Power Macintosh 5500 & 6500: Supported Graphics Modes (2/97)

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TOPIC ---

This article contains a description of the video memory and 2D and 3D graphics acceleration support in the Power Macintosh 5500 and 6500 series computers.

DISCUSSION ---

The logic board in the Power Macintosh 5500 and 6500 series computers has the following built-in video and graphics capabilities:

* ATI 3D RAGE II 64-bit graphics and multimedia accelerator (ATI264GT graphics controller (see description below))
* 2 MB of synchronous graphic RAM (SGRAM)
* Hardware acceleration of 2D QuickDraw graphics and video to speed up scrolling text and graphics and screen redraw operations
* Hardware acceleration of video for full screen, full motion, TV-quality playback of Cinepak and MPEG1 QuickTime movies
* Bilinear hardware interpolation and scaling
* Accelerated 3D QuickDraw rendering up to 6 times that of software-only rendering
* Real-time 3D shaded object manipulation, animation, and virtual world navigation
* Includes 16-bit Z buffer for hidden texture surface removal
* Provides six perspectively correct texture-mapping functions
* Alpha blending, transparency, and fog effects
* Flat and Gouraud shading
* Video textures and video lighting

ATI264GT Graphics Controller
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The ATI264GT graphics controller contains the logic for the video display. It includes the following functions:

* Display memory controller, built-in drawing coprocessor, video scaler, color space converter, clock generator, and true color palette video DAC (digital-to-analog converter)
* Video CLUT (color lookup table)
* Hardware graphics acceleration with a 16-bit Z-buffer
* Accelerates QuickDraw 3D rendering up to 6 times that of software-only

acceleration
* True color palette DAC supporting pixel clock rates to 135 MHz for 1280 by 1024 resolution at 75 Hz
* Graphics and video line buffer for superior video scaling and playback quality
* Hardware cursor up to 64 x 64 x 2
* DCC1 and DDC2B plug-and-play monitor support
* Supports synchronous graphics RAM (SGRAM) at up to 67 MHz memory clock, providing a bandwidth up to 536 MB per second
* Graphics control accessible through the QuickDraw , QuickDraw 3D, QuickDraw 3D RAVE, and QuickTime components APIs

A separate data bus handles data transfers between the ATI264GT IC and the display memory. The display memory data bus is 64 bits wide, and all data transfers consist of 32 bits at a time. The ATI264GT IC breaks each 64-bit data transfer into several pixels of the appropriate size for the current display mode--4, 8, 16, 24, or 32 bits per pixel.

The ATI264GT IC uses several clocks. Its transactions are synchronized with the PCI bus. Data transfers from the frame-buffer RAM are clocked by the MEM_CLK signal, which runs at 67 MHz. Data transfers to the CLUT and the video output are clocked by the dot clock, which has a different rate for different display monitors.

The 2D graphics accelerator is a fixed-function accelerator for rectangle fill, line draw, polygon fill, panning/scrolling, bit masking, monochrome expansion, and scissoring.

Video Memory & QuickDraw 3D Acceleration

The display memory on the Power Macintosh 5500 and 6500 computers is separate from the main memory. The display memory consists of 2 MB of 12-nanosecond (ns) SGRAM devices configured to make a 64-bit data bus. The display memory cannot be expanded. The display data generated by the computer can have pixel depths of 8, 16, or 32 bits for monitors up to 832 by 624 pixels, 8 or 16 bits for larger monitors up to 1152 by 870 pixels, and 8 bits for monitors supporting 1280 by 1024 pixels. Data from the video input module is always stored and transferred at 16 bits per pixel. The video frame buffers support live video in a 320-by-240 pixel frame at 30 frames per second.

Although the display modes up to 1152 by 870 at 16 bits of resolution are supported, the largest supported display size is useful for standard 2D applications. For 3D applications, the 2 MB of video memory space is used differently, which restricts the useful display size and supported bit depth.

For example, QuickDraw 3D uses double buffering if the hardware supports it. Double buffering immediately reduces the available video memory for application use. In addition, 3D applications that use a Z buffer for hidden texture removal have even less space available for caching textures to increase graphics rendering speed.

To get the most performance out of 3D applications in the 2 MB of video memory, the display mode size should be reduced. A 512 by 384 display mode is provided

specifically for increasing the available memory space for texture caching to improve 3D graphics rendering speed.

Hardware acceleration for 3D applications is not provided for all of the supported 2D display modes. Refer to the tables below for specific information.

Power Macintosh 6500 Video Input and Graphics Acceleration Display Modes

Begin_Table

Display Resolution	Pixel Depth	Vertical Scan Rate	Video Input	QuickDraw 2D Acceleration	QuickDraw 3D Acceleration
512 x 384	8	70 Hz	Yes	Yes	No
512 x 384	16,32	70 Hz	Yes	Yes	Yes
640 x 480	8	60,67,72,75,85 Hz	Yes	Yes	No
640 x 480	16	60,67,72,75,85 Hz	Yes	Yes	Yes
640 x 480	32	60,67,72,75,85 Hz	Yes	Yes	Depends on application window size
640 x 870	16	75 Hz	Yes	Yes	No
800 x 600	8,32	56,60,72,75,85 Hz	Yes	Yes	No
800 x 600	16	56,60,72,75,85 Hz	Yes	Yes	Depends on application window size
832 x 624	8,32	75 Hz	Yes	Yes	No
832 x 624	16	75 Hz	Yes	Yes	Depends on application window size
1024 x 768	8,16	60,70,75 Hz	Yes	Yes	No
1152 x 870	16	75 Hz	Yes	Yes	No
1280 x 980	8	75 Hz	Yes	Yes	No
1280 x 1024	8	60,75 Hz	Yes	Yes	No

End_Table

Power Macintosh 5500 Video Input and Graphics Acceleration Display Modes

Begin_Table

Display Resolution	Pixel Depth	Vertical Scan Rate	Video Input	QuickDraw 2D Acceleration	QuickDraw 3D Acceleration
640 x 480	8	60,67 Hz	Yes	Yes	No
640 x 480	16	60,67 Hz	Yes	Yes	Yes
640 x 480	32	60,67 Hz	Yes	Yes	Depends on application window size
800 x 600	8,32	60,72 Hz	Yes	Yes	No
800 x 600	16	60,72 Hz	Yes	Yes	Depends on application window size
832 x 624	8,32	75 Hz	Yes	Yes	No
832 x 624	16	75 Hz	Yes	Yes	Depends on application window size
1024 x 768	8,16	60 Hz	Yes	Yes	No

End_Table

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