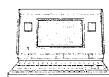


Macintosh Portable

Table of Contents



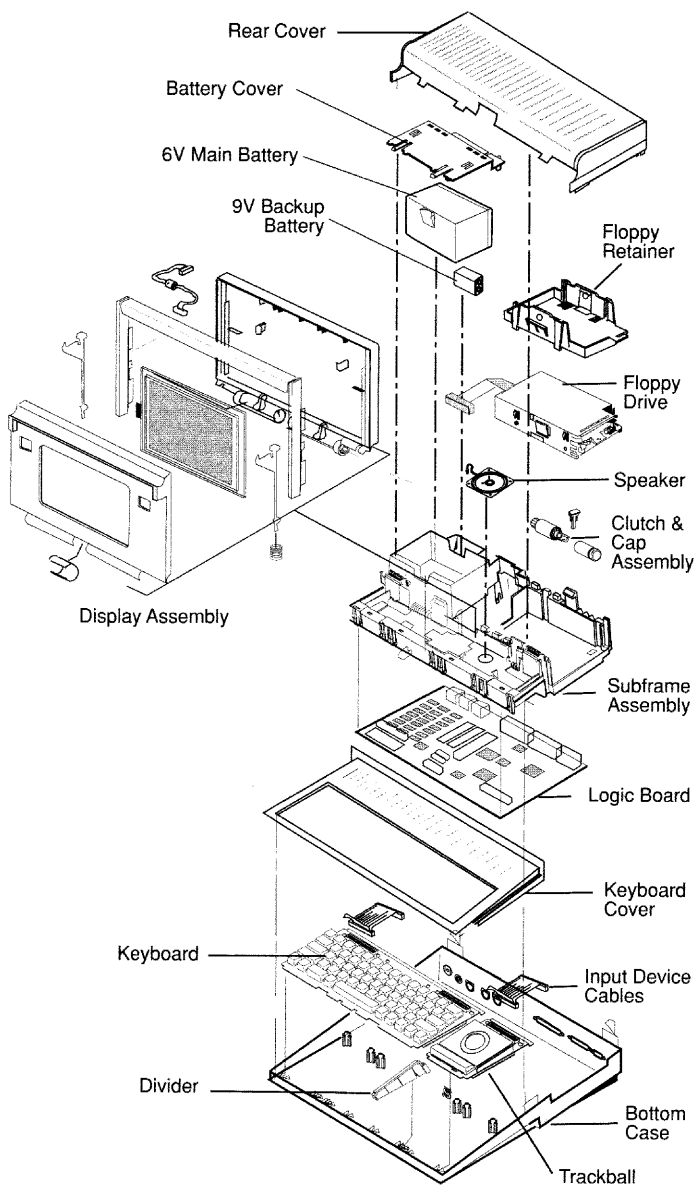
Contents	Page
Exploded View	2
Logic Board	3
Specifications	4
Parts List	5-6
Module Replacement	7-12
Troubleshooting—Battery	13
Symptom/Cure Chart	14-18
Troubleshooting—Startup Problems	19-20
Portable Data Modems	21
Memory Upgrade	22





Macintosh Portable

Exploded View



Macintosh Portable

Logic Board

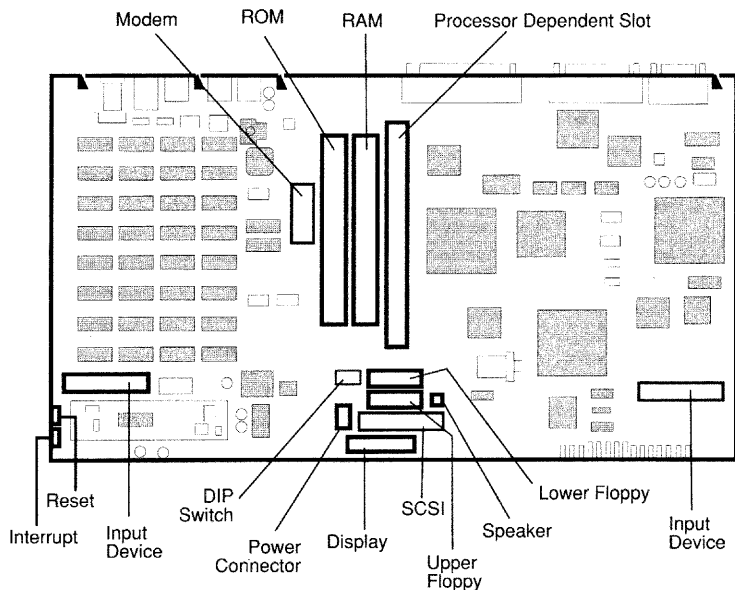


Figure: Internal Connectors and Switches

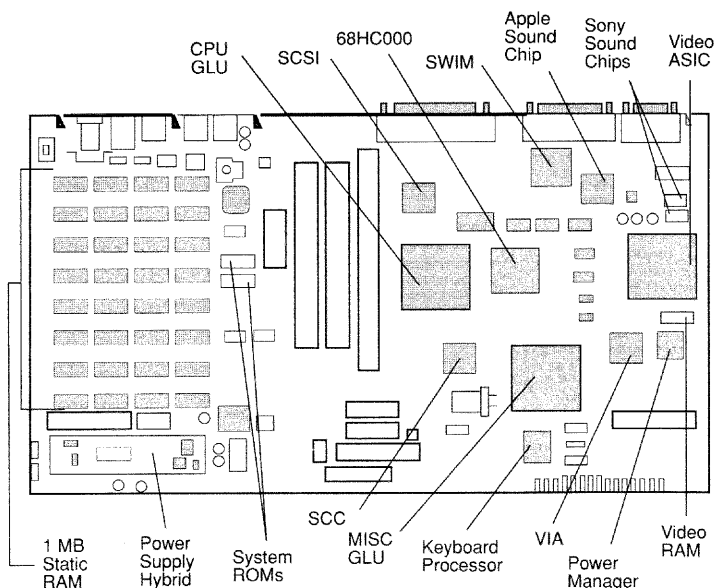


Figure: Logic Board Components



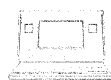
Macintosh Portable

Specifications

Macintosh Portable Specifications	
Microprocessor	CMOS 68000 16 MHz clock speed
Memory	1 MB of low-power RAM, expandable to 9 MB 256K of ROM, expandable to 4 MB
Screen	Active matrix liquid crystal display Full page width 640 by 400 pixels
Input Devices	Built-in keyboard with standard Macintosh layout Low-power ADB mouse 1.3-inch diameter trackball pointing device 18 key numeric keypad (can be installed as an alternative to the trackball)
Internal Storage	One 1.4 MB, FDHD SuperDrive Optional Internal Hard Disk 40SC
Interfaces	One external disk drive port One SCSI interface: uses a 50-pin internal connector and a DB-25 external connector One Apple Desktop Bus port allows daisy-chaining of multiple peripheral devices One stereo sound port One power adapter port Two RS-232/RS-422 serial ports One video output port
Expansion Connectors	Three expansion slots for optional RAM, ROM, or 2400 bps modem 96-pin processor direct slot
Sound	Apple custom digital sound chip
Electrical	Line voltage: 85 to 270 volts AC, 48 to 62 Hz Power: 15 watts maximum

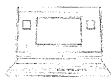
Macintosh Portable

Parts List



Macintosh Portable

1.4 MB Disk Drive	661-0474
1.4 MB Drive Shield	805-0961
FDHD Screw	844-0018
Floppy Retainer	815-1110
Floppy Bezel	815-1092
Internal 1.4 MB Drive Cable	590-0501
Battery Insulator	865-0068
Battery Pack (6V)	076-0376
Bottom Case	630-5418
Corner Foot	865-0060
Keyboard Spacer	815-1093
Modem Cap	815-1111
RFI Foam Gasket	805-0973
Flat Foot	865-0054
Carrying Case	630-5574
Carrying Case Strap	699-0508
Luggage Tag	699-0142
Display Assembly	
Case Handle	630-5071
Center Pivot Cover	815-1108
Clutch Cover	815-1098
Clutch Mechanism	699-5070
Clutch Retainer	815-1109
Display Bezel	630-5416
Display Cable	590-0502
Display Housing	630-5642
Latch Spring	805-1120
LCD Display	661-0473
External Modem/Data Access Arrangement (DAA)	
Austria, Int'l XP 2400™	AU077-0235
Belgium, Int'l XP 2400	FN077-0235
Denmark, Int'l XP 2400	DK077-0235
Finland, Int'l XP 2400	K077-0235
France, Int'l XP 2400	F077-0235
Germany, Int'l XP 2400	D077-0235
Holland, Int'l XP 2400	N077-0235
Ireland, Int'l XP 2400	EI077-0235
Italy, Int'l XP 2400	T077-0235
Norway, Int'l XP 2400	H077-0235
Spain, Int'l XP 2400	Y077-0235
Sweden, Int'l XP 2400	S077-0235
Switzerland, Int'l XP 2400	SD077-0235
United Kingdom, Int'l XP 2400	B077-0235
External Modem/DAA Cables	
Austria/Luxembourg	AU076-8369
Belgium	FN076-8369
Denmark	DK076-8369
Finland/Norway	H076-8369
France	F076-8369
Germany	D076-8369



Macintosh Portable

Parts List

Holland	N076-8369
Italy	T076-8369
Spain/Ireland	Y076-8369
Sweden/Iceland	S076-8369
Switzerland	SD076-8369
United Kingdom	B076-8369
HDA, 3.5-inch, 40 MB, SCSI	661-0540
Internal Modem (Cards)	
Data Modem 2400	661-0468
Int'l XP 2400 Int Modem	661-0465
Int'l XP 2400 Int Modem, Germany	D661-0465
Keyboard	661-0476
British Keyboard	B661-0476
French Canadian Keyboard	C661-0476
German Keyboard	D661-0476
Spanish Keyboard	E661-0476
French Keyboard	F661-0476
Swedish Keyboard	S661-0476
Italian Keyboard	T661-0476
Keyboard Parts	
Keyboard Cover	815-1059
Keycap Set	658-7136
Keyswitch Set (10/pk)	076-0226
Locking Keyswitch	815-1132
Keyboard/Trackball Cable	590-0507
Logic Board	661-0470
Mouse, Low-Power	661-0585
Mouse Ball (21.9 mm)	699-8038
Retainer, ADB Mouse Ball (38 mm)	076-0231
Numeric Keypad	661-0477
Numeric Keypad, Int'l PA Version	PA661-0477
Numeric Keypad, Int'l Z Version	Z661-0477
Packaging	
Packaging, 800K/FDHD SuperDrive	602-0210
Packaging, Battery (6 V)	602-0208
Shipping Fixture, 1.4 MB Mechanism	805-5050
Power Adapter/Charger	699-0505
RAM Card, 1 MB	661-0480
Rear Cover	630-5687
Standard Bezel	810-1096
Speaker	600-0406
Subframe Assembly	630-5684
Battery Connector	805-0970
Battery Cover	630-5723
Modem RFI Gasket	805-0976
Telephone Cable, U.S.	590-0590
Trackball Assembly	661-0475
Trackball Ball	815-1133
Trackball Retainer	815-1134
Wire Harness Assembly	600-0425

Macintosh Portable Module Replacement



Summary of Warnings and Cautions

The following warnings and cautions should be observed whenever you repair the Macintosh Portable computer. If you have not done so recently, take the time to review this important information.



CAUTION: Before replacing any modules within the Portable, always unplug the power adapter, remove the main battery, and replace the battery cover.



CAUTION: Failure to replace the battery cover could damage the computer. Replacing the battery cover disconnects the Portable from the 9-volt backup battery. Failure to do so leaves power connected to the logic board and could damage the modules being removed.



WARNING: The 6-volt sealed lead acid battery is considered toxic waste. When bad, return these batteries to Apple—do not dispose of them with other trash.



CAUTION: The Macintosh Portable makes extensive use of low-power complementary metal oxide semiconductor (CMOS) devices. These devices are very susceptible to damage from electrostatic discharge (ESD). Observe appropriate ESD precautions.



CAUTION: The LCD display is extremely susceptible to ESD damage. As with all sensitive electronics, use a grounded workstation pad and grounding wriststrap when handling the display—and handle it ONLY by the edges. Do not remove the protective tape on the component side of the LCD display.



CAUTION: The bottom case and sub-frame of the Portable are coated to reduce electromagnetic interference. This protective coating can be damaged by skin oils. Avoid excessive handling of these modules.



Macintosh Portable

Module Replacement

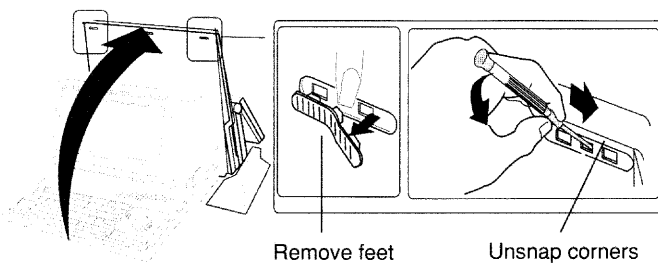


Figure: Removing the Keyboard Cover

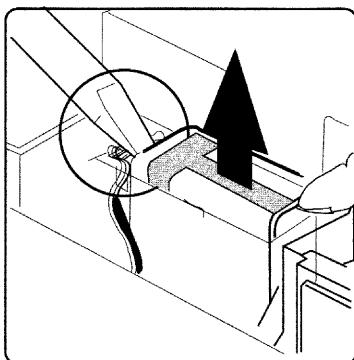


Figure: Removing the Backup Battery

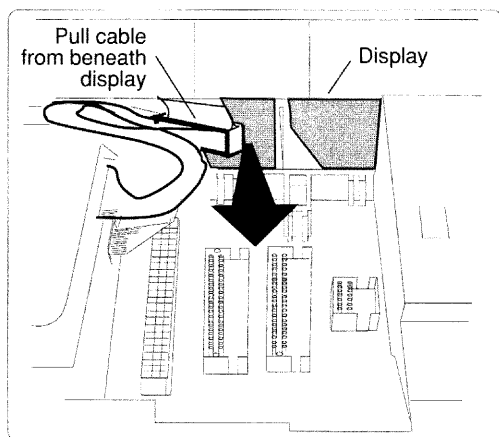


Figure: Removing the SCSI Drive

Macintosh Portable

Module Replacement



Summary of Module Removal Steps

Rear Cover

- Depress the two rear latches and lift off the rear cover.

Keyboard Cover

1. Open the display.
2. Using a small screwdriver, pop off the two feet beneath the keyboard (**see Figure**). Insert the screwdriver through the center holes, and push down and out to unsnap the corners.
3. Unsnap and remove the keyboard cover.

Main Battery

1. Remove the rear cover.
2. Slide off the battery cover.
3. Lift out the battery. If you are removing another module, replace the battery cover.

Backup Battery

Note: Removing the backup battery will erase parameter RAM. Before doing so, note all Control Panel settings so you can restore them later.

1. Access the main battery.
2. Pry up the backup battery with a small screwdriver (**see Figure**).
3. Remove the battery and disconnect its cable.

Option Cards

- Remove the main battery and replace the battery cover before removing any cards.

SCSI Drive

1. Remove the main battery and keyboard cover.
2. Remove all option cards.
3. Disconnect J19 and J18 from the logic board.
4. Close the display and slide out the disk drive cable.
5. Unsnap the two plastic latches and remove the SCSI drive.



CAUTION: When replacing the drive cable beneath the display assembly, make sure the cable does not get caught under the disk drive shield (**see Figure**).

6. After installing the new SCSI drive, be sure to run *Macintosh Hard Disk Test* to verify that the drive is operating properly.

If you are using version 1.0 of *Macintosh Hard Disk Test*, be sure to operate the computer with the power adapter connected, and do not use the "Loop on selected tests" option.



Macintosh Portable Module Replacement

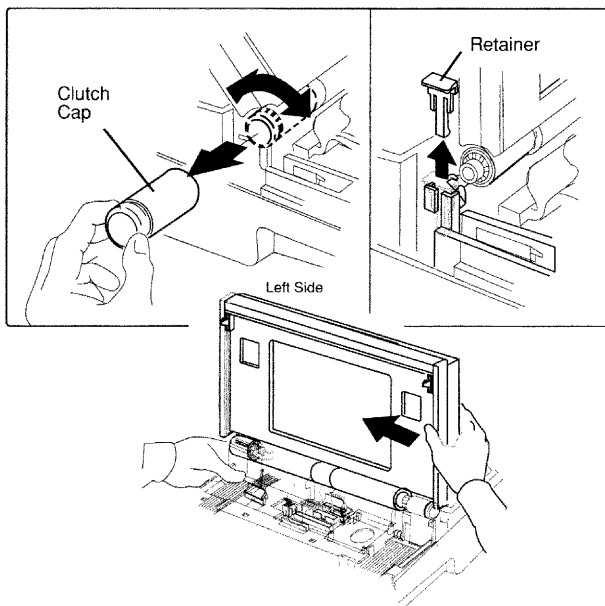


Figure: Removing the Display Assembly

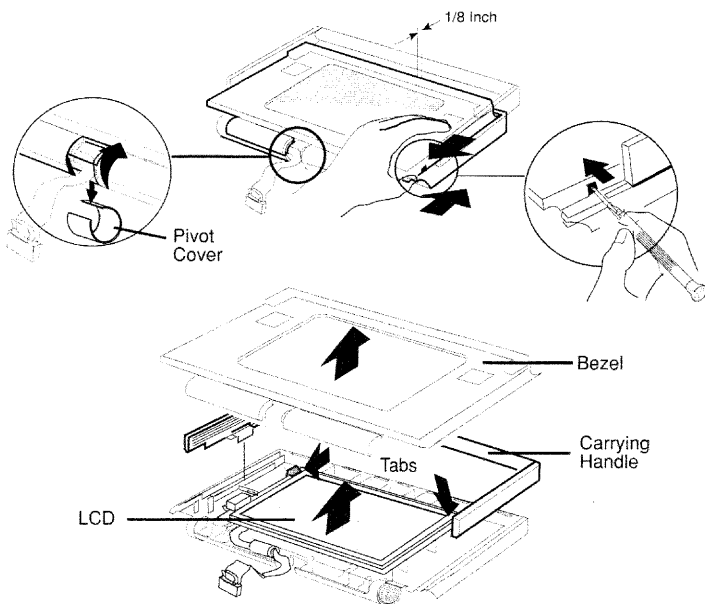


Figure: Removing the LCD Display

Macintosh Portable

Module Replacement



Upper Floppy

1. Remove the main battery and any option cards.
2. Disconnect the drive cable from the drive.
3. Unsnap the two plastic latches and remove the floppy drive.
4. Depress the two metal tabs to remove the drive mechanism.

Lower Floppy

- First remove the upper floppy or SCSI drive.

Trackball/ Numeric Keypad

1. Remove the main battery and keyboard cover.
2. Disconnect the flat cable from the device(s) to be moved.
3. Unsnap and remove the device(s) from the case.

Speaker

1. Remove the main battery and keyboard cover.
2. Disconnect the speaker cable from J16.
3. Depress the two plastic tabs and remove the speaker.

Display Assembly

1. Remove the main battery and keyboard cover.
2. Disconnect the display cable from J19.
3. Gently twist back and forth, and remove the left clutch cap (**see Figure**).
4. Pull off the left clutch retainer.
5. As shown, push the display left and remove the left clutch mechanism.
6. Disengage the display from the right clutch mechanism and remove the mechanism.

LCD Display

1. Remove the main battery and display assembly.
2. Rotate and remove the center pivot cover.
3. Pull out the carrying handle.
4. Release the plastic bezel from the LCD display. Unhook the bezel using a screwdriver, and pull down on the LCD display (**see Figure**). Repeat on both sides.
5. Remove the bezel and carrying handle.
6. Release the two plastic clips and remove the display.
7. Disconnect the display cable.

Logic Board

1. Remove the main battery, keyboard cover, keyboard/trackball/keypad, display assembly, and option cards.
2. Disconnect all cables (if present, J13-J18 and J20) from the logic board.
3. Using a screwdriver, release the clips at the left, front center, and right sides of the subframe (**see Figure on next page**). Remove the subframe.
4. Release the eight plastic clips on the bottom of the subframe in the order shown, and separate the logic board from the subframe.



Macintosh Portable

Module Replacement

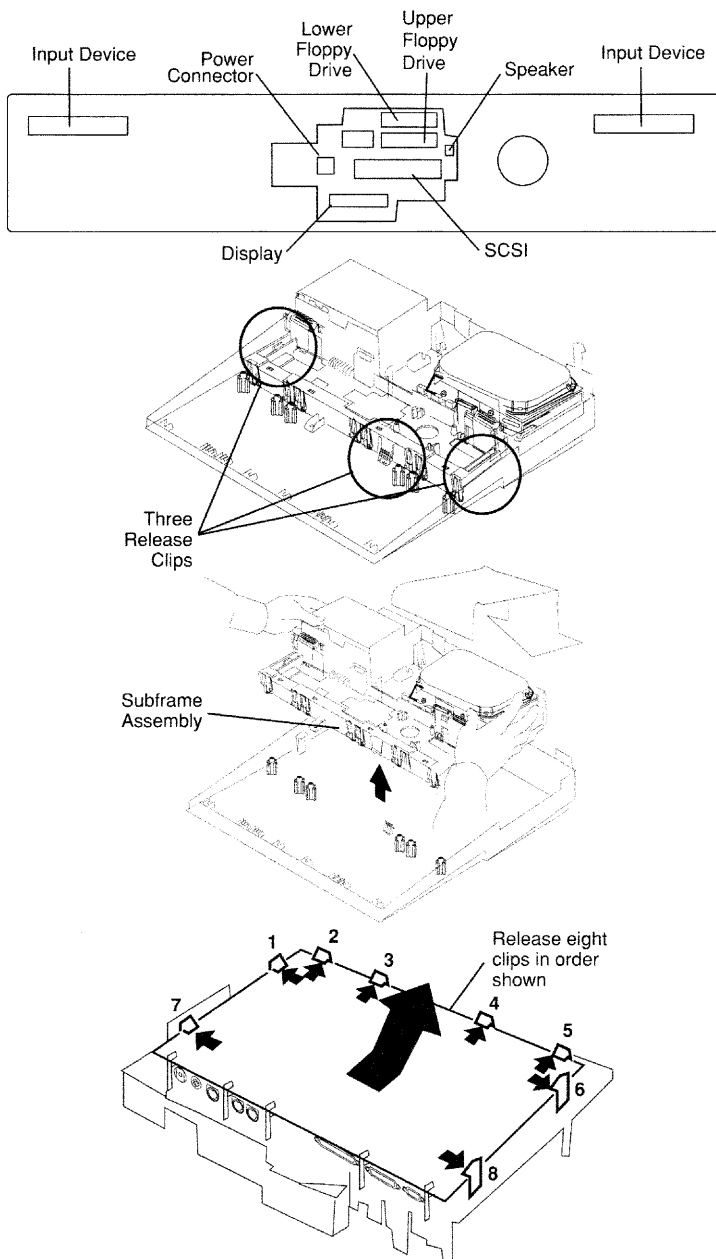
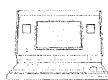


Figure: Removing the Logic Board

Macintosh Portable

Troubleshooting—Battery



Troubleshooting—Introduction

Before trying other troubleshooting aids, determine whether the Portable is receiving enough power. Perform the battery troubleshooting procedure below.

If the problem is not resolved by the suggestions in battery basics, continue troubleshooting by starting up the system and listening for the diagnostic error chords. The diagnostic error chords will indicate major problems with the logic board or battery. If this does not identify all problems, run *MacTest* if the system will boot or run *AppleCAT*® if the system will not boot. These diagnostic programs perform identical tests. If the system still doesn't function properly or will not boot, refer to the Symptom/Cure Chart. If the symptom is not listed or is not clearly defined, refer to Troubleshooting—Startup Problems. These flowcharts provide step-by-step procedures for troubleshooting the complete Portable system.

Troubleshooting—Battery Basics

Note: The power adapter by itself cannot provide enough power to operate the Macintosh Portable if the battery is not adequately charged.

1. Connect the power adapter and check the battery level. Even with the power adapter connected, the Portable must be more than 25% charged to operate properly.
2. Make sure the battery cover is completely closed. The Portable will not operate unless the battery cover is closed.
3. Press any key—you may merely have forgotten to wake the Portable up!
4. As a last resort, reset the power manager. To do this:
 - Unlock the interrupt and reset switches (**see Figure**).
 - Simultaneously press and hold the reset and interrupt switches, and then release both of them.
 - Again, wake up the Portable by pressing any key.

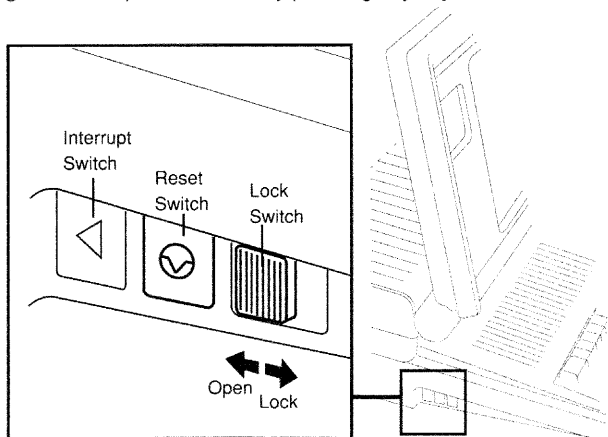


Figure: Resetting the Power Manager



Macintosh Portable

Symptom/Cure Chart

Power Problems

Solutions

Screen is blank;
computer not
responding

1. If computer is new, verify that plastic sheet has been removed from between battery and contacts.
2. Reset power manager.
3. Connect power adapter and try computer again in three or four minutes.
4. Try known-good, charged main battery. If computer now works, replace main battery.
5. Verify that keyboard cable is securely connected at both ends.
6. Replace keyboard.
7. Replace keyboard cable.
8. Replace logic board.

After main
battery removal,
some Control Panel
settings are
different

1. Was battery cover replaced when main battery was removed? If it was, power to computer was interrupted and this is normal. Restore contents of the Control Panel.
2. Replace backup battery.

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

1. Verify charger is connected properly.
2. Try a different main battery. If battery now charges, replace main battery.
3. Replace power adapter.
4. Replace logic board.

A low-power
warning is
displayed soon
after startup

1. Battery needs recharging. Attach power adapter.
2. Make sure peripherals being used display low-power icon.
3. Reduce usage of floppy or hard disk, modem, sound, or other power-consuming devices, or connect power adapter.

Battery needs
recharging after
computer is unused
for four or more days

1. If system software 6.0.4 is being used and AppleTalk is active, using Shutdown command allows serial communications controller (SCC) to draw excess current. To prevent this, select **Sleep** from Special menu or deactivate AppleTalk using Chooser prior to **Shutdown**.
2. Install system software 6.0.5.

Video Problems

Solutions

Some pixels never
come on (blacken);
no pattern

- A maximum number of five permanently OFF pixels (voids) is considered acceptable. If display contains six or more voids, replace LCD display.

Macintosh Portable

Symptom/Cure Chart



Some pixels are always black; no pattern	– If any pixel remains on constantly, replace LCD display.
A row of pixels never blackens	1. Replace LCD display. 2. Replace display cable. 3. Replace logic board.
A row of pixels is always black (black streaks)	1. Replace LCD display. 2. Replace display cable. 3. Replace logic board.
No display, but computer appears to be operating correctly	1. Verify that display cable is securely connected. 2. Replace LCD display. 3. Replace display cable. 4. Replace logic board.
Display looks blurred	1. Adjust angle of display. 2. Adjust screen contrast setting using Control Panel.
Display looks dark	1. Not enough light is available. Locate computer closer to direct light or move light source closer to computer. 2. Adjust screen contrast setting using Control Panel. 3. Replace LCD display. 4. Replace logic board.
Display is too light	1. Adjust angle of display. 2. Adjust screen contrast setting using Control Panel. 3. Replace LCD display.

Disk Drive Problems Solutions

Audio and video present, but internal drive does not operate	1. Try different floppy disk. 2. Replace floppy disk drive. 3. Replace floppy disk drive cable. 4. Replace logic board.
Disk ejects while booting; display shows Mac icon with blinking "X"	1. Try known-good system disk. 2. Replace floppy disk drive. 3. Replace floppy disk drive cable. 4. Replace logic board.
Disk initialization fails	1. Verify that Apple-certified media are being used. 2. Try different disk. 3. Replace floppy disk drive. 4. Replace logic board.



Macintosh Portable

Symptom/Cure Chart

Disk Drive Problems (continued)

Solutions

Disk will not eject

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

SCSI Drive Problems

Solutions

Internal hard disk will not operate

1. Verify that SCSI hard drive cable is securely connected.
2. Use HD SC Setup to see if drive is visible. If it is, reinitialize drive.
3. Replace hard disk drive.
4. Replace logic board.

Peripheral Problems

Solutions

After connecting external SCSI device, computer no longer boots

1. Turn on external SCSI device before starting up computer.
2. Verify that proper cable termination is provided.
3. Verify that no two SCSI devices have same device address.
4. Replace logic board.

Cursor does not move when using trackball

1. Reset power manager.
2. Check cable connections between trackball and logic board.
3. Replace trackball cable.
4. Replace trackball.
5. Replace logic board.

Cursor intermittently does not move or moves erratically

- Clean trackball ball and internal rollers.

Cursor does not move when using mouse

1. Check mouse connection to ADB port.
2. Reset power manager.
3. Clean mouse ball and inside mouse case. (Refer to You Oughta Know tab in *Apple Service Technical Procedures*.)
4. Replace mouse.
5. Replace logic board.

Macintosh Portable

Symptom/Cure Chart

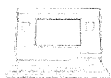


Device connected to modem port doesn't work	1. Verify that External Modem is selected in Portable CDEV. 2. If using System 6.0.4, upgrade to 6.0.5 or later. 3. Replace logic board.
Cursor moves, but clicking button has no effect	1. If trackball button is not working, replace trackball cable. If mouse button is not working, replace mouse. 2. Replace trackball. 3. Replace logic board.
No response to any key on keyboard	1. If screen is blank and you are trying to bring computer out of system sleep, try resetting power manager. 2. Check keyboard connection to logic board. 3. Replace keyboard. 4. Replace logic board.
Known-good ImageWriter, ImageWriter II, LQ, or LaserWriter will not print	1. Make sure System 6.0.5 is being used. 2. Make sure Chooser is set correctly. 3. Try another printer. If that printer works, computer is OK. Refer to Networks tab in <i>Apple Service Technical Procedures</i>. 4. Replace logic board.
Serial devices are unrecognized or garbage is transmitted and/or received	1. If System 6.0.4 is being used, be sure Macintosh Portable INIT 1.0 is installed in system folder. 2. Upgrade to System 6.0.5 or later.
When using external modem, after exiting communication program and putting Portable to sleep three or four times, computer locks-up when coming out of system sleep	– If System 6.0.4 is being used, upgrade to System 6.0.5 or later.

Internal Modem Problems

Solutions

Internal modem options do not appear in Portable CDEV when modem is installed	1. Try removing and reseating card. 2. Replace modem card. 3. Replace logic board.
Modem interferes with system sound	1. Replace modem card. 2. Replace logic board.



Macintosh Portable

Symptom/Cure Chart

Internal Modem Problems (cont'd.)

Solutions

Modem does not respond properly to AT command set instructions

1. Check baud rate and data format settings. Are they compatible with Portable Data Modem 2400 and remote modem?
2. Replace modem card.

Modem does not respond to incoming call

1. If system does not respond to incoming call during sleep mode, verify that **When Phone Rings** option in Automatic Wake-up section of Portable CDEV is selected.
2. Replace modem card.
3. Replace logic board.

Modem has no sound output

- Replace modem card.

Miscellaneous Problems

Solutions

Screen goes blank and computer shuts down every few minutes

- Computer is going into system sleep to conserve battery power. Adjust sleep delays in Control Panel or connect power adapter.

Some applications seem to run slower after running for a few seconds

- Computer is switching to system rest. To disable system rest, open Control Panel, hold down <Option> key, and click anywhere on words **Minutes Until Automatic Sleep**. When dialog box appears, click on **Don't Rest**.

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

- The computer is powering down hard disk or going into system sleep to conserve battery power. Adjust sleep delays in Control Panel or connect power adapter.

No sound from speaker

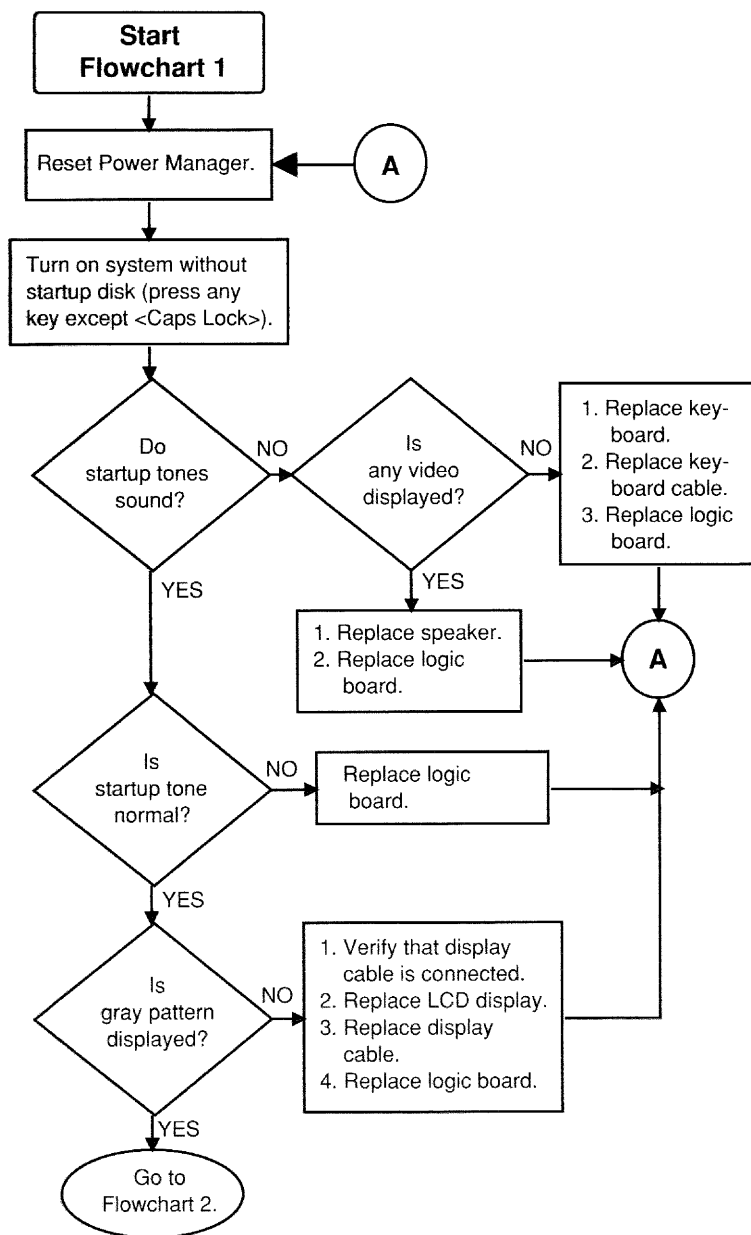
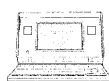
1. Verify that volume setting in the Control Panel is 1 or above.
2. Check speaker connection to logic board.
3. Replace speaker.
4. Replace logic board.

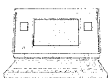
Screen suddenly goes blank

- Computer has gone into system sleep to conserve battery power.

Macintosh Portable

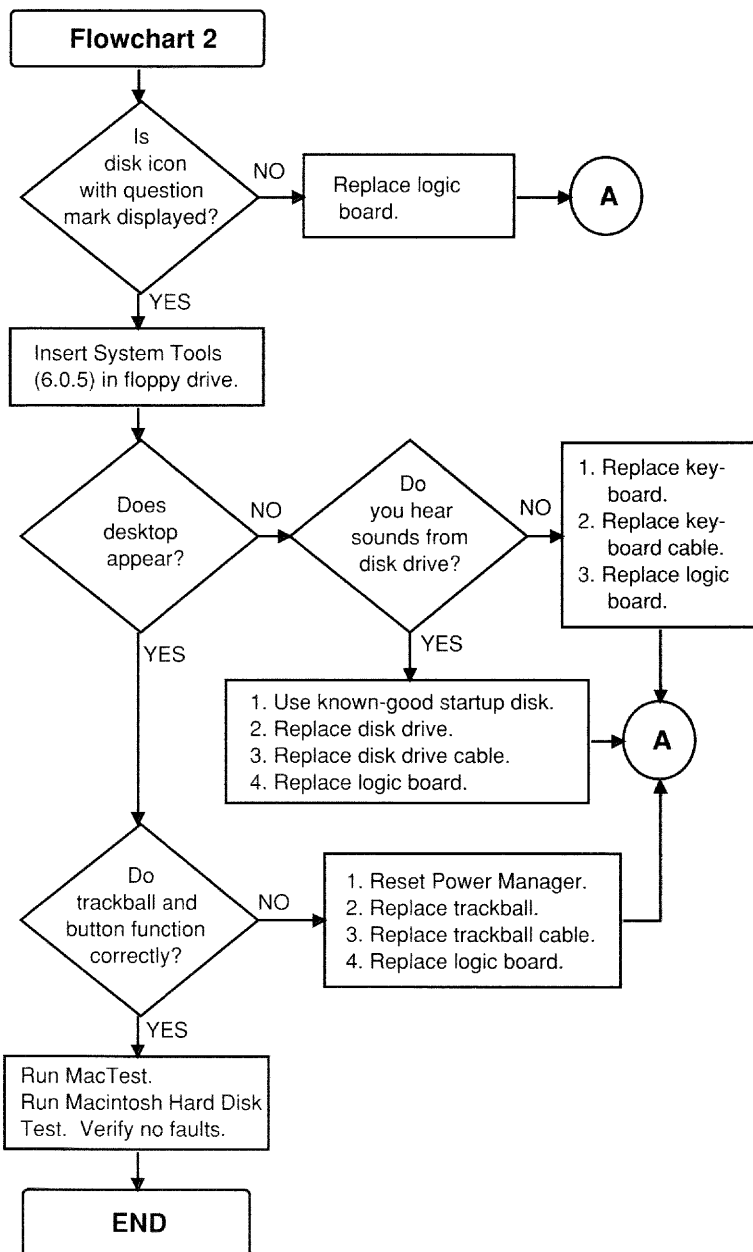
Troubleshooting—Startup Problems





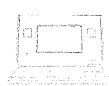
Macintosh Portable

Troubleshooting—Startup Problems



Macintosh Portable

Portable Data Modems



Installation and Verification Procedure

The following procedure covers the installation and verification of the internal, Macintosh Portable Data Modem 2400 and International XP 2400.

1. Unplug the power adapter, and remove the rear cover and main battery.
2. Remove the modem cap by pushing it through the rear of the computer.
3. Install the modem card in the modem connector. Make sure the modem card is on the right side of the modem gasket.
4. Replace the main battery and rear cover, and turn on the computer.
5. Use *ModemTest* to verify that the computer and modem are communicating, and AppleLink to verify operation of the modem with the telephone network. (For additional information, refer to Section 4, Diagnostics, under the Modems tab in *Apple Service Technical Procedures*.)

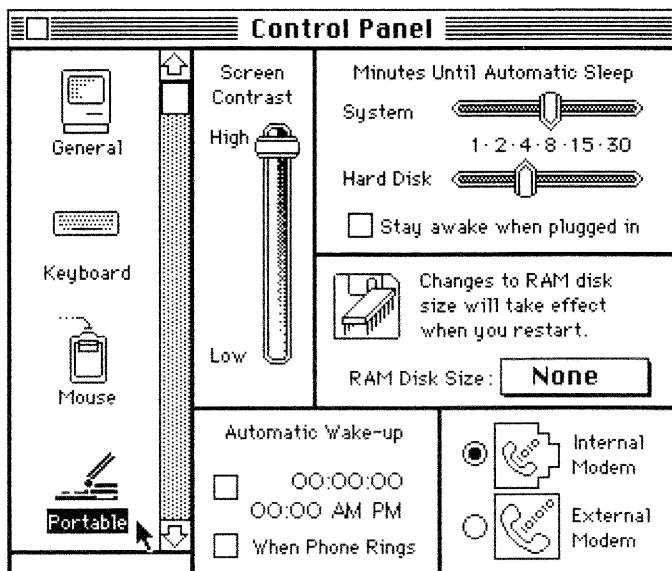


Figure: Verifying Correct Modem Installation



Macintosh Portable

Memory Upgrade

1 MB RAM Expansion Card Installation Procedure

1. Place the Macintosh Portable on a grounded workbench pad and put on your grounding wriststrap.
2. Unplug the power adapter, and remove the rear cover and main battery.
3. Replace the main battery cover.
4. Locate the RAM expansion connector.
5. Position the 1 MB RAM Expansion Card over the connector and plug in the card (see Figure).
6. Remove the battery cover and replace the main battery.
7. Replace the rear cover.

Troubleshooting the Installation

1. Turn on the computer by pressing any key except <Caps Lock>.
2. Pull down the Apple menu and select **About the Finder™**.
3. Check that the amount of RAM indicated is 2048K:
 - If the amount of RAM is *not* 2048K, replace the card.
 - If the amount of RAM indicated is *still not* 2048K, replace the logic board.

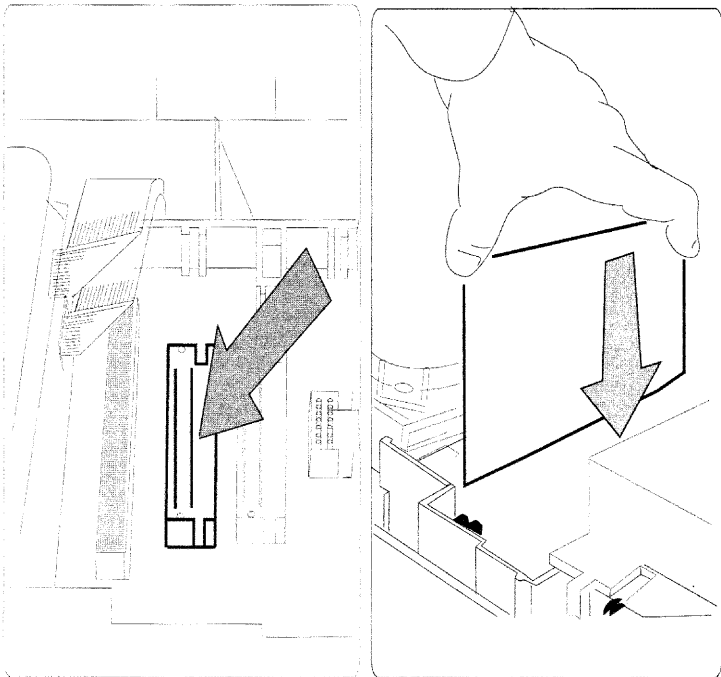


Figure: Installing 1 MB RAM Expansion Card