Service Source

Power Macintosh 8100/
WS 8150

Power Macintosh 8100/80 and 8100/80AV, Power
Macintosh 8100/100 and 8100/100AV, Power
Macintosh 8100/110, Workgroup Server 8150,
Workgroup Server 8150/110

Basics

Power Macintosh 8100/WS 8150

Power Macintosh System Overview

PowerPC microprocessors are a family of processors built on reduced instruction-set computing (RISC) technology. RISC processors streamline the internal workings of computers. Whereas traditional (complex instruction-set computing, or CISC) processors contain a wide variety of instructions to handle many different tasks, RISC processors contain only those instructions that are used most often. When a complex instruction is needed, a RISC processor builds it from a combination of basic instructions.

RISC processors are designed to execute these basic instructions extremely quickly. The performance gains achieved by speeding up the most-used instructions more than compensate for the time spent creating less-used instructions.

Previously, RISC technology had been used only in high-end workstations and commercial database servers. With the introduction of Macintosh PowerPC computers, Apple succeeded in bringing RISC technology to personal computing.

Key Points

Three key points to remember about a PowerPC processor-based Macintosh system: It's a Macintosh; it's compatible; it offers tremendous performance.

Apple's PowerPC computers feature the same user interface as their 680x0-based predecessors. Users can mix RISC-based and 680x0-based Macintosh systems on the same network and exchange files and disks between them. In addition, users can run both 680x0 and native PowerPC applications on the same Power Macintosh system simultaneously.

Compatibility is not limited just to applications. INITs, CDEVs, drivers, and other Macintosh utility software also work on PowerPC processor-based Macintosh systems. So do AppleTalk devices (such as printers), SCSI devices (such as hard drives and scanners), ADB devices (such as mice, trackballs, and keyboards), and other Macintosh cards and peripherals.

The primary operating system for PowerPC processor-based Macintosh computers is System 7. The operating system has been optimized for the highest performance on the PowerPC processor. This optimization of System 7 benefits applications written for 680x0 systems as well as those developed specifically for PowerPC processor-based systems.

And while PowerPC-based Macintosh systems running native applications offer two to four times the performance

of the fastest 68040- and 80486-based personal computers, the real promise of PowerPC technology is that it enables Apple and other developers to deliver new software capabilities on Macintosh systems that were previously available only on high-end workstations.

Troubleshooting Tips

When troubleshooting Power Macintosh systems, keep in mind the following:

1   If a Power Macintosh system does not power up, you should first attempt to reset the logic board. Instructions are provided in the Additional Procedures chapter.

2   With Power Macintosh computers, you must install noncomposite RAM SIMMs only, and the RAM SIMMs must be installed in like pairs (that is, the same size and speed). Additional troubleshooting information is

provided in the Symptom Charts section of the Troubleshooting chapter under the "System" topic heading.

3   If a Power Macintosh system has bad RAM SIMMs installed, you will not hear death chimes. Instead, a dialog box will appear alerting you to the fact that a bad RAM SIMM has been detected. Additional troubleshooting information is provided in the Symptom Charts section of the Troubleshooting chapter under the "System" topic heading.

4   If the system hangs shortly after installing a new NuBus card, contact the vendor to verify that the card is compatible with the Power Macintosh system or to see if there is a software upgrade available. If the NuBus card is an Apple manufactured product, refer to the Service Tech Info Library for more information.

5 The Power Macintosh AV systems use the same logic
   board as the non-AV versions. The only difference is that
   the AV versions have the Power Macintosh AV Card
   installed in the PDS slot.

   The Power Macintosh 7100/66 and 8100/80 systems
   must have a video card installed in the PDS slot. The
   Power Macintosh 7100/66 system uses the Power
   Macintosh 2 MB Video Card and the Power Macintosh
   8100/80 system uses the Power Macintosh 4 MB Video
   Card. A missing card can result in a system that won't
   boot or a system that crashes.

HDI-45 Pinouts

This section includes an illustration of the HDI-45
connector and a table containing the pinout descriptions.
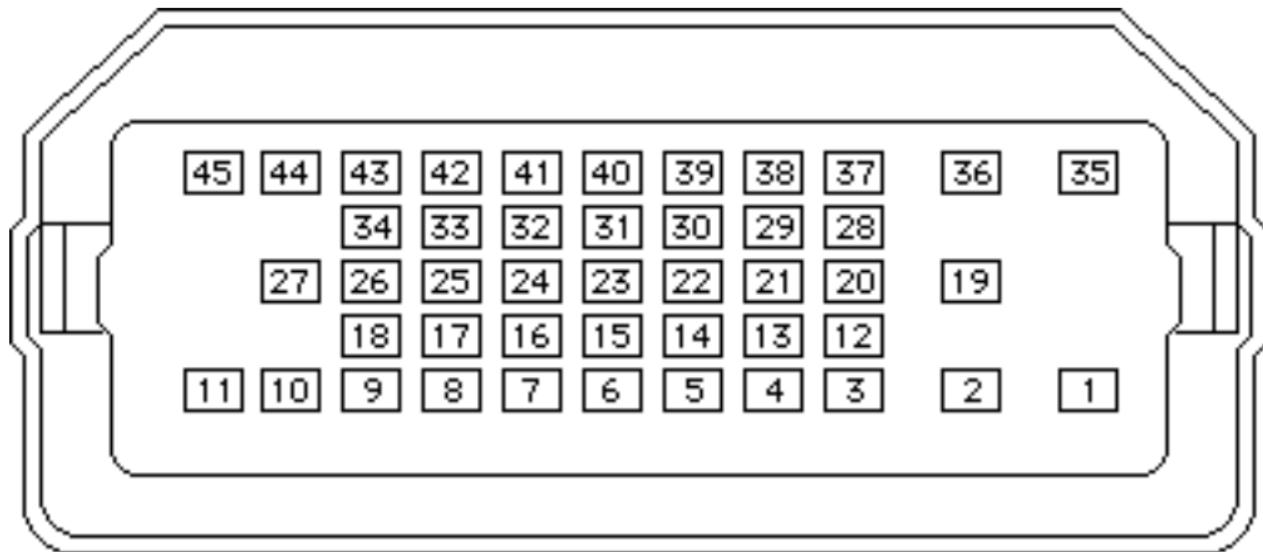
Figure: HDI-45 Connector on the Logic Board

Table: HDI-45 Pinouts

Pin	Description
1	Analog audio ground
2	Audio input shield
3	Left channel audio input
4	Right channel audio input
5	Left channel audio output
6	Right channel audio output
7	Reserved
8	Monitor ID sense line 1
9	Monitor ID sense line 2
10	Green ground (shield)

Pin	Description
11	Green video output (75Ω)
12	Video input power ground
13	Power for camera +5 V
14	Reserved
15	Reserved
16	Reserved
17	Reserved
18	Monitor ID sense line 3
19	S-video input shield
20	S-video input luminance (Y)
21	S-video input chroma (C)

Pin	Description
22	Reserved
23	Reserved
24	Reserved
25	Reserved
26	Red ground (shield)
27	Red video output (75Ω)
28	I^2C data signal
29	I^2C clock signal
30	Reserved
31	Monitor ID
32	Monitor ID

Pin	Description
33	Vertical sync signal
34	Composite sync signal
35	ADB power +5 V
36	ADB ground
37	ADB data
38	Keyboard switch
39	Reserved
40	Reserved
41	Monitor ID
42	Horizontal sync signal
43	Video sync ground

Pin	Description
44	Blue ground (shield)
45	Blue video output (75Ω)

Rear Panel Connectors

The figure on the following page shows a Power Macintosh
8100 computer with a 4 MB Video Card installed. The AV
version of the Power Macintosh 8100 would have a Power
Macintosh AV Card installed instead of the 4 MB Video Card.
In addition to a DB-15 connector, the AV Card includes an S-
Video Input and an S-Video Output port.

Power-On

SCSI

Ethernet

HDI-45 Video

Printer

Modem

ADB

Sound Out

Sound In

DB-15
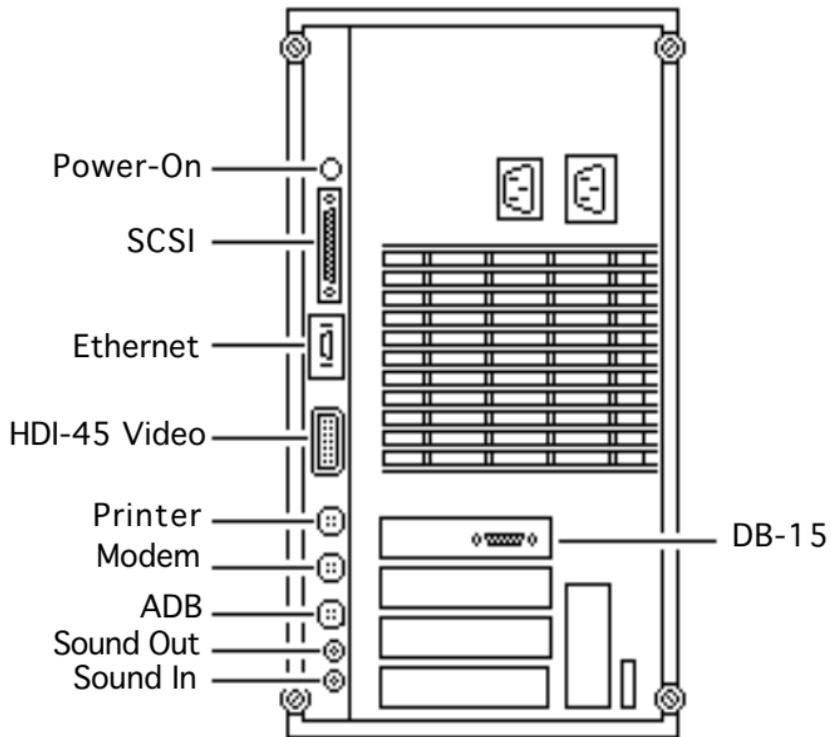
Power Macintosh 8100 Rear Panel

Logic Board Connectors

The figure on the following page shows a Power Macintosh 8100/80 logic board.

Caution: It is important to note that the Power Macintosh 8100/100 and 8100/110 Series logic boards have a thermoelectrical cooling device that attaches directly to the microprocessor's heatsink. You can identify this cooling device by the black and red wires that run to the right of the heatsink and plug into the logic board via a keyed connector. This device is not a serviceable item. Do **not** unplug this device or you may damage the logic board.

CD-ROM/Tape SCSI
Power Supply
Speaker
CD-ROM Audio
Floppy Drive
LED
Power On
SCSI
Ethernet
PowerPC 601 Chip
HDI-45 Video
Printer
Modem
ADB
Sound Out
Sound In
DRAM SIMMs
8 MB Soldered DRAM
Hard Drive SCSI
601 PDS
ROM Slot
L2 Cache Slot
NuBus Slots
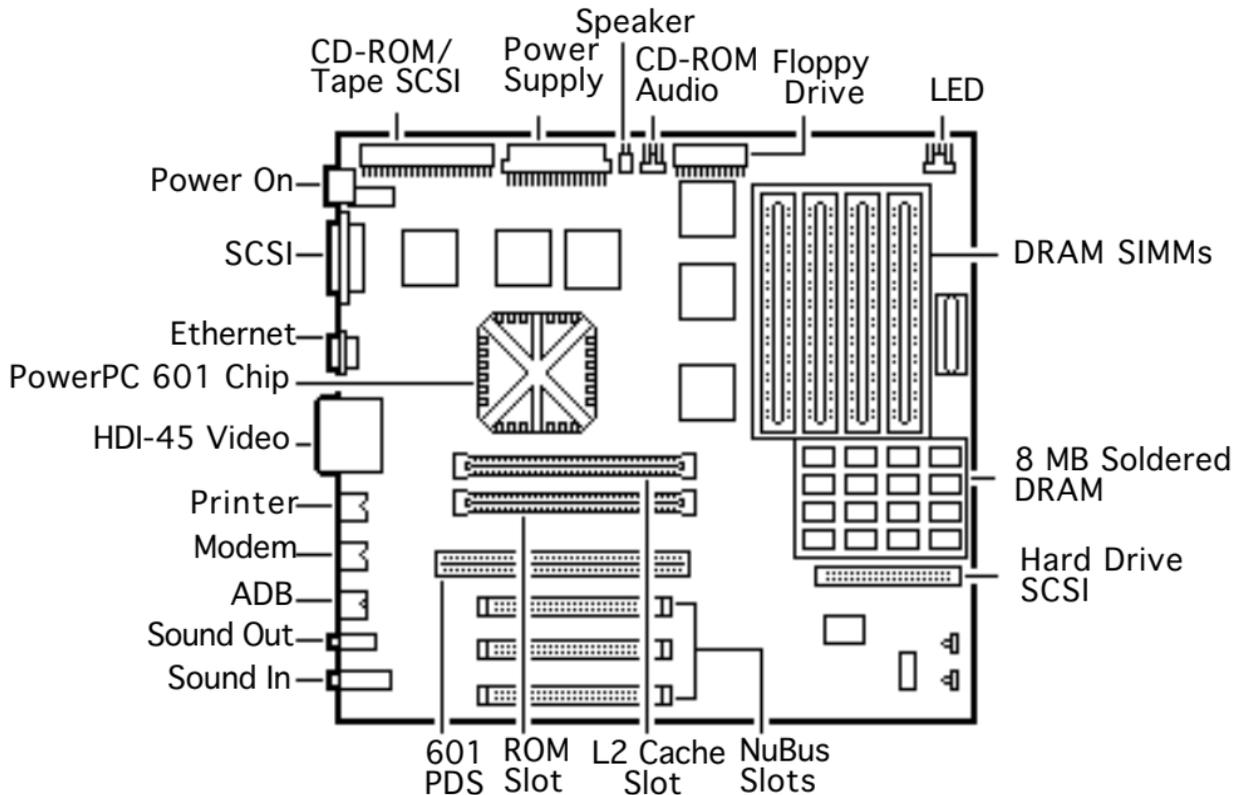
Apple RAID Software

Apple RAID (Redundant Array of Independent Disks) software protects data from loss during a disk failure and enhances the speed of data storage and retrieval. It is available for all Power Macintosh Workgroup servers.

Data protection is achieved through disk mirroring, a data storage scheme in which identical data is stored on two different disks. Apple RAID can also be configured for disk striping, a data storage scheme in which successive units of data are transferred to several disks at one time.

If you plan to install the Apple RAID software on an existing Power Macintosh Workgroup Server, or if you are reinitializing an existing Apple RAID drive, keep in the mind the following:

- If you wish to use your server's startup disk for Apple RAID, do not install the Apple RAID program on your startup disk until you have initialized and set up new volumes on that disk. Before you initialize the startup disk, back up all valuable data.

- You must reinitialize all disks on which you will use Apple RAID volumes. Initializing with Apple RAID removes all data, so be sure to back up your disks first.

- Apple HD SC Setup does not recognize Apple RAID volumes. If you want to remove or resize volumes on Apple RAID disks, use the Apple RAID program.

- The Apple RAID CD contains the facilities to reinstall your system software. However, if you have made any customizations to your system files, such as adding extension files, control panels, or preference files, then

back up your system files now. Back them up in such a
way that you can restore your system files separately
from the nonsystem files on your disk. You will later
restore your system files using the backup copy rather
than the System Installer on the RAID CD, so that you
preserve your system customizations.

Specifications

Power Macintosh 8100/WS 8150

Processor

CPU

Built-in MMU and FPU
32K of on-chip cache memory
80, 100 or 110 MHz PowerPC 601 RISC microprocessor

8100/80 & 8150

Requires system software version 7.1.2 or later

8100/100, 8100/110 & 8150/110

Requires system software version 7.5 or later

Note: To run System 7.5 on these systems, you need enabler version 1.1.1 at a minimum. This version of the system software requires Finder version 7.1.5. You can verify the Finder version installed by using the "Get Info" command. Refer to the Tech Info Library for more information.

Memory

RAM

8100/80, 8100/100 & 8150
8 MB RAM soldered on logic board, expandable to 264 MB via 8 SIMM sockets on logic board (using pairs of same size, 80 ns or faster, 72-pin noncomposite SIMMs); Optional 16 MB configuration has two 4 MB SIMMs installed

8100/110 & 8150/110
16 MB RAM standard (8 MB soldered on logic board and two 4 MB SIMMs), expandable to 264 MB via 8 SIMM sockets on logic board (using pairs of same size, 80 ns or faster, 72-pin noncomposite SIMMs)

Note: SIMMs must be installed in pairs of the same size. Install noncomposite SIMMS only.

VRAM

8100/80, 8100/100, 8100/110, 8150 & 8150/110	2 MB of VRAM on video card, expandable to 4 MB using 512K VRAM SIMMs
8100/80AV & 8100/100AV	2 MB of VRAM on Macintosh AV card, including support for NTSC or PAL monitors
8150 & 8150/110	None

ROM   4 MB installed on ROM SIMM

Cache   32K on-chip cache; 256K level 2 cache SIMM

Clock/Calendar   CMOS custom chip with long-life lithium battery

Disk Storage

Hard Drive

8100/80	500 MB or 1 GB hard drive
8150	500 MB, 1 GB, or 2 GB hard drive
8100/100	700 MB or 1 GB hard drive
8100/110	2 GB hard drive
8150/110	1 GB hard drive

Floppy Drive   1.4 MB Apple SuperDrive Manual Insert

CD-ROM Drive   Internal AppleCD 300 Plus CD-ROM drive optional on some
                          models and standard on other models

  8150/110   AppleCD 600 CD-ROM drive standard

I/O Interfaces

SCSI
One SCSI port; DB-25 connector
Supports maximum of six external devices (five with CD-ROM drive)

Serial
Two RS-232/RS-422 LocalTalk/GeoPort serial ports; mini DIN-9 connectors (backward compatible with mini DIN-8 connectors)

Apple Desktop Bus
One Apple Desktop Bus (ADB) port; mini-Din-4 connector
Maximum power draw 500 mA; maximum of three devices total

Ethernet
One Ethernet port; AAUl-15 connector

Expansion Slot   One processor-direct slot (PDS); 182-pin connector

NuBus   Three slots support long or short expansion cards; 96-pin Euro-DIN connectors

Sound   16-bit stereo in and out
Sample rates of 48, 44.1, 24, and 22.05 kHz
Input/output line level: 1 V peak-to-peak
Input/output signal-to-noise ratio (SNR): 82 dB with no audible discrete tones
Bandwidth: 20 Hz–20 kHz (± 2 dB) at 44.100 kHz sample rate
THD+N (total harmonic distortion plus noise): less than 0.05%, measured 20Hz–20kHz with a 1-Vrms sine wave input

Video   One HDI-45 DRAM-based video port on logic board supports
               direct connection to Apple AudioVision monitors and with
               optional HDI-45 to DB-15 adapter supports 12-in., 13-in.,
               14-in., 15-in. portrait, 16-in., and 17-in. monitors

8100/80, 8100/100,   Come with a Power Macintosh 4 MB Video Card with one DB-15
8100/110   VRAM-based video port that supports 12-in., 13-in., 14-in.,
                          15-in. portrait, 16-in., 17-in., 20-in., and 21-in. monitors

8100/80AV & 8100/   Come with a Power Macintosh AV Card* with: one DB-15 VRAM-
100AV   based video on the card that supports 12-in., 13-in., 14-in.,
                          15-in. portrait,16-in., 17-in., 20-in., and 21-in.
                          monitors; one S-video/composite input port; and one S-video
                          composite output port

                          *Only one monitor can be attached to the card at one time (that
                          is, either through the DB-15 port or the S-video port).

Digital-Audio Video

8100/80AV & 8100/100AV   Support for DAV connector standard

I/O Devices

Keyboard	Standard, extended, or adjustable keyboard
	Keyboard draws 25–80 mA, depending on model of keyboard

Mouse	ADB Mouse II; Draws up to 10 mA

Microphone

8100/80, 8150 & 8150/110	Optional Apple PlainTalk microphone; unidirectional and optimized for use with speech recognition
8100/80AV, 8100/100, 8100/100AV & 8100/110	Apple PlainTalk microphone standard

Video Display

Video Support   System must have the Power Macintosh 4 MB Video Card, Power Macintosh AV Card, or PDS terminator board installed.

These systems support monochrome, color, VGA, and SVGA formats on the HDI-45 logic board connector, including:

- Macintosh 12" Monochrome Display (640 x 480)
- Macintosh 12" RGB Display (512 x 384)
- AppleColor High-Res RGB 14" Monitor (640 x 480)
- Apple AudioVision 14 Display (640 x 480)
- Macintosh Color Display (640 x 480)
- Macintosh 15" Portrait Display (640 x 870)
- Macintosh 16" Color Display (832 x 624)

**Video Support
(cont'd)**

All Power Macintosh 8100 series computers support the
following monitors via the DB-15 connector on their
respective video cards:

- Macintosh 19" Color Display (1024 x 768)
- Apple Multiple Scan 20 Display (1280 x 1024)
- Macintosh 21" Color Display (1152 x 870)

In addition, the AV versions support the following monitors via the
DB-15 connector on the Power Macintosh AV Card:

- NTSC (512 x 384 and 640 x 480)
- PAL (640 x 480 and 768 x 576)

Electrical

A/C Line Input Voltage   100–240 VAC; RMS single phase, automatically configured

Input Line Frequency   50–60 Hz, single phase

Input Power   298 W maximum continuous, 453 W peak input (not including monitor power)

Power Supply DC Output   200 W continuous output

Physical

Dimensions   Height: 14.25 in. (360 mm)
                      Width: 7.75 in. (196 mm)
                      Depth: 16 in. (396 mm)

Weight   25.3 lb. (11.5 kg); weight varies depending on internal devices
                      installed

Environmental

**Operating
Temperature**   50–104° F (10° to 40° C)

**Storage
Temperature**   –40 to 116.6° F (–40 to 47° C)

Relative Humidity   5–90% noncondensing

Altitude   0–3048 m (0–10,000 ft.)

Troubleshooting

Power Macintosh 8100/WS 8150

General

The Symptom Charts included in this chapter will help you diagnose specific symptoms related to your product. Because cures are listed on the charts in the order of most likely solution, try the first cure first. Verify whether or not the product continues to exhibit the symptom. If the symptom persists, try the next cure. (Note: If you have replaced a module, reinstall the original module before you proceed to the next cure.)

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

For additional assistance, contact Apple Technical Support.

Symptom Charts

Power Supply

System does not
power up

1 Reset logic board. (Refer to Additional Procedures.)
2 Reseat ROM SIMM and cache SIMM.
3 Replace power supply.
4 Replace logic board.

Error Chords

One-part error
chord sounds during
startup sequence

1 Disconnect SCSI data cable from hard drive and reboot
   system. If startup sequence is normal, initialize hard drive.
   If error chord still sounds, replace hard drive.
2 Disconnect floppy drive cable from floppy drive and reboot
   system. If startup sequence is normal, replace floppy drive.
3 Replace logic board. Retain customer's SIMMs.

System

Does not power on;
screen is black, fan is
not running, and LED
is not lit

1 Check power cables.
2 Plug monitor directly into wall socket, and verify that monitor has power.
3 Reset logic board. (Refer to Additional Procedures.)
4 Reseat ROM SIMM and cache SIMM.
5 Replace power cord.
6 Replace power supply.
7 Replace logic board. Retain customer's SIMMs.

Clicking, chirping,
or thumping

1 Replace power supply.
2 Replace logic board. Retain customer's SIMMs.
3 Replace floppy drive cable.
4 Replace floppy drive.

System (Continued)

System shuts down
intermittently

1 Make sure air vents are clear. Thermal protection circuitry
   may shut down system. After 30 to 40 minutes, system
   should be OK.
2 Replace power cord.
3 Check battery. Refer to "Battery Verification" in Additional
   Procedures.
4 Replace power supply.
5 Replace logic board. Retain customer's SIMMs.

System (Continued)

System
intermittently
crashes or hangs

1 Verify system software is version 7.1.2 or later.
2 Verify SIMMs are installed in pairs of same size/speed and
   are noncomposite.
3 Verify software is known-good.
4 Verify software is Power Macintosh compatible (contact
   developer).
5 Verify PDS slot has video card installed.
6 Clear parameter RAM. Hold down <Command> <Option> <P>
   <R> during startup but before "Welcome to Macintosh"
   appears.
7 Replace SIMMs.
8 Replace cache SIMM.
9 Replace logic board. Retain SIMMs.
10 Replace power supply.

System (Continued)

During startup,
following message is
displayed, "This
startup disk will not
work on this
Macintosh model."

1 Verify that startup disk is good.
2 Verify that LED cable is securely attached to logic board.
3 Reinstall system software.
4 Replace LED cable.
5 Replace logic board. Retain customer's SIMMs.

Video

Screen is black, audio
and drive operate, fan
is running, and LED is
lit

1 Adjust brightness on monitor.
2 Replace video cable.
3 Try using known-good RAM SIMMs.
4 Replace video card.
5 Clear parameter RAM. Hold down <Command> <Option> <P>
  <R> during startup but before "Welcome to Macintosh"
  appears.
6 Replace SIMMs.
7 Replace monitor. Refer to appropriate monitor manual to
  troubleshoot defective monitor.
8 Replace logic board. Retain customer's SIMMs.
9 Replace power supply.

Video **(Continued)**

Screen is black, audio
and drive do not
operate, but fan is
running and LED is lit

1   Replace video cable.
2   Replace video card.
3   Replace SIMMs.
4   Replace logic board. Retain customer's SIMMs.
5   Replace power supply.

Partial or whole
screen is bright and
audio is present, but
no video information
is visible

1   Replace video cable.
2   Replace video card.
3   Clear parameter RAM. Hold down <Command> <Option> <P>
    <R> during startup but before "Welcome to Macintosh"
    appears.
4   Replace monitor. Refer to appropriate monitor manual to
    troubleshoot defective monitor.
5   Replace logic board. Retain customer's SIMMs.

Video (Continued)

Multiple Scan
monitor attached to
Power Macintosh
8100/80AV displays
ghosting or video
smearing

1   Replace Power Macintosh AV Card.

Floppy Drive

Internal floppy drive
does not operate

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

During system
startup, disk ejects;
display shows icon
with blinking "X"

1 Replace disk with known-good system disk.
2 Clear parameter RAM. Hold down <Command> <Option> <P>
  <R> during startup but before "Welcome to Macintosh"
  appears.
3 Replace floppy drive cable.
4 Replace floppy drive.
5 Replace logic board. Retain customer's SIMMs.

Floppy Drive (Continued)

Does not eject disk

1 Switch off computer. Hold mouse button down while you switch computer on.
2 Replace floppy drive cable.
3 Replace floppy drive.
4 Replace logic board. Retain customer's SIMMs.

Attempts to eject disk, but doesn't

1 Push disk completely in.
2 Reseat floppy drive bezel and drive so bezel slot aligns correctly with drive.
3 Eject disk manually.
4 Replace floppy drive.

Internal floppy drive runs continuously

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

Floppy Drive (Continued)

MS-DOS drive does not recognize a disk formatted on a 1.4 MB drive

1 To read and write files with either MS-DOS or 1.4 MB drive, format all disks with MS-DOS drive first.

Hard Drive

Single internal hard
drive does not
operate; drive
doesn't spin

1 Check the SCSI and hard drive power cable connections.
2 Replace hard drive power cable.
3 Replace hard drive. (Note: If replacing an Apple WS 8150
   RAID drive, you must reinstall the RAID software on the
   drive. See "RAID Information" in Basics.)
4 Replace power supply.

No internal SCSI
drives operate

1 Verify there are no duplicate SCSI device addresses.
2 Replace SCSI data cable.
3 Replace power supply.
4 Replace logic board. Retain customer's SIMMs.

Hard Drive (Continued)

Drive does not appear
on the desktop

1 Verify there are no duplicate SCSI device addresses.
2 Update the SCSI device driver using Apple HD SC Setup. Run
   Disk First Aid to verify the condition of the drive's
   directory structure.
3 Replace the SCSI hard drive cable.
4 If drive is not initialized, use HD SC Setup to initialize.
   (Note: Use Apple RAID to initialize RAID drives for the WS
   8150 drives.)
5 Replace with known-good hard drive. (Note: If replacing an
   Apple WS 8150 RAID drive, you must reinstall the RAID
   software on the drive. See "RAID Information" in Basics.)
6 If the hard drive still doesn't work, switch back to the
   original hard drive and replace the logic board.

Hard Drive (Continued)

Works with internal
or external SCSI
devices but not with
both

1   Verify there are no duplicate SCSI device addresses.
2   Replace terminator on external SCSI device.
3   Verify that SCSI device at end of internal SCSI data cable is
    only device terminated.
4   Refer to appropriate manual to troubleshoot defective
    external device.

Peripherals

Cursor does not move

1 Replace external SCSI cables.
2 Verify that there is only one terminator on external devices.
3 Check mouse connection.
4 Inspect inside of mouse for buildup of dirt or other contaminants. Clean mouse if necessary.
5 If mouse was connected to keyboard, connect mouse to computer ADB port instead. If mouse works, replace keyboard.
6 If mouse does not work in any ADB port on computer, replace mouse.
7 Replace logic board. Retain customer's SIMMs.

Peripherals (Continued)

Cursor moves, but
clicking mouse
button has no effect

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

Double-click doesn't
open application,
disk, or server

1 Remove duplicate system folders.
2 Clear parameter RAM. Hold down <Command> <Option> <P>
   <R> during startup but before "Welcome to Macintosh"
   appears.
3 If mouse was connected to keyboard, connect mouse to
   computer ADB port instead. If mouse works, replace
   keyboard.
4 If mouse does not work in any ADB port on computer, replace
   mouse.
5 Replace logic board. Retain customer's SIMMs.

Peripherals (Continued)

No response to any
key on keyboard

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

Known-good serial
printer does not work

1   Verify you have correct version of system software (see
    Processor topic in Specifications chapter).
2   Verify that Chooser is set correctly.
3   Replace printer interface cable.
4   Replace logic board. Retain customer's SIMMs.

Known-good network
printer does not print

1   Verify you have correct version of system software (see
    "Processor" topic in Specifications chapter).
2   Verify that Chooser is set correctly.
3   Replace logic board. Retain customer's SIMMs.

Miscellaneous

No sound from speaker

1 Verify that volume setting in Control Panel is 1 or above.
2 Replace speaker.
3 Replace logic board. Retain customer's SIMMs.

About This Macintosh reports more memory than is installed

1 Verify that RAM SIMMs are installed in matching pairs (same size and speed).
2 Replace RAM SIMMs.

About This Macintosh reports less memory than is installed

1 Verify that RAM SIMMs are installed in matching pairs (same size and speed).
2 Replace RAM SIMMs.

CD-ROM Drive

CD-ROM drive does not accept compact disc

1   Exchange disc.
2   Replace CD-ROM drive mechanism.

Macintosh does not display CD-ROM drive icon

1   Verify that CD-ROM software is installed.
2   Replace CD-ROM drive mechanism.
3   Replace SCSI data cable.

Computer with 600i CD-ROM drive makes stuttering sounds when playing CD+ or CD-R formatted discs or CD-ROM disc won't mount

Replace CD-ROM drive.

Take Apart

Power Macintosh 8100/WS 8150
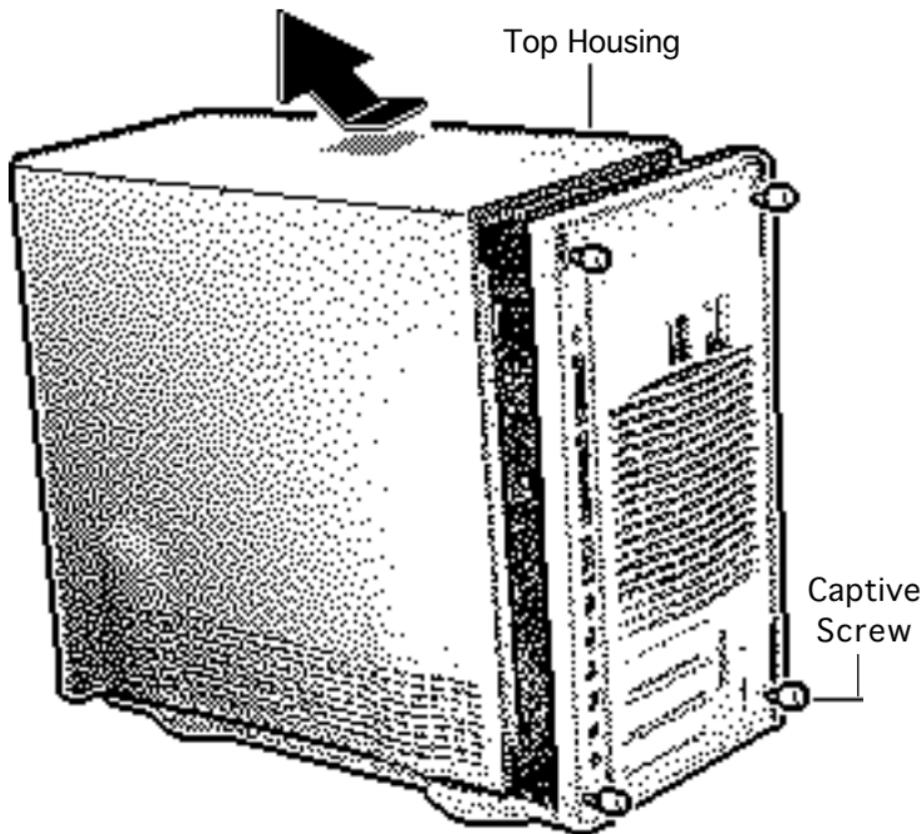
Top Housing

No preliminary steps are required before you begin this procedure.

1 Loosen the four captive screws on the rear panel.

2 **Caution:** Be careful that you don't deform the metal dome-shaped shield inside the top housing.

Slide the top housing forward about 1/2 inch and lift the top housing.

Top Housing

Captive Screw

Floppy Drive

Before you begin, remove the following:

- Top housing
- CD-ROM drive

Caution: To prevent ESD damage, wear a grounding wriststrap. Review the ESD precautions in Bulletins/Safety.
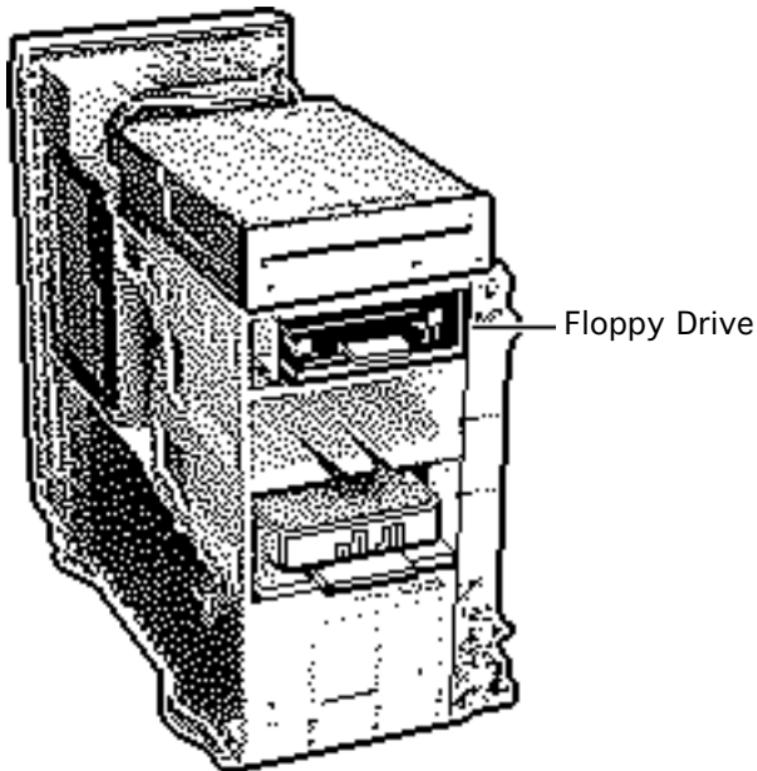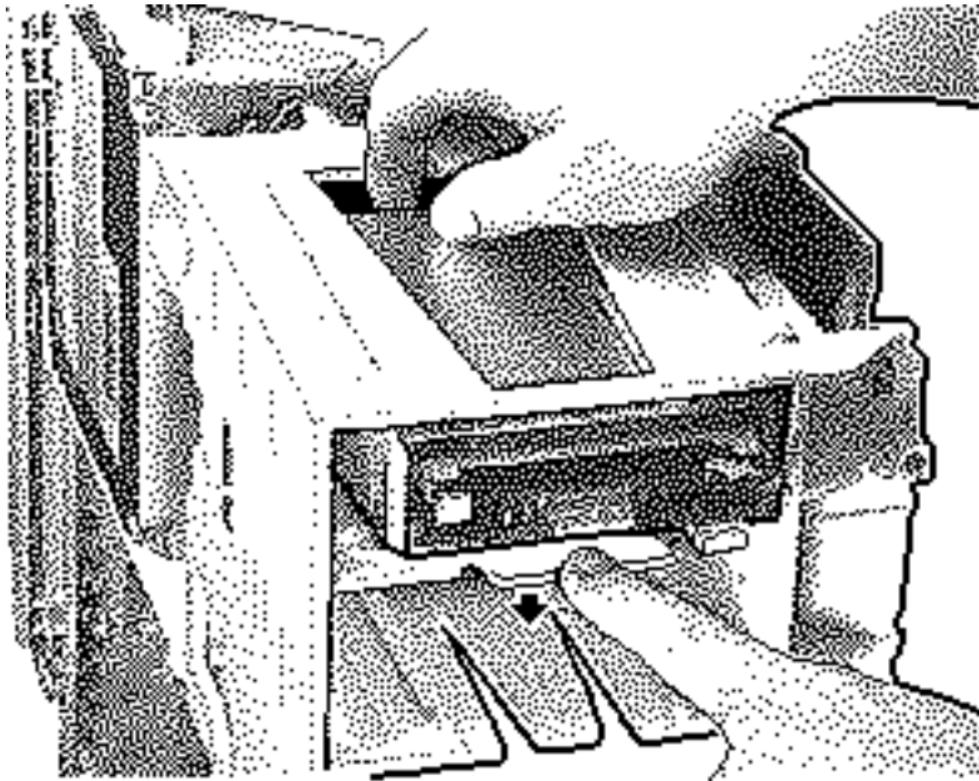
Floppy Drive

1 Press down the retaining clip securing the floppy drive and slide the floppy drive forward about 2 inches.

2 Disconnect the floppy drive cable from the floppy drive.

3 Remove the floppy drive from the chassis.

4 Remove the drive carrier from the drive.

Hard Drive

Before you begin, remove the top housing.

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

Hard Drive

Retaining Clip
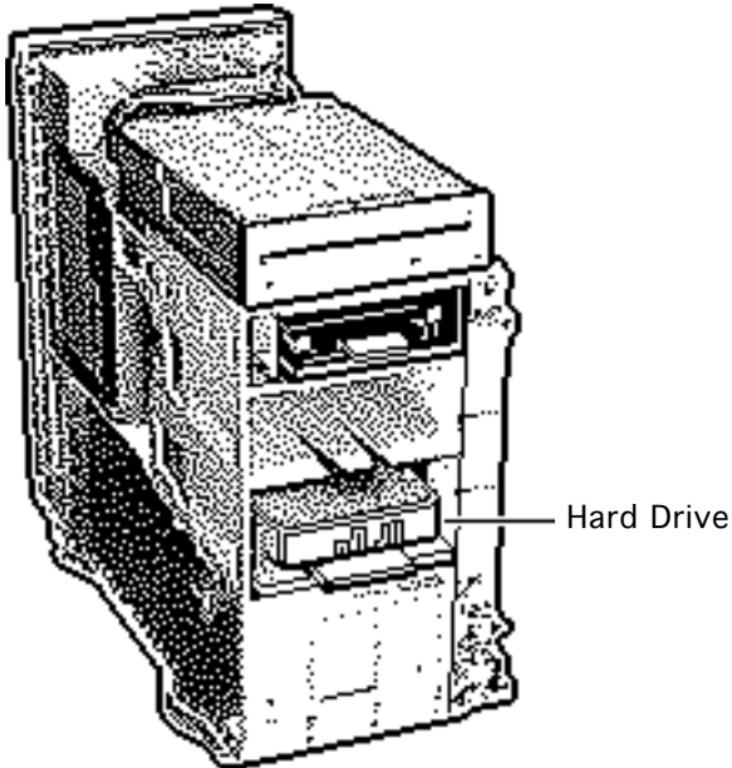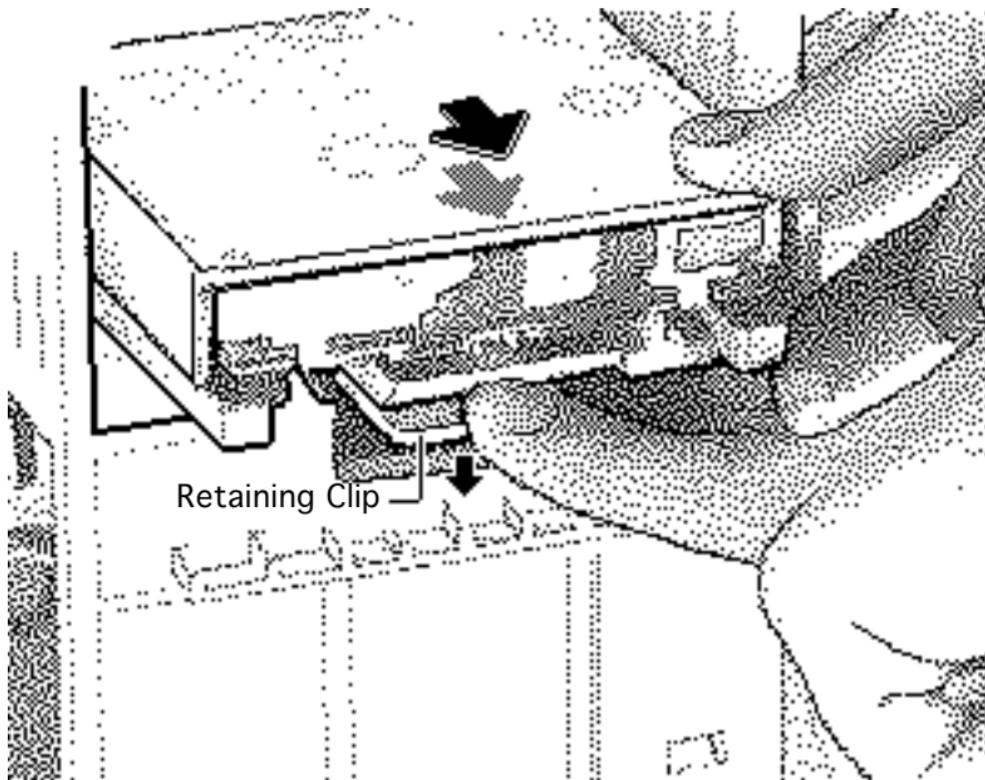
1   Disconnect the SCSI data
    cable and power cable
    from the back of the hard
    drive.

Note: There are two in-
ternal SCSI connectors on
the logic board (see "Logic
Board Connectors" in
Basics for an illustration).
In the standard
configuration, the SCSI
connector at the top of the
logic board is used for the
CD-ROM/Tape drives, and
the SCSI connector near the
bottom of the logic board
(beneath the DRAM and
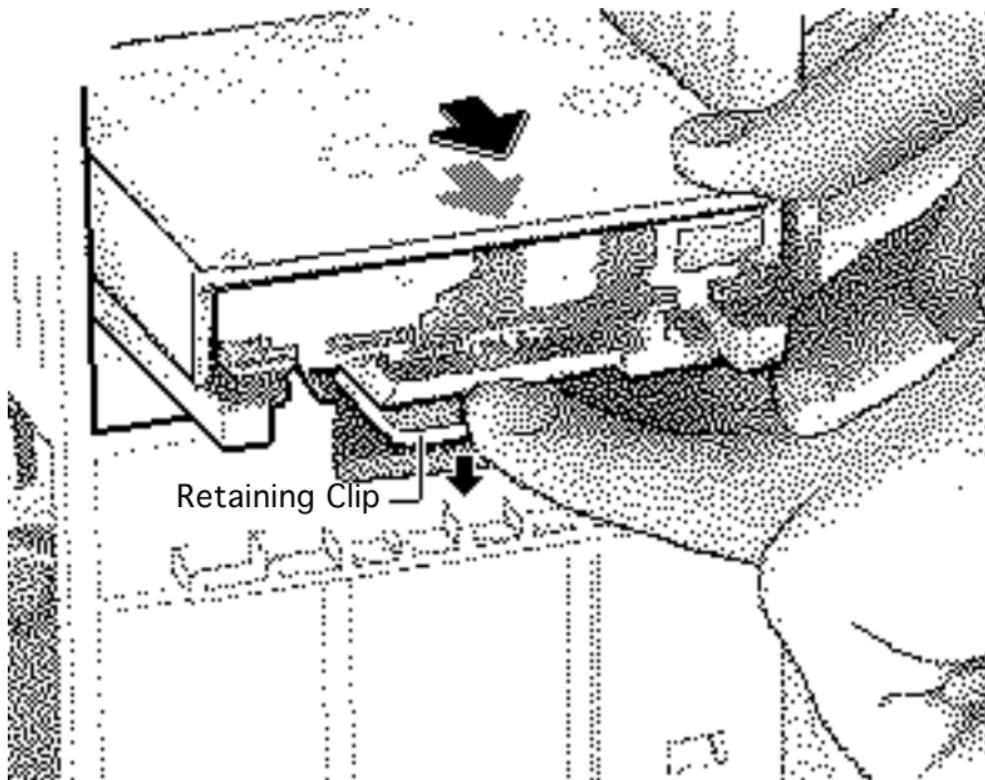
Retaining Clip

above the reset/interrupt switch) is used for the internal hard drive.

2 Press down the retaining clip securing the hard drive and slide the hard drive out.

Replacement Note: For information on removing the hard drive from its carrier and returning drives, cables, and carriers to Apple, refer to Additional Procedures in the Hard Drives manual.

CD-ROM Drive

CD-ROM Drive

Before you begin, remove the top housing.

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

Audio Cable

Retaining Clip
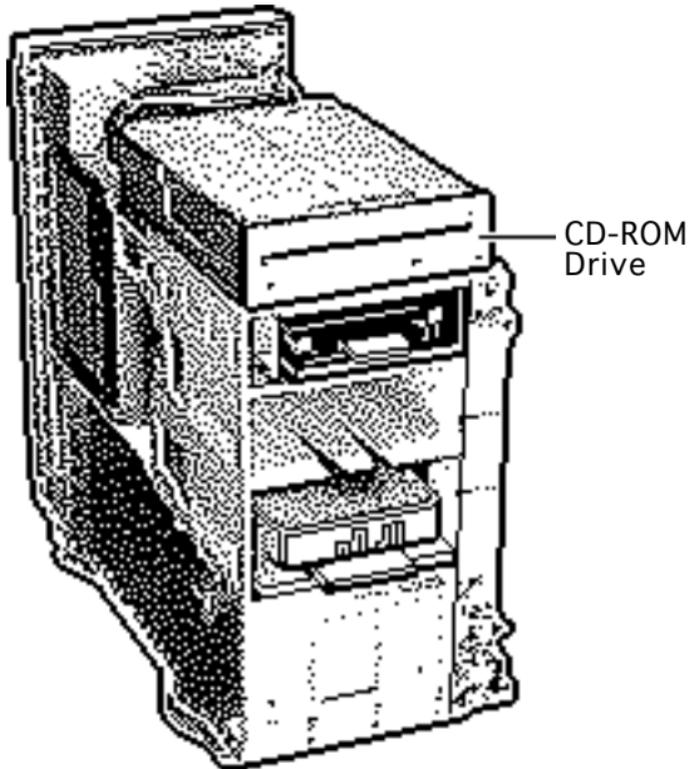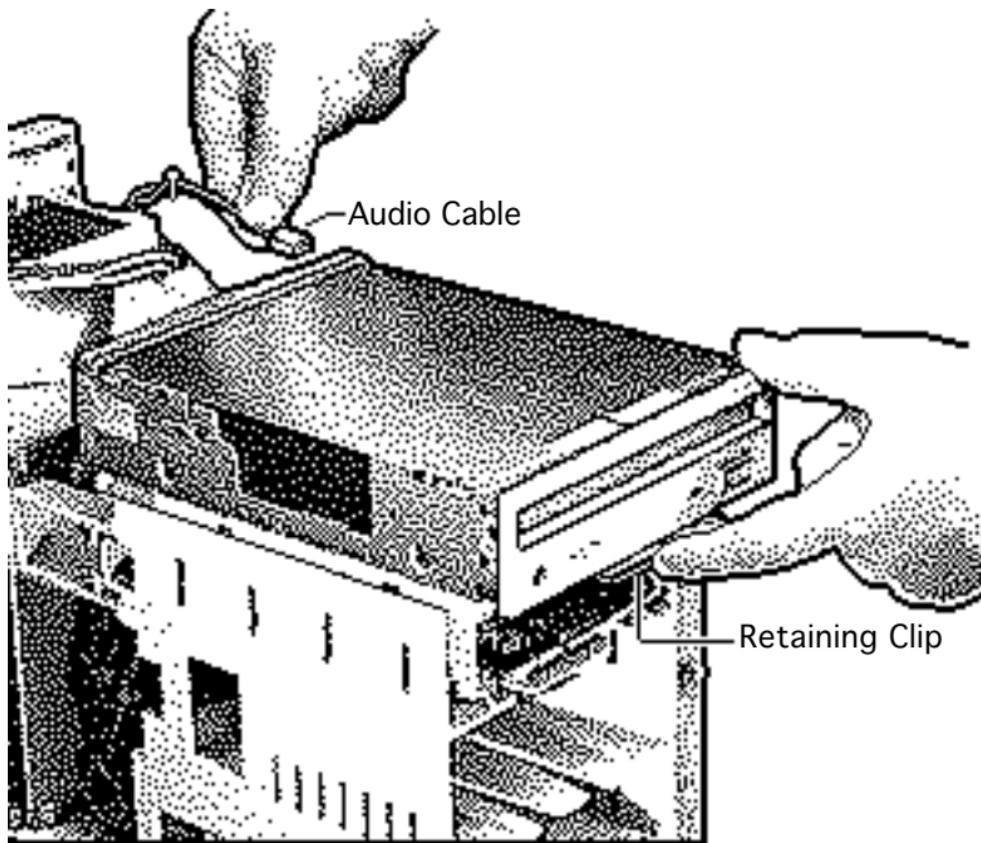
1 Disconnect the SCSI data cable, audio cable, and power cable from the back of the CD-ROM drive.

Note: There are two internal SCSI connectors on the logic board (see "Logic Board Connectors" in Basics for an illustration). In the standard configuration, the SCSI connector at the top of the logic board is used for the CD-ROM/Tape drives, and the SCSI connector near the bottom of the logic board (directly beneath the DRAM

Audio Cable
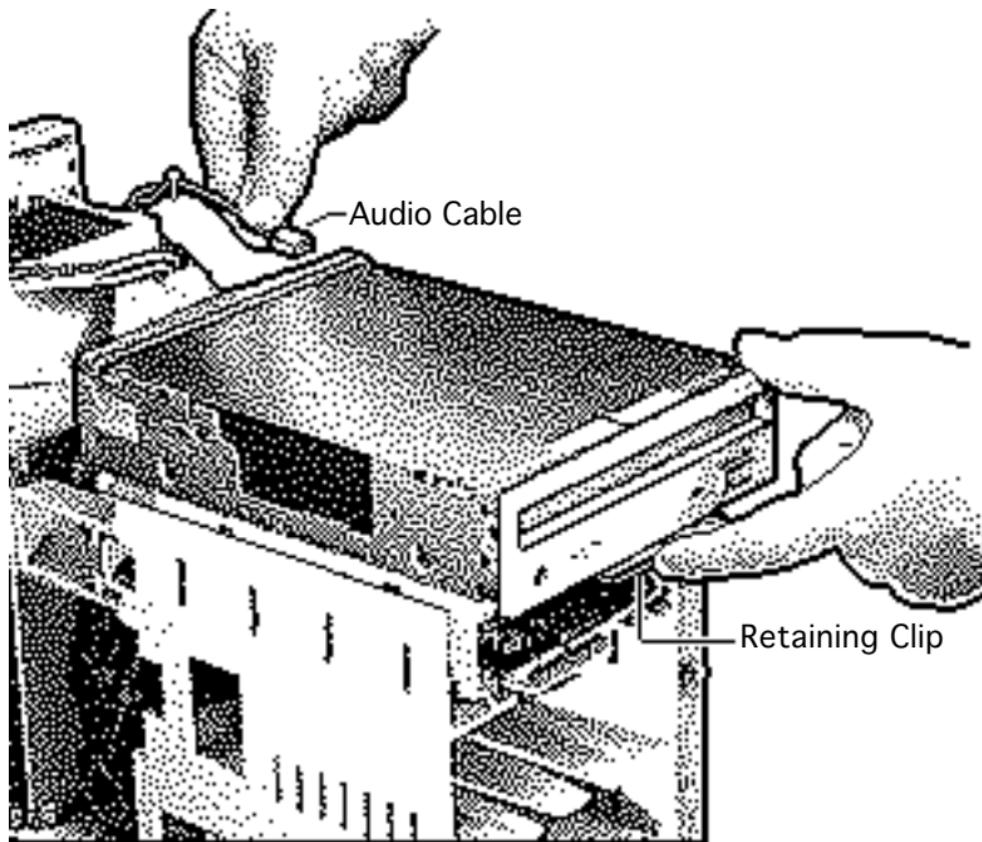
Retaining Clip

and above the reset/ interrupt switch) is used for the internal hard drive.

2 Pull up on the retaining clip securing the CD-ROM drive and slide the CD-ROM drive out.

Replacement Note: Be sure to remove the CD-ROM drive from the carrier prior to returning the drive to Apple.

Tape
Drive

Tape Drive

Before you begin, remove the top housing.

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

SCSI Data Cable

Tape Drive Power Cable
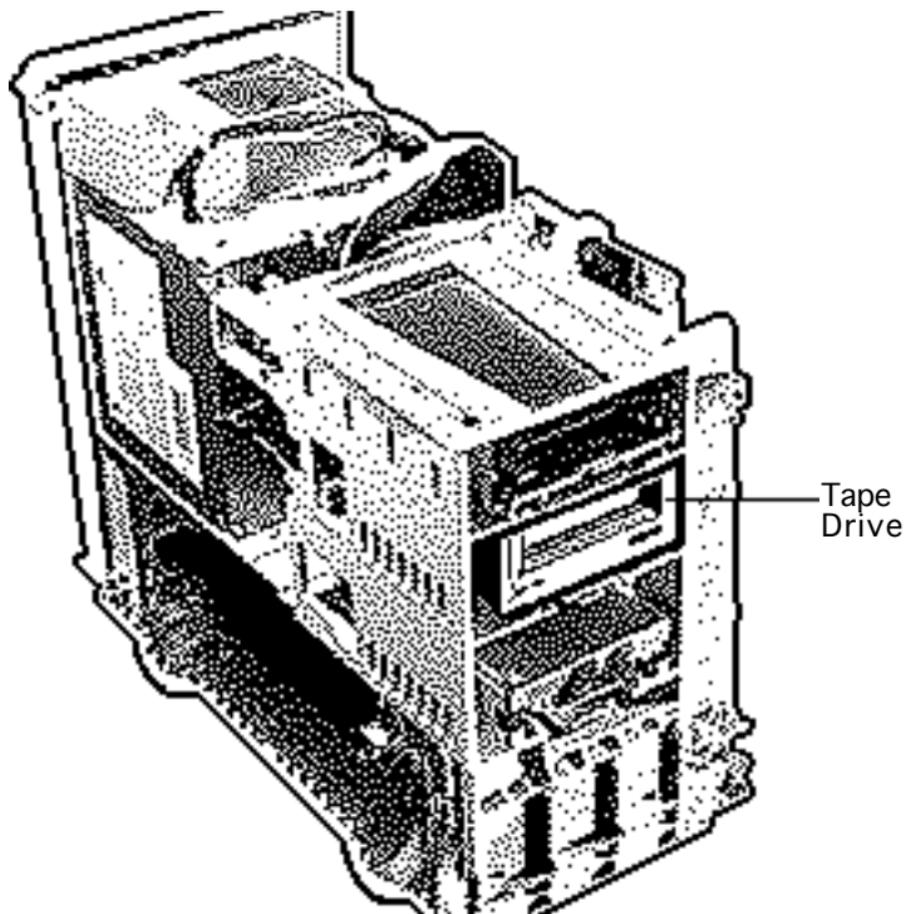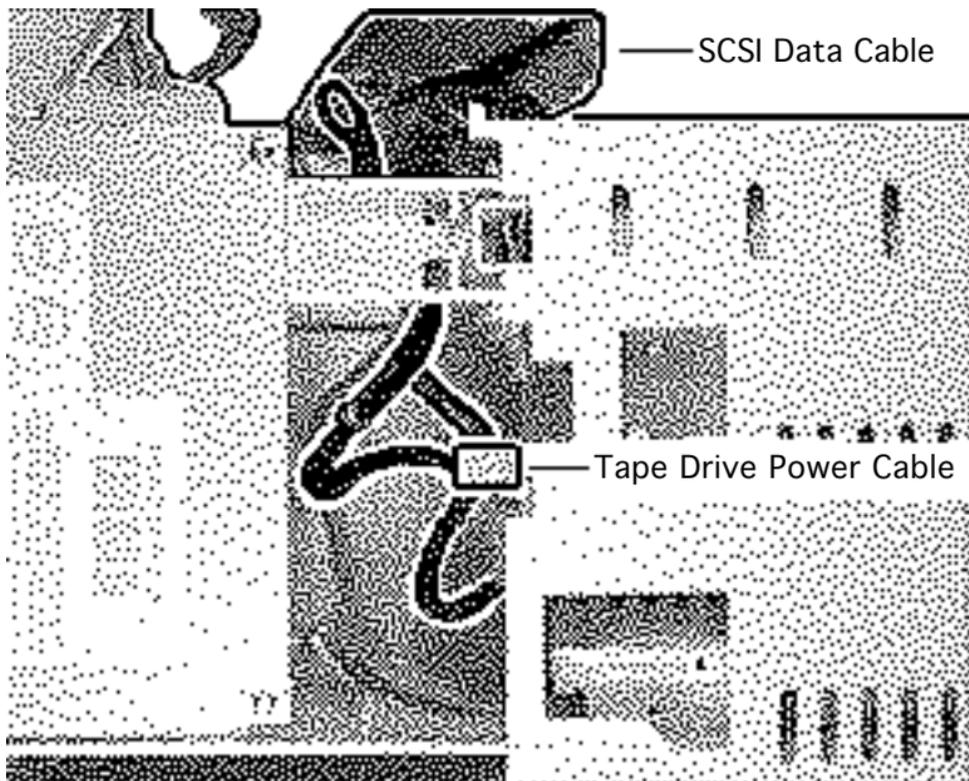
1 Disconnect the SCSI data cable and power cable from the back of the tape drive.

Note: There are two internal SCSI connectors on the logic board (see "Logic Board Connectors" in Basics for an illustration). In the standard configuration, the SCSI connector at the top of the logic board is used for the CD-ROM/Tape drives, and the SCSI connector near the bottom of the logic board (directly beneath the DRAM and above the reset/
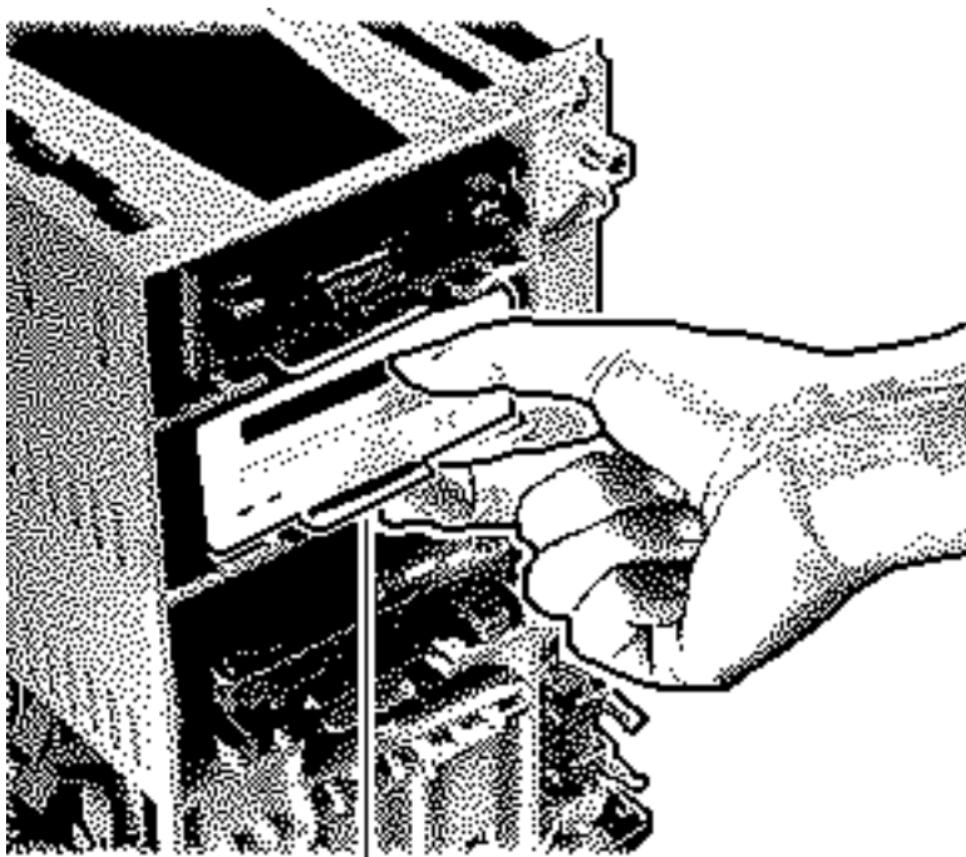
Tape Drive

interrupt switch) is used for the internal hard drive.

2 Press down the retaining clip securing the tape drive and slide the tape drive out.

Replacement Note: Be sure to remove the tape drive from the carrier prior to returning the drive to Apple.

Video Card —

Video Card

Before you begin, remove the top housing.

Caution: To prevent ESD damage, wear a grounding wriststrap. Review the ESD precautions in Bulletins/ Safety.
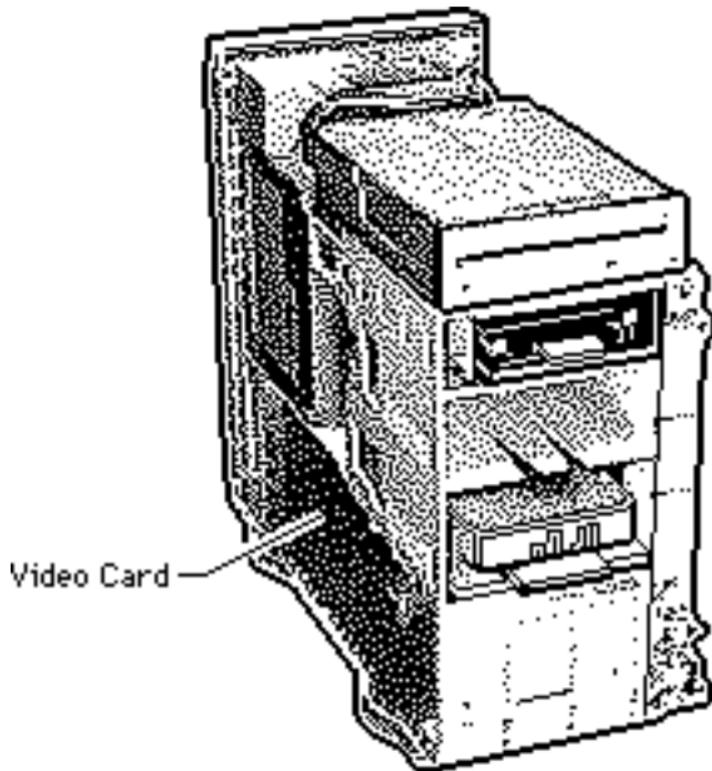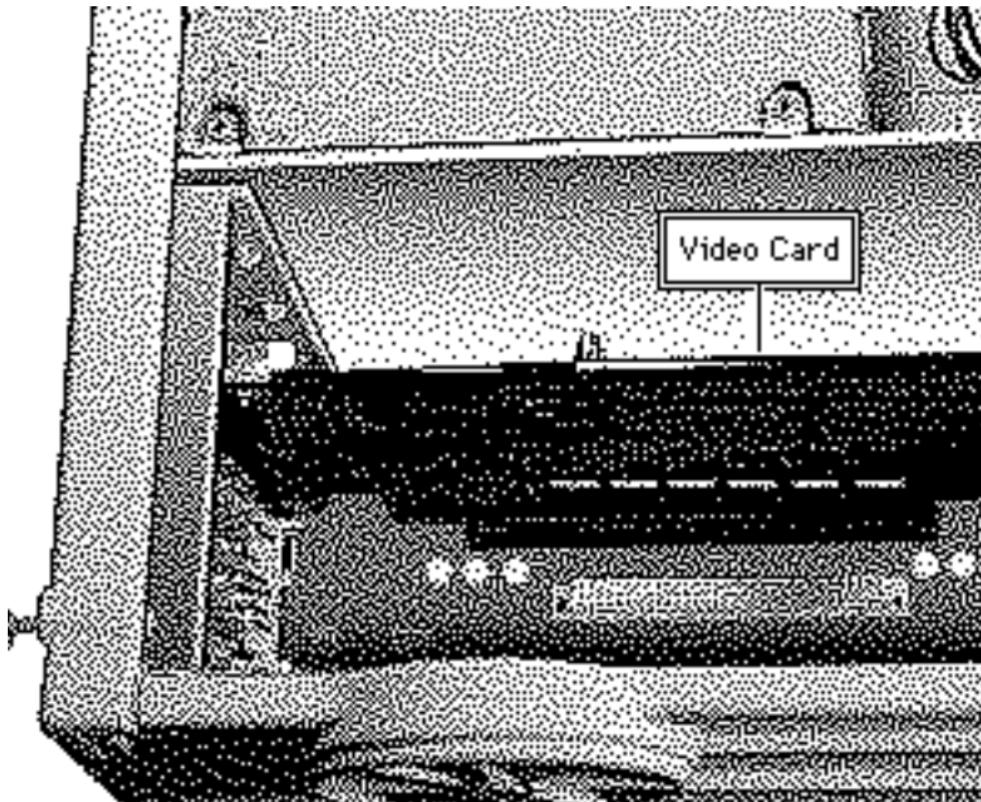
Video Card

**Note:** All Power Macintosh 8100 series computers require that a video card or PDS termination card be installed in the PDS slot. This procedure describes how to remove either of these cards.
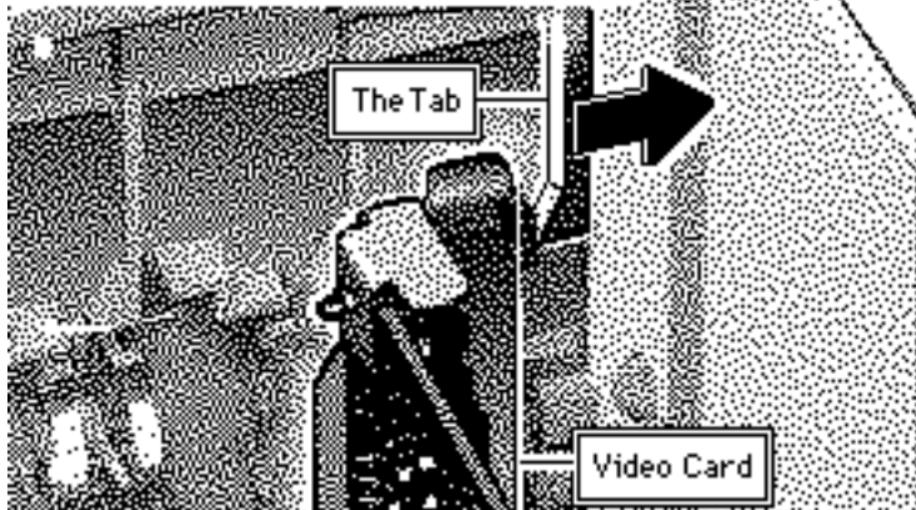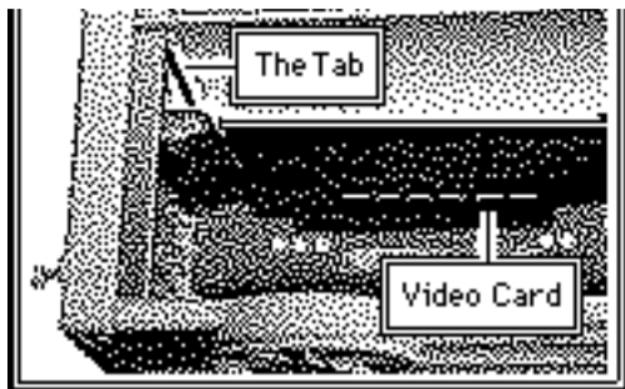
1 Push up on the tab that secures the video card to the chassis.
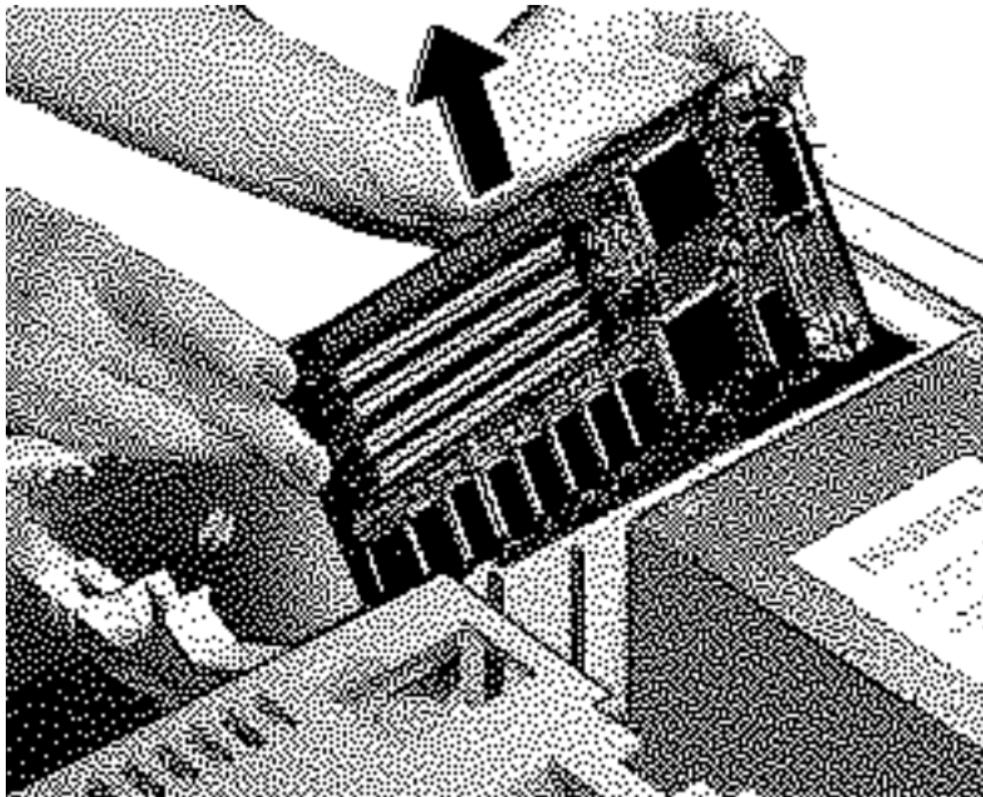
2 Gently pull out the video card to remove it.

Replacement Caution: When replacing the card, do not force it into the expansion slot. If the card does not seat properly, remove the card, check the logic board for damage, and try to install the card again.

Logic Board

Before you begin, remove the following:

- Top housing
- Video card
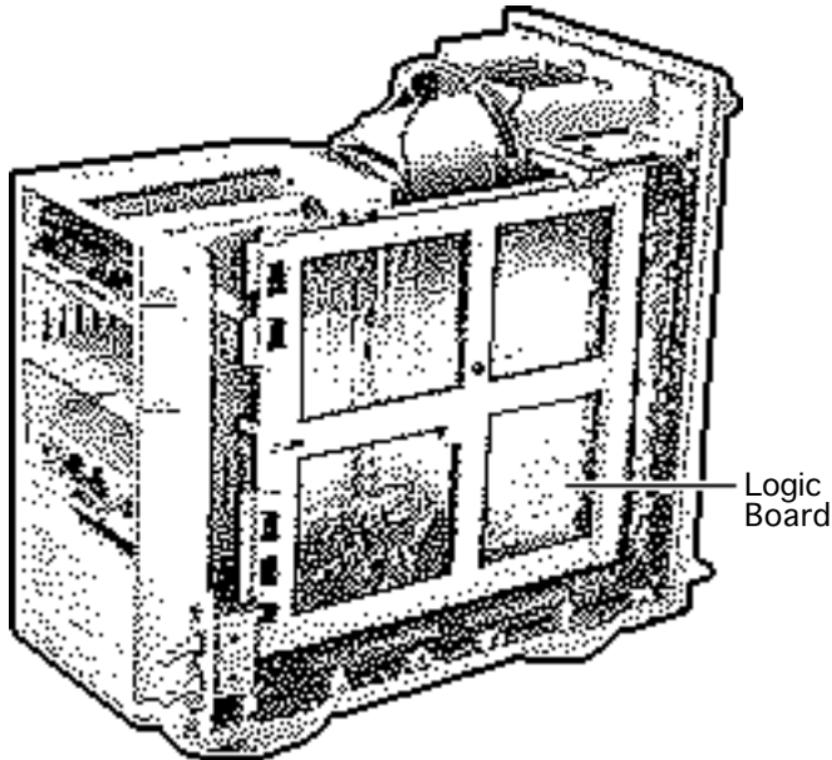
Logic Board

1   Disconnect the following
    cables from the top of
    the logic board:
    • Logic board power
      cable
    • Speaker cable
    • LED cable
    • CD-ROM/Tape Drive
      SCSI cable
    • Floppy drive cable
    • CD-ROM audio cable
      (if present)

2   Disconnect the SCSI
    hard drive cable from
    the logic board.

Replacement Note: There
are two internal SCSI
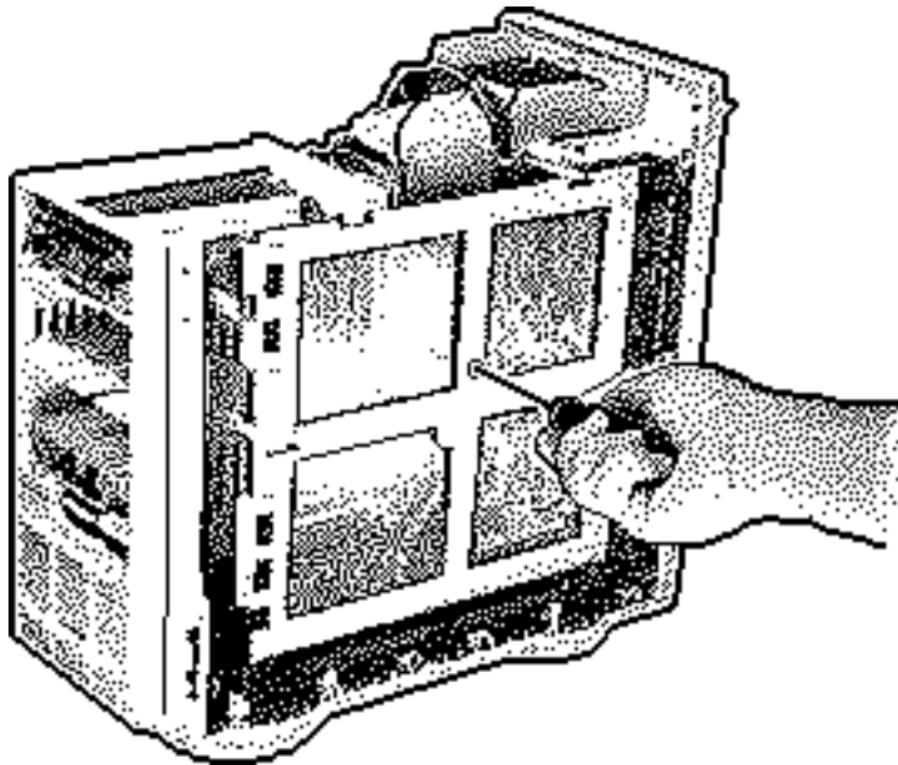
connectors on the logic board (see "Logic Board Connectors" in Basics for an illustration). In the standard configuration, the SCSI connector at the top of the logic board is used for the CD-ROM/Tape drives, and the SCSI connector near the bottom of the logic board (directly beneath the DRAM and above the reset/ interrupt switch) is used for the internal hard drive.

3 Remove the reset/ interrupt actuator.

4 Remove the screw

Slot

Latch
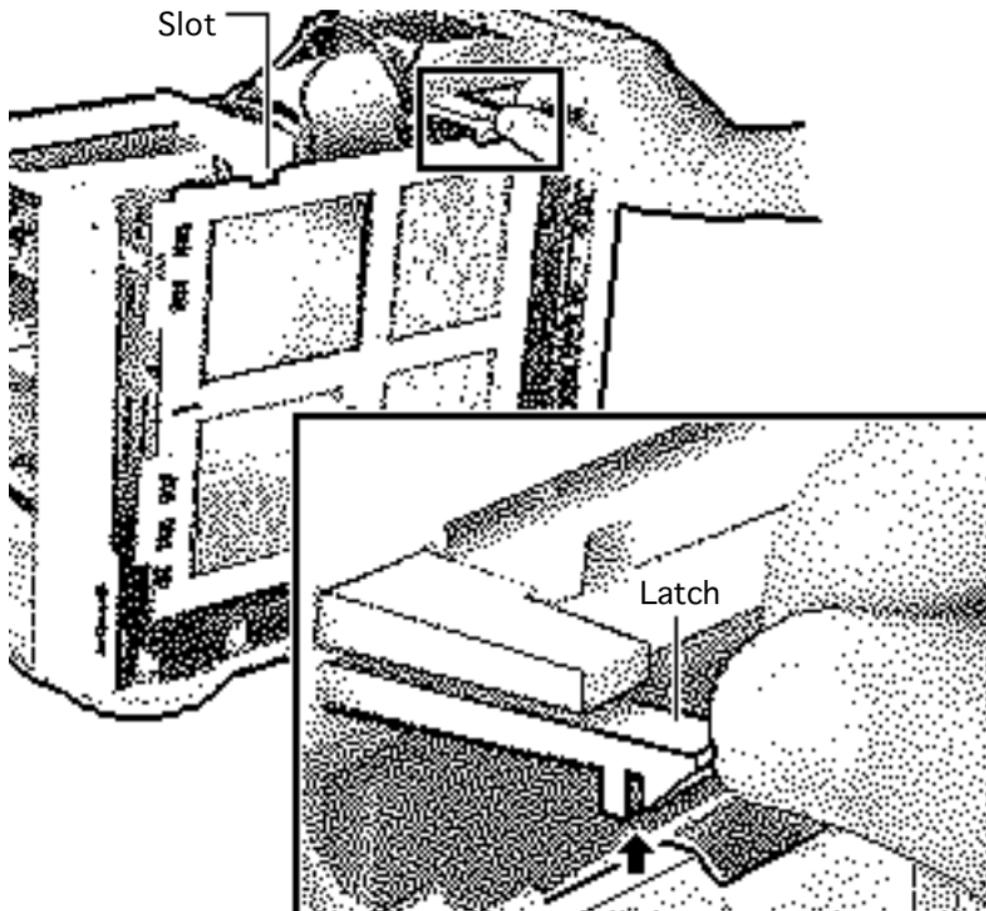
securing the logic board.

Replacement Note:
When replacing a Power Mac 8100 series logic board, move the thermo-electric cooling device wires out of the way of the center hole before screwing down the logic board. (See "Logic Board Connectors" in Basics for a description of the thermoelectric cooling device.)

5 Slide the logic board forward until the slot lines up with the tab.

6 Lift the latch at the rear
   of the logic board and
   release the logic board.
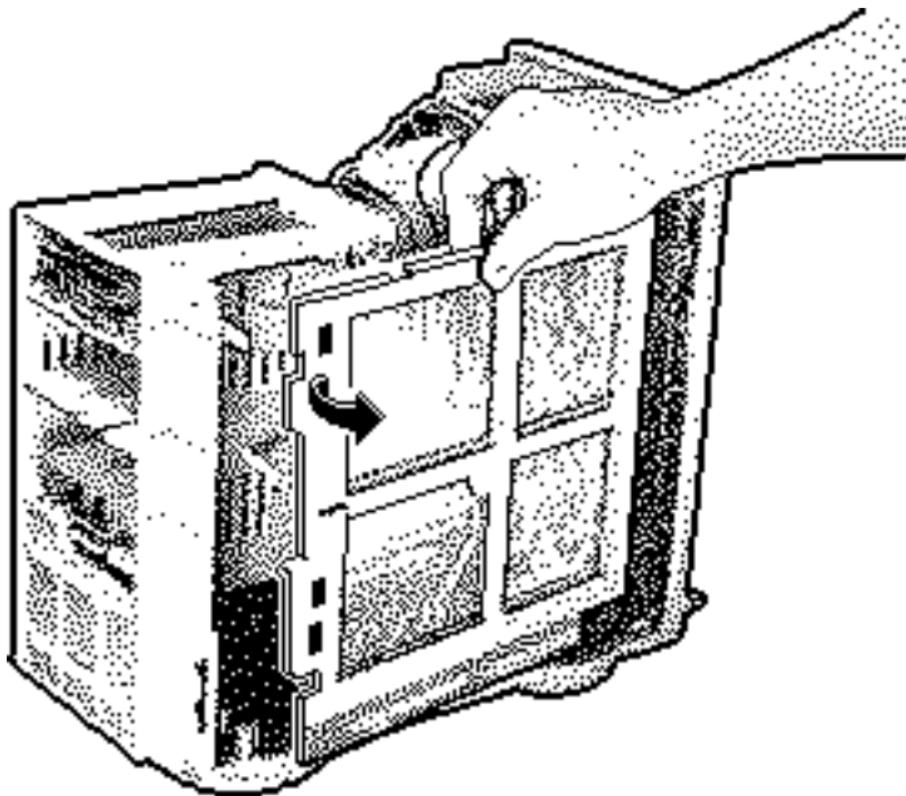
7 Pivot the front of the logic board out of the chassis.

Note: Remove the 256K cache SIMM and RAM SIMMs before returning the board to Apple, but do **not** remove the ROM SIMM. Refer to the parts database to identify the cache SIMM.

Note: Grasp the cache SIMM by its corners and pull up to remove it.

Replacement Note: Be sure to reconnect the LED cable to the logic board.

Power Supply

Power Supply

Before you begin, remove the top housing.

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

Chassis Support Brace
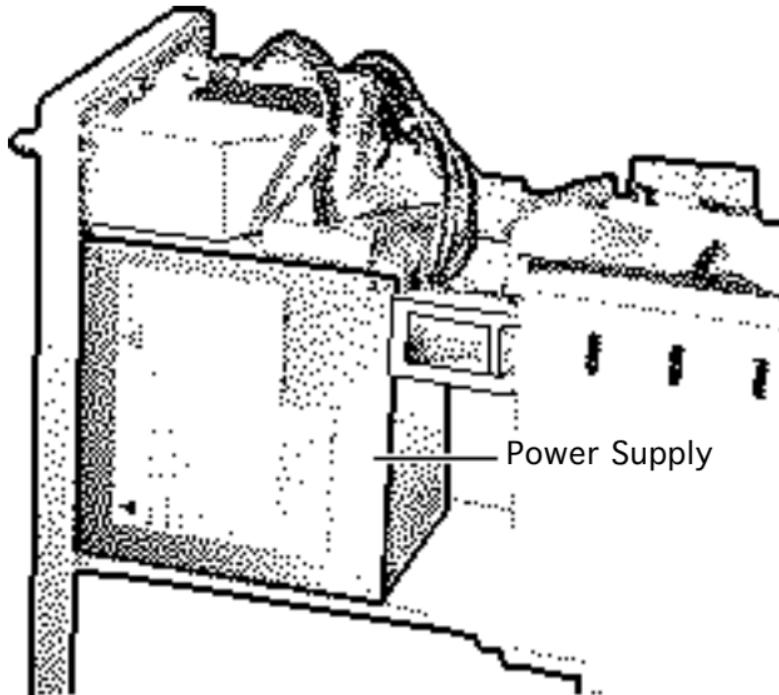
1 Remove the chassis support brace.
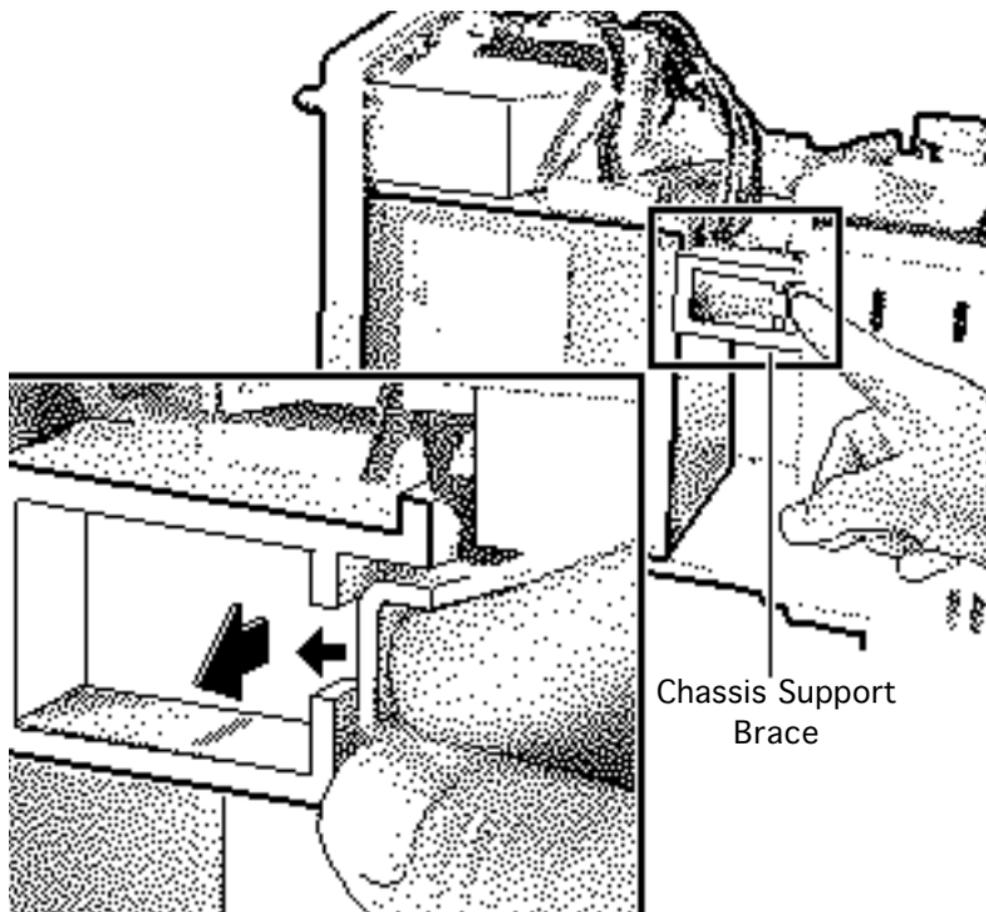
2 Disconnect the logic
   board power cable.

Logic Board
PowerCable
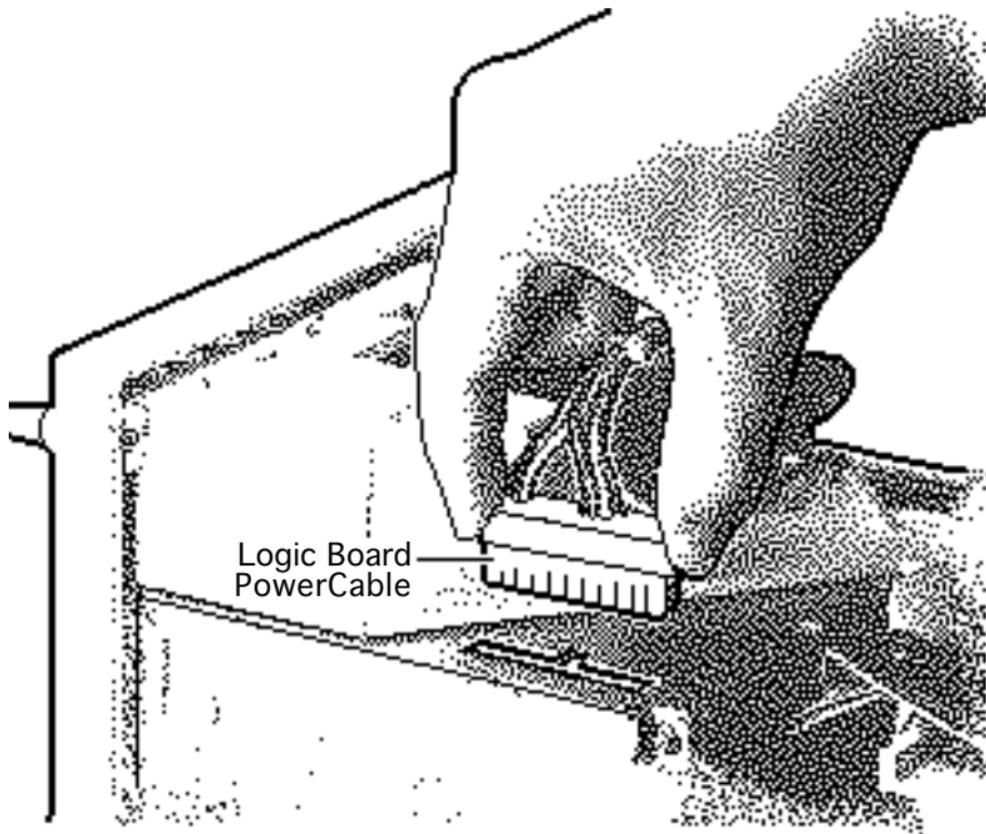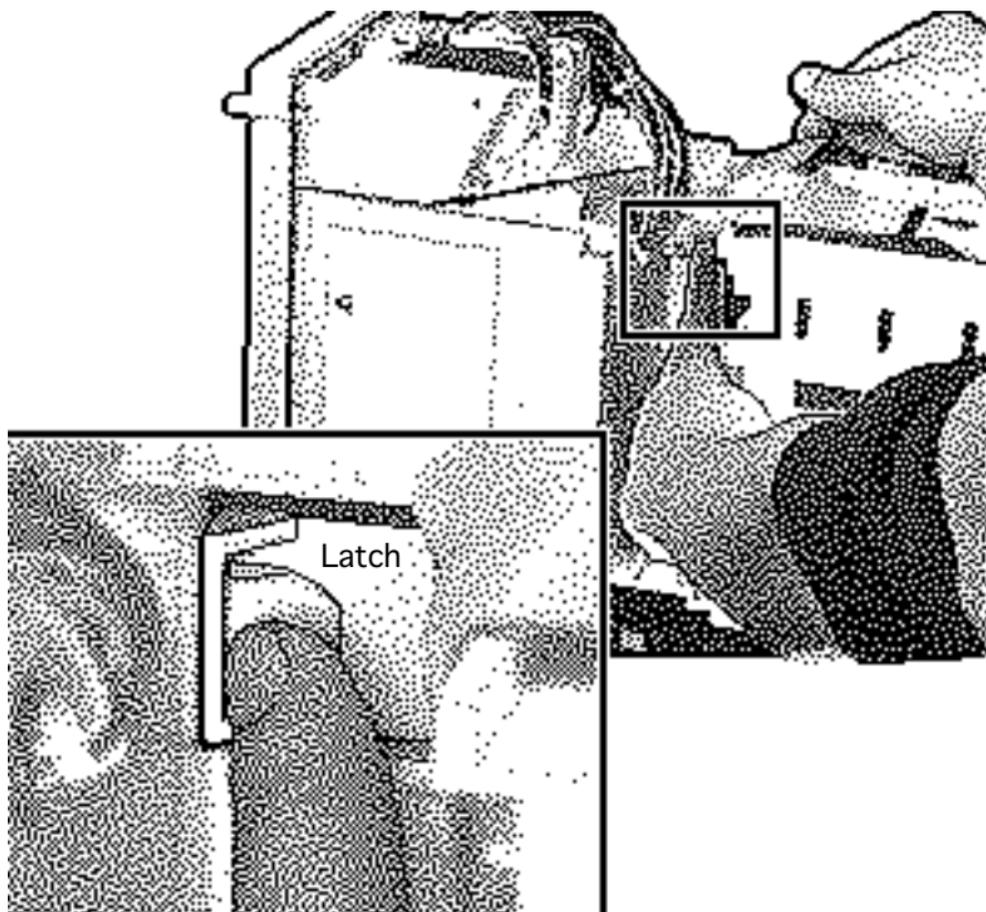
Latch

3 Press the latch to release the power supply.
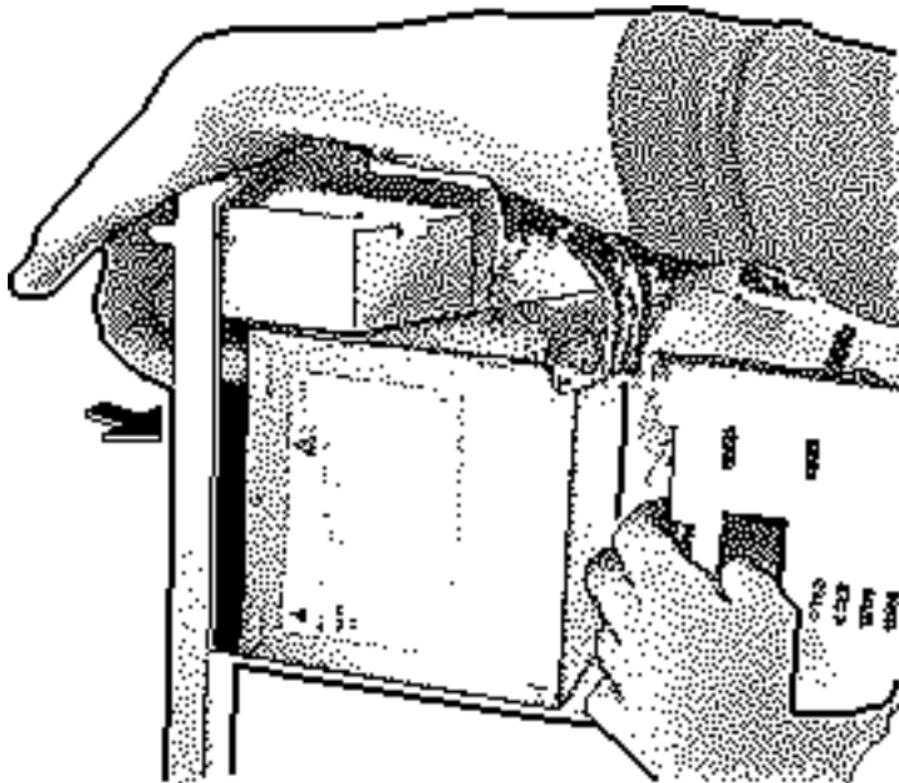
4 Slide the power supply forward.

5 Pull the power supply out of the computer.

Speaker

Speaker

Before you begin, remove the top housing.

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

1   Disconnect the speaker cable from the logic board.
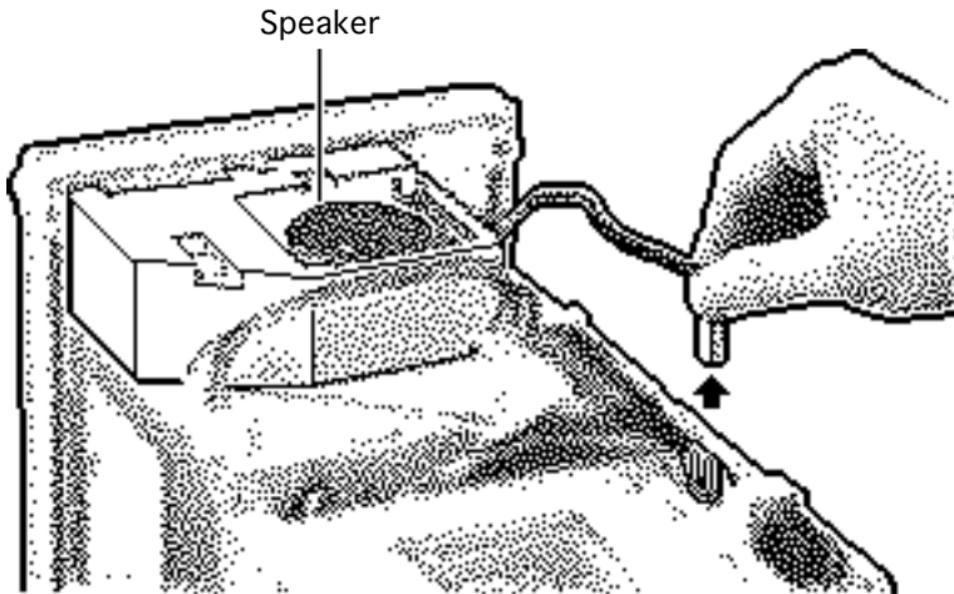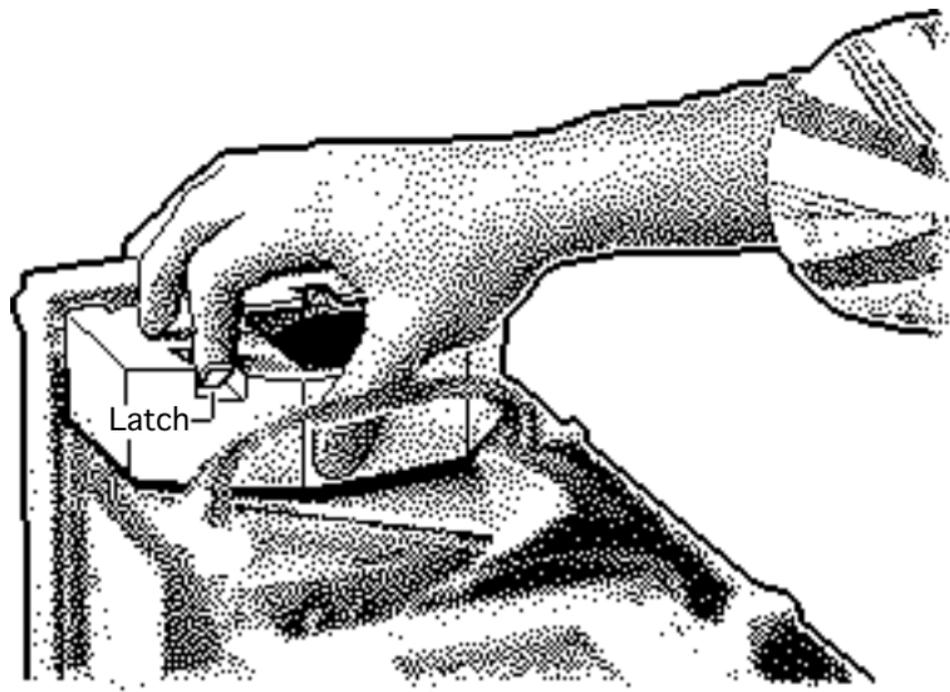
Latch

2 Press the latch holding the speaker housing to the chassis and lift the front of the speaker housing.

3 Pull the speaker housing from the clips at the rear of the chassis.

Rear Panel

Before you begin, remove the following:
- Top housing
- Speaker
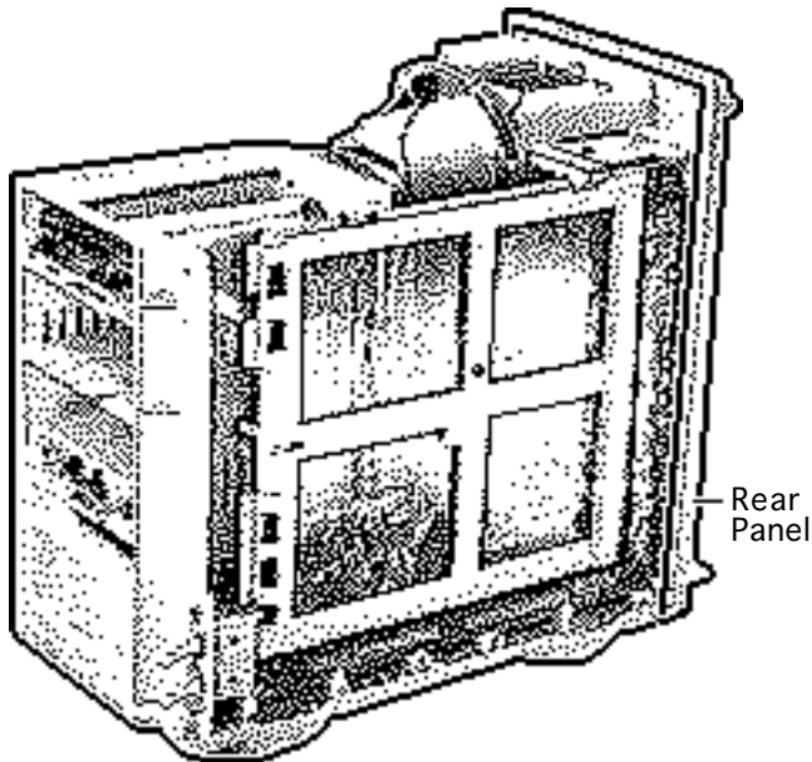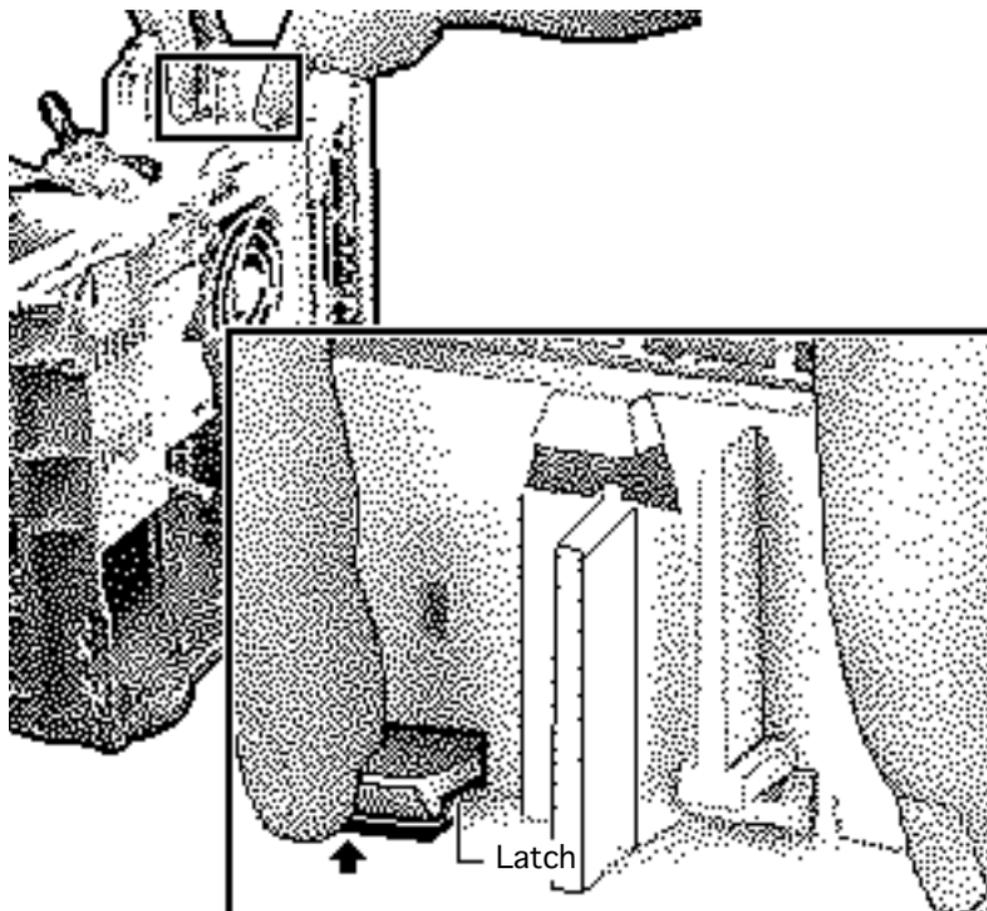
Rear Panel

Latch

1 Lift the two latches and pull the rear panel loose.

2 Remove the rear panel from the computer.
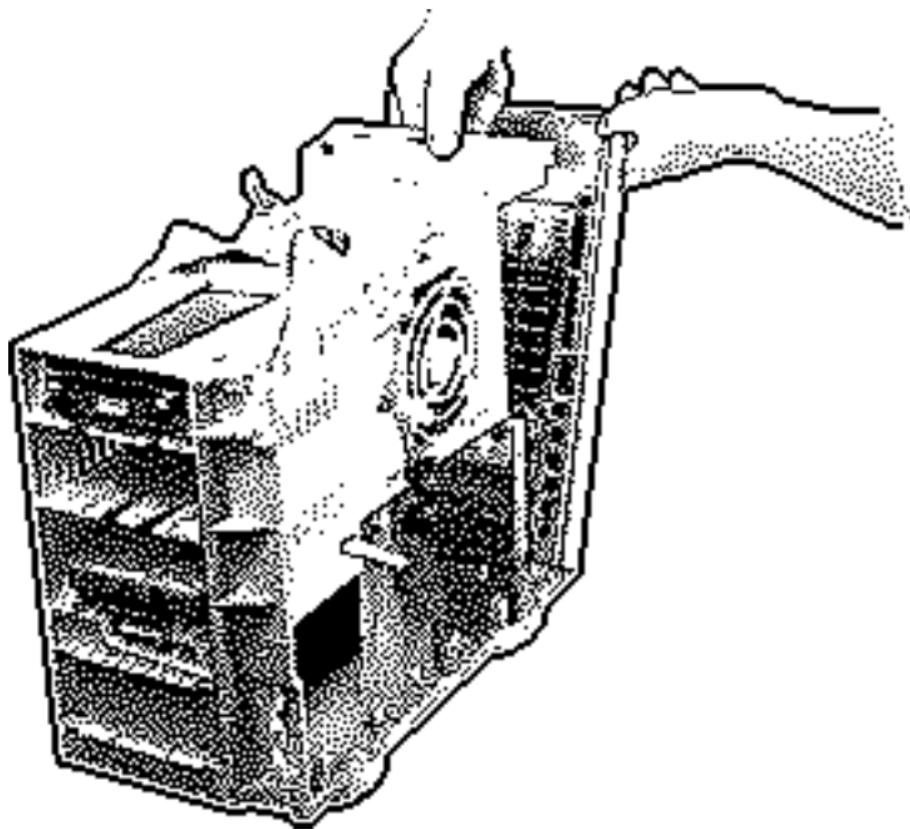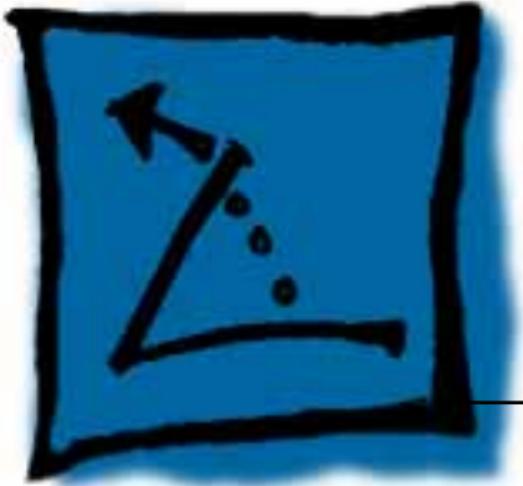
Additional Procedures

## Power Macintosh 8100/WS 8150

Battery

Battery Verification

Before you begin, remove the following:

- Top housing
- Logic board

Warning: If handled or discarded improperly, the lithium battery could explode. Review battery-handling and disposal instructions in Bulletins/ Safety.
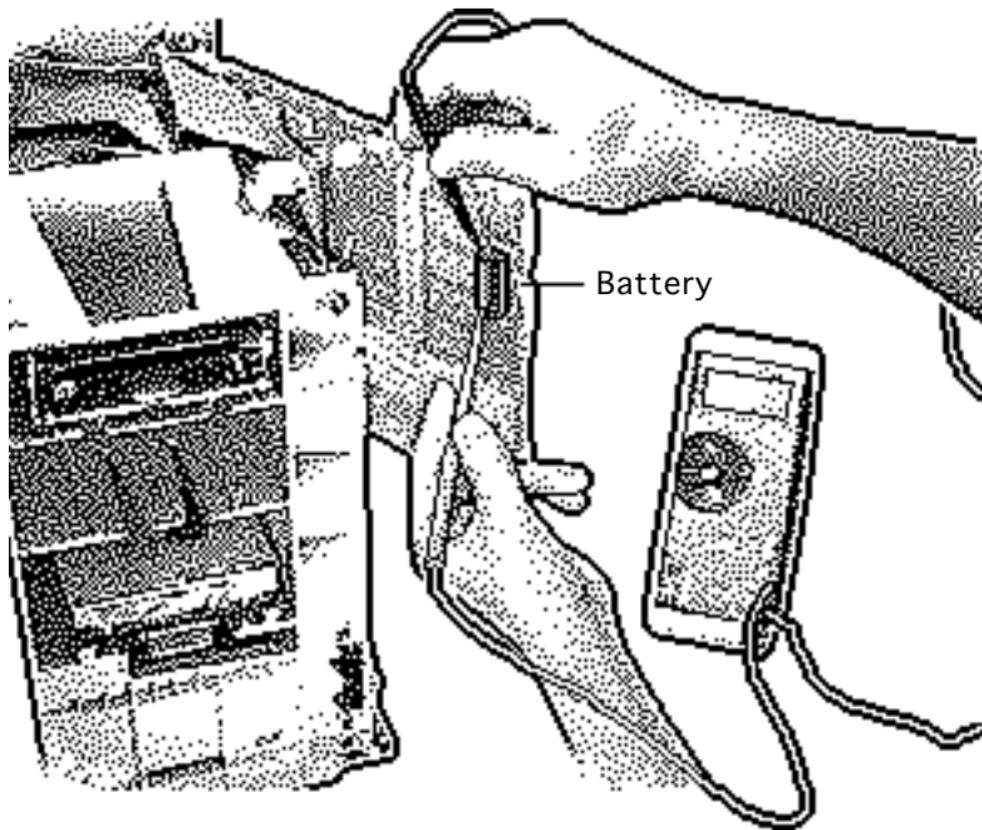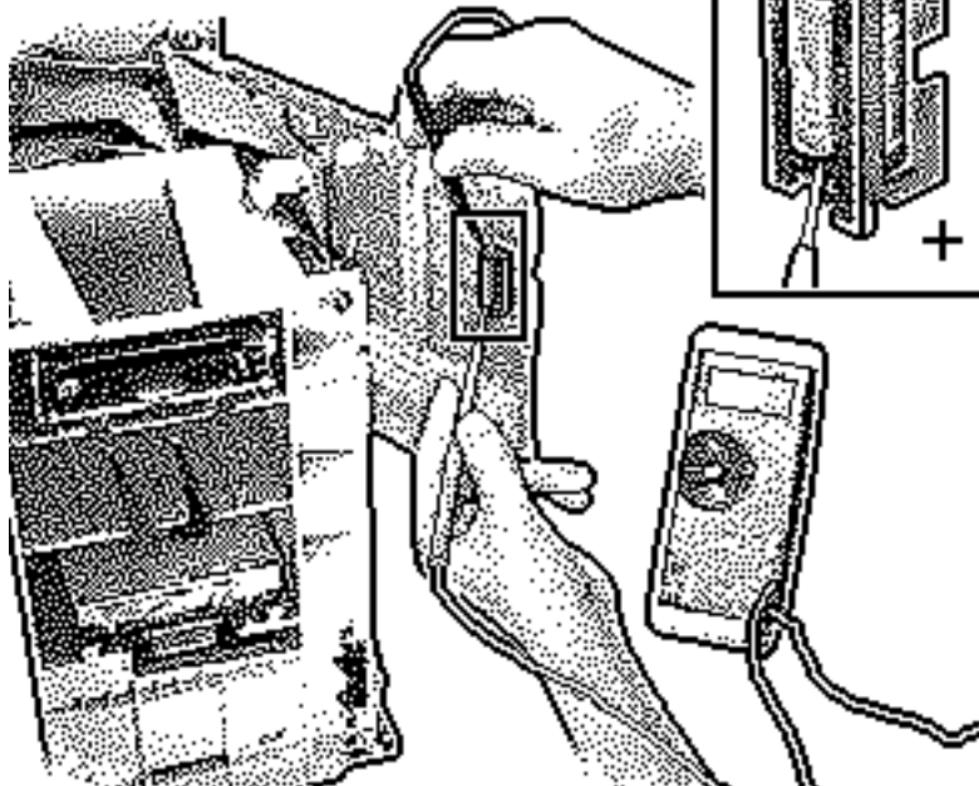
1 Set the voltmeter to 10 volts DC scale.

2 Hold the positive probe of the voltmeter to the positive end of the battery ("+" on the logic board) and the negative probe to the battery's negative end.

3 If the battery voltage is below 3.2 volts, replace the battery. Refer to "Battery Replacement."

Note: Make sure the battery is installed in the correct +/- direction.

Battery

Battery Replacement

Before you begin, remove the following:
- Top housing
- Logic board

Warning: If handled or discarded improperly, the lithium battery could explode. Review battery-handling and disposal instructions in Bulletins/Safety.
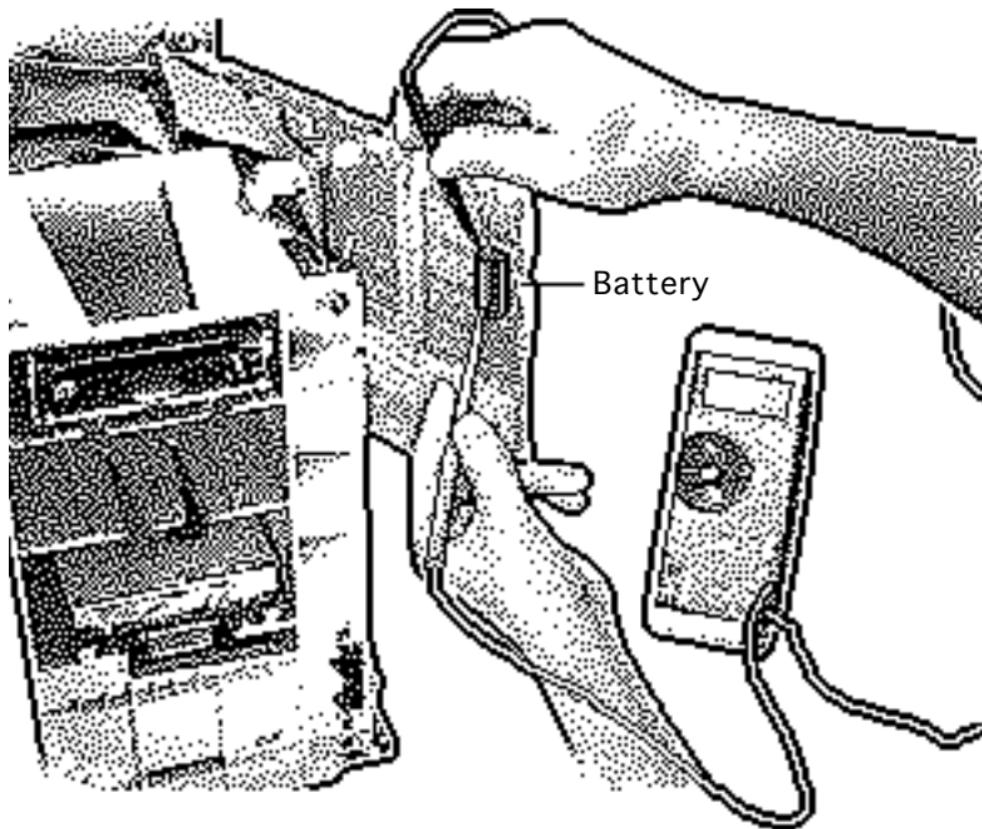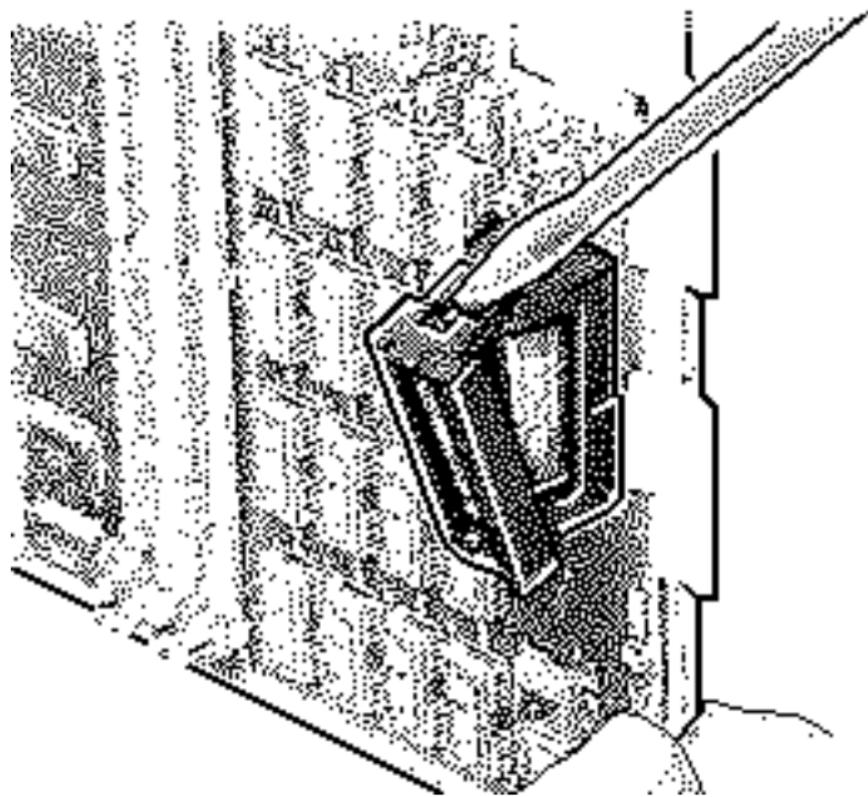
1 Using a small flat-blade screwdriver, pry open the latch at the end of the battery holder and lift off the cover.
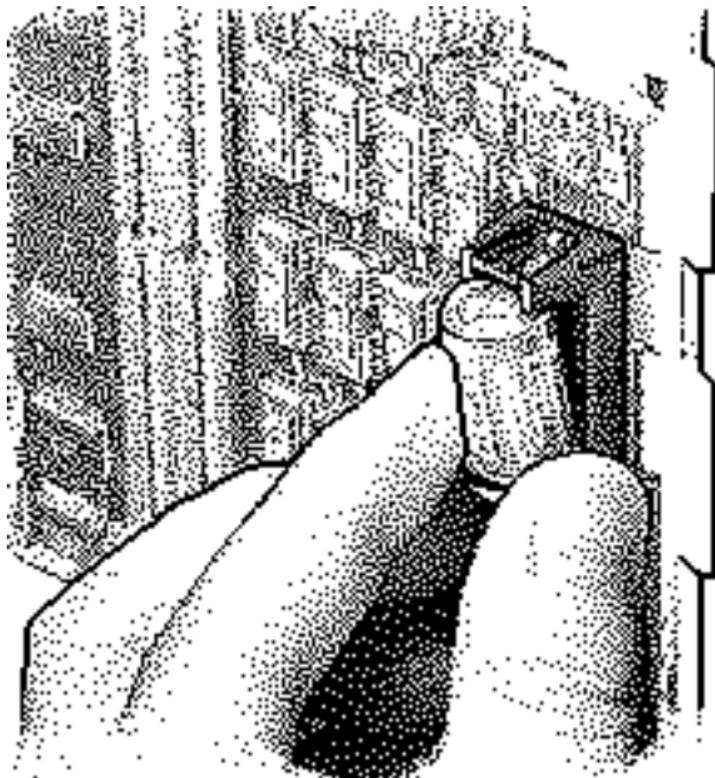
2 Grasp the battery and remove it from the holder.

3 Return the battery to Apple for proper disposal. For battery packaging and labeling instructions, refer to the safety information in Bulletins/Safety.

   Note: Make sure the battery is installed in the correct +/- direction.

Reset Logic Board

Before you begin, remove the following:

- Top housing
- Power cord
- Logic board

Note: Whenever you have a unit that fails to power up, you should follow this procedure to reset the logic board **before** replacing any modules.
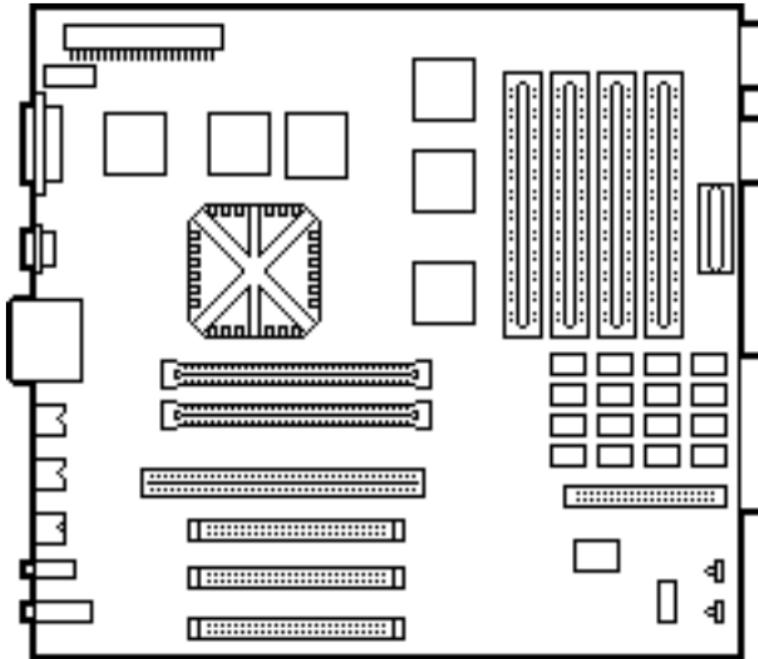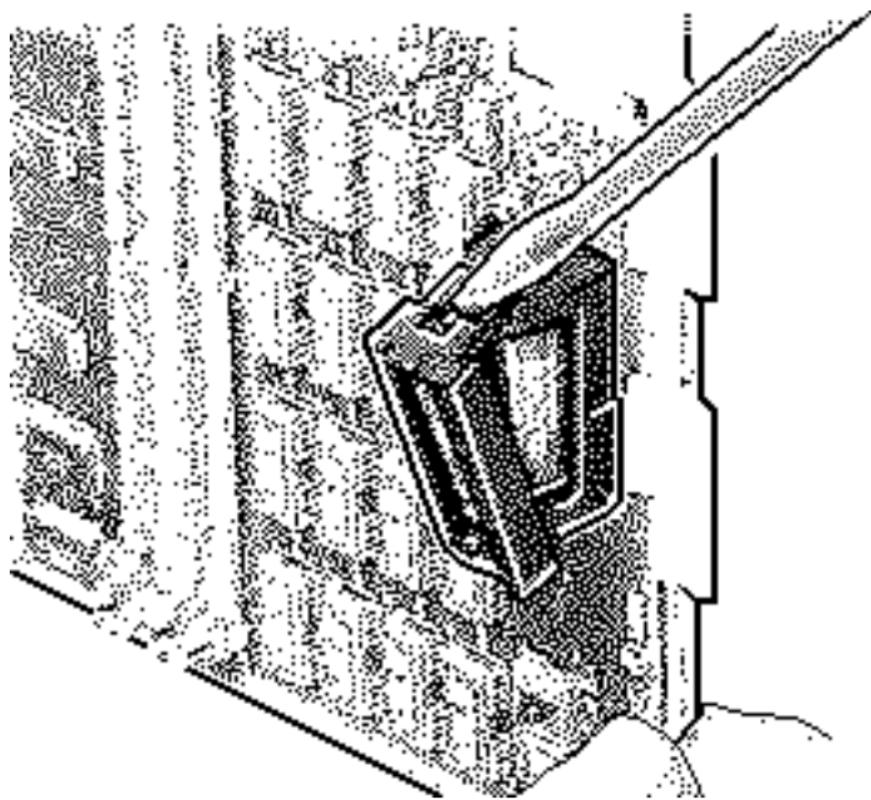
Warning: If handled or discarded improperly, the lithium battery could explode. Review battery-handling and disposal instructions in Bulletins/Safety.

1   Unplug the computer first.

2   Using a small flat-blade screwdriver, pry open the latch at the end of the battery holder and lift off the cover.

3 Grasp the battery and remove it from the holder.

Power-on
Button

Power Supply
Connector
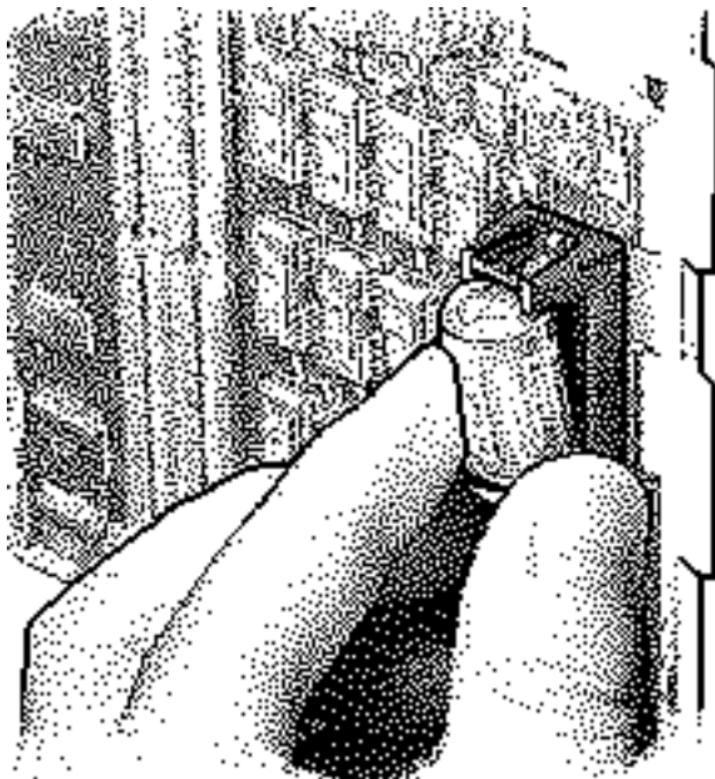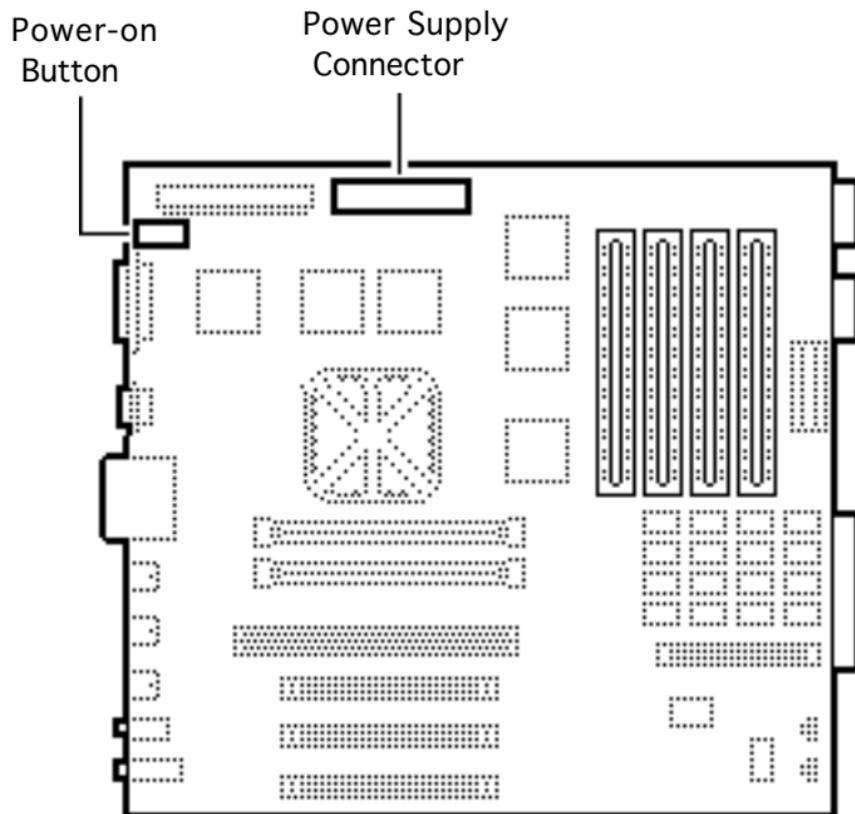
4 Press the computer's power-on button. Verify that the power supply cable is disconnected from the logic board. Wait 5–10 minutes and then:

 • Replace battery
 • Reassemble computer

**Note**: Make sure the battery in installed in the correct +/- direction.

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

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

Upgrades

Power Macintosh 8100/WS 8150

NuBus Card Retainer

Expansion Cards

Before you begin, remove the top housing.

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

1   Pinch the two handles and remove the NuBus card retainer.
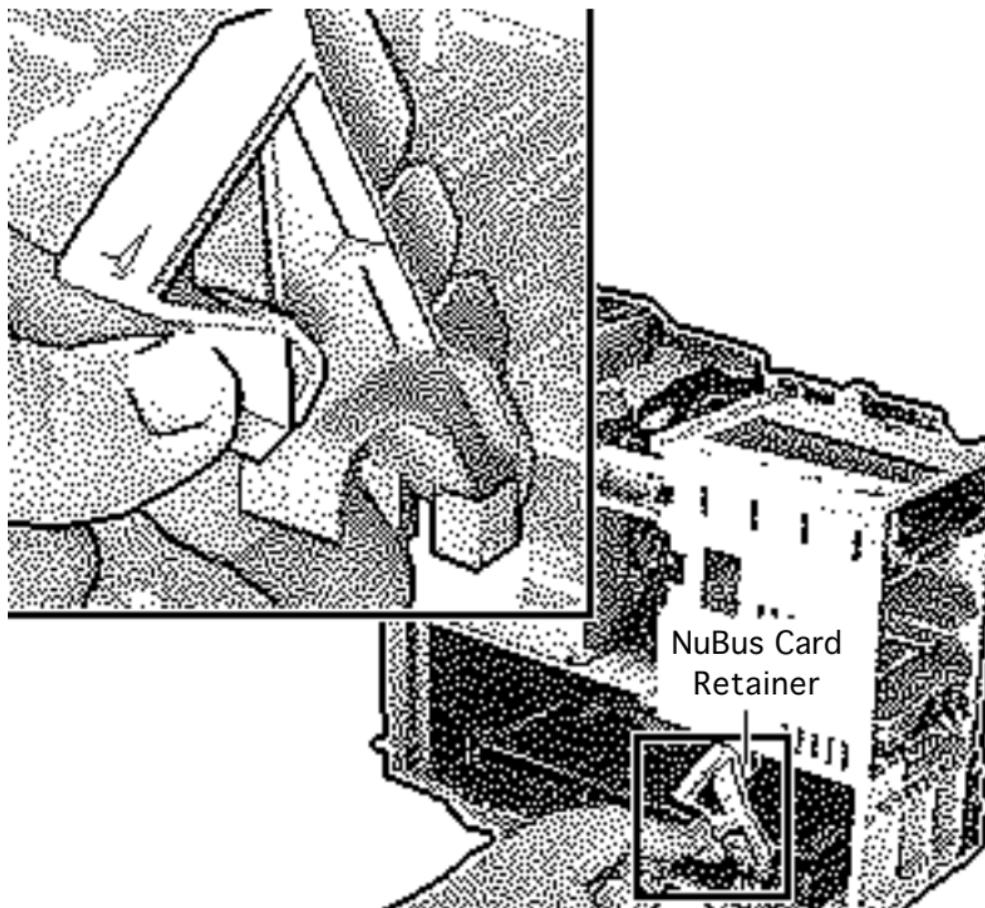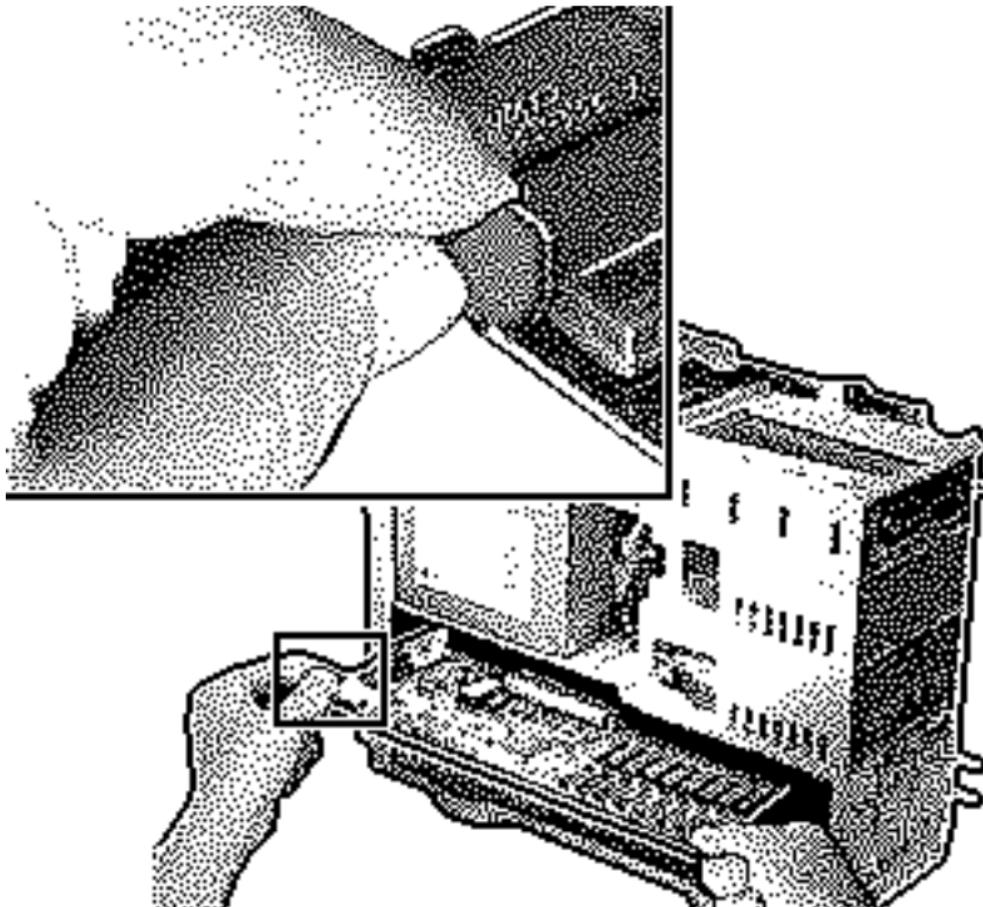
2 **Caution**: Pull up evenly on both sides of the card to avoid bending the connector pins.

Carefully grasp each end of the card and pull straight out to remove it.

Note: Grab the left side of the card by the metal bracket.

Replacement Caution: Do not force the card into the expansion slot. If the card does not seat properly, remove it and try again.

◀■▶

Upper Blank Bezel
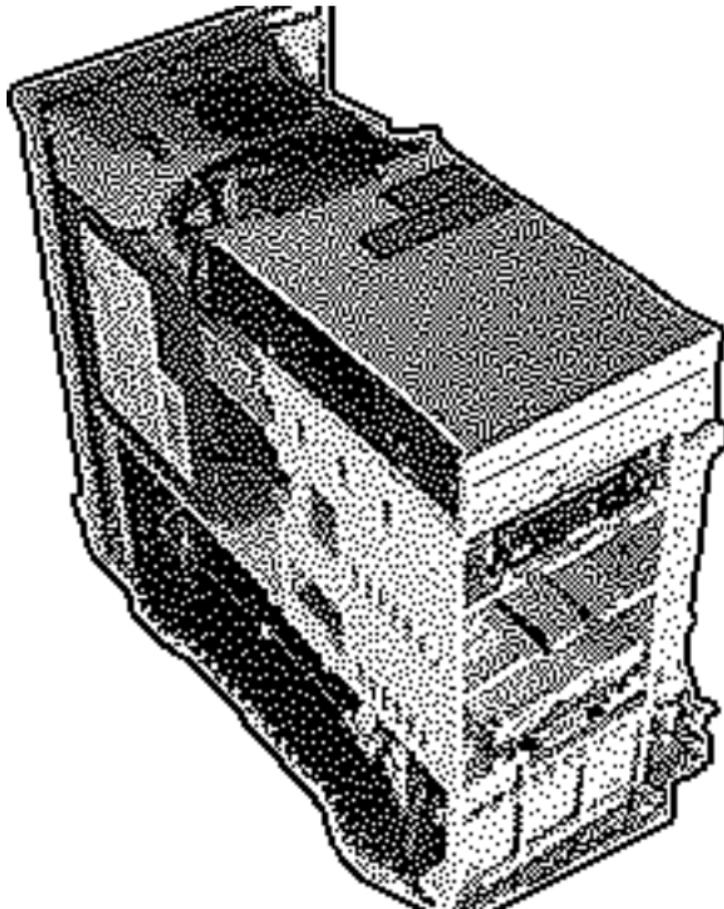
CD-ROM Upgrade

Before you begin, remove the top housing.

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

Upper Blank Bezel
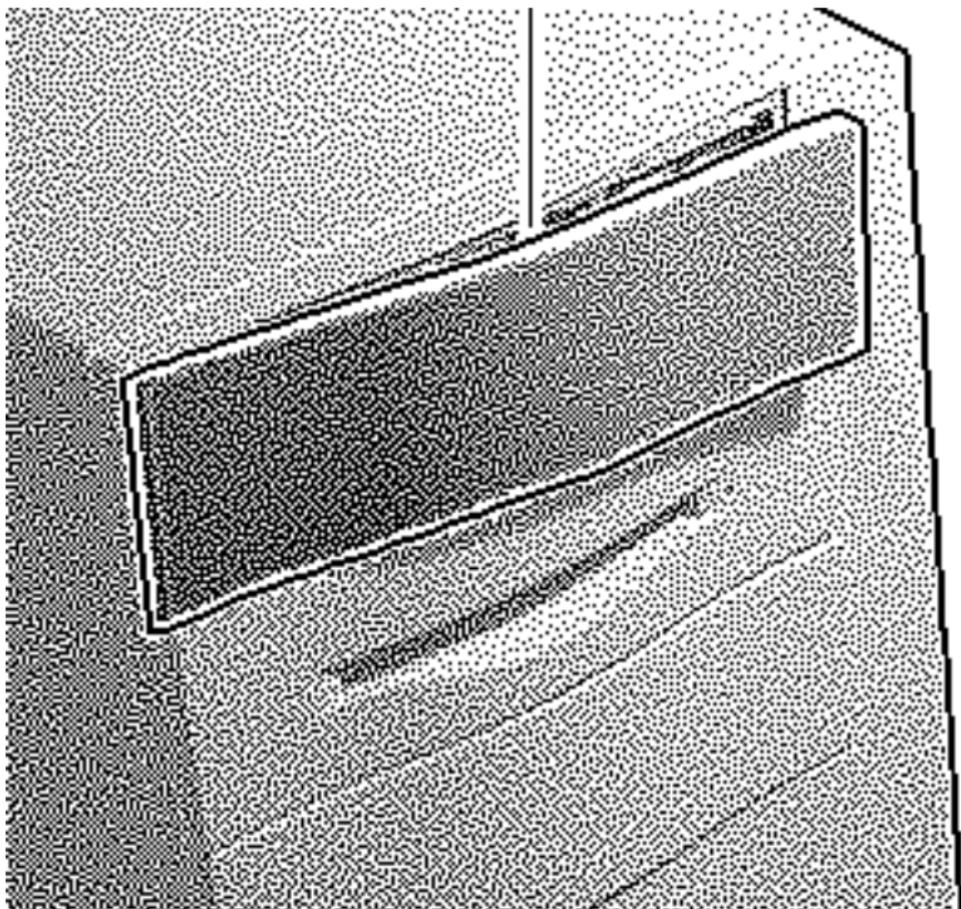

1 Remove the upper blank bezel from the top housing.

CD-ROM Drive Bezel
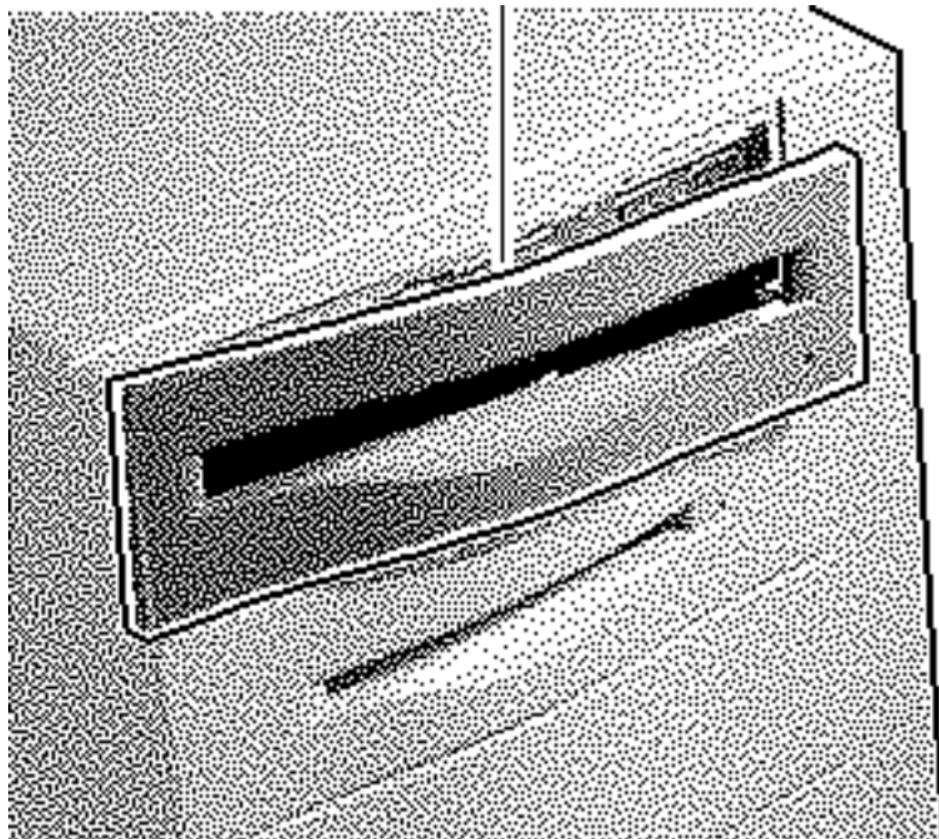
2 Install the slotted CD-ROM drive bezel in the top housing.
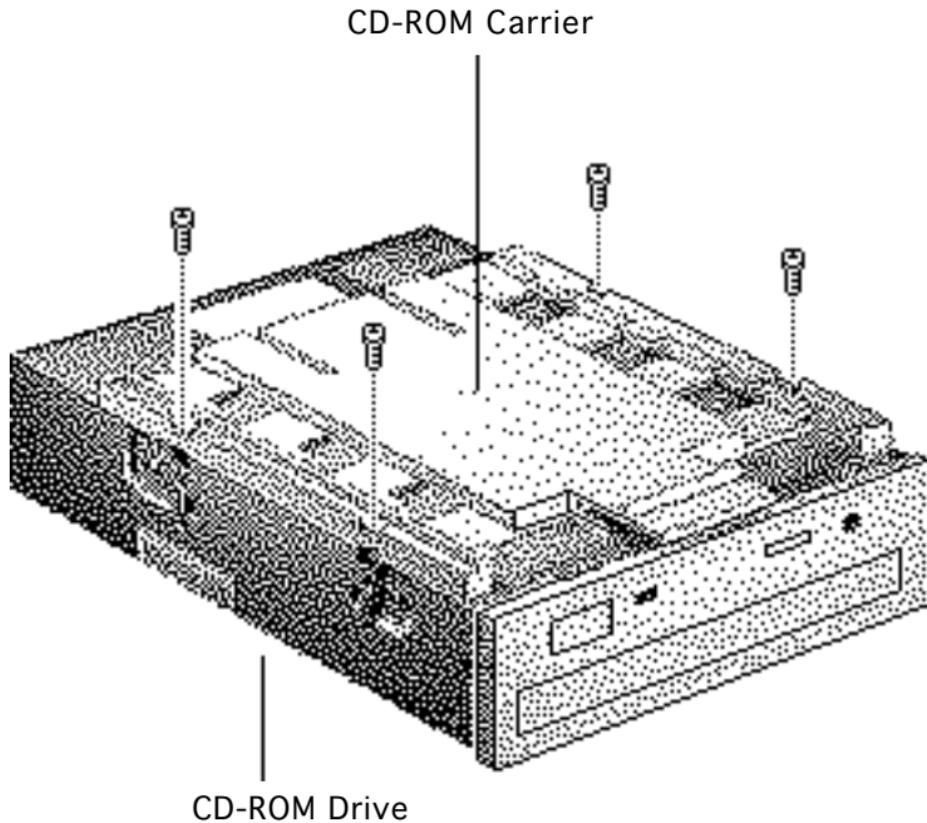
CD-ROM Carrier

3 Attach the CD-ROM
   carrier to the CD-ROM
   drive with four Phillips
   screws.

CD-ROM Drive

Jumper Connectors

L GND R
AUDIO OUT
0 1 2
F.GND
INTERF
TEST MODE
PREVENT/ALLOW
ID SELECT
PARITY

4 Verify that the three jumper connectors are installed as shown.
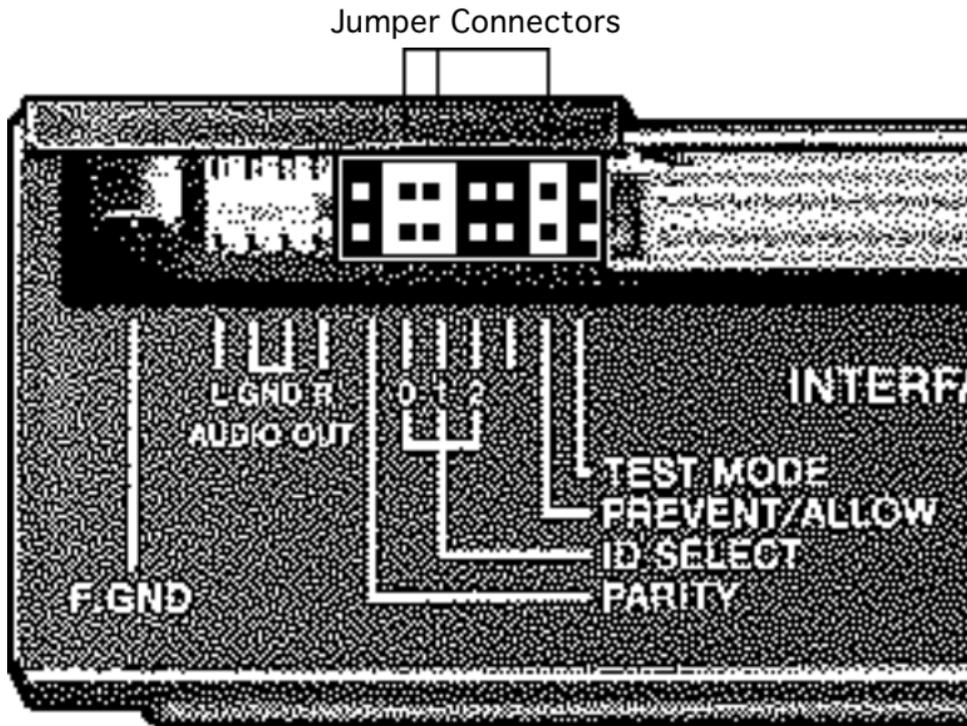
Important: These jumpers configure the SCSI device address of the CD-ROM drive. The CD-ROM drive will have a SCSI device ID of 3. Verify that no other SCSI device installed in the computer already has that address. If another device does have an ID of 3, change the ID prior to installing the CD-ROM drive.

CD-ROM Drive and Carrier
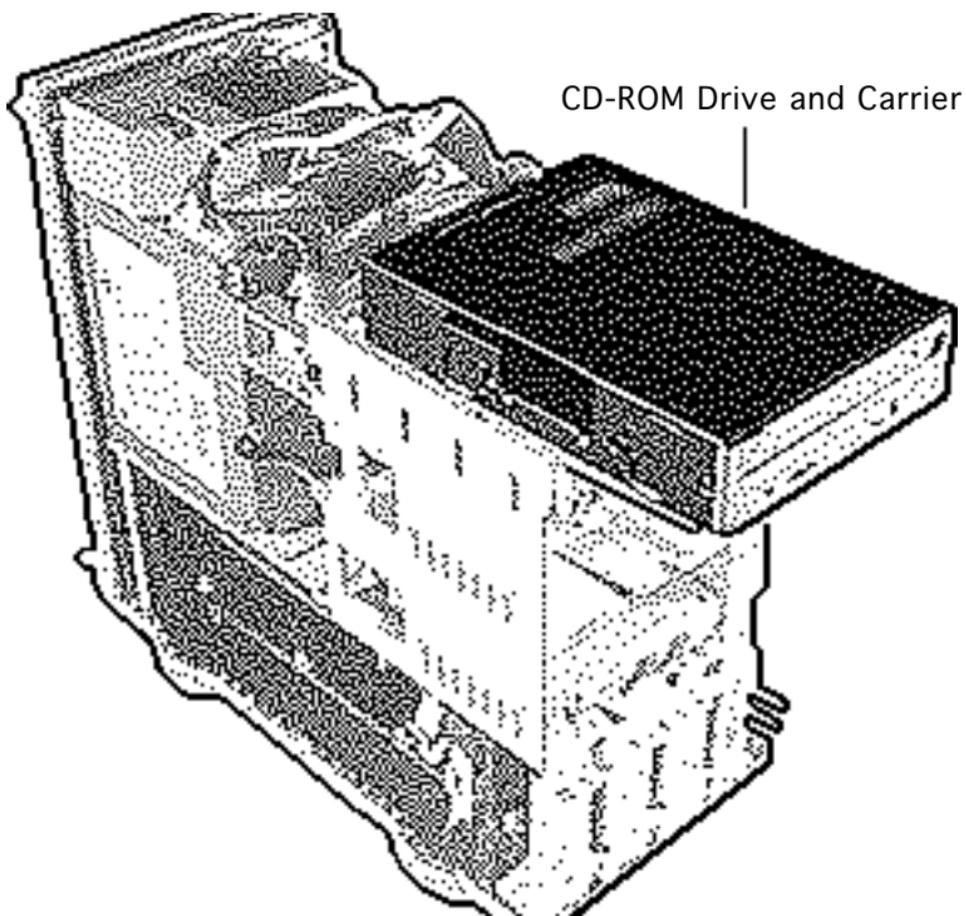
5 Slide in the CD-ROM drive and carrier.

Audio Cable

SCSI Data Cable

CD-ROM Drive Power Cable
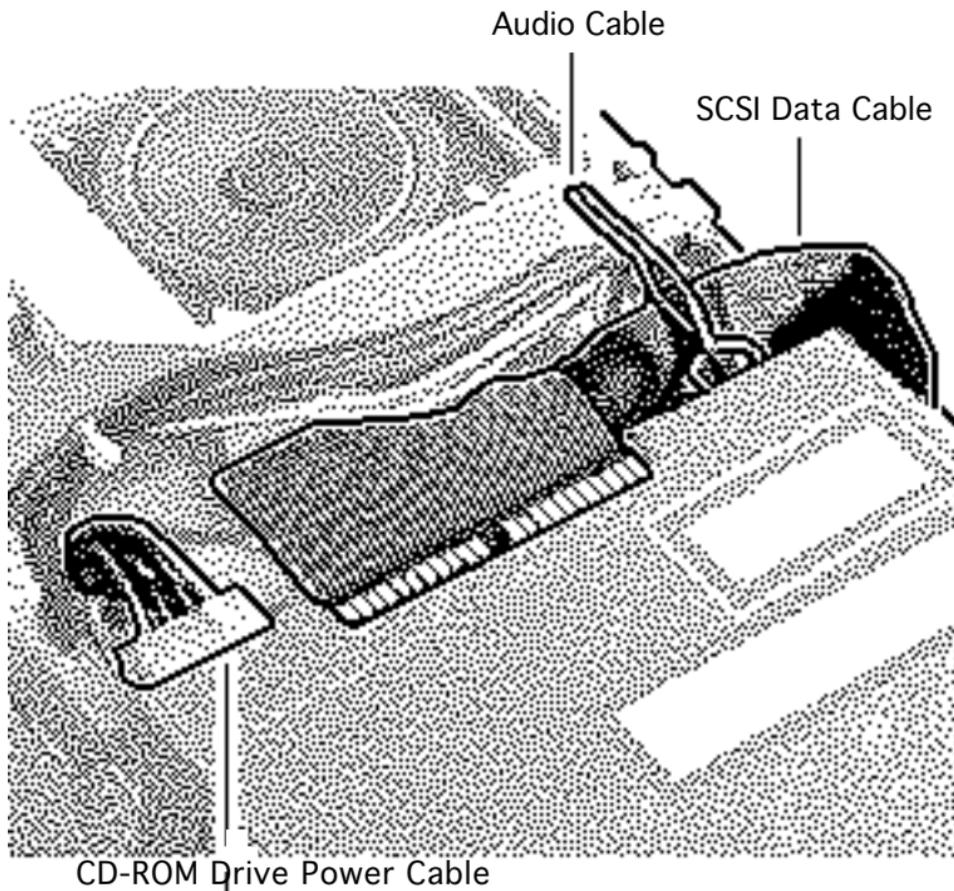
6 Connect these cables to the CD-ROM drive:
- Audio cable
- SCSI data cable
- CD-ROM drive power cable

Power Macintosh 8100 Series
and WS 8150 Logic Board

Power Macintosh Upgrade

Before you begin, remove

- Top housing
- Top housing bezels
- Floppy drive
- Hard drive
- CD-ROM drive (if present)
- Logic board
- Power supply
- Speaker

Note: The Power Macintosh 8100/80 logic board upgrades a Quadra 800 or 840AV. The WS 8150 logic

Speaker

CD-ROM
Audio

Floppy
Drive

LED
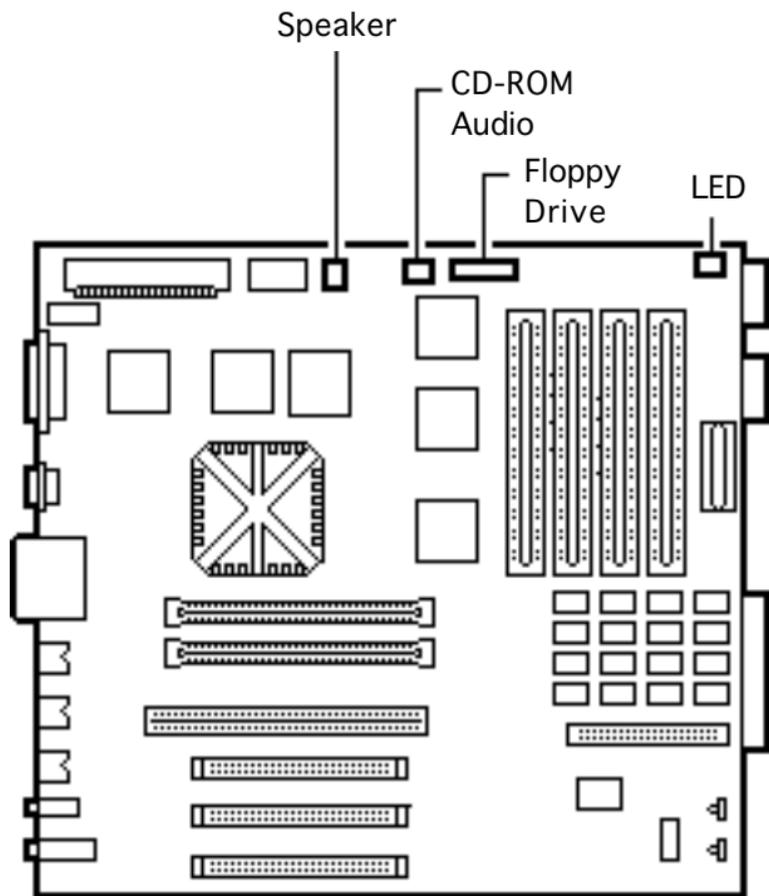
board upgrades an AWS 80.

Note: The upgrade kit contains a logic board, internal chassis, top housing, CD-ROM and hard drive SCSI cables, SCSI power cable, reset/interrupt actuator, and video card.

1 Remove the following cables from the old logic board and connect them to the new logic board:
   • LED cable
   • Speaker cable
   • CD-ROM audio cable
   • Floppy drive cable
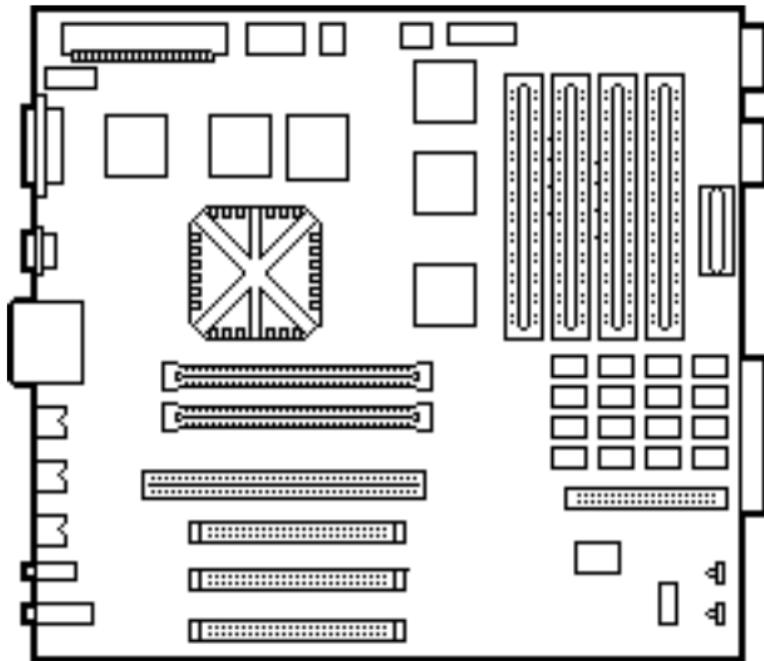
2 Install the speaker in the upgraded chassis.

3 If the customer's original logic board had DRAM SIMMs installed, remove them and install them on the upgraded logic board.

Important: Upgraded units require that DRAM SIMMs be installed in matching pairs (i.e., same size and speed). The SIMMs must be 80 ns or faster, non-composite, 72-pin SIMMs.

Speaker

CD-ROM

Power
Supply

Floppy Drive
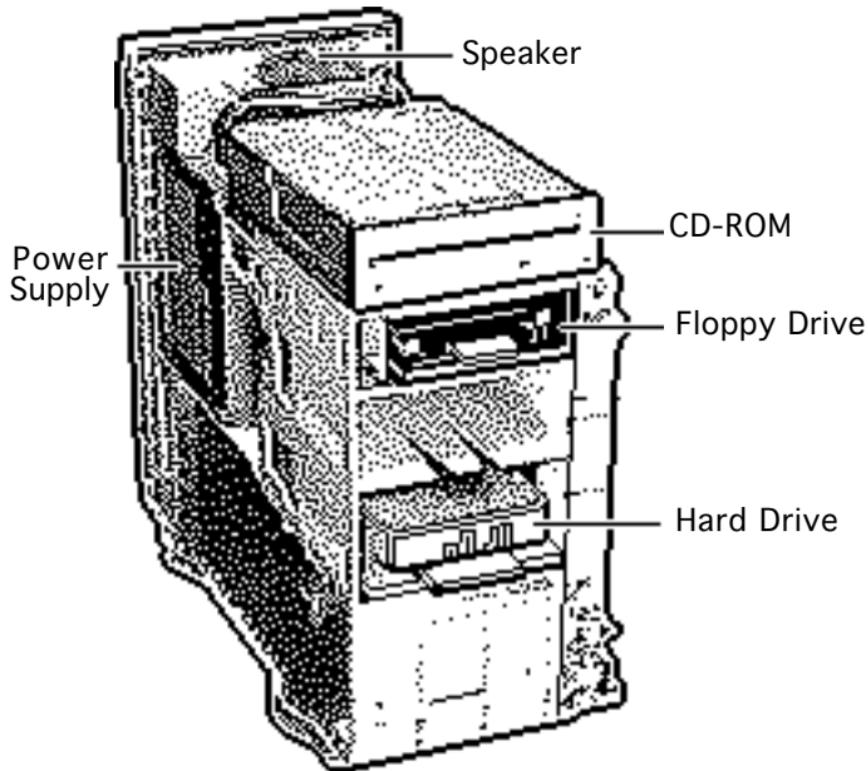
Hard Drive

Replacement Note: Return
all VRAM and non-matching
DRAM SIMMs from the old
logic board to the customer.

4   Remove the existing
     power cable from the
     power supply and the
     SCSI cables from the
     hard drive and CD-ROM
     drive.

5   Install the floppy drive,
     hard drive, CD-ROM
     drive (if present),
     power supply, and
     speaker in the upgraded
     internal chassis.

Note: The upgrade kits ship with new SCSI cables and a new power cable attached to the logic board. The equivalent cables in the original unit are **not** forward compatible. You must use the new SCSI and power cables provided in the kit.

Replacement Note: The top SCSI cable connects to the CD-ROM unit. The bottom SCSI cable connects to the hard drive.

Note: These upgraded units **must** have a video card installed for proper bus termination. The 8100/80 requires the Power Macintosh 4 MB Video Card; the 8100/80AV requires the Power Macintosh AV Card. The WS 8150 requires a video terminator card.
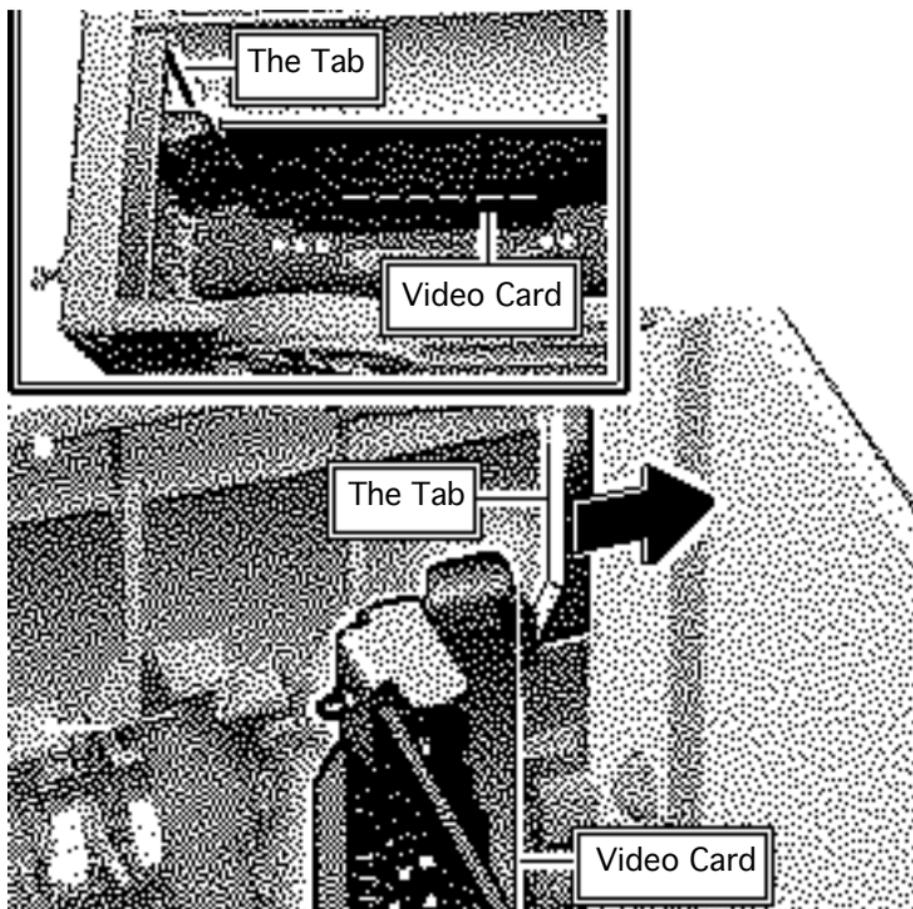
Caution: Install the video card at an angle, inserting the back end (the non-connector end) first. Do not force the card into the expansion slot. If the card does not seat properly, remove the card, check the logic board for damage, and try to install the card again.

6   Gently push down on the video card until it snaps into place.

    Replacement Note: Push up on the tab that holds the video card in place to remove the card.

CD-ROM Bezel
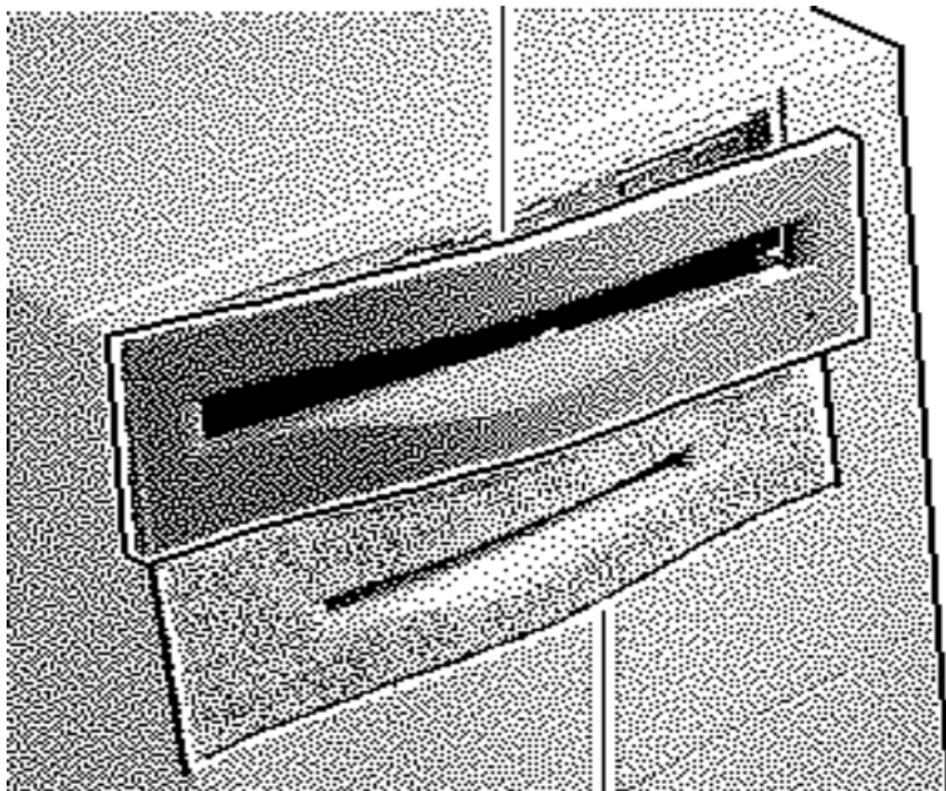
Floppy Drive Bezel

7 Remove the bezels from the old top housing and install them on the new top housing.

8 Copy the computer's serial number from the old top housing to the new top housing.

   Note: A blank serial number label is provided on the new top housing.
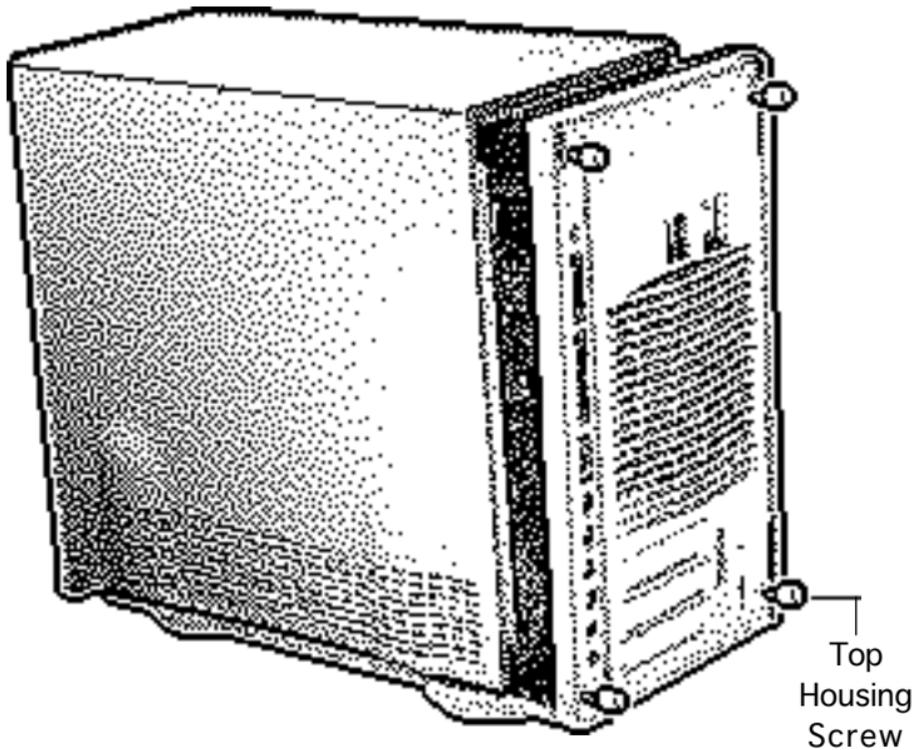
9 Move the top housing
screws from the old unit
to the new unit and
reassemble the
computer.

Note: For the Power
Macintosh 8100/80 and
8100/80AV upgrades, you
must install the System
7.1.2 software that came
with the upgrade kit. Refer
to the user manual provided
in the upgrade kit for
installation instructions.

Top
Housing
Screw

10 Run MacTest Pro in looping mode or other software in demo mode for 1 hour as a burn-in test.

Note: Contact Finished Goods for an RMA number to return the old logic board. Return the logic board in the old housing. You do not need to return the cables to Apple.

Power Macintosh 8500 Upgrade

The Power Macintosh 8500 Upgrade Kit can be used to upgrade a Quadra 800, Quadra 840, or a Power Macintosh 8100. The kit includes everything except:

- The peripherals (such as the hard drive, floppy drive, and CD-ROM drive), which must be transferred from the original unit you are upgrading
- A processor card, which must be purchased separately.

Refer to the appropriate Take Apart chapter (that is, the Take Apart chapter in the Quadra 800, Quadra 840AV, or Power Macintosh 8100 manual) for instructions on how to remove the drives from the original unit.

Refer to the Take Apart chapter in the Power Macintosh 8500/WS 8550 manual to see where the peripherals should be installed in the upgraded unit and for instructions on how

to install the processor card.

Once you have installed all the drives in the upgraded unit and replaced the top housing, copy the serial number from the original unit to the blank serial label on the upgraded unit.

WorkGroup Server 8550/132 Upgrade

The WorkGroup Server 8550/132 Upgrade Kit can be used to upgrade a WorkGroup Server 80, 8150/80, or 8150/110. The kit includes everything except:

- The peripherals (such as the hard drive, floppy drive, and CD-ROM drive), which must be transferred from the original unit you are upgrading
- Drive carriers
- Drive bezels
- Drive shields
- Speaker
- CD-ROM audio cable
- Floppy drive cable
- Power supply to logic board cable
- Chassis support bracket
- DRAM DIMMs

All of the part listed above, except for the DRAM DIMMs, need to be removed from the original unit and installed in the upgraded unit. Refer to the Take Apart chapter for the product from which you are upgrading for instructions on how to remove these parts. Refer to the Take Apart chapter in the Power Macintosh 8500/WS 8550 manual to see where the peripherals should be installed in the upgraded unit.

Note: The WS 8550 logic board in the upgrade kit does not contain any DRAM. You must install 64 bit-wide, 168-pin DRAM DIMMs. The DIMMs should be fast-paged mode, 70 ns or faster. You can use 8, 16, 32, or 64 MB DIMMs, which can be installed in any configuration. For the best performance, however, the DIMMs should be installed in pairs of the same size into paired slots. The slower 80 ns SIMMs and DIMMs used in older Macintosh computers will not work reliably in the WS 8550.

Once you have installed all the necessary parts in the upgraded unit and replaced the top housing, copy the serial number from the original unit to the blank serial label on the upgraded unit.

Note: The WorkGroup Server 8550/132 Upgrade Kit does not include a hard drive bracket.

Exploded View

Power Macintosh 8100/WS 8150

Top Housing
922-1277

Front Panel *

CD-ROM Bezel
Trayloading
922-0811

Blank Bezel
922-0620

Floppy Drive Bezel
922-0523

Tape Drive Bezel
922-0969

Logic Board*
661-0209
661-0199
661-1026

Logic Board
Guard
922-0851

Speaker
Housing
922-0394

Speaker
922-0353

Thumbscrew
922-0395

CD-ROM
Audio Cable
922-0724

CD-ROM
Drive*
661-0913

LED
Cable
922-0841

CD-ROM
Shield
922-0812

Rear
Panel
922-0722

CD-ROM
Carrier
922-0850

Floppy Drive
Cable
922-0872

Power
Supply
Cable
922-0838

Manual Insert
Floppy Drive
661-0121

SCSI
Cable
922-0723
922-0803

Brace
922-0396

Floppy Drive
Shield
922-0813

Floppy Drive
Carrier
922-0445

Reset
Interrupt
922-0843

Hard Drive*

Power
Supply*
661-1687
661-0232

Hard Drive
Carrier
922-0621

Tape Drive*
661-0039

NuBus
Retainer
922-0393

Chassis
922-0888

Tape Drive
Carrier
922-0621

Product family configurations may vary. For parts with asterisk (*), refer to parts list.

Power Macintosh 8100/WS8150