

WHITE PAPER

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Compaq Computer
Corporation

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Compaq Professional Workstation SP700 Key Technologies White Paper

The purpose of this paper is to provide an overview of the Key Technologies incorporated into the Compaq Professional Workstation SP700. This paper concentrates on covering those features and technologies that have unique customer benefits. The objective is to provide the technical information and benefits of these features.

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Compaq Professional Workstation SP700 Key Technologies White Paper

September 1998

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NEW COMPAQ PROFESSIONAL WORKSTATION SP700

The Compaq Professional Workstation SP700 is the first member of the new Scalable Performance (SP) Line of Compaq Professional Workstations. The Scalable Performance Line is founded upon industry accepted standards and designed specifically for users requiring scalability, expandability, and optimal performance.



Based on the Microsoft® Windows NT® operating system, this new Compaq Professional Workstation keeps pace with today's most demanding applications by delivering uncompromising power and scalability in an industry standard architecture. The SP700 challenges UNIX-based system performance and sets new standards for high-performance Windows NT-based systems. Incorporating the second generation Highly Parallel System Architecture design, Intel Pentium® II Xeon™ processors, new high-performance 2D and 3D AGP graphics solutions, IEEE 1394, and the latest component technologies, the Compaq Professional Workstation SP700 delivers industry-leading performance coupled with unprecedented reliability.

The SP700 is ideal for any professional specializing in compute-intensive applications. Users who have made the strategic architectural decision to move from RISC-based UNIX systems to Intel workstations running Windows NT will experience comparable, if not higher, performance levels at a substantially lower total cost of ownership. The SP700 combines a robust industry standard platform, testing and certification of leading high-end software applications, and traditional Compaq quality to provide optimal performance and compatibility.

Target markets for the Professional Workstation SP700 include:

- **Mechanical CAD and CAM** designers performing functional, tool and fixture, conceptual and plant design. Example applications include: Parametric Technology Corporation's Pro/ENGINEER and DesignWave; SDRC's I-DEAS Master Series and Metaphase Series 2; EDS Unigraphics' Unigraphics and SolidEdge; and Dassault Systemes' CATIA and CADAM.
- **CAE** professionals utilizing design and simulation analysis to predict fluid flow, statics and dynamics, heat and mass transfer, chemical reaction, and related phenomena. Example applications include: MARC Analysis Research Corporation's: MARC and Menat; Fluent, Inc.'s FLUENT, FIDAP, and POLYFLOW; and ANSYS, Inc.'s ANSYS Family of Products.
- **Digital Content Creators (DCC)** performing design tasks, such as animation frame rendering, 3D imaging, and video editing. Example applications include: Softimage's Digital Studio and Softimage 3D; Alias|Wavefront's Maya, Studio, and PowerAnimator 8.0; Kinetix's 3D StudioMAX, Character Studio, and Viz; Avid's Symphony and Media Composer; and Pinnacle Systems' Reeltime.

- **Electronic Design Automation (EDA)** engineers involved in simulation, synthesis, verification, and automated place and route. Example applications include: Cadence's Verilog XL Turbo and SPECCTRAquest; Mentor Graphics' Boardstation, Calibre, xCalibre, and Interconnectix; Synopsys' Design Compiler, VCS, and XTK for Windows; Avant!'s HSPICE and Hercules; OrCAD's PSPICE; Silvaco's SmartSPICE; and Ambit's BuildGates.
- **Financial Analysis and Risk Management** professionals performing real-time financial analysis and portfolio risk management. Example applications include: NeoVision Hypersystems, Inc.'s Heatmaps and RiskMaps; Decisioneering, Inc.'s Crystal Ball and Analytica; TIBCO's TIB and MarketSheet; and Reuters' Reuters RTW and KOBRA.
- **Geographic Information Systems (GIS)** professionals who manage, manipulate, analyze, and display geographic data and attribute data. Example applications include: Earth Resource Mapping's ER Mapper V5.5, ERDAS' IMAGINE VirtualGIS V8.3, Autometric's EDGE.

INTEL PENTIUM II XEON PROCESSOR

In today's increasingly competitive business environment, workstation users need high-performance workstations to enhance productivity and maintain their competitive edge. The Pentium II Xeon is the first in a family of processors designed specifically for workstation and server users who require the highest level of performance from an Intel-based Windows NT workstation. The Intel Pentium II Xeon offers:

- High performance on key industry benchmarks delivered by a balanced architecture for processor, memory, graphics, and I/O.
- Seamless integration of Intel-based workstations into the corporate network.
- A single platform for business productivity and complex enterprise and technical applications.
- Built-in multiprocessing capabilities and other features essential for the workstation market.

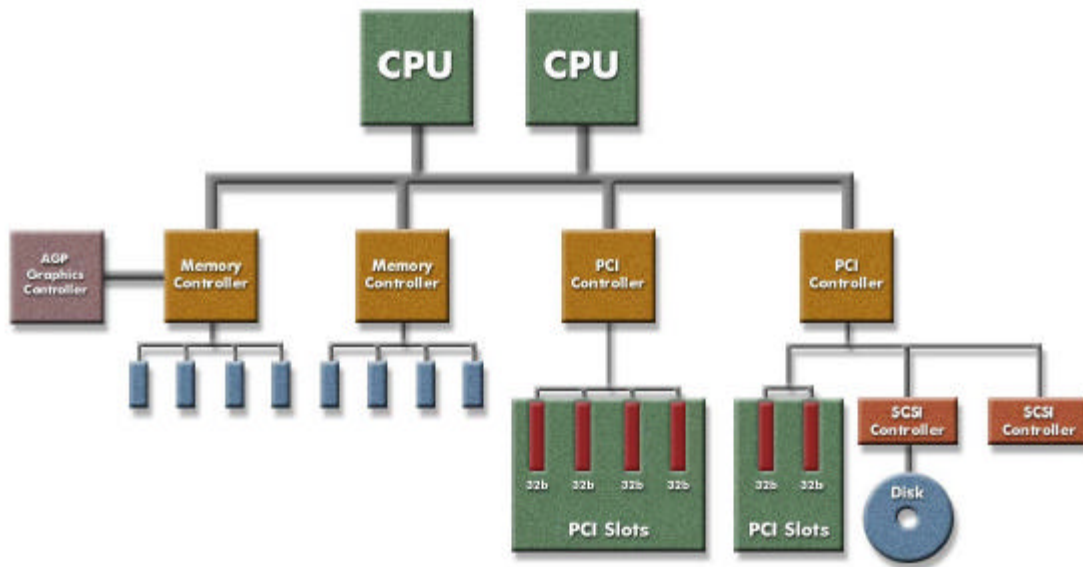
The Compaq Professional Workstation SP700 uses the Intel Pentium II Xeon processor to provide a high-performance, industry standard, Windows NT workstation. The Pentium II Xeon processor enhances Pentium II processor technology with additional scalability and breakthrough performance. To support the large application sizes, data sets, and I/O demands of workstation applications, the Pentium II Xeon processor is designed with a state-of-the-art system architecture for more balanced throughput between the processors, memory, graphics, and I/O. The Pentium II Xeon processor includes the Dynamic Execution micro-architecture, a Dual Independent Bus architecture, 100-MHz front side bus, seamless multiprocessing with built-in cache coherency, full-speed level 2 cache, and ECC memory. The Slot-2 form factor allows the Pentium II Xeon processor to support cache sizes ranging from 512 KB to 1 MB for the SP700. All of these features are designed to optimize performance in demanding, resource-intensive workstation applications.

For more information about the Pentium II Xeon processor, visit Intel's web site at: www.intel.com/intel/product

HIGHLY PARALLEL SYSTEM ARCHITECTURE

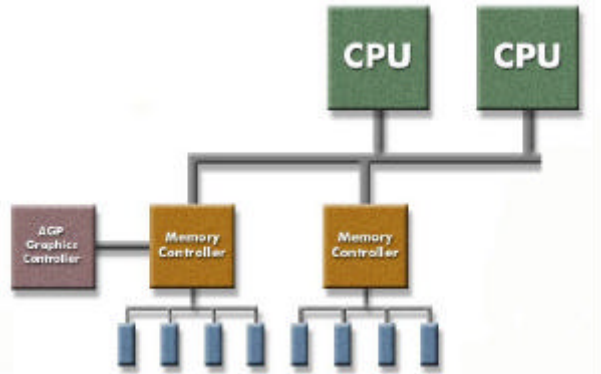
Compaq Workstation engineers conducted extensive application profiling to understand the nature of the bottlenecks inherent when running complex, resource-intensive applications, such as those found in CAD/CAE, EDA, DCC, and financial analysis environments. The Compaq Professional Workstation SP700 is designed with a standards-based Highly Parallel System Architecture that maximizes system bandwidth to improve performance in demanding, resource-intensive applications. Most workstations in the NT/X86 market support two CPUs to process instructions concurrently. However, overall system bandwidth is limited since each CPU must compete for access to critical subsystems, such as memory and I/O, for which the bandwidth has not been correspondingly increased.

The Highly Parallel System Architecture used with the Compaq Professional Workstation SP700 addresses the need for greater overall system bandwidth by using dual memory controllers, dual-peer PCI buses, dual channel SCSI buses, AGP 2X support, and optimized multiprocessing support.

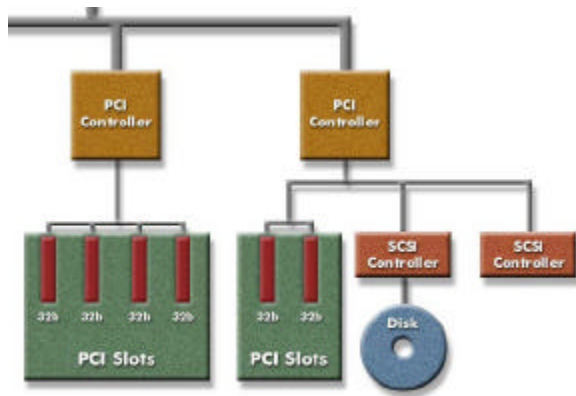


Dual Memory Controllers

The Compaq Professional Workstation SP700 uses dual memory controllers that can process memory requests in parallel, significantly increasing overall memory bandwidth. Other workstations in the Intel-based Windows NT market that use a single memory controller, such as the 440BX/GX AGPset, offer memory bandwidth of up to 800 MB/s. The Compaq Professional Workstation SP700 uses two memory controllers, each with a bandwidth of 800 MB/s. Therefore, total memory bandwidth increases to 1.6 GB/s, two times that of other systems. The SP700 can support up to 4 GB of system memory (using eight 512-MB DIMMs), more than any other Intel-based Windows NT workstation. Larger memory expandability gives the Compaq Professional Workstation SP700 greater ability to run memory-intensive applications with large data sets, such as NASTRAN and VCS.



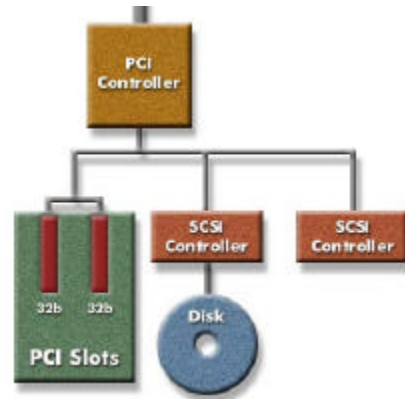
Dual-Peer PCI Buses



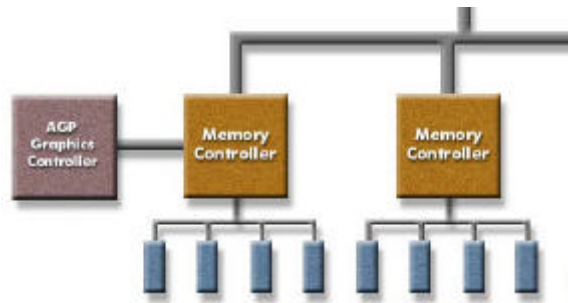
The Compaq Professional Workstation SP700 uses dual-peer PCI buses to increase system I/O bandwidth. A single PCI bus provides I/O bandwidth of 133 MB/s, which must be shared by many key peripherals, such as the SCSI controllers, array controllers, and NIC. With dual-peer PCI buses, each bus can provide peak bandwidth in parallel with the other controller, allowing an aggregate I/O bandwidth of 267 MB/s. Also, the dual PCI buses allow key peripherals to be connected to separate buses to balance system throughput.

Dual Channel SCSI Buses

The Compaq Professional Workstation SP700 uses dual, independent channel Wide-Ultra SCSI controllers, which balance the disk subsystem work load and performance by placing high-performance peripherals on separate buses. Using dual SCSI buses provides the capability of separating lower performance SCSI devices, such as tape backup devices, from high performance devices, such as 10,000 rpm hard drives and RAID arrays. The dual Wide-Ultra SCSI implementation also doubles the bandwidth to the disk subsystem, providing an aggregate bandwidth of 80 MB/s (40 MB/s per controller) when compared to single SCSI bus systems.



AGP 2X Support



The AGP bus is an I/O port that directly links the graphics controller to system memory. By providing a dedicated path to system memory, AGP provides faster graphics performance when 3D applications use texture mapping or extensive command lists that require more data support than is available in local memory on the graphics subsystem. The Compaq Professional Workstation SP700 fully supports the Accelerated Graphics Port (AGP) 2X specification.

Optimized Multiprocessing Support

Finally, the SP700 delivers optimized multiprocessing performance by combining the Intel Pentium II Xeon processors with the Compaq Highly Parallel System Architecture. Some manufacturers have added multiple processors to a typical desktop system design and called the end result a “workstation.” In contrast, Compaq engineers have designed a standards-based architecture that increases the bandwidth of critical subsystems to complement the multiprocessing capabilities of the system. This balanced approach to system design ensures maximum performance in applications that stress more than just the processor.

MEMORY

The Compaq Professional Workstation SP700 uses 100-MHz Registered ECC Synchronous DRAM (SDRAM) and can support up to 4 GB of memory (using eight 512-MB DIMMs), which is up to twice the amount of other competitive Intel-based Windows NT workstations. The memory architecture used on the Compaq Professional Workstation SP700 also allows for added flexibility when configuring memory by providing 8 DIMM slots. This allows users to reach larger memory capacities without having to use newer, more expensive memory technologies. For example, the Compaq Professional Workstation SP700 can be configured with 1 GB of RAM by using eight 128-MB DIMMs instead of four 256-MB DIMMs. Currently, one 256-MB DIMM costs 50% more than two 128-MB DIMMs. So, using smaller capacity DIMMs is cost effective and delivers the best performance when the DIMMs are split between the two memory controllers. SDRAM is designed to accommodate higher processor speeds and provides faster memory operation with burst data rates of up to four times that of standard page-mode DRAMs. The new burst mode addresses an entire block of data rather than one piece at a time. Most importantly, SDRAM is synchronized with the CPU system clock to allow continuous data flow. Estimated performance increases are 2% for cached systems and 10% for non-cached systems.

The 100-MHz SDRAM, along with the 100-MHz Front Side Bus, are designed to accommodate higher microprocessor speeds and to provide faster memory operation.

CUSTOMER BENEFITS

There are clear benefits to SDRAM compared to the previous memory technology, EDO (extended data output) DRAM. Some key benefits are:

- **Increased performance.** Customers will experience greater CPU responsiveness with SDRAM technology. New generations of SDRAM will support new high-speed Pentium II Xeon 450-MHz technologies that EDO DRAM cannot support.
- **Faster bus speeds.** SDRAM can run up to 100 MHz, while the maximum bus speed that EDO DRAM can run is 66 MHz.
- **Perfect match for demanding applications.** As graphics and software programs become more and more complex, SDRAM is better suited to handle these advances compared to EDO SDRAM because of its higher bus speed.

ACCELERATED GRAPHICS PORT (AGP)

Today's three-dimensional graphic applications consume large amounts of memory bandwidth. Consequently, the proliferation of 3D applications is increasing the need for high-speed access to larger amounts of graphics memory. AGP is an industry standard solution to improve the bandwidth between the graphics accelerator and the system memory so that a portion of the 3D rendering data structures can be shifted into main memory. The higher bandwidth of AGP (compared to PCI) also improves the sharing of rendering tasks between the system processor and the graphics accelerator.

AGP improves system performance by establishing pipelined access to the system's main memory and effectively reducing latency. AGP transfers data up to four times faster than PCI, utilizing the bandwidth of a 100-MHz system memory bus more efficiently. The maximum data transfer rate of AGP is 533 MB/s, compared to 133 MB/s for PCI.

CUSTOMER BENEFITS

Some specific applications that can benefit from AGP include:

- Video applications, like conferencing or DVD playback, where a steady stream of images must be sent from system memory to the graphics frame-buffer for display.
- Graphics command lists, such as lengthy data sets defining vertices for 3D objects.
- Texture memory for 3D rendering, where textures are overlaid on 3D objects for realistic effects. To improve realism, texture sizes will grow to 32 MB and beyond in 1999.

Note: 3D texture data is the most immediate and important target opportunity for AGP. By shifting texture data to system memory, bandwidth load and memory size can be balanced between system and local graphics frame-buffer memory. The bandwidth and space required for textures are split between the heavily loaded frame-buffer and the (comparatively) lightly loaded system memory. Since texture data is not persistent (unlike display buffers), system memory used for texture data is returned to the free memory heap when a 3D application concludes.

To gain the full benefit of AGP performance, the system must have the following features:

- Pentium II or Pentium II Xeon class microprocessors

Note: While AGP could be adapted to Pentium-class processors, the floating point and processing power of the Pentium II and Pentium II Xeon class products are a better fit.

- AGP Sideband and Pipeline functions in the core logic, which improve data transfer efficiency
- 100-MHz system memory architecture to meet system processor and AGP bandwidth demands
- Microsoft Windows® 95 OSR2.1, Windows 98, or Windows NT 5.0 operating systems to provide necessary memory management services

Note: Windows NT 4.0 can operate AGP subsystems as PCI 66MHz-type devices only.

GRAPHICS

Two graphics solutions are available for the Compaq Professional Workstation SP700. Both are AGP controllers, which take advantage of main memory for texture mapping operations. All controllers have been tested to ensure optimum compatibility and reliability.

- For 2D and entry 3D applications, the Compaq Professional Workstation SP700 includes the ELSA GLoria Synergy+ (AGP). The ELSA GLoria Synergy+ comes standard with 8 MB of SGRAM. It provides fast 2D windowing and is a great low-cost 3D solution for CAD and DCC applications.
- For mid-range 3D graphics needs, the Compaq Professional Workstation SP700 includes models with the Compaq PowerStorm 300 (AGP) graphics controller. The Compaq PowerStorm 300 is a high-performance, 3D graphics solution for users working in demanding, true color environments. It uses the high-performance REALimage 2100 rendering engine from Evans & Sutherland, provides true color resolution (16 million colors) at up to 1280 x 1024 resolution, and is ideal for higher-end 3D graphic requirements, such as Pro/ENGINEER. This controller comes standard with 15-MB 3D-RAM for frame and Z-buffer memory and 16 MB of Cache DRAM (CDRAM) for texture memory.

For more information about our graphics offering refer to:

<http://www.compaq.com/products/workstations/graphics>

Compaq Graphics Driver Compatibility

All controllers are high-performance graphics solutions, optimized for Windows NT applications that require up to 16.7 million color processing and high resolutions. The drivers for each are developed by their respective manufacturers and have been thoroughly tested by Compaq to ensure compatibility with existing applications.

ELSA GLoria Synergy+ (AGP) Graphics Controller

The ELSA GLoria Synergy+ (AGP) graphics controller in the Compaq Professional Workstation SP700 comes standard with 8 MB of SGRAM to provide greater color depth in higher resolution modes. It is a low-cost, high-performance leader in the 2D/3D segment. This controller is based on the Permedia-2A graphics engine from 3Dlabs. It provides the 2D performance of a Matrox Millennium II while adding a robust 3D environment that rivals the performance of previous GLINT Delta/TX boards, such as the GLoria-L. The GLoria Synergy+ is the perfect low-cost solution for mainstream CAD, web authoring, pre-print, and 2D/3D animation applications that do not require greater than 1024x768 resolution for true-color rendering. The GLoria Synergy+, as an AGP device, can also take advantage of main memory for texture mapping operations through the use of Compaq's GART mini-port driver. This is a feature that will be supported in Windows NT 5.0 from Microsoft; however, only available in Windows NT 4.0 through Compaq's standard implementation. Unified 2D/3D graphics controllers available for the Compaq Professional Workstation provide exceptional performance at a low cost. Professionals who require fast window and menu level performance, as well as robust 3D rendering capabilities, use 2D/3D graphics.

Requirements for the 2D/3D graphics segment include exceptional 2D/3D-vector performance, 3D shading and lighting, and texture mapping support. These features, used by mainstream OpenGL and Heidi-based applications, typically offer great price and performance without sacrificing required functionality. This combination is important for mainstream CAD applications, such as AutoCAD, Microstation, and SolidWorks, which have recently integrated 3D techniques into their environment. It is also useful in DCC where 2D and 3D animation applications are used in the same environment. Financial analysis and trading environments can benefit from the 2D performance provided by these solutions. Graphics controllers in this segment also provide investment protection as financial analysis application developers add 3D modeling to their environment.

Color and Resolution Support

Resolution	8-MB SGRAM	Maximum Refresh Rate
1920x1200	32,768	75 Hz
1920x1080	32,768	80 Hz
1600x1280	32,768	85 Hz
1600x1200	32,768	85 Hz
1600x1000	32,768	100 Hz
1536x1152	32,768	85 Hz
1280x1024	16.7 million*	80 Hz
1152x864	16.7 million	100 Hz
1024x768	16.7 million	100 Hz
800x600	16.7 million	100 Hz
640x480	16.7 million	100 Hz

* 1280 x 1024 can run in a double-buffered visual if it is reduced to 32,768 colors

Features and Technical Specifications

The following features are included in the ELSA GLoria Synergy+:

- Provides 2D windowing performance equivalent to the Matrox Millennium II
- A low-cost solution for professional 3D applications, such as AutoCAD, Microstation, SolidWorks, and 3D StudioMAX
- Supports a wide range of resolutions and color depths for flexibility and performance in a variety of 3D graphics environments
- Supports up to 4 displays using additional GLoria Synergy controllers (PCI)
- Uses 3Dlabs Permedia-2A processor for highly integrated 2D and robust 3D rendering requirements

- Comes standard with 8 MB of SGRAM
- Supports up to 1920x1200 resolution at 16 bpp
- Provides a 24-bit double buffered environment at 1024x768 resolution (16-bit/single buffer at 1280x1024 including a 16-bit Z-buffer)
- Optimized graphics drivers for OpenGL and Heidi under Windows NT 4.0 and 3.51, display list drivers for AutoCAD, Direct3D driver for Windows 95

Features	Technical Specifications
Controller	3Dlabs Permedia-2A
Bus Type	AGP
RAMDAC	Integrated 250 MHz
Memory Type	SGRAM
Memory Amount	8 MB standard
Memory Speed	8 ns
Data Path	64-bit
Controller Clock Speed	90 MHz
Maximum Vertical Refresh Rate	219 Hz
Maximum Horizontal Scan Rate	281 kHz
Maximum Pixel Clock	250 MHz at 8 bpp and 16 bpp/5:5:5 145 MHz at 32 bpp/8:8:8
3D Graphics Features:	VGA
• Integrated geometry pipeline setup processor	Yes
• True-color 3D graphics	Yes
• Polygon based with Z-buffer	Yes
• Texture decompression	Yes
• Full scene anti-aliasing	Yes
• Enhanced GUI	Yes
Acceleration:	
• Ultra-fast BLT engine and 2D rasterizer	Yes
• Stretch BLTs, mono/color expansion and logic ops	Yes
• Fast on-chip SVGA	Yes
• AutoDesk Display list driver	Yes
• Heidi drivers support for 3D StudioMAX	Yes
Operating Systems	Windows 95 Windows 98 Windows NT 3.51/4.0

Compaq PowerStorm 300 (AGP)

Professionals that use high-end applications require the performance of mid-range 3D graphics solutions. CAD and CAE applications, such as Pro/E, Unigraphics, I-DEAS, CATIA, NASTRAN, and Hypermesh, take advantage of this graphics controller to provide a high performance rendering solution for solids modeling and visual data analysis. The PowerStorm 300 also provides superior performance and visual quality for DCC applications, such as Softimage, 3D StudioMAX, and Maya. System performance is key for these applications where the graphics controller must not be perceived as a bottleneck.

The PowerStorm 300 is an optimized, high-performance solution for 3D graphics requirements in this segment. Based on the next-generation REALimage 2000 architecture from Evans & Sutherland, it provides the fastest 3D-application performance in its class.

Color and Resolution Support

Resolution	3D Acceleration with Double Buffering, Colors Supported	Texture Memory	Maximum Refresh Rate
1280x1024	16.7 million	16 MB	85 Hz
1024x768	16.7 million	16 MB	85 Hz
800x600	16.7 million	16 MB	85 Hz
640x480	16.7 million	16 MB	85 Hz

Features and Technical Specifications

The PowerStorm 300 provides:

- Optimized solution at 1280x1024, true-color double buffered for demanding solids modeling, animation, and visualization applications
- Next-generation, high-performance rendering engine based on the Evans & Sutherland REALimage 2000 architecture
- 15-MB 3D-RAM for frame buffer and Z-buffer, 16-MB CDRAM (cache DRAM) for fast texture buffering
- Dual display support using an additional PCI controller

Features	Technical Specifications
Controller	Evans & Sutherland REALimage 2100
Bus Type	AGP
RAMDAC	IBM 640
Memory Type	3D RAM and CDRAM
Memory Amount	15-MB 3D RAM, 16-MB CDRAM
Memory Speed	10-ns 3D RAM, 15-ns CDRAM
Data Path	64-bit
Controller Clock Speed	100 MHz
Maximum Vertical Refresh Rate	120 Hz
Maximum Pixel Clock	220 MHz
Hardware Accelerated 3D:	
• 24-bit Z-buffering	Yes
• Gouraud Shading	Yes
• Stencils	Yes
• Texture Mapping (bilinear and trilinear)	Yes
Performance:	
• Random 10-Pixel Solid Lines	4 million/s
• Filled 25-Pixel Triangles	4 million/s
Pixel Fill Rates:	
• Bilinear	90 million/s
• Trilinear	45 million/s
Operating System	Windows NT 4.0

CHASSIS FEATURES

The Compaq Professional Workstation SP700 chassis has been designed for ease of service and expandability. The unit is opened using thumbscrews (no tools are required) and a single side panel. After the side panel is removed, most of the components are visible. The Compaq Professional Workstation SP700 uses an expansion board assembly, which holds the PCI and ISA expansion slots and is removable. The system board is attached to a tray and slides out for easy removal or replacement. The internal drive cage is also removable and makes adding additional hard drives easier. The Compaq Professional Workstation SP700 chassis has also been designed to be rack mounted, using an optional rack mounting conversion kit.



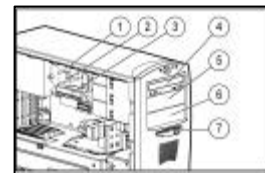
SP700 Chassis

The Compaq Professional Workstation SP700 chassis is very expandable; it has a total of nine expansion slots: five PCI, two ISA, one shared PCI/ISA, and one AGP (populated by graphics controller). There are also seven drive bays: three internal 3.5" (one populated by hard drive), three 5.25" user-accessible drive bays (one populated by the CD-ROM drive), and one 3.5" diskette drive.

WIDE-ULTRA SCSI SMART HARD DRIVES

The Compaq Professional Workstation SP700 comes standard with a one-inch 4.3-GB or 9.1-GB 10,000 rpm hard drive, depending on the model. The standard hard drive is located in the internal removable drive cage, leaving two one-inch internal drive bays available. The Compaq Professional Workstation SP700 supports up to five one-inch 10,000 rpm hard drives or four 1.6-inch 10,000 rpm hard drives. This internal expandability is ideal for the customer who requires large amounts of data to be stored on their workstation. For those customers who require more storage, Compaq has included a dual-channel Wide-Ultra SCSI controller, which allows for external SCSI devices, such as additional hard drives.

Bay	Bay Width	Bay Height	Device Configuration
1	3.5 inch	Third	Part of the removable hard drive cage. Supports a 1.0-inch hard drive or a 1.6-inch hard drive.
2	3.5 inch	Third	Part of the removable hard drive cage. Supports a 1.0-inch hard drive. Bay 2 is not available when a 1.6-inch hard drive is installed in either bay 1 or 3.
3	3.5 inch	Third	Part of the removable hard drive cage. Supports a 1.0-inch hard drive or a 1.6-inch hard drive.
4	5.25 inch	Half	Supports 1.6-inch CD-ROM only.
5	5.25 inch	Half	Supports 1.0-inch or a 1.6-inch storage device. If installing 10,000 rpm hard drives, option 10,000 rpm Drive Cooling Kit is required.
6	5.25 inch	Half	Supports 1.0-inch or a 1.6-inch storage device. If installing 10,000 rpm hard drives, option 10,000 rpm Drive Cooling Kit is required.
7	3.5 inch	Third	Supports a 1.0-inch storage device. A 3.5-inch diskette drive is standard.



SP700 drive bays



Internal removable drive cage

INTEGRATED NETWORK INTERFACE CONTROLLER (NIC)

With its new Compaq Fast Ethernet Embedded NIC NC3121 (10/100 Mb/s), Compaq dramatically simplifies the network management task and lowers the total cost of ownership in today's businesses. The Wake on LAN (WOL) feature enables remote system power-up and maintenance during non-working hours, making it easy to perform routine updates, audits, and other management operations without interrupting end users. Moreover, because the new NIC operates at both 10 and 100 Mb/s, it is an ideal solution for environments that are migrating towards Fast Ethernet.

For maximum flexibility in designing your business' network, the NC3121 NIC conforms to the full range of today's industry standards, including PC97. It is compatible with both Compaq and Intel Fast Ethernet drivers, allowing MIS departments to standardize on one set of drivers. The SNMP-compliant NC3121 can be remotely monitored with Compaq's Insight Manager, Compaq's CNMS network management software, HP Openview, or any other SNMP compliant management solution.

Performance and connectivity are further enhanced by the NC3121's 10/100 Mb/s autosensing, auto-negotiating feature, which enables the NIC to automatically negotiate between 10 and 100 Mb/s and achieve the highest common speed on the network. Full duplex support allows the controller to transmit and receive data simultaneously for data rates up to 20 Mb/s for Ethernet and 200 Mb/s for Fast Ethernet, and 6-KB buffer memory produces low CPU utilization at high throughputs.

IEEE 1394

1394 is an IEEE standard for a high-speed, low cost serial bus that has been developed by an IEEE committee. Among other things, 1394 is designed to be a global interconnect, which eliminates the need for many different I/O interconnects. The net result is port integration, board space consolidation, and system-level cost reduction.

The Compaq Professional Workstation SP700 includes two IEEE 1394 connections. The IEEE 1394 standard describes a flexible, high-speed, serial bus that allow multi-media and peripheral devices, such as digital camcorders, video recorders, still cameras, scanners, and storage media, to share real-time information. To use the IEEE 1394 connections, Windows 98 or Windows NT 5.0 must be installed on the SP700. Both Windows 98 and Windows NT 5.0 have been designed to take full advantage of the capabilities of the IEEE 1394 standard features listed below.

- **High speed:** 100/200/400 Megabits per second
- **Real-time data transmission:** Bandwidth for time-sensitive applications, such as audio and video
- **Universal I/O interconnect:** Global interconnect for a variety of devices
- **Superior cabling:** Uses small, flexible, and inexpensive cables
- **Flexible topology:** Easily expandable to support up to 63 devices by "daisy-chaining"
- **Plug and Play:** Automatically reconfigures itself, no termination needed
- **"Live" insertion and removals:** Hot plug capability built-in



OTHER KEY TECHNOLOGIES

32X CD-ROM

The Compaq Professional Workstation SP700 features a 5.25-inch, half-height tray-load 32X Maximum CD-ROM Drive using the new Constant Angular Velocity (CAV) technology. Previous CD-ROM technology used Constant Linear Velocity (CLV) technology, which allowed the disc to rotate at a faster rate while reading the inner tracks and a slower rate when reading the outer tracks. Conversely, CAV technology spins the disc at a fixed rate and the data transfer rate increases as it moves toward the outer tracks. This is the same technology that is used for hard drives where it has demonstrated excellent performance in high data transfer and fast access times. This technology enables reliable CD-ROM speeds above 8X. The 32X CAV CD-ROM dramatically increases the access time performance of the CD-ROM in the Compaq Professional Workstation SP700.

PremierSound™ Audio

The Compaq Professional Workstation SP700 PremierSound audio system is a solution optimized for workstations. The signature performance characteristics of a PremierSound audio system are exceptional sound output and clarity from a completely integrated, “no desktop clutter,” audio solution. This is the same PremierSound found on the Compaq Professional Workstation AP200, AP400, and AP500.

The PremierSound audio system is comprised of several subsystems, each individually optimized to work as a complete solution. The core subsystems incorporated into the SP700 PremierSound audio design are:

- High performance, custom-designed, 40x70 mm loudspeaker
- Low distortion, 5-watt (RMS) amplifier
- Six stages of fixed equalization
- Electrical system gain staging to provide a large output, low distortion audio signal

The end result of the interaction between the subsystems is a well-balanced audio system capable of delivering clean, undistorted output at a level needed to support an office environment.

Universal Serial Bus (USB)

The Compaq Professional Workstation SP700 includes two Universal Serial Bus (USB) ports. USB enables hot plug and play of computer peripherals outside of the workstation eliminating the need to install boards into expansion slots and then having to reconfigure the system. Workstations equipped with USB allow peripheral devices to be automatically configured as soon as they are physically attached, without the need to reboot or run setup. The USB also allows up to 127 devices to run simultaneously with peripherals such as monitors and keyboards acting as additional plug-in sites or hubs.

USB peripherals include telephones, modems, keyboards, mice, CD-ROM drives, joysticks, tape and diskette drives, scanners, and printers. The USB has a 12 Mbits/s data rate, compared to 115.2 Kb/s for serial ports and 2 Mb/s for enhanced parallel ports. This improved transfer rate will accommodate a new generation of peripherals, including MPEG-2 (compressed data) video-based products and digitizers.

Redundant Array of Independent Disks (RAID)

Although there are numerous variations of RAID solutions available, there are two fundamental approaches to providing disk fault-tolerance, data integrity, and performance. The first approach, hardware RAID, uses a dedicated hardware array controller with its own microprocessor, memory, and SCSI channels. The second approach is strictly through the use of software.

The Compaq Professional Workstation SP700 offers the SMART 2SL and SMART 2DH for customers who require a hardware RAID implementation, while Windows NT 4.0 offers built-in software RAID levels 0,1. The SMART 2SL and 2DH are excellent solutions when RAID 1 and 5 are required for fault-tolerance and data integrity. These are the same array controllers used on Compaq servers and offer the same reliability and integrity people have come to expect from Compaq. Software RAID, however, is an excellent solution for RAID 0 when the best performance is required, although providing no added fault-tolerance or data integrity.

The choice of RAID level and RAID type (software or hardware) is dependant on the individual needs of the customer. Customers using video editing software, for instance, will want the highest performance disk subsystem possible through the use of software RAID 0. For customers performing mission critical applications that require the highest fault-tolerance and data integrity, such as financial analysis, the SMART 2SL and 2DH hardware RAID controllers provide excellent RAID 5 performance.

Monitors

The recommended monitors for Professional Workstations are the Compaq P75 (17-inch), V75 (17-inch), V900 (19-inch), V1000, P110 (21-inch), S700 (17-inch), S900 (19-inch), and P1610 (24-inch), and the Compaq TFT450 (14-inch flat panel) and TFT500 (15-inch flat panel).

	P75	V75	V900	V1000
Viewable image	16.0 inches	16.0 inches	18.0 inches	20.0 inches
Screen type	.25 mm aperture grille pitch	.26 mm dot pitch	.22 mm horizontal dot pitch	.22 mm horizontal dot pitch
Top resolution	1280x1024	1024x768	1600x1200	1600x1200
Refresh rate at top resolution	75 Hz	85 Hz	75 Hz	85 Hz
TCO 95 compliant	Yes	Yes	Yes	Yes
Plug and Play	Yes	Yes	Yes	Yes
Microsoft PC97 compliant	Yes	Yes	Yes	Yes

	S700	S900	P110	P1610
Viewable image	15.7 inches	18 inches	21.0 inches	24.0 inches
Screen type	.24 mm horizontal dot pitch	.22 mm horizontal dot pitch	.25 to .27 mm variable aperture grille pitch	.25 to .28 mm variable aperture grille pitch
Top resolution	1024x768	1600x1200	1600x1200	1920x200
Refresh rate at top resolution	85 Hz	75 Hz	85 Hz	76 Hz
TCO 95 compliant	Yes, outside North and Latin America	Yes	Yes	Yes
Plug and Play	Yes	Yes	Yes	Yes
Microsoft PC97 compliant	No	No	Yes	Yes

	TFT450	TFT500
Viewable image	14.5 inches	15.0 inches
Screen type	Thin Film Transistor (TFT)	Thin Film Transistor (TFT)
Plug and Play	Yes	Yes
Microsoft PC97 compliant	Yes	Yes
Horizontal viewing angle	120°	120°
Vertical viewing angle	105°	80°

For a more complete overview of Compaq Monitors, please refer to the Monitor area on Compaq's web site: <http://www.compaq.com/products/monitors>.

WORKSTATION SOFTWARE PLATFORM

Microsoft Operating System Compatibility

The Compaq Professional Workstation SP700 is designed to comply with the requirements of the PC97 Hardware Design Guide. In support of this initiative, the SP700 meets the hardware compatibility requirements for the Microsoft Windows NT Workstation operating system and has been verified, tested, and certified as "Designed for Windows NT" in Microsoft's logo program.

Intelligent Manageability

Intelligent Manageability is the Compaq management solution that gives customers day one ROI by making Compaq Workstations more manageable from a single point on the network. The Compaq Workstation family can be integrated into a broad range of LAN and enterprise management applications. Workstation products are easy to troubleshoot because the hardware has built-in instrumentation to detect potential failures and allow for rapid recovery if problems occur. Fundamental benefits include the ability to protect data and minimize end-user downtime, thus increasing the productivity of both the end-user and the IT organization. End-users can feel more secure knowing that systems and data are protected while the IT organization benefits from smoother and faster service call resolution. This is a key benefit for organizations with limited technical support resources.

Most fault management features (local and remote) require that the Compaq Management Agent be running on the Workstation. This agent is available for Windows NT Workstation and comes pre-installed and pre-configured on SP700 Workstations. The Compaq Management Agents for Workstations is available on the Compaq Software Support CD and the Compaq web site.

Key Intelligent Manageability features for the Professional Workstation SP700 include:

Initial Configuration and Deployment

- Remote System Installation (Remote Boot Capability)
- Replicated Setup
- Compaq SmartStart for Workstations

Asset Tracking and Security

- AssetControl
- System, monitor, hard drive, memory, serial number, model, and manufacturer
- ROM and system board revision level
- DMI 2.0 Support
- Memory Change Alert
- Ownership Tag
- Standard security features include power-on password, setup password, and media and port input/output control

Software Updating and Management

- Compaq Info Messenger
- Compaq SmartStart for Workstations
- Remote Security Management
- Remote ROM Flash
- Remote Wakeup/Remote Shutdown
- Support Software CD and the Compaq Web site

Fault Notification and Recovery

- ECC Memory, Fault Prediction, and Pre-failure Warranty
- SMART Drives, Proactive Backup and Pre-failure Warranty
- Surge Tolerant Power Supply
- Thermal Sensor
- Ultra ATA Integrity Monitoring
- Diagnostics for Windows

Other Features

- ACPI-Ready Hardware
- Dual-State Power Button

Support Software CD and the Compaq Web Site

The Compaq Support Software CD and the Compaq Web site (www.compaq.com) provide software updates, device drivers, tools, and other value added software from Compaq that allow customers to achieve optimum performance and the best manageable workstation. Through both these mediums, a customer can easily customize the software that comes pre-installed on each Professional Workstation SP700. These instruments, which are updated monthly, provide easy installation of the most current device drivers and other value-added software. The Compaq Support Software CD is available by subscription.

SmartStart for Workstations

All Compaq Professional Workstations ship standard with SmartStart for Workstations. SmartStart for Workstations enables re-installation of the operating system, drivers, and management agents in the event that the customer experiences hard drive failure or chooses to perform a custom installation of the system's software and operating system.

For more information about the software platform, please refer to the Compaq Professional Workstation Software area on the Compaq Workstation Web site.

For more information about our software offerings, refer to:
<http://www.compaq.com/products/workstations/software-platform>