

# Sun Blade™ 2000 Workstations

## Just the Facts



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# Positioning

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**Figure 1.** Sun Blade™ 2000 workstations

## Introduction

The Sun Blade™ 2000 workstations are Sun's UltraSPARC™ III processor-based workstation platforms. They can be configured as either single- or dual-processor workstations, and offer the user outstanding system performance through superscalar processor technology, a high-performance system interconnect, high-bandwidth I/O, and accelerated graphics.

The Sun Blade 2000 workstations are outstanding solutions for customers who require high-performance and high-capacity computing. These workstations can expand to up to two CPUs, two 73-GB Sun Blade 2000 FC-AL disks, 8-GB RAM, and two high-performance UPA graphics accelerators. The generous expansion capacity in these workstations allow customers to tailor a solution directly for their needs.

Several graphics accelerators are available including Sun™ Creator3D, Sun Elite3D m6, Sun Expert3D, Sun Expert3D-Lite, Sun XVR-500, and Sun XVR-1000 graphics. These graphics accelerators range from the very affordable, Sun PGX64 graphics to the entry-level 3D acceleration of Sun XV 500 graphics, to the very high-performance, hardware-based texture mapping acceleration of Sun XVR-1000 graphics. A number of multi-monitor configurations are possible.

The Sun Blade 2000 workstations include three industry-standard interfaces that enable the use of Sun and third-party peripherals. These are:

- A universal serial bus (USB) for low-speed devices (such as a keyboard and a mouse)
- An IEEE 1394 interface for digital video use
- A Fibre Channel arbitrated loop (FC-AL) interface to enable high-speed disk access

All Sun Blade 2000 workstations also include an external 40 MB/second UltraSCSI interface and 100 Mb/second Fast Ethernet.

The tower enclosure is designed for ease of expansion and service. Memory, CPU modules, PCI cards, disk drives, and removable media peripherals are all independently accessible. The Sun Blade 2000



workstations also offer exceptional power-management features. These enable various subsystems to independently enter and exit a low power state depending on activity levels, while maintaining an active network connection.

Note that the Sun Blade 2000 workstations support only the Solaris™ 8 Operating Environment 2/02 version or later. There is no support for earlier versions of the Solaris Operating Environment; however, these workstations maintain full binary compatibility with applications compiled on previous versions of the operating environment. Sun Blade 2000 systems require the 2/02 version of the Solaris Operating Environment (Solaris 8, Update 7).

## Introducing the Sun Blade 2000 20 Year Celebration Edition Workstations

The Sun Blade 2000 system is the latest addition to the Sun Blade family of workstations, and is a very close relative to the recently EOled Sun Blade 1000 system. It is configured with up to two 900-MHz or 1.05-GHz UltraSPARC III Cu processors, has a larger disk capacity (up to two 73-GB disks), and comes with a minimum of 1-GB RAM. The Sun Blade 2000 workstation is the first 1-GHz, 64-bit UNIX® workstation.

In addition, Sun is celebrating 20 years of innovation with a limited-edition 20 Year Celebration Edition Sun Blade 2000 workstation. At the time of the announcement, this is perhaps the highest performing workstation on the market. This "personal visualization system" comes fully configured with two 1.05 GHz UltraSPARC III Cu processors, 8 GB of memory, and the newly announced Sun XVR-1000

### Sun Blade Workstation Product Line Placement

Sun Blade workstations and their predecessors, the Ultra™ systems, have several things in common, including:

- The SPARC™ processor
- 100 percent binary compatibility throughout Sun's product line
- Modularity — easy-to-swap components

The table below shows a feature comparison between the three Sun Blade workstations.

| Feature                 | Sun Blade 150                           | Sun Blade 1000  | Sun Blade 2000                                 |
|-------------------------|---|---|--|
| <b>Placement</b>        | Economy Workstation                     | Value Workstation   | Performance Workstation                        |
| <b>CPU</b>              | One UltraSPARC-III with 512-KB L2 cache | Up to two UltraSPARC III; UltraSPARC III Cu as X-option only with 8-MB L2 cache | Up to two UltraSPARC III Cu with 8-MB L2 cache |
| <b>Processor Speeds</b> | 550/650 MHz                             | 750 MHz<br>900 MHz  | 900 MHz<br>1.05 GHz                            |
| <b>Memory Capacity</b>  | 2 GB                                    | 8 GB  |  |
| <b>Drive Capacity</b>   | Up to two 40 GB                         | Up to two 36 GB standard<br>73 GB optional                                      | Up to two 73 GB standard                       |
| <b>Drive Type</b>       | EIDE                                    | Fibre Channel   |  |



| Feature                                      | Sun Blade 150                                  | Sun Blade 1000  | Sun Blade 2000            |
|--|--|---|---------------------------|
| <b>Graphics Supported</b>                    | Sun PGX64,<br>Sun XVR 500<br>Sun Expert3D-Lite | Sun PGX64,<br>Sun Creator3D, Sun Elite3D,<br>Sun Expert3D, Sun Expert3D-Lite,<br>Sun XVR-500, Sun XVR-1000  |                           |
| <b>Solaris Operating Environment Support</b> | Solaris 8 (2/02) or newer                      | <ul style="list-style-type: none"> <li>• Solaris 8 (10/00) or newer recommended</li> <li>• Solaris 8 (10/01) or later for systems using the UltraSPARC-II Cu processor</li> </ul> | Solaris 8 (2/02) or newer |
| <b>OBP Revision</b>                          | —  | 4.X or newer  | 4.5.X or newer            |

## Key Messages

- **The Sun Blade 2000 systems are very high-performance, 64-bit workstations that support technical applications that require exceptional computational speed and lots of memory for large data sets.**
  - Standard configurations of the Sun Blade 2000 come with 900-MHz UltraSPARC III Cu processors. Configurations with the high-performance 1.05-GHz processor module are also available.
  - All Sun Blade 2000 processors come with 8 MB of L2 cache.
  - Systems have an 8-GB memory capacity. Memory is installed in banks of four DIMMs to take advantage of the architecture's 576-bit-wide memory path.
  - UPA provides a crossbar-oriented interconnection establishing a 144-bit wide, ECC-protected data path to the CPU. Clocked at up to 150 MHz, the UPA crossbar gives a peak throughput of over 1.2 GB/second.
- **The Sun Blade 2000 workstations provide customers with several graphics solutions from the single-display, low-cost 2D graphics solutions to multi-display, high-performance texture-mapping 3D graphics solutions.**
  - Sun PGX64 graphics is a low-cost option for those customers that only require 2D graphics. Up to four cards are supported in a single system.
  - Sun Expert3D graphics is Sun's high-end, hardware-accelerated, texture mapping option. Up to two graphics cards are supported.
  - Sun Expert3D-Lite provides texture-mapping acceleration at a bargain price. It is Sun's best price-performance graphics option.
  - Sun Creator3D graphics is Sun's low-end 3D graphics option.
  - Sun XVR-500 graphics accelerator is a mid-range graphics option that allows customers with small, medium, and large datasets to choose the system to meet their demanding application needs. This board provides support for multiple frame buffers in a single system; up to four are supported to support up to four synchronized displays.



- Sun XVR-1000 graphics is an ideal solution for customers who need the highest possible workstation image quality for personal visualization applications. Each card drives two monitors and up to two graphics cards are supported in each system.
- **The Sun Blade workstations continue to be the industry leaders in networking, connectivity, and I/O performance and versatility ratings**
  - 100-Mbps Fast Ethernet through twisted pair is a standard feature on all Sun Blade 2000 workstations, but the system also maintains connectivity with 10 Mbps networking technology through an autosensing speed switch feature.
  - Advanced networking options include FDDI and additional Fast Ethernet ports through industry-standard PCI option cards
  - The Sun Blade workstations come with USB and IEEE 1394 (FireWire®) ports to support the newer peripherals that come with these I/O interfaces.
- **The Sun Blade 2000 workstations run the same applications that run throughout Sun workstation and server product lines. Binary compatibility continues to be of the most important ways that Sun protects its customers' investments.**

## Availability

The Sun Blade 2000 workstations with 900-MHz UltraSPARC III Cu processors or the high-performance 1.05-GHz processors are currently available. Sun Blade 1000 workstations have been EOLed. Last Order Date 06/30/2002; Last Ship Date 11/08/2002

## Target Users

The target customer is the user who requires maximum computer resources — CPU, memory, and disk capability — in a desktop system. In particular, the Sun Blade 2000 systems are excellent workstations for users who run applications that require extremely high floating-point performance or who need high-performance graphics for visualization applications.

## Target Markets

Designed for the power user who requires high-performance, multiprocessing capability, high-end graphics, and large amounts of expansion capacity, the Sun Blade 2000 workstations meet the needs of users in a number of disciplines. Primary market areas are:

- Electronic design automation (EDA)
- Mechanical design (MCAD/MCAE)
- Earth resources/GIS (oil and gas)
- Visualization and simulation
- Research and development



Secondary markets are:

- Defense/government
- Financial modeling
- Medical imaging

With the Sun Expert3D graphics card, the Sun Blade 2000 workstations can perform complex DCC operations for visual/simulation applications, and texture memory operations for intense graphics use. Its two-way CPU capability is ideal for financial services applications that perform simultaneous financial simulations and trading activities.

| Industry   | Key Features to Highlight  |
|--|--|
| <b>Digital Content Creation (DCC)</b>  | <ul style="list-style-type: none"> <li>• 8-GB RAM to support large data sets</li> <li>• High floating point performance for complex compute rendering</li> <li>• Dual CPUs to handle simultaneous tasks</li> <li>• XVR 500 or XVR 1000 Graphics Accelerators</li> </ul>  |
| <b>Electronic Design (EDA)</b> <ul style="list-style-type: none"> <li>• Chip designers, board designers</li> <li>• System houses</li> <li>• Telco</li> </ul>                                   | <ul style="list-style-type: none"> <li>• High-performance, full 64-bit processing</li> <li>• Large memory capacity</li> <li>• Availability of applications</li> <li>• PGX 64 or XVR 500 Graphics Accelerators</li> </ul>   |
| <b>Financial</b> <ul style="list-style-type: none"> <li>• Stock and commodity traders</li> <li>• Banks</li> </ul>  | <ul style="list-style-type: none"> <li>• High performance CPUs</li> <li>• Compact design</li> <li>• Multimedia capabilities</li> <li>• Multi-headed display capability</li> </ul>  |
| <b>Mechanical Design (MCAD/MCAE)</b> <ul style="list-style-type: none"> <li>• Automotive</li> <li>• Aerospace</li> <li>• Defense industry</li> <li>• Mechanical equipment designers</li> </ul> | <ul style="list-style-type: none"> <li>• High-performance, full 64-bit processing</li> <li>• High-end graphics performance and functionality</li> <li>• Availability of applications</li> <li>• XVR 500 Graphics Accelerator</li> </ul>  |
| <b>Oil and Gas</b> <ul style="list-style-type: none"> <li>• 2D, 3D, and 4D seismic analysis</li> <li>• Production engineering</li> <li>• Reservoir engineering</li> </ul>                      | <ul style="list-style-type: none"> <li>• High-performance, full 64-bit processing to handle computation with large data sets</li> <li>• High-end graphics performance and functionality for imaging operations</li> <li>• Dual-headed monitor capability</li> <li>• 3D support for 24-inch displays</li> <li>• XVR 500 Graphics Accelerator</li> </ul> |
| <b>Publishing and Imaging</b> <ul style="list-style-type: none"> <li>• Newspapers</li> <li>• Magazines</li> <li>• Image banks</li> <li>• Advertising agencies</li> </ul>                       | <ul style="list-style-type: none"> <li>• High-performance CPUs</li> <li>• High-end graphics performance and functionality for imaging operations</li> <li>• Dual graphics monitor capability</li> </ul>  |
| <b>Research and Development</b> <ul style="list-style-type: none"> <li>• In-house development</li> <li>• Research institutions</li> </ul>  | <ul style="list-style-type: none"> <li>• High computing performance</li> <li>• Feature-rich Solaris Operating Environment</li> </ul>   |



| Industry   | Key Features to Highlight  |
|--|--|
| <b>Software Development (CASE)</b> <ul style="list-style-type: none"> <li>• ISVs</li> <li>• In-house development at large organizations</li> </ul> | <ul style="list-style-type: none"> <li>• High-performance Solaris Operating Environment</li> <li>• A full, 64-bit environment</li> <li>• Availability of applications</li> <li>• Multithreaded application development</li> <li>• PGX 64 or XVR 500 Graphics Accelerators</li> </ul> |
| <b>Visualization and Simulation</b> <ul style="list-style-type: none"> <li>• Scientific visualization</li> <li>• Technical simulation</li> </ul>   | <ul style="list-style-type: none"> <li>• High-performance CPUs</li> <li>• tuned for high-end graphics performance and functionality</li> <li>• Sun Expert3D or Sun XVR-1000 graphics with high-end texture mapping</li> <li>• Multi-monitor capability</li> </ul>                    |

# Selling Highlights

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## Compatibility

The Sun Blade™ 2000 workstations run the Solaris™ 8 Operating Environment. They can also run 64-bit applications unmodified from the Solaris 7 Operating Environment, as well as 32-bit applications from previous versions of the Solaris Operating Environment making these systems compatible with previous systems and software. Sun Blade 2000 systems require the Solaris 8 2/02 version of the Solaris Operating Environment or later.

## Market Value Propositions

- Sun re-emphasizes its position with leading-edge compute performance and high-end 3D visualization capabilities with the best price/performance available in the 64-bit workstation marketplace.
- Due to the exceptional application and graphics performance, customers in manufacturing who use graphics and compute intensive applications to visualize large data sets will see a marked increase in their productivity level. The workstation will help enable customers to more accurately view their datasets, make better decisions based on what they see, and reduce errors and manufacturing cycle times.
- By utilizing the Sun Blade 2000 workstation's exceptional dual-processing compute performance and large 8-GMB memory capacity in addition to Sun Grid Engine software, customers in electronic design automation and MCAE environments who work with complex, compute-intensive and visually intensive applications should see a marked increase in their productivity.
- Because of Sun's continued focus on investment protection, Sun customers can realize significant cost savings by upgrading/adding to their Sun Blade 2000 workstation to newer processors and components rather than purchasing new systems.
- The Sun Blade 2000 workstations exceptional performance along with its ability to support four high-performance monitors driving by two Sun XVR-1000 or four Sun XVR-500 graphics accelerators, allows customers to provide "personal visualization systems" at a fraction of the cost of large visualization solutions.
- Assemble-To-Order configurations offer customers a customized configuration that is configured for their needs, instead of pre-configured system with standard features.



# Enabling Technologies

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## UltraSPARC III Cu Processors

The Sun Blade™ 2000 workstations are shared-memory, multitasking systems built around the UltraSPARC III Cu microprocessors. These processors are Sun's latest generation of the SPARC™ processor family and the second generation of 64-bit UltraSPARC chips.

The Sun Blade 2000 workstation comes with 900-MHz or 1.05-GHz versions of the UltraSPARC III Cu processor.

- As a member of the UltraSPARC family of CPUs, full binary compatibility is provided.
- Modules have the 64-bit SPARC V9 architecture.
- Systems have 8 MB of Ecache per CPU.
- An on-chip memory controller is included for reduced latency.

## I/O Interfaces

The Sun Blade 2000 workstations include two advanced I/O interfaces, which greatly increase customers' access to peripherals.

- **USB interface**

Universal serial bus (USB) support is provided for low-speed devices. Initially devices such as the Sun™ Type-6 keyboard and mouse are supported along with USB hubs. Sun Blade 2000 workstations have four (Type A) USB connectors on the rear panel.

- **IEEE 1394 interface**

IEEE 1394 — also known in the industry as FireWire® — has emerged as a standard for medium-speed devices such as digital cameras and digital video cameras. IEEE 1394 interfaces provide an isochronous service that provides latency along with delivering a 400-Mbps bandwidth that is required for transferring large images and other multimedia data. The Sun Blade 2000 workstations have two IEEE 1394 (6-pin) connectors on the rear panel.

## Fiber Channel Arbitrated Loop (FC-AL)

Sun has been an early and aggressive adopter of Fiber Channel arbitrated loop (FC-AL) technology in its higher end systems and disk array technologies. The Sun Blade 2000 workstations are Sun's first desktop systems using this exciting high-bandwidth (1 Gbit/second) technology, offering considerable performance advantage and deployment flexibility over the slower UltraSCSI technology. Only FC-AL disk drives are supported for internal disk storage in the Sun Blade 2000 workstations.



# System Architecture

## Technology Overview

Sun Blade™ 2000 workstation architecture is designed to provide high-performance multiprocessing power, scalability, reliability, and flexibility in a balanced package that does not compromise economy. The very high levels of integration achieved with Sun workstations through the use of application-specific integrated circuits (ASICs) have resulted in a greatly reduced part count, high reliability, and low cost without compromising access to a full complement of expansion options through high performance, standardized interfaces.

An architectural block diagram of the Sun Blade 2000 workstation board is shown in the figure below.

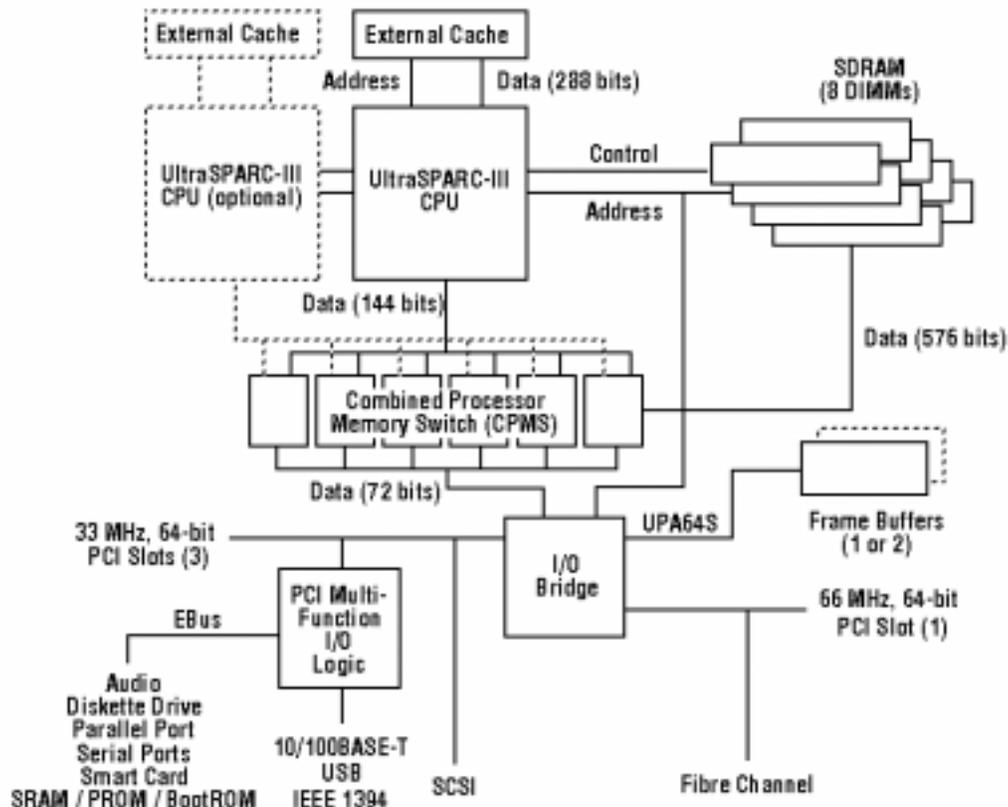


Figure 2. Architecture of the Sun Blade 1000 and 2000 system

The Sun Blade 2000 workstations are designed for balanced system performance, accelerating applications at every step. Faster I/O and networking, together with the Sun™ Fireplane interconnect, allow fast data fetching. This interconnect is based on a packet-switched, crossbar architecture. The Sun Blade 2000 workstations have nine buffered crossbar-switched processors that allow the memory and the graphics to interconnect. This architecture provides supercomputing power, and moves data through the interconnect at high speed.



## Technical Fact Summary

- Sun Blade 2000 workstations use one or two 900-MHz or 1.05-GHz UltraSPARC III Cu processors.
- High-performance Sun Fireplane interconnect with 4.8 GB/second throughput provides fast access to memory and graphics.
- Internal FC-AL interface for disk access supports up to two internal FC-AL disks in these system (up to 144-GB capacity). The Sun Blade 2000 workstation comes with up to two 73-GB FC-AL disks.
- Up to 8 GB of memory for configurations (using 8 x 1-GB DIMMs)
- High performance interconnect at up to 150 MHz /1.2 GB/second peak throughput.
- High-performance 64-bit PCI I/O bus offering dual independent PCI buses, plus 66-MHz PCI support
- High-end graphics functionality and performance at mid-level prices with Sun XVR 500 and Sun XVR-1000 graphics
- Fast Ethernet, 100 BASE-T, autosensing, and autoswitching to 10BASE-T for backward compatibility in networking; advanced networking options include Gigabit Ethernet, ATM, token ring, and FDDI.

## Processors in the Sun Blade 2000 Workstations

Sun Blade 2000 workstations are powered by up to two UltraSPARC III Cu microprocessors with 8 MB of external cache. Binary compatible with all Sun SPARC™ processor-based systems, the UltraSPARC III Cu processors provide excellent integer and floating-point performance to address the needs of the most computationally demanding applications.

## UltraSPARC III Cu Processor Features

The UltraSPARC III Cu processor, the second model in this family, offers a number of performance enhancements. This processor incorporates a number of data prefetching mechanisms to exploit memory level parallelism. The processor offers an enhanced data memory management unit (DMMU) that has 1040 TLB entries and more support for flexibly using large pages, up to 4-MB pages, to more effectively map gigabytes of data. The processor supports a two-way set-associative external cache instead of a direct-mapped cache. This updated processor includes all the features of its predecessor, with a few significant improvements. It is currently available at 900- and 1.05-GHz speeds.

- Prefetch is enabled in the UltraSPARC III Cu modules. This feature significantly improves floating point and integer arithmetic performance (up to 15 percent).
- The performance gain also comes from a combination of support for the two-way, set-associate external cache and a larger cache table.
- Specific applications in the oil and gas, MCAE/MCAD, and EDA markets have seen significant performance boosts over the same speed UltraSPARC III CPU modules that do not have prefetch enabled.

## Data Prefetching Support

The UltraSPARC III Cu processor makes use of an advanced data prefetching mechanism. This mechanism is used to both overlap load misses to increase memory-level parallelism and to hide load-miss latency. This mechanism allows software to explicitly expose the memory-level parallelism and to



schedule memory operations. This mechanism is extra important because the processors in the UltraSPARC III family have blocking loads; when the processor reaches a load instruction that misses in the cache, the processor waits for the load to complete before executing any other instructions. The processors supports software prefetching where the compiler (or Java JIT) can schedule prefetching of data to exploit memory-level parallelism. Some versions of the processor will also support hardware prefetching, where the processor observes common data sequences and attempts to prefetch the data automatically. There are a number of variations of software prefetches. Software prefetches can specify if the data should be brought into the processor either for reading or both reading and writing. Software can also specify if the data should be installed into the external cache, for data that will be reused frequently, or only brought into the prefetch cache.

One of the main mechanisms for implementing prefetches is a special prefetch cache. The prefetch cache is a small (2 KB) cache that is accessed in parallel with the data cache for floating-point loads. Floating-point load misses, hardware prefetches and software prefetches bring data into the prefetch cache. The prefetch cache is 4-way set-associative and has 64-byte lines which are broken into two 32-byte subblocks with separate valid bits. The prefetch cache is write invalidate.

### Enhanced Data Memory Management Unit

The data memory management unit of UltraSPARC III Cu is enhanced to provide more translation entries and to provide more support for using large pages for translation. For the data reference address stream translation there are three TLBs accessed in parallel. The first TLB is a 16-entry fully-associative TLB. This TLB can translate page sizes of 8K, 64K, 512K and 4M. The second TLB is a 256-set, 2-way set-associative (512 entries) TLB. This TLB can translate at 8K, 64K, 512K and 4M page sizes, but at any one time it is configured to only handle one of the page sizes.

The third TLB is identical to the second. This TLB, like the second, can handle one of four page sizes and can be configured to the same or a different page size than the second TLB.

Having the two large TLBs is very important for general use of large pages for translation. One of the TLBs can be set for large pages (such as 4-MB pages) while the other can be set to the default page size (usually 8-KB pages). With this configuration the processor has robust support for large pages.

### Enhanced External Cache Unit

The external cache for UltraSPARC III Cu can be configured as two-way set-associative. This offers substantial improvements in the hit rate of cache. The cache size and line size remains the same.

## UltraSPARC III and UltraSPARC III Cu Processor Comparison

| Feature                               | UltraSPARC III                         | UltraSPARC III Cu         |
|---------------------------------------|--|---------------------------|
| Speeds Available                      | 750/900 MHz                            | 900 MHz/1.05 GHz          |
| Can mix processor speeds?             | Yes                                    | No                        |
| Solaris Operating Environment Support | Solaris 8 (10/00) or newer recommended | Solaris 8 (2/02) or newer |
| OBP Revision                          | 4.X or newer                           | 4.5.X or newer            |
| Prefetch Settings                     | off                                    | on                        |
| On-chip SRAM protection               | no                                     | ECC/parity                |



| Feature            | UltraSPARC III | UltraSPARC III Cu |
|--------------------|----------------|-------------------|
| SPECint2000 (peak) | 396/466        | 533/610           |
| SPECfp2000 (peak)  | 395/410        | 731/817           |

**Notes:**

- The UltraSPARC III benchmarks were performed with the Forte™ Developer 6 update 1 compiler on the Solaris 8 10/00 Operating Environment.
- The UltraSPARC III Cu benchmarks were performed with Forte Developer 7 EA compiler and the Solaris 8 2/02 Operating Environment

Note that UltraSPARC III Cu modules cannot be mixed with the UltraSPARC III modules. The 2/02 version of the Solaris Operating Environment is required for Sun Blade 1000 systems prior to installing the UltraSPARC III Cu module upgrades.

Additional improvements were made to the UltraSPARC III Cu processor to enhance performance:

- A number of changes to the array parity protections were made
- The Ecache initialization process was streamlined
- The processor clock and the Ecache modes were modified to support higher clock frequencies



## Sun Fireplane Interconnect

In recent years, processor technology has moved so quickly that memory systems and interconnects have been hard-pressed to keep up. As a result, many designs fail to deliver the data bandwidth that modern processors are capable of. With the updated system interconnect, Sun Microsystems continues the tradition of providing superior memory and I/O bandwidth on its desktop systems.

Features of this system interconnect include:

- Fast 150-MHz operating frequency offers greatly increased performance over previous designs
- Low latency memory access
- Completely separate address/control and data paths for flexible implementation
- Out-of-order transaction processing enables multiple "in-flight" transactions on the bus at one time.
- More economical implementation through distributed control (no central memory controller required)
- Integrated support for multiprocessor configurations
- 4.8 GB/sec. peak data bandwidth
- Separate address and data paths, so no ordering on data and better load balancing
- Distributed arbitration for address control; no need for central arbiter
- Boot bus provides alternate path for booting and diagnostic
- Energy Star mode built-in
- ECC on data, parity on private data bus, parity on address control

The Sun Fireplane interconnect directly connects the two UltraSPARC III Cu processors and the I/O bridge. The address bus runs at half the speed of the data paths, and utilizes DTL signaling. One of the major architectural innovations of this interconnect is the ability to combine the simplicity of a single bus with the high bandwidth normally associated with a switch-based interconnect. This is accomplished with the complete separation and independence of address and data paths. The address and data paths in most computer systems are very closely related, especially in their low-level sequencing, forcing a strong coupling between the transport of addresses and data between system components. The system interconnect breaks away from this traditional methodology by completely separating the address and data paths — both at the topological level and in low-level sequencing. For addresses, a hierarchical bus is used. For data, a high bandwidth point-to-point data network is used. This interconnect supports high-performance servers with up to 24 processor sockets.

For larger scale systems, a directory protocol can be used to connect many smaller groups of CPUs together. The directory protocol is based on Sun's scalable shared memory (SSM) architecture. Within each group, snooping is used for coherency, and the directory protocol is used between groups. The CPUs of the UltraSPARC III Cu family all have built-in support for both the snooping and the directory-based cache coherency protocols. With the directory protocol, coherent multiprocessor with more than a thousand CPUs can be built.

## Memory

The Sun Blade 2000 workstations support up to 8 GB of 50-ns, 232-pin, 3.3-volt, dynamic RAM memory. Memory is organized into two banks of four DIMMs. DIMMs are added in groups of four.



## Storage

Internal data storage is provided by up to two 3.5-inch, FC-AL disk drives. The Sun Blade 2000 workstations come with up to two 73-GB drives. These 10000-rpm drives offer a peak data transfer rate of 100 MB/second.

In addition to internal and external high-speed fixed storage capabilities, the Sun Blade 2000 workstations provide three removable media bays that support DVD-ROM, 1.44-MB, 3.5-inch manual-eject floppy, or 4-mm tape for software installation and system management.

## Networking and I/O

All Sun Blade 2000 workstation models provide standard 100-Mbps Fast Ethernet, which can autosense and drop to 10 Mbps operation. In addition, a wide range of serial I/O options are supported, bringing additional capabilities and higher levels of performance to desktop workstations:

- **USB interface**

Universal serial bus (USB) support is provided for low-speed devices. Initially devices such as the Sun Type-6 keyboard and mouse are supported along with USB hubs. The Sun Blade 2000 workstations have four USB connectors on the rear panel.

- **IEEE 1394 interface**

IEEE 1394 — also known as FireWire® — has emerged as a standard for medium speed devices such as digital cameras and digital video cameras. IEEE 1394 interface provides an isochronous service which helps ensure latency along with providing the needed 400-Mbps bandwidth for transferring large images and other multimedia data. The Sun Blade 2000 workstations have two IEEE 1394 connectors on the rear panel.

- **Fiber Channel arbitrated loop (FC-AL)**

Sun has been an early and aggressive adopter of Fiber Channel arbitrated loop (FC-AL) technology in its higher end systems and disk array technology. The Sun Blade 2000 workstations continued the precedent set by the recently eoled SunBlade 1000 workstations of this exciting high-bandwidth (1 Gbit/second) technology in desktop systems, offering considerable performance advantage and deployment flexibility over slower UltraSCSI. Only FC-AL disk drives are supported for internal storage in Sun Blade 2000 workstations.

- **SCSI**

Sun Blade 2000 workstations still support 40 MB/second UltraSCSI (Fast-20) for support of internal removable media devices and legacy external SCSI devices. UltraSCSI is completely compatible with earlier fast (10 MB/second) and standard 8-bit (5 MB/second) SCSI peripherals. A standard external 68-pin connector is provided.

- **Terminal/modem interface**

Two serial ports are provided, both supporting synchronous communication. The maximum baud rate is 384-Kbaud synchronous and 460.8-Kbaud asynch. Both RS232 and RS423 standards are supported via a software setting. The default configuration is RS423. Connection is via two DB25 standard connectors.



# Supported Graphics

The Sun Blade™ 1000 (recently EOLed) and 2000 workstations provide access to Sun's most popular and most powerful graphics accelerators. The table below shows the graphics systems supported on these workstations.

| Graphics Accelerator            | Sun Blade 1000 Workstation | Sun Blade 2000 Workstation | Max. Number Supported |
|---------------------------------|----------------------------|----------------------------|-----------------------|
| Sun™ PGX64 graphics             | Standard configuration     | Standard configuration     | 4                     |
| Sun Creator3D series 3 graphics | Option                     | Option                     | 2                     |
| Sun Elite3D m6 graphics         | Option                     | Option                     | 2                     |
| Sun Expert3D graphics           | Option                     | Option                     | 2                     |
| Sun Expert3D-Lite graphics      | Standard configuration     | Option                     | 3                     |
| Sun XVR-500 graphics            | Option                     | Random configuration       | 4                     |
| Sun XVR-1000 graphics           | Option                     | Random configuration       | 2                     |

Sun's existing graphics product lines maintain binary-compatibility with all other Sun graphics products. The following sections describe these graphics accelerators in more detail.

Note: Sun Creator3D series 3 graphics and Sun Elite3D m6 graphics accelerators have been EOLed.

The Last Order Date for both EOLed graphics accelerators is September 6, 2002 and the Last Ship Date for both is December 6, 2002.

## Sun PGX64 Graphics

Sun PGX64 graphics is the low-cost PCI graphics product in the PGX™ family. It is the PGX32™ graphics successor. Sun PGX64 graphics provides Sun with a very low-cost, flexible 24-bit, 2D graphics board supporting the widest range of Sun systems and supporting up to four boards in systems that can accommodate four PCI boards. Sun PGX64 graphics is a PCI-based graphics board providing support for all current Sun PCI-based workstations and workgroup and enterprise servers; as well as future workstations and workgroup servers supporting PCI.

Sun PGX64 graphics include the following features:

- ATI's RageXL graphics processor
  - 2D graphics acceleration
  - 8-MB SGRAM
  - 24-bit-only true color video support up to 1920 x 1200
  - 8-bit-only pseudo color video support up to 1600 x 1000
- 33-MHz, 32-bit, 5-volt PCI card, short form factor (< 7-inch length)
- Low power consumption (< 8 watts)
- HD15 video connector on the motherboard supports composite and separate video sync timing



- Compatible with OpenWindows™ environment, CDE windowing, and supports the following APIs: X11, Motif, JDK, XGL™, XIL™, and OpenGL® API via a software pipeline.
- Backwards compatibility with Sun's PGX24™ and PGX32 graphics accelerators (including MUX support, support for VESA/Sun resolutions, flexibility, and so on)
- Support for all Sun monitor products released since 1995
- A HD15-to-13W3 video connector cable is included to connect to monitors with the 13W3 interface.

Sun PGX64 graphics supports the resolutions shown in the table below.

| Display Resolution | Vertical Refresh Rate | Sync Standard | Aspect Ratio | Color Depth |
|--------------------|-----------------------|---------------|--------------|-------------|
| 1920 x 1200        | 70 Hz                 | Sun           | 16:10        | 8-bit       |
| 1920 x 1080        | 72 Hz                 | Sun           | 16:9         | 24-bit      |
| 1600 x 1280        | 76 Hz                 | Sun           | 5:4          | 24-bit      |
| 1600 x 1200        | 75 Hz                 | VESA          | 4:3          | 8-bit       |
| 1600 x 1000        | 66, 76 Hz             | Sun           | 16:10        | 24-bit      |
| 1440 x 900         | 76 Hz                 | Sun           | 16:10        | 24-bit      |
| 1280 x 1024        | 60, 75, 85 Hz         | VESA          | 5:4          | 24-bit      |
| 1280 x 1024        | 67, 76 Hz             | Sun           | 5:4          | 24-bit      |
| 1280 x 800         | 76 Hz                 | Sun           | 16:10        | 24-bit      |
| 1152 x 900         | 66, 76 Hz             | Sun           | 5:4          | 24-bit      |
| 1152 x 864         | 75 Hz                 | VESA          | 4:3          | 24-bit      |
| 1024 x 768         | 60, 70, 75, 85 Hz     | VESA          | 4:3          | 24-bit      |
| 800 x 600          | 56, 60, 72, 75, 85 Hz | VESA          | 4:3          | 24-bit      |
| 720 x 400          | 85 Hz                 | VESA          | 9:5          | 24-bit      |
| 640 x 480          | 60, 72, 75, 85 Hz     | VESA          | 4:3          | 24-bit      |

**Note:** 8-bit color support is via emulation in 24-bit window. Sun PGX64 graphics outputs separate sync for VESA resolutions and composite sync for Sun resolutions.

Sun PGX64 graphics supports 64-bit/66-MHz, 64-bit/33-MHz, or 32-bit/33-MHz PCI slots in all PCI-based Sun workstations and servers. Specific support for the Sun Blade workstations is shown in the following table.

| System         | Standard Configuration? | X-option? | Max. Number of Boards per System | Slot Configuration                      | Number Supported, if UPA Graphics also Configured |
|----------------|-------------------------|-----------|----------------------------------|---|---|
| Sun Blade 150  | on-board version        | Yes       | 3                                | NA                                      | NA  |
| Sun Blade 2000 | Yes                     | Yes       | 4                                | 1 in 66-MHz slots;<br>3 in 33-MHz slots | 1 or 2  |



On the Sun Blade 2000 systems, the Sun PGX64 graphics board cannot be installed if there is a double-wide UPA frame buffer (Sun Elite3D m6 graphics) installed in the adjacent UPA slot. And, while the Sun Blade 2000 systems support four Sun PGX64 frame buffers, installing the fourth buffer in the 66-MHz slot slows performance of the entire 66-MHz PCI bus to operate at 33 MHz.

## **Sun Creator3D Graphics Series 3 Overview**

Note: Sun Creator3D series 3 graphics accelerator has been EOLed.

***The Last Order Date for the EOLed graphics accelerator is September 6, 2002 and the Last Ship Date for is December 6, 2002.***

*Sun Creator3D graphics series 3 is the latest generation of the Sun Creator graphics family of accelerators. With one architecture it can accelerate and support diverse types of graphic needs ranging from 8-bit and 24-bit windowing to high-end 3D graphics.*

*Sun Creator graphics is designed as an integral part of Sun Blade or Sun Enterprise™ servers and is, therefore, designed to take advantage of the UltraSPARC CPU performance increases to 300 MHz and beyond. The original generation of Sun Creator graphics has a single graphics/frame buffer clock for all on-board logic. This generation has one clock for the internal graphics processing and another clock for the frame buffer. This design makes it possible to drive each part at its maximum speed.*

### **Key Messages**

- ***Solid graphics performance***

*Sun Creator3D graphics performance is based upon the Sun Creator approach to designing graphics. In series 3, the Sun Creator graphics technology is enhanced, with up to 50 percent graphics performance improvement over series 1.*

- *UltraSPARC CPU*

*Sun Creator graphics relies on the power of the UltraSPARC CPU for floating point calculations, and on the visual instruction set (VIS software) to accelerate imaging-related operations. This eliminates the need for a dedicated graphics processor, and results in a significant cost advantage.*

- *Ultra port architecture (UPA) high-speed interconnect for graphics*

*UPA provides a high-speed, high-bandwidth interconnect between the CPU, Sun Creator graphics, and main memory. It raises overall graphics performance while maintaining a balanced throughput. Unlike the peripheral buses, such as SBus or PCI, the UPA interconnect ties Sun Creator graphics directly to the CPU and memory, and delivers greater bandwidth by orders of magnitude.*

*UPA also allows Sun Creator3D to utilize main system memory for texturing, allowing large texture mapping possibilities.*

- *Sun Creator-rendering ASIC (FBC2)*

*FBC2 ASIC renders graphic primitives at very high speeds. FBC2 accelerates fills, scrolling, text, lines, and polygon rendering.*

- *3D-RAM graphics memory*

*This generation of the 3D-RAM breakthrough in graphic memory provides high-bandwidth and built-in acceleration for 3D graphics.*



- **Scalable performance**

*The performance of Sun Creator3D graphics takes advantage of general system performance enhancements and scales up with increases in CPU clock rate, making it unnecessary to upgrade graphics as new generations of CPUs become available.*

- **More standard functionality**

*All Sun Creator graphics products come standard with high resolution and 24-bit true color, as well as an 8-bit overlay plane. Sun Creator3D graphics supports 24-bit double buffering and a 28-bit Z-buffer. In addition, stereo output support is built-in. Sun Creator graphics established a new standard for workstation graphics functionality.*

*Sun Creator3D graphics series 3 also adds support for high-resolution monitors (up to 1920 x 1200) and hardware acceleration of color-space conversion during video playback.*

*Four 8-bit color maps for dynamic color-map segment allocation within the 8-bit color overlay plane and support for adjustable gamma correction give applications greater access to colors even in 8-bit mode and give the user the ability to color adjust (gamma correct) for optimal display quality.*

- **Fully compatible with existing APIs**

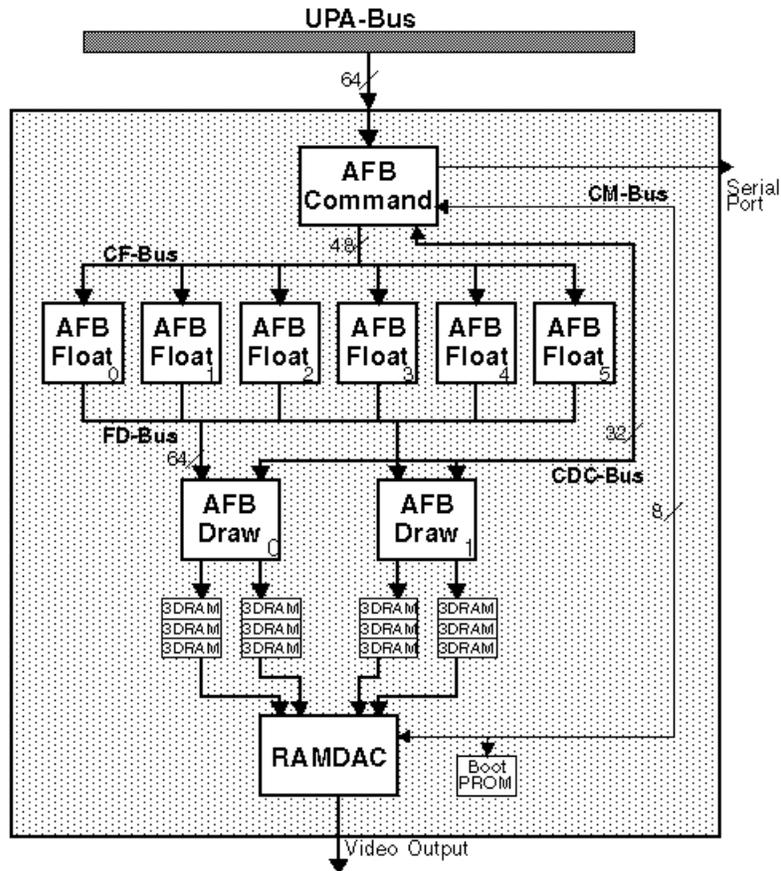
*Sun Creator graphics accelerates existing APIs, including OpenGL, X11, XIL, and XGL graphics libraries.*

## **Sun Elite3D Graphics Overview**

Note: Sun Elite3D m6 graphics accelerator has been EOLed.

The Last Order Date for the Eoled graphics accelerator is September 6, 2002 and the Last Ship Date for is December 6, 2002.





**Figure 3.** Sun Elite3D m6 graphics chip-level diagram

*Sun Elite3D graphics greatly accelerates the rendering of 3D triangles, vectors, and texture maps over what is possible with Sun Creator or a raw CPU. It does this by adding specialized graphics floating-point units and more powerful pixel-drawing chips. It supports a 1280 x 1024 96-bit-deep frame buffer, configured the same as the double-buffered and Z-buffered Sun Creator3D graphics. The 96-bit pixels support two 24-bit color buffers, an 8-bit pseudo-color overlay buffer and a 28-bit Z buffer, plus some miscellaneous control planes.*

*Sun Elite3D graphics has a highly parallel and efficient graphics pipeline. The Sun Elite3D graphics architecture uses a new generation of 3D-RAM chip. This chip speeds up a read/modify/write pixel access from 160 ns to 10 ns, changing all of the rules about graphics pipeline behavior.*

*AFB-Command, at the interface level, is a superset of the Sun Creator ASIC chip. The additional functionality supports rendering of model space geometry. The main change is to allow the most important bits to be packaged up into single-header words that can be passed down with the geometric data without stopping the pipeline. Additional functionality includes complete binary compatibility with the register set and functions of Sun Creator3D graphics and support for the OpenGL platform.*

*Given the technological changes brought on by 3D-RAM, the primary justification for the existence of a 3D graphics accelerator is to deliver an order of magnitude more floating-point performance than a contemporary general purpose RISC CPU, at a price less than that of a single CPU and cache.*



*The Sun Elite3D m6 graphics accelerator is offered as an option to Sun Blade 2000 configurations. Sun Elite3D m6 graphics provides a high level of performance with six high-performance, floating-point processors. It provides significantly higher levels of performance and functionality than the m3 model including:*

- *Standard 24-bit color, 1280 x 1024 resolution, MPEG playback acceleration at 30+ frames per second, greater than 4.7 million 2D vectors per second, greater than 8.2 million 3D vectors per second, over 5.9 million triangles per second, and on-board image acceleration functions.*
- *88-bit planes, including full 24-bit double-buffer planes for smooth animation. A 28-bit Z-buffer is included to provide support for hidden surface removal and dynamic rendering of 3D objects.*
- *Support for a wide array of important graphics functions, including Bresenham lines; polygons; fonts; accelerated dots, lines, triangles, and quadrilaterals; antialiasing of dots and lines; Gouraud shaded triangles; specular lighting; hardware per-pixel depth cueing; transparency; texture map support; compressed 3D geometry decompression; viewport clipping; flexible blending operations; and a full set of Boolean operations.*
- *Sun/Mitsubishi developed 3D-RAM to improve 3D graphics rendering performance*
- *Exploits the high floating-point performance and VIS instruction set of the UltraSPARC III processor*
- *High speed RAMDAC can display 8-bit and 24-bit images simultaneously, and features a programmable video timing generator for multiple resolution support*
- *Completely compatible with existing Sun graphics APIs, including X11, XGL, and XIL graphics libraries. Also compatible with the OpenGL API, a vendor-neutral 2D and 3D graphics API. In line with its philosophy of uninhibited expansion potential, the Sun Blade 1000 and 2000 workstations have two UPA64S slots to allow "dual-headed" (two monitor) Sun Elite3D graphics operation.*

## **Sun Elite3D Graphics Features and Benefits**

### **Features**

- *Integrated imaging*
- *Very high-performance, accelerated, 24-bit, double-buffered 3D graphics*
- *28-bit Z-buffer*
- *8-bit overlay plane*
- *Gouraud shading*
- *Acceleration for geometry decompression*
- *Alpha blending and screen door transparency*

### **Benefits**

- *Performs fast imaging and 3D on unified frame buffer*
- *Smooth animation and interactivity of 3D graphics*
- *Improves visual quality and depth accuracy*
- *Allows overlay of 8-bit windows on top of the 24-bit visuals without damaging the underlying visual, allowing virtually seamless integration and manipulation of windows*
- *Allows smooth shading of solid geometry*
- *Allows complex compressed geometry to be decompressed at hardware rates*
- *Simulates transparent materials such as glass*



## **Features**

- *Line and big dot antialiasing*
- *Per-pixel depth cueing*
- *Per-pixel alpha interpolation*
- *4-bit stencil support with hardware acceleration of OpenGL API stencil functions*
- *Accelerated lighting*
- *Four 8-bit color maps*
- *Adjustable gamma correction*
- *NTSC/PAL video timing support*
- *Stereo 960 x 680 at 112 Hz supported with 21-inch monitor*
- *1280 x 1024 at 76-Hz resolution standard*
- *Two serial-port connectors*
- *Dual-headed support: two Sun Elite3D m6 frame buffers and/or two Sun Creator3D frame buffers*
- *Sun™ OpenGL® for Solaris™, XGL3.0, XIL, X, and Java 3D™ API support*
- *Binary compatibility with Sun Creator graphics product family*

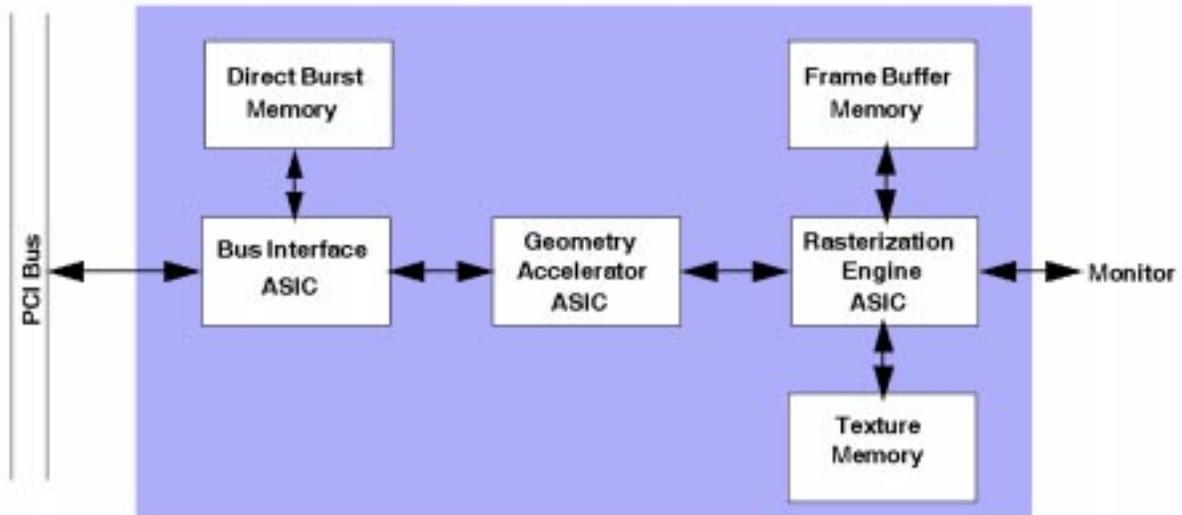
## **Benefits**

- *Needed in MCAD and visualization for better visual quality*
- *More accurate depth cueing or fog*
- *Variable transparency*
- *Enables hardware acceleration for OpenGL API*
- *More lights can be turned on for enhanced visual display without encountering large performance penalties*
- *Dynamic color map segment allocation when running 8-bit window systems should eliminate color flashing problems*
- *Allows users to gamma-correct visuals for enhanced visual quality*
- *Supports frame buffer to video timing*
- *With frame buffer, monitor, and window systems support for stereo, users can see better representation of 3D data*
- *High-resolution display quality*
- *For VR peripherals*
- *For users who need to be able to do multiple things simultaneously, such as command and control applications, 3D and video playback for animators, design and analysis for engineers, and so on*
- *A choice of APIs*
- *Interoperability with existing applications and users*

## **Sun Expert3D Graphics Overview**

The Sun Blade 2000 workstation configurations with Sun Expert3D graphics offer a high-performance graphics adapter with on-board texture mapping memory. This PCI graphics adapter provides an outstanding and affordable high-performance graphics solution for demanding 2D and 3D graphics applications that specifically require hardware-based texture mapping acceleration.





**Figure 4.** Sun Expert3D graphics schematic

For demanding applications in geothermal, high-end MCAD, digital content creation, visualization and simulation — where hardware-based texture mapping is essential — the Sun Blade 2000 workstations support the Sun Expert3D graphics accelerator. Sun Expert3D graphics presents a high-performance, affordable solution with the following features:

- 128 MB total on-board memory with 64 MB for accelerated texture-mapping performance for acceleration of complex 2D and 3D textures
- True-color 3D double and Z-buffering at very high resolutions for large screen HDTV monitor support as well as stereo-mode graphics for enhanced realism at high resolutions.
- On-board geometry accelerator delivers up to six million triangles per second with up to 3.2 Gigaflops of floating point performance.
- On-board rasterization engine performs triangle setup, texture processing, and pixel operations at up to 143 Mpixels per second fill rate.
- Compatibility with Sun's graphics APIs including the Sun OpenGL for Solaris API version 1.1.2 or later and Java 3D API. The Sun Expert3D accelerator can be installed in one of the Sun Blade 2000 workstations' PCI slots and up to two Sun Expert3D accelerators can be installed per system.

Other features of the Sun Expert3D frame buffer include double-buffering/Z-buffering (3D) support at super high resolutions of 1920 x 1200, stereo-video mode support at 1280 x 1024, and hardware support for 3D SuperScene antialiasing.

The Sun Expert3D frame buffer is ideal for Sun customers and resellers in the technical marketplace. The Sun Blade 2000 workstation configurations with Sun Expert3D graphics are especially appropriate for customers working with CAD wire-frame models or highly textured seismic data, such as in the oil and gas industry.

## Sun Expert3D Graphics Features and Benefits

| Features  | Benefits  |
|---|---|
| <ul style="list-style-type: none"><li>• On-board 64-MB texture-mapping memory</li></ul>                                     | <ul style="list-style-type: none"><li>• Accelerates applications requiring texture maps</li></ul>   |
| <ul style="list-style-type: none"><li>• On-board 64-MB frame-buffer memory</li></ul>  | <ul style="list-style-type: none"><li>• Provides support for 24-bit truecolor 2D and 3D up to 1920 x 1200, supporting Sun's 24-inch display</li></ul>                             |
| <ul style="list-style-type: none"><li>• Supports double-buffering and Z-buffering at up to 1920 x 1200 resolution</li></ul> | <ul style="list-style-type: none"><li>• Allows customers to use large-screen monitors including Sun's 24-inch monitor to display their 2D and 3D data</li></ul>                   |
| <ul style="list-style-type: none"><li>• Supports stereo mode graphics at 1280 x 1024 resolution</li></ul>                   | <ul style="list-style-type: none"><li>• Allows customers to display 3D data in stereo mode at higher resolutions, providing enhanced realism for immersive applications</li></ul> |
| <ul style="list-style-type: none"><li>• Supports SuperScene antialiasing</li></ul>  | <ul style="list-style-type: none"><li>• Improves rendered image quality</li></ul>   |
| <ul style="list-style-type: none"><li>• Graphics framelock support</li></ul>  | <ul style="list-style-type: none"><li>• Enables multiple graphics frame buffers to be used in a single or multiple systems to render to very high-screen resolutions</li></ul>    |

Up to two Sun Expert3D cards can be installed in the Sun Blade 2000 workstations. Implemented as a full-length PCI graphics card, Sun Expert3D graphics features internal I/O ports for multi-viewing and external I/O ports for external video synchronization and stereo capabilities. Connecting these multi-viewing ports together, allows frame locking and rate locking of multiple Sun Expert3D cards in a single workstation in order to display synchronous multiscreen applications.

## Sun Expert3D-Lite Graphics

Sun Expert3D-Lite graphics is a derivative product based on the Sun Expert3D graphics board. Sun Expert3D-Lite graphics offers many of the same features as its predecessor, but at a lower cost. Features include on-board 3D geometry acceleration, hardware-based texture mapping, and high-resolution 24-bit, 3D support for all of Sun's PCI-based workstations.

Sun Expert3D-Lite graphics accelerates 3D geometry at up to 4 million triangles/second and provides up to three times the texture mapping performance of Sun Elite3D m3 graphics, at a much lower price.

Sun Expert3D-Lite graphics is a single, full-length, 64-bit PCI board. It is a 66-MHz card, and operates at 66 MHz when plugged into a 66 MHz-capable slot and at 33 MHz when plugged into a 33-MHz slot.



## Key Features and Benefits

| Features  | Benefits   |
|---|--|
| <ul style="list-style-type: none"><li>• High-performance 3D graphics and texture mapping performance at an affordable entry-level cost — provides great geometry performance of up to 4 million tris/sec. with up to 88 Mpixels/sec. of texture fill rate</li></ul> | <ul style="list-style-type: none"><li>• Aggressive price/performance allows users to capitalize on 3D application functionality in a cost-effective manner</li></ul>   |
| <ul style="list-style-type: none"><li>• High resolution 24-bit 3D double-buffering with 32-bit Z-buffer, up to 1920 x 1080 HDTV (16:9 aspect ratio) resolution</li></ul>  | <ul style="list-style-type: none"><li>• Supports 24-bit, 2D and 3D graphics on all of Sun's displays including the 24-inch color monitor. With the 24-inch monitor, users can display many applications windows with little or no overlap</li></ul>                    |
| <ul style="list-style-type: none"><li>• Hardware-accelerated texture mapping with 16 MB of dedicated on-board texture memory</li></ul>  | <ul style="list-style-type: none"><li>• Provides high-performance for texture mapping operations</li><li>• Large texture storage accelerates complex 2D and 3D texturing</li><li>• No trade-offs between resolution support and texture storage capabilities</li></ul> |
| <ul style="list-style-type: none"><li>• Stereoscopic graphics support at 960 x 680, 1152 x 900, and 1280 x 800 resolutions</li></ul>  | <ul style="list-style-type: none"><li>• Allows customers to use stereoscopic viewing for immersive applications, which enhances data comprehension</li></ul>   |
| <ul style="list-style-type: none"><li>• Support for up to four Sun Expert3D-Lite boards in a single system (depending on system)</li></ul>  | <ul style="list-style-type: none"><li>• Enables applications to take advantage of more screen real estate</li></ul>  |
| <ul style="list-style-type: none"><li>• 32-bit Z-buffer at all supported resolutions</li></ul>  | <ul style="list-style-type: none"><li>• Provides high level of three-dimensional accuracy, helping to eliminate anomalies such as the flickering of objects when moving around a 3D image</li></ul>  |
| <ul style="list-style-type: none"><li>• Full acceleration support of Sun OpenGL for Solaris and Java 3D™ APIs</li></ul>   | <ul style="list-style-type: none"><li>• Applications automatically receive performance benefits of these APIs. Single application binary for Sun graphics options</li></ul>  |

## Sun Expert3D-Lite Graphics Specifications

- On-board geometry accelerator ASIC performs transform, clipping, and lighting
- On-board rasterization ASIC performs 2D/3D rasterization, 2D/3D texturing, pixel transfers, imaging and fragment processing
- High-resolution DAC with 10-bit RGB analog video at dot rates up to 350 MHz.
- Memory
  - 8-MB direct burst memory
  - 16-MB dedicated texture memory



- 32-MB dedicated frame buffer memory
- Standard HD15 video connector with support for Composite and Separate sync provides support for a DDC link for monitor query and control
- VESA Standard 3-pin mini-DIN stereo connector

## Display Resolutions

Sun Expert3D-Lite graphics supports the following resolutions.

| Display Resolution | Vertical Refresh Rate | Sync Standard | Aspect Ratio Format |
|--------------------|-----------------------|---------------|---------------------|
| 1920 x 1080        | 72 Hz                 | Sun           | 16:9                |
| 1600 x 1280        | 76 Hz                 | Sun           | 5:4                 |
| 1600 x 1200        | 75 Hz                 | VESA          | 4:3                 |
| 1600 x 1000        | 66, 76 Hz             | Sun           | 16:10               |
| 1440 x 900         | 76 Hz                 | Sun           | 16:10               |
| 1280 x 800         | 112 Hz                | Sun-Stereo    | 16:10               |
| 1280 x 800         | 76 Hz                 | Sun           | 16:10               |
| 1280 x 1024        | 60, 75, 85 Hz         | VESA          | 5:4                 |
| 1280 x 1024        | 67, 76 Hz             | Sun           | 5:4                 |
| 1152 x 900         | 120 Hz                | Sun-Stereo    | 5:4                 |
| 1152 x 900         | 66, 76 Hz             | Sun           | 5:4                 |
| 1024 x 800         | 84 Hz                 | Sun           | 5:4                 |
| 1024 x 768         | 75 Hz                 | VESA          | 4:3                 |
| 1024 x 768         | 60, 70, 77 Hz         | Sun           | 4:3                 |
| 960 x 680          | 108, 112 Hz           | Sun-Stereo    | Sun-Stereo          |
| 768 x 575          | 50i Hz                | PAL           | PAL                 |
| 640 x 480          | 60 Hz                 | VESA          | 4:3                 |
| 640 x 480          | 60i Hz                | NTSC          | NTSC                |

## Sun XVR-500 Graphics Accelerator

The Sun XVR-500 graphics accelerator doubles the geometry performance and improves the texture performance by up to 50 percent over the Sun Expert3D-Lite graphics, which it replaces. The Sun XVR-500 graphics accelerator provides a very affordable graphics solution for demanding 3D graphics applications that require fast geometry performance and reasonable texture mapping performance. Key markets for the Sun XVR-500 graphics accelerator are MCAD, MCAE, medical imaging, high-end EDA, GIS, and energy markets. This product for Sun workstations and workgroup servers provides an integrated solution for compute-intensive modeling applications.

The Sun XVR-500 graphics accelerator is based on the 3Dlabs Wildcat architecture. It is positioned as part of a total solution serving the technical and professional workstation market. The Sun XVR-500 graphics accelerator also provides 3D graphics for powerful servers such as the Sun Fire™ V880 server. The Sun XVR-500 graphics outperforms previous Sun graphics accelerators such as the Sun Creator3D and Sun Elite3D graphics for most MCAD/MCAE applications. It outperforms Sun Expert3D-Lite graphics by up to twice the geometry performance and in geometry applications outperforms Sun Expert3D graphics by up to 33 percent.



The Sun XVR-500 graphics accelerator offers state-of-the-art handling of color and gamma correction, and advanced 3D functionality, including hardware-accelerated texture mapping with on-board texture memory. The Sun XVR-500 graphics accelerator supports monitor refresh rates of up to 112 Hz and provides double-buffered/Z-buffered support for 3D graphics up to 1920 x 1080 with support for stereoscopic 3D up to 1280 x 800.

| Feature                   | Sun XVR-500 Graphics                     |
|---------------------------|--|
| Frame Buffer Memory       | 32 MB                                    |
| Texture Memory            | 16 MB                                    |
| Max. 2D Resolution        | 1920 x 1080 @ 72 Hz                      |
| Max. 3D Resolution        | 1920 x 1080 @ 72 Hz                      |
| Max. 3D Stereo Resolution | 1152 x 900 @ 120 Hz, 1280 x 800 @ 112 Hz |

## Key Features

The Sun XVR-500 graphics accelerator, like Sun Expert3D graphics, is a 64-bit board and is supported in both the 33-MHz and 66-MHz PCI bus slots. It provides the following advanced features:

- 32-MB frame buffer memory
- 16-MB on-board texture mapping memory and acceleration
- Support for resolutions up to 2 megapixels (1920 x 1080, double-buffered/Z-buffered)
- 32-bit Z-buffering at all supported resolutions
- Synchronization of two to four displays at 1280 x 800 @ 112 Hz stereo
- Multidisplay support (up to four) in the Sun Blade 1000 and 2000 workstations and the Sun Fire V880 server
- Performance up to 8M triangles per second (10-pixel, smooth, lit) and a trilinear texture fill rates of 88 Mpixels/second with Z-buffering or 166 Mpixels/second without Z-buffering
- Hardware acceleration for the features listed above in OpenGL applications using Sun OpenGL for Solaris API versions 1.2.1 and later

## Display Resolutions

The Sun XVR-500 graphics accelerator's video timings/monitor screen resolutions (32-MB frame buffer) and HD15 output is listed below.

| Display Resolution | Vertical Refresh Rate | Sync Standard | Aspect Ratio |
|--------------------|-----------------------|---------------|--------------|
| 1920 x 1080        | 72 Hz                 | Sun           | 16:9         |
| 1600 x 1280        | 76 Hz                 | Sun           | 5:4          |
| 1600 x 1200        | 75 Hz                 | VESA          | 4:3          |
| 1600 x 1000        | 66, 76 Hz             | Sun           | 16:10        |
| 1440 x 900         | 76 Hz                 | Sun           | 16:10        |
| 1280 x 800         | 112 Hz                | Sun-Stereo    | 16:10        |



| Display Resolution | Vertical Refresh Rate | Sync Standard   | Aspect Ratio |
|--------------------|-----------------------|-----------------|--------------|
| 1280 x 800         | 76 Hz                 | Sun             | 16:10        |
| 1280 x 1024        | 60, 75, 85 Hz         | VESA            | 5:4          |
| 1280 x 1024        | 67, 76 Hz             | Sun             | 5:4          |
| 1152 x 900         | 120 Hz                | Sun-Stereo      | 5:4          |
| 1152 x 900         | 66, 76, 120 Hz        | Sun             | 5:4          |
| 1024 x 800         | 84 Hz                 | Sun             | 5:4          |
| 1024 x 768         | 75 Hz                 | VESA            | 4:3          |
| 1024 x 768         | 60, 70, 77 Hz         | Sun             | 4:3          |
| 960 x 680          | 108, 112 Hz           | Sun-Stereo      | Sun-Stereo   |
| 768 x 575          | 50i Hz                | PAL             | PAL          |
| 640 x 480          | 60 Hz                 | VESA            | 4:3          |
| 640 x 480          | 60i Hz                | NTSC interlaced | NTSC         |

## Sun XVR-1000 Graphics Accelerator

Sun XVR-1000 graphics is Sun's third-generation fast frame buffer graphics accelerator, designed for use in UltraSPARC processor-based systems. Sun XVR-1000 graphics provides Sun's most complete acceleration of the OpenGL API to date, including 2D and 3D texture mapping, image processing, OpenGL 1.2, and a significant number of extensions beyond the OpenGL 1.2 API.

The Sun XVR-1000 graphics accelerator introduces an entirely new graphics accelerator architecture with the MAJC graphics processor at its core. It is part of Sun's commitment to steadily increase graphics performance and capabilities over time in new products. Sun XVR-1000 graphics is offered as part of random configurations or could be installed as an option for the Sun Blade 2000 workstations.

This new graphics accelerator allows Sun to better support graphics-demanding technical markets, especially those who require a high-performance visualization engine, including the GEO/GIS, biomedical, government/defense, and product design/styling fields. This graphics accelerator provides Sun's UPA-based workstations with a competitive advantage due to its superior 3D performance, higher levels of quality, and new levels of flexibility.

| Feature                           | Sun XVR-1000 Graphics |
|-----------------------------------|-----------------------|
| Frame Buffer Memory               | 72 MB                 |
| Texture Memory                    | 256 MB                |
| Max. 2D Resolution (30-bit color) | 1920 x 1200 @ 75 Hz   |
| Max. 3D Resolution (30-bit color) | 1920 x 1200 @ 75 Hz   |
| Max. 3D Stereo Resolution         | 1280 x 1024 @ 112 Hz  |
| Single-Pass Supersampling Capable | Yes                   |
| Dual Video Output                 | Yes                   |



## Key Features

- High-performance 2D and 3D graphics acceleration, including on-board geometry acceleration resulting in a display rate of 19.9M triangles per second. (two to four times that of Sun Elite3D m6 and Sun Expert3D graphics)
- Hardware-based, high-performance texture mapping (up to 163 MP/sec. texture fill rate) and with dedicated 256 MB of texture memory
- Superior quality 3D via single-pass supersampled antialiasing
- High resolutions supported in 2D and 3D up to HDTV resolutions
  - Supports up to 1920 x 1200 30-bit color, DB, 26-bit Z-buffered
  - Support up to 1280 x 1020 @ 112 stereo output
- 30-bit (10-bit/channel) color support with 10-bit alpha channel (38-bit RGBA), which provides not only more colors, but eliminates color banding effects with high-definition images
- 26-bit floating-point Z-buffer
  - Requires fewer bits/pixel compared to the fixed point format: (26 versus 32) thereby reducing the Z-buffer memory requirements
  - Is much better in resolving far away pixels; a floating-point Z gives things at the front of the scene more precision than those at the back
- Multiple, flexible video-output capabilities from a single board
  - Analog S-Video output for displaying graphics on a TV monitor or recorded to a VCR
  - Dual display RGB support from single frame buffer
  - Supports standard 13W3 and HD-15 analog, as well as the new digital DVI standard for driving digital flat panels and high-end projection systems
- The ability to program resolutions in the hardware allows end users to define non-standard resolution output for specialty displays

## Display Resolutions

Sun XVR-1000 graphics video timings/monitor screen resolutions for the main 13W3 are listed below. Sun XVR-1000 graphics supports full 30-bit 2D and 3D (double/Z-buffered) at all supported resolutions.

| Display Resolution | Vertical Refresh Rate | Sync Standard | Aspect Ratio | 13W3 | S-Video | HD15 | DVi-D | Samples | Dual |
|--------------------|-----------------------|---------------|--------------|------|---------|------|-------|---------|------|
| 1920 x 1200        | 60d Hz                | Sun           | 16:10        | X    |         | X    | X     | 1       |      |
| 1920 x 1200        | 70, 75 Hz             | Sun           | 16:10        | X    |         |      |       | 1       |      |
| 1920 x 1080        | 60d Hz                | Sun           | 16:9         | X    |         | X    | X     | 1       |      |
| 1920 x 1080        | 72 Hz                 | Sun           | 16:9         | X    |         |      |       | 1       |      |
| 1792 x 1344        | 60, 75 Hz             | VESA          | 4:3          | X    |         |      |       | 1       |      |
| 1600 x 1280        | 76 Hz                 | Sun           | 5:4          | X    |         |      |       | 1       |      |



| Display Resolution | Vertical Refresh Rate | Sync Standard | Aspect Ratio | 13W3 | S-Video | HD15 | DVi-D | Samples | Dual |
|--------------------|-----------------------|---------------|--------------|------|---------|------|-------|---------|------|
| 1600 x 1200        | 60d Hz                | VESA          | 4:3          | X    |         | X    | X     | 1       |      |
| 1600 x 1200        | 60, 73, 75 Hz         | VESA          | 4:3          | X    |         |      |       | 1       |      |
| 1600 x 1024        | 60 Hz                 |               |              | X    |         |      |       | 2       |      |
| 1600 x 1000        | 66, 76 Hz             | Sun           | 16:10        | X    |         |      |       | 2       |      |
| 1440 x 900         | 76 Hz                 | Sun           | 16:10        | X    |         | X    | X     | 2       |      |
| 1280 x 1024        | 96, 108, 112 Hz       | Sun-Stereo    | 5:4          | X    |         |      |       | 2       |      |
| 1280 x 1024        | 60, 75, 85 Hz         | VESA          | 5:4          | X    |         | X    | X     | 2       | X    |
| 1280 x 1024        | 67, 76 Hz             | Sun           | 5:4          | X    |         | X    | X     | 2       | X    |
| 1280 x 800         | 112 Hz                | Sun-Stereo    | 16:10        | X    |         | X    |       | 2       |      |
| 1280 x 800         | 76 Hz                 | Sun           | 16:10        | X    |         | X    | X     | 3       | X    |
| 1280 x 768         | 56 Hz                 | Sun           | 5:3          | X    |         | X    | X     | 5       | X    |
| 1152 x 900         | 120 Hz                | Sun-Stereo    | 5:4          | X    |         | X    |       | 2       |      |
| 1152 x 900         | 66, 76 Hz             | Sun           | 5:4          | X    |         | X    | X     | 3       | X    |
| 1024 x 800         | 84 Hz                 | Sun           | 4:3          | X    |         | X    | X     | 4       | X    |
| 1024 x 768         | 77 Hz                 | Sun           | 4:3          | X    |         | X    | X     | 5       | X    |
| 1024 x 768         | 60, 70, 75 Hz         | VESA          | 4:3          | X    |         | X    | X     | 5       | X    |
| 960 x 680          | 108, 112 Hz           | Sun-Stereo    | 14:10        | X    |         | X    |       | 6       | X    |
| 800 x 600          | 75 Hz                 | VESA          | 4:3          | X    |         | X    | X     | 8       | X    |
| 768 x 575          | 50i Hz                | PAL           | PAL          | X    | X       | X    |       | 10      | X    |
| 640 x 480          | 180fsc Hz             |               |              | X    |         |      |       | 16      | X    |
| 640 x 480          | 60, 72, 75 Hz         | VESA          | 4:3          | X    |         | X    | X     | 16      | X    |
| 640 x 480          | 60i Hz                | NTSC          | NTSC         | X    | X       | X    |       | 16      | X    |

**Note:** All resolutions marked VESA use separate sync; the remainder use composite sync.

With two Sun XVR-1000 graphics boards in a workstation, up to four displays can be driven at 1280 x 1024 resolution in mono mode. If the four-display environment requires stereo graphics, the maximum resolution that the four displays can be driven at is 960 x 680 @ 112 Hz.

Sun XVR-1000 graphics has a VESA standard 8-pin mini-DIN stereo connector and supports stereoscopic graphics video output in the standard Sun stereo resolutions supported by both Sun Creator3D and Sun Elite3D graphics. It also supports the much higher stereo resolutions supported by the Sun FD 21-inch display and Sun 24-inch display. Frame Lock and sync is also provided through the connector.

## Graphics Comparison Summary

The two tables below provide a feature comparison for Sun's graphics boards.



| Feature                              | Sun PGX64                               | Sun Creator3D     | Sun Elite3D m6         |
|--------------------------------------|---|-------------------|------------------------|
| Bus                                  | PCI<br>32 bit, 33 MHz<br>64 bit, 66 MHz | UPA               | UPA                    |
| Max. 2D resolution                   | 1920 x 1200                             | 1920 x 1200       | 1280 x 1024            |
| Max. 3D resolution                   | —                                       | 1280 x 1024       | 1280 x 1024            |
| Stereo resolution                    | not supported                           | 960 x 680 @112 Hz | 960 x 680 @108, 112 Hz |
| Memory type                          | SGRAM                                   | 3D-RAM            | 3D-RAM                 |
| Frame buffer memory                  | 8 MB                                    | 15 MB             | 15 MB                  |
| On-board texture memory              | —                                       | System memory     | 16 x 16 texel cache    |
| Geometry performance (tris/sec.)     | —                                       | 1.5 M             | 5.9 M                  |
| Texture fill rate (pix/sec.)         | —                                       | Host bound        | 56 M                   |
| APIs supported (software interfaces) | OpenGL, XGL™, XIL™, Xlib, Java 3D™      |                   |                        |

| Feature                          | Sun Expert3D                                  | Sun Expert3D-Lite  | Sun XVR-500                              | Sun XVR-1000   |
|----------------------------------|---|--|--|--|
| Bus                              | PCI<br>64 bit, 66 MHz                         | PCI<br>64 bit, 66 MHz  | PCI<br>32/64 bit, and<br>33/66 MHz       | UPA  |
| Max. 2D resolution               | 1920 x 1200                                   | 1920 x 1080  | 1920 x 1080                              | 1920 x 1200  |
| Max. 3D resolution               | 1920 x 1200                                   | 1920 x 1080  | 1920 x 1080                              | 1920 x 1200  |
| Stereo resolution                | 1280 x 1024 @112 Hz<br>960 x 680 @108, 112 Hz | 1280 x 800 @112 Hz<br>1152 x 900 @120 Hz<br>960 x 680 @108, 112 Hz | 1152 x 900 @120 Hz<br>1280 x 800 @112 Hz | 1280 x 1024 @96-112 Hz<br>1280 x 800 @112 Hz<br>1152 x 900 @120 Hz<br>960 x 680 @108, 112 Hz |
| Memory type                      | SDRAM   | SDRAM  | SDRAM                                    | DRDRAM   |
| Frame buffer memory              | 64 MB   | 32 MB  | 32 MB                                    | 72 MB  |
| On-board texture memory          | 64 MB   | 16 MB  | 16 MB                                    | 256 MB   |
| Geometry performance (tris/sec.) | 6.0 M   | 4.1 M  | 8.2M                                     | 19.1 M   |
| Texture fill rate (pix/sec.)     | 118 M   | 88 M   | 166M                                     | 157 M  |



| Feature                              | Sun Expert3D  | Sun Expert3D-Lite | Sun XVR-500              | Sun XVR-1000    |
|--------------------------------------|---|-------------------|--------------------------|-----------------|
| APIs supported (software interfaces) | OpenGL, Xlib, Java 3D<br>(XIL via X-shared memory only) |                   | OpenGL, Xlib,<br>Java 3D | OpenGL, Java 3D |

## Graphics Benchmarks

The benchmarks in the table below are for the 900-MHz Sun Blade 2000 workstation.

| Benchmarks                    | Sun PGX64 | Sun Creator3D | Sun Expert3D-Lite | Sun Elite3D m6 | Sun Expert3D | Sun XVR-500 | Sun XVR-1000 |
|-------------------------------|-----------|---------------|-------------------|----------------|--------------|-------------|--------------|
| <b>Xmark93</b>                | 16.9      | 44.7          | 26.0              | 47.9           | 29.8         | —           | —            |
| <b>2D Vectors per sec.</b>    | 558 K     | 4.9 M         | 6.8M              | 6.1 M          | 7.9 M        | 15.2 M      | —            |
| <b>3D Performance</b>         |           |               |                   |                |              |             |              |
| • 3D vectors/sec.             | —         | 3.7 M         | 8.1 M             | 8.8 M          | 10.5 M       | 13.1 M      | 11.1 M       |
| • 3D tris/sec.                | —         | 1.5 M         | 4.1 M             | 5.9 M          | 6.0 M        | 8.0 M       | 19.1 M       |
| • 3D quads/sec.               | —         | 698 K         | 2.0 M             | 2.1 M          | 2.7 M        | 3.7 M       | 5.6 M        |
| • 3D texture fill pixels/sec. | —         | 13 M          | 88 M              | 56 M           | 118 M        | 166 M       | 157 M        |
| <b>ViewPerf 6.1.1</b>         |           |               |                   |                |              |             |              |
| • ProCDRS-02                  | —         | 10.8          | 22.9              | 24.1           | 29.2         | —           | —            |
| • DX-05                       | —         | 17.6          | 37.3              | 34.8           | 39.0         | —           | —            |
| • AWadvs-03                   | —         | 19.6          | 55.1              | 23.4           | 65.1         | —           | —            |
| <b>ViewPerf 6.1.2</b>         |           |               |                   |                |              |             |              |
| • ProCDRS-03                  | —         | 6.0           | 13.6              | 12.6           | 17.2         | 28.0        | 38.47        |
| • DX-06                       | —         | 5.4           | 12.5              | 10.6           | 12.8         | 15.8        | 15.91        |
| • AWadvs-04                   | —         | 18.9          | 44.0              | 20.6           | 55.2         | 69.3        | 58.25        |

**Note:** Configuration for timing includes the Solaris™ 8 Operating Environment and OpenGL 1.2.1 performance data collected in January 2002. Performance data is subject to change. See Sun's web site at <http://www.sun.com/desktop/> for latest performance numbers.

Metrics defined:

- 2D vectors are 10 pixels long, X11 perf numbers
- 3D vectors are 10 pixels long, depth cued, clip tested, perspective projection, solid line through the OpenGL API
- 3D triangles: 25 pixel triangle mesh, one light source
- 3D quads: 100 pixel, independent quadrilaterals, with one directional light source
- Both 3D mesh and quads are Gouraud shaded, randomly oriented, transformed, clip tested, with perspective projection and Z-buffered via the OpenGL API

### Special Features

- Accelerated imaging and advanced 3D graphics with Gouraud shading, line antialiasing, per-pixel depth cueing, subpixel addressing, transparency, and stereo viewing with monitor.
- Sun Elite3D m6 graphics utilize a connector for stereo viewing synchronization, a 7-pin mini-DIN style of connector. (StereoGraphics Corporations sells a cable adapter for connecting the old and new styles of connectors. It can be ordered from them using the part number ESUN.)



# System Configuration

| Feature                                    | Sun Blade™ 1000   | Sun Blade 2000                            |
|--|---|---|
| <b>Dimensions</b>                          | 45.5 cm x 25.6 cm x 61.0 cm (H x W x D)<br>17.9 inches x 10.1 inches x 24.0 inches  |   |
| <b>Weight</b>                              | 31.1 kg (70 lb.)  |   |
| <b>CPU and UPA</b>                         |   |   |
| • Architecture                             | UltraSPARC™ III or UltraSPARC III Cu superscalar, 64 bit, V9  | UltraSPARC III Cu superscalar, 64 bit, V9 |
| • Clock rate                               | 750 MHz<br>(or higher with options)   | 900Mhz or 1.05GHz                         |
| • Processor slots                          | 2   | 2   |
| • Cache on chip                            | 64-KB D-cache<br>32-KB I-cache  | 64-KB D-cache<br>32-KB I-cache            |
| • External cache                           | 8 MB  | 8 MB                                      |
| • Sun™ Fireplane system interconnect speed | 150 MHz   | 150 MHz                                   |
| • UPA                                      | Two 120-MHz graphics slots  | Two 120-MHz graphics slots                |
| <b>Memory</b>                              |   |   |
| • Memory type                              | ECC   | ECC                                       |
| • Number of slots                          | 8   | 8   |
| • Capacity                                 | 512 MB to 8 GB  | 1 to 8 GB                                 |
| • DRAM speed                               | 50 ns   | 50 ns                                     |
| • Bus width                                | 576 bits  | 576 bits                                  |
| • DIMMs                                    | 128-MB, 256-MB, and 1-GB SDRAM  | 256-MB, 512-GB, and 1-GB SDRAM            |
| <b>I/O Interfaces</b>                      |   |   |
| • UltraSCSI                                | 68-pin Ultra Wide SCSI (40 MB/sec.)   |   |
| • Serial ports                             | Two RS-232C/RS423 serial ports,<br>384K Baud sync/460.8K Baud asynch (DB25-F).<br>Industry-standard USB port<br>IEEE 1394 |   |
| • Parallel port                            | Centronics compatible; one DB25 connector   |   |
| • UPA graphics                             | Two UPA slots   |   |
| • Internal disk access                     | FC-AL access for mass storage   |   |
| • PCI I/O bus                              | Three full-size and one half-size PCI slots (version 2.1):<br>Three at 33 MHz; one at 33 or 66 MHz                        |   |



| Feature   | Sun Blade 1000  | Sun Blade 2000   |
|---|---|--|
| <b>Graphics, Imaging, and Video</b> <ul style="list-style-type: none"> <li>• Graphics supported in PCI slots</li> <li>• Graphics supported in UPA slots</li> <li>• Monitors supported</li> <li>• Digital media</li> </ul>   | <p style="text-align: center;">Sun PGX64, Sun Expert3D, Sun Expert3D-Lite, Sun XVR-500</p> <p style="text-align: center;">Sun Creator3D, Sun Elite3D m6, Sun XVR-1000</p> <p style="text-align: center;">All Sun monitors since 1996, including<br/>17-, 21-, and 24-inch color monitors; 18-inch flat panel, 24-inch flat panel</p> <p style="text-align: center;">Sun 1394 Visual Collaboration Kit</p> |  |
| <b>Networking Ports</b>   | <p style="text-align: center;">10/100BASE-T autosensing Fast Ethernet</p>   |  |
| <b>Internal Storage</b> <ul style="list-style-type: none"> <li>• Disks</li> </ul> <p>Three front-access, removable media bays:</p> <ul style="list-style-type: none"> <li>• One 5.25 x 1.6 inch</li> <li>• One 3.5 x 1.0 inch</li> <li>• One bay that accommodates a device of either size</li> </ul> | <p style="text-align: center;">Up to two 10000-rpm, FC-AL disks<br/>36-GB disks standard<br/>73-GB disks optional</p> <p style="text-align: center;">1.4-MB triple-density manual-eject floppy<br/>4-mm tape drive (opt.)<br/>10X DVD-ROM (opt.)<br/>Smart card reader standard</p>   | <p style="text-align: center;">Up to two 73-GB, 10000-rpm, FC-AL disks standard<br/>(total maximum = 146 GB)</p> <p style="text-align: center;">1.4-MB triple-density manual-eject floppy<br/>4-mm tape drive (opt.)<br/>10X DVD-ROM (opt.)<br/>Smart card reader standard</p> |
| <b>External Storage</b> <ul style="list-style-type: none"> <li>• Tape/optical</li> <li>• Disk, via FC-AL interface</li> </ul>   | <p style="text-align: center;">Automated tape products<br/>Sun StorEdge™ UniPack and MultiPack systems</p> <p style="text-align: center;">FC-AL MultiPack</p>   |  |
| <b>Solaris™ Operating Environment Support</b>   | <ul style="list-style-type: none"> <li>• For UltraSPARC III modules: Solaris 8 (10/00); plus patches</li> <li>• For UltraSPARC III Cu modules: Solaris 8 (10/01) or later</li> </ul>  | <p style="text-align: center;">Solaris 8 (2/02) or later</p>   |
| <b>Input Devices</b> <ul style="list-style-type: none"> <li>• USB keyboard</li> <li>• USB mouse</li> <li>• Microphone</li> </ul>  | <p style="text-align: center;">Sun Type 6 (USB interface).<br/>Third-party USB keyboards are not supported</p> <p style="text-align: center;">Opto-mechanical, 3-button</p> <p style="text-align: center;">SunMicrophone™ II</p>  |  |



# Requirements and Specifications

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## Environment

| Feature   | Specification   |
|---|---|
| <b>Temperature</b> <ul style="list-style-type: none"><li>• Operating</li><li>• Nonoperating</li></ul> | 5 to 35°C with removable media<br>5 to 40°C without removable media<br>-40°C to 60°C                        |
| <b>Humidity</b> <ul style="list-style-type: none"><li>• Operating</li><li>• Nonoperating</li></ul>    | 20 to 80% RH, max. wet bulb of 27°C with internal tape media installed<br>5 to 93% RH noncondensing at 40°C |
| <b>Altitude</b> <ul style="list-style-type: none"><li>• Operating</li><li>• Nonoperating</li></ul>    | 3,000 meters (70KPa)<br>12,000 meters (19.3KPa)   |
| <b>Shock</b> <ul style="list-style-type: none"><li>• Operating</li><li>• Nonoperating</li></ul>       | 5G for 11 msec. half-sine, wave form<br>30G for 11 msec.  |
| <b>Vibration</b> <ul style="list-style-type: none"><li>• Operating</li><li>• Nonoperating</li></ul>   | 0.2 G peak, three mutually perpendicular axes, 5 to 500 Hz<br>1.0 G peak, all axes, 5 to 500 Hz             |
| <b>Acoustic</b> <ul style="list-style-type: none"><li>• Operating</li><li>• Idle</li></ul>            | 5.64 bels<br>4.77 bels  |
| <b>Drop and Topple</b>  | 50-mm drop height   |

## Regulations

| Regulation                    | Details   |
|-------------------------------|---|
| <b>Safety</b>                 | UL 1950, CSA 950, TUV EN60950 with Nordic deviations, CB Scheme   |
| <b>RFI/EMI</b>                | FCC Class B, CRF 47 Part 15, 6dB margin below the limit<br>ICES-003 Class B (for Canada)<br>EN55022 Class B (for the European Union)<br>EN61000-3-2 (for the European Union as of 01JUN98 or 01JAN01)<br>VCCI Class B (for Japan)<br>GOST-R Class B (for Russia)<br>EZU Class B (for Czech Republic)<br>EZU Class B (for Slovakia)<br>RRL Class B (for Korea)<br>BCIQ Class B (for Taiwan)<br>AS/NZS 3548 Class B (for Australia & New Zealand) |
| <b>Immunity</b>               | EN 50082-1<br>SUN 990-1151-01 Rev A   |
| <b>X-ray</b>                  | DHHS 21 Subchapter J<br>PTB German X-ray Decree   |
| <b>Environmental</b>          | Enhanced Energy Star (certain configurations)<br>Network aware in low power mode  |
| <b>Monitors and Keyboards</b> | TCO95   |

## Power

Sun Blade™ 2000 configurations (except configurations using 1.05 Ghz UltraSPARC III Cu processors) are compliant with Energy Star specifications under the Solaris™ 8 Operating Environment and meet EPA guidelines *without* check-pointing and restoring the system. An innovative approach to power management enables Sun Blade 2000 workstations to remain network-aware, even in low-power mode.

**Note:** *All Sun Blade 2000 standard and random configurations (except configurations using 1.05 GHz UltraSPARC III Cu processors) fully meet Energy Star compliance requirements. Modifying any of these configuration by adding any available Sun or third-party option may render the configuration non-compliant.*

| Feature             | Specifications                       |
|---------------------|--------------------------------------|
| AC power            | 100 to 240 VAC, 47 to 63 Hz, 0.8 KVA |
| Power supply output | 670 Watts max.                       |
| Power control       | Front panel on/off switch            |

## Advanced Power Management

Sun Blade 2000 workstations come equipped with a single 670-Watt power supply providing all the power needed for internal expansion options. With Sun Blade 2000 workstations, Sun has gone beyond the need for environmentally sensitive construction and provides an innovative approach to compliance



with EPA Energy Star specifications when running the Solaris 8 Operating Environment. Power management software on Sun Blade 2000 workstations allows the system to enter a "low-power" mode after a programmed period of time. Rather than completely pausing the system (checkpoint-and-resume), power management software detects idle subsystems and brings them to a low-power, but operational state. For instance, selected Sun Blade 2000 workstations remain network-aware, even when running in low-power mode.

To support this power management model, the various subsystems within Sun Blade 2000 workstations are designed to enter a low-power state independently, for example:

- Processors and other internal ASICs including those which operate the Sun™ Fireplane system interconnect reduce their power consumption by running at a lower internal clock frequency.
- The 33-MHz PCI bus frequency is reduced to 1 MHz. When activity is pending, the bus clock is returned to full frequency.
- The USB, IEEE 1394, and Ethernet subsystems are set in their lowest power-consuming modes.
- The audio module is disabled.

The graphics subsystem is configured for lowest DC power consumption. The checkpoint-and-resume approach to power management is still available and can be configured by power management software. The Solaris Operating Environment allows users to quickly resume work in progress before the shutdown.

**Note:** *Assemble-To-Order (ATO) configurations are compliant with Energy Star specifications only when ordered with 900 MHz UltraSPARC III Cu CPUs. Adding any available Sun or third-party option may render the configuration non-compliant.*

# Reliability, Availability, and Serviceability (RAS)

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## Reliability

The Sun Blade™ 2000 workstations support the following features to help ensure data integrity and reliable operation of the system:

- End-to-end ECC on all memory transfers (SEC-DED-S4ED) to the CPUs and to the I/O subsystems (except UPA64S)
- The ECC code detects and correct all single bit errors. It also detects all double, triple, and quadruple bit errors that occur in the same nibble. The Sun Blade 2000 workstation implementation allows detection of SDRAM chip failures due to a customized routing of the memory bus.
- ECC protection on external cache
- ECC or parity on all major data buses
- Parity protection on interconnect address/command bus, all interconnect miscellaneous signals, PCI and EPCI, major data buses, and cache RAM
- Internal error detection and reporting on all ASICs
- Generation of reset on fatal error by BBC (as much state as possible is preserved in processor and ASICs for analysis)
- Checksum on BootPROM
- Extensive power on self-test (POST)
- Power-down of subsystems when not in use

In addition to supporting the above features, reliability is designed in by:

- Extensive signal integrity analysis
- Providing adequate decoupling
- Extensive EM susceptibility and interference analysis/design
- Software memory scrubbing

## Availability

Hardware, software, and diagnostic features that support availability include:

- Deconfiguration of faulty memory DIMM banks
- Deconfiguration of faulty I/O boards
- Thermal sensors controlling fan speed and cooling
- Thermal faults detected by software result in customer alerts and system shutdown to protect components
- SunVTS™ diagnostics can run at scheduled times to periodically validate system functionality



- Automatic reboot of the system on fatal errors

## Serviceability

Features that are designed to minimize downtime include the following:

- Simple enclosure layout
- All FRUs can be accessed independently; that is, each FRU can be serviced without needing to remove any other FRU
- Minimal internal cabling
- Action-oriented diagnostic messages indicating failed FRUs (at the POST and SunVTS diagnostic levels)
- JTAG scan support on ASICs, processor module and frame buffers and EPCI connector
- No configuration jumpers
- Modular components include the motherboard, disks, memory DIMMs, graphics options, processor modules, and power supply
- Common fasteners used throughout for easy servicing

### FRUs and Serviceability Details

- **Motherboard**

The motherboard FRU is removed by disconnecting all cables, removing daughtercards (PCI, frame buffer, audio), removing three screws from the rear panel, and sliding the board forward and directly upward.

- **Hard disk drives**

All internal hard drives plug directly into the internal FC-AL backplane. No drive jumpering or configuration is required. Drives are secured with the "spud bracket" which provides the necessary shock and vibration isolation, drive-to-chassis grounding, and chassis mounting/locking features.

- **Power supply**

The power supply is secured to the chassis by six loose screws. Supply removal is accomplished by removing the side cover, disconnecting cables from the motherboard, removing the power supply screws, sliding the supply back, and lifting it out of the chassis.

- **DIMMs**

Accessible by removing the top panel. A built in ejector facilitates removal and installation of the memory DIMMs.

- **Side cover**

The side cover may be removed by hand, without the use of tools.

- **Chassis bottom housing**

The chassis provides securing points for the power supply, motherboard, and disk drives. The motherboard and power supply drop into securing hooks or slides and are secured with screws. Hard disk drives slide into brackets in the chassis and are secured by latches on the drives themselves. Removable media devices are secured to a bracket with common (M3) Phillips screws.



# System Management

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## Software Requirements

Sun Blade 2000 systems run the 2/02 version of the Solaris Operating Environment (Solaris 8, Update 2/02) or later.

## System Administration

Sun Blade 2000 workstations deliver the power and graphics needed by the customers who use heavy compute-intensive applications. Customers who run these compute-intensive applications require a system like the Solaris Operating Environment that can provide a highly reliable, available, fast and safe desktop computing environment. Built into the Solaris Operating Environment are systems management and security features that help deliver the computing environment demanded by these customers. Sun also offers unbundled systems management products that supplements the systems management features in the Solaris 8 Operating Environment. Together, the Solaris Operating Environment management features and Sun's unbundled systems management products create one the most stable and available desktop computing environment in the industry.

## **Solstice AdminTools™ Software**

Solstice AdminTools™ software is a set of GUI-based administration tools that have been shipping since the Solaris 2.2 Operating Environment release and can be used to provide local systems administration. Solstice AdminTools software can be used to manage user accounts, groups, hosts, printers, serial ports, and installation/removal of software.

## **SunVTS™ Software**

The SunVTS™ system exerciser is a graphically oriented UNIX® application that permits the continuous exercising of system resources and internal and external peripheral equipment. Used to determine if the system is functioning properly, SunVTS software incorporates a multifunctional stress test of the system through operating-system-level calls, and allows the addition of new tests as they become available.

## **Solaris Web Start Software**

Solaris Web Start software is an easy-to-use Java™ technology-based application that guides users through the installation of both the Solaris Operating Environment and copackaged application software with a single on-screen button. Its graphical user interface facilitates file system configuration. It also features a built-in suite of on-line information and answers questions about the product itself, the software it installs, and the hardware platform it supports.

## **Solstice Enterprise Agents™ Software**

Solstice Enterprise Agents™ software allows the workstation to be managed from simple network management protocol (SNMP)-based system/network management tools. Solstice Enterprise Agents software is based on the extensible agent technology or manager/subagent technology. The Manager agents receive and respond to SNMP or desktop management interface (DMI) requests. After retrieving the appropriate values from the respective subagents, responses are sent. The subagents manage information bases (MIBs or MIFs) designed for specific components and applications.

## **Solaris Desktop Extensions Software**

Solaris Desktop Extensions software features ideal systems management tools for those non-UNIX platform users who want to quickly view processes and system resources. The process manager in Solaris Desktop Extensions software is a GUI-based tool that enables users to quickly identify, sort, suspend, and eliminate processes based on attributes such as CPU consumption and time elapsed.

Solaris Desktop Extensions software also features a GUI-based performance monitor, enabling users to quickly monitor some of the key system resources such as CPU, load, disk, page, context, job swaps, interrupts, packets, collisions, and errors.

## **ShowMe How™ Software: State-of-the-Art Installation and Maintenance Instruction**

ShowMe How™ software is a documentation system that presents information in a highly understandable multimedia format. Installation and service tutorials as well as reference information provide users with comprehensive, easy-to-use instruction. ShowMe How software streamlines installation and maintenance to help lower service costs and maximize system uptime. Some of the features of this tool are:

- Distributed on CD-ROM



- Movies of installation and replacement procedures played through ShowMe TV™ software packaged with application
- Photo sequences with narrated installation and replacement procedures
- Text-based instructions can be viewed on-line and printed, excerpted from standard Sun documentation
- Photos with active callouts link to more detailed photos and text-based reference information

## The Solaris 8 Operating Environment

Sun Blade 2000 systems require the 2/02 version of the Solaris Operating Environment (Solaris 8, Update 7) or later.

The Solaris 8 Operating Environment is the latest release of one of the industry's leading enterprise operating environments. The Solaris 8 Operating Environment contains the complete functionality required for all supported Sun Workstation™ systems. The Solaris 8 Operating Environment is a solid, scalable 64-bit operating environment that also supports 32-bit applications.

The Solaris 8 Operating Environment includes:

- Reliable, Internet-ready operating environment for 32- and 64-bit SPARC™ processor-based platforms and Intel platforms
- Enhanced ease of use and PC-interoperability features
- Integrated, high-performance Java™ technology and tools
- Robust software developer environment
- Advanced, standards-based networking
- Improved systems installation and management tools
- Enterprise-class directory services
- Enhanced desktop tools, I/O standards, and security

The Solaris Operating Environment delivers a competitive advantage to businesses through networked computing, scalability, and multiarchitecture support. The Solaris Operating Environment provides an advanced, superior solution for all customer IT needs, both technical and business. With its strength in enterprise-class reliability, scalability, and performance, the Solaris Operating Environment is an industrial-grade solution with the quality and robustness required to deliver mission-critical computing.

**Note:** *In order to upgrade to the UltraSPARC III Cu module from Sun Blade 1000 systems, the customer must first upgrade to the 10/01 version of the Solaris Operating Environment (Solaris 8, Update 6) or later.*

## Features and Benefits

The Solaris 8 Operating Environment continues the tradition of reliability, availability, and scalability (RAS) of the earlier operating environment releases, including features IPv6/IPsec/Mobile IP, realtime application support, filesystem logging, and remote console.

Existing applications that adhere to the Solaris application binary interface (ABI) runs unmodified with Solaris 8 software on both SPARC processor-based platforms and Intel platforms. In addition, Sun



provides an easy-to-use AppCert testing tool for developers, so they can verify existing Solaris application binaries and report on any potential incompatibilities.

| Features   | Benefits   |
|--|--|
| <ul style="list-style-type: none"> <li>• Desktop management and productivity tools</li> </ul>  | <ul style="list-style-type: none"> <li>• Helps increase productivity with intuitive desktop, printer, PDA sync, HotKey, and CDE 1.4 control panel tools. The StarOffice™ productivity suite easily handles Microsoft Office documents, and creates complex documents, spreadsheets, and presentations. Use PC Launcher and the SunPCi™ Iipro coprocessor card to run Windows, Lotus 1-2-3, and AutoCAD applications on Sun workstations.</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Advanced networking features</li> </ul>   | <ul style="list-style-type: none"> <li>• Support for IPv6 in the Solaris 8 Operating Environment is integrated into NFS, RPC, NIS, NIS+, and DNS. IPsec enables secure virtual private networks and network access control. Mobile IP provides Internet disconnect/reconnect capabilities with no data loss.</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Bundled software</li> </ul>   | <ul style="list-style-type: none"> <li>• Includes Oracle 8i Enterprise Edition, <code>lxr</code>run for Linux application compatibility (for Solaris on Intel), Apache Webserver, Netscape™ Communicator, iPlanet™ Directory Server, <code>gzip</code>, <code>bash</code>, and <code>tcsh</code>.</li> <li>• Ships with support for a number of software components that increase overall availability including Solaris Resource Manager software for fine-grained control of system resources, Solaris Bandwidth Manager software for enhanced network resource availability, Sun Cluster 3.0 software for greater application availability through a clustered file system, scalable data services, and built-in load balancing.</li> </ul> |
| <ul style="list-style-type: none"> <li>• Enhancements to the Common Desktop Environment (CDE)</li> </ul>   | <ul style="list-style-type: none"> <li>• Provides workstation users with an easy-to-use, open, secure platform. CDE features streaming video using MPEG1, MPEG2, Quicktime, and AVI formats as well as MIDI audio using the Java Media Framework.</li> <li>• Personal Digital Assistant (PDA) support synchronizes data from most Palm Computing devices with the CDE calendar, mail, memo, and address book.</li> </ul>   |
| <ul style="list-style-type: none"> <li>• Improved system error messages, system debugging capabilities, and remote console capability</li> </ul> | <ul style="list-style-type: none"> <li>• Allows the customer to apply scarce system expertise remotely across the enterprise.</li> </ul>   |
| <ul style="list-style-type: none"> <li>• File system logging</li> </ul>  | <ul style="list-style-type: none"> <li>• Logging file system features and parallel SCSI probes help make rebooting faster.</li> </ul>  |



| Features  | Benefits  |
|---|---|
| <ul style="list-style-type: none"> <li>• Live Upgrade</li> </ul>  | <ul style="list-style-type: none"> <li>• Allows Solaris 8 software to be installed on a separate partition from the currently running version of the operating environment. When installation is complete, a simple reboot enables the Solaris 8 Operating Environment to take control. Live Upgrade includes a version migration and fallback feature, so the customer can also fallback to the previous release — through a simple reboot — without losing administration information.</li> </ul> |
| <ul style="list-style-type: none"> <li>• Real-time video creation and broadcast support</li> </ul>      | <ul style="list-style-type: none"> <li>• The Java Media Framework (JMF) player provides access to the latest industry-standard audio and video files, including MPEG1/2, Quicktime, VIVO, AVI, AIFF, GSM, WAV, RMF, AU, and MIDI.</li> </ul>  |
| <ul style="list-style-type: none"> <li>• 100 percent binary compatibility</li> </ul>                    | <ul style="list-style-type: none"> <li>• Software investment protection — all of today's Solaris Operating Environment-certified 32-bit applications continue to run on Solaris 8 Operating Environment without modification</li> </ul>   |
| <ul style="list-style-type: none"> <li>• Reliability, availability, and serviceability (RAS)</li> </ul> | <ul style="list-style-type: none"> <li>• Less downtime, more productivity, and faster project completion</li> </ul>   |
| <ul style="list-style-type: none"> <li>• 64-bit computing</li> </ul>                                    | <ul style="list-style-type: none"> <li>• Higher performance, capacity, and precision on 64-bit SPARC processor-based systems and Intel systems with 32-bit binary compatibility</li> <li>• Compliant with UNIX® 98 and Aspen Group LP64 standards</li> </ul>  |
| <ul style="list-style-type: none"> <li>• 64-bit compilers</li> </ul>                                    | <ul style="list-style-type: none"> <li>• Quickly develop and certify 64-bit applications for SPARC and IA-64 processors using Solaris Operating Environment APIs, 64-bit C/C++ and FORTRAN compilers, and ABI certification tools</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Java 2 SDK</li> </ul>  | <ul style="list-style-type: none"> <li>• Provides a high-performance, scalable Java virtual machine</li> <li>• Offers improved memory management, optimized JIT compiler and faster Java thread synchronization</li> </ul>  |
| <ul style="list-style-type: none"> <li>• IPv6/IPsec/Mobile IP</li> </ul>                                | <ul style="list-style-type: none"> <li>• Helps increase addressing range, provides better authentication and privacy, and enables additional quality of service capabilities. Mobile IP permits intermittent connection to the Internet with no data loss.</li> </ul>   |
| <ul style="list-style-type: none"> <li>• Scale from 1 to 512 processors per node</li> </ul>             | <ul style="list-style-type: none"> <li>• Helps increase compute resources as a customer's needs grow. Expand to four processors on the desktop, or use up to 64 processors per server, with up to eight servers per cluster.</li> </ul>   |
| <ul style="list-style-type: none"> <li>• LDAP directory services</li> </ul>                             | <ul style="list-style-type: none"> <li>• High-speed, enterprise-class directory service, using the Solaris 8 Operating Environment LDAP client and the iPlanet Directory Server, supports complex, data intensive network applications. Includes Microsoft Active Directory support.</li> </ul>   |
| <ul style="list-style-type: none"> <li>• System management tools</li> </ul>                             | <ul style="list-style-type: none"> <li>• Helps reduce the time spent on system administration duties using Web-based wizards and Java technology-powered graphical interfaces.</li> </ul>   |



| Features  | Benefits  |
|---|---|
| <ul style="list-style-type: none"> <li>Extended device and support</li> </ul> | <ul style="list-style-type: none"> <li>I/O Connect with Sun, using the customer's favorite devices, including DVD, ZIP and JAZ drives, and USB, 1394, SCSI, UPA, and PCI buses.</li> </ul>  |
| <ul style="list-style-type: none"> <li>Internationalization</li> </ul>        | <ul style="list-style-type: none"> <li>The Solaris 8 Operating Environment is a comprehensive global product that supports 37 languages and over 90 locales, the euro currency symbol, and complex text formats for the Arabic, Thai, and Hebrew languages. Additional language installation tools, expanded Unicode support, and improved data interoperability utilities greatly simplify the development and testing of applications for international markets.</li> </ul> |
| <ul style="list-style-type: none"> <li>X11R6.4</li> </ul>                     | <ul style="list-style-type: none"> <li>Runs X applications in a browser and provides single logical screen across multiple display devices</li> </ul>   |
| <ul style="list-style-type: none"> <li>Real Time application</li> </ul>       | <ul style="list-style-type: none"> <li>Offers scalable, fixed-priority, and fully preemptive scheduling using multiple high-resolution, per-CPU interval timers. Provides priority inheritance for synchronization by multi-threaded realtime applications, such as simulation, telemetry, data acquisition, signal processing, and video-on-demand.</li> </ul>   |
| <ul style="list-style-type: none"> <li>Enhanced security features</li> </ul>  | <ul style="list-style-type: none"> <li>Increased support for security protocols and additional technologies including IPSec, AMI, Kerberos v5, and smart cards reduce the chance of security-related downtime</li> </ul>  |

## New Features in Solaris 8, Update 7

The latest update of the Solaris 8 Operating Environment is Solaris 8, Update 7 or Solaris 2/02. The following features are new in this update.

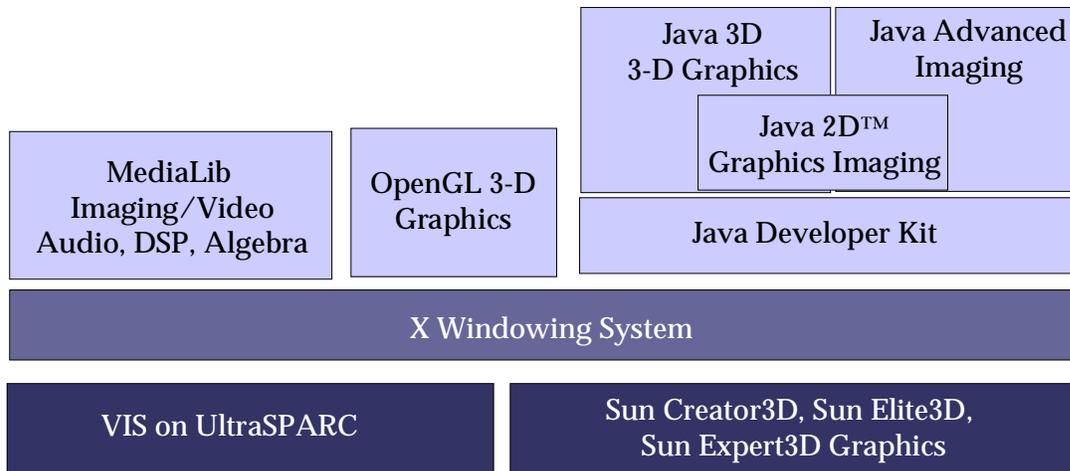
| Features  | Benefits  |
|---|---|
| <ul style="list-style-type: none"> <li>Solaris Web Start Program enhancements</li> </ul>              | <ul style="list-style-type: none"> <li>Users can now perform the following functions during installation or upgrade: <ul style="list-style-type: none"> <li>– Automatically reboot the system after installation.</li> <li>– Automatically eject the CD or DVD after installation.</li> <li>– Select to preserve file systems.</li> <li>– Customize fdisk partitions (Intel platform only).</li> <li>– Automated installations can now use sysidcfg file</li> </ul> </li> </ul> |
| <ul style="list-style-type: none"> <li>Support for the new Chinese GB18030 locale encoding</li> </ul> | <ul style="list-style-type: none"> <li>Customers can input, print, and display the latest 32-bit Chinese characters</li> <li>Backward compatibility to previous Chinese codesets (GBK and GB2312)</li> <li>Conversion to other codesets such as Unicode.</li> </ul>   |



| Features   | Benefits  |
|--|---|
| <ul style="list-style-type: none"> <li>Enhancements to the optional alternative multithreading libraries</li> </ul>                          | <ul style="list-style-type: none"> <li>The Solaris 8 (2/02) Operating Environment release includes an improved alternative multithreaded library that provides better performance</li> </ul>  |
| <ul style="list-style-type: none"> <li>Two new options for Sun servers to allow it to run as a display-only device</li> </ul>                | <ul style="list-style-type: none"> <li>Customers can run the Solaris Operating Environment window manager in display-only mode without the need for a mouse or a keyboard</li> </ul>  |
| <ul style="list-style-type: none"> <li>Locator command</li> </ul>  | <ul style="list-style-type: none"> <li>Customers can quickly identify a system among a large number of systems by using the new locator command to illuminate the locator LED on some new UltraSPARC systems (SPARC platform only)</li> </ul>   |
| <ul style="list-style-type: none"> <li>Netra™ X1 platform support</li> </ul>   | <ul style="list-style-type: none"> <li>Solaris 8 (2/02) Operating Environment now includes integrated support for the Netra X1 system, making it easier to install and maintain these systems (SPARC platform only)</li> </ul>  |
| <ul style="list-style-type: none"> <li>CPR for Sun Blade 100 and 2000 workstations</li> </ul>  | <ul style="list-style-type: none"> <li>Allows users to suspend a system to save power or power off temporarily for transport (SPARC platform only)</li> </ul>   |
| <ul style="list-style-type: none"> <li>LTO/Ultrium tape driver support</li> </ul>  | <ul style="list-style-type: none"> <li>The Solaris 8 (2/02) Operating Environment release provides support for major linear tape open (LTO) tape drives (SPARC platform only)</li> </ul>  |
| <ul style="list-style-type: none"> <li>14 new and 7 updated Open Source packages</li> </ul>  | <ul style="list-style-type: none"> <li>Provides the benefits of Open Source operating systems, such as Linux, while continuing to provide datacenter quality stability and scalability</li> </ul>   |
| <ul style="list-style-type: none"> <li>Solaris media kit contents extended to include the iPlanet Integration Server, EAI Edition</li> </ul> | <ul style="list-style-type: none"> <li>Allows legacy applications to be turned into web services by providing SOAP, WSDL, XML, and UDDI interfaces; limited licensing for evaluation and development only (SPARC platform only)</li> <li>Customers who are moving their information services to the services-on-demand model can preserve their existing software applications investment by utilizing the capabilities of the iPlanet Integration Server, EAI Edition</li> </ul> |

## Graphics Software Interfaces





**Figure 5.** Graphics software interfaces

The Sun Blade 2000 systems support all Solaris 8 Operating Environment graphics and window system APIs, including OpenGL® and Display PostScript™. A large number of Sun and third-party graphics APIs are also supported, including IRIS GL, OpenGL, GKS, HOOPS, and Java 3D™ software. Industry-standard X-extension libraries, such as Xlib and PEXlib, are available.

## The Solaris Operating Environment System Requirements

| Disk Space  |   |
|-------------|---|
| • End user  | 25 MB                                     |
| • Developer | 40 MB (runtime binaries and header files) |
| Memory      |   |
| • Minimum   | 1 GB                                      |
| • Typical   | 2 GB (for serious applications)           |

**Note:** *Required disk space varies based on OS packages selected, desktop or server use, desired swap tmp space, localization or translations, online documentation, and applications installed.*

## The Solaris Operating Environment Licensing and Usage

Under the Free Solaris Binary License Program program, Sun is making the binary (runtime) version of its Solaris 8 Operating Environment available to everyone who accepts the terms of the Solaris 8 Binary Code License (BCL) and the Free Solaris Binary License Program. There are no fees for the right to use the software on computers with a capacity of eight or fewer processors; just a small charge for the media kit.

Refer to <http://www.sun.com/software/solaris> for current licensing details. Some features of the Solaris Operating Environment license include the following:

- No longer a distinction between desktop and server licenses
- Free binary (runtime) license for all systems of 8 or fewer CPUs for customers who accept the terms of the Solaris 8 Binary Code License and the free Solaris Binary License Program
- Solaris 8 Operating Environment software is provided via the Solaris 8 Media Kit available for purchase on-line at <http://www.sun.com/solaris/binaries>
- Single Solaris Media Kit can be used to install multiple systems
- Solaris Media Kit contains additional bundled software
  - Solaris Supplemental CD of bundled user and system management tools
  - Oracle 8i Enterprise Edition (with development license)
  - StarOffice 5.2 productivity suite
  - Solaris Software Companion CD of popular freeware
  - iPlanet Advantage Software (with development licenses)

## Sun OpenGL for Solaris 1.2.3 Software

Sun OpenGL for Solaris 1.2.3 software provides a powerful programming environment for developing and deploying interactive 3D applications on SPARC processor workstations. It allows mainstream 3D graphics and visualization applications to be deployed on Sun's Ultra family of graphics workstations at a compelling price-to-performance ratio.



Sun OpenGL for Solaris software is an application programming interface (API) that provides 2D and 3D graphics features. Features include modeling, transformations, color, lighting, and smooth shading, as well as advanced features such as texture mapping, NURBS, fog, alpha blending, and motion blur. Sun OpenGL for Solaris software works in both immediate and non-editable display-list modes.

Using the Xinerama X window extension available in Solaris 7 or 8 Operating Environment (release 11/99 or later), users can configure their systems to utilize multiple frame buffers as one large, super-high resolution, virtual display. Sun OpenGL for Solaris software allows existing OpenGL API-based applications to run virtually without change in a multi-screen Xinerama environment.

Widespread multivendor availability of OpenGL software allows source-code portability of 3D graphics applications across platforms. Sun OpenGL for Solaris software is a compliant implementation of OpenGL 1.2 specification from the OpenGL Architecture Review Board (ARB) and is source-code compatible with other conformant OpenGL software on the market. Most existing OpenGL applications need only to be recompiled in order to run with Sun OpenGL for Solaris software.

Sun OpenGL for Solaris software is targeted at developers creating interactive 3D graphics applications for technical, creative, and analytical markets. Potential users include those in computer-aided design and manufacturing, global information systems, simulation, industrial design and modeling, entertainment, biochemistry, and petroleum exploration market segments.

Sun OpenGL for Solaris software is compatible with and accelerated for Sun workstations with the Sun PGX64, Sun Creator, Sun Creator3D, Sun Elite3D, Sun Expert3D, Sun Expert3D-Lite, Sun XVR-500, and Sun XVR-1000 graphics products. It is also compatible with legacy SPARCstation™ systems equipped with GZ, ZX, PGX, PGX24, and PGX32 frame buffers.

## Features and Benefits

Sun OpenGL for Solaris software provides the following features:

| Features  | Benefits   |
|---|--|
| <ul style="list-style-type: none"> <li>• Multiscreen rendering for super-high resolution 3D visualization (Xinerama)</li> </ul>   | <ul style="list-style-type: none"> <li>• Users no longer need to rewrite their 3D applications to take advantage of the multiple screens</li> </ul>  |
| <ul style="list-style-type: none"> <li>• 64-bit OpenGL library support</li> </ul>   | <ul style="list-style-type: none"> <li>• Allows OpenGL applications to take advantage of the full 64-bit addressing in the Solaris Operating Environment</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Additional interface imaging and 3D texturing               <ul style="list-style-type: none"> <li>– Texture level of detail control</li> <li>– BGRA and packed-pixel formats</li> <li>– Texture specular color</li> <li>– Texture edge clamping</li> <li>– Constant texture data extension</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Offers a more portable interface for imaging operation during 3D texture mapping               <ul style="list-style-type: none"> <li>– Offers better texture memory utilization</li> <li>– Supports more file- and hardware-data types</li> <li>– Allows more realistic lighting effects with texturing</li> <li>– Avoids blending border and image texels during texturing</li> <li>– Helps reduce texture mapping memory utilization and loading time</li> </ul> </li> </ul> |



| Features   | Benefits  |
|--|---|
| <ul style="list-style-type: none"> <li>• General performance improvements               <ul style="list-style-type: none"> <li>– Improved drivers</li> <li>– Occlusion culling test extension</li> </ul> </li> <li>• Additional extensions               <ul style="list-style-type: none"> <li>– Triangle list primitive</li> <li>– Vertex extension</li> <li>– Global alpha extension</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>– Helps enable better performance for all supported graphics cards; in particular, there has been some substantial performance gains for Sun Elite3D frame buffers — for some applications over 100 percent</li> <li>– Enables applications to trivially reject occluded objects in a scene, resulting in big improvements in interactive rendering performance for visualization of large models</li> <li>– Allows multiple triangle strips or fans to be specified within a single <code>glBegin glEnd</code> pair; improves performance</li> <li>– Allows applications to specify all vertex data (color, normal, coordinates, and so on) in a single function call; saves function call overhead</li> <li>– Allows applications to specify an alpha component which can be applied globally to all primitives; useful for cases where many vertices share the same alpha value because the application does not have to send an alpha component for each vertex</li> </ul> |

## Sun OpenGL for Solaris Software Tech Facts

Sun OpenGL for Solaris software system requirements are shown in the following table.

| Feature   | Requirements   |
|---|--|
| <b>Platforms</b>  | SPARC III Cu processor-based systems using Sun Elite3D, Sun Creator, Sun Creator3D, Sun Expert3D, Sun Expert3D-Lite, Sun XVR-500, Sun XVR-1000, GZ, ZX, PGX™, PGX24™, and PGX32™ frame buffers |
| <b>Operating environments supported</b>   | Solaris 2.6, 7, 8, or later<br><br>Note: Multi-display Xinerama support requires Solaris 7 Operating Environment (11/99 or later) or later.  |
| <b>Recommended patches</b>  |  |
| <ul style="list-style-type: none"> <li>• Using PGX graphics on an Ultra™ 5 or 10 workstation</li> </ul> | Solaris 2.6: patch 105362-19 (or later)  |
| <ul style="list-style-type: none"> <li>• Using Sun Elite3D graphics</li> </ul>                          | Solaris 2.6: patch 105362-19 (or later)<br>Solaris 7: patches 106148-03 and 106144-05 (or later)   |
| <b>Window system supported</b>  | CDE or OpenWindows™  |
| <b>Disk space</b>   |  |
| <ul style="list-style-type: none"> <li>• For end-user runtimes</li> </ul>                               | 32 MB for 32 bit; 55-MB for 64 bit   |



|  |   |
|--|---|
| • For ISV developers (total to build examples) | 54 MB for 32 bit; 77 MB for 64 bit            |
| <b>Memory</b>                                  | 64 MB minimum with 128 MB or more recommended |

## Ordering Information

**Note:** All Sun Blade 2000 standard and random configurations using 900 MHz UltraSPARC III Cu CPUs fully comply with Energy Star regulations. Modifying any of these configuration by adding any available Sun or third-party option may render the configuration non-compliant. Configurations using 1.05 Ghz UltraSPARC CPUs do not meet Energy Star regulations.

## Sun Blade 2000 Workstation Part Numbers

| Part Number             | Description   |
|-------------------------|---|
| <b>A29-PS1-9C-1GMAJ</b> | <b>Standard Configuration</b><br>Sun Blade 2000 workstation with one 900-MHz UltraSPARC III Cu processor with 8-MB cache, 1-GB memory(differentiated DIMMS), one 73-GB 10000-rpm FC-AL internal disk, Sun PGX64 graphics (13W3 adapater cable included), 10/100-Mbit Ethernet, IEEE 1394, USB, Solaris 8 (2/02) Operating Environment preinstalled                |
| <b>A29-PS1-9Y-1GMAJ</b> | <b>Random (Non-Standard) Configuration</b><br>Sun Blade 2000 workstation with one 900-MHz UltraSPARC III Cu processor with 8-MB cache, 1-GB memory(differentiated DIMMS), one 73-GB 10000-rpm FC-AL internal disk, XVR-500 Graphics Accelerator, 10/100-Mbit Ethernet, IEEE 1394, USB, Solaris 8 (2/02) Operating Environment preinstalled                        |
| <b>A29-PS1-9Z-2GAJN</b> | <b>Random (Non-Standard) Configuration</b><br>Sun Blade 2000 workstation with one 900-MHz UltraSPARC III Cu processors with 8-MB cache, 2-GB memory, one 73-GB 10000-rpm FC-AL internal disk, Sun XVR-1000 graphics, 10/100-Mbit Ethernet, IEEE 1394, USB, Solaris 8 (2/02) Operating Environment preinstalled  |
| <b>A29-PS2-9C-2GMAJ</b> | <b>Standard Configuration</b><br>Sun Blade 2000 workstation with two 900-MHz UltraSPARC III Cu processors with 8-MB cache each, <b>2-GB memory (differentiated DIMMS)</b> , one 73-GB 10000-rpm FC-AL internal disk, Sun PGX64 graphics (13W3 adapater cable included), 10/100-Mbit Ethernet, IEEE 1394, USB, Solaris 8 (2/02) Operating Environment preinstalled |



| Part Number       | Description   |
|-------------------|---|
| A29-PS2-9Z-4GAJN  | <p><b>Random (Non-Standard) Configuration</b></p> <p>Sun Blade 2000 workstation with <b>two</b> 900-MHz UltraSPARC III Cu processor with 8-MB cache, <b>4-GB memory</b>, one 73-GB 10000-rpm FC-AL internal disk, Sun XVR-1000 graphics, 10/100-Mbit Ethernet, IEEE 1394, USB, Solaris 8 (2/02) Operating Environment preinstalled</p>  |
| A29-PT2-9C-1GMAJN | <p><b>Random (Non-Standard) Configuration</b></p> <p>Sun Blade 2000 workstation with two 1.05 GHz UltraSPARC III Cu processors with 8-MB cache each, <b>1-GB memory (differentiated DIMMS)</b>, one 73-GB 10000-rpm FC-AL internal disk, Sun PGX64 graphics (13W3 adapter cable included), 10/100-Mbit Ethernet, IEEE 1394, USB, Solaris 8 (2/02) Operating Environment preinstalled. (This configuration is not compliant with Energy Star requirements.)</p>  |
| A29-UT2-9Z-8GAJP  | <p><b>Limited Edition Promo: Sun Blade 2000 20 Year Celebration Edition (available through October 2002)</b></p> <p>Sun Blade 2000 workstation with <b>two</b> 1.05-GHz UltraSPARC III Cu processors with 8-MB cache each, <b>8-GB memory</b>, <b>two</b> 73-GB 10000-rpm FC-AL internal disks, DVD-ROM drive, <b>one Sun XVR-1000 graphics accelerator</b>, 10/100-Mbit Ethernet, IEEE 1394, USB, Solaris 8 (2/02) Operating Environment preinstalled <b>with a SunPCi IIpro coprocessor card</b> and 1394 Vis Kit. (This configuration is not compliant with Energy Star requirements.)</p> |

*Note: All Sun Blade 2000 standard and random configurations using 900 MHz UltraSPARC III Cu CPUs, fully comply with Energy Star regulations. Modifying any of these configuration by adding any available Sun or third-party option may render the configuration non-compliant.*

## Ordering Guidelines and Notes

- **Discontinuation of Sun Blade 1000 configurations**
  - The 600-MHz model of the Sun Blade 1000 workstation is no longer available.
  - The 750-MHz configurations of the Sun Blade 1000 workstation are being discontinued, with a last order date of June 30, 2002, and a last ship date of November 8, 2002. The EOLed 750-MHz Sun Blade 1000 system configurations are replaced by 900-MHz UltraSPARC Cu Sun Blade 2000 system configurations.
- **Memory**
  - The Sun Blade 2000 workstations support 8 GB of main memory. This architecture currently accepts 128-MB, 256-MB, 512-MB, and 1-GB memory modules.



– The Sun Blade 2000 workstations can accommodate up to 8 DIMM modules in increments of four. DIMM modules within each set *must* be of the same type. DIMM module sets of four may be mixed.

– NOTE:

Some Sun Blade 2000 configurations use differentiated DIMMS. The new differentiated DIMMs will have the same performance and functionality as previous DIMMS, but they are no longer compatible with Sun enterprise servers. These new DIMMs are specifically designed & tested for the Sun Blade 2000/280R products and because they are no longer compatible with Sun enterprise servers, they are called "differentiated DIMMS" to "differentiate" from Sun standard memory DIMMs. It is possible to mix and match differentiated DIMMs with previous DIMMs in a Sun Blade 2000 without any degradation of performance or change in functionality. You can mix and match DIMMs even within the same memory bank. Please note: this mixing and matching of DIMMs **ONLY** applies to Sun Blade 2000/1000. From the view point of functionality and performance of the DIMM itself, there are no differences. Some minor changes were made (server required capacitors were removed) to remove dependency from server memory. These new differentiated DIMMs are rigorously tested and perform identically to original DIMMs for Sun Blade 2000/1000.

- **Graphics**

– The Sun Blade 2000 workstations support the Sun PGX64 PCI graphics for non-3D applications, as well as Sun Expert3D, Sun Expert3D-Lite, Sun XVR-500, and Sun XVR-1000 high-performance 3D graphics.

- **Monitors**

– Monitors are not included with any Sun Blade 2000 systems.

– The customer can choose among the 17-, 21-, and 24-inch color monitor, or the 18- and 24-inch flat-panel display.

- **SCSI**

– The internal SCSI host controller operates in Fast-20 (UltraSCSI) mode by default. Installation of non-FAST-20 devices, although allowed, decreases overall SCSI performance.

– The total combined SCSI cable length must not exceed three meters for Fast/Wide operation or 1.5 meters for Fast-20 (UltraSCSI) operation.

– To achieve Fast-20 speeds on all devices on the bus, it is recommended that:

- A maximum of two Sun StorEdge™ UniPack systems using Fast-20 cables be connected to the external connector.
- All devices on the SCSI bus should be Fast-20 devices. (Non-Fast-20 devices may cause the internal devices to run at Fast/Wide speeds, but are supported.)

- **Keyboard**

– Type 6 USB keyboards are supported on the Sun Blade 2000 workstations.

## Sun Blade 2000 Assemble-to-Order (ATO) Options

The Sun Blade 2000 workstations are available with assemble-to-order (ATO) options. This allows customers to configure systems to match their specifications.



The primary use of ATO for the Sun Blade workstation is for customers who require a specific configuration not available from the list of standard configurations, non-standard configurations, or promotional configurations.

The ATO process requires that the system be built to order and therefore has a longer lead time (estimated at two weeks) than standard configurations.

Follow the steps below to assemble a specific configuration of the Sun Blade 2000 workstation.

### Step 1: Select a chassis (Required)

Select one of the following chassis combinations.

| Part Number | Description   |
|-------------|---|
| A29-AA      | Sun Blade 2000 workstation in desktide tower; two CPU slots, eight memory slots, four PCI I/O slots, two FC-AL disk bays, bay for DVD drive, 1.44-MB floppy drive removable media bay, 10/100-Mbit Ethernet, Solaris Operating Environment license; no CPU, memory, or disk included; rackmountable on tray     |
| A29-AAV     | Sun Blade 2000 workstation in desktide tower with Danish power supply; two CPU slots, eight memory slots, four PCI I/O slots, two FC-AL disk bays, bay for DVD drive, removable media bay, 10/100-Mbit Ethernet, Solaris Operating Environment license; no CPU, memory, or disk included; rackmountable on tray |

### Step 2: Select a CPU module (Required)

Select one or two of the following, with any combination of CPU speeds. A minimum of one is required. Note that the 900-MHz UltraSPARC Cu CPU module is a direct replace for the 750-MHz module. The 900-MHz UltraSPARC Cu module, when used to upgrade from the 750-MHz module (used in eoled Sun Blade 1000 systems), requires an OS patch and OBP update.

| Part Number                        | CPU, Memory Module                          | Max. per System |
|------------------------------------|---|-----------------|
| <b>Sun Blade 2000 Workstations</b> |   |                 |
| 7009A                              | 900-MHz UltraSPARC III Cu CPU, 8-MB Ecache  | Two             |
| 7017A                              | 1.05 GHz UltraSPARC III Cu CPU, 8-MB Ecache | Two             |

### Step 3: Specify memory kit (Required)

Select one or two memory kits, any combination. Maximum installed memory is 8 GB. Full physical memory can be accessed with only one CPU; two CPUs are not required. The Sun Blade 2000 has eight DIMM slots. RAM must be installed in banks of four. Memory can be mixed and matched but must be one size per bank of four.

| Part Numbers | Memory Size           | Number of Maximum Memory Kits per System |
|--------------|-----------------------|--|
| 7061A        | 1024 MB (4 x 256 MB)  | 2  |
| 7062A        | 2048 MB (4 x 512 MB)  | 2  |
| 7052A        | 4096 MB (4 x 1024 MB) | 2  |



The table below lists memory sizes and required memory kits.

| Size    | Bank Configuration                           | Kit Selection           |
|---------|--|-------------------------|
| 2048 MB | 2 banks 256-MB DIMMs                         | two 7061A               |
| 2048 MB | 1 bank 512-MB DIMMs                          | one 7062A               |
| 3072 MB | 1 bank 512-MB DIMMs and 1 bank 256-MB DIMMs  | one 7062A and one 7061A |
| 4096 MB | 1 bank 1024-MB DIMMs                         | one 7052A               |
| 4096 MB | 2 banks 512-MB DIMMs                         | two 7062A               |
| 5120 MB | 1 bank 1024-MB DIMMs and 1 bank 256-MB DIMMs | one 7052A and one 7061A |
| 6144 MB | 1 bank 1024-MB DIMMs and 1 bank 512-MB DIMMs | one 7052A and one 7062A |
| 8192 MB | 2 banks 1024-MB DIMMs                        | two 7052A               |

#### Step 4: Select a graphics card (Required)

Select a one or more cards, subject to installation combinations listed below. The maximum configuration of graphics cards in the Sun Blade 2000 workstations is as follows:

- Sun Creator3D graphics, maximum 2
- Sun Elite3D m6 graphics, maximum 2
- Sun PGX64 graphics, maximum 4
- Sun Expert3D graphics, maximum 2 (must be installed in 33-MHz PCI slot)
- Sun Expert3D-Lite graphics, maximum 3 (must be installed in 33-MHz PCI slot)
- Sun XVR-500 graphics, maximum 4
- Sun XVR-1000 graphics, maximum 2

| Part Number | Description                | Max. # Supported | Bus   | Connections     |
|-------------|----------------------------|------------------|-------|-----------------|
| 3670A       | Sun Creator3D graphics     | 2                | UPA   | 13W3            |
| 3679A       | Sun Elite3D m6 graphics    | 2                | UPA   | 13W3            |
| 3768A       | Sun PGX64 graphics         | 4                | PCI66 | HD15            |
| 3678A       | Sun Expert3D graphics      | 2                | PCI66 | 13W3            |
| 3684A       | Sun Expert3D-Lite graphics | 3                | PCI66 | HD15            |
| 3685A       | Sun XVR-1000 graphics      | 4                | PCI   | 13W3, HD15      |
| 3256A       | Sun XVR-1000 graphics      | 2                | UPA   | 13W3, HD15, DVi |

The specific mix and match rules for these graphics options are outlined below. Customers can mix and match until they run out of slots in the system. Any combination of cards is allowed as long as there are no slot conflicts. The slot configurations and physical positions are shown in the table below. Gray areas indicate slots incompatible with the specified graphics card. Customers can install total of four graphics cards on one system.



| Graphics Board                 | Total Supported | UPA Slot 0 | PCI Slot 4, 33 MHz | UPA Slot 1 | PCI Slot 3, 33 MHz | PCI Slot 2, 33 MHz | PCI Slot 1, 66 MHz |
|--------------------------------|-----------------|------------|--------------------|------------|--------------------|--------------------|--------------------|
| Sun Creator3D                  | 2               | X          |                    | X          |                    |                    |                    |
| Sun Elite3D m6 <sup>A</sup>    | 2               | X          |                    | X          |                    |                    |                    |
| Sun PGX64 <sup>B</sup>         | 4               |            | X                  |            | X                  | X                  | X                  |
| Sun Expert3D-Lite <sup>C</sup> | 3               |            | X                  |            | X                  | X                  |                    |
| Sun Expert3D <sup>C</sup>      | 2               |            | X                  |            | X                  | X                  |                    |
| Sun XVR-500                    | 4               |            | X                  |            | X                  | X                  | X                  |
| Sun XVR-1000                   | 2               | X          |                    | X          |                    |                    |                    |

**Notes:**

- a. Sun Elite3D graphics cards take up a UPA slot AND an adjacent PCI slot.
- b. Installing the Sun PGX64 card in the 66-MHz slot slows performance of the entire 66-MHz PCI bus to operate at 33 MHz.
- c. The Sun Expert3D and Sun Expert3D-Lite cards cannot be used in the 66-MHz PCI slot.



## Step 5: Select a country kit (Required)

Select one country kit and one power cord kit.

| Type 6 Country Kits    | USB I/O   | Power Cord | Documentation | MM    |
|------------------------|-----------|------------|---------------|-------|
| US/Universal/Canadian  | X3531A    | X311L      | English       | NTSC  |
| French                 | X3532A    | X312L      | French        | Secam |
| German                 | X3533A    | X312L      | German        | PAL   |
| Swiss-French           | X3534A    | X314L      | French        | PAL   |
| Swiss-German           | X3535A    | X314L      | German        | PAL   |
| Swedish                | X3536A    | X312L      | Swedish       | PAL   |
| UK                     | X3537A    | X317L      | English       | PAL   |
| US UNIX                | X3538A    | X311L      | English       | NTSC  |
| Japanese UNIX          | X3539A    | X311L      | Japanese      | NTSC  |
| Japanese UNIX Logoless | X3539A-O# | X311L      | Japanese      | NTSC  |
| Taiwanese              | X3554A    | X311L      | English       | NTSC  |
| Korean                 | X3555A    | X311L      | English       | NTSC  |
| Japanese               | X3556A    | X311L      | Japanese      | NTSC  |
| Japanese Logoless      | X3556A-O# | X311L      | Japanese      | NTSC  |
| UK UNIX                | X3558A    | X317K      | English       | PAL   |
| European UNIX          | X3559A    | X312L      | English       | PAL   |
| Norwegian              | X3560A    | X312L      | English       | PAL   |
| Portuguese             | X3561A    | X312L      | English       | PAL   |
| Spanish                | X3562A    | X312L      | Spanish       | PAL   |
| Danish                 | X3563A    | X383L      | Danish        | PAL   |
| Italian                | X3564A    | X384L      | Italian       | PAL   |
| Dutch                  | X3565A    | X312L      | English       | PAL   |
| Australian             | X3566A    | X386L      | English       | PAL   |
| Finnish                | X3567A    | X312L      | English       | PAL   |
| European Universal     | X3568A    | X312L      | English       | PAL   |
| Chinese                | X3582A    | X386L      | English       |       |
| Euro Cordless          | X3583A    | X312L**    | English       | PAL   |

**Notes:** \*\*Power cord shipped separately



## Step 6: Select disk drives and Solaris Operating Environment pre-installation (Required)

Select the number of disk drives to install. Also, specify whether to pre-install the Solaris Operating Environment on the workstation. The requirement is a maximum of two disk drives, of which at least one has the Solaris Operating Environment pre-installed 6766A

| Part Number | Description  |
|-------------|--|
| 6766A       | 73-GB FC-AL 10000-rpm drive option, Solaris Operating Environment preinstalled |
| 6742A       | 73-GB FC-AL 10000-rpm drive option   |

# Options

Below is a comprehensive list of system expansion, networking, graphics, and multimedia options that are supported by Sun Blade™ 2000 systems. Refer to the Sun Price Book and configuration guides for currently available option listings, configuration notes, and ordering information. When no maximum number is listed, refer to ordering or configuration notes for that option.

**Note:** *Options listed in italics are supported by the Sun Blade 2000 workstations, but are no longer available for purchase from Sun. These are listed only for reference purposes.*

| Part Number   | Option Description   | Maximum Number Supported | Comments  |
|---|--|--------------------------|---|
| <b>Processors</b>   |  |                          |   |
| X7017A  | 1.05 GHz UltraSPARC™ III Cu module                           | 2                        | USIII Cu processor speed cannot be mixed. Cu processor cannot be mixed with non Cu processors |
| X7009A  | 900-MHz UltraSPARC III Cu module                             | 2                        |   |
| <b>Mass Storage: Internal</b>   |  |                          |   |
| X6742A  | 73-GB, 10000-rpm FC-AL disk                                  | 2                        |   |
| <b>Mass Storage: Removable Media</b>                                      |  |                          |   |
| X6006A  | 3.5-inch, 1.44-MB manual-eject floppy drive (triple density) | 1                        |   |
| X6168A  | DVD-ROM 10X speed  | 1                        |   |
| X6282A  | 12-GB to 24-GB, 4-mm DDS-3 tape drive                        | 1                        |   |
| X6295A  | 20-GB, 4-mm DDS-4 tape drive                                 | 1                        |   |
| <b>External Tape Options: Sun StorEdge™ FlexiPack and UniPack Systems</b> |  |                          |   |
| X6540A  | Dual-channel SE SCSI   |                          |   |
| X5010A  | Single-channel SE SCSI                                       |                          |   |
| X1032A  | SE SCSI, Fast Ethernet                                       |                          |   |
| <b>Mass Storage: Sun StorEdge UniPack (68-pin SCSI)</b>                   |  |                          |   |
| SG-XTAP4MM-012A   | 20-GB, 4-mm DDS-4 tape drive in a UniPack desktop enclosure  | 2                        |   |
| SG-4MMDDS410  | 4-mm DDS-4 tapes, 10 pack                                    |                          |   |



| Part Number                                 | Option Description  | Maximum Number Supported | Comments   |
|---|---|--------------------------|--|
| SGXMEDDLTCIV-10                             | SLT Type IV tapes, 10 pack  |                          |  |
| SG-XMED4MMCL-10                             | DDS-4 tape cleaners, 10 pack  |                          |  |
| SG-XMEDDLTCL-10                             | SLT tape cleaners, linear, 10 pack  |                          |  |
| SG-XDSK010C-18G                             | 18.2-GB, 7200-rpm UniPack   | 4                        |  |
| SG-XDSK010C-36G                             | 36.4-GB, 10000-rpm UniPack  | 4                        |  |
| SG-XTAP4MM-011A                             | 12-GB, 4-mm DDS-3 tape drive UniPack desktop enclosure                      | 2                        |  |
| SG-XTAP8MM-010A                             | 7-GB, 8-mm drive in a UniPack desktop enclosure                             | 2                        |  |
| SG-XTAP4MM-012A                             | 20-GB, 4-mm DDS-4   | 2                        |  |
| SG-XTAP8MM-011A                             | 20-GB, 8-mm drive in a UniPack desktop enclosure                            | 2                        |  |
| SG-XDSK010C-9G                              | 9.1-GB, 7200-rpm UniPack  | 4                        |  |
| <b>Mass Storage: Sun StorEdge FlexiPack</b> |   |                          |  |
|   | <i>The following FlexiPack options come with a 68 to 68 pin SCSI cable:</i> |                          |  |
| SG-XTAPDLT-021A                             | 35-GB, DLT 7000 tape, desktop, full height                                  | 2                        |  |
| SG-XTAP4MM-021A                             | 12-GB, 4-mm DDS-3 tape FlexiPack, half height                               | 2                        |  |
| SG-XTAP4MM-031A                             | 72-GB, 4-mm DDS-3 tape FlexiPack, desktop autoloader                        | 2                        |  |
| SG-XTAP8MM-020A                             | 7-GB, 8-mm tape FlexiPack, half height                                      | 2                        |  |
| SG-XTAP8MM-021A                             | 20-GB, 8-mm tape FlexiPack, desktop, half height                            | 2                        |  |
| X6166A                                      | SunCD™ 32X internal CD-ROM expansion drive                                  |                          |  |
| X6168A                                      | DVD-ROM, 10X internal   |                          |  |
| X6212A                                      | 7-GB 8-mm DDS-3 internal tape expansion drive                               |                          |  |
| X6236A                                      | 20-GB, 8-mm internal tape for FlexiPack                                     |                          |  |
| X6282A                                      | 12-GB DDS-3 tape drive  |                          |  |
| <b>Mass Storage: Sun StorEdge MultiPack</b> |   |                          |  |
| SG-XDSK020C-36G                             | 36.4-GB (2 x 18.2-GB) 10000-rpm MultiPack                                   | 1                        | One Sun StorEdge MultiPack is supported per SCSI channel |
| SG-XDSK020C-72G                             | 72.8-GB (2 x 36.4-GB) 10000-rpm MultiPack                                   | 1                        |  |
| SG-XDSK040C-72G                             | 72.8-GB (4 x 18.2-GB) 10000-rpm MultiPack                                   | 1                        |  |
| SG-XDSK040C-144G                            | 145.6-GB (4 x 36.4-GB) 10000-rpm MultiPack                                  | 1                        |  |
| SG-XDSK060C-109G                            | 109.2-GB (6 x 18.2-GB) 10000-rpm MultiPack                                  | 1                        |  |
| SG-XDSK060C-218C                            | 218.6-GB (6 x 36.4-GB) 10000-rpm MultiPack                                  | 1                        |  |
| SG-XDSK020C-18G                             | 18.2-GB (2 x 9.1-GB) 10000-rpm MultiPack                                    | 1                        |  |
| SG-XDSK040C-36G                             | 36.4-GB (4 x 9.1-GB) 10000-rpm MultiPack                                    | 1                        |  |
| SG-XDSK060C-54G                             | 54.6-GB (6 x 9.1-GB) 10000-rpm MultiPack                                    | 1                        |  |
| X5237A                                      | 18-GB UltraSCSI 10000-rpm drive   |                          |  |
| X5242A                                      | 36-GB UltraSCSI 10000-rpm drive   |                          |  |
| X5234A                                      | 9-GB UltraSCSI 10000-rpm drive  |                          |  |



| Part Number                                    | Option Description  | Maximum Number Supported | Comments   |
|--|---|--------------------------|--|
| <b>Mass Storage: Sun StorEdge A1000 Arrays</b> |   |                          |  |
| SG-XARY150A-72G                                | 72-GB Sun StorEdge A1000 tabletop array (4 x 18-GB, 10000-rpm disks)              |                          | One array can be connect to each channel of the X6541A controller card or three Sun StorEdge A1000 arrays daisy-chained per channel. |
| SG-XARY170A-145G                               | 145-GB Sun StorEdge A1000 tabletop array (4 x 36.4-GB, 10000-rpm disks)           |                          |  |
| SG-XARY170A-436G                               | 436-GB Sun StorEdge A1000 tabletop array (12 x 36.4-GB, 10000-rpm disks)          |                          |  |
| SG-XARY155A-72G                                | 72-GB Sun StorEdge A1000 rackmountable array (4 x 18-GB, 10000-rpm disks)         |                          |  |
| SG-XARY171A-145G                               | 145-GB Sun StorEdge A1000 rackmountable array (4 x 36.4-GB, 10000-rpm disks)      |                          |  |
| SG-XARY155A-218G                               | 218-GB Sun StorEdge A1000 rackmount array (12 x 18.2-GB, 10000-rpm disks)         |                          |  |
| SG-XARY171A-436G                               | 436-GB Sun StorEdge A1000 rackmount array (12 x 36.4-GB, 10000-rpm disks)         |                          |  |
| <i>SG-XARY144A-36G</i>                         | <i>36-GB Sun StorEdge A1000 tabletop array (4 x 9.1-GB, 10000-rpm disks)</i>      |                          |  |
| <i>SG-XARY144A-109G</i>                        | <i>109-GB Sun StorEdge A1000 tabletop array (12 x 9.1-GB, 10000-rpm disks)</i>    |                          |  |
| <i>SG-XARY146A-36G</i>                         | <i>36-GB Sun StorEdge A1000 rackmountable array (4 x 9.1-GB, 10000-rpm disks)</i> |                          |  |
| <i>SG-XARY151A-218G</i>                        | <i>218-GB Sun StorEdge A1000 tabletop array (12 x 18.2-GB, 10000-rpm disks)</i>   |                          |  |
| <i>SG-XARY161A-291G</i>                        | <i>291-GB Sun StorEdge A1000 tabletop array (8 x 36.4-GB, 10000-rpm disks)</i>    |                          |  |
| <b>Mass Storage: Sun StorEdge D1000 Arrays</b> |   |                          |  |
| SG-XARY153A-72G                                | 72-GB Sun StorEdge D1000 tabletop array (4 x 18-GB, 10000-rpm disks)              |                          | System accepts max. one array per X6541A controller card   |
| SG-XARY172A-145G                               | 145-GB Sun StorEdge D1000 tabletop array (4 x 36.4-GB, 10000-rpm disks)           |                          |  |
| SG-XARY153A-218G                               | 218-GB Sun StorEdge D1000 tabletop array (12 x 18.2-GB, 10000-rpm disks)          |                          | Sun StorEdge D1000 arrays cannot be daisy-chained.   |
| SG-XARY172A-436G                               | 436-GB Sun StorEdge D1000 tabletop array (12 x 36.4-GB, 10000-rpm disks)          |                          |  |
| SG-XARY154A-72G                                | 72-GB Sun StorEdge D1000 rackmountable array (4 x 18-GB, 10000-rpm disks)         |                          |  |
| SG-XARY173A-145G                               | 145-GB Sun StorEdge D1000 rackmountable array (4 x 36.4-GB, 10000-rpm disks)      |                          |  |
| SG-XARY154A-218G                               | 218-GB Sun StorEdge D1000 rackmount array (12 x 18.2-GB, 10000-rpm disks)         |                          |  |
| SG-XARY173A-436G                               | 436-GB Sun StorEdge D1000 rackmount array (12 x 36.4-GB, 10000-rpm disks)         |                          |  |



| Part Number                                    | Option Description   | Maximum Number Supported | Comments   |
|--|--|--------------------------|--|
| SG-XARY145A-36G                                | 36-GB Sun StorEdge D1000 tabletop array (4 x 9.1-GB, 10000-rpm disks)      |                          |  |
| SG-XARY145A-3109G                              | 1409-GB Sun StorEdge D1000 tabletop array (12 x 9.1-GB, 10000-rpm disks)   |                          |  |
| SG-XARY147A-36G                                | 36-GB Sun StorEdge D1000 rackmountable array (4 x 9.1-GB, 10000-rpm disks) |                          |  |
| SG-XARY163A-145G                               | 145-GB Sun StorEdge D1000 tabletop array (4 x 36.4-GB, 10000-rpm disks)    |                          |  |
| <b>Sun StorEdge A5200 Arrays</b>               |  |                          |  |
| X6727A   | PCI dual FC network adapter  | 1                        |  |
| SG-XARY540A-127G                               | 127-GB Sun StorEdge 5200 tabletop array (7 x 18.2-GB, 10000-rpm disks)     | 2                        |  |
| SG-XARY540A-400G                               | 400-GB Sun StorEdge 5200 tabletop array (22 x 18-GB, 10000-rpm disks)      | 2                        |  |
| SG-XARY560A-254G                               | 254-GB Sun StorEdge 5200 tabletop array (7 x 36-GB, 10000-rpm disks)       | 2                        |  |
| SG-XARY560A-800G                               | 400-GB Sun StorEdge 5200 tabletop array (22 x 36-GB, 10000-rpm disks)      | 2                        |  |
| <b>Sun StorEdge T3 Arrays</b>                  |  |                          |  |
| XT3WG-TT-11-163                                | 163-GB (9 x 18-GB) tabletop single array                                   | 2                        | Cannot mix Sun StorEdge T3 with A5200 on a single system |
| XT3ES-TT-22-327                                | 327-GB (9 x 18-GB) tabletop dual array                                     | 2                        |  |
| XT3WG-TT-11-327                                | 327-GB (9 x 36-GB) tabletop single array                                   | 2                        |  |
| XT3ES-TT-22-655                                | 655-GB (9 x 36-GB) tabletop dual array                                     | 2                        |  |
| XT3WG-TT-11-1310                               | 1310-GB (9 x 73-GB) tabletop single array                                  | 2                        |  |
| XT3ES-TT-22-2620                               | 2620-GB (9 x 73-GB) tabletop dual array                                    | 2                        |  |
| XT3WG-RR-11-163                                | 163-GB (9 x 18-GB) rackmount single array                                  | 2                        |  |
| XT3ES-RR-22-327                                | 327-GB (9 x 18-GB) rackmount dual array                                    | 2                        |  |
| XT3WG-RR-11-327                                | 327-GB (9 x 36-GB) rackmount single array                                  | 2                        |  |
| XT3ES-RR-22-655                                | 655-GB (9 x 36-GB) rackmount dual array                                    | 2                        |  |
| XT3WG-RR-11-1310                               | 1310-GB (9 x 73-GB) rackmount single array                                 | 2                        |  |
| XT3ES-RR-22-2620                               | 2620-GB (9 x 73-GB) rackmount dual array                                   | 2                        |  |
| <b>External Tape Autoloaders and Libraries</b> |  |                          |  |
| SG-XAUTODLT8D-L9                               | 360-GB Sun StorEdge L9 autoloader, desktop                                 | 1                        |  |
| SG-XRACKIT-L9                                  | Rackmounting kit for Sun StorEdge L9 autoloader                            |                          |  |
| SG-XLIBDLT81-L20                               | Sun StorEdge L20 library, deskside   | 1                        |  |
| SG-XLIB180-Base2                               | Sun StorEdge L180 tape library   | 1                        |  |
| SG-XLIB9840-Drv                                | Sun StorEdge L180 tape library with 9840                                   | 1                        |  |
| SG-XLIBDLT8-Drv                                | Sun StorEdge L180 tape library with DLT                                    | 1                        |  |



| Part Number                | Option Description  | Maximum Number Supported | Comments  |
|----------------------------|---|--------------------------|-----------|
| <b>PCI Expansion Cards</b> |   |                          |           |
| X1033A                     | 10BASE-T Sun FastEthernet PCI adapter with MII interface  | 3                        | Universal |
| X1034A                     | Sun Quad FastEthernet™ PCI Card (QFE)   | 4                        |           |
| X1141A                     | Sun GigabitEthernet PCI adapter 2.0   | 4                        |           |
| X1150A                     | Sun GigaSwift Ethernet UTP  |                          |           |
| X1155A                     | High-speed serial interface PCI adapter 2.0   | 4                        |           |
| X1157A                     | SunATM™-155/MFiber PCI adapter 4.0  | 4                        |           |
| X1158A                     | SunATM-155/UTP PCI adapter 4.0  | 4                        |           |
| X1159A                     | SunATM-622/MFiber PCI adapter 4.0   | 2                        |           |
| X2156A                     | Serial asynchronous interface PCI adapter 3.0 for Solaris 8 Operating Environment   | 4                        |           |
| X1032A                     | PCI UltraSCSI SE with Ethernet  | 1                        |           |
| X5010A                     | Single-channel SCSI   | 1                        |           |
| X6540A                     | Dual-channel, single-ended UltraSCSI controller   | 2                        |           |
| X6541A                     | Dual-channel, differential UltraSCSI controller   | 2                        |           |
| X6799A                     | PCI single Fibre Channel network adapter  | 1                        |           |
| X6727A                     | PCI dual FC network adapter   | 1                        |           |
| X1089A                     | Real-time video/audio capture and compression   | 3                        |           |
| X2132A                     | SunPCi™ Ipro 733-MHz coprocessor card, 128-MB memory  | 4                        |           |
| X7042A                     | 128-MB DIMM memory expansion for SunPCi Ipro PCI option card  | 2                        |           |
| X7044A                     | 256-MB DIMM memory expansion for SunPCi Ipro PCI option card  | 2                        |           |
| X7045A                     | 512-MB DIMM memory expansion for SunPCi Ipro PCI option card  | 2                        |           |
| X1152A                     | <i>SunFDDI™ single-attach PCI bus interface adapter 2.0</i>   | 4                        |           |
| X1153A                     | <i>SunFDDI dual-attach PCI bus interface adapter 2.0</i>  | 4                        |           |
| X1131A-64.2                | <i>SunPCi™ I coprocessor card with 300-MHz processor and 64-MB memory</i>   | 1                        |           |
| X2131A                     | <i>SunPCi II coprocessor card with 600-MHz processor and 64-MB memory, 3.3 to 5 volts</i>   | 1                        |           |
| X2154A                     | <i>Token ring interface for Solaris 8 Operating Environment</i>   | 4                        |           |
| X1089A                     | <i>SunVideo Plus™ 3.1 video/audio capture</i>   | 1                        |           |
| X499A-EU                   | <i>PCI multimedia Kit, SunVideo Plus 1.3, a PAL SunCamera™ II, Sun Microphone™ II, and documentation (Continental Europe), supports SunForum™ 3.0</i> | 1                        |           |
| X499A-UK                   | <i>PCI multimedia Kit, SunVideo Plus 1.3, a PAL SunCamera II, Sun Microphone II, and documentation (U.K), supports SunForum 3.0</i>                   | 1                        |           |
| X499A                      | <i>PCI multimedia Kit, SunVideo Plus 1.3, a NTSC SunCamera II, Sun Microphone II, and documentation (U.S.), supports SunForum 3.0</i>                 | 3                        |           |



| Part Number                  | Option Description   | Maximum Number Supported | Comments   |
|------------------------------|--|--------------------------|--|
| X2069A                       | <i>FC-AL/Gigabit Ethernet for Solaris™ 8 Operating Environment</i>                 | 2                        |  |
| X7041A                       | <i>64-MB DIMM memory expansion for SunPCi I</i>                                    | 2                        |  |
| X7035A                       | <i>128-MB DIMM memory expansion for SunPCi I</i>                                   | 2                        |  |
| <b>Graphics and Imaging</b>  |  |                          |  |
| X3685A                       | Sun XVR-500 graphics   | 4                        |  |
| X3256A                       | Sun XVR-1000 graphics  | 2                        |  |
| X3768A                       | Sun PGX64 graphics card  | 4                        |  |
| X3670A                       | Sun Creator3D series 3 graphics card   | 2                        |  |
| X3679A                       | Sun Elite3D m6 series 2 graphics accelerator                                       | 2                        |  |
| X3678A                       | Sun Expert3D graphics board  | 2                        |  |
| X3684A                       | Sun Expert3D-Lite PCI-based graphics   | 2                        |  |
| X3682A                       | Sun 1392 Visual Collaboration Kit  | 1                        |  |
| X3677A                       | <i>Sun Elite3D m3 series 2 graphics accelerator</i>                                | 2                        |  |
| X3668A                       | <i>PGX32™ 8- and 24-bit color graphics PCI adapter frame buffer, CD, and cable</i> | 3                        |  |
| <b>Monitors and Adapters</b> |  |                          |  |
| X7143A                       | 17-inch color monitor  |                          |  |
| X7137A                       | 18.1-inch TFT LCD color monitor  |                          |  |
| X7146A                       | 21-inch flat-screen color Trinitron monitor  |                          |  |
| X7134A                       | Widescreen 24-inch flat-panel monitor  |                          |  |
| X7124A                       | Widescreen 24-inch color monitor   |                          |  |
| X471A                        | 13W3F-to-HD15M video adapter cable   |                          |  |
| X3872A                       | HD15F-to-13W3 video adapter  |                          |  |
| X7127A                       | <i>18.1-inch TFT LCD color monitor</i>   |                          |  |
| X7135A                       | <i>19-inch flat screen color Trinitron monitor</i>                                 |                          |  |
| X7136A                       | <i>21-inch flat screen color Trinitron monitor</i>                                 |                          |  |
| <b>Miscellaneous Options</b> |  |                          |  |
| X5681A                       | Smart card reader for serial or USB port   |                          |  |
| X1400A                       | Extra cards for smart card reader, 25 pack   |                          |  |
| <b>Type6 Country Kits</b>    |  |                          |  |
| X3531A                       | US/Canada Universal  | 1                        | Except for "Z" Country Kit Codes, these kits are included with every Sun Blade system. Refer to the "Choice of Country Kit" sub-section (above) for details. |
| X3532A                       | French   | 1                        |  |
| X3533A                       | German   | 1                        |  |
| X3534A                       | Swiss-French   | 1                        |  |
| X3535A                       | Swiss-German   | 1                        |  |
| X3536A                       | Swedish  | 1                        |  |
| X3537A                       | United Kingdom   | 1                        |  |
| X3538A                       | US UNIX  | 1                        |  |
| X3554A                       | Taiwanese  | 1                        |  |



| Part Number | Option Description  | Maximum Number Supported | Comments |
|-------------|---------------------|--------------------------|----------|
| X3555A      | Korean              | 1                        |          |
| X3556A      | Japanese            | 1                        |          |
| X3558A      | United Kingdom UNIX | 1                        |          |
| X3559A      | European UNIX       | 1                        |          |
| X3560A      | Norwegian           | 1                        |          |
| X3561A      | Portuguese          | 1                        |          |
| X3562A      | Spanish             | 1                        |          |
| X3563A      | Danish              | 1                        |          |
| X3564A      | Italian             | 1                        |          |
| X3565A      | Dutch (Netherlands) | 1                        |          |
| X3566A      | Australian          | 1                        |          |
| X3567A      | Finnish             | 1                        |          |
| X3582A      | Chinese             | 1                        |          |
| X3583A      | European cordless   | 1                        |          |



# Upgrades

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## Key Messages

The Sun™ Upgrade Allowance Program offers customers outstanding investment protection for their existing Sun equipment. Upgrades are available for specific configurations within the Sun Blade™ Sun Blade 2000 product family.

- Sun upgrades allow as many components as possible to be carried forward, to protect the customer's hardware investment.
- Existing investments in non-Sun hardware can be preserved by upgrading to Sun through competitive full-system upgrades.

## Sun Upgrade Allowance Program (Sun UAP)

Sun UAP offers customers a simple, flexible, and easy-to-understand way of ordering desktop workstation upgrades. Sun UAP is a percentage-based model. This model simplifies the upgrades process by providing a trade-in value as a percentage allowance. This percentage allowance can then be applied to the list price of a regular Sun system configuration.

Under Sun UAP, trade-in allowance codes have been created and the percentage allowance is built into this part number (see below). Allowance codes can be found at the following locations:

- Sun Price Book
- Configuration Guide
- Desktop System Migration and Allowance Matrix on SunWIN, #94726
- Internal URL: <http://ibb.eng/upgrades>
- External URL: <http://www.sun.com/ibb/upgrades>
- Partner/CDPs URL: <http://partner.sun.com/ibb/upgrades>

**Note:** Allowance codes can be applied to standard marketing part numbers. Allowances CANNOT be applied to X-options or CTO options.

## Allowance Code Numbering Scheme

Below is an example allowance code, along with a description of the components.

### Allowance code = ALW-02-T-A-A29

- **ALW** = Every upgrade code starts with these letters, identifying it as an upgrade.
- **02** = Percentage allowance. This is the allowance that is subtracted from the list price of the product (02 equals 2% off of list, 08 equals 8% off of list, and so on). Note that any other discounts, such as volume discounts, should also be taken off the list price and not the net of the above.
- **T** = Desktop upgrades, S for server upgrades, and D for storage upgrades.



- **A** = Residue group; acceptable trade-ins by Sun — for reporting purposes.
- **A29** = Product family; identifies the type of product the customer is upgrading to.

## How to Apply Allowance Code

- Retrieve a copy of the desktop matrix which includes the allowances from one of the URLs noted above.
- Select the platform the customer is upgrading from
- Choose the allowance code that pertains to the platform the customer is upgrading to
- Subtract the allowance percentage from the list price of the configuration

**Note:** *The trade-in allowance is in addition to any contracted discounts that the customer may be eligible for. Contracted discounts should also be taken off the LIST PRICE.*

## Upgrade Ordering Notes

The following lists what can and cannot migrate from UltraSPARC-II systems to the Sun Blade 2000 product family.

- Memory, internal disks, and controllers do not migrate.
- CPU modules from Ultra™ workstations do not migrate.
- Sun PGX64, Sun Creator3D, and Sun Elite3D m6 graphics cards do migrate.
- Selected SCSI arrays and PCI cards migrate. See Options sections for details.
- Monitors
  - Monitors are not included with any Sun Blade system upgrades.
  - Sun branded 17-inch and 20-inch monitors migrate from previous generation Sun systems.
  - Upgrade trade-ins are available for Non-Sun competitive monitors
- Country kits do not migrate
- Type 4 and Type 5 keyboards are not supported on the Sun Blade 2000 workstations. Only USB keyboards are supported.

## Upgrading to UltraSPARC III Cu Processor

Sun Blade 1000/2000 workstation customers can upgrade the system's processors to the 900-MHz UltraSPARC III Cu processors (X-option #7009A) or the 1.05-GHz UltraSPARC III Cu processors (X-option X7017A).

### Notes:

- All customer VEUs are different.
- Processor speeds cannot be mixed on the same workstation.



- The UltraSPARC III Cu 900-MHz module UltraSPARC III Cu and 1.05 Ghz UltraSPARC III Cu module do and not mix with 600/750/900-MHz UltraSPARC III CPU modules. Customers must remove their existing 600/750/900-MHz modules from the system and then install UltraSPARC III Cu 900-MHz module or UltraSPARC III Cu 1.05 Ghz UltraSPARC III Cu module.
- Before upgrading to the UltraSPARC III Cu processors, customers must be running the 2/02 version of the Solaris 8 Operating Environment.



## Upgrade Paths

| System/<br>Component             | Upgrade From                     | Upgrade To   | Allowance Code Part<br>Number  | Customer Returns                 |
|----------------------------------|----------------------------------|--|--|----------------------------------|
| Sun Workstations                 | Any Sun workstation              | A Sun Blade 2000 workstation   | See Desktop System Migration and Allowance Matrix for available configurations and trade-in allowances.<br>SunWIN #94726 | A complete functioning system    |
| Non-Sun Workstations             | Any Non-Sun workstation          | A Sun Blade 2000 workstation   | See Desktop System Migration and Allowance Matrix for available configurations and trade-in allowances.<br>SunWIN #94726 | A complete functioning system    |
| CPUs                             | 600-MHz UltraSPARC III (X6898A)  | 900-MHz UltraSPARC III Cu (X7009A) and 1.05 Ghz UltraSPARC III Cu (X7017A) | See Component Migration and Allowance Matrix for trade-in allowance. SunWIN #108142                                      | A 600-MHz CPU option             |
|                                  | 750-MHz UltraSPARC III (X6990A)  | 900-MHz UltraSPARC III Cu (X7009A) and 1.05 Ghz UltraSPARC III Cu (X7017A) | Same as above  | A 750-MHz CPU option             |
|                                  | 900-MHz UltraSPARC III (X7000A)  | 900-MHz UltraSPARC III Cu (X7009A) and 1.05 Ghz UltraSPARC III Cu (X7017A) | Same as above  | A 900-MHz CPU option             |
| Memory:<br>Increasing Density 2x | 512 MB (4 x 128-MB DIMMs) X7050A | 1 GB (4 x 256-MB DIMMs) X7061A   | See Component Migration and Allowance Matrix for trade-in allowance. SunWIN #108142                                      | 512 MB (4 x 128-MB DIMMs) X7050A |
|                                  | 1 GB (4 x 256-MB DIMMs) X7053A   | 2 GB (4 x 512-MB DIMMs) X7062A   | Same as above  | 1 GB (4 x 256-MB DIMMs) X7053A   |
|                                  | 2 GB (4 x 512-MB DIMMs) X7051A   | 4 GB (4 x 1-GB DIMMs) X7052A   | Same as above  | 2 GB (4 x 512-MB DIMMs) X7051A   |
| Memory:<br>Increasing Density 4x | 512 MB (4 x 128-MB DIMMs) X7050A | 2 GB (4 x 512-MB DIMMs) X7062A   | Same as above  | 512 MB (4 x 128-MB DIMMs) X7050A |
|                                  | 1 GB (4 x 256-MB DIMMs) X7053A   | 4 GB (4 x 1-GB DIMMs) X7052A   | Same as above  | 1 GB (4 x 256-MB DIMMs) X7053A   |



**Note:** For graphics cards and disk upgrades, see *Component Migration and Allowance Matrix for trade-in allowance*. Refer to SunWIN #108142 or go to any of the following URLs:

- Sun Price Book
- Configuration Guide
- Desktop System Migration and Allowance Matrix on SunWIN, #94726
- Component Migration and Allowance Matrix on SunWIN, #108142
- Internal URL: <http://ibb.eng/upgrades>
- External URL: <http://www.sun.com/ibb/upgrades>
- Partner/CDPs URL: <http://partner.sun.com/ibb/upgrades>



# Service and Support

The SunSpectrum<sup>SM</sup> program is an innovative and flexible service offering that allows customers to choose the level of service best suited to their needs, ranging from mission-critical support for maximum solution availability to backup assistance for self-support customers. The SunSpectrum program provides a simple pricing structure in which a single fee covers support for an entire system, including related hardware and peripherals, the Solaris<sup>TM</sup> Operating Environment software, and telephone support for Sun<sup>TM</sup> software packages. The majority of Sun's customers today take advantage of the SunSpectrum program, underscoring the value that it represents. Customers should check with their local Sun Enterprise Services representatives for program and feature availability in their areas.

## Support Contracts

SunSpectrum program support contracts are available both during and after the warranty program. Customers may choose to uplift the service and support agreement to meet their business needs by purchasing a SunSpectrum contract.

The four levels of SunSpectrum support contracts are outlined below.

## SunSpectrum Program Support

| Program   | Description  |
|---|--|
| <b>Mission-Critical<br/>SunSpectrum Platinum<sup>SM</sup> Support</b> | Designed to support client-server, mission critical solutions by focusing on failure prevention, rapid recovery and year round technical services planning. Support is provided 24 x 7.  |
| <b>Business-Critical<br/>SunSpectrum Gold<sup>SM</sup> Support</b>    | Includes a complete package of proactive and responsive services for customers who require maximum uptime for their strategic business-critical systems. Support is provided 24 x 7.   |
| <b>System Coverage<br/>SunSpectrum Silver<sup>SM</sup> Support</b>    | Combines the service expertise, responsive on-site support and technical support by telephone and SunSolve <sup>TM</sup> CD/on-line services. Support is provided 8 a.m. to 8 p.m. Mon. through Fri.   |
| <b>Self-Directed<br/>SunSpectrum Bronze<sup>SM</sup> Support</b>      | Provided for customers who rely primarily upon their own in-house service capabilities. Enables customers to deliver high quality service by giving them access to UNIX <sup>®</sup> expertise, Sun certified replacement parts, software releases and technical tools. Support is provided 8 a.m. to 5 p.m. Mon. through Fri. |

## SunClient<sup>SM</sup> Support Program

The SunClient<sup>SM</sup> support program is a suite of offerings that is separate, yet complementary to the SunSpectrum program. This program helps reduce hardware and software support costs for the Sun Blade<sup>TM</sup> 2000 workstations. SunClient support program provides:

- A choice for optimizing low-cost workstation support



- Flexibility to select only the services needed
- Administrative simplicity, saving time and money
- Access to world-class UNIX® networking experts

| Feature  | SunClient Maintenance                      | SunClient Central Maintenance                | SunClient Software Tech Support Option* |
|--|--|--|---|
| Systems approach coverage  | *  | *  |   |
| Solaris and unbundled software technical support   | —  | —  | *                                       |
| 9 a.m.–5 p.m., Monday–Friday telephone coverage  | *  | *  | *                                       |
| 9 a.m.–5 p.m., Monday–Friday on-site coverage  | *†‡  | *‡   | —                                       |
| Response times (phone/onsite)  | 4 hour callback/next business day response | 4 hour callback/second business day response | 4 hour callback                         |
| Centralized on-site repair of multiple units   | —  | *  | Not Applicable                          |
| Patches  | Not Applicable                             | Not Applicable                               | *                                       |
| SunSolve license   | Not Applicable                             | Not Applicable                               | *                                       |
| SunSolve EarlyNotifier™ Service  | Not Applicable                             | Not Applicable                               | *                                       |
| Software updates   | Not Applicable                             | Not Applicable                               | Not Applicable                          |
| * Can only be sold as an option to SunClient Maintenance or SunClient Central Maintenance.   |  |  |   |
| † Next business day on-site response requires that the request for service be received by 3:00 p.m. If the call is received after 3:00 p.m., service is provided on the second business day. |  |  |   |
| ‡ Customers located more than 50 miles from an authorized service provider or reseller is charged an additional fee for service activity.  |  |  |   |

## Features and Benefits of the SunClient Program

| Features  | Benefits   |
|---|--|
| <ul style="list-style-type: none"> <li>• Unbundled hardware and software support</li> </ul> | <ul style="list-style-type: none"> <li>• <i>Flexibility</i><br/>Select the type and amount of coverage needed for desktop systems, so service dollars are targeted where they are needed most.</li> <li>• <i>Cost savings</i><br/>Pay only for the support services needed.</li> </ul> |



| Features  | Benefits   |
|---|--|
| <ul style="list-style-type: none"> <li>• Next business day (SunClient Maintenance) or second business day (SunClient Central Maintenance) on-site response</li> </ul> | <ul style="list-style-type: none"> <li>• <i>Cost efficiency</i><br/>Because Sun can more efficiently manage spare inventory and labor scheduling, the savings can be passed on to the customer.</li> </ul>   |
| <ul style="list-style-type: none"> <li>• Single contract with choice of automatic warranty upgrade</li> </ul>   | <ul style="list-style-type: none"> <li>• <i>Simplicity</i><br/>One contract covers a predefined number of systems at one low price. Additional systems acquired can be upgraded to the SunClient service level.</li> </ul>   |
| <ul style="list-style-type: none"> <li>• SunClient Central Maintenance</li> </ul>   | <ul style="list-style-type: none"> <li>• <i>Cost savings</i><br/>Sun realizes an economy of scale by repairing multiple systems with one visit and leverages existing support infrastructures, so cost efficiency is maximized while duplication of effort is virtually eliminated.</li> </ul> |
| <ul style="list-style-type: none"> <li>• Service delivery by Sun experts</li> </ul>   | <ul style="list-style-type: none"> <li>• <i>Consistency</i><br/>Selected desktops can be deployed virtually anywhere with enabling cost-effective, quality service and support.</li> </ul>   |

For more information, visit the SunClient support web site at:  
<http://www.sun.com/service/support/sunclient>

# Glossary

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|               |   |
|---------------|---|
| 24-bit color  | The ability to render objects from a palette of 16.7 million colors. It is often referred to as true color and results in much more realistic shading of 3D objects for enhanced image quality.   |
| 3D-RAM        | Dual-ported video memory with graphics functionality built into the memory chip.  |
| 100BASE-T     | <i>See</i> Fast Ethernet.   |
| Antialiasing  | A graphics technique that greatly enhances the quality of images by eliminating many of the inaccuracies ("jaggies") inherent to rendering on a raster display. Typically found only in high-end graphics systems.  |
| DIMM          | Dual inline memory module. A memory unit that can come in a variety of sizes, such as 16, 32, 64, and 128 MB.   |
| Fast Ethernet | IEEE standard for 100-Mb Ethernet. This technology supports a data transfer rate of 100 megabits per second over special grades of twisted-pair wiring.   |
| NFS           | Sun's distributed computing file system.  |
| ODBC          | Open database connectivity.   |
| OpenGL®       | The de facto standard software interface for graphics hardware that allows programmers to create interactive 3D applications. The OpenGL API provides a full-featured, network-transparent application programming interface.   |
| PCI           | Peripheral component interconnect. A industry standard for connecting peripherals such as disk drives, tapes drives, and other devices used in the PCs.   |
| UPA           | Ultra™ port architecture. A high-speed, crossbar-oriented, packet-switched mother board interconnect.   |
| V9            | Version 9 of the SPARC™ definition.   |
| VIS™          | Visual instruction set. The UltraSPARC III Cu processor implements a special instruction set that is primarily aimed at image and video processing. Some of the instructions allow the CPU to directly access and operate on image data with a high degree of parallelism. Other instructions provide facilities for formatting and moving data at very high rates of speed both within the CPU, and between the CPU and the other system components. |



# Materials Abstract

All materials are available on SunWIN except where noted otherwise.

| Collateral  | Description                     | Purpose             | Distribution         | Token # or COMAC Order # |
|---|---------------------------------|---------------------|----------------------|--------------------------|
| <b>PowerPack</b>  |                                 |                     |                      |                          |
| – <i>Sun Blade™ 2000 Workstation: Just the Facts</i>                  | Reference Guide (this document) | Training Sales Tool | SunWIN, Reseller Web | 124808                   |
| – <i>Sun Blade Workstation Customer Presentation</i>                  | Presentation with Slide Notes   | Sales Tool          | SunWIN, Reseller Web | 124810                   |
| <b>Product Literature</b>   |                                 |                     |                      |                          |
| – <i>Sun Blade 1000 and 2000 Workstation Architecture White Paper</i> | Technical White Paper           | Sales Tool          | SunWIN, Reseller Web | 124809                   |
| – <i>Literature - Sun Blade 1000 Workstation Data Sheet</i>           | Data Sheet                      | Sales Tool          | SunWIN, Reseller Web | 121205<br>DE1211-1       |
| – <i>Literature - Sun Blade 2000 Workstation Data Sheet</i>           | Data Sheet                      | Sales Tool          | SunWIN, Reseller Web | 336012<br>DE1590-0       |
| – <i>Graphics Solution Guide</i>                                      | Graphics Overview               | Sales Tool          | SunWIN               | 75271                    |
| – <i>Sun Blade 1000 Benchmark Index</i>                               | Benchmark Index                 | Sales Tool          | SunWIN               | 125774                   |
| <b>References</b>   |                                 |                     |                      |                          |
| – <i>Sun™ Creator3D Graphics: Just the Facts</i>                      | Reference Guide                 | Training Sales Tool | SunWIN, Reseller Web | 75246                    |
| – <i>Sun PGX64 Graphics, Just the Facts</i>                           | Reference Guide                 | Training Sales Tool | SunWIN, Reseller Web | 301866                   |
| – <i>Sun Expert3D Graphics: Just the Facts</i>                        | Reference Guide                 | Training Sales Tool | SunWIN, Reseller Web | 114214                   |
| – <i>Sun Expert3D-Lite Graphics: Just the Facts</i>                   | Reference Guide                 | Training Sales Tool | SunWIN, Reseller Web | 125033                   |
| – <i>Sun Elite3D Graphics: Just the Facts</i>                         | Reference Guide                 | Training Sales Tool | SunWIN, Reseller Web | 75245                    |
| – <i>Sun XVR-500 Graphics Accelerator, Just the Facts</i>             | Reference Guide                 | Training Sales Tool | SunWIN, Reseller Web | 343613                   |
| – <i>Sun XVR-500 Graphics Accelerator Data Sheet</i>                  | Data Sheet                      | Sales Tool          | SunWIN<br>COMAC      | 343614                   |



| Collateral  | Description   | Purpose             | Distribution                | Token # or COMAC Order # |
|---|---|---------------------|-----------------------------|--------------------------|
| – <i>Sun XVR-1000 Graphics Accelerator Just the Facts</i>                 | Reference Guide   | Training Sales Tool | SunWIN, Reseller Web        | 335930                   |
| – <i>Sun XVR-1000 Graphics Accelerator Technical White Paper</i>          | Technical Brief   | Training Sales Tool | SunWIN, Reseller Web        | 335932                   |
| – <i>Sun Elite3D Graphics White Paper</i>                                 | Technical Brief   | Training Sales Tool | SunWIN, Reseller Web        | 75265                    |
| – <i>SunPCi IIpro Coprocessor Card, Just the Facts</i>                    | Reference Guide   | Training Sales Tool | SunWIN, Reseller Web        | 92629                    |
| – <i>SunPCi IIpro Coprocessor Card Data Sheet</i>                         | Data Sheet  | Training Sales Tool | SunWIN, Reseller Web, COMAC | 123626<br>DE1243-1       |
| <b>Quick Reference Cards</b>  |   |                     |                             |                          |
| – <i>Quick Reference Card: Sun Workstation™ Product Line Overview</i>     | Quick Reference Card  | Sales Tool          | SunWIN, Reseller Web        | 10826                    |
| – <i>Quick Reference Card Competitive Summary Workstations</i>            | Quick Reference Card  | Sales Tool          | SunWIN, Reseller Web        | 12259                    |
| – <i>Quick Reference Card: Sun Workstation Graphics Products Overview</i> | Quick Reference Card  | Sales Tool          | SunWIN, Reseller Web        | 24507                    |
| <b>Presentations</b>  |   |                     |                             |                          |
| – <i>Graphics Overview Presentation</i>                                   | Presentation  | Sales Tool          | SunWIN, Reseller Web        | 75254<br>75255           |
| <b>External Web Sites</b>   |   |                     |                             |                          |
| – <i>General Information on Sun's Desktop Line</i>                        | <a href="http://www.sun.com/desktop/">http://www.sun.com/desktop/</a>   |                     |                             |                          |
| – <i>Detailed Information on the Sun Blade 1000 Workstation</i>           | <a href="http://www.sun.com/desktop/sunblade1000">http://www.sun.com/desktop/sunblade1000</a>                             |                     |                             |                          |
| – <i>Detailed Information on the Sun Blade 2000 Workstation</i>           | <a href="http://www.sun.com/desktop/sunblade2000">http://www.sun.com/desktop/sunblade2000</a>                             |                     |                             |                          |
| – <i>SunPCi IIpro Coprocessor Card Portal</i>                             | <a href="http://www.sun.com/desktop/products/sunpci/index.html">http://www.sun.com/desktop/products/sunpci/index.html</a> |                     |                             |                          |
| – <i>Sun Store</i>  | <a href="http://www.sun.com/sunstore">http://www.sun.com/sunstore</a>   |                     |                             |                          |
| – <i>Investment Protection Solutions</i>                                  | <a href="http://www.sun.com/ibb">http://www.sun.com/ibb</a>   |                     |                             |                          |

