



Technical Information



Specifications for Power Macintosh 7600 series computers

Technical Information

Main unit

Processor

A PowerPC™ 604 processor with the following features:

- 132 megahertz (MHz)
- built-in floating point unit (FPU)
- 44 MHz system bus
- fully upgradable

Memory

- 16 megabytes (MB) of dynamic random-access memory (DRAM) supplied in removable DIMMs, expandable to a maximum of 512 MB
- 2 MB of built-in video RAM (VRAM) supplied in removable DIMMs, expandable to a maximum of 4 MB
- 4 MB of read-only memory (ROM)
- 8 kilobytes (K) of nonvolatile parameter memory
- 256K of static RAM supplied in a removable DIMM, used as a Level 2 cache for the PowerPC microprocessor



DRAM, VRAM, and cache configurations

You can have memory—dynamic random-access memory (DRAM) or video random-access memory (VRAM)—added to your computer in packages called Dual Inline Memory Modules, or DIMMs. You can also upgrade your computer's cache by installing a DIMM.

DRAM configurations

Your computer can use any DRAM configuration with DIMMs of these sizes: 8, 16, 32, or 64 MB. The exact configuration depends on the density of the DRAM chips that are mounted on the DIMMs. (The DIMMs support both 2K and 4K refresh rates.)

You can increase your computer's DRAM to up to 512 MB. The main logic board has eight slots where DIMMs can be installed. To increase DRAM to the maximum of 512 MB, have an Apple-authorized dealer or service provider fill all eight slots with 64 MB DIMMs. You can also fill slots with 8, 16, or 32 MB DIMMs.

Note: 128 MB DIMMs are available and can fit in the computer's memory slots to increase DRAM to as much as 1 gigabyte (GB). These DIMMs have not been tested for use with Power Macintosh 7600 computers, however.

IMPORTANT The DIMMs should be 64-bit-wide, 168-pin fast-paged mode, with 70-nanosecond (ns) RAM access time or faster. The Single Inline Memory Modules (SIMMs) from older Macintosh computers are not compatible with your computer and should not be used.

If you decide to have additional DRAM installed in your computer, the DIMMs can be installed one-at-a-time in any order in any of the memory slots.

However, if you wish to take advantage of your computer's memory interleaving capability, which provides maximum performance, you must have the DIMMs installed in pairs, and in paired slots. (Slots are paired A1 and B1, A2 and B2, and so on. It doesn't matter which pairs you use or the order in which you use them, as long as the DIMMs are installed in paired slots.) Memory interleaving allows the computer to read or write to its memory at the same time that other memory reads or writes are occurring, thus providing faster performance.

VRAM configurations

Video RAM (VRAM), like standard DRAM, is also provided in DIMMs. Your computer comes with 2 MB of video RAM installed in two 1 MB DIMMs. (These DIMMs are installed in bank 1.) Your computer's VRAM can be expanded to a maximum of 4 MB by adding two 1 MB DIMMs to bank 2. Both DIMMs must be added at the same time.

IMPORTANT The VRAM DIMMs must be 32-bit-wide, 112-pin fast-paged mode with 70-ns RAM access time or faster. Do not use the 256K or 512K VRAM SIMMs used in older Macintosh computers.

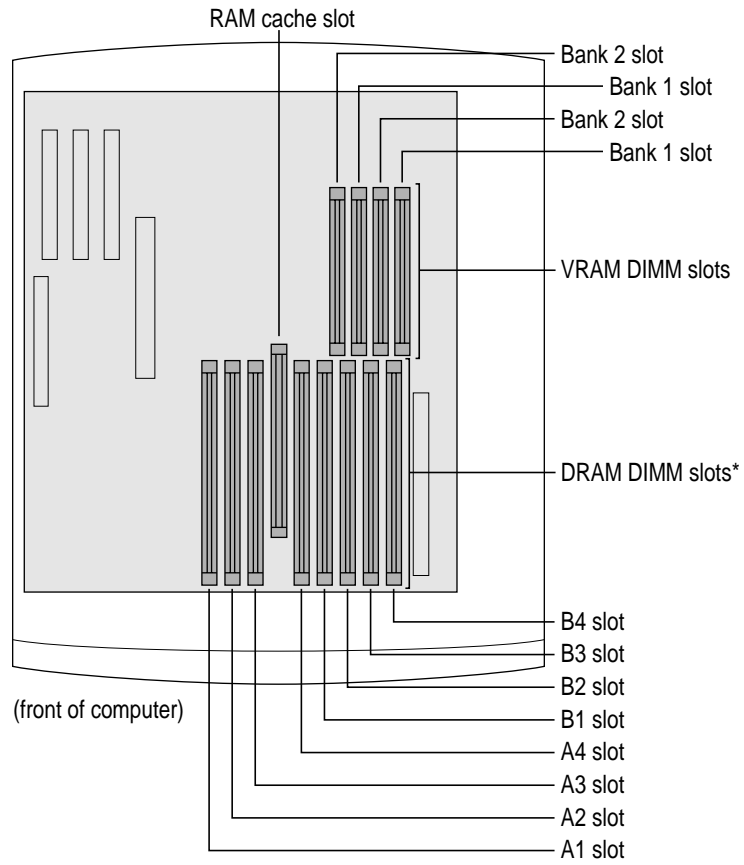
Cache configurations

Your computer can support a cache up to a maximum of 4 MB. Cache DIMMs are available in various sizes from 256K to 1 MB.

Adding DRAM or VRAM, or upgrading the cache

WARNING Although instructions for installing DIMMs are provided in this manual, Apple Computer strongly recommends that you have an Apple-certified technician install additional DRAM, VRAM, or cache. Consult the service and support information that came with your computer for instructions on how to contact an Apple-authorized service provider or Apple for service. If you install additional DIMMs yourself, you risk damaging your equipment, and this damage is not covered by the limited warranty on your computer. See an Apple-authorized dealer or service provider for additional information about this or any other warranty question.





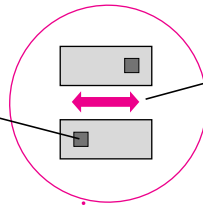
*When installing DRAM, for best performance, fill paired slots. (Slots are paired A1 and B1, then A2 and B2, and so on. It doesn't matter which pairs you use or the order in which you use them.)

DRAM, VRAM, and cache DIMMs are installed as follows:

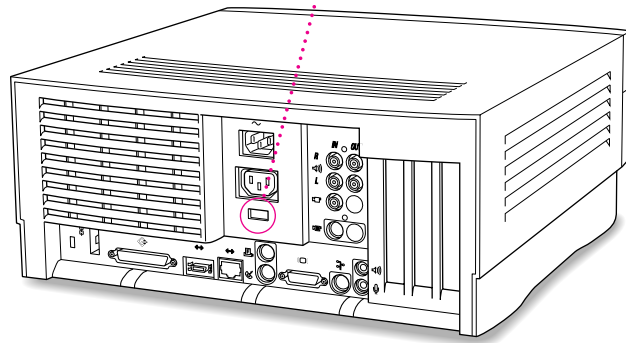
- 1 Make sure the voltage switch is set correctly for the voltage system to which you will be connecting the computer.**

If you don't know the voltage used in the country you're in, refer to the table, "Voltages for Different Locations," in Chapter 1 of the user's manual that came with your computer.

Check to see that the voltage switch on the back of your computer is properly set before you plug it in. If you need to change the setting, insert a small screwdriver here and slide the switch.



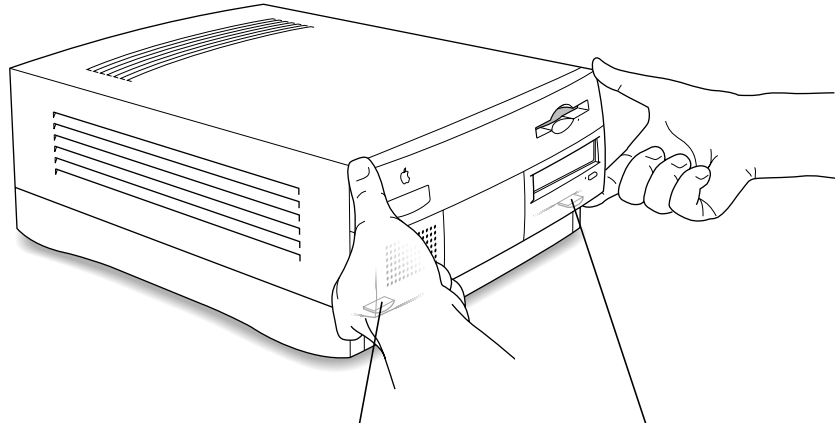
Set the switch to show "115" for voltages in the 100–130V range.
Set the switch to show "230" for voltages in the 200–270V range.



- 2 Plug the power cord into the back of the computer and into an AC outlet. Make sure the computer is turned off.**

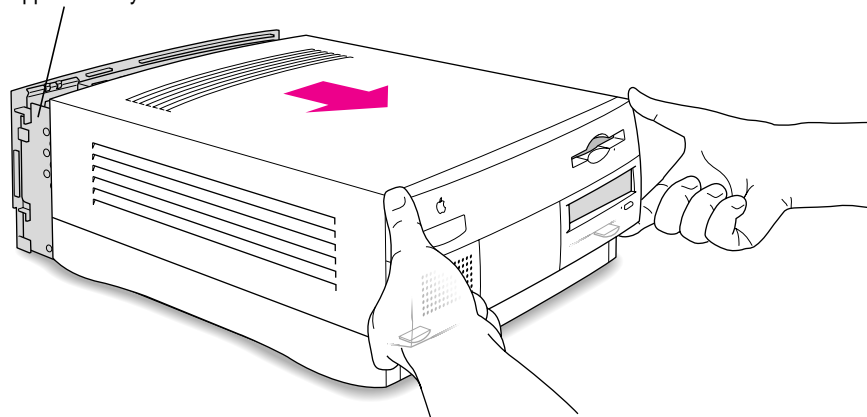


- 3** Press the two release buttons under the front panel and slide the cover toward you approximately two inches.



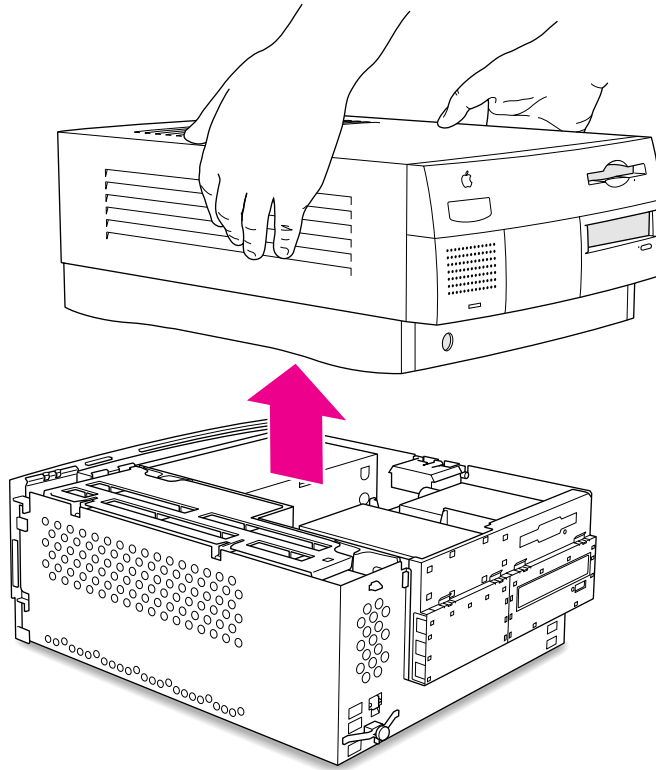
Locate the two release buttons under the front panel ledge with your fingertips.

While pressing the release buttons, pull the top cover forward approximately two inches to release it from the chassis.



4 Remove the cover from the computer.

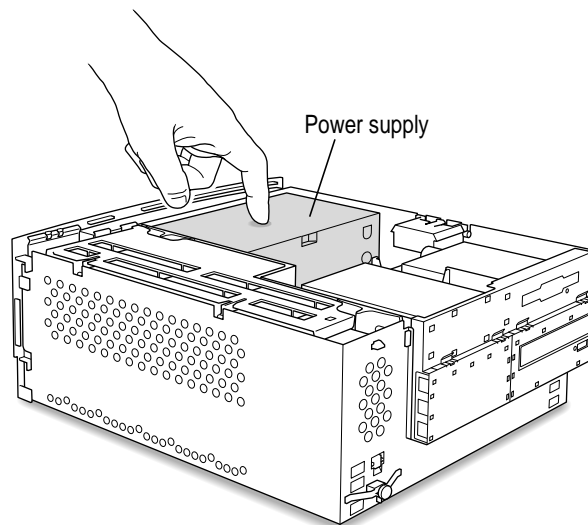
After you've slid the cover forward about two inches, lift it straight up and off the computer.



- 5 **Touch the metal part of the power supply case inside the computer to discharge static electricity.**

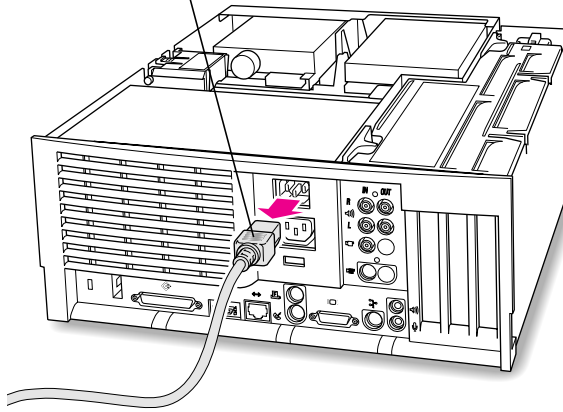
Always do this before you touch any parts, or install any components, inside the computer.

IMPORTANT Both DIMMs and the components inside your computer can be damaged by static electricity. Be sure to follow the procedure given here for discharging static electricity. To avoid damaging DIMMs, handle them only by the edges—never touch the connectors.



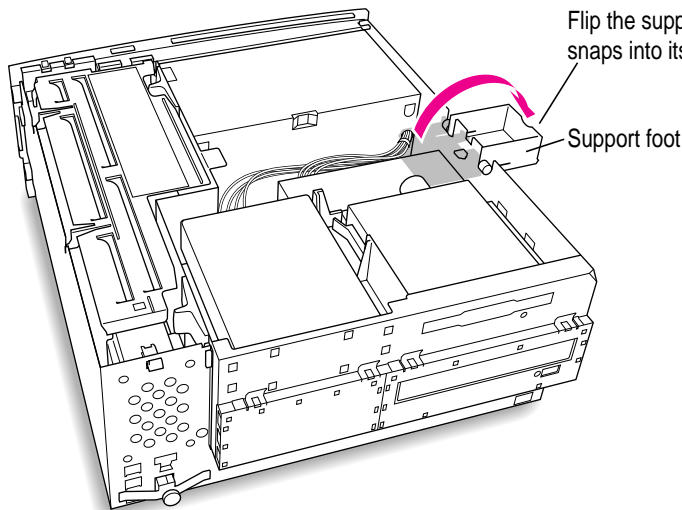
6 Disconnect the power cord from the back of the computer.

Remove the power cord from the back of the computer.



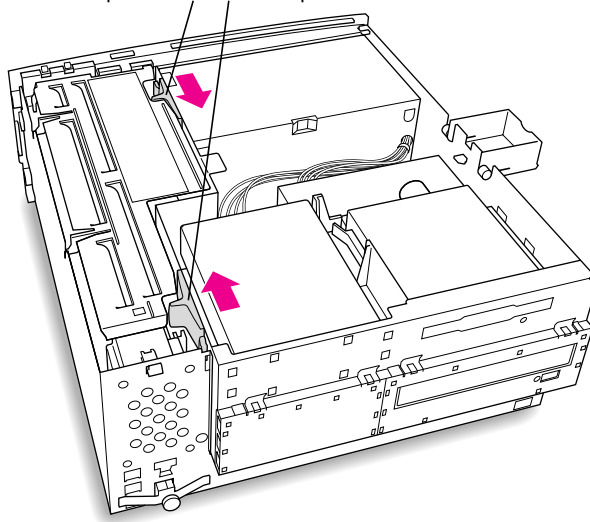
7 Flip out the support foot.

Flip the support foot out until it snaps into its locked position.



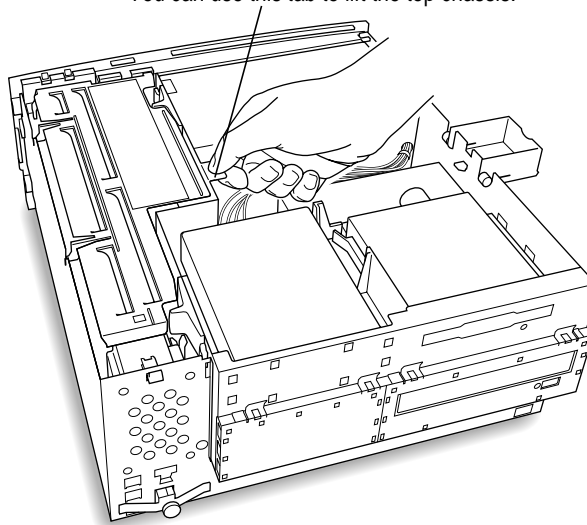
- 8** Unlock the top chassis by pressing the release switches toward the inside of the computer.

Move the release switches toward the inside of the computer to unlock the top chassis.



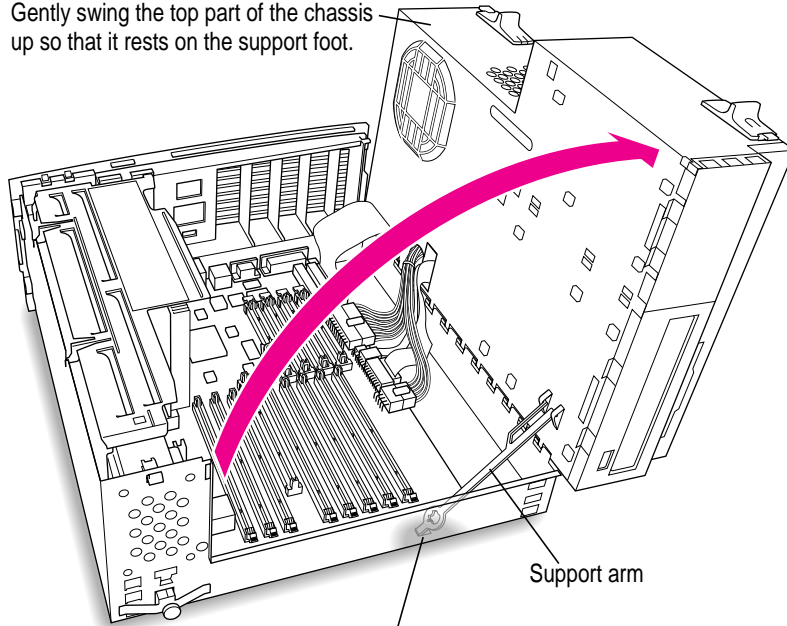
- 9** Using the tab shown below, lift the top chassis up to reveal the DRAM and cache slots.

You can use this tab to lift the top chassis.



10 Swing the chassis up and insert the support arm in the hole as pictured below.

Gently swing the top part of the chassis up so that it rests on the support foot.

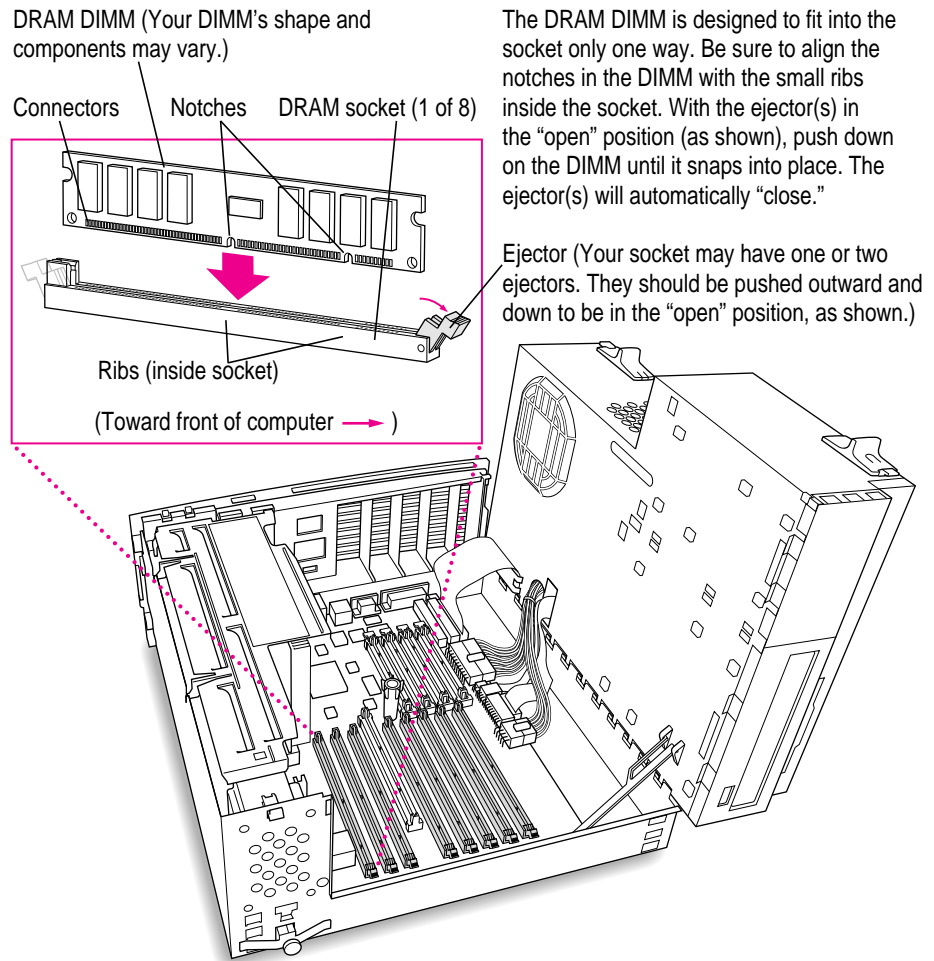


Be sure that the support arm engages this hole on the floor of the bottom chassis so that the top chassis is locked in place.



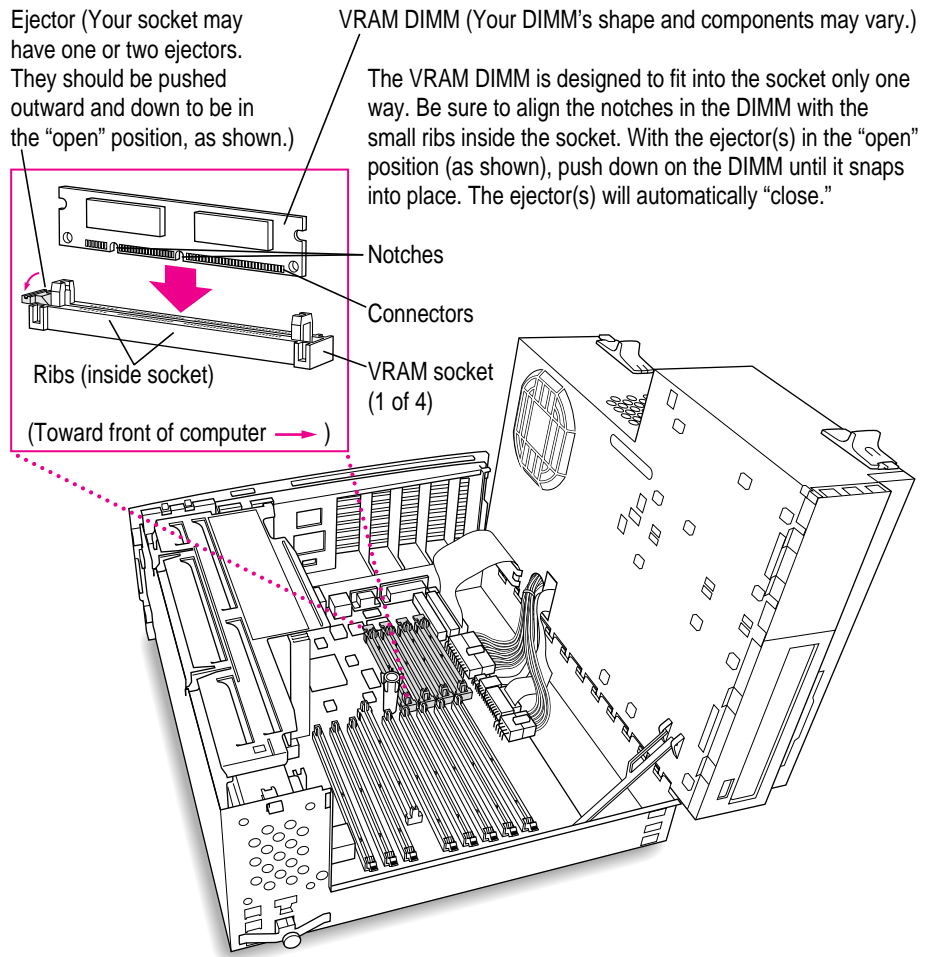
11 If you're installing DRAM DIMMs, align them in the DRAM sockets as pictured.

IMPORTANT Do not touch the DIMM's connectors. Handle the DIMM only by the edges.



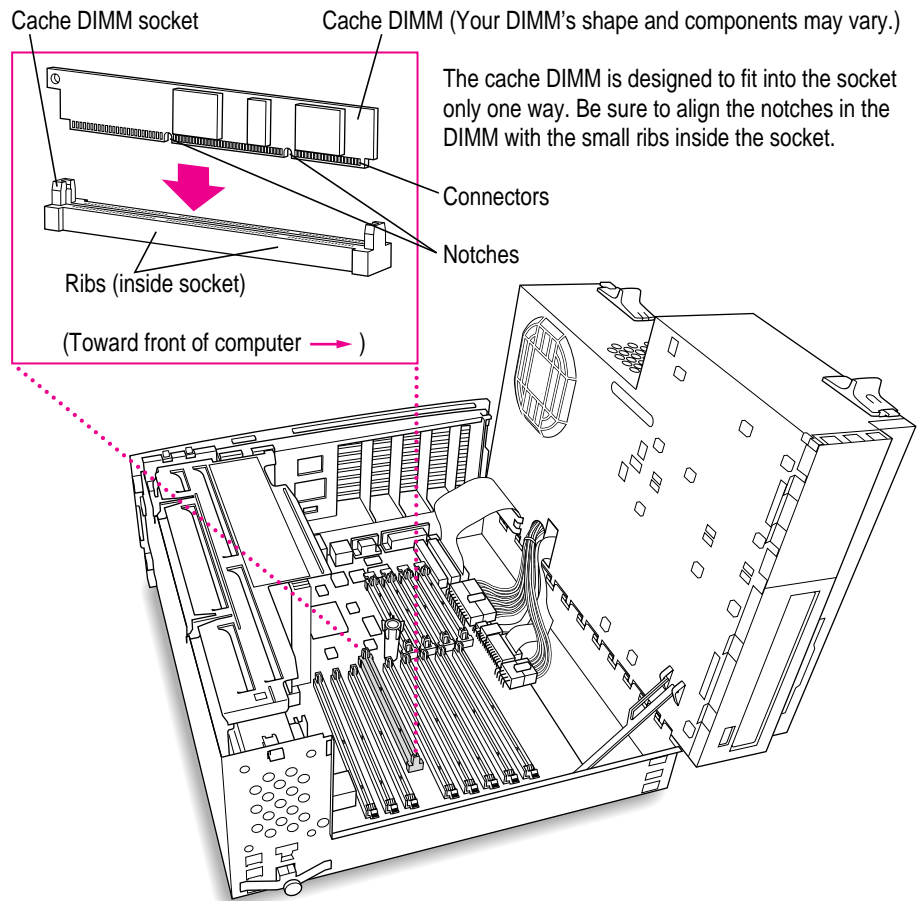
12 If you're installing VRAM DIMMs, place them in the VRAM sockets as illustrated below.

IMPORTANT Do not touch the DIMM's connectors. Handle the DIMM only by the edges.

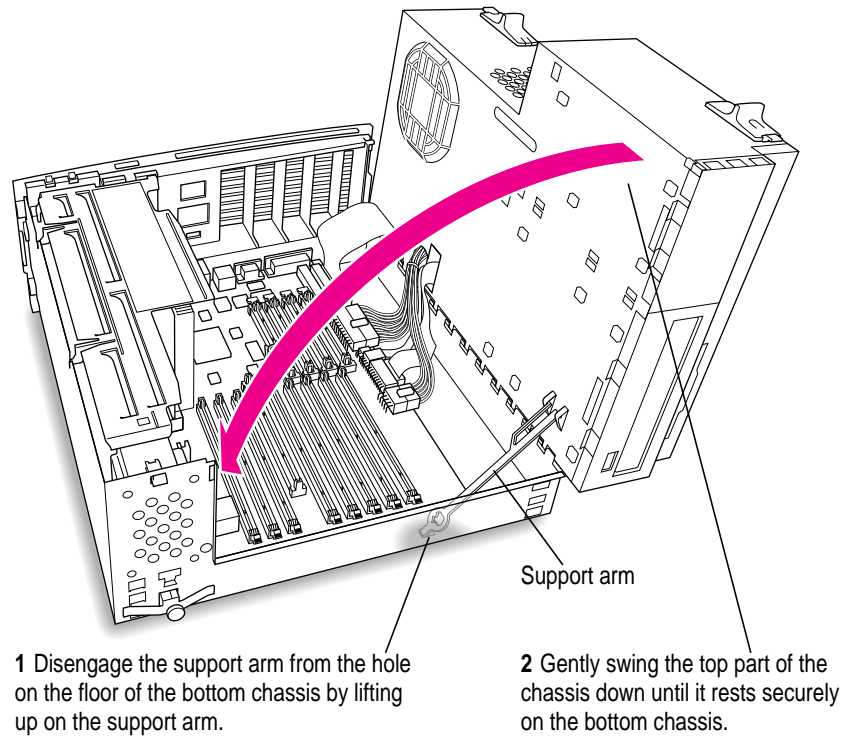


13 If you're installing a cache DIMM, insert the DIMM as illustrated below.

IMPORTANT Do not touch the DIMM's connectors. Handle the DIMM only by the edges.

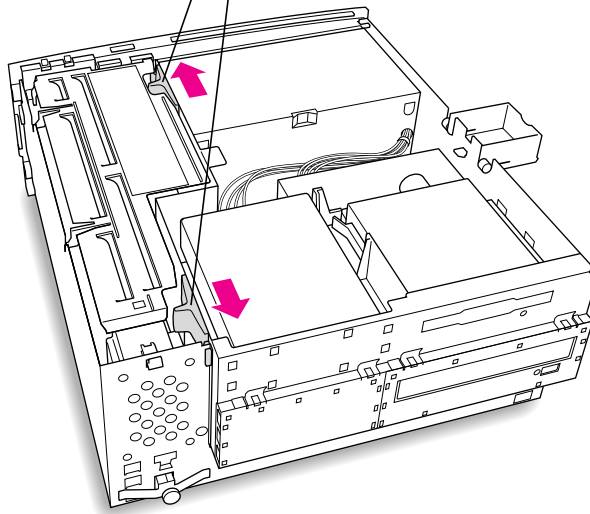


- 14** Replace the chassis by disengaging the support arm and gently swinging the chassis back into place.

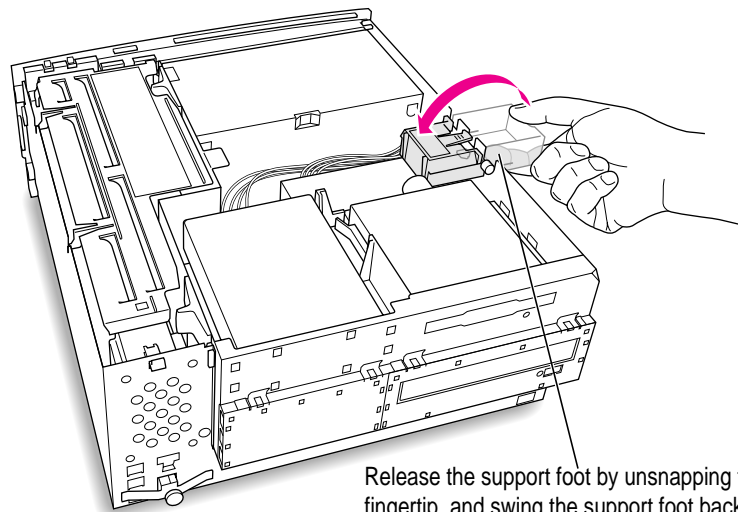


- 15 Lock the chassis back into place by pressing the release switches toward the outside of the computer.**

Move the release switches toward the outside of the computer to lock the top chassis.



- 16 Unsnap the support foot and swing it back inside the computer housing.**

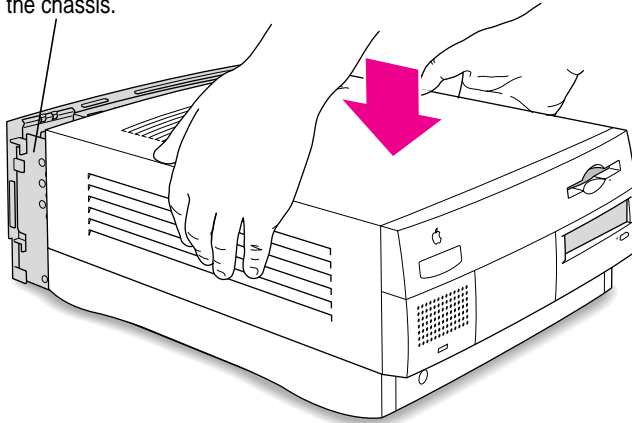


Release the support foot by unsnapping the catch with your fingertip, and swing the support foot back inside the chassis.

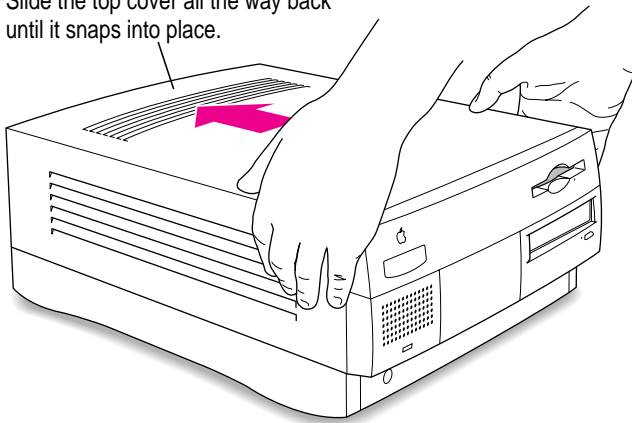
17 Replace the cover on the computer.

Lower the cover all the way down onto the case, leaving a 2-inch gap. Push the cover back until it snaps into place.

Set the top cover down so that there is about a 2-inch gap between the back of the top cover and the back of the chassis.



Slide the top cover all the way back until it snaps into place.



Graphics modes

The table on the following page shows the image sizes for monitors that can be connected to the monitor port, along with the number of colors or grays supported with 2 MB of VRAM and with the optional expansion to 4 MB of VRAM. (You can place monitors weighing up to 70 lbs. [31.75 kg] on top of your computer.)

There are also many special PCI monitor cards available from other manufacturers that can support other monitors and special video requirements. See your Apple-authorized dealer for information.

Note: On some monitors from manufacturers other than Apple, the connector pinout designates one pin for both green video and timing synchronization. These “sync on green” monitors are not compatible with Power Macintosh computers. If you’re not sure what type of monitor you have, check with your dealer.

Colors or grays supported

Monitor	VIS*	Resolution	VRAM		Screen refresh rates	
			2 MB VRAM maximum colors**	4 MB VRAM maximum colors**	Vertical	Horizontal
12" RGB	N/A	512 by 384	Millions	Millions	60 Hz	24.48 kHz
12" Monochrome	N/A	640 by 480	256	256	67 Hz	34.971 kHz
13" RGB Hi-Res	N/A	640 by 480	Millions	Millions	67 Hz	34.971 kHz
14" RGB Hi-Res	11.5"	640 by 480	Millions	Millions	67 Hz	34.971 kHz
VGA	***	640 by 480	Millions	Millions	60 Hz	31.505 kHz
		800 by 600	Millions	Millions	60 Hz	39.921 kHz
		800 by 600	Millions	Millions	72 Hz	48.1 kHz
		800 by 600	Millions	Millions	75 Hz	47.933 kHz
		1024 by 768	Thousands	Millions	60 Hz	48.294 kHz
		1024 by 768	Thousands	Millions	72 Hz	58.286 kHz
		1024 by 768	Thousands	Millions	75 Hz	60.093 kHz
Full-page Monochrome	N/A	640 by 870	256	256	75 Hz	68.773 kHz
Full-page RGB	***	640 by 870	Thousands	Millions	75 Hz	68.773 kHz
14" AudioVision	11.5"	640 by 480	Millions	Millions	67 Hz	35 kHz
16" color	14.8"	832 by 624	Millions	Millions	75 Hz	49.670 kHz
19" color	***	1024 by 768	Thousands	Millions	75 Hz	60.060 kHz
Two-page Monochrome	N/A	1152 by 870	256	256	75 Hz	68.476 kHz
Two-page RGB	11.5"	1152 by 870	Thousands	Millions	75 Hz	68.476 kHz
Multiple Scan 15	13.3"	640 by 480	Millions	Millions	67 Hz	34.971 kHz
		832 by 624	Millions	Millions	75 Hz	49.670 kHz
Multiple Scan 17	16.1"	640 by 480	Millions	Millions	67 Hz	34.971 kHz
		832 by 624	Millions	Millions	75 Hz	49.670 kHz
		1024 by 768	Thousands	Millions	75 Hz	60.060 kHz
Multiple Scan 20	19.1"	640 by 480	Millions	Millions	67 Hz	34.971 kHz
		832 by 624	Millions	Millions	75 Hz	49.670 kHz
		1024 by 768	Thousands	Millions	75 Hz	60.060 kHz
		1152 by 870	Thousands	Millions	75 Hz	68.476 kHz
		1280 by 1024	256	Thousands	75 Hz	79.964 kHz

*Viewable Image Size

**256=image depth of 8 bits, thousands=image depth of 16 bits, millions=image depth of 32 bits

***Refer to the manual that came with your monitor to determine VIS.

N/A=not available



Video support

All video input ports support 24-bit RGB format as well as 16-bit component (YUV) format.

Video input ports

Connector	Standard	Resolution
Composite/S-video	NTSC	256 by 192
		320 by 240
		512 by 384
		640 by 480
Composite/S-video	PAL/SECAM	320 by 240
		384 by 288
		640 by 480
		768 by 576

Internal disk drives

The following drives have been installed in your computer at the factory:

- Apple SuperDrive 1.4 MB high-density floppy disk drive
- Apple SCSI hard disk drive

Some Power Macintosh computers have an optional built-in CD-ROM drive (5.25-inch, 1/2-height 8X-speed).

You can have additional internal drives installed by an Apple-authorized dealer or service provider.

Clock/calendar

- CMOS custom circuitry with long-life lithium battery

Keyboard

- Supports all Apple Desktop Bus (ADB) keyboards

Mouse

- Supports all models of the ADB mouse

Interfaces

- One Apple Desktop Bus (ADB) port supporting up to three ADB input devices (such as a trackball, keyboard, or mouse) daisy-chained through a low-speed, synchronous serial bus.
- Monitor port supporting color and grayscale monitors of various sizes and resolutions. (See “Graphics Modes” earlier in this booklet.)
- Three internal expansion slots supporting Peripheral Component Interconnect (PCI) expansion cards. Install only expansion cards that come with Macintosh drivers and are compliant with the PCI 2.0 standard. NuBus™ cards cannot be used in these expansion slots.
- Two RS-232/RS-422 serial GeoPort-compatible serial ports, 230.4 Kbits per second maximum (up to 2.048 Mbits per second if clocked externally).
- One built-in Ethernet 10BASE-T connector for direct connection to 10BASE-T networks. (If both AAUI and 10BASE-T connectors are plugged in, the computer uses the 10BASE-T connector by default.)
- One built-in Apple Ethernet AAUI connector for connecting to high-speed Ethernet networks. Requires the appropriate AAUI transceiver adapter (10BASE-T, thin coaxial, or thick coaxial).
- One 3.5 mm sound output port for headphones or line-level devices.
- One 3.5 mm sound input port for stereo sound input. The sound input port supports the Apple PlainTalk Microphone that comes with some Macintosh computers. The sound input port also supports a standard stereo (miniplug-to-RCA) cable adapter for connecting stereo equipment to your computer. It does not support the omnidirectional microphone (the round microphone shipped with some earlier models of Macintosh) or the attenuated RCA adapter provided with some models of Macintosh.
- One pair of RCA-type audio ports for stereo input (left and right).
- One pair of RCA-type audio ports for stereo output (left and right).
- Two video input ports that support the NTSC, PAL, and SECAM video standards.
- One external standard SCSI interface that supports up to seven external SCSI devices, or one internal plus six external SCSI devices. An internal SCSI device can be connected to this interface by an Apple-authorized dealer or service provider.



IMPORTANT Some older SCSI devices may require updated drivers. (A “driver” is special software that is installed in your System Folder.) Contact the device manufacturer for information on obtaining driver software.

- One internal fast SCSI interface that supports the internal hard disk and optional CD-ROM drive. One additional SCSI device can be connected to the internal SCSI interface by an Apple-authorized dealer or service provider.

IMPORTANT The factory-installed internal hard disk is terminated. If another SCSI device is attached to the internal SCSI interface, it must not be terminated. The internal SCSI interface can contain only one terminated device; if you attach more than one terminated device to the internal SCSI interface, damage to the computer’s main logic board can occur.

Audio system

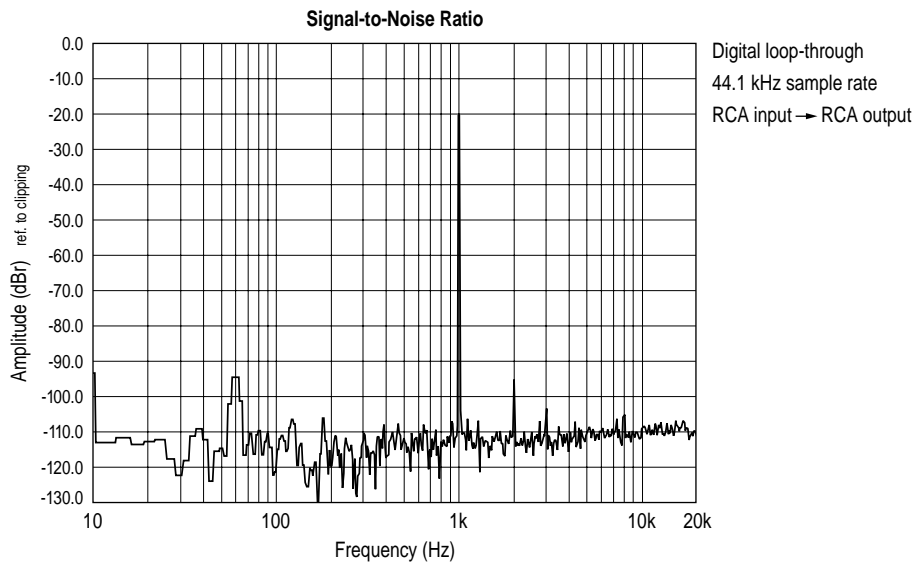
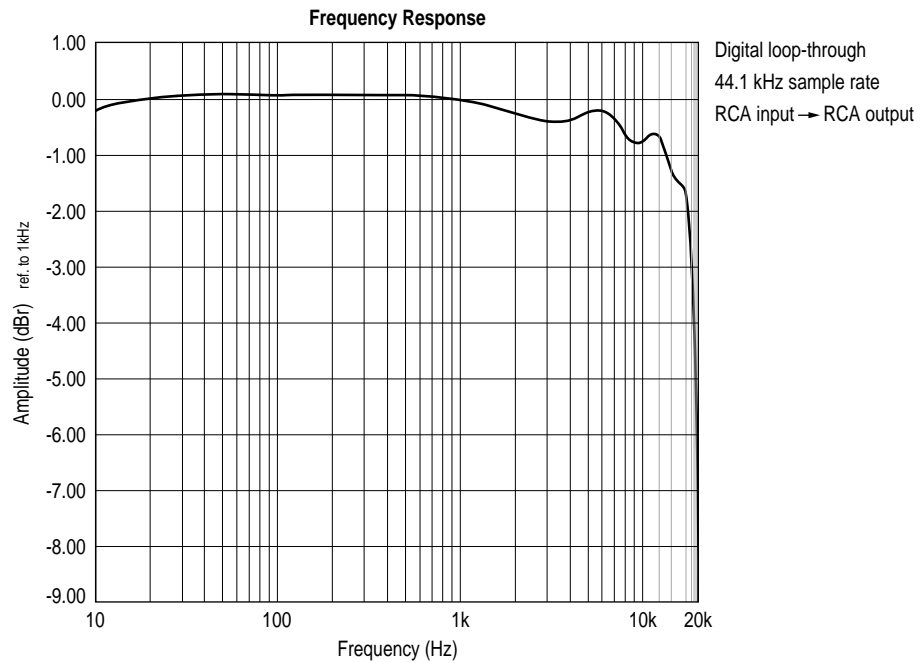
- Custom sound circuitry, including stereo generator (digital-to-analog converter, or DAC)—capable of driving stereo miniplug headphones or audio equipment—and stereo sampling hardware (analog-to-digital converter, or ADC) for recording stereo sound
- 16-bit stereo input and output
- Sample rates of 44.1 and 22.05 kilohertz (kHz)

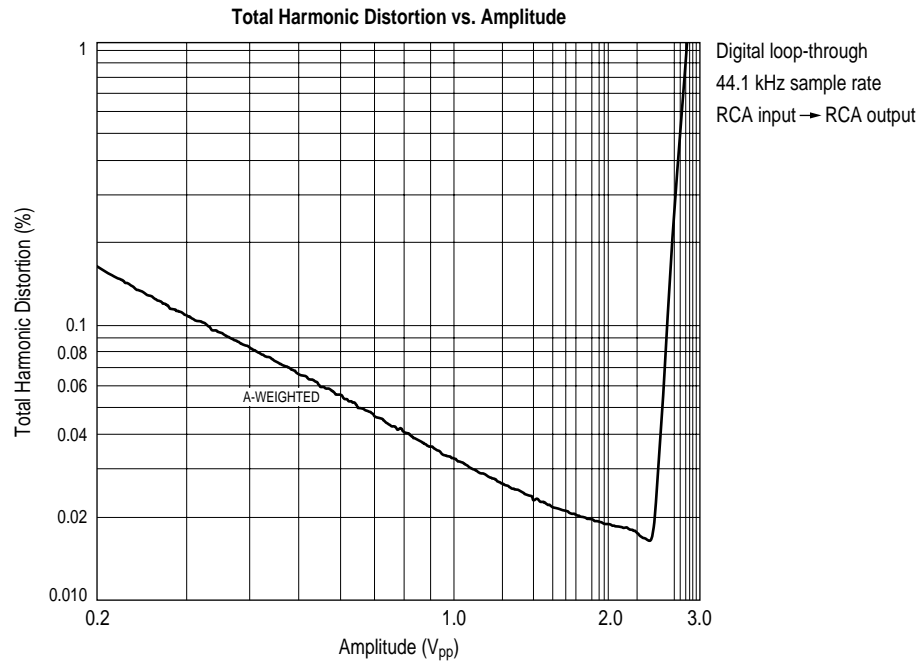
Typical specifications

- Sound input connector line level: 2.8 volts peak-to-peak (V_{pp}) nominal, into 3.0-kilohm (k Ω) impedance (minimum)
- RCA-type input connector line level: 2.4 V_{pp} nominal into 13.5-k Ω impedance (minimum)
- Sound output connector line level: 2.7 V_{pp} nominal, into 32-k Ω impedance
- RCA-type output connector level: 2.9 V_{pp} nominal into 2-k Ω impedance (minimum)
- Sound input signal-to-noise ratio (SNR): >83 decibels (dB) A-weighted with no audible discrete tones
- RCA-type input SNR: >77 dB A-weighted with no audible discrete tones
- Sound output SNR: >84 dB A-weighted with no audible discrete tones
- RCA-type output SNR: >84 dB A-weighted with no audible discrete tones

- Bandwidth: 10 Hz to 18 kHz (+0.1 dB, -3.0 dB) at 44.1-kHz sample rate
- RCA-type input total harmonic distortion plus noise (THD + N): less than 0.018 percent A-weighted; measured 10 Hz to 30 kHz with a 2.4-Vpp sine wave input

The following graphs show typical data for the Power Macintosh 7600. (Your computer's data may vary, depending on the equipment you have connected.)





Video system

Video input

- Type: composite or S-video
- Timing: industry standard NTSC/PAL/SECAM
- Polarity: sync negative
- Level: 8 V_{pp} minimum to 2.0 peak-to-peak (p-p) maximum (“S” chroma level 1.4 V_{pp} maximum)
- Impedance: 75 ohms (Ω) internally terminated
- DC offset: +/- 1.0 volts (V) maximum

AC line input

- Line voltage: 100–130 V alternating current (AC) and 200–270 V AC, RMS single phase, manually configured
- Frequency: 50–60 Hz
- Power: 298 watts maximum continuous; 453 watts peak input

AC line output

- Output receptacle: 100–120 V, 3 amperes (A) AC, 220–240 V, 1.5 A AC RMS (determined by actual input voltage); 3 A maximum at 100 V

DC power

- Continuous output: 150 watts

Current type	Maximum current*
+5 V	20 A**
+5 V (trickle)	0.1 A
+3.3 V	10 A**
+12 V	5 A
-12 V	0.75 A

*Total power output cannot exceed 150 W.

**Note: Not more than 25 A total combined current.

Power requirements for devices you can connect

Apple Desktop Bus (ADB)

- Mouse draws up to 10 milliamperes (mA)
- Keyboard draws 25–80 mA (varies with keyboard model used)
- Maximum current available for all ADB devices: 500 mA

Note: The ADB port can support up to three daisy-chained ADB devices.

Audio and telecommunications devices

The following table shows power allowances for external devices connected to input ports.

Device	Voltage	Current	Power
Microphone	+5 V	20 mA	100 mW
GeoPort telecom adapter	+5 V	500 mA	2.5 W
S-video input connector	+12 V	250 mA	3 W



Expansion cards and devices

If you add an expansion card, a 5.25-inch storage device, or a 3.5-inch storage device to your Macintosh computer, make sure the component's power requirements don't exceed the maximum power allowances allocated to it by the computer.

The maximum power allowances for expansion cards in your computer can accommodate three 15-watt or two 25-watt cards. Detailed guidelines are presented in the following table.

Device	Voltage	Current	Power
Expansion card (15 watts)*	+5 V	3 A	15 W
	+12 V	0.500 A	6 W
	-12 V	0.100 A	1.2 W
	+3.3 V	2 A	6.6 W
Expansion card (25 watts)**	+5 V	5 A	25 W
	+12 V	0.500 A	6 W
	-12 V	0.100 A	1.2 W
	+3.3 V	2 A	6.6 W
Storage device (such as a CD-ROM drive)	+5 V	9 A	45 W
	+12 V	3 A	36 W
	+12 V	7.5 A peak***	—

*15-watt expansion cards should not consume more than 15 watts of power total.

**25-watt cards should not consume more than 25 watts of power total.

***Peak power is for startup only and must not occur in normal operation.

Assigning SCSI ID numbers

Your computer has two SCSI chains: an internal chain and an external chain. All devices on the same SCSI chain must have unique ID numbers, but devices on different SCSI chains may use the same SCSI ID number. (For example, you could have a CD-ROM drive with ID number 3 connected to the internal SCSI chain and a tape drive with ID number 3 connected to the external SCSI chain.)

The drives that were installed in your computer at the factory, as well as the computer itself have already reserved certain SCSI ID numbers. Other ID numbers are available for assignment to SCSI devices that are added after you buy your computer, as described in the following table.

SCSI chain	SCSI ID number	Device
Internal*	0	factory-installed hard disk
	1	available
	2	available
	3	factory-installed CD-ROM drive (optional)
	4	available
	5	available
	6	available
	7	Power Macintosh computer
External	0	available
	1	available
	2	available
	3	available
	4	available
	5	available
	6	available
	7	Power Macintosh computer

*Although 5 or 6 SCSI ID numbers are available for assignment, only one other SCSI device can be connected to the internal SCSI chain.



Size and weight

Weight	Height	Width	Depth
Main unit			
9.98 kg*	156 mm	365 mm	430 mm
22 lbs.*	6.15 in.	14.37 in.	16.93 in.
<hr/>			
Mouse			
0.11 kg	33 mm	61 mm	107 mm
4 oz.	1.3 in.	2.4 in.	4.2 in.

*Weight varies depending on type of hard disk and may be greater if a 5.25-inch device, such as a CD-ROM drive, is installed.

Maximum supportable monitor weight

- 70 lbs. (31.75 kg)

Environment

Operating temperature

- 10° C to 40° C (50° F to 104° F)

Storage temperature

- -40° C to 47° C (-40° F to 116.6° F)

Relative humidity

- 5 percent to 95 percent (noncondensing)

Altitude

- 0 to 3048 m (0 to 10,000 ft.)

Specifications for optional CD-ROM drive

- Disc diameter 120 millimeters (mm)
(5.25 inches) and 80 mm
- Scanning velocity 1.2–1.4 meters per second (normal speed)
- Rotation speed Varies over radius
 - Normal speed ~530 to 230 revolutions per minute (rpm)
 - Double speed ~1060 to 460 rpm
 - Eight-times speed ~4240 to 1840 rpm
- Latency (average) Varies over radius
 - Normal speed ~55 to 130 milliseconds (ms)
 - Double speed ~27.5 to 65 ms
 - Eight-times speed ~6.88 to 16.25 ms
- Blocks per rotation ~8.4 to 19.5 variable
- Average access time (typical)
 - Normal speed 380 ms
 - Double speed 270 ms
 - Eight-times speed 160 ms

Data

- Data capacity 656 megabytes (MB), Mode 1
748 MB, Mode 2
- Number of blocks per disc 336,150
- Data per block 2048 bytes, Mode 1
2336 bytes, Mode 2
- Address description Minutes, seconds, blocks

Audio capacity

- Playing time 74 minutes, 42 seconds



Modes supported

- Audio CD
- CD-ROM Modes 1 and 2
- CD-ROM XA Mode 2, Forms 1 and 2
- CD-I Mode 2, Forms 1 and 2
- Photo CD Single-session and multisession
- Video CD

Data streaming and transfer rates

- Blocks per second

Normal speed	75
Double speed	150
Eight-times speed	600
- User kilobytes (K) per second

Normal speed	150K, Mode 1
	171.1K, Mode 2
Double speed	300K, Mode 1
	342.2K, Mode 2
Eight-times speed	1200K, Mode 1
	1368.8K, Mode 2
- SCSI bus burst rate (typical)

Asynchronous	50 MB per second
Synchronous	50 MB per second

Power consumption (typical)

+5 V DC	350 milliamperes (mA)
+12 V DC	300 mA

Laser

- Type: Semiconductor GaAlAs laser
- Wavelength: 770 to 795 nanometers
- Output power: 0.2 to 0.6 milliwatts
- Beam divergence: 55°



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030-9824-A
Printed in U.S.A.