Macintosh Quadra 840AV

Specifications

Macintosh Quadra 840AV

Processor

CPU
Motorola 68040 microprocessor
40 MHz
Built-in paged memory management unit (PMMU), floating-point unit (FPU), and 8K memory cache

Addressing
32-bit registers
32-bit address/data bus

Direct Memory Access (DMA)
A Peripheral Subsystem Controller (PSC) provides direct memory access (DMA) between the 68040 buses and peripheral devices.

Digital Signal
Processor (DSP)   AT&T DSP3210 32-bit floating-point digital signal processor
                              Supports real-time tasks such as speech recognition, audio
                                  compression, and analog modem signal processing.

Memory

RAM   8 MB standard (one 8 MB SIMM), expandable to 128 MB
                     72-pin SIMMs
                     Requires CAS-before-RAS
                     60 ns access time

ROM   2 MB soldered on logic board

PRAM   256 bytes of parameter memory

VRAM   1 MB standard, expandable to 2 MB (80 ns or faster 256K VRAM
                  SIMMs)
                  Maximum pixel depths for 1 MB / 2 MB VRAM:
                  12-inch color (512 x 384) - 16 / 16 bits per pixel
                  12-inch monochrome (640 x 480) - 16 / 16 bits per pixel
                  13-inch color (640 x 480) - 8 / 16 bits per pixel
                  15-inch portrait (640 x 870) - 4 / 8 bits per pixel
                  16-inch color (832 x 624) - 8 / 16 bits per pixel
                  19-inch color (1024 x 768) - 4 / 8 bits per pixel
                  21-inch monochrome (1152 x 870) - 4 / 8 bits per pixel
                  21-inch color (1152 x 870) - 4 / 8 bits per pixel
                  VGA (640 x 480) - 8 / 16 bits per pixel
                  SVGA (800 x 600) - 8 / 16 bits per pixel

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

Disk Storage

Floppy Drive   Internal, 1.4 MB Apple SuperDrive

Hard Drive   Internal, 3.5 in. hard drive (230, 500, 1000 MB) optional

CD-ROM Drive   Internal, CD-300 mechanism optional

I/O Interfaces

Serial
Two RS-232/RS-422 ports (modem port is an Apple high-performance serial port)

Printer port: mini DIN-8 connector

Modem port: mini DIN-9 connector (also supports mini DIN-8 connector)

230.4 Kbaud maximum

0.920 mbit/sec. if external clock source is provided (modem interface only)

Asynchronous and synchronous communications supported up to 9600 baud

GeoPort (Modem Port)

High-performance serial port

Supports connection to analog, PBX, ISDN, facsimile (fax), and data telephone lines

Provides full-duplex telephone I/O at up to 14.4 Kbps

Supports AppleTalk and V.22, V.22bis, V.29, and V.32 modem protocols

Supports Apple HiPPort protocols

Video

One monitor port; DB-15 connector

Supports Apple monitors (up to 16-bits), VGA monitors, and NTSC and PAL video standards

S-Video Input & Output

One S-video output port; one S-video input port; mini DIN-4 connectors

Supports input/output in NTSC, PAL, and SECAM formats

Composite Video   One composite video output port; one composite video input port;
Input & Output   RCA phono plug connectors

                         Supports input/output in NTSC, PAL, and SECAM formats

Ethernet   One Ethernet port; AUI-15 connector

Floppy Disk   Supports one internal 1.4 MB Apple SuperDrive

                         Supports industry-standard 765 or Apple group code recording
                             (GCR) formats

SCSI   One SCSI port; DB-25 connector

                         Supports a maximum of eight devices (including the computer,
                             which is always device 7)

                         Transfers data at a maximum rate of 5 Mbps (synchronous)

                         Automatic termination of internal and external SCSI buses

NuBus   Three slots; 96-pin Euro-DIN connectors
                   Supports standard-size cards, block transfers, burst-mode
                       transfers, a processor write buffer, power control service,
                       and NuBus '90 data transfers between cards at 20 MHz
                   One slot supports NuBus cards that contain a Digital Audio and
                       Video (DAV) connector

Expansion   One 68040 processor-direct slot (PDS); 140-pin connector

Audio   One 16-bit stereo output port; one 16-bit stereo input port; mini phone-jack connectors

Sample rates up to 48 kHz (44.1 kHz standard rate)

Uses the digital signal processor (DSP) chip

Supports stereo audio from internal CD drive and Apple PlainTalk microphone

Audio input port characteristics: 26K ohms impedance, 2 V rms maximum, 22.5 dB gain

Audio output port characteristics: 37 ohms impedance, 0.9 V rms maximum, attenuated −22.5 dB

Apple Desktop Bus   One Apple Desktop Bus (ADB) port for keyboard, mouse, and low-speed input devices; mini DIN-4 connector

I/O Devices

Keyboard   Apple Keyboard, Apple Extended Keyboard, Apple Keyboard II, or
                       Apple Extended Keyboard II (optional); mini DIN-4 connector

Mouse   Apple Desktop Mouse or Apple Desktop Mouse II; mini DIN-4
                       connector

Microphone   Electret, omnidirectional; output voltage is 4 mV, peak to peak, at
                       normal value; mini phone plug connector
                       Designed for speech recording and recognition

Sound and Video

Video Display   Built-in VRAM video support for all Apple monitors; four VRAM
                       expansion slots (two banks)

                       Supports Apple 16-bit monitors and many non-Apple monitor
                       types (NTSC, PAL, VGA)

                       Multiple external color and monochrome monitors through NuBus
                       expansion slots

Sound Generator   Enhanced Apple sound chip (EASC), including four-voice wave
                       table synthesis and stereo sampling generator capable of
                       driving stereo mini phone-jack headphones or stereo
                       equipment

Electrical

Line Voltage   100–240 VAC

Frequency   50–60 Hz, single phase

Maximum Power   200 W continuous

Power for SCSI   Maximum continuous power available for each SCSI device:
Devices   1.5A @ +5 V
                          4.3A @ +12 V

Power for NuBus Cards   Maximum continuous power available for each NuBus card:
2.0A @ +5 V
0.175A @ +12 V
0.15A @ –12 V

Physical

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

Weight   24 lb. (11.3 kg)

Environmental

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

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

Relative Humidity   5–90% noncondensing

Altitude   0–10,000 ft. (0–3048 m)

Service Source

Troubleshooting

Macintosh Quadra 840AV

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

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.

Two-part error chord sounds during startup sequence

Perform SIMMs verification.

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   Replace power cord.
5   Replace power supply.
6   Replace logic board. Retain customer's SIMMs.

System (Continued)

Clicking, chirping, or thumping sound from power supply

1 Remove all NuBus expansion cards and disconnect all internal peripherals (hard drives, CD-ROM drives, floppy drives, etc.) and power-on system again. If system powers on normally, reconnect one device at a time and replace NuBus expansion cards one at a time, powering on the system after each reconnection/reinstallation. The defective module is identified when the symptom reappears

2 Replace power supply.

3 Replace logic board. Retain customer's SIMMs.

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   Check battery. Refer to "Battery Verification" in Additional
    Procedures.
3   Replace power cord.
4   Replace power supply.
5   Replace logic board. Retain customer's SIMMs.

System **(Continued)**

System
intermittently
crashes or hangs

1 Verify that system software is version 7.1 or later.
2 Verify that software is known-good.
3 Verify that software is System 7 compatible.
4 Clear parameter RAM. Hold down <Command> <Option> <P> <R> during startup but before "Welcome To Macintosh" appears.
5 Replace SIMMs.
6 Replace logic board. Retain customer's SIMMs.
7 Replace power supply.

Intermittent shut-
downs from a cold boot

Replace power supply.

Video

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

1 Adjust brightness on monitor.
2 Replace monitor. Refer to appropriate monitor manual to
   troubleshoot defective monitor.
3 Replace video cable.
4 If video interface card is installed, move it to different slot.
5 Replace video card, if installed.
6 Clear parameter RAM. Hold down <Command> <Option> <P>
   <R> during startup but before "Welcome To Macintosh"
   appears.
7 Replace SIMMs.
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 If video interface card is installed, move it to different slot.
3 Replace video interface card, if installed.
4 Replace SIMMs.
5 Replace logic board. Retain customer's SIMMs.
6 Replace power supply.

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

1 Replace monitor. Refer to appropriate monitor manual to
   troubleshoot defective monitor.
2 Replace video cable.
3 If video interface card is installed, move it to different slot.
4 Replace video interface card, if installed.
5 Clear parameter RAM. Hold down <Command> <Option> <P>
   <R> during startup but before "Welcome To Macintosh"
   appears.
6 Replace logic board. Retain customer's SIMMs.

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 with a floppy
disk, 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 SIMMs.
6   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

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 Replace hard drive power cable.
2 Replace hard drive.
3 Replace power supply.

No internal SCSI devices operate

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

Drive does not appear on the desktop

1 Verify there are no duplicate SCSI device addresses.
2 Clear parameter RAM. Hold down <Command> <Option> <P> <R> during startup but before "Welcome To Macintosh" appears.
3 If drive is not initialized, use HD SC Setup to initialize.

4   Replace hard drive.

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 Check mouse connection.
2 Inspect inside of mouse for buildup of dirt or other contaminants. Clean mouse if necessary.
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 mouse button has no effect

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

Peripherals (Continued)

Double-click doesn't
open selected item

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.

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.

Peripherals (Continued)

Known-good serial
printer does not work

1. Verify that system software is version 7.1 or later.
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 that system software is version 7.1 or later.
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.

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 icon

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

Take Apart

Macintosh Quadra 840AV
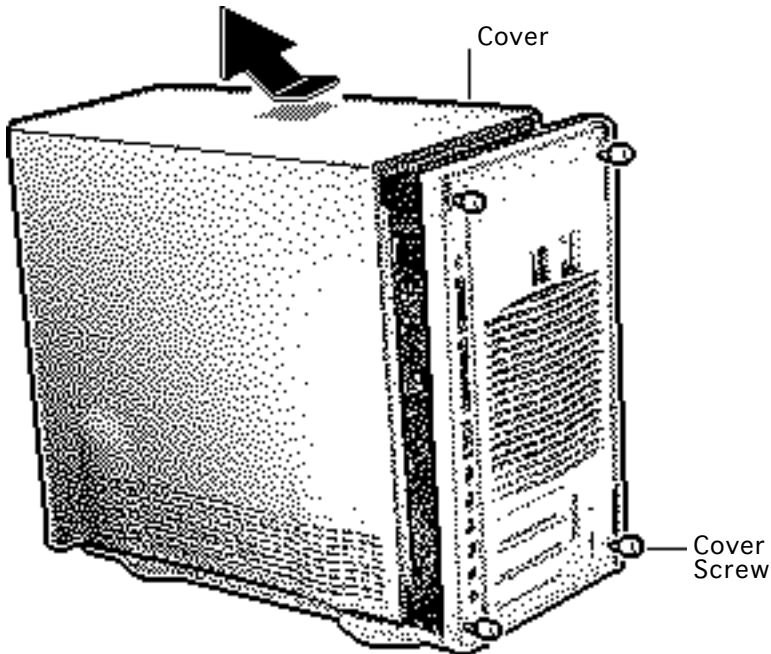
Cover

No preliminary steps are required before you begin this procedure.

1 Loosen the four captive cover screws.

2 Slide the cover forward about 1/2 inch and lift the cover from the computer.

Floppy Drive ——

Floppy Drive

Before you begin, remove the cover.

Caution: Review the ESD precautions in Bulletins/Safety.
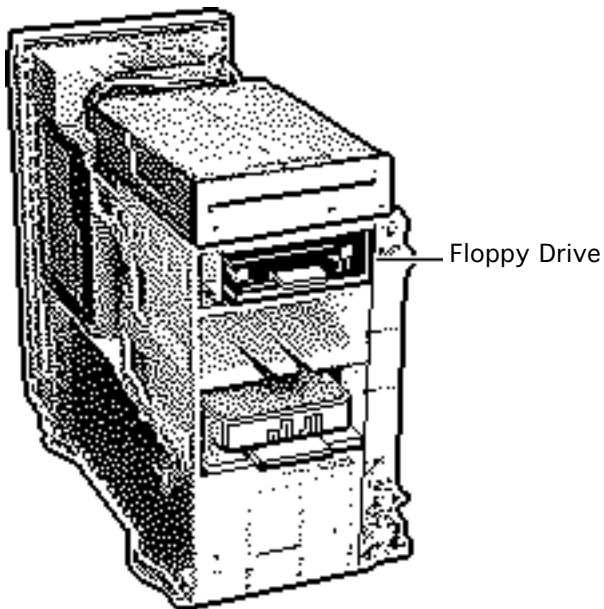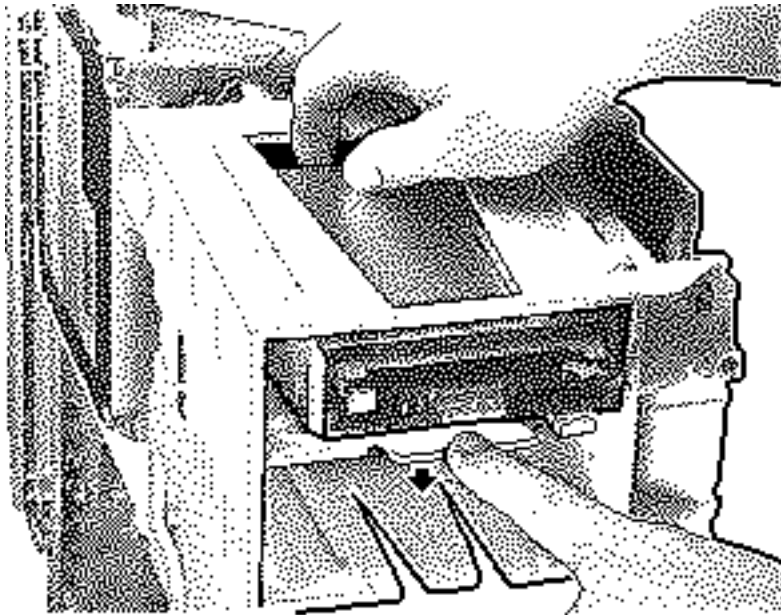
1. Press down the retaining clip securing the floppy drive and slide the floppy drive forward about 2 inches.

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

3. Remove the floppy drive from the chassis.

Replacement Note: Install dust shields on 1.4 MB drives in the Quadra 840AV. All 1.4 MB replacement drives ship with the dust shield already installed.

Hard Drive

Before you begin, remove the cover.

Caution: Review the ESD precautions in Bulletins/Safety.
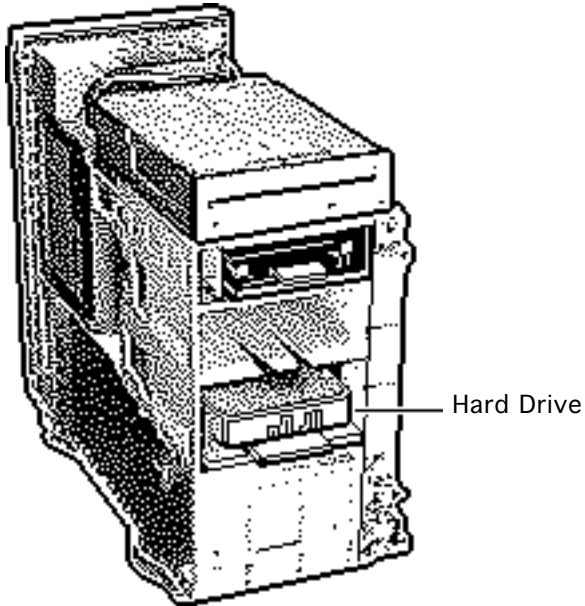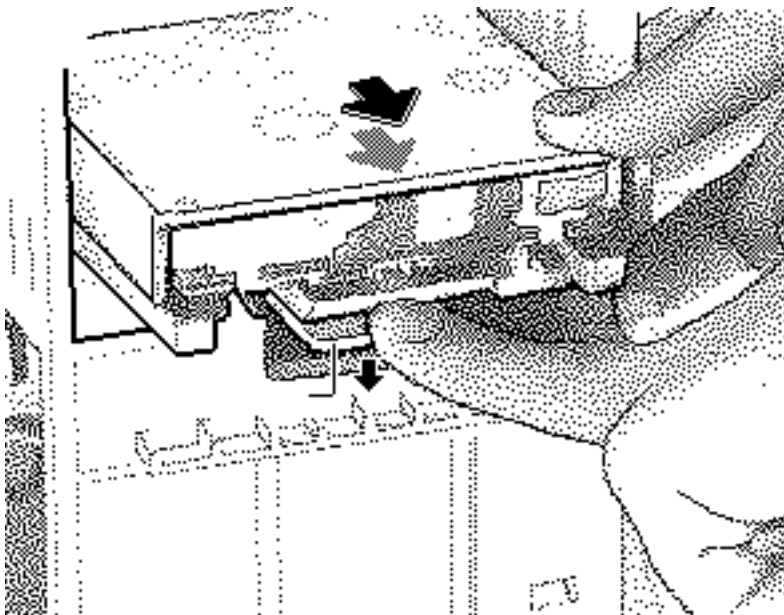
Hard Drive

1 Disconnect the SCSI data cable and hard drive power cable from the 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 the carrier and returning drives, cables, and carriers to Apple, refer to Additional Procedures in the Hard Drives manual.

CD-ROM Drive

Before you begin, remove the cover.

Caution: Review the ESD precautions in Bulletins/ Safety.

CD-ROM Drive

Power Cable

SCSI Data Cable
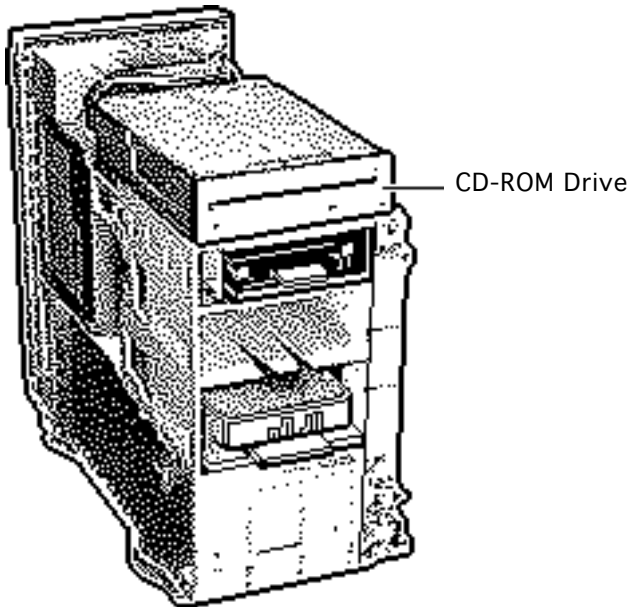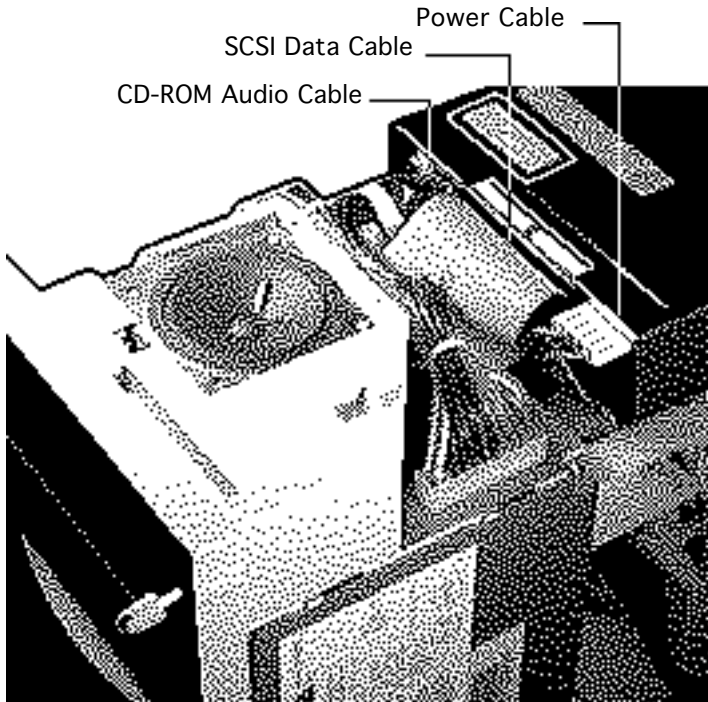
CD-ROM Audio Cable

1 Disconnect the following cables from the CD-ROM drive:

- SCSI data cable
- CD-ROM audio cable
- CD-ROM power cable
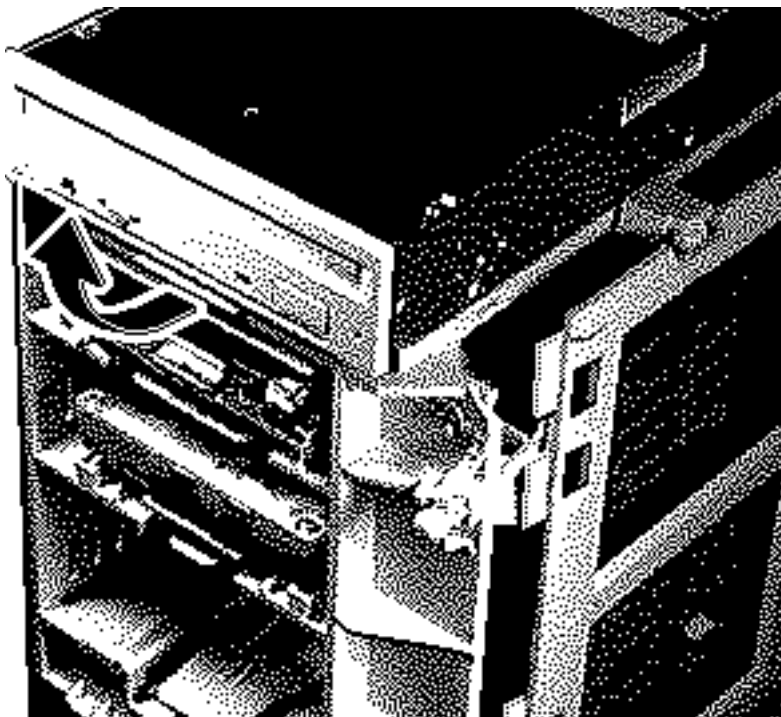
2 Pull up on the retaining clip securing the CD-ROM drive and slide the CD-ROM drive out.

Replacement Note: Be sure the floppy drive cable is seated firmly in its channel before replacing the CD-ROM drive. Failure to do so could result in damage to the floppy drive cable.

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

Logic Board

Before you begin, remove the cover.

Caution: Review the ESD precautions in Bulletins/Safety.

Logic Board

CD-ROM Audio Cable
Speaker Cable
Power Cable
SCSI Data Cable
Floppy Drive Cable
LED Cable
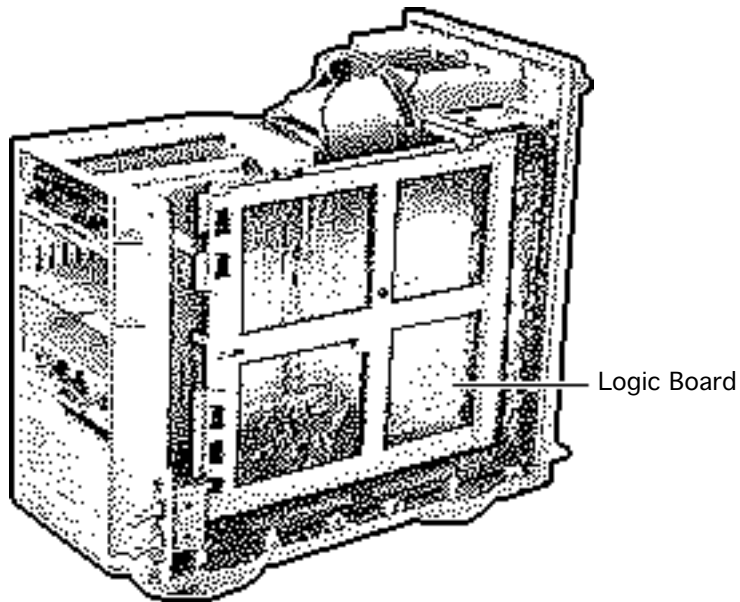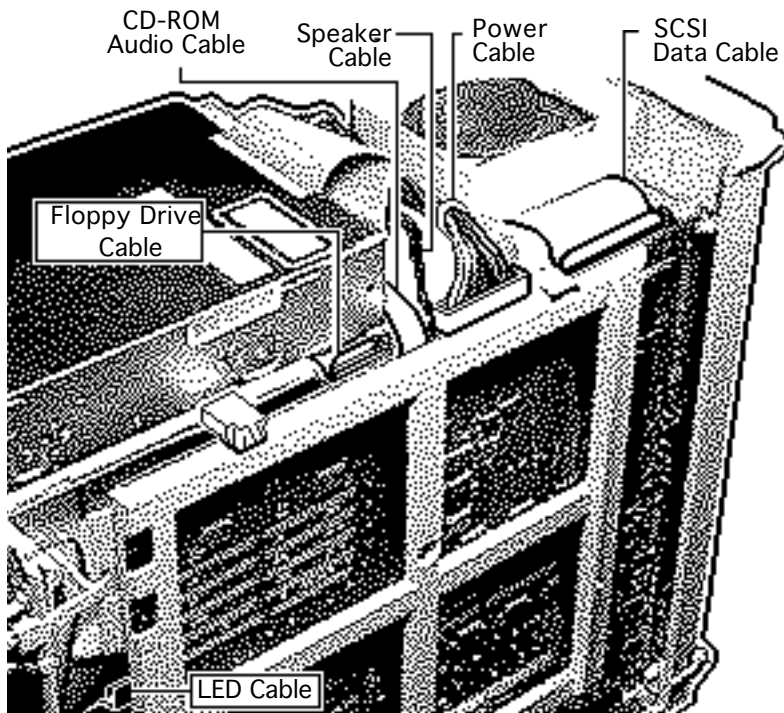
1 Disconnect the following cables from the logic board:
   • SCSI data cable
   • Logic board power cable
   • Speaker cable
   • CD-ROM audio cable
   • Floppy drive cable
   • LED cable

Power-On Actuator
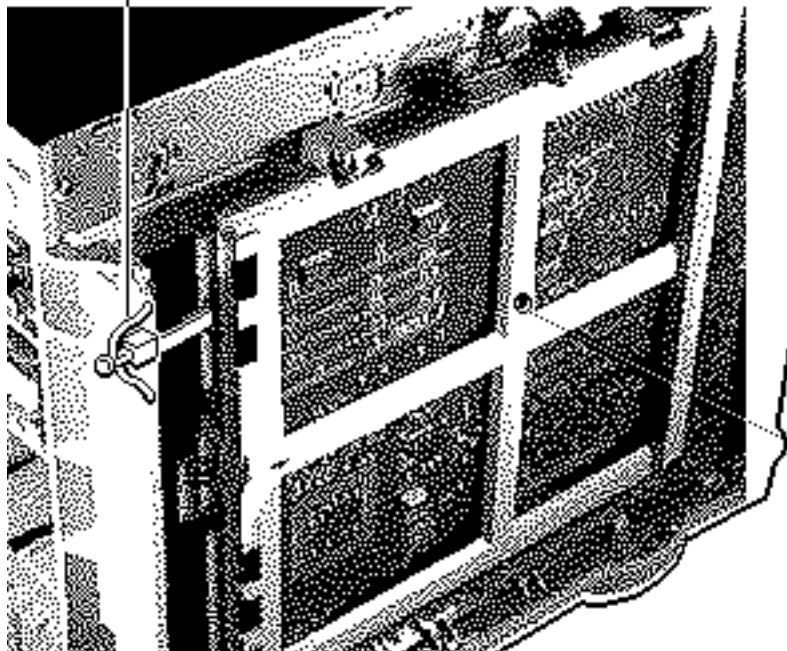
2 Remove the power-on actuator.

3 Remove the screw securing the logic board.

Latch

Tab
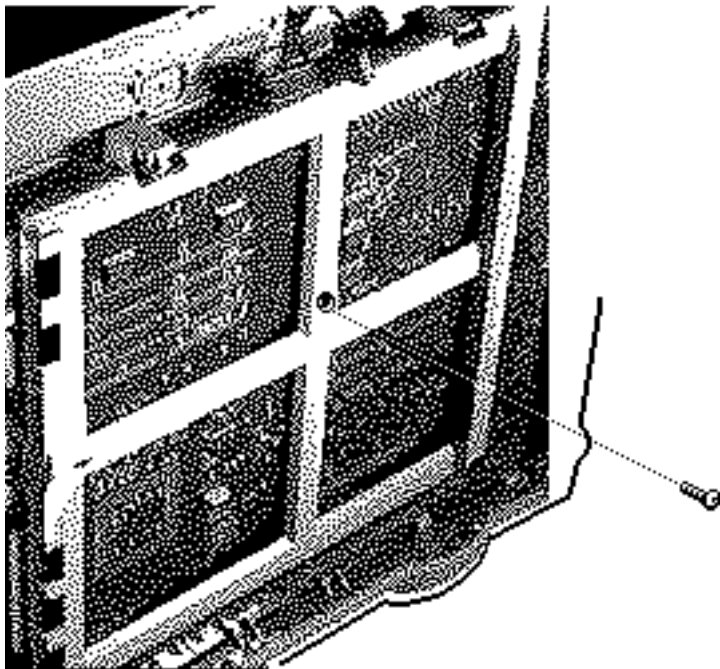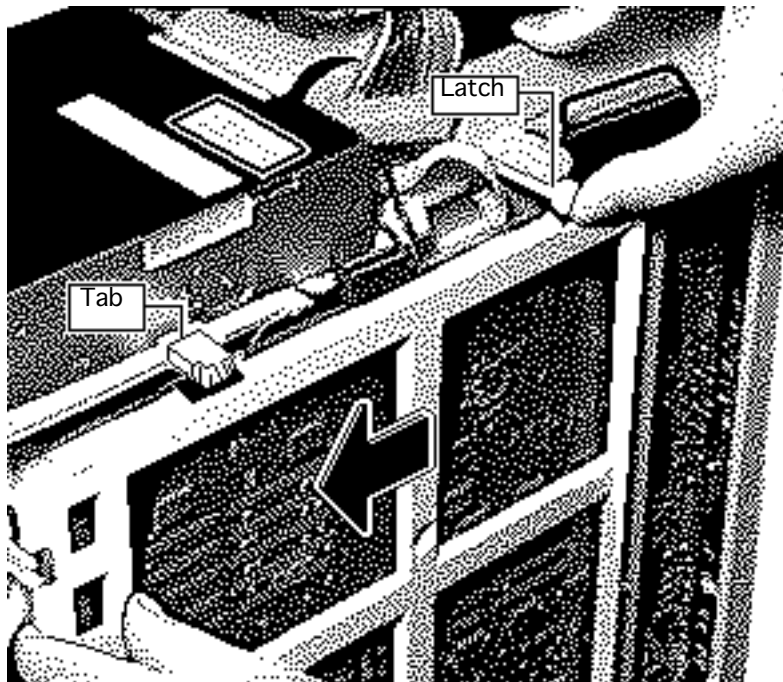
4 Slide the logic board forward until the slot indicated lines up with the tab.

5 Lift the latch at the rear of the logic board and release the logic board.
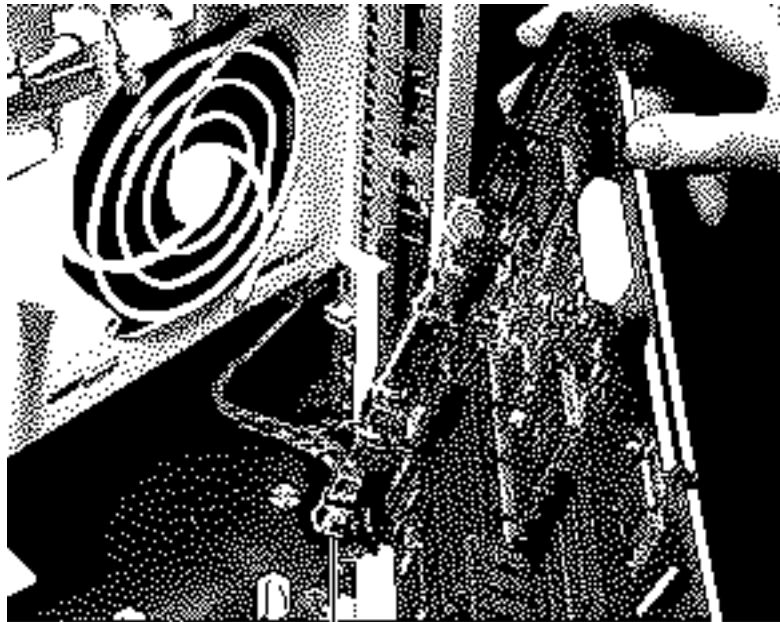
Composite Video Input and Output Connectors

6   Pivot the front of the logic board out of the chassis and stand the logic board on the static mat next to the computer.

7   Disconnect the composite video input and output connector cables from the logic board.

Power Supply

Before you begin, remove the cover.

Caution: Review the ESD precautions in Bulletins/Safety.

Power Supply

Chassis Support Brace
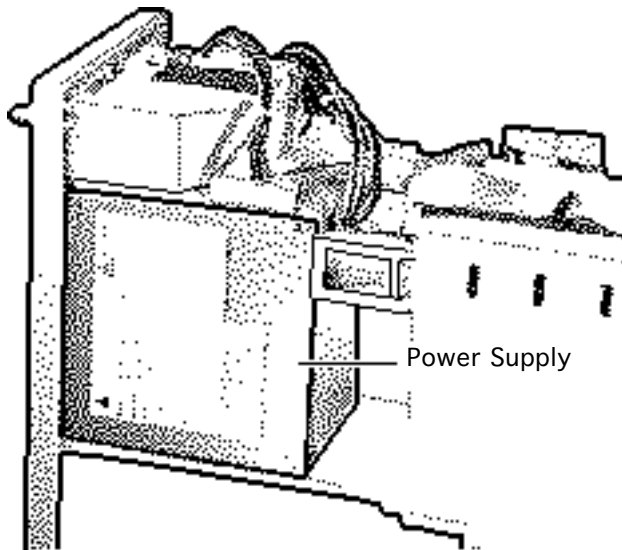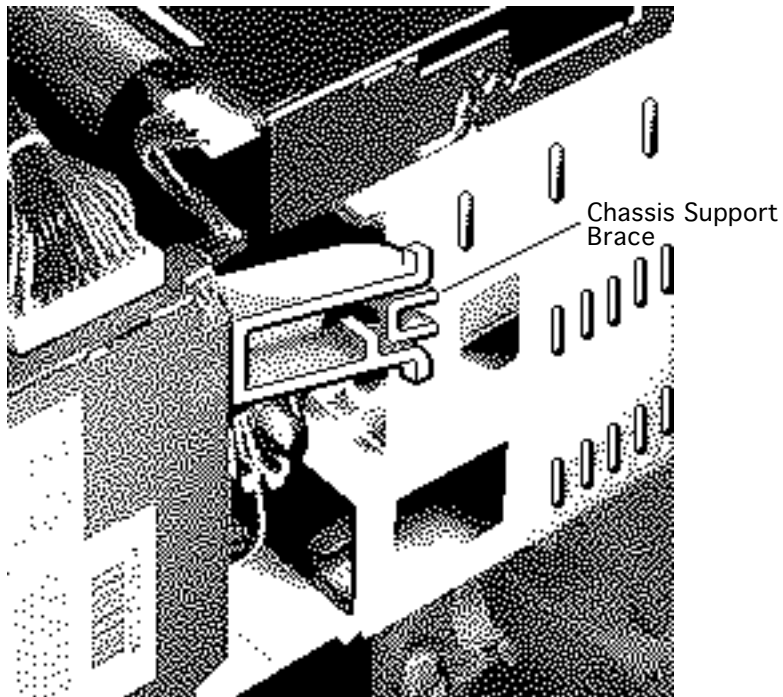
1 Remove the chassis support brace.

2 Disconnect the logic board power cable.

Logic Board
Power Cable
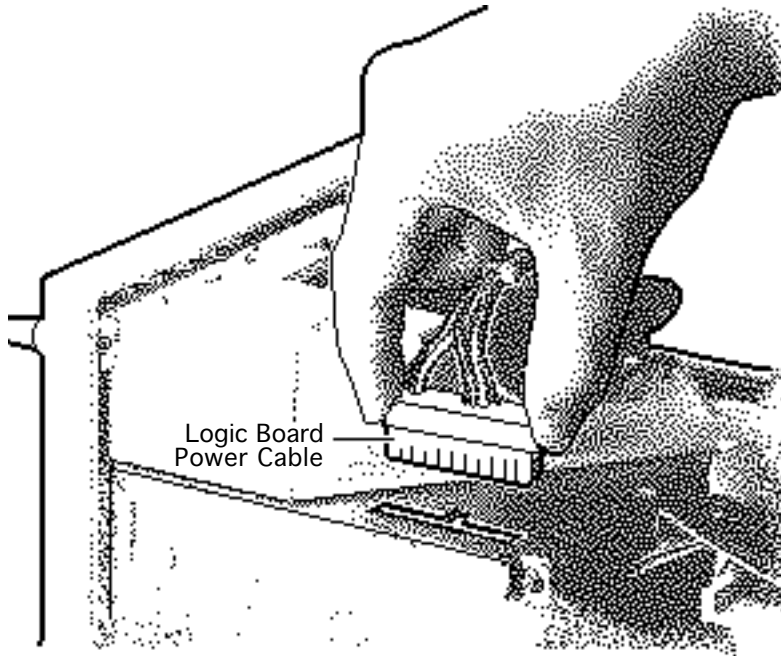
3 Press the latch and
   release the power
   supply.

Latch
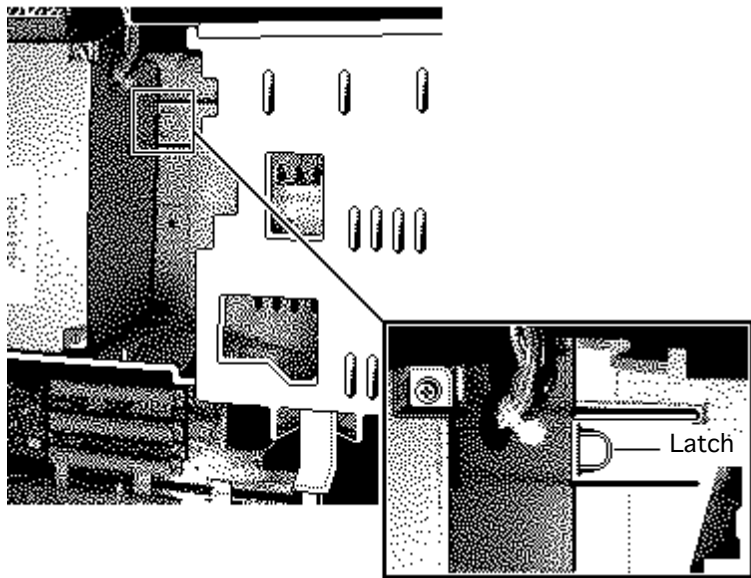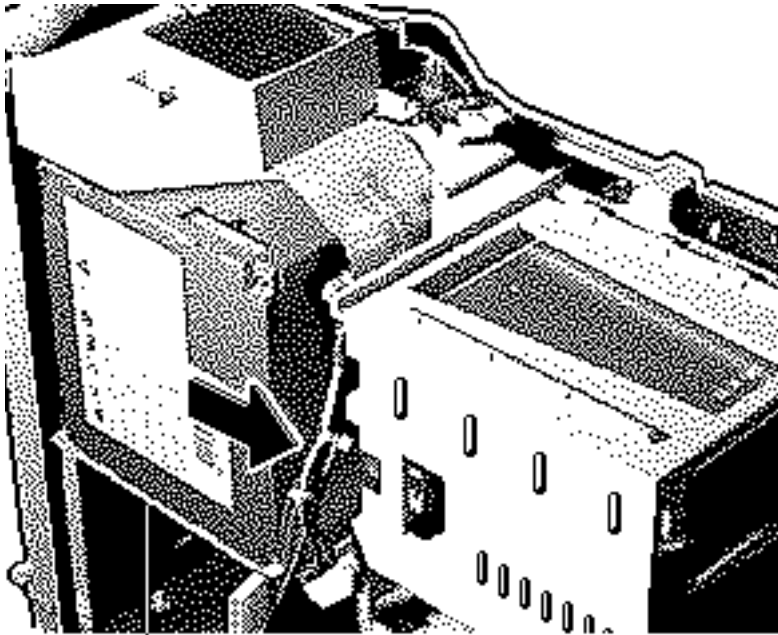
Power Supply

4 Slide the power supply forward.

5 Pull the power supply out of the computer.

Speaker

Speaker Cable

Speaker

Before you begin, remove the cover.

Caution: Review the ESD precautions in Bulletins/Safety.

1   Disconnect the speaker cable from the logic board.
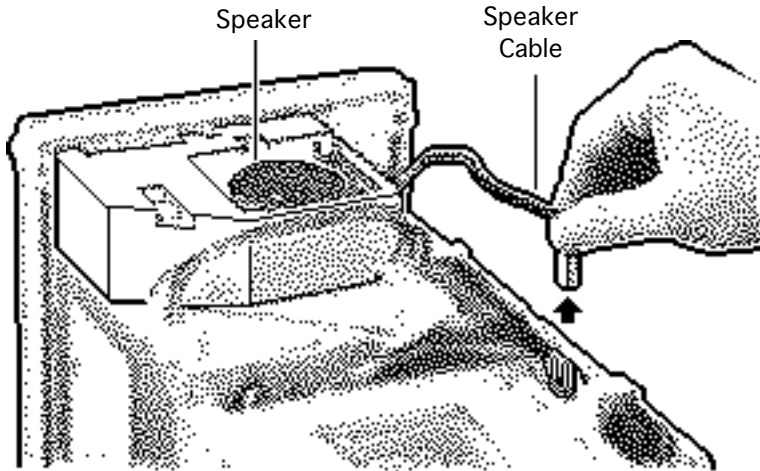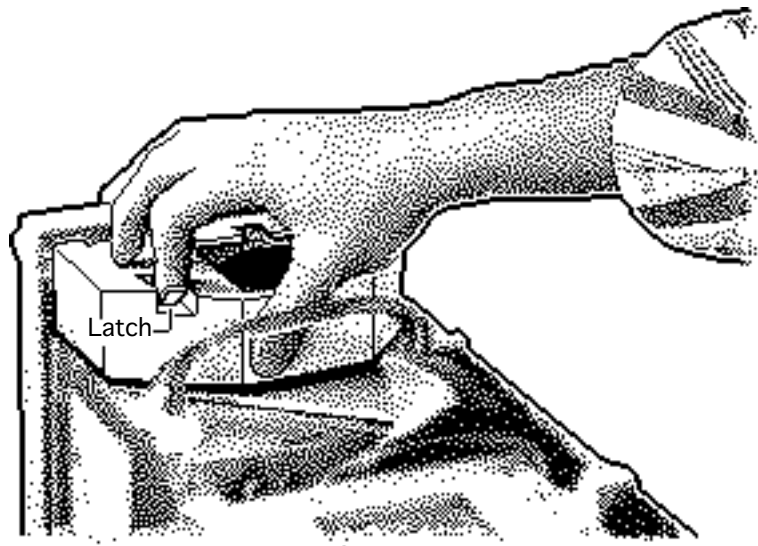
Latch

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 Cover

Rear Cover

Before you begin, remove the following:

- Cover
- Speaker

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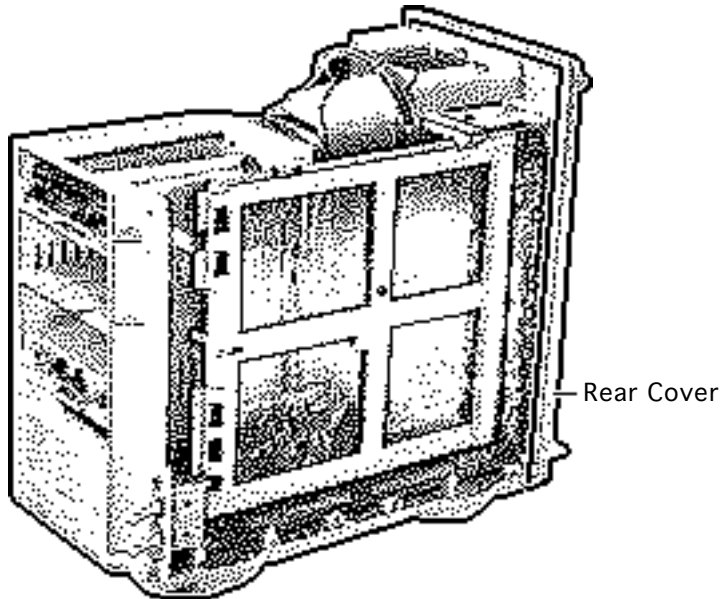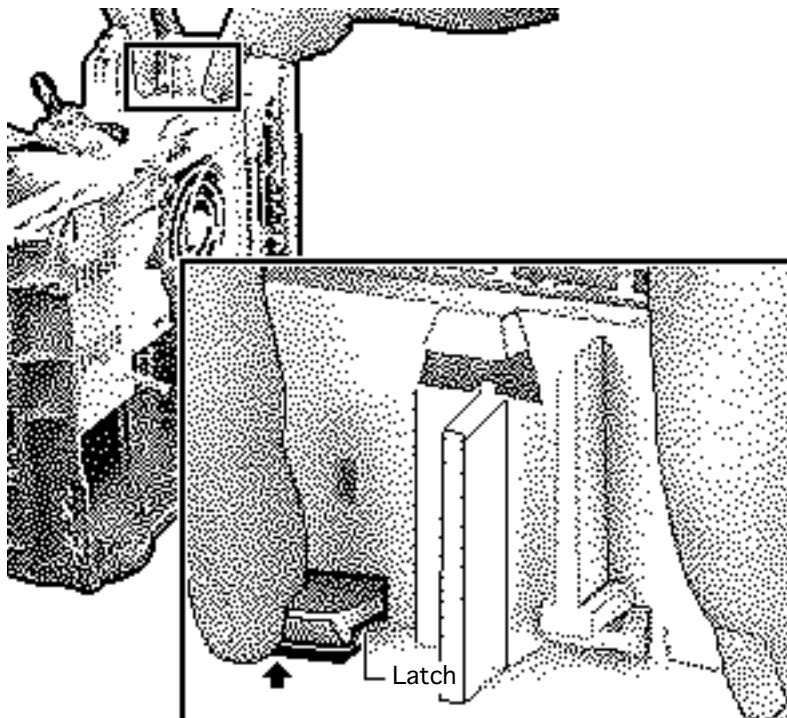
Latch

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

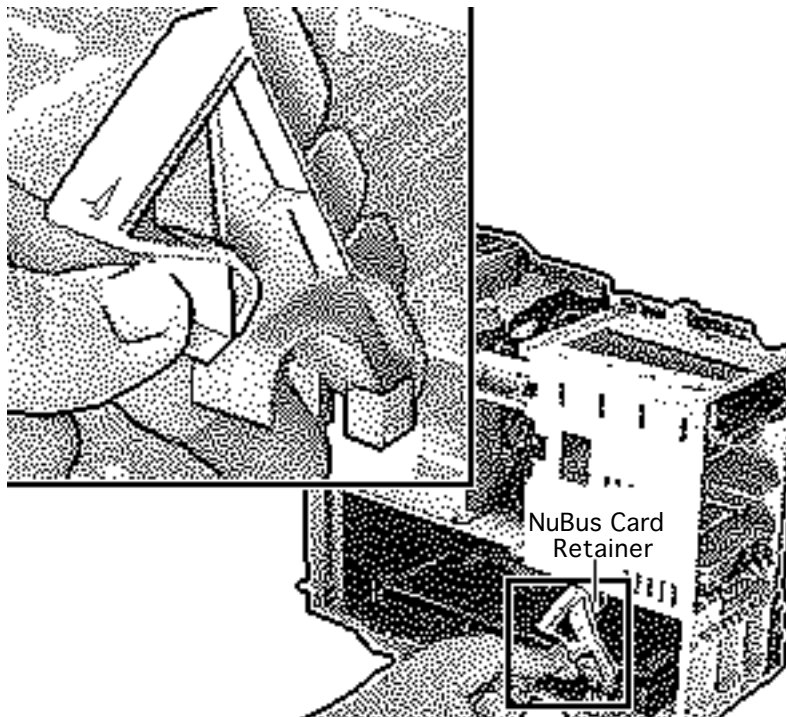2 Remove the rear cover from the computer.
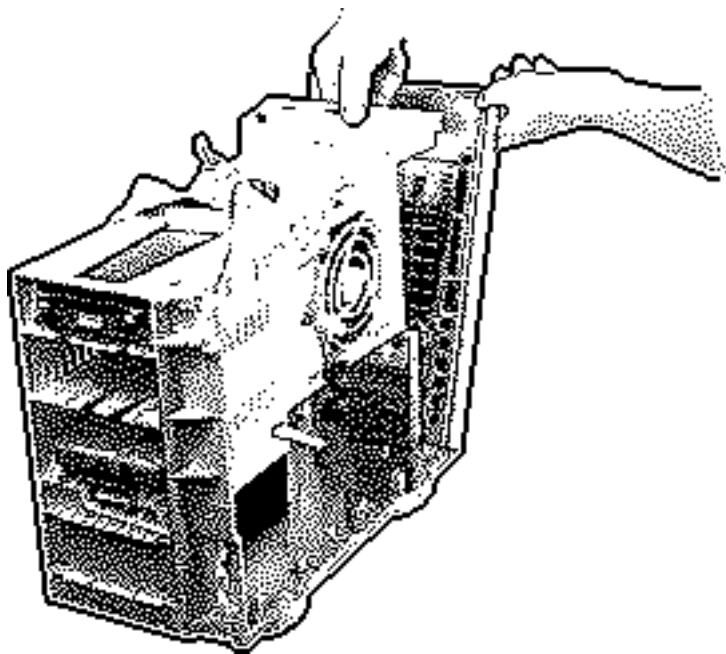
Upgrades

Macintosh Quadra 840AV

NuBus Card
Retainer

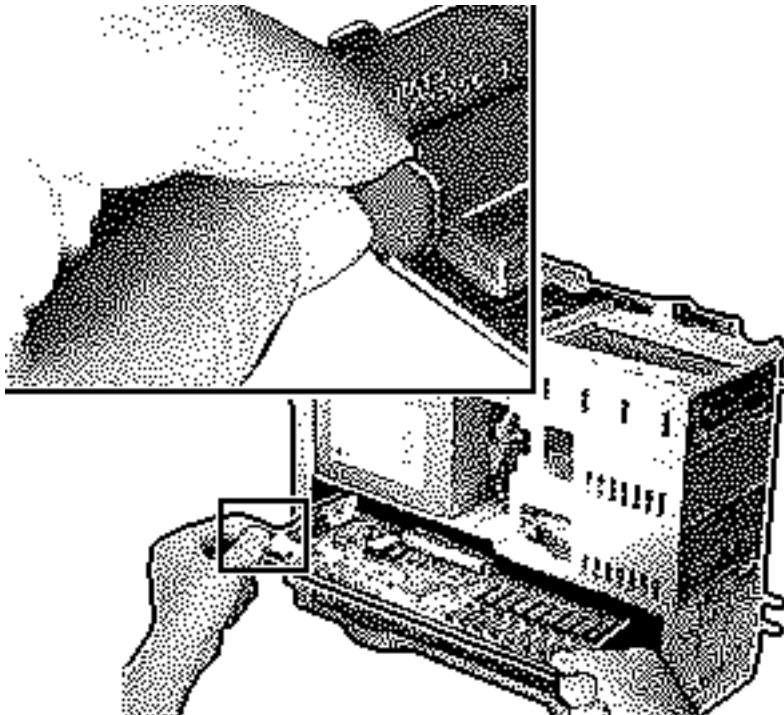## Expansion Cards

Before you begin, remove the cover.

Caution: 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.
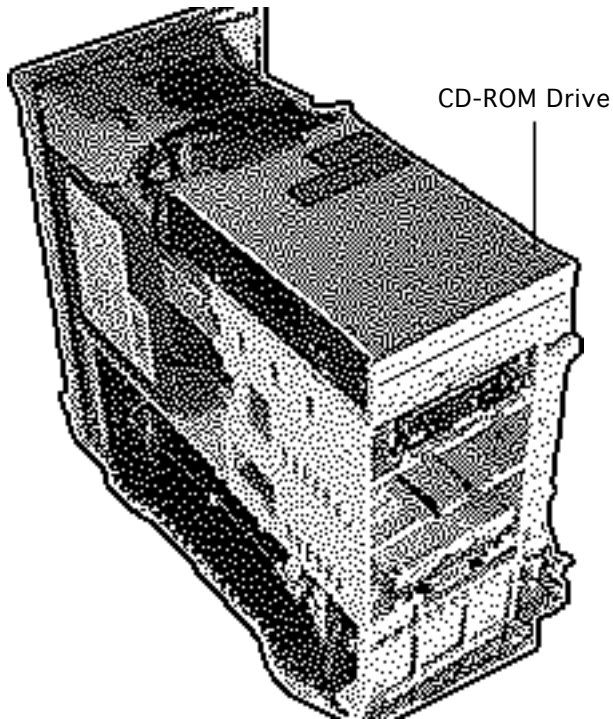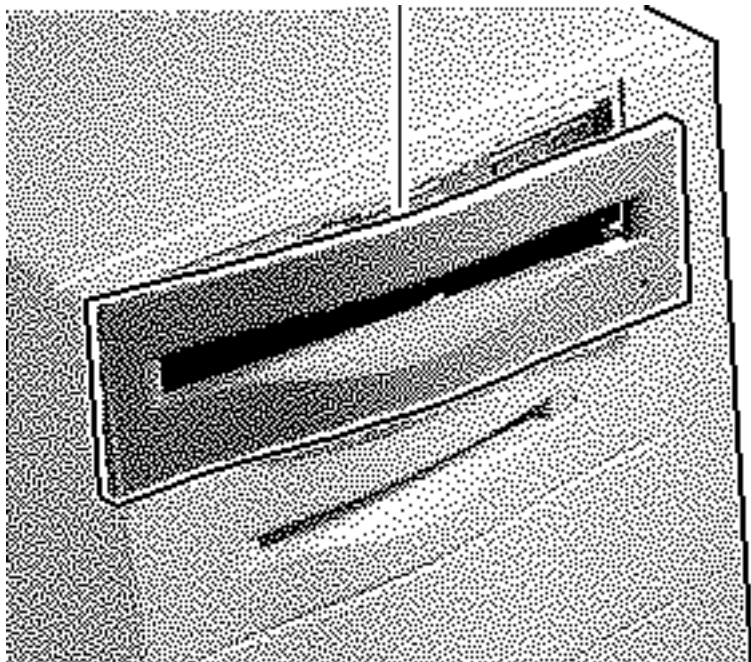
CD-ROM Drive

CD-ROM Upgrade

Before you begin, remove the cover.
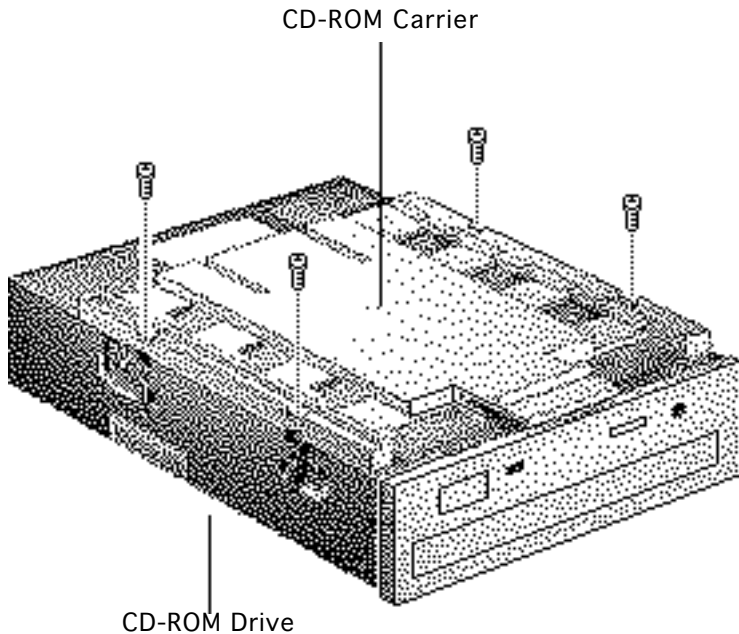
Caution: Review the ESD precautions in Bulletins/Safety.

Bezel

1 Remove the upper blank bezel from the top cover.
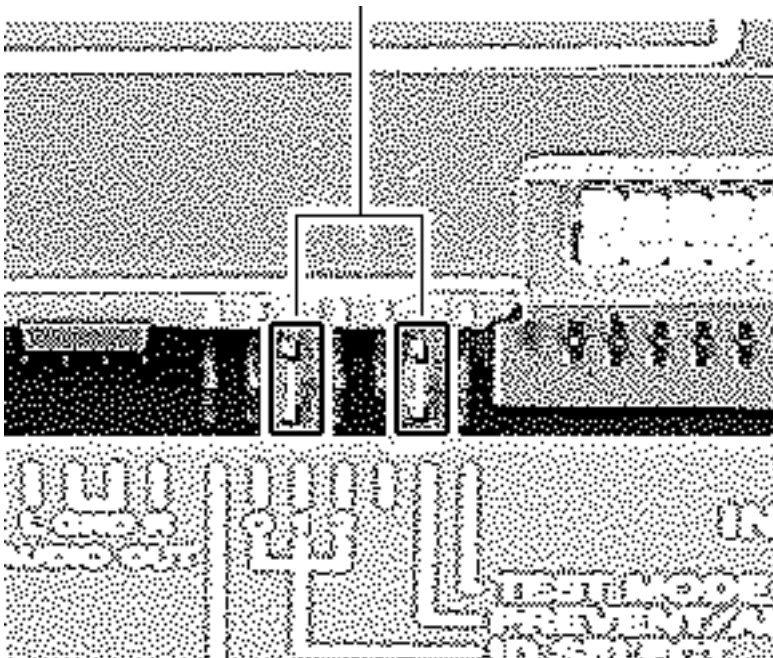
2 Install the slotted CD-ROM drive bezel in the top cover.

CD-ROM Carrier

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

CD-ROM Drive

Jumper Connectors

4 Verify that the two 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 2. Verify that no other SCSI device installed in the computer already has that address. If another device does have an ID of 2, change the ID prior to installing the CD-ROM drive.

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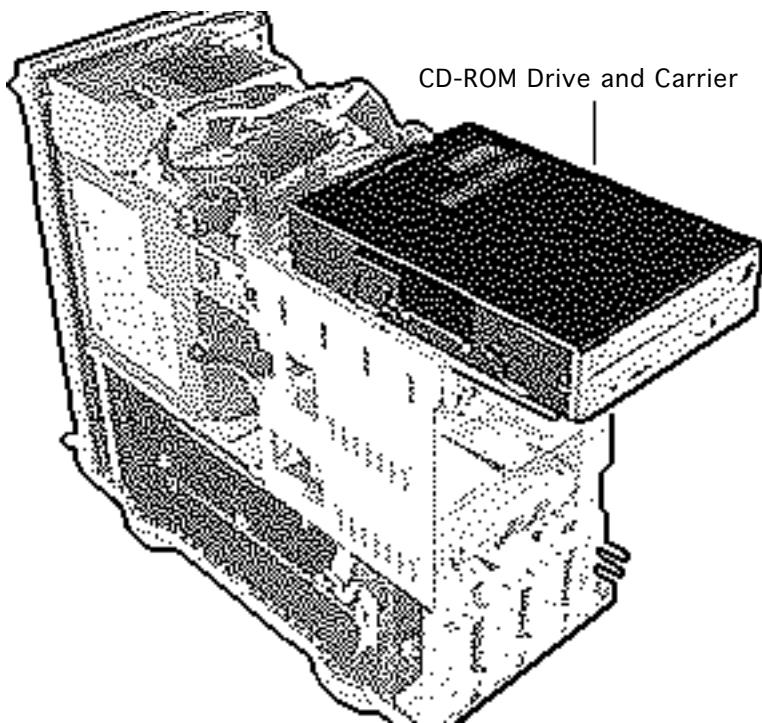
5 Slide in the CD-ROM drive and carrier.

SCSI Data Cable

CD-ROM Drive Power Cable
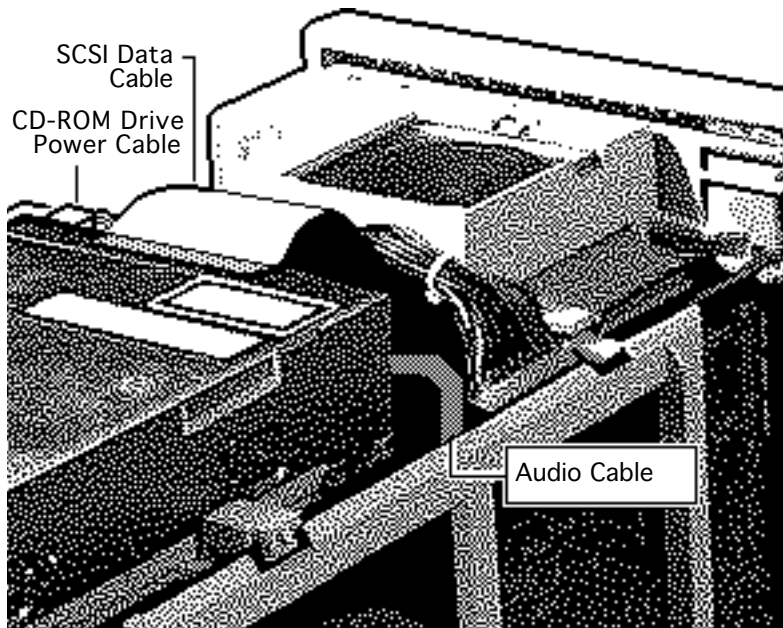
Audio Cable

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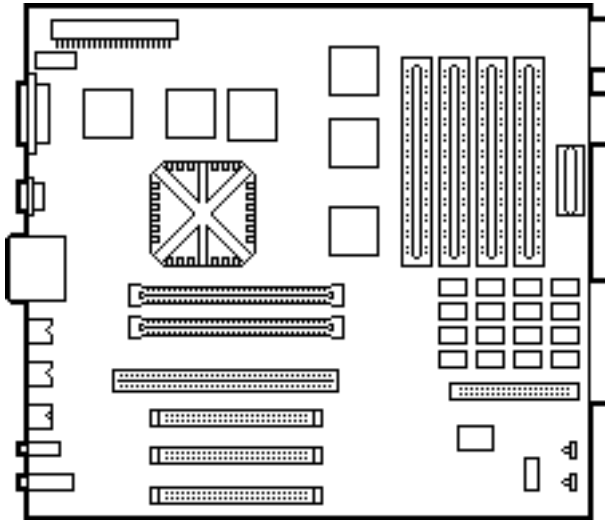 • SCSI data cable
  • CD-ROM drive power cable

Power Macintosh Upgrade

No preliminary steps are required before you begin this procedure.

The Quadra 840AV can be upgraded to a Power Macintosh 8100/80 or Power Macintosh 8100/80AV. For upgrade instructions, refer to Additional Procedures in the Power Macintosh 8100 manual.

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.
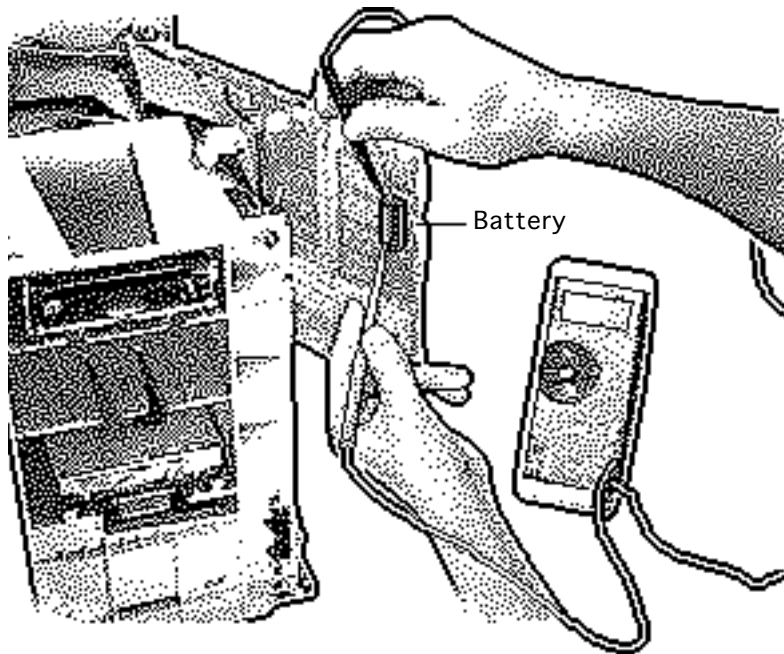
Additional Procedures

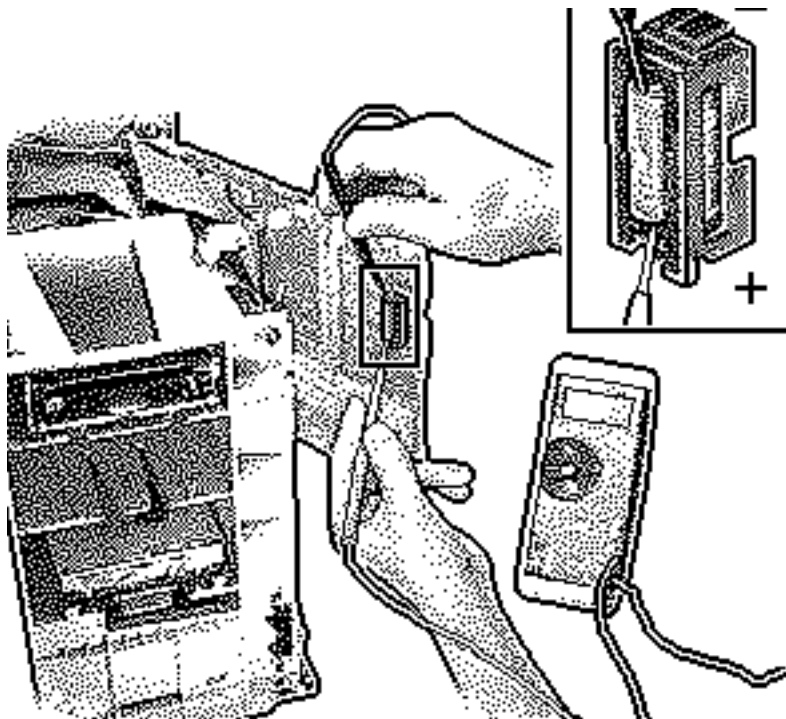Macintosh Quadra 840AV

Battery

Battery Verification

Before you begin, remove the following:

• Cover
• Logic Board

Caution: Review the ESD precautions in Bulletins/Safety.

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

1 Set the voltmeter to the 10 volts DC scale.

2 Hold the positive probe of the voltmeter to the positive end of the battery (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 following:

- Cover
- Logic Board

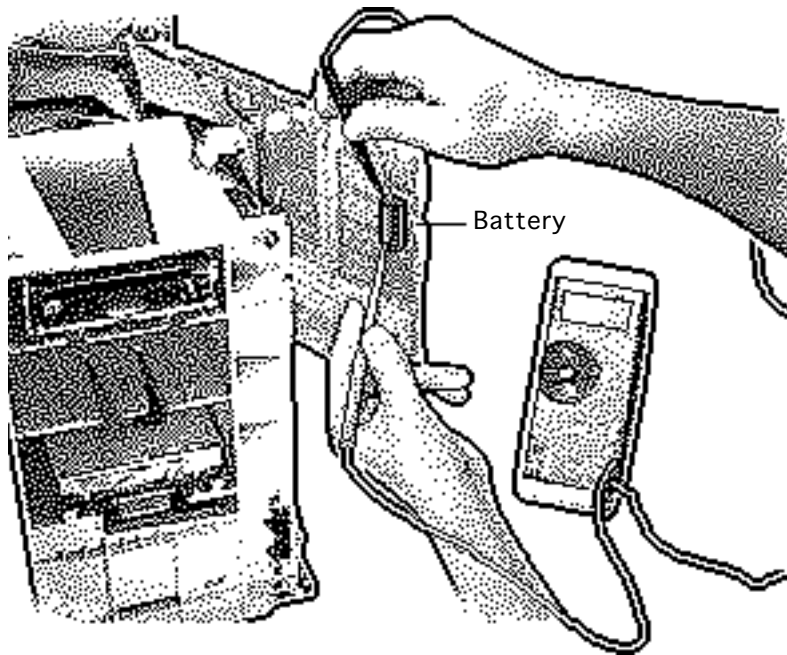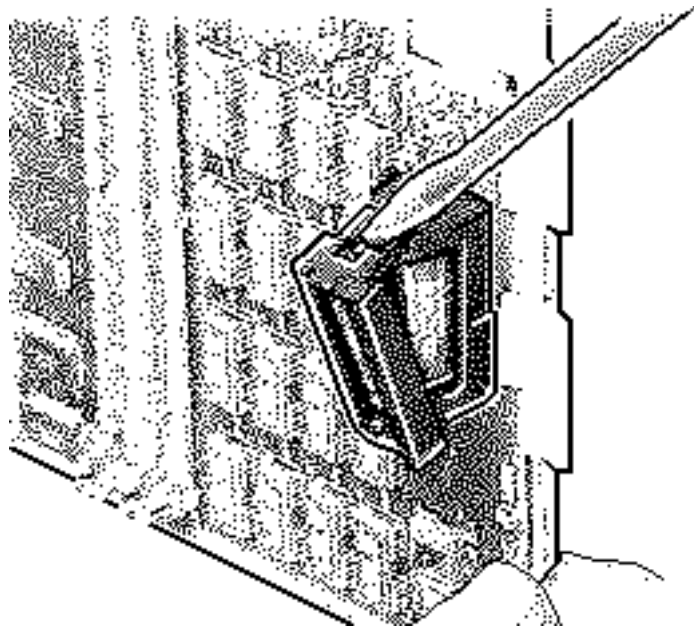**Caution:** Review the ESD precautions in Bulletins/ Safety.

⚠**Warning:** If handled or discarded improperly, the 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.

Reset Logic Board

Before you begin, remove the following:
- Cover
- Power Cord
- Logic Board

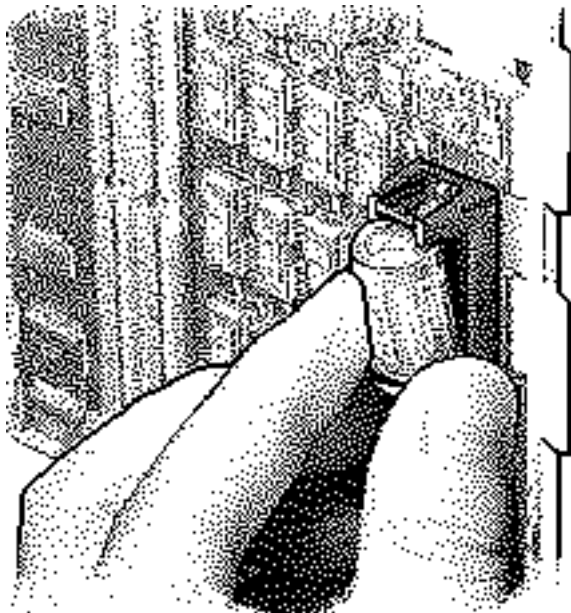**Caution:** Review the ESD precautions in Bulletins/Safety.

⚠ Warning: If handled or discarded improperly, the lithium battery in the Quadra 840AV could explode. Review battery handling and disposal instructions in Bulletins/Safety.

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.
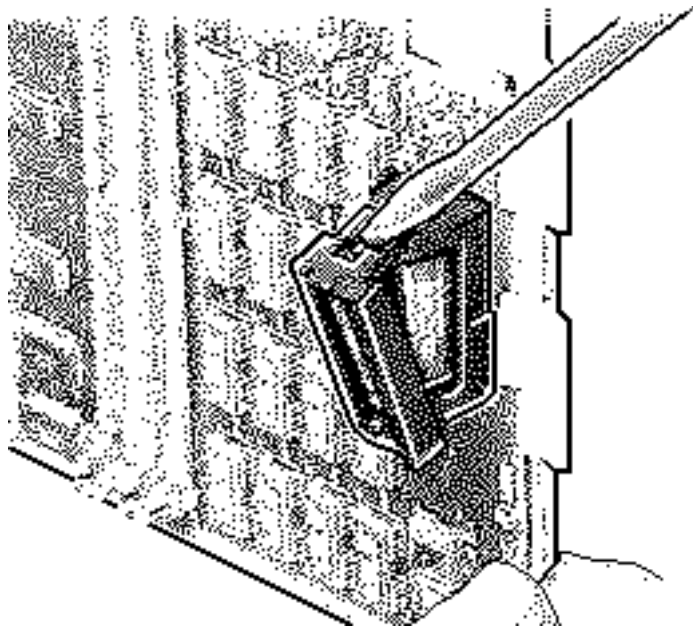
1 Unplug the computer
   first.

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.
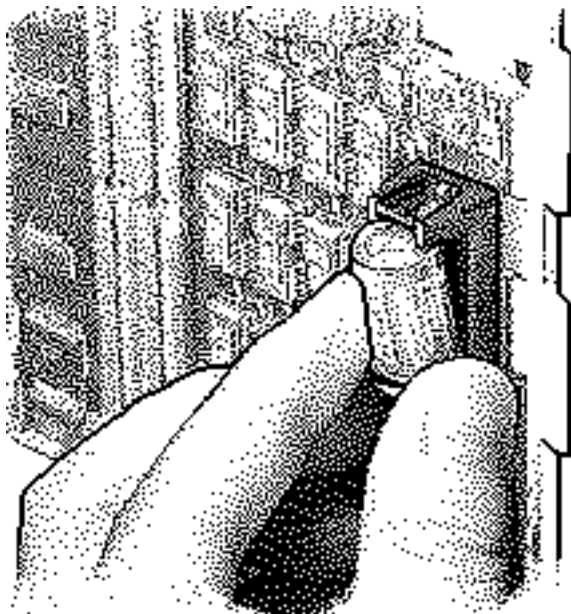
4 Press the computer's power-on button. Verify that the
   power supply cable is disconnected from the logic board.
   Wait 5—10 minutes and then
   • Replace the battery
   • Reassemble the computer

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 system parameter settings.

Exploded View

Macintosh Quadra 840AV

Top Housing
922-0847

Front Panel
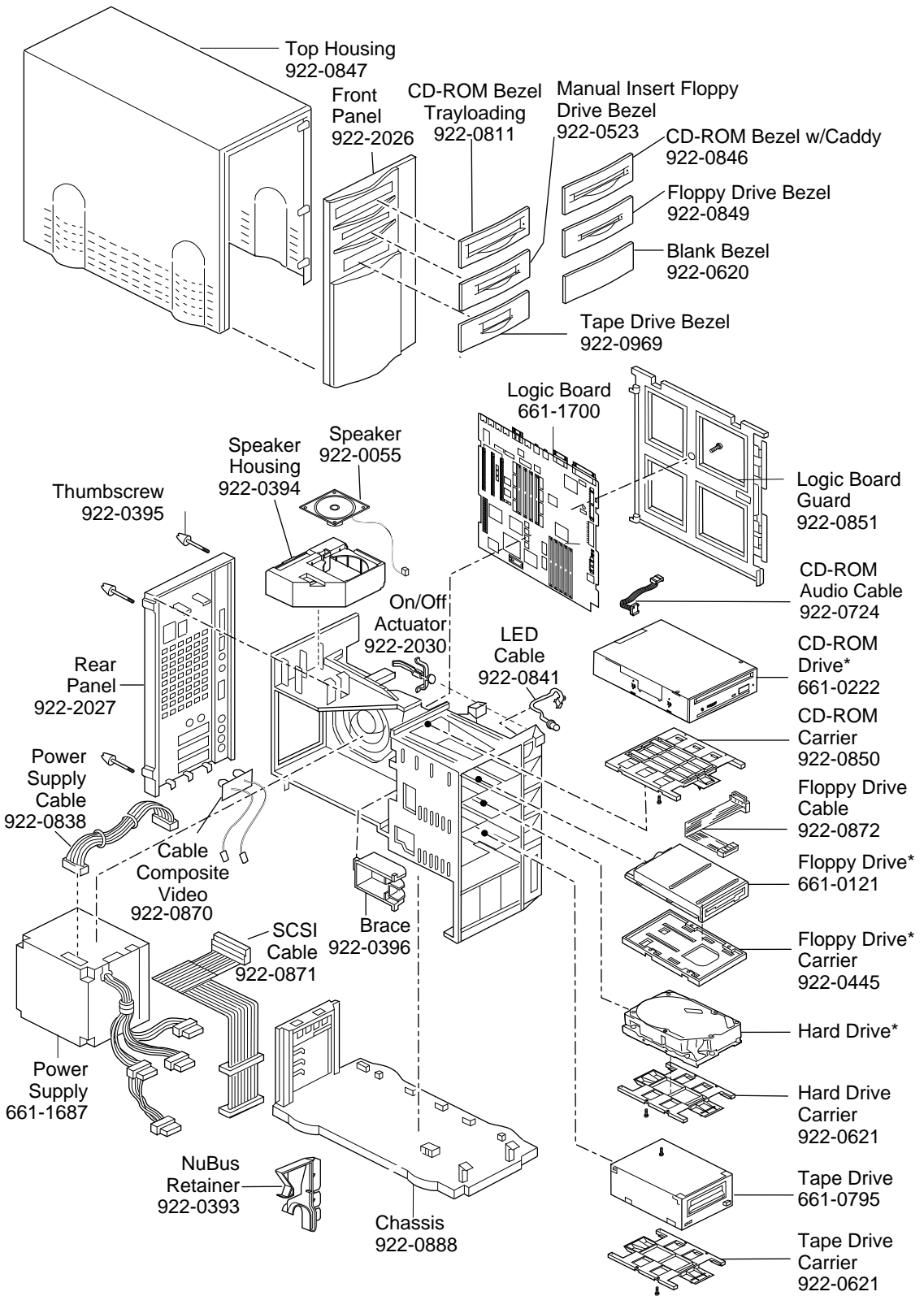922-2026

CD-ROM Bezel Trayloading
922-0811

Manual Insert Floppy Drive Bezel
922-0523

CD-ROM Bezel w/Caddy
922-0846

Floppy Drive Bezel
922-0849

Blank Bezel
922-0620

Tape Drive Bezel
922-0969

Logic Board
661-1700

Logic Board Guard
922-0851

Speaker Housing
922-0394

Speaker
922-0055

Thumbscrew
922-0395

CD-ROM Audio Cable
922-0724

On/Off Actuator
922-2030

LED Cable
922-0841

CD-ROM Drive*
661-0222

CD-ROM Carrier
922-0850

Rear Panel
922-2027

Floppy Drive Cable
922-0872

Power Supply Cable
922-0838

Floppy Drive*
661-0121

Cable Composite Video
922-0870

Brace
922-0396

SCSI Cable
922-0871

Floppy Drive* Carrier
922-0445

Hard Drive*

Power Supply
661-1687

Hard Drive Carrier
922-0621

NuBus Retainer
922-0393

Tape Drive
661-0795

Chassis
922-0888

Tape Drive Carrier
922-0621

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

Quadra 840AV