Technical Information

Specifications for Power Macintosh 9500 series computers

Technical Information

Main unit

Power Macintosh 9500/200 processor

A PowerPC™ 604e processor with the following features:

- 200 megahertz (MHz) processor clock
- built-in floating point unit (FPU)
- 50 MHz system bus
- fully upgradeable

Power Macintosh 9500/180MP processors

Two PowerPC 604e processors with the following features:

- 180 megahertz (MHz) processor clocks
- built-in floating point units (FPUs)
- 45 MHz system bus
- fully upgradeable

Memory

- 16 or 32 megabytes (MB) dynamic random-access memory (DRAM), expandable to a maximum of 768 MB
- 2 MB of video RAM (VRAM) with an optional monitor (video) card, expandable to a maximum of 4 MB
- 4 MB of read-only memory (ROM)
- 8 kilobytes (K) of nonvolatile parameter memory
- 512K of static RAM used as a Level 2 cache for the PowerPC processor

DRAM and VRAM configurations

You can have memory—DRAM—added to your computer in packages called Dual Inline Memory Modules or DIMMs.

WARNING To avoid damage to your computer, Apple Computer recommends that only an Apple-certified technician install additional DRAM. 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 attempt to install additional DRAM yourself, any damage you may cause to your equipment will not be 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.

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 768 MB using 16-megabit (Mbit) DRAM technology. The main logic board has 12 slots (each with a 64-bit data bus) where DIMMs can be installed. If the DIMMs are installed in paired slots, the memory subsystem is 128 bits wide, providing increased performance. To increase DRAM to the maximum of 768 MB, have an Apple-authorized dealer or service provider fill all 12 slots with 64 MB DIMMs. You can also fill slots with 8, 16, or 32 MB DIMMs.

Note: Your Power Macintosh is designed to expand to a DRAM capacity of up to 1.5 GB using 128 MB DIMMs. However, these DIMMs are not currently readily available and have not been tested for use with Power Macintosh 9500 series computers.

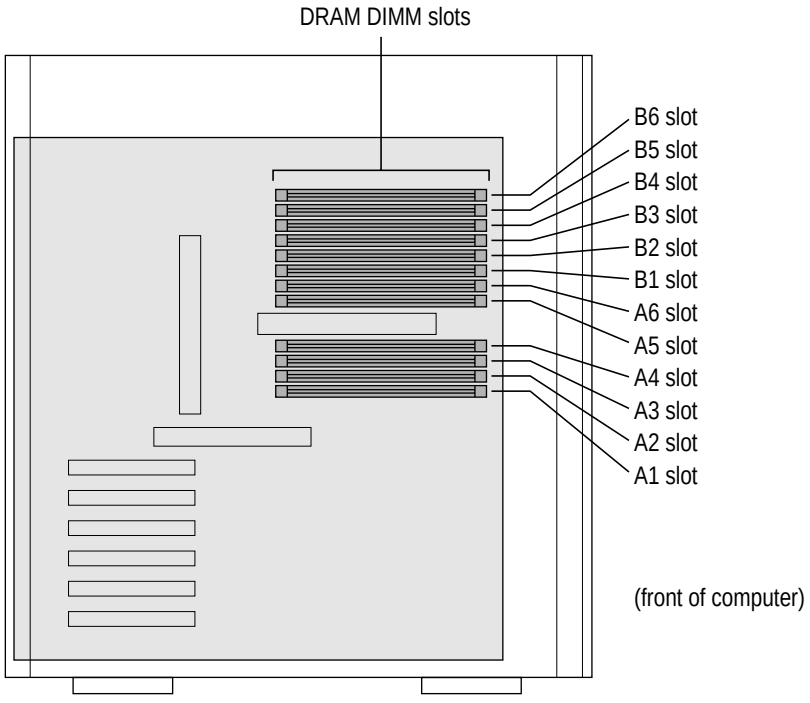
IMPORTANT The DIMMs should be 5-volt, 64-bit-wide, 168-pin fast-paged mode, with 70-nanosecond (ns) RAM access time or faster. DIMMs taller than 1.25 inches cannot fit in your computer. The Single Inline Memory Modules (SIMMs) from older Macintosh computers are not compatible with your computer and cannot be used.

Adding DRAM

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 while other memory reads or writes are occurring, thus providing faster performance.

Paired DIMMs should be the same size and speed. DIMMs purchased from different manufacturers can be paired as long as they are the same size and speed. Use the following illustration of the computer's memory slots as a guide.



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.)

Optional VRAM configuration

If your computer came with the optional monitor card installed, it already has 2 MB of video RAM (VRAM). (If your computer has a video connector in one of the expansion slot openings, it has the optional monitor card installed.)

Your computer's VRAM can be expanded to a maximum of 4 MB with the addition of a 2 MB VRAM upgrade card. The upgrade card attaches to the monitor card already installed in your computer. You can purchase a VRAM upgrade card at an Apple-authorized dealer.

Optional monitor support

The table on the following page shows the image sizes for monitors that can be connected to the optional 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.

The optional factory-installed monitor card supports the monitors listed in the table. (Note that this monitor card does not support the black and white monitor setting or grayscale for 4-color and 16-color settings.) There are also many special monitor cards available from Apple and 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 by optional monitor card

Monitor	VIS*	Resolution	2 MB VRAM maximum colors**	4 MB VRAM maximum colors**	Screen refresh rates Vertical	Horizontal
12" Monochrome	11.5"	640 by 480	256	256	66.67 Hz	35 kHz
12" RGB	11.5"	512 by 384	Millions	Millions	60.15 Hz	24.48 kHz
13" Color	12.8"	640 by 480	Millions	Millions	66.67 Hz	35 kHz
15" RGB***	—	640 by 480	Thousands	Millions	75 Hz	68.85 kHz
16" Color	15"	832 by 624	Millions	Millions	74.55 Hz	49.725 kHz
Multiple Scan 15	13.3"	640 by 480	Millions	Millions	66.67 Hz	35 kHz
		832 by 624	Millions	Millions	74.55 Hz	49.725 kHz
Multiple Scan 17	16.1"	640 by 480	Millions	Millions	66.67 Hz	35 kHz
		832 by 624	Millions	Millions	74.55 Hz	49.725 kHz
		1024 by 768	Thousands	Millions	74.93 Hz	60.241 kHz
19" RGB***	—	1024 by 768	Thousands	Millions	74.93 Hz	60.241 kHz
21" Color	19"	1152 by 870	Thousands	Millions	75 Hz	68.681 kHz
Multiple Scan 20	19.1"	640 by 480	Millions	Millions	66.67 Hz	35 kHz
		832 by 624	Millions	Millions	74.55 Hz	49.725 kHz
		1024 by 768	Thousands	Millions	74.93 Hz	60.241 kHz
		1152 by 870	Thousands	Millions	75.08 Hz	68.681 kHz
		1280 by 1024	Thousands	Thousands	75 Hz	79.976 kHz
VGA	—	640 by 480	Millions	Millions	60 Hz	31.463 kHz
SVGA	—	800 by 600	Millions	Millions	55.98 Hz	35.156 kHz
VESA						
standard modes	—	800 by 600	Millions	Millions	60.3165 Hz	37.879 kHz
		800 by 600	Millions	Millions	75 Hz	46.875 kHz
		1024 by 768	Millions	Millions	60 Hz	48.363 kHz
		1024 by 768	Millions	Millions	70 Hz	56.476 kHz
		1280 by 1024	Thousands	Thousands	60 Hz	65.625 kHz
		1280 by 1024	Thousands	Thousands	75 Hz	79.976 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.

Internal disk drives

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

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

Some Power Macintosh 9500 computers have an optional built-in CD-ROM drive (also called a CD-ROM player) with these features:

- Internal, 5.25-inch, 1/2-height 8x-speed (A 1/2-height drive is 49 millimeters, or approximately 2 inches tall.)

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

Clock/calendar

- CMOS custom circuitry with long-life battery

WARNING If the clock begins to lose accuracy, see an Apple-authorized dealer or service provider for a battery replacement. Do not attempt to replace the clock battery yourself.

Keyboard

- Supports all Apple Desktop Bus (ADB) keyboards

Mouse

- Supports all models of the ADB mouse

Interfaces

- One Apple Desktop Bus (ADB) port supports up to three ADB input devices (such as a keyboard, mouse, and trackball) daisy-chained through a low-speed, synchronous serial bus.
- Optional monitor port supports color and monochrome monitors of various sizes and resolutions. (See “Optional Monitor Support,” earlier in this booklet.)

- Six internal expansion slots support Peripheral Component Interconnect (PCI) expansion cards. The PCI bus runs at 33 MHz. Install only expansion cards that come with Macintosh drivers and are compliant with the PCI 2.0 standard. (If you have the optional monitor card installed, it is in one of your PCI slots.) NuBus ™ cards should not be used in these expansion slots.
- Two RS-232/RS-422 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 sound output port for stereo compact disc audio and stereo computer-generated sound.
- One 3.5 mm, line-level 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 external SCSI interface that supports up to seven external SCSI devices, or one internal plus six external SCSI devices.

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

- One internal SCSI interface that supports the internal hard disk and optional CD-ROM drive. An additional SCSI device can be attached to this 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 more than one terminated device is attached to the internal SCSI interface, damage to the computer's main logic board can occur. The terminated Apple SCSI drive needs to always be the last device on the internal SCSI chain.

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)
- Input line level: 2.8 volts peak-to-peak (Vpp) nominal, into 6.5-kilohm (kΩ) impedance
- Output line level: 3.0 Vpp nominal, into 1-kΩ impedance
- Input signal-to-noise ratio (SNR): > 74 decibels (dB) non-weighted
- Output SNR: > 82 dB non-weighted
- Frequency response: 20 hertz (Hz) to 17 kHz (+/– 0.8 dB) at 44.100-kHz sample rate; 20 Hz to 19 kHz (+/– 2.0 dB) at 44.100-kHz sample rate
- Total harmonic distortion plus noise (THD + N): Less than 0.05 percent; measured 20 Hz to 20 kHz with a 2.5-Vpp sine wave input

AC line input

- Line voltage: 100–240 volts (V) alternating current (AC), RMS single phase, automatically configured
- Frequency: 50–60 Hz
- Power: 340 watts (W) maximum continuous; 520 W peak input
- Current: 9 amperes (A) maximum

AC line output

- Output receptacle: 100–120 V, 3 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: 225 W
- Peak output (for 12 seconds at startup): 328 W

Current type	Total*
+5 V	35 A**
+12 V	5 A
+3.3 V	20 A**
–12 V	0.75 A

*Overall system power consumption cannot exceed 225 watts.

**Total for +3.3V and +5 V current cannot exceed 35 A.

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

Power allowances for external devices connected to ports:

Device	Voltage	Current	Power
Microphone	+5 V	20 mA	100 mW
Serial ports/GeoPort telecom adapter	+5 V	500 mA	2.5 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 six 15-watt or four 25-watt cards. Detailed guidelines are presented below.

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.

Size and weight

Weight	Height	Width	Depth
Main unit			
12.7 kg*	430 mm	196 mm	400 mm
28 lb.*	16.9 in.	7.7 in.	15.75 in.
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.

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.)

Optional CD-ROM specifications

■ Disc diameter	120 millimeters (4.7 inches) and 80 mm
■ Scanning velocity	1.2–1.4 meters per second
■ 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	5.0 MB per second
Synchronous	5.0 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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