

Sun Ultra™ 5 Workstation

Just the Facts



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Positioning

The Sun Ultra™ 5 Workstation

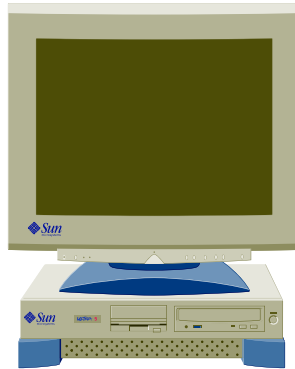


Figure 1. The Ultra 5 workstation

The Sun Ultra™ 5 workstation is an entry-level workstation based upon the 333- and 360-MHz UltraSPARC™-IIi processors. The Ultra 5 is Sun's lowest-priced workstation, designed to meet the needs of price-sensitive and volume-purchase customers in the personal workstation market without sacrificing performance. The Ultra 5 workstation has the following features:

There are now two models available for the Ultra 5 workstation:

Ultra 5 Model 333	Ultra 5 Model 360
Processor <ul style="list-style-type: none"> • 333-MHz UltraSPARC-IIi • 2-MB external cache 	Processor <ul style="list-style-type: none"> • 270-MHz UltraSPARC-IIi • 256-KB external cache
Graphics <ul style="list-style-type: none"> • PGX24™ on-board 24-bit graphics • Sun and third-party PCI graphics cards 	Graphics <ul style="list-style-type: none"> • PGX24 on-board 24-bit graphics • Sun and third-party PCI graphics cards
Internal Storage <ul style="list-style-type: none"> • 9.1-GB, 7200-rpm EIDE hard disk • 32X-speed CD-ROM drive standard • 1.44-MB floppy standard 	Internal Storage <ul style="list-style-type: none"> • 8.4-GB, 5400-rpm EIDE hard disk • 32X-speed CD-ROM drive standard • 1.44-MB floppy standard
Memory <ul style="list-style-type: none"> • Up to 512-MB EDO error correcting DRAM (50 ns) 	Memory <ul style="list-style-type: none"> • Up to 512-MB EDO error correcting DRAM (50 ns)
Networking <ul style="list-style-type: none"> • 10/100BASE-T Ethernet 	Networking <ul style="list-style-type: none"> • 10/100BASE-T Ethernet

In addition, the Ultra 5 workstation comes with the Solaris™ 7 operating environment (3/99) preinstalled, which makes it ready-to-run right out of the box.

Key Messages

- Built-in accelerated, high-resolution, 24-bit PGX24 graphics
 - On-board, 24-bit-capable graphics support
 - Up to 1152 x 900 resolution at 85 Hz in 24-bit-only mode
 - Up to 1280 x 1024 resolution at 76 Hz in 8-bit-only mode
 - 4 MB of SGRAM video RAM
 - Support for 17-inch color, 19-inch color, and 21-inch color monitors
 - On-board 24-bit graphics provide fast acceleration for typical workstation customers and leave the PCI slots open for other uses
- High performance for an entry price-point workstation
 - Up to 512 MB of 168-pin EDO JEDEC DRAM with ECC error correction
- Multiple PCI options available
 - Three PCI slots provide access to a variety of Sun and third-party PCI cards
 - Additional graphics cards, SCSI expansion cards, and audio/video input cards are also available
 - The ability to expand and change is key to today's technical professional, and the availability of PCI options meets this need today and in the future
- Large internal storage and expansion
 - 8.4-GB, 5400-rpm or 9.1-GB, 7200-rpm EIDE hard drive
 - Internal 32X-speed ATAPI CD-ROM, photo-CD compatible
 - PCMCIA bay provided for third-party PCMCIA options
 - Standard 1.44-MB floppy drive
 - Generous local storage capacity for large files, data and technical applications
- Advanced networking capabilities
 - FastEthernet, 100BASE-T, auto-sensing, and autoswitching down to 10BASE-T for backward compatibility
 - Just plug in and turn on; the Ultra 5 workstation will adjust to the customer's network environment
- Robust, reliable, scalable, secure, network-centric Solaris operating environment
 - Preinstalled Solaris 7 operating environment, Hardware: 3/99, 64-bit ready-to-run
 - The Solaris operating environment is the technical industry's leading enterprise operating environment with over 12,000 applications to choose from
 - Scalable from the lowest priced Ultra workstation (the Ultra 5 workstation) to the most powerful Sun server (the Sun Enterprise™ 10000 server), the Solaris operating environment provides the ability to scale both up and down as a customer's business needs change
 - The Solaris™ Desktop Extensions administration tools provide simple setup, use, and management, facilitating more reliable installations and simpler system maintenance
- World-class Sun Enterprise Services offers SunClientSM, an inexpensive, customizable service and support plan
 - Allows customers to save costs by choosing only the services needed
 - Easy administration reduces administrative workload and costs
 - Another example of Sun's commitment to reducing the costs and overhead of technical computing for Sun customers



Product Family Placement

The Ultra 5 workstation is the beginning of Sun's desktop workstation product family. Sun's desktop product family scales from the lowest entry-priced Sun Ultra 5 workstation up to the two-way multiprocessing Sun Ultra 60 workstation.

Ultra 5	<p>The Ultra 5 workstation is Sun's lowest-priced workstation. Designed to meet the needs of price-sensitive and volume-purchase customers without sacrificing performance, the Ultra 5 workstation is Sun's entry-level offering in the personal workstation market.</p> <p>Target markets include software development, 2-D content creation, finance, EDA, telecommunications, and embedded systems.</p>
Ultra 10	<p>The Ultra 10 is the entry point of Sun's high-performance graphics computing systems. The Ultra 10 workstation provides optional UPA-based graphics cards and greater PCI expansion, faster processing, and twice the memory capacity when compared to the Ultra 5 workstation.</p> <p>Target markets for this workstation include software development, MCAD, electronic design automation, financial analysis, and modeling. With the installation of Creator3D, Sun Elite3D m3, or Sun Elite3D m6 graphics, the markets are extended to animation, 3-D content creation, and simulation.</p>
Ultra 2	<p>The Ultra 2 system is an SBus-based multiprocessing workstation. It is targeted for the technical user who requires high performance and multiprocessing (MP) capability.</p> <p>The market includes both technical and commercial users who need the large number of applications and the functional capabilities of the Solaris operating environment, the high performance of the UltraSPARC CPU, and the integration and support capabilities provided by the Sun channels.</p>
Ultra 60	<p>Ultra 60 is a more advanced Ultra 2 workstation. Like the Ultra 2 system, the Ultra 60 workstation is designed for the technical user who requires high performance and multiprocessing capability. The Ultra 60 workstation also addresses the needs of graphics-intensive users and continues to support and build upon the upgradability features to which Ultra 2 users have grown accustomed.</p> <p>The target customer is the traditional "power desktop" user who has performance and expansion requirements that exceed the capabilities of the Ultra 10, Ultra 2, or Ultra 30 systems. This includes both technical and commercial users who need the large number of applications and the functional capabilities of the Solaris operating environment, the high performance of the UltraSPARC-II processor(s), dual UPA-based graphics, and superior throughput and bandwidth.</p>

Target Users

Sun Ultra 5 systems are ideal for price-sensitive and volume-purchase customers who do not wish to sacrifice performance. The Ultra 5 workstation is up to three times faster than the SPARCstation™ 5, based on SPECint_95 and SPECfp_95 benchmark results. Also, due to its slimline design and size the Ultra 5 workstation is optimal for customers who are space-constrained. Embedded systems are an ideal match for the Ultra 5 workstation.



Target Markets

The market opportunities for the Sun Ultra 5 workstation are software development, telecommunications, 2-D content creation, EDA, finance, and embedded systems.

Industry	Key Features to Highlight
Software Development <ul style="list-style-type: none"> ISVs In-house development at large organizations 	<ul style="list-style-type: none"> High-performance Solaris operating environment Availability of applications
Entertainment/DCC Industry <ul style="list-style-type: none"> 2-D content creation 	<ul style="list-style-type: none"> CPU performance
Electronic Design (EDA) <ul style="list-style-type: none"> PC board design and layout System houses Telco 	<ul style="list-style-type: none"> High-performance CPUs Memory capacity Availability of applications
Financial <ul style="list-style-type: none"> Stock and commodity traders Banks 	<ul style="list-style-type: none"> High performance Ample local storage
Research and Development <ul style="list-style-type: none"> In-house development Research institutions 	<ul style="list-style-type: none"> Computing performance Feature-rich Solaris operating environment
Telecommunications Industry <ul style="list-style-type: none"> Front-end for central-office PBX switches 	<ul style="list-style-type: none"> High-speed serial I/O for PCI bus
OEM Systems <ul style="list-style-type: none"> Embedded systems 	<ul style="list-style-type: none"> Performance, price, small form-factor, PCI expansion

Compatibility

The Ultra 5 workstation runs the following versions of the Solaris operating environment:

Ultra 5 333-MHz Model	Ultra 5 360-MHz Model
<ul style="list-style-type: none"> Solaris 7 preinstalled Solaris 2.6 Hardware: 3/98 Solaris 2.5.1 Hardware: 11/97 	<ul style="list-style-type: none"> Solaris 7 Hardware: 3/99 preinstalled Solaris 2.6 Hardware: 5/98 Solaris 2.5.1 Hardware: 11/97

The Ultra 5 workstation can run 32-bit applications unmodified from the Solaris 2.3 and Solaris 2.4 operating environments; therefore these new systems are totally compatible with previous systems and software.

Selling Highlights

Key Applications

Sun works closely with major software vendors to provide applications that have been tested and will be available and officially supported soon after all new releases. All major applications that are available can be found in CatalystSM catalog of third-party solutions.

Target Market	ISV— Software Applications	
Entertainment, Animation, and Content Creation	Adobe ArSciMed Electric Image Engineering Animation Inc. Lightwork NewTek Nichimen XaosTools	PhotoShop Kinema/Sim Electric Image Vislab Kinetix (rendering tool kit) Lightwave 3D NWorld Pandemonium
EDA	Avant!/ISS Avant!/Meta Software Cadence Design Compass Design K2 Technologies Mentor Graphics Mentor/Precedence Silvaco SpeedSim Systems Science Viewlogic/Vantage Analysis Simplex Silvaco	DRC/ERC product HSpice Vampire Dracula Pathfinder Mask Compose and QuickView Caliber ICVerify Checkmate Co-Simulation Backplane Simulators Atlas Athena Spice SpeedSim Vera SpeedWave MT Thunder and Lightning Fire and Ice Virtual Wafer Fab Automation Tools
	For general information see: http://www.sun.com/desktop http://www.dacafe.com:80/DACafe/CORPORATE/corpeda.html	

Target Market	ISV— Software Applications	
Healthcare	Cemax Context Vision Geovision ISG Virtual Vision Software	VIP 2.0 Imaging processing for refining MT data Vision Silohet
MCAE	ANSYS, Inc. Computational Dynamics, Inc. ESI EXA Corporation Fluent, Inc. Fluid Dynamics, Inc. (FDI) Hibbitt, Karlsson & Sorensen, Inc Livermore Software Technology Corporation (LSTC) MacNeal-Schwendler (MSC) MARC Analysis Research Corp	ANSYS StarCD Pam-Crash Powerflow Fluent, Fluent UNS, Rampant, Nekton FIDAP ABAQUS LSDyna 3D PATRAN, NASTRAN Mentat, MARC
MCAD	Computervision Dassault EDS/ Unigraphics Parametric Technology Corp SDRC	CADD5, Medusa Catia, Catia Studio Unigraphics Pro Engineer, Pro CDRS, ProFlythrough I-Deas Master Series
	For general information see: http://www.sun.com/desktop	

Enabling Technology

UltraSPARC™-III Processor

The Ultra™ 5 workstation uses the UltraSPARC™-III, a highly integrated, 64-bit SPARC™ V9 superscalar processor. Created for the Ultra 5 and Ultra 10 workstations, the UltraSPARC-III is part of a second generation of products based on the UltraSPARC processor. In addition to using a new process technology, the UltraSPARC-III provides a higher clock frequency, multiple SRAM modes and system-to-processor clock ratios that accommodate varying economics for a range of products. At the same time, it provides software compatibility with existing systems based on the UltraSPARC processor architecture.

PGX24™ Graphics

PGX24™ is the new onboard graphics built into the motherboard of the Ultra 5 workstation. PGX24 is the entry-level, 24-bit-capable graphics subsystem for cost-conscious customers who do not need the higher performance capabilities offered by the Creator graphics accelerator. PGX24 utilizes the ATI RagePRO graphics processor with 4 MB of SGRAM, and provides up to 1152 x 900 resolution for 24-bit-only windowing and up to 1280 x 1024 resolution for 8-bit-only windowing.

Note: *Unlike Creator and Sun Elite3D graphics, PGX24 graphics does not offer both 24-bit and 8-bit windowing environments simultaneously. PGX24 graphics is user configurable to display either 24-bit-only windowing or 8-bit-only windowing. A minority of applications require an 8-bit-only windowing environment to operate properly. Customers who require the use of these applications will need to configure the PGX24 graphics to display 8-bit-only windowing.*

PGX24 graphics include the following features:

- ATI's RagePRO graphics processor
- 2-D graphics acceleration
- 220-MHz integrated DAC and 4-MB SGRAM provide:
 - 24-bit-only true color video support up to 1152 x 900 @ 85 Hz
 - 8-bit-only pseudo color video support up to 1280 x 1024 @ 76 Hz
- HD15 video connector on the motherboard supports composite and separate video sync timing
- Compatible with OpenWindows™ and CDE

PCI Technology

PCI is a high-performance 32-bit local bus that is optimized for high-speed data transfers. It resides on the motherboard and operates at high speeds between highly integrated components such as peripherals, add-on boards, and memory systems. A high-performance bridge ASIC interfaces the UltraSPARC UPA bus to the 33-MHz PCI buses.

In addition to Sun's commitment to expand the capacity and performance of all Sun™ systems, Sun is continually looking for ways to increase the openness and standards-compliance of its systems. Sun has chosen to support PCI on the Ultra 5, Ultra 10, Ultra 30, and Ultra 60 workstations as well as on future systems, for the following reasons:

- **PCI is an open, architecture-independent bus**

Because PCI is open and shipping in volume, it has been adopted quickly by both customers and producers of computer hardware. As a result, the potential exists for a large number of platform-independent peripherals to be supported.

- **PCI is fast**

The PCI bus architecture is designed to provide high performance, with its I/O performance a key differentiator from other bus architectures. Running at 33 MHz, PCI offers configurations that meet a variety of developer and user needs.

- **PCI is standardized**

PCI is a standard bus architecture that has been adopted by the volume personal computer industry. Because of its wide acceptance, PCI promises that compliant adapter cards will be available from more sources than ever before.

The PCI bus is based on the industry-standard PCI specification version 2.1. Unlike most standards, the PCI specification is very broad. It covers everything from multiple form-factors and voltages to connector types.

SunPCi™ PC Coprocessor Card

The SunPCi™ card is a cost-effective hardware and software product that provides PC compatibility to customers who wish to run PC applications on Sun workstations using Solaris™ operating environment software. SunPCi brings together the ease of use of DOS and Microsoft Windows programs and the powerful features of the Solaris operating environment, giving users access to powerful workstation technology without sacrificing access to DOS and Microsoft Windows applications.

Some of the SunPCi processor features are:

- Full PC compatibility
- Solaris operating environment/PC interoperability
- 300-MHz AMD K6-2 processor
- 64- to 256-MB RAM on-card
- USB, parallel, and serial ports
- 24-bit graphics, monitor port
- Audio in/out ports
- PCI form factor



System Architecture

Product Architecture

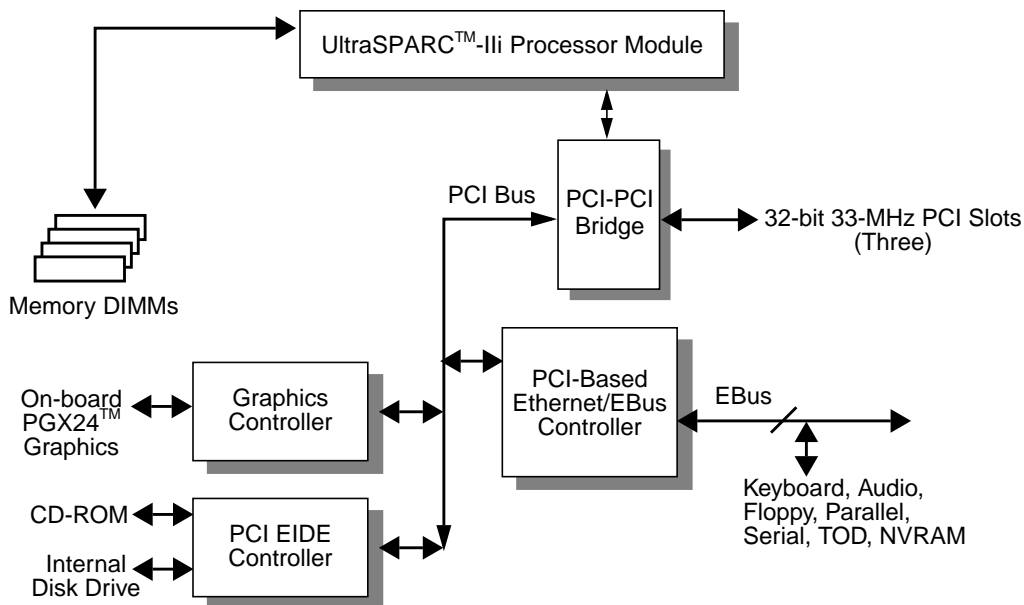


Figure 2. Sun Ultra™ 5 workstation system block diagram

The Sun Ultra™ 5 workstation is designed to provide high performance, scalability, and flexibility at low cost. The use of high-volume components and 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 standardized high-performance interfaces.

On the Ultra 5 workstation, a single LPX-sized motherboard is used. Features integrated into or supported by the motherboard include:

- Modular processor card with
 - 360-MHz UltraSPARC™-III with 256-KB external cache
 - 333-MHz UltraSPARC-III with 2-MB external cache
- PGX24™ on-board graphics with 4-MB SGRAM video RAM (DB15 connector)
 - 24-bit-only support for resolutions up to 1152 x 900 @ 85Hz
 - 8-bit-only support for resolutions up to 1280 x 1024 @ 76Hz
 - Supports 17-inch color, 19-inch color, and 21-inch color monitors
- Four DIMM sockets, 168-pin EDO JEDEC DRAM with ECC error correction
- Riser card connector to support three (two long, one short), 32-bit, 33-MHz, 5-volt PCI slots
- 10BASE-T/100BASE-T Fast Ethernet, self-sensing
- Two 16.7 MB/second EIDE connectors for hard drive and CD-ROM
- Two serial ports
 - Asynchronous/synchronous RS423A/RS232A, DB25 connector
 - Asynchronous RS423A, DB9 connector

- Centronics-compatible, parallel-port interface, IEEE 1284 bidirectional, DB25 connector
- Sun Type 6 keyboard and mouse support
- CD-quality, EBus-based audio
- Time-of-day NVRAM for clock and ID functions

Refer to the *Ultra 5 and Ultra 10 Architecture* White Paper (see “Materials Abstract” section) for more detailed information about the product architecture.

UltraSPARC™-III Processor

The Ultra 5 workstation is a high-performance system built around the UltraSPARC-III microprocessor. The UltraSPARC-III is Sun’s latest release of the SPARC™ processor family and the second generation of 64-bit UltraSPARC processors. It utilizes the latest 0.25-micron technology. This process technology is the key to the UltraSPARC-III processor’s higher clock rates and increased performance. This also enables the UltraSPARC-III to operate at a core voltage of 1.9 volts, rather than the UltraSPARC-I processor’s 3.3 volts. This lower voltage reduces power consumption and allows the chip to operate at higher frequencies without increasing total power requirements or heat dissipation—both major design issues in today’s high-performance systems.

The UltraSPARC-III supports both 2-D and 3-D graphics as well as image processing, video compression and decompression, and video effects through the sophisticated VIS™ instruction set. VIS provides high levels of multimedia performance, including real-time H.261 video compression and decompression and two streams of MPEG-2 decompression at full broadcast quality with no additional hardware support.

The UltraSPARC-III processor interfaces have been optimized to the “sweet spot” of typical uniprocessor system requirements. This provides a balanced price-performance solution delivering the power and features that the majority of high-end applications need, optimizes power utilization and supports manufacturability and ease-of-use.

Features

- Integrated VIS instruction set
- Uses the latest 0.25-micron process technology which greatly decreases the die size
- CPU is mounted on field-installable module card with associated UPA data buffers and external cache

Benefits

- Ready for increased performance on multimedia and networking operations
- Results in a significant increase in performance and a decrease in power consumption (due to a lower core voltage of 1.9 volts)
- Facilitates easy system service and upgrades

Memory

The Ultra 5 workstation supports up to 512 MB of 168-pin EDO JEDEC DRAM with ECC error correction. The four double in-line memory modules (DIMMs) used by the Ultra 5 workstation are the same as those used in the Ultra 10 workstation, but are not compatible with DRAM modules used in any other Sun workstation. The Ultra 5 workstation supports 32-, 64-, and 128-MB DIMM modules.

Note: DRAM DIMMs must be installed in pairs of identical size. Adding DIMMs in a set of four results in the best memory-system performance.

Features

- Lower cost, industry-standard memory modules
- ECC memory

Benefits

- Less expensive, allowing customers to move up to higher levels of memory at lower cost
- Superior error correction and system reliability, superior to parity error correction

Storage

Internal data storage for the Ultra 5 workstation is provided by either a high-capacity, internal, 8.4-GB, 3.5-inch enhanced IDE hard drive running at 5400 rpm or a 9.1-GB, 3.5-inch enhanced IDE hard drive running at 7200 rpm.

- A 1.6-inch, 32X-speed EIDE CD-ROM drive is standard.
- A 1.44-MB, 3.5-inch, manual-eject floppy drive is standard.
- The Ultra 5 workstation low-profile enclosure features the following device bays:
 - One half-height, 5.25-inch, front-accessible bay for CD-ROM
 - One 3.5-inch internal hard-drive mount for hard drive
 - One 3.5-inch floppy-drive bay
 - One PCMCIA-ready front-access bay with flip-up access door

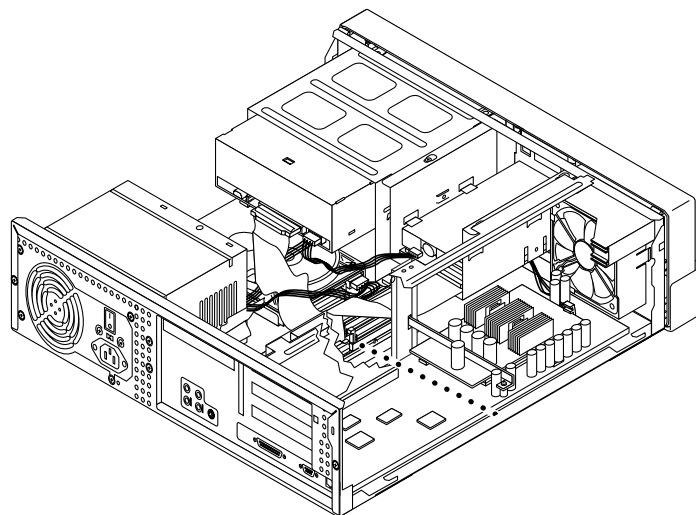


Figure 3. Sun Ultra 5 workstation chassis with access panel removed, providing full access to internal options

System I/O—High-performance PCI Technology

System I/O for the Ultra 5 workstation is provided by the industry-standard peripheral component interconnect (PCI) data bus. The PCI bus in the Ultra 5 workstation complies with the 2.1 revision of the PCI specification, released in March 1995. To provide maximum expandability, the Ultra 5 workstations feature three (two long, one short) 32-bit, 33-MHz, 5-volt PCI slots.

Sun supports a variety of PCI-based adapter cards, including Ethernet, token ring, ATM, and FDDI networking cards, video and audio input, SCSI adapters, and high-speed serial and parallel interfaces. In addition, Sun is working with a host of third-party partners to develop PCI hardware and software that is certified for operation on Sun's entire line of workstations, including the Ultra 5 workstation.

Refer to the "Ordering Information" section for a listing of Sun PCI cards that have been qualified on the Ultra 5 workstation. The cards listed below are currently available or are under development.

Fast Ethernet/SCSI	Ultra/Diff/SCSI	ATM 155 single and multi
Quad Fast Ethernet	10/100 Ethernet	ATM 155/622 (PCI 66)
ISDN—basic rate	Token ring (TRI/S)	ATM 25 MB
ISDN—primary rate	High-speed serial	FDDI single attach
Hard bus	VDC/MPEG	FDDI dual attach
"TGX+-like"	Video teleconference	Serial-parallel controller
RAID arrays	HIPPI	2K x 2K frame buffers
IEEE-488	1394	Video frame grabber
DR11W	PCI bus expansion	X.25
T1/E1	SCSI	ESCON
8/16/32 Port MUX	SS7	Telephony
Imaging and cameras	Fax	A/D and enablers
Parallel	Fibre Channel	Voice/speech
Audio	1553	SCI
SBus expansion	PCMCIA	DR-11W

See <http://www.sun.com/pci/pci.cards.ihv.html> for a list of tested PCI cards.

SunPCi™ PC Coprocessor Card

The SunPCi™ card is a cost-effective hardware and software product that provides PC compatibility to customers who wish to run PC applications on Sun workstations using Solaris™ operating environment software. SunPCi brings together the ease of use of DOS and Microsoft Windows programs and the powerful features of the Solaris operating environment, giving users access to powerful workstation technology without sacrificing access to DOS and Microsoft Windows applications.

The SunPCi card is integrated with the workstation in which it is installed. It uses the workstation's keyboard, mouse, floppy drive, and Ethernet port as if they were its own, and it uses files from the Solaris file system to emulate C:\ and D:\ drives. If the VGA port on the card is not used for a second display, the video from the SunPCi is routed to an X11 window on the workstation's monitor.

Other Solaris operating environment services are available to the SunPCi card. Any file system which is mounted on the hosting workstation, local or networked, including CD-ROMs, can be mapped to a network drive symbol on the PC. In addition, SunPCi can access printers connected to a Solaris network.



Nearly any Solaris service for which there is a Microsoft Windows client can be used from the SunPCi card. The SunPCi card must be assigned its own IP address, and the SunPCi Solaris drivers select net traffic addressed to the card and pass it to the card. This is transparent to the SunPCi card.

Features

- Full PC compatibility
- Solaris/PC interoperability
- 300-MHz AMD K6-2 processor
- 64- to 256-MB RAM on-card
- USB, parallel, and serial ports
- 24-bit graphics, monitor port
- SoundBlaster-compatible sound
- Audio in/out ports
- PCI form factor

Benefits

- Runs Microsoft Windows NT, Windows 95, Windows 3.x, and DOS applications, whether off-the-shelf or developed in-house
- Integrates Ultra workstations into heterogeneous enterprise environments
- Increases productivity by allowing access to technical and productivity applications via the same monitor, keyboard, and mouse
- Allows sharing of files, data, and cut/copy/paste functions between Solaris and PC environments
- Uses Solaris operating environment resources and peripherals from within PC environment: Ethernet networking (file, print, etc.), Solaris file system, removable media (CD-ROM, floppy, etc.), shared monitor
- Saves desktop real estate with all-in-one design
- Reduces system management costs
- Provides power and performance to run demanding productivity and technical applications and get the job done in a hurry
- Runs Microsoft Windows NT/95 and DOS applications at native, Pentium II-class speeds
- Runs multiple PC applications without memory constraints
- Provides dedicated memory for PC applications
- Expandable to grow with your needs
- Standard ports to connect to devices new and old: keyboards, mice, multimedia devices, printers, etc.
- Drives an optional second monitor dedicated to PC environment in 24-bit, 1280 x 1024 graphics
- Audio performance for running multimedia PC applications
- Supports stereo speakers, microphone in
- PC coprocessor supports all of Sun's PCI-based Ultra workstations: Ultra 5, Ultra 10, Ultra 30, Ultra 60, and Ultra 450

PGX32™ PCI-based Graphics

PGX32™ is Sun's first high-resolution 8-bit and 24-bit color PCI graphics frame buffer supporting all Sun PCI I/O-based workstations and workgroup servers. The PGX32 frame buffer is targeted towards professionals requiring fast X Window system performance, displaying 24-bit and 8-bit graphics at full



speed. With 8 MB of SGRAM, the PGX32 frame buffer is capable of providing full 24-bit hardware double buffering at resolutions up to 1152 x 900, 8+24-bit color up to 1280 x 1024 and support up to 1600 x 1200 in pseudo color (8-bit color) mode. PGX32 supports the following resolutions

Display Resolution	Color Mode	Double Buffered	Vertical Refresh Rate (Hz)
640 x 480	8-bit, 24-bit, 8+24-bit	Yes	60/72/75/85
800 x 600	8-bit, 24-bit, 8+24-bit	Yes	60/72/75/85
1024 x 768	8-bit, 24-bit, 8+24-bit	Yes	60/70/75/77/85
1024 x 800	8-bit, 24-bit, 8+24-bit	Yes	85
1152 x 900	8-bit, 24-bit, 8+24-bit	Yes	60/66/70/75/76
1152 x 900	8-bit	Yes	60/66/70/75/76/85
1280 x 800	8-bit, 8+24-bit	Single Only	76
1280 x 1024	8-bit	Yes	60/67/75/76/85
1280 x 1024	24-bit, 8+24-bit	Single Only	60/67/75/76
1600 x 1000	8-bit	Yes	66/76
1600 x 1200	8-bit	Yes	60/65/66/70/75/76/80

The PGX32 frame buffer supports all standard Sun video timings and also supports VESA timings for supporting PC type displays and flat panels. It is also capable of supporting Sun's 24-inch display @ 1600 x 1000.

The PGX32 frame buffer can work in single or multiheaded configurations and can be set as the only frame buffer in the system, as the console or as the secondary frame buffer. Up to four PGX32 frame buffers are supported in any system. The PGX32 frame buffer supports all releases of Solaris 2.6 and the latest Solaris 7 operating environment release. The product has not been tested with all configurations with Solaris 2.5.

Features

- Simultaneous 8-bit and 24-bit
- 24-Bit true color video support
- Support for high resolutions
- PCI 33-MHz format
- 1280 x 1024 at 76-Hz resolution
- Multi-headed (display) support; multiple frame buffers (with support for up to four PGX32 frame buffers in one system)
- 8-bit overlay plane

Benefits

- Eliminates colormap flashing display visual support when running both 8-bit and 24-bit applications; allows legacy 8-bit applications to run while simultaneously running the latest 24-bit applications
- Display the highest quality color on screen
- Ability to display more information with higher quality and image detail
- Allows usage in the widest variety of systems from the Ultra 5 up to the Sun Enterprise™ 450 workgroup server
- High-resolution display quality standard
- For users who must do multiple tasks simultaneously, for example, command and control applications, design, and analysis for engineers
- Allows overlay of 8-bit windows on top of the 24-bit visuals without damaging the underlying visual, resulting in seamless integration and manipulation of windows

Sun Ultra™ 5 Workstation System Configuration

	333-MHz Model	360-MHz Model
Dimensions		
<ul style="list-style-type: none"> • Height • Width • Depth 	112 mm (4.4-inches) 436 mm (17.1-inches) 430 mm (16.9-inches)	
CPU		
<ul style="list-style-type: none"> • Architecture • Clock rate • External cache 	UltraSPARC-IIi 333 MHz 2 MB	UltraSPARC-IIi 360 MHz 256 KB
Memory		
<ul style="list-style-type: none"> • Memory type • Number of slots • Capacity • DRAM speed • DIMM sizes 	168-pin EDO JEDEC, ECC error correction 3 (2 full size, one short) 64 MB to 512 MB 50 ns 32 MB, 64 MB, and 128 MB (installed in pairs)	
Storage		
<ul style="list-style-type: none"> • Maximum internal 	9.1-GB 7200-rpm EIDE hard disk	8.4-GB 5400-rpm EIDE hard disk
I/O Interfaces		
<ul style="list-style-type: none"> • Graphics • Serial ports • Parallel port • PCI I/O bus • PCMCIA bay 	On-board 24-bit PGX24 frame buffer with: <ul style="list-style-type: none"> • Accelerated text, windowing, 2-D and 3-D wireframe • 1152 x 900 resolution at 85 Hz in 24-bit-only mode • 1280 x 1024 resolution at 76 Hz in 8-bit-only mode • Support for Sun color monitors up to 21-inch; compatible third-party monitors Three PCI slots (two long, one short), 33 MHz (version 2.1) One D-Sub 25-pin, asynch/synch RS423A/RS232A One D-Sub 9-pin, asynch RS423A One D-Sub 25-pin, IEEE 1284 bidirectional One front-access bay with flip-up access door	
Networking Ports	10BASE-T/100BASE-T Fast Ethernet, self-sensing	
Backup and Distribution		
<ul style="list-style-type: none"> • Floppy • CD-ROM 	1.44-MB, 3.5-inch, manual-eject floppy 32X-speed EIDE, photo-CD compatible standard	
Operating Environment		
	Solaris 7 (preinstalled) Solaris 2.6 Hardware: 3/98 Solaris 2.5.1 Hardware: 11/97	Solaris 7 Hardware: 3/99 (preinstalled) Solaris 2.6 Hardware: 5/98 Solaris 2.5.1 Hardware: 11/97

Sun Ultra 5 Workstation Performance Numbers

These figures are based on a 512-MB, 50-ns memory configuration.

	360-MHz Model	333-MHz Model
SPECint_95	12.1	14.1
SPECfp_95	13.1	18.3



Operating Environment

The Solaris™ 7 Operating Environment, Hardware: 3/99

Sun workstations are supported by one of the industry's leading enterprise operating environment, Solaris™ 7. The Solaris 7 operating environment contains the base-level functionality required for all Sun workstations. The Solaris 7 operating environment is a solid, scalable 32-bit and 64-bit operating environment. The Solaris 7 operating environment includes

- A 32-bit and 64-bit kernel
- Standards-based networking with easy access to a wide range of computing environments and network technologies
- Platform support for both SPARC™ and Intel
- Integrated Java™ software
- System administration support

The Solaris operating environment delivers a competitive advantage to businesses through networked computing, scalability, and multi-architecture 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.

Sun Ultra™ 5 systems are supported by the Solaris 2.5.1 Hardware: 11/97, Solaris 2.6 Hardware: 5/98, and Solaris 7 operating environments.

The Solaris 7 Operating Environment Features and Benefits

Features

- Higher performance
- Improved scalability
- Greater ease of use
- Comprehensive global product
- 100 percent binary compatibility

Benefits

- A complete 64-bit computing environment provides greater computing capacity, precision, and performance
- The 64-bit kernel provides access to and capacity for more system resources; this allows more applications to be consolidated onto a single server, and enables systems to handle much larger problem sets
- Web-based installation, text and voice notes, and graphical process manager make Solaris software easy to install and use
- Support for the euro currency symbol, complex text formats for Arabic, Thai, and Hebrew languages, and the development of multilingual applications
- Software investment protection—all of today's Solaris operating environment-certified 32-bit applications continue to run on the Solaris 7 operating environment with out modification

What's New in the Solaris 7 Operating Environment?

The Solaris 7 operating environment release culminates the phased release of the Solaris 64-bit technology, and provides enhancements in overall performance, scalability, reliability, availability, security, and ease of use, while maintaining backwards compatibility with all existing 32-bit applications.

The strategy for delivering and extending the Solaris 7 operating environment reliability consists of four interrelated activities: leading-edge features, stringent quality standards, extensive product testing, and a robust global support model.

Major Enhancements over Solaris 2.6

- **Increased performance**

The Solaris 7 operating environment's complete 64-bit computing environment provides greater capacity, precision, and performance. By increasing capacity from 32 to 64 bits, customers realize significantly increased performance for applications that need to address more than 4 GB of memory to run in main memory rather than from disk. This makes the operating environment *10-to-100 times faster in application access and performance*.

An updated version of the Java™ Development Kit (JDK™ 1.1.6) performs up to 9 times faster than JDK 1.1.3, which was included in the Solaris 2.6 operating environment. This improvement is due to the inclusion of an advanced, multithreaded virtual machine, with fast-thread synchronization, a new memory system, and a highly optimized just-in-time compiler.

- **Mainframe-class reliability, availability, and serviceability (RAS)**

The Solaris 7 operating environment allows customers to add, remove, and replace defective hardware without rebooting the system, resulting in greater system stability and even less system downtime.

- **Extended scalability**

64-bit virtual addressing, more file descriptors, more processes, and more available sockets increasing scalability by

- Enabling access to more system resources
- Allowing more applications and processes to be consolidated onto a single Solaris application server
- Enabling applications to handle much larger data sets
- Allowing customers to add significantly more memory (up to 32 GB) to existing hardware

- **Greater ease of use**

Sun continues to improve the Solaris operating environment to make it easy for customers to use. In this release, Sun enhanced the web-based installation, enhanced the graphical process manager, and added more GUI-interfaces to the most commonly used command line UNIX® commands.

- **Comprehensive global product**

All localized Solaris operating environment versions now share a single global binary. The Solaris operating environment supports up to 37 languages and 95 locales. In particular, the Solaris operating environment now includes support for the euro currency symbol, complex text formats for Arabic, Thai, and Hebrew languages, and support for the development of multilingual applications.

In addition, more local versions of Solaris software are available during installation—customers no longer have to purchase an additional package to get European locales.



- **100 percent binary compatibility—protecting customer’s software investment**

Complete binary compatibility between the Solaris 7, Solaris 2.5, and Solaris 2.6 operating environments ensures that all of Sun’s customers’ 32-bit applications will continue to run on the Solaris 7 operating environment without modification. This protects their large investment in software.

Graphics Software Interfaces

Sun systems support all Solaris 2.5.1, Solaris 2.6, and Solaris 7 graphics and window system APIs, including OpenGL®, XGL™, XIL™, 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™. Industry-standard X-extension libraries, such as Xlib and PEXlib, are available and are accelerated via the XGL and XIL foundation graphics libraries.

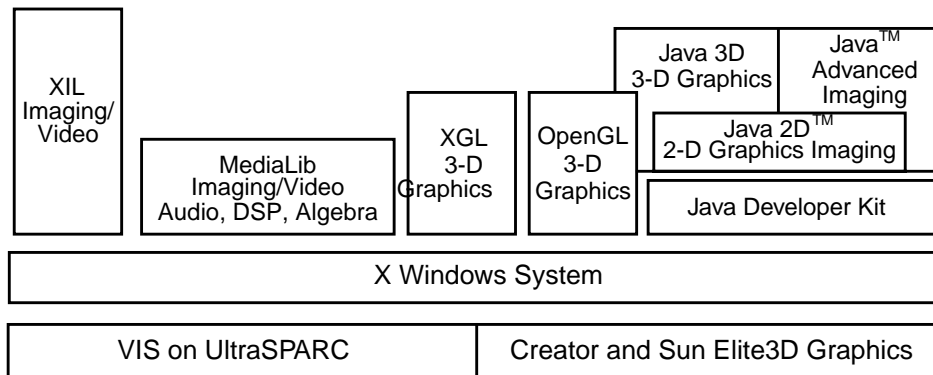


Figure 4. Graphics software interfaces

The Solaris Operating Environment System Requirements

Disk Space	
• End user	25 MB
• Developer	40 MB (runtime binaries and header files)
Memory	
• Minimum	64 MB
• Recommended	128 MB or higher (for serious applications)

The Solaris Operating Environment Licensing and Usage

All Sun system and system-board products include a Solaris license. The type of Solaris license(s) shipped with each platform reflects the way in which that system is most commonly used. Additional Solaris licenses are available to allow increased usage of the software.

Ultra 5 workstations come with a Solaris Desktop License. The Solaris Desktop License is a limited license. It does not provide several of the services provided by the Solaris Server License, such as

- Allowing more than two users to be directly connected
- Providing database or compute services for more than two continuous users
- Providing swap disk space for any other system
- Providing home directory space for any other system



If a system that is shipped with a Solaris Desktop License will be used as a server (requires services listed above), the system must be upgraded to a Solaris Server license.

Ultra 5 and Ultra 10 Workstations Plug-and-Play Systems

The Solaris 7 Desktop Edition is preinstalled on all new Ultra 5 and Ultra 10 workstations beginning in November 1998. This new plug-and-play feature provides users with a ready-to-run workstation right out of the box. Customers are up and running within minutes.

- Preinstalled on Ultra 5 and Ultra 10 workstations:
 - The Solaris 7 operating environment (3/99)
 - CDE 1.3
 - JDK/ JVM 1.1.6
 - ODBC 2.11
 - PC File viewer 1.0.1
 - SunVTS™ 3.1
 - ShowMe TV™ 1.2.1
 - SunForum™ 1.0 (English version)
 - Netscape™ Communicator 4.5
 - OpenGL 1.1.2 run time (with 64-bit support for Sun Elite3D frame buffers)
 - XIL 1.4 run time
 - Java Plug-in
 - Developer Tools—Try and Buys
 - Java WorkShop™ 2.0
 - Java Studio™ 1.0
 - AnswerBook2™
 - Sun Ultra 5 and Ultra 10 Hardware AnswerBook™
 - Solaris 7 Operating Environment User Collection
 - Solaris 7 Operating Environment System Administration Collection, Volume 1 and Volume 2
 - Solaris 7 Operating Environment Software Developer Collection, Volume 1 and 2
 - Solaris 7 Operating Environment on Sun Hardware AnswerBook
- The Solaris 7 operating environment preinstalled software comes with the following languages:
 - English
 - French
 - German
 - Italian
 - Spanish
 - Swedish
 - Traditional Chinese
 - Simplified Chinese
 - Korean
 - Japanese



System Management

Many of the Sun™ workstations deliver the kind of power and graphics needed by the customers who use heavy compute-intensive applications in markets such as MCAE, oil and gas, simulation, visualization, and animation. Customers who run these compute-intensive applications generate and handle critical technical and scientific data, and require an operating environment that can deliver highly reliable, available, fast, and safe desktop computing environment. Built into the Solaris™ 7 operating environment (Hardware: 3/99) are systems management and security features that help deliver the computing environment demanded by these customers. These features are described below.

Admintool

Admintool is a GUI-based administration tool that provides local systems administration. Admintool can be used to manage user accounts, groups, hosts, printers, serial ports, and installation/removal of software.

Sun Enterprise SyMON™ 2.0 Software

Sun Enterprise SyMON™ 2.0 software is a GUI-based system management tool for Sun systems. Sun Enterprise SyMON software enables system administrators to proactively monitor and manage the health and status of many Ultra™ workstations from a central location. Sun Enterprise SyMON 2.0 software simplifies the management of many workstations, establishing highly stable and reliable workstation computing environment for running business-critical applications. In addition, Sun Enterprise SyMON 2.0 software is also scalable enough to run entirely on a workstation as a stand-alone application.

Key Features

- **Performance monitoring and management**
Provides proactive monitoring and management of workstation hardware and the Solaris operating environment, by detecting impending failures
- **Predictive failure analysis**
Enables administrators to predict potential memory and disk hardware failures on a statistical bases, thereby enhancing the decision making process and increasing machine availability
- **Fault and event management**
Collects alarms and events, and then helps users identify the root cause of the problems.
- **Physical view of workstations**
Provides enhanced serviceability with visual view that highlights failed hardware components

Solstice AutoClient™ 2.1 Software

Solstice AutoClient™ software reduces the cost of Ultra workstation management by enabling centralized administration. This centralization eliminates the need to do backups, installations, and software management on the workstation itself. Solstice AutoClient software caches the Solaris operating environment, required applications, and user data onto the workstation's disk from a network server.

Key Features

- **Centralized software management model**

Reduces workstation administration costs by allowing workstations to be managed from a server

- **Hands-off installation**

When an application is needed, Solstice AutoClient automatically pulls the software from the server and loads it onto the workstation disk, resulting in built-in software distribution

- **Workstations become field replaceable units**

Ultra workstations can be replaced easily in the event of hardware failure, minimizing user down time

- **No workstation backups required**

Solstice AutoClient workstations only have cached data, so there is no need to back up the workstation; the backup occurs on the server, saving considerable time and resources

Performance Meter

This GUI-based performance meter enables users to quickly monitor some of the key system resources such as CPU, load, disk, page, context, job swaps, interrupts, packets, collisions, and errors.

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.

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

ShowMe How™ 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 streamlines installation and maintenance for lower service costs and maximum system uptime.

Key Features

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

AnswerBook2™: System Administration Guide

The AnswerBook2™ product is Sun's on-line documentation system. It uses a web-browser interface that lets you view and print a variety of Solaris information, including SGML-based AnswerBook™ collections, Display PostScript™ AnswerBook collections, and man pages.

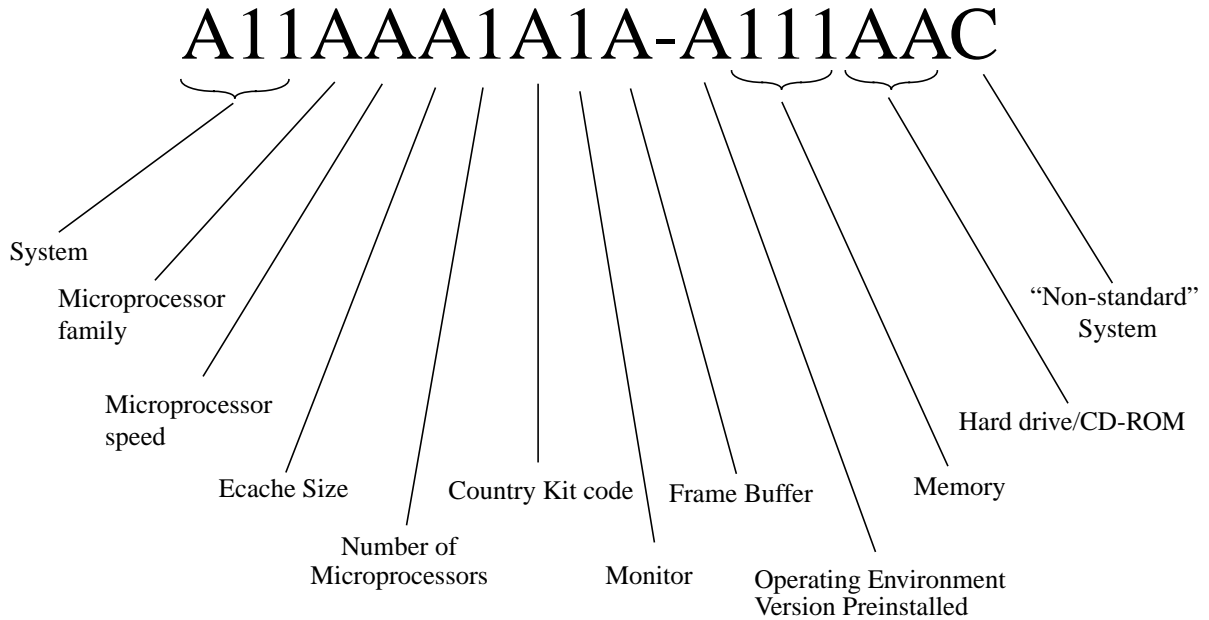
The AnswerBook2 product provides a search engine that lets you find information throughout the documentation library. You can install AnswerBook2 document collections on a centralized documentation server or on a local server.

Features and Functions

- Uses a web-browser-based interface so that you can view on-line documentation from any platform (running any operating system), provided that your web browser supports HTML 3.2
- Contains support for multimedia (video and audio) content
- Provides a search engine for finding words and word phrases throughout the documentation library
- Lets the user define a subset of document collections (a personal library) to be displayed when using a specific documentation server
- Lets users copy information from AnswerBook2 documents and paste it into other locations, such as the command line, depending on the web browser's functionality
- Gives users the ability to print sections and books directly from the AnswerBook2 interface in a PostScript™ format that is near print-quality output
- Allows the user to choose a language in which to view on-screen instructions and Help information
- Provides a command-line interface (CLI) and a browser-based interface (GUI) for performing documentation server administration functions

Ordering Information

The Sun Ultra™ 5 workstation utilizes a marketing part-number scheme that includes the Solaris™ operating environment version preinstalled on the hard drive and the choice of Country Kit in the marketing part number. This page explains how to read the part number scheme, and the next section explains the changes in specifying or ordering the Country Kit.



(Note: A = alpha character, 1 = numeric character, C = optional alpha or numeric character)

Model Key (Subset of Part Number Definitions)

<p>System A21 = Sun Ultra 5</p>	<p>Number of Processors 1 = Single processor</p>	<p>Monitor 9 = No monitor</p>	<p>Memory 64 = 64 MB 128 = 128 MB 256 = 256 MB</p>
<p>Microprocessor Family U = UltraSPARC™-III</p>	<p>Country Kit A = North America UNIX® B = Japanese Language C = Japanese Logoless D = German Language E = United Kingdom F = French Language Z = No Included Ship Kit</p>	<p>Frame Buffer P = On-board PGX24™</p>	<p>Hard Drive/CD-ROM CP = 9.1 GB, 32X CD-ROM CR = 8.4 GB, 32X CD-ROM AR = 8.4 GB, 32X CD-ROM</p>
<p>Microprocessor Speed G = 360 MHz H = 333 MHz</p>		<p>Operating Environment Version Preinstalled B = Solaris 7 C = Solaris 7 HW: 3/99</p>	
<p>Ecache Size E = 256 KB C = 2 MB</p>			

Choice of Country Kit

Unlike traditional Sun systems, the Ultra 5 workstation has the Country Kit physically included within the System Ship Kit. The choice of Country Kit is specified by adding an additional character to the Ultra 5 workstation marketing part number. The eighth character of the Ultra 5 workstation marketing part number specifies the choice of Country Kit. The single-character Country Kit codes are listed below.

Code	Country Kit
A	North America UNIX
B	Japanese Language
C	Japanese Logoless
D	German Language
E	United Kingdom
F	French Language
Z	No Included Country Kit

To order a Country Kit that is not shown on the table, specify the Country Kit code “Z” and order the Country Kit as a separate line item. Ultra 5 systems ordered with the “Z” code will be shipped to the customer in a separate box—in other words, the customer receives the CPU system in one box and the Country Kit in a separate box. Customers who order Country Kit codes: A, B, C, D, E, and F receive the CPU system and Country Kit in a single box.

Three examples using the same base Ultra 5 workstation Model 360 configuration (64-MB RAM, 8.4-GB hard drive, 32X CD-ROM) are:

1. North American UNIX with 17-inch entry color monitor

A21UGE1A9P-C64CR Note that the eighth character is “A” for North American UNIX
X7103A Marketing number for 17-inch entry color monitor

2. Japanese Language with 21-inch color monitor:

A21UGE1B9P-C64CR Note that the eighth character is “B” for Japanese Language
X7121A Marketing number for 21-inch color monitor
X470A Marketing number for required 13W3-to-HD15 video adapter cable

3. No Included Country Kit with 21-inch color monitor and separate Italian Country Kit:

A21UGE1Z9P-C64CR Note that the eighth character is “Z” for No Country Kit
X3574A Marketing number for separate Italian Country Kit
X7121A Marketing number for 21-inch color monitor
X470A Marketing number for required 13W3-to-HD15 video adapter cable



Sun Ultra 5 Workstation Model 360 Workstation Configurations

Part Number	System
A21UGE1A9P-C64AR A21UGE1C9P-C64AR A21UGE1Z9P-C64AR	Ultra 5 Model 360 workstation with 360-MHz UltraSPARC-IIi processor, 256-KB Ecache, 64-MB DRAM, 8.4-GB hard disk, 1.44-MB floppy drive, on-board PGX24 graphics, Solaris 7 operating environment (3/99) North American UNIX Country Kit Japanese Logoless No Included Country Kit
A21UGE1A9P-C64CR A21UGE1B9P-C64CR A21UGE1C9P-C64CR A21UGE1D9P-C64CR A21UGE1E9P-C64CR A21UGE1F9P-C64CR A21UGE1Z9P-C64CR	Ultra 5 Model 360 workstation with 360-MHz UltraSPARC-IIi processor, 256-KB Ecache, 64-MB DRAM, 8.4-GB hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, on-board 24-bit PGX24 graphics, Solaris 7 operating environment (3/99) preinstalled North American UNIX Country Kit Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit
A21UGE1A9P-C128CR A21UGE1B9P-C128CR A21UGE1C9P-C128CR A21UGE1D9P-C128CR A21UGE1E9P-C128CR A21UGE1F9P-C128CR A21UGE1Z9P-C128CR	Ultra 5 Model 360 workstation with 360-MHz UltraSPARC-IIi processor, 256-KB Ecache, 128-MB DRAM, 8.4-GB hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, on-board 24-bit PGX24 graphics, Solaris 7 operating environment (3/99) preinstalled North American UNIX Country Kit Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit
A21UGE1A9P-C256CR A21UGE1B9P-C256CR A21UGE1C9P-C256CR A21UGE1D9P-C256CR A21UGE1E9P-C256CR A21UGE1F9P-C256CR A21UGE1Z9P-C256CR	Ultra 5 Model 360 workstation with 360-MHz UltraSPARC-IIi processor, 256-KB Ecache, 256-MB DRAM, 8.4-GB hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, on-board 24-bit PGX24 graphics, Solaris 7 operating environment (3/99) preinstalled North American UNIX Country Kit Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit

Sun Ultra 5 Workstation Model 333 Workstation Configurations

Part Number	System
<p>A21UHC1A9P-B128CP A21UHC1B9P-B128CP A21UHC1C9P-B128CP A21UHC1D9P-B128CP A21UHC1E9P-B128CP A21UHC1F9P-B128CP A21UHC1G9P-B128CP A21UHC1Y9P-B128CP A21UHC1Z9P-B128CP</p>	<p>Ultra 5 Model 333 workstation with 333-MHz UltraSPARC-IIi processor, 2-MB Ecache, 128-MB DRAM, 9.1-GB hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, on-board 24-bit PGX24 graphics, Solaris 7 operating environment (3/99) preinstalled</p> <p>North American UNIX Country Kit Japanese Language Japanese Logoless German Language United Kingdom French Language Swedish Language Universal UNIX No Included Country Kit</p>
<p>A21UHC1A9P-B256CP A21UHC1B9P-B256CP A21UHC1C9P-B256CP A21UHC1D9P-B256CP A21UHC1E9P-B256CP A21UHC1F9P-B256CP A21UHC1G9P-B256CP A21UHC1Y9P-B256CP A21UHC1Z9P-B256CP</p>	<p>Ultra 5 Model 333 workstation with 333-MHz UltraSPARC-IIi processor, 2-MB Ecache, 256-MB DRAM, 9.1-GB hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, on-board 24-bit PGX24 graphics, Solaris 7 operating environment (3/99) preinstalled</p> <p>North American UNIX Country Kit Japanese Language Japanese Logoless German Language United Kingdom French Language Swedish Language Universal UNIX No Included Country Kit</p>

Ordering Guidelines and Notes

- **Memory**

- The Ultra 5 workstation supports up to 512 MB of 168-pin EDO JEDEC DRAM with ECC error correction. The DIMMs are the same as those used in the Ultra 10 systems but are not compatible with other Sun workstations. The Ultra 5 workstation supports 32-MB, 64-MB, and 128-MB DIMM modules.
- The Ultra 5 workstation can accommodate up to four DIMM modules which must be installed in pairs. Adding DIMMs in a set of four identically sized DIMMs results in the best memory system performance.

Memory Expansion Options	Part Number
64-MB ECC DRAM expansion kit (two 32-MB DIMMs)	X7036A
128-MB ECC DRAM expansion kit (two 64-MB DIMMs)	X7037A
256-MB ECC DRAM expansion kit (two 128-MB DIMMs)	X7038A

- **Keyboard**

- Keyboard are included in all Ultra 5 workstation configurations, except for configurations that have been ordered with the “Z” Country Kit code, or in certain upgrades.
 - The 360-MHz Model comes with Type-6 keyboards
 - The 333-MHz model comes with Type-5 keyboards

- **External SCSI devices**

A PCI SCSI adapter card is required to attach any external SCSI device since SCSI is not a feature of the Ultra 5 workstation. In addition, all internal SCSI options are not compatible with the Ultra 5 workstation.

- **Monitors**

The choice of monitors is not reflected in the Ultra 5 workstation marketing part number. Customers are not required to order a monitor. Monitors are ordered as a separate line item. The Ultra 5 workstation supports the Sun monitors listed below. For some monitor and frame-buffer combinations, a video adapter cable may be required; consult the table below.

Supported Monitors	Video Adapter Required for On-board 24-bit PGX24
17-inch color (X7103A)	none
19-inch color (X7119A)	none
21-inch color (X7121A)	X470A

Options

Below is a comprehensive list of system expansion, networking, graphics, and multimedia options that are supported by Sun Ultra™ 5 systems. The options listed below in *italics* have been retired and can no longer be ordered from Sun, but are shown here for reference purposes. 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.

Part Number	Option Description	Maximum Number Supported	Comments
Memory			
X7036A	64-MB ECC DRAM expansion kit (two 32-MB DIMMs)	2	These are all pairs of DIMM units
X7037A	128-MB ECC DRAM expansion kit (two 64-MB DIMMs)	2	
X7038A	256-MB ECC DRAM expansion kit (two 128-MB DIMMs)	2	
Mass Storage—Internal			
X5236A	Internal 9.1-GB, 7200-rpm Enhanced IDE hard drive	1	Ultra 5 and Ultra 10 only
X6171A	Internal 32X-speed ATAPI CD-ROM	1	
Mass Storage—External			
X814A	5.0-GB, 8-mm tape backup drive, desktop storage module	2	A PCI SCSI Adapter card is required to attach any external SCSI device to the Ultra 5 and Ultra 10
X827A	20-GB, 4-mm tape autoloader, desktop storage module	2	
X545A	1.05-GB Fast SCSI-2 desktop disk pack	4	
X567A	2.1-GB Fast SCSI-2 desktop disk pack	4	
X737A	2.1-GB Fast SCSI-2 desktop disk pack	4	
X579A	SunCD 2Plus™, desktop storage pack	2	
X660A	150-MB QIC tape drive, desktop storage pack	2	
X822A	5.0-GB, 4-mm tape drive, desktop storage pack	2	
X834A	10-GB, 8-mm backup tape drive, desktop storage module	2	
X844A	14.0-GB, 8-mm tape drive, desktop storage pack	2	

Part Number	Option Description	Maximum Number Supported	Comments
Mass Storage— Sun StorEdge™ UniPack	<i>The following Sun StorEdge UniPack options come with a 68–68 pin SCSI cable</i>		
X5101A	1.05-GB, 7200-rpm fast/wide SCSI-2 disk UniPack	4	A PCI SCSI adapter card is required to attach any external SCSI device to the Ultra 5 and Ultra 10
X5103A	2.1-GB, 7200-rpm fast/wide SCSI-2 disk UniPack	4	
X5151A	2.1-GB, 7200-rpm fast/wide SCSI-2 disk UniPack	4	
X5209A	4.2-GB, 7200-rpm fast/wide SCSI-2 disk UniPack (68–68 pin)	2	
X5253A	9.1-GB, 7200-rpm fast/wide SCSI-2 disk UniPack (68–68 pin)	2	
X6151A	SunCD™ 4X CD-ROM UniPack	1	
X6201A	14-GB, 8-mm tape UniPack	2	
X6208A	14-GB, 8-mm tape UniPack	4	
X6251A	5-GB, 4-mm tape UniPack	4	
X6157A	SunCD 12X CD-ROM UniPack	4	
X6261A	4-GB to 8-GB, 4-mm DDS-2 drive	4	
X6280A	12-GB to 24-GB, 4-mm DDS-3 tape drive	4	
X6230A	20-GB to 40-GB, 8-mm tape drive	4	
	<i>The following Sun StorEdge UniPack options come with a 50–68 pin SCSI cable:</i>		
X5102A	1.05-GB, 7200-rpm fast/wide SCSI-2 disk UniPack	4	
X5152A	2.1-GB, 7200-rpm fast/wide SCSI-2 disk UniPack	4	
X5204A	2.1-GB, 7200-rpm fast/wide SCSI-2 disk UniPack	4	
X5213A	4.2-GB, 7200-rpm fast/wide SCSI-2 disk UniPack	2	
X5254A	9.1-GB, 7200-rpm fast/wide SCSI-2 disk UniPack	2	
X6152A	SunCD 4X CD-ROM UniPack	1	
X6202A	14-GB, 8-mm tape UniPack	4	
X6209A	14-GB, 8-mm tape UniPack	4	
X6252A	5-GB, 4-mm tape UniPack	4	
X6158A	SunCD 12X CD-ROM UniPack	4	
X6262A	4-GB to 8-GB, 4-mm DDS-2 tape drive	4	
X6281A	2-GB to 24-GB, 4-mm DDS-3 tape drive	4	
X6231A	20-GB to 40-GB, 8-mm tape drive	4	



Part Number	Option Description	Maximum Number Supported	Comments
Mass Storage— Sun StorEdge FlexiPack			
X6057A	DLT™ 4000 tape FlexiPack (68-pin)	4	A PCI SCSI adapter card is required to attach any external SCSI device to the Ultra 5 and Ultra 10
X6060A	DLT 7000 tape FlexiPack (68-pin)	4	
X6263A	4 to 8-GB 4-mm DDS-2 tape FlexiPack (68-pin)	4	
X6210A	8705 DX 14-GB 8-mm tape FlexiPack (68-pin)	4	
X6232A	20 to 40-GB tape drive FlexiPack (68-pin)	4	
X6284A	12 to 24-GB 4-mm DDS-3 FlexiPack (68-pin)	4	
Mass Storage— MultiDisk Pack			
X569A	4.2-GB SCSI MultiDisk Pack (2 x 2.1-GB Fast SCSI-2 disk)	2	A PCI SCSI adapter card is required to attach any external SCSI device to the Ultra 5 and Ultra 10
X570A	8.4-GB SCSI MultiDisk Pack (4 x 2.1-GB Fast SCSI-2 disk)	1	
X739A	8.4-GB, 7200-rpm MultiDisk Pack (4 x 2.1-GB Fast SCSI-2 disk)	1	
X748A	8.4-GB SCSI MultiDisk Pack (2 x 4.2-GB Fast SCSI-2 disk)	2	
X749A	16.8-GB SCSI MultiDisk Pack (4 x 4.2-GB Fast SCSI-2 disk)	1	
X771A	2.1-GB SCSI MultiDisk Pack (2 x 1.05-GB)	2	
X5211A	8.4-GB (2 x 4.2-GB), 7200-rpm, fast/wide SCSI-2 MultiPack	2	
X5212A	16.8-GB (4 x 4.2-GB), 5400-rpm, fast/wide SCSI-2 MultiPack	1	

Part Number	Option Description	Maximum Number Supported	Comments
Mass Storage— Sun StorEdge MultiPack			
X5511A	4.2-GB (2 x 2.1-GB), 7200-rpm fast/wide SCSI-2 MultiPack	1	A PCI SCSI adapter card is required to attach any external SCSI device to the Ultra 5 and Ultra 10
X5512A	12.6-GB (6 x 2.1-GB), 7200-rpm fast/wide SCSI-2 MultiPack	1	
X5513A	25.2-GB (12 x 2.1-GB), 7200-rpm fast/wide SCSI-2 MultiPack	1	
X5514A	8.4-GB (2 x 4.2-GB), 7200-rpm fast/wide SCSI-2 MultiPack	1	
X5515A	25.2-GB (6 x 4.2-GB), 7200-rpm fast/wide SCSI-2 MultiPack	1	
X5516A	50.4-GB (12 x 4.2-GB), 7200-rpm fast/wide SCSI-2 MultiPack	1	
X5501A	8.4-GB MultiPack (2 x 4.2-GB 5400-rpm) fast/wide SCSI-2	1	
X5502A	16.8-GB MultiPack (4 x 4.2-GB 5400-rpm) fast/wide SCSI-2	1	
X5503A	25.2-GB MultiPack (6 x 4.2-GB 5400-rpm) fast/wide SCSI-2	1	
X5504A	18.2-GB MultiPack (2 x 9.1-GB, 7200-rpm) fast/wide SCSI-2	1	
X5505A	36.4-GB MultiPack (4 x 9.1-GB, 7200-rpm) fast/wide SCSI-2	1	
X5506A	54.6-GB MultiPack (6 x 9.1-GB, 7200-rpm) fast/wide SCSI-2	1	
X6527A	18.2-GB MultiPack (2 x 9.1-GB, 7200-rpm) UltraSCSI	1	
X6528A	36.4-GB MultiPack (4 x 9.1-GB, 7200-rpm) UltraSCSI	1	
X6529A	54.6-GB MultiPack (6 x 9.1-GB, 7200-rpm) UltraSCSI	1	
Input Devices			
X180A	SunButtons™ 32-key function I/O device	1	
X190A	SunDials™ 8-dial interactive graphics I/O device for 3-D	1	
SUNX-MICII/G5	SunMicrophone™ II		

Part Number	Option Description	Maximum Number Supported	Comments
PCI Expansion Cards			
X1032A	10/100BASE-T Ethernet with SunPCI UltraSCSI	3	
X1033A	10/100BASE-T with MII PCI adapter	3	
X1034A	PCI Quad Fast Ethernet controller PCI adapter	1	
X1035A	SunFDDI™ single-attach PCI adapter (SAS/5.0)	3	
X1036A	SunFDDI dual-attach PCI adapter (DAS/5.0)	3	
X1039A	SunLink™ token ring interface/PCI adapter	3	Universal
X1040A	High-speed serial interface PCI adapter (SunHSI™), 1 port	3	
X1041A	Serial asynchronous interface (SunSAI) PCI adapter, 8 ports	3	Universal
X1066A	SunATM™/P-155 Multimode Fiber	1	
X1067A	SunATM/P-155 Cat-5 UTP	1	
X1068A	SunATM/P-622 Multimode Fiber	1	
X3668A	PGX32™ 32-bit color PCI graphics frame buffer	4	
X6541A	Dual-channel, differential UltraSCSI controller	3	
X1131A	SunPCi™ 300-MHz K6-2 coprocessor card	1	
Monitors and Graphics			
X7103A	17-inch entry color monitor		One monitor per graphics accelerator
X7119A	19-inch color monitor		
X7121A	21-inch color monitor		
X470A	13W3F-to-HD15M video adapter cable		One per monitor as needed
X3872A	HD15F-to-13W3M video adapter cable		
Other Options			
X901A	0.8-meter wide-to-narrow 68–68-pin UltraSCSI	1	A PCI SCSI adapter card is required to attach any external SCSI device to the Ultra 5 and Ultra 10
X902A	2.0-meter wide-to-narrow 68–68-pin UltraSCSI	1	
X903A	1.2-meter wide-to-narrow 68–68-pin SCSI adapter cable	1	
X904A	2.0-meter wide-to-narrow 68–68-pin SCSI adapter cable	1	
X907A	Optional power cable, CPU-to-monitor, 1.5 meter	1	
X908A	Optional power cable, CPU-to-monitor, 2.5 meter	1	
X467A	MII-AUI converter	1	

Part Number	Option Description	Maximum Number Supported	Comments
Type-5 Country Kits			
X3500A	North American	1	Except for "Z" Country Kit Codes, the Country Kit contents are included with every Ultra 5 and Ultra 10 configuration. Refer to the "Choice of Country Kit" sub-section (above) for ordering details
X3550A	North American Universal	1	
X3540A	UNIX	1	
X3551A	UNIX Universal	1	
X3552A	Euro UNIX (Power Cordless)	1	
X3502A	French	1	
X3503A	German	1	
X3504A	Swiss-French	1	
X3505A	Swiss-German	1	
X3506A	Swedish	1	
X3577A	Finnish	1	
X3507A	U.K.	1	
X3547A	U.K. UNIX	1	
X3570A	Norwegian	1	
X3571A	Portuguese	1	
X3572A	Spanish	1	
X3573A	Danish	1	
X3574A	Italian	1	
X3575A	Dutch (Netherlands)	1	
X3544A	Taiwanese	1	
X3545A	Korean	1	
X3546A	Japanese	1	
X3542A	Japanese UNIX	1	
X3576A	Australian	1	
X3579A	Canadian Bilingual	1	

Part Number	Option Description	Maximum Number Supported	Comments
Type-6 Country Kits			
X3508A	North American Universal	1	Except for "Z" Country Kit Codes, the Country Kit contents are included with every Ultra 5 and Ultra 10 configuration. Refer to the "Choice of Country Kit" sub-section (above) for ordering details
X3509A	French	1	
X3510A	German	1	
X3511A	Swiss-French	1	
X3512A	Swiss-German	1	
X3513A	Swedish	1	
X3514A	United Kingdom	1	
X3516A	Japanese UNIX	1	
X3517A	Taiwanese	1	
X3518A	Korean	1	
X3519A	Japanese	1	
X3520A	United Kingdom UNIX	1	
X3521A	Euro UNIX (Power Cordless)	1	
X3522A	Norwegian	1	
X3523A	Portuguese	1	
X3524A	Spanish	1	
X3525A	Danish	1	
X3526A	Italian	1	
X3527A	Dutch (Netherlands)	1	
X3528A	Australian	1	
X3529A	Finnish	1	

Upgrade Information

Sun™ upgrades offer customers superior investment protection for their existing Sun equipment.

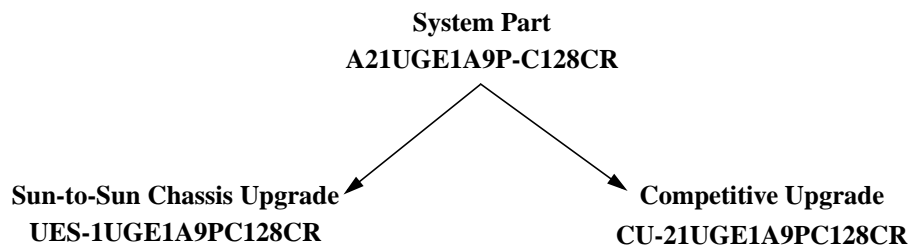
Key Messages

- Sun offers customers a variety of flexible upgrade paths to the most popular Sun systems
- Choose from full array of chassis upgrades
- Existing investments in non-Sun hardware can be leveraged by upgrading to Sun through competitive upgrades

Sun Ultra™ 5 Workstation Upgrade Paths

From	Receive	Return
Chassis upgrade from Any SLC™, ELC™, IPC™, 1/1+, SPARCclassic™, LX, IPX™, or SPARCstation™ 2 to Ultra™ 5 workstation	Sun Ultra 5 system	Workstation chassis, including CPU board, primary memory, and internal disk
Chassis upgrade from SPARCstation 4 or 5 to Ultra 5 workstation	Sun Ultra 5 system	Workstation chassis, including CPU board, primary memory, and internal disk
Competitive upgrade to Ultra 5 workstation	Sun Ultra 5 system	Competitive workstation

Marketing Upgrade Numbering Scheme



- The differences between the upgrade and system part numbers lie in the first eight characters; the ten trailing characters carry the same interpretation as new system parts.
- Sun-to-Sun upgrades begin with U or UG; competitive upgrades begin with CU. Sun-to-Sun upgrades show the “from” path system in the first three characters that follow the U or UG.
- Character representations following the “from” system have the same interpretation as new system parts, but dashes may be removed from left to right, as necessary, to meet the maximum part number length of 18 characters.



Ordering Notes

- No disks, memory, or CD-ROM drives migrate to the Ultra 5 workstation.
- Country Kits (keyboard and localized manuals)
 - The Ultra 5 workstation has the Country Kit physically included within the System Ship Kit. Please note other Country Kit versions are also available.
 - Country kits are not provided with upgrades from SPARCstation 4, SPARCstation 5, SPARCstation 10, or SPARCstation 20 systems. These platforms are very likely to have Type-5 keyboards and can be migrated to the Ultra 5 workstation.
 - The Ultra 5 workstation does not support the Type-4 keyboard. If a customer has a Type-4 keyboard, please order appropriate Country Kit. Type-5 keyboards can migrate to the Ultra 5 workstation.
- Monitors
 - Monitors are not included with any Ultra 5 workstation upgrades. If a monitor is needed, order the appropriate X-option or refer to monitor upgrade section of the pricebook.
 - Sun-branded 17-inch and 20-inch monitors migrate from previous generation Sun systems; however, the customer may need to purchase a monitor adapter X470A.
 - For some monitors, a video adapter may be required. Please order correct adapter (example: a 21-inch color monitor with on-board 8-bit graphics requires X470A). Adapter choices are:
 - X3872A—HD15F-to-13W3 video adapter
 - X470A—13W3F-to-HD15M video adapter (10-inch cable)
 - N1 (Sony GDM 17E10), N2 (Sony GDM 20E20, GDM 17E20), P4 (Sony GDM20D10) are supported monitors on Ultra 5 and 10 workstations. Customer may migrate any of these monitors. However, an adapter is required for operation.

Sun Ultra 5 Workstation Upgrades from Previous Sun Workstations

Part Number	Description
UES-1UGE1A9P-C64AR	Upgrade from early SPARCstation systems to Ultra 5 Model 360 workstation with 360-MHz UltraSPARC-III processor, 256-KB cache, 64-MB DRAM, 8.4-GB hard drive, 1.44-MB floppy drive, PGX24™, and Solaris™ 7 operating environment (3/99) preinstalled; no country kit, no monitor included
UES-1UGE1A9PC128CR	Upgrade from early SPARCstation systems to Ultra 5 Model 360 workstation with 360-MHz UltraSPARC-III processor, 256-KB cache, 128-MB DRAM, 8.4-GB hard drive, 1.44-MB floppy drive, PGX24, 32X-speed CD-ROM, and Solaris 7 operating environment (3/99) preinstalled; no country kit, no monitor included



Part Number	Description
US5-1UGE1Z9PC256CR	Upgrade from SPARCstation 4 or 5 systems to Ultra 5 Model 360 workstation with 360-MHz UltraSPARC-IIi processor, 256-KB cache, 256-MB DRAM, 8.4-GB hard drive, 1.44-MB floppy drive, PGX24, 32X-speed CD-ROM, and Solaris 7 operating environment (3/99) preinstalled; no country kit, no monitor included
UGSS2UHC1A9PB128CP	Upgrade from any low-end Sun workstation (such as SLC, ELC, IPC, 1/1+, SPARCclassic, LX, IPX, SPARCstation 2) to Ultra 5 Model 333 workstation with 2 MB of cache, 128-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, 100-Mb Ethernet, PGX24, and Solaris 7 preinstalled (with North American UNIX Country Kit)
UGS5-UHC1Z9PB128CP	Upgrade from SPARCstation 4 or 5 workstation to Ultra 5 Model 333 workstation with 2 MB of cache, 128-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, 100-Mb Ethernet, PGX24, and Solaris 7 preinstalled (no Country Kit)
UGSS2UHC1A9PB128CP	Upgrade from any low-end Sun workstation (such as SLC, ELC, IPC, 1/1+, SPARCclassic, LX, IPX, SPARCstation 2) to Ultra 5 Model 333 workstation with 2 MB of cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, 100-Mb Ethernet, PGX24, and Solaris 7 preinstalled (with North American UNIX Country Kit)
UGS5-UHC1Z9PB256CP	Upgrade from SPARCstation 4 or 5 workstation to Ultra 5 Model 333 workstation with 2 MB of cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, 100-Mb Ethernet, PGX24, and Solaris 7 preinstalled (no Country Kit)

Sun Ultra 5 Workstation Competitive Upgrades

Part Number	Description
CU-21UGE1A9PC128CR	Upgrade from competitive system to Ultra 5 Model 360 workstation with 360-MHz UltraSPARC-III processor, 256 KB of cache, 128-MB DRAM, 8.4-GB hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, PGX24, and Solaris 7 preinstalled; no country kit, no monitor included
CUA21UHC1A9PB128CP	Upgrade from competitive system to Ultra 5 Model 333 workstation with 2 MB of cache, 128-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, 10/100 Ethernet, and Solaris 7 Operating Environment preinstalled (North American UNIX Country Kit), no monitor included
CUA21UHC1A9PB256CP	Upgrade from competitive system to Ultra 5 Model 333 workstation with 2 MB of cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, 10/100 Ethernet, and Solaris 7 Operating Environment preinstalled (North American UNIX Country Kit), no monitor included

Service and Support

Sun Enterprise™ Services Offerings

Sun Enterprise™ Services now provides two service offerings: SunClient™ for low-level, low-cost support and SunSpectrum™ for high-level support and mission-critical response. Both support programs are available to service Ultra™ 5 workstations.

SunClient

Now there is a way to reduce hardware and software support costs for JavaStation™ network computers and the Ultra 5 and Ultra 10 workstations. The SunClient support program is a new suite of offerings that is separate, yet complementary to the SunSpectrum program. SunClient Support provides:

- A new 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., M-F telephone coverage	*	*	*
8 a.m.-5 p.m., M-F 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	*
SW 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 will be provided on the second business day.			
‡ Customers located more than 50 miles from an authorized service provider or reseller will be charged an additional fee for service activity.			

Features and Benefits of the SunClient Program

Features

- Unbundled hardware and software support
- Next business day (SunClient Maintenance) or second business day (SunClient Central Maintenance) on-site response
- Single contract with choice of automatic warranty upgrade
- SunClient Central Maintenance
- Service delivery by Sun experts

Benefits

- **Flexibility:** Select the type and amount of coverage needed for desktop systems, so service dollars are targeted where they are needed most.
- **Cost savings:** Pay only for the support services needed.
- **Cost efficiency:** Because Sun can more efficiently manage spare inventory and labor scheduling, the savings can be passed on to the customer.
- **Simplicity:** One contract covers a predefined number of systems at one low price. New systems acquired can be upgraded to the SunClient service level.
- **Cost savings:** 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 eliminated.
- **Consistency:** Selected desktops can be deployed anywhere with assurance of cost-effective, quality service and support.

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

SunSpectrum

The SunSpectrum 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 operating environment software, and telephone support for Sun™ 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.

FEATURE	SUNSPECTRUM PLATINUM SM Mission-critical Support	SUNSPECTRUM GOLD SM Business-critical Support	SUNSPECTRUM SILVER SM Systems Support	SUNSPECTRUM BRONZE SM Self Support
Systems Features				
Systems approach coverage	Yes	Yes	Yes	Yes
System availability guarantee	Customized	No	No	No
Account Support Features				
Service account management team	Yes	No	No	No
Personal technical account support	Yes	Yes	No	No
Account support plan	Yes	Yes	No	No
Software release planning	Yes	No	No	No
On-site account reviews	Monthly	Semiannual	No	No
Site activity log	Yes	Yes	No	No
Coverage / Response Time				
Standard telephone coverage hours	7 day/24 hour	7 day/24 hour	8 a.m.–8 p.m., Monday–Friday	8 a.m.–5 p.m., Monday–Friday
Standard on-site coverage hours	7 day/24 hour	8 a.m.–8 p.m., Monday–Friday	8 a.m.–5 p.m., Monday–Friday	N/A
7-day/24-hour telephone coverage	Yes	Yes	Option	No
7-day/24-hour on-site coverage	Yes	Option	Option	N/A
Customer-defined priority setting	Yes	Yes	Yes	No
• Urgent (phone/on-site)	Live transfer/ 2 hour	Live transfer/ 4 hour	Live transfer/ 4 hour	4 hour / N/A
• Serious (phone/on-site)	Live transfer/ 4 hour	2 hour/next day	2 hour/next day	4 hour / N/A
• Not critical (phone/on-site)	Live transfer/ customer convenience	4 hour/ customer convenience	4 hour/ customer convenience	4 hour / N/A
Additional contacts	Option	Option	Option	Option
Enhanced Support Features				
Mission-critical support team	Yes	Yes	No	No

FEATURE	SUNSPECTRUM PLATINUM SM Mission-critical Support	SUNSPECTRUM GOLD SM Business-critical Support	SUNSPECTRUM SILVER SM Systems Support	SUNSPECTRUM BRONZE SM Self Support
Sun Vendor Integration Program (SunVIP SM)	Yes	Yes	No	No
Software patch management assistance	Yes	No	No	No
Field change order (FCO) management assistance	Yes	No	No	No
Remote Systems Diagnostics				
Remote dial-in analysis	Yes	Yes	Yes	Yes
Remote systems monitoring	Yes	Yes	No	No
Remote predictive failure reporting	Yes	Yes	No	No
Software Enhancements and Maintenance Releases				
Solaris enhancement releases	Yes	Yes	Yes	Yes
Patches and maintenance releases	Yes	Yes	Yes	Yes
Sun unbundled software enhancements	Option	Option	Option	Option
Internet and CD-ROM Support Tools				
SunSolve TM license	Yes	Yes	Yes	Yes
SunSolve EarlyNotifier SM Service	Yes	Yes	Yes	Yes

Glossary

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 3-D 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	Double inline memory module. A memory unit that can come in a variety of sizes, such as 16 MB, 32 MB, 64 MB, and 128 MB.
Fast Ethernet	IEEE standard for 100-Mb Ethernet.
MII	Media independent interface. Used for connecting external transceivers to Fast Ethernet.
ODBC	Open database connectivity.
OpenGL®	A standard software interface for graphics hardware that allows programmers to create interactive 3-D applications. OpenGL provides a full-featured, network-transparent application programming interface.
PCI	Peripheral component interconnect. An industry standard for connecting peripherals such as disk drives, tapes drives, and other devices used in the PCs.
PGX24™	The 24-bit graphics capabilities built-in to the Ultra™ 5 and Ultra 10 workstations.
PLBwire93	The Picture Level Benchmark for wireframe performance. A benchmark standardized by the National Computer Graphics Associated GPC committee. The value represents the geometric mean performance on several commonly used 3-D wireframe operations.
PLBsurf93	The Picture Level Benchmark for 3-D surface performance. A benchmark standardized by the National Computer Graphics Associated GPC committee. The value represents the geometric mean performance on several commonly used 3-D surface operations.
UPA	Ultra port architecture. A high-speed, packet-switched mother board interconnect.
V9	Version 9 of the SPARC™ definition.

VIS™

Visual instruction set. The UltraSPARC™ processor implements a special instruction set that is aimed primarily 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.

XGL™

A foundation geometry-oriented 2-D/3-D graphics library that provides high functionality and performance to geometry applications and application program interfaces (APIs).

XIL™

A foundation imaging-oriented graphics library providing high functionality and performance to imaging applications.

Materials Abstract

All materials are available on SunWIN, except as otherwise noted.

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
PowerPack – <i>Sun Ultra™ 5 Workstation: Just the Facts, 4/99</i>	Reference Guide for Sun Ultra 5 Workstation	Training Sales Tool	SunWIN, Reseller Web	75243
References – <i>Sun Intro: Sun Ultra 5 with PGX24™, 4/99</i>	Introduction E-mail	Sales Tool	SunWIN, Reseller Web	93318
Quick Reference Cards – <i>Sun Workstation Product Line Overview, 4/99</i> – <i>Sun Workstation Graphics Products Overview, 4/99</i> – <i>Competitive Summary Workstations, 4/99</i> – <i>Upgrades Paths, 4/99</i>	Quick Reference Card Quick Reference Card Quick Reference Card Quick Reference Card	Sales Tool Sales Tool Sales Tool Sales Tool	SunWIN, Reseller Web, First Resort SunWIN, Reseller Web, First Resort SunWIN, Reseller Web, First Resort SunWIN, Reseller Web, First Resort	10826 24507 12259 24513
Competitive Analysis – <i>Differentiating a PC Workstation from a Sun Workstation Competitive Brief, 1/98</i> – <i>PC Workstation Battle Brief</i> – <i>SGI Competitive Battle Brief</i> – <i>HP Competitive Battle Brief</i>	White Paper White Paper White Paper White Paper	Sales Tool Sales Tool Sales Tool Sales Tool	SunWIN SunWIN SunWIN SunWIN	75269 75270 70605 70601
Product Collateral – <i>Sun Ultra Desktop Family Brochure, 4/99</i> – <i>Sun Ultra 5 Workstation Data Sheet, 4/99</i>	Data Sheet Data Sheet	Sales Tool	SunWIN, Reseller Web, COMAC SunWIN, Reseller Web, COMAC	69376 BE604-3 69272 DE777-2

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Product Presentations				
– <i>Desktop Product Golden Pitch</i>	Product Presentation, with Slide Notes	Sales Tool	SunWIN, Reseller Web	75248
– <i>Graphics Product Presentation, 1/98</i>	Product Presentation, with Slide Notes	Sales Tool	SunWIN, Reseller Web	75254
– <i>Sun in Entertainment Customer Presentation, 1/98</i>	Product Presentation, with Slide Notes	Sales Tool	SunWIN, Reseller Web	75241
– <i>Sun in Software Development Customer Presentation, 9/97</i>	Product Presentation, with Slide Notes	Sales Tool	SunWIN, Reseller Web	59375
– <i>Sun in EDA Customer Presentation, 9/97</i>	Product Presentation, with Slide Notes	Sales Tool	SunWIN, Reseller Web	59078
– <i>Sun in MCAD/MCAE Customer Presentation, 1/98</i>	Product Presentation, with Slide Notes	Sales Tool	SunWIN, Reseller Web	59074
White Paper				
– <i>Ultra 5 and Ultra 10 Architecture White Paper, 10/98</i>	White Paper	Sales Tool Training	SunWIN, Reseller Web	75258
External Web Site				
– <i>Sun Home Page</i>	http://www.sun.com/desktop			