



Macintosh Portable

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## Basics

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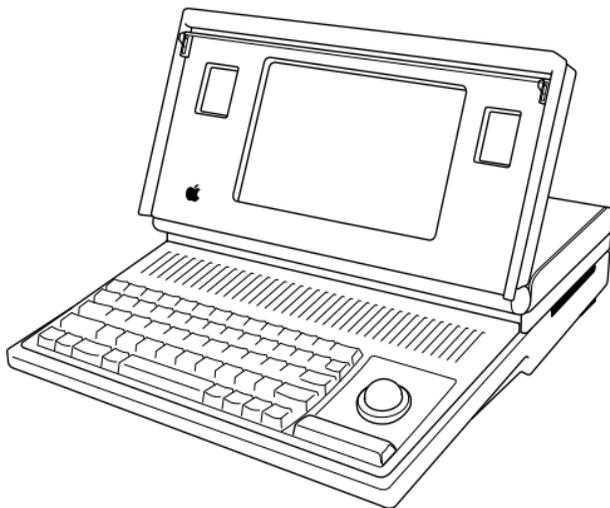
Macintosh Portable





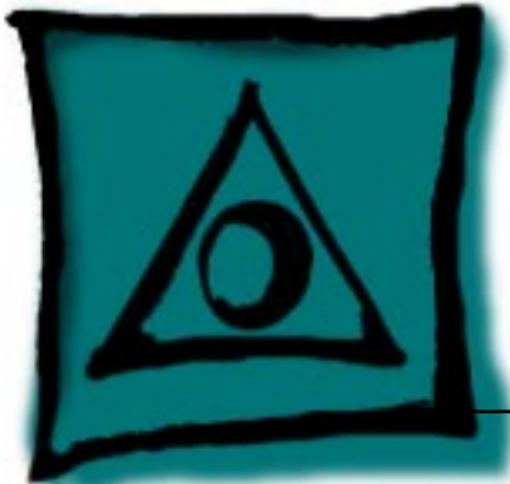
## Overview

This manual contains complete repair procedures for the Macintosh Portable shown at left.



**Figure: Macintosh Portable**





## Specifications

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Macintosh Portable





## Processor

<b>CPU</b>	Motorola 68HC000, 16-bit CMOS microprocessor 15.6672 MHz
<b>Addressing</b>	32-bit internal registers 24-bit address bus 16-bit data bus
<b>Wait States</b>	1 (static logic board) 10 (pseudostatic logic board)





# Memory

<b>RAM</b>	1 MB using thirty-two 32K by 8-bit static RAM chips; 100 ns access time; addressing supports up to 9 MB Expandable to 2 MB with optional 1 MB RAM expansion card Expandable to 4 MB with optional 3 MB RAM expansion card (backlit model)
<b>ROM</b>	256K using two 128K by 8-bit devices; 150 ns access time; addressing supports up to 4 MB
<b>PRAM</b>	128 bytes of system parameter memory
<b>VRAM</b>	32K of static video display memory





## Disk Storage

### **Floppy Drive**

Internal 1.4 MB floppy drive

### **Hard Drive**

Internal 40 MB hard drive (optional)





## I/O Interfaces

### **Floppy Drive**

DB-19 connector

Supports Macintosh 800K Disk Drive, Apple 3.5 Drive, Apple SuperDrive, and Apple Hard Disk 20

### **SCSI**

1.5 MB/second transfer rate

Supports a maximum of eight devices

### **Apple Desktop Bus**

Low-speed serial interface

Supports optional low-power mouse

### **Serial**

Two RS-422 serial ports; mini DIN-8 connectors

### **Modem**

Phone jack for optional external modem





**Power Adapter**

Power adapter port

**Sound**

Stereo sound-in port

**Video**

DA-15 connector

Supports the connection of external video devices





## I/O Devices

### **Keyboard**

63 keys

N-key rollover

Apple Desktop Bus (ADB) interface

US, British, French Canadian, Japanese, German, Spanish,  
French, Swedish, and Italian versions available

### **Low-Power ADB Mouse**

Low-power version of the ADB mouse

Opto-mechanical type

ADB interface

### **Trackball**

ADB interface





**Numeric Keypad  
(Optional)**

18 keys

ADB interface

US, Pacific, and European versions available





## Sound and Video

### Sound Generator

Apple Sound Chip

One- or four-voice mono (one or two voices in stereo) with 4-bit digital-to-analog conversion using a 22-kHz sampling rate  
Filtered by two Sony sound chips

### Video Display

10-in. (diagonal) screen

Reflective, active-matrix, liquid crystal, flat-panel display  
640 by 400 pixels, 75 dpi

.28 mm dot size; .33 mm dot pitch; 80% active area

Variable tilt

Contrast (nonbacklit display) and brightness (backlit display) is software adjustable using the Control Panel.





## Electrical

### Main Battery

Sealed lead-acid

6.5 V

Up to 10 hours (fully charged battery); time depends on system configuration and power management settings

### Backup Battery

9 V transistor

### Power Adapter

**Input voltage:**

85–270 VAC (100/240 nominal), 48–62 Hz (50/60 nominal)

**Output voltage:**

7.0–7.6 V (7.5 nominal), 5 mA–2.0 A (1.5 nominal)

US, Japanese, United Kingdom, Australian, and European versions





**Battery Recharger  
(Optional)**

Input voltage: 7.5 VAC

Battery recharger output voltage: 6.5 VDC





## Physical

### **Dimensions (Display Open)**

Width: 15.25 in. (387.35 mm)

Height: 11.0 in. (279.4 mm)

Depth: 14.83 in. (365.25 mm)

Height at rear panel: 4.05 in. (102.87 mm)

Height at front panel: 2.10 in. (53.34 mm)

### **Weight (With Battery)**

13.75 lb. (6.25 kg) without hard drive

15.75 lb. (7.16 kg) with hard drive





Troubleshooting  
Macintosh Portable





## 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

Screen is blank;  
computer is not  
responding

- 1 If computer is new, remove plastic sheet from between battery and contacts.
- 2 Reset power manager.
- 3 Connect power adapter and restart computer in three or four minutes.
- 4 Replace main battery.
- 5 Check keyboard cable connections.
- 6 Replace keyboard.
- 7 Replace keyboard cable.
- 8 Replace logic board. Retain customer's SIMMs.





## Power (Continued)

After main battery is removed, some Control Panel settings are different

- 1 Did you replace battery cover after removing main battery? If so, power interruption destroyed settings. Restore contents of Control Panel.
- 2 Replace backup battery.

Power adapter is plugged in and connected; battery DA does not indicate charger is connected

- 1 Verify that charger is connected properly.
- 2 Replace main battery.
- 3 Replace power adapter.
- 4 Replace logic board. Retain customer's SIMMs.





## Power (Continued)

Low-power warning appears soon after you start to use computer

- 1 Attach power adapter.
- 2 Make sure peripherals display low-power icon.
- 3 Reduce use of power-consuming devices—for example, floppy drive, hard drive, modem, and speaker—or connect power adapter.

Battery does not retain charge, even when computer is not in use

- 1 Upgrade to system software 6.0.5 or later.
- 2 Replace battery.
- 3 Replace keyboard.
- 4 Replace wire harness assembly.
- 5 Replace logic board.





## Video

Some pixels never come on; no pattern

If display contains six or more voids, replace LCD display. Maximum of five permanently OFF pixels (voids) is acceptable.

Some pixels are always black; no pattern

If any pixel is on constantly, replace LCD display.

Row of pixels is always black

- 1 Replace LCD display.
- 2 Replace display cable.
- 3 Replace logic board. Retain customer's SIMMs.

Row of pixels never blackens

- 1 Replace LCD display.
- 2 Replace display cable.
- 3 Replace logic board. Retain customer's SIMMs.





## Video (Continued)

- |                      |   |
|----------------------|---|
| Display is blurred   | <ol style="list-style-type: none"><li>1 Adjust angle of display.</li><li>2 Use Control Panel to adjust screen contrast.</li></ol>   |
| Display is too dark  | <ol style="list-style-type: none"><li>1 Move computer closer to direct light or move light source closer to computer.</li><li>2 Use Control Panel to adjust screen contrast.</li><li>3 Replace LCD display.</li><li>4 Replace logic board. Retain customer's SIMMs.</li></ol> |
| Display is too light | <ol style="list-style-type: none"><li>1 Adjust angle of display.</li><li>2 Use Control Panel to adjust screen contrast.</li><li>3 Replace LCD display.</li></ol>  |





## Video (Continued)

Backlight level cannot be changed

Use version 1.3 of Portable CDEV.

Backlight does not operate

- 1 Use version 1.3 of Portable CDEV.
- 2 Check inverter PCA connections.
- 3 Replace inverter PCA. Refer to “LCD Display (Backlit)” in Take Apart.
- 4 Replace LCD Display.
- 5 Replace logic board. Retain customer’s SIMMs.

Display is blank, though computer appears to operate correctly

- 1 Check display cable connection.
- 2 Replace LCD display.
- 3 Replace display cable.
- 4 Replace logic board. Retain customer’s SIMMs.





## Floppy Drive

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

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

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

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





## Floppy Drive (Continued)

Disk does not eject

- 1 Shut down computer, press and hold trackball or mouse button, and switch on computer.
- 2 Eject disk manually by pushing opened paper clip into hole near drive.
- 3 Replace floppy drive.
- 4 Replace floppy drive cable.
- 5 Replace logic board. Retain customer's SIMMs.

Disk initialization fails

- 1 Verify that disk is Apple-certified.
- 2 Replace floppy disk.
- 3 Replace floppy drive.
- 4 Replace logic board. Retain customer's SIMMs.





## Hard Drive

Internal hard drive  
does not operate

- 1 Switch on external SCSI devices connected to Portable.
- 2 Check hard drive cable connection.
- 3 Use HD SC Setup to see whether drive is visible. If it is, reinitialize drive.
- 4 Replace hard drive.
- 5 Replace logic board. Retain customer's SIMMs.





## Peripherals

After external SCSI device is connected, computer no longer boots

- 1 Switch on external SCSI device before starting computer.
- 2 Verify that cable termination is correct.
- 3 Verify that no two SCSI devices have same device address.
- 4 Replace logic board. Retain customer's SIMMs.

Cursor does not move when you use trackball

- 1 Reset power manager.
- 2 Check cable connections between trackball and logic board.
- 3 Replace trackball cable.
- 4 Replace trackball.
- 5 Replace logic board. Retain customer's SIMMs.





## Peripherals (Continued)

- |  |  |
|--|--|
| Cursor intermittently does not move or moves erratically | <ol style="list-style-type: none"><li>1 Clean trackball ball and internal rollers.</li><li>2 Replace trackball.</li></ol>  |
| Cursor does not move when you use mouse.                 | <ol style="list-style-type: none"><li>1 Check mouse connection to ADB port.</li><li>2 Reset power manager.</li><li>3 Clean mouse ball and inside mouse.</li><li>4 Replace mouse.</li><li>5 Replace logic board. Retain customer's SIMMs.</li></ol>   |
| Cursor moves, but clicking button has no effect          | <ol style="list-style-type: none"><li>1 If trackball button isn't working, replace trackball cable. If mouse button doesn't work, replace mouse.</li><li>2 Replace trackball ball.</li><li>3 Replace logic board. Retain customer's SIMMs.</li></ol> |





## Peripherals (Continued)

No response to any key on keyboard

- 1 Reset power manager by pressing reset and interrupt switches simultaneously.
- 2 Check keyboard connection to logic board.
- 3 Replace keyboard.
- 4 Replace logic board. Retain customer's SIMMs.

Known-good ImageWriter, ImageWriter II, or LQ doesn't print

- 1 Verify that System is 6.0.5 or later.
- 2 Verify Chooser settings.
- 3 Replace printer cable.
- 4 Replace logic board. Retain customer's SIMMs.

Known-good LaserWriter doesn't print

- 1 Verify that System is 6.0.5 or later.
- 2 Verify Chooser settings.
- 3 Replace printer. If new printer works, computer is OK.
- 4 Replace logic board. Retain customer's SIMMs.





## Peripherals (Continued)

Device connected to modem port doesn't work

- 1 Verify that External Modem is selected in the Portable CDEV.
- 2 Verify that System is 6.0.5 or later.
- 3 Replace logic board. Retain customer's SIMMs.

Serial devices are unrecognized or garbage is transmitted and/or received

- 1 Use version 1.0 of Portable INIT.
- 2 Upgrade to system software 6.0.5 or later.





## Peripherals (Continued)

When using an external modem: after exiting a communication application and putting the computer to sleep three or four times, the computer freezes when it comes out of system sleep

Upgrade to system software 6.0.5 or later.





## Internal Modem

Internal modem options do not appear in Portable CDEV when modem is installed

- 1 Reseat modem card.
- 2 Replace modem card.
- 3 Replace logic board. Retain customer's SIMMs.

Modem does not respond properly to AT instructions

- 1 Verify that baud rate and data format settings of communications application are compatible with Portable Data Modem 2400 and remote modem.
- 2 Replace modem card.

Modem interferes with system sound

- 1 Replace modem card.
- 2 Replace logic board. Retain customer's SIMMs.





## Internal Modem (Continued)

Modem does not respond to incoming call

- 1 If system doesn't respond to incoming call during sleep mode, select When Phone Rings option in Automatic Wake-up section of Portable CDEV .
- 2 Replace modem card.
- 3 Replace logic board. Retain customer's SIMMs.

Modem has no sound output

Replace modem card.





## Miscellaneous

Screen goes blank and computer shuts down every few minutes

Adjust sleep delay in Control Panel or connect power adapter.

Some applications seem to run slower after few seconds

Disable system rest.

Hard disk is slow to respond, or screen goes blank too often

Adjust sleep delay in Control Panel or connect power adapter.





## Miscellaneous (Continued)

Speaker doesn't work	<ol style="list-style-type: none"><li>1 Verify that volume setting in Control Panel is 1 or above.</li><li>2 Check speaker connection to logic board.</li><li>3 Replace speaker.</li><li>4 Replace logic board. Retain customer's SIMMs.</li></ol>
Screen suddenly goes blank	Press any key except Caps Lock.
Error chords sound during startup	Replace logic board. Retain customer's SIMMs.





Take Apart  

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Macintosh Portable

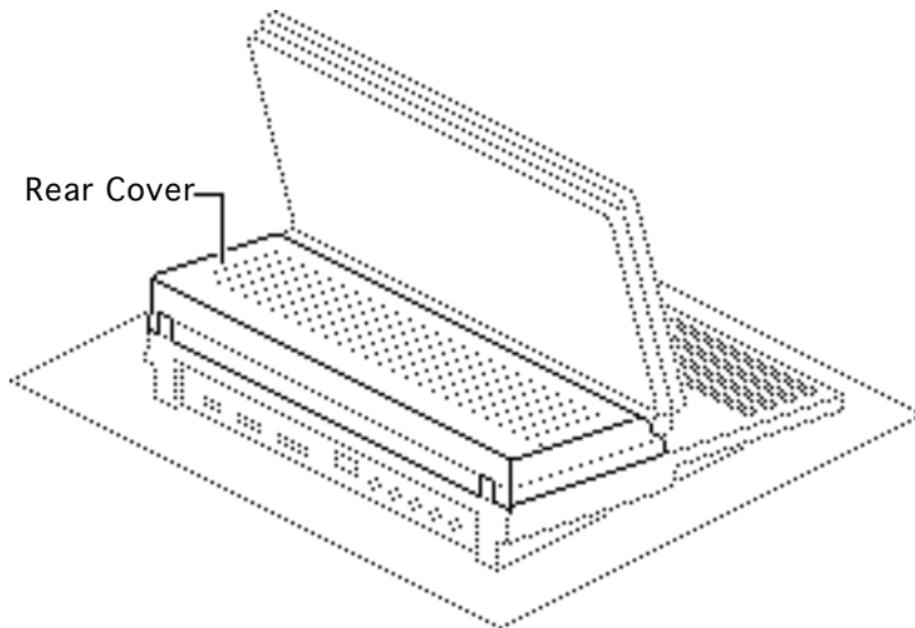




## Rear Cover

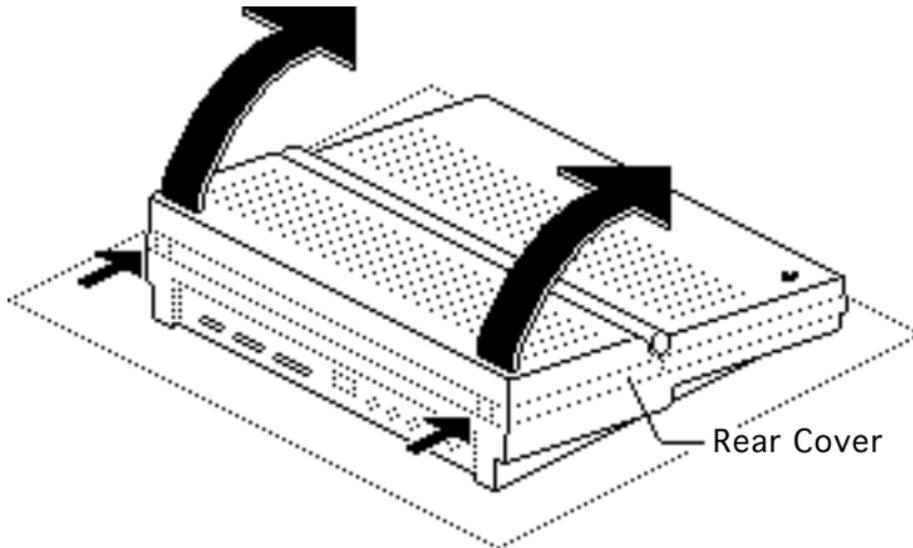
No preliminary steps are required before you begin this procedure.

Review the ESD precautions in Bulletins/Safety.





Press the two plastic cover latches, pivot the rear of the cover up, and lift off the rear cover.



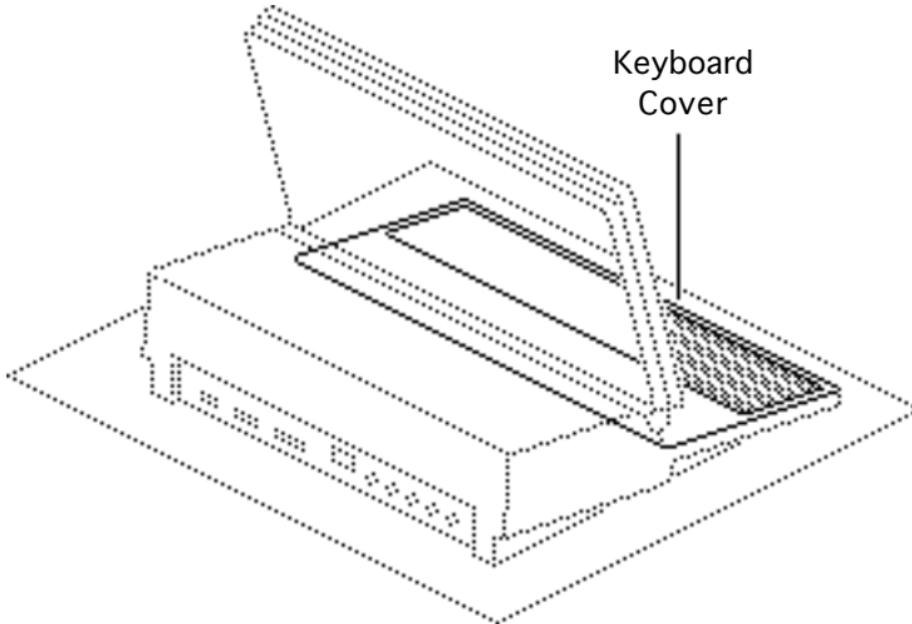


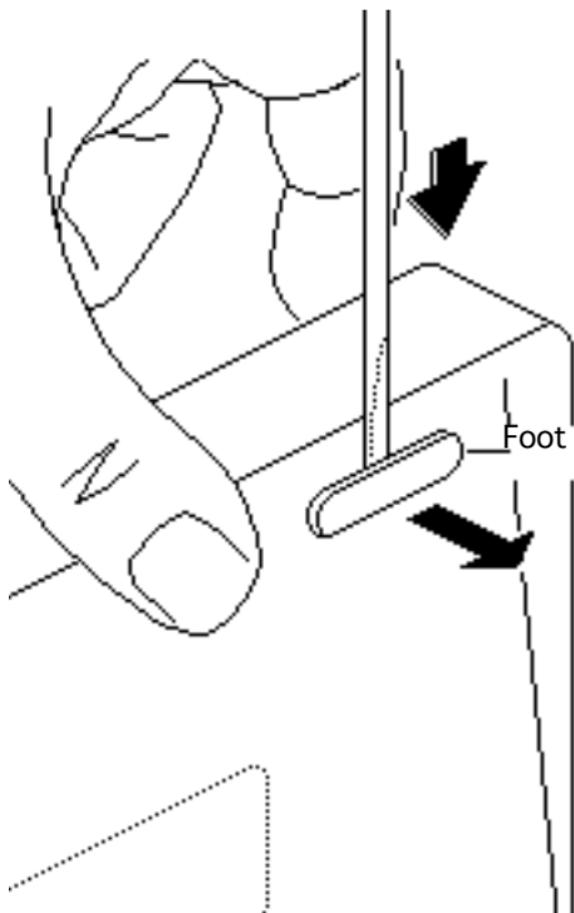
## Keyboard Cover

No preliminary steps are required before you begin this procedure.

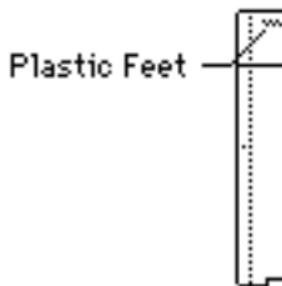
Review the ESD precautions in Bulletins/Safety.

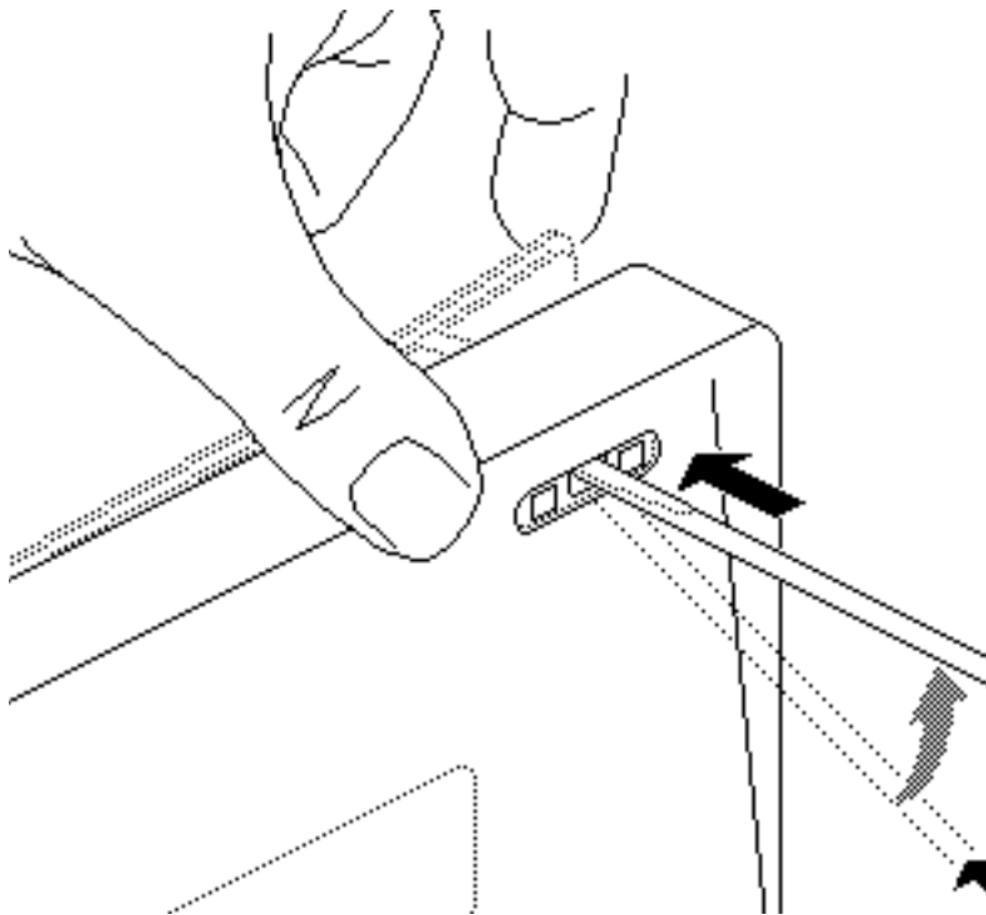
- 1 Push the carrying handle toward the computer and open the display.





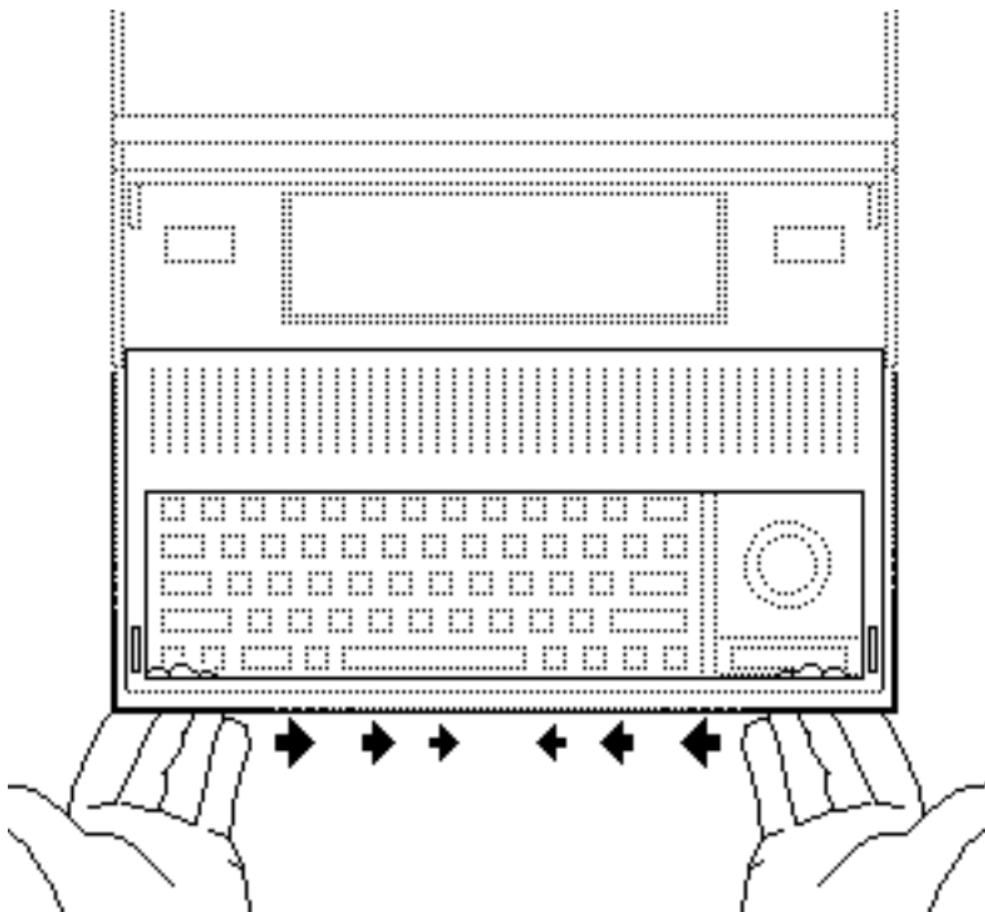
- 2 Position the computer upright on the rear panel.
- 3 Insert the tip of a screwdriver under the center of each foot; gently lift the foot away from the case and remove it.





- 4 Insert a jeweler's screwdriver into the center hole at the top-right corner of the bottom case. Push in the screwdriver and unsnap the corner of the keyboard cover.
- 5 Repeat this step to unsnap the left corner of the keyboard cover.





- 6 Place the computer flat on the grounded surface.
- 7 Starting at the edges and working toward the center, slide your index fingers between the bottom case and the keyboard cover until the cover releases.

**Note:** Two latches attach the center of the cover to the bottom case, so you'll feel some resistance as you lift the center cover.



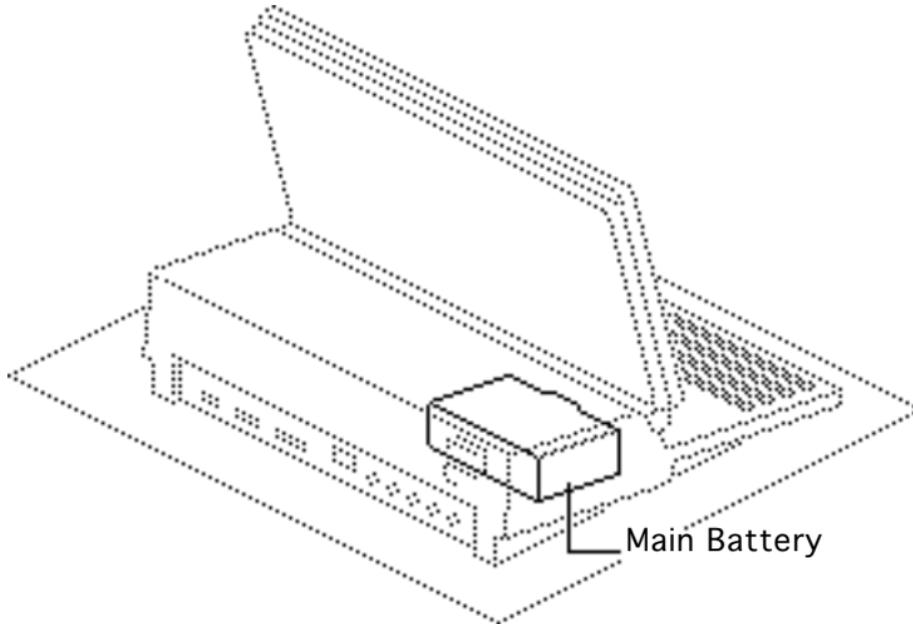


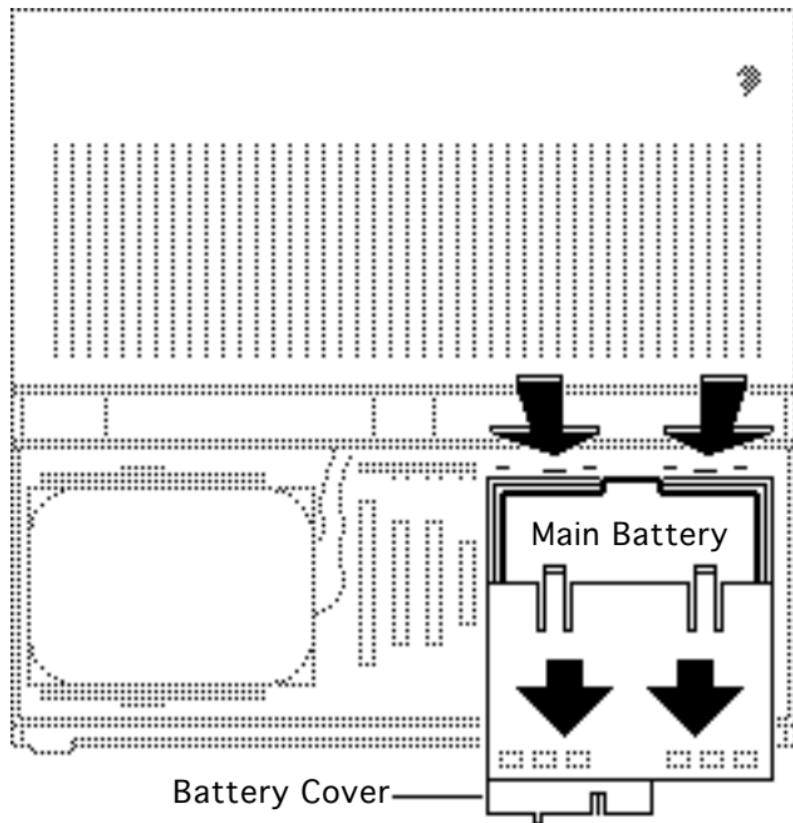
## Main Battery

Before you begin, remove the rear cover.

Review the ESD precautions in Bulletins/Safety.

**Caution:** The main battery is a sealed, lead-acid battery that contains toxic materials. Review battery handling and disposal instructions in Bulletins/Safety.





- 1 Press the two plastic tabs at the front of the battery cover and slide the battery cover toward the rear of the computer.
- 2 Lift out the main battery.

**Caution:** You must reinstall the battery cover if you are doing anything other than replacing the main battery. Failure to reinstall the cover leaves power connected to the logic board and could damage new and old modules.



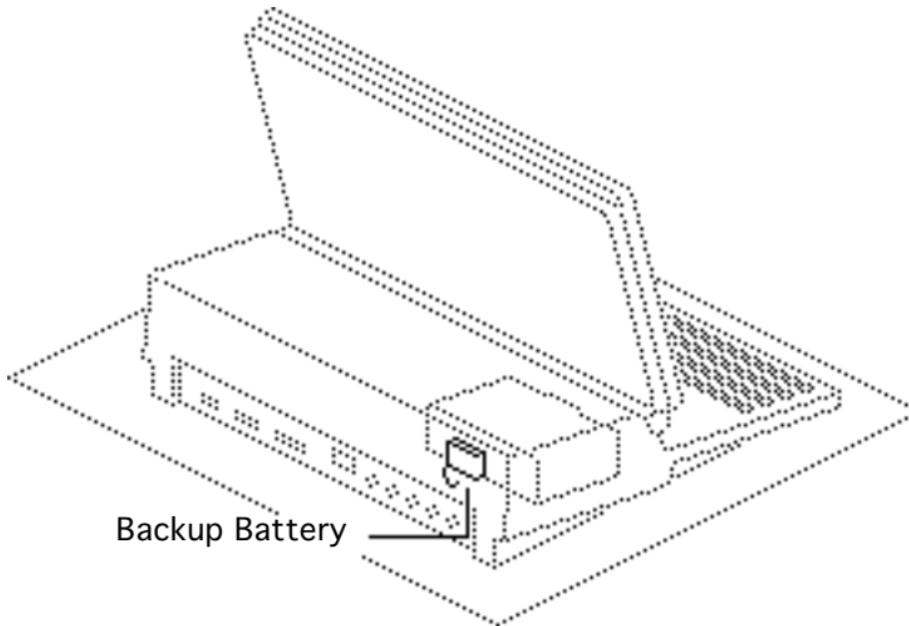


## Backup Battery

Before you begin, remove the following:

- Rear cover
- Main battery cover

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



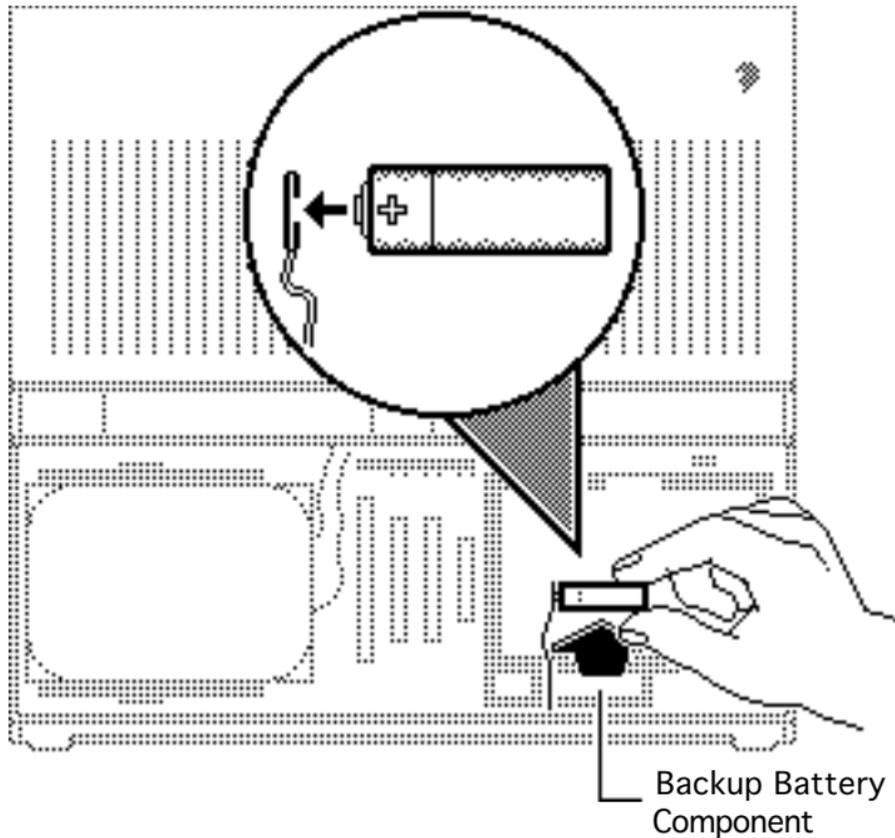
Backup Battery





**Note:** Removing the backup battery erases the contents of parameter RAM. Before removing the backup battery, be sure to note all the Control Panel settings so you can restore them after completing your repairs.





- 1 Using the tip of a jeweler's screwdriver, lift the edge of the backup battery far enough to grab the battery with your fingers. Remove the battery from its compartment.
- 2 Disconnect the battery cable from the battery.



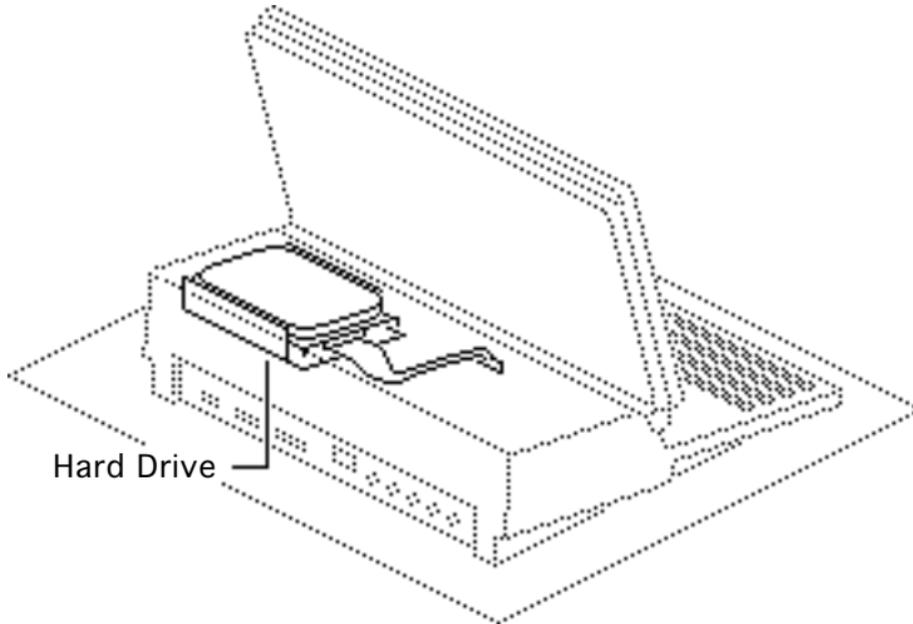


## Hard Drive

Before you begin, remove the following:

- Rear cover
- Main battery
- Keyboard cover
- All option cards

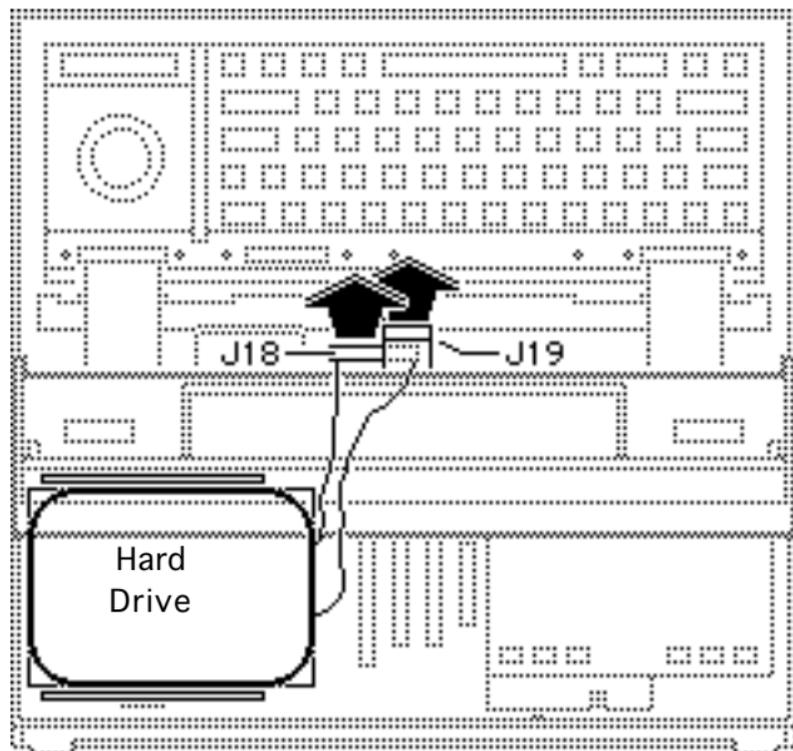
**Caution:** Review the ESD precautions in Bulletins/Safety.





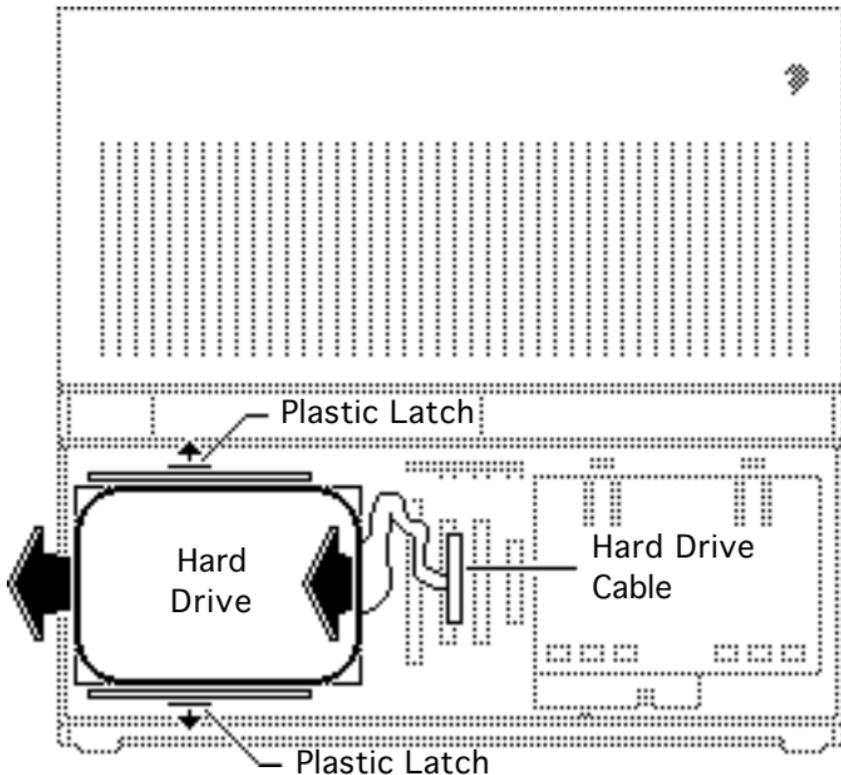
**Caution:** Remember to replace the battery cover after removing the main battery. Failure to put the cover on leaves power connected to the logic board. Removing and replacing modules with power available could damage any module.





- 1 Disconnect the following cable connectors from the logic board:
  - Display cable from J19
  - Hard drive cable from J18





- 2 Close the display and move the hard drive cable toward the rear of the computer.
- 3 **Caution:** Do not loosen or remove the Torx screws that attach the hard drive to the drive shield. Doing so could irreparably damage the hard drive.

Unsnap the two plastic latches and remove the hard drive (with shield) from the subframe.





**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.



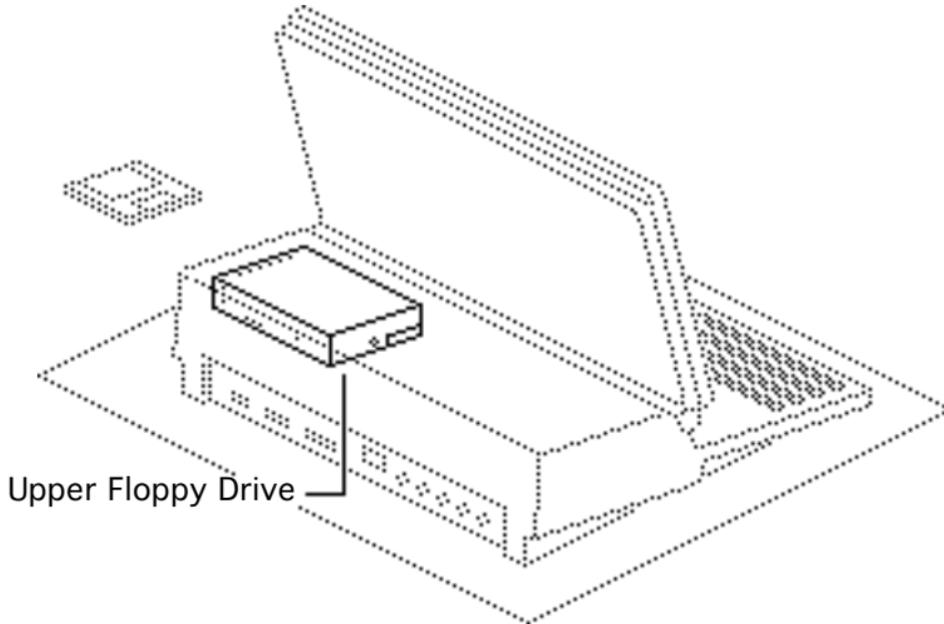


## Upper Floppy Drive

Before you begin, remove the following:

- Rear cover
- Main battery
- All option cards

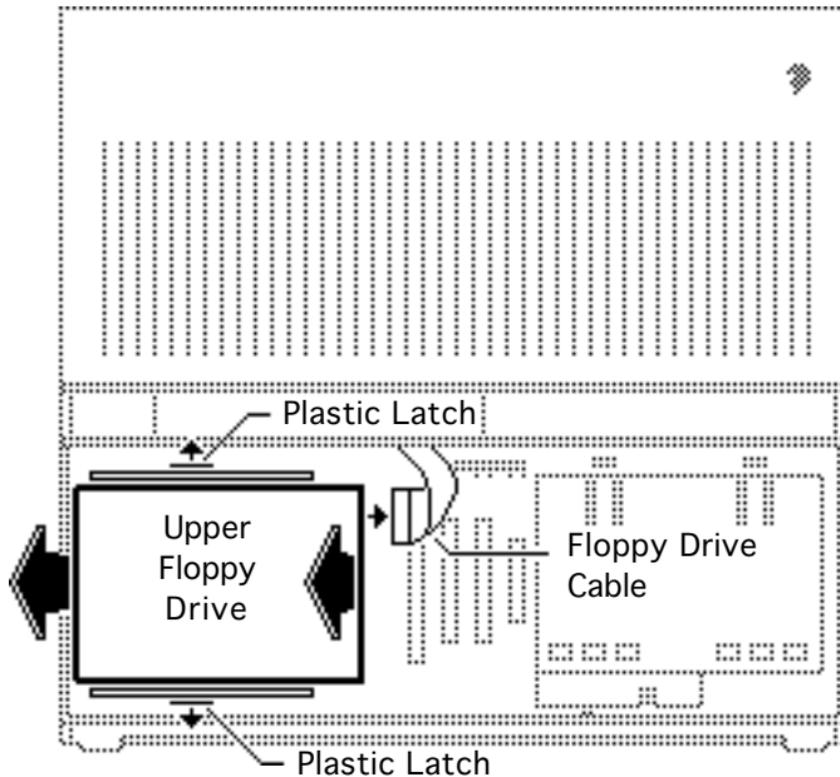
**Caution:** Review the ESD precautions in Bulletins/Safety.





**Caution:** Remember to replace the battery cover after removing the main battery. Failure to reinstall the cover leaves power connected to the logic board. Removing and replacing modules with power available could damage any modules.





- 1 Disconnect the floppy drive cable from the floppy drive.
- 2 Unsnap the two plastic latches and remove the floppy drive (with retainer) from the subframe.
- 3 Depress the two metal tabs and remove the floppy drive mechanism from the retainer.





**Replacement Note:** Before you install a replacement 1.4 MB SuperDrive, you must remove the dust shield.



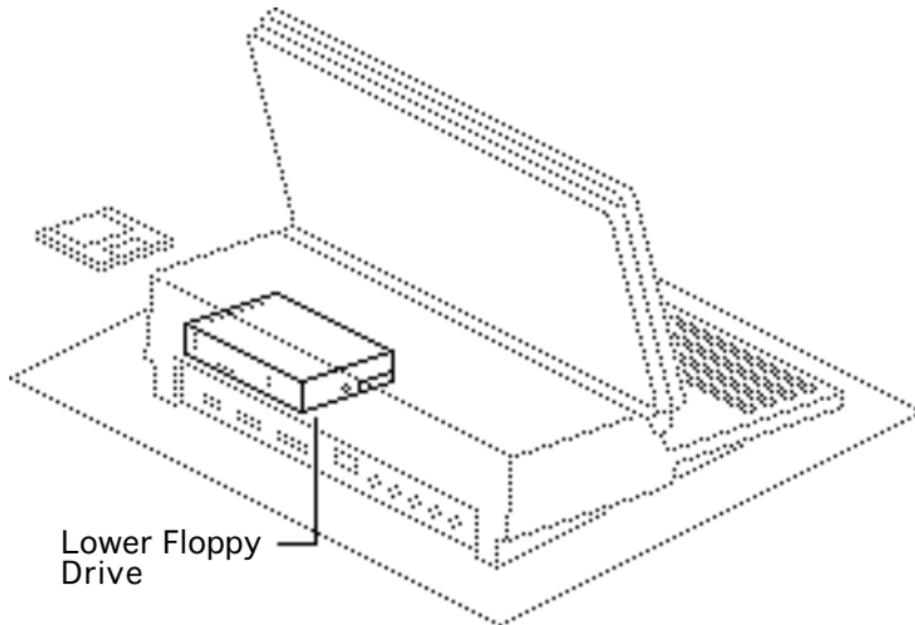


## Lower Floppy Drive

Before you begin, remove the following:

- Rear cover
- Main battery
- All option cards
- Upper floppy drive (if installed)
- Hard drive (if installed)

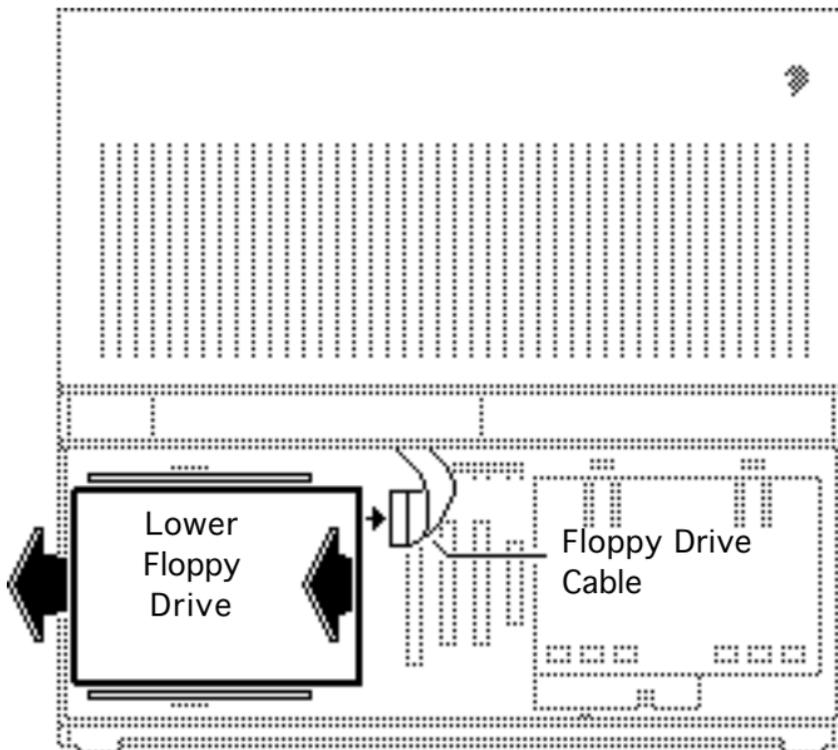
**Caution:** Review the ESD precautions in Bulletins/ Safety.





**Caution:** Remember to replace the battery cover after removing the main battery. Failure to reinstall the cover leaves power connected to the logic board. Removing and replacing modules with power available could damage any modules.





- 1 Disconnect the floppy drive cable from the floppy drive.
- 2 Remove the floppy drive from the subframe.

**Replacement Note:** Before you install a replacement 1.4 MB SuperDrive, you must remove the dust shield.



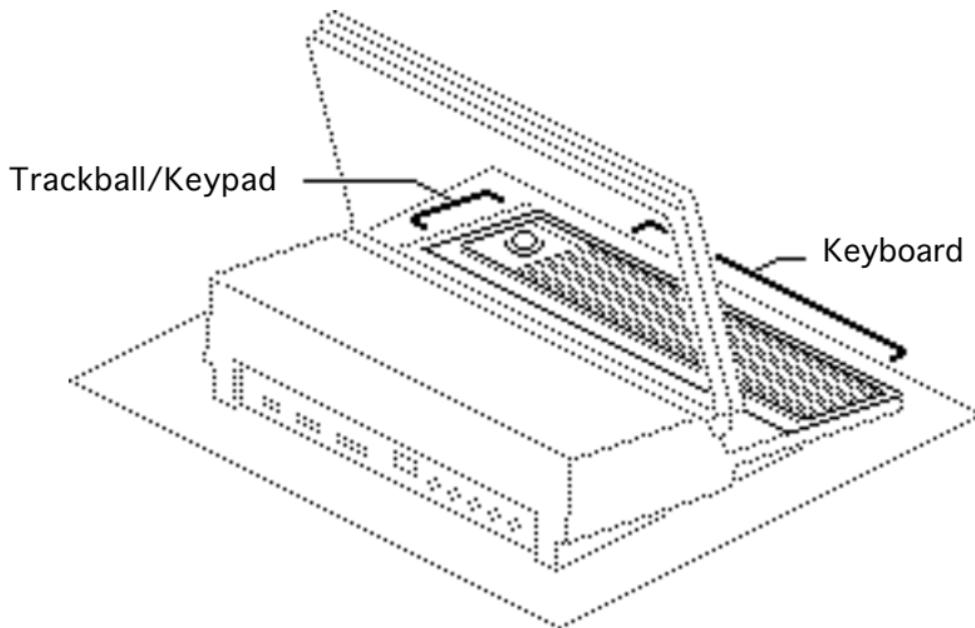


## Keyboard Components

Before you begin, remove the following:

- Rear cover
- Main battery
- Keyboard cover

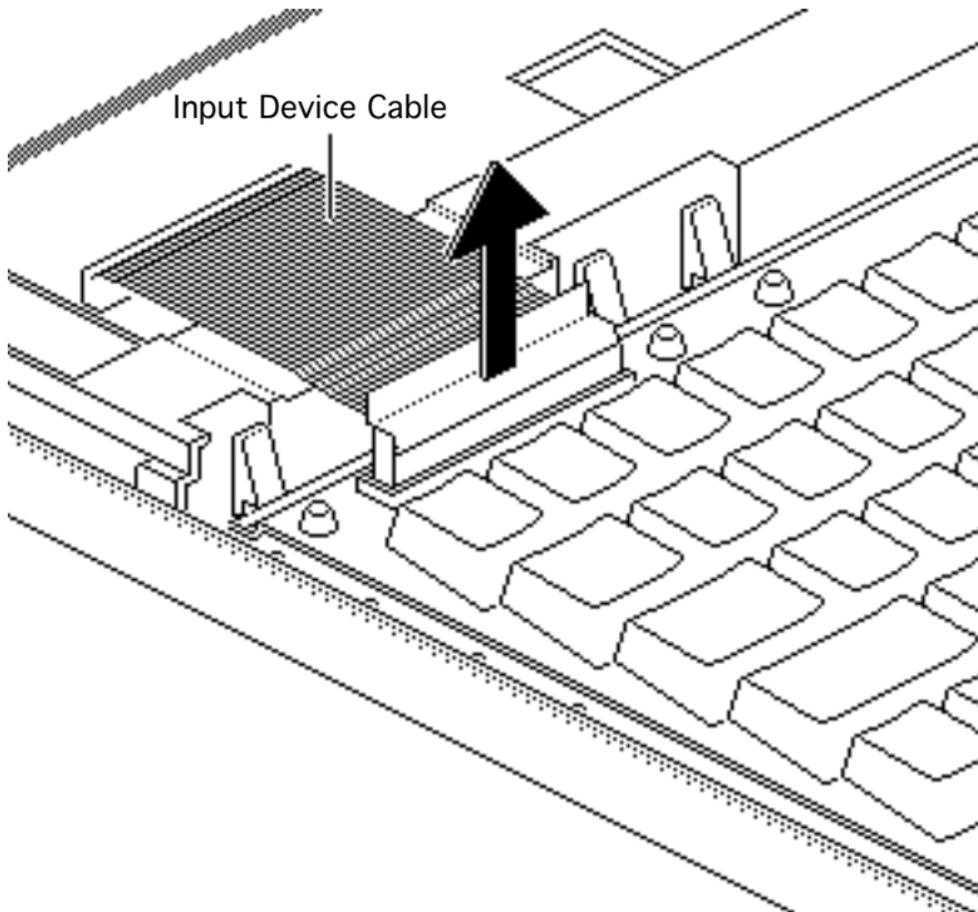
**Caution:** Review the ESD precautions in Bulletins/ Safety.





**Caution:** Remember to replace the battery cover after removing the main battery. Failure to reinstall the cover leaves power connected to the logic board. Removing and replacing modules with power available could damage any modules.

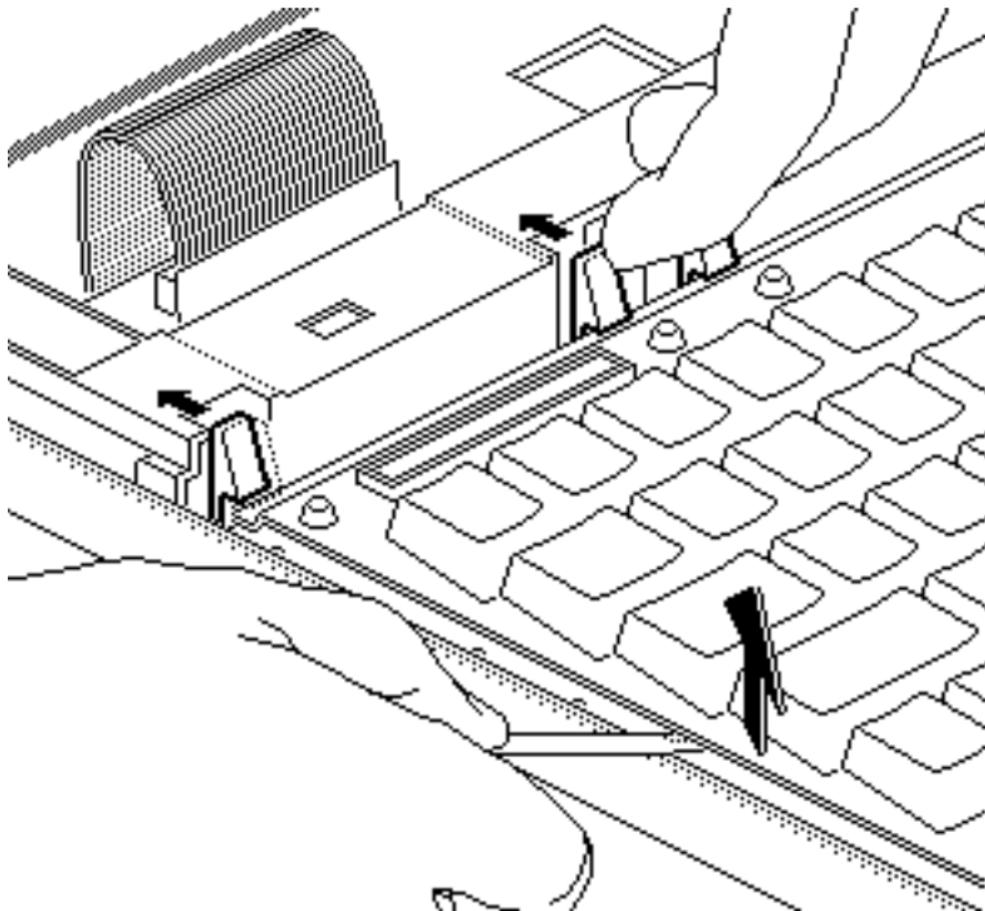




**Note:** The take apart procedure is the same for the keyboard, trackball, and numeric keypad.

- 1 Disconnect the flat cable from the device you want to remove.
  - Keyboard
  - Trackball
  - Numeric keypad





- 2 Starting at one side of the device, pull or pry up the frame of the device while releasing each plastic retainer clip.
- 3 After you release all the clips, lift the back end of the device up and out of the computer.



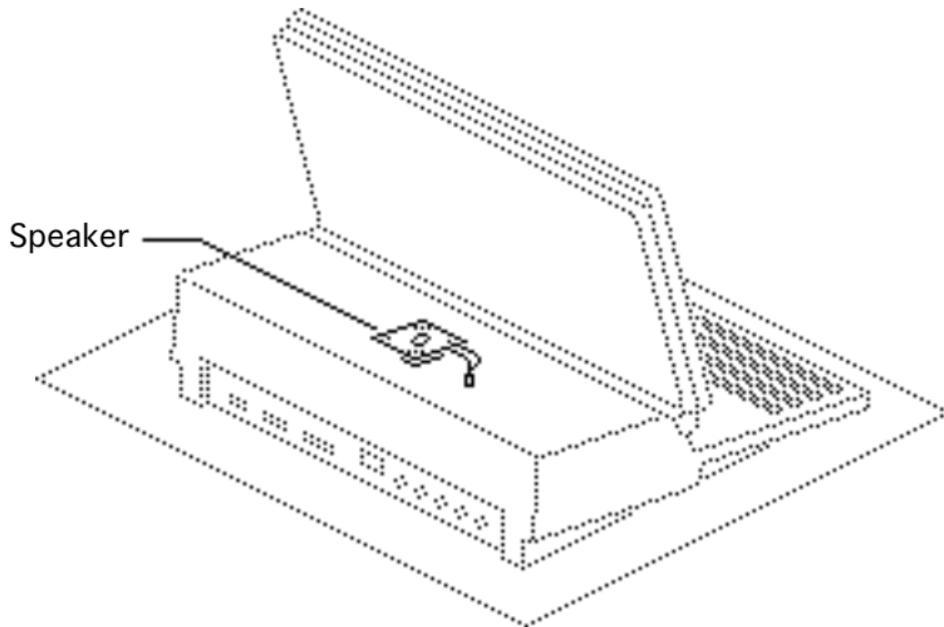


## Speaker

Before you begin, remove the following:

- Rear cover
- Main battery
- Keyboard cover

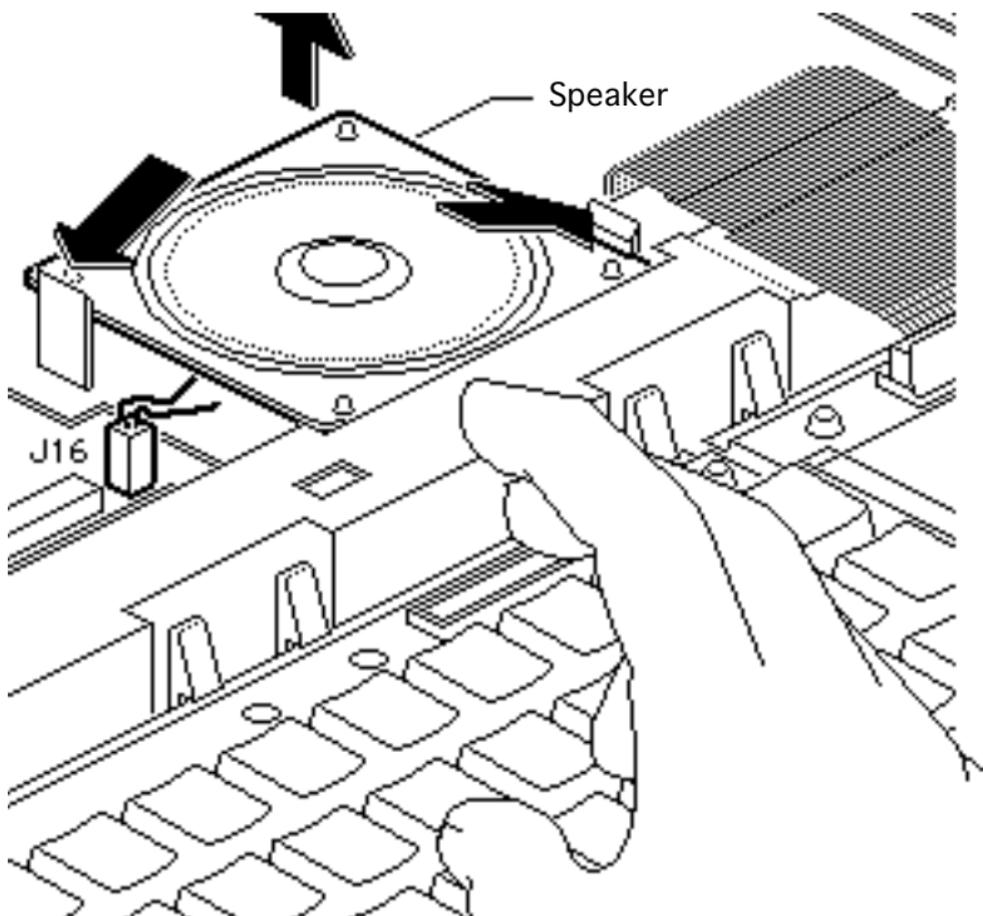
**Caution:** Review the ESD precautions in Bulletins/ Safety.





**Caution:** Remember to replace the battery cover after removing the main battery. Failure to reinstall the cover leaves power connected to the logic board. Removing and replacing modules with power available could damage any modules.





- 1 Disconnect the speaker cable from connector J16 on the logic board.
- 2 Push out the two latches and remove the speaker from the subframe.



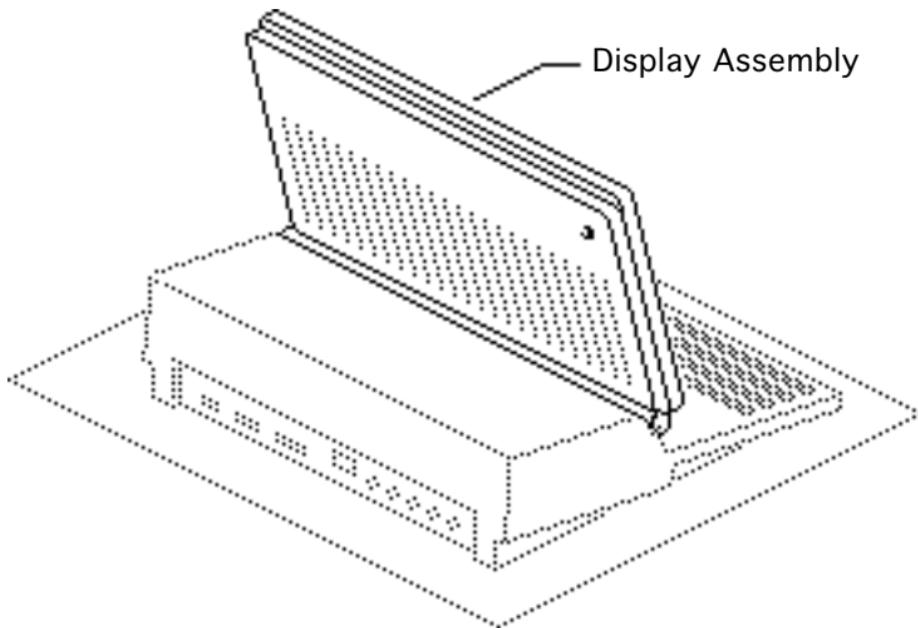


## Display Assembly

Before you begin, remove the following:

- Rear cover
- Main battery
- Keyboard cover

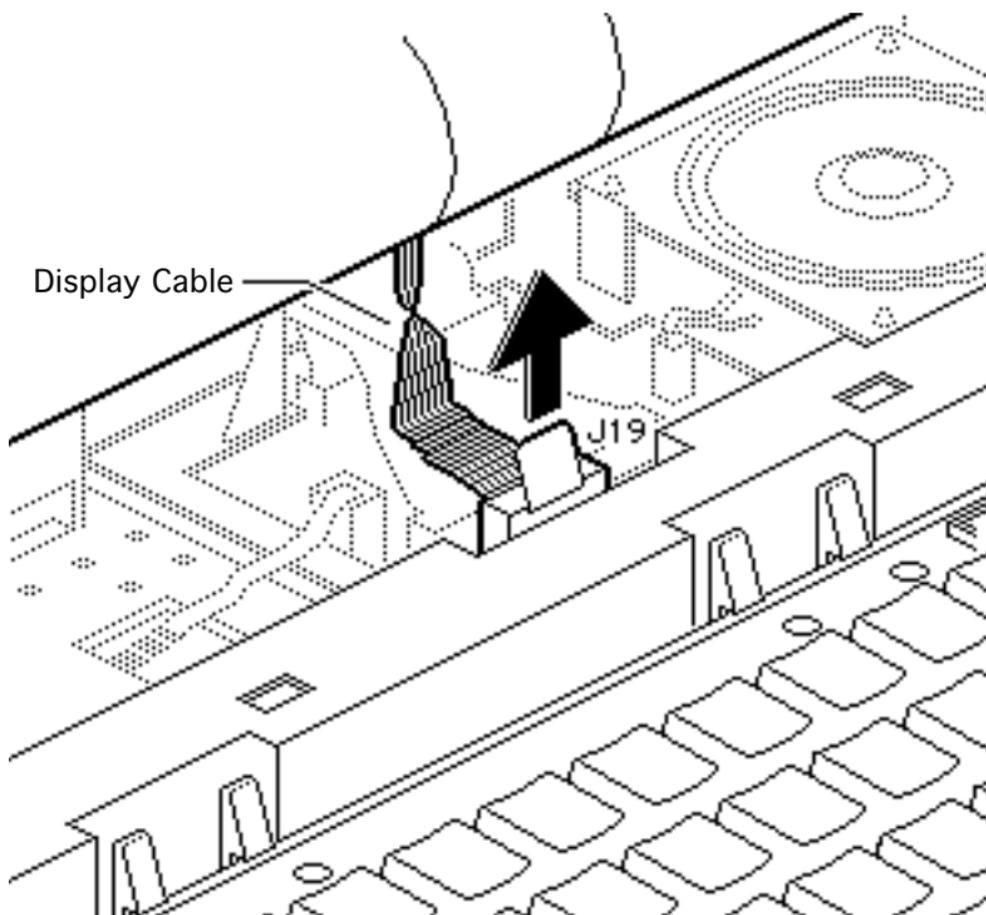
**Caution:** Review the ESD precautions in Bulletins/ Safety.





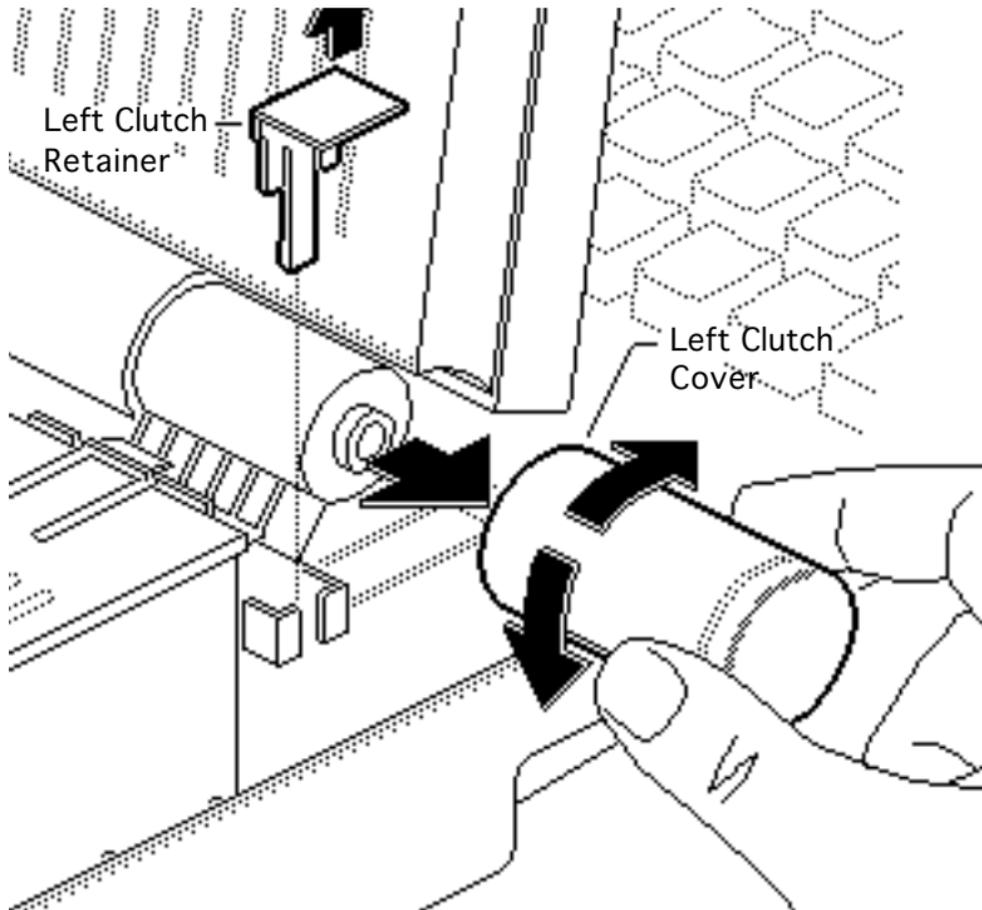
**Caution:** Remember to replace the battery cover after removing the main battery. Failure to reinstall the cover leaves power connected to the logic board. Removing and replacing modules with power available could damage any modules.





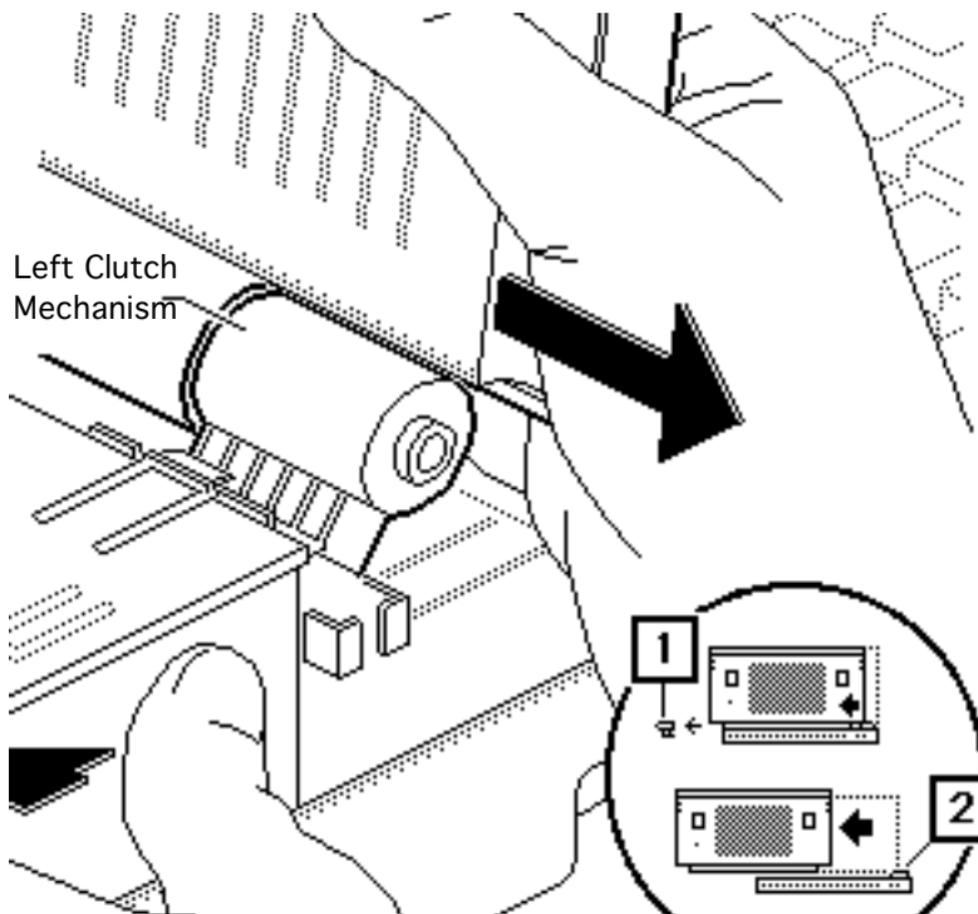
- 1 Disconnect the display cable from connector J19 on the logic board.





- 2 Twist the left clutch cover back and forth and pull it away from the display.
- 3 Lift and remove the left clutch retainer.





- 4 Pull the display with your right hand while maintaining slight outward pressure on the computer with your left hand. This movement pulls off the left clutch mechanism (1).
- 5 Disengage and remove the display assembly from the right clutch mechanism (2).

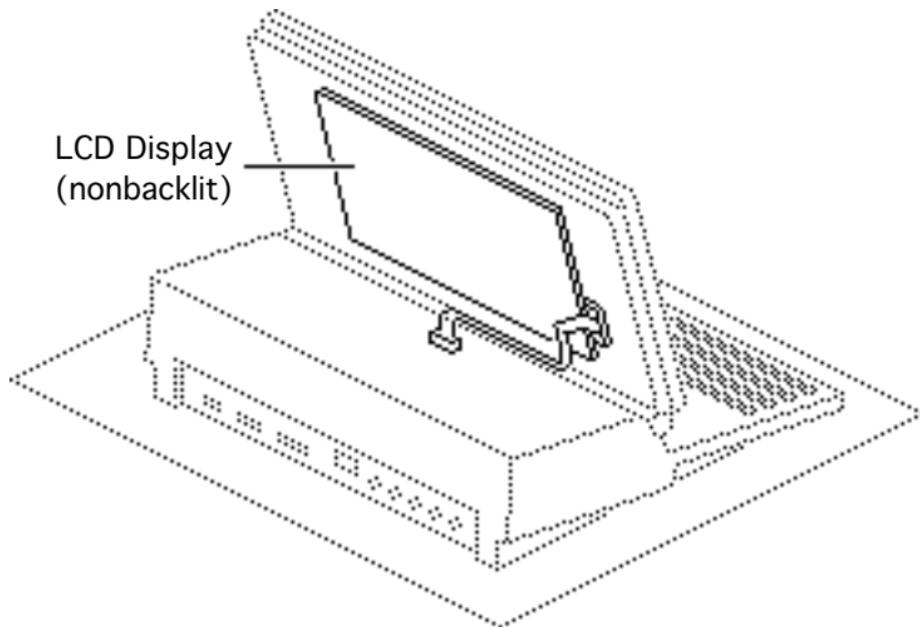




## LCD Display (Nonbacklit)

Before you begin, remove the following:

- Rear cover
- Main battery
- Keyboard cover
- Display assembly





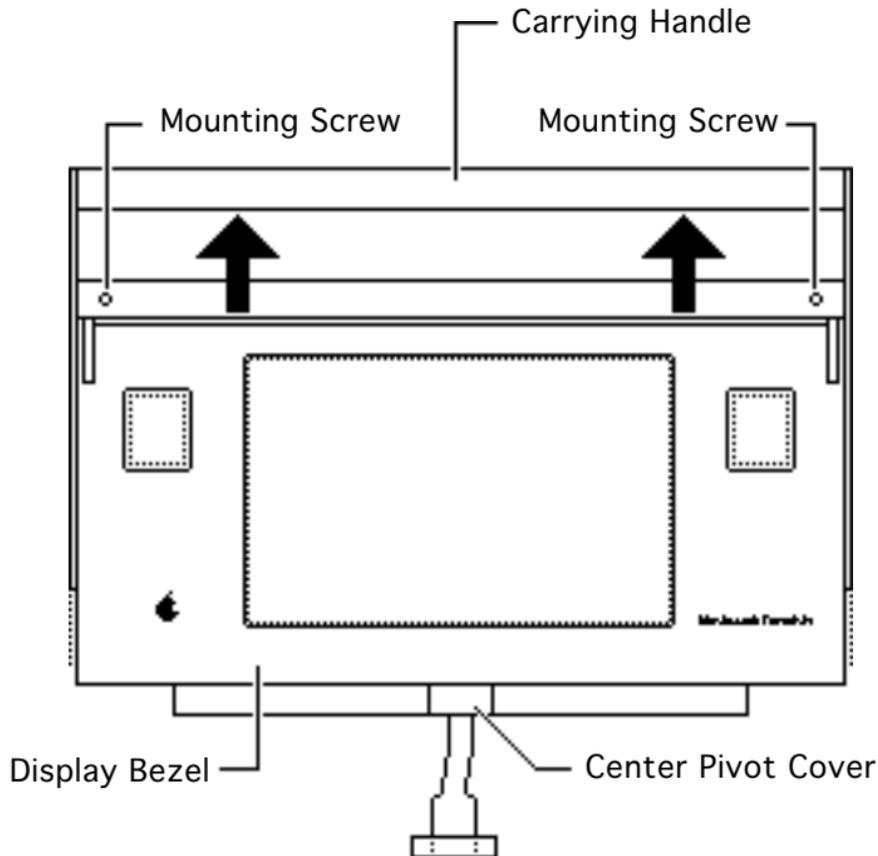
**Caution:** The LCD display is extremely susceptible to ESD damage. Review the ESD precautions in Bulletins/Safety. Handle the display by the edges and do not touch the component side or remove the tape.





**Caution:** Remember to replace the battery cover after removing the main battery. Failure to reinstall the cover leaves power connected to the logic board. Removing and replacing modules with power available could damage any modules.



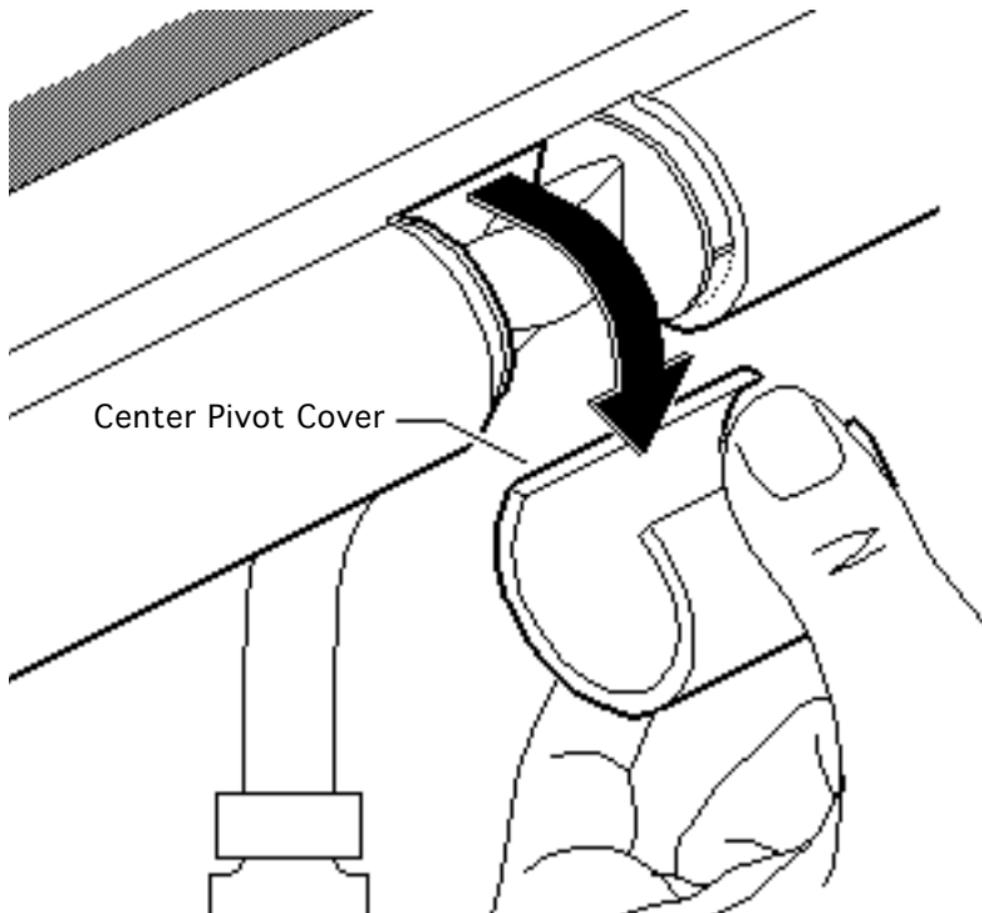


- 1 Slide the carrying handle from the display to its fully extended position.

**Note:** Later model Portables and replacement displays have two Phillips screws securing the bezel to the housing.

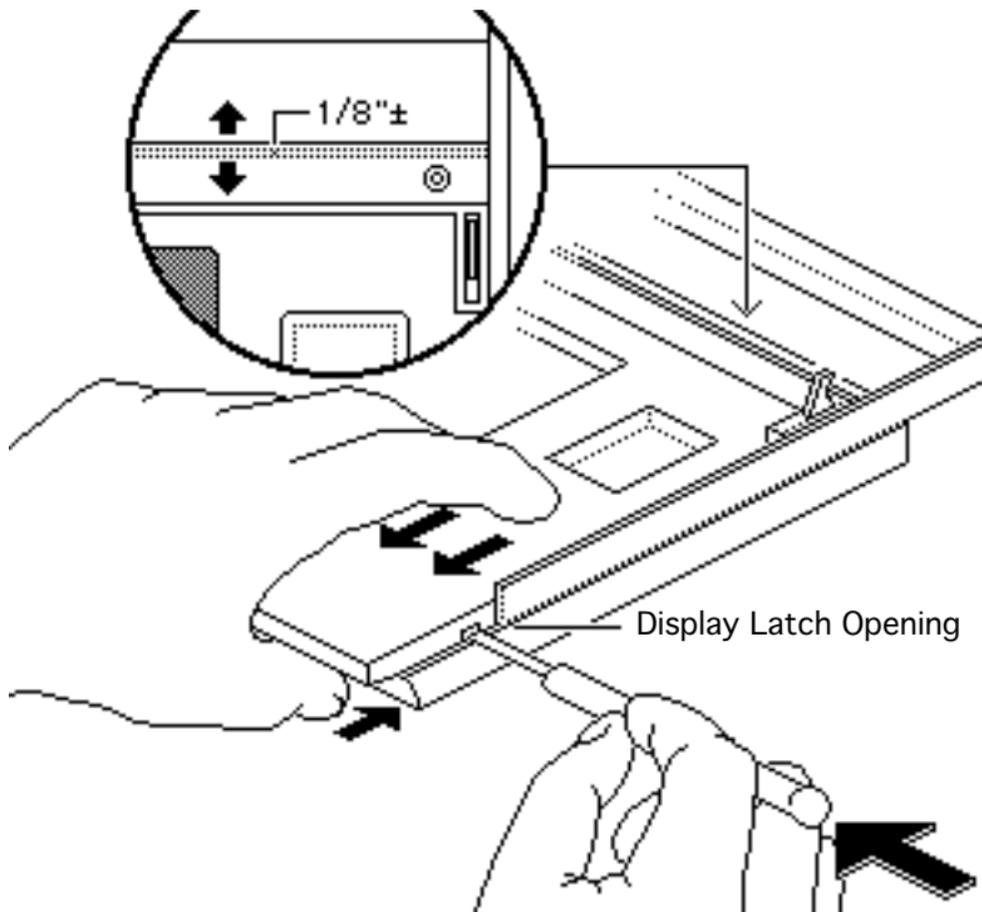
- 2 Remove the two bezel mounting screws, if present.





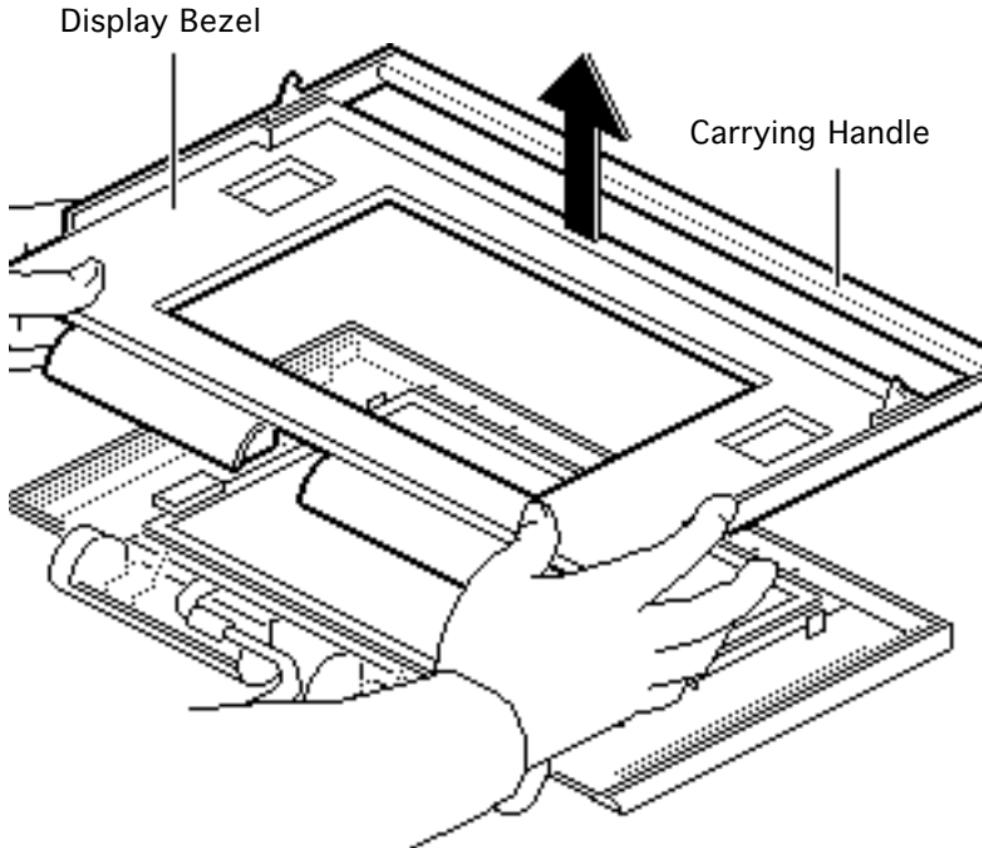
- 3 Turn the opening of the center pivot cover toward the display. Pull the cover from the display housing.





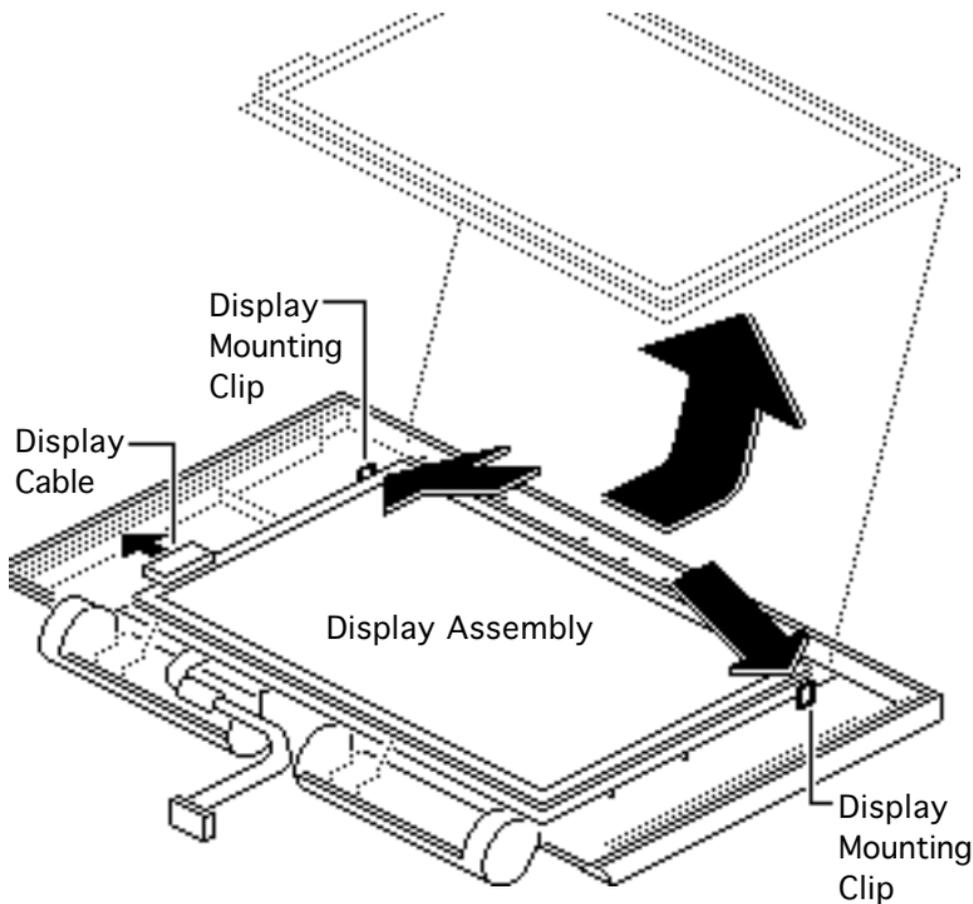
- 4 Insert a jeweler's screwdriver into the display latch opening on the right side of the display housing. Push the screwdriver into the opening until you hear a click.
- 5 Pull the display bezel toward you with your fingers while you push the display housing with your thumb. The two parts separate about  $1/8$  inch.
- 6 Repeat for the left side.





- 7 Lift the display bezel and the carrying handle off the display housing.





- 8 Disconnect the display cable.
- 9 Pull out the two display mounting clips with your thumbs and lift the display with your index fingers.
- 10 Slide the display up and out of the housing.

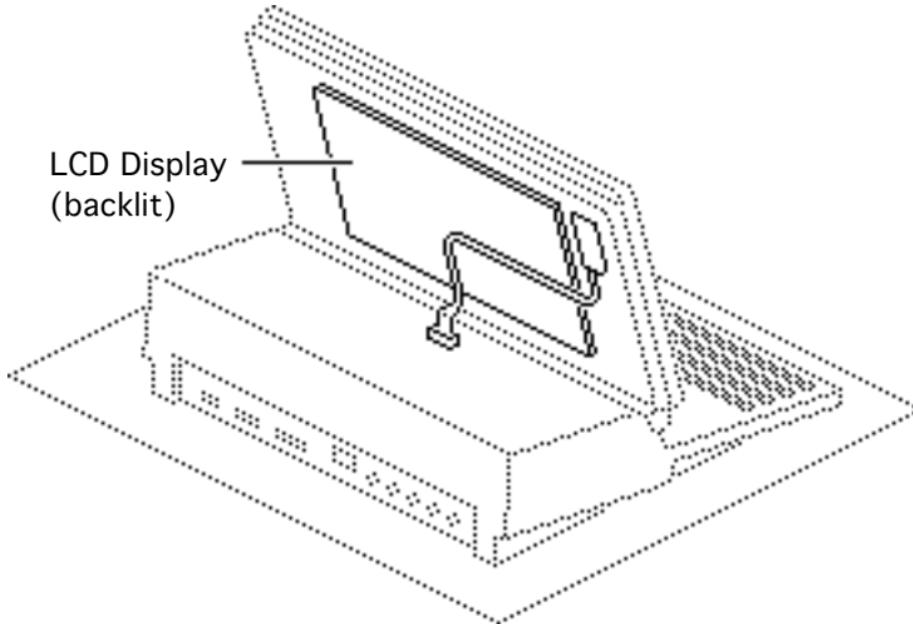




## LCD Display (Backlit)

Before you begin, remove the following:

- Rear cover
- Main battery
- Keyboard cover
- Display assembly





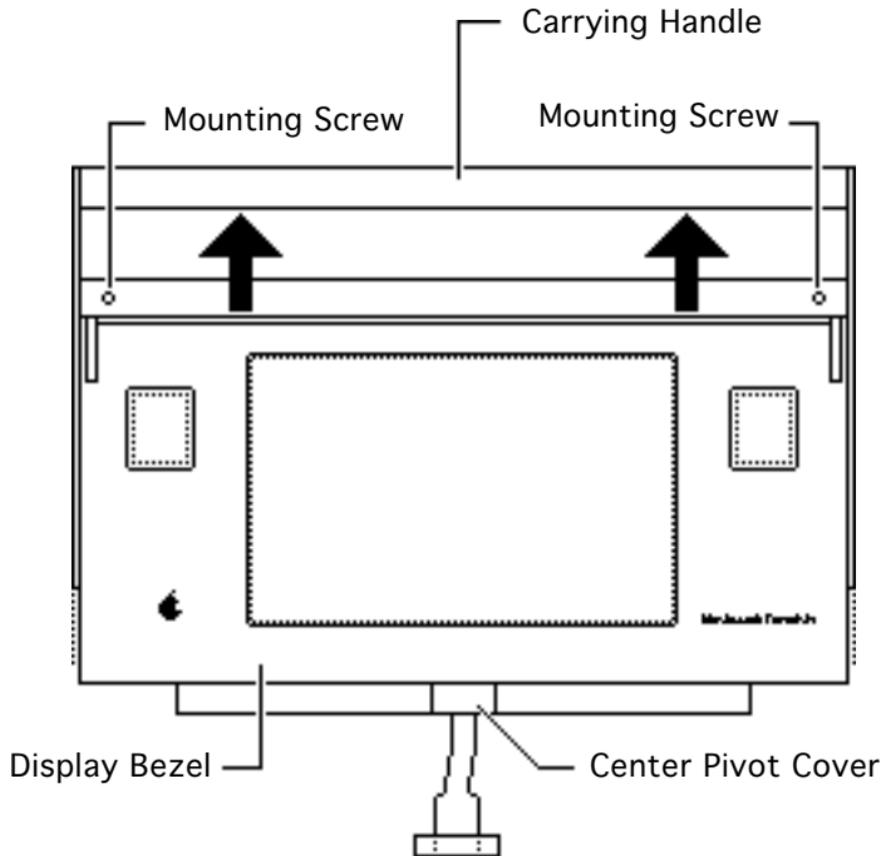
**Caution:** The LCD display is extremely susceptible to ESD damage. Review the ESD precautions in Bulletins/ Safety. Handle the display by the edges and do not touch the component side or remove the tape.





**Caution:** Remember to replace the battery cover after removing the main battery. Failure to reinstall the cover leaves power connected to the logic board. Removing and replacing modules with power available could damage any modules.



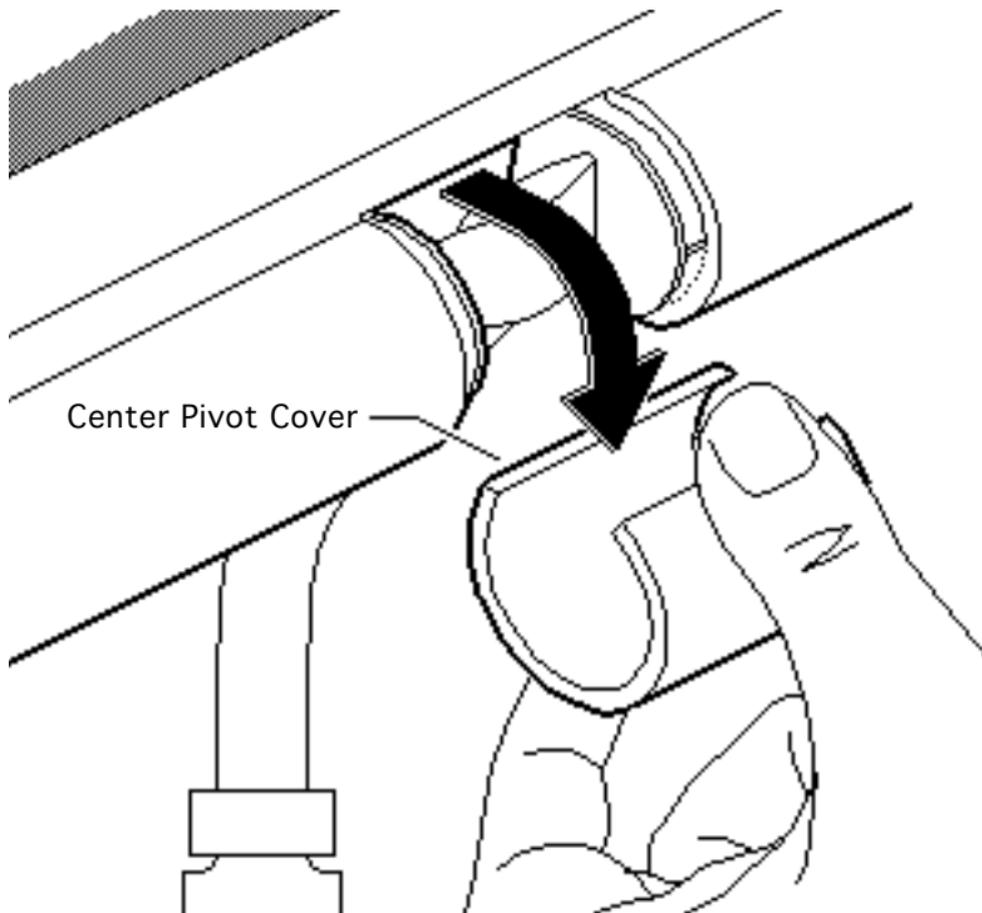


- 1 Slide the carrying handle from the display to its fully extended position.

**Note:** Later model Portables and replacement displays have two Phillips screws securing the bezel to the housing.

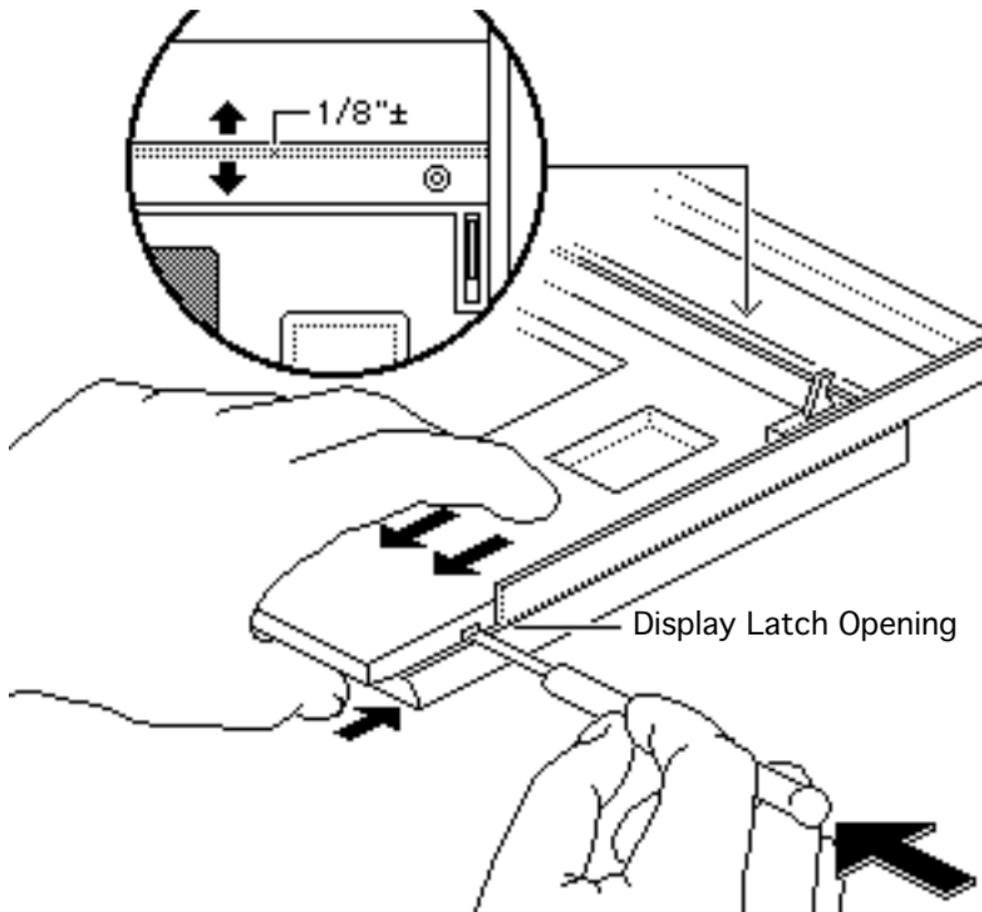
- 2 Remove the two bezel mounting screws, if present.





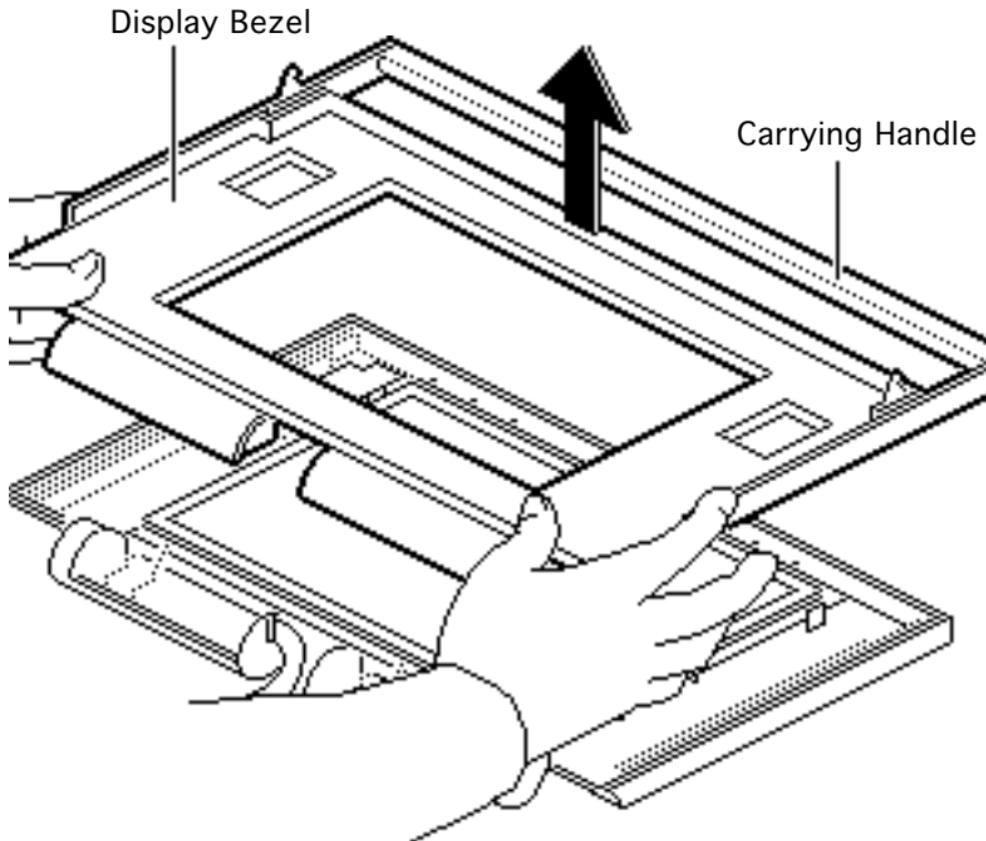
- 3 Turn the opening of the center pivot cover toward the display. Pull the cover from the display housing.





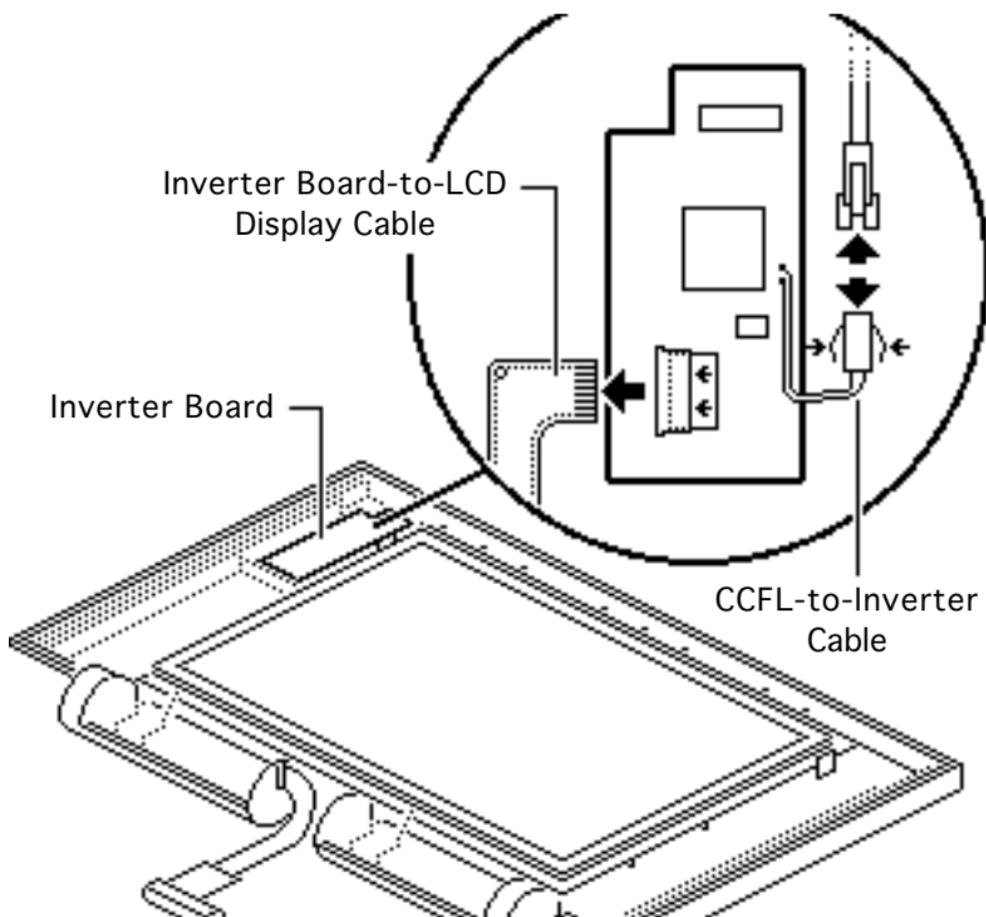
- 4 Insert a jeweler's screwdriver into the display latch opening on the right side of the display housing. Push the screwdriver into the opening until you hear a click.
- 5 Pull the display bezel toward you with your fingers while you push the display housing with your thumb. The two parts separate about 1/8 inch.
- 6 Repeat for the left side.





- 7 Lift the display bezel and the carrying handle off the display housing.

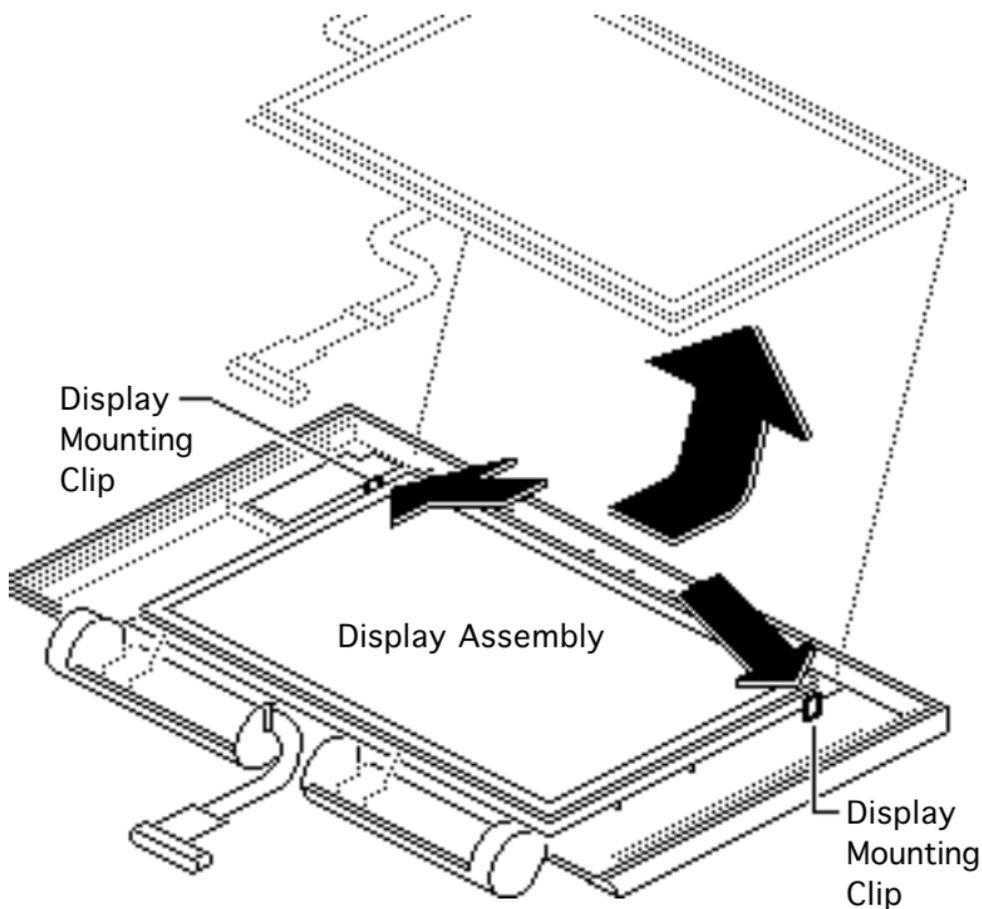




- 8 Press the tab and disconnect the CCFL-to-inverter cable.
- 9 Slide out the release latch and remove the cable that connects the inverter board to the LCD display.
- 10 **Note:** Skip this step if you are replacing only the display.

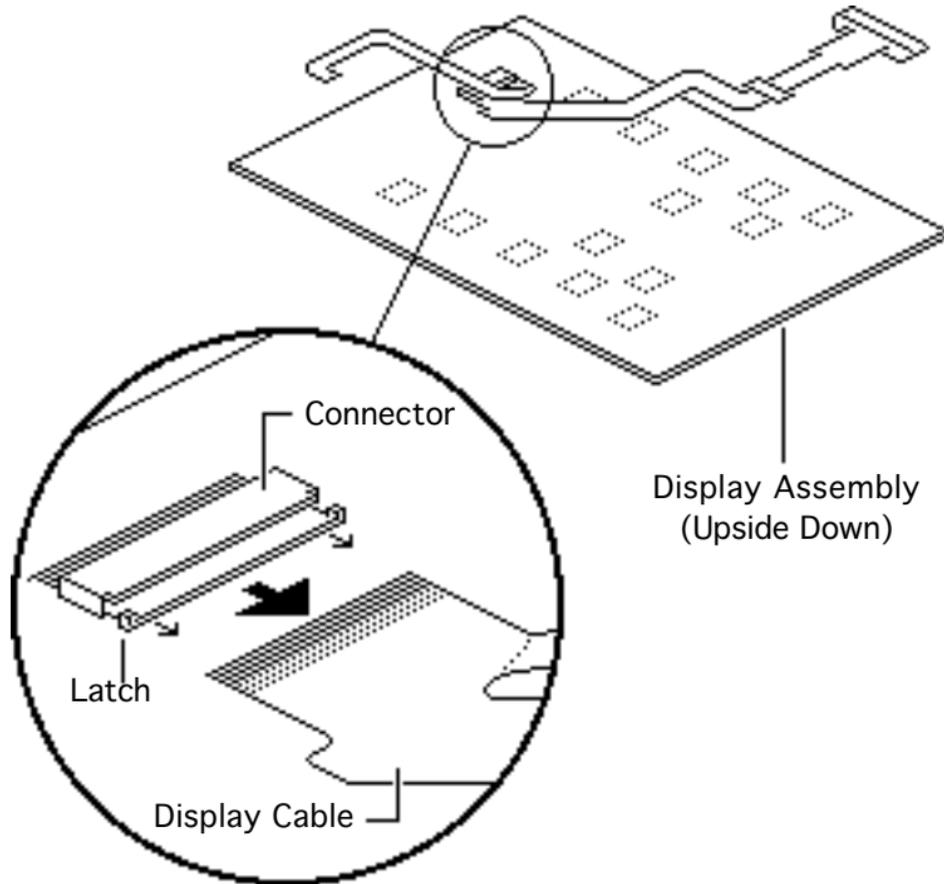
Using a jeweler's screwdriver, gently pry the inverter board from the display housing.





- 11 Pull out the two display mounting clips with your thumbs and lift the display with your index fingers.
- 12 Slide the display up and out of the housing.





13 Turn over the display assembly.

14 Slide out the release latch and remove the display cable from the connector.

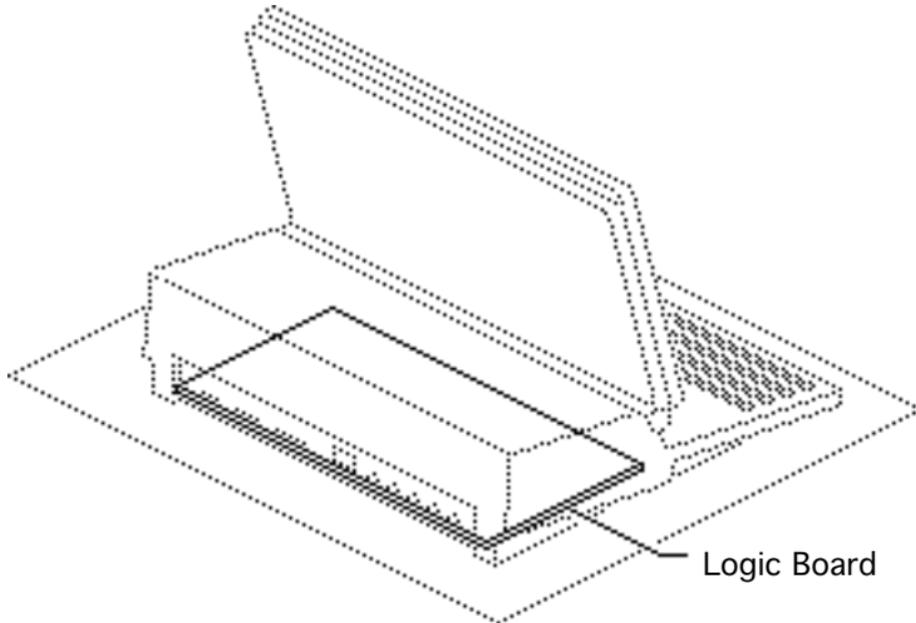




## Logic Board

Before you begin, remove the following:

- Rear cover
- Main battery
- Keyboard cover
- Display assembly
- Keyboard
- Trackball/numeric keypad
- All option cards



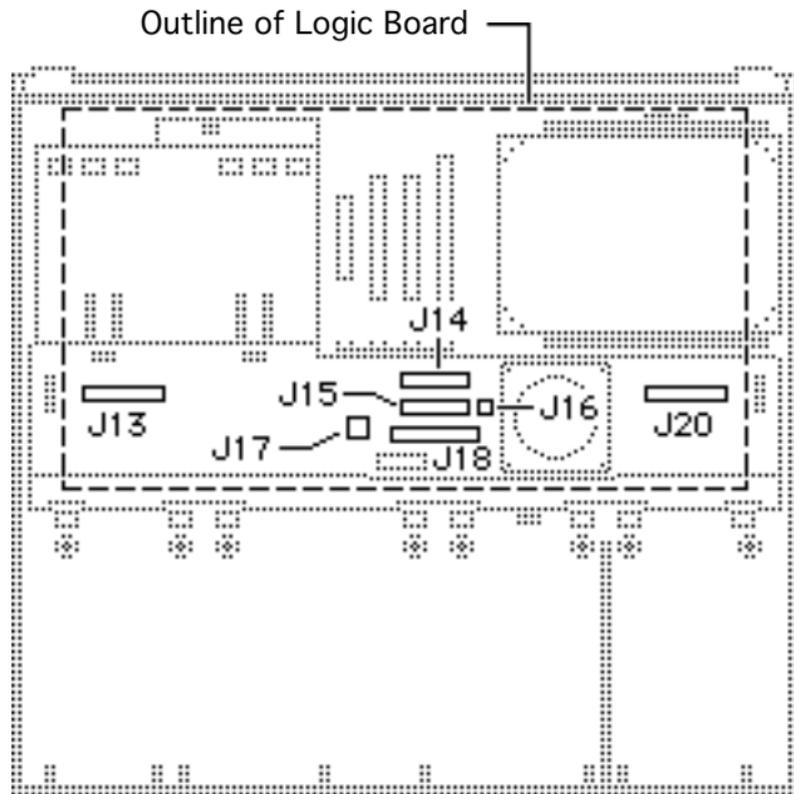
**Caution:** Review the ESD precautions in Bulletins/Safety.





**Caution:** Remember to replace the battery cover after removing the main battery. Failure to reinstall the cover leaves power connected to the logic board. Removing and replacing modules with power available could damage any modules.

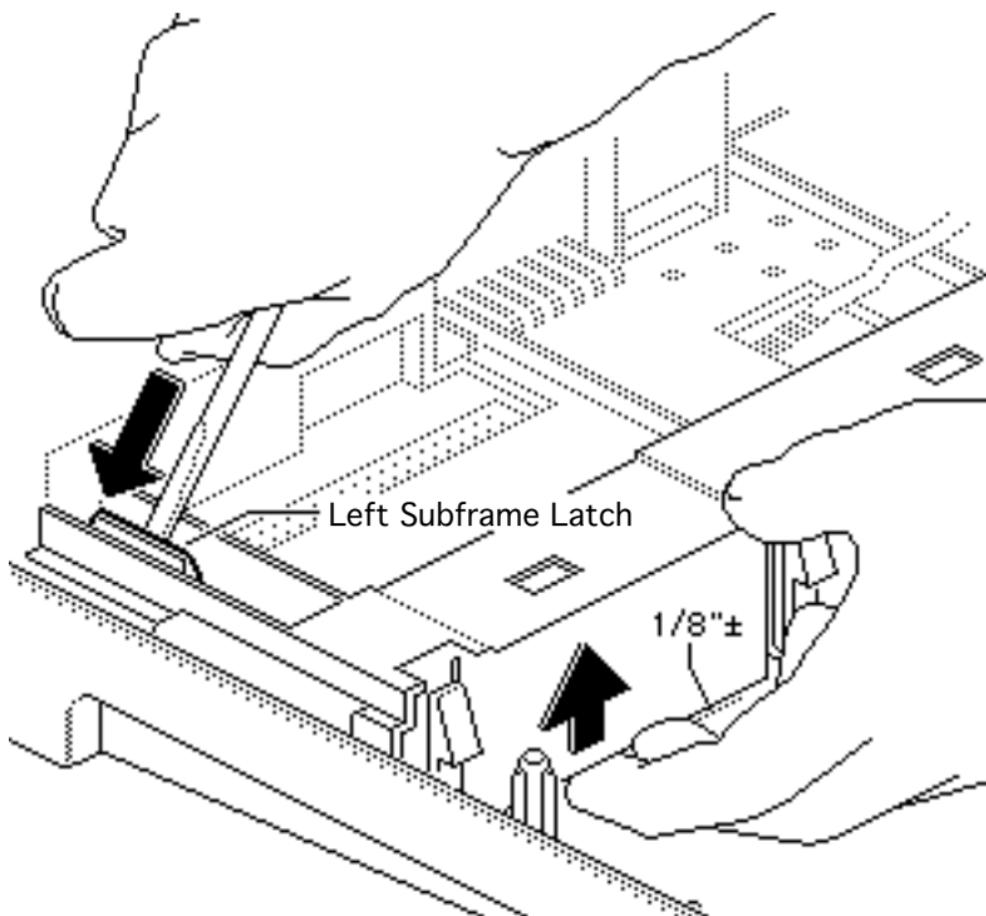




1 Disconnect the following cable connectors from the logic board:

- Input device cable from J13
- Input device cable from J20
- Battery cable from J17
- Hard drive cable from J18
- Lower floppy drive cable from J14
- Upper floppy drive cable from J15
- Speaker cable from J16

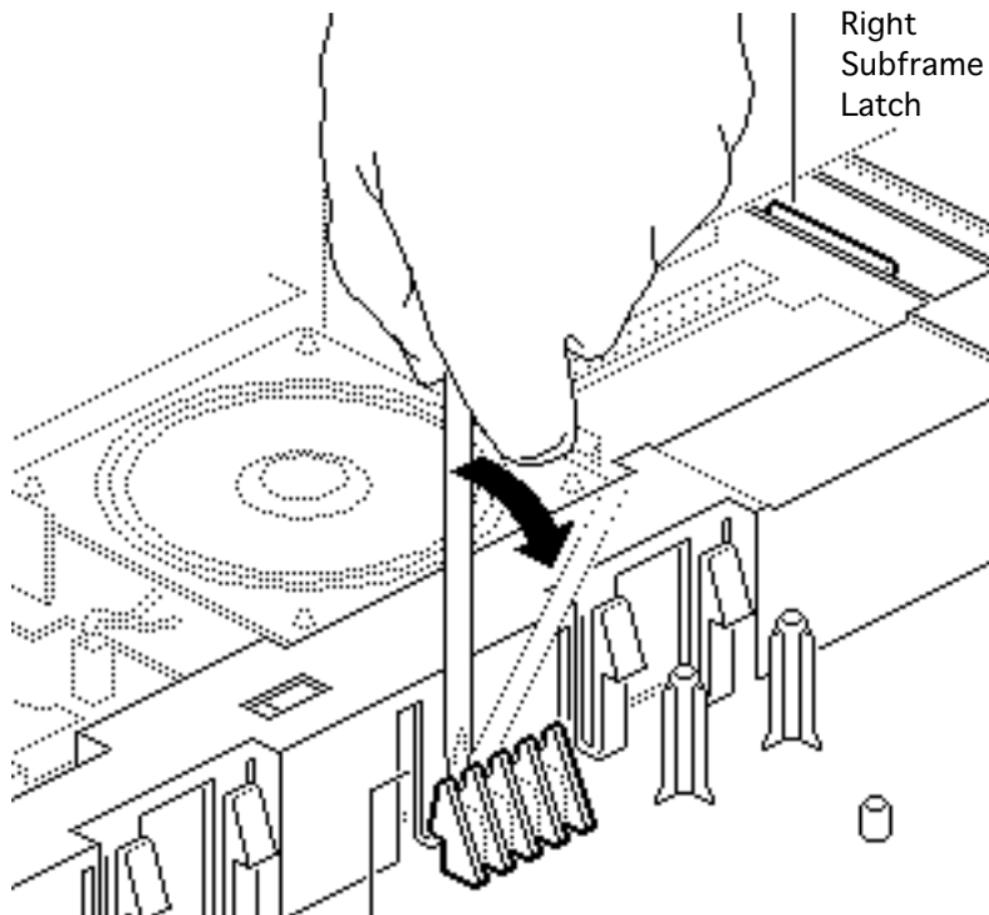




**Caution:** Do not lift the subframe too far. Lifting too far puts excess strain on the subframe and logic board and could damage both.

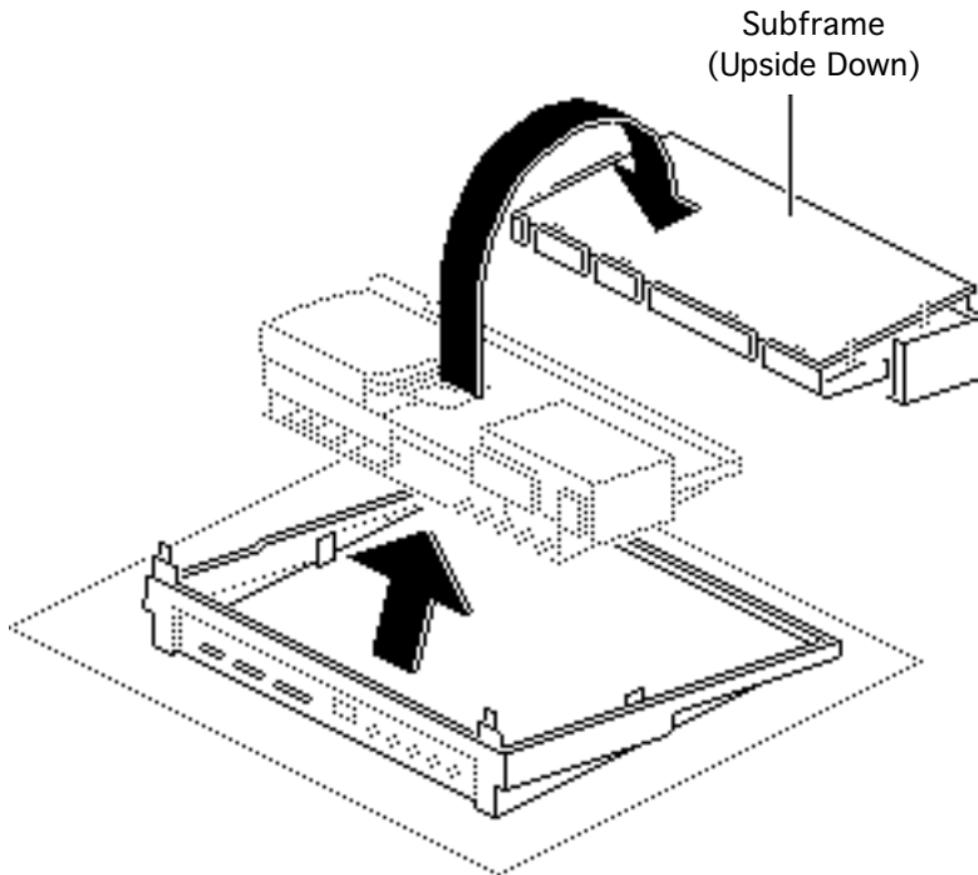
- 2 Using a flat-blade screwdriver, pull the latch from the subframe. When the latch is clear, lift the left side of the frame.





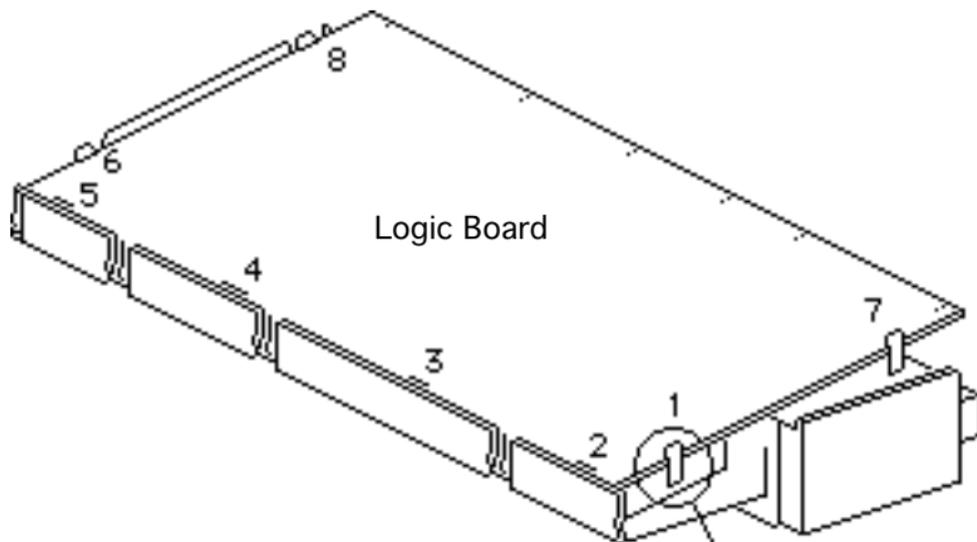
- 3 Hold the left side of the subframe up—far enough to keep it from being held by the clip—and press in the clip at the right front of the subframe. Lift the subframe a little further.
- 4 Using a flat-blade screwdriver, release the plastic latch at the right side of the subframe.





- 5 To remove the subframe from the bottom case, lift the front of the subframe and pull it toward you.
- 6 Place the subframe upside down.





- 7 Release each of the plastic clips that secure the logic board to the subframe. Release the clips in the order shown. As you release each clip, gently lift the logic board and proceed to the next clip.
- 8 Remove the logic board from the subframe.

Typical Securing Clip





Upgrades

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Macintosh Portable



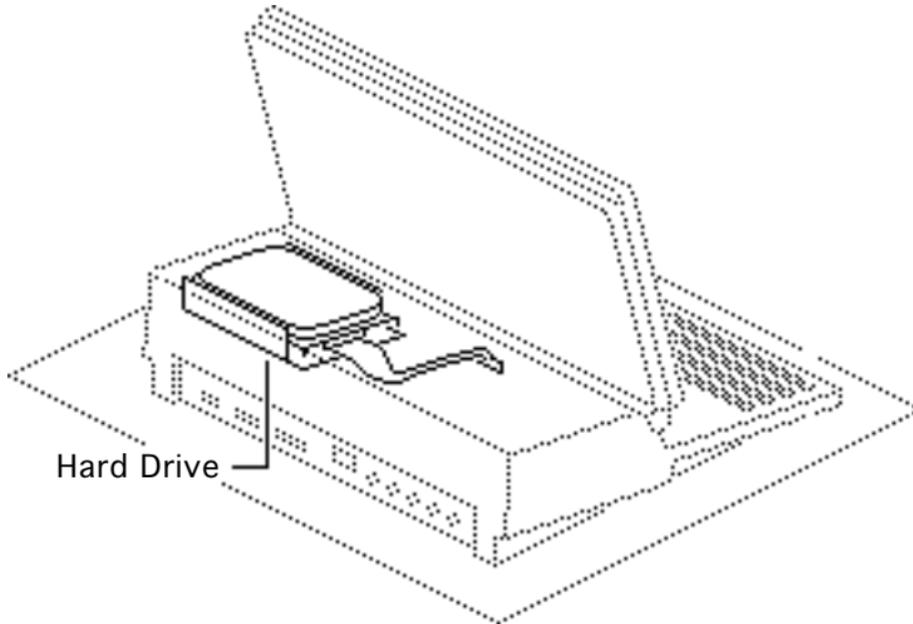


## Hard Drive Installation

Before you begin, do the following:

- Disconnect the power adapter
- Remove the rear cover
- Remove the main battery
- Remove the keyboard cover
- Remove any option cards

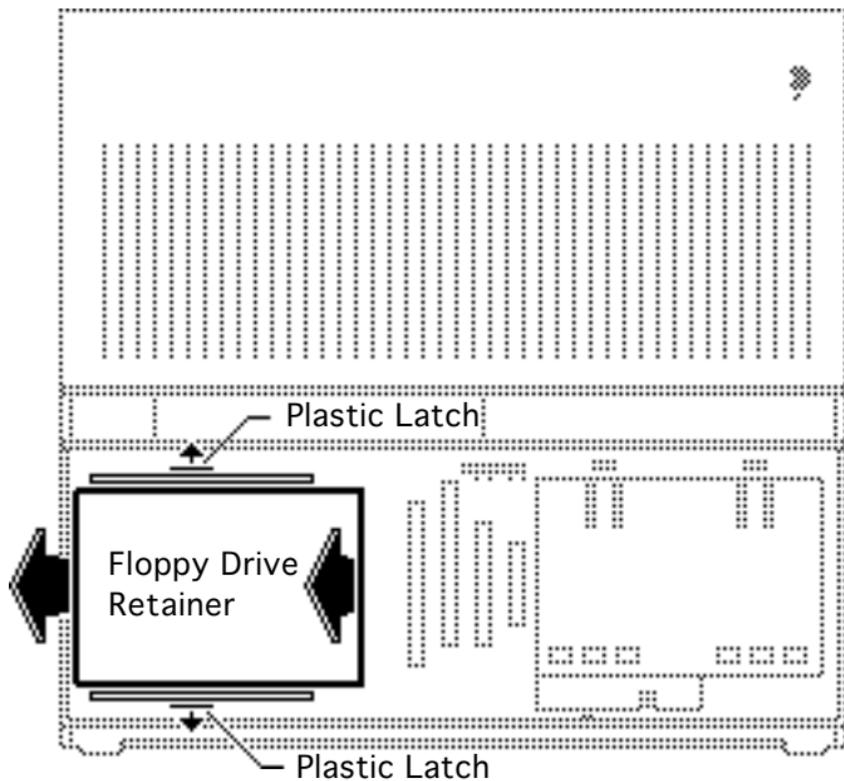
**Caution:** Review the ESD precautions in Bulletins/ Safety.





**Caution:** Remember to replace the battery cover after removing the main battery. Failure to reinstall the cover leaves power connected to the logic board. Removing and replacing modules with power available could damage new and old modules.

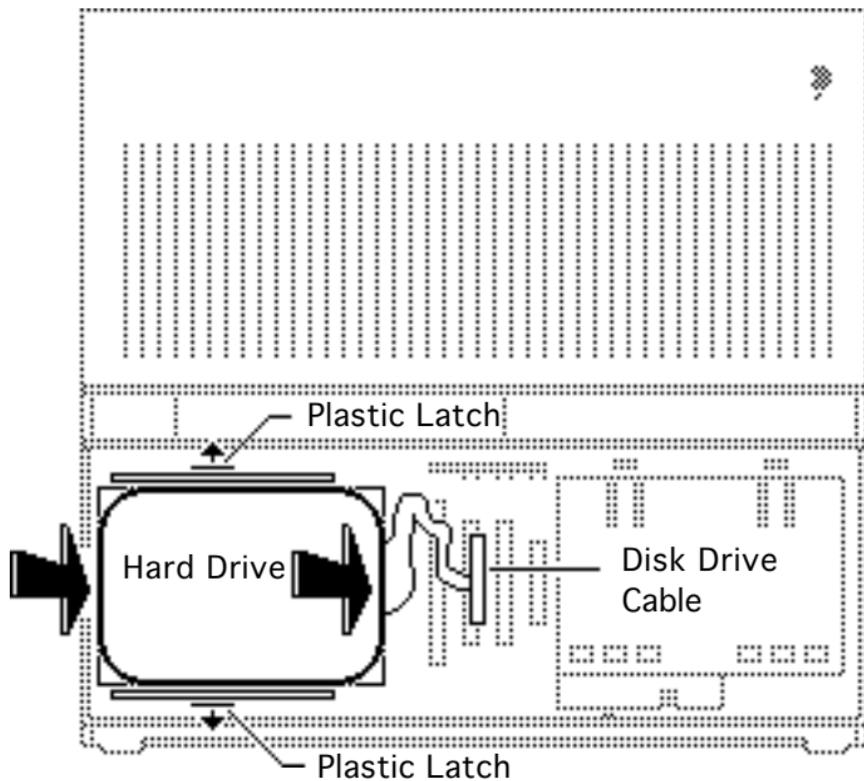




**Note:** The minimum configuration of the Macintosh Portable includes a single internal floppy drive. The Portable can be upgraded to include an internal 40 MB hard drive. This procedure covers the installation and verification of the hard drive. For further information, see “Hard Drive” in the Troubleshooting chapter.

- 1 Release the two plastic latches and remove the floppy drive retainer from the subframe.





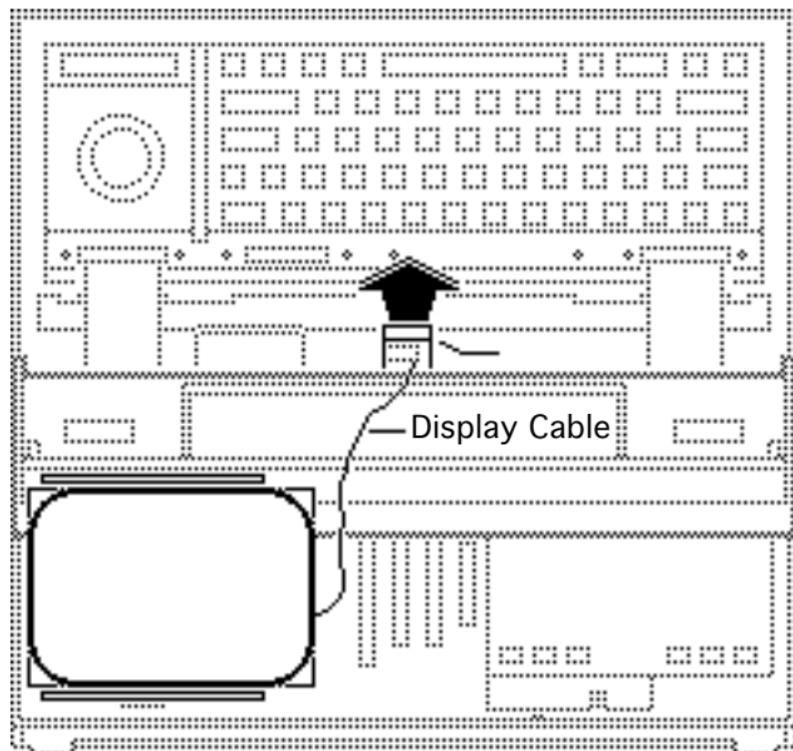
- 2 Lower the hard drive into the subframe. Align the four metal tabs and press down until the plastic latches at the front and rear snap into place.

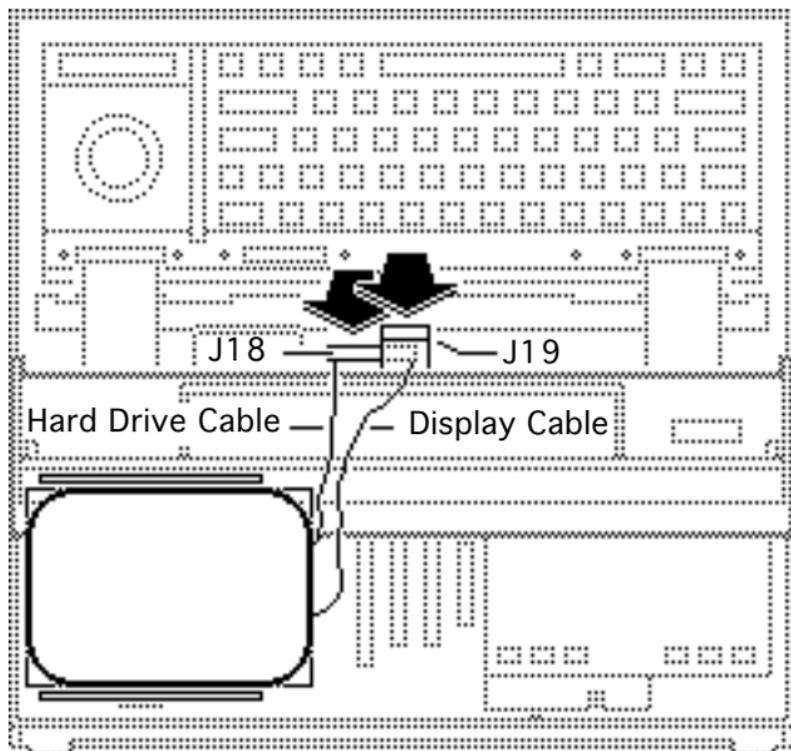
**Caution:** Make sure the disk drive cable does not catch under the metal disk drive bracket. The bracket can damage the cable.





- 3 Disconnect the display cable from logic board connector J19.





- 4 Slide the hard drive cable through the opening under the display assembly.
- 5 Connect the hard drive cable to logic board connector J18.
- 6 Connect the display cable to logic board connector J19.
- 7 Run Macintosh Hard Disk Test (version 1.0 or later) on the new drive.



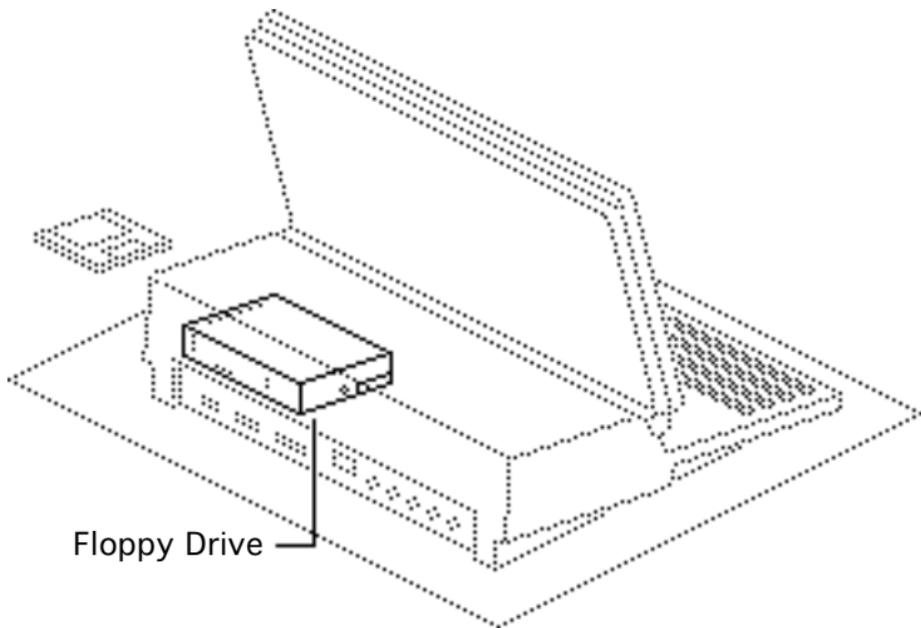


## Floppy Drive Installation

Before you begin, remove the following:

- Rear cover
- Main battery
- Keyboard cover
- All option cards

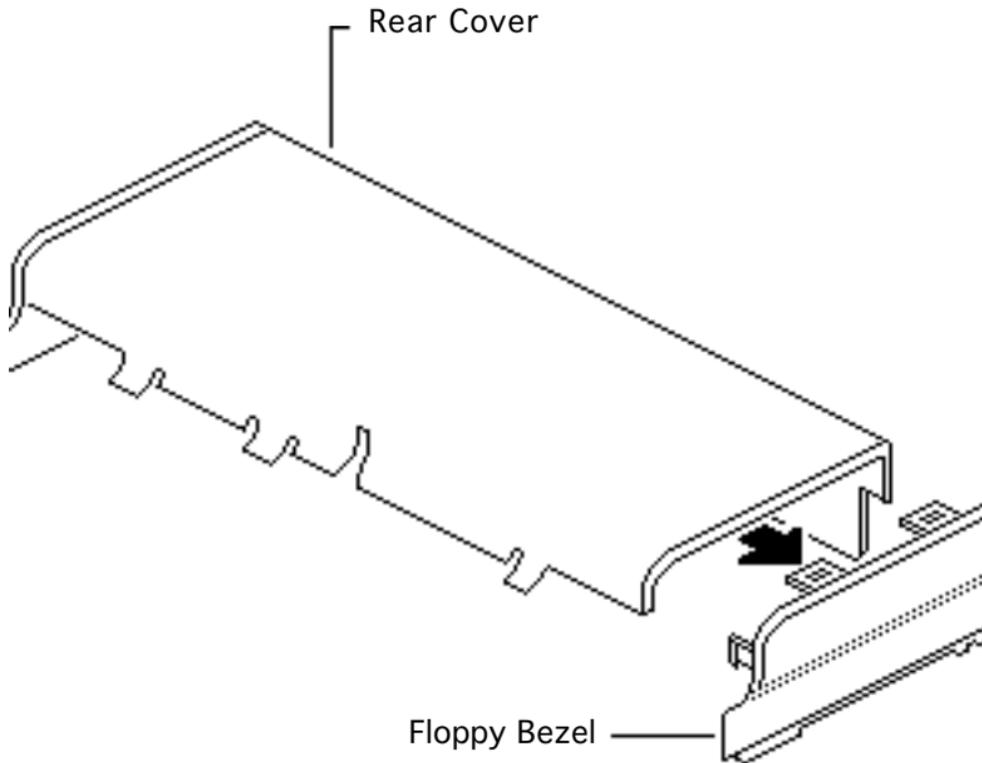
**Caution:** Review the ESD precautions in Bulletins/ Safety.





**Caution:** Remember to replace the battery cover after removing the main battery. Failure to reinstall the cover leaves power connected to the logic board. Removing and replacing modules with power available could damage new and old modules.





**Note:** The minimum configuration of the Macintosh Portable includes a single internal floppy drive. The Portable can be upgraded to include a second internal floppy drive. This procedure covers the installation and verification of the new floppy drive. For further information, see “Floppy Drive” in the Troubleshooting chapter.

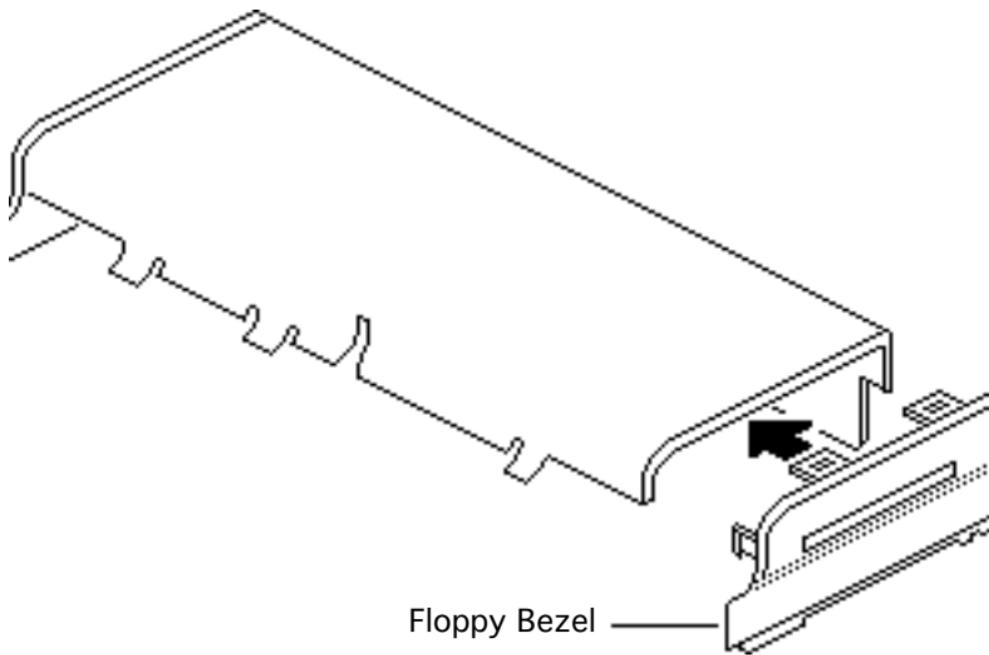
- 1 Release the four plastic snaps in order, and remove the standard floppy bezel from the





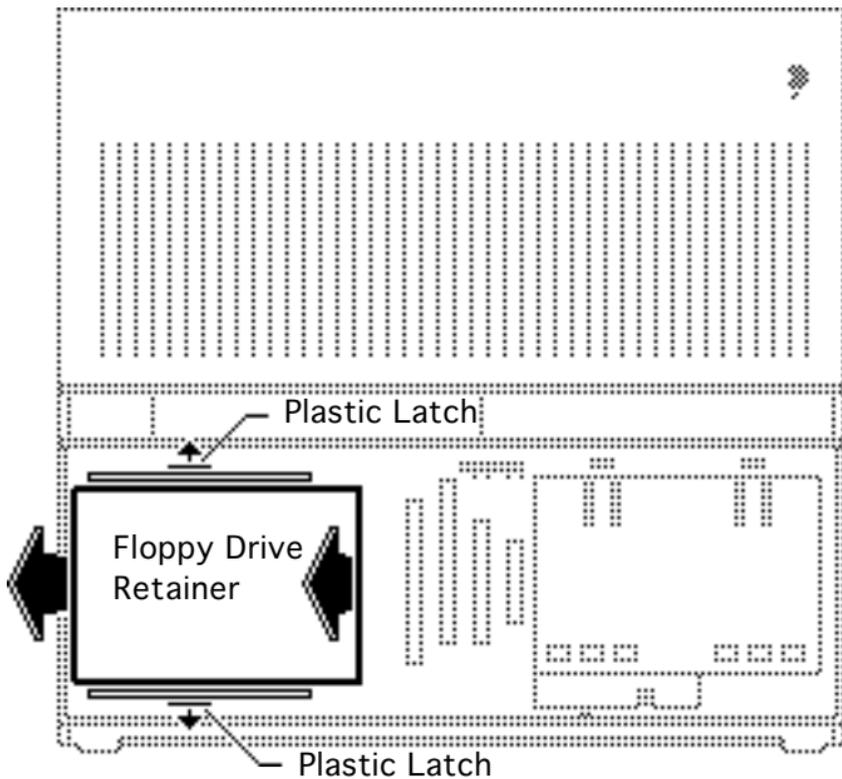
rear cover.

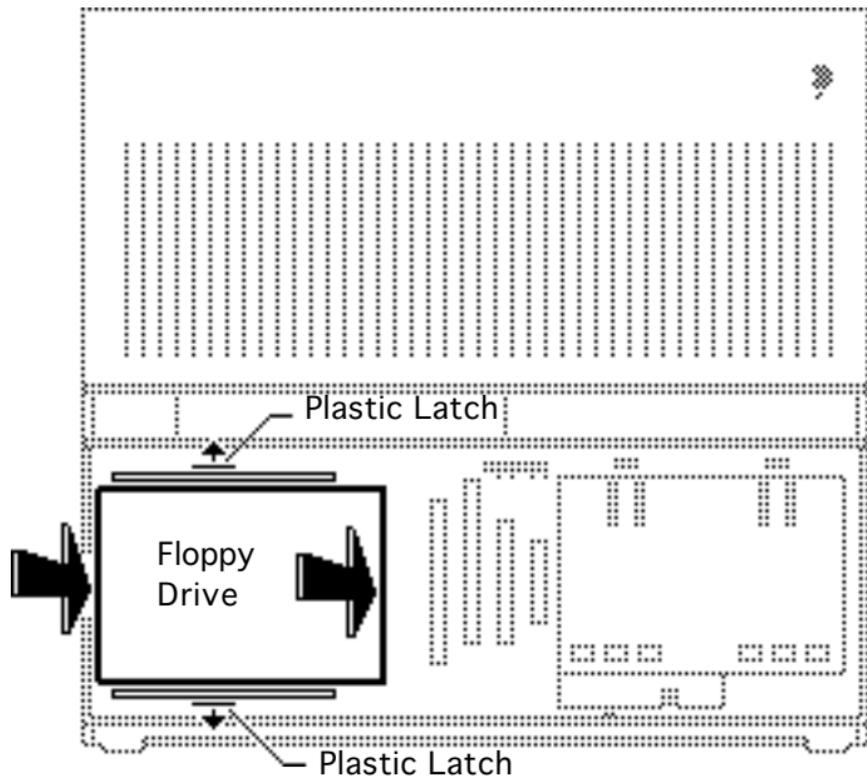
- 2 Install new floppy bezel.





- 3 Release the two plastic latches and remove the floppy drive retainer from the subframe.



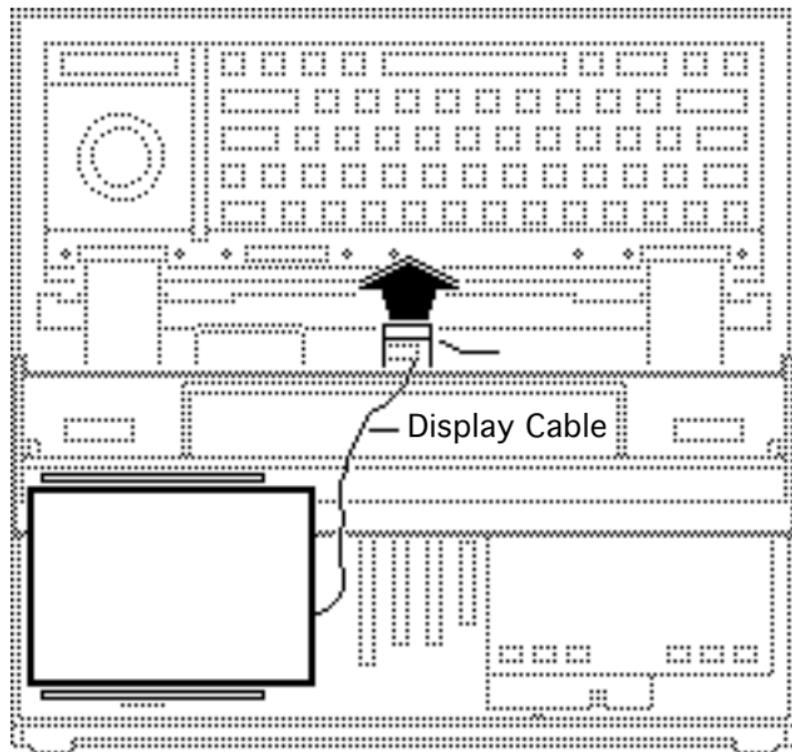


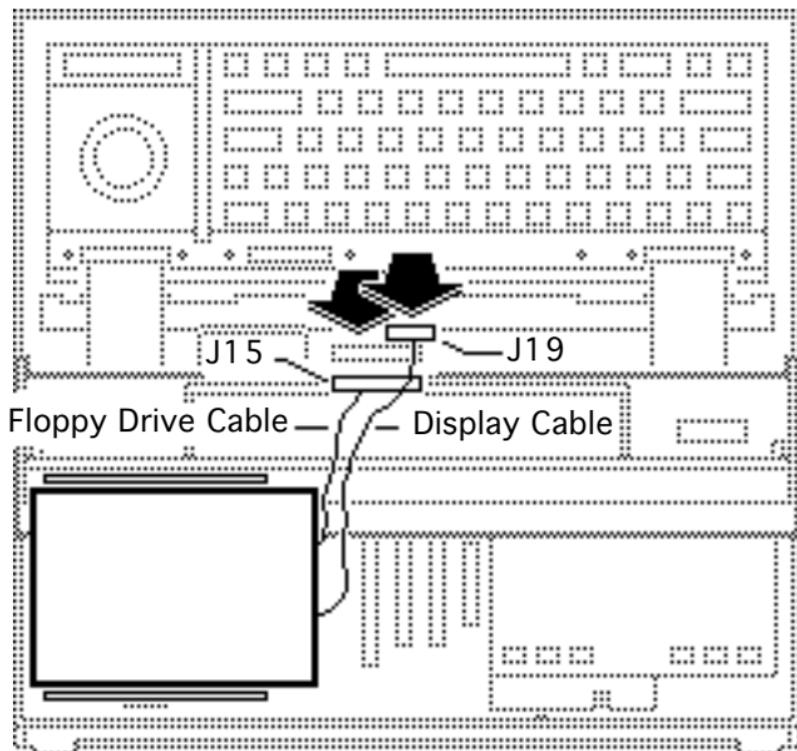
- 4 Place the floppy drive into the floppy drive retainer.
- 5 Lower the retainer with the floppy drive into the subframe. Align the four metal tabs and press down until the plastic latches at the front and rear snap into place.





- 6 Disconnect the display cable from logic board connector J19.



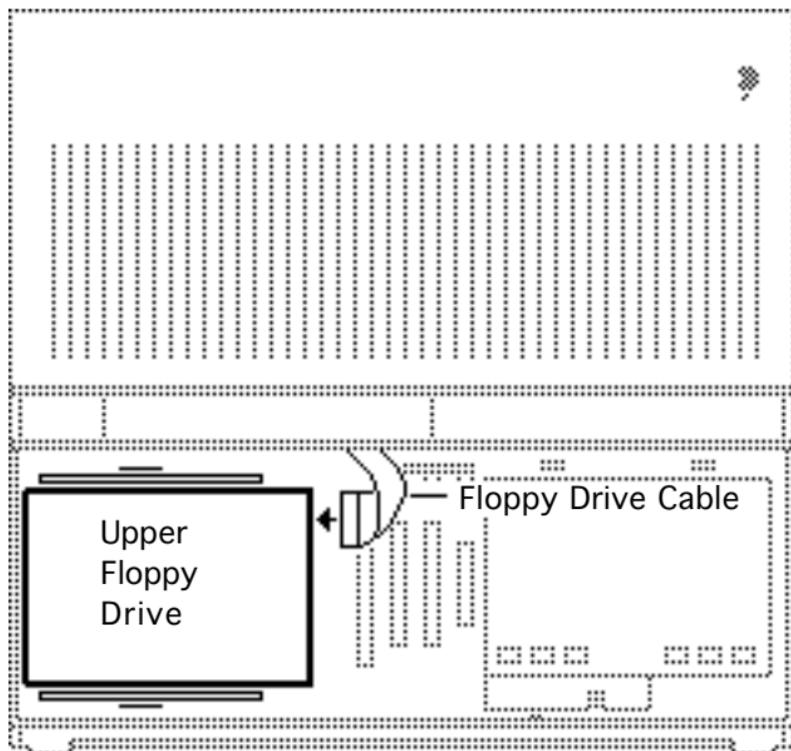


- 7 Slide the floppy drive cable through the opening under the display assembly.
- 8 Connect the floppy drive cable to logic board connector J15.
- 9 Connect the display cable to logic board connector J19.





- 10 Connect the other end of the floppy drive cable to the upper floppy drive.



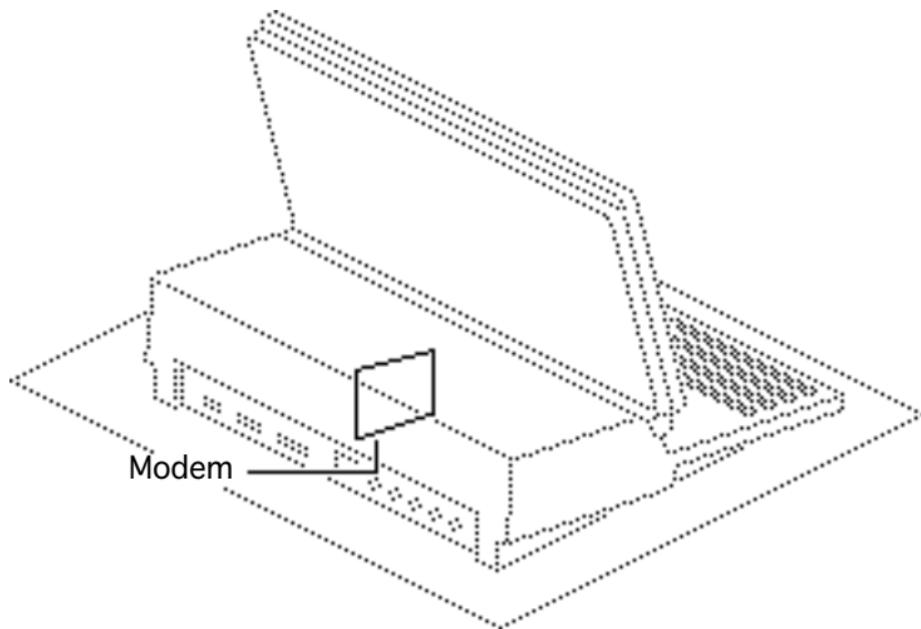


## Modem Installation

Before you begin, do the following:

- Disconnect the power adapter
- Remove the rear cover
- Remove the main battery

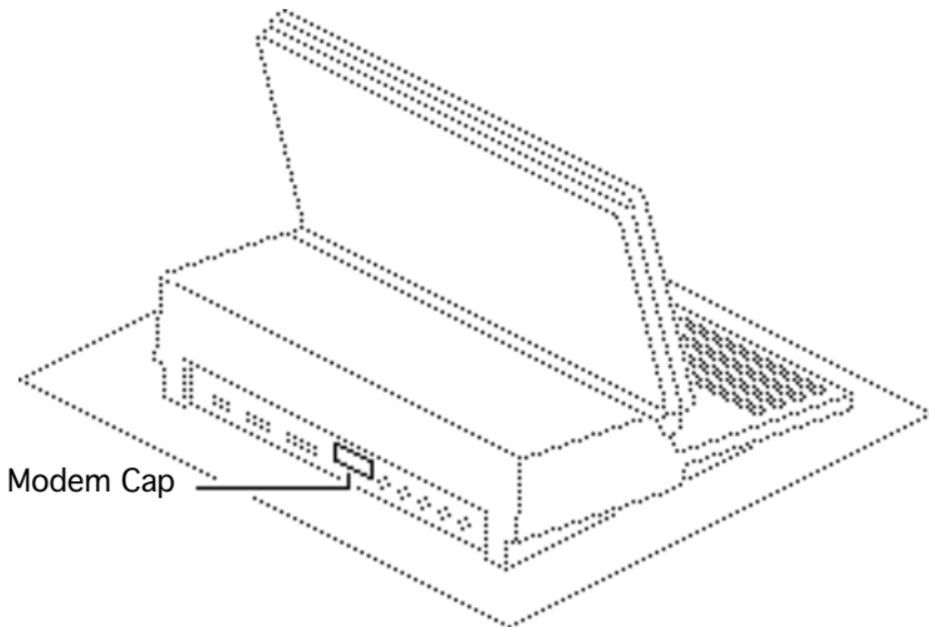
**Caution:** Review the ESD precautions in Bulletins/ Safety.





**Caution:** Remember to replace the battery cover after removing the main battery. Failure to reinstall the cover leaves power connected to the logic board. Removing and replacing modules with power available could damage new and old modules.





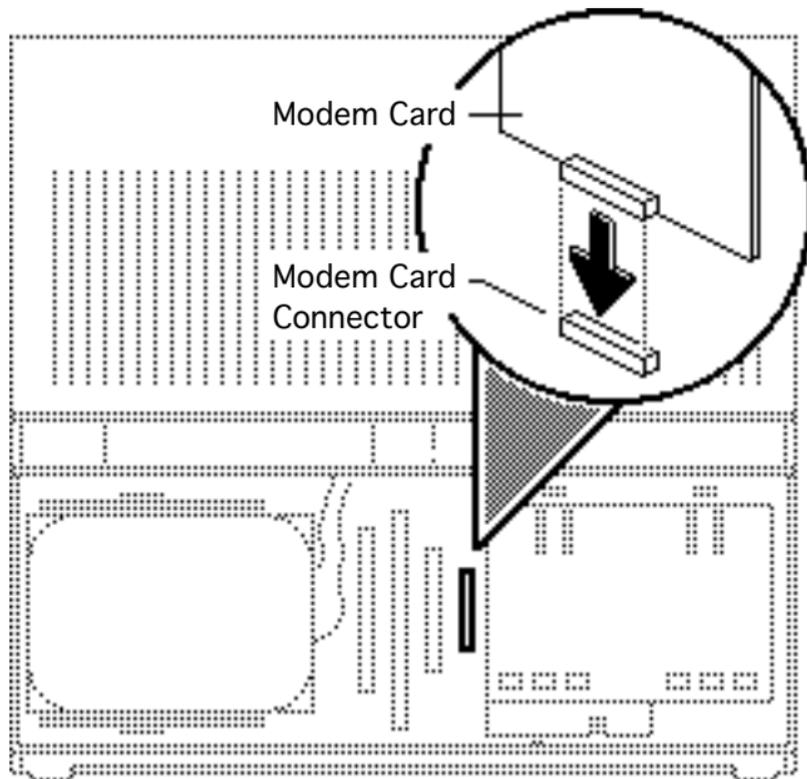
**Note:** The Macintosh Portable has an option for an internal 2400-baud modem. This procedure covers the installation and verification of the new modem. See “Internal Modem” in the Troubleshooting chapter for further information.

- 1 Push the modem cap through the rear of the computer.





- 2 Plug the modem card into the modem card connector.
- 3 Run Modem Test to verify the installation and operation of the modem. Launch AppleLink to verify operation of the modem with the telephone network.



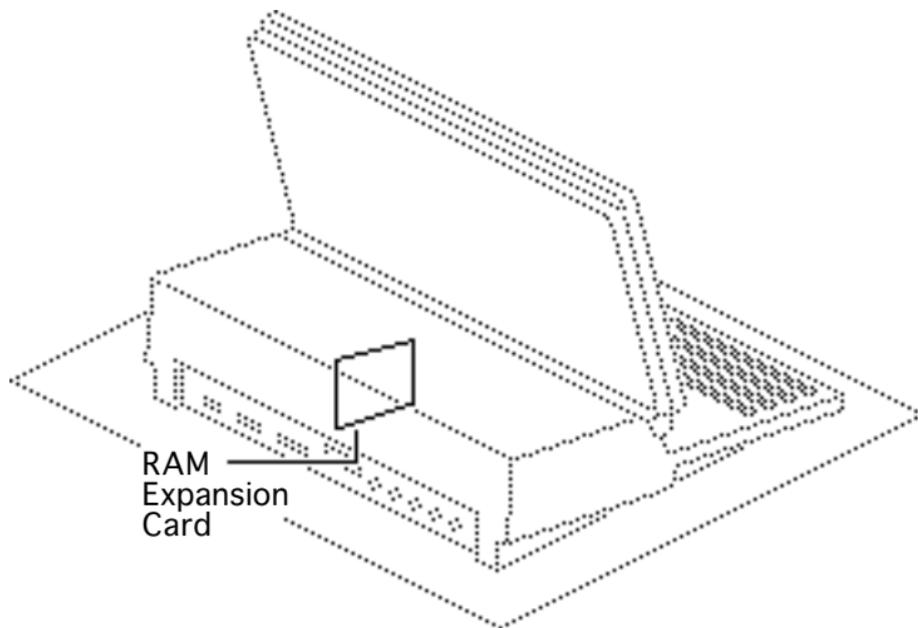


## RAM Expansion

Before you begin, remove the following:

- Rear cover
- Main battery

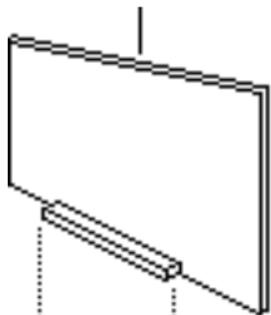
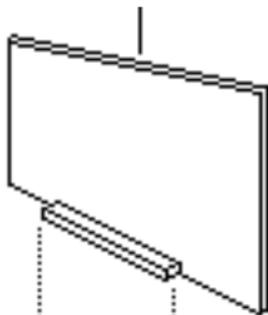
**Caution:** Review the ESD precautions in Bulletins/Safety.





**Caution:** Remember to replace the battery cover after removing the main battery. Failure to reinstall the cover leaves power connected to the logic board. Removing and replacing modules with power available could damage new and old modules.



Pseudostatic RAM  
Expansion CardRAM Connector  
with Notch1 MB RAM  
Expansion CardRAM Connector  
without Notch

**Note:** Static and pseudostatic RAM expansion cards are available for the Macintosh Portable. **Static and pseudostatic RAM cards are not interchangeable.** The 1 MB RAM expansion card must be used with a static RAM logic board; the 1 and 3 MB pseudostatic RAM cards must be used with a pseudostatic RAM logic board.

- 1 Note whether the RAM connector has a notch. If it does, install a pseudostatic RAM card.



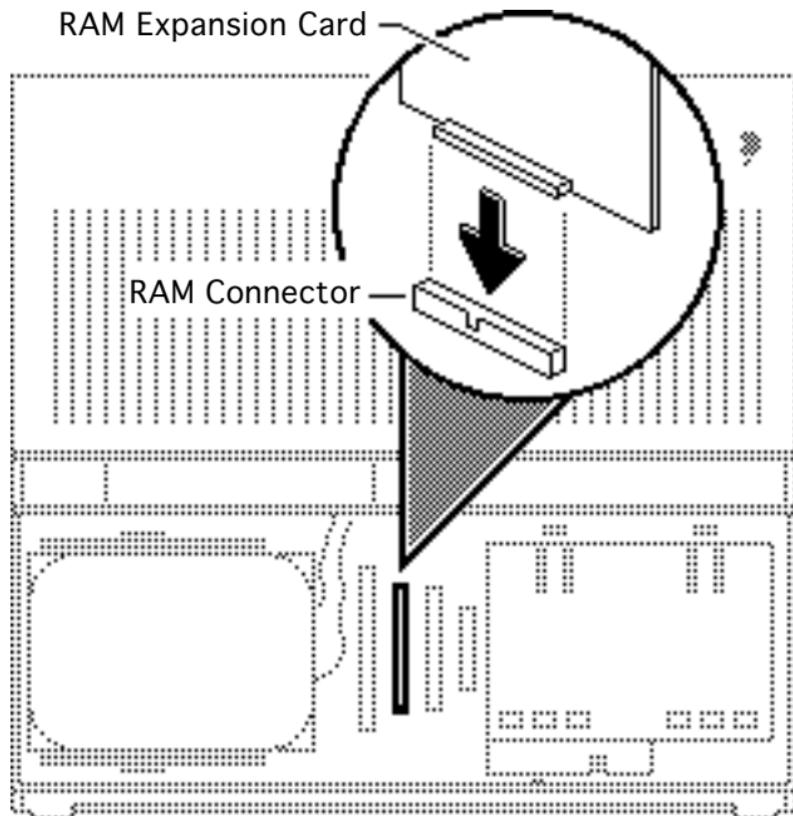


- 2 If the RAM connector does not have a notch, install the 1 MB RAM expansion card.





- 3 Plug the card into the RAM expansion connector.

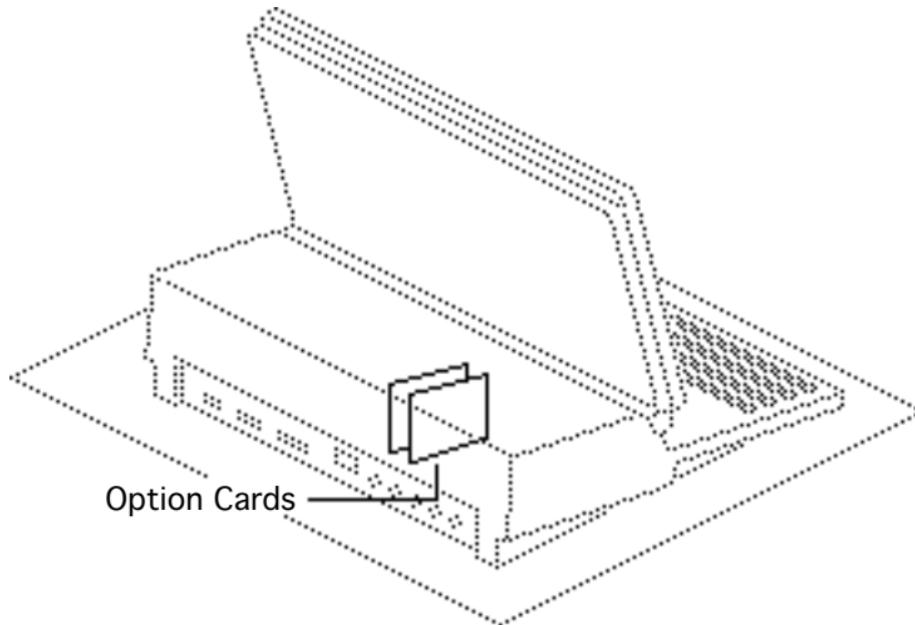




## Option Cards

Before you begin, remove the rear cover.

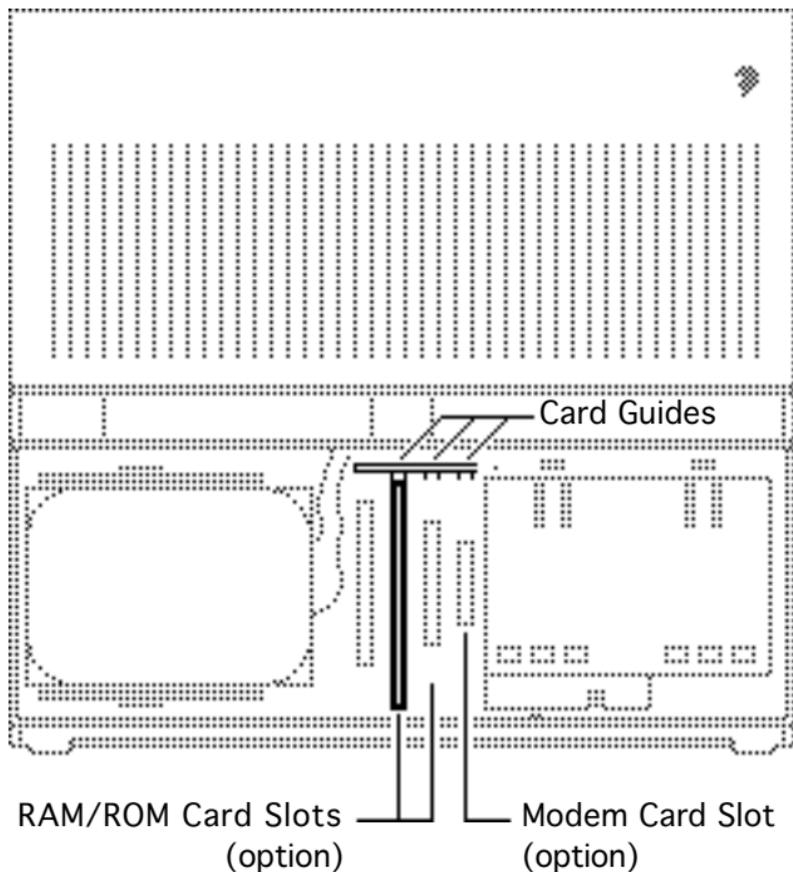
**Caution:** The Macintosh Portable contains CMOS devices that are very susceptible to damage from electrostatic discharge (ESD). Review the ESD precautions in Bulletins/ Safety.





**Caution:** Remember to replace the battery cover after removing the main battery. Failure to reinstall the cover leaves power connected to the logic board. Removing and replacing modules with power available could damage new and old modules.





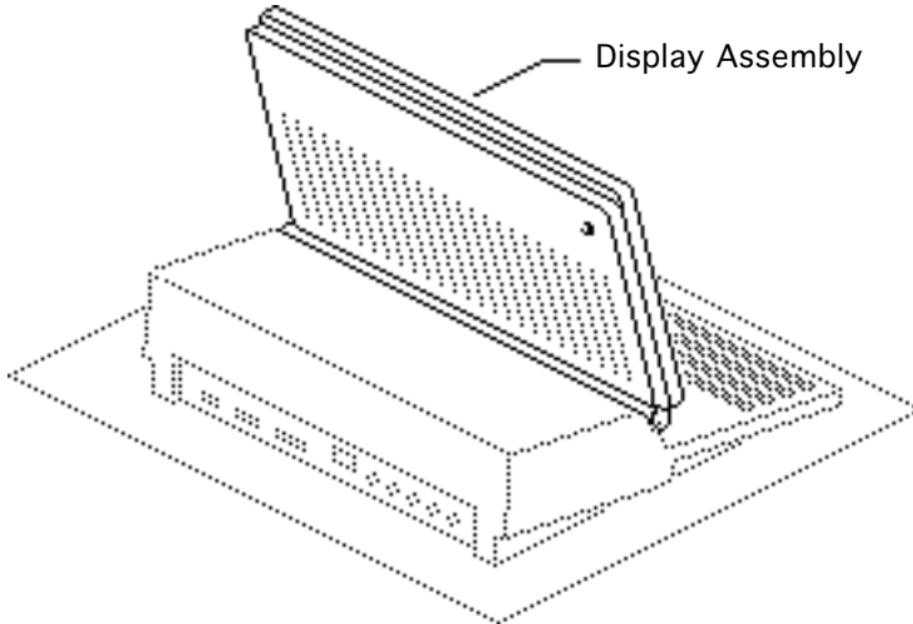
**Caution:** To reduce the possibility of ESD damage, handle the card only by the edges.

Lift the card straight up and out of the computer.





## Backlit Display Upgrade



Before you begin, remove the following:

- Rear cover
- Main battery
- Keyboard cover
- Old LCD display

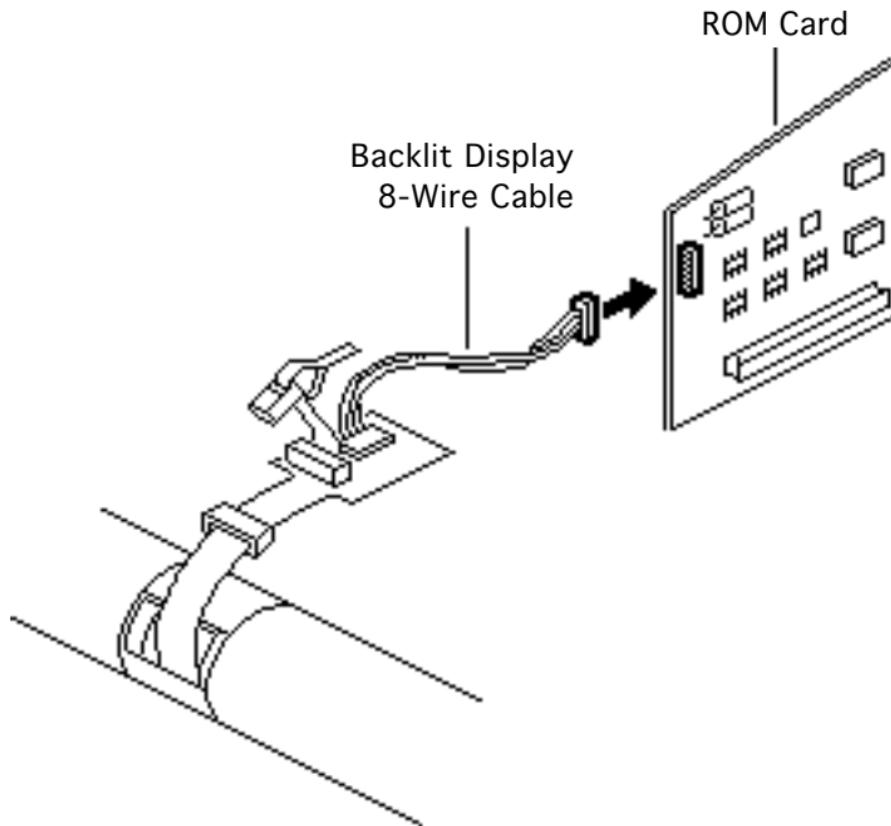
**Caution:** Review the ESD precautions in Bulletins/Safety.





**Caution:** Remember to replace the battery cover after removing the main battery. Failure to reinstall the cover leaves power connected to the logic board. Removing and replacing modules with power available could damage new and old modules.

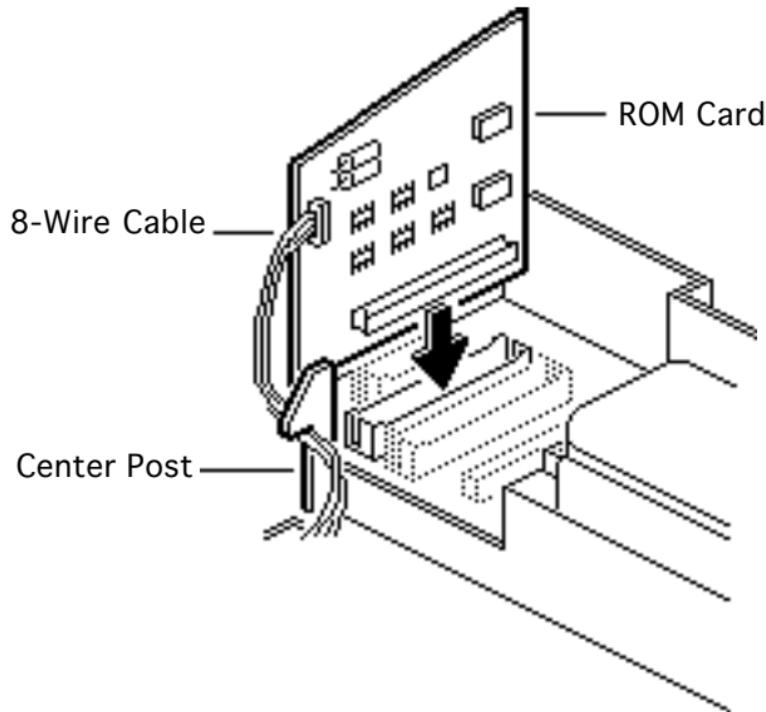




**Caution:** If a RAM disk is present, be sure to save its contents before beginning the backlit display upgrade. Otherwise, the contents of the RAM disk will be lost.

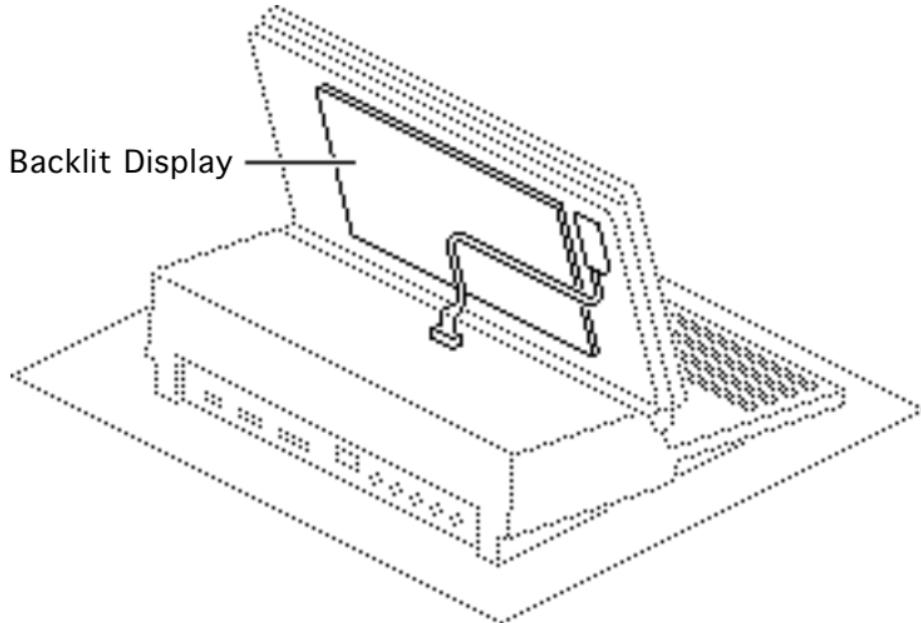
- 1 Connect the backlit display 8-wire cable to the ROM card.





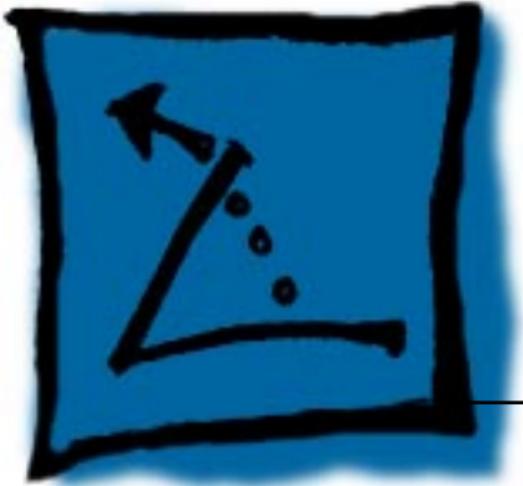
- 2 Insert the ROM card into the ROM slot at the back of the logic board. The card fits only one way—with the connector facing forward.
- 3 Wrap the 8-wire cable around the front of the center post.





- 4 Install the new backlit display. See “LCD Display (Backlit)” in the Take Apart chapter.
- 5 If necessary, install system software version 6.0.5 or later.





## Additional Procedures

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Macintosh Portable



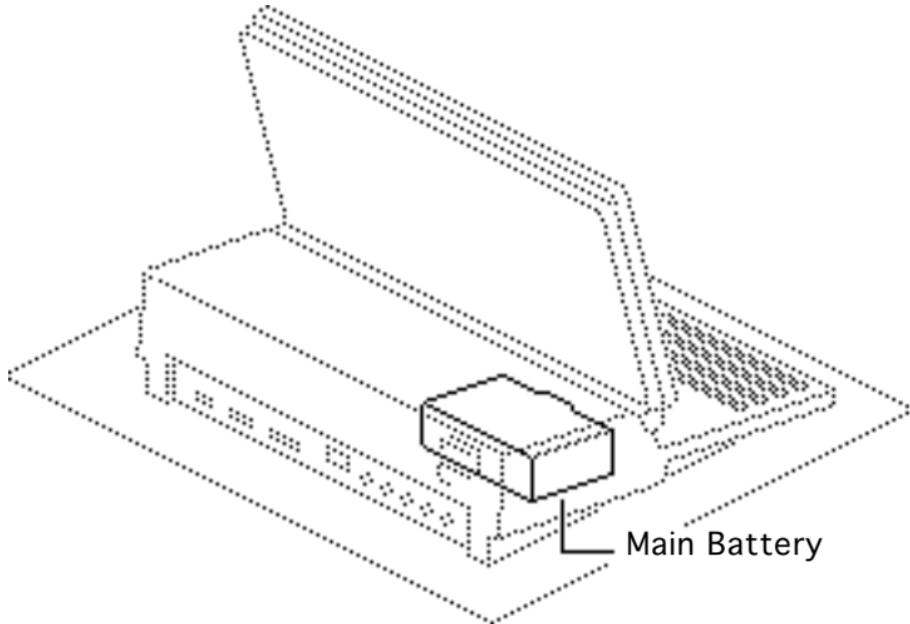


## Battery Verification

Before you begin, remove the following:

- Rear cover
- Main battery

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

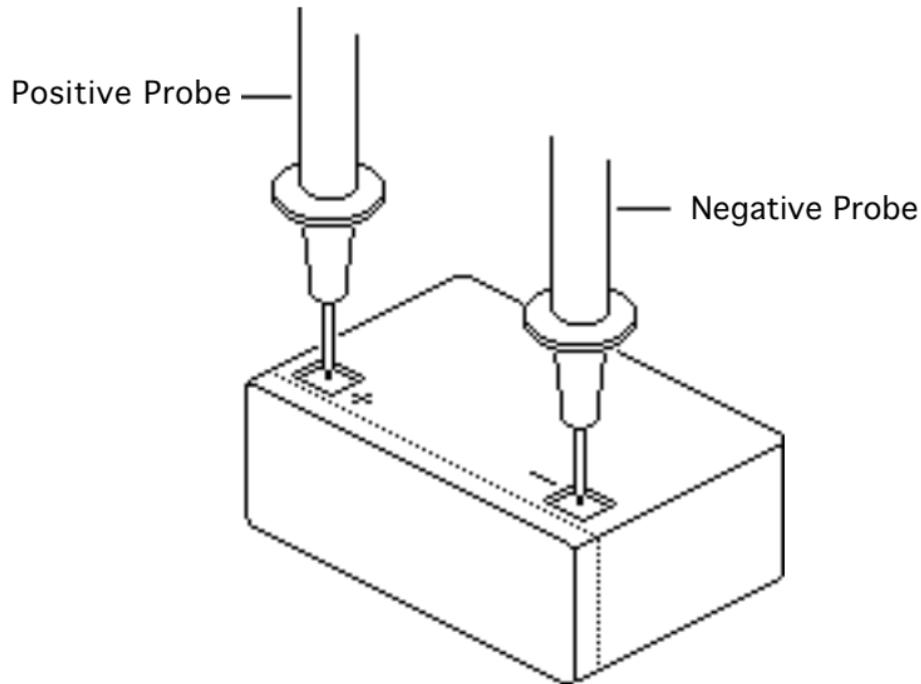




**Caution:** Remember to replace the battery cover after removing the main battery. Failure to reinstall the cover leaves power connected to the logic board. Removing and replacing modules with power available could damage new and old modules.

- 1 Set the voltmeter range to 10 volts DC.





- 2 Touch and hold the positive probe to the positive side of the battery. Touch and hold the negative probe to the negative side of the battery.
- 3 If the reading is less than 5.7 volts, recharge the battery. If the battery will not recharge, replace it.

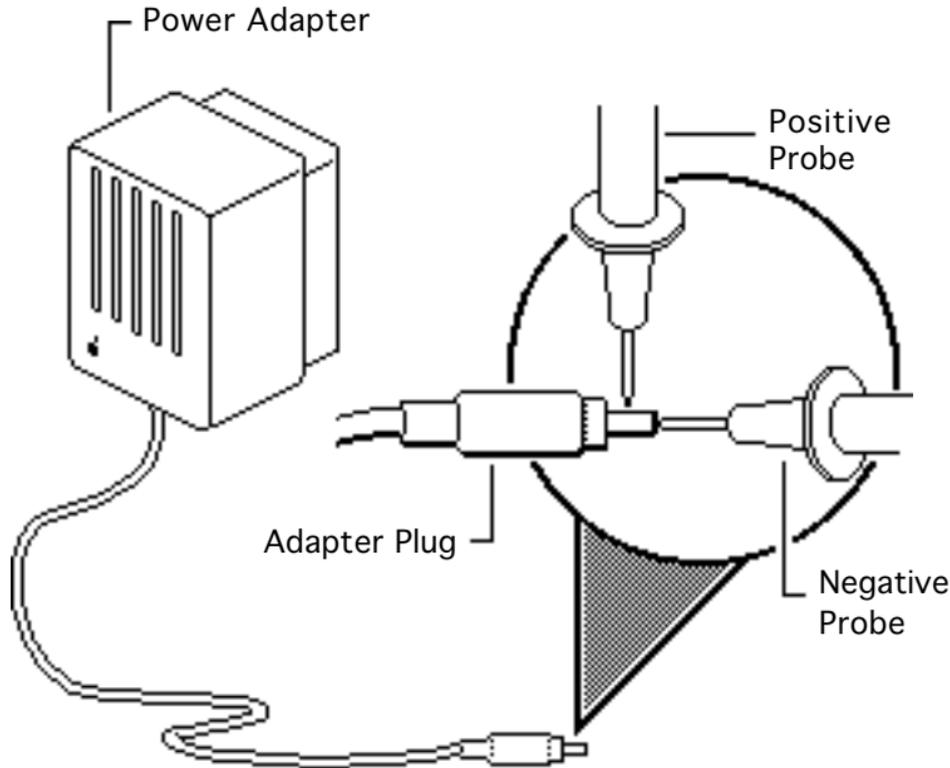




## Adapter Verification

Before you begin, remove the rear cover.

- 1 Plug the power adapter into a power source.
- 2 Set the voltmeter range to 10 volts DC.
- 3 Touch and hold the positive probe to the inside of the adapter plug. Touch and hold the negative probe to the outside of the adapter plug.





- 4 If the reading is not 7.53–7.54 volts, replace the adapter.



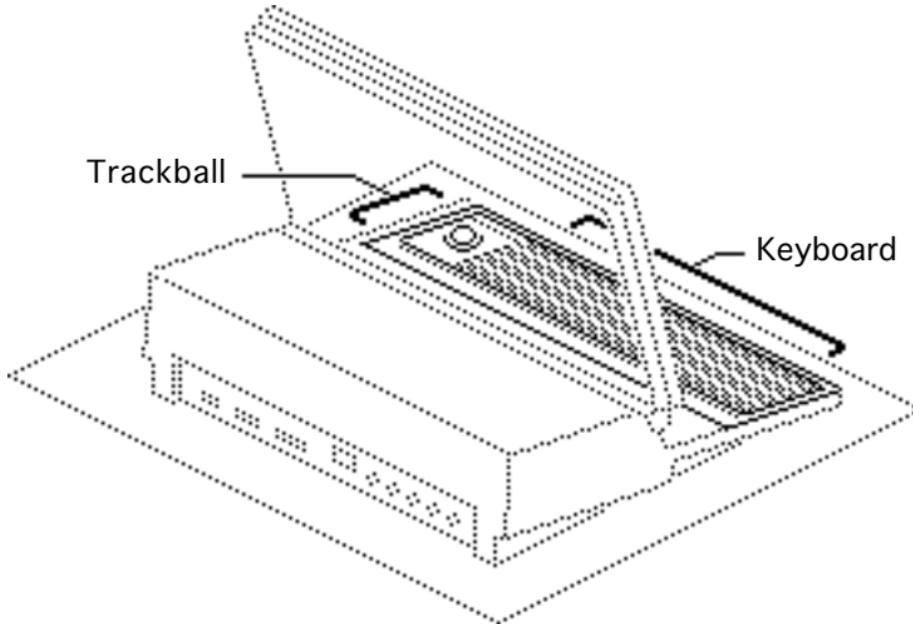


## Reconfiguring Input Devices

Before you begin, do the following:

- Disconnect the power adapter
- Remove the rear cover
- Remove the main battery
- Remove the keyboard cover

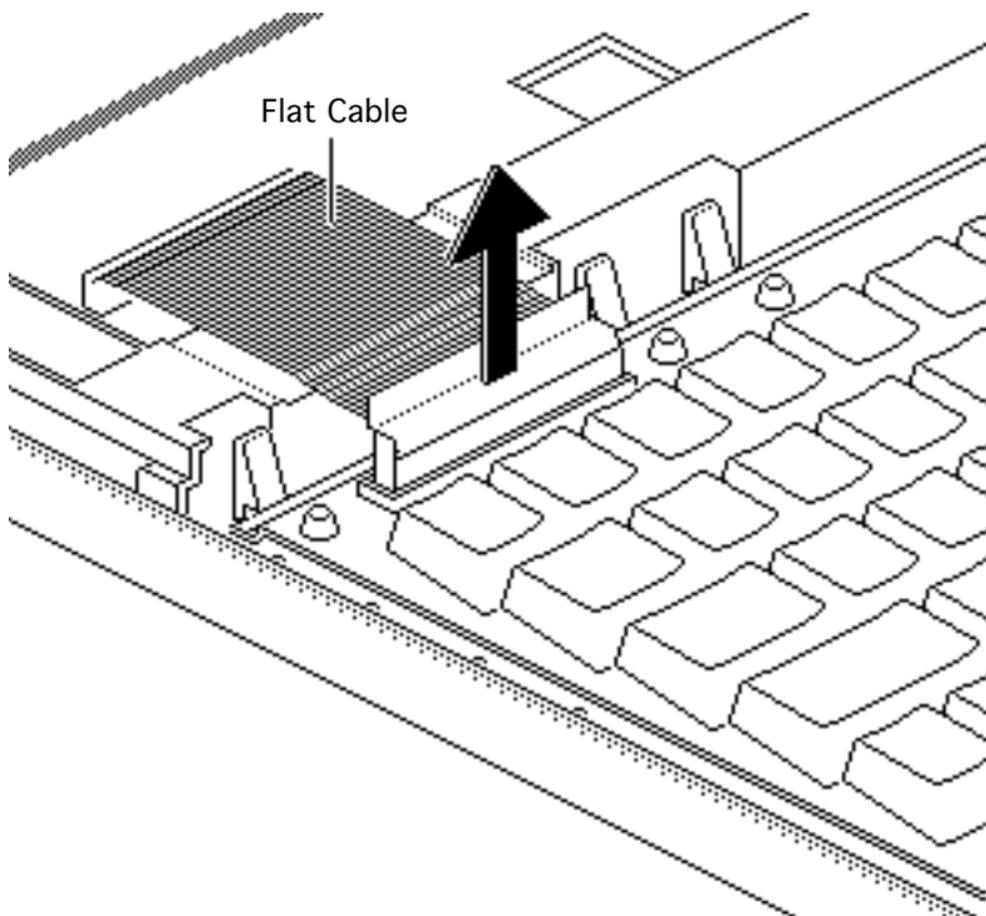
**Caution:** Review the ESD precautions in Bulletins/ Safety.





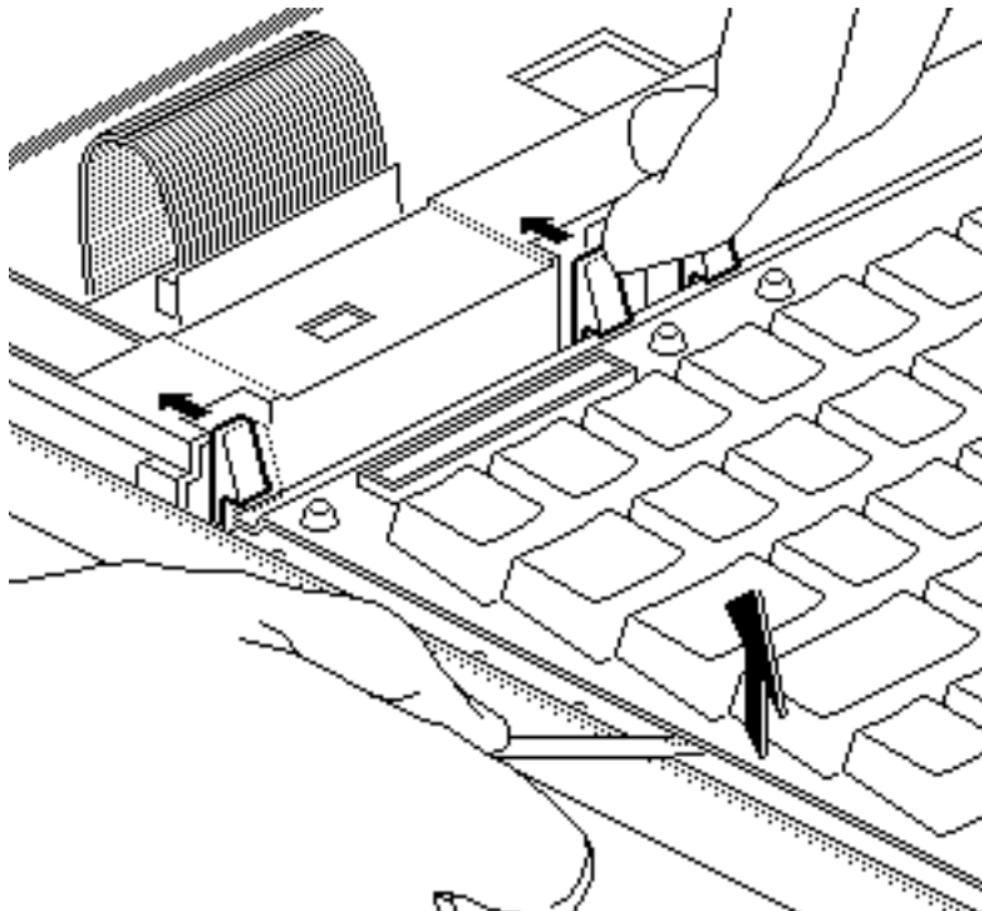
**Caution:** Remember to replace the battery cover after removing the main battery. Failure to reinstall the cover leaves power connected to the logic board. Removing and replacing modules with power available could damage new and old modules.





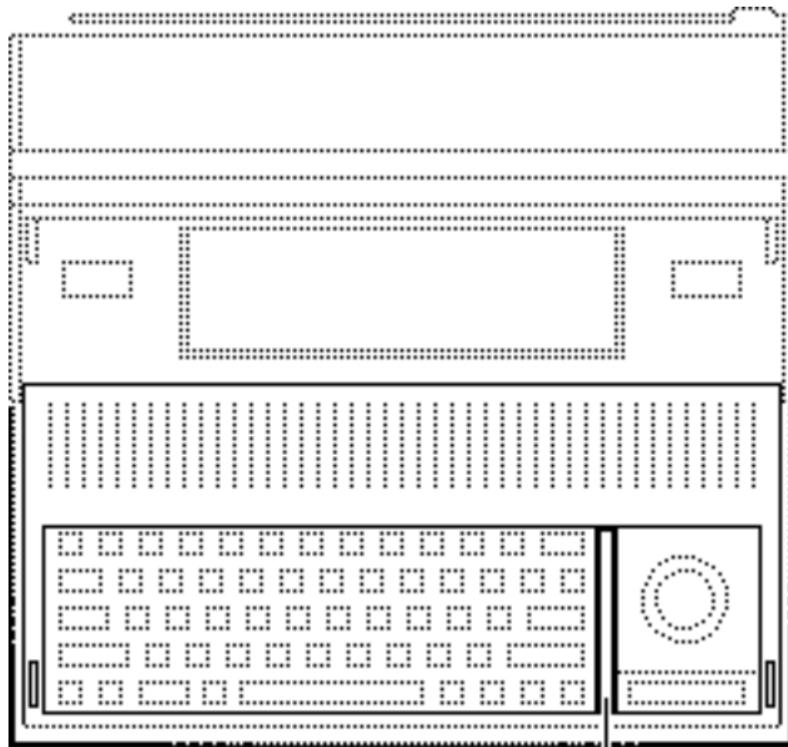
- 1 Disconnect the flat cable(s) of the input device(s) you are exchanging.





- 2 Simultaneously press back on each plastic tab and lift the device. Successively release all of the tabs and remove the device(s) from the computer.





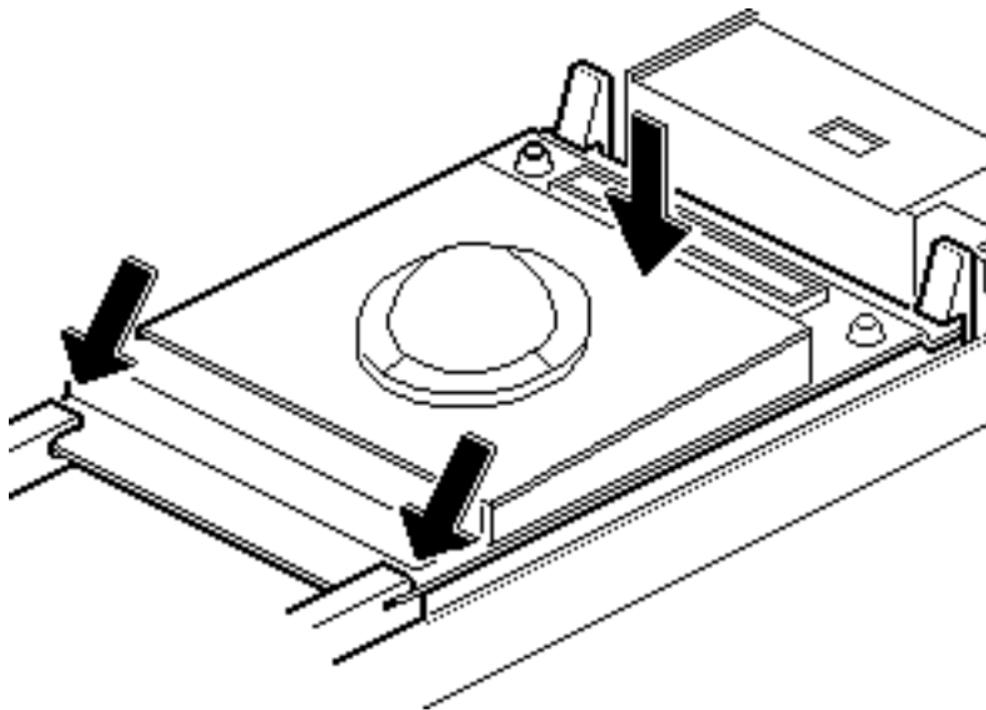
Keyboard Spacer

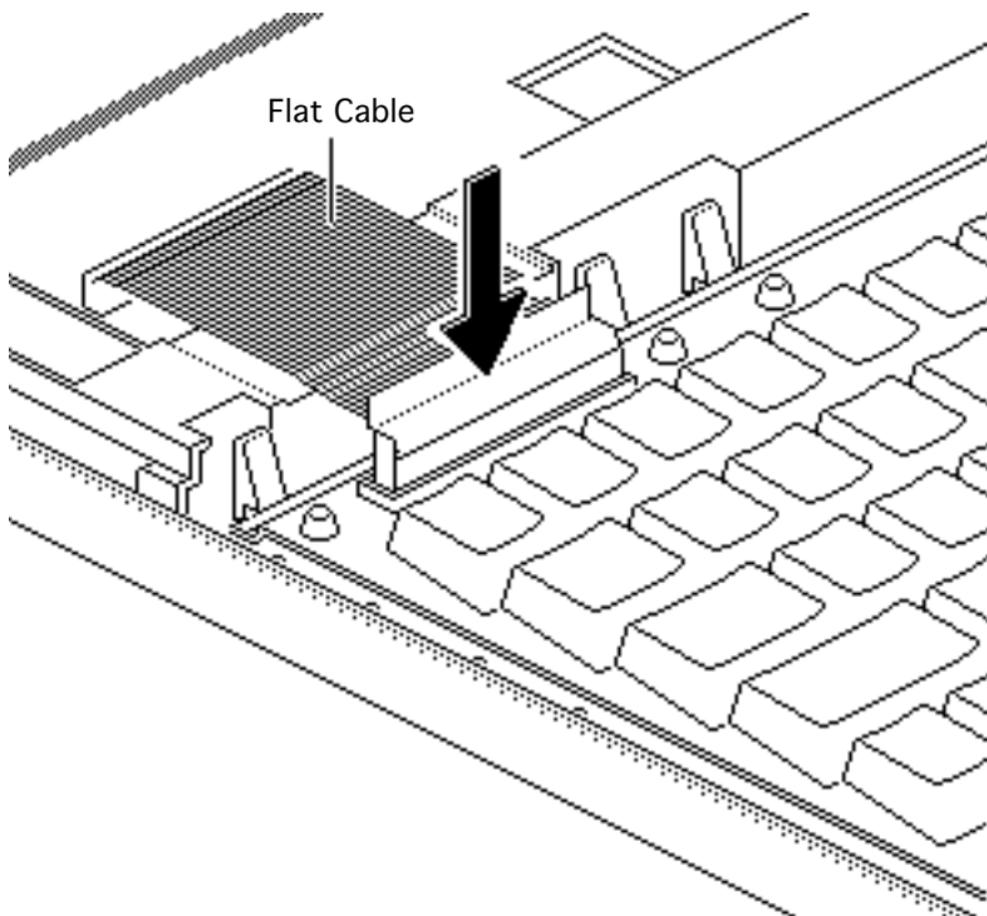
- 3 If you are changing device positions, reverse the position of the keyboard spacer:
  - The keyboard spacer is on the right when the keyboard is on the left.
  - The keyboard spacer is on the left when the keyboard is on the right.





- 4 Place the front of the device in the guides at the front of the computer. Press down the rear of the device until it snaps into place.





- 5 Connect the flat cable to the device.

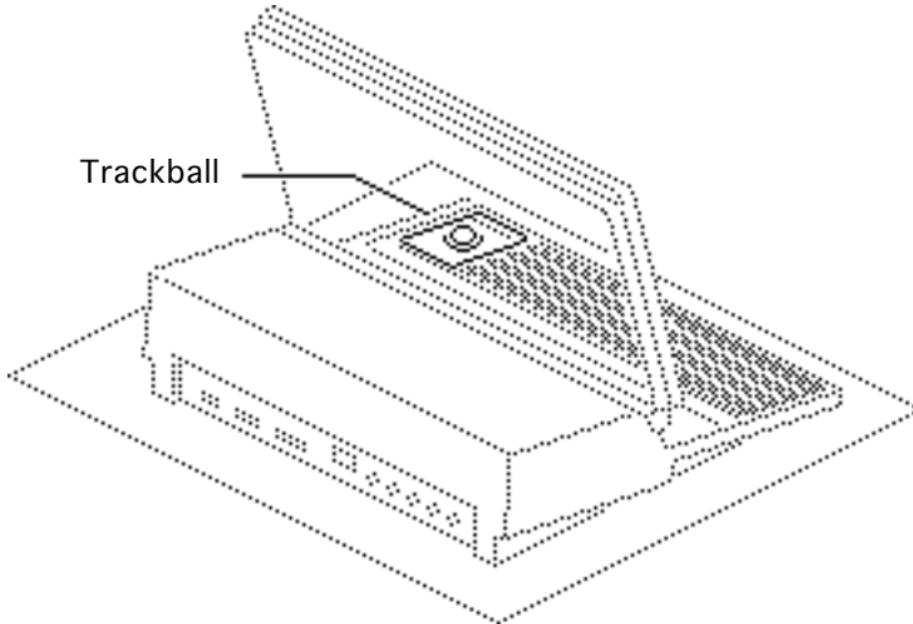




## Trackball Maintenance

No preliminary steps are required before you begin this procedure.

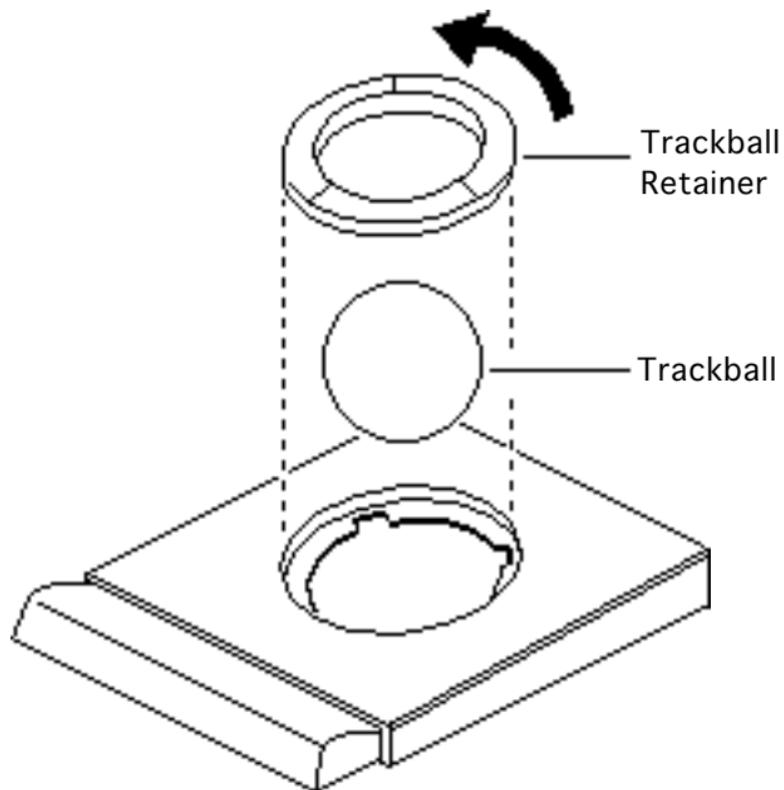
**Caution:** Review the ESD precautions in Bulletins/ Safety.





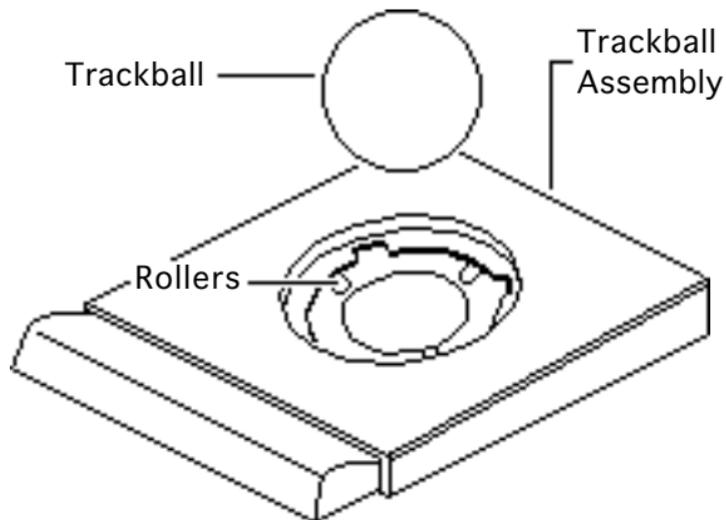
**Caution:** Remember to replace the battery cover after removing the main battery. Failure to reinstall the cover leaves power connected to the logic board. Removing and replacing modules with power available could damage any modules.





- 1 Rotate the trackball retainer counterclockwise as far as it will go and remove the retainer and trackball.





- 2 Gently blow dust from inside the trackball assembly.
- 3 Using a cotton swab moistened with alcohol or tape head cleaner, wipe oil or dust from the rollers. Rotate the rollers to clean all surfaces.

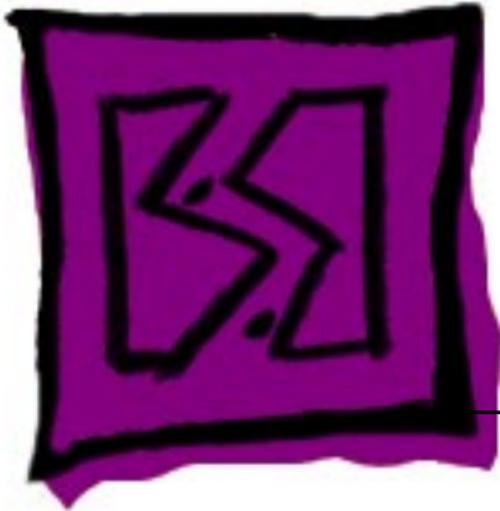
**Caution:** When cleaning the trackball, do not use tissue or anything that can leave lint. Do not use cleaning liquid.





- 4 Wipe the trackball with a soft dry cloth.



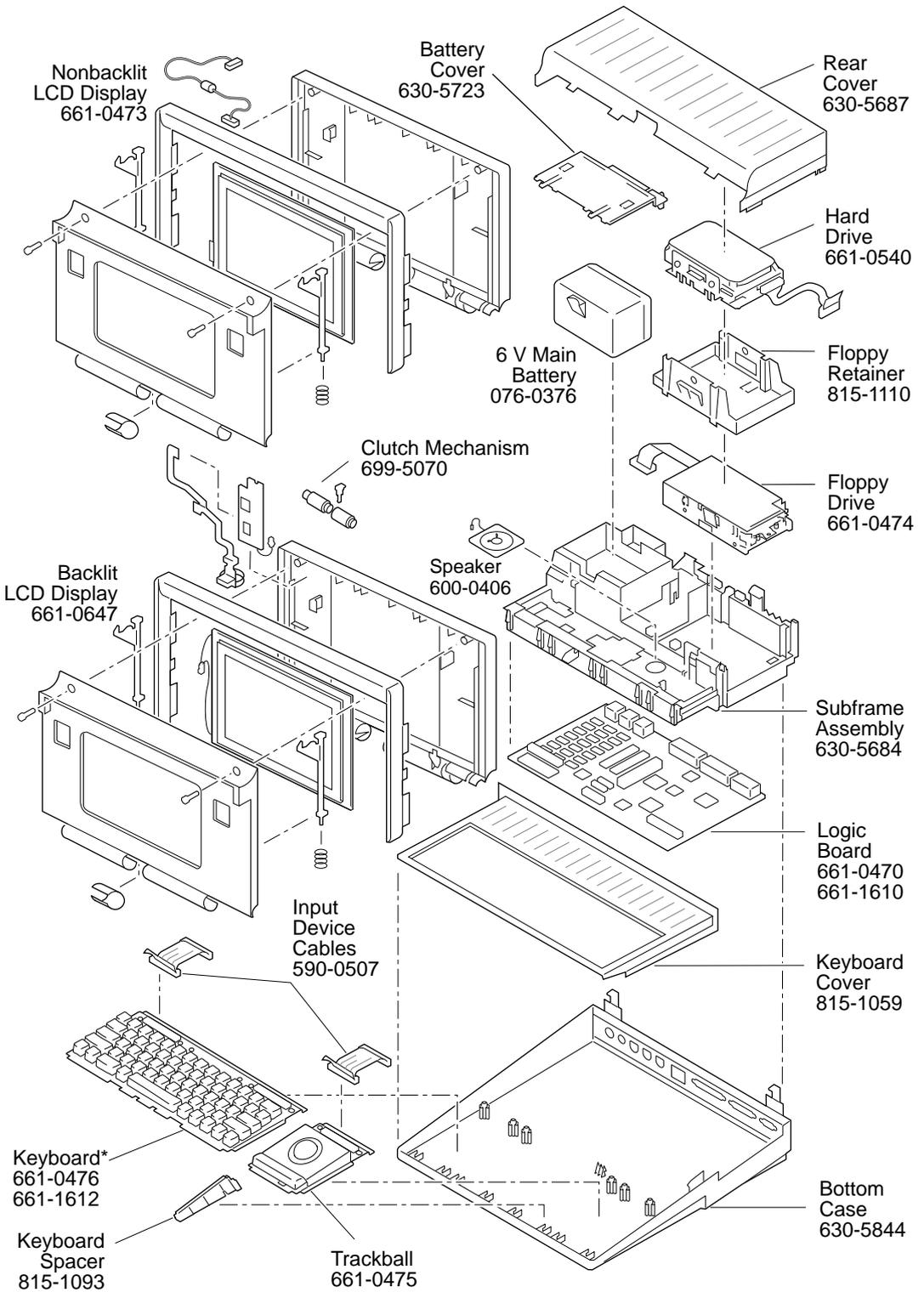


Exploded View

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Macintosh Portable





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

