Developer Note

Enhanced Power Macintosh 8600 and 9600 Computers

Developer Note

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Contents

Figures and Tables

About This Developer Note

This developer note describes the newest enhanced models of the Power Macintosh 8600 and 9600 computers. This developer note describes only the changes that make the new models different from their earlier counterparts. For information about earlier models, see "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 additional 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

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 8600 and 9600 computers. Because the note is so short, it has no index.

Supplemental Reference Documents

Developers should have the developer notes that describe the earlier counterparts of the new models. The relevant developer notes are:

■ *Power Macintosh 7500 and 8500 Computers*

■ *Power Macintosh 9500 Computer*

■ *Power Macintosh 7300, 7600, 8600, and 9600 Computers*

Acrobat PDF versions of these developer notes are available on the developer CD and on the World Wide Web at <http://devworld.apple.com/dev/devnotes/dntable1.html>.

Note

Developer notes are not available in printed form. The PDF files are designed so that developers may print them for their own use. ◆

For a description of the version of the Mac OS that comes with the new models, developers should refer to the Technotes about System 7.6.1 and Mac OS 8. Technotes are available on the Developer CD Series and on the Technote web site at <http://devworld.apple.com/dev/technotes.shtml>. Printed copies of Technotes are available from Field Copy and Printing, telephone 1-415-323-3155.

Developers should also have copies of the relevant books of the *Inside Macintosh* series, available in technical bookstores.

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 developer note, 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
Hz	hertz	MHz	megahertz
KB	kilobytes	V	volts

Other abbreviations used in this note include:

ADB	Apple Desktop Bus
ADC	analog-to-digital converter
AWAC	audio waveform amplifier and converter

CD-ROM	compact disc read-only memory
DAC	digital-to-analog converter
DIMM	Dual Inline Memory Module
DMA	direct memory access
DRAM	dynamic RAM
EDO	extended data out
FPM	fast page mode
IC	integrated circuit
JEDEC	Joint Electron Device Engineering Council
L2	level 2 or second level, a type of cache
MESH	an Apple custom IC
PCI	Peripheral Component Interconnect, an industry-standard expansion bus
PDF	portable document file
PRAM	parameter random-access memory
RAM	random-access memory
ROM	read-only memory
RTC	real time clock
SCC	Serial Communications Controller
SCSI	Small Computer System Interface
SWIM	Super Woz Integrated Machine (custom IC that controls the floppy disk interface)
VCI	video component interconnect, a variant of PCI
VIA	versatile interface adapter
VRAM	video RAM; used for display buffers

Delta Guide to the New Models

Apple Computer has introduced new high-end models in the Power Macintosh family of desktop computers. The new models are enhanced versions of the Power Macintosh 8600 and 9600 computers. This chapter is a delta guide—it describes only the changes in and new features of these computers. For descriptions of the previous models, 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 their processor clock speeds.

Table 1-1   New Power Macintosh models

Model name	Processor clock speed
Power Macintosh 8600/250	250 MHz
Power Macintosh 8600/300	300 MHz
Power Macintosh 9600/300	300 MHz
Power Macintosh 9600/350	350 MHz

New Features

The new features in the enhanced Power Macintosh 8600 and 9600 models are:

- a new processor card with 1 MB of Apple inline cache (level 2)
- a new PowerPC microprocessor, code named Mach 5.
- faster processor speeds: 250 to 350 MHz
- larger internal hard disks: 4 GB
- a built-in 24X-speed CD-ROM drive
- a built-in Zip removable cartridge drive (in both 8600 and 9600)
- the latest version of the Mac OS: System 7.6.1

The new features are described in the following sections.

New Processor Card

The only architectural difference between the new models and their older counterparts is a new type of processor card, the Apple Inline Cache Processor Card. The new processor

card includes 1 megabyte of Apple inline cache (level 2) and a cache controller. Figure 1-1 on page 4 and Figure 1-2 on page 5 are simplified block diagrams of the enhanced Power Macintosh 8600 and 9600 computers, respectively, showing the inline cache and controller on the processor card.

Having the inline L2 cache on the processor card provides improved performance compared with previous models because data moves between the cache and the microprocessor over a bus with a faster clock speed (100 MHz). In the previous design, the cache was connected to the 50 MHz system bus on the main logic board.

The new processor card is designed around the Brick custom IC, which controls the inline cache and the bus traffic to and from the microprocessor, the cache, and the main system bus. The Brick IC makes all bus cycles from the main system bus available for the microprocessor's internal L1 cache as well as the inline L2 cache.

IMPORTANT

The control logic on the main logic board has been changed to support the inline cache on the processor card. The new processor card will not work in an older model Power Macintosh 8600 or 9600. ▲

Mach 5 Microprocessor

The enhanced Power Macintosh 8600 and 9600 computers use a new microprocessor, code named Mach 5, that is based on the 604e architecture. Among the features of the Mach 5 microprocessor are:

■ on-chip data and instruction caches of 32 KB each

■ processor clock speed up to 7 times the bus clock speed

Processor Clock Speeds

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

Table 1-2   Comparison of processor and bus clock speeds

Model	Processor clock speed	Cache bus speed	System bus speed
Power Macintosh 8600/250	250 MHz	100 MHz	50 MHz
Power Macintosh 8600/300	300 MHz	100 MHz	50 MHz
Power Macintosh 9600/300	300 MHz	100 MHz	50 MHz
Power Macintosh 9600/350	350 MHz	100 MHz	50 MHz

Delta Guide to the New Models

Figure 1-1   Block diagram of the enhanced Power Macintosh 8600
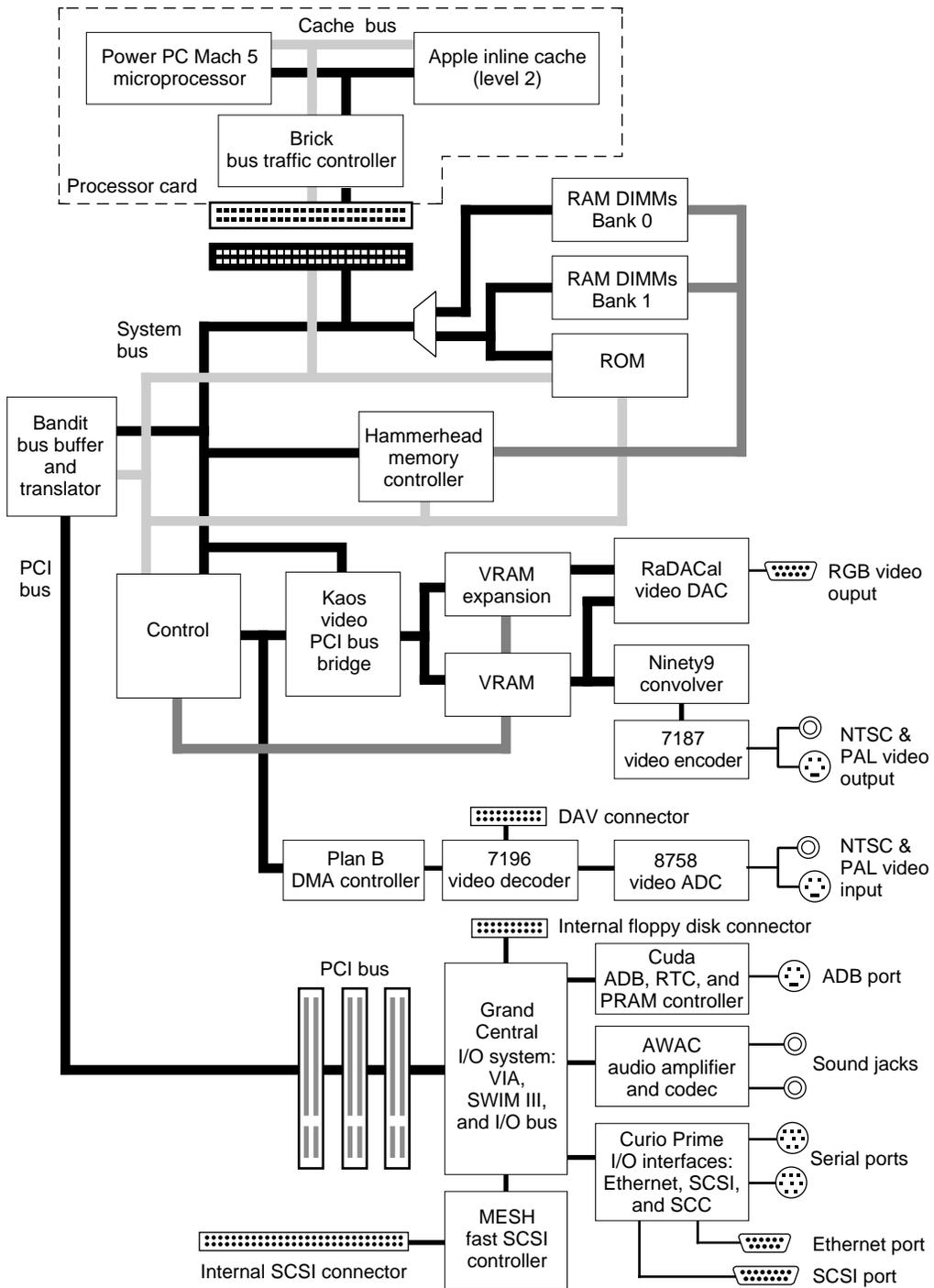
Figure 1-2 Block diagram of the enhanced Power Macintosh 9600
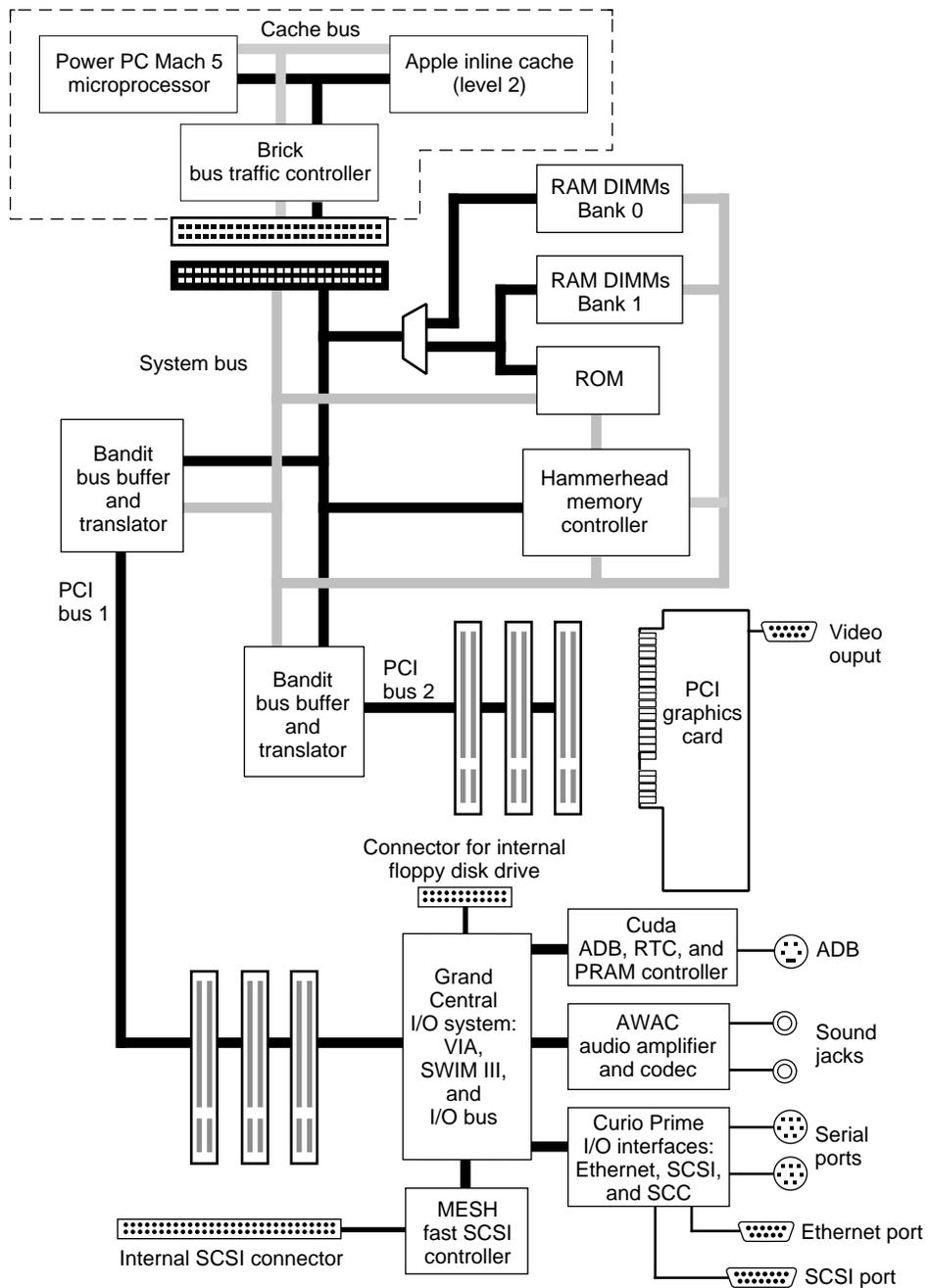
Apple Inline Cache

All the new models include an inline L2 cache soldered on the processor card. The inline cache is made up of pipeline burst static RAM devices and operates in write-through mode. The size of the inline cache on both the new Power Macintosh models is 1 MB.

Hard Disk Size

The size of the built-in hard disk in the new Power Macintosh computers is 4 GB. The hard disk in both the new Power Macintosh models is fast SCSI.

24X-Speed CD-ROM Drive

All the new models include a built-in 24X-speed CD-ROM drive. The drive features a 24X-speed mechanism that supports sustained data transfer rates of 3600 KB per second and a data buffer that further enhances performance.

The drive 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.

Built-in Removable Cartridge Drive

The new models have 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.

Accelerated Display Card

The enhanced Power Macintosh 9600 includes a video display card that supports acceleration of 2D graphics and text. The display card has 8 MB of buffer memory and cannot be expanded.

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

Table 1-3   Display types and pixel depths for the accelerated display card

Resolution (pixels)	Vertical frequency (Hz)	Bits per pixel	Number of colors
512 by 384	60	8, 16, or 24	256, Thousands, or Millions
640 by 480	60 or 67	8, 16, or 24	256, Thousands, or Millions
640 by 870	75	8, 16, or 24	256, Thousands, or Millions
800 by 600	60, 72, 75, or 85	8, 16, or 24	256, Thousands, or Millions

Table 1-3 Display types and pixel depths for the accelerated display card (continued)

Resolution (pixels)	Vertical frequency (Hz)	Bits per pixel	Number of colors
832 by 624	75	8, 16, or 24	256, Thousands, or Millions
1024 by 768	60, 70, 75, or 85	8, 16, or 24	256, Thousands, or Millions
1152 by 870	75	8, 16, or 24	256, Thousands, or Millions
1280 by 960	60, 75, or 85	8, 16, or 24	256, Thousands, or Millions
1280 by 1024	60, 75, or 85	8, 16, or 24	256, Thousands, or Millions
1600 by 1200	60, 65, or 75	8, 16, or 24	256, Thousands, or Millions

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 enhanced Power Macintosh 9600 does not support sync on green. ◆

Configurations

All the new models of the Power Macintosh 8600 and 9600 computers have a 1 megabyte inline L2 cache on the processor card. The internal hard disk in all the new models is 4 GB in size and is fast SCSI, and all the new models have a built-in Zip cartridge drive and a built-in 24X-speed CD-ROM drive.

Besides having different processor clock speeds, the new models differ in the number of PCI expansion slots, the amount of DRAM installed, and the type of video and display support. Table 1-4 shows the configurations of the new models.

Table 1-4 Configurations of the new models

Model	Number of PCI slots	Amount of DRAM	Special features
Power Macintosh 8600/250	3	32 MB	video input and output
Power Macintosh 8600/300	3	32 MB	video input and output
Power Macintosh 9600/300	6	64 MB	video display card with graphics acceleration
Power Macintosh 9600/350	6	64 MB	video display card with graphics acceleration

System Software

The Mac OS installed on the new models is System 7.6.1. For a list of the features of System 7.6.1, see Technote 1096, "System 7.6.1." To find out how to obtain the Technotes, see "Supplemental Reference Documents" on page vii.

Changes in the ROM

The following changes have been made in the ROM software:

- support for the new processor card with Apple inline cache and Brick custom IC (cache and bus controller)
- support for higher clock frequencies and multipliers with the Mach 5 PowerPC
- support for higher bus frequencies

Changes in the Disk Software

The System 7.6.1 software includes support for the new video display card with its 8 MB of RAM and additional display modes.

Mac OS 8 Availability

The newest system software, Mac OS 8, runs on the enhanced Power Macintosh 8600 and 9600 computers. Mac OS 8 will be included with the new computers.

Note
A Technote is available for Mac OS 8. To find out how to obtain a copy of the Technote, see "Supplemental Reference Documents" on page vii. ◆

Compatibility Issues

Except for the changes described in this developer note, the features of the enhanced Power Macintosh 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

Applications can find out which computer they are running on by using the Gestalt Manager. For the Power Macintosh 8600 computer, the gestaltMachineType value returned is 105 (hexadecimal 69) and for the Power Macintosh 9600 the value is 103

(hexadecimal 67). *Inside Macintosh: Overview* describes the Gestalt Manager and tells how to use the `gestaltMachineType` value to obtain the machine name string.

System Software

The Mac OS installed on the new models is System 7.6.1. For a list of the features of System 7.6.1, see Technote 1096, "System 7.6.1." To find out how to obtain Apple Computer's Technotes, see "Supplemental Reference Documents" on page vii.

The new enabler included with System 7.6.1 also supports the earlier counterparts of these computers.

RAM DIMM Specifications

The method of RAM expansion in the new models is essentially the same as in their earlier counterparts: 168-pin, 5-volt, 64-bit DIMMs, as defined in the JEDEC MO-161 specification.

IMPORTANT

Both the previous and the enhanced Power Macintosh 8600 and 9600 computers accommodate 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 Power Macintosh 8600 and 9600 computers can use either extended data out (EDO) or fast page mode (FPM) DRAM devices. The computers always operate the devices in fast page mode.

IMPORTANT

As in the previous Power Macintosh 8600 and 9600 models, only 5-V power is available on the RAM DIMM slots. Devices that require 3.3-V power cannot be used. ▲

Corrected Sense Code Table

Like the earlier Power Macintosh 8500 computer, the Power Macintosh 8600 uses the Apple monitor sense codes to identify the type of monitor that is connected. Table 3-6 on page 30 of the developer note for the Power Macintosh 7500 and 8500 computers showed the sense code values for those computers; that table is incorrect. Table 1-5 is a corrected and expanded version of the original Table 3-6.

Note

The video card in the Power Macintosh 9600 also uses the sense codes to identify the type of monitor, but the card does not support the PAL and NTSC monitors or the obsolete monitors listed in Table 1-5. ◆

Delta Guide to the New Models

Table 1-5   Monitor sense codes

Monitor type	Standard sense code	Extended sense code		
	(S2–0)	(S1,0)	(S2,0)	(S2,1)
Macintosh 21-inch Color Display	0 0 0	—	—	—
Macintosh Portrait Display	0 0 1	—	—	—
Macintosh 12-inch RGB Display	0 1 0	—	—	—
Apple Two-Page Monochrome Monitor	0 1 1	—	—	—
NTSC monitor	1 0 0	—	—	—
15-inch RGB monitor	1 0 1	—	—	—
Apple Multiple Scan 14 and 15 Displays	1 1 0	0 0	0 0	1 1
Apple Multiple Scan 17 and 1705 Displays	1 1 0	0 0	1 0	1 1
Apple Multiple Scan 20 Display	1 1 0	1 0	0 0	1 1
AppleVision 850, 850av, 1710, and 1710av Displays, Macintosh 12-inch Monochrome Display, or AppleColor High Resolution RGB Monitor	1 1 0	1 0	1 0	1 1
PAL monitor	1 1 1	0 0	0 0	0 0
NTSC monitor, with convolution	1 1 1	0 1	0 1	0 0
VGA or SVGA monitor	1 1 1	0 1	0 1	1 1
Macintosh 16-inch Color Display	1 1 1	1 0	1 1	0 1
PAL monitor, with convolution	1 1 1	1 1	0 0	0 0
19-inch RGB monitor	1 1 1	1 1	1 0	1 0
No monitor connected	1 1 1	1 1	1 1	1 1

For a complete description of the sense code system, developers should refer to Technote *HW 30 - Sense Lines*. To find out how to obtain Apple Computer's Technotes, see "Supplemental Reference Documents" on page vii.

Delta Guide to the New Models

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