



Developer Note

Power Macintosh 7300, 7600, 8600, and 9600 Computers

Power Macintosh 7300/166

Power Macintosh 7300/180

Power Macintosh 7300/200

Power Macintosh 7600/200

Power Macintosh 8600/200

Power Macintosh 9600/200

Power Macintosh 9600/200MP




Developer Note

4/18/00

Developer Technology Services

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About This Developer Note

This developer note describes the new Power Macintosh 7300, 7600, 8600, and 9600 models. This developer note describes only the changes that make the new models different from their earlier counterparts. For information about the original Power Macintosh 7500, 8500, and 9500 computers, see *Macintosh Developer Note Number 12* and *Macintosh Developer Note Number 13*, described in “Supplemental Reference Documents,” later in this preface.

This developer note is intended to help hardware and software developers design products that are compatible with the Macintosh products described here. If you are not already familiar with Macintosh computers or if you would simply like more technical information, you may wish to read the supplementary reference documents described in this preface.

This note is published only in electronic form, as an Adobe™ Acrobat™ PDF (portable document file). The file is available from two sources:

- on the World Wide Web at <<http://devworld.apple.com/dev/devnotes/dntable1.html>>.
- on the Reference Library Edition of the Developer CD Series, which is distributed as part of the monthly mailing to registered developers and also available through the *Apple Developer Catalog* (ADC).

Contents of This Note

This note has only one chapter: a delta guide describing the differences between the new models and the original Power Macintosh 7500, 8500, and 9500 computers. Because the note is so short, it has no index.

Supplemental Reference Documents

For information about the original Power Macintosh 9500 computer, developers should have copies of *Macintosh Developer Note Number 12*, ADC part number R0651LL/A. Information about the original Power Macintosh 7500 and 8500 computers is provided in *Macintosh Developer Note Number 13*, ADC part number R0677LL/A. Acrobat PDF versions of the developer notes are available on the developer CD and on the World Wide Web at <<http://devworld.apple.com/dev/devnotes/dntable1.html>>.

For a description of the version of the Mac OS that comes with the new models, developers should refer to Technote 1069, “System 7.5.5.” The

technote is available on the Developer CD Series and on the technote web site at <<http://devworld.apple.com/dev/technotes.shtml>>. Printed copies of the technote are available from Field Copy and Printing, AppleLink FIELDCOPY or telephone 1-415-323-3155.

The API for multiprocessor operation of the Power Macintosh 9600/200MP is available from Apple Computer, Inc.

Developers should also have copies of the relevant books of the *Inside Macintosh* series, available in technical bookstores and through the *Apple Developer Catalog*.

The *Apple Developer Catalog*

The *Apple Developer Catalog* (ADC) is Apple Computer's worldwide source for hundreds of development tools, technical resources, training products, and information for anyone interested in developing applications on Apple computer platforms. Customers receive the *Apple Developer Catalog* featuring all current versions of Apple development tools and the most popular third-party development tools. ADC offers convenient payment and shipping options, including site licensing.

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Conventions and Abbreviations

This developer note uses the following typographical conventions and abbreviations.

Typographical Conventions

Note

A note like this contains information that is of interest but is not essential for an understanding of the text. ◆

IMPORTANT

A note like this contains important information that you should read before proceeding. ▲

Abbreviations

When unusual abbreviations appear in this book, the corresponding terms are also spelled out. Standard units of measure and other widely used abbreviations are not spelled out.

Here are the standard units of measure used in this developer note:

GB	gigabytes
MB	megabytes
MHz	megahertz

Other abbreviations used in this note include:

CD-ROM	compact disc read-only memory
DIMM	Dual Inline Memory Module
DRAM	dynamic RAM
EDO	extended data out
FPM	fast page mode
JEDEC	Joint Electron Device Engineering Council
PDF	portable document file
RAID	random array of inexpensive disks
RAM	random-access memory
RAVE	Rendering Acceleration Virtual Engine
ROM	read-only memory
SCSI	Small Computer System Interface
SGRAM	synchronous graphics RAM

P R E F A C E

Delta Guide to the New Models

Apple Computer has introduced several new models in the Power Macintosh family of desktop computers. The new models are improved versions of previous models. This chapter is a delta guide—it describes only the changes and new features. For descriptions of the previous models, see the developer notes for the Power Macintosh 7500, 8500, and 9500 computers. For information about obtaining the developer notes, see “Supplemental Reference Documents” on page vii.

New Models

The new Power Macintosh models have higher processor clock speeds and other performance improvements, which are described in this chapter. Table 1-1 lists the new models and compares them with the previous models.

Table 1-1 Comparison of new models with previous ones

New models	Previous models	Major changes
Power Macintosh 7300/166 Power Macintosh 7300/180 Power Macintosh 7300/200	Power Macintosh 7500/100	Clock speeds 166–200 MHz, 256 KB L2 cache installed, 2 GB hard drive, 12X-speed CD-ROM drive
Power Macintosh 7600/200	Power Macintosh 7600/120 Power Macintosh 7600/132	Clock speed 200 MHz, 2 GB hard drive, 12X-speed CD-ROM drive
Power Macintosh 8600/200	Power Macintosh 8500/150 Power Macintosh 8500/180	Clock speed 200 MHz, new tower enclosure, 2 GB AV-capable hard drive, 12X-speed CD-ROM drive, internal Zip cartridge drive
Power Macintosh 9600/200	Power Macintosh 9500/200	New tower enclosure, 12X-speed CD-ROM drive, new accelerated display card
Power Macintosh 9600/200MP	Power Macintosh 9500/180MP	Clock speed 200 MHz, dual PPC604e microprocessors, new tower enclosure, 12X-speed CD-ROM drive, new accelerated display card

NOTE The Power Macintosh 7600/200 is available only in Japan.

New Features

The new features in the faster Power Macintosh 7300, 7600, 8600, and 9600 computers include:

- a PowerPC™ 604e microprocessor in all models
- a dual microprocessor configuration (Power Macintosh 9600/200MP)
- faster processor speeds, ranging from 166 to 200 MHz
- a second-level (L2) cache in all models
- larger size internal hard disks: 2 or 4 GB
- an AV-capable hard disk (Power Macintosh 8600 only)
- a built-in 12X-speed CD-ROM drive
- a built-in Iomega Zip removable cartridge drive (Power Macintosh 8600 only)
- a new accelerated display card (Power Macintosh 9600 only)
- a security bar on the Power Macintosh 7300 and 7600 models
- a new tower enclosure with easy access and security lock (Power Macintosh 8600 and 9600 models)
- the Mac OS in the new models is Macintosh System 7.5.5

The features of the new tower enclosure are described in “New Tower Enclosure” beginning on page 8. The changes in the system software are described in “System Software” on page 16. The other new features are described in the following sections.

PowerPC 604e Microprocessor

All the new models use the PowerPC 604e microprocessor. The PowerPC 604e is a version of the PowerPC 604 with the following enhancements:

- on-chip data and instruction caches of 32 KB each
- processor clock speed up to 5 times the bus clock speed

Dual Processor Configuration

In the 9600/200MP model, two PowerPC 604e microprocessors are on the processor card. With applications that support the new multiprocessor API, the MP configuration provides up to 2 times the performance of the equivalent single-processor computers.

The operation of the dual-processor configuration is asymmetric multiprocessing. One processor is the primary processor: it runs the Mac OS and handles interrupts from the I/O systems. The second processor runs MP tasks as set up by the primary processor.

Delta Guide to the New Models

Developers can obtain the multiprocessor API and documentation from Apple Computer, Inc.

Processor Clock Speeds

The clock speeds for the microprocessors in the Power Macintosh 7300, 7600, 8600, and 9600 computers are increased over their earlier counterparts. Table 1-2 shows the microprocessor clock speeds along with the corresponding processor bus speeds.

Table 1-2 Comparison of processor and bus speeds

Model	Processor clock speed	Processor bus speed
Power Macintosh 7300/166	168 MHz	48.0 MHz
Power Macintosh 7300/180	180 MHz	45.0 MHz
Power Macintosh 7300/200	200 MHz	50.0 MHz
Power Macintosh 7600/200	200 MHz	50.0 MHz
Power Macintosh 8600/200	200 MHz	50.0 MHz
Power Macintosh 9600/200	200 MHz	50.0 MHz
Power Macintosh 9600/200MP	200 MHz	50.0 MHz

NOTE The processor clock speed of the Power Macintosh 7300/166 is actually 168 MHz.

Second-Level Cache

All the new models include a second-level (L2) cache. The L2 cache provides a performance improvement of up to 40% over machines without such a cache.

The L2 cache in the Power Macintosh 9600/200 and 9600/200MP consists of 512 KB of fast static RAM on the main logic board. The L2 cache in the other models consists of a 256 KB DIMM installed in a slot. Table 1-4 on page 7 lists the cache size for the individual models.

Hard Disk Sizes

The built-in hard disks in the new Power Macintosh computers are either 2 or 4 GB. Table 1-4 on page 7 shows the sizes of the hard disks in the individual models.

AV-Capable Hard Disk

The 2 GB hard disk in the Power Macintosh 8600 can support AV applications. It can transfer video data at 30 frames per second with no dropped frames.

12X-Speed CD-ROM Drive

All the new models include a built-in 12X-speed CD-ROM drive, an AppleCD 1600i. The AppleCD 1600i supports the worldwide standards and specifications for CD-ROM and CD-digital audio discs described in the Sony/Philips Yellow Book and Red Book. The drive can read CD-ROM, CD-ROM XA, CD-I, and PhotoCD discs as well as play standard audio discs.

The AppleCD 1600i CD-ROM drive has a sliding tray to hold the disc. The drive features an 12X-speed mechanism that supports sustained data transfer rates of 1600 KB per second and a data buffer that further enhances performance.

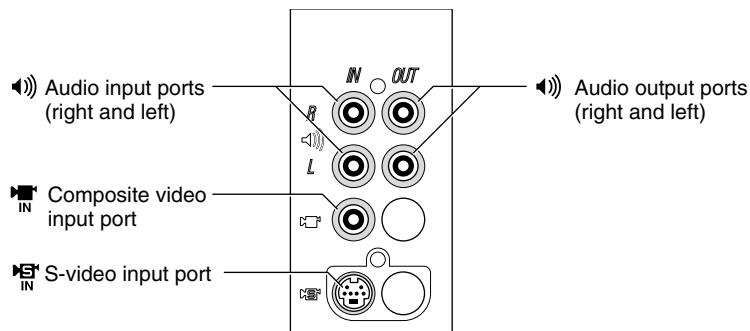
Built-in Removable Cartridge Drive

One of the new models, the Power Macintosh 8600, has a built-in Iomega Zip removable cartridge drive. The built-in Zip drive is similar to its external counterpart. The user has the option of placing a system folder on a Zip cartridge and starting up the computer from the Zip drive.

Video Input

The new Power Macintosh 7600 has the same video input capabilities as the Power Macintosh 8500 and 8600 models. The back of the computer has a small panel with RCA jacks for stereo pairs of audio inputs and outputs, an RCA jack for composite video input, and a multipin connector for S-video input. Figure 1-1 shows the arrangement of the connectors on the AV panel on the back of the Power Macintosh 7600.

Figure 1-1 AV panel on the Power Macintosh 7600



Note

The Power Macintosh 8600, like the earlier Power Macintosh 8500, has both video inputs and outputs. ♦

Accelerated Display Card

The Power Macintosh 9600 includes a video display card that supports acceleration of 2D graphics and text. The display card has 4 MB of buffer memory and cannot be expanded.

The display card supports pixel depths of 8, 16, and 24 bits per pixel on small and medium-sized monitors, and 8 and 16 bits on large monitors, as shown in Table 1-3.

Table 1-3 Display types and pixel depths

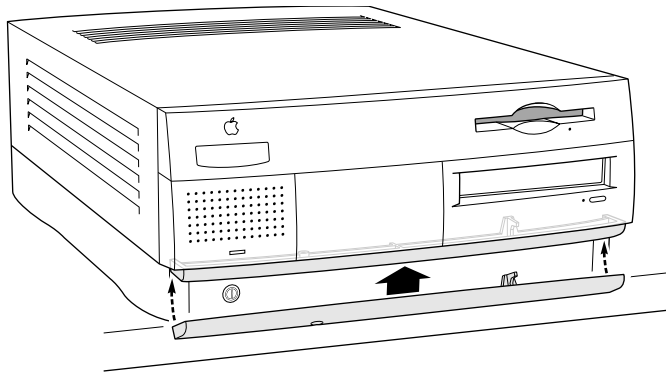
Resolution (pixels)	Vertical frequency (Hz)	Pixel depths (bits per pixel)
512 by 384	60	8, 16, or 24
640 by 480	67	8, 16, or 24
640 by 870	75	8, 16, or 24
800 by 600	75	8, 16, or 24
832 by 624	75	8, 16, or 24
1024 by 768	75	8, 16, or 24
1152 by 870	75	8, 16, or 24
1280 by 960	75	8 or 16
1280 by 1024	75	8 or 16
1600 by 1200	60, 67, or 75	8 or 16

Note

Some monitors from manufacturers other than Apple Computer have a video connector with the green video component and the synchronizing signal on the same pin, an arrangement called sync on green. The display card in the Power Macintosh 9600 does not support sync on green. ♦

Security Bar

The Power Macintosh 7300 and 7600 models have a security bar that conceals the latches for the top cover. The security bar snaps into place on the front of the case and is held in place by a screw. Figure 1-2 shows the location of the security bar.

Figure 1-2 Security bar

Configurations

The new models of the Power Macintosh 7300, 7600, 8600, and 9600 computers come with 16 or 32 MB of main RAM installed in RAM DIMM slots. All models have a built-in second-level (L2) cache of either 256 or 512 KB. The size of the internal hard disk is either 2 or 4 GB. Table 1-4 shows the configurations of the new models.

Table 1-4 Configurations

Model	Amount of DRAM	Size of hard disk	Size of L2 cache	Special features
Power Macintosh 7300/166	16 MB	2 GB	256 KB	
Power Macintosh 7300/180	16 MB	2 GB	256 KB	
Power Macintosh 7300/200	32 MB	2 GB	256 KB	
Power Macintosh 7600/200	32 MB	2 GB	256 KB	Video input
Power Macintosh 8600/200	32 MB	2 GB	256 KB	Built-in Zip drive, AV-capable hard disk, video input and output
Power Macintosh 9600/200	32 MB	4 GB	512 KB	Video display card with graphics acceleration
Power Macintosh 9600/200MP	32 MB	4 GB	512 KB	Dual microprocessors, video display card with graphics acceleration

Note

All the new models include a built-in 12X-speed CD-ROM drive. ♦

New Tower Enclosure

The new tower enclosure has the following new features:

- more space for internal storage devices
- larger power supply
- easier access to internal components
- a locking feature
- space for larger-size DIMMs

The following sections describe the new features of the enclosure.

Appearance of the New Tower Enclosure

The new tower enclosure is used for the Power Macintosh 8600 and 9600 computers. Figure 1-3 and Figure 1-4 are front and back views of the Power Macintosh 8600. Figure 1-5 and Figure 1-6 are the same views of the Power Macintosh 9600.

Figure 1-3 Front view of the Power Macintosh 8600

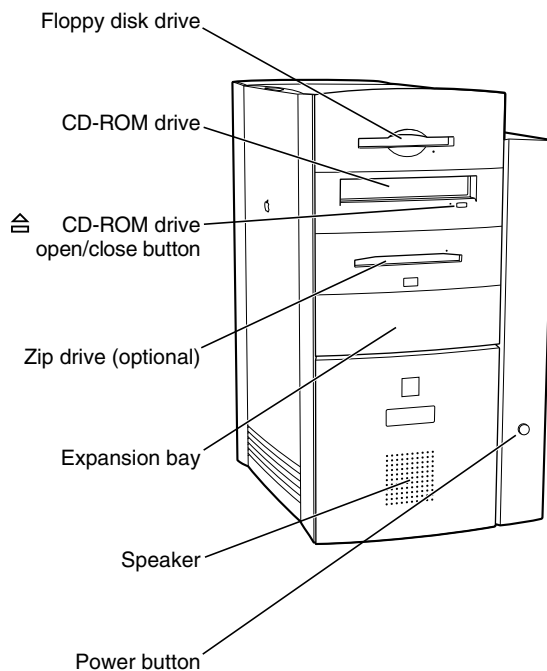


Figure 1-4 Back view of the Power Macintosh 8600

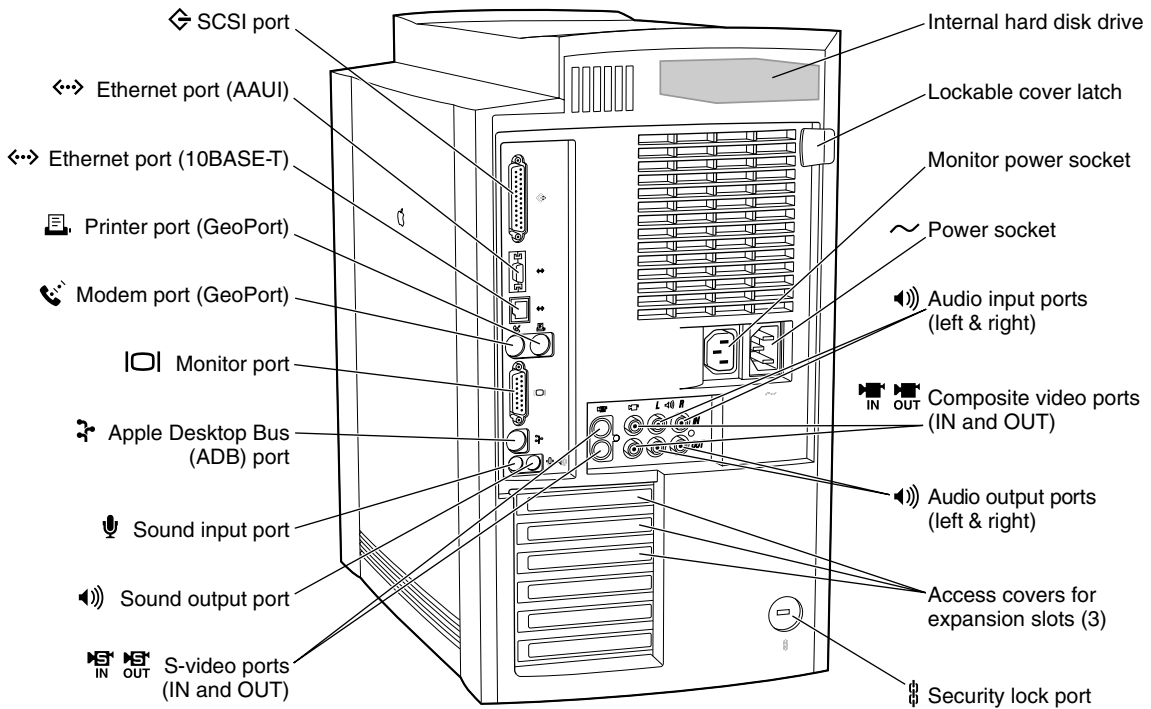


Figure 1-5 Front view of the Power Macintosh 9600

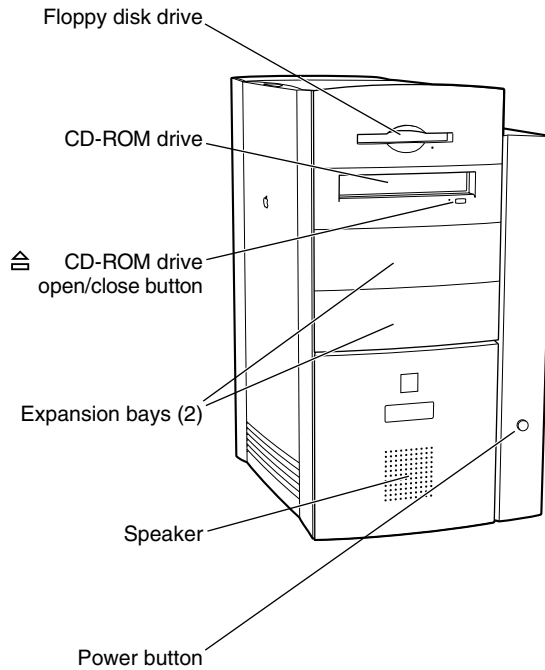
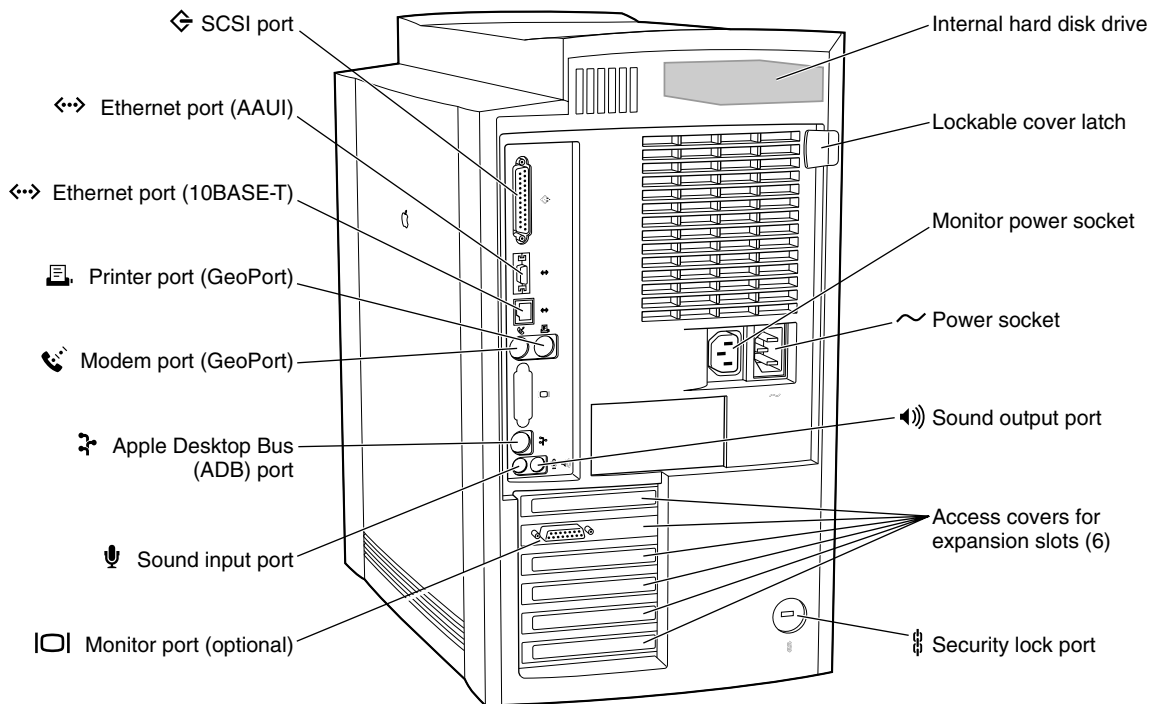


Figure 1-6 Back view of the Power Macintosh 9600



Dimensions of the New Tower Enclosure

Table 1-5 shows the dimensions of the tower enclosure.

Table 1-5 Dimensions of the tower enclosure

Height	Width	Depth
429 mm	224 mm	440 mm
17.3 in.	8.8 in.	17.3 in.

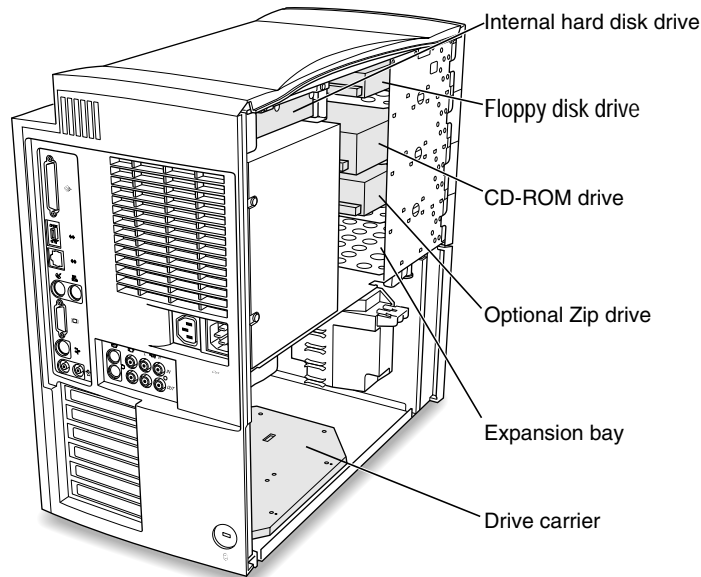
Internal Storage Devices

The new tower enclosure has spaces for up to seven internal storage devices. Four of those spaces are accessible from the front; of those four, three can accommodate 5.25-inch devices and one can accommodate a 3.5-inch device. The other spaces are not accessible from the front; they can accommodate three 3.5-inch devices or one 5.25-inch device and one 3.5-inch device.

Accessible Devices

At the front of the enclosure are four bays for internal storage devices. The computer is shipped with three of those bays occupied by the floppy disk drive, the CD-ROM drive, and the Zip drive. Figure 1-7 shows the locations of those devices.

Figure 1-7 Locations of internal devices



The floppy disk drive can be replaced with a 3.5-inch SCSI hard disk drive up to 1 inch high. The CD-ROM drive and the Zip drive can be replaced with 5.25-inch or smaller SCSI devices up to 1.625 inches high.

Each of the front storage bays has a front panel. For devices with removable media, the front panels have openings to allow for user access to the media. With the side panel removed, you can remove the front panels by pulling on a tab on the side of each front panel.

Inaccessible Devices

Inside the enclosure are spaces for additional storage devices. One of those is the bay that is usually used for the startup hard disk drive. That drive can be replaced with another 3.5-inch SCSI hard disk drive up to 1 inch high.

All the storage-device spaces described so far are fully supported storage bays. In addition to those, the bottom part of the enclosure also has space for one or two additional disk drives, such as RAID stacks. One 5.25-inch SCSI hard disk drive or two 3.5-inch SCSI hard disk drives can be mounted on the drive carrier that is installed in the bottom of the enclosure.

IMPORTANT

To prevent electromagnetic interference, the drive carrier must be in place whenever the computer is operating. ▲

The power supply has two power connectors to provide power for the added drives. The maximum power available for additional storage devices is shown in Table 1-6. The user must install power cables and a PCI expansion card to provide the interface to the added drives.

IMPORTANT

The added drives in the bottom of the enclosure occupy the space that would be used by PCI cards in the lowest one or two of the six PCI expansion slots in the Power Macintosh 9600. ▲

Larger Power Supply

The power supply in the new tower enclosure now provides a total of 390 watts to support the larger number of drives and the faster processor. Table 1-6 shows the maximum power available for additional internal devices such as expansion cards and storage devices. The power supply can support as many as six 15-watt cards or four 25-watt cards.

Table 1-6 Power for additional devices

Device	Voltage	Current	Power
Expansion card (15 watts)	+5 V	3 A	15 W
	+12 V	0.5 A	6 W
	-12 V	0.1 A	1.2 W
	+3.3 V	2 A	6.6 W
Expansion card (25 watts)	+5 V	5 A	25 W
	+12 V	0.5 A	6 W
	-12 V	0.1 A	1.2 W
	+3.3 V	2 A	6.6 W
Storage devices	+5 V	9 A	45 W
	+12 V	3 A	36 W
	+12 V	7.5 A peak*	—

NOTE Peak power is for startup only.

Access to Internal Components

Two features of the new tower enclosure makes it easier to obtain access to the internal components:

- removable side panel
- hinged subchassis

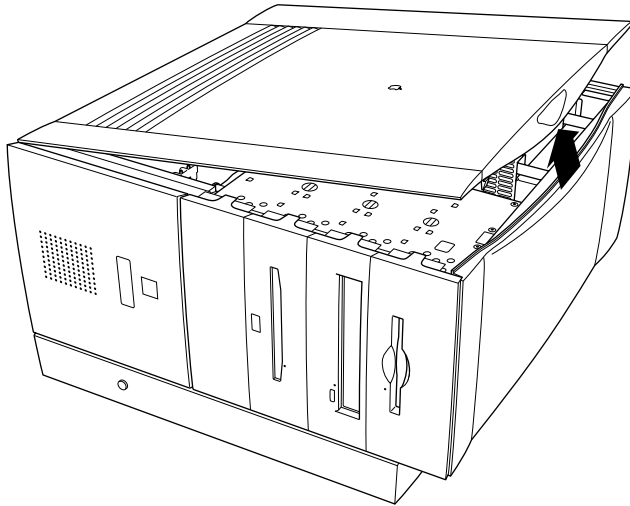
Removable Side Panel

The entire side panel on the left side of the enclosure is removable. The panel is held in position by a latch with a pushbutton at the top of the enclosure. To remove the side panel takes three steps:

1. Gently tilt the computer onto its right side, as viewed from the front. Small rubber bumpers on the right side act as feet when the computer is on its side.
2. Press down on the button at the top of the side panel and pull the panel away from the enclosure at the top as shown in Figure 1-8.
3. Pull the side panel to the right (the top of the enclosure) to release it from the bottom of the enclosure, then lift it up and away.

Figure 1-8 Opening the new tower enclosure

Press the button and lift the cover up a few inches.



With the side panel out of the way, the user has access to the components at the bottom of the computer: PCI expansion slots, the DAV connector, and the space for internal RAID storage devices.

Hinged Subchassis

As in earlier Power Macintosh 8500 and 9500 models, access to the DIMM slots is obstructed by the power supply and disk drives. In the new tower enclosure, those components are mounted on a hinged subchassis that can be tilted out of the enclosure.

With the side panel removed, moving the hinged subchassis out of the way takes two steps:

1. Raise the two plastic catches at the top of the open area to release the subchassis. With the computer on its side, and viewed from the front, the catches are at the right of the open space, as shown in Figure 1-9.
2. Grasp the large plastic handle below the catches and slowly lift up, tilting the subchassis to the right. When the subchassis is clear of the internal components, it will rest on its top, as shown in Figure 1-10.

With the computer on its right side, and the subchassis in the open position, the main logic board with its array of expansion slots is facing up. The user can now insert expansion DIMMs into the appropriate slots.

Figure 1-9 Unlocking the top chassis

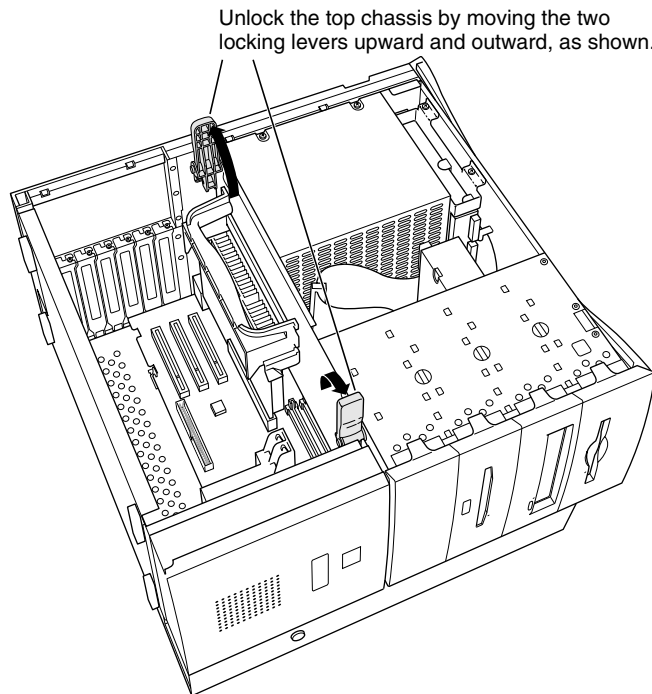
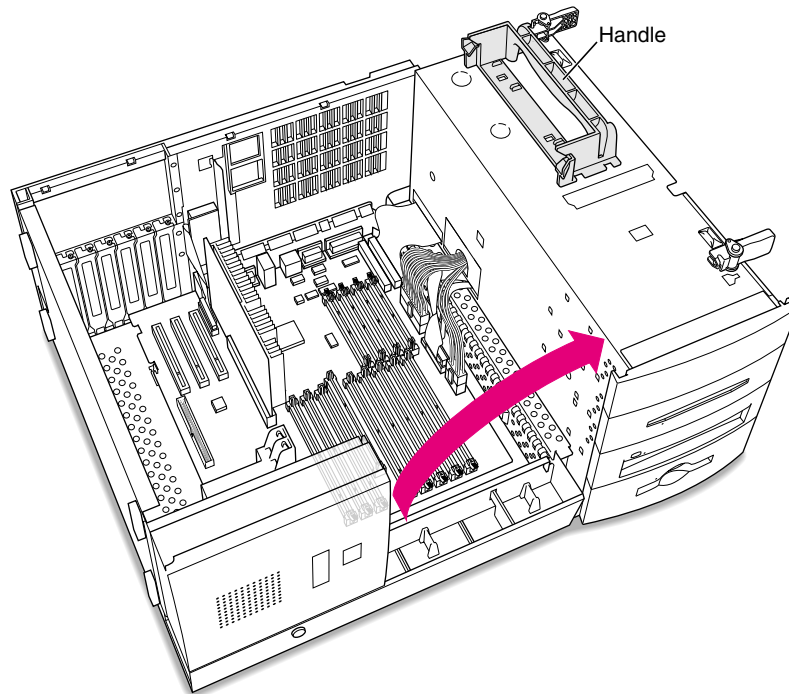
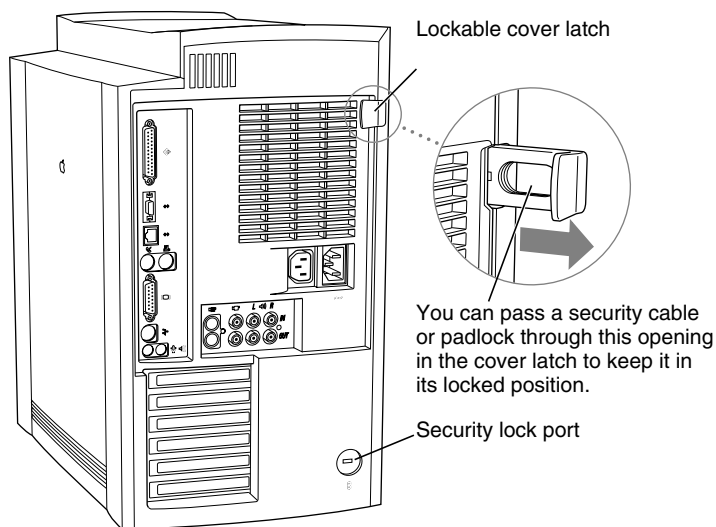


Figure 1-10 Lifting the top chassis

Locking Feature

The new tower enclosure for the Power Macintosh 8600 and 9600 has a locking feature. As shown in Figure 1-11, a tab on the back of the enclosure connects to an internal latching mechanism for the removable side panel. Pulling out the tab engages the locking mechanism and exposes a hole in the tab. By inserting a security cable or a padlock through the hole, the user can secure the tab in the locked position.

Figure 1-11 Locking cover

Taller RAM DIMM

The method of RAM expansion in the new models is the same as in their earlier counterparts. However, Apple Computer has made the following change to the mechanical specification for the RAM DIMM.

IMPORTANT

The JEDEC MO-161 specification shows three possible heights for the 8-byte DIMM. All Power Macintosh computers can accommodate DIMMs with the shortest of the three specified heights: 1.100 inches. The new Power Macintosh 8600 and 9600 can also accommodate DIMMs with a height of 1.255 inches. ▲

System Software

The system software has been modified to support the new hardware features. The Mac OS for the new models is a modified version of System 7.5.5 with a new enabler.

For a list of the features of System 7.5.5, see Technote 1069, “System 7.5.5.” To find out how to obtain Apple Computer’s Technotes, see “Supplemental Reference Documents” on page vii.

Changes in the ROM

The following changes have been made in the ROM software:

Delta Guide to the New Models

- The SCSI Manager has been revised to correct a problem with the asynchronous receive-acknowledge signal in the SCSI controller.
- The default value of the hard disk time-out has been increased from 25 to 31 seconds.
- The software now sets the guarded bit in the MMU for cache-inhibited address space.
- The ROM has been modified to fix bugs that affected multiprocessor operation.

Changes in the Disk Software

The following changes have been made in the system software on the hard disk:

- The CD Setup application now supports the Macintosh 12X-speed CD-ROM drive.
- The Drive Setup application now supports the 2 and 4 GB hard disk drives.
- For dual-processor operation, the multiprocessor API is installed automatically. The multiprocessor API is the same as the one available from Daystar Digital, Inc.

Compatibility Issues

Except for the changes described in this developer note, the features of the faster Power Macintosh 7300, 7600, 8600, and 9600 computers are the same as those of their earlier counterparts. There should be no compatibility problems with applications and peripherals that operate correctly with the earlier models.

Machine Identification

The new Power Macintosh 7600, 8600, and 9600 computers have the same machine ID values as their earlier counterparts. The Power Macintosh 7300 has a new machine ID value: 109 (hexadecimal 6D). Applications can find out which computer they are running on by using the Gestalt Manager routines. *Inside Macintosh: Overview* describes the Gestalt Manager and tells how to use the `gestaltMachineType` value to obtain the machine name string.

Dual Processor Operation

To make effective use of dual-processor operation, the computer must meet the following three conditions.

- Memory doubler extensions such as Connectix RAM Doubler must not be installed.
- Virtual memory must be turned off. This setting is in the Memory control panel.
- The hard disk must never be put to sleep. This setting is in the Server Settings dialog box in the Energy Saver control panel.

System Software

The new enabler also supports the earlier counterparts of these computers, including the Power Macintosh 7500. For a description of the version of the Mac OS that comes with the new models, developers should refer to Technote 1069, "System 7.5.5." For information about obtaining the technote, see "Supplemental Reference Documents" on page vii.

RAM DIMM Modifications

The method of RAM expansion in the new models is essentially the same as in their earlier counterparts: 168-pin, 8-byte DIMMs as defined in the JEDEC MO-161 specification.

IMPORTANT

The new tower enclosure for the Power Macintosh 8600 and 9600 accommodates RAM DIMMs of 1.1 and 1.255 inches in height. Other Power Macintosh computers accommodate only DIMMs with the 1.1-inch height. ▲

The RAM expansion DIMMs in the new computers can use either extended data out (EDO) or fast page mode (FPM) DRAM devices. The computer always operates the devices in fast page mode.

IMPORTANT

As in the previous Power Macintosh models, only 5-V power is available on the RAM DIMM slots. Devices that require 3.3-V power cannot be used. ▲



Developer Press Art List

Montana Developer Note

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