



PowerBook 150





Basics

PowerBook 150





Figure: PowerBook 150

General Information

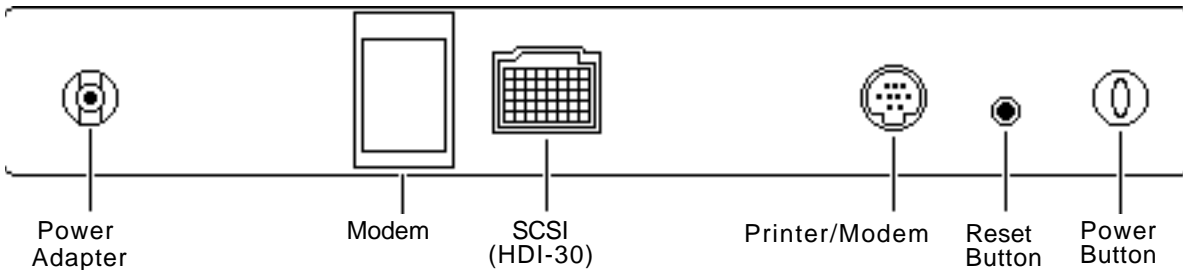
The PowerBook 150, shown at left, is an all-in-one notebook computer that features a 68030 processor running at 33 MHz and a 9.5 inch diagonal backlit FSTN display. The PowerBook 150 includes a 120 MB internal hard drive and supports up to six external SCSI devices through a SCSI port.

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





Specifications

PowerBook 150





Introduction

You can also find specifications information for this product in the Spec Database, which you can access in one of three ways:

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





Processor

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 working or dimmed but is fine now

If temperature is under 5 or over 40 degrees centigrade, this reaction is normal for FSTN screens.

Backlight doesn't operate

- 1 Check cables.
- 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
or always black

Replace display.





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 reseal 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 reseal 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 reseal modem card.
- 4 Verify that System is current.
- 5 Replace modem card.
- 6 Replace logic board.

Modem interferes with system sound

- 1 Remove and reseal 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.

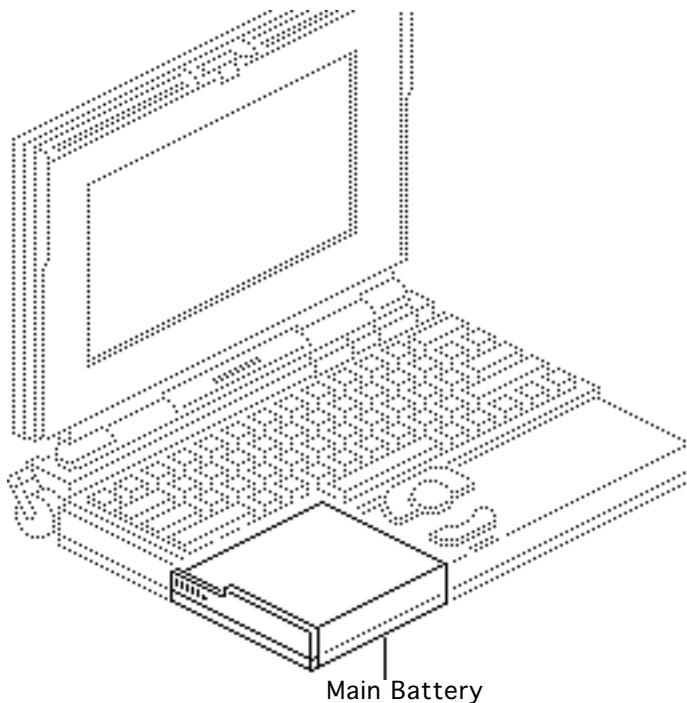




Take Apart

PowerBook 150





Main Battery

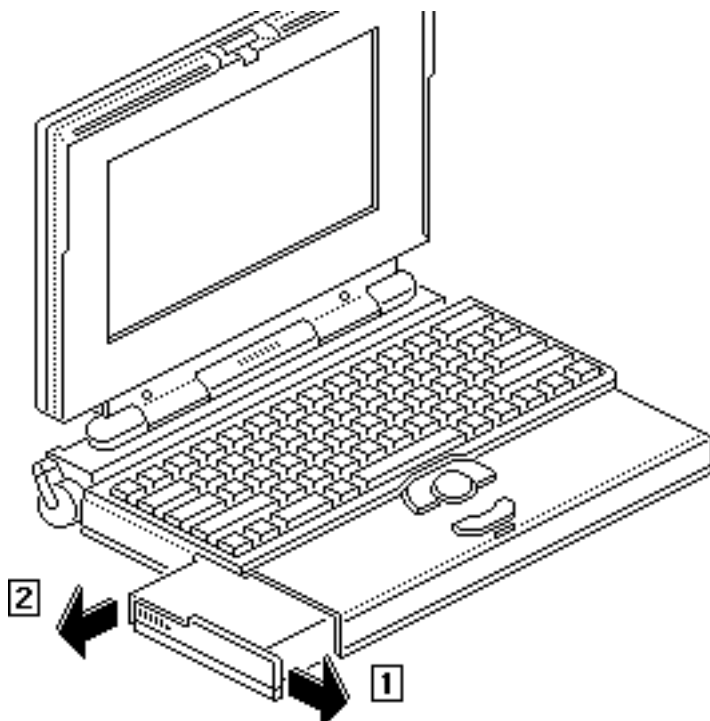
Before you begin, disconnect the power adapter.

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

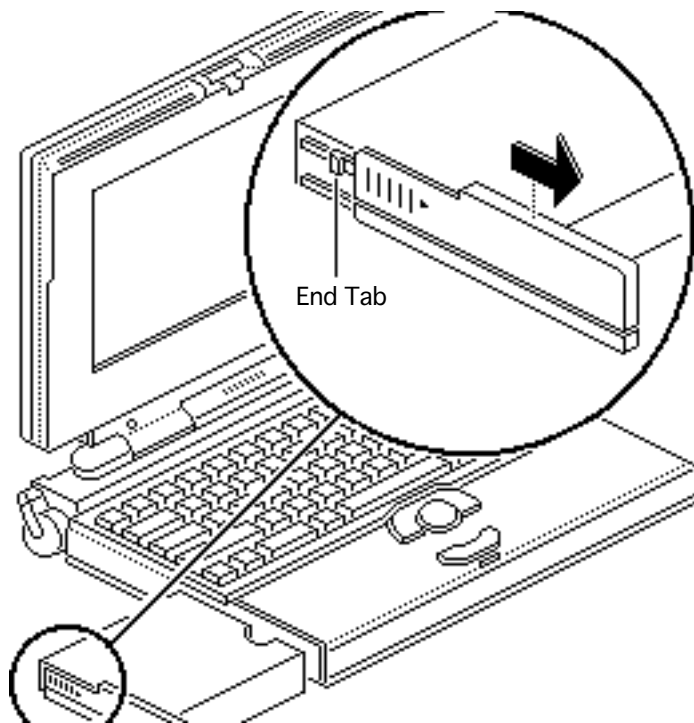




materials. Review battery handling and disposal instructions in Bulletins/ Safety.

- 1 Slide open the battery door.
- 2 Using the battery door as a handle, pull out the main battery.

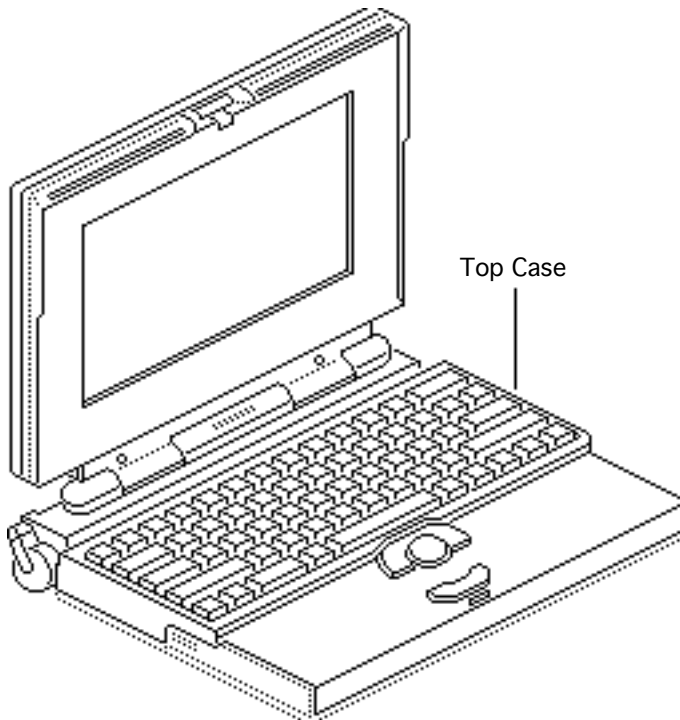




Note: Complete the next steps only if you are replacing the battery or battery door.

- 3 Slide the battery door completely open.
- 4 Pull the end tab until it releases, and remove the door from the battery.





Top Case

Top Case

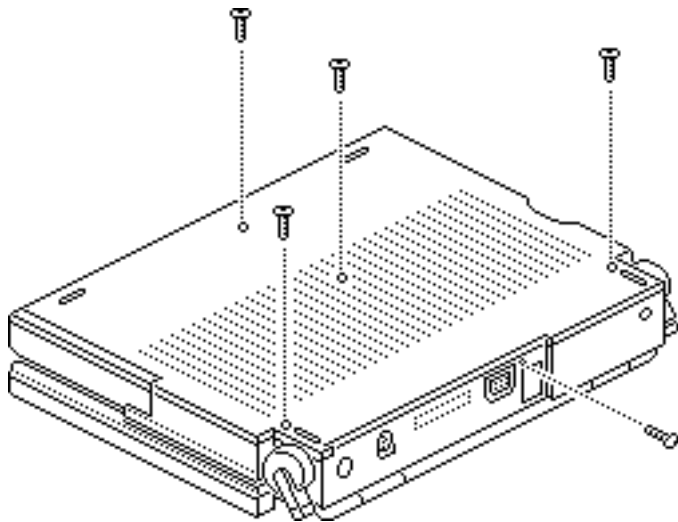
Before you begin, remove the main battery.

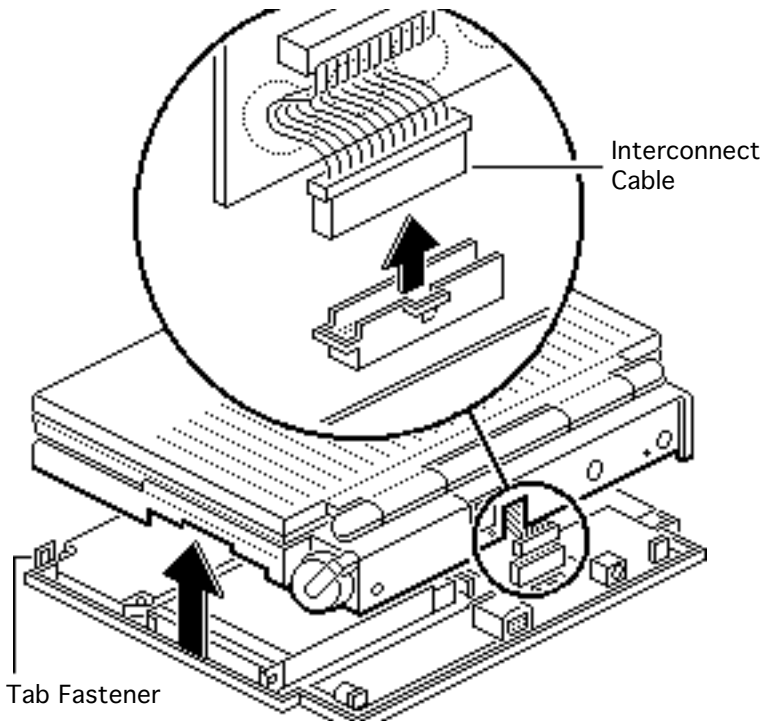
Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/ Safety.





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





- 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.



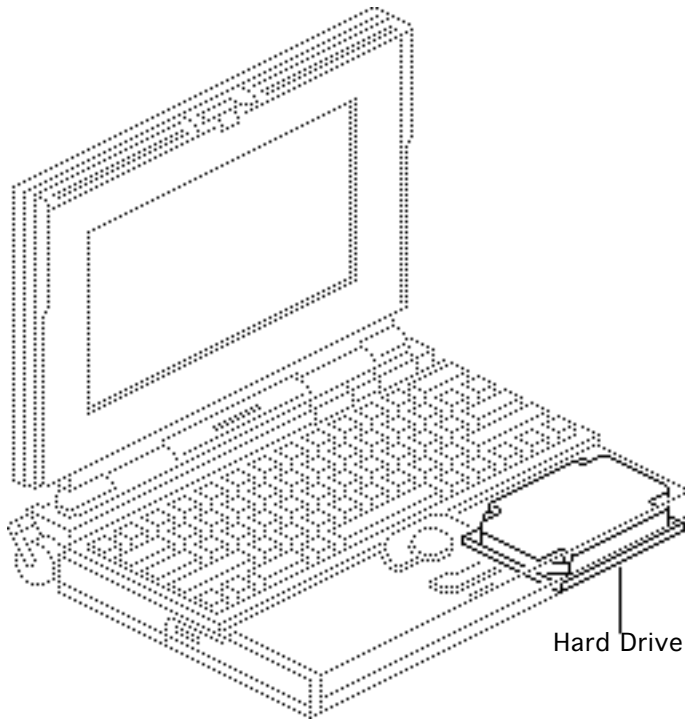


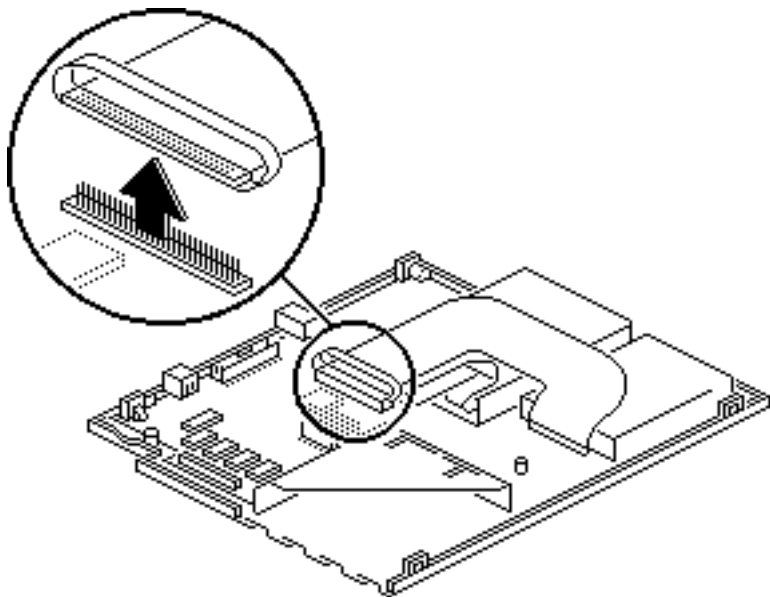
Hard Drive

Before you begin, remove the following:

- Main battery
- Top case

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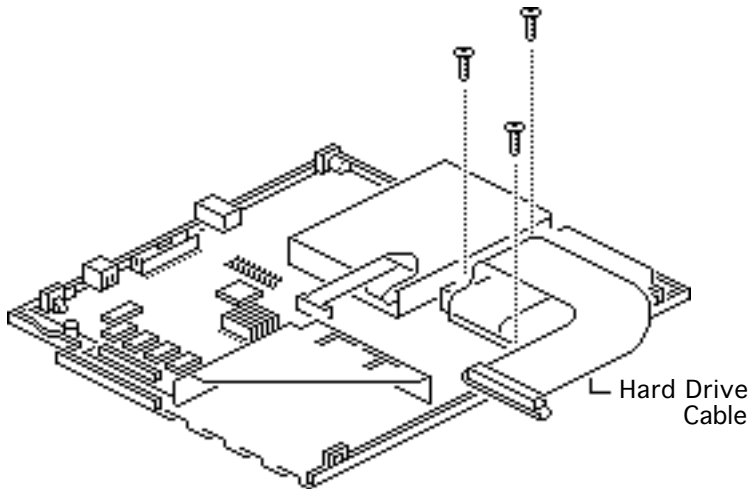




Caution: The hard drive cable is fragile. Handle it with care.

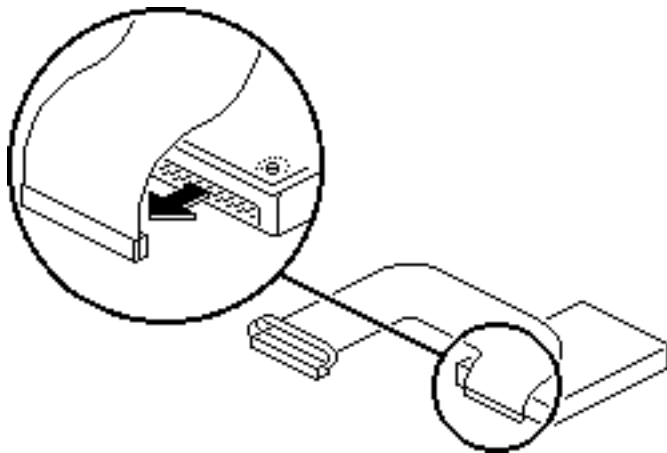
- 1 Disconnect the hard drive cable from the logic board.





- 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.

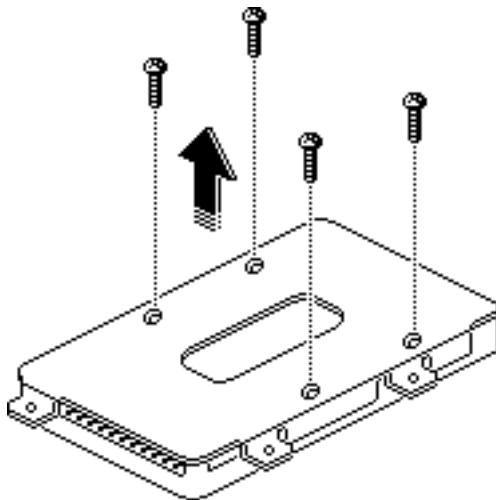




Note: Complete the following steps if you are replacing the hard drive, hard drive cable, or hard drive bracket.

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

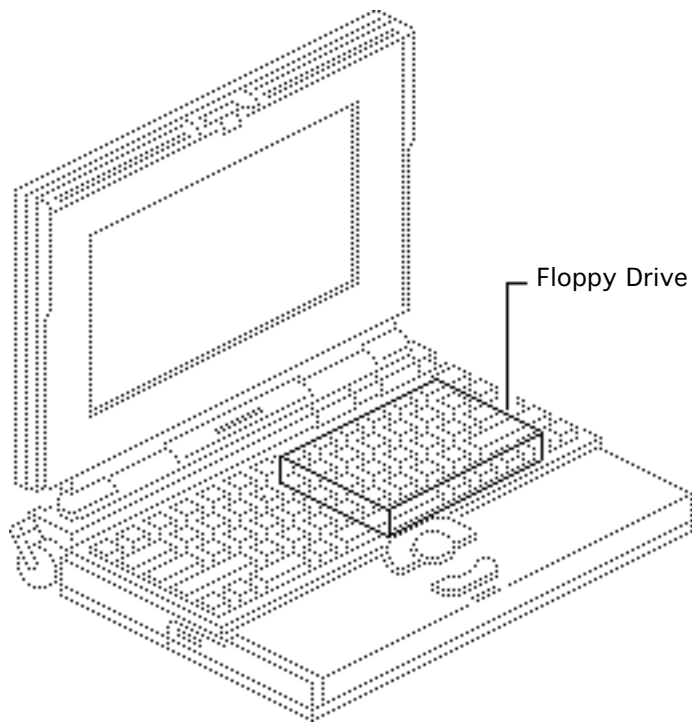




- 6 Turn over the hard drive.
- 7 Using a #1 Phillips screwdriver, remove the four screws securing the hard drive bracket.
- 8 Remove the bracket from the hard drive.

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





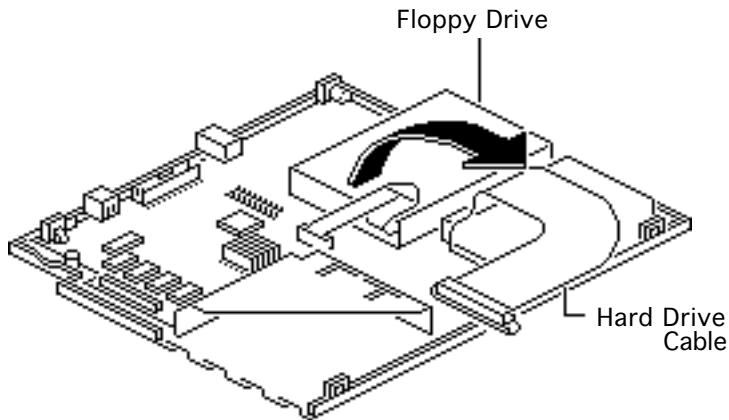
Floppy Drive

Before you begin, remove the following:

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

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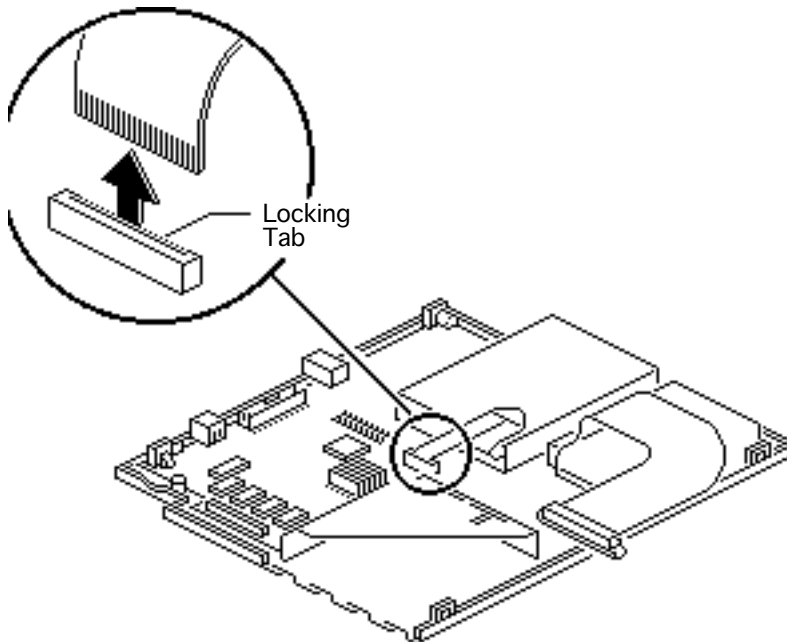




Caution: The hard drive cable is fragile and should be handled with care.

- 1 Disconnect the hard drive cable from the logic board.
- 2 Carefully fold back the cable from the floppy drive.

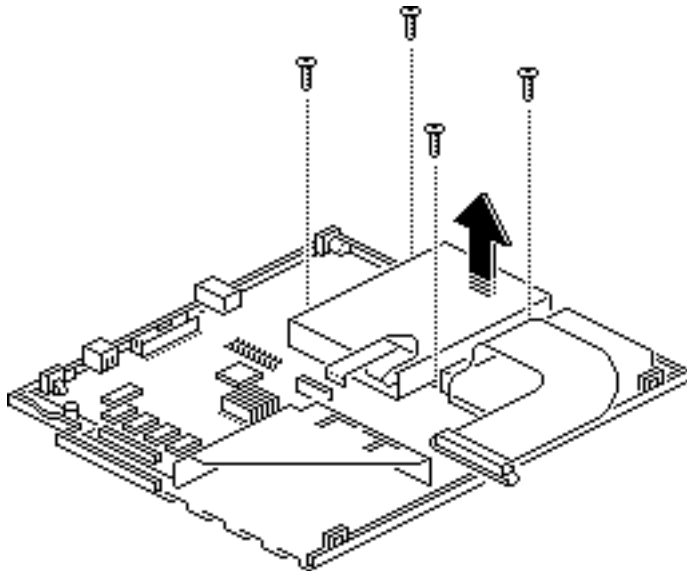




Caution: The floppy drive cable is fragile and should be handled with care.

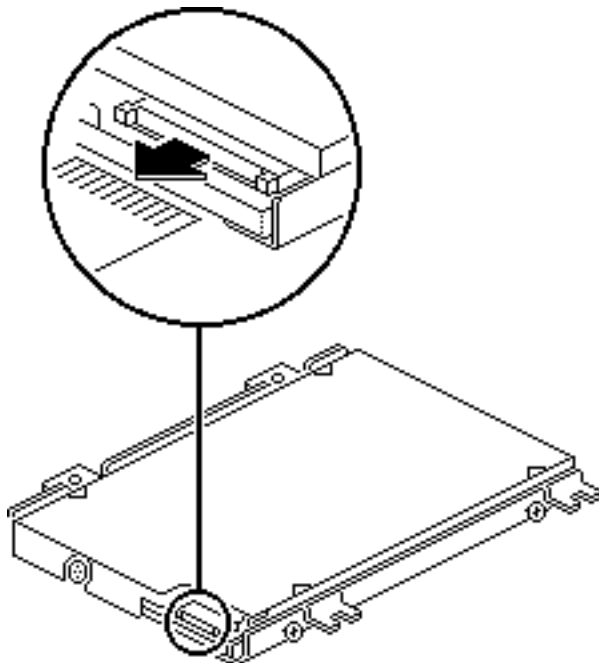
- 3 Lift the locking tab on the floppy drive connector and disconnect the floppy drive cable from the logic board.





- 4 Using a T-8 torx driver, remove the four floppy drive mounting screws.
- 5 Lift the floppy drive out of the bottom case.

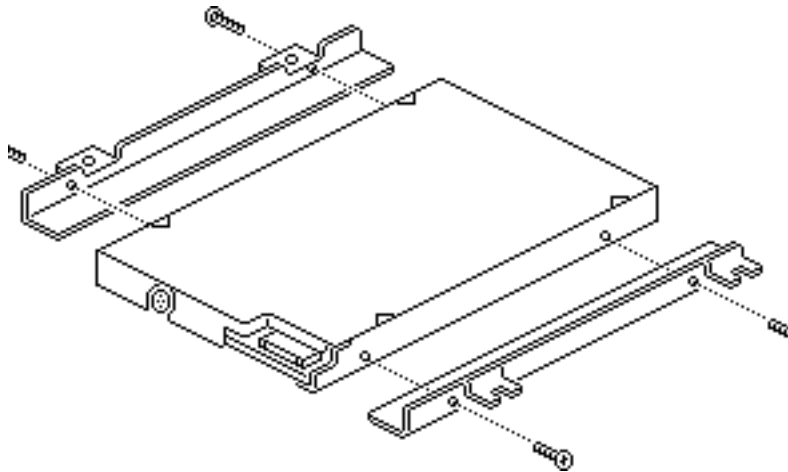




Note: Complete the following steps if you are replacing the floppy drive, floppy drive cable, or floppy drive brackets.

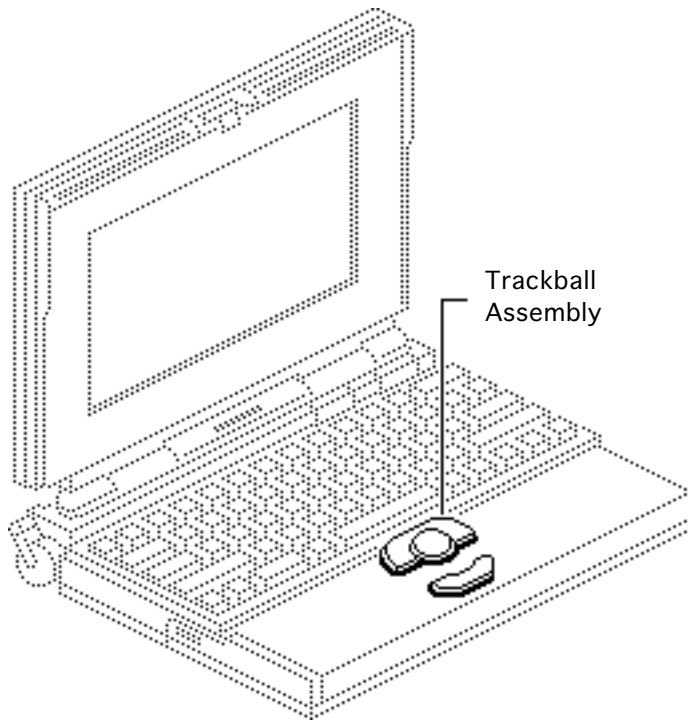
- 6 Using a small flat-blade screwdriver, push out the locking tab and remove the floppy drive cable from the drive.





- 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.





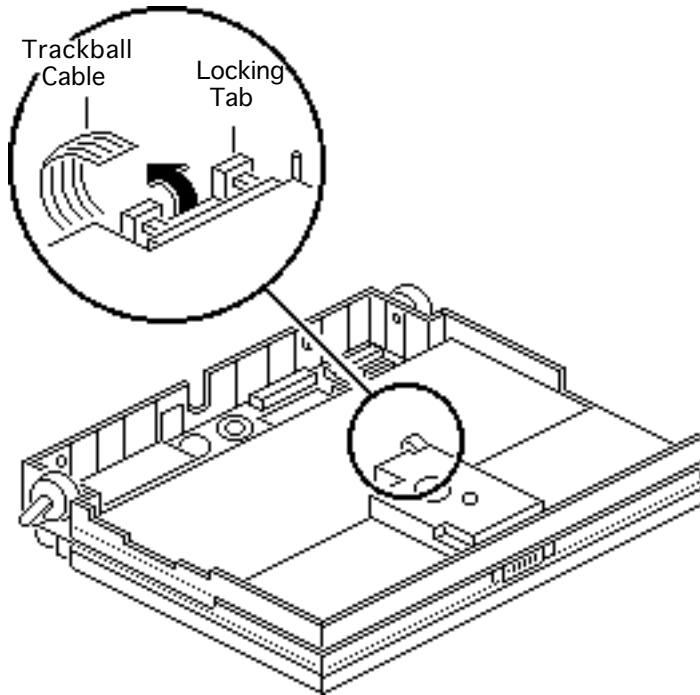
Trackball Assembly

Before you begin, remove the following:

- Main battery
- Top case

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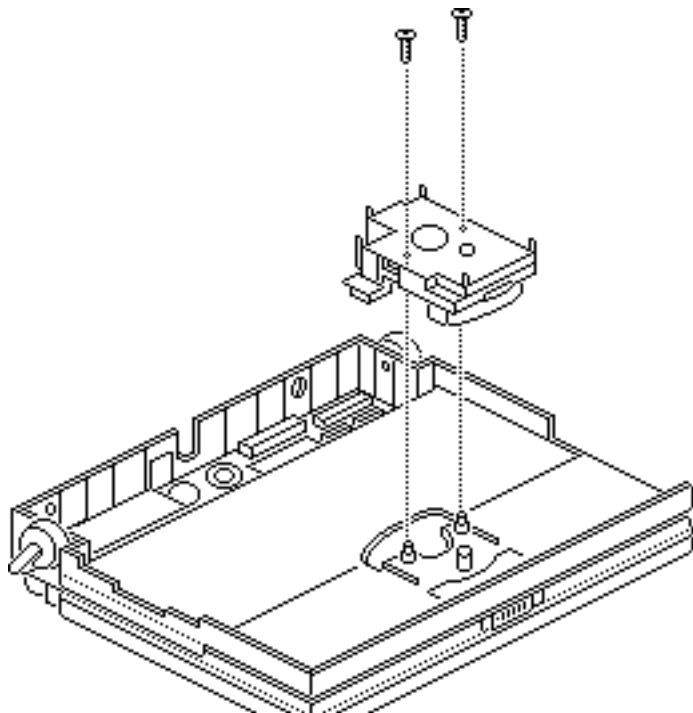




Caution: The trackball cable is fragile and should be handled with care.

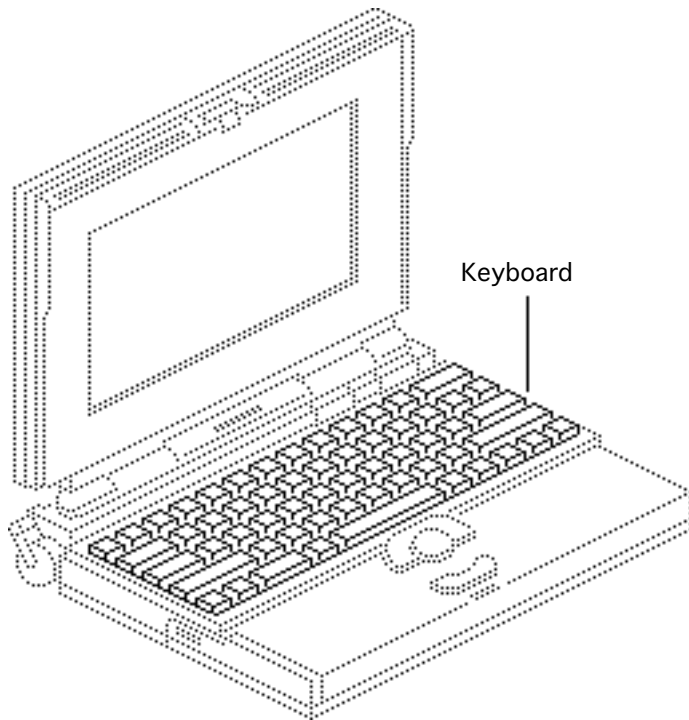
- 1 Pull out the locking tab on the trackball connector and disconnect the trackball cable.





- 2 Using a T-8 torx driver, remove the two mounting screws and lift the trackball assembly out of the top case.





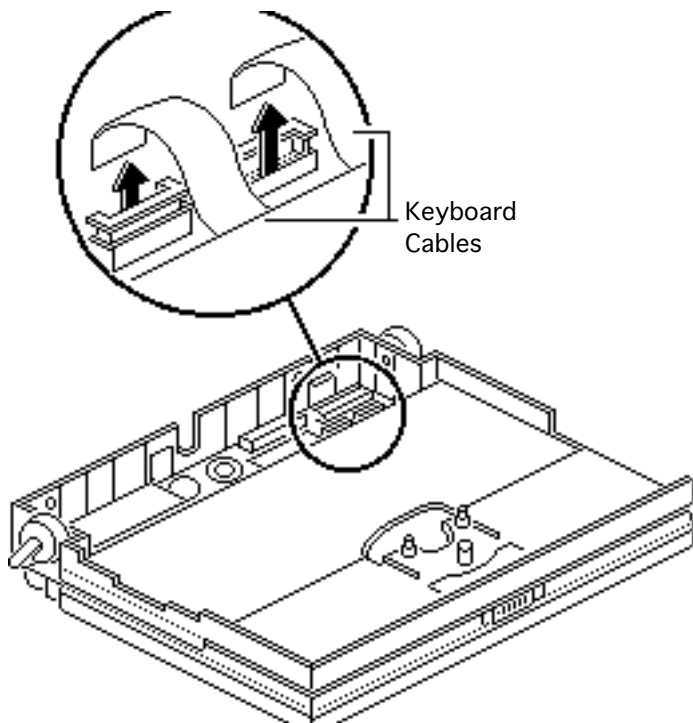
Keyboard

Before you begin, remove the following:

- Main battery
- Top case
- Trackball assembly

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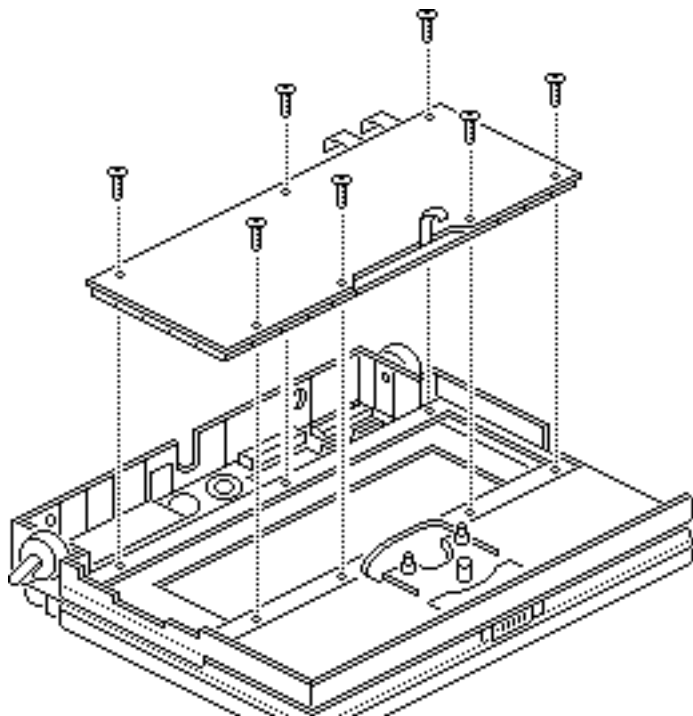




Caution: The keyboard ribbon cables are fragile and should be handled with care.

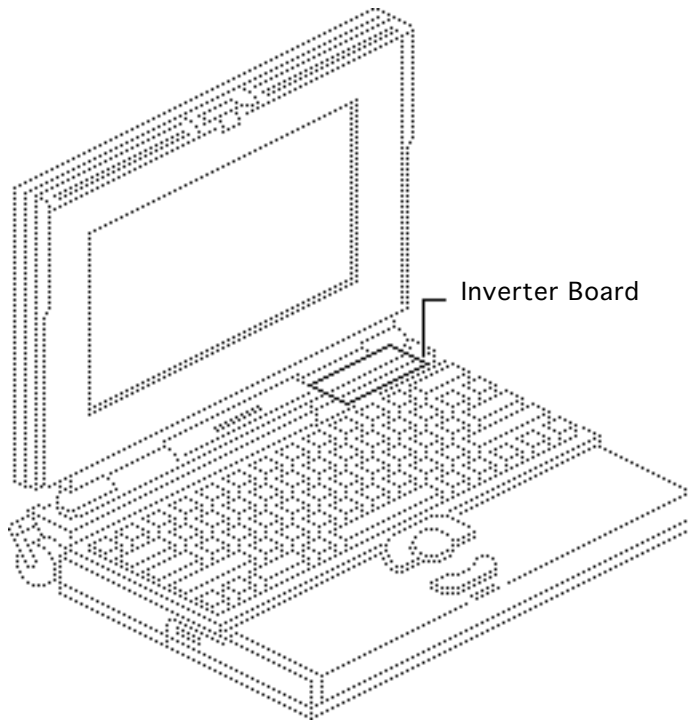
- 1 Lift up the locking tabs on the two keyboard connectors and disconnect the keyboard cables.





- 2 Using a T-8 torx driver, remove the seven mounting screws and lift the keyboard out of the top case.





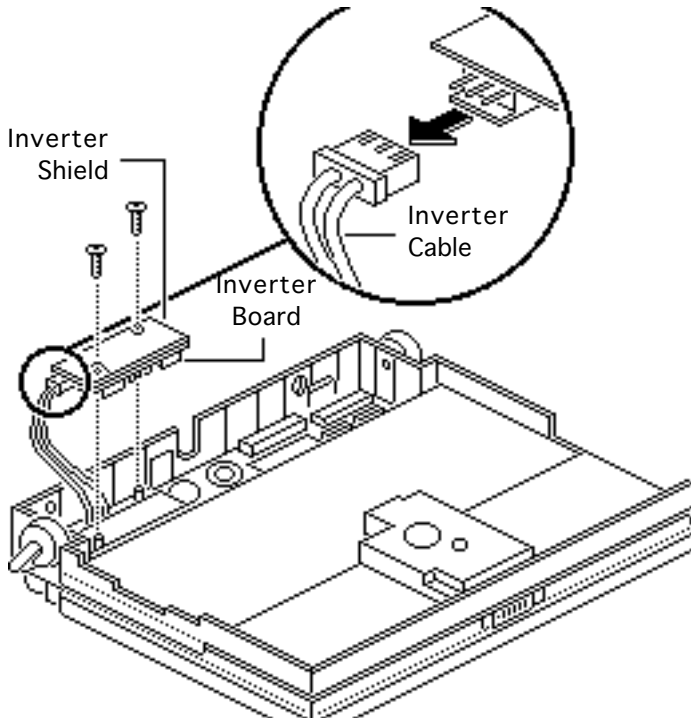
Inverter Board

Before you begin, remove the following:

- Main battery
- Top case

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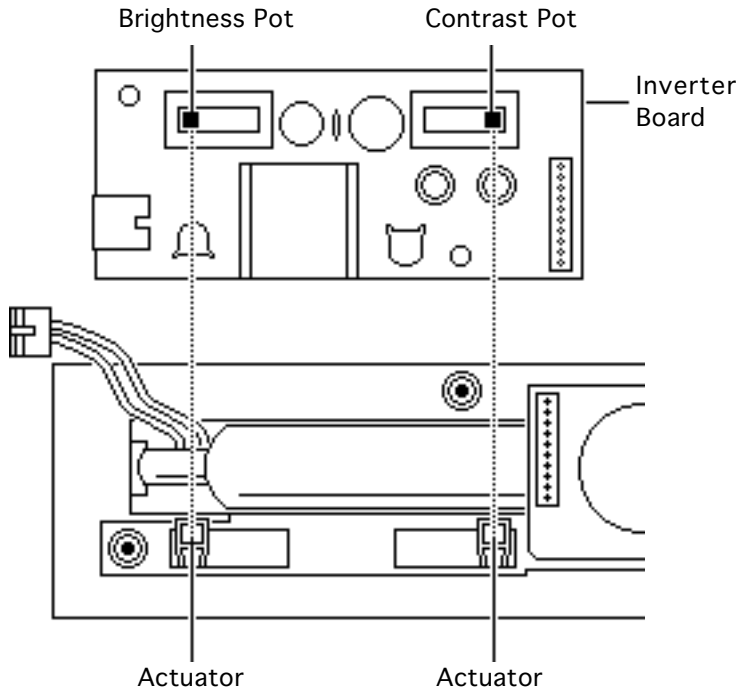
- 1 Remove the two mounting screws that secure the inverter board to the bottom case.
- 2 **Note:** Do not remove the inverter shield from the inverter board.

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





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.



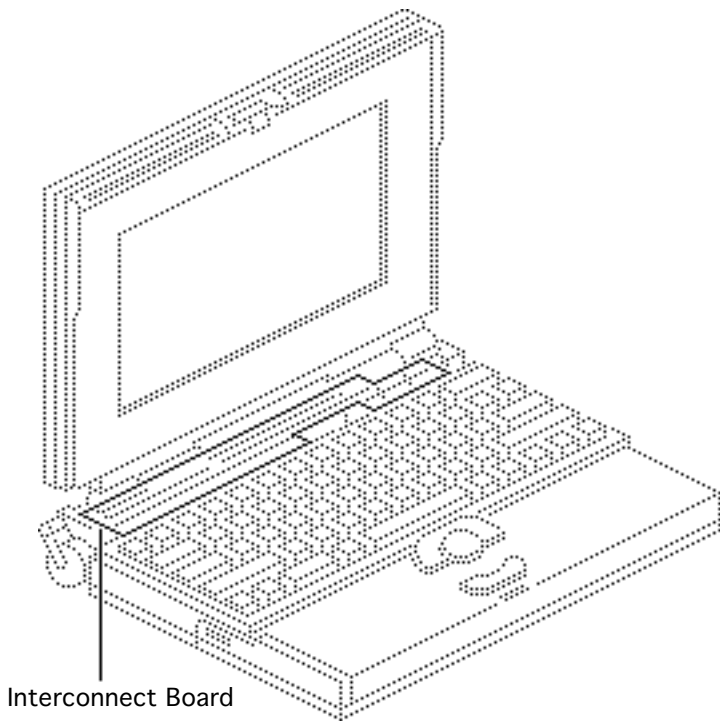


Interconnect Board

Before you begin, remove the following:

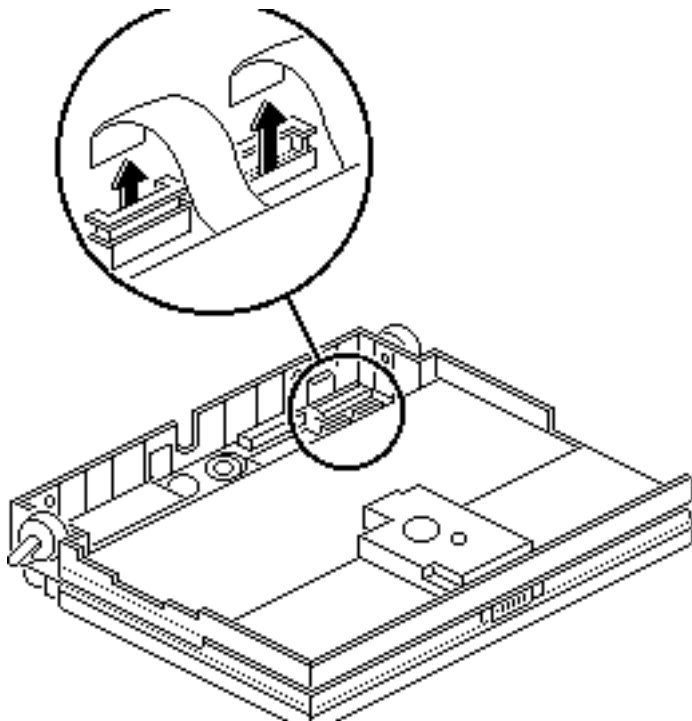
- Main battery
- Top case
- Inverter board

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Interconnect Board



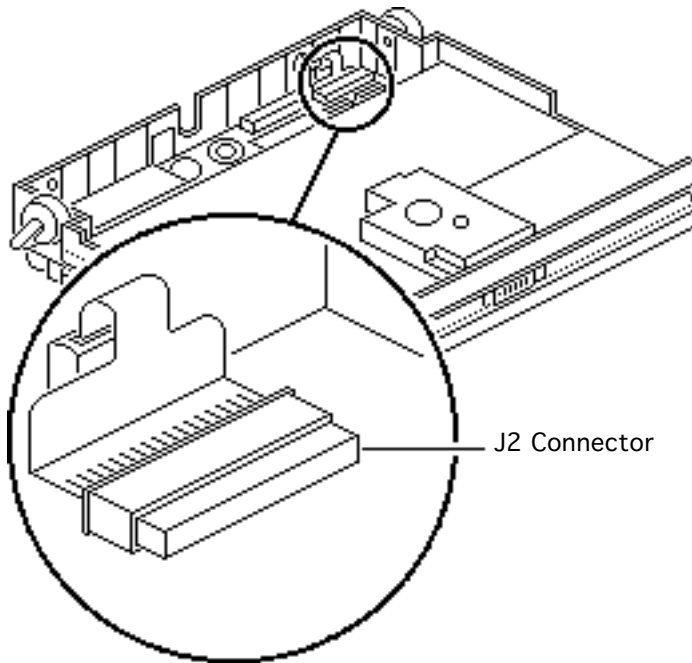


⚠ Warning: The interconnect board contains hazardous materials. Return bad interconnect boards to Apple for proper disposal.

- 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.



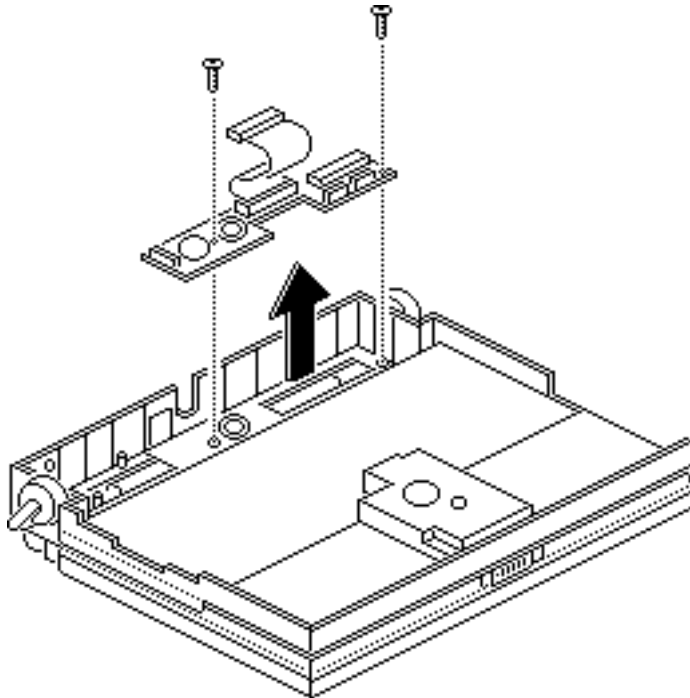


- 2 **Note:** The display cable will not come entirely out of the connector until you remove the interconnect board from the top case.

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

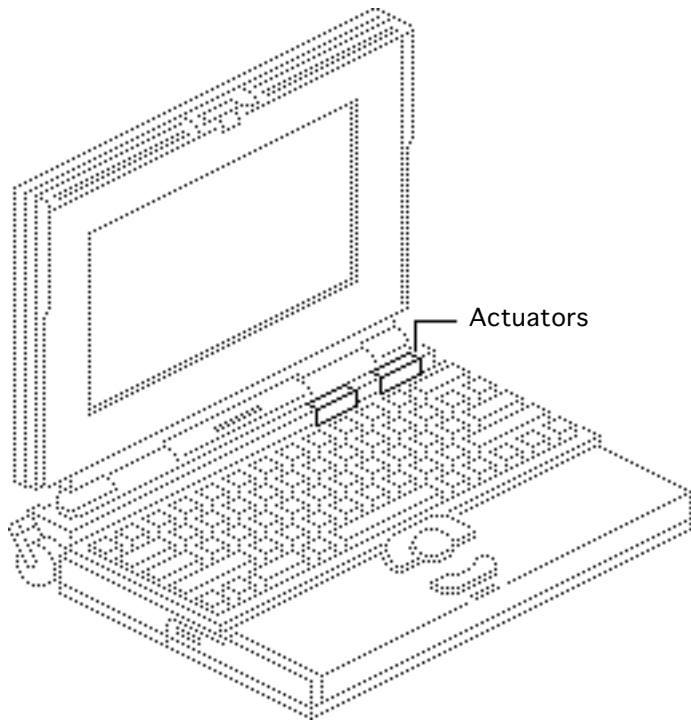
Replacement Note: Connect the display cable before replacing the interconnect board.





- 3 Using a T-8 torx driver, remove the two mounting screws and lift the interconnect board from the top case.





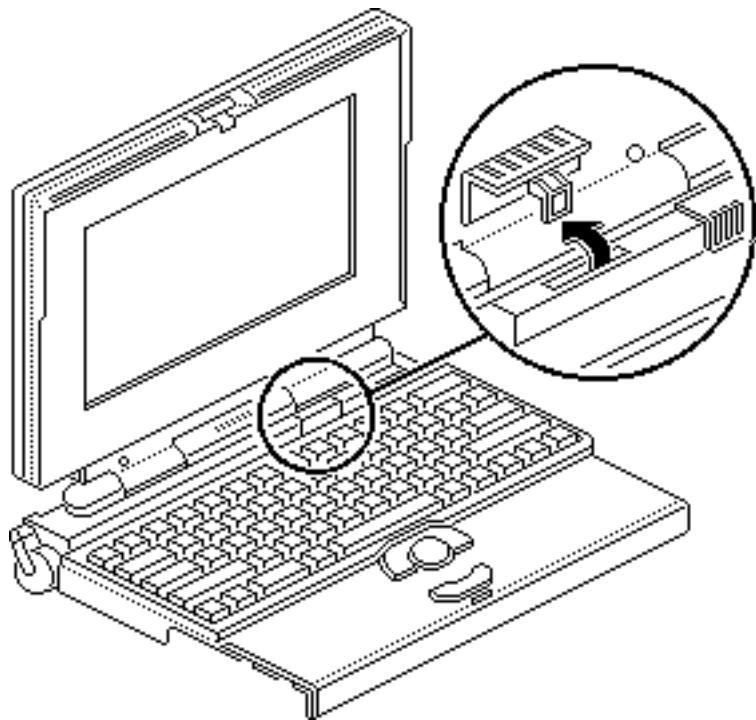
Actuators

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.



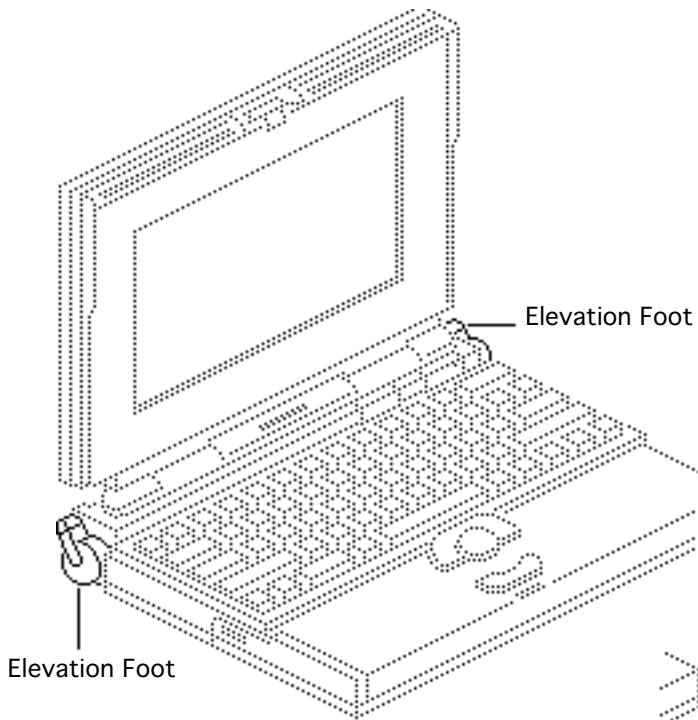


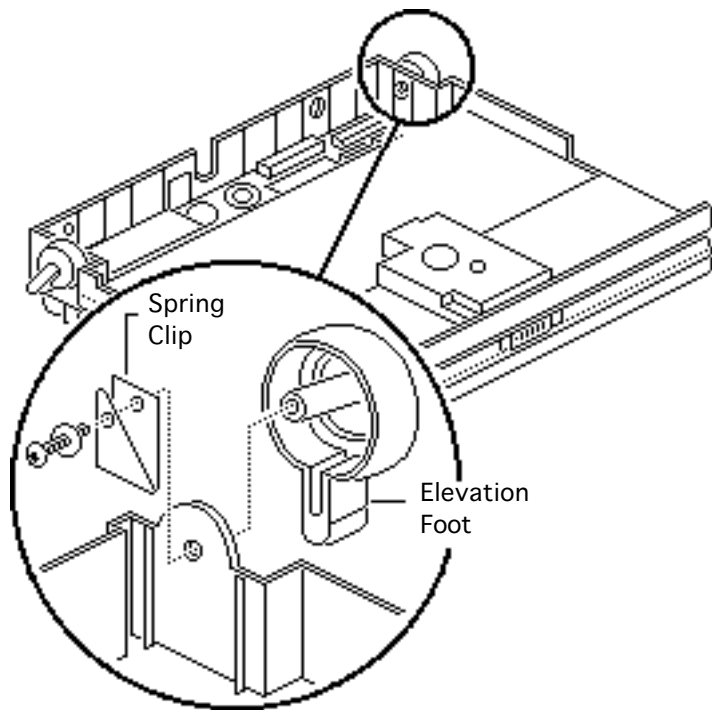
Elevation Feet

Before you begin, remove the following:

- Main battery
- Top case

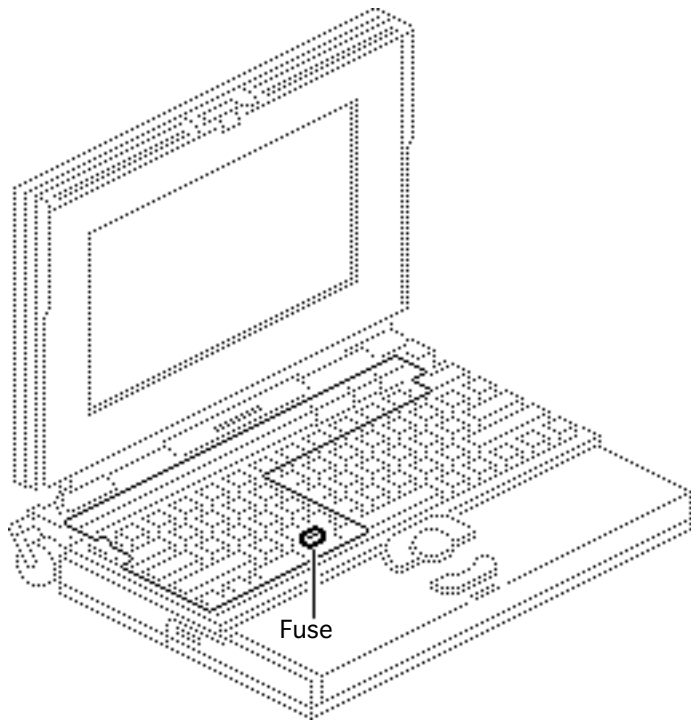
Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/ Safety.





- 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.





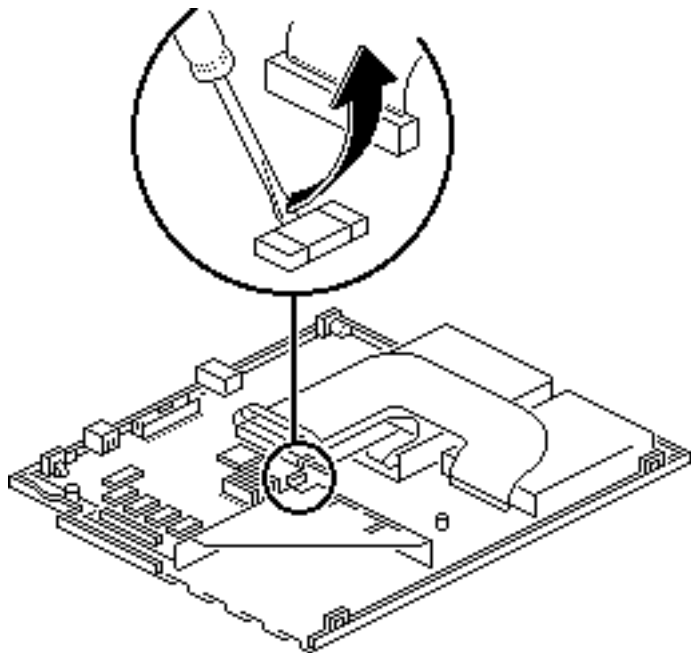
Fuse

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.





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



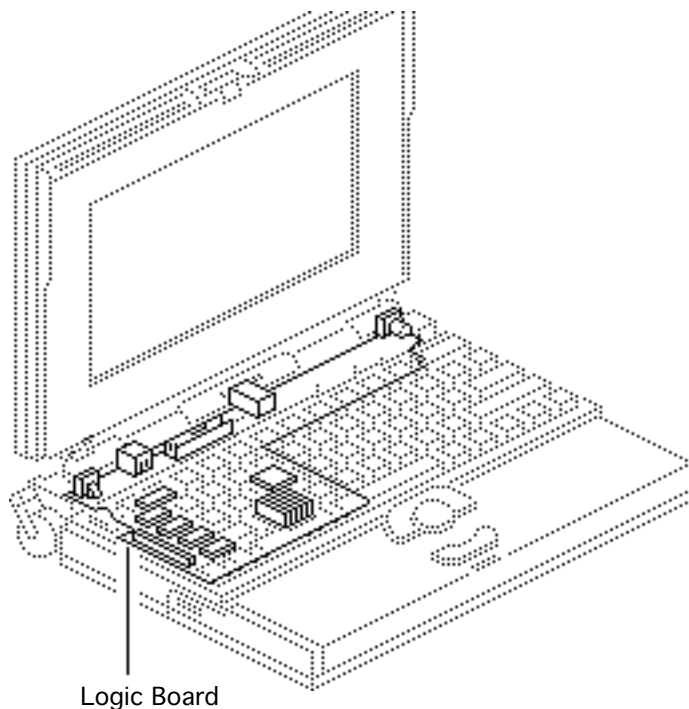


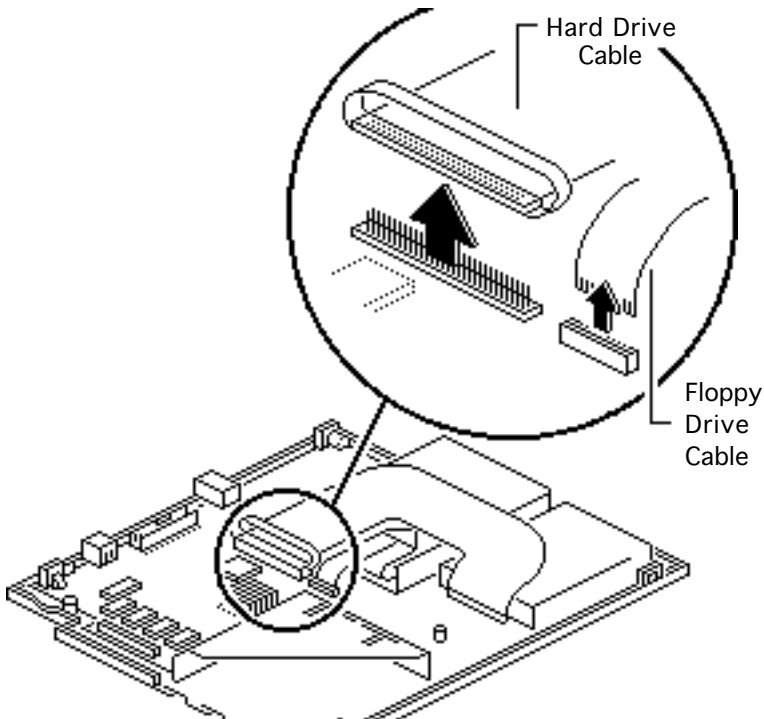
Logic Board

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.

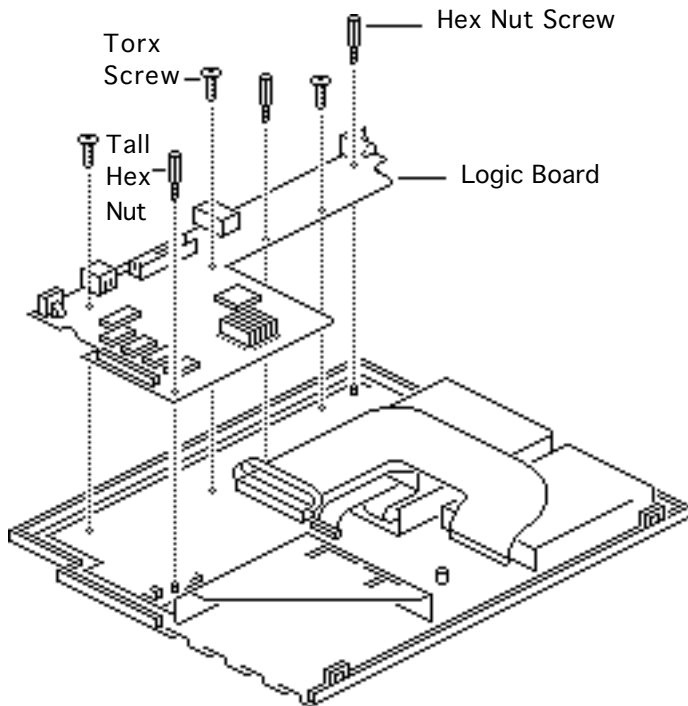




Caution: The hard drive and floppy drive cables are fragile. Handle them with care.

- 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.

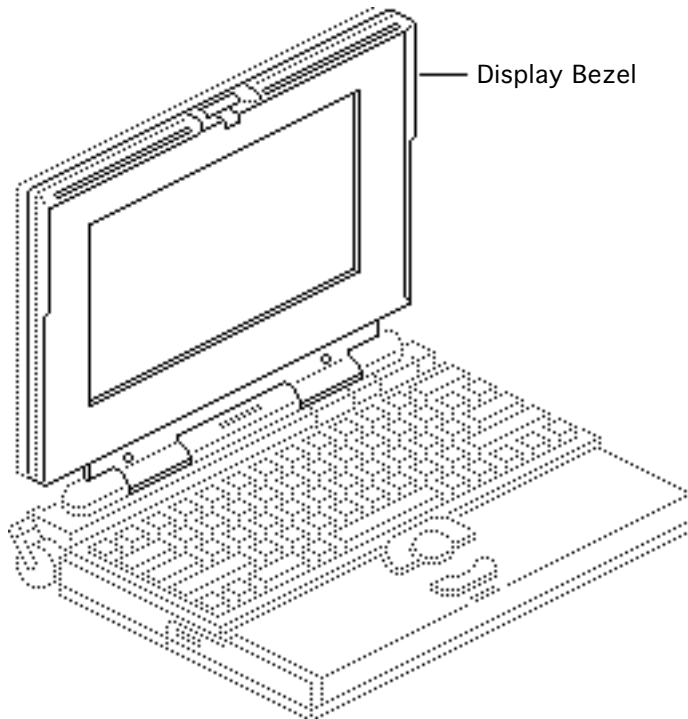




- 3 Remove the three hex nut screws and three torx screws that secure the logic board to the bottom case.
- 4 Lift the logic board out of the bottom case.

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



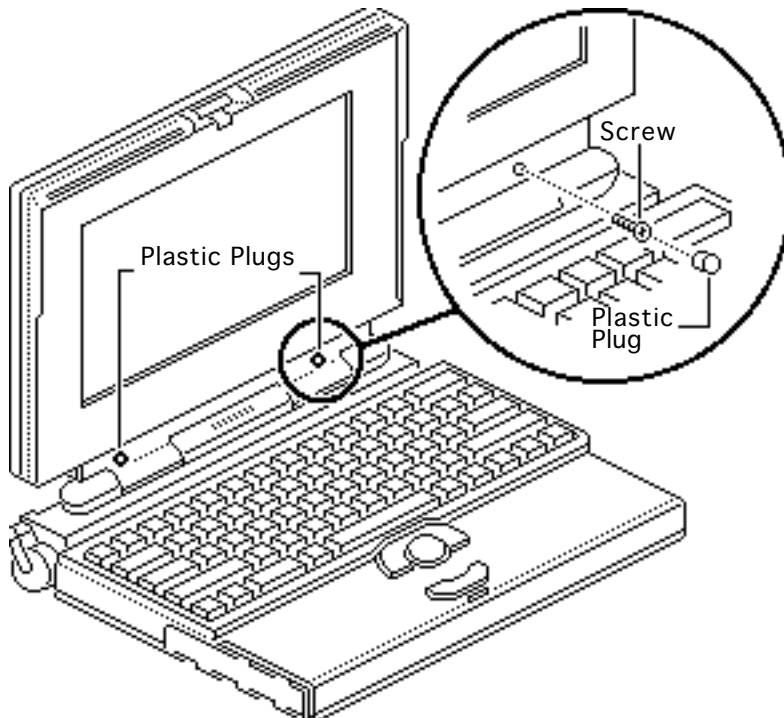


Display Bezel

Before you begin, remove the main battery.

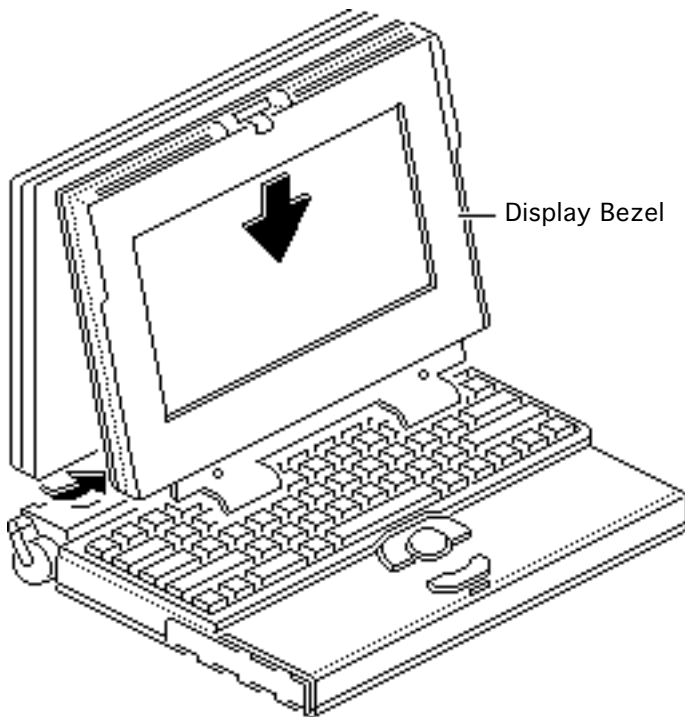
Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/ Safety.





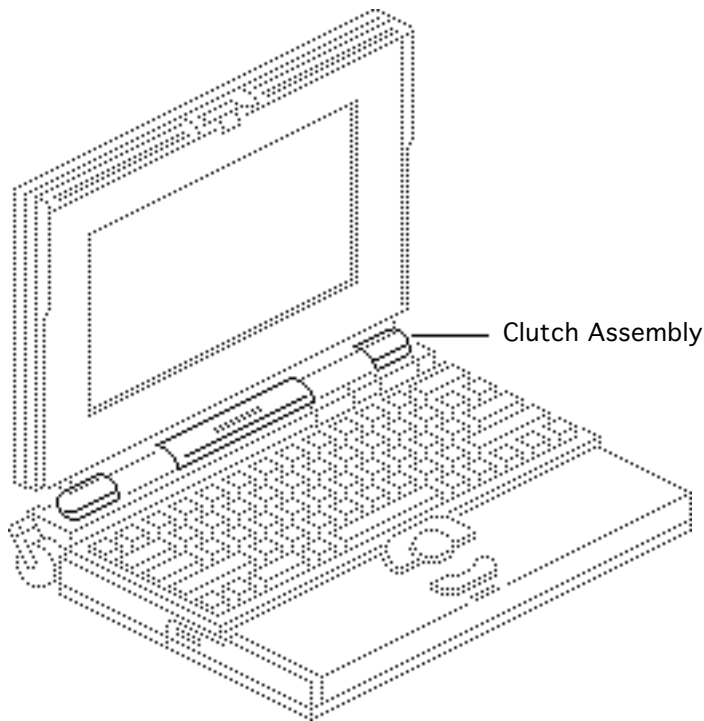
- 1 Remove the two plastic plugs.
- 2 Using a T-8 torx driver, remove the two bezel mounting screws from the display.





- 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.





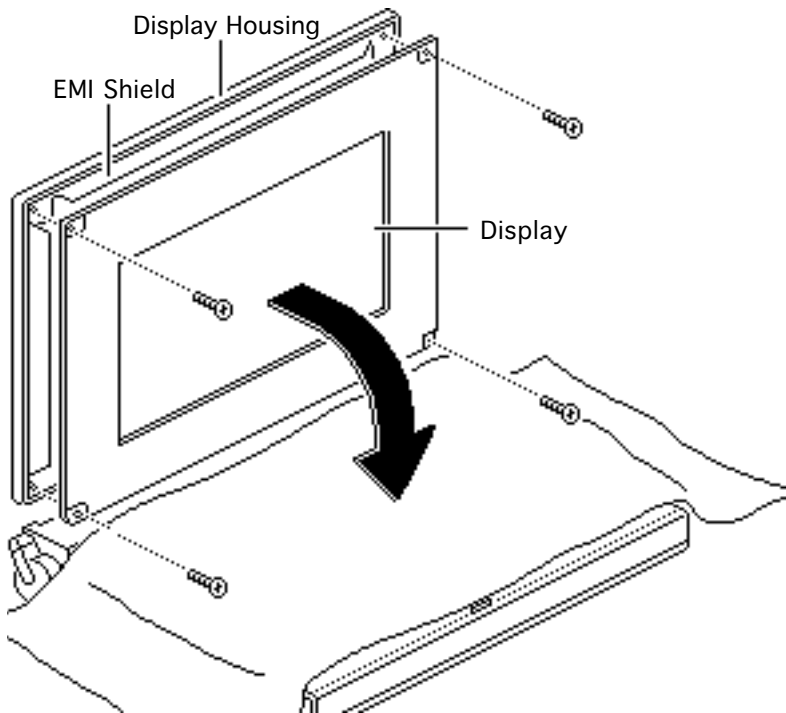
Clutches/Display Housing

Before you begin, remove the following:

- Main battery
- Display bezel

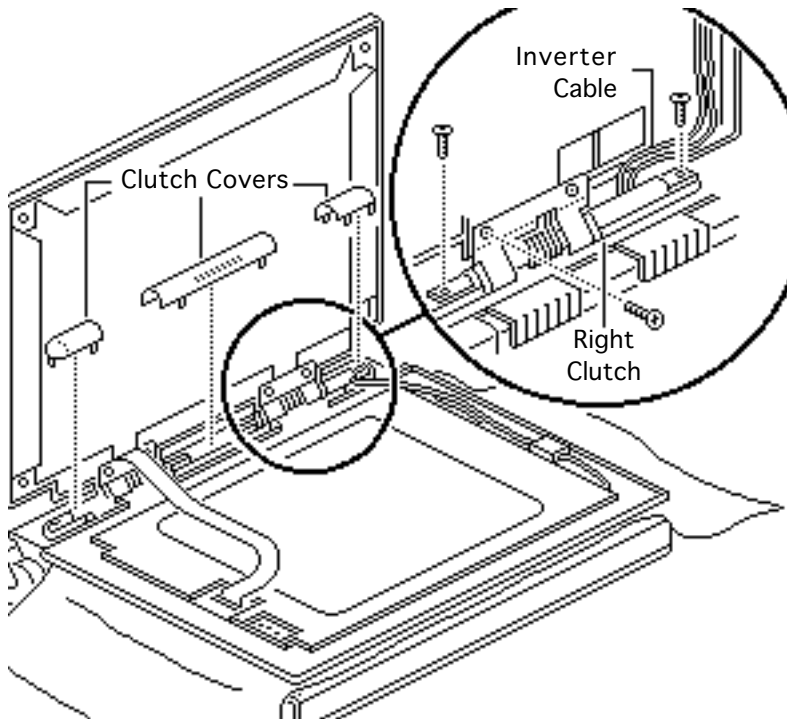
Caution: The PowerBook 150 contains CMOS devices that are very susceptible to ESD damage. Review the ESD precautions in Bulletins/Safety.





- 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.

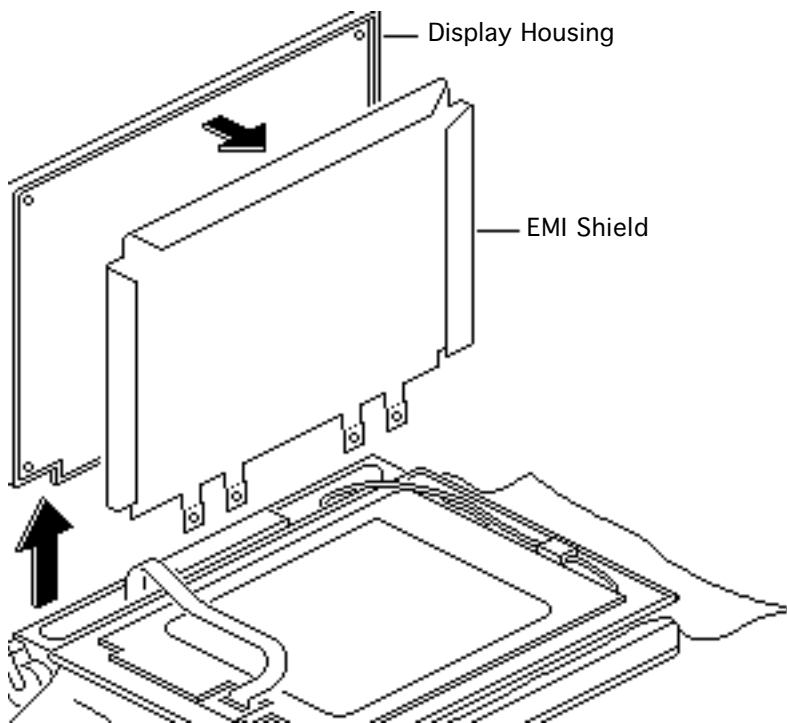




- 5 Pull off the three clutch covers.
- 6 Using a T-8 torx driver, remove the three mounting screws from the left and right clutches.
- 7 Remove the left and right clutches from the display housing.

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

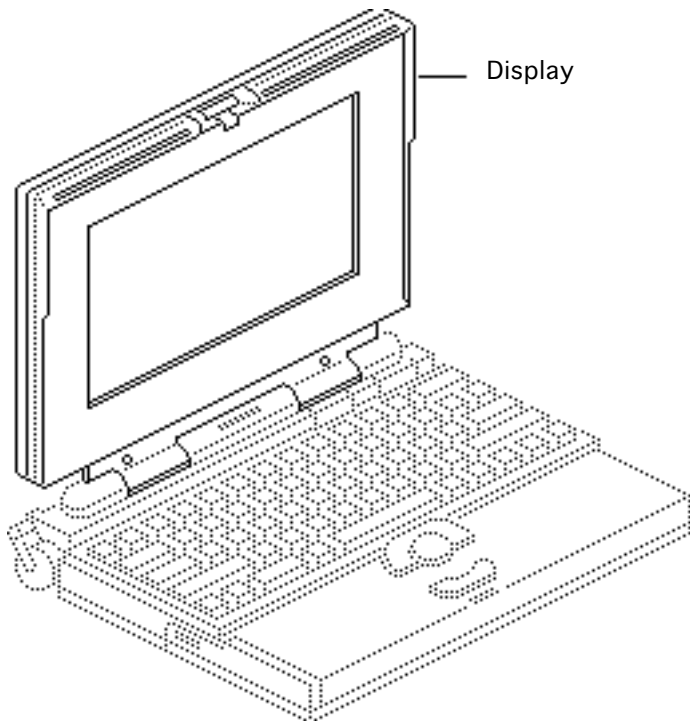




Replacement Note: To avoid pinching the inverter cable, make sure it routes as illustrated.

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





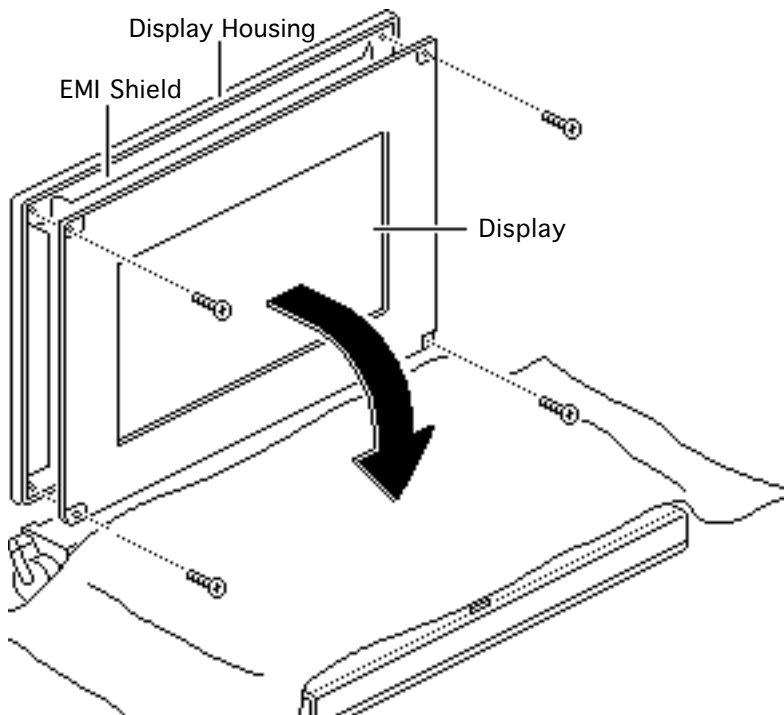
Display

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.

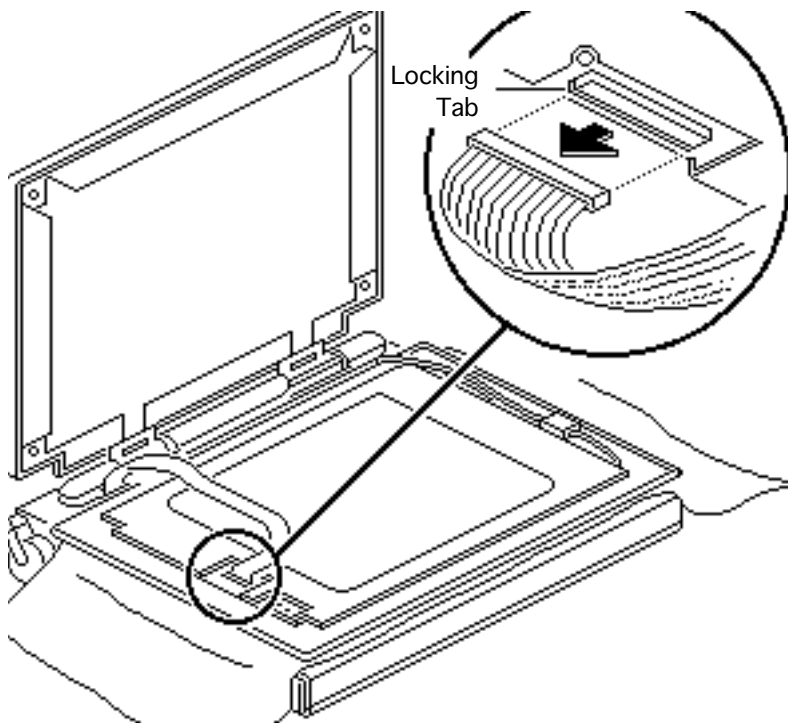




Caution: The display cable is fragile and should be handled with care.

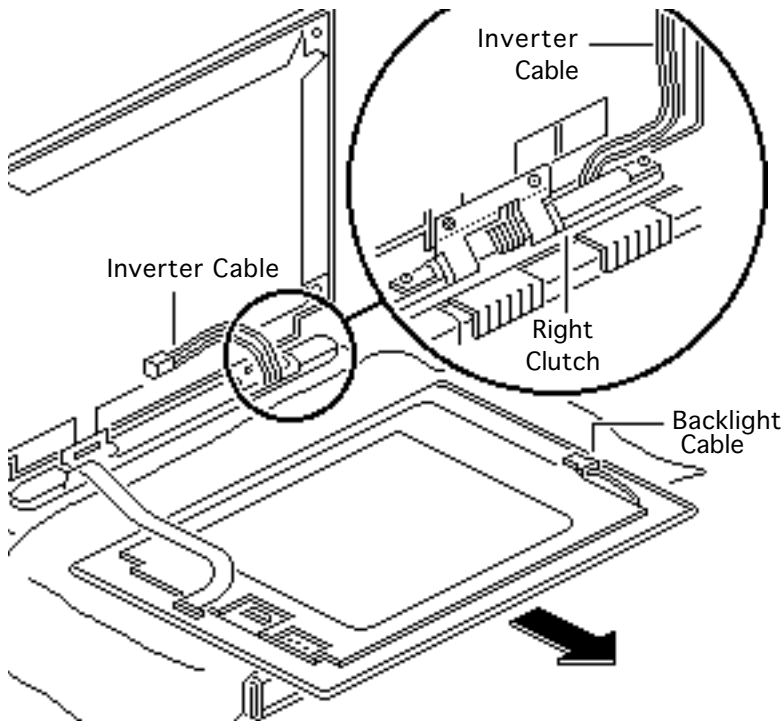
- 1 Cover the keyboard with a clean cloth or sheet of paper.
- 2 Using a T-8 torx driver, remove the four display mounting screws.
- 3 Remove the display from the housing and EMI shield.
- 4 Place the display face-down on the keyboard.





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

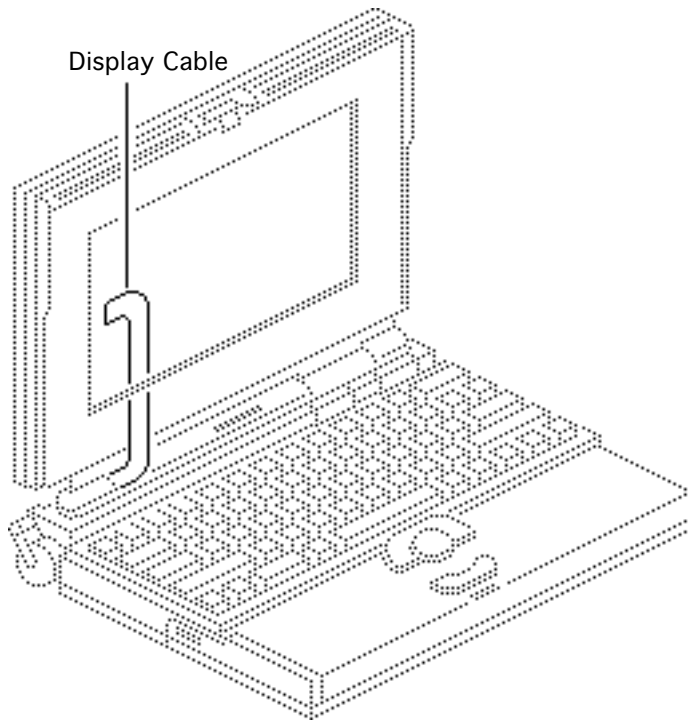




- 6 Disconnect the inverter cable from the display backlight cable.
- 7 Remove the display.

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





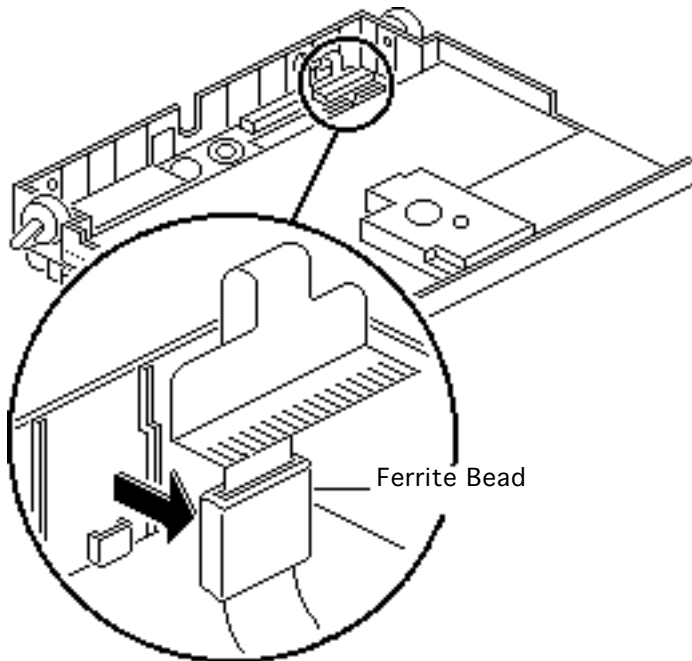
Display Cable

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.

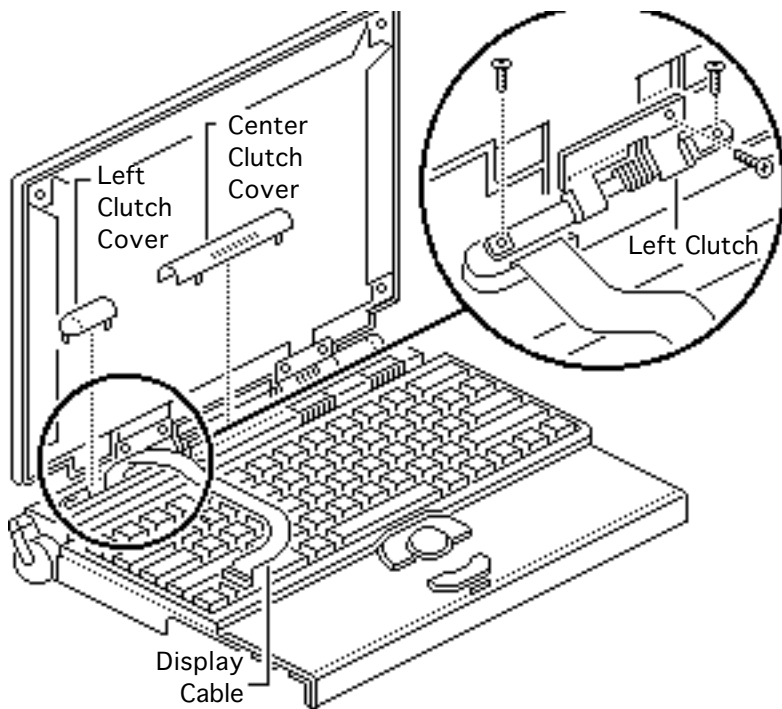




Caution: The display cable is fragile and should be handled with care.

- 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.

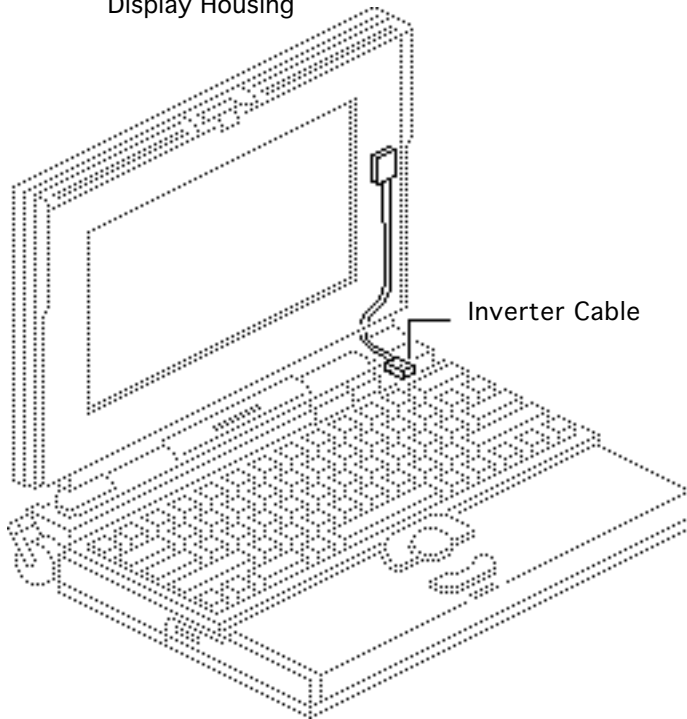
Replacement Note: Replace the short mounting screw in the top-inside clutch threading. The top-outside threading is used to mount the bezel.

- 5 Remove the display cable from the case.





Display Housing



Inverter Cable

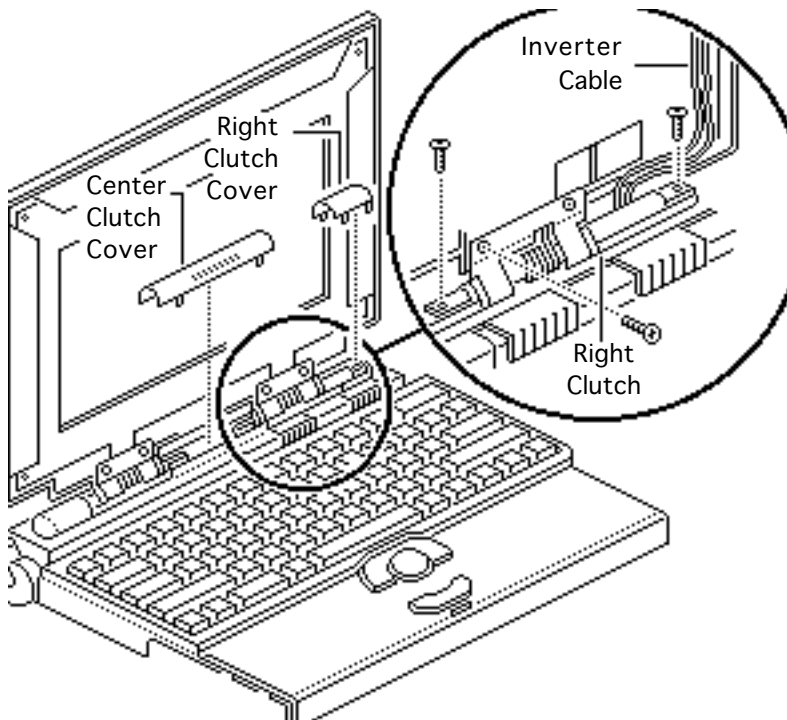
Inverter Cable

Before you begin, remove the following:

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

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

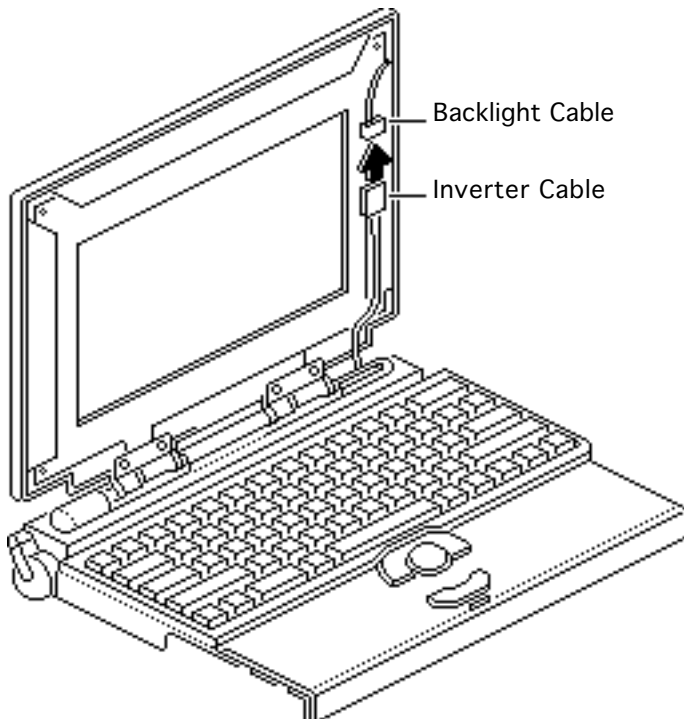




- 1 Pull off the center and right clutch covers.
- 2 Using a T-8 torx driver, remove the three mounting screws from the right clutch.
- 3 Remove the clutch from the display housing.

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





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.

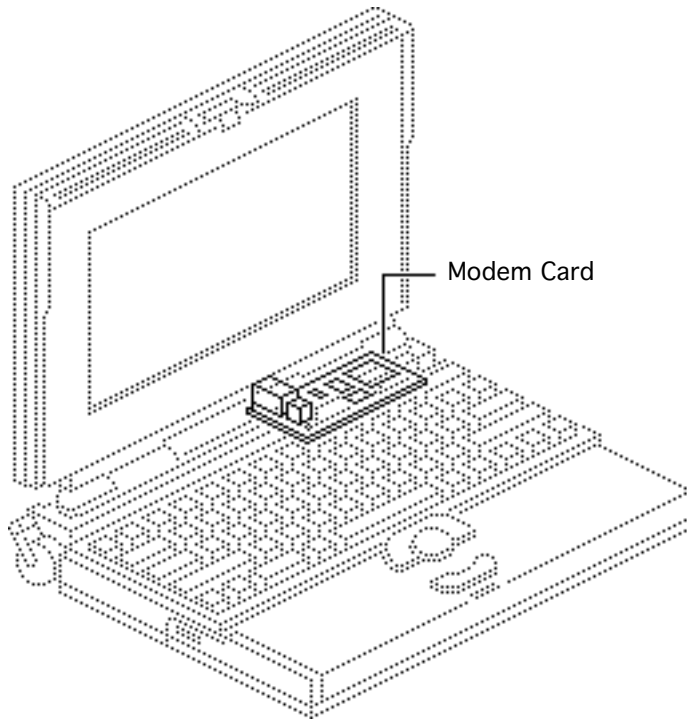




Upgrades

PowerBook 150





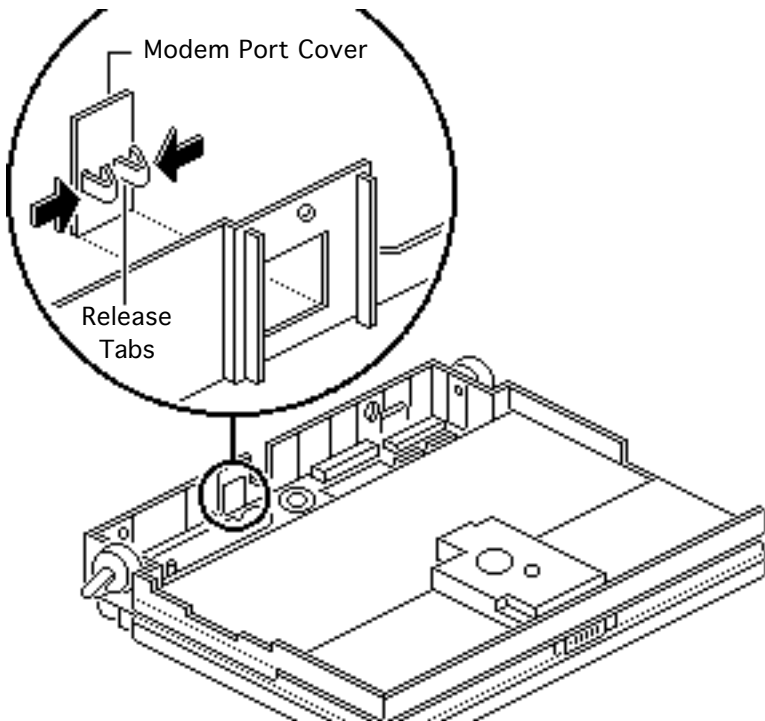
Modem Card

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.

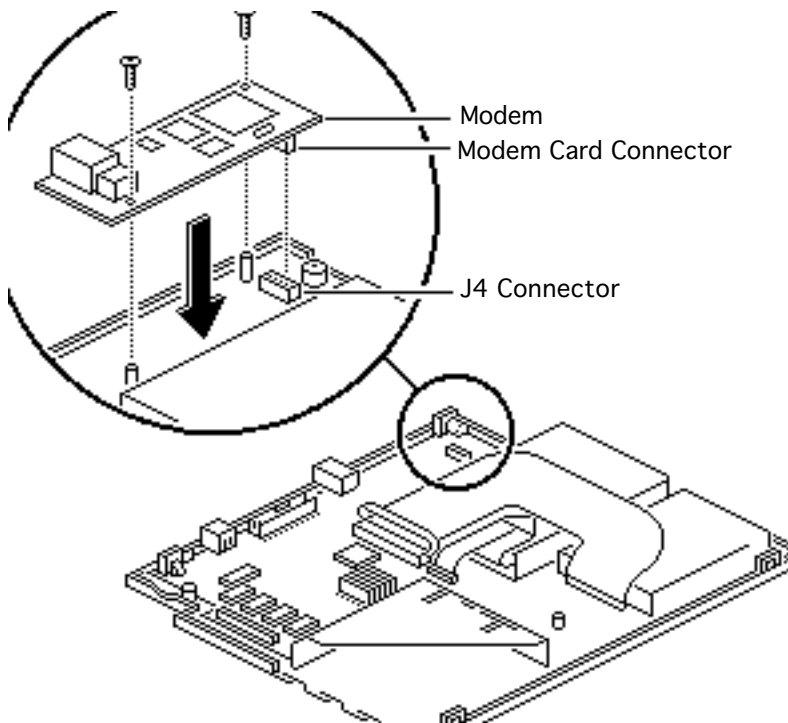




Note: The modem card is an option for the PowerBook 150.

- 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.



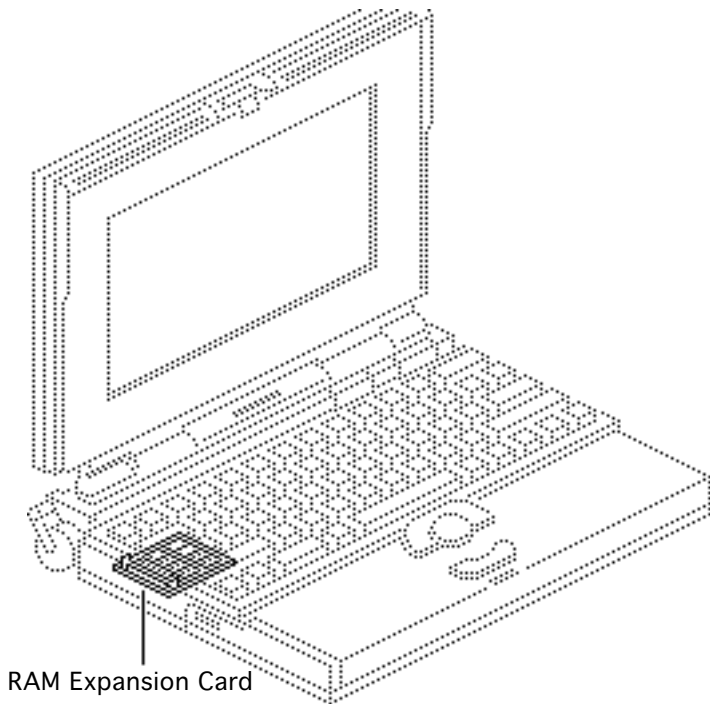


RAM Expansion Card

Before you begin, remove the following:

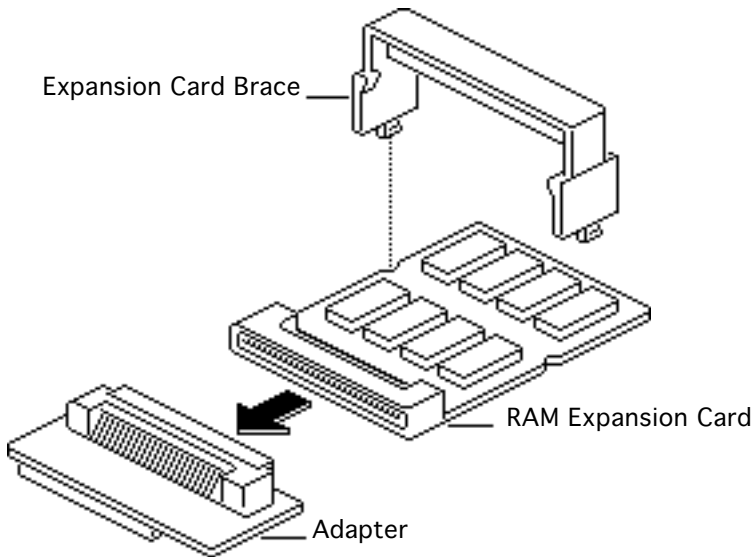
- Main battery
- Top case

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



RAM Expansion Card



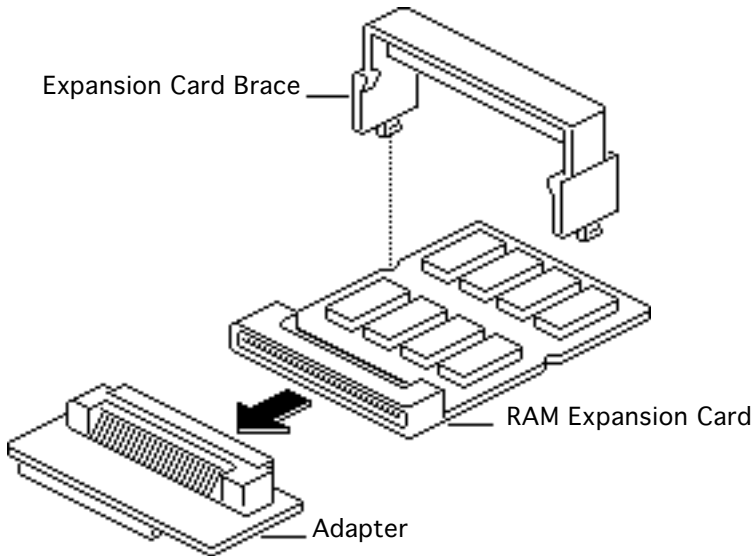


Caution: Handle the RAM expansion card by the edges only. Do not touch any components on the card.

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





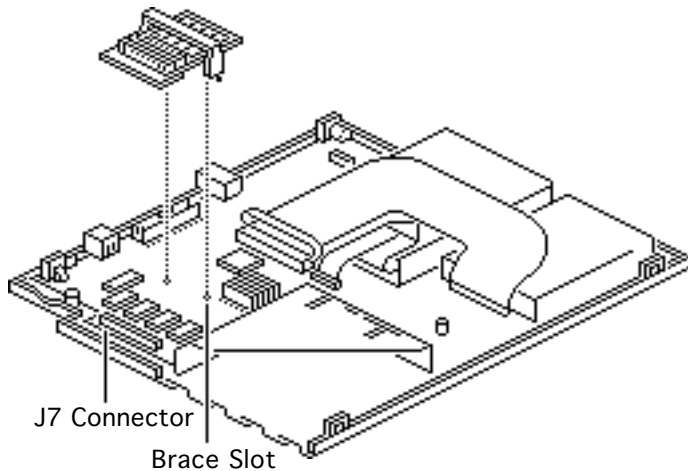
holding onto the white projections on the top of both cards and squeezing them together.

Connect the RAM expansion card to the adapter.

- 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.





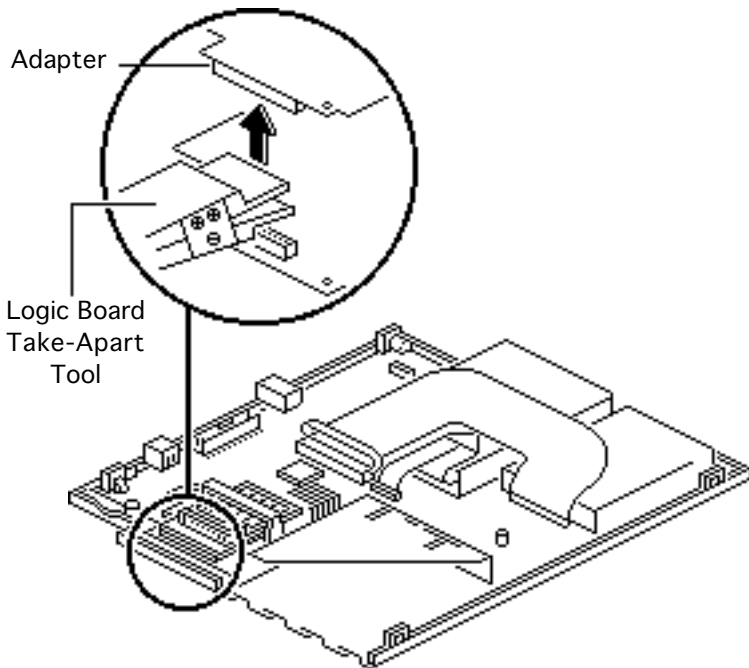
3 Insert the two legs of the expansion card brace into the two brace slots in the logic board.

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.





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.

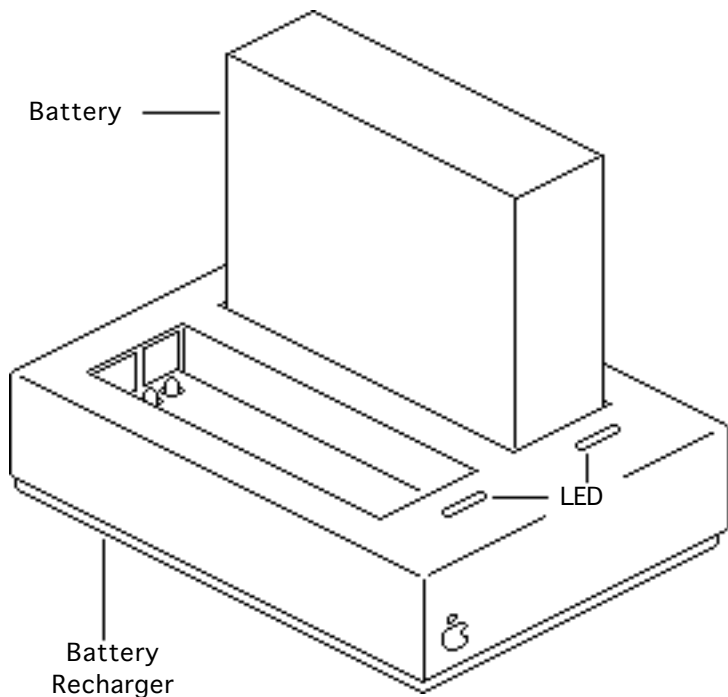




Additional Procedures

PowerBook 150





Battery 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.





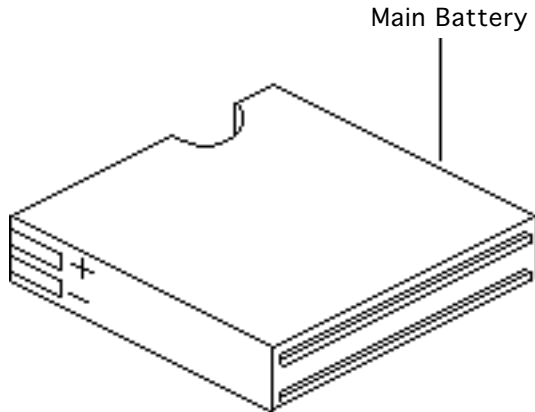
- 2 Track the status of the battery. If the LED is
 - Yellow, the battery is charging.
 - Green, the battery is ready to use.
 - Off, the charger is unplugged, the battery is bad, the power adapter is defective, or the charger is defective.





Battery Handling

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





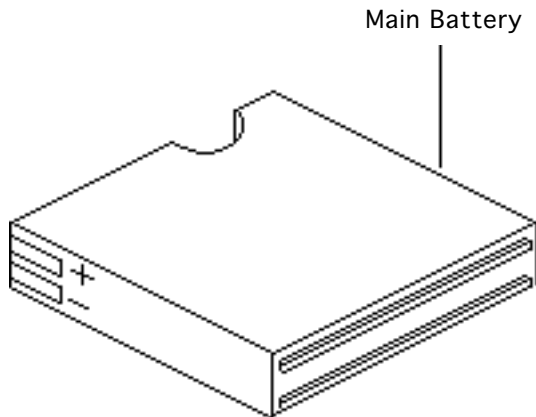
- ships batteries in a partially-charged state.
- Do not leave the battery in the computer for longer than two weeks without plugging in the power adaptor.
 - Completely discharge and recharge the battery once a month.
 - Store the battery in the protective battery case.
 - Do not short-circuit the battery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





Battery Verification

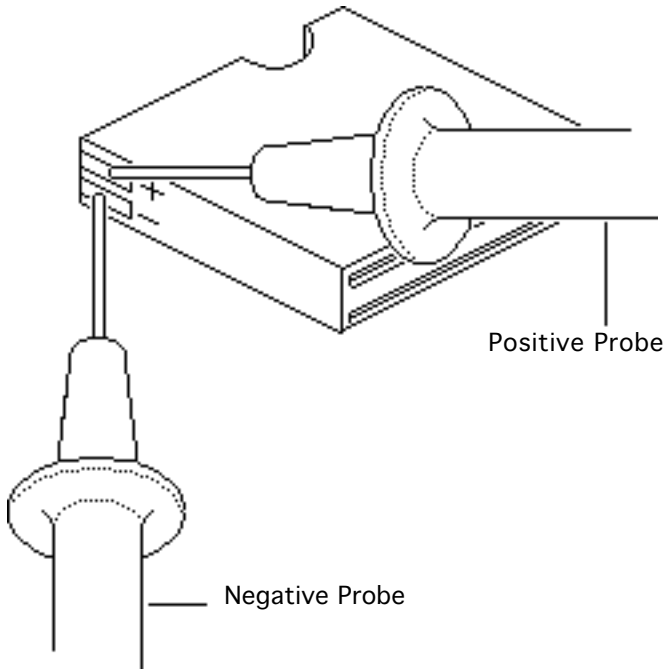
Before you begin, remove the main battery.



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

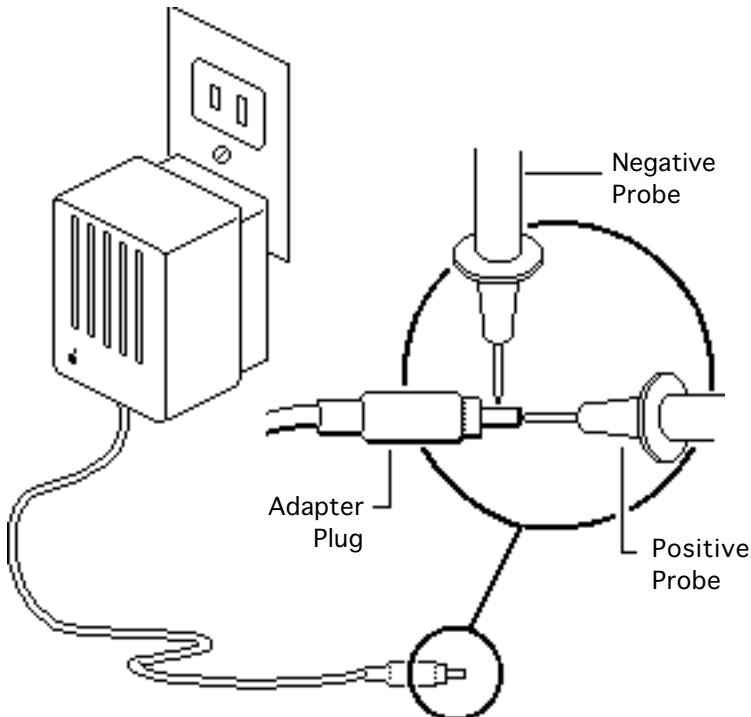




handling and disposal instructions in Bulletins/Safety.

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

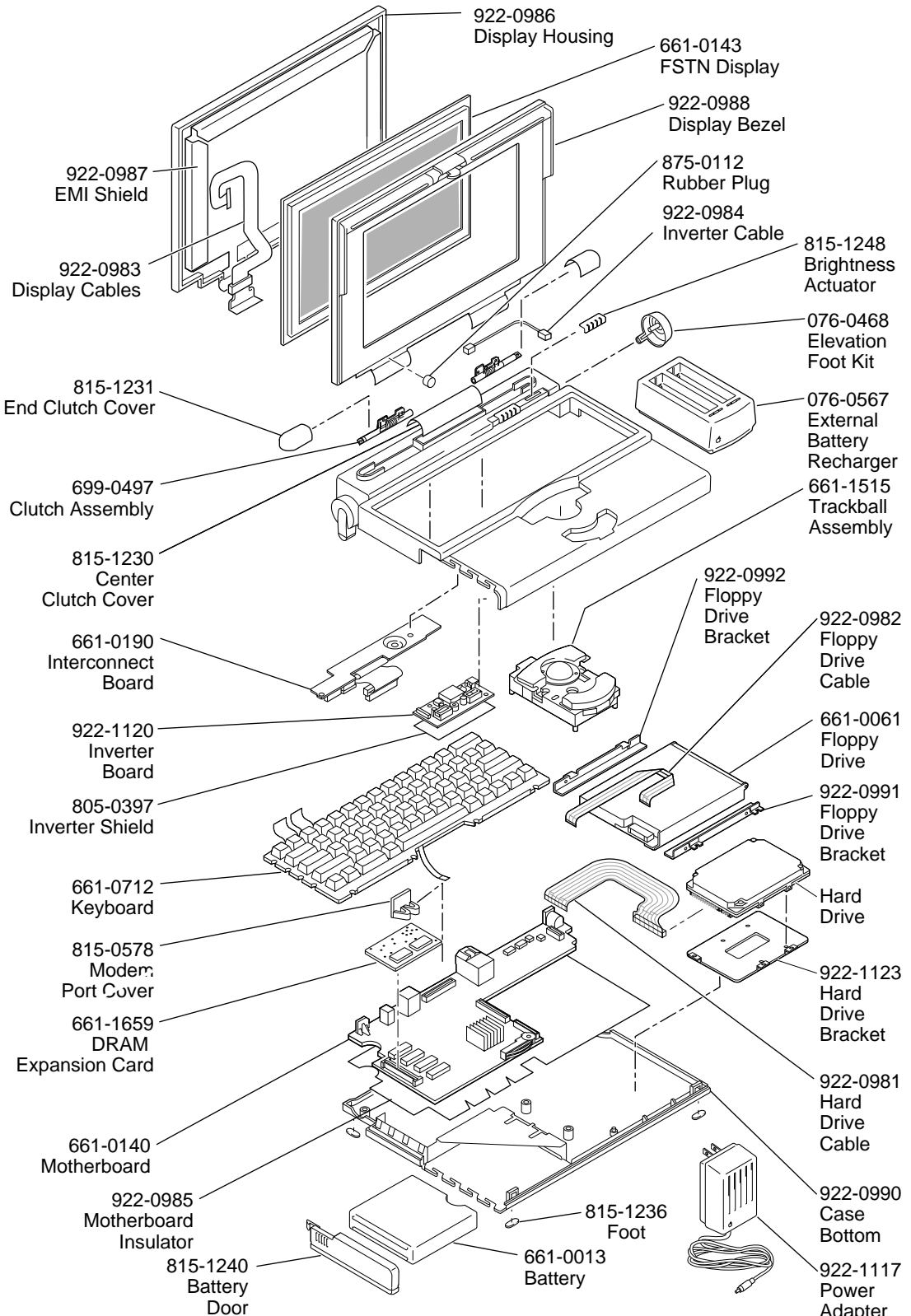
PowerBook 150





Exploded View

PowerBook 150



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

