# Macintosh LC Series/ Quadra 605

Macintosh LC, Macintosh LC II,
Macintosh LC III, Macintosh LC 475,
Macintosh Quadra 605

# Basics

## Macintosh LC Series/Quadra 605

**Figure: Macintosh LC Series, Quadra 605**

# Overview

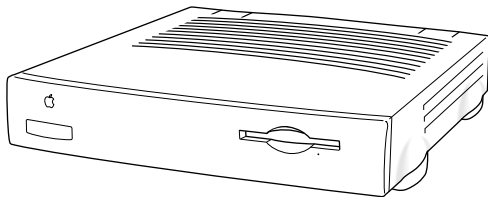This manual includes complete repair procedures for the Macintosh LC Series/ Quadra 605, shown at left.

Specifications

Macintosh LC Series/Quadra 605

# Introduction

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

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

# Processor

**LC**                     Motorola 68020 microprocessor
                           16 MHz
                           16-bit internal data bus

**LC II**                  Motorola 68030 microprocessor
                           16 MHz
                           16-bit internal data bus
                           Burst-mode RAM access

**LC III**                 Motorola 68030 microprocessor
                           25 MHz
                           32-bit internal data bus
                           Burst-mode RAM access
                           Coprocessor socket

**LC 475/Quadra 605**     Motorola 68LC040 microprocessor
25 MHz
32-bit internal data bus
Burst-mode RAM access

# Memory

**DRAM**
LC: 2 MB, expandable to 10 MB (100 ns or faster SIMMs)
LC II: 4 MB standard, expandable to 10 MB (100 ns or faster SIMMs)
LC III: 4 MB standard, expandable to 36 MB (80 ns or faster SIMMs)
LC 475/Quadra 605: 4 MB or 8 MB standard, expandable to 36 MB (80 ns or faster SIMMs)

**ROM**
LC/LC II: 512 K
LC III/LC 475/Quadra 605: 512K expandable to 1 MB

**VRAM**                       LC: 256K VRAM, upgradable to 512K
                               LC II: 256K VRAM SIMM, upgradable to 512K
                               LCIII: 512K VRAM on board, upgradable to 768K
                               LC 475/Quadra 605: Two 256K VRAM SIMMs, upgradable to 1MB

# Disk Storage

**Floppy Drive**      LC/ LC II/ LC III: Apple SuperDrive 1.4 MB Floppy Disk Drive
Optional second internal 1.4 MB floppy drive (LC only)
LC 475/Quadra 605: Apple SuperDrive 1.4 MB Floppy Disk Drive
    or Apple SuperDrive Manual Insert Floppy Disk Drive

**Hard Drive**        LC: 40 MB or 80 MB
LC II: 40 MB, 80 or 160 MB
LC III: 40, 80 or 160 MB
LC 475/Quadra 605: 160 or 230 MB

# I/O Interfaces

**Serial**            Two RS-232/RS-422 serial ports; mini DIN-8 connectors

**SCSI**             SCSI interface; DB-25 connector

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

**Video**            One DB-15 monitor port for built-in video; DA-15 connector

**Sound**            LC/LC II/LC III: Mono sound input and output port; mini phono
                     plug
                     LC 475/Quadra 605: Mono sound input port; stereo output; mini
                     phono plug

**Expansion Connector**

LC: 96-pin processor-direct slot (PDS) supporting 020 direct slot expansion card

LC II: 96-pin PDS supporting 020/030 direct slot expansion card

LC III: 114-pin PDS supporting 020/030 direct slot expansion card

LC 475/Quadra 605: 114-pin expansion slot supporting 030/040 expansion cards. Accepts Macintosh LC compatible I/O display, network, and video capture cards.  Does not support 030 processor accelerator or cache cards.

# I/O Devices

**Keyboard**          Apple Keyboard, Apple Keyboard II, Apple Extended Keyboard II,
                       or Apple Adjustable Keyboard connected through ADB ports
                       (mini DIN-4)

**Mouse**             ADB mouse and ADB Mouse II connected through ADB ports (mini
                       DIN-4)

**Microphone**        Electret, omnidirectional
                       Operates on 8 VDC supplied by microphone port on CPU

# Sound and Video

**Sound**         Monaural, 8-bit sound input at 11 or 22 kHz
                  LC, LC II, LC III: Monophonic, 8-bit sound generator supplying
                     same signal to both channels of stereo equipment
                  LC 475 and Quadra 605: Stereo output capability

**Video**         LC and LC II provide built-in support for many monitors,
                     including
                  • Apple High-Resolution Monochrome Monitor
                  • AppleColor High-Resolution RGB Monitor
                  • Macintosh 12-Inch RGB Display
                  • Macintosh 12-Inch Monochrome Display
                  • Macintosh Color Display
                  • Apple Basic Color Monitor

**Video (cont'd)**      LC III, LC 475 and Quadra 605 provide up to 16-bit support on
                        12-, 13-, and 16-inch monitors and 8-bit support on 15-
                        inch portrait and 21-inch monitors. LC III, LC 475 and Quadra
                        605 support all Apple monitors available at CPU introduction
                        dates, including

- Apple High-Resolution Monochrome Monitor
- AppleColor High-Resolution RGB Monitor
- Macintosh 12-Inch RGB Display
- Macintosh 12-Inch Monochrome Display
- Macintosh Color Display
- Apple Basic Color Monitor
- Macintosh 16-Inch Color Display (Macintosh LC III only)

LC III, LC 475 and Quadra 605 support NTSC and PAL.

## Electrical

**Line Voltage**          100–240 VAC, automatically configured

**Frequency**             LC Series: 47–63 Hz
                          Quadra 605: 50–60 Hz

**Maximum Power**         LC/LC II: 50 W (not including monitor)
                          LC III: 30 W
                          Quadra 605: 26 W

## Physical

**Dimensions**          Height: 3.0 in. (7.7 cm)
                        Width: 12.2 in. (31.0 cm)
                        Depth: 15.0 in. (38.2 cm)

**Weight**              8.8 lb. (4.0 kg)

# Troubleshooting

## Macintosh LC Series/Quadra 605

# 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

Error chord sounds
during startup
(Macintosh LC)

1  Replace SIMMs.
2  Perform SIMM verification on replacement logic board.
3  Replace logic board. Retain customer's SIMMs.

Eight-tone error
chord sounds during
startup (LC II/III/
475/Quadra 605)

1  Replace SIMMs.
2  Perform SIMM verification on replacement logic board.
3  Replace logic board. Retain customer's SIMMs.

## Error Chords (Continued)

Four-tone error chord sounds during startup (Macintosh LC II)

1  Disconnect hard drive power cable and hard drive data cable and reboot system. If startup sequence is normal, run "Macintosh Hard Disk Test" and replace hard drive if necessary.

2  Disconnect floppy drive cable and reboot system. If startup sequence is normal, replace floppy drive.

3  Replace logic board. Retain customer's SIMMs.

## **Built-in Video**

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

1  Adjust brightness on monitor.
2  Try monitor with another Macintosh computer.
3  Check battery.
4  Replace monitor. Troubleshoot defective monitor. See Symptom Charts in appropriate monitor manual.
5  Replace video cable.
6  Replace VRAM SIMM.
7  Replace logic board. Retain customer's SIMMs.
8  Replace power supply.

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

1  Remove expansion card, if present.
2  Remove peripherals.
3  Disconnect hard drive and floppy drive.
4  Replace SIMMs. Refer to Memory manual.
5  Replace logic board. Retain customer's SIMMs.
6  Replace power supply.

## Built-in Video (Continued)

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

1   Verify monitor works with another Macintosh.
2   Replace video cable.
3   Replace monitor.
4   Replace logic board. Retain customer's SIMMs.

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

1   Plug monitor directly into wall socket. Verify that monitor
    has power.
2   Remove expansion card, if present.
3   Remove peripherals.
4   Disconnect hard drive and floppy drive.
5   Replace power supply.
6   Replace logic board. Retain customer's SIMMs.

## Built-in Video (Continued)

Vertical lines,
horizontal lines, or
snow appears on
screen, or screen is
completely dark;
startup tone is
normal

1  Verify monitor works with another Macintosh.
2  Replace video cable.
3  Replace monitor.
4  Replace VRAM SIMM.
5  Replace logic board. Retain customer's SIMMs.
6  Replace power supply.

## **Floppy Drive**

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

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

Disk ejects; display shows Mac icon with blinking "X"

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

Disk does not eject

1  Switch off system and hold mouse button down while switching system back on.
2  Remove top cover.
3  Eject disk manually by pushing opened paper clip into hole beside drive slot.
4  Replace floppy drive cable.
5  Replace floppy drive.

## Floppy Drive (Continued)

Drive attempts to
eject disk, but doesn't

1  Push disk completely in.
2  Eject disk manually by pushing opened paper clip into hole
   beside drive slot.
3  Check that cover is completely on.
4  Replace floppy drive.

## Hard Drive

Internal hard drive runs continuously

1   Make sure System is version 6.0.7 (or later) for Macintosh LC, version 7.0.1 (or later) for Macintosh LC II, or version 7.1 (or later) for LC III/475 and Quadra 605.
2   Replace hard drive cable.
3   Replace internal hard drive.
4   Replace logic board. Retain customer's SIMMs.

Internal hard drive does not operate

1   Replace hard drive data cable.
2   Replace hard drive power cable.
3   Replace internal hard drive.
4   Replace logic board. Retain customer's SIMMs.

## Peripherals

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

1  Verify that SCSI select switch on external device is set to different priority from internal.
2  Verify that both ends of external SCSI device are terminated.
3  Replace terminator on external device.
4  Verify that terminator is installed on internal SCSI drive.
5  Replace SCSI select cable.

Cursor does not move

1  Reboot system.
2  Check mouse connection.
3  If mouse was connected to keyboard, connect mouse to rear ADB port and disconnect keyboard. If mouse works, replace keyboard.
4  If mouse does not work in any ADB port, replace mouse.
5  Remove additional PDS cards.
6  Reset PRAM.
7  Replace logic board. Retain customer's SIMMs.

## Peripherals (Continued)

Cursor moves, but
clicking mouse
button has no effect

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

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

1  Remove extra system files on hard drive.
2  Clear parameter RAM. System 7: Hold down <Command>
   <Option> <P> <R> during startup but before "Welcome to
   Macintosh" appears. System 6 and earlier: Hold down
   <Command> <Option> <Shift> keys and select Control Panel
   from Apple menu.
3  If mouse was connected to keyboard, connect mouse to rear
   ADB port and disconnect keyboard. If mouse works, replace
   keyboard.
4  If mouse does not work in any ADB port, replace mouse.
5  Replace logic board. Retain customer's SIMMs.

## Peripherals (Continued)

No response to any
key on keyboard

1 Make sure System is version 6.0.7 (or later) for Macintosh
   LC, version 7.0.1 (or later) for Macintosh LC II, or version
   7.1 (or later) for LC III/475 and Quadra 605.
2 Check keyboard connection to ADB port.
3 Replace keyboard cable.
4 Replace keyboard.
5 Remove battery for 15 to 30 minutes to reset logic board.
6 Replace logic board. Retain customer's SIMMs.

## Peripherals (Continued)

| | |
|---|---|
| Known-good LaserWriter does not print | 1 Make sure that Chooser and Control Panel settings are correct. |
| | 2 Make sure System is version 6.0.7 (or later) for Macintosh LC, version 7.0.1 (or later) for Macintosh LC II, or version 7.1 (or later) for LC III/475 and Quadra 605. |
| | 3 Reset PRAM. |
| Known-good ImageWriter or ImageWriter II does not print | 1 Make sure that Chooser and Control Panel settings are correct. |
| | 2 Make sure System is version 6.0.7 (or later) for Macintosh LC, version 7.0.1 (or later) for Macintosh LC II, or version 7.1 (or later) for LC III/475 and Quadra 605. |
| | 3 Check printer DIP switches. |
| | 4 Reset PRAM. |
| | 5 Replace printer interface cable. |
| | 6 Replace logic board. Retain customer's SIMMs. |

## **Miscellaneous**

Clicking, chirping, or thumping

1 Disconnect hard drive. Replace drive if noise disappears.
2 Replace power supply.
3 Replace logic board. Retain customer's SIMMs.

System shuts down or restarts intermittently

1 Make sure air vents on back and top of case are unobstructed. Thermal protection circuitry may shut down computer. After 30 to 40 minutes, system should be OK.
2 Replace power cable.
3 Install standoffs on LC Ethernet Card, if present.
4 Replace power supply.
5 Replace SIMMs. Refer to Memory manual.
6 Replace logic board. Retain customer's SIMMs.

## Miscellaneous **(Continued)**

System
intermittently
crashes or locks up

1  Make sure System is version 6.0.7 (or later) for Macintosh
   LC, version 7.0.1 (or later) for Macintosh LC II, or version
   7.1 (or later) for LC III/475 and Quadra 605.
2  Make sure software is known-good.
3  Replace logic board. Retain customer's SIMMs.
4  Replace SIMMs.
5  Replace power supply.

No sound from
speaker

1  Verify that volume setting in Control Panel is 1 or above.
2  Reset PRAM.
3  Verity nothing is connected to sound-out port.
4  Replace speaker.
5  Replace logic board. Retain customer's SIMMs.

## Miscellaneous (Continued)

System seems to boot, then message "Finder is old version" displays

1  Clear parameter RAM. System 7: Hold down <Command> <Option> <P> <R> during startup but before "Welcome to Macintosh" appears. System 6 and earlier: Hold down <Command> <Option> <Shift> keys and select Control Panel from Apple menu.
2  Replace logic board. Retain customer's SIMMs.

System intermittently doesn't power on

1  Check cables.
2  Plug monitor directly into wall socket. Verify that monitor has power.
3  Try known-good keyboard and ADB cable.
4  Replace power cord.
5  Check batteries. See "Battery Verification" in Additional Procedures.
6  Replace logic board. Retain customer's SIMMs.

## Miscellaneous (Continued)

Monitor raster width
too narrow

Refer to Adjustments section in the appropriate monitor manual
for horizontal size (width) adjustment.

Stand-alone system
hangs or crashes

1   If using an older LC Ethernet card with a computer running
    System 7, disable virtual memory.
2   Clear parameter RAM. System 7: Hold down <Command>
    <Option> <P> <R> during startup but before "Welcome to
    Macintosh" appears. System 6 and earlier: Hold down
    <Command> <Option> <Shift> keys and select Control Panel
    from Apple menu.
3   Upgrade to latest revision of software.
4   Remove additional RAM and PDS card.
5   Replace logic board

## Miscellaneous (Continued)

| | |
|---|---|
| Networked 33 MHz LC III freezes | 1  Verify 10Base-T cable is secure. |
| | 2  Replace 10Base-T adapter card. |
| | 3  Remove additional RAM and external SCSI devices. |
| | 4  Replace logic board. |
| Clock doesn't run | 1  Replace battery. See "Battery Replacement" in Additional Procedures. |
| | 2  Reset PRAM. |
| | 3  Verify nothing is connected to sound-out port. |
| | 4  Replace logic board. Retain customer's SIMMs. |
| System doesn't recognize more than 10 MB of RAM (LC/LC II) | Although you can install up to12 MB of RAM in Macintosh LC/LC II computers, 10 MB is the maximum amount of RAM that the system recognizes. |

Take Apart

Macintosh LC Series/Quadra 605

LC/LC II/LC III/LC 475

Quadra 605
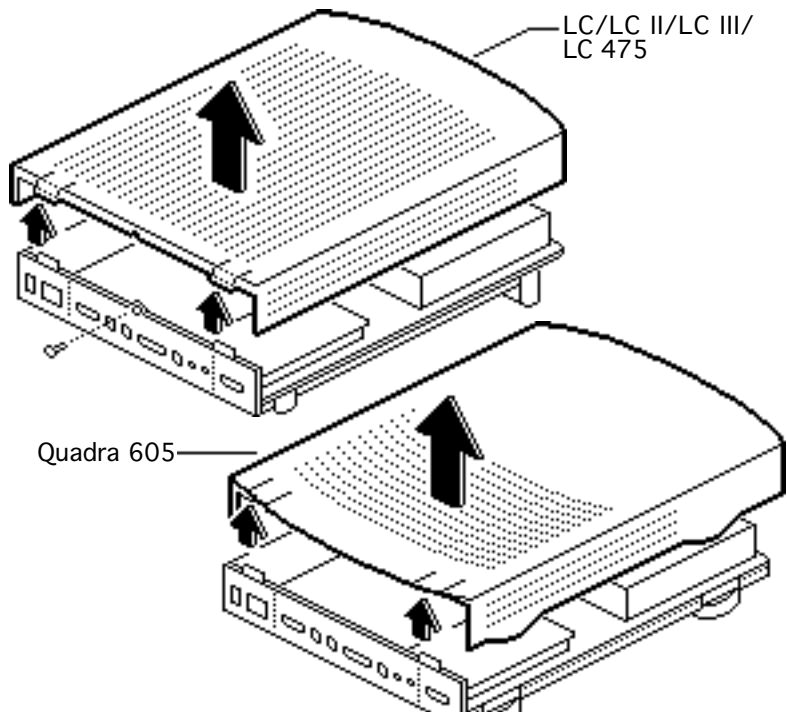
## Top Cover

No preliminary steps are required before you begin this procedure.

1  Remove the case screw if one is present.

2  Lift the tabs at the back of the lid.

3  Lift the top cover straight up.

## Hard Drive

Before you begin, remove the top cover.

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

Hard Drive

Hard Drive Data Cable

Hard Drive Power Cable

Hard Drive Data Cable Connector

Hard Drive Power Connector
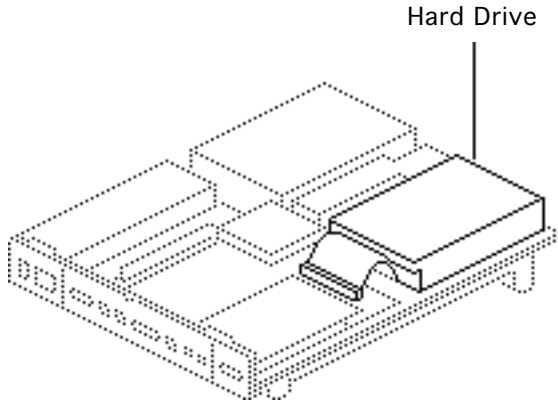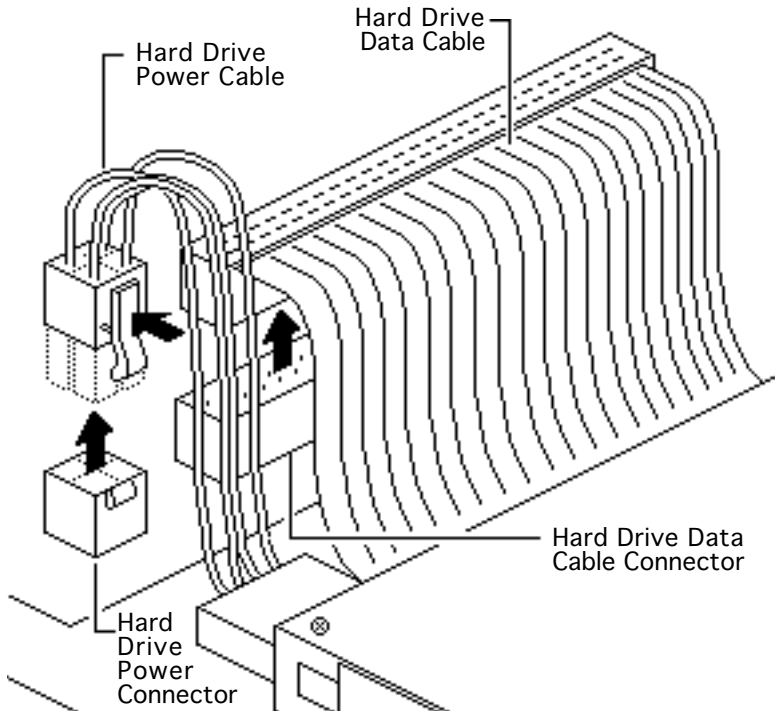
1  Release the locking tab and disconnect the hard drive power cable from the connector on the logic board.

2  Disconnect the hard drive data cable from the connector on the logic board.
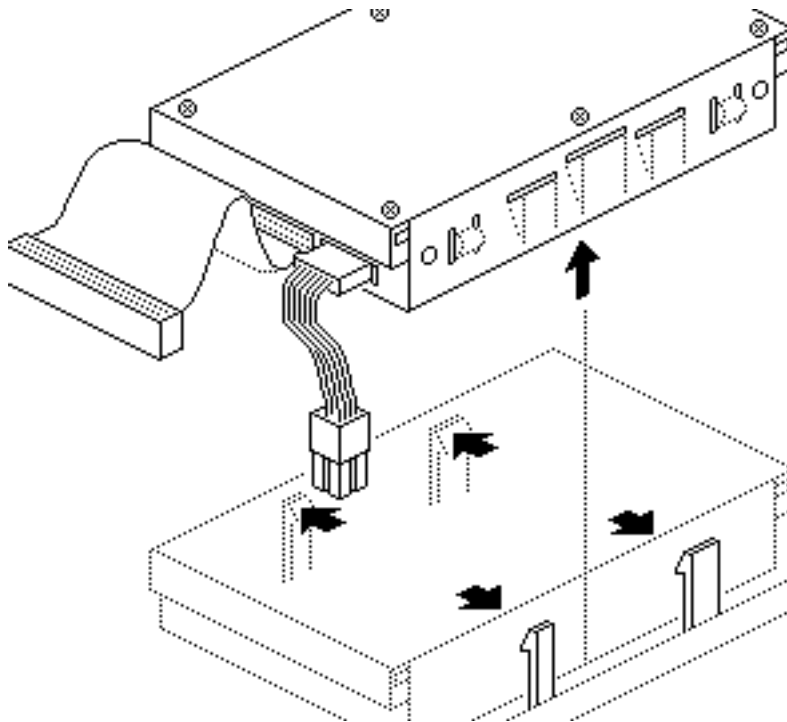
3  Release the two plastic latches on one side of the hard drive and lift the drive slightly. Repeat on the other side of the drive and remove the drive (with carrier) from the computer.

**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.

# Fan/Speaker Assembly (LC)

Before you begin, remove the top cover.

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

Fan/Speaker Assembly
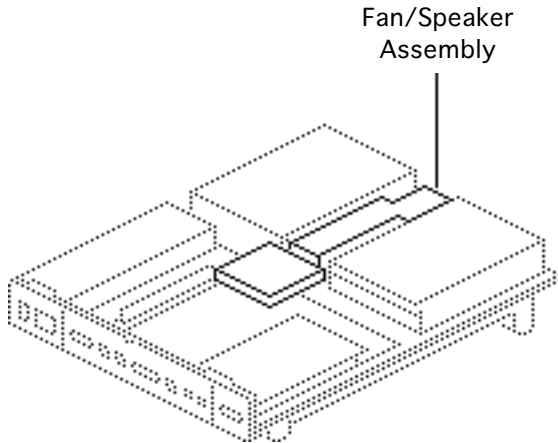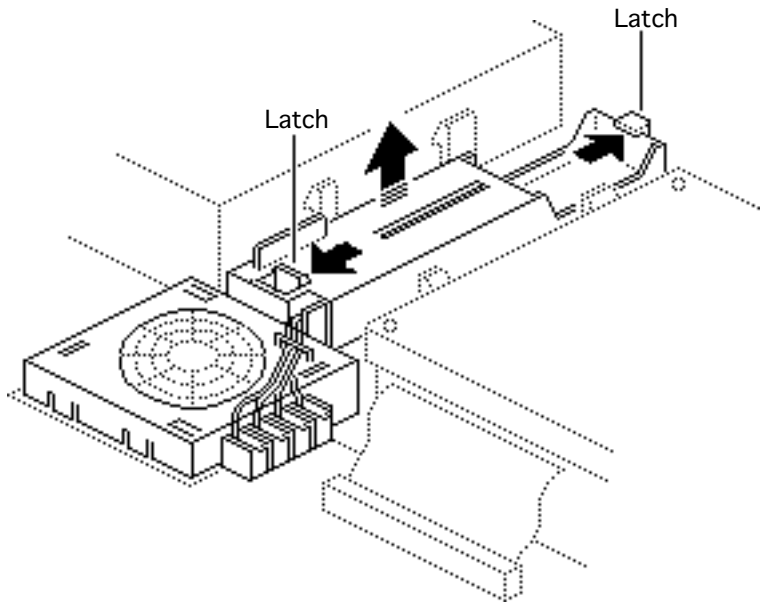
1 Release the latch on one end of the fan/speaker assembly, and lift the assembly slightly.

2 Release the other latch and remove the fan/speaker assembly from the bottom case.

# Fan (LC II/III)

Before you begin, remove the top cover.

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

Fan

Fan Cable

Latch

Latch
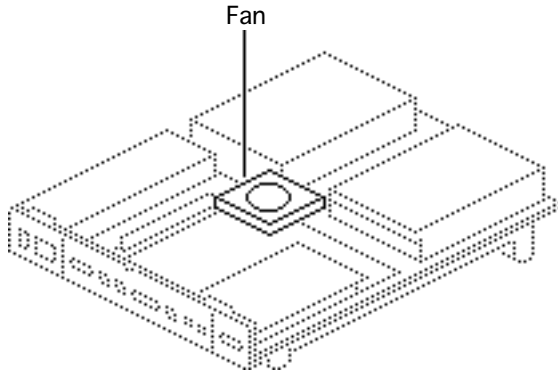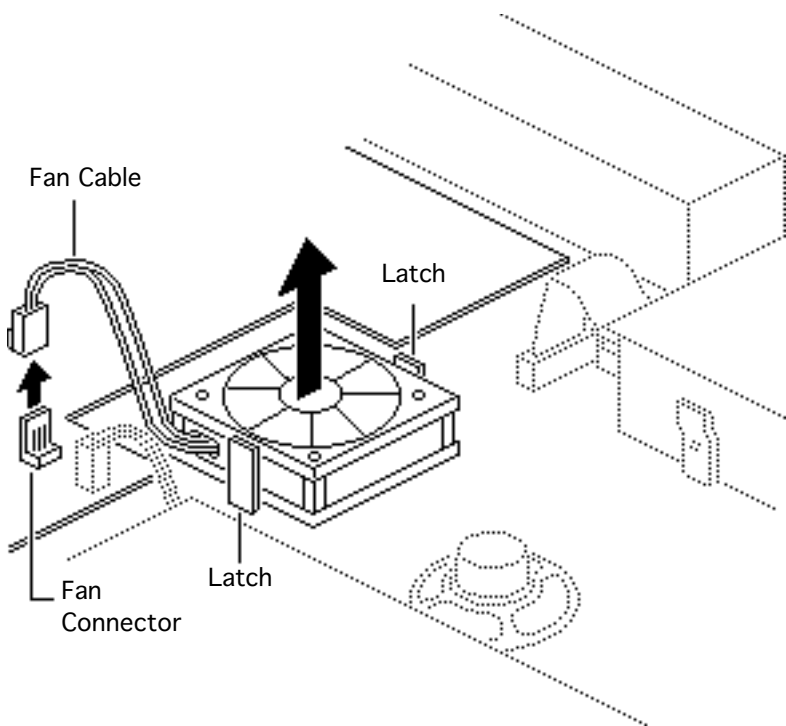
Fan Connector

1 Disconnect the fan cable from the fan connector on the logic board.

2 Release the plastic latches and lift the fan from the case.

**Replacement Caution:** Be sure to install the fan with the logo side down, or the fan may damage the computer.

# Speaker (LCII/III)

Before you begin, remove the following:

- Top cover
- Hard drive

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

Speaker

Speaker Cable

Speaker Connector

Latch
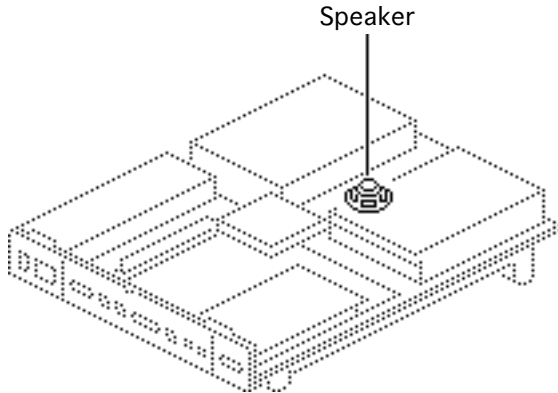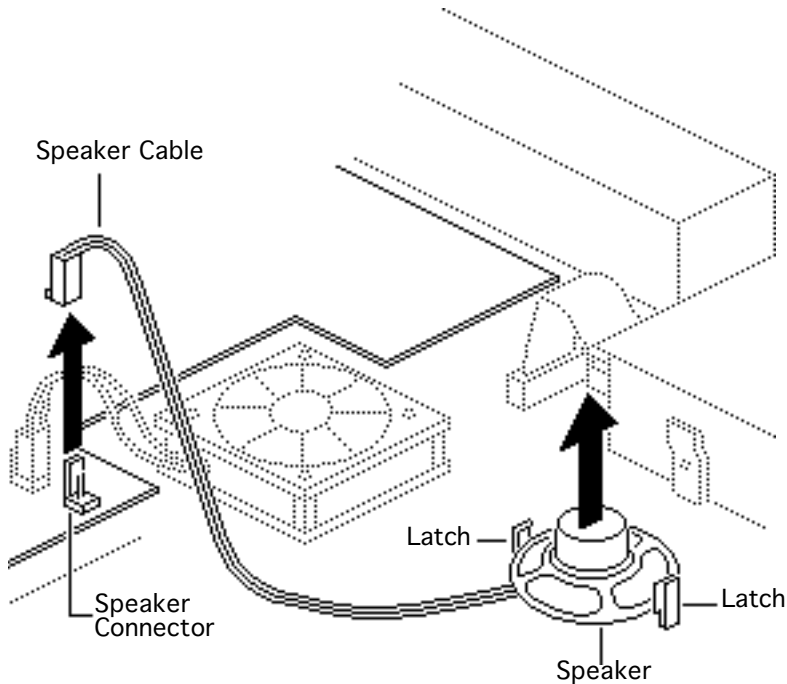
Latch

Speaker

1 Disconnect the speaker cable from the speaker connector on the logic board.

2 Release the plastic latches and lift the speaker from the case.

**Replacement Note:** Before reconnecting the speaker cable, thread it through the top two brackets that hold the hard drive in place.

# Floppy Drive

Floppy Drive

Before you begin, remove the top cover.

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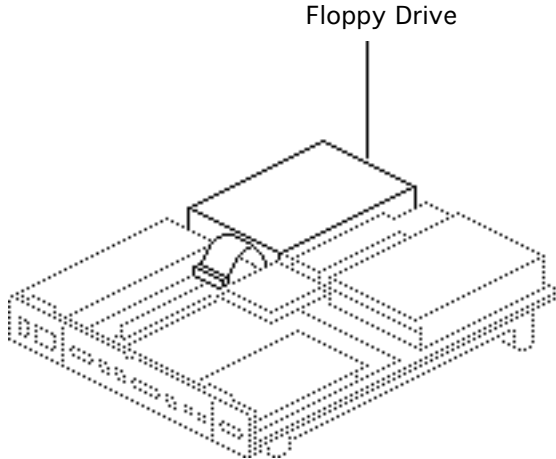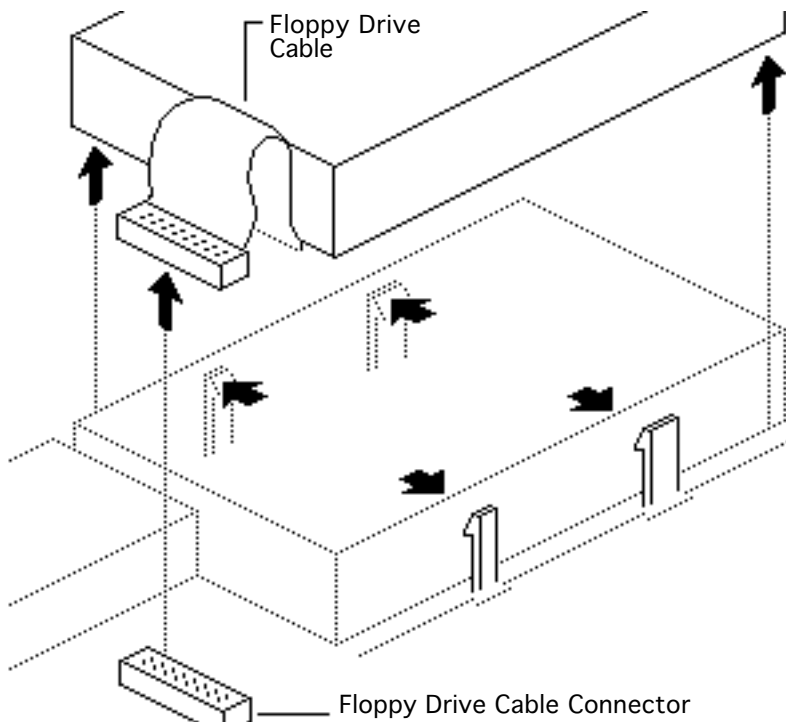
Floppy Drive Cable

## Macintosh LC

1   Disconnect the floppy drive cable from the connector on the logic board.

    **Note:** Retain the old floppy drive cable. Use the old cable on the new exchange module.

2   Release the two latches on one side of the drive and lift the drive slightly. Repeat on the other side and remove the drive from the case.

Floppy Drive Cable Connector

**Replacement Note:** Before you install a replacement 1.4 MB SuperDrive, you must remove the dust shield.
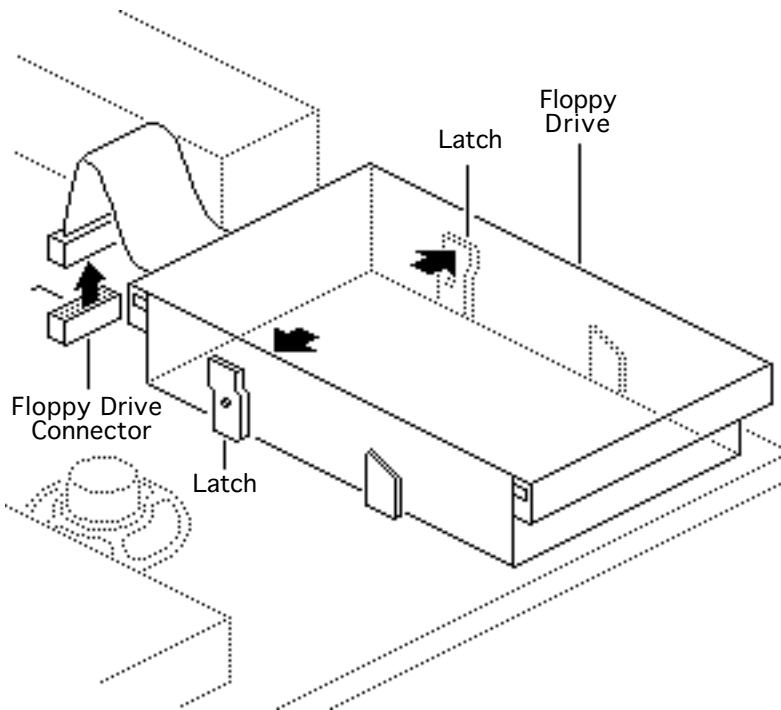
## LC II/LC III/Quadra 605

1 Disconnect the floppy drive cable from the connector on the logic board.

2 Release the two latches at the rear of the floppy drive and remove the drive from the case.

**Replacement Note:** Before you install a replacement auto-inject 1.4 MB SuperDrive, you must remove the dust shield, if present.

**Replacement Note:** You may encounter either an Apple SuperDrive or a manual eject floppy drive in some models. Replace floppy drives like for like.

# Power Supply

Before you begin, remove the top cover.

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

Power Supply

Power Supply Cable

Power Supply Connector
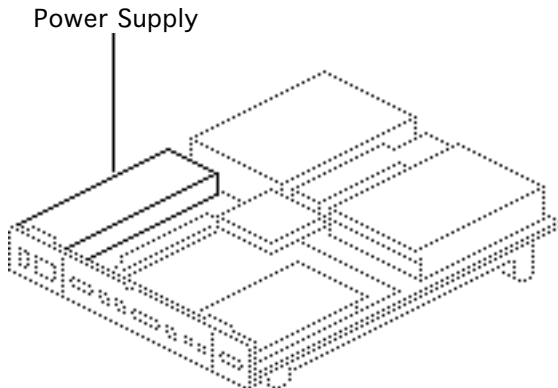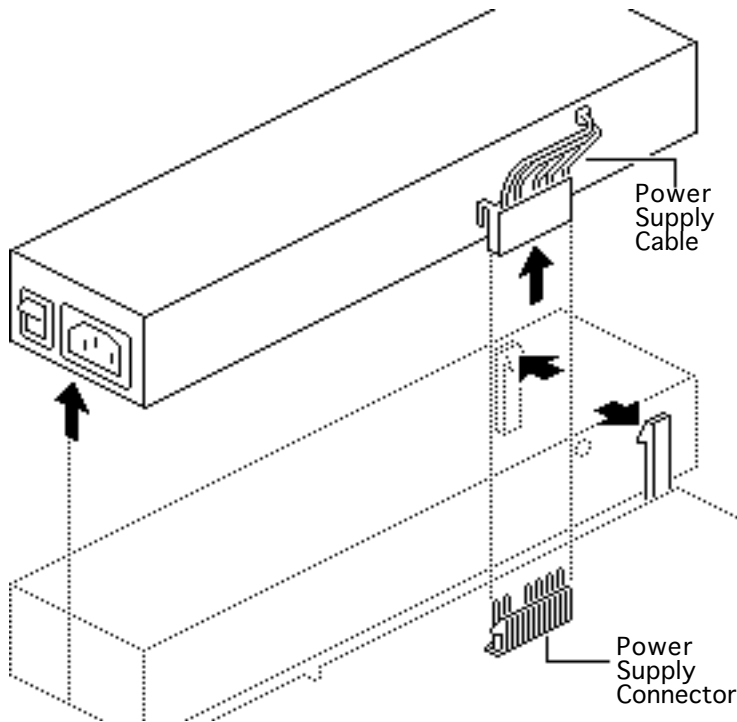
1. Disconnect the power supply cable from the connector on the logic board.

2. Release the two latches that secure the front end of the power supply to the bottom case, and lift the power supply out of the case.

# Logic Board

Before you begin, remove the following:

- Top cover
- Fan/speaker assembly (LC)
- Fan (LC II/III/475 and Quadra 605)

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

Logic Board

Power Supply Cable

Floppy Drive Cable

Fan Cable

Speaker Cable

Hard Drive Data Cable

Hard Drive Power Cable

Expansion Connector

Expansion Card
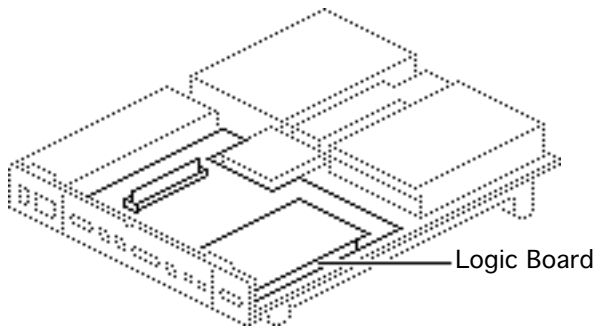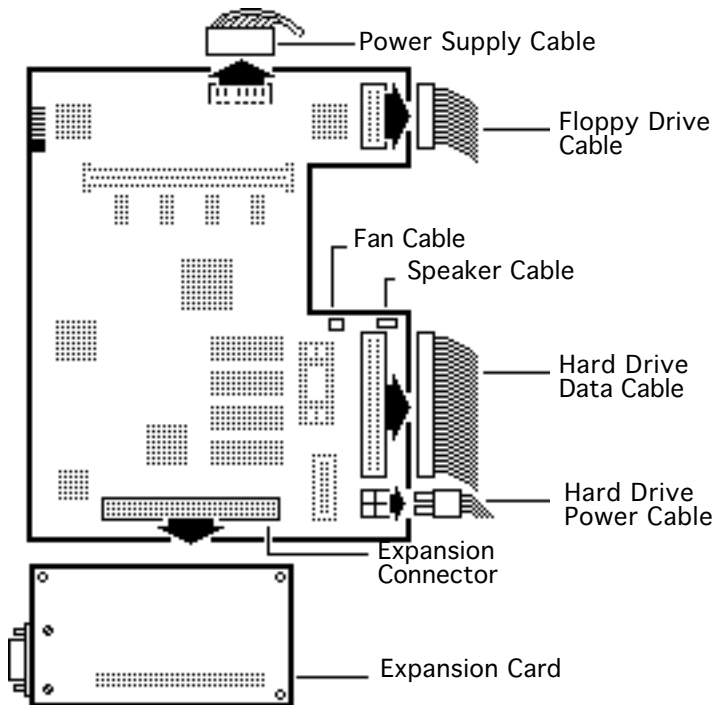
1 Disconnect the following cable connectors from the logic board:
- Hard drive power cable
- Hard drive data cable
- Floppy drive cable
- Power supply cable
- Fan cable (LC II/III/ LC 475 and Quadra 605)
- Speaker cable (LC II/ III/LC 475 and Quadra 605)

2 Remove the expansion card (if installed).

**Caution:** In the next step, be sure the power on/off button clears the rear panel before you remove the logic board. While lifting the board, do not touch any components or connectors on the back of the logic board. (The oil from your skin can harm the connectors.)

3 Using your forefingers, spread the two latches that secure the logic board to the bottom case. At the same time, using your right thumb, push on the expansion connector and slide the logic board toward the front of the case.

Latch

Latch

Expansion Connector
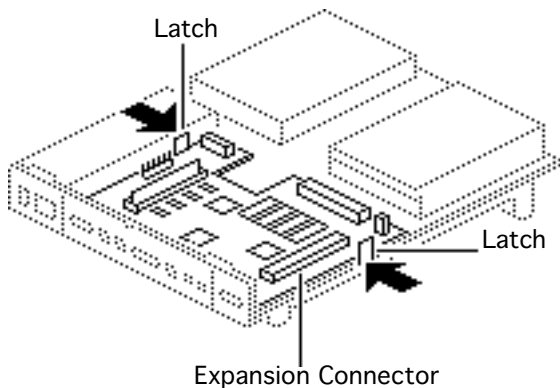
4   Gently lift the board
    from the case.

**Replacement Note:**  Remove
the SIMMs from the
defective logic board and
install them on the
replacement logic board.

Quadra 605 Logic Board



J18
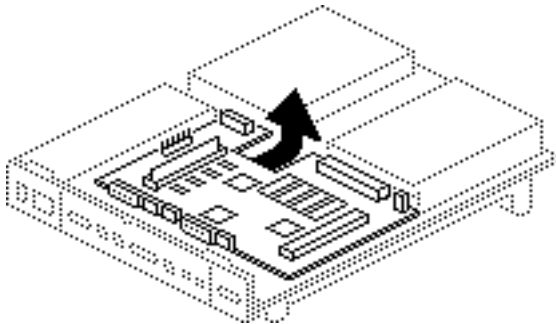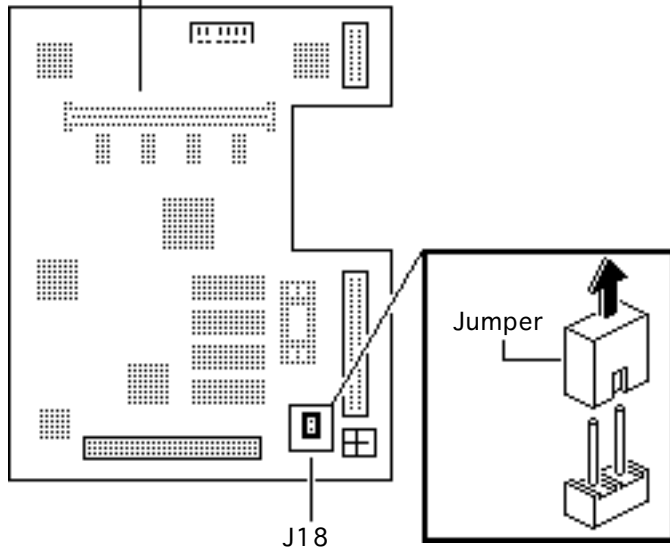
Jumper

5 Remove the jumper from the pins at location J18 on the defective board.

**Replacement Note:** The LC 475 and Quadra 605 use the same logic board replacement. The Quadra 605 requires a jumper to connect the pins at location J18. Quadra 605 service replacement logic boards do not include the jumper.

Quadra 605 Logic Board
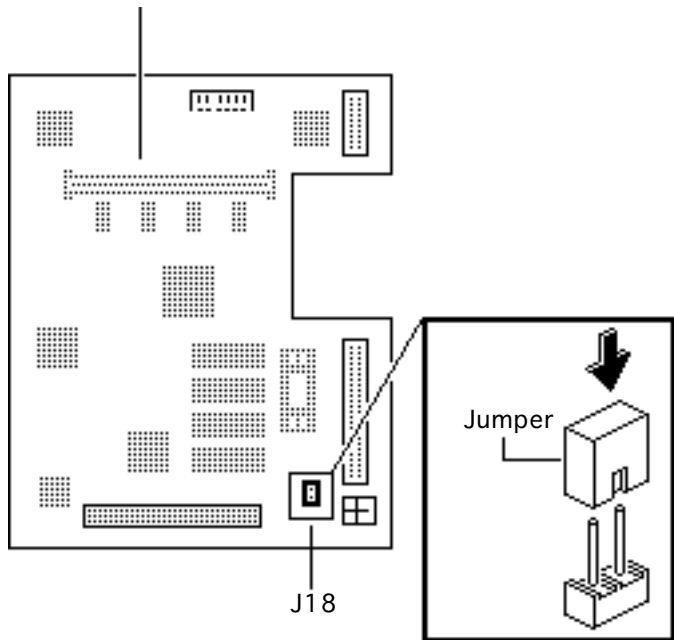
6 Install a jumper on the pins at location J18 on the Quadra 605 service replacement logic board.

Jumper

J18

Foam
Grounding Pad

Connecting
Grounding Spring
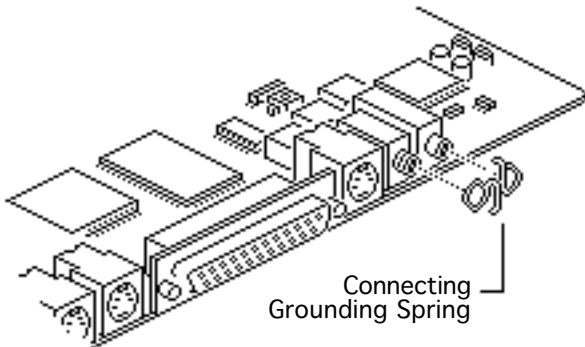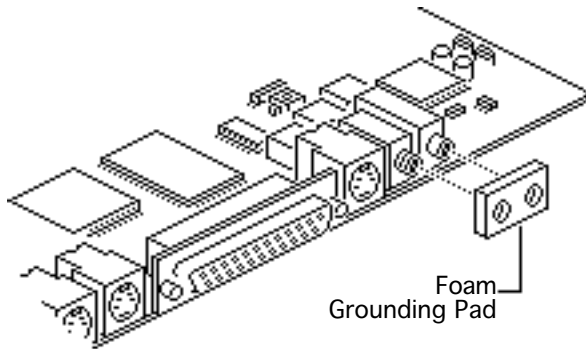
**Replacement Note:** The replacement logic boards for the LC 475 and the Quadra 605 do not include grounding connectors. You must remove the grounding connector from the defective board and install it on the replacement board.

There are two versions of grounding connectors, a foam grounding pad and a connecting grounding spring. You may encounter either version on LC 475 and Quadra 605 logic boards.
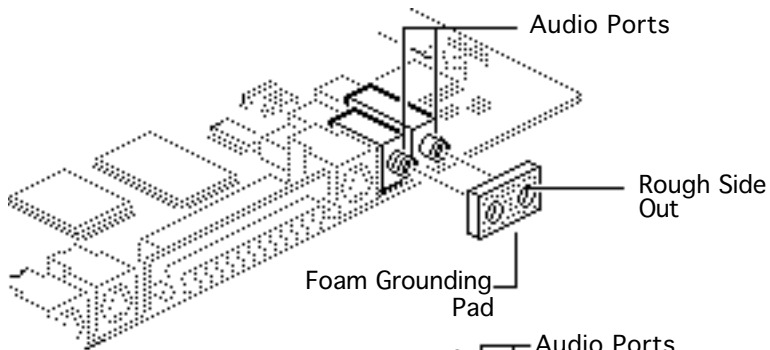
7  Install the foam grounding pad on the audio ports of the replacement logic board with the rough side of the pad facing out.

8  Install the connecting grounding spring on the audio ports of the replacement logic board with the arms of the spring facing out.
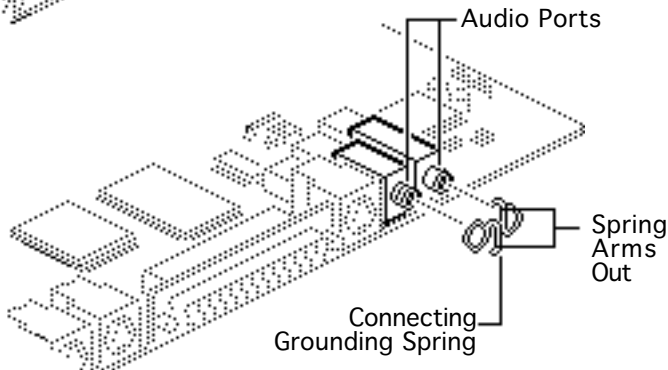
Upgrades

Macintosh LC Series/Quadra 605

# LC Ethernet Upgrade

Before you begin, remove the top cover.

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

**Note:** The finished goods LC Ethernet Card package includes the LC Ethernet Card and standoffs. If you order service parts, you must order the standoffs separately from the card.

LC Ethernet Card

Long Standoff —————————
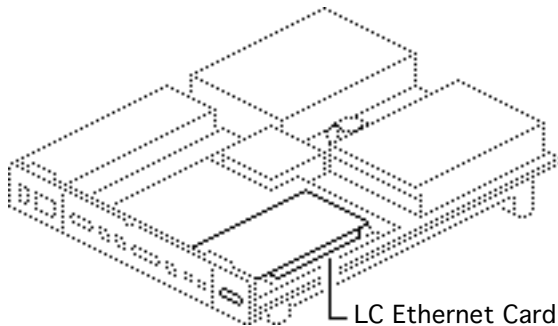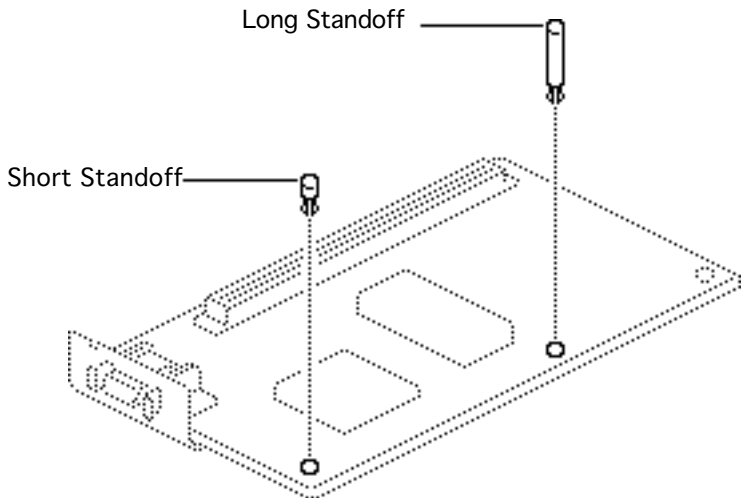
Short Standoff—————

1   Insert the short standoff
    in the hole on the corner
    near the connector end of
    the card.

2   Insert the long standoff
    in the hole on the center
    edge of the card.

    **Caution:** Failure to
    install the standoffs can
    cause the computer to
    restart intermittently.

LC Ethernet Card
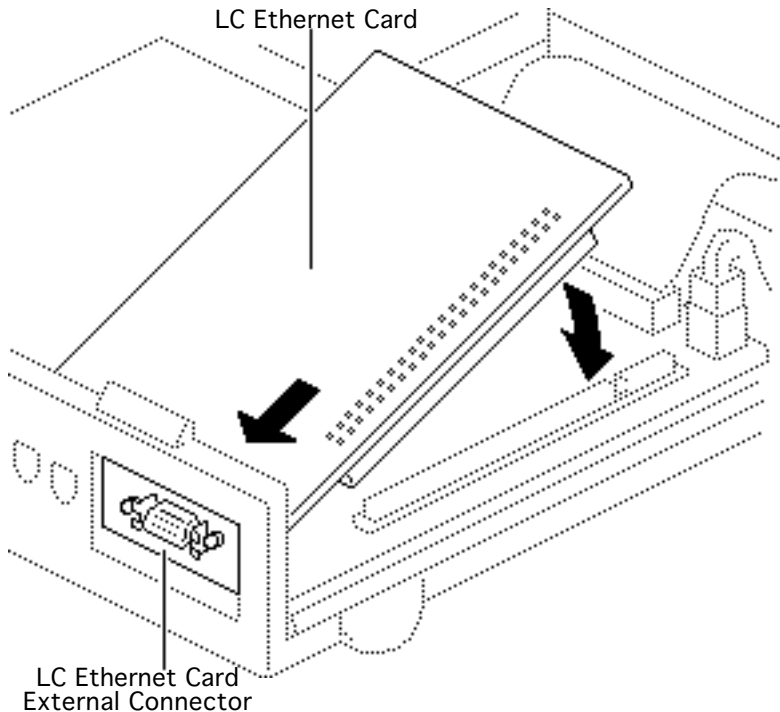
3 Position the card so that the external connector extends through the expansion connector opening.

4 Pivot the card over the expansion slot.

5 Press the connector pins into the connector slot.

**Note:** Do not force the card into the slot. If you meet a lot of resistance, pull the card out and reseat it.

LC Ethernet Card
External Connector

# LC II Upgrade

Macintosh LC Logic Board

Before you begin, remove the following:

- Top cover
- Fan/speaker assembly
- Logic board

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

**Note:** A Macintosh LC ll upgrade kit upgrades a Macintosh LC to a Macintosh LC ll. The upgrade kit includes a Macintosh LC ll logic board and cover.
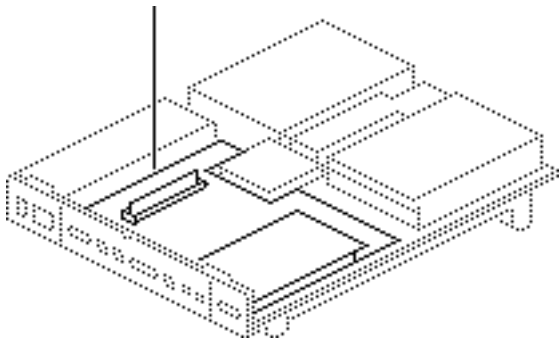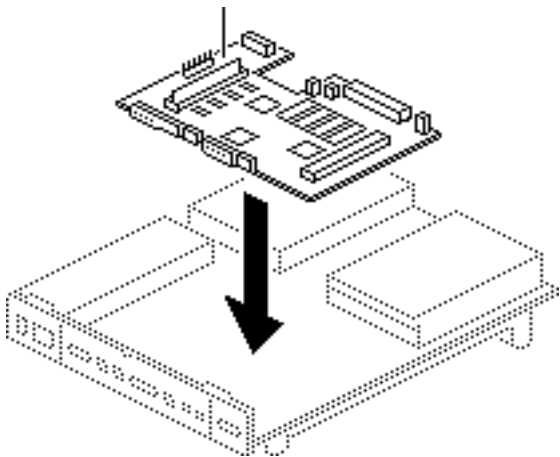
1 Install the Macintosh LC II logic board.

2 Install the customer's SIMMs into the new logic board.

Macintosh LC II Logic Board
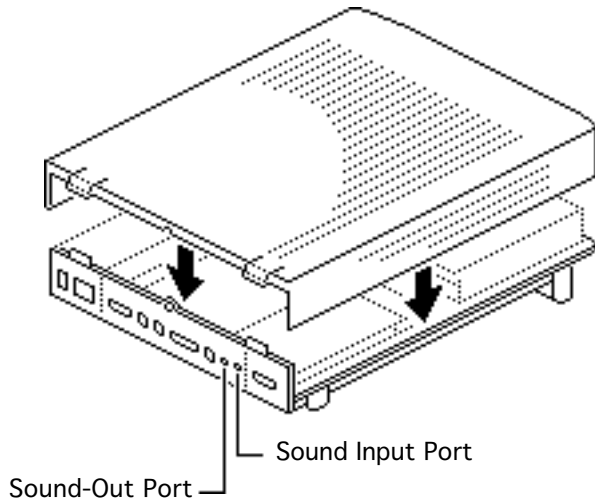
**Replacement Note:** After replacing the fan/speaker assembly, install the Macintosh LC II top cover.

Make sure that the connections to the sound-out and sound input ports are correct. Inserting equipment into the wrong port can damage the computer or equipment.

Sound Input Port

Sound-Out Port

# LC to LC III Upgrade

Macintosh LC III Upgrade
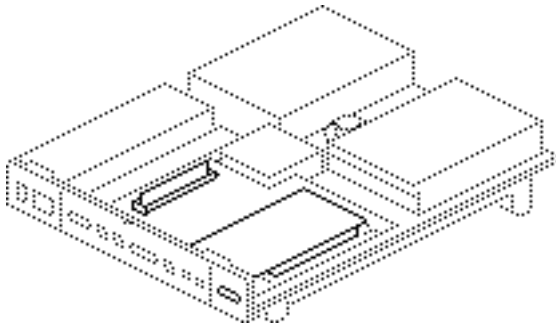
Before you begin, remove the following:

- Top cover
- Fan/speaker assembly
- Floppy drive
- Logic board

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

**Note:** A Macintosh LC III upgrade kit includes LC III logic board, bottom case, top cover, power supply, speaker, fan, and floppy drive carrier.

**Note:** You will use only a few parts from the original LC in upgrading an LC to an LC III. The following procedures explain how to remove the LC parts and install them into the LC III upgrade unit.
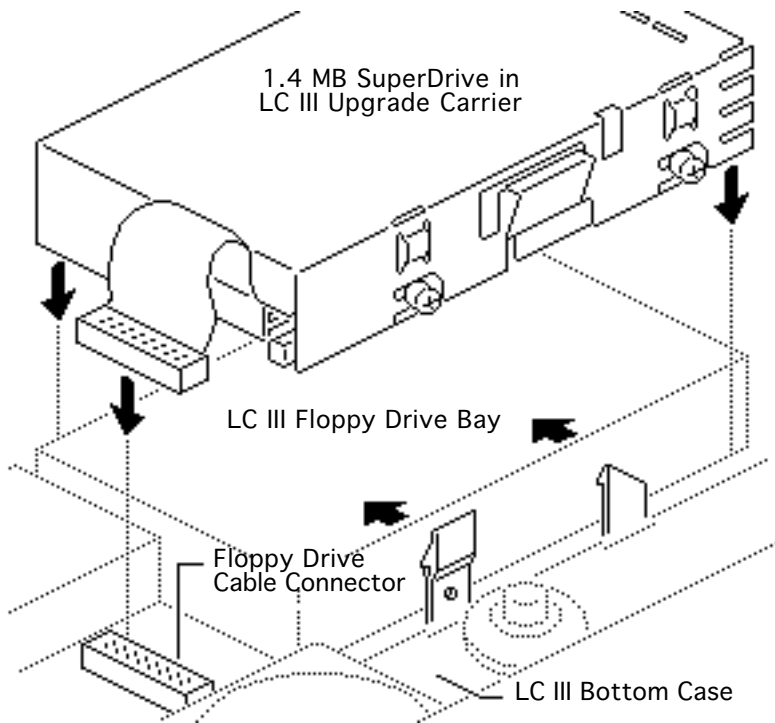
LC Floppy Drive Carrier

Floppy Drive Cable     Apple 1.4 MB SuperDrive
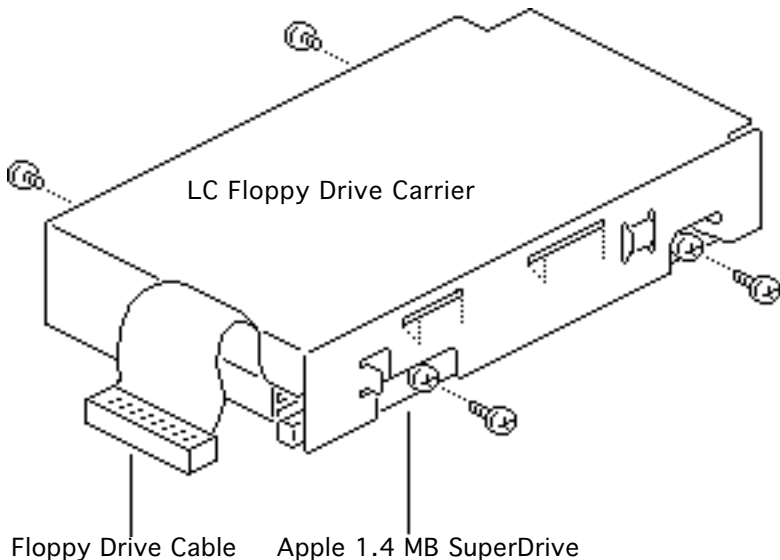
1   Remove the Macintosh LC floppy drive and floppy drive cable. (See "Floppy Drive" in Take Apart.)

2   Remove the floppy drive and cable from the LC floppy drive carrier.

3 Install the floppy drive
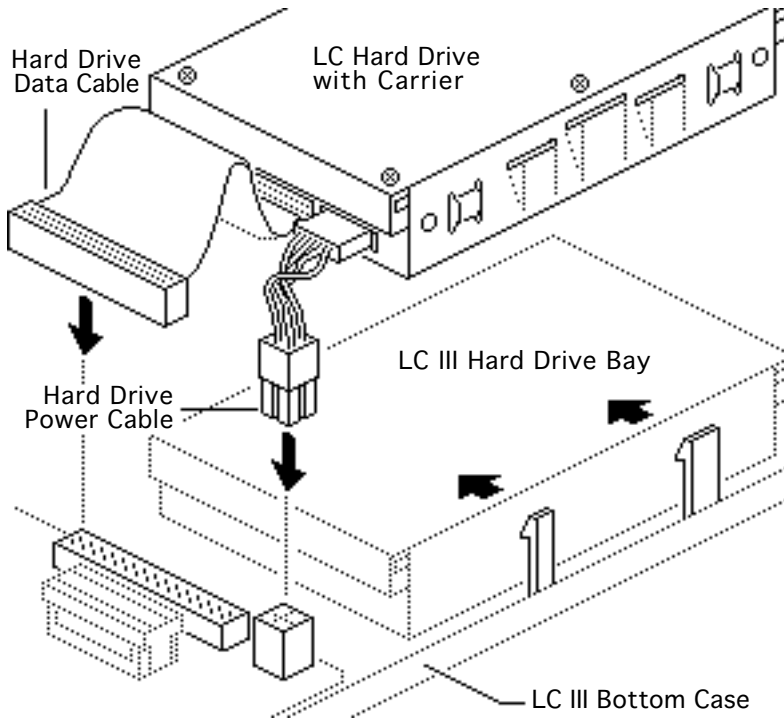with cable into the LC III
floppy drive carrier.



LC III Upgrade Floppy
Drive Carrier

Apple 1.4 MB SuperDrive

Floppy Drive Cable

1.4 MB SuperDrive in
LC III Upgrade Carrier

LC III Floppy Drive Bay

Floppy Drive
Cable Connector
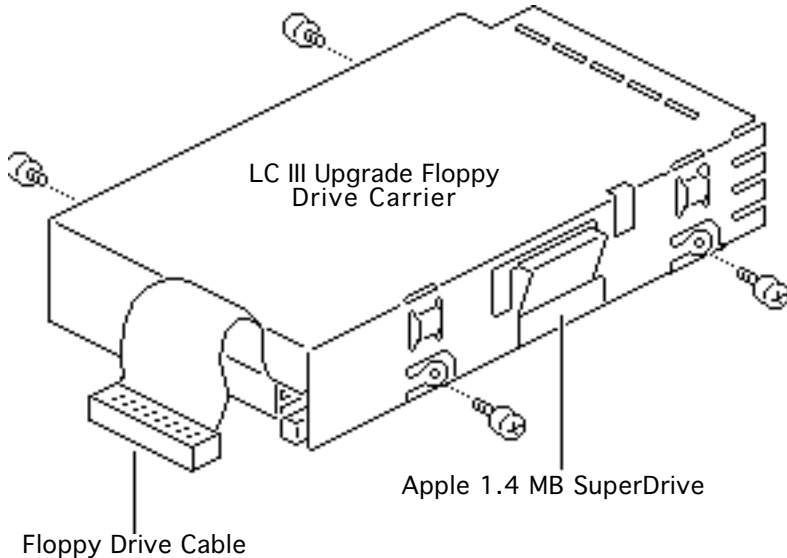
LC III Bottom Case

4 Install the floppy drive
into the floppy drive
bay of the LC III upgrade
bottom case.

5 Connect the floppy drive
cable to the floppy drive
connector on the logic
board.

**Replacement Note:** If you
are installing a replacement
auto-inject 1.4 MB
SuperDrive, you must
remove the dust shield, if
present.

Hard Drive Data Cable

LC Hard Drive with Carrier

LC III Hard Drive Bay

Hard Drive Power Cable

LC III Bottom Case

6  Remove the Macintosh LC hard drive with carrier, hard drive data cable, and hard drive power cable. (See "Hard Drive" in Take Apart.)

7  Install the LC hard drive into the hard drive bay of the LC III upgrade bottom case.

8  Connect the hard drive data cable and hard drive power cable connectors to the connectors on the LC III upgrade logic board.
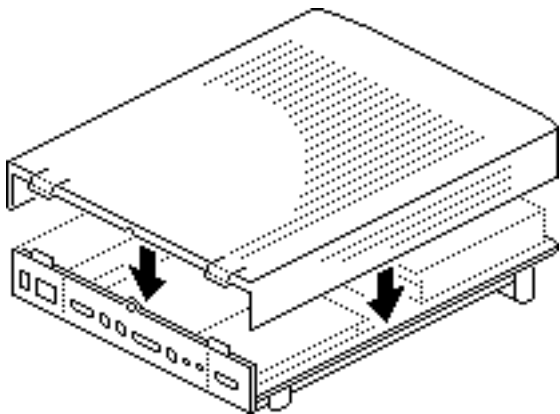
9 Install the LC VRAM
SIMMs and the expansion
card (if present) into
the LC III upgrade logic
board.

**Note:** DRAM SIMMs
from an LC are not
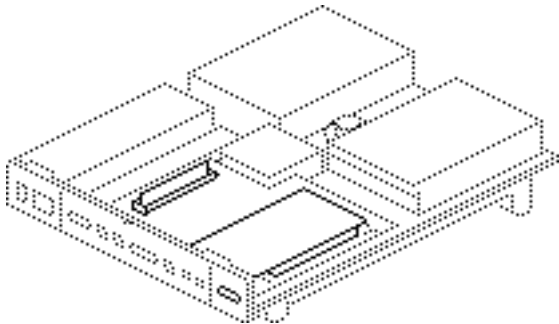compatible with the LC
III.

10 Attach the top cover.

# LC II to LC III Upgrade

Macintosh LC III Upgrade



Before you begin, remove the top cover.

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

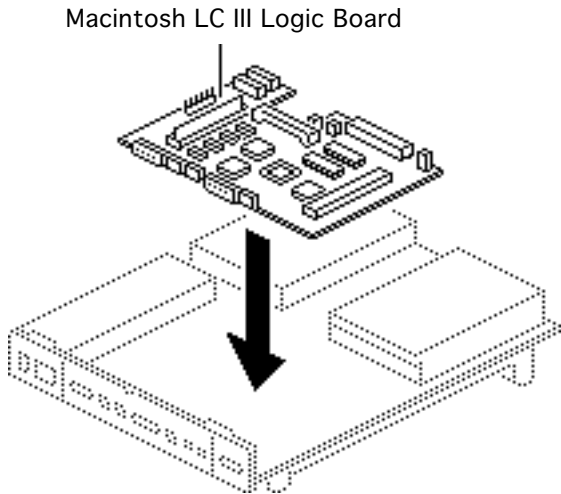**Note:** A Macintosh LC III upgrade kit upgrades a Macintosh LC II to a Macintosh LC III. The upgrade kit includes a Macintosh LC III logic board, top cover, fan, speaker, and a floppy drive carrier. When upgrading an LC II to an LC III, you will need only the LC III logic board.

1  Install the Macintosh LC III logic board. (See Take Apart chapter.)

Macintosh LC III Logic Board

Sound Input Port

Sound-Out Port

2 Install the fan and new Macintosh LC III top cover (see Take Apart chapter).

**Replacement Caution:** Make sure that the connections to the sound-out and sound input ports are correct. Inserting equipment into the wrong port can damage the computer or equipment.
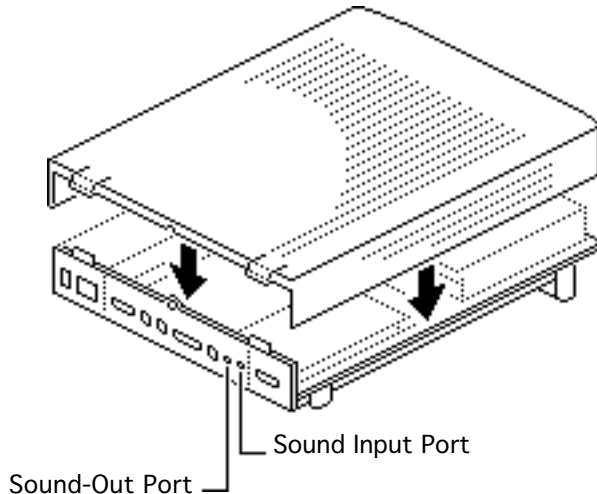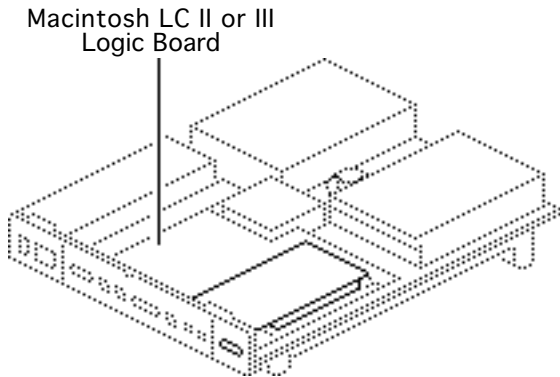
# LC 475 Logic Board Upgrade

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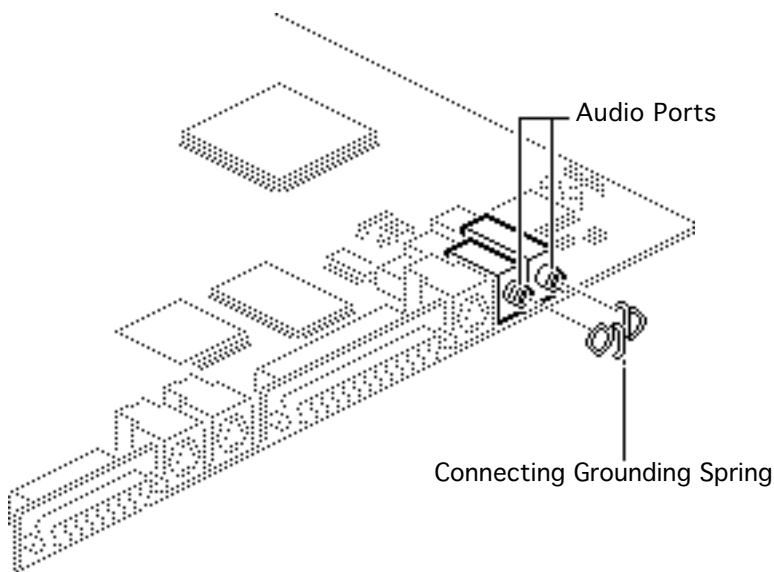
- Top cover
- Fan
- Logic board

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

Macintosh LC II or III Logic Board

**Note:** A Macintosh LC 475 upgrade kit upgrades a Macintosh LC II or III to a Macintosh LC 475. The upgrade kit includes a Macintosh LC 475 logic board and product ID labels.

Audio Ports

Connecting Grounding Spring

1 **Note:** The upgrade kit does not include a connecting grounding spring. You must order this part separately.
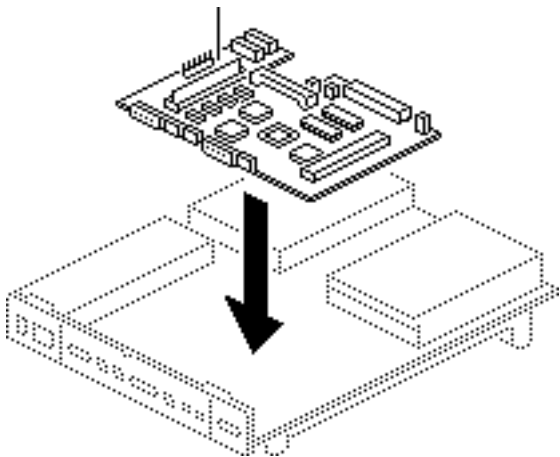
Before installing the upgrade logic board, install the connecting grounding spring on the audio ports of the board, with the arms of the spring facing out.
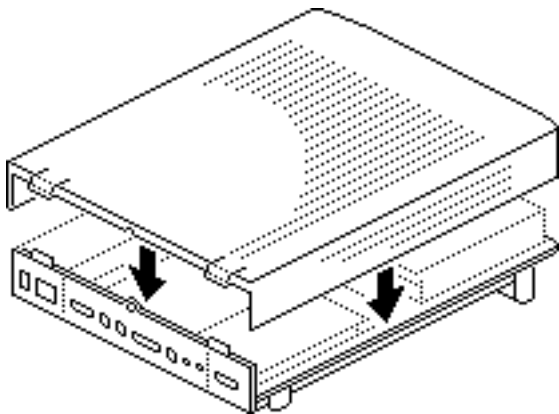
2  Install the Macintosh LC 475 logic board.

Macintosh LC 475 Logic Board
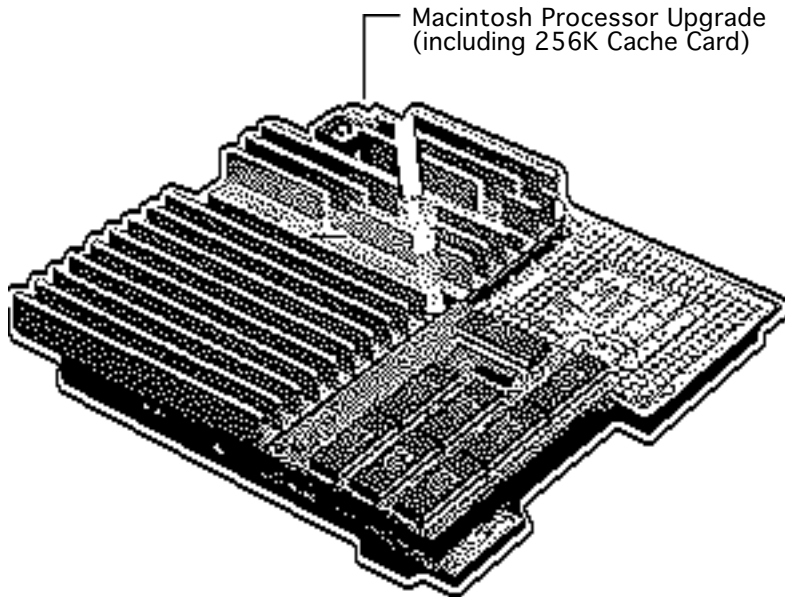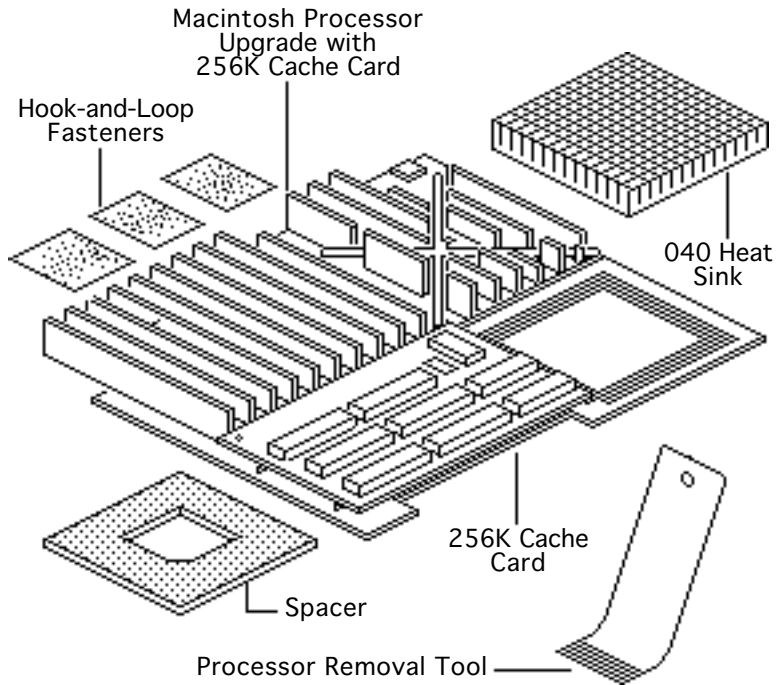
3  Install the fan and top cover (see Take Apart chapter).

Macintosh Processor Upgrade
(including 256K Cache Card)

# Macintosh Processor Upgrade

Before you begin, remove the following:

- Top cover
- I/O door
- Logic board
- Card in the PDS slot (if any)

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

Hook-and-Loop
Fasteners

Macintosh Processor
Upgrade with
256K Cache Card

040 Heat
Sink

256K Cache
Card

Spacer

Processor Removal Tool

**Note:** The Macintosh
Processor Upgrade kit
allows 68LC040 computers
to switch between a
PowerPC 601 processor
and a 68LC040 processor.
The upgrade board includes
the PowerPC 601 processor
on board and a socket to
accept the customer's
68LC040 processor.

**Note:** Refer to the Macintosh
Processor Upgrade manual
under the Power Macintosh
menu for information about
specifications and
troubleshooting.

**Note:** The Macintosh Processor Upgrade comes packaged with the Macintosh Processor Upgrade board, 256K cache card, 040 heat sink, and hook-and-loop fasteners. If you need to order service replacement parts, order the parts separately.

**Note:** To install the upgrade, you will need a processor removal tool. Order the removal tool as a separate service part.

**Note:** The cache card comes installed on the upgrade board.

## Installation Procedure Overview

There are three basic steps to installing the Macintosh Processor Upgrade on LC 475 and Quadra 605 computers.
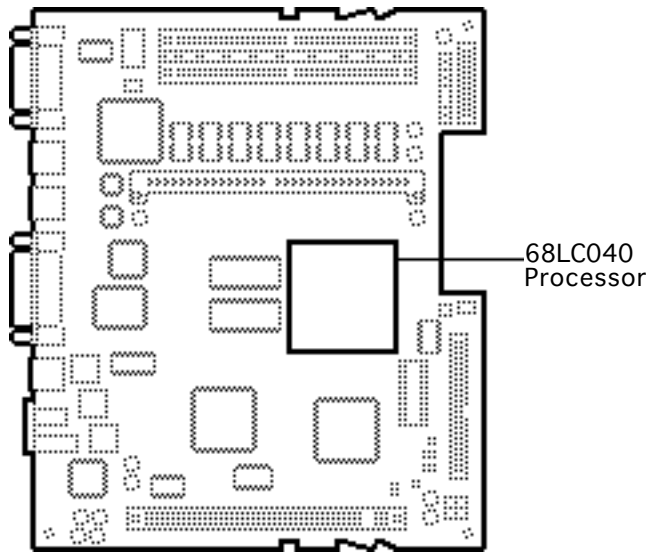
- Remove the 68LC040 processor from the customer's logic board
- Install the 68LC040 processor on the upgrade board
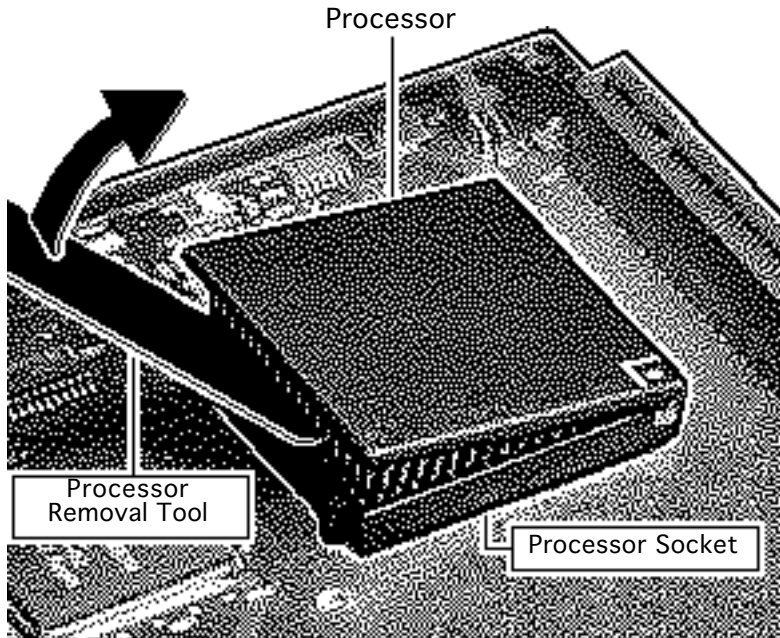- Install the upgrade board on the logic board

Detailed procedures follow.

68LC040
Processor

1  Locate the 68LC040
   processor on the logic
   board.

2  Remove the 68LC040
   processor from the logic
   board

Processor

Processor Removal Tool

Processor Socket

**Note:** This graphic shows the proper way to remove any 68LC040 chip from its logic board. Your logic board may differ somewhat from this graphic

3   Position the teeth of the processor removal tool in the groove between the processor and the logic board socket.

**Caution:** Be sure to lift up on the handle of the processor removal tool. Pressing down could damage components on the logic board.

**Caution:** Pry up each side of the processor only slightly to avoid bending the pins.

4  Gently lift up the processor removal tool handle and pry up each side of the processor from the socket.
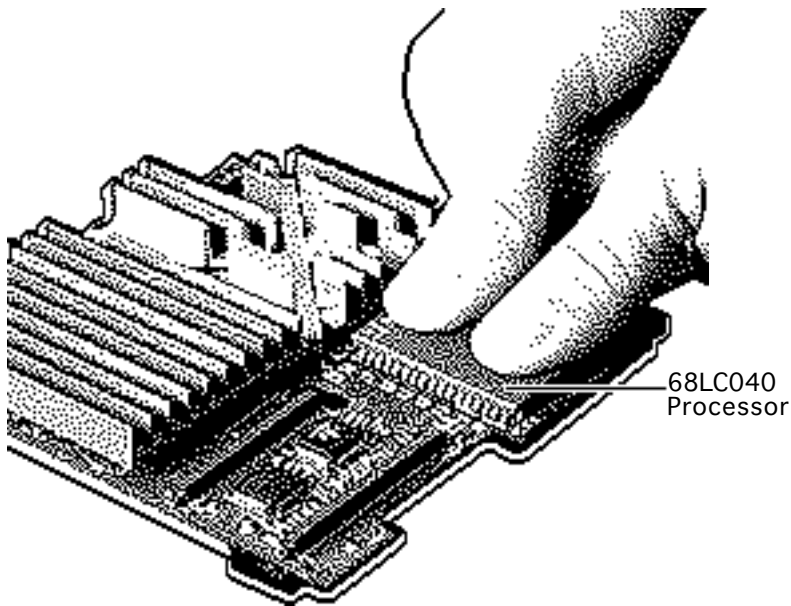
5  Remove the processor.

## Install the 68LC040 Processor on the Upgrade Board

**Note:** The alignment corner of the 68LC040 processor is missing one pin. The alignment corner of the spacer is missing a pin hole.
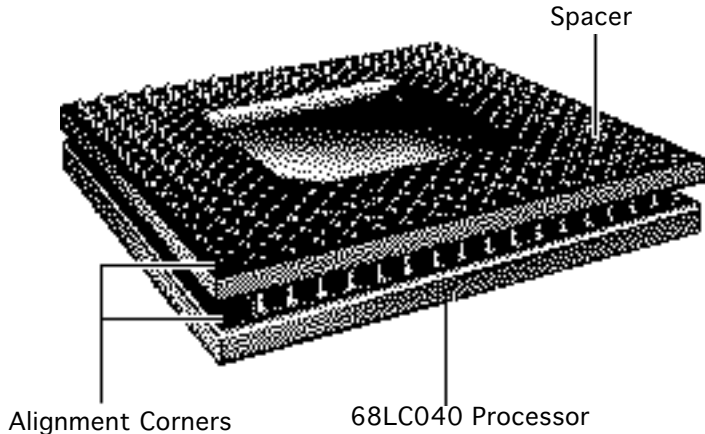
1  Position the spacer alignment corner over the 68LC040 processor alignment corner

2  Place the spacer on the processor.

Spacer

Alignment Corners

68LC040 Processor

68LC040 Processor

**Caution:** Forcing the 68LC040 processor connector pins into the socket could damage the pins. If the processor resists installation, check the pin alignment.

**Caution:** Place the upgrade board on a firm even surface to avoid bending the upgrade board when pressing the processor into the socket.
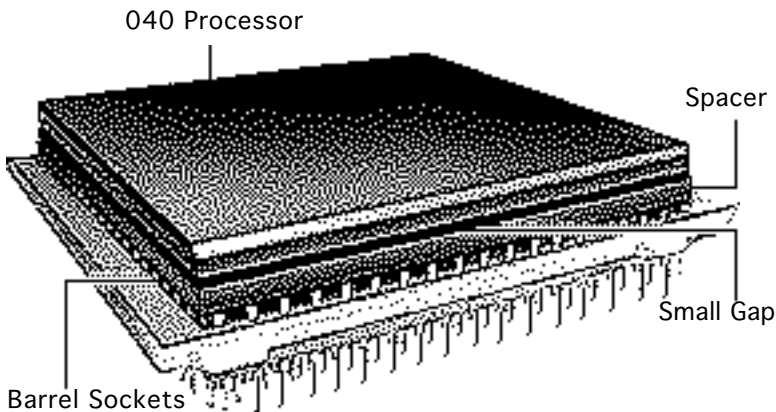
**Caution:** Use two thumbs to evenly distribute the pressure as you press the processor into the socket.

3   Hold the processor and
    spacer together and
    position the spacer
    alignment corner over
    the upgrade socket
    alignment corner.

4   Press the processor
    connector pins into the
    socket until you hear a
    "snap."

040 Processor

Spacer

Small Gap

Barrel Sockets

**Note:** On a correctly installed 040 processor, a very small gap separates the 040 chip from the metal spacer. A larger gap caused by the board barrel sockets separates the upgrade board and the spacer.
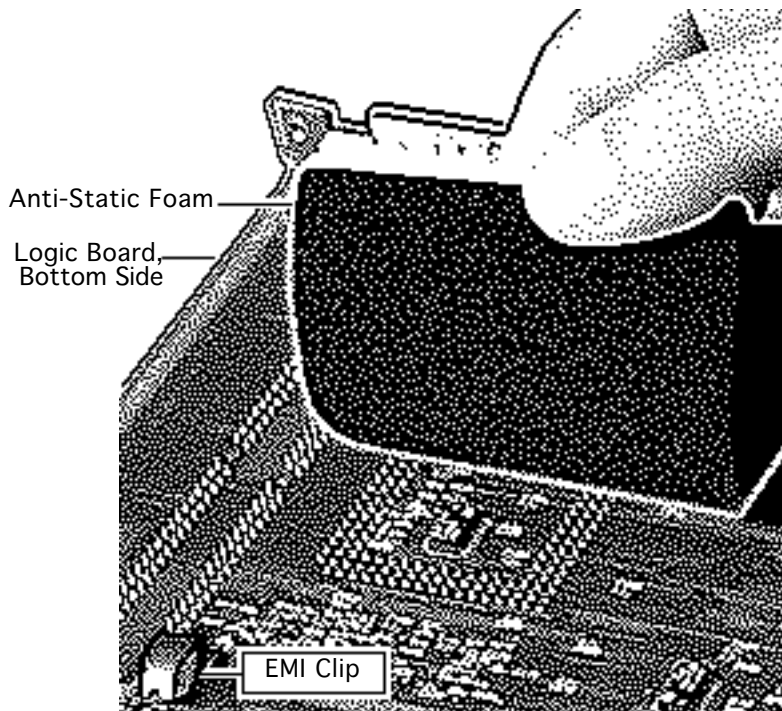
040 Heat Sink

68LC040 Processor
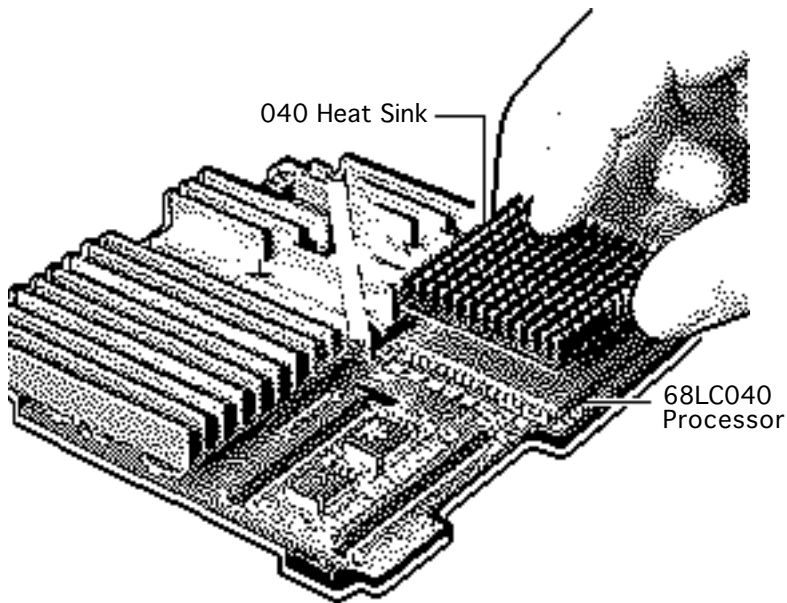
5 Peel the paper from the back of the heat sink and install the heat sink on the processor.

**Note:** Make sure the 040 heat sink is aligned with the sides of the processor.

Anti-Static Foam

Logic Board, Bottom Side

EMI Clip

## Install the Upgrade Board

**Note:** The next step explains how to prepare the logic board to accept the upgrade board.

**Caution:** The EMI clips on the bottom of the LC 475 and Quadra 605 logic boards flex easily. Do not apply heavy pressure directly to these clips or to the logic board, or you may bend the board.
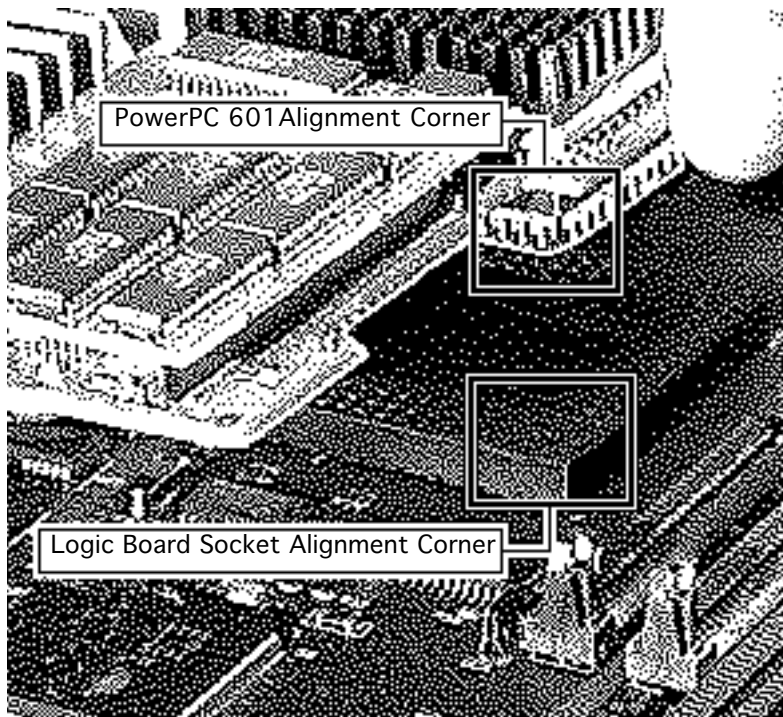
1 Place a piece of antistatic foam directly under the processor socket on the bottom side of the logic board.

   **Note:** This step helps prevent the logic board from bending when you apply pressure in the next few steps.

PowerPC 601 Alignment Corner

Logic Board Socket Alignment Corner

2 **Caution:** Forcing the upgrade board connector pins into the logic board socket could damage the pins. If the connector resists installation, check the pin alignment.

Position the upgrade connector alignment corner over the logic board socket alignment corner.

3 Carefully align the pins along all sides of the processor and socket.

4   Firmly press the
    connector pins into the
    logic board socket.

**Note:**  To install the
software, refer to the
Macintosh Processor
Upgrade Owner's Guide.

## Logic Board and Upgrade Board Returns

Return the upgrade and logic boards to their original conditions before sending them to Apple. Be sure to remove the upgrade board from the logic board and reinstall the 68LC040 processor on the logic board.

**Replacement Caution:** To avoid bending any pins when removing the 68LC040 processor, pry up each side only slightly.
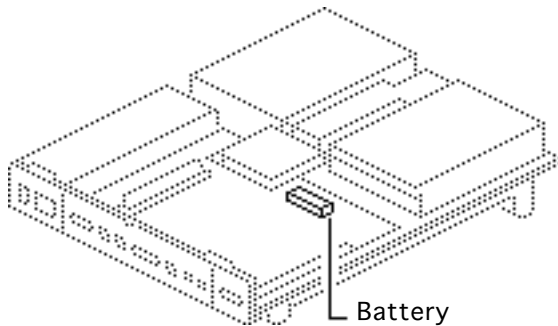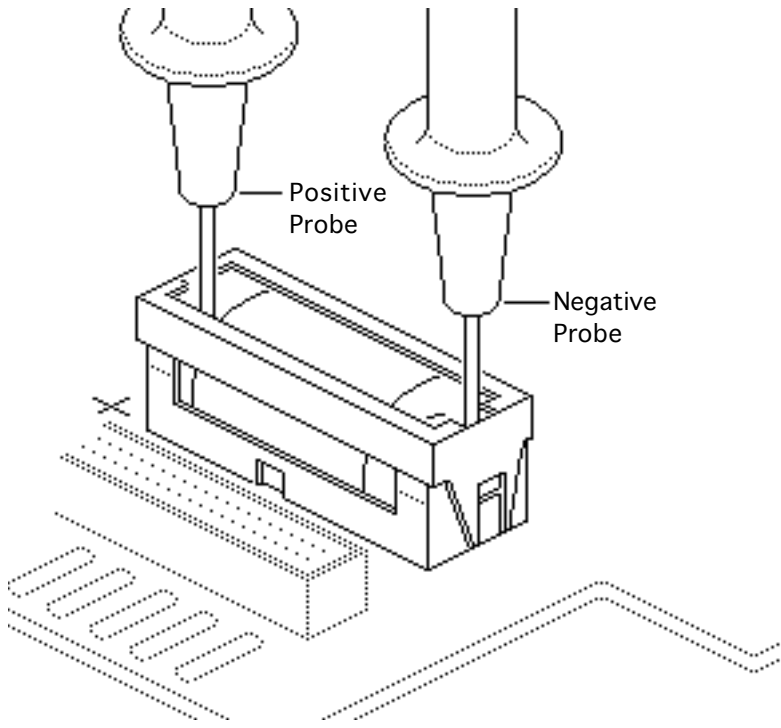
Additional Procedures

Macintosh LC Series/Quadra 605

# Battery Verification

Before you begin, remove the top cover.

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

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

Battery

1  Set the voltmeter to the 10 volts DC scale.

2  Hold the positive probe of the voltmeter to the positive end of the battery and the negative probe to the negative end of the battery.

3  If the battery voltage is below 3.0 volts, replace the battery. Refer to "Battery Replacement" in this chapter.
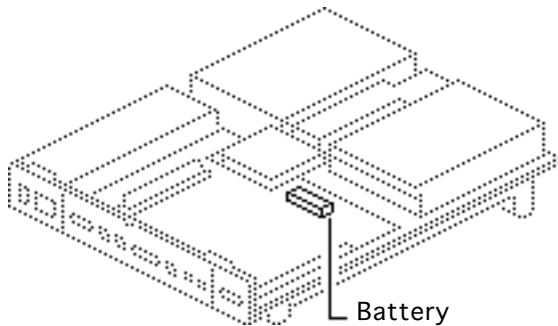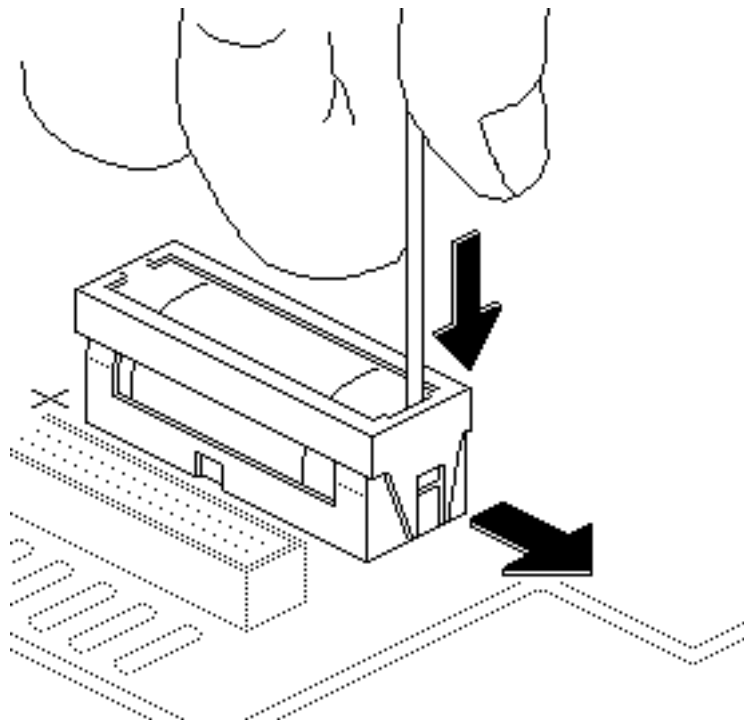
# Battery Replacement

Before you begin, remove the top cover.

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

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

Battery

1 Insert a small flat-blade screwdriver into the top of the holder and gently push the screwdriver down until the side tab pushes out.

2 Repeat on the other end and remove the cover from the holder.
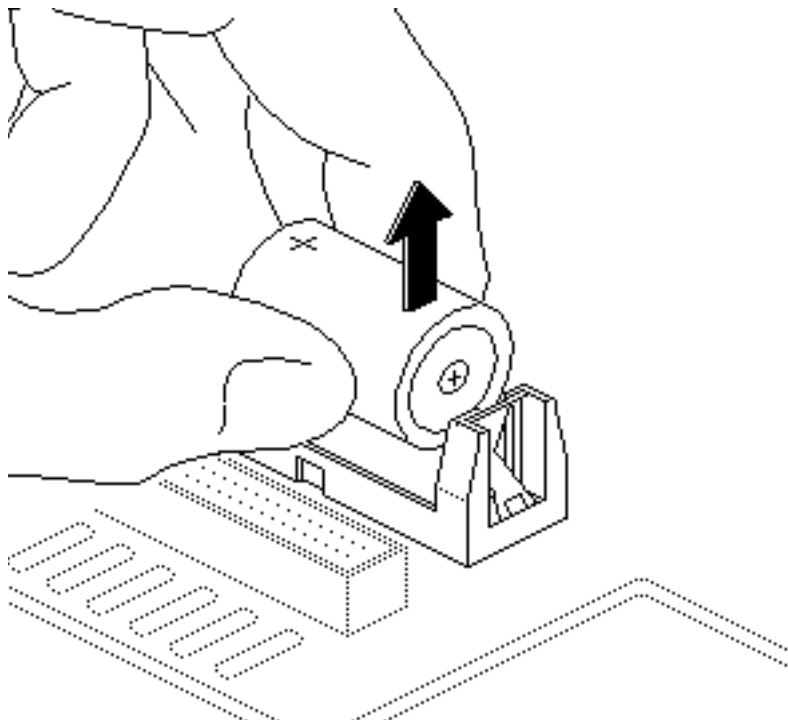
3   Grasp the battery and remove it from the holder.

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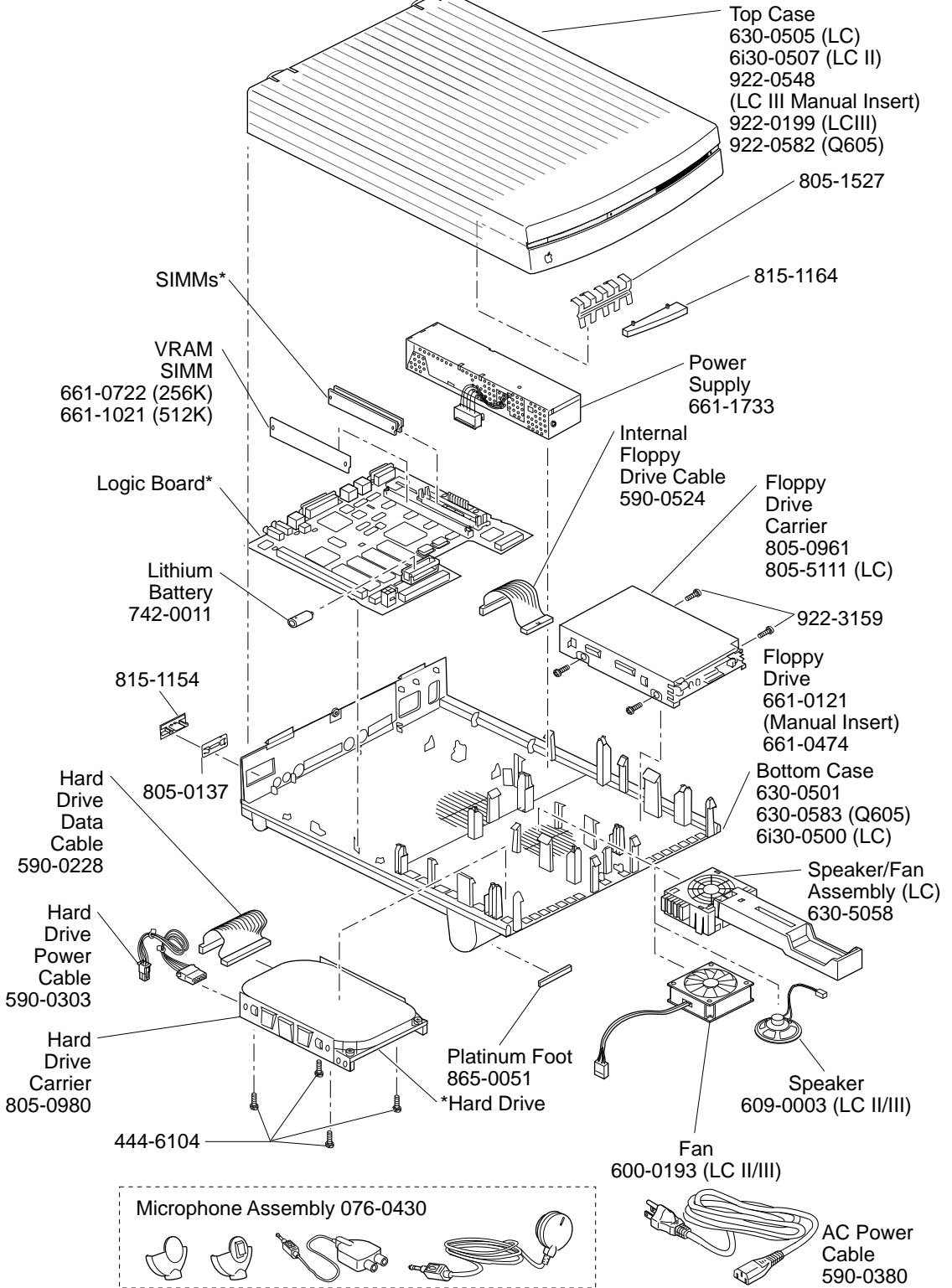
Service Source

Exploded View

Macintosh LC Series, Quadra 605

# Exploded View

Top Case
630-0505 (LC)
6i30-0507 (LC II)
922-0548
(LC III Manual Insert)
922-0199 (LCIII)
922-0582 (Q605)

805-1527

815-1164

SIMMs*

VRAM
SIMM
661-0722 (256K)
661-1021 (512K)

Power
Supply
661-1733

Internal
Floppy
Drive Cable
590-0524

Floppy
Drive
Carrier
805-0961
805-5111 (LC)

Logic Board*

Lithium
Battery
742-0011

922-3159

Floppy
Drive
661-0121
(Manual Insert)
661-0474

815-1154

805-0137

Bottom Case
630-0501
630-0583 (Q605)
6i30-0500 (LC)

Hard
Drive
Data
Cable
590-0228

Speaker/Fan
Assembly (LC)
630-5058

Hard
Drive
Power
Cable
590-0303

Hard
Drive
Carrier
805-0980

Platinum Foot
865-0051
*Hard Drive

Speaker
609-0003 (LC II/III)

444-6104

Fan
600-0193 (LC II/III)

Microphone Assembly 076-0430

AC Power
Cable
590-0380

**This is a generic representation of a product family. Configurations may vary.
For number of part with asterisk, see parts list.**