Macintosh Quadra 950

Developer Note

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Preface

About this note

This developer note provides a preliminary look at the Macintosh Quadra 950 computer, a new model in the high-performance Macintosh Quadra family of computers. Using an MC68040 microprocessor at 33 MHz, the Macintosh Quadra 950 achieves higher performance than any previous Macintosh computer.

Because the Macintosh Quadra 950 is so similar to the Macintosh Quadra 900, this developer note has only one chapter. The chapter describes the features of the Macintosh Quadra 950 that are different from those of the Macintosh Quadra 900. For a complete description of the Macintosh Quadra 900, see *Macintosh Classic II, Macintosh PowerBook Family, and Macintosh Quadra Family Developer Notes.*

This developer note does not constitute a manual and should not be considered complete in its present form. While every attempt has been made to verify the accuracy of the information presented here, it is subject to change without notice. The primary reason for releasing this type of preliminary product information is to provide the development community with essential product specifications, theory, and application information for the purpose of stimulating work on compatible third-party products.

Supplemental reference documents

To supplement the information in this developer note, developers should have a copy of *Macintosh Classic II, Macintosh PowerBook Family*, *and Macintosh Quadra Family Developer Note,* available through APDA. Developers should also have copies of *Inside Macintosh,* including Volumes IV, V, and VI; *Guide to the Macintosh Family Hardware,* second edition; and *Developing Cards and Drivers for the Macintosh Family,* second edition. Those books are available in bookstores and through APDA.

Hardware developers should also have copies of Motorola's *MC68040 User's Manual* and *MC68040 Designer's Handbook.*

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Chapter 1 Introducing the Macintosh Quadra 950

The Macintosh Quadra 950 computer is a new model in the Macintosh Quadra family, similar to the Macintosh Quadra 900. This chapter summarizes the features of the Macintosh Quadra 950 and gives brief descriptions of the features that are different from those of the Macintosh Quadra 900. For a complete description of the Macintosh Quadra 900, see *Macintosh Classic II, Macintosh PowerBook Family, and Macintosh Quadra Family Developer Notes.*

The Macintosh Quadra 950 computer is basically a higher-performance Macintosh Quadra 900. The improved features of the Macintosh Quadra 950 include

■ Faster processor: The MC68040 processor in the Macintosh Quadra 950 runs at 33 MHz instead of the 25 MHz rate used in the Macintosh Quadra 900, for a performance increase of up to 30%.

■ Faster video hardware: The video hardware in the Macintosh Quadra 950 speeds up video performance by as much as 20%. That speed increase is in addition to the increase due to the 33 MHz processor speed; the cumulative increase in video performance can be as much as 50% overall.

■ Improved video on large monitors: The Macintosh Quadra 950 supports the same types of video displays as the Macintosh Quadra 900, and adds 16 bits per pixel for thousands of colors, even on the 21-inch color monitor.

■ Faster I/O bus: The clock frequency for the I/O bus on the Macintosh Quadra 950 is 25 MHz instead of the 16 MHz used on the Macintosh Quadra 900.

The next section gives a summary of the features of the Macintosh Quadra 950 , including those shared with the Macintosh Quadra 900. Later sections of this note describe the improved features of the Macintosh Quadra 950 . The last section tells how to identify the Macintosh Quadra 950 using the Gestalt routine.

Summary of features

Most of the features of the Macintosh Quadra 950 are the same as those of the Macintosh Quadra 900 computer. Foremost of those features are the Motorola MC68040 microprocessor and the built-in video display hardware. The MC68040 has built-in caches, memory management unit (MMU), and floating-point unit (FPU). The computer's built-in video hardware provides 16 bits per pixel or better on all Apple monitors and video performance approaching that of the Macintosh Display Card 8•24GC.

Like the Macintosh Quadra 900, the Macintosh Quadra 950 has intelligent I/O processors (IOPs) on the ports for the floppy disk, Apple Desktop Bus (ADB), and serial I/O. The SCSI interface uses separate ICs for internal and external devices.

Also like the Macintosh Quara 900, the Macintosh Quadra 950 computer has a large case that stands on the floor and provides space for more peripheral devices than the standard Macintosh II case.

The hardware features of the Macintosh Quadra 950 computer include

- Motorola MC68040 microprocessor running at 33.333 MHz
- a large case, designed to stand on the floor
- support for as many as four internal mass-storage devices, including two with removable media
- four banks of dynamic RAM with 4 or 16 MB per bank for a maximum of 64 MB
- built-in video hardware with direct-attach frame buffer using separate video RAM
- a dual-channel SCSI interface for faster internal SCSI devices
- intelligent I/O processors (IOPs) for floppy-disk, ADB, and serial I/O ports
- built-in support for Ethernet by way of an Apple AUI connector
- SuperDrive high-density floppy disk drive with 1.44 MB capacity
- five NuBus expansion slots with NuBus '90 features and space for oversized NuBus cards
- a processor-direct slot (PDS) for low-level hardware expansion
- improved sound capability with integration of sound from CD-ROM
- a key lock for security
- a large power supply, with capacity of 300 watts

Faster processor clock

The system bus clock in the Macintosh Quadra 950 runs at 33.333 MHz. The MC68040 processor receives both the bus clock and a 2X bus clock for internal timing; thus, the MC68040 in the Macintosh Quadra 950 operates at 66.666 MHz internally.

Processor power dissipation

The higher speed of operation causes the MC68040 to consume more power. The manufacturer's worst-case power specification is 7.6 watts at 5.25 volts. To dissipate the resulting heat, the Macintosh Quadra 950 uses a heat sink on the MC68040.

Faster PDS

The PDS attaches to the pins of the MC68040 without any buffers. For a PDS card to operate properly in the Macintosh Quadra 950 , the card must be capable of meeting the 33 MHz timing specifications of the MC68040. Refer to Motorola's *MC68040 Designer's Handbook* for the 33 MHz timing specifications.

Except for the timing changes, the PDS in the Macintosh Quadra 950 is identical to the one in the Macintosh Quadra 900. For pinouts and signal loading specifications, see *Macintosh Classic II, Macintosh PowerBook Family, and Macintosh Quadra Family Developer Notes.*

Faster video hardware

The video RAM (VRAM) in the Macintosh Quadra 950 uses 80 ns devices instead of the 100 ns devices used in the Macintosh Quadra 900. The video controller (DAFB) has been reprogrammed to take advantage of the faster VRAM, speeding up video performance by as much as 20%. That speed increase is in addition to the increase due to the 33 MHz processor speed. The cumulative increase in video performance can be as much as 50% overall.

Improved video on large monitors

On the Macintosh Quadra 900, the best video display available for monitors too large to support at 24 bits per pixel is 8 bits per pixel. The Macintosh Quadra 950 adds support for 16 bits per pixel.

The 16 bit-per-pixel video displays provide up to 32,768 colors. If sufficient VRAM is installed to support 16 bits per pixel on the connected monitor, the user can select 16 bits per pixel by opening the Monitors control panel and choosing Thousands.

Like the Macintosh Quadra 900, the Macintosh Quadra 950 comes with 1 MB of video RAM (VRAM) and sockets for expanding the VRAM to a total of 2 MB. The 1-MB VRAM configuration supports up to 24 bits per pixel on Apple's 12-inch RGB monitor, 16 bits per pixel on the 13-inch and 16-inch RGB monitors, and 8 bits per pixel on 21-inch Apple monitors. The 2-MB VRAM configuration supports up to 24 bits per pixel on Apple's 12-inch, 13-inch, and 16-inch RGB monitors and 16 bits per pixel on Apple's 21-inch RGB monitor.

The Macintosh Quadra 950 also supports 19-inch monitors with 1024 by 768 pixel displays. With 2 MB of VRAM, the Macintosh Quadra 950 supports up to 16 bits per pixel on such monitors.

◆ *Note:* The video hardware in the Macintosh Quadra 950 incorporates several modifications so that it can support 16 bits per pixel. The system software has been changed to accomodate the hardware modifications. Except for the addition of the 16 bit-per-pixel mode itself, the changes should be transparent to application programs.

Faster I/O bus

On the Macintosh Quadra 950 , the clock frequency for the I/O bus is 24.28416 MHz instead of the 15.6672 MHz used on the Macintosh Quadra 700 and Quadra 900. The higher clock frequency reduces latency to I/O devices and provides better throughput on Ethernet.

◆ *Note:* To accomodate the faster I/O bus clock, the Macintosh Quadra 950 uses a 25 MHz version of the Sonic, the DP83932 Ethernet controller IC made by National Semiconductor.

Identifying the Macintosh Quadra 950

Applications can determine which Macintosh model they are running in by using the Gestalt routine. For the Macintosh Quadra 950 computer, the machine type returned from Gestalt is 26. (For the Macintosh Quadra 900 computer, the machine type from Gestalt is 20.)