Power Macintosh 6100/ WS 6150

Power Macintosh 6100/60, 6100/60AV, 6100/66, 6100/66AV, 6100/DOS Compatible, and Workgroup Server 6150

Basics

Power Macintosh 6100/WS 6150

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.
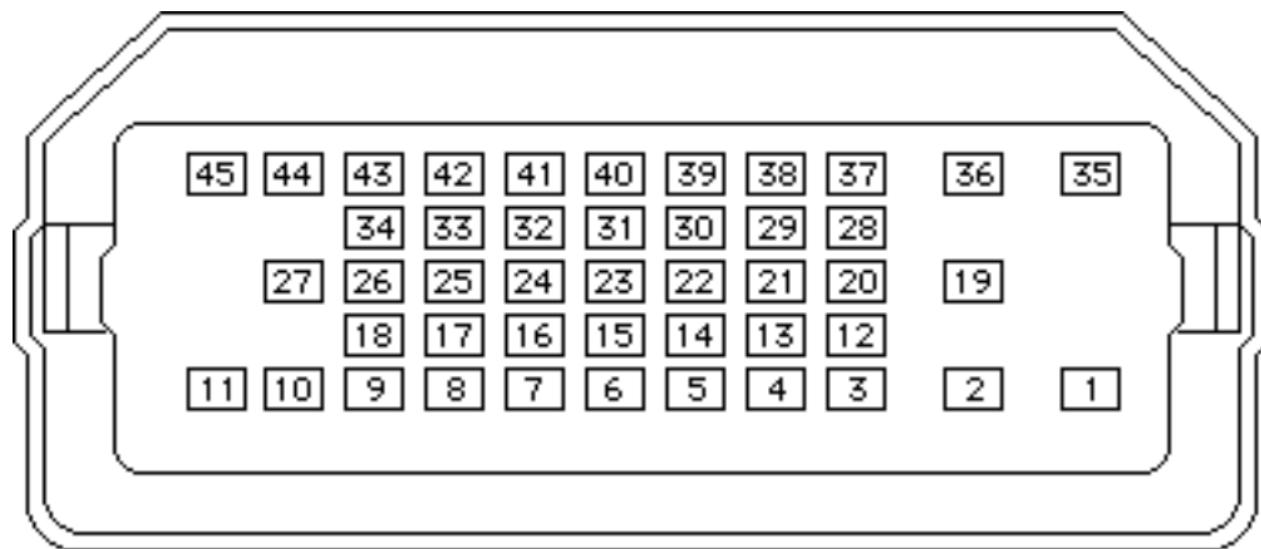
Figure: HDI-45 Connector on the Logic Board

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

(continued)

Pin	Description
10	Green ground (shield)
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)

(continued)

Pin	Description
21	S-video input chroma (C)
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

(continued)

Pin	Description
32	Monitor ID
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

(continued)

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

Rear Panel Connectors

The figure on the following page shows the rear panel of a Power Macintosh 6100/60AV computer. The Workgroup Server and other non-AV versions of this machine would not include the S-Video In, DB-15 Video, and S-Video Out ports, which are actually part of the AV Card.
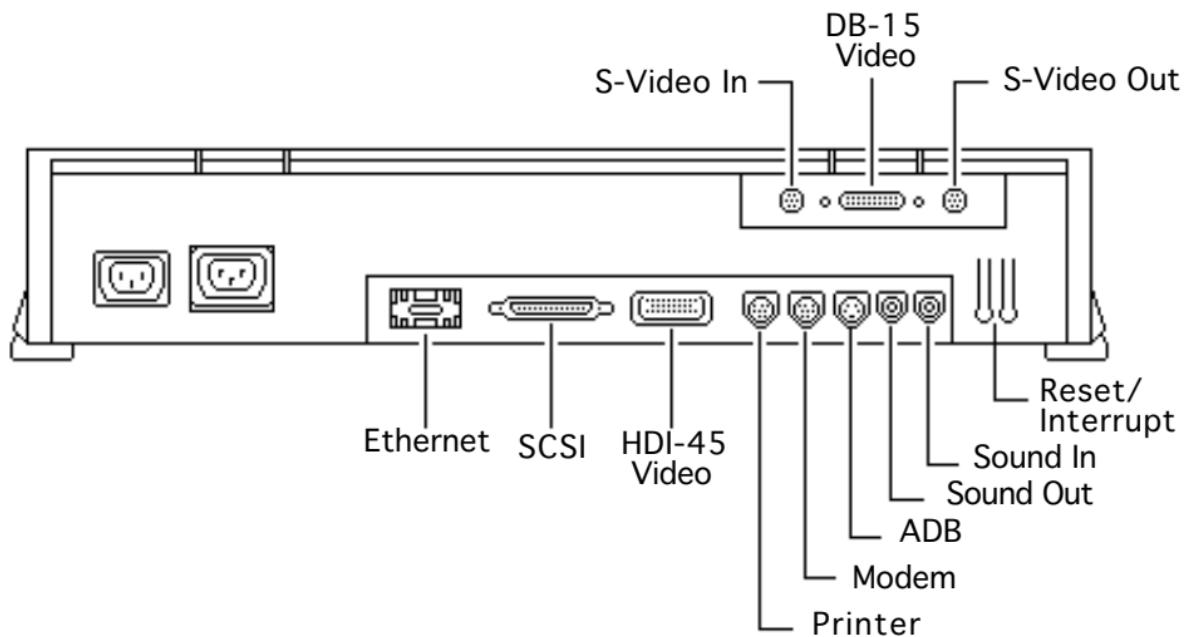
Power Macintosh 6100/60 AV Rear Panel

Logic Board Connectors

The figure on the following page shows a Power Macintosh
6100 Series logic board.

Sound Out — Serial Ports — AV Display Connector — SCSI — Ethernet — ADB — Sound In — 601 PDS — ROM — Cache — 601 Chip — Soldered DRAM — DRAM SIMMs
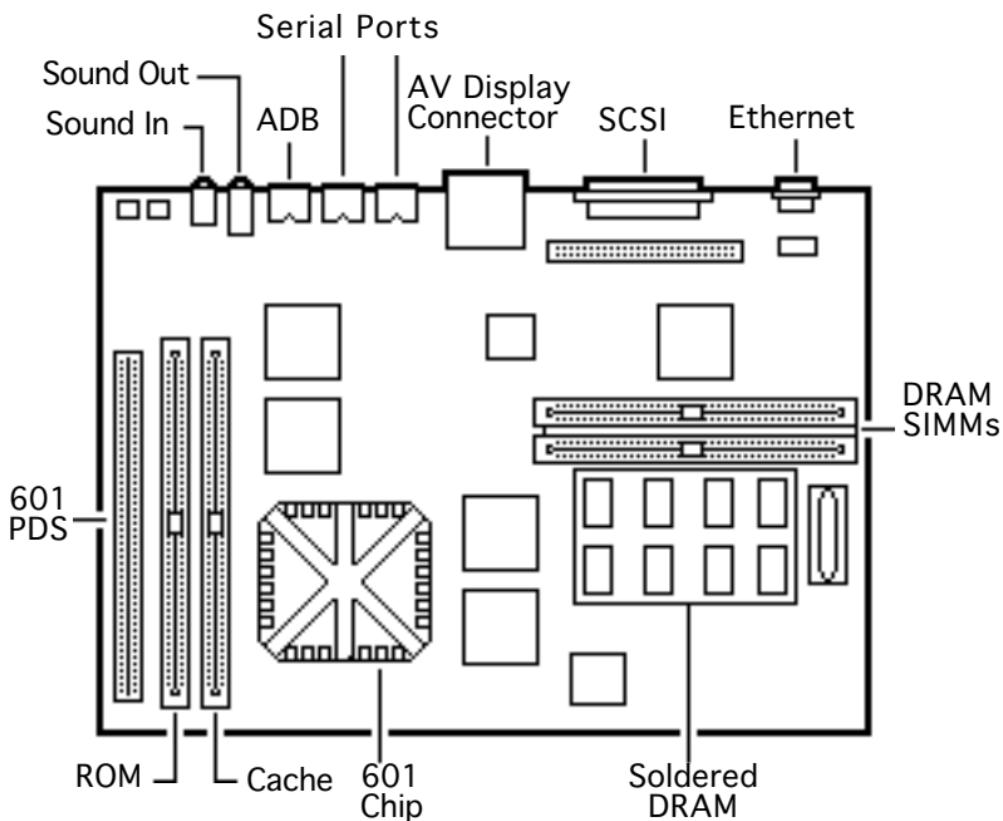
Apple RAID Software

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 6100/WS 6150

Processor

CPU

6100/60 & 6150:	60 MHz PowerPC 601 RISC microprocessor
	Built-in MMU and FPU
	32K of on-chip cache memory
	Requires system software version 7.1.2 or later
6100/66 & 6150/66:	66 MHz PowerPC 601 RISC microprocessor
	Built-in MMU and FPU
	32K of on-chip cache memory
	Requires system software version 7.5 or later

Memory

RAM

6100/60 & 6150:	8 MB RAM soldered on board; expandable to 72 MB via 2 SIMM sockets on logic board (requires a pair of same size, 80 ns or faster, 72-pin, noncomposite SIMMs); 16 MB configuration has two 4 MB SIMMs installed
6150/66:	16 MB RAM standard (8 MB soldered on board and two 4 MB SIMMs); expandable to 72 MB via 2 SIMM sockets on logic board (requires a pair of same size, 80 ns or faster, 72-pin, noncomposite SIMMs)
	Note: SIMMs must be installed in pairs of the same size and speed. Install noncomposite SIMMS only.

ROM   4 MB installed on SIMM socket

VRAM

**6100/60, 6100/66,
6150 & 6150/66:**   None

**6100/60AV & 6100/
66AV:**   2 MB on Power Macintosh AV Card

Cache

6100/60 & 6150:   32K of on-chip cache; optional 256K level 2 cache available

6100/66:   32K of on-chip cache; 256K level 2 cache standard

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

Disk Storage

Floppy Drive   1.4 MB Apple SuperDrive Manual Insert

Hard Drive

   6100/60:   160 MB or 250 MB hard drive

   6100/66:   350 MB or 500 MB hard drive

   6150/66:   700 MB hard drive

CD-ROM Drive

6100/60:	Optional internal CD-ROM drive
6100/60AV:	Internal AppleCD 300 Plus CD-ROM drive
6100/66 & 6100/ 66AV:	Internal AppleCD 300 Plus CD-ROM drive standard on some models and optional on others
6150/66:	Internal AppleCD 600 CD-ROM drive standard

I/O Interfaces

SCSI   One SCSI port; DB-25 connector
                        Supports a maximum of six external SCSI devices (five when CD-
                            ROM is installed)

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

Expansion Slot

6100/60, 6100/66, 6150 & 6150/66:	Internal expansion slot supports either a processor-direct slot card or 7-in. NuBus card (with appropriate adapter)
6100/60AV & 6100/66AV:	Units ship with Power Macintosh AV card installed in the internal expansion slot

Ethernet   One built-in AUUI-15 Ethernet port

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

Sound (continued)   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

    6100/60, 6100/66,   One HDI-45 DRAM-based video port on logic board supports
    6150 & 6150/66:   direct connection to Apple AudioVision monitors; and, with
                        HDI-45 to DB-15 adapter (which is included), these
                        computers support 12", 13", 14", 15" portrait, 16", and 17"
                        monitors

Video (continued)

6100/60AV & 6100/66AV: One HDI-45 DRAM-based video port on logic board supports
direct connection to Apple AudioVision monitors; and, with
HDI-45 to DB-15 adapter (which is included), these
computers support 12", 13", 14", 15" portrait, 16", and 17"
monitors; Power Macintosh AV card provides: DB-15 VRAM-
based video port that supports 12", 13", 14", 15" portrait,
16", 17", 20", and 21" monitors; one S-video/composite
input and one S-video/composite output port.

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

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

6100/60, 6150 & 6150/66:
Optional Apple PlainTalk microphone; unidirectional and optimized for use with speech recognition

6100/60AV, 6100/66 & 6100/66AV:
Apple PlainTalk microphone standard

Video Display

Video Display   All Power Macintosh 6100 series computers support
monochrome, color, VGA, and SVGA formats on the HDI-45
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 Display
(continued)

In addition, the AV versions support (via the DB-15 connector)

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

Input Power   132 W maximum continuous, 201 W peak input (not including monitor power)

Power Supply DC Output   86 W continuous output

Physical

Dimensions   Height: 3.4 in. (85 mm)
                        Width: 16.3 in. (415 mm)
                        Depth: 15.6 in. (399 mm)

Weight   14.0 lb. (6.4 kg), weight varies depending on internal devices
                        installed

Environmental

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

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

Relative Humidity   5–95% (noncondensing)

Altitude   0–3,048 m (0–10,000 ft.)

Troubleshooting

Power Macintosh 6100/WS 6150

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.

System

System
intermittently
crashes or hangs

1 Verify that system software is version 7.1.2 or later
   (6100/60 & 6150) or 7.5 or later (6100/66 &
   6150/66).
2 Verify SIMMs are noncomposite and installed in like pairs
   (same size/speed).
3 Verify that software is known-good.
4 Verify that software is Power Macintosh compatible (contact
   developer).
5 Clear parameter RAM. Hold down <Command> <Option> <P>
   <R> during startup but before "Welcome to Macintosh"
   appears.
6 Replace cache SIMM (if installed).
7 Replace DRAM SIMMs. Refer to Memory manual.
8 Replace logic board. Retain SIMMs.
9 Replace power supply.

Video

Screen is dark, audio and at least one drive operate, fan is running, and LED is lit

1. Adjust brightness on monitor.
2. Replace video cable.
3. Replace monitor. Refer to appropriate monitor manual to troubleshoot defective monitor.
4. Replace logic board. Retain customer's SIMMs.

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

1. Reset logic board. (Refer to Additional Procedures.)
2. Reseat ROM SIMM and cache SIMM.
3. Remove peripherals.
4. Replace DRAM SIMMs.
5. Replace power supply.
6. Replace logic board.

Video (Continued)

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

1   Replace video cable.
2   Replace monitor. Refer to appropriate monitor manual to
    troubleshoot defective monitor.
3   Replace logic board. Retain customer's SIMMs.

Screen is completely
dark, fan is not
running, and LED is
not lit

1   Verify that external power cables are properly connected.
2   Remove peripherals.
3   Replace power supply.
4   Replace logic board. Retain customer's SIMMs.

Video (Continued)

Multiple Scan
monitor attached to
Power Macintosh
6100/60AV displays
ghosting or video
smearing

Replace Power Macintosh AV Card.

Floppy Drive

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

1 Replace internal floppy drive cable.
2 Replace internal floppy drive.
3 Replace logic board. Retain customer's SIMMs.

Floppy disk ejects, and display shows Mac icon with blinking "X"

1 Try a different floppy disk.
2 Replace floppy drive cable.
3 Replace internal floppy drive.
4 Replace logic board. Retain customer's SIMMs.

Floppy disk does not eject

1 Switch off system and hold mouse button down while switching on the system
2 Eject disk manually.
3 Replace floppy drive cable.
4 Replace floppy drive.

Floppy Drive (Continued)

Floppy drive
attempts to eject disk
but doesn't

1 Push floppy disk completely in.
2 Eject floppy disk manually.
3 Replace floppy drive.
4 Reseat or replace top housing assembly.

Hard Drive

Internal hard drive runs continuously

1. Update driver software of hard drive using HD-SC Setup. (Note: Use Apple RAID to update driver on RAID WS 6150 drives.)
2. Reinstall system software.
3. Replace SCSI data cable.
4. Replace hard drive. (Note: If replacing an Apple WS 6150 RAID drive, you must reinstall the RAID software on the drive. See "RAID Information" in Basics.)
5. Replace logic board. Retain customer's SIMMs.

Internal hard drive does not operate

1. Replace SCSI data cable.
2. Replace SCSI power cable.
3. Replace hard drive. (Note: If replacing an Apple WS 6150 RAID drive, you must reinstall the RAID software on the drive. See "RAID Information" in Basics.)
4. Replace logic board. Retain customer's SIMMs.

CD-ROM Drive

CD-ROM drive does
not accept a compact
disc

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

Macintosh does not
display CD-ROM
drive icon

1 Verify that CD-ROM extension is in System Folder.
2 Replace CD-ROM drive mechanism.
3 Replace SCSI data cable.

Compact disc won't
eject from the drive

1 Turn off file sharing in Sharing Setup Control Panel.
2 Manually eject the compact disc.
3 Press the eject button behind the front bezel (if it is
   accessible).
4 Replace CD-ROM drive mechanism.

CD-ROM Drive (Continued)

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.

Peripheral

Works with internal
or external SCSI
device, but does not
work with both

1 Replace external SCSI cables.
2 Verify that there is only one terminator on external devices.
3 Verify that SCSI select switch on any external device is set
   differently from any internal SCSI device.
4 Verify that hard drive is terminated but optional CD-ROM is
   not terminated.
5 Replace terminator on external hard drive.
6 Replace SCSI select cable on external SCSI device.

Peripheral (Continued)

Cursor does not move

1 Reboot computer.
2 Verify that mouse is connected properly.
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.

Cursor moves, but clicking the mouse button has no effect

1 Replace mouse.
2 Replace logic board. Retain customer's SIMMs.
3 If mouse was connected to keyboard, connect mouse to computer ADB port instead. If mouse works, replace keyboard.

Peripheral (Continued)

Double-click does not open application, disk, or server

1 Remove duplicate system files from hard drive.
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.

No response to any key on the keyboard

1 Verify that keyboard is connected to ADB port.
2 Replace keyboard cable.
3 Replace keyboard.
4 Replace logic board. Retain customer's SIMMs.

Miscellaneous

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.

Power on/off button gets stuck

1 Remove cover and realign plastic on/off button.
2 Reseat power supply.
3 Enlarge metal hole around power on/off button by 1/16 of an inch.
4 Bend down metal tabs on bottom housing that guide on/off button to reduce horizontal play. Be sure on/off button has no front to back restrictions.
5 Replace bottom housing.

Miscellaneous **(Continued)**

Stack Overflow
Errors in DOS/
Windows
Environment

If you encounter intermittent manual overflow errors when using
the DOS Compatibility card, remove the card and make sure the
jumper is in the "SX" position (over the two right-most prongs).

Screen at bootup of
DOS Compatibility
Card intermittently
blank

Remove DOS Compatibility card and make sure the jumper is in
the "SX" position (over the two right-most prongs).

Global Village Modem "Busy Serial Port"

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

The TelePort Control Panel becomes corrupted when a Power Macintosh 6100CD is restarted while AppleTalk is set to "Inactive" in the Chooser or LocalTalk is not the selected AppleTalk Connection in the Network Control Panel. Follow these steps;

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

Global Village Modem "Busy Serial Port"

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

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

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

Take Apart

Power Macintosh 6100/WS 6150

Top Housing

No preliminary steps are required before you begin this procedure.
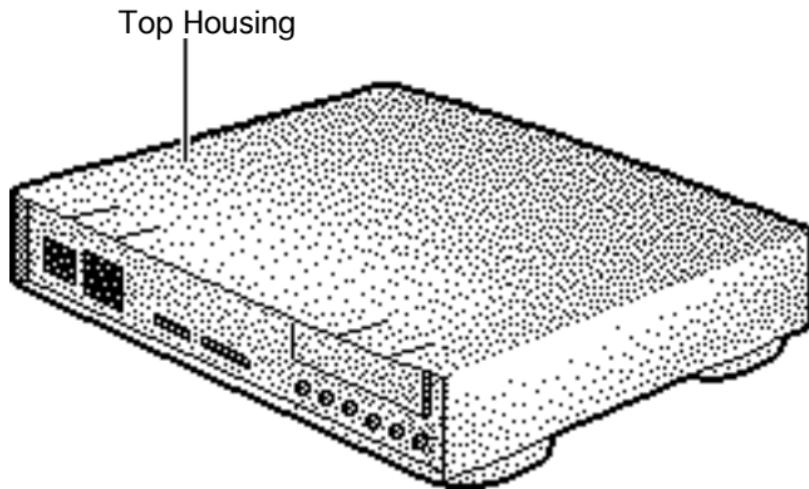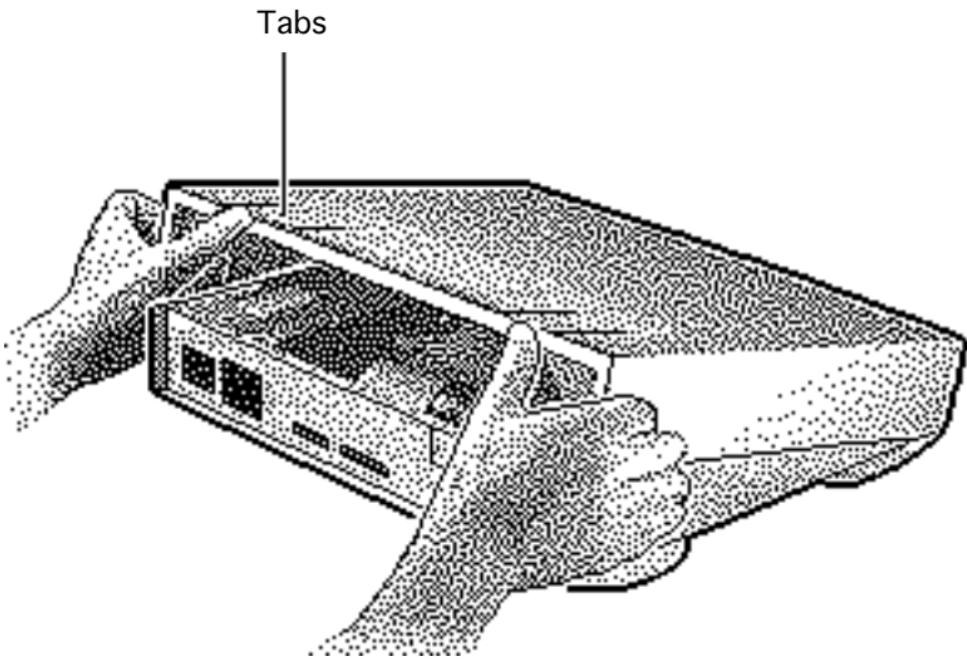
Top Housing

Tabs

1   Press up on the tabs at
    the back of the top
    housing.

2   Tilt the back of the top
    housing and remove it
    from the bottom housing.

Power Supply

Power Supply
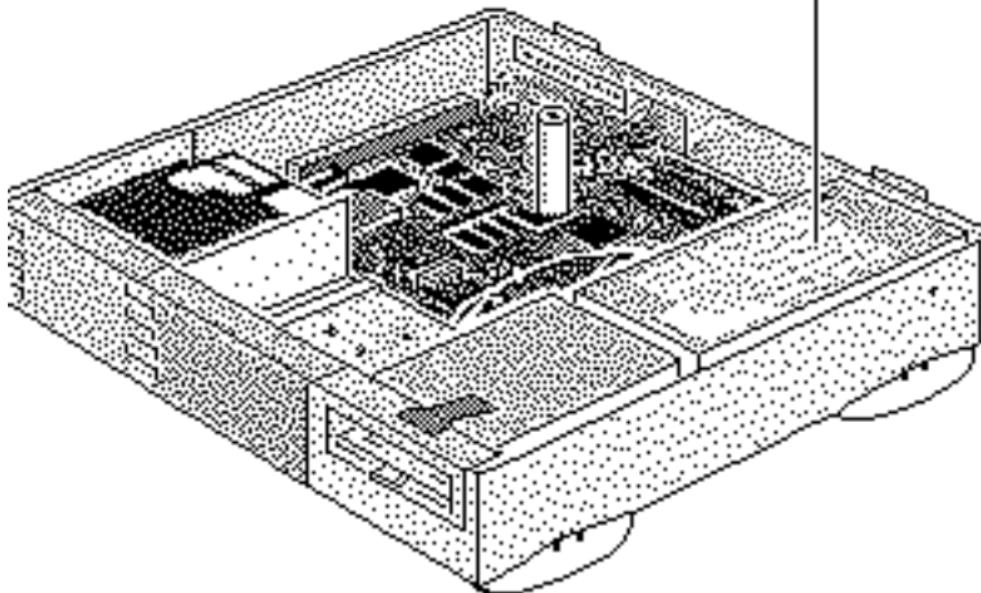
Before you begin, remove the top housing.

Caution: Review the ESD precautions in Bulletins/Safety.

1 Remove the screw that secures the power supply.

Power Supply

Tab
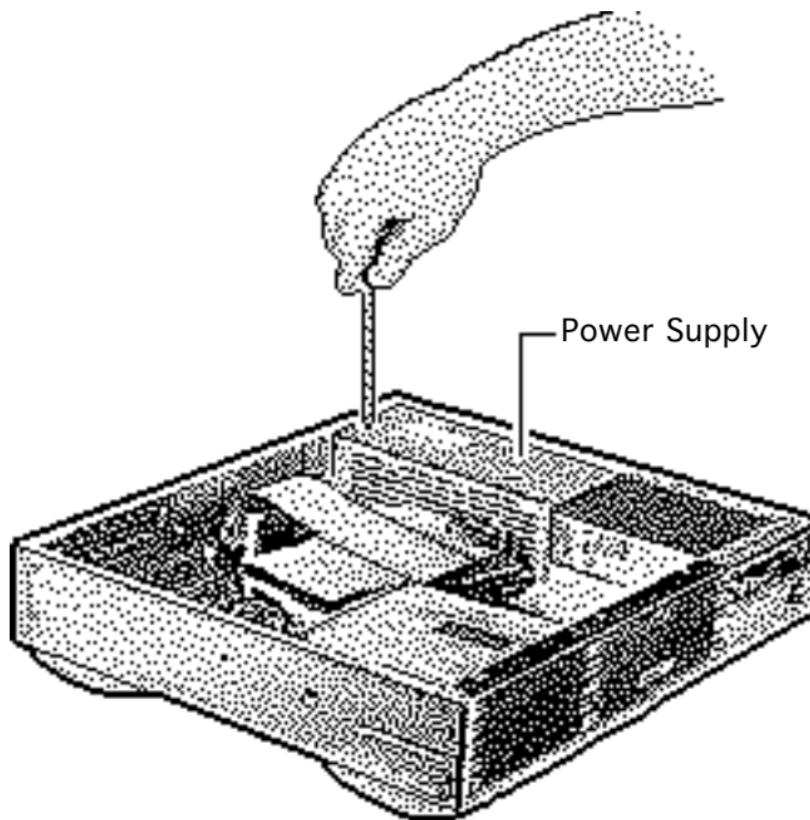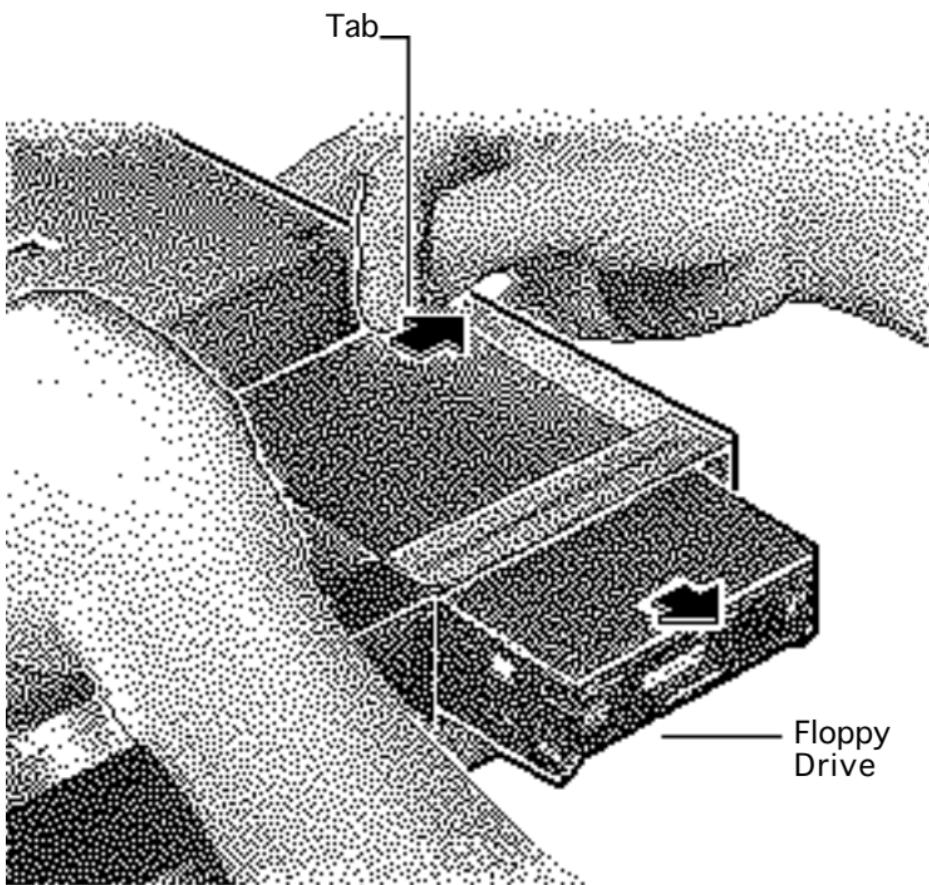
Floppy
Drive

2 For easier access to the
   power supply, release
   the tabs of the floppy
   drive and slide the
   floppy drive forward a
   few inches.

   Note: If a CD-ROM drive
   is present, remove the
   SCSI data cable and move
   the CD-ROM drive
   forward. Refer to the
   CD-ROM drive topic.

Main
Power Cable

CD-ROM Drive
Power Cable

Hard Drive
Power Cable
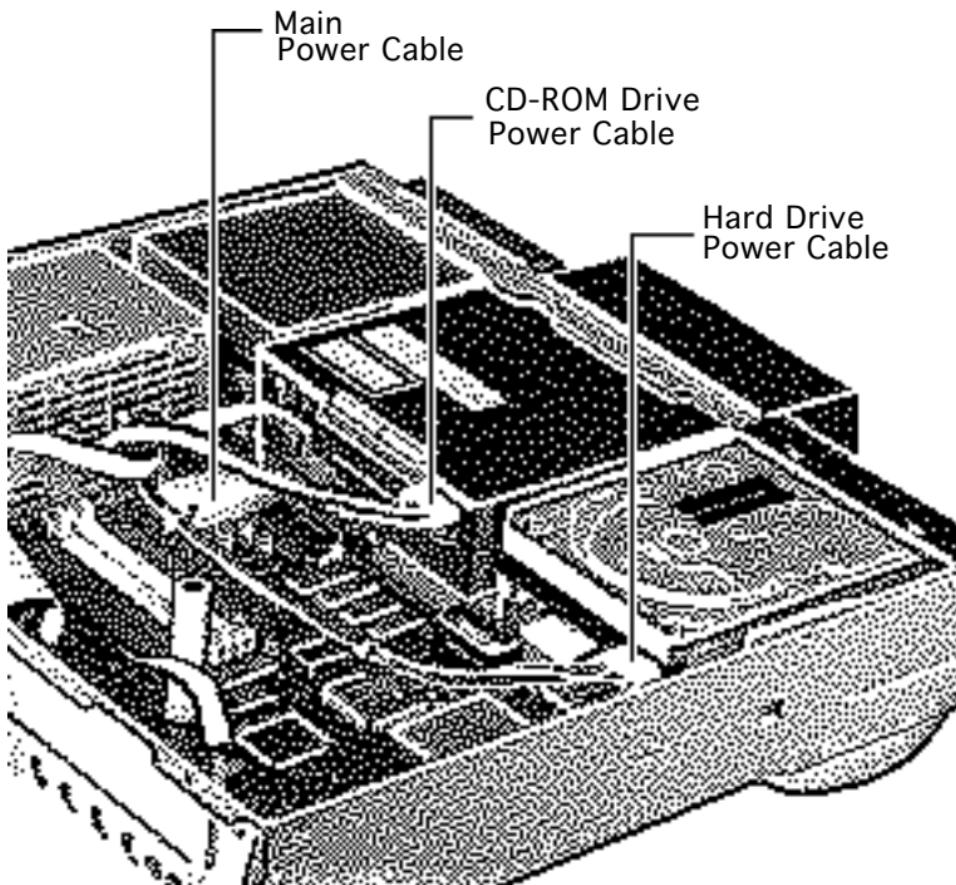
3   Disconnect these power
    supply cables
    • Main power cable
    • Hard drive power
      cable
    • CD-ROM drive power
      cable (if installed)

4   Slide the power supply
     forward slightly.

Power Supply
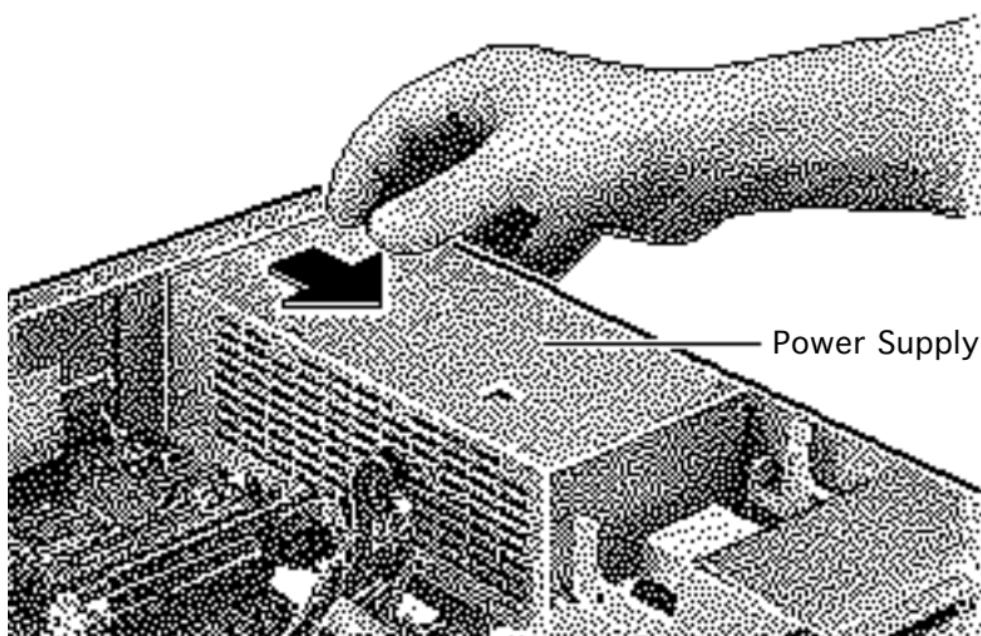
Power Switch

5 Tilt the front of the power supply and lift it out of the computer.

Replacement Note: Move the floppy drive forward. Press the actuator toward the back of the computer to properly seat the power switch in the actuator.
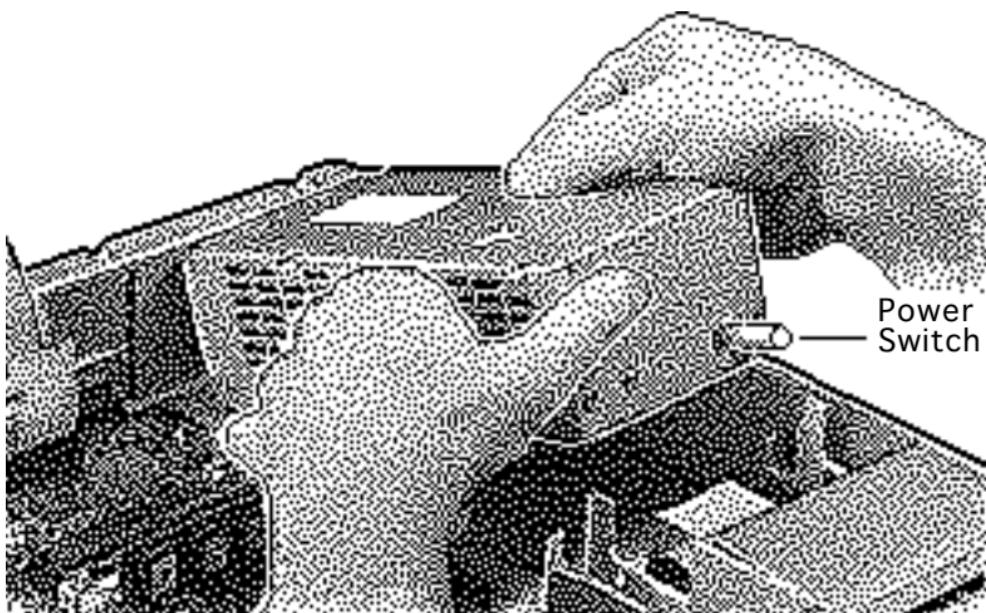
Logic Board
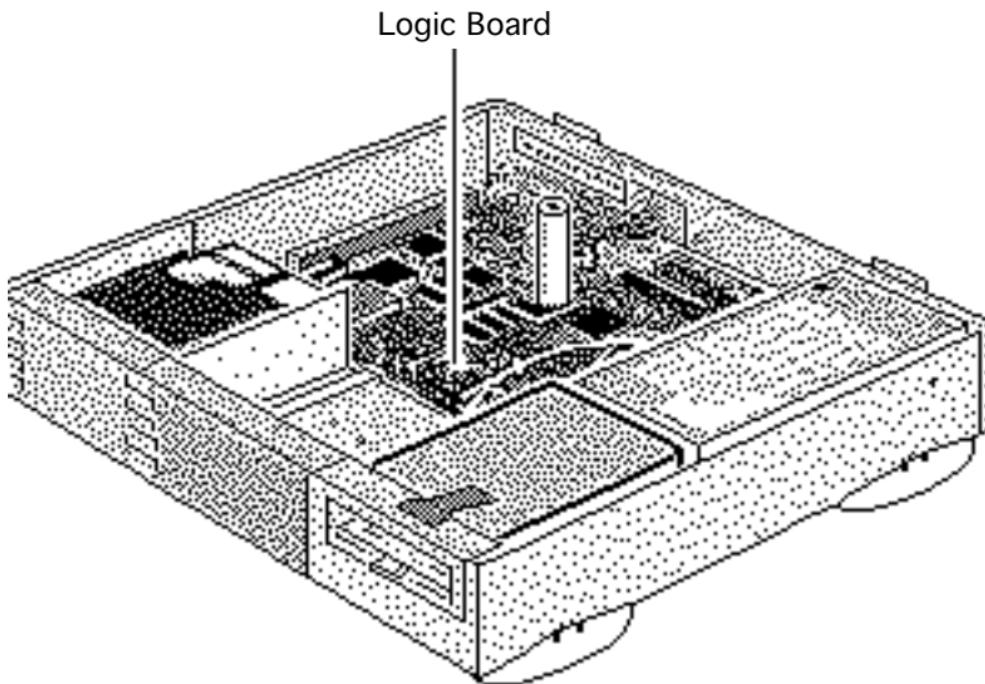
Logic Board

Before you begin, remove the following:

• Top housing
• Power supply (optional)

Caution: Review the ESD precautions in Bulletins/Safety.

Note: If removing the logic board from a 6100/60AV, you must first remove the Power Macintosh AV Card. Refer to "Expansion Cards" in the Upgrades chapter for more information.

Floppy Drive Cable

Speaker Cable

LED Cable

CD-ROM Audio Cable
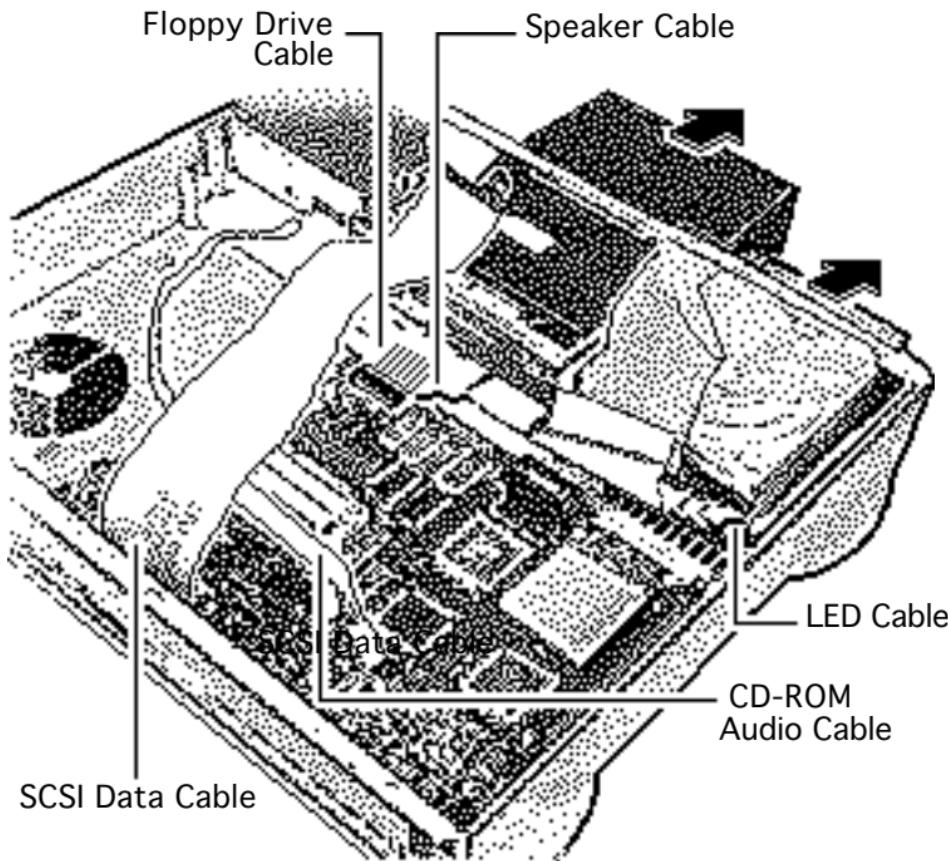
SCSI Data Cable

1 Disconnect these cables from the logic board:
  - SCSI data cable
  - Speaker cable
  - LED cable
  - CD-ROM audio cable (if present)
  - Floppy drive cable

Note: Lift the front edge of the logic board to make removing the floppy drive easier.

2 Slide forward the hard drive and CD-ROM drive (if installed).

Standoff with
Internal Screw
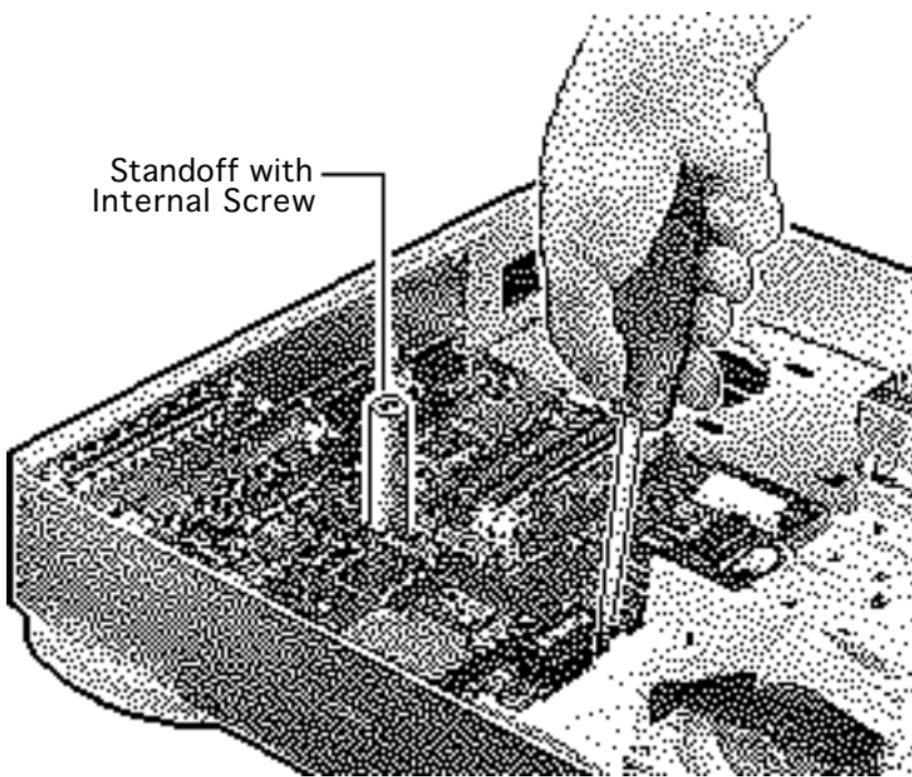
3　Remove the customer's
RAM SIMMs and 256K
cache SIMM before
returning the logic board
to Apple.

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

Standoff with
Internal Screw
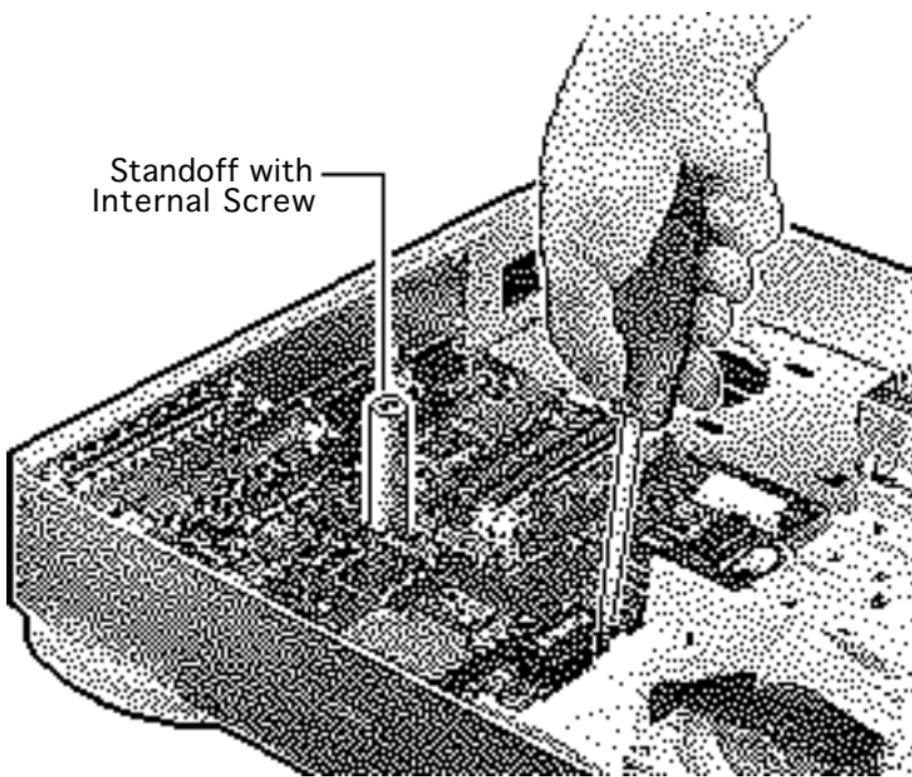
Note: The connectors for
the cache and ROM
SIMMs are functionally
the same, and the ROM
and 256K cache SIMMs
may be installed in
either connector. Be
sure you remove the
cache SIMM and not the
ROM SIMM. The 256K
cache SIMM has five
chips on each side.

4 Using a long Phillips
   screwdriver, remove
   the screw from the
   center of the standoff.
   Remove the standoff.
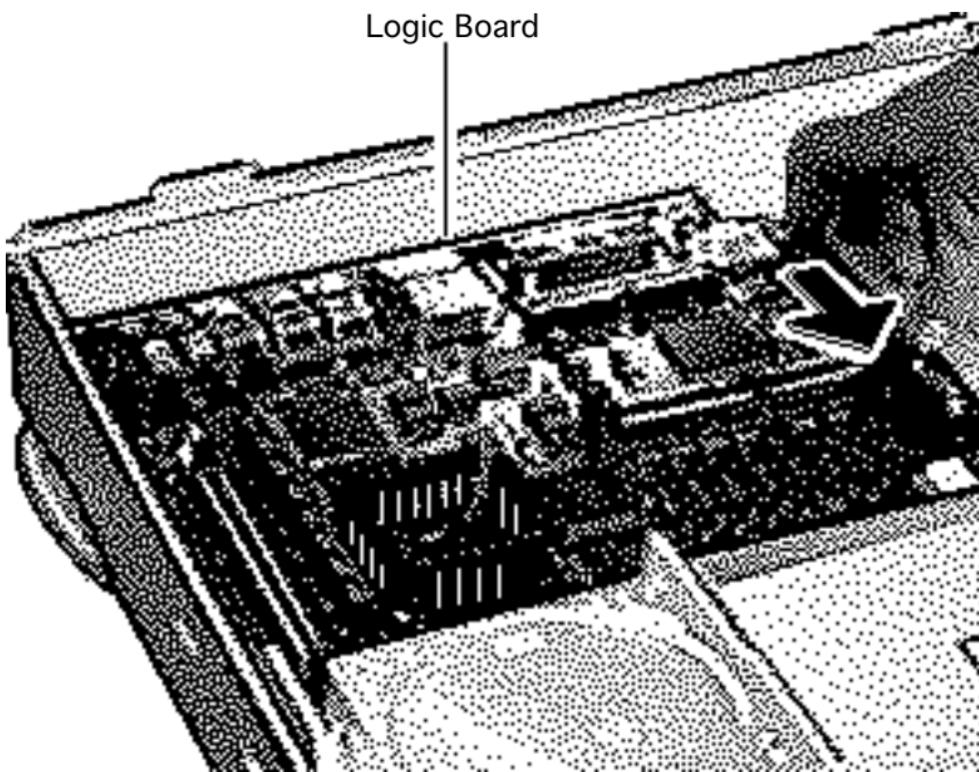
Logic Board

5 Remove the Phillips
   screw from the front
   edge of the logic board.

6 Slide the logic board
   toward the front of the
   computer.
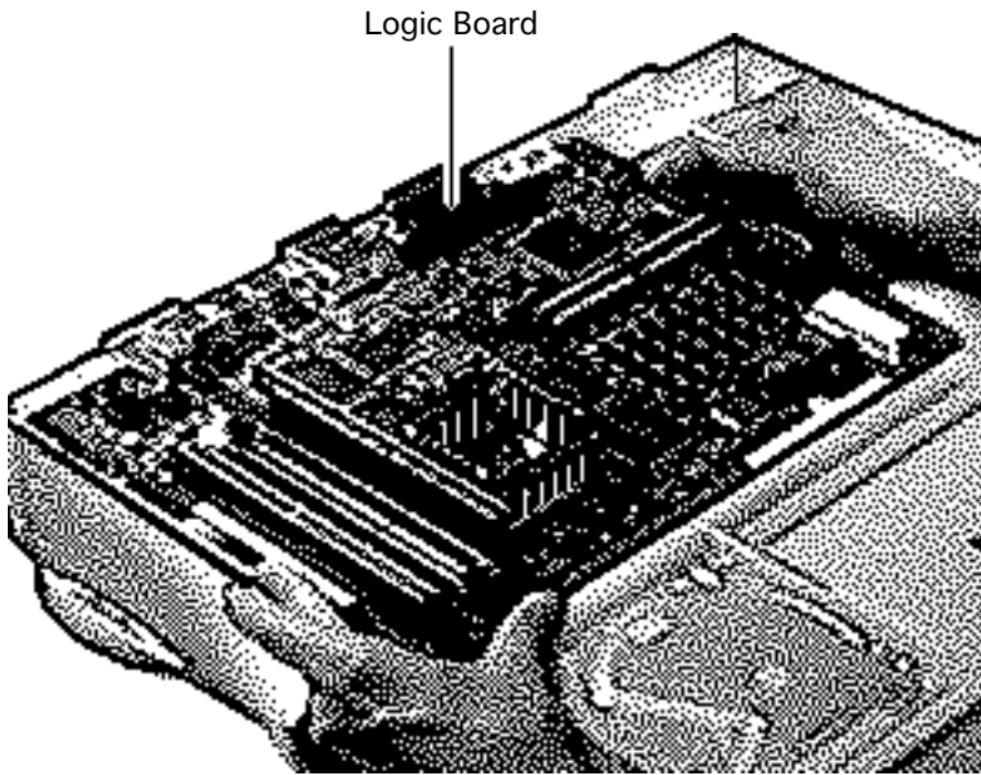
Logic Board

7 Remove the logic board.

Replacement Note: Slide the hard drive and optional CD-ROM drive forward. Connect the floppy drive cable before replacing the logic board.

DOS Compatibility Card
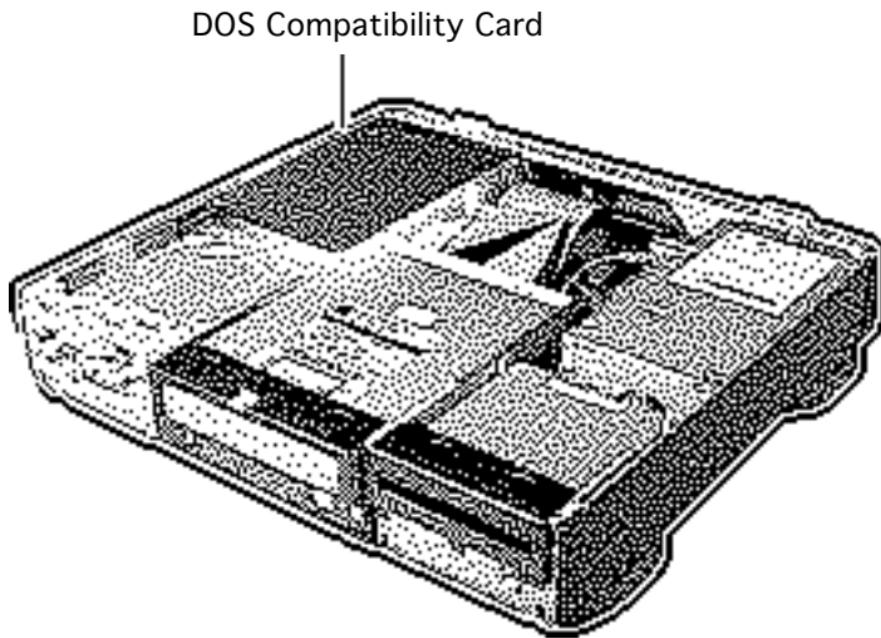
DOS Compatibility Card

Before you begin, remove the top housing.

Caution: Review the ESD precautions in Bulletins/Safety.

Note: The DOS Compatibility card is an optional upgrade for the Power Macintosh 6100 Series computers.
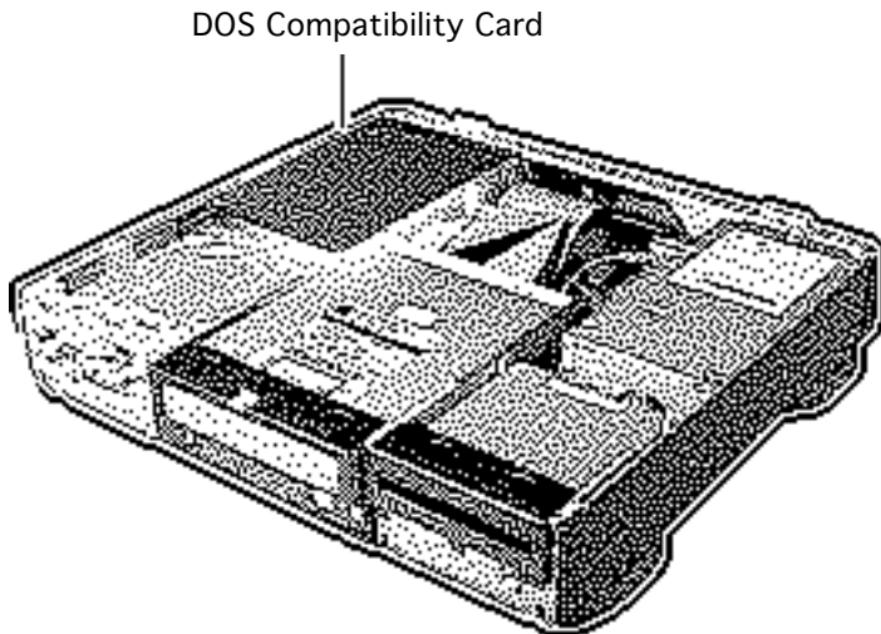
Note: You must remove the sound card (if present) before returning the DOS Compatibility card to Apple.

DOS Compatibility Card

Rear
Panel
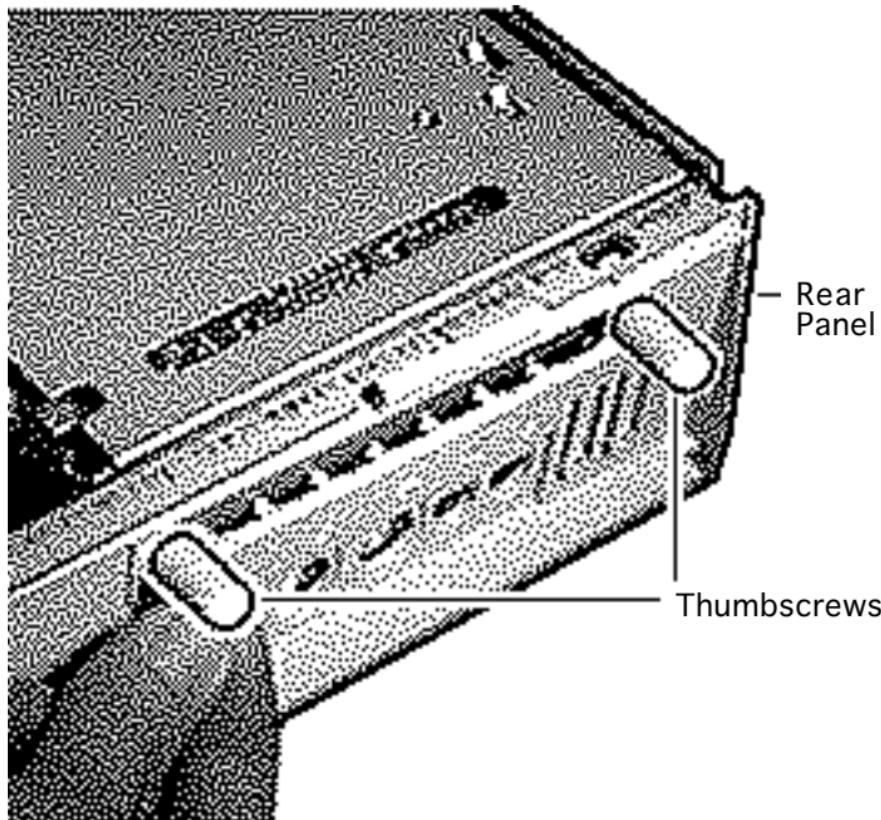
Thumbscrews

1 Remove the thumbscrews that secure the DOS Compatibility card to the computer's rear panel.

Adapter Card Tab

Adapter Card Connector

Bottom Case Slot
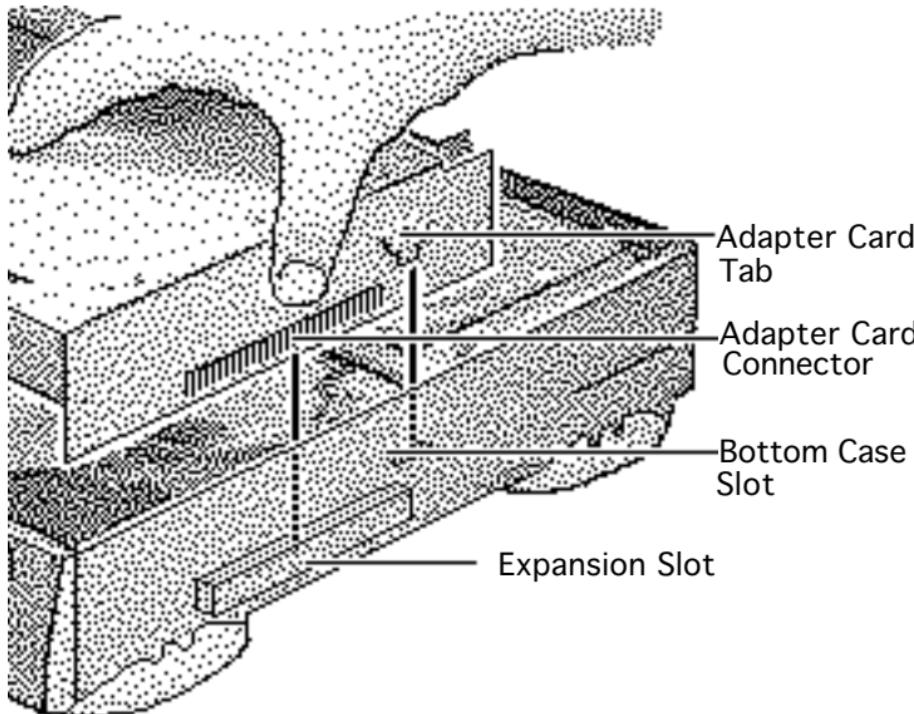
Expansion Slot

2 Lift straight up on the DOS Compatibility card to remove it from the expansion slot on the logic board.

DOS Compatibility Card

Sound Out Connector
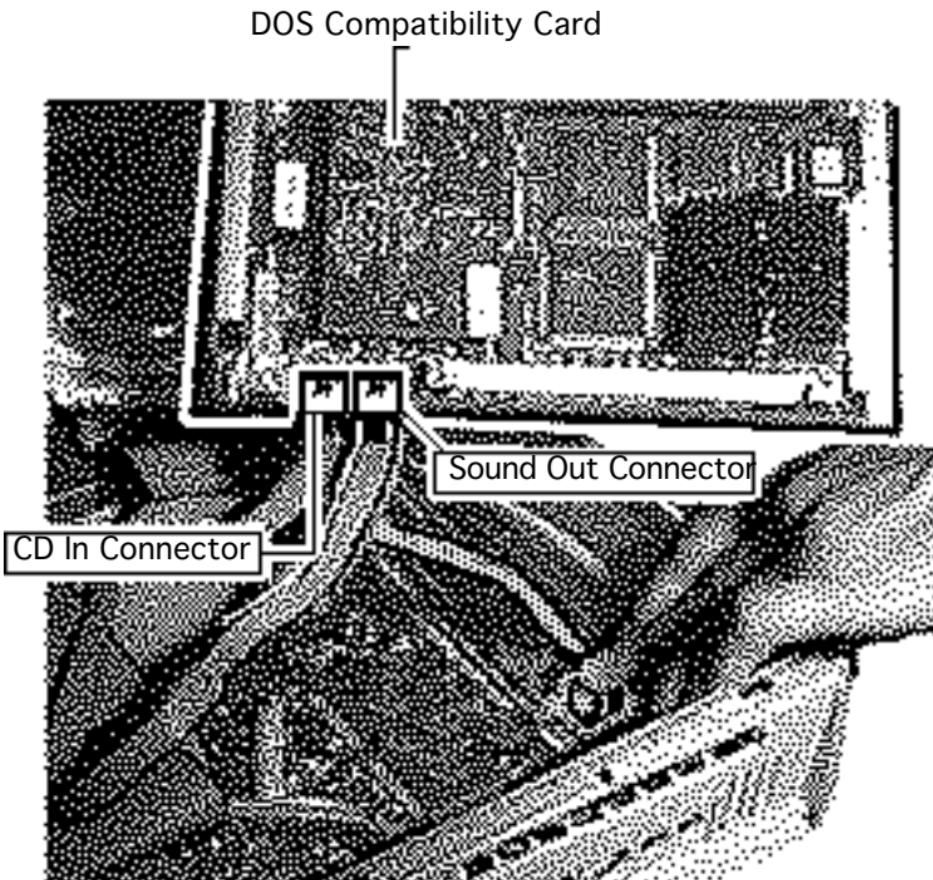
CD In Connector

3 If a CD-ROM drive is present, unplug the CD audio cables from the Sound Out and CD In connectors on the DOS Compatibility card.

Replacement Note: Connect the CD Audio cable that is plugged into the CD-ROM drive into the CD In connector on the DOS Compatibility card. Connect the CD Audio cable that is plugged into the logic board into the Sound Out connector on the DOS Compatibility card.

DOS Compatibility Card

Sound Out Connector
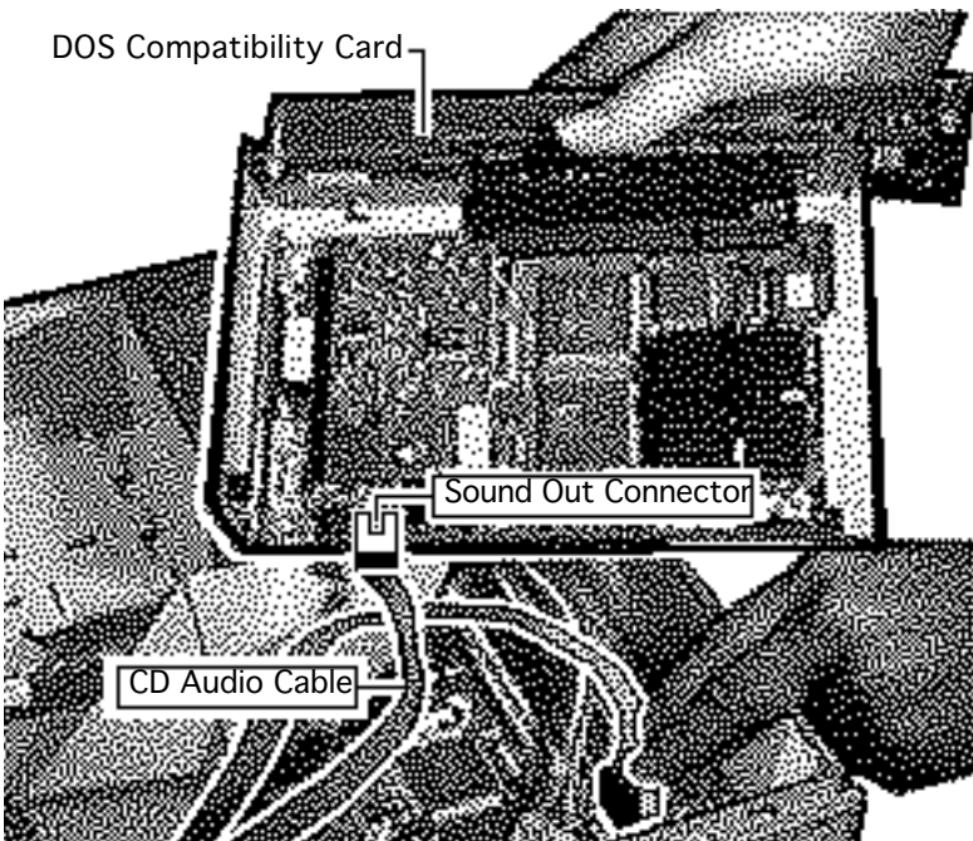
CD Audio Cable

4 If no CD-ROM drive is present, unplug the CD audio cable from the Sound Out connector on the DOS Compatibility card.

Replacement Note: The CD audio cable should connect from the CD audio connector on the logic board to the Sound Out connector on the DOS Compatibility card.

Screws
Sound Card
DOS Compatibility Card
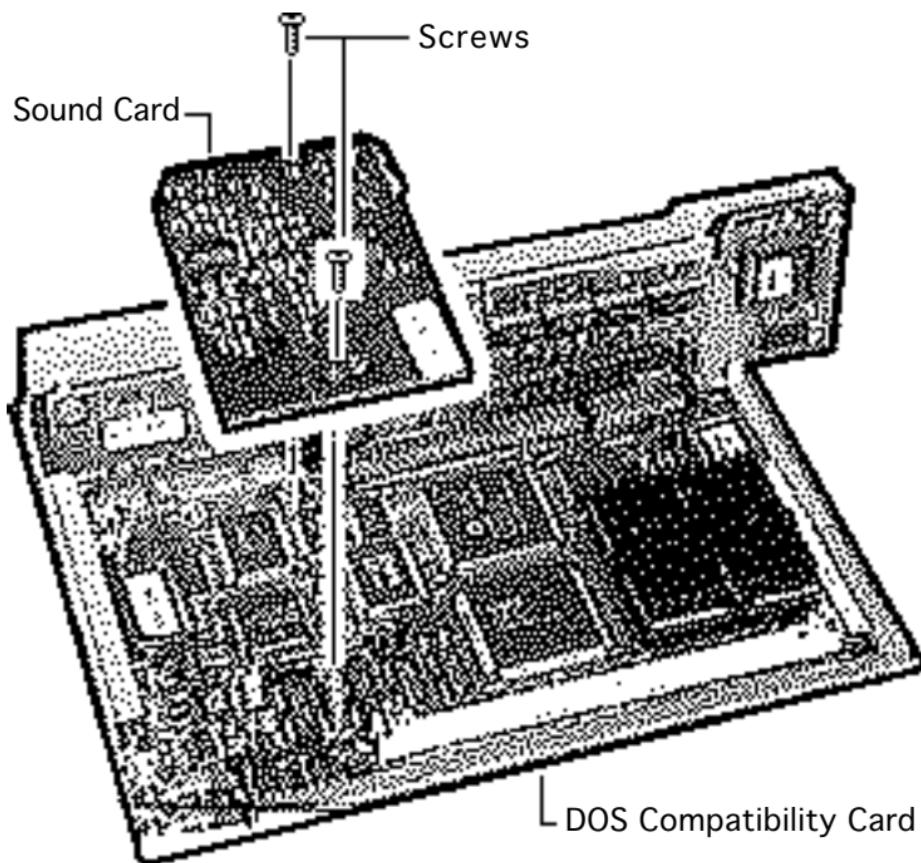
5　Remove the two screws that secure the sound card to the DOS Compatibility card.

6　Lift straight up on the sound card to remove it.

Note: You must remove the sound card before returning the DOS Compatibility card to Apple.
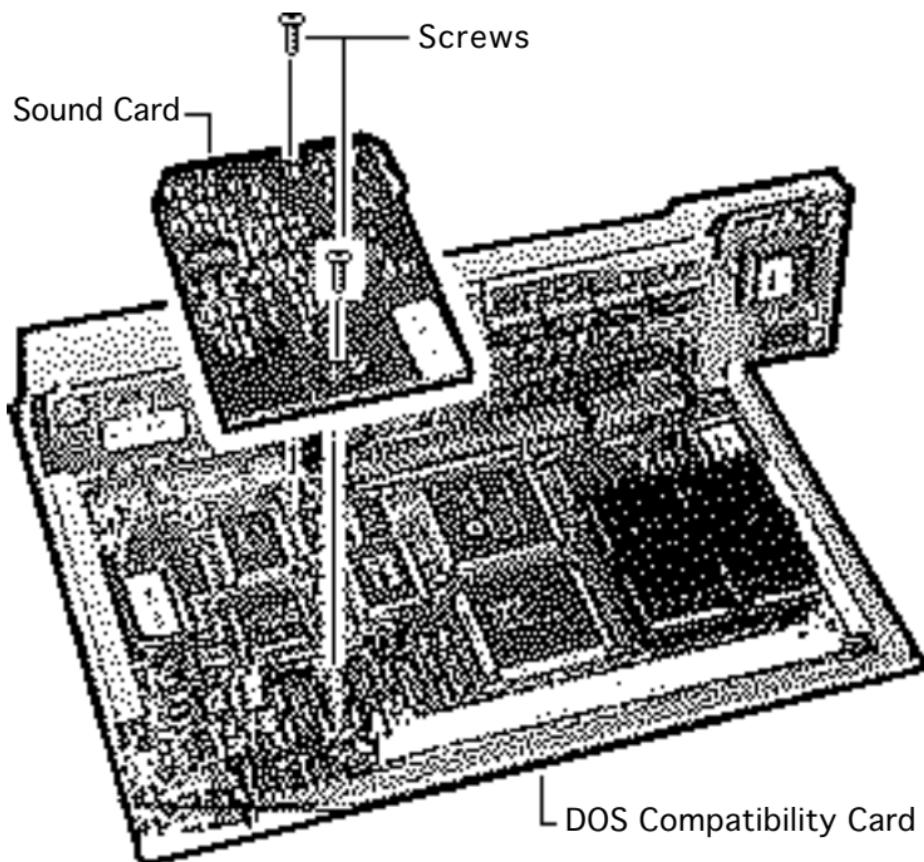
Screws

Sound Card

DOS Compatibility Card

Important: The jumper at location J10 on the DOS Compatibility card is mismarked. When installing a new DOS Compatibility card, make sure the jumper at J10 is in the "SX" position (over the two right-most prongs) or you may experience problems with the card. See the "Miscellaneous" topic in the Trouble-shooting chapter for more information.

Floppy Drive

Floppy Drive
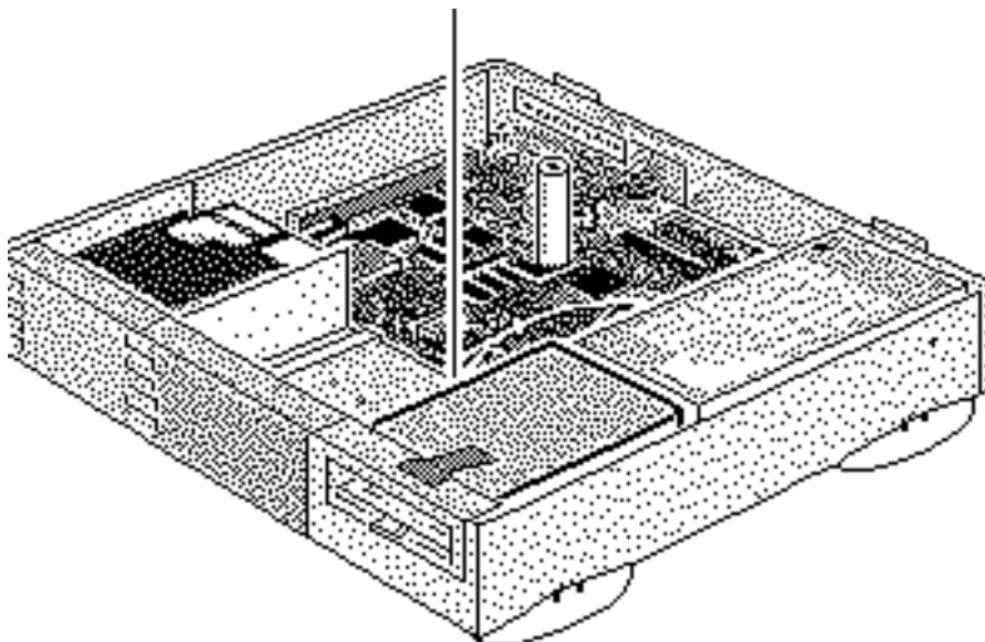
Before you begin, remove the top housing.

Caution: Review the ESD precautions in Bulletins/ Safety.
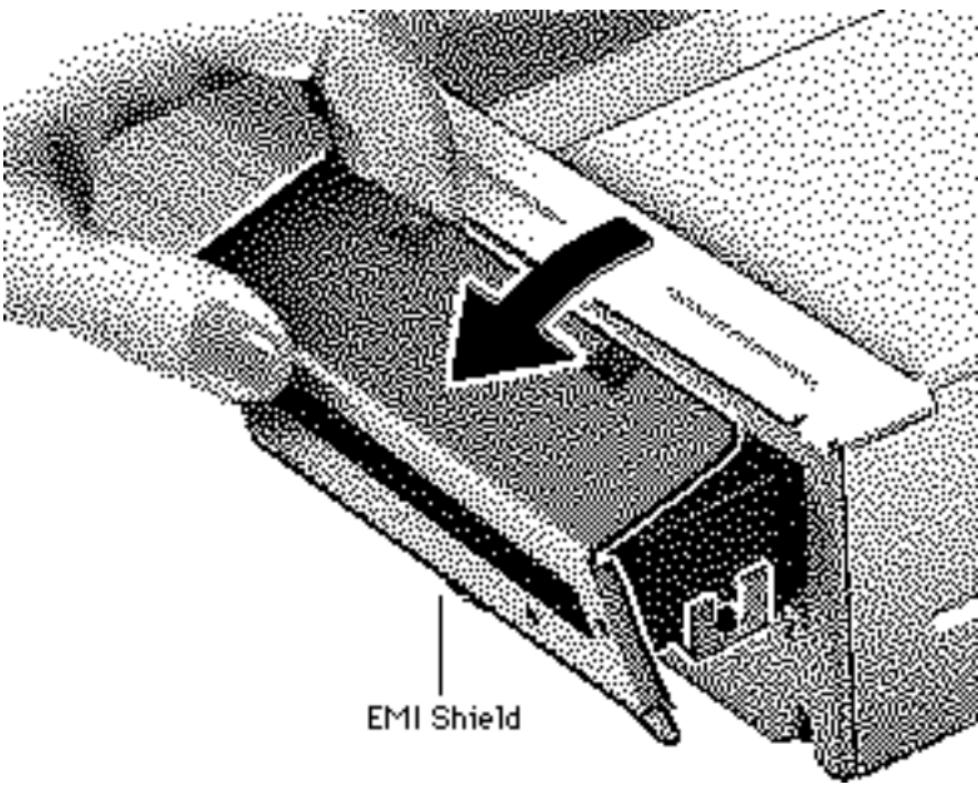
EMI Shield

1. Slide the drive forward a couple of inches.

2. Lift up and out on the EMI shield to remove it from the front of the floppy drive.

Floppy Drive

Tab

Tab

3 Press the tabs outward
   and slide the floppy
   drive forward a few
   inches.
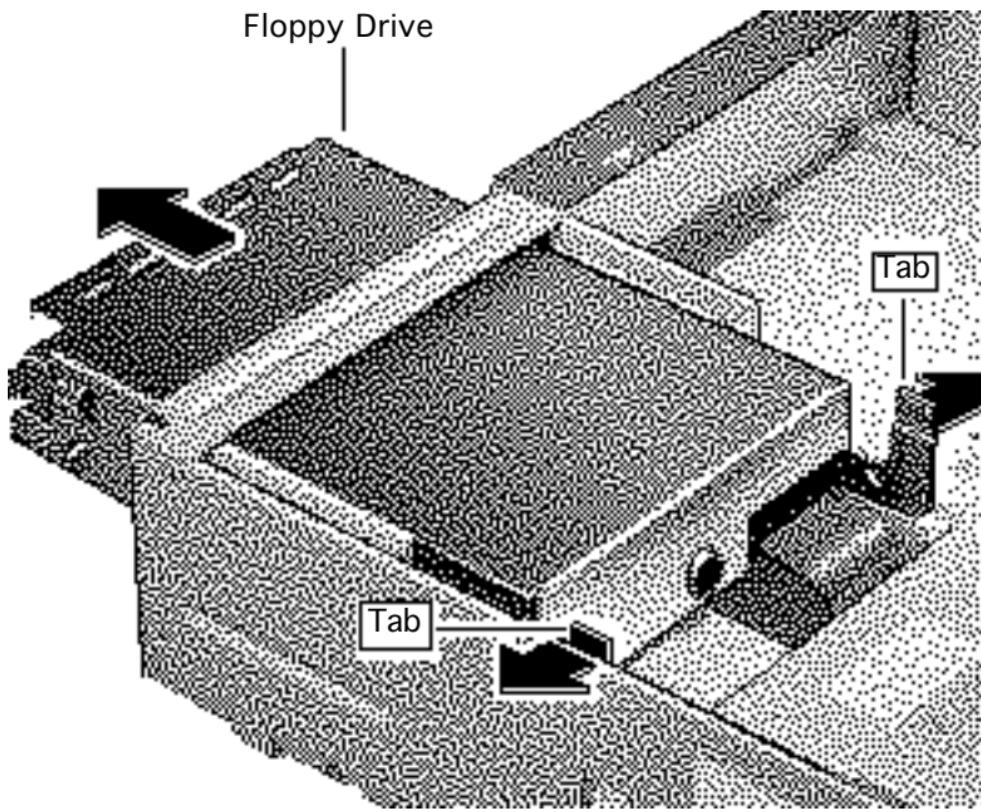
Floppy
Drive
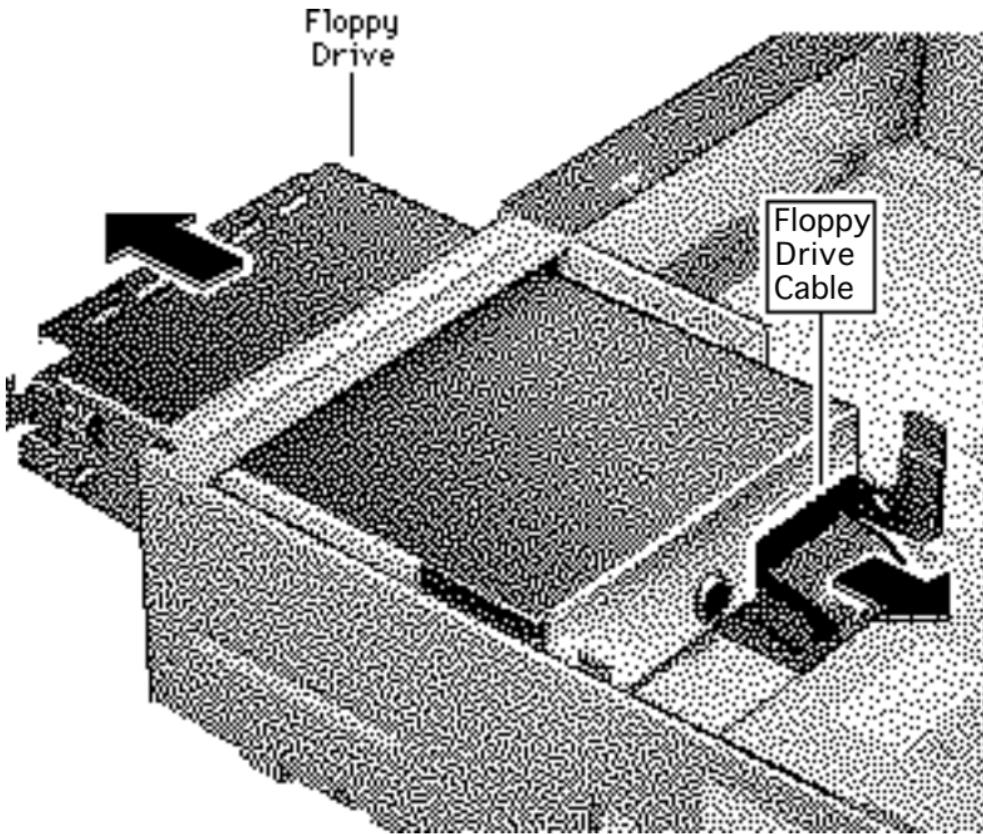
Floppy
Drive
Cable

4 Disconnect the floppy
   drive cable.

   Note: You can easily
   reach the floppy drive
   cable connector when the
   floppy drive is forward.

5 Slide out the floppy
   drive.

Hard Drive

Before you begin, remove the top housing.

Caution: Review the ESD precautions in Bulletins/Safety.

Hard Drive

SCSI Data Cable

Hard Drive
Power Cable
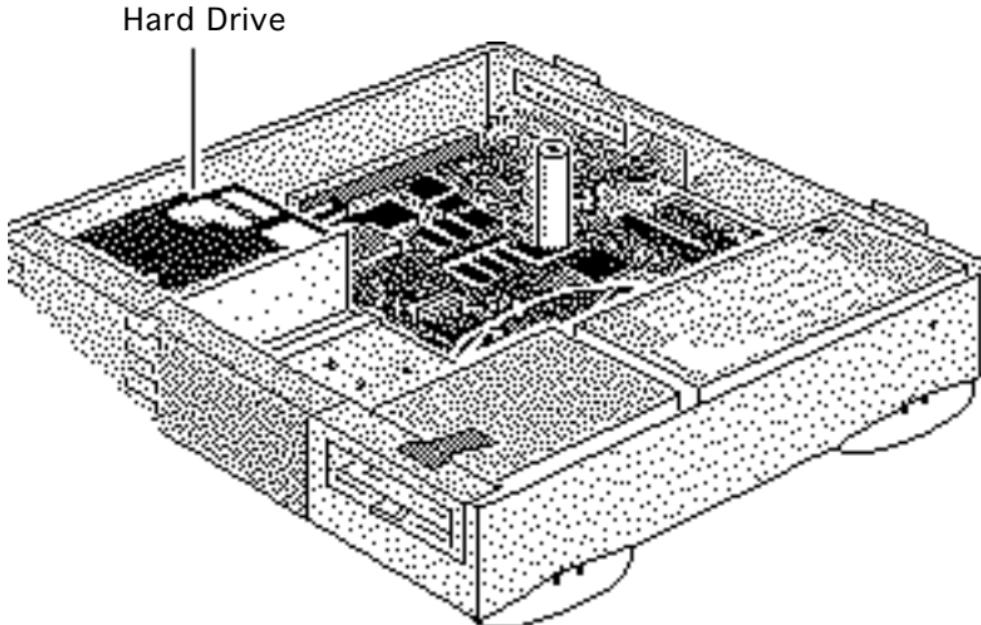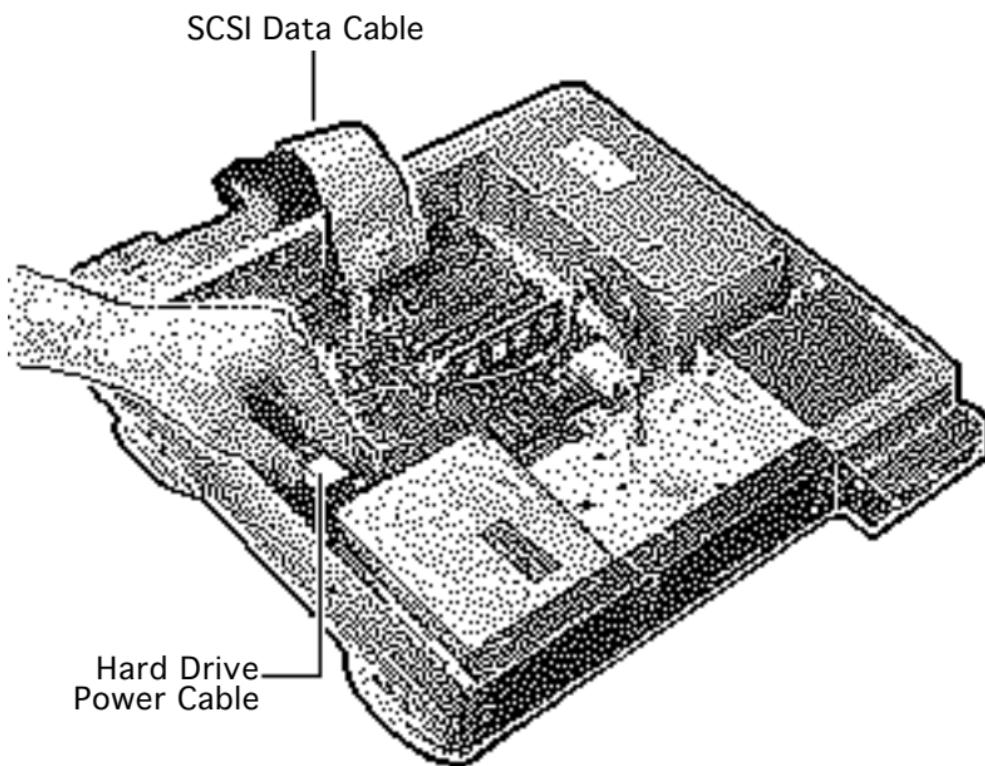
1 Disconnect the SCSI data
   and hard drive power
   cables from the hard
   drive.

2   Remove the hard drive
    EMI shield.

Hard Drive EMI Shield
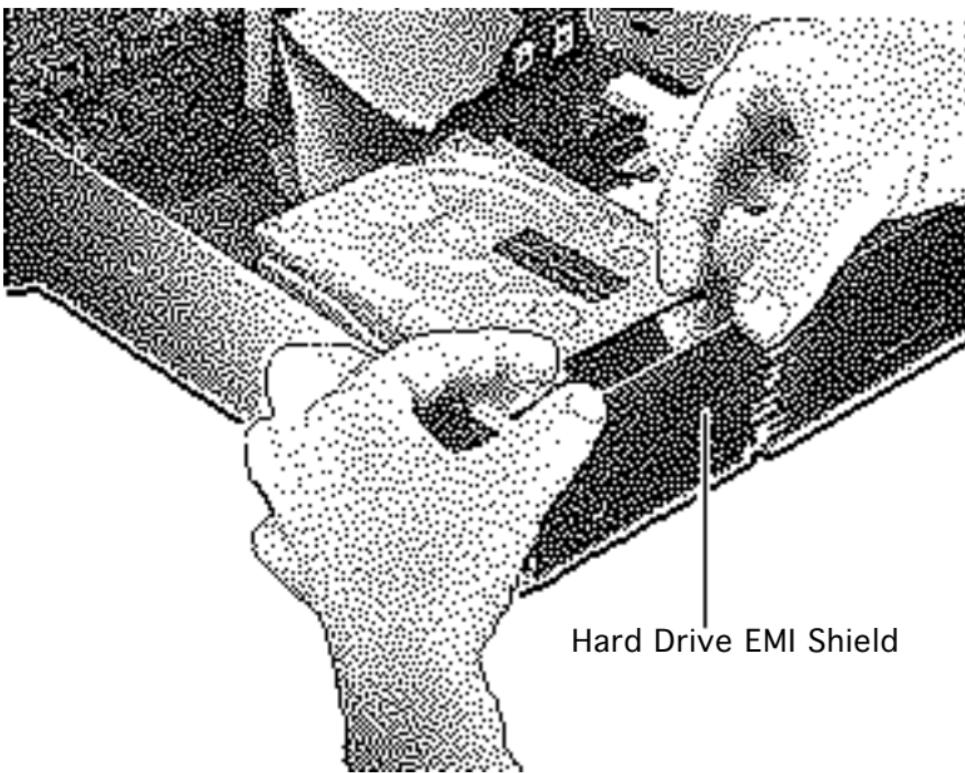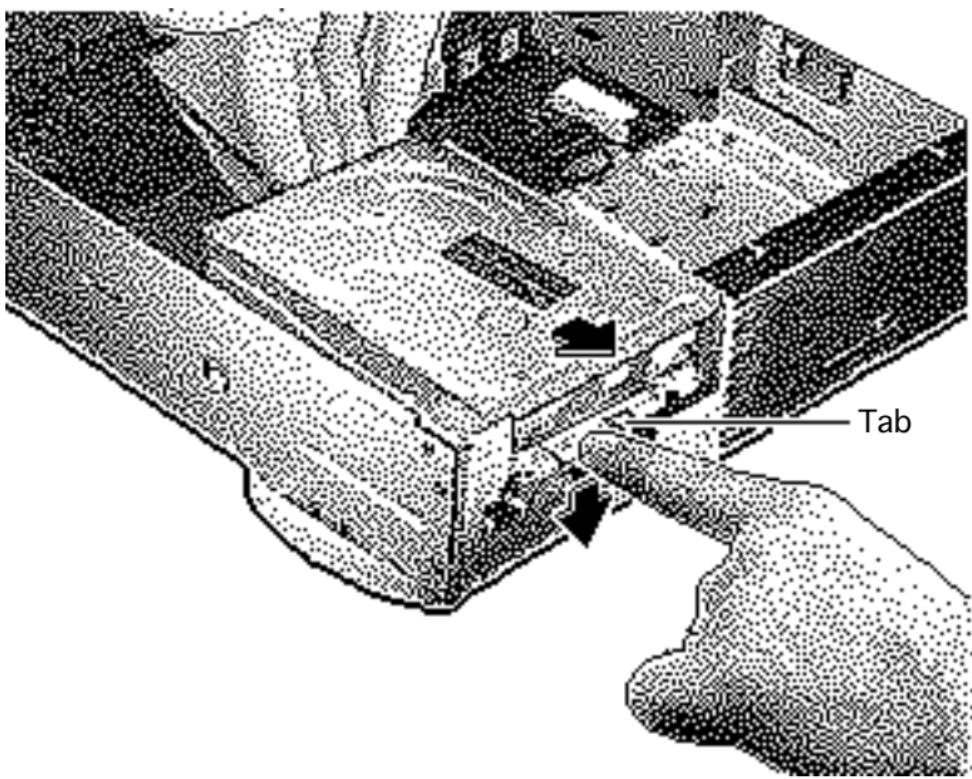
3 Press down on the tab and slide out the hard drive.
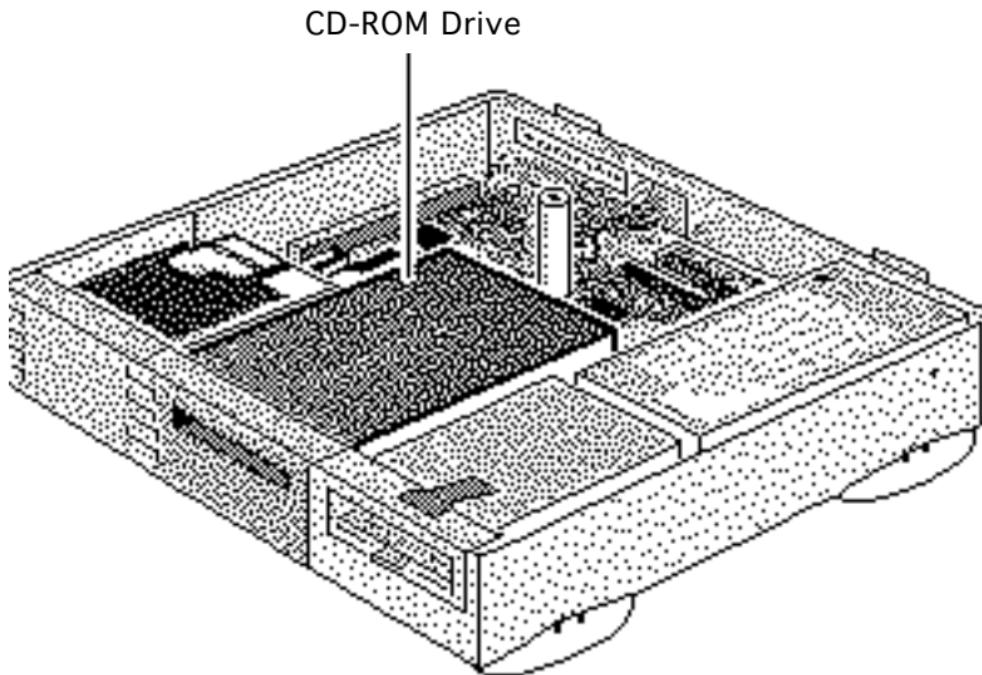
Tab

CD-ROM Drive

CD-ROM Drive

Before you begin, remove the top housing.

Caution: Review the ESD precautions in Bulletins/Safety.

SCSI Data Cable

CD-ROM Drive Power Cable
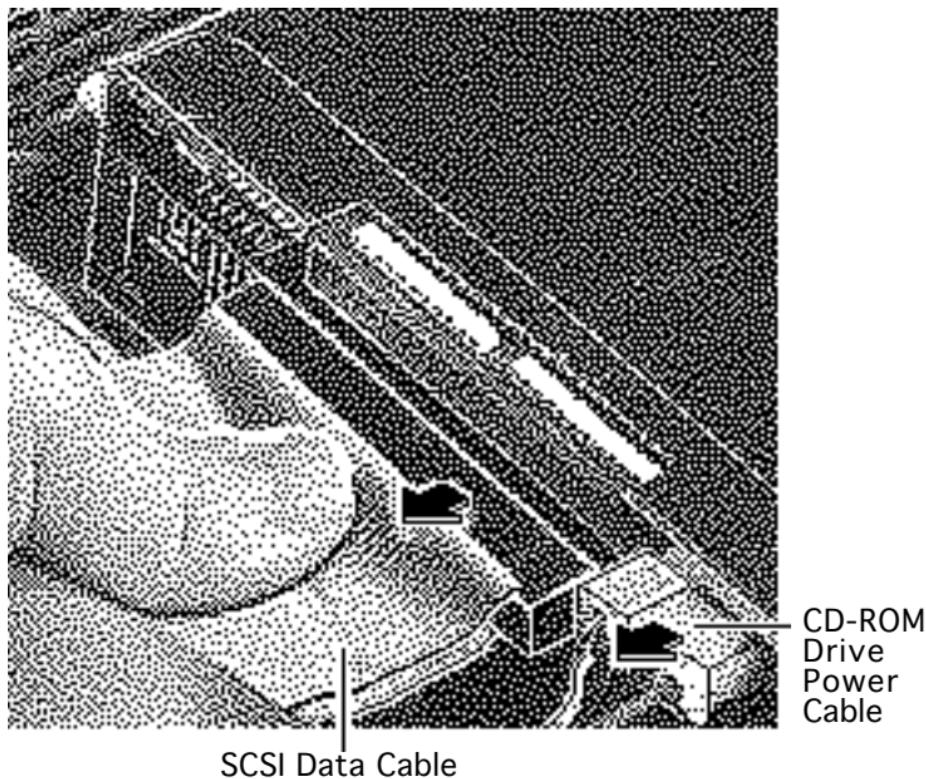
1   Disconnect the SCSI data cable and CD-ROM drive power cable from the CD-ROM drive.

2   Disconnect the CD-ROM audio cable.

3 Remove the CD-ROM drive EMI shield.

Bottom Cover

CD-ROM Drive EMI Shield
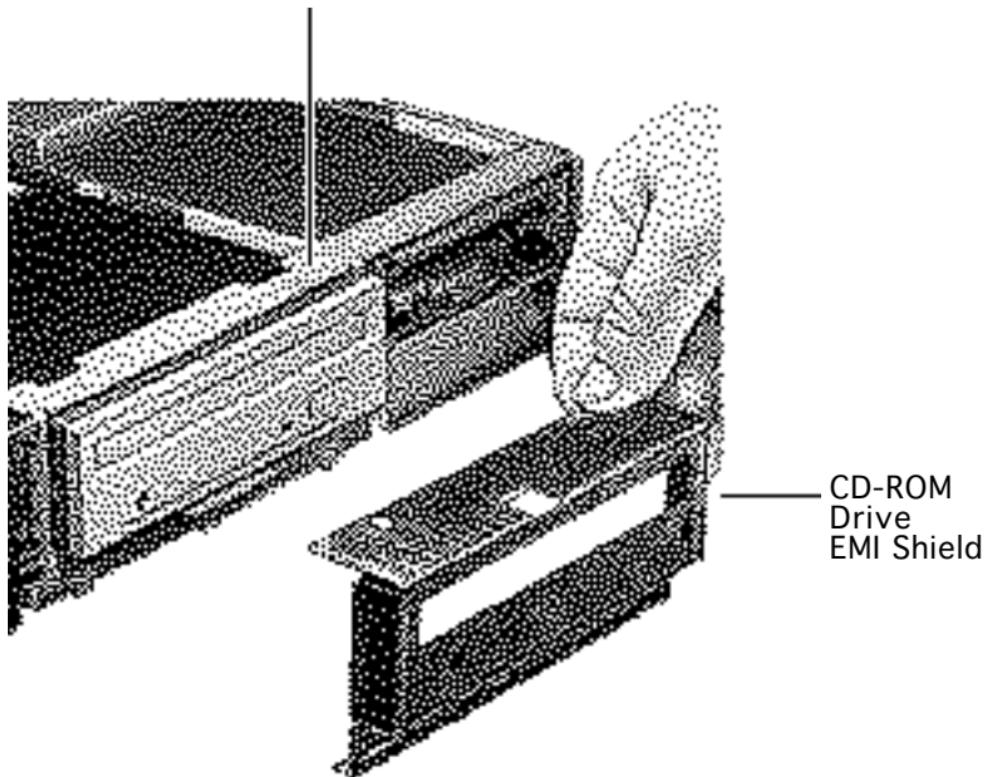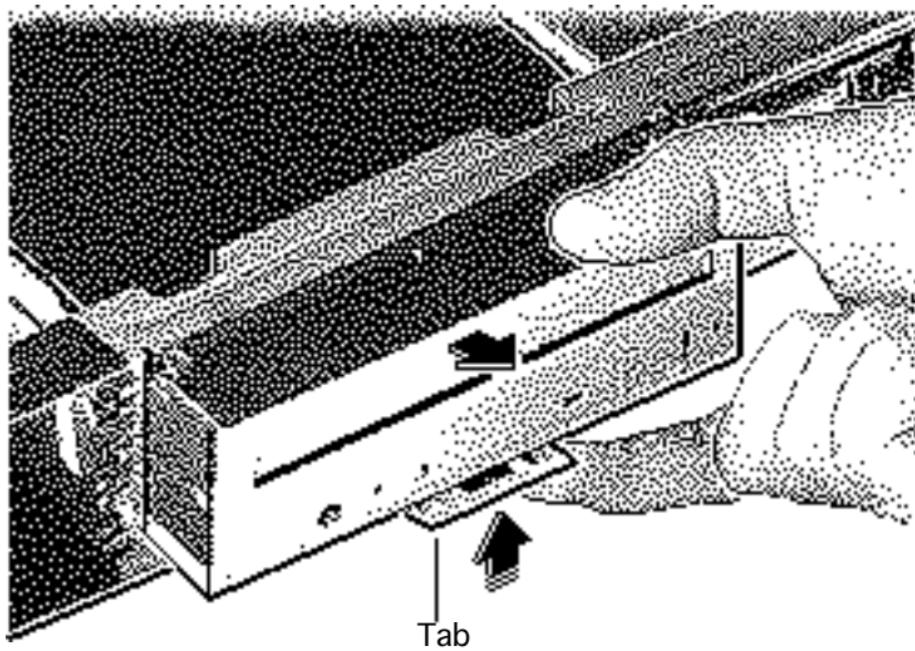
4   Press up on the tab and
    slide out the CD-ROM
    drive.

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

Tab

Bottom Housing Assy
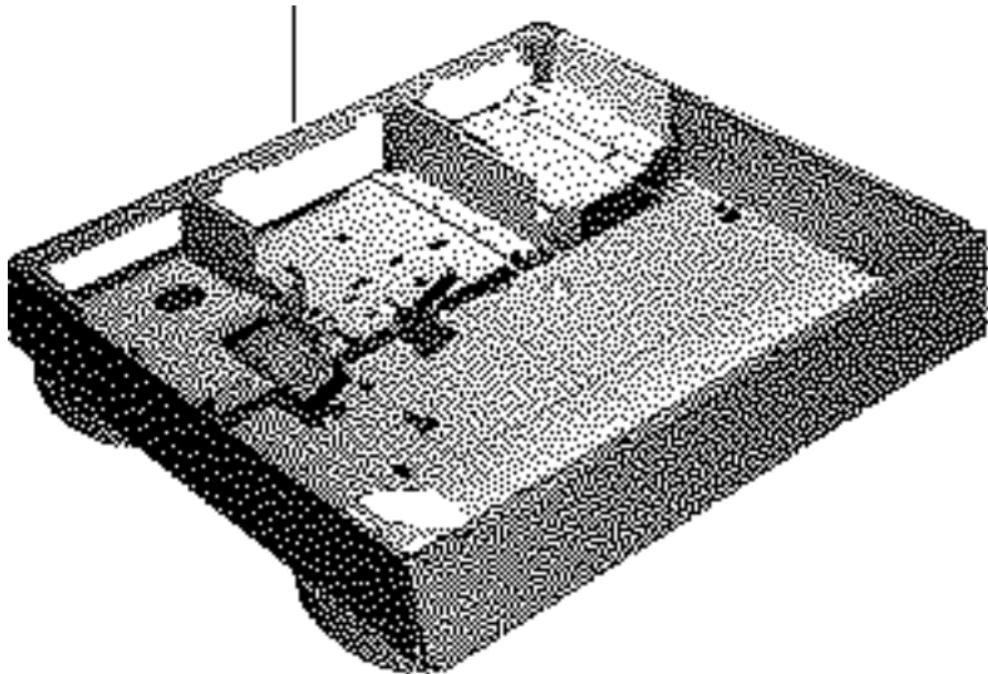
Bottom Housing Assy

Before you begin, remove the following:

- Top housing
- Power supply
- Floppy drive
- Hard drive
- CD-ROM drive (if installed)
- Logic board

Caution: Review the ESD precautions in Bulletins/Safety.

Bottom Housing Assy
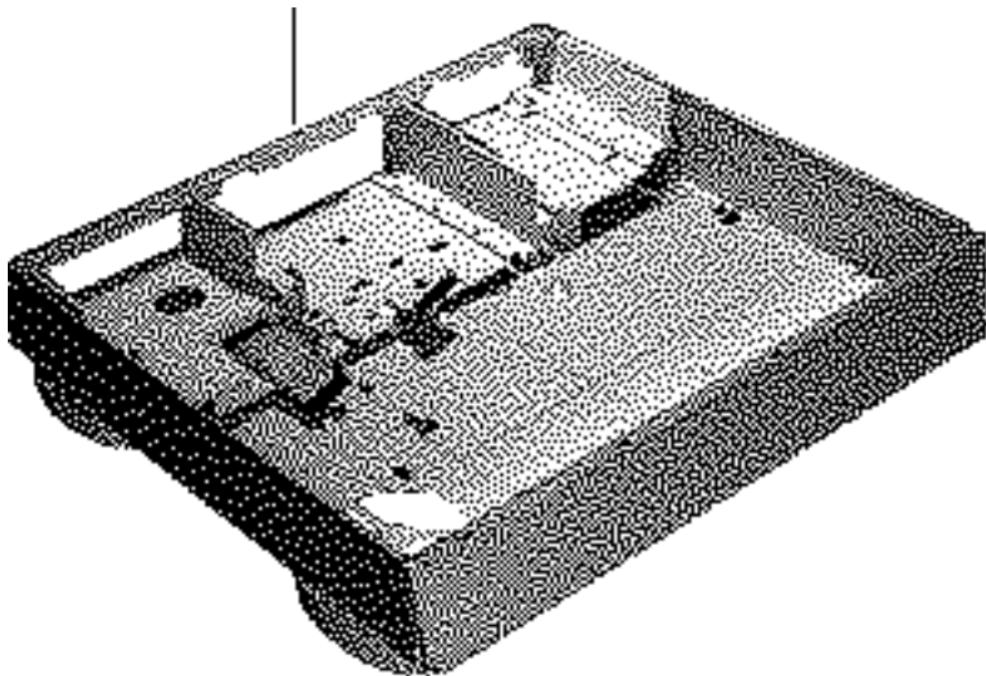
Note: Once you have removed all the parts listed on the previous page, the bottom housing assembly is what remains. It includes the floppy drive cable, LED cable, speaker, and internal chassis.
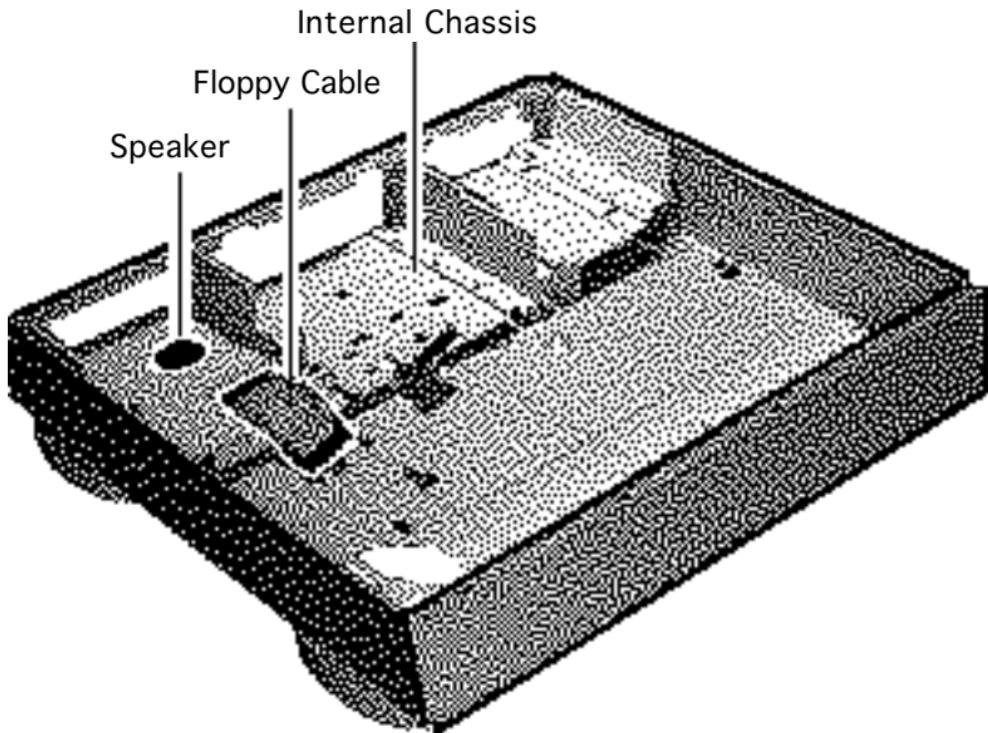
Speaker & Floppy Cable

Internal Chassis

Floppy Cable

Speaker

Before you begin, remove the following:

- Top housing
- Power supply
- Floppy drive
- Hard drive
- CD-ROM drive (if installed)
- Logic board

Caution: Review the ESD precautions in Bulletins/Safety.

Internal Chassis

Support Post

Rail and
Metal Tab

Tab
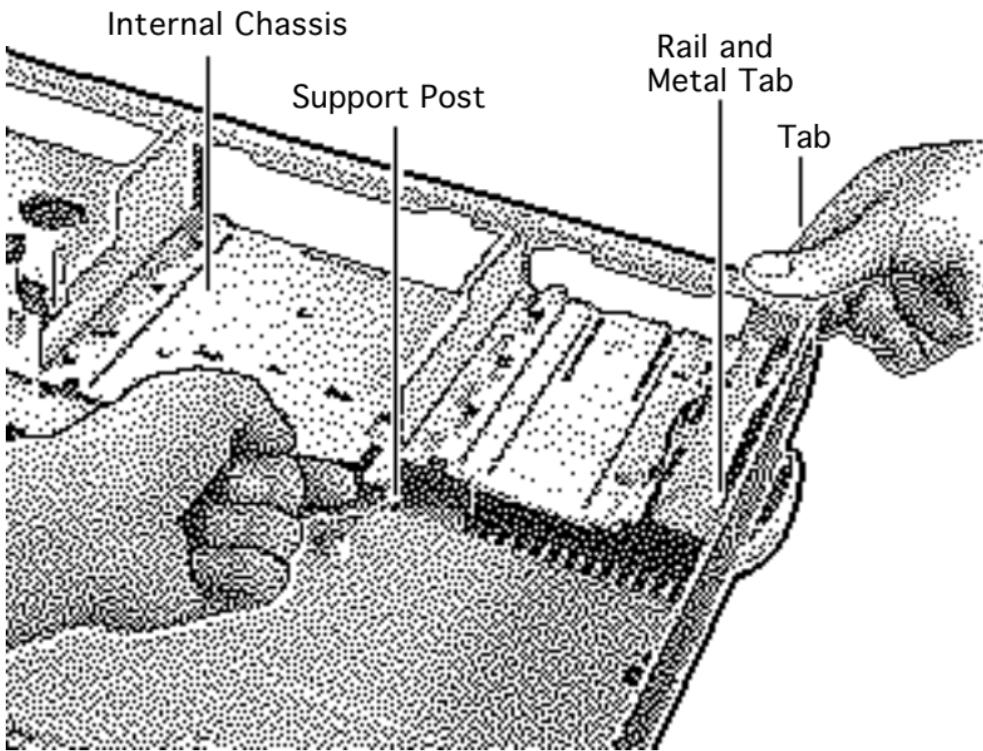
Note: The chassis is secured to the bottom cover by two tabs at the front of the unit, two rail and tab sets at the sides of the unit, support posts at the back of the chassis, and hidden brackets that slide into the bottom cover.

1　Press up on one of the front tabs while lifting the support post.

2　Repeat this step on the other side until the internal chassis slides easily toward the back of the computer.

Internal Chassis
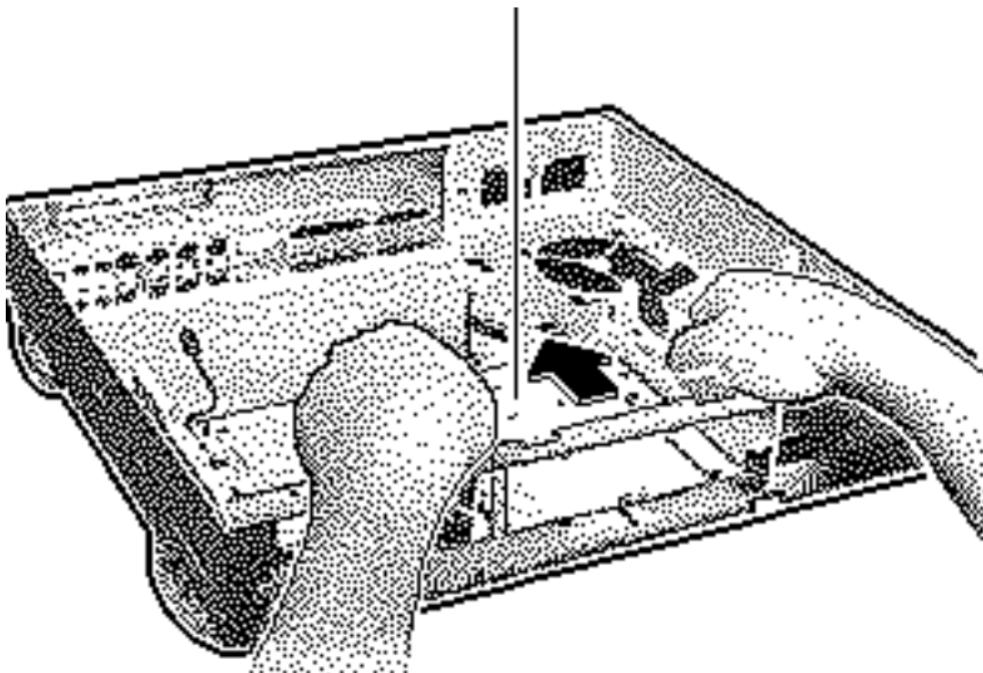
3 Press down and slide the chassis toward the back of the computer.

4 Remove the chassis.
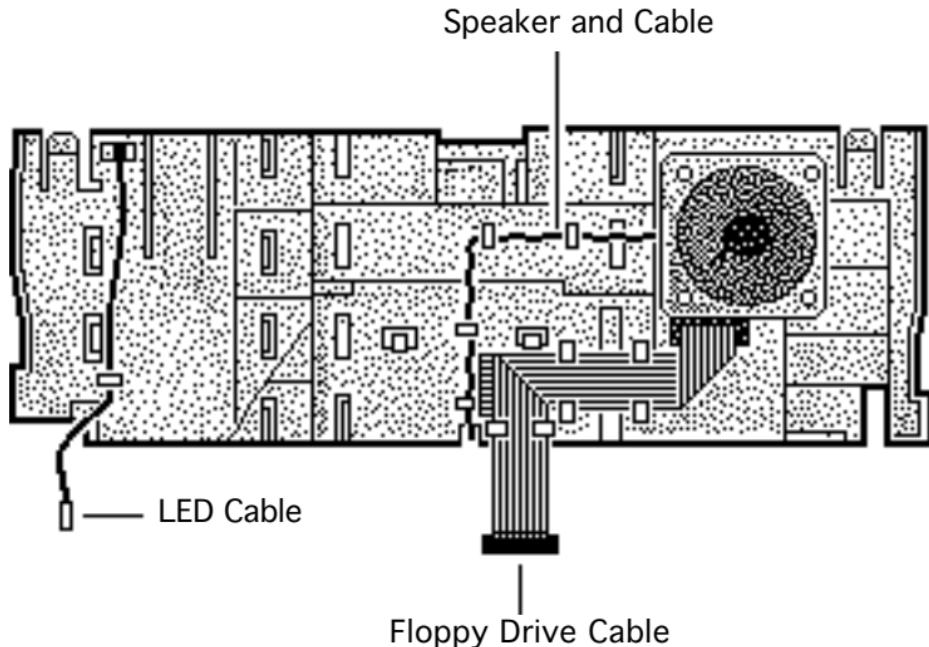
Note: The LED cable, floppy drive cable and speaker are part of the internal chassis assembly.

5   Turn the chassis over.

6   Remove the floppy drive cable and the LED cable.

Speaker and Cable

LED Cable

Floppy Drive Cable
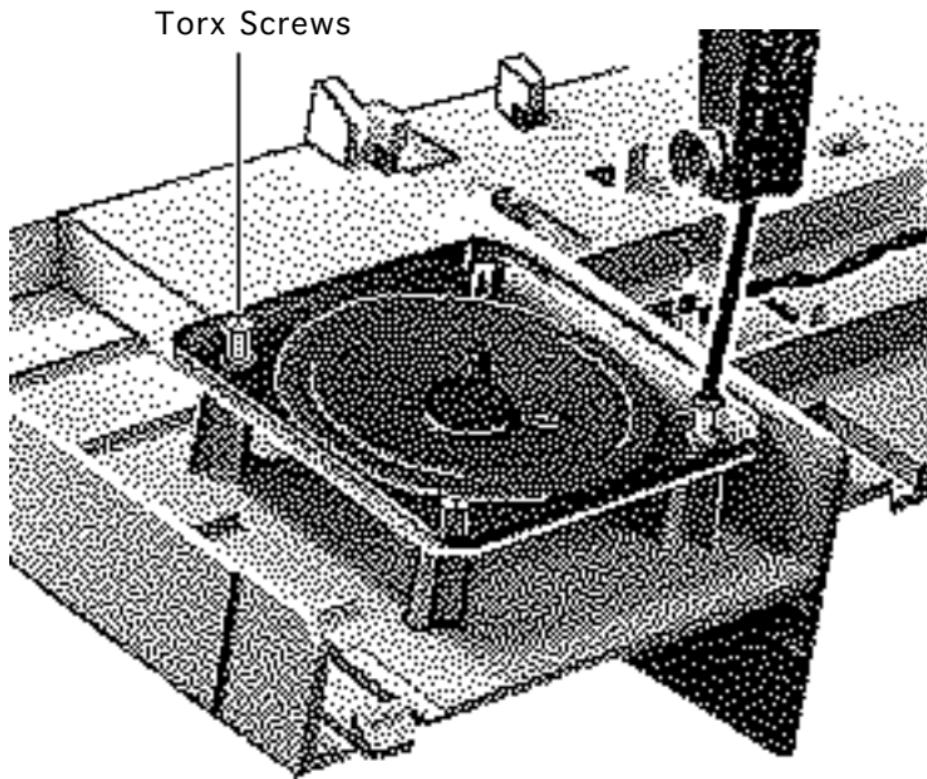
Torx Screws

7 Remove the two torx
   screws from the
   speaker.

8 Remove the speaker
   cable from its routing
   guides.

9 Lift out the speaker.

Bottom Cover

Internal Chassis
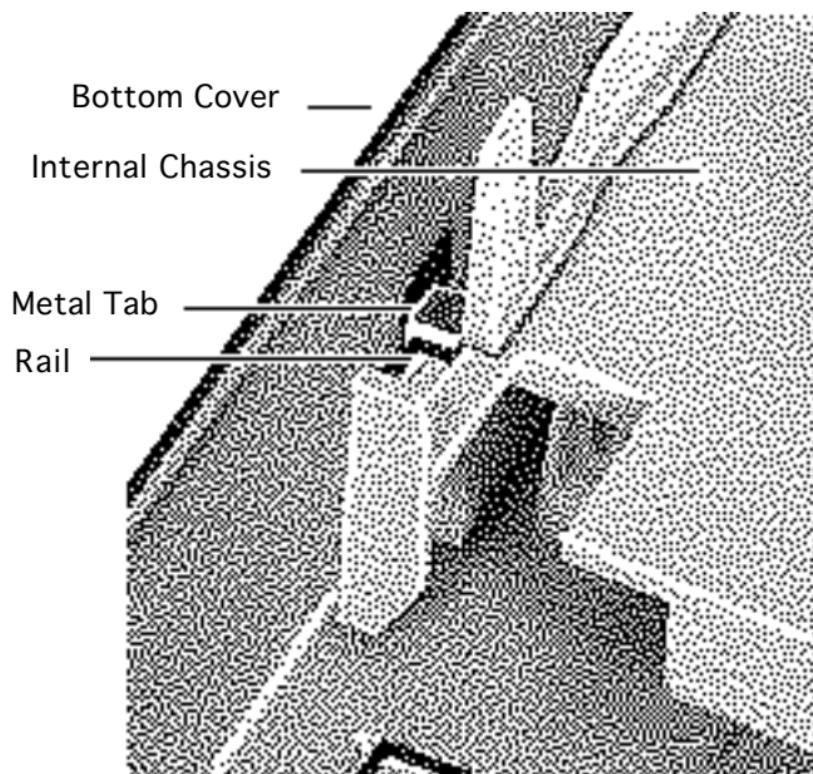
Metal Tab

Rail

Replacement Note: To replace the chassis, carefully slide rails at the side of the chassis under the metal tabs.

Replacement Note: After carefully aligning the side rails, push down firmly on the chassis and slide it toward the front of the unit. The tabs will snap in place.

Additional Procedures

Power Macintosh 6100/WS 6150

Battery

Battery Verification

Before you begin, remove the top housing.

Warning: If handled or discarded improperly, the lithium battery in the computer could explode. Review battery handling and disposal instructions in Bulletins/Safety.

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

Negative Probe

Positive Probe

✂ — "+"
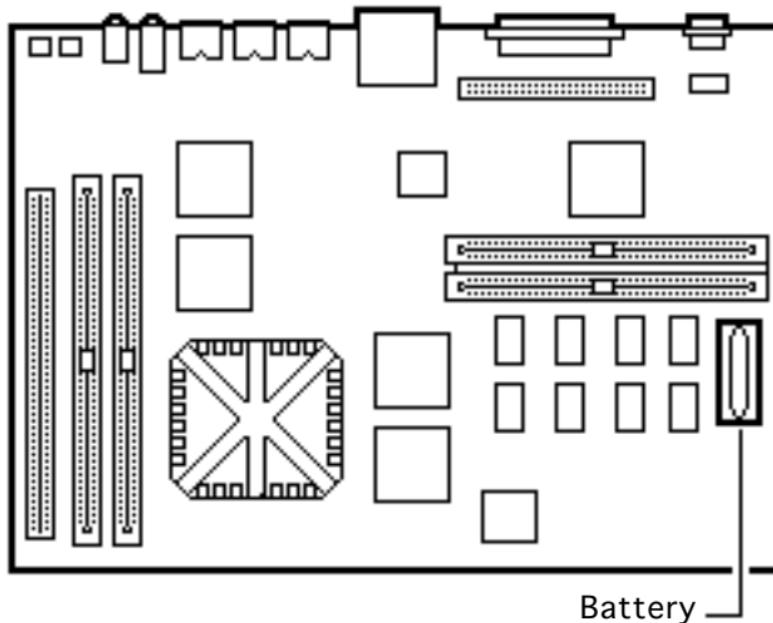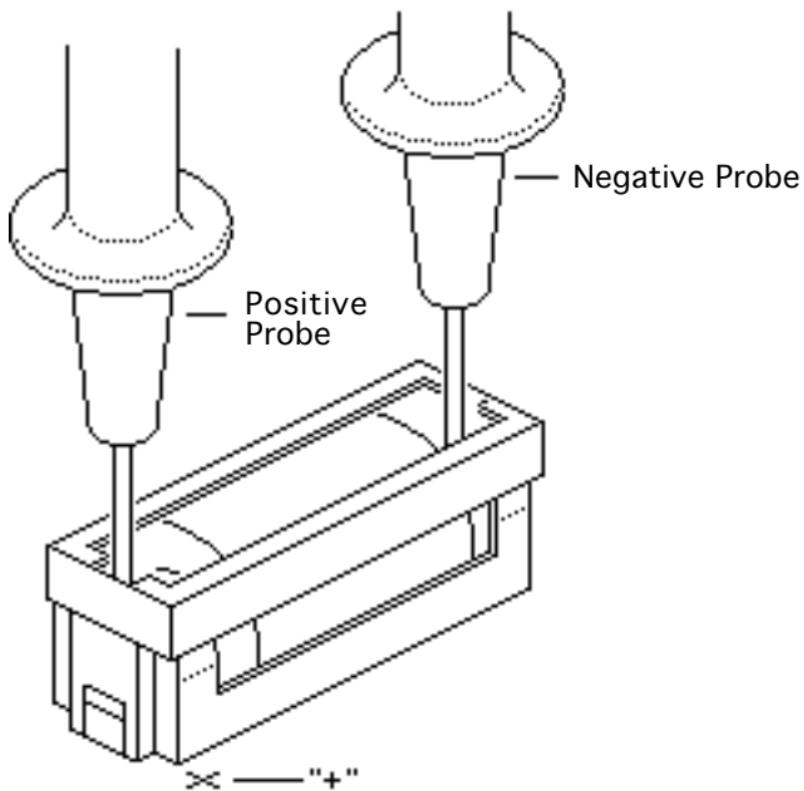
1. Set the voltmeter to the 10 volts DC scale.

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

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

Battery

Battery Replacement

Before you begin, remove the top housing.

Warning: If handled or discarded improperly, the lithium battery in the computer could explode. Review battery handling and disposal instructions in Bulletins/Safety.

Caution: Review the ESD precautions in Bulletins/Safety.
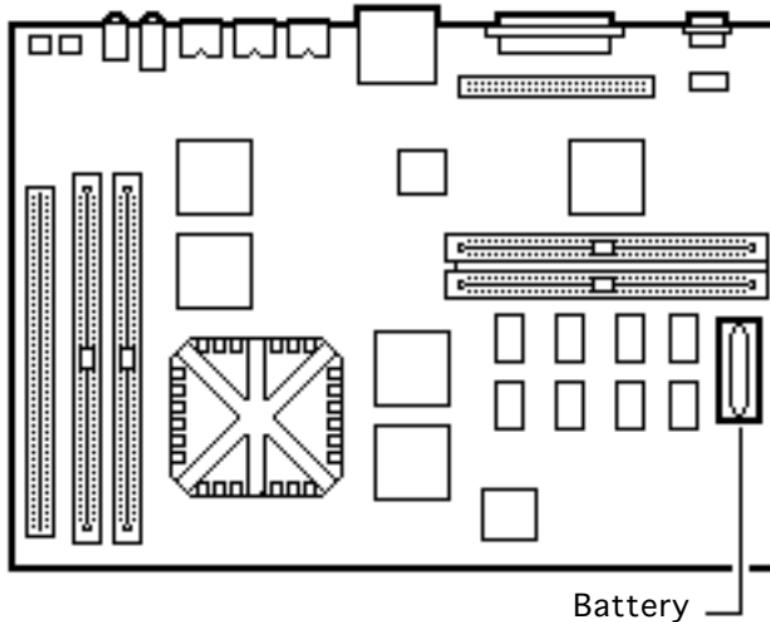
1 Using a small flat-blade screwdriver, pry open the latch at the end of the battery holder and lift off the cover.
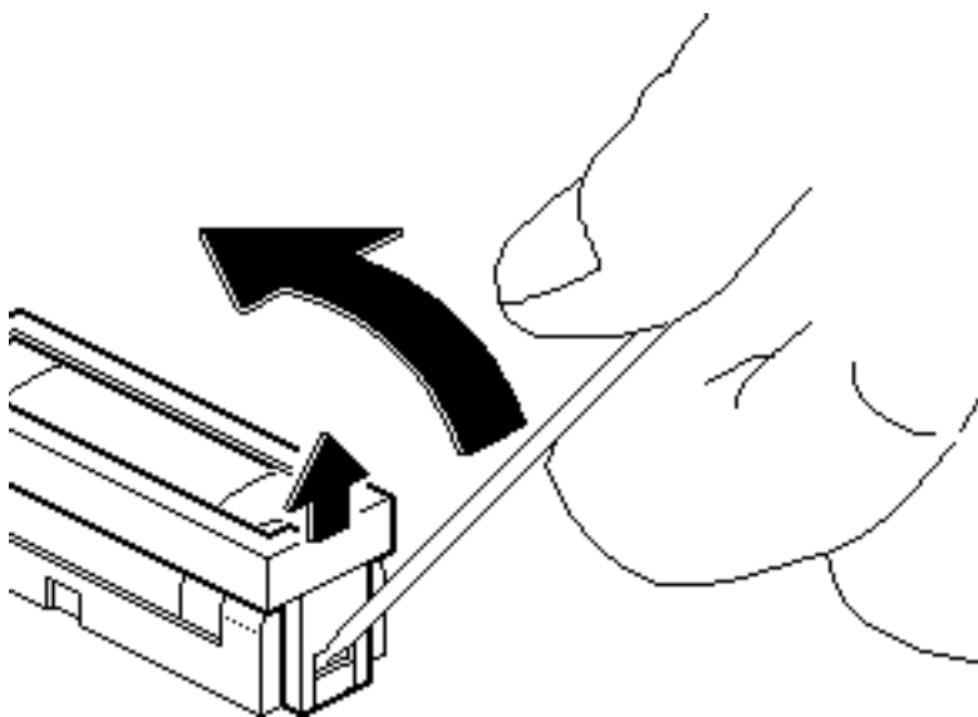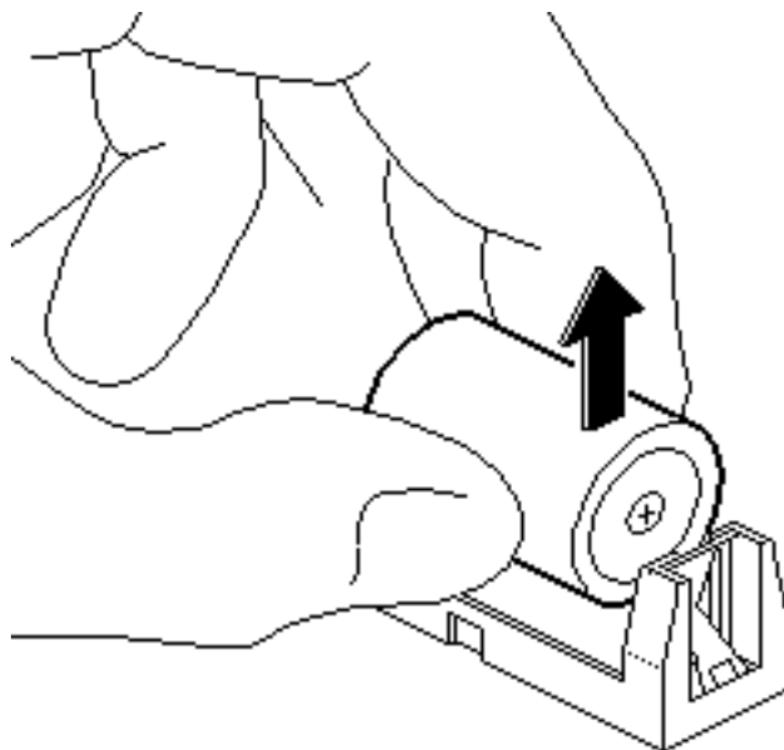
2 Grasp the battery and remove it from the holder.

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

Battery

Reset Logic Board

Before you begin, remove the following:

- Top housing
- Power cord

Note: Whenever you have a unit that fails to power up, follow this procedure to reset the logic board **before** replacing any modules.
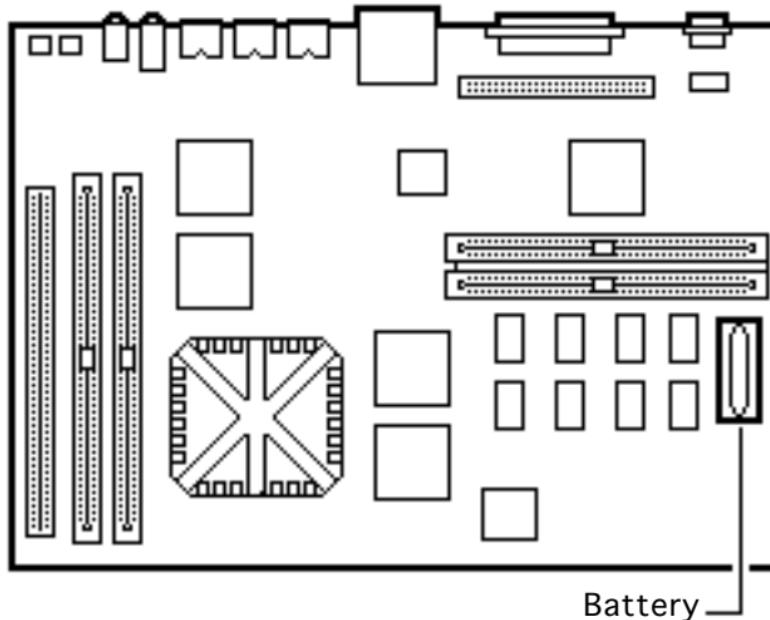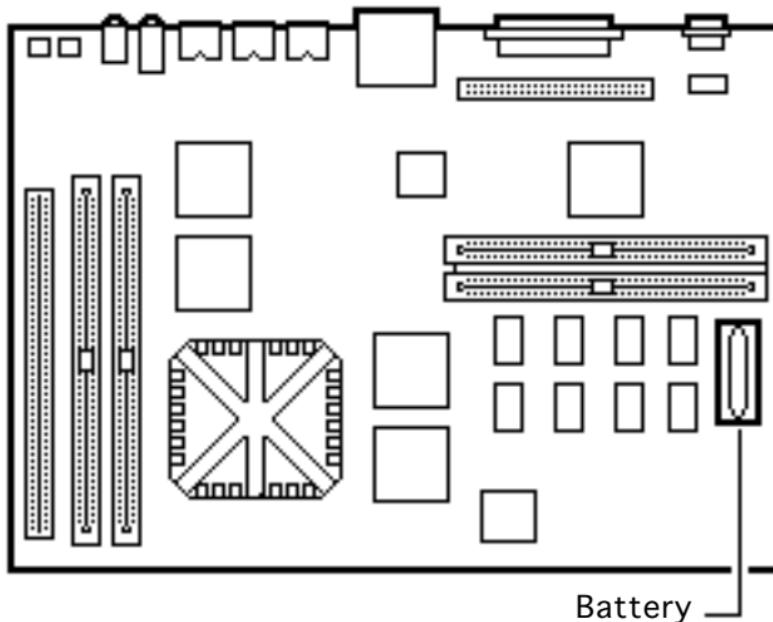
Battery

Warning: If handled or discarded improperly, the lithium battery in the computer could explode. Review battery handling and disposal instructions in Bulletins/Safety.

Caution: Review the ESD precautions 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.
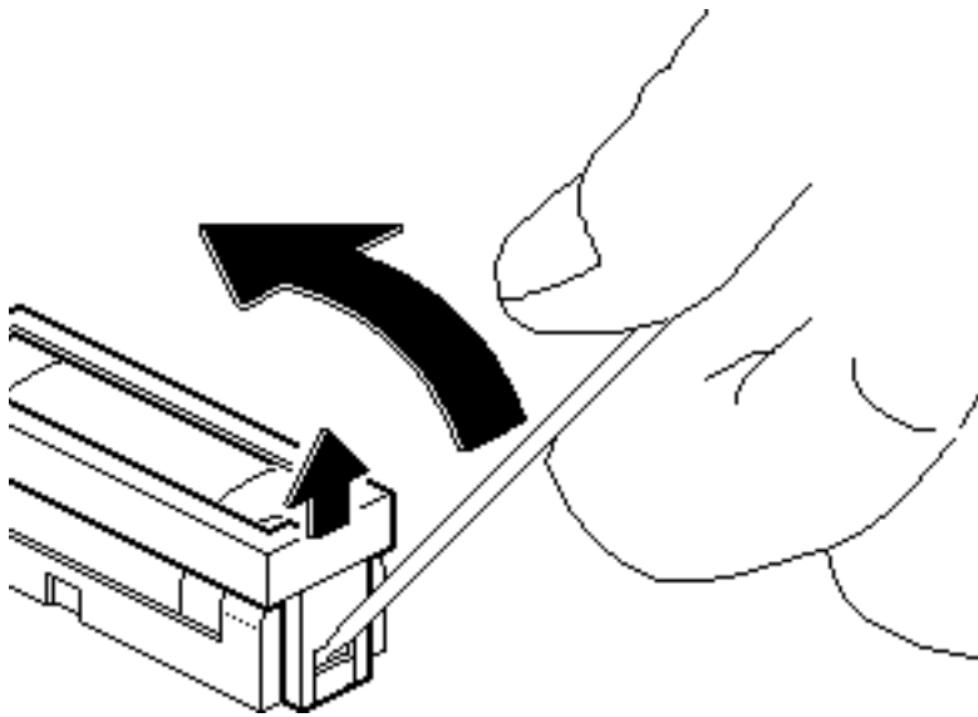
3 Grasp the battery and
   remove it from the
   holder.
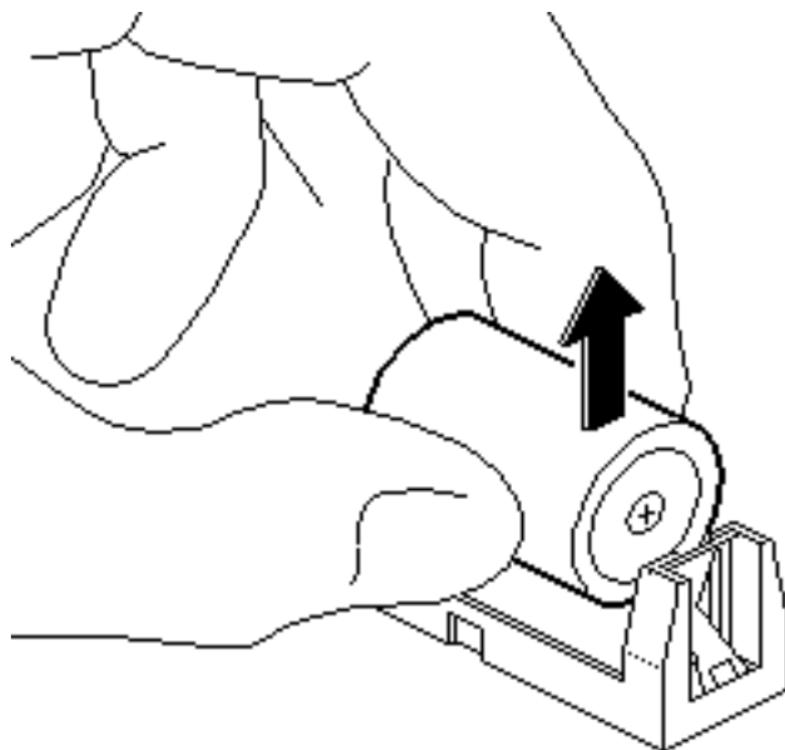
4 Press the power on button.

5 Disconnect the power supply cable from the logic board. Wait 5–10 minutes and then

   • Replace the battery
   • Reconnect the power supply cable
   • Reassemble the computer

Replacement Note: Make sure the battery is facing in the correct direction.

Power On Button

Power On Button

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 the defective component and **do not** claim the adjustment procedure.
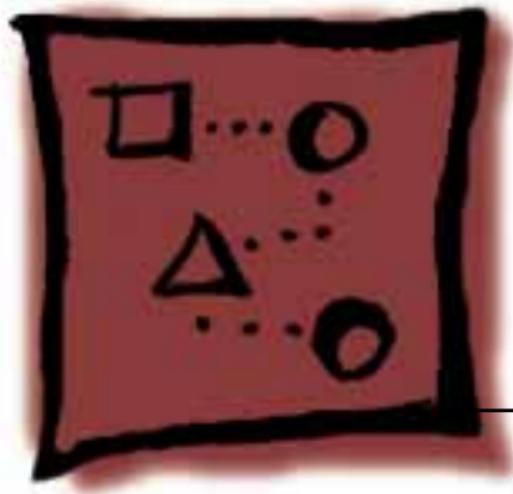
Upgrades

Power Macintosh 6100/WS 6150

Expansion Card Slot
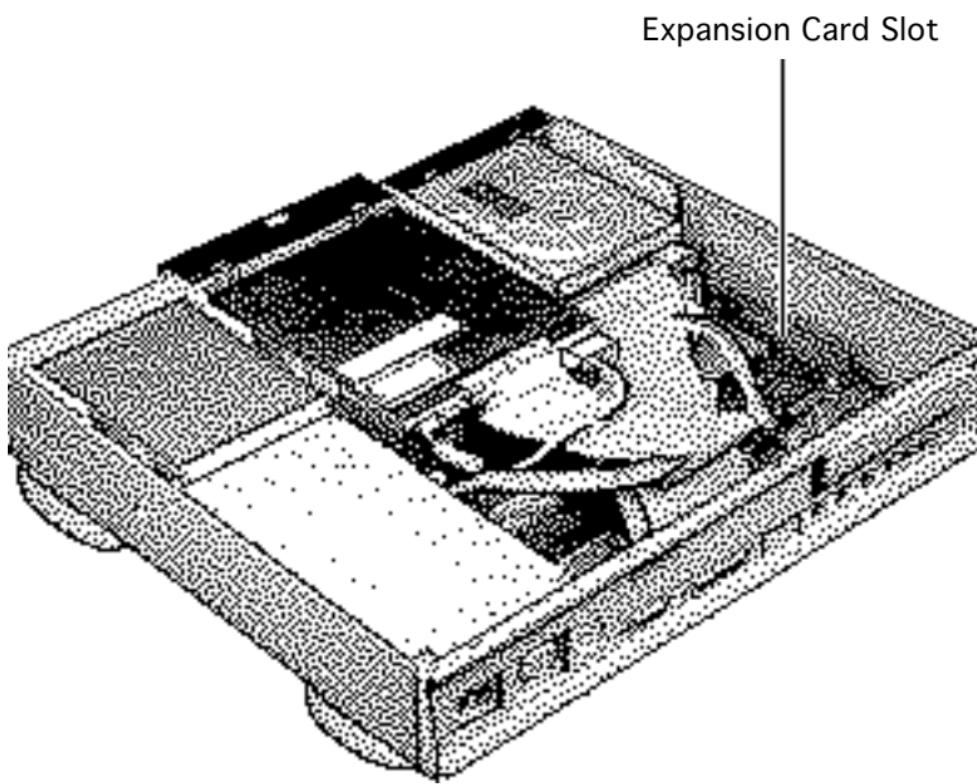
Expansion Cards

Before you begin, remove the following:

- Top housing
- SCSI hard drive cable

Caution: Review the ESD precautions in Bulletins/Safety.

Note: The Power Macintosh 6100/60AV has an AV card in the PDS slot. You cannot install expansion cards in this machine.

Expansion Port
Cover

1 Remove the expansion port cover from the rear panel.
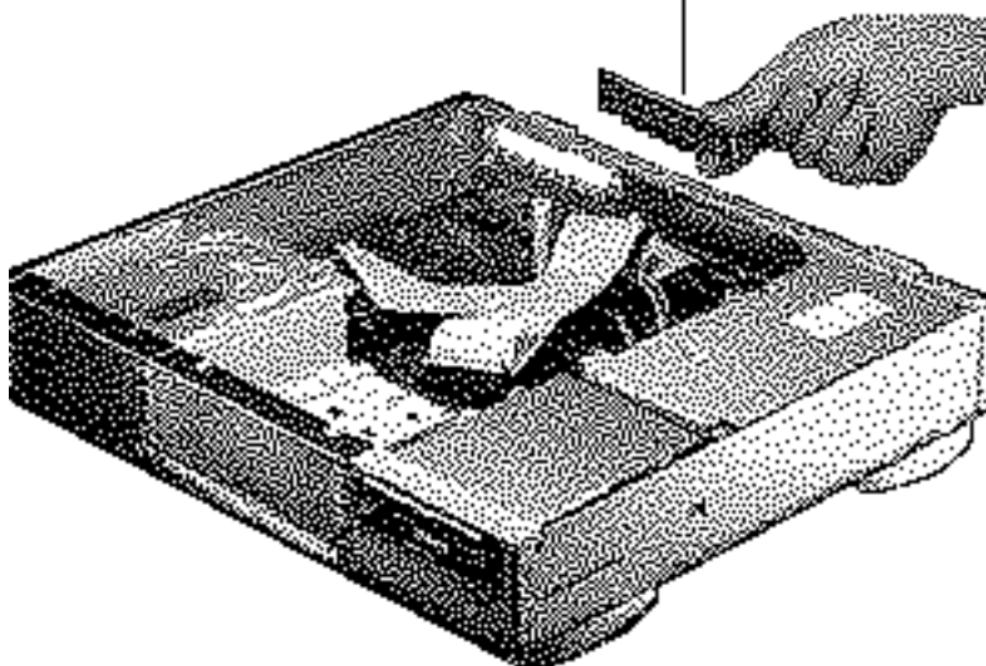
Expansion Card

Adapter Card Pin

Expansion Card Hole
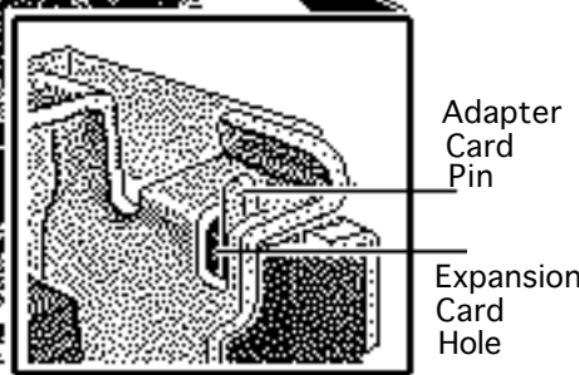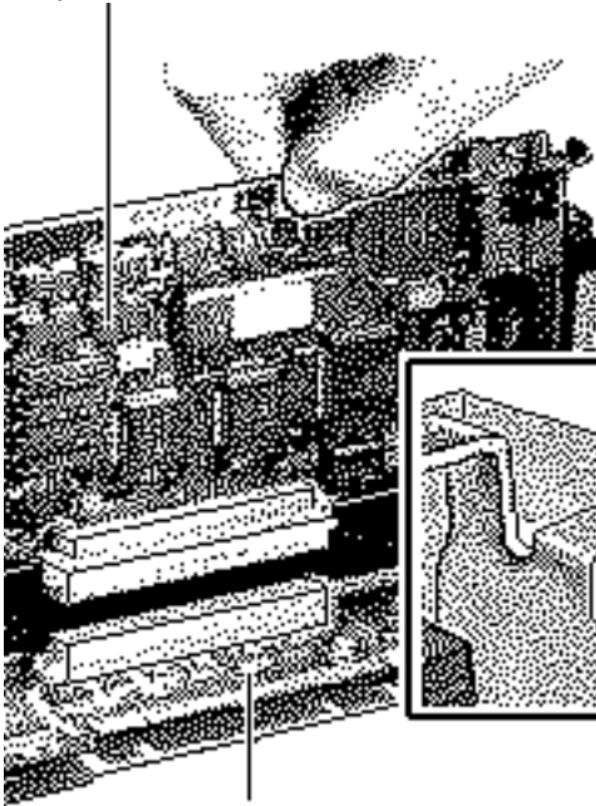
Adapter Card

2   Loosely connect the
    expansion card
    connector to the adapter
    card connector.

    Note: Be sure to fit the
    adapter card pin into the
    expansion card hole.

3   Gently press the
    connectors together.

Adapter Card Tab

Adapter Card Connector

Bottom Housing Slot
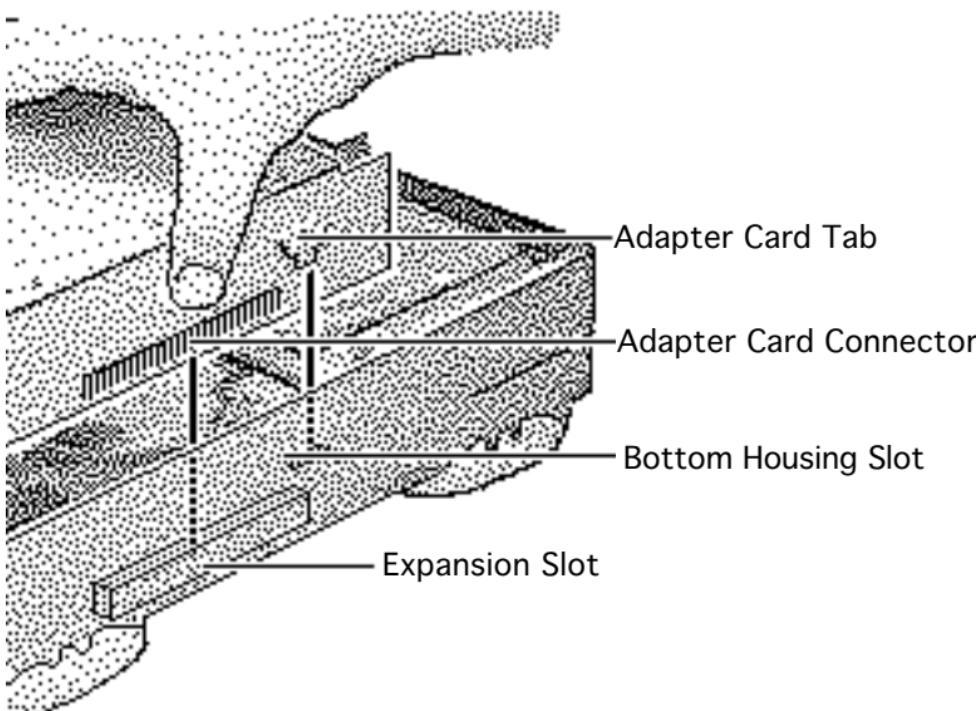
Expansion Slot

4   Insert the connector on the bottom of the adapter card into the expansion slot.

Note: Make sure that the tab on the side of the adapter card slides into the slot on the side of the bottom housing.
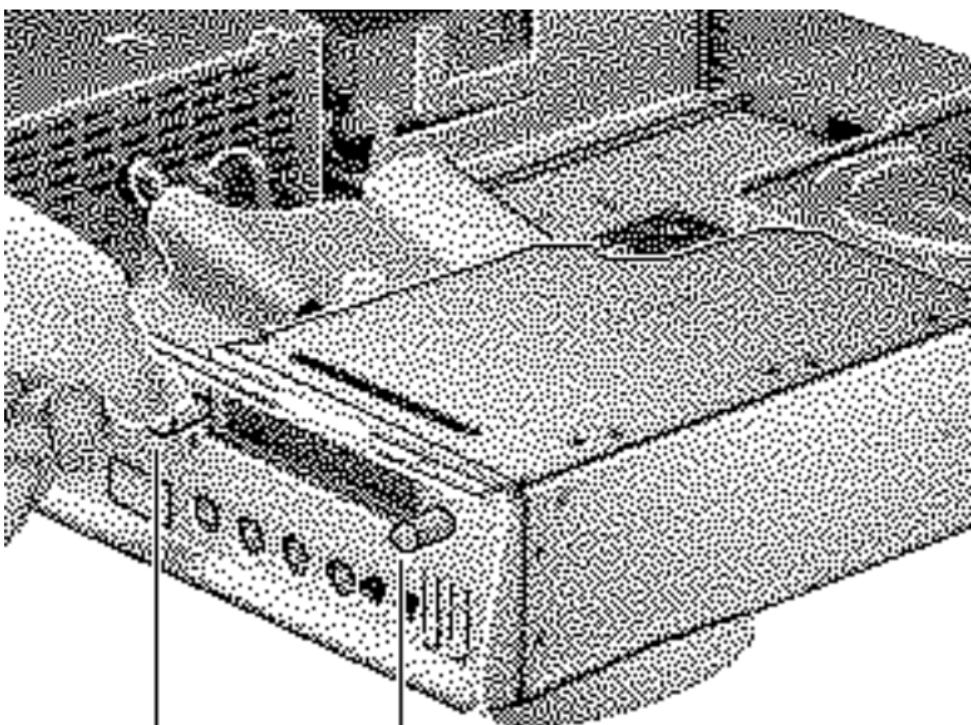
Thumbscrews

5   Attach the thumbscrews.

6   Reconnect the SCSI hard drive cable making sure you run the cable over the expansion card.

CD-ROM Upgrade

CD-ROM Drive Bay
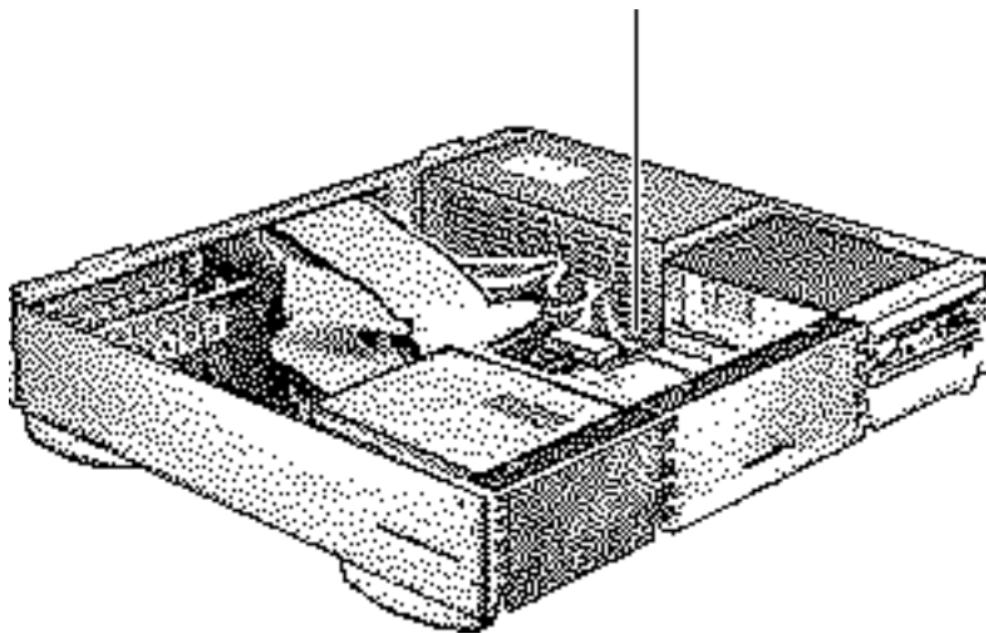
Before you begin, remove the top housing.

Caution: Review the ESD precautions in Bulletins/ Safety.

1 Remove the blank CD-ROM drive bezel from the top housing.

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

Slotted CD-ROM
Drive Bezel
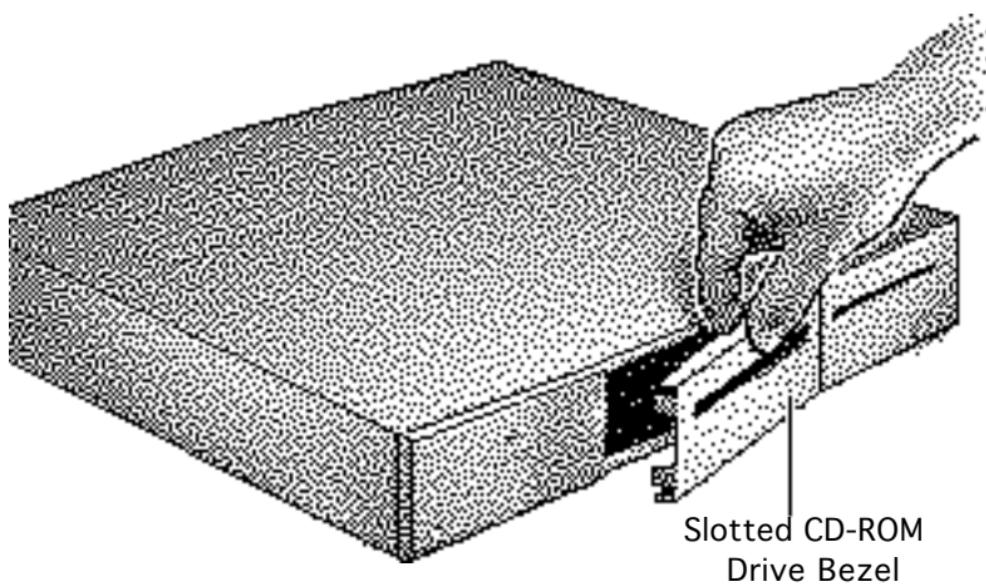
3 Pry off the metal 5.25"
drive bay shield.

5.25'' Drive Bay Shield

CD-ROM Drive Carrier

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

CD-ROM Drive
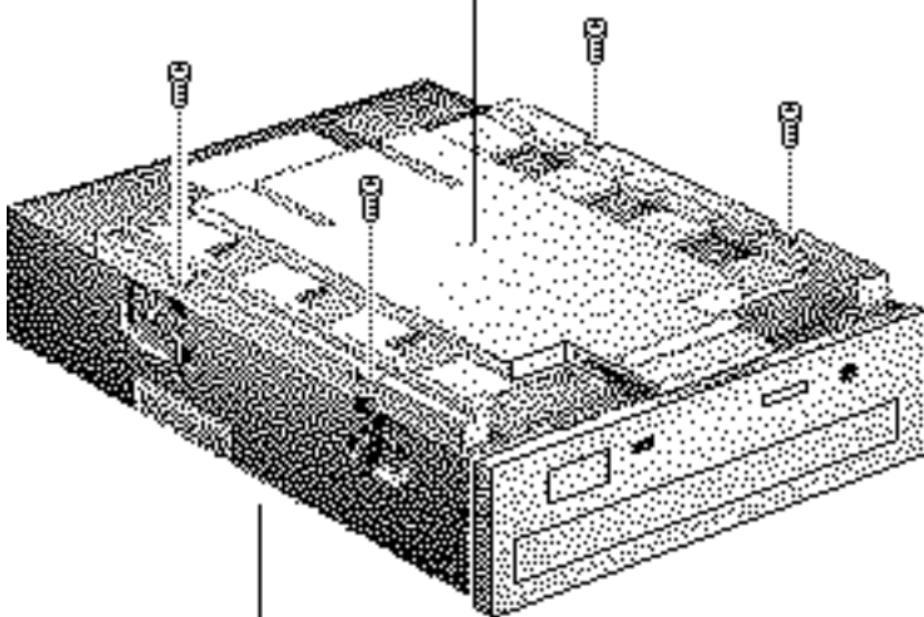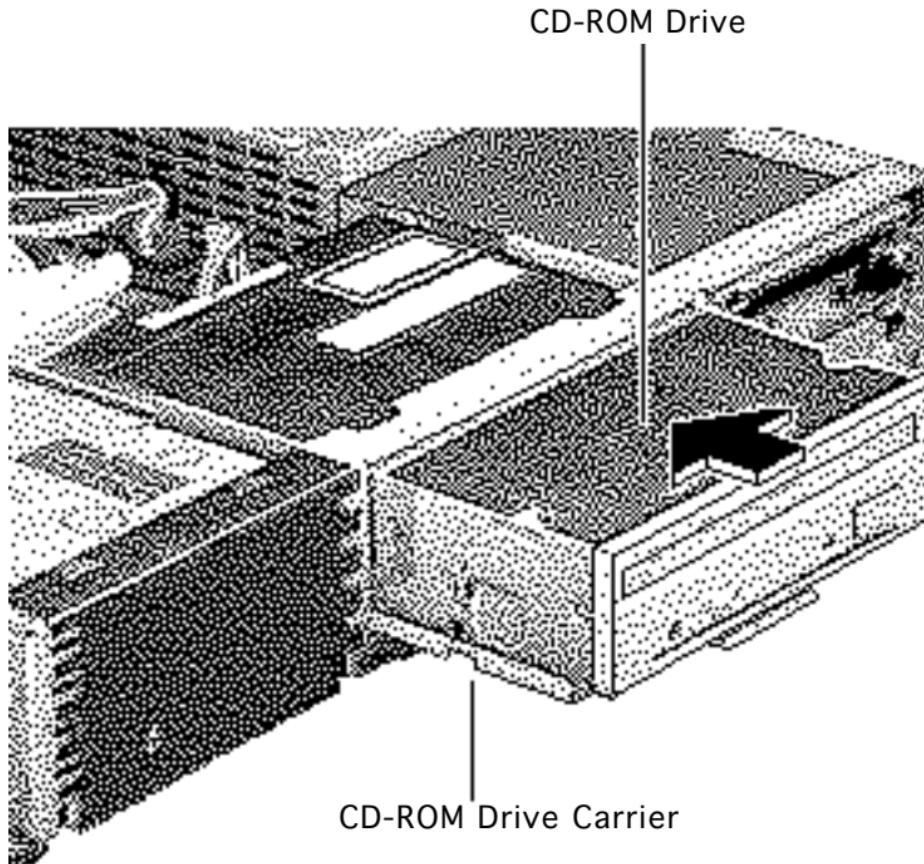
CD-ROM Drive

5 Push in the CD-ROM
  drive and carrier.

CD-ROM Drive Carrier

Bottom Cover

CD-ROM Shield
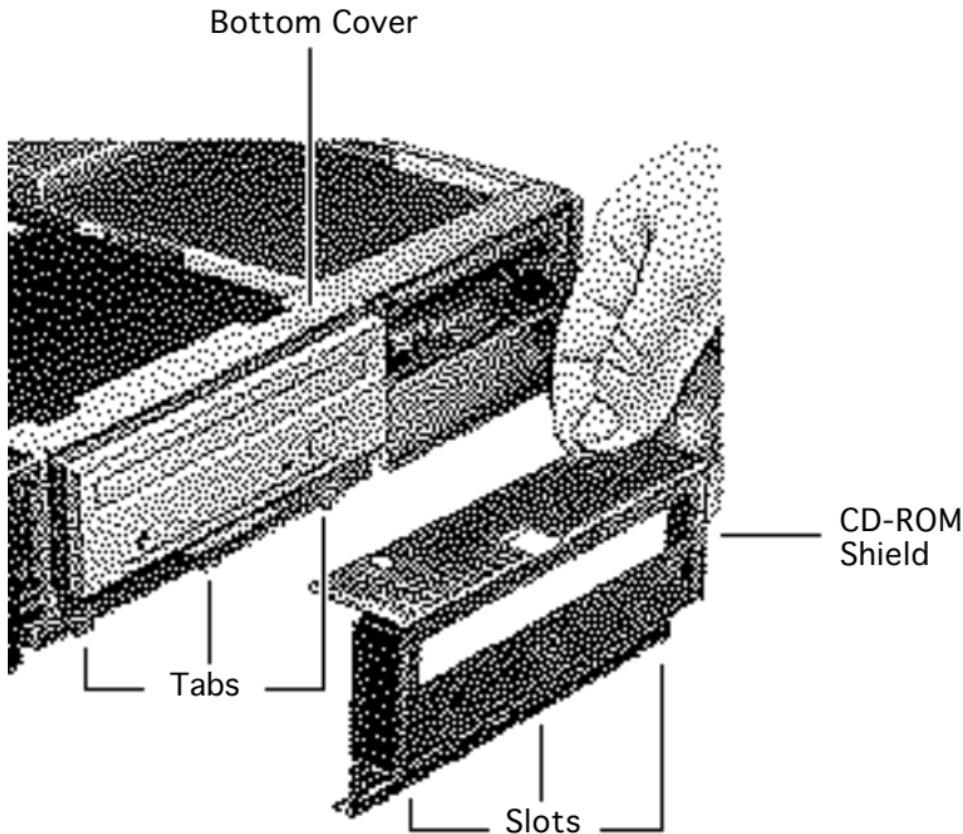
Tabs

Slots

6 Align the slots at the lower edge of the CD-ROM shield with the tabs on the bottom housing.

7 Swing up the CD-ROM shield until it snaps securely onto the bottom housing.

CD-ROM
Audio Cable

SCSI
Data Cable

CD-ROM Drive
Power Cable
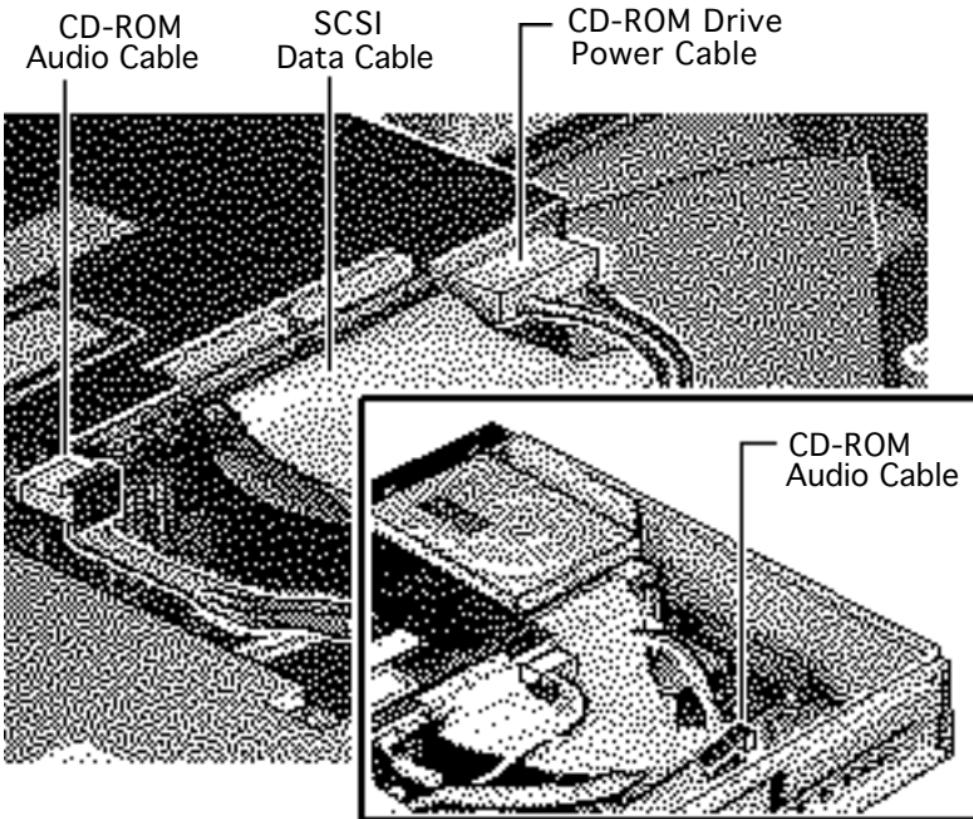
CD-ROM
Audio Cable

8 Connect these cables
   from the power supply
   to the CD-ROM drive:
   • CD-ROM audio cable
   • SCSI data cable
   • CD-ROM drive power
     cable

9 Connect the other end of
   the CD-ROM audio cable
   to the logic board.

Expansion Card Slot
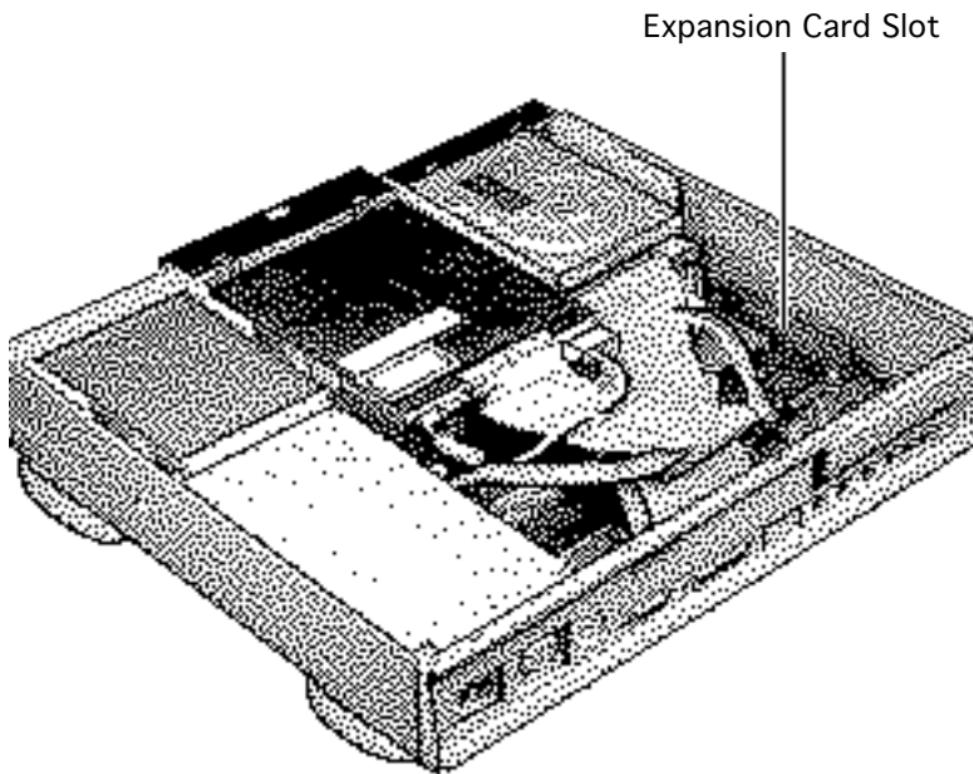
DOS Compatibility Upgrade

Before you begin, remove the top housing.

Caution: Review the ESD precautions in Bulletins/ Safety.

Note: The Power Macintosh 6100/60AV has an AV card in the PDS slot. You cannot install the DOS Compatibility card in this machine.

Expansion Card Slot
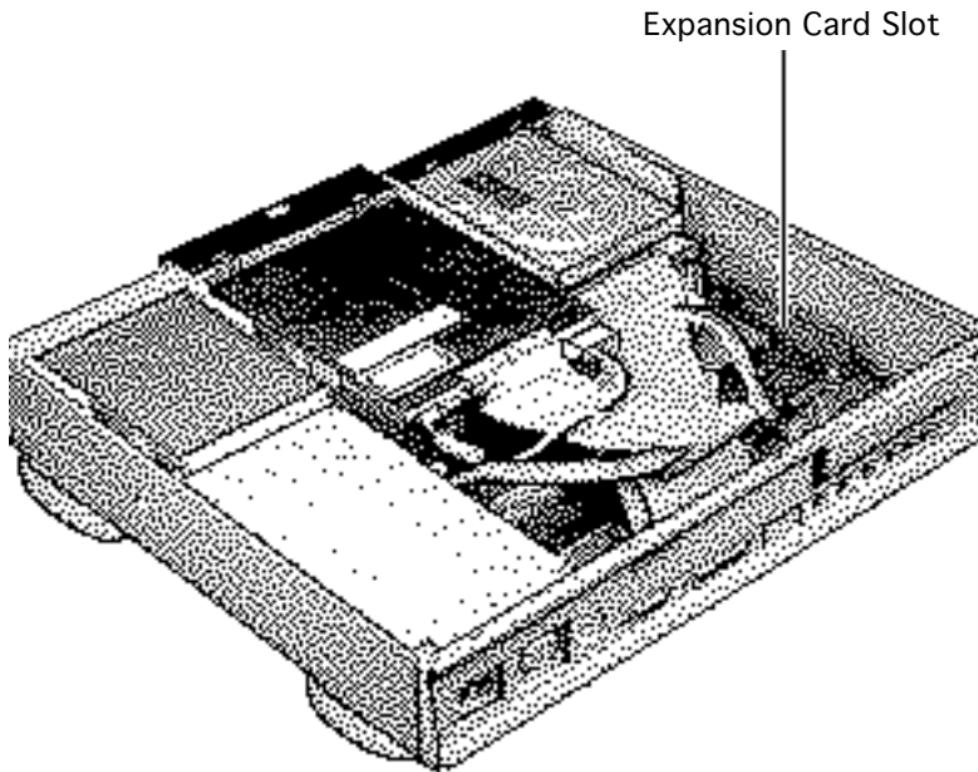
Note: The DOS Compatibility Upgrade Kit comes with a DOS Compatibility card installed in a bracket adapter, a monitor cable with four connectors, a hard drive power extension cable, a monitor cable adapter, a CD-ROM audio cable, and two thumbscrews.

Expansion Port Cover

1 Remove the expansion
   port cover from the rear
   panel.
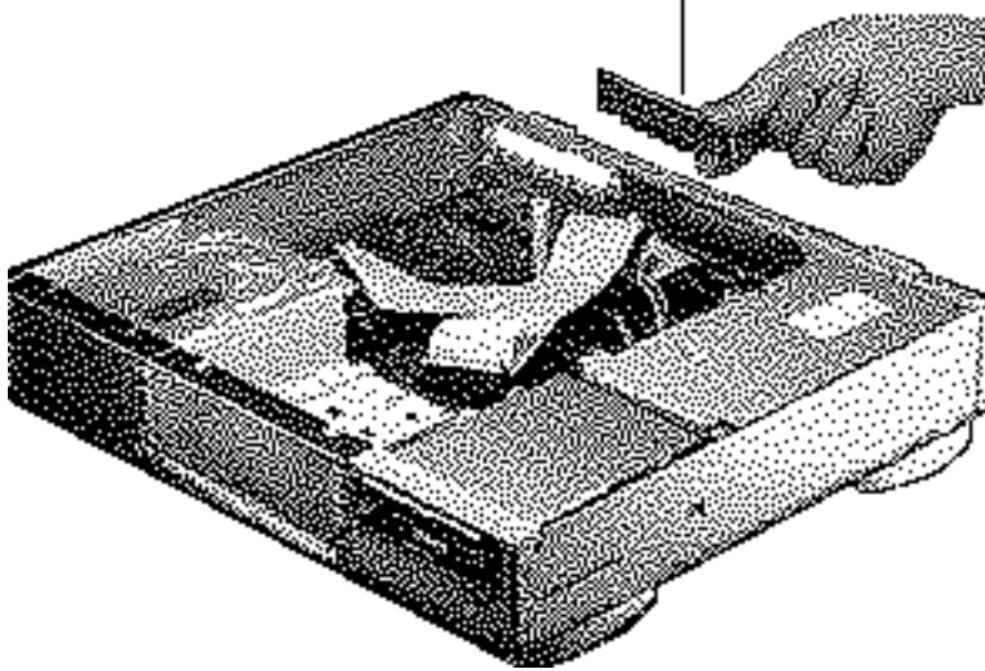
Hard Drive

Hard Drive Power Cable
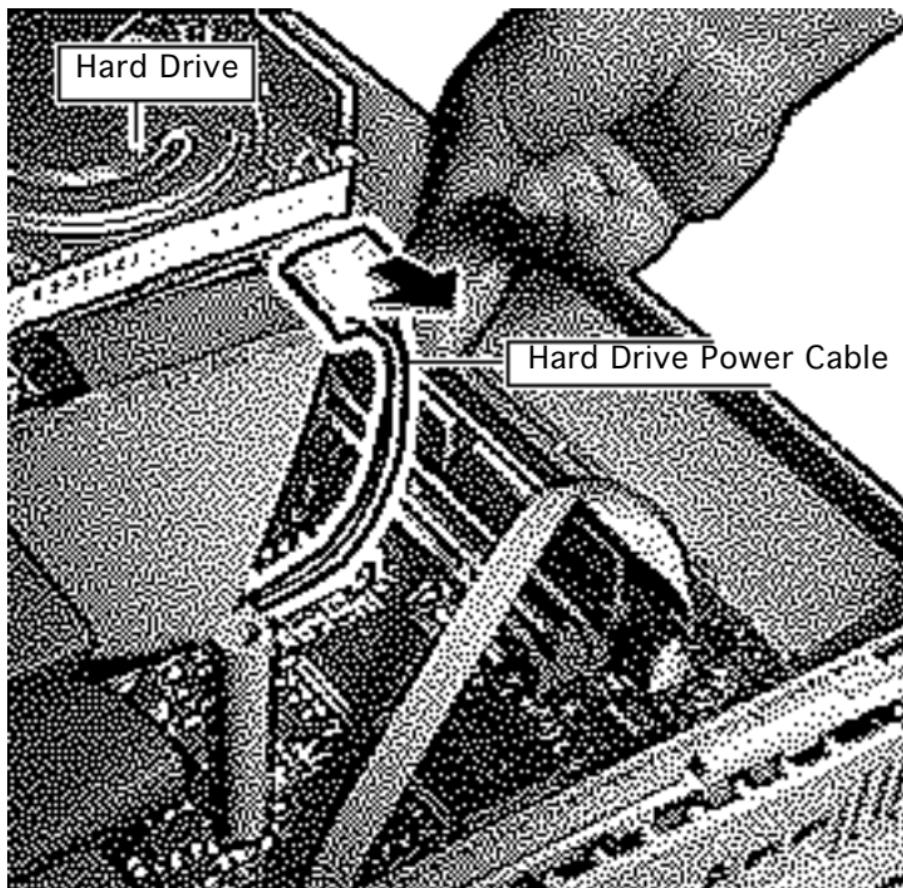
2 Unplug the power cable from the hard drive.

Hard Drive

Hard Drive Power
Extension Cable

Standoff

Hard Drive
Power Cable
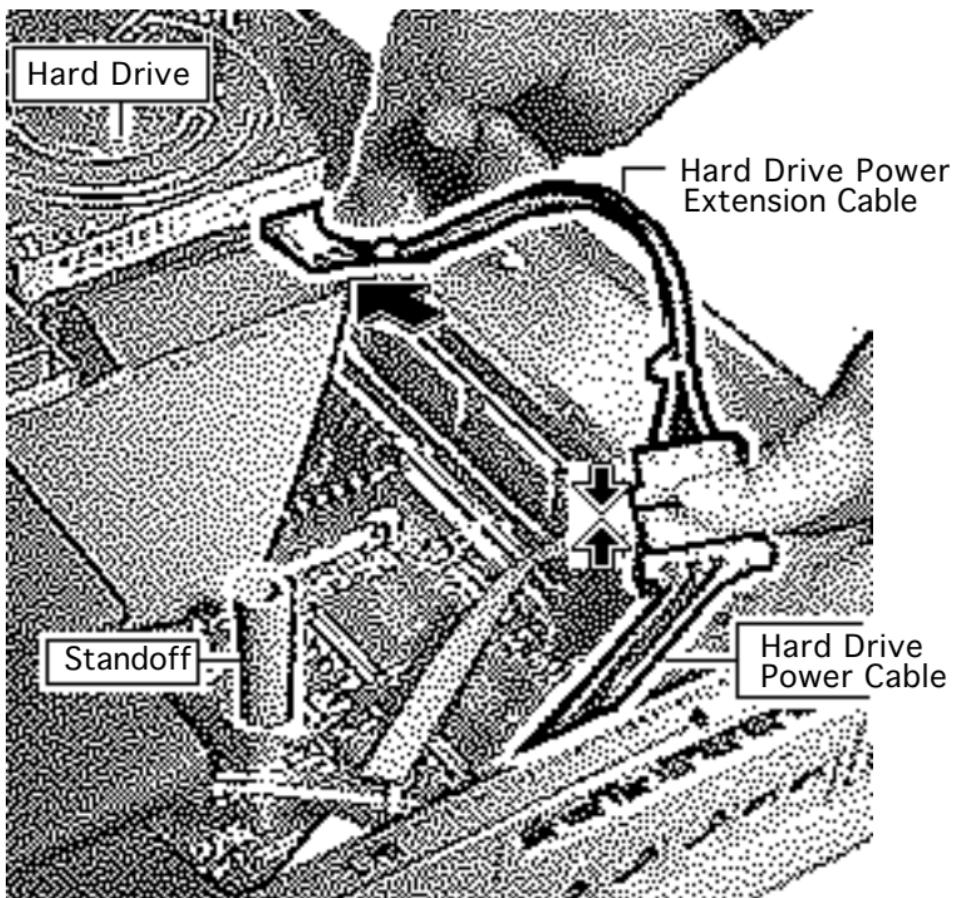
3 Connect the power cable
that you disconnected
from the hard drive to
one end of the hard drive
power extension cable.

4 Route the extended hard
drive power cable
around the standoff.

5 Plug the cable into the
hard drive.

DOS Compatibility Card

CD In Connector
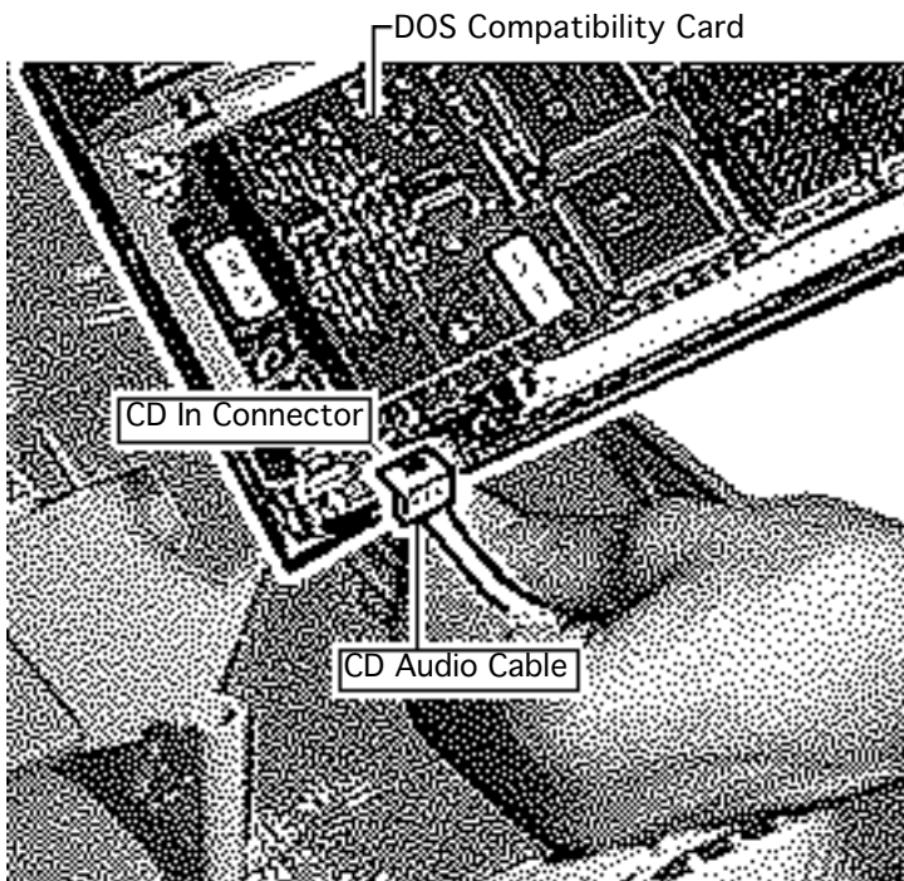
CD Audio Cable

Installation With CD-ROM Drive Present

6　Unplug the CD audio cable from the computer's logic board.

7　Plug this end of the CD audio cable into the CD In connector on the DOS Compatibility card.

Note: The CD Audio cable should now connect the CD-ROM drive to the DOS Compatibility card through the CD In Connector on the card.

DOS Compatibility Card

Sound Out Connector

CD Audio Cable

CD Audio Connector
on Logic Board
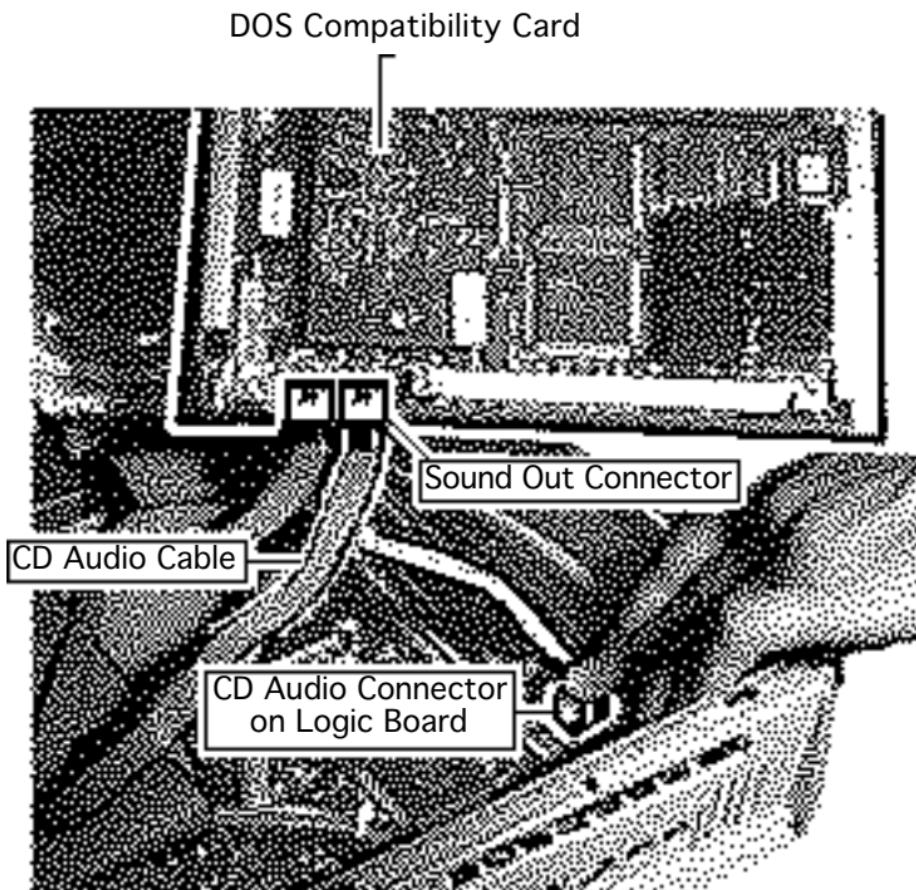
8 Plug one end of the CD
   audio cable that came
   with the upgrade kit
   into the Sound Out
   connector on the DOS
   Compatibility card.

9 Plug the other end of this
   cable into the CD audio
   connector on the
   computer's logic board.

DOS Compatibility Card

Sound Out Connector

CD Audio Cable

CD Audio Connector
on Logic Board
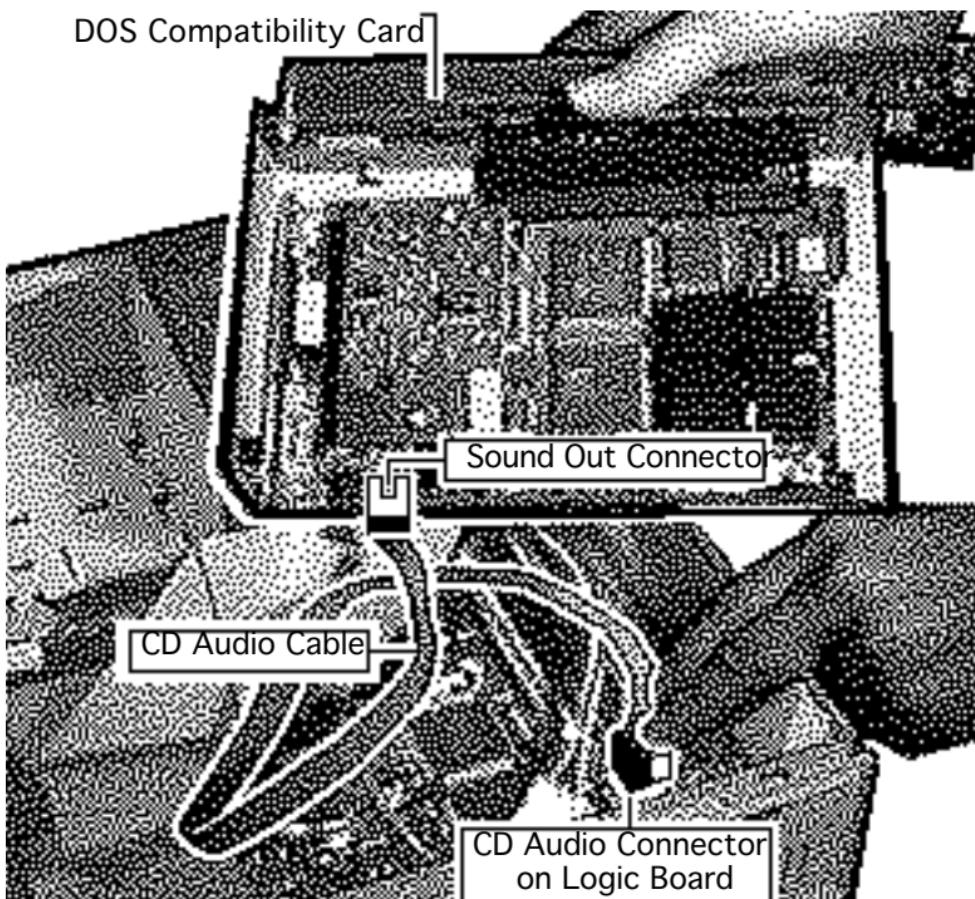
Installation Without CD-ROM Drive

10 Plug one end of the CD audio cable that came with the upgrade kit into the Sound Out connector on the DOS Compatibility card.

11 Plug the other end of this cable into the CD audio connector on the computer's logic board.
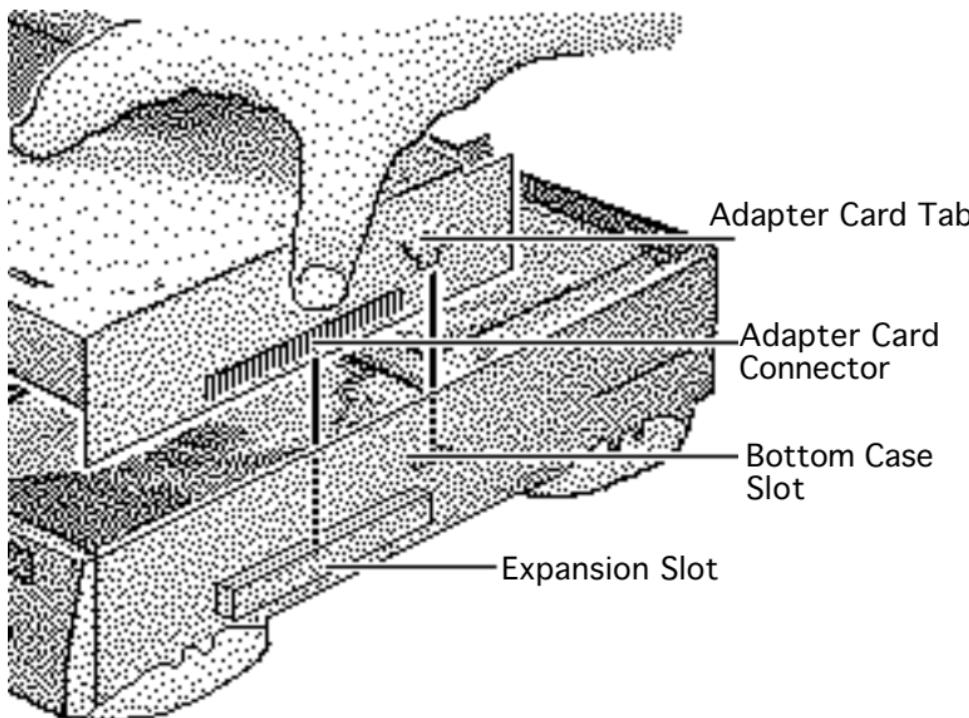
Adapter Card Tab

Adapter Card Connector

Bottom Case Slot

Expansion Slot

Important: The jumper at location J10 on the DOS Compatibility card is mismarked. When installing the card, make sure the jumper at J10 is in the "SX" position (over the two right-most prongs) or you may experience problems with the card. See the "Miscellaneous" topic in the Troubleshooting Chapter for more information.

Adapter Card Tab

Adapter Card
Connector

Bottom Case
Slot

Expansion Slot
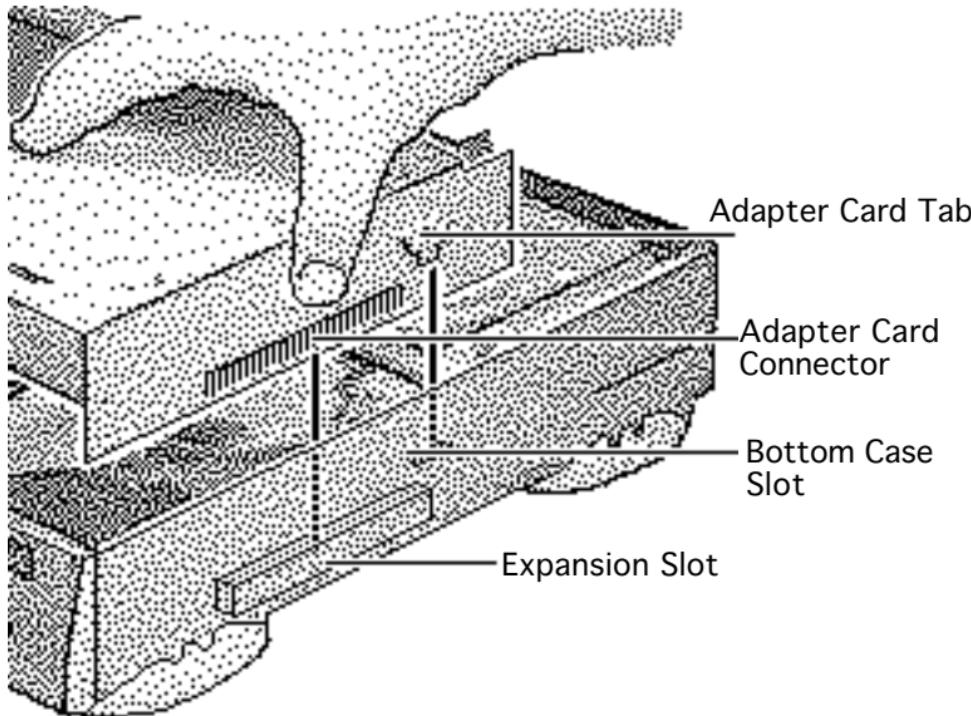
Note: Fold the SCSI ribbon cable back so that it doesn't get caught under the DOS Compatibility card. The cable should fold over the top of the card.

Note: Hold the hard drive power cable, which runs underneath the DOS Compatibility card, out of the way when installing the card.

12 Insert the connector on the bottom of the adapter card into the expansion slot.
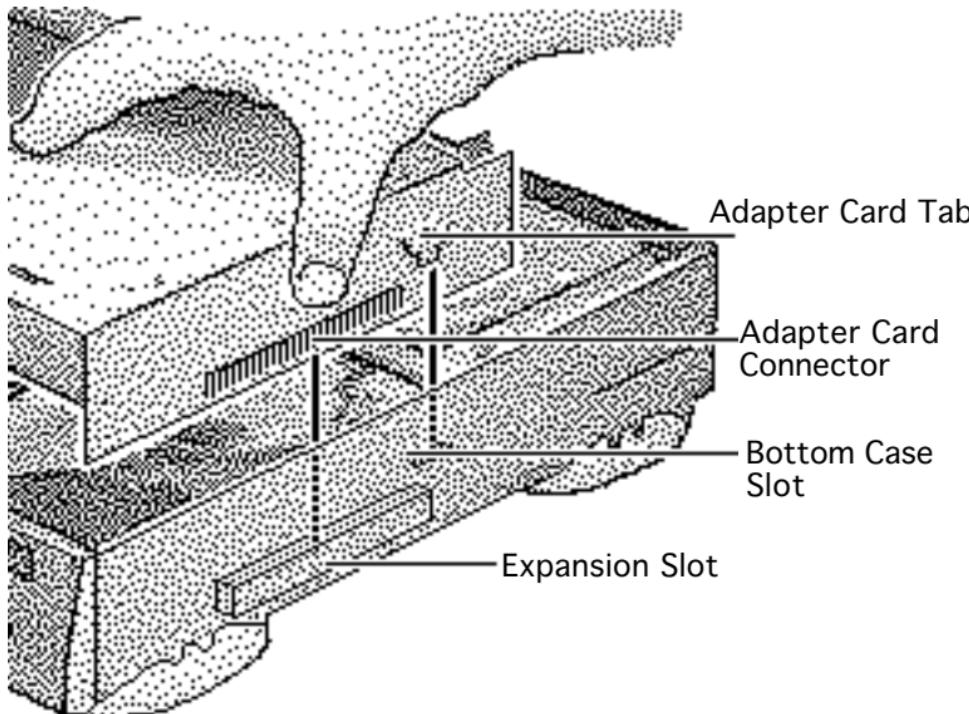
Note: Make sure that the tab on the side of the adapter card slides into the slot on the side of the bottom housing.

Adapter Card Tab

Adapter Card Connector

Bottom Case Slot

Expansion Slot

Rear Panel
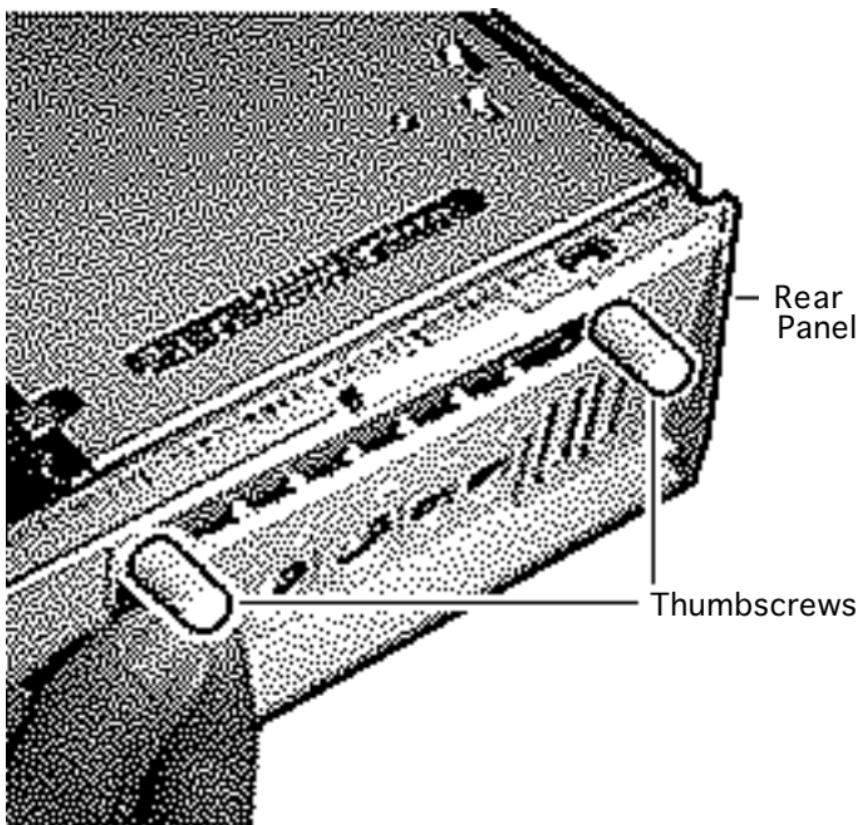
Thumbscrews

13 Attach the thumbscrews that secure the DOS Compatibility card to the computer's rear panel.

Note: Fold the CD Audio cable inside the computer so it doesn't get caught when you replace the cover.

14 Replace the top housing on the computer.

DOS Compatibility Card

Male 26-Pin Connector

Joystick Connector

Monitor Adapter Cable

Male DB-15 Connector

4-Headed Monitor Cable

Female DB-15 Connector
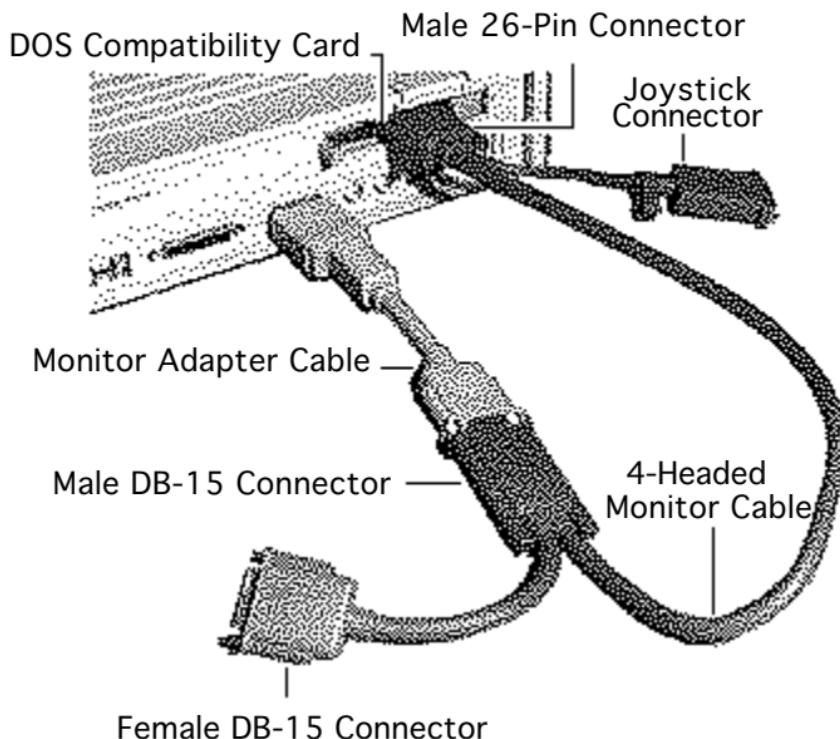
15 Plug the HDI-45 end of the monitor adapter cable into the monitor port on the back of the computer.

16 Plug the male DB-15 connector on the 4-headed monitor cable into the monitor adapter cable.

17 Plug the female DB-15 connector on the 4-headed monitor cable into the back of the monitor.
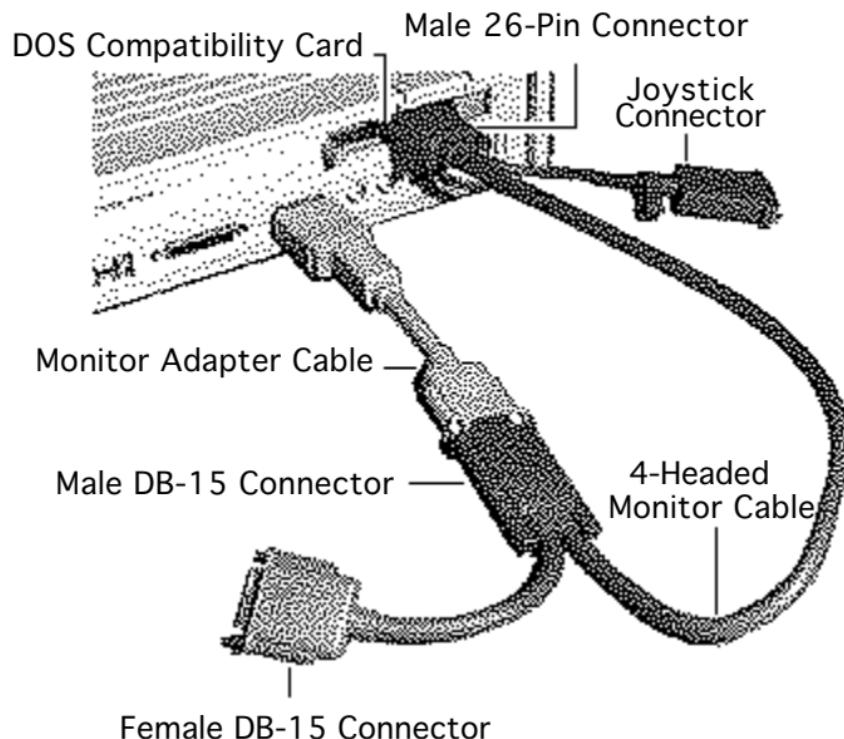
18 Plug the 26-pin male connector on the 4-headed monitor cable into the DOS Compatibility card.

DOS Compatibility Card

Male 26-Pin Connector

Joystick Connector

Monitor Adapter Cable

Male DB-15 Connector

4-Headed Monitor Cable

Female DB-15 Connector

Power Macintosh 6100/60 and
WS 6150 Logic Board

Power Macintosh Upgrade
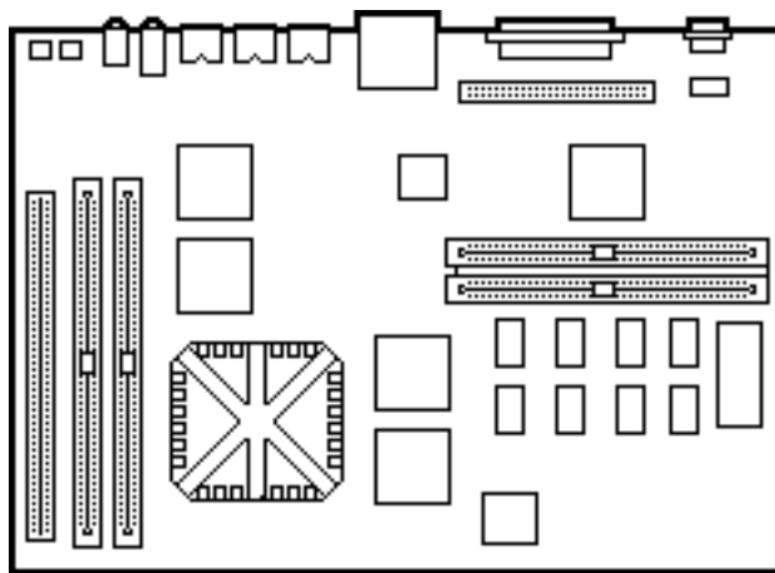
Before you begin, remove the following:

- Top housing
- Power supply
- Logic board

**Caution**: Review the ESD precautions in Bulletins/Safety.
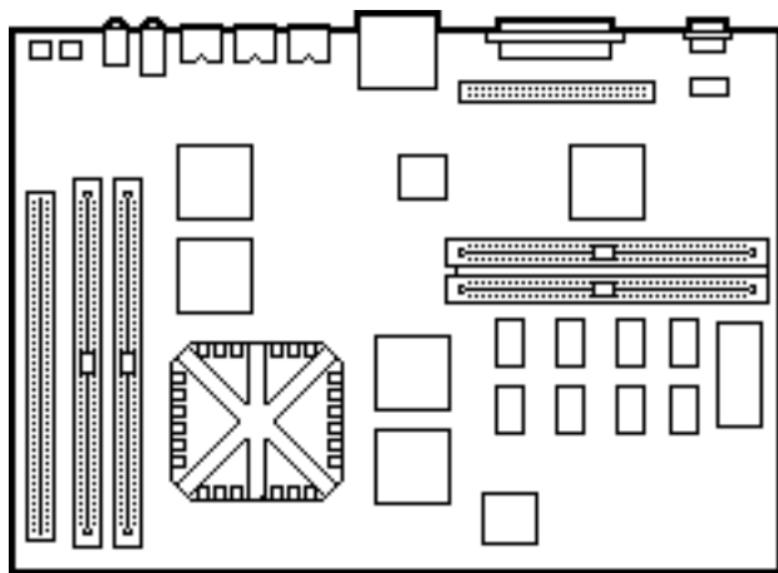
Power Macintosh 6100/60 and
WS 6150 Logic Board

Note: The Power Macintosh 6100/60 and WS 6150 upgrade kits contain a Power Macintosh logic board, insulator sheet I/O panel, rubber foot, SCSI cable, floppy drive EMI shield, CD gasket, and PowerPC or WS 6150 sticker. The Power Macintosh 6100/60AV upgrade also includes the Power Macintosh AV Card.

Floppy Drive

Tab

Tab

1 Press the tabs outward and slide the floppy drive forward a few inches.
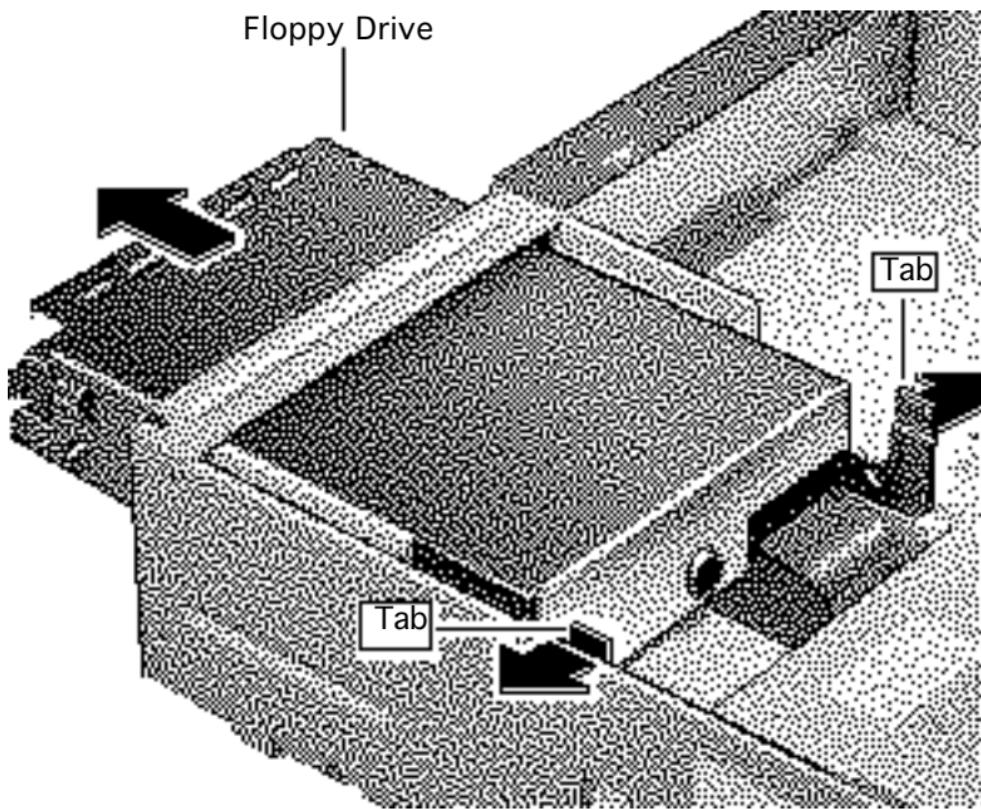
EMI Shield
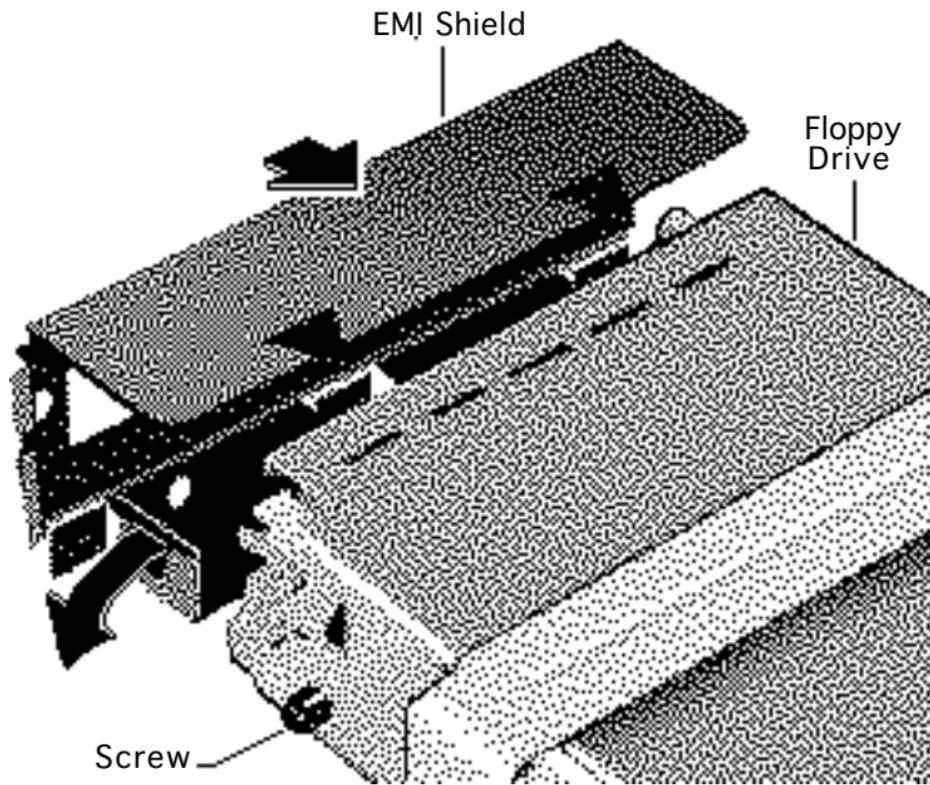
Floppy Drive

Screw

2 Place the metal openings that are on the sides of the EMI shield (provided in the upgrade kit) over the screws that are on either side of the floppy drive.

Note: The top of the EMI shield should rest on top of the floppy drive. Leave the floppy drive pushed out until you replace the power supply later in this procedure.

3 Press up on the tab and slide out the CD-ROM drive.
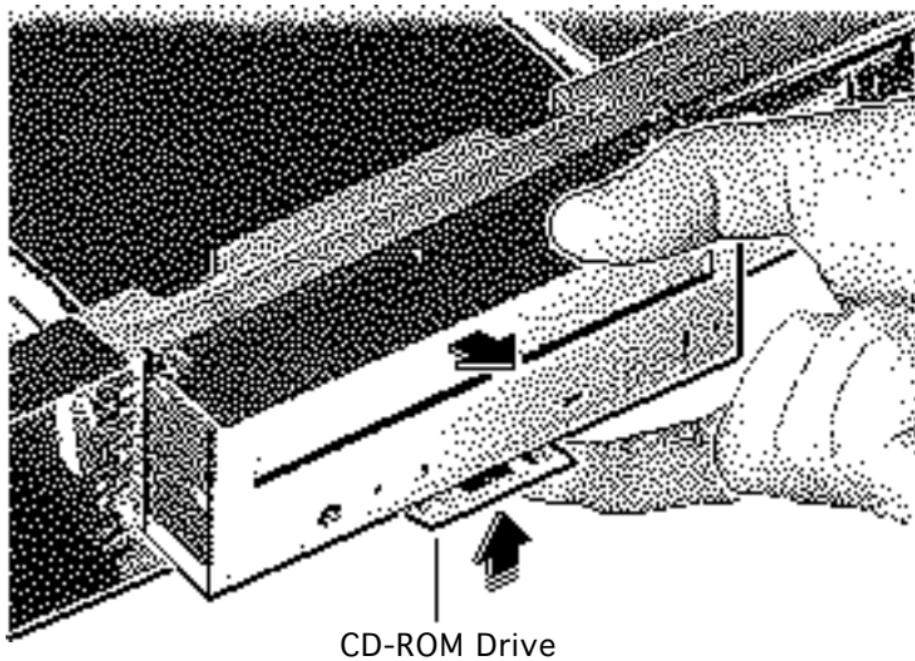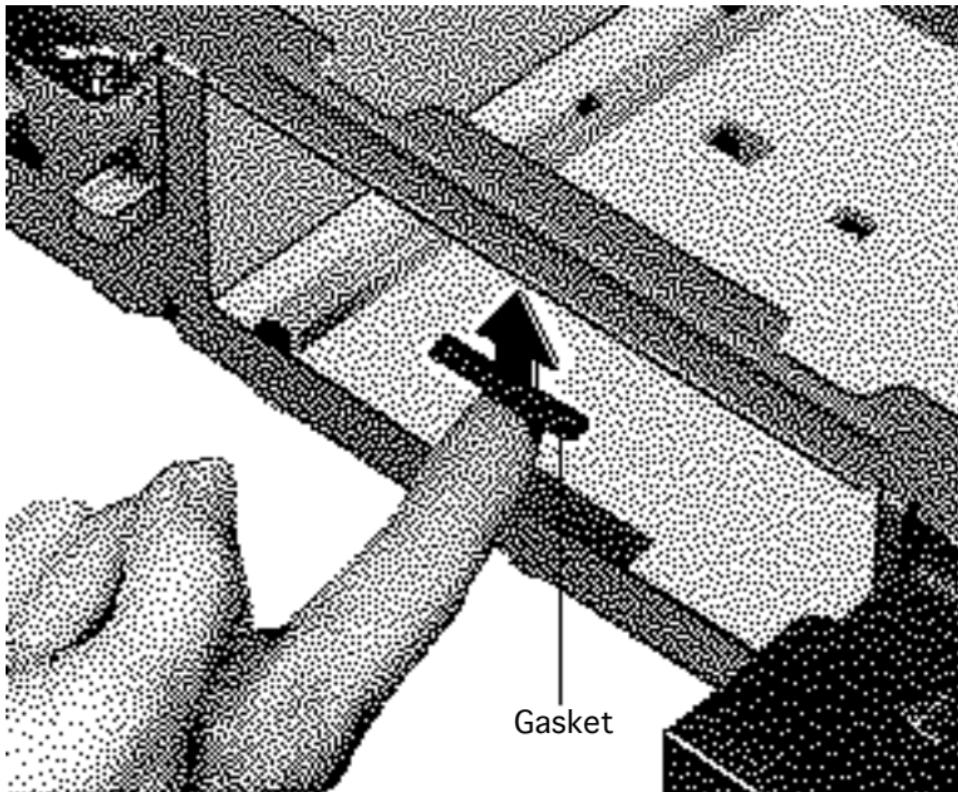
CD-ROM Drive

Gasket

4   Remove the adhesive strip from the rubber EMI gasket.

   Note: The gasket should be placed in the middle of the opening for the CD-ROM drive.

5   Place the rubber gasket on the underneath side of the frame that houses the CD-ROM.

   Note: Replace the CD-ROM drive, but don't push it all the way in until you replace the power supply later in this procedure.
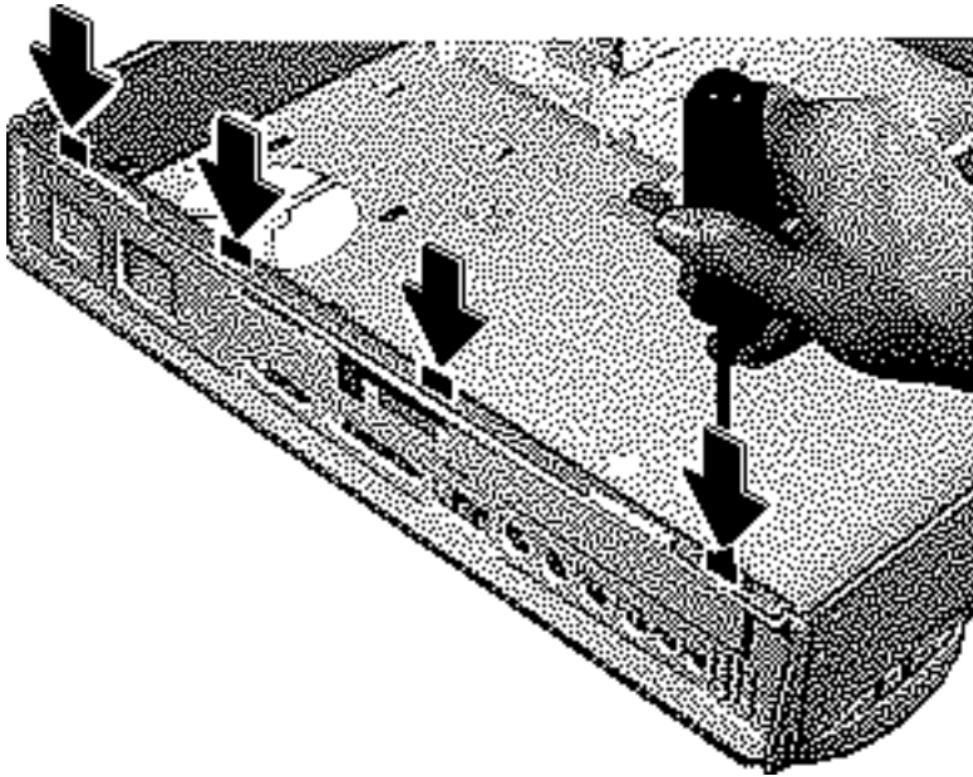
6   Using a flat-blade
    screwdriver, press
    down and release the
    four tabs that secure the
   rear panel to the chassis.

7   Remove the rear panel.
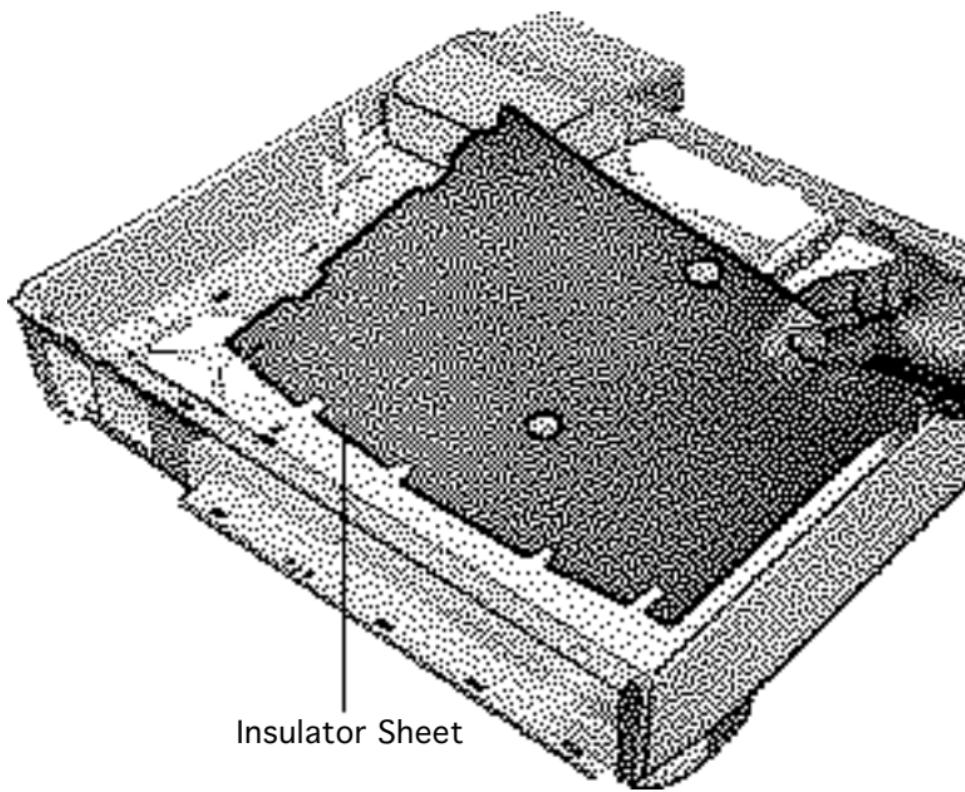
8 Remove the existing insulator sheet and replace it with the insulator sheet provided with the upgrade kit.

Insulator Sheet
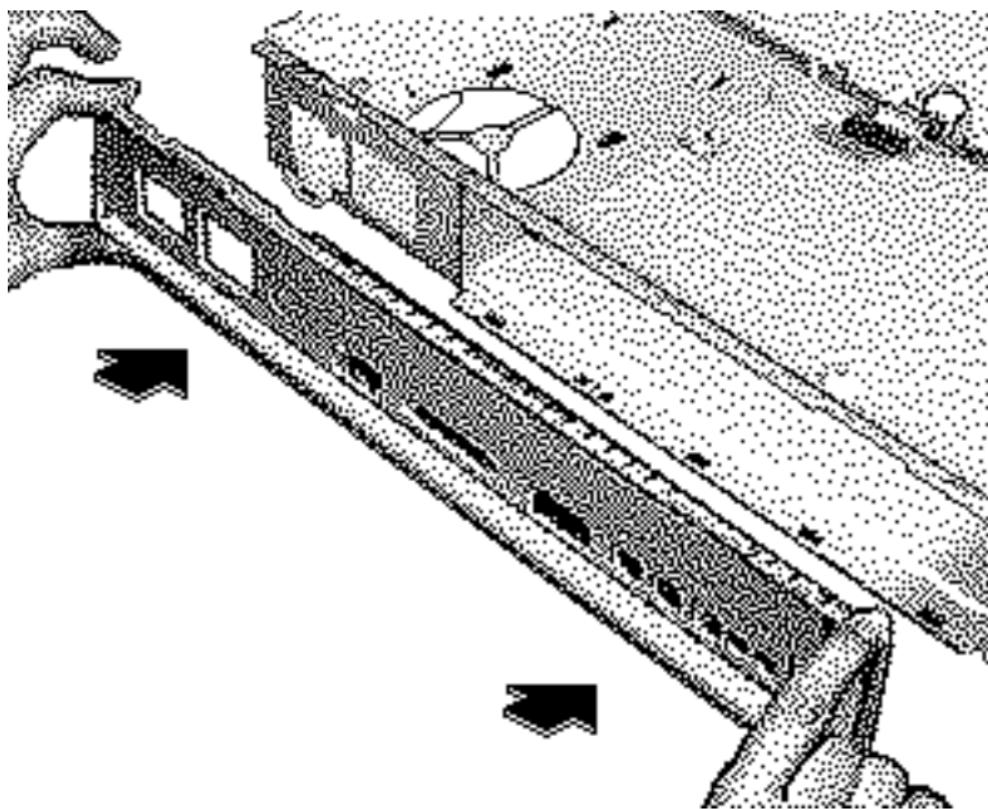
9 Line up the bottom tabs on the rear panel provided in the upgrade kit with the slots in the chassis.

10 Press in on the rear panel until the top tabs snap into place.

11 Affix the blank serial number label that came with the upgrade kit onto the new rear panel.

12 Copy the serial number from the old rear panel to the upgraded rear panel.
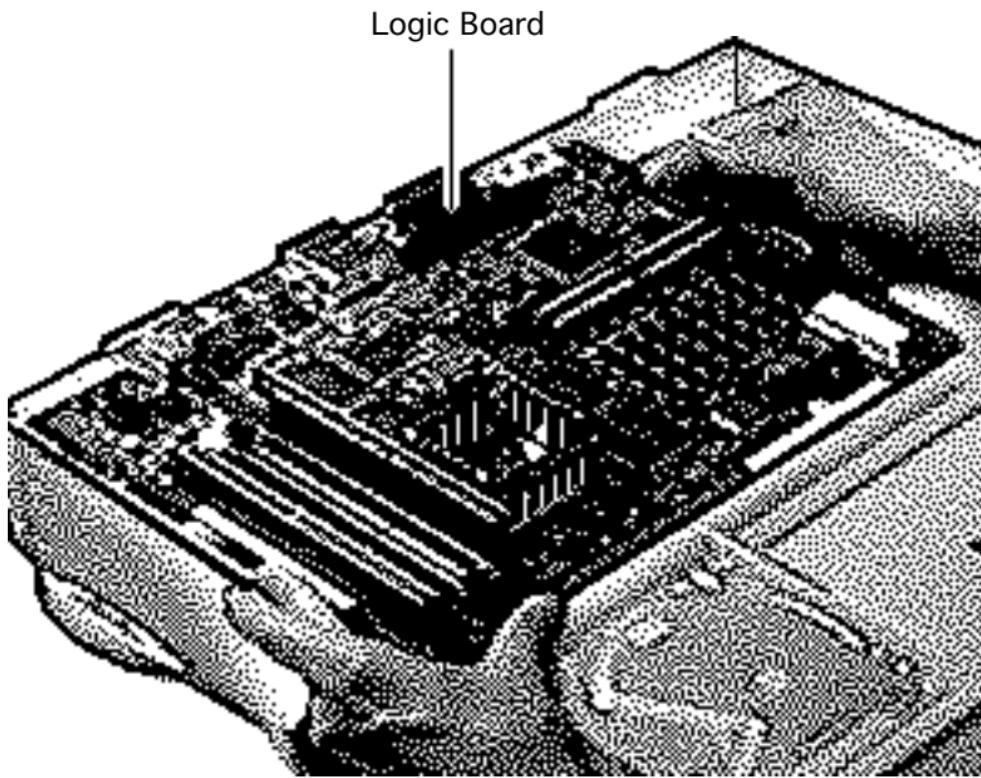
Logic Board

Note: Connect the floppy drive cable before inserting the logic board.

13 Install the PowerPC logic board.

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

Logic Board
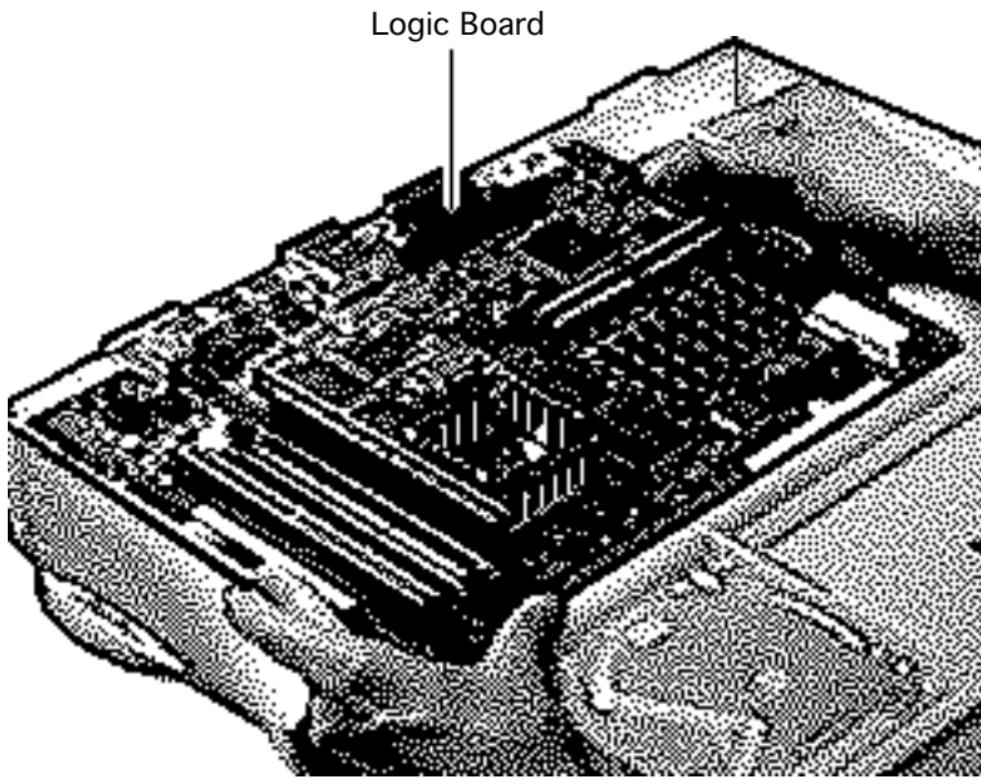
Important: These upgraded units require that DRAM SIMMs be installed in matching pairs (that is, SIMMs of the same size and speed). The SIMMs must be 80 ns or faster, noncomposite, 72-pin SIMMs.

Replacement Note: Return all nonmatching DRAM SIMMs from the old logic board to the customer.
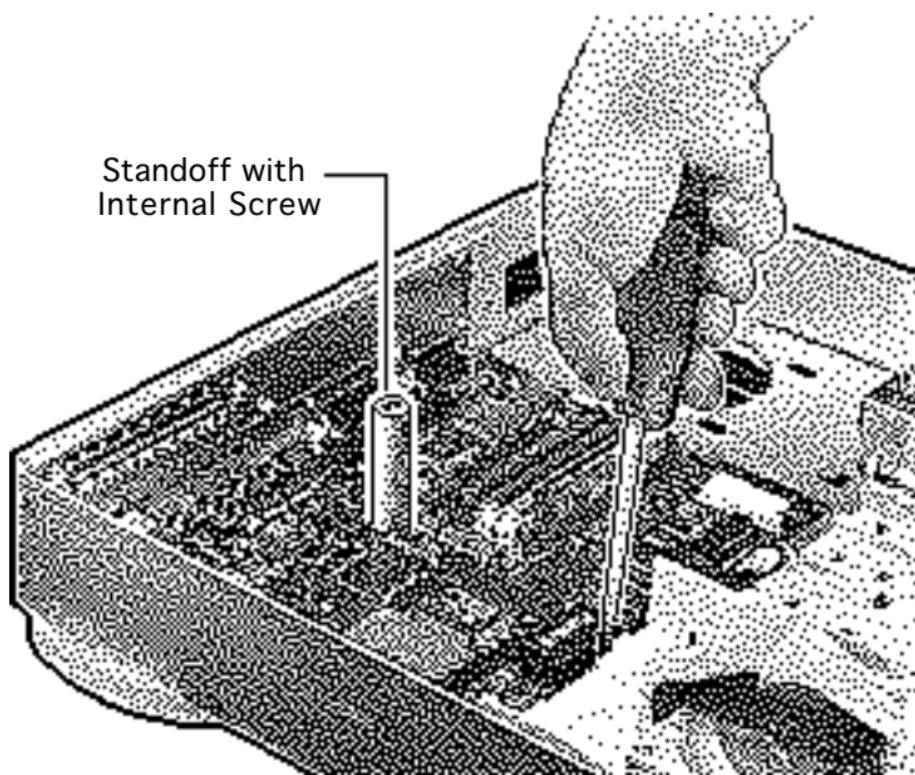
**Note:** The logic board is secured with two screws.

15 Replace the standoff and, using a long Phillips screwdriver, tighten the screw in the center of the standoff.

16 Replace the Phillips screw at the front edge of the logic board.

Standoff with Internal Screw

Floppy Drive Cable — Speaker Cable

LED Cable

CD-ROM Audio Cable
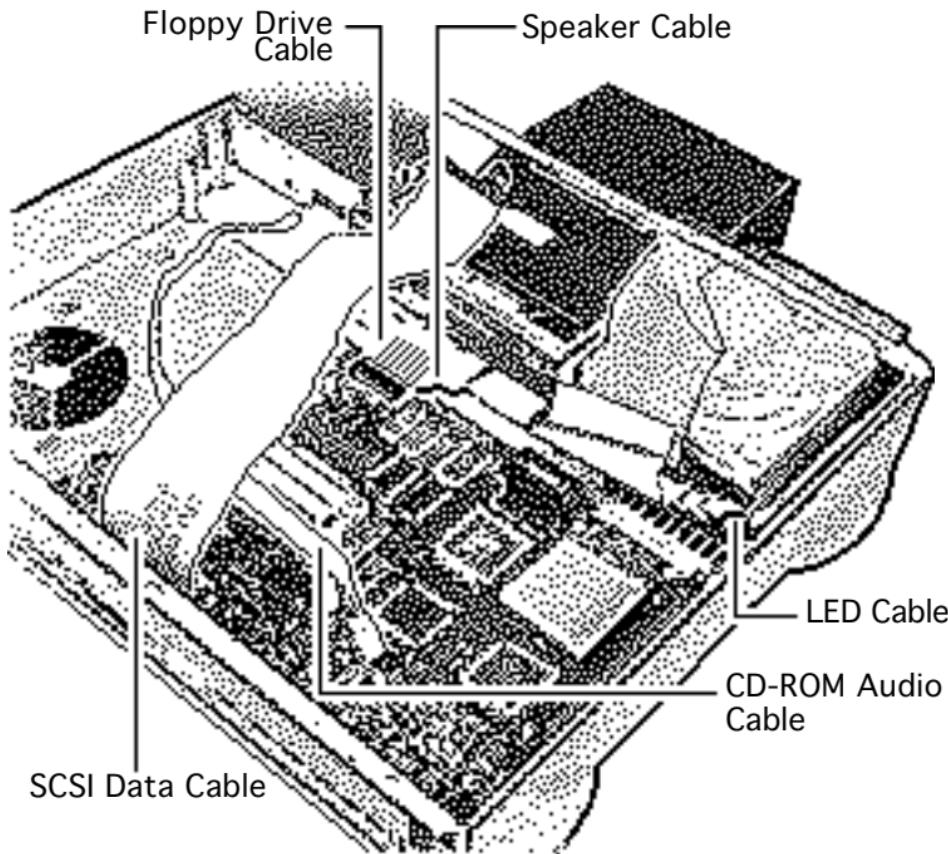
SCSI Data Cable

17 Replace the SCSI data cable with the one provided in the upgrade kit.

18 Connect these cables to the logic board
- Floppy drive cable
- Speaker cable
- LED cable
- CD-ROM audio cable (if present)
- SCSI data cable

Main Power Cable

CD-ROM Drive Power Cable

Hard Drive Power Cable
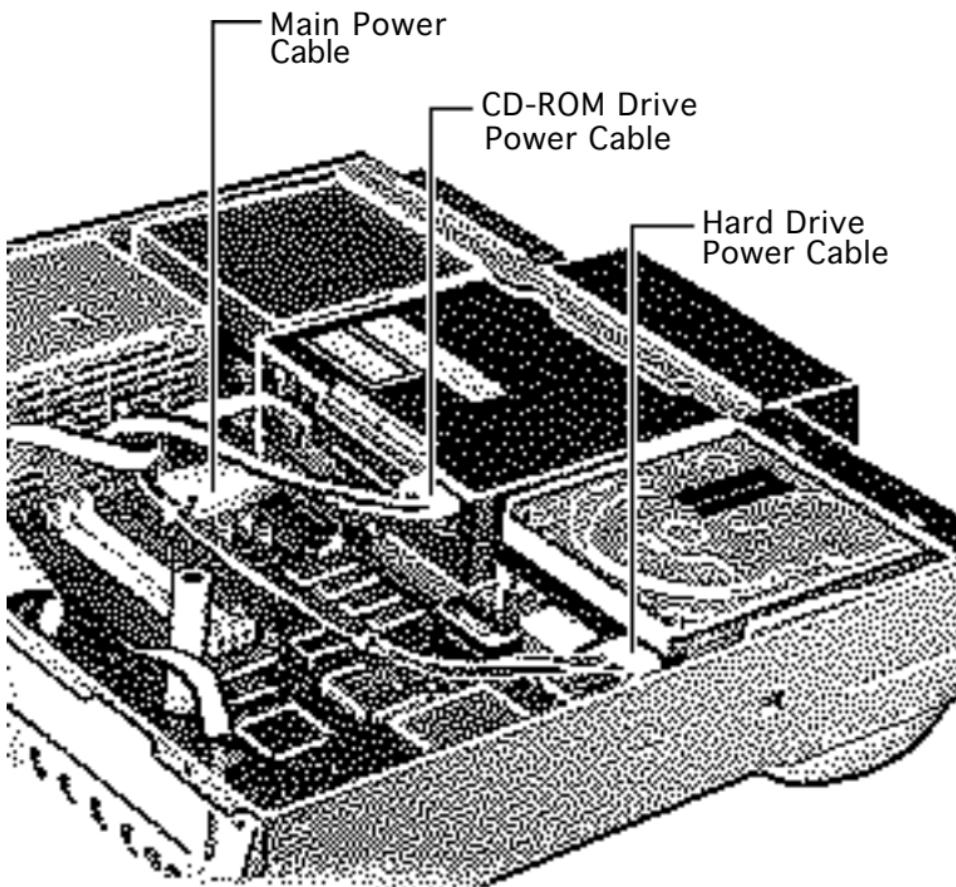
19 Reconnect these power supply cables
  • Main power cable
  • Hard drive power cable
  • CD-ROM drive power cable (if installed)
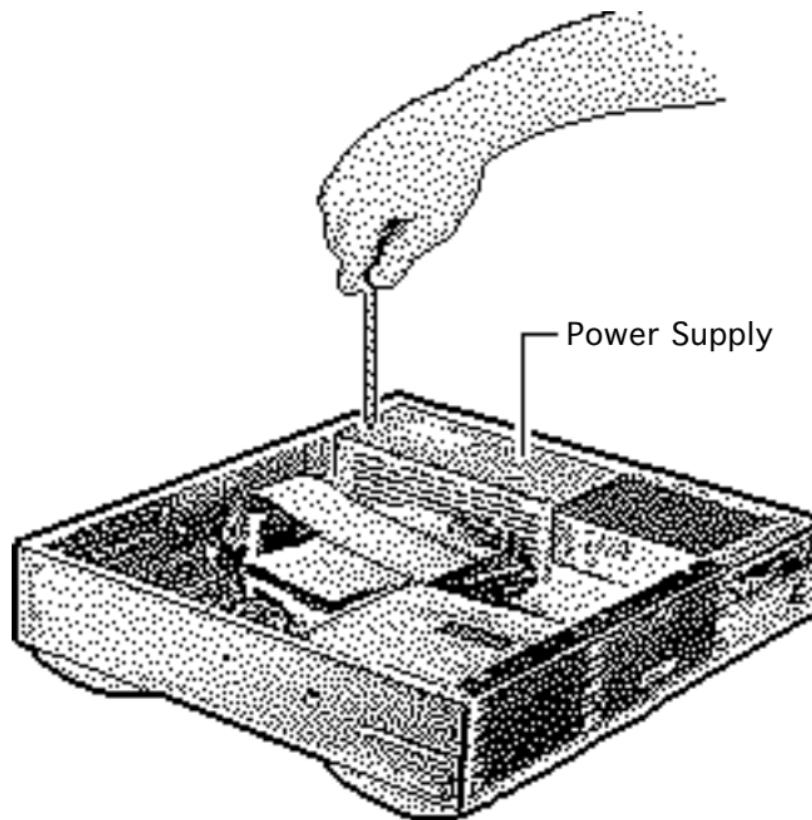
Power Supply

20 Replace the power supply.

21 Tighten the screw that secures the power supply to the chassis.

22 Push in the CD-ROM drive until you hear it click into place.
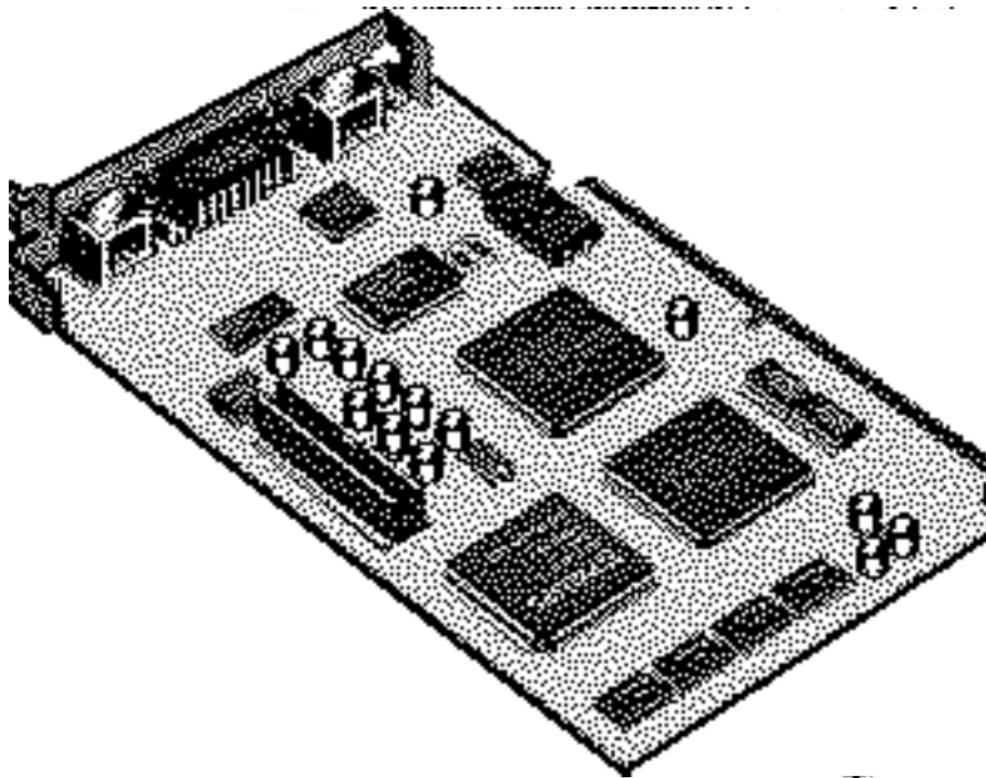
23 Lift up on the top of the metal EMI shield and slide the floppy drive back into place.

Note: The top of the metal EMI shield should rest of top of the chassis frame.

24 For the Power Macintosh 6100/60AV only, install the Power Macintosh AV Card in the expansion slot on the logic board. Refer to "Expansion Cards" in this chapter for instructions.
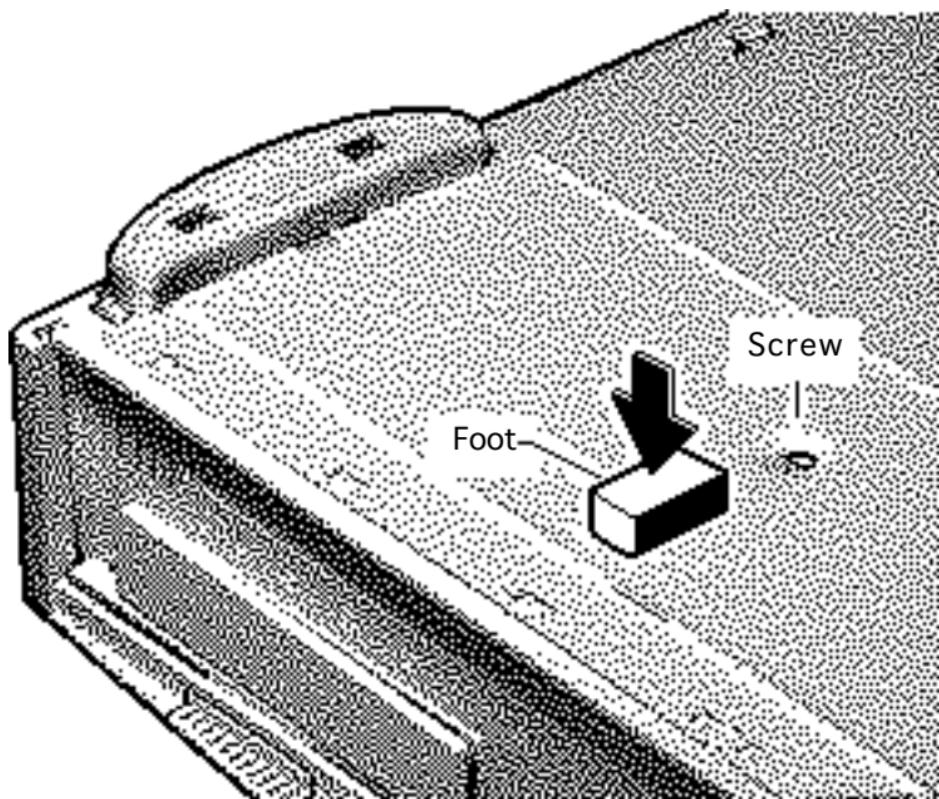
Foot

Screw

25 Replace the top housing and turn the unit over.

26 Remove the adhesive strip from the rubber foot provided in the upgrade kit.

27 Press the rubber foot onto the bottom chassis towards the back of the unit and directly in front of the screw that secures the logic board to the chassis.

28 Adhere the 6100/60 or
   WS 6150 sticker to the
   front of the unit,
   directly over the
   current model name.

Note: For the Power
Macintosh 6100/60
upgrade, 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.

29 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.

Exploded View

Power Macintosh 6100/WS 6150

Top Housing
(PM) 922-0807
(WS) 922-0993

Power
Supply
661-1688

SCSI
Cable
922-1207

Support
Column
922-0356

Logic Board
661-0207
661-1022

Insulator
Sheet
922-0808

Expansion
Plug
922-0902

Rear
Housing
Assy
922-0720

Feet (4)
922-0862

Bottom
Housing
922-0806

Hard Drive*

PDS 922-0768
and NuBus
Adapter 661-0049

Hard
Drive
Carrier
922-0621

CD ROM
Drive
Carrier
922-0850

Blank Bezel
922-0358

Slotted CD
 Bezel
 w/ Caddy
 922-0805

Slotted CD
 Bezel
Caddiless

Internal
Chassis
(part of
Bottom
Housing)

Floppy
Drive
Cable
922-0351

Speaker
922-0353

LED cable
922-0354

On/Off
Actuator
922-0357

CD Audio
Cable
922-0842

Manual
Insert
Floppy
Drive
661-0121

Carrier
922-0621

Floppy
Shield
922-0809

CD ROM
 Drive
661-0913

CD ROM
Shield
922-0826

Hard Drive
Shield
922-0367

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

Power Macintosh 6100/WS 6150