Utility to display the Gray Bars test pattern.

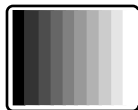
- 7 Using a fine-tip plastic adjustment tool, set the red bias (VR304) and the green bias (VR305) controls to their minimum (counterclockwise) positions.





- 8 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.



Gray Bars  
Test Pattern



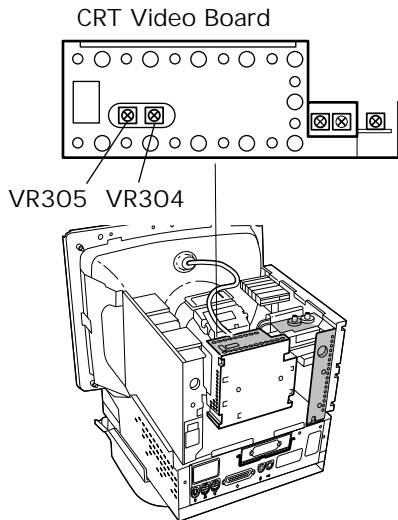
## White Balance

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

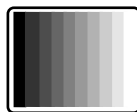
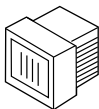
- 1 **Note:** Verify that the display resolution is set to 640 x 480.

Run Display Service Utility to display the Gray Bars test pattern.

- 2 Using a fine-tip plastic adjustment tool, adjust the red bias (VR304)

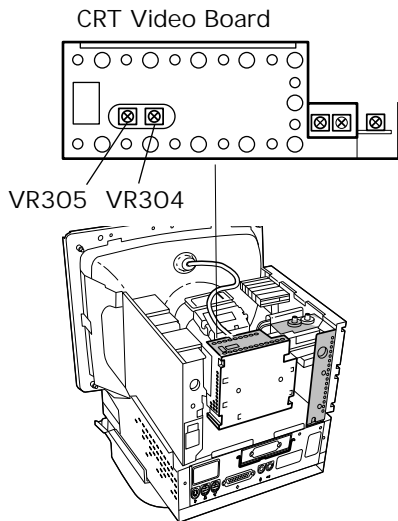


Run  
Display Service  
Utility

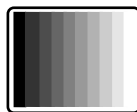
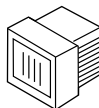


Gray Bars  
Test Pattern





Run  
Display Service  
Utility



Gray Bars  
Test Pattern

and green bias (VR305) controls to neutralize the four darkest bars.

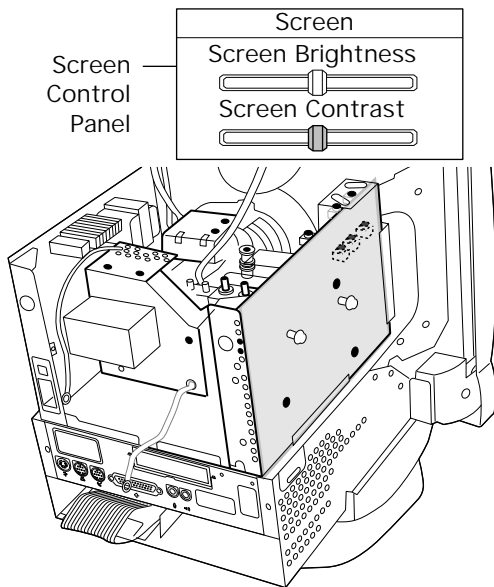
- 3 If the screen shows a predominant blue color, start by adjusting the green bias control (VR305) until the blue color is neutralized with green and it's difficult to tell whether the four darkest bars are blue or green.
- 4 Adjust the red bias control (VR304) until the bars appear to be shades of gray.





**Note:** If the predominant color appears to be always too red or too green, reduce the levels of both the green and red bias controls to neutralize the predominant color. The darkest bar must remain completely black, and the second darkest bar should be just barely visible.

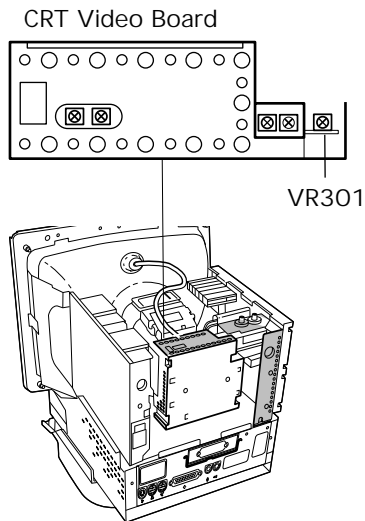




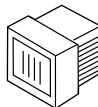
- 5 From the desktop, open the Screen icon to open the on-screen control panel.
- 6 Set the Screen Brightness slider control to its center position.

**Note:** The screen might appear too bright and out of focus.



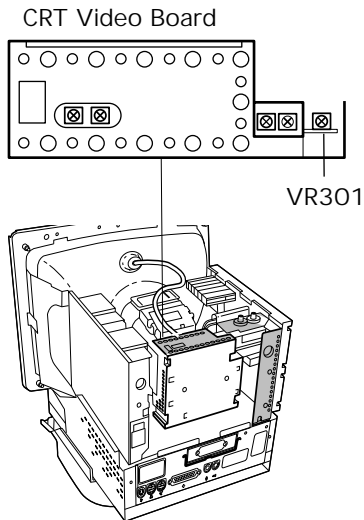


Run  
Display Service  
Utility

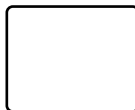
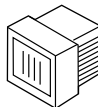


- 7 Run Display Service Utility to display the All-White Screen test pattern.
- 8 Hold a light meter or photometer against the center of the screen.





Run  
Display Service  
Utility

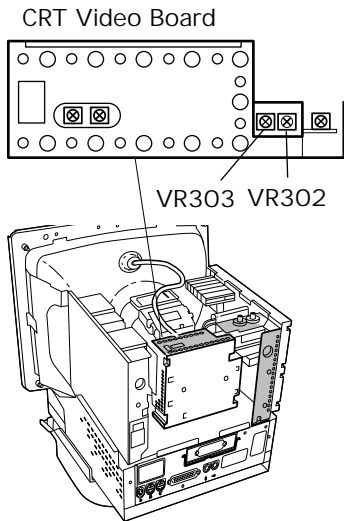


All-White Screen

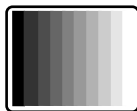
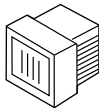
9 Adjust the sub-contrast control (VR301) to decrease the screen brightness until the screen luminance measures

- 21 on the bottom scale of light meter Model R77
- Upper end of 10 on the 10 through 18 scale of light meter Model L-248
- 21 footcandles on the red scale of light meter Model 246
- 25 fL (foot lamberts) on a photometer





Run  
Display Service  
Utility



Gray Bars  
Test Pattern

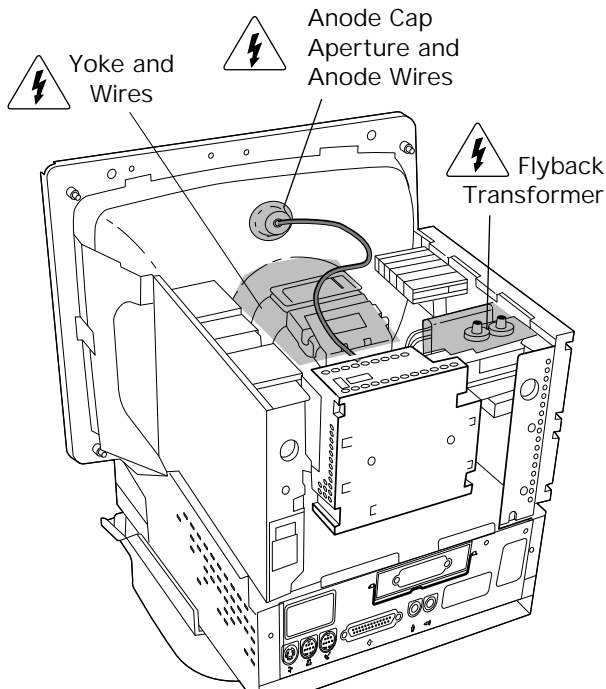
- 10 Run Display Service Utility to display the Gray Bars test pattern.
- 11 In most cases the four brightest bars will appear to be shades of gray, and the leftmost bar will be solid black. If not, adjust the red (VR302) and green (VR303) gain controls until the color of the four brightest bars is neutralized.





- 12 Check the screen luminance again and reset it to the proper reading by repeating the previous step that set it to one of the following:
  - 21 on light meter Model R77
  - Upper end of 10 on light meter Model L-248
  - 21 footcandles on light meter Model 246
  - 25 fL (foot lamberts) on a photometer





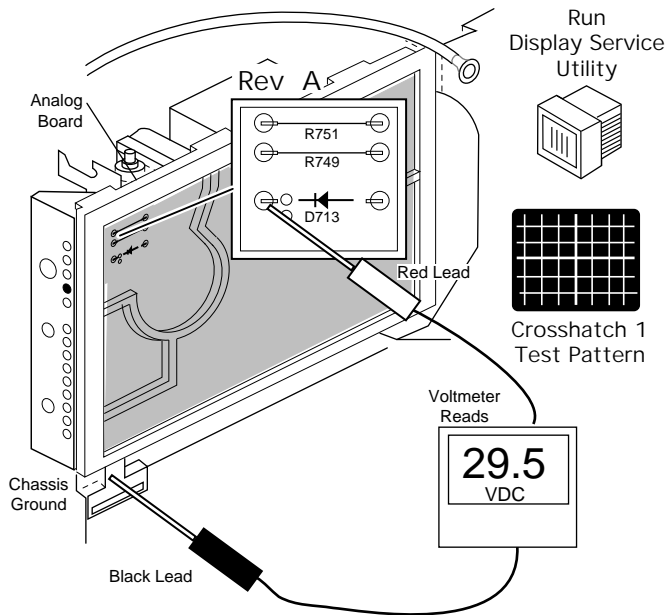
## High Voltage

Before you begin,

- Remove the rear housing
- Remove the EMI shield
- Reattach ground wire and screw

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





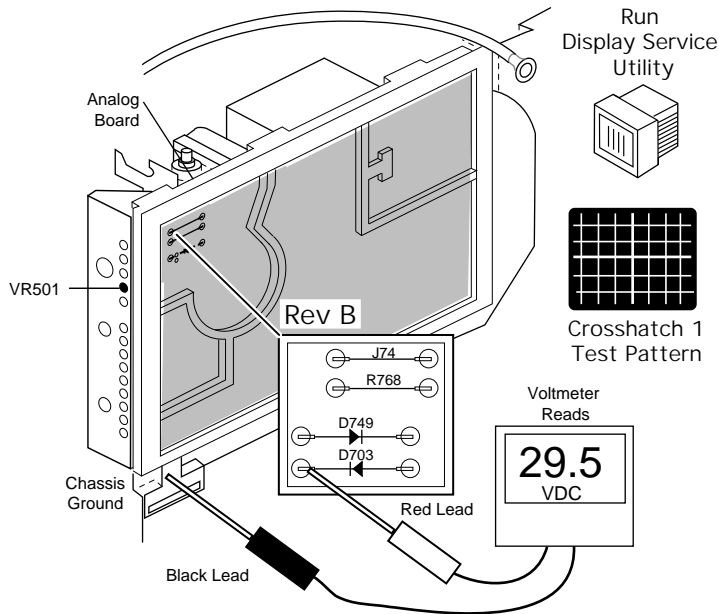
**Replacement Note:** Perform the high voltage adjustment whenever you replace the CRT or the deflection board.

**Note:** Perform the high voltage adjustment after the monitor has been on for at least 10 minutes.

**Note:** The 5500 is made with Rev. B parts.

- 1 Run Display Service Utility to display the Crosshatch test pattern.
- 2 Locate diode D713 (Rev. A) or D703 (Rev. B) on the analog board.

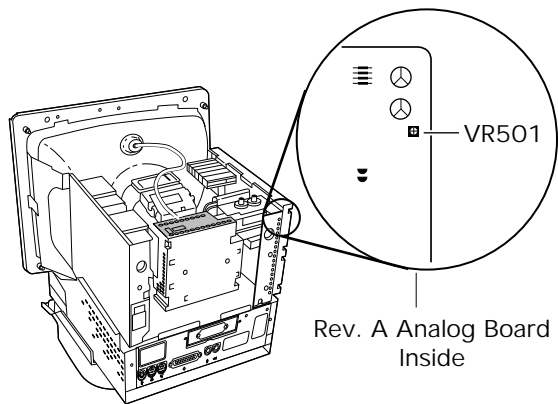




3 Connect a digital voltmeter as follows:

- Attach the red (positive) lead of the voltmeter to the cathode side of diode D713 (Rev. A) or D703 (Rev. B).
- Attach the black (negative) lead of the voltmeter to the metal chassis ground.



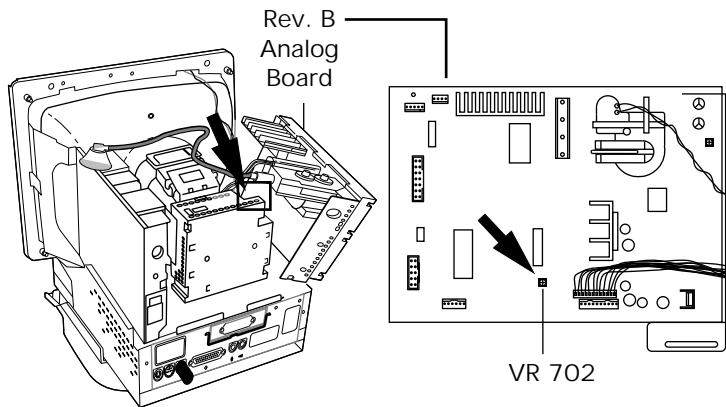


- 4 Using a fine-tip plastic adjustment tool, set the high-voltage adjustment control (VR501 on Rev. A, VR702 on Rev. B is pictured on next page) so the voltmeter reads 29.5 volts DC ( $\pm 0.1$  volt).

**Note:** The VR501 control is inside the analog board.







**Note:** To reach the VR702 high-voltage adjustment control on Rev. B computers, tilt back the analog board. The VR702 control is inside the analog board.

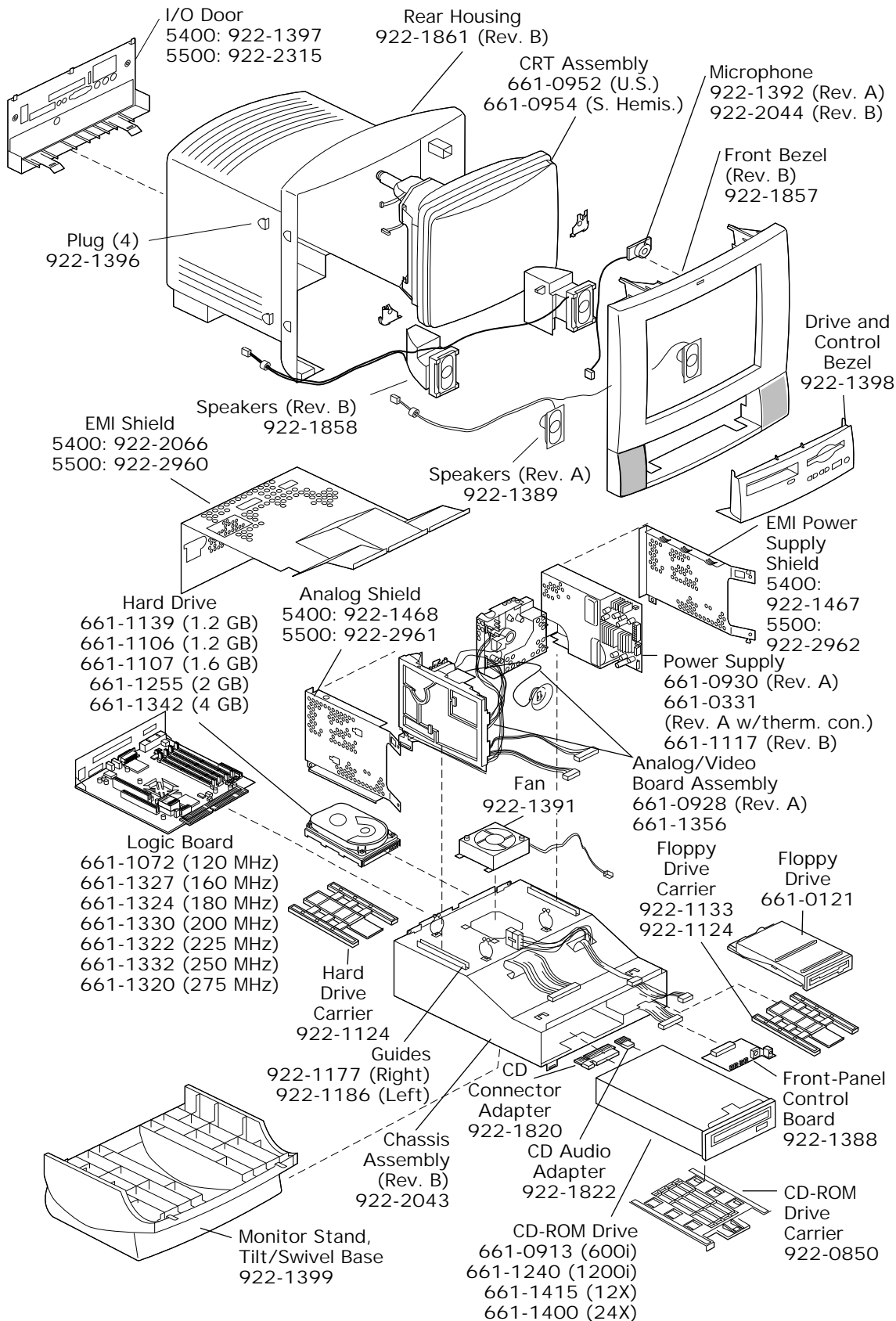


## Exploded View

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Power Macintosh/Performa  
5400 and 5500 Series







Exploded View

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Performa  
5400/180, 5420, 5420/180



