



# PowerBook 2300 Series

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PowerBook Duo 2300c



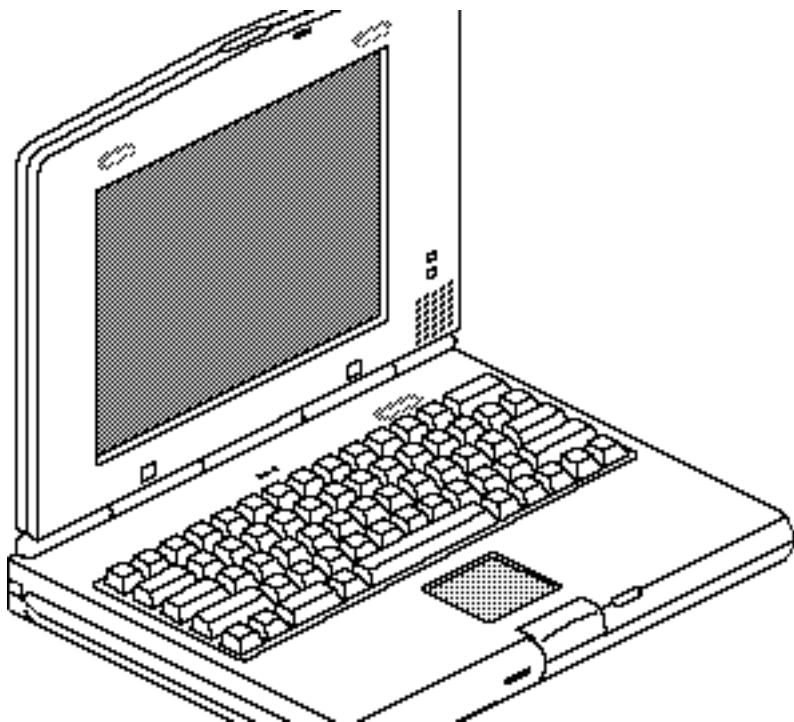


## Basics

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PowerBook 2300 Series





## General Information

The PowerBook Duo 2300c brings RISC- based PowerPC processor technology to the subnotebook class. This system features a 100-megahertz PowerPC 603e processor, an active-matrix color display, and a trackpad. Its integrated 9.5-inch display offers two modes—640 by 480 pixels with 256 colors, or 640 by 400 pixels with up to





thousands of colors. Also offered are a high-capacity hard disk and RAM that can easily be expanded to 56 megabytes.





## Repair Strategy

Service the PowerBook 2300 Series computers through module exchange and parts replacement. Customers can request on-site service from an Apple Authorized Service Provider Plus (AASP+) Apple Assurance (US only), or request a courier through the Apple Canada Technical Answerline (Canada only). They can also choose carry-in service from an AASP.

### Ordering

Apple Service Providers planning to support the computer systems covered in this manual may purchase Service modules and parts to develop servicing capability. To order parts, use the AppleOrder (US only) or ARIS (Canada only) system and refer to “Service Price Pages.”





Large businesses, universities, and K-12 accounts must provide a purchase order on all transactions, including orders placed through the AppleOrder (US only) or ARIS (Canada only) system.

### **USA Ordering**

US Service Providers not enrolled in AppleOrder may fax their orders to Service Provider Support (512-908-8125) or mail them to

Apple Computer, Inc.  
Service Provider Support  
MS 212-SPS  
Austin, TX 78714-9125

For US inquiries, please call Service Provider Support at 800-919-2775 and select option #1.





## Canadian Ordering

Canadian Service Providers not enrolled in ARIS may fax their orders to Service Provider Support in Canada (1-800-903-5284). For Canadian inquiries, please call Service Provider Support at 905-513-5782 and select option #3.





# Warranty/AppleCare/ARIS

## **US Only**

The PowerBook 2300 Series computers are covered under the Apple One-Year Limited Warranty. The AppleCare Service Plan is also available for these products. Service Providers are reimbursed for warranty and AppleCare repairs made to these computers. For pricing information, refer to “Service Price Pages.”

## **Canada Only**

The PowerBook 2300 Series computers are covered under first-year AppleCare. The Extended AppleCare Service Plan is also available for these products. Service Providers are reimbursed for first-year warranty and Extended AppleCare repairs made to these computers. For pricing information, refer to “Service Price Pages.”







## Tools Required

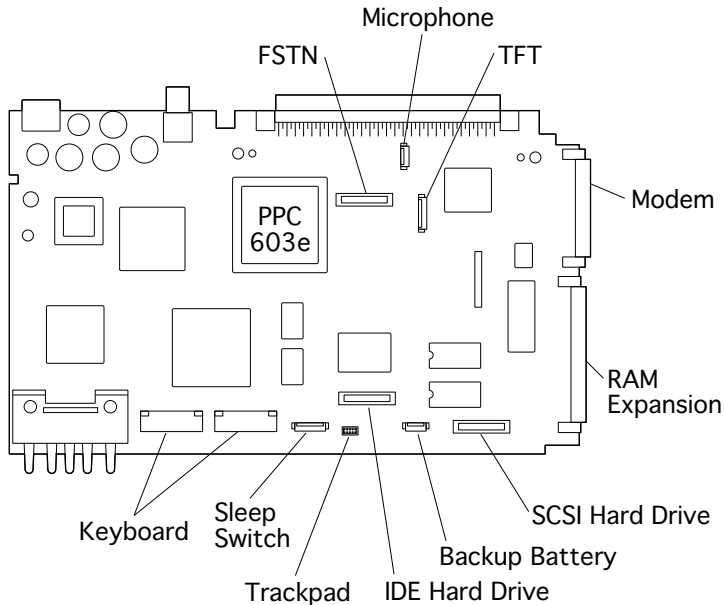
The following tools are required to disassemble a PowerBook Duo 2300c system:

- T-6 torx driver
- T-8 torx driver
- T-10 torx driver
- IC extractor
- Jeweler's flat-blade screwdriver
- # 00 Phillips screwdriver
- Duo battery contact alignment tool



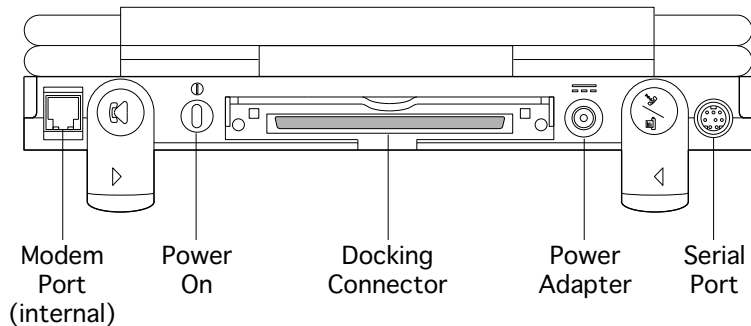


# Logic Board Connectors





# Rear Panel





|   |  |  |
|---|--|--|
| 1 |  | Bottom case, clutch clips, logic board |
| 2 |  | Hard drive, logic board, inverter      |
| 3 |  | Hard drive carrier                     |
| 4 |  | Trackpad carrier (bottom)              |
| 5 |  | Trackpad carrier (top)                 |
| 6 |  | Bezel                                  |
| 7 |  | Speaker                                |
| 8 |  | Display                                |
| 9 |  | Feet                                   |

## Screw Matrix

Nine different types of screws are used in the PowerBook Duo 2300c. Most are Torx screws that require a T-6 or T-8 Torx screwdriver.

The following matrix illustrates these screws and notes their location in the unit.

When installing the screws, make them finger-tight; do not overtighten.





## Specifications

PowerBook 2300 Series





## 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**

PowerPC 603e RISC processor  
100 MHz

### **Addressing**

32-bit data bus





## Memory

|                       |  |
|-----------------------|--|
| <b>RAM</b>            | 8 MB of low-power, self-refresh dynamic RAM on board<br>Expandable to 56 MB<br>Maximum of 48 MB RAM expansion card, with 70 ns or faster chips |
| <b>ROM</b>            | 1 MB of ROM on board   |
| <b>Clock/Calendar</b> | CMOS custom chip with long-life rechargeable lithium battery   |







## Disk Storage

### **Hard Drive**

Internal 2.5" IDE drive (750 MB or 1.1 GB)

### **Floppy Drive**

Optional external 1.4 MB Apple SuperDrive





## I/O Interfaces

|                              |  |
|------------------------------|--|
| <b>Processor-Direct Slot</b> | 152-pin processor-direct slot (PDS) connector for attaching expansion devices<br>32-bit expansion bus      |
| <b>Serial</b>                | Serial port for attaching modem, printer, AppleTalk network, or other serial device (RS-422 or mini DIN-8) |
| <b>Modem</b>                 | Modem telephone jack (RJ-11 in United States, mini DIN-8 elsewhere) for optional internal modem            |
| <b>Power Adapter</b>         | Power adapter port   |





## I/O Devices

### **Keyboard**

Built-in standard Apple keyboard  
63 keys, domestic; 64 keys, ISO  
Caps-locked LED  
Soft power-on switch  
2.4 mm travel; 18 mm vertical and horizontal pitch  
Two-level tilt adjustment using feet

### **Trackpad**

Solid-state trackpad  
400 dpi resolution for relative mode  
520 dpi minimum resolution for absolute mode





## Sound and Video

### **Sound Generator**

4-voice sound with 8-bit digital-analog conversion  
Records at 11 kHz or 22 kHz sample rate

### **Microphone**

Built-in, omnidirectional  
Electret

### **Speaker**

Built-in

### **Video Display**

9.5" active-matrix color display  
640 by 480 pixels with 256 colors, or 640 by 400 pixels with  
thousands of colors





## Electrical

### **Main Battery**

NiMH (nickel metal hydride), Type 3

2-4 hours of use before recharging

Recharge time: approximately 2 hours if in sleep or shutdown mode; approximately 4 hours when computer is in use

### **Power Adapter**

Input: AC 100-240 V, 50-60 Hz

Output: DC 24 V, 1.5 A, 36 W

### **Microphone**

Output: 4 mV peak to peak at normal speaking volume

### **Apple Desktop Bus (ADB)**

Maximum current draw: 100 mA (PowerBook Duo MiniDock or PowerBook Floppy Adapter) or 500 mA (PowerBook Duo Dock)





## Physical

### **Dimensions**

Height: 1.5 in. (3.8 cm)

Width: 10.9 in. (27.7 cm)

Depth: 8.5 in. (21.6 cm)

### **Weight**

4.8 lb. (2.2 kg)





## Environmental

|                              |   |
|------------------------------|---|
| <b>Operating Temperature</b> | 41–95° F (5–35° C) if used alone or connected to a MiniDock or floppy disk adapter<br>41–86° F (5–30° C) if used in a Duo Dock Plus or other Duo Dock |
| <b>Storage Temperature</b>   | -13° to 140° F (-25° to 60° C)  |
| <b>Relative Humidity</b>     | 20% to 80% noncondensing  |
| <b>Operating Altitude</b>    | 0–10,000 ft. (0–3,048 m) maximum  |
| <b>Storage Altitude</b>      | 0–15,000 ft. (0–4,572 m) maximum  |





## Other

### **Express Modem**

14,400-bps data transmission, with 14,400-bps fax send and receive capability

Supports two error-correction and data-compression protocols: MNP classes 2 to 5 and CCITT standard V.42/V.42bis

### **SCSI Adapter**

Enables connection between PowerBook computer and desktop Macintosh (PowerBook appears as a hard drive on the desktop)







# Troubleshooting

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## PowerBook 2300 Series





## 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.





## Battery Contact Alignment

Use the Duo battery contact alignment tool in these situations:

- Any time a battery contact screw is loosened, removed, or replaced.
- Whenever a PowerBook Duo logic board is installed or reassembled into a system.
- Whenever a PowerBook Duo with a known good battery shuts down unexpectedly (other than going to sleep), won't boot off the battery, or intermittently powers off when running off the battery.
- Any time a known good PowerBook Duo battery won't charge.





## Power Manager Reset

If a unit crashes or experiences power problems, reset the power manager chip by pressing the rear power switch for 30-45 seconds.

If resetting the power manager chip does not solve the problem, reset the code for the power manager chip by removing all power sources and letting the unit sit for 10 minutes. (Take out the battery and disconnect the AC adapter and the internal backup battery.) This forces the PowerBook Duo to reload the power manager code from the system software.





# Symptom Charts

## Startup

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

- 1 Attach power adapter.
- 2 Check RAM expansion card connection.
- 3 Replace RAM expansion card
- 4 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures “Align Battery Contacts.”)





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

- 1 Check that mylar tape on docking connector is attached and in place.
- 2 Disconnect hard drive cable from logic board and reboot system. If startup sequence is normal, power off system, reseal cable, and retest.
- 3 Check for sound from spinning hard drive.
- 4 Replace hard drive.
- 5 If system is connected to any external device, disconnect device and reboot system. If startup sequence is normal, reseal device's cable and retest.
- 6 Replace logic board.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures “Align Battery Contacts.”)





## Power

Screen is blank;  
computer does not  
respond

- 1 Disconnect power adapter, remove battery for 3 minutes, then reinstall battery.
- 2 Press rear power switch.
- 3 Reset power manager.
- 4 Try known-good, charged main battery.
- 5 Check all logic board cable connections.
- 6 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.





After you remove main battery, some Control Panel settings are different

- 1 Make sure backup battery is securely connected.
- 2 Replace backup battery.

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

- 1 This is normal for fully-charged battery.
- 2 Check power adapter connection.
- 3 Try known-good, charged main battery.
- 4 Check output voltage on power adapter to determine if adapter is good.
- 5 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.







Computer runs when plugged into wall outlet but not when using battery power; battery voltage is within tolerance

- 1 If battery is new, fully charge it.
- 2 Check that leftmost CPU stiffener mounting screw is installed.
- 3 Inspect battery contacts on logic board to make sure not bent or dirty.
- 4 Perform battery contact alignment procedure. (See Additional Procedures, “Align Battery Contacts.”)
- 5 If system had dead backup battery before replaced main battery, reset power manager. (See Troubleshooting Info, “Power Manager Reset.”)
- 6 Replace main battery.
- 7 Replace logic board.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures “Align Battery Contacts.”)





System acts erratically, such as powering off unexpectedly, or hanging up.

- 1 Make sure logic board mounting screw installed on battery contact is tightened.
- 2 Check power adapter for physical damage.
- 3 Check power adapter connection.

System powers down unexpectedly, won't boot off battery, or powers down intermittently when running off battery. Or, battery won't charge.

- 1 Make sure battery is good battery.
- 2 Check if battery is securely installed; if it is, battery door will catch correctly.
- 3 Check keyboard cable connection.
- 4 Use Duo battery contact alignment tool to check alignment of battery contacts.





## External Floppy Drive

Audio and video present, but external drive does not operate

- 1 Check floppy-adapter-to-PowerBook connection.
- 2 Try known-good floppydisk.
- 3 Check floppy drive cable connection.
- 4 Replace floppy drive cable.
- 5 Replace floppy adapter.
- 6 Replace floppy drive.
- 7 Check that logic board docking connector is protected by mylar covering.
- 8 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.





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

- 1 Try known-good system disk.
- 2 Verify that trackpad  $\Sigma\Sigma$ button is not stuck.
- 3 Check floppy drive cable connection.
- 4 Replace floppy drive cable.
- 5 Replace floppy adapter.
- 6 Replace floppy drive.
- 7 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.





Disk does not eject

- 1 Switch off system and hold trackpad  $\Sigma\Sigma$  button down while you switch on system.
- 2 Insert straightened paper clip into hole next to drive opening to eject disk.
- 3 Check floppy drive cable connection.
- 4 Replace floppy drive cable.
- 5 Replace floppy adapter.
- 6 Replace floppy drive.
- 7 Replace logic board.

When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.





Disk initialization  
fails

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

Read/write/copy  
error

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





## Video

Pixel never comes on or is always on

Replace display or return computer to Apple.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures)

Partial or full row of pixels is always on or never comes on

- 1 Check cables.
- 2 Replace logic board.
- 3 Replace display.





Display is very light  
or totally white

- 1 Adjust screen contrast and brightness settings.
- 2 Verify cable, inverter board, and logic board.
- 3 Replace inverter board (CPRC/Int'l only).
- 4 Replace display.
- 5 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedure)

Display stopped  
working or dimmed  
but is fine now

- 1 If temperature is under 5° C or over 40° C, this reaction is normal.
- 2 Let screen warm up for 30 minutes.







Backlight doesn't operate.

- 1 Verify that backlight cable connection is secure.
- 2 Check cable, inverter board, and logic board connections.
- 3 Verify that cables are not pinched or severed.
- 4 Replace inverter board (CPRC/Int'l only).
- 5 Replace display.
- 6 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.





No display, but computer appears to operate correctly

- 1 Press any key to wake computer from system sleep.
- 2 Adjust screen contrast and brightness settings.
- 3 Verify cable, inverter board, trackpad, keyboard, and logic board connections.
- 4 Connect power adapter.
- 5 Replace inverter board (CPRC/Int'l only).
- 6 Replace display.
- 7 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.





## Hard Drive

Internal hard drive  
does not spin

- 1 Check internal hard drive cable connection.
- 2 Replace internal hard drive cable.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures, “Align Battery Contacts.”)





Internal hard drive  
does not power up

- 1 Check internal hard drive cable connection.
- 2 Replace internal hard drive cable.
- 3 Run Mass Storage Test on MacTest Pro.
- 4 Use Drive Setup to reinitialize drive
- 5 Replace internal hard drive.
- 6 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures, “Align Battery Contacts.”)





## Peripherals

After you connect external SCSI device, computer does not boot

- 1 Switch on external SCSI device before starting computer.
- 2 Check cable connections.
- 3 Verify that SCSI chain is terminated correctly.
- 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.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.





Cursor does not move when you are using trackpad

- 1 Reset power manager.
- 2 Check trackpad connections.
- 3 Check keyboard and logic board connections.
- 4 Connect low-power mouse and try to move cursor. If cursor moves, try using trackpad and keyboard. If trackpad does not move cursor, replace trackpad. If keyboard does not move cursor, replace keyboard.
- 5 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.





Cursor intermittently  
does not move or  
moves erratically

- 1 Reset power manager.
- 2 Clean trackpad surface.
- 3 Check trackpad connections.
- 4 Replace trackpad.
- 5 Replace keyboard.
- 6 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures, “Align Battery Contacts.”)





Cursor moves, but clicking trackpad button has no effect

- 1 Reset power manager.
- 2 Clean trackpad connections.
- 3 Check keyboard and logic board connections.
- 4 Examine trackpad  $\Sigma\Sigma$  button for damage. If OK, reseal and try again. If  $\Sigma\Sigma$  button still fails, replace it.
- 5 Replace trackpad.
- 6 Replace keyboard.
- 7 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.







No response to any  
key on keyboard

- 1 Verify that computer is on.
- 2 Reset power manager.
- 3 Check keyboard connection.
- 4 Replace keyboard.
- 5 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures, “Align Battery Contacts.”)





Known-good direct connect printer does not print

- 1 Check that power adapter is plugged in.
- 2 Verify that System is 7.5.2 or later.
- 3 Verify that Chooser and Control Panel settings are correct.
- 4 Check serial cable.
- 5 Replace printer cable.
- 6 Try known-good printer.
- 7 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures, “Align Battery Contacts.”)





Known-good network  
printer does not print

- 1 Verify that System is 7.5.2 or later.
- 2 Verify that the Chooser and Control Panel settings are correct.
- 3 Check that Filesharing is turned on and Network Control is not set on Apple Remote Access (ARA).
- 4 Check cables.
- 5 Replace printer cable.
- 6 Try know-good printer. If printer works, troubleshoot network.
- 7 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.





Device connected to external modem port does not work

- 1 Verify that External Modem is selected in CDEV.
- 2 Verify that System is 7.5.2 or later.
- 3 Check cables.
- 4 Test device with known good computer.
- 5 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures, “Align Battery Contacts.”)





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

- 1 Verify that System is 7.5.2 or later.
- 2 Check cables
- 3 Verify that SCSI device is correctly terminated.
- 4 Verify that SCSI select switch setting on external device is unique.
- 5 Test device with known-good computer.
- 6 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures, “Align Battery Contacts.”)





In disk mode, computer does not display SCSI icon until host is booted, or computer crashes when host is shut down

Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures, “Align Battery Contacts.”)





## Internal Modem

Internal modem options do not appear in CDEV

- 1 Verify using system software 7.5.2 or later.
- 2 Verify that correct modem driver is selected in Extensions folder within System Folder.
- 3 Remove and reseal modem card.
- 4 Replace modem card.
- 5 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures “Align





## Battery Contacts.”)

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 Verify using system software 7.5.2 or later.
- 4 Remove and reseal modem card.
- 5 Replace modem card.







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 Verify using system software 7.5.2 or later.
- 4 Remove and reseal modem card.
- 5 Replace modem card.
- 6 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.





Modem interferes  
with system sound

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

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures “Align Battery Contacts.”)





Modem does not respond to incoming call

- 1 If computer is in sleep mode, verify that “Answer calls” is selected in PowerBook Control Panel.
- 2 Check phone cord connection and operation.
- 3 Replace modem card.
- 4 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures “Align Battery Contacts.”)





Modem has no sound  
output

- 1 Verify that Control Panel volume setting is 1 or above.
- 2 Replace modem card.
- 3 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures “Align Battery Contacts.”)





Modem Connects but  
does not communicate  
with remote modem

- 1 Verify that remote modem needs error correction (error correction is internal modem default).
- 2 Type AT &Q0 to disable error correction.





## Miscellaneous

Application seems to run slower after few seconds

Adjust Battery Conservation Options setting in Control Panel or connect power adapter.





No sound from  
speaker

- 1 Verify that Control Panel volume setting is 1 or above.
- 2 Check display cable connection.
- 3 Replace display cable.
- 4 Replace speaker (CPRC/Int'l only).
- 5 Replace logic board.
- 6 Return computer to Apple.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures “Align Battery Contacts.”)





Unit unable to come  
out of sleep mode after  
asleep for 2 or more  
days

- 1 Plug in power adapter.
- 2 Press on rear switch power.







Unit unable to enter  
sleep mode

- 1 Verify using system 7.5.2 or later.
- 2 Make sure display actuator is installed
- 3 on CPU stiffener.
- 4 Replace sleep switch.
- 5 Replace logic board.

**Note:** When replacing the logic board, check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing. The “CPU Stiffener” topic in Take Apart helps you locate and identify the two EMI clips.

**Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures, “Align Battery Contacts.”)



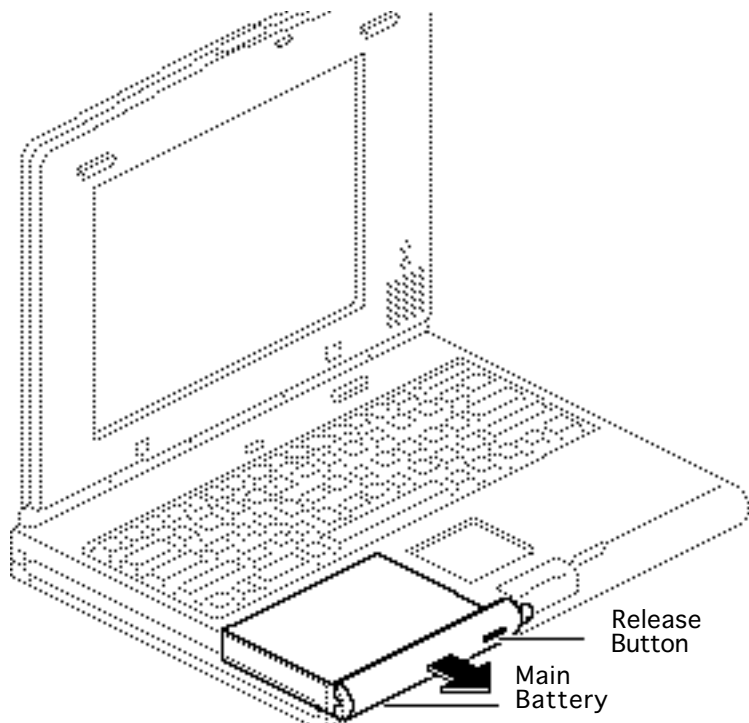


Take Apart

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PowerBook 2300 Series





## Main Battery

Before you begin, disconnect the power adapter.

- 1 Depress the release button and slide open the battery door.
- 2 Pull out the main battery.

**Caution:** If you fail to disconnect the power adapter and to remove the main battery before attempting take-apart procedures, you could short out the logic board.





**Replacement Note:** Perform the battery contact alignment procedure when a known-good battery has power problems. (See Additional Procedures, “Align Battery Contacts.”)

**Replacement Note:** If you remove a dead battery from a unit that also had a dead backup battery, you must reset the power manager to start up the system. (See Troubleshooting Info, “Power Manager Reset.”)

**Replacement Note:** Fully charge a replacement battery before using it.



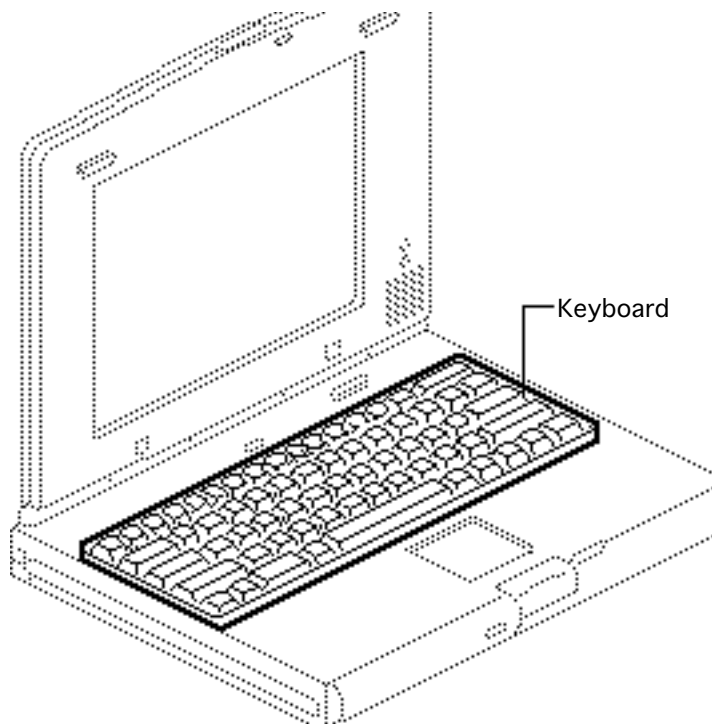


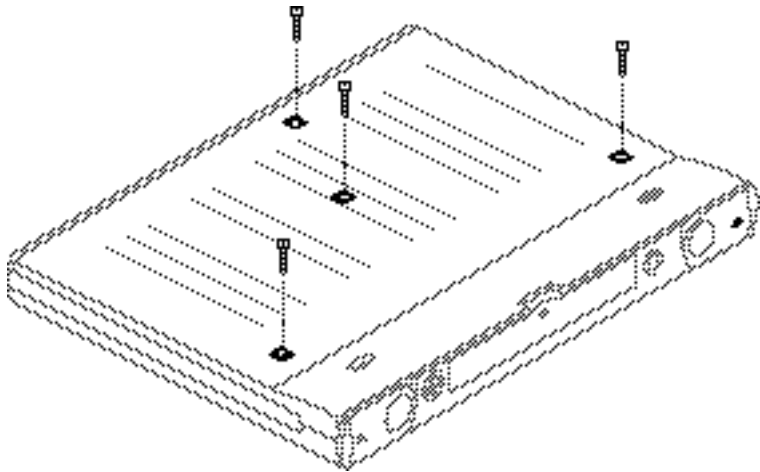
## Keyboard

Before you begin, remove the following:

- Power adapter
- Main battery

**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent damage, wear a grounding wriststrap. Review the ESD precautions in Bulletins/ Safety.





**Caution:** PowerBook Duo cables are fragile and easily torn or damaged. Handle all cables with care.

**Note:** If you are removing the keyboard only, you do not need to remove the case screw nearest the front of the unit.

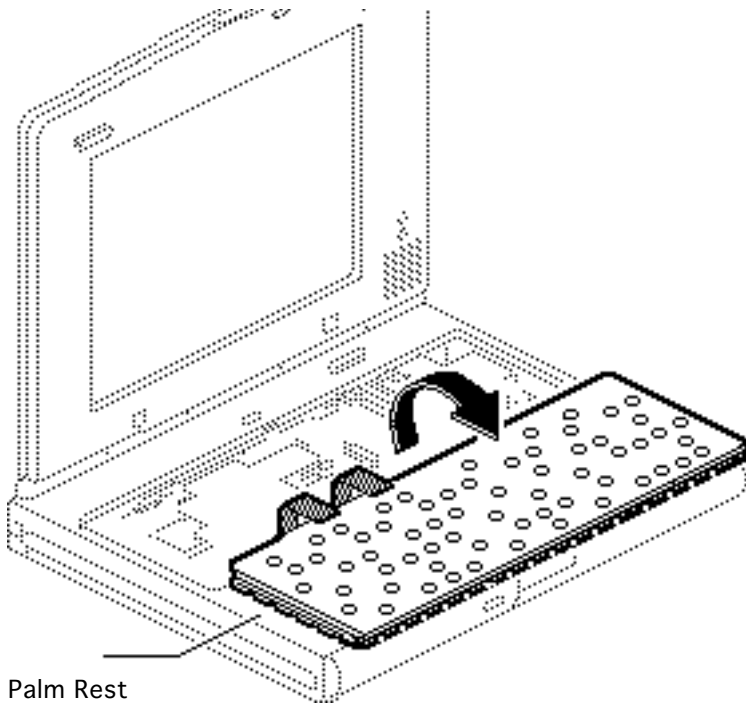
- 1 Close, latch, and turn over the computer. Using a T-8 torx driver, remove the four case screws from the bottom of the computer.





**Replacement Caution:** Don't overtighten the keyboard screws. Overtightening could warp the keyboard and restrict key movement. After replacing the screws, always check the keys and space bar to make sure they work.





- 2 Turn the computer upright and open the display.

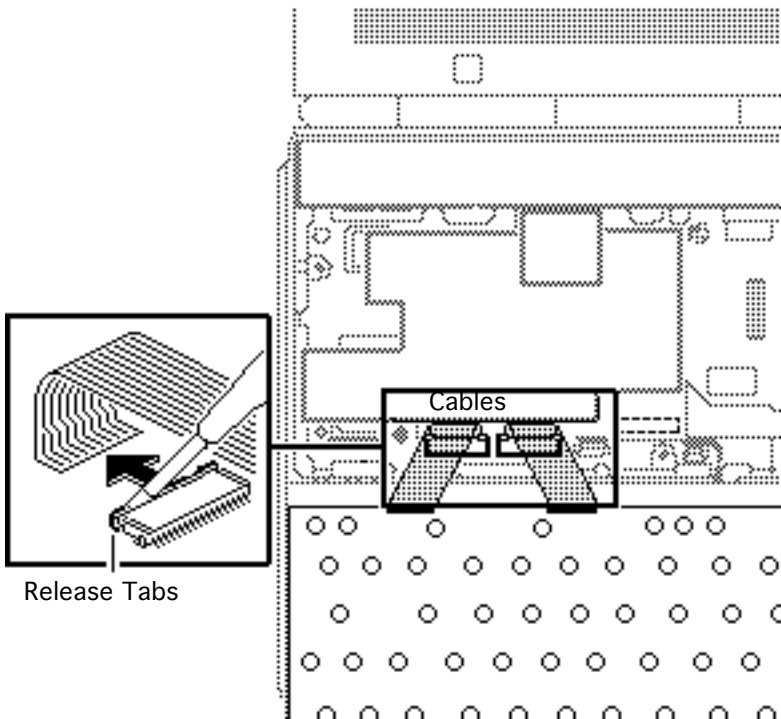
**Caution:** Handle the keyboard carefully in the next step to avoid tearing cables connected between the keyboard and the logic board.

- 3 Carefully tilt the computer and lift out the keyboard. Turn the keyboard over and place it on the palm rest.

Palm Rest







- 4 Using a jeweler's flat-blade screwdriver, push out the release tabs and disconnect the two keyboard cables.
- 5 Set aside the keyboard.



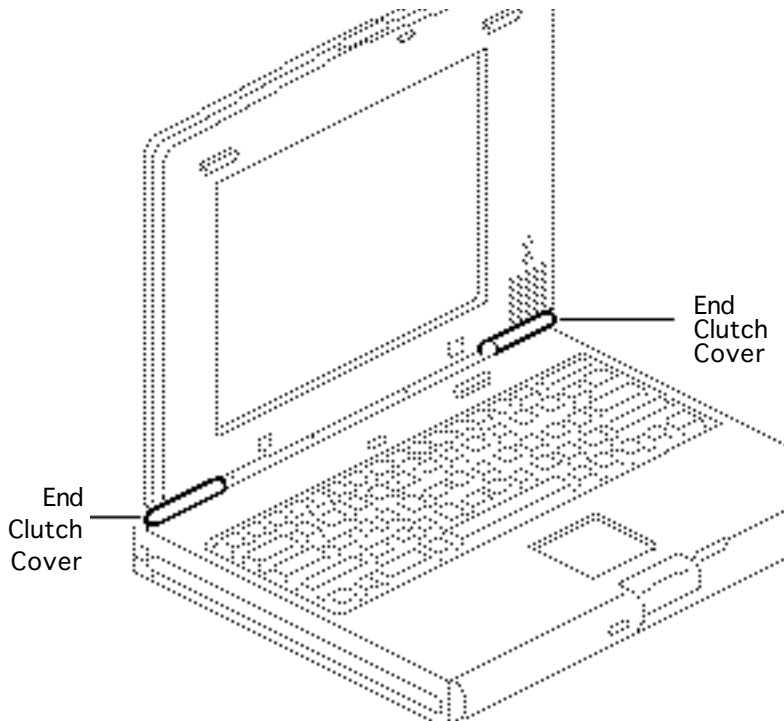


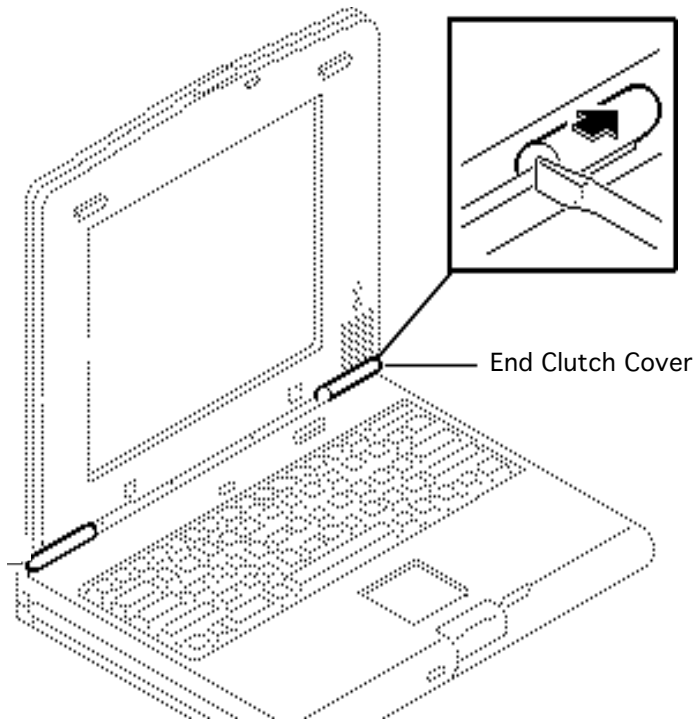
## End Clutch Covers

Before you begin, remove the following:

- Power adapter
- Main battery

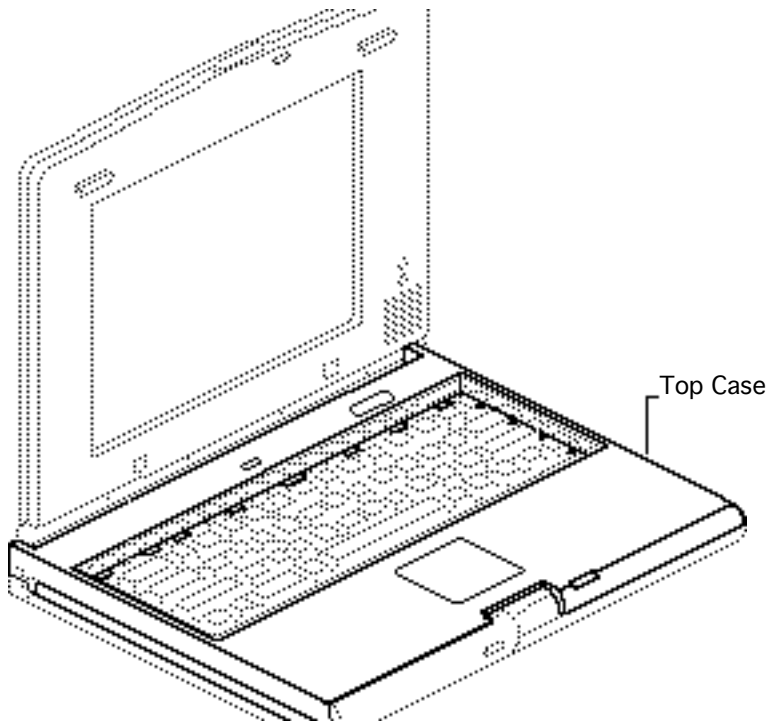
**Note:** The end clutch covers are disposable. If you break or cosmetically damage the covers, replace them.





Using a jeweler's flat-blade screwdriver, push off the left and right end clutch covers.





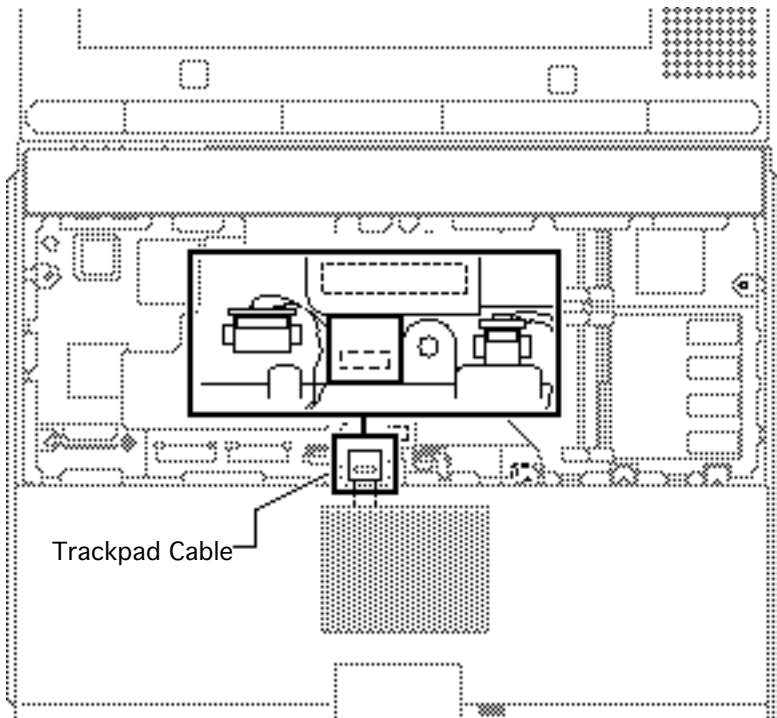
## Top Case

Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers

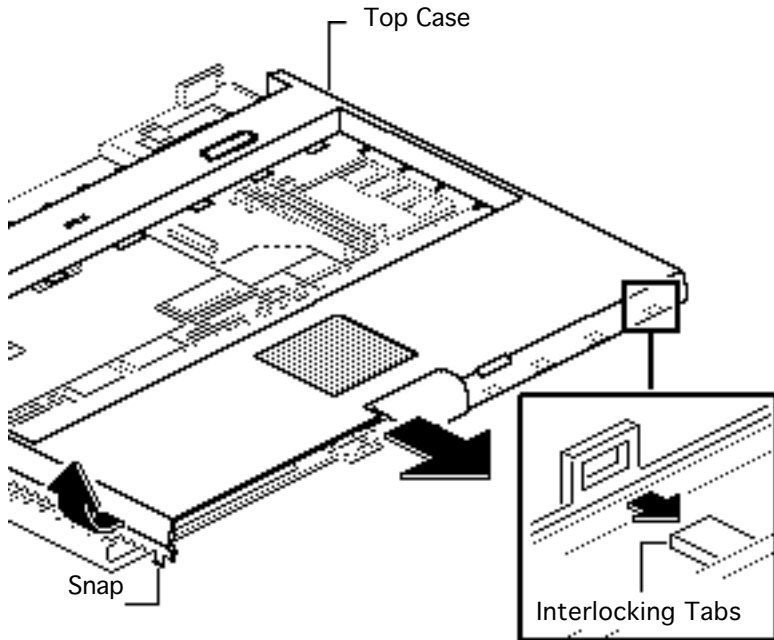
**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent damage, wear a grounding wriststrap. Review the ESD precautions in Bulletins/ Safety.





- 1 Using your fingers, disconnect the trackpad cable.

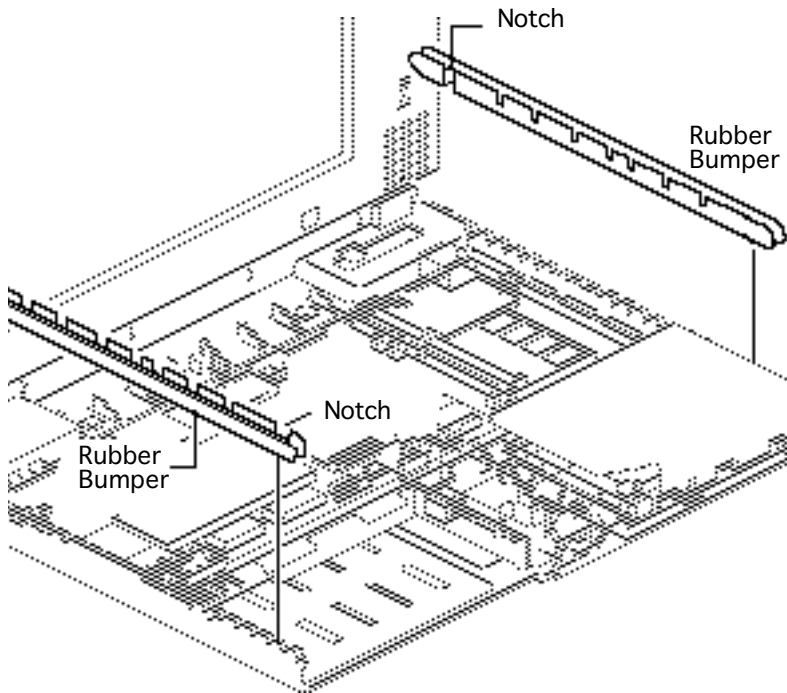




**Caution:** The top case is secured to the chassis by a snap and four interlocking tabs along the front. Failure to unlock the four case tabs could damage the top case.

- 2 Raise the bottom left corner of the top case to release the case snap.
- 3 Slide the top case off the four interlocking tabs.

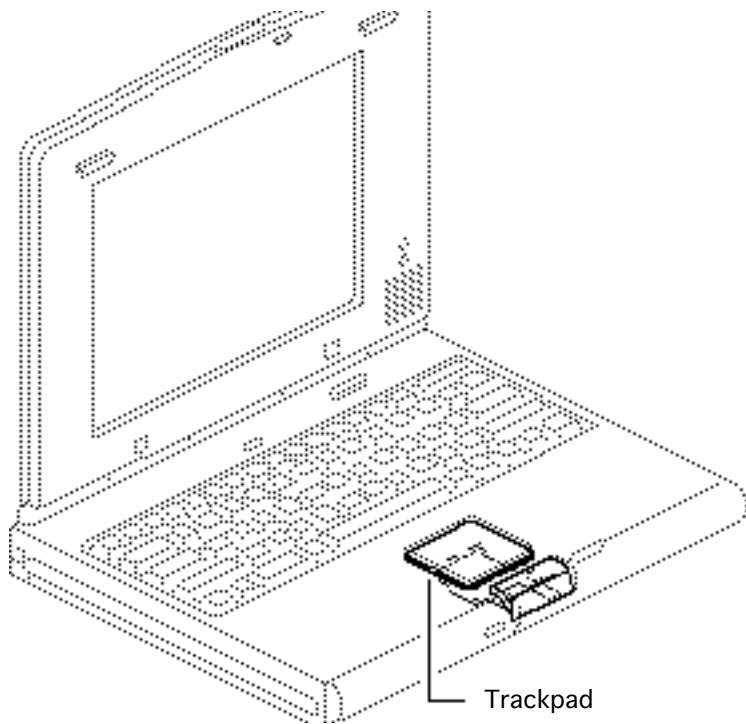




- 4 Remove the two rubber bumpers from the chassis.

**Replacement Note:** Align the rubber bumpers with the notched ends as shown.





## Trackpad Assembly

Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case

**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent damage, wear a grounding wriststrap. Review the ESD



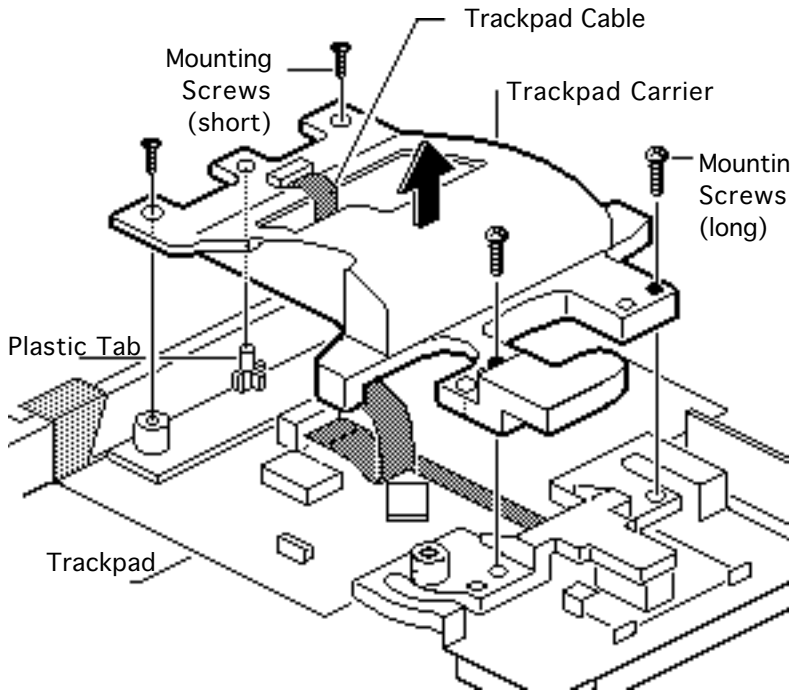




precautions in Bulletins/Safety.

**Caution:** PowerBook Duo cables are fragile and easily torn or damaged. Handle all cables with care.





- 1 Using a T-8 torx driver, remove the four mounting screws and lift off the trackpad carrier.

**Replacement Note:** Make sure you install the lower left screw in the proper hole.

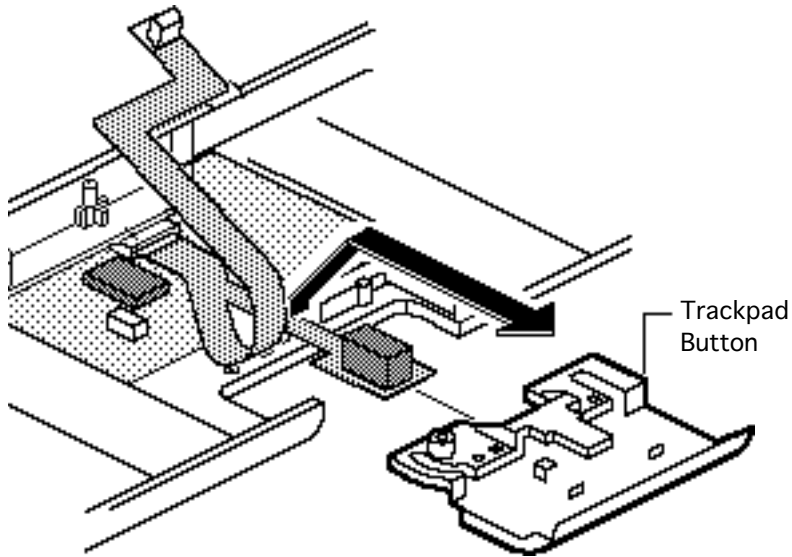
**Replacement Note:** Thread the trackpad cable through the center of the carrier. Align the upper middle hole of the carrier with the plastic tab on the top case. Set the carrier into place.

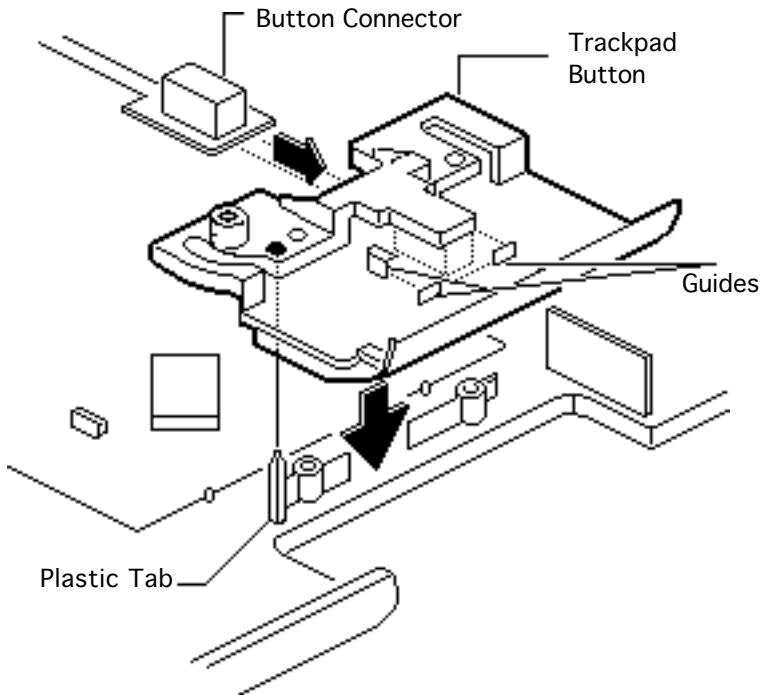




**Note:** To avoid tearing the trackpad cable, carefully pull it through the trackpad button.

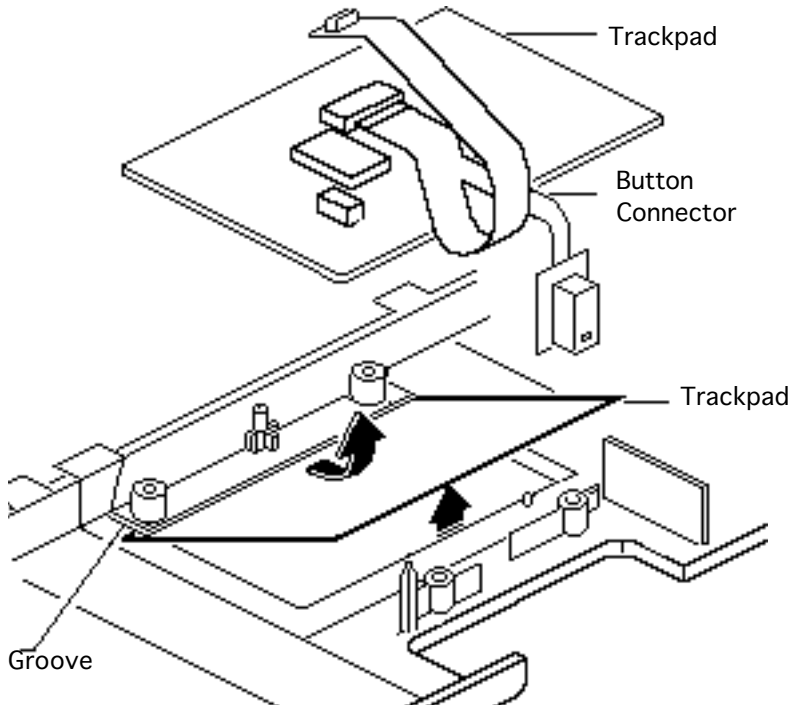
- 2 Lift up and remove the trackpad button.



**Replacement Note:**

Install the trackpad button before installing the trackpad carrier: Slide the button connector into the guides on the button. Line up the button's lower left hole with the plastic tab on the top case and set the button in place.





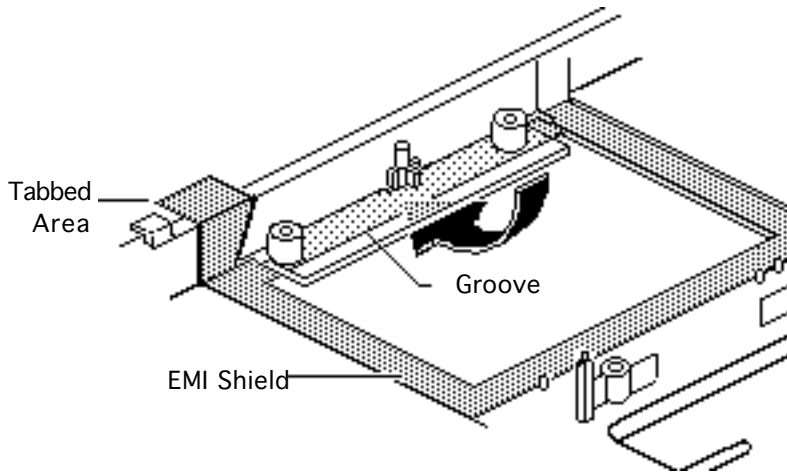
- 3 Push up the trackpad and remove it

**Replacement Note:**

Install the trackpad so that the button connector faces the direction shown. Angle the trackpad downward, slide it into the top groove, and snap it firmly into place. Turn the top case over and check that the fit is snug.

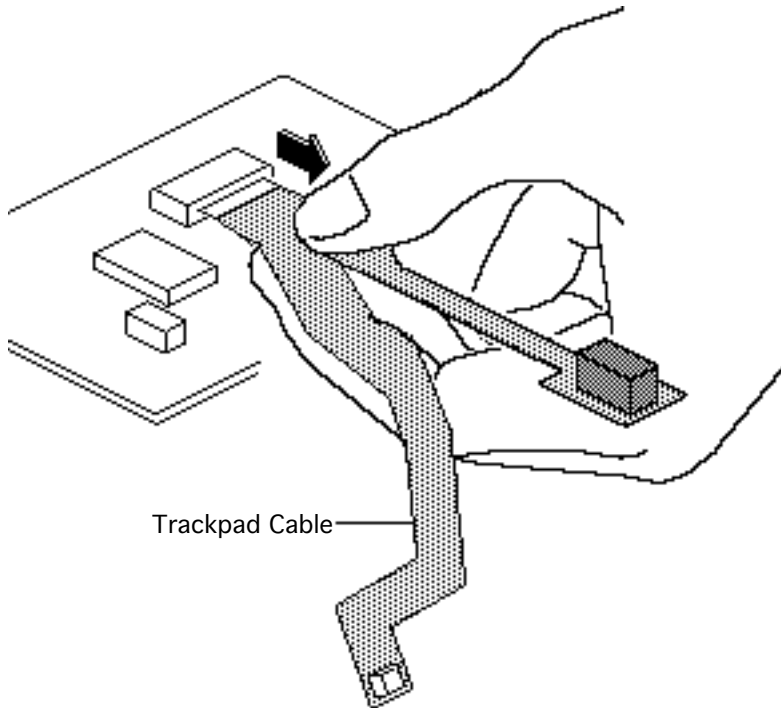
**Replacement Note:** Make sure the trackpad button clicks after installation; if it doesn't, reinstall it.





**Replacement Note:** If the trackpad EMI shield is twisted, replace it. Gently slide the top portion of the shield into the groove on the top case. Be sure the tabbed area is unbent; bending would prevent the shield from making contact with the CPU stiffener after reassembly.





**Note:** Do not use pliers or a screwdriver to remove the trackpad cable; this could damage the traces on the cable.

- 4 Using your fingers, carefully disconnect the trackpad cable.

**Replacement Note:** The trackpad cable has connectors to the logic board, trackpad, and button.

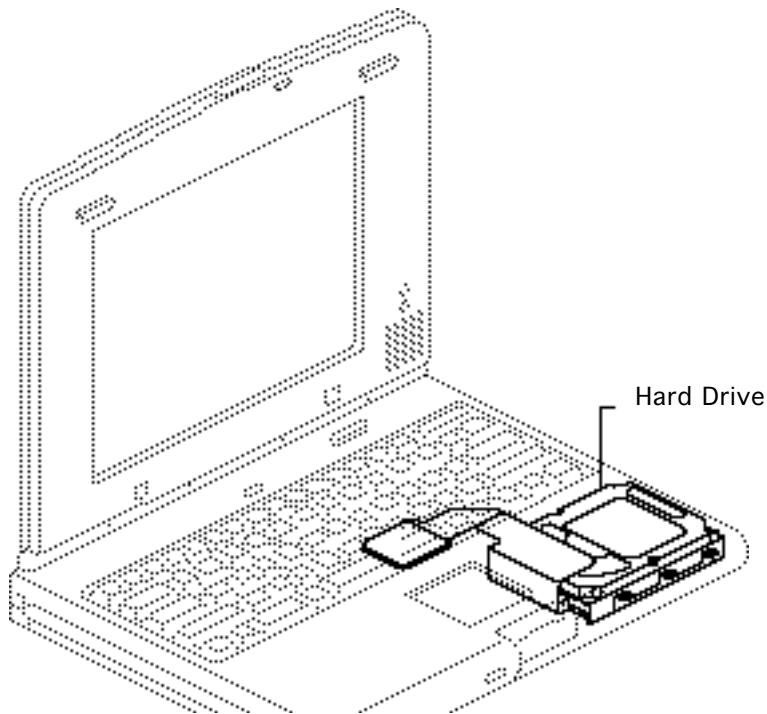




## Hard Drive

Before you begin, remove the following:

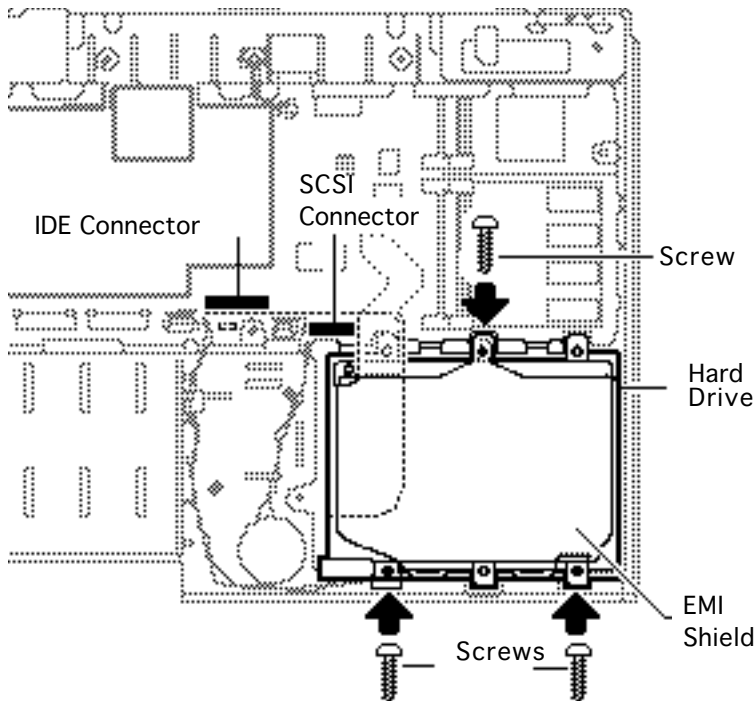
- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case



**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent damage, wear a grounding wriststrap. Review the ESD precautions in Bulletins/ Safety.





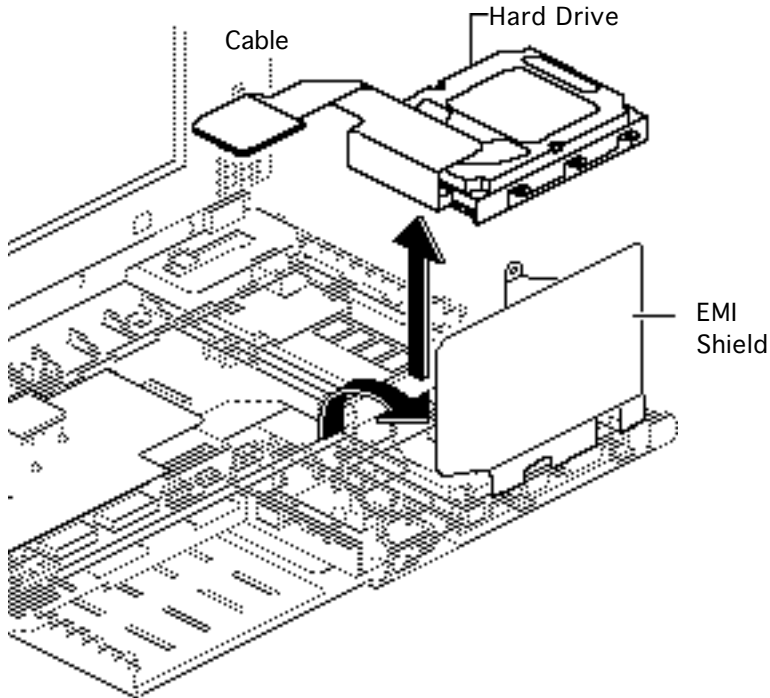


**Caution:** These cables are fragile and easily torn or damaged. Handle with care.

- 1 Using an IC extractor, disconnect the IDE or SCSI cable from the logic board.
- 2 Using a T-8 torx driver, remove the three self-threading screws that secure the hard drive to the CPU stiffener.

**Note:** The Duo comes with an IDE or SCSI hard drive; each has its own connector on the logic board.



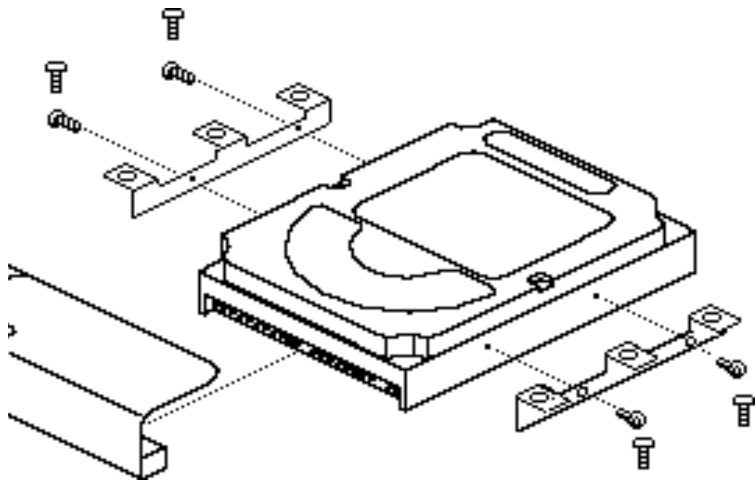


- 3 Pull back the EMI shield and lift out the hard drive.

**Replacement Note:** Make sure you do a like-for-like hard drive installation (SCSI for SCSI or IDE for IDE).

**Replacement Note:** Before closing the EMI shield, place the hard drive cable underneath.





**Note:** Remove the mounting brackets and cable only if you are returning a defective drive to Apple.

- 4 Using a T-8 torx driver, remove the four screws and the two mounting brackets from the hard drive.

**Note:** To avoid bending any pins, gently rock the cable connector from side to side and carefully remove it.





- 5 Using a jeweler's flat-blade screwdriver, disconnect the hard drive cable connector from the hard drive.

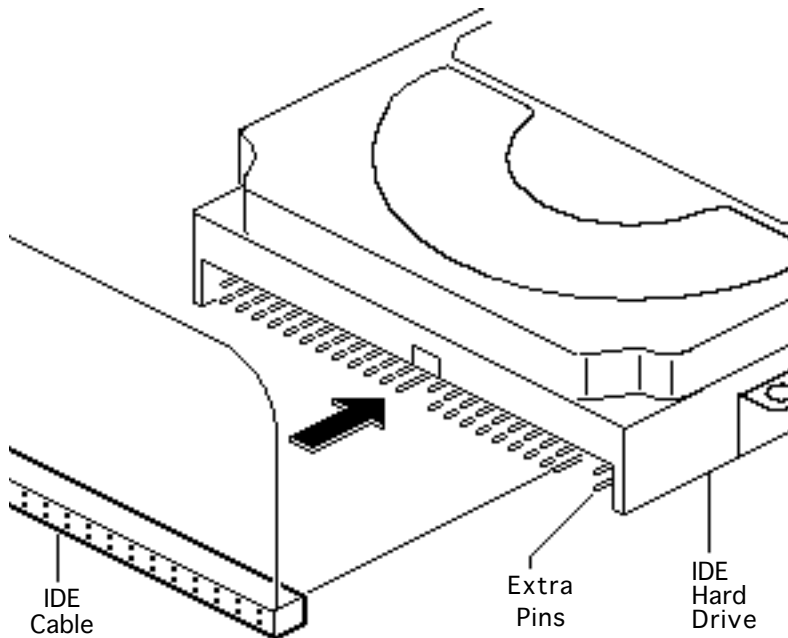
**Replacement Note:** Before installing the cable on a replacement drive, test it on a known-good drive to ensure that it is functioning.

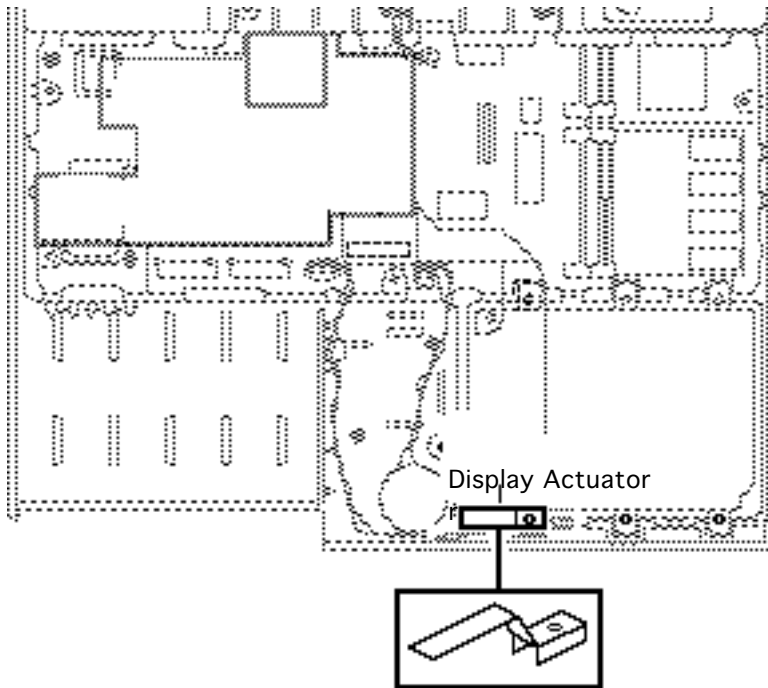
**Replacement Note:** IDE and SCSI cables are not interchangeable. If you replace a cable, make sure you install the correct one.



**Replacement Caution:**

The pins on an IDE and SCSI hard drive can easily be damaged if the cable is installed upside down or with the pins misaligned. Before installation, note if there are extra pins on the right side; these pins do not connect to the cable.





- 6 Remove the display actuator and set it aside.

**Replacement Note:**

Before installing the hard drive, install the actuator on the CPU stiffener. Failure to install the actuator will prevent the PowerBook Duo from entering sleep mode when you close the unit.

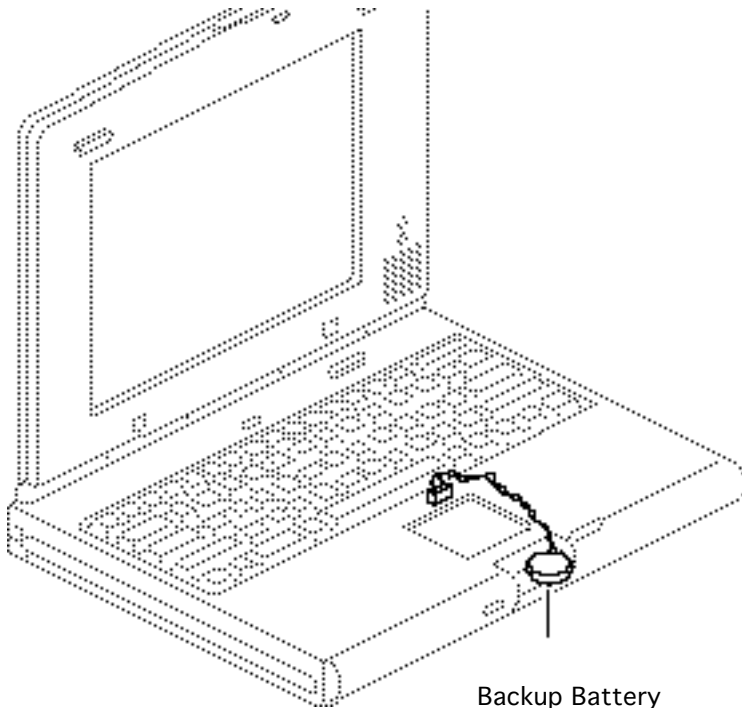




## Backup Battery

Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case



Backup Battery





**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent damage, wear a grounding wriststrap. Review the ESD precautions in Bulletins/Safety.

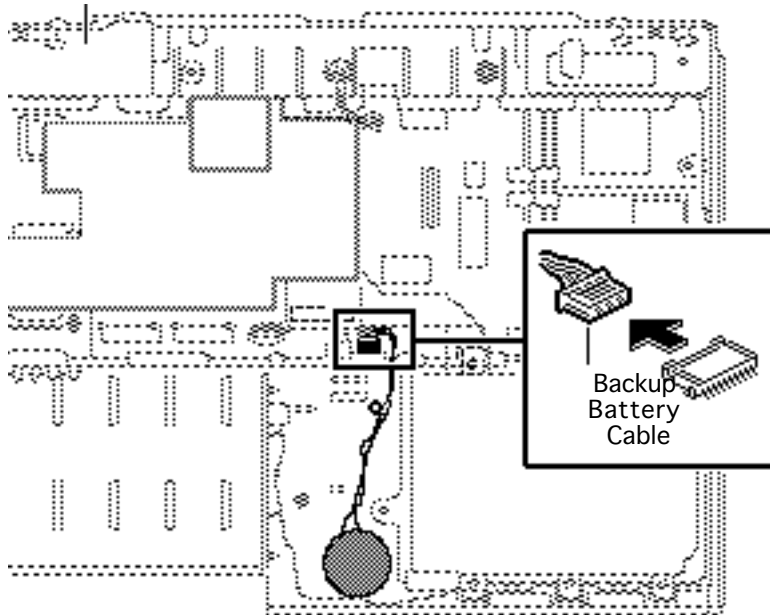
**Caution:** PowerBook Duo cables are fragile and easily torn or damaged. Handle all cables with care.







Logic Board



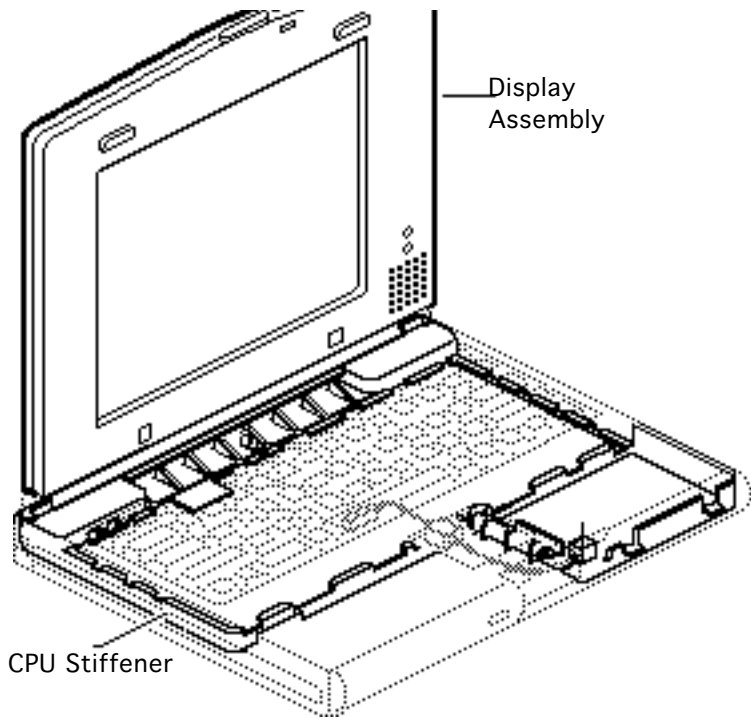
Using a jeweler's flat-blade screwdriver, carefully disconnect the backup battery cable.

**Replacement Note:**

Install the connector component side up.

**Replacement Note:** Each time you remove the backup battery, you lose memory stored in PRAM. In order to power up the unit after reassembly, you must reset the power manager. (See Troubleshooting Info, "Power Manager Reset.")





## Display Assembly & CPU Stiffener

Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case
- Hard drive

**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent damage, wear a grounding wriststrap.



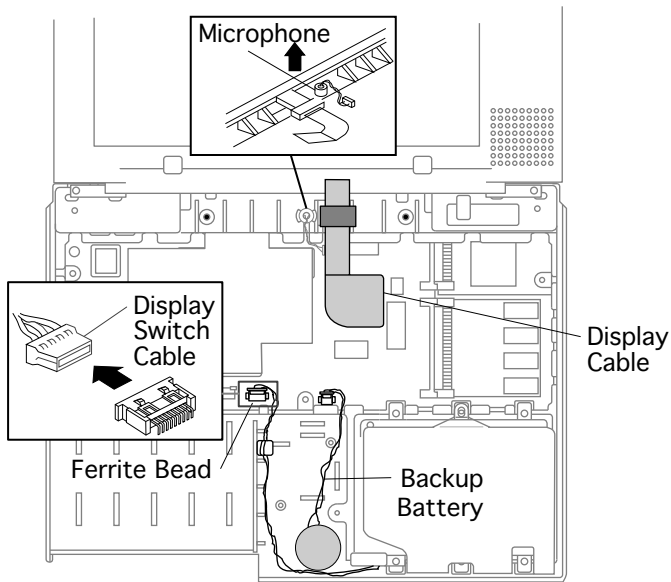


Review the ESD precautions in Bulletins/Safety.

**Important:** Remove the display assembly & CPU stiffener as a single unit only when replacing a defective logic board or case bottom. In all other cases, remove the display assembly and the CPU stiffener separately.

**Caution:** PowerBook Duo cables are fragile and easily torn or damaged.



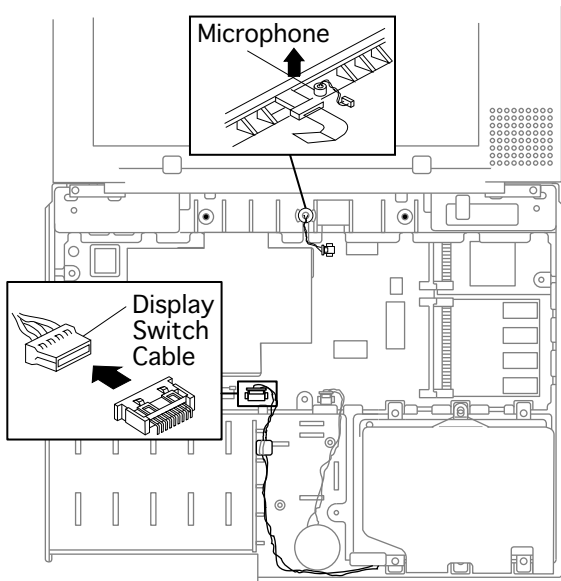


**Note:** It is unnecessary to disconnect the backup battery in this next step.

- 1 Lift up the backup battery and carefully set it on the logic board.
- 2 Pull the display switch cable ferrite bead off the bottom case.

**Replacement Note:** Make sure you attach the sticky side of the bead in the proper location on the bottom case.



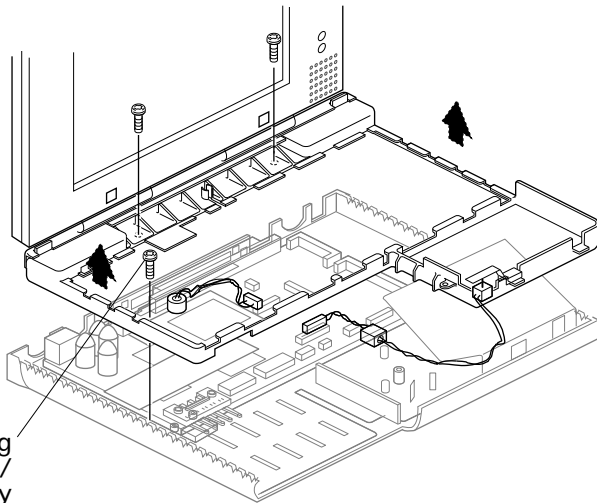


- 3 Using a jeweler's flat-blade screwdriver, carefully disconnect the display switch cable.

**Replacement Note:**  
Install the connector component-side up.

- 4 Using an IC extractor, disconnect the display cable.
- 5 Remove the microphone.





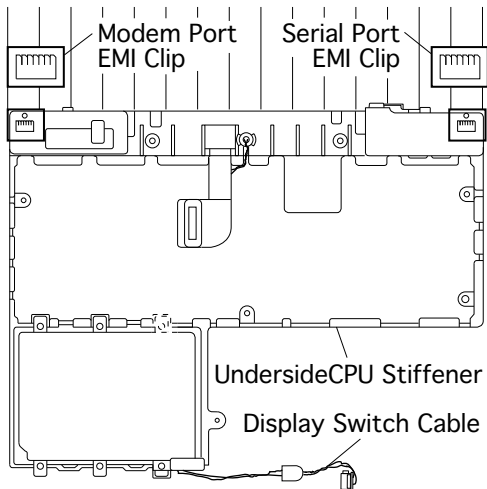
Mounting  
Screw/  
Battery  
Contact

- 6 Remove the three mounting screws that secure the CPU stiffener to the bottom case.

**Replacement Note:** The leftmost CPU stiffener mounting screw is also a battery contact. If you fail to reinstall this screw, the battery may not charge.

- 7 Lift the CPU stiffener and attached display assembly straight up and remove the unit from the bottom case.





**Important:** Check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem port EMI clip is missing.

**Replacement Note:** Move the display switch cable and microphone cable forward before reinstalling the display assembly/CPU stiffener unit. This will prevent them from being caught under the stiffener





and possibly damaged.

**Replacement Note:** After reinstalling the display assembly/CPU stiffener unit, wrap the hard drive EMI shield around the outside of the stiffener.

**Replacement Note:** After reinstalling the display assembly/CPU stiffener unit, use the Duo battery contact alignment tool to check the alignment of the battery contacts.





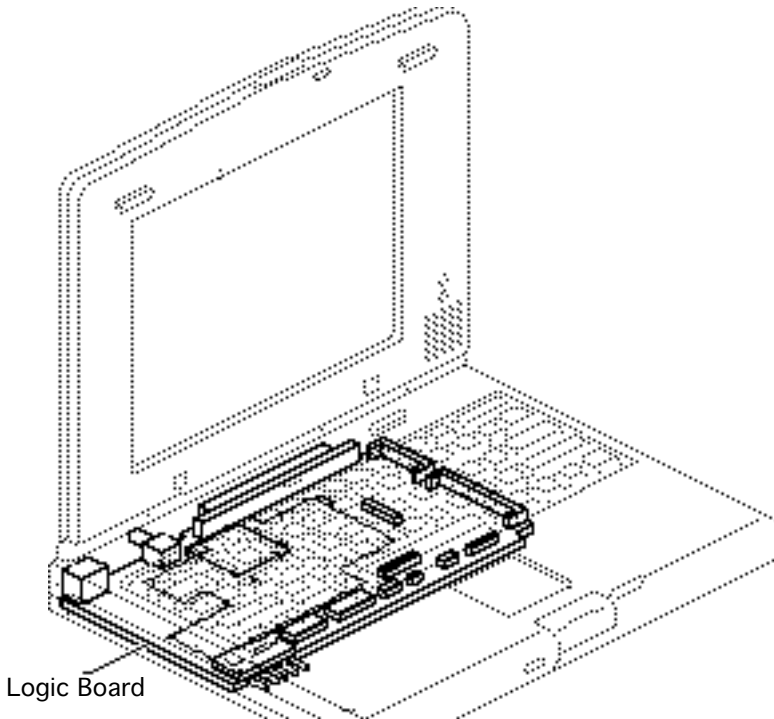


## Logic Board

Before you begin, remove the following:

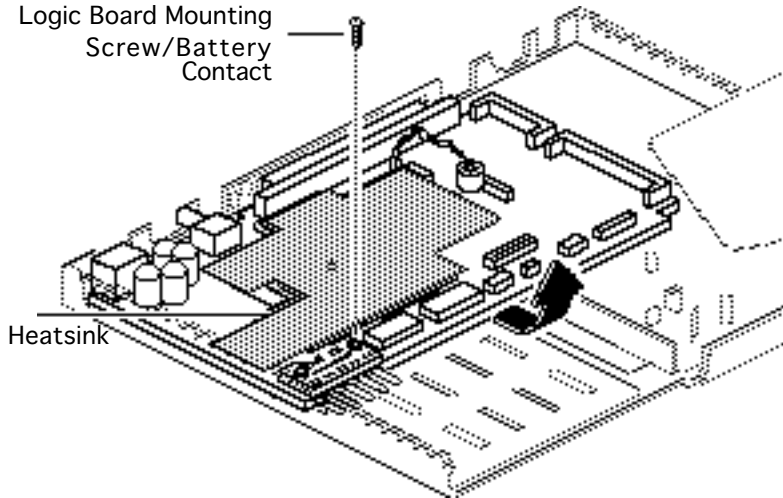
- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case
- Hard drive
- Backup battery
- Display assembly & CPU Stiffener

**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent



Logic Board





damage, wear a grounding wriststrap. Review the ESD precautions in Bulletins/ Safety.

- 1 Remove the logic board mounting screw.

### Replacement

**Caution:** This mounting screw is also a battery contact (one of two). If you fail to reinstall it, the battery may not charge.

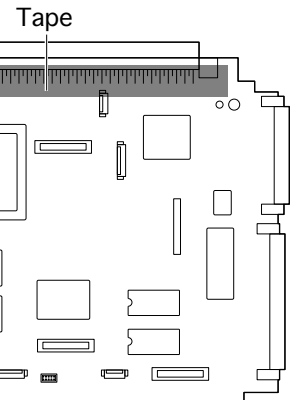
**Replacement Note:** Do not remove the heatsink. Replacement boards include





a heatsink.





- 2 Raise the side of the logic board opposite the 152-pin docking connector. Slide the docking connector out of the bottom case and remove the logic board.

**Replacement Note:** Perform the battery contact alignment procedure when you replace a logic board. (See Additional Procedures “Align Battery Contacts.”)

**Replacement Note:** The 152-pin processor-direct connector is insulated with kapton tape. If this tape is torn or missing, carefully replace it on both sides of the connector.

- 3 Carefully disconnect the microphone cable from the logic board.
- 4 Disconnect the on/off board (or modem board, if installed).
- 5 Disconnect the RAM expansion card (if installed).





**Replacement Note:** When replacing the logic board, keep in mind that the PowerBook Duo won't work unless an on/off board or a modem card is connected to the logic board.

**Replacement Note:** If you are returning the logic board for repair, set aside the microphone, on/off board, and expansion card (if installed). Reinstall these parts on the replacement board.

**Replacement Note:** Do not remove the heatsink; replacement boards include a heatsink.

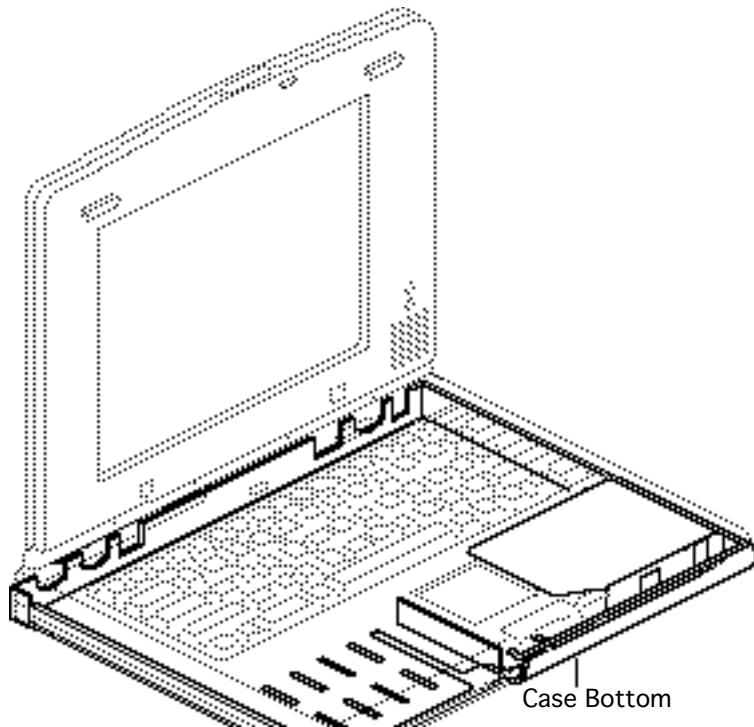




## Case Bottom

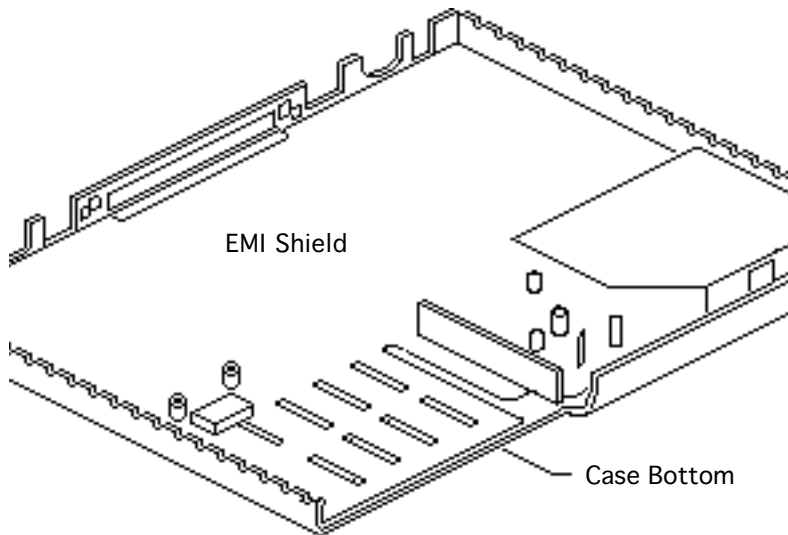
Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case
- Hard drive
- Backup battery
- Display assembly & CPU Stiffener
- Logic board



Case Bottom

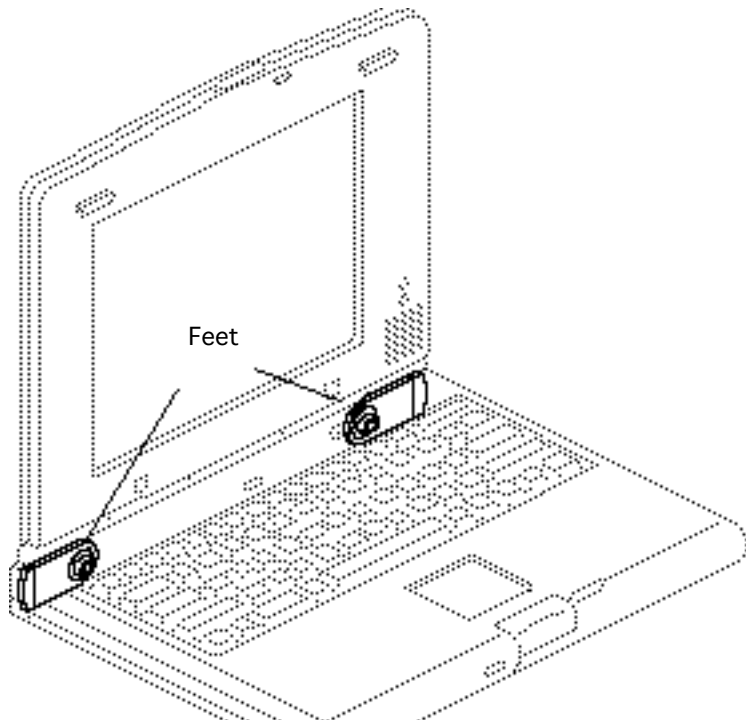




**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent damage, wear a grounding wriststrap. Review the ESD precautions in Bulletins/ Safety.

**Replacement Note:** If the EMI shield on the bottom case is torn or damaged, replace the bottom case.





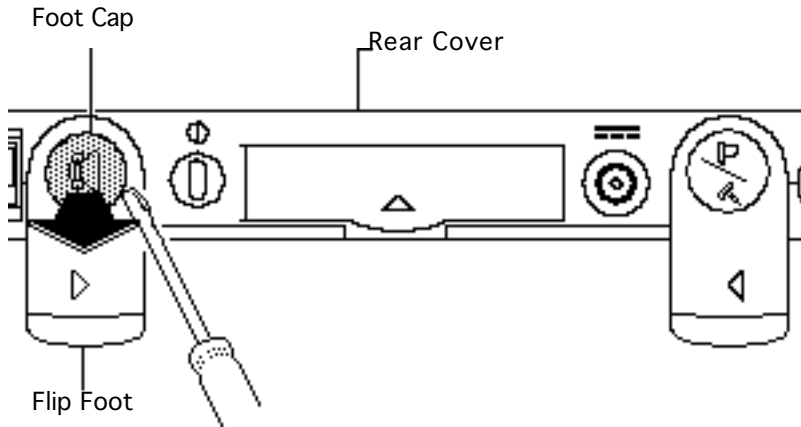
## Feet

Before you begin, remove the following:

- Power adapter
- Main battery

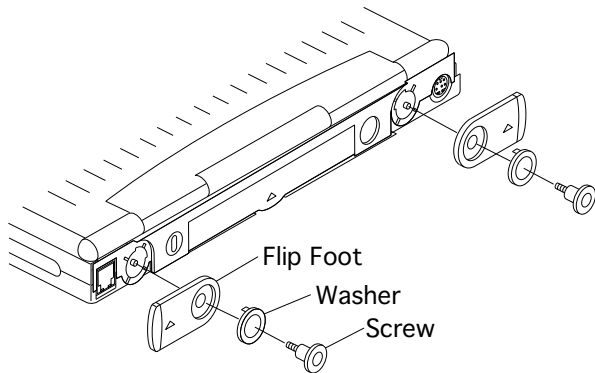






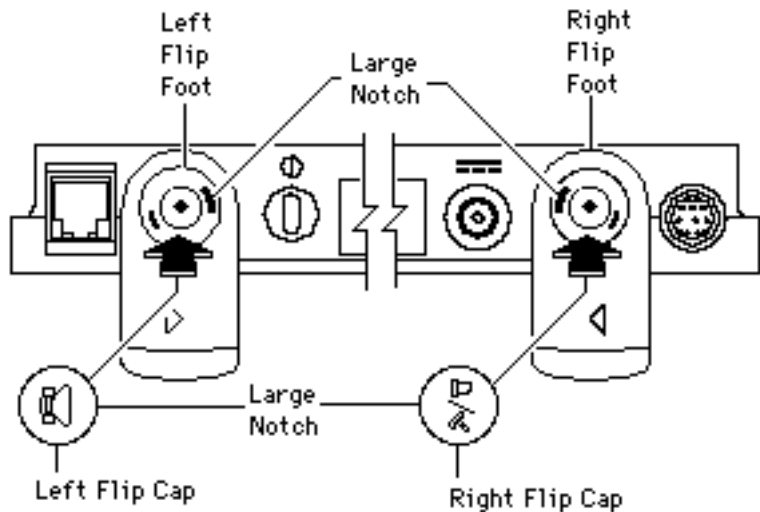
- 1 Using a jeweler's flat-blade screwdriver, remove the foot cap from the flip foot near the modem port.





- 2 Using a T-8 torx driver, remove the screw, washer, and flip foot near the modem port from the rear cover.
- 3 Perform the same procedure for the cap and flip foot near the serial port.





**Replacement Note:** The left and right foot caps are not interchangeable; neither are the flip feet. Note the icons on each and install them with notches aligned as shown.

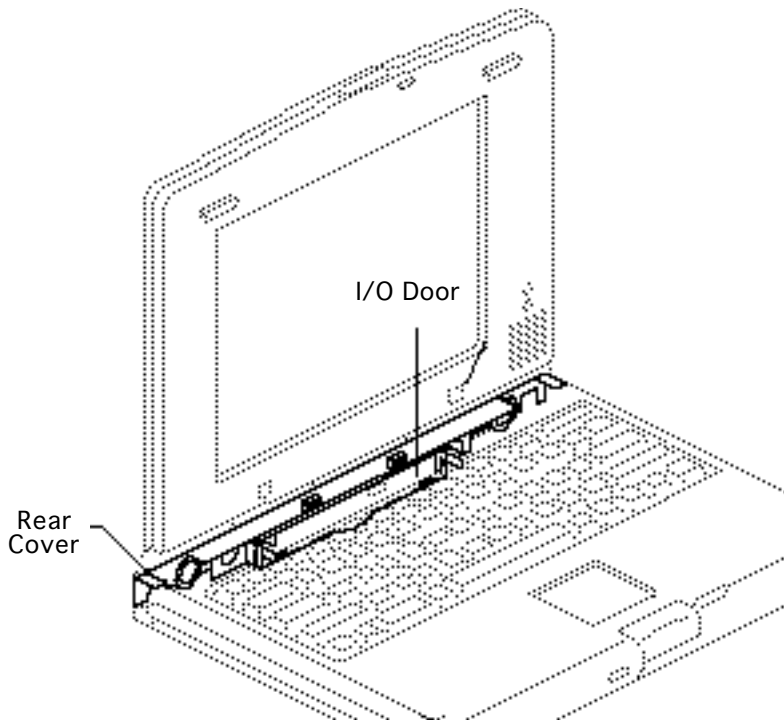


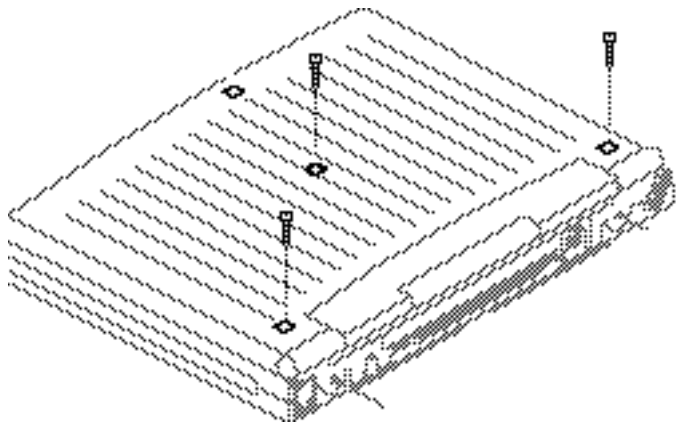


## Rear Cover & I/O Door

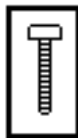
Before you begin, remove the following:

- Power adapter
- Main battery
- End clutch covers
- Feet





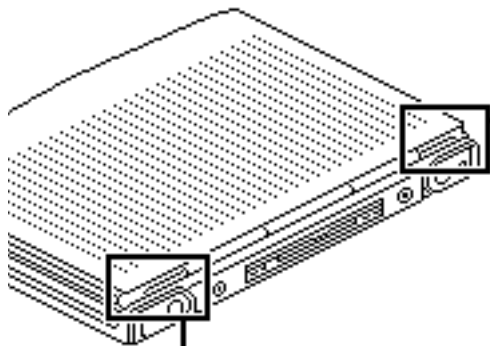
- 1 Close, latch, and turn over the computer. Remove the three case screws that secure the keyboard to the bottom case.



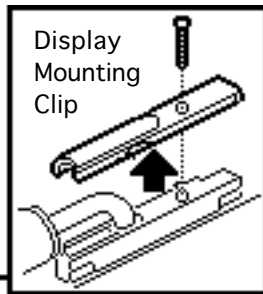
### Replacement

**Caution:** Don't overtighten the keyboard screws. Overtightening could warp the keyboard and restrict key movement. After replacing the screws, always check the keys and space bar to make sure they work.





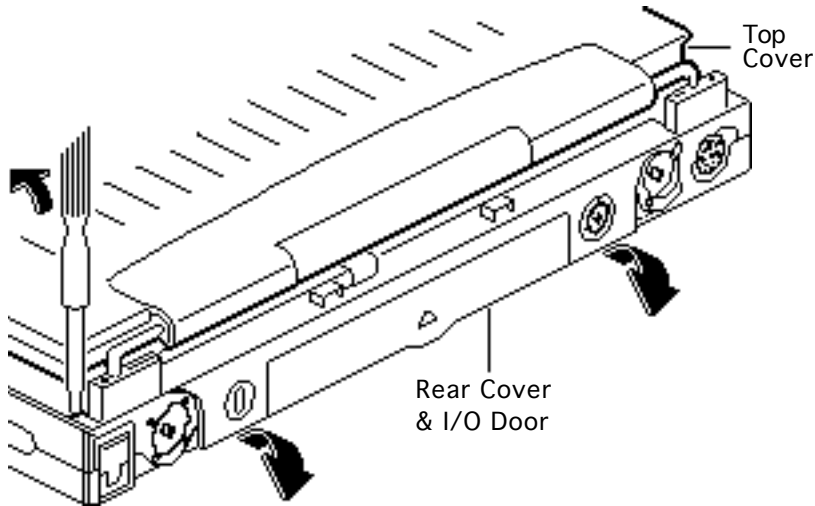
Display  
Mounting  
Clip



Display  
Mounting  
Clip

- 2 Using a T-8 torx driver, remove the screw and display mounting clip from the right side.
- 3 Repeat for the left side.

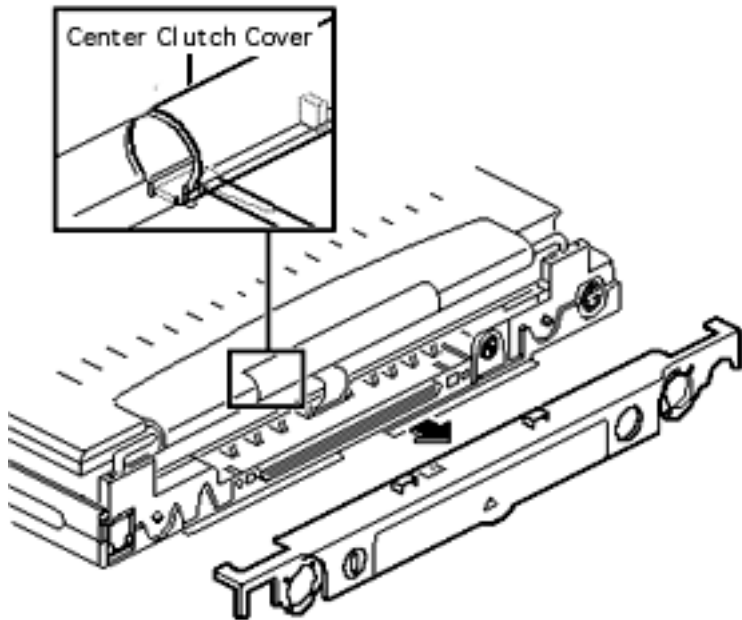




**Note:** Removing the keyboard case screws, the end clutch covers, and the two display mounting clips allows the top cover to separate slightly, and enables you to pull off the rear cover.

- 4 Insert a jeweler's flat-blade screwdriver into the left corner of the rear cover and pull out that corner.
- 5 Perform the same procedure on the right side.





**Caution:** The display cable, which is fragile, is under the left side of the center clutch cover. Be careful not to damage the display cable with the screwdriver.

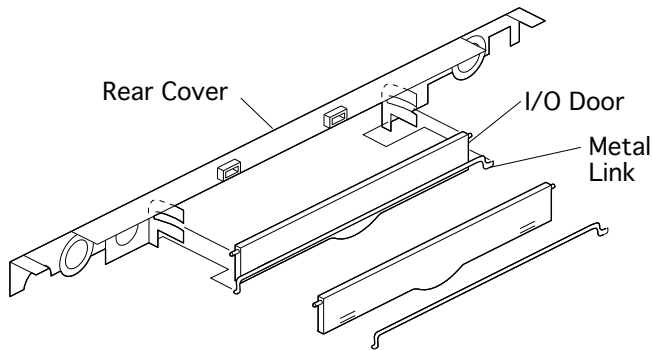
- 6 Slide a jeweler's flat-blade screwdriver into the notches under the center clutch cover and release the center clutch cover.
- 7 Remove the rear cover.

**Replacement Note:**

After installing the rear cover, snap the center clutch cover into place.





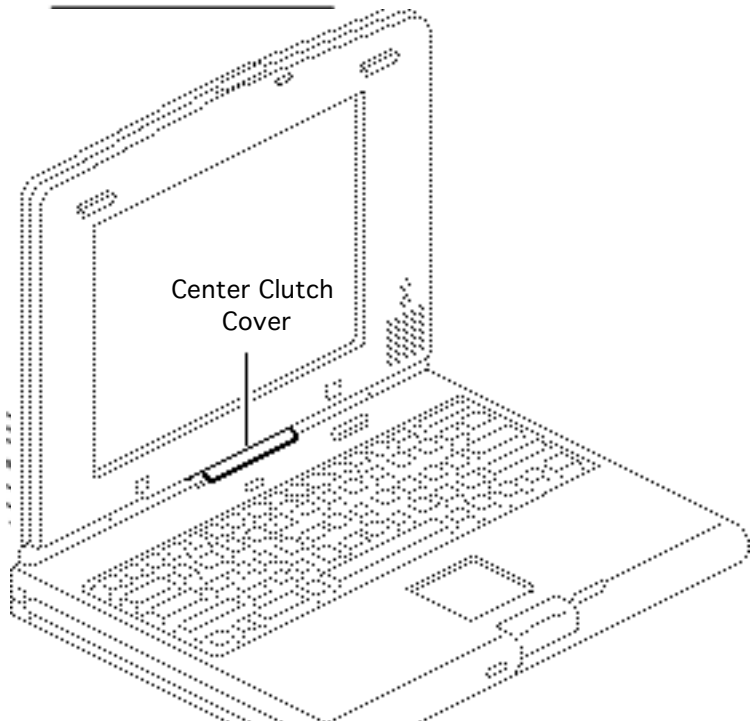


- 8 Unhook the metal link at one end of the I/O door. Remove the I/O door and attached link from the rear cover.

**Replacement Note:**

Before installing the rear cover, install the I/O door on the cover.





## Center Clutch Cover

Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case
- Feet
- Rear cover

**Caution:** Removing the center clutch cover unnecessarily could exert wear and tear on the display cable and plastics. Remove

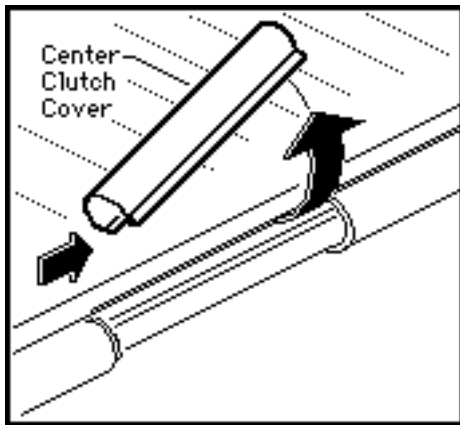




the cover only if you are replacing the CPU stiffener or display assembly (including parts within the assembly).

**Note:** The center clutch cover is disposable. If you break or cosmetically damage the cover, replace it.

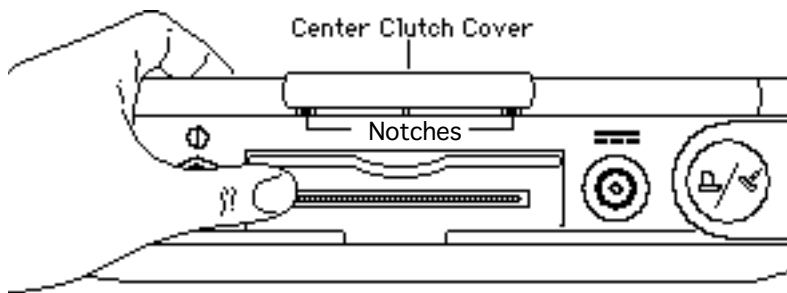




**Caution:** Be careful when removing the center clutch cover not to damage the display cable, which is under the left side. To avoid exerting stress on the cable, make sure the opening on the center clutch faces downward as you perform this next step.

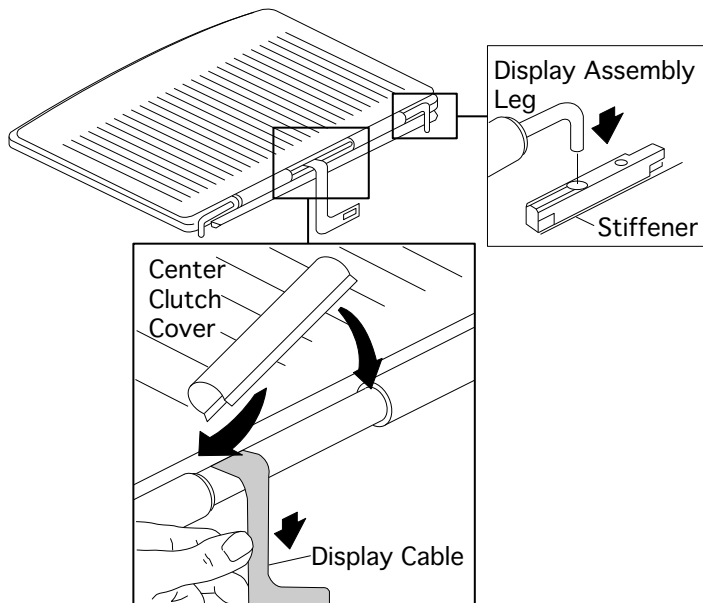
- 1 Grasp the right side of the center clutch cover and carefully slide it off.





**Replacement Note:** After attaching the rear cover and feet, carefully slide on the center clutch cover. Align the tabs on the center clutch cover with the notches on the rear cover. Holding your thumb on the open I/O door for support, use your fingers to firmly snap the left tab into place; do the same for the right side.

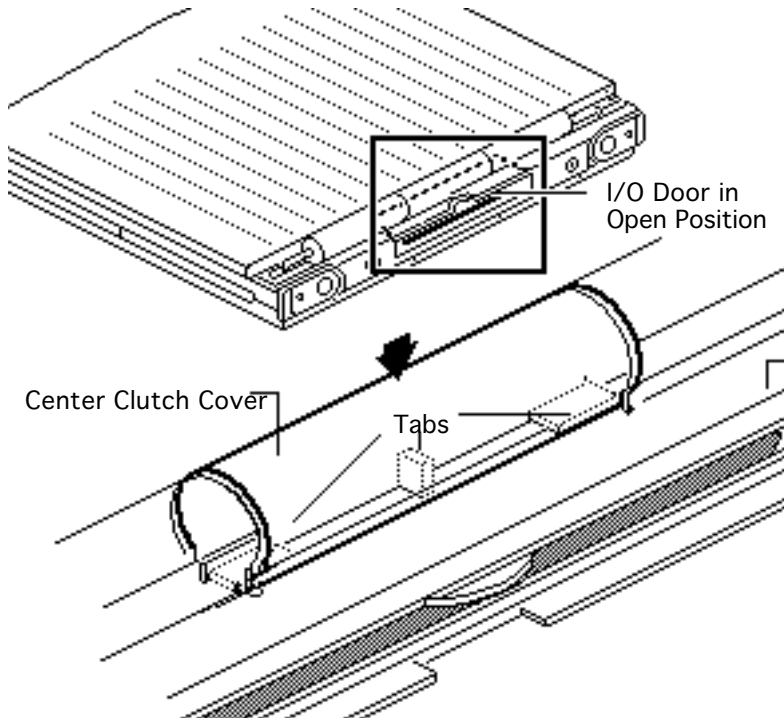




**Replacement Note:** (For display assembly only) If the display assembly has been removed separately, reinstall the center clutch cover before reattaching the display assembly.

- 2 Place the display assembly face down, with the display cable freely hanging over the edge of a counter. Turn the center clutch cover so the opening faces downward and then carefully snap it into place. Insert the display





assembly legs into the holes in the stiffener and close the cover.

- 3 For added support, raise the I/O door and then snap the clutch firmly onto its notches on the rear cover.



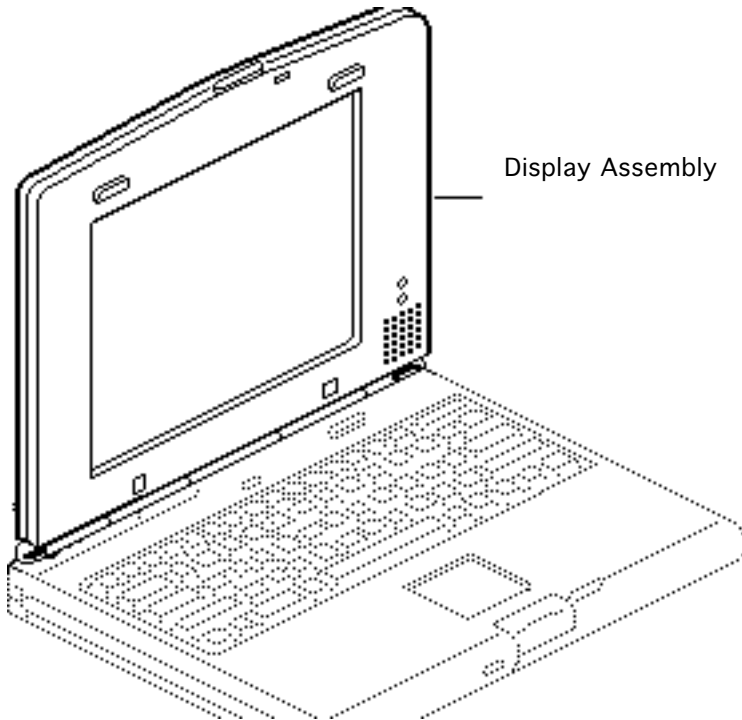


## Display Assembly

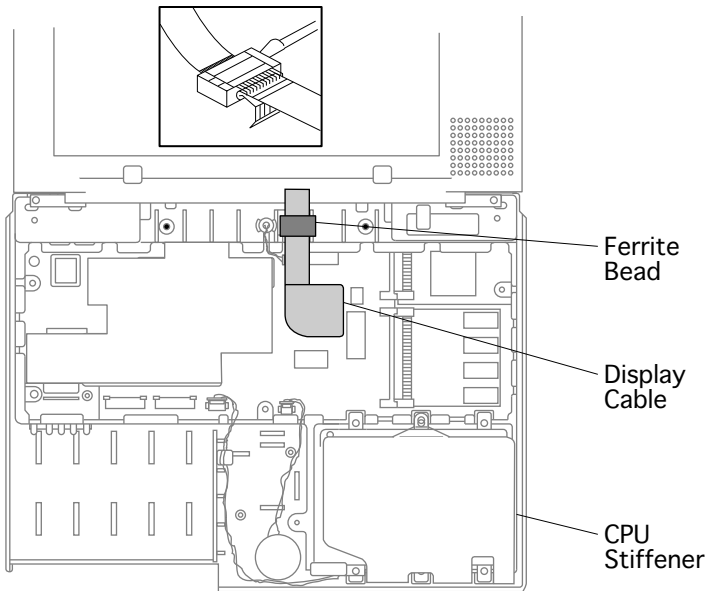
Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case
- Center clutch cover

**Note:** The display assembly is not available as a module; however, its components are available to CPRC and international repairers.



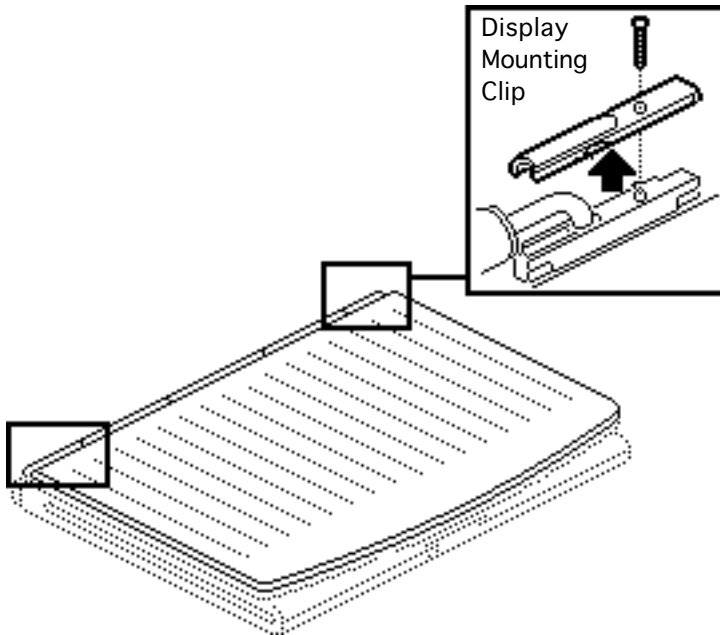




**Caution:** PowerBook Duo cables are fragile and easily torn or damaged. Handle all cables with care.

- 1 Using an IC extractor, disconnect the display cable.
- 2 Using a jeweler's flat-blade screwdriver, unclip the display cable ferrite bead from the CPU stiffener.



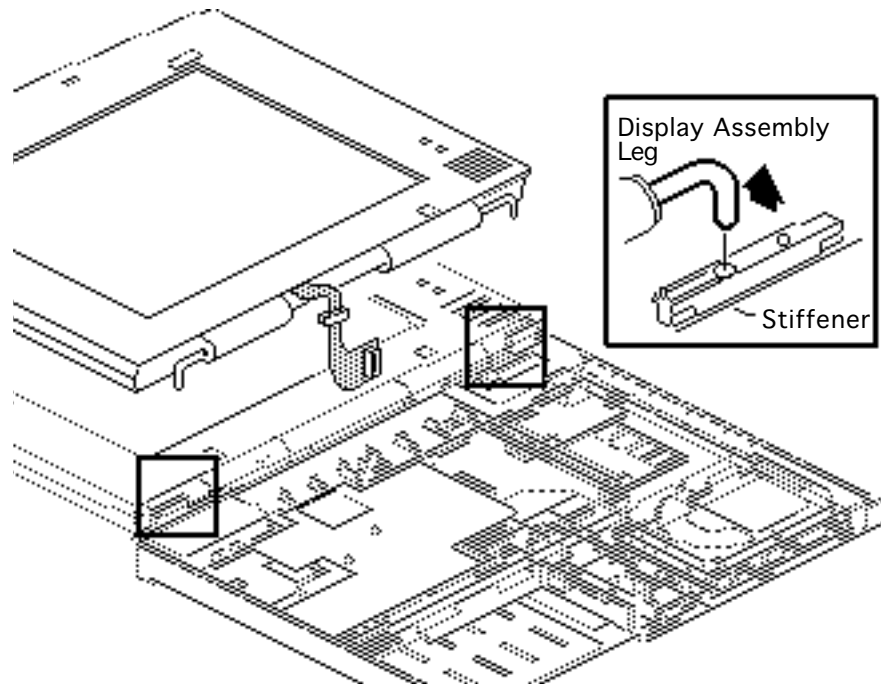


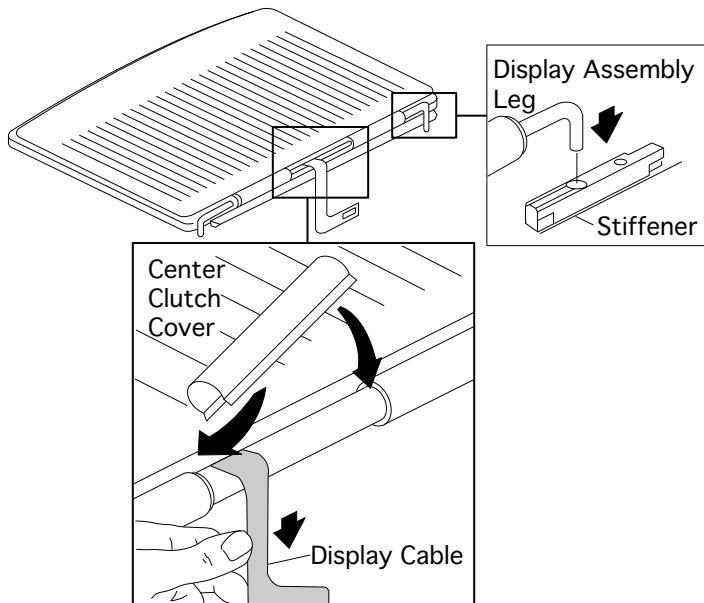
- 3 Using a T-8 torx driver, remove the screw and display mounting clip from the right side.
- 4 Repeat for the left side.





- 5 Gently lift the display assembly legs out of the holes in the stiffener.

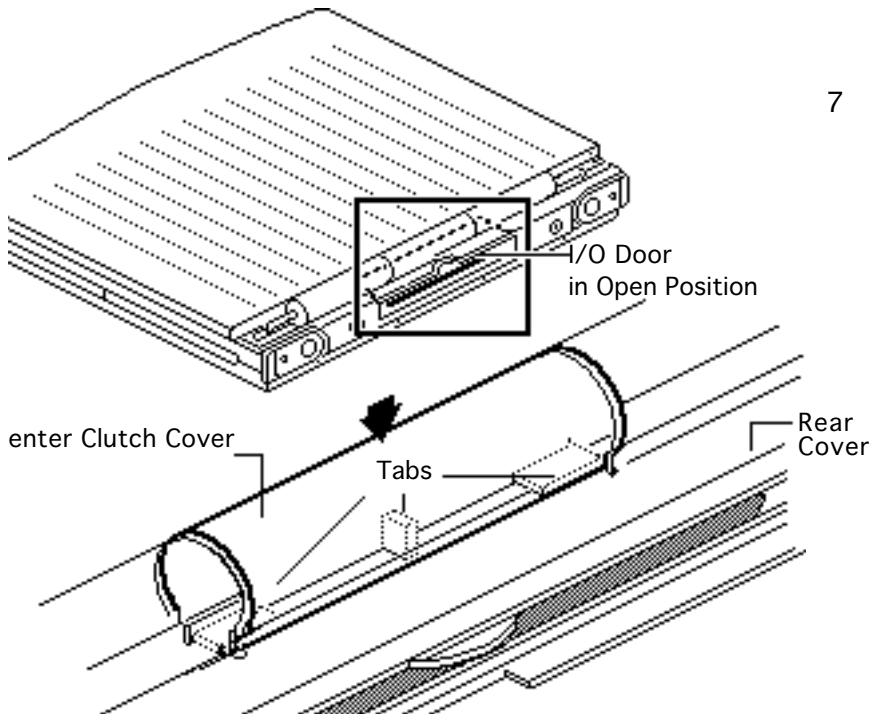




**Replacement Note:** (For display assembly only)  
Before reattaching the display assembly to the PowerBook Duo, install the center clutch cover.

- 6 Place the display assembly face down, with the display cable freely hanging over the edge of a counter. Turn the center clutch cover so the opening faces downward and then carefully snap it into place. Insert the display assembly legs into the holes in the

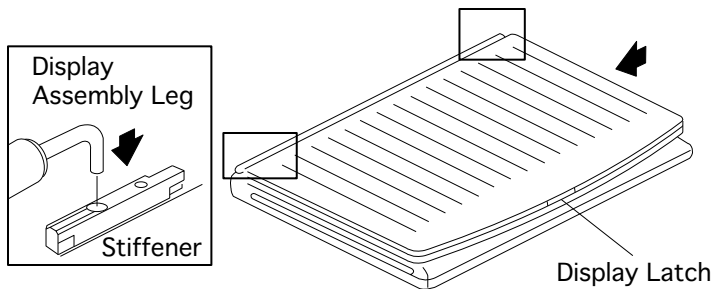




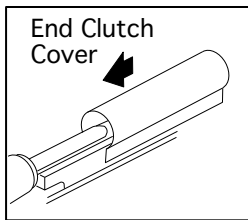
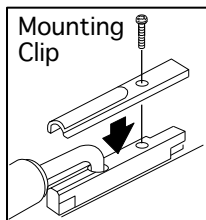
stiffener and close the cover.

- 7 For added support, raise the I/O door and then snap the clutch firmly onto its mounting tabs on the rear cover.





Typical For Both Sides



**Replacement Note:** When you reassemble the unit, ensure that the display latch is positioned correctly: Place the display assembly legs into the holes in the CPU stiffener, install the top cover, and close the PowerBook Duo. With the front of the unit facing you, push the display assembly to the left so that it aligns with the top case and latch mechanism. Fasten the display mounting clips and slide the end clutch covers on.



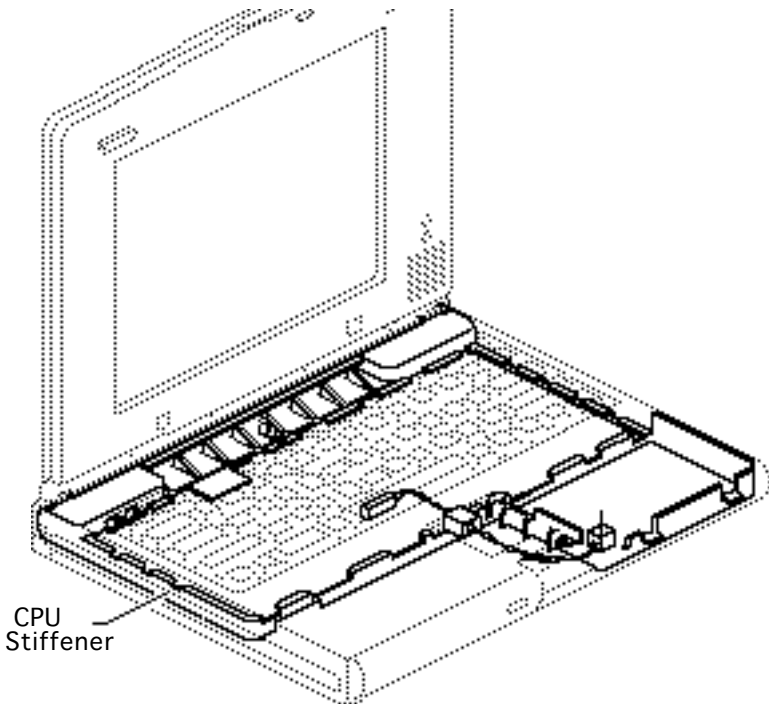


## CPU Stiffener

Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case
- Center clutch cover
- Hard drive
- Backup battery
- Display assembly

**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent





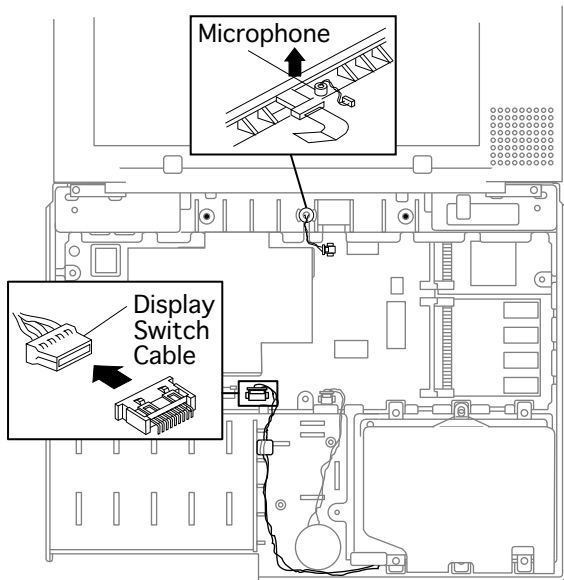
damage, wear a grounding wriststrap. Review the ESD precautions in Bulletins/Safety.

**Important:** Perform this procedure only if you are replacing a defective stiffener or logic board.

**Caution:** PowerBook cables are fragile and easily torn or damaged. Handle all cables with care.







- 1 Pull the display switch ferrite bead off the bottom case.

**Replacement Note:**

Make sure you attach the sticky side of the bead in the proper location on the bottom case.

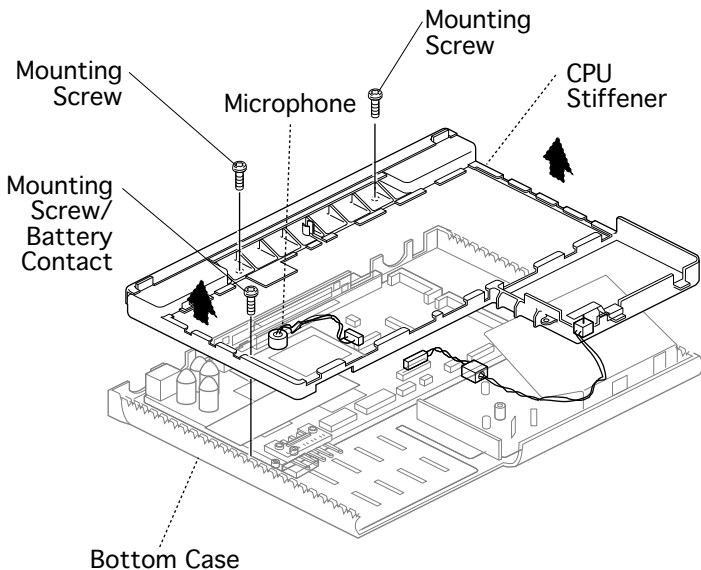
- 2 Using a jeweler's flat-blade screwdriver, carefully disconnect the display switch cable.

**Replacement Note:**

Install the connector component-side up.

- 3 Remove the microphone





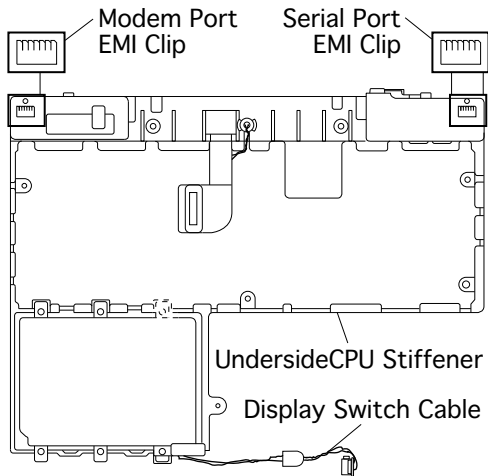
from the CPU stiffener.

- 4 Remove the three mounting screws that secure the CPU stiffener to the bottom case.

**Replacement Note:** The leftmost CPU stiffener mounting screw is also a battery contact. If you fail to reinstall this screw, the battery may not charge.

- 5 Lift the CPU stiffener straight up and remove it from the bottom case.

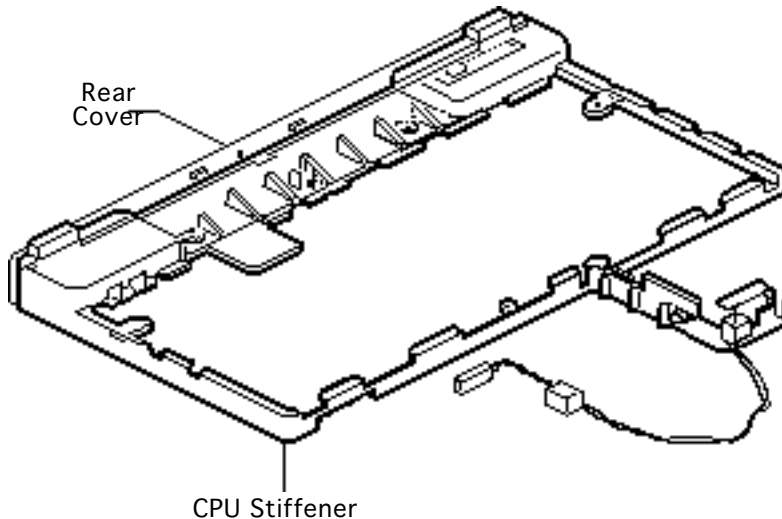




**Important:** Check that the serial port EMI clip is attached to the bottom of the CPU stiffener. If it is missing, replace the stiffener. On international units, also replace the stiffener if the modem EMI clip is missing.

**Replacement Note:** Move the display switch cable and microphone cable forward before reinstalling the CPU stiffener. This will prevent them from being caught under the stiffener and possibly damaged.





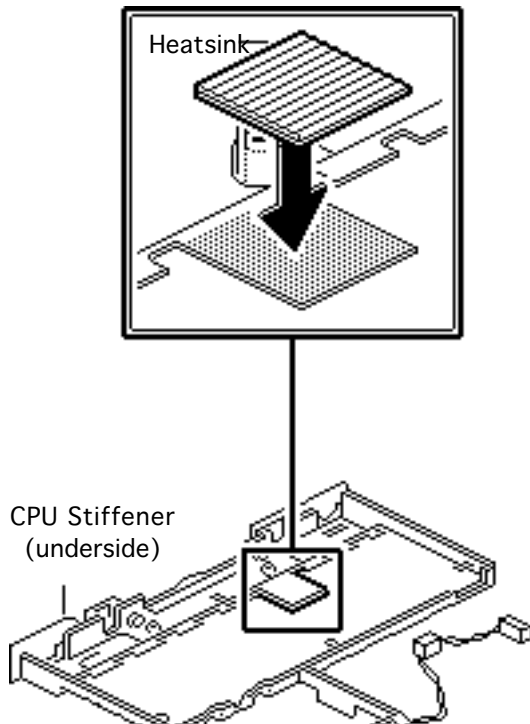
**Replacement Note:** When installing the CPU stiffener, be sure to wrap the hard drive EMI shield around the outside of the stiffener.

**Replacement Note:** After reinstalling the CPU stiffener, use the Duo battery contact alignment tool to check the alignment of the battery contacts.

- 6 If you are replacing a damaged CPU stiffener, return it with the rear cover attached.

**Note:** Replacement CPU





stiffeners include the rear cover, I/O door, feet, display switch, and heatsink. You can also individually replace the rear cover, I/O door, and feet.

**Replacement Note:** Turn a replacement CPU stiffener upside down and install the foam heatsink on the tabbed area. Failure to install the correct heatsink could cause a short circuit and blow out the logic board.



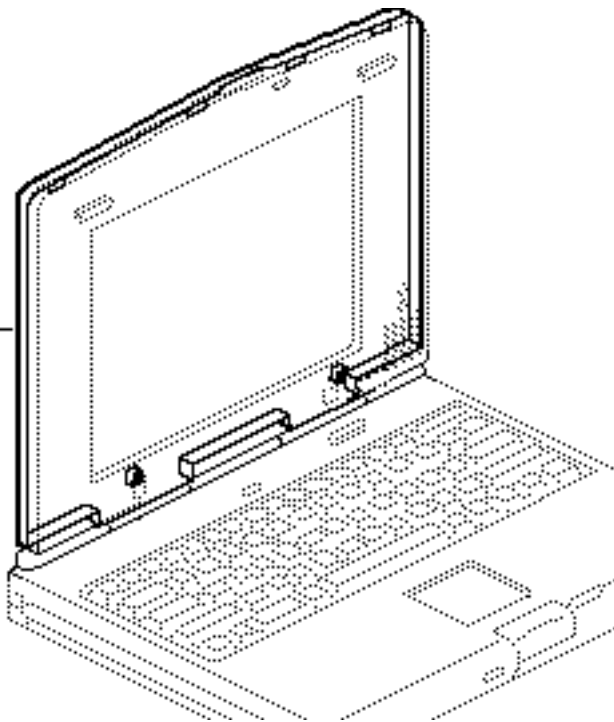


## Display Housing

Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case
- Center clutch cover
- Display assembly

Display  
Housing



**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent damage, wear a grounding wriststrap. Review the ESD



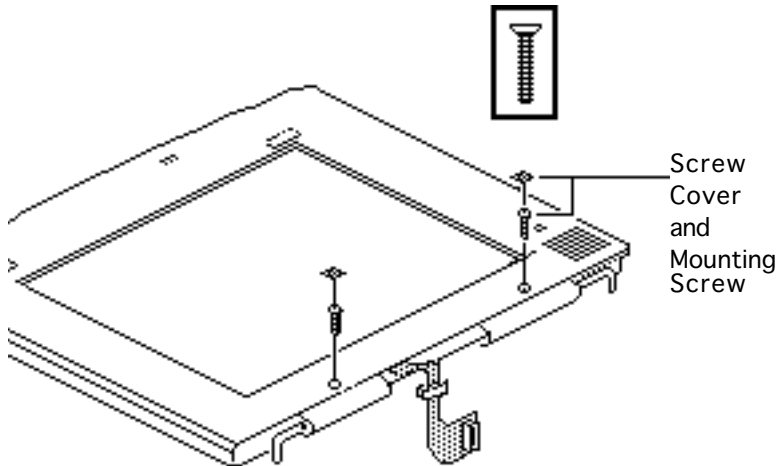


precautions in Bulletins/Safety.

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

**Important:** The display housing is part of the housing kit, which also contains the bezel. This kit is available to CPRC and international repairers only.





**Note:** The display housing is secured to the bezel by mounting screws.

- 1 Peel off the two screw covers. Using a T-6 torx driver, remove the mounting screws.

**Replacement Caution:** Do not overtighten the mounting screws or you will damage the screw inserts on the display housing.

**Replacement Note:** The screw covers are disposable. If they are damaged or no longer adhere, replace them.



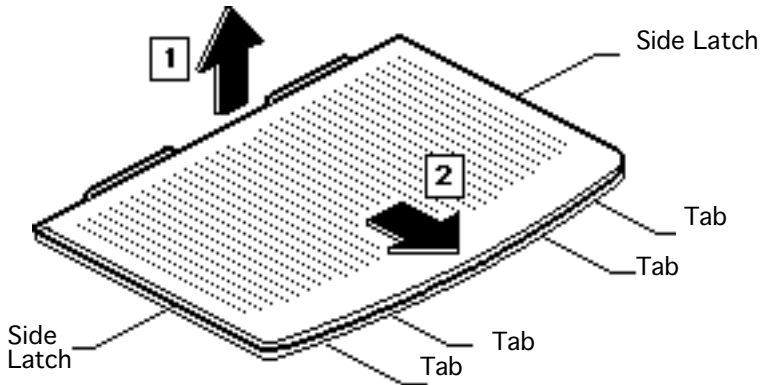


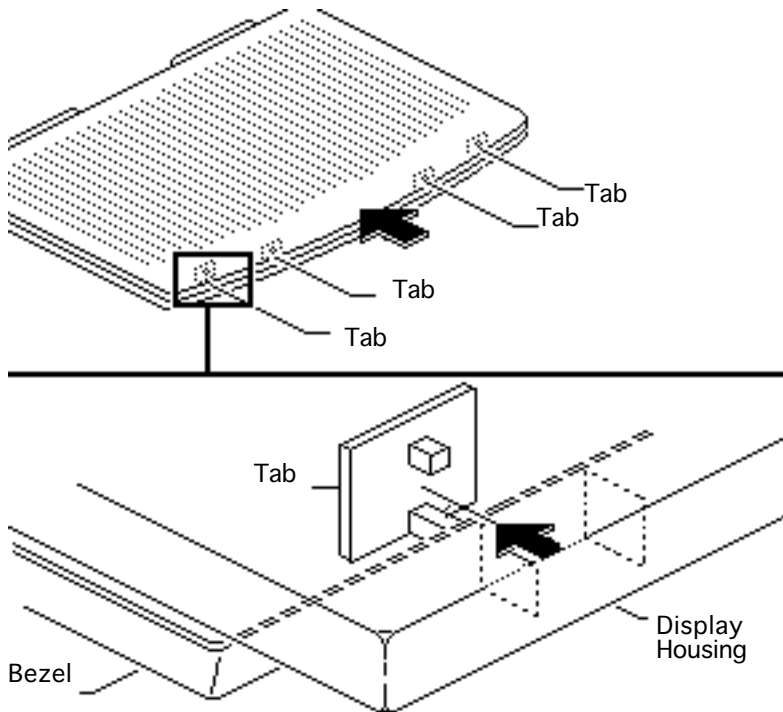


- 2 Turn the display over and place it on a clean, soft surface.

**Note:** The display housing is also secured to the bezel by side latches and front tabs.

- 3 Pull the display housing up and disengage the side latches. Gently slide the housing forward to disengage the four front tabs.



**Replacement Caution:**

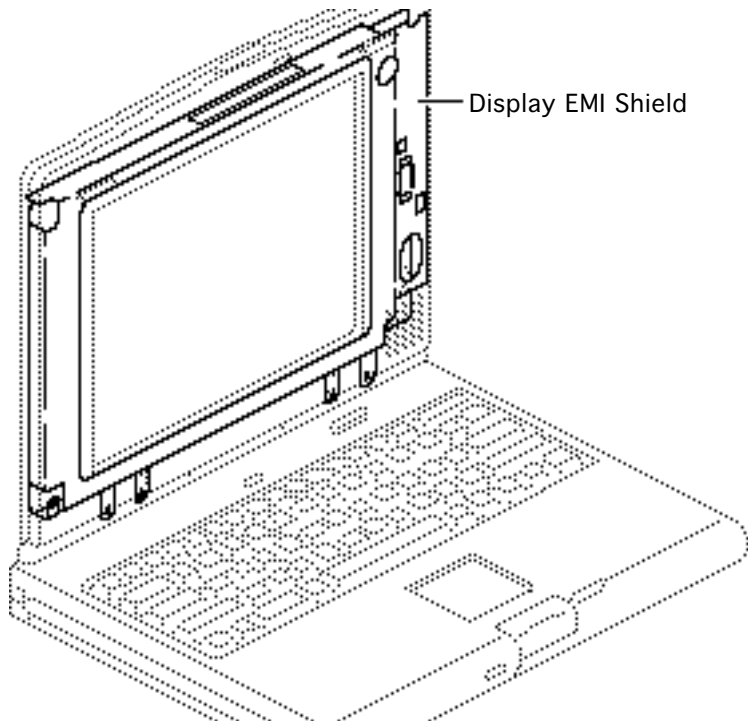
Carefully engage the four tabs along the front of the housing. Failure to engage the tabs correctly may cause them to break, requiring replacement of the damaged bezel.

**Replacement Caution:**

Make sure the display cable clears the center clutch opening before you snap the display assembly together.

- 4 If you are replacing the latch and spring, remove them from the bezel.





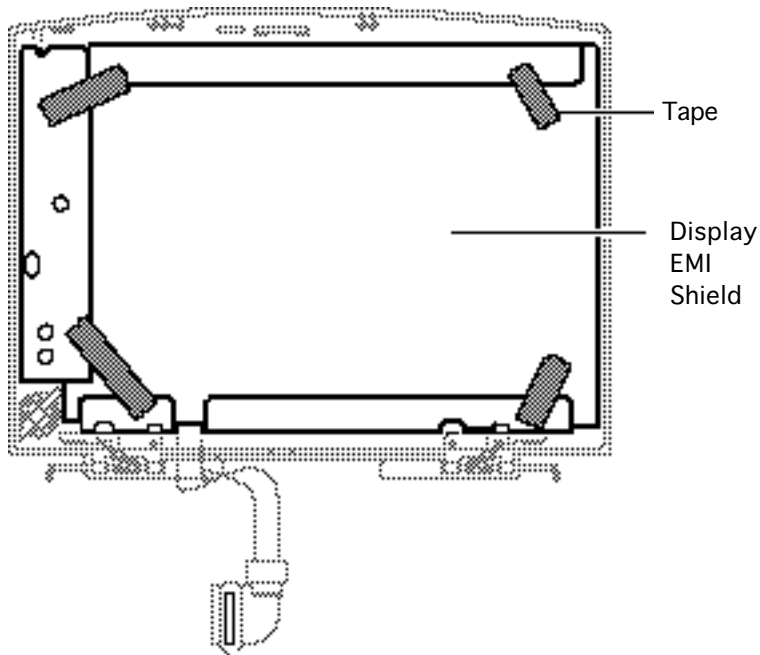
## Open Display EMI Shield

Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case
- Center clutch cover
- Display assembly
- Display housing

**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent



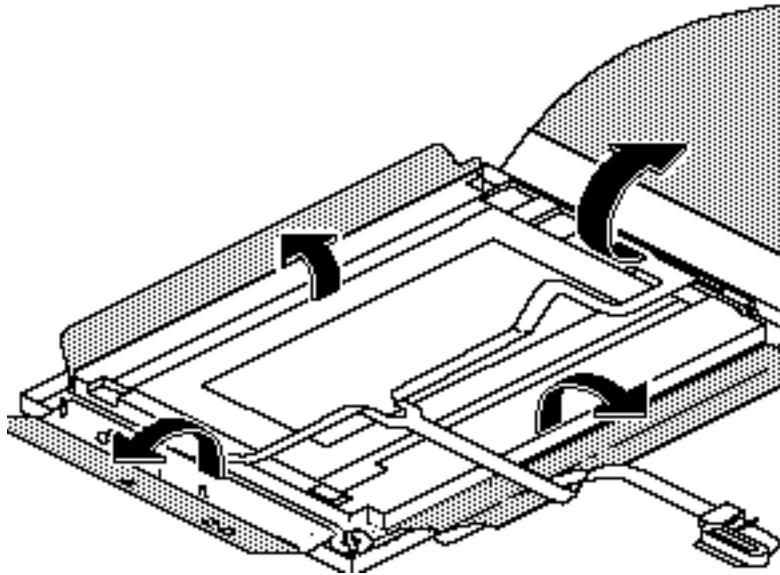


damage, wear a grounding wriststrap. Review the ESD precautions in Bulletins/ Safety.

**Note:** The display EMI shield is available to CPRC and international repairers only.

- 1 Remove the tape that secures the EMI shield.

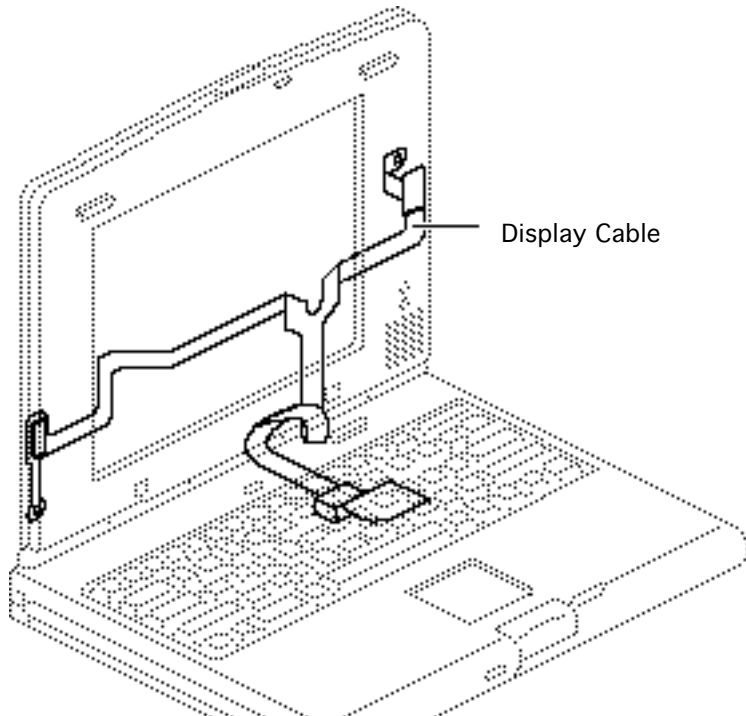




2 Peel aside the shield.

**Note:** To prevent the tape from curling after it's removed, stick it firmly onto your work surface. If the tape tears, apply new tape.





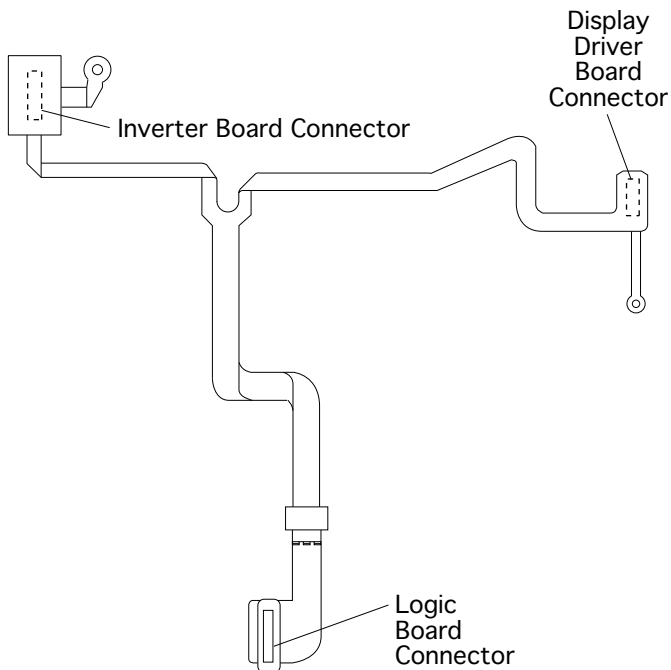
## Display Cable

Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case
- Center clutch cover
- Display assembly
- Display housing
- Open display EMI shield

**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent



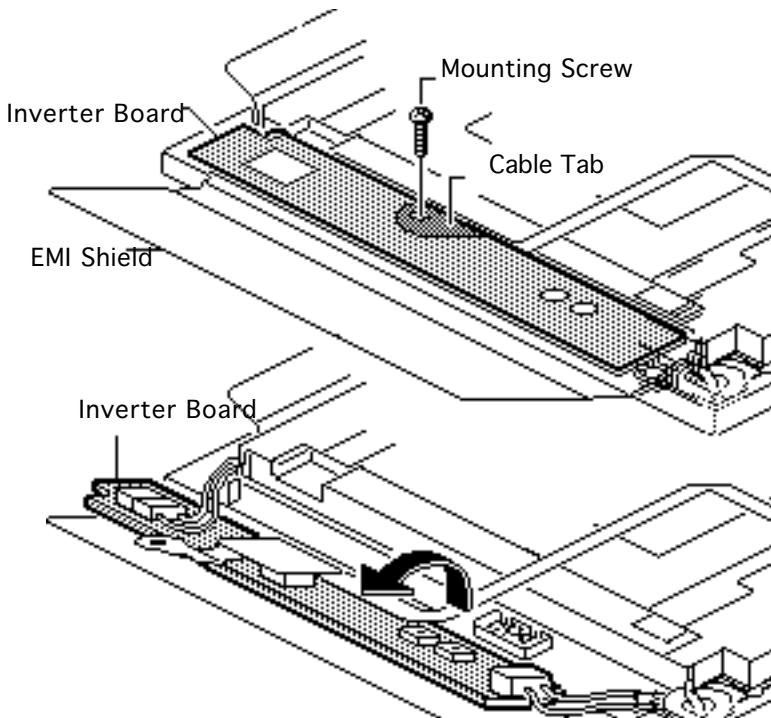


damage, wear a grounding wriststrap. Review the ESD precautions in Bulletins/ Safety.

**Note:** The display cable is available to CPRC and international repairers only.

**Note:** The display cable has connectors to the inverter board, display driver board, and logic board.





- 1 Using a T-8 torx driver, remove the inverter board mounting screw.

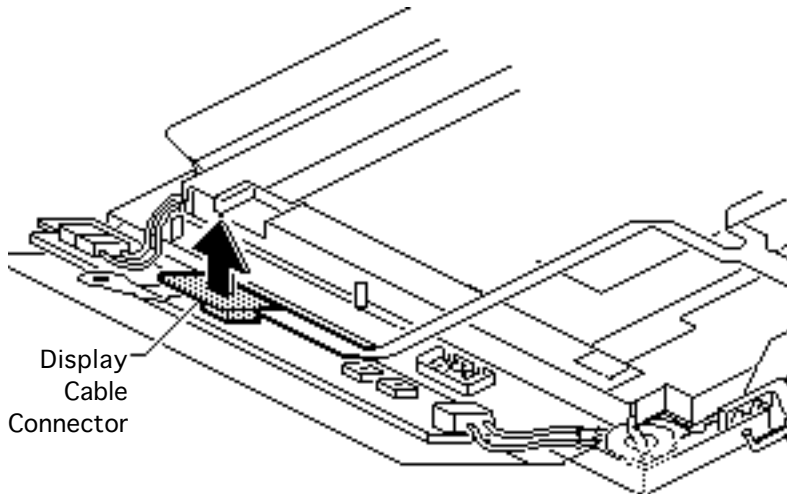
**Replacement Note:**

Wrap the tabbed area of the display cable around the inverter board before installing the screw.

- 2 Lift up the inverter board and carefully turn it on its left side to expose the cable connectors.





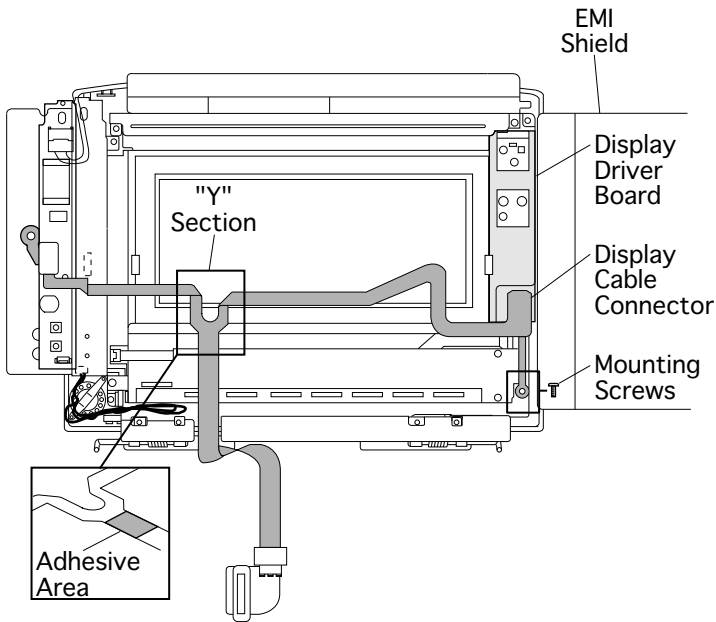


**Replacement Note:** Place the inverter board onto its three plastic bezel mounts. (For the location of these mounts, refer to the “Inverter Board” topic.)

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

- 3 Using an IC extractor, disconnect the display cable from the inverter board.





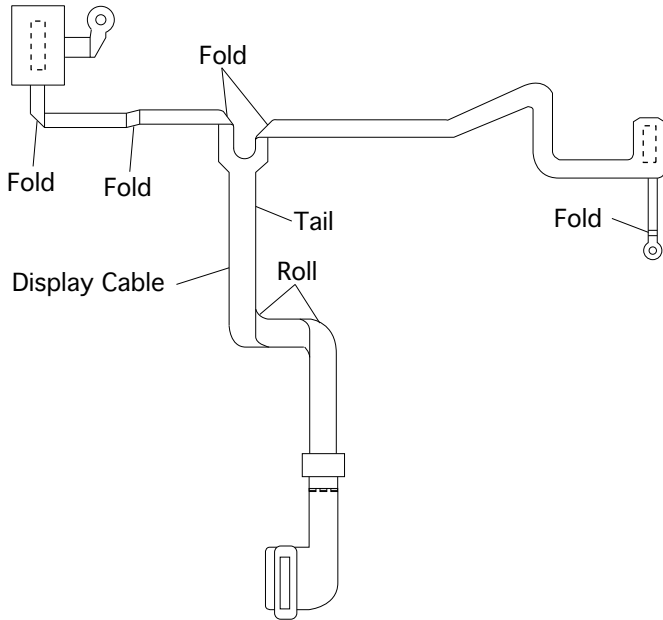
- Using a T-8 torx driver, remove the lower right mounting screw from the display cable.

**Replacement Note:**

Before replacing the screw, insert it into the screw hole of the display cable. To avoid tearing this thin strip of cable, install the screw carefully.

- Using an IC extractor, disconnect the display cable from the display driver board.





- 6 Gently peel the “Y” section of the display cable from the display.

**Replacement Note:** The display cable is attached with adhesive. Re-adhere the cable to prevent it from rubbing against the display and becoming worn.

**Note:** Be particularly careful when removing the thin sections of the cable.

- 7 Lift off the display cable.

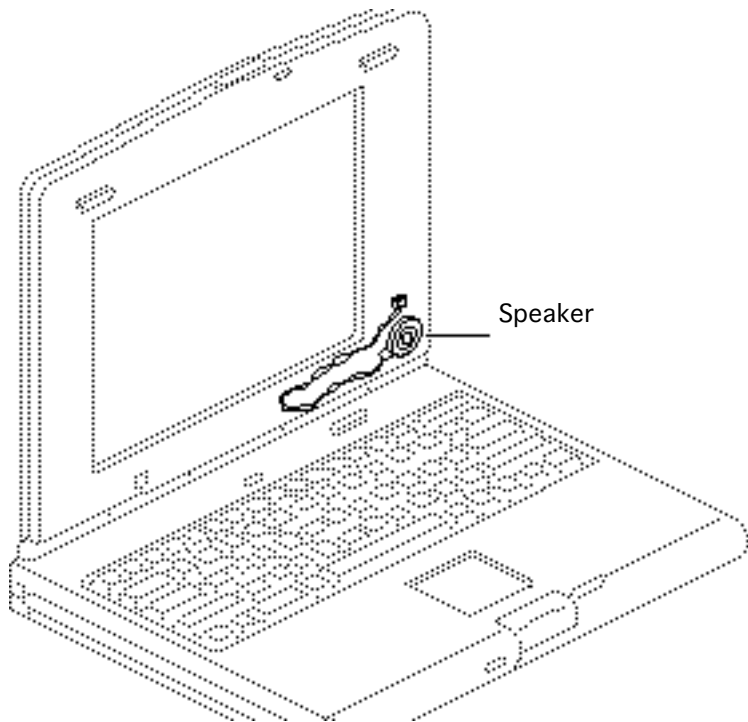




**Replacement Note:** Note the folds and roll in the display cable so you can duplicate them on the replacement cable.

**Replacement Note:** Place the tail of the cable in the opening on the EMI shield.





Speaker

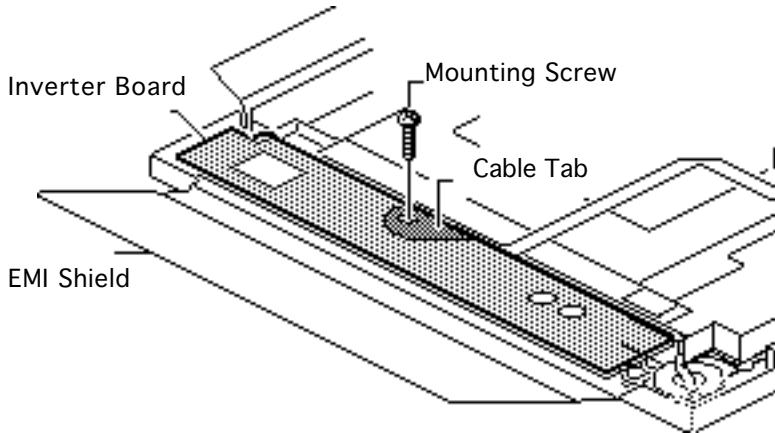
## Speaker

Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case
- Center clutch cover
- Display assembly
- Display housing
- Open display EMI shield

**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent





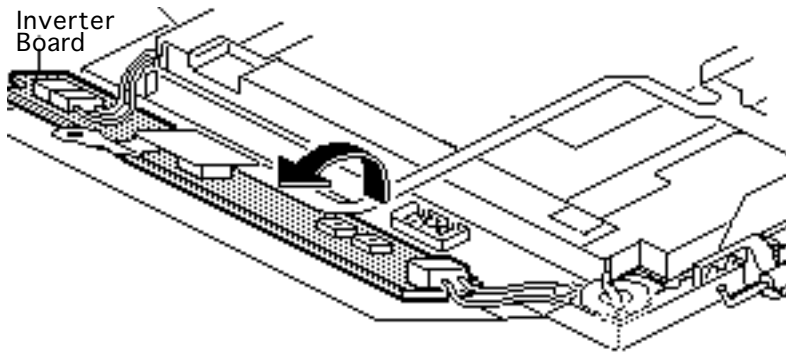
damage, wear a grounding wriststrap. Review the ESD precautions in Bulletins/ Safety.

**Note:** The speaker is available to CPRC and international repairers only.

- 1 Using a T-8 torx driver, remove the inverter board mounting screw.

**Replacement Note:** Wrap the tabbed area of the display cable around the inverter board before installing the screw.

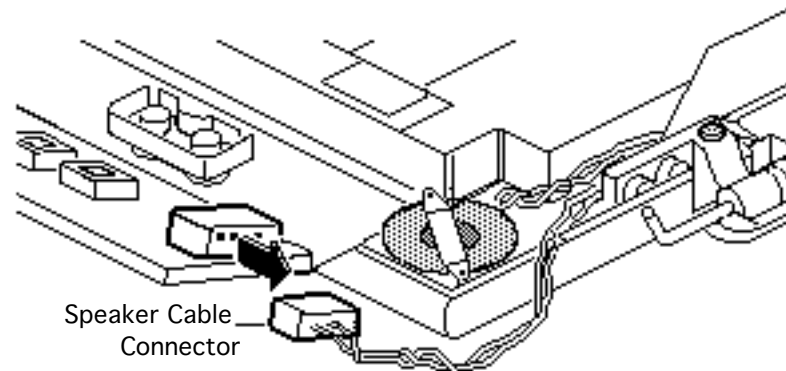




- 2 Lift up the inverter board and carefully turn it on its left side to expose the cable connectors.

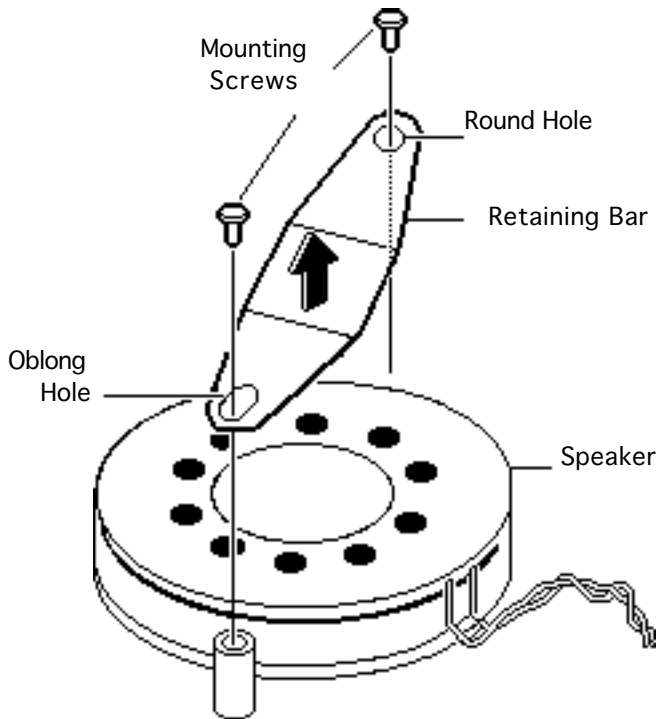
**Replacement Note:**

Place the inverter board onto its three plastic bezel mounts. (For the location of these mounts, refer to the Inverter Board topic.)



- 3 Disconnect the speaker cable.





**Replacement Note:** Make sure you route the cable above the clutch, inside the EMI shield.

- 4 Using a #00 Phillips screwdriver, remove the two speaker mounting screws and lift off the speaker retaining bar.

**Replacement Note:** Replace the retaining bar as shown. Install the screw in the round hole first, then the screw in the oblong hole.

- 5 Lift out the speaker.





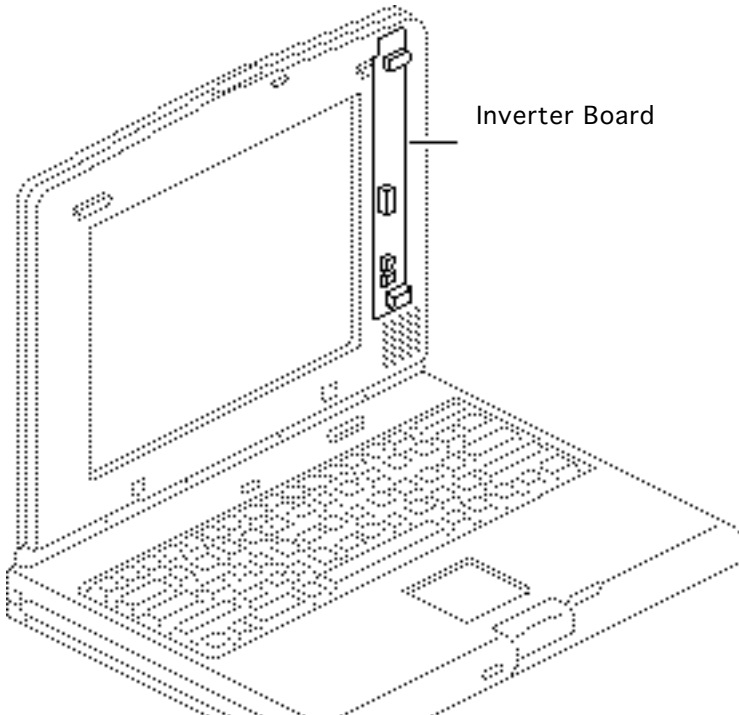


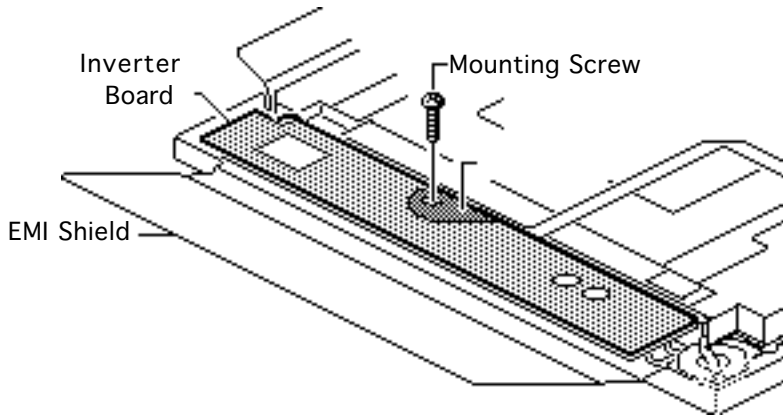
## Inverter Board

Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case
- Center clutch cover
- Display assembly
- Display housing
- Open display EMI shield

**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent





damage, wear a rounding wriststrap. Review the ESD precautions in Bulletins/ Safety.

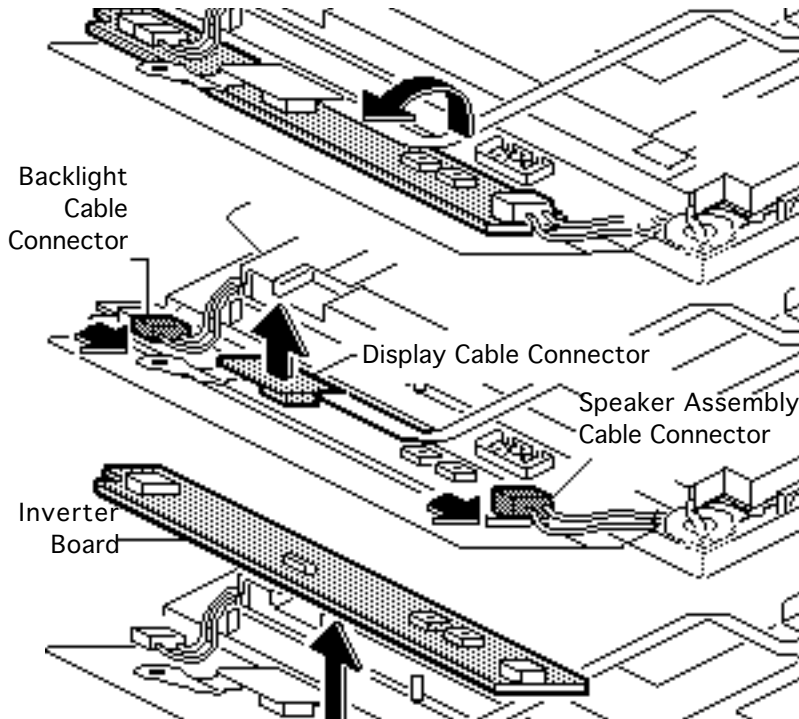
**Note:** The inverter board is only available to CPRC and international repairers.

- 1 Using a T-8 torx driver, remove the inverter board mounting screw.

**Replacement Note:**

Wrap the tabbed area of the display cable around the inverter board before installing the screw.



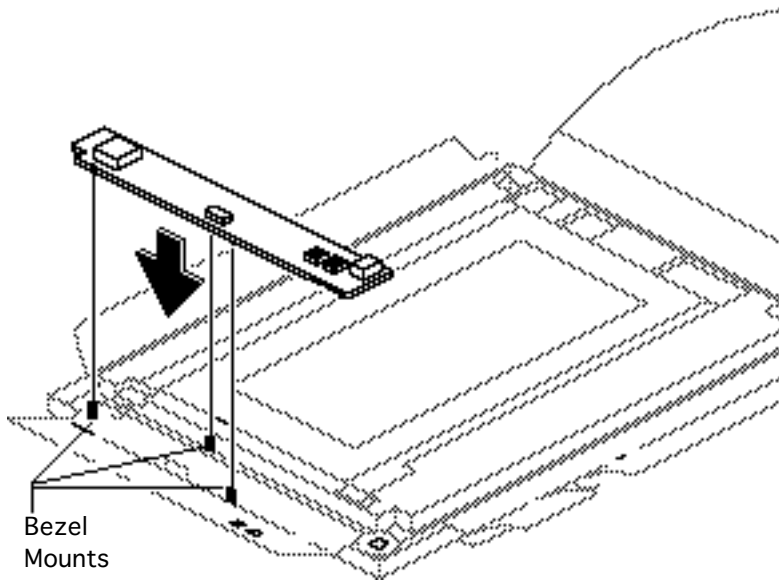


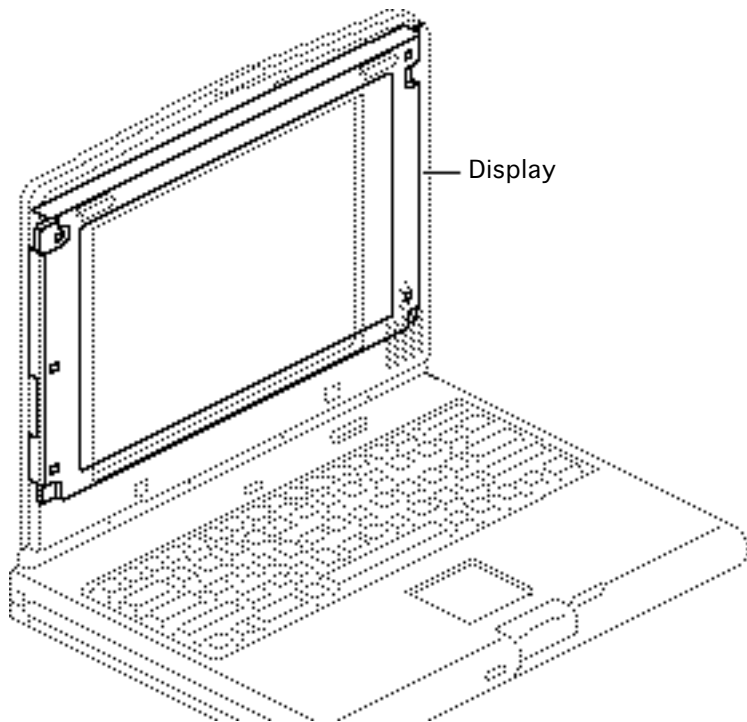
- 2 Lift up the inverter board and carefully turn it on its left side to expose the cable connectors.
- 3 Using an IC extractor, disconnect the display cable.
- 4 Disconnect the speaker assembly cable.
- 5 Disconnect the backlight cable.
- 6 Lift out the inverter board.





**Replacement Note:** Place the inverter board onto its three plastic bezel mounts.





## Display

Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case
- Center clutch cover
- Display assembly
- Display housing
- Open display EMI shield
- Display cable

**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to

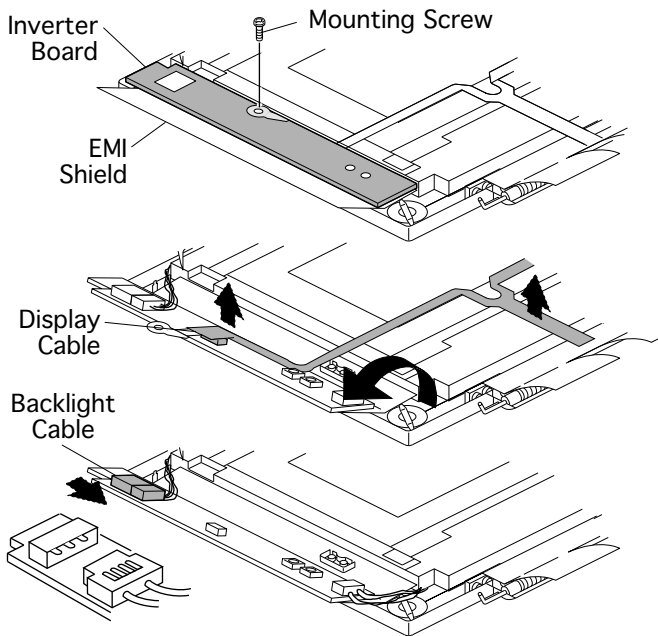




ESD damage. To prevent damage, wear a grounding wriststrap. Review the ESD precautions in Bulletins/Safety.

**Note:** The display is available to CPRC and international repairers only.





- 1 Using a T-8 torx driver, remove the inverter board mounting screw.

**Replacement Note:**

Wrap the tabbed area of the display cable around the inverter board before installing the screw.

- 2 Lift up the inverter board and carefully turn it on its left side to expose the cable connectors.





**Replacement Note:** Place the inverter board onto three plastic bezel mounts.

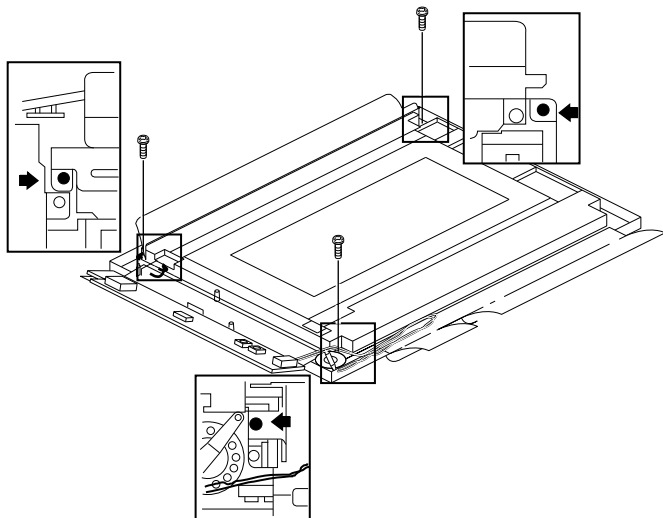
- 3 Using an IC extractor, disconnect the display cable, and remove from display assembly.
- 4 Using a jeweler's flat-blade screwdriver, disconnect the backlight cable from the inverter board.

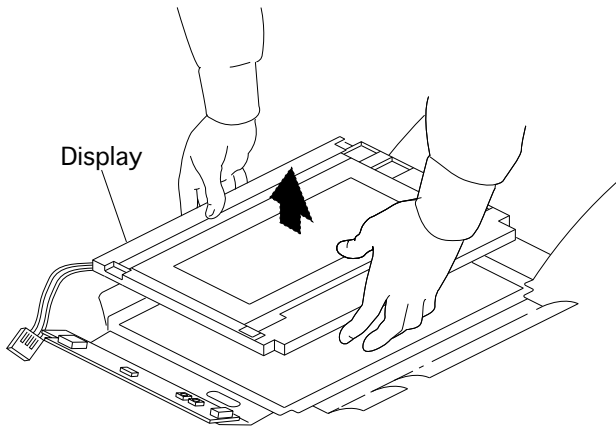






- 5 Using a T-8 torx driver, remove the remaining three mounting screws.



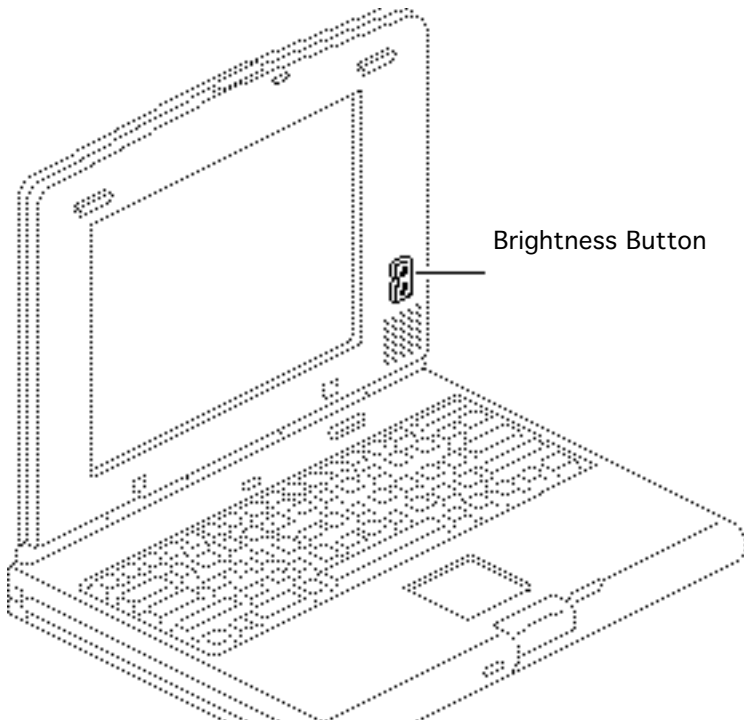


**Caution:** Pick up the display by its edges; avoid touching its delicate components.

6 Lift the display off the bezel and set it down carefully on a clean, soft surface.

**Replacement Note:** Move aside the speaker cable so it is not caught under the display and damaged.





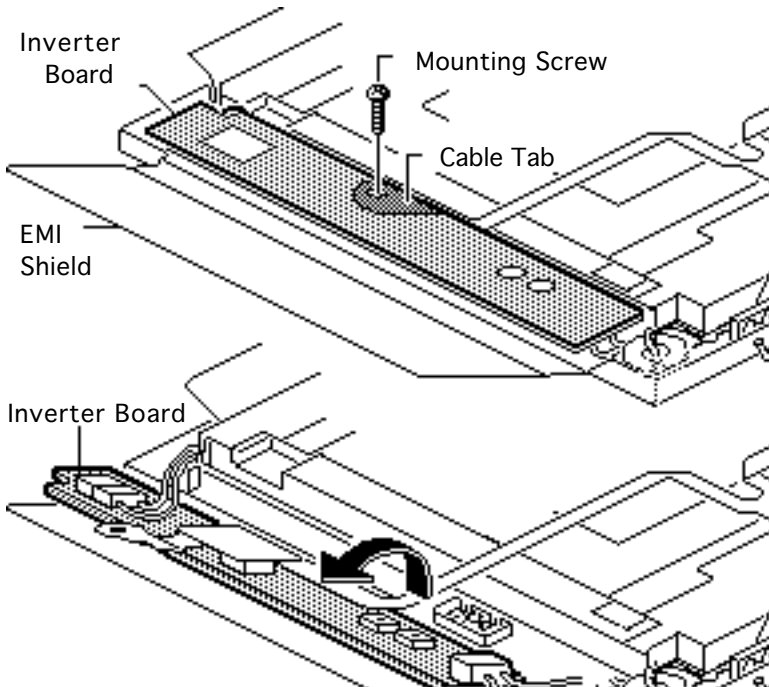
## Brightness Button

Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case
- Center clutch cover
- Display assembly
- Display housing
- Open display EMI shield

**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent





damage, wear a grounding wriststrap. Review the ESD precautions in Bulletins/ Safety.

**Note:** The brightness button is available only to CPRC and international repairers.

- 1 Using a T-8 torx driver, remove the inverter board mounting screw.

**Replacement Note:** Wrap the tabbed area of the display cable around the inverter board before installing the



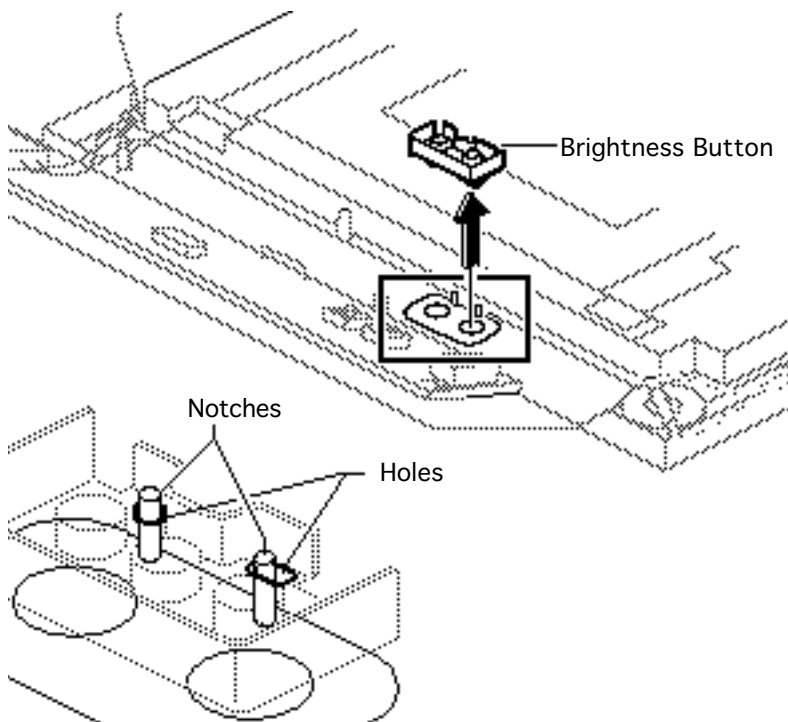


screw.

- 2 Lift up the inverter board and carefully turn it on its left side.

**Replacement Note:** Place the inverter board onto its three plastic bezel mounts. (For the location of these mounts, refer to the “Inverter Board” topic.)

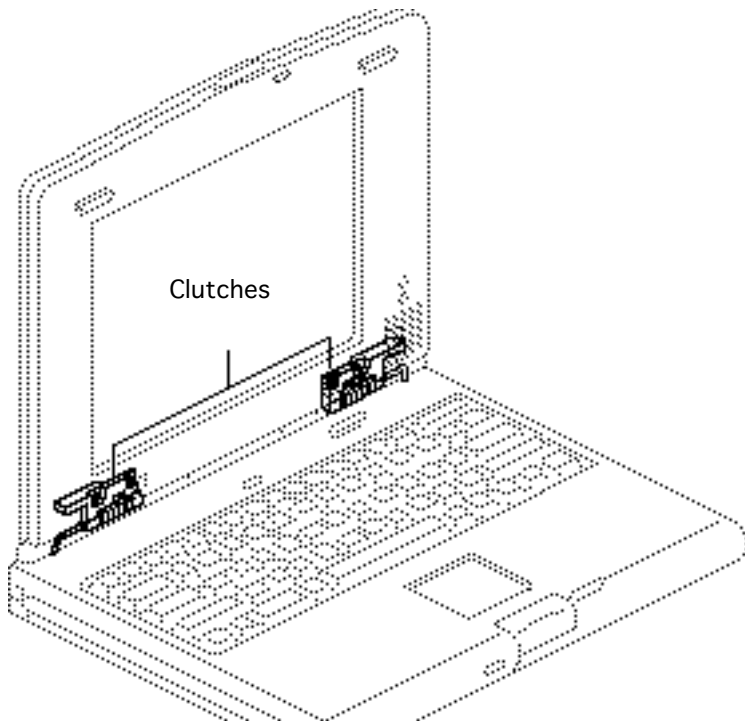




- 3 Remove the brightness button.

**Replacement Note:** Align the holes in the button with the notches on the bezel, as shown.





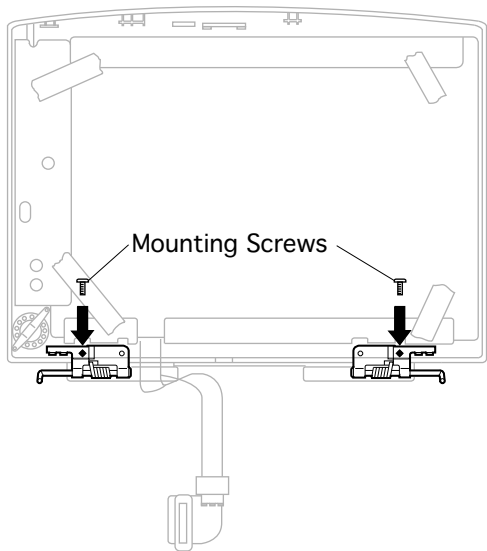
## Clutches

Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case
- Center clutch cover
- Display assembly
- Display housing

**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent damage, wear a grounding





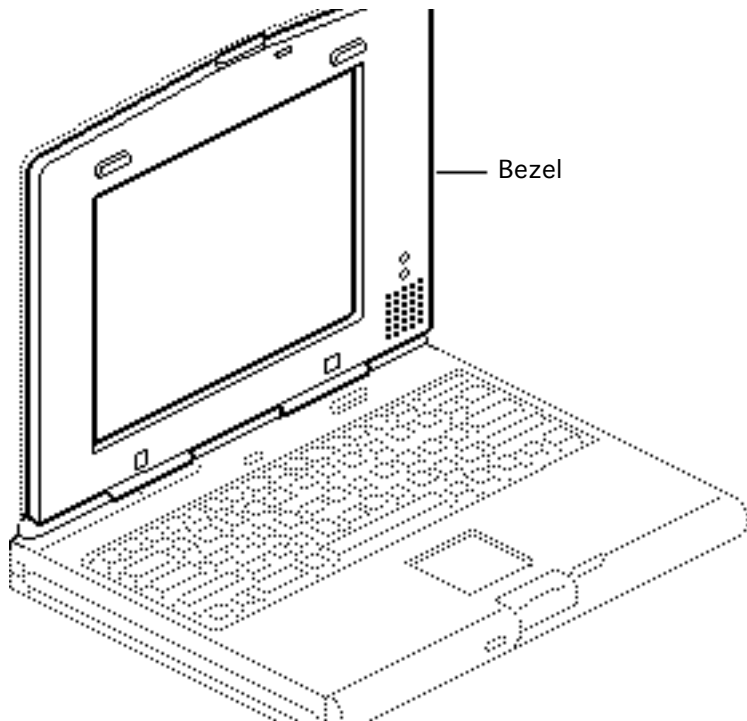
wriststrap. Review the ESD precautions in Bulletins/ Safety.

**Note:** The clutch kit is available to CPRC and international repairers only.

- 1 Using a T-8 torx driver, remove the mounting screw for the right clutch and remove the clutch.
- 2 Repeat for the left clutch.





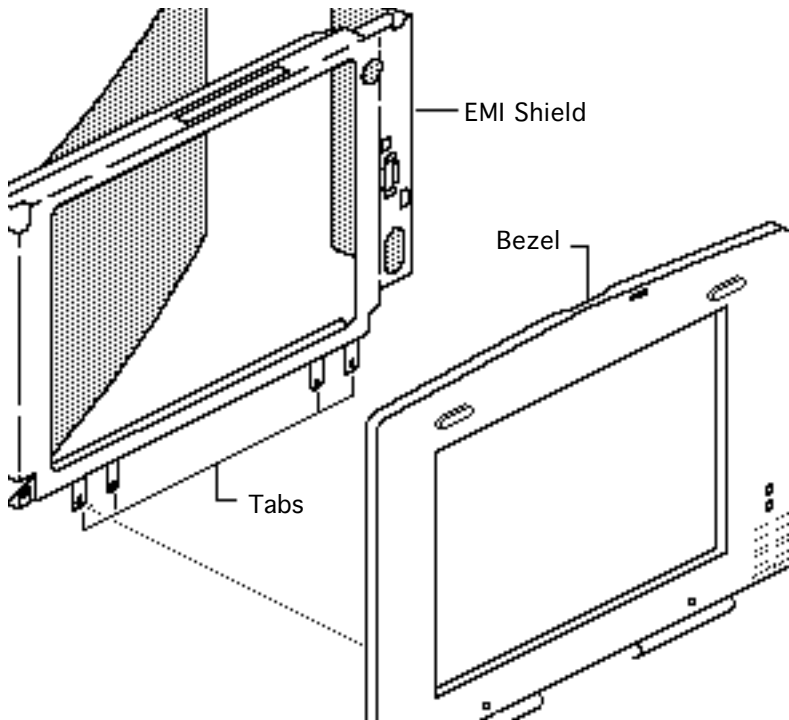


## Bezel

Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case
- Center clutch cover
- Display assembly
- Display housing
- Open display EMI shield
- Display cable
- Speaker
- Inverter board
- Brightness button





- Display
- Clutches

**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent damage, wear a grounding wriststrap. Review the ESD precautions in Bulletins/ Safety.

**Note:** The bezel is part of the housing kit, which also contains the display housing. This kit is available to CPRC and international repairers only.





Remove the EMI shield.

**Replacement Note:** Replace the EMI shield if the tabs are torn or if the shield is otherwise damaged.



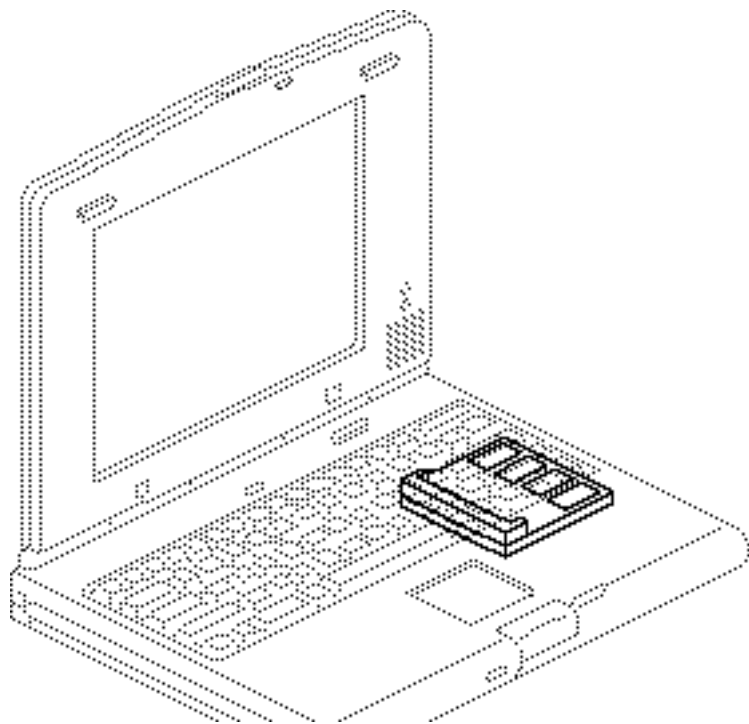


## Upgrades

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PowerBook 2300 Series





## Memory Expansion

Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard

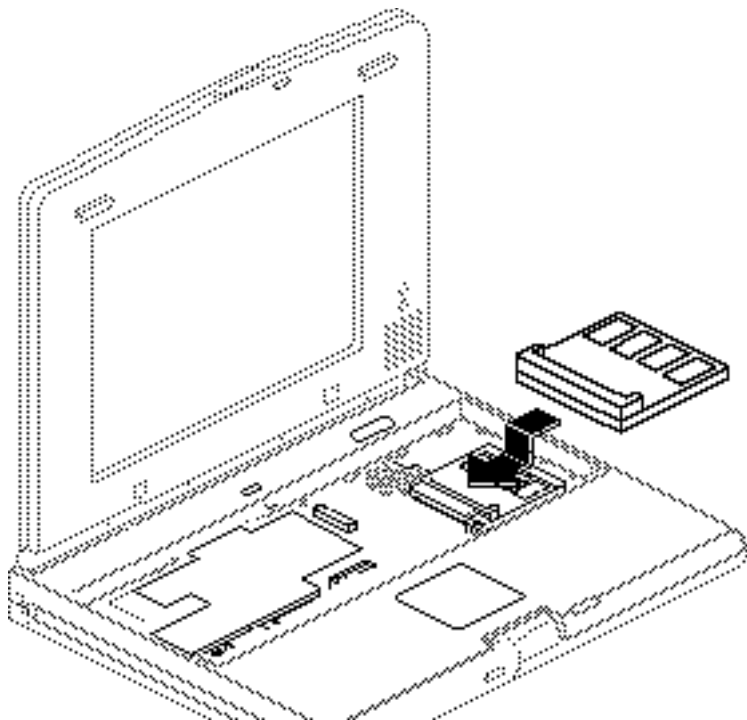
**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent damage, wear a grounding wriststrap. Review the ESD precautions in Bulletins/ Safety.





**Note:** Use 70 ns or faster chips to expand this system up to as much as 56 MB.





- 1 Holding the RAM expansion card by the edges, slide it into the unit.
- 2 Connect the card to the logic board.

**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 8 MB of RAM plus the amount of RAM on the expansion card.

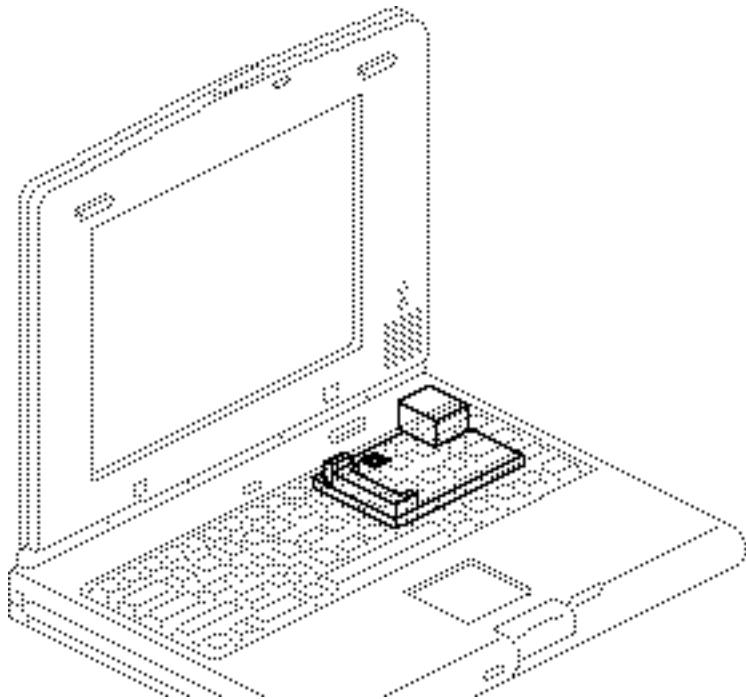




If the memory size is incorrect, reseal the RAM card. If the memory size is still incorrect, replace the RAM expansion card. If the memory size is still incorrect, contact Apple Technical Support.







## Modem

Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case
- Hard drive
- Backup battery
- Display assembly & CPU Stiffener

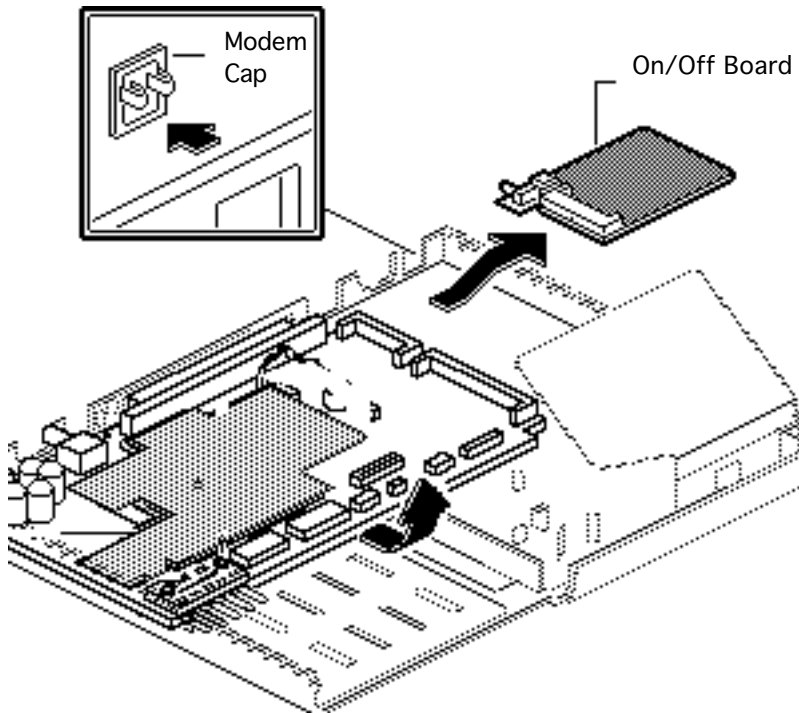
**Caution:** The PowerBook Duo contains CMOS devices that are very susceptible to ESD damage. To prevent





damage, wear a grounding wriststrap. Review the ESD precautions in Bulletins/ Safety.





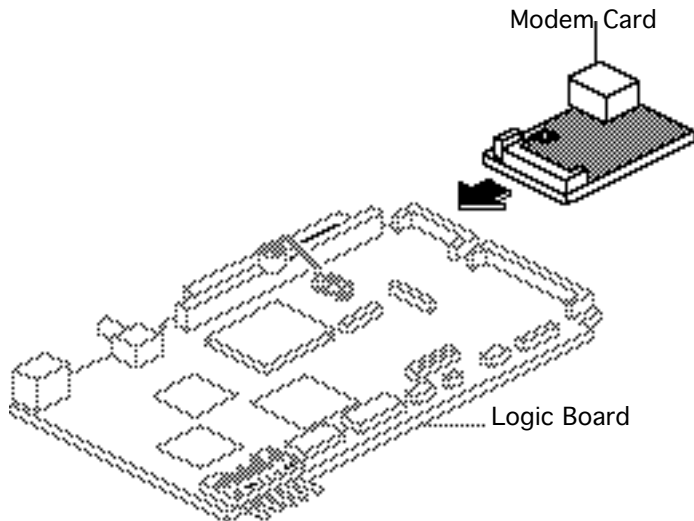
- 1 Remove the modem cap from the rear cover.
- 2 Disconnect the on/off board.

**Note:** The Apple modem includes the on/off circuitry provided by the on/off board. After installing the modem card, you may discard the on/off board.





- 3 Holding the modem card by the edges, connect it to the logic board.

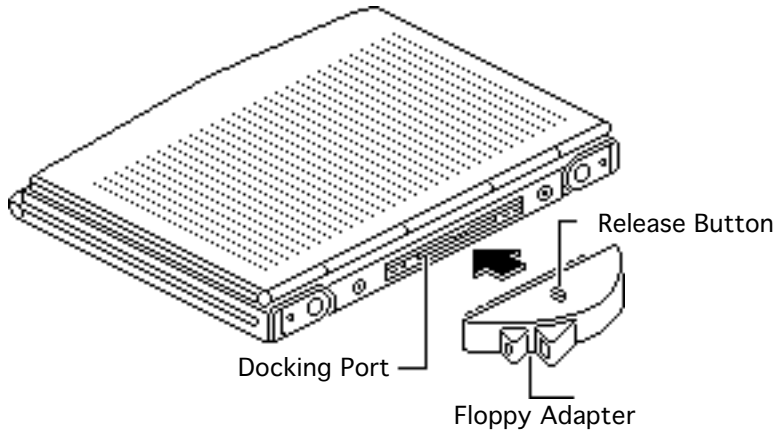




## Floppy Adapter

No preliminary steps are required before you begin this procedure.

**Note:** The PowerBook Duo Floppy Adapter attaches to the 152-pin docking connector and provides an external floppy drive (HDI-20) port and an ADB port. Replace defective floppy adapters by whole unit exchange.





- 1 To install the floppy adapter, raise the I/O door and push the adapter firmly onto the external 152-pin docking port. Make sure the floppy adapter release button is up.
- 2 To remove the adapter, depress the release button and pull off the adapter.





## Additional Procedures

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PowerBook 2300 Series

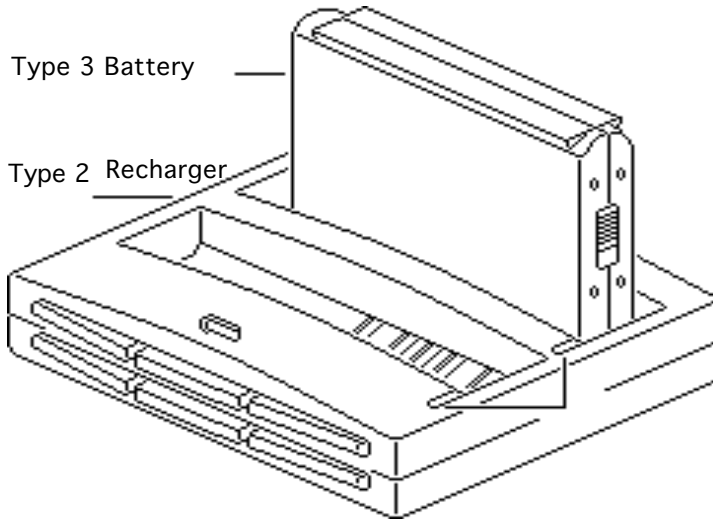




## Battery Recharger

No preliminary steps are required before you begin this procedure.

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







- 2 If the LED is
  - Yellow, the battery is charging
  - Green, the battery is ready to use
  - Red, the Type 2 recharger has not been updated with software for a Type 3 battery.
  - Off, the recharger is unplugged, the battery is bad, the power adapter is defective, or the recharger is defective





**Note:** You can charge Type 3 batteries in a Type 1/2/3 battery recharger.

However, the first time (only) that you charge a Type 3 battery in a Type 2 recharger, the recharger must be connected to a Duo with “Type III Battery” in the Extension folder. If you fail to do this, the Type 3 battery will not charge.



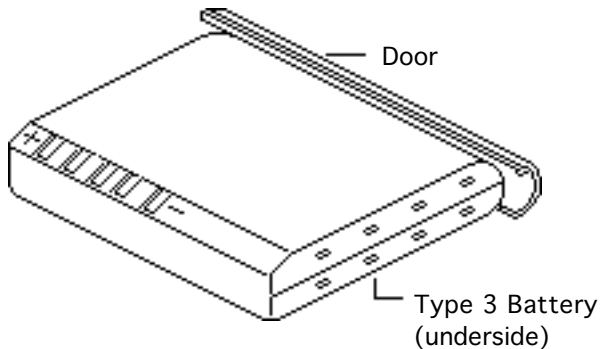


## Battery Handling

No preliminary steps are required before you begin this procedure.

**Note:** The main battery is a nickel-metal-hydride (NiMH) battery. To extend its longevity, follow the instructions below.

**Warning:** Return undamaged, dead NiMH batteries to Apple; do not discard dead batteries with other waste. If the battery is damaged, do not return it to

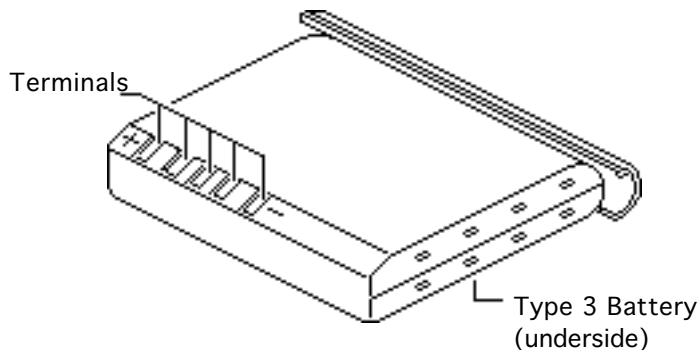




Apple. Dispose of damaged batteries according to local ordinances. Review battery-handling and disposal instructions in Bulletins/ Safety.

**Note:** Type 3 batteries include the description “High-Capacity Type 3” in the upper-right corner.



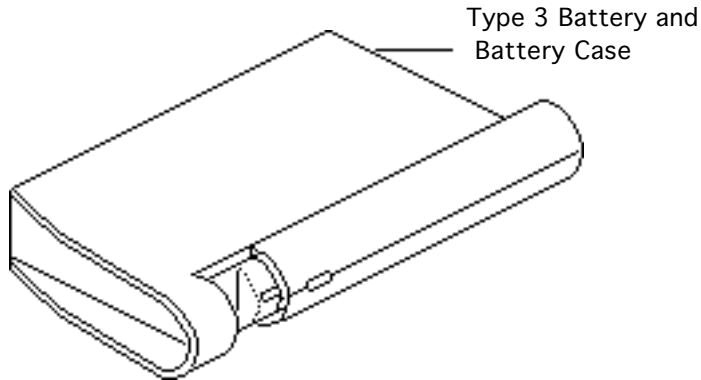


**Note:** Charge Type 3 batteries in a Type 1/2/3 battery recharger; Type 3 batteries will not charge in a Type 1 battery recharger.

Follow the guidelines on this card and the next for properly handling the NiMH 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 a week





- without recharging.
- Do not short-circuit the battery terminals.
- Store the battery in the protective battery case. For additional battery cases, see Illustrated Parts.
- To maximize battery life, discharge and then recharge the battery once every 30 days. Use only the power adapter or recharger supplied with the PowerBook Duo system.
- Keep the battery in a cool, dark place; do not





store it for longer than 6 months without recharging.

- Handle the battery carefully. Do not drop, puncture, disassemble, mutilate, or incinerate the battery.





## Align Battery Contacts

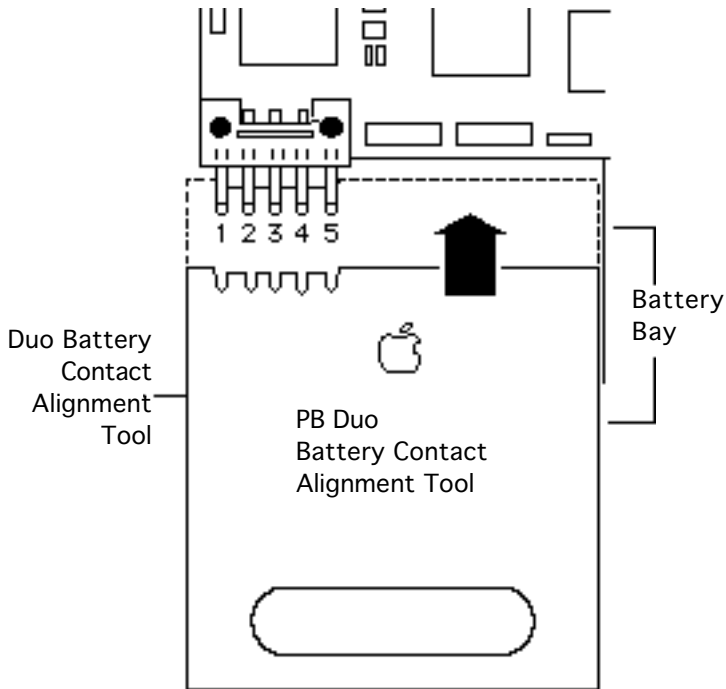
Before you begin, remove the following:

- Power adapter
- Main battery
- Keyboard
- End clutch covers
- Top case

**Caution:** The Duo contains CMOS devices that are very susceptible to ESD damage. To prevent damage, wear a grounding wrist-strap. Review the ESD pre-cautions in Bulletins/Safety.



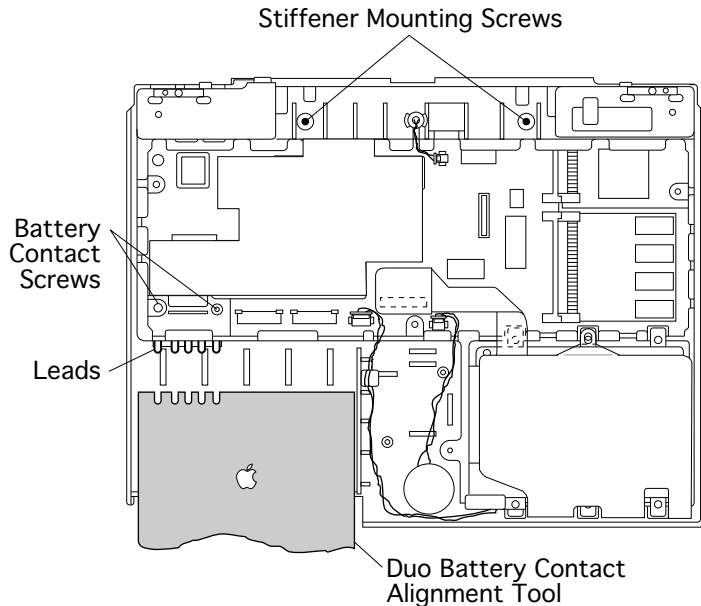




**Note:** Perform the battery contact alignment procedure when you replace a PowerBook Duo logic board or when a known good battery has power problems. (Also see “Troubleshooting Info: Battery Contact Alignment.”) Use the Duo battery contact alignment tool to align the two outer battery contacts so they are perpendicular to the edge of the logic board.

- 1 Slide the Duo battery contact alignment tool into the battery bay.





**Note:** If leads 1 or 5 flex or offer resistance to the alignment tool, perform the following steps. If there is no resistance, the contacts are aligned.

- 2 Slide the alignment tool out of the battery bay and loosen the two battery contact screws and two CPU stiffener mounting screws.
- 3 Slide the tool back in and press it against the sides of the contacts.
- 4 Retighten all screws.





**Note:** The soldered center leads (2, 3, and 4) were already aligned by Apple. If any of the center contacts become misaligned, install a new logic board and return the old one to Apple.



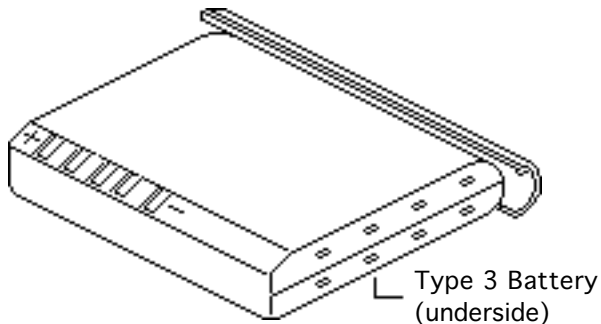


## Battery Verification

Before you begin, remove the main battery.

**Note:** Refer to the Control Panel for a general indication of the battery charge. Use a voltmeter to determine the actual charge.

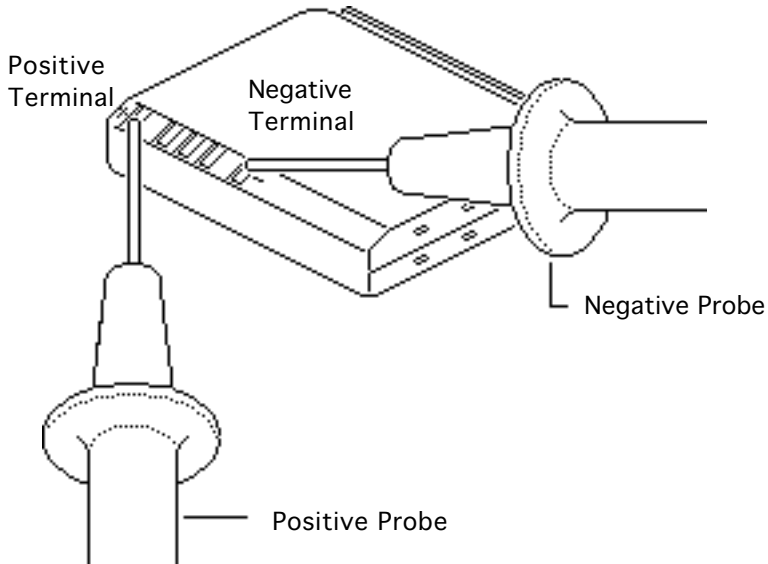
**⚠ Warning:** Return undamaged, dead NiMH batteries to Apple—do not discard dead batteries with other waste. If the battery is damaged, do not return it to





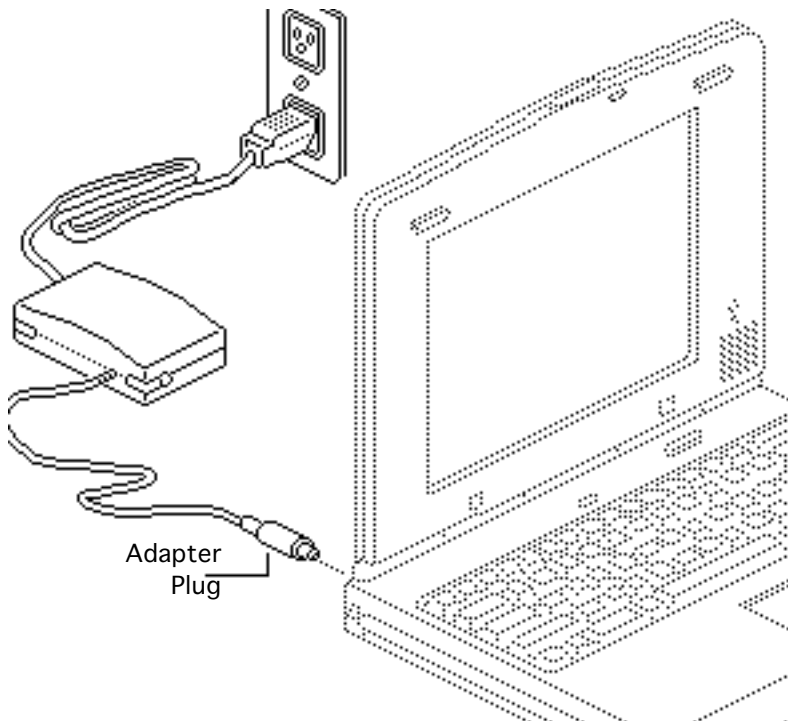
Apple. Dispose of damaged batteries according to local ordinances. Review battery-handling and disposal instructions in Bulletins/ Safety.





- 1 Set a voltmeter to the 20 volts DC scale.
- 2 Touch the positive probe of the voltmeter to the positive terminal and the negative probe to the negative terminal.
- 3 If the reading is not 12 volts, recharge the battery. If the reading remains below 6 volts, replace the battery.



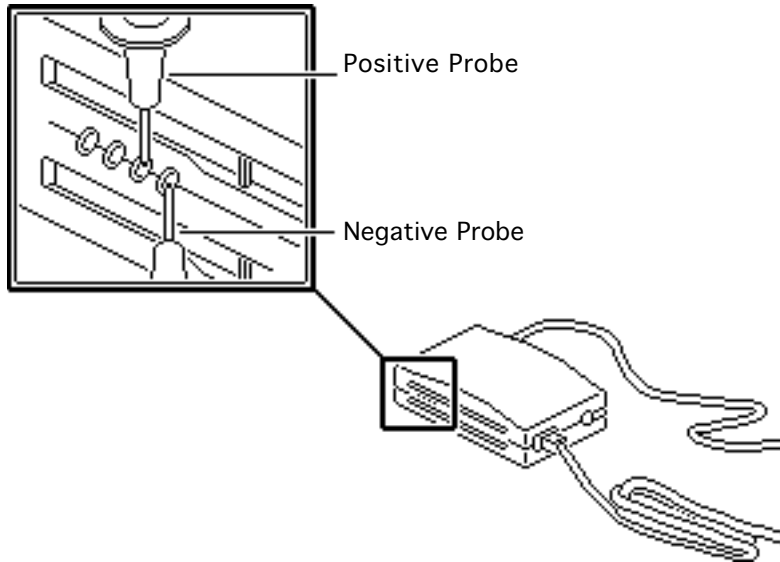


## AC Adapter Verification

No preliminary steps are required before you begin this procedure.

- 1 Plug in the AC adapter to a wall socket.
- 2 Connect the AC adapter plug to the PowerBook Duo.
- 3 Set a voltmeter so that it will measure volts in the mid-20 range on a DC scale.





- 4 Touch the negative voltmeter probe to the contact nearest the power plug and the positive probe to the contact second nearest the power plug. If the reading is not 24-25 volts, replace the adapter.
- 5 Also check the AC adapter under load. Switch on the PowerBook and repeat the voltmeter check. If the reading drops more than 1-2 volts, replace the adapter.







Exploded View

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PowerBook 2300 Series





# PowerBook Duo 2300c Exploded View

