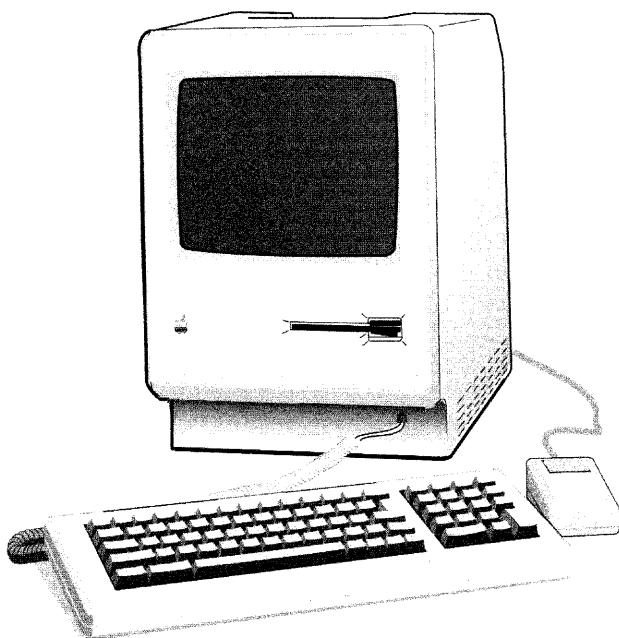




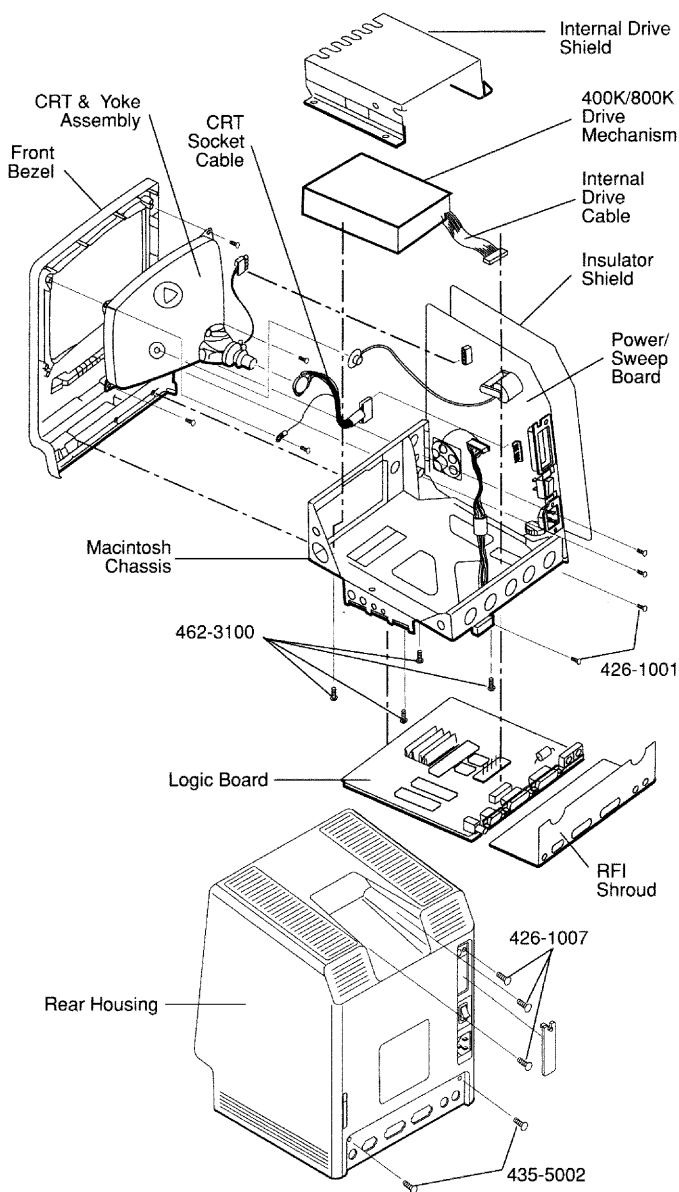
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Macintosh and Macintosh Plus

Exploded View



Macintosh and Macintosh Plus

Logic Board Identification

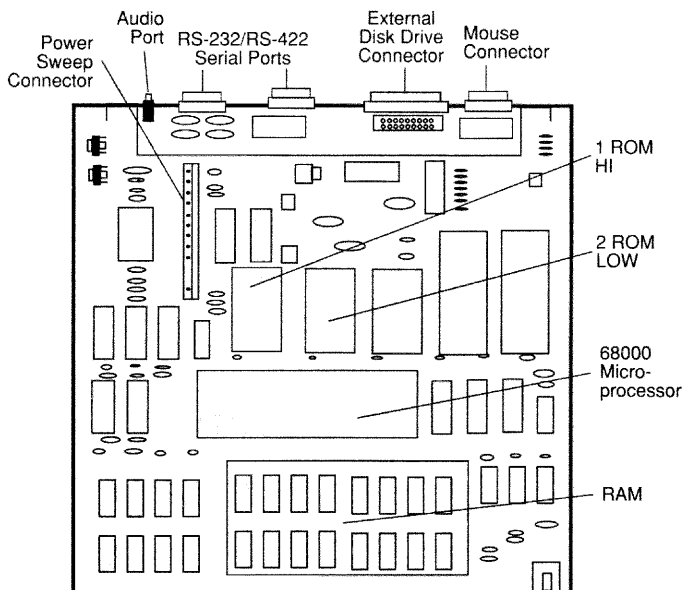


Figure: Macintosh 128K/512K Logic Board

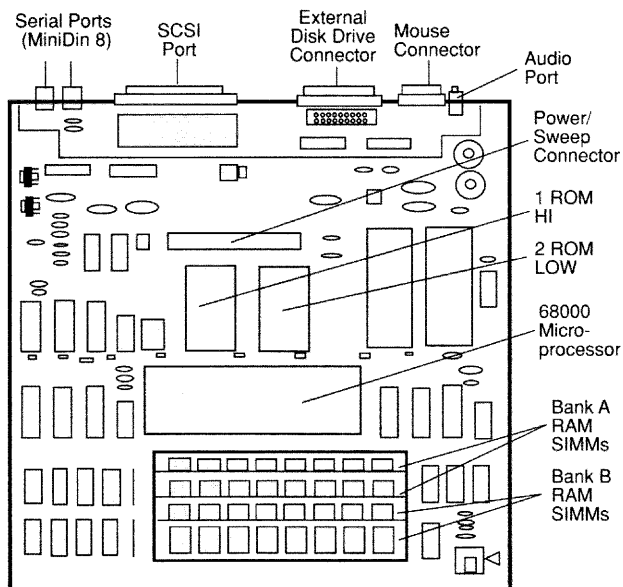


Figure: Macintosh Plus 1 MB Logic Board



Macintosh and Macintosh Plus

Specifications

Macintosh/Macintosh Plus Specifications	
Microprocessor	MC68000; 32-bit internal data bus 7.83 MHz clock speed
Memory	128K, 512K Plus: 1 MB, expandable to 4 MB 128K ROM standard
Video Display	9-inch (diagonal) screen; 512 by 342-pixel bit-mapped display
Interfaces	Two RS-232/RS-422 serial ports (DB-9 on the Macintosh 128K/512K; Mini DIN-8 on the Macintosh Plus) One SCSI parallel port (Macintosh Plus only) One DB-19 external disk drive port One sound port
Internal Storage	Built-in 3.5-inch 400K drive for 128K and 512K Built-in 3.5-inch 800K drive for 512Ke and Plus (uses 3.5-inch hard-case floppy disks either double-sided with 800K capacity, or single- sided with 400K capacity)
Sound	Four-voice sound with 8-bit digital/analog conversion using 22 KHz sampling rate
Clock/Calendar	CMOS custom chip with 4.5-volt user- replaceable battery backup (includes 256 bytes of memory which remembers system parameters even with the machine turned off)
Electrical	Line voltage: 105 to 125 volts AC Frequency: 50 to 60 Hz Maximum power: 60 watts

Macintosh and Macintosh Plus

Parts List



Macintosh only

400K Mechanism, Apple 3.5 Drive	661-76156
Shield for Internal Drive	805-0765
128K Main Logic Board	661-96152
512K Main Logic Board	661-96236
IC, ROM Low (128K/512K logic boards, not upgraded)	342-0221
IC, ROM High (Upgraded 512K boards—supports 800K drives)	342-0220
RFI Shroud	805-0577
Front Bezel	810-0373
Mylar Washer	725-0018
Keyboard Parts:	
Keyboard Bottom Case	815-0754
Keyboard Top Case	815-0728
Keycap Set	658-7039
Rear Housing with Label	630-5139
Agency Approval Label	825-4018
Agency Approval Label, 512K Enhanced	825-1014
Battery, Alkaline, 4.5 V	742-0003
Logo Label (Bezel)	825-0547
Logo Label (Housing)	825-0613
Macintosh Battery Door, Beige	815-0938
Macintosh Foot	865-0051
Macintosh Label	825-0742
Macintosh Signature 512K Label	825-1065
Reset/Interrupt Switch, Beige	815-0737
Reset/Interrupt Switch, Smoke	815-0763
Screw, Tap, 8-32 x .625 Fill, Torx, Black Zinc Oxide	435-5002
Screw, Tap, M 4.22 x 1.41 x 16, Torx, Zinc	426-1007

Macintosh Plus only

Floppy Metal Housing (for transporting)	805-5050
Packing Disk, 2-sided (for transporting)	003-0003
Screw, M 3 x 6, with two washers	462-3401
Front Bezel	810-0379
Ground Clip	805-0910
Logo Plate Label	825-1256
Keyboard, Platinum (with cable)	661-0416
Keyboard, Platinum, French Canadian	C661-0416
Keyboard, Platinum, German	D661-0416
Keyboard, Platinum, Spanish	E661-0416
Keyboard, Platinum, French	F661-0416
Keyboard, Platinum, Italian	T661-0416
Keyboard Parts:	
Bottom Cover, Beige	815-0937
Bottom Cover, Platinum	815-0984
Keycap Set, Beige	658-5186
Keycap Set, Smoke	658-5190
Mitsumi Keyswitch	705-0104
Mitsumi Locking Keyswitch	705-0044
Top Cover, Beige	815-0936
Top Cover, Platinum	815-0983



Macintosh and Macintosh Plus

Parts List

Logic Board (w/o RAM; replaces 661-0321)	661-0525
Macintosh Plus RFI Shroud	805-5047
Resistor, 150 Ohms, 1/4 W, $\pm 5\%$	101-4151
SIMM, 256K, 120 ns	661-0402
SIMM, 256K, DIP, 120 ns	661-0494
SIMM, 1 MB, 120 ns	661-0403
Rear Housing, Beige	630-5211
Agency Approval Label, Beige	825-1254
Battery Door, Beige	815-0938
Rear Housing, Platinum	630-5235
Agency Approval Label, Platinum	825-1345
Battery Door, Platinum	815-0971

Macintosh & Macintosh Plus

800K Mechanism, Apple 3.5 Drive (512K Enhanced)	661-0345
3-1/2" Drive Cable Internal (red stripe)	590-0167
3-1/2" Drive Cable Internal (yellow stripe) (512K Enhanced)	590-0437
Shield for Internal 800K Drive (512K Enhanced)	805-0217
CRT and Yoke Assembly	076-0103
Keyboard, Beige (replacing 661-96154)	661-0322
Alps Alpha Lock Keyswitch	705-0077
Alps Long-Stem Keyswitch	705-0070
Keyboard/Keypad Cable, Beige	590-0144
Keyboard/Keypad Cable, Smoke	590-0170
Screw, Tap 2.20 x 6.25 (Keyboard Case)	430-1025
Macintosh Chassis	805-0766
Screw, Tap, 6-32 x .375, Chassis Grounding	490-0002
Screw, Tap, M 4.22 x 1.41 x 13 (CRT & Chassis)	426-1001
Screw, M 3 x .5 x 6	462-3100
Macintosh Mouse	661-96155
Apple Mouse, Platinum	661-0400
Mouseball Retainer	815-0409
Rubber-Coated Mouseball	699-8001
Numeric Keypad Assembly	658-4045
Macintosh Foot	865-0051
Screw, Tap, 2.2 x 6.25	430-1025
Power Cable, Beige	590-0138
Power Cable, Smoke	590-0131
Power Supply, Beige	661-0461
Power Supply, Platinum	661-0462
Power/Sweep Board, 220 V	661-76214
Brightness Knob, Smoke	865-0029
Cable, CRT Socket	590-0160
Cable, Power Supply to Logic	590-0184
Fuse, Power Supply, Int'l, 1.6 A 250 V	740-0060
Fuse, Power Supply, U.S., 2.5 A 250 V	740-0300
Insulator Shield (Back of Power Supply)	725-0011
Lower Ground Clip	805-0576
Screw, 2.9 x 10 mm	470-2101
Service Packaging, 800K/1.4 MB Drives	602-0210

Macintosh and Macintosh Plus

Power/Sweep Voltage Adjustment



You must verify correct voltages whenever the logic board or power/sweep board is replaced. If the voltages are outside specified tolerances, perform the voltage and video adjustments.

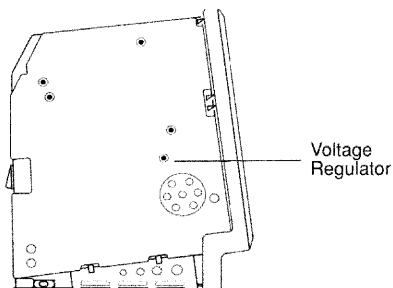


Figure: Voltage Adjustment Control



WARNING: Voltage adjustments are performed with the power on. Review the CRT safety and live adjustment rules before performing this procedure.



WARNING: When using the voltmeter, make sure the banana plug test probes do not short to one another, which will damage the Macintosh. Pull the insulating rubber hoods down over the test probes.

Voltage Adjustment Procedure

1. Switch off power, disconnect the power cord, and disconnect any peripheral devices.
2. Connect the **voltage test cable** to the **external disk drive port**.
3. Use the voltmeter and **orange** test cable as follows:
 - a. Connect the **black** voltmeter lead between the ground terminal of the voltmeter and the computer chassis.
 - b. Connect the **orange** test cable lead (12-volt lead) to the voltage input terminal on the voltmeter.
 - c. Connect the power cord and switch on the computer. The voltage reading must be from **11.90 to 12.75 volts**.
 - d. If not within tolerance, use the plastic alignment tool to adjust the voltage regulator on the power/sweep board (**see Figure**).
4. Switch off computer power and disconnect the orange lead.
5. Connect the **red** test cable lead (5-volt lead) to the voltage input terminal and switch on computer. If the voltage reading is not from **4.85 to 5.15 volts**, adjust the voltage regulator (**see Figure**).
6. Repeat steps to verify correct voltages. Replace the power/sweep board if correct voltages cannot be attained.



Macintosh and Macintosh Plus

CRT Yoke Adjustments

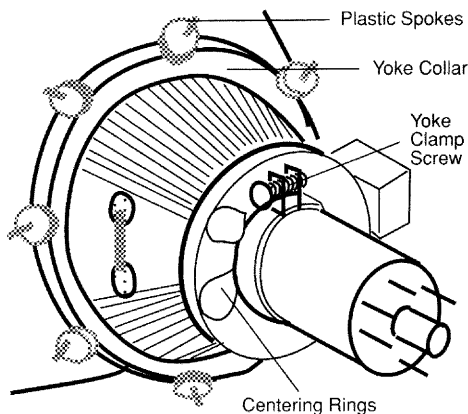


Figure: CRT Adjustment Controls



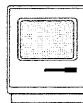
WARNING: Video adjustments are performed with the power on. Review the CRT safety rules before performing these procedures.

Tilt Adjustment Procedure

1. Remove the cover and discharge the CRT. Turn the computer so that the back is facing you, and place a mirror in front of the CRT screen.
2. Loosen the **yoke clamp screw** two or three turns.
3. Connect the power cord and switch the power on.
4. Place one hand behind your back, and with your other hand grasp only the plastic spokes of the **yoke collar**. Rotate the **yoke collar** until the top and bottom edges of the picture appear parallel with the top and bottom edges of the bezel. (**Do not move the magnets, which are preset by the manufacturer and should not be adjusted.**)
5. Switch the power off, unplug the computer, and discharge the CRT.
6. Hold the **yoke collar** in position and tighten the **yoke clamp screw** so that the **yoke collar** will not slip. Don't overtighten.
7. Connect the power cord and switch the power on to verify that the adjustment is still correct.
8. Replace the cover.

Macintosh and Macintosh Plus

CRT Yoke Adjustments



Centering Ring Adjustment Procedure

1. Remove the cover and discharge the CRT. Turn the computer so that the back is facing you, and place a mirror in front of the CRT screen.
2. Locate the two **centering rings** on the yoke assembly. If a bonding material is holding the rings in place, use a small mat knife to break the bonding.
3. Connect the power cord and switch the power on.
4. Rotate each ring about half a turn and observe the effect on the screen. The adjustment of the **centering rings** determines whether the picture is centered or offset to one side.
5. Center the picture by first holding the **front ring** steady and moving the **rear ring**, then holding the **rear ring** steady and moving the **front ring**.
6. When the screen is properly centered, switch the power off, unplug the computer, and replace the cover.



Macintosh and Macintosh Plus

Video Adjustments

Perform the video adjustments whenever the CRT or power/sweep board is replaced.

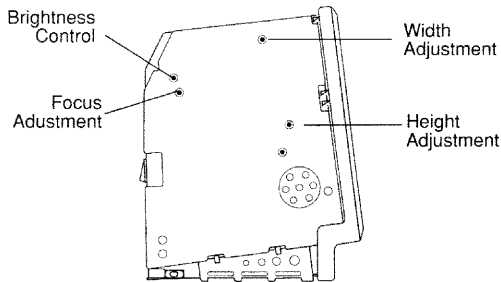


Figure: Video Adjustment Controls



WARNING: Video adjustments are performed with the power on. Review the CRT safety rules before performing these procedures.

Brightness and Contrast Adjustment Procedure

1. Remove the cover and discharge the CRT. Turn the computer so that the back is facing you and place a mirror in front of the CRT screen.
2. Connect the power cord and switch the power on.
3. Turn the **contrast control** fully clockwise.
4. Using the alignment tool, turn the **brightness control** fully counterclockwise so that white lines are visible on the screen. Then turn the **brightness control** clockwise until the white lines just disappear.
5. Turn the **contrast control** slightly counterclockwise to achieve the ideal brightness and contrast adjustment.

Size Adjustment Procedure

1. Use the plastic alignment tool to adjust the **width** until the raster is approximately 7 inches wide.
2. Use the alignment tool to adjust the **height** until the raster is approximately 4.7 inches high.

Focus Adjustment Procedure

1. Turn the **focus adjustment** fully clockwise. Then turn the **focus adjustment** back (counterclockwise) one-eighth of a turn.
2. Switch the power off, unplug the computer, and replace the cover.



Video Problems

Solutions

No video, but audio tone is present and drive operates

1. Turn contrast control fully clockwise.
2. Check video cable.
3. Replace neck cable.
4. Replace power/sweep board.
5. Replace logic board.

Screen is bright and audio is present, but no video information is present

1. Replace power/sweep board.
2. Replace logic board.

Drive Problems

Solutions

Disk ejects; display shows disk icon with blinking "X"

1. Replace bad disk.
2. Replace disk drive cable.
3. Replace disk drive.
4. Replace logic board.

Unable to insert disk all the way

1. Power off the system and hold mouse button down while switching power back on to ensure eject cycle has been completed.
2. Replace disk drive.

Drive will not eject disk

1. Hold down <Shift> and <Command> keys and press 1 (for the internal drive) or 2 (for external drive).
2. Pull down File menu and select **Eject**. Attempt this two or three times.
3. Eject disk manually by pushing opened paper clip into hole beside drive slot.
4. Replace disk drive.

Will not read disks on internal or external drive

1. Replace bad disk.
2. Replace disk drive cable.
3. Replace Mylar RFI shield.
4. Replace disk drive.
5. Verify ROMs on logic board.
6. Replace logic board.

Audio tone sounds at power on, video is present, but drive does not operate

1. Replace disk drive cable.
2. Replace disk drive.
3. Replace logic board.

Drive continually ejects disk

1. Check disk drive cable. **See Internal Disk Drive Cable Compatibility in General Information.**
2. Replace disk drive.



Macintosh and Macintosh Plus

Symptom/Cure Chart

Drive Problems (continued)

Solutions

Disk drive runs continuously

1. Replace bad disk.
2. Replace disk drive cable.
3. Replace disk drive.
4. Replace logic board.

400K drive will not boot

1. If logic board has Rev. A ROMs and drive stepper motor is serial number F518 or higher, upgrade to Rev. B ROMs.
2. Replace disk drive.

Peripheral Problems

Solutions

Cursor does not move

1. Connect mouse.
2. Replace mouse.
3. Replace logic board.

Cursor moves but clicking mouse produces no response

1. Replace mouse.
2. Replace logic board.

No response to any key on the keyboard

1. Replace keyboard cable.
2. Replace keyboard.
3. Replace logic board.

No response from a particular key

1. Replace keyswitch.
2. Replace keyboard.
3. Replace logic board.

Known-good ImageWriter, or ImageWriter II will not print

1. Make sure Chooser and Control Panel are set correctly.
2. Replace software with known-good software.
3. Replace printer interface cable.
4. Replace logic board.

Known-good LaserWriter will not print

1. Make sure Chooser and Control Panel are set correctly.
2. Replace software with known-good software.
3. Refer to Networks tab in *Apple Service Technical Procedures*.

Macintosh and Macintosh Plus

Symptom/Cure Chart



Miscellaneous Problems

Solutions

When turned on, Macintosh Plus continuously beeps and tries to power up

1. Check power/sweep voltage.
2. Replace power/sweep board, logic board, and internal drive; then turn on Macintosh Plus.
Replacing only the power/sweep board may damage the new power/sweep board.

Clicking or chirping sound

1. Connect logic board cable.
2. Perform voltage adjustment.
3. Replace power/sweep board.
4. Replace logic board.

Smoke/odor issues from computer

- Replace power/sweep board.

No video, no audio tone, and no drive operation

1. Connect power cord.
2. Turn power on.
3. Replace power cord.
4. Check fuse.
5. Replace power/sweep board.
6. Replace logic board.

MacTest displays 128K/512K when 1 MB Macintosh Plus is tested

- Replace Macintosh Plus logic board.

When developer's switch is installed, Macintosh Plus resets intermittently

- Remove switch and file it down 1/16 of an inch.

Macintosh Plus hangs on startup

- Check ROMs. If ROMs 342-0341-A or B (ROM HI) and 342-0342-A (ROM LO) are installed on logic board and peripheral device is connected to SCSI port, turn on peripheral device before switching on computer.

Macintosh 512K enhanced has two RFI shrouds

- Some machines have two RFI shrouds installed. Replace two RFI shrouds with one RFI shroud.



Macintosh and Macintosh Plus

Macintosh Plus Kits

Things To Remember

1. Before working inside the Macintosh, discharge the CRT to the metal ground lug. Failure to do so can result in damage to the logic and power/sweep boards (**see Discharging and Disposing of the CRT under Safety**). Use the CRT discharge tool (**see Special Tools Index under General Information**).
2. After installing the Disk Drive Kit, return the old ROMs and the 400K disk drive to Apple.
3. After installing the Logic Board Kit, return the 128/512K logic board, the old RFI shield, and the old cover to Apple.

800K Disk Drive Kit Installation Procedure

1. Remove the cover and the RFI shield, and discharge the CRT to the metal ground lug.
2. Remove the logic board. Using an IC extractor, remove the two ROMs installed at locations D5 and D8.
3. Install the two **new** ROMs in the appropriate locations on the logic board. The notch at the end of each ROM should face the front of the machine.

<u>ROM</u>	<u>P/N</u>	<u>Location</u>
HI	342-0341	D5
LOW	342-0342	D8

4. Remove the internal disk drive.
5. Install the logic board and the new 800K internal disk drive.
6. Install the RFI shield and the cover.

Logic Board Kit Installation Procedure

1. Remove the cover and the RFI shield, and discharge the CRT to the metal ground lug.
2. Remove the **128K/512K** logic board. Using an IC extractor, remove the two ROMs installed at locations D5 and D8.
3. Install the ROMs in the appropriate locations on the new **1 MB** logic board. The notch at the end of each ROM should face the front of the machine.

<u>ROM</u>	<u>P/N</u>	<u>Location</u>
HI	342-0341	D5
LOW	342-0342	D8

4. Install the new **1 MB** logic board, the new RFI shield, and the new cover.

Macintosh and Macintosh Plus

Macintosh Plus Memory Upgrade



The Macintosh and Macintosh Plus require 150-ns (or faster) SIMMs. RAM speed is indicated by the -xx number after the manufacturer's part number (-15 indicates a 150-ns SIMM). SIMMs are available in 256K and 1 MB RAM sizes. Adding memory to a Macintosh and Macintosh Plus requires that you configure the logic board as shown in the Figure and chart below.

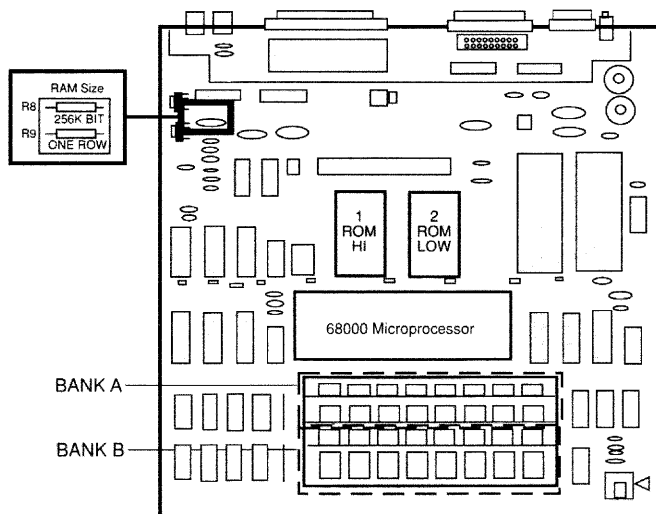


Figure: Macintosh Plus 1 MB Logic Board

Upgrade Procedure

1. Clip or install the needed resistor (see chart below).
2. Remove/install the SIMMs as indicated in the chart below. Use the SIMM removal tool (see **Special Tools Index** under **General Information**).

RAM	Resistors	SIMMs
1 MB	R8 installed R9 removed	2—256K SIMMs (Bank A) 2—256K SIMMs (Bank B)
2.5 MB	R8 removed R9 removed	2—1 MB SIMMs (Bank A) 2—256K SIMMs (Bank B)
4 MB	R8 removed R9 removed	2—1 MB SIMMs (Bank A) 2—1 MB SIMMs (Bank B)



Macintosh and Macintosh Plus

ROM Upgrade & ROM Compatibility

To be compatible with the current 400K disk drive stepper motor, the 128K/512K Macintosh should have ROM HI 342-0220-B at location D5, and ROM LOW 342-0221-B at location D8. If these ROMs are not installed, upgrade the logic board by replacing the boot ROMs as shown below.

ROM Upgrade Procedure

1. Power off the Macintosh, remove the power cord and cover, and discharge the CRT. Use the CRT discharge tool (see **Special Tools Index under General Information**).



WARNING: Failure to follow the rules for safe CRT discharge could result in serious injury or property damage. The Macintosh CRT must be discharged to the ground lug to prevent damage to the logic board.

2. Put on your grounding wriststrap and place the Macintosh on a grounded workbench pad.
3. Remove the logic board and verify old ROMs are installed.
4. Using an IC extractor, remove the old ROMs.
5. Install the new ROMs in the appropriate location—ROM HI (P/N 342-0220-B) at location D5, ROM LOW (P/N 342-0221-B) at location D8. The notch at the end of each ROM should face the front of the machine on installation.
6. Replace the Macintosh logic board and the cover.
7. Run *MacTest* to verify correct operation.

ROM Compatibility for 800K Drives

The 512K logic board (P/N 661-96236) is shipped with a high-boot ROM (P/N 342-0220) and a low-boot ROM (P/N 342-0221) that support only the 400K disk drive. When the 512K logic board is used to replace a defective 512K enhanced logic board or a defective 512K logic board with a 800K disk drive, you must replace its ROMs with ROMs from the customer's logic board. The customer's ROMs, which support 800K disk drive systems, will have part numbers 342-0341 (high-boot ROM) and 342-0342 (low-boot ROM).

Also, newer Macintosh 512K enhanced and Macintosh Plus systems and the 800K disk drive upgrade kit have revised high-boot and low-boot ROMs that correct the SCSI device problems of older ROMs. The newer ROMs are compatible with 512K systems, but you cannot mix old and new ROMs. This list gives the part number and the version letter of the old and new ROMs:

	Old ROMs	New ROMs
High Boot:	342-0341-A 342-0341-B	342-0341-C
Low Boot:	342-0342-A	342-0342-B