

WHITE PAPER

January 1999

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Workstation Marketing

Compaq Computer
Corporation

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Compaq Professional Workstation XP1000 Key Technologies White Paper

The purpose of this paper is to provide an overview of the Key Technologies incorporated into the Compaq Professional Workstation XP1000. The objective is to provide the technical information and associated benefits of these features.

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Compaq Professional Workstation XP1000 Key Technologies White Paper

January 1999

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NEW COMPAQ PROFESSIONAL WORKSTATION XP1000

The Compaq Professional Workstation XP1000 is the first product to be introduced in the Extreme Performance (XP) Line of Workstations from Compaq Computer Corporation. These workstations offer the unparalleled performance of the Alpha 21264 processor, bringing to the market today the computing power of 64-bit processing when used with Tru64™ UNIX v4.0E (or later). This product also offers Microsoft® Windows NT® Workstation 4.0 giving customers complete freedom of choice in their operating system environments.

The Alpha processor was designed specifically to solve complex computing problems and is the ideal solution for design and engineering professionals who require the fastest time-to-solution. Key applications for this product include both UNIX and Windows NT-based applications:

- **Mainstream CAD/CAE applications:**
 - UG Solutions Unigraphics v14
 - Parametric Technology Corporation Pro/ENGINEER version 20
 - Matra Euclid3 v2.2
 - Bentley MicroStation vj6.0
 - Dassault CATIA v5
- **Select GIS:**
 - ESRI ARCINFO v7.2.1, ARCView GIS v3.1
 - ERDAS IMAGINE v8.3, Virtual v8.3
- **High-performance technical computing solutions:**
 - Gaussian 98
 - Paradigm VEGA
 - NAG IRIS Explorer, Fortran & C libraries
 - Visual Numerics IMSL libraries
 - AVS Explorer
 - European Bioinformatics GeneQuiz
- **Mainstream digital content creation:**
 - Softimage 3D v3.8
 - NewTek Lightwave 3D v5.6
 - Discrete Logic edit 4, paint 4, effect 4, light 4

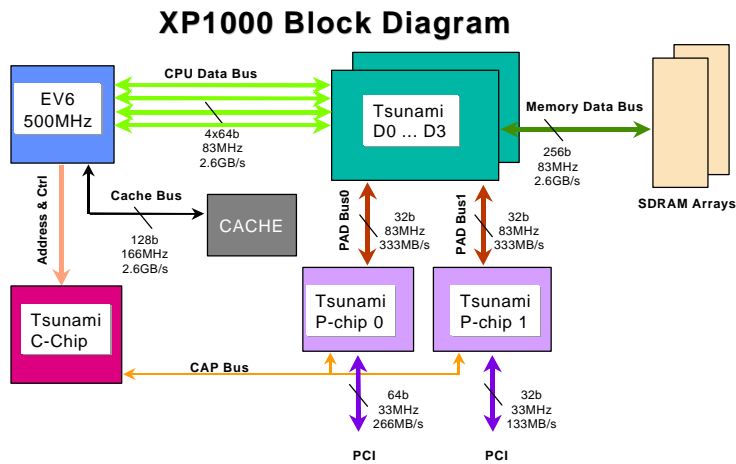
The XP1000 is also attractive to the many existing Technical Original Equipment Manufacturers (TOEM) who develop custom applications and embed workstations within complete, turnkey solutions including equipment for the printing and publishing industry, healthcare industry, industrial controls, and government and defense systems.

The Compaq Professional Workstation XP1000 supports both Tru64 UNIX v4.0E (minimum) and Microsoft's Windows NT Workstation 4.0 operating environments. Applications tuned and optimized with native Alpha compilers in either environment benefit the most from Alpha's superior performance, up to 2X the performance of competing RISC systems. In addition, Intel® x86 applications running within the FX!32 translation environment will realize Pentium® II class performance. Refer to page 26 for more information on FX!32.

Compaq Professional Workstations are backed by strong partnerships with leading ISVs to provide highly integrated and optimized solutions, which can be confidently deployed in the most demanding, business-critical environments. The Compaq Professional Workstation XP1000 combines powerful industry standard options, strong partnerships with leading ISVs, and Compaq quality and reliability, giving users the IT infrastructure and applications availability that allows them the time-to-market advantage they need to succeed.

The Compaq Professional Workstation XP1000 has the following system features:

- Alpha 21264 (EV6) processor running at 500 MHz (at time of publication)
- 64 KB I-Cache
- 64 KB D-Cache
- 4 MB L2 External Cache
- Memory capacity up 2 GB
- Supports 18 GB drives and up to 54 GB of internal storage
- 32X ATAPI CD-ROM
- 1.44 MB diskette drive
- Six storage drive bays: one 3.5-inch front accessible with diskette drive, one 5.25-inch front accessible with CD-ROM drive, two 5.25-inch front accessible device bays (half-height; 1.6-inch), and two internal 3.5-inch device bays (low-profile; 1.0-inch)
- Integrated Wide-Ultra SCSI controller
- Integrated 16-bit audio
- Thinwire Ethernet option
- Graphics options include ELSA GLoria Synergy, Compaq PowerStorm™ 300 (PCI), and Compaq PowerStorm 350 (PCI)
- I/O support includes two, 64-bit full-sized PCI slots, two half-sized 32-bit PCI and one half-sized shared PCI/ISA combination slot
- Back panel connectors include: 2 USB connectors, 2 serial, 1 parallel port, keyboard, mouse, audio line in, audio line out, and 10/100BaseT (RJ-45) Ethernet
- 400-watt power supply
- Choice of operating system with Tru64 UNIX or Microsoft Windows NT Workstation 4.0



ALPHA 21264 (EV6) PROCESSOR

The Compaq Professional Workstation XP1000 uses the newest Alpha 21264 (EV6) 500 MHz processor, which incorporates MMX-like multimedia instruction set technology and a 333 MHz Front Side Bus de-multiplexed down to 83 MHz, which enables support for today's 100 MHz SDRAM. The Front Side Bus is the processor-to-memory bus. The Alpha 21264 processor also incorporates an industry-leading 128 Kbytes of on-chip cache (64 kB instruction and 64 kB data) with the design able to support up to 16 MB of L2 cache. This makes it ideally suited to handle large, complex code and very large data sets that are required by today's most demanding technical application users.

The Alpha 21264 processor contains an advanced microarchitecture featuring:

- Four instructions issued per cycle
- Out-of-Order Execution
- Quad integer execution units
- Dual pipelined floating-point execution units
- Up to 70 instructions in flight
- Can retire up to 11 instructions per cycle
- Motion Video Instruction set
- Sophisticated branch and subroutine predictors
- Independent 32-entry load and store queues
- Deep I/O read/write and cache victim buffers

Like previous Alpha processors, the new processor ships as a single module that contains the CPU chip, the cache tag, and the L1 cache on a single semiconductor die, packaged in a 587-pin CPGA package. The Alpha 21264 processor with 4 MB of integrated non-blocking L2 cache and a dedicated 128-bit cache bus with four separate 64-bit system memory buses improves performance by reducing average memory access time. This translates into a spectacular sustained available memory bandwidth of over 2.6 GB/s yielding 26 SPECint95 (estimated) and 49 SPECfp95 (estimated) at 500 MHz. The faster system bus and memory will significantly increase overall workstation performance (compared to Intel's 450 MHz Pentium II Xeon™, which yields 17.3 SPECint95 and 15.2 SPECfp95, IBM's new 200 MHz POWER3 yielding 13.2 SPECint95 and 30.1 SPECfp95, and Sun's 360 MHz UltraSPARC II, which yields 16.1 SPECint95 and 23.5 SPECfp95).

MMX-like Video Instructions

Similar to the earlier Alpha 21164PC processor, the new Alpha 21264 500 MHz processor has the same MVI instructions added to the Alpha instruction set to handle specific multimedia applications. Unlike Intel's MMX technology (MultiMedia Extensions is the name for the 57 multimedia instructions Intel has added to its processors), the key changes to the Alpha instruction set are designed to minimize disruption by adding only a few instructions for motion estimation and a few parallel 32-bit computations. The main focus of the new Alpha extensions is video encoding.

CUSTOMER BENEFITS

- **Major leap in processor power.** The new Alpha 500 MHz processor provides a significant increase in processing power over previous Alpha processors and all competing RISC systems. The Alpha 21264 systems can deliver up to twice the application performance of competing RISC workstations.
- **Improved overall system performance.** The 2.6 GB/s memory and cache bandwidth improve the overall performance of the workstation by enhancing the speed at which data is transferred between the processor and other parts of the system.
- **Improved value.** The new Alpha processor provides greater value by delivering higher application performance at the same price as the previous generation.

XP1000 SYSTEM ARCHITECTURE

The XP1000 uses the Compaq Tsunami 21272 core-logic chipset. Core-logic chipsets include technologies that allow processors, memory, I/O, graphics, and other devices to communicate and work together in a computer.

The Tsunami chipset provides a 256-bit wide memory bus running at 83 MHz and supports industry-standard 100 MHz SDRAM. In addition, Tsunami provides address control logic and PCI host bridges to enable access to one 64-bit and one 32-bit 33 MHz PCI bus. On-board I/O and EIDE interfacing exists via the “southbridge” logic on the 64-bit PCI bus.

In the XP1000, four 64-bit CPU data buses are provided, each running at 83 MHz. This yields an effective throughput of 2.6 GB/s.

The following table shows how Tsunami compares with the previous Pyxis (21172) core logic chipset.

Comparison of EV56 and EV6 core logic feature sets		
Feature	Pyxis (21172) chipset (Alpha 21164 processor EV56)	Tsunami (21272) chipset (Alpha 21264 processor EV6)
Processor FSB	66 MHz	83 MHz
Memory – Maximum/type	64 MB – 1.5 GB 83 MHz SDRAM ECC supported	128 MB – 2 GB 100 MHz SDRAM ECC supported
EIDE	UltraDMA/33 (via southbridge)	UltraDMA/33 (via southbridge)
AGP	No	No
USB	2 ports (via southbridge)	2 ports (via southbridge)
PCI buses available	One 64-bit	One 64-bit and one 32-bit

CUSTOMER BENEFITS

- **Performance.** Support for up to 2 GB of SDRAM provides support for memory-intensive applications and very large in-memory data files. This increases system performance and provides access to application functionality that is unattainable with competing workstations. The dual independent PCI buses also provide significant I/O throughput advantage.
- **Speed.** Alpha 21264 clock speeds of 500 MHz are offered initially with simple CPU card upgrades to higher frequencies for faster performance later.

Q. Does the Compaq Professional Workstation XP1000 use the Highly Parallel System Architecture?

- A.** No. The Compaq Professional Workstation XP1000 has some similarities to the Compaq Professional Workstation SP700 Highly Parallel System Architecture, such as dual PCI buses and high bandwidth throughput; however, there are enough differences, such as different core-logic chipset, single memory controller, and no AGP support, that the XP1000 architecture can be considered unique.

MEMORY

The Compaq Professional Workstation XP1000 supports up to 2 GB of main memory (using eight 256-MB DIMMs). Dedicated 128-bit cache bus with four separate 64-bit system memory buses improves performance by reducing average memory access time with sustained available memory bandwidth of over 2.6 GB/s. Memory is configured in two banks of four. Different capacity DIMMs may be installed in alternative banks; however, each bank must have the same capacity DIMM. Bank 1 must be completely filled before filling Bank 2.

Unlike previous generation Alpha workstations, the Compaq Professional Workstation XP1000 uses 100 MHz Registered ECC Synchronous DRAM (SDRAM) and supports up to 2 GB of memory. 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.

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. The 100 MHz SDRAM will support high-speed Alpha 500 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 DRAM because of its higher bus speed.
- **Lower cost.** Support for 100 MHz SDRAM across Intel's Pentium platforms ensures maximum availability and lowest cost memory technology for Alpha customers.

*The XP1000 memory bus runs at 83 MHz.

- Q. The Compaq Professional Workstation XP1000 uses registered memory. What is the difference between registered and unregistered memory?**
- A.** Registered memory is buffered memory. Buffered DIMMs use buffer logic chips on their control lines to reduce loading on the system board. This buffering action increases the maximum size of DIMM module sockets on the system board. Unbuffered DIMMs do not use any buffer logic chips, thus achieving slightly faster operation due to the elimination of the propagation delay of the logic buffer. The increase in speed comes at the tradeoff of reducing the maximum size of DIMM modules on the system board, which results in smaller memory capacity.
- Q. Can I use older memory from my installed base of Alpha-based Workstation systems in the new XP1000 machine?**
- A.** The Compaq Professional Workstation XP1000 uses the same memory as the Compaq Professional Workstation SP700; however, the XP1000 memory is not interchangeable with the previous generation Alpha workstation DIMMs (DIGITAL Personal Workstation 433a/au, DPW500a/au, DPW600a/au).

ATAPI Support (AT Attachment Packet Interface)

ATAPI is a definition for an ATA data transfer protocol that utilizes the EIDE (Enhanced Integrated Drive Electronics) interface to connect the CD-ROM drive. On the XP1000, ATAPI support is delivered via the southbridge logic chip on the 64-bit PCI bus and supports the standard 16.6 MB/s transfer rate.

The internal diskette drive resides on a separate, dedicated bus.

CUSTOMER BENEFITS

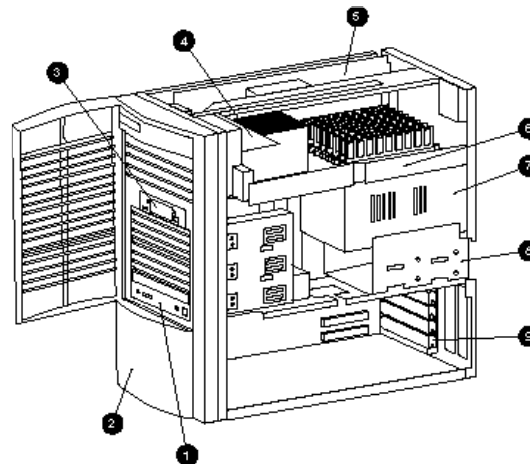
- **Enables access to fast and inexpensive devices.** ATAPI based CD-ROM drives continue to be less expensive and perform close to their SCSI counterparts. The removable media usage model renders the performance issue a very low priority for most customers.
- **Enhances system performance.** Having the slower diskette and CD-ROM devices on dedicated EIDE interface allows the SCSI disks to function at maximum efficiency.

WIDE-ULTRA SCSI HARD DRIVES

Standard SCSI hard drive configurations for the Compaq Professional Workstation XP1000 include a one-inch 4.3-GB or 9.1-GB Wide-Ultra SCSI 10,000 rpm hard drive, depending on the model. These drives are Wide-Ultra2 SCSI capable when Wide-Ultra2 SCSI controllers become available. The standard hard drive occupies a single one-inch bay in the internal drive cage. The XP1000 is expandable for customers with additional storage requirements. It supports a total of two one-inch hard drives and up to two 1.6-inch hard drives. Optional drives include 4.3-GB, 9.1-GB, and 18.2-GB 7200 and 10,000 rpm hard drives (all Wide-Ultra2 SCSI capable, except the 18.2-GB 7200 rpm drive, which is a Wide-Ultra SCSI). The following drawing and table describe the internal layout of the XP1000.

Inside View Description

1. CD-ROM drive
2. Front bezel
3. Diskette drive
4. Fan pipe (directs air to CPU heatsink area)
5. Main logic board (MLB)
6. CPU and memory daughter-card latch
7. 400-watt power supply
8. Internal drive bay cage
9. PCI and ISA expansion slots



RAID CONTROLLER

The original specifications for Redundant Array of Independent Discs (RAID) include a series of seven definitions (0 through 6), which were created to specify different disk subsystem architectures that enable extended data availability and protection against system failures. Higher levels of RAID now exist for servers, which define disk array architectures providing fault tolerance.

A common utilization of RAID systems within workstations is RAID level 0 (disk striping), RAID level 1 (disk mirroring), and the combination of both, RAID level 0+1 (striped mirroring). Striping provides the benefit of improved disk throughput, while mirroring provides protection against loss of data due to hardware failure (with an associated performance penalty). RAID controllers are offered as optional additions to the XP1000 and support RAID level 0, 1, 0+1, and 5 (striping with parity). Level 0+1 and level 5 require a minimum of three disks within the array. Level 5 is more efficient as it provides 66% to 87% usable storage compared to 50% usable storage with level 0+1. Support for RAID configurations is available via add-in PCI boards, including a single port, fast, wide SCSI RAID adapter, a three-port RAID adapter with 4 MB of cache, or a three-port RAID adapter with 8 MB of cache. Note that the RAID adapter cache memory is not field upgradable and care should be taken to specify the correct cache amount at point of order.

PCI VERSUS 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 emerging, industry standard solution, driven by Intel, 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 sharing rendering tasks between the system processor and the graphics accelerator. However the full benefits of AGP remain to be realized in later versions of the Windows® operating environments (Windows NT 5.0), and in some cases in machines with slower processors where the main system bus is sufficiently slow, AGP can become a performance bottleneck.

The main benefits of AGP are:

- Up to 4 times higher bandwidth (AGP clocked at 66 MHz, PCI at 33 MHz). AGP has a theoretical peak throughput of 528 MB/s (in 2x mode) versus 266 MB/s for 64-bit PCI. However, the actual throughput for the AGP bus is dependent on how much of the main memory system bus can be allocated at any given time (plus whether or not the graphics subsystem supports 2x mode). This is the major consideration as to why AGP and PCI graphics subsystems today can be seen to deliver similar applications performance.
- AGP is a point-to-point link and does not share bus resource as in the case of PCI.
- DIME, Direct Memory Execution of textures – a memory mapping feature that will allow AGP devices to use main memory for storing texture maps. This feature will be supported in Windows 98 and Windows NT 5.0.
- CPU accesses to system memory can proceed concurrently with the AGP graphics chip's memory requests.

Given the above considerations, the lack of AGP graphics within the XP1000 should not be seen as a competitive showstopper. The Compaq PowerStorm 300 and 350 PCI graphics controllers provide large local texture memory. This texture memory has much higher bandwidth and lower latency than DIME memory mapping. The result is higher graphics performance than can be achieved with AGP DIME. Also, the PCI bus can support 3-4M triangles per second, which is the full performance of the PowerStorm 300. AGP on the Compaq Professional Workstation XP1000 would not noticeably improve 3D graphics performance.

GRAPHICS

Compaq PowerStorm™ 300 (PCI) Graphics Controller

Standard on certain models of the Compaq Professional Workstation XP1000 is the Compaq PowerStorm 300 (PCI) graphics controller. The Compaq PowerStorm 300 provides a high-performance, mid-range, 3D graphics solution at a very competitive price.

Professionals that use more demanding workstation applications require the performance of mid-range 3D graphics solutions. CAD and CAE applications, such as Pro/E and CATIA, 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 NewTek's Lightwave. 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 mid-range 3D graphics requirements in these segments. Based on the next-generation REALimage architecture from Evans & Sutherland, it provides the fastest 3D-application performance in its class. The PowerStorm 300 is the graphics controller to use when up against other non-geometry accelerated solutions, such as the Intergraph 3400T (VX113T).

Maximum Color Depth Single-Buffer Mode			
Resolution	3D Acceleration with Double Buffering, Colors Supported	Texture Memory	Maximum Refresh Rate
800 x 600	16.7 million	16 MB	85 Hz
1024 x 768	16.7 million	16 MB	85 Hz
1280 x 1024	16.7 million	16 MB	85 Hz

Features and Technical Specifications

The following features are included in the Compaq PowerStorm 300:

- Optimized solution at 1280 x 1024, true-color double-buffered for demanding solids modeling, animation, and visualization applications
- Next-generation high-performance rendering engine based on the Evans & Sutherland REALimage 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	PCI
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	32-bit
Controller Clock Speed	100 MHz
Maximum Vertical Refresh Rate	120 Hz
Maximum Pixel Clock	220 MHz
Hardware Accelerated 3D: <ul style="list-style-type: none"> • 24-bit Z-buffering • Gouraud Shading • Stencils • Texture Mapping (bilinear and trilinear) 	Yes Yes Yes Yes
Performance: <ul style="list-style-type: none"> • Random 10-Pixel Solid Lines • Filled 25-Pixel Triangles 	4 million/s 4 million/s
Pixel Fill Rates: <ul style="list-style-type: none"> • Bilinear • Trilinear 	90 million/s 45 million/s
Operating Systems	Tru64 UNIX, Windows NT 4.0

Compaq PowerStorm™ 350 (PCI) Graphics Controller

The Compaq PowerStorm 350 combines the high-performance, mid-range, 3D graphics features and competitive price of the PowerStorm 300 and adds increased frame buffer memory, increased texture memory, and stereographics support.

GIS professionals that use applications such as ESRI, ERDAS and Autometric as well as scientific visualization professionals will take advantage of the HDTV resolution supported by the larger frame buffer, the increased texture memory, and stereographics support.

Visual simulation professionals will take advantage of the HDTV resolution and increased texture memory.

DCC and MCAD professionals will take advantage of the HDTV resolution to provide them with greater screen real estate.

The PowerStorm 350 is an optimized, high-performance solution for mid-range 3D graphics requirements in these segments. Based on the next-generation REALimage architecture from Evans & Sutherland, it provides the fastest 3D-application performance in its class. The PowerStorm 350 is the graphics controller to use when HDTV resolution, increased texture memory and/or stereographics support is required.

Maximum Color Depth Single-Buffer Mode			
Resolution	3D Acceleration with Double Buffering, Colors Supported	Texture Memory	Maximum Refresh Rate
800 x 600	16.7 million	32 MB	85 Hz
1024 x 768	16.7 million	32 MB	85 Hz
1280 x 1024	16.7 million	32 MB	85 Hz
1600 x 1200	16.7 million	32 MB	85 Hz
1920 x 1080	16.7 million	32 MB	75 Hz
1920 x 1200	16.7 million	32 MB	75 Hz

Features and Technical Specifications

The following features are included in the Compaq PowerStorm 350:

- Optimized solution at 1920 x 1200, true-color double-buffered for GIS animation and visualization applications
- Next-generation high-performance rendering engine based on the Evans & Sutherland REALimage architecture
- 30-MB 3D-RAM for frame buffer and Z-buffer, 32-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	PCI
RAMDAC	IBM 640
Memory Type	3D RAM and CDRAM
Memory Amount	30-MB 3D RAM, 32-MB CDRAM
Memory Speed	10-ns 3D RAM, 15-ns CDRAM
Data Path	32-bit
Controller Clock Speed	100 MHz
Maximum Vertical Refresh Rate	120 Hz
Maximum Pixel Clock	220 MHz
Hardware Accelerated 3D: <ul style="list-style-type: none"> • 24-bit Z-buffering • Gouraud Shading • Stencils • Texture Mapping (bilinear and trilinear) 	<ul style="list-style-type: none"> Yes Yes Yes Yes
Performance: <ul style="list-style-type: none"> • Random 10-Pixel Solid Lines • Filled 25-Pixel Triangles 	<ul style="list-style-type: none"> 4 million/s 4 million/s
Pixel Fill Rates: <ul style="list-style-type: none"> • Bilinear • Trilinear 	<ul style="list-style-type: none"> 90 million/s 45 million/s
Stereographics Support	Yes
Operating Systems	Tru64 UNIX, Windows NT 4.0

ELSA GLORIA SYNERGY

Compaq offers an affordable, high-performance leader in the 2D/3D graphics arena with the ELSA GLoria Synergy. This PCI controller is based on the Permedia-2 graphics engine from 3Dlabs. It provides excellent 2D performance under Tru64 UNIX or Windows NT and a robust, entry-level, 3D environment under Windows NT. In addition, basic 3D capabilities are also available under Tru64 UNIX via a software only implementation. For those running Windows NT, the GLoria Synergy is the perfect solution for mainstream CAD, web authoring, pre-print, and 2D/3D animation applications that do not require greater than 1024x768 resolution for true-color, double-buffered rendering. The Synergy also supports a 1280x1024 double-buffered visual for environments that can accept a limitation of 32k colors. For those running Tru64 UNIX, the ELSA GLoria Synergy is a solid solution for 2D applications.

Resolution	Maximum Colors Supported	Maximum Refresh Rate
640 x 480	16.7M	85 Hz
800 x 600	16.7M	85 Hz
1024 x 768	16.7M	85 Hz
1152 x 864	16.7M	85 Hz
1280 x 1024	65,536	85 Hz
1600 x 1200	256	85 Hz

Features and Technical Specifications

The GLoria Synergy provides:

- Support for a wide range of resolutions (up to 1600x1200) and color depths for flexibility and performance in a variety of 3D graphics environments
- PCI slot connection
- Standard 8 MB of SGRAM
- Multi-display support:
 - Tru64 UNIX – up to 4 displays running 2D only or up to 2 displays running 2D/3D
 - Windows NT – up to 3 displays running 2D only or up to 2 displays running 2D/3D
- Optimized graphics drivers for OpenGL under Windows NT 4.0

Features	Technical Specifications
3D/2D Controller	3Dlabs Permedia-2
VGA Controller	Integrated
Bus Type	PCI
RAMDAC	Integrated 230 MHz
Memory Type	SGRAM
Memory Amount	8 MB SGRAM
Memory Speed	8 ns
Data Path	64-bit
Controller Clock Speed	80 MHz
Maximum Possible Vertical Refresh Rate	219 MHz
Maximum Pixel Clock	230 MHz at 8 bpp and 16 bpp/5:5:5 135 MHz at 32 bpp/8:8:8
Performance: <ul style="list-style-type: none"> • Primitives • Fill rate 	1 million 3D polygons/s, textured 83 million pixels/s - bilinear filtered, textured, perspective
Operating Systems	Tru64 UNIX, Windows NT 4.0

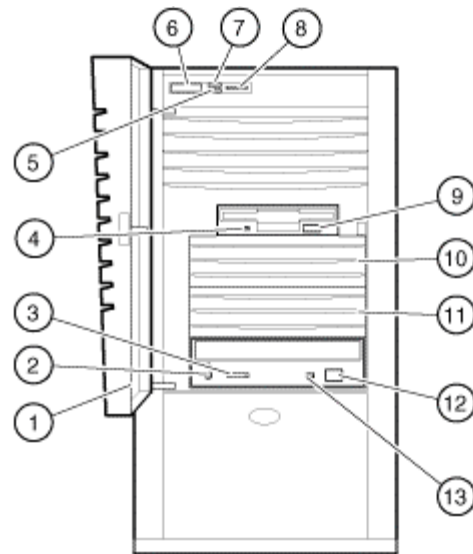
CHASSIS FEATURES

The Compaq Professional Workstation XP1000 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 XP1000 uses an expansion board assembly, which holds the CPU, core logic chipset, and memory expansion slots. The internal 1-inch drive cage is hinged at the side and makes adding hard drives easier.

The Compaq Professional Workstation XP1000 chassis is very expandable. It has a total of five expansion slots: two full-length, 64-bit PCI and three, 32-bit PCI short slots (one shared PCI/ISA). There are also six peripheral expansion bays: two internal 3.5" (one populated by the hard drive), three 5.25" user-accessible drive bay (one populated by the CD-ROM drive) for additional disks, DAT, ZIP etc, and one 3.5" user-accessible bay populated by the diskette drive.

Front View Description

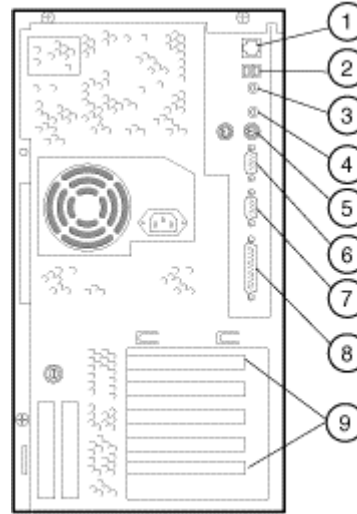
1. Front door
2. CD-ROM headphone jack
3. CD-ROM volume adjustment
4. Diskette drive activity LED
5. Drive activity LED. Indicates activity on the internal SCSI drives
6. Power switch
7. Power indicator
8. Reset switch for NT. Halt switch for UNIX.
9. Eject button for diskette
10. Front-accessible drive bay
11. Front-accessible drive bay
12. CD-ROM Eject button
13. CD-ROM activity LED.



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Rear View Description

1. Network 10/100 connector
2. USB ports
3. Audio line out (left and right)
4. Audio line in (left and right)
5. Mouse connector (left); Keyboard connector (right).
6. COM2 serial port
7. COM1 serial port
8. Parallel port connector.
9. PCI option slots, numbered from top:
 - Slot 1: 64-bit PCI, full-sized
 - Slot 2: 32-bit PCI, half-sized
 - Slot 3: 64-bit PCI, full-sized
 - Slot 4: ISA or 32-bit PCI, half-sized
 - Slot 5: 32-bit PCI, half-sized



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INTEGRATED NETWORK INTERFACE CONTROLLER (NIC)

With the Intel 21143PD Fast Ethernet (10/100 Mbps), Compaq dramatically simplifies the network management task and lowers the total cost of ownership in today's businesses. The product's Wake-on-LAN (WOL) feature, supported under Windows NT 5.0, 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 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 a business' network, the 21143PD NIC conforms to the full range of today's industry standards, including PC97 and PC98

Performance and connectivity are further enhanced by the 21134PD's 10/100 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

Features	Technical Specifications
Compliance	IEEE 802.3, ANSI 8802-3
Data Transfer	32-bit bus-master PCI, 10 or 100 Mb/s, autonegotiating
Connector	RJ-45 Twisted Pair
Buffer Memory	Large independent XMIT and RCV FIFO buffers
Communication Processor	Intel 21143PD chipset
Operating System Support	Windows NT, Tru64 UNIX, OpenVMS, Linux

Q. What is the relationship between Intel and Compaq with regard to Compaq NICs?

A. The relationship between Compaq and Intel allows the two companies to speed the deployment and evolution of new networking technologies. With technology licensing and cooperative engineering and product development, the two companies can generate more affordable, efficient, and interoperable networks.

Q. Is this NIC standards-based?

A. Yes. The NIC works with any standards-based system. It is PC97 compliant, Windows NT compatible, and fully compliant with IEEE 802.3, and ANSI 8802-3.

32X ATAPI CD-ROM

The Compaq Professional Workstation XP1000 features a 5.25", half-height tray-load 32X ATAPI 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. Using 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 XP1000.

Features	Technical Specifications
Access Time	Random = <100 ms Full Stroke = <150 ms
Variable Transfer Rate	2100 - 4800 KB/s

AUDIO

Audio functionality is provided by the sound-blaster compatible, ISA-based, ESS Technology ESS1887 chip that records and plays back voice, sound, and music. Features include:

- 2 DMA channels; full duplex with simultaneous playback and record
- Support for Sound Blaster interface
- 16-bit volume control

Note that the audio output is directed to the I/O port only. External speakers (rear connectors) or a stereo headset (front connectors) is required to hear the signal. The internal speaker is reserved for standard "beep" codes only.

CUSTOMER BENEFITS

- **High-performance output.** Provides crisp, clean, wide-bandwidth audio from a small-integrated solution. The voice clarity and low frequency output is better than current integrated computer office products.
- **De facto standard compatible.** Compatible with the de facto sound-blaster standard.

The end result of the interaction between the subsystems is a well balanced, "no desktop clutter," 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 XP1000 includes two Universal Serial Bus (USB) ports.

USB is a peripheral bus standard developed by a group of PC and telecom industry leaders including Compaq, DEC, IBM, Intel, Microsoft, NEC and NORTEL. 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. 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. 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.

Drawing its intelligence from the host workstation, USB detects when devices are added and removed. USB automatically determines what host resource each peripheral needs, including driver software and bus bandwidth, and makes those resources available without user intervention.

Currently, there are different ways to implement USB. The Compaq Professional Workstation XP1000 implements the OpenHCI USB interface. OpenHCI reduces CPU overhead for USB devices compared to other implementations and is fully compatible with UniversalHCI.

Currently, Windows NT Workstation 4.0 does not support USB, but future versions are expected to include USB drivers that will allow the workstation to use USB peripherals.

MONITORS

The recommended monitors for the Professional Workstation XP1000 are the Compaq P75 (17-inch) or P110 (21-inch) Monitors.

Feature	P75	P110
Viewable image	16.0 inches	21.0 inches
Screen type	.25 mm stripe pitch	.25 to .27 mm variable aperture grille pitch
Top Resolution	1280 x 1024	1600 x 1200
Refresh rate at top resolution	75 Hz	85 Hz
TCO 95 Compliant	Yes	Yes
Plug and Play	Yes	Yes
Microsoft 97 compliant	Yes	Yes

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

The Compaq Professional Workstation XP1000 provides customers the freedom of choice in operating system environments. The XP1000 includes either Tru64 UNIX 4.0E (minimum) or Microsoft Windows NT Workstation 4.0 and a backup CD for restoration purposes. Both operating systems are fully featured to meet the demands of technical and visual computing environments.

UNIX Software

Tru64 UNIX

Tru64 UNIX provides a high-performance, scalable, and robust UNIX operating system environment. Tru64 UNIX contains a full 64-bit architecture, a host of advanced operating system features, is year 2000 ready, and conforms to all major industry standards for open systems. The unique combination of AlphaPowered™ systems and industry standard Tru64 UNIX deliver high-performance for applications in technical and visual computing.

New features in version 4.0E include:

Features	Benefit
EV6 System Support	Significant performance increase without recompiling
Gigabit Ethernet	10 times performance improvement with 1-Gbit/s bandwidth
EURO currency support	Ability to input, display, print, store, retrieve, recognize, and process the EURO symbol
ODBC and JDBC libraries bundled	Complements UNIX/Windows NT interoperability
Dual connect to Ethernet and FDDI with NetRAIN	Failover to other device provides greater availability
Support for standard devices	USB: Ease in adding peripherals (for mouse and keyboard only) DVD: Larger capacity at same cost

Other features:

- Support for Intraserver UNIX driver and KZPCM (ITI combo adapter)
- Arena malloc: SGI interface to malloc provided in addition to Tru64 UNIX malloc
- Maximum number of POSIX semaphores raised to 1024
- SYS CHECK tool included
- Support for Sendmail V8.8.8
- Support for a dual math library
- Coprocessor translation buffer extended
- Cluster capability through Compaq TruCluster Solutions
- Latest version of Netscape Navigator Gold Client Web browser, Fastrack Version 2.0 Internet Web server, and the Java Development Kit Version 1.0.2
- Tru64 UNIX and Windows NT integration and interoperability
- StorageWorks provides economical on-line storage with integrated, scalable management of virtually unlimited storage capacity
- Log-based Advanced File System (AdvFS) and Logical Storage Manager (LSM)
- Fast system reboot and recovery
- Easy on-line management and flexibility
- Easy installation, unattended and remote
- SysMan graphical system management tool - easy to navigate and use
- Common Desktop Environment (CDE) - industry-standard desktop GUI
- Standards-compliant, including UNIX-95 branding
- Software investment protection with simplified software development, multivendor systems integration, and application porting
- Worldwide deployment capabilities with more than 30 single and multibyte language variants
- Year 2000 ready
- System and application safety with a number of C2-level security features
- Compaq's industry-leading portfolio for all levels of customer support

SRM Firmware for the Compaq Professional Workstation XP1000 System

The SRM user interface is the command line interface that allows you to configure and boot the Tru64 UNIX operating system.

The SRM firmware can perform many functions, including:

- Produce a hardware configuration report
- Customize the system with environmental variables
- Configure ISA characteristics

Intelligent Manageability

Intelligent Manageability is the Compaq management solution that makes Compaq products more manageable. Tru64 UNIX supports the industry-standard Simple Network Management Protocol (SNMP) for managing the workstations.

Compaq has announced plans to enhance the Intelligent Manageability capabilities of the Professional Workstation XP1000 by adding Web-based Enterprise Management (WBEM) capabilities to Tru64 UNIX. These planned management capabilities will make it easier to integrate the workstation into a broad range of LAN and enterprise management applications.

Windows Software

Microsoft Operating System Compatibility

The Compaq Professional Workstation XP1000 is designed to comply with the requirements of Microsoft Windows NT 4.0. The Windows NT Workstation 4.0 operating system is a high-performance, highly reliable, secure multithreaded operating system. It provides maximum 32-bit performance that meets the needs of demanding applications.

FX!32

FX!32 provides fast and transparent execution of 32-bit x86 applications on Windows NT 4.0 Alpha. FX!32 runs these applications at speeds comparable to high performance x86 platforms.

FX!32 consists of three interoperable components. There is a run-time environment that provides the transparent execution, a binary translator (also called the background optimizer) that provides the high performance, and a server that coordinates them. Although FX!32 is transparent and does not require user intervention, it includes a graphical interface – the FX!32 Manager – for viewing status and providing management input.

The Windows NT operating system invokes the FX!32 run-time environment (called the "runtime") when the user runs a x86 Win32 application. The runtime provides transparent execution by emulating the entire x86 user-mode instruction set and creating Alpha/NT "jackets" for Win32 calls made by the application.

When an application is first run under the emulator, FX!32 develops a profile that is later used to translate parts of the application to native Alpha code. Successive runs of the application exchange increasingly more of the application's x86 instructions for native Alpha instructions. Eventually, little of the application is run in the emulator.

The rest of the transparency is provided by full support for the Win32 environment, such as multiple threads and structured exception handling. Transparency is also provided through dynamic jacketing, which solves the multi-architecture problem. For example, the runtime fully supports the Microsoft OLE service architecture (OLE2), and supports it across both the Alpha and x86 architectures. The runtime jackets the interfaces to all OLE objects, allowing the interfaces to be called from either x86 or Alpha code. The caller of the OLE object does not need to know the object's architecture.

AlphaBIOS Firmware for the Compaq Professional Workstation XP1000 System

AlphaBIOS is the enhanced BIOS graphical interface for Compaq Professional Workstation systems. AlphaBIOS supports the Microsoft Windows NT operating system. From AlphaBIOS, you can install and boot Windows NT, display the system configuration, perform setup tasks, run utility programs, and update system firmware.

Intelligent Manageability

Intelligent Manageability is the Compaq management solution that makes Compaq products more manageable. Intelligent Manageability features for the Professional Workstation XP1000 in the Windows NT operating system environment include Security Management, Remote Wakeup via Magic Packet Support, Remote ROM Flash, and Remote Shut Down.

Compaq has announced plans to enhance the Intelligent Manageability capabilities of the Professional Workstation XP1000 by adding Web-based Enterprise Management (WBEM) capabilities. These planned management capabilities will make it easier to integrate the workstation into a broad range of LAN and enterprise management applications.

Compaq – Microsoft Frontline Partnership

Compaq and Microsoft formed the Frontline Partnership to lead the way in providing new solutions within the PC industry. This partnership provides the knowledge and tools customers need to take full advantage of Window NT Workstation.

Compaq Web Site

The Compaq Web site (www.compaq.com) provides software updates, device drivers, tools, and other value-added software from Compaq that allow customers to achieve optimum performance. These instruments, which are updated monthly, provide easy installation of the most current device drivers and other value-added software.

For more information about the software platform, please refer to the Compaq Professional Workstation Software area on the Compaq Workstation web site at:

<http://www.compaq.com/products/workstations/software-platform>