PowerBook 150

Basics

PowerBook 150
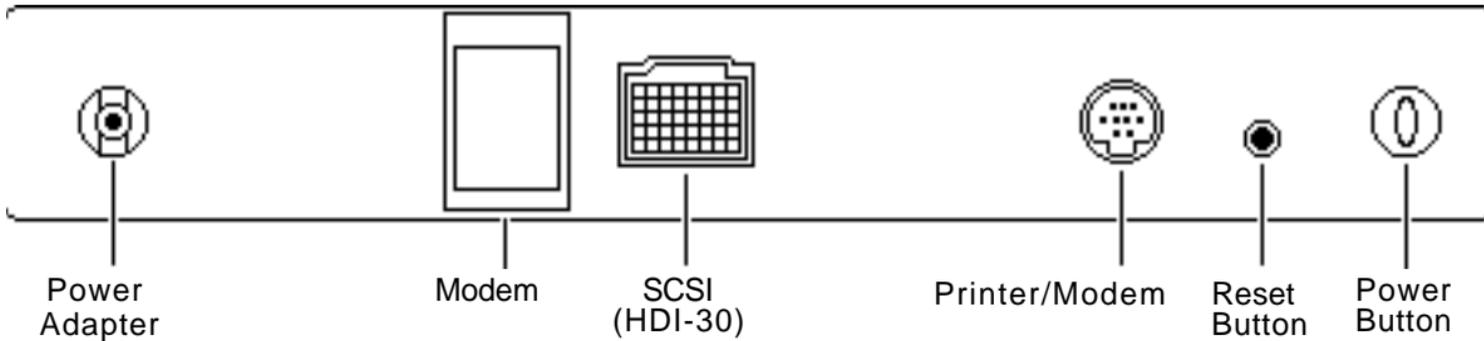
Figure: PowerBook 150

General Information

The PowerBook 150, shown at left, is an all-in-one notebook computer that features a 68030 processor running at 33 MHz and a 9.5 inch diagonal backlit FSTN display. The PowerBook 150 includes a 120 MB internal hard drive and supports up to six external SCSI devices through a SCSI port.
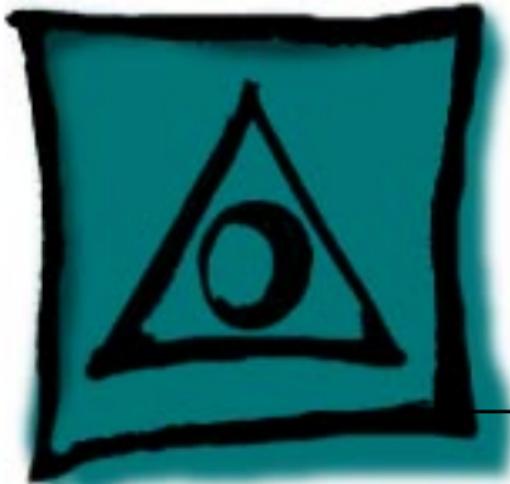
The PowerBook 150 internal hard drive is based on IDE (Intelligent Device Electronics) technology, commonly used in DOS-compatible systems. The IDE drive functions the same as a typical SCSI hard drive; it does not affect SCSI ID selections or SCSI termination schemes.

Rear Panel

Power Adapter

Modem

SCSI (HDI-30)

Printer/Modem

Reset Button

Power Button

Specifications

PowerBook 150

Processor

CPU   Motorola 68030 microprocessor
                     33 MHz

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

Memory

RAM   4 MB, expandable to 40 MB

ROM   1 MB

PRAM   256 bytes of parameter memory

VRAM   256K of static video display memory

Clock/Calendar CMOS custom chip

Disk Storage

Floppy Drive   19 mm high, 1.4 MB Apple SuperDrive

Hard Drive   2.5 in., 120 MB IDE hard drive

I/O Interfaces

SCSI   HDI-30 SCSI port with 1.5 MB/sec. transfer rate
                      Supports up to six external SCSI devices
                      Connect SCSI device to computer with HDI-30 SCSI system cable

Serial   One RS-422 serial port; mini DIN-8 connector

I/O Devices

Keyboard   Built-in standard Apple keyboard
                        63 keys domestic; 64 keys ISO
                        18 mm vertical pitch; 18.63 mm horizontal pitch
                        Two-level tilt adjustment

Trackball   30 mm diameter, dual button
                        Apple Desktop Bus (ADB) interface

Sound and Video

Video Display   9.5 in. diagonal screen
Flat-panel, film-compensated supertwist nematic (FSTN) liquid
    crystal display
640 lines by 480 pixels

Sound Generator   Apple sound chip provides 8-bit sound capable of driving stereo
headphones or other stereo equipment through the sound jack

Electrical

Main Battery   Nickel cadmium (NiCad) battery
                        Provides 2–4 hours of usage before recharging

Power Adapter   110–240 VAC line voltage
                        50–60 Hz
                        US, Japanese, United Kingdom, Australian, and European versions

Physical

Dimensions   Height: 2.3 in. (5.8 cm)
                      Width: 11.3 in. (28.7 cm)
                      Depth: 9.3 in. (23.6 cm)

Weight   5.5 lb. (2.5 kg) with battery

Environmental

**Operating
Temperature**   50–95° F (10–35° C)

**Storage
Temperature**   14–140° F (-10 to 60° C)

Relative Humidity   20–80% noncondensing

Operating Altitude 0–10,000 ft. (0–3048 m)

Shipping Altitude   0–15,000 ft. (0–4722 m)

Troubleshooting

PowerBook 150

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.

Power Manager Reset

Reset the power manager if

- The battery and power adapter are proven good, but the computer will not power on.
- The computer will not reset after a system crash.

To reset the power manager in a PowerBook 150,

- Remove the AC adapter and the battery.
- Using a paper clip, hold down the reset button on the back of the computer for 5–10 seconds.
- Reconnect the AC adapter and briefly push the reset button again. You should hear a small pop from the speaker.
- Turn on the computer.
- If the computer powers on, reinstall the battery. If the computer does not start, it may need servicing.

Symptom Charts

Startup

RAM failure occurs
(eight-tone error
chord sequence
sounds after startup
chord)

1 Replace RAM expansion card.
2 Replace logic board.

Hardware failure
occurs (four-tone
error chord sequence
sounds after startup
chord)

1 Disconnect hard drive data cable and reboot system. If
   startup sequence is normal, replace hard drive.
2 Disconnect floppy drive cable and reboot system. If startup
   sequence is normal, replace floppy drive.
3 Replace logic board.

Startup (Continued)

Screen displays checkerboard pattern; no startup chime	1	Reseat RAM expansion card.
	2	Replace RAM expansion card.
	3	Reseat display cable.

Power

Screen is blank; computer doesn't respond

1 Press reset switch.
2 Connect power adapter and reboot computer in 3–4 minutes.
3 Try known-good, charged main battery.
4 Check all interconnect board and logic board connections.
5 Reset the power manager.
6 Replace keyboard.
7 Replace interconnect board.
8 Replace logic board.

After removing main battery, some Control Panel settings are different

1 Replace interconnect board.
2 Replace logic board.

Power (Continued)

Power adapter is
plugged in, but
battery DA does not
indicate charger is
connected

1 Check battery charger connection.
2 Try known-good, charged main battery.
3 Try known-good power adapter.
4 Replace logic board.

Low-power warning
appears

1 Recharge battery or attach power adapter.
2 Verify that peripherals are low-power.
3 Reduce use of power-consuming devices or connect power
   adapter.
4 Try known-good, charged main battery.
5 Try known-good power adapter.
6 Replace logic board.

Power (Continued)

Computer runs when
plugged in to wall
outlet but not on
battery power;
battery voltage is
within tolerance

1 Reseat battery to make sure battery is mating with contacts
   on logic board.
2 Replace fuse on logic board.
3 Replace logic board.
4 Return computer to Apple.

Video

Row or partial row of pixels never comes on or is always on

1   Replace display cable.
2   Replace display.
3   Replace interconnect board.

Thin white line is always on at middle of screen

Thin white line is normal for FSTN screens.

Video (Continued)

Display is very light
or totally white

1 Adjust screen contrast.
2 Adjust screen brightness.
3 Check display cable, inverter board, interconnect board, and
   logic board connections.
4 Replace inverter board.
5 Replace interconnect board.
6 Replace display cable.
7 Replace display.
8 Replace logic board.

Video (Continued)

No display, but
computer appears to
operate correctly

1 Adjust screen contrast.
2 Check display cable, inverter board, interconnect board, and
   logic board connections.
3 Replace inverter board.
4 Replace interconnect board.
5 Replace power cable.
6 Replace display cable.
7 Replace display.
8 Replace logic board.

Rainbow colors
visible from extreme
viewing angles

Such colors are normal for FSTN screens.

Video (Continued)

Image is not uniform   Irregularity in images is normal for FSTN screens. Adjust
                            contrast and brightness to diminish effect.

Display stopped   If temperature is under 5 or over 40 degrees centigrade, this
working or dimmed   reaction is normal for FSTN screens.
but is fine now

Backlight doesn't   1 Check cables.
operate   2 Check display cable, inverter board, interconnect board, and
                               logic board connections.
                            3 Replace inverter board.
                            4 Replace inverter cable.
                            5 Replace interconnect board.
                            6 Replace display.
                            7 Replace logic board.

Video (Continued)

Screen goes blank   1 Press any key to wake computer from system sleep.
                           2 Check display cable connection.

Pixel is always white   Replace display.
or always black

Floppy Drive

Audio and video
present, but internal
drive does not operate

1 Try known-good floppy disk.
2 Check floppy drive cable connection.
3 Replace floppy drive cable.
4 Replace floppy drive.
5 Replace logic board.

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

1 Try known-good system disk.
2 Verify that trackball or mouse button is not stuck.
3 Check floppy drive cable connection.
4 Replace floppy drive cable.
5 Replace floppy drive.
6 Replace logic board.

Floppy Drive (Continued)

Disk does not eject
1. Switch off system and hold mouse button down while you switch system on.
2. Insert opened paper clip into hole beside drive.
3. Check floppy drive cable connection.
4. Replace floppy drive cable.
5. Replace floppy drive.
6. Replace logic board.

Disk initialization fails
1. Try known-good floppy disk.
2. Install inverter shield.
3. Check floppy drive cable connection.
4. Replace floppy drive cable.
5. Replace floppy drive.

Floppy Drive (Continued)

Read/write/copy
error

1. Try known-good floppy disk.
2. Install inverter shield.
3. Check floppy drive cable connection.
4. Replace floppy drive cable.
5. Replace floppy drive.

Hard Drive

Internal hard drive
does not operate

1   Make sure power adapter is connected.
2   Check hard drive cable connection.
3   Replace hard drive cable.
4   Replace hard drive.
5   Replace logic board.

Peripherals

After connecting external SCSI device, computer doesn't boot

1 Switch on external SCSI device before starting computer.
2 Check cable connections.
3 Verify that standard Apple terminator terminates end of SCSI chain.
4 Verify that SCSI select switch setting on external device is unique.
5 Verify operation of internal hard drive.
6 Try known-good external SCSI device.
7 Replace logic board.

Cursor does not move when using trackball

1 Press reset switch.
2 Check interconnect board and logic board connections.
3 Replace interconnect board.
4 Replace logic board.

Peripherals **(Continued)**

Cursor intermittently
does not move or
moves erratically

1   Clean ball and rollers of trackball.
2   Replace trackball.
3   Replace keyboard.
4   Replace interconnect board.
5   Replace logic board.

Cursor moves, but
clicking trackball
button has no effect

1   Check interconnect board and logic board connections.
2   Replace trackball.
3   Replace keyboard.
4   Replace interconnect board.
5   Replace logic board.

Peripherals (Continued)

No response to any
key on keyboard

1 Reset power manager.
2 Check connections of keyboard to interconnect board.
3 Replace keyboard.
4 Replace interconnect board.
5 Replace logic board.

Known-good
ImageWriter,
ImageWriter II, or
LQ does not print

1 Verify that System is current.
2 Verify that Chooser and Control Panel settings are correct.
3 Check cables.
4 Replace printer interface cable.
5 Try known-good printer.
6 Replace logic board.

Peripherals **(Continued)**

Known-good
LaserWriter does not
print

1   Verify that System is current.
2   Verify that Chooser and Control Panel settings are correct.
3   Check cables.
4   Replace printer interface cable.
5   Try known-good printer. If printer works, troubleshoot
    network. Refer to Networking and Communications manual.
6   Replace logic board.

Device connected to
external modem port
doesn't work

1   Verify that External Modem is selected in CDEV.
2   Verify that System is current.
3   Verify third-party setup software.
4   Check cables.
5   Attach device to known-good computer.
6   Replace logic board.

Peripherals (Continued)

I/O devices are
unrecognized or
garbage is
transmitted or
received

1   Verify that System is current.
2   Check cables.
3   Verify that SCSI device has standard Apple terminator.
4   Verify that SCSI select switch setting on external device is
    unique.
5   Attach device to known-good computer.
6   Replace logic board.

Internal Modem

Internal modem
options do not appear
in CDEV

1 Remove and reseat modem card.
2 Verify that System is current.
3 Replace modem card.
4 Replace logic board.

Modem does not
respond properly to
AT command set
instructions

1 Verify that baud rate and data format settings of
   communications application are compatible with internal
   modem and remote modem.
2 Check phone cord connection and operation.
3 Remove and reseat modem card.
4 Verify that System is current.
5 Replace modem card.

Internal Modem (Continued)

Strange mix of
characters appears
on screen

1   Verify that baud rate and data format settings of
    communications application are compatible with internal
    modem and remote modem.
2   Check phone cord connection and operation.
3   Remove and reseat modem card.
4   Verify that System is current.
5   Replace modem card.
6   Replace logic board.

Modem interferes
with system sound

1   Remove and reseat modem card.
2   Replace modem card.
3   Replace interconnect board.
4   Replace logic board.

Internal Modem (Continued)

Modem does not respond to incoming call

1 If computer is in sleep mode, verify that Wake On Ring option in CDEV is selected.
2 Check phone cord connection and operation.
3 Replace modem card.
4 Replace logic board.

Modem has no sound output

1 Verify that Control Panel volume setting is above 0.
2 Replace modem card.
3 Replace interconnect board.
4 Replace logic board.

Modem connects but does not communicate with remote modem

1 Verify that remote modem needs error correction (error correction is internal modem default).
2 If remote modem does not need error correction, type AT &Q0 to disable error correction.

Miscellaneous

Screen goes blank and computer shuts down every few minutes

Adjust sleep delays in Control Panel or connect power adapter.

Application seems to run slower after few seconds

Connect power adapter.

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

Adjust sleep delays in Control Panel or connect power adapter.

Miscellaneous **(Continued)**

No sound from
speaker

1   Verify that volume setting in Control Panel is 1 or above.
2   Check connection of interconnect board to logic board.
3   Replace interconnect board.
4   Replace logic board.

Take Apart

PowerBook 150
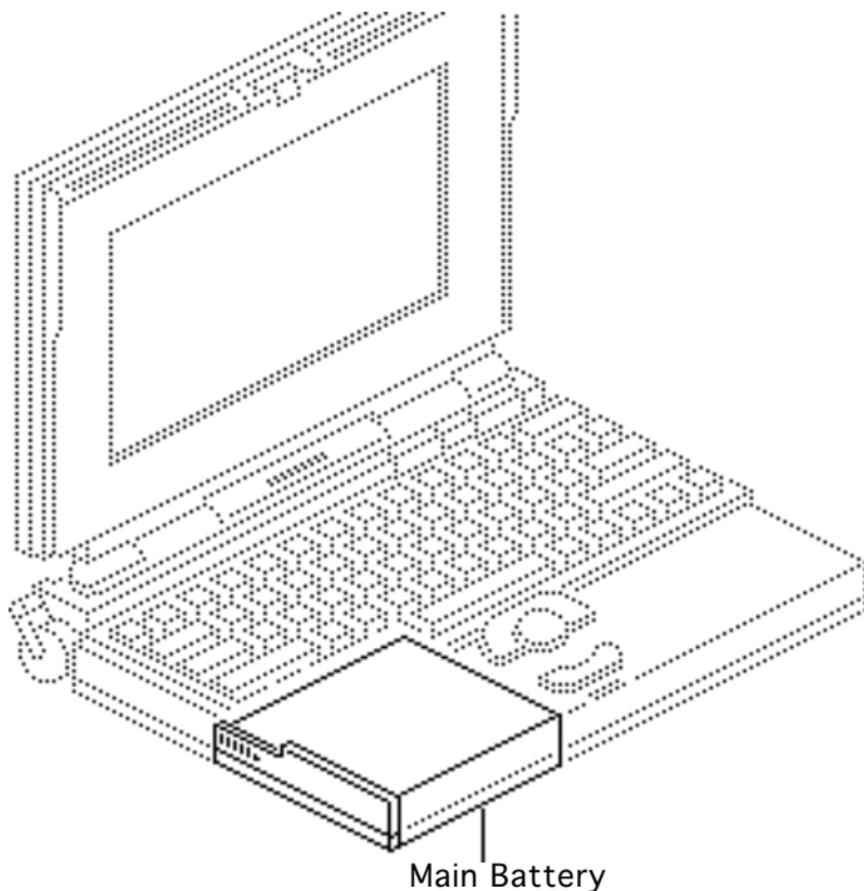
Main Battery

Main Battery

Before you begin, disconnect the power adapter.

Note: This procedure also covers removal of the main battery door.

Important: Before removing the main battery, use the Macintosh Shut Down command. Otherwise, all RAM contents will be lost.

⚠Warning: The main battery is a NiCad battery that contains toxic
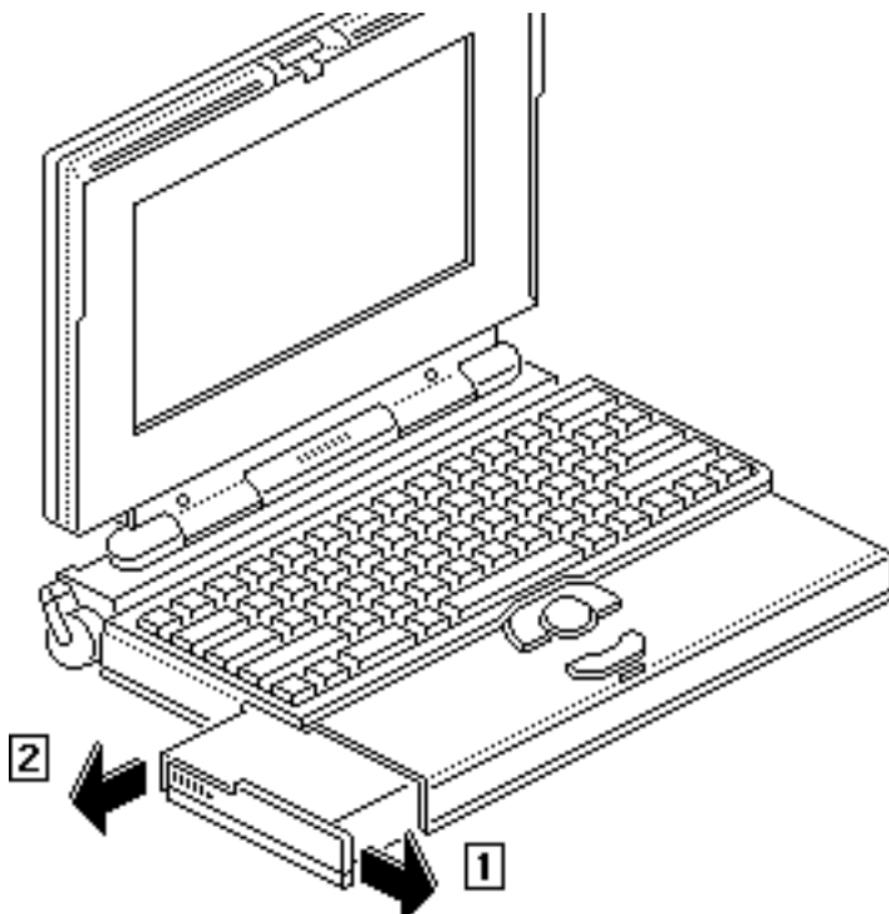
materials. Review battery handling and disposal instructions in Bulletins/ Safety.

1 Slide open the battery door.

2 Using the battery door as a handle, pull out the main battery.
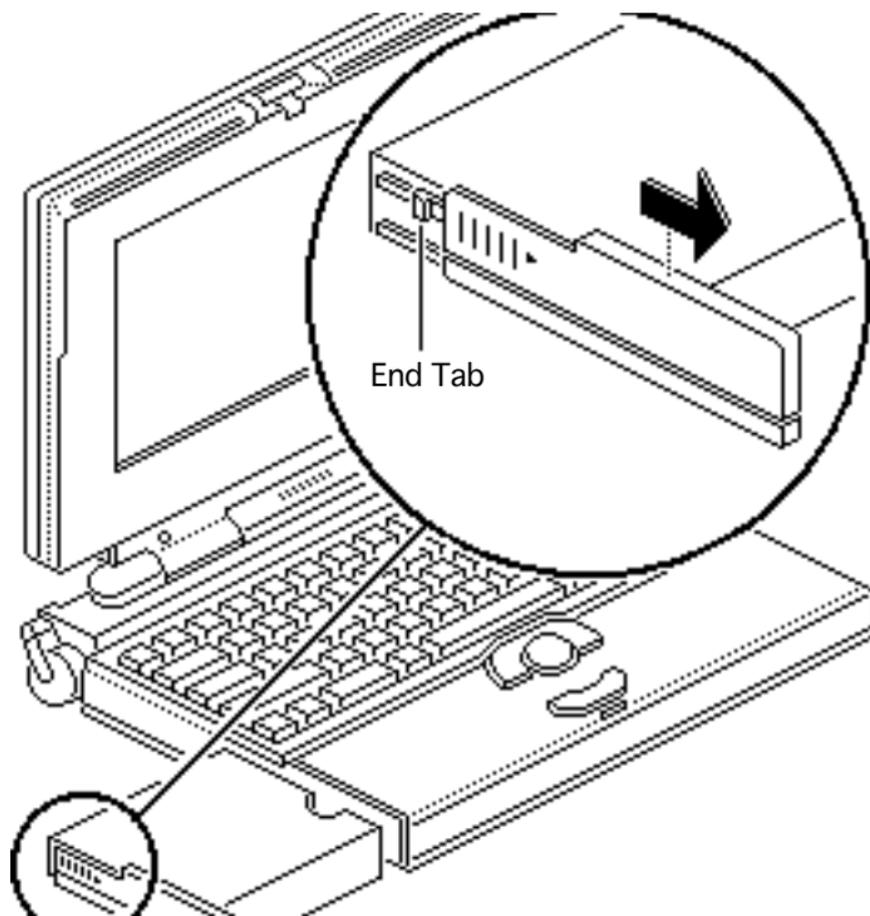
End Tab

Note: Complete the next steps only if you are replacing the battery or battery door.

3 Slide the battery door completely open.

4 Pull the end tab until it releases, and remove the door from the battery.
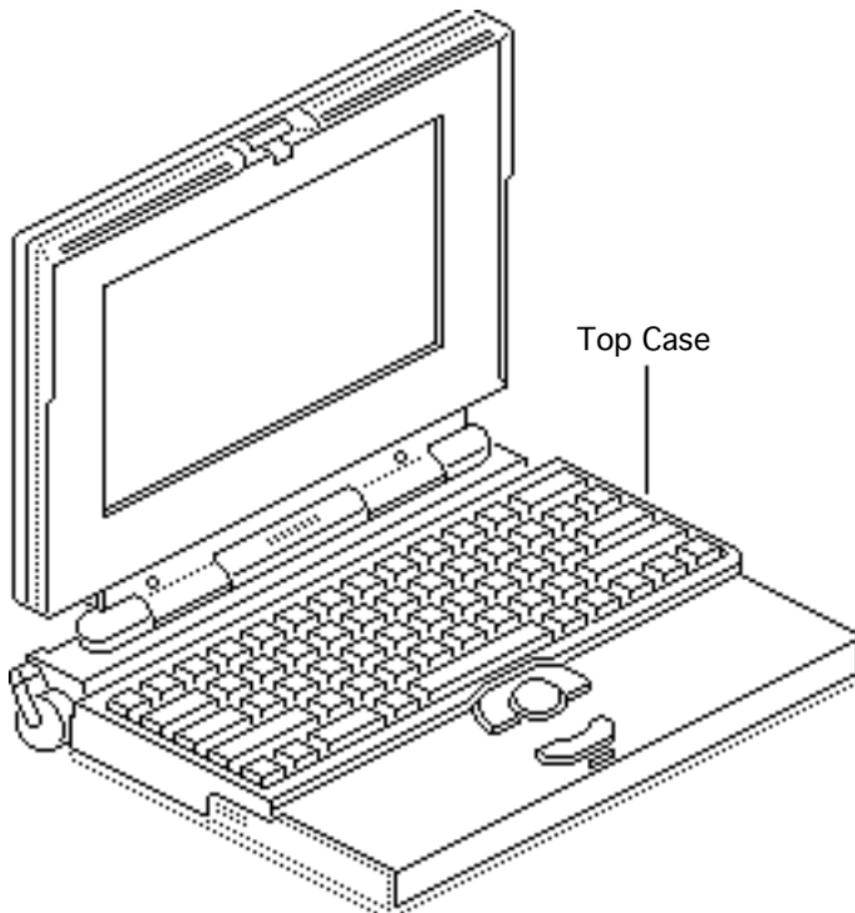
Top Case

Before you begin, remove the main battery.

Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/ Safety.

Top Case

1 Using a T-8 torx driver, remove the five torx screws from the bottom case.

Interconnect Cable
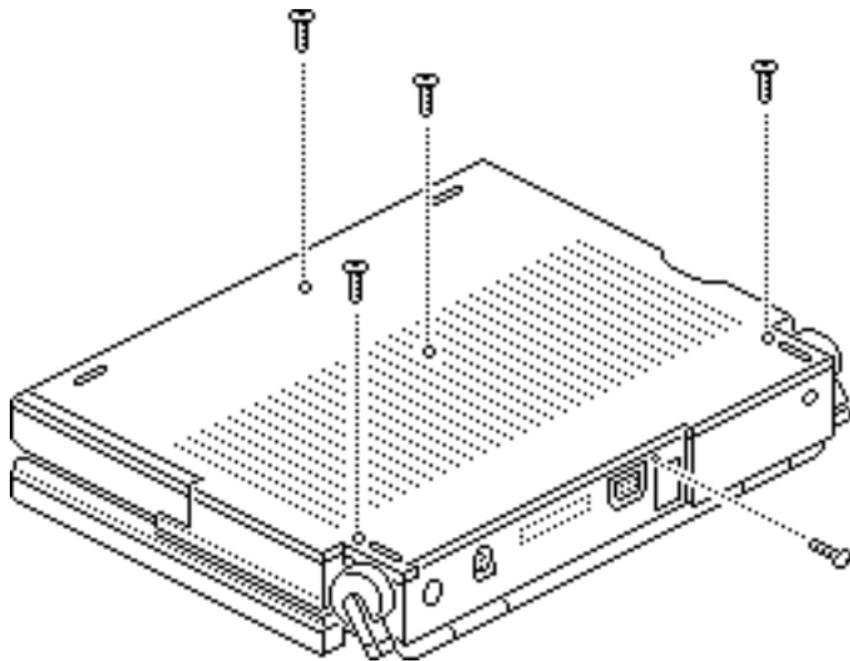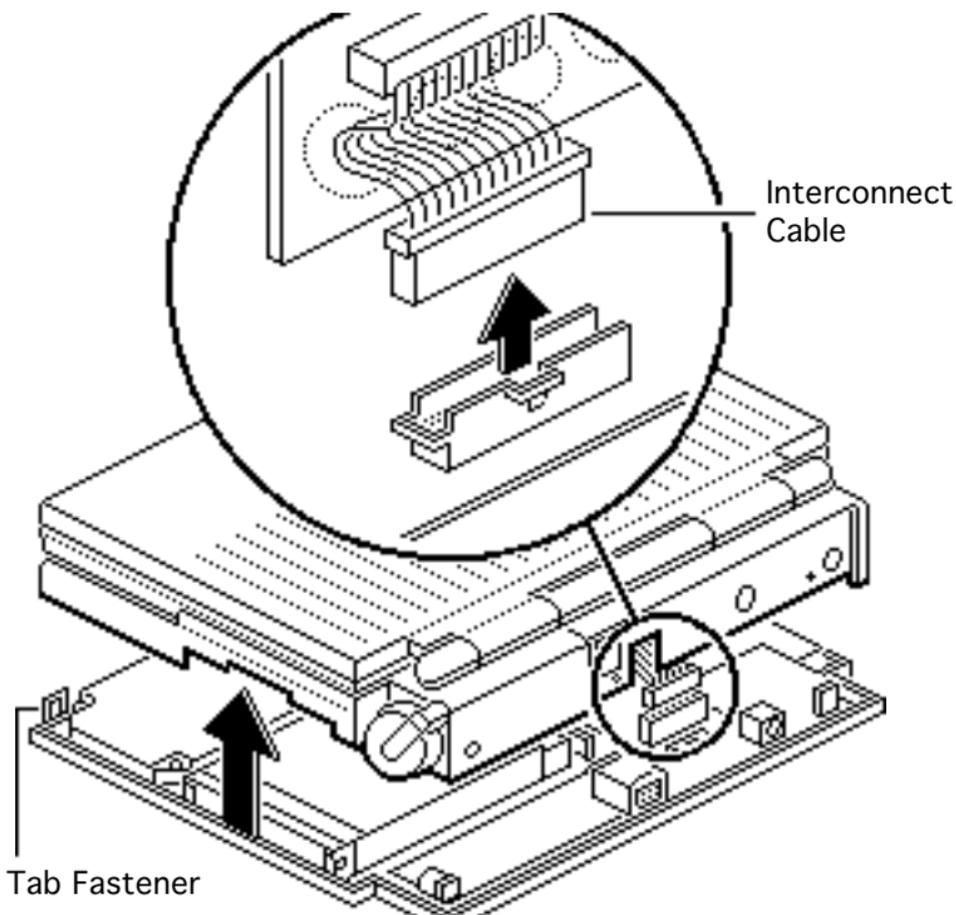
Tab Fastener

2 Lift up the top case and disconnect the interconnect cable.

3 Lift off the top case and unhook the two tab fasteners from the front of the bottom case.

Replacement Caution: When connecting the interconnect cable, fold the cable as shown. If it is not folded correctly, the cable could short.

Hard Drive

Hard Drive
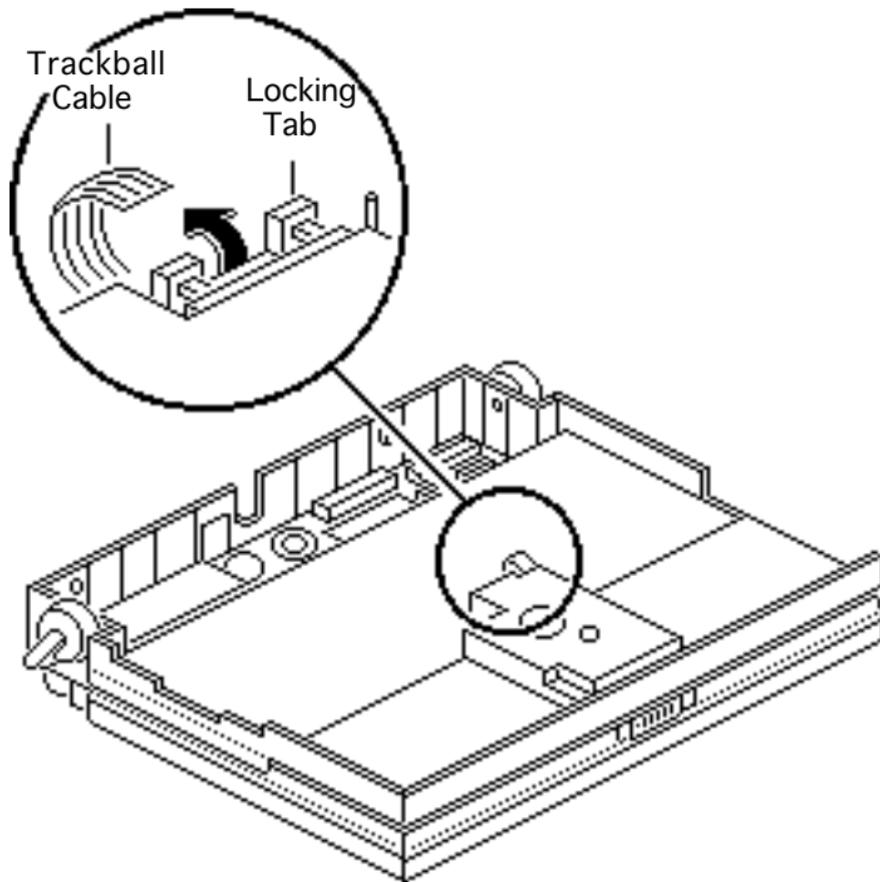
Before you begin, remove the following:

- Main battery
- Top case

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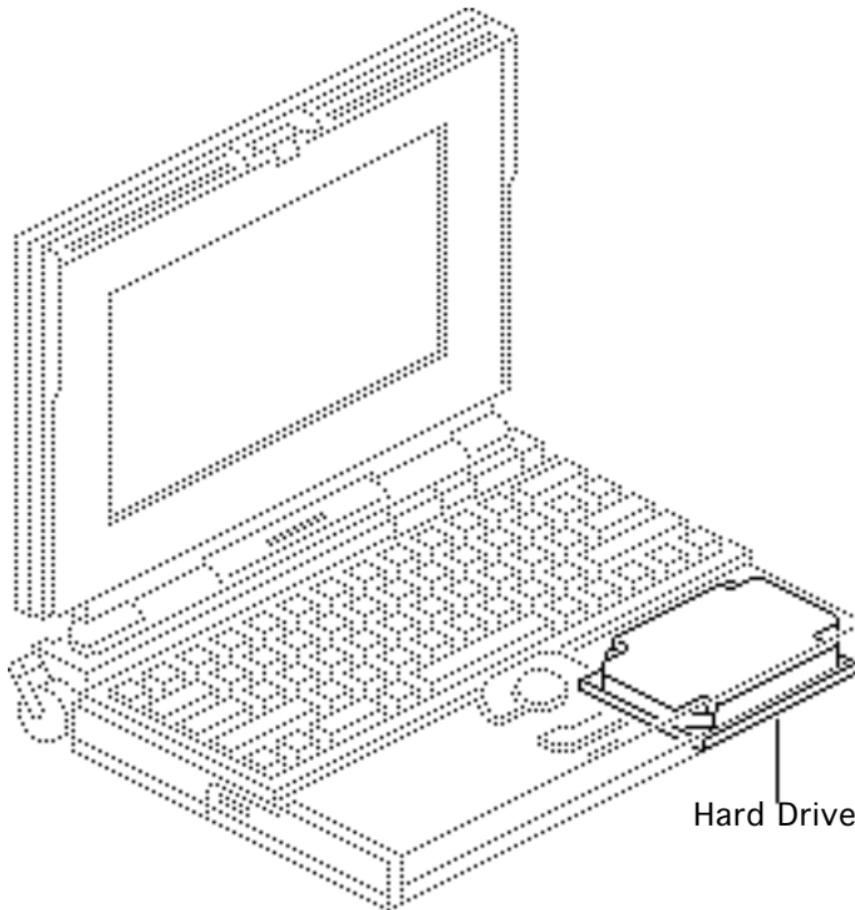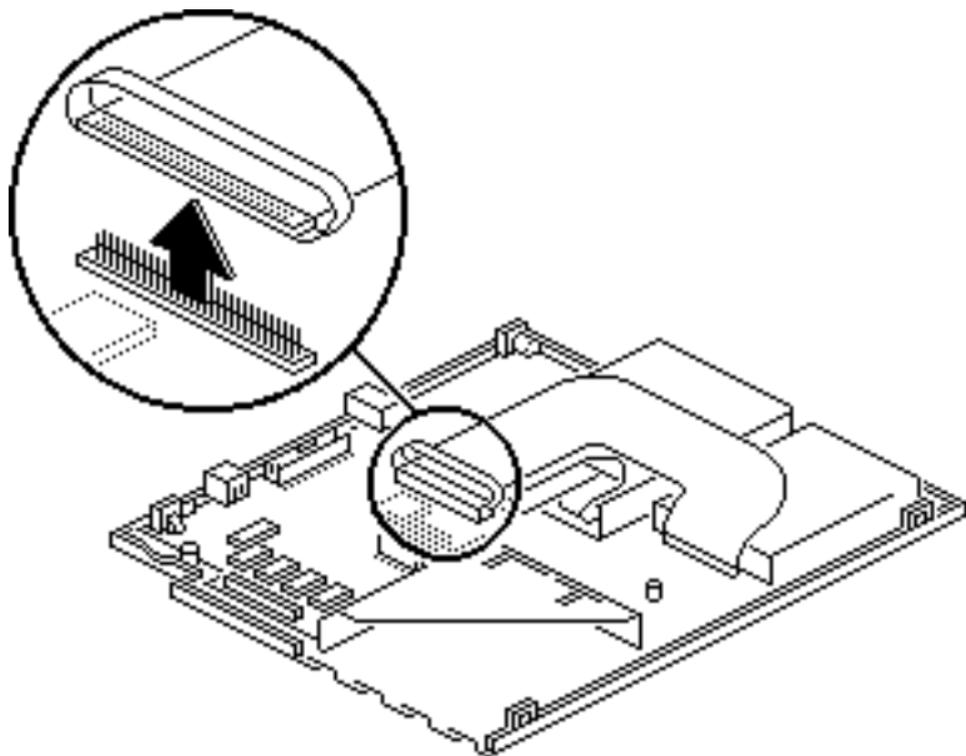
Caution: The hard drive cable is fragile. Handle it with care.

1 Disconnect the hard drive cable from the logic board.
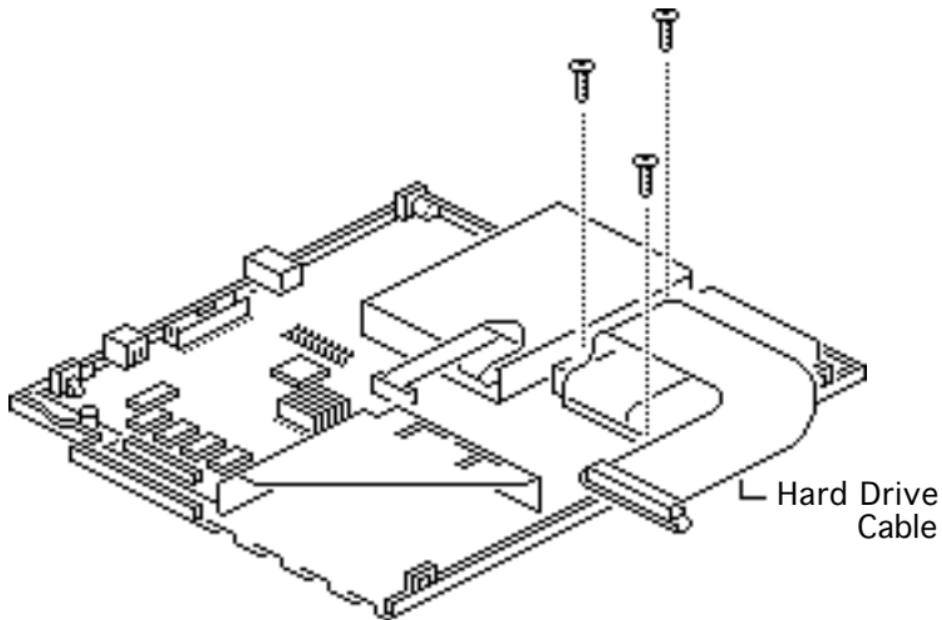
Hard Drive
Cable

2 Carefully fold back the
   hard drive cable.

3 Using a T-8 torx driver,
   remove the three hard
   drive mounting screws.

4 Lift the hard drive out of
   the bottom case.

Note: Complete the following steps if you are replacing the hard drive, hard drive cable, or hard drive bracket.

5   Using a small flat-blade screwdriver, carefully pry the hard drive cable from the hard drive.
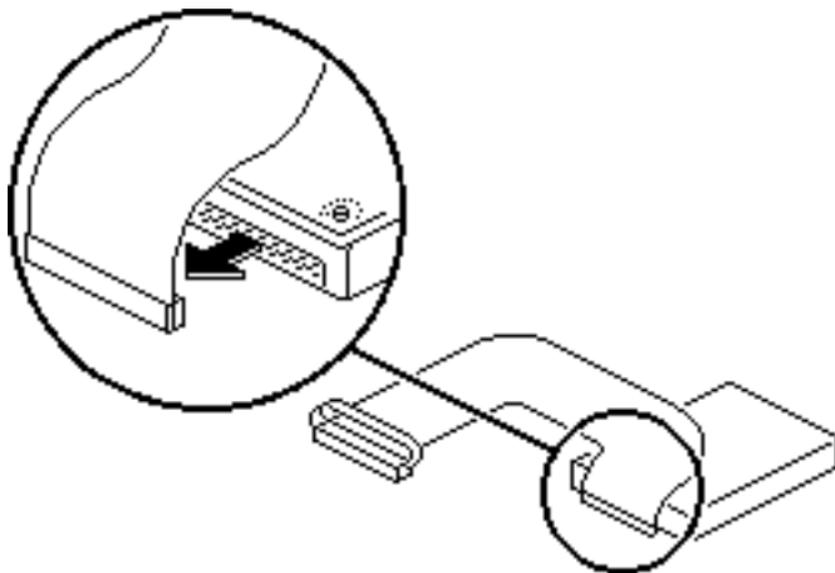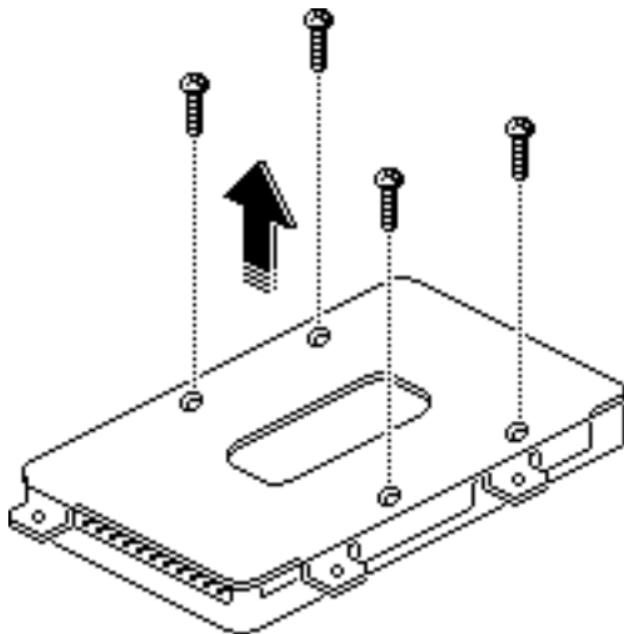
6 Turn over the hard drive.

7 Using a #1 Phillips screwdriver, remove the four screws securing the hard drive bracket.

8 Remove the bracket from the hard drive.

Replacement Note: For information on returning drives, cables, and carriers to Apple, refer to the Hard Drives manual.
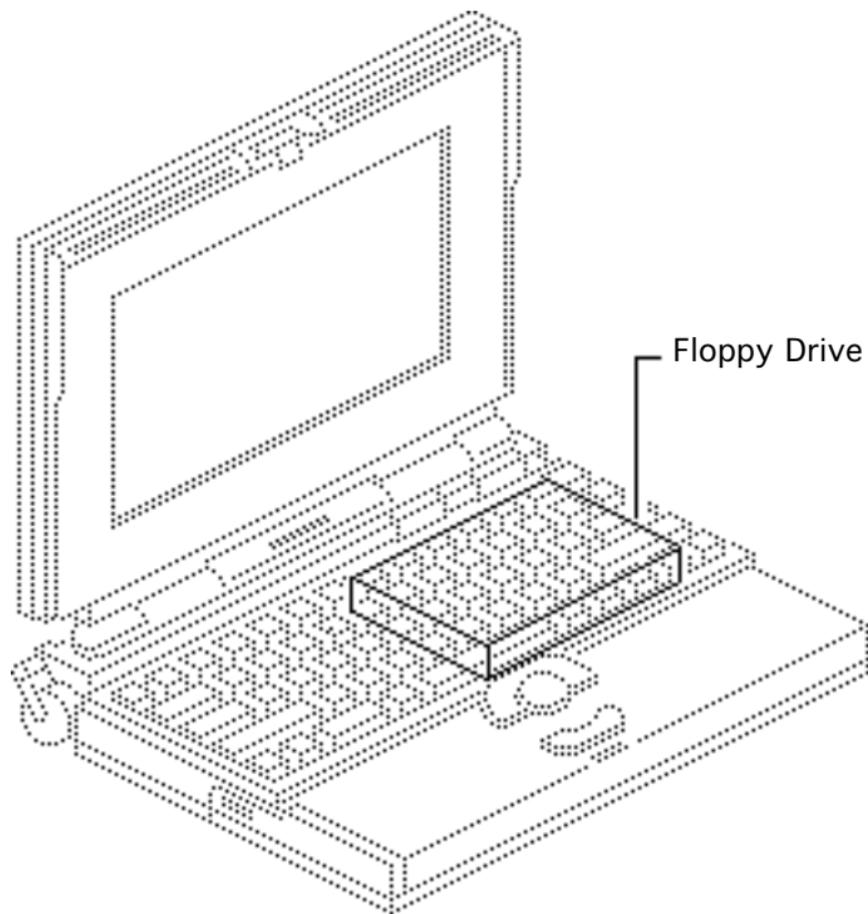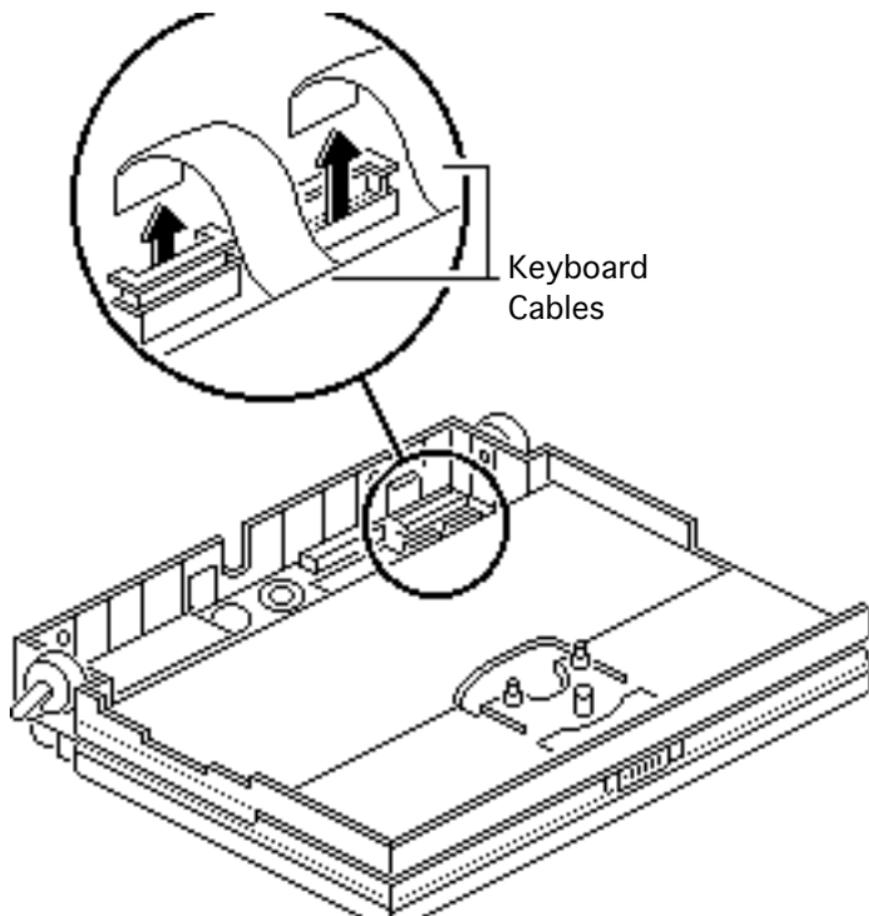
Floppy Drive

Before you begin, remove the following:

- Main battery
- Top case
- Modem card (if present)

Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/Safety.
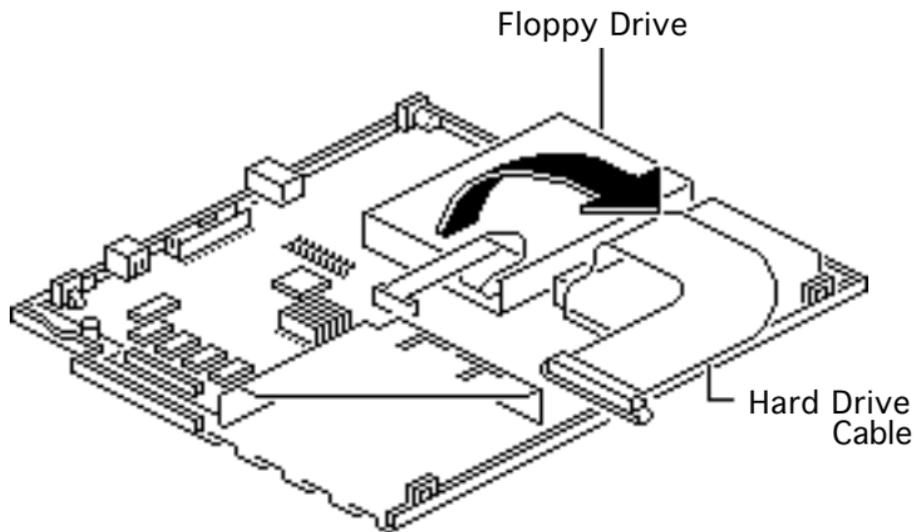
Floppy Drive

Caution: The hard drive cable is fragile and should be handled with care.

1 Disconnect the hard drive cable from the logic board.

2 Carefully fold back the cable from the floppy drive.

Floppy Drive
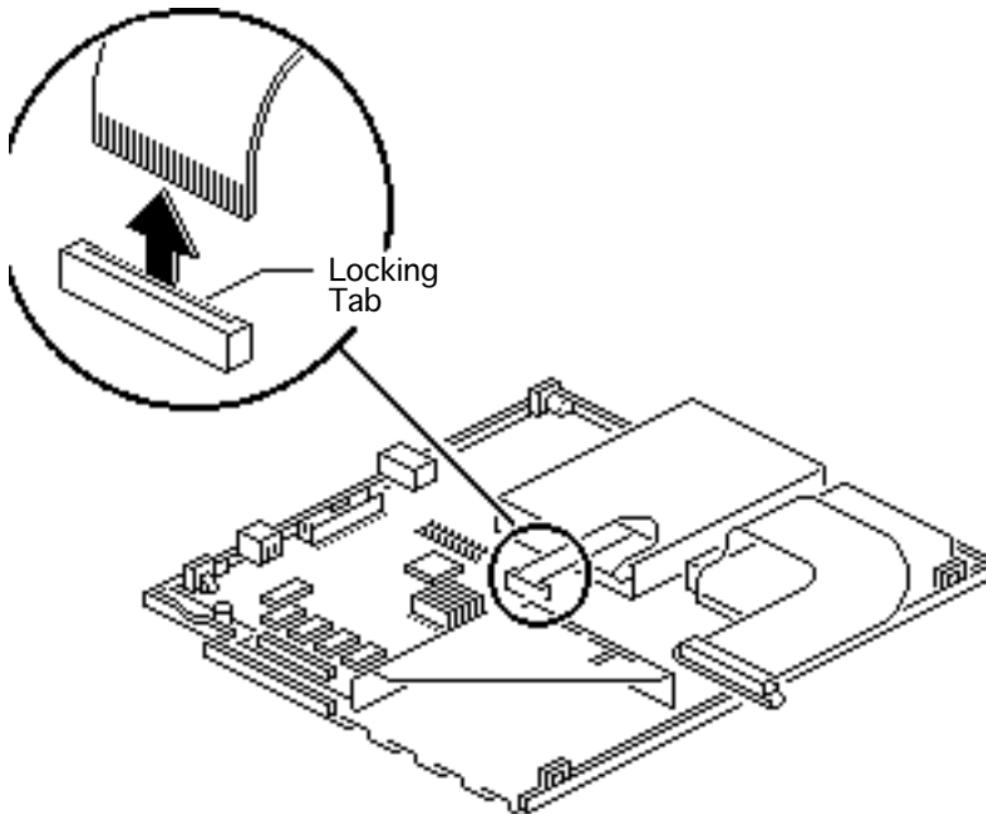
Hard Drive Cable

Caution: The floppy drive cable is fragile and should be handled with care.

3 Lift the locking tab on the floppy drive connector and disconnect the floppy drive cable from the logic board.

Locking Tab
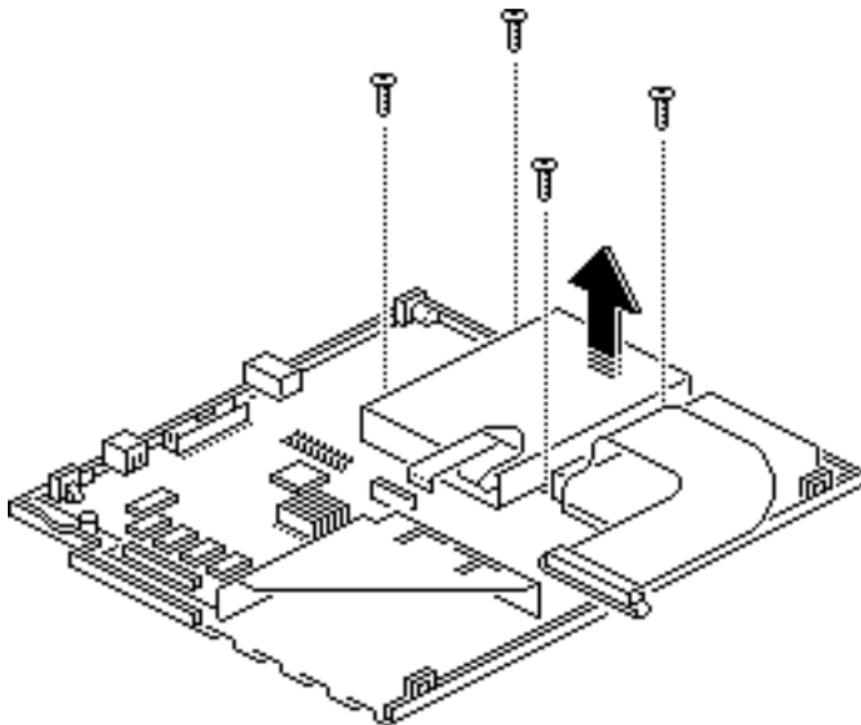
4 Using a T-8 torx driver, remove the four floppy drive mounting screws.

5 Lift the floppy drive out of the bottom case.
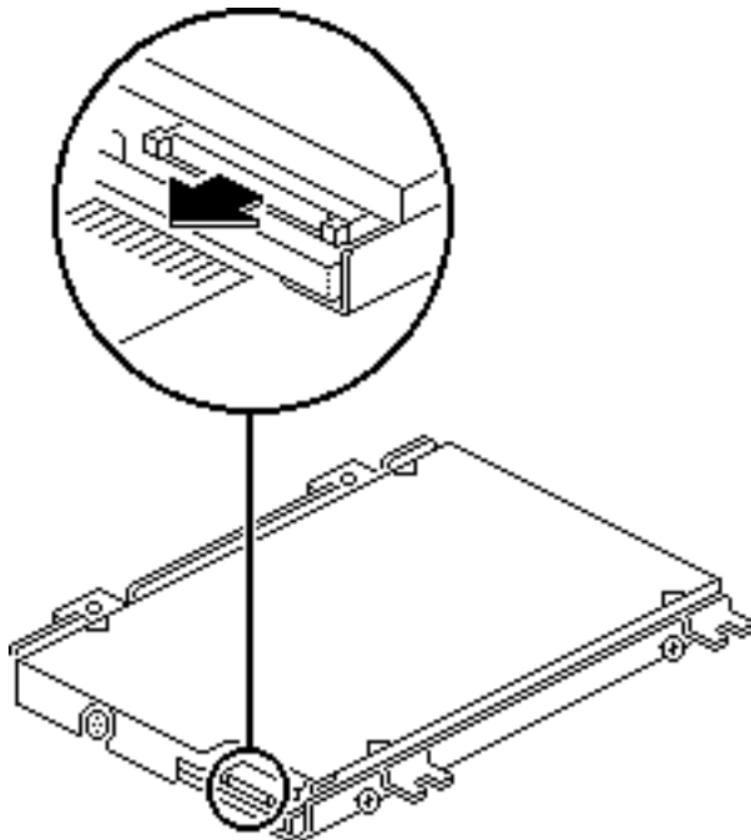
Note: Complete the following steps if you are replacing the floppy drive, floppy drive cable, or floppy drive brackets.

6 Using a small flat-blade screwdriver, push out the locking tab and remove the floppy drive cable from the drive.
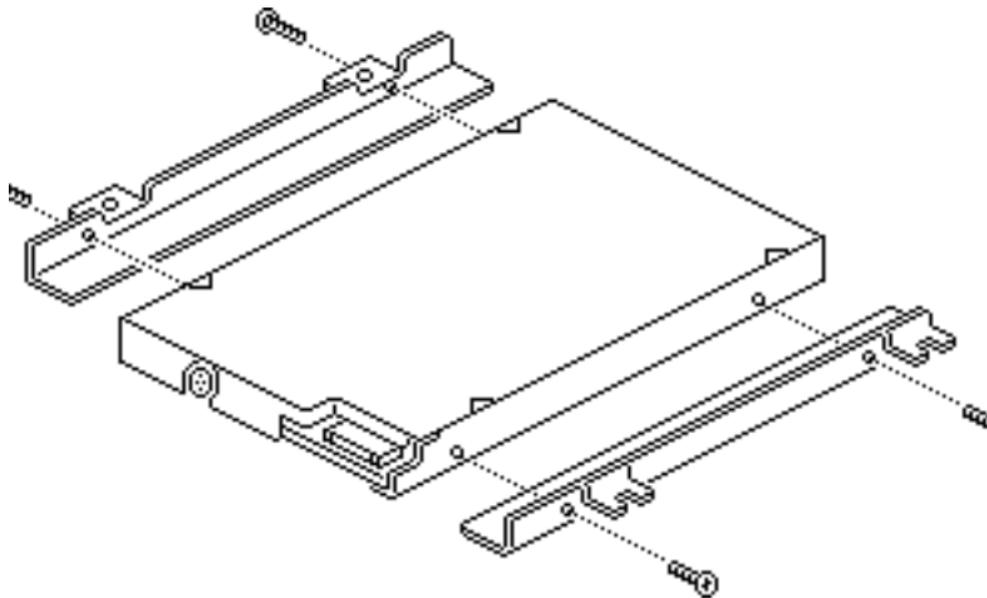
7   Using a #0 Phillips
    screwdriver, remove
    the four screws securing
    the left and right floppy
    drive brackets.

8   Remove the brackets
    from the floppy drive.

Trackball Assembly label pointing to the trackball assembly
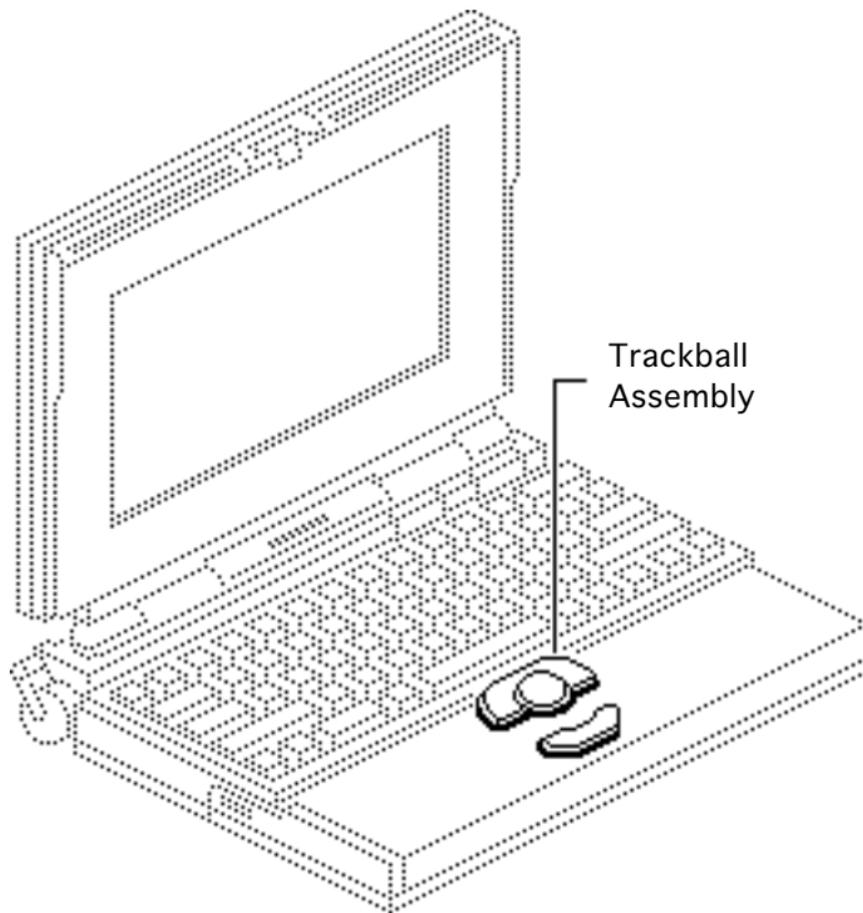
Trackball Assembly

Before you begin, remove the following:

- Main battery
- Top case

Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/Safety.

Trackball
Cable

Locking
Tab

Caution: The trackball cable is fragile and should be handled with care.

1 Pull out the locking tab on the trackball connector and disconnect the trackball cable.
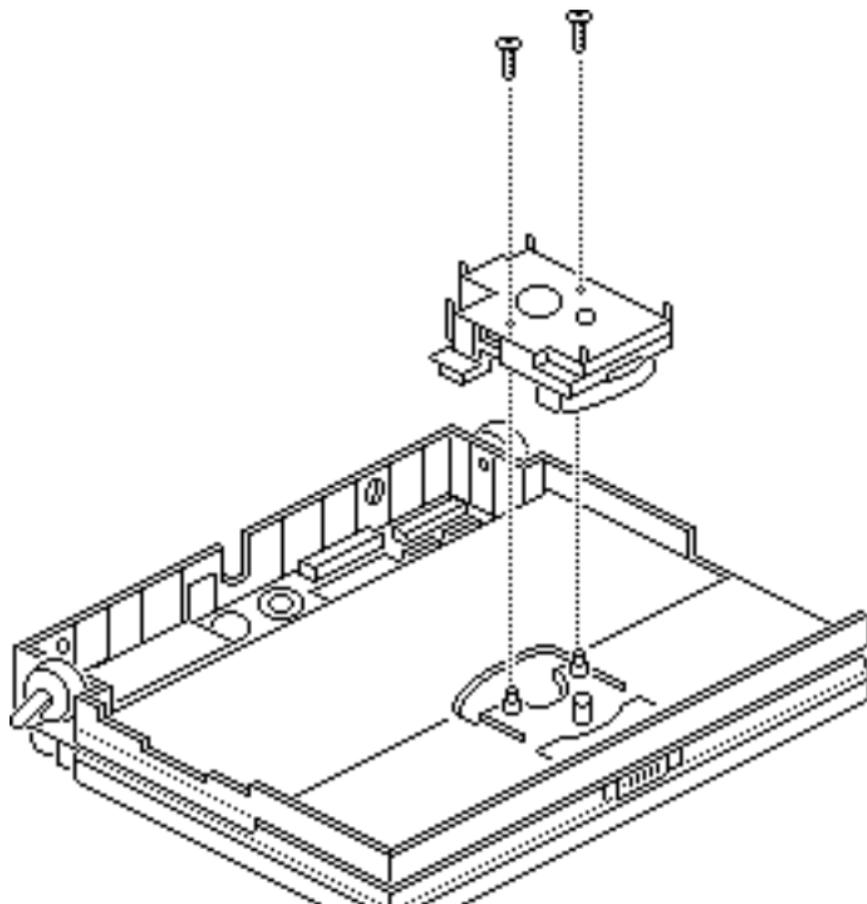
2 Using a T-8 torx driver, remove the two mounting screws and lift the trackball assembly out of the top case.
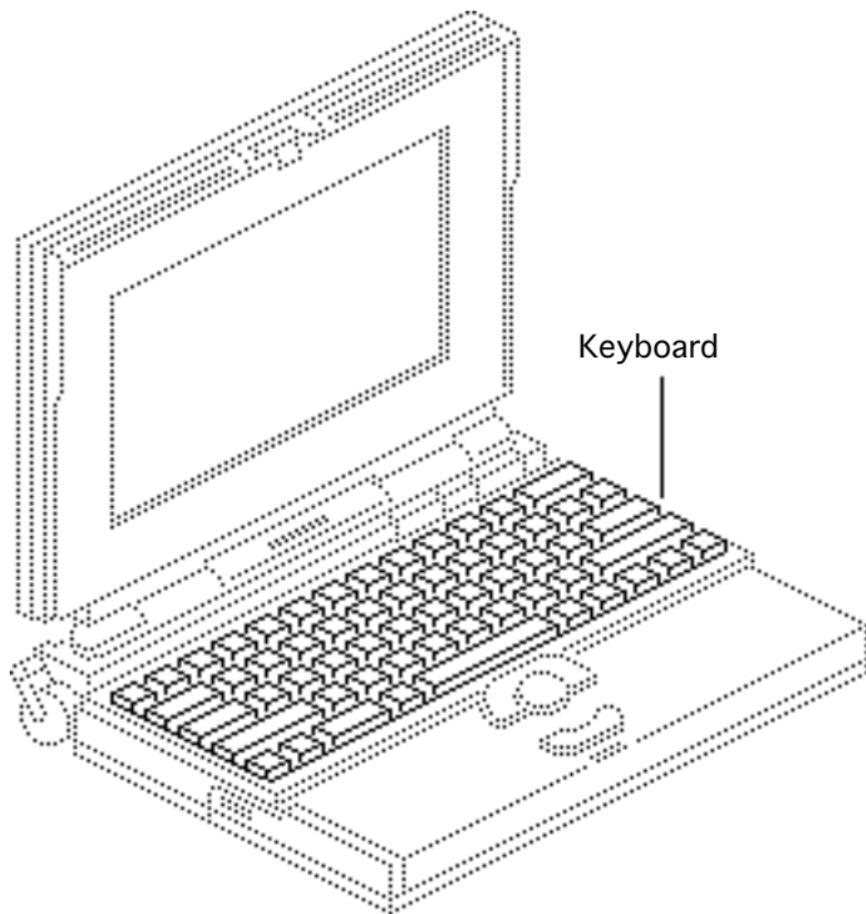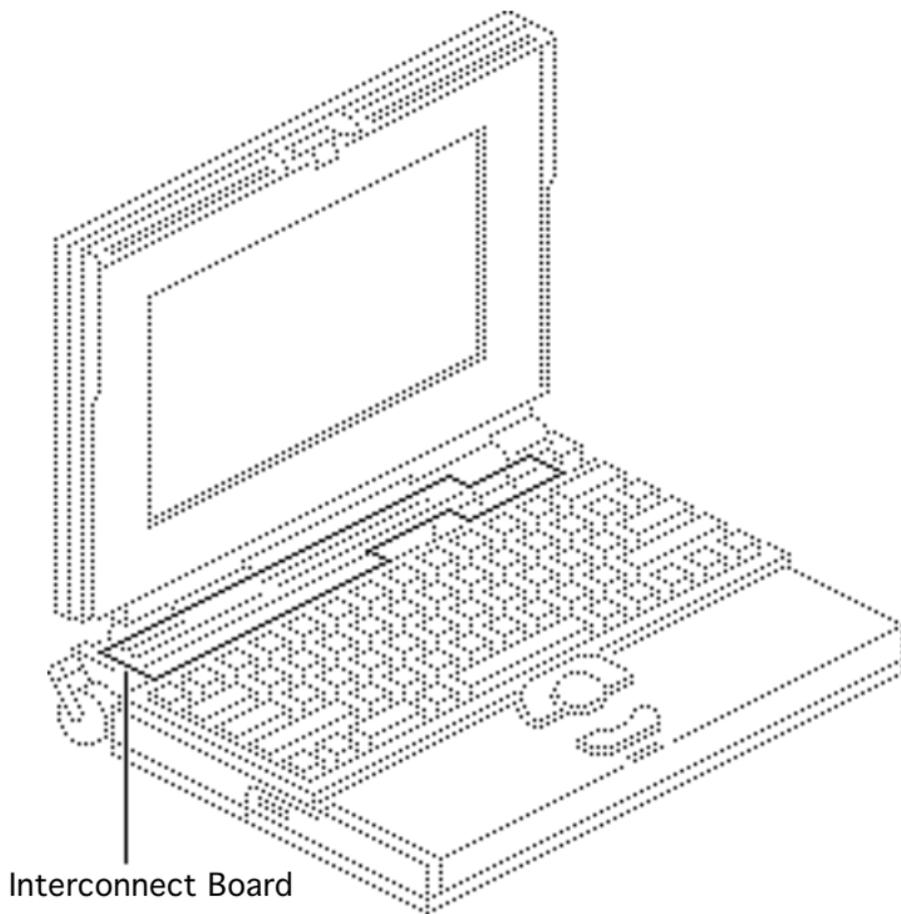
Keyboard

Before you begin, remove the following:

- Main battery
- Top case
- Trackball assembly

Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/Safety.

Keyboard

Keyboard
Cables

Caution: The keyboard ribbon cables are fragile and should be handled with care.

1 Lift up the locking tabs on the two keyboard connectors and disconnect the keyboard cables.
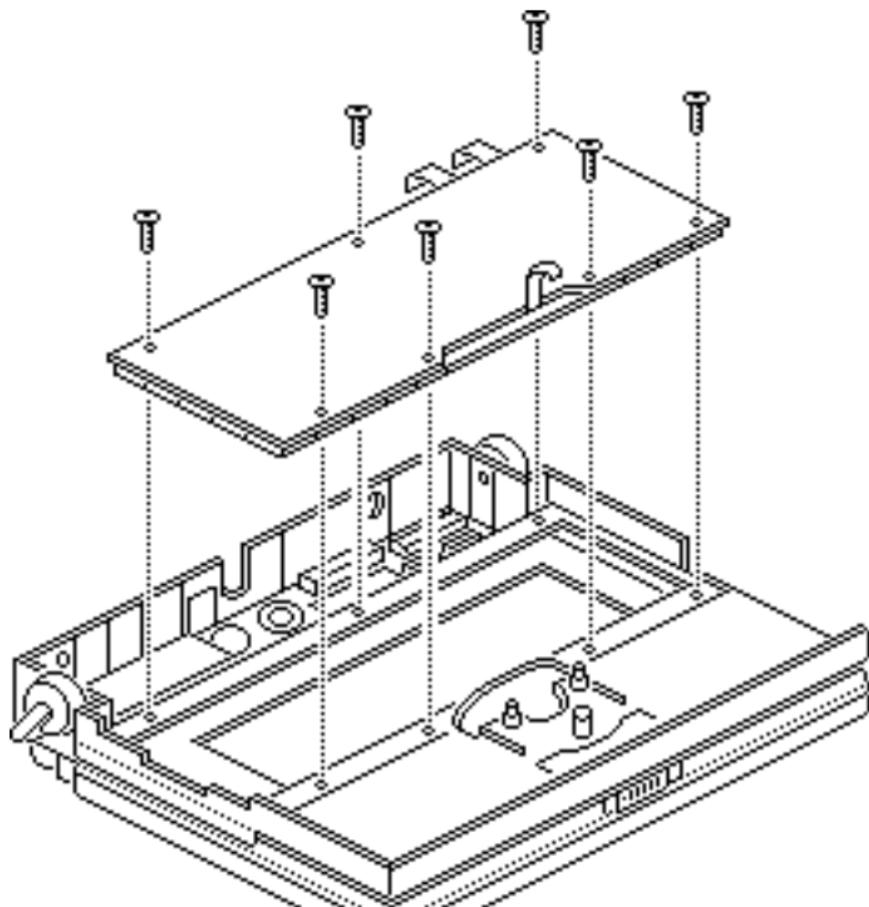
2 Using a T-8 torx driver, remove the seven mounting screws and lift the keyboard out of the top case.
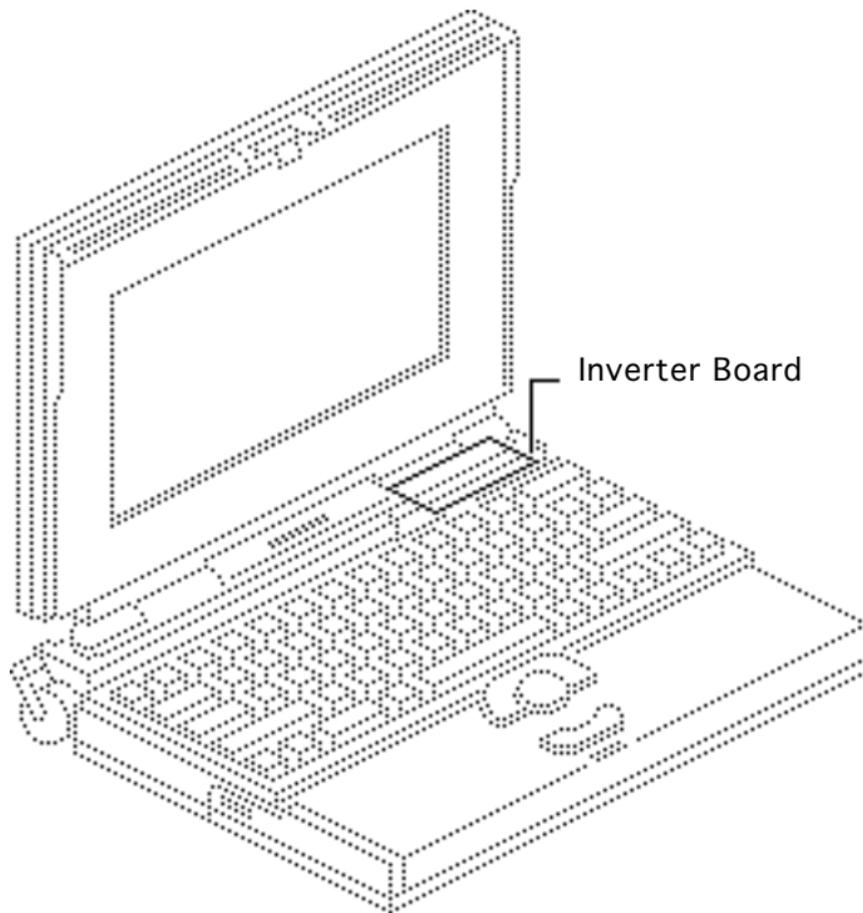
Inverter Board

Before you begin, remove the following:

- Main battery
- Top case

Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/ Safety.

Inverter Board

Inverter Shield

Inverter Cable
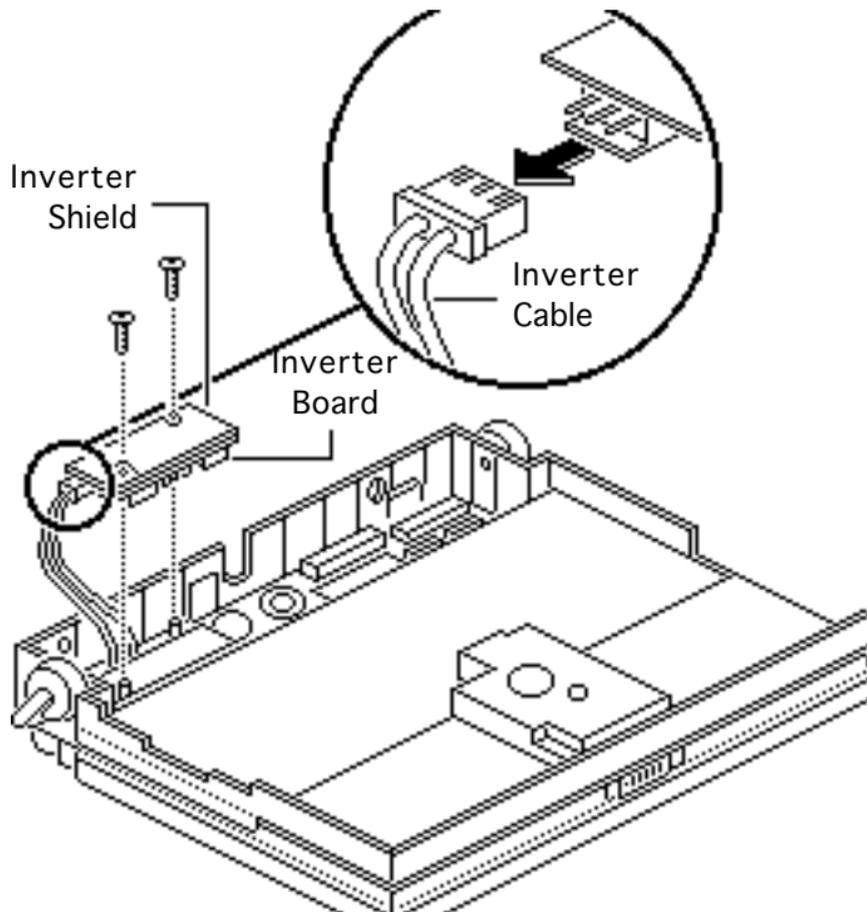
Inverter Board

1. Remove the two mounting screws that secure the inverter board to the bottom case.

2. **Note:** Do not remove the inverter shield from the inverter board.

   Pull the inverter board and attached shield straight up and off the connector on the interconnect board.

3. Disconnect the inverter cable.

Replacement Note: Inverter shields are available from

Brightness Pot   Contrast Pot

Inverter Board

Actuator   Actuator
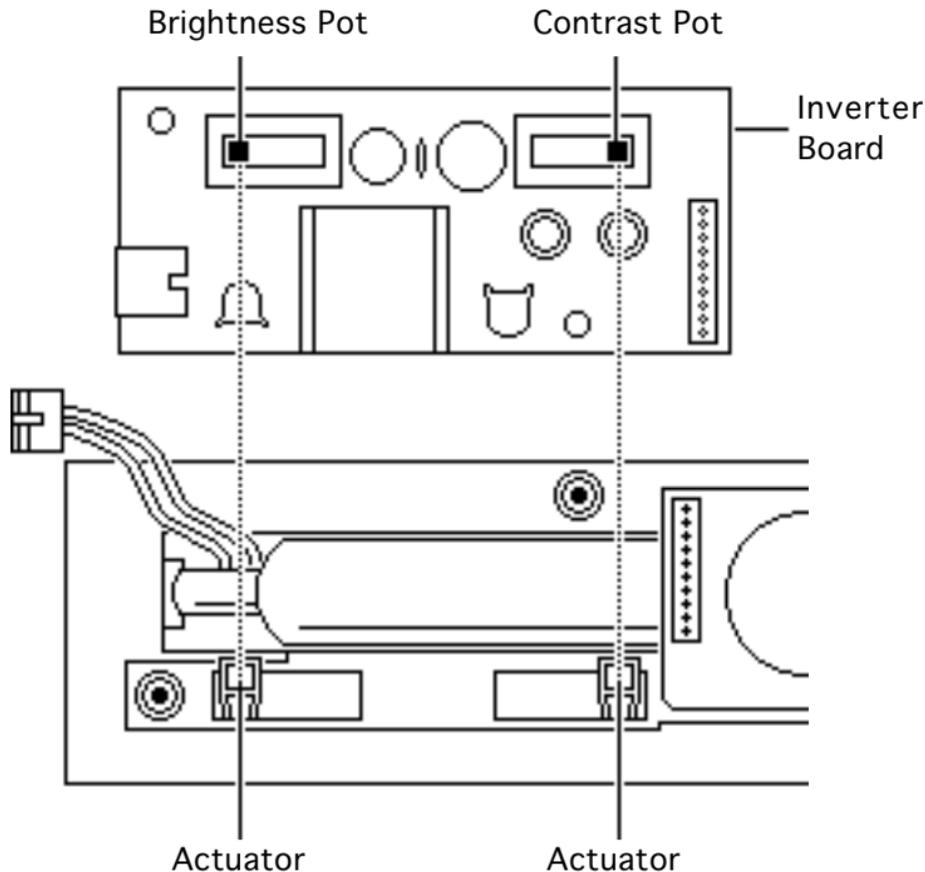
the Service Price Pages. If you are replacing a defective inverter that has an inverter shield installed, order both the inverter board and the inverter shield. Do not reuse the original inverter shield.

Replacement Note: Be sure to align the brightness and contrast pots on the inverter board with the plastic actuators on the top case. It is easiest to align the pots and actuators if you set both to their extreme outer positions.
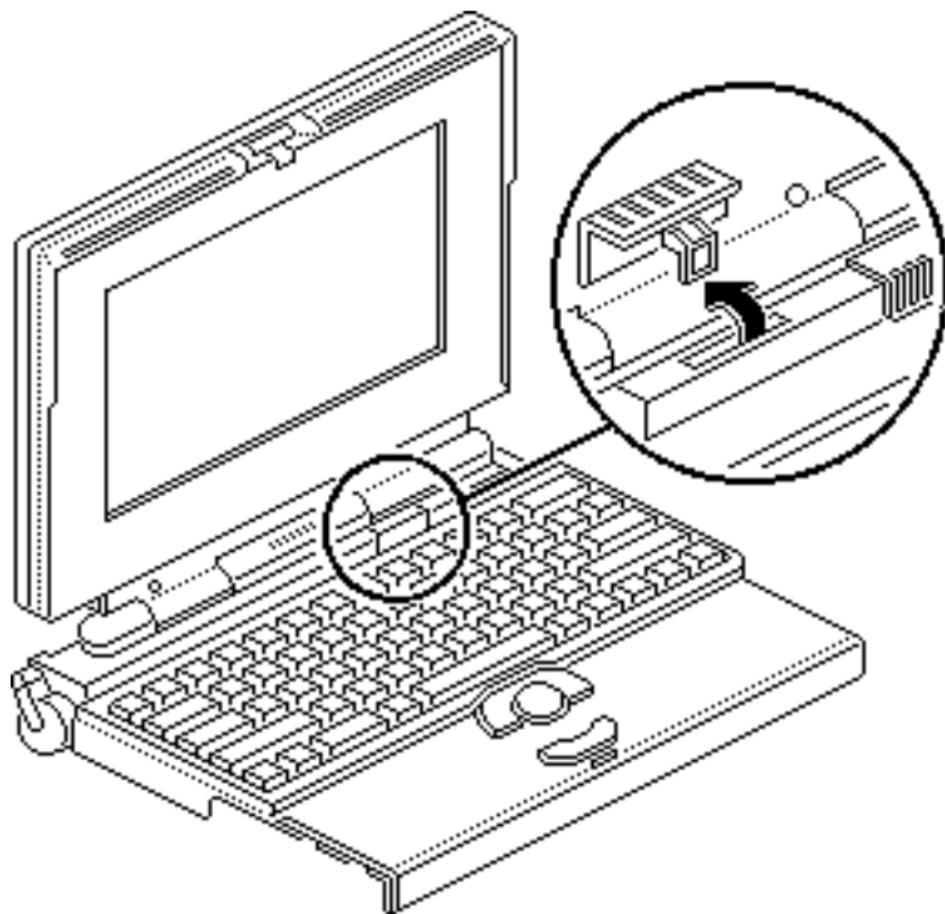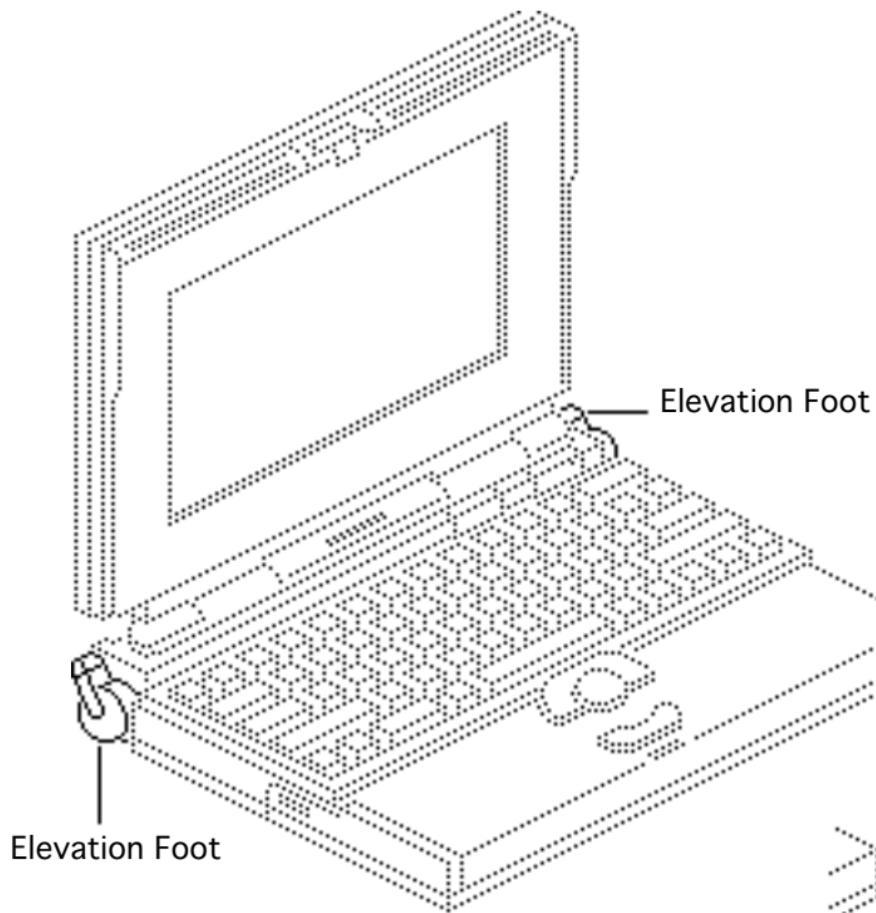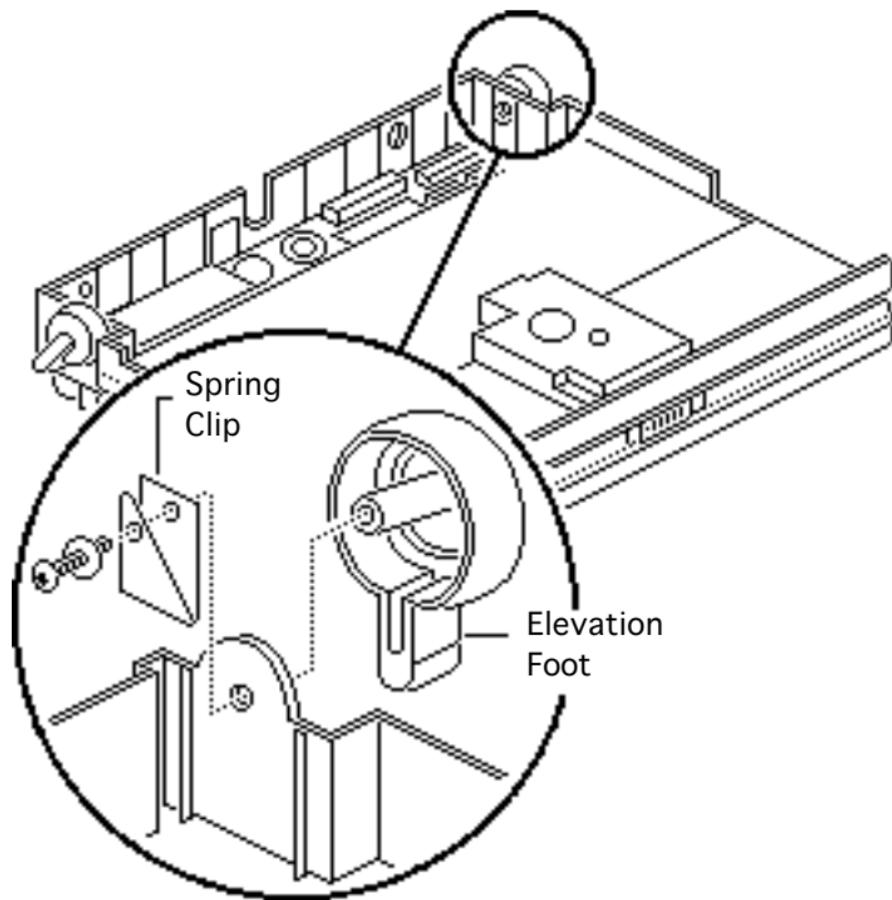
Interconnect Board

Interconnect Board

Before you begin, remove the following:
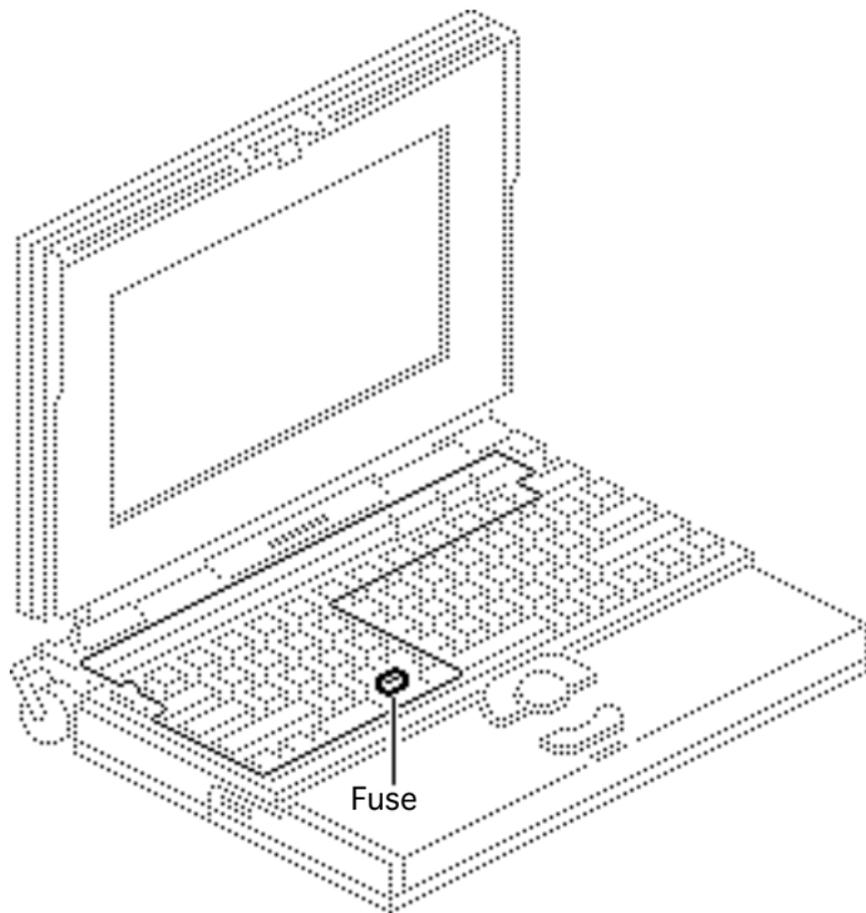
- Main battery
- Top case
- Inverter board

Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/Safety.
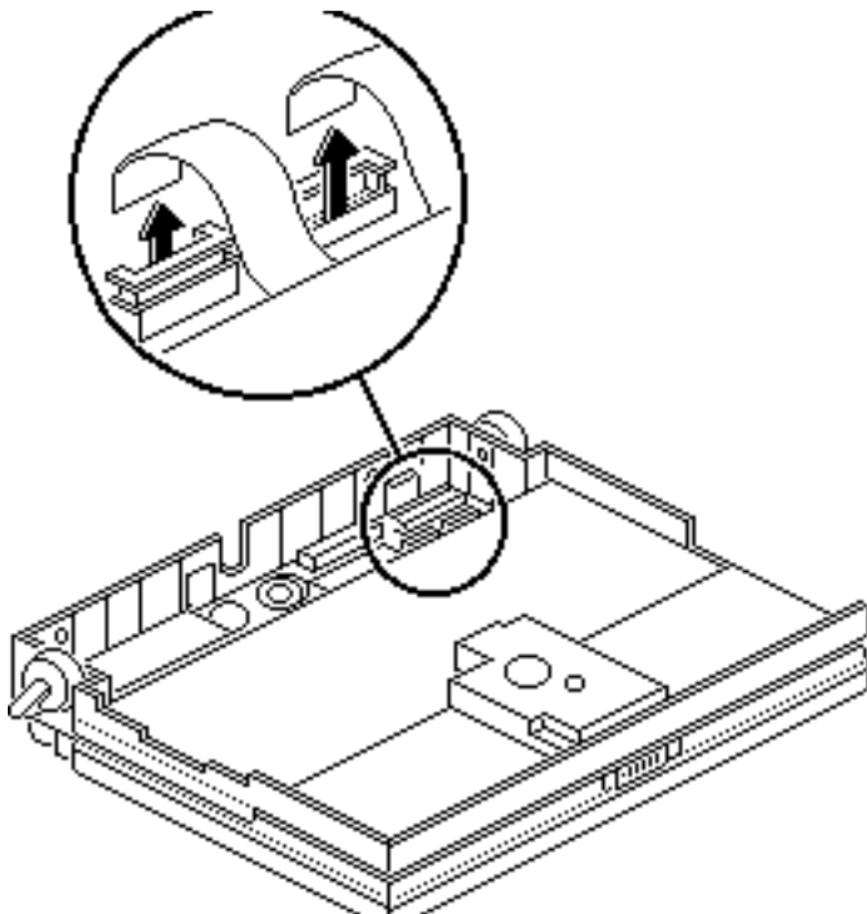
⚠ Warning: The interconnect board contains hazardous materials. Return bad interconnect boards to Apple for proper disposal.

1 **Caution:** The keyboard and display ribbon cables are fragile. Handle these cables with care.

Lift up the locking tabs on the two keyboard connectors and disconnect the keyboard cables.
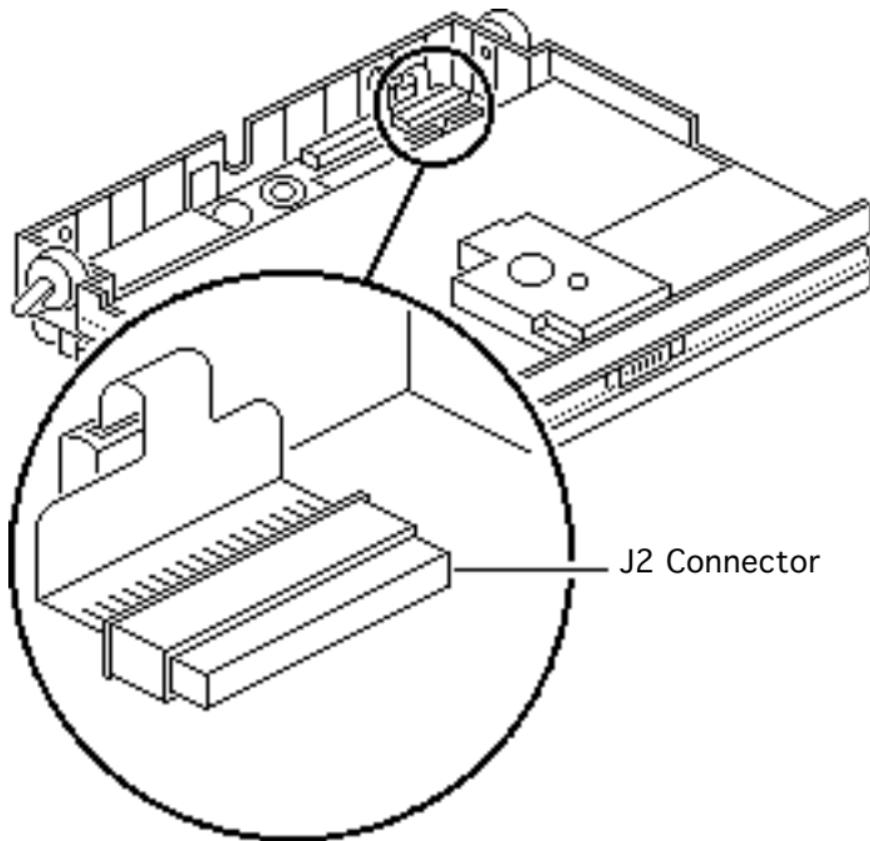
J2 Connector

2 **Note:** The display cable will not come entirely out of the connector until you remove the interconnect board from the top case.

Pull out the locking tab on connector J2 and ease the display cable out of the connector as far as the cable will go.

Replacement Note: Connect the display cable before replacing the interconnect board.
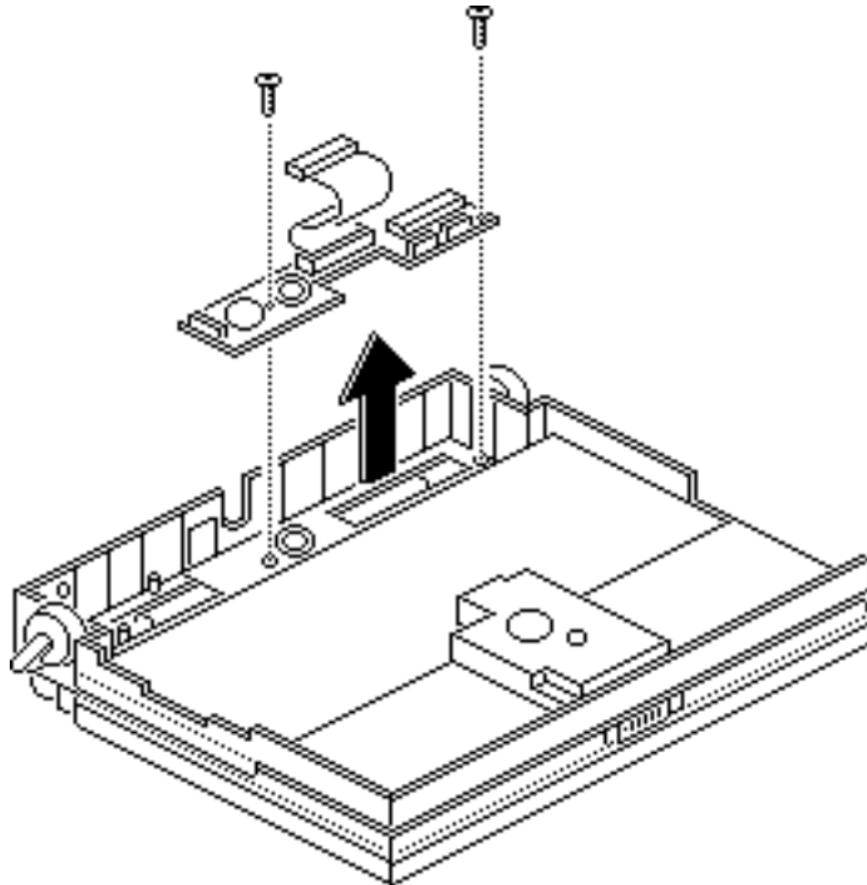
3 Using a T-8 torx driver,
   remove the two mounting
   screws and lift the
   interconnect board from
   the top case.
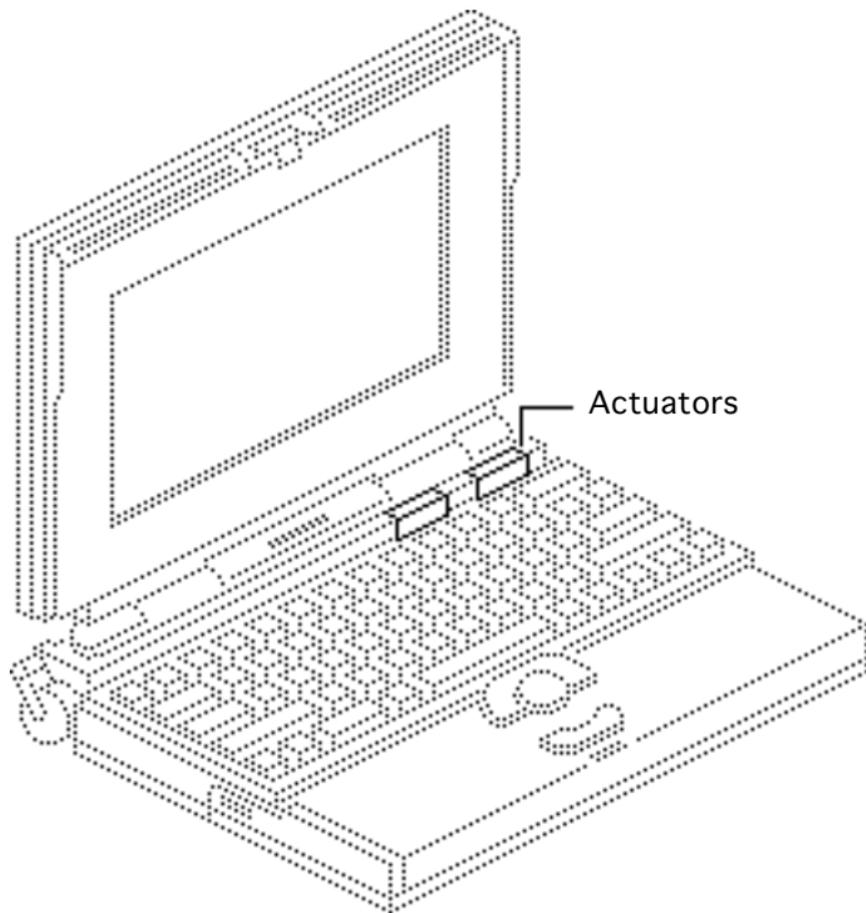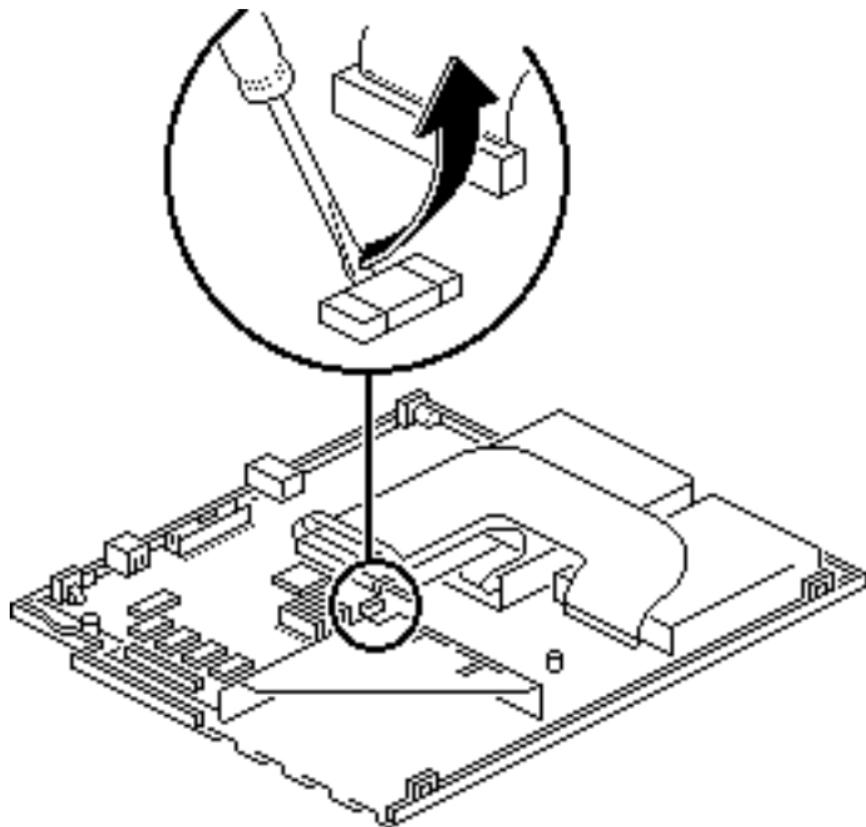
Actuators

Actuators

Before you begin, remove the following:

- Main battery
- Top case
- Inverter board

Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/ Safety.

1 Pull up the contrast actuator, rotate it toward the display, and remove the actuator from the top case.

2 Repeat for the brightness actuator.

Elevation Foot

Elevation Foot

Elevation Feet

Before you begin, remove the following:

- Main battery
- Top case

Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/Safety.

Spring
Clip

Elevation
Foot

1 Using a T-8 torx driver, remove the torx screw and washer and the spring clip from the inside of the elevation foot.

2 Pull off the elevation foot.

Fuse

Before you begin, remove the following:

- Main battery
- Top case

Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/Safety.

Fuse

1   Using a small flat-blade screwdriver, pry up and remove the fuse.

Logic Board

Logic Board

Before you begin, remove the following:

- Main battery
- Top case
- RAM expansion card (if present)
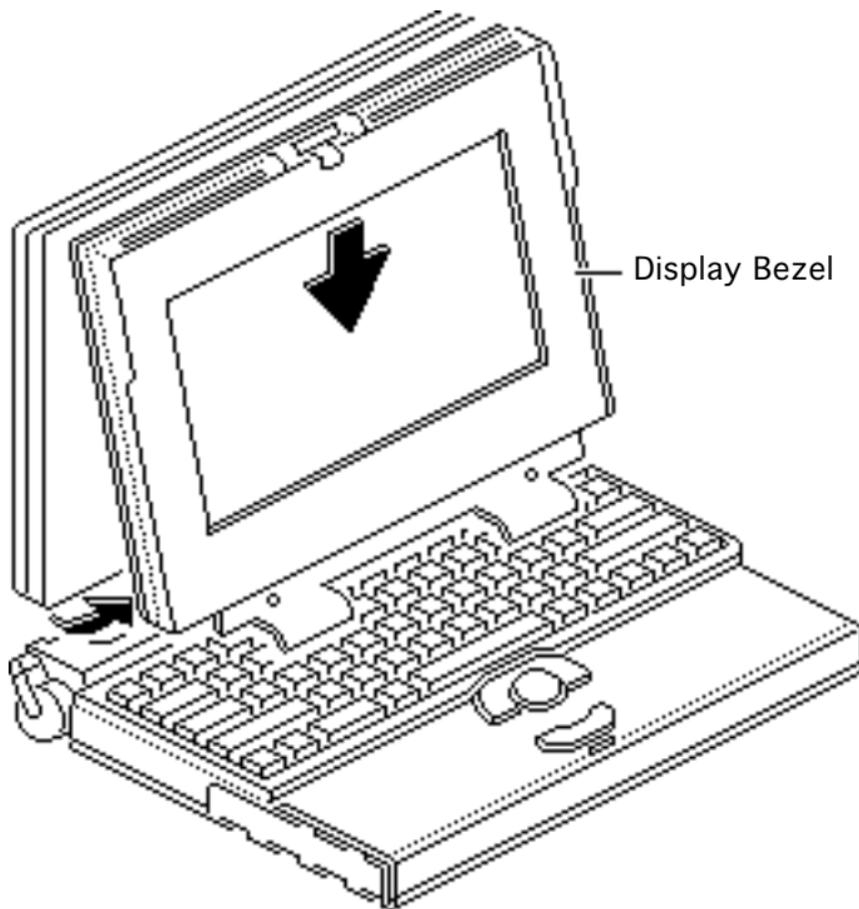- Modem board (if present)

Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/Safety.

Hard Drive Cable
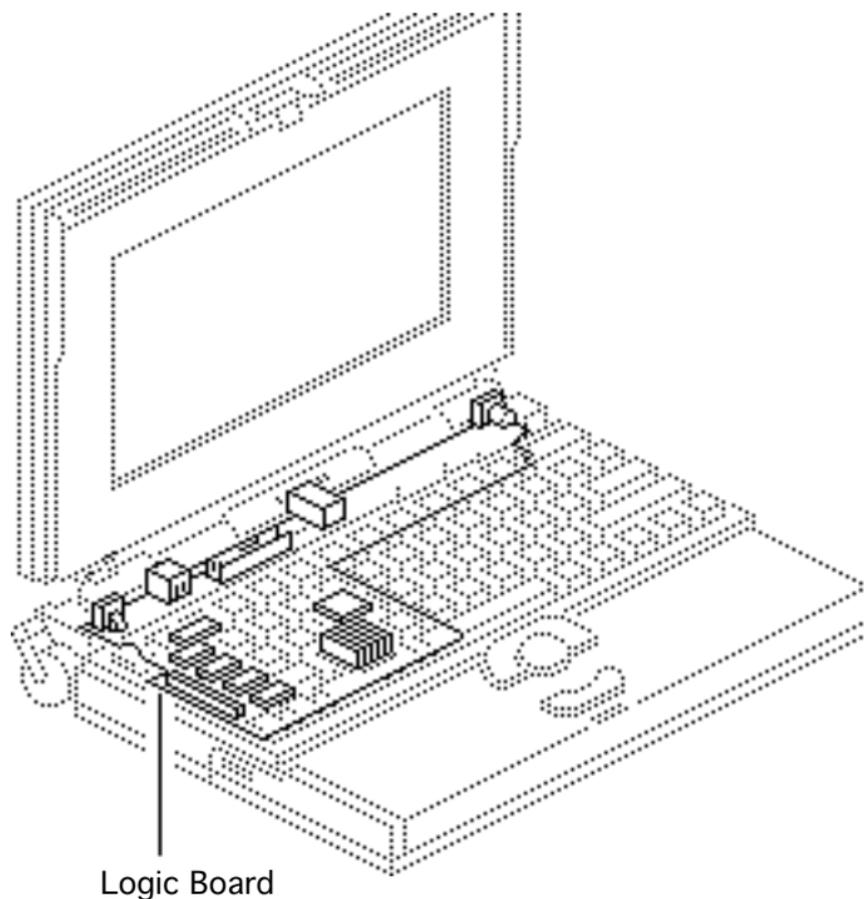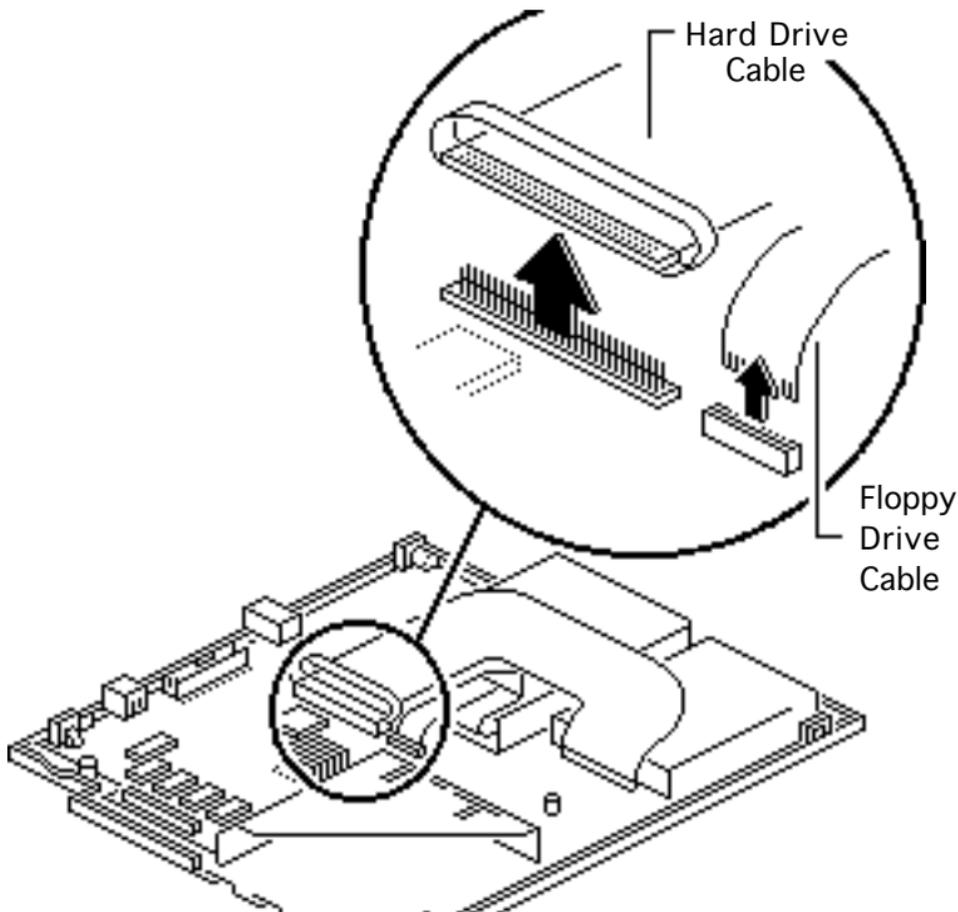
Floppy Drive Cable

Caution: The hard drive and floppy drive cables are fragile. Handle them with care.

1 Disconnect the hard drive cable from the logic board.

2 Lift up the locking tabs and disconnect the floppy drive cable from the logic board.

Hex Nut Screw

Torx Screw

Tall Hex Nut
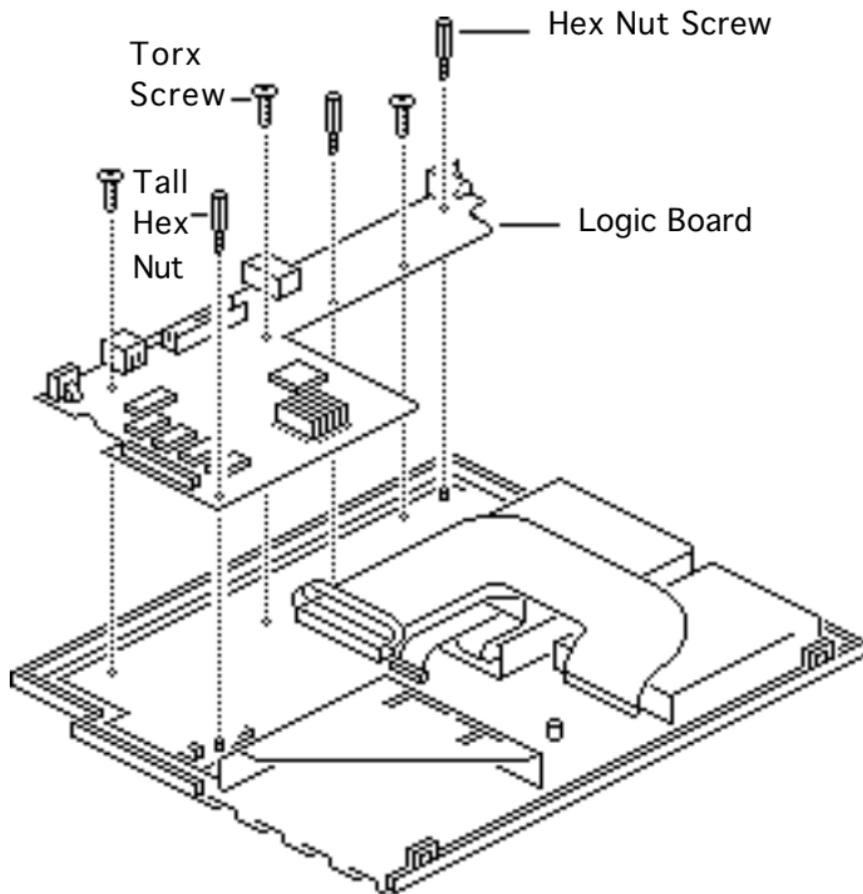
Logic Board

3　Remove the three hex nut screws and three torx screws that secure the logic board to the bottom case.

4　Lift the logic board out of the bottom case.

Replacement Note: Replace the tall hex nut screw in the corner of the logic board nearest the RAM card connector.
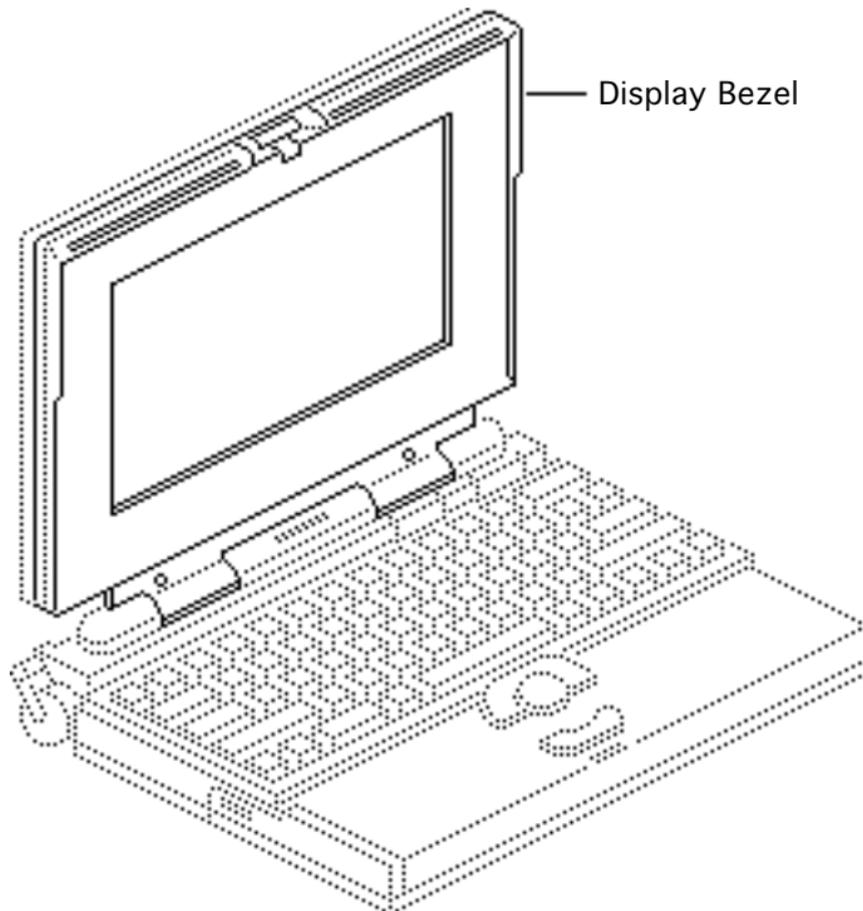
Display Bezel

Display Bezel

Before you begin, remove the main battery.

Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/ Safety.
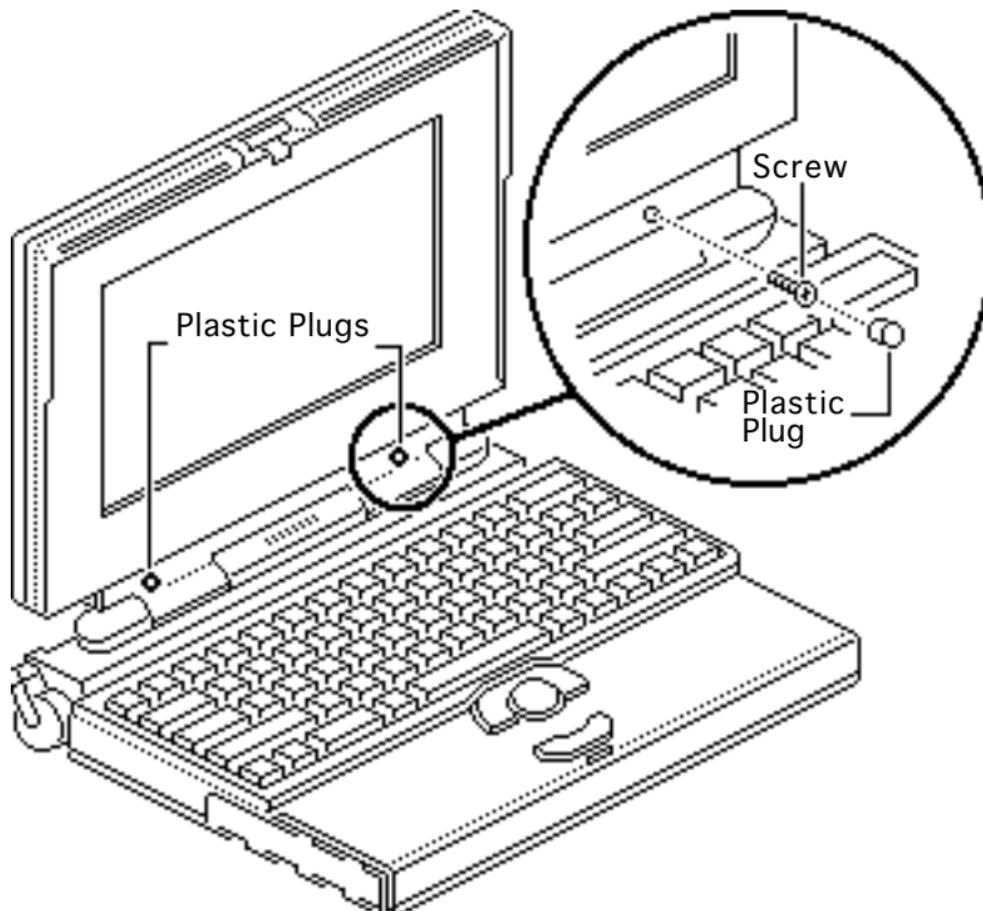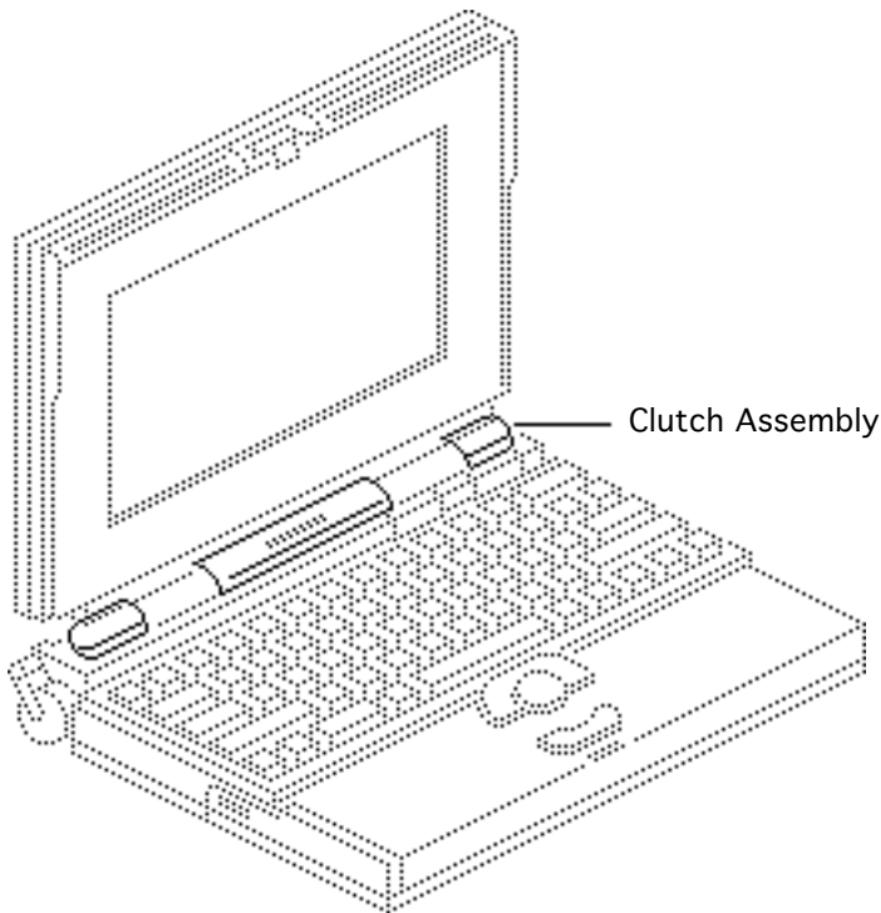
1 Remove the two plastic plugs.

2 Using a T-8 torx driver, remove the two bezel mounting screws from the display.

Display Bezel

3 Pull the display bezel down and away from the display and release the bezel from the mounting tabs at the top and sides of the display.
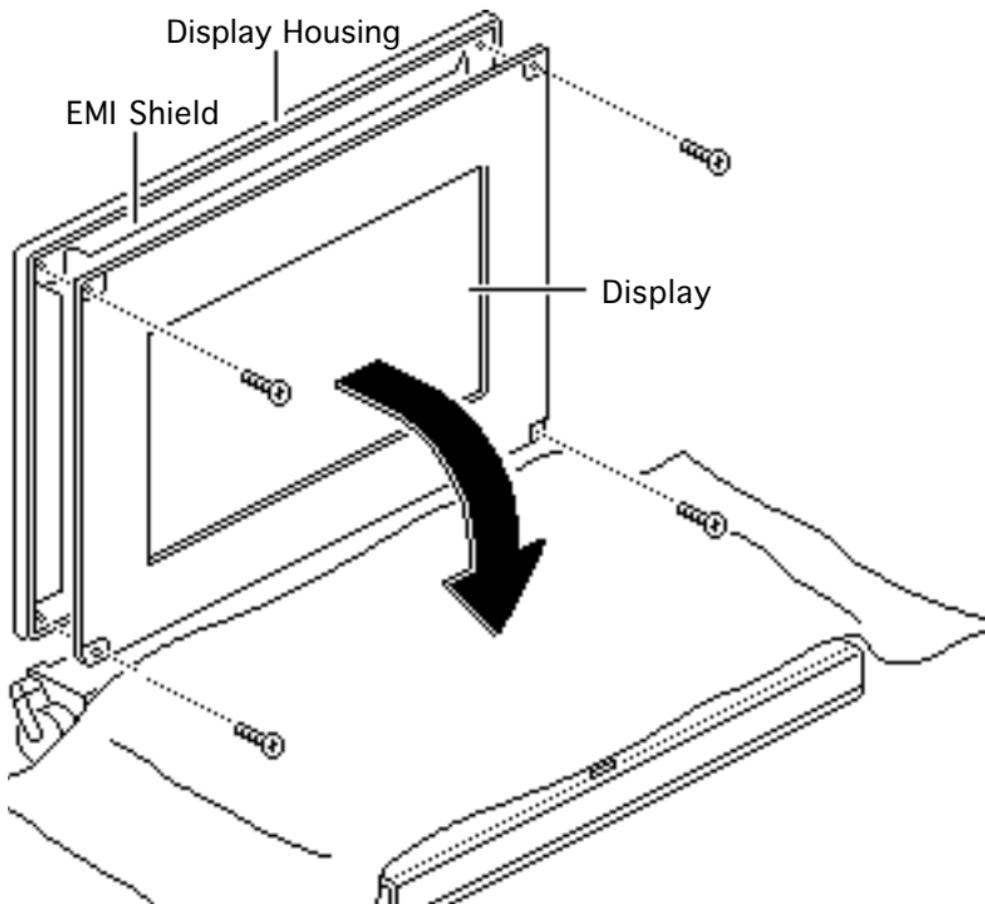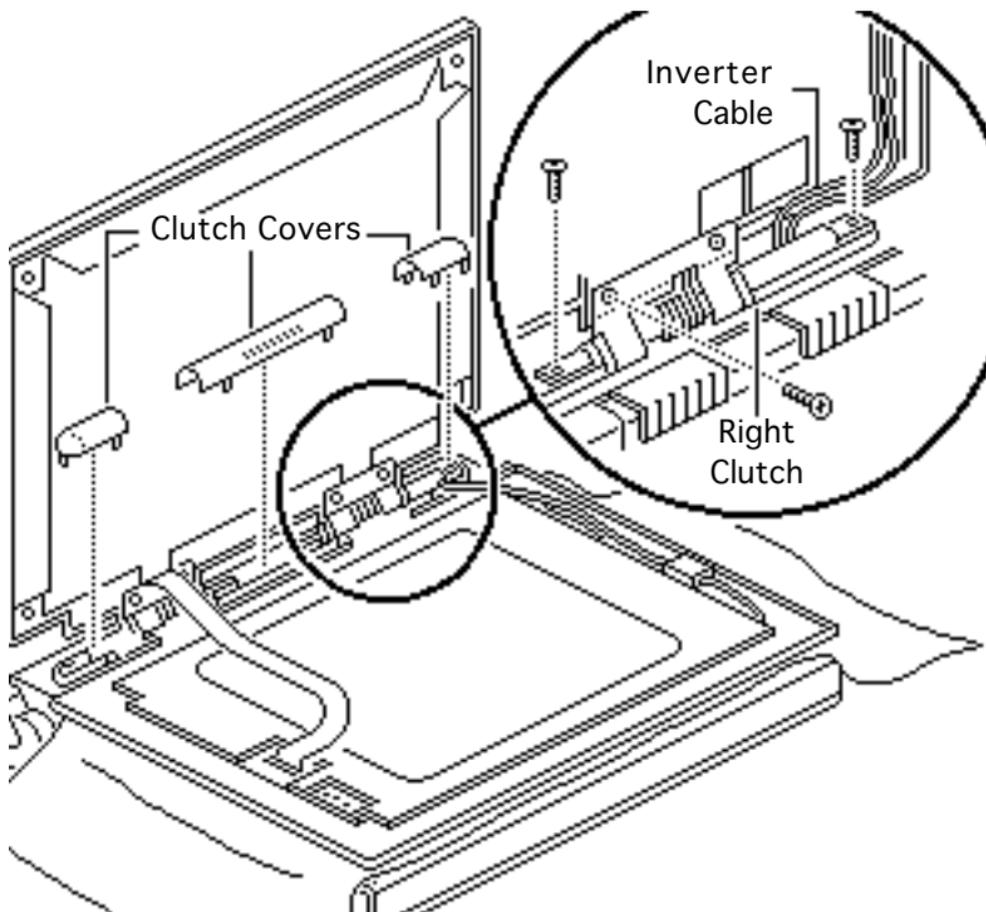
4 Lift the bezel off the display.

Clutch Assembly

Clutches/Display Housing

Before you begin, remove the following:

- Main battery
- Display bezel

Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/Safety.

Display Housing

EMI Shield

Display

1. Cover the keyboard with a clean cloth or sheet of paper.

2. Using a T-8 torx driver, remove the four display mounting screws.

3. Remove the display from the housing and EMI shield.

4. Place the display face-down on the keyboard.
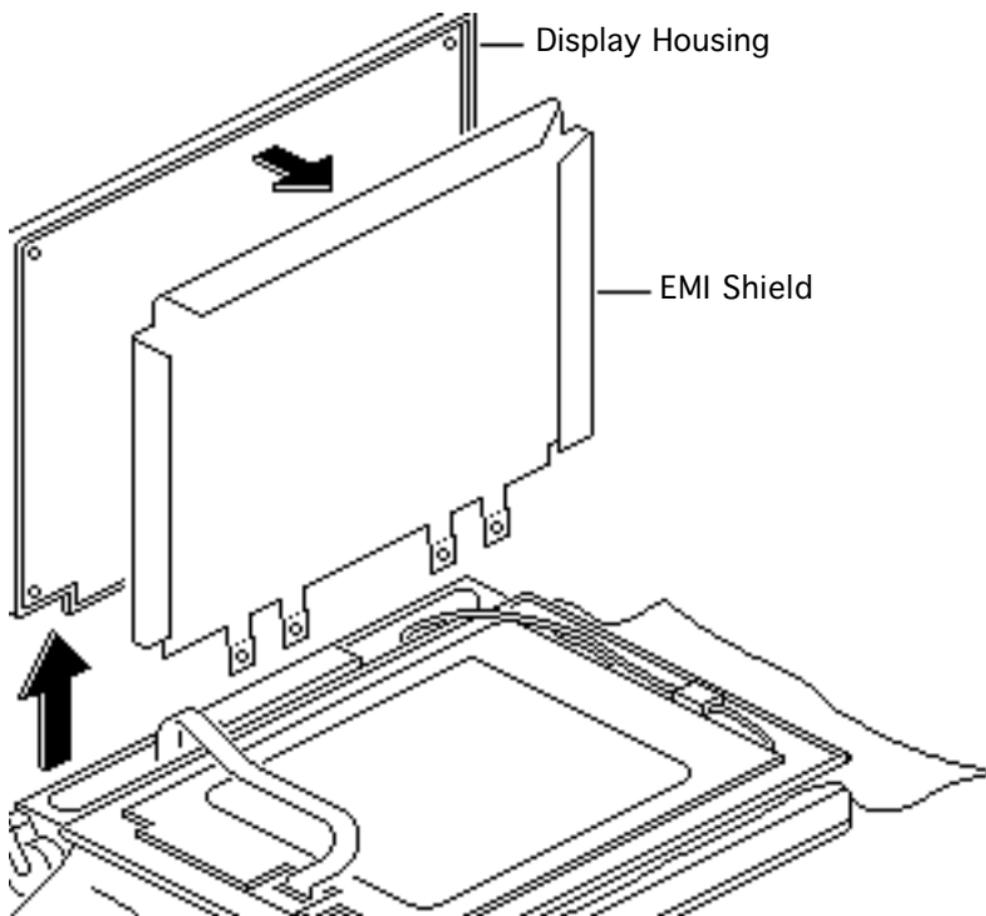
Inverter Cable

Clutch Covers

Right Clutch

5 Pull off the three clutch covers.

6 Using a T-8 torx driver, remove the three mounting screws from the left and right clutches.

7 Remove the left and right clutches from the display housing.

Replacement Note: Replace the short mounting screws in the top-inside clutch threadings. The top-outside threadings are used to mount the bezel.
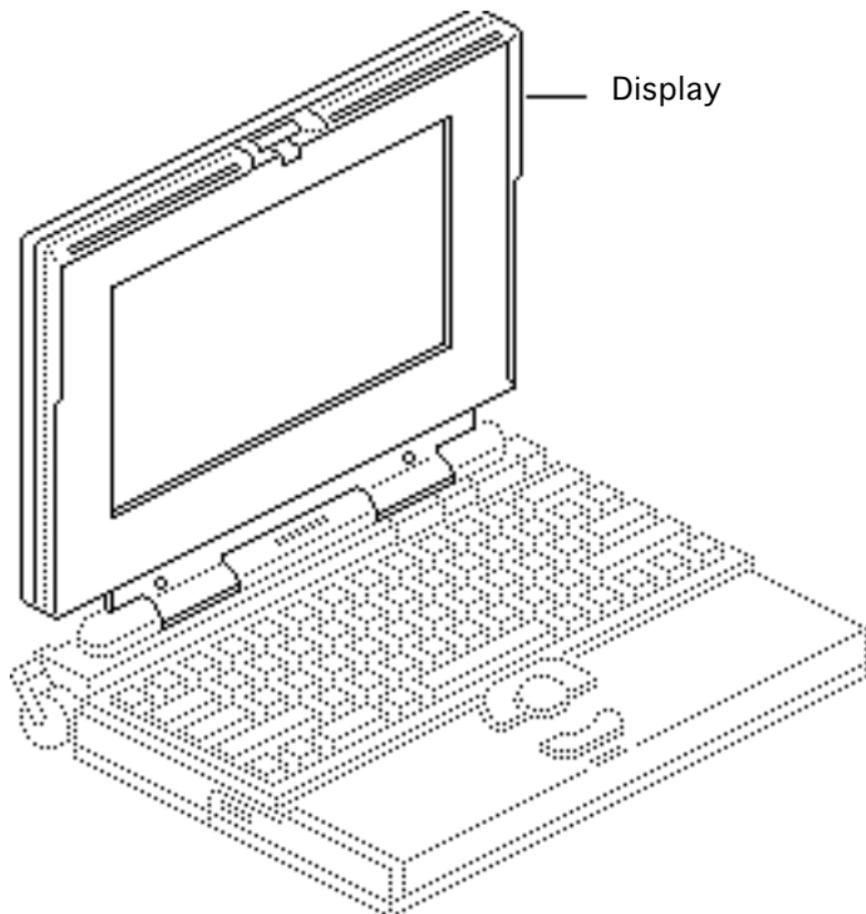
Display Housing

EMI Shield

Replacement Note: To avoid pinching the inverter cable, make sure it routes as illustrated.

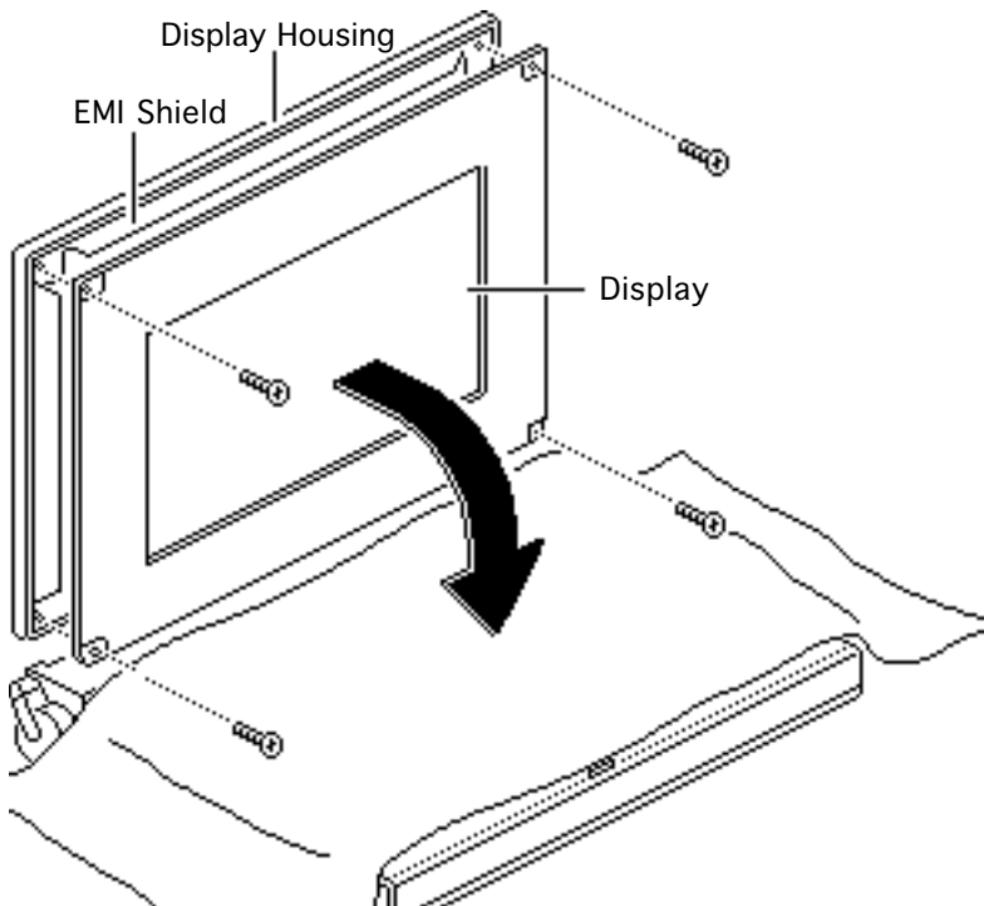8 Remove the display housing and EMI shield from the case.

Display

Display

Before you begin, remove the following:

- Main battery
- Display bezel

Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/Safety.
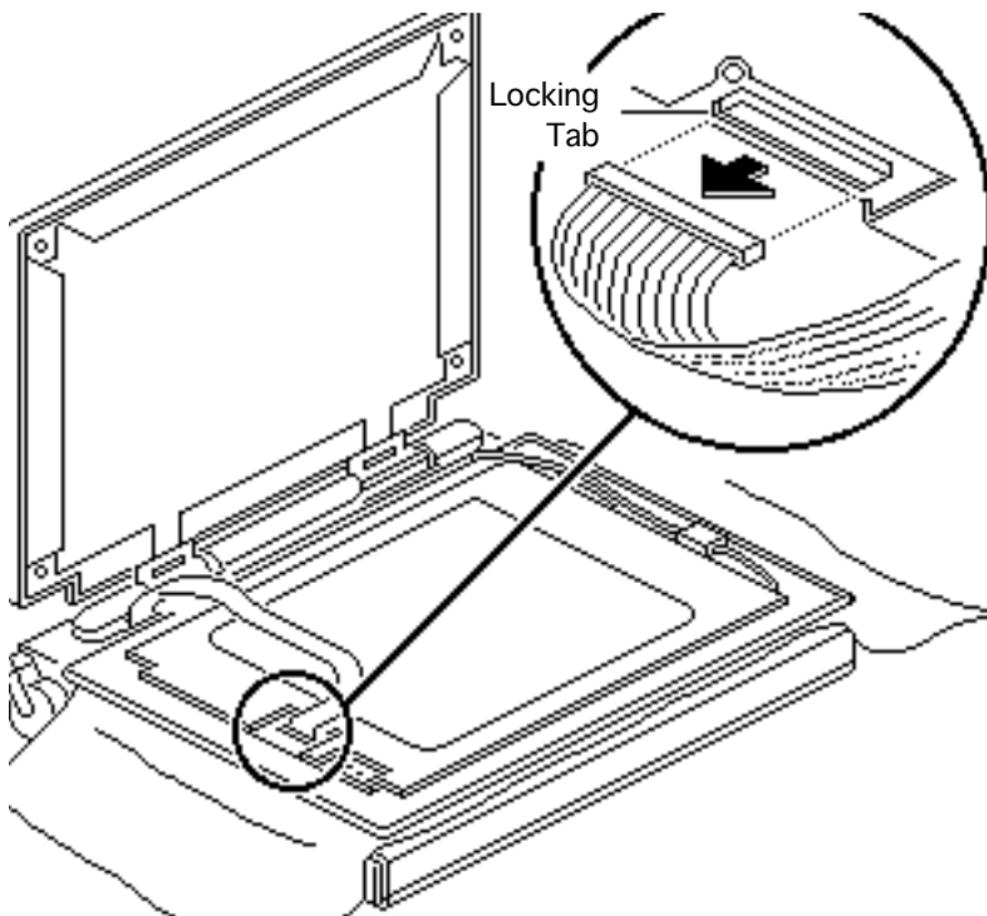
Display Housing

EMI Shield

Display

Caution: The display cable is fragile and should be handled with care.
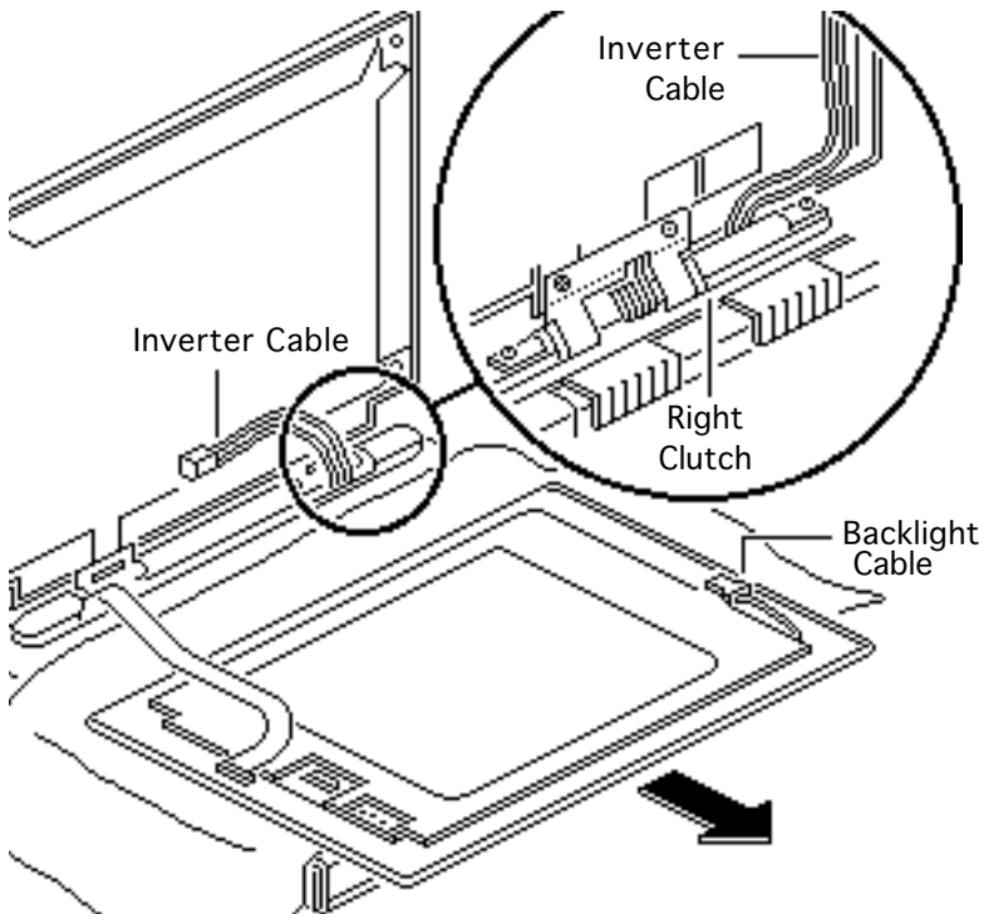
1 Cover the keyboard with a clean cloth or sheet of paper.

2 Using a T-8 torx driver, remove the four display mounting screws.

3 Remove the display from the housing and EMI shield.

4 Place the display face-down on the keyboard.

Locking Tab

5 Using a small flat-blade screwdriver, pry up and disconnect the display cable.

Inverter Cable

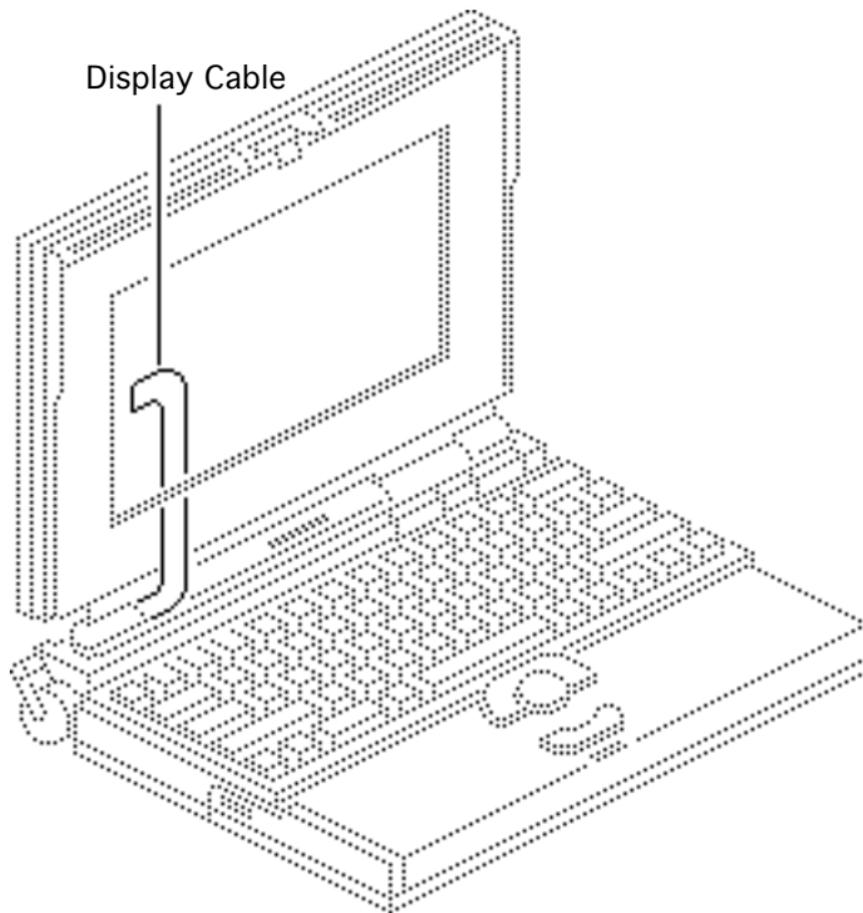Inverter Cable

Right Clutch

Backlight Cable

6 Disconnect the inverter cable from the display backlight cable.

7 Remove the display.

Replacement Note: To avoid pinching the inverter cable, make sure it routes as illustrated.
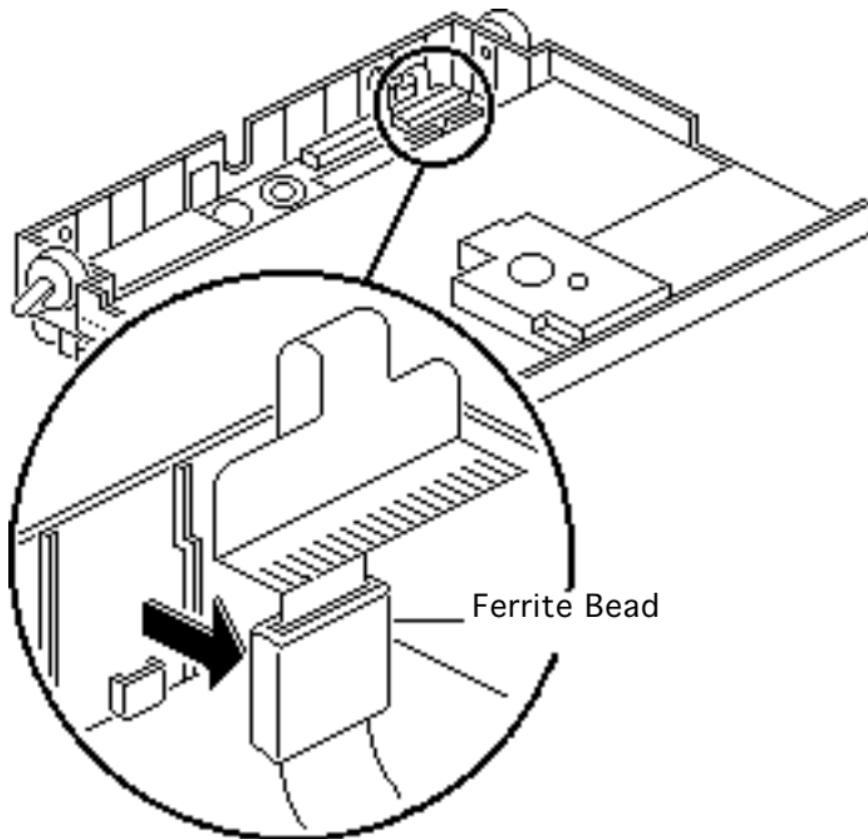
Display Cable

Display Cable

Before you begin, remove the following:

- Main battery
- Top case
- Inverter board
- Interconnect board
- Display bezel
- Display

Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/Safety.
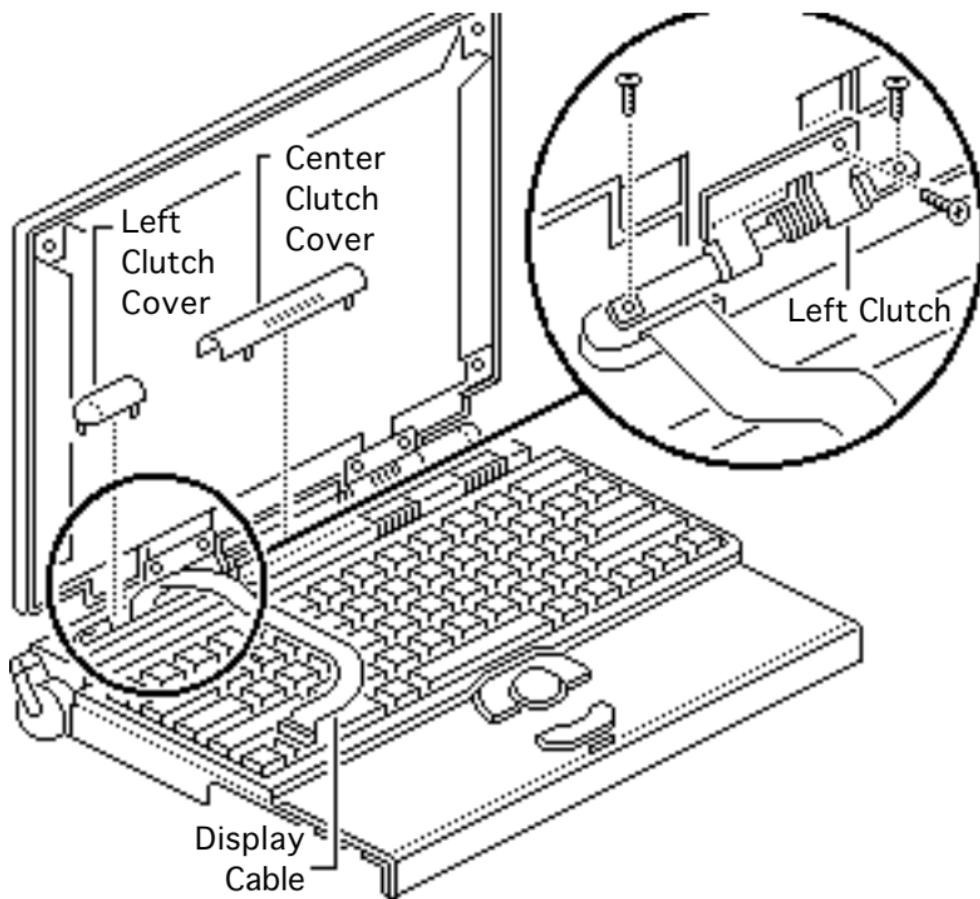
Ferrite Bead

Caution: The display cable is fragile and should be handled with care.

1 Pry the display cable ferrite bead from the case.

2 Pull off the center and left clutch covers.

3 Using a T-8 torx driver, remove the three mounting screws from the left clutch.

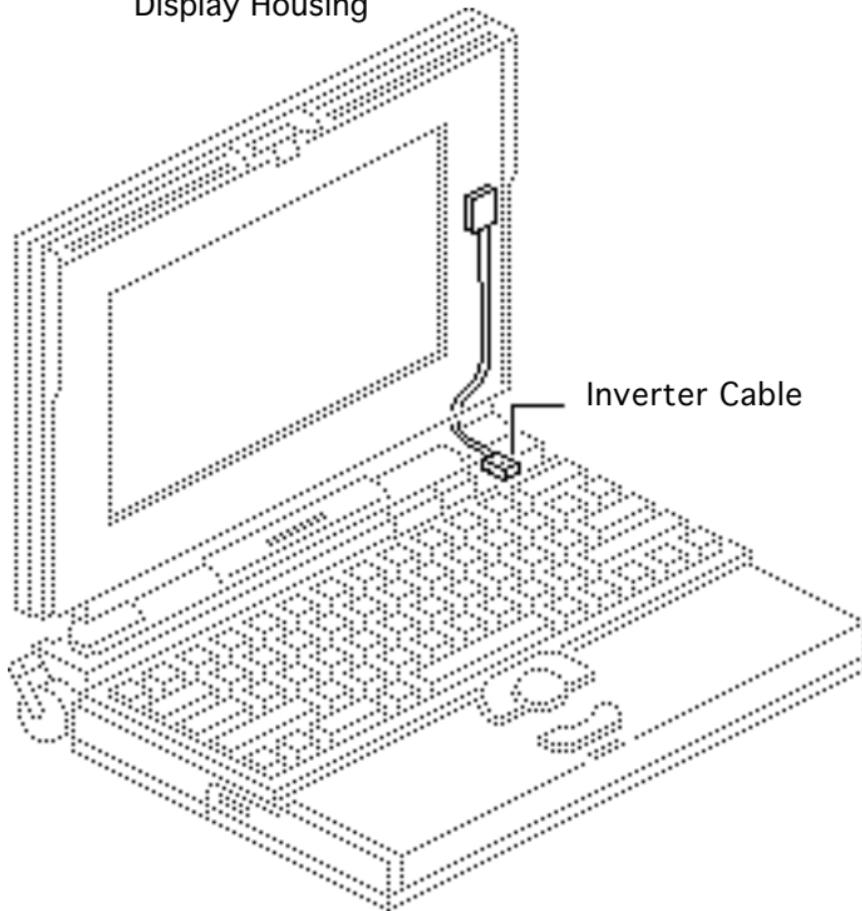4 Remove the clutch from the display housing.

Replacement Note: Replace the short mounting screw in the top-inside clutch threading. The top-outside threading is used to mount the bezel.

5 Remove the display cable from the case.
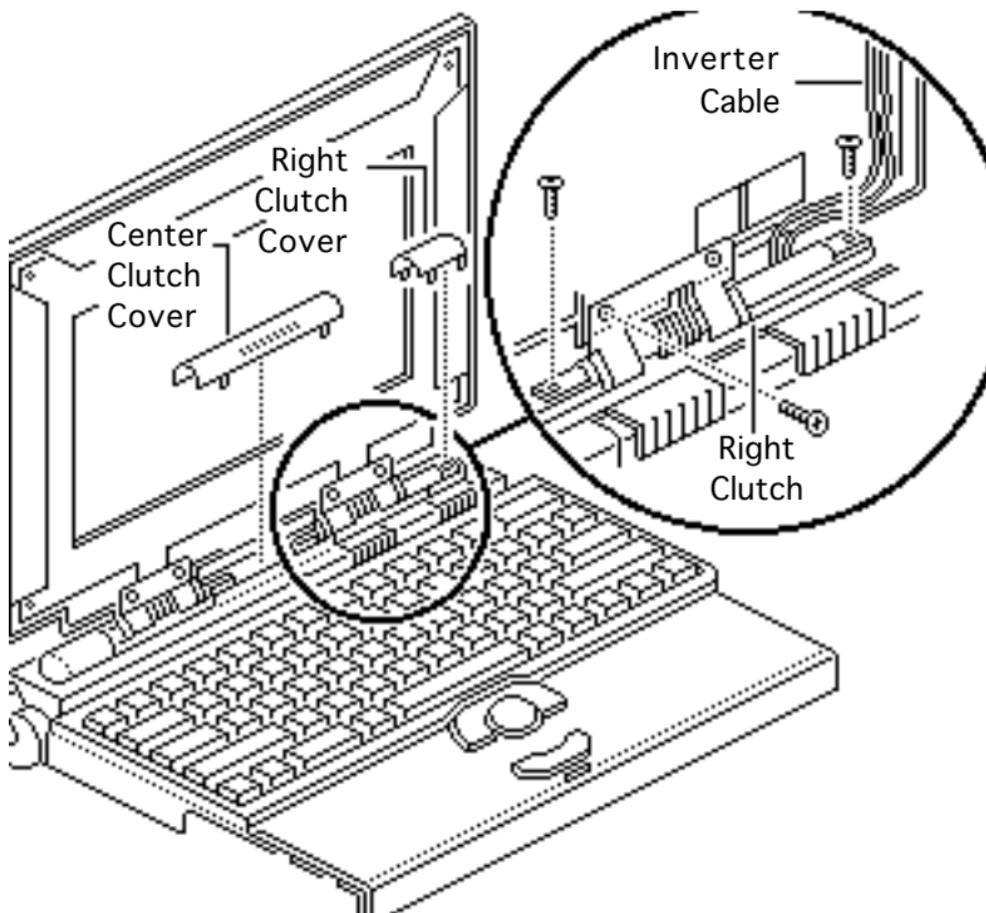
Display Housing

Inverter Cable

Before you begin, remove the following:

- Main battery
- Top case
- Inverter board
- Display bezel

Inverter Cable

Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/ Safety.
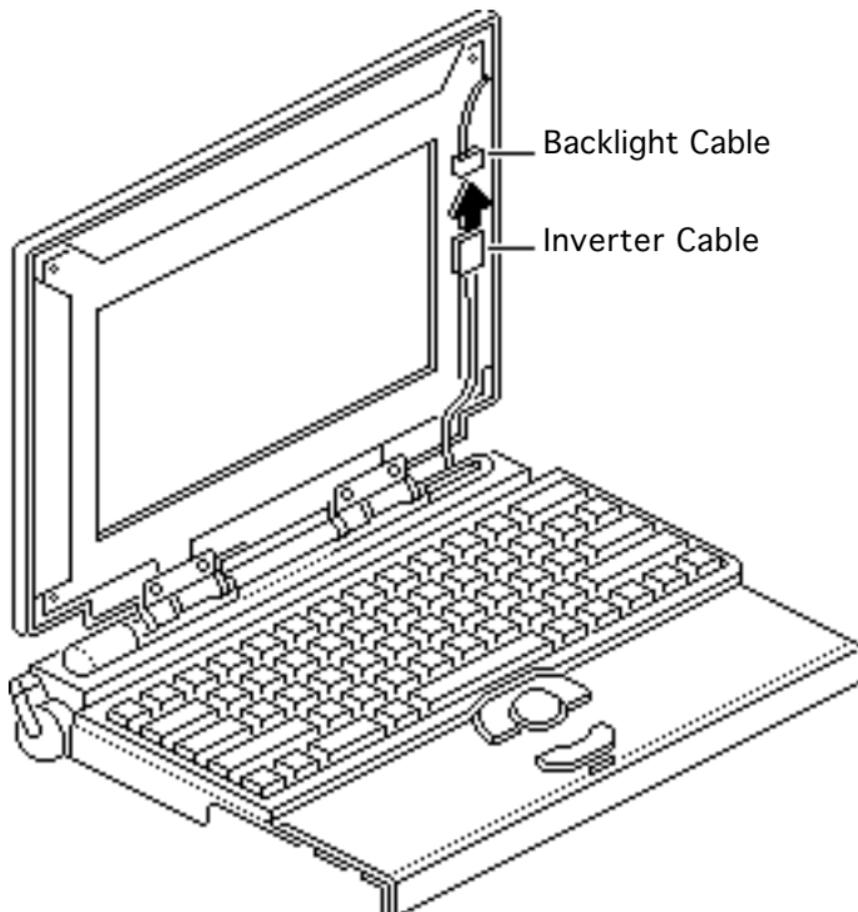
1 Pull off the center and right clutch covers.

2 Using a T-8 torx driver, remove the three mounting screws from the right clutch.

3 Remove the clutch from the display housing.

Replacement Note: Replace the short mounting screw in the top-inside clutch threading. The top-outside threading is used to mount the bezel.
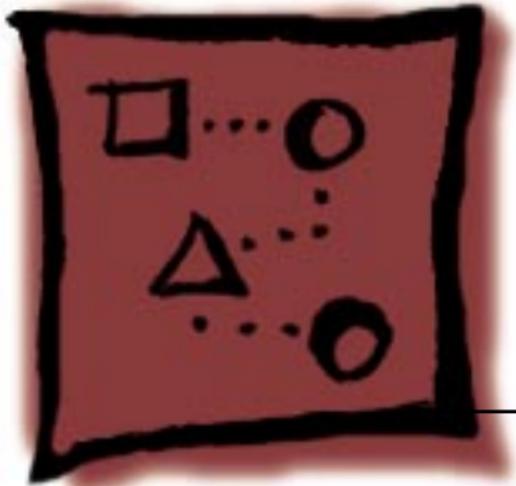
Backlight Cable

Inverter Cable

Replacement Note: To avoid pinching the inverter cable, make sure it routes as illustrated.

4 Fold back the right edge of the display EMI shield and disconnect the inverter cable from the backlight cable.

5 Remove the inverter cable from the case.

Upgrades

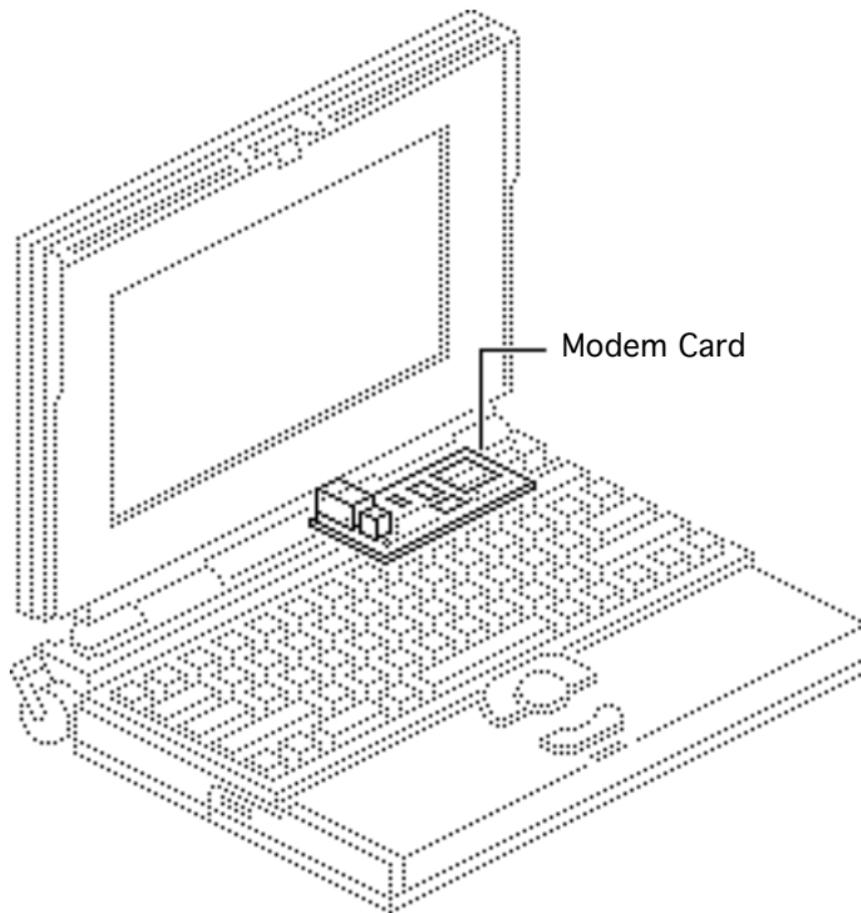PowerBook 150

Modem Card

Modem Card

Before you begin, remove the following:

- Main battery
- Top case

Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/ Safety.

Modem Port Cover

Release Tabs

Note: The modem card is an option for the PowerBook 150.

1 Pinch the release tabs and push out the modem port cover.

2 Connect the modem card connector to connector J4 on the logic board.

3 Install the two mounting screws.

Modem

Modem Card Connector
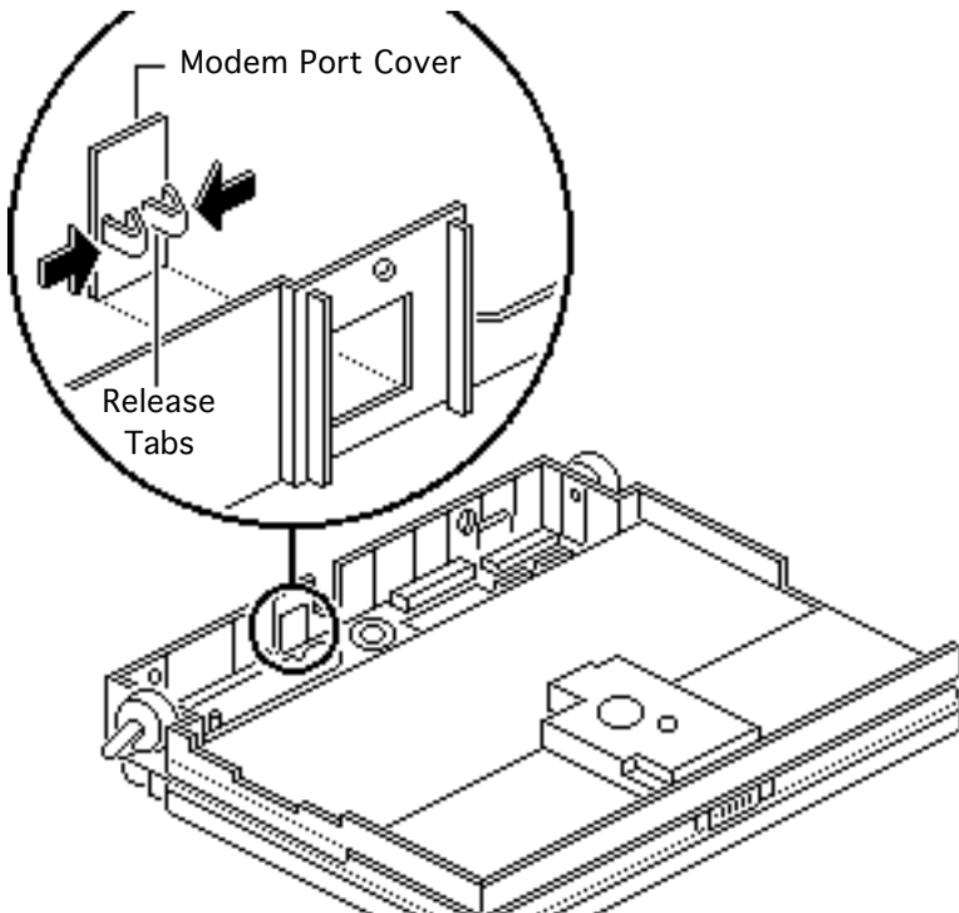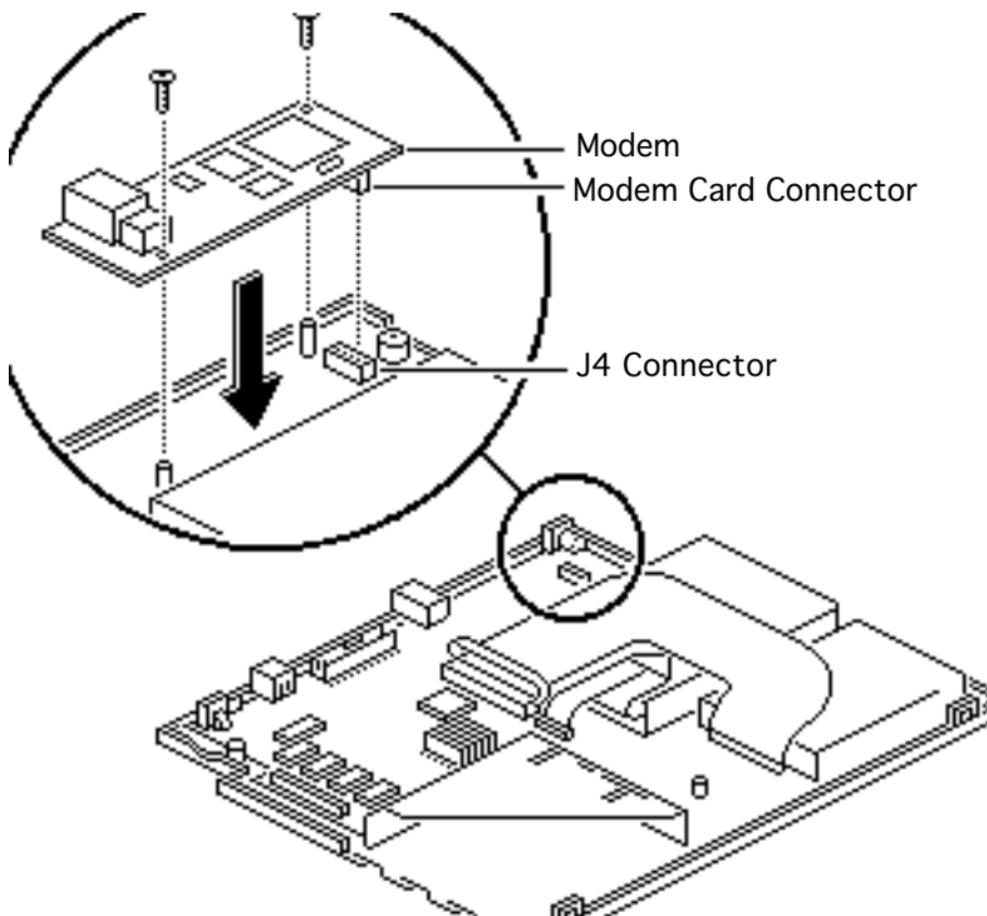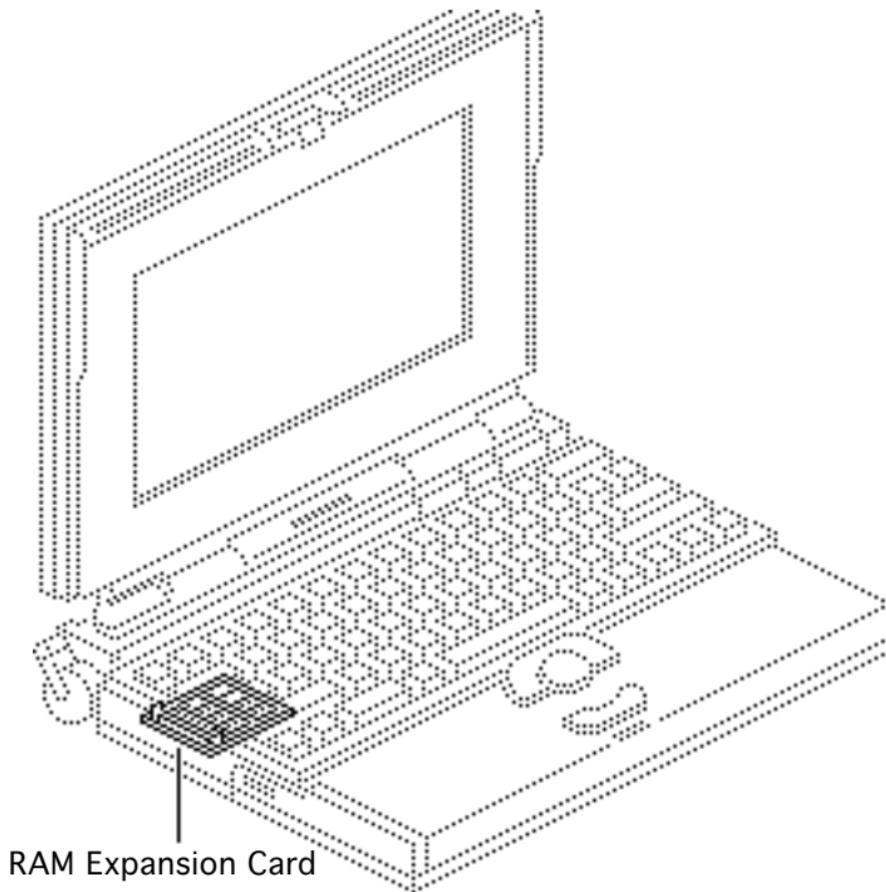
J4 Connector

RAM Expansion Card

RAM Expansion Card

Before you begin, remove the following:

- Main battery
- Top case

Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/Safety.

Expansion Card Brace

RAM Expansion Card

Adapter
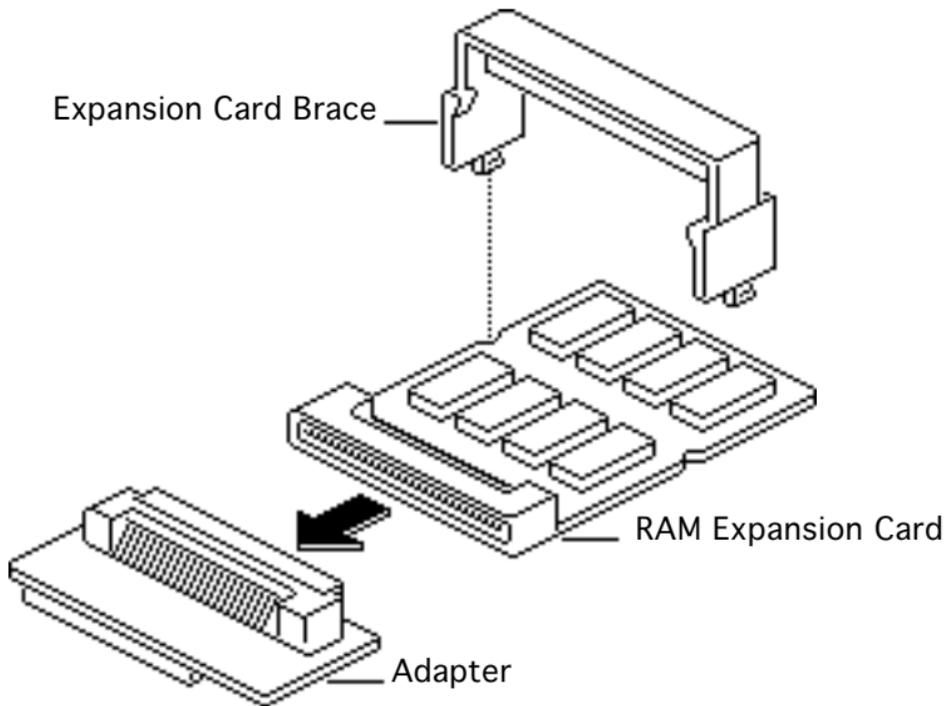
Caution: Handle the RAM expansion card by the edges only. Do not touch any components on the card.

This procedure explains how to install the RAM expansion card kit. The kit is an option for the PowerBook 150 and includes a RAM expansion card, adapter, brace, and mounting screw.

1 **Caution:** Be careful not to flex the RAM card when inserting it into the adapter. Connect the card to the adapter by

Expansion Card Brace

RAM Expansion Card
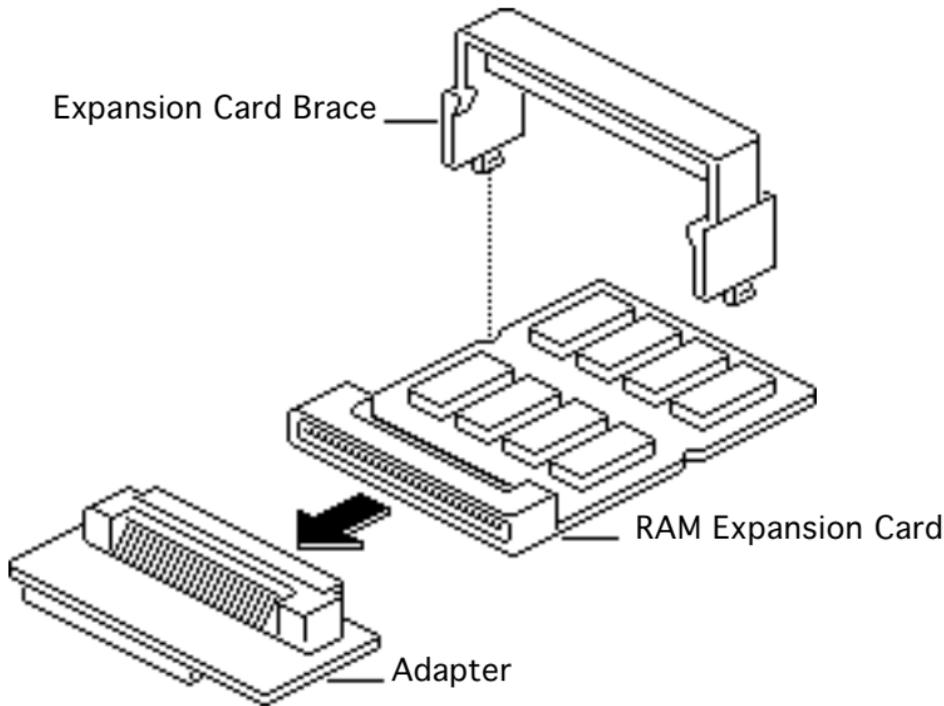
Adapter

holding onto the white projections on the top of both cards and squeezing them together.

Connect the RAM expansion card to the adapter.

2 **Note:** Make sure the ridge on the underside of the brace fits between the rows of chips on the RAM card.

Position the expansion card brace over the RAM card and snap it into place.

J7 Connector
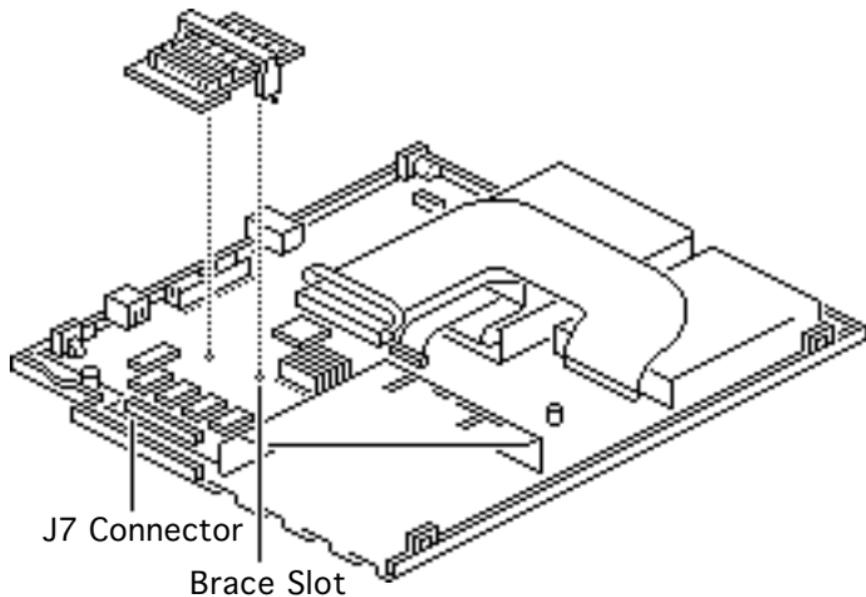
Brace Slot

3   Insert the two legs of the expansion card brace into the two brace slots in the logic board.

4   **Caution:** Be careful not to flex the RAM card or adapter when connecting the adapter to the logic board.

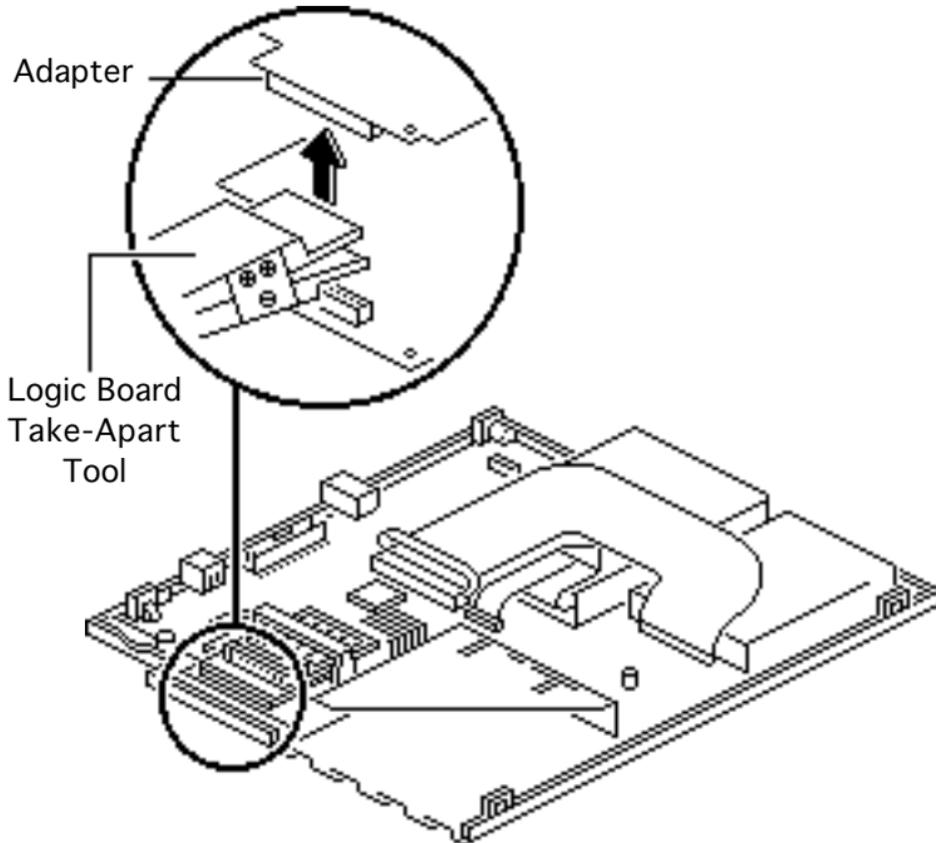   Connect the adapter (with RAM card and brace attached) to connector J7 on the logic board.

5   Install the mounting screw.

Adapter

Logic Board
Take-Apart
Tool

Note: To disconnect the adapter from the logic board, be sure to use the Apple logic board take-apart tool.

Note: To verify that the upgrade is successful, check the Total Memory message (for systems with virtual memory switched off) or the Built-in Memory message (for systems with virtual memory switched on). The memory size should be 4 MB of soldered RAM plus the RAM on the expansion board. If the memory size is

incorrect, replace the RAM expansion card. If the memory size is still incorrect, send the computer to Apple.
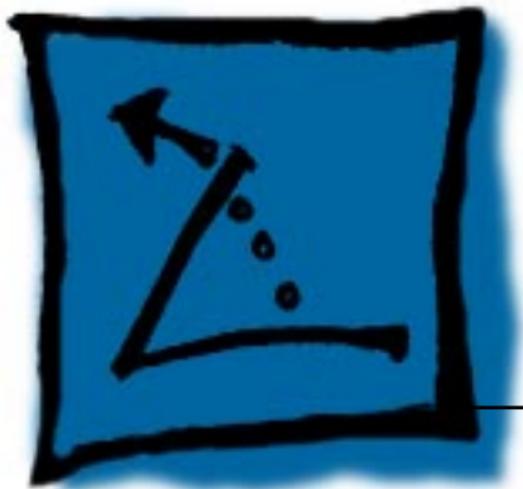
Additional Procedures

PowerBook 150

Battery

LED
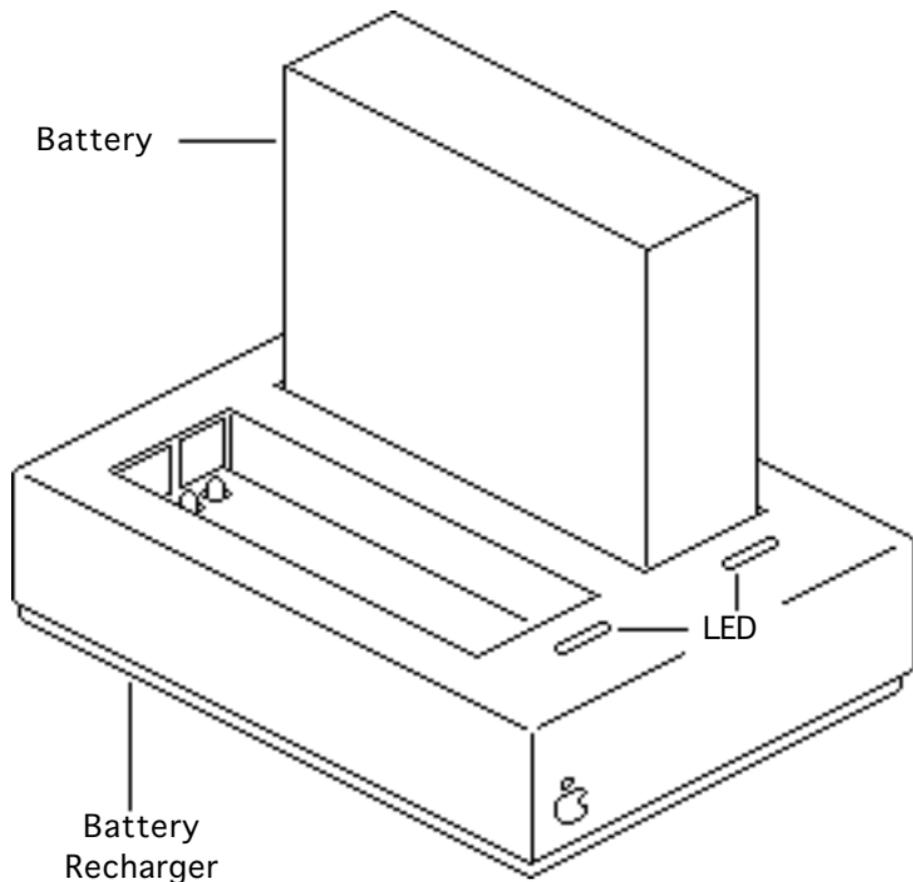
Battery
Recharger

Battery Recharger

No preliminary steps are required before you begin this procedure.

1 Using the PowerBook power adapter, plug the battery recharger into a power outlet and insert the main battery into the recharger.

2 Track the status of the
   battery. If the LED is
   • Yellow, the battery is
     charging.
   • Green, the battery is
     ready to use.
   • Off, the charger is
     unplugged, the
     battery is bad, the
     power adapter is
     defective, or the
     charger is defective.

Battery Handling

Main Battery

No preliminary steps are required before you begin this procedure.
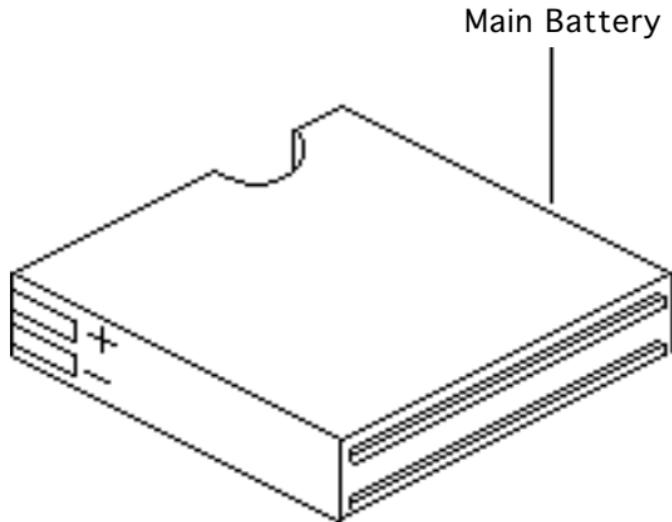
Note: The PowerBook150 main battery is a nickel cadmium (NiCad) battery with a voltage of 5.65-7.5 volts. Its longevity is estimated at 500 power cycles. To extend its longevity, follow the battery handling guidelines on the next page.

⚠**Warning:** The main

battery contains toxic materials.   Review battery handling and disposal instructions in Bulletins/ Safety.

The following are guidelines for properly handling the NiCad battery:

- Handle the battery carefully. Do not drop, puncture, disassemble, mutilate, or incinerate the battery.
- Fully charge a replacement battery before using it; Apple

ships batteries in a
partially-charged state.

- Do not leave the battery
  in the computer for
  longer than two weeks
  without plugging in the
  power adaptor.
- Completely discharge and
  recharge the battery once
  a month.
- Store the battery in the
  protective battery case.
- Do not short-circuit the
  battery terminals.
- Keep the battery in a
  cool, dark place.

Battery Verification

Main Battery

Before you begin, remove the main battery.
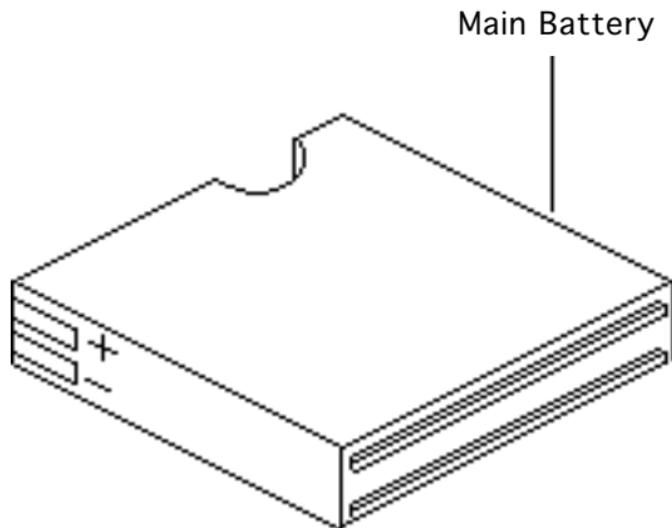
Note: The Control Strip on the PowerBook 150 desktop is a general indicator of the battery charge. Use a voltmeter to determine the actual charge. Refer to the procedure on the next page.

⚠Warning: The main battery is a NiCad battery that contains toxic materials.   Review battery

Positive Probe
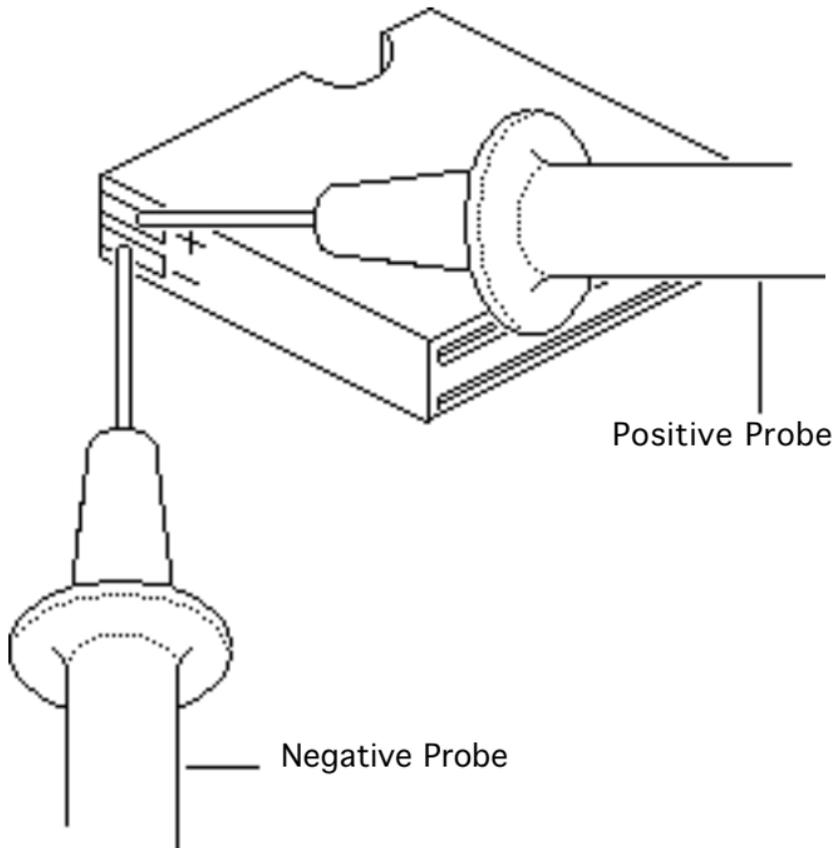
Negative Probe

handling and disposal instructions in Bulletins/Safety.

Set a voltmeter to the 10 volts DC scale and touch the positive and negative terminals of the battery with the positive and negative voltmeter probes. If the reading is not above 5.7 volts, recharge (first) or replace the battery.
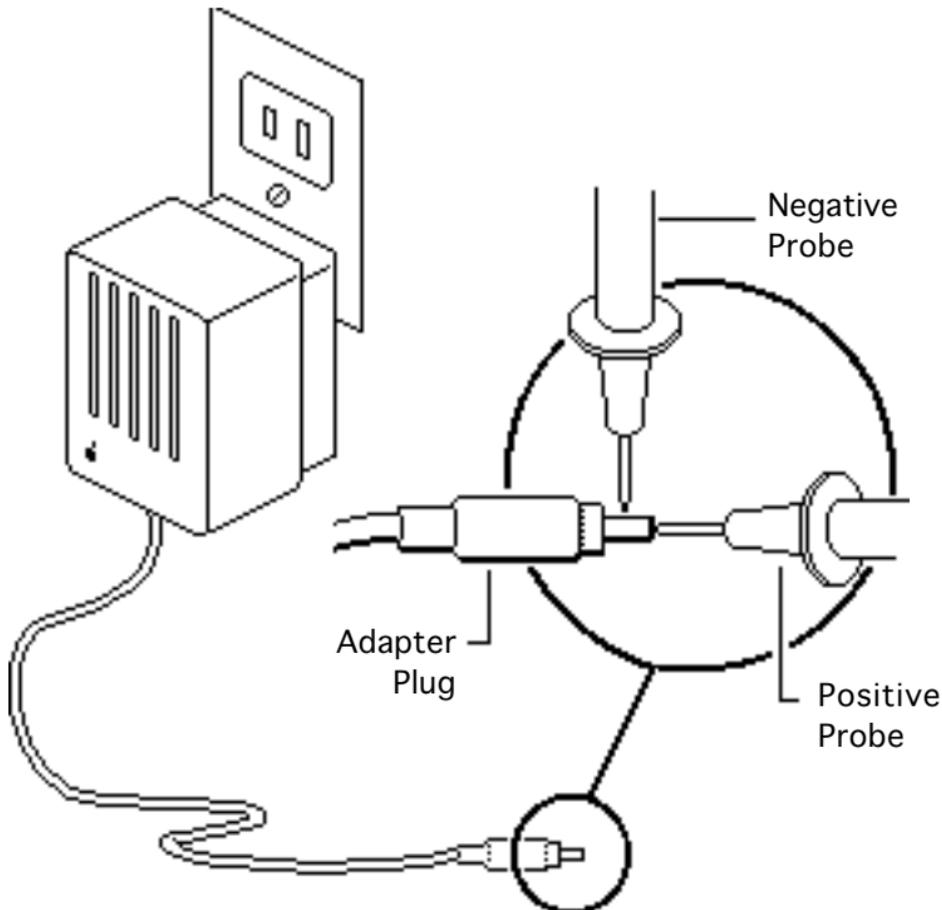
Adapter Verification

No preliminary steps are required before you begin this procedure.

1. Plug in the AC adapter to a wall socket.

2. Set a voltmeter to the 10 volts DC scale.

3. Touch the positive voltmeter probe to the inside of the adapter plug, and touch the negative voltmeter probe to the outside of

the adapter plug. If the reading is not 7.5–7.9 volts, replace the adapter.

Exploded View

PowerBook 150

Exploded View
PowerBook 150

922-0986
Display Housing
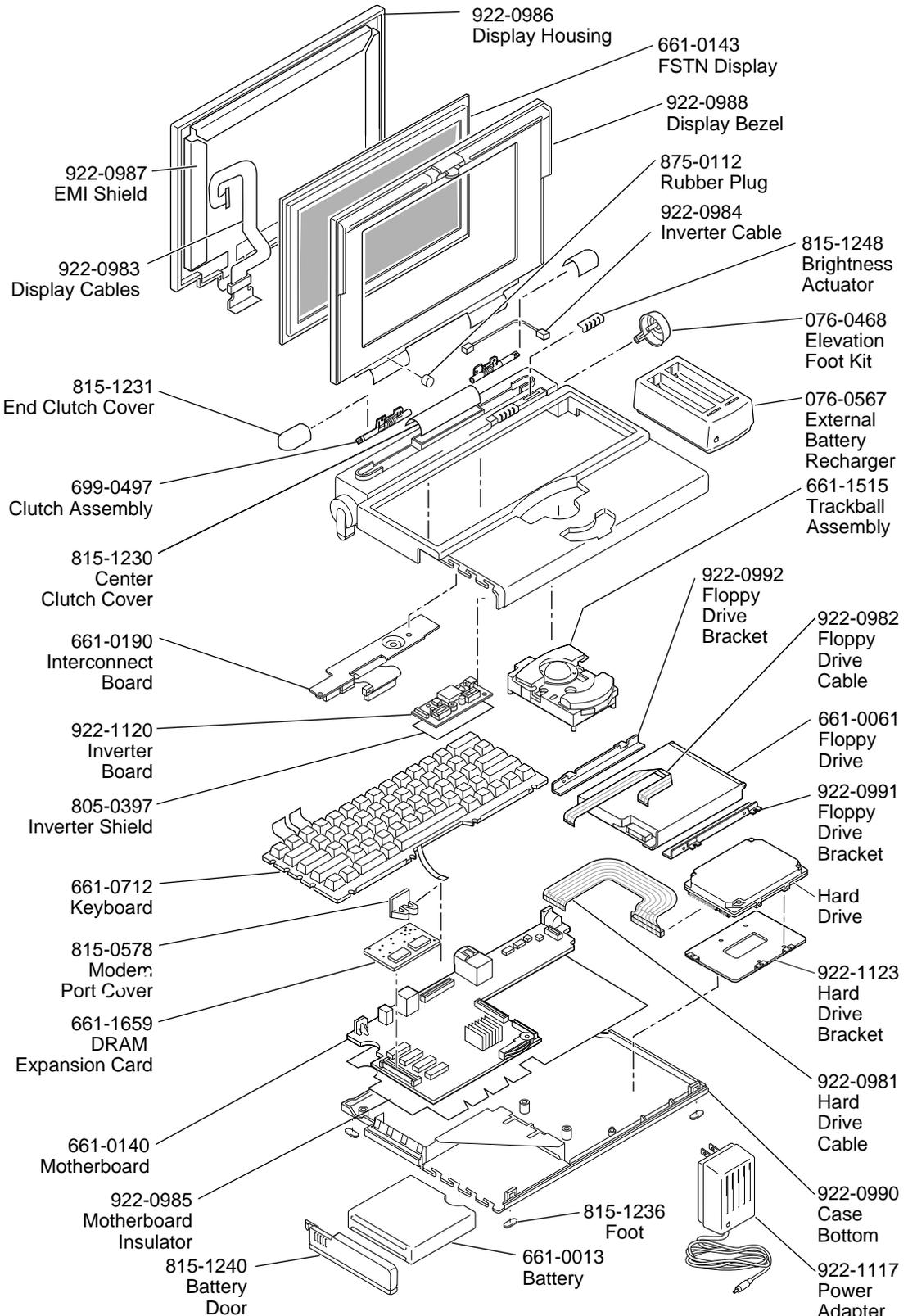
661-0143
FSTN Display

922-0988
Display Bezel

922-0987
EMI Shield

875-0112
Rubber Plug

922-0984
Inverter Cable

815-1248
Brightness
Actuator

922-0983
Display Cables

076-0468
Elevation
Foot Kit

815-1231
End Clutch Cover

076-0567
External
Battery
Recharger

699-0497
Clutch Assembly

661-1515
Trackball
Assembly

815-1230
Center
Clutch Cover

922-0992
Floppy
Drive
Bracket

922-0982
Floppy
Drive
Cable

661-0190
Interconnect
Board

661-0061
Floppy
Drive

922-1120
Inverter
Board

922-0991
Floppy
Drive
Bracket

805-0397
Inverter Shield

Hard
Drive

661-0712
Keyboard

815-0578
Modem
Port Cover

922-1123
Hard
Drive
Bracket

661-1659
DRAM
Expansion Card

922-0981
Hard
Drive
Cable

661-0140
Motherboard

922-0985
Motherboard
Insulator

815-1236
Foot

922-0990
Case
Bottom

815-1240
Battery
Door

661-0013
Battery

922-1117
Power
Adapter

This is a generic representation of a product family. Configurations may vary.