

CORREIOS

(DOC
000232)

CORREIOS
CONCORRÊNCIA
001/2000

PASTA - 14

CORREIOS

CORREIOS

RQS nº	000232
CPMI	01
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Pavita

14

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COBRA

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EMPRESA BRASILEIRA DE CORREIOS E TELÉGRAFOS/ECT

CONCORRÊNCIA Nº 001/2000-CPL/AC

PROPOSTA TÉCNICA

Handwritten signature and initials, including "Sk 01" and a large circular mark.

COBRA Computadores e Sistemas Brasileiros S.A.
Estrada dos Bandeirantes 7966
CEP 22783-110 Rio de Janeiro RJ
Tel. 21 442-8800
www.cobra.com.br

Handwritten number 04 and a large handwritten '3'.

36 52

LOC:

Brasília - DF, 09 de maio de 2000



A
EMPRESA BRASILEIRA DE CORREIOS E TELÉGRAFOS/ECT
COMISSÃO ESPECIAL DE LICITAÇÃO / AC - ECT
SBN QUADRA 01 BLOCO A - 4º ANDAR - ALA NORTE
70002-900 - BRASÍLIA - DF

Ref.: Concorrência - N.º 001/2000-CPL/AC

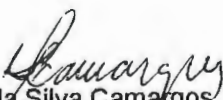
Prezados Senhores,

Encaminhamos para sua apreciação nossa Proposta Técnica para o Fornecimento de produtos conforme solicitado por V.Sas., na referência supra.

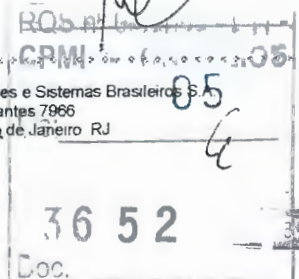
As soluções apresentadas visam atender da melhor maneira suas necessidades técnicas e financeiras.

Com a certeza de estarmos oferecendo em informática a melhor tecnologia, associada a maior rede de assistência técnica do mercado nacional, colocamo-nos à sua disposição, para quaisquer esclarecimentos adicionais.

Atenciosamente,


Vantuir da Silva Camargos
CI-REG. 610.750 - SSP/DF
Representante Comercial
Regional Brasília

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APRESENTAÇÃO DA EMPRESA:

Em 1974, nasce a COBRA - Computadores - primeira Empresa a desenvolver, produzir e comercializar tecnologia genuinamente nacional na área de informática.

A COBRA, desde sua fundação, acompanhou as tendências mundiais de informática, para adaptá-las da melhor forma possível às necessidades brasileiras.

Numa primeira fase, nacionalizando tecnologia, a Cobra implementou o Cobra 700 e o Cobra 400 (transformações do Argus 700 da Ferranti e do Sycor 440, respectivamente).

Com o acúmulo de conhecimento do seu corpo técnico e do meio acadêmico nacional, a Cobra passou a ousar e desenvolver os seus próprios produtos. Foi assim que viu surgir seus primeiros microcomputadores de 8 bits (o Cobra 300 e o Cobra 210), seus terminais de vídeo TD e TR e seu sistema operacional SOD. Foi a linha 500, no entanto, o ponto alto desta etapa, vez que o Cobra 530 foi o primeiro computador totalmente projetado, desenvolvido e industrializado no Brasil.

As evoluções continuaram: atualizou o hardware da linha 500, implementando a Linha X com processadores Motorola, desenvolveu o Sistema Operacional SOX (Unix-Like) reconhecido internacionalmente pela X-Open e lançou seu microcomputador XT (o XPC).

Nos anos 90, e sob o controle acionário do Banco do Brasil, a Cobra se afinou à tendência mundial de parcerias, dentre as quais podem ser citadas as efetivadas com a Sun Microsystems, Corollary, Compaq, Microsoft, DFI e SCO (Santa Cruz Operation).

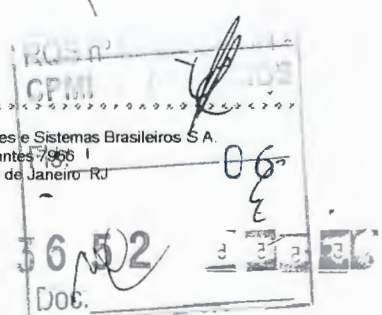
Nesta linha, a Cobra comercializa na atualidade equipamentos de tecnologia INTEL (Pentium), superservidores multiprocessados de 64 bits (CBUS-II) e servidores e estações RISC (aqui incluídos os servidores Internet), todos eles com seus periféricos e softwares associados.

O compromisso da Cobra é se manter em dia com a tecnologia da informação, para poder continuar oferecendo ao mercado nacional o melhor do hardware e software, associado à maior rede nacional de assistência técnica. Assim como o vem fazendo desde 1974.

REDE DE ASSISTÊNCIA TÉCNICA:

A COBRA possui 45 Centros de Atendimento Técnico no País e 19 Filiais, espalhadas por todo o território brasileiro, com técnicos, almoxarifados e peças para pronto atendimento a seus clientes. A Matriz fica em Jacarepaguá/RJ, que funciona como retaguarda para qualquer eventualidade em qualquer área que as pontas necessitem de suporte.

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COBRA
SOLUÇÕES TECNOLÓGICAS CORPORATIVAS

ITEM 1.8 - SERVIDOR DE REDE TIPO RISC 1

QUANTIDADE: 03 (tres) servidores

O Servidor de Rede proposto possui as seguintes características:

Dois processadores UltraSPARCII de 300 Mhz, expansível até 4 processadores, memória cache de 2 MB por processador.

Capacidade Memória RAM de 512 Mbytes, expansível até 4 Gbytes.

Essa configuração apresenta performance comprovada de **229 SPECint_rate95**, e

338 SPECfp_rate95 (vide teste anexo).

O servidor proposto apresenta 09 slots **PCI** vagos de 32/64 bits, 02 slots **UPA** vagos, 03 slots para Fast /wide **SCSI** Disks vagos.

Gabinete do tipo Torre, bivolt, com fonte de 560 W redundante, compatível com a configuração máxima do equipamento.

Controladora de disco padrão UltraSCSI, com 2 (dois) discos de 9.1 Gbytes, totalizando 18.2 Gbytes de área livre para dados, com tempo médio de acesso de 10 ms, alcançando uma taxa de transferência de 25 Mbytes/Seg.

Monitor de vídeo policromático com 19 polegadas, dot-pitch 0,24mm, obedece as normas MPRII, Epa Energy Star. Seleção automática de tensão entre 90-240 VAC - full-range, com resoluções

De:

1152 x 900. @ 66 Hz, 76 Hz;

1280 x 1024. @ 66 Hz, 76 Hz;

1600 x 1200. @ 75 Hz, 85 Hz.

Teclado alfanumérico com 101 teclas e mouse de 3 teclas com resolução de 320 dpi, mouse-pad e driver de instalação.

Unidade disco flexível de 3 1/2 com capacidade 1,44 MB.

Possui duas interfaces seriais padrão RS 232 C.

Possui uma porta Paralela para impressora.

Possui uma unidade de CD-ROM com velocidade de 32x-SCSI II, instalada;

Uma unidade fita padrão DLT para utilização de mídias de 35 Gbytes, sem compressão e com taxa de transferência sustentada de 5 Mbytes/Seg;

Possui uma placa de rede padrão Ethernet de 32 bits-IEEE802.3 CSMA/CD com driver para Unix, saída 100Base TX(RJ-45), velocidade dupla 10 ou 100 Mbps auto-sensing, possibilidade de gerenciamento SNMP, compatível com TCP/IP, acompanhada dos respectivos manuais de documentação.

Sistema Operacional Solaris, em sua última versão, padrão Unix, 64 bits, instalado e configurado para para a Rede Local e Corporativa da ECT, com número de acessos simultâneos ilimitados, com capacidade para suportar a Plataforma de Gerenciamento HP Open View - NNM (NetWORK Node Management) na versão 5.0, e os módulos HP Open View entregues em mídia CD-ROM com toda a documentação e licença.

O servidor proposto está imune a quaisquer problemas decorrentes do "Bug do milênio", devidamente comprovada na documentação que acompanha.

Features especiais:

Recuperação Automática do Sistema;

Hot swap disks;

Fontes Redundante Hot swap;

Proteção de sobre temperatura;

Controle automático de temperatura por Sensor Térmico;

04 Níveis de diagnósticos de sistemas.

MARCA: Sun Microsystems

MODELO: E-450

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2 .DESEMPENHO (DE)

A pontuação para o fator DESEMPENHO (DE) será atribuída calculando-se o somatório da pontuação obtida para os seguintes subfatores opcionais:

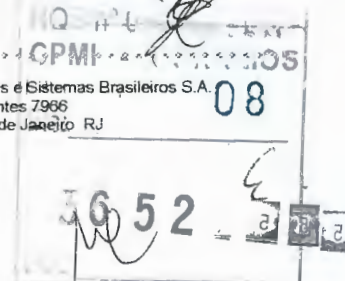
- Processador;
- Performance;
- Memória RAM;
- Capacidade do Disco Rígido;
- Fonte de alimentação redundante.

Performance		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à performance solicitada do equipamento.	resposta	Pontos
SPECint-rate95 igual ou superior a 240.	NÃO	01
SPECfp_rate95 igual ou superior a 250.	NÃO	01

Memória RAM		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à Memória do equipamento.	Resposta	Pontos
Igual ou superior a 1 Gbyte	NÃO	01

Capacidade do Disco Rígido		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção à capacidade do disco rígido do equipamento.	Resposta	Pontos
Igual ou superior a 30 Gbytes.	NÃO	01

Fonte de Alimentação Redundante (que suporte a configuração máxima do equipamento)		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente ao tipo de fonte de alimentação do equipamento.	Resposta	Pontos
Fonte de alimentação redundante, hotswappable.	SIM	02
Fonte de alimentação redundante	NÃO	01





3. QUALIDADE (QD)

PESO 4

A pontuação do fator QUALIDADE (QD) será atribuída considerando a certificação de que as empresas, na fabricação e manutenção do(s) equipamento(s) proposto(s), atendem aos padrões das normas ISO 9002 ou NBR equivalente:

Certificação		
Assinalar com a palavra "Atende" para as certificações que o modelo do equipamento cotado possui:		
Possui Certificação atualizada conforme segue:	Resposta	Pontos
ISO 9002 referente a serviços de suporte de hardware e software.	SIM	01

4. SUPORTE DE SERVIÇOS (SS)

PESO 06

A pontuação para o fator SUPORTE DE SERVIÇOS (SS) será atribuída calculando-se a pontuação obtida para os seguintes subfatores opcionais:

- Prazo de atendimento;
- Horário de atendimento e suporte;
- Central de atendimento e suporte;
- Duração da garantia.

Prazo de Atendimento		
Assinalar com a palavra "Atende" a opção correspondente ao prazo máximo de atendimento ao equipamento cotado:		
Tendo como base o registro de chamada do suporte técnico, o atendimento será prestado nos prazos, conforme segue:	Resposta	Pontos
Até 02 horas	SIM	02

Horário de Atendimento e Suporte		
Assinalar com a palavra "Atende" a opção correspondente ao Horário de atendimento às chamadas referentes ao equipamento cotado:		
Além do horário comercial, o atendimento será prestado também nos horários, conforme segue:	Resposta	Pontos
Horário integral – 24 horas/ 7 dias por semana	SIM	02
Horário semi-integral – 24 horas (de 2ª a 6ª feira)		01

Central de Atendimento e Suporte		
Assinalar com a palavra "Atende" a opção correspondentes às facilidades oferecidas no atendimento às chamadas referentes ao equipamento cotado:		
Está disponível, para o atendimento aos chamados	resposta	Pontos (cumulativos)
(0800) para hardware e software	SIM	01



Assinalar com a palavra "Atende" a opção correspondente a duração da garantia dada pelo fabricante para o equipamento cotado.

O fabricante oferece garantia para o produto por um período de:	Resposta	Pontos
5 (cinco) anos	NÃO	03
4 (quatro) anos	NÃO	02
3 (três) anos	NÃO	01

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ITEM I.9 - SERVIDOR DE REDE TIPO RISC 2

QUANTIDADE: 25(vinte e cinco) servidores

O Servidor de Rede proposto possui as seguintes características:

01 processador UltraSPARCIIi de 440 Mhz, , memória cache de 2 MB por processador.
Capacidade Memória RAM de 512 Mbytes, expansível até 1Gbytes.
Essa configuração apresenta performance comprovada de **18.1 SPECint95**, e **22,7 SPECfp** (vide teste anexo).

O servidor proposto apresenta 03slots **PCI** vagos .

Gabinete do tipo MiniTorre, bivolt, com fonte de 0,4KVA compatível com a configuração máxima do equipamento.

Controladora de disco padrão EIDE, com 2 (dois) discos de 9.1 GB, totalizando 18.2 GB de área disponível para dados, com tempo médio de acesso de 10 ms, alcançando uma taxa de transferência de 33,3 Mbytes/Seg.

Monitor de vídeo policromático com 19 polegadas, dot-pitch 0,24mm, obedece as normas MPRII, Epa Energy Star. Seleção automática de tensão entre 90-240 VAC - full-range, com resoluções

De:

1152 x 900. @ 66 Hz, 76 Hz

1280 x 1024. @ 66 Hz, 76 Hz

1600 x 1200. @ 75 Hz, 85 Hz.

Teclado alfanumérico com 101 teclas e mouse de 3 teclas com resolução de 320 dpi, mouse-pad e driver de instalação.

Unidade disco flexível de 3 1/2 com capacidade 1,44 MB.

Possui duas interfaces seriais padrão RS 232 C.

Possui uma porta Paralela para impressora.

Possui uma unidade de CD-ROM com velocidade de 32x-SCSI II, instalada;

Uma unidade fita padrão DLT para utilização de mídias de 35 Gbytes, sem compressão e com taxa de transferência sustentada de 5 Mbytes/Seg;

Possui uma placa de rede padrão Ethernet de 32 bits-IEEE802.3 CSMA/CD com driver para Unix, saída 100Base TX(RJ-45), velocidade dupla 10 ou 100 Mbps auto-sensing, possibilidade de gerenciamento SNMP, compatível com TCP/IP, acompanhada dos respectivos manuais de documentação.

Sistema Operacional Solaris, em sua última versão, padrão Unix, 64 bits, instalado e configurado para a Rede Local e Corporativa da ECT, com número de acessos simultâneos ilimitados, com capacidade para suportar a Plataforma de Gerenciamento HP Open View - NNM (NetWORK Node Management) na versão 5.0, e os módulos HP Open View entregues em mídia CD-ROM com toda a documentação e licença.

O servidor proposto está imune a quaisquer problemas decorrentes do "Bug do milênio", devidamente comprovada na documentação que acompanha.

MARCA: Sun Microsystems

MODELO: Ultra 10





2 .DESEMPENHO (DE)

PESO 06

A pontuação para o fator DESEMPENHO (DE) será atribuída calculando-se o somatório da pontuação obtida para os seguintes subfatores opcionais:

- Processador;
- Performance;
- Memória RAM;
- Capacidade do Disco Rígido;
- Fonte de alimentação redundante.

Performance		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à performance solicitada do equipamento.	resposta	pontos
SPECint_95 igual ou superior a 19 ou SPECint-rate95 igual ou superior a 92.	NÃO	01
SPECfp_95 igual ou superior a 27 ou SPECfp_rate95 igual ou superior a 115.	NÃO	01

Memória RAM		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à Memória do equipamento.	Resposta	Pontos
Igual ou superior a 1 Gbyte	NÃO	01

Capacidade do Disco Rígido		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção à capacidade do disco rígido do equipamento.	Resposta	Pontos
Igual ou superior a 10 Gbytes.	SIM	01

Fonte de Alimentação Redundante (que suporte a configuração máxima do equipamento)		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente ao tipo de fonte de alimentação do equipamento.	Resposta	Pontos
Fonte de alimentação redundante, hotswappable.	NÃO	02
Fonte de alimentação redundante	NÃO	01



3. QUALIDADE (QD)

PESO 4

A pontuação do fator QUALIDADE (QD) será atribuída considerando a certificação de que as empresas, na fabricação e manutenção do(s) equipamento(s) proposto(s), atendem aos padrões das normas ISO 9002 ou NBR equivalente:

Certificação		
Assinalar com a palavra "Atende" para as certificações que o modelo do equipamento cotado possui:		
Possui Certificação atualizada conforme segue:	Resposta	Pontos
ISO 9002 referente a serviços de suporte de hardware e software.	SIM	01

4. SUPORTE DE SERVIÇOS (SS)

PESO 06

A pontuação para o fator SUPORTE DE SERVIÇOS (SS) será atribuída calculando-se a pontuação obtida para os seguintes subfatores opcionais:

- Prazo de atendimento;
- Horário de atendimento e suporte;
- Central de atendimento e suporte;
- Duração da garantia.

Prazo de Atendimento		
Assinalar com a palavra "Atende" a opção correspondente ao prazo máximo de atendimento ao equipamento cotado:		
Tendo como base o registro de chamada do suporte técnico, o atendimento será prestado nos prazos, conforme segue:	Resposta	Pontos
Até 02 horas	SIM	02

Horário de Atendimento e Suporte		
Assinalar com a palavra "Atende" a opção correspondente ao Horário de atendimento às chamadas referentes ao equipamento cotado:		
Além do horário comercial, o atendimento será prestado também nos horários, conforme segue:	Resposta	Pontos
Horário integral – 24 horas/ 7 dias por semana	SIM	02
Horário semi-integral – 24 horas (de 2ª a 6ª feira)	NÃO	01

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Central de Atendimento e Suporte

Assinalar com a palavra "Atende" a opção correspondentes às facilidades oferecidas no atendimento às chamadas referentes ao equipamento cotado:

Está disponível, para o atendimento aos chamados	resposta	Pontos (cumulativos)
(0800) para hardware e software	SIM	01

Duração da Garantia

Assinalar com a palavra "Atende" a opção correspondente a duração da garantia dada pelo fabricante para o equipamento cotado.

O fabricante oferece garantia para o produto por um período de:	Resposta	Pontos
5 (cinco) anos	NÃO	03
4 (quatro) anos	NÃO	02
3 (três) anos	NÃO	01

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ITEM 1.10 - SERVIDOR DE REDE TIPO RISC 3

QUANTIDADE: 10 (dez) servidores

O Servidor de Rede proposto possui as seguintes características:

Seis processadores UltraSPARCII de 400 Mhz, , memória cache de 8MB por processador.
Capacidade Memória RAM de 04 Gbytes, expansível até 28 Gbytes.
Essa configuração apresenta performance TpmCE = 21.543,4 expansível à 50.268,07
(vide teste anexo).

O servidor proposto apresenta 06 slots sbus vagos de 64 bits, 02 slots UPA vagos. Gabinete do tipo Torre, bivolt, com fonte de 300 W redundante, compatível com a configuração máxima do equipamento.

Controladora de video Creator 3D com 4 bancos de 2,5 MB DRAM.

Controladora de disco padrão UltraSCSI2, com dois discos de 9.1 GB, totalizando 18.2 Gbytes de área disponível para dados, tempo médio de acesso de 10 ms, alcançando uma taxa de transferência de Mbytes/Seg.

Monitor de vídeo policromático com 17 polegadas, dot-pitch 0.28mm, obedece as normas MPRII, Epa Energy Star. Seleção automática de tensão entre 90-240 VAC - full-range, com resoluções

De:

1152 x 900. @ 66 Hz, 76 Hz

1024 x 768. @ 60 Hz, 75 Hz

800 x 600. @ 75 Hz,.

Teclado alfanumérico com 101 teclas e mouse de 3 teclas com resolução de 320 dpi, mouse-pad e driver de instalação.

Possui duas interfaces seriais padrão RS 232 C.

Possui uma unidade de CD-ROM com velocidade de 32x-SCSI II, instalada.

Uma unidade fita padrão DLT para utilização de de mídias de 35 Gbytes, sem compressão e com taxa de transferência sustentada de 5 Mbytes/Seg.

Possui uma placa de rede padrão Ethernet de 32 bits-IEEE802.3 CSMA/CD com driver para Unix, saída 100Base TX(RJ-45), velocidade dupla 10 ou 100 Mbps auto-sensing, possibilidade de gerenciamento SNMP, compatível com TCP/IP, acompanhada dos respectivos manuais de documentação.

Controladora USCSI_Diferencial para interfaciar com o ARRAY DE DISCOS EXTERNOS A1000.

Storage Array A1000 com controlador de Raid por hardware com capacidade 181 Gbytes composto por 5 X 36,4 GB (10K rpm.) discos hot_swappable, o que inclui também disco hot_spare.

Sistema Operacional Solaris, em sua última versão, padrão Unix, 64 bits, instalado e configurado para para a Rede Local e Corporativa da ECT, com número de acessos simultâneos ilimitados. O servidor proposto está imune a quaisquer problemas decorrentes do "Bug do milênio", devidamente comprovada na documentação que acompanha.

Features especiais:

- Recuperação Automática do Sistema;
- Reconfiguração Dinamica;
- CPU Power Control;
- Alternate Pathing;
- Hot swap disks;
- Hot-swap Power/Cooling Modules;
- Hardware Failure Prediction;
- Fontes Redundante Hot swap;
- Proteção de sobre temperatura;
- Controle automático de temperatura por Sensor Térmico.

MARCA: Sun Microsystems

MODELO: E-4500

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2. DESEMPENHO (DE)

PESO 06

A pontuação para o fator DESEMPENHO (DE) será atribuída calculando-se o somatório da pontuação obtida para os seguintes subfatores opcionais:

- Escalabilidade de Performance Auditada ou estimada, com base em equipamento auditado da mesma família;
- Performance Auditada ou estimada, com base em equipamento auditado da mesma família;
- Memória RAM;
- Memória Cache;
- Expansibilidade de memória RAM;
- Disco Interno e Controladora de disco SCSI;
- Controladora de Array de Disco e
- Fonte de Alimentação Interna "Hot-swappable".

Escalabilidade de Performance Auditada ou Estimada

Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à capacidade máxima de performance atingida pelo equipamento.	resposta	pontos
TpmC igual ou superior a 50000	SIM	03
TpmC igual ou superior a 40000	NÃO	02
TpmC igual ou superior a 35000	NÃO	01

Performance Auditada ou Estimada

Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à performance solicitada do equipamento	Resposta	Pontos
TpmC igual ou superior a 28000	NÃO	03
TpmC igual ou superior a 24500	NÃO	02
TpmC igual ou superior a 22000	NÃO	01

Memória RAM

Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à memória RAM instalada do equipamento	Resposta	Pontos
Igual ou superior a 8 Gbytes.	NÃO	02
Igual a 6 Gbytes.	NÃO	01

Memória Cache

Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à memória cache por processador do equipamento.	Resposta	Pontos
8 Mbytes por processador.	SIM	03
4 Mbytes por processador.	SIM	02
2 Mbytes por processador	SIM	01

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Expansibilidade de Memória RAM		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à capacidade de expansão de memória RAM do equipamento	Resposta	Pontos
Acima de 16 Gbytes	SIM	01

Disco Interno e Controladora de disco SCSI		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à Disco Interno e Controladora de disco SCSI do equipamento.	Resposta	Pontos
RAID 1 por Hardware para controladora SCSI (Discos Interno)	NÃO	02

Controladora de Array de Disco		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à Controladora de Array de Disco do equipamento.	Resposta	Pontos
RAID 1 por Hardware para controladora de Array de Disco.	SIM	02

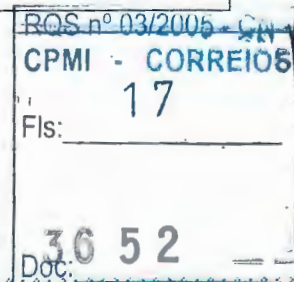
Fonte de Alimentação Interna "Hot-swappable" (que suporte a configuração máxima do equipamento)		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à Fonte de Alimentação Interna do equipamento.	Resposta	Pontos
Fonte "Hot-swappable".	SIM	01

3. QUALIDADE (QD)

PESO 4

A pontuação do fator QUALIDADE (QD) será atribuída considerando a certificação de que as empresas, na fabricação e manutenção do(s) equipamento(s) proposto(s), atendem aos padrões das normas ISO 9002 ou NBR equivalente:

Certificação		
Assinalar com a palavra "Atende" para as certificações que o modelo do equipamento cotado possui:		
Possui Certificação atualizada conforme segue:	Resposta	Pontos
ISO 9002 referente a serviços de suporte de hardware e software.	SIM	01





4. SUPORTE DE SERVIÇOS (SS)

PESO 06

A pontuação para o fator SUPORTE DE SERVIÇOS (SS) será atribuída calculando-se a pontuação obtida para os seguintes subfatores opcionais:

- Prazo de atendimento;
- Horário de atendimento e suporte;
- Central de atendimento e suporte;
- Duração da garantia.

Prazo de Atendimento		
Assinalar com a palavra "Atende" a opção correspondente ao prazo máximo de atendimento ao equipamento cotado:		
Tendo como base o registro de chamada do suporte técnico, o atendimento será prestado nos prazos, conforme segue:	Resposta	Pontos
Até 02 horas	SIM	02

Horário de Atendimento e Suporte		
Assinalar com a palavra "Atende" a opção correspondente ao Horário de atendimento às chamadas referentes ao equipamento cotado:		
Além do horário comercial, o atendimento será prestado também nos horários, conforme segue:	Resposta	Pontos
Horário integral – 24 horas/ 7 dias por semana	SIM	02
Horário semi-integral – 24 horas (de 2ª a 6ª feira)		01

Central de Atendimento e Suporte		
Assinalar com a palavra "Atende" a opção correspondentes às facilidades oferecidas no atendimento às chamadas referentes ao equipamento cotado:		
Está disponível, para o atendimento aos chamados	Resposta	Pontos (cumulativos)
(0800) para hardware e software	SIM	01

Duração da Garantia		
Assinalar com a palavra "Atende" a opção correspondente a duração da garantia dada pelo fabricante para o equipamento cotado.		
O fabricante oferece garantia para o produto por um período de:	Resposta	Pontos
5 (cinco) anos	NÃO	03
4 (quatro) anos	NÃO	02
3 (três) anos	NÃO	01





COBRA
SOLUÇÕES TECNOLÓGICAS CORPORATIVAS

CONDIÇÕES DE COMERCIALIZAÇÃO:

VALIDADE DA PROPOSTA: 60 (sessenta) dias corridos;

PRAZO DE ENTREGA: 45(quarenta e cinco), 90(noventa), 120(cento e vinte) e 150(cento e cinquenta) dias corridos a contar da data de assinatura do contrato, de acordo com a Pauta de Distribuição - Anexo III do Edital;

PRAZO DE GARANTIA: 24(vinte e quatro) meses ON SITE, 24(vinte e quatro) horas por dia, 7 (sete) dias por semana.

CONDIÇÕES DE PAGAMENTO: Conforme previsto no Edital.

DADOS DA EMPRESA:

Razão Social	Cobra Computadores e Sistemas Brasileiros S.A.
CGC/MF	42.318.949/0001-84
Inscrição Estadual	82.131.515
Endereço	Estrada dos Bandeirantes 7966 - Jacarepaguá - Rio de Janeiro-RJ - CEP: 22775-610
Telefone	0XX.21.442.88.00
Fax-símile	0XX.21.441.28.80
Banco	Banco do Brasil S.A. - Ag. 0493-6 - Conta Corrente: 5826-2
Procuradores	Eduardo Galdeano François-Diretor e Vantuir da Silva Camargos-Representante Comercial
Contato	Vantuir da Silva Camargos - Telefone: 0xx61.349.24.00 - Fax: 0xx61.349.19.13

Vantuir da Silva Camargos
Vantuir da Silva Camargos
CF- REG. 610.750 - SSP/DF
Representante Comercial
Regional Brasília

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COBRA Computadores e Sistemas Brasileiros S.A.
Estrada dos Bandeirantes 7966
CEP 22783-110 Rio de Janeiro RJ
Tel 21 442-8800
www.cobra.com.br



COBRA
SOLUÇÕES TECNOLÓGICAS CORPORATIVAS

SERVIDOR DE REDE TIPO RISC1

DOCUMENTOS DO FABRICANTE

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36 52
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Estrada dos Bandeirantes 7966
CEP 22783-110 Rio de Janeiro RJ
Tel 21 442-8800
www.cobra.com.br



São Paulo, 02 de maio de 2000.

À

ECT Empresa Brasileira de Correios e Telégrafos
Comissão Especial de Licitação da Administração Central – CEL/AC
SBN Quadra 01 Bloco A 4º andar – Ala Norte – Brasília-DF
CEP 70002-900
Att. Sr. Benedito Medeiros Neto
Presidente da CEL/AC.

Ref.: Concorrência 001/2000 – CPL/AC
Abertura: 03/05/2000 às 9:30hs.

DECLARAÇÃO

Nós, da Sun Microsystems do Brasil, inscrita no CNPJ sob nº. 65.497.745/0001-53, estabelecida na Rua Alexandre Dumas, 2016 – Chácara Santo Antonio – 04717-004, São Paulo/SP., subsidiária da Sun Microsystems Inc., declaramos que o Servidor Sun Enterprise 450 ofertado pela empresa Cobra – Computadores e Sistemas Brasileiros S.A., inscrita no CNPJ sob o n.o 42.318.949/0001-84, sediada na Estrada dos Bandeirantes, 7.966, Jacarepaguá, Rio de Janeiro, RJ, em sua proposta técnica, SERVIDOR DE REDE TIPO RISC 1, é imune a Quaisquer problemas decorrentes do "Bug do milênio".

Por ser expressão da verdade, firmamos a presente



SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antônio Alves
Country Manager

ROS nº 03/2005 - CN
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Fls: 21
36 52
Doc:



van Odaivo Boaro J



São Paulo, 02 de maio de 2000.

À

ECT Empresa Brasileira de Correios e Telégrafos
Comissão Especial de Licitação da Administração Central – CEL/AC
SBN Quadra 01 Bloco A 4º andar – Ala Norte – Brasília-DF
CEP 70002-900

Att. Sr. Benedito Medeiros Neto
Presidente da CEL/AC.

Ref.: Concorrência 001/2000 – CPL/AC

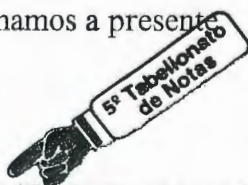
Abertura: 03/05/2000 às 9:30hs.

DECLARAÇÃO

Nós, da Sun Microsystems do Brasil, inscrita no CNPJ sob nº. 65.497.745/0001-53, estabelecida na Rua Alexandre Dumas, 2016 – Chácara Santo Antonio – 04717-004, São Paulo/SP., subsidiária da Sun Microsystems Inc., declaramos que o Servidor Sun Enterprise 450 ofertado pela empresa Cobra – Computadores e Sistemas Brasileiros S.A., inscrita no CNPJ sob o n.o 42.318.949/0001-84, sediada na Estrada dos Bandeirantes, 7.966, Jacarepaguá, Rio de Janeiro, RJ, em sua proposta técnica, SERVIDOR DE REDE TIPO RISC 1, possui mouse de 3 teclas, com resolução de 320 dpi, mouse-pad e driver de instalação.

Por ser expressão da verdade, firmamos a presente

SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antônio Alves
Country Manager



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Olivan Osvaldo Boaro Jr.
ESCREVENTE AUTORIZADO





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Thursday, April 6, 2000

URL: <http://www.sun.com:80/servers/workgroup/450/index.html>

WORKGROUP SERVERS

Sun Enterprise™ 450

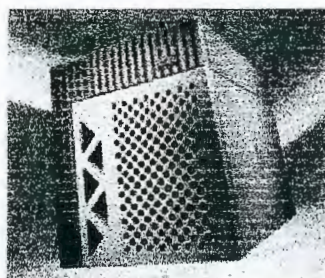


Product Overview



Enterprise power, scalability, and reliability for workgroups.

Whether it's running one critical application for hundreds of clients, or many applications at once for a branch office or workgroup, the Sun™ Enterprise™ 450 gives you performance, reliability, and scalability you can count on--at a price you can afford.



get more info

In today's heterogeneous network environments, you expect a lot from your workgroup server. It should be scalable to accommodate changing business needs, reliable so data and applications are always available, and must interoperate with all your systems. And it should be easy to deploy and manage.

Whether you're deploying these systems for e-mail, database applications, clustering, Web service, or enterprise resource planning--the Enterprise 450 gives you the power, throughput, and storage you need to meet user demands.

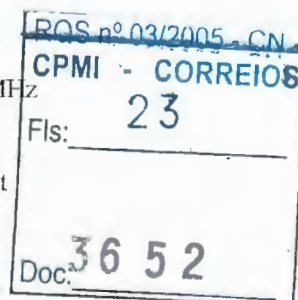
The Enterprise 450 delivers excellent performance for almost any mix of compute-, data-, or I/O-intensive applications: It supports up to four 300-MHz/2-MB or 400-MHz/4-MB UltraSPARC™-II processors, a 1.6-GB/sec UPA interconnect, and a 1GB/sec PCI I/O subsystem for outstanding performance and data throughput. With up to 4-GB of main memory, up to 364-GB of fast hot-swap UltraSCSI internal storage, and over 6-TB of external storage capacity, it's a server you can count on when times--and workloads--change.

What's more, the Enterprise 450 works seamlessly with workstations, PCs, and Macintosh systems. With the robust Solaris™ operating environment's easy-to-use installation and Web software, you can actually get more productivity from all your systems--and your administrators. The Enterprise 450 is reliable with standard ECC datapath and memory protection, automatic system recovery, and hot-swap power supplies and disk drives. That's investment protection you can count on.

Highlights

- Enterprise-class server at an affordable price
- Supports up to four UltraSPARC™-II processors: 300-MHz or 400-MHz
 - 400-MHz UltraSPARC™-II has 4-MB Ecache memory
 - More than 360-GB internal storage capacity
- 6 separate PCI buses providing more than 1-GB/sec I/O throughput

<http://www.sun.com/servers/workgroup/450/index.html?pagestyle=print>



06/03/2000

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- 32X SCSI CD-ROM
- Two hot swap 560W power supplies standard (3 possible)

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URL: <http://www.sun.com:80/servers/workgroup/450/spec.html>

SUN ENTERPRISE™ 450 Specifications

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Processor	
Number	From one to four processor modules
Type	300- or 400-MHz UltraSPARC-II modules with onboard E-cache
Cache memory	16-KB I-cache, 16-KB D-cache per processor
	2-MB external cache per processor with 300-MHz CPU
	4-MB external cache per processor with 400-MHz CPU
Datapath	Two independent, buffered 144-bit UPA buses; 128 bits data, 16 bits ECC; two processors per bus
	UPA operates at 100-MHz with 300-MHz or 400-MHz processors
Main Memory	
Capacities	16 DIMM module slots; four banks of four slots
	Accepts 32-, 64-, 128-MB or 256-MB DIMMs
	128 MB to 4 GB total memory capacity
Memory type	144-pin 5V 60-ns memory modules
Datapath	576 bits wide; 512 bits data, 64 bits ECC
	Up to 1.78-GB/sec throughput
Standard Interfaces	
Serial	Two EIA-232D or EIA-423 serial ports, DB25 (requires Y-type splitter cable); one 50 to 384 Kbps synchronous, one 50 to 460.8 Kbaud asynchronous
Parallel	2-MB/sec Centronics compatible bidirectional EPP port; DB25
Ethernet	One 10/100-Mb/sec autoselect port; RJ45 or MII
Keyboard and mouse	One standard keyboard/mouse port; mini DIN-8
	Three slots for 32-bit 33-MHz 5V PCI cards

<http://www.sun.com/servers/workgroup/450/spec.html?pagestyle=print>

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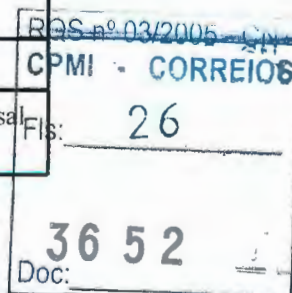
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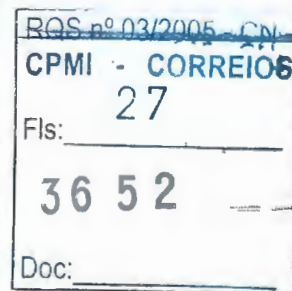


PCI	Four slots for 32- or 64-bit 33-MHz 5V PCI cards Three slots for 32- or 64-bit 33- or 66-MHz 3.3V PCI cards
SCSI	One, three, or five 40-MB/sec UltraSCSI-3 buses for internal disks One 20-MB/sec Fast/Wide SCSI-2 bus for CD-ROM and tape; 68-pin external connector
Internal Mass Storage	
Disk bays	Four, twelve, or twenty hot-swap disk bays
Disk controllers	One, three, or five 40-MB/sec UltraSCSI-3 channels; maximum four drives per channel
Disks	Up to twenty 18.2-GB (3.5- x 1-in.) hot-swap UltraSCSI-3 drives (max. 364 GB)
CD-ROM	SunCD™32 644-MB SCSI CD-ROM (standard)
Floppy	1.44-MB 3.5-in. floppy drive (standard)
Tape	One bay available for optional 5.25- x 1.6-in. SCSI tape drive; 8-mm or 4-mm DDS-3, or SLR
External Mass Storage	
Host adapters	Supports up to ten single- or dual-channel, single-ended or differential, fast/wide or UltraSCSI PCI host adapters; up to 8 100-MB/sec FC-AL host bus adapters
Disk	Supports up to twenty 108-GB SPARCstorage™ MultiPack™ systems (2-TB) Supports up to; 14 A1000/D1000s, 2 A3500s, 16 A5000s, 1 A7000
Tape	Supports up to four SCSI tape devices from onboard SCSI Supports up to 16 SCSI tape devices, total 8-mm, 4-mm DDS-2, DDS-3, DLT, QIC, SLR
Console Options	
Monitor	17- or 24-in. color
Frame buffer	256-color PGX graphics card
Keyboard and mouse	Standard Sun™ keyboard and mouse
PCI I/O Options	
10/100-Mb/sec Ethernet, QuadFastEthernet, Gigabit Ethernet, Token Ring, FDDI single attach, FDDI dual attach, ATM-155, ATM-622, high-speed serial, eight-line serial, UltraSCSI with 10/100 Mb/sec Ethernet, dual-channel single-ended UltraSCSI, dual-channel differential UltraSCSI, 100-MB/sec FCAL	
Power Supplies	
Type	One, two, or three modular, N+1 redundant, hot swap, universal input (two supplies standard)



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Output	1120W maximum, 560W maximum each supply
Power bus	Common, load-sharing
Software	
Operating system	Solaris 2.5.1 Nov 97 Release or later, Solaris 2.6 May 98 or later, or Solaris 7
Languages	C, C++, Cobol, FORTRAN, Java™, Pascal
Networking	ONC+™, NFS™, TCP/IP, IPX/SPX, SunLink™ OSI, MHS, DCE, DNI, SNA, X.25, PPP, XTL, Frame Relay
System monitoring	Solstice™ SymON™
System and Network Management	
Solstice JumpStart™, Solaris Web Start, Solstice AdminSuite™, Solstice DiskSuite™, Solstice Backup™ (single server), and other Solstice products	
Environment	
AC power	90-264 VAC, 47-63 Hz
AC service requirement	15A at 110V, 7.5A at 240V Maximum power consumption 1664 watts
Heat output	5,680 BTU/hr, maximum
Operating	5° C to 40° C (41° F to 104° F) at sea level, derated to 35° C at 3000 meters (10,000 feet) 20% to 80% relative humidity, noncondensing
Nonoperating	-20° C to 60° C (-4° F to 140° F) at 5% to 93% relative humidity, noncondensing
Acoustic noise	6.9 bels
Declared noise	emissions in accordance with ISO 9296, measured at 23° C
Regulations	
Meets or exceeds the following requirements:	
Safety	UL 1950 and CB-scheme EN60950 with Nordic Deviations, CUL C22.2 No. 950, TUV EN60950
RFI/EMI	FCC Class B, Industry Canada Class B, EN55022/CISPR22 Class B, VCCI Class B
Immunity	EN50082-1/IEC1000-4-2, IEC1000-4-3, IEC1000-4-4, IEC1000-4-5
Harmonics	EN61000-3-2/IEC1000-3-2
Dimensions and Weights	
Height	58.1 cm (22.87 in.)
Width	44.8 cm (17.64 in.)
Depth	69.6 cm (27.40 in.)
Weight	94.0 kg (205 lb.)
Rack Mounting	



The Sun Enterprise 450 can be mounted in a standard 19-in. rack. The optional rackmounting kit consists of a depth-adjustable, slide-mounted shelf and retaining bracket.



Investment Protection

As businesses leverage Sun's scalable server family to meet increasing market demands, their current Sun Server investment can be leveraged as well. Sun provides the ability to migrate Sun memory, disk drives and CPU modules to the latest Workgroup Enterprise Servers.

Specifically, the Sun Enterprise 450 will support our customer's current investment in:

- 32MB or higher memory DIMMS
- 1" high 2.1GB or 4.2GB disk drives
- 300MHz UltraSPARC CPU modules

In addition, Sun's aggressive upgrade program gives an affordable way to trade-in older Sun or competitive servers and move up to Sun's Workgroup Enterprise Server family.

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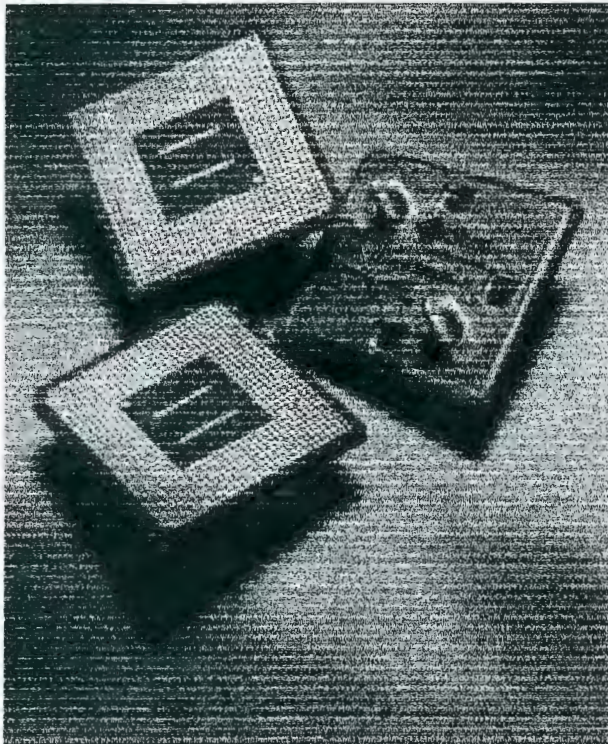
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UltraSPARC™ II Microprocessor

High-Performance, Highly-Scalable, Multiprocessing, 64-bit SPARC™ V9 RISC Microprocessor



The state-of-the-art UltraSPARC™ II processor is the second generation in the UltraSPARC s-series microprocessor family. A complete implementation of the SPARC™ V9 architecture, the UltraSPARC II processor is binary compatible with all previous versions of SPARC processors, resulting in an increased return on your investment. Designed for scalability from mainstream workstations at the low end up to supercomputing servers at the high end, the UltraSPARC II processor delivers high performance and reliability. Meeting and exceeding the demands of today's compute-intensive, network-centric, multimedia-rich applications, the UltraSPARC II processor implements innovative technologies that help lower the end user's total cost of ownership.

The UltraSPARC II processor microarchitecture is designed to provide up to 4-way glueless multiprocessing support and supports up to 64-way systems. The processor supports multiple L2 cache speeds and sizes to enable high-performance multiprocessing systems.

Balanced overall system performance requires optimal performance along *three* critical levels: memory bandwidth, media processing, and raw compute performance. A highly-scalable, high-performance system interconnect ensures a bottleneck-free computing environment resulting in high memory bandwidth. VIS™ (Visual Instruction Set) multimedia extensions boost the performance of graphics-intensive multimedia applications, and thus reduce overall system costs by eliminating the need for a special-purpose media processor. And the UltraSPARC II delivers superior raw compute performance by using the most innovative RISC microprocessor architecture and state-of-the-art process technology.

The UltraSPARC II processor not only helps the system designer by implementing industry-standard testing and instrumentation interfaces, it also uses Error Checking & Correction (ECC) and parity to increase system reliability. With high performance, high scalability, and high reliability, the UltraSPARC II is the processor of choice for today's workstations and servers.

FEATURES

- Full 64-bit implementation of SPARC V9 architecture
- 100% binary compatibility with previous versions of SPARC systems
- Built-in MP support (glueless 4-way and up to 64-way)
- High-performance UPA system interconnect
- Performance Scalability (frequency range: 250-480MHz; L2 cache support: 256KB-16MB)
- VIS multimedia accelerating instructions
- Block load and store instructions
- Multiple SRAM modes (variable speed L2 cache)
- JTAG boundary scan and performance instrumentation
- Error Checking & Correction (ECC) and Parity
- State-of-the-art 0.25 micron technology and packaging
- Superscalar/Superpipelined high-performance micro-architecture

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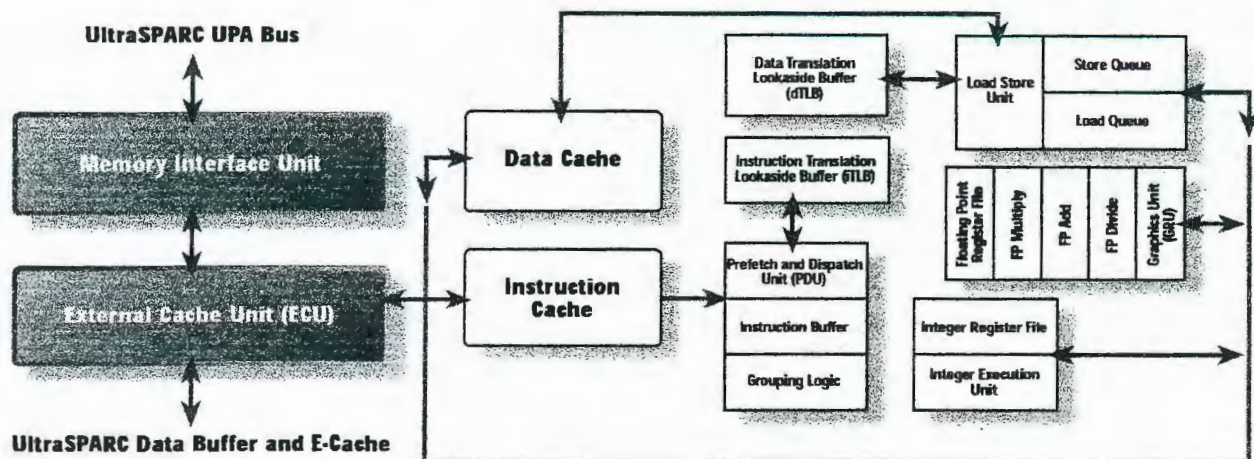
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UltraSPARC II Microprocessor Architecture



UltraSPARC II Microprocessor Specifications

Transistors:	5.4M
Process technology:	0.25 micron, 5 metal layers
Die size:	126 mm sq.
Frequency range:	250-480MHz
Core voltage:	1.9V
Power dissipation:	21W @ 400MHz
On-chip instruction cache:	16KB
On-chip data cache:	16KB
L2 cache size:	256KB-16MB
SRAM clocking ratios:	1-1-1, 2-2
Max. Bandwidth to L2 cache:	5333MB/sec
CPU to system clocking ratios:	2:1, 3:1, 4:1
Max. bandwidth to memory:	1.92GB/sec @ 120MHz UPA
Outstanding memory requests:	3 loads, 2 stores
Software data prefetch:	yes
Integer execution units:	4
Floating-point execution units:	3
Graphics execution unit:	1
System Performance (est):	19.6 (SPECint95) and 27.1 (SPECfp95) @ 450MHz
System I/O voltage:	3.3V



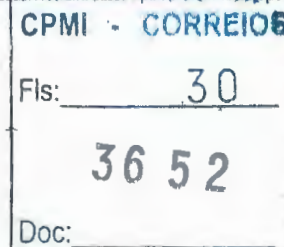
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Palo Alto, CA 94303
800-681-8845

<http://www.sun.com/microelectronics>

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Sweden +46 8 623 9250

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Japan +81-3-5717-5060
Korea +82-3-469-0298
Singapore +65-438-1888 x58677

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11/98 PBN 0140-01



SPECint_rate95

Sun Microsystems

Ultra 450

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If you wish to print this information we highly recommend using the [postscript reporting page](#).

SPECint_rate95 229

SPECint_rate_base95 186

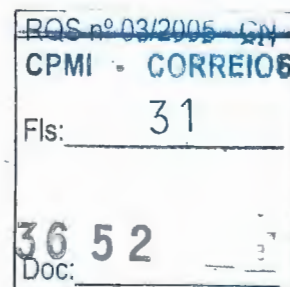
Benchmark # and Name	Base # Copies	Base Run Time	Base SPEC Ratio	Peak # Copies	Peak Run Time	Peak SPEC Ratio
099.go	2	392	211	2	390	212
124.m88ksim	2	183	187	2	135	254
126.gcc	2	157	194	2	145	211
129.compress	2	157	206	2	130	250
130.li	2	225	152	2	143	239
132.jpeg	2	227	190	2	221	196
134.perl	2	199	172	2	130	264
147.vortex	2	268	181	2	227	214
SPECint_rate_base95			186			
			SPECint_rate95			229

Tester Information:

SPEC License #:	6
Tested By:	Sun, Palo Alto
Test Date:	Apr-98
Hardware Avail:	Jul-98
Software Avail:	Oct-98

Hardware Information:

Model Name:	Ultra 450
CPU:	296 MHz UltraSPARC-II
FPU:	Integrated
Number of CPU(s):	2
Primary Cache:	16KBI+16KBD on chip
Secondary Cache:	2MB(I+D) off chip
Other Cache:	None
Memory:	512MB
Disk Subsystem:	2 x 4.0GB
Other Hardware:	Fast Ethernet



System clock frequency: 99 MHz

Software Information:

Operating System:	Solaris 2.6 3/98
Compiler:	Sun C SC5.0 EFT1 (8/98)
File System:	UFS
System State:	Single User
Kernel Extensions:	consistent_coloring=1



Notes:

```
P1= -xprofile=collect:`pwd`/../feedback
P2= -xprofile=use:`pwd`/../feedback
Baseline: -fast -xO5 -xarch=v8plusa
Baseline: PASS1= ${P1}; PASS2= ${P2}
Peak: -fast -xO4 -xarch=v8plusa -xchip=ultra
099.go: -fast -xO4 -xarch=v8plus -xrestrict -xcrossfile -W2,-O4+ansi_alias+bopt
099.go: PASS1= ${P1}; PASS2= ${P2} ${ALIGN} -dn
124.m88ksim: -fast -xO5 -xsafe=mem -xarch=v8plus -xcrossfile -xrestrict -W2,-O4+cond_elim+
124.m88ksim: PASS1= ${P1}; PASS2= ${P2} -dn
126.gcc: -fast -xO4 -xarch=v8plus -W2,-O4+ansi_alias+cond_elim
126.gcc: PASS1= ${P1}; PASS2= ${P2}
129.compress: -fast -xO5 -xsafe=mem -xarch=v8plus -xrestrict -W2,-O4+ansi_alias+pde -Wc,-Q
129.compress: PASS1= ${P1}; PASS2= ${P2} -dn
130.li: PASS1= -fast -xO4 -xarch=v8plus -xcrossfile ${P1}
130.li: PASS2= -fast -xO5 -xsafe=mem -xarch=v8plus -xcrossfile -W2,-O4+ansi_alias+cond_eli
132.jpeg: -fast -xO5 -xsafe=mem -xarch=v8plus -W2,-O4+ansi_alias+cond_elim
132.jpeg: PASS1= ${P1}; PASS2= ${P2} -dn
134.perl: -fast -xO4 ${CULTRA} -xcrossfile -W2,-ANSI_S,-Mpl,-O4+cond_elim -Wc,-Qiselect-sw
134.perl: PASS1= ${P1}; PASS2= ${P2} -dn
147.vortex: PASS1= -fast -xO4 -xarch=v8plus -xcrossfile ${P1}
147.vortex: PASS2= -fast -xO5 -xsafe=mem -xarch=v8plus -xcrossfile ${P2} -W2,-O4+cond_elim
Portability: 124.m88ksim, 132.jpeg: -DSYSV -Xc, 126.gcc: -Dalloca=__builtin_alloca -Xc
others: -Xc
Shell limits: # ulimit -n 1024 or % limit descriptors 1024
Config file: ultra450_int.cfg
```

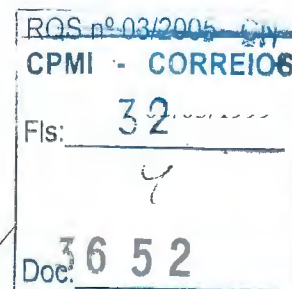
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SPECfp_rate95**Sun Microsystems****Ultra 450**

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SPECfp_rate95 **338**
 SPECfp_rate_base95 **296**

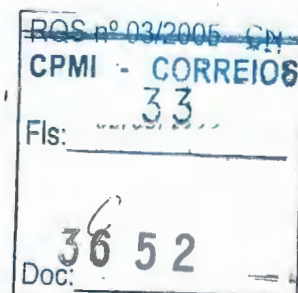
Benchmark # and Name	Base # Copies	Base Run Time	Base SPEC Ratio	Peak # Copies	Peak Run Time	Peak SPEC Ratio
101.tomcatv	2	152	440	2	126	527
102.swim	2	266	581	2	231	670
103.su2cor	2	126	200	2	128	197
104.hydro2d	2	256	169	2	244	177
107.mgrid	2	144	312	2	143	314
110.applu	2	226	175	2	174	228
125.turb3d	2	287	257	2	273	270
141.apsi	2	102	370	2	99	381
145.fpppp	2	549	315	4	713	485
146.wave5	2	147	367	2	120	448
SPECfp_rate_base95			296			
			SPECfp_rate95			338

Tester Information:

SPEC License #:	6
Tested By:	Sun, Palo Alto
Test Date:	Jul-98
Hardware Avail:	Jul-98
Software Avail:	Oct-98

Hardware Information:

Model Name:	Ultra 450
CPU:	296 MHz UltraSPARC-II
FPU:	Integrated
Number of CPU(s):	2
Primary Cache:	16KBI+16KBD on chip
Secondary Cache:	2MB(I+D) off chip
Other Cache:	None
Memory:	512MB



Disk Subsystem:	2 x 4.0GB
Other Hardware:	Fast Ethernet
	System clock frequency: 99 MHz

**Software Information:**

Operating System:	Solaris 2.6 3/98
Compiler:	Sun f77 SF775.0 EFT1 (8/98)
File System:	UFS
System State:	Single User
Kernel Extensions:	consistent_coloring=1

Notes:

```

P1= -xprofile=collect:`pwd`/../../feedback
P2= -xprofile=use:`pwd`/../../feedback
BCOPY=-Qoption iropt -O4+bcopy; INV=-Qoption iropt -O4+invccexp; BMR=-Qoption iropt -O4+bm
Baseline: -fast -xarch=v8plusa -fsimple=2 -xprefetch
Peak:      -fast -xO4 -xarch=v8plusa -xchip=ultra
101.tomcatv: -fast -xarch=v8plusa -xpad=local:23 -xprefetch -Qoption iropt -O4+data_access
102.swim:    -fast -xarch=v8plusa -xpad=common:15 -xprefetch -fsimple=2
103.su2cor:  -fast -xarch=v8plusa -xvector -Qoption cg -Qms_pipe+nfl1=5 -fsimple=2 ${BCOPY}
103.su2cor:  PASS1= -xO4 ${P1}; PASS2= -xO5 -xsafe=mem ${P2}
104.hydro2d: -fast -xarch=v8plusa -xprefetch -Qoption iropt -O4+pde -fsimple=2
104.hydro2d: PASS1= ${P1}; PASS2= ${P2}
107.mgrid:   -fast -xarch=v8plusa -xprefetch -fsimple=2 ${BCOPY}
107.mgrid:   PASS1= -xO4 ${P1}; PASS2= -xO5 -xsafe=mem ${P2}
110.applu:   -fast -xarch=v8plusa -Qoption iropt -O4+scalarrep+ddint+perfect+loop_dist+pde
125.turb3d:  -fast -xarch=v8plusa -stackvar -xpad -fsimple=2 -Qoption iropt -O4+bcopy ${INV}
125.turb3d:  PASS1= -xO4 ${P1}; PASS2= -xO5 -xsafe=mem ${P2}
141.apsi:    -fast -xarch=v8plusa -xchip=ultra3 -fsimple=2 -stackvar -Qoption iropt -Si36
141.apsi:    PASS1= -xO4 ${P1}; PASS2= -xO5 -xsafe=mem ${P2}
145.fpppp:   -fast -xarch=v8plusa -xO5 -xsafe=mem -fsimple=2 -nodepend -Qoption iropt -O4+
145.fpppp:   PASS1= ${P1}; PASS2= ${P2}
146.wave5:   -fast -xarch=v8plusa -stackvar -fsimple=2 -Qoption iropt -O4+unroll ${BCOPY}
Shell limits: # ulimit -n 1024 or % limit descriptors 1024
Config file: ultra450_fp.cfg

```

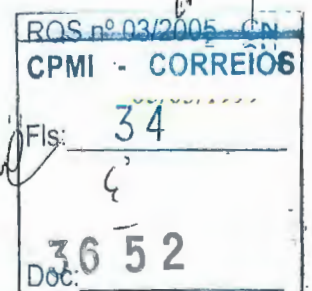
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MONITORS

- [24" Wide Screen Color Monitor](#)
- [21" Flat Screen Aperture Grille \(AG\) Color Monitor](#)
- [19" Flat Screen Aperture Grille \(AG\) Color Monitor](#)
- [18.1" TFT LCD Monitor](#) **NEW!**
- [17" Sun Color Monitor](#)

**24" Wide Screen Color Monitor**

- 24-inch CRT size, 22.5" viewable area
- 0.26mm aperture grille pitch
- Up to 1920 x 1200 @ 70Hz (16:10 aspect ratio mode)
- 2-meter non-detachable 13W3 video input cable and HD15-pin video input connector
- 580mm (W) x 500mm (H) x 548mm (D)

21" Flat Screen Aperture Grille (AG) Color Monitor (new)

- 21-inch Flat Screen AG CRT, 19.8" viewable area
- 0.24mm aperture grille pitch
- 1152x900 @ 66Hz, 76Hz
- 1280x1024 @ 67Hz, 76Hz
- 1600x1200 @ 75Hz
- 2-meter non-detachable 13W3 video input cable and HD15-pin video input connector
- 499mm (W) x 495mm (H) x 500mm (D)

19" Flat Screen Aperture Grille (AG) Color Monitor (new)

- 19-inch Flat Screen AG CRT, 18" viewable area
- 0.24mm aperture grille pitch
- 1152x900 @ 66Hz, 76Hz
- 1280x1024 @ 67Hz, 76Hz
- 1600x1200 @ 75Hz
- 2-meter non-detachable HD15-pin video input cable
- 449mm(W) x 463mm(H) x 463mm (D)

RQS nº 03/2005 - CN

CPMI 10/01/05 **CORREIOS**

Fis: 35

3652

Doc: _____

18.1" TFT LCD Monitor (new)



- 18.1" actual viewable area (equivalent to 19" CRT)
- 0.28mm pixel pitch
- True 24-bit, 256 gray scale levels, 16.7M colors
- 1280x1024 @ 60Hz* or 76Hz
- 160 degree horizontally and vertically
- < 50W POWER
- Analog interface
- 2-meter detachable 13W3 video input cable and HD15-pin video input connector
- Complete assembly:
 - * Total width: 449.5mm
 - * Total Height: 459.8mm
 - * Total Depth: 218.6mm
- (*) recommended resolution on the 18.1" flat panel
- Wall-mounting capability - wall-mounting solutions from Ergotron, Inc.
- Security Lock Slot



17" Sun Color Monitor



- 15.7" viewable image size
- 0.28mm dot pitch
- 1152 x 900 @ 66Hz, 76Hz
- 1024x x 768 @ 60Hz, 75Hz for JavaStation platforms
- 800 x 600 @ 75Hz for JavaStation platforms
- 2-meter non detachable HD15 pin video signal cable

Handwritten signature

RQS nº 03/2005 CN

CPMI - CORREIOS

Fls: 36

36 52

Doc: _____



SERVIDOR DE REDE TIPO RISC2

DOCUMENTOS DO FABRICANTE

COBRA Computadores e Sistemas Brasileiros S.A.
Estrada dos Bandeirantes 7966
CEP 22783-110 Rio de Janeiro RJ
Tel. 21 442-8800
www.cobra.com.br

Handwritten signature: *AK*

Handwritten signature: *[Signature]*

Stamp: **RECEBOS nº 03/0005 CN**

Stamp: **CPMI - CORREIOS**

Stamp: **37**

Stamp: **36 52**

Stamp: **Doc:**



São Paulo, 02 de maio de 2000.

À

ECT Empresa Brasileira de Correios e Telégrafos
Comissão Especial de Licitação da Administração Central – CEL/AC
SBN Quadra 01 Bloco A 4º andar – Ala Norte – Brasília-DF
CEP 70002-900
Att. Sr. Benedito Medeiros Neto
Presidente da CEL/AC.

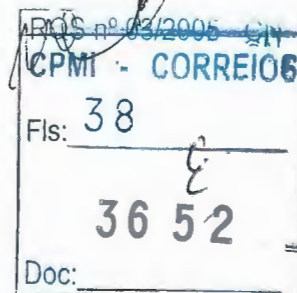
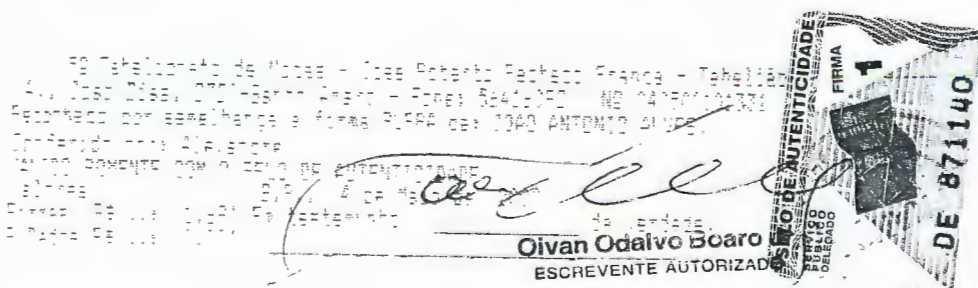
Ref.: Concorrência 001/2000 – CPL/AC
Abertura: 03/05/2000 às 9:30hs.

DECLARAÇÃO

Nós, da Sun Microsystems do Brasil, inscrita no CNPJ sob nº. 65.497.745/0001-53, estabelecida na Rua Alexandre Dumas, 2016 – Chácara Santo Antonio – 04717-004, São Paulo/SP., subsidiária da Sun Microsystems Inc., declaramos que o Servidor Sun Ultra 10 ofertado pela empresa Cobra – Computadores e Sistemas Brasileiros S.A., inscrita no CNPJ sob o n.o 42.318.949/0001-84, sediada na Estrada dos Bandeirantes, 7.966, Jacarepaguá, Rio de Janeiro, RJ, em sua proposta técnica, SERVIDOR DE REDE TIPO RISC 2, é imune a Quaisquer problemas decorrentes do "Bug do milênio".

Por ser expressão da verdade, firmamos a presente,

SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antônio Alves
Country Manager





São Paulo, 02 de maio de 2000.

À

ECT Empresa Brasileira de Correios e Telégrafos
Comissão Especial de Licitação da Administração Central - CEL/AC
SBN Quadra 01 Bloco A 4º andar - Ala Norte - Brasília-DF
CEP 70002-900
Att. Sr. Benedito Medeiros Neto
Presidente da CEL/AC.

Ref.: Concorrência 001/2000 - CPL/AC

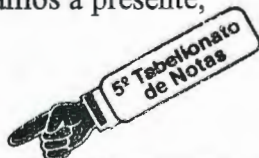
Abertura: 03/05/2000 às 9:30hs.

DECLARAÇÃO

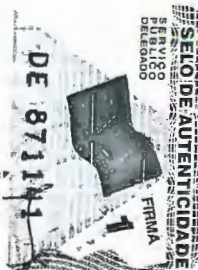
Nós, da Sun Microsystems do Brasil, inscrita no CNPJ sob nº. 65.497.745/0001-53, estabelecida na Rua Alexandre Dumas, 2016 - Chácara Santo Antonio - 04717-004, São Paulo/SP., subsidiária da Sun Microsystems Inc., declaramos que o Servidor Sun Ultra 10 ofertado pela empresa Cobra - Computadores e Sistemas Brasileiros S.A., inscrita no CNPJ sob o n.º 42.318.949/0001-84, sediada na Estrada dos Bandeirantes, 7.966, Jacarepaguá, Rio de Janeiro, RJ, em sua proposta técnica, SERVIDOR DE REDE TIPO RISC 2, possui mouse de 3 teclas, com resolução de 320 dpi, mouse-pad e driver de instalação.

Por ser expressão da verdade, firmamos a presente,

João Alves



SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antônio Alves
Country Manager



Oivan Odalvo Boaro Jr
ESCRIVENTE AUTORIZADO

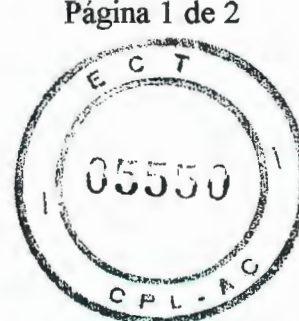
RQ5 nº 03/2005

CPMI - CORREIO6

Fls: 39

36 52

Doc:



SPECfp95

Sun Microsystems

Ultra 10 Model 440

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SPECfp95 22.7

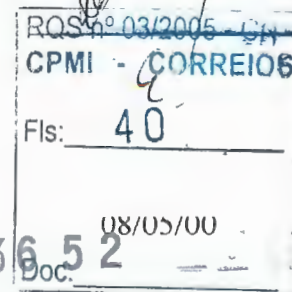
SPECfp_base95 19.8

Benchmark # and Name	Reference Time	Base Run Time	Base SPEC Ratio	Peak Run Time	Peak SPEC Ratio
101.tomcatv	3700	133	27.8	116	31.9
102.swim	8600	227	37.8	206	41.8
103.su2cor	1400	110	12.7	95	14.7
104.hydro2d	2400	233	10.3	220	10.9
107.mgrid	2500	133	18.8	131	19.1
110.applu	2200	188	11.7	149	14.8
125.turb3d	4100	218	18.8	217	18.9
141.apsi	2100	77.0	27.3	70	29.9
145.fpppp	9600	423	22.7	265	36.3
146.wave5	3000	113	26.6	101	29.6
SPECfp_base95			19.8		
			SPECfp95		22.7

Tester Information:

SPEC License #:	6
Tested By:	Sun, Palo Alto
Test Date:	Apr-99
Hardware Avail:	May-99
Software Avail:	Feb-99

Hardware Information:



Model Name:	Ultra 10 Model 440
CPU:	440 MHz UltraSPARC-III
FPU:	Integrated
Number of CPU(s):	1
Primary Cache:	16KBI+16KBD on chip
Secondary Cache:	2MB(I+D) off chip
Other Cache:	None
Memory:	512MB
Disk Subsystem:	2 x 9GB (7200 RPM)
Other Hardware:	Fast Ethernet
	System clock frequency: 110 MHz



Software Information:

Operating System:	Solaris 7 (64bit)
Compiler:	Sun WorkShop FORTRAN 77 5.0
File System:	UFS
System State:	Single User
Kernel Extensions:	consistent_coloring=1

Notes:

P1= -xprofile=collect:`pwd`/../../feedback; P2= -xprofile=use:`pwd`/../../feedback; FO
 BCOPY = -Qoption iropt -O4+bcopy; INV = -Qoption iropt -O4+invccexp; BMR = -Qopt
 Baseline: -fast -xarch=v8plusa -fsimple=2 -xprefetch
 101.tomcatv: -fast -xarch=v8plusa -xpad=local:23 -xprefetch -Qoption iropt -O4+d
 102.swim: -fast -xarch=v8plusa -xpad=common:15 -xprefetch -fsimple=2
 103.su2cor: \${FOPTION} -xvector -Qoption cg -Qms_pipe+nfll=5 -fsimple=2 \${BCOPY
 103.su2cor: PASS1= -xO4 \${P1}; PASS2= -xO5 -xsafe=mem \${P2}
 104.hydro2d: \${FOPTION} -xprefetch -Qoption iropt -O4+pde -fsimple=2
 104.hydro2d: PASS1= \${P1}; PASS2= \${P2}
 107.mgrid: \${FOPTION} -xprefetch -fsimple=2 \${BCOPY}
 107.mgrid: PASS1= -xO4 \${P1}; PASS2= -xO5 -xsafe=mem \${P2}
 110.applu: -fast -xarch=v8plusa -Qoption iropt -O4+scalarrep+ddint+perfect+loo
 125.turb3d: \${FOPTION} -stackvar -xpad -fsimple=2 -Qoption iropt -O4+bcopy \${IN
 125.turb3d: PASS1= -xO4 \${P1}; PASS2= -xO5 -xsafe=mem \${P2}
 141.apsi: \${FOPTION} -fsimple=2 -stackvar -Qoption iropt -Si36 \${INV} \${BMR
 141.apsi: PASS1= -xO4 \${P1}; PASS2= -xO5 -xsafe=mem \${P2}
 145.fpppp: -fast -xarch=v8plusa -xO5 -xsafe=mem -fsimple=2 -nodepend -Qoption
 145.fpppp: PASS1= \${P1}; PASS2= \${P2}
 146.wave5: \${FOPTION} -stackvar -fsimple=2 -Qoption iropt -O4+unroll \${BCOPY}
 Shell limits: # ulimit -n 1024 or % limit descriptors 1024
 Config file: ultrabest.cfg

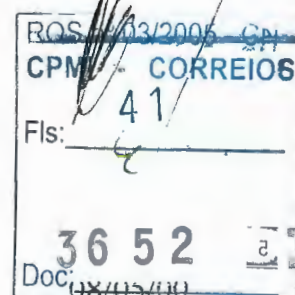
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SPECint95

Sun Microsystems

Ultra 10 Model 440

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SPECint95 18.1
SPECint_base95 15.0

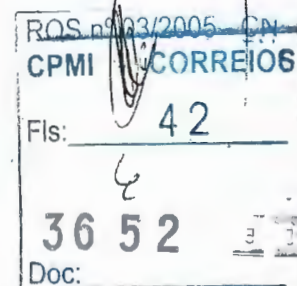
Benchmark # and Name	Reference Time	Base Run Time	Base SPEC Ratio	Peak Run Time	Peak SPEC Ratio
099.go	4600	290	15.9	283	16.2
124.m88ksim	1900	134	14.2	86	22.0
126.gcc	1700	106	16.0	105	16.3
129.compress	1800	104	17.3	88	20.5
130.li	1900	149	12.7	106	18.0
132.jpeg	2400	152	15.8	153	15.7
134.perl	1900	130	14.6	93	20.4
147.vortex	2700	197	13.7	159	17.0
SPECint_base95			15.0		
			SPECint95		18.1

Tester Information:

SPEC License #:	6
Tested By:	Sun, Palo Alto
Test Date:	Apr-99
Hardware Avail:	May-99
Software Avail:	Feb-99

Hardware Information:

Model Name:	Ultra 10 Model 440
CPU:	440 MHz UltraSPARC-IIi
FPU:	Integrated
Number of CPU(s):	1
Primary Cache:	16KBI+16KBD on chip
Secondary Cache:	2MB(I+D) off chip
Other Cache:	None





Memory:	512MB
Disk Subsystem:	2 x 9GB (7200 RPM)
Other Hardware:	Fast Ethernet
	System clock frequency: 110 MHz

Software Information:

Operating System:	Solaris 7 (64bit)
Compiler:	Sun WorkShop C 5.0
File System:	UFS
System State:	Single User
Kernel Extensions:	consistent_coloring=1

Notes:

```
P1= -xprofile=collect:`pwd`/../feedback; P2= -xprofile=use:`pwd`/../feedback; FO
Baseline: -fast -xO5 -xarch=v8plusa
Baseline: PASS1= ${P1}; PASS2= ${P2}
099.go: -fast -xO5 -xarch=v8plusa
099.go: PASS1= ${P1}; PASS2= ${P2} -dn
124.m88ksim: ${FOPTION} -xO5 -xsafe=mem -xcrossfile -xrestrict -W2,-O4+cond_eli
124.m88ksim: PASS1= ${P1}; PASS2= ${P2} -dn
126.gcc: ${FOPTION} -xO4 -W2,-O4+ansi_alias+cond_elim
126.gcc: PASS1= ${P1}; PASS2= ${P2}
129.compress: ${FOPTION} -xO5 -xrestrict -W2,-O4+ansi_alias+pde -Wc,-Qms_pipe+un
129.compress: PASS1= ${P1}; PASS2= ${P2} -dn
130.li: PASS1= -xO4 -xcrossfile ${P1}
130.li: PASS2= -xO5 -xsafe=mem -xcrossfile -W2,-O4+ansi_alias+cond_elim+pde,-Mt3
132.jpeg: ${FOPTION} -xO5 -xsafe=mem -W2,-O4+ansi_alias+cond_elim
132.jpeg: PASS1= ${P1}; PASS2= ${P2} -dn
134.perl: ${FOPTION} -xO4 -xcrossfile -W2,-ANSI_S,-Mpl,-O4+cond_elim -Wc,-Qisel
134.perl: EXTRA_LIBS= -lfast; PASS1= ${P1}; PASS2= ${P2} -dn
147.vortex: PASS1= -xO4 -xcrossfile ${P1}
147.vortex: PASS2= -xO5 -xsafe=mem -xcrossfile ${P2} -W2,-O4+cond_elim,-Mt500,-M
Portability: 124.m88ksim, 132.jpeg: -DSYSV -Xc, 126.gcc: -Dalloca=__builtin_all
others: -Xc
Shell limits: # ulimit -n 1024 or % limit descriptors 1024
Config file: u5best.cfg
```

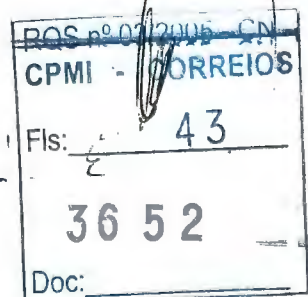
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Positioning



Figure 1. The Sun Ultra 10 workstation

The Sun UltraTM 10 workstation is based upon the UltraSPARCTM-III processor running at 440 MHz. The Ultra 10 workstation features PCI I/O, Sun's Ultra port architecture (UPA), a high-speed graphics interconnect slot, and a mini-tower enclosure, which allows for additional PCI card expansion, memory expansion, SunTM Creator3D and Sun Elite3D m3 and m6 graphics accelerators.

The Ultra 10 workstation allows Sun to compete on both price and performance with Pentium-II, Pentium-III, and Xeon-class PC personal workstations. When combined with the optional UPA graphics cards, the Ultra 10 workstation offers powerful computing and world-class graphics performance at aggressive prices.

The Ultra 10 workstation includes the following features:

- **Processor**
 - 440-MHz UltraSPARC-III
 - 2-MB external cache
- **Graphics**
 - Onboard PGX24TM 24-bit graphics, standard
 - Sun Creator3D graphics
 - Sun Elite3D m3 graphics
 - Sun Elite3D m6 graphics
- **Internal storage**
 - Up to two 9.1-GB, 7200-rpm EIDE hard disks
 - 32X-speed CD-ROM drive standard
 - 1.44-MB floppy standard
- **Memory**
 - Up to 1-GB EDO error correcting DRAM (50 ns)
- **Networking**
 - 10/100BASE-T Ethernet

New Features on the Ultra 10 Workstation

The Ultra 10 workstation now offers configurations featuring new Sun Elite3D series 2 graphics. The new Sun Elite3D series 2 graphics product line incorporates hardware acceleration for geometry decompression. Sun Elite3D series 2 graphics frame buffers will replace existing Sun Elite3D series 1 configurations.

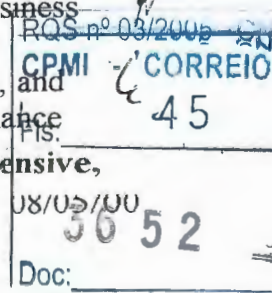
Key Messages

- **High performance for an entry price-point workstation**

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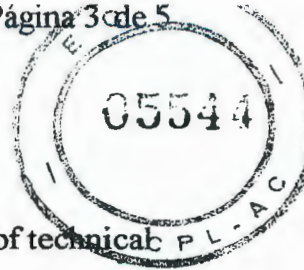
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- o 440-MHz UltraSPARC-III processor with 2-MB external cache
- o Up to 1 GB of 168-pin, 50 ns EDO JEDEC DRAM with ECC error correction
- o Provides both performance and capacity for the most demanding technical applications and solutions
- **Powerful graphics for interactive media and 3-D applications**
 - o UPA slot provides a fast, large-bandwidth data path from processor to UPA graphics cards
 - o Integrated visual instruction set (VIS™) in the UltraSPARC-III processor provides support for multimedia applications
 - o On-board PGX24 graphics provides 24-bit video support up to a resolution of 1152 x 900 and 8-bit support up to a resolution of 1280 x 1024. PGX24 can also be used to support a second monitor on systems configured with Sun Creator3D, Sun Elite3D m3, or Sun Elite3D m6 graphics accelerators.
 - o Advanced, fast 24-bit accelerated Sun Creator3D, Sun Elite3D m3, and Sun Elite3D m6 UPA graphics cards available
 - o Sun Creator3D graphics supports 24-bit color up to 1920 x 1200 resolution at 70 Hz on the 24-inch, wide-screen monitor
 - o The Ultra 10 workstation is clearly the entry point for Sun's high-performance graphics systems. Customers can choose the level of graphics performance they need now and in the future
- **Multiple PCI options available**
 - o Four full-size PCI slots provide access to a variety of Sun and third-party PCI cards
 - o High-speed networking, such as Sun Quad FastEthernet™, ATM, token ring, and FDDI, plus many more, are ready and available
 - o Additional graphics cards, SCSI expansion cards, and audio/video input cards are also available
 - o 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
- **Easy internal storage and expansion**
 - o Up to two fast internal 9.1-GB, 7200-rpm EIDE hard disks
 - o Internal mirroring supported on systems with two internal EIDE hard disks
 - o Internal 32X-speed EIDE CD-ROM, photo-CD compatible
 - o PCMCIA bay provided for third-party PCMCIA options
 - o Ample local storage capacity for large multimedia files, data, and technical applications
- **Advanced networking capabilities**
 - o Fast Ethernet, 100BASE-T, auto-sensing, and autoswitching down to 10BASE-T for backward compatibility
 - o Simply plug in and turn on; the Ultra 10 workstation adjusts automatically to the customer's network environment
- **Robust, reliable, scalable, secure, network-centric Solaris™ Operating Environment**
 - o The 64-bit, ready-to-run Solaris 7 and 8 Operating Environments are preinstalled on all Ultra 10 workstations
 - o The Solaris Operating Environment is one of the technical industry's leading enterprise operating environments with over 12,000 applications to choose from
 - o 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
 - o 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 the SunClient™ program, an inexpensive,**



customizable service and support plan

- o Allows customers to save costs by choosing only the services needed
- o Easy administration reduces administrative workload and costs
- o Another example of Sun's commitment to reducing the costs and overhead of technical computing for customers

**Product Family Placement**

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

Ultra 5	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. Target markets include software development, 2-D content creation, finance, EDA, telecommunications, and embedded systems.
Ultra 10	The Ultra 10 workstation 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. Target markets for this workstation include software development, MCAD, electronic design automation, financial analysis, and modeling. With the installation of Sun Elite3D m6 graphics, the applications are extended to include animation, 3-D content creation, and simulation.
Ultra 60	The Ultra 60 workstation is designed for the technical user who requires high performance and dual-processing capability. The target customer is the traditional "power desktop" user who has CPU performance, graphics performance, and expansion requirements that exceed the capabilities of the Ultra 10 workstation. The target markets for this workstation are the high-end MCAD/MCAE, oil and gas, finance, and scientific markets.
Ultra 80	The Ultra 80 workstation is Sun's high-end multiprocessor workstation for the user who requires extremely high-end performance. Like the Ultra 60 workstation, it addresses the needs of the power desktop user. The target applications for this workstation are the most demanding MCAD/MCAE, oil and gas, finance, and scientific markets.

Sun Ultra 10 Workstation Configurations

The Sun Ultra 10 workstation is offered in a variety of workstation configurations based upon the DRAM and graphics accelerator options.

Processor speed	440 MHz
Cache size	2 MB
SPECint_95	17.9
SPECfp_95	22.7

The graphics options are:

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- PGX24 24-bit graphics built into the motherboard with 4 MB of SGRAM
 - 24-bit support for up to 1152 x 900 resolution at 85 Hz
 - 8-bit support for up to 1280 x 1024 resolution at 76 Hz
- Accelerated 24-bit, 2-D PGX32 graphics with resolution support up to 1600 x 1200 dpi
- Accelerated 24-bit, 2-D and 3-D Sun Creator3D graphics with single-buffer resolution support up to 1920 x 1200 dpi
- Accelerated high-performance 24-bit, 2-D and 3-D Sun Elite3D m3 or Sun Elite3D m6 graphics

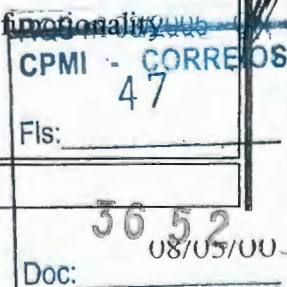
Target Users

The Ultra 10 workstation is ideal for customers who require a powerful workstation with exceptional graphics capabilities but do not need the added expansion and throughput capabilities of the Ultra 60 workstation. The Ultra 10 workstation spans the needs of the cost-conscious customers and those requiring more powerful and capable graphic options.

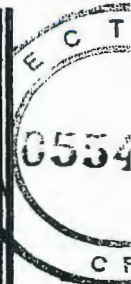
Target Markets

The market opportunities for the Sun Ultra 10 workstation are technical and commercial areas in which high-performance computing and advanced graphics capability are required.

Industry	Key Features to Highlight
Electronic Design (EDA)	
• Chip designers, board designers • System houses • Telco	• High-performance CPUs • High memory capacity • Availability of applications
Entertainment/DCC Industry	
• Animation and rendering • Displaying and viewing completed animations	• CPU performance • High-performance graphics
Financial	
• Stock and commodity traders • Banks	• High performance • Multimedia capabilities
Mechanical Design (MCAD/MCAE)	
• Automotive • Aerospace • Defense industry • Mechanical equipment designers	• High-performance CPUs • High-end graphics performance and functionality • Availability of applications
Publishing and Imaging	



• Newspapers • Magazines • Image banks • Advertising agencies	• High-performance CPUs • High-end performance and functionality for both graphics and imaging operations • Wide-screen 24-inch color monitors, 24-bit at 1920 x 1200 resolution (Sun Creator3D graphics only)
Research and Development	
• In-house development • Research institutions	• High computing performance • Feature-rich Solaris Operating Environment
Software and Java™ Development	
• ISVs • In-house development at large organizations	• High-performance Solaris Operating Environment • Availability of applications • Multithreaded application development



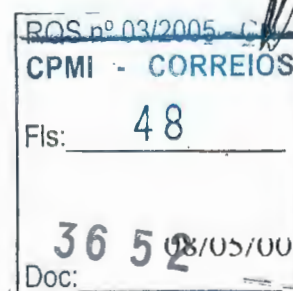
Availability

Ultra 10 workstations configurations with Sun Elite3D series 2 graphics began shipping in April 2000.

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Processor	
Architecture	440-MHz UltraSPARC-IIi
Cache	2 MB external
Memory	
1 GB maximum Four DIMM slots, 50ns 168-pin EDO JEDEC DIMMs	
Standard Interfaces	
Network	Ethernet/Fast Ethernet, twisted pair standard (10/100-BaseT)
Serial	One D-Sub 25-pin connector, synchronous/asynchronous One D-Sub 9-pin connector, asynchronous
Parallel	One D-Sub 25-pin connector, IEEE 1294 (bidirectional) VGA I/O
System I/O	PCI-IDE DMA master controller
Expansion	Four 32-bit PCI, 33-MHz slots (full size)
Mass Storage and Media	
Internal disk	3.5-in. Enhanced IDE HDD, 9.1-GB, 7200 rpm; bay for optional second 9.1-GB drive
Internal CD	One 1.6-in. 32X CD-ROM
Internal floppy disk	One 3.5-in. 1.44-MB floppy
PCMCIA	One front-access bay for third-party options
Console Options	
Monitor	17-, 19-, or 21-in. color 24-bit on-board graphics (standard)
Frame buffer	1024 x 768, 16-color PCI graphics card

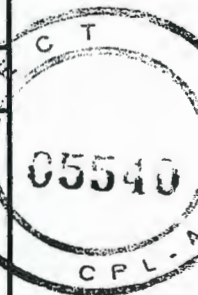
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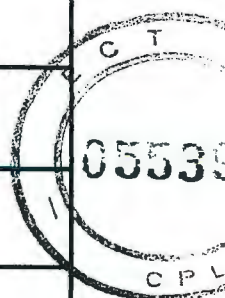
Keyboard and mouse	Standard Sun keyboard and mouse
PC I/O Options	
10/100-Mb/sec Ethernet, QuadFastEthernet, Token Ring, FDDI single attach, FDDI dual attach, ATM-155, ATM-622, high-speed serial, eight-line serial, UltraSCSI with 10/100-Mb/sec Ethernet dual-channel single-ended UltraSCSI, dual-channel differential UltraSCSI, Gigabit Ethernet 2.0 Adapter	
Software	
Operating system	Solaris™ 2.5.1, Solaris 2.6 or Solaris 7 operating environment Solaris Easy Access Server
Languages	C, C++, Cobol, FORTRAN, Java™, Pascal
Networking	ONC+™, NFS™, TCP/IP, IPX/SPX, Solaris PC NetLink, OSI, MHS, DCE, DNI, SNA, X.25, PPP, XTL, Frame Relay
System and Network Management	
Solstice JumpStart™, Solaris Web Start, Solstice AdminSuite™, Solstice DiskSuite™, Solstice Backup™	
Options	
Internal storage	9.1-GB EIDE drive
External storage	- Disk: 9-GB Sun StorEdge™ UP - 50-GB Sun StorEdge MP (12 drives, 4.1 or 2.1 GB per drive) - 54-GB Sun StorEdge MP (6 drives, 9.1 GB per drive) - Tape: 4- to 8-GB SLR Sun StorEdge UP or FP - 20- to 40-GB 8-mm Sun StorEdge UP or FP - 12- to 24-GB 4-mm DDS-3 Sun StorEdge UP - 72- to 144-GB 4-mm DDS-3 Sun StorEdge FP autoloader - 20- to 40-GB Sun StorEdge DLT™ 4000 - 35- to 70-GB Sun StorEdge DLT 7000 - 400-GB Sun StorEdge L400 - Sun StorEdge A1000/D1000
Environment	
AC power	100-240 VAC, 47-63 Hz, 0.4 K VA
Operating	5° C to 40° C (41° F to 104° F) 20% to 80% relative humidity, noncondensing
Nonoperating	-40° C to 60° C (-4° F to 140° F) 5% to 95% relative humidity, noncondensing



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Operating acoustic noise	6.1 bels
Idling acoustic noise	5.9 bels
Declared noise emissions in accordance with ISO 9296, measured at 23° C	
Regulations Meets or exceeds the following requirements:	
Safety	UL 1950, CSA C22.2 No. 950, TUV EN 60950, CB Scheme with Nordic deviations EMKO-TSE (74-SEC) 203, ZH1/618
RFI/EMI	FCC Class B, DOC Class B, VCCI Class 2, EN 55022 Class B, EN 61000-3-2
Immunity	EN 50082-1
X-ray	DHHS 21 Subchapter J; PTB German X-ray Decree
Dimensions and Weights	
Height	40.2 cm (15.8 in.)
Width	17.6 cm (6.9 in.)
Depth	43.5 cm (17.1 in.)
Shipping weight	20.0 kg (44 lb.)



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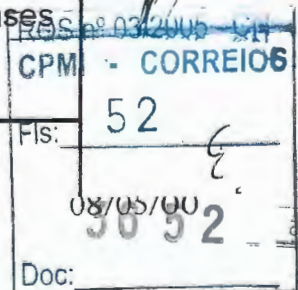
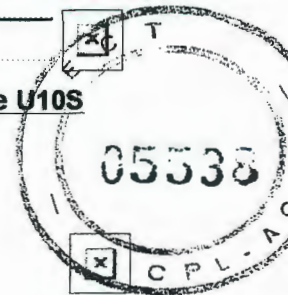
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Features	Benefits
New 440-MHz UltraSPARC-IIi processor with 2-MB external cache	Brings the technology and high performance of Sun's UltraSPARC processor family down into the entry-level workstation price range
Up to 1-GB EDO JEDEC DRAM with ECC error correction technology	Lower-priced memory allows customers to purchase the memory capacity for technical applications, 1-GB capacity allows large files to be moved into memory greatly improving performance
ECC error correction DRAM technology	Superior error correction increases the stability and reliability of the Sun Enterprise Ultra 10S in day-to-day use
Mini-Tower enclosure design	Provides ample space for adding additional storage devices, PCI expansion, and memory which allows the system to expand and meet a customer's current and future needs
PCI I/O Bus expansion	Access to industry-standard, Sun-qualified adapter cards for system expansion
Up to two high-capacity Enhanced IDE 9.1 GB internal hard disks	Less expensive, more cost-effective alternative to SCSI drives provides less-expensive storage capacity for customers
32X-speed internal Atapi CD-ROM drive	Provides access to large multimedia and data files, eases software installations and upgrades
On-board 10BASE-	Fast network connection,

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Ethernet, self sensing	customer's network environment; backward compatible
PCMCIA-ready front access bay with flip-up access door	PCMCIA capability is designed into the mini-tower enclosure making third-party PCMCIA options easy to add now or in the future (via PCI slot)
24-Bit on-board graphics	Better Graphics without card
Supports Solaris™ 2.5.1, Solaris 2.6, Solaris 7 operating environment	100 percent binary compatible to today's applications, allows customers to scale their needs up and down the server product line without changing their operating environment
Affordable	Workgroup performance at a competitive price
Integrated networking	Coexistence and cost-effective integration with the enterprise
High reliability and easy serviceability with clean, modular design and quality-tested operating system	Maximum up time
Solstice JumpStart™, Solstice AdminSuite™, Solstice Backup™, Solstice DiskSuite™	Easy to install and administer workgroups, printer, disks and arrays, and backup systems
TCP/IP, IPX™/SPX, optional Solaris™ PC Netlink and Solstice PC-Networking products	Integrates into any environment including PCs, Novell networks, mini computers, and mainframes
NIS+ enterprise-wide naming service	Global access and management of all network resources
NFS™, optional Solstice™ NW Server (NetWare), and Solstice™ LM Server (LAN Manager)	Provides powerful network file sharing services for PC or UNIX® clients
Binary-compatible, Solaris 2.x applications run unchanged	Access to thousands of applications



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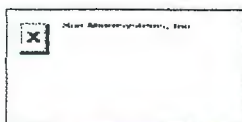
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Product Overview

The fast, affordable workgroup server with universal connectivity.

Sun's minitower entry-level workgroup server, the Sun Enterprise Ultra™ 10S, works seamlessly with all the diverse clients on your network: PCs, Macintosh systems, UNIX® workstations, network computers -- you name it. With the 440-MHz UltraSPARC™-Ili processor supporting up to 1 GB of memory, 4 PCI expansion slots, and up to 18.2 GB of internal storage, this system provides you with an excellent low-cost platform for business-critical network services. The Sun Enterprise Ultra 10S server is a fast, affordable solution for Web, e-mail, or file and print services. What's more, Solaris™ Easy Access Server -- an extension to Sun's robust Solaris™ operating environment -- delivers Web-based services with outstanding scalability and reliability. And all Sun servers and software are Year 2000 compliant.

Highlights

- Ideal as a Web server; also supports e-mail, file, and print.
- Solaris Web Start (available with Solaris 2.6 or later Operating Environment software) gets you up and running quickly.
- 440-MHz UltraSPARC-Ili processor delivers fast application performance.
- Room for two Enhanced IDE disks, 1-GB DRAM, and four PCI cards.
- Up to 18.2 GB of internal storage.
- 10/100-Mb/sec Ethernet for high-speed networking.
- Connects with any PC, Macintosh, network computer, or UNIX client on the network through Solaris Easy Access Server extension.

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SERVIDOR DE REDE TIPO RISC3

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COBRA Computadores e Sistemas Brasileiros S.A.
Estrada dos Bandeirantes 7966
CEP 22783-110 Rio de Janeiro RJ
Tel. 21 442-8800
www.cobra.com.br

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São Paulo, 02 de maio de 2000.

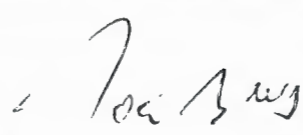
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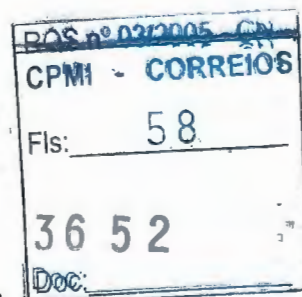
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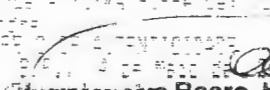
DECLARAÇÃO

Nós, da Sun Microsystems do Brasil, inscrita no CNPJ sob nº. 65.497.745/0001-53, estabelecida na Rua Alexandre Dumas, 2016 – Chácara Santo Antonio – 04717-004, São Paulo/SP., subsidiária da Sun Microsystems Inc., declaramos que o Servidor Sun Enterprise 4500 ofertado pela empresa Cobra – Computadores e Sistemas Brasileiros S.A., inscrita no CNPJ sob o n.º 42.318.949/0001-84, sediada na Estrada dos Bandeirantes, 7.966, Jacarepaguá, Rio de Janeiro, RJ, em sua proposta técnica, SERVIDOR DE REDE TIPO RISC 3, possui mouse de 3 teclas, com resolução de 320 dpi, mouse-pad e driver de instalação.

Por ser expressão da verdade, firmamos a presente.


SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antônio Alves
Country Manager




Silvan Gustavo Boaro Jr.
ESCREVENTE AUTORIZADO



São Paulo, 02 de maio de 2000.

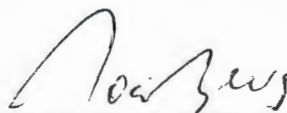
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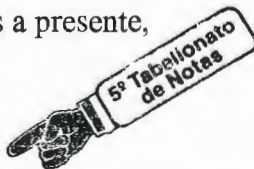
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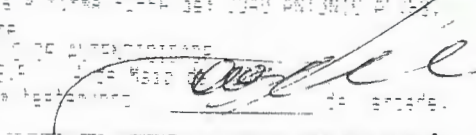
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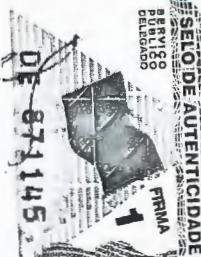
Nós, da Sun Microsystems do Brasil, inscrita no CNPJ sob nº. 65.497.745/0001-53, estabelecida na Rua Alexandre Dumas, 2016 – Chácara Santo Antonio – 04717-004, São Paulo/SP., subsidiária da Sun Microsystems Inc., declaramos que o Servidor Sun Enterprise 4500 ofertado pela empresa Cobra – Computadores e Sistemas Brasileiros S.A., inscrita no CNPJ sob o n.º 42.318.949/0001-84, sediada na Estrada dos Bandeirantes, 7.966, Jacarepaguá, Rio de Janeiro, RJ, em sua proposta técnica, SERVIDOR DE REDE TIPO RISC 3, é imune a Quaisquer problemas decorrentes do "Bug do milênio".

Por ser expressão da verdade, firmamos a presente,


SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antônio Alves
Country Manager




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São Paulo, 02 de maio de 2000.

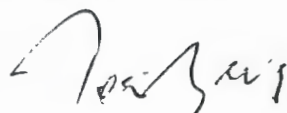
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Att. Sr. Benedito Medeiros Neto
Presidente da CEL/AC.

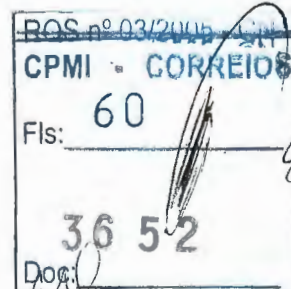
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Abertura: 03/05/2000 às 9:30hs.

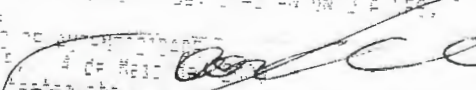
DECLARAÇÃO

Nós, da Sun Microsystems do Brasil, inscrita no CNPJ sob nº. 65.497.745/0001-53, estabelecida na Rua Alexandre Dumas, 2016 – Chácara Santo Antonio – 04717-004, São Paulo/SP., subsidiária da Sun Microsystems Inc., declaramos que o Servidor Sun Enterprise 4500 ofertado pela empresa Cobra – Computadores e Sistemas Brasileiros S.A., inscrita no CNPJ sob o n.º 42.318.949/0001-84, sediada na Estrada dos Bandeirantes, 7.966, Jacarepaguá, Rio de Janeiro, RJ, em sua proposta técnica, **SERVIDOR DE REDE TIPO RISC 3**, possui performance estimada com base no valor auditado para o mesmo equipamento de 21.543,45 TpmCE com 6 processadores de 400MHz e 8MB de memória cache, calculado a partir da definição: $NPC \geq (TpmCE \times NPA) / TpmCA$ e é expansível a 50.268,07 TpmCA, com 14 processadores.

Por ser expressão da verdade, firmamos a presente.


SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antônio Alves
Country Manager




Oivan Odalvo Boaro Jr.
ESCRIVENTE AUTORIZADO



[Back to TPC Results Home Page](#)



Results for Sun

Sponsor	System	TpmC	Price Performance	System Availability	Database	Date Submitted
Sun	<u>Starfire Enterprise 10000</u>	115395.73	105.63 US \$	8/22/1999	Oracle 8i v.8.1.5.1	3/24/1999
Sun	<u>Enterprise 6500 Cluster</u>	135461.4	97.1 US \$	1/31/2000	Oracle8i Ent. Edition 8.1.6.0	9/24/1999
Sun	<u>Enterprise 4500</u>	50268.07	49.88 US \$	3/30/2000	Sybase Adaptive Server Enterprise 11.9.3	11/23/1999
Sun	<u>Enterprise 450</u>	20123.7	27.7 US \$	7/28/2000	Fujitsu/ICL SymfoWARE Server for Workgroup 2.0	2/2/2000

http://www.tpc.org/new_result/tpcc_b.asp/

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REG n° 03/2000
CPMI - CORREIOS
Fls: 61
36 52
Doc:

UltraSPARC™ II Microprocessor

High-Performance, Highly-Scalable, Multiprocessing, 64-bit SPARC™ V9 RISC Microprocessor



The state-of-the-art UltraSPARC™ II processor is the second generation in the UltraSPARC s-series microprocessor family. A complete implementation of the SPARC™ V9 architecture, the UltraSPARC II processor is binary compatible with all previous versions of SPARC processors, resulting in an increased return on your investment. Designed for scalability from mainstream workstations at the low end up to supercomputing servers at the high end, the UltraSPARC II processor delivers high performance and reliability. Meeting and exceeding the demands of today's compute-intensive, network-centric, multimedia-rich applications, the UltraSPARC II processor implements innovative technologies that help lower the end user's total cost of ownership.

The UltraSPARC II processor microarchitecture is designed to provide up to 4-way glueless multiprocessing support and supports up to 64-way systems. The processor supports multiple L2 cache speeds and sizes to enable high-performance multiprocessing systems.

Balanced overall system performance requires optimal performance along *three* critical levels: memory bandwidth, media processing, and raw compute performance. A highly-scalable, high-performance system interconnect ensures a bottleneck-free computing environment resulting in high memory bandwidth. VIS™ (Visual Instruction Set) multimedia extensions boost the performance of graphics-intensive multimedia applications, and thus reduce overall system costs by eliminating the need for a special-purpose media processor. And the UltraSPARC II delivers superior raw compute performance by using the most innovative RISC microprocessor architecture and state-of-the-art process technology.

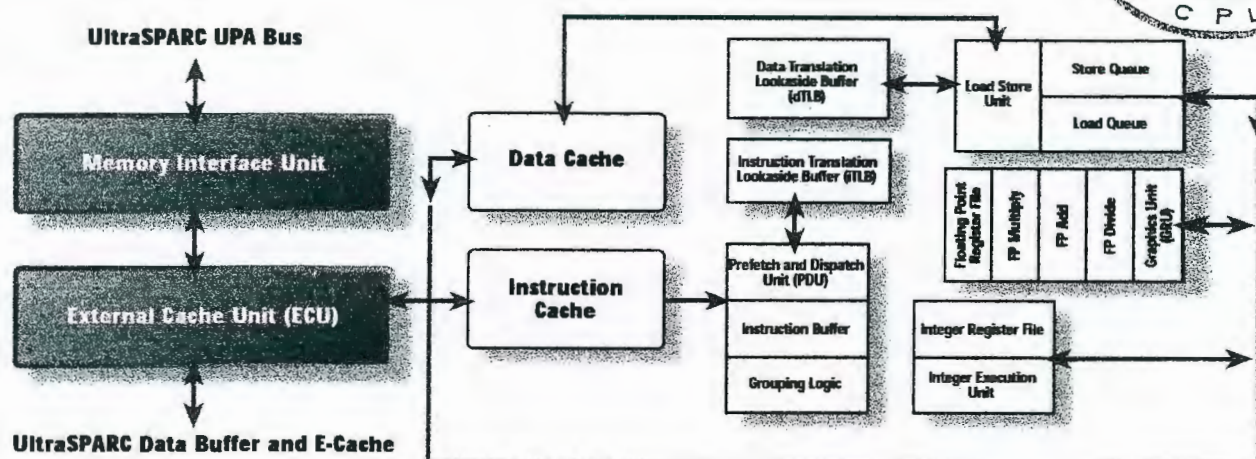
The UltraSPARC II processor not only helps the system designer by implementing industry-standard testing and instrumentation interfaces, it also uses Error Checking & Correction (ECC) and parity to increase system reliability. With high performance, high scalability, and high reliability, the UltraSPARC II is the processor of choice for today's workstations and servers.

FEATURES

- Full 64-bit implementation of SPARC V9 architecture
- 100% binary compatibility with previous versions of SPARC systems
- Built-in MP support (glueless 4-way and up to 64-way)
- High-performance UPA system interconnect
- Performance Scalability (frequency range: 250-480MHz; L2 cache support: 256KB-16MB)
- VIS multimedia accelerating instructions
- Block load and store instructions
- Multiple SRAM modes (variable speed L2 cache)
- JTAG boundary scan and performance instrumentation
- Error Checking & Correction (ECC) and Parity
- State-of-the-art 0.25 micron technology and packaging
- Superscalar/Superpipelined high-performance micro-architecture

RGS nº 03/2005, GN
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Doc:

UltraSPARC II Microprocessor Architecture



UltraSPARC II Microprocessor Specifications

Transistors:	5.4M
Process technology:	0.25 micron, 5 metal layers
Die size:	126 mm sq.
Frequency range:	250-480MHz
Core voltage:	1.9V
Power dissipation:	21W @ 400MHz
On-chip instruction cache:	16KB
On-chip data cache:	16KB
L2 cache size:	256KB-16MB
SRAM clocking ratios:	1-1-1, 2-2
Max. Bandwidth to L2 cache:	5333MB/sec
CPU to system clocking ratios:	2:1, 3:1, 4:1
Max. bandwidth to memory:	1.92GB/sec @ 120MHz UPA
Outstanding memory requests:	3 loads, 2 stores
Software data prefetch:	yes
Integer execution units:	4
Floating-point execution units:	3
Graphics execution unit:	1
System Performance (est):	19.6 (SPECint95) and 27.1 (SPECfp95) @ 450MHz
System I/O voltage:	3.3V

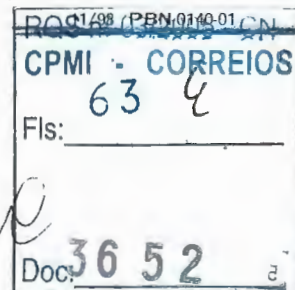


Sun Microelectronics
901 San Antonio Road
Palo Alto, CA 94303
800-681-8845
<http://www.sun.com/microelectronics>

UK +44-1276-416944
Germany +49-89-46008-474
Italy +39 039 60 55 266
France +33 1 30 67 53 95
Russia +7-095-935-8411
Sweden +46 8 623 9250

Taiwan +886-2-2514-1181
China +86-10-6803-5588 x28882
Japan +81-3-5717-5060
Korea +82-3-469-0298
Singapore +65-438-1888 x58677

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DECLARAÇÃO DE SOLIDARIEDADE DO
FABRICANTE

COBRA Computadores e Sistemas Brasileiros S.A.
Estrada dos Bandeirantes 7966
CEP 22783-110 Rio de Janeiro, RJ
Tel 21 442-8800
www.cobra.com.br

ROS nº 03/2005-01
CPMI - CORREIOS
64
36 52
Doc: _____



São Paulo, 02 de maio de 2000.

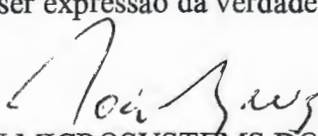
À
ECT Empresa Brasileira de Correios e Telégrafos
Comissão Especial de Licitação da Administração Central – CEL/AC
SBN Quadra 01 Bloco A 4º andar – Ala Norte – Brasília-DF
CEP 70002-900
Att. Sr. Benedito Medeiros Neto
Presidente da CEL/AC.

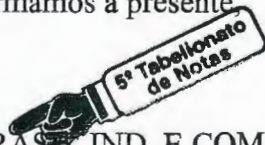
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Abertura: 03/05/2000 às 9:30hs.

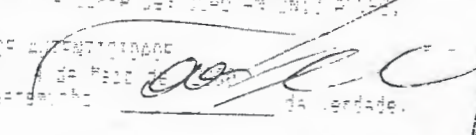
DECLARAÇÃO

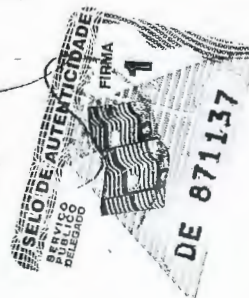
Nós, da Sun Microsystems do Brasil, inscrita no CNPJ sob nº. 65.497.745/0001-53, estabelecida na Rua Alexandre Dumas, 2016 – Chácara Santo Antonio – 04717-004, São Paulo/SP., subsidiária da Sun Microsystems Inc., declaramos que somos solidários com a empresa Cobra – Computadores e Sistemas Brasileiros S.A., inscrita no CNPJ sob o n.º 42.318.949/0001-84, sediada na Estrada dos Bandeirantes, 7.966, Jacarepaguá, Rio de Janeiro, RJ, em sua proposta para atender ao Edital da Concorrência em epígrafe, para fornecer, instalar, prestar garantia de funcionamento e treinamento, quando for o caso, aos técnicos da ECT.

Por ser expressão da verdade, firmamos a presente


SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antônio Alves
Country Manager




Olvan Odalvo Boaro Jr.
ESCREVENTE AUTORIZADO





RQS nº 113/2005 - CN
CPMI - CORREIOS
Fls: 65
Doc: 36 52



DEMAIS DOCUMENTOS DO FABRICANTE

COBRA Computadores e Sistemas Brasileiros S.A.
Estrada dos Bandeirantes 7966
CEP 22783-110 Rio de Janeiro RJ
Tel. 21 442-8800
www.cobra.com.br

ROS nº 03/2001
CPMI CORREIOS
FIS: 66
Doc: 36 52



São Paulo, 02 de maio de 2000.

À
ECT Empresa Brasileira de Correios e Telégrafos
Comissão Especial de Licitação da Administração Central – CEL/AC
SBN Quadra 01 Bloco A 4º andar – Ala Norte – Brasília-DF
CEP 70002-900
Att. Sr. Benedito Medeiros Neto
Presidente da CEL/AC.

Ref.: Concorrência 001/2000 – CPL/AC
Abertura: 03/05/2000 às 9:30hs.

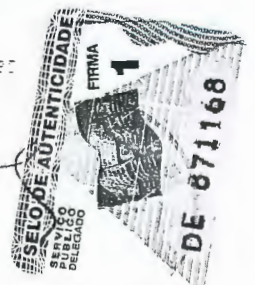
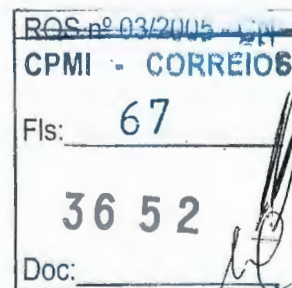
DECLARAÇÃO

Nós, da SUN MICROSYSTEMS DO BRASIL, estabelecida a Rua Verbo Divino, 1488 7º andar- São Paulo/SP, inscrita sob nº65.497.745/0001-53, na condição de Subsidiária da SUN MICROSYSTEMS OF CALIFORNIA INC., declaramos que os Servidores Enterprise fabricados por nossa empresa, já possuem memória com densidade de 2Gbytes, conseqüentemente os servidores passam a ter as seguintes expansibilidades:

- Servidor E3500 até 16Gbytes
- Servidor E4500 até 28Gbytes
- Servidor E5500 até 28Gbytes
- Servidor E6500 até 60Gbytes

Por ser expressão da verdade, firmamos a presente.

SUN MICROSYSTEMS DO BRASIL, IND. E COM. LTDA.
João Antônio Alves
Country Manager





Brasília, 03 de Maio de 2000.

À Empresa Brasileira de Correios e Telégrafos - ECT
Comissão Especial de Licitação da Administração Central - CEL/AC
SBN Quadra 01, Bloco A, 4.o Andar, Ala Norte
Brasília/DF, CEP: 70002-900

At. : Benedito Medeiros Neto - Presidente

Ref.: Concorrência Pública 001/2000
Abertura: 03/Maio/2000

DECLARAÇÃO

A SUN Microsystems do Brasil Indústria e Comércio Ltda, estabelecida à Alexandre Dumas, 2016, em São Paulo-SP, inscrita no CNPJ: 65.497.745/0001-53, declara que a prestação dos serviços de instalação, treinamento, suporte e manutenção nos produtos (SUN) propostos, para atender ao certame acima referenciado, serão efetuados diretamente por nós, através da nossa Divisão de Serviços Enterprise Services.

Abaixo indicamos nossa rede de empresas credenciadas pela SUN:

Empresa: Cobra Computadores
Base: CAT-ARA
Responsável: Djalma Melo Bacelar/Daybe (Tecnica)
Endereço: Rua Santa Luzia, 157 - Centro
CEP: 49010-310
Cidade: ARACAJU
Estado: SE
Fone: (079) 214-0123
Fax: (079) 211-2387
E-Mail: catara@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-BEM
Responsável: Geraldo Pantoja/Jorge Dias
Endereço: Av. Conselheiro Furtado, 757 - Altos Batista
CEP: 66025-160
Cidade: BELÉM
Estado: PA
Fone: (091) 222-4718/4099/4784/4765
E-Mail: catbem@cobra.com.br j.dias@zipmail.com.br



ROS nº 03/2000
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Pls: 68
36 52
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Empresa: Cobra Computadores
Base: CAT-BEL
Responsável: Orlando Versiani Rodrigues/Eduardo Silva
Endereço: R. Ceará, 1566 - 4º e 5º andar - Funcionários
CEP: 30150-311
Cidade: BELO HORIZONTE
Estado: MG
Fone: (031) 281-2955 (Hw)
(031) 281-2900 (Sw)
Fax: (031) 227-0763
E-Mail: catbel@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-BRA
Responsável: Márcia Bezerra de Araujo /Zila/Rosangela/Flavio
Endereço: SEPN 511 Bl. B, 57 Ed. Bittar III - 3º andar - Asa Norte
CEP: 70750-527
Cidade: BRASILIA
Estado: DF
Fone: (061) 349-2400
Pager: (061) 321-0410 - cód.: 4700
Fax: (061) 349-3930
E-Mail: getec_rebra@cobra.com.br
catbra@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-CGR
Responsável: Jorge Mashanori Oshiro
Endereço: R. 14 de Julho, 1198 - Centro
CEP: 79004-393
Cidade: CAMPO GRANDE
Estado: MS
Fone: (067) 782-5259
Fax: (067) 782-5259
E-Mail: catcgr@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-CUI
Responsável: Luis Artur da Rocha Almeida
Endereço: Av. Pres. Castelo Branco, 1268 - 4º andar-Cj. A
CEP: 78045-610
Cidade: CUIABÁ
Estado: MT
Fone: (065) 624-1604/624-9448
Fax: (065) 624-1604

ROS nº 03/2005 - CUIABÁ

CPMI - CORREIOS	
Fls:	69
552	
Doc:	



Empresa: Cobra Computadores
Base: CAT-CUR
Responsável: Eduardo Schleder/Mauricio
Endereço: R. Amintas de Barros, 144 - 4º ao 6º andar - Ed. Luiz -Napodamo - Centro
CEP: 80060-200
Cidade: CURITIBA
Estado: PR
Fone: (041) 322-1424
Fax: (041) 322-1424 /324-6585
E-Mail: Catcur@cobra.com.br
mauriciomvg@netscape.net

Empresa: Cobra Computadores
Base: CAT-FLO
Responsável: Sonia
Endereço: Av. Osmar Cunha, 183 - Bl. C - Sala 801 - Ed. Ceisa Center
CEP: 88015-500
Cidade: FLORIANÓPOLIS
Estado: SC
Fone: (048) 224-2588
Fax: (048) 224-2588
E-Mail: catflo@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-FOR
Responsável: Aristóteles Teixeira Jr. /Mesquita
Endereço: Av. Santos Dumont, 2088 S/401 a 405 - Aldeota
CEP: 60150-160
Cidade: FORTALEZA
Estado: CE
Fone: (085) 244-9200
Fax: (085) 244-2920
E-Mail: catfor@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-GOI
Responsável: Gilvan Porto Gonçalves/Marcos Roberto
Endereço: R. 09, 481 - Ed. Heitor Piva - 5º andar - Centro
CEP: 74013-040
Cidade: GOIÂNIA
Estado: GO
Fone: (062) 224-3040
Fax: (062) 224-3040
E-Mail: catgoi@cobra.com.br
marcobra@zipmail.com.br

ROS nº 03/2005 - CN
CPMI - CORREIOS
Fls: 70
36 52
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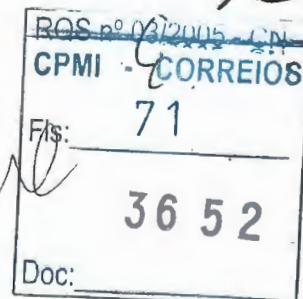


Empresa: Cobra Computadores
Base: CAT-MAC
Responsável: Abimael Ferreira da Rocha
Endereço: R. Barão de Alagoas, 164 S/107 a 109 - Centro
CEP: 57020-210
Cidade: MACEIÓ
Estado: AL
Fone: (082) 221-4856/4233/4147
Fax: (082) 221-4147
E-Mail: catmac@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-MAN
Responsável: Manoel Virgílio Rodrigues Chaves/João Luis / Furlan
Endereço: R. Major Gabriel, 1818/A - 3º andar - Pça. 14 de Janeiro
CEP: 69020-060
Cidade: MANAUS
Estado: AM
Fone: (092) 633-4648
Fax: (092) 622-6566
E-Mail: catman@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-NAT
Responsável: Maria dos Prazeres Cavalcante
Endereço: R. Coronel Estevam, 1139 S/104 e 105 - Alecrim
CEP: 59030-000
Cidade: NATAL
Estado: RN
Fone: (084) 211-4491/4795
Fax: (084) 211-4491
E-Mail: catnat@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-PAL
Responsável: José Agripino C. de Araújo/Ricardo Vanzo
Endereço: R. Carlos Trein Filho, 63 e 69 - Auxiliadora
CEP: 90450-120
Cidade: PORTO ALEGRE
Estado: RS
Fone: (051) 332-7111
Fax: (051) 332-7710
E-Mail: catpal@cobra.com.br





Empresa: Cobra Computadores

Base: CAT-REC

Responsável: Roberto Augusto S. Freire/Vera/Erivaldo /Eriberto/Xavier

Endereço: Av. Dantas Barreto, 1200 - Ed. San Diego - S/901, 902 e 904 - São José

CEP: 50020-000

Cidade: RECIFE

Estado: PE

Fone: (081) 424-5988

Fax: (081) 424-4797

E-Mail: catrec@cobra.com.br

rerec@cobra.com.br

Empresa: Cobra Computadores

Base: CAT-RIO

Responsável: Rubem Maciel Gomes/Humberto Lyra

Endereço: R. Santa Luzia, 651 - 32º andar - Ed. Santos Dumont - Centro

CEP: 20030-040

Cidade: RIO DE JANEIRO

Estado: RJ

Fone: (021) 852-4632/852-4633

(021) 852-4695

(021) 852-4694/852-4696

Pager: (021) 460-3030 Cod. 827520 - BIP Plantao

Fax: (021) 220-5301

E-Mail: catrio@cobra.com.br

Empresa: Cobra Computadores

Base: CAT-SAL

Responsável: Arnaldo Alves Costa/Carlos

Silveira/Antonio(931-6814/071-983-7210

Endereço: Rua Conselheiro Saraiva, 26 - 8º andar - Ed. 15 de Julho - Comércio

CEP: 40015-100

Cidade: SALVADOR

Estado: BA

Fone: (071)-450-7880

Fax: (071) 351-7881

E-Mail: catsal@cobra.com.br

BOS nº 03/2005 - CN	
CPMI	CORREIOS
Fls:	72
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Empresa: Cobra Computadores
Base: CAT-SLU
Responsável: George Luiz Santos
Endereço: Av. Castelo Branco, 333 S/202, 203 - São Francisco
CEP: 65076-090
Cidade: SÃO LUIZ
Estado: MA
Fone: (098) 235-6664
Fax: (098) 235-6939
E-Mail: catslu@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-SPO
Responsável: Laerte Souza
Anselmo Alencar
Hideki Sadatsuki
Endereço: Alameda Santos, 1000 - 7º e 8º andar - Cerqueira Cesar
CEP: 01418-100
Cidade: SÃO PAULO
Estado: SP
Fone: (011) 251-3311
Fax: (011) 287-1740
E-Mail: catspo@cobra.com.br
respo@cobra.com.br
getec_respo@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-BAU
Responsável: Adevenir Aparecido Mendes Barbaresco
Endereço: R. Rio Branco, 5-38 - 4º andar S/41 e 43 - Ed. Centro Empresarial Rio Branco
CEP: 17040-190
Cidade: BAURU
Estado: SP
Fone: (014) 232-5844/6360
Fax: (014) 232-6360
E-Mail: catbau@cobra.com.br

Handwritten signature and initials above the stamp.

RCS nº 02/2005 - CN	
CPMI - CORREIOS	
Fls:	73
56 52	
Doc:	



Empresa: Cobra Computadores
Base: CAT-TER
Responsável: Francivaldo Ostemo Souza
Endereço: R. Elizeu Martins, 1294 S/301 a 303 - Centro
CEP: 64000-120
Cidade: TERESINA
Estado: PI
Fone: (086) 221-2909/2741
Fax: (086) 221-2741
E-Mail: catter@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-VIT
Responsável: Claudionor Santos Júnior
Endereço: Av. N. Senhora da Penha, 699 S/1110 a 1113 - Ed. Century - Towers - Praia do Canto
CEP: 29055-131
Cidade: VITÓRIA
Estado: ES
Fone: (027) 227-1022
Fax: (027) 225-1419
E-Mail: catvit@cobra.com.br

Empresa: Integrís
Responsável : Sr. Paulo Sérgio ou Jane
Endereço: Av. Almirante Barroso, 974 - Centro - João Pessoa- Paraíba
Cidade: JOÃO PESSOA
Estado: PB
Telefone (083) 221-0243
(083)222-2411
(083)982-4570

Empresa: Integrís
Responsável : Sr. Ricardo José
Endereço: Av. Pinheiro Machado, 2011 - Bairro S. Cristovão
Cidade: RONDONIA
Estado: Porto Velho
Cep 78902-100
Telefone (069) 221-8666
(069) 223-4255

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RQS nº 03/2005 - CN	
CPMI - CORREIOS	
Fis:	74
36 52	
Doc:	



Empresa: Integris
Responsavel : José Fernandes Muniz
Endereço: Conjunto Xavier Maia - Quadra 5 Casa 26 - Vila Ivonete
Cidade: Rio Branco
Estado: ACRE
Tel (068) 220-1959
Tel (068) 224-0734

Os técnicos acima descritos são treinados em serviços de suporte aos equipamentos de marca SUN diretamente pela SUN MICROSYSTEMS.

Procedimentos para Abertura de Chamados

O cliente poderá requisitar suporte para o Centro de Soluções da Sun do Brasil através de contato telefônico, fax, correio eletrônico via Internet ou Pager. Excetuando-se o Pager, qualquer que seja o meio utilizado, o cliente precisará fornecer as seguintes informações:

- Número de série e modelo do equipamento Sun;
- Número do contrato (quando aplicável);
- Versão do sistema operacional;
- Produto e versão do software Sun;
- Descrição clara do problema.

No momento do registro do chamado, o cliente receberá o *Número do Chamado*, que será de referência utilizada para acompanhamento do caso.

Uma vez registrado o chamado, um engenheiro de suporte entrará em contato com o cliente respeitando sempre o tempo de resposta de acordo com a cobertura do equipamento afetado.

Telefone

O seguinte número telefônico deverá ser utilizado para abertura chamados de suporte técnico junto ao Centro de Soluções da Sun do Brasil:

0800-11-8988

O Centro de Soluções da Sun do Brasil aceita abertura de chamados da 8:00 as 20:00hs, de segundas as sextas-feiras, em dias úteis.

Para o cliente que possui atendimento 7x24, dispomos de um número de telefone Toll Free exclusivo para clientes de Missão Crítica,

0800-55-4653

ROS nº 03/2002-1211

CPMI - CORREIOS

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Correio-eletrônico

O seguinte endereço de correio-eletrônico deve ser utilizado para abertura chamados de suporte técnico junto ao Centro de Soluções da Sun do Brasil:

suporte@Brazil.Sun.COM

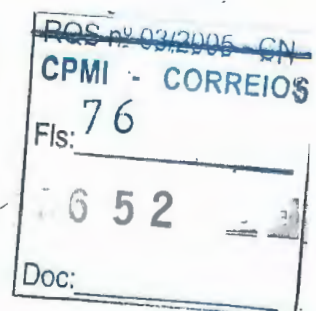
Cabe observar que a Sun do Brasil não recomenda a abertura de chamados com severidade 1 e 2 sejam feitos via Internet. Para estes casos, pedimos que utilizem a orientação descrita acima.

Por ser a expressão da verdade, firmamos a presente.



João Antônio Alves
Diretor Geral
RG: 4.253.920-SSP-SP

5º Tabelionato de Notas - José Roberto Pacheco França - Tabelião
Av. João Dias, 2320-Santa Amara - Fone: 56416092 - Nº 040500101731
Reconheço por semelhança a firma RUPRA de: JOAO ANTONIO ALVES.
Conferido por: Alexandre
VALIDO SOMENTE COM O SELO DE AUTENTICIDADE
(S.P.) 4 de Maio de 2000
1.601 Em testemunho da verdade.
1.601
1.601 Oliver João da Costa Junior - Tabelião





**17ª ALTERAÇÃO DO CONTRATO SOCIAL DE
"SUN MICROSYSTEMS DO BRASIL INDÚSTRIA
E COMÉRCIO LTDA."**

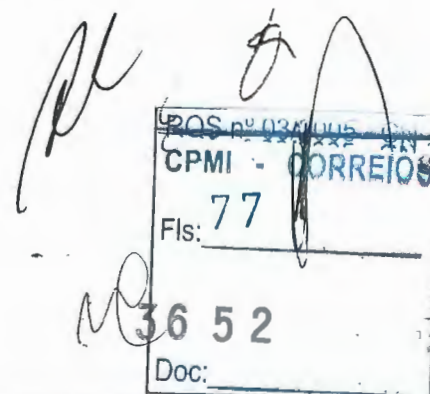
CNPJ/MF nº: 65.497.745/0001-53

NIRE nº: 35.209.923.643

Pelo presente instrumento particular, e na melhor forma de direito, as partes abaixo:

1. **SUN MICROSYSTEMS, INC.**, uma sociedade organizada e existente de acordo com as leis do Estado de Delaware, Estados Unidos da América, com sede em 901 San Antonio Road, Palo Alto, Califórnia, Estados Unidos da América, neste ato representada por seu bastante procurador, José Augusto Caleiro Regazzini, brasileiro, solteiro, advogado, portador da Cédula de Identidade RG nº 4.977.914 SSP/SP e do CIC nº 535.965.288-87, com escritório na cidade de São Paulo, Estado de São Paulo, na Rua Líbero Badaró, 293, 19º andar, conforme instrumento de mandato anexo; e
2. **SUN MICROSYSTEMS OF CALIFORNIA, INC.**, uma sociedade organizada e existente de acordo com as leis do Estado da Califórnia, Estados Unidos da América, com sede em 901 San Antonio Road, Palo Alto, Califórnia, Estados Unidos da América, neste ato representada por seu bastante procurador, José Augusto Caleiro Regazzini, acima qualificado, conforme instrumento de mandato anexo,

únicas quotistas da sociedade por quotas, de responsabilidade limitada denominada **SUN MICROSYSTEMS DO BRASIL INDÚSTRIA E COMÉRCIO LTDA.**, (a "Sociedade"), com sede na cidade de São Paulo, Estado de São Paulo, na Rua Alexandre Dumas, 2016, Bairro Chácara Santo Antônio, cujo Contrato Social, datado de 5 de fevereiro de 1991, encontra-se devidamente arquivado na Junta Comercial do Estado de São Paulo ("JUCESP") sob NIRE n.º 35.209.923.643, em sessão de 7 de fevereiro de 1991, e posteriores alterações também arquivadas na mesma JUCESP, estando a 16ª e mais recente delas, datada de 03 de julho de 1999, registrada sob nº 130.940/99-9, em sessão de 04 de agosto de 1999, têm entre si, justo e contratado, alterar referido Contrato Social, como segue:





1. **ALTERAR** os itens (iii) e (iv) do Artigo 8º do Contrato Social, que passam a vigorar com a redação constante da consolidação abaixo;
2. **CONSOLIDAR**, tendo em vista a deliberação acima, o Contrato Social, que passa a vigorar como segue:

**"CONTRATO SOCIAL DE
SUN MICROSYSTEMS DO BRASIL INDÚSTRIA E COMÉRCIO LTDA.**

DENOMINAÇÃO, SEDE, FORO JURÍDICO E FILIAIS

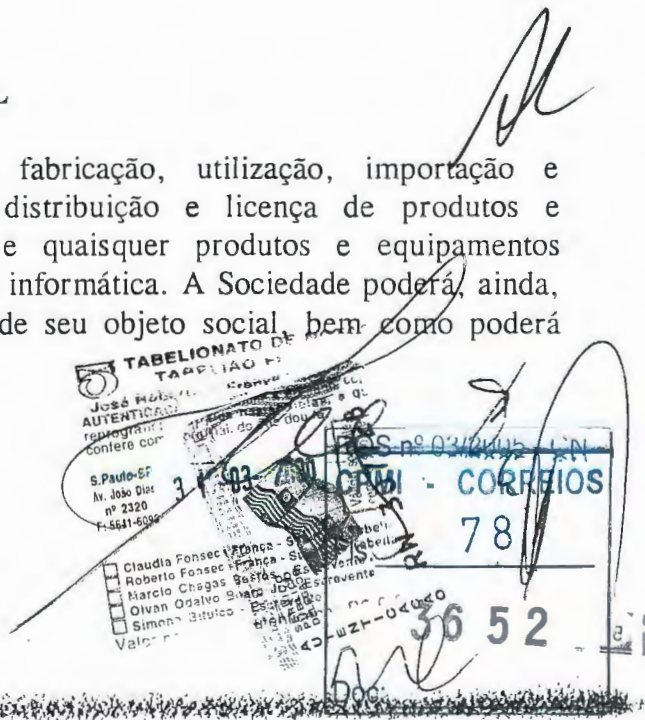
Artigo 1º - A Sociedade denomina-se **SUN MICROSYSTEMS DO BRASIL INDÚSTRIA E COMÉRCIO LTDA.** e tem sua sede e foro jurídico na Rua Alexandre Dumas, 2016, Bairro Chácara Santo Antônio, Edifício "SPOP III", na cidade de São Paulo, Estado de São Paulo. A Sociedade poderá abrir novas agências, escritórios e filiais em qualquer parte do território nacional, mediante deliberação unânime das quotistas nesse sentido.

Parágrafo Único - A Sociedade mantém, ainda, os estabelecimentos abaixo relacionados, os quais têm um capital em separado, para fins fiscais, de R\$ 100,00 cada um:

- Filial na cidade de Belo Horizonte, Estado de Minas Gerais, na Rua Paraíba, 1000, 6º andar, conjunto C, "Edifício Asamar";
- Filial na cidade do Rio de Janeiro, Estado do Rio de Janeiro, na Av. Rio Branco, 1, conjunto 702;
- Filial na cidade de São Paulo, Estado de São Paulo, na Rua Stefano, 196/196B, Bairro do Cambuci; e
- Filial em Brasília, Distrito Federal, na SCN, Quadra 4, Bloco B, 100 - Conjunto 303 (parte A).

OBJETO SOCIAL

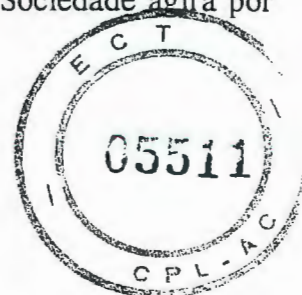
Artigo 2º - A Sociedade tem por objeto social a fabricação, utilização, importação e exportação, venda, locação, sublocação, distribuição e licença de produtos e equipamentos de informática, "hardware", "software" e quaisquer produtos e equipamentos relacionados, bem como a prestação de serviços na área de informática. A Sociedade poderá, ainda, desempenhar qualquer atividade relacionada à promoção de seu objeto social, bem como poderá



representar e prestar serviços a outras sociedades brasileiras ou estrangeiras. A Sociedade agirá por conta própria ou de outra forma permitida por lei.

DURAÇÃO

Artigo 3º - O prazo de duração da Sociedade é indeterminado.



CAPITAL SOCIAL

Artigo 4º - O capital da sociedade, totalmente subscrito, é de R\$ 1.450.000,00 (um milhão, quatrocentos e cinquenta mil reais), dividido em 1.450.000 (um milhão, quatrocentas e cinquenta mil) quotas, no valor nominal de R\$ 1,00 (um real) cada uma, distribuídas entre as quotistas da seguinte forma:

1. **SUN MICROSYSTEMS OF CALIFORNIA INC.**, detém 1.305.000 (um milhão, trezentas e cinco mil) quotas, no valor nominal total de R\$ 1.305.000,00 (um milhão, trezentos e cinco mil reais), das quais 1.291.828 (um milhão, duzentas e noventa e uma mil, oitocentas e vinte e oito) encontram-se integralizadas.
2. **SUN MICROSYSTEMS INC.**, detém 145.000 (cento e quarenta e cinco mil) quotas, no valor nominal total de R\$ 145.000,00 (cento e quarenta e cinco mil reais), que se encontram totalmente integralizadas.

Parágrafo Primeiro - De acordo com o artigo 2º, "in fine", do Decreto n.º 3.708, de 10 de janeiro de 1919, a responsabilidade das quotistas é limitada à importância total do capital social.

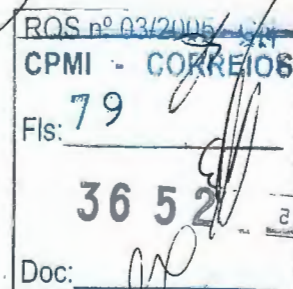
Parágrafo Segundo - As 13.172 (treze mil, cento e setenta e duas) quotas remanescentes deverão ser integralizadas até 05 de outubro de 2000, em moeda corrente nacional, em bens ou em créditos, pela quotista SUN MICROSYSTEMS OF CALIFORNIA, INC.

Parágrafo Terceiro - Na proporção do número de quotas que possuírem, as quotistas terão preferência para a subscrição do aumento de capital.

CESSÃO E TRANSFERÊNCIA DE QUOTAS

Artigo 5º - A alienação de quotas somente será válida com a prévia e expressa autorização das quotistas representando a maioria do capital social, e desde que refletida em alteração deste Contrato Social.

3





GERÊNCIA E ADMINISTRAÇÃO

Artigo 6º - A Sociedade será administrada pela quotista **SUN MICROSYSTEMS OF CALIFORNIA, INC.**, que poderá delegar poderes a um indivíduo residente no país que terá o título de Gerente Delegado e será responsável pela administração diária da Sociedade.

Parágrafo Primeiro - A quotista gerente poderá, a qualquer tempo, com ou sem causa, e sem qualquer aviso prévio, destituir o Gerente Delegado e delegar poderes a um novo.

Parágrafo Segundo - O Gerente Delegado da Sociedade está autorizado a pagar todos os valores devidos pela Sociedade às suas quotistas ou qualquer empresa do grupo societário destas, incluindo, mas não se limitando a, valores devidos por produtos adquiridos.

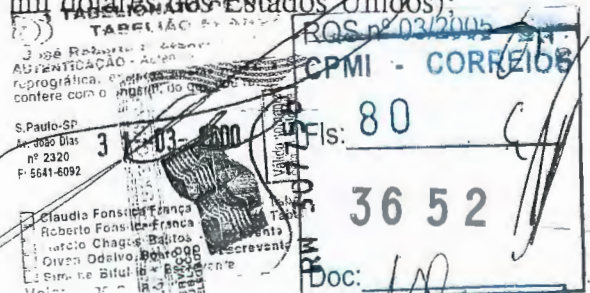
Artigo 7º - A Sociedade somente se obrigará pelos atos ou assinatura:

- (a) da quotista gerente; ou
- (b) do Gerente Delegado, agindo isoladamente; ou
- (c) de dois procuradores, agindo em conjunto e dentro dos limites estabelecidos nas respectivas procurações; ou
- (d) de um procurador com poderes especiais, agindo individualmente e dentro dos limites estabelecidos na respectiva procuração.

Parágrafo Único - As procurações outorgadas pela Sociedade deverão ser sempre e exclusivamente assinadas pelo Gerente Delegado, devendo ser expressamente identificados os poderes outorgados e, com exceção daquelas com poderes "ad judícia", terão prazo de validade determinado, que não poderá ser superior a 1 (um) ano, observado o disposto no Artigo 8º (i) abaixo.

Artigo 8º - Os seguintes atos estão sujeitos ao prévio e expresse consentimento das quotistas representando a maioria do capital social:

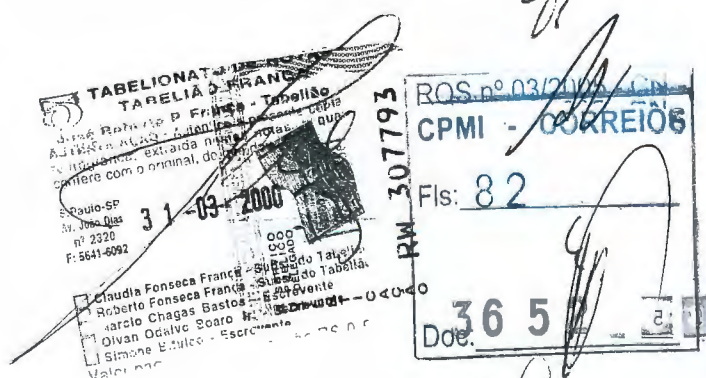
- (i) nomeação de procuradores para representar a Sociedade na prática dos atos ou atividades abaixo listados, observado o prazo de validade previsto no Parágrafo Único do Artigo 7º acima;
- (ii) transferências entre contas correntes bancárias da Sociedade, cujo valor exceda o montante equivalente em reais a US\$ 500.000,00 (quinhentos mil dólares dos Estados Unidos);



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-

- (xiii) exercício dos direitos de voto, oneração, transferência ou disposição de ações ou quotas que a Sociedade possua em outras sociedades a ela afiliadas ou não;
- (xiv) emissão ou resgate de títulos ou obrigações da Sociedade (que não títulos de crédito relativos aos negócios normais da Sociedade);
- (xv) a não ser que de outra forma disposto neste Artigo, garantia de empréstimos ou quaisquer obrigações de terceiros, sejam pessoas físicas ou jurídicas;
- (xvi) concessão de empréstimos;
- (xvii) organização, dissolução ou liquidação de qualquer subsidiária da Sociedade;
- (xviii) compra e venda de ativos permanentes da Sociedade que tenham um valor de mercado superior ao equivalente em reais a US\$ 75.000,00 (setenta e cinco mil dólares dos Estados Unidos);
- (xix) licença do uso ou qualquer outra forma de divulgação de tecnologia, patenteada ou não, dados técnicos, know-how, ou de qualquer outra informação confidencial que tenha sido transferida ou revelada à Sociedade;
- (xx) contratação de qualquer empregado cuja remuneração anual total (incluindo bônus, salário *in natura*, etc.) exceda ao equivalente em reais a US\$ 100.000,00 (cem mil dólares dos Estados Unidos);
- (xxi) assinatura de quaisquer contratos ou acordos, com exceção dos contratos (i) que tenham especial disposição neste Artigo; (ii) de locação de imóveis, cujo valor exceda ao equivalente em reais a US\$ 100.000,00 (cem mil dólares dos Estados Unidos) por mês; (iii) comerciais para venda, licença ou distribuição de produtos das quotistas da Sociedade ou de empresas de seu grupo societário, de qualquer valor; e (iv) de prestação de serviços pela Sociedade, de qualquer valor;
- (xxii) tomada de qualquer iniciativa em relação à dissolução ou liquidação da Sociedade;
- (xxiii) tomada de qualquer iniciativa em relação a direitos de propriedade industrial; e
- (xxiv) tomada de empréstimos bancários de curto prazo (um a sete dias) e, na forma de "hot money", operação de conta garantida, cheque especial ou descontos de duplicatas de valores superiores ao equivalente em reais a US\$ 150.000,00 (cento e cinquenta mil dólares dos Estados Unidos).



EXERCÍCIO SOCIAL, BALANÇO E LUCROS



Artigo 9º - O exercício social se encerra no dia 31 de dezembro de cada ano, data em que serão levantadas as demonstrações financeiras do exercício, com observância das prescrições legais, sendo assinadas pelo gerente delegado e por contabilista devidamente registrado perante os órgãos competentes. Cópia autêntica das demonstrações financeiras deverá ser distribuída às quotistas no prazo de 3 (três) meses a contar do encerramento do exercício social.

Parágrafo Primeiro - Os resultados apurados ao final de cada exercício social deverão ter o destino que vier a ser determinado pelas quotistas representando a maioria do capital social. A distribuição de lucros, se houver, será feita às quotistas na proporção de sua participação no capital social, salvo deliberação em contrário tomada pelas quotistas representando a maioria do capital social.

Parágrafo Segundo - A Sociedade, por deliberação das quotistas representando a maioria do capital social, poderá distribuir lucros à conta dos lucros acumulados ou à conta de reservas de lucros existentes no mais recente balanço anual.

Parágrafo Terceiro - A Sociedade, por deliberação das quotistas representando a maioria do capital social, poderá levantar balanço e distribuir lucros em períodos menores.

Parágrafo Quarto - A Sociedade, por deliberação das quotistas representando a maioria do capital social, poderá capitalizar estes lucros, total ou parcialmente, devendo os mesmos ser atribuídos às quotistas na proporção da participação que cada uma detém no capital da Sociedade.

DIREITO DE INSPEÇÃO

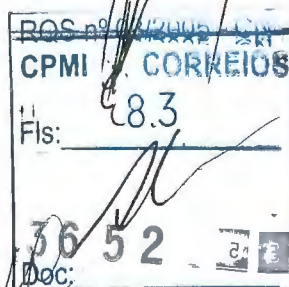
Artigo 10 - Cada quotista terá o direito de inspecionar, examinar e fazer cópias de livros, arquivos e registros contábeis da Sociedade durante o horário normal de trabalho da mesma.

Parágrafo Único - Os livros fiscais e demonstrativos financeiros da Sociedade poderão ser auditados anualmente por uma firma de auditoria renomada indicada pelas quotistas representando a maioria do capital social. Se necessária, essa auditoria realizar-se-á imediatamente após a conclusão de cada exercício social da Sociedade.

7



RW 307802





ALTERAÇÃO DO CONTRATO SOCIAL

Artigo 11 - O presente Contrato Social poderá ser alterado, a qualquer tempo e em qualquer de seus aspectos, por resolução das quotistas representando a maioria do capital social. O correspondente instrumento de alteração será válido quando celebrado pelas quotistas que tiverem votado a favor de aludida resolução.

DISSOLUÇÃO E LIQUIDAÇÃO DA SOCIEDADE

Artigo 12 - A Sociedade entrará em liquidação por deliberação das quotistas representando a maioria do capital social. Neste caso, o liquidante será a quotista gerente ou alguém por ela indicado. Os ativos da Sociedade deverão ser utilizados para a quitação de seu passivo, devendo o saldo, se existente, ser dividido entre as quotistas na proporção de sua participação no capital social.

Artigo 13 - No caso de exclusão de qualquer quotista, ou morte ou incapacidade de quotista pessoa física, ou liquidação ou falência de quotista pessoa jurídica, a Sociedade não se dissolverá, salvo se assim decidido pelas quotistas. A apuração e pagamento dos haveres da quotista excluída, falecida, incapacitada, em liquidação ou falida seguirá as regras que serão então estabelecidas pelas quotistas.

TRANSFORMAÇÃO

Artigo 14 - A Sociedade poderá adotar qualquer outro tipo societário por resolução das quotistas representando a maioria do capital social. As quotistas desde já renunciam expressamente ao direito de retirada previsto na legislação.

LEGISLAÇÃO APLICÁVEL

Artigo 15 - A Sociedade será regida pelos dispositivos do Decreto nº 3.708, de 10 de janeiro de 1919 e, subsidiariamente, no que for aplicável, pelos dispositivos da Lei nº 6.404/76 e alterações posteriores."

DISPOSIÇÕES TRANSITÓRIAS

Nos termos do Artigo 6º do Contrato Social, a quotista gerente SUN MICROSYSTEMS OF CALIFORNIA, INC. ratifica a nomeação do Sr. João Antônio Alves, brasileiro, casado, administrador, portador da Carteira de Identidade RG nº 4.253.920 SSP-SP e inscrito no CPF/MF sob o nº 194.101.318-04, residente e domiciliado na cidade de São Paulo, Estado de São Paulo, na



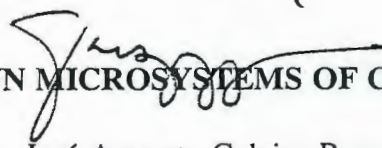
Rua Pará, 81, apto. 61, para o cargo de Gerente Delegado da Sociedade, por prazo indeterminado, podendo praticar os atos necessários ou convenientes à administração da Sociedade.

E, estando assim justas e contratadas, as partes acima qualificadas assinam o presente instrumento em 4 (quatro) vias de igual teor e forma, na presença de duas testemunhas abaixo assinadas.

São Paulo, 25 de setembro de 1999.


SUN MICROSYSTEMS, INC.

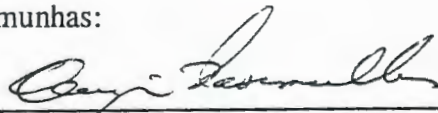
p.p. José Augusto Caleiro Regazzini

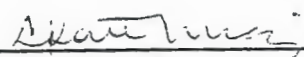

SUN MICROSYSTEMS OF CALIFORNIA, INC.

p.p. José Augusto Caleiro Regazzini

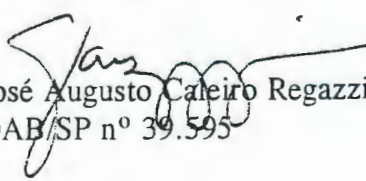


Testemunhas:

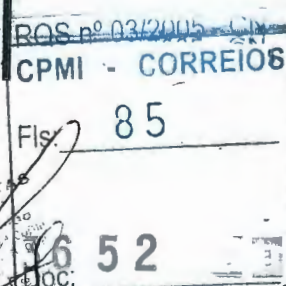
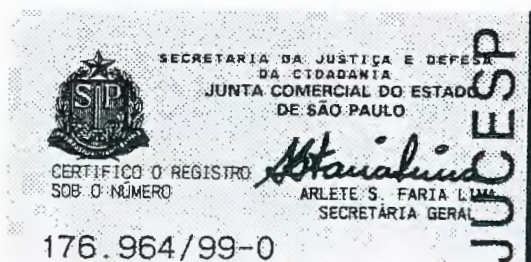
1. 
Nome: Cinyra Azevedo de Vasconcellos
R.G.: 4.247.864-SSP/SP
CIC: 789.469.647-15

2. 
Nome: Lígia Kate Nucci
R.G.: 7.613.876-SSP/SP
CIC: 046.595.178-37

Visto do Advogado:


José Augusto Caleiro Regazzini
OAB/SP nº 39.595

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Claudia Fonseca Franca - Subst. do Tabelião
Roberto Fonseca Bastos - Escrevente
Arlene Góes Boaro Jr. - Escrevente
Simone Brito - Escrevente
Valor pago pela autenticação R\$ 0,91

Doc: 3652
Fls: 86
CPMI - CORREIOS

SELO DE AUTENTICIDADE
VALOR PAGO PELA
AUTENTICACAO R\$ 0,91
15 FEV. 2000
ABELIAO FRANÇA - Tabelião
Autentico e presente copia reprográfica, extraída
qual contiere com o original, do que dou fé.
S. PAULO
AV. JOAO
R. 2

RC: 512649

CONSULADO DO BRASIL EM SÃO FRANCISCO



Recebi Cz\$ 20,00 (ouro) ou
US\$ 20,00 tab 4/16

Reconheço verdadeira a assinatura, no documento anexo, de MEI-CHI

YEE----- Escrivão _____ da Corte do Condado de
Santa Clara Estado Califórnia Estados Unidos da America

E, para constar onde convier, mandei passar o presente, que assinei e fiz selar com o Selo deste Consulado
Dispensado reconhecimento de firma de acordo com o Decreto nº 84.451, de 31-01-1980. A legalização deste
documento não implica aceitação ou aprovação de seu conteúdo.
The legalization of this document does not imply approval or acceptance of its contents.

São Francisco, 01 de março de 19 97

Noemia Wainer
NOEMIA WAINER
Vice - Consul





ISO 9000 REGISTRATION CERTIFICATION



I, Kuljit Rai, Logistics Manager of Sun Microsystems Computer Company, a corporation organized under the laws of the State of California, U.S.A. and having its principal office at 2550 Garcia Avenue, Mountain View, California 94043, U.S.A. (the "Corporation"), hereby certify that attached hereto is a true and accurate copy of the ISO 9000 Registrations of the Corporation and its affiliates and that such Registrations remain in full force and effect.

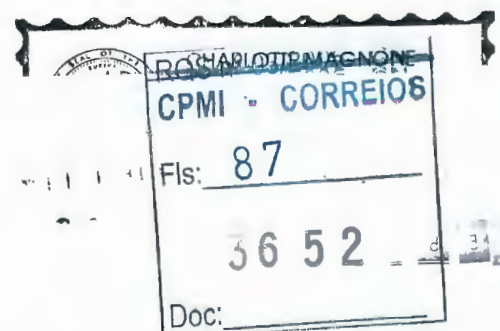
IN WITNESS WHEREOF, I hereunto set my hand this 23rd day of January, 1996.

SUN MICROSYSTEMS COMPUTER COMPANY

By:


Kuljit Rai
Logistics Manager

STATE





República Federativa do Brasil

Magnolia Yazbek Pereira

Tradutora Pública e Intérprete Comercial

C. P. F. 020522028-20

Matriculada na Junta Comercial do Estado de São Paulo sob nº 333

IDIOMA: PORTUGUÊS - INGLÊS



Nº da tradução / versão: 3977 livro nº 31 fls. 306
Condado de Alameda

Em 29 de janeiro de 1996 perante mim, CHARLOTTE MAGNONE, Notária Pública, pessoalmente compareceu Kuljit Rai, certificado com base em prova satisfatória, como sendo a pessoa cujo nome se encontra subscrito no instrumento anexo e confirmou perante mim ter sido ela a pessoa que assinou o mesmo de acordo com a sua capacidade autorizada e que, através da sua assinatura no instrumento, a pessoa ou entidade, em cujo nome agiu, assinou o instrumento.

Em testemunho do que, após a minha assinatura e meu selo oficial.

(Assinatura) - CHARLOTTE MAGNONE - Notária Pública

Selo Oficial

Carimbo: CHARLOTTE MAGNONE

Comissionamento Nº 1069658

Notária Pública - Califórnia

Condado de Alameda

Meu comissionamento expira em 20 de agosto de 1999



SEÇÃO OPCIONAL

Embora as leis não exijam que o Notário preencha os dados abaixo, o fato de fazê-lo poderá ser muito importante para as pessoas que dependem do documento e poderão evitar que o presente seja apenso ou removido de forma fraudulenta.

Descrição do Documento Apenso

Título ou Tipo de Documento: Certificado de Registro

Número de Páginas: 1

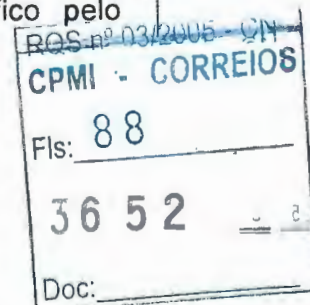
Data do Documento: 23 de janeiro de 1996

Signatário além do acima nomeado: nenhum

ESTADO DA CALIFORNIA

Secretário de Estado

EU, BILL JONES, Secretário de Estado da Califórnia, certifico pelo





República Federativa do Brasil

Magnolia Yazbek Pereira

Tradutora Pública e Intérprete Comercial

C. P. F. 020522028-20

Matriculada na Junta Comercial do Estado de São Paulo sob nº 333

IDIOMA: PORTUGUÊS - INGLÊS



Nº da tradução / versão:3277..... livro nº...31..... fls. 308.....

instrumentos escritos para serem registrados no referido Estado e que total fé e crédito são e deverão ser dados a todos os seus atos oficiais como Notária Pública e que estou perfeitamente familiarizado com a escrita da referida NOTÁRIA PÚBLICA e creio ser autêntica a assinatura aposta ao certificado apenso e que o instrumento apenso foi assinado e reconhecido de acordo com as leis do Estado da Califórnia e certifico ainda que a lei não exige que uma impressão do carimbo da referida Notária Pública seja arquivada em meu gabinete.

EM TESTEMUNHO DO QUE, assinei o presente e afixei o meu selo oficial neste dia 5 de fevereiro de 1996

(Ass.) PATRICK O'CONNELL

Escrivão do Condado de Alameda, Estado da Califórnia

Legalização Consular:

CONSULADO GERAL DO BRASIL EM SÃO FRANCISCO

Reconheço verdadeira a assinatura, no documento anexo, de BILL JONES, Secretário de Estado do Estado da Califórnia, Estados Unidos da América. E, para constar onde convier, mandei passar o presente que assinei e fiz selar com o Selo deste Consulado.

Dispensado reconhecimento de firma de acordo com o Decreto N°84.451, de 31-01-1980. A legalização deste documento não implica aceitação ou aprovação de seu conteúdo.

São Francisco, 13 de fevereiro de 1996

(Ass.) Noemia Wainer
Vice-Cônsul

Carimbo e Selo Consular

Recebi CZ\$20.00 (ouro) ou US\$20.00 - Tab.416

Nada mais constava do documento acima que devolvo juntamente com esta tradução, a qual conferi, achei conforme e assino. DOU FÉ.

São Paulo, 21 de janeiro de 1997 S nº 03/2005

Recibo: 0054





Certificate of Registration

This is to certify that

**Sun Microsystems
Computer Corporation**

WWOPS, US Sites, 1421 California Circle
Milpitas, California 95035, U S A

hold Certificate No. FM 14854 and operate a quality management system which complies with
the requirements of BS EN ISO 9002:1994 for the activities detailed in the scope of registration.

Originally registered 19 March 1996.

This certificate does not expire. To check its validity telephone +44 (0) 1908 227700

A

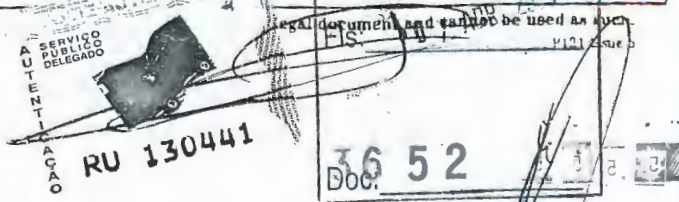
Jan Holmen

Director and General Manager
BSI Quality Assurance



BSI Quality Assurance PO Box 375 Milton Keynes United Kingdom MK14 6LJ

The British Standards Institution is incorporated by Royal Charter





Certificate of Registration of a Firm of Assessed Capability

This is to certify that:

SUN MICROSYSTEMS INC - SUNSERVICE
US CUSTOMER SERVICE

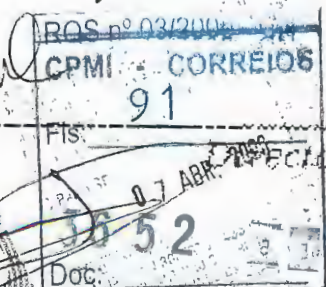
holds Certificate No. *FS 31168* dated *10 April 1995*

to produce goods or provide services in respect of the
Appendix attaching thereto and in accordance with

BS EN ISO 9001 : 1994

Signed for and on behalf of BSI

A handwritten signature in dark ink, appearing to read 'J. B. Smith'.



RU 124628



POWER OF ATTORNEY

The undersigned, Michael Morris, Secretary and Director of Sun Microsystems of California, Inc., a California corporation (the "Company"), acting by virtue of the authority conferred upon me by resolutions adopted by the Board of Directors and effective as of October 1st, 1999, hereby authorize Mr. João Antonio Alves, General Manager for Sun Microsystems do Brasil Ind. e Com. Ltda. ("Sun do Brasil"), to be the Company's true and lawful Attorney to deliver certifications to Brazilian customers of the Company and of Sun do Brasil regarding the ownership and authorization of the Company and of Sun do Brasil and the origin of their products, including, without limitation, the following:

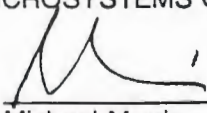
1. That the Company is a wholly-owned subsidiary of Sun Microsystems, Inc. with its principal offices at 901 San Antonio Road, Palo Alto, CA 94303;
2. That identify Sun Microsystems, Inc. and the Company's wholly-owned subsidiaries;
3. That identify Sun do Brasil as a wholly-owned subsidiary of the Company and of Sun Microsystems, Inc.;
4. That the Company and Sun do Brasil are the Sun Microsystems Inc. affiliated companies authorized to distribute Sun Microsystems products in Brazil, directly or through their authorized distributors and resellers;
5. That Sun Microsystems, Inc. is a manufacturer of computer workstations, computer servers, and networking products;
6. That inform the location of Sun Microsystems, Inc. manufacturing plants;
7. That Sun do Brasil, as well as its authorized distributors and resellers, are authorized to offer Sun Microsystems, Inc. products to the Brazilian Government, governmental bodies and agencies;
8. That Sun Microsystems, Inc. products offered by Sun do Brasil or by its authorized distributors and resellers shall carry Sun Microsystems' standard warranty.

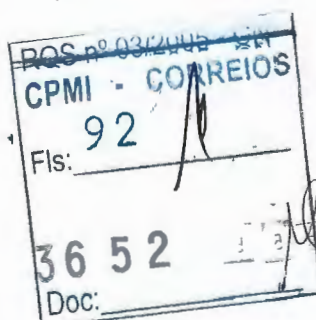
In addition, Mr. João Antonio Alves may perform for the Company in its name all things which shall be necessary or desirable concerning the matters described herein, including without limitation receiving service of process and responding administratively and judicially to such matters on behalf of the Company, as freely as the Company would do for the attainment of the objects of the Company, together with the power to delegate any or all of the powers hereby granted to others, and the right to revoke such delegation. The undersigned hereby ratifies and confirms all and whatever the said Attorney shall do or cause to be done, about or concerning this instrument and any part thereof.

This Power of Attorney shall remain in full force and effect until revoked in writing.

IN WITNESS WHEREOF, and pursuant to the resolutions of the Board of Directors of the Company dated as of October 1, 1999, I have hereunder set my hand effective as of October 14, 1999.

SUN MICROSYSTEMS OF CALIFORNIA, INC.

By: 
Name: Michael Morris
Title: Secretary and Director



PJ 106133



CONSULADO GERAL DO BRASIL SÃO FRANCISCO

Reconheço verdadeiro verdadeira a assinatura, no documento anexo, de GRACE

BOOCKHOLDT--

Escrivão _____ da Corte do Condado de

Santa Clara

Estado Califórnia

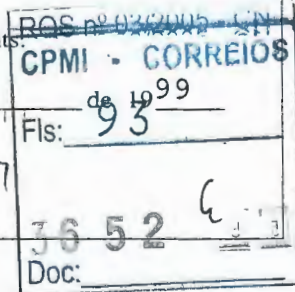
Estado Unidos da America.

E, para constar onde convier, mandei passar o presente, que assinei a fiz selar com o Selo deste Consulado. Dispensado reconhecimento de firma de acordo com o Decreto nº 84.451, do 31-01-1980. A legalização deste documento não implica aceitação ou aprovação de seu conteúdo.

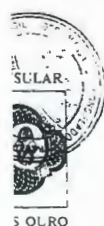
The legalization of this document does not imply approval or acceptance of its contents.

São Francisco, 15 de outubro

NOEMIA WALKER
Vice - Consul



Recebemos R\$ 2000 (ouro) ou US\$ 2000 tab. 476



CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT



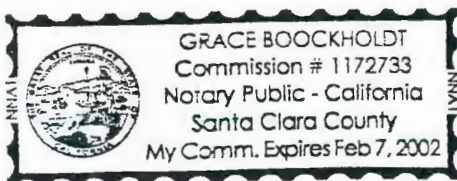
State of CALIFORNIA

County of SANTA CLARA

On OCTOBER 15, 1999 before me, GRACE BOOCKHOLDT, Notary Public

personally appeared MICHAEL H. MORRIS

☒ personally known to me – OR – ☐ proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.



WITNESS my hand and official seal.

Grace Boockholdt
Signature of Notary Public

OPTIONAL

Though the information shown is required, it may prove valuable to persons relying on the document and could prevent its reattachment of this form to another document.

it may prove valuable to persons relying on the document and could prevent its reattachment of this form to another document.

Description of Document

Title or Type of Document

Document Date

Number of Pages

Signer(s) Other Than Name Above

Capacity(ies) of Signer(s)

Signer's Name:

- ☐ Individual
- ☐ Corporate Officer
- Title(s):
- ☐ Partner — ☐ Limited ☐ General
- ☐ Attorney-in-Fact
- ☐ Trustee
- ☐ Guardian or Conservator
- ☐ Other:

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

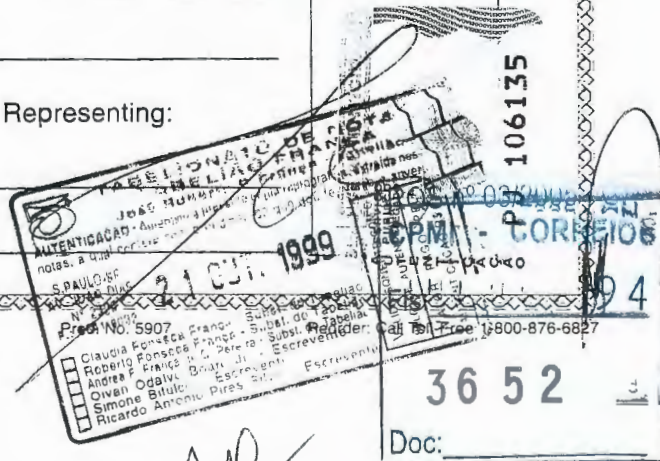
Signer Is Representing:

Signer's Name:

- ☐ Individual
- ☐ Corporate Officer
- Title(s):
- ☐ Partner — ☐ Limited ☐ General
- ☐ Attorney-in-Fact
- ☐ Trustee
- ☐ Guardian or Conservator
- ☐ Other:

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

Signer Is Representing:



MANOEL REVERENDO VIDAL NETO

Tradutor Público Juramentado e Intérprete Comercial

INGLÊS



Tradução N.º 5008

L. 123 Fls. 86-91

Certifico e dou fé, para os devidos fins, que nesta data foi-me apresentado um documento redigido em idioma inglês, mpan de uma folha e uma Proção outorgada por Mi-reto Sun Microsystems of de o de 1999, documento ilo r seguintes termos:

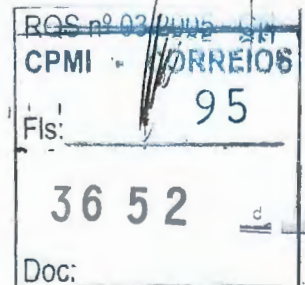
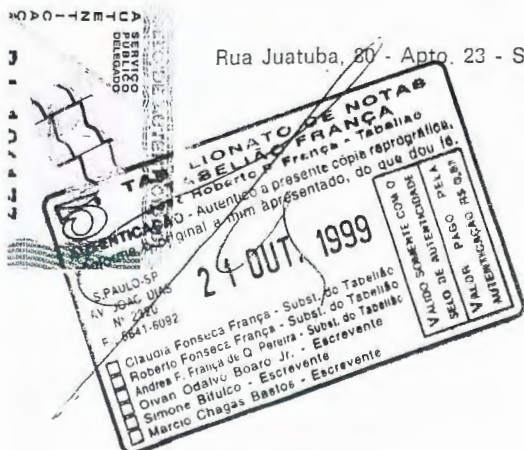
RAÇA

ris, retário e Diretor da , In companhia da Califór-por a dos poderes a mim tações rovasdas pelo Conselho a a r de 1º de outubro de Sr. Antonio Alves, Geren-

te Geral da Sun Microsystems do Brasil Ind. e Com. Ltda. ("Sun do Brasil") a ser o bastante Procurador da Companhia para o fim de entregar certificados aos clientes brasileiros da Companhia e da Sun do Brasil atinentes à titularidade e autorização da Companhia e da Sun do Brasil e à origem de seus produtos, inclusive, sem limitação, o que segue:

- 1 -

Rua Juatuba, 20 - Apto. 23 - São Paulo - SP - Tel.: 262-6493 - Mat. Jucesp N.º 377 - CPF N.º 672.398-708.04



MANOEL REVERENDO VIDAL NETO

Tradutor Público Juramentado e Intérprete Comercial

INGLÊS



Tradução N.º 5008

L. 123 Fls. 86-91

1. Que a Companhia é subsidiária integral da Sun Microsystems, Inc. com sede em 901 San Antonio Road, Palo Alto, CA 94303;

2. Que identifiquem a Sun Microsystems, Inc. bem como as subsidiárias integrais da Companhia;

3. Que identifiquem a Sun do Brasil como subsidiária integral da Companhia e da Sun Microsystems, Inc.

4. Que a Companhia e a Sun do Brasil são empresas afiliadas da Sun Microsystems, Inc. autorizadas a distribuir os produtos da Sun Microsystems no Brasil, diretamente ou por intermédio de seus distribuidores e revendedores autorizados;

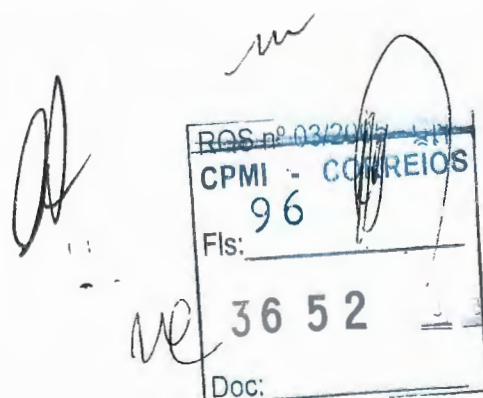
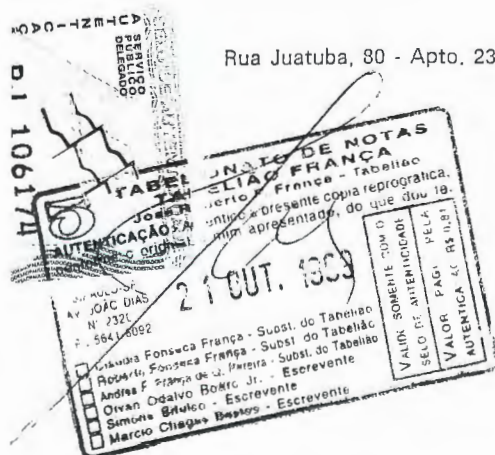
5. Que a Sun Microsystems, Inc. é fabricante de estações de computadores, de servidores e de produtos de rede;

6. Que informem a localização das fábricas da Sun Microsystems, Inc.;

7. Que a Sun do Brasil, assim como seus distribuidores e revendedores autorizados, encontram-se autorizados a

- 2 -

Rua Juatuba, 80 - Apto. 23 - São Paulo - SP - Tel.: 262-6493 - Mat. Jucesp N.º 377 - CPF N.º 672.398-708.04



MANOEL REVERENDO VIDAL NETO

Tradutor Público Juramentado e Intérprete Comercial

INGLÊS



Tradução N.º 5008

L. 123 Fls. 86-91

oferecer os produtos da Sun Microsystems, Inc. ao governo brasileiro e às agências e órgãos públicos;

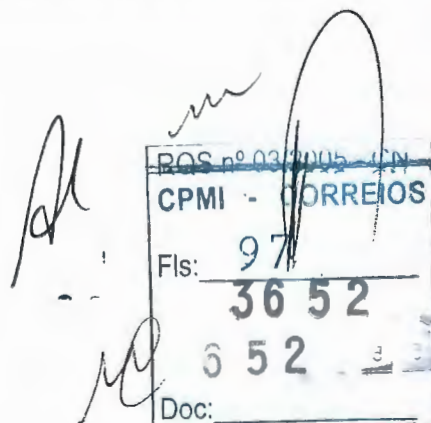
8. Que os produtos da Sun Microsystems, Inc. oferecidos pela Sun do Brasil ou por seus ditribuidores e revendedores autorizados portam a garantia padrão da Sun Microsystems.

Ademais, o Sr. João Antonio Alves terá poderes para praticar em nome e por conta da Companhia todos os atos que se fizerem necessários ou convenientes com relação às matérias aqui descritas, inclusive, sem limitação, receber citação e responder administrativa e judicialmente a tais matérias por conta da Companhia, de forma tão livre quanto a Companhia poderia fazê-lo a fim de alcançar os objetivos da Companhia, tendo poderes ainda para substabelecer os poderes ora conferidos no todo ou em parte, bem como o direito de revogar tal substabelecimento. O infra assinado por este ato ratifica e confirma tudo o que o referido Procurador praticar ou fizer com que seja praticado no âmbito deste instrumento ou de qualquer parte do mesmo.

A presente Procuração permanecerá em pleno vigor até que seja revogada por escrito.

- 3 -

Rua Juatuba, 80 - Apto. 23 - São Paulo - SP - Tel.: 262-6493 - Mat. Jucesp N.º 377 - CPF N.º 672.398-708.04



MANOEL REVERENDO VIDAL NETO

Tradutor Público Juramentado e Intérprete Comercial

INGLÊS



Tradução N.º 5008

L. 123 Fls. 86-91

EM TESTEMUNHO DO QUE, e em conformidade com as deliberações do Conselho de Administração da Companhia datadas de 1º de outubro de 1999, aponho minha assinatura de próprio punho em 14 de outubro de 1999.

SUN MICROSYSTEMS OF CALIFORNIA, INC.

por: (assinatura ilegível)

Nome: Michael Morris - Cargo: Secretário e Diretor."

Legalizações norte-americanas: (folha anexa) "CALIFÓRNIA - RECONHECIMENTO PARA FINS MÚLTIPLOS. Estado da Califórnia, Condado de Santa Clara.

Em 15 de outubro de 1999 perante mim, *Grace Boockholdt*, Notário Público, compareceu pessoalmente *Michael H. Morris*, de mim pessoalmente conhecido como sendo a pessoa cujo nome subscreve o instrumento em apenso, tendo reconhecido a mim que firmou o mesmo em sua qualidade autorizada e que, por força de sua assinatura aposta ao instrumento, a pessoa física ou jurídica por conta de quem agiu celebrou o instrumento.

Em testemunho do que, aponho minha assinatura de próprio punho bem como meu carimbo oficial.

(assinatura ilegível), Assinatura do Notário Público.

- 4 -

Rua Juatuba, 80 - Apto. 23 - São Paulo - SP - Tel.: 262-6493 - Mat. Jucesp N.º 377 - CPF N.º 672.398-708.04



MANOEL REVERENDO VIDAL NETO

Tradutor Público Juramentado e Intérprete Comercial

INGLÊS



Tradução N.º 5008

L. 123 Fls. 86-91

Carimbo: Grace Boockholdt. Comissão N.º 1172733. Notário Público - Califórnia. Condado de Santa Clara. Minha comissão expira em 7 de fevereiro de 2002.

INFORMAÇÕES OPCIONAIS: Embora as informações abaixo não sejam exigidas por lei, poderão ser valiosas às pessoas que confiarem no documento e poderão impedir a remoção ou reanexação fraudulenta deste formulário a outro documento.

Descrição do Documento Anexo

Título ou Tipo de Documento: (em branco)

Data do Documento: (em branco) - Número de Páginas: (em branco)

Outros Signatários que não o acima mencionado: (em branco)

Qualidade(s) Alegada(s) pelo(s) Signatário(s)

Nome do Signatário: (em branco)

- ☐ Pessoa Física
☐ Administrador de Empresa - Cargo(s)
☐ Sócio - ☐ Limitada ☐ Geral
☐ Procurador
☐ Agente Fiduciário
☐ Tutor ou Conservador
☐ Outros:

O Signatário representa: (em branco)."

- 5 -

Rua Juatuba, 80 - Apto. 23 - São Paulo - SP - Tel.: 262-6493 - Mat. Jucesp N.º 377 - CPF N.º 672.398-708.04



MANOEL REVERENDO VIDAL NETO

Tradutor Público Juramentado e Intérprete Comercial

INGLÊS



Tradução N.º 5008

L. 123 Fls. 86-91

Legalizações brasileiras: Em 15 de outubro de 1999, na Cidade de São Francisco, foi reconhecida a firma de Grace Bookholdt, Escrivã da Corte do Condado de Santa Clara, Estado da Califórnia, EUA, pela Sra. Noemia Wainer, Vice-Cônsul do Consulado Geral do Brasil em São Francisco, tendo sido apostos o devido selo bem como a chancela do aludido Consulado Geral.-----

NADA MAIS constava do documento acima, que devolvo juntamente com a presente tradução, impressa em seis laudas, a qual conferi, achei conforme e assino. DOU FÉ.

São Paulo, 21 de outubro de 1999

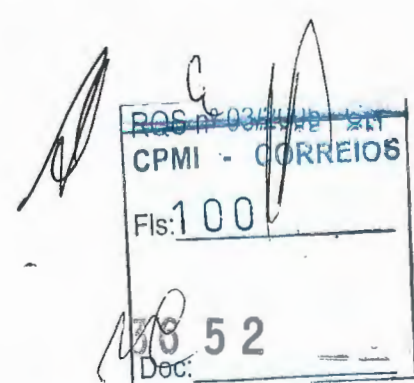
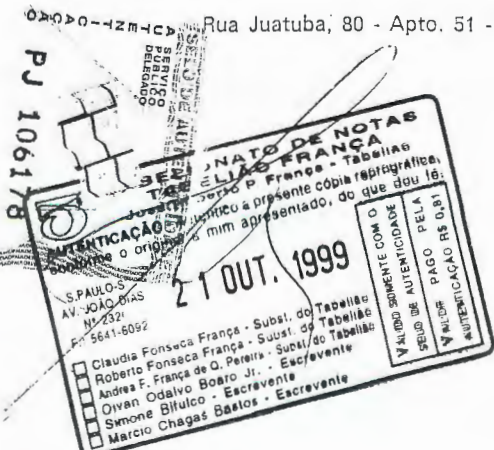
Manoel Reverendo Vidal Neto

Emol.: R\$ 154,00

Recibo nº 899-A

- 6 -

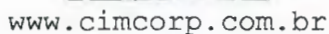
Rua Juatuba, 80 - Apto. 51 - São Paulo - SP - Tel.: 262-6493 - Mat. Jucesp N.º 377 - CPF N.º 672.398.708.04





CINCORP

RGS nº 03/2005 - CN	
CPMI - CORREIOS	
Fis:	101
36 52	
Doc:	



Rua Dempachi Nakayama,23 - Sala 05
Cruz Preta
Barueri – SP
CEP 06413-010

Barueri , 9 de Maio de 2.000

A,

EMPRESA BRASILEIRA DE CORREIOS E TELÉGRAFOS/ECT
SBN Quadra 01 Bloco A 4º andar – Ala Norte
Brasília - DF

**A/C.: COMISSÃO ESPECIAL DE LICITAÇÃO DA ADMINISTRAÇÃO
CENTRAL-CEL/AC
REF.: CONCORRÊNCIA 001/2000**

“PROPOSTA TÉCNICA”

Com satisfação estamos encaminhando a Vossa apreciação, nossas condições comerciais para fornecimento dos seguintes produtos.

Esperamos que os produtos e os Serviços da CIMCORP, venham de encontro as exigências e interesses de sua companhia no que se refere à excelência de Hardware/Software/ Serviços, e principalmente ao preço/performance de nossas soluções.

A CIMCORP possui uma experiência de quase 10 anos em serviços de integração.

Sem mais, colocamo-nos à disposição para fornecer-lhes quaisquer esclarecimentos que se façam necessários.

Atenciosamente,

CIMCORP COM.INTERN.E INFORMÁTICA LTDA
Rogério Dias
Diretor Regional

RQS nº 03/2005
CPMI - CORREIOS
Fls: 102
3652
Doc:



www.cimcorp.com.br



Rua Dempachi Nakayama, 23 - Sala 05
Cruz Preta
Barueri - SP
CEP 06413-010

02

1. **Prazo de Garantia: 2 anos (padrão 7x24x2; 7 dias na semana, 24 horas por dia e atendimento em 2 horas)**, com reposição de peças que apresentarem defeitos e respectivos serviços, sem ônus adicionais, contados a partir da data de emissão do último termo de aceitação relativo ao equipamentos entregues;
2. **Prazo de Entrega:** Conforme Pauta de Distribuição, nos termos do anexo III do edital desta licitação (reproduzida nesta proposta).
3. **Quantidades a serem entregues:** Conforme Pauta de distribuição, nos termos do Anexo III do edital desta licitação (reproduzida nesta proposta).
4. **Local de Entrega dos Equipamentos:** Será nos almoxarifados das Diretorias regionais da ECT, nos endereços constantes no Anexo IV – endereços dos Almoxarifados do edital desta licitação (reproduzida nesta proposta).

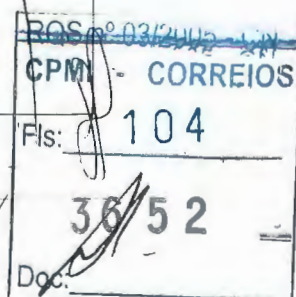
RECIBO Nº 02/2005 - CN

CPMI - CORREIOS
Fls: 103
36 52
Doc:

I.8 - SERVIDOR TIPO RISC1

03(três) Servidores marca **Sun Microsystems**, modelo **Enterprise 450**, conforme descrição abaixo:

ATRIBUTO	CONFIGURAÇÃO OFERTADA
CPU	Processadores RISC UltraSparc-II de 300 MHz, de 64 bits, em número igual a 2(dois), expansível a 4(quatro) processadores.
Memória Cache Instruction + Data (Primary + secondary)	2 MB por processador.
Memória RAM	ECC com capacidade instalada de 512 MB expansível a 4 Gbytes, "On Board", tempo de acesso máximo de 60 ns.
Performance	SPECint_rate95 igual a 229 e SPECfp_rate95 igual a 338
Suporte à Arquitetura	SMP- Symetric Multi Processing
Slots	Apresenta, após configuração montada: 8 slots livres de 32bits
Fonte de Alimentação Interna	Redundante, Hotswappable Bivolt, compatível com configuração máxima do equipamento.
Controladora e Disco Rígido Interno	Padrão UltraSCSI-III, com capacidade de 18(dezoito) Gbytes formatado, tempo médio de acesso igual a 10 ms e taxa de transferência de 40 Mbytes/Seg.
Monitor de vídeo	Policromático, com 19", dot pitch de .28 mm, atende às normas MPR II, EPA Energy Star. Seleção automática de tensão entre 100-240 VAC - Full-Range. Com resolução de 1.280 x 1.024. Marca : Sun Microsystems Modelo : X7136A
Teclado Alfanumérico	101 teclas.
Mouse	03 teclas com resolução de 320 dpi, mouse-pad e driver de instalação.
Unidade de Disco Flexível	01 (uma) unidade de 3 1/2" com capacidade de 1.44 Mbytes.
Interface Serial	02 (duas) interfaces seriais padrão RS-232C.
Unidade de Fita DLT	01 (uma) unidade de fita padrão DLT para utilização de mídias com capacidade de 35 Gbytes, sem compressão, e com taxa de transferência sustentada de 5 Mbytes/Seg. Marca : Sun Microsystems Modelo : StorEdgeDLT7000



Placa de rede	01 (uma) placa padrão Ethernet de 32 Bits – IEEE 802.3 – CSMA/CD com driver para Unix, saída 100Base-TX (RJ-45), velocidade dupla 10 ou 100 mbps autosense, possibilidade de gerenciamento SNMP, compatível com TCI/IP, acompanhada dos respectivos manuais de documentação
Sistema Operacional	Solaris Server, versão 7, padrão Unix, 64 bits, instalado e configurado para Rede Local e Corporativa da ECT, com 3 acessos simultâneos, com capacidade para suportar a Plataforma de Gerenciamento HP Open View – NNM (Network Node Management) na versão 5.0 ou superior, e os módulos HP Open View, entregue em mídia CD-ROM com toda documentação e licenças
Imunidade	O Produto está imune a quaisquer problemas decorrentes do “Bug do milênio”, devidamente comprovada por declaração explícita do fabricante em anexo.
Documentação Técnica	No fornecimento da documentação técnica, serão fornecidos todos os informes, conforme descritos nos subitens que seguem: A documentação que acompanha o equipamento será na língua inglesa. Na Proposta Técnica referente ao produto serão fornecidos: • Fabricante: Sun Microsystems; Marca: Sun Microsystems; Modelo: Enterprise 450. • Nome e endereço da assistência Técnica Autorizada do produto ofertado: COBRA COMPUTADORES; End.: SEPN 511 BL.B, 57 – Ed. Bittar III – 3º andar – Asa Norte – Brasília/DF. Demais localidades, conforme declaração em anexo. • Nome e telefone do técnico que possa responder questionamentos sobre todas as características do produto em pauta: Sr. Sérgio Nielson Cerqueira F.:61-328.1218 R.502. • Site do Fabricante: www.sun.com • Site do Fornecedor/distribuidor: www.cimcorp.com.br

RQS nº 03/2005 - CPMI - CORREIO

Fls: 105

36 52

Doc:

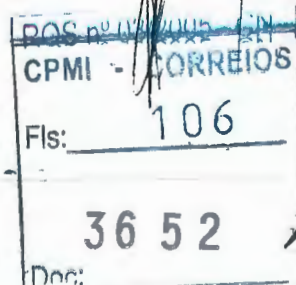


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Garantia	Total do fabricante por um prazo de 2 anos
Outros	Cabos, acessórios, manuais e documentação que são necessários ao pleno funcionamento do equipamento.
Certificação	ISO 9000. Apresentado cópia oficial emitido pelo órgão certificador e tradução oficial com autenticação em anexo.
Assistência Técnica	Em anexo está sendo apresentada carta de Solidariedade do fabricante, assegurando o fornecimento e a garantia do produto em questão e também a relação completa de Assistência Técnica Autorizada para o produto, em todo o território nacional, com a nomeação para cada endereço, de técnico responsável que possa atender consultas da licitadora.
Chamado de Suporte	Com atendimento "On site" (atuação de um técnico no local onde), no prazo máximo de 2 horas e prazo máximo de solução do problema de até 24 horas . Caso o problema não seja resolvido neste prazo máximo, nos comprometemos a colocar outro equipamento similar ou superior em substituição, até o conserto integral do equipamento com defeito.
Horário de Atendimento	Das 00:00 às 24:00 hs (de Segunda- feira a Domingo)





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06

✓

A empresa **CIMCORP COMÉRCIO INTERNACIONA E INFORMÁTICA LTDA** declara que:

(X) Atende

() Não Atende

plenamente os atributos técnicos que constituem a configuração mínima obrigatória exigida para este produto.

DESEMPENHO(DE):

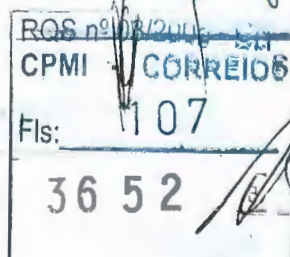
PESO 06

A pontuação para o fator DESEMPENHO(DE) será atribuída calculando-se o somatório da pontuação obtida para os seguintes subfatores opcionais:

- Processador;
- Performance;
- Memória RAM;
- Capacidade do disco Rígido;
- Fonte de alimentação.

Performance		
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à performance solicitada do equipamento	Resposta	Pontos
SPECint_rate95 igual ou superior a 240	Não atende	01
SPECfp_rate95 igual ou superior a 250	Atende	01

Memória RAM		
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à memória do equipamento	Resposta	Pontos
Igual ou Superior a 1 Gbyte	Não atende	01





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07

Capacidade do Disco Rígido		
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à capacidade do disco rígido do equipamento	Resposta	Pontos
Igual ou Superior a 30 Gbyte	Não atende	01

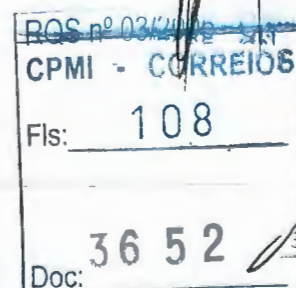
Fonte de alimentação Redundante (que suporte a configuração máxima do equipamento)		
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente ao tipo de fonte de alimentação do equipamento	Resposta	Pontos
Fonte de alimentação redundante, Hot-swappable.	Atende	02
Fonte de alimentação redundante		01

QUALIDADE(QD):

04

A pontuação do fator QUALIDADE(QD) será atribuída considerando a certificação de que as empresas, na fabricação e manutenção do equipamento(s), atendem aos padrões das normas ISO9002 ou NBR equiv

Certificação		
Assinalar com a palavra "Atende" para as certificações que o modelo do equipamento cotado possui:		
Possui certificação atualizada conforme segue	Resposta	Pontos
ISO 9002 referente a serviços de suporte de hardware e software	Atende	01





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SUPORTE DE SERVIÇOS(SS):

PESO 06

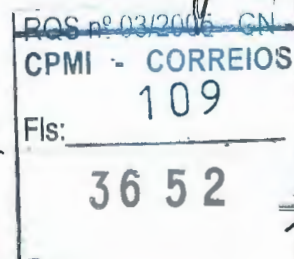
A pontuação do fator SUPORTE DE SERVIÇOS(SS) será atribuída calculando-se a pontuação obtida para os seguintes subfatores opcionais:

- Prazo de atendimento;
- Horário de atendimento e suporte;
- Central de atendimento e suporte;
- Duração da garantia.

Prazo de
Assinalar com a palavra "Atende" a atendimento ao equipamento cotado:
Tendo como base o registro de chamada de atendimento será prestado nos prazos, conforme
Até 02 horas

ente ao prazo máximo de	
Resposta	Pontos
Atende	02

Horário de Atendimento e Suporte		
Assinalar com a palavra “Atende” a opção correspondente ao horário de atendimento às chamadas referentes ao equipamento cotado:		
Além do horário comercial, o atendimento será prestado também nos horários, conforme segue:	Resposta	Pontos
Horário integral – 24 horas / 7 dias por semana	Atende	02
Horário semi-integral – 24 horas (de 2ª a 6ª feira)		01





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09

Central de Atendimento e Suporte

Assinalar com a palavra "Atende" a opção correspondente às facilidades oferecidas no atendimento às chamadas referentes ao equipamento cotado:

Está disponível, para o atendimento aos chamados:

(0800) para hardware e software : 0800118988

Resposta

Pontos
(cumulativos)

Atende

01

Duração de Garantia

Assinalar com a palavra "Atende" a opção correspondente a duração da garantia dada pelo fabricante para o equipamento cotado:

O fabricante oferece garantia para o produto por um período de:

Resposta

Pontos

05 (cinco) anos

Não atende

03

04 (quatro)anos

Não atende

02

03 (três)anos

Não atende

01

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I.9 - SERVIDOR TIPO RISC2

25(vinte e cinco) Servidores marca **Sun Microsystems**, modelo **Ultra 10**, conforme descrição abaixo:

ATRIBUTO	CONFIGURAÇÃO OFERTADA
CPU	Processador RISC UltraSparc-III de 440 MHZ, de 64 bits, em número igual a 1(um).
Memória Cache Instruction + Data (Primary + secondary)	2MB por processador.
Memória RAM	ECC com capacidade instalada de 512 MB expansível até 01 GB, "On Board", tempo de acesso de 60 ns.
Performance	SPECint_rate95 = 160 e SPECfp_rate95 = 199
Slots	Apresenta, após configuração montada: 3 slots livres de 32bits
Fonte de Alimentação Interna	Bivolt, compatível com configuração máxima do equipamento.
Controladora e Disco Rígido Interno	Padrão E-IDE com capacidade de 9(nove) Gbytes formatado, tempo médio de acesso igual a 10 ms e taxa de transferência de 16,6 Mbytes/Seg.
Monitor de vídeo	Policromático, com 19", dot pitch de .28 mm, atende às normas MPR II, EPA Energy Star. Seleção automática de tensão entre 100-240 VAC - Full-Range. Com resolução de 1.280 x 1.024. Marca: Sun Microsystems Modelo : X7136A
Teclado Alfanumérico	101 teclas.
Mouse	03 teclas com resolução de 320 dpi, mouse-pad e driver de instalação.
Interface Serial	02 (duas) interfaces seriais padrão RS-232C.
Unidade de CD-ROM	Velocidade de 32 X - EIDE, instalada e reconhecida pelo sistema operacional Unix Solaris 7
Unidade de Fita DLT	01 (uma) unidade de fita padrão DLT para utilização de mídias com capacidade de 35 Gbytes, sem compressão, e com taxa de transferência sustentada de 5 Mbytes/Seg. Marca: Sun Microsystems Modelo : StorEdge DLT7000

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Placa de rede	01 (uma) placa padrão Ethernet de 32 Bits – IEEE 802.3 – CSMA/CD com driver para Unix, saída 100Base-TX (RJ-45), velocidade dupla 10 ou 100 mbps autosense, possibilidade de gerenciamento SNMP, compatível com TCI/IP, acompanhada dos respectivos manuais de documentação
Sistema Operacional	Solaris Server, versão 7, padrão Unix, 64 bits, instalado e configurado para Rede Local e Corporativa da ECT, com 3 acessos simultâneos, com capacidade para suportar a Plataforma de Gerenciamento HP Open View – NNM (Network Node Management) na versão 5.0 ou superior, e os módulos HP Open View, entregue em mídia CD-ROM com toda documentação e licenças.
Imunidade	O Produto está imune a quaisquer problemas decorrentes do “Bug do milênio”, devidamente comprovada por declaração explícita do fabricante em anexo.
Documentação Técnica	No fornecimento da documentação técnica, serão fornecidos todos os informes, conforme descritos nos subitens que seguem: A documentação que acompanha o equipamento será na língua inglesa. Na Proposta Técnica referente ao produto serão fornecidos: • Fabricante: Sun Microsystems; Marca : Sun Microsystems; Modelo: Ultra 10 • Assistência Técnica Autorizada do produto ofertado: : COBRA COMPUTADORES; End.: SEPN 511 BL.B, 57 – Ed. Bittar III – 3º andar – Asa Norte – Brasília/DF. Demais localidades, conforme declaração em anexo. - Nome e telefone do técnico que possa responder questionamentos sobre todas as características do produto em pauta: Sr. Sérgio Nielson Cerqueira F.:61-328.1218 R.502. • Site do Fabricante: www.sun.com - Site do Fornecedor/distribuidor: www.cimcorp.com.br

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Garantia	Total do fabricante por um prazo de 2 anos
Outros	Cabos, acessórios, manuais e documentação que são necessários ao pleno funcionamento do equipamento.
Certificação	ISO 9000. Apresentado cópia oficial emitido pelo órgão certificador e tradução oficial com autenticação em anexo.
Assistência Técnica	Em anexo está sendo apresentada carta de Solidariedade do fabricante, assegurando o fornecimento e a garantia do produto em questão e também a relação completa de Assistência Técnica Autorizada para o produto, em todo o território nacional, com a nomeação para cada endereço, de técnico responsável que possa atender consultas da licitadora.
Chamado de Suporte	Com atendimento "On site" (atuação de um técnico no local onde), no prazo máximo de 2 horas e prazo máximo de solução do problema de até 24 horas. Caso o problema não seja resolvido neste prazo máximo, nos comprometemos a colocar outro equipamento similar ou superior em substituição, até o conserto integral do equipamento com defeito.
Horário de Atendimento	Das 00:00 às 24:00 hs (de Segunda-feira a Domingo)

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13

A empresa **CIMCORP COMÉRCIO INTERNACIONA E INFORMÁTICA LTDA** declara que:

(X) Atende

() Não Atende

plenamente os atributos técnicos que constituem a configuração mínima obrigatória exigida para este produto.

DESEMPENHO(DE):

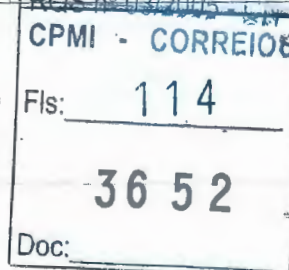
PESO 06

A pontuação para o fator DESEMPENHO(DE) será atribuída calculando-se o somatório da pontuação obtida para os seguintes sub-fatores opcionais:

- Processador;
- Performance;
- Memória RAM;
- Capacidade do disco Rígido;
- Fonte de alimentação.

Performance		
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à performance solicitada do equipamento	Resposta	Pontos
SPECint_95 igual ou superior a 19 SPECint_rate95 igual ou superior a 92	atende	01
SPECfp_95 igual ou superior a 27 SPECfp_rate95 igual ou superior a 115	atende	01

Memória RAM		
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à memória do equipamento	Resposta	Pontos
Igual ou Superior a 01 Gbyte	Não atende	01



Capacidade do Disco Rígido		
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à capacidade do disco rígido do equipamento	Resposta	Pontos
Igual ou Superior a 30 Gbyte	Não atende	01

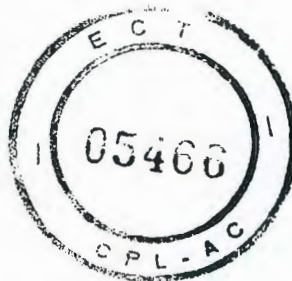
Fonte de alimentação Redundante (que suporte a configuração máxima do equipamento)		
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente ao tipo de fonte de alimentação do equipamento	Resposta	Pontos
Fonte de alimentação redundante, Hot-swappable.	Não atende	02
Fonte de alimentação redundante	Não atende	01

QUALIDADE(QD):

PESO 04

A pontuação do fator QUALIDADE(QD) será atribuída considerando a certificação de que as empresas, na fabricação e manutenção do(s) equipamento(s) proposto(s), atendem aos padrões das normas ISO9002 ou NBR equivalente:

Certificação		
Assinalar com a palavra "Atende" para as certificações que o modelo do equipamento cotado possui:		
Possui certificação atualizada conforme segue	Resposta	Pontos
ISO 9002 referente a serviços de suporte de hardware e software	Atende	01



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SUPORTE DE SERVIÇOS(SS):

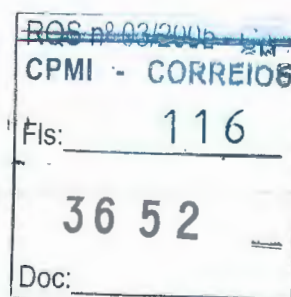
PESO 06

A pontuação do fator SUPORTE DE SERVIÇOS(SS) será atribuída calculando-se a pontuação obtida para os seguintes subfatores opcionais:

- Prazo de atendimento;
- Horário de atendimento e suporte;
- Central de atendimento e suporte;
- Duração da garantia.

Prazo de Atendimento		
Assinalar com a palavra "Atende" a opção correspondente ao prazo máximo de atendimento ao equipamento cotado:		
Tendo como base o registro de chamada do suporte técnico, o atendimento será prestado nos prazos, conforme segue:	Resposta	Pontos
Até 02 horas	Atende	02

Horário de Atendimento e Suporte		
Assinalar com a palavra "Atende" a opção correspondente ao horário de atendimento às chamadas referentes ao equipamento cotado:		
Além do horário comercial, o atendimento será prestado também nos horários, conforme segue:	Resposta	Pontos
Horário integral - 24 horas / 7 dias por semana	Atende	02
Horário semi - integral - 24 horas (de 2ª a 6ª feira)		01





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Central de Atendimento e Suporte

Assinalar com a palavra "Atende" a opção correspondente às facilidades oferecidas no atendimento às chamadas referentes ao equipamento cotado:

Está disponível, para o atendimento aos chamados:	Resposta	Pontos (cumulativos)
(0800) para hardware e software : 0800118988	Atende	01

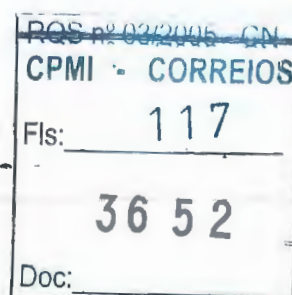
Duração de Garantia

Assinalar com a palavra "Atende" a opção correspondente a duração da garantia dada pelo fabricante para o equipamento cotado:

O fabricante oferece garantia para o produto por um período de:	Resposta	Pontos
05 (cinco) anos	Não atende	03
04 (quatro)anos	Não atende	02
03 (três)anos	Não atende	01

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I.10 - SERVIDOR TIPO RISC3

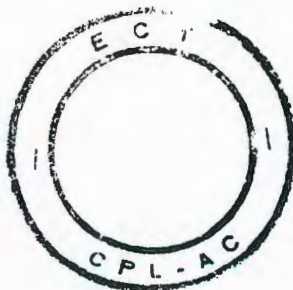
10(dez) Servidores marca **Sun Microsystems**, modelo **Enterprise 4500**, conforme descrição abaixo:

ATRIBUTO	CONFIGURAÇÃO OFERTADA
CPU	Processador RISC UltraSparc-IIi de 400 MHZ , de 64 bits, em número igual a 6(seis), expansível a 14 (quatorze).
Memória Cache Instruction + Data (Primary + secondary)	8 Mbytes por processador.
Memória RAM	ECC com capacidade instalada de 4 Gbytes expansível até 28 Gbytes, "On Board", tempo de acesso máximo de 60 ns.
Performance	TPM-C superior a 21.000, expansível a 32.000. Índice estimado : 21543 conforme regra estabelecida na pág 65/80-rodapé do edital. Ver performance Auditada em anexo.
Suporte à Arquitetura	SMP- Symetric Multi Processing
Slots	Apresenta, após configuração montada: 6 interfaces de I/O livres
Fonte de Alimentação Interna	Bivolt, , redundante, hotswappable e compatível com configuração máxima do equipamento
Controladora e Disco Rígido Interno	Padrão Wide UltraSCSI, com capacidade de 18(dezoito) Gbytes em duas unidades, formatados, espelhados, tempo médio de acesso igual a 9 ms e rotação de 7.200RPM.
Controladora de Array e Arrays de Discos	Wide Ultra SCSI com suporte a RAID 0 e 5, por Hardware, com capacidade de 36GB cada, totalizando 108(cento e oito) Gbytes formatados, líquidos, com tempo médio de acesso de 9ms, rotação de 10.000RPM, "hot-swappable" e com "hot-spare". Marca: Sun Microsystems Modelo : StorEdge A1000
Monitor de vídeo	Policromático, com 17", dot pitch de .28 mm, atende às normas MPR II, EPA Energy Star. Seleção automática de tensão entre 100-240 VAC - Full-Range. Com resolução de 800 x 600. Marca: Sun Microsystems Modelo : X7143A
Placa de vídeo	Gráfica com 2MB de memória.

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Teclado Alfanumérico	101 teclas.
Mouse	03 teclas com resolução de 320 dpi, mouse-pad e driver de instalação.
Interface Serial	02 (duas) interfaces seriais padrão RS-232C.
Unidade de CD-ROM	Velocidade de 32 X - SCSI-2, instalada e reconhecida pelo sistema operacional Unix Solaris 7
Unidade de Fita DLT	01 (uma) unidade de fita padrão DLT para utilização de mídias com capacidade de 35 Gbytes, sem compressão, e com taxa de transferência sustentada de 5 Mbytes/Seg. Foi destinada uma controladora específica para compartilhar um canal de I/O exclusivamente com a unidade de CD-ROM. Marca: Sun Microsystems Modelo : StorEdge DLT7000
Placa de rede	01 (uma) placa padrão Ethernet de 32 Bits - IEEE 802.3 - CSMA/CD com driver para Unix, saída 100Base-TX (RJ-45), velocidade dupla 10 ou 100 mbps autosenso, possibilidade de gerenciamento SNMP, compatível com TCP/IP, acompanhada dos respectivos manuais de documentação
Sistema Operacional	Solaris Server, versão 7, padrão Unix, 64 bits, instalado e configurado para Rede Local e Corporativa dos Correios-CorreiosNET, com número ilimitado de usuários simultâneos entregues em mídia CD-ROM com toda documentação e licenças. Suporta a Plataforma de Gerenciamento HP Open View - NNM (Network Node Management) na versão 5.0 ou superior, os módulos HP Open View e o Maestro Tivoli, e compatível com a Solução Integrada de Gestão Empresarial dos Correios.
Imunidade	O Produto está imune a quaisquer problemas decorrentes do "Bug do milênio", devidamente comprovada por declaração explícita do fabricante em anexo.
Documentação Técnica	No fornecimento da documentação técnica, serão fornecidos todos os informes, conforme descritos nos subitens que Seguem: A documentação que acompanha o equipamento será na língua inglesa.

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	Na Proposta Técnica referente ao produto serão fornecidos: - Fabricante: Sun Microsystems ; Marca : Sun Microsystems; Modelo: Enterprise 4500 - Assistência Técnica Autorizada do produto ofertado: COBRA COMPUTADORES; End.: SEPN 511 BL.B, 57 - Ed. Bittar III - 3º andar - Asa Norte - Brasília/DF. Demais localidades, conforme declaração em anexo. Nome e telefone do técnico que possa responder questionamentos sobre todas as características do produto em pauta: Sr. Sérgio Nielson Cerqueira F.:61-328.1218 R.502. - Site do Fabricante: www.sun.com Site do Fornecedor/distribuidor: www.cimcorp.com.br - Endereço/Nome do Distribuidor Nacional : Cimcorp Comércio Internacional e Informática Ltda - R. Henrique Monteiro, nº90, 7ºandar, Pinheiros - São Paulo/SP F.: 11-3038.3899 - Endereço/Nome do Representante em Brasília : Microlog Informática Tecnologia Ltda - SHCGN 714/715 - Bloco D - Loja 40 - CEP 70.760-795 - Brasília-DF - F.: 61-347-0995 - Prospecto técnico do modelo cotado. - Endereço completo da página do Site do Fabricante, onde constem as especificações técnicas do modelo do produto ofertado: www.sun.com/servers/midrange/e4500/e4500.spec.html.
Garantia	Total do fabricante por um prazo de 2 anos
Outros	Cabos, acessórios, manuais e documentação que são necessários ao pleno funcionamento do equipamento.
Certificação	ISO 9000. Apresentado cópia oficial emitido pelo órgão certificador e tradução oficial com autenticação em anexo.
Assistência Técnica	Em anexo está sendo apresentada carta de Solidariedade do fabricante, assegurando o fornecimento e a garantia do produto em questão e também a <u>relação completa de Assistência Técnica Autorizada</u> para o produto, em todo o território nacional, com a nomeação para cada endereço, de

	técnico responsável que possa atender consultas da licitadora.
Chamado de Suporte	Com atendimento "On site" (atuação de um técnico no local onde), no prazo máximo de 2 horas e prazo máximo de solução do problema de até 24 horas. Caso o problema não seja resolvido neste prazo máximo, nos comprometemos a colocar outro equipamento similar ou superior em substituição, até o conserto integral do equipamento com defeito.
Horário de Atendimento	Das 00:00 às 24:00 hs (de Segunda-feira a Domingo)

A empresa **CIMCORP COMÉRCIO INTERNACIONAL E INFORMÁTICA LTDA** declara que:

(X) Atende

() Não Atende

plenamente os atributos técnicos que constituem a configuração mínima obrigatória exigida para este produto.

DESEMPENHO(DE):

PESO 06

A pontuação para o fator DESEMPENHO(DE) será atribuída calculando-se o somatório da pontuação obtida para os seguintes subfatores opcionais:

- Escalabilidade de Performance Auditada ou estimada, com base em equipamento auditado da mesma família;
- Performance Auditada ou estimada, com base em equipamento auditado da mesma família;
- Memória RAM;
- Memória Cache;
- Expansibilidade de memória RAM;
- Disco Interno e Controladora de Disco SCSI;
- Controladora de Array de Disco;
- Fonte de Alimentação Interna Hot-swappable



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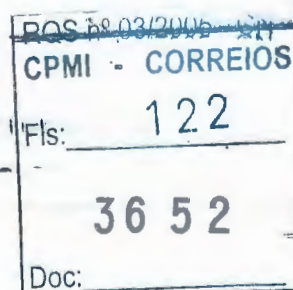
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Escalabilidade de Performance Auditada ou Estimada		
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à capacidade máxima de performance atingida pelo equipamento	Resposta	Pontos
TpmC igual ou superior a 50.000	Atende	03
TpmC igual ou superior a 40.000		02
TpmC igual ou superior a 35.000		01

Performance Auditada ou Estimada		
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à performance solicitada do equipamento	Resposta	Pontos
TpmC igual ou superior a 28.000	Não atende	03
TpmC igual ou superior a 24.500	Não atende	02
TpmC igual ou superior a 22.000	Não atende	01

Memória RAM		
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à Memória RAM instalada do equipamento	Resposta	Pontos
Igual ou Superior a 8 Gbyte	Não atende	02
Igual ou Superior a 6 Gbyte	Não atende	01

Memória Cache		
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à Memória Cache por processador do equipamento	Resposta	Pontos
8 Mbytes por processador	Atende	03
4 Mbytes por processador		02
2 Mbytes por processador		01





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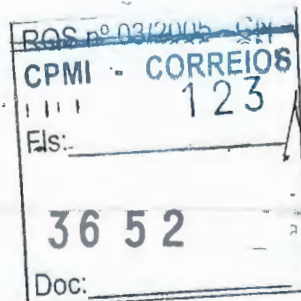
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Expansibilidade de Memória RAM		
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à Capacidade de expansão de memória RAM do equipamento	Resposta	Pontos
Acima de 16 Gbytes	Atende	01

Disco Interno e Controladora de Disco SCSI		
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à Disco Interno e Controladora de disco SCSI do equipamento	Resposta	Pontos
RAID 1 por Hardware para controladora SCSI(Discos Interno)	Não atende	02

Controladora de Array de Disco		
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à Controladora de Arrays de Disco do equipamento	Resposta	Pontos
RAID 1 por Hardware para controladora de Array de Disco	Atende	02

Fonte de alimentação Interna "Hot-swappable" (que suporte a configuração máxima do equipamento)		
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à fonte de alimentação interna do equipamento	Resposta	Pontos
Fonte Hot-swappable.	Atende	01





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QUALIDADE(QD):

PESO 04

A pontuação do fator QUALIDADE(QD) será atribuída considerando a certificação de que as empresas, na fabricação e manutenção do(s) equipamento(s) proposto(s), atendem aos padrões das normas ISO9002 ou NBR equivalente:

Certificação		
Assinalar com a palavra "Atende" para as certificações que o modelo do equipamento cotado possui:		
Possui certificação atualizada conforme segue	Resposta	Pontos
ISO 9002 referente a serviços de suporte de hardware e software	Atende	01

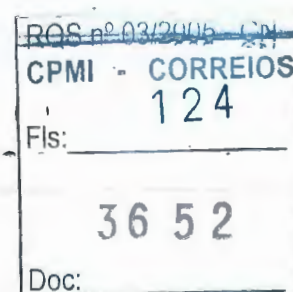
SUPORTE DE SERVIÇOS(SS):

PESO 06

A pontuação do fator SUPORTE DE SERVIÇOS(SS) será atribuída calculando-se a pontuação obtida para os seguintes subfatores opcionais:

- Prazo de atendimento;
- Horário de atendimento e suporte;
- Central de atendimento e suporte;
- Duração da garantia.

Prazo de Atendimento		
Assinalar com a palavra "Atende" a opção correspondente ao prazo máximo de atendimento ao equipamento cotado:		
Tendo como base o registro de chamada do suporte técnico, o atendimento será prestado nos prazos, conforme segue:	Resposta	Pontos
Até 02 horas	Atende	02





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Horário de Atendimento e Suporte

Assinalar com a palavra "Atende" a opção correspondente ao **horário de atendimento às chamadas** referentes ao equipamento cotado:

Além do horário comercial, o atendimento será prestado também nos horários, conforme segue:	Resposta	Pontos
Horário integral - 24 horas / 7 dias por semana	Atende	02
Horário semi - integral - 24 horas (de 2ª a 6ª feira)		01

Central de Atendimento e Suporte

Assinalar com a palavra "Atende" a opção correspondente às facilidades oferecidas no **atendimento às chamadas** referentes ao equipamento cotado:

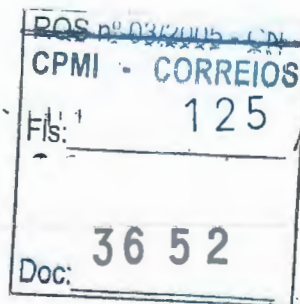
Está disponível, para o atendimento aos chamados:	Resposta	Pontos (cumulativos)
(0800) para hardware e software : 0800118988	Atende	01

Duração de Garantia

Assinalar com a palavra "Atende" a opção correspondente a **duração da garantia dada pelo fabricante** para o equipamento cotado:

O fabricante oferece garantia para o produto por um período de:	Resposta	Pontos
05 (cinco) anos	Não atende	03
04 (quatro)anos	Não atende	02
03 (três)anos	Não atende	01


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I.11 - SERVIDOR TIPO RISC4

02 (dois) Servidores marca **Sun Microsystems**, modelo **Enterprise 3500**, conforme descrição abaixo:

ATRIBUTO	CONFIGURAÇÃO OFERTADA
CPU	Processador RISC UltraSparc-II-i de 400 Mhz, de 64 bits, em número igual a 3(três), expansível a 8(oito) processadores.
Performance	TPM-C superior a 8.000, expansível a 24.000. Índice estimado : 10.771 conforme regra estabelecida na pág 73/80-rodapé do edital. Ver performance Auditada em anexo.
Memória Cache Instruction + Data (Primary/+ secondary)	8 Mbytes por processador.
Memória RAM	ECC com capacidade instalada de 2 Gbytes expansível até 16 Gbytes, "On Board", tempo de acesso de 60 ns.
Suporte à Arquitetura	SMP- Symetric Multi Processing
Slots	Apresenta, após configuração montada: 02 interfaces de I/O livres.
Fonte de Alimentação Interna	Redundante, Hot-Swappeble ,Bivolt, compatível com configuração máxima do equipamento.
Controladora e Disco Rígido Interno	Padrão FC-AL, com capacidade de 18(dezoito) Gbytes FC-AL em duas unidades, formatados, espelhados, com tempo médio de acesso igual a 9 ms e rotação de 10.000RPM.
Monitor de vídeo	Policromático, com 17", dot pitch de .28 mm, atende às normas MPR II, EPA Energy Star. Seleção automática de tensão entre 100-240 VAC - Full-Range. Com resolução de 800 x 600. Marca: Sun Microsystems Modelo : X7143A
Placa de vídeo	Gráfica com 2MB de memória.
Teclado Alfanumérico	101 teclas.
Mouse	03 teclas com resolução de 320 dpi, mouse-pad e driver de instalação.
Interface Serial	02 (duas) interfaces seriais padrão RS-232C.
Unidade de CD-ROM	Velocidade de 32 X , SCSI-2, instalada e reconhecida pelo sistema operacional Unix Solaris 7



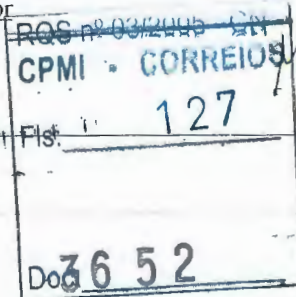
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Unidade de Fita DAT	01 (uma) unidade de fita padrão DAT para utilização de mídias com capacidade de 12 Gbytes, sem compressão. Foi destinada uma controladora específica para compartilhar um canal de I/O exclusivamente com a unidade de CD-ROM.
Placa de rede	01 (uma) placa padrão Ethernet de 32 Bits - IEEE 802.3 - CSMA/CD com driver para Unix, saída 100Base-TX (RJ-45), velocidade dupla 10 ou 100 mbps autosenso, possibilidade de gerenciamento SNMP, compatível com TCI/IP, acompanhada dos respectivos manuais de documentação
Sistema Operacional	Solaris Server, versão 7, padrão Unix, 64 bits, instalado e configurado para Rede Local e Corporativa da ECT, com número ilimitado de usuários simultâneos.
Imunidade	O Produto está imune a quaisquer problemas decorrentes do "Bug do milênio", devidamente comprovada por declaração explícita do fabricante em anexo.
Documentação Técnica	No fornecimento da documentação técnica, serão fornecidos todos os informes, conforme descritos nos subitens que Seguem: A documentação que acompanha o equipamento será na língua inglesa. Na Proposta Técnica referente ao produto serão fornecidos: - Fabricante: Sun Microsystems ; Marca : Sun Microsystems; Modelo: Enterprise 3500 - Assistência Técnica Autorizada do produto ofertado: COBRA COMPUTADORES; End.: SEPN 511 BL.B, 57 - Ed. Bittar III - 3º andar - Asa Norte - Brasília/DF. Demais localidades, conforme declaração em anexo. Nome e telefone do técnico que possa responder questionamentos sobre todas as características do produto em pauta: Sr. Sérgio Nielson Cerqueira F.:61-328.1218 R.502. - Site do Fabricante: www.sun.com Site do Fornecedor/distribuidor: www.cimcorp.com.br



	- Endereço/Nome do Distribuidor Nacional : Cimcorp Comércio Internacional e Informática Ltda - R. Henrique Monteiro, nº90, 7º andar, Pinheiros - São Paulo/SP F.: 11-3038.3899 - Endereço/Nome do Representante em Brasília : Microlog Informática Tecnologia Ltda - SHCGN 714/715 - Bloco D - Loja 40 - CEP 70.760-795 - Brasília-DF - F.: 61-347-0995 - Prospecto técnico do modelo cotado - Endereço completo da página do Site do Fabricante, onde constem as especificações técnicas do modelo do produto ofertado: www.sun.com/servers/midrange/e4500/e4500.spec.html.
Garantia	Total do fabricante por um prazo de 2 anos
Outros	Cabos, acessórios, manuais e documentação que são necessários ao pleno funcionamento do equipamento.
Certificação	ISO 9000. Apresentado cópia oficial emitido pelo órgão certificador e tradução oficial com autenticação em anexo.
Assistência Técnica	Em anexo está sendo apresentada carta de Solidariedade do fabricante, assegurando o fornecimento e a garantia do produto em questão e também a relação completa de Assistência Técnica Autorizada para o produto, em todo o território nacional, com a nomeação para cada endereço, de técnico responsável que possa atender consultas da licitadora.
Chamado de Suporte	Com atendimento "On site" (atuação de um técnico no local onde), no prazo máximo de 2 horas e prazo máximo de solução do problema de até 24 horas. Caso o problema não seja resolvido neste prazo máximo, nos comprometemos a colocar outro equipamento similar ou superior em substituição, até o conserto integral do equipamento com defeito.
Horário de Atendimento	Das 00:00 às 24:00 hs (de Segunda-feira a Domingo)



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(X) Atende

() Não Atende

plenamente os atributos técnicos que constituem a configuração mínima obrigatória exigida para este produto.

DESEMPENHO(DE):

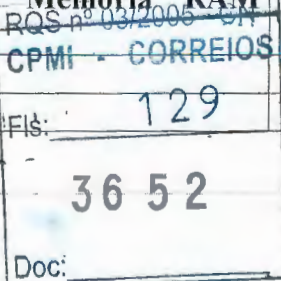
PESO 06

A pontuação para o fator DESEMPENHO(DE) será atribuída calculando-se o somatório da pontuação obtida para os seguintes subfatores opcionais:

- Performance Auditada ou estimada, com base em equipamento auditado da mesma família;
- Memória RAM;
- Memória Cache;
- Expansibilidade de memória RAM;
- Disco Interno e Controladora de Disco SCSI;
- Fonte de Alimentação Interna Hot-swappable.

Performance Auditada ou Estimada		
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à performance solicitada do equipamento	Resposta	Pontos
TpmC igual ou superior a 13.000	Não atende	03
TpmC igual ou superior a 10.000	Atende	02
TpmC superior a 8.500		01

Memória RAM		
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à Memória RAM instalada do equipamento	Resposta	Pontos
Igual ou Superior a 6 Gbyte	Não atende	02
Igual ou Superior a 4 Gbyte	Não atende	01





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Memória Cache

Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à Memória Cache por processador do equipamento	Resposta	Pontos
8 Mbytes por processador	Atende	03
4 Mbytes por processador		02
2 Mbytes por processador		01

Expansibilidade de Memória RAM

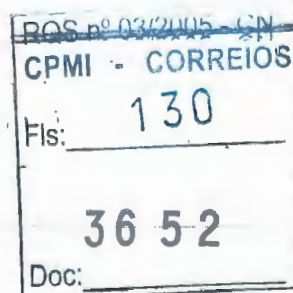
Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à Capacidade de expansão de memória RAM do equipamento	Resposta	Pontos
Acima de 8 Gbytes	Atende	01

Disco Interno e Controladora de Disco SCSI

Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente à Disco Interno e Controladora de disco SCSI do equipamento	Resposta	Pontos
RAID 1 por Hardware para controladora SCSI(Discos Interno)	Não atende	02

Fonte de alimentação Interna "Hot-swappable" (que suporte a configuração máxima do equipamento)

Assinalar com a palavra "Atende" no campo "Resposta", conforme opção correspondente ao fonte de alimentação interna do equipamento	Resposta	Pontos
Fonte Hot-swappable.	Atende	01





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QUALIDADE(QD):

PESO 04

A pontuação do fator QUALIDADE(QD) será atribuída considerando a certificação de que as empresas, na fabricação e manutenção do(s) equipamento(s) proposto(s), atendem aos padrões das normas ISO9002 ou NBR equivalente:

Certificação		
Assinalar com a palavra "Atende" para as certificações que o modelo do equipamento cotado possui:		
Possui certificação atualizada conforme segue	Resposta	Pontos
ISO 9002 referente a serviços de suporte de hardware e software	Atende	01

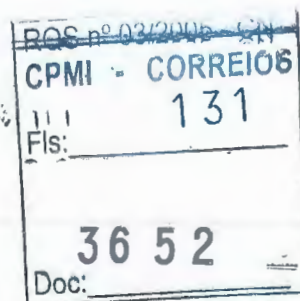
SUPORTE DE SERVIÇOS(SS):

PESO 06

A pontuação do fator SUPORTE DE SERVIÇOS(SS) será atribuída calculando-se a pontuação obtida para os seguintes subfatores opcionais:

- Prazo de atendimento;
- Horário de atendimento e suporte;
- Central de atendimento e suporte;
- Duração da garantia.

Prazo de Atendimento		
Assinalar com a palavra "Atende" a opção correspondente ao prazo máximo de atendimento ao equipamento cotado:		
Tendo como base o registro de chamada do suporte técnico, o atendimento será prestado nos prazos, conforme segue:	Resposta	Pontos
Até 02 horas	Atende	02





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Horário de Atendimento e Suporte

Assinalar com a palavra "Atende" a opção correspondente ao **horário de atendimento às chamadas** referentes ao equipamento cotado:

Além do horário comercial, o atendimento será prestado também nos horários, conforme segue:	Resposta	Pontos
Horário integral - 24 horas / 7 dias por semana	Atende	02
Horário semi-integral - 24 horas (de 2ª a 6ª feira)		01

Central de Atendimento e Suporte

Assinalar com a palavra "Atende" a opção correspondente às facilidades oferecidas no **atendimento às chamadas** referentes ao equipamento cotado:

Está disponível, para o atendimento aos chamados:	Resposta	Pontos (cumulativos)
(0800) para hardware e software : 0800118988	Atende	01

Duração de Garantia

Assinalar com a palavra "Atende" a opção correspondente a **duração da garantia dada pelo fabricante** para o equipamento cotado:

O fabricante oferece garantia para o produto por um período de:	Resposta	Pontos
05 (cinco) anos	Não atende	03
04 (quatro) anos	Não atende	02
03 (três) anos	Não atende	01

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Processor	
Number	From one to four processor modules
Type	300- or 400-MHz UltraSPARC-II modules with onboard E-cache
Cache memory	16-KB I-cache, 16-KB D-cache per processor
	2-MB external cache per processor with 300-MHz CPU 4-MB external cache per processor with 400-MHz CPU
Datapath	Two independent, buffered 144-bit UPA buses; 128 bits data, 16 bits ECC; two processors per bus
	UPA operates at 100-MHz with 300-MHz or 400-MHz processors
Main Memory	
Capacities	16 DIMM module slots; four banks of four slots
	Accepts 32-, 64-, 128-MB or 256-MB DIMMs 128 MB to 4 GB total memory capacity
Memory type	144-pin 5V 60-ns memory modules
Datapath	576 bits wide; 512 bits data, 64 bits ECC
	Up to 1.78-GB/sec throughput



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Standard Interfaces

Serial	Two EIA-232D or EIA-423 serial ports, DB25 (requires Y-type splitter cable); one 50 to 384 Kbps synchronous, one 50 to 460.8 Kbaud asynchronous
Parallel	2-MB/sec Centronics compatible bidirectional EPP port; DB25
Ethernet	One 10/100-Mb/sec autoselect port; RJ45 or MII
Keyboard and mouse	One standard keyboard/mouse port; mini DIN-8
PCI	Three slots for 32-bit 33-MHz 5V PCI cards Four slots for 32- or 64-bit 33-MHz 5V PCI cards Three slots for 32- or 64-bit 33- or 66-MHz 3.3V PCI cards
SCSI	One, three, or five 40-MB/sec UltraSCSI-3 buses for internal disks One 20-MB/sec Fast/Wide SCSI-2 bus for CD-ROM and tape; 68-pin external connector

Internal Mass Storage

Disk bays	Four, twelve, or twenty hot-swap disk bays
Disk controllers	One, three, or five 40-MB/sec UltraSCSI-3 channels; maximum four drives per channel
Disks	Up to twenty 18.2-GB (3.5- x 1-in.) hot-swap UltraSCSI-3 drives (max. 364 GB)
CD-ROM	SunCD™32 644-MB SCSI CD-ROM (standard)
Floppy	1.44-MB 3.5-in. floppy drive (standard)
Tape	One bay available for optional 5.25- x 1.6-in. SCSI tape drive; 8-mm or 4-mm DDS-3, or SLR

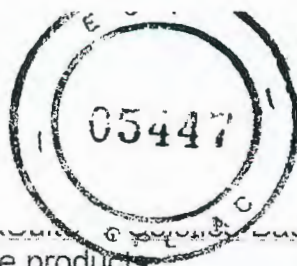
External Mass Storage

Host adapters	Supports up to ten single- or dual-channel, single-ended or differential, fast/wide or UltraSCSI PCI host adapters; up to 8 100-MB/sec FC-AL host bus adapters
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Disk	Supports up to twenty 100-GB SPARCstorage™ MultiPack™ systems (2-TB) Supports up to; 14 A1000/D1000s, 2 A3500s, 16 A5000s, 1 A7000
Tape	Supports up to four SCSI tape devices from onboard SCSI Supports up to 16 SCSI tape devices, total 8-mm, 4-mm DDS-2, DDS-3, DLT, QIC, SLR
Console Options	
Monitor	17- or 24-in. color
Frame buffer	256-color PGX graphics card
Keyboard and mouse	Standard Sun™ keyboard and mouse
PCI I/O Options	
10/100-Mb/sec Ethernet, QuadFastEthernet, Gigabit Ethernet, Token Ring, FDDI single attach, FDDI dual attach, ATM-155, ATM-622, high-speed serial, eight-line serial, UltraSCSI with 10/100 Mb/sec Ethernet, dual-channel single-ended UltraSCSI, dual-channel differential UltraSCSI, 100-MB/sec FCAL	
Power Supplies	
Type	One, two, or three modular, N+1 redundant, hot swap, universal input (two supplies standard)
Output	1120W maximum, 560W maximum each supply
Power bus	Common, load-sharing
Software	
Operating system	Solaris 2.5.1 Nov 97 Release or later, Solaris 2.6 May 98 or later, or Solaris 7
Languages	C, C++, Cobol, FORTRAN, Java™, Pascal
Networking	ONC+™, NFS™, TCP/IP, IPX/SPX, SunLink™, OSI, MHS, DCE, DNI, SNA, X.25, PPP, XTL, Frame Relay
System monitoring	Solstice™ SyMON™
System and Network Management	
Solstice JumpStart™, Solaris WebStart, Solstice AdminSuite™, Solstice DiskSuite™, Solstice Backup™ (single server) and	



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Sun Enterprise 450 server, and other Solstice products

Environment

AC power	90-264 VAC, 47-63 Hz
AC service requirement	15A at 110V, 7.5A at 240V Maximum power consumption 1664 watts
Heat output	5,680 BTU/hr, maximum
Operating	5° C to 40° C (41° F to 104° F) at sea level, derated to 35° C at 3000 meters (10,000 feet) 20% to 80% relative humidity, noncondensing
Nonoperating	-20° C to 60° C (-4° F to 140° F) at 5% to 93% relative humidity, noncondensing
Acoustic noise	6.9 bels
Declared noise	emissions in accordance with ISO 9296, measured at 23° C

Regulations

Meets or exceeds the following requirements:

Safety	UL 1950 and CB-scheme EN60950 with Nordic Deviations, CUL C22.2 No. 950, TUV EN60950
RFI/EMI	FCC Class B, Industry Canada Class B, EN55022/CISPR22 Class B, VCCI Class B
Immunity	EN50082-1/IEC1000-4-2, IEC1000-4-3, IEC1000-4-4, IEC1000-4-5
Harmonics	EN61000-3-2/IEC1000-3-2

Dimensions and Weights

Height	58.1 cm (22.87 in.)
Width	44.8 cm (17.64 in.)
Depth	69.6 cm (27.40 in.)
Weight	94.0 kg (205 lb.)

Rack Mounting

The Sun Enterprise 450 can be mounted in a standard 19-in. rack. The optional rackmounting kit consists of a depth-adjustable, slide-mounted shelf and retaining bracket.

Investment Protection

CPMI - CORREIOS

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Doc: 08/05/00



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As businesses leverage Sun's scalable server family to meet increasing market demands, their current Sun Server investment can be leveraged as well. Sun provides the ability to migrate Sun memory, disk drives and CPU modules to the latest Workgroup Enterprise Servers.

Specifically, the Sun Enterprise 450 will support our customer's current investment in:

- 32MB or higher memory DIMMS
- 1" high 2.1GB or 4.2GB disk drives
- 300MHz UltraSPARC CPU modules

In addition, Sun's aggressive upgrade program gives an affordable way to trade-in older Sun or competitive servers and move up to Sun's Workgroup Enterprise Server family.

Sun Enterprise 450 : Features & Benefits | Specifications

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ROS nº 02/2005-124

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Doc:

08/05/00

SPECint_rate95

Sun Microsystems

Ultra 450



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If you wish to print this information we highly recommend using the [postscript reporting page](#).

SPECint_rate95 229

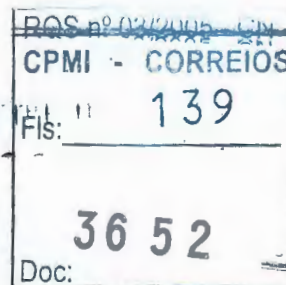
SPECint_rate_base95 186

Benchmark # and Name	Base # Copies	Base Run Time	Base SPEC Ratio	Peak # Copies	Peak Run Time	Peak SPEC Ratio
099.go	2	392	211	2	390	212
124.m88ksim	2	183	187	2	135	254
126.gcc	2	157	194	2	145	211
129.compress	2	157	206	2	130	250
130.li	2	225	152	2	143	239
132.jpeg	2	227	190	2	221	196
134.perl	2	199	172	2	130	264
147.vortex	2	268	181	2	227	214
SPECint_rate_base95			186			
			SPECint_rate95			229

Tester Information:

SPEC License #:	6
Tested By:	Sun, Palo Alto
Test Date:	Apr-98
Hardware Avail:	Jul-98
Software Avail:	Oct-98

Hardware Information:



Model Name:	Ultra 450
CPU:	296 MHz UltraSPARC-II
FPU:	Integrated
Number of CPU(s):	2
Primary Cache:	16KBI+16KBD on chip
Secondary Cache:	2MB(I+D) off chip
Other Cache:	None
Memory:	512MB
Disk Subsystem:	2 x 4.0GB
Other Hardware:	Fast Ethernet
	System clock frequency: 99 MHz

**Software Information:**

Operating System:	Solaris 2.6 3/98
Compiler:	Sun C SC5.0 EFT1 (8/98)
File System:	UFS
System State:	Single User
Kernel Extensions:	consistent_coloring=1

Notes:

```

P1= -xprofile=collect:`pwd`/../feedback
P2= -xprofile=use:`pwd`/../feedback
Baseline: -fast -xO5 -xarch=v8plusa
Baseline: PASS1= ${P1}; PASS2= ${P2}
Peak: -fast -xO4 -xarch=v8plusa -xchip=ultra
099.go: -fast -xO4 -xarch=v8plus -xrestrict -xcrossfile -W2,-O4+ansi_alias+bopt
099.go: PASS1= ${P1}; PASS2= ${P2} ${ALIGN} -dn
124.m88ksim: -fast -xO5 -xsafe=mem -xarch=v8plus -xcrossfile -xrestrict -W2,-O4+co
124.m88ksim: PASS1= ${P1}; PASS2= ${P2} -dn
126.gcc: -fast -xO4 -xarch=v8plus -W2,-O4+ansi_alias+cond_elim
126.gcc: PASS1= ${P1}; PASS2= ${P2}
129.compress: -fast -xO5 -xsafe=mem -xarch=v8plus -xrestrict -W2,-O4+ansi_alias+pd
129.compress: PASS1= ${P1}; PASS2= ${P2} -dn
130.li: PASS1= -fast -xO4 -xarch=v8plus -xcrossfile ${P1}
130.li: PASS2= -fast -xO5 -xsafe=mem -xarch=v8plus -xcrossfile -W2,-O4+ansi_alias+
132.jpeg: -fast -xO5 -xsafe=mem -xarch=v8plus -W2,-O4+ansi_alias+cond_elim
132.jpeg: PASS1= ${P1}; PASS2= ${P2} -dn
134.perl: -fast -xO4 ${CULTRA} -xcrossfile -W2,-ANSI_S,-Mpl,-O4+cond_elim -Wc,-Qis
134.perl: PASS1= ${P1}; PASS2= ${P2} -dn
147.vortex: PASS1= -fast -xO4 -xarch=v8plus -xcrossfile ${P1}
147.vortex: PASS2= -fast -xO5 -xsafe=mem -xarch=v8plus -xcrossfile ${P2} -W2,-O4+c
Portability: 124.m88ksim, 132.jpeg: -DSYSV -Xc, 126.gcc: -Dalloca=__builtin_alloc
others: -Xc
Shell limits: # ulimit -n 1024 or % limit descriptors 1024
Config file: ultra450_int.cfg

```

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CPMI - CORREIOS
Fls: 141
36 52

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SPECfp_rate95: Ultra 450

<http://www.spec.org/osg/cpu95/results/res98q3/cpu95-980718-02899.html>

SPECfp_rate95

Sun Microsystems

Ultra 450

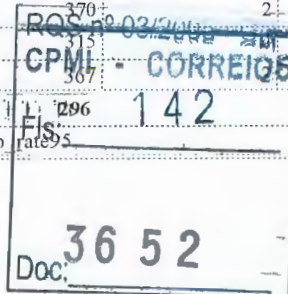
This result has been submitted to SPEC, see the [disclaimer](#) before studying any results.

If you wish to print this information we highly recommend using the [postscript reporting page](#).

SPECfp_rate95 338

SPECfp_rate_base95 296

Benchmark # and Name	Base # Copies	Base Run Time	Base SPEC Ratio	Peak # Copies	Peak Run Time	Peak SPEC Ratio
101.tomcatv	2	152	440	2	126	527
102.swim	2	266	581	2	231	670
103.su2cor	2	126	200	2	128	197
104.hydro2d	2	256	169	2	244	177
107.mgrid	2	144	312	2	143	314
110.applu	2	226	175	2	174	228
125.turb3d	2	287	257	2	273	270
141.apsi	2	102	370	2	99	381
145.fpppp	2	549	315	2	713	485
146.wave5	2	147	367	2	120	448
SPECfp_rate_base95			296			
SPECfp_rate95						338



Tester Information:

SPEC License #:	6
Tested By:	Sun, Palo Alto
Test Date:	Jul-98
Hardware Avail:	Jul-98
Software Avail:	Oct-98

Hardware Information:

Model Name:	Ultra 450
CPU:	296 MHz UltraSPARC-II
FPU:	Integrated
Number of CPU(s):	2
Primary Cache:	16KBI+16KBD on chip
Secondary Cache:	2MB(I+D) off chip
Other Cache:	None
Memory:	512MB
Disk Subsystem:	2 x 4.0GB
Other Hardware:	Fast Ethernet
	System clock frequency: 99 MHz

Software Information:

Operating System:	Solaris 2.6 3/98
Compiler:	Sun f77 SF775.0 EFT1 (8/98)
File System:	UFS
System State:	Single User
Kernel Extensions:	consistent_coloring=1

Notes:

2 of 3

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SPECfp_rate95: Ultra 450

http://www.spec.org/osg/cpu95/results/res98q3/cpu95-980718-02899.html

```

P1= -xprofile=collect:'pwd'/'../feedback
P2= -xprofile=use:'pwd'/'../feedback
BCOPY=-Qoption iropt -O4+bcopy; INV=-Qoption iropt -O4+invccexp; BMR=-Qoption iropt -O4+bmerge
Baseline: -fast -xarch=v8plusa -fsimple=2 -xprefetch
Peak: -fast -xO4 -xarch=v8plusa -xchip=ultra
101.tomcatv: -fast -xarch=v8plusa -xpad=local:23 -xprefetch -Qoption iropt -O4+data_access
102.swim: -fast -xarch=v8plusa -xpad=common:15 -xprefetch -fsimple=2
103.su2cor: -fast -xarch=v8plusa -xvector -Qoption cg -Qms_pipe+nfl=5 -fsimple=2 ${BCOPY}
103.su2cor: PASS1= -xO4 ${P1}; PASS2= -xO5 -xsafe=mem ${P2}
104.hydro2d: -fast -xarch=v8plusa -xprefetch -Qoption iropt -O4+pde -fsimple=2
104.hydro2d: PASS1= ${P1}; PASS2= ${P2}
107.mgrid: -fast -xarch=v8plusa -xprefetch -fsimple=2 ${BCOPY}
107.mgrid: PASS1= -xO4 ${P1}; PASS2= -xO5 -xsafe=mem ${P2}
110.aplu: -fast -xarch=v8plusa -Qoption iropt -O4+scalarrep+ddint+perfect+loop_dist+pde+algassoc,-Mt6000,-Mr20000,-Ma140
125.turb3d: -fast -xarch=v8plusa -stackvar -xpad -fsimple=2 -Qoption iropt -O4+bcopy ${INV} -xvector=yes
125.turb3d: PASS1= -xO4 ${P1}; PASS2= -xO5 -xsafe=mem ${P2}
141.apsi: -fast -xarch=v8plusa -xchip=ultra3 -fsimple=2 -stackvar -Qoption iropt -Si36 ${INV} -Qoption iropt -O4+algas
141.apsi: PASS1= -xO4 ${P1}; PASS2= -xO5 -xsafe=mem ${P2}
145.fpppp: -fast -xarch=v8plusa -xO5 -xsafe=mem -fsimple=2 -nodepend -Qoption iropt -O4+algassoc -Qoption iropt -reroll=1
145.fpppp: PASS1= ${P1}; PASS2= ${P2}
146.wave5: -fast -xarch=v8plusa -stackvar -fsimple=2 -Qoption iropt -O4+unroll ${BCOPY}
Shell limits: # ulimit -n 1024 or % limit descriptors 1024
Config file: ultra450_fp.cfg

```

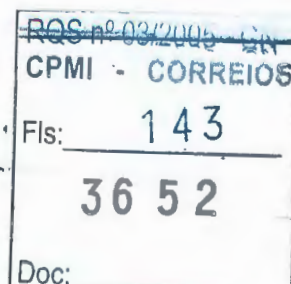
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- > Ultra 10 Workstation
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 - Key Technologies
 - Just the Facts
 - Guided Tour

ULTRA 10 WORKSTATION Datasheet

The Powerful, Expandable Ultra System That's Easy To Afford.

For demanding technical and commercial applications like 3-D modeling, workstations are the best solution. And the Sun Ultra™10 system sets new standards for performance and value in a desktop work station. With 440 MHz and a large 2-MB external cache you get the scalable performance you need.

Related:

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- Development tools
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Sun's Ultra Port Architecture 3-D graphics accelerators Creator3D, Sun Elite3D™ m3, and Sun Elite3D m6, provide the throughput and processing power for high-performance 3-D graphics computing. Additionally, with the available SunPCi™ coprocessor card you can now run your PC productivity applications at native speeds alongside your UNIX® technical applications for unmatched versatility and productivity. And with the preinstalled 64-bit Solaris™7 Operating Environment software and new graphical desktop tools for simple setup and management, all that power is easy to use. A better solution, and a better value (the Sun Ultra 10 workstation).

Highlights

- 440-MHz UltraSPARC™-III processor with large 2-MB cache for industry leading performance.
- Up to 1-GB DRAM, up to two 9-GB hard disks, and four PCI slots for maximum flexibility and expandability.
- Great for 2-D and 3-D digital content creation, software and Java™ application development, financial analysis, EDA, MCAD, MCAE, and GIS applications.
- SunClient[sm] support offers flexible, low cost service and support options.
- Elite3D m6, Elite3D m3 and Creator3D graphics accelerator options for the most demanding graphics applications.
- Web-enhanced Common Desktop Environment (CDE) is easy to use, customize, and manage.
- Robust, scalable Solaris Operating Environment software provides 100% binary compatibility across the entire product line (protecting your investment).

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Sun Ultra™ 10 Workstation Series Specifications

Processor Options

Architecture

440-MHz UltraSPARC-III with 2-MB external cache

Main Memory

Memory

Install DIMMs in pairs

1 GB maximum, ECC error-correction
Four DIMM slots, 50ns 168-pin JEDEC DIMMs

Standard Interfaces

Expansion bus

Four 32-bit PCI slots, full-size, 33 MHz, 5 volt

UPA graphics slot

One UPA graphics slot, supports Creator, Creator3D, and Elite3D high-performance graphics options

Network

Ethernet/Fast Ethernet, twisted pair standard (10-BaseT and 100-BaseT), self-sensing

Serial

One D-Sub 25-pin connector, synchronous/asynchronous
One D-Sub 9-pin connector, asynchronous

Parallel

One D-Sub 25-pin connector, IEEE 1284 (bidirectional)

Audio

One line-in/line-out
One microphone-in/speaker-out

Mass Storage and Media

Internal disk

9.1 GB, 7200 rpm, 3.5-in. Enhanced IDE HDD

Internal CD

32X-speed CD-ROM

Internal floppy disk

One 3.5-in. 1.44-MB floppy

PCMCIA

One front-access bay for third-party options

Expansion

One empty full-height storage device bay

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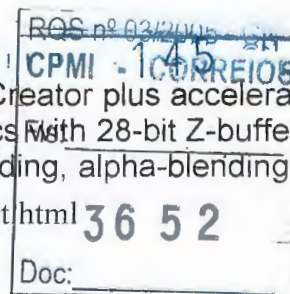
Graphics and Imaging

• Standard

Onboard 8-or 24-bit user configurable frame buffer with accelerated text, windowing, 2-D and 3-D wireframe, 1152 x 900 in 24-bit mode or 1280 x 1024 in 8-bit mode at 76 Hz, high-resolution support.

• Creator3D

All the imaging features of Creator plus accelerated 24-bit double-buffered 3-D graphics with 28-bit Z-buffer and 8-bit overlay plane. Gouraud shading, alpha-blending and screen-





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door transparency, line antialiasing, depth-cueing, 4-bit stencil support with hardware acceleration of OpenGL stencil functions, four 256-entry colormaps for dynamic color map segment allocation and adjustable gamma correction. NTSC/PAL video timing support. 1280 x 1024 t 76 Hz resolution standard, stereo 960 x 680 t 112 Hz supported with 21-in. monitor. Option to reconfigure frame buffer to high-resolution single-buffered Creator for imaging applications supporting 24-in. high-resolution wide-screen monitors, up to 1920 x 1200 t 70 Hz.

• Elite3D m3

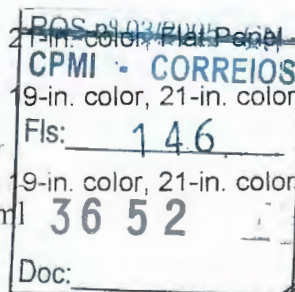
Three on-board graphics floating-point engines with all the imaging features of Creator plus higher performance accelerated 24-bit double-buffered 3-D graphics with 28-bit Z-buffer and 8-bit overlay plane. Gouraud shading, alpha-blending and screen-door transparency, line and dot antialiasing, per-pixel depth-cueing, per-pixel lpha interpolation, 4-bit stencil support with hardware acceleration of OpenGL stencil functions, four 256-entry colormaps for dynamic colormap segment allocation and adjustable gamma correction. NTSC/PAL video timing support. 1280 x 1024 t 76 Hz resolution standard, stereo 960 x 680 t 112 Hz supported with 21-in. monitor.

• Elite3D m6

Highest performance Sun graphics with the integrated imaging features of Creator3D, plus very high-performance accelerated 24-bit double-buffered 3-D graphics with 28-bit Z-buffer and 8-bit overlay plane. Gouraud shading, alpha-blending and screen-door transparency, line and dot-antialiasing, per-pixel depth-cueing, per-pixel alpha interpolation, 4-bit stencil support with hardware acceleration of OpenGL ® stencil functions, four 256-entry colormaps for dynamic colormap segmental location and adjustable gamma correction, NTSC/PAL video timing support. 1280 x 1024 t 76 MHz resolution standard, stereo 960 x 680 t 112 Hz supported with 21-in. monitor.

Monitor Options

Resolution	Screen
1600 x 1200 resolution, 75-Hz refresh rate	19-in. color, 21-in. color
1280 x 1024 resolution, 60-, 76-or 67-Hz refresh rate	19-in. color, 21-in. color, Flat Panel
1152 x 900 resolution, 76-or 66-Hz refresh rate	17-in. color, 19-in. color, 21-in. color, Flat Panel
1024 x 768 resolution, 76-Hz refresh rate	17-in. color, 19-in. color, 21-in. color



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Refresh rate

960 x 680 resolution, 112-Hz refresh rate	19-in. color, 21-in. color
1920 x 1200 resolution, 70-Hz refresh rate	24-in. wide screen color
1600 x 1000 resolution, 76-or 66-Hz refresh rate	24-in. wide screen color
1440 x 900 resolution, 76-Hz refresh rate	24-in. wide screen color
1280 x 800 resolution, 76-Hz refresh rate	24-in. wide screen color



Software

Operating system	Solaris™7 Operating Environment, 3/99 preinstalled Solaris 2.6, Hardware: 5/98 or later releases Solaris 2.5.1, Hardware: 11/97 or later releases
-------------------------	---

Environment

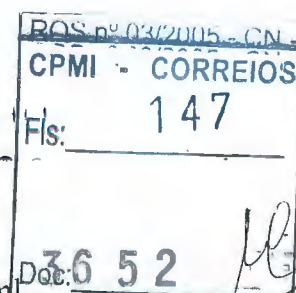
AC power	100-120; 220-240 VAC, 47-63 Hz, 0.4 K VA
Operating	10 °C to 35 °C (50 °F to 95 °F) 40% to 80% relative humidity, noncondensing
NonOperating	-20 °C to 60 °C (4 °F to 140 °F) 30% to 90% relative humidity, noncondensing
Operating acoustic noise	5.2 bels
Idling acoustic noise	5.2 bels
Declared noise emissions	in accordance with ISO 9296, measured at 23 °C

Regulations

Meets or exceeds the following requirements:

Safety	UL 1950, CSA C22.2 No.950, TUV EN 60950, CB Scheme with Nordic deviations, EMKO-TSE (74-SEC)203, ZH1/618
RFI/EMI	FCC Class B, DOC Class B, VCCI Class 2, EN 55022 Class B, EN 61000-3-2
Immunity	EN 50082-1
X-ray	DHHS 21 Subchapter J; PTB German X-ray Decree
Power management	Energy Star compliant

Weights and Measurements





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Models	Sun Ultra 10 chassis	17-in. color monitor	24-in. wide- screen color monitor	18.1-in. flat panel	19-in. flat screen	21-in. flat screen
Height	40.2 cm (15.8 in.)	421 mm (16.6 in.)	50.0 cm (19.7 in.)	459.8 mm (18.1 in.)	449 mm (17.7 in.)	498 mm (19.6 in.)
Width	17.6 cm (6.9 in.)	420 mm (16.6 in.)	58.0 cm (22.8 in.)	449.5 mm (17.7 in.)	463 mm (18.2 in.)	501 mm (19.7 in.)
Depth	43.5 cm (17.1 in.)	425 mm (16.8 in.)	54.8 cm (21.6 in.)	32.9 mm (1.3 in.)	463 mm (18.2 in.)	498 mm (19.6 in.)
Shipping weight	20.0 kg (44 lb.)	16.5 kg (36.3 lb.)	41.4 kg (91.0 lb.)	8.8 kg (19.5 lb.)	26 kg (57.3 lb.)	32.5 kg (71.6 lb.)

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Ultra 10 Workstation : [Datasheet](#) | [Architecture](#) | [Key Technologies](#) | [Just the Facts](#) | [Guided Tour](#)

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ROS nº 03/2005

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36 52

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SPECint_rate95: Ultra 10 Model 440

<http://www.spec.org/osg/cpu95/results/res99q2/cpu95-19990514-03653.html>

SPECint_rate95

Sun Microsystems

Ultra 10 Model 440

This result has been submitted to SPEC, see the [disclaimer](#) before studying any results.

If you wish to print this information we highly recommend using the [postscript reporting page](#).

SPECint_rate95 160

SPECint_rate_base95 134

Benchmark # and Name	Base # Copies	Base Run Time	Base SPEC Ratio	Peak # Copies	Peak Run Time	Peak SPEC Ratio
099.go	2	558	148	2	594	139
124.m88ksim	2	264	130	2	173	198
126.gcc	2	211	145	2	210	146
129.compress	2	211	153	2	179	181
130.li	2	303	113	2	214	160
132.jpeg	2	316	137	2	305	141
134.perl	2	260	132	2	185	185
147.vortex	2	395	123	2	338	144

SPECint_rate_base95

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SPECint_rate95
CPMI - CORREIOS
Fls: 149
3652
Doc:

Tester Information:

SPEC License #:	6
Tested By:	Sun, Palo Alto
Test Date:	Apr-99
Hardware Avail:	May-99
Software Avail:	Feb-99



Hardware Information:

Model Name:	Ultra 10 Model 440
CPU:	440 MHz UltraSPARC-III
FPU:	Integrated
Number of CPU(s):	1
Primary Cache:	16KBI+16KBD on chip
Secondary Cache:	2MB(I+D) off chip
Other Cache:	None
Memory:	512MB
Disk Subsystem:	2 x 9GB (7200 RPM)
Other Hardware:	Fast Ethernet
	System clock frequency: 110 MHz

Software Information:

Operating System:	Solaris 7 (64bit)
Compiler:	Sun WorkShop C 5.0
File System:	UFS
System State:	Single User
Kernel Extensions:	consistent_coloring=1

Notes:

P1= -xprofile=collect:`pwd`/../../feedback; P2= -xprofile=use:`pwd`/../../feedback; FOPTION= -fast -xarch=v8plusa -s

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```
Baseline: -fast -xO5 -xarch=v8plusa
Baseline: PASS1= ${P1}; PASS2= ${P2}
099.go: ${FOPTION} -xO4 -xrestrict -xcrossfile -W2,-O4+ansi_alias+bopt
099.go: PASS1= ${P1}; PASS2= ${P2} ${ALIGN} -dn
124.m88ksim: ${FOPTION} -xO5 -xsafe=mem -xcrossfile -xrestrict -W2,-O4+cond_elim+pde,-ldstr,-Mt8500 -Wc,-Qiselect-sw_pf_tb
124.m88ksim: PASS1= ${P1}; PASS2= ${P2} -dn
126.gcc: ${FOPTION} -xO4 -W2,-O4+ansi_alias+cond_elim
126.gcc: PASS1= ${P1}; PASS2= ${P2}
129.compress: ${FOPTION} -xO5 -xrestrict -W2,-O4+ansi_alias+pde -Wc,-Qms_pipe+unoovf
129.compress: PASS1= ${P1}; PASS2= ${P2} -dn
130.li: PASS1= -xO4 -xcrossfile ${P1}
130.li: PASS2= -xO5 -xsafe=mem -xcrossfile -W2,-O4+ansi_alias+cond_elim+pde,-Mt350,-whole,-crit ${P2} -dn
132.jpeg: ${FOPTION} -xO5 -xsafe=mem -W2,-O4+ansi_alias+cond_elim
132.jpeg: PASS1= ${P1}; PASS2= ${P2} -dn
134.perl: ${FOPTION} -xO4 -xcrossfile -W2,-ANSI_S,-Mpl,-O4+cond_elim -Wc,-Qiselect-sw_pf_tbl_th=30
134.perl: EXTRA_LIBS= -lfast; PASS1= ${P1}; PASS2= ${P2} -dn
147.vortex: PASS1= -xO4 -xcrossfile ${P1}
147.vortex: PASS2= -xO5 -xsafe=mem -xcrossfile ${P2} -W2,-O4+cond_elim,-Mt500,-Mr6000,-crit -dn
Portability: 124.m88ksim, 132.jpeg: -DSYSV -Xc, 126.gcc: -Dalloca=__builtin_alloca -Xc
others: -Xc
Shell limits: # ulimit -n 1024 or * limit descriptors 1024
Config file: ultrabest.cfg
```

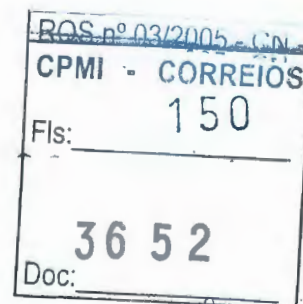
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SPECfp_rate95: Ultra 10 Model 440

<http://www.spec.org/osg/cpu95/results/res99q2/cpu95-19990514-03655.html>

SPECfp_rate95

Sun Microsystems

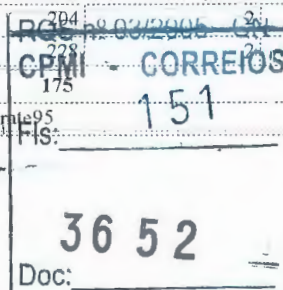
Ultra 10 Model 440

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SPECfp_rate95 199
SPECfp_rate_base95 175

Benchmark # and Name	Base # Copies	Base Run Time	Base SPEC Ratio	Peak # Copies	Peak Run Time	Peak SPEC Ratio
101.tomcatv	2	270	247	2	242	275
102.swim	2	454	341	2	411	376
103.su2cor	2	223	113	2	199	127
104.hydro2d	2	474	91.2	2	453	95.3
107.mgrid	2	265	170	2	264	170
110.applu	2	379	104	2	301	132
125.turb3d	2	439	168	2	438	168
141.apsi	2	164	230	2	151	251
145.fpppp	2	845	204	2	546	317
146.wave5	2	237	228	2	206	262
SPECfp_rate_base95			175			
			SPECfp_rate95			199



06/04/00 17:44

Tester Information:

SPEC License #:	6
Tested By:	Sun, Palo Alto
Test Date:	Apr-99
Hardware Avail:	May-99
Software Avail:	Feb-99

Hardware Information:

Model Name:	Ultra 10 Model 440
CPU:	440 MHz UltraSPARC-III
FPU:	Integrated
Number of CPU(s):	1
Primary Cache:	16KBI+16KBD on chip
Secondary Cache:	2MB(I+D) off chip
Other Cache:	None
Memory:	512MB
Disk Subsystem:	2 x 9GB (7200 RPM)
Other Hardware:	Fast Ethernet
	System clock frequency: 110 MHz

Software Information:

Operating System:	Solaris 7 (64bit)
Compiler:	Sun WorkShop FORTRAN 77 5.0
File System:	UFS
System State:	Single User
Kernel Extensions:	consistent_coloring=1

Notes:

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```
P1= -xprofile=collect:`pwd`../feedback; P2= -xprofile=use:`pwd`../feedback; FOPTION= -fast -xarch=v8plusa -s
BCOPY = -Qoption iropt -O4+bcopy; INV = -Qoption iropt -O4+invccexp; BMR = -Qoption iropt -O4+bmerge
Baseline: -fast -xarch=v8plusa -fsimple=2 -xprefetch
101.tomcatv: -fast -xarch=v8plusa -xpad=local:23 -xprefetch -Qoption iropt -O4+data_access
102.swim: -fast -xarch=v8plusa -xpad=common:15 -xprefetch -fsimple=2
103.su2cor: ${FOPTION} -xvector -Qoption cg -Qms_pipe=nfl=5 -fsimple=2 ${BCOPY}
103.su2cor: PASS1= -xO4 ${P1}; PASS2= -xO5 -xsafe=mem ${P2}
104.hydro2d: ${FOPTION} -xprefetch -Qoption iropt -O4+pde -fsimple=2
104.hydro2d: PASS1= ${P1}; PASS2= ${P2}
107.mgrid: ${FOPTION} -xprefetch -fsimple=2 ${BCOPY}
107.mgrid: PASS1= -xO4 ${P1}; PASS2= -xO5 -xsafe=mem ${P2}
10.applu: -fast -xarch=v8plusa -Qoption iropt -O4+scalarep+ddint+perfect+loop_dist+pde+algassoc,-Mt6000,-Mr20000,-Ma140
125.turb3d: ${FOPTION} -stackvar -xpad -fsimple=2 -Qoption iropt -O4+bcopy ${INV} -xvector=yes
125.turb3d: PASS1= -xO4 ${P1}; PASS2= -xO5 -xsafe=mem ${P2}
141.apsi: ${FOPTION} -fsimple=2 -stackvar -Qoption iropt -Si36 ${INV} ${BMR} -Qoption iropt -O4+algassoc
141.apsi: PASS1= -xO4 ${P1}; PASS2= -xO5 -xsafe=mem ${P2}
145.fpppp: -fast -xarch=v8plusa -xO5 -xsafe=mem -fsimple=2 -nodedep -Qoption iropt -O4+algassoc -Qoption iropt -reroll=1
145.fpppp: PASS1= ${P1}; PASS2= ${P2}
146.wave5: ${FOPTION} -stackvar -fsimple=2 -Qoption iropt -O4+unroll ${BCOPY}
Shell limits: # ulimit -n 1024 or % limit descriptors 1024
Config file: ultrabest.cfg
```

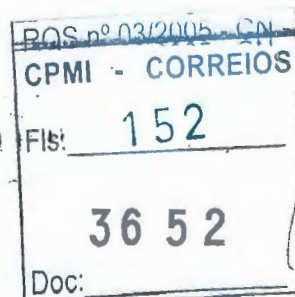
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- [Specifications](#)

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- [Sun Enterprise 3000/4000/5000/6000 servers](#)

SUN ENTERPRISE™ 4500 Specifications

Processor

Number of processors	One to 14
Architecture	Superscalar SPARC Version 9, UltraSPARC
Cache per processor	Primary: 16-KB instruction, and 16-KB data on chip Secondary: 4 MB external cache
CPU interface	One to 14, 128-bit Ultra Port Architecture (UPA) slots
System Interconnect	Gigaplane, 2.68 GB/sec (at 84 MHz), 3.2 GB/sec (at 100 MHz)

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System Boards

Number of boards	Maximum of eight boards per system; minimum configuration requires one CPU/Memory board and one I/O board
CPU/Memory board	Holds up to two processors and 16 memory SIMMs
SBus I/O board	Offers two SBus channels, three SBus slots, SunFastEthernet, fast/wide SCSI-2, two FC-AL sockets
Graphics I/O board	Offers one SBus channel, two SBus slots, one UPA slot for Creator and Creator3D graphics, SunFastEthernet, fast/wide SCSI-2, two FC-AL sockets
PCI I/O board	Offers four PCI channels, two (short) PCI slots, SunFastEthernet, fast/wide SCSI-2

Main Memory

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256-MB to 14-GB memory capacity per system 256-MB and 1-GB memory expansion options (each a group of 8 SIMMs)

Standard Interfaces

Serial	Two RS-232/423 ports on clock board
SBus	64-bit data bus width, 25 MHz
PCI	64-bit data bus width, 66 MHz
Keyboard and mouse port	One each per system
Ethernet	10/100 MB/sec twisted pair standard (10-BaseT and 100-BaseT) and/or MII transceiver per I/O board
SCSI	On-board 20-MB/sec fast/wide SCSI-2 (synchronous) per I/O board
Fibre channel	Two on-board sockets (100 MB/sec full duplex) per SBus and Graphics I/O boards

Mass Storage

Internal disk	Up to four 8.4-GB disk boards
Internal tape	8mm, 4mm, and .25-inch tape options available
CD-ROM	SunCD 32 drive standard

External storage

Supports over 4-TB of storage

RQS nº 03/2005 - CPMI - CORREIOS
Fls: 154

Console options

Monitor	17- or 20-in color monitor
Frame buffer	TurboGX, TurboGXplus, Creator, or Creator3D frame buffer

SBus options



SunFastEthernet, SunATM 155 and 622, Quad FastEthernet, Differential Fast/Wide Intelligent SCSI-2 (DWIS/S), Single-Ended Fast/Wide Intelligent SCSI-2 (SWIS/S), High-Speed Serial Interface (HSI/S), Token Ring Interface (TRI/S), Single- and Dual-Attach FDDI, Serial Parallel Controller (SPC/S), 100BaseT Fast/Wide SCSI, ISDN, Fast Differential SCSI-2 Buffered Ethernet (DSBE/S), Fast SCSI-2 Buffered Ethernet (FSBE/S), Sun Gigabit Ethernet, FC-AL

PCI options

10/100BaseT Fast/Wide UltraSCSI, 10/100BaseT FastEthernet, Quad FastEthernet, Single- and Dual-Attach FDDI, Token Ring, High Speed Serial Interface, Serial Asynchronous Interface, Gigabit Ethernet Network, SunATM 155 and 622

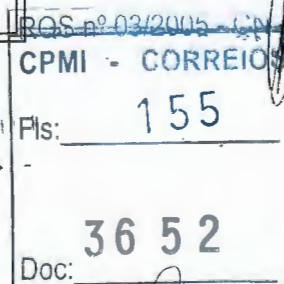
Power supplies

One 184-watt Peripheral Power Supply standard. Up to four hot swappable 300-watt Power Cooling Modules (PCM) with redundant, dual-speed fans. One PCM required per two systems boards. Fully-redundant power and cooling available on this system.

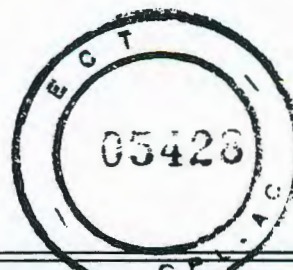
Availability features

Automatic System Recovery
Dynamic Reconfiguration
Alternate Pathing
CPU Power Control
Redundant Power and Cooling
Hot-swap Power/Cooling Modules
Hardware Failure Prediction
Remote Power Control
Modular components
and more...

Software



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Operating system	Solaris 2.5.1 or later operating environment
Languages	C, C++, Pascal, FORTRAN, Java
Networking	ONC, NFS, TCP/IP, SunNet OSI, MHS, X.25, DCE, Netware
Windowing system	CDE, OpenWindows Version 3 optional
System monitoring	Enterprise SyMON
System and network management	Solaris Web Start, Solstice AdminSuite, Solstice Domain Manager, Solstice Enterprise Manager, Solstice DiskSuite, Solstice Backup, Veritas File System and more...

Environment

AC power	100-240 VAC, 47-63 Hz, 12A
Operating	5° C to 40° C (41° F to 104° F) 20% to 80% relative humidity, noncondensing
Nonoperating	-20° C to 60° C (-4° F to 140° F) 5% to 93% relative humidity, noncondensing
Plug Type	NEMA 5-15P

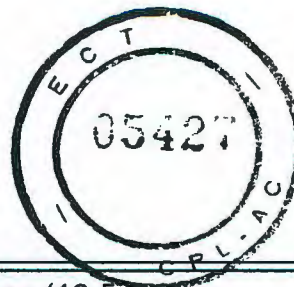
Regulations

Meets or exceeds the following requirements:

Safety	UL 1950, CSA 950, TUV EN60950, CB Scheme (Nordic Deviation)
RFI/EMI	FCC Class A, DOC Class A, EN55022 Class A, VCCI Class 1
Immunity	EN50082-1
Harmonics	EN61000-3-2

Dimensions and Weight

RCS nº 03/2005 - CN
CPMI - CORREIOS
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Height	34 cm (13.5 in.)
Width	50 cm (19.7 in.)
Depth	56 cm (22 in.)
Weight, main cabinet	68 kg (150 lb.) approximate
Power cord	1.83 m (6 ft.)

Upgrades

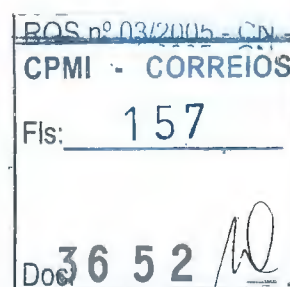
Full system upgrades are available for SPARCcenter 2000/2000E, SPARCserver 1000/1000E, SPARCserver 6X0, 4X0, and 3X0 systems. Chassis upgrades are available for Enterprise 3000 and Enterprise 3500 servers. Competitive server trade-ins are also available.

Sun Enterprise 4500 : Specifications

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- > Sun Enterprise 5500
- > Sun Enterprise 6500
- Sun Enterprise 3000/4000/5000/6000 servers

SUN ENTERPRISE™ 3500 Specifications

Processor

Number of processors	One to eight
Architecture	Superscalar SPARC Version 9, UltraSPARC
Cache per processor	Primary: 16-KB instruction, and 16-KB data on chip Secondary: 4 MB external cache
CPU interface	One to eight, 128-bit Ultra Port Architecture (UPA) slots
System Interconnect	Gigaplane, 2.68 GB/sec (at 84 MHz), 3.2 GB/sec (at 100 MHz)

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System Boards

Number of boards	Maximum of five boards per system; minimum configuration requires one CPU/Memory board and one I/O board
CPU/Memory board	Holds up to two processors and 16 memory SIMMs
SBus I/O board	Offers two SBus channels, three SBus slots, SunFastEthernet, fast/wide SCSI-2, two FC-AL sockets
Graphics I/O board	Offers one SBus channel, two SBus slots, one UPA slot for Creator and Creator3D graphics, SunFastEthernet, fast/wide SCSI-2, two FC-AL sockets
PCI I/O board	Offers four PCI channels, two (short) PCI slots, SunFastEthernet, fast/wide SCSI-2

Main Memory

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256-MB to 8-GB memory capacity per system
256-MB and 1-GB memory expansion options (each a group of 8 SIMMs)

Standard Interfaces

Serial	Two RS-232/423 ports on clock board
SBus	64-bit data bus width, 25 MHz
PCI	64-bit data bus width, 66 MHz
Keyboard and mouse port	One each per system
Ethernet	10/100 MB/sec twisted pair standard (10-BaseT and 100-BaseT) and/or MII transceiver per board
SCSI	On-board 20-M (synchronous) fast/wide SCSI board
Fibre channel	Two on-board duplex per SE 100 MB/sec graphics full

Mass Storage

Internal disk	Maximum eight 3.5-inch disk drives with dual connections
Internal tape	8mm, 4mm, and .25-inch tape options available
CD-ROM	SunCD 32 drive standard

External storage

Supports over 2-TB of storage

Console options

Monitor	17- or 20-in color monitor
Frame buffer	TurboGX, TurboGXplus, Creator, or Creator3D frame buffer

SBus options



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SunFastEthernet, SunATM 155 and 622, Quad FastEthernet, Differential Fast/Wide Intelligent SCSI-2 (DWIS/S), Single-Ended Fast/Wide Intelligent SCSI-2 (SWIS/S), High-Speed Serial Interface (HSI/S), Token Ring Interface (TRI/S), Single- and Dual-Attach FDDI, Serial Parallel Controller (SPC/S), 100BaseT Fast/Wide SCSI, ISDN, Fast Differential SCSI-2 Buffered Ethernet (DSBE/S), Fast SCSI-2 Buffered Ethernet (FSBE/S), Sun Gigabit Ethernet, FC-AL

PCI options

10/100BaseT Fast/Wide UltraSCSI, 10/100BaseT FastEthernet, Quad FastEthernet, Single- and Dual-Attach FDDI, Token Ring, High Speed Serial Interface, Serial Asynchronous Interface, Gigabit Ethernet Network, SunATM 155 and 622

Power supplies

One 184-watt AC Inlet/Peripheral Power Supply standard. Optional, 195-watt Second Peripheral Power Supply available.

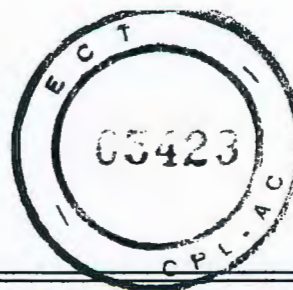
Up to three hot swappable 300-watt Power Cooling Modules (PCM) with redundant, dual-speed fans. One PCM required per two systems boards. Fully-redundant power and cooling available on this system.

Availability features

Automatic System Recovery
Dynamic Reconfiguration
Alternate Pathing
CPU Power Control
Redundant Power and Cooling
Hot-swap Power/Cooling Modules and Disk Drives
Internal Disk Drives with Dual Connections Hardware
Failure Prediction
Remote Power Control
Modular components
and more...

Software

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Operating system	Solaris 2.5.1 or later operating environment
Languages	C, C++, Pascal, FORTRAN, Java
Networking	ONC, NFS, TCP/IP, SunNet OSI, MHS, X.25, DCE, Netware
Windowing system	CDE, OpenWindows Version 3 optional
System monitoring	Sun Management Center
System and network management	Solaris Web Start, Solstice AdminSuite, Solstice Domain Manager, Solstice Enterprise Manager, Solstice DiskSuite, Solstice Backup, Veritas File System and more...

Environment

AC power	100-240 VAC, 47-63 Hz, 9.5A
Operating	5° C to 35° C (41° F to 95° F) 20% to 80% relative humidity, noncondensing
Nonoperating	-20° C to 60° C (-4° F to 140° F) 5% to 93% relative humidity, noncondensing
Plug Type	NEMA 5-15P

Regulations

Meets or exceeds the following requirements:

Safety	UL 1950, CSA 950, TUV EN60950, CB Scheme (Nordic Deviation)
RFI/EMI	FCC Class A, DOC Class A, EN55022 Class A, VCCI Class 1
Immunity	EN50082-1
Harmonics	EN61000-3-2

Dimensions and Weight

RGS nº 03/2000

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Height	65 cm (25.5 in.)
Width	43 cm (17.0 in.)
Depth	60 cm (23.5 in.)
Weight, main cabinet	72.5 kg (160 lb.) approximate
Power cord	1.83 m (6 ft.)

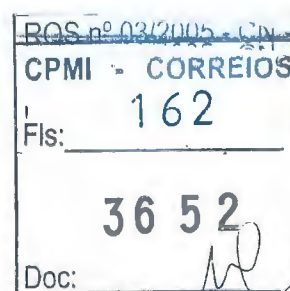
Upgrades

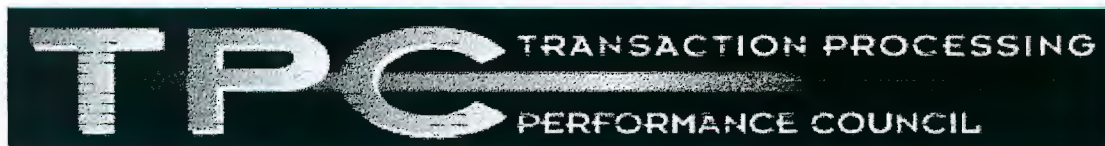
System upgrades are available for Enterprise 1, Enterprise 2, Enterprise 150, Enterprise 3000, SPARCserver 10/20, SPARCserver 1000/1000E, SPARCserver 6X0, 4X0, and 3X0 systems. Competitive server trade-ins are also available.

Sun Enterprise 3500 : Specifications

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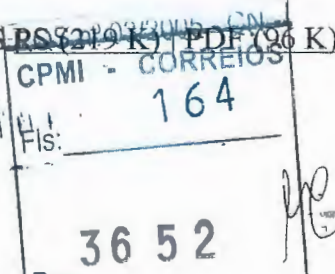
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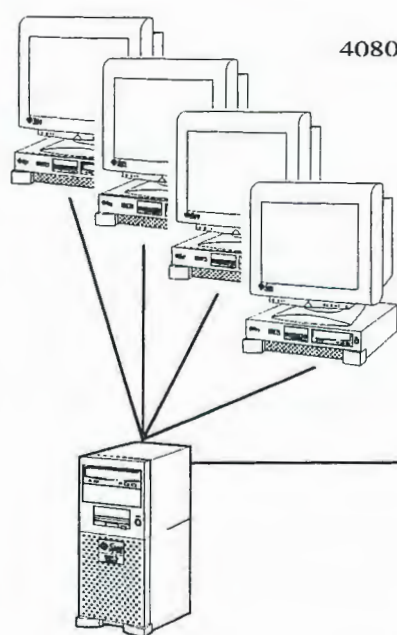
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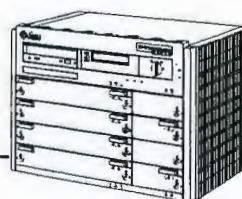
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 Sun Sybase, Inc.		Sun Enterprise 4500 C/S w/15 Front-Ends		TPC-C 3.5	
				Report Date: November 22, 1999	
Total System Cost	TPC-C Throughput	Price/Performance	Availability Date		
\$2,507,453	50268.07	\$49.88	March 30, 2000		
Processors	Database Manager	Operating System	Other Software	Number of Users	
14 * 400MHz UltraSPARC II	Sybase ASE 11.9.3 GA	Solaris 7	BEA Tuxedo 6.3	40800	

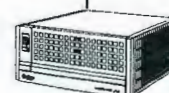


40800 User Connections to 15 Clients

Sun Enterprise 4500 Server
 14 * 400 Mhz UltraSPARC CPU
 28 Gb RAM



4 * Sun StorEdge
 A1000 Array
 - 12 * 9GB Each



18* Sun StorEdge A5200 Array
 - 22 * 9GB Each

15 * Sun Ultra Model 333 Server

Configuration

	Server System	Front End Systems
Database Nodes:	1 Sun Enterprise 4500 Servers	15 * Ultra 10 Model 333
Processors	14* 400 MHz UltraSPARC II	1 * 333 MHz UltraSPARC II each
Cache memory	32KB (D+I), 8MB external	32KB (D+I), 512KB external, each
Main memory	28 GB	1 GB each
Disk controllers	3 Dualport FC-AL, 2 Fast/Wide SCSI-2	1 * SSCSI-2 each
Disk Drives	444 * 9GB FC-AL (18 * A5200, 4 * A1000), 6 * 9GB SCSI-2 (1 * MultiPack)	1 * 9 GB disk
Total Disk Storage	4050 GB	9 GB each
10 BaseT Hub	None	5100* 9-Port Hubs
100 Base T Hubs	None	
100 BaseT Switches	1 * 16-Port	

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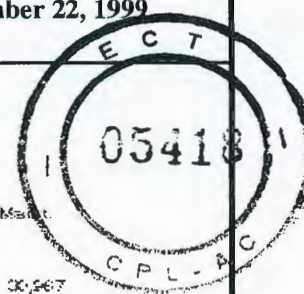


Sun Enterprise 4500 C/S w/15 Front-Ends

TPC-C 3.5

Report Date:
November 22, 1999

Pricing Summary



Description	Part Number	Source	Unit Price	Qty	Ext. Price	5 Yr. Maint.
Server Hardware						
E4500	E4500		23,360	1	23,360	30,567
CPUM/Memory board	2602A		4,360	7	30,560	71,089
400MHz/8MB UltraSPARC II	2580A		10,950	14	153,300	
2GB memory (8 * 256MB)	7006A		12,045	14	168,630	
PS/300W for E4500	254A		1,314	2	2,628	
SEBus IO board	2612A		4,745	1	4,745	
FCAL SEBus Host adapter	6730A		1,971	2	3,942	
DWIS/SEBus Host Adapter	1062A		945	1	945	
20GB StorEdge A5200 Array	SG-XARY200A-200G		51,120	18	920,160	264,016
108-Gbyte StorEdge A1000 Array	SG-XARY144A-108G		18,036	4	72,144	40,320
54.6 Gbyte StorEdge Infort Pack	SG-XIDSR060C-54G		6512	1	6,512	
SCSI Cable 66 pin	3856A		40	1	40	
Opt im Tape 123b 4MM	6263A		966	1	966	
Wyse Terminal	WYSE-WY55-A		430	1	430	
Server Hardware Subtotal:					1,226,480	398,401
Server Software						
Solaris Server Software	SOLMS-262W9599		100	1	100	
SPARC Compiler C/C++ 5.0	WCCIS-500-T999		995	1	995	1,060
Sybase Adaptive Server Enterprise 11.9.3			29,500	1	295,000	236,000
Sybase Development			960	1	960	7,680
Sybase Open Client			795	1	795	636
Sybase Discount (10%)					(30,540)	
Server Software Subtotal:					275,961	245,386
Client Hardware						
Ultra 10 Server Model 300	A22UHC125S-B512CP		5,456	15	81,840	64,584
512MB Memory for Ultra 10	7009A		1,580	15	23,694	
PCI GEF Card	1034A		1,310	15	19,650	
Color Monitor	27126		343	15	5,145	
Client Hardware Subtotal:					130,329	64,584
Client Software						
BEA Tuxedo CFS 6.3			3,000	15	45,000	36,000
Client Software Subtotal:					45,000	36,000
User Connectivity						
16-port 10/100Mbps Fast Ethernet Hub	Z179489		450	3	1,350	
9-port 10Mbps Ethernet Hub	Z179489		27	5640	151,470	
User Connectivity Subtotal:					152,820	
Sun Enterprise Services discounts						(226,020)
Total					1,599,921	614,361
5 Yr. cost					2,507,463	
term Rating					50,268	
\$/tpmC					\$49.88	

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Notes

1. Sun Microsystems Inc. 2. CMT Technology Inc. 3. Sybase Inc. 4. BEA Systems, Inc. 5. Software House Inc.

Audited by: Francois Raab, Infosizing Inc.

Prices used in TPC benchmarks reflect the actual prices a customer would pay for a one-time purchase of the stated components. Individually negotiated discounts are not permitted. Special prices based on assumptions about past or future purchase are not permitted. All discounts reflect standard pricing policies for the listed components. For complete details, see the pricing sections of the TPC benchmark specifications. If you find the stated prices are not available according to these terms, please inform the TPC at pricing@tpc.org. Thank you.

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Numerical Quantity Summary

MQTH, Computed Maximum Qualified Throughput
tpmC = 50268.07
% throughput difference, reported & reproducibility runs = < 0.1%



Response Times (in secs)	90th Percentile	Average	Maximum
Menu	0.50	0.25	0.65
New-Order	0.80	0.34	24.14
Payment	1.00	0.47	25.52
Order-Status	1.00	0.51	21.63
Delivery(interactive)	0.26	0.25	0.35
Delivery(deferred)	2.00	0.64	5.00
Stock-level	2.00	0.67	5.44

Transaction Mix, in percent of total transactions

New-Order	44.85%
Payment	43.06%
Order-Status	4.02%
Delivery	4.04%
Stock-level	4.03%

Keying/Think Times (in secs)	Average.	Min.	Maximum
New-Order	18.02/12.20	18.01/0	18.17/122.00
Payment	3.02/12.20	3.01/0	3.13/122.00
Order-Status	2.02/10.25	2.01/0	2.14/102.50
Delivery	2.02/5.19	2.01/0	2.10/52.00
Stock-level	2.02/5.20	2.01/0	2.10/52.00

Test Duration

Ramp-up time	25 minutes
Measurement Interval	60 minutes
Number of checkpoints	4
Checkpoint Interval	15 minutes
Number of transactions (all types) completed in measurement interval	6724854

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20911-300 - Rio de Janeiro - RJ
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59075-200 - Natal - RN
CGC: 34.028.316/0025-80
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CGC.: 34.028.316/0026-61
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02065-000 - São Paulo - SP
CGC: 34.028.316/0031-29
Insc. Est.: 11.238.885.311-9

DR/SPI Rua Benedito Eleutério, 5-79 - Vila Falção
17050-370 - Bauru - SP
CGC: 34.028.316/
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Tipo		INT1	INT2	INT3	INT4	INT5	INT6	INT7	RISC1	RISC2	RISC3	RISC4	Total
Local	Prazo de Entrega (dias)	45~150	45	45	45~90	45~120	90	45~90	150	150	120	45	
AC		25	8	2	2	4	11	45	1	1	1	2	102
AL		8	2	0	0	2	0	0	0	1	0	0	13
AM		10	2	0	0	2	0	0	0	1	0	0	15
BA		6	2	0	0	2	0	0	0	1	1	0	12
BSB		11	2	0	0	2	0	0	0	1	1	0	17
CE		8	2	0	0	2	0	0	0	1	0	0	13
ES		10	2	0	0	2	0	0	0	1	0	0	15
GT		8	2	0	0	2	0	0	0	1	0	0	13
MA		8	2	0	0	2	0	0	0	1	0	0	13
MG		9	2	1	0	1	4	0	0	1	1	0	19
MS		7	2	0	0	2	0	0	0	1	0	0	12
MT		9	2	0	0	2	0	0	0	1	0	0	14
NO		8	2	0	0	2	0	0	0	1	0	0	13
PA		8	2	0	0	2	0	0	0	1	0	0	13
PB		8	2	0	0	2	0	0	0	1	0	0	13
PE		8	2	0	0	2	0	0	0	1	1	0	14
PI		9	2	0	0	2	0	0	0	1	0	0	14
PR		9	2	1	0	1	4	0	0	1	1	0	19
RJ		10	4	1	0	1	4	0	1	1	1	0	23
RN		10	2	0	0	2	0	0	0	1	0	0	15
RS		7	2	1	0	1	4	0	0	1	1	0	17
SC		8	2	0	0	2	0	0	0	1	0	0	13
SE		7	2	0	0	2	0	0	0	1	0	0	12
SPM		11	4	2	1	1	5	0	1	1	1	0	27
SPI		12	5	1	3	1	0	0	0	1	1	0	24
TOTAL		234	63	9	6	46	32	45	3	25	10	2	475

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Locais de Entrega Interna

Obs.: Após o recebimento pelo Almoxarifado os equipamentos serão destinados à GPLAT, DESIT, GESIT's e GETEC's.

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AM	Praça Antônio Bittencourt, 90		Manaus	AM
BA	Av. Paulo VI, 190 - 5º andar	Pituba	Salvador	BA
BSB	SBN Q. 1 Conj. 3 Bloco A - 2º subsolo		Brasília	DF
CE	Rua Sem. Alencar, 38 - Sala 307	Centro	Fortaleza	CE
ES	Av. Leitão da Silva, 2730	Santa Luzia	Vitória	ES
GT	Praça Cívica, 11 - 2º andar	Centro	Goiânia	GO
MA	Praça João Lisboa, 292 - sala 306	Centro	São Luis	MA
MG	Av. Afonso Pena, 1270 - 1º andar	Centro	Belo Horizonte	MG
MS	Av. Vasconcelos Fernandes, 164		Campo Grande	MS
MT	Av. Dom Orlando Chaves, 1250	Cristo Rei	Várzea Grande	MT
NO	Av. Costa e Silva, 2137		Porto Velho	RO
PA	Av. Presidente Vargas, 498 - 4º andar		Belém	PA
PB	Praça Pedro Américo, 70	Centro	João Pessoa	PB
PE	Av. Guararapes, 250 - sala 305	Centro	Recife	PE
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PR	Rua XV de Novembro, 700 - 1º andar		Curitiba	PR
RJ	Av. Pres. Vargas, 3077 - 4º andar	Cidade Nova	Rio de Janeiro	RJ
RN	Av. Engº Hildebrando de Góis, 221	Ribeira	Natal	RN
RS	Rua Siqueira Campos, 1100 - sala 314		Porto Alegre	RS
SC	Praça XV de Novembro, 242	Centro	Florianópolis	SC
SE	Rua Laranjeiras, 229	Centro	Aracaju	SE
SPM	Rua Mergenthaler, 592 - Bloco 2 - 7º andar	V. Leopoldina	São Paulo	SP
SPI	Praça D. Pedro II, 4-55 - Centro - 3º andar	Centro	Bauru	SP

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What's New in Solaris 9/98

Sun Microsystems, Inc.
901 San Antonio Road
Palo Alto, CA 94303-4900
U.S.A.

Part No: 805-4126-06
June 1998

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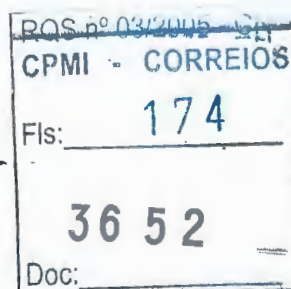
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CHAPTER 1

What's New at a Glance

This document highlights new features of the Solaris™ 2.7 operating environment. Table 1-1 provides a brief description of new features in this release. For more extensive descriptions of these features, see Chapter 2.

The Solaris operating environment is the foundation for web-based computing. It is scalable and has the capacity to run and grow businesses on the Internet. As reliable as the dial tone on your phone, Solaris software is the WebTone for the Internet. Reliable, solid, and multifaceted, Solaris software is built to provide capacity, security, interoperability, manageability, and global connectivity.

Why Upgrade to the Solaris 2.7 Release

The following key features are the highlights of this release. Table 1-1 overviews these new features and Chapter 2 provides details on each feature.

- Solaris software includes a new applications environment that enables the construction and execution of 64-bit applications while retaining compatibility and functionality for the existing 32-bit environment. (for SPARC Platform Edition only)
- UFS logging increases file system efficiency by eliminating the chance for file systems to become inconsistent, and reduces the time to reboot a system after it crashes.
- LDAP protocol improves managing name databases.
- The Solaris Java™ Developer Kit significantly improves scalability and performance for Java applications.

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- Dynamic reconfiguration allows the service provider to add or remove and replace hot-pluggable system boards in a running system, eliminating the time lost in rebooting. (This feature is available for certain SPARC™ servers only.)
- The AnswerBook2™ server can run on top of an existing web server, such as Sun™ WebServer™. It does not require an additional web server running on your system solely for AnswerBook2 support.
- Unicode locales include five new UTF-8 locales, and the Unicode locales have been enhanced with multiscrypt capabilities so that users can input and display text from different writing scripts.
- RPC has been modified based on the GSS-API. This increases security integrity and confidentiality, and NFS™ services are no longer tied to a specific or a single security mechanism.
- The Solaris Common Desktop Environment (CDE) contains new tools to make it easy to find, manipulate, and manage address cards, applications, email addresses, files, folders, hosts, processes, and web addresses.

TABLE 1-1 Solaris 2.7 Features at a Glance

Feature	Description
Solaris 64-bit Operating Environment	
64-bit operating environment (SPARC only)	The 64-bit Solaris operating environment is a complete 32-bit and 64-bit application and development environment supported by a 64-bit operating system. This permits maximum compatibility and interoperability for existing applications, both source and binary. At the same time, the 64-bit Solaris operating environment overcomes many of the limitations of the 32-bit system, most notably by supporting a 64-bit virtual address space as well as removing other existing 32-bit system limitations. (For SPARC Platform Edition only)
Network Management and System Administration	
UFS logging	UFS logging is the process of storing transactions (changes that make up a complete UFS operation) into a log before the transactions are applied to the UFS file system. Once a transaction is stored, the transaction can be applied to the file system later. UFS logging provides two advantages. It eliminates the chance for file systems to become inconsistent and, in turn, eliminates the need to run <code>fsck(1M)</code>. And, because <code>fsck</code> can be bypassed, UFS logging reduces the time to reboot a system if it crashes or boots after an unclean halt.
-o noatime UFS mount option	To ignore access time updates on files, you can specify the <code>-o noatime</code> option when mounting a UFS file system. This option reduces disk activity on file systems where access times are uninteresting (for example, a Usenet news spool).
LDAP	LDAP, the Lightweight Directory Access Protocol, is an open standard, platform-independent protocol that defines a global directory structure. LDAP operates at a low layer in the TCP/IP stack and therefore performs quickly, is easy to implement, and has improved search capabilities.

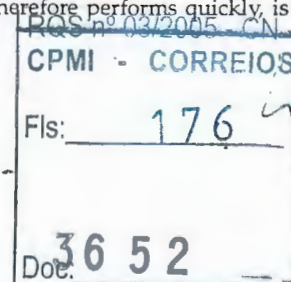
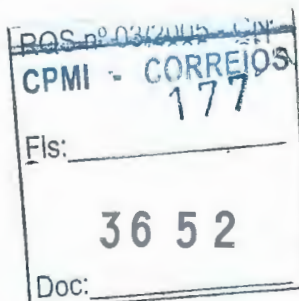




TABLE 1-1 Solaris 2.7 Features at a Glance (continued)

Feature	Description
Dynamic reconfiguration	Dynamic reconfiguration allows the service provider to add, or remove and replace, hot-pluggable system boards in a running system, eliminating the time lost in rebooting. (For certain SPARC systems only.)
New commands: pgrep and pkill	The pgrep command looks at the active processes on the system and displays the process IDs of the processes whose attributes match the specified criteria on the command line. The pkill command works the same way as the pgrep command except that each matching process ID is signaled by kill(2) instead of having the process ID displayed.
sendmail 8.8.8	This version includes hooks that enable restriction of spam (unsolicited, bulk email); virtual hosting that allows email to be received using different domain names; and an improved configuration hierarchy that makes building your own sendmail configuration file much easier.
Traceroute utility	Solaris 2.7 software bundles the popular traceroute utility. The traceroute utility is used to trace the route an IP packet follows to an Internet host. It is especially useful for determining routing misconfiguration and routing path failures.
System crash dump utility	The system crash dump features include the following: ■ The dumpadm command enables system administrators to configure crash dumps of the operating system. ■ Dump data is now stored in compressed format on the dump device. ■ Saving core files is run in the background when a dedicated dump device—not the primary swap area—is part of the dump configuration.
Network Performance	
TCP with SACK	TCP selective acknowledgment (TCP SACK) provides the support described in RFC 2018 to solve the problems related to congestion and multiple packet drops, especially in applications using TCP large windows (RFC 1323) over satellite links or transcontinental links.
Network Security	
RPCSEC_GSS	RPC has been modified based on the GSS-API. This increases security integrity and confidentiality, and NFS services are no longer tied down to a specific or a single security mechanism.
NIS+ extended Diffie-Hellman	NIS+ enhances NIS+ security by increasing the authentication key length from 192 bits to 640 bits.
BIND 8.1.1	Berkeley Internet Name Daemon (BIND), the most popular DNS implementation, has been upgraded to 8.1.1. It provides a new configuration file that enhances network security through the use of access control lists (ACLs).



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TABLE 1-1 Solaris 2.7 Features at a Glance (continued)

Feature	Description
Ease-of-Use and Management Improvements	
Installation	
SPARC: Installing a 64-bit operating environment	The Solaris 2.7 installation programs have a new check box for selection of 64-bit support; it is selected by default when installing on UltraSPARC™ platforms.
Installing AnswerBooks with Web Start	The Web Start product (on the Documentation CD) provides a point-and-click interface with selections for installing the AnswerBook2 server, all document collections on this CD, or selected document collections.
More locale selections	In the Solaris 2.7 release, the English and European localized versions of Solaris software have been combined on a single CD. As a result, more locale selections are available during installation of this combined CD than were seen for Solaris 2.6 software.
Documentation	
Man pages available in AnswerBook2 format	Man pages are available in AnswerBook2 (SGML), rather than AnswerBook™ format. This provides improvements in navigation and links to man pages directly from other AnswerBook2 documents.
Running an AnswerBook2 server directly from the Documentation CD	With a Documentation CD and root access to the system on which the CD is connected, the AnswerBook2 server can run directly from the CD using the ab2cd script. The documentation can be viewed from the CD.
Ability to use CGI-based web servers	The AnswerBook2 server can run on top of an existing web server, such as Sun WebServer, rather than requiring an additional web server run on the system solely for AnswerBook2 support.
Ability to control display of style sheet errors	An environment variable, AB2_DEBUG, can be set on the AnswerBook2 server. It controls whether style sheet errors are displayed to the user with a red "BUG."
Language Support	

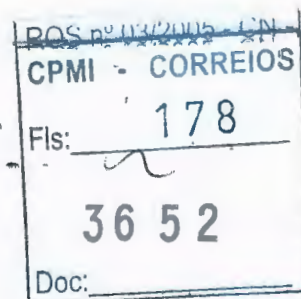
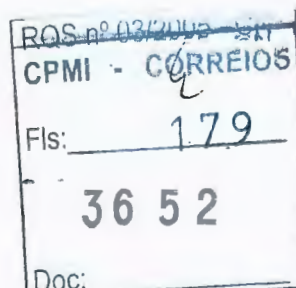




TABLE 1-1 Solaris 2.7 Features at a Glance (continued)

Feature	Description
Enhanced language framework	- Complex text support has been integrated for complex text layout languages such as Arabic, Hebrew, and Thai, which require special text pre-processing to handle bidirectional, composite, and context-sensitive text. - Solaris 2.7 software implements the Internet Intranet Input Method Protocol (IIIMP) to enable seamless interoperability between the input methods provided in Solaris, Java, and non-X Windows applications. - The Desktop Font Downloader enables users to download, remove, re-encode and convert fonts, check status, and perform other administrative tasks on a PostScript™ printer.
Expanded Unicode support	- Solaris software has expanded its Unicode support with the addition of five new UTF-8 locales: French, German, Italian, Spanish, and Swedish. - Enhanced Unicode locale with multiscript capability is included. Users can input and display text from different writing scripts such as Japanese, Thai, and Russian, and easily switch between the scripts without having to change to or install a new locale.
Expanded locale support	- The European Community (EC) has agreed to standardize on a single currency - the "Euro" currency. Beginning January 1999, all foreign exchange, banking, and finance industries in the EC will convert from using their local currencies to using the Euro. In anticipation of this changeover, Solaris 2.7 software has added support for the Euro currency with six new user locales. - Solaris software has added support for the Eastern European, Thai, and the Middle Eastern regions.
Software Developer Environment	
64-bit developer environment (SPARC only)	The Solaris 2.7 operating environment provides developers with complete 32-bit and 64-bit development environments.
Runtime linker	The runtime linker permits programs to find shared libraries without having to set LD_LIBRARY_PATH and makes the loading of shared libraries even more efficient.
man utility now displays SGML code	The man utility is now able to display man pages that are coded with SGML, as well as the traditional nroff.
Solaris 64-bit X Window libraries	All of the core X11 shared libraries (.so) and all lint libraries (.ln) for programmers provided in 32-bit versions are available in 64-bit versions for 64-bit Solaris software.



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TABLE 1-1 Solaris 2.7 Features at a Glance (continued)

Feature	Description
Java performance improvements	The Solaris Java Developer Kit (JDK) 1.1.5 has been specially tuned and tested for Solaris 2.5.1 and 2.6 operating environments (on both the SPARC and Intel platforms). As a result, the JDK offers significantly improved scalability and performance for Java applications developed for, and deployed in, the enterprise and across the network.
WebNFS™ Software Development Kit included	The WebNFS Software Development Kit (SDK) provides remote file access for Java applications using WebNFS. Since it implements the NFS™ protocol directly, it requires no NFS support on the host system.
User-level function-call tracing	A <code>-u</code> option has been added to <code>truss</code> to enable user-level function-call tracing.
Improved device configuration library	The <code>libdevinfo</code> library, used to obtain device configuration information, has been made more robust and comprehensive in Solaris 2.7. For more information, see the man page <code>libdevinfo(3)</code> .
Graphics/Imaging	
XIL™	The XIL foundation imaging library is suitable for libraries or applications requiring imaging or digital video, such as document imaging, color prepress, or digital video generation and playback. New support for stereoscopic image display enables the presentation of image pairs representing a left-eye/right-eye view. This provides an image display with depth perception. The XIL Developer's Kit is now separate from Solaris and is available free of charge.
Desktop	
Common Desktop Environment, (CDE)	CDE contains new tools to make it easy to find, manipulate, and manage address cards, applications, email addresses, files, folders, hosts, processes, and web addresses.
Printing	
Enhanced Font Management	The Desktop Font Downloader allows users to download, remove, re-encode and convert fonts, check status, and perform other administrative tasks on a PostScript printer.
Intel Platform Edition Hardware Support	

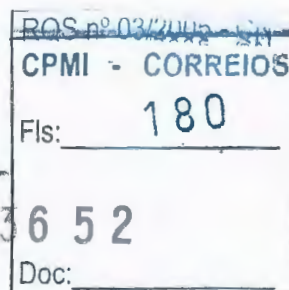




TABLE 1-1 Solaris 2.7 Features at a Glance (continued)

Feature	Description
SCSI disk driver sd	The sd SCSI disk target driver, formerly supplied only on Solaris (SPARC Platform Edition) systems, is now used for SCSI disk support and ATAPI CD-ROM support in place of cmdk. The cmdk driver is still available to support non-SCSI hard disks.
Intelligent I/O framework support	Intelligent I/O (I2O) is an emerging standard for modular, high-performance I/O subsystems. This feature, which is dependent on I2O-capable hardware, is only available for Solaris (Intel Platform Edition).

Features Added in Previous Solaris Releases

This section describes features introduced in previous Solaris releases.

Solaris 2.6 Release

Table 1-2 describes new and enhanced features of the Solaris 2.6 release.

TABLE 1-2 Solaris 2.6 Features

Feature	Description
Java	
Java Virtual Machine	The Java Virtual Machine 1.1 integrates the Java platform for the Solaris operating environment. It includes the Java runtime environment and the basic tools needed to develop Java applets and applications.
HotJava™ browser	The HotJava browser provides an easy-to-use, customizable user interface for exploring the Internet and corporate intranets. It can run executable content in the form of applets. (Applets are Java programs that can be included in an HTML page, much like images can be included.)
Intranet/Internet Services	

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TABLE 1-2 Solaris 2.6 Features (continued)

Feature	Description
WebNFS™ software	The WebNFS software enables file systems to be accessed through the Web using the NFS protocol. This protocol is very reliable and provides greater throughput under a heavy load.
Performance Improvements	
Database Performance	
UFS direct I/O	For UFS files, direct I/O enables a program to read and write data directly from and to the disk, bypassing the virtual memory buffer cache. An example of a bulk I/O operation is downloading large amounts of satellite data to a file.
Raw I/O	Improvements were made to low-level I/O support routines that dramatically improve throughput for I/O to disk devices without a file system (raw devices often used for database files.). The driver for the SPARCstorage™ Array was rewritten to improve its throughput.
Network/Web Performance	
Kernel sockets	The kernel sockets implementation provides improved compatibility with SunOS™ 4.x and BSD sockets, and enables higher socket performance.
TCP large windows	TCP large windows provides the support described in RFC1323. It improves performance over high-bandwidth networks such as ATM, or high-delay networks such as satellite links, by using windows that exceed the normal 64-Kbyte limit.
Zero copy TCP/hardware checksum	Zero copy TCP has been used to eliminate copying from user-space to kernel-space. Support for hardware checksum has been added as well. Performance is improved by avoiding software computation of the checksum, off-loading the work to a network adapter that supports it. This is currently only supported on the SunATM™ card.
Ease-of-Use and Management Improvements	
Installation	
Solaris Web Start browser-based installation	Solaris Web Start is a browser-based utility that guides users through selection and installation of both Solaris and bundled application software.
Installation documentation	A documentation reorganization makes finding information on how to install Solaris software easier.
x86 device configuration	The Configuration Assistant interface is part of the new booting system for the Solaris (Intel Platform Edition) software. It determines which hardware devices are in the machine, accounts for the resources each device uses, and enables users to choose which device to boot from.

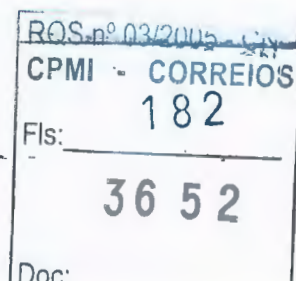




TABLE 1-2 Solaris 2.6 Features (continued)

Feature	Description
x86 configuring peripherals	The <code>kdmconfig</code> program is used to configure the mouse, graphics adapter, and monitor on an x86 system. If an <code>owconfig</code> file already exists, <code>kdmconfig</code> will extract any usable information from it. In addition, this updated version of <code>kdmconfig</code> will also retrieve information left in the <code>devinfo</code> tree by the <code>devconf</code> program, and use that information to automatically identify devices.
Changed Solaris CD layout	Slice 0 on the Solaris CD has been reorganized to make it more intuitive and extensible.
Upgrade with disk space reallocation	The upgrade option provides an auto-layout feature to reallocate disk space if the current file systems don't have enough space for the upgrade.
Testing upgrade profiles	The <code>pfinstall</code> command is now available to test profiles that use the upgrade option.
Changing a system's boot device	A system's boot device is now changeable during installation.
Preconfiguring system Configuration information	Using the <code>sysidcfg</code> file, you can now preconfigure system configuration information through a set of keywords. You can choose to provide one or more of the keywords to preconfigure varying levels of system information.
Optional 8-bit locales	The installation window in the English Solaris 2.6 CD offers several English language locales. To use 8-bit characters, users should install through one of the <code>-en_xx</code> options. The locale used in the installation becomes the default system locale.
Documentation	
AnswerBook2 documentation	Solaris online documentation can be accessed with any popular browser. The AnswerBook2 viewer uses a web browser-based interface that enables users to view and print a variety of Solaris information, including existing AnswerBook™ documents and man pages.
Desktop	
Common Desktop Environment (CDE)	Solaris CDE is an advanced Motif-based desktop with an easy-to-use interface that provides a consistent look and feel across UNIX® platforms. With Solaris CDE you can run OpenWindows™ applications without modifications. In addition, CDE applications are integrated with the Web; for example, you can click on an HTTP address in a CDE Mailer message and a browser will open to the selected address.
Power Management™ for SPARC desktops	Power Management software enables users to be more frugal with power consumption on desktop systems when they are not being used. By default, all UltraSPARC™ desktop systems power off when left alone for 30 minutes. Users can modify or turn off Power Management if needed.

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TABLE 1-2 Solaris 2.6 Features (continued)

Feature	Description
OpenWindows desktop	The OpenWindows 3.6 desktop and libraries have been updated with bug fixes and prepared for the year 2000.
New user locales	Ten new locales are added for Eastern European, Russian, Greek, and Baltic states.
Unicode 2.0 support	Two locales that are Unicode 2.0 and ISO 10646 compliant have been added. These locales enable multiscrypt input and output and are the first locales provided in the Solaris environment with this capability. These locales support the CDE environment only, including the Motif and CDE libraries
Font administration	- Font Admin enables easy installation and usage of fonts for the X Window System. It supports TrueType, Type0, Type1, and CID fonts for multibyte languages, and provides comparative font preview capability. It is fully integrated into the CDE desktop. - TrueType fonts are supported through X and Display PostScript. Font Admin enables easy installation and integration of third-party fonts into the Solaris environment.
Asian language enhancements	Solaris 2.6 software has been re-architected to the historical dependency on the Extended UNIX Codeset (EUC). Additional codeset support and locales for popular Asian PC encoding standards (ShiftJIS (PCK) in Japan, Big5 in PRC, and Johap) in Korea are also provided. These locales support the CDE environment only, including the Motif and CDE libraries.
Solaris user registration	Users who register using Solaris electronic registration will receive information about new Solaris offerings and support.
Standards	
Year 2000 compliance	The Solaris 2.6 operating environment is year-2000 ready. It uses unambiguous dates and follows the X/Open guidelines where appropriate.
X/Open UNIX 95 (Spec 1170)	The previous release of the Solaris software was compliant with much of Spec 1170. The Solaris 2.6 release now meets all the requirements.
X/Open XFN CAE	Federated Naming Service (FNS) is now compliant with the X/Open XFN CAE definition.
POSIX 1003.1b	POSIX real-time functionality is added. This includes full support for POSIX AIO (with the exception of the -PRIORITIZED I/O option) and some new extensions to support 64-bit files, (see "Large Files").
ISO 10646	The ISO 10646 standard defines Unicode 2.0, including UCS-2 and UTF-8 (the standard UNIX implementation). All implementations specified in this standard are Unicode 2.0 compliant.
Robust Software Developer Environment	

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TABLE 1-2 Solaris 2.6 Features (continued)

Feature	Description
Large files	Large files are supported on UFS, NFS™, and CacheFS™ file systems. The interfaces defined by the Large File Summit are supported.
Versioning/ scoped libraries	Developers of shared libraries can now have better control over the public interfaces that they offer. This helps to control the dependencies that applications have on these shared libraries. It also means the applications are more portable and less affected by changes in the shared libraries, thus leading to higher-quality products for both. In the Solaris 2.6 operating environment, the system libraries take advantage of this technology and have been both scoped and versioned.
Scheduler activations	Scheduler activations provide additional kernel scheduling support for multithreaded applications.
Pre-emption control	Pre-emption control allows application control over kernel pre-emption.
/proc File system and watchpoints	The previous flat /proc file system has been restructured into a directory hierarchy that contains additional subdirectories for state information and control functions. It also provides a watchpoint facility to monitor access to and modifications of data in the process address space. The adb(1) command uses this facility to provide watchpoints.
Federated naming service (FNS)	FNS is now compliant with the X/Open XFN CAE definition. FNS has also been enhanced to include support for Lightweight Directory Access Protocol (LDAP) and provides improved support for the files and NIS back ends.
Asynchronous I/O	Asynchronous I/O support for tapes provides an interface to improve performance on high-performance tape devices. With the ability to queue up I/O requests, this feature significantly improves the I/O throughput.
Solaris Developer Kit (SDK)	The SDK software is now built into the Solaris operating environment and is no longer an unbundled product. All the information a developer needs to produce applications and graphics handlers for end-user Solaris runtime environments is now available in this Solaris release.
Graphics	
XGL™	The XGL 2-D and 3-D immediate-mode API provides portability across hardware platforms and optimal performance from graphics acceleration. The XGL API includes support for raster text, environment and vertex-level texture mapping, four-component texture mapping, DGA transparent overlay, and triangle list Gcache.

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TABLE 1-2 Solaris 2.6 Features (continued)

Feature	Description
XIL	The XIL foundation imaging library is suitable for libraries or applications requiring imaging or digital video, such as document imaging, color prepress, or digital video generation and playback. The following features are new in the Solaris 2.6 release. The XIL 1.3 library: - Is MT-hot - Supports the 32-bit, single-precision, floating-point data type - Supports temporary images - Supports the new XIL_GENERAL storage format - Includes Kodak Color Management System™ (KCMS) support - Supports the new XIL_BAND_SEQUENTIAL storage format for all data types - Saves on memory use with tiled storage
PEX™ 3.0.2 runtime environment	The PEX application programmer interface (API) provides application portability across platforms and 3-D graphics on local and remote displays.
KCMS multithreaded programming	KCMS now supports multithreaded programs: it is multithread safe (MT-safe). A KCMS application using multithreaded capabilities does not require locks around KCMS library calls.
X11R6 base window system	The X11R6 Base Windowing System includes the latest fixes and patches from the X Consortium.
X11 double buffer extension	The double buffer extension (DBE) provides a standard way to use double-buffering within the framework of the X Window System. Double-buffering uses two buffers, called "front" and "back," that hold images. The front buffer is visible to the user; the back buffer is not. A detailed specification is available via an Internet browser at ftp://ftp.x.org/pub/DOCS/DBE/
Large Files Support	
Large files	Large files are supported on UFS, NFS, and CacheFS file systems. Applications can create and access files up to one Tbyte on UFS-mounted file systems and up to the limit of the NFS server for NFS- and CacheFS-mounted file systems. A new <code>-mount</code> option is available to disable the large-file support on UFS file systems. This <code>-mount</code> option gives the system administrator a way to ensure that older applications that are not able to safely handle large files will not accidentally operate on large files.

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TABLE 1-2 Solaris 2.6 Features (continued)

Feature	Description
64-bit AIO	The Solaris operating environment provides a new set of interfaces for developers who want to do asynchronous I/O to large files. These interfaces are integrated with KAIO in an implementation technique that optimizes I/O to raw files. They are automatically selected by either the Solaris AIO interfaces or the new POSIX AIO interfaces. KAIO is the optimized path for doing I/O to raw files. When using the interfaces with KAIO to raw files, there is a significant performance improvement.
Network Security	
NFS Kerberos	Kerberos authentication uses DES encryption to improve security over the network. The kernel implementations of NFS and RPC network services now support a new RPC authentication flavor that is based on the Generalized Security Services API (GSS-API). This support contains the hooks to add stronger security to the NFS environment.
RPCSEC_GSS	The user-level RPC implementation supports a new authentication flavor. This flavor is based on the GSS-API and provides the hooks to add stronger authentication, privacy, and integrity for RPC-based services.
Authentication modules (PAM)	The PAM framework enables you to "plug in" new authentication technologies.
BIND version 4.9.4-P1	Berkeley Internet Name Daemon (BIND), the most popular DNS implementation, has been upgraded to 4.9.4-P1. It addresses many of the security problems found in earlier versions of the implementation.
Network Management and System Administration	
Network time protocol (NTP)	Solaris software now supports NTP, which provides both precise time and/or network clock synchronization for use in distributed computing environments. In the past, Solaris customers could use a publicly available version of NTP. The new support provides increased time precision.
Solstice™ Enterprise Agents™	Solstice Enterprise Agents (SEA) is based on the new extensible agent technology or master/subagent technology. SEA is for component developers and system and network managers who want to develop custom Simple Network Management Protocol (SNMP), or Desktop Management Interface (DMI) subagents, to instrument different components, subsystems, and applications within a device to enable management from an SNMP management console.
DHCP	Dynamic Host Configuration Protocol (DHCP) enables a host to get an Internet protocol address and other system configuration parameters without preconfiguration by the administrator.
NFS client failover	Client failover provides a high level of availability of read-only file systems by enabling the client to automatically mount the file system from another server if the first server becomes unavailable.

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TABLE 1-2 Solaris 2.6 Features (continued)

Feature	Description
Variable length subnet mask (VLSM)	VLSM enables more efficient use of IP address space by enabling the TCP/IP administrator to use Classless Inter-Domain Routing (CIDR) to partition this space in a flexible manner.
Routing sockets	Conformance with the de facto routing socket interface as implemented by 4.4 BSD, which allows use of CIDR-aware routing protocols such as OSPF, BGP-4, and RIPv2, is now included.
autofs	The new autofs automount daemon is now fully multithreaded. This enables concurrent servicing of multiple mount requests and increases reliability.
Processor sets	Processor sets give the system administrator control over the allocation of processes to sets of processors.
NIS+ backup/fast restore	NIS+ backup and restore provide a quick and efficient method of backing up and restoring NIS+ namespaces.
NIS+ over a wide area network (WAN)	Server-use customization enables NIS+ administrators to specify NIS+ server search order for clients that need naming services. Server use can be balanced among various clients by designating different servers for different clients as "preferred" (primary). If a client cannot obtain information from its preferred servers, the order in which the client seeks out other servers can be specified. This feature is particularly useful when a NIS+ domain spans a WAN link, because administrators can reduce network traffic over the WAN link by specifying that clients first try to obtain the naming service from servers on the client's side of the link.
NIS server	Solaris software now natively supports the NIS server. In previous Solaris releases, the NIS server was supported under emulation mode by the NIS+ server or using an unbundled product named NSkit.
CFS boot	CFS Boot enables AutoClient™ systems to boot more quickly with less network traffic by booting from a local CacheFS disk cache. The first system boot populates the cache. System boots that follow are satisfied from the cache.
Patch tools	Patch tools, including patchadd and patchrm commands to add and remove patches, are now part of the Solaris software, rather than shipping with each individual patch as installpatch and backoutpatch commands.
isalist utilities	isalist is a set of utilities that enables users to find out which instruction sets are supported on their machines and also to determine which one performs best for them.

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TABLE 1-2 Solaris 2.6 Features (continued)

Feature	Description
Printing	The Solaris 2.6 print software offers a better solution than the LP print software in previous Solaris releases. System administrators can easily set up and manage print clients using the NIS or NIS+ name services. This means print administration can be centralized for a network of systems and printers. New features include: - Redesign of print packages - Print protocol adapter - SunSoft™ Print Client - Network printer support
Hardware Support	
PCMCIA PC card	PCMCIA delivers a PCMCIA supplement into a Solaris Device Driver Kit to enable OEMs and third parties to develop PC Card device drivers that will be source-compatible across all Solaris platforms.
Nomadic Support	
filesync	filesync ensures that data is moved automatically between a portable computer and a server.

Solaris 2.5.1 Release

Table 1-3 describes new and enhanced features of the Solaris 2.5.1 release.

TABLE 1-3 New Features in Solaris 2.5.1

Feature	Description
Security	
Large user IDs and group ID	The limit on User ID and Group ID values has been raised to 2147483647, or the maximum value of a signed integer. The <i>nobody</i> user and group (60001) and the <i>no access</i> user and group (60002) retain the same UIDs and GIDs as previous Solaris 2.x releases.

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TABLE 1-3 New Features in Solaris 2.5.1 (continued)

Feature	Description
Graphics/Imaging	
KCMS calibrator tool	KCMS includes a loadable driver module for the X-Rite DTP92 Incident Colorimeter. The driver supports the X-Rite colorimeter, which connects to the serial port to obtain color measurement data. Includes new procedures for adding and removing color calibration modules to the system configuration file, OWconfig.

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CHAPTER 2

What's New: A Closer Look

This chapter describes new features of the Solaris 2.7 release in detail. For a list of features with brief descriptions, see Chapter 1.

The Solaris 2.7 operating environment includes advanced technologies for multithreading, symmetric multiprocessing, integrated TCP/IP-based networking, and centralized network administration tools. This Solaris release provides many new features that improve an already powerful, stable, operating environment.

Here are some of the new features:

- Solaris 64-bit operating environment added (SPARC Platform Edition only)
- UFS logging improves file system support
- LDAP protocol improves managing name databases
- Java Developer Kit significantly improves scalability and performance for Java applications
- Dynamic reconfiguration significantly decreases system downtime
- AnswerBook2 server runs on a web server
- Unicode locales enhanced with multiscrypt capabilities and six new Unicode locales added
- RPC security is enhanced with integrity and confidentiality
- The Solaris Common Desktop Environment (CDE) contains new tools to make it easy to find, manipulate, and manage address cards, applications, email addresses, files, folders, hosts, processes, and web addresses

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SPARC: Solaris 64-bit Operating Environment

The 64-bit Solaris operating environment is a complete 32-bit and 64-bit application and development environment supported by a 64-bit operating system. This permits maximum compatibility and interoperability for existing applications, both source and binary. At the same time, the 64-bit Solaris operating environment overcomes the limitations of the 32-bit system, most notably by supporting a 64-bit virtual address space and removing other 32-bit system limitations.

The key limitations overcome by the 64-bit Solaris operating environment are the following:

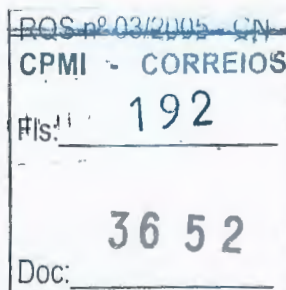
- 64-bit virtual address space for applications and the kernel allows large tasks to be handled in primary memory, which can provide big performance benefits.
- 256 file descriptor limit for `stdio` expanded to 32-bit quantity for 64-bit applications.
- 64-bit `time_t` (avoids 2038 problems) for 64-bit applications.
- Full 64-bit integer arithmetic for 64-bit applications. Though 64-bit arithmetic has been available in all Solaris 2.x releases, the 64-bit implementation now uses full 64-bit machine registers for integer operations and parameter passing. This allows an application to take full advantage of the capabilities of the 64-bit CPU hardware.
- Greater than 2 Gbytes `tmpfs` on the 64-bit system.
- Greater than 2 Gbytes per swap device on the 64-bit system.

The compatibility and interoperability in the 64-bit Solaris operating environment is so complete that there is no noticeable difference. Existing applications just work and `PATH` settings remain unchanged.

The new `isainfo` program helps determine whether you are running on a 32-bit or 64-bit system. `isainfo` prints information about all the supported Instruction Set Architectures (ISA) of the running system.

Finally, there is the option of booting either the 32-bit or 64-bit Solaris operating environment on UltraSPARC machines.

See "Software Developer Environment" on page 31 for more detailed 64-bit information for developers. Also, for more information on using the 64-bit operating system, see *Solaris 2.7 64-bit Developer's Guide*.



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Network Management and System Administration

The Solaris operating environment provides a stable and reliable networking environment. New network management and system administration features in this release expand tools for managing this environment.

UFS Logging

UFS logging is the process of storing transactions (changes that make up a complete UFS operation) into a log before the transactions are applied to the UFS file system. Once a transaction is stored, the transaction can be applied to the file system later.

UFS logging provides two advantages. It eliminates the chance for file systems to become inconsistent and, in turn, eliminates the need to run `fsck(1M)`. And, because `fsck` can be bypassed, UFS logging reduces the time to reboot a system if it crashes or boots after an unclean halt.

UFS logging is not enabled by default. To enable UFS logging, you must specify the `-o logging` option with the `mount(1M)` command when mounting the file system. Also, the `fsdb(1M)` command has been updated with new debugging commands for UFS logging.

For more information, see *System Administration Guide, Volume 1*.

UFS Mount Option to Ignore Access Time Updates

To ignore access time updates on files, you can specify the `-o noatime` option when mounting a UFS file system. This option reduces disk activity on file systems where access times are uninteresting (for example, a Usenet news spool). See the `mount_ufs(1M)` man page for more details.

Lightweight Directory Access Protocol (LDAP)

The Lightweight Directory Access Protocol (LDAP) is an open standard, platform-independent protocol that defines a global directory structure. Born out of the X.500 directory system, LDAP performs faster than DAP because it operates at a lower layer in the TCP/IP stack, is much easier to implement, and has greater search capabilities.

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SPARC: Dynamic Reconfiguration for Hot-Pluggable System Boards

Dynamic reconfiguration (DR) allows the service provider to add or remove and replace hot-pluggable system boards in a running system, eliminating the time lost in rebooting. Also, if a replacement board is not immediately available, the system administrator can use DR to shut down a failing board while allowing the server to continue operations. Only certain SPARC servers support this version of DR.

See your hardware manufacturer's documentation for information about whether DR supports your server.

New Commands, `pgrep` and `pkill`, to Manage Processes

The Solaris 2.7 release provides the `pgrep` and `pkill` commands, which replace the combination of the `ps`, `grep`, `egrep`, `awk`, and `kill` commands that were used to manage processes in previous Solaris releases. The `pgrep` command looks at the active processes on the system and displays the process IDs of the processes whose attributes match the specified criteria on the command line. The `pkill` command works the same way as the `pgrep` command except that each matching process ID is signaled by `kill(2)` instead of having the process ID displayed.

For more information, see *System Administration Guide, Volume 1*.

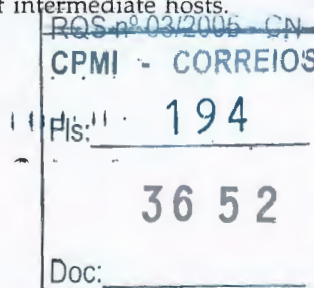
`sendmail`

The `sendmail` 8.8.8 includes hooks that permit restriction of spam (unsolicited, bulk email); virtual hosting, which allows email to be received using different domain names; and an improved configuration hierarchy that makes building your own `sendmail` configuration file much easier.

For more information, see *Mail Administration Guide*.

Traceroute Utility

Solaris 2.7 software bundles the popular traceroute utility. The traceroute utility is used to trace the route an IP packet follows to an Internet host. Traceroute uses the IP protocol ttl (time to live) field and attempts to elicit an ICMP `TIME_EXCEEDED` response from each gateway along the path, and `PORT_UNREACHABLE` (or `ECHO_REPLY`) from the destination host. The traceroute utility starts sending probes with a ttl of 1, and increases by one until it gets to the intended host or has passed through a maximum number of intermediate hosts.



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The traceroute utility is especially useful for determining routing configuration problems and routing path failures. If a particular host is unreachable, the traceroute utility can be used to see what path the packet follows to the intended host and where possible failures occur. The traceroute utility also displays the round-trip time for each gateway along the path to the target host. This information can be useful for analyzing where traffic is slow between the two hosts.

For more information, see *TCP/IP and Data Communications Administration Guide*.

System Crash Dump Utility

The Solaris 2.7 system crash dump features are the following:

- The `dumpadm` command enables system administrators to configure crash dumps of the operating system. The `dumpadm` configuration parameters include the dump content, dump device, and the directory to which core files are written. This command can set and change parameters as well as verify the validity of a crash dump configuration.
- The `savecore` command is now enabled by default.
- Dump data is now stored in compressed format on the dump device. Kernel crash dump images can be as big as 4 Gbytes or more. Compressing the data means faster dumping and less disk space needed for the dump device.
- Saving core files is run in the background when a dedicated dump device—not the primary swap area—is part of the dump configuration. A booting system doesn't have to wait for the `savecore` command to complete before going to the next step. On large memory systems, the system can be available before `savecore` completes.

See *System Administration Guide, Volume II* for more information about system crash dump features.

Network Performance Improvements

Solaris 2.7 performance enhancements focuses on solving problems with congestion and multiple packet drops when using TCP on the network.

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TCP With SACK

TCP selective acknowledgment (TCP SACK) provides the support described in RFC 2018 to solve the problems related to congestion and multiple packet drops, especially in applications making use of TCP large windows (RFC 1323) over satellite links or transcontinental links.

Without TCP with SACK, the receiving TCP application only acknowledges the last packet received in order. For instance, if the TCP application receives packet 1, packet 2, and packet 3, and then receives packet 5, it will only acknowledge receiving up to packet 3 and will discard all subsequent packets until it receives packet 4. This can cause massive retransmission. With TCP with SACK, the receiving location can acknowledge the packets as they are received and the transmitting side can determine which packets never were received. For instance, if the receiving side receives packet 1, packet 2, and packet 3, and then receives packet 5 and packet 6, it can acknowledge each of these packets and the transmitting side only needs to resend the lost packet 4, rather than having to retransmit packet 4, packet 5, and packet 6.

For more information, see *TCP/IP and Data Communications Administration Guide*.

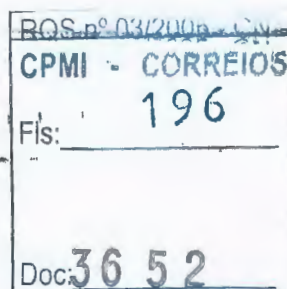
Network Security

The Solaris operating environment provides a sophisticated security system that controls the way users access files, protect system databases, and use system resources. Solaris security is network-wide security, providing security over several different systems, not just one. The Solaris security system is designed to accommodate different security models, giving users the flexibility to choose the model that best fits their needs now and in the future. Here are a number of new features added to the Solaris security system.

RPCSEC_GSS

The kernel-level RPC implementation adds support for a new authentication flavor based on the GSS-API. NFS services are no longer tied down to a specific or a single security mechanism. The user-level RPC implementation has been modified to support two stronger security services—integrity and confidentiality. This implementation also supports multiple security mechanisms.

For more information, see *NFS Administration Guide*.



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NIS+ Extended Diffie-Hellman (DH)

NIS+ enhances NIS+ security by increasing the authentication key length from 192 bits to 640 bits.

For more information, see *NIS+ Transition Guide*, *Solaris Naming Administration Guide*, or *Solaris Naming Setup and Configuration Guide*.

BIND 8.1.1

Berkeley Internet Name Daemon (BIND), the most popular DNS implementation, has been upgraded to 8.1.1. It provides a new configuration file that enhances network security through the use of access control lists (ACLs).

The `/etc/named.conf` (BIND 8.1.1) file replaces the `/etc/named.boot` (BIND 4.9.6 file and older).

For more information, see *Solaris Naming Setup and Configuration Guide* or *Solaris Naming Administration Guide*.

Ease-of-Use and Management Improvements

The Solaris operating environment is large and complex; its structure gives customers the flexibility to meet their needs. New features enable customers to easily install and manage the Solaris environment.

Installation

This section describes new features in the Solaris 2.7 software that affect installation.

Installing the 64-bit Operating Environment

The Solaris 2.7 installation programs have a new check box for selection of 64-bit support. The check box is active (not grayed-out) if 64-bit support is a valid option for either the hardware or the software group (metacenter) selected for installation.

Selection of 64-bit support is appropriate if the system is to be used to either develop or run applications compiled for the 64-bit SPARC instruction set. The 64-bit SPARC instruction set is currently supported on UltraSPARC systems.

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Deselection of 64-bit support for an UltraSPARC system removes the ability to run or compile a 64-bit program. An UltraSPARC system with 64-bit support should execute 32-bit programs at comparable speeds (typically within a few percent) to a system running without 64-bit support.

For more information, see *Solaris 2.7 (SPARC Platform Edition) Installation Library*.

Installing AnswerBook with Web Start

The Solaris 2.7 Documentation CD includes a new choice for installing software from the CD. Standard utilities, such as `pkgadd`, can be used to install everything on the CD or the install icon can be clicked to use the Web Start product. The Web Start product provides a point-and-click interface with selections for installing the AnswerBook2 server, all document collections on this CD, or selected document collections.

For more information, see *Solaris 2.7 (Intel Platform Edition) Installation Library* or *Solaris 2.7 (SPARC Platform Edition) Installation Library*.

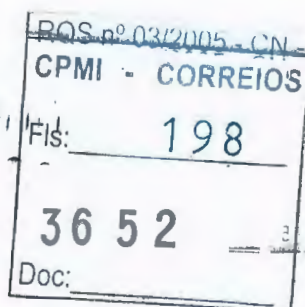
More Locale Selections

In the Solaris 2.7 release, the English and European localized versions of Solaris software have been combined on a single CD. As a result, more locale selections are available during installation of this combined CD than were seen for Solaris 2.6 software.

Note - Note that more than one locale may be associated with a particular language. This allows for regional differences such as currency notation. For example, an English-speaking user in the United States can select the `en_US` locale (English for the United States). An English-speaking user in Great Britain can select `en_GB` (English for Great Britain).

Documentation

The AnswerBook2 documentation system uses a web browser-based interface that enables you to view and print a variety of Solaris information, including existing AnswerBook documents and man pages. The following are new features for AnswerBook2.





Solaris Reference Manual (Man Pages) Available in AnswerBook2 Format

Some man pages are available in AnswerBook2 (SGML), rather than AnswerBook1 format. This provides improvements in navigation and links to them directly from other AnswerBook2 documents. The man pages on the Documentation CD are the following:

- *man Pages(9E) : DDI and DKI Driver Entry Points*
- *man Pages(9F) : DDI and DKI Kernel Functions*
- *man Pages(9S) : DDI and DKI Data Structures*

Running an AnswerBook2 Server Directly from the Documentation CD

With the Documentation CD and root access to the system on which the CD is connected, the AnswerBook2 server can run directly from the CD using the `ab2cd` script.

For detailed information, see the `Doc CD README` file on the Documentation CD, the module *Accessing Online Documentation in Solaris 2.7 (SPARC Platform Edition) Installation Library* or *Solaris 2.7 (Intel Platform Edition) Installation Library*, or AnswerBook2 online Help.

Ability to Use CGI-based Web Servers

The AnswerBook2 server can run on top of an existing web server, such as Sun WebServer, rather than requiring an additional web server running on a system solely for AnswerBook2 support.

For detailed information about how to change servers, and some possible limitations, see the module *Accessing Online Documentation in Solaris 2.7 (SPARC Platform Edition) Installation Library* or *Solaris 2.7 (Intel Platform Edition) Installation Library* or the AnswerBook2 online Help.

Ability to Control Display of Stylesheet Errors

An environment variable, `AB2_DEBUG`, can be set on the AnswerBook2 server. This controls whether style sheet errors are displayed to the user with a red "BUG."

For detailed information on setting this variable, see the AnswerBook2 online Help.

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Software Developer Environment

The Solaris operating environment provides developers with the documentation, development software libraries, productivity tools, sample code, and testing tools needed to develop software applications for the Solaris runtime environments. This section describes new features relating to the 64-bit Solaris operating environment, shared objects, and the man command.

SPARC: 64-bit Development Environment

The Solaris 2.7 operating environment provides developers with complete 32-bit and 64-bit development environments. Here are some of the highlights:

- 32-bit Solaris APIs are unchanged.
- 64-bit Solaris APIs are the same as 32-bit XPG5 (UNIX 98) APIs.
- Can build 32-bit and 64-bit applications and drivers on SPARC systems running 32-bit Solaris 2.7 software (with 64-bit support installed) or UltraSPARC systems running 64-bit Solaris 2.7 software.
- Shared header files support 32-bit and 64-bit programs.
- Separate libraries for 32-bit and 64-bit programs.
- Separate drivers for 32-bit and 64-bit kernels.
- PATHs unchanged.
- Large Files — If an application requires only large files support, then it can remain 32-bit and use the Large Files interface. However, an application should be converted to 64-bit to take full advantage of 64-bit capabilities.
- \$ORIGIN — The linker supports a new keyword \$ORIGIN that can be embedded in path names (specified with the -R flag) to enable library locations to be specified relative to the location of the running executable. For more information on \$ORIGIN, see *Linker and Libraries Guide*.
- The bundled assembler on SPARC systems has been updated to support assembling both 32-bit and 64-bit SPARC assembler programs. The supported instructions sets include SPARC V8, SPARC V9 and the UltraSPARC-specific VIS instructions.

For more information, see *Solaris 2.7 64-bit Developer's Guide*.

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Runtime Linker

The runtime linker permits programs to find shared libraries without having to set `LD_LIBRARY_PATH` and makes the loading of shared libraries even more efficient.

- Shared objects can now be loaded at runtime relative to where the requesting object is located.
- The loading of a shared object can now be deferred until the object is actually referenced by the running program.

The man Utility Now Displays SGML Code

The man utility is now able to display man pages that are coded with SGML, as well as the traditional nroff.

For more information on SGML man pages, see the `man(1)` man page.

SPARC: Solaris 64-bit X Window Libraries

All of the core X11 shared libraries (.so) and all lint libraries (.ln) for programmers provided in 32-bit versions are available in 64-bit versions for 64-bit Solaris software. There are no changes to the API for any of these libraries. All of these libraries are installed in the /usr/openwin/lib/sparcv9 directory. No 64-bit X11 application programs are provided. There are four 64-bit X11 packages:

- `SUNWxwix` (X Window System ICE 64-bit library)
- `SUNWxwpl` (X Window System 64-bit library software)
- `SUNWxwrt` (X Window System 64-bit runtime compatibility Package)
- `SUNWxwsl` (X Window System 64-bit lint libraries for programmers)

Java Development Kit Improvements

Solaris Java Developer Kit (JDK) 1.1.5 has been specially tuned and tested for Solaris 2.5.1 and 2.6 operating environment (on both the SPARC and Intel platforms). As a result, this release of the JDK offers significantly improved scalability and performance for Java applications developed for, and deployed in, the enterprise and across the network. The following Solaris JDK performance improvements have been made:

- Improved computational application performance with one processor. Running with one processor, the performance of many computational applications is improved compared to Solaris JDK 1.1.4.

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with one processor. Running computational applications is

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- Improved performance for multithreaded programs running on multiple processors. Applications with many threads and a significant amount of networking running with two or more processors will typically run much faster on Solaris JDK 1.1.5, due to improvements in scalability.

For more information on the JDK, see the Java web site at <http://www.sun.com/solaris/java>.

WebNFS

The WebNFS Software Development Kit(SDK) provides remote file access for Java applications using WebNFS. Since it implements the NFS protocol directly, it requires no NFS support on the host system. It provides access to WebNFS or conventional NFS servers by way of URL file naming. The file access API is modelled after the classes in the `java.io.*` package and provides seamless access to both local and remote files. For updates to this SDK, go to the web site: <http://www.sun.com/webnfs>.

New Option Enables Function Call Tracing

The `truss` utility executes the specified command and produces a trace of the system calls it performs, the signals it receives, and the machine faults it incurs. With the new `-u` option, `truss` can produce an entry/exit trace of user-level function calls executed by the traced process. For more information, see the man page `truss(1)`.

Improved Library for Device Configuration

The `libdevinfo` library, used to obtain device configuration information, has been made more robust and comprehensive in Solaris 2.7. For more information, see `libdevinfo(3)`.

Graphics/Imaging

The Solaris VISUAL™ software includes several graphics and multimedia software foundation libraries. Foundation libraries are the lowest-level device-independent layer of the Solaris software. This level of interface is designed to support a wide variety of common functions. You can build higher-level libraries on top of the foundation libraries, or the foundation libraries can be used directly by a software application. These foundation libraries create applications that incorporate 2-D and 3-D graphics, imaging, and digital video. The libraries are the XGL graphics library

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and XIL imaging library. The new XIL stereoscopic image display feature is described below.

XIL 1.3 Runtime Environment

The XIL library is an imaging API that provides a basic set of functions for imaging and video applications. The library provides a strategy for low-level software interfaces (foundation libraries) and enables APIs and API developers to port their code to these foundation libraries.

The XIL 1.3 runtime environment (RTE) should be installed if users at your site are running imaging applications. Whether an application requires the XIL RTE is not always obvious; therefore, you should install the XIL RTE if you are installing either OpenWindows or CDE software, since an application may reference the XIL libraries.

The XIL developer components are now separate from Solaris and are available free of charge on Sun's web site. The developer components are the following:

- The XIL man pages describing use of the XIL API
- The XIL Programmer's Guide
- The XIL header files for support of the XIL API

The XIL runtime libraries is included to ensure continuing support for applications employing XIL.

The XIL RTE has been improved with the following new functionality.

- XIL is adding support for stereoscopic image display. This will initially be supported on the Creator 3D frame buffer. Access to these capabilities is provided by a simple set of API calls. Stereoscopic display enables the presentation of image pairs representing a left-eye/right-eye view of the world. The left and right images are alternately displayed at a frame rate above the eye's flicker frequency. When used in conjunction with electro-optic shuttering eyeglasses, an image display with depth perception, just like normal binocular human vision is produced. Both double-buffered and stereo display can be combined so that stereo updates can be swapped between back and front buffers.

Common Desktop Environment

The Common Desktop Environment (CDE) 1.3 release contains a set of tools that supplement the CDE 1.2 functionality. It provides simplified end-user access, improved local system administration, and enhanced productivity capabilities. The new tools include:

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- Organization and customization of the desktop environment
 - File Finder, which enables you to easily search for files using specified criteria
 - Reorganized, customizable, graphical Front Panel and Workspace menu
 - Per-screen Front Panel for multiple monitor configurations
- Improved local system administration
 - Process Manager, which displays information about system processes
 - Perfmeter, which displays system performance graphically
 - System Info, which displays information about your workstation
- Enhanced Productivity
 - Address Manager, which enables you to create and search for electronic addresses
 - Text and voice notes

CDE applications support Complex Text Layout (CTL) locales.

Motif 2.1

Solaris 2.7 software supports Motif 2.1, which includes five new Motif widgets. Motif 2.1 is MT-safe and includes software for CTL locale support.

Printing

For PostScript printers, a new printing feature manages third-party PostScript fonts.

Enhanced Font Management

Solaris 2.7 has enhanced its font support through a new Desktop Font Downloader application so that users can easily use and manage third-party Postscript Type 1 and TrueType fonts in their Solaris environments. The Desktop Font Downloader allows users to download, remove, re-encode and convert fonts, check status, and perform other administrative tasks on their Postscript printer.

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C2 Level Security

Solaris, in response to the need for further security-related specifications, provides features required for government-approved computing. The Department of Defense (DoD) developed guidelines for varying levels of computer system security in the 1980s. These requirements are defined in the DoD Trusted Computer System Evaluation Criteria (TCSEC) manual (DoD 5200.28-STD) otherwise known as the "Orange Book" after the color of its cover. The National Computer Security Center (NCSC) of the National Security Agency (NSA) evaluates systems based on these criteria.

Orange Book Requirements

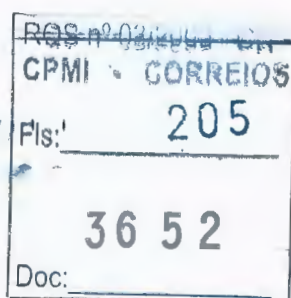
The Orange Book defines 7 different levels of trust:

D	Minimal protection
C1	Discretionary access control
C2	Authentication, auditing
B1	Mandatory access control, labels
B2	Configuration control, covert channel
B3	Access control lists
A1	Formal proofs

It is recognized as the standard by most of U. S. DoD and NATO.

Figure 2 - Orange Book Requirements

Meeting C2-level requirements is considered a baseline requirement for many government security-conscious computer users. This same feature set has application in the non-government sphere as well. The C2 requirements are varied. Important C2 features include DAC, object reuse, identification and authentication, auditing, assurances, and relevant documentation. The basic UNIX system includes features





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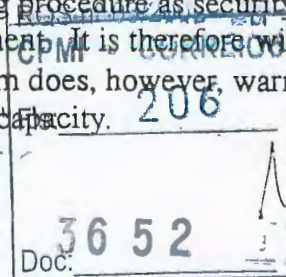
which include DAC (discussed above) and user identification and authentication through the login/password paradigm. Object reuse ensures that no user or process can use resources which were previously used by another user or process without being cleared; this is also covered by basic UNIX operations. Auditing is a component of the C2 package which will be discussed below. Assurances basically guarantee that the system will be secure and operate in the manner it professes to operate. This includes system architectural issues, tools to verify system integrity, and testing of both the system functionality and possible penetration. The documentation package provides usage information as well as design, test, and functionality information.

Since SunOS 4.0, SunOS (now a Solaris component) has provided most C2-level security features. An update to the C2 feature set is provided as a software patch to Solaris 1.0 and Solaris 1.0.1. This patched version of the C2 package is also known as the Basic Security Module (BSM). The BSM auditing features form the base of SunOS CMW auditing, a product which will meet the Compartmented Mode Workstation (CMW) and B1 security specifications and which is discussed below. It is available from the SMCC Solution Center via the 1-800-USA4SUN phone line. It is also available for Solaris 2.1 as an option for a nominal media fee.

The majority of security-conscious customers, both government and otherwise, will find C2 security satisfactory. This feature set is general enough to be of use to commercial, university, and other customer environments; the features have widespread applicability and are used by a varied group of users from financial to technical.

The C2 feature set adds to the UNIX security base. First, passwords are more secure through the use of a file called */etc/passwd.adjunct*. While standard UNIX encrypts passwords, itself a basic security mechanism, the */etc/passwd* file is readable by anyone. Use of the */etc/passwd.adjunct* file splits the sensitive password information from the general background information of the */etc/passwd* file. The */etc/passwd.adjunct* file containing the encrypted passwords is only readable by root, further safeguarding the encrypted passwords. The C2 system also allows for requiring a password be entered for single user booting. This protects against someone halting a machine, rebooting it single user, and deleting the root password. This can be done through the */etc/ttytab* file or via a change in the system's *eeeprom* as discussed above.

Auditing, a key component of C2 security, provides a record of system events for later examination. Activities can be traced to individual users of the system, providing accountability for system actions. Auditing can be performed on given commands, given users, or for all system activity. Commands exist which enable the system administrator to later analyze the audit data. It is important to ensure that the system has sufficient disk space allocated for audit data. If the file system(s) allocated to store audit data fill, the system will halt. This is intentional operating procedure as security concerns are paramount in this type of operating environment. It is therefore wise to audit selectively and clean out audit data regularly. The system does, however, warn the administrator at specific intervals that the audit space is near capacity.





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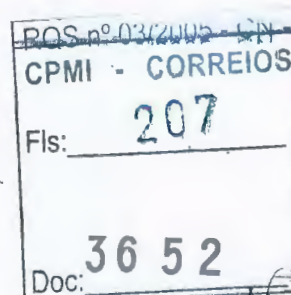
One of the benefits of the BSM C2 package is its modularity. Individual site administrators can decide how secure to make their environment by implementing only desired features. For strict C2 operation, several things must be set in place. A site security policy should be defined. This includes several components:

- * select limited number of trusted users
- * provide desired physical security including machine and network cable access
- * decide which users and which commands will be audited
- * determine how and when audit data will be analyzed

Administration of a C2 system is critical to its success. All systems should be administered centrally with the Network Information Service (NIS). The NIS maintains network-wide databases of information such as the host file or the password file. This simplifies network administration, centralizing the maintenance of such database files. The BSM should be run on all machines on the network. Individual users should not have superuser passwords. A master `/etc/fstab` file should be created providing a set of common mount points. All systems should utilize a subset of that file. The network can be physically separated, if desired. The password option of the boot PROM should be utilized insuring that crashing a system will not allow anyone to reboot and take over; "full" provides the highest level of security and is required for true C2 security. Root logins can be disallowed to insure that all audited actions can be traced to an individual user ID; allow root access only through the wheel group, group 0. The `/etc/passwd.adjunct` file, which only allows root access to this repository for encrypted passwords, is required for auditing; the last two entries in this file are used for this purpose.

Device allocation is an important component of the BSM. This feature allows for secure sharing of devices and provides mutual exclusion. The ability to clean a device is a significant component of this feature. A prime example would be removing the last number dialed from a modem. Furthermore, device access can be restricted to certain users.

Inter-operation is also important. The BSM will interoperate with basic encryption and the ARM and ASET Sun SHIELD components discussed below. The Solaris BSM is an important component of a secure UNIX operating environment.





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POWER OF ATTORNEY

The undersigned, Michael Morris, Secretary and Director of Sun Microsystems of California, Inc., a California corporation (the "Company"), acting by virtue of the authority conferred upon me by resolutions adopted by the Board of Directors and effective as of October 1st, 1999, hereby authorize Mr. João Antonio Alves, General Manager for Sun Microsystems do Brasil Ind. e Com. Ltda. ("Sun do Brasil"), to be the Company's true and lawful Attorney to deliver certifications to Brazilian customers of the Company and of Sun do Brasil regarding the ownership and authorization of the Company and of Sun do Brasil and the origin of their products, including, without limitation, the following:

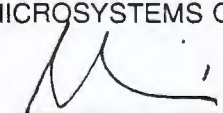
1. That the Company is a wholly-owned subsidiary of Sun Microsystems, Inc. with its principal offices at 901 San Antonio Road, Palo Alto, CA 94303;
2. That identify Sun Microsystems, Inc. and the Company's wholly-owned subsidiaries;
3. That identify Sun do Brasil as a wholly-owned subsidiary of the Company and of Sun Microsystems, Inc.;
- That the Company and Sun do Brasil are the Sun Microsystems Inc. affiliated companies authorized to distribute Sun Microsystems products in Brazil, directly or through their authorized distributors and resellers;
5. That Sun Microsystems, Inc. is a manufacturer of computer workstations, computer servers, and networking products;
6. That inform the location of Sun Microsystems, Inc. manufacturing plants;
7. That Sun do Brasil, as well as its authorized distributors and resellers, are authorized to offer Sun Microsystems, Inc. products to the Brazilian Government, governmental bodies and agencies;
8. That Sun Microsystems, Inc. products offered by Sun do Brasil or by its authorized distributors and resellers shall carry Sun Microsystems' standard warranty.

In addition, Mr. João Antonio Alves may perform for the Company in its name all things which shall be necessary or desirable concerning the matters described herein, including without limitation receiving service of process and responding administratively and judicially to such matters on behalf of the Company, as freely as the Company would do for the attainment of the objects of the Company, together with the power to delegate any or all of the powers hereby granted to others, and the right to revoke such delegation. The undersigned hereby ratifies and confirms all and whatever the said Attorney shall do or cause to be done, about or concerning this instrument and any part thereof.

This Power of Attorney shall remain in full force and effect until revoked in writing.

IN WITNESS WHEREOF, and pursuant to the resolutions of the Board of Directors of the Company dated as of October 1, 1999, I have hereunder set my hand effective as of October 14, 1999.

SUN MICROSYSTEMS OF CALIFORNIA, INC.

By: 
Name: Michael Morris
Title: Secretary and Director

RQS nº 03/2005 - 124
CPMI - CORREIOS
Fls: 208
36 52
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TABELIONATO
TABELIAO F. FRANC
José Roberto F. Fr
AUTENTICAÇÃO - Autenticado e
conforme o original e imit. aprese.
S. PAULO-SP
AV. JOÃO DIAS
Nº 232
F. 5641-6092
24 OUT. 99
Claudio Fonseca França - Suost. do Tabelião
Roberto Fonseca França - Suost. do Tabelião
André F. França de O. Pereira - Suost. do Tabelião
Oivan Odaivo Bozco - Escrevente
Simone Bitucci - Escrevente
Marcio Chagas - Escrevente

PJ 106109



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36 52
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CONSULADO GERAL DO BRASIL SÃO FRANCISCO

Reconheço verdadeiro verdadeira a assinatura, no documento anexo, de GRACE

BOOCKHOLDT--

Escrivão _____ da Corte do Condado de

Santa Clara

Estado Califórnia Estado Unidos da America.

E, para constar onde convier, mandei passar o presente, que assinei a fiz selar com o Selo deste Consulado. Dispensado reconhecimento de firma de acordo com o Decreto nº 84.451, do 31-01-1980. A legalização deste documento não implica aceitação ou aprovação de seu conteúdo.

The legalization of this document does not imply approval or acceptance of its contents.

São Francisco, 15 de outubro de 1999

NOEMIA
VICE-CONSUL

R \$ 2000 (ouro) ou
US \$ 2000 tab. 9/6
Recebemos



CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT



109

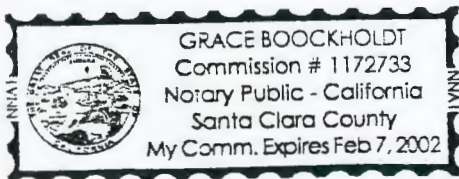
State of CALIFORNIA

County of SANTA CLARA

On OCTOBER 15, 1999 before me, GRACE BOOCKHOLDT, Notary Public

personally appeared MICHAEL H. MORRIS

☒ personally known to me – OR – ☐ proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.



WITNESS my hand and official seal.

Grace Boockholdt
Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: _____

Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

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- ☐ Corporate Officer
- Title(s): _____
- ☐ Partner — ☐ Limited ☐ General
- ☐ Attorney-in-Fact
- ☐ Trustee
- ☐ Guardian or Conservator
- ☐ Other: _____

RIGHT-THUMBPRINT
OF SIGNER
Top of thumb here

Signer Is Representing: _____

Signer's Name: _____

- ☐ Individual
- ☐ Corporate Officer
- Title(s): _____
- ☐ Partner — ☐ Limited ☐ General
- ☐ Attorney-in-Fact
- ☐ Trustee
- ☐ Guardian or Conservator
- ☐ Other: _____

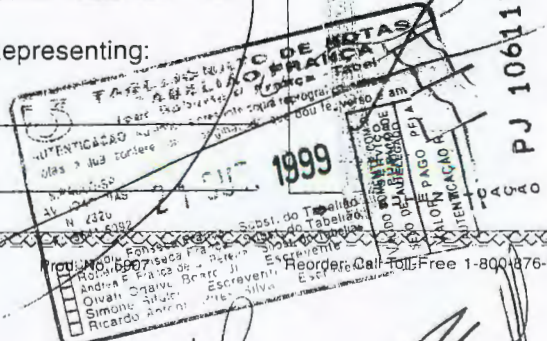
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CPMI - CORREIOS

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Doc: _____
RIGHT-THUMBPRINT
OF SIGNER
Top of thumb here

Signer Is Representing: _____



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MANOEL REVERENDO VIDAL NETO

Tradutor Público Juramentado e Intérprete Comercial

INGLÊS



Tradução N.º 5008

L. 123 Fls. 86-91

1. Que a Companhia é subsidiária integral da Sun Microsystems, Inc. com sede em 901 San Antonio Road, Palo Alto, CA 94303;

2. Que identifiquem a Sun Microsystems, Inc. bem como as subsidiárias integrais da Companhia;

3. Que identifiquem a Sun do Brasil como subsidiária integral da Companhia e da Sun Microsystems, Inc.

4. Que a Companhia e a Sun do Brasil são empresas afiliadas da Sun Microsystems, Inc. autorizadas a distribuir os produtos da Sun Microsystems no Brasil, diretamente ou por intermédio de seus distribuidores e revendedores autorizados;

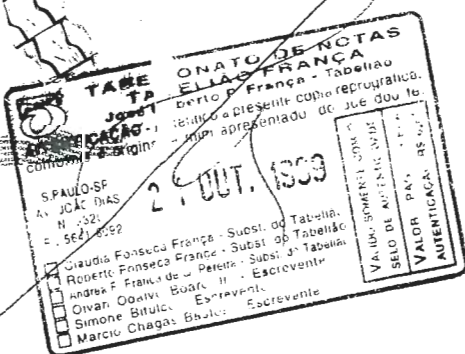
5. Que a Sun Microsystems, Inc. é fabricante de estações de computadores, de servidores e de produtos de rede;

6. Que informem a localização das fábricas da Sun Microsystems, Inc.;

7. Que a Sun do Brasil, assim como seus distribuidores e revendedores autorizados, encontram-se autorizados a

- 2 -

Rua Juatuba, 80 - Apto. 23 - São Paulo - SP - Tel.: 262-6493 - Mat. Jucesp N.º 377 - CPF N.º 672.398-708.04



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MANOEL REVERENDO VIDAL NETO

Tradutor Público Juramentado e Intérprete Comercial

INGLÊS



Tradução N.º 5008

L. 123 Fls. 86-91

oferecer os produtos da Sun Microsystems, Inc. ao governo brasileiro e às agências e órgãos públicos;

8. Que os produtos da Sun Microsystems, Inc. oferecidos pela Sun do Brasil ou por seus distribuidores e revendedores autorizados portam a garantia padrão da Sun Microsystems.

Ademais, o Sr. João Antonio Alves terá poderes para praticar em nome e por conta da Companhia todos os atos que se fizerem necessários ou convenientes com relação às matérias aqui descritas, inclusive, sem limitação, receber citação e responder administrativa e judicialmente a tais matérias por conta da Companhia, de forma tão livre quanto a Companhia poderia fazê-lo a fim de alcançar os objetivos da Companhia, tendo poderes ainda para substabelecer os poderes ora conferidos no todo ou em parte, bem como o direito de revogar tal substabelecimento. O infra assinado por este ato ratifica e confirma tudo o que o referido Procurador praticar ou fizer com que seja praticado no âmbito deste instrumento ou de qualquer parte do mesmo.

A presente Procuração permanecerá em pleno vigor até que seja revogada por escrito.

- 3 -

Rua Juatuba, 80 - Apto. 23 - São Paulo - SP - Tel.: 262-6493 - Mat. Jucesp N.º 377 - CPF N.º 672.398-708.04

02000-42M-C
PJ 105711

ATTESTADO DE NOTAS
BELIAO FRANCA
Roberto P. França - Tabelião
Autentica e apresenta cópia reprográfica,
autenticando a presente, do que dou fé.

21 OUT. 1989

S. PAULO - SP
AV. IAC DIAS
N.º 2324
F. 56416092

☒ Claudio Fonseca França - Subst. do Tabelião
☒ Roberto Fonseca França - Subst. do Tabelião
☒ Andreia F. França de C. Pereira - Escrevente
☒ Oivan Odalvo Roaro Jr. - Escrevente
☒ Simone Bitulco - Escrevente
☒ Marcio Chagas Bastos - Escrevente

VALIDO SOMENTE COM O
SELO DE AUTENTICIDADE
VALOR PAGO PELA
AUTENTICACAO R\$ 0,81

BOS nº 002442-44
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MANOEL REVERENDO VIDAL NETO

Tradutor Público Juramentado e Intérprete Comercial

INGLÊS



Tradução N.º 5008

L. 123 Fls. 86-91

EM TESTEMUNHO DO QUE, e em conformidade com as deliberações do Conselho de Administração da Companhia datadas de 1º de outubro de 1999, aponho minha assinatura de próprio punho em 14 de outubro de 1999.

SUN MICROSYSTEMS OF CALIFORNIA, INC.

por: (assinatura ilegível)

Nome: Michael Morris - Cargo: Secretário e Diretor."

Legalizações norte-americanas: (folha anexa) "CALIFÓRNIA - RECONHECIMENTO PARA FINS MÚLTIPLOS. Estado da Califórnia, Condado de Santa Clara.

Em 15 de outubro de 1999 perante mim, *Grace Boockholdt, Notário Público*, compareceu pessoalmente *Michael H. Morris*, de mim pessoalmente conhecido como sendo a pessoa cujo nome subscreve o instrumento em apenso, tendo reconhecido a mim que firmou o mesmo em sua qualidade autorizada e que, por força de sua assinatura aposta ao instrumento, a pessoa física ou jurídica por conta de quem agiu celebrou o instrumento.

Em testemunho do que, aponho minha assinatura de próprio punho bem como meu carimbo oficial.

(assinatura ilegível), Assinatura do Notário Público.

- 4 -

Rua Juatuba, 80 - Apto. 23 - São Paulo - SP - Tel.: 262-6493 - Mat. Jucesp N.º 377 - CPF N.º 672.398-708.04

PROVA
PJ 105712

TABELIONATO DE NOTAS
TABELIÃO FRANÇA
José Roberto P. França - Tabelião
Autenticado a presente cópia reprográfica.
contém o original a mim apresentado, do que dou fé.

21 OUT. 1999

S. PAULO - SP
AV. PAO D'AS
N.º 2326
F.º 5641-6092

☐ Claudia Fonseca França - Subst. do Tabelião
☐ Roberto Fonseca França - Subst. do Tabelião
☐ Andrea P. França de Q. Pereira - Subst. do Tabelião
☐ Oivan Odalvo Boaro Jr. - Escrevente
☐ Simone Bitulco - Escrevente
☐ Marcio Chagas Bastos - Escrevente

VALIDO SOMENTE COM O
SELO DE AUTENTICIDADE
VALOR PAGO PELA
AUTENTICACAO R\$ 0,81

RQS.º 03/2000
CPMI - CORREIOS
Fls: 214
36 52
Doc:

MANOEL REVERENDO VIDAL NETO

Tradutor Público Juramentado e Intérprete Comercial

INGLÊS



Tradução N.º 5008

L. 123 Fls. 86-91

Carimbo: Grace Boockholdt. Comissão N.º 1172733. Notário Público - Califórnia. Condado de Santa Clara. Minha comissão expira em 7 de fevereiro de 2002.

INFORMAÇÕES OPCIONAIS: Embora as informações abaixo não sejam exigidas por lei, poderão ser valiosas às pessoas que confiarem no documento e poderão impedir a remoção ou reanexação fraudulenta deste formulário a outro documento.

Descrição do Documento Anexo

Título ou Tipo de Documento: (em branco)

Data do Documento: (em branco) - Número de Páginas: (em branco)

Outros Signatários que não o acima mencionado: (em branco)

Qualidade(s) Alegada(s) pelo(s) Signatário(s)

Nome do Signatário: (em branco)

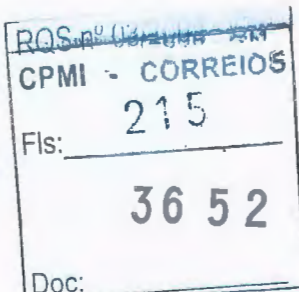
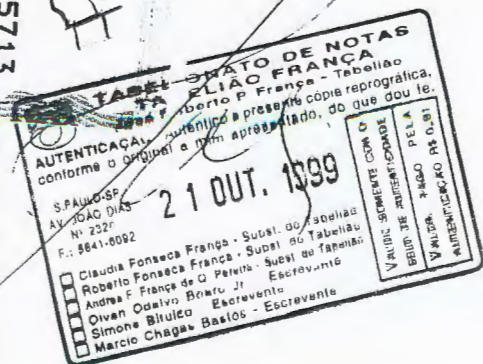
- ☐ Pessoa Física
☐ Administrador de Empresa - Cargo(s)
☐ Sócio - ☐ Limitada ☐ Geral
☐ Procurador
☐ Agente Fiduciário
☐ Tutor ou Conservador
☐ Outros:

O Signatário representa: (em branco)."

- 5 -

Rua Juatuba, 80 - Apto. 23 - São Paulo - SP - Tel.: 262-6493 - Mat. Jucesp N.º 377 - CPF N.º 672.398-708.04

PJ 105713



MANOEL REVERENDO VIDAL NETO

Tradutor Público Juramentado e Intérprete Comercial

INGLÊS



Tradução N.º 5008

L. 123 Fls. 86-91

Legalizações brasileiras: Em 15 de outubro de 1999, na Cidade de São Francisco, foi reconhecida a firma de Grace Bookholdt, Escrivã da Corte do Condado de Santa Clara, Estado da Califórnia, EUA, pela Sra. Noemia Wainer, Vice-Cônsul do Consulado Geral do Brasil em São Francisco, tendo sido apositos o devido selo bem como a chancela do aludido Consulado Geral.....

NADA MAIS constava do documento acima, que devolvo juntamente com a presente tradução, impressa em seis laudas, a qual conferi, achei conforme e assino. DOU FÉ.

São Paulo, 21 de outubro de 1999

Manoel Vidal Neto

Manoel Reverendo Vidal Neto

Emol.: R\$ 154,00

Recibo nº 899-A

- 6 -

Rua Juatuba, 80 - Apto. 51 - São Paulo - SP - Tel.: 262-6493 - Mat. Jucesp N.º 377 - CPF N.º 672.398.708.04

PJ 105714

TABELA DE NOTAS
CLAUDIO FRANÇA
 Tabelião
 Roberto P. França - Tabelião
 Autenticado a presente cópia reprográfica,
 conforme o original a mim apresentado, do que dou fé.
 21 OUT. 1999
 S. PAULO-SP
 AV. JOÃO DAS
 Nº 2300
 F.: 5941-6062
 Claudio Fonseca França - Subst. do Tabelião
 Roberto Fonseca França - Subst. do Tabelião
 Andrea F. França de Q. Pereira - Subst. do Tabelião
 Oivan Odalvo Boaro Jr. - Escrevente
 Simone Bitulco - Escrevente
 Marcio Chagas Bastos - Escrevente

BOS nº 03/2005 - CN
CPMI - CORREIOS
 Fls: 216
 36 52
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**17ª ALTERAÇÃO DO CONTRATO SOCIAL DE
"SUN MICROSYSTEMS DO BRASIL INDUSTRIA
E COMÉRCIO LTDA."**

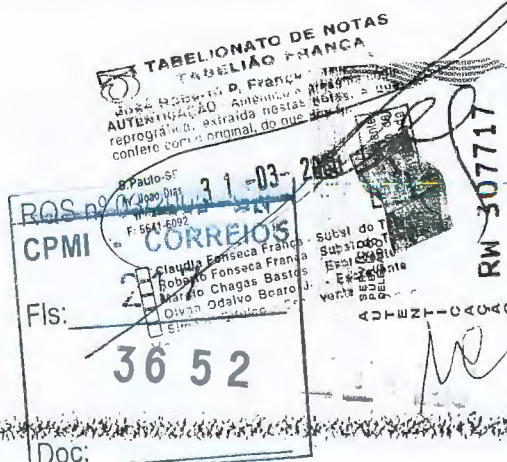
CNPJ/MF nº: 65.497.745/0001-53

NIRE nº: 35.209.923.643

Pelo presente instrumento particular, e na melhor forma de direito, as partes abaixo:

1. **SUN MICROSYSTEMS, INC.**, uma sociedade organizada e existente de acordo com as leis do Estado de Delaware, Estados Unidos da América, com sede em 901 San Antonio Road, Palo Alto, Califórnia, Estados Unidos da América, neste ato representada por seu bastante procurador, José Augusto Caleiro Regazzini, brasileiro, solteiro, advogado, portador da Cédula de Identidade RG nº 4.977.914 SSP/SP e do CIC nº 535.965.288-87, com escritório na cidade de São Paulo, Estado de São Paulo, na Rua Líbero Badaró, 293, 19º andar, conforme instrumento de mandato anexo; e
2. **SUN MICROSYSTEMS OF CALIFORNIA, INC.**, uma sociedade organizada e existente de acordo com as leis do Estado da Califórnia, Estados Unidos da América, com sede em 901 San Antonio Road, Palo Alto, Califórnia, Estados Unidos da América, neste ato representada por seu bastante procurador, José Augusto Caleiro Regazzini, acima qualificado, conforme instrumento de mandato anexo,

únicas quotistas da sociedade por quotas, de responsabilidade limitada denominada **SUN MICROSYSTEMS DO BRASIL INDÚSTRIA E COMÉRCIO LTDA.**, (a "Sociedade"), com sede na cidade de São Paulo, Estado de São Paulo, na Rua Alexandre Dumas, 2016, Bairro Chácara Santo Antônio, cujo Contrato Social, datado de 5 de fevereiro de 1991, encontra-se devidamente arquivado na Junta Comercial do Estado de São Paulo ("JUCESP") sob NIRE n.º 35.209.923.643, em sessão de 7 de fevereiro de 1991, e posteriores alterações também arquivadas na mesma JUCESP, estando a 16ª e mais recente delas, datada de 03 de julho de 1999, registrada sob nº 130.940/99-9, em sessão de 04 de agosto de 1999, têm entre si, justo e contratado, alterar referido Contrato Social, como segue:



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1. **ALTERAR** os itens (iii) e (iv) do Artigo 8º do Contrato Social, que passam a vigorar com a redação constante da consolidação abaixo;
2. **CONSOLIDAR**, tendo em vista a deliberação acima, o Contrato Social, que passa a vigorar como segue:

**"CONTRATO SOCIAL DE
SUN MICROSYSTEMS DO BRASIL INDÚSTRIA E COMÉRCIO LTDA.**



DENOMINAÇÃO, SEDE, FORO JURÍDICO E FILIAIS

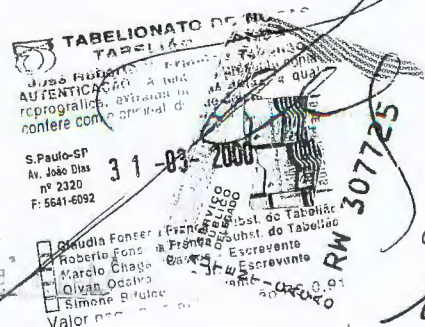
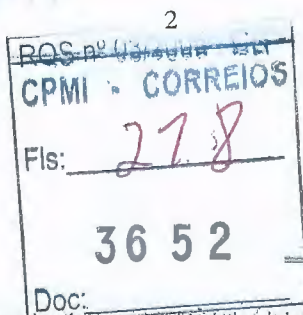
Artigo 1º - A Sociedade denomina-se **SUN MICROSYSTEMS DO BRASIL INDÚSTRIA E COMÉRCIO LTDA.** e tem sua sede e foro jurídico na Rua Alexandre Dumas, 2016, Bairro Chácara Santo Antônio, Edifício "SPOP III", na cidade de São Paulo, Estado de São Paulo. A Sociedade poderá abrir novas agências, escritórios e filiais em qualquer parte do território nacional, mediante deliberação unânime das quotistas nesse sentido.

Parágrafo Único - A Sociedade mantém, ainda, os estabelecimentos abaixo relacionados, os quais têm um capital em separado, para fins fiscais, de R\$ 100,00 cada um:

- Filial na cidade de Belo Horizonte, Estado de Minas Gerais, na Rua Paraíba, 1000, 6º andar, conjunto C, "Edifício Asamar";
- Filial na cidade do Rio de Janeiro, Estado do Rio de Janeiro, na Av. Rio Branco, 1, conjunto 702;
- Filial na cidade de São Paulo, Estado de São Paulo, na Rua Stefano, 196/196B, Bairro do Cambuci; e
- Filial em Brasília, Distrito Federal, na SCN, Quadra 4, Bloco B, 100 - Conjunto 303 (parte A).

OBJETO SOCIAL

Artigo 2º - A Sociedade tem por objeto social a fabricação, utilização, importação e exportação, venda, locação, sublocação, distribuição e licença de produtos e equipamentos de informática, "hardware", "software" e quaisquer produtos e equipamentos relacionados, bem como a prestação de serviços na área de informática. A Sociedade poderá, ainda, desempenhar qualquer atividade relacionada à promoção de seu objeto social, bem como poderá



[Handwritten signatures and notes]

representar e prestar serviços a outras sociedades brasileiras ou estrangeiras. A Sociedade agirá por conta própria ou de outra forma permitida por lei.

DURAÇÃO

Artigo 3º - O prazo de duração da Sociedade é indeterminado.



CAPITAL SOCIAL

Artigo 4º - O capital da sociedade, totalmente subscrito, é de R\$ 1.450.000,00 (um milhão, quatrocentos e cinquenta mil reais), dividido em 1.450.000 (um milhão, quatrocentas e cinquenta mil) quotas, no valor nominal de R\$ 1,00 (um real) cada uma, distribuídas entre as quotistas da seguinte forma:

1. **SUN MICROSYSTEMS OF CALIFORNIA INC.**, detém 1.305.000 (um milhão, trezentas e cinco mil) quotas, no valor nominal total de R\$ 1.305.000,00 (um milhão, trezentos e cinco mil reais), das quais 1.291.828 (um milhão, duzentas e noventa e uma mil, oitocentas e vinte e oito) encontram-se integralizadas.
2. **SUN MICROSYSTEMS INC.**, detém 145.000 (cento e quarenta e cinco mil) quotas, no valor nominal total de R\$ 145.000,00 (cento e quarenta e cinco mil reais), que se encontram totalmente integralizadas.

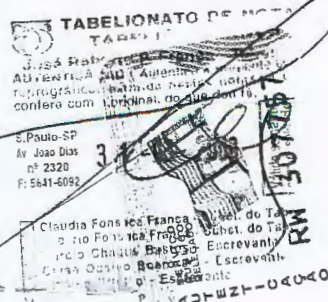
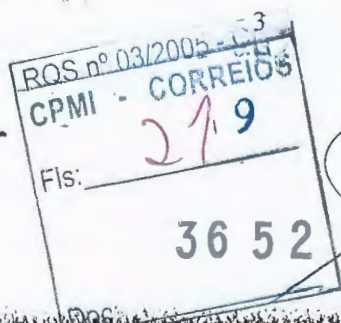
Parágrafo Primeiro - De acordo com o artigo 2º, "in fine", do Decreto n.º 3.708, de 10 de janeiro de 1919, a responsabilidade das quotistas é limitada à importância total do capital social.

Parágrafo Segundo - As 13.172 (treze mil, cento e setenta e duas) quotas remanescentes deverão ser integralizadas até 05 de outubro de 2000, em moeda corrente nacional, em bens ou em créditos, pela quotista **SUN MICROSYSTEMS OF CALIFORNIA, INC.**

Parágrafo Terceiro - Na proporção do número de quotas que possuírem, as quotistas terão preferência para a subscrição do aumento de capital.

CESSÃO E TRANSFERÊNCIA DE QUOTAS

Artigo 5º - A alienação de quotas somente será válida com a prévia e expressa autorização das quotistas representando a maioria do capital social, e desde que refletida em alteração deste Contrato Social.



Handwritten signature and initials.



GERÊNCIA E ADMINISTRAÇÃO

Artigo 6º - A Sociedade será administrada pela quotista **SUN MICROSYSTEMS OF CALIFORNIA, INC.**, que poderá delegar poderes a um indivíduo residente no país que terá o título de Gerente Delegado e será responsável pela administração diária da Sociedade.

Parágrafo Primeiro - A quotista gerente poderá, a qualquer tempo, com ou sem causa, e sem qualquer aviso prévio, destituir o Gerente Delegado e delegar poderes a um novo.

Parágrafo Segundo - O Gerente Delegado da Sociedade está autorizado a pagar todos os valores devidos pela Sociedade às suas quotistas ou qualquer empresa do grupo societário destas, incluindo, mas não se limitando a, valores devidos por produtos adquiridos.

Artigo 7º - A Sociedade somente se obrigará pelos atos ou assinatura:

- (a) da quotista gerente; ou
- (b) do Gerente Delegado, agindo isoladamente; ou
- (c) de dois procuradores, agindo em conjunto e dentro dos limites estabelecidos nas respectivas procurações; ou
- (d) de um procurador com poderes especiais, agindo individualmente e dentro dos limites estabelecidos na respectiva procuração.

Parágrafo Único - As procurações outorgadas pela Sociedade deverão ser sempre e exclusivamente assinadas pelo Gerente Delegado, devendo ser expressamente identificados os poderes outorgados e, com exceção daquelas com poderes "ad judicia", terão prazo de validade determinado, que não poderá ser superior a 1 (um) ano, observado o disposto no Artigo 8º (i) abaixo.

Artigo 8º - Os seguintes atos estão sujeitos ao prévio e expresse consentimento das quotistas representando a maioria do capital social:

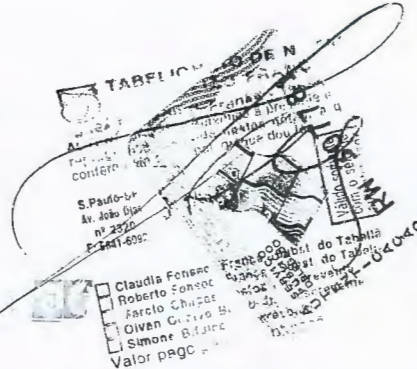
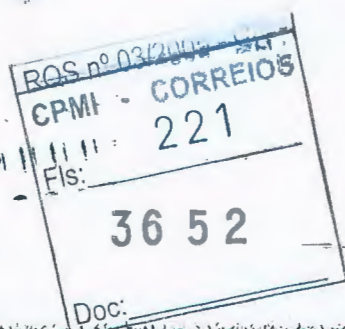
- (i) nomeação de procuradores para representar a Sociedade na prática dos atos ou atividades abaixo listados, observado o prazo de validade previsto no Parágrafo Único do Artigo 7º acima;
- (ii) transferências entre contas correntes bancárias da Sociedade, cujo valor exceda o montante equivalente em reais a US\$ 500.000,00 (quinhentos mil dólares dos Estados Unidos);



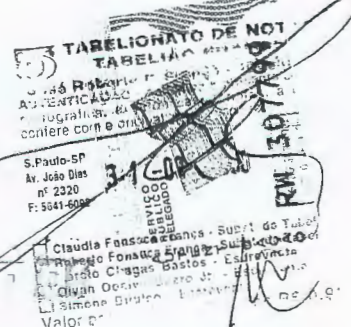
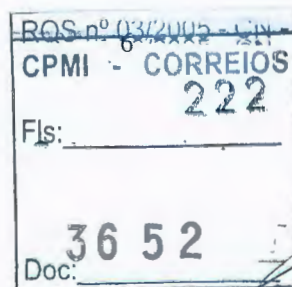
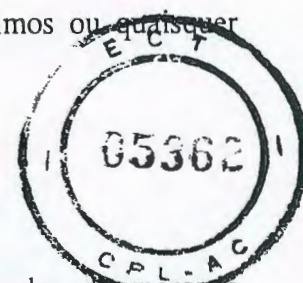


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- (iii) pagamento de tributos relacionados à importação e revenda de produtos Sun Microsystems, ou pagamento de montantes relacionados à importação de produtos Sun Microsystems, incluindo, mas não se limitando a, preços, custos de transporte e seguro, quantias devidas à trading company utilizada pela Sociedade, ou pagamento de folhas de pagamento, cujos valores excedam o equivalente em reais a US\$ 1.000.000,00 (um milhão de dólares dos Estados Unidos);
- (iv) assinatura de quaisquer contratos de câmbio relacionados à remessa de fundos para o exterior, cujos valores excedam o equivalente em reais a US\$ 1.000.000,00 (um milhão de dólares dos Estados Unidos);
- (v) implementação de transações de empréstimo (sob Resolução No. 63 do Banco Central do Brasil) para financiar importação de produtos das próprias quotistas da Sociedade ou de empresas do mesmo grupo societário, tendo a Sociedade como importadora, cujo valor exceda o equivalente em reais a US\$ 1.000.000,00 (um milhão de dólares dos Estados Unidos), por transação;
- (vi) implementação de transações de empréstimo (sob Resolução No. 63 do Banco Central do Brasil) para financiar importação de produtos de quaisquer terceiros que não do grupo da Sociedade, tendo a Sociedade como importadora, cujo valor exceda o equivalente em reais a US\$ 250.000,00 (duzentos e cinquenta mil dólares dos Estados Unidos), por transação;
- (vii) implementação de transações de empréstimos (sob Resolução No. 63 do Banco Central do Brasil) para financiar importações de produtos quando o revendedor for o importador e a Sociedade for a parte interveniente, cujo valor exceda o equivalente em reais a US\$ 150.000,00 (cento e cinquenta mil dólares dos Estados Unidos), por transação;
- (viii) pagamento de qualquer despesa que não esteja descrita neste Artigo, cujo valor exceda o equivalente em reais a US\$ 75.000,00 (setenta e cinco mil dólares dos Estados Unidos);
- (ix) reinvestimento de lucros e/ou distribuição de dividendos de outra forma que não a disposta no Artigo 9º abaixo;
- (x) estabelecimento de novos negócios não relacionados aos da Sociedade;
- (xi) criação de novas linhas de produtos da Sociedade através de importação, fabricação, montagem, utilização, venda ou distribuição de produtos;
- (xii) a fusão da Sociedade com outras entidades, ou a venda ou aquisição de participação societária da Sociedade em outras entidades, independentemente da forma de organização societária destas entidades;



- (xiii) exercício dos direitos de voto, oneração, transferência ou disposição de ações ou quotas que a Sociedade possua em outras sociedades a ela afiliadas ou não;
- (xiv) emissão ou resgate de títulos ou obrigações da Sociedade (que não títulos de crédito relativos aos negócios normais da Sociedade);
- (xv) a não ser que de outra forma disposto neste Artigo, garantia de empréstimos ou quaisquer obrigações de terceiros, sejam pessoas físicas ou jurídicas;
- (xvi) concessão de empréstimos;
- (xvii) organização, dissolução ou liquidação de qualquer subsidiária da Sociedade;
- (xviii) compra e venda de ativos permanentes da Sociedade que tenham um valor de mercado superior ao equivalente em reais a US\$ 75.000,00 (setenta e cinco mil dólares dos Estados Unidos);
- (xix) licença do uso ou qualquer outra forma de divulgação de tecnologia, patenteada ou não, dados técnicos, know-how, ou de qualquer outra informação confidencial que tenha sido transferida ou revelada à Sociedade;
- (xx) contratação de qualquer empregado cuja remuneração anual total (incluindo bônus, salário *in natura*, etc.) exceda ao equivalente em reais a US\$ 100.000,00 (cem mil dólares dos Estados Unidos);
- (xxi) assinatura de quaisquer contratos ou acordos, com exceção dos contratos (i) que tenham especial disposição neste Artigo; (ii) de locação de imóveis, cujo valor exceda ao equivalente em reais a US\$ 100.000,00 (cem mil dólares dos Estados Unidos) por mês; (iii) comerciais para venda, licença ou distribuição de produtos das quotistas da Sociedade ou de empresas de seu grupo societário, de qualquer valor; e (iv) de prestação de serviços pela Sociedade, de qualquer valor;
- (xxii) tomada de qualquer iniciativa em relação à dissolução ou liquidação da Sociedade;
- (xxiii) tomada de qualquer iniciativa em relação a direitos de propriedade industrial; e
- (xxiv) tomada de empréstimos bancários de curto prazo (um a sete dias) e, na forma de "hot money", operação de conta garantida, cheque especial ou descontos de duplicatas de valores superiores ao equivalente em reais a US\$ 150.000,00 (cento e cinquenta mil dólares dos Estados Unidos).



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EXERCÍCIO SOCIAL, BALANÇO E LUCROS

Artigo 9º - O exercício social se encerra no dia 31 de dezembro de cada ano, data em que serão levantadas as demonstrações financeiras do exercício, com observância das prescrições legais, sendo assinadas pelo gerente delegado e por contabilista devidamente registrado perante os órgãos competentes. Cópia autêntica das demonstrações financeiras deverá ser distribuída às quotistas no prazo de 3 (três) meses a contar do encerramento do exercício social.

Parágrafo Primeiro - Os resultados apurados ao final de cada exercício social deverão ter o destino que vier a ser determinado pelas quotistas representando a maioria do capital social. A distribuição de lucros, se houver, será feita às quotistas na proporção de sua participação no capital social, salvo deliberação em contrário tomada pelas quotistas representando a maioria do capital social.

Parágrafo Segundo - A Sociedade, por deliberação das quotistas representando a maioria do capital social, poderá distribuir lucros à conta dos lucros acumulados ou à conta de reservas de lucros existentes no mais recente balanço anual.

Parágrafo Terceiro - A Sociedade, por deliberação das quotistas representando a maioria do capital social, poderá levantar balanço e distribuir lucros em períodos menores.

Parágrafo Quarto - A Sociedade, por deliberação das quotistas representando a maioria do capital social, poderá capitalizar estes lucros, total ou parcialmente, devendo os mesmos ser atribuídos às quotistas na proporção da participação que cada uma detém no capital da Sociedade.

DIREITO DE INSPEÇÃO

Artigo 10 - Cada quotista terá o direito de inspecionar, examinar e fazer cópias de livros, arquivos e registros contábeis da Sociedade durante o horário normal de trabalho da mesma.

Parágrafo Único - Os livros fiscais e demonstrativos financeiros da Sociedade poderão ser auditados anualmente por uma firma de auditoria renomada indicada pelas quotistas representando a maioria do capital social. Se necessária, essa auditoria realizar-se-á imediatamente após a conclusão de cada exercício social da Sociedade.

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RQS nº 03/2008
CPMI - CORREIOS
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TABELIONATO DE NOTAS
TARELIÃO FRANÇA
José Roberto P. França - T. de Not. e
AUTENTICAÇÃO - Autenticou a cópia que
origina, extraída nestas condições:
interfere com o original do que dá fé.
Paulista - SP
31-03-2008
Nº 2320
5641-6092
Claudia Fonseca França - Subst. e
Roberto Fonseca França - Subst. e
Marcio Chagas Brito - Subst. e
Silvan O'Silva Brito - Subst. e
Simone Brito - Subst. e
RW 307803

ALTERAÇÃO DO CONTRATO SOCIAL

Artigo 11 - O presente Contrato Social poderá ser alterado, a qualquer tempo e em qualquer de seus aspectos, por resolução das quotistas representando a maioria do capital social. O correspondente instrumento de alteração será válido quando celebrado pelas quotistas que tiverem votado a favor de aludida resolução.

DISSOLUÇÃO E LIQUIDAÇÃO DA SOCIEDADE

Artigo 12 - A Sociedade entrará em liquidação por deliberação das quotistas representando a maioria do capital social. Neste caso, o liquidante será a quotista gerente ou alguém por ela indicado. Os ativos da Sociedade deverão ser utilizados para a quitação de seu passivo, devendo o saldo, se existente, ser dividido entre as quotistas na proporção de sua participação no capital social.

Artigo 13 - No caso de exclusão de qualquer quotista, ou morte ou incapacidade de quotista pessoa física, ou liquidação ou falência de quotista pessoa jurídica, a Sociedade não se dissolverá, salvo se assim decidido pelas quotistas. A apuração e pagamento dos haveres da quotista excluída, falecida, incapacitada, em liquidação ou falida seguirá as regras que serão então estabelecidas pelas quotistas.

TRANSFORMAÇÃO

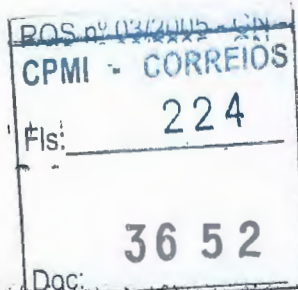
Artigo 14 - A Sociedade poderá adotar qualquer outro tipo societário por resolução das quotistas representando a maioria do capital social. As quotistas desde já renunciam expressamente ao direito de retirada previsto na legislação.

LEGISLAÇÃO APLICÁVEL

Artigo 15 - A Sociedade será regida pelos dispositivos do Decreto nº 3.708, de 10 de janeiro de 1919 e, subsidiariamente, no que for aplicável, pelos dispositivos da Lei nº 6.404/76 e alterações posteriores."

DISPOSIÇÕES TRANSITÓRIAS

Nos termos do Artigo 6º do Contrato Social, a quotista gerente SUN MICROSYSTEMS OF CALIFORNIA, INC. ratifica a nomeação do Sr. João Antônio Alves, brasileiro, casado, administrador, portador da Carteira de Identidade RG nº 4.253.920 SSP-SP e inscrito no CPF/MF sob o nº 194.101.318-04, residente e domiciliado na cidade de São Paulo, Estado de São Paulo, na



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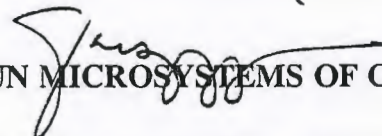
Rua Pará, 81, apto. 61, para o cargo de Gerente Delegado da Sociedade, por prazo indeterminado, podendo praticar os atos necessários ou convenientes à administração da Sociedade.

E, estando assim justas e contratadas, as partes acima qualificadas assinam o presente instrumento em 4 (quatro) vias de igual teor e forma, na presença de duas testemunhas abaixo assinadas.

São Paulo, 25 de setembro de 1999.


SUN MICROSYSTEMS, INC.

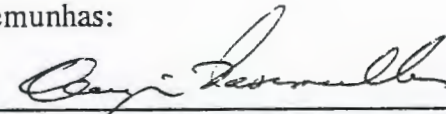
p.p. José Augusto Caleiro Regazzini

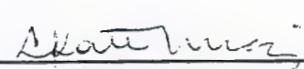

SUN MICROSYSTEMS OF CALIFORNIA, INC.

p.p. José Augusto Caleiro Regazzini

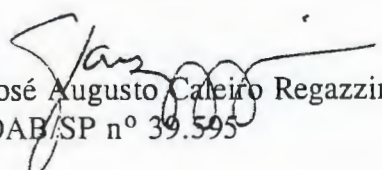


Testemunhas:

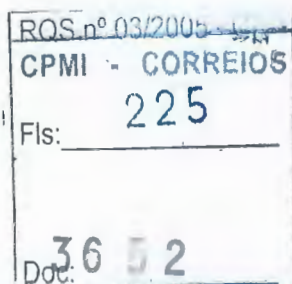
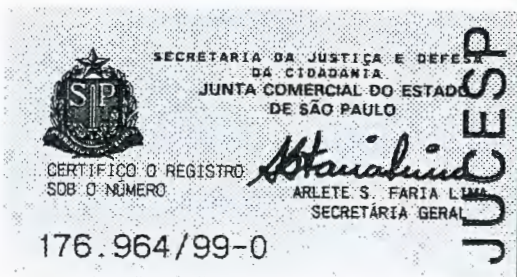
1. 
Nome: Cinyra Azevedo de Vasconcellos
R.G.: 4.247.864-SSP/SP
CIC: 789.469.647-15

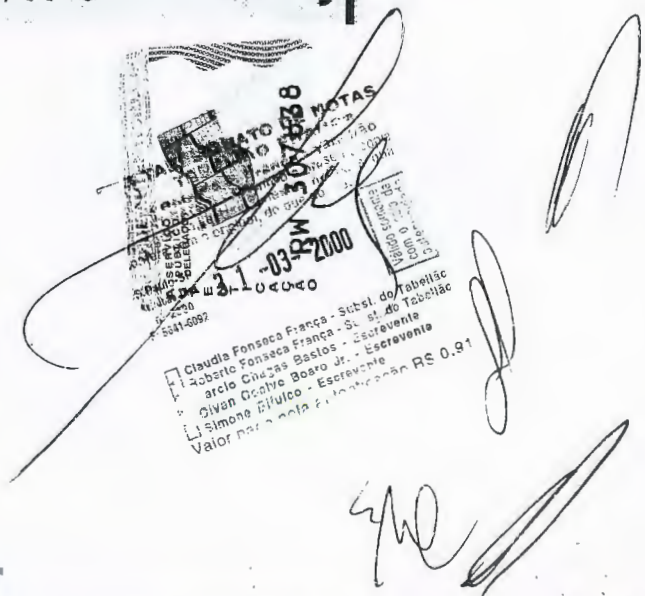
2. 
Nome: Lígia Kate Nucci
R.G.: 7.613.876-SSP/SP
CIC: 046.595.178-37

Visto do Advogado:


José Augusto Caleiro Regazzini
OAB/SP nº 39.595

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Brasília, 03 de Maio de 2000.

À Empresa Brasileira de Correios e Telégrafos - ECT
Comissão Especial de Licitação da Administração Central - CEL/AC
SBN Quadra 01, Bloco A, 4.o Andar, Ala Norte
Brasília/DF, CEP: 70002-900



At. : Benedito Medeiros Neto - Presidente

Ref.: Concorrência Pública 001/2000

Abertura: 03/Maio/2000

DECLARAÇÃO

A SUN Microsystems do Brasil Indústria e Comércio Ltda, estabelecida à Alexandre Dumas, 2016, em São Paulo-SP, inscrita no CNPJ: 65.497.745/0001-53, declara que a prestação dos serviços de instalação, treinamento, suporte e manutenção nos produtos (SUN) propostos, para atender ao certame acima referenciado, serão efetuados diretamente por nós, através da nossa Divisão de Serviços Enterprise Services .

Abaixo indicamos nossa rede de empresas credenciadas pela SUN:

Empresa: Cobra Computadores
Base: CAT-ARA
Responsável: Djalma Melo Bacelar/Daybe (Tecnica)
Endereço: Rua Santa Luzia, 157 - Centro
CEP: 49010-310
Cidade: ARACAJU
Estado: SE
Fone: (079) 214-0123
Fax: (079) 211-2387
E-Mail: catara@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-BEM
Responsável: Geraldo Pantoja/Jorge Dias
Endereço: Av. Conselheiro Furtado, 757 - Altos Batista Campos
CEP: 66025-160
Cidade: BELÉM
Estado: PA
Fone: (091) 222-4718/4099/4784/4765
E-Mail: catbem@cobra.com.br j.dias@zipmail.com.br

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Fls:	226
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Empresa: Cobra Computadores
 Base: CAT-BEL
 Responsável: Orlando Versiani Rodrigues/Eduardo Silva
 Endereço: R. Ceará, 1566 - 4º e 5º andar - Funcionários
 CEP: 30150-311
 Cidade: BELO HORIZONTE
 Estado: MG
 Fone: (031) 281-2955 (Hw)
 (031) 281-2900 (Sw)
 Fax: (031) 227-0763
 E-Mail: catbel@cobra.com.br



Empresa: Cobra Computadores
 Base: CAT-BRA
 Responsável: Márcia Bezerra de Araujo /Zila/Rosangela/Flavio
 Endereço: SEPN 511 Bl. B, 57 Ed. Bittar III - 3º andar - Asa Norte
 CEP: 70750-527
 Cidade: BRASILIA
 Estado: DF
 Fone: (061) 349-2400
 Pager: (061) 321-0410 - cód.: 4700
 Fax: (061) 349-3930
 E-Mail: getec_rebra@cobra.com.br
 catbra@cobra.com.br

Empresa: Cobra Computadores
 Base: CAT-CGR
 Responsável: Jorge Mashanori Oshiro
 Endereço: R. 14 de Julho, 1198 - Centro
 CEP: 79004-393
 Cidade: CAMPO GRANDE
 Estado: MS
 Fone: (067) 782-5259
 Fax: (067) 782-5259
 E-Mail: catcgr@cobra.com.br

Empresa: Cobra Computadores
 Base: CAT-CUI
 Responsável: Luis Artur da Rocha Almeida
 Endereço: Av. Pres. Castelo Branco, 1268 - 4º andar-Cj. A
 CEP: 78045-610
 Cidade: CUIABÁ
 Estado: MT
 Fone: (065) 624-1604/624-9448
 Fax: (065) 624-1604

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Empresa: Cobra Computadores
Base: CAT-CUR
Responsável: Eduardo Schleder/Mauricio
Endereço: R. Amintas de Barros, 144 - 4º ao 6º andar - Ed. Luiz -Napodamo - Centro
CEP: 80060-200
Cidade: CURITIBA
Estado: PR
Fone: (041) 322-1424
Fax: (041) 322-1424 /324-6585
E-Mail: Catcur@cobra.com.br
mauriciomvg@netscape.net

Empresa: Cobra Computadores
Base: CAT-FLO
Responsável: Sonia
Endereço: Av. Osmar Cunha, 183 - Bl. C - Sala 801 - Ed. Ceisa Center
CEP: 88015-500
Cidade: FLORIANÓPOLIS
Estado: SC
Fone: (048) 224-2588
Fax: (048) 224-2588
E-Mail: catflo@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-FOR
Responsável: Aristóteles Teixeira Jr. /Mesquita
Endereço: Av. Santos Dumont, 2088 S/401 a 405 - Aldeota
CEP: 60150-160
Cidade: FORTALEZA
Estado: CE
Fone: (085) 244-9200
Fax: (085) 244-2920
E-Mail: catfor@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-GOI
Responsável: Gilvan Porto Gonçalves/Marcos Roberto
Endereço: R. 09, 481 - Ed. Heitor Piva - 5º andar - Centro
CEP: 74013-040
Cidade: GOIÂNIA
Estado: GO
Fone: (062) 224-3040
Fax: (062) 224-3040
E-Mail: catgoi@cobra.com.br
marcobra@zipmail.com.br

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36 52	
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Empresa: Cobra Computadores
Base: CAT-MAC
Responsável: Abimael Ferreira da Rocha
Endereço: R. Barão de Alagoas, 164 S/107 a 109 - Centro
CEP: 57020-210
Cidade: MACEIÓ
Estado: AL
Fone: (082) 221-4856/4233/4147
Fax: (082) 221-4147
E-Mail: catmac@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-MAN
Responsável: Manoel Virgílio Rodrigues Chaves/João Luis / Furlan
Endereço: R. Major Gabriel, 1818/A - 3º andar - Pça. 14 de Janeiro
CEP: 69020-060
Cidade: MANAUS
Estado: AM
Fone: (092) 633-4648
Fax: (092) 622-6566
E-Mail: catman@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-NAT
Responsável: Maria dos Prazeres Cavalcante
Endereço: R. Coronel Estevam, 1139 S/104 e 105 - Alecrim
CEP: 59030-000
Cidade: NATAL
Estado: RN
Fone: (084) 211-4491/4795
Fax: (084) 211-4491
E-Mail: catnat@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-PAL
Responsável: José Agripino C. de Araújo/Ricardo Vanzo
Endereço: R. Carlos Trein Filho, 63 e 69 - Auxiliadora
CEP: 90450-120
Cidade: PORTO ALEGRE
Estado: RS
Fone: (051) 332-7111
Fax: (051) 332-7710
E-Mail: catpal@cobra.com.br

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Fls:	229
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Empresa: Cobra Computadores

Base: CAT-REC

Responsável: Roberto Augusto S. Freire/Vera/Erivaldo /Eriberto/Xavier

Endereço: Av. Dantas Barreto, 1200 - Ed. San Diego - S/901, 902 e 904 - São José

CEP: 50020-000

Cidade: RECIFE

Estado: PE

Fone: (081) 424-5988

Fax: (081) 424-4797

E-Mail: catrec@cobra.com.br

rerec@cobra.com.br

Empresa: Cobra Computadores

Base: CAT-RIO

Responsável: Rubem Maciel Gomes/Humberto Lyra

Endereço: R. Santa Luzia, 651 - 32º andar - Ed. Santos Dumont - Centro

CEP: 20030-040

Cidade: RIO DE JANEIRO

Estado: RJ

Fone: (021) 852-4632/852-4633

(021) 852-4695

(021) 852-4694/852-4696

Pager: (021) 460-3030 Cod. 827520 - BIP Plantao

Fax: (021) 220-5301

E-Mail: catrio@cobra.com.br

Empresa: Cobra Computadores

Base: CAT-SAL

Responsável: Arnaldo Alves Costa/Carlos

Silveira/Antonio(931-6814/071-983-7210

Endereço: Rua Conselheiro Saraiva, 26 - 8º andar - Ed. 15 de Julho - Comércio

CEP: 40015-100

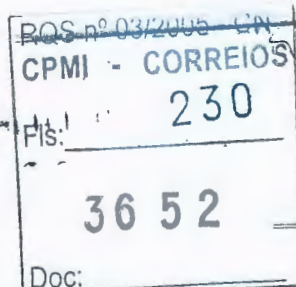
Cidade: SALVADOR

Estado: BA

Fone: (071)-450-7880

Fax: (071) 351-7881

E-Mail: catsal@cobra.com.br



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Empresa: Cobra Computadores
Base: CAT-SLU
Responsável: George Luiz Santos
Endereço: Av. Castelo Branco, 333 S/202, 203 - São Francisco
CEP: 65076-090
Cidade: SÃO LUIZ
Estado: MA
Fone: (098) 235-6664
Fax: (098) 235-6939
E-Mail: catslu@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-SPO
Responsável: Laerte Souza
Anselmo Alencar
Hideki Sadatsuki
Endereço: Alameda Santos, 1000 - 7º e 8º andar - Cerqueira Cesar
CEP: 01418-100
Cidade: SÃO PAULO
Estado: SP
Fone: (011) 251-3311
Fax: (011) 287-1740
E-Mail: catspo@cobra.com.br
respo@cobra.com.br
getec_respo@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-BAU
Responsável: Adevenir Aparecido Mendes Barbaresco
Endereço: R. Rio Branco, 5-38 - 4º andar S/41 e 43 - Ed. Centro Empresarial Rio Branco
CEP: 17040-190
Cidade: BAURU
Estado: SP
Fone: (014) 232-5844/6360
Fax: (014) 232-6360
E-Mail: catbau@cobra.com.br

RQS nº 03/2005 - 5A	
CPMI - CORREIOS	
Fls:	231
36 52	
Doc:	



Empresa: Cobra Computadores
Base: CAT-TER
Responsável: Francivaldo Osterno Souza
Endereço: R. Elizeu Martins, 1294 S/301 a 303 - Centro
CEP: 64000-120
Cidade: TERESINA
Estado: PI
Fone: (086) 221-2909/2741
Fax: (086) 221-2741
E-Mail: catter@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-VIT
Responsável: Claudionor Santos Júnior
Endereço: Av. N. Senhora da Penha, 699 S/1110 a 1113 - Ed. Century - Towers - Praia do Canto
CEP: 29055-131
Cidade: VITÓRIA
Estado: ES
Fone: (027) 227-1022
Fax: (027) 225-1419
E-Mail: catvit@cobra.com.br

Empresa: Integris
Responsável : Sr. Paulo Sérgio ou Jane
Endereço: Av. Almirante Barroso, 974 - Centro - João Pessoa- Paraíba
Cidade: JOÃO PESSOA
Estado: PB
Telefone (083) 221-0243
(083)222-2411
(083)982-4570

Empresa: Integris
Responsável : Sr. Ricardo José
Endereço: Av. Pinheiro Machado, 2011 - Bairro S. Cristovão
Cidade: RONDONIA
Estado: Porto Velho
Cep 78902-100
Telefone (069) 221-8666
(069) 223-4255

RQS nº 03/2002	
CPMI - CORREIOS	
Fls:	232
36 52	
Doc:	

[Handwritten signatures and initials]



132

Empresa: Integris
Responsável : José Fernandes Muniz
Endereço: Conjunto Xavier Maia - Quadra 5 Casa 26 - Vila Ivonete
Cidade: Rio Branco
Estado: ACRE
Tel (068) 220-1959
Tel (068) 224-0734

Os técnicos acima descritos são treinados em serviços de suporte aos equipamentos de marca SUN diretamente pela SUN MICROSYSTEMS.

Procedimentos para Abertura de Chamados

O cliente poderá requisitar suporte para o Centro de Soluções da Sun do Brasil através de contato telefônico, fax, correio eletrônico via Internet ou Pager. Excetuando-se o Pager, qualquer que seja o meio utilizado, o cliente precisará fornecer as seguintes informações:

- Número de série e modelo do equipamento Sun;
- Número do contrato (quando aplicável);
- Versão do sistema operacional;
- Produto e versão do software Sun;
- Descrição clara do problema.

No momento do registro do chamado, o cliente receberá o *Número do Chamado*, que será de referência utilizada para acompanhamento do caso.

Uma vez registrado o chamado, um engenheiro de suporte entrará em contato com o cliente respeitando sempre o tempo de resposta de acordo com a cobertura do equipamento afetado.

Telefone

O seguinte número telefônico deverá ser utilizado para abertura chamados de suporte técnico junto ao Centro de Soluções da Sun do Brasil:

0800-11-8988

O Centro de Soluções da Sun do Brasil aceita abertura de chamados da 8:00 as 20:00hs, de segundas as sextas-feiras, em dias úteis.

Para o cliente que possui atendimento 7x24, dispomos de um número de telefone Toll Free exclusivo para clientes de Missão Crítica,

0800-55-4653
RQS nº 03/2005 - CN
CPMI - CORREIOS
Fls: 233
Doc: 3652



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Correio-eletrônico

O seguinte endereço de correio-eletrônico deve ser utilizado para abertura chamados de suporte técnico junto ao Centro de Soluções da Sun do Brasil:

suporte@Brazil.Sun.COM

Cabe observar que a Sun do Brasil não recomenda a abertura de chamados com severidade 1 e 2 sejam feitos via Internet. Para estes casos, pedimos que utilizem a orientação descrita acima.

Por ser a expressão da verdade, firmamos a presente.



João Antônio Alves
Diretor Geral
RG: 4.253.920-SSP-SP

5º Tabelionato de Notas - José Roberto Pacheco França - Tabelião
Av. João Dias, 3320-Santa Amara - Fone: 56416092 - NG 040500101731
Reconheço por semelhança a firma PURPA de: JOÃO ANTÔNIO ALVES,
Conferido por: Alexandre
VÁLIDO SOMENTE COM O SELO DE AUTENTICIDADE
Valores: R\$ 1,00 - 4 de Maio de 2000
Firma R\$ 1,00 Em testemunho
Total R\$ 2,00
Deverá ser assinado por: Alexandre

Marcio Chagas Bastos
ESCREVENTE AUTORIZADO



RQS nº 03/2005 - Sun	
CPMI - CORREIOS	
Fls:	234
36 52	
Doc:	



São Paulo, 02 de maio de 2000.

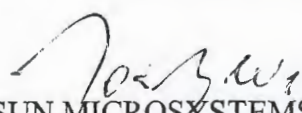
À
ECT Empresa Brasileira de Correios e Telégrafos
Comissão Especial de Licitação da Administração Central - CEL/AC
SBN Quadra 01 Bloco A 4º andar - Ala Norte - Brasília-DF
CEP 70002-900
Att. Sr. Benedito Medeiros Neto
Presidente da CEL/AC.

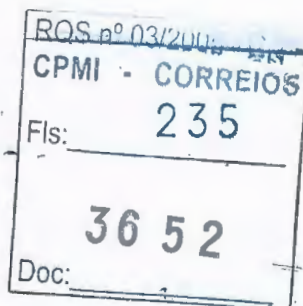
Ref.: Concorrência 001/2000 - CPL/AC
Abertura: 03/05/2000 às 9:30hs.

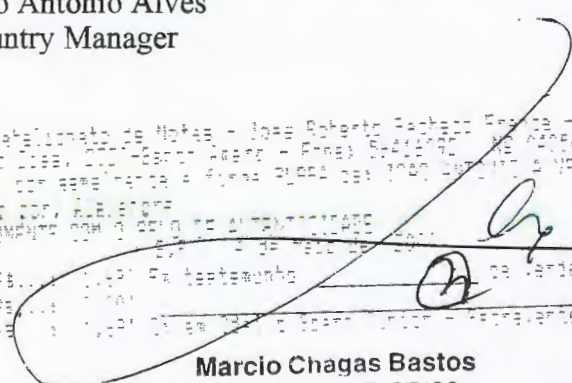
DECLARAÇÃO

Nós, da SUN MICROSYSTEMS DO BRASIL, estabelecida a Rua Verbo Divino, 1488 7º andar- São Paulo/SP, inscrita sob nº65.497.745/0001-53, na condição de Subsidiária da SUN MICROSYSTEMS OF CALIFORNIA INC., declaramos que somos solidários com a empresa Cimcorp Comércio Internacional e Informática Ltda, sediada à rua Dempachi Nakayama, nº23, sala 05 Cruz Preta, inscrita sob o CGC nº 59.773.416/0001-95, Inscrição Estadual nº 206.064.99011, nossa Distribuidora credenciada a comercializar os nossos produtos em todo o território nacional, em sua proposta para atender ao Edital da Concorrência em epígrafe, para fornecer, instalar, prestar garantia de funcionamento e treinamento, quando for o caso, aos técnicos da ECT.

Por ser expressão da verdade, firmamos a presente,


SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antônio Alves
Country Manager



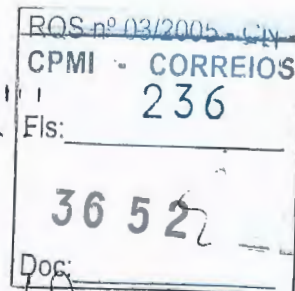

Marcio Chagas Bastos
ESCREVENTE AUTORIZADO



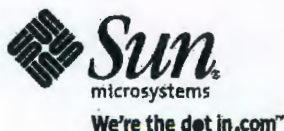


A

Marcio Chagas Bastos



136



São Paulo, 02 de maio de 2000.

À
ECT Empresa Brasileira de Correios e Telégrafos
Comissão Especial de Licitação da Administração Central – CEL/AC
SBN Quadra 01 Bloco A 4º andar – Ala Norte – Brasília-DF
CEP 70002-900
Att. Sr. Benedito Medeiros Neto
Presidente da CEL/AC.

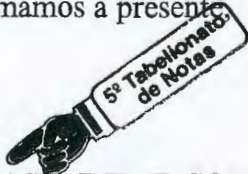
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Abertura: 03/05/2000 às 9:30hs.

DECLARAÇÃO

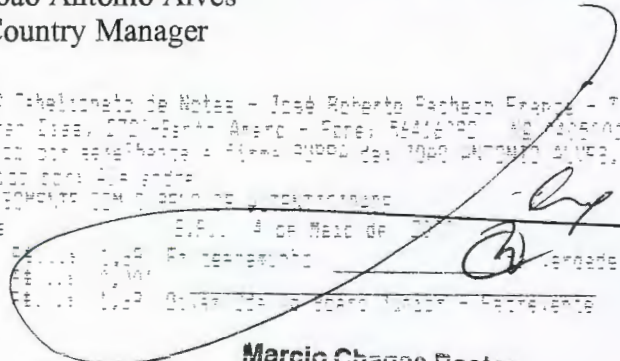
Nós, da SUN MICROSYSTEMS DO BRASIL, estabelecida a Rua Verbo Divino, 1488 7º andar– São Paulo/SP, inscrita sob nº65.497.745/0001-53, na condição de Subsidiária da SUN MICROSYTEMS OF CALIFORNIA INC., declaramos que os Servidores RISC ofertados por nosso Distribuidor Cimcorp Comércio Internacional e Informática Ltda, sediado à rua Dempachi Nakayama, nº23 , sala 05 Cruz Preta, inscrita sob o CGC nº 59.773.416/0001-95, Inscrição Estadual nº 206.064.99011, itens I.8, I.9, I.10, I.11, estão imunes a quaisquer problemas decorrentes do Bug do Milênio.

Por ser expressão da verdade, firmamos a presente.


SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antônio Alves
Country Manager



POS nº 03/2005 - CN	
CPMI - CORREIOS	237
Fls:	36, 52
Doc:	2


Marcio Chagas Bastos
ESCREVENTE AUTORIZADO





São Paulo, 02 de maio de 2000.

À
ECT Empresa Brasileira de Correios e Telégrafos
Comissão Especial de Licitação da Administração Central – CEL/AC
SBN Quadra 01 Bloco A 4º andar – Ala Norte – Brasília-DF
CEP 70002-900
Att. Sr. Benedito Medeiros Neto
Presidente da CEL/AC.

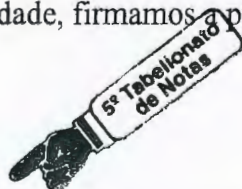
Ref.: Concorrência 001/2000 – CPL/AC
Abertura: 03/05/2000 às 9:30hs.

DECLARAÇÃO

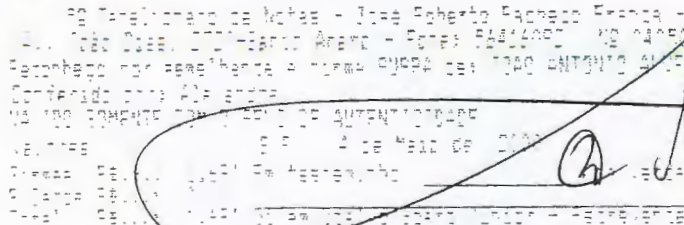
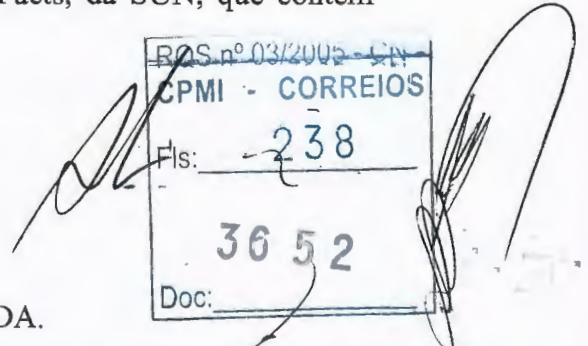
Nós, da SUN MICROSYSTEMS DO BRASIL, estabelecida a Rua Verbo Divino, 1488 7º andar- São Paulo/SP, inscrita sob nº65.497.745/0001-53, na condição de Subsidiária da SUN MICROSYSTEMS OF CALIFORNIA INC., declaramos que os manuais dos Servidores RISC ofertados por nosso Distribuidor Cimcorp Comércio Internacional e Informática Ltda, sediado à rua Dempachi Nakayama, nº23 , sala 05 Cruz Preta, inscrita sob o CGC nº 59.773.416/0001-95, Inscrição Estadual nº 206.064.99011, estão apresentados através do Just The Facts, da SUN, que contém todas as características de nossos produtos.

Por ser expressão da verdade, firmamos o presente,

João Alves



SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antônio Alves
Country Manager



Marcio Chagas Bastos
ESCREVENTE AUTORIZADO





São Paulo, 02 de maio de 2000.

À
ECT Empresa Brasileira de Correios e Telégrafos
Comissão Especial de Licitação da Administração Central – CEL/AC
SBN Quadra 01 Bloco A 4º andar – Ala Norte – Brasília-DF
CEP 70002-900
Att. Sr. Benedito Medeiros Neto
Presidente da CEL/AC.

Ref.: Concorrência 001/2000 – CPL/AC
Abertura: 03/05/2000 às 9:30hs.

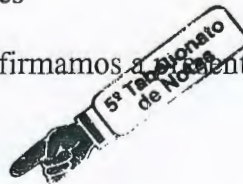
DECLARAÇÃO

Nós, da SUN MICROSYSTEMS DO BRASIL, estabelecida a Rua Verbo Divino, 1488 7º andar– São Paulo/SP, inscrita sob nº65.497.745/0001-53, na condição de Subsidiária da SUN MICROSYTEMS OF CALIFORNIA INC., declaramos que os Servidores Enterprise fabricados por nossa empresa, já possuem memória com densidade de 2Gbytes, consequentemente os servidores passam a ter as seguintes expansibilidades:

- Servidor E3500 até 16Gbytes
- Servidor E4500 até 28Gbytes
- Servidor E5500 até 28Gbytes
- Servidor E6500 até 60Gbytes

Por ser expressão da verdade, firmamos a presente,

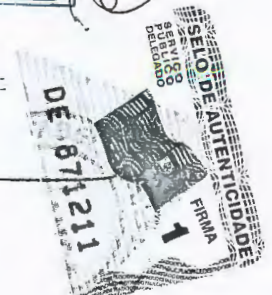
João Alves



SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.

João Antônio Alves
Country Manager

RQS nº 03/2000
CPMI - CORREIOS
Els: 239
36 52
Doc:



Marcio Chagas Bastos



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Certificate of Registration



This is to certify that

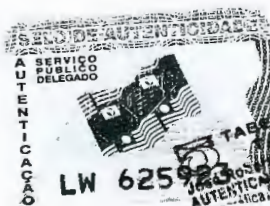
Sun Microsystems Computer Corporation

WWOPS, US Sites, 1421 California Circle
Milpitas, California 95035, U S A

hold Certificate No. FM 14854 and operate a quality management system which complies with the requirements of BS EN ISO 9002:1994 for the activities detailed in the scope of registration.

Originally registered 19 March 1996.

This certificate does not expire. To check its validity telephone +44 (0) 1908 227700



TABELIONATO DE NOTAS
TABELIÃO FRANÇA
Pacheco França - Tabelião
- Autentico a presente cópia
- das nestas notas, a qual contém
di, do que dou fé, verso e anverso.
reprografia com 0,01%

S. Paulo-SP
Av. João Dias
nº 2320
Sto. Amaro

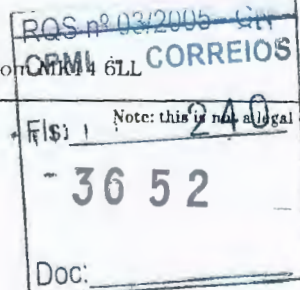
22 JUL 1996
- Claudio Fonseca França - Subst. do Tabelião
- Roberto Fonseca França - Subst. do Tabelião
- Andre P. Franco de Q. Persim - Subst. do Tabelião
- Alton Marinho - Escrevente
- Otton Osvaldo Basso Jr. - Escrevente
- Simone Riffuto - Escrevente
Valor pago pela autenticação R\$ 0,55

Director and General Manager
BSI Quality Assurance



BSI Quality Assurance PO Box 375 Milton Keynes United Kingdom MK14 6LL

The British Standards Institution is incorporated by Royal Charter



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Certificate of Registration of a Firm of Assessed Capability

This is to certify that

SUN MICROSYSTEMS INC - SUNSERVICE
US CUSTOMER SERVICE

holds Certificate No. *FS 31168* dated *10 April 1995*

to produce goods or provide services in respect of the
Appendix attaching thereto and in accordance with

BS EN ISO 9001 : 1994

Signed for and on behalf of BSI

[Signature]

ROS nº 03/2005	
CPMI - CORREIOS	
Fis: ..	241
36	02
Doc: ..	

[Signature] Director



RU 129629



Nº da tradução / versão: 3977 livro nº 31 fls. 305

Certifico e dou fé, para os devidos fins, que nesta data me foi apresentado um documento, no idioma inglês, com a seguinte identificação --DECLARAÇÃO DE REGISTRO DO CERTIFICADO ISO 9000 DADA PELA SUN -- para que o traduzisse para o vernáculo no seguinte teor:

Papel Timbrado:

Sun

CERTIFICADO DE REGISTRO - ISO 9000

Eu, Kuljit Rai, Gerente de Logística da Sun Microsystems Computer Company, uma empresa organizada sob as leis do Estado da Califórnia, E.U.A. e tendo a sua sede no seguinte endereço: 2550 Garcia Avenue, Mountain View, Califórnia 94043, E.U.A. (a "Empresa"), certifico pelo presente que apenso ao presente encontra-se uma cópia fiel e autêntica dos Registros ISO 9000 da Empresa e de suas coligadas e que os referidos Registros permanecem em pleno vigor e efeito.

EM TESTEMUNHO DO QUE, assinei o presente neste dia 23 de janeiro de 1996.

SUN MICROSYSTEMS COMPUTER COMPANY

Por: (Ass.)

Kuljit Rai
Gerente de Logística

Carimbo: CHARLOTTE MAGNONE
Comissionamento Nº 1069658
Notária Pública - Califórnia
Condado de Alameda
Meu comissionamento expira em 20 de agosto de 1999

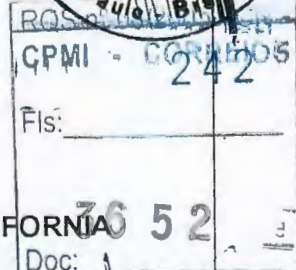
Apenso ao documento supra havia a seguinte legalização:

RECONHECIMENTO PARA TODOS OS FINS DO ESTADO DA CALIFORNIA

(Somente os itens assinalados ou preenchidos foram incluídos na tradução)

Estado da Califórnia

RUA CANARIO, 515 - APTº 121 CEP 04521-002
TEL.: 530-0906 - SÃO PAULO - SP



CCM 8.541.362-3
NPS 10930889921

528789

142

State of California

SECRETARY OF STATE



I, BILL JONES, Secretary of State of the State of California, hereby certify:

That Patrick O'Connell, whose name appears on the annexed certificate, was on February 5, 1996, the duly elected, qualified and acting County Clerk of the Alameda County of Alameda in said State.

That the seal affixed thereto is the seal of said County; that the signature thereon appears to be the signature of Patrick O'Connell, County Clerk and that the annexed certificate is in due form and by the proper officer.

IN WITNESS WHEREOF, I execute
this certificate and affix the Great
Seal of the State of California this
8th day of February, 1996.

Bill Jones

BILL JONES
Secretary of State



SP-4407A

ROS 2005
CPMI CORREIOS

Fis. 243

3652

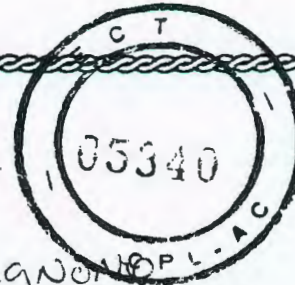
Doc:

By *Paul Rantilla*
Deputy

24 FEB 1996
R 528788
SERVICO
DELEGADO

EW
JD

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT



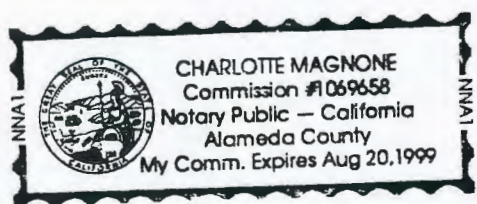
State of California

County of Alameda

On Jan. 29, 1996 before me, Charlotte Magnone,
Date Name and Title of Officer (e.g., "Jane Doe, Notary Public")

personally appeared Kuljit Rai
Name(s) of Signer(s)

☐ personally known to me - OR - ☒ proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.



WITNESS my hand and official seal.

Charlotte Magnone
Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: Registration Certification

Document Date: 1/23/96 Number of Pages: 1

Signer(s) Other Than Named Above: NONE

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

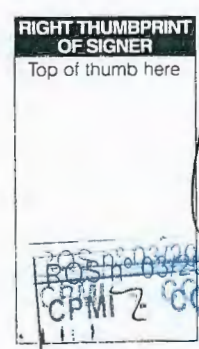
- ☐ Individual
- ☐ Corporate Officer
- Title(s): _____
- ☐ Partner — ☐ Limited ☐ General
- ☐ Attorney-in-Fact
- ☐ Trustee
- ☐ Guardian or Conservator
- ☐ Other: _____



Signer Is Representing: _____

Signer's Name: _____

- ☐ Individual
- ☐ Corporate Officer
- Title(s): _____
- ☐ Partner — ☐ Limited ☐ General
- ☐ Attorney-in-Fact
- ☐ Trustee
- ☐ Guardian or Conservator
- ☐ Other: _____



Signer Is Representing: _____

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CONSULADO DO BRASIL EM SÃO FRANCISCO

Reconheço verdadeira a assinatura, no documento anexo, de MEI-CHI

YEE----- Escrivão _____ da Corte do Condado de
Santa Clara Estado Califórnia Estados Unidos da America.

E, para constar onde convier, mandei passar o presente, que assinei e fiz selar com o Selo deste Consulado Dispensado reconhecimento de firma de acordo com o Decreto nº 84.451, de 31-01-1980. A legalização deste documento não implica aceitação ou aprovação de seu conteúdo.

The legalization of this document does not imply approval or acceptance of its contents.

São Francisco, 01 de março de 19 97

Noemia Wainer
NOEMIA WAINER
 Vice-Consul

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TABELIONATO DE NOTAS
TAB. SÃO FRANCISCO
 Rua Roberto Freire, 211 - Tabellão
 Autenticado e Autenticado a presente data
 Autenticado e Autenticado a presente data
 Autenticado e Autenticado a presente data

RE 528792

S. Paulo - SP
 Av. João Dias
 nº 2320
 F: 5641-6092

24-02-2000
☒ Claudia Fonseca França - Subst. do Tabelião
☒ Roberto Chagas Bastos - Escrivento
☒ Cláudio Odalio Boaro Jr. - Escrivento
☒ Simone Bifulco - Escrivento
 Valor pago pela autenticação R\$ 0,91-

RQS nº 03/2005
 CPMI - CORREIOS
 Filo: 11
 2145
 3652
 Doc: _____

Recebi
 Cz \$ 10,00 (ouro) ou
 US \$ 22,00 tab. 1/16



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TABELIONATO DE NOTAS
 TABELAOS FRANC
 Autenticidade Autentico a Teste
 reprobologica. Autentico a Teste
 confere com o original.

José Roberto P. Franco - Tabelião
 24-02-2008 No 328

S. Paulo-SP
 Ar. João Duda
 V. 2320
 FICHA 4592

A SERVIÇO
 U. DELEGADO
 T. FISCAL
 E FISCAL
 Subst. do Tabaco
 Estr. evania

Claude For...
 Roberto...
 Marcio...
 Olivan...
 Simon...

RE 528798

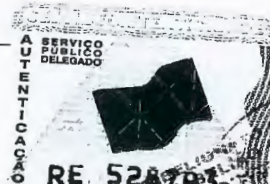
RE 528798

Reconheço verdadeiro(a) o(a) assinatura de BILL JONES, Secretário
de Estado do Estado da Califórnia, EUA.-

E, para constar onde convier, mandei passar o presente, que assinei e fiz selar com o Selo deste Consulado. Dispensado reconhecimento de firma de acordo com o Decreto nº 84.451, do 31-01-1980. A legalização deste documento não implica aceitação ou aprovação de seu conteúdo.
The legalization of this document does not imply approval or acceptance of its contents.

São Francisco, 13 de fevereiro de 19 96

Noemia Wainer
NOEMIA WAINER
Vice - Consul



24 FEB. 2000



Cláudia Fonseca Franco - Diretor do Taboalho
Roberto Carlos Franco - Diretor do Taboalho
Mário Carlos Franco - Diretor do Taboalho
Liliana Franco - Secretária
Valor pago pela autenticação R\$ 0,91

RQS nº 01/2000 - 146
CPMI **CORREIOS**
Fls: 247
36 52
Doc:

State of California } ss
County of Alameda }

I, Patrick O'Connell, County Clerk of Alameda, State of California, having by law a seal, do hereby certify that

CHARLOTTE MAGNONE

whose name is subscribed to the attached certificate of proof, acknowledgement or affidavit, was at the time of taking such proof, acknowledgement or affidavit a Notary Public in and for said Alameda County, duly commissioned and qualified and residing in said county, and was as such an officer of the State of California, duly authorized by the laws hereof to administer oaths or affirmations and to take and certify the proof and acknowledgement of deeds and other instruments in writing to be recorded in said State, and that full faith and credit are and ought to be given all his official acts as such Notary Public, and that I am well acquainted with the handwriting of said Notary Public and verily believe that the signature to the attached certificate is genuine signature and that the annexed instrument is executed and acknowledged according to the laws of the State of California, and I further certify that an impression of the seal of said Notary Public is not required by law to be filed in my office.

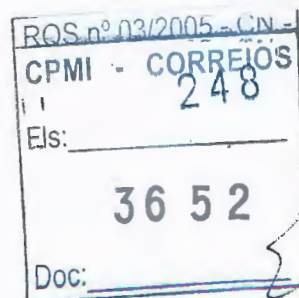
In witness whereof I have hereunto set my hand and affixed my official seal

2/5/96

Seal

Patrick O'Connell

County Clerk of the County of Alameda, State of California.



[Handwritten signature]

148



ISO 9000 REGISTRATION CERTIFICATION

I, Kuljit Rai, Logistics Manager of Sun Microsystems Computer Company, a corporation organized under the laws of the State of California, U.S.A. and having its principal office at 2550 Garcia Avenue, Mountain View, California 94043, U.S.A. (the "Corporation"), hereby certify that attached hereto is a true and accurate copy of the ISO 9000 Registrations of the Corporation and its affiliates and that such Registrations remain in full force and effect.

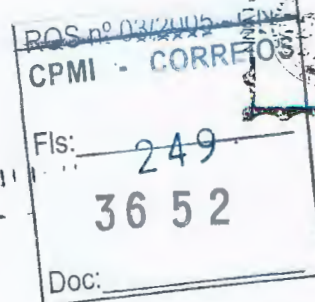
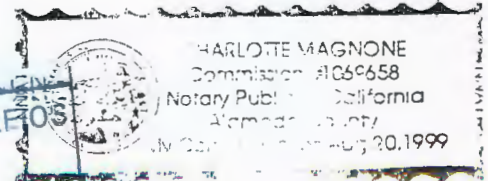
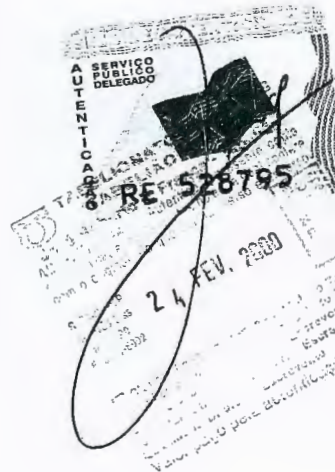
IN WITNESS WHEREOF, I hereunto set my hand this 23rd day of January, 1996.

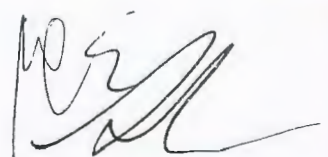


SUN MICROSYSTEMS COMPUTER COMPANY

By:


Kuljit Rai
Logistics Manager







República Federativa do Brasil

Magnolia Yazbek Pereira

Tradutora Pública e Intérprete Comercial

C. P. F. 020522028-20

Matriculada na Junta Comercial do Estado de São Paulo sob nº 333

IDIOMA: PORTUGUÊS - INGLÊS

Nº da tradução / versão: 3777 livro nº 31 fls. 326
Condado de Alameda

Em 29 de janeiro de 1996 perante mim, CHARLOTTE MAGNONE, Notária Pública, pessoalmente compareceu Kuljit Rai, certificado com base em prova satisfatória, como sendo a pessoa cujo nome se encontra subscrito no instrumento anexo e confirmou perante mim ter sido ela a pessoa que assinou o mesmo de acordo com a sua capacidade autorizada e que, através da sua assinatura no instrumento, a pessoa ou entidade, em cujo nome agiu, assinou o instrumento.

Em testemunho do que, apus a minha assinatura e meu selo oficial.

(Assinatura) - CHARLOTTE MAGNONE - Notária Pública

Selo Oficial

Carimbo: CHARLOTTE MAGNONE

Comissionamento Nº 1069658

Notária Pública - Califórnia

Condado de Alameda

Meu comissionamento expira em 20 de agosto de 1999

SEÇÃO OPCIONAL

Embora as leis não exijam que o Notário preencha os dados abaixo, o fato de fazê-lo poderá ser muito importante para as pessoas que dependem do documento e poderão evitar que o presente seja apenso ou removido de forma fraudulenta.

Descrição do Documento Apenso

Título ou Tipo de Documento: Certificado de Registro

Número de Páginas: 1

Data do Documento: 23 de janeiro de 1996

Signatário além do acima nomeado: nenhum

ESTADO DA CALIFORNIA

Secretário de Estado

EU, BILL JONES, Secretário de Estado da Califórnia, certifico pelo presente:

RUA CANARIO 515 - APTº 121 CEP 04521-002
TEL 530-0906 - SÃO PAULO - SP



CCM 8 54 362-3
NPS 1031083921



República Federativa do Brasil

Magnolia Yazbek Pereira

Tradutora Pública e Intérprete Comercial

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Matriculada na Junta Comercial do Estado de São Paulo sob nº 332

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Que Patrick O'Connell, cujo nome aparece no certificado anexo, era em 5º de fevereiro de 1996 o Escrivão do Condado de Alameda no referido Estado.

Que o selo afixado ao mesmo é o selo de referido Condado; que a assinatura ali aposta, de acordo com o meu conhecimento, é a assinatura de Patrick O'Connell, Escrivão do Condado e que o certificado apenso foi devidamente preparado e assinado pelo dirigente competente.

EM TESTEMUNHO DO QUE, assinei este certificado e afixei o Grande Selo do Estado da California neste dia 8 de fevereiro de 1996

(Assinatura) - BILL JONES - Secretário de Estado

GRANDE SELO DO ESTADO DA CALIFORNIA

Apenso ao documento havia o seguinte certificado:



CERTIFICADO DO ESCRIVÃO DO CONDADO

EM RELAÇÃO AO NOTÁRIO PÚBLICO

ESTADO DA CALIFORNIA)

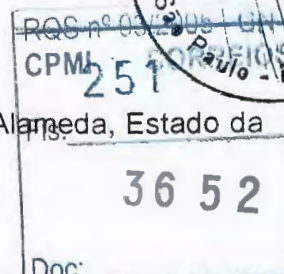
) FAZEM SABER:

CONDADO DE ALAMEDA)

Eu, Patrick O'Connell, Escrivão do Condado de Alameda, Estado da California, tendo por lei um selo, certifico pelo presente que

CHARLOTTE MAGNONE

cujo nome se encontra subscrito na declaração juramentada, depoimento, certificado de reconhecimento ou prova acima, era, na ocasião em que a mesma foi prestada, uma NOTÁRIA PÚBLICA em e para o referido Condado de Alameda, devidamente comissionada e habilitada e residente no referido condado, e como tal, um oficial no Estado da California, devidamente autorizada pelas suas leis a receber juramentos ou declarações e a receber e certificar escrituras e outros





República Federativa do Brasil

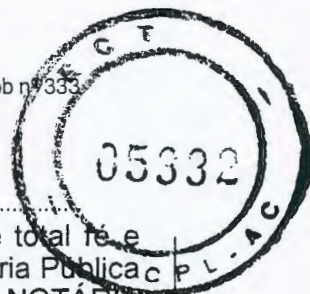
Magnolia Yazbek Pereira

Tradutora Pública e Intérprete Comercial

C. P. F. 020522028-20

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IDIOMA: PORTUGUÊS - INGLÊS



Nº da tradução / versão: 3777 livro nº 37 fls. 303
instrumentos escritos para serem registrados no referido Estado e que total té e
crédito são e deverão ser dados a todos os seus atos oficiais como Notária Pública
e que estou perfeitamente familiarizado com a escrita da referida NOTÁRIA
PÚBLICA e creio ser autêntica a assinatura aposta ao certificado apenso e que o
instrumento apenso foi assinado e reconhecido de acordo com as leis do Estado
da Califórnia e certifico ainda que a lei não exige que uma impressão do carimbo
da referida Notária Pública seja arquivada em meu gabinete.

EM TESTEMUNHO DO QUE, assinei o presente e afixei o meu selo
oficial neste dia 5 de fevereiro de 1996

(Ass.) PATRICK O'CONNELL

Escrivão do Condado de Alameda, Estado da Califórnia

Legalização Consular:

CONSULADO GERAL DO BRASIL EM SÃO FRANCISCO

Reconheço verdadeira a assinatura, no documento anexo, de BILL JONES,
Secretário de Estado do Estado da Califórnia, Estados Unidos da América. E, para
constar onde convier, mandei passar o presente que assinei e fiz selar com o Selo
deste Consulado.

Dispensado reconhecimento de firma de acordo com o Decreto N°84.451, de 31-
01-1980. A legalização deste documento não implica aceitação ou aprovação de
seu conteúdo.

São Francisco, 13 de fevereiro de 1996

(Ass.) Noemia Wainer
Vice-Cônsul

Carimbo e Selo Consular
Recebi CZ\$20.00 (ouro) ou US\$20.00 - Tab.416

Nada mais constava do documento acima que devolvo juntamente com esta
tradução, a qual conferi, achei conforme e assino. DOU FÉ.

São Paulo, 21 de janeiro de 1997

Recibo: 2054
Emolumentos:

RGS nº 03/2005 - CN	
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Fls:	252
36 52	
Doc:	

RUA CANARIO, 515 - APTº 121 CEP 04521-002
TEL.: 530-0906 - SÃO PAULO - SP



CCM 8.541 3623
INPS 1093088132

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República Federativa do Brasil

Magnolia Yazbek Pereira

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IDIOMA: PORTUGUÊS - INGLÊS



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Certifico e dou fé, para os devidos fins, que nesta data me foi apresentado um documento, no idioma inglês, com a seguinte identificação --CÓPIA DE UM CERTIFICADO - ISO 9002-- para que o traduzisse para o vernáculo no seguinte teor:

BSI REGISTERED FIRM
(FIRMA REGISTRADA NA BSI)
BRITISH STANDARDS INSTITUTION
(INSTITUIÇÃO BRITÂNICA DE PADRÕES)

O presente certifica que a

Sun Microsystems
Computer Corporation

(Sun Microsystems - Empresa de Computadores)

WWOPS, US Sites, 1421 California Circle
Milpitas, California 95035, E.U.A.

é a detentora do Certificado No. FM 14854, e opera um sistema de gerenciamento de qualidade que atende às exigências da BS EN ISO 9002 :1994 em relação às atividades detalhadas no escopo do registro

Originalmente registrada em 19 de março de 1996

Este certificado não expira. Para verificar a sua validade telefone + 44 (0) 1908 227700

(Ass.)

Diretor e Gerente Geral
BSI Quality Assurance

BSI Quality Assurance P.O.Box 375 Milton Keynes - Reino Unido - MK14 6EL
(Símbolo)

A British Standards Institution foi constituída de acordo com documento constitutivo real.

Observação: este não é um documento legal e não deverá ser usado como tal.

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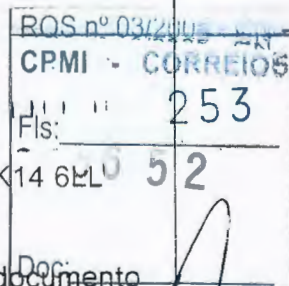
São Paulo, 21 de janeiro de 1997

Recibo:
Emolumento:

RUA CANARIO, 515 - APT. 21 - JARDIM
TEL.: 530-0906 - SÃO PAULO



RE 528808



CCM 8 541 362-3
NPS 109308892-1



República Federativa do Brasil

Magnolia Yazbek Pereira

Tradutora Pública e Intérprete Comercial

C. P. F. 020522028-20

Matriculada na Junta Comercial do Estado de São Paulo sob nº 333

IDIOMA: PORTUGUÊS - INGLÊS



Nº da tradução / versão: 337-1 livro nº 31 fls. 310
Certifico e dou fé, para os devidos fins, que nesta data me foi apresentado um documento, no idioma inglês, com a seguinte identificação --CÓPIA DE UM CERTIFICADO - ISO 9001-- para que o traduzisse para o vernáculo no seguinte teor:

BSI REGISTERED FIRM

(FIRMA REGISTRADA NA BSI)

CERTIFICADO DE REGISTRO
DE UMA FIRMA DE CAPACIDADE AVALIADA

O presente certifica que a

SUN MICROSYSTEMS INC. - SUNSERVICE

EMPRESA DE ATENDIMENTO A CLIENTES DOS E.U.A.

é a detentora do Certificado No. FS 31168, datado de 10 de abril de 1995

para fabricar os produtos ou prestar os serviços relativos ao
Apêndice apenso ao mesmo e de conformidade com o

BS EN ISO 9001: 1994

Assinado por e em nome da BSI (Ass.) - Diretor

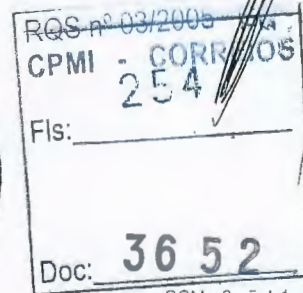
BSI

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São Paulo, 21 de janeiro de 1997

Recibo: 2054

Emolumentos:



Cimcorp



Sun Ultra™ 10 Workstation

Just the Facts



RQS nº 03/2005 - CN	
CPMI - CORREIOS	
Fls:	255
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Doc:	



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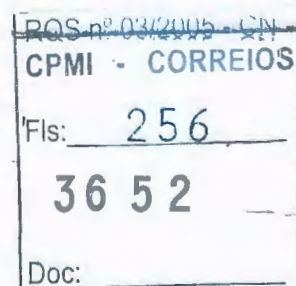
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Positioning

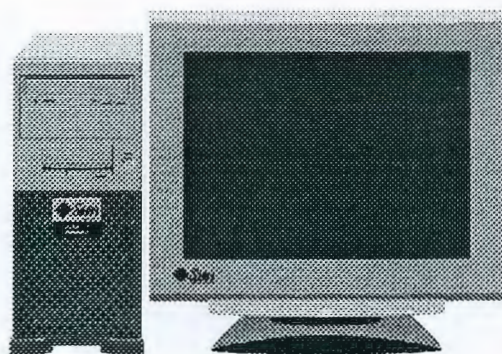


Figure 1. The Sun Ultra 10 workstation

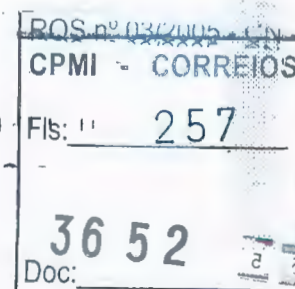
The Sun Ultra™ 10 workstation is based upon the UltraSPARC™-IIi processor running at 440 MHz. The Ultra 10 workstation features PCI I/O, Sun's Ultra port architecture (UPA), a high-speed graphics interconnect slot, and a mini-tower enclosure, which allows for additional PCI card expansion, memory expansion, Sun Creator3D and Sun Elite3D m3 and m6 graphics accelerators.

The Ultra 10 workstation allows Sun to compete on both price and performance with Pentium-II, Pentium-III, and Xeon-class PC personal workstations. When combined with the optional UPA graphics cards, the Ultra 10 workstation offers powerful computing and world-class graphics performance at aggressive prices.

The Ultra 10 workstation includes the following features:

- **Processor**
 - 440-MHz UltraSPARC-IIi
 - 2-MB external cache
- **Graphics**
 - Onboard PGX24™ 24-bit graphics, standard
 - Sun Creator3D graphics
 - Sun Elite3D m3 graphics
 - Sun Elite3D m6 graphics
- **Internal Storage**
 - Up to two 9.1-GB, 7200-rpm EIDE hard disks
 - 32X-speed CD-ROM drive standard
 - 1.44-MB floppy standard
- **Memory**
 - Up to 1-GB EDO error correcting DRAM (50 ns)
- **Networking**
 - 10/100BASE-T Ethernet

Positioning



Key Messages

- **High performance for an entry price-point workstation**
 - 440-MHz UltraSPARC-IIi processor with 2-MB external cache
 - Up to 1 GB of 168-pin, 50 ns EDO JEDEC DRAM with ECC error correction
 - Provides both performance and capacity for the most demanding technical applications and solutions
- **Powerful graphics for interactive media and 3-D applications**
 - UPA slot provides a fast, large-bandwidth data path from processor to UPA graphics cards
 - Integrated visual instruction set (VIS™) in the UltraSPARC-IIi processor provides support for multimedia applications
 - On-board PGX24 graphics provides 24-bit video support up to a resolution of 1152 x 900 and 8-bit support up to a resolution of 1280 x 1024. PGX24 can also be used to support a second monitor on systems configured with Sun Creator3D, Sun Elite3D m3, or Sun Elite3D m6 graphics accelerators.
 - Advanced, fast 24-bit accelerated Sun Creator3D, Sun Elite3D m3, and Sun Elite3D m6 UPA graphics cards available
 - Sun Creator3D graphics supports 24-bit color up to 1920 x 1200 resolution at 70 Hz on the 24-inch, wide-screen monitor
 - The Ultra 10 workstation is clearly the entry point for Sun's high-performance graphics systems. Customers can choose the level of graphics performance they need now and in the future
- **Multiple PCI options available**
 - Four full-size PCI slots provide access to a variety of Sun and third-party PCI cards
 - High-speed networking, such as Sun Quad FastEthernet™, ATM, token ring, and FDDI, plus many more, are ready and available
 - 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
- **Easy internal storage and expansion**
 - Up to two fast internal 9.1-GB, 7200-rpm EIDE hard disks
 - Internal mirroring supported on systems with two internal EIDE hard disks
 - Internal 32X-speed EIDE CD-ROM, photo-CD compatible
 - PCMCIA bay provided for third-party PCMCIA options
 - Ample local storage capacity for large multimedia files, data, and technical applications
- **Advanced networking capabilities**
 - Fast Ethernet, 100BASE-T, auto-sensing, and autoswitching down to 10BASE-T for backward compatibility
 - Simply plug in and turn on; the Ultra 10 workstation adjusts automatically to the customer's network environment
- **Robust, reliable, scalable, secure, network-centric Solaris™ Operating Environment**
 - The Solaris 7 64-bit ready-to-run operating environment is preinstalled on all Ultra 10 workstations
 - 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



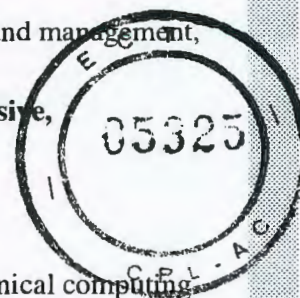
Positioning

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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 the SunClient™ program, 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 customers



Product Family Placement

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

Ultra 5	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. Target markets include software development, 2-D content creation, finance, EDA, telecommunications, and embedded systems.
Ultra 10	The Ultra 10 workstation 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. Target markets for this workstation include software development, MCAD, electronic design automation, financial analysis, and modeling. With the installation of Sun Creator3D, Sun Elite3D m3, or Sun Elite3D m6 graphics, the markets are extended to animation, 3-D content creation, and simulation.
Ultra 2	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. 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.
Ultra 60	The Ultra 60 workstation is a more advanced Ultra 2 workstation. Like the Ultra 2 workstation, 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 workstation users have grown accustomed. 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 workstations. 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.

Positioning

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Doc:



Sun Ultra 10 Workstation Configurations

The Sun Ultra 10 workstation is offered in a variety of workstation configurations based upon the DRAM and graphics accelerator options. The graphics options are:

- PGX24 24-bit graphics built into the motherboard with 4 MB of SGRAM
 - 24-bit support for up to 1152 x 900 resolution at 85 Hz
 - 8-bit support for up to 1280 x 1024 resolution at 76 Hz
- Accelerated 24-bit, 2-D and 3-D Sun Creator3D graphics
- Accelerated high-performance 24-bit, 2-D and 3-D Sun Elite3D m3 or Sun Elite3D m6 Graphics

Processor speed	440 MHz
Cache size	2 MB
SPECint_95	17.9
SPECfp_95	22.7

Target Users

The Ultra 10 workstation is ideal for customers who require a powerful workstation with exceptional graphics capabilities but do not need the added expansion and throughput capabilities of the Ultra 60 workstation. The Ultra 10 workstation spans the needs of the cost-conscious customers and those requiring more powerful and capable graphic options.

Target Markets

The market opportunities for the Sun Ultra 10 workstation are technical and commercial areas in which high-performance computing and advanced graphics capability are required.

Industry	Key Features to Highlight
Electronic Design (EDA) • Chip designers, board designers • System houses • Telco	• High-performance CPUs • High memory capacity • Availability of applications
Entertainment/DCC Industry • Animation and rendering • Displaying and viewing completed animations	• CPU performance • High-performance graphics
Financial • Stock and commodity traders • Banks	• High performance • Multimedia capabilities
Mechanical Design (MCAD/MCAE) • Automotive • Aerospace • Defense industry • Mechanical equipment designers	• High-performance CPUs • High-end graphics performance and functionality • Availability of applications



Industry	Key Features to Highlight
Publishing and Imaging • Newspapers • Magazines • Image banks • Advertising agencies	• High-performance CPUs • High-end performance and functionality for both graphics and imaging operations • Wide-screen 24-inch color monitors, 24-bit at 1920 x 1200 resolution (Sun Creator3D graphics only)
Research and Development • In-house development • Research institutions	• High computing performance • Feature-rich Solaris Operating Environment
Software and Java™ Development • ISVs • In-house development at large organizations	• High-performance Solaris Operating Environment • Availability of applications • Multithreaded application development

Positioning

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CPMI - CORREIOS	261
Fls:	
Doc:	36 52

Selling Highlights

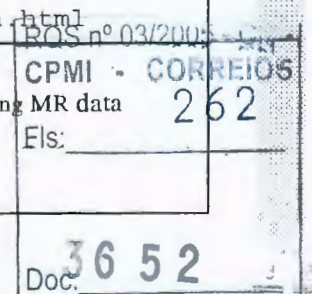


Key Applications

Sun works closely with major software vendors in testing their applications and making them available and officially supported soon after all new releases. All major applications that are available can be found in the Sun Developer ConnectionSM program 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	
Health Care	Cemax Context Vision ISG Virtual Vision Software	VIP 2.0 Imaging processing for refining MR data Silohet

Selling Highlights





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

Compatibility

The 440-MHz Ultra™ 10 workstation runs the following Solaris™ Operating Environments:

- Solaris 7 Hardware: 3/99 preinstalled
- Solaris 2.6 Hardware: 5/98
- Solaris 2.5.1 Hardware: 11/97

As a result, it can run 32-bit applications unmodified from the Solaris 2.3 and Solaris 2.4 Operating Environments, so these new systems are totally compatible with previous systems and software.

Selling Highlights



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Enabling Technology



UltraSPARC™-IIi Processor

The Sun Ultra™ 10 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 processor is part of a second generation of products based on the UltraSPARC processor architecture. In addition to using a new process technology, the UltraSPARC-IIi processor 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.

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. The SunPCi card 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.



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SunPCi Card Feature Summary

- Full PC compatibility
- Solaris Operating Environment/PC interoperability
- 400-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

Note: A Microsoft Windows license is not included with the SunPCi coprocessor card.

PGX24™ Graphics

PGX24™ graphics is the new on-board graphics built into the motherboard of the Ultra 10 workstation. PGX24 graphics 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 graphics 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 Sun Creator3D 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 or move up to Sun Creator3D or Sun Elite3D graphics.

PGX24 graphics includes 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 @ 85Hz
 - 8-bit-only pseudo color video support up to 1280 x 1024 @ 76Hz
- HD15 video connector on the motherboard supports composite and separate video sync timing
- Compatible with OpenWindows™ environment and CDE

Sun Creator3D Graphics, Series 3

Creator Graphics leads the way, integrating high-performance graphics with 24-bit imaging, windowing, video playback and 2-D/3-D graphics with Sun's UltraSPARC-II processors. For accelerated imaging and video playback, Creator is combined with the visual instruction set (VIS™), an extremely comprehensive set of imaging and graphics instructions built into the CPU.

Creator Graphics is designed as an integral part of the workstation system and is able to draw on system resources for functions traditionally built into the graphics board with specialized hardware. The result is that Creator is very fast and cost effective.



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Sun Creator3D graphics, series 3 is the latest generation of the Creator Graphics family of accelerators. It can accelerate and support diverse types of graphics needs ranging from 8-bit and 24-bit windowing to high-end 3-D graphics. Sun Creator3D graphics provides fast, high-quality transformation and display of 3-D solid and wireframe objects.

Creator 3D Graphics, series 3 has four 8-bit color maps for better dynamic color map segment allocation to applications running in 8-bit and 24-bit color. This feature gives applications better access to private color map segments that do not interfere with other applications. Adjustable gamma correction, which gives the user the ability to adjust display color to best match individual preferences is also supported. Sun Creator3D, series 3 adds hardware acceleration of OpenGL® stencil planes. This results in increased application performance for many applications based on OpenGL technology.

Lastly, Sun Creator3D series 3 supports a 1920 x 1200 resolution with Sun's 24-inch monitors (in single-buffer mode). Typical uses for configurations with the 24-inch monitor are in prepress, publishing, imaging, and in other situations in which high-quality 2-D imaging or large amounts screen real estate are essential.

Sun Elite3D Graphics

Sun Elite3D graphics represents a high-powered graphics subsystem for the 3-D graphics market and is complementary to the Creator Graphics product line. Sun Elite3D graphics retains the basic underlying architecture of Creator Graphics, and maintains full API layer compatibility and transparent acceleration of 3-D graphics APIs. Like the Creator Graphics, Sun Elite3D graphics is combined with the visual instruction set. Sun Elite3D comes in two models: Sun Elite3D m3 is twice as fast as Sun Creator3D and Sun Elite3D m6 graphics four to five times the performance of Sun Creator3D graphics.

Sun Elite3D provides very fast, high-quality transformation and display of 3-D solid and wireframe objects, and dramatically accelerates high-end functionality, such as double-buffering, triangle and quad rendering, and lighting and shading. At the same time, Sun Elite3D accelerates 2-D objects that meet X11 rules. Fast 8-bit and 24-bit window system and imaging performance are provided. Sun Elite3D systems provide 96-bit planes, including full 24-bit double-buffer planes required for smooth animation. A 28-bit Z-buffer is included to provides hardware assistance for hidden surface removal and dynamic rendering for 3-D objects.

Sun Elite3D systems utilize 3D-RAM technology. This technology is responsible for implementing fast, inexpensive 3-D frame buffers. In addition, Sun Elite3D has three or six (depending on the model) on-board floating-point processors that speed up floating-point-intensive operations such as transformations, clip tests, face determinations, and lighting.

Sun Elite3D is fully compatible with Sun Creator3D accelerators, and does not compromise the windowing system, 2-D graphics, imaging, or video performance. Sun Elite3D simply adds significant performance gains for 3-D applications.

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System Architecture

Product Architecture

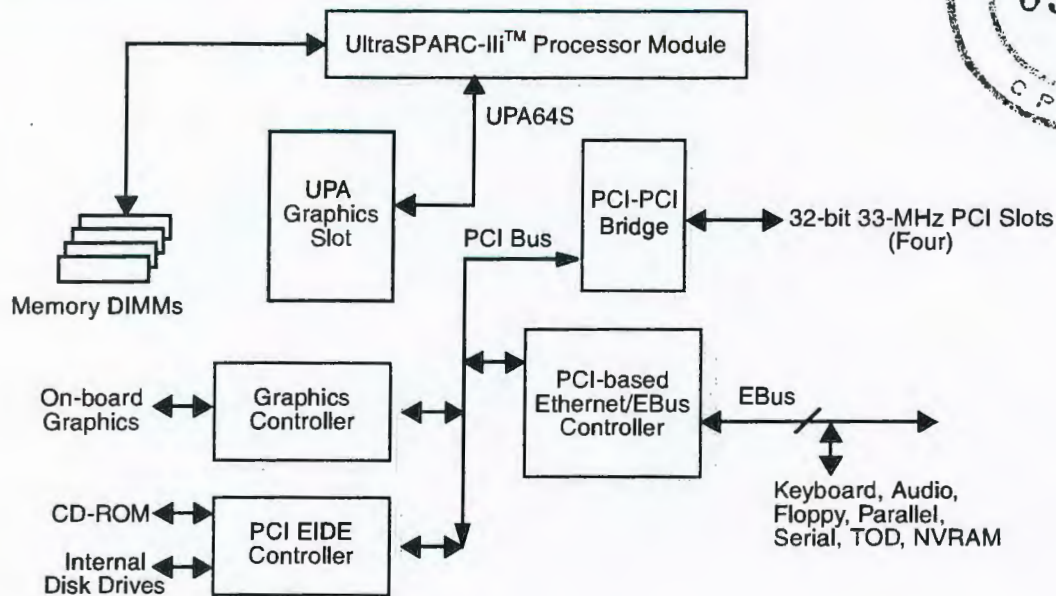


Figure 2. Sun Ultra™ 10 workstation block diagram

The Sun Ultra™ 10 workstation was designed to provide high performance, scalability, and flexibility at low cost. The use of high-volume components and application-specific integrated circuits (ASICs) has 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.

On the Ultra 10 workstation, a single LPX-sized motherboard is used. Features integrated into or supported by the motherboard include:

- Modular processor card with 2 MB of external cache
- Four 168-pin EDO JEDEC DRAM DIMM sockets with ECC error correction
 - 50-ns memory for Model 440
- Riser-card connector to support four full-size, 32-bit, 33-MHz, 5-volt PCI slots
- UPA64s vertical connector for Creator, Sun Creator3D, and Sun Elite3D graphics cards
- 10BASE-T/100BASE-T self-sensing Fast Ethernet
- Two 16.7-MB/second EIDE connectors for hard disk(s) 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, compatible with Type 5
- CD-quality, EBus-based audio
- PGX24™ on-board graphics with 4-MB VRAM (DB15 connector)
 - 24-bit-only support for resolutions up to 1152 x 900 @ 85 Hz
 - 8-bit-only support for resolutions up to 1280 x 1024 @ 76 Hz
 - Supports 17-inch color, 19-inch color, and 21-inch color monitors
- Time-of-day NVRAM for clock and ID functions

See the *Ultra 5 and Ultra 10 Architecture* White Paper for more detailed information about the product architecture.

UltraSPARC™-III Processor

The Ultra 10 workstation is a high-performance system built around the UltraSPARC™-III microprocessor. The UltraSPARC-III processor is Sun's latest release of the SPARC™ processor family and the second generation of 64-bit UltraSPARC processors. It utilizes the latest 0.22-micron technology. This process technology is the key to the UltraSPARC-III processor's higher clock rates and increased performance. This process technology also enables the UltraSPARC-III processor to operate at a core voltage of 1.9 volts. This low 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 processor 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, optimizing power utilization and supporting manufacturability and ease-of-use.

Features

- Integrated VIS instruction set
- Uses the latest 0.22-micron process technology which greatly decreases the die size
- CPU is mounted on a 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 low core voltage of 1.9 volts)
- Facilitates easy system service and upgrades

Memory

The Ultra 10 workstation supports up to 1 GB of 168-pin EDO JEDEC DRAM with ECC error correction. The four double in-line memory modules (DIMMs) used by the Ultra 10 workstation are the same as those used in the Ultra 5 workstation, but are not compatible with DRAM modules used in any other Sun Workstation™. The Ultra 10 workstation supports 32-MB, 64-MB, 128-MB, and 256-MB DIMM units.



Just the Facts



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Note: The Ultra 10 Models 440 is factory configured with 50-ns DRAM. DRAM DIMMs must be installed in pairs of identical size. Adding DIMMs in a set of four identical-sized DIMMs results in the best memory-system performance for the Ultra 10 workstation.

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

Storage

- Internal data storage for the Ultra 10 workstation is provided by up to two internal 9.1-GB, 7200-rpm disk drives.
- The Ultra 10 workstation includes a CD-ROM bay for the standard internal 32X-speed ATAPI CD-ROM drive.
- A 1.44-MB, 3.5-inch, manual-eject floppy drive is standard.

Features

- Up to two fast 9.1-GB, 7200-rpm, enhanced IDE internal disk drives
- Photo-CD compatible internal CD-ROM drive

Benefits

- Ample storage capacity for storing large files and applications locally
- Provides access to large multimedia and data files

The Ultra 10 workstation minitower enclosure features the following device bays:

- Two 1.6-inch, half-height, 5.25-inch, front-accessible bays (for CD-ROM and second hard drive)
- One 3.5-inch, internal hard-drive mount (for primary hard disk)
- One 3.5-inch, floppy-drive bay
- One PCMCIA-ready, front-access bay with flip-up access door

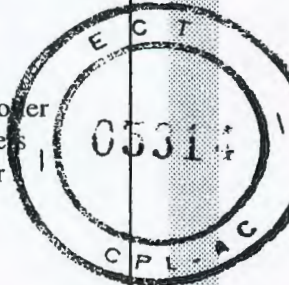
System I/O—High-performance PCI Technology

System I/O for the Ultra 10 workstation is provided by the industry-standard peripheral component interconnect (PCI) data bus. The PCI bus in the Ultra 10 workstation complies with the 2.1 revision of the PCI specification, released in March 1995. To provide maximum expandability, the Ultra 10 workstations feature four full-size 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 10 workstation.

Refer to the "Ordering Information" section of this document for a listing of Sun PCI cards that have been qualified on the Ultra 10 workstation. The cards listed below are currently available or are under development.

- Fast Ethernet/SCSI - Quad Fast Ethernet - ISDN—basic rate - ISDN—primary rate - Hard bus - "TGX+-like" - RAID arrays - IEEE-488 - DR11W - T1/E1 - 8/16/32 Port MUX - Imaging and cameras - Parallel - Audio - SBus expansion - PCMCIA	- Ultra/Diff/SCSI - 10/100 Ethernet - Gigabit Ethernet - Token ring (TRI/S) - High-speed serial - VDC/MPEG - Video teleconference - HIPPI - 1394 - PCI bus expansion - SCSI - SS7 - Fax - Fibre Channel - 1553	- ATM 155 single and multi - ATM 155/622 (PCI 66) - ATM 25 MB - FDDI single attach - FDDI dual attach - Serial-parallel controller - 2K x 2K frame buffers - Video frame grabber - X.25 - ESCON - Telephony - A/D and enablers - Voice/speech - SCI - DR-11W
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See http://www.sun.com/io_technologies/pci/index.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. The SunPCi card 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 card 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
- 400-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 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, 1600 x 1200 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

Note: A Microsoft Windows license is not included with the SunPCi coprocessor card.

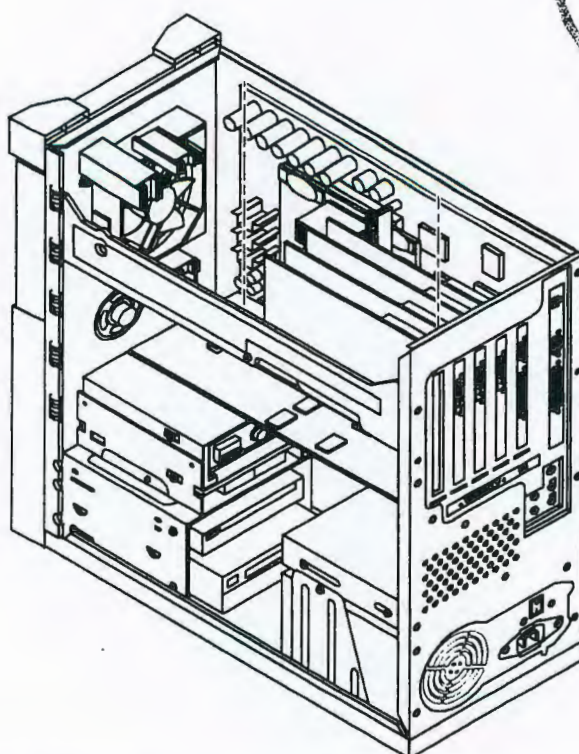


Figure 3. Ultra 10 Workstation chassis with access panel removed, providing full access to internal options

PGX32™ PCI-based Graphics

PGX32™ graphics 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 Operating Environment and the latest Solaris 7 Operating Environment release. The product has not been tested with all configurations with Solaris 2.5 Operating Environment.

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
- Multiheaded (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

Creator Graphics Series 3 Overview

Creator Graphics Series 3 is the latest generation of the Creator Graphics product family. Creator Graphics accelerates and supports diverse types of graphics needs ranging from 8-bit and 24-bit windowing to high-end 3-D graphics.

Creator Graphics Series 3 is designed to match CPU performance increases beyond the currently available CPU speeds. Series 3 accelerators have one clock for internal graphics processing and another clock for the frame buffer, enabling each part to run at maximum speed independently from each other.

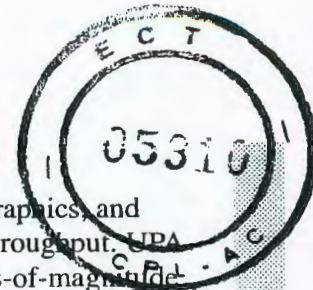
Creator Graphics performance is based on a unique system-level approach to designing graphics.

• UltraSPARC-III processor

Creator Graphics relies on the power of the UltraSPARC-III processor for floating-point calculations, and on the VIS to accelerate imaging. This eliminates the need for a dedicated graphics processor, and results in a significant cost advantage with Creator Graphics.



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- **UPA graphics interconnect**

UPA provides a high-speed, high-bandwidth interconnect between the CPU, Creator Graphics, and system memory. It raises overall graphics performance while maintaining a balanced throughput. UPA interconnect ties Creator Graphics directly to the CPU and memory, and delivers orders-of-magnitude greater bandwidth compared to the traditional way of attaching graphics accelerators through a peripheral bus such as PCI.

- **Creator rendering ASIC**

A powerful ASIC renders graphics primitives at very high speeds. The Creator ASIC accelerates fills, scroll, text, lines, polygon rendering, and color space conversion.

- **3D-RAM graphics memory**

Specialized graphics memory provides high bandwidth and built-in acceleration for 3-D graphics. Creator Graphics Series 3 uses the fastest available 3D-RAM chips.

Creator Graphics Model Features

Creator Graphics is available in two configurations: Creator, a single-buffered version that provides hardware acceleration of 2-D graphics; and Sun Creator3D graphics, a double-buffered version that has the full capabilities of Creator, plus increased 3-D graphics acceleration. Only Sun Creator3D graphics is supported on the Ultra 10 workstation.

The features provided by Creator Graphics Series 3 on both the single-buffered and double-buffered cards are:

- Accelerated video decompression (playback) by YCC-to-RGB color space conversion
- Imaging and windowing support, including contrast stretch and consecutive-block prefetch for SFB reads
- High-resolution video and monitor support
 - Line doubling for interlaced video writes
 - DDC2B monitor serial communication, with EDID default resolution support in the Creator bootprom
 - Provides a utility to change the resolution within the upper and lower limits of what the new Creator Graphics boards can easily support
- Accelerated imaging and advanced 3-D graphics with Gouraud shading, line antialiasing, per-pixel depth cueing, subpixel addressing, transparency, and stereo viewing with monitor
- Four 8-bit color maps for intelligent and dynamic color-map segment allocation give 8-bit and 24-bit color applications better color access and virtually eliminate interference (such as color flashing) between color-intensive applications
- Adjustable gamma correction offers the user the ability to adjust color to individually preferred settings and optimal display quality

The double-buffered (Sun Creator3D graphics) option has the following additional features:

- Buffer B addressing for stateless (DFB) and video accesses
- Single-buffered, high-resolution (2.3 million pixels) support
 - 1920 x 1200 landscape mode (HDTV-style 16:10 format) on the available 24-inch color monitor
- Hardware acceleration of OpenGL[®] stencil functions are provided for the double-buffered, including overlay SOV support

Sun Creator3D Graphics Summary

- Full 2-D imaging and windowing acceleration, plus full 3-D acceleration
- Ideal for high-end 2-D, mid-range 3-D graphics, and solids in MCAD and MCAE, as well as high-end imaging and color publishing applications
- 24-bit true color, double-buffered up to 1280 x 1024
- 28-bit Z-buffer
- 8-bit overlay and visual planes
- Stereo display up to 960 x 680 at 112-Hz non-interlaced, double- and Z-buffered
- 15-MB 3D-RAM memory
- 1280 x 1024 at 76 Hz standard with programmable bootprom resolution
- NTSC/PAL video timings
- 128-bit DAC
- High resolution 1920 x 1200 at 70 Hz (single-buffered) supporting 24-inch, wide-screen display



Sun Elite3D Graphics Overview

Sun Elite3D graphics greatly accelerates the rendering of 3-D triangles, vectors, and texture maps over what is possible with 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.

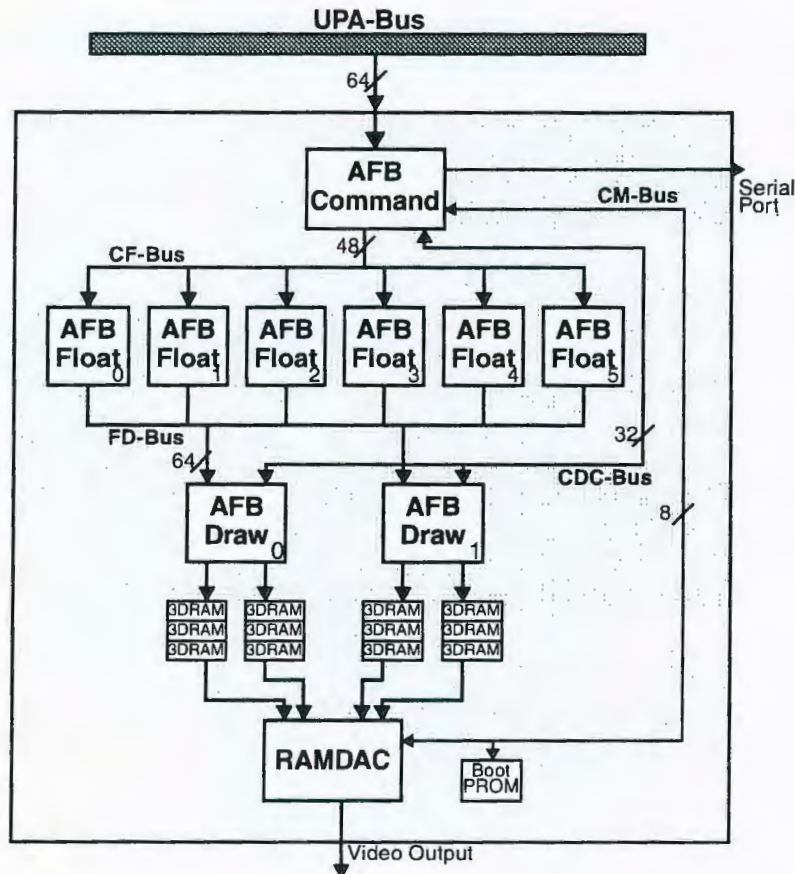


Figure 4. Sun Elite3D m6 graphics chip-level diagram

Sun Elite3D graphics has a highly parallel and efficient graphics pipeline. The Sun Elite3D 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 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 OpenGL.

Given the technological changes brought on by 3D-RAM, the primary justification for the existence of a 3-D 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.



Features

- Integrated imaging
- High-performance accelerated 24-bit double-buffered 3-D graphics
- 28-bit Z-buffer
- 8-bit overlay plane
- Gouraud shading
- Alpha blending and screen-door transparency
- Line and dot antialiasing
- Per-pixel depth cueing
- Per-pixel alpha interpolation
- 4-bit stencil support with hardware acceleration of OpenGL stencil functions
- Accelerated lighting
- Compressed geometric decompression
- Four 8-bit color maps
- Adjustable gamma correction
- NTSC/PAL video timing support
- Stereo video output (960 x 680 at 112 Hz) supported with 19- and 21-inch monitors
- 1280 x 1024 at 76-Hz resolution standard
- Dual-headed support (two Sun Elite3D m6 frame buffers)

Benefits

- Performs fast imaging and 3-D on unified frame buffer
- Smooth animation and interactivity of 3-D 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; allows seamless integration and manipulation of windows
- Allows smooth shading of solid geometry
- Simulates transparent materials such as glass
- Needed in MCAD and visualization for better visual quality
- More accurate depth cueing or fog
- Greater accuracy and image quality
- Provides greater performance
- More lights can be turned on for enhanced visual display without encountering large performance penalties
- Allows much more geometric data to be stored in the available memory, but also reduces bus bandwidth needs as well; for efficient geometry handling to enable network-centric graphics collaboration
- For dynamic colormap 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 output
- With frame buffer, monitor, and window systems support for stereo, users can get more accurate representation of 3-D data
- High-resolution display quality
- For users who need to do multiple things simultaneously, such as command and control applications, 3-D, and video playback for animators, or design and analysis for engineers



Features

- OpenGL 1.1.2., XGL™ 3.0, XIL™, X Windows, Java 3D™, Java™ Media Framework, and MediaLib 1.2 (SDK) support
- Binary compatibility with Creator Graphics product family

Benefits

- A choice of APIs
- Interoperability with existing applications and users

Sun Ultra 10 Workstation UPA-based Graphics Performance

Graphics Supported	PGX24 Ultra 10 440-MHz (24-bit mode)	Sun Creator3D Ultra 10 440-MHz	Sun Elite3D m3 Ultra 10 440-MHz	Sun Elite3D m6 Ultra 10 440-MHz
Xmark93	10.2	29.6	30.8	30.8
2-D vectors/sec.	873	5.0 M	5.0 M	5.0 M
3-D vectors/sec.	521 K	3.7 M	4.9 M	8.8 M
3-D triangles/sec.	—	1.5 M	3.0 M	5.9 M
3-D quads/sec.	—	698 K	1.2 M	1.3 M
PLBwire93	18.3	250	303	435
PLBsurf93	—	403	519	673
ViewPerf OpenGL				
• ProCDRS-01	—	8.2	13.7	19.0
• DX-04	—	11.2	27.8	30.7
Notes • Performance data as of April 1999; Configuration for timing includes Solaris 2.6 Operating Environment, Hardware: 5/98 and OpenGL 1.1.2. • Performance data is subject to change. Please see Sun's web site at http://www.sun.com for latest performance numbers.				

Metrics Defined

- 2-D vectors are 10 pixels long, X11 perf numbers
- 3-D vectors are 10 pixels long, depth-cued, clip tested, perspective projection, and solid line through XGL
- 3-D mesh are 25 pixel triangle mesh, one light source
- 3-D quads are 100 pixel, independent quadrilaterals, with one directional light source
- Both 3-D mesh and quads are Gouraud shaded, randomly oriented, transformed, clip tested, with perspective projection and Z-buffered through XGL
- Configuration with 24-inch monitor uses Sun Creator3D graphics in single-buffer mode unless otherwise noted
- 3-D quads are 100-pixel 3-D quads, one light—ambient, diffuse, isolated, perspective, Gouraud shaded, and Z-buffered with culling (in thousands)
- XIL numbers are in million pixels (megapixels per second) for a single-band image



Special Features

Accelerated imaging and advanced 3-D graphics with Gouraud shading, line antialiasing, per-pixel depth cueing, subpixel addressing, transparency, and stereo viewing with monitor

Sun Ultra 10 Workstation Configuration

	Model 440
Dimensions	
• Height	402 mm (15.8-inches)
• Width	176 mm (6.9-inches)
• Depth	435 mm (17.1-inches)
CPU and UPA	
• Architecture	UltraSPARC-IIi
• Clock rate	440 MHz
• External cache	2 MB
Memory	
• Memory type	168-pin EDO JEDEC, ECC error correction
• Number of slots	4
• Capacity	128 MB to 1 GB (minimum factory-configured system is 128 MB)
• DRAM speed	50 ns
• DIMM sizes	32 MB, 64 MB, 128 MB, and 256 MB (installed in pairs)
Storage	
Maximum internal	Up to two 9.1-GB, 7200-rpm EIDE hard disks
Graphics	
• UPA	One slot supports optional Sun Creator3D, and Sun Elite3D m3, and Sun Elite3D m6 graphics cards
• On-board PGX24™ 24-bit graphics	• On-board 24-bit frame buffer with accelerated text, windowing, 2-D and 3-D wireframe • Support for color monitors up to 21 inches • 24-bit support for resolutions up to 1152 x 900 @ 85 Hz • 8-bit support for resolutions up to 1280 x 1024 @ 76 Hz
I/O Interfaces	
• PCI I/O bus	Four full-size 33-MHz PCI slots (version 2.1)
• Serial ports	One D-Sub 25-pin, asynch/synch RS423A/RS232A
	One D-Sub 9-pin, asynch RS423A
• Parallel port	One D-Sub 25-pin, IEEE 1284 bidirectional
• PCMCIA bay	One front-access bay with flip-up access door
Networking Ports	10BASE-T/100BASE-T Fast Ethernet, self-sensing
Backup and Distribution	
• Floppy	1.44-MB, 3.5-inch, manual-eject floppy
• CD-ROM	32X-speed ATAPI, photo-CD compatible
Operating Environment	Solaris 7 Hardware: 3/99 (preinstalled) Solaris 2.6 Hardware: 5/98 Solaris 2.5.1 Hardware: 11/97

Operating Environment



The Solaris™ 7 Operating Environment

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.

The Sun Ultra™ 10 workstation runs the following Solaris Operating Environments:

- Solaris 7 Hardware: 3/99 preinstalled
- Solaris 2.6 Hardware: 5/98
- Solaris 2.5.1 Hardware: 11/97

As a result, it can run 32-bit applications unmodified from the Solaris 2.3 and Solaris 2.4 Operating Environments, so these new systems are totally compatible with previous systems and software.

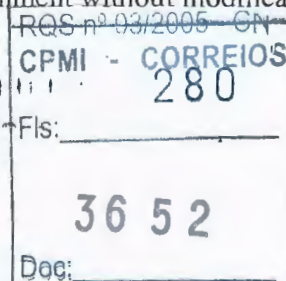
The Solaris 7 Operating Environment Features and Benefits

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 without 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 Solaris reliability consists of four interrelated activities: leading-edge features, stringent quality standards, extensive product testing, and a robust global support model.

The Solaris 7 Operating Environment delivers several major enhancements over the Solaris 2.6 operating environment:

- **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.

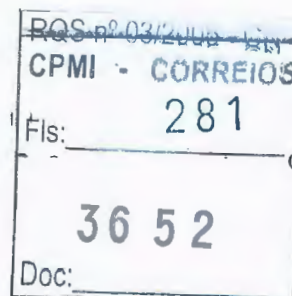
- **Extended scalability**

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 among the Solaris 7, Solaris 2.5, and Solaris 2.6 Operating Environments allows all of Sun's customers' 32-bit applications to 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.

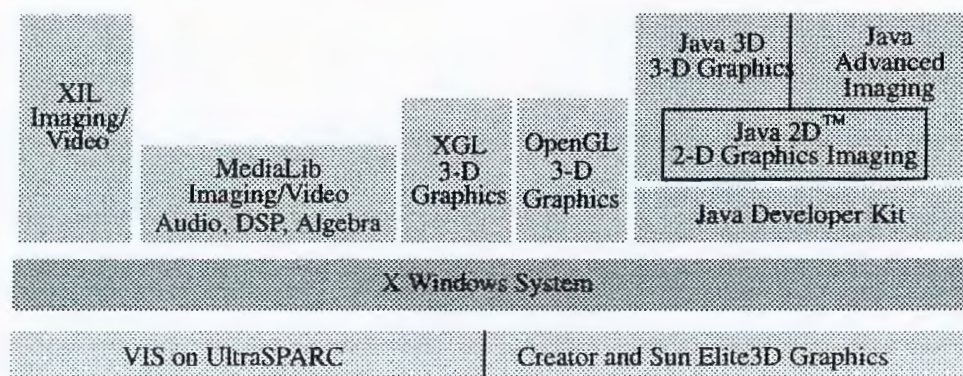


Figure 5. Graphics software interfaces

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 10 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 Ultra 5 and Ultra 10 workstations. This 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 (Hardware: 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™ 2.0 (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



Sun OpenGL 1.1.2 API for the Solaris Operating Environment

Sun OpenGL API for the Solaris Operating Environment provides a complete solution for developing and deploying interactive 3-D applications across SPARC workstations. It enables mainstream, industry-leading 3-D graphics and visualization applications to be deployed on Sun's Ultra family of graphics workstations at a compelling price-to-performance ratio. The OpenGL API is an application programming interface (API) that provides 2-D and 3-D graphics functions, including modeling, transformations, color, lighting, and smooth shading, as well as advanced features such as texture mapping, NURBS, fog, alpha blending, and motion blur. The OpenGL API works in both immediate and non-editable display-list graphics modes.

The OpenGL API is targeted at developers creating interactive 3-D applications for the enterprise, the intranet, and the Internet. These developers are affiliated with ISVs or VEUs in technical markets or in research labs. 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.

Widespread multivendor availability of the OpenGL API allows source-code portability of 3-D graphics clients. The OpenGL API 1.1.2 for the Solaris Operating Environment is a compliant implementation of OpenGL 1.1 from the OpenGL Architecture Review Board (ARB) and is, therefore, source-code compatible with other conformant OpenGL applications on the market. Most existing OpenGL applications need only to be recompiled in order to run with OpenGL 1.1.2 for the Solaris Operating Environment software.

The OpenGL API 1.1.2 for the Solaris Operating Environment is available for the Creator, and Sun Elite3D graphics product families, where the OpenGL functionality is accelerated in hardware. In addition, it is available on all the legacy SPARCstation™ systems equipped with SX, ZX, GX, GXplus, TurboGX™, TurboGXplus™, S24™, TCX, or FSV frame buffers, which is made possible through an optimized software-rendering pipeline.

Features and Benefits

Sun OpenGL API 1.1.2 for the Solaris Operating Environment provides the following new features:

Features

- 64-bit OpenGL libraries
- Occlusion culling test extension
- Improvements in DPA rendering support
- Constant texture data extension
- General performance improvements

Benefits

- Allows OpenGL applications to take advantage of the full 64-bit addressing in Solaris 7 Operating Environment
- Enables applications to trivially reject occluded objects in a scene, resulting in big improvements in interactive rendering performance for visualization of large models
- Enables OpenGL rendering on Ultra 5 and Ultra 10 systems using the PGX™ or PGX24™ frame buffers
- Reduces texture mapping memory utilization and loading time
- Enables 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

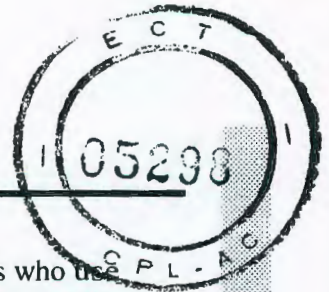


Sun OpenGL 1.1.2 for the Solaris Operating Environment Tech Facts

Sun OpenGL 1.1.2 for the Solaris Operating Environment system requirements:

Platforms	Sun Elite3D, Sun Creator3D, Creator, PGX, ZX, GX, TCX, SX product families
• Operating environments supported	Solaris 2.5.1 Maintenance Update 3 Solaris 2.6 or higher Solaris 7
• Window system supported	CDE or OpenWindows™
Disk space	
• For end-user runtimes	32 MB for 32-bit 55 MB for 64-bit
• For developers	
– Runtime binaries and header files	44 MB for 32-bit 67 MB for 64-bit
– To build examples	54 MB for 32-bit 77 MB for 64-bit
Memory	64 MB minimum 128 MB or more recommended

System Management



Many of the Sun™ workstations deliver the kind of power and graphics needed by 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 are systems management and security features that help deliver the computing environment demanded by these customers. These features are described below.

Admintool

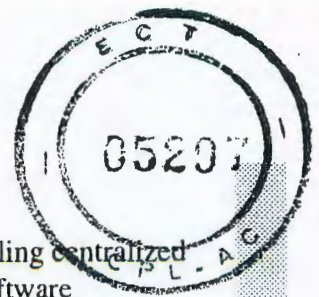
Admintool is a GUI-based administration tool that provides local systems administration. Admintool can be used to manage user accounts, groups, hosts, printers, serial ports, and installation/removal of software.

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

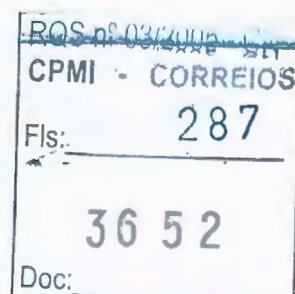
ShowMe How™ is a documentation system that presents information in a highly understandable multimedia format. Installation and service tutorials as well as reference information provide users with comprehensive, easy-to-use instruction. ShowMe How software streamlines installation and maintenance for 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



Just the Facts



October 1999



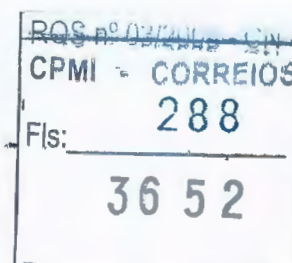
AnswerBook2™: System Administration Guide

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

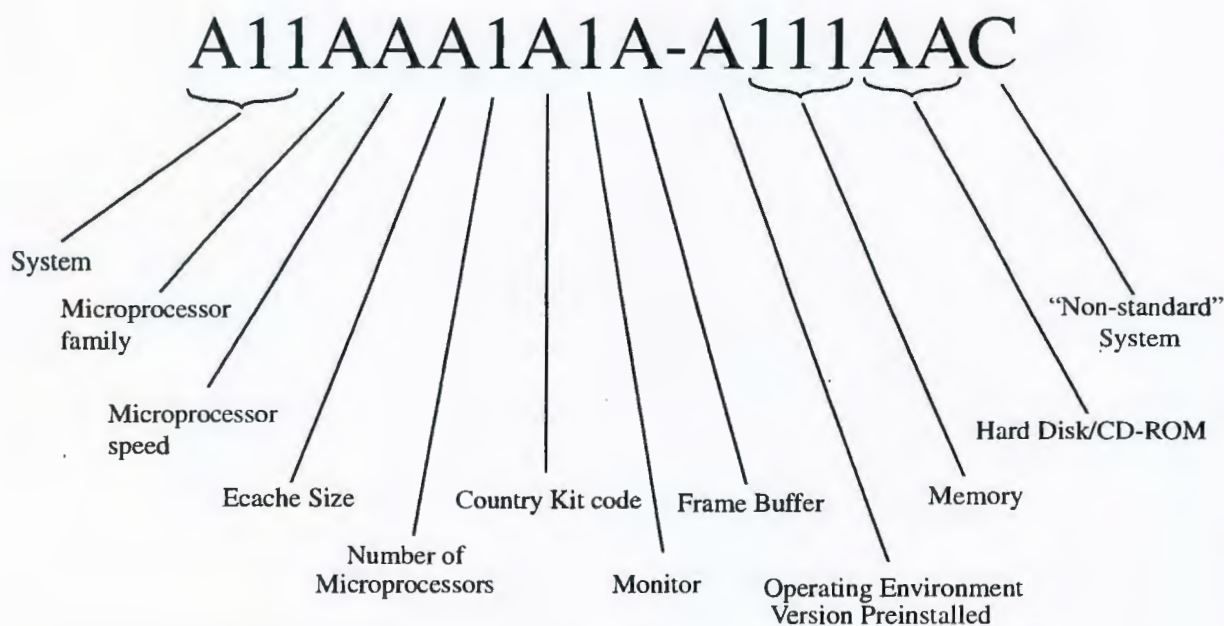


Ordering Information



Sun Ultra™ 10 Workstation Ordering Information

The Sun Ultra™ 10 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)

System A22 = Sun Ultra 10	Number of Processors 1 = Single processor	Monitor 9 = No monitor	Memory 128 = 128 MB 256 = 256 MB 512 = 512 MB
Microprocessor Family U = UltraSPARC™-III	Country Kit Code A = North America UNIX® B = Japanese Language C = Japanese Logoless D = German Language E = United Kingdom F = French Language Z = No Country Kit	Frame Buffer L = Sun Creator3D Series 3 M = Sun Elite3D m6 Q = Sun Elite3D m3 P = On-board PGX24™	Hard Disk/CD-ROM CP = 9.1-GB, 32X CD-ROM
Microprocessor Speed H = 333 MHz K = 440 MHz		Operating Environment Version Preinstalled B = Solaris™ 7 C = Solaris 7 3/99	
Ecache Size C = 2 MB			

Choice of Country Kit

Unlike traditional Sun systems, the Ultra 10 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 10 workstation marketing part number specifies the choice of Country Kit. The single-character Country Kit codes are listed below.

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



Japanese Language and Japanese Logoless Kits no longer include the contents of the Country Kit in the CPU box when shipped from the point of manufacture. 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 10 systems ordered with Country Kit code B, C, and Z do not include the contents of the Country Kit within the CPU box. In other words, the customer receives the CPU system in one box and the Country Kit in a separate box (this may vary in Japan). Customers who order Country Kit codes A, D, E, and F receive the CPU system and Country Kit in a single box.

Three examples using the same base Ultra 10 workstation configuration (128-MB DRAM, 9.1-GB, 7200-rpm hard disk, CD-ROM, on-board PGX24 graphics) are:

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

A22UKC1A9P-C128CP Note that the eighth character is "A" for North American UNIX
X7103A Marketing number for 17-inch entry color monitor

2. German Language with 21-inch color monitor

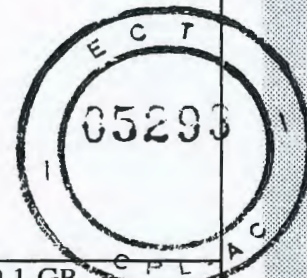
A22UKC1D9P-C128CP Note that the eighth character is "D" for German Language
X7121A Marketing number for 21-inch color monitor
X470A Marketing number for required 13W3-to-HD15 video adapter cable

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

A22UKC1Z9P-C128CP 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

Ultra 10 Model 440 with On-board 24-bit PGX24 Graphics

Part Number	System
A22UKC1A9P-C128CP A22UKC1B9P-C128CP A22UKC1C9P-C128CP A22UKC1D9P-C128CP A22UKC1E9P-C128CP A22UKC1F9P-C128CP A22UKC1Z9P-C128CP	Ultra 10 Model 440 , 2-MB Ecache, 128-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, on-board 24-bit PGX24 graphics, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit
A22UKC1A9P-C256CP A22UKC1B9P-C256CP A22UKC1C9P-C256CP A22UKC1D9P-C256CP A22UKC1E9P-C256CP A22UKC1F9P-C256CP A22UKC1Z9P-C256CP	Ultra 10 Model 440 , 2-MB Ecache, 256-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, on-board 24-bit PGX24 graphics, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit
A22UKC1A9P-C512CP A22UKC1B9P-C512CP A22UKC1C9P-C512CP A22UKC1D9P-C512CP A22UKC1E9P-C512CP A22UKC1F9P-C512CP A22UKC1Z9P-C512CP	Ultra 10 Model 440 , 2-MB Ecache, 256-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, on-board 24-bit PGX24 graphics, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit



Ordering Information



Ultra 10 Model 440 with Sun Creator3D Series 3 Graphics

Part Number	System
A22UKC1A9L-C128CP A22UKC1B9L-C128CP A22UKC1C9L-C128CP A22UKC1D9L-C128CP A22UKC1E9L-C128CP A22UKC1F9L-C128CP A22UKC1Z9L-C128CP	Ultra 10 Model 440 , 2-MB Ecache, 128-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Creator3D graphics Series 3, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit
A22UKC1A9L-C256CP A22UKC1B9L-C256CP A22UKC1C9L-C256CP A22UKC1D9L-C256CP A22UKC1E9L-C256CP A22UKC1F9L-C256CP A22UKC1Z9L-C256CP	Ultra 10 Model 440 , 2-MB Ecache, 256-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Creator3D graphics Series 3, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit
A22UKC1A9L-C512CP A22UKC1B9L-C512CP A22UKC1C9L-C512CP A22UKC1D9L-C512CP A22UKC1E9L-C512CP A22UKC1F9L-C512CP A22UKC1Z9L-C512CP	Ultra 10 Model 440 , 2-MB Ecache, 512-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Creator3D graphics Series 3, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit

Ordering Information



Ultra 10 Model 440 with Sun Elite3D m3 Graphics

Part Number	System
A22UKC1A9Q-C128CP A22UKC1B9Q-C128CP A22UKC1C9Q-C128CP A22UKC1D9Q-C128CP A22UKC1E9Q-C128CP A22UKC1F9Q-C128CP A22UKC1Z9Q-C128CP	Ultra 10 Model 440 2-MB Ecache, 128-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit (included) Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit
A22UKC1A9Q-C256CP A22UKC1B9Q-C256CP A22UKC1C9Q-C256CP A22UKC1D9Q-C256CP A22UKC1E9Q-C256CP A22UKC1F9Q-C256CP A22UKC1Z9Q-C256CP	Ultra 10 Model 440 2-MB Ecache, 256-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit (included) Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit
A22UKC1A9Q-C512CP A22UKC1B9Q-C512CP A22UKC1C9Q-C512CP A22UKC1D9Q-C512CP A22UKC1E9Q-C512CP A22UKC1F9Q-C512CP A22UKC1Z9Q-C512CP	Ultra 10 Model 440 , 2-MB Ecache, 512-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit (included) Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit

Ordering Information

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Ultra 10 Model 440 with Sun Elite3D m6 Graphics



Part Number	System
A22UKC1A9M-C256CP A22UKC1B9M-C256CP A22UKC1C9M-C256CP A22UKC1D9M-C256CP A22UKC1E9M-C256CP A22UKC1F9M-C256CP A22UKC1Z9M-C256CP	Ultra 10 Model 440 2-MB Ecache, 256-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Elite3D m6 Graphics, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit (included) Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit
A22UKC1A9M-C512CP A22UKC1B9M-C512CP A22UKC1C9M-C512CP A22UKC1D9M-C512CP A22UKC1E9M-C512CP A22UKC1F9M-C512CP A22UKC1Z9M-C512CP	Ultra 10 Model 440 , 2-MB Ecache, 512-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Elite3D m6 Graphics, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit (included) Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit

Ordering Guidelines and Notes

• Memory

- The Ultra 10 workstation supports up to 1 GB of 50-ns, 168-pin EDO JEDEC DRAM with ECC error correction. The DIMMs are the same as those used in the Ultra 5 but are not compatible with other Sun workstations. The Ultra 10 workstation supports 32-MB, 64-MB, 128-MB, and 256-MB DIMM units.
- The Ultra 10 workstation can accommodate up to four DIMM units which must be installed in pairs. Adding DIMMs in the same set of four results in the best memory system performance.

Memory Expansion Options	Part Number
64-MB 50-ns ECC DRAM expansion kit (two 32-MB DIMMs)	X7036A
128-MB 50-ns ECC DRAM expansion kit (two 64-MB DIMMs)	X7037A
256-MB 50-ns ECC DRAM expansion kit (two 128-MB DIMMs)	X7038A
512-MB 50-ns ECC DRAM expansion kit (two 256-MB DIMMs)	X7039A

• Keyboard

Type 6 keyboard and mouse is included with Model 440, except for configurations which are ordered with the "B", "C", or "Z" Country Kit code.



- **Internal storage devices**

The internal hard-disk drive and CD-ROM drive are unique to the Ultra 5 and Ultra 10 workstations and are not compatible with other Sun Workstation™ systems. In addition, all other Sun internal hard disks, CD-ROM drives, and other storage devices are not compatible with the Ultra 10 workstation.

Internal Storage Device	Part Number
Internal 9.1-GB, 7200-rpm, EIDE hard disk	X5236A
Internal 32X-speed ATAPI CD-ROM	X6171A

Note: The internal 32X-speed CD-ROM is standard on the Ultra 10 workstation.

- **External and internal SCSI devices**

A PCI SCSI adapter card is required to attach any external SCSI device since SCSI is not a feature of the Ultra 10 workstation. In addition, all internal SCSI options are not supported by the Ultra 10 workstation.

- **Monitors**

The choice of monitors is not reflected in the Ultra 10 workstation marketing part number. A monitor is required and is ordered as a separate line item. The Ultra 10 workstation supports the monitors listed below. For some monitor and frame buffer combinations, a video adapter cable may be required; consult the table below.

Monitor	Video Adapter Required		
	On-board 8-bit	Sun Creator3D Series	Sun Elite3D
17-inch color (X7103A)	None	X3872A	X3872A
19-inch color (X7119A)	None	X3872A	X3872A
21-inch color (X7121A)	X470A	None	None
24-inch wide-screen (X7124A)	Not recommended	None	Not recommended

Ordering Information

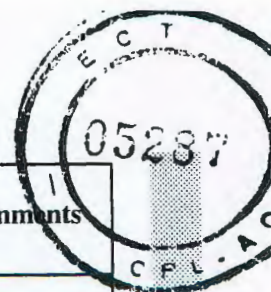
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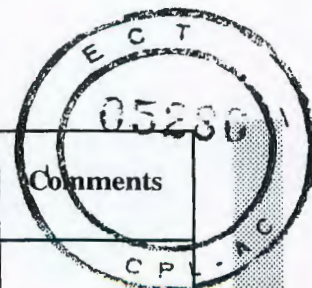
Below is a comprehensive list of system expansion, networking, graphics, and multimedia options that are supported by Sun Ultra 10 workstation. The options listed below, which are in *italic font*, have been retired and can no longer be ordered from Sun, but are shown here for reference purposes. Refer 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, 50-ns ECC DRAM expansion kit (two 32-MB DIMMs)	2	These are all pairs of DIMM units
X7037A	128-MB, 50-ns ECC DRAM expansion kit (two 64-MB DIMMs)	2	
X7038A	256-MB, 50-ns ECC DRAM expansion kit (two 128-MB DIMMs)	2	
X7039A	512-MB, 50-ns ECC DRAM expansion kit (two 256-MB DIMMs)	2	
Mass Storage—Internal			
X5236A	Internal 9.1-GB, 7200-rpm EIDE hard disk	2	
X6171A	Internal 32X-speed ATAPI CD-ROM	1	
Mass Storage—External			
X814A	5-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	

Ordering Information



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)	1	
X5253A	9.1-GB, 7200-rpm fast/wide SCSI-2 disk UniPack (68–68 pin)	1	
X6151A	SunCD™ 4X CD-ROM UniPack	4	
X6201A	14-GB, 8-mm tape UniPack	4	
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	A PCI SCSI adapter card is required to attach any external SCSI device to the Ultra 5 and Ultra 10
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	
X6102A	2.5-GB QIC tape UniPack	4	
X6152A	SunCD 4x CD-ROM UniPack	4	
X6160A	SunCD 12X CD-ROM (50-pin)	4	
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 Mammoth tape 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	
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	

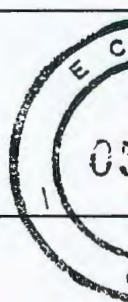
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Part Number	Option Description	Maximum Number Supported	Comments
Input Devices			
X180A	SunButtons™ 32-key function I/O device	1	
X190A	SunDials™ 8-dial interactive graphics I/O device for 3-D	1	
SUNX-MICII/G5	SunMicrophone™ II		
PCI Expansion Cards			
X1032A	10/100BASE-T Ethernet with SunPCI UltraSCSI	4	Universal
X1033A	10/100BASE-T with MII PCI adapter	4	
X1034A	PCI Quad Fast Ethernet controller PCI adapter	1	
X1035A	SunFDDI™ single-attach PCI adapter (SAS/5.0)	4	
X1036A	SunFDDI dual-attach PCI adapter (DAS/5.0)	4	
X1039A	SunLink™ token ring interface/PCI adapter	4	
X1040A	High-speed serial interface PCI adapter (SunHSI™), 1 port	4	
X1041A	Serial Asynchronous Interface (SunSAI) PCI adapter 8 ports	4	
X1066A	SunATM™/P-155 Multimode Fiber	2	
X1067A	SunATM/P-155 Cat-5 UTP	2	
X1068A	SunATM/P-622 Multimode Fiber	1	
X3668A	PGX32™ 32-bit color PCI graphics frame buffer	4	
X6541A	Dual-channel, differential UltraSCSI controller	4	
X1131A-64.2	SunPCi™ 400-MHz K6-2 coprocessor card	1	
Monitors and Graphics			
X3663A	Sun Creator3D Series 3, 24-bit color, double-buffered graphics, vertical	1	UPA
X3664A	Sun Elite3D m3, 24-bit color graphics accelerator, vertical	1	UPA
X3665A	Sun Elite3D m6 graphics accelerator	1	UPA
X3670A	Sun Creator3D Series 3, 24-bit color, double-buffered graphics, vertical	1	UPA
X3668A	PGX32™ 32-bit color PCI graphics frame buffer	4	
X7103A	17-inch 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		

Ordering Information

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Part Number	Option Description	Maximum Number Supported	Comments
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	
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	

Ordering Information

Upgrades

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 leverage by upgrading to Sun through competitive upgrades



Sun Ultra™ 10 Workstation Upgrade Paths

From	Receive	Return
Chassis upgrade from Any SLC™, ELC™, SunIPC™, 1/1+, SPARCclassic™, LX, IPX™, or SPARCstation™ 2 to Ultra 10 workstation	Sun Ultra 10 workstation	Workstation chassis, including CPU board, primary memory, frame buffer, and internal disk
Chassis upgrade from SPARCstation 4 or SPARCstation 5 to Ultra 10 workstation	Sun Ultra 10 workstation	Workstation chassis, including CPU board, primary memory, frame buffer, and internal disk
Chassis upgrade from SPARCstation 10 or SPARCstation 20 to Ultra 10 workstation	Sun Ultra 10 workstation	Workstation chassis, including CPU board, primary memory, frame buffer, and internal disk
Chassis upgrade from Ultra 1 to Ultra 10 workstation	Sun Ultra 10 workstation	Workstation chassis, including CPU board, primary memory, frame buffer, and internal disk
Competitive upgrade to Ultra 10 workstation	Sun Ultra 10 workstation	Competitive workstation

Ordering Information

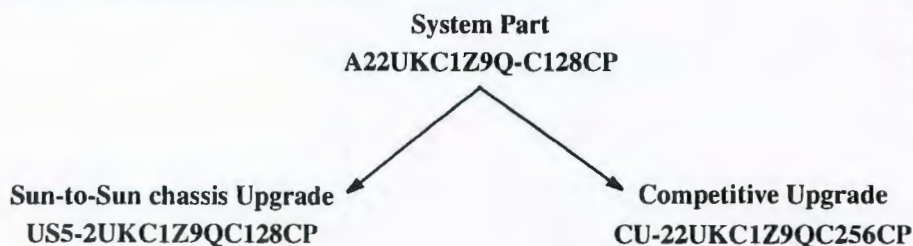
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Marketing Upgrade Numbering Scheme



- 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 eighteen characters.

CPU Module Upgrade

Part Number	Description
UG-MXXX-M440	CPU module upgrade from any Ultra 10 CPU module to the 440-MHz UltraSPARC-IIi CPU module

440-MHz Sun Ultra 10 Workstation Upgrades with PGX24 Graphics

Part Number	Description
UES-2UKC1Z9PC128CP	Upgrade from any low-end Sun Workstation (such as SLC, ELC, IPC, 1/1+, SPARCclassic, LX, IPX, SPARCstation 2) to Ultra 10 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 128-MB DRAM, 32X-speed CD-ROM, 10/100BASE-T Ethernet 9.1-GB, 7200-rpm hard drive, on-board PGX24 graphics, with North American UNIX Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled
UES-2UKC1Z9PC512CP	Upgrade from any low-end Sun Workstation (such as SLC, ELC, IPC, 1/1+, SPARCclassic, LX, IPX, SPARCstation 2) to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 512-MB DRAM, 10/100BASE-T Ethernet, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, on-board PGX24 graphics, with North American UNIX Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

**US5-2UKC1Z9PC128CP**

Upgrade from SPARCstation 4 or SPARCstation 5 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 128-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 10/100BASE-T Ethernet, on-board PGX24 graphics, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

US5-2UKC1Z9PC512CP

Upgrade from SPARCstation 4 or SPARCstation 5 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 10/100BASE-T Ethernet, on-board PGX24 graphics, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

USS-2UKC1Z9PC128CP

Upgrade from SPARCstation 10 or SPARCstation 20 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 128-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 10/100BASE-T Ethernet, on-board PGX24 graphics, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

USS-2UKC1Z9PC512CP

Upgrade from SPARCstation 10 or SPARCstation 20 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 10/100BASE-T Ethernet, on-board PGX24 graphics, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

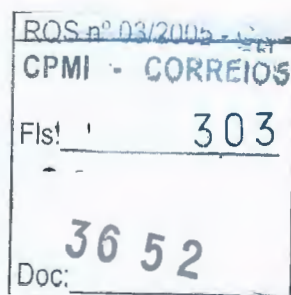
UG1-2UKC1Z9PC128CP

Upgrade from Ultra 1 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 128-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 10/100BASE-T Ethernet, on-board PGX24 graphics, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

UG1-2UKC1Z9PC512CP

Upgrade from Ultra 1 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 10/100BASE-T Ethernet, on-board PGX24 graphics, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

Ordering Information

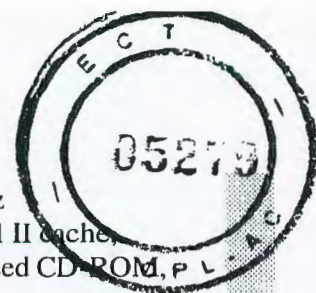




440-MHz Sun Ultra 10 Workstation Upgrades with Sun Creator3D Graphics

Part Number	Description
UES-2UKC1Z9LC128CP	Upgrade from any low-end Sun Workstation (such as SLC, ELC, IPC, 1/1+, SPARCclassic, LX, IPX, SPARCstation 2) to Ultra 10 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 128-MB DRAM, 32X-speed CD-ROM, 10/100BASE-T Ethernet 9.1-GB, 7200-rpm hard drive, Sun Creator3D graphics Series 3, with North American UNIX Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled
UES-2UKC1Z9LC512CP	Upgrade from any low-end Sun Workstation (such as SLC, ELC, IPC, 1/1+, SPARCclassic, LX, IPX, SPARCstation 2) to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 512-MB DRAM, 10/100BASE-T Ethernet, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, Sun Creator3D graphics Series 3, with North American UNIX Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled
US5-2UKC1Z9LC128CP	Upgrade from SPARCstation 4 or SPARCstation 5 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 128-MB DRAM, 9.1-GB, 7200-rpm hard drive, Sun Creator3D graphics Series 3, 32X-speed CD-ROM, 10/100BASE-T Ethernet, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled
US5-2UKC1Z9LC512CP	Upgrade from SPARCstation 4 or SPARCstation 5 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, Sun Creator3D graphics Series 3, 32X-speed CD-ROM, 10/100BASE-T Ethernet, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled
USS-2UKC1Z9LC128CP	Upgrade from SPARCstation 10 or SPARCstation 20 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 128-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, Sun Creator3D graphics series 3, 10/100BASE-T Ethernet, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled
USS-2UKC1Z9LC512CP	Upgrade from SPARCstation 10 or SPARCstation 20 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, Sun Creator3D graphics series 3, 10/100BASE-T Ethernet, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

Ordering Information

**UG1-2UKC1Z9LC128CP**

Upgrade from Ultra 1 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 128-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, Sun Creator3D graphics Series 3, 10/100BASE-T Ethernet, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

UG1-2UKC1Z9LC512CP

Upgrade from Ultra 1 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, Sun Creator3D graphics Series 3, 10/100BASE-T Ethernet, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

440-MHz Sun Ultra 10 Workstation Upgrades with Elite3D m3 Graphics**Part Number****Description****US5-2UKC1Z9QC128CP**

Upgrade from SPARCstation 4 or 5 to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level-II cache, 128-MB DRAM, 9.1-GB, 7200-rpm hard drive, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, 32X-speed CD-ROM, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

UG1-2UKC1Z9QC256CP

Upgrade from Ultra 1 or Ultra 30 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level-II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, 32X-speed CD-ROM, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

USS-2UKC1Z9QC256CP

Upgrade from SPARCstation 10 or 20 to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II-cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

US5-2UKC1Z9QC256CP

Upgrade from SPARCstation 4 or 5 to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level-II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, 32X-speed CD-ROM, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

Ordering Information



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**Part Number****UES-2UKC1Z9QC256CP****Description**

Upgrade from early SPARCstation systems to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level-II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, 32X-speed CD-ROM, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

UG1-2UKC1Z9QC512CP

Upgrade from Ultra 1 or Ultra 30 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level-II cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, 32X-speed CD-ROM, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

USS-2UKC1Z9QC512CP

Upgrade from SPARCstation 10 or 20 to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II-cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

440-MHz Sun Ultra 10 Workstation Upgrades with Elite3D m6 Graphics**Part Number****UG1-2UKC1Z9MC256CP****Description**

Upgrade from Ultra 1 or Ultra 30 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level-II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 1.44-MB floppy drive, Sun Elite3D m6 Graphics, 32X-speed CD-ROM, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

USS-2UKC1Z9MC256CP

Upgrade from SPARCstation 10 or 20 to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II-cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Elite3D m6 Graphics, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

USS-2UKC1Z9MC256CP

Upgrade from SPARCstation 4 or 5 to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level-II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 1.44-MB floppy drive, Sun Elite3D m6 Graphics, 32X-speed CD-ROM, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

Ordering Information

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Ordering Information

Part Number

UES-2UKC1Z9MC256CP

Description

Upgrade from early SPARCstation systems to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level-II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 1.44-MB floppy drive, Sun Elite3D m6 Graphics, 32X-speed CD-ROM, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

UG1-2UKC1Z9MC512CP

Upgrade from Ultra 1 or Ultra 30 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level-II cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, 1.44-MB floppy drive, Sun Elite3D m6 Graphics, 32X-speed CD-ROM, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

USS-2UKC1Z9MC512CP

Upgrade from SPARCstation 10 or 20 to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II-cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Elite3D m6 Graphics, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

440-MHz Sun Ultra 10 Workstation Competitive Upgrades

Part Number

CU-22UKC1A9PC256CP

Description

Upgrade from competitive system to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, on-board PGX24 graphics, 10/100BASE-T Ethernet, North American UNIX Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

CU-22UKC1A9LC256CP

Upgrade from competitive system to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, Sun Creator3D graphics series 3, 10/100BASE-T Ethernet, North American UNIX Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled



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**Part Number****CU-22UKC1Z9QC256CP****Description**

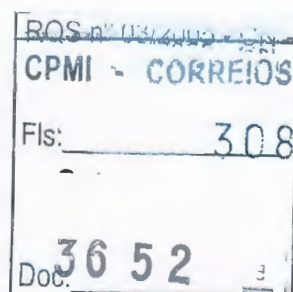
Upgrade from competitive system to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, Sun Elite3D m3 Graphics, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, and no country kit

CU-22UKC1Z9MC256CP

Upgrade from competitive system to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, Sun Elite3D m6 Graphics, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, and no country kit

Ultra 10 Workstation Upgrade Ordering Notes

- **No disks, memory, or CD-ROM drives migrate to the Ultra 10 workstation**
- **Country Kits (keyboard and localized manuals)**
 - The Ultra 10 workstation has the Country Kit physically included within the System Ship Kit. Please note other Country Kit choices are also available.
 - Country kits are not provided with upgrades from SPARCstation 4, SPARCstation 5, SPARCstation 10, SPARCstation 20, and Ultra 1 systems. These platforms are very likely to have Type-5 keyboards and can be migrated to the Ultra 10 workstation.
 - The Ultra 10 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 10 workstation.
- **Monitors**
 - Monitors are not included with any Ultra 10 workstation upgrades. If a monitor is needed, order the appropriate X-option or refer to monitor upgrade section of the price book.
 - 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 (i.e., 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 Ultra 10 workstations. Customer may migrate any of these monitors. However, an adapter is required for operation.
 - For Ultra 10 workstation competitive upgrades, a monitor must be ordered and entered as a separate line item. Customers have a choice of ordering either an X-option monitor or a competitive monitor upgrade.



Service and Support



Sun Enterprise™ Services Offerings

Sun Enterprise™ Services now provides two service offerings: the new 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™ 10 workstations.

SunClient™

Now there is a way to reduce hardware and software support costs for 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/on site)	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.

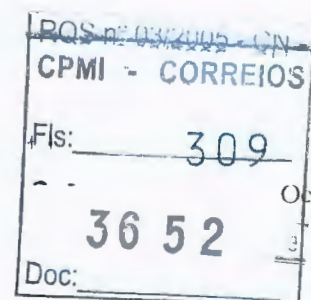
† Next-business-day, on-site response requires that the request for service be received by 3 p.m. If the call is received after 3 p.m., service will be provided on the second business day.

‡ Customers located more than 50 miles from an authorized service provider or reseller will be charged an additional fee for service activity.

Service and Support



Just the Facts



Features and Benefits of the SunClient Program



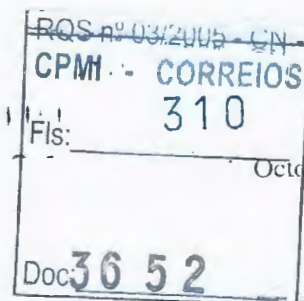
Features

- 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

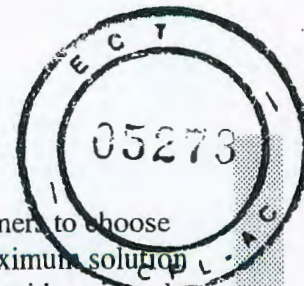
- **Flexibility:** Select the type and amount of P.L.A.C. coverage needed for desktop systems, so service dollars are targeted where they're needed most.
- **Cost savings:** Pay only for the support services needed.
- **Cost efficiency:** Because Sun can more efficiently manage spare inventory and labor 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
Local customer support management	No	Yes	No	No
Personal technical account support	Yes	Yes	Option	No
SunStart SM installation service	Yes	No	No	No
Account support plan	Yes	Yes	No	No
Software release planning	Yes	No	No	No
On-site account reviews	Monthly	Semiannual	No	No
Skills assessment	Yes	No	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	Option
7-day/24-hour on-site coverage	Yes	Option	Option	N/A
7-day/12-hour on-site coverage	No	Option	No	No
5-day/24-hour on-site coverage	No	Option	No	No

Service and Support

Just the Facts



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FEATURE	SUNSPECTRUM PLATINUM SM Mission-critical Support	SUNSPECTRUM GOLD SM Business-critical Support	SUNSPECTRUM SILVER SM Systems Support	SUNSPECTRUM BRONZE SM Self Support
Coverage / Response Time (cont.)				
Customer-defined priority setting	Yes	Yes	Yes	Option
• 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
2-hour on-site response	Yes	Option	Option	N/A
Additional contacts	Option	Option	Option	Option
Premier Support Features				
Mission-critical support team	Yes	For urgent problems	No	No
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
Hardware Support Delivery				
Replacement hardware parts	On-site technician	On-site technician	On-site technician	Courier
Two day parts delivery	N/A	N/A	N/A	Yes
Overnight parts delivery	N/A	N/A	N/A	Option
Same-day parts delivery	Yes	Yes	Yes	Option
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 license	Yes	Yes	Yes	Yes
SunSolve EarlyNotifier Service	Yes	Yes	Yes	Yes

Service and Support

Just the Facts



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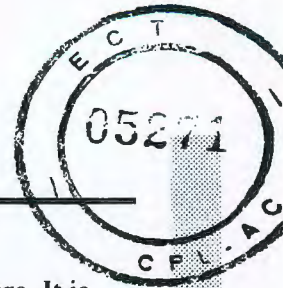
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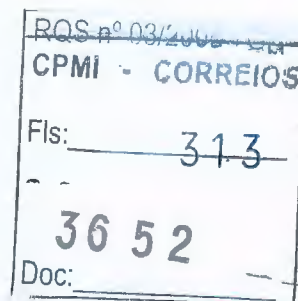
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Glossary



24-bit color	The ability to render objects from a palette of 16.7 million colors. It is often referred to as <i>true color</i> 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	Also known as Fast Ethernet, the IEEE standard for 100-Mb 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.
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™

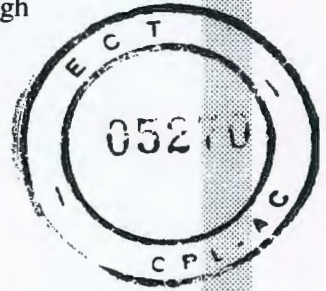
Visual instruction set. The UltraSPARC™ processor implements a special instruction set that is primarily aimed at image and video processing. Some of the instructions allow the CPU to directly access and operate on image data with a high degree of parallelism. Other instructions provide facilities for formatting and moving data at very high rates of speed both within the CPU, and between the CPU and the other system components.

XGL™

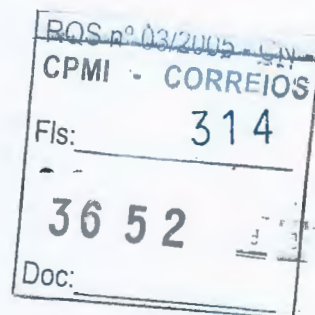
A foundation geometry-oriented 2-D/3-D graphics library that provides high functionality and performance to geometry applications and application program interfaces (APIs).

XIL™

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



Glossary



Materials Abstract



All materials are available on SunWIN except where noted otherwise.

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Powerpack				
– Sun Ultra™ 10 Workstation: Just the Facts	Reference Guide for Sun Ultra 10 Workstation	Training Sales Tool	SunWIN, Reseller Web	76924
References				
– Sun Intro—New Sun Ultra 10 Workstation with PGX24™ Graphics	Introduction E-mail	Sales Tool	SunWIN, Reseller Web, E-mail	93320
Just-the-Facts				
– Sun Elite3D: Just the Facts	Reference Guide for Sun Elite3D m6	Training Sales Tool	SunWIN, Reseller Web	75245
– Creator Graphics Series 3: Just the Facts	Reference Guide for Creator Graphics, Series 3	Training Sales Tool	SunWIN, Reseller Web	75246
Quick Reference Cards				
– Quick Reference Card—Sun Workstation Product Line Overview	Quick Reference Card	Sales Tool	SunWIN, Reseller Web, First Resort	10826
– Quick Reference Card—Sun Workstation Graphics Products Overview	Quick Reference Card	Sales Tool	SunWIN, Reseller Web, First Resort	24507
– Quick Reference Card—Competitive Summary Workstations	Quick Reference Card	Sales Tool	SunWIN, Reseller Web, First Resort	12259
– Quick Reference Card—Upgrade Paths	Quick Reference Card	Sales Tool	SunWIN, Reseller Web, First Resort	24513
Product Literature				
– Sun Ultra Desktop Family Brochure	Data Sheet	Sales Tool	SunWIN, Reseller Web COMAC	69376 BE604-3
– Sun Ultra 10 Workstation Data Sheet	Data Sheet	Sales Tool	SunWIN, Reseller Web COMAC	69377 DE778-2
– Graphics Brochure—Imagine It	Data Sheet	Sales Tool	SunWIN, Reseller Web COMAC	60585 BE508-3
Competitive Analyses				
– PC Workstation Battle Brief	Competitive Brief	Sales Tool	SunWIN	75270
– SGI Competitive Battle Brief	Competitive Brief	Sales Tool	SunWIN	70605

Materials Abstract

Just the Facts



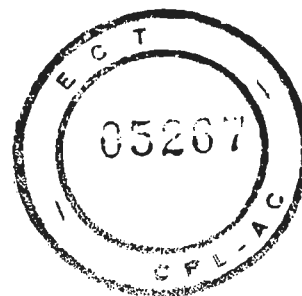
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Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Product Presentations				
- <i>Graphics Product Presentation</i>	Product Presentation, with Notes	Sales Tool	Sun WIN, Reseller Web	75254
- <i>Sun in Software Development Customer Presentation</i>	Product Presentation, with Notes	Sales Tool	Sun WIN, Reseller Web	59375
- <i>Sun in EDA Customer Presentation</i>	Product Presentation, with Notes	Sales Tool	Sun WIN, Reseller Web	59078
- <i>Sun in MCAD/MCAE Customer Presentation</i>	Product Presentation, with Notes	Sales Tool	Sun WIN, Reseller Web	59074
White Paper				
- <i>Ultra 5 and Ultra 10 Architecture White Paper</i>	White Paper	Sales Tool Training	Sun WIN, Reseller Web	75258
External Web Sites				
- <i>Sun Home Page</i>	http://www.sun.com/desktop			
- <i>List of Tested PCI Cards</i>	http://www.sun.com/pci/pci.cards.ihv.html			
- <i>SunClientSM Support Web Site</i>	http://www.sun.com/service/support/sunclient			



Materials Abstract

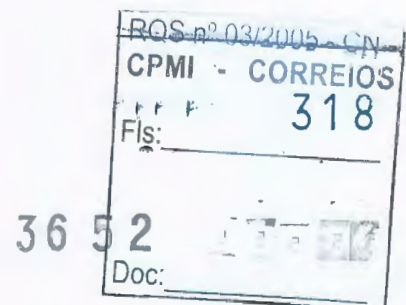


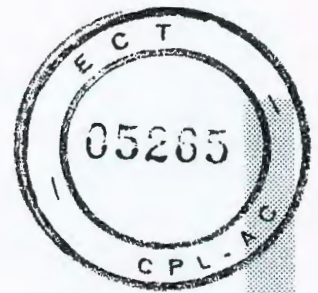
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Sun Enterprise™ 450 Server

Just the Facts





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Sun, Sun Microsystems, the Sun logo, Sun Enterprise, Sun Enterprise SyMON, Ultra, Java, Solaris, Sun WebServer, IPX, NFS, Gigaplane, TurboGX, PGX, Sun StorEdge, Solstice, Solstice DiskSuite, OpenBoot, Solstice AdminSuite, Solstice Backup, Solstice AutoClient, SunVTS, Sun Internet Mail Server, Solstice NFS Client, Solaris Web Start Wizards, ShowMe How, HotJava, WebNFS, SunLink PC, JDK, AnswerBook, Solstice SunNet Manager, SunCD, SunSpectrum, SunSwift, SunFastEthernet, Sun Quad FastEthernet, SunFDDI, Sun HSI, Sun StorEdge SRC/P Intelligent SCSI Raid Controller, SunSpectrum Platinum, SunSpectrum Gold, SunSpectrum Silver, SunSpectrum Bronze, SunStart, SunVIP, SunSolve, SunSolve EarlyNotifier, and CacheFS are trademarks, registered trademarks, or service marks of Sun Microsystems, Inc. in the United States and other countries.

All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. in the United States and other countries. Products bearing SPARC trademarks are based upon an architecture developed by Sun Microsystems, Inc.

UNIX and X/Open are registered trademarks in the United States and other countries, exclusively licensed through X/Open Company, Ltd.

X/Open is a registered trademark, and the "X" device is a trademark, of X/Open Company Limited.

DLT is claimed as a trademark of Quantum Corporation in the United States and other countries.



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Positioning

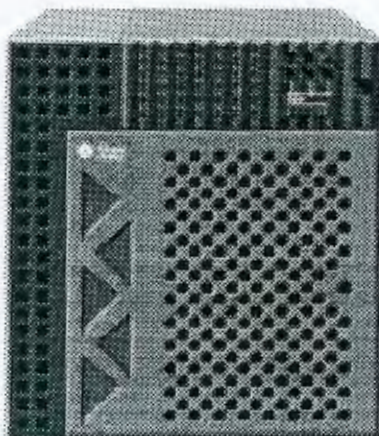


Figure 1. Sun Enterprise™ 450 server, front view

Introduction

The Sun Enterprise™ 450 server is the latest member of Sun's powerful line of UltraSPARC™-based servers for enterprise network computing. This tremendously flexible and versatile mid-range server delivers a potent combination of stellar performance, outstanding reliability, and a remarkably affordable price. This rackmountable tower server's exceptional blend of computing power, storage capacity, disk I/O throughput, and network I/O performance make it perfect for running or front-ending databases from Oracle, Sybase, and Informix, delivering e-mail or web services to hundreds of concurrent users, or for implementing thousands of other critical two-tier and three-tier client-server business applications.

With up to four 250-MHz, 300-MHz, or 400-MHz UltraSPARC-II 64-bit RISC microprocessors, 4 GB of memory, 20 internal 18.2-GB UltraSCSI-3 disk drives, and six high-performance PCI I/O buses that can move over one gigabyte of data per second, the Sun Enterprise 450 server is ideal for applications that demand more processing power, integrated storage, or expandability than offered by the Sun Enterprise 250 server, but that do not require the seamless growth path or extensive datacenter RAS features offered by the Sun Enterprise 3000–6000 server family. The Sun Enterprise 450 server is designed to satisfy many of the demanding information management, processing, and delivery requirements found in medium-sized businesses, branch offices, workgroups, and distributed applications within large-scale or global enterprises.

Positioning

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Features include the following:

- Database management or digital media management (20 GB to 2000 GB)
- Distributed database access
- Distributed file management, HTTP, and FTP services, and NC boot services
- E-mail, web mail services, Internet gateway, and legacy host gateway
- On-line transaction processing (OLTP) and electronic commerce
- Decision support and on-line analytical processing (OLAP)
- Simulation
- Groupware (such as Lotus Notes)
- Print services
- Network management, message routing, and network backup

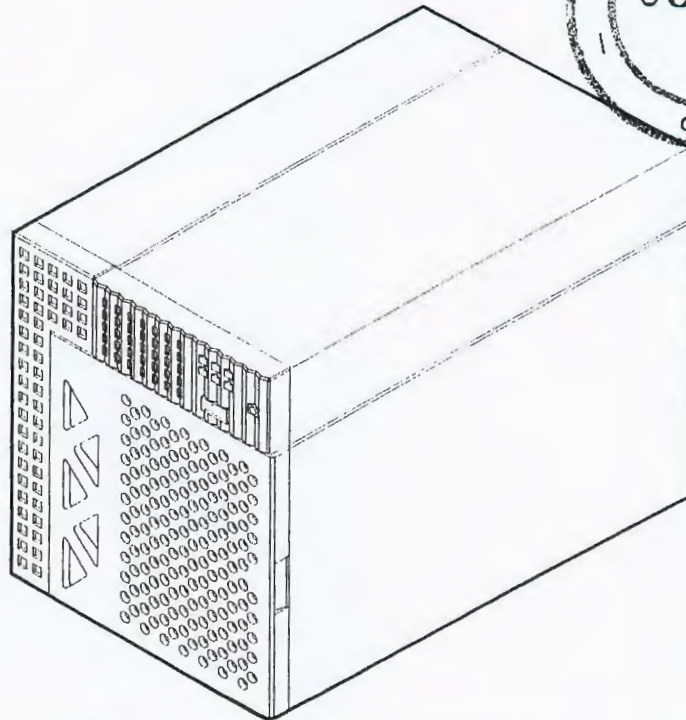


Figure 2. Sun Enterprise 450 server, side view

Key Features

Rackmountable Tower	• Fits in open office or standard 19-inch rack • 22.9 x 17.6 x 27.4 (inches) / 58.1 x 44.8 x 69.6 (cm)
One to Four CPUs	• 250-MHz, 300-MHz, or 400-MHz UltraSPARC-II
Up to 4-GB Memory	• 16 DIMM slots • SPARCstation 20-style memory modules
Up to 364-GB Internal Storage	• Up to 20 18.2-GB, 10000-rpm UltraSCSI disks • Five separate UltraSCSI channels • 200 MB per second internal disk I/O
Up to 6-TB External Storage	• Up to 20 Fast/Wide or UltraSCSI channels
Ten PCI Slots	• Seven 64-bit slots • Three PCI66 (66-MHz) slots
1 GB/second I/O Throughput	• Six independent PCI I/O buses
17,674 TPM	• OLTP performance (TPC-C)
Datacenter RAS Features	• Automatic System Recovery (ASR) • Hot-swap disks • Redundant hot-swap power supplies • Thermal sensing, auto fan control • Sun Enterprise SyMON™ system monitor
Operating Environment Support	• Solaris™ 2.5.1: Hardware 4/97 • Solaris 2.5.1: Hardware 8/97 • Solaris 2.6 • Solaris 7

Positioning



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Typical Customer Applications	• Database/datamart • Business-critical applications • Workgroup support/groupware • Intranet/Internet/Web • Digital media/video
Key Messages	• Scalable performance • Price/performance • Reliability and availability • Application growth path

Key Features and Benefits

Features

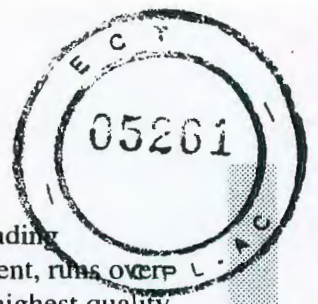
- Up to four 250-MHz, 300-MHz or 400-MHz UltraSPARC-2 CPUs, with 1-MB, 2-MB or 4-MB Ecache respectively; up to 4 GB of ECC memory (requires 256-MB DIMMs) with two-way or four-way interleaving
- Five-segment Ultra™ port architecture (UPA) crossbar datapath moves up to 1.6 GB of data per second between CPUs, memory, and I/O channels
- Six high-performance industry-standard PCI I/O buses supporting ten PCI slots plus onboard UltraSCSI, 10/100 Ethernet, and serial and parallel ports deliver up to 1-GB per second total I/O throughput
- Five 40 MB/second UltraSCSI controllers support up to 20 internal 18.2-GB, 10000-rpm disks; supports up to 6-TB external storage
- Multiple independent datapaths, error correcting code (ECC) protection for memory and data paths, Automatic System Recovery (ASR), redundant hot-swap power supplies, hot-swap disk drives, RAID 0, 1, 0+1, and 5, thermal sensing and auto fan control, overtemp protection, four levels of diagnostics, and high-availability cluster configuration options

Benefits

- Scalable computing performance provides support for heavy compute-intensive applications such as database management, decision support, or simulation
- High-speed, parallel data flows provide minimum latency and maximum system resource utilization for sustained high performance under the heaviest workloads
- Blazing I/O performance makes the Sun Enterprise 450 server a superior file, web, or database server, especially for large multimedia files; it is also a premier boot server for Java technology-enabled "thin client" desktop systems
- With up to ten times the disk I/O performance of similarly priced systems, the Sun Enterprise 450 server surpasses every machine in its price range for file, web, database, or digital media server applications
- The extensive array of reliability, high-availability, and serviceability features of the Sun Enterprise 450 server allows customers to deploy these systems in their most business-critical environments with complete confidence

Positioning

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Features

- The Sun Enterprise 450 server runs Sun's powerful and dependable Solaris Operating Environment and is 100 percent binary compatible with all software that runs on Sun's Enterprise 3000-6000 server family
- Solaris for Intranets includes many features, such as Solaris easy installer, Sun Enterprise SyMON, Sun WebServer™, DHCP, PPP, and file and print support for Windows, NetWare, and Macintosh clients

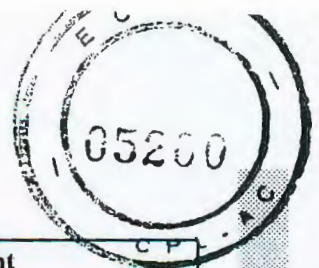
Benefits

- Solaris, recognized as the industry's leading enterprise network operating environment, runs over 12,000 of the most extensively tested, highest quality software packages available today for both commercial and technical applications
- Sun Enterprise 450 server customers can deploy systems with confidence, knowing their applications can grow and their investment in network technology, software, and training will be protected
- Extensive software tools make it easier than ever to install and use Sun Enterprise servers for a wide range of applications throughout the enterprise network

Target Industries

Industry	Applications
Financial Services - Insurance - Banking - Securities traders and brokerages	• Branch office servers, customer management (CMS), and electronic commerce
Publishing	• Digital media management, web publishing, and electronic commerce
Manufacturing - Automotive - Aerospace - Electronics - Pharmaceuticals and process industries	• IT, finance and accounting, HR, manufacturing, engineering, sales and marketing, customer service/CMS, and electronic commerce
Telecommunications and Internet Services - Long distance carriers, PTTs - RBOCs - Cable operators - Wireless operators - Internet service providers - Equipment OEMs	• Internet HTTP, e-mail, FTP, directory servers, and electronic commerce • CMS, billing, fraud detection, network monitoring and reporting, and software development
Retail - Major retail chains	• In-store electronic retail systems, HQ customer management, merchandising systems, inventory management, distribution, and electronic commerce
Government - Federal/national - State/provincial	• Branch office systems
Health Care - Hospitals and clinics - HMOs and managed care providers - Medical equipment OEMs	• Satellite office servers, patient records, billing, claims processing, medical imaging systems, picture archival, and communications systems
Education - Colleges and universities	• Registration and student records, library management, financial aid administration, and academic research

Positioning



Target Applications

Target Applications	Key Features to Highlight
E-mail Web mail services Internet gateway Legacy host gateway	- Connectivity with heterogeneous systems and networks - TCP/IP, IPX™/SPX, NetBEUI, NetBIOS, OSI, X.25, SNA, DECnet - Ethernet, Token Ring, FDDI, ATM, ISDN, T1, E1 - MS mail, UNIX® mail, POP3, IMAP - Exceptionally scalable multithread performance - Exceptional total system throughput
Database or digital media management - From 20 GB to 2000 GB - Oracle, Informix, Sybase	- Storage capacity (364-GB internal, 6-TB external) - Outstanding storage I/O performance - Exceptional network connectivity and I/O bandwidth
Distributed database access	- Outstanding network connectivity, computing power, network I/O performance, total system throughput - Reliability and availability features
On-line transaction processing (OLTP) Electronic commerce Business applications	- Outstanding computing power, storage I/O performance, network I/O performance, reliability and availability features - Over 12,000 top software applications - Robust development environment - Scalable O/S, broad product line for enterprise-wide deployment
Groupware, collaboration Lotus Notes	- Enterprise networking and PC interoperability - Supports hundreds of UNIX or PC clients
Decision support and On-line analytical processing (OLAP)	- Outstanding computing power - Storage capacity and storage I/O performance
Distributed file access, file management - Distributed NFS™, NetWare, LAN Manager file management - HTTP and FTP services - NC boot services	- Robust, secure, distributed file sharing with NFS version 3 - Enterprise networking and PC interoperability
Internet	- Secure, reliable, and cost-effective - Sun is the leading Internet provider; the majority of the servers on the Internet are Sun servers
Simulation	
Network monitoring and management Message routing Network backup	- Infrastructure and tools to reduce systems management effort - Proven expertise in large-scale networking; eases difficulties in managing PC LANs

Positioning



Sun Enterprise Server Family Comparisons

Sun Enterprise 450 Server versus Sun Enterprise 250 and 3500 Servers

As a member of Sun's Enterprise family of servers, the Sun Enterprise 450 server is positioned between the Enterprise 250 and the Enterprise 3500 servers. The charts below compare the features of these three servers.

Key Features	Sun Enterprise 250 Server (2-CPU Configuration)	Sun Enterprise 450 Server (4-CPU Configuration)	Sun Enterprise 3500 Server ¹ (4-CPU Configuration)
Product Positioning	• Compact, versatile dual-processor network application server for medium-sized workgroups and compute-intensive applications • Suitable for small-to-medium database applications and web sites	• Affordable high performance 4-way SMP network application server • Reliable, high-capacity mid-range tower server • For larger web sites, branch offices, workgroups, or distributed enterprise applications • Ideal for managing larger files	• Highly reliable and expandable mid-range server • For fast-growing small-to-medium-size business-critical applications • Exceptional investment protection for high growth applications
Packaging	• Deskside or rackmounted • 517 mm x 262 mm x 732 mm (H x W x D)	• Rackmountable deskside tower • 581 mm x 448 mm x 696 mm (H x W x D)	• Rackmountable tower • 650 mm x 430 mm x 600 mm (H x W x D)
CPUs	• 250 MHz, 300 MHz, or 400 MHz • 1-MB, 2-MB, or 4-MB Ecache • Up to two CPUs • Modular CPUs can be added one at a time	• 250 MHz, 300 MHz, or 400 MHz • 1-MB, 2-MB, or 4-MB Ecache • Up to four CPUs • Modular CPUs can be added one at a time	• 250 MHz, 336 MHz, or 400 MHz • 4-MB Ecache • Up to eight CPUs • Modular CPUs can be added one at a time

¹ For this comparison, the Sun Enterprise 3500 server is configured as a 4-way server with two CPU/memory boards and two I/O boards.

Positioning

Just the Facts



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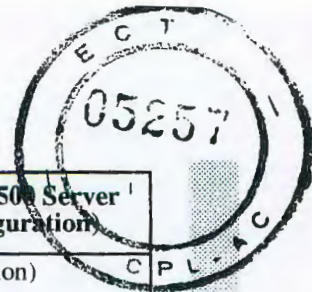
Key Features	Sun Enterprise 250 Server (2-CPU Configuration)	Sun Enterprise 450 Server (4-CPU Configuration)	Sun Enterprise 3500 Server ¹ (4-CPU Configuration)
Memory	16 DIMM slots 5V 60 nanosecond DIMMs 128 MB to 2 GB 576-bit-wide data path - Minimum/maximum latency = 30 to 130 nanoseconds - Memory added in groups of four DIMMs	16 DIMM slots 5V 60 nanosecond DIMMs 128 MB to 4 GB 576-bit-wide data path - Minimum/maximum latency = 30 to 130 nanoseconds - Memory added in groups of four DIMMs - Two-way or four-way interleaving	16 DIMM slots per CPU/memory board 32 DIMMs with four CPUs installed 3.3V 60 nanosecond DIMMs 64 MB to 8 GB (eight-CPU configuration) 576-bit-wide data path - Minimum/maximum latency = 30 to 300 nanoseconds - Memory added in groups of eight DIMMs - Up to 16-way interleaving
System Bus	- Three-segment UPA 1.6 GB/second peak throughput - Runs at 83 MHz with 250-MHz CPU installed, or 100 MHz with 300-MHz or 400-MHz CPU installed	- Five-segment UPA 1.6 GB/second throughput - Runs at 83 MHz with 250-MHz CPU installed or 100 MHz with 300-MHz or 400-MHz CPU installed	- Gigaplane™ (2.6 GB/second) to UPA (1.3 GB/second) - Runs at 83 MHz with 250-MHz CPU installed or 100 MHz with 300-MHz or 400-MHz CPU installed

¹ For this comparison, the Sun Enterprise 3500 server is configured as a 4-way server with two CPU/memory boards and two I/O boards.

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Key Features	Sun Enterprise 250 Server (2-CPU Configuration)	Sun Enterprise 450 Server (4-CPU Configuration)	Sun Enterprise 3500 Server ¹ (4-CPU Configuration)
I/O	- Two PCI buses, four PCI slots 40 MB/second UltraSCSI, 20 MB/second Fast/Wide SCSI 10/100 Ethernet port - Two 384K sync or 460K async ports; DB25 - Parallel port 350 MB/second maximum system I/O throughput	- Six PCI buses, ten PCI slots 40 MB/second UltraSCSI, 20 MB/second Fast/Wide SCSI 10/100 Ethernet port - One 384K sync serial port, one 460K async port; DB25 - Parallel port 1 GB/second maximum system I/O throughput	(4-CPU configuration) - Four SBuses, six SBus slots - Four 25 MB/second FC ports - Two 20 MB/second Fast/Wide SCSI - Two 10/100 Ethernet ports 400 MB/second maximum system I/O throughput or - Four PCI buses, six PCI slots - Two 20 MB/second Fast/Wide SCSI - Two 10/100 Ethernet ports Either configuration includes two sync/async serial ports and one parallel port
Storage	- Internal bays for up to six 9.1-GB, 10000-rpm, 1-inch or 18-GB, 10000-rpm, 1-inch, hot-plug drives 1 x 20 MB/second Fast/Wide SCSI - Up to 108 GB internal storage - Up to 1-TB external storage	- Internal bays for up to twenty 9.1-GB, 10000-rpm, 1-inch, or 18.2-GB, 10000-rpm, 1-inch, hot-plug drives 5 x 40 MB/second UltraSCSI - Up to 364 GB internal storage - Up to 6-TB external storage	- Internal bays for up to ten 9.1-GB, 10000-rpm, 1-inch or 18-GB, 10000-rpm, 1.6-inch, hot-plug drives 1 x 20 MB/second Fast/Wide SCSI - Up to 182 GB internal storage - Up to 6-TB external storage
Removable Media	1.44-MB floppy drive (optional) 32X CD-ROM (standard) - Internal 5.25-inch, half-height, SCSI 4-mm or 8-mm tape device (optional) - External SCSI tape devices (optional)	1.44-MB floppy drive (standard) 32X CD-ROM (standard) - Internal 5.25-inch, half-height, SCSI 4-mm or 8-mm tape device (optional) - External SCSI tape devices (optional)	- No floppy drive 32X CD-ROM (standard) - Internal 5.25-inch, half-height, SCSI 4-mm, 8-mm, or QIC tape device (optional) - External SCSI tape devices (optional)

¹ For this comparison, the Sun Enterprise 3500 server is configured as a 4-way server with two CPU/memory boards and two I/O boards.

Positioning



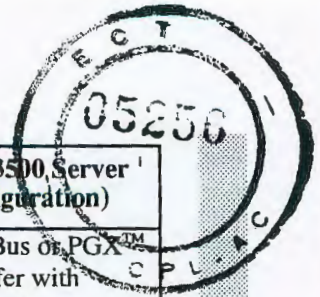
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Key Features	Sun Enterprise 250 Server (2-CPU Configuration)	Sun Enterprise 450 Server (4-CPU Configuration)	Sun Enterprise 3500 Server ¹ (4-CPU Configuration)
System Console	Low-cost PCI frame buffer with 17-inch or 20-inch color monitor	Low-cost PCI frame buffer with 17-inch or 20-inch color monitor	TurboGX™ SBus or PGX™ PCI frame buffer with 17-inch or 20-inch color monitor
Power	110/220 volts 360 watts	110/220 volts 1120 watts	110/220 volts 1100 watts
Performance	@ 1 x 400 MHz, 2-MB Ecache - SPECint95 = 16.8 @ 2 x 400 MHz, 2-MB Ecache - SPECfp95 = 26.4 - SPECint_rate95 = 303 - SPECfp_rate95 = 334 - SPECweb96 = 4,277	@ 1 x 400 MHz, 4-MB Ecache - SPECint95 = 17.4 @ 4 x 400 MHz, 4-MB Ecache - SPECfp95 = 40.8 - SPECint_rate95 = 609 - SPECfp_rate95 = 758 - SPECweb96 = 9115 - Notesmark Users Supported = 8,200 - Notesmark = 12,540 tpm - TPC-C = 17,674 \$/TPC-C = \$27.24	@ 1 x 400 MHz, 4-MB Ecache - SPECint95 = 18.3 @ 4 x 400 MHz, 4-MB Ecache - SPECfp95 = 47.9 @ 6 x 400 MHz, 4-MB Ecache - SPECint_rate95 = 955 - SPECfp_rate95 = 1519 @ 8 x 400 MHz, 4-MB Ecache - TPC-C = 21,871 \$/TPC-C = \$77.56
Note: TPC-C results submitted 2/2/99			
RAS Features	- Integrated design, fewer connections - ECC protection for memory and datapaths - Automatic System Recovery - Redundant hot-swap power supplies - Hot-swap disk drives - RAID 0, 1, 0+1, and 5 - Thermal sensing and auto fan control - Overtemp protection - Four levels of diagnostics - High-availability cluster configuration options	- Integrated design, fewer connections - Multiple independent datapaths - ECC protection for memory and datapaths - Automatic System Recovery - Redundant hot-swap power supplies - Hot-swap disk drives - RAID 0, 1, 0+1, and 5 - Thermal sensing and auto fan control - Overtemp protection - Four levels of diagnostics - High-availability cluster configuration options	- Multiple independent datapaths - ECC protection for memory and datapaths - Automatic System Recovery - Dynamic System Reconfiguration - Redundant hot-swap power supplies - Hot-swap disk drives - RAID 0, 1, 0+1, and 5 - Hot-swap CPU and I/O modules - Thermal sensing and auto fan control - Fault-tolerant cooling with overtemp protection - Four levels of diagnostics - High-availability cluster configuration options
Warranty *	3-year, on-site, second-day service	3-year, on-site, second-day service	1-year, on-site, next-day service

Note: * Product warranty may vary by geographical location. Check with the local SunService representative for applicable warranty coverage.

¹ For this comparison, the Sun Enterprise 3500 server is configured as a 4-way server with two CPU/memory boards and two I/O boards.



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System Architecture

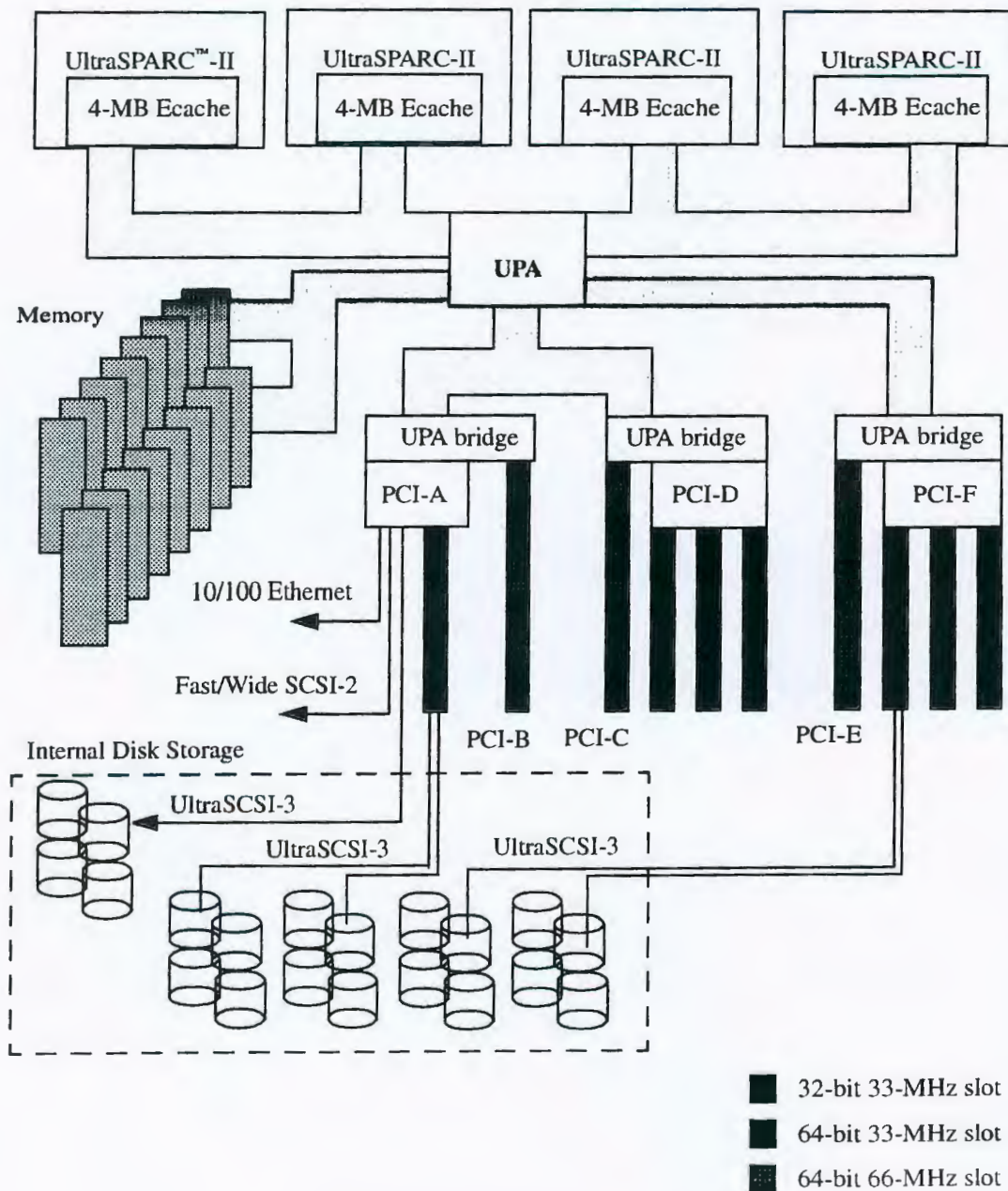


Figure 3. Sun Enterprise™ 450 server architecture

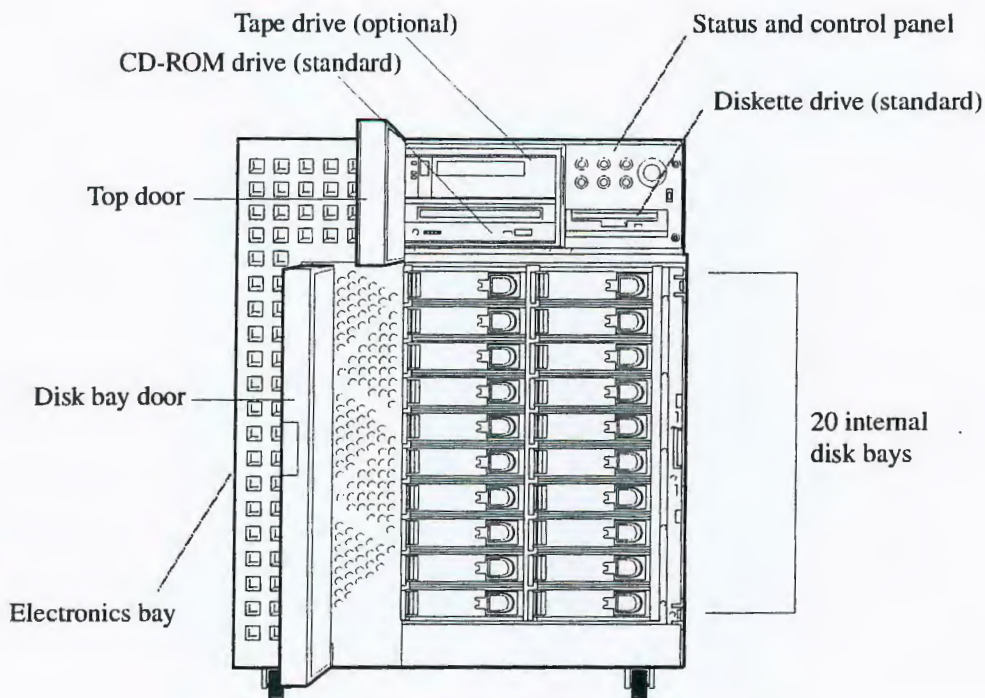


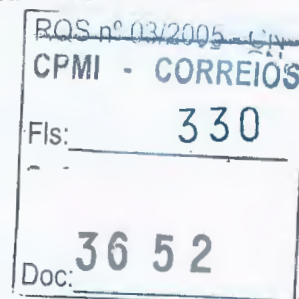
Figure 4. Sun Enterprise 450 server, front view, panels open

UltraSPARC™-II Processors

The Sun Enterprise™ 450 server is a shared-memory, symmetric-multiprocessing system built around the UltraSPARC™-II microprocessor. The UltraSPARC-II processor is Sun's latest generation of the SPARC™ family and the second generation of 64-bit UltraSPARC chips. It utilizes the latest 0.35-micron technology (versus the 0.5-micron technology of the UltraSPARC-I processor), which shrinks the die size to 149² mm (from 218² mm). This reduced die size is the key to the higher clock rates and increased performance of the UltraSPARC-II processor. This smaller die size also enables the UltraSPARC-II processor to operate at a core voltage of 2.5 volts, rather than at the 3.3 volts, of the UltraSPARC-I processor. 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.

UltraSPARC-II processors used in the Sun Enterprise 450 server are individually mounted on 4-inch x 6-inch field-installable module cards along with associated Ultra™ port architecture (UPA) data buffers and up to 4 MB of high-speed SRAM external cache memory (2-MB cache with 300-MHz CPU). These modules are similar to those used in the Sun Enterprise 250 server and Ultra 60 workstations. This modular design facilitates easy system expansion (adding additional CPUs), processor upgrades (to higher performance UltraSPARC processors), and system service.

The Sun Enterprise 450 server is designed to exploit the full processing power of up to four high performance UltraSPARC-II CPUs. Processors with clock rates of 250 MHz, 300 MHz, or 400 MHz are supported, and all processors installed in a single system must operate at the same clock frequency. The system's UPA interconnect, main memory, and I/O subsystems have been carefully architected to sustain the high data rates necessary to use these processors fully, resulting in highly scalable system performance that is remarkably linear from a lightly loaded uniprocessor configuration to a "maxed-out" four-processor system.





Ultra Port Architecture System Interconnect

The processors, memory, and I/O subsystems of the Sun Enterprise 450 server are interconnected by a high-speed, five-segment UPA crossbar datapath. This is an enhanced implementation of the same UPA design used in the Sun Enterprise 2 and 250 servers. Two UPA segments support pairs of CPU modules, two support system I/O, and one provides the system datapath to main memory. The two CPU datapaths are 144 bits wide, with 128 bits for data and 16 bits for error correcting code (ECC). The two UPA datapaths that support system I/O are 72 bits wide, with 64 bits for data and 8 bits for ECC. The memory datapath is 576 bits wide, with 512 bits (64 bytes) for data and 64 bits for ECC.

Each UPA segment operates independently of the others and moves data blocks over a parallel datapath between client buffers and UPA switch buffers. Transfers are completed at a clock rate that is automatically synchronized by the system controller to one-third or one-quarter that of the system's CPU clock rate. With 250-MHz CPUs installed, the UPA clocks at 83.3 MHz, and with 300-MHz or 400-MHz CPUs installed, the UPA transfers data at 100 MHz, or one transfer every ten nanoseconds. CPU segments, which transfer 16 bytes of data in parallel each clock cycle, each have a maximum transfer rate of 1.6 GB per second. I/O segments, which transfer 8 bytes in parallel each clock cycle, each have a maximum transfer rate of 800 MB per second. Memory transfers require three UPA clock cycles to complete (depending on clock speed), producing a maximum memory I/O throughput of 1.78 GB per second.

Since each UPA segment operates independently of the others, all segments can be transferring data between local and switch buffers concurrently. CPU segments move data from 64-byte buffers at the crossbar switch to 16-byte local buffers during four consecutive UPA clock cycles, and I/O segments move data from 64-byte crossbar buffers to 8-byte local buffers during eight consecutive UPA clock cycles. Once its local buffer is filled with outbound data, a client on a shared UPA segment arbitrates for control of the segment, then transfers its data to the segment's switch buffer during the requisite number of clock pulses.

All UPA addressing and arbitration occurs over signal lines which are separate from the datapaths. This arrangement allows arbitration and addressing to occur in parallel with data transfers, reducing transfer latency and improving datapath utilization.

Memory

The Sun Enterprise 450 server supports up to 4 GB of 60 nanoseconds, 5-volt, dynamic RAM memory (4 GB with currently available 256-MB Sun memory DIMMs). DIMMs used by the Sun Enterprise 450 server are the same type as those used in the Sun Enterprise 2 and 250 servers. Memory is organized into four banks of four dual in-line memory modules (DIMMs). All four DIMMs within the same bank must be identical, and can range in capacity from 32 MB each to 256 MB each. DIMMs in different banks can have different capacities.

Data moves between memory and the UPA crossbar switch buffers over an ECC protected 64-byte-wide datapath. A memory read or write operation to a single memory location requires approximately twelve UPA clock cycles to complete (approximately 120 nanoseconds with current memory chips).

With two banks of identical DIMMs installed, memory operations are two-way interleaved, reducing the average latency for reads and writes almost by half, and nearly doubling the memory throughput over non-interleaved operations. With four banks of identical DIMMs installed, memory read-write operations are four-way interleaved, nearly doubling throughput again over two-way interleaved operation. With four-way interleaving enabled, average memory latency is reduced to approximately 36 nanoseconds, yielding an average memory throughput of 1.6 GB per second. If only one or three banks of DIMMs are present, or if the DIMMs in different banks have different capacities, interleaving will not occur.



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System I/O

All system communications with storage peripherals and network interface devices is mediated by three UPA-to-PCI bridges, located on the system's main logic board. Each of these bridge chips manages communication between the UPA bus and two industry-standard peripheral component interconnect (PCI) data buses, giving the system a total of six separate PCI buses. Two bridges (four PCI buses) share one 800 MB per second UPA segment while the third bridge has uncontested use of the other UPA I/O segment.

Each bridge chip provides buffered data transfers between the UPA and one 66-MHz PCI bus and one 33-MHz PCI bus. Each bridge is capable of sustained data transfer rates of over 334 MB per second with either one or both supported PCI buses active. With all three bridges transferring data, total system I/O can exceed one gigabyte per second.

Together, the system's six PCI buses support slots for up to ten PCI interface cards. One PCI bus (bus B) also handles communications between the system and devices connected to the main logic board's SCSI, FastEthernet, serial, parallel, and keyboard/mouse ports. All PCI buses in the Sun Enterprise 450 server comply with the 2.1 revision of the PCI specification, released in March 1995.

- PCI buses A, C, and E operate at 33 MHz or 66 MHz and provide one slot each for either a 32-bit or 64-bit 3.3-volt or universal PCI card.
- PCI bus B operates at 33 MHz and provides one slot for a 32-bit 5-volt or universal PCI card. PCI-B also supports all system-board I/O (see below).
- PCI bus D operates at 33 MHz and provides two slots for 32-bit 5-volt or universal cards and one slot for a 32-bit or 64-bit 5-volt or universal card.
- PCI bus F operates at 33 MHz and provides three slots for either 32-bit or 64-bit 5-volt, or universal PCI cards.

Sun Enterprise 450 Server PCI Bus/Slot Layout and Slot Characteristics

PCI Slot Number	PCI-UPA Bridge	PCI Bus	Slot Width/ Card Widths Supported	PCI Clock Rate, MHz	Card Input Voltages Supported
10	1	B	32/32 bits only	33	5V or Universal
9	3	F	32/32, 64 (as 32)	33	5V or Universal
8	3	F	32/32, 64 (as 32)	33	5V or Universal
7	3	F	64/32, 64	33	5V or Universal
6	3	E	64/32, 64	33, 66	3.3V or Universal
5	1	A	64/32, 64	33, 66	3.3V or Universal
4	2	C	64/32, 64	33, 66	3.3V or Universal
3	2	D	64/32, 64	33	5V or Universal
2	2	D	64/32, 64	33	5V or Universal
1	2	D	64/32, 64	33	5V or Universal



In addition to the I/O capabilities available through PCI option cards, the Sun Enterprise 450 server provides the following I/O channels directly from the main system board through PCI bus B:

- One internal-only 40 MB per second UltraSCSI-3 channel which supports the system's four standard 3.5-inch UltraSCSI disk bays
- One internal/external 20 MB per second Fast/Wide SCSI-2 channel; supports the standard CD-ROM drive plus one optional, internal, narrow (8-bit) SCSI tape device; one external 68-pin SCSI connector supports connections to up to four external SCSI tape devices or a single Sun StorEdge™ MultiPack
- One internal-only floppy drive controller port supports the standard 3.5-inch 1.44-MB floppy drive
- One external 10/100 auto-select Ethernet port that supports either a Cat-5 UTP (RJ45 connector) or 40-pin miniature "D" MII connection
- Two external EIA-232D or EIA-423 serial ports, one synchronous and one asynchronous, via one DB25 connector with a Y splitter cable (without the splitter cable, the default output is synchronous); supports EIA-423 synchronous data rates from 50 baud to 384 Kbps, and asynchronous data rates from 50 baud to 460.8 Kbaud
- One external 2 MB per second Centronics-compatible, bi-directional EPP parallel port with one DB25 connector
- One external standard Sun keyboard/mouse port (mini DIN-8 connector)

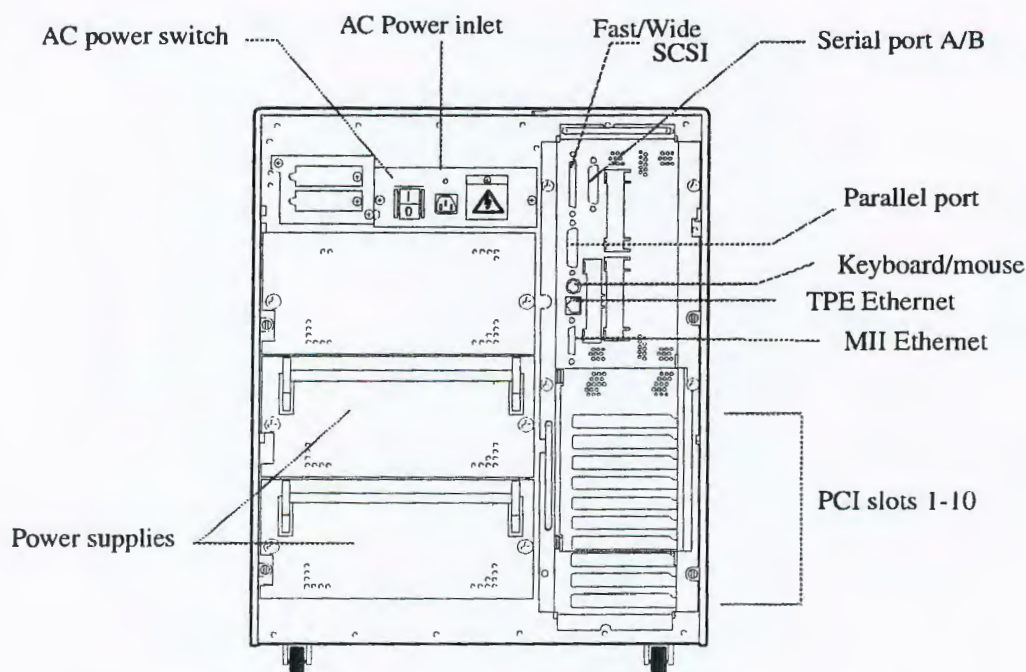


Figure 5. Sun Enterprise 450 server, rear view, panels open

Storage

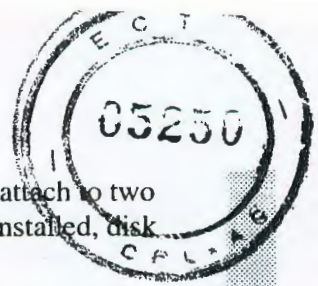
Primary (internal) data storage for the Sun Enterprise 450 server is provided by up to twenty 18.2-GB, 3.5-inch by 1-inch, hot-swappable UltraSCSI-3 disk drives. These 10000-rpm drives have an average access time of 14 milliseconds and a peak internal transfer rate of up to 140 Mbits per second. Drives are attached in groups of four to five separate single-ended UltraSCSI controllers, each of which offers a peak data transfer rate of 40 MB per second, twice the transfer rate of Fast/Wide SCSI controllers. The first four



Just the Facts

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drives attach to the UltraSCSI port on the system motherboard. Drives five through twenty attach to two dual-channel UltraSCSI controllers, which occupy two PCI slots. With all five controllers installed, disk I/O between internal drives and the UPA can approach 200 MB per second.

Spreading the internal drives across five UltraSCSI buses allows multiple system processes to execute disk read-write operations simultaneously. This significantly reduces disk I/O latency by reducing the number of queued I/O requests at each controller and by reducing contention between drives for access to the SCSI bus. It also allows large files of data to be striped across multiple drives and controllers, further enhancing disk I/O performance by reducing request queueing and bus arbitration delays. The result is superior total disk I/O throughput compared with single- or dual-controller implementations. Multiple disk I/O channels also increase total system availability by allowing drives on one controller channel to be hot-swapped without disrupting user access to data stored on other SCSI buses.

To satisfy the needs of customers with larger data storage requirements, the Sun Enterprise 450 server supports a variety of external storage subsystems. PCI storage controllers provide support for Sun StorEdge UniPack and MultiPack systems. With 20 fully configured Sun StorEdge arrays attached through ten dual-channel UltraSCSI storage controllers, the Sun Enterprise 450 server can access over 6 TB of local data.

Storage management software such as Sun's Solstice DiskSuite™ and VERITAS Volume Manager software enables the Sun Enterprise 450 server to support disk striping (RAID 0), mirroring (RAID 1), striping with parity (RAID 5), and striping plus mirroring (RAID 0+1).

In addition to its internal and external high-speed fixed storage capabilities, the Sun Enterprise 450 server provides a standard 32X CD-ROM drive and a 1.44-MB 3.5-inch, manual-eject, floppy drive for software installation and system management. An internal 5.25-inch, half-height (1.6-inch high) drive bay is provided for an additional narrow (8-bit) SCSI device, such as a 4-mm DDS-2 or DDS-3 tape drive, or an 8-mm tape drive. Additional externally attached tape drives, autoloaders, or libraries can be attached by to the system's external Fast/Wide SCSI port or to optional PCI SCSI controller cards.

Console System

The Sun Enterprise 450 server can be managed from either a local or remote (network) console device. A local character terminal console device can be attached through one of the system's two serial ports, or a color monitor, keyboard, and mouse can be attached to any supported PCI graphics controller/framebuffer and the keyboard/mouse port. The system can be managed remotely from any X-windows terminal or workstation.

The four-position front panel key switch controls system power as well as administrator access to the system's power-on self-test (POST) diagnostics and flash-upgradable PROM.

The system flash-upgradable boot PROM provides standard OpenBoot™ capabilities, power-on self-test, and extensive OpenBoot diagnostics.

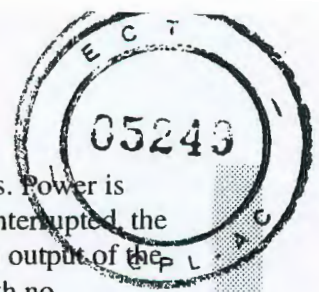
Six front panel LEDs provide system administrators with easy to interpret status information about the health of the system motherboard, CPUs, memory, disks, cooling fans, and power supplies.

Power Distribution System

System power is provided by one, two, or three 560-watt, universal DC power supplies. These modular hot-swap units are easily installed and removed from the rear of the system, even while the machine is operational. Maximally configured systems will operate continuously with two power supplies installed.



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Power supplies feed all active system components through a common power distribution bus. Power is drawn equally from all supplies installed in the system. If service from one power supply is interrupted, the system power demand shifts automatically to the remaining active supplies. If the combined output of the remaining supplies satisfies the system's requirements, the machine continues to operate with no interruption of service. With a hot standby or "n+1" power supply installed, the system can continue operating while a replacement power supply is installed. If power demands exceed the output of the active supplies, the system automatically notifies the console and suspends operation.

The base server includes one power supply that provides sufficient power for maximum memory, ten PCI cards, four internal disks, an optional tape drive, and up to three CPU modules. When either a fourth CPU or more than four internal disks are required, a second power supply must be installed.

Environmental Monitoring and Control (EM&C) System

The environmental monitoring and control system of the Sun Enterprise 450 server continuously monitors temperatures at several critical locations throughout the machine. Readings from thermal sensors provide input to the server's airflow management system, which automatically adjusts fan speeds as necessary to keep component operating temperatures within acceptable ranges. If measured temperatures exceed safe operating limits and fans are already operating at maximum speed, the system automatically notifies the console and suspends operation.

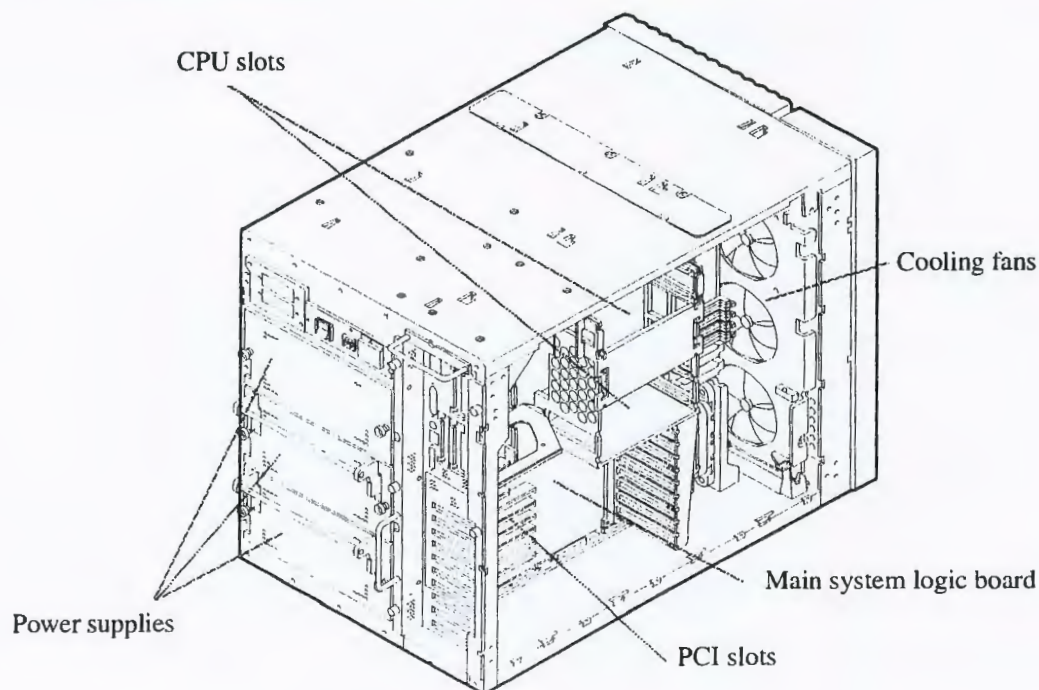


Figure 6. Sun Enterprise 450 server, rear cut-away view

System Enclosure and Mechanical Specifications

The Sun Enterprise 450 system is housed in a deskside tower enclosure that measures 22.87-inches high x 17.64-inches wide x 27.4-inches deep (581 mm x 448 mm x 696 mm). The system chassis is mounted on four swivel casters that lock to provide system stability. Depending on the number and type of options installed, the system weighs between 120 pounds and 205 pounds.



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Access to operator controls, all internal disk drives, and removable media drives is provided through two hinged doors on the front of the system. The disk bay door has a key lock for added system security. All front panel status indicator LEDs are visible through windows in the media bay door.

Power supplies and the main power switch are easily accessible from the rear of the chassis for serviceability, and all three power supplies may be secured in place by a removable locking device for additional peace of mind. Each power supply has status indicator lights visible from the rear of the system showing power-on and fault conditions.

Internal service access to the system requires simply unlocking and lifting off the server's left and right cover panels. CPU modules, memory DIMMs, and PCI option cards can be installed or removed easily through the left side of the machine. The main system board, which is oriented vertically from front-to-back, can be removed or installed easily through the rear of the system.

Airflow through the system is front-to-back, allowing the system to be rackmounted in any standard 19-inch EIA rack (minimum 30-inch depth required). Cooling is provided by two slide-mounted fan tray assemblies. One cools the system board electronic components while the other cools the disk drives and power supplies. Each is easily removable through the side of the system.

System Rackmounting Kit

The Sun Enterprise 450 server is designed to be rackmounted in its desktower configuration. The optional rackmounting kit, which consists of a depth-adjustable, slide-mounted shelf and retaining brackets, can be installed in any EIA 19-inch-wide rack with:

- Front and rear vertical mounting rail flanges between 28.5 and 34.875 inches apart
- Standard front- and rear-facing mounting flanges
- At least 24 inches of available vertical mounting space
- Sufficient load-bearing capacity

The system is simply placed on the shelf and secured in position with the brackets supplied in the kit. Because of the weight of the system, racks must be either bolted to the floor or must be equipped with stabilizer legs to prevent rack tipping when the system is pulled out for servicing.

Solaris Server Features and Benefits

Installation and Administration

Features

- Solaris Web Start software, part of Solaris 2.6, enables fast, easy network-based installation of the Solaris Operating Environment

Benefits

- Eases and speeds the installation of the Solaris Operating Environment on hosts and clients

System Management



Solaris™ Operating Environment

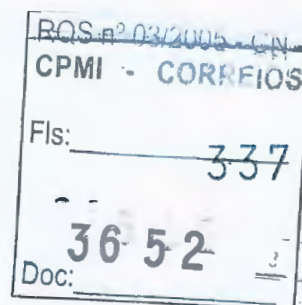
The Sun Enterprise™ 450 server offers customers the reliability, performance, scalability, and interoperability of Sun's industry leading Solaris™ Operating Environment. Customers who plan to continue running Solaris 2.5.1 on their existing Sun servers and desktop systems can easily integrate the Sun Enterprise 450 server into their environments by installing the system with Solaris 2.5.1

Hardware: 4/97 (or later). Sun Enterprise 450 server customers who are ready for the latest Solaris release will be able to take full advantage of all the powerful new server features added to Solaris 2.6 and Solaris 7 with this system. Sun Enterprise 450 customers will be especially interested in the new installation and administration features, intranet and Internet capabilities, and desktop services for PCs, Macintosh systems, UNIX® workstations, and Java™ technology-based network computers added to this new Solaris Operating Environment release.

Key Workgroup Server Features in the Solaris 2.5.1 Operating Environment

Ease of Installation and Administration	Reliability/Serviceability	Web Features	PC Connectivity
Bundled with Solaris 2.5.1			
- Solstice AdminSuite™ - Solstice DiskSuite™ - Solstice Backup™ (single server)	- Sun Enterprise SyMON™ - Sun VTS™		
Available Separately			
Solstice AutoClient™		Sun Internet Mail Server™	- Solaris PC NetLink (server and unlimited clients) - Syntax TotalNET - Solstice NFS Client™

System Management





Key Workgroup Server Features Available with the Solaris 2.6 Operating Environment

Ease of Installation and Administration	Reliability/Serviceability	Web/Java™ Features	PC Connectivity
- Solaris™ Web Start/ Solaris Web Start Server - Solstice AdminSuite - Solstice AutoClient (server plus 1 client) - Solstice DiskSuite - Solstice Backup (single server)	- ShowMe How™ - Sun Enterprise SyMON - SunVTS	- Sun WebServer™ - HotJava™ Browser - Java™ virtual machine - Simple Key Management for IP (SKIP) - Dynamic host configuration protocol (DHCP) - WebNFS™ - PPP - Sun Internet Mail Server (30 day "Try & Buy" only)	- Solaris PC NetLink (server and unlimited clients) - SunLink PC™ (TotalNET) (server plus 1 client) - Solstice NFS Client (1 client)

Key Workgroup Server Features Available with the Solaris 7 Operating Environment

Ease of Installation and Administration	Reliability/Serviceability	Web Features	PC Connectivity / Interoperability
- Solaris Web Start/ Solaris Web Start Wizards™ - Solstice AdminSuite - Solstice AutoClient (server plus 1 client) - Solstice DiskSuite - Solstice Backup (single server) - Solaris Management Console	- ShowMe How - SunVTS	- Sun WebServer - HotJava Browser - Java virtual machine - Simple Key Management for IP (SKIP) - Dynamic host configuration protocol (DHCP) - WebNFS - Solstice™ PPP	- Solaris PC NetLink (server and unlimited clients) - SunLink PC (server plus one client) - Solstice NFS Client (one client) - Sun Directory Services

Sun Enterprise 450 server customers who are ready for the latest Solaris Operating Environment release will be able to take full advantage of all the powerful new server features added to Solaris 7 Operating Environment. The Solaris 7 Operating Environment has a 64-bit kernel and provides enhancements in overall performance, scalability, reliability, availability, security, and ease of use, while maintaining backwards compatibility for all Solaris Operating Environment-certified existing 32-bit applications.

System Management



The Solaris 7 Operating Environment delivers the following major enhancements over the Solaris 2.6 Operating Environment:

- **Data center-class reliability, availability, and serviceability (RAS)**

Data center-class RAS features that can provide greater system stability and lower system downtime by allowing customers to add, remove, or replace defective hardware without rebooting the system.

- **Higher performance**

A complete 64-bit computing environment provides greater capacity, precision, and performance. By increasing capacity from 32 bits to 64 bits, customers can realize significantly better performance for certain functions. The 64-bit virtual addressing and file system allows greater application flexibility enabling the creation of a new class of applications. New 64-bit applications unleash the full power of Sun systems based on UltraSPARC™ technology. Some newly architected applications offer a performance boost of 10-100 over customers' existing systems.

An updated version of the Java Development Kit (JDK™) 1.1.6 software, with software-enhanced Java virtual machine and optimizing "Just-In-Time" (JIT) compiler technologies, provides significantly improved scalability. These benefits will be significantly enhanced in the JDK 1.2 software version (currently available in early access from the Web). The JDK 1.2 software enhancements include a highly tuned, multithreaded VM architecture with faster thread synchronization, a new memory system with generational garbage collection, and a highly optimizing JIT compiler.

- **Improved scalability**

The complete 64-bit kernel also provides increased scalability by enabling access to more system resources, by allowing many more applications to be consolidated onto a single server that utilizes the Solaris software and to handle much larger problem sets, and by adding more capacity to existing hardware.

The benefits of improved scalability are not just limited to servers, the Solaris 7 Operating Environment enables a new application environment for desktop users. No model is too complex or too large to visualize and solve as a whole.

- **Greater ease of use**

The easy-to-use, web-based installation, GUI-based text/voice notes, and process manager make Solaris software easy to install and use. Command line entries are no longer required for some of the most often used desktop utilities.

- **Comprehensive global product**

The Solaris Operating Environment includes support for the Euro currency symbol, complex text formats for Arabic, Thai, and Hebrew languages, and support for the development of multilingual applications.

- **Software investment protection**

Complete binary compatibility enables all of today's Solaris Operating Environment-certified 32-bit applications to continue running on the Solaris 7 Operating Environment without modification.



Compatibility

Features

- The Sun Enterprise 450 server runs Sun's powerful and dependable Solaris Operating Environment and is 100 percent binary compatible with all software that runs on the Sun Enterprise 3500-6500 server family
- The Solaris Operating Environment is binary-compatible across all SPARC™ platforms, from desktops to enterprise servers
- The Solaris Operating Environment is supported on SPARC, x86, and PowerPC platforms

Benefits

- Runs over 12,000 of some of the most extensively tested, highest quality software packages available today for both commercial and technical applications
- Allows customers to deploy systems with confidence, knowing their applications can grow and their investment in network technology, software, and training will be protected
- Makes it easy to deploy applications developed on SPARC platforms on other platforms

Performance and Scalability

Features

- Outstanding performance and functionality in a variety of application areas, including database, networking, groupware, and multiuser business applications
- Highly scalable symmetric multiprocessing (SMP)
- Multithreading

Benefits

- Provides maximum productivity for individuals and workgroups
- Accelerates application throughput by distributing tasks among multiple processors (MP)
- Delivers exceptional MP system price/performance and investment protection
- Enables a single application to be partitioned into independent components that can be executed simultaneously, reducing response time and increasing throughput

Reliability

Feature

- Proven and reliable network operating system

Benefit

- Maximum uptime for running business-critical applications



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Low-cost Data Management and Backup

Features

- Solstice DiskSuite provides data redundancy and enhanced disk system performance using RAID technology
- Journaling File System improves performance of directory operations and reduces file system check times during system restarts
- Solstice Backup automates network backup, recovery, and media management

Benefits

- Increases data availability and speeds system throughput
- Enhances system throughput and increases system availability
- Simplifies data administration, improves data security and availability

Global Networking and Resource Sharing

Features

- Connectivity for TCP/IP, NFS™, NetWare, IPX™/SPX, LAN Manager, and AppleTalk
- NFS

Benefits

- Enables complete corporate-wide connectivity and integration
- Provides easy transparent network access to remote file systems, applications, and data on heterogeneous computer systems

Security

Feature

- Simple Key Management for IP is a standard protocol that provides privacy and authentication services for data over the network

Benefit

- Allows for secure communications over the Internet or intranet, without requiring any changes to the application

Electronic Mail

Feature

- Sun Internet Mail Server, a high-performance, Internet-standard mail server that supports diverse types of e-mail clients from a single mail server

Benefit

- Provides fast e-mail response, scalability to support large numbers of users and large quantities of data



Internet Services

Features

- WebNFS is a robust and scalable file system that enables users to quickly access and share files over the Web
- Dynamic host configuration protocol (DHCP) allows administrators to easily add clients to the intranet by dynamically assigning IP addresses
- HotJava Browser provides an easy-to-use, customizable user interface
- Sun WebServer

Benefits

- Enables users to quickly access and share files over the Web
- Eliminates need for administrator to assign IP addresses manually to each client
- Provides easy-to-use interface for installing software, performing web-based administration tasks, and accessing data over the Web
- Provides fast response for accessing data over the Internet or when performing Web-based administration tasks

PC Integration and PC Interoperability

Solaris™ PC NetLink 1.0 software, formerly code named Project Cascade, is a software product that allows Sun servers to run native Microsoft Windows NT 4.0 network services on the Solaris Operating Environment software. Solaris PC NetLink software provides Microsoft Windows NT naming, authentication, file, and print services on Sun Enterprise servers, increasing the reliability, scalability, and manageability of Microsoft Windows NT networks.

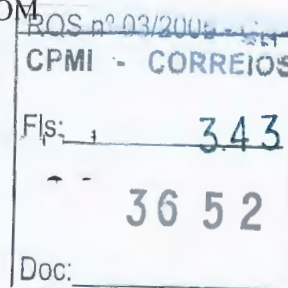
Solaris PC NetLink software is a key addition to Sun's Microsoft Windows NT interoperability product line. Based on AT&T's Advanced Server for UNIX product, Solaris PC NetLink software provides transparent connectivity into Microsoft Windows NT network environments, allowing customers to replace Microsoft Windows NT servers with the more reliable and scalable Sun solution. Solaris PC NetLink 1.1 software adds support for Solaris 7 Operating Environment (SPARC Platform Edition and Intel Platform Edition) and will be included in the Solaris Easy Access Server 3.0 (SEAS 3.0) product which is available with any WGS.

Sun's strategy is to support any client, including PCs, Macintoshes, UNIX workstations, and Java technology-based Network Computers. Because PCs are by far the most common desktop, Sun is focusing its integration strategy on PC services and PC interoperability.

To achieve this strategy, Sun remains focused on supporting open industry standards. By supporting interoperability and open standards, Sun is able to provide the same services (network services, including file, print, directory, security, messaging, and objects) required by PC clients.

Examples of open industry standards include:

Network	TCP/IP, FTP, HTTP, Telnet
File and print	SMB, CIFS, NFS, WebNFS
Directory	LDAP, X.500, DNS
Security	X.509, Kerberos, SSL, IPV6Sec
E-mail	SMTP, MIME, POP, IMAP
Objects	IIOP (CORBA), RMI, DCOM



Data Access

X/Open® XA, OLEDB/ODBC,
Java Database Connectivity (JDBC™)

Management

SNMP, CIM, WBEM, Java



PC Interoperability Features in the Solaris 7 and Solaris 2.6 Operating Environments

File/Print	
• Solaris PC NetLink (Cascade)	Allows Sun servers to run native Windows NT 4.0 network services on the Solaris Operating Environment software. Solaris PC NetLink provides Windows NT naming, authentication, file, and print services on Sun Enterprise servers. Software installed only on server, not on the client. No per client licensing.
• SunLink PC (TotalNET)	This server-side software allows a Sun server to provide file and print services to PCs running LAN Manager or Novell NetWare and Macintosh systems running AppleTalk. Nothing is required on the client.
• Solstice NFS Client	This client software allows a PC running Microsoft Windows 95 or Microsoft Windows NT to use NFS file and print services on a network without having to install and pay for additional network applications and functionality that the average user does not require. It provides higher performance and more robust services than Syntax TotalNET, but requires changes to the client.
E-mail	
• Sun Internet Mail Server (SIMS)	SIMS supports IMAP4 and POP3. Most PC e-mail solutions today, including Microsoft Exchange, support POP3. Eventually, the industry will move to IMAP4, which is the Internet mail standard.
• Solstice NFS Client	Solstice NFS Client allows a PC running Microsoft Windows 95 or Microsoft Windows NT to use NFS file and print services. It provides higher performance and more robust services than Syntax TotalNET, but requires changes to the client.

Future Interoperability Features

Management	
• Manage PC clients	Sun's ISVs, including Computer Associates (CA) and Tivoli, offer best-of-breed software tools for managing PC clients. In addition, once these are enhanced with Java technology, these products can be integrated into the Solstice family of tools. Over 40 management ISVs, including CA and Tivoli, will enhance their applications with Java Management API (JMAPI).
• Manage from anywhere, manage from a PC	Sun's Solstice tools are being enhanced with Java technology and will soon conform to the Java Management API (JMAPI). That means they will be managed over the Web from any console that has a browser enabled by Java technology.

System Management



Ordering Information

Ordering the Sun Enterprise™ 450 Server

The Sun Enterprise™ 450 server is an assemble-to-order product. Assemble-to-order Sun Enterprise 450 configurations begin with a base chassis that includes two power supplies, a CD-ROM drive, a floppy drive, two internal and one external UltraSCSI buses, PCI and EPCI buses, 20 internal hard disk bays, and a removable media bay for one internal tape device. Valid system configurations must include at least one CPU module, at least two identical memory options, and at least one internal disk.

Assemble-to-order Configurations

Assemble-to-order configurations are customized from the options listed below. Valid sales orders must specify at least one CPU module, at least two identical memory options, and at least one internal disk.

Note: When ordering CPU, memory and disk for assemble-to-order configurations, use the appropriate part number without the preceding "X."

All customer-specified system components and buildable options that appear on a sales order on the same line item with a base system will be installed in that system at the factory for no additional charge.

Assemble-to-order sales orders for the Sun Enterprise 450 server must specify:

- The family part number (A25) as the first entry in a line item
- A server base part number
- System components: CPU module, memory, and internal disk
- Internal options: memory, I/O cards, and so on

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Base Systems

Order Number	Title and Description
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A25-BA

Sun Enterprise 450 server zero base

The Sun Enterprise 450 server base configuration includes:

- Sun Enterprise 450 server tower enclosure (rackmountable)
- SunCD™ 32
- 1.44-MB floppy drive
- Two 560-watt, hot-swap power supplies
- Two external 68-pin Fast/Wide SCSI port
- FastEthernet port (either RJ45 or MII)
- Parallel and serial ports
- Slots for:
 - Four 250-MHz/1-MB, 300-MHz/2-MB or 400-MHz/4-MB UltraSPARC™-II CPUs
 - 8 memory options (16 memory modules)
 - 10 PCI option cards
 - One 5.25-inch half height removable drive
 - One additional hot swap power supply
- Disk cage for up to 20 low profile UltraSCSI hot swap disks with a standard backplane for four drives
- Supports 9.1-GB, 10000-rpm disks and 18.2-GB, 10000-rpm disks
- Solaris™ server license
- 3-year, second-day, on-site hardware warranty *
- 90-day software SunSpectrum™ warranty *

* Product warranty may vary by geographical location. Check with the local SunService™ representative for applicable warranty coverage.

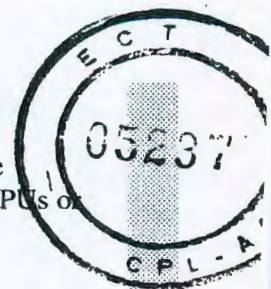
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Ordering Process for Systems and Factory-Installed Components

Follow the steps listed below to prepare a complete and valid sales order. Steps 1 to 4, 6, and 11 are required. Step 5 is required if more than four internal disks are ordered. Step 10 is required if four CPUs or more than four internal disks are ordered. Steps 7 to 9 and 12 to 14 are optional.



Step 1: Enter the Family Part Number (required)

Specify one: **A25** Sun Enterprise 450 server

Step 2: Order Base Package (required)

Order one: **A25-BA** Sun Enterprise 450 server base

Step 3: Order CPU Modules (1 required, maximum of 4)

Order one to four:	2230A	250-MHz UltraSPARC-II CPU module with 1-MB Ecache and DC to DC converter
	2240A	300-MHz UltraSPARC-II CPU module with 2-MB Ecache and DC to DC converter
	2244A	400-MHz UltraSPARC-II CPU module with 4-MB Ecache and DC to DC converter

- Notes:
- All CPUs ordered for one system must be the same part number.
 - A third power supply is recommended when 4 CPUs are installed.

Step 4: Order Memory (2 required, maximum of 8)

Order two, four, six or eight:	7002A	64-MB ECC memory (2 x 32-MB DIMMs)
	7003A	128-MB ECC memory (2 x 64-MB DIMMs)
	7004A	256-MB ECC memory (2 x 128-MB DIMMs)
	7005A	512-MB ECC memory (2 x 256-MB DIMMs)

- Notes:
- Each memory option includes 2 DIMMs.
 - Each Sun Enterprise 450 server order must include a minimum of 2 memory options (4 DIMMs).
 - Maximum memory configuration: 16 DIMMs (4 groups of 4).
 - DIMMs must be added in matched groups of 4 (e.g., 2 x 7005A).
 - Order additional memory options in pairs.
 - For best performance, systems should be configured with 4 or 8 identical memory options (8 or 16 DIMMs).

Ordering Information

Step 5: Order Internal Storage Expansion Option (may be required, maximum of 2)



- Order one or two:
- (X)6601A Eight-bay storage expansion option
 - (X)6602A Eight-bay storage expansion option with SRC/P Intelligent SCSI RAID Controller

Notes:

- The Sun Enterprise 450 server system base provides 4 drive-ready internal disk bays. If more than 4 internal disks are to be installed in the server, then 1 or more internal storage expansion options are required.
- One (X)6601A or (X)6602A options must be installed to support 5 to 12 drives.
- Two (X)6601A or (X)6602A options must be installed to support 13 to 20 drives.
- When installing 5 to 12 disks without SRC/P, order one (X)6601A option. When installing 13 to 20 disks without SRC/P, order two (X)6601A options.
- Until SRC/P boot support is available, in addition to drives installed in (X)6602A, at least 1 internal drive must be installed for booting.
- When installing 1 to 8 disks with SRC/P, order one (X)6602A. At least one additional drive is still needed in one of the first 4 drive slots for booting.
- When installing 9 to 16 disks with SRC/P, order two (X)6602As. At least one additional drive is still needed in one of the first four drive slots for booting.
- Maximum of two (X)6601A or (X)6602A options per system.
- Each (X)6601A or (X)6602A uses one PCI slot (either 32 or 64 bit).
- A third power supply is recommended when SRC/P is installed.

Step 6: Order Internal Disks (1 required, maximum of 20)

- Order one to twenty:
- (X)5229A 9.1-GB, 7200-rpm, hot-swap UltraSCSI disk drive
 - (X)5234A 9.1-GB, 10000-rpm, hot-swap UltraSCSI disk drive
 - (X)5237A 18.2-GB, 10000-rpm, hot-swap UltraSCSI disk drive

Notes:

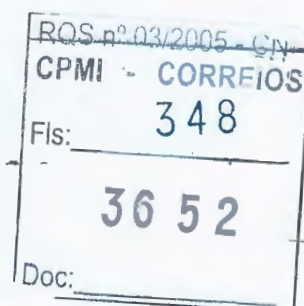
- Internal disks may be added individually.
- Maximum configuration: 20 internal disks.
- One (X)6601A or (X)6602A 8-bay storage expansion option must be installed to support 5 to 12 disks.
- Two (X)6601A or (X)6602A 8-bay storage expansion options must be installed to support 13 to 20 disks.

Step 7: Order Internal Removable Storage Device (optional, maximum of 1)

- Order one internal removable media device:
- (X)6286A 12 to 24-GB, 4-mm DDS-3 tape drive
 - (X)6213A 7 to 14-GB, 8-mm tape drive
 - (X)6107A 4 to 8-GB SLR tape drive

Notes:

- Maximum of one internal 5.25-inch, half-height tape drive may be installed.



Step 8: Order PCI Host Adapters and Network Interface Cards (optional)



- | | | |
|--------------------|----------|---|
| Order up to ten: | (X)6540A | Dual-channel single-ended UltraSCSI host adapter, PCI |
| | (X)6541A | Dual-channel differential UltraSCSI host adapter, PCI |
| Order up to eight: | (X)1032A | 10/100BASE-T Fast/Wide UltraSCSI adapter, 1.0, PCI |
| | (X)1033A | SunFastEthernet™ controller, PCI |
| Order up to seven: | (X)6729A | Single-loop PCI FC-AL host adapter (<i>see note, below</i>) |
| Order up to six: | (X)1152A | SunFDDI™/P single-attach adapter, PCI |
| | (X)1153A | SunFDDI/P dual-attach adapter, PCI |
| | (X)6542A | SRC/P Intelligent SCSI RAID controller to support external Sun StorEdge MultiPack systems. (See step 9 for additional SRC/P configuration information.) |
| Order up to four: | (X)1034A | Sun QFE/P Sun Quad FastEthernet™ controller, PCI |
| | (X)1154A | Sun TRI/P™ token ring interface, PCI |
| | (X)1155A | Sun HSI/P™ high-speed serial interface, PCI |
| | (X)1156A | Sun SAI/P multiport serial interface, PCI |
| | (X)3668A | PGX32 graphics card, PCI |
| Order up to two: | (X)1141A | Sun Gigabit Ethernet card, PCI |
- Notes:
- Maximum configuration: 10 PCI cards less any PCI slots occupied by Sun Enterprise 450 server 8-disk backplanes.
 - Note that each 8-slot disk backplane installed in a Sun Enterprise 450 server occupies a PCI slot.
 - 6729A, the single-loop PCI FC-AL host adapter, requires Solaris 2.6 Operating Environment or a later operating system.

Ordering Information

Step 9: Sun StorEdge SRC/P Intelligent SCSI RAID Controller™ (optional)



- Order up to six:
- (X)6542A SRC/P Intelligent SCSI RAID controller to support external Sun StorEdge MultiPack systems.
 - X3832A 2-meter SCSI data cable to connect SRC/P controller to external Sun StorEdge MultiPack systems.

Notes:

- Up to 6 (X)6542A options may be installed in the Sun Enterprise 450 server to control external Sun StorEdge MultiPack systems. Each (X)6542A or (X)6602A occupies a PCI slot. Therefore, if two (X)6602A options (the 8-disk internal storage expansion kit with SRC/P) are installed, then up to 4 (X)6542A options may be installed.
- Each (X)6542A includes 2 external 2-meter SCSI data cables and can control 2 external Sun StorEdge MultiPack systems. To connect a third MultiPack to an (X)6542A, order X3832A.
- A third power supply is recommended for Sun Enterprise 450 servers using Sun StorEdge SRC/P.

Step 10: Order Additional Power Supplies (2 are supplied with the Sun Enterprise 450 server base system; order up to 1 additional power supply)

- Order one:
- 9682A 560-watt universal power supply

Notes:

- Maximum configuration: 3 power supplies (2 are standard).
- A fully loaded system will operate on 2 power supplies. The third power supply provides redundancy for greater system availability.
- A third power supply is recommended for systems in which CPUs, memory, PCI cards, and internal storage populate more than 50 percent of available slots.

Ordering Information

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Step 11: Order Power Cord/Country Kit (required, maximum of 1)



Order: X3XXL Power cord
X35XXA Type-5 Country Kit

- Notes:
- Order an X3XXL power cord if the system will not require a local graphics console.
 - Order an X35XXA Country Kit if the system will host a local graphics console.
 - See *Sun Enterprise 450 Server Options* for a list of available Power Cord and country kits.

Step 12: Order External Disk Storage Options (optional)

Order: See options list.

- Notes:
- One Sun StorEdge MultiPack or up to 4 Sun StorEdge UniPack disks may be attached to the system's Fast/Wide SCSI port.
 - Additional SCSI storage devices may be supported by PCI SCSI host adapters.

Step 13: Order External Tape Options (optional)

Order: See options list.

- Notes:
- Up to four external SCSI tape devices may be attached to the system's Fast/Wide SCSI port.
 - Additional SCSI tape devices may be supported by PCI SCSI host adapters.

Step 14: Order Other Options (optional)

Order: See options list.



Typical Sun Enterprise 450 Server Configuration

Sun Enterprise 450 server with internal SunCD 32, floppy, two power supplies, two 400-MHz UltraSPARC-II processors, 512-MB main memory, 12 internal disk bays, 72.8-GB internal disk storage, internal 7 to 14-GB, 8-mm tape drive, and local color graphics console with 17-inch monitor.

Quantity	Order Number	Description
1	A25	Sun Enterprise 450 server family
1	A25-BA	Sun Enterprise 450 server, zero base; SunCD 32, floppy, two 560-watt power supplies, Solaris server license; no CPU, memory, disk drives or tape drives
2	2244A	400-MHz UltraSPARC-II CPU module, 4-MB external cache
4	7003A	128-MB memory (2 x 64-MB DIMMs)
1	6601A	Eight-bay storage expansion option
8	5234A	9.1-GB, internal, hot-plug disk drive, 10000 rpm, 1 inch high
1	6213A	Internal 14-GB, 8-mm tape drive
1	3668A	PGX32™ color graphics frame buffer option
1	X7126A	17-inch entry color monitor
1	X3500A	Type-5 Country Kit, U.S.

Ordering Information

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Maximum Sun Enterprise 450 Server Configuration

Sun Enterprise 450 server with internal SunCD 32, floppy, four 400-MHz UltraSPARC-II CPUs, 4-GB main memory, 20 internal disk bays, 364-GB disk storage, 7 to 14-GB, 8-mm tape drive, three fully redundant power supplies, local graphics console with 17-inch monitor, and cabinet with rackmounting kit, seven available PCI slots to support network cards, and external storage options.

Quantity	Order Number	Description
1	A25	Sun Enterprise 450 server family
1	A25-BA	Sun Enterprise 450 server, zero base; SunCD 32, floppy, two 560-watt power supplies, Solaris server license; no CPU, memory, disk
4	2244A	400-MHz UltraSPARC-II CPU module, 4-MB external cache
8	7005A	512-MB memory (2 x 256-MB DIMMs)
2	6602A	Eight-bay storage expansion option with SRC/P controller card, internal and external SCSI cables
3	6542A	SRC/P Intelligent SCSI RAID Controller to support external storage MultiPacks
20	5237A	18.2-GB, internal, hot-plug disk drive, 10000 rpm, 1 inch high
1	6213A	Internal, 14-GB, 8-mm tape drive
1	3668A	PGX32 graphics card, PCI
4	6729A	Single Loop PCI FC-AL host adapter
1	9682A	560-watt power supply
1	X7126A	17-inch entry color monitor
1	X3500A	Type-5 Country Kit, U.S.
1	SG-XARY030A	72-inch Sun StorEdge expansion cabinet
1	X3800A	Power cord for Sun Enterprise expansion cabinet
1	X9690A	Sun Enterprise 450 server rackmounting kit

Ordering Information

Options



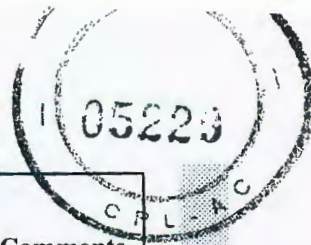
Below is a partial list of options available for the Sun Enterprise 450 system. Refer to the Sun Price Book for complete option listings, configuration notes, and ordering information. When no maximum number is listed, consult the configuration information for that option.

Part Number	Option Description	Maximum Number Supported per System	Comments
CPUs			
(X)2230A	250-MHz UltraSPARC-II CPU module with 1-MB Ecache	4	
(X)2240A	300-MHz UltraSPARC-II CPU module with 2-MB Ecache	4	
(X)2244A	400-MHz UltraSPARC-II CPU module with 4-MB Ecache	4	
Memory			
(X)7002A	64-MB, 60-ns memory expansion (2 x 32-MB DIMMs)	8	See memory configuration requirements
(X)7003A	128-MB, 60-ns memory expansion (2 x 64-MB DIMMs)	8	
(X)7004A	256-MB, 60-ns memory expansion (2 x 128-MB DIMMs)	8	
(X)7005A	512-MB, 60-ns memory expansion (2 x 256-MB DIMMs)	8	
Internal Storage Expansion Kit			
(X)6601A	Eight-bay internal storage expansion option	2	A third power supply is recommended when (X)6602A is installed
(X)6602A	Eight-bay storage expansion option with SRC/P Intelligent SCSI RAID Controller	2	
Internal Storage Devices			
(X)5229A	9.1-GB, 7200-rpm, 3.5 x 1 inch, low-profile UltraSCSI disk drive	20	
(X)5234A	9.1-GB, 10000-rpm, 3.5 x 1 inch, low-profile UltraSCSI disk drive	20	
(X)5237A	18.2 GB 10000 rpm, 3.5 x 1 inch, low-profile UltraSCSI disk drive	20	
Internal Removable Storage Devices			
(X)6286A	12 to 24-GB, 4-mm DDS-3 tape drive	1	
(X)6213A	7 to 14-GB, 8-mm tape drive	1	
(X)6107A	4 to 8-GB, SLR tape drive	1	

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Part Number	Option Description	Maximum Number Supported per System	Comments
External Storage Interfaces			
(X)6542A	Sun StorEdge SRC/P Intelligent SCSI RAID Controller to support external Sun StorEdge MultiPack systems	6	A third power supply is recommended for systems that include (X)6542A
(X)6540A	Dual-channel, single-ended UltraSCSI host adapter, PCI	10	
(X)6541A	Dual-channel, differential UltraSCSI host adapter, PCI	10	
(X)6729A	Single-loop PCI FC-AL host adapter—requires Solaris Operating Environment version 2.6 or later	7	
(X)1032A	SunSwift™, PCI (FastEthernet plus UltraSCSI)	8	
Network Interfaces			
(X)1032A	SunSwift, PCI (FastEthernet plus UltraSCSI)	8	
(X)1033A	SunFastEthernet, PCI	8	
(X)1034A	Sun QFE/P QuadFastEthernet, PCI	4	
(X)1141A	Sun GigabitEthernet PCI adapter 2.0	2	
(X)1152A	SunFDDI/P, single-attach, PCI	6	
(X)1153A	SunFDDI/P, dual-attach, PCI	6	
(X)1154A	Sun TRI/P token ring interface, PCI	4	
(X)1155A	Sun HSI/P high-speed serial interface, PCI	4	
(X)1156A	Sun SAI/P serial asynchronous interface, PCI	4	
X1157A	SunATM-155/MFiber PCI adapter	4	
X1158A	SunATM-155/UTP PCI adapter	4	
X1159A	SunATM-622/MFiber PCI adapter	4	
External Sun StorEdge Tape Libraries			
SG-XLIBDLT1-280G	280 to 560-GB Sun StorEdge L280 tape autoloader (desktop)	20	Sun StorEdge L1000, L1800, L3500 and L11000 tape libraries require the dual-channel differential SCSI controller, (X)6541A.
SG-XLIBDLT1-1TB-2	Sun StorEdge L1000 deskside tape library with one DLT™ 7000 tape drive	4	
SG-XLIBDLT4-1TB-2	Sun StorEdge L1000 deskside tape library with four DLT 7000 tape drives	4	
SG-XLIBDLT1R-1TB-2	Sun StorEdge L1000 rackmountable tape library with one DLT 7000 tape drive	4	
SG-XLIBDLT4R-1TB-2	Sun StorEdge L1000 rackmountable tape library with four DLT 7000 tape drives	4	
X6077A	Sun StorEdge L1800 with two DLT 7000 tape drives	4	
X6078A	Sun StorEdge L1800 with four DLT 7000 tape drives	4	
X6079A	Sun StorEdge L3500 with two DLT 7000 tape drives	4	
X6080A	Sun StorEdge L3500 with seven DLT 7000 tape drives	4	
SG-XLIBDLT4-11TB	Sun StorEdge L11000 tape library with four DLT 7000 tape drives	4	
SG-XLIBDLT16-11TB	Sun StorEdge L11000 tape library with 16 DLT 7000 tape drives	4	

Ordering Information

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Part Number	Option Description	Maximum Number Supported per System	Comments
Sun StorEdge Tape UniPack Systems			
SG-STAPSLR-010A	4-GB SLR tape drive UniPack	20	
SG-XTAP4MM-011A	12-GB, 4-mm DDS-3 tape drive in a UniPack desktop enclosure	20	
SG-XTAP8MM-011A	20-GB, 8-mm drive in a UniPack desktop enclosure	20	
SG-XTAP8MM-011A	20-GB, 8-mm drive in a UniPack desktop enclosure	20	
Sun StorEdge Disk Drive UniPack Systems			
SG-XDSK010A-9G	9.1-GB, 7200-rpm StorEdge UniPack	20	
SG-XDSK010B-18G	18.2-GB, 7200-rpm Sun StorEdge UniPack	20	
Sun StorEdge FlexiPack Systems			
SG-XTAPSLR-020A	4-GB, SLR tape drive	20	
SG-XTAP4MM-021A	12-GB, 4-mm DDS-3 tape drive	20	
SG-XTAP4MM-031A	72-GB, 4-mm DDS-3 autoloader	20	
SG-XTAP8MM-020A	7-GB, 8-mm drive	20	
SG-XTAP8MM-021A	20-GB, 8-mm drive	20	
SG-XTAPDLT-020A	20-GB DLT 4000 tape drive	20	
SG-XTAPDLT-021A	35-GB DLT 7000 tape drive	20	
Expansion Drives for FlexiPack Systems			
X6106A	4-GB SLR5 internal tape drive for Ultra 30, 60, and FlexiPack		A maximum of one expansions drive may be installed in each Sun StorEdge FlexiPack
X6236A	20 to 40-GB, 8-mm internal tape drive for FlexiPack		
X6166A	32X internal CD-ROM drive for Ultra 30 and 60 systems		
X6212A	7-GB, 8-mm internal tape drive for Ultra 1, 2, 30, and 60 systems		
X6282A	12-GB, 4-mm DDS-3 internal tape drive for Ultra 1, 2, 30, 60, and FlexiPack		
External Sun StorEdge MultiPack Systems			
SG-XDSK020C-18G	Sun StorEdge MultiPack 18.2 GB, 2 x 9.1-GB, 10000-rpm disk drives	20	
SG-XDSK020C-36G	Sun StorEdge MultiPack 36.4 GB, 2 x 18.2-GB, 10000-rpm disk drives	20	
SG-XDSK040C-36G	Sun StorEdge MultiPack 36.4 GB, 4 x 9.1-GB, 10000-rpm disk drives	20	
SG-XDSK040C-72G	Sun StorEdge MultiPack 72.8 GB, 4 x 18.2-GB, 10000-rpm disk drives	20	
SG-XDSK060C-54G	Sun StorEdge MultiPack 54.6 GB, 6 x 9.1-GB, 10000-rpm disk drives	20	
SG-XDSK060C-109G	Sun StorEdge MultiPack 109.2 GB, 6 x 18.2-GB, 10000-rpm disk drives	20	

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Part Number	Option Description	Maximum Number Supported per System	Comments
Expansion Drives for Desktop MultiPacks			
X5229A	9.1-GB, 7200-rpm UltraSCSI expansion drive for MultiPack	4	
X5232A	18.2-GB, 7200-rpm UltraSCSI expansion drive for MultiPack	4	
Note: Up to six drives may be installed in a Sun StorEdge MultiPack. The maximum number of drives supported depends on the number ordered with the MultiPack option.			
External Differential SCSI Disk Storage			
SG-XARY144A-36G	36-GB (4 x 9.1-GB, 10000-rpm disks) Sun StorEdge A1000 tabletop or desktide with HW RAID controller	20 ¹	External Differential SCSI Disk Storage options require the Dual Channel Differential SCSI Controller, (X)6541A
SG-XARY144A-109G	109-GB (12 x 9.1-GB, 10000-rpm disks) Sun StorEdge A1000 tabletop or desktide with HW RAID controller	20 ¹	
SG-XARY151A-72G	72-GB (4 x 18-GB, 10000-rpm disks) Sun StorEdge A1000 tabletop or desktide with HW RAID controller	20 ¹	
SG-XARY151A-218G	144-GB (12 x 18-GB, 10000-rpm disks) Sun StorEdge A1000 tabletop or desktide with HW RAID controller	20 ¹	
SG-XARY146A-36G	36-GB (4 x 9.1-GB, 10000-rpm disks) Sun StorEdge A1000 for rackmounting in Sun StorEdge or Enterprise expansion racks	20 ¹	
SG-XARY152A-72G	72-GB (4 x 18-GB, 10000-rpm disks) Sun StorEdge A1000 for rackmounting in Sun StorEdge or Enterprise expansion racks	20 ¹	
SG-XARY145A-109G	109-GB (12 x 9.1-GB, 10000-rpm disks) Sun StorEdge D1000 tabletop or desktide	20 ¹	
SG-XARY153A-72G	72-GB (4 x 18-GB, 10000-rpm disks) Sun StorEdge D1000 tabletop or desktide	20 ¹	
SG-XARY153A-218G	218-GB (12 x 18-GB, 10000-rpm disks) Sun StorEdge D1000 tabletop or desktide	20 ¹	
SG-XARY147A-36G	36-GB (4 x 9.1 GB 10000-rpm disks) Sun StorEdge D1000 for rackmounting in Sun StorEdge or Enterprise expansion racks	20 ¹	
SG-XARY154A-72G	72-GB (4 x 18-GB 10000-rpm disks) Sun StorEdge D1000 array for rackmounting in Sun StorEdge or Sun Enterprise expansion racks	20 ¹	
SG-XARY366A-72G	72-GB Sun StorEdge A3500-Light (8 x 9.1-GB, 10000-rpm drives)	20 ¹	
SG-ARY370A-91G	91-GB Sun StorEdge A3500 (10 x 9.1-GB, 10000-rpm drives)	20 ¹	
SG-ARY372A-182G	182-GB Sun StorEdge A3500 (20 x 9.1-GB, 10000-rpm drives)	20 ¹	
SG-XARY360A-545G	545-GB Sun StorEdge A3500 (60 x 9.1-GB, 10000-rpm drives)	20 ¹	
SG-XARY374A-273G	273-GB Sun StorEdge A3500 (30 x 9.1-GB, 10000-rpm drives)	20 ¹	
¹ Requires Solaris 2.6 Operating Environment or a more recent version of the Solaris operating system			

Ordering Information



Part Number	Option Description	Maximum Number Supported per System	Comments
External Differential SCSI Disk Storage (cont.)			
SG-ARY380A-182G	182-GB Sun StorEdge A3500 (10 x 18.2-GB, 10000-rpm drives)	20 ¹	
SG-ARY382A-364G	180-GB Sun StorEdge A3500 (20 x 18.2-GB, 10000-rpm drives)	20 ¹	
SG-XARY384A-546G	546-GB Sun StorEdge A3500 (30 x 18.2-GB, 10000-rpm drives)	20 ¹	
¹ Requires Solaris 2.6 Operating Environment or a more recent version of the Solaris operating system			
External Fiber Channel Disk Storage			
SG-XARY530A-91G	91-GB Sun StorEdge A5100 (5 x 18.2-GB 7200-rpm half-height FC-AL drives)	7 ¹	External Fiber Channel disk storage options require the single-loop PCI FC-AL host adapter, (X)6729A.
SG-XARY530A-254G	254.8-GB Sun StorEdge A5100 (14 x 18.2-GB 7200 rpm half-height FC-AL drives)	7 ¹	
SG-XARY531A-254G	254.8-GB Sun StorEdge A5100 (14 x 18.2-GB 7200-rpm half-height FC-AL drives)	7 ¹	
SG-XARY533A-509G	509.6-GB Sun StorEdge A5000 including two 254.8-GB arrays (14 x 18.2-GB 1.625-inch 7200-rpm FC-AL drives)	7 ¹	
SG-XARY533A-1528G	1528.8-GB Sun StorEdge A5100 including six 254.8-GB arrays (14 x 18.2-GB 1.625-inch 7200-rpm FC-AL drives)	7 ¹	
¹ Requires Solaris 2.6 Operating Environment or a more recent version of the Solaris operating system			

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Part Number	Option Description	Maximum Number Supported per System	Comments
Other Options			
X180A	SunButtons - 32 key function I/O device	1	
X985A	Serial port Y splitter cable	1	
(X)1046A	SunSwitch—Gigabit Ethernet switch	*	
(X)3668A	PGX32 PCI graphics card	4	
X3800A	Power cord for EE cabinet, U.S.	1	
X3830A	4-meter SCSI cable; VHDC to 68-pin SCSI; for use with 6541A	*	
X3831A	10-meter SCSI cable; VHDC to 68-pin SCSI; for use with 6541A	*	
X3832A	2-meter SCSI data cable to connect SRC/P Controller to external Sun StorEdge MultiPack systems	6	
X3848A	Power cord for EE cabinet, international	1	
X3856A	Fast-wide 68-68 pin SCSI cable and geo-specific power cord	*	
X3857A	Fast-narrow 50-68 pin SCSI cable and geo-specific power cord	*	
X3872A	Video connector adapter, HD15 female to 13W3 male	2	
X7119A	19-inch color monitor	2	
X7121A	21-inch color monitor, 19.8 inch v.a.	2	
X7124A	24-inch wide screen color monitor	2	
X7126A	17-inch entry color monitor	2	
X9602A	Sun Enterprise cabinet floor brackets	1	
(X)9682A	560-watt hot-swap power supply	1	
X9690A	Sun Enterprise 450 server rackmounting kit	1	
Other Options (cont.)			
SG-XARY030A	72-inch Sun StorEdge expansion cabinet		
SOLMS-070W9999	Solaris 7 English server media kit, includes CD and documentation		
Note: The number of cables and Gigabit Ethernet switches required varies by configuration and is determined by the requirements of the individual configuration.			

Ordering Information

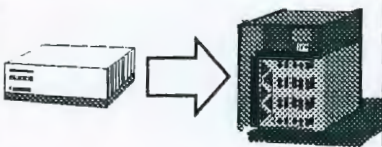
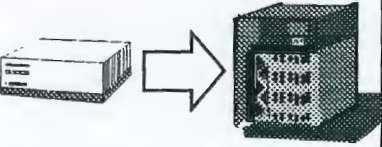
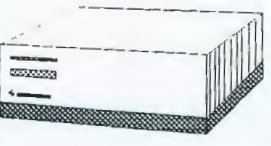


Upgrades

Sun offers customers a variety of flexible upgrade paths to the most popular Sun systems. Customers can choose among full system, non-full system, CPU and memory upgrades. To protect customers' investments, Sun upgrades allow customers to move as many components forward as possible. Existing investments in non-Sun hardware can be preserved by trading in non-Sun systems for Sun systems or CPU modules with competitive upgrades

System Upgrades

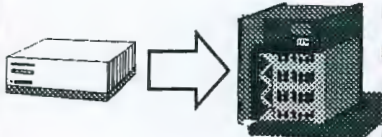
Partial System Upgrades (chassis)

UG14-5UNC-9S-000NK	Receive	Return
 Any Sun Enterprise 2 Model 1300 or 2300 to Sun Enterprise 450 server	 Sun Enterprise 450 server chassis, SunCD32, floppy, two power supplies, two DC/DC converters, four disk brackets; assume CPU, disk, and memory migrate	 Sun Enterprise 2 Model 1300 or 2300 chassis, and CD-ROM
UG14-A25-9S-000NK	Receive	Return
 Any UltraSPARC server with 7200-rpm, 1-inch high, 2.1-GB or 4.2-GB disk drives to Sun Enterprise 450 server	 Sun Enterprise 450 server chassis, SunCD32, floppy, two power supplies, four disk brackets, plus required choice of CPU; assume disk and memory migrate	 UltraSPARC server chassis, CPU, and CD-ROM

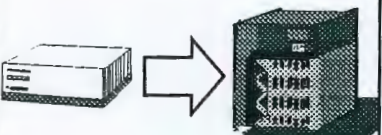
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UG14-A25-9S-000-BA	Receive	Return
 Any UltraSPARC or SPARCserver 20 system with 4 x 32-MB memory SIMMs to Sun Enterprise 450 server	 Sun Enterprise 450 server chassis, SunCD32, floppy plus required choice of CPU and internal drive; assume memory migrates	 UltraSPARC or SPARCserver 20 system including chassis, CPU, disk, and CD-ROM

Full System Upgrade

UG10-A25-BA	Receive	Return
 Any SPARCstation10 or earlier Sun server to Sun Enterprise 450 server	 Sun Enterprise 450 server zero base system plus required choice of CPU, memory, and disk	 Complete SPARCstation10 or earlier Sun server system including chassis, disk, and CD-ROM

Competitive System Upgrades

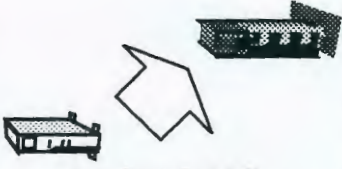
CU-PC-A25-BA CU-UX-A25-BA	Receive	Return
 Any Category 2 or 3 competitive PC or UNIX server to Sun Enterprise 450 server	 Sun Enterprise 450 server zero base system plus required choice of CPU, memory, and disk	 Any category 2 or 3 competitive server system including chassis, disk, and CD-ROM

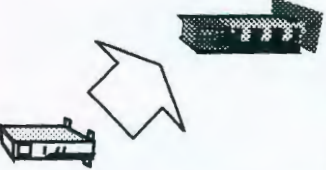
Ordering Information



Module Upgrade

UG-M22XX-M2244* UGFA-M22XX-M2244*	Receive	Return
 Any UltraSPARC 300-MHz CPU module to 400-MHz UltraSPARC-II CPU module with 4-MB Ecache and DC/DC converter	 UltraSPARC-II 400-MHz, 4-MB Ecache, CPU module, and DC/DC converter; installable only on Sun Enterprise 450 systems with 400-MHz/4-MB enabled motherboard	 UltraSPARC 300-MHz CPU module

UG-MXXXX-M2244* UGFA-MXXXX-M2244*	Receive	Return
 Any UltraSPARC 167/200/250-MHz CPU module to 400-MHz UltraSPARC-II CPU Module with 4-MB Ecache and DC/DC converter	 UltraSPARC-II 400-MHz, 4-MB Ecache CPU module and DC/DC converter; installable only on Sun Enterprise 450 systems with 400-MHz/4-MB enabled motherboard	 UltraSPARC 167/200/250-MHz CPU module

UG-MXXX-M300	Receive	Return
 Any UltraSPARC CPU module to 300-MHz UltraSPARC-II CPU Module with 2-MB Ecache and DC/DC converter	 300-MHz UltraSPARC-2 CPU module with 2-MB Ecache and DC/DC converter	 Any UltraSPARC CPU module

Ordering Information



CU-CONSL-A25-M2244* CUCONSLFA-A25M2244*	Receive	Return
 OR Any Cat 2 or 3 competitive system or CPU board to 400-MHz UltraSPARC-II CPU Module with 4-MB Ecache and DC/DC converter	 UltraSPARC-II 400-MHz, 4-MB Ecache CPU module and DC/DC converter; installable only on Sun Enterprise 450 systems with 400-MHz/4-MB enabled motherboard	 OR UltraSPARC 167/200/250-MHz CPU module

UG-MEM128-MEM512	Receive	Return
 Upgrade from 128 MB of Sun memory to 512-MB (4 x 128-MB Sun DIMM modules) memory	 512-MB (4 x 128-MB Sun memory DIMM modules) memory	 Any Sun memory SIMMs totaling 128 MB of memory

UGMB-A25AA-A25BA*	Receive	Return
250/300-MHz Motherboard 400-MHz Motherboard Upgrade from Sun Enterprise 450 250/300-MHz motherboard to Sun Enterprise 450 server 250/300/400-MHz enabled motherboard	 Sun Enterprise 450 250/300/400-MHz enabled motherboard	 Sun Enterprise 450 250/300-MHz motherboard

When to Install a Motherboard Upgrade

A motherboard upgrade may be required when upgrading CPU speed from 250-MHz or 300-MHz to 400-MHz, 4-MB CPU. New systems after 11/10/98 do not require this motherboard change. To learn whether the system requires a motherboard upgrade, follow these steps.

1. Using the **Sun Enterprise 450 Server Owner's Guide** complete the procedure in the section "How to Power Off the System."
2. Bring the system to the ok prompt. Use the **Sun Enterprise 450 Server Owner's Guide**, and follow Steps 1 through 7 in the procedure, "How to Initiate a Reconfiguration Boot."



3. When the ok prompt is displayed, enter the command: `ok cd /`
4. Enter the following command for the list of data about the system: `ok .prp`

Examine the output listed for the model property. If the system board is not part number 501-5270 (or if there is no part number listing), you cannot install the UltraSPARC II 400-MHz module. You will need to order a new motherboard UGMB-A25AA-A25BA that is 400-MHz ready. Contact your local sales representative to order this new board.

Ordering Process for Chassis and Base System Upgrades

The Sun Enterprise 450 server is a configure-to-order product. All required customer-specified system components and configurable options appearing on a customer's order with a base system will be installed at the factory for no additional charge.

As with other Sun configure-to-order systems, Sales Orders for upgrading to the Sun Enterprise 450 server specify:

- The family part number as the first entry in a line item
- A full system upgrade or non-full system upgrade
- Required system components—country kit or power cord
- Internal (configured) options—CPU, memory, disk, storage expansion kits, I/O cards, etc.
- External (non-configured) options

Sun Enterprise 450 Server Non-Full System Upgrades

Non-full system upgrades require migration of Sun Enterprise 450 server-compatible components from the Sun server being upgraded (i.e., 300-MHz UltraSPARC CPU modules; 7200-rpm, 1-inch high, 2.1-GB or 4.2-GB disk drives; 32-MB or greater memory DIMMs). Valid non-full system upgrade orders must declare the compatible components that are migrating using Configtool 4.4. A Configuration List Report generated by Configtool must be attached to any non-full system upgrade quote to the customer. The following are Sun Enterprise 450 server non-full system upgrades:

Order Number	Title and Description
UG14-5UNC-9S-000NK UG14-A25-9S-000NK UG14-A25-9S-000-BA	Tower system—non-full system upgrade to Sun Enterprise 450 server in deskside tower enclosure includes: • 3.5-inch floppy disk • SunCD 32 • Four internal 3.5-inch x 1-inch hot-swap UltraSCSI drive bays • Fast/Wide SCSI port • 10/100 Ethernet • Two 560-watt, hot-swap power supplies • Solaris Server license • 3-year second day, on-site hardware warranty • 90-day software SunSpectrumSM warranty • Assumes CPU, disk, or memory is migrated or ordered see the previous section for a detailed description by upgrade part number



Sun Enterprise 450 Server Full System Upgrades

Order Number	Title and Description
UG10-A25-BA CU-PC-A25-BA CU-UX-A25-BA	Sun Enterprise 450 server CTO zero base system in desktide tower enclosure includes: • 3.5-inch floppy disk • SunCD 32 • Four internal 3.5-inch x 1-inch hot-swap UltraSCSI drive bays • Fast/Wide SCSI port • 10/100 Ethernet • Two 560-watt, hot-swap power supplies • Solaris server license • 3-year second day, on-site hardware warranty • 90-day software SunSpectrum warranty • Choice of CPU, memory, and internal drive for list of options

Ordering Information

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To order:

Follow the steps listed below to prepare a complete and valid Upgrade Sales Order.

Step 1: Enter the Family Part Number

Specify: **UG-A25** Sun Enterprise 450 server upgrades

Step 2: Order Base Package

Order: **UG14-5UNC-9S-000NK** Sun Enterprise 450 server chassis only

UG14-A25-9S-000NK Sun Enterprise 450 server, chassis and choice of 400MHz, 4-MB Ecache; 300-MHz, 2-MB Ecache; or 250-MHz, 1-MB Ecache CPU

UG14-A25-9S-000BA Sun Enterprise 450 server, chassis and choice of 400-MHz, 4-MB Ecache; 300-MHz, 2-MB Ecache; or 250-MHz, 1-MB Ecache CPU and choice of internal drive

UG10-A25-BA* Sun Enterprise 450 server CTO base system, no CPU, memory or drive

CU-PC-A25-BA* Sun Enterprise 450 server CTO base system, no CPU, memory or drive

CU-UX-A25-BA* Sun Enterprise 450 server CTO base system, no CPU, memory or drive

***UG-RMA** RMA Kit required for CTO base system

Step 3: Order CPU (required for full system CTO or UG14-A25 partial system)

Order one to four: **2230A** 250-MHz UltraSPARC-II CPU module with 1-MB Ecache

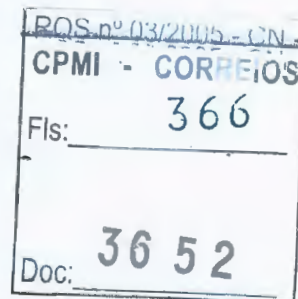
2240A 300-MHz UltraSPARC-II CPU module with 2-MB Ecache

2244A 400-MHz UltraSPARC-II CPU module with 4-MB Ecache

Notes:

- 1 to 4 CPUs can be installed in a system
- All CPUs ordered for one system must be the same processor speed and must match the CPU that is being migrated in non-full system upgrades or in the base system

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Step 4: Order Memory (required for full system CTO)

Order two, four, six or eight:	7002A	64-MB ECC memory (2 x 32-MB DIMMs)
	7003A	28-MB ECC memory (2 x 64-MB DIMMs)
	7004A	256-MB ECC memory (2 x 128-MB DIMMs)
	7005A	512-MB ECC memory (2x 256-MB DIMMs)

Notes:

- Memory is configured with 4 identical memory DIMMs)
- Maximum memory configuration: 16 DIMMs (4 groups of 4)
- Each memory option includes two DIMMs
- DIMMs must be added in matched groups of four (e.g., 2, 4, or 6 x 7002A)
- For best performance, systems should be configured with 8 or 16 identical DIMMs (add 2 or 6 identical memory options)

Step 5: Order Internal Storage Expansion Option (may be required, maximum of 2)

Order one or two: **(X)6601A** Eight-bay storage expansion option

Notes:

- The Sun Enterprise 450 server system base provides four drive-ready internal disk bays. If more than four internal disks are to be installed in the server, then one or more internal storage expansion options are required.
- When installing 5 to 12 disks, order one 6601A.
- When installing 13 to 20 disks, order two 6601As.
- Maximum of two per system
- Each 6601A uses one PCI slot (either 32- or 64-bit)
- A second power supply is a prerequisite for installing a 6601A

Step 6: Order Internal Disks (required for full system CTO)

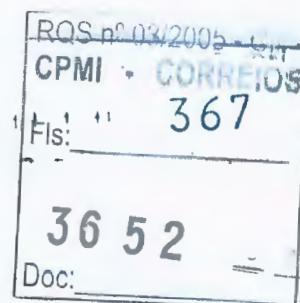
Order: **5229A** 9.1-GB, 7200-rpm, hot-swap UltraSCSI disk drive
 5234A 9.1-GB, 10000-rpm, hot-swap UltraSCSI disk drive

Notes:

- Internal disks may be added individually.
- Maximum configuration: 20 internal disks
- One 6601A 8-bay storage expansion option must be installed to support 5 to 12 disks
- Two 6601A 8-bay storage expansion options must be installed to support 13 to 20 disks
- A second power supply is required if 6601A is installed

Steps 7 through 13 are identical to the New System orders and documented in that section. See "Ordering Information" for Sun Enterprise 450 systems in the earlier section.

Ordering Information



Step 14: Submit "Sun Enterprise 450 Component Migration Assessment Form" with Order (Required)

Obtain assessment from Configtool 4.4: UG14-5UNC-9S-000NK UG14-A25-9S-000NK UG14-A25-9S-000BA Valid Non-Full System upgrade orders must declare the compatible components that are migrating using Configtool 4.4.



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Service and Support

The SunSpectrumSM 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 SolarisTM Operating Environment software, and telephone support for SunTM 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 EnterpriseTM 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
Local customer support management	No	Yes	No	No
Personal technical account support	Yes	Yes	Option	No
SunStart TM installation service	Yes	No	No	No
Account support plan	Yes	Yes	No	No
Software release planning	Yes	No	No	No
On-site account reviews	Monthly	Semiannual	No	No
Skills assessment	Yes	No	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	Option
7-day/24-hour on-site coverage	Yes	Option	Option	N/A
7-day/12-hour on-site coverage	No	Option	No	No
5-day/24-hour on-site coverage	No	Option	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
Coverage / Response Time (cont.)				
Customer-defined priority setting	Yes	Yes	Yes	Option
• 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
2-hour on-site response	Yes	Option	Option	N/A
Additional contacts	Option	Option	Option	Option
Premier Support Features				
Mission-critical support team	Yes	For urgent problems	No	No
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
Hardware Support Delivery				
Replacement hardware parts	On-site technician	On-site technician	On-site technician	Courier
Two day parts delivery	N/A	N/A	N/A	Yes
Overnight parts delivery	N/A	N/A	N/A	Option
Same-day parts delivery	Yes	Yes	Yes	Option
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

Service and Support

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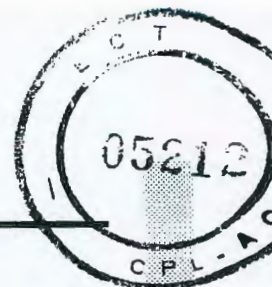
Glossary



Glossary

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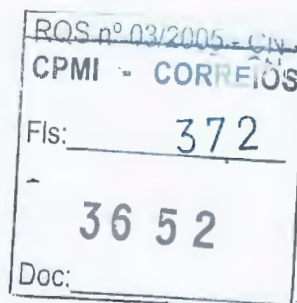


All materials will be available on SunWIN except where noted otherwise.

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Powerpack				
– Sun Enterprise™ 450 Server <i>Just the Facts</i>	Reference Guide (this document)	Training, Sales Tool	SunWIN, Reseller Web	71649
– Sun Enterprise 450 Server <i>Customer Presentation</i>	Customer Presentation and Notes (in Four Parts)	Sales Tool	SunWIN, Reseller Web	73645, 73649, 73653, 73657
References			web site	
– Sun Product Intro: Sun Enterprise 450 and HPC 450 Servers	Introduction E-mail	Sales Tool	SunWIN, E-mail, Reseller Web	95455
– Sun Product Intro: Sun Enterprise 450 and HPC 450 Servers	Introduction E-mail	Sales Tool	SunWIN, E-mail, Reseller Web	95455
– Sun Workgroup Server <i>Product Line Overview</i>	Quick Reference Card	Sales Tool	SunWIN, Reseller Web, First Resort	24517
– Sun Workgroup Server/ <i>Competitive Summary</i>	Quick Reference Card	Sales Tool	SunWIN, Reseller Web, First Resort	24515
– Workgroup Server Sales and Marketing Tools Guide	Reference Guide	Sales Tool	SunWIN	88195
– Product: 400-MHz Sun Enterprise 450 Server TPC-C Results, 2/2/99	Product Performance Information	Sales Tool	SunWIN	99320
Presentations				
– Sun Solutions for the Enterprise Workgroup <i>Golden Pitch Presentation and Slide Notes</i>	Information on Product Launch	Sales Tool	SunWIN, Reseller Web	88148

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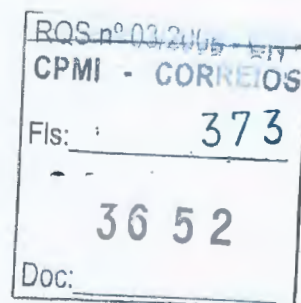


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Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Product Literature				
- Sun Enterprise 450 and 250 Server Architecture White Paper	Technical White Paper	Sales Tool	SunWIN, Reseller Web	72523
- Literature: Sun Enterprise 450 Server Data Sheet	Data Sheet	Sales Tool	SunWIN, Reseller Web, COMAC	63029
- Sun Enterprise 450 Server Performance Brief	Product Brief	Sales Tool	SunWIN, Reseller Web	74025
- Solaris for ISPs™ Product Brief	Product Brief	Sales Tool	SunWIN	88146
- Sun Enterprise Server and Storage Family Brochure	Enterprise Server and Storage Family Brochures	Sales Tool	COMAC	BE607-1
- Sun Enterprise 450 Server Product Book, 10/97	Product Pricing Information	Sales Tool	SunWIN, Reseller Web	75933
- Product Update Bulletin: Sun Enterprise 450 Server Disk Support, 6/99	Product Update	Sales Tool	SunWIN, Reseller Web	104931
Competitive				
- Workgroup Server Competitive Brief	Competitive Brief	Sales Tool	SunWIN	53106
Success Stories				
- Success Story: Sun Enterprise 450 Workgroup Servers Get the Job for U.S. & Canadian Career Planning Web Site, 4/99	Customer Success Story	Sales Tool	SunWIN	103095
- Success Story: See's Candies' Sweet E-commerce Site Ramps Up on Sun Enterprise 450 Workgroup Server, 4/99	Customer Success Story	Sales Tool	SunWIN	103100
- PRODUCT: Sun Enterprise 450 EMC Compliance, 5/99	Customer Success Story	Sales Tool	SunWIN	103641
- Success Story: University of Scranton Upgrades Campus Intranet with Sun Enterprise 450 Workgroup Servers, 6/99	Customer Success Story	Sales Tool	SunWIN	106406
External Web Sites				
- UltraSPARC™ information	http://www.sun.com/sparc.html			
- Sun Enterprise 450 Server Information	http://www.sun.com/servers/workgroup/450/			

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Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Internal Web Sites				
- <i>Internal SE information</i>	http://edss.corp/workgroup/450.html http://edss.corp/workgroup/hwraid.html http://onestop.eng/hw/e450.shtml			
- <i>Competition Profiles (USA)</i>	http://nafo.corp/profiles/competitive.html			
- <i>Performance Information</i>	http://perfwww.eng			



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Sun Enterprise™

3500–6500 Servers



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Sun Enterprise™ 3500–6500 Server Positioning

Product Overview

The Sun Enterprise™ server family is ideally suited for mission-critical network computing environments. Family members range from the entry-level Sun Enterprise Ultra™ 5S workgroup server up to the mainframe-class Sun Enterprise 10000 server. This document focuses on the Sun Enterprise 3500–6500 servers. These servers represent the next generation of the popular Sun Enterprise 3000–6000 servers, which have been enhanced in the following areas:

- System expandability
- Improved availability for internal disks
- Higher datacenter storage density
- Improved availability with Dynamic Reconfiguration and Alternate Pathing
- Improved investment protection for the Sun Enterprise 3500–5500 with the enhanced Gigaplane™ system interconnect

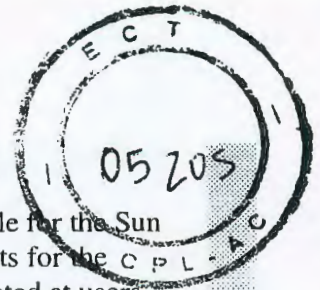
Product Line Enhancements in Sun Enterprise 3500–6500 Servers

Enhanced Gigaplane™ System Interconnect

All of the Sun Enterprise 3500–6500 servers include a revised Gigaplane system interconnect. The Sun Enterprise 3000–6000 server Gigaplane bus has a maximum speed of 84 MHz. This bus is sufficient to support the UltraSPARC™ processors running at up to 336 MHz when operating with a 4:1 processor-to-Gigaplane speed ratio. The enhanced Gigaplane system bus on the Sun Enterprise 3500–5500 servers is capable of running up to 100 MHz, delivering a throughput of 3.2 GB per second. The Gigaplane system bus must run at 100 MHz in order to support the new 400-MHz UltraSPARC processor with 4 MB of external cache, without changing the processor-to-Gigaplane speed ratio. This new 400-MHz/4-MB processor is supported on the Sun Enterprise 3500–5500. The Gigaplane on the Sun Enterprise 6500 server cannot run at 100 MHz and therefore does not support this 400-MHz/4-MB processor. The maximum Gigaplane speed on the Sun Enterprise 6500 will remain at 84 MHz. Please note, however, that a future UltraSPARC processor which runs faster than 336 MHz will be available for the Sun Enterprise 6500 as well as the Sun Enterprise 6000 servers. Please see the “System Architecture” section for further details regarding the enhanced Gigaplane system interconnect.

New System Boards

New system boards (CPU/memory boards, SBus I/O boards, Graphics I/O boards, and PCI I/O boards) are available to support the Sun Enterprise 3500–6500 servers. These boards are designed to support the enhanced Gigaplane system bus. In addition, the on-board fibre channel sockets on the Graphics I/O board have been modified to support 100-MB-per-second Fibre Channel Arbitrated Loop (FC-AL) connectivity. These systems boards may also be used in the Sun Enterprise 3000–6000 servers. Please see the “CPU/Memory Board” and “I/O Board” sections for further details.



Availability of Sun Elite3D m6 and Creator3D series 3 Graphics Support

The high-performance graphics previously available in the Ultra workstations is now available for the Sun Enterprise 3500–6500 workstations. These products address the graphics market requirements for the superworkstation to technical server segments. In Sun Enterprise servers, the product is targeted at users who need the high-performance compute, memory, I/O, and other server support features. These users need more—more graphics, more CPUs, more I/O, more disk—to get their jobs done.

New Disk Board

The 4.2-GB disk board used on the Sun Enterprise 4000–6000 servers has been replaced by an 8.4-GB disk board. This disk board may be used in the Sun Enterprise 4500–6500 servers as well as the Sun Enterprise 4000–6000 servers.

Faster CD-ROM

All of the Sun Enterprise 3500–6500 servers include a new internal Sun StorEdge™ CD32 drive. These 32X CD-ROM drives (the drive reads information 32 times as fast as a music CD) are faster than the 12X CD-ROM drives that were included with the Sun Enterprise 3000–6000 servers.

Dynamic Reconfiguration

Dynamic Reconfiguration (DR) is the ability to alter the configuration of a running system by bringing components online or taking them offline without disrupting system operation or requiring a system reboot. With the availability of Dynamic Reconfiguration, system boards can be logically and physically included into the system configuration, or logically deactivated and removed while the system is running.

Dynamic Reconfiguration for I/O boards is available for Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers with Solaris™ 2.6 Hardware: 5/98 and Dynamic Reconfiguration for CPU/memory boards is expected to be available with a future version of the Solaris Operating Environment™ in the first half of calendar year 1999. Please refer to the “Reliability, Availability, and Serviceability” section for more details on Dynamic Reconfiguration.

Alternate Pathing

Alternate Pathing (AP) is an extension of Dynamic Reconfiguration. It allows dynamic reconfiguration of the I/O boards without disrupting the network or external storage connection. Alternate Pathing increases overall system availability by maintaining crucial network and storage access for mission-critical environments. As with Dynamic Reconfiguration, the Alternate Pathing feature has previously been available on the Sun Enterprise 10000 server platform. These features are currently unavailable on any other general purpose UNIX® platform.

Alternate Pathing is available for Sun Enterprise 3000–6000 server and Sun Enterprise 3500–6500 servers with Solaris 2.6 Hardware: 5/98. Please refer to the “Reliability, Availability, and Serviceability” section for more details on Alternate Pathing.

Sun Enterprise™ 3500–6500 Server Positioning



Product Platform-Specific Enhancements

Sun Enterprise 3500 Server

- **Additional System Slot:**

The Sun Enterprise 3500 server is an enhanced Sun Enterprise 3000 server with an additional system slot. The Sun Enterprise 3500 server supports five system boards and can, therefore, support up to eight UltraSPARC processors and 8 GB of memory, whereas the Sun Enterprise 3000 server accommodates four system boards with a maximum of six processors and 6 GB of memory. Alternatively, the additional system slot can be used to provide greater I/O connectivity.

- **Internal FC-AL Drives:**

The Sun Enterprise 3500 server has two internal disk banks (four disks per disk bank) that support up to eight 9.1-GB FC-AL disks, each with dual port connections, while the Sun Enterprise 3000 server supports ten internal SCSI disks with a single connection. The number of internal disks supported in the Sun Enterprise 3500 server was reduced in order to provide room for the additional system slot in the rear of the server. The newer drives, however, provide greater throughput and can be configured to increase the disk redundancy when compared to the Sun Enterprise 3000 server. Please see the "Sun Enterprise 3500 System Cabinet" section for further details.

Sun Enterprise 4500 Server

The only differences from the current Sun Enterprise 4000 server are the enhanced Gigaplane system bus and the faster 32X CD-ROM mentioned in the "Product Line Enhancements" above.

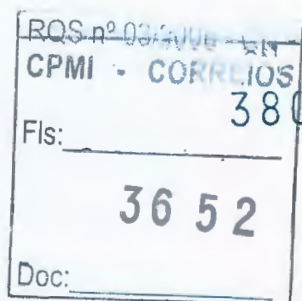
Sun Enterprise 5500 Server

In addition to the faster Gigaplane system bus and 32X CD-ROM changes, the Sun Enterprise 5500 server is now housed in a taller, data center cabinet. The new cabinet is 68 inches tall, compared to 56 inches for the Sun Enterprise 5000 cabinet. The taller cabinet was designed to support additional storage devices such as an additional Sun StorEdge A5X00 array without increasing the system footprint. The width and depth of the new data center cabinet remain the same as the Sun Enterprise 5000 cabinet.

Sun Enterprise 6500 Server

As with the Sun Enterprise 5500 server, the Sun Enterprise 6500 server includes the 32X CD-ROM and is also housed in a new, 68-inch data center cabinet, compared to 56 inches for the Sun Enterprise 6000 cabinet. As indicated earlier, the Gigaplane system bus on the Sun Enterprise 6500, unlike the Sun Enterprise 3500-5500 servers, does not run faster than 84 MHz.

Sun Enterprise™ 3500-6500 Server Positioning



Key Messages

The Sun Enterprise servers offer excellent performance, reliability, availability, and serviceability (RAS), along with expandability, investment protection, and upgradability (Performance excellence can be substantiated by comparing Sun Enterprise 6500 SPECint-rate95, SPECfp_rate95, and TPC-C results to competitive systems from HP, IBM, and DEC /Compaq).

- **Performance**

The Sun Enterprise 3500–6500 servers share a common architecture that is designed to offer balanced system performance. The systems feature outstanding integer and floating-point performance, supporting up to thirty UltraSPARC modules in the Sun Enterprise 6500 server. The system interconnect, the Gigaplane bus, delivers 2.68-GB-per-second throughput at 84 MHz and 3.2-GB-per-second at 100 MHz. High-speed networking is supported with integrated 10/100 Mb Ethernet and optional FDDI, ISDN, Token Ring, and ATM interfaces. Fast I/O capability is supported through either 64-bit/25 MHz SBus or 64-bit/66 MHz PCI channels.

- **Reliability, Availability, and Serviceability**

Extensive RAS capabilities are among the key strengths of the Sun Enterprise 3500–6500 servers. For details on these features, see “Reliability, Availability, and Serviceability” later in this document.

- **Expandability**

Sun Enterprise 3500–6500 servers can be expanded from small, entry-level configurations to system configurations that handle terabytes of data and thousands of users.

- **Scalability**

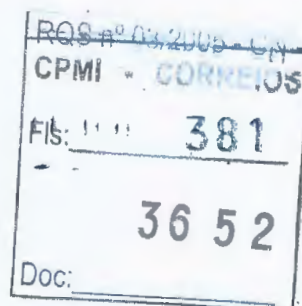
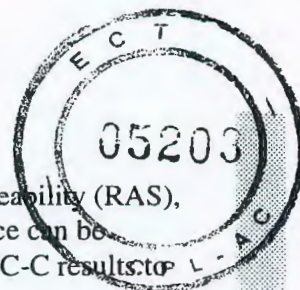
Sun Enterprise 3500–6500 servers are designed as highly modular systems. Customers can easily configure these systems to meet their application requirements by using the appropriate mix of CPU/memory boards and I/O boards. In addition, as their computing or I/O performance needs increase, customers can easily increase the capability of these systems by simply adding UltraSPARC modules, memory modules, or I/O boards. The high-throughput Gigaplane system bus and I/O architecture eliminate system bottlenecks and provide balanced system performance, even in a system with the maximum number of UltraSPARC modules or I/O devices.

- **Investment Protection**

Virtually all of the components used in the Sun Enterprise 3500–6500 servers are interchangeable. These components include CPU/memory boards, I/O boards, disk boards, UltraSPARC modules, memory modules, power/cooling modules, clock boards, and peripherals. Therefore, when upgrading to a larger system (for example, from a Sun Enterprise 4500 server to a Sun Enterprise 6500 server), customers can move these components from the existing system to the new system, protecting their investment. Even the previous-generation Sun Enterprise 3000–6000 server components can be carried over to the Sun Enterprise 3500–6500 server.

- **Upgradability**

The modular design of the Sun Enterprise 3500–6500 servers means that upgrading to new technologies and higher performance is easy. These systems are designed to support future generations of UltraSPARC processors, disk arrays, tape devices, and networking interface cards.



Sun Enterprise 3500–6500 Server Key Facts

- Each server can support multiple processors:

Sun Enterprise 3500	Sun Enterprise 4500–5500	Sun Enterprise 6500
1–8	1–14	1–30

- The Sun Enterprise 3500–6500 servers can be ordered with 250-MHz/4-MB or 336-MHz/4-MB UltraSPARC modules.
- The Sun Enterprise 3500–5500 servers can also be ordered with the 400-MHz/4-MB UltraSPARC modules.
- 167-MHz/0.5-MB, 167-MHz/1-MB, and 250-MHz/1-MB UltraSPARC modules are supported when carried over from existing Sun Enterprise 3000–6000 systems.
- The Gigaplane system bus delivers a throughput rate of 2.68 GB per second at 84 MHz (when using the 167-MHz, 250-MHz or 336-MHz processors). This throughput rate increases to 3.2 GB per second when running at 100 MHz (when using the 400-MHz processors in the Sun Enterprise 3500–5500).
- Several boards can be installed in each server:

Sun Enterprise 3500	Sun Enterprise 4500–5500	Sun Enterprise 6500
Up to 5 boards	Up to 8 boards	Up to 16 boards

- Five types of plug-in boards are available:
 - CPU/memory board
 - SBus, Graphics, and PCI I/O boards
 - Disk board (Sun Enterprise 4500, Sun Enterprise 5500, and Sun Enterprise 6500 only)
- CPU/memory boards can support up to two UltraSPARC modules and two memory banks (up to 2 GB).
- CPU/memory boards are hot pluggable. Hot-swap software support (Dynamic Reconfiguration) will be available with an upcoming version of the Solaris 7 Operating Environment.
- The SBus I/O board with FC-AL has three SBus slots, two empty FC-AL sockets, one fast/wide SCSI port, and one 10/100-Mb-per-second Ethernet port. This board has two SBus channels.
- Graphics I/O boards contain two SBus slots, one UPA slot for a Creator3D or Sun Elite3D graphics board, two empty FC-AL sockets, one fast/wide SCSI port, and one 10/100-Mb Ethernet port. This board has one SBus channel.
- PCI I/O boards have two PCI slots, on-board fast/wide SCSI, and 10/100-Mb-per-second Ethernet. This board has two PCI-66 (66-MHz, 64-bit) channels and two standard PCI (33-MHz, 32-bit) channels.
- I/O boards are hot swappable with the Alternate Pathing and Dynamic Reconfiguration software (Solaris 2.6 Hardware: 5/98).
- The 8.4-GB disk board contains two 4.2-GB, 7200-rpm, fast/wide SCSI-2 disk drives.
- The Sun Enterprise 3500–6500 servers support redundant, hot-swappable power/cooling modules.
- The Sun Enterprise 3500–6500 servers run on the following operating environments: Solaris 2.5.1 Hardware: 11/97 (or later), Solaris 2.6 Hardware: 3/98 (or later) or the Solaris 7 Operating Environment.
- Memory options include 256 MB (8 x 32-MB modules) and 1 GB (8 x 128-MB modules).
- Floor brackets may be installed to help prevent the Sun Enterprise 3500, Sun Enterprise 5500, Sun Enterprise 6500 servers, and Sun Enterprise expansion cabinet from shifting in the event of extreme floor movement.



Sun Enterprise™ 3500–6500 Server Positioning



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- The Sun Enterprise 4500 may be rack mounted into a Sun Enterprise expansion cabinet or Sun Enterprise 5500 or 6500 system cabinet.
- The Sun StorEdge A5X00 arrays, Sun StorEdge A1000/D1000 disk trays, Sun StorEdge FlexiPack removable storage trays, and Sun StorEdge Tape Libraries may be installed in the Sun Enterprise 5500 or Sun Enterprise 6500 system cabinet.

Performance Comparison

The table below illustrates the significant performance increases from the entry-level Sun Enterprise 3500 to the high-end Sun Enterprise 6500 server. (Results are based on 400-MHz, 4-MB Ecache modules for the Sun Enterprise 3500-5500 and 336-MHz, 4-MB Ecache modules for the Sun Enterprise 6500.) The SPECint-rate95, SPECfp-rate95, and LADDIS results are available at <http://www.specbench.org/results.html>.

Specifications	Sun Enterprise 3500 (8 CPUs)	Sun Enterprise 4500 (12 CPUs)	Sun Enterprise 5500 (12 CPUs)	Sun Enterprise 6500 (30 CPUs)
Processor	400 MHz/4 MB	400 MHz/4 MB		336 MHz/4 MB
Sun Microsystems relative OLTP performance (based on Solaris 7) ⁱ	7.92	10.72		14.74 (24 CPUs)
SPECint_rate95	1,234	1,828		3,480 (30 CPUs)
SPECfp_rate95	1,611	2,209		3,021 (30 CPUs)
LADDIS (based on Solaris 2.6)	11,681@15.8 (6 x 336 MHz CPUs)	21,192@15.7 (12 x 336 MHz CPUs)		28,993@20.4 (24 CPUs)
Linpack DP 1000 (based on Sol. 2.6)	2.95	4.50 (14 CPUs)		5.19 (30 CPUs)
Linpack DP Rmax (based on Sol. 2.6)	5.77	10.05 (14 CPUs)		17.89 (30 CPUs)

ⁱ Relative OLTP performance compared to an Sun Enterprise server with a single 336-MHz UltraSPARC processor with 4-MB Ecache

Sun Enterprise™ 3500-6500 Server Positioning

The following table shows a performance comparison of the SPARCserver™ 1000E, the Sun Enterprise 3000–5000, and Sun Enterprise 3500–5500 servers.

Performance Type	SPARCserver 1000E	Sun Enterprise 3000	Sun Enterprise 3500	Sun Enterprise 4000/4500/5000/5500
Relative CPU performance				
• integer	1 (8)	approx. 4.1 (6)	approx. 6.6 (8)	approx. 11.3 (14)
• floating point	1 (8)	approx. 5.3 (6)	approx. 8.2 (8)	approx. 12.6 (14)
System bus throughput	312 MB/sec.	2.68 GB/sec. @84 MHz 3.2 GB/sec. @100 MHzⁱ		
Memory latency	1200 ns	approx. 300 ns		approx. 300 ns
Networking performance	10 MB/sec.	100 MB/sec.		
I/O performance (aggregate)	1-to-4 SBuses, 100 MB/sec. each	1-to-6 SBuses, 200 MB/sec. each 1-to-6 PCI buses, 528 MB/sec. each	1-to-8 SBuses, 200 MB/sec. each 1-to-8 PCI buses, 528 MB/sec. each	1-to-14 SBuses, 200 MB/sec. each 1-to-12 PCI buses, 528 MB/sec. each
SCSI performance	10 MB/sec.	20 MB/sec.		
Fibre channel performance	25 MB/sec.	100 MB/sec.		

ⁱ The Sun Enterprise 3000–5000 servers require a Gigaplane field upgrade to run the Gigaplane system bus at 100 MHz.

The following table shows a performance comparison of the SPARCcenter™ 2000E and the Sun Enterprise 6000 and 6500 servers:

Performance Type	SPARCcenter 2000E	Sun Enterprise 6000/6500
Relative CPU performance		
• integer	1 (20)	approx. 5.6 (30)
• floating point	1 (20)	approx. 7.6 (30)
System bus throughput	625 MB/sec.	2.68 GB/sec. @84 MHz
Memory latency	1200 ns	approx. 300 ns
Networking performance	10 MB/sec.	100 MB/sec.
I/O performance	1 to 10 SBuses, 100 MB/sec.	1 to 30 SBuses, 200 MB/sec. each 1 to 12 PCI buses, 528 MB/sec. each
SCSI performance	10 MB/sec.	20 MB/sec.
Fibre channel performance	25 MB/sec.	100 MB/sec.

Product Line Summary

The Sun Enterprise family of servers is targeted at strategic markets chosen by Sun: manufacturing, finance, telecommunications, government, education, health care, retail, design automation, and oil and gas. The following pages describe how each server in the Sun Enterprise family has different characteristics and is therefore deployed in a different capacity within the target markets.

Target Markets and Users for the Sun Enterprise 3500 Server

The Sun Enterprise 3500 server is an affordable server with unprecedented power and reliability in its class. The Sun Enterprise 3500 server enables customers to deploy sophisticated business and technical applications with the kind of performance and reliability previously available only in very expensive, large-scale systems.

The Sun Enterprise 3500 server is ideal for customers who need application servers with tremendous network throughput and processing power, in addition to high reliability, availability, and serviceability. The Sun Enterprise 3500 server is also ideal for price-sensitive customers who need integrated storage or want the investment protection offered by an expandable family of servers. Typical Sun Enterprise 3500 server customers may already own a SPARCserver 20 or an entry-level SPARCserver 1000E system.

The Sun Enterprise 3500 server is recommended for running the new generation of network-based business programs, such as SAP R/3, Oracle Financials, or PeopleSoft Human Resources. The Sun Enterprise 3500 server is also recommended for use in technical environments. The Sun Enterprise 3500 server can be used for running dedicated, computation-intensive applications and high-end graphics applications, such as ECAD and MCAD.

Sun also offers the Sun HPC 3500 which combines the Sun Enterprise 3500 server with High-Performance Computing (HPC) software that allows the platform to scale in the most demanding technical and supercomputing environments.

The Sun Enterprise 3500 server is designed to be primarily a single-enclosure system; however, it does support external peripherals such as the Sun StorEdge A1000, D1000, A3500 and Sun StorEdge A5X00 products. The Sun Enterprise 3500 server should be recommended over the Sun Enterprise 450 server when the customer requires more than four CPUs and 4 GB of memory, or when the customer needs the expandability and investment protection offered by the Sun Enterprise 3500-6500 server family.

Target Markets and Users for the Sun Enterprise 4500 Server

The Sun Enterprise 4500 server is a versatile server with exceptional value and scalability for companies requiring an affordable business server with tremendous computing power, plus the ability to scale system performance and capacity as their needs grow.

The Sun Enterprise 4500 server is ideal for customers who need an enterprise-wide application server with high reliability, availability, and serviceability. Typical Sun Enterprise 4500 server customers may already own a six-to-eight CPU SPARCserver 1000E system.

The Sun Enterprise 4500 server is recommended for running business-critical applications that support thousands of users. These applications include large departmental databases, customer-management applications, or decision-support applications.

The Sun Enterprise 4500 server is recommended over the Sun Enterprise 3500 server if the customer's I/O and CPU growth requirements go beyond the capacity of the Sun Enterprise 3500 server.



Sun Enterprise™ 3500-6500 Server Positioning



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Target Markets and Users for the Sun Enterprise 5500 server

The Sun Enterprise 5500 server is a scalable and reliable datacenter server capable of running mission-critical applications, supporting thousands of users.

The Sun Enterprise 5500 server is ideal for customers who have mainframe-class system requirements. With features previously available only in proprietary fault-tolerant and mainframe systems, the Sun Enterprise 5500 server has a comprehensive set of uptime features. Typical Sun Enterprise 5500 server customers may already own a six-to-eight CPU SPARCserver 1000E system in a stacker unit or data center cabinet. Typical Sun Enterprise 5500 server customers may also have two-to-six CPU SPARCcenter 2000E systems.

The Sun Enterprise 5500 server is recommended over the Sun Enterprise 4500 server if the customer needs a rack-mount system with integrated mass storage. The Sun Enterprise 5500 server is also ergonomically better suited for a data center environment because it has easily accessible CD-ROM and tape drives and direct access to the Sun StorEdge tape library. The Sun Enterprise 5500 server also has an enhanced warranty which includes more comprehensive ServerStartSM system installation compared to basic installation on the Sun Enterprise 4500 server.

Target Markets and Users for the Sun Enterprise 6500

The Sun Enterprise 6500 server is ideal for customers who need to build network computing applications of a size and scale that previously required mainframes. The customer receives the benefits of improved data access and flexibility even as databases grow to multiple terabytes. Typical Sun Enterprise 6500 server customers may already own large SPARCcenter 2000 systems.

The Sun Enterprise 6500 server offers more than twice the CPU and memory expandability of the Sun Enterprise 5500. The Sun Enterprise 6500 server should be recommended when the Sun Enterprise 5500 server does not offer enough expandability. The Sun Enterprise 6500 server should be recommended over the Sun Enterprise 10000 server when:

- The customer's simultaneous processing and I/O requirements can be met with one Sun Enterprise 6500 server
- The Sun Enterprise 6500 server meets the customer's availability requirements
- Customer is driven to clustering for seamless failover requirements
- Customer prefers to distribute smaller systems rather than take a centralized approach with one large system

The Sun Enterprise 6500 server should be recommended over the Sun Enterprise 5500 server when the Sun Enterprise 5500 server does not offer enough CPU and I/O growth for the customer.

Sun EnterpriseTM 3500-6500 Server Positioning

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Target Markets and Users for the Sun Enterprise 10000

The Sun Enterprise 10000 server is the industry's highest-performance (according to TPC-D results.), most-balanced SMP system (competitors of the Sun Enterprise 10000 do not have SMP, but NUMA or MPP). It has the highest availability in UNIX systems other than fault-tolerant systems. The Sun Enterprise 10000 server has the following high-availability features, which the competitors do not have: fault-tolerant power/cooling, dynamic reconfiguration with hot-swappable system boards, alternate pathing, dynamic domains and fail-over between internal domains. Other features employed by the Sun Enterprise 10000 server and the competitors include system service processor and clustering.

Its RAS features are comparable to mainframes. In fact, it can be configured to have no single point of hardware failure.

The Sun Enterprise 10000 server is targeted for high-end commercial and technical markets. Key applications include data warehousing, data mining, high-volume OLTP, LAN consolidation, analytics, and Internet/intranet.

The Sun Enterprise 10000 server should be recommended over the Sun Enterprise 6500 server when:

- The customer's simultaneous processing and I/O requirements cannot be met with one Sun Enterprise 6500 server
- Customer's availability requirements cannot be met by one Sun Enterprise 6500 server
- There is no reason to prefer clustered Sun Enterprise 6500 servers over one Sun Enterprise 10000 server (for example, if failover is not required)
- System administration prefers one large, centralized system (potentially split into domains) over multiple, smaller ones

Note: See Sun Enterprise 10000 server *Just the Facts* for more detailed information on this product.

Sun Enterprise™ 3500-6500 Server Positioning



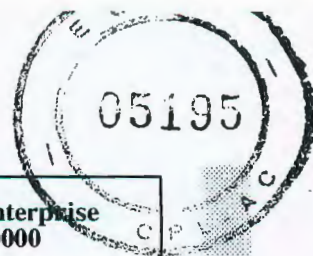
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Product Line Comparisons

Product	Positioning	Applications	Markets
Sun Enterprise 10000	Highest-end server for customers who require the highest performance and availability. For main-frame-class, mission-critical applications.	• Data warehousing • Data mining • High-volume OLTP • LAN consolidation • Analytics • Internet/intranet	• Financial services • Telecommunications • Government • Petroleum • Education
Sun Enterprise 6500	Highly scalable and expandable, offering performance and availability required for large-scale database applications.	• Data warehousing • Data mining • Business apps • CMS™ OLTP • NFS™	• Manufacturing • Finance • Telecommunications • Government • Education
Sun Enterprise 5500	Affordable datacenter system designed to deliver high performance and high availability for enterprise-wide applications supporting thousands of users.	• Design automation • Analysis and simulation • Video	• Healthcare • Retail • Oil and gas • Pharmaceuticals • Chemical • Internet commerce
Sun Enterprise 4500	Highly expandable yet compact system delivering high-performance scalability for department applications in a distributed network-computing environment.		
Sun Enterprise 3500	An affordable system for departmental business applications supporting up to hundreds of users in office environments. For customers that want the investment protection of an upgrade path in an expandable family of servers.	• Database server • Business apps • NFS • CMS • Graphics/imaging • Modeling, simulation analysis • Video	• Manufacturing • Finance • Telecommunications • Government • Education • Healthcare • Retail • Oil and gas • ECAD/MCAD • Internet commerce
Sun Enterprise 450	Affordable high-performance SMP network application server. Ideal for workgroups, larger web sites, branch offices or distributed enterprise applications.	• Database server • Business apps • OLTP • NFS • Internet gateway • Web mail services • Groupware	• Manufacturing • Finance • Telecommunications • Government • Education • Retail • Healthcare

Sun Enterprise™ 3500-6500 Server Positioning



Specifications	Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500	Sun Enterprise 6500	Sun Enterprise 10000
Operating Environment	Solaris 2.5.1 Hardware: 11/97 ⁱ or Solaris 2.6 Hardware: 3/98 ⁱⁱⁱ (or later) or Solaris 7				
Warranty (may vary according to geography)	One year, next day, on site 8-hour phone		One year, 4 hours, on site 4-hour phone		

- ⁱ Sun Enterprise 6500 system bus cannot run at 100 MHz, and, therefore, does not support the 400-MHz/4-MB UltraSPARC processor.
- ⁱⁱ Two patches are required for Sun Enterprise 3500–6500 servers running Solaris 2.5.1 Hardware: 11/97. Please refer to the “Solaris Operating Environment” section for details.
- ⁱⁱⁱ Although Dynamic Reconfiguration and Alternate Pathing have been available on the Sun Enterprise 10000 server when running Solaris 2.5.1 Operating Environment, a minimum of Solaris 2.6 Hardware: 5/98 is required for these features when running the Solaris 2.6 Operating Environment.

Sun Enterprise™ 3500–6500 Server Positioning

Product Line Specification Summary

The following chart illustrates the specifications of the Sun Enterprise Server product line.



Specifications	Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500	Sun Enterprise 6500	Sun Enterprise 10000
Packaging	Tower/Deskside	Tabletop	Datacenter Cabinet		
Number of CPUs	1 to 8	1 to 14		1 to 30	16 to 64
CPU clock rate	250 MHz, 336 MHz, 400 MHz				
Ecache per CPU	4 MB				
Maximum memory	8 GB	14 GB		30 GB	64 GB
System bus	2.68 GB/sec. @84 MHz 3.2 GB/sec. @100 MHz ⁱ				10.67 GB/sec @84 MHz 12.8 GB/sec. @100MHz
Maximum SBus/PCI slots	SBus: 12 PCI: 8	SBus: 21 PCI: 12		SBus: 45 PCI: 12	64
Maximum internal disk	72.8 GB	33.6 GB	720 GB	576 GB	191 GB
Maximum total disk	> 6 TB	>10 TB	>10 TB	>20 TB	> 20 TB
Maximum number Creator3D/ Sun Elite3D m6 graphics boards	3	4		8	—
RAS features (see “Reliability, Availability, and Serviceability” section for complete RAS details)	• Hot-plug boards • Hot-swap power • Hot-swap cooling • Redundant power • ASR • Remote control • ECC-protected data paths • ECC memory • CPU power control (Solaris 2.6 Operating Environment) • Hot-swap FC-AL disks • RAID 0, 1, 5 • Hot-disk sparing				• Hot-swap boards • Fault-tolerant power • ASR • Hostview • Remote control • ECC-protected data paths • ECC memory • Dynamic domains
RAS features with Solaris 2.6 Hardware: 5/98	Dynamic Reconfiguration (Hot swap for I/O boards) Alternate Pathing				Currently available
Latest RAS and Resource Management features	Sun Enterprise SyMON™ (replaced Solstice SyMON™ Solaris Resource Manager)				
Future RAS features	Dynamic Reconfiguration (Hot swap for CPU/memory boards)				Currently available

Sun Enterprise™ 3500–6500 Server Positioning



Specifications	Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500	Sun Enterprise 6500	Sun Enterprise 10000
Operating Environment	Solaris 2.5.1 Hardware: 11/97 ⁱⁱ or Solaris 2.6 Hardware: 3/98 ⁱⁱⁱ (or later) or Solaris 7				
Warranty (may vary according to geography)	One year, next day, on site 8-hour phone		One year, 4 hours, on site 4-hour phone		

- ⁱ Sun Enterprise 6500 system bus cannot run at 100 MHz, and, therefore, does not support the 400-MHz/4-MB UltraSPARC processor.
- ⁱⁱ Two patches are required for Sun Enterprise 3500–6500 servers running Solaris 2.5.1 Hardware: 11/97. Please refer to the “Solaris Operating Environment” section for details.
- ⁱⁱⁱ Although Dynamic Reconfiguration and Alternate Pathing have been available on the Sun Enterprise 10000 server when running Solaris 2.5.1 Operating Environment, a minimum of Solaris 2.6 Hardware: 5/98 is required for these features when running the Solaris 2.6 Operating Environment.

Sun Enterprise™ 3500–6500 Server Positioning

Reliability, Availability, and Serviceability

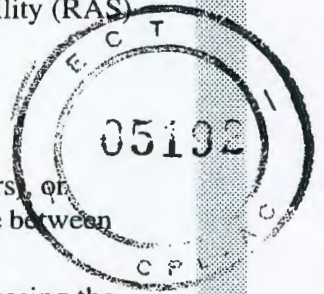
The Sun Enterprise™ 3500–6500 servers offer excellent reliability, availability, and serviceability (RAS) features. They have the most availability features in their class.

Reliability

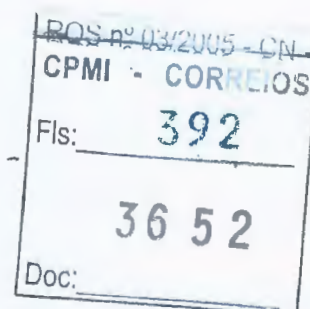
- Passive, centerplane bus (Sun Enterprise 4000–6000 and Sun Enterprise 4500–6500 servers), or backplane bus (Sun Enterprise 3000 and Sun Enterprise 3500 server), increases mean time between failures (MTBF) of the system compared to previous-generation servers
- Simple, elegant, centerplane bus design reduces the amount of bus circuitry required, increasing the MTBF of the system
- Current-sharing power circuitry supports redundant power capability
- ECC-protected data throughout the system increases data integrity
- Parity-protected address and control signals increase the integrity of these signals

Availability

- Effective system diagnostics minimize downtime
- Multiple UltraSPARC™ modules, CPU/memory boards, and I/O boards provide redundancy
- Redundant power supplies and current-sharing power circuitry keep the system running if a power supply fails
- Enhanced Automatic System Recovery (ASR) quickly reconfigures the system around any failed components
- Dual variable-speed fans in each power/cooling module keep the system cool if one fan within a module fails
- Dual disk array host interfaces
- Dual, independent connections to FC-AL internal disks (Sun Enterprise 3500 server)
- CPU Power Control (available with the Solaris™ 2.6 Operating Environment) removes an active CPU from the system configuration and powers it off if environmental sensors detect that the processor is running too hot due to a cooling problem. This is done without any interruption to running processes and without a reboot of the server
- Remote administration control allows remote reboots and power cycling
- The Sun Enterprise SyMON™ system monitor software, which is included with the Sun Enterprise 3500–6500 servers, maximizes uptime by predicting hardware failures



Reliability, Availability, and Serviceability



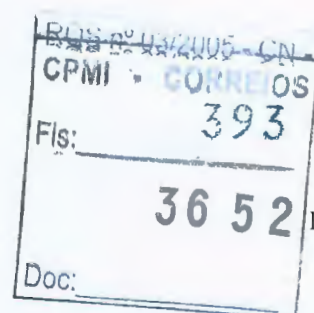


- The Sun Enterprise SyMON software also provides an easy user interface and multi-system management capability
- Redundant, time-of-day clock
- Dynamic Reconfiguration of I/O boards (Solaris 2.6 Hardware: 5/98) and CPU/memory boards (future Solaris 7 Operating Environment release) allows boards to be attached to and detached from the system online, without requiring a reboot
- Alternate Pathing (Solaris 2.6 Hardware: 5/98) enables the network or storage connection to be moved from an active controller to a stand-by controller, thereby enabling Dynamic Reconfiguration of the I/O boards while preserving the network/storage connection
- Solaris Resource Manager provides the ability to allocate critical resources such as CPU and virtual memory to specific applications or users. This provides efficient utilization of resources and availability of resources for important applications - thus specific service levels can be delivered.

Serviceability

- Modular system design makes it easy to replace failed components
- Hot-swap I/O boards (Solaris 2.6 Hardware: 5/98) make it possible to perform a full hardware installation and reconfiguration without system interruption
- Hot-plug CPU/memory boards make it possible to perform the hardware installation without system interruption (CPU/memory boards will become hot-swap once Dynamic Reconfiguration becomes available with upcoming release of the Solaris 7 Operating Environment)
- Hot-swap power/cooling modules make it easy to replace failed modules or to upgrade the power and cooling capacity of the system
- Ability of Sun Enterprise SyMON software to notify a system administrator of a failure allows the system administrator to determine immediately which components have failed and need to be serviced
- Ability of Sun Enterprise SyMON software to predict memory and disk failures enables proactive hardware service and prevents hard failures
- Ability of Sun Enterprise SyMON to monitor all of the Solaris systems in the network from any desktop (UNIX®, Windows NT, Macintosh, etc)
- Improved remote administration control allows users to reboot and power cycle in a "lights out" environment
- Sun Validation Test Suite (SunVTS™) allows users to perform UNIX diagnostics

Reliability, Availability, and Serviceability





New RAS Features

Dynamic Reconfiguration

Dynamic Reconfiguration is the ability to alter the configuration of a running system by bringing components online or taking them offline without disrupting system operation or requiring a system reboot. With the availability of Dynamic Reconfiguration, system boards can be logically and physically included in the system configuration, or logically deactivated and removed while the system is running.

This is particularly useful in mission-critical environments if a system board has failed and needs to be replaced or if new system boards need to be added to the system for additional performance and capacity.

Dynamic Reconfiguration increases system availability and flexibility by allowing the hot-swap CPU/memory and I/O board functionality that the Sun Enterprise 3000–6000 server hardware has supported from the beginning. Hot-swap functionality means that the components can be physically and logically removed or added while the system is running.

Dynamic Reconfiguration has previously been available only on the Sun Enterprise 10000 server within the Sun Enterprise server product line. This feature is currently unavailable with any other general purpose UNIX platform. Dynamic Reconfiguration includes:

- **Dynamic attach:** Logically (rather than physically) including I/O boards and CPU/memory boards into the system configuration and making them available for use without rebooting the system. For example, both I/O boards and CPU/memory boards can be installed and logically attached while the system is online.
- **Dynamic detach:** Logically (rather than physically) removing components from a configuration, including taking the components offline and powering them down, thus making them ready for physical removal.

Dynamic Reconfiguration for I/O boards is available for Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers with Solaris 2.6 Hardware: 5/98 and Dynamic Reconfiguration for CPU/memory boards is expected to be available with a future version of the Solaris 7 Operating Environment in the first half of calendar 1999. Note that Dynamic Reconfiguration for I/O boards requires Flashprom software release 3.2.14 or later.

Please refer to *Availability Features in the Sun Enterprise 3500 to Sun Enterprise 6500 Server Family—A Technical White Paper* for more information on Dynamic Reconfiguration.

Alternate Pathing

Alternate Pathing is an extension of Dynamic Reconfiguration that enhances network and external storage availability. It allows dynamic reconfiguration of the I/O boards without disrupting the network or external storage connection. For example, assume that the active Ethernet connection resides on an I/O board that needs to be removed from the system. Removal of the I/O board means that the Ethernet controller must be taken offline, however that would disconnect the network access. Alternate Pathing provides the ability to switch the logical Ethernet connection to another, stand-by Ethernet controller residing on a different I/O board, thereby enabling the I/O board with the original Ethernet connection to be removed without any disruption to the network connection.

Alternate Pathing is available for Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers with Solaris 2.6 Hardware: 5/98.

System Architecture



Overview

The Sun Enterprise™ 4500, Sun Enterprise 5500, and Sun Enterprise 6500 servers are designed around a centerplane, with system slots in both the front and rear. Each slot can accommodate either a CPU/memory, I/O, or disk board with some limitations. Almost any combination of boards is allowed, as long as the required minimum of one CPU/memory board and one I/O board is met. One I/O board must be inserted into slot 1 in order to provide the SCSI connection to the CD-ROM drive and the optional internal tape device. In addition, the Sun Enterprise 4500 and Sun Enterprise 5500 servers support a maximum of four 8.4-GB disk boards, while the Sun Enterprise 6500 server supports a maximum of two disk boards.

The Sun Enterprise 3500 server is the smallest member of the Sun Enterprise 3500–6500 server family. There is little need for a centerplane arrangement because it has only five slots. The centerplane arrangement allows for larger configurations in less physical space. Intended as a desktide system, the Sun Enterprise 3500 server uses a traditional backplane configuration with all five boards plugged into one side of the system. The Sun Enterprise 3500 server also has internal mounting for up to eight FC-AL 3.5 x 1.6-inch (or 1.0-inch) disks along with a CD-ROM and tape drive.

Each CPU/memory board in the Sun Enterprise 3500–6500 servers supports up to two UltraSPARC™ modules and 2 GB of memory (see the “CPU/Memory Board” section for more details). SBus, Graphics, and PCI I/O boards are available for the Sun Enterprise 3500–6500 servers (see the “I/O Boards” section for more details). CPU/memory boards, I/O boards, power/cooling modules, and clock boards are interchangeable within the Sun Enterprise 3500–6500 product line. The clock board contains the keyboard and mouse port, two serial ports, time-of-day clock, and the IDPROM. The frequency of the clock, the processor clock, and the system clock are all programmable through firmware.

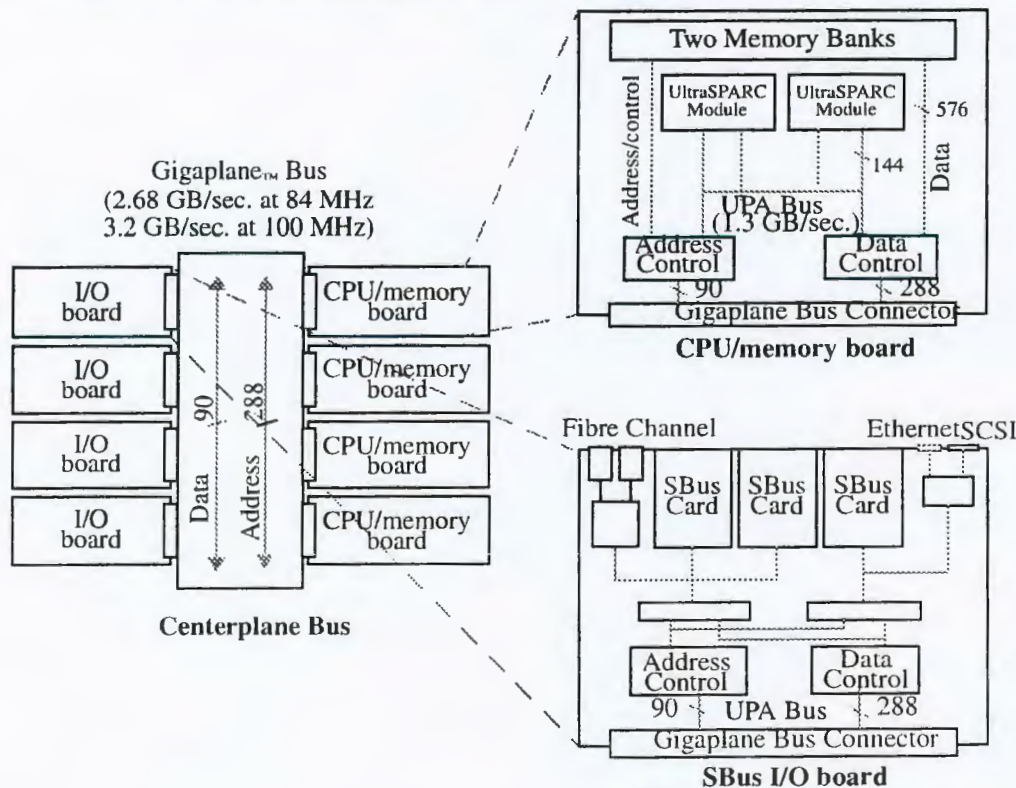


Figure 1. The Sun Enterprise 3500–6500 system bus architecture



System Bus

The system bus for the Sun Enterprise 3500–6500 servers is the Gigaplane™ system bus, a packet-switched bus. This bus has a split-transaction design with separate buses for address and data. This design provides a faster transfer rate than system buses that have the same paths for address and data.

The Gigaplane system bus has been revised from the one used in the Sun Enterprise 3000–6000 servers, which has a maximum speed of 84 MHz—sufficient to support the UltraSPARC processors running at up to 336 MHz when operating with a 4:1 processor-to-Gigaplane speed ratio. The enhanced Gigaplane system bus on the Sun Enterprise 3500–5500 servers runs at a rate of up to 100 MHz. This enables support for the new 400-MHz/4-MB UltraSPARC processor without changing the processor-to-Gigaplane speed ratio. The maximum throughput is 2.68 GB per second at 84 MHz and 3.2 GB per second at 100 MHz.

The physical length of the Gigaplane in the Sun Enterprise 6500 (and Sun Enterprise 6000) prohibits the Gigaplane from running at 100 MHz. The maximum Gigaplane speed on the Sun Enterprise 6500 will remain at 84 MHz. As a result, with a 4:1 processor-to-Gigaplane speed ratio, this new 400-MHz processor cannot be supported. A future UltraSPARC processor, with a clock speed greater than 336 MHz will be available for the Sun Enterprise 6500 as well as the Sun Enterprise 6000.

In order to realize the increased Gigaplane bus speed, the Sun Enterprise 3500–5500 servers ship with new, enhanced CPU/memory and I/O boards that are also capable of running at 100 MHz. These boards are backwards compatible and will, therefore, be supported on existing Sun Enterprise 3000–6000 systems. However, the maximum Gigaplane speed will be limited to 84 MHz, unless the Gigaplane is upgraded (see the “Upgrades” section for details).

In addition, the previous-generation of CPU/memory boards and I/O boards (84-MHz boards) are supported on the Sun Enterprise 3500–6500 servers (no factory installation). However, such systems run the Gigaplane system bus at a maximum of 84 MHz.

The previous-generation Sun Enterprise 3000–5000 systems are field upgradeable to support the enhanced Gigaplane speed of up to 100 MHz and thereby support the new 400-MHz processor. The upgrade involves system boards, UltraSPARC modules, and a base package upgrade kit. The base package upgrade kit varies among the server models and may include a new clock board, Gigaplane centerplane, and an enhanced SCSI peripheral tray for the Sun Enterprise 5000 system. In most cases, the clock board and four-slot backplane can run the Gigaplane system bus at up to 100 MHz in the Sun Enterprise 3000 server without requiring a base package upgrade (see the “Upgrades” section for details).

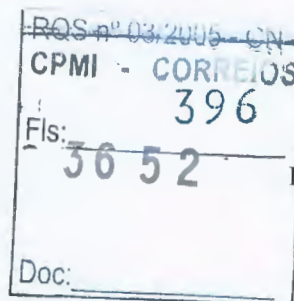
The Ultra™ Port Architecture (UPA) bus is used as an intermediate bus connecting CPU/memory boards and I/O boards to the Gigaplane bus. The UPA bus also runs at the same speed as the Gigaplane system bus, with a peak throughput of 1.3 GB per second at 84 MHz and 1.55 GB per second at 100 MHz.

Reducing the memory latency of the system bus was one of the primary system bus design goals. The memory latency for the Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers is approximately one-fourth the memory latency of the SPARCcenter™ 2000E system. This reduction was the result of the following design changes:

- **Separate address, data, and control signals.** In the SPARCserver™ 1000E system, the address and data shared the same bus. In the Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers, the address and data use separate buses. This allows read requests to be transmitted on the address bus at the same time data from the previous read request is being transmitted on the data bus.
- **Wider data buses.** The data buses throughout the Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers are two-to-four times wider than the data buses in the SPARCserver 1000E systems.



Just the Facts



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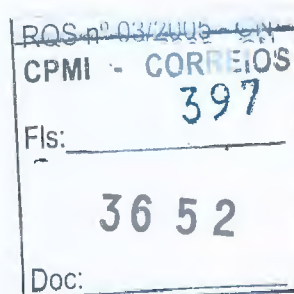
Data Bus	Sun Enterprise 3000-6000; Sun Enterprise 3500-6500	SPARCserver 1000E	Difference compared to SPARCserver 1000E	SPARCcenter 2000E	Difference compared to SPARCcenter 2000E
Memory data bus	576 bits	72 bits	8 times	144 bits	4 times
Data bus	288 bits	72 bits	4 times	72 bits	2 times
CPU data bus	144 bits	64 bits	2 times	64 bits	2 times

- **Faster bus.** The Gigaplane bus, which runs at 84 MHz (with the potential of running up to 100 MHz), is faster than the 50-MHz XDBus™ used in the SPARCserver 1000E and SPARCcenter 2000E.
- **Enhanced arbitration cycles.** Zero cycle arbitration mode, used in certain situations, greatly reduces bus arbitration time. Additionally, by using two cycle address and data packets (versus two-to-nine cycles on the SPARCserver 1000E system), devices have much less time to wait in order to get on the bus.
- **Faster memory response.** A number of techniques are employed to get a faster response to data requests:
 - 576-bit-wide memory
 - 16-way memory interleave
 - Read bypass writes in memory controller
 - Queue bypasses for requests and data
 - Writebacks handled after miss

System Bus RAS Features

The following four attributes of the system bus architecture contribute to many of the RAS features of the Sun Enterprise 3500-6500 (and Sun Enterprise 3000-6000) servers:

- **Passive backplane system bus.** A passive backplane bus minimizes the number of active components required to control the bus. This results in a more reliable system.
- **Sturdy connectors and better board-insertion guides.** The SPARCserver 1000E has 100 pins on a connector. The Sun Enterprise 3500-6500 servers are much sturdier, with 450 pins on a connector that is only twice the size of the SPARCserver 1000E connector. The sturdier connectors, combined with better guides for board insertion, minimize the chance of the system being disabled due to bent pins from a faulty board insertion.
- **ECC-protected data paths.** All the data paths in the Sun Enterprise 3500-6500 servers are fully protected by error checking and correction (ECC), which is able to detect single-bit and double-bit errors and to correct single-bit errors.
- **Parity-protected address and data paths.** All the address and data paths in the Sun Enterprise 3500-6500 servers are protected by parity.



System Bus Questions and Answers

Why didn't Sun use UPA crossbar bus technology in the Sun Enterprise 3500–6500 servers as in the Ultra 1 desktop workstation?

The crossbar bus used in the Ultra 1 desktop workstation supports a maximum of four devices. The Sun Enterprise 4500 and Sun Enterprise 5500 servers have eight slots and the Sun Enterprise 6500 server has 16 slots, with multiple devices per slot. Perhaps more importantly, crossbar bus technology was not needed for the Sun Enterprise 3500–6500 system interconnect because the Gigaplane bus is fast enough to support 30 CPUs without the use of crossbar technology.

At 100 MHz, the Gigaplane bus provides 3.2 GB per second of sustained throughput making it suitable for large symmetrical multiprocessor (SMP) servers. The Gigaplane bus runs at 84 MHz, provides a throughput of 2.68 GB per second and is able to support up to 16 boards in the Sun Enterprise 6500 server. Each board contains a UPA bus that connects to the Gigaplane bus and “multiplexes” the associated component loads, such as CPU and SBus, onto a single connection to the Gigaplane bus. This design is able to support many more CPU and SBus slots than if they were connected directly to the Gigaplane bus.

Why is the Gigaplane-XB™ crossbar technology used in the Sun Enterprise 10000 server not used in the Sun Enterprise 3500–6500 servers?

The implementation of the Gigaplane-XB interconnect would have increased the cost of the system substantially. The Gigaplane-XB technology provides higher system throughput, supports more devices (64 processors) and enables partitioning (domains), which are essential in the Sun Enterprise 10000 server.

Will there be a latency penalty for memory access relative to the single-level bus implementation of the Ultra 1 desktop?

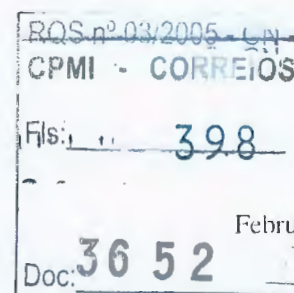
There will be some penalty, but exceptional effort has gone into minimizing this penalty. Relative to the Ultra 1 desktop, the penalty for access to the first word in a data request is five clock cycles, or 60 ns. This decreases to two clock cycles (or 24 ns) by the last word in a data request. This minimal latency penalty should be imperceptible to the user, as it was in systems based on XDBus technology.

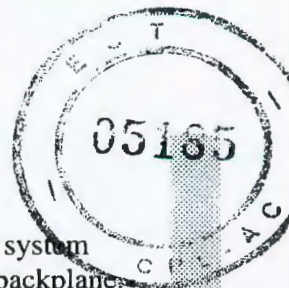
How can the sustained data transfer rate on the Gigaplane bus be so close to the peak bandwidth?

There are two reasons why the sustained data transfer rate on the Gigaplane bus is so close to the peak bandwidth. The first is separate address and data buses. With separate address and data buses, data requests can be sent out on the address bus at the same time that data from a previous data request is on the data bus. The second is out-of-order data transmission, which allows data to be put on the data bus in a different order than requested. This helps maximize the bus usage by minimizing unused data bus bandwidth.

Why does the Sun Enterprise 3500 server have a new clock board and backplane if the Sun Enterprise 3000 server backplane is capable of running at up to 100 MHz?

The new backplane on the Sun Enterprise 3500 server is required to support the additional (fifth) system slot, not to support the faster Gigaplane speed. The new centerplane on the Sun Enterprise 4500–5500 servers is required to support the faster Gigaplane speed. The new clock board is required to support the new five-slot backplane on the Sun Enterprise 3500 server and the enhanced eight-slot and 16-slot centerplane on the Sun Enterprise 4500, Sun Enterprise 5500, and Sun Enterprise 6500 servers, respectively.





Why did Sun move from a backplane to a centerplane design (Sun Enterprise 4500–6500 servers only)?

The centerplane design allows the system to support twice as many boards for a given length of system bus. This reduced length translates into an electrically shorter bus than would be possible with a backplane. This is important because bus speed (frequency) is, in part, determined by bus length. All other things being equal, the shorter the bus, the faster it can run.

The more densely packed centerplane also allows for more compact packaging. With this configuration, the Sun Enterprise 4500 server can support eight slots with a smaller footprint than the SPARCserver 1000E system that supports four slots. Also, the Sun Enterprise 6500 server can support 16 slots in the same size data center cabinet that supports a ten-slot SPARCcenter 2000E system.

What happens if there isn't an I/O board in slot 1? Will the system be functional?

Yes, it will be fully functional, with the exception that the internal CD-ROM and tape drives will not be accessible.

Will the new, enhanced Gigaplane system bus provide increased system performance while running 250-MHz or 336-MHz UltraSPARC processors?

No, the performance benefits of the enhanced Gigaplane system bus is realized only when using processors with clock speeds in excess of 336 MHz. The Gigaplane system bus runs at up to 84 MHz when using 250-MHz or 336-MHz processors. However, the new 400-MHz UltraSPARC processor increases the speed and throughput of the Gigaplane system bus, enabling it to run at up to 100 MHz and provide a throughput rate of up to 3.2 GB per second (2.68 GB per second on the Sun Enterprise 6500 Gigaplane system bus, which is capable of running at 84 MHz.)

Does the change to the Gigaplane system bus mean that the Sun Enterprise 3500–5500 servers perform better than similarly configured Sun Enterprise 3000–5000 servers?

No. There are three component speeds that determine the speed of the server: the speed of the Gigaplane system bus, the speed of the system boards, and the speed of the UltraSPARC module. These systems use the same processors as the previous systems. Therefore the Gigaplane system bus runs at the same speed in all systems providing the same performance.

Graphics Support



Creator3D Graphics series 3 Overview

Creator3D Graphics series 3 is the latest generation of the Creator Graphics product family accelerates and supports diverse types of graphics needs ranging from 8-bit and 24-bit windowing to high-end 3-D graphics.

Creator3D Graphics series 3 is designed to match the CPU performance increase beyond the currently available CPU speeds. Series 3 accelerators have one clock for the internal graphics processing and another clock for the frame buffer enabling each part to run at maximum speed independently from each other.

Creator3D graphics has the following features:

- Full 2-D imaging and windowing acceleration, plus full 3-D acceleration
- Ideal for high-end 2-D, mid-range 3-D graphics, and solids in MCAD and MCAE, as well as high-end imaging and color publishing applications
- 24-bit true color, double-buffered up to 1280 x 1024
- 28-bit Z-buffer
- 8-bit overlay and visual planes
- Stereo display up to 960 x 680 at 112-Hz non-interlaced, double- and Z-buffered
- 15-MB 3D-RAM memory
- 1280 x 1024 at 76 Hz standard with programmable bootprom resolution
- NTSC/PAL video timings
- 128-bit DAC
- High resolution 1920 x 1200 at 70 Hz (single buffered) supporting 24-inch wide screen display

Sun Elite3D Graphics Overview

Sun Elite3D greatly accelerates the rendering of 3-D triangles, vectors, and texture maps over what is possible with 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 Creator3D. 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.

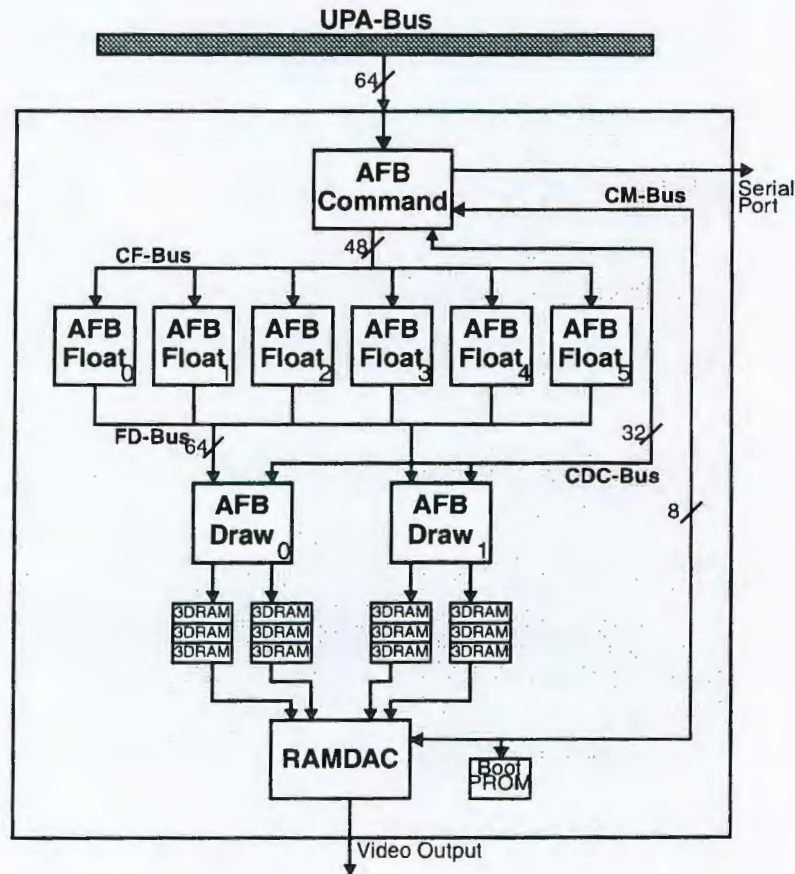


Figure 2. Sun Elite3D Chip-level Diagram

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

Sun Elite3D Features and Benefits

• Features

- Integrated imaging
- Very high performance accelerated 24-bit double-buffered 3-D graphics
- 28-bit Z-buffer
- 8-bit overlay plane
- Gouraud shading
- Alpha blending and screen door transparency
- Line and dot anti-aliasing
- Per pixel depth-cueing
- Per pixel alpha interpolation
- 4-bit stencil support with hardware acceleration of OpenGL stencil functions
- Accelerated lighting
- Four 8-bit color maps

• Benefits

- Can perform fast imaging and 3-D on unified frame buffer
- Smooth animation and interactivity of 3-D 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. This allows seamless integration and manipulation of windows
- Allows smooth shading of solid geometry
- Used to simulate transparent materials such as glass
- Needed in MCAD and visualization for better visual quality
- More accurate depth-cueing or fog
- Greater accuracy and image quality
- Provide greater performance
- More lights can be turned on for enhanced visual Sun display without encountering large performance penalties
- For dynamic colormap segment allocation when running 8-bit window systems should eliminate color flashing problems



Sun Enterprise™ 3500 Server



Sun Enterprise 3500 System Cabinet

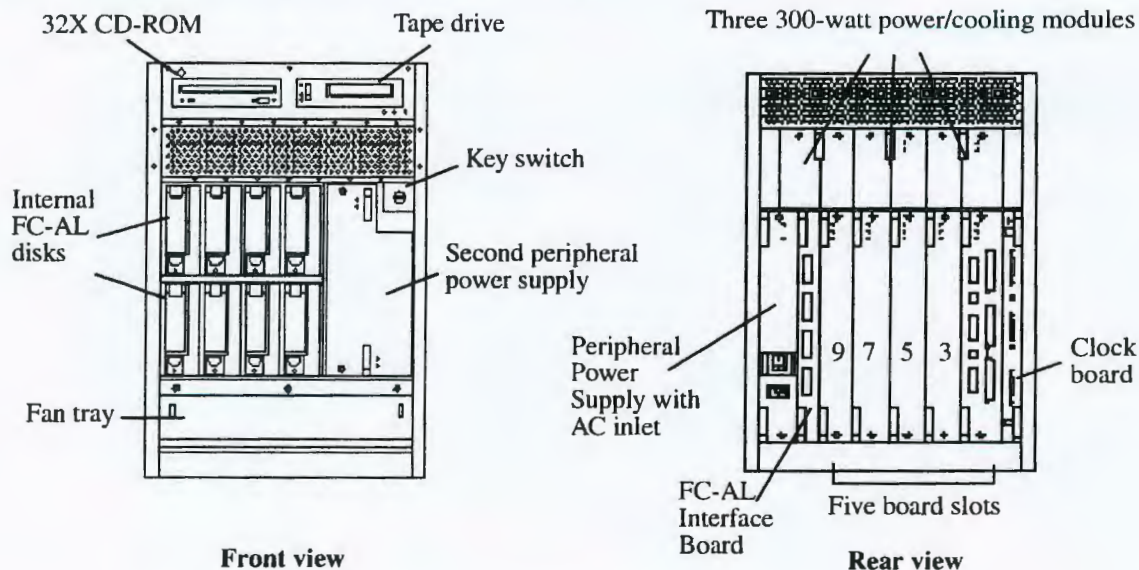


Figure 3. The Sun Enterprise™ 3500 System Cabinet

The Sun Enterprise 3500 server is a desktide tower enclosure, measuring approximately 65 cm x 43 cm x 44 cm (65 cm x 43 cm x 64 cm with the rear bumper and cable organizer which protects the cables.) In addition to the enhanced Gigaplane system bus, which runs up to 100 MHz and supports the fifth system slot, the Sun Enterprise 3500 server also features a 32X CD-ROM drive and improved disk availability with Fibre Channel Arbitrated Loop (FC-AL) internal disk drives. Despite the expansion of system slots and the changes to the internal disks, the Sun Enterprise 3500 server maintains the footprint, compact overall dimensions and power supply redundancy of the Sun Enterprise 3000 server.

Features

- A hinged door, covering the lower three-quarters of the cabinet, offers easy access to internal disk drives and the key switch.
- Two built-in disk banks hold up to eight internal hot-swap FC-AL disk drives. This is fewer than the ten SCSI disk drives offered with the Sun Enterprise 3000 server. The newer drives, however, can be configured to provide better disk availability (please see the "Sun Enterprise 3500 Internal Disk Drives" section for details on the FC-AL disks).
- A Fibre-Channel Interface board is located in a dedicated slot, between the fifth system board slot and the peripheral power supply. This board serves as the interface between the FC-AL drives and the first I/O board (please see the "Sun Enterprise 3500 Internal Disk Drives" section for details regarding the Fibre-Channel Interface board).
- A Sun StorEdge™ CD32 drive is installed in the upper left of the cabinet.
- An optional tape drive may be installed to the right of the CD-ROM drive. The tape drive can be a 4-mm, 8-mm, or one-quarter-inch tape drive.
- The key switch is located behind the door in the upper-right corner.



- There are five slots in the bottom portion of the cabinet for CPU/memory boards and I/O boards. The slots are numbered 1, 3, 5, 7, and 9 from right to left.
- The Sun Enterprise 3500 server comes with at least one power/cooling module located above slots 1 and 3. If a second power/cooling module is required, it would fit above slots 5 and 7, to the left of the first power/cooling module.
- A fan tray above the peripheral power supply is also included in an entry configuration.
- A third power/cooling module can be used for redundant power in a system with three or more boards. To install the third power/cooling module, the existing fan tray, located to the left of the second power/cooling module, must be removed. The third power/cooling module fits into this slot.
- In addition to three power/cooling modules, a second peripheral power supply is required for full N+1 power supply redundancy in a five-board Sun Enterprise 3500 server configuration.
- The first peripheral power supply is located in the lower left of the cabinet rear. A spot for the second, optional peripheral power supply is located in the lower right of the Sun Enterprise 3500 cabinet front. This second peripheral power supply is located in the rear of the Sun Enterprise 3000 system cabinet. It was redesigned and moved to the front of the Sun Enterprise 3500 system cabinet in order to provide space for the additional system slot.
- The second peripheral power supply on the Sun Enterprise 3500 server is now 195 watts, instead of the 184 watts peripheral power supply used on the Sun Enterprise 3000 server.
- The clock board is located in the lower right, next to board slot 1. The clock board has its own slot and does not use any of the five slots for the CPU/memory or I/O boards.
- A cable organizer is included with the Sun Enterprise 3500 server base package. This will protect the 2-meter fibre channel cable (used for connecting to the internal FC-AL disk drives) from excessive bending, thereby maintaining optimum fibre channel performance.

Sun Enterprise™ 3500 Server

Sun Enterprise 3500 Internal Disk Drives

Internal FC-AL Drives

The Sun Enterprise 3500 server has two internal disk banks (four disks per disk bank), which support up to eight 9.1-GB FC-AL disks with optional dual-port connections, while the Sun Enterprise 3000 server supports ten internal SCSI disks with a single connection. The number of internal disks supported in the Sun Enterprise 3500 server was reduced in order to provide room for the additional system slot in the rear of the server. The inclusion of the fifth system slot in the back of the cabinet required that the optional second peripheral power supply be redesigned and moved to the front of the cabinet, resulting in less space in the front of the cabinet for disk drives.

The newer drives, however, can be configured to provide better disk availability than that offered by the Sun Enterprise 3000 server. In the Sun Enterprise 3000 server, all ten disk drives are connected to a single SCSI channel. The Sun Enterprise 3500 server eliminates this single point of failure. Each of the two disk banks can have one or two FC-AL loops connected to the installed drives for a total of up to four loops. Dual-loop configurations provide a highly-available, redundant hardware configuration.

Because the two banks are independent, a full configuration of eight disk drives requires a minimum of two loops: one for each bank of four drives. On the other hand, a minimum configuration requires only one FC-AL connection for up to four disk drives.

The new FC-AL drives in the Sun Enterprise 3500 server still provide the hot-swap capability offered with the internal SCSI drives on the Sun Enterprise 3000 server.



Just the Facts

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Both Solstice DiskSuite™ and VERITAS/Sun Enterprise Volume Manager™ are supported disk management software for the internal FC-AL drives.

VERITAS/Sun Enterprise Volume Manager releases 2.3, 2.4, 2.5 and 2.6 are supported with the Solaris™ 2.5.1 Operating Environment. VERITAS/Sun Enterprise Volume Manager releases 2.4, 2.5 and 2.6 are supported with the Solaris 2.6 Operating Environment. Patches are associated with all of these releases. VERITAS/Sun Enterprise Volume Manager is not currently supported with the Solaris 7 Operating Environment.

Solstice DiskSuite version 4.1 is supported on both Solaris 2.5.1 and Solaris 2.6. Solstice DiskSuite version 4.2 is supported on both Solaris 2.6 and the Solaris 7 Operating Environment.

Note: A license is needed to install Sun Enterprise Volume Manager. An additional license is needed to enable advanced Sun Enterprise Volume Manager capabilities such as RAID 5.

Fibre Channel Interface Board

This is a new board, designed to provide connectivity to the internal FC-AL disk drives in the Sun Enterprise 3500 server. The internal FC-AL disk drives support up to four FC-AL loops. Each of the four potential FC-AL loops corresponds to one of four GBICs on the FC-AL Interface board.

The FC-AL board comes with two GBIC modules and one 2-meter fibre channel cable to establish one loop (connection). One GBIC module is installed on the FC-AL Interface board and, typically, the other is installed on the I/O board (or SBus card) leaving three empty FC-AL sockets on the FC-AL Interface board. Each additional loop requires two additional GBIC modules and one 2-meter fibre channel cable. The GBIC modules on the FC-AL Interface board are exactly the same as those used in the Sun StorEdge A5X00 arrays, FC-AL SBus Host Adapter, and on the SBus I/O board.

The Sun Enterprise 3500 server can be ordered without internal disk drives. Any of the bootable Sun StorEdge disk products (such as the Sun StorEdge UniPack, MultiPack, D1000, A3500, and A5X00 products) can be used as a boot device for a Sun Enterprise 3500 server without internal disk drives. Such a configuration does not require an FC-AL Interface board.

The individual FC-AL connections on the FC-AL Interface board are logically independent. The components do get their power through a single connection. However, the power to the FC-AL Interface board comes from the backplane which is supported by redundant power supplies. Therefore the design has practically no single point of failure.

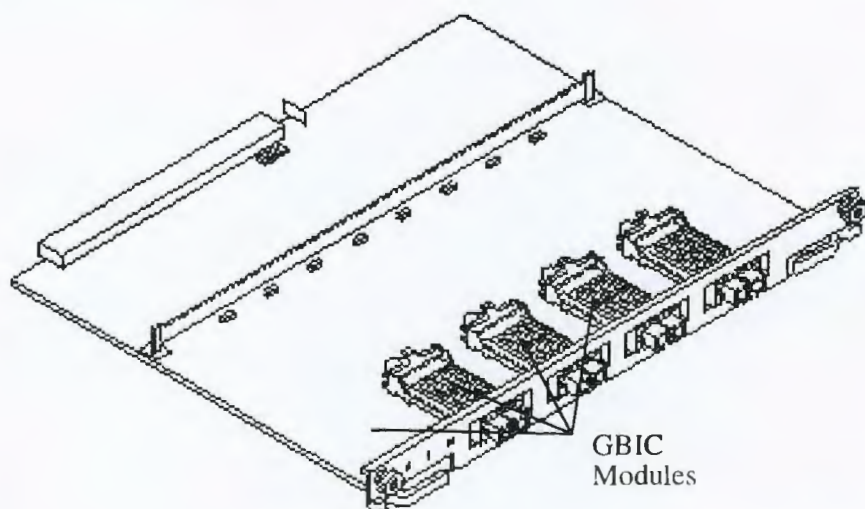
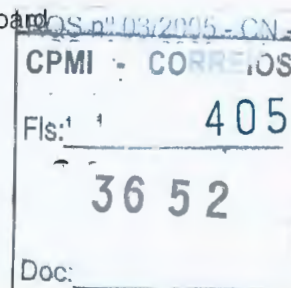


Figure 4. FC-AL Interface board



Sun Enterprise 3500 Server Questions and Answers

Is the FC-AL drive supported in the Sun Enterprise 3500 server the same as the FC-AL drive supported in the Sun StorEdge A5X00 disk array?

Yes, the same FC-AL drives are supported in both the StorEdge A5X00 and the Sun Enterprise 3500.

What is the purpose of the cable organizer?

The cable organizer, which is shipped with all Sun Enterprise 3500 servers, attaches easily to the rear bumper on the Sun Enterprise 3500 server. Fiber cables that connect the GBICs on the FC-AL Interface board and the GBICs on the I/O boards should be routed through the cable organizer in a "figure eight" pattern. This will keep the cables out of the way and secure so that they are less likely to be inadvertently detached from the system. The cable organizer also provides that the fibre channel cables are not bent beyond their supported bend radius, preventing the cables from crimping and damage; it also provides mounting for the power cord restrainer that comes installed on the rear bumper.

Can the GBIC sockets be used on the FC-AL Interface board to connect (daisy-chain) Sun StorEdge A5X00 disk arrays to the Sun Enterprise 3500 server?

No, the GBIC sockets on the FC-AL Interface board can only be used to connect the internal FC-AL drives of the Sun Enterprise 3500 server. Sun StorEdge A5X00 systems must be connected to FC-AL sockets on system I/O boards, through the on-board sockets or through SBus Host Adapters.

Is the Sun Enterprise 3500 FC-AL Interface Board orderable in a factory configuration?

The Sun Enterprise 3500 FC-AL Interface board can be ordered either as factory configured or standalone.

Can pairs of FC-AL sockets support both the Sun Enterprise 3500 server internal disks and Sun StorEdge A5X00 system?

Yes. The SBus I/O board and the Graphics I/O board both come with a pair of on-board 100-MB-per-second FC-AL sockets. In addition, both types of boards support an SBus host adapter that has a pair of 100-MB-per-second FC-AL sockets. Each of these pairs of sockets can support the internal disk drives in the Sun Enterprise 3500 server and/or the Sun StorEdge A5X00 array. They can be split up so that one supports one type of device while the other socket supports a different type of device.

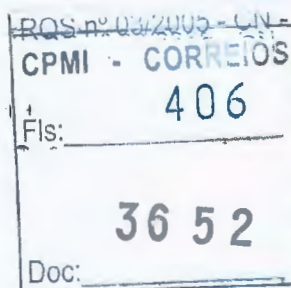
For example, if one of the two on-board FC-AL sockets is being used as the connection to the internal drives in the Sun Enterprise 3500 server, its matching empty socket *can* be used to connect a Sun StorEdge A5X00 disk array.

Is the LUXADM disk administration facility supported with the Sun Enterprise 3500 internal disk drives?

Yes, a specific set of LUXADM commands are supported currently and more will be added in the first half of calendar year 1999. The following commands are currently supported on both Solaris 2.5.1, Solaris 2.6 and the Solaris 7 Operating Environment: luxadm inquiry, stop, start, -e forcelp, -e rdl, set_boot_dev.

Why is there a new second peripheral power supply?

When the second peripheral power supply was moved to the front of the Sun Enterprise 3500 server, it had to be redesigned to fit its new space. When this second peripheral power supply is not used, a thermal protection module is inserted in its place. This light-weight component can be recognized by the warning labels on it and should *not* be discarded. It should only be removed when a second peripheral power supply is installed.



As the internal disk drives are no longer SCSI, can the on-board SCSI connection be used on the first I/O board in the Sun Enterprise 3500 server?

Yes. This connection may be used to connect certain SCSI devices as long as the total SCSI length (including the connection to the tape and internal CD to the Sun Enterprise 3500 server) does not exceed SCSI specifications (6 meters). The internal SCSI bus length is 1.56 meters. This means that up to two Sun StorEdge UniPacks or one Sun StorEdge MultiPack (with six drives or fewer) may be daisy chained from the on-board SCSI port located on the first I/O board of the Sun Enterprise 3500 server.



Sun Enterprise™ 3500 Server

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Sun Enterprise™ 4500 Server

Sun Enterprise 4500 System Enclosure

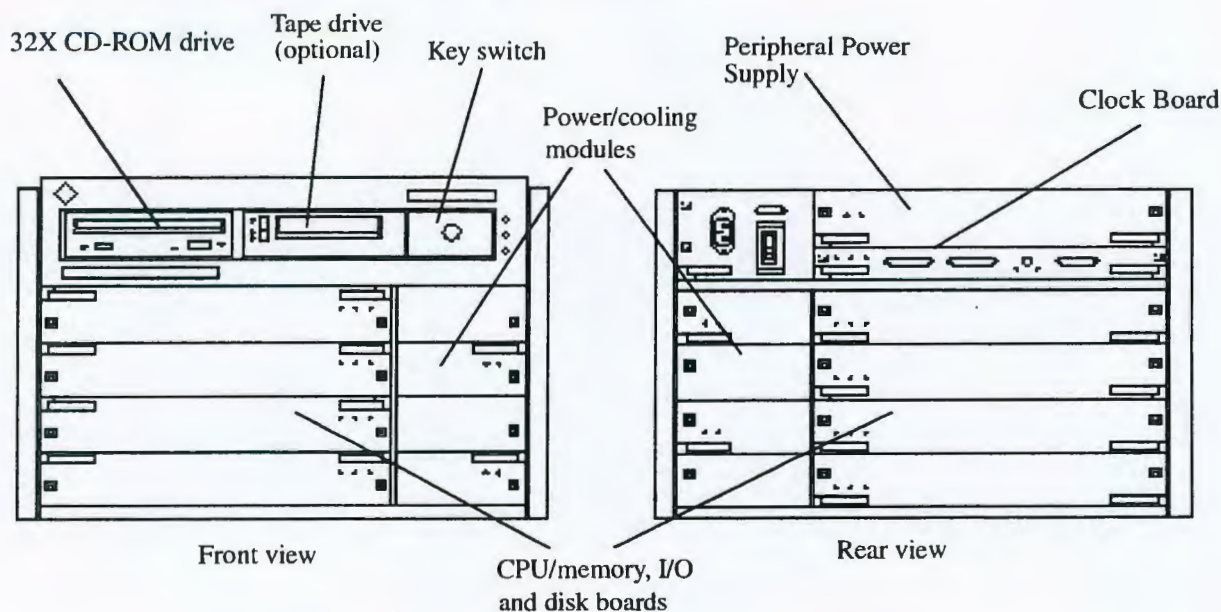


Figure 5. The Sun Enterprise™ 4500 System Enclosure

The Sun Enterprise 4500 server package is a tabletop enclosure, which is identical to the Sun Enterprise 4000 server and similar in size to the external package of the SPARCserver™ 1000E system. In addition to the enhanced Gigaplane™ system bus, the Sun Enterprise 4500 server also has a faster 32X CD-ROM, compared to the 12X CD-ROM used in the Sun Enterprise 4000 server. The Sun Enterprise 4500 server also includes a power cord locking module that prevents the power cord from being accidentally removed from the system.

- Inside the enclosure is an eight-slot card cage for CPU/memory, I/O, or disk boards, allowing four boards to be installed from the front of the cabinet and four boards to be installed from the rear. Typically, the I/O boards and disk boards are installed from the rear for ease of cabling.
- In the card cage, next to the board slots, are slots for the power/cooling modules. Up to four power/cooling modules can be installed, two from the front and two from the rear. Power/cooling modules must be installed adjacent to CPU/memory, I/O, and disk boards.
- The peripheral power supply is located at the top rear of the card cage.
- The Sun StorEdge™ CD32 drive is located at the upper left front of the enclosure. Next to the SunCD™ 32 is a slot for an optional half-height tape device. The tape device can be a 4-mm, 8-mm, or one-quarter-inch tape drive. Next to the slot for the optional tape device are the key switch and system LEDs.
- The clock board is located in the card cage below the peripheral power supply. The clock board has its own slot and does not use one of the eight board slots for the CPU/memory, I/O, or disk boards.

Sun Enterprise™ 5500 Server



Sun Enterprise 5500 System Cabinet

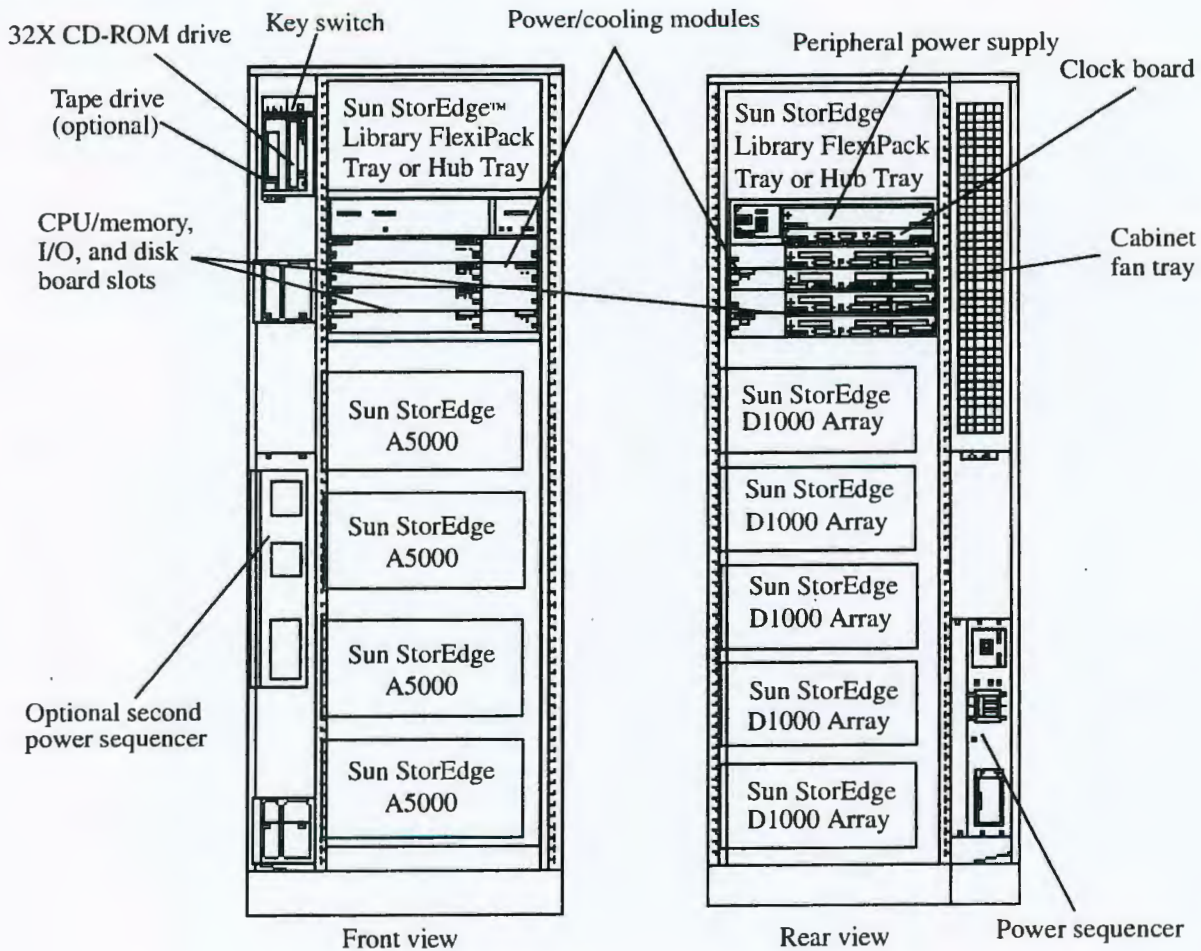


Figure 6. The Sun Enterprise™ 5500 System Cabinet

The Sun Enterprise 5500 system enclosure is a 68-inch data-center cabinet, 12 inches taller than both the Sun Enterprise 5000 system cabinet as well as the SPARCcenter™ 2000E system cabinet. In addition to the enhanced Gigaplane™ system bus, the Sun Enterprise 5500 server also has a faster 32X CD-ROM, compared to the 12X CD-ROM used in the Sun Enterprise 5000 server. The fan tray that supports the internal SCSI devices (internal tape and CD) in the Sun Enterprise 5500 server has also been modified to enable support for new, higher performing tape devices.

- Inside the cabinet is an eight-slot card cage for CPU/memory, I/O, or disk boards, allowing four boards to be installed from the front of the cabinet and four boards to be installed from the rear. Typically, the I/O boards and disk boards will be installed from the rear for ease of cabling.
- In the card cage, next to the board slots, are slots for the power/cooling modules. Up to four power/cooling modules can be installed, two from the front and two from the rear. Power/cooling modules must be installed adjacent to CPU/memory, I/O, and disk boards.



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Sun Enterprise™ 5500 Server



- The peripheral power supply is located at the top rear of the card cage.
- The clock board is located in the card cage below the peripheral power supply. The clock board has its own slot and does not use one of the eight board slots for the CPU/memory, I/O, or disk boards.
- The cabinet fan tray contains four fans that blow hot air out the rear of the cabinet.
- An optional Sun StorEdge™ FlexiPack removable storage tray, Sun StorEdge Tape Library, or FC-AL hub tray (supporting two hubs) can be installed above the card cage. The FC-AL hub tray can also be installed below the card cage in the Sun Enterprise 5500 server in all cases, except maximum configurations, with four Sun StorEdge A5X00 arrays.
- The following devices can be installed in the system cabinet below the card cage:
 - Up to four Sun StorEdge A5X00 disk arrays
 - Up to five Sun StorEdge A1000/D1000 arrays
 - Up to two Sun Enterprise 4000 or Sun Enterprise 4500 servers (using the rack-mount rails for Sun Enterprise 4000 or Sun Enterprise 4500 server)

Note: *The SPARCstorage™ Array Model 100 series subsystems and the Sun StorEdge RSM™ disk trays are still supported in the Sun Enterprise 5500 system cabinet, however they are no longer orderable. The Sun Enterprise 5500 system cabinet can support up to four SPARCstorage Array Model 100 series subsystems or up to six StorEdge RSM disk trays.*

- A hinged door covering the lower four-fifths of the cabinet offers easy access to internal components.
- A Sun StorEdge CD32 drive is installed in the upper left front of the system cabinet. Next to the SunCD™ 32 is a slot for an optional half-height tape device. The tape device can be a 4-mm, 8-mm, or one-quarter-inch tape drive. Next to the slot for the optional, half-height tape device are the key switch and system LEDs. The SunCD 32 CD-ROM, the optional tape device, and the key switch are mounted behind a separate, small door.
- The top panel does not have a hinged door. The upper right front of the system cabinet will either have a bezel for the Sun StorEdge FlexiPack removable storage tray or Sun StorEdge Tape Library, or a blank panel when no peripherals are installed above the card cage.
- Customers who wish to include two or more Sun StorEdge A5X00 arrays in the Sun Enterprise 5500 system cabinet must also order the Sun StorEdge A5000 screen door, which provides additional electro-magnetic interference shielding.
- A 9-inch air baffle is required when three Sun StorEdge A5X00 arrays are installed in a Sun Enterprise 5500 system cabinet.
- An optional, second power sequencer is offered to provide a second power source for configurations where the aggregate power requirements of the devices exceed the power provided by a single power sequencer. The second power sequencer also provides a second power source for storage devices that support dual power inlets.
- When the Second Power Sequencer is ordered for installation in the system cabinets (Sun Enterprise 5500 and Sun Enterprise 6500 servers), the second sequencer mounting brackets for Sun Enterprise 5500 and 6500 servers must also be ordered.



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Sun Enterprise™ 6500 Server



Sun Enterprise 6500 System Cabinet

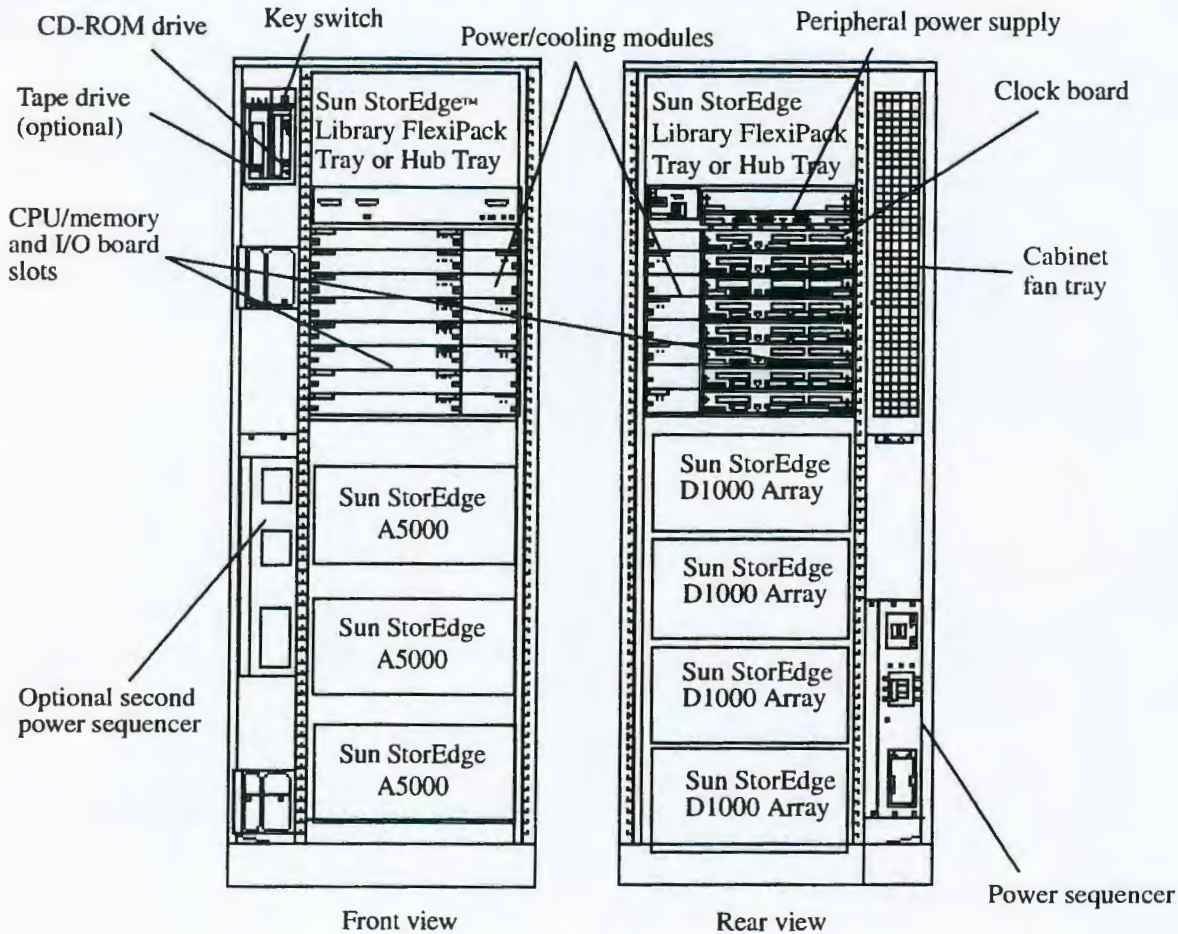
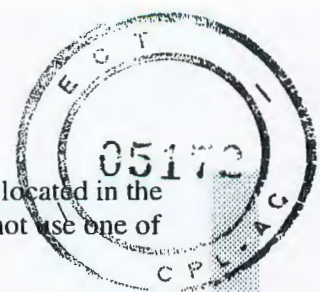


Figure 7. The Sun Enterprise™ 6500 System Cabinet

The Sun Enterprise 6500 system enclosure is a 68-inch tall data-center cabinet, 12 inches taller than both the Sun Enterprise 6000 cabinet and the SPARCcenter™ 2000E cabinet. The Sun Enterprise 6500 server also has a faster 32X CD-ROM, compared to the 12X CD-ROM used in the Sun Enterprise 6000 server. The fan tray that supports the internal SCSI devices (internal tape and CD) in the Sun Enterprise 6500 server has also been modified to enable support for new, higher-performing tape devices.

- Inside the cabinet is a 16-slot card cage for CPU/memory boards, I/O boards and disk boards, allowing eight boards to be installed from the front of the cabinet and eight boards to be installed from the rear of the cabinet. Typically, the I/O boards are installed from the rear for ease of cabling.
- The physical length of the 16-slot Gigaplane system bus in the Sun Enterprise 6500 server limits the maximum speed of the system interconnect. Therefore the Sun Enterprise 6500 server runs the Gigaplane system bus at a maximum of 84 MHz with 16 slots.
- In the card cage, next to the board slots, are slots for the power/cooling modules. Up to eight power/cooling modules can be installed, four from the front and four from the rear. Power/cooling modules must be installed adjacent to CPU/memory and I/O boards.



- The peripheral power supply is located at the top rear of the card cage. The clock board is located in the card cage below the peripheral power supply. The clock board has its own slot and does not use one of the 16-board slots for the CPU/memory or I/O boards.
- The cabinet fan tray contains four fans that blow hot air out the rear of the cabinet.
- An optional Sun StorEdge FlexiPack removable storage tray, Sun StorEdge Tape Library or FC-AL hub tray (supporting two hubs) can be installed above the card cage. The hub tray can also be installed below the card cage in the Sun Enterprise 6500 server in all cases except maximum configurations, with three Sun StorEdge A5X00 arrays.
- The following storage devices can be installed in the system cabinet below the card cage:
 - Up to three Sun StorEdge A5X00 disk arrays
 - Up to four Sun StorEdge A1000/D1000 arrays
 - Up to two Sun Enterprise 4000 or Sun Enterprise 4500 servers (using the rack-mount rails for Sun Enterprise 4000 or Sun Enterprise 4500 servers)

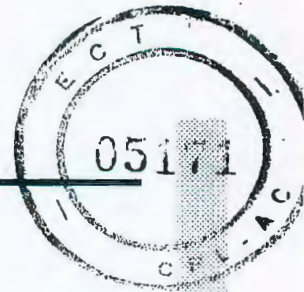
Note: *The SPARCstorage™ Array Model 100 series subsystems and Sun StorEdge RSM™ trays are still supported in the Sun Enterprise 6500 system cabinet, however they are no longer orderable. The Sun Enterprise 6500 system cabinet can support up to three SPARCstorage Array Model 100 series subsystems or up to five StorEdge RSM disk trays.*

- A hinged door covering the lower three-quarters of the cabinet offers easy access to internal components.
- A Sun StorEdge CD32 drive is installed in the upper left front of the system cabinet. Next to the SunCD™ 32 is a slot for an optional half-height tape device. The tape device can be a 4-mm, 8-mm, or one-quarter-inch tape drive. Above the slot for the optional half-height tape device is the key switch. The SunCD 32 CD-ROM, the optional tape device, and the key switch are mounted behind a separate, small door.
- The top panel does not have a hinged door as on the SPARCcenter 2000E. The upper right front of the system cabinet will have either a bezel for the Sun StorEdge FlexiPack removable storage tray or Sun StorEdge Tape Library, or a blank panel when no peripherals are installed above the card cage.
- Customers who wish to include two or more Sun StorEdge A5X00 arrays in the Sun Enterprise 6500 system cabinet must also order the Sun StorEdge A5000 screen door, which provides additional electro-magnetic interference shielding.
- A 9-inch air baffle is required when two Sun StorEdge A5X00 arrays are installed in a Sun Enterprise 6500 system cabinet.
- An optional, second power sequencer is offered to provide a second power source for configurations where the aggregate power requirements of the devices exceed the power provided by a single power sequencer. The second power sequencer also provides a second power source for storage devices that support dual power inlets.
- When the Second Power Sequencer is ordered for installation in the system cabinets (Sun Enterprise 5500 and Sun Enterprise 6500 servers), the second sequencer mounting brackets for Sun Sun Enterprise 5500 and 6500 servers must also be ordered.

Sun Enterprise™ 6500 Server

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Sun Enterprise™ Expansion Cabinet



Sun Enterprise Expansion Cabinet

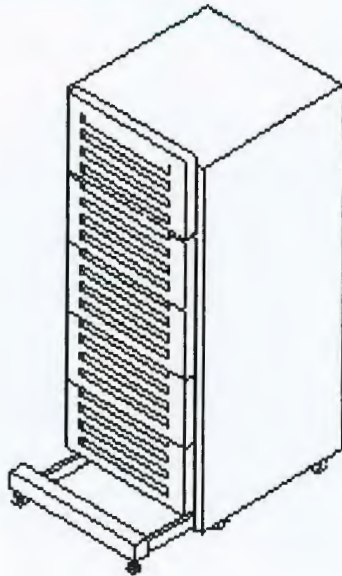


Figure 8. The Sun Enterprise™ Expansion Cabinet

The 68-inch Sun Enterprise expansion cabinet is primarily used to rack mount Sun Enterprise 4000 and Sun Enterprise 4500 servers and is ordered without factory-installed devices. This data center cabinet is similar in look and size to the Sun Enterprise 5500 and Sun Enterprise 6500 system cabinets.

This section describes the features of the new 68-inch Sun Enterprise expansion cabinet. Refer to the *Sun Enterprise 3000–6000 Just the Facts* document for details regarding the 56-inch expansion cabinet.

Each expansion cabinet includes a cable for connecting the expansion cabinet to a system cabinet. The cable allows control and status information to be transferred between the expansion cabinet and the system cabinet (see “Expansion Cabinet Cooling” for more details). Multiple expansion cabinets can be daisy-chained to the system cabinet.

- The following devices may be installed in an expansion cabinet:
 - Sun Enterprise 4000 and Sun Enterprise 4500 servers
 - Sun StorEdge™ A5X00 disk arrays
 - Sun StorEdge A1000/D1000 arrays
 - Sun StorEdge FlexiPack removable storage trays
 - Sun StorEdge Tape Library
- The expansion cabinet has a full-height hinged door, offering easy access.
- Sun Enterprise cabinet floor brackets may be installed to help prevent the cabinet from shifting in cases of extreme floor movement.

Sun Enterprise™ Expansion Cabinet

Expansion Cabinet Capacity

- A maximum of six Sun StorEdge A5X00 arrays and two FC-AL hub trays (supporting two hubs each) can be installed in an expansion cabinet, offering up to 1.2 TB of storage (with the StorEdge A5200 array).
- A maximum of eight Sun StorEdge A1000/D1000 arrays are supported per cabinet (a second power sequencer is required if more than four A1000/D1000 arrays are installed in the expansion cabinet).
- A maximum of two Sun StorEdge FlexiPack removable storage trays are supported per expansion cabinet; a maximum of five Sun StorEdge FlexiPack removable storage trays are supported per system.
- Up to four tape devices are supported per Sun StorEdge FlexiPack removable storage tray.
- A maximum of four Sun StorEdge Tape Libraries are supported per expansion cabinet.
- Expansion cabinets with Sun StorEdge FlexiPack removable storage trays or Sun StorEdge Tape Libraries must be adjacent to the system cabinet. This is required because the maximum length of the single-ended SCSI cable is 6 meters.
- Customers who wish to include two or more Sun StorEdge A5X00 arrays in the Sun Enterprise expansion cabinet must also order the Sun StorEdge A5000 screen door, which provides additional electro-magnetic interference shielding.
- A 9-inch air baffle is required when five Sun StorEdge A5X00 arrays are installed in a Sun Enterprise expansion cabinet
- An optional, second power sequencer is offered to provide a second power source for configurations where the aggregate power requirements of the devices exceed the power provided by a single power sequencer. The second power sequencer also provides a second power source for storage devices that support dual power inlets. The Expansion cabinet comes with mounting brackets already installed so no Second Sequencer mounting brackets need be ordered.

Note: Please note that the SPARCstorage™ Array model 100 series subsystems, model 200 series controllers and Sun StorEdge RSM™ trays are supported in the 68-inch Sun Enterprise expansion cabinet system cabinet, however they are no longer orderable. The Sun Enterprise expansion cabinet can support a maximum of seven SPARCstorage Array Model 100 Series disk arrays or a maximum of ten StorEdge RSM disk trays (an expansion cabinet with 8 or more RSM disk trays requires the second power sequencer).

- Up to four Sun Enterprise 4000 or Sun Enterprise 4500 servers may be mounted in a Sun Enterprise expansion cabinet (using the rack-mount rails for the Sun Enterprise 4000 or Sun Enterprise 4500 server). An expansion cabinet with four Sun Enterprise 4000 or Sun Enterprise 4500 systems requires the second power sequencer.
 - The following combinations of rack-mounted devices are supported with *one* Sun Enterprise 4500 server in the Sun Enterprise expansion cabinet:
 - Five Sun StorEdge A5X00 arrays with one hub tray (supporting two hubs)
 - Up to six Sun StorEdge A1000/D1000 arrays (a second power sequencer is required if more than four Sun StorEdge A1000/D1000 arrays are installed in the expansion cabinet).
 - Up to eight Sun StorEdge RSM disk trays (an expansion cabinet with eight or more Sun StorEdge RSM disk trays requires the second power sequencer).
 - Up to five SPARCstorage Array Model 100 Series
 - The following combinations of rack-mounted devices are supported with *two* Sun Enterprise 4500 servers in the Sun Enterprise expansion cabinet:
 - Three Sun StorEdge A5X00 arrays with one hub tray (supporting two hubs)
 - Up to four Sun StorEdge A1000/D1000 arrays



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- Up to five Sun StorEdge RSM disk trays
- Up to three SPARCstorage Array Model 100 Series
- The following combinations of rack-mounted devices are supported with *three* Sun Enterprise 4500 servers in the Sun Enterprise expansion cabinet:
 - Exactly three Sun Enterprise 4X00 systems (no other devices in the cabinet) require one 9-inch air baffle (X9622A) and two 6-inch air baffles (X9625A).
 - Three Sun Enterprise 4X00 systems and one Sun StorEdge A5X00 array (or one SPARCstorage Array Model 100) require two 6-inch baffles (X9625A).
 - Three Sun Enterprise 4X00 systems and two Sun StorEdge A5X00 arrays (or two SPARCstorage Arrays Model 100) require no baffles
 - Three Sun Enterprise 4X00 systems and any other devices (Sun StorEdge RSM tray, Sun StorEdge A1000/D1000 array, etc) in any quantity requires no baffles

No additional devices can be mounted in the 68-inch Sun Enterprise expansion cabinet with four Sun Enterprise 4X00 servers. One 6-inch air baffle (X9625A) is required when four Sun Enterprise 4500 system chassis are installed in a Sun Enterprise expansion cabinet. A second power sequencer is also required with four Sun Enterprise 4X00 systems in a 68-inch Expansion Cabinet.

Expansion Cabinet Cooling

- Each expansion cabinet has one cabinet fan tray that includes four fans supported by two power supplies. Each power supply supports two fans.
- The expansion cabinet features redundant cooling. If a power supply fails, two fans stop running and two fans continue to operate, providing enough cooling to keep the devices in the expansion cabinet cool.
- Expansion cabinets can be controlled by the Sun Enterprise 4500-6500 server and can send status information to the system cabinet, through a connection between the expansion cabinets and the system cabinet. Specifically, the connection supports the following:
 - When a cabinet fan tray fails in an expansion cabinet, the Sun Enterprise 4500-6500 server is notified of this failure. A system administrator monitoring the Sun Enterprise 4500-6500 server status will be able to see when a cabinet fan tray fails in an expansion cabinet.
 - The system administrator is able to turn off the Sun Enterprise 4500-6500 server and all expansion cabinets connected to the Sun Enterprise 4500 server with either the Sun Enterprise 4500-6500 server key switch or through a software command.

Sun Enterprise™ Expansion Cabinet

Expansion Cabinet Questions and Answers

What is the difference between the 56-inch and 68-inch Sun Enterprise expansion cabinet?

Basically the only difference is the height of the cabinet. One more 12-inch door panel was added to increase the height to 68 inches. Additional space allows more devices in the cabinet, which in turn requires more power. Therefore an optional, second power sequencer is offered. As mentioned earlier, if two or more Sun StorEdge A5X00 arrays are to be installed in the Sun Enterprise expansion cabinet the customer must also order the Sun StorEdge A5000 front screen door, which provides additional electro-magnetic interference shielding.

Can the peripherals in an existing SPARCcenter™ expansion cabinet be migrated and moved to the new Sun Enterprise expansion cabinet?

Yes, the peripheral devices in the SPARCcenter expansion cabinet can be migrated to the Sun Enterprise expansion cabinet. The only device supported in the SPARCcenter expansion cabinet that is not supported in the Sun Enterprise expansion cabinet is the half-inch tape drive.



Sun Enterprise™ Expansion Cabinet



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CPU/Memory Board

CPU/Memory Board

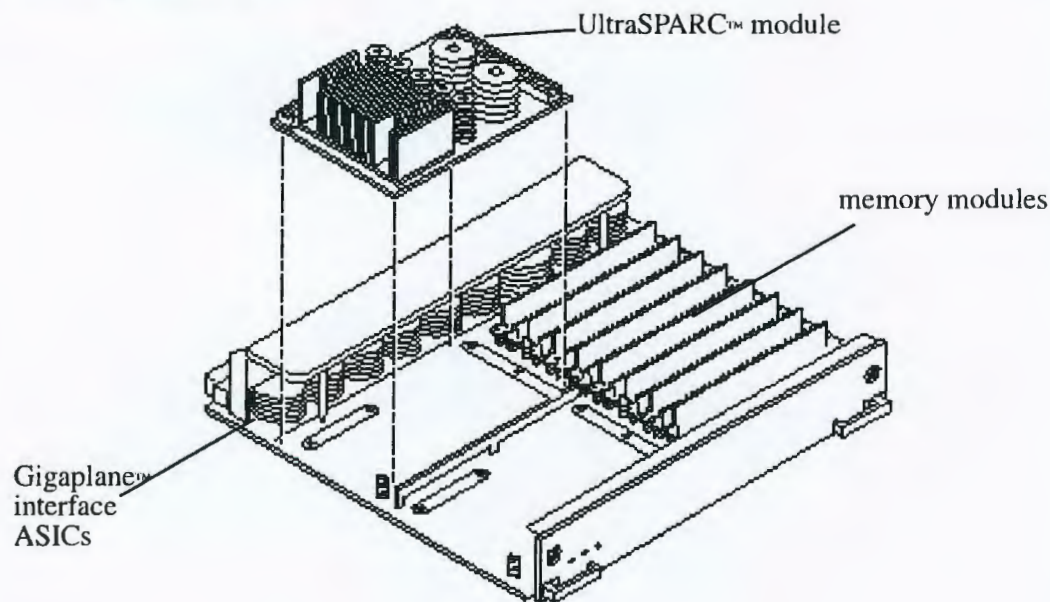


Figure 9. CPU/memory board

CPU/memory boards connect to the Gigaplane™ bus. On the CPU/memory boards, the Ultra™ Port Architecture (UPA) bus connects the Gigaplane bus to the two UltraSPARC™ modules and two memory banks.

- The latest CPU/memory board (2602A) is capable of running at up to 100-MHz Gigaplane speed.
- Each CPU/memory board can support zero, one, or two UltraSPARC modules. CPU/memory boards with no UltraSPARC modules can be added to systems requiring more memory capacity.
- The Sun Enterprise™ 3500–5500 servers support 167-MHz, 250-MHz, 336-MHz and 400-MHz UltraSPARC modules.
- The Sun Enterprise 6500 server support 167-MHz, 250-MHz and 336-MHz UltraSPARC modules.
- The CPU/memory board has two banks of 60-ns, 3.3-V memory modules. Each memory bank consists of eight memory modules. Two types of memory options are available: 256 MB (8 x 32-MB memory modules), and 1 GB (8 x 128-MB memory modules).
- Each CPU/memory board supports up to 2 GB of memory.
- The CPU/memory boards have temperature sensors located under the UltraSPARC modules that control the fan speed in the adjacent power/cooling module and allow the actual temperature of individual boards to be monitored through the Sun Enterprise SyMON™ software.
- With a system design that supports multiple CPU/memory boards, a failure of a single UltraSPARC module or memory module will result in a temporary interruption of system operation while the system reboots itself around the failed component.
- The part number for the new, 100 MHz-capable CPU/memory boards is 2602A. This CPU/memory board includes two empty CPU slots, two empty memory banks, no processors, and no memory.

Note: The 84 MHz-capable CPU/memory boards (2600A and 2601A) have been transitioned off of the price list. CPU/memory Board



Just the Facts

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CPU/Memory Board



CPU/Memory Board Questions and Answers

Why did Sun change from using a single system board that included everything in the SPARCserver 1000/2000 (CPU, memory, and I/O) to offering two types of boards, CPU/memory boards and I/O boards with the Sun Enterprise 3X00-6X00 servers?

There are many advantages gained by offering separate CPU/memory boards and I/O boards. The primary advantage is configuration flexibility. With one system board, a customer who wants to increase memory capacity must purchase an entire system board. With separate CPU/memory and I/O boards, customers can purchase only what they need. If they want to add additional memory, they purchase a CPU/memory board. This allows customers to configure systems as computing engines or I/O engines, which are not only less expensive, but also offer much higher performance, since they can configure more CPUs (and memory) or more I/O bandwidth, depending upon their application needs.

Another reason is design flexibility. With separate CPU/memory and I/O boards, Sun can make modifications to each type of board independently. For example, Sun can upgrade the Fibre Channel Interface on the I/O board and not affect the CPU/memory board. Sun also recently introduced the new, PCI I/O board. Ultimately, this allows Sun to bring out new CPU/memory and I/O board modifications, as well as new technologies, more quickly.

In addition, because the I/O board has much more functionality than before, one I/O board in the Sun Enterprise 4500 server has the same I/O capability as two system boards in the SPARCserver 1000E. This means Sun offers greater CPU, memory, and I/O expandability in these systems by offering separate CPU/memory and I/O boards.

Can the UltraSPARC modules be inserted and removed by anyone?

No. Only qualified personnel should insert and remove UltraSPARC modules.

Why did Sun go to a new UltraSPARC module connector?

The new connector is more reliable than the type of connector used in the SPARCserver 1000E. Also, the previous connectors did not provide the number of pins required for the new modules.

Are there any special requirements for upgrading to the 250-MHz/4-MB or 336-MHz/4-MB UltraSPARC modules?

Yes, the 250-MHz and 336-MHz modules with 4 MB of external cache should be installed on either the 2601A or the latest CPU/memory board (2602A) which replaced the 2601A. Although the 250-MHz/4-MB and 336-MHz/4-MB modules will function and are supported on the original CPU/memory board (2600A) only 2 MB of Ecache will be used per module.

What is the software requirement for the 336-MHz modules?

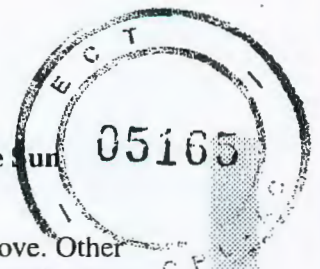
The 336-MHz UltraSPARC module requires the Solaris™ 2.5.1 Operating Environment or later releases. It also requires Sun Enterprise Flashprom Update 3.2.12 or later.

Can the newer 100 MHz-capable CPU/memory boards be used in Sun Enterprise 3000-6000 servers?

Yes. The previous 84-MHz CPU/memory boards are being transitioned off the price list and these new CPU/memory boards are compatible with existing Sun Enterprise 3000-6000 servers. There is no problem mixing these CPU/memory boards in a Sun Enterprise 3000-6000 server that already uses the previous boards.



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Is there any new hardware or software required to support the 400-MHz module in the Sun Enterprise 3X00-5X00 servers?

Yes, the 400-MHz modules will require Ultra Sun Enterprise Flashprom update 3.2.18 or above. Other than the Flashprom version, no new hardware or software is required from what is being shipped currently in the Sun Enterprise 3500-5500 servers.

They will run in existing Sun Enterprise 3000-5000 servers if they have the following:

- 100-MHz capable CPU/memory and I/O boards (2602A, 2612A, 2622A, 2632A)
- An upgraded 100-MHz capable Gigaplane in the Sun Enterprise 4000 and 5000 (Sun Enterprise 3000 excluded as mentioned above.) See "Upgrades" section for details regarding system board and Gigaplane upgrades.
- Ultra Sun Enterprise Flashprom update 3.2.18 or above.
- 100-MHz clock board (manufacturing part number 501-4946) which is required to support 100-MHz Gigaplane. A 100-MHz clock board upgrade is available (part number UG-ENT-100MHCLOCKB)

The clock board in the latest Sun Enterprise 3000 and Gigaplane in all Sun Enterprise 3000 servers are already 100-MHz capable so in most cases only the system boards need to be upgraded in order to support the 400-MHz/4-MB modules. Only original Sun Enterprise 3000 base packages need to have the clock board upgraded. This is because the original clock board in Sun Enterprise 3000 base package did not support any modules above 167-MHz and therefore needs to be upgraded to support 400-MHz modules. Base packages with order numbers "E3001" and "E3002" do not need to have the clock board upgraded because they shipped with a second generation clock board which supported modules above 167-MHz.

Is the 400-MHz/4-MB UltraSPARC module supported in a system with any 84-MHz system boards (2600A, 2601A, 2610A, 2611A, 2620A, or 2630A)?

No, the 400-MHz/4-MB UltraSPARC module is not supported in a system with any 84-MHz system boards due to the fact that it runs at a 4:1 CPU-to-Gigaplane speed ratio and requires the Gigaplane (and associated system boards) to run at 100-MHz.

What CPU modules are supported in the Sun Enterprise 3500-6500 servers?

The Sun Enterprise 3500-5500 servers can be ordered with factory-configured 250-MHz/4-MB, 336-MHz/4-MB or 400-MHz/4-MB UltraSPARC modules. The Sun Enterprise 6500 can be factory-configured with either 250-MHz/4MB or 336-MHz/4-MB UltraSPARC modules. The 250-MHz/1-MB, 167-MHz/1-MB, and 167-MHz/0.5-MB UltraSPARC Modules are also supported, but they not available as factory-configured options.

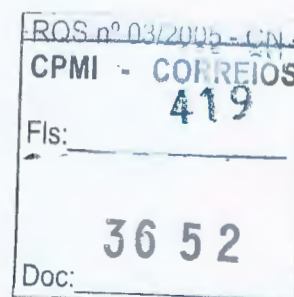
Note: Customers with 167-MH UltraSPARC modules who wish to migrate their modules to Sun Enterprise 3500-6500 servers might require a PROM upgrade as the minimum PROM level supported is 3.2.10

Why isn't the 400-MHz/4-MB UltraSPARC module supported in the Sun Enterprise 6500 & 6000 Servers?

The 400-MHz/4-MB module requires the Gigaplane to run at 100-MHz. The Sun Enterprise 6000 and 6500 cannot support running the Gigaplane at 100-MHz due to the physical length of the bus.

Will the 400-MHz/4-MB module ever be supported in the Sun Enterprise 6000 and 6500 Servers?

No, the 400-MHz/4-MB module will never be supported in the Sun Enterprise 6000 and 6500 Servers.





Will there be a faster than 336-MHz UltraSPARC module available for the Sun Enterprise 6000 and 6500 Servers?

Yes, there will be a future module available that will run faster than 336-MHz and will not require the Gigaplane, I/O boards, or 2601A/2602A CPU/memory boards to be upgraded (2600A CPU/memory boards will need to be upgraded). Up to 30 of these future modules will be supported in a single system and all 16 Gigaplane slots will be usable.

Is it necessary to upgrade the Gigaplane in order to support faster than 336-MHz modules in the Sun Enterprise 3000-5000 servers?

At this time yes, but in the future there will be a new module available that will run at faster than 336-MHz speeds and will not require the Gigaplane, I/O boards, or 2601A/2602A CPU/memory boards to be upgraded (2600A CPU/memory boards will need to be upgraded).

Will an Sun Enterprise 3500-5500 system support a mixture of different processor speeds (for example, 336-MHz and 400-MHz)?

Mixing 167-MHz, 250-MHz modules, 336-MHz modules, or 400-MHz modules in a single system is not supported. Mixing same frequency modules with different external cache is supported as long as all modules on a single CPU/memory Board have the same size external cache.

CPU/Memory Board

Memory Subsystem



Memory Subsystem

The memory in the Sun Enterprise™ 3000–6000 and Sun Enterprise 3500–6500 servers is located on the CPU/memory boards. Up to 2 GB of RAM can be installed on each CPU/memory board. The memory subsystem in Sun Enterprise 3500–6500 servers is designed to offer fast, reliable data access.

- The memory controller manages two banks of memory on each CPU/memory board. Each bank of memory consists of eight standard JEDEC memory module modules, implemented in 3.3-V CMOS.
- The memory banks on the CPU/memory boards are very “wide.” Each bank can deliver 512 bits (64 bytes) in a single cycle, meaning that a 64-byte cache miss can be supplied in one memory cycle. This results in faster memory subsystem performance.
- Sun Enterprise 3500–6500 servers support up to 16-way memory interleave. Extensive interleave is required to support the high memory access rates possible in systems with many UltraSPARC™ modules.
- Interleaved memory banks can be different sizes, which is an improvement from the memory interleaving scheme used in the SPARCserver™ 1000E and SPARCcenter™ 2000E systems.

Memory Interleaving

Memory interleaving helps increase memory subsystem performance by reducing the probability of “hot spots” or contention in a few memory banks by spreading access to multiple memory banks. In a two-way interleaved system, the first cacheline is supplied by bank 0 while the second is supplied by bank 1. The size and extent of interleave is arranged so that a single typical request is satisfied by one bank. This permits memory requests to be fulfilled with a minimum amount of contention from other UltraSPARC modules.

Interleaved memory on Sun Enterprise 3500–6500 systems is considerably more important than on previous-generation systems because the UltraSPARC modules generate requests faster and the bandwidth of a single bank of memory is a smaller fraction of the Gigaplane™ bus bandwidth.

Configuring Memory for Best Performance

Configuring the memory for optimal system performance is easier than doing so for the SPARCserver 1000E and SPARCcenter 2000E systems because the memory interleave algorithm used for Sun Enterprise 3500–6500 server is much more flexible. Here are some general guidelines that should be used as a starting point in configuring a memory subsystem:

- Each UltraSPARC module should have at least 128 MB of RAM.
- Spread the amount of memory equally among the available banks. If there are one 1024-MB bank and one 256-MB bank, 80 percent ($1024 \times 100 / (1024 + 256)$) of all accesses on average will go to the 1024-MB bank and the bandwidth available will be limited by that bank, even though the 256-MB bank has the same available bandwidth. If most of the memory is in a few big banks, the interleaving of those big banks is more important than the interleaving of the other banks.
- In general, it is better to have more banks of smaller size than a smaller number of bigger banks.
- Fill up one bank on every board before filling the second bank on any board.
- If there are some boards with both banks filled and some boards with only one bank, the smaller banks must be put on the boards with two banks; the bigger banks must be kept on boards with only one bank.

Memory Subsystem Questions and Answers

What is the difference between the memory interleaving in the Sun Enterprise 3500–6500 servers and the memory interleaving in the SPARCserver 1000E system?

The SPARCserver 1000E system used a simple interleaving system that produced up to eight-way interleave. Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers have an improved design with fewer restrictions on the interleave configuration. They can support up to 16-way interleave and these interleaved memory banks can also be different sizes. The previous-generation systems interleaved memory only when memory banks were the same size. This meant that a SPARCserver 1000E system with two 32-MB banks and two 256-MB banks would use a two-way interleave between the 32-MB banks and two-way interleave between the 256-MB banks.

A similarly configured Sun Enterprise 3500–6500 server can use four-way interleave on the two 256-MB banks when combined with the first 256 MB of the 1-GB banks, and two-way interleave on the remaining memory. This permits considerably higher memory subsystem performance.

Why can't the memory modules from the SPARCcenter 2000E or SPARCserver 1000E be used in Sun Enterprise 3500–6500 servers? The Ultra™ 1 systems use the memory modules from the previous generation of desktops.

Sun Enterprise 3500–6500 server architecture requires 3.3-volt memory modules. All of Sun's previous generation memory modules were 5 volt. In addition, the desktop memory modules are too tall for the CPU/memory board spacing. The JEDEC memory modules fit both the form factor and voltage requirements.

Does the use of industry-standard memory modules mean that customers can buy off-the-shelf memory modules for use in Sun Enterprise 3500–6500 servers?

Yes, as long as the memory modules are the correct size (density), form, and voltage. However, Sun cannot guarantee that memory modules from third-party vendors will operate properly in Sun Enterprise 3500–6500 servers. Sun does not support third-party memory options.

Do Sun Enterprise 3500–6500 servers need more memory per processor compared to the SPARCcenter 2000E and SPARCserver 1000E systems? If so, why and how much?

Yes. With the SPARCcenter 2000E system, the general rule is that each processor should have at least 64 MB of RAM. With Sun Enterprise 3500–6500 servers, the general rule is that each processor should have at least 128 MB of RAM. The reason is that the UltraSPARC modules in the Sun Enterprise 3500–6500 servers are much higher performance than the CPU modules in the SPARCcenter 2000E system, so they require more memory for a balanced system.

How can one tell what interleave factor a Sun Enterprise 3500–6500 server is using?

Use `prtdiag(1M)`, located in the `/usr/platform/sun4u/sbin` directory.

I/O Boards



Overview

Most of the I/O connectivity for Sun Enterprise™ 3000–6000 and Sun Enterprise 3500–6500 servers is supported through I/O boards. Three types of I/O boards—SBus, Graphics, and PCI—offer a wide range of I/O connectivity.

One of the significant improvements over the I/O subsystem in the SPARCserver™ 1000E and SPARCcenter™ 2000E systems is the use of dual SBus channels on each SBus I/O board. In these previous-generation servers, each system board had one 32-bit SBus channel, offering a maximum I/O bandwidth of 100 MB per second per system board. With dual 64-bit SBus channels on each SBus I/O board, the maximum bandwidth in a Sun Enterprise 3500–6500 server is 400 MB per second per board.

The SBus and Graphics I/O boards also provide 100 MB per second Fibre Channel Arbitrated Loop (FC-AL) connectivity.

The PCI I/O board has two PCI-66 channels and two standard 33-MHz PCI channels. The PCI I/O board has two PCI slots, 20-MB-per-second fast-wide SCSI, and 10/100-Mb-per-second Ethernet. The Ultra™ Port Architecture (UPA) interface that connects the PCI I/O board to the Gigaplane™ system bus has a throughput of 668 MB per second. Thus, the PCI I/O board throughput is 668 MB per second.

The I/O boards also offer environmental monitoring. The I/O boards have temperature sensors, allowing the actual temperature of individual boards to be monitored through the Sun Enterprise SyMON™ software.

I/O boards connect to the Gigaplane bus (see I/O board diagrams on following pages).

- On the SBus I/O board, the UPA bus connects the Gigaplane bus to two SBus channels, which connect the various I/O ports to the UPA bus.
- On the graphics I/O board, the UPA bus connects the Gigaplane bus to one SBus channel and one UPA slot for a graphics card (Creator or Creator3D).
- On the PCI I/O board, the UPA interface connects the Gigaplane bus to two PCI-66 channels and two standard PCI channels.

Sun Enterprise 3500–6500 servers can be PCI- or SBus-only systems. Up to four PCI I/O boards are supported per Sun Enterprise 3500 system and up to six PCI I/O boards are supported per Sun Enterprise 4500–6500 system. Mixed PCI and SBus systems are also supported.

I/O boards are hot-swappable, with the Dynamic Reconfiguration software enhancement provided with Solaris™ 2.6 Hardware: 5/98. This means new I/O boards can be installed and logically configured into the system while the system is online, or I/O boards that have been deconfigured from the system can be removed while the system is online. See the “Reliability, Availability, and Serviceability” section for more details.

SBus I/O Board

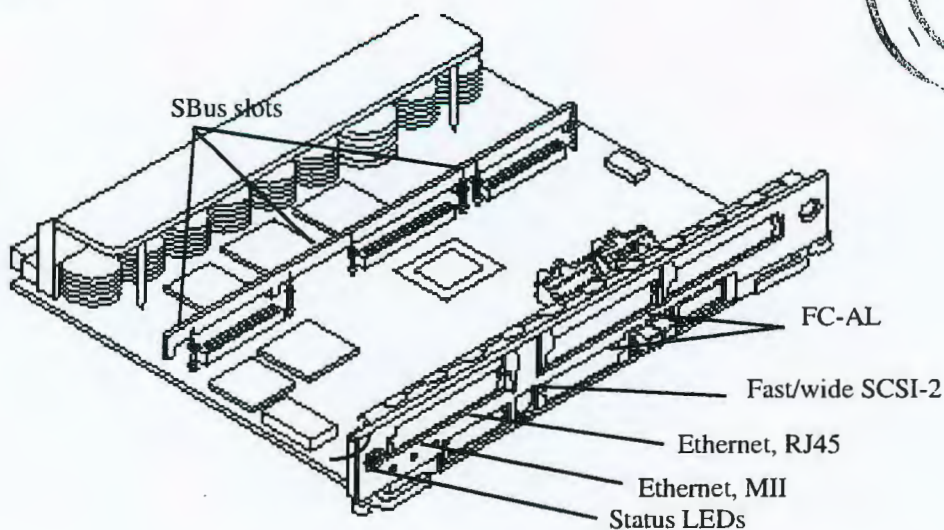


Figure 10. SBus I/O board

SBus I/O board features:

- The latest SBus I/O board (2612A) is capable of running at up to 100-MHz Gigaplane speed
- One on-board, 10/100-Mb-per-second Ethernet port (twisted pair and MII connector)
- One 20-MB-per-second, fast/wide SCSI-2 port
- Two empty 100-MB-per-second FC-AL sockets for GBIC modules
- Three 64-bit SBus slots running at 25 MHz
- Two 64-bit SBus channels, offering a peak throughput of 400 MB per second

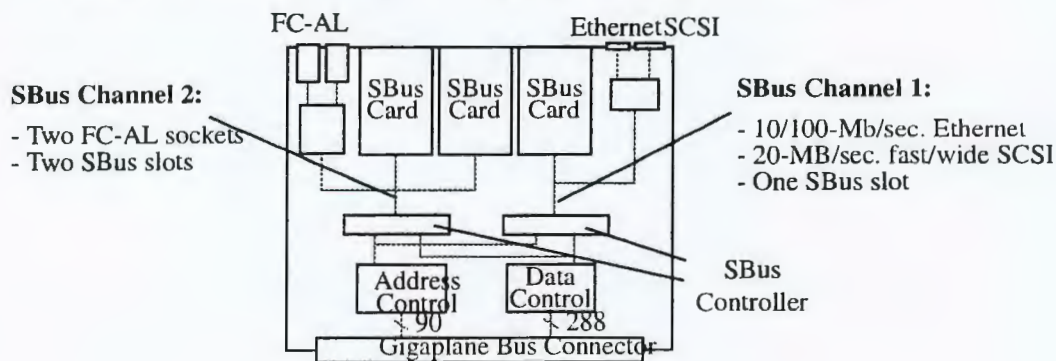


Figure 11. SBus I/O Block Diagram

Note: The 84 MHz-capable SBus I/O boards (2610A and 2611A) have been transitioned off of the price list.

In order to populate the FC-AL sockets on the newer SBus I/O boards (2611A and 2612A) and enable connectivity to a Sun StorEdge™ A5X00 array, order one or two GBIC modules (6731A).

Graphics I/O Board

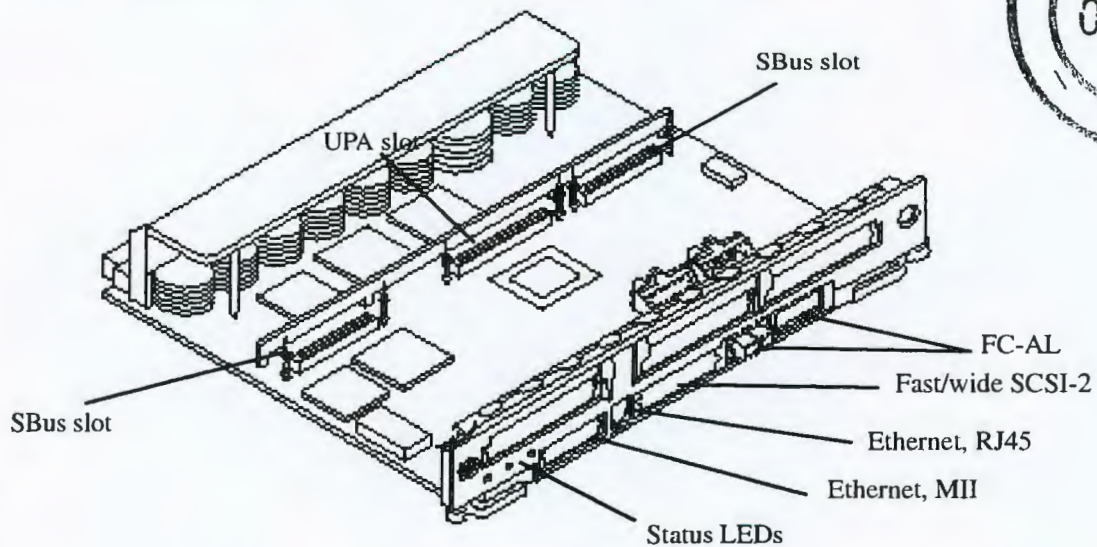


Figure 12. Graphics I/O board

The graphics I/O board, as shown, includes the following features:

- The latest Graphics I/O board (2622A) is capable of running at up to 100-MHz Gigaplane speed
- One on-board, 10/100-Mb-per-second Ethernet port (twisted pair and MII connector)
- One 20-MB-per-second, fast/wide SCSI-2 port
- Two empty 100-MB-per-second FC-AL sockets for GBIC modules
- Two 64-bit SBus slots running at 25 MHz
- One UPA slot for a Creator3D series 3 or Sun Elite3D m6 graphics board
- One 64-bit SBus channel, offering 200-MB-per-second data transfer

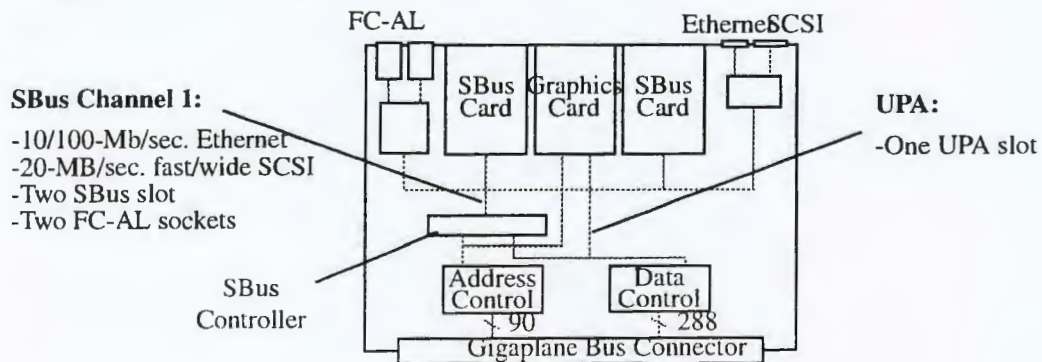
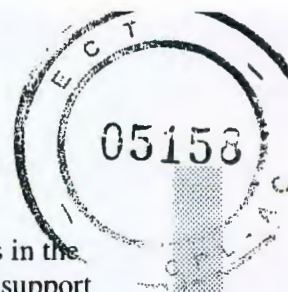


Figure 13. Graphics I/O Board Block Diagram

Note: The 84 MHz-capable Graphics I/O board (2620A) has transitioned off of the price list.



I/O Boards

Graphics Frame Buffers Supported

The Graphics I/O board can support both Creator3D series 3 and Sun Elite3D m6 frame buffers in the horizontal form factor. As shown in the table below, the Sun Enterprise 3500-6500 servers can support multiple board configurations.

System	Maximum Number of Creator3D series 3 or Sun Elite3D m6 Frame Buffers	Maximum Number of CPUs
Sun Enterprise 3500 Sun Elite3D (5 slots)	3	4
Sun Enterprise 4500 Sun Elite3D (6 slots)		
• Configuration 1	1	10
• Configuration 2	2	8
• Configuration 3	3	6
• Configuration 4	4	4
Sun Enterprise 6500 Sun Elite3D (16 slots)		
• Configuration 1	1	30
• Configuration 2	2	28
• Configuration 3	3	26
• Configuration 4	4	24
• Configuration 5	5	22
• Configuration 6	6	20
• Configuration 7	7	18
• Configuration 8	8	16

PCI I/O Board

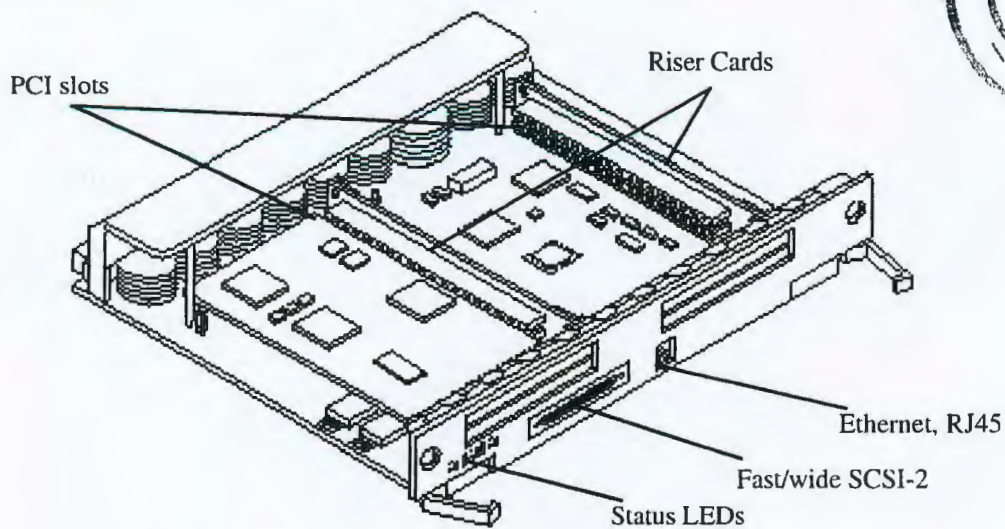


Figure 14. PCI I/O board

The PCI I/O board, as shown, includes the following features:

- The latest PCI I/O board (2632A) is capable of running at up to 100-MHz Gigaplane speed
- One on-board 10/100-Mb-per-second Ethernet port (twisted pair)
- One 20-MB-per-second, fast/wide SCSI-2 port
- Two 64-bit PCI slots running at 66 MHz (also supports 33 MHz)
- Two 64-bit PCI channels, each offering 528-MB-per-second data transfer

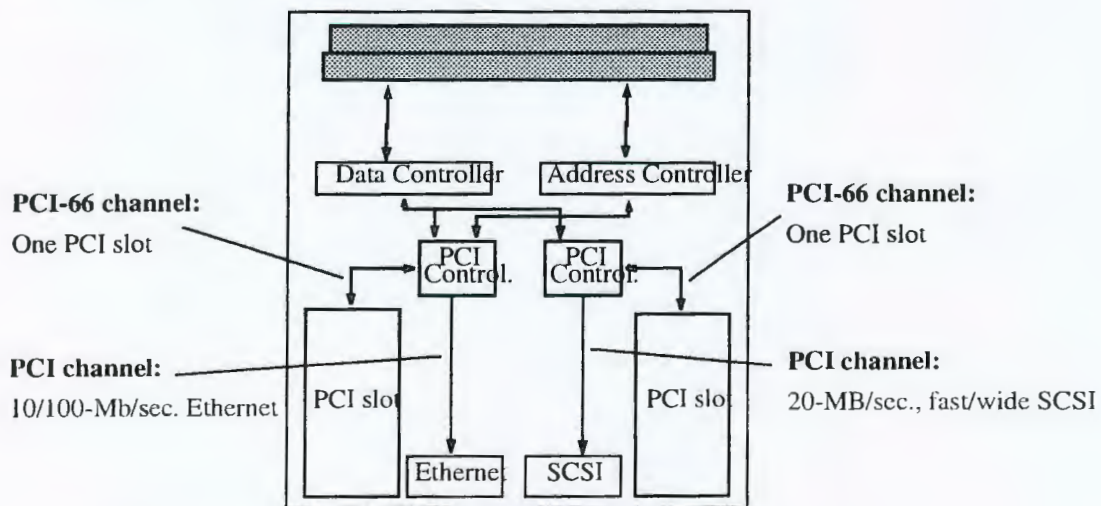


Figure 15. PCI I/O Board Block Diagram

Note: The 84 MHz-capable PCI I/O board (2630A) has transitioned off of the price list.



I/O Boards Questions and Answers

Are the 32-bit SBus cards supported on the SPARCcenter 2000E and SPARCserver 1000E systems also supported on Sun Enterprise 3500–6500 servers?

Yes.

Does the graphics I/O board also support the TurboGX™ graphics card?

Yes. Both the Graphics I/O board and the SBus I/O board support the TurboGX graphics card.

Do dual-wide SBus cards work with the SBus I/O board or graphics I/O board?

One dual-wide SBus card will fit on an SBus I/O board. Only single-wide SBus cards will work with the Graphics I/O board.

What type of PCI cards can be used in the Sun Enterprise 3500–6500 servers?

Sun supports 3.3-volt or 5.0-volt PCI short cards (4.200 x 6.875 inches).

What PCI card speeds are supported in the Sun Enterprise 3500–6500 servers?

The PCI slots accept either 66-MHz or 33-MHz PCI cards. They can be either 64-bit or 32-bit cards.

Does Sun support (service) third-party PCI cards?

No. Sun does not support (service) third-party PCI cards. However, Sun has been working with third-party independent hardware vendors to ensure a robust supply of cards for Sun platforms. PCI cards that have been verified by Sun to operate properly on Sun platforms are subject to stringent testing. A list of these third-party PCI cards can be found at URL <http://www.sun.com/sunready/vendors.html>.

What is included with the PCI I/O board?

The board comes with two 5.0-volt riser cards preinstalled. The PCI card plugs into the riser card. The PCI I/O board also comes with two 3.3-volt riser cards. If your PCI card is 3.3-volt, then a 5.0-volt riser card must be removed and a 3.3-volt riser card must be installed.

Do PCI cards on the same PCI I/O board have to be the same voltage?

No. There may be one 5.0-volt card and one 3.3-volt card on the same PCI I/O board. It must be ascertained that the appropriate riser card for each PCI card are being used.

Are there any software requirements for the PCI I/O board?

Yes. The PCI I/O board requires Solaris 2.5.1. Hardware: 4/97 or higher. The CPU/memory boards must also have at least OpenBoot™ PROM software, version 3.2.8 or later.

Can the new 100 MHz-capable I/O boards be used in Sun Enterprise 3000–6000 servers?

Yes. The previous 84-MHz I/O boards are being transitioned off the price list and these new I/O boards are compatible with existing Sun Enterprise 3000–6000 servers. There is no problem mixing these I/O boards in a Sun Enterprise 3000–6000 server that already uses the previous boards.

Does the Sun Enterprise 3500–6500 server family support SBus-only and mixed I/O board configurations?

Yes. However, a PCI-only configuration in a Sun Enterprise 3500 server does not provide a way to connect the internal FC-AL disk drives. This is because the PCI I/O board does not have on-board FC-AL sockets and currently there is no PCI FC-AL card available. So, to be able to use the internal disk drives in the Sun Enterprise 3500, there must be at least one SBus I/O or one Graphics I/O board installed.

Are there plans to add on-board FC-AL sockets to the PCI I/O board?

No, there is not enough physical space on the board to accommodate on-board FC-AL sockets.



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Power and Cooling

Power and Cooling

The Sun Enterprise™ 3500–6500 servers offer a highly flexible, highly reliable power and cooling environment. With an N+1 system configuration (where N is the minimum number of power supplies required), Sun Enterprise 3500–6500 servers offer redundant power, using power/cooling modules that are hot swappable. This offers customers a system that will almost never fail due to a power supply or a fan failure.

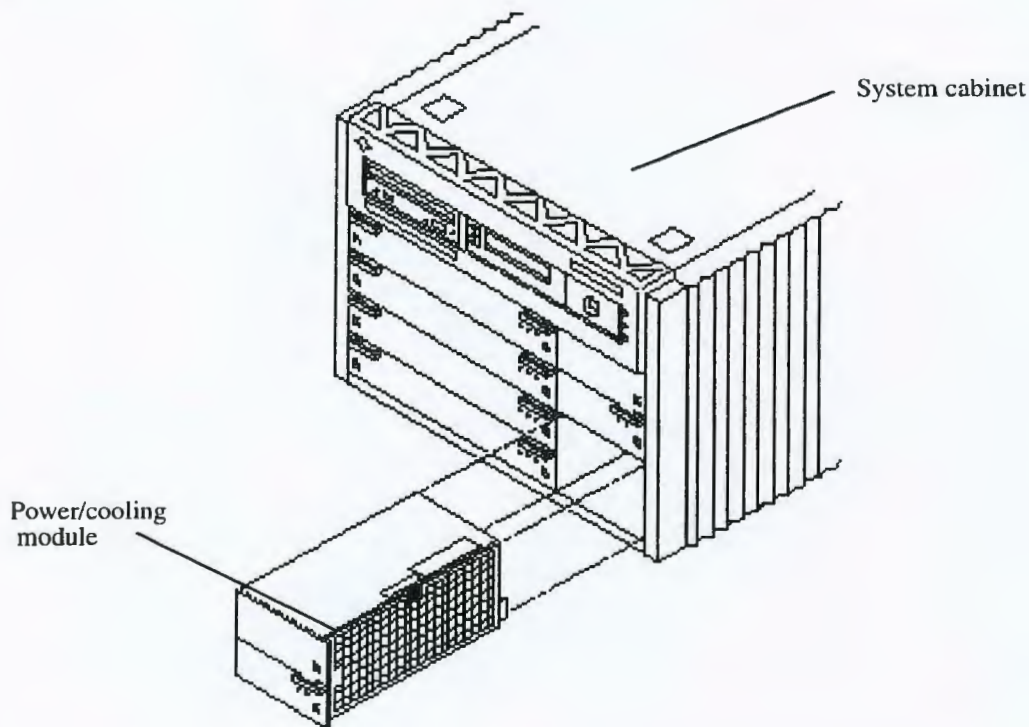


Figure 16. The Sun Enterprise 4500 Server Hot-swappable Power/Cooling Module

Power Circuitry

There are two different types of power supplies in Sun Enterprise 3500–6500 servers: power/cooling modules and peripheral power supplies.

- Power/cooling modules contain a 300-watt power supply and two variable-speed fans. The number of power/cooling modules installed in a system depends on the system configuration.
- One power/cooling module is required for every two adjacent boards on each side of the centerplane.
- The Sun Enterprise 3500 server supports a maximum of three power/cooling modules.
- The Sun Enterprise 4500 and Sun Enterprise 5500 servers support a maximum of four power/cooling modules.
- The Sun Enterprise 6500 server supports a maximum of eight power/cooling modules.
- Power from the power/cooling modules is distributed throughout the system using current-sharing circuitry, so that if the power supply in one power/cooling module fails, power from the other power/cooling modules keeps the system running (if the system is configured for redundant power).



- To configure a system *without* redundant power, the system must have $x/2$ power/cooling modules, where x is the number of CPU/memory, I/O and disk boards (round up to the nearest whole number).
- To configure a system *with* redundant power, the system must have $(x/2 + 1)$ power/cooling modules, where x is the number of CPU/memory, I/O and disk boards (round up to the nearest whole number). However all of the Sun Enterprise 3500–6500 server platforms are able to provide redundant power for maximum board configurations with only $x/2$ power/cooling modules, therefore providing the following exceptions to the $x/2 + 1$ rules:
 - When configuring the Sun Enterprise 3500 server, the $x/2+1$ configuration rule implies that a Sun Enterprise 3500 system with five boards would require four power/cooling modules ($5/2 + 1 = 4$). But there are only three power/cooling module slots. In order to resolve this issue, each power/cooling module is able to supply slightly more power than is required, so a Sun Enterprise 3500 server with five boards can operate on two power/cooling modules plus a second peripheral power supply. Thus, a second peripheral power supply is required for full N+1 power supply redundancy in a five-board Sun Enterprise 3500 server configuration.
 - Similarly, a Sun Enterprise 6500 system with 16 boards would require nine power/cooling modules ($16/2 + 1 = 9$). But there are only eight power/cooling module slots. Each power/cooling module is able to supply slightly more power than is required, so a Sun Enterprise 6500 server with 16 boards can operate on seven power/cooling modules.
 - Sun Enterprise 4500 and Sun Enterprise 5500 servers with eight boards are able to run on three power supplies, so only four power supplies are required for redundancy. The peripheral power supply is connected to the same power circuitry as the power/cooling modules, providing the additional power required for redundancy. Note that there are some limitations with regard to power supply redundancy with certain configurations of the Sun Enterprise 4500 and 5500 when using the 400-MHz processor. See the “Power and Cooling Questions and Answers” section for more details.
- The power/cooling module is hot swappable. Therefore, if a power supply fails, the power/cooling module can be replaced (assuming the system is configured for power/cooling redundancy) while the system is running without any adverse effects to the system.
- The Sun Enterprise 4500–6500 servers have one peripheral power supply. The peripheral power supply is hot pluggable but not redundant in these platforms.
- The Sun Enterprise 3500 server supports a second, hot-swappable, peripheral power supply. The peripheral power supply provides power for the internal SCSI devices and the FC-AL internal disk drives, as well as additional power for the system boards. If the primary peripheral power supply fails, the system continues to run, but the internal SCSI devices are not functional unless the system has a second peripheral power supply. The primary peripheral power supply includes the AC inlet so it is not hot swappable. Only the second peripheral power supply is hot swappable.

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System Cooling

Sun Enterprise 3500–6500 servers have multiple power/cooling modules for cooling the CPU/memory, I/O, and disk boards (Sun Enterprise 4500–6500 server only), and one set of dual fans to cool the AC distribution assembly, clock board, and peripherals.

- The power/cooling modules include a power supply and two variable-speed fans.
- With dual, variable-speed fans, if one fan fails, the other fan speeds up to increase its cooling capacity.
- The power/cooling module is hot swappable. Therefore, if a fan fails, the power/cooling module can be replaced (assuming the system is configured for power/cooling redundancy) while the system is running without any adverse effects to the system.
- The fans within a power/cooling module are powered by all the power supplies in the system through current sharing. With this design, if a power supply fails, the fans within that power/cooling module continue to run.
- Variable-speed fans minimize system noise.
- The Sun Enterprise 5500 and Sun Enterprise 6500 system cabinets includes one cabinet fan tray. The cabinet fan tray includes four fans supported by two power supplies. Each power supply supports two fans. The cabinet fan tray in the system cabinet directs the hot air from the card cage and peripheral devices out the rear of the cabinet.
- Each Sun Enterprise expansion cabinet also contains one cabinet fan tray. The cabinet fan tray in an expansion cabinet can be connected to the system cabinet so that the Sun Enterprise SymON™ software is able to detect the failure of a cabinet fan tray in an expansion cabinet. The cabinet fan tray is not hot pluggable.

Power and Cooling Questions and Answers

If a fully configured, eight-board Sun Enterprise 4500 server can operate on three power/cooling modules, can an identically configured eight-board Sun Enterprise 6500 server also operate with three power/cooling modules?

No. In the Sun Enterprise 4500 server, the peripheral power supply and the power/cooling modules are connected to the same power circuit. Therefore, if one power/cooling module fails, power from the other three power/cooling modules plus power from the peripheral power supply provide enough power to run the system. This allows eight boards to be powered by three power/cooling modules.

However, in the Sun Enterprise 6500 server, the peripheral power supply and power/cooling modules have different power circuits. Therefore, if one power/cooling module fails, the only power available is from the three remaining power/cooling modules, which is not enough to support the systems.

Are there any limitations in regard to power supply redundancy (N+1) associated with the 400-MHz/4-MB UltraSPARC™ module?

Yes, 100-MHz Gigaplane™ capable 8-slot systems (Sun Enterprise 4500, 5500, and Sun Enterprise 4000 and 5000 servers with upgraded 100-MHz Gigaplane) have an N+1 power limitation. These systems do not support N+1 power if the system has seven CPU/memory boards installed (even with four power/cooling modules installed). N+1 power is supported in any other configurations of these systems assuming the correct number of power/cooling modules are installed. The N+1 power limitation is due to the fact that the 100-MHz system speed consumes more power than the 84-MHz system speed that we currently run at. The increased power consumption does not leave enough spare power to continue running a system with seven CPU/memory boards installed if one of the power/cooling modules fails.

Do fully configured Sun Enterprise 4500 or 5500 servers with twelve 400-MHz/4-MB modules, six CPU/memory boards, two I/O boards, and four power/cooling modules have N+1 power?

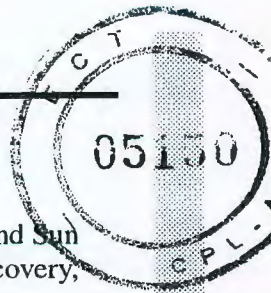
Yes, the N+1 power limitation is applicable only when the configuration includes seven CPU/memory boards.



Power and Cooling

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System Management



System Diagnostics

There are three types of system diagnostics tools available for the Sun Enterprise™ 3000–6000 and Sun Enterprise 3500–6500 servers: the Sun Validation Test Suite (SunVTS™), Automatic System Recovery, and Remote Administration Control.

SunVTS™

SunVTS is the replacement product for SunDiag™ diagnostics tool. Like SunDiag, SunVTS is run at the UNIX® level and is designed to exercise the entire system. It supports either a graphical user interface (GUI) or TTY user interface, and provides error and information logging. The key features of SunVTS are:

- **UNIX-level diagnostics**

System tests execute UNIX code under the Solaris Operating Environment™.

- **Automatic system probing**

The system configuration is displayed through the user interface.

- **Two user interfaces**

Both a graphical user interface and a character-based interface are available. The SunVTS kernel is cleanly separable from the user interface, such that multiple user interfaces can communicate with the same SunVTS kernel. The character-based interface permits the writing of shell scripts to control SunVTS.

- **Application programming interface (API)**

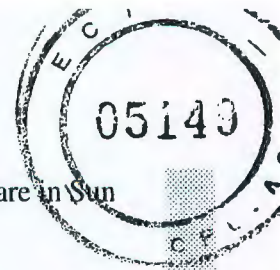
The API provides a defined interface into the SunVTS kernel from other processes, as well as the user interfaces. A SunVTS execution could be initiated in a cron-like fashion, with no direct user interface at all.

- **Advanced configuration and execution control**

Tests can be grouped together based on user requirements, with fine-grained execution control for status and logging information.

Automatic System Recovery

Automatic System Recovery operates the same way in Sun Enterprise 3500–6500 servers as in the Sun Enterprise 3000–6000 and SPARCcenter™ 2000E systems. Automatic System Recovery allows Sun Enterprise 3500–6500 servers to recover after a component, such as a UltraSPARC™ module, CPU/memory board, memory module, or I/O board fails. Upon failure, the system reboots. While rebooting, Automatic System Recovery tests system components and identifies the failed component; the system reboots around the failed component.



Automatic System Recovery is driven by power-on self-test (POST) software. The POST software in Sun Enterprise 3500–6500 systems includes two significant changes from the POST used in the SPARCcenter 2000E:

- **Uses a flash EPROM**

Flash EPROM makes it simple to update the OpenBoot™ PROM software in the field. New PROM code can be installed from a CD-ROM while the system is running.

- **Uses a configurable rule-based expert system**

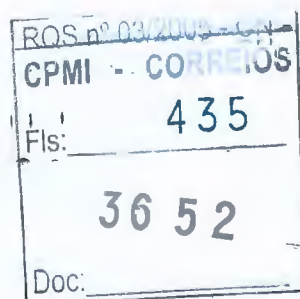
A configurable rule-base expert system allows the user to customize the boot/diagnostic control flow.

Remote Administration Control

The Remote Administration Control feature on Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers allows a user to reboot, power cycle, or perform extensive operating system debugging through one of the serial ports (serial port A only). A special serial processor on the system clock board scans the input for system commands.

This remote console functionality allows for true “lights out” management of a system, giving system administrators more flexibility in point of management and control. This also enhances the serviceability aspect of the systems by providing a method of retrieving the system state on “hung” systems.

Remote control can be disabled by putting the key switch in the “secure” position.



Sun Enterprise SyMON™



Sun Enterprise SyMON™

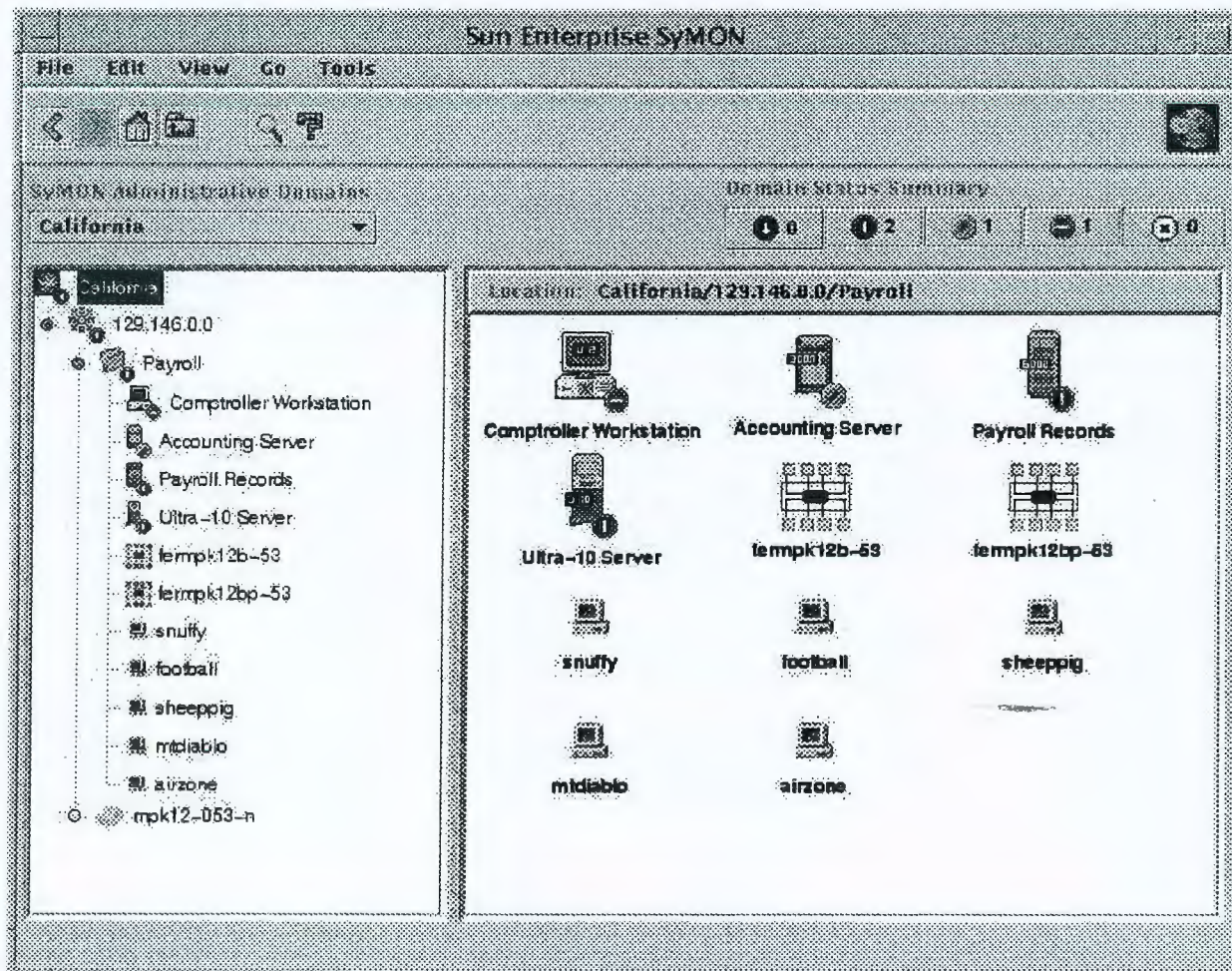


Figure 17. Sun Enterprise SyMON™

Key Features

Sun Enterprise SyMON software is Sun's next-generation enterprise system management tool for Sun Enterprise™ 3500–6500 servers. Designed to support Sun systems, Sun Enterprise SyMON technology provides a platform upon which the enterprise can base its administrative and management operations to help ensure all systems and the services they provide are highly available. A powerful tool for managing the enterprise network, the Sun Enterprise SyMON product enables system administrators to perform remote system configuration, monitor performance, and isolate hardware and software faults all through an easy-to-use graphical user interface.

Key features of Sun Enterprise SyMON software include:

- Common management platform, scalable from a single system to thousands of server and desktop systems
- Single point of management, enabling effective use of administrative resources
- Proactive and automated management of complex and common administrative tasks, reducing the likelihood for costly errors and helping to ensure availability



- Configuration flexibility, enabling Sun Enterprise SymON technology to be configured out of the box to best fit the needs of the environment, as well providing easy customization for new rules, scripts, actions, etc.
- Extensible agent architecture, enabling administrators to add functionality and management features with ease
- Dynamic agents, enabling functionality to be extended asynchronously
- Active configuration management controls, providing a secure interface for remote dynamic reconfiguration capabilities and helping to ensure availability
- Single event model, enabling information to be shared with multiple consoles or users with ease
- Multiple system support, enabling administrators to monitor and manage all Solaris™ systems remotely
- Predictive failure analysis, enabling administrators to predict potential memory and disk hardware failures on a statistical basis, thereby enhancing decision making and increasing availability
- Health monitoring, a sophisticated set of heuristics that incorporates a large body of administrative knowledge, including an intelligent rules-based health monitor that correlates metrics and gives suggested steps for resolution, resulting in simplified administration
- Log-file scanning, enabling administrators to search and parse logs and registers for a particular status—the foundation for application health monitoring
- Logical element grouping, enabling the grouping of Sun systems by geographical location, server role, administrative responsibility, etc. The status of the individual systems are summarized by the group, as events and alarms are issued to each system
- Hierarchy and topology viewer, a central management application that displays the hierarchy and a topology map of all the objects that are being managed
- Automatic discovery of Sun systems, including IP address, subnet address, hostnames, and OIDs to identify specific types of systems, as well as parametric scheduling
- Physical viewer, displaying photo-realistic images of hardware components and pointing to components with an associated event, enabling administrators unfamiliar with a particular Sun platform to quickly determine which components need to be replaced
- Logical viewer, presenting a tree hierarchy of the managed host or domain, including all hardware and operating system components. If an event is associated with a particular component, the logical viewer will identify its exact location within the hierarchy
- Event and alarm management, providing administrators with the information they need when they need it
- Enterprise-wide security measures, such as authentication, data integrity, and access control lists for management of data and active management functions
- Real-time performance analysis, enabling administrators to isolate potential and existing bottlenecks
- Standard interfaces and protocols, enabling integration with third-party management tools, including Tivoli and Computer Associates, thereby providing a complete enterprise management solution
- Full SNMP connectivity, enabling information to be shared with other enterprise management tools
- GUI using Java™ technology, providing heterogeneous GUI support, a common “look-and-feel” for all Sun Enterprise SymON applications, and the flexibility to manage the enterprise from any platform using Java technology, thereby increasing administrator efficiency



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Sun Enterprise SyMON software can be extended through the use of sophisticated add-on products to provide additional functionality:

- Trend analysis and historical data storage, supporting system performance analysis, configuration fault analysis, system sizing, and long term capacity planning and forecasting efforts
- Host application and database fault management, increasing data and service availability through integration with third-party products like BMC PATROL
- Firmware and patch management, providing administrators with the ability to upgrade systems when needed with the addition of Sun Enterprise Configuration and Service Tracker
- On-line diagnostics, enabling hardware and software problems to be predicted, detected, isolated, and resolved, thereby increasing system and service availability with the addition of Sun Enterprise Diag Tool

Sun Enterprise SyMON 2.0 Compatibility

The Sun Enterprise SyMON 2.0 software platform supports all systems running Solaris 2.5.1, 2.6 and Solaris 7 Operating Environments.

Hardware-dependent configuration management functions support includes:

- Sun Ultra™ 1, Ultra 2, Ultra 5, Ultra 10, Ultra 30, Ultra 60 and Ultra 450 workstations
- Sun Enterprise 3X00, Sun Enterprise 4X00, Sun Enterprise 5X00, and Sun Enterprise 6X00 servers
- SPARCserver™ 1000 and SPARCserver 1000E servers
- SPARCcenter™ 2000 and SPARCcenter 2000E servers

Additional hardware-dependent configuration management function support will be available from the Sun Enterprise SyMON web site (www.sun.com/products/symon) after version 2.0 ships. These platforms include, but are not limited to: Sun Enterprise 150, Sun Enterprise 250, Sun Enterprise 450, and Sun Enterprise 10000 servers, and the Sun StorEdge™ A5X00 array.

Sun Enterprise SyMON Licensing/Usage

Sun Enterprise SyMON 2.0 software is available off the web free-of-charge to manage an individual server or desktop (www.sun.com/products/symon). A right-to-use license is required to manage additional servers or desktops/network devices from one Sun Enterprise SyMON server layer.

Sun Enterprise SyMON™



Just the Facts

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Sun Enterprise SyMON System Monitor Questions and Answers

How is Sun Enterprise SyMON different from previous versions?

Sun Enterprise SyMON is a major new release compared to the existing release. It provides several new and enhanced features such as:

- Multiple system support: Administrators can remotely monitor and manage all the Solaris systems in their environments and have the ability to define Sun systems by geography, server role, administrative responsibility, etc.
- Heterogeneous GUI support (Java technology-based GUI): the Java technology UI in Sun Enterprise SyMON allows administrators to have the flexibility to manage from a Java platform and be more efficient through the use of a easy-to-use interface.
- Enhanced event/alarm management: Sun Enterprise SyMON has state-of-the-art event management capabilities that enables cooperative management between multiple system administrators.
- Logical element grouping: ability to group multiple managed systems into one managed entity. Allows IT-organization to map individual managed components into groups related to applications and business processes.
- Active configuration management controls: Sun Enterprise SyMON is a secure interface for remote dynamic reconfiguration capabilities (dynamic attach/detach, etc).
- Application monitoring capabilities: Sun Enterprise SyMON can monitor health and performance of application processes, monitor and act upon error log entries, monitor application files and monitor directory statistics.
- State-of-the-art standard interfaces such as SNMPv2c, SNMPv2usec, and SNMPv1 for interoperability, end-to-end security, and efficient data transfer.
- Integration with major system management platform vendors such as Tivoli and Computer Associates: Sun Enterprise SyMON integrates with the major commercial system and network management platforms to ensure an enterprise solution.

Does Sun Enterprise SyMON integrate with Computer Associates Unicenter TNG, Tivoli TMS, and Hewlett-Packard OpenView?

Sun Enterprise SyMON can send SNMP traps to any SNMP-compliant management platform. For the near future, Sun is working closely with the leading Sun Enterprise Management vendors to provide a tightly integrated solution.

Is Sun Enterprise SyMON 2.x compatible with Solstice SyMON™ 1.x?

Sun Enterprise SyMON 2.0 is not backward compatible with Solstice SyMON 1.x

Sun Enterprise SyMON™



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The Solaris Operating Environment™

The Sun Enterprise 3500–6500 servers run on an industry-leading enterprise operating environment, Solaris™. The Sun Enterprise 3500–6500 servers require Solaris 2.5.1 Hardware: 11/97 with two patches: 104595-03 (or later) and 104594-01 (or later). In addition, patch number 105310-04 (or later), which is an FC-AL patch, is highly recommended. The Sun Enterprise 3500–6500 servers can also run Solaris 2.6 Hardware: 3/98 and the Solaris 7 Operating Environment with no required patches. However, patch number 105375-04 (or later), an FC-AL patch, is highly recommended for both releases.

The Solaris product line is the premier software environment for network computing, delivering unparalleled scalability and performance. Designed for IT professionals, line of business managers, Internet Service Providers and power desktop users, the Solaris software environment safely delivers information to anyone, any time, any place, on anything including PCs, workstations, and all other Internet devices.

Unlike other operating environments, Solaris delivers what companies require today and anticipates the innovation they will require tomorrow. Solaris is reliable, scalable, easy to administer, fast, safe, Year-2000 and Euro compliant, and unleashes the full power of SPARC™ processor- and Intel-based computers.

The Solaris Operating Environment contains the base level functionality required for all systems. It includes a rock solid, scalable 32-bit and 64-bit kernel; standards-based networking; platform support for both SPARC and Intel; and Java™ support. These technologies provide the foundation for building and deploying enterprise class systems for multi-vendor, multi-client workgroup environments and for highly available data center environments.

The strengths of the Solaris Operating Environment lie in enterprise-class reliability, scalability and performance. The Solaris 7 Operating Environment extends these strengths.

Features

Along with the features available in the Solaris 2.5.1 and 2.6 Operating Environment, the Solaris 7 Operating Environment includes support for several new features and capabilities listed below.

RAS Features

- Dynamic Reconfiguration—support for hot-swap I/O boards on Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 systems
- UFS Logging—logs changes to the UFS files system before updates are applied to the UFS
- Year 2000 compliance—no errors result when moving from date 12/31/99 to 1/1/00 or from 2/29/00 to 3/1/00
- System Crash Dump Utility Enhancement—faster capture of system data and the ability to dump data to a specified dump partition at time of system crash while also using less disk space
- Traceroute Utility—traces the route of an IP packet to an Internet host
- New system commands: pgrep(1) and pkill(1)—replaces combination of ps, grep, egrep, awk, and kill
- UNIX® 98 and UNIX 95 branding—complies with industry standards specification

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Performance Enhancements

- Complete 64-bit Operating Environment—process addressing beyond 4-GB, 32-bit barrier; supports 64-bit data types, and 64-bit logical and arithmetic operations
- Improved Poll System Call—system call for querying files
- TCP SACK—selective packet acknowledgment
- SCSI Driver—support for shared disk SCSI driver

Scalability Enhancements

- 64-bit Computing—64-bit virtual addressing, more file descriptors, processes and more available sockets
- Open Sockets—15,000 times as many open sockets available to applications
- Light Weight Processes—support for up to 10 million times more light weight processes
- File Descriptors—support for 15 million times as many file descriptors

Ease-of-use Features

- CDE Administration Enhancements—process manager, perfmeter, system info monitor
- CDE Productivity Enhancements—file finder, customizable graphical front panel and workspace menu, address manager, and text and voice post-it notes
- Printing Enhancements—enhanced font management
- 64-bit and AnswerBook™ Installation—menu-based selection of 64-bit or 32-bit environment, and AnswerBook
- Netscape™ 4.05 Communicator—Netscape e-mail, HTML editor, and browser
- AnswerBook Enhancements—Web browser interface for on-line AnswerBook documentation, man pages are now available in SGML format; can now be run directly from the CD
- man utility displays SGML format in addition to nroff format

Global Language Support Enhancements

- Expanded Unicode Support—support for Unicode 2.1 standard
- Expanded Native Language Support—support for up to 37 languages and 95 locales
- Complex Text Format—support for bidirectional, composite, and context sensitive text
- Euro Currency—support for Euro currency symbol
- More locale selections—English and European versions combined on a single CD
- Fully Globalized—All localized versions share a single global binary

Security and Stability Features

- Generic Security Services—Modified remote procedure call (RPC) based on standard GSS-API
- NIS+ Extended Security—Diffie Helman key extended from 192 bits to 640 or 1024
- Directory Naming Service(DNS)—Berkeley Internet Name Daemon (BIND) upgraded to version 8.1.2. Control Lists.
- Sendmail—Upgraded to version 8.9
- 32-bit Compatibility—all existing 32-bit applications run without modification.
- Single source base for all platforms—all platforms developed from one source tree



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Options



Disk Options

The preferred disk solution for the Sun Enterprise™ 3500–6500 servers depends on the server model as well as the customer's environment. The following is a summary of the disk options available.:

Server

Disk Option

Sun Enterprise 3500

- Internal 9.1-GB, 3.5-inch FC-AL, disk drive(s)
- Sun StorEdge™ A1000/D1000, Sun StorEdge A3500, Sun StorEdge A5X00, and Sun StorEdge A7000 disk arrays
- Sun StorEdge UniPack, MultiPack, FlexiPack
- Sun StorEdge Tape Library

Sun Enterprise 4500

- Internal 8.4-GB disk board
- Sun StorEdge A1000/D1000, Sun StorEdge A3500, Sun StorEdge A5X00, and Sun StorEdge A7000 disk arrays
- Sun StorEdge UniPack, MultiPack, FlexiPack
- Sun StorEdge Tape Library

Sun Enterprise 5500

- Internal, 8.4-GB disk board
- Sun StorEdge A1000/D1000, Sun StorEdge A3500, Sun StorEdge A5X00, and Sun StorEdge A7000 disk arrays
- Sun StorEdge FlexiPack removable storage tray
- Sun StorEdge Tape Library

Sun Enterprise 6500

- Internal, 8.4-GB disk board
- Sun StorEdge A1000/D1000, Sun StorEdge A3500, Sun StorEdge A5X00, and Sun StorEdge A7000 disk arrays
- Sun StorEdge FlexiPack removable storage tray
- Sun StorEdge Tape Library

Keep in mind that the above list is not a complete listing. For example, a Sun Enterprise 3500 server may also boot from external disk drives, but the internal FC-AL disk drives is the most commonly chosen option. Also note that the SPARCstorage™ Array Models 100 and 200 are still supported with the above platforms, although they are no longer factory-configurable.

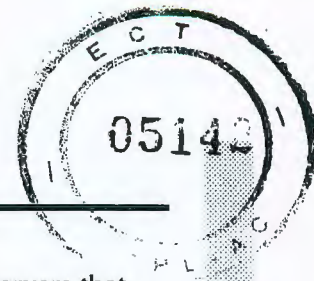
The disk board is designed to be used only as a system disk in the Sun Enterprise 4500–6500 server. Its capacity is not large enough for anything else. It also does not make sense to use several system slots for internal capacity in these systems. External disk options can also be used as system disks.

Refer to the *Sun Enterprise 3500–6500 Servers System Options* document for a list of supported disk options. For Sun Enterprise 3500–6500 servers with certain internal disk options, the Solstice JumpStart™ Boot Image software may be factory installed at no charge. The Solstice JumpStart software may be installed on the following disk storage products:

- Internal FC-AL disk drives on the Sun Enterprise 3500 server
- 8.4-GB disk board in the Sun Enterprise 4500, Sun Enterprise 5500, and Sun Enterprise 6500 servers

The Solstice JumpStart software is not supported with the Sun StorEdge A5X00 array

Upgrades



Sun offers customers a variety of flexible upgrade paths to the Sun Enterprise™ 3500–6500 servers that protect their investment. Customers can choose among full-system, chassis only, Gigaplane™ system bus, CPU, board and memory upgrades. To protect customers' investments, Sun upgrades allow customers to carry forward as many components as possible to a Sun Enterprise 3500, Sun Enterprise 4500, Sun Enterprise 5500 or Sun Enterprise 6500 server.

Sun-to-Sun Upgrades (Trade ins) to the Sun Enterprise Server Family

FROM:	TO:	Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500	Sun Enterprise 6500
Full System Workgroup Server		Yes	No	No	No
Full System Sun 3X0/4X0		Yes	Yes	No	No
Full System Sun 6X0/SS1000		Yes	Yes	Yes	No
Full System Sun SC2000		No	Yes	Yes	Yes
Intra-Family Chassis Upgrade from Sun Enterprise 3000 or Sun Enterprise 3500		No	Yes	Yes	No
Intra-Family Chassis Upgrade from Sun Enterprise 4000 or Sun Enterprise 4500		No	No	No	Yes
Intra-Family Chassis Upgrade from Sun Enterprise 5000 or Sun Enterprise 5500		No	No	No	Yes
Gigaplane Field Upgrade		N/A	Yes	Yes	No
CPU/Memory Board Upgrades		Yes	Yes	Yes	Yes
I/O Board Upgrades		Yes	Yes	Yes	Yes
CPU Module Upgrades		Yes	Yes	Yes	Yes
Memory Upgrade		Yes	Yes	Yes	Yes

Upgrades

Competitive Upgrades (Trade ins) to the Sun Enterprise Server Family

Existing investments in other hardware not by Sun can be preserved by upgrading to Sun Enterprise 3500–6500 systems through competitive upgrades.

FROM:	TO:	Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500	Sun Enterprise 6500
Server System		Yes	Yes	Yes	Yes
CPU Boards		Yes	Yes	Yes	Yes
CPU Modules		Yes	Yes	Yes	Yes



Upgrades to the Sun Enterprise 3500 and Sun Enterprise 4500 Servers

The following system upgrades are available for Sun Enterprise 3500 and 4500 servers:

- Full-system upgrade from workgroup servers
- Full-system upgrade from the older-generation Sun servers
- Full-system upgrade from qualified competitive servers
- Chassis upgrade from Sun Enterprise 3000 to the Sun Enterprise 3500 or Sun Enterprise 4500 servers
- Gigaplane field upgrade for Sun Enterprise 4000 servers

Full-System Upgrades

The full-system upgrades to the Sun Enterprise 3500 server include the chassis, a power/cooling module, one CPU/memory board, and two CPU modules. The chassis upgrades to the Sun Enterprise 4500 server includes the chassis, clock board, and CD. The full-system upgrades are intended to be used in conjunction with the CPU/memory board and UltraSPARC™ module upgrades, and other options to provide a method of upgrading a range of sizes of Sun and competitive systems. This allows Sun to offer excellent value for large and small servers

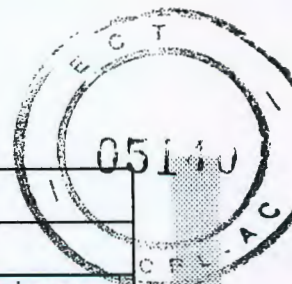
Note: The Return Material Authorization Kit (no-charge part number UG-RMA) is **required** to be ordered with any factory-installed system or component upgrade. This part number will ship return material information..

Order	Receive	Return
Workgroup Server Full-System Upgrade to two-CPU Sun Enterprise 3500 Base		
UG-WRKGP-E3500-C52 (250/4) UG-WRKGP-E3500-C62 (336/4) UG-WRKGP-E3500-C72 (400/4)	Server base package: one CPU/memory board, and two CPU modules, one Power/Cooling Mod.	Chassis, system board, primary memory board, and internal peripherals
Workgroup Server Full-System Upgrades to four-CPU Sun Enterprise 3500 Base (Note: Transition Announced 1/99)		
UG-WRKGP-E3500-C54 (250/4) UG-WRKGP-E3500-C64 (336/4)	Server base package: two CPU/memory board, and four CPU modules and one Power/Cooling modules	Chassis, system board, primary memory board, and internal peripherals
Sun-3™/Sun-4™ or SPARCserver™ 6X0MP Desksides and SPARCserver 1000 Full-System Upgrade to two-CPU Sun Enterprise 3500 Base		
UG-SUNSV-E3500-C52 (250/4) UG-SUNSV-E3500-C62 (336/4) UG-SUNSV-E3500-C72 (400/4)	Server base package: chassis, one CPU/memory board, and two CPU modules, one Power/Cooling module	Chassis, system board (except SPARCcenter™ 1000E, see system board upgrade below), primary memory board, and internal peripherals
Sun-3/Sun-4 /6X0MP Desksides and SPARCserver 1000 Full-System Upgrade to four-CPU Sun Enterprise 3500 base (Note: Transition Announced 1/99)		
UG-SUNSV-E3500-C54 (250/4) UG-SUNSV-E3500-C64 (336/4)	Server base package: two CPU/memory boards, four CPU modules, and one power/cooling modules	Chassis, system board (except SPARCcenter 1000, see system board upgrade below), primary memory board, and internal peripherals

Upgrades



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Order	Receive	Return
Competitive Full-System Upgrade to two-CPU Sun Enterprise 3500 base		
CU-E3500-C52 (250/4) CU-E3500-C62 (336/4) CU-E3500-C72 (400/4)	Server base package: chassis, one CPU/memory board, and two CPU modules	Chassis, system board, primary memory board, and internal peripherals
Competitive Full-System Upgrade to four-CPU Sun Enterprise 3500 base (Note: Transition Announced 1/99)		
CU-E3500-C54 (250/4) CU-E3500-C64 (336/4)	Server base package: two CPU/memory boards, four CPU modules, and one power/cooling modules	Chassis, system board, primary memory board, and internal peripherals
Sun-3/Sun-4 or SPARCserver 6X0MP Desksides SPARCserver 1000 Full System or SPARCcenter 2000 Upgrade		
UG-SUNSV-E4500	Server base package: chassis, clock board, CD, two power/cooling modules, one CPU/memory board, and one SBus I/O board	Chassis, system board, (except SPARCcenter 1000 and 2000, see system board upgrade below) primary memory board, and internal peripherals
Competitive Full-System Upgrade to Sun Enterprise 4500 Base		
CU-E4500	Server base package: chassis, clock board, CD, two power/cooling modules, one CPU/memory board, and one SBus I/O board	Chassis, system board, primary memory board, and internal peripherals

Upgrades

Just the Facts



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Intra-Family Chassis Upgrades

Sun Enterprise 3000 Component Migration

The following is a summary table detailing which components will or will not migrate when upgrading from the Sun Enterprise 3000 server to Sun Enterprise 3500, 4500, or 5500 server:

FROM:	TO:	
Sun Enterprise 3000	Sun Enterprise 3500	Sun Enterprise 4500/5500
Internal Disk	No	No
Memory	Yes	Yes
CPU Module*	Yes	Yes
I/O Boards*	Yes	Yes
CPU/memory Board*	Yes	Yes
Power/Cooling Modules	Yes	Yes
Internal Tape Drive	Yes	Yes
Peripheral Power Supply with AC Inlet	Yes	No
Fan Tray (Above Peripheral Power Supply Only)	Yes	No
* Migrate these boards/modules only if current speed is to be maintained. Migrating 167-MHz modules might require a PROM upgrade as the minimum PROM level supported is 3.2.10. (See product announcement for details on downloading the patch for a PROM level upgrade).		

While the Sun Enterprise 3000 server internal disks are not compatible in the Sun Enterprise 3500–6500 server family, an upgrade (trade in) offering is available. See product announcement for details.

Order	Receive	Return
Sun Enterprise 3000-to-Sun Enterprise 3500 Intra-family Upgrade		
UG-E3000-E3500	Sun Enterprise 3500 system enclosure with clock board, CD, card cage, one board filler panel for power/cooling module	Sun Enterprise 3000 system enclosure, clock board, CD, card cage, fan tray (under disks)
Sun Enterprise 3000-to-Sun Enterprise 4500 Intra-family Upgrade		
UG-E3000-E4500	Sun Enterprise 4500 system enclosure with clock board, CD, card cage, one peripheral power supply, and one power/cooling module, four board filler panels	Sun Enterprise 3000 system enclosure, clock board, CD, card cage, and peripheral power supplies, fan tray
Sun Enterprise 3000-to-Sun Enterprise 5500 Intra-family Upgrade		
UG-E3000-E5500	Sun Enterprise 5500 rack system enclosure with clock board, CD, card cage, one peripheral power supply, and one power/cooling module, four board filler panels	Sun Enterprise 3000 system enclosure, clock board, CD, card cage, and peripheral power supplies

Just the Facts



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Sun Enterprise 3500 Component Migration

The following is a summary table detailing which components will or will not migrate when upgrading from the Sun Enterprise 3500 server to an Sun Enterprise 4500 or Sun Enterprise 5500 server:

FROM:	TO:	
Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500
Internal Disk	No	No
Clock board	Yes	Yes
CD	Yes	Yes
Memory	Yes	Yes
CPU Module	Yes	Yes
I/O Boards	Yes	Yes
CPU/Memory Board	Yes	Yes
Power/Cooling Modules	Yes	Yes
Internal Tape Drive	Yes	Yes
Peripheral Power Supplies	No	No
IB Board	No	No

While the Sun Enterprise 3500 server internal disks are not compatible in the Sun Enterprise 4500 or Sun Enterprise 5500 servers, an upgrade (trade-in) offering is available. See product announcement for details.

Order	Receive	Return
Sun Enterprise 3500-to-Sun Enterprise 4500 Intra-family Upgrade:		
UG-E3500-E4500	Sun Enterprise 4500 system enclosure with card cage, one peripheral power supply, and one power/cooling module	Sun Enterprise 3500 system enclosure, card cage, and peripheral power supplies
Sun Enterprise 3500-to-Sun Enterprise 5500 Intra-family Upgrade:		
UG-E3500-E5500	Sun Enterprise 5500 rack system enclosure with card cage, one peripheral power supply, and one power/cooling module	Sun Enterprise 3500 system enclosure, card cage, and peripheral power supplies
Sun Enterprise 4000-to-Sun Enterprise 4500 Gigaplane Upgrade:		
UG-E4000-100GIGPLN	100-MHz-capable centerplane, 100-MHz-capable clockboard, 32X SunCD™, Sun Enterprise 4500 nameplate	Sun Enterprise 4000 centerplane, SunCD, clockboard, nameplate

Upgrades

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Upgrades to the Sun Enterprise 5500 and Sun Enterprise 6500 Servers

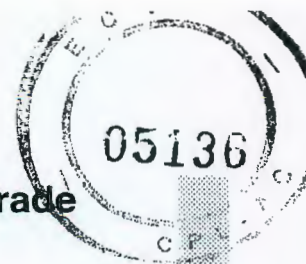
The following system upgrades are available for Sun Enterprise 5500 and Sun Enterprise 6500 servers:

- Full-system upgrade from Sun SPARCserver 6X0MP Desksides, SPARCserver 1000 and SPARCcenter 2000 servers
- System board upgrades for the SPARCserver 1000 and SPARCcenter 2000 servers
- Full-system upgrade from qualified competitive servers
- Intra-Family chassis upgrades: Sun Enterprise 3000-5500, Sun Enterprise 3500-5500, Sun Enterprise 4500-6500, and Sun Enterprise 5500-6500
- Inter-Family chassis upgrades: Sun Enterprise 4000-6500
- Gigaplane field upgrade: Sun Enterprise 5000

Full-System Upgrades

The full-system upgrades include the chassis, and, two power/cooling modules, one CPU/memory board, and one SBus I/O board with FC-AL. The full-system upgrades are intended to be used in conjunction with the system board upgrades and other Sun Enterprise server options to provide a method of upgrading a range of sizes of SPARCserver 1000E and SPARCcenter 2000E servers. This allows Sun to offer excellent value for large and small SPARCserver 1000E and SPARCcenter 2000E servers in the installed base.

Order	Receive	Return
SPARCserver 6X0MP Deskside, SPARCserver 1000 or SPARCcenter 2000 System Upgrade:		
UG-SUNSV-E5500	Server base package: Rack enclosure, chassis, clock board, CD, two power/cooling modules, one CPU/memory board, and one SBus I/O board	Chassis, CPU board, primary memory board, and internal peripheral
SPARCcenter 2000E System Upgrade:		
UGS2000-E6500	Server base package: Rack enclosure, chassis, clock board, CD, two power/cooling modules, one CPU/memory board, and one SBus I/O board	Chassis, CPU board, primary memory board, and internal peripheral
Competitive Full-System Upgrade:		
CU-E5500 CU-E6500	Server base package: Rack enclosure, chassis, clock board, CD, two power/cooling modules, one CPU/memory board, and one SBus I/O board	Chassis, CPU board, primary memory board, and internal peripheral



Sun Enterprise 5500 and Sun Enterprise 6500 Intra-Family Upgrade

Sun Enterprise 4000 Component Migration

The following is a summary table detailing which components will migrate when upgrading from the Sun Enterprise 4000 to an Sun Enterprise 6500 server:

FROM Sun Enterprise 4000:	TO Sun Enterprise 6500:
Memory	Yes
CPU Module*	Yes
I/O Boards*	Yes
CPU/Memory Board*	Yes
Power/Cooling Modules	Yes
Internal Tape Drive	Yes
Peripheral Power Supplies	Yes
Optional Disk Board	Yes

* Migrate these boards/modules only if current speed is to be maintained. Migrating 167-MHz modules might require a PROM upgrade as the minimum PROM level supported is 3.2.10. (See product announcement for details on downloading the patch for a PROM level upgrade).

Order	Receive	Return
Sun Enterprise 4000-to-Sun Enterprise 6500 Intra-family Upgrade:		
UG-E4000-E6500	Sun Enterprise 6500 rack system enclosure with clock board, CD, and card cage	Sun Enterprise 4000 system enclosure, clock board, CD, and card cage

Upgrades



Sun Enterprise 4500 Component Migration

The following is a summary table detailing which components will migrate when upgrading from the Sun Enterprise 4500 to an Sun Enterprise 6500 server:

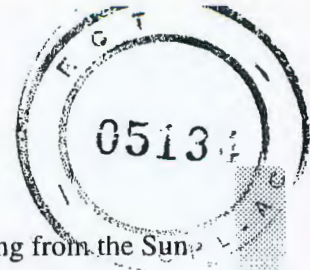
FROM Sun Enterprise 4000:	TO Sun Enterprise 6500:
Memory	Yes
CPU Module	Yes
I/O Boards	Yes
CPU/Memory Board	Yes
Power/Cooling Modules	Yes
Internal Tape Drive	Yes
Peripheral Power Supplies	Yes
Optional Disk Board	Yes

Order	Receive	Return
Sun Enterprise 4500-to-Sun Enterprise 6500 Intra-family Upgrade:		
UG-E4500-E6500	Sun Enterprise 6500 rack system enclosure and card cage	Sun Enterprise 4500 system enclosure, and card cage

Upgrades



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Sun Enterprise 5000 Component Migration

The following is a summary table detailing which components will migrate when upgrading from the Sun Enterprise 5000 to an Sun Enterprise 6500 server:

FROM Sun Enterprise 5000:	TO Sun Enterprise 6500:
Memory	Yes
CPU Module*	Yes
I/O Boards*	Yes
CPU/Memory Board*	Yes
Power/Cooling Modules	Yes
Internal Tape Drive	Yes
Peripheral Power Supplies	Yes
Optional Disk Board	Yes
* Migrate these boards/modules only if current speed is to be maintained. Migrating 167-MHz modules might require a PROM upgrade as the minimum PROM level supported is 3.2.10. (See product announcement for details on downloading the patch for a PROM level upgrade).	

Order	Receive	Return
Sun Enterprise 5000-to-Sun Enterprise 6500 Intra-family Upgrade:		
UG-E5000-E6500	Sun Enterprise 6500 rack system enclosure with clock board, CD and card cage	Sun Enterprise 5000 system enclosure, clock board, CD and card cage
Sun Enterprise 5000 Gigaplane Upgrade:		
UG-E5000-100GIGPLN	100-MHz-capable centerplane, 100-MHz-capable clockboard, 32xSunCD, CD tray assembly	Sun Enterprise 5000 centerplane, SunCD, clockboard, tray assembly

Upgrades



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Sun Enterprise 5500 Component Migration

The following is a summary table detailing which components will migrate when upgrading from the Sun Enterprise 5500 to an Sun Enterprise 6500 server:

FROM Sun Enterprise 5500:	TO Sun Enterprise 6500:
Memory	Yes
CPU Module	Yes
I/O Boards	Yes
CPU/Memory Board	Yes
Power/Cooling Modules	Yes
Internal Tape Drive	Yes
Peripheral Power Supplies	Yes
Optional Disk Board	Yes

Order	Receive	Return
Sun Enterprise 5500-to-Sun Enterprise 6500 Intra-family Upgrade:		
UG-E5500-E6500	Sun Enterprise 6500 rack system enclosure with and card cage	Sun Enterprise 5500 system enclosure, and card cage

Upgrades



CPU Module, Board, and Memory Upgrades

The following processor module, board and memory upgrades are common to all Sun Enterprise 3500–6500 systems:

- UltraSPARC CPU module upgrades
- System board upgrades from existing Sun Enterprise 3000–6000 compatible boards. Also, board upgrades for customers with Sun SPARCserver 1000E or SPARCcenter 2000E systems
- Sun memory upgrade

UltraSPARC module upgrades from 167-MHz and 250-MHz UltraSPARC modules are available for field installation or, if ordered with an Intra-Family chassis upgrade, can be installed at the factory.

System board upgrades from Sun Enterprise 3000–6000 systems are shipped separately for field installation only.

System board upgrades and UltraSPARC module upgrades from pre-UltraSPARC processor systems or competitive systems are factory configured and intended to be used in conjunction with chassis upgrades.

Memory upgrades are shipped separately for field installation only.

Note: The Return Material Authorization Kit (no-charge part number UG-RMA) is **required** to be ordered with any factory-installed system or component upgrade. This part number will ship return material information.

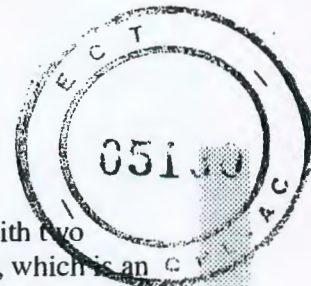
Order	Receive	Return
UltraSPARC Module Upgrade, Field Installed:		
	UltraSPARC Processor module:	
UG-M2510-M2550	250-MHz, 4-MB Ecache	167-MHz, 512-KB or 1-MB Ecache
UG-M2530-2560	336-MHz, 4-MB Ecache	250-MHz, 1-MB or 4-MB Ecache
UG-M2510-M2560	336-MHz, 4-MB Ecache	167-MHz, 512-KB or 1-MB Ecache
UG-M2510-M2570	400-MHz, 4-MB Ecache	167-MHz, 512-KB or 1-MB Ecache
UG-M2550-M2570	400-MHz, 4-MB Ecache	250-MHz, 1-MB or 4-MB Ecache
UG-M2560-M2570	400-MHz, 4-MB Ecache	336-MHz, 4-MB Ecache
UltraSPARC Module Upgrade, Factory Installed:		
	UltraSPARC Processor module:	
UG-M2550,	250-MHz, 4-MB Ecache	SuperSPARC™ processor module
CU-M2550	250-MHz, 4-MB Ecache	Qualified competitive CPU module
UGFA-M2530-M2560	336-MHz, 4-MB Ecache	250-MHz, 1-MB or 4-MB Ecache
UGFA-M2510-M2560	336-MHz, 4-MB Ecache	167-MHz, 512-KB or 1-MB Ecache
UG-M2560	336-MHz, 4-MB Ecache	SuperSPARC processor module
CU-M2560	336-MHz, 4-MB Ecache	Qualified competitive CPU module
UGFA-M2510-M2570	400-MHz, 4-MB Ecache	167-MHz, 512-KB or 1-MB Ecache
UGFA-M2550-M2570	400-MHz, 4-MB Ecache	250-MHz, 1-MB or 4-MB Ecache
UGFA-M2560-M2570	400-MHz, 4-MB Ecache	336-MHz, 4-MB Ecache
UG-M2570	400-MHz, 4-MB Ecache	SuperSPARC processor module
CU-M2570	400-MHz, 4-MB Ecache	Qualified competitive CPU module

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Order	Receive	Return
CPU/Memory Board Upgrades:		
UGFA-SB260X-2602	CPU/memory board that supports 100-MHz centerplane; factory installed	One 2600 or 2601 CPU/memory board
UGSB260X-2602	CPU/memory board that supports 100-MHz centerplane; field installed	One 2600 or 2601 CPU/memory board
CU-2602	CPU/memory board that supports 100-MHz centerplane; factory installed	A qualified competitive system board
UGSB1000-X-256M-C	100 MHz-compatible CPU/memory board with 256 MB of RAM; factory installed	SPARCserver 1000 system board
UGSB1000-X-1GB-C	100 MHz-compatible CPU/memory board with 1 GB of RAM; factory installed	SPARCserver 1000 system board
UGSB2000-X-0M-C	100 MHz-compatible CPU/memory board, no memory; factory installed	SPARCserver 1000 or SPARCserver 2000 system board
UGSB2000-X-256M-C	100 MHz-compatible CPU/memory board with 256 MB of RAM; factory installed	SPARCcenter 2000 system board
UGSB2000-X-1GB-C	100 MHz-compatible CPU/memory board with 1 GB of RAM; factory installed	SPARCcenter 2000 system board
I/O Board Upgrades:		
UGFA-SB261X-2612	Sbus I/O board that supports 100-MHz centerplane; factory install	One 2610 or 2611 Sbus I/O board
UGSB261X-2612	Sbus I/O board that supports 100-MHz centerplane; field installed	One 2610 or 2611 Sbus I/O board
UGFA-SB262X-2622	Graphics I/O board that supports 100-MHz centerplane; factory install	One 262x Graphics I/O board
UGSB262X-2622	Graphics I/O board that supports 100-MHz centerplane; field install	One 262x Graphics I/O board
UGFA-SB263X-2632	PCI I/O board that supports 100-MHz centerplane; factory install	One 263x PCI I/O board
UGSB263X-2632	PCI I/O board that supports 100-MHz centerplane; field install	One 263x PCI I/O board
UGSB261X-2632	PCI I/O board that supports 100-MHz centerplane; field install	One 261x SBus I/O board
Sun Enterprise Server Memory Upgrades:		
UGFA-MEM256-MEM1GB	1 GB of memory; factory installed	One 256-MB memory module (7022A)
UG-MEM256-MEM1GB	1 GB of memory; field installed	One 256-MB memory module (7022A)

Upgrades

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Configuration Guidelines

All upgrades to Sun Enterprise 3500–6500 servers require Solaris™ 2.5.1 Hardware: 11/97 with two patches: 104595-03 (or later) and 104594-01 (or later). In addition, patch number 105310-04, which is an FC-AL patch, is highly recommended. The Sun Enterprise 3500–6500 servers can also run Solaris 2.6 Hardware: 3/98 with no required patches. However, patch number 105375-04, an FC-AL patch, is highly recommended.

Note: *The Return Material Authorization Kit (no-charge part number UG-RMA) is **required** to be ordered with any factory-installed system or component upgrade. This part number will ship return material information*

Configtool now supports Intra-Family Upgrades. A declaration of the compatible components that will be migrated is required when configuring a Intra-Family Upgrade. Configtool now has the ability to assess existing components when determining a valid configuration.

Upgrades

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Upgrades Questions and Answers

Why is the Return Material Authorization kit (no-charge part number UG-RMA) required for all Sun Enterprise 3500-6500 upgrades?

Ordering part number UG-RMA will ship a Return Material Authorization kit to the customer who is trading in a server. This kit houses the terms and conditions of the upgrade.

Is there any hardware or software required to support the 400-MHz/4-MB module in the Sun Enterprise 3X00 through 5X00 servers?

The 400-MHz/4-MB modules will require Sun Enterprise Flashprom update 3.2.18 or above. Other than the Flashprom version, no new hardware or software is required from what is being shipped currently in the Sun Enterprise 3500 through 5500 servers. They will run in existing Sun Enterprise 3000 through 5000 servers if they have the following:

- Sun Enterprise Flashprom update 3.2.18 or above
- 100-MHz clock board which is required to support 100-MHz Gigaplane

The Sun Enterprise 3000 clock board and Gigaplane are already 100-MHz capable, so, in most cases, only the system boards need to be upgraded in order to support the 400-MHz/4-MB modules. Only original Sun Enterprise 3000 base packages need to have the clock board upgraded. This is because the original clock board in Sun Enterprise 3000 base package did not support any modules above 167 MHz and, therefore, needs to be upgraded to support 400-MHz/4-MB modules. Sun Enterprise "3001" and "3002" base packages do not need to have the clock board upgraded because they shipped with a second-generation clock board that supported modules above 167 MHz.

A 100-MHz clock board upgrade is also available (part number UG-ENT-100MHCLOCKB).

- 100-MHz capable CPU/memory and I/O boards (2602A, 2612A, 2622A, and 2632A)

See the previous upgrade pages for a list of available 100-MHz CPU/memory and I/O board upgrades.

- An upgraded 100-MHz capable Gigaplane in the Sun Enterprise 4000 and 5000

Is the 400-MHz/4-MB UltraSPARC module supported in a system with any 84-MHz system boards?

No, the 400-MHz/4-MB UltraSPARC module is not supported in a system with any 84-MHz system boards, due to the fact that it runs at a 4:1 CPU-to-Gigaplane speed ratio and requires the Gigaplane (and associated system boards) to run at 100 MHz.

Why isn't the 400-MHz/4-MB UltraSPARC module supported in the Sun Enterprise 6500 and 6000 servers?

The 400-MHz/4-MB module requires the Gigaplane to run at 100-MHz. The Sun Enterprise 6500 and 6000 servers cannot support running the Gigaplane at 100-MHz due to the physical length of the bus.

Will there be a faster-than-336-MHz UltraSPARC module available for the Sun Enterprise 6500 and 6000 servers?

Yes, there will be a module available that will run faster than 336-MHz and will not require the Gigaplane, I/O boards, or 2601A/2602A CPU/memory boards to be upgraded (2600A CPU/memory boards will need to be upgraded). Up to 30 of these future modules will be supported and all sixteen Gigaplane slots will be able to be utilized.

Will the 400-MHz/4-MB module ever be supported in the Sun Enterprise 6500 and 6000 Servers?

No, the 400-MHz/4-MB module will never be supported in the Sun Enterprise 6500 and 6000 Servers.

Is it necessary to upgrade the Gigaplane in order to support faster-than 336-MHz modules in the Sun Enterprise 3000 through 5000 servers?

At this time yes, but in the future there will be a new module available that will run at faster-than-336-MHz speeds and will not require the Gigaplane, I/O boards, or 2601A/2602A CPU/memory boards to be upgraded (2600A CPU/memory boards will need to be upgraded).

What is the benefit of the enhanced Gigaplane system bus and system boards?

Sun provides investment protection for near term performance growth requirements on the Sun Enterprise 4000 and Sun Enterprise 5000. Offering this Gigaplane upgrade enables customers to use the faster 400-MHz/4-MB processors. All system boards in the Sun Enterprise 4000/Sun Enterprise 5000 must be upgraded to be 100 MHz-compatible to take advantage of the Gigaplane upgrade.

Why does Sun have new system boards?

The new system boards are capable of supporting the faster (over 84 MHz) Gigaplane speeds. In addition, the Graphics I/O board has been modified: the pair of on-board, 25-MB-per second fiber channel sockets has been replaced by a pair of on-board, 100-MB-per-second FC-AL sockets. These new FC-AL sockets provide on-board connection to the internal disk drives in the Sun Enterprise 3500 server or to Sun StorEdge™ A5000 disk arrays.

Can I use the 100-MHz-compatible system boards in Sun Enterprise 3000–6000 servers?

Yes. These new system boards are compatible with existing Sun Enterprise 3000–6000 servers. There is no problem mixing these system boards in a Sun Enterprise 3000–6000 server that already uses the previous system boards.

What CPU modules are supported in the Sun Enterprise 3500–6500 servers?

The Sun Enterprise 3500–6500 servers can be ordered with factory-configured, 250-MHz/4-MB, 336-MHz/4-MB or 400-MHz/4-MB UltraSPARC modules. The 250-MHz/1-MB, 167-MHz/1-MB, and 167-MHz/0.5-MB UltraSPARC modules are also supported, but they not available as factory-configured options.

Note: Customers with 167-MHz UltraSPARC processors who wish to migrate their modules to Sun Enterprise 3500–6500 servers might require a PROM upgrade as the minimum PROM level supported is 3.2.10.

How does a customer determine the PROM level on their system? And if the PROM level is below 3.2.10 how can the customer obtain a PROM upgrade?

The system POST (Power On Self Test) displays the OpenBoot™ PROM software version of the system during the POST. Customers with versions below 3.2.10 can download a patch for the PROM level upgrade at URL: <http://sunsolve.sun.com/> (access is limited to customers on Sun Enterprise Services contract).

Do the Sun Enterprise 4500–6500 servers support the previous 4.2-GB disk board?

Yes.

Do current Sun Enterprise 3000–5000 server customers need to upgrade their existing CPU/memory and I/O boards?

Only if 400-MHz/4-MB CPU modules are being installed will the customer be required to have 26X2A 100-MHz-compatible CPU/memory and I/O boards installed. Otherwise, their current CPU/memory boards are capable of supporting 167-MHz, 250-MHz, or 336-MHz UltraSPARC modules. However, in



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order to take advantage of the 4-MB cache of either the 250-MHz/4-MB or 336-MHz/4-MB CPU modules, either the 2601A or 2602A CPU/memory board is needed. The older 2600A CPU/memory boards support modules with 4-MB cache but only 2 MB of cache per processor is used.

Can Sun Enterprise Server systems support a combination of new and older CPU/memory boards and/or I/O boards?

No, if 400-MHz/4-MB CPU modules are installed. Yes, if slower speed modules are installed in which case the old and new boards may be mixed in the Sun Enterprise 3500-6500 servers and in the Sun Enterprise 3000-6000 servers. In a mixed configuration the server runs at the speed of the lowest-speed component in the system (system board(s) speed(s) and the Gigaplane speed).

Which components can a customer carry forward during an Intra-Family Upgrade from the Sun Enterprise 3000-5000 server to Sun Enterprise 4500-6500 server?

Existing memory, power/cooling modules, and internal tape devices, can be carried forward. In addition, the following components will migrate if the customer is upgrading in order to use more system slots and plans to expand their configuration with the same speed UltraSPARC processors as they have in their existing Sun Enterprise 3000-5000 server: existing CPU/memory boards, I/O boards, and UltraSPARC CPU modules.

What options are available to customers who are upgrading from the Sun Enterprise 3000 server to Sun Enterprise 3500, 4500 or Sun Enterprise 5500 server, where the internal disk does not migrate?

Sun offers the following disk upgrade (trade in) options to customers:

- Trade in 4 GB of disk and upgrade to 9.1-GB FC-AL disk drive
- Trade in 30 GB of disk and upgrade to Sun StorEdge A3000 disk array

Can customers install their own upgraded system? What services are available to aid them?

The Sun Enterprise 3500-6500 server upgrades can be accomplished by the customer. However, it is strongly recommended that the customer purchase installation services from Sun Enterprise Services. Because of the variability in customer configurations, installation services purchased from Sun Enterprise Services need to be quoted on a time and material basis.

When does a customer need a clock board upgrade?

A customer needs to purchase a clock board upgrade if the Sun Enterprise 3000-6000 server was purchased prior to November 19, 1996 and the customer wants to upgrade from 167-MHz processors to the 250-MHz or 336-MHz processor module. Or, if the customer is upgrading the Sun Enterprise 3000-5000 to run the 400-MHz/4-MB CPU module

Can existing Sun Enterprise 4000-5000 systems be upgraded to support faster than 84-MHz Gigaplane system bus?

Yes. See announcement dated January 26, 1999 or refer to pages earlier in this section for details

Where do I find more information on which servers are eligible in each of the competitive server trade-in categories?

Contact the Installed Base Business representative in your area.

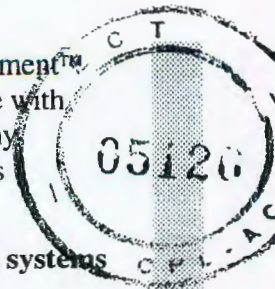
Are there any software-compatibility issues with applications migrating to the servers based on the UltraSPARC processor architecture?

Upgrades



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The UltraSPARC processor-based servers require a new version of the Solaris Operating Environment™ (Solaris 2.5.1). This new version of the Solaris Operating Environment is fully binary-compatible with the current version of the Solaris Operating Environment (Solaris 2.5). Sun does not anticipate any major problems with ISVs supporting their application software on the next version of the Solaris Operating Environment.



Which SPARCserver 1000E and SPARCcenter 2000E system components can be used in the systems based on the UltraSPARC processor architecture?

Upgrading from a SPARCserver 1000E or SPARCcenter2000E system requires a chassis swap. The chassis, system boards, SuperSPARC processors, and memory must be replaced. The components from a SPARCcenter 2000E or SPARCserver 1000E systems that can be migrated to an UltraSPARC processor-based server include SPARCstorage™ Array subsystems, and disk trays.

Upgrades



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Service and Support

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The SunSpectrumSM 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 softwareTM, and telephone support for Sun software packages. The majority of Sun Microsystems, Inc., customers today take advantage of the SunSpectrum program, underscoring the value it represents. Customers should check with their local Sun EnterpriseTM Services representative for program/feature variance and availability in their area.

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	Semi-annual	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	Option
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

Service and Support

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FEATURE	SUNSPECTRUM PLATINUM SM Mission-Critical Support	SUNSPECTRUM GOLD SM Business-Critical Support	SUNSPECTRUM SILVER SM Systems Support	SUNSPECTRUM BRONZE SM Self Support
Enhanced Support Features				
Mission-critical support team	Yes	Yes	No	No
Sun Vendor Integration Program (SunVIP TM)	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

Service and Support

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Warranty

The Sun Enterprise family of servers offers extensive warranties that can be enhanced through the Sun Enterprise Services SunSpectrum product offering. The table below describes the Sun Enterprise XX00 server warranties (warranties may vary in different countries).

	Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500	Sun Enterprise 6500
Hardware	1 year	1 year	1 year	1 year
Software	90 days	90 days	90 days	90 days
Telephone Assistance	8 a.m.–8 p.m., Monday–Friday 8-hour response	8 a.m.–8 p.m., Monday–Friday 8-hour response	8 a.m.–8 p.m., Monday–Friday 4-hour response	8 a.m.–8 p.m., Monday–Friday 4-hour response
On-site Assistance	8 a.m.–5 p.m., Monday–Friday next day	8 a.m.–5 p.m., Monday–Friday next day	8 a.m.–5 p.m., Monday–Friday 4-hour	8 a.m.–5 p.m., Monday–Friday 4-hour
Installation	Basic	Basic	ServerStart SM installation	ServerStart installation

Service and Support

Glossary



Circuit-switched bus	A bus in which a transaction is normally implemented in an automatic fashion. Simple and easy to construct, a circuit-switched bus is often less efficient than a comparable packet-switched bus. SBus is a circuit-switched bus.
ECC	Error checking and correcting. ECC code is used to verify the integrity of data and can be used to correct some data errors. The ECC code used in the Sun Enterprise™ 3500–6500 servers is able to detect and correct single-bit errors, and detect double-bit errors.
Fault-resistant	Systems that are fault-resistant are able to withstand and recover from many types of system problems.
Fault-tolerant	Systems that are fault-tolerant are able to withstand and recover from any system problem and offer 100 percent uptime. These systems are typically more expensive than comparable fault-resistant systems.
FC-AL	Fibre Channel Arbitrated Loop
Gigaplane™	Gigaplane is the system bus that is used in the Sun Enterprise 3500, Sun Enterprise 4500, Sun Enterprise 5500, and Sun Enterprise 6500 servers. The Gigaplane bus is a packet-switched bus, capable of offering a sustained data transfer rate of 3.2 GB per second at 100 MHz.
High availability	Availability is the time a particular resource, such as a system, application, or data is accessible and usable. High availability means the resource is accessible and usable a maximum amount of time.
Hot-plug	A hot-plug component means that it is electrically safe to remove or add that component while the machine is still running. Typically, the system must be rebooted before the hot-plug component is configured into the system.
Hot-swap	A hot-swap component can be installed or removed by simply pulling the component out and putting the new one in. The system will either automatically recognize the component change and configure itself as necessary or will require user interaction to configure the system; however, in neither case is a reboot required. All hot-swappable components are hot pluggable, but not all hot-pluggable components are hot-swappable.
Interleaved memory	Interleaved memory helps reduce memory access time by permitting multiple memory components to operate in parallel. In interleaved memory schemes, memory is divided into n banks arranged so that every n th byte is supplied by a different memory bank. In a two-way interleaved system, the first doubleword is supplied by bank 0 while the second is supplied by bank 1. Normally, the size and extent of interleave is arranged so that a single typical request is satisfied by as many banks as possible. This arrangement permits a single memory request to be fulfilled without waiting for memory recycle time.
OBP	OpenBoot™ PROM.



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Packet-switched bus	A bus in which information is transmitted in fixed-sized units. This type of bus is often associated with the use of split transactions. Gigaplane and UPA are packet-switched buses.
Parity	Parity is a simple technique used to verify the integrity of data. Parity detects single-bit errors.
POST	Power-on self-test. POST is a suite of hardware integrity tests implemented in firmware that verifies the integrity of system components.
RAS	Reliability, availability, and serviceability. Reliability is a measure of the likelihood that problems will occur. A highly reliable system will have few problems. Once a problem occurs, availability is the measure of how the system will protect the user from being adversely affected by the problem. Serviceability is a measure of how easy it is to repair the problem.
SunVTS™	Sun Validation Test Suite. This is the replacement for SunDiag™.
UPA Bus	Ultra™ Port Architecture bus. Used as an intermediate bus on the CPU/memory and I/O boards.
XBus™	Intermediate bus used on system boards for the SPARCserver™ 1000E and SPARCcenter™ 2000E servers. The Sun Enterprise 3500, Sun Enterprise 4500, Sun Enterprise 5500, and Sun Enterprise 6500 servers use the UPA bus in place of the XBus.

Materials Abstract



All materials are available on SunWIN except where noted otherwise.

Collateral	Description	Purpose	Distribution	Token # or Comac order #
Powerpack				
– <i>Sun Enterprise™ 3500–6500 Servers: Just the Facts, 2/99</i>	Reference guide for the Sun Enterprise 3500–6500 servers	Sales tool Training	SunWIN, Reseller web	83501
– <i>Sun Enterprise 3500–6500 Servers: Customer Presentation 2/99</i>	Overview, strategy, and details of the Sun Enterprise 3500–6500 Servers	Sales tool	SunWIN, Reseller web	83552
References				
– <i>Sun Intro: New 400 MHz, 4-MB CPU Modules and Upgrades, 1/99</i>	Introduction e-mail	Sales tool	SunWIN, Reseller web, E-mail	98881
– <i>Sun Intro: Sun Enterprise and Sun HPC 3500–6500 Server Family and Related Upgrades; Repricing of 250-MHz, 4-MB and 336-MHz, 4-MB UltraSPARC Modules, 4/98</i>	Introduction e-mail	Sales tool	SunWIN, Reseller web, E-mail	83553
– <i>Sun Intro: Transition of Sun Enterprise 3000–6000 Upgrades, Sun HPC Servers and System Boards; Transition of 250-MHz, 1-MB UltraSPARC Module, 4/98</i>	Introduction e-mail	Sales tool	SunWIN, Reseller web, E-mail	84906
– <i>Sun Intro: New 336 MHz, 4-MB UltraSPARC™ Module, Server Base Packages and Upgrades; Repricing of Sun Enterprise and Sun HPC 6000 and Upgrades, 2/98</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	80960
– <i>Sun Intro: PROMOTION: Sun Enterprise 3000–6000 167-MHz, 1-MB UltraSPARC Module, 1/98</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	77887
– <i>Sun Intro: New CPU/ Memory Board and Options for Sun Enterprise 3000 through 6000 Servers, 4/97</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	70253

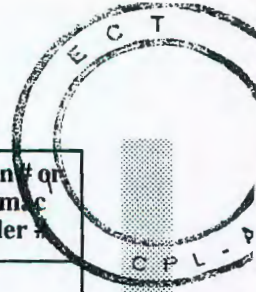
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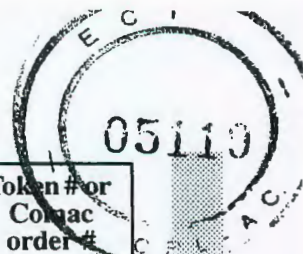


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Collateral	Description	Purpose	Distribution	Token # or Comac order #
References (continued)				
- <i>Sun Intro: New 250-MHz UltraSPARC Module, Server Base Packages, and Options for Sun Enterprise 3000 through 6000 Servers, 4/97</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	70255
- <i>Sun Intro: 250-MHz UltraSPARC Module and Other Options for Sun Enterprise X000 Servers, 1/97</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	70250
- <i>Sun Intro: Enhanced Ultra™ Sun Enterprise X000 Servers; Sun Enterprise Clock Board Upgrade, 11/96</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	73346
- <i>Sun Intro: Ultra Sun Enterprise X000 Memory and CPU Module, 10/96</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	73338
- <i>Sun Intro: New Sun Enterprise X000 Configurations and Options, 7/96</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	73339
- <i>Sun Intro: Ultra Sun Enterprise X000 Server Family, 4/96</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	73335
- <i>Sun Server Product Line Overview, 4/98</i>	Quick reference card	Sales tool	SunWIN, Reseller web, E-mail	24517
- <i>Competitive Summary—Servers, 4/98</i>	Quick reference card	Sales tool	SunWIN, Reseller web, E-mail	24515
- <i>Sun Enterprise X000 Server Family All-in-One, 8/97</i>	Specification summary	Sales tool	SunWIN, Reseller web	53152
Training				
- <i>IQ Kit: Sales Information Quickstart, 4/98</i>	Detailed sales and marketing information for Sun Enterprise 3500–6500 servers and related software	Sales tool	SunWIN, Reseller web	83556
- <i>IQ Kit: Reference Information Quickstart, 4/98</i>	Detailed resource catalog for Sun Enterprise 3500–6500 servers and related software	Sales tool	SunWIN, Reseller web	83558



Collateral	Description	Purpose	Distribution	Token # or Comac order #
Product Literature				
- <i>Sun Enterprise 3000-6000 Servers: Just the Facts, 3/98</i>	Reference guide for the Sun Enterprise 3000-6000 servers (in two parts)	Sales tool Training	SunWIN, Reseller web	52489 52966
- <i>Sun Enterprise SyMON™: Just the Facts, 11/98</i>	Reference guide for the Solstice SyMON monitoring software	Sales tool Training	SunWIN, Reseller web	52499
- <i>Sun Enterprise XX00 Servers System Options, 4/98</i>	Comprehensive reference guide for Sun Enterprise 3000-6000 and 3500-6500 server options	Sales tool	SunWIN	63142
- <i>Sun Enterprise 3000-6000 Servers: Customer Presentation 3/98</i>	Overview, Strategy, and Details of the Sun Enterprise 3000-6000 Servers	Sales tool	SunWIN, Reseller web	81540
- <i>Server Family Brochure, 4/98</i>	High-level overview brochure on Sun server and storage products	Sales tool	SunWIN, Reseller web, Comac	69480 BE607-1
- <i>Sun Enterprise 3500 Datasheet, 4/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	81065 DE827-0
- <i>Sun Enterprise 4500 Datasheet, 4/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	81067 DE828-1
- <i>Sun Enterprise 5500 Datasheet, 4/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	81070 DE829-0
- <i>Sun Enterprise 6500 Datasheet, 4/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	81072 DE830-0
- <i>Sun Enterprise 3000 Datasheet, 1/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	53188 DE647-1
- <i>Sun Enterprise 4000 Datasheet, 1/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	53190 DE644-2
- <i>Sun Enterprise 5000 Datasheet, 1/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	53194 DE658-1
- <i>Sun Enterprise 6000 Datasheet, 1/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	53221 DE643-1

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Collateral	Description	Purpose	Distribution	Token # or Comac order #
Product Literature (continued)				
- <i>Sun Enterprise 3500-6500 Server Family: Architecture and Implementation White Paper, 4/98</i>	In-depth discussion of Sun Enterprise 3500-6500 server architecture	Sales tool	SunWIN, Reseller web	84915
- <i>Ultra Sun Enterprise 3000-6000 Server Family: Architecture and Implementation White Paper, 4/98</i>	In-depth discussion of Sun Enterprise 3000-6000 server architecture	Sales tool	SunWIN, Reseller web	53094
- <i>Availability Features in the Sun Enterprise 3500-6500 Server Family White Paper, 4/98</i>	In-depth technical discussion of Sun Enterprise 3500-6500 server availability features	Sales tool	SunWIN, Reseller web	88368
- <i>Sun Enterprise 3500 Ordering Flow Chart, 2/99</i>	Ordering information	Sales tool	SunWIN, Reseller web	84910
- <i>Sun Enterprise 4500 Ordering Flow Chart, 2/99</i>	Ordering information	Sales tool	SunWIN, Reseller web	84911
- <i>Sun Enterprise 5500 Ordering Flow Chart, 2/99</i>	Ordering information	Sales tool	SunWIN, Reseller web	84912
- <i>Sun Enterprise 6500 Ordering Flow Chart, 2/99</i>	Ordering information	Sales tool	SunWIN, Reseller web	84913
- <i>Sun Enterprise 3000 Ordering Flow Chart, 4/98</i>	Ordering information	Sales tool	SunWIN, Reseller web	53154
- <i>Sun Enterprise 4000 Ordering Flow Chart, 4/98</i>	Ordering information	Sales tool	SunWIN, Reseller web	53156
- <i>Sun Enterprise 5000 Ordering Flow Chart, 4/98</i>	Ordering information	Sales tool	SunWIN, Reseller web	53158
- <i>Sun Enterprise 6000 Ordering Flow Chart, 4/98</i>	Ordering information	Sales tool	SunWIN, Reseller web	53160
- <i>56-Inch Sun Enterprise Expansion Cabinet Ordering Flow Chart, 4/98</i>	Ordering information	Sales tool	SunWIN, Reseller web	53162
Product Brief				
- <i>Sun Enterprise 3000 Product Brief, 7/97</i>	On-line version of datasheet	Sales tool	SunWIN, Reseller web	53247
- <i>Sun Enterprise 4000 Product Brief, 7/97</i>	On-line version of datasheet	Sales tool	SunWIN, Reseller web	53250
- <i>Sun Enterprise 5000 Product Brief, 7/97</i>	On-line version of datasheet	Sales tool	SunWIN, Reseller web	53256
- <i>Sun Enterprise 6000 Product Brief, 7/97</i>	On-line version of datasheet	Sales tool	SunWIN, Reseller web	53264
- <i>Solstice SyMON Product Brief, 7/97</i>	Overview of Solstice SyMON monitoring software	Sales tool	SunWIN, Reseller web	53243

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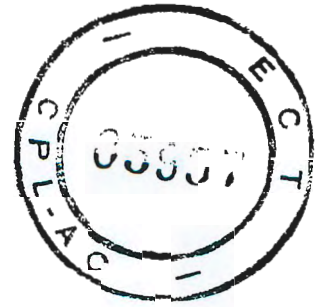
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COMPAQ



PROPOSTA TÉCNICA

CONCORRÊNCIA 001/2000 – CPL/AC

SERVIDORES DE REDE, DESENVOLVIMENTO E APLICAÇÃO

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POS nº 03/2000 - CN	
CPMI - CORREIOS	
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COMPAQ



ATRIBUTO	CONFIGURAÇÃO
Outros	Acompanha cabos, acessórios, manuais e documentação necessários ao pleno funcionamento do equipamento.
Garantia	"On site", total pelo fabricante Compaq Computer pelo prazo de 01 (um) ano, de acordo com as condições do Edital.
Certificação	ISO 9001. Documento anexo.
Assistência Técnica	Será prestado "on site" diretamente pelo fabricante Compaq Computer ou por sua Rede de Assistência Técnica Credenciada. Documentação anexa. Ou maiores informações: www.compaq.com.br/local/suporte/
Chamado de Suporte	Com atendimento "on site" (atuação de um técnico no local onde está instalado o equipamento), no prazo máximo de 04 (quatro) horas para os equipamentos instalados nos estados de São Paulo, Rio de Janeiro e em Brasília e de 04 (quatro) horas para as demais localidades e prazo máximo para solução do problema de até 24 (vinte e quatro) horas . Caso o problema não seja resolvido neste prazo máximo, a Compaq Computer colocará outro equipamento similar ou superior em substituição, até o conserto integral do equipamento com defeito.
Horário de Atendimento	Das 08:00 às 24:00 horas (de 2ª a 6ª feira).

A

Compaq Computer Brasil Ind. Com. Ltda.

declara que:

(X) **Atende**

Plenamente os atributos técnicos que constituem a configuração mínima obrigatória exigida para este produto.

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CPMI - CORRIGIOS
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COMPAQ

I.1. – SERVIDOR TIPO INT1

2. DESEMPENHO

Processador		
Assinalar com a palavra “Atende” no campo “Resposta”, conforme a opção correspondente ao <i>modelo</i> do equipamento	Resposta	Pontos
02 (dois) processadores Intel Pentium III, clock de 733 MHz, cada.	Atende	02

Memória RAM		
Assinalar com a palavra “Atende” no campo “Resposta”, conforme a opção correspondente à <i>memória</i> do equipamento	Resposta	Pontos
Igual a 1 (hum) Gbyte	Não	02

Capacidade do Disco Rígido		
Assinalar com a palavra “Atende” no campo “Resposta”, conforme a opção correspondente à <i>capacidade do disco rígido</i> do equipamento	Resposta	Pontos
Acima de 18 GBytes, cada.	Não	02
Entre 10 e 17 GBytes, cada.	Não	01

Fonte de Alimentação Redundante (suporta a configuração máxima do equipamento)		
Assinalar com a palavra “Atende” no campo “Resposta”, conforme a opção correspondente ao <i>tipo de fonte de alimentação</i> do equipamento	Resposta	Pontos
Fonte de alimentação redundante, hotswappable	Atende	02
Fonte de alimentação redundante.	Não	01

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3. QUALIDADE

Certificação		
Assinalar com a palavra "Atende" para as <i>certificações</i> que o modelo do equipamento cotado possui :		
Possui Certificação atualizada conforme segue :	Resposta	Pontos
ISO 9002 referente a serviços de suporte de hardware e software	Atende	01

4. SUPORTE DE SERVIÇOS

Prazo de Atendimento		
Assinalar com a palavra "Atende" a opção correspondente ao <i>prazo máximo de atendimento</i> ao equipamento cotado:		
Tendo como base o registro de chamada do suporte técnico, o Atendimento será prestado nos prazos, conforme segue :	Resposta	Pontos
Até 04 (quatro) horas	Atende	02
Até 06 horas	Não	01

Horário de Atendimento e Suporte		
Assinalar com a palavra "Atende" a opção correspondente ao <i>horário de atendimento às chamadas</i> referentes ao equipamento cotado :		
Além do horário comercial, o atendimento será prestado também nos horários, conforme segue :	Resposta	Pontos
Horário integral – 24 horas/ 7 dias por semana	Não	02
Horário semi-integral – 24 horas (de 2ª a 6ª feira)	Não	01

Central de Atendimento e Suporte		
Assinalar com a palavra "Atende" a opção correspondente às <i>facilidades oferecidas no atendimento às chamadas</i> referentes ao equipamento cotado :		
Está disponível, para o atendimento aos chamados :	Resposta	Pontos (cumulativos)
Telefone 0800-550377 para hardware e software	Atende	01

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COMPAQ

Duração da Garantia		
Assinalar com a palavra "Atende" a opção correspondente a duração da garantia dada pelo fabricante para o equipamento cotado.		
O fabricante oferece garantia para o produto por um período de :	Resposta	Pontos
5 (cinco) anos	Não	03
4 (quatro) anos	Não	02
3 (três) anos	Não	01

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PROS n° 01/002-01
CPMI - CORREIOS
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COMPAQ



1.2. – Servidor de Rede marca COMPAQ, modelo PROLIANT ML 370 - TIPO INT2

Quantidade: 63 (Sessenta e três) unidades.

1. PADRONIZAÇÃO

ATRIBUTO	CONFIGURAÇÃO
Processador	02 (dois) Processadores Intel Pentium III , com clock de 733 MHz, cada.
Barramento	Barramento do sistema de 133 MHz.
Memória Cache	256 KBytes ECC L2 full speed, por processador.
Memória RAM	512 MBytes ECC SDRAM DIMM, expansível até 04 (quatro) GBytes, instalada "on board".
Slots	03 (três) slots PCI livres, após montada configuração proposta.
Interface Serial	02 (duas) interfaces seriais padrão RS-232C.
Interface Paralela	01 (uma) interface paralela padrão Centronics.
Fonte de Alimentação Interna	Bivolt, de 325W compatível com a configuração máxima do equipamento cotado.
Unidade de Disco Flexível	01 (uma) unidade de 3 1/2" com capacidade de 1,44 MBytes.
Controladora RAID	Smart Array com tecnologia Wide Ultra2 SCSI, com suporte para RAID 5. Outras informações pelo site: www.compaq.com/products/storageworks/ .
Unidades de Disco Rígido	03 (três) unidades internas, hot-swappable, com capacidade de 18.2 (dezoito ponto dois) GBytes, Wide Ultra2 SCSI, cada, formatados. Suporta RAID 0 e 5. Outras informações pelo site: www.compaq.com/products/storageworks/ .
Unidade de Fita DLT	01 (uma) unidade de fita padrão DLT, interna, para utilização de mídias com capacidade de 35 (trinta e cinco) GBytes, sem compressão, e com taxa de transferência sustentada de 5 (cinco) Mbytes/seg. Outras informações pelo site: www.compaq.com/products/storageworks/ .
Gabinete	Modelo Torre, com capacidade interna para 06 (seis) unidades de discos rígidos hot-swappable. Capacidade interna de até 109.2 (cento e nove ponto dois) GB, hot-plug.
Teclado Alfanumérico	Com 101 (cento e uma) teclas, padrão ABNT 2
Placa de Vídeo	ATI Rage IIC PCI integrada à placa mãe (on-board), padrão VGA, com 04 (Quatro) Mbytes de vídeo SGRAM.
Monitor de Vídeo	SVGA policromático não entrelaçado com tela plana, anti-reflexiva de, 14" (quatorze polegadas), dot-pitch de 0.28 mm. Atinge resolução de 1024 x 768. Atende às normas MPR II, EPA Energy Star. Seleção automática de tensão entre 90-240 VAC - full-range. Outras informações pelo site: www.compaq.com.br/produtos/monitores/

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Mouse Serial	02 (duas) teclas padrão Microsoft com resolução de 400 dpi, mouse-pad e driver de instalação.
Unidade de CD-ROM	01 (uma) unidade interna, tecnologia IDE, com velocidade de 32X, com driver de instalação para Windows NT Server 4.0.
Placa de Rede	01 (uma) placa padrão Ethernet de 32 bits - IEEE 802.3, saídas 10Base-T / 100Base-TX, velocidade dupla 10 ou 100 Mbps autosenso, possibilidade de gerenciamento SNMP, com driver de instalação para Windows NT Server 4.0, acompanhada dos respectivos manuais de documentação.
Compatibilidade	O equipamento cotado apresenta compatibilidade com produtos Microsoft segundo Certificação HCL – Hardware Compatibility List, na categoria System/Server Multiprocessor. Documentação anexa. Ou pelo site: www.microsoft.com/hcl/default.asp
Sistema Operacional	O equipamento cotado é compatível com o Sistema Operacional Microsoft Windows NT 4.0 Server e Windows 2000 (entre outros – vide folder QuickSpecs pág. 3). O SO será fornecido, instalado e configurado pelos Correios. Outras informações pelo site: www.compaq.com/it/servers/ProLiantML370_customer_advisories_WinNT.html
Documentação Técnica	2.1. Acompanha descrição completa do produto; 2.2. Acompanha identificação do fabricante, da marca e do modelo; 2.3. Acompanha lista de endereços completos da Assistência Técnica Autorizada dos produtos ofertados, os nomes e telefones dos responsáveis técnicos em todo o país; 2.4. Site do fabricante: www.compaq.com.br ou www.compaq.com ; 2.6. Acompanham as comprovações de todos os atributos técnicos da planilha de Especificações Técnicas; 2.6.1. Prospecto/folder(da internet) técnico do modelo cotado, com grifo nas características técnicas informadas; 2.6.3. Endereço completo da página da internet da Compaq Computer: www.compaq.com.br ou www.compaq.com .
Imunidade	O produto é imune a quaisquer problemas decorrentes do "Bug do milênio. Documentação anexa. Ou pelo site: www.compaq.com/year2000/
Outros	Acompanha cabos, acessórios, manuais e documentação necessários ao pleno funcionamento do equipamento.
Garantia	"On site", total pelo fabricante Compaq Computer pelo prazo de 01 (um) ano, de acordo com as condições do Edital.
Certificação	ISO 9001. Documento anexo.
Assistência Técnica	Será prestado "on site" diretamente pelo fabricante Compaq Computer ou por sua Rede de Assistência Técnica Credenciada. Documentação anexa. Ou maiores informações pelo site: www.compaq.com.br/local/suporte/

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CPMI - CORREIOS
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COMPAQ

Chamado de Suporte	Com atendimento "on site" (no local), no prazo máximo de 04 (quatro) horas e prazo máximo para solução do problema de até 24 (vinte e quatro) horas. Caso o problema não seja resolvido neste prazo máximo, a Compaq colocará outro equipamento similar ou superior em substituição, até o conserto integral do equipamento com defeito.
Informações adicionais sobre o produto	Pelo site: www.compaq.com/products/servers/proliantml370/index.html
Horário de Atendimento	Das 08:00 às 24:00 horas (de 2ª a 6ª feira).

A empresa **Compaq Computer Brasil Ind. Com. Ltda** declara que:

(☒) **Atende**

Plenamente os atributos técnicos que constituem a configuração mínima obrigatória exigida para este produto.

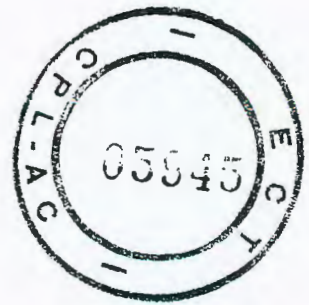
2. DESEMPENHO

Processador		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente ao <i>modelo</i> do equipamento	Resposta	Pontos
02 (dois) processadores Intel Pentium III, clock de 733 MHz, cada.	Atende	02

Memória RAM		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à <i>memória</i> do equipamento	Resposta	Pontos
Igual a 1 Gbyte	Não	02

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CPMI - CORREIOS
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COMPAQ

Capacidade do Disco Rígido		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à <i>capacidade do disco rígido do equipamento</i>	Resposta	Pontos
Acima de 30 GBytes, cada.	Não	02
Entre 20 e 28 GBytes, cada.	Não	01

Fonte de Alimentação Redundante (suporta a configuração máxima do equipamento)		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente ao <i>tipo de fonte de alimentação do equipamento</i>	Resposta	Pontos
Fonte de alimentação redundante, hotswappable.	Atende	02
Fonte de alimentação redundante.	Não	01

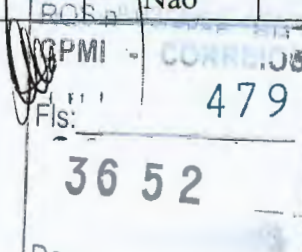
3. QUALIDADE

Certificação		
Assinalar com a palavra "Atende" para as certificações que o modelo do equipamento cotado possui :		
Possui Certificação atualizada conforme segue :	Resposta	Pontos
ISO 9002 referente a serviços de suporte de hardware e software	Atende	01

4. SUPORTE DE SERVIÇOS

Prazo de Atendimento		
Assinalar com a palavra "Atende" a opção correspondente ao prazo máximo de atendimento ao equipamento cotado :		
Tendo como base o registro de chamada do suporte técnico, o atendimento será prestado nos prazos, conforme segue :	Resposta	Pontos
Até 04 (quatro) horas	Atende	02
Até 06 horas	Não	01

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COMPAQ

Horário de Atendimento e Suporte

Assinalar com a palavra "Atende" a opção correspondente ao
horário de atendimento às chamadas referentes ao equipamento cotado :

Além do horário comercial, o atendimento será prestado também nos horários, conforme Segue :	Resposta	Pontos
Horário integral – 24 horas/ 7 dias por semana	Não	02
Horário semi-integral – 24 horas (de 2ª a 6ª feira)	Não	01

Central de Atendimento e Suporte

Assinalar com a palavra "Atende" a opção correspondente às *facilidades oferecidas no atendimento às chamadas* referentes ao equipamento cotado.

Está disponível, para o atendimento aos chamados :	Resposta	Pontos (cumulativos)
Telefone 0800-550377 para hardware e software	Atende	01

Duração da Garantia

Assinalar com a palavra "Atende" a opção correspondente a
duração da garantia dada pelo fabricante para o equipamento cotado.

O fabricante oferece garantia para o produto por um período de :	Resposta	Pontos
5 (cinco) anos	Não	03
4 (quatro) anos	Não	02
3 (três) anos	Não	01

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COMPAQ

I.3. – Servidor de Aplicação marca COMPAQ, modelo PROLIANT 5500 - TIPO INT3

Quantidade: 09 (nove) unidades.

1. PADRONIZAÇÃO

ATRIBUTO	CONFIGURAÇÃO
Processador	04 (quatro) Processadores Intel Pentium III Xeon, com clock de 550 MHz. cada.
Barramento	Barramento do sistema de 100 MHz.
Memória Cache	01 (um) MB ECC L2 por processador.
Memória RAM	02 (dois) GBytes ECC EDO DIMM, expansível até 04 (quatro) Gbytes, instalada "on board".
Slots	03 (três) slots PCI livres, após montada configuração proposta.
Interface Serial	02 (duas) interfaces seriais padrão RS-232C.
Interface Paralela	01 (uma) interface paralela padrão Centronics.
Fonte de Alimentação Interna	Bivolt, de 500W compatível com configuração máxima do equipamento, com redundância.
Unidade de Disco Flexível	01 (uma) unidade de 3 1/2" com capacidade de 1,44 MBytes.
Disco Interno e Controladora de disco SCSI	Dual Channel Wide Ultra2 SCSI. Suporta RAID 0. Capacidade de 9.1 (nove ponto um) GB cada, espelhado, com tempo médio de acesso igual a 9 ms e rotação de 10.000 RPM. Outras informações pelo site: www.compaq.com/products/storageworks/
Controladora de Array de Disco	Smart Array 3200, Wide Ultra2 SCSI, suporta RAID 0 e 5. Com controladora exclusiva. Outras informações pelo site: www.compaq.com/products/storageworks/
Array de Discos	Wide Ultra2 SCSI, "Hot-swappable", com capacidade de 18.2 (dezoito ponto dois) Gbytes cada, formatados, perfazendo um total de 54 (cinquenta e quatro) GB, líquidos. Rotação de 10.000 RPM, com tempo médio de acesso igual a 08 (oito) ms. e suporta RAID 0 e 5, com "HOT SPAIR" e controladora exclusiva. Outras informações pelo site: www.compaq.com/products/storageworks/
Unidade de Fita DAT	01 (uma) unidade de fita padrão DAT, para utilização de mídias com capacidade de 12 (doze) Gbytes, sem compressão. Com um canal de I/O SCSI dedicado. Outras informações pelo site: www.compaq.com/products/storageworks/
Gabinete	Modelo Torre, com capacidade interna para 10 (dez) unidades de discos rígidos "Hot-swappable". Capacidade total interna de 218.4 (duzentos e dezoito ponto quatro) GB, hot-plug.

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ATRIBUTO	CONFIGURAÇÃO
Teclado Alfanumérico	Com 101 (cento e uma) teclas padrão ABNT 2.
Placa de Vídeo	Integrada à placa mãe (on-board), padrão VGA, com 02 (dois) MBytes.
Monitor de Vídeo	SVGA policromático não entrelaçado com tela plana, anti-reflexiva de 14" (quatorze polegadas), dot-pitch 0.28 mm. Atinge resolução de 1024 x 768, atende às normas MPR II, EPA Energy Star. Seleção automática de tensão entre 90-240 VAC - full-range. Outras informações pelo site: www.compaq.com.br/produtos/monitores/
Mouse Serial	02 (duas) teclas padrão Microsoft com resolução de 400 dpi, mouse-pad e driver de instalação.
Unidade de CD-ROM	01 (uma) unidade interna, interface IDE, com velocidade de 32X, com driver de instalação para Windows NT Server 4.0.
Placa de Rede	01 (uma) placa padrão Ethernet de 32 bits - IEEE 802.3, saídas 10Base-T / 100Base-TX, velocidade dupla 10 ou 100 Mbps autossense, possibilidade de gerenciamento SNMP, com driver de instalação para Windows NT Server 4.0, acompanhada dos respectivos manuais de documentação.
Compatibilidade	O equipamento cotado apresenta compatibilidade com produtos Microsoft segundo Certificação HCL - Hardware Compatibility List, na categoria System/Server Multiprocessor. Documento anexo. Ou pelo site: www.microsoft.com/hcl/default.asp
Sistema Operacional	O equipamento cotado é compatível com o Sistema Operacional Microsoft Windows NT 4.0 Server e Windows 2000. (Entre outros, vide folder QuickSpecs pág. 4). Será fornecido, instalado e configurado pelos Correios. Outras informações pelo site: www.compaq.com/it/servers/ProLiantML370_customer_advisories_WinNT.html
Documentação Técnica	2.1. Acompanha descrição completa do produto; 2.2. Acompanha identificação do fabricante, da marca e do modelo; 2.3. Acompanha lista de endereços completos da Assistência Técnica Autorizada dos produtos ofertados, os nomes e telefones dos responsáveis técnicos em todo o país; 2.4. Site do fabricante: www.compaq.com.br ou www.compaq.com ; 2.6. Acompanham as comprovações de todos os atributos técnicos da planilha de Especificações Técnicas; 2.6.1. Prospecto/folder(da internet) técnico do modelo cotado, com grifo nas características técnicas informadas; 2.6.3. Endereço completo da página da internet da Compaq Computer: www.compaq.com.br ou www.compaq.com .
Imunidade	O produto é imune a quaisquer problemas decorrentes do "Bug do milênio". Documentação anexa. Ou pelo site: www.compaq.com/year2000/
Outros	Acompanha cabos, acessórios, manuais e documentação necessários ao pleno funcionamento do equipamento.
Garantia	"On site", total pelo fabricante Compaq Computer pelo prazo de 01 (um) ano, de acordo com as condições do Edital.

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Assistência Técnica	Será prestado "on site" diretamente pelo fabricante Compaq Computer ou por sua Rede de Assistência Técnica Credenciada. Documentação anexa. Ou maiores informações pelo site: www.compaq.com.br/local/suporte/
Certificação	ISO 9001. Documento anexo.
Chamado de Suporte	Com atendimento "on site" (atuação de um técnico no local onde está instalado o equipamento), no prazo máximo de 04 (quatro) horas para os equipamentos instalados nos estados de São Paulo, Rio de Janeiro e em Brasília e de 04 (quatro) horas para as demais localidades e prazo máximo para solução do problema de até 24 (vinte e quatro) horas . Caso o problema não seja resolvido neste prazo máximo, a Compaq Computer colocará outro equipamento similar ou superior em substituição, até o conserto integral do equipamento com defeito.
Informações Adicionais sobre o produto	Pelo site: www.compaq.com/products/servers/proliant5500/index.html
Horário de Atendimento	Das 08:00 às 24:00 horas (de 2ª a 6ª feira).

A empresa **Compaq Computer Brasil Ind. Com. Ltda** declara que:

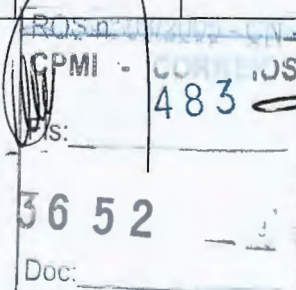
(X) **Atende**

Plenamente os atributos técnicos que constituem a configuração mínima obrigatória exigida para este produto.

2. DESEMPENHO

Processador		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente ao modelo do equipamento	Resposta	Pontos
Quatro processadores Intel Pentium III Xeon, clock igual ou superior a 600 MHz, cada.	Não	03

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COMPAQ

04 (quatro) processadores Intel Pentium III Xeon, clock de 550 MHz.	Atende	02
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Memória RAM		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à <i>memória</i> do equipamento	Resposta	Pontos
Igual a 4 Gbytes	Não	02

Disco Interno e Controladora de disco SCSI		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à <i>Disco Interno e Controladora de disco SCSI</i> do equipamento	Resposta	Pontos
RAID 1 por Hardware para controladora SCSI (Discos Interno)	Atende	02

Controladora de Array de Disco		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à <i>Controladora de Array de Disco</i> do equipamento	Resposta	Pontos
RAID 1 por Hardware para controladora de Array de Disco	Atende	02

Fonte de Alimentação Hot-swappable (suporta a configuração máxima do equipamento)		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente ao <i>tipo de fonte de alimentação</i> do equipamento	Resposta	Pontos
Fonte de alimentação hot-swappable.	Atende	02

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CPMI - CORREIOS
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3. QUALIDADE

Certificação		
Assinalar com a palavra "Atende" para as <i>certificações</i> que o modelo do equipamento cotado possui :		
Possui Certificação atualizada conforme segue :	Resposta	Pontos
ISO 9002 referente a serviços de suporte de hardware e software	Atende	01

4. SUPORTE DE SERVIÇOS

Prazo de Atendimento		
Assinalar com a palavra "Atende" a opção correspondente ao <i>prazo máximo de atendimento</i> ao equipamento cotado :		
Tendo como base o registro de chamada do suporte técnico, o atendimento será prestado nos prazos, conforme segue :	Resposta	Pontos
Até 04 (quatro) horas	Atende	02
Até 06 horas	Não	01

Horário de Atendimento e Suporte		
Assinalar com a palavra "Atende" a opção correspondente ao <i>horário de atendimento às chamadas</i> referentes ao equipamento cotado :		
Além do horário comercial, o atendimento será prestado também nos horários, conforme Segue :	Resposta	Pontos
Horário integral – 24 horas/ 7 dias por semana	Não	02
Horário semi-integral – 24 horas (de 2ª a 6ª feira)	Não	01

Central de Atendimento e Suporte		
Assinalar com a palavra "Atende" a opção correspondente às <i>facilidades oferecidas no atendimento às chamadas</i> referentes ao equipamento cotado :		
Está disponível, para o atendimento aos chamados :	Resposta	Pontos (cumulativos)
Telefone 0800-550377 para hardware e software	Atende	01

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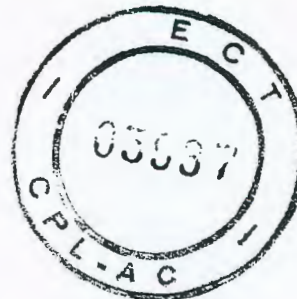
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CPMI - CORREIOS
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COMPAQ

1.4. – Servidor de Aplicação marca COMPAQ, modelo PROLIANT 5500 - TIPO INT4

Quantidade: 06 (seis) unidades.

1. PADRONIZAÇÃO

ATRIBUTO	CONFIGURAÇÃO
Processador	04 (quatro) Processadores Intel Pentium III Xeon, com clock de 550 MHz, cada.
Barramento	Barramento do sistema de 100 MHz.
Memória Cache	01 (um) MB ECC L2 por processador.
Memória RAM	04 (quatro) GBytes ECC EDO DIMM.
Slots	03 (três) PCI livres, após montada configuração proposta.
Interface Serial	02 (duas) interfaces seriais padrão RS-232C.
Interface Paralela	01 (uma) interface paralela padrão Centronics.
Fonte de Alimentação Interna	Bivolt, de 500W compatível com configuração máxima do equipamento, com redundância .
Unidade de Disco Flexível	01 (uma) unidade de 3 1/2" com capacidade de 1,44 MBytes.
Disco Interno e Controladora de disco SCSI	Dual Channel Wide Ultra2. 02 (duas) unidades de disco Wide Ultra2 SCSI, suporta RAID 0. Capacidade de 9.1 (nove ponto um) GB cada, espelhado, com tempo médio de acesso igual a 8 ms e rotação de 10.000 RPM. Outras informações pelo site: www.compaq.com/products/storageworks/ .
Controladora de Array de Disco	Smart Array 3200 Dual Channel Wide Ultra2 SCSI suporta, RAID 0 e 5. Com controladora exclusiva e RAID por hardware . Outras informações pelo site: www.compaq.com/products/storageworks/ .
Array de Discos	Wide Ultra2 SCSI, "Hot-swappable", com capacidade de 18.2 (dezoito ponto dois) Gbytes, cada, formatados, perfazendo um total de 72 (setenta e dois) GB, líquidos. Rotação de 10.000 RPM, com tempo médio de acesso igual a 8 ms. Suporta RAID 0 e 5, com HOT SPAIR . Outras informações pelo site: www.compaq.com/products/storageworks/ .
Unidade de Fita DAT	01 (uma) unidade de fita padrão DAT para utilização de mídias com capacidade de 12 (doze) Gbytes, sem compressão. Com um canal de I/O SCSI dedicado . Outras informações pelo site: www.compaq.com/products/storageworks/ .
Gabinete	Modelo Torre, com capacidade interna para 10 (dez) unidades de discos rígidos hot-swappable. Capacidade interna máxima de 218.4 (duzentos e dezoito ponto quatro) GB, hot-plug.
Teclado Alfanumérico	Com 101 (cento e uma) teclas, padrão ABNT 2.

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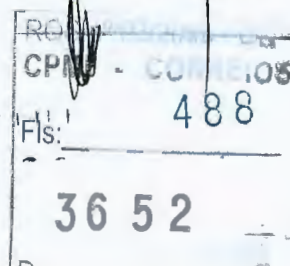


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COMPAQ

ATRIBUTO	CONFIGURAÇÃO
Placa de Vídeo	Integrada à placa mãe (on-board), padrão VGA, com 02 (dois) MBytes.
Monitor de Vídeo	SVGA policromático não entrelaçado com tela plana, anti-reflexiva de, 14" (quatorze), dot-pitch de 0.28 mm. Atinge resolução de 1024 x 768, atende às normas MPR II, EPA Energy Star. Seleção automática de tensão entre 90-240 VAC - full-range. Outras informações pelo site: www.compaq.com.br/produtos/monitores .
Mouse Serial	02 (duas) teclas padrão Microsoft com resolução de 400 dpi, mouse-pad e driver de instalação.
Unidade de CD-ROM	01 (uma) unidade interna, interface IDE, com velocidade de 32X, com driver de instalação para Windows NT Server 4.0.
Placa de Rede	01 (uma) placa padrão Ethernet de 32 bits - IEEE 802.3, saídas 10Base-T / 100Base-TX, velocidade dupla 10 ou 100 Mbps autosense, possibilidade de gerenciamento SNMP, com driver de instalação para Windows NT Server 4.0, acompanhada dos respectivos manuais de documentação.
Compatibilidade	O equipamento cotado apresenta compatibilidade com produtos Microsoft segundo Certificação HCL - Hardware Compatibility List, na categoria System/Server Multiprocessor. Documento anexo. Ou pelo site: www.microsoft.com/hcl/default.asp
Sistema Operacional	O equipamento cotado é compatível com o Sistema Operacional Microsoft Windows NT 4.0 Server e Windows 2000 (entre outros - vide folder QuickSpecs pág. 4). O SO será fornecido, instalado e configurado pelos Correios. Outras informações pelo site: www.compaq.com/it/servers/ProLiant5500_customer_advisories_WinNT.html
Documentação Técnica	2.1. Acompanha descrição completa do produto; 2.2. Acompanha identificação do fabricante, da marca e do modelo; 2.3. Acompanha lista de endereços completos da Assistência Técnica Autorizada dos produtos ofertados, os nomes e telefones dos responsáveis técnicos em todo o país; 2.4. Site do fabricante: www.compaq.com.br ou www.compaq.com ; 2.6. Acompanham as comprovações de todos os atributos técnicos da planilha de Especificações Técnicas; 2.6.1. Prospecto/folder(da internet) técnico do modelo cotado, com grifo nas características técnicas informadas; 2.6.3. Endereço completo da página da internet da Compaq Computer: www.compaq.com.br ou www.compaq.com .
Imunidade	O produto é imune a quaisquer problemas decorrentes do "Bug do milênio". Documentação anexa. Ou pelo site: www.compaq.com/year2000/
Outros	Acompanha cabos, acessórios, manuais e documentação que são necessários ao pleno funcionamento do equipamento.
Garantia	"On site", total pelo fabricante Compaq Computer pelo prazo de 01 (um) ano, de acordo com as condições do Edital.
Certificação	ISO 9001. Documento anexo.

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COMPAQ

Assistência Técnica	Será prestado diretamente pelo fabricante Compaq Computer ou por sua Rede de Assistência Técnica Credenciada. Documentação anexa. Ou maiores informações pelo site: www.compaq.com.br/local/suporte/
Chamado de Suporte	Com atendimento "on site" (atuação de um técnico no local onde está instalado o equipamento), no prazo máximo de 04 (quatro) horas para os equipamentos instalados nos estados de São Paulo, Rio de Janeiro e em Brasília e de 04 (quatro) horas para as demais localidades e prazo máximo para solução do problema de até 24 (vinte e quatro) horas . Caso o problema não seja resolvido neste prazo máximo, a Compaq colocará outro equipamento similar ou superior em substituição, até o conserto integral do equipamento com defeito.
Informações Adicionais sobre o produto	Pelo site: www.compaq.com/products/servers/proliant5500/index.html
Horário de Atendimento	Das 08:00 às 24:00 horas (de 2ª a 6ª feira).

A empresa **Compaq Computer Brasil Ind. Com. Ltda** declara que:

(X) Atende

Plenamente os atributos técnicos que constituem a configuração mínima obrigatória exigida para este produto.

2. DESEMPENHO

Processador		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente ao <i>modelo</i> do equipamento	Resposta	Pontos
Quatro processadores Intel Pentium III Xeon, clock igual a 600 MHz, cada.	Não	03
04 (quatro) processadores Intel Pentium III Xeon, clock de 550 MHz, cada.	Atende	02

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**COMPAQ**

Memória RAM

Memória RAM		
Assinalar com a palavra “Atende” no campo “ Resposta”, conforme a opção correspondente à <i>memória</i> do equipamento	Resposta	Pontos
Superior a 4 Gbytes	Não	02

Disco Interno e Controladora de disco SCSI

Disco Interno e Controladora de disco SCSI		
Assinalar com a palavra “Atende” no campo “ Resposta”, conforme a opção correspondente à Disco Interno e Controladora de disco SCSI <i>do equipamento</i>	Resposta	Pontos
RAID 1 por Hardware para controladora SCSI (Discos Interno)	Atende	02

Controladora de Array de Disco

Controladora de Array de Disco		
Assinalar com a palavra “Atende” no campo “ Resposta”, conforme a opção correspondente à Controladora de Array de Disco <i>do equipamento</i>	Resposta	Pontos
RAID 1 por Hardware para controladora de Array de Disco	Atende	02

**Fonte de Alimentação Hot-swappable
(que suporte a configuração máxima do equipamento)**

Fonte de Alimentação Hot-swappable (que suporte a configuração máxima do equipamento)		
Assinalar com a palavra “Atende” no campo “Resposta”, conforme a opção correspondente ao <i>tipo de fonte de alimentação do equipamento</i>	Resposta	Pontos
Fonte de alimentação hot-swappable.	Atende	02

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CPMI - CONTINIOS
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COMPAQ

3. QUALIDADE

Certificação		
Assinalar com a palavra "Atende" para as certificações que o modelo do equipamento cotado possui :		
Possui Certificação atualizada conforme segue :	Resposta	Pontos
ISO 9002 referente a serviços de suporte de hardware e software	Atende	01

4. SUPORTE DE SERVIÇOS

Prazo de Atendimento		
Assinalar com a palavra "Atende" a opção correspondente ao prazo máximo de atendimento ao equipamento cotado :		
Tendo como base o registro de chamada do suporte técnico, o atendimento será prestado nos prazos, conforme segue :	Resposta	Pontos
Até 04 (quatro) horas	Atende	02
Até 06 horas	Não	01

Horário de Atendimento e Suporte		
Assinalar com a palavra "Atende" a opção correspondente ao horário de atendimento às chamadas referentes ao equipamento cotado :		
Além do horário comercial, o atendimento será prestado também nos horários, conforme segue :	Resposta	Pontos
Horário integral – 24 horas/ 7 dias por semana	Não	02
Horário semi-integral – 24 horas (de 2ª a 6ª feira)	Não	01

Central de Atendimento e Suporte		
Assinalar com a palavra "Atende" a opção correspondente às facilidades oferecidas no atendimento às chamadas referentes ao equipamento cotado:		
Está disponível, para o atendimento aos chamados :	Resposta	Pontos (cumulativos)
Telefone 0800-550377 para hardware e software	Atende	01

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COMPAQ

Duração da Garantia

Assinalar com a palavra "Atende" a opção correspondente a
duração da garantia dada pelo fabricante para o equipamento cotado.

O fabricante oferece garantia para o produto por um período de :	Resposta	Pontos
5 (cinco) anos	Não	03
4 (quatro) anos	Não	02
3 (três) anos	Não	01

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RQS nº	492
CPMI - CORRIGIS	
Fls:	492
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COMPAQ

**1.5. – Servidor de Aplicação marca COMPAQ, modelo PROLIANT 5500
- TIPO INT5**

Quantidade: 46 (quarenta e seis) unidades.

1. PADRONIZAÇÃO

ATRIBUTO	CONFIGURAÇÃO
Processador	02 (dois) Processadores Intel Pentium III Xeon, com clock de 550 MHz, cada.
Barramento	Barramento do sistema de 100 MHz.
Memória Cache	512 KB ECC L2 por processador.
Memória RAM	01 (um) Gbyte ECC EDO DIMM.
Slots	03 (três) slots PCI livres, após montada configuração proposta.
Interface Serial	02 (duas) interfaces seriais padrão RS-232C.
Interface Paralela	01 (uma) interface paralela padrão Centronics.
Fonte de Alimentação Interna	Bivolt, de 500W compatível com configuração máxima do equipamento, com redundância.
Unidade de Disco Flexível	01 (uma) unidade de 3 1/2" com capacidade de 1,44 MBytes.
Disco Interno e Controladora de disco SCSI	Dual Channel Wide Ultra2. 02 (duas) unidades de disco Wide Ultra2 SCSI. Suporta RAID 0. Capacidade de 9.1 (nove ponto um) GB cada, espelhado, com tempo médio de acesso de 9 ms e rotação de 10.000 RPM. Outras informações pelo site: www.compaq.com/products/storageworks/
Controladora de Array de Disco	Smart Array 3200 Dual Channel Wide Ultra2 SCSI. Suporta RAID 0 e 5. Com controladora exclusiva e RAID por hardware. Outras informações pelo site: www.compaq.com/products/storageworks/
Array de Discos	Wide Ultra2 SCSI, "Hot-swappable", com capacidade de 18.2 (dezoito ponto dois) Gbytes cada, formatados, perfazendo um total de 54 (cinquenta e quatro) GB, líquidos. Rotação de 10.000 RPM, com tempo médio de acesso de 9 ms. Suporta RAID 0 e 5, com HOT SPAIR. Outras informações pelo site: www.compaq.com/products/storageworks/
Unidade de Fita DAT	01 (uma) unidade de fita padrão DAT para utilização de mídias com capacidade de 12 (doze) Gbytes, sem compressão. Com um canal de I/O SCSI dedicado. Outras informações pelo site: www.compaq.com/products/storageworks/
Gabinete	Modelo Torre, com capacidade interna para 10 (dez) unidades de discos rígidos "Hot-swappable". Capacidade interna máxima de 218.4 (duzentos e dezoito ponto quatro) GB, hot-plug.

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COMPAQ



ATRIBUTO	CONFIGURAÇÃO
Teclado Alfanumérico	Com de 101 (cento e uma) teclas, padrão ABNT 2.
Placa de Vídeo	Integrada à placa mãe (on-board), padrão VGA, com 02 (dois) MBytes.
Monitor de Vídeo	SVGA policromático não entrelaçado com tela plana, anti-reflexiva de, 14" (quatorze), dot-pitch de 0.28 mm. Atinge resolução de 1024 x 768, atende às normas MPR II, EPA Energy Star. Seleção automática de tensão entre 90-240 VAC - full-range. Outras informações pelo site: www.compaq.com.br/produtos/monitores .
Mouse Serial	02 (duas) teclas padrão Microsoft com resolução de 400 dpi, mouse-pad e driver de instalação.
Unidade de CD-ROM	01 (uma) unidade interna, interface IDE, com velocidade de 32X, com driver de instalação para Windows NT Server 4.0.
Placa de Rede	01 (uma) placa padrão Ethernet de 32 bits - IEEE 802.3, saídas 10Base-T / 100Base-TX, velocidade dupla 10 ou 100 Mbps autosense, possibilidade de gerenciamento SNMP, com driver de instalação para Windows NT Server 4.0, acompanhada dos respectivos manuais de documentação.
Compatibilidade	O equipamento cotado apresenta compatibilidade com produtos Microsoft segundo Certificação HCL - Hardware Compatibility List, na categoria System/Server Multiprocessor. Documento anexo. Ou pelo site: www.microsoft.com/hcl/default.asp
Sistema Operacional	O equipamento cotado é compatível com o Sistema Operacional Microsoft Windows NT 4.0 Server e Windows 2000 (entre outros - vide folder QuickSpecs pág. 4). O SO será fornecido, instalado e configurado pelos Correios. Outras informações pelo site: www.compaq.com/it/servers/ProLiant5500_customer_advisories_WinNT.html
Documentação Técnica	2.1. Acompanha descrição completa do produto; 2.2. Acompanha identificação do fabricante, da marca e do modelo; 2.3. Acompanha lista de endereços completos da Assistência Técnica Autorizada dos produtos ofertados, os nomes e telefones dos responsáveis técnicos em todo o país; 2.4. Site do fabricante: www.compaq.com.br ou www.compaq.com ; 2.6. Acompanham as comprovações de todos os atributos técnicos da planilha de Especificações Técnicas; 2.6.1. Prospecto/folder(da internet) técnico do modelo cotado, com grifo nas características técnicas informadas; 2.6.3. Endereço completo da página da internet da Compaq Computer: www.compaq.com.br ou www.compaq.com .
Imunidade	O produto é imune a quaisquer problemas decorrentes do "Bug do milênio". Documentação anexa. Ou pelo site: www.compaq.com/year2000/
Outros	Cabos, acessórios, manuais e documentação que são necessários ao pleno funcionamento do equipamento.
Garantia	"On site", total pelo fabricante Compaq Computer pelo prazo de 01 (um) ano, de acordo com as condições do Edital.
Certificação	ISO 9001. Documento anexo.

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CORREIOS
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COMPAQ

Assistência Técnica	Será prestado diretamente pelo fabricante Compaq Computer ou por sua Rede de Assistência Técnica Credenciada. Documentação anexa. Ou maiores informações pelo site: www.compaq.com.br/local/suporte/
Chamado de Suporte	Com atendimento "on site" (atuação de um técnico no local onde está instalado o equipamento), no prazo máximo de 04 (quatro) horas para os equipamentos instalados nos estados de São Paulo, Rio de Janeiro e em Brasília e de 04 (quatro) horas para as demais localidades e prazo máximo para solução do problema de até 24 (vinte e quatro) horas . Caso o problema não seja resolvido neste prazo máximo, a Compaq Computer colocará outro equipamento similar ou superior em substituição, até o conserto integral do equipamento com defeito.
Informações Adicionais sobre o produto	Pelo site: www.compaq.com/products/servers/proliant5500/index.html
Horário de Atendimento	Das 08:00 às 24:00 horas (de 2ª a 6ª feira).

A empresa **Compaq Computer Brasil Ind. Com. Ltda** declara que:

(X) **Atende**

Plenamente os atributos técnicos que constituem a configuração mínima obrigatória exigida para este produto.

2. DESEMPENHO

Processador		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente ao <i>modelo</i> do equipamento	Resposta	Pontos
Dois processadores Intel Pentium III Xeon, clock igual ou superior a 600 MHz, cada.	Não	03
02 (dois) processadores Intel Pentium III Xeon, clock de 550 MHz, cada.	Atende	02

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RECIBO DE ENTREGA
CORREIOS
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COMPAQ



Memória RAM		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à <i>memória</i> do equipamento	Resposta	Pontos
Igual a 4 Gbytes	Não	02
Igual a 2 Gbytes	Não	01

Disco Interno e Controladora de disco SCSI		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à Disco Interno e Controladora de disco SCSI do equipamento	Resposta	Pontos
RAID 1 por Hardware para controladora SCSI (Discos Interno)	Atende	02

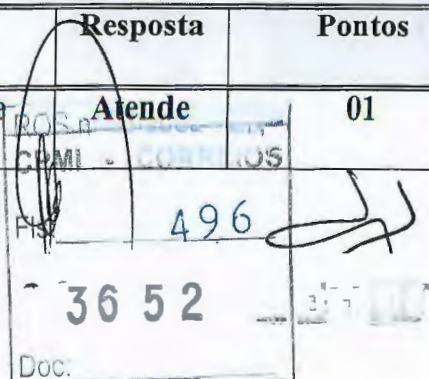
Controladora de Array de Disco		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à Controladora de Array de Disco do equipamento	Resposta	Pontos
RAID 1 por Hardware para controladora de Array de Disco	Atende	02

Fonte de Alimentação Hot-swappable (suporta a configuração máxima do equipamento)		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente ao <i>tipo de fonte de alimentação</i> do equipamento	Resposta	Pontos
Fonte de alimentação hot-swappable.	Atende	02

3. QUALIDADE (QD)

Certificação		
Assinalar com a palavra "Atende" para as certificações que o modelo do equipamento cotado possui :		
Possui Certificação atualizada conforme segue :	Resposta	Pontos
ISO 9002 referente a serviços de suporte de hardware e software	Atende	01

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COMPAQ



4. SUPORTE DE SERVIÇOS

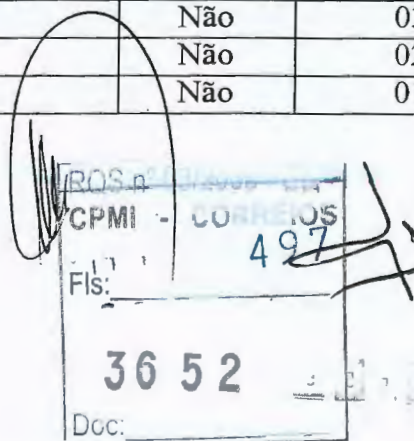
Prazo de Atendimento		
Assinalar com a palavra "Atende" a opção correspondente ao <i>prazo máximo de atendimento</i> ao equipamento cotado :		
Tendo como base o registro de chamada do suporte técnico, o atendimento será prestado nos prazos, conforme segue :	Resposta	Pontos
Até 04 (quatro) horas	Atende	02
Até 06 horas	Não	01

Horário de Atendimento e Suporte		
Assinalar com a palavra "Atende" a opção correspondente ao <i>horário de atendimento às chamadas</i> referentes ao equipamento cotado :		
Além do horário comercial, o atendimento será prestado também nos horários, conforme segue :	Resposta	Pontos
Horário integral – 24 horas/ 7 dias por semana	Não	02
Horário semi-integral – 24 horas (de 2ª a 6ª feira)	Não	01

Central de Atendimento e Suporte		
Assinalar com a palavra "Atende" a opção correspondente às <i>facilidades oferecidas no atendimento às chamadas</i> referentes ao equipamento cotado :		
Está disponível, para o atendimento aos chamados :	Resposta	Pontos (cumulativos)
Telefone 0800-550377 para hardware e software	Atende	01

Duração da Garantia		
Assinalar com a palavra "Atende" a opção correspondente a <i>duração da garantia</i> dada pelo fabricante para o equipamento cotado.		
O fabricante oferece garantia para o produto por um período de :	Resposta	Pontos
5 (cinco) anos	Não	03
4 (quatro) anos	Não	02
3 (três) anos	Não	01

000031



COMPAQ



I.6. – Servidor de Rede, marca COMPAQ, modelo PROLIANT ML 530 - INT6

Quantidade: 32 (trinta e dois) unidades

1. PADRONIZAÇÃO

ATRIBUTO	CONFIGURAÇÃO
Processador	02 (dois) Processadores Intel Pentium III, com clock de 800 MHz, cada.
Barramento	Barramento do sistema de 133 MHz.
Memória Cache	256 KBytes ECC L2 por processador, full speed.
Memória RAM	512 MBytes ECC SDRAM DIMM, expansível até 04 (quatro) GByte, instalada "on board".
Slots	05 (cinco) slots PCI livres, após montada configuração proposta.
Interface Serial	02 (duas) interfaces seriais padrão RS-232C.
Interface Paralela	01 (uma) interface paralela padrão Centronics.
Fonte de Alimentação Interna	Bivolt, de 450W, compatível com configuração máxima do equipamento, com redundância.
Unidade de Disco Flexível	01 (uma) unidade de 3 1/2" com capacidade de 1,44 Mbytes.
Disco Interno e Controladora de disco SCSI	Dual Channel Wide Ultra2. Wide Ultra2 SCSI. Suporta RAID 0. Capacidade de 09 (nove ponto um) GB, líquidos, cada, espelhado, com tempo médio de acesso de 09 (nove) ms e rotação de 10.000 RPM. Outras informações pelo site: www.compaq.com/products/storageworks/
Controladora de Array de Disco	Smart Array 221 Dual Channel Wide Ultra2 SCSI. Suporta RAID 0 e 5. Com controladora exclusiva e RAID por hardware. Outras informações pelo site: www.compaq.com/products/storageworks/
Array de Discos	Wide Ultra2 SCSI, "Hot-swappable", com capacidade de 18.2 (dezoito ponto dois) Gbytes, cada, formatados, perfazendo um total de 54 GB líquidos. Rotação de 10.000 RPM, com tempo médio de acesso de 09 (nove) ms. Suporta RAID 0 e 5, com HOT SPAIR. Outras informações pelo site: www.compaq.com/products/storageworks/
Unidade de Fita DAT	01 (uma) unidade de fita padrão DAT para utilização de mídias com capacidade de 12 (doze) Gbytes, sem compressão. Com um canal de I/O SCSI dedicado. Outras informações pelo site: www.compaq.com/products/storageworks/
Gabinete	Modelo Torre, com capacidade interna para 12 (doze) unidades de discos rígidos "Hot-swappable". Capacidade interna máxima de 218.4 (duzentos e dezoito ponto quatro) GB, hot-plug.
Teclado Alfanumérico	Com 101 (cento e uma) teclas, padrão ABNT 2.
Placa de Vídeo	ATI Rage IIC integrada à placa mãe (on-board), padrão VGA, com no mínimo 04 (quatro) Mbytes.

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EMI - CORREIOS
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Monitor de Vídeo	SVGA policromático não entrelaçado com tela plana, anti-reflexiva de 14", dot-pitch de 0.28 mm. Atinge resolução de 1024 x 768, atende às normas MPR II, EPA Energy Star. Seleção automática de tensão entre 90-240 VAC - full-range. Outras informações pelo site: www.compaq.com.br/produtos/monitores .
Mouse Serial	02 (duas) teclas padrão Microsoft com resolução de 400 dpi, mouse-pad e driver de instalação.
Unidade de CD-ROM	01 (uma) unidade interna, tecnologia IDE, com velocidade de 32X, com driver de instalação para Windows NT Server 4.0.
Placa de Rede	01 (uma) placa padrão Ethernet de 32 bits - IEEE 802.3, saídas 10Base-T / 100 Base-TX, velocidade dupla 10 ou 100 Mbps autosense, possibilidade de gerenciamento SNMP, com driver de instalação para Windows NT Server 4.0, acompanhada dos respectivos manuais de documentação.
Compatibilidade	O equipamento cotado apresenta compatibilidade com produtos Microsoft segundo Certificação HCL – Hardware Compatibility List, na categoria System/Server Multiprocessor. Documentação anexa. Ou pelo site: www.microsoft.com/hcl/default.asp
Sistema Operacional	O equipamento é compatível com o Sistema Operacional Microsoft Windows NT 4.0 Server e Windows 2000 (entre outros – vide folder QuickSpecs pág. 4). O SO será fornecido, instalado e configurado pelos Correios. Outras informações pelo site: www.compaq.com/it/servers/ProLiantML530_customer_advisories_WinNT.html
Documentação Técnica	2.1. Acompanha descrição completa do produto; 2.2. Acompanha identificação do fabricante, da marca e do modelo; 2.3. Acompanha lista de endereços completos da Assistência Técnica Autorizada dos produtos ofertados, os nomes e telefones dos responsáveis técnicos em todo o país; 2.4. Site do fabricante: www.compaq.com.br ou www.compaq.com ; 2.6. Acompanham as comprovações de todos os atributos técnicos da planilha de Especificações Técnicas; 2.6.1. Prospecto/folder(da internet) técnico do modelo cotado, com grifo nas características técnicas informadas; 2.6.3. Endereço completo da página da internet da Compaq Computer: www.compaq.com.br ou www.compaq.com .
Imunidade	O produto é imune a quaisquer problemas decorrentes do "Bug do milênio". Documentação anexa. Ou pelo site: www.compaq.com/year2000/
Outros	Acompanha cabos, acessórios, manuais e documentação necessários ao pleno funcionamento do equipamento.
Garantia	“On site”, total pelo fabricante Compaq Computer pelo prazo de 01 (um) ano, de acordo com as condições do Edital.
Certificação	ISO 9001. Documentação anexa.

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COMPAQ



Assistência Técnica	Será prestado diretamente pelo fabricante Compaq Computer ou por sua Rede de Assistência Técnica Credenciada. Documentação anexa. Ou maiores informações pelo site: www.compaq.com.br/local/suporte/
Chamado de Suporte	Com atendimento "on site" (atuação de um técnico no local onde está instalado o equipamento), no prazo máximo de 04 (quatro) horas para os equipamentos instalados nos estados de São Paulo, Rio de Janeiro e em Brasília e de 04 (quatro) horas para as demais localidades e prazo máximo para solução do problema de até 24 (vinte e quatro) horas . Caso o problema não seja resolvido neste prazo máximo, a Compaq Computer colocará outro equipamento similar ou superior em substituição, até o conserto integral do equipamento com defeito.
Informações Adicionais sobre o produto	Pelo site: www.compaq.com/products/servers/proliant5500/index.html
Horário de Atendimento	Das 08:00 às 24:00 horas (de 2ª a 6ª feira).

A empresa	Compaq Computer Brasil Ind. Com. Ltda	declara que:
(X) Atende		
Plenamente os atributos técnicos que constituem a configuração mínima obrigatória exigida para este produto.		

2. DESEMPENHO

Processador		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente ao <i>modelo</i> do equipamento	Resposta	Pontos
02 (dois) processadores Intel Pentium III, clock de 800 MHz, cada.	Atende	03
Dois processadores Intel Pentium III, clock igual ou superior a 550 MHz, cada.	Não	02

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COMPAQ



Memória RAM		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à <i>memória</i> do equipamento	Resposta	Pontos
Igual a 1 GByte	Não	02

Disco Interno e Controladora de disco SCSI		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à <i>Disco Interno e Controladora de disco SCSI do equipamento</i>	Resposta	Pontos
RAID 1 por Hardware para controladora SCSI (Discos Interno)	Não	02

Controladora de Array de Disco		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à <i>Controladora de Array de Disco do equipamento</i>	Resposta	Pontos
RAID 1 por Hardware para controladora de Array de Disco	Atende	02

Fonte de Alimentação Hot-swappable (que suporte a configuração máxima do equipamento)		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente ao <i>tipo de fonte de alimentação do equipamento</i>	Resposta	Pontos
Fonte de alimentação hot-swappable.	Atende	02

3. QUALIDADE

Certificação		
Assinalar com a palavra "Atende" para as <i>certificações</i> que o modelo do equipamento cotado possui :		
Possui Certificação atualizada conforme segue :	Resposta	Pontos
ISO 9002 referente a serviços de suporte de hardware e software	Atende	01

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ROS - ROTEIRO DE TRABALHO
PPMI - CONHECIMENTOS
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36 52
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COMPAQ

I.7. - Servidor de Desenvolvimento, marca COMPAQ, modelo DESKPRO EP - TIPO INT7

Quantidade: 45 (quarenta e cinco) unidades.

PADRONIZAÇÃO

ATRIBUTO	CONFIGURAÇÃO
Processador	01 (um) Processador Intel Pentium III, com clock 550 MHz, cada.
Placa de Som	Placa de som integrada AC "97 audio w/Compaq Premier*Sound™.
Chipset	Barramento de 100 MHz.
Memória Cache	512 KB ECC L2 por processador.
Memória RAM	128 MB ECC SDRAM. Expansível até 512 MB.
Slots	02 (dois) slots PCI livres, após montada configuração proposta
Interface Serial	02 (duas) interfaces seriais padrão RS-232C.
Portas USB	02 (duas) portas USB (double stacked)
Interface Paralela	01 (uma) interface paralela padrão Centronics.
Fonte de Alimentação Interna	Bivolt, compatível com configuração máxima do equipamento.
Unidade de Disco Flexível	01 (uma) unidade de 3 1/2" com capacidade de 1,44 Mbytes.
Controladora de Disco Rígido	Tecnologia IDE Ultra ATA DMA. Outras informações pelo site: www.compaq.com/products/storageworks/
Disco Rígido	IDE SMART Ultra ATA/66, compatível com a controladora de disco acima cotada, com capacidade de 13.5 (treze ponto cinco) Gbytes, formatados, com rotação de 7200 rpm, com tempo médio de acesso de 9 ms . Com SMART (Self Monitoring Analysis and Reporting Technology). Outras informações pelo site: www.compaq.com/products/storageworks/
Gabinete	Modelo mini-torre ou desktop ("Towerable"), com capacidade interna para 02 (duas) unidades de disco rígido.
Teclado Alfanumérico	Com 104 (cento e quatro) teclas, padrão ABNT 2.
Placa de Vídeo	Intel 3D graphics, integrada à placa mãe (on-board), padrão VGA, com 04 (quatro) Mbytes.
Monitor de Vídeo	SVGA policromático não entrelaçado com tela plana, anti-reflexiva de, 17" (dezessete), dot-pitch de 0.23 (Zero ponto vinte e três) mm. Atinge resolução de 1280 x 1024 à frequência vertical de 75 e 85 Hz, atende às normas MPR II, EPA Energy Star. Seleção automática de tensão entre 90-240 VAC - full-range. Outras informações pelo site: www.compaq.com.br/produtos/monitores .

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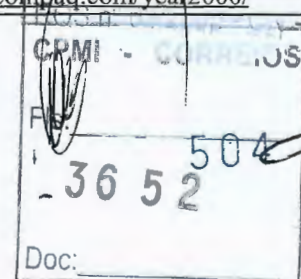
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CPMI - CORREIOS
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COMPAQ

ATRIBUTO	CONFIGURAÇÃO
Mouse Serial	02 (dois) botões, resolução de 400 dpi, mouse-pad e driver de instalação.
Unidade de CD-ROM	01 (uma) unidade interna, tecnologia IDE, com velocidade 32X, com driver de instalação para Windows NT 4.0.
Placa de Rede	01 (uma) placa padrão Ethernet de 32 bits - IEEE 802.3, saídas 10Base-T / 100Base-TX, velocidade dupla 10 ou 100 Mbps autosenso, possibilidade de gerenciamento SNMP, com driver de instalação para Windows NT Server 4.0, acompanhada dos respectivos manuais de documentação.
Sistema Operacional	Inclui Microsoft Windows NT Workstation 4.0, instalado e configurado para rede Local e Corporativa dos Correios, entregues em mídia CD-ROM com toda documentação e licenças. Outras informações pelo site: www.compaq.com/it/deskproep_customer_advisories_Win.html ou http://www.microsoft.com/brasil/ntworkstation
Documentação Técnica	2.1. Acompanha descrição completa do produto; 2.2. Acompanha identificação do fabricante, da marca e do modelo; 2.3. Acompanha lista de endereços completos da Assistência Técnica Autorizada dos produtos ofertados, os nomes e telefones dos responsáveis técnicos em todo o país; 2.4. Site do fabricante: www.compaq.com.br ou www.compaq.com ; 2.6. Acompanham as comprovações de todos os atributos técnicos da planilha de Especificações Técnicas; 2.6.1. Prospecto/folder(da internet) técnico do modelo cotado, com grifo nas características técnicas informadas; 2.6.2. Acompanha Manual Técnico do modelo cotado, com grifo nas características informadas; 2.6.3. Endereço completo da página da internet da Compaq Computer: www.compaq.com.br ou www.compaq.com .
Garantia	"On site", total pelo fabricante Compaq Computer pelo prazo de 01 (um) ano, de acordo com as condições do Edital.
Certificação	ISO 9001. Documento anexo.
Assistência Técnica	Será prestado diretamente pelo fabricante Compaq Computer ou por sua Rede de Assistência Técnica Credenciada. Documentação anexa. Ou maiores informações pelo site: www.compaq.com.br/local/suporte/
Outros	Acompanha cabos, acessórios, manuais e documentação necessários ao pleno funcionamento do equipamento.
Chamado de Suporte	Com atendimento "on site"(atuação de um técnico no local onde está instalado o equipamento), no prazo máximo de 04 (quatro) horas e para a solução do problema prazo de até 24 (vinte e quatro) horas . Caso o problema não seja resolvido neste prazo máximo, a Compaq Computer colocará outro equipamento similar ou superior em substituição, até o conserto integral do equipamento com defeito.
Horário de Atendimento	Das 08:00 às 24:00 horas (de 2ª a 6ª feira).
Imunidade	O produto é imune a quaisquer problemas decorrentes do "Bug do milênio" Documentação anexa.. Ou pelo site: www.compaq.com/year2000/

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COMPAQ

A empresa **Compaq Computer Brasil Ind. Com. Ltda** declara que:

(X) Atende

Plenamente os atributos técnicos que constituem a configuração mínima obrigatória exigida para este produto.

DESEMPENHO

Processador		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente ao <i>modelo</i> do equipamento	Resposta	Pontos
Processador Intel Pentium III, clock igual a 550 MHz.	Atende	02

Memória RAM		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à <i>memória</i> do equipamento	Resposta	Pontos
Igual ou superior a 256 Mbytes	Não	02

Capacidade do Disco Rígido		
Assinalar com a palavra "Atende" no campo "Resposta", conforme a opção correspondente à <i>capacidade do disco rígido do equipamento</i>	Resposta	Pontos
Disco de 13.5 (treze ponto cinco) GB	Atende	02
De 10 a 12 Gbytes	Não	01

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CPMI - CORRETO

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COMPAQ

QUALIDADE

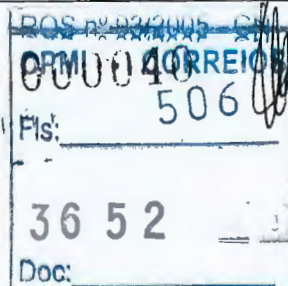
Certificação		
Assinalar com a palavra "Atende" para as certificações que o modelo do equipamento cotado possui :		
Possui Certificação atualizada conforme segue :	Resposta	Pontos
ISO 9002 referente a serviços de suporte de hardware e software	Atende	01

SUPORTE DE SERVIÇOS

Prazo de Atendimento		
Assinalar com a palavra "Atende" a opção correspondente ao prazo máximo de atendimento ao equipamento cotado :		
Tendo como base o registro de chamada do suporte técnico, o atendimento será prestado nos prazos, conforme segue :	Resposta	Pontos
Até 04 (quatro) horas	Atende	02
Até 06 horas	Não	01

Horário de Atendimento e Suporte		
Assinalar com a palavra "Atende" a opção correspondente ao horário de atendimento às chamadas referentes ao equipamento cotado :		
Além do horário comercial, o atendimento será prestado também nos horários, conforme segue :	Resposta	Pontos
Horário integral – 24 horas/ 7 dias por semana	Não	02
Horário semi-integral – 24 horas (de 2ª a 6ª feira)	Não	01

Tipo de Atendimento		
Assinalar com a palavra "Atende" a opção correspondente ao tipo de atendimento dado ao equipamento cotado :		
O atendimento oferecido para o equipamento é do tipo:	Resposta	Pontos
Atendimento "On Site"	Atende	01





COMPAQ

Central de Atendimento e Suporte

Assinalar com a palavra "Atende" a opção correspondente às *facilidades oferecidas no atendimento às chamadas* referentes ao equipamento cotado :

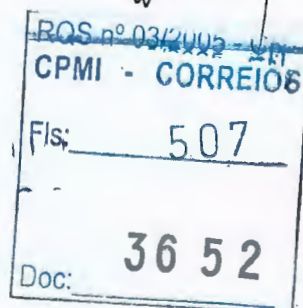
Está disponível, para o atendimento aos chamados :	Resposta	Pontos (cumulativos)
Telefone 0800-550377 para hardware e software	Atende	01

Duração da Garantia

Assinalar com a palavra "Atende" a opção correspondente a *duração da garantia* dada pelo fabricante para o equipamento cotado.

O fabricante oferece garantia para o produto por um período de :	Resposta	Pontos
5 (cinco) anos	Não	03
4 (quatro) anos	Não	02
3 (três) anos	Não	01

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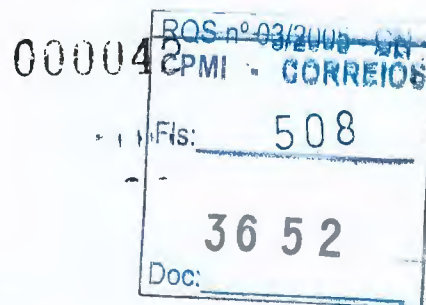
COMPAQ



RESPONSÁVEIS TÉCNICOS

(Atendimento ao subitem 2.3 do Anexo I, dos INT1 a INT7 e ao RISC 3 e 4)

1. Infolab – Vitória-ES
- Elilson Elias Martins
2. BMS – Belo Horizonte-MG
- Márcio Nogueira de Menezes
3. Compex – Belo Horizonte-MG
- Sérgio Fábio
4. Decmaster – Belo Horizonte-MG
- Rubens Egídio Pereira
5. IO – Belo Horizonte-MG
- Vagner Martins Costa
6. ITS – Poços de Caldas-MG
- Orténio de Oliveira
7. Microcity – Nova Lima-MG
- Marcos José Rajão Costa
8. Pacific – Uberlândia-MG
- José Vander de Freitas Oliveira
9. Procedata – Belo Horizonte-MG
- Feres Maron Salim
10. Sinco – Uberaba-MG
- Fernando Henrique Oliveira Martins
11. Vipservice – Juiz de Fora-MG
- Lênio Canedo





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12. Chiptek – Rio de Janeiro-RJ
- Paulo Monteiro
13. DB Rio – Rio de Janeiro-RJ
- Almir Francisco da Silva
- Info Valle – Volta Redonda-RJ
- Valdir de Carvalho Muniz
14. Lavish – Volta Redonda-RJ
- Fábio Pinto
15. MC Room – Rio de Janeiro-RJ
- Luiz Alberto Mattuo
16. Microware – Niterói-RJ
- Antonio Augusto Valente dos Reis
17. MLX – Rio de Janeiro-RJ
- Sylla Velasco Júnior
18. NTL – Rio de Janeiro-RJ
- Márcio de Albuquerque Cordeiro
19. PC Manutenção – Rio de Janeiro-RJ
- Orlando Sabóia
20. Quantor – Rio de Janeiro-RJ
- Israel Amadolar
21. SIML – Rio de Janeiro-RJ
- José Augusto Susini
22. Agnus – São Paulo-SP
- Vinícius Sasaki
23. All Side – Franca-SP
- Daniel Gomes Mazzotti

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CPMI - CORREIOS

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COMPAQ

- 24. Assistec – São Vicente-SP
 - Emerson Busatti Barbosa
- 25. BBA – Santos-SP
 - Marcos Augusto Cunha Couto Estácio
 - Marcelo Luiz da Conceição
- 26. BCSI – São Paulo-SP
 - Benedito Robachini
- 27. Chiptek – São Paulo-SP
 - Eduardo José Nascimento
- 28. Compex – Campinas-SP
 - Anderson Ferreira
 - Sandra Lúcia Santos Bezerra
- 29. Compuhelp – Barueri-SP
 - Marcelo Alberto Lima
- 30. Computeasy – São Paulo-SP
 - Flávio Vestri
- 31. Computec – Piracicaba-SP
 - Marco Antonio Correia
- 32. Compway – São Paulo-SP
 - Marcelo Gomes
- 33. Coopertec – São Paulo-SP
 - Fábio Rogério Alves de Souza
- 34. CPP – São Paulo-SP
 - Ricardo Liang
- 35. DMI – São Paulo-SP
 -

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CPMI - CORREIOS

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COMPAQ

- 36. Duralex – Presidente Prudente-SP
-
- 37. Fênix – Baurú-SP
- José Luís Pereira Reno
- 38. Full Service – São Paulo-SP
- Gersino Flores
- 39. HTS – Baurú-SP
- Osvaldo Haruo Tanaka
- 40. Inconac – São Paulo-SP
- Gilberto Tangelo
- 41. Infortron – Sorocaba-SP
- Ricardo Rodrigo Cornejo Lopes
- 42. Litech – Limeira-SP
- Edson Garcia
- 43. MCR/Planus – São Paulo-SP
- Roberto Soaglione
- 44. MF Informática –Baurú-SP
- Moacir Elias Paiva
- 45. Micro Assist – São José dos Campos-SP
- Paulo Roberto Cabral
- 46. Microsave – São Paulo-SP
- Antonio Romualdo Morales Filho
- 47. Microsul –São Paulo-SP
- Helves Albuquerque
- Edmilson Slamino Egea
- 48. Microsys – São Paulo-SP
- Júlio César Martinez Cueto

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POS nº 03/2005 - CN
CPMI - CORREIOS

Fls: 511

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COMPAQ

- 49. MS –São Paulo-SP
 - Wilson Roberto Correia
- 50. Optec – São Paulo-SP
 - Marcos Aurélio Lucas Santos
- 51. Precisão – São José do Rio Preto-SP
 - Sandra Cristina Turatti
- 52. Proservices – Ribeirão Preto-SP
 - Denis Aparecido Silva Salzedas
 - Roberto de Tarso Faccione
- 53. Prosun – Marília-SP
 - Carlos Nakamura
- 54. Pulsar – São Bernardo do Campo-SP
 - Anderson Garcia Couto
- 55. Qualifix – São Caetano do Sul-SP
 - Edson Lamin
- 56. Scopus – São Paulo-SP
 - Paulo José Carignani
- 57. Sensus – Campinas-SP
 - Júlio Salvato Dias
- 58. Sibra – Campinas-SP
 - Carlos Pupin
- 59. Tech-Tron – São Paulo-SP
 - Rubens Luís Z. Fonseca
- 60. Tecnocomp – São Bernardo do Campo-SP
 - Sidney Molina
- 61. Thema Trade – São Paulo-SP
 - Carlos Alberto Stocco

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RQS nº 03/2000
CPMI - CORREIOS
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Doc: 36 52



COMPAQ

62. Assistécnica – Rio Branco-AC
- Mariano Pereira Marques
63. Cia de Informática – Macapá-AP
-
64. Quality – Manaus-AM
-
65. Micro Mania – Belém-PA
- Paulo Edson Moraes
66. Newsupri – Maceió-AL
- Ivana Muniz
67. Compos – Salvador-BA
- Katuchi Iseki
68. Prontec – Salvador-BA
- Joselito da Paz Souza
69. Quattro – Salvador-BA
- Everaldo Pamphilo dos Santos Filho
70. RW – Fortaleza-CE
- Francisco José Caetano de Sousa
71. Temática – São Luiz-MA
- Raimundo Luís Camargo de Araújo
72. Equipe – João Pessoa-PB
- Suênia do Nascimento Patrício
73. Newsupri – Recife-PE
- Ivana Muniz
74. Norbit – Recife-PE
- João Novo
75. Microserv – Terezina-PI
- Ricardo José Ferry Sampaio

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RQS nº 03/2005 - CN
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36 52
Doc:



COMPAQ

- 76. Hot Line – Natal-RN
 - Andrin Calquist
- 77. Chip & Cia. – Aracajú-SE
 - Marcos Rabelo
 - Ana Rosa
- 78. NT Service – Brasília-DF
 - João Ricardo
- 79. Hepcom – Goiânia-GO
 - Nara Regina Silveira do Canto
- 80. AGC – Cuiabá-MT
 - André Alves Vicente
- 81. AZ Informática – Campo Grande-MS
 - Marlon Ferreira Gonçalves
- 82. Águia – Maringá-PR
 - Marcos Paixão
- 83. Sernews – Curitiba-PR
 - Mauro Antonio Silveira
- 84. Tals – Ponta Grossa-PR
 - Nelza Mello
- 85. Teletex – Curitiba-PR
 - Luís Carlos Almeida Toporovcz
- 86. Ária – Caxias do Sul-RS
 - Arli Silveira de Oliveira
- 87. Compumídia – Porto Alegre-RS
 - Roberto dos Santos
- 88. CS – Santa Maria-RS
 - Maristela Savian
 - João Alberto Palma

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RGS nº 03/2005 - CA
40 - CORREIOS
FIS: 514
36 52
Doc:



COMPAQ

89. NIT – Novo Hamburgo-RS
- Wilson Westhelli

90. Pavão – Rio Grande-RS
- Rodrigo Pavão Przybylski

91. Processor – Porto Alegre-RS
- Ana Rochann

92. Scherer – Porto Alegre-RS
- Marcelo Cordeiro Kunarzewski

94. Digi Service -Criciúma-SC
- Hélio Sommacal

93. Lógica – Blumenau-SC
- Sandro Augusto Reiter

94. Power House – Florianópolis-SC
- Marcos Oliveira Júnior

95. Sercomp – Joinville-SC
-

96. VJM – São José-SC
-

97. Infolab – Vitória-ES
- Elilson Elias Martins

98. Qualifix – Belo Horizonte-MG
- Leonardo Bernard

99. Qualifix – Rio de Janeiro-RJ
- Leonardo Bernard

100. Qualifix – Campinas-SP
- Leonardo Bernard

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CPMI - CORREIOS
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36 52
Doc:



COMPAQ

- 101. Qualifix – São Caetano do Sul-SP
 - Leonard Bernard
- 102. Servtécnica - São Paulo-SP
 - Antonio Manuel Dias Coelho
 - Wagner Ruva de Oliveira
- 103. Qualifix – Brasília-DF
 - Leornado Bernard
- 104. Qualifix – Goiânia-GO
 - Leonard Bernard
- 105. Qualifix – Cuiabá-MT
 - Leonard Bernard
- 106. Qualifix – Maceió-AL
 - Leonard Bernard
- 107. Qualifix – Salvador-BA
 - Leonardo Bernard
 - Paulo César Gonçalves Delgado
- 108. Qualifix – Recife-PE
 - Leonardo Bernard

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RQS nº 03/2005 - CP
CPMI - CORREIOS
Fls: 516
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Doc:



COMPAQ

INFORMAÇÕES ADICIONAIS

- a) **Do prazo de entrega:** Conforme Pauta de Distribuição, nos termos do Anexo III do Edital;
- b) **Das quantidades:** Conforme Pauta de Distribuição, nos termos do Anexo III do Edital;
- c) **Do local de entrega:** Nos almoxarifados das Diretorias Regionais, constantes das páginas 1 e 2 do Anexo IV e os locais de instalação são os locais de Entrega Interna, constante das páginas 3 e 4 do Anexo IV.
- d) **Declaramos expressamente que concordamos com todas as exigências do Edital.**

DADOS CADASTRAIS

Razão Social: **Compaq Computer Brasil Indústria e Comércio Ltda.**

Endereço: Rua Alexandre Dumas, 2220, térreo, 11º. E 12º. Andares,
São Paulo, SP.

CEP: 04.717-004

Telefone: (011) 5188-4759

Fax: (011) 5188-4749

E-mail: jmanuel.sanches@grupont.com.br

WEB www.compaq.com.br

CNPJ/MF: 67.612.937/0001-99

Banco: Banco Itaú S/A, agência nº. 0912, conta-corrente nº, 03802-3

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PROS nº 00/2002

CPMI - CORRETOS

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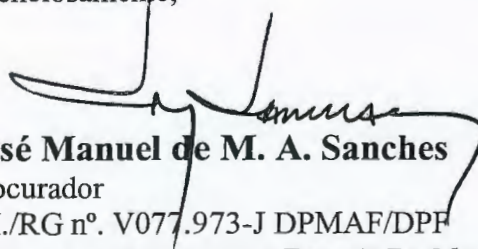
DADOS DOS RESPONSÁVEIS

Responsável/Contrato: **Emílio Kaoru Umeoka**
Cargo: Diretor-Presidente
CPF/MF.: 108.606.358-99
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WEB: www.compaq.com.br
Tel.: (061) 248-1434
Fax: (061) 248-5801

Brasília (DF), 09 de maio de 2000.

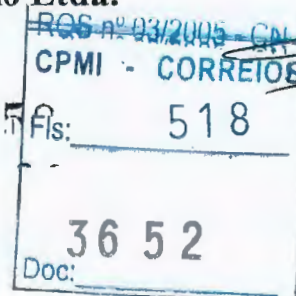
Atenciosamente,


José Manuel de M. A. Sanches

Procurador

C.I./RG nº. V077.973-J DPMF/DPF

Compaq Computer Brasil Indústria e Comércio Ltda.





Proposta Técnica

Rede de Serviços Autorizado Compaq

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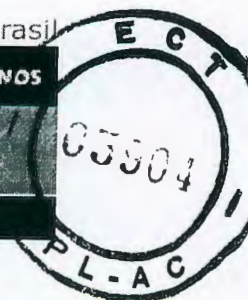
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Brasil

prestadores de serviço autorizado**Região CENTRO-OESTE**

P Empresa credenciada como CompaqCare Partner, prestadora de serviços que atende às necessidades de empresas de pequeno e médio porte.

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CEP: 71200-045 - Guara - Brasília - DF
Tel.: (061) 361-1027 Fax: (061) 361-9513
E-Mail: crs@tba.com.br

NT SERVICES

SCS Qd - 7 / Exec.Tower Sls.1213/1219
CEP: 70300-911 - Asa Sul - Brasília - DF
Tel.: (061) 321-0522 Fax: (061) 321-9764
E-Mail: ntservices@grupont.com.br

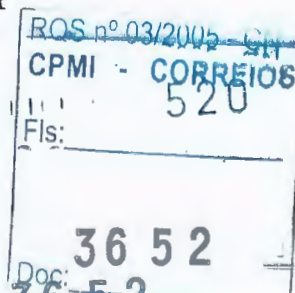
» GOIÁS**HEPCOM**

Al. Ricardo Paranhos, 208
CEP: 74175-020 - Setor Marista - Goiânia - GO
Tel.: (062) 281-2621 Fax: (062) 281-2621
E-Mail: hepcom@zaz.com.br

» MATO GROSSO

http://www.compaq.com.br/local/suporte/PS_centro.html

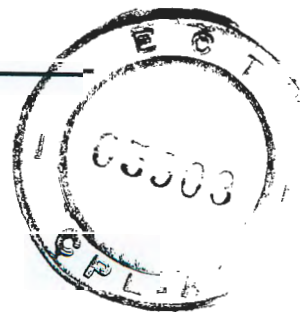
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 E-Mail: azi@azi.com.br

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http://www.compaq.com.br/local/suporte/PS_centro.html

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» BAHIA**COMPOS **

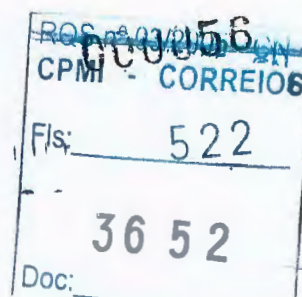
Av. Tancredo Neves, 999 - Lj.2
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36 52

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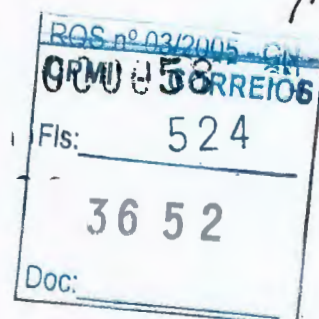
NEWSUPRI

R. Renato Santos Teixeira, 108
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E-Mail: ivana@newsupri.com.br



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PARÁ****» ACRE****ASSISTÉCNICA**

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E-Mail: webmaster@assistecnica.com.br

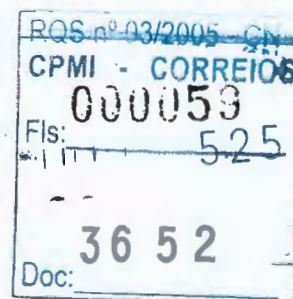
» AMAPÁ**CIA DE INFORMÁTICA**

Al. Francisco Serrano, 36
CEP: 68900-100 - Centro - Macapá - AP
Tel.: (096) 212-4221 Fax: (096) 223-7960
E-Mail: ciainfo@zaz.com.br

» AMAZONAS**QUALITY**

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E-Mail: quality@internext.com.br

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PARÁ

MICRO MANIA

Trav. 3 de Maio, 2000

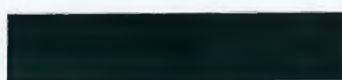
CEP: 66063-390 - Cremação - Belém - PA

Tel.: (091) 249-2500 Fax: (091) 249-2500

E-Mail: tec@mmania.com.br

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Tel.: (027) 200-3111 Fax: (027) 200-3111
E-Mail: infolab@infolab.com.br

> MINAS GERAIS**BMS**

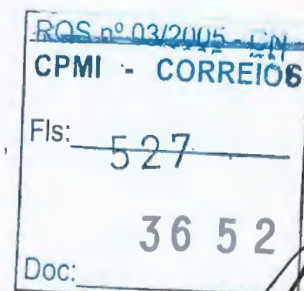
Av. 31 de Março, 840
CEP: 30575-000 - Dom Cabral - Belo Horizonte - MG
Tel.: (031) 375-9006 Fax: (031) 375-8863
E-Mail: marcion@bms.com.br

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E-Mail: compex@compex.com.br

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Tel.: (031) 427-2277 / 2262 Fax: (031) 427-2425
E-Mail: suhora@decmaster.com.br



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E-Mail: heleno@io.inf.br

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E-Mail: its@gatnet.com.br

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E-Mail: rajao@microcity.com.br

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Tel.: (031) 287-2988 Fax: (031) 227-9135
E-Mail: supervisores@procedata.com.br

SINCO

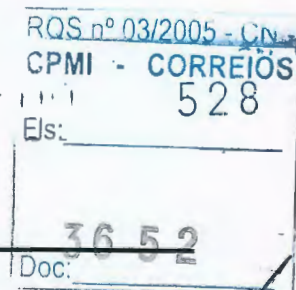
Pça.Sta. Terezinha, 162/164
CEP: 38065-130 - Fabrício - Uberaba - MG
Tel.: (034) 312-7524 Fax: (034) 312-3383
E-Mail: sinco@sinco.inf.br

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E-Mail: vipcom@vipservice.com.br

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E-Mail: chintekri@chintek.com.br



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dbsup@domain.com.br

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CEP: 22280-100 - Botafogo - Rio de Janeiro - RJ
Tel.: (021) 546-3797 Fax: (021) 541-8745
E-Mail: jbento@medidata.com.br

NTL

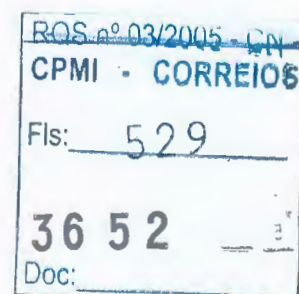
R. Viscondi de Inhaúma, 38 - 7º Andar
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**• SÃO PAULO****AGNUS**

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CHIPTEK

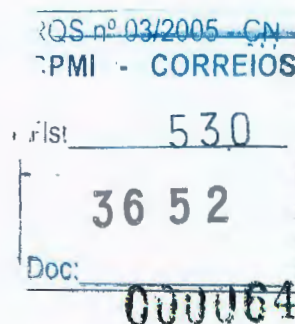
Av. Miguel Estéfano, 740
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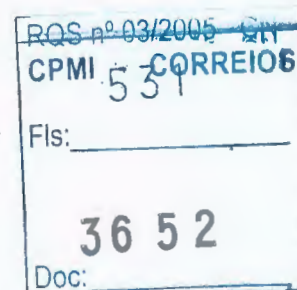
R. Regino Aragão, 201
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MICROSYS

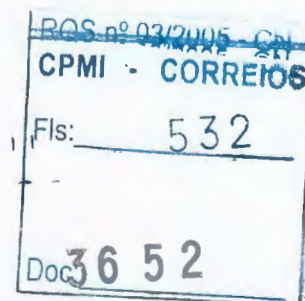
R.Dr. Zuquim, 1720 - Cj.41
CEP: 02035-022 - Santana - São Paulo - SP
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E-Mail: microsys@microsys.com.br

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E-Mail: grupo@imares.com.br

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Tel.: (011) 3277-5105 Fax: (011) 3277-5105
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Tel.: (011) 3904-9811 / 5199 Fax: (011) 3904-3594
E-Mail: comercial@scopus.com.br

SENSUS

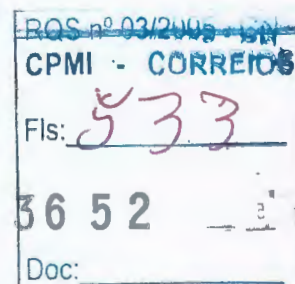
Av. Moraes Sales, 2098
CEP: 13010-110 - Nova Campinas - Campinas - SP
Tel.: (019) 252-0166 Fax: (019) 252-0166
E-Mail: sorocamp@sorocamp.com.br

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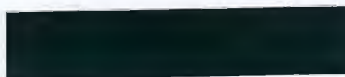
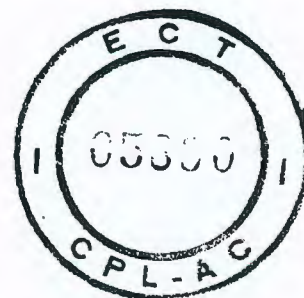
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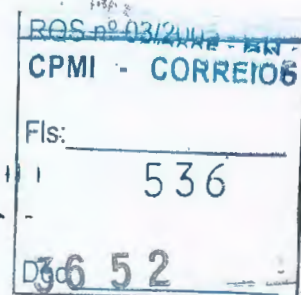
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SERCOMPE

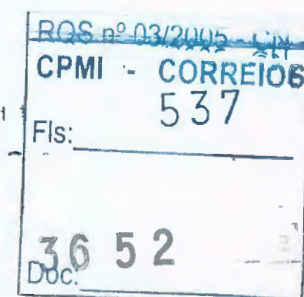
R. Presidente Prudente de Moraes, 80
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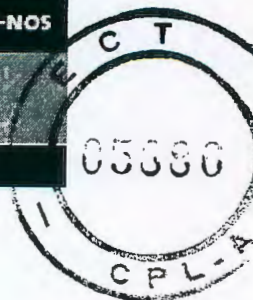
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E-Mail: alex@qualifix.com.br

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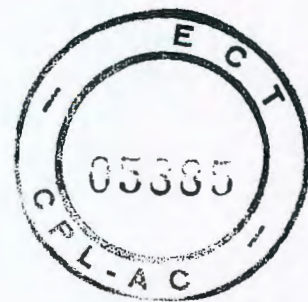
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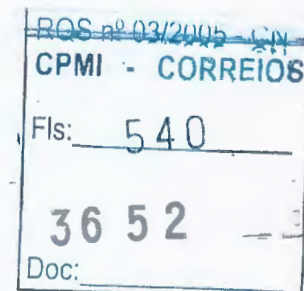
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R. Francisco Catharino Pithon, 41 - Lj.04
CEP: 41940-340 - Rio Vermelho - Salvador - BA
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E-Mail: supssa@qualifix.com.br

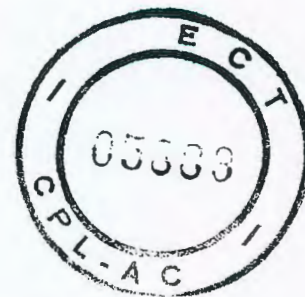
✧ **CEARÁ****RW**

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CEP: 60150-163 - Papicu - Fortaleza - CE
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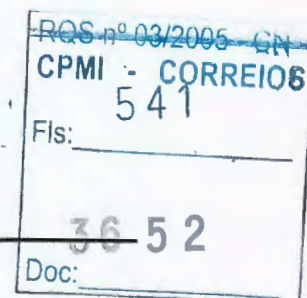
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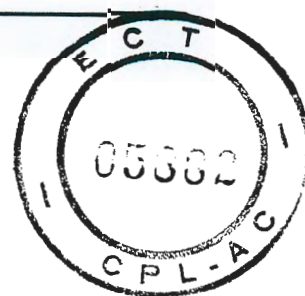
• **GRANDE DO NORTE**



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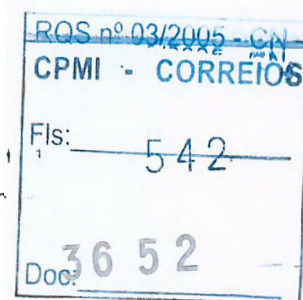
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R. Romualdo Galvão, 956
CEP: 59056-100 - Tirol - Natal - RN
Tel.: (084) 211-5359 Fax: (084) 211-5359
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E-Mail: diretoria@chipcia.com.br

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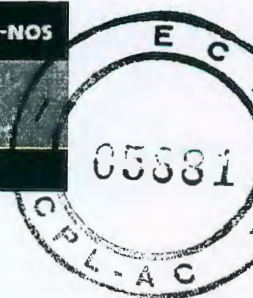
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R. Borba, 1111

CEP: 69065-030 - Cachoeirinha - Manaus - AM

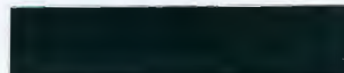
Tel.: (092) 663-2603 Fax: (092) 663-2603

E-Mail: quality@internext.com.br**» PARÁ****MICRO MANIA**

Travessa 3 de Maio, 2000

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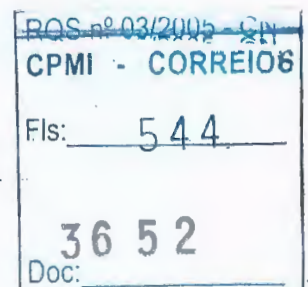
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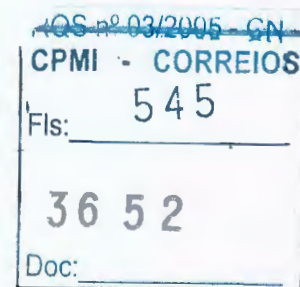
R. Teodoro da Silva, 287
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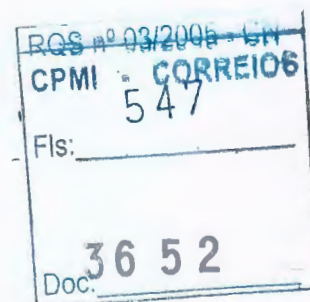
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E-Mail: qualifix@zaz.com.br

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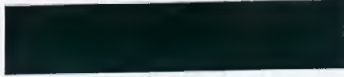
R. Heloisa Pamplona, 785
CEP: 09520-320 - Fundação - S. Caetano do Sul - SP
Tel.: (011) 4225-9137 Fax: (011) 4225-9023
E-Mail: alberto@qualifix.com.br

SERVTECNICA

Av. Nova Cantareira, 1438
CEP: 02330-001 - Tucuruvi - São Paulo - SP
Tel.: (011) 6953-7370 Fax: (011) 6953-7370
E-Mail: servtec@uol.com.br



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Informações e avisos legais

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CPMI - CORREIOS	
Fls:	548
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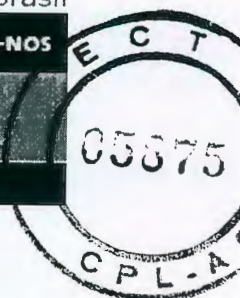
COMPAQCOMPRA
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PRODUTOS

SERVIÇO
TÉCNICO

CONTATE-NOS

Brasil

centros de serviço autorizado

*Centro de Serviço Autorizado Compaq
Região Sul*

PARANÁ**SANTA CATARINA****RIO GRANDE DO SUL****• PARANÁ****ÁGUIA**

Av. Cerro Azul, 924 - 1º Andar
CEP: 87010-000 - Zona 2 - Maringá - PR
Tel.: (044) 226-5633 Fax: (044) 226-5633
E-Mail: aguia@wnet.com.br

COMPUFIX

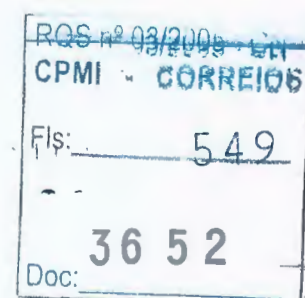
Av. Agostinho Leão Junior, 157
CEP: 80030-110 - Alto da Glória - Curitiba - PR
Tel.: (041) 362-3120 Fax: (041) 362-3120
E-Mail: sebastiao@compufix.bsi.com.br

QUALIFIX

R. Dom Pedro I, 968 - Lj.01
CEP: 80620-130 - Água Verde - Curitiba - PR
Tel.: (041) 342-3242 / 244-2233 Fax: (041) 342-3242 / 243-0988
E-Mail: supcwb@qualifix.com.br

TALS

R. Adjamiro Cardon, 387
CEP: 84015-580 - Jardim Carvalho - Ponta Grossa - PR
Tel.: (042) 225-2310 Fax: (042) 225-2310
E-Mail: marcior@tals.com.br

**• RIO GRANDE DO SUL****ÁRIA**

Av. Rio Branco, 840 - Sl.702
CEP: 95010-060 - Rio Branco - Caxias do Sul - RS
Tel.: (054) 226-3033 Fax: (054) 226-3326
E-Mail: aria@zaz.com.br

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CS

R. Duque de Caxias, 1921
CEP: 97015-190 - Centro - Santa Maria - RS
Tel.: (055) 222-7330 Fax: (055) 222-7330
E-Mail: cs@infoway.com.br

NIT

Av. 7 de Setembro, 1097
CEP: 93332-470 - Liberdade - Novo Hamburgo - RS
Tel.: (051) 587-8222 Fax: (051) 587-8222
E-Mail: wilson@nit10.com.br

PAVÃO

Av. Rheingantz, 6
CEP: 96202-110 - Centro - Rio Grande - RS
Tel.: (053) 231-3300 Fax: (053) 231-3300
E-Mail: pavao@vetorialnet.com.br

QUALIFIX

Av. Carlos Barbosa, 1231
CEP: 90880-001 - Teresópolis - Porto Alegre - RS
Tel.: (051) 219-9000 / 1777 Fax: (051) 219-1984
E-Mail: suppoa@qualifix.com.br

SCHERER

Trav. do Carmo, 72
CEP: 90050-210 - Cidade Baixa - Porto Alegre - RS
Tel.: (051) 228-8501 Fax: (051) 221-7919
E-Mail: pckless@schererinformatica.com.br

» SANTA CATARINA**DIGI SERVICE**

R. Santa Catarina, 59
CEP: 88802-260 - Centro - Criciúma - SC
Tel.: (048) 437-2245 Fax: (048) 437-2245
E-Mail: dservice@cri.matrix.com.br

LÓGICA

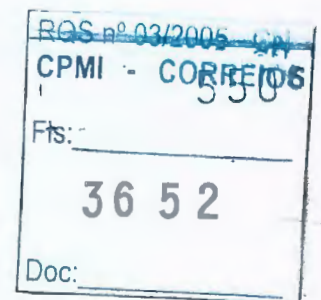
R. Joinville, 945
CEP: 89035-200 - Vila Nova - Blumenau - SC
Tel.: (047) 323-7700 Fax: (047) 323-7700
E-Mail: logica@zaz.com.br

POWER HOUSE

R. Jerônimo Coelho, 185 - SI.801
CEP: 88010-030 - Centro - Florianópolis - SC
Tel.: (048) 223-5668 Fax: (048) 223-5668
E-Mail: pmenezes@powerhouse.com.br

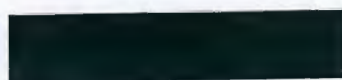
SERCOMPE

R. Presidente Prudente de Moraes, 80
CEP: 80218-000 - Santa Antônio - Joinville - SC



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CEP: 89218-000 - Santo Antônio - Joinville - SC
Tel.: (047) 433-0911 Fax: (047) 433-8615
E-Mail: sercompe@sercompe.com.br



informações e avisos legais

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Fls:	551
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PROPOSTA TÉCNICA

Especificação do INT1 e INT2

ProLiant ML370

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servidores e opcionais

o família ProLiant



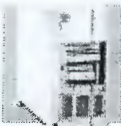
LINHA
DL

O nova linha DL, tamanho otimizado para ambientes em rack.

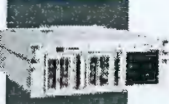
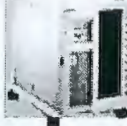
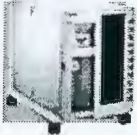
➤ [Mais Informações](#)



Série 300

DL380  ProLiant 1800R*	ML370  ProLiant 1600*
ML350  ProLiant 800* Prosignia 740*	ML330  ProLiant 400 Prosignia 720

Série 500

DL580  ProLiant 6400R	ML570  ProLiant 5500
ML530  ProLiant 3000*	

Série 700

DL750  ProLiant 8500	ML750  ProLiant 8000
--	--

LINHA
ML

O nova linha ML, máxima expansão interna de sistemas.

➤ [Mais Informações](#)

*Esta transição será efetuada em fevereiro de 2000.
A transição do restante da família ocorrerá ao longo do ano 2000.

[Informações e avisos legais](#)

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RQS nº 03/2000 - CPMI - CORREIOS

Fls: 553

36 52

Doc:

United States April 27, 2000

COMPAQ

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ProLiant servers

ProLiant ML370

Next-Generation ProLiant 1600 & ProLiant 1600R

The ProLiant Advantage

- Enhanced reliability features ideally suited for remote and branch office requirements
- Modular Chassis optimized for ease of access and serviceability
- Optimized for remote management; fully integrated with optional Remote Insight
- Designed for maximum flexibility to support dynamic business environments
- Available in rack and tower models



CONFIGURE & BUY

New ProLiant ML Line:
maximum for internal
system expansion

general information

- product description
- question and answer
- request purchase information
- printed documentation

technical information

- QuickSpecs
- cable guide

downloadables - pdf

- product bulletins
- Adobe Acrobat - pdf reader

media information

- ProLiant ML370 6/866 -New!
- ProLiant ML370 6/800 -New!
- ProLiant ML370 6/733
- ProLiant ML370 6/667
- ProLiant ML370 6/600
- ProLiant 1600 6/600
- ProLiant 1600R 6/600

technical links

- array diagnostic utility
- ActiveAnswers
- active update
- benchmarks
- Compaq services
- disk drive-specific information
- enterprise solutions
- insight manager
- info messenger
- key contacts
- Linux
- os certifications
- os support matrix
- retired products
- software downloads
- SmartStart
- support information
- u.s. warranty
- buy direct
- white papers

Product Description

Features Benefits Compaq Advantage Specifications

QuickSpecs

Overview Std. Features Options Memory Storage TechSpecs

Product Support

Find documentation, the latest downloadables, and online support.

Manageability

Build a virtual presence in your data center.

CarePac Services

Extend the warranty coverage on your ProLiant server.

The Smart Array Advantage

Controllers for ProLiant systems - easy to upgrade - low cost of ownership - investment protection.

1.800.345.1518

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RQS nº 03/2005 - CN
CPMI - CORREIO6
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Doc:

privacy and legal statement



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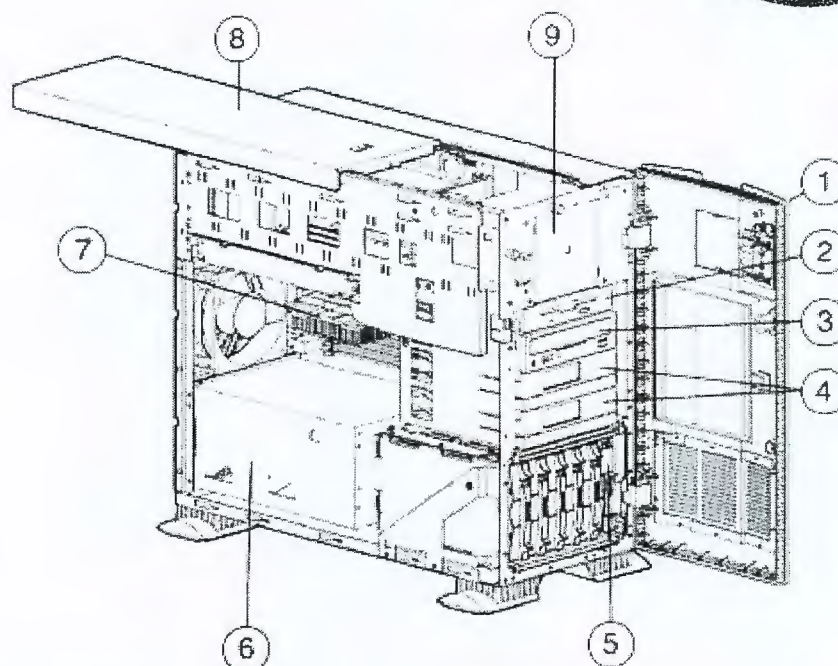
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- › [Overview](#)
- › [Standard Features](#)
- › [Options](#)
- › [Memory](#)
- › [Storage](#)
- › [TechSpecs](#)

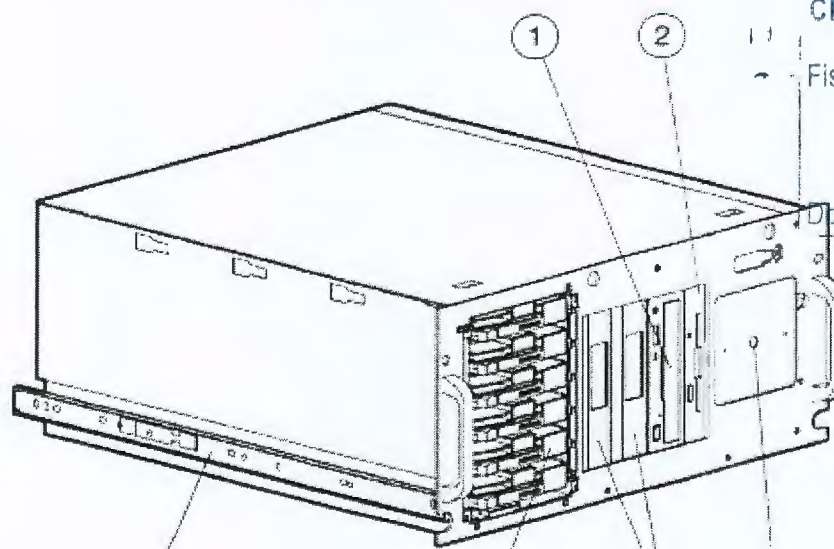
QuickSpecs

Compaq ProLiant ML370



Tower Model

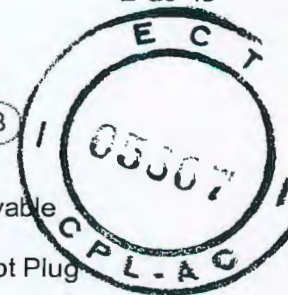
- | | |
|---|--|
| 1. Front Bezel | 6. Power Supply |
| 2. 1.44-MB Diskette Drive | 7. Processor |
| 3. High Speed IDE CD-ROM Drive | 8. Small access panel |
| 4. Two available Removable Media Bays | 9. Optional Integrated Management Display (IMD) slot |
| 5. Wide Ultra2/Ultra3 Hot Plug Hard Drive Cage (6 x 1") | |



ROS nº 03/2005 - CN
CPMI - CORREIO
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3

Rack Model

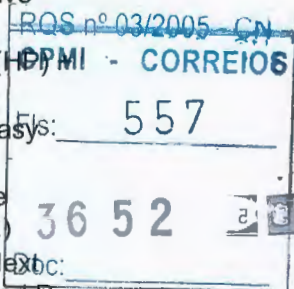
- | | |
|--|--|
| 1. High Speed IDE CD-ROM Drive | 4. Two available Removable Media Bays |
| 2. 1.44-MB Diskette Drive | 5. Wide Ultra2/Ultra3 Hot Plug Drive Cage (6 x 1") |
| 3. Optional Integrated Management Display (IMD) slot | 6. Side Rails |

What's New

- Intel Pentium® III 600-MHz, 800-MHz or 866-MHz Processor (dual capability)

At A Glance

- The ultimate workgroup server designed for demanding workgroups and remote/branch sites that need a powerful and highly available platform that is easy to use
- Dual Peer PCI Architecture
- RCC LE 3.0 Chipset with 133-MHz Front Side Bus
- Intel Pentium III 600-MHz, 667-MHz, 733-MHz, 800-MHz or 866-MHz processors
- 256-KB second level ECC cache standard (full speed)
- 128-MB PC133MHz Registered ECC SDRAM memory expandable to 4 GB
- Six expansion PCI slots: Four 64-bit and two 32-bit
- Compaq NC3163 Fast Ethernet NIC (embedded) 10/100 WOL (Wake On Lan)
- Integrated Dual Channel Wide Ultra2 SCSI Adapter
- Wide Ultra2/Ultra3 Drive Cage standard
- Support for up to six 1-inch Wide Ultra2/Ultra3 SCSI hot plug drives
- 109.2-GB maximum internal storage (internal hot plug drive cage only)
- Internal mass storage capacity up to 182GB (6x18.2GB (HDP) 2x36.4GB (NHP))
- Single thumb screw system board removal for fast and easy servicing
- Compaq Insight Manager, SmartStart, Integrated Remote Console (IRC) and Automatic Server Recovery-2 (ASR-2)
- Protected by Compaq Services, including a three-year, Next Business Day on-site limited Global warranty and extended Pre-Failure Warranty which covers processors, memory and disk drives — Certain restrictions and exclusions apply. Consult the Compaq Customer Support Center at 1-800-345-1518 for details.

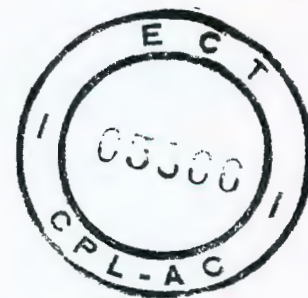


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- [Overview](#)
- [Standard Features](#)
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- [Memory](#)
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- [TechSpecs](#)

Standard Features



Models

Compaq ProLiant ML370

Available in multiple configurations.

Processor – One of the following:

Intel Pentium III processor 866 MHz
 Intel Pentium III processor 800 MHz
 Intel Pentium III processor 733 MHz
 Intel Pentium III processor 667 MHz
 Intel Pentium III processor 600 MHz

Cache Memory

256-KB second level ECC cache (full speed)

Upgradability

Upgradable to dual processing

Memory

Standard	128 MB (PC133-MHz Registered ECC SDRAM DIMM memory)
Maximum	4 GB

Network Controller

Compaq NC3163 Fast Ethernet NIC (embedded) 10/100 WOL (Wake On LAN)

Expansion Slots

I/O (Total)	6
64-bit PCI	4
32-bit PCI	2

Storage Controller

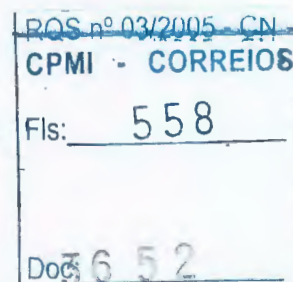
Integrated Dual Channel Wide Ultra2 SCSI Adapter (upgradable with optional Integrated Smart Array Controller)

Storage

Diskette Drive	1.44 MB
CD-ROM	High Speed IDE CD-ROM Drive
Hard Drives	None
Maximum Internal Storage	109.2 GB (internal hot plug drive cage only)

Interfaces

Parallel	1
Serial	2
Pointing Device (Mouse)	1
Graphics	1
Hot Plug Keyboard	1
External SCSI (for tape only)	1
Network R L45	1



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NETWORK TO

Graphics

Integrated ATI Rage IIC Video Controller with 4MB Video Memory

Form Factor

Tower or Rack

Compaq Software

Compaq Insight Manager

The comprehensive system management tool that monitors the operation of Compaq servers, workstations and clients

Compaq SmartStart

The server configuration and software integration tool from Compaq

Array Configuration Utility (ACU) with Smart Array Controllers

Same easy to use yet powerful graphical user Interface (GUI) configuration utility and easy to navigate wizards for all Smart Array Controllers

Manageability

Compaq Insight Manager

Compaq Remote Insight Board (PCI) (optional)

Compaq Remote Lights-Out Edition (optional)

Automatic Server Recovery-2 (ASR-2)

Integrated Remote Console (IRC)

Hardware Remote Console

Full Remote Server Reboot Capability

Reset and Failure Sequence Replay

Host Hardware Independent

Operating System Independent

Communication is out-of-band

Integrated Management Display (IMD) (Optional)

Integrated Management Log

Server Health Logging

Revision History Table

Automatic Revision Tracking

Drive Parameter Tracking (with Smart Array controller)

Dynamic Sector Repairing (with Smart Array controller)

Recovery Server Option (optional)

Off-Line Backup Processor capability

Pre-Failure Warranty (covers processors, hard drives and memory)

Security

Power-on password

Keyboard password

Diskette drive control

Diskette boot control

QuickLock, Network Server Mode

Parallel and serial interface control

Administrator's password

Disk configuration lock

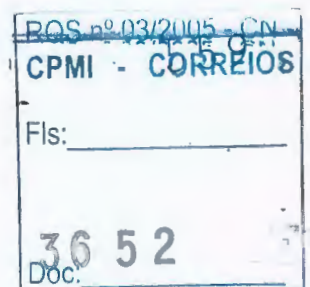
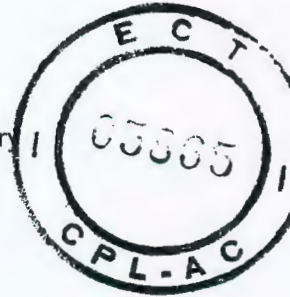
Power Supply

325 Watt-CE Mark Compliant

Optional Hot Plug Redundant Power Supply Capability

Required Cabling

For required cabling information, refer to the Compaq website at



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<http://www.compaq.com/products/servers/proliantML370>.

Note: This web site available in English only.

OS Support

Microsoft Windows NT
Microsoft Windows 2000
Novell NetWare
SCO UnixWare and OpenServer
IBM OS/2 Warp Family
Sun Solaris Intel Platform Edition
Banyan VINES
Linux RedHat (future support)



Service and Support

Compaq Services provides a three-year, limited warranty, including Pre-Failure Warranty (coverage of hard drives, memory and processors) fully supported by a worldwide network of resellers and service providers and lifetime toll-free 7 x 24 hardware technical phone support. In addition, available service offerings include:

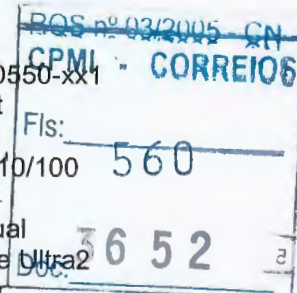
A full range of CarePac packaged hardware and software services:

- Installation and start up
- Extended coverage hours and enhanced response times
- System management and performance services
- Availability and recovery services

Note: Certain restrictions and exclusions apply. Consult the Compaq Customer Support Center at 1-800-345-1518 for details.

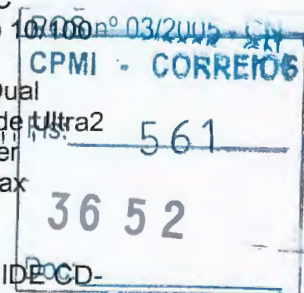
Models

ML370T01 P866-256K		161060-xx1	
Processor(s)	Intel Pentium III processor 866 MHz	Network Controller	NC3163 Fast Ethernet NIC (embedded) 10/100 WOL
Cache Memory	256-KB second level ECC cache	Storage Controller	Integrated Dual Channel Wide Ultra2 SCSI Adapter 109.2 GB max
Memory	PC133-MHz Registered ECC SDRAM DIMM	Internal Storage	
Standard	128 MB	Optical Drive	High Speed IDE CD-ROM Drive
Maximum	4 GB	Form Factor	Tower
ML370T01 P800-256K		160550-xx1	
Processor(s)	Intel Pentium III processor 800 MHz	Network Controller	NC3163 Fast Ethernet NIC (embedded) 10/100 WOL
Cache Memory	256-KB second level ECC cache	Storage Controller	Integrated Dual Channel Wide Ultra2 SCSI Adapter 109.2 GB max
Memory	PC133-MHz Registered ECC SDRAM DIMM	Internal Storage	
Standard	128 MB	Optical Drive	High Speed IDE CD-ROM Drive
Maximum	4 GB	Form Factor	Tower
ML370T01 P733-256K		157831-xx1	
Processor(s)	Intel Pentium III	Network	NC3163 Fast

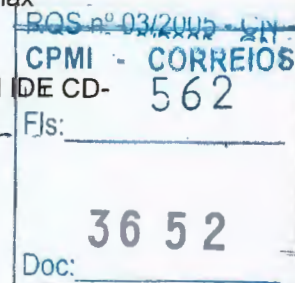


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Processor(s)	Intel Pentium III processor 733 MHz	Network Controller	NC3163 Fast Ethernet NIC (embedded) 10/100 WOL
Cache Memory	256-KB second level ECC cache	Storage Controller	Integrated Dual Channel Wide Ultra2 SCSI Adapter 109.2 GB max
Memory	PC133-MHz Registered ECC SDRAM DIMM	Internal Storage	
Standard	128 MB	Optical Drive	High Speed IDE CD-ROM Drive
Maximum	4 GB	Form Factor	Tower
ML370T01 P667-256K			
Processor(s)	Intel Pentium III processor 667 MHz	Network Controller	NC3163 Fast Ethernet NIC (embedded) 10/100 WOL
Cache Memory	256-KB second level ECC cache	Storage Controller	Integrated Dual Channel Wide Ultra2 SCSI Adapter 109.2 GB max
Memory	PC133-MHz Registered ECC SDRAM DIMM	Internal Storage	
Standard	128 MB	Optical Drive	High Speed IDE CD-ROM Drive
Maximum	4 GB	Form Factor	Tower
ML370T01 P600-256K			
Processor(s)	Intel Pentium III processor 600 MHz	Network Controller	NC3163 Fast Ethernet NIC (embedded) 10/100 WOL
Cache Memory	256-KB second level ECC cache	Storage Controller	Integrated Dual Channel Wide Ultra2 SCSI Adapter 109.2 GB max
Memory	PC133-MHz Registered ECC SDRAM DIMM	Internal Storage	
Standard	128 MB	Optical Drive	High Speed IDE CD-ROM Drive
Maximum	4 GB	Form Factor	Tower
ML370R01 P866-256K			
Processor(s)	Intel Pentium III processor 866 MHz	Network Controller	NC3163 Fast Ethernet NIC (embedded) 10/100 WOL
Cache Memory	256-KB second level ECC cache	Storage Controller	Integrated Dual Channel Wide Ultra2 SCSI Adapter 109.2 GB max
Memory	PC133-MHz Registered ECC SDRAM DIMM	Internal Storage	
Standard	128 MB	Optical Drive	High Speed IDE CD-ROM Drive
Maximum	4 GB	Form Factor	Tower
ML370R01 P800-256K			
Processor(s)	Intel Pentium III processor 800 MHz	Network Controller	NC3163 Fast Ethernet NIC (embedded) 10/100 WOL
Cache Memory	256-KB second level ECC cache	Storage Controller	Integrated Dual Channel Wide Ultra2 SCSI Adapter 109.2 GB max
Memory	PC133-MHz Registered ECC SDRAM DIMM	Internal Storage	
Standard	128 MB	Optical Drive	High Speed IDE CD-ROM Drive
Maximum	4 GB	Form Factor	Rack



Cache Memory	256-KB second level ECC cache	Storage Controller	Integrated Dual Channel Wide Ultra2 SCSI Adapter 109.2 GB max
Memory	PC133-MHz Registered ECC SDRAM DIMM	Internal Storage	
Standard	128 MB	Optical Drive	High Speed IDE CD-ROM Drive
Maximum	4 GB	Form Factor	Rack
ML370R01 P733-256K Processor(s)	Intel Pentium III processor 733 MHz	Network Controller	NC3163 Fast Ethernet NIC (embedded) 10/100 WOL 157830-xx1
Cache Memory	256-KB second level ECC cache	Storage Controller	Integrated Dual Channel Wide Ultra2 SCSI Adapter 109.2 GB max
Memory	PC133-MHz Registered ECC SDRAM DIMM	Internal Storage	
Standard	128 MB	Optical Drive	High Speed IDE CD-ROM Drive
Maximum	4 GB	Form Factor	Rack
ML370R01 P667-256K Processor(s)	Intel Pentium III processor 667 MHz	Network Controller	NC3163 Fast Ethernet NIC (embedded) 10/100 WOL 102119-xx1
Cache Memory	256-KB second level ECC cache	Storage Controller	Integrated Dual Channel Wide Ultra2 SCSI Adapter 109.2 GB max
Memory	PC133-MHz Registered ECC SDRAM DIMM	Internal Storage	
Standard	128 MB	Optical Drive	High Speed IDE CD-ROM Drive
Maximum	4 GB	Form Factor	Rack
ML370R01 P600-256K Processor(s)	Intel Pentium III processor 600 MHz	Network Controller	NC3163 Fast Ethernet NIC (embedded) 10/100 WOL 195294-xx1
Cache Memory	256-KB second level ECC cache	Storage Controller	Integrated Dual Channel Wide Ultra2 SCSI Adapter 109.2 GB max
Memory	PC133-MHz Registered ECC SDRAM DIMM	Internal Storage	
Standard	128 MB	Optical Drive	High Speed IDE CD-ROM Drive
Maximum	4 GB	Form Factor	Rack
Country Code Key			
XX=00	US		
XX=01	Australia		
XX=42	EURO		
XX=03	UK		
XX=04	German (not available for Rack Models – please use EURO part number)		
XX=05	France (not available for Rack Models - please use EURO part number)		
XX=06	Japan		



Sh

AA=29 Japan
XX=37 APD
XX=AA PRC



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Options

Processor

P866 Pentium III 256K Processor Option Kit	161085-B21
P800 Pentium III 256K Processor Option Kit	161084-B21
P733 Pentium III 256K Processor Option Kit	161083-B21
P667 Pentium III 256K Processor Option Kit	159756-B21
P600 Pentium III 256K Processor Option Kit	128292-B21

Memory

1024-MB PC133MHz Registered ECC SDRAM DIMM Memory Option Kit	128280-B21
512-MB PC133MHz Registered ECC SDRAM DIMM Memory Option Kit	128279-B21
256-MB PC133MHz Registered ECC SDRAM DIMM Memory Option Kit	128278-B21
128-MB PC133MHz Registered ECC SDRAM DIMM Memory Option Kit	128277-B21
64-MB PC133MHz Registered ECC SDRAM DIMM Memory Option Kit	128276-B21

Optical Drives

DVD-ROM Drive Option Kit (Opal)	388481-B21
(DVD-ROM Drive Option Kit only supported by Windows NT or Windows 2000 OS.)	

Hard Drives

Wide Ultra2 SCSI -Universal Hot Plug

18.2-GB Wide Ultra2 SCSI 10,000 rpm Drive (1")	128418-B22
18.2-GB Wide Ultra2 SCSI Drive (1")	388144-B22
9.1-GB Wide Ultra2 SCSI 10,000 rpm Drive (1")	328939-B22
9.1-GB Wide Ultra2 SCSI Drive (1")	123065-B22

Wide Ultra2 SCSI -Non-Hot Plug

18.2-GB Wide Ultra2 SCSI Drive (1")	388143-B21
9.1-GB Wide Ultra2 SCSI Drive (1")	349526-B21

Wide Ultra3 SCSI -Universal Hot Plug

18.2-GB Wide Ultra3 SCSI 10,000 rpm Drive (1")	142673-B22
9.1-GB Wide Ultra3 SCSI 10,000 rpm Drive (1")	142671-B22

Wide Ultra3 SCSI -Non-Hot Plug

36.4-GB Wide Ultra3 SCSI 10,000 rpm Drive (1.6")	142676-B21
18.2-GB Wide Ultra3 SCSI 10,000 rpm Drive (1")	142674-B21
9.1-GB Wide Ultra3 SCSI 10,000 rpm Drive (1")	142672-B21

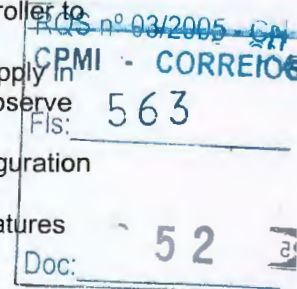
Note: Wide Ultra3 Drives require an optional Wide Ultra3 Controller to support Ultra3 transfer rates.

Note: When using the Compaq Hot Plug Redundant Power Supply in conjunction with 10K-II rpm Drives (9 GB and 18 GB) please observe the following rules:

9-GB and 18GB 10K rpm Hot Plug Hard Drives. In a rack configuration at altitudes above 5000 feet (1,520 meters) the server must be operated in ambient temperatures not exceeding 86°F (30°C).

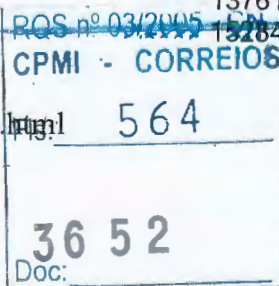
Storage Controllers

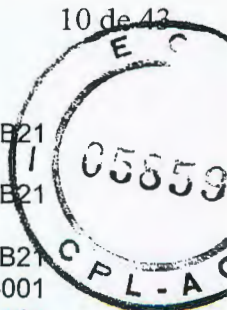
Integrated Smart Array Controller Module	128293-B21
Smart Array 431 Controller	127695-B21
Smart Array 431 Controller (Japan)	127695-291
Smart Array 3200 Controller	295643-B21
Smart Array 3200 Controller (Japan)	295643-291
Smart Array 221 Controller	388099-B21
Smart Array 221 Controller (Japan)	388099-B21





Smart Array 4200 Controller	295636-B21
Smart Array 4200 Controller (Japan)	295636-291
64-Bit Dual Channel Wide Ultra2 SCSI Adapter	348757-B21
64-Bit Dual Channel Wide Ultra2 SCSI Adapter (Japan)	348757-291
64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter	129803-B21
64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter (Japan)	129803-291
64-Bit/66MHz Single Channel Wide Ultra3 SCSI Adapter	154457-B21
64-Bit/66MHz Single Channel Wide Ultra3 SCSI Adapter (Japan)	154457-291
Communications	
Compaq NC3123 Fast Ethernet NIC PCI 10/100 WOL (The ProLiant ML370 Models ship standard with one Compaq NC3163 Fast Ethernet NIC Embedded 10/100 WOL. For redundancy, a second controller is required (174830-B21).)	174830-B21
Compaq NC3122 Fast Ethernet NIC PCI Dual 10/100	317450-B21
Compaq NC3134 Fast Ethernet NIC 64 PCI Dual Port 10/100	138603-B21
Compaq NC3135 Fast Ethernet Module Dual 10/100 Upgrade Module for NC3134	138604-B21
Compaq NC6132 Gigabit Module 1000 SX Upgrade Module for NC3131	338456-B23
Compaq NC6133 Gigabit Module 1000LX Upgrade Module for NC3131	338456-B24
Compaq NC3133 Fast Ethernet Module 100FX Upgrade Module for NC3131 and NC3134	338456-B25
Compaq NC6134 Gigabit NIC 64 PCI 1000SX	174818-B21
Compaq 100 FDDI PCI SAS Fibre-SC Controller	242505-001
Compaq 100 FDDI PCI SAS UTP Controller	242507-001
Compaq 100 FDDI PCI DAS Fibre-SC Controller	242509-001
Compaq 100 FDDI PCI DAS UTP Controller	242511-001
Compaq 100 FDDI PCI SAS Fibre-MIC Controller	287728-001
Compaq NC4621 Token Ring NIC PCI 4/16 WOL	379956-B21
IBM 16/4 Token Ring PCI Special	133749-B21
ServerNet PCI Adapter	309833-B22
4M Cable	309834-B23
30M Cable	309834-B22
Internal Tape Drives	
Internal 20/40-GB DAT DDS-4 Tape Drive	157769-B21
Internal 12/24-GB DAT Drive (Opal)	295513-B22
Internal 12/24-GB DAT Drive (Opal) (Japan)	295513-292
Internal 4/8-GB DAT Drive (Opal)	295353-B22
Internal 4/8-GB DAT Drive (Opal) (Japan)	295353-292
Internal 4/8-GB SLR Drive (Opal)	295480-B22
Internal 4/8-GB SLR Drive (Opal) (Japan)	295480-292
Internal 35/70-GB DLT Drive	242520-B21
Internal 35/70-GB DLT Drive (Japan)	242520-291
Internal 20/40-GB DLT Drive (Opal)	340743-B22
Internal 20/40-GB DLT Drive (Opal) (Japan)	340743-292
Internal AIT 50-GB Tape Drive	157766-B21
Internal AIT 35-GB Tape Drive	388504-B21
12/24-GB DAT DDS-3 8 Cassette autoloader (internal)	103549-B21
20/40-GB DAT DDS-4 8 Cassette Autoloader, Internal	166504-B21
4-GB DDS-2 DAT Cassette	137611-001
DDS-4 Media (10 pack)	132642-001





12/24-GB DDS-3 DAT 8 Cassette Pre-Filled Magazine (7 data cassettes, 1 cleaning cassette)	134117-B21
20/40-GB DAT DDS-4 8 Cassette Magazine with Media	171532-B21
12-GB DDS-3 DAT Cassette (10 pack)	295515-B21
DAT Cleaning Cassette	242781-001
AIT 50-GB Data Cassette (5 pack)	152841-001
AIT 35-GB Data Cassette (5 pack)	402371-B21
AIT Cleaning Cassette	402374-B21
DLT IV Drive Cartridge (single)	295194-B21
DLT IV Drive Cartridge (7 pack)	295192-B21
DLT Cleaning Cartridge	199704-001
Redundant Options	
Compaq NC3123 Fast Ethernet NIC PCI 10/100 WOL	174830-B21

(The ProLiant ML370 Models ship standard with one Compaq NC3163 Fast Ethernet NIC Embedded 10/100 WOL. For redundancy, a second controller is required (174830-B21).)

Compaq Hot Plug Redundant Power Supply Option Kit (US)	480083-001
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(When using the Compaq Hot Plug Redundant Power Supply in conjunction with 10K-II rpm Drives (9 GB and 18 GB) please observe the following rules:
9-GB and 18GB 10K rpm Hot Plug Hard Drives. In a rack configuration at altitudes above 5000 feet (1,520 meters) the server must be operated in ambient temperatures not exceeding 86°F (30°C).)

Compaq Hot Plug Redundant Power Supply Option Kit (no power cords)	480083-B21
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(When using the Compaq Hot Plug Redundant Power Supply in conjunction with 10K-II rpm Drives (9 GB and 18 GB) please observe the following rules:
9-GB and 18GB 10K rpm Hot Plug Hard Drives. In a rack configuration at altitudes above 5000 feet (1,520 meters) the server must be operated in ambient temperatures not exceeding 86°F (30°C).)

Compaq Hot Plug Redundant Power Supply Option Kit (Australia)	480083-011
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(When using the Compaq Hot Plug Redundant Power Supply in conjunction with 10K-II rpm Drives (9 GB and 18 GB) please observe the following rules:
9-GB and 18GB 10K rpm Hot Plug Hard Drives. In a rack configuration at altitudes above 5000 feet (1,520 meters) the server must be operated in ambient temperatures not exceeding 86°F (30°C).)

Compaq Hot Plug Redundant Power Supply Option Kit (EURO)	480083-021
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(When using the Compaq Hot Plug Redundant Power Supply in conjunction with 10K-II rpm Drives (9 GB and 18 GB) please observe the following rules:
9-GB and 18GB 10K rpm Hot Plug Hard Drives. In a rack configuration at altitudes above 5000 feet (1,520 meters) the server must be operated in ambient temperatures not exceeding 86°F (30°C).)

Compaq Hot Plug Redundant Power Supply Option Kit (UK)	480083-031
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(When using the Compaq Hot Plug Redundant Power Supply in conjunction with 10K-II rpm Drives (9 GB and 18 GB) please observe the following rules:

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9-GB and 18GB 10K rpm Hot Plug Hard Drives. In a rack configuration at altitudes above 5000 feet (1,520 meters) the server must be operated in ambient temperatures not exceeding 86°F (30°C.)

Compaq Hot Plug Redundant Power Supply Option Kit (Japan)

(When using the Compaq Hot Plug Redundant Power Supply in conjunction with 10K-II rpm Drives (9 GB and 18 GB) please observe the following rules:

9-GB and 18GB 10K rpm Hot Plug Hard Drives. In a rack configuration at altitudes above 5000 feet (1,520 meters) the server must be operated in ambient temperatures not exceeding 86°F (30°C.)

Compaq Hot Plug Redundant Power Supply (48 volt DC) 158395-B21

Management Options

Integrated Management Display Option (Opal) 127409-B21

Compaq Remote Insight Lights-Out Edition (NA, LA) 157866-001

Compaq Remote Insight Lights-Out Edition (EURO) 157866-021

Compaq Remote Insight Lights-Out Edition (APD, Japan) 157866-371

Compaq Remote Insight (PCI) LAN + NA Modem 294013-002

Compaq Remote Insight Board (PCI) LAN/Serial without modem 294013-B24

Compaq Remote Insight Board (PCI) LAN only 294013-B25

Monitors

TFT8000 Flat Panel (opal, no protective cover) 307906-001

TFT8000 Flat Panel (carbon, no protective cover) 307932-001

TFT8000 Flat Panel (opal, with protective cover) 307931-001

TFT8000 Flat Panel (carbon, with protective cover) 307935-001

TFT8020 18" Flat Panel Monitor (Opal) 326100-001

TFT8020 18" Flat Panel Monitor (Carbon) 159244-001

TFT8020 18" Flat Panel Monitor (Opal, bulked packed 2 monitor heads per box) 173610-001

TFT5010 15" Flat Panel Monitor (Opal) 104741-001

TFT5010 15" Flat Panel Monitor (Carbon) 154486-001

P1610 Color 305708-001

P1100 Color 325606-001

P900 Color 386326-001

P700 Color 380207-001

V1100 Color 386472-001

V700 Color (opal) 325800-001

V500 Color 325900-001

S510 Color 168636-001

S910 Color 138485-001

S710 Color 152991-001

Note: Monitors larger than 17" may be too heavy for use in rack systems.

External Tape Drives

External 20/40-GB DAT DDS-4 Tape Drive 157770-001

External 20/40-GB DAT DDS-4 Tape Drive (Int'l) 157770-B31

External 20/40-GB DAT DDS-4 Tape Drive (Japan) 157770-291

External 35/70-GB DLT Drive 242521-B21

External 35/70-GB DLT Drive (Japan) 242521-291

External 20/40-GB DLT Drive (Opal) 340744-B22

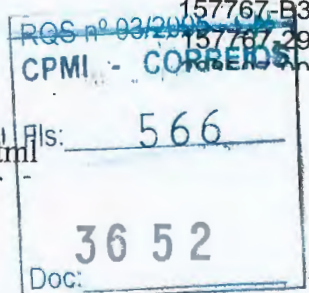
External 20/40-GB DLT Drive (Opal) (Japan) 340744-292

External AIT 50-GB Tape Drive 157767-001

External AIT 50-GB Tape Drive (Int'l) 157767-B31

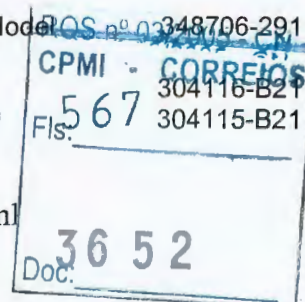
External AIT 50-GB Tape Drive (Japan) 157767-291

External AIT 25-GB Tape Drive 157767-291

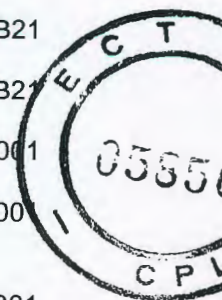




External AIT 35-GB Tape Drive	388507-001
External AIT 35-GB Tape Drive (Int'l)	388507-B31
External AIT 35-GB Tape Drive (Japan)	388507-291
12/24-GB DAT DDS-3 8 Cassette autoloader (external)	110946-001
12/24-GB DAT DDS-3 8 Cassette autoloader (external) (Int'l)	110946-B31
12/24-GB DAT DDS-3 8 Cassette autoloader (external) (Japan)	110946-291
20/40-GB DAT 8 Cassette Autoloader External	166505-001
20/40-GB DAT 8 Cassette Autoloader External (Int'l)	166505-B31
20/40-GB DAT 8 Cassette Autoloader External (Japan)	166505-291
4-GB DDS-2 DAT Cassette	137611-001
DDS-4 Media (10 pack)	152842-001
12/24-GB DDS-3 DAT 8 Cassette Pre-Filled Magazine (7 data cassettes, 1 cleaning cassette)	134117-B21
20/40-GB DAT 8 Cassette Magazine with Media	171532-B21
12-GB DDS-3 DAT Cassette (10 pack)	295515-B21
DAT Cleaning Cassette	242781-001
AIT 50-GB Data Cassette (5 pack)	152841-001
AIT 35-GB Data Cassette (5 pack)	402371-B21
AIT Cleaning Cassette	402374-B21
DLT IV Drive Cartridge (single)	295194-B21
DLT IV Drive Cartridge (7 pack)	295192-B21
DLT Cleaning Cartridge	199704-001
External Storage - Tower	
Compaq StorageWorks Enclosure Model 4214T (tower)	124875-001
(The Compaq StorageWorks Enclosure 4200 Family only supports Wide Ultra2/Ultra3 1" hot pluggable hard drives.)	
Compaq StorageWorks Enclosure Model 4214T (tower) (Int'l)	124875-B31
(The Compaq StorageWorks Enclosure 4200 Family only supports the Wide Ultra2/Ultra3 1" hot pluggable hard drives.)	
Compaq StorageWorks Enclosure Model 4214T (tower) (Japan)	124875-291
(The Compaq StorageWorks Enclosure 4200 Family only supports the Wide Ultra2/Ultra3 1" hot pluggable hard drives.)	
SCSI Storage Expander II	332609-001
SCSI Storage Expander II (Int'l)	332609-002
ProLiant Storage System Tower Model UE	348710-002
ProLiant Storage System Tower Model UE (Int'l)	348710-B31
ProLiant Storage System Tower Model UE (Japan)	348710-291
ProLiant Tower Storage System Model U2	304110-B22
ProLiant Tower Storage System Model U2 (Int'l)	304114-B32
ProLiant Tower Storage System Model U2 (Japan)	304114-292
ProLiant Storage System Model F1 or U1 to Model UE Upgrade Kit	348718-B21
ProLiant Storage System Model F1 or U1 to Model UE Upgrade Kit (Japan)	348718-291
ProLiant Storage System Model F2 or U2 to Model UE Upgrade Kit	348706-B21
ProLiant Storage System Model F2 or U2 to Model UE Upgrade Kit (Japan)	348706-291
Conversion Kit, SB to DB/U	304116-B21
Conversion Kit, DB to SB/U	304115-B21

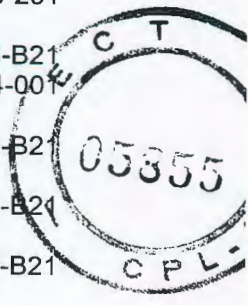


StorageWorks Enclosure 4200 Redundant Power Supply Option	119826-B21
StorageWorks Enclosure 4200 Ultra2 Dual Bus I/O Module Option	119829-B21
StorageWorks Enclosure Tower to Rack Conversion Kit	150213-B21
ProLiant Storage System/U Redundant Power Supply Option	224206-001
ProLiant Storage System /U Redundant Power Supply (Int'l)	224214-001
External Storage - Rack	
Compaq StorageWorks Enclosure Model 4214R (rack-mountable)	103381-001
(The Compaq StorageWorks Enclosure 4200 Family only supports Wide Ultra2/Ultra3 1" hot pluggable hard drives.)	
Compaq StorageWorks Enclosure Model 4214R (rack-mountable) (Int'l)	103381-B31
(The Compaq StorageWorks Enclosure 4200 Family only supports the Wide Ultra2/Ultra3 1" hot pluggable hard drives.)	
Compaq StorageWorks Enclosure Model 4214R (rack-mountable) (Japan)	103381-291
(The Compaq StorageWorks Enclosure 4200 Family only supports the Wide Ultra2/Ultra3 1" hot pluggable hard drives.)	
Compaq StorageWorks Enclosure Model 4254R (rack-mountable)	138151-001
(The Compaq StorageWorks Enclosure 4200 Family only supports Wide Ultra2/Ultra3 1" hot pluggable hard drives.)	
Compaq StorageWorks Enclosure Model 4254R (rack-mountable) (Int'l)	138151-B31
(The Compaq StorageWorks Enclosure 4200 Family only supports the Wide Ultra2/Ultra3 1" hot pluggable hard drives.)	
Compaq StorageWorks Enclosure Model 4254R (rack-mountable) (Japan)	138151-291
(The Compaq StorageWorks Enclosure 4200 Family only supports the Wide Ultra2/Ultra3 1" hot pluggable hard drives.)	
Rack-Mountable SCSI Storage Expander II	332607-001
Rack-Mountable SCSI Storage Expander II (Int'l)	332607-B31
Rack-Mountable ProLiant Storage System Model UE	348700-001
Rack-Mountable ProLiant Storage System Model UE (Int'l)	348700-B31
Rack-Mountable ProLiant Storage System Model UE (Japan)	348700-291
Rack-Mountable ProLiant Storage System Model U2	304100-B22
Rack-Mountable ProLiant Storage System Model U2 (Int'l)	304104-B32
Rack-Mountable ProLiant Storage System Model U2 (Japan)	304104-292
ProLiant Storage System Model F1 or U1 to Model UE Upgrade Kit	348718-B21
ProLiant Storage System Model F1 or U1 to Model UE Upgrade Kit (Japan)	348718-291
ProLiant Storage System Model F2 or U2 to Model UE Upgrade Kit	
ProLiant Storage System Model F2 or U2 to Model UE Upgrade Kit (Japan)	



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ProLiant Storage System Model F2 or U2 to Model UE Upgrade Kit (Japan)	340700-291
ProLiant Storage System RPS or /F or /U	224206-B21
ProLiant Storage System /U Redundant Power Supply (Int'l)	224214-001
StorageWorks Enclosure 4200 Redundant Power Supply Option	119826-B21
StorageWorks Enclosure 4200 Dual Bus Module Option	119829-B21
StorageWorks Enclosure Tower to Rack Conversion Kit	150213-B21
Server Recovery	
Recovery Server Option for ProLiant Storage System Model U1 & F1	304117-B21
ProLiant Storage System RSO/U Tower	387490-002
ProLiant Storage System RSO/U Tower (Int'l)	387490-B32
ProLiant Storage System RSO/U Tower (Japan)	387490-292
Rack-Mountable ProLiant Storage System RSO/U	387256-001
Rack-Mountable ProLiant Storage System RSO/U (Int'l)	387256-B31
Rack-Mountable ProLiant Storage System RSO/U (Japan)	387256-291
DLT Libraries	
DLT Tape Array Model 0	199860-001
DLT Tape Array II Model 35/70-4 (U.S.) no software	295165-001
DLT Tape Array II Model 35/70-4 no software (Int'l)	295165-B31
DLT Library 15 Cartridge Model 35/70-1	350365-001
DLT Library 15 Cartridge Model 35/70-2 (Model not available in North America.)	350365-002
DLT Library 15 Cartridge Model 35/70-1 (Japan)	350365-291
DLT Library 15 Cartridge Model 35/70-2 (Japan)	350365-292
DLT Library 15 Cartridge Model 20/40-1	350362-001
DLT Library 15 Cartridge Model 20/40-2	350362-002
DLT Library 15 Cartridge Model 20/40-1 (Int'l)	350362-B31
DLT Library 15 Cartridge Model 20/40-1 (Japan)	350362-291
DLT Library 15 Cartridge Model 20/40-2 (Int'l)	350362-B32
35/70 DLT Library Ready Drive	350367-B21
35/70 DLT Library Ready Drive (Japan)	350367-291
20/40 DLT Library Ready Drive	350364-B21
20/40 DLT Library Ready Drive (Japan)	350364-291
DLT Library Tabletop Conversion Kit	350384-B21
TL891 DLT library unit, 1 drive Table Top	120875-B21
TL891 DLT library unit, 2 drive Table Top	120875-B22
TL881 DLT Library, 1 drive Table Top, FWD	128667-B21
TL881 DLT Library, 2 drive Table Top, FWD	128667-B22
TL881 DLT Library, 1 drive Table Top, FWSE	128668-B21
TL881 DLT Library, 2 drive Table Top, FWSE	128668-B22
TL891 DLT library unit, 1 drive Rack	120876-B21
TL891 DLT library unit, 2 drive Rack	120876-B22
TL881 DLT Library, 1 drive Rack	128669-B21
TL881 DLT Library, 2 drive Rack	128669-B22
MiniLibrary Data Unit	128670-B21
MiniLibrary Expansion Unit	120877-B21
DLT IV Data Cartridges (single pack)	295194-B21
DLT IV Data Cartridges (7 pack)	295192-B21
DLT Cleaning Cartridge	199704-001
DLT Tape Array Cable Kit	242427-001
Daisy Chain Cable	199712-001
DLT Magazine with five Type IV DLT Tapes	295165-B21
10 Slot Magazine	120881-B21



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Add-On 35/70-GB Drive for TL891	120878-B31
Add-On 20/40-GB Drive for TL881	128671-B21
MiniLibrary Pass Thru Mechanism Kit	120880-B21
MiniLibrary Table Top to Rack Mount Conversion Kit, Metric/RETMA racks	120882-B21
MiniLibrary Table Top to Rack Mount Conversion Kit, Compaq racks	120883-B21
DLT7000 drive upgrade kit	349351-B21

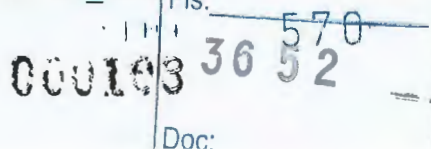
Note: The DLT 15 Cartridge Library Model 20/40 or Model 35/70 can be mounted in a Compaq rack. To use any model of the library on a tabletop, the customer would purchase one of the Library Models listed above and would also order the Tabletop Conversion Kit (350384-B21) to provide metal top and side covers. Refer to the Compaq DLT Libraries QuickSpec for details.

DLT Library Model 20/40 or 3570 includes one 20/40 DLT data cartridge or one 35/70 DLT data cartridge and three empty 5-cartridge magazines. US 350362-001/-002 (1 drive/2 drive) includes U.S. power cord, US 350365-001/-002 (1 drive/2 drive) includes U.S. power cord, Int'l -B31/B32 (1 drive/2 drive) CTO power cord for country ordering the unit.

Note: The TL891 library unit (1 & 2 drive) or the TL881 library unit (1 & 2 drive) require country kits (349386-001, 349386-011, 349386-AR1, 349386-021, 349386-031, 349386-111, 349386-061, 349386-081 or 349386-291), SCSI Cable kits (328215-001, 328215-002, 328215-003 or 328215-004) and ProLiant Connectivity Kits (113395-001 or 113396-001). Please refer to the TL891/881 Automated DLT Tape Library Solution QuickSpecs for further details.

StorageWorks RAID Array 4000

StorageWorks Raid Array 4000 (tower)	241300-001
StorageWorks Raid Array 4000 (rack)	223100-001
StorageWorks Raid Array 4100 (rack)	146013-001
StorageWorks Raid Array 4100 (rack) (Int'l)	146013-B31
StorageWorks Raid Array 4100 (rack) (Japan)	146013-291
Fibre Channel Storage Hub 12	295573-001
Fibre Channel Storage Hub 7	234453-001
Compaq Storage Hub 7 Universal Rack Mount Kit	136127-B21
Fibre Channel Storage Hub - 12 Port with 41U/42U Bracket	295573-B22
Compaq Storage Hub 12 Management Option	159262-B21
64-Bit/66MHz Fibre Channel Host Adapter	120186-B21
64-Bit/66MHz Fibre Channel Host Adapter (Japan)	120186-291
Fibre Channel Host Adapter Kit/P	223180-B21
StorageWorks Raid Array 4000 Redundant Array Controller	223187-B21
GBIC-SW Connector Kit (two each)	234459-B21
GBIC-LW Connector Kit (two each)	340412-B21
Fibre Channel Connection Kit, 3 SW GBICS, 2 Cables	380579-B21
Fibre Channel Connection Kit, 2 SW GBICS, 2 Cables	380596-B21
Fibre Channel Short Wave GBIC	380561-B21
Fibre Channel Long Wave GBIC	127508-B21
2m Multi-Mode Fibre Channel Cable	234457-B21
5m Multi-Mode Fibre Channel Cable	234457-B22
15m Multi-Mode Fibre Channel Cable	234457-B23
30m Multi-Mode Fibre Channel Cable	234457-B24
50m Multi-Mode Fibre Channel Cable	234457-B25
Raid Array 4000 Redundant Power Supply	224206-001
Raid Array 4000 Tower to Rack Conversion Kit	297162-B21
Raid Array 4100 Rack to Tower Conversion Kit	154253-B21



Upgrade Kit for ProLiant Storage System F and F1
Fibre Channel Troubleshooting Kit

296324-B21
234468-B21

StorageWorks RAID Array 7000

Departmental Subsystem

Dual controller configuration
Single controller configuration
Expansion building block

DS-SWXRA-HA
DS-SWXRA-HC
DS-SWXRA-HB

StorageWorks UltraSCSI Controllers

Redundant UltraSCSI controller with 64-MB cache
(requires DS-HS35X-BC/BD battery)

DS-HSZ70-AH

64-MB expansion cache module (redundant
controllers require equal amounts of cache)

DS-HSSIM-AB

Single replacement or additional cache battery

HS35X-BA

Dual replacement or additional cache battery

HS35X-BB

Note: Please see the Compaq StorageWorks Fibre Channel RAID Array 8000, RAID Array 7000, ESA12000 or ESA10000 QuickSpecs for FC Hubs, FC switches, platform software, host adapters, disks and options for complete solutions.

StorageWorks RAID Array 8000

Departmental Pedestal Models

RA8000 FC Single Controller (Opal)

380560-B22

RA8000 FC Dual Controller (Opal)

380550-B22

Expansion Cabinet 24 slot (Opal)

380570-B22

Rack Mountable Models

RA8000 FC Single Controller

380670-B21

RA8000 FC Dual Controller

380550-B21

Expansion Cabinet 24 slot

380570-B21

Note: Please see the Compaq StorageWorks Fibre Channel RAID Array 8000, RAID Array 7000, ESA12000 or ESA10000 QuickSpecs for FC Hubs, FC switches, platform software, host adapters, disks and options for complete solutions.

StorageWorks Enterprise Storage Array 10000

High-capacity and general business base unit
configuration (60Hz)

DS-SWXES-AA

High-capacity and general business base unit
configuration (50Hz)

DS-SWXES-AB

High bandwidth base unit configuration (60Hz)

DS-SWXES-BA

High bandwidth base unit configuration (50Hz)

DS-SWXES-BB

Dual expansion configuration (60Hz)

DS-SWXES-CA

Dual expansion configuration (50Hz)

DS-SWXES-CB

Single expansion configuration (60Hz)

DS-SWXES-DA

Single expansion configuration (50Hz)

DS-SWXES-DB

Data Center Options

64 MB cache memory upgrade for DS-HSZ70-AH
controller (60Hz)

DS-HSSIM-AB

Redundant power (requires all 3 parts)

180 watt power supply (60Hz)

DS-BA35X-HH

AC input box (60Hz)

DS-BA35X-HE

Power distribution unit (60Hz)

DS-SW6XP-AA

Power distribution unit (50Hz)

DS-SW6XP-AB

Note: Please see the Compaq StorageWorks Fibre Channel RAID Array 8000, RAID Array 7000, ESA12000 or ESA10000 QuickSpecs for FC Hubs, FC switches, platform software, host adapters, disks and options for complete solutions.

StorageWorks Enterprise Storage Array 12000

ESA Building Blocks

High-Capacity/General Business - Dual Controllers

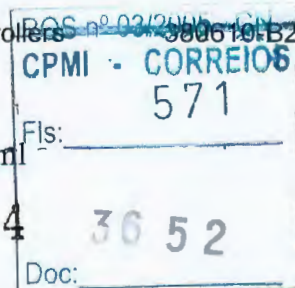
380600-002

48 slots, 60 Hz (Opal)

High-Capacity/General Business - Dual Controllers

380610-B22

48 slots, 50 Hz (Opal)



High Bandwidth Quad controllers 48 slots, 60 Hz (Opal)	380620-002
High Bandwidth Quad controllers 48 slots, 50 Hz (Opal)	380630-B22
Single Expansion Dual controllers 24 slots, 25U extra cabinet space, 60 Hz (Opal)	380580-002
Single Expansion Dual controllers 24 slots, 25U extra cabinet space, 50 Hz (Opal)	380590-B22

Expansion enclosure 48 slots, 60 Hz (Opal)	380640-002
Expansion enclosure 48 slots, 50 Hz (Opal)	380650-B22

Note: Please see the Compaq StorageWorks Fibre Channel RAID Array 8000, RAID Array 7000, ESA12000 or ESA10000 QuickSpecs for FC Hubs, FC switches, platform software, host adapters, disks and options for complete solutions.

StorageWorks Modular Array 8000/Enterprise Modular Array 12000

EMA12000 D14 60Hz	175990-B21
EMA12000 D14 50Hz	175990-B22
EMA12000 S14 60Hz	175991-B21
EMA12000 S14 50Hz	175991-B22
MA8000 60Hz	175992-B21
MA8000 50Hz	175992-B22
EMA12000 Blue 60Hz	175993-B21
EMA12000 Blue 50Hz	175993-B22

Note: Options include controller, solution kits, ACS.

MA8000/EMA12000 includes controller shelf, drive shelves and cabinet. Packaging upgrade to RA8000/ESA12000.

Note: Please see the Compaq StorageWorks MA8000/EMA12000 QuickSpecs for FC Hubs, FC switches, platform software, host adapters, disks and options for complete solutions.

StorageWorks Options

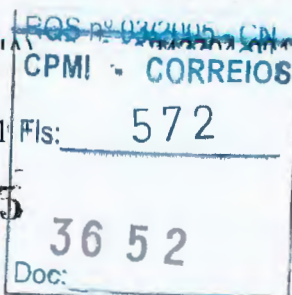
Fibre Channel Tape Controller – II	152975-001
Fibre Channel Tape Controller – II (Int'l)	152975-B31
Fibre Channel Tape Controller – II (Japan)	152975-291
Fibre Channel Storage Switch 16	380578-B21
Fibre Channel Storage Switch 8	380591-B21
Fibre Channel SAN Switch/8 with Fabric Operating Software	158222-B21
Fibre Channel SAN Switch/8 with Fabric Operating Software	158223-B21
F200 Clustering Kit	380357-B21

Uninterruptible Power Systems - Tower

UPS Model T1000 (100-127 Volt/1000 Volt Amp)	242688-001
UPS Model T1000h (200-240 Volt/1000 Volt Amp) (Int'l)	242688-002
UPS Model T1500 (100-127 Volt/1440 Volt Amp)	242688-003
UPS Model T1500h (200-240 Volt/1440 Volt Amp) (Int'l)	242688-004
UPS Model T1500j (100-127 Volt) (Japan)	242688-293
UPS Model T2000 (100-127 Volt/1920 Volt Amp)	242688-005
UPS Model T2000j (100-127 volt) (Japan)	242688-295
UPS Model T2400h-NA (200-240 Volt/2300 Volt Amp)	242688-007
UPS Model T2400h (200-240 volt) (Int'l)	242688-007
Multi-Server UPS Card	123508-B21
Scalable UPS Card	123509-B21
SNMP-EN Adapter	347225-B21
High to Low Voltage Transformer (250VA)	388643-B21

Uninterruptible Power Systems - Rack

Rack Mountable UPS B1500 (100-127 VAC) (Int'l)



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Rack-Mountable UPS R1500 (100-127 VAC) (NA)	242704-000
Rack-Mountable UPS R1500h (200-230 VAC) (Int'l)	242704-002
Rack-Mountable UPS R1500j (100-127 VAC) (Japan)	242704-291
Rack-Mountable UPS R3000 100-127 VAC) (NA)	242705-001
Rack-Mountable UPS R3000h (208-240 VAC) (Int'l)	242705-002
Rack-Mountable UPS R3000h-NA (208-240 VAC)	242705-003
Rack-Mountable UPS R3000j 100-127 VAC) (Japan)	242705-291
Rack-Mountable UPS R6000 (208 VAC default) (NA)	347207-001
Rack-Mountable UPS R6000 (230 VAC default) (Int'l)	347207-001
Rack-Mountable UPS R6000 (200 VAC default) (Japan)	347207-001
R6000 Extended Runtime Module	347224-B21
SNMP-EN Adapter	347225-B21
High to Low Voltage Transformer (250VA)	388643-B21
Multi-Server UPS Card	123508-B21
Scalable UPS Card	123509-B21

Please see the Compaq Rack Builder for configuration assistance
at www.compaq.com/support/files/server/softpqs/Rompaq/RackBuilprol.html.

Rack Conversion Kit

Compaq ML370 Tower to Rack Conversion Kit 157006-B21

Compaq Rack 9000 Series (Opal)

Compaq Rack 9142 (42U) – Pallet	120663-B21
Compaq Rack 9142 (42U) – Shock Pallet	120663-B22
Compaq Rack 9142 (42U) – Crated	120663-B23
Compaq Rack 9136 (36U) – Pallet	120664-B21
Compaq Rack 9136 (36U) – Shock Pallet	120664-B22
Compaq Rack 9136 (36U) – Crated	120664-B23
Compaq Rack 9122 (22U) – Pallet	120665-B21
Compaq Rack 9122 (22U) – Shock Pallet	120665-B22
Compaq Rack 9122 (22U) – Crated	120665-B23

Note: -B21 part numbers are for all Geo's

-B22 part numbers are used to ship configured racks (by custom systems, VAR's and Channels)

-B23 part numbers are used for air shipments

Compaq Rack 7000 Series (Beach Gray)

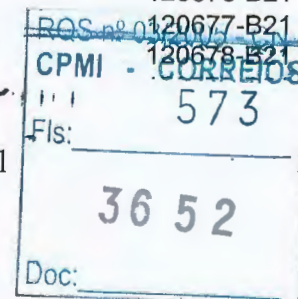
Compaq Rack 7142 (42U) (NA)	165753-001
Compaq Rack 7142 (42U) (Air Shipment)	165753-002
Compaq Rack 7142 (42U) (Int'l)	165753-003
Compaq Rack 7142 (42U) (Japan)	165753-293
Compaq Rack 7122 (22U) (NA)	163747-001
Compaq Rack 7122 (22U) (Int'l)	163747-002
Compaq Rack 7122 (22U) (Japan)	163747-292

Compaq Rack 4000 Series (Beach Gray)

Compaq Rack 4136 (36U) (NA)	303656-001
Compaq Rack 4136 (36U) (Air Shipment)	303656-B21
Compaq Rack 4136 (36U) (Int'l)	303656-B31

Rack Options for Compaq Rack 9000 Series

Baying Kit	120669-B21
9142 Side Panel Kit	120670-B21
9136 Side Panel Kit	120671-B21
Ballast Option Kit	120672-B21
Stabilizer Option Kit	120673-B21
Rack Rail Adapter Kit (25" depth)	120675-B21
Fan (110 VAC) Roof Mount	120677-B21
Fan (220 VAC) Roof Mount	120678-B21



Bustle Kit	120679-B21
Grounding Rack Option Kit	120682-B21
Rack Options for Compaq Rack 7000 Series	
Rack Sidewall Kit (42U only)	165652-001
Rack Coupling Kit (42U only)	165664-001
Stabilizing Feet (42U only)	189907-001
High Air Flow Rack Door Insert for 7122	157847-B21
High Air Flow Rack Door Insert for 7142	327281-B21
High Air Flow Rack Door Insert for 7142 (6 pack)	327281-B22
Compaq Rack Extension Kit for 7142	154392-B21
Rack Options for Compaq Rack 4000 Series	
Compaq Rack Frame 4136 (36U)	303668-001
Compaq Rack Frame 4136 (36U) (Air Shipment)	303668-B21
Compaq Rack Frame 4136 (36U) (Int'l)	303668-B31
Rack Sidewall Kit (36U only)	303658-B21
Rack Coupling Kit (36U only)	303657-B21
Stabilizing Feet (36U only)	303659-B21
Rack Frame 36U Front Door Kit	303669-B21
Rack Frame 36U Back Door Kit	303670-B21
Rack Options for Compaq Rack 4000, 7000 and 9000 Series	
Sliding Shelf Kit	332564-B21
Monitor Utility Shelf	303606-B21
Rack Blanking Panel Kit (Beach Gray)	169940-001
Rack Blanking Panel Kit (Opal)	169940-B21
Compaq Networking Cable Management Kit	292407-B21
Compaq Networking Recessed Rail Management Kit	292406-B21
High Capacity Cable Management Arm Kit	124711-B21
Compaq Power Distribution Unit – Low Voltage PDU (NA)	295363-001
Compaq Power Distribution Unit – Low Voltage PDU (Japan)	295363-291
Compaq Power Distribution Unit – High Voltage PDU (NA)	295363-002
Compaq Power Distribution Unit – High Voltage PDU (Int'l)	295363-B31
Compaq Power Distribution Unit, 30A (NA only)	295363-003
Server Console Switch 1 x 2 port (100-230 VAC)	120206-001
Server Console Switch 1 x 4 port (100-230 VAC)	400336-001
Server Console Switch 1 x 8 port (100-230 VAC)	400337-001
Server Console Switch 2 x 8 port (100-230 VAC)	400338-001
Server Console Switch 2 x 8 port (48VDC)	400542-B21
CPU to Server Console Cable, 12'	110936-B21
CPU to Server Console Cable, 20'	110936-B22
CPU to Server Console Cable, 40'	110936-B23
CPU to Server Console Cable (Plenum Rated) 20'	149363-B21
CPU to Server Console Cable (Plenum Rated) 40'	149364-B21
Switch Box Connector Kit (115V)	144007-001
Switch Box Connector Kit (230V)	144007-002
Rack Internal Trackball Keyboard (Opal)	185152-406
1U Rack Keyboard Drawer	338056-B21
Keyboard/Monitor/Mouse extension cables	169989-001
Rack Options for Third Party Cabinet Racks	
Depth Adjustable Fixed Rails	332558-B21
Service Upgrades (CarePacs)	
Hardware Services 4-Hour On-site Service	
4-Hour On-site Service, 9-Hour x 5-Day Coverage, 3 Years (2-5-2 Part Number for US)	FM-LO4HR-36
4-Hour On-site Service, 9-Hour x 5-Day Coverage, 3 Years (2-5-2 Part Number for Canada)	FM-LO4HR-36

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4-Hour On-site Service, 9-Hour x 5-Day Coverage, 3 Years (6-3 Part Number for US)	162658-002
4-Hour On-site Service, 9-Hour x 5-Day Coverage, 3 Years (6-3 Part Number for Canada)	162658-122
4-Hour On-site Service, 9-Hour x 5-Day Coverage, 3 Years (6-3 Part Number for EMEA)	324417-002
4-Hour On-site Service, 24-Hour x 7-Day Coverage, 3 Years (2-5-2 Part Number for US)	FM-LO724-36
4-Hour On-site Service, 24-Hour x 7-Day Coverage, 3 Years (2-5-2 Part Number for Canada)	FP-LO724-36
4-Hour On-site Service, 24-Hour x 7-Day Coverage, 3 Years (6-3 Part Number for US)	162657-002
4-Hour On-site Service, 24-Hour x 7-Day Coverage, 3 Years (6-3 Part Number for Canada)	162657-122
4-Hour On-site Service, 24-Hour x 7-Day Coverage, 3 Years (6-3 Part Number for EMEA)	376912-022
Installation & Start-up Services	
Hardware Installation (2-5-2 Part Number for US)	FM-LOINS-IN
Hardware Installation (2-5-2 Part Number for Canada)	FP-LOINS-IN
Hardware Installation (6-3 Part Number for US)	401792-002
Hardware Installation (6-3 Part Number for Canada)	401792-122
Hardware Installation (6-3 Part Number for EMEA)	Quote
O/S & Hardware Installation (2-5-2 Part Number for US)	FP-CXHSI-02
(Hardware installation plus two days O/S start-up activity (install, config, network access & orientation).)	
O/S & Hardware Installation (6-3 Part Number for US)	160556-002
(Hardware installation plus two days O/S start-up activity (install, config, network access & orientation).)	
O/S & Hardware Installation (6-3 Part Number for EMEA)	Quote
(Hardware installation plus two days O/S start-up activity (install, config, network access & orientation).)	
Business Solutions Priority Service Plan -Priority Level	
5 x 9 4-hour H/W, 5 x 9 2-hour O/S (NT & NetWare), Three Years (2-5-2 Part Number for US)	FP-CX102-36
5 x 9 4-hour H/W, 5 x 9 2-hour O/S (NT & NetWare), Three Years (2-5-2 Part Number for Canada)	FP-CZ102-36
5 x 9 4-hour H/W, 5 x 9 2-hour O/S (NT & NetWare), Three Years (6-3 Part Number for US)	155324-002
5 x 9 4-hour H/W, 5 x 9 2-hour O/S (NT & NetWare), Three Years (6-3 Part Number for Canada)	155324-122
5 x 9 4-hour H/W, 5 x 9 2-hour O/S (NT & NetWare), Three Years (6-3 Part Number for EMEA)	118310-022
Business Solutions Priority Service Plan -Priority 24 Level	
7 x 24 4-hour H/W, 7 x 24 2-hour O/S (NT & NetWare), Three years (2-5-2 Part Number for US)	FP-CX202-36
7 x 24 4-hour H/W, 7 x 24 2-hour O/S (NT & NetWare), Three years (6-3 Part Number for US)	155328-002
7 x 24 4-hour H/W, 7 x 24 2-hour O/S (NT & NetWare), Three years (6-3 Part Number for FMFA)	118316-022

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Business Solutions Priority Service Plan -Priority Plus Level

7 x 24 4-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), SPS account review, Three Years (2-5-2 Part Number for US)

FP-CX302-36

7 x 24 4-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), SPS account review, Three Years (2-5-2 Part Number for Canada)

FP-CZ302-36

7 x 24 4-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), SPS account review, Three Years (6-3 Part Number for US)

155332-002

7 x 24 4-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), SPS account review, Three Years (6-3 Part Number for Canada)

155332-122

Business Solutions Priority Service Plan -Priority Premier Level

7 x 24 2-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), SPS Account Review, Proactive Management Review, named S/w rep, Three Years (2-5-2 Part Number for US)

FP-CX502-36

7 x 24 2-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), SPS Account Review, Proactive Management Review, named S/w rep, Three Years (2-5-2 Part Number for Canada)

FP-CZ502-36

7 x 24 2-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), SPS Account Review, Proactive Management Review, named S/w rep, Three Years (6-3 Part Number for US)

155336-002

7 x 24 2-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), SPS Account Review, Proactive Management Review, named S/w rep, Three Years (6-3 Part Number for Canada)

155336-122

Business Solutions Priority Service Plan -Priority Executive Premier Level

7 x 24 2-hour H/W, 7 x 24 30-minute O/S (NT & NetWare), SPS Account Review, Proactive Management Review, named S/w rep, Three Years (2-5-2 Part Number for US)

FP-CX702-36

7 x 24 2-hour H/W, 7 x 24 30-minute O/S (NT & NetWare), SPS Account Review, Proactive Management Review, named S/w rep, Three Years (2-5-2 Part Number for Canada)

FP-CZ702-36

7 x 24 2-hour H/W, 7 x 24 30-minute O/S (NT & NetWare), SPS Account Review, Proactive Management Review, named S/w rep, Three Years (6-3 Part Number for US)

155340-002

7 x 24 2-hour H/W, 7 x 24 30-minute O/S (NT & NetWare), SPS Account Review, Proactive Management Review, named S/w rep, Three Years (6-3 Part Number for Canada)

155340-122

Note: For more information, customer/resellers can contact www.Compaq.com/services.

- » [Overview](#)
- » [Standard Features](#)
- » [Options](#)
- » [Memory](#)
- » [Storage](#)
- » [TechSpecs](#)

Memory

Compaq ProLiant ML370 All Models

Standard Memory

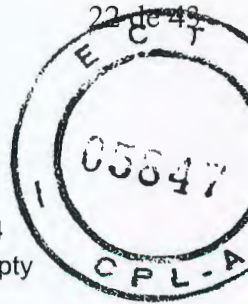
128-MB PC133-MHz Registered ECC SDRAM DIMM10321001-1-xt

http://www.compaq.com/products/quickspecs/10493_div/10493_div.htm

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128-MB SDRAM DIMM)

Standard	1	2	Slot	3	4
128 MB	128 MB	Empty	Empty	Empty	Empty

Standard Memory Plus Optional Memory

Up to 3200-MB memory is available with the optional installation of PC133-MHz Registered ECC SDRAM DIMM memory kits.

Up to	1	2	Slot	3	4
3200 MB	128 MB	1024 MB	1024 MB	1024 MB	1024 MB

Standard Memory Replaced With Optional Memory

Up to 4096 MB of memory is available with the removal of the standard 128-MB of memory and the optional installation of PC133-MHz Registered ECC SDRAM DIMM memory kits.

Up to	1	2	Slot	3	4
4096 MB	1024 MB	1024 MB	1024 MB	1024 MB	1024 MB

Note: This chart does not represent all possible memory configurations.

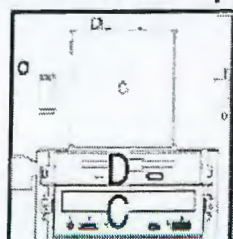
Following are the memory options available from Compaq:

- 1024-MB PC133-MHz Registered ECC SDRAM DIMM Memory Option Kit 128280-B21
- 512-MB PC133-MHz Registered ECC SDRAM DIMM Memory Option Kit 128279-B21
- 256-MB PC133-MHz Registered ECC SDRAM DIMM Memory Option Kit 128278-B21
- 128-MB PC133-MHz Registered ECC SDRAM DIMM Memory Option Kit 128277-B21
- 64-MB PC133-MHz Registered ECC SDRAM DIMM Memory Option Kit 128276-B21

- [Overview](#)
- [Standard Features](#)
- [Options](#)
- [Memory](#)
- [Storage](#)
- [TechSpecs](#)

Storage

Tower Drive Support



0-5 - 6 x 1" Hot Pluggable Hard Drive Bays

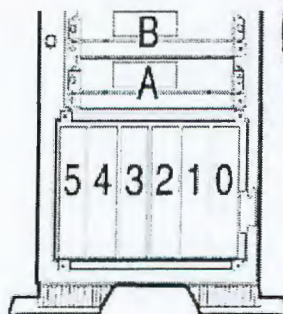
A, B - Two Available half height bays

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High Speed IDE CD-ROM

D - 3.5 in Diskette Drive

		Quantity Supported	Position Supported	Controller
Removable Media				
1.44-MB Diskette Drive	Up to 1	D		Integrated
IDE CD-ROM Drive	Up to 2	B,C		Integrated IDE
DVD-ROM Drive Option Kit	Up to 2	B,C		Integrated IDE
Hard Drives				
Wide Ultra2 Hot Pluggable Drives				
<u>1-inch</u>	Up to 6	0-5		Integrated Dual Channel Wide Ultra2 SCSI Adapter Smart Array 3200 Controller
18.2-GB 10,000 rpm				Smart Array 221 Controller Smart Array 4200 Controller
18.2-GB				Smart Array 431 Controller
9.1-GB 10,000 rpm				64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter
9.1-GB				64-Bit/66MHz Single Channel Wide Ultra3 SCSI Adapter Integrated Smart Array Controller Module (optional)
Wide Ultra2 SCSI -Non-Hot Plug				
<u>1-inch</u>	Up to 3	A,B, C		Integrated Dual Channel Wide Ultra2 SCSI Adapter Smart Array 3200 Controller
18.2-GB		(Using the C position requires the removal of CD-ROM)		Smart Array 221 Controller Smart Array 4200 Controller
9.1-GB				Smart Array 431 Controller 64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter
				64-Bit/66MHz Single Channel Wide Ultra3 SCSI Adapter Integrated Smart Array Controller Module (optional)
Wide Ultra3 Hot Pluggable Drives				
<u>1-inch</u>	Up to 6	0-5		Integrated Dual Channel Wide Ultra3 SCSI Adapter
18.2-GB 10,000 rpm				



rpm
9.1-GB 10,000
rpm

Smart Array 3200
Controller
Smart Array 221 Controller
Smart Array 4200
Controller
Smart Array 431 Controller
64-Bit/66MHz Dual
Channel Wide Ultra3 SCSI
Adapter
64-Bit/66MHz Single
Channel Wide Ultra3 SCSI
Adapter
Integrated Smart Array
Controller Module (optional)

Wide Ultra3 SCSI -Non-Hot Plug

1-inch
18.2-GB 10,000
rpm
9.1-GB 10,000
rpm

Up to 3

A,B, C
(Using the
C position
requires
the
removal of
CD-ROM)

Integrated Dual Channel
Wide Ultra2 SCSI Adapter
Smart Array 3200
Controller
Smart Array 221 Controller
Smart Array 4200
Controller
Smart Array 431 Controller
64-Bit/66MHz Dual
Channel Wide Ultra3 SCSI
Adapter
64-Bit/66MHz Single
Channel Wide Ultra3 SCSI
Adapter
Integrated Smart Array
Controller Module (optional)

1.6-inch
36.4-GB 10,000
rpm

External Storage

StorageWorks
Enclosure 4200
Family

Up to 25

External

Smart Array 221 Controller
Smart Array 431 Controller
Smart Array 3200
Controller
Smart Array 4200
Controller
64-Bit Dual Channel Wide
Ultra2 SCSI Adapter
64-Bit/66MHz Dual
Channel Wide Ultra3 SCSI
Adapter

ProLiant Storage
System Models
UE
ProLiant Storage
System Models
U2

Up to 25

External

Smart Array 3200
Controller
Smart Array 221 Controller
Smart Array 4200
Controller
Compaq Dual Channel
Wide-Ultra SCSI-3 Adapter
Compaq Wide-Ultra SCSI-3
Adapter

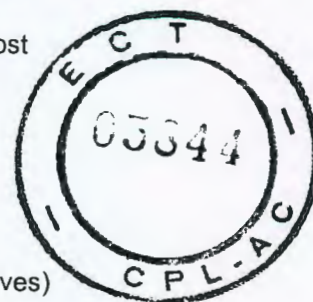
SCSI Storage
Expander II

Up to 3

External

Smart Array 3200
Controller
Integrated Smart Array
Controller Module (optional)
Compaq Dual Channel
Wide-Ultra SCSI-3 Adapter

StorageWorks Up to 25 External Compaq Wide-Ultra SCSI-3 Adapter
 Raid Array 4000 Fibre Channel Host Adapter
 Kit
 StorageWorks
 Raid Array 4100
 Kit



Maximum Storage Capacity (Hot Plug)

Internal 109.2 GB (6 x 18.2-GB hot plug hard drives)
 External 7.280 TB (25 ProLiant Storage Systems, each with 8 x 36.4-GB hard drives)
 Total 7.389 TB

Maximum Storage Capacity (Hot Plug & Non-Hot Plug)

Internal 182 GB (6 x 18.2-GB hot plug hard drives with 2 x 36.4 GB non-hot plug drives in removable media bays)
 External 7.280 TB (25 ProLiant Storage Systems, each with 8 x 36.4-GB hard drives)
 Total 7.462 TB

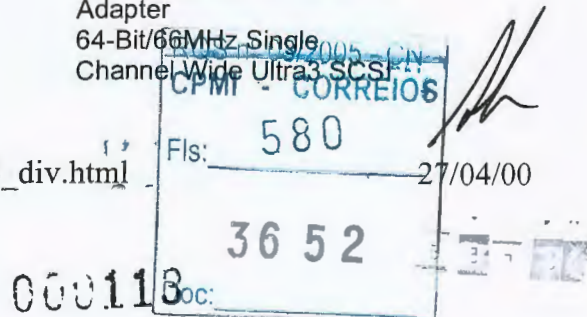
Maximum Storage Capacity (StorageWorks Enclosure SCSI Attached)

Internal 109.2 GB (6 x 18.2-GB 1" hot plug hard drives)
 External 6.370 TB hot plug SCSI storage (25 x (14 x 18.2GB 1" Wide Ultra2))
 Total: 6.479 TB

Quantity Position Controller Supported Supported

Tape Drives

Internal 20/40-GB Up to 2	A, B	Integrated Dual Channel Wide Ultra2 SCSI Adapter
DAT DDS-4		Compaq Dual Channel Wide-Ultra SCSI-3 Adapter
Internal 12/24-GB DAT		Compaq Wide-Ultra SCSI-3 Adapter
Internal 4/8-GB DAT		Integrated Smart Array Controller Module (optional)
Internal 4/8-GB SLR		64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter
		64-Bit/66MHz Single Channel Wide Ultra3 SCSI Adapter
12/24-GB DAT 1	A + B (two bays)	Integrated Dual Channel Wide Ultra2 SCSI Adapter
DDS-3 8		Compaq Dual Channel Wide-Ultra SCSI-3 Adapter
Cassette Autoloader		Compaq Wide-Ultra SCSI-3 Adapter
20/40-GB DAT DDS-4 8		Integrated Smart Array Controller Module (optional)
Cassette Autoloader (internal)		64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter
		64-Bit/66MHz Single Channel Wide Ultra3 SCSI Adapter





Internal 35/70-GB 1 DLT		A + B (two bays)	Adapter Integrated Dual Channel Wide Ultra2 SCSI Adapter Compaq Dual Channel Wide-Ultra SCSI-3 Adapter Compaq Wide-Ultra SCSI-3 Adapter 64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter 64-Bit/66MHz Single Channel Wide Ultra3 SCSI Adapter
Internal 20/40-GB DLT			
AIT 50 GB Internal	1	A, B	Integrated Dual Channel Wide Ultra2 SCSI Adapter Compaq Dual Channel Wide-Ultra SCSI-3 Adapter Compaq Wide-Ultra SCSI-3 Adapter
AIT 35 GB Internal			
AIT 50 GB External		External	Integrated Smart Array Controller Module (optional) 64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter 64-Bit/66MHz Single Channel Wide Ultra3 SCSI Adapter
AIT 35 GB External			
DLT Tape Array II Model 35/70	1 to 4	External	Integrated Dual Channel Wide Ultra2 SCSI Adapter Compaq Dual Channel Wide-Ultra SCSI-3 Adapter Compaq Wide-Ultra SCSI-3 Adapter
External 35/70-GB DLT	Up to 3	External	Integrated Dual Channel Wide Ultra2 SCSI Adapter Compaq Dual Channel Wide-Ultra SCSI-3 Adapter Compaq Wide-Ultra SCSI-3 Adapter 64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter 64-Bit/66MHz Single Channel Wide Ultra3 SCSI Adapter
External 20/40-GB DLT			
TL891 DLT Library (1 - 2 Drive)	2 drives per SCSI channel	External	Compaq Dual Channel Wide-Ultra SCSI-3 Adapter Compaq Wide-Ultra SCSI Adapter
TL881 DLT Library (1 - 2 Drive)			
DLT 15 Cartridge Library Model 35/70-1	1 Library per SCSI channel		Compaq Dual Channel Wide-Ultra SCSI-3 Adapter Compaq Wide-Ultra SCSI-3 Adapter
DLT 15 Cartridge Library Model 35/70-2			
DLT 15 Cartridge Library Model			

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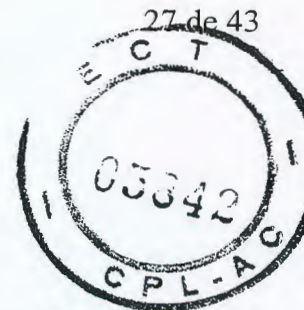
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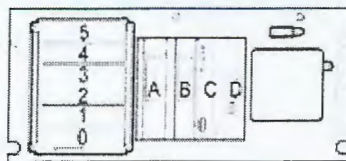
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Library Model
20/40-1
DLT 15 Cartridge
Library Model
20/40-2



Rack Drive Support



0-5 - 6 x 1-inch Wide Ultra2 Hot Pluggable Hard Drive Bays

A, B - Two available half height bays

C - High Speed IDE CD-ROM drive

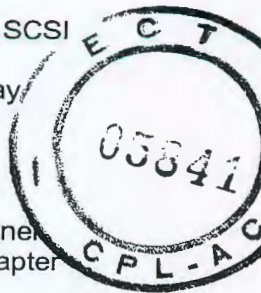
D - 3.5-in Diskette Drive

	Quantity Supported	Position Supported	Controller
Removable Media			
1.44-MB Diskette Drive	Up to 1	D	Integrated
IDE CD-ROM Drive	Up to 2	B,C	Integrated IDE
DVD-ROM Drive Option Kit	Up to 2	B,C	Integrated IDE
Hard Drives			
Wide Ultra2 Hot Pluggable Drives			
1-inch	Up to 6	0-5	Integrated Dual Channel Wide Ultra2 SCSI Adapter Smart Array 3200 Controller
18.2-GB 10,000 rpm			Smart Array 221 Controller
18.2-GB 9.1-GB 10,000 rpm			Smart Array 4200 Controller
9.1-GB			Smart Array 431 Controller
			64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter
			64-Bit/66MHz Single Channel Wide Ultra3 SCSI Adapter
			Integrated Smart Array Controller Module (optional)
Wide Ultra2 SCSI-Non-Hot Plug			
1-inch	Up to 3	A,B, C	Integrated Dual Channel Wide Ultra2 SCSI Adapter Smart Array 3200 Controller
18.2-GB		(Using the C position requires the removal of CD-ROM)	Smart Array 221 Controller
9.1-GB			Smart Array 4200 Controller
			Smart Array 431 Controller
			64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter

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64-Bit/66MHz Single
Channel Wide Ultra3 SCSI
Adapter
Integrated Smart Array
Controller Module
(optional)



Wide Ultra3 Hot Pluggable Drives

1-inch Up to 6 0-5
18.2-GB 10,000
rpm
9.1-GB 10,000
rpm

Integrated Dual Channel
Wide Ultra2 SCSI Adapter
Smart Array 3200
Controller
Smart Array 221 Controller
Smart Array 4200
Controller
Smart Array 431 Controller

64-Bit/66MHz Dual
Channel Wide Ultra3 SCSI
Adapter
64-Bit/66MHz Single
Channel Wide Ultra3 SCSI
Adapter Integrated Smart
Array Controller Module
(optional)

Wide Ultra3 SCSI-Non-Hot Plug

1-inch Up to 3 A,B, C
18.2-GB 10,000 (Using the
rpm C position
9.1-GB 10,000 requires
rpm the
removal of
CD-ROM)
1.6-inch
36.4-GB 10,000
rpm

Integrated Dual Channel
Wide Ultra2 SCSI Adapter
Smart Array 3200
Controller
Smart Array 221 Controller
Smart Array 4200
Controller
Smart Array 431 Controller

64-Bit/66MHz Dual
Channel Wide Ultra3 SCSI
Adapter
64-Bit/66MHz Single
Channel Wide Ultra3 SCSI
Adapter
Integrated Smart Array
Controller Module
(optional)

External Storage

StorageWorks Up to 25 External
Enclosure 4200
Family
(supports
Ultra2/Ultra3 1"
drives only)

Smart Array 221 Controller
Smart Array 431 Controller
Smart Array 3200
Controller
Smart Array 4200
Controller
64-Bit Dual Channel Wide
Ultra2 SCSI Adapter
64-Bit/66MHz Dual
Channel Wide Ultra3 SCSI
Adapter

ProLiant Storage Up to 25 External
System Models
UE

Smart Array 3200
Controller
Smart Array 221 Controller

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ProLiant Storage
System Models
U2
(supports Wide-
Ultra SCSI-3
drives only)

SCSI Storage
Expander II

Up to 3

External

Smart Array 4200
Controller
64-bit Dual Channel Wide
Ultra2 SCSI Adapter

Smart Array 3200
Controller
Compaq Dual Channel
Wide-Ultra SCSI-3
Adapter
Integrated Smart Array
Controller Module
(optional)

StorageWorks
Raid Array 4000
Kit
StorageWorks
Raid Array 4100
Kit

Up to 25

External

Fibre Channel Host
Adapter

Maximum Storage Capacity (Hot Plug)

Internal	109.2 GB (6 x 18.2-GB 1" hot plug hard drives)
External	7.280 TB (25 ProLiant Storage Systems, each with 8 x 36.4-GB hard drives)
Total	7.389 TB (2.02 TB)

Maximum Storage Capacity (Hot Plug & Non-Hot Plug)

Internal	182 GB (6 x 18.2 GB hot plug hard drives with 2 x 36.4 GB non hot plug drives in removable media bays)
External	7.280 TB (25 ProLiant Storage Systems, each with 8 x 36.4-GB hard drives)
Total	7.462 TB

Maximum Storage Capacity (StorageWorks Enclosure SCSI Attached)

Internal	109.2 GB (6 x 18.2-GB 1" hot plug hard drives)
External	6.370 TB hot plug SCSI storage (25 x (14 x 18.2GB 1" Wide Ultra2))
Total	6.479 TB

Quantity	Position
Supported	Supported Controller

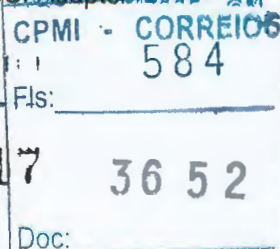
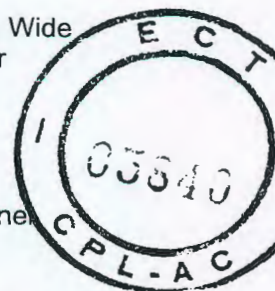
Tape Drives

Internal 20/40-GB
DAT DDS-4
Internal 12/24-GB
DAT
Internal 4/8-GB
DAT
Internal 4/8-GB
SLR

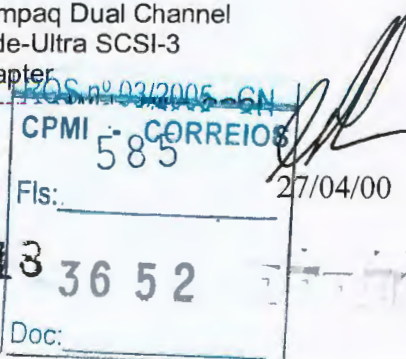
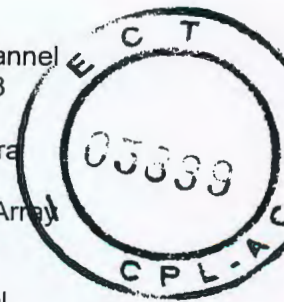
Up to 2

A, B

Compaq Dual Channel
Wide-Ultra SCSI-3
Adapter
Compaq Wide-Ultra
SCSI-3 Adapter
Integrated Smart Array
Controller Module
(optional)
64-Bit/66MHz Dual
Channel Wide Ultra3
SCSI Adapter
64-Bit/66MHz Single
Channel Wide Ultra3
SCSI Adapter



AIT 50 GB Internal AIT 35 GB Internal AIT 50 GB External AIT 35 GB External	1	A, B	Compaq Dual Channel Wide-Ultra SCSI-3 Adapter
		External	Compaq Wide-Ultra SCSI-3 Adapter Integrated Smart Array Controller Module (optional) 64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter 64-Bit/66MHz Single Channel Wide Ultra3 SCSI Adapter
12/24-GB DAT DDS-3 8 Cassette autoloader 20/40-GB DAT DDS-4 8 Cassette Autoloader	1	A + B (two bays)	Compaq Dual Channel Wide-Ultra SCSI-3 Adapter Compaq Wide-Ultra SCSI-3 Adapter 64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter 64-Bit/66MHz Single Channel Wide Ultra3 SCSI Adapter
Internal 35/70-GB DLT Internal 20/40-GB DLT	1	A + B (two bays)	Compaq Dual Channel Wide-Ultra SCSI-3 Adapter Compaq Wide-Ultra SCSI-3 Adapter Integrated Smart Array Controller Module (optional) 64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter 64-Bit/66MHz Single Channel Wide Ultra3 SCSI Adapter
DLT Tape Array II Model 35/70	1 to 4	External	Compaq Dual Channel Wide-Ultra SCSI-3 Adapter Compaq Wide-Ultra SCSI-3 Adapter
External 35/70-GB Up to 3 DLT External 20/40-GB DLT		External	Compaq Dual Channel Wide-Ultra SCSI-3 Adapter Compaq Wide-Ultra SCSI-3 Adapter 64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter 64-Bit/66MHz Single Channel Wide Ultra3 SCSI Adapter
TL891 DLT Library (1 – 2 Drive) TL891 DLT	2 drives per SCSI	External	Compaq Dual Channel Wide-Ultra SCSI-3 Adapter



DLT 15 Cartridge Library (1 – 2 Drive)
 DLT 15 Cartridge Library Model 35/70-1
 DLT 15 Cartridge Library Model 35/70-2
 DLT 15 Cartridge Library Model 20/40-1
 DLT 15 Cartridge Library Model 20/40-2

channel
 1 Library per SCSI channel

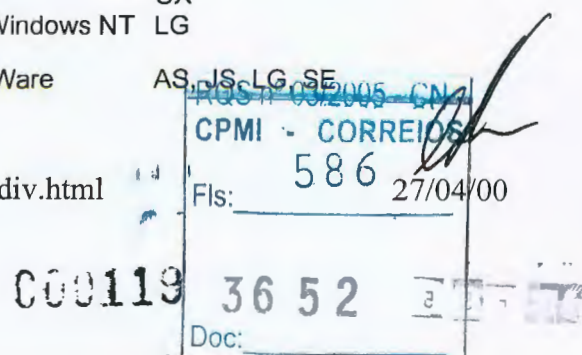
Compaq Wide-Ultra SCSI Adapter

Compaq Dual Channel Wide-Ultra SCSI-3 Adapter
 Compaq Wide-Ultra SCSI-3 Adapter



Supported Tape Drive Options

Tape Drive	Operating System	Key
Internal 20/40-GB DAT DDS-4 Tape Drive	Novell NetWare	AS, SE
	Microsoft Windows NT	AS, NT, SE
	Novell NetWare	AS, JS, SE
Internal 12/24-GB DAT Drive	SCO UNIX	Native (Tar & CPIO)
	Microsoft Windows NT	AS, NT, SE
	Novell NetWare	AS, JS, SE
Internal 4/8-GB DAT Drive	SCO UNIX	Native (Tar & CPIO)
	Microsoft Windows NT	AS, NT, SE
	Novell NetWare	AS, SE
Internal 4/8-GB SLR Drive	SCO UNIX	Native (Tar & CPIO)
	Microsoft Windows NT	AS, NT, SE
	Novell NetWare	AS, JS, SE
AIT 50-GB Drive	SCO UNIX	Native (Tar & CPIO)
	Microsoft Windows NT	AS, NT, SE
	Novell NetWare	AS, SE
AIT 35-GB Drive	SCO UNIX	Native (Tar & CPIO)
	Microsoft Windows NT	AS, NT, SE
	Novell NetWare	AS, SE
12/24-GB DAT DDS-3 8 Cassette Autoloader	Microsoft Windows NT	AS, NT, SE
	Novell NetWare	AS, SE
	Microsoft Windows NT	AS, NT, SE
20/40-GB DAT DDS-4 8 Cassette Autoloader	Novell NetWare	AS, SE
	Microsoft Windows NT	AS, NT, SE
	Novell NetWare	LG
DLT Tape Array II Model 35/70	SCO UNIX	UX
	Microsoft Windows NT	LG
	Novell NetWare	AS, JS, LG, SE



	SCO UNIX	AO, UX
	OS/2 Warp and LAN Server	ST
	Microsoft Windows NT	AS, NT, SE, LG
20/40-GB DLT Drive	Novell NetWare	AS, JS, LG, SE
	SCO UNIX	AO, UX
	OS/2 Warp and LAN Server	NV
	Microsoft Windows NT	AS, NT, SE
DLT 15 Cartridge Library Model 35/70-1	Novell NetWare	AS, JS, SE
	SCO UNIX	AO, UX
	Microsoft Windows NT	AS, NT, SE
DLT 15 Cartridge Library Model 35/70-2	Novell NetWare	AS, JS, SE
	SCO UNIX	AO, UX
	Microsoft Windows NT	AS, NT, SE
DLT 15 Cartridge Library Model 20/40-1	Novell NetWare	AS, JS, SE
	SCO UNIX	AO, UX
	Microsoft Windows NT	AS, NT, SE
DLT 15 Cartridge Library Model 20/40-2	Novell NetWare	AS, JS, SE
	SCO UNIX	AO, UX
	Microsoft Windows NT	AS, NT, SE
TL891 DLT Library (1 - 2 Drive)	Novell NetWare	AS, SE
	Microsoft Windows NT	AS, NT, SE, LG 4.0
TL881 DLT Library (1 - 2 Drive)	Novell NetWare	AS, SE
	Microsoft Windows NT	AS, NT, SE 4.0

Keys to Chart

AS Computer Associates ARCserve

JS Computer Associates JETserve

AO Computer Associates ARCserve Open

LG Legato Networker Software from Legato

ST Sytos Plus software

SE Veritas Software Backup Exec

VN Banyan VINES support for Compaq tape drives included in operating system

UX Device drivers for Compaq tape drives available from SCO in the SCO Compaq Supplement

NT Microsoft Windows NT support for Compaq tape drives included in operating system

NV Novastor Novaback for OS/2

[Overview](#)

TechSpecs

http://www.compaq.com/products/quickspecs/10493_div/10493_div.html

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- [Standard Features](#)
- [Options](#)
- [Memory](#)
- [Storage](#)
- [TechSpecs](#)

System Unit - Tower Dimensions

18.63 x 10.63 x 22.67 in/47.32 x 27.01 x 57.58 cm
63 lbs/28.35 kg (without hard drives, no RPS)

Weight

Input Requirements

Range Line Voltage
Rated Input Voltage
Rated Input Frequency
Rated Input Current
Rated Input Power

90 to 132 VAC/180 to 265 VAC
100 to 120 VAC/220 to 240 VAC
50 to 60 Hz
6A (110V) to 3A (220V)
550W

BTU Rating

1,880 BTU/HR

SCSI Connectors

Three HD68 connectors (2 internal, 1 external) supporting Ultra2

Power Supply Output Power

Steady State Power
Maximum Peak Power

325W
350W

Temperature Range

Operating
Shipping

50° to 93°F/10° to 35°C
-22° to 122°F/-30° to 50°C

Relative Humidity (non-condensing)

Operating
Non-operating

8% to 90%
5% to 95%

Maximum Wet Bulb Temperature

101.7°F/38.7°C

Acoustic Noise

NPEL (BELS) AVERAGE SPL (dBA)

Idle (Fixed Disk Drives Spinning) 6 43

Operating (Random Seeks to Fixed 6.1 Disks) 44

System Unit - Rack

Dimensions

8.67 x 19 x 22.75 in/22 x 48.34 x 55.9 cm

Weight

63 lbs/28.35 kg (without hard drives, no RPS)

Input Requirements

Range Line Voltage
Rated Input Voltage
Rated Input Frequency
Rated Input Current
Rated Input Power

90 to 132 VAC/180 to 265 VAC
100 to 120 VAC/220 to 240 VAC
50 to 60 Hz
6A (110V) to 3A (220V)
550W

BTU Rating

1,880 BTU/HR

SCSI Connectors

Three HD68 connectors (2 internal, 1 external) supporting Ultra2

Power Supply Output Power

Steady State Power
Maximum Peak Power

325W
350W

Temperature Range

Operating
Shipping

50° to 93°F/10° to 35°C
-22° to 122°F/-30° to 50°C

Relative Humidity (non-condensing)

Operating
Non-operating

8% to 90%
5% to 95%

Maximum Wet Bulb Temperature

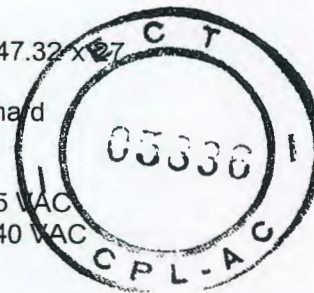
101.7°F/38.7°C

Acoustic Noise

NPEL (BELS) AVERAGE SPL (dBA)

Idle (Fixed Disk Drives Spinning) 6 43

Operating (Random Seeks to Fixed 6.1 Disks) 44



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**Optional Redundant Power Supply****Input Requirements**

Rated Input Voltage	100 to 240 VAC
Rated Input Frequency	50 to 60 Hz
Rated Input Current	8A (110V) 4A (220V)
Rated Input Power	728W

BTU Rating

2,490 BTU/HR

Power Supply Output Power

Steady State Power	400W
Maximum Peak Power	445W

Temperature Range

Operating	50° to 93°F/10° to 35°C
Shipping	-22° to 122°F/-30° to 50°C

Relative Humidity (non-condensing)

Operating	8% to 90%
Non-operating	5% to 95%

Maximum Wet Bulb Temperature 101.7°F/38.7°C**1.44-MB Diskette Drive****Diskette Size** 3.5 in**LED Indicators** (front panel) Green**Read/Write Capacity per Diskette** 1.44 MB/720 KB (high/low density)**Drive Supported** One**Drive Height** One-third**Drive Rotation** 300 rpm**Transfer Rate** (high/low) 500/250 Kb/s**Bytes/Sector** 512**Sectors/Track** (high/low) 18/9**Tracks/Side** (high/low) 80/80**Access Times****Track-to-Track** (high/low) 3/6 ms**Average** (high/low) 94/169 ms**Settling Time** 15 ms**Latency Average** 100 ms**Cylinders** (high/low) 80/80**Read/Write Heads** Two**Hot Plug Wide Ultra2 SCSI Hard Drives****18.2 GB 10K****Capacity** 18209.3 MB **Seek Time** (typical reads, including settling)**Height** 1 in/25.4 mm **Single Track** 0.8 ms**Width** 3.5 in/88.9 mm **Average** 5.2 ms**Interface** Wide Ultra2 SCSI **Full-Stroke** 12 ms**Transfer Rate** **Rotational Speed** 10,000 rpm**Synchronous** 80 MB/s**(Maximum)****Physical****Configuration****Bytes/Sector** 512**Logical Blocks** 35,565,080**Operating** 50° to 95° F/10°**Temperature** to 35° C**18.2 GB****Capacity** 18209.3 MB**Seek Time** (typical reads, including settling)**Height** 1 in/25.4 mm **Single Track** 0.8 ms**Width** 3.5 in/88.9 mm **Average** 7.0 ms**Interface** Wide Ultra2 SCSI **Full-Stroke** 15 ms**Transfer Rate** **Rotational Speed** 7200 rpm**Synchronous** 80 MB/s**(Maximum)****Physical****Configuration**

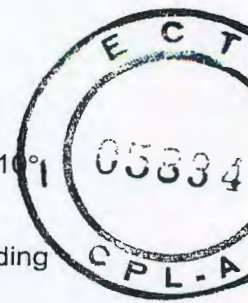
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9.1 GB 10K Capacity

9100.0 MB

Height
Width
Interface
Transfer Rate
Synchronous
(Maximum)

1 in/25.4 mm
3.5 in/88.9 mm
Wide Ultra2 SCSI

80 MB/s

Bytes/Sector 512
Logical Blocks 35,565,080
Operating Temperature 50° to 95° F/10° to 35° C

Seek Time (typical reads, including settling)

Single Track 0.8 ms
Average 5.2 ms
Full-Stroke 12 ms
Rotational Speed 10,000 rpm

Physical Configuration

Bytes/Sector 512
Logical Blocks 17,773,524
Operating Temperature 50° to 95° F/10° to 35° C

9.1 GB Capacity

9100.0 MB

Height
Width
Interface
Transfer Rate
Synchronous
(Maximum)

1 in/25.4 mm
3.5 in/88.9 mm
Wide Ultra2 SCSI

80 MB/s

Seek Time (typical reads, including settling)

Single Track 0.8 ms
Average 7.0 ms
Full-Stroke 15 ms
Rotational Speed 7200 rpm

Physical Configuration

Bytes/Sector 512
Logical Blocks 17,773,524
Operating Temperature 50° to 95° F/10° to 35° C

Non-Hot Plug Wide Ultra2 SCSI Hard Drives
18.2 GB
Capacity

18209.3 MB

Height
Width
Interface
Transfer Rate
Synchronous
(Maximum)

1 in/25.4 mm
3.5 in/88.9 mm
Wide Ultra2 SCSI

80 MB/s

Seek Time (typical reads, including settling)

Single Track 0.8 ms
Average 5.5 ms
Full-Stroke 12 ms
Rotational Speed 7200 rpm

Physical Configuration

Bytes/Sector 512
Logical Blocks 35,565,080
Operating Temperature 50° to 95° F/10° to 35° C

9.1 GB
Capacity

9100.0 MB

Height
Width
Interface
Transfer Rate
Synchronous
(Maximum)

1 in/25.4 mm
3.5 in/88.9 mm
Wide Ultra2 SCSI

80 MB/s

Seek Time (typical reads, including settling)

Single Track 0.8 ms
Average 7.1 ms
Full-Stroke 16 ms
Rotational Speed 7200 rpm

Physical Configuration

Bytes/Sector 512
Logical Blocks 17,773,524
Operating Temperature 50° to 95° F/10° to 35° C

Hot Plug Wide Ultra3 SCSI Hard Drives
18.2 GB 10K

to 35° C 3/2005 - L.N.

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Capacity	18209.3 MB	Seek Time (typical reads, including settling)	
Height	1 in/25.4 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	5.2 ms
Interface	Wide Ultra3 SCSI	Full-Stroke	12 ms
Transfer Rate		Rotational Speed	10,000 rpm
Synchronous (Maximum)	160 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	35,565,080
		Operating Temperature	50° to 95° F/10° to 35° C



9.1 GB 10K Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
Height	1 in/25.4 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	5.0 ms
Interface	Wide Ultra3 SCSI	Full-Stroke	12 ms
Transfer Rate		Rotational Speed	10,000 rpm
Synchronous (Maximum)	160 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	17,773,524
		Operating Temperature	50° to 95° F/10° to 35° C

Non-Hot Plug Wide Ultra3 SCSI Hard Drives

36.4 GB 10K Capacity	36419.5 MB	Seek Time (typical reads, including settling)	
Height	1.6 in/40.6 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	5.7 ms
Interface	Wide Ultra3 SCSI	Full-Stroke	13 ms
Transfer Rate		Rotational Speed	10,000 rpm
Synchronous (Maximum)	160 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	71,132,000
		Operating Temperature	50° to 95° F/10° to 35° C

18.2 GB 10K Capacity	18209.3 MB	Seek Time (typical reads, including settling)	
Height	1 in/25.4 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	5.5 ms
Interface	Wide Ultra3 SCSI	Full-Stroke	12 ms
Transfer Rate		Rotational Speed	10,000 rpm
Synchronous (Maximum)	160 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	35,565,080
		Operating Temperature	50° to 95° F/10° to 35° C

9.1 GB 10K Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
Height	1 in/25.4 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	5.0 ms
Interface	Wide Ultra3 SCSI	Full-Stroke	12 ms
Transfer Rate		Rotational Speed	10,000 rpm
Synchronous	160 MB/s	Physical Configuration	

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Synchronous 100 MB/s
(Maximum)

Physical Configuration

Bytes/Sector 512
Logical Blocks 17,773,524
Operating Temperature 50° to 95° F/10° to 35° C



32X Max CD-ROM Drive IDE Disk

Applicable Disk

CD-ROM (Mode 1 and 2)
CD-DA, CD-XA (Mode 2, Form 1 and 2)
Photo CD (Single and Multi-session)
Mixed Mode (Audio and Data combined)
CD-Recordable
CD-Rewritable
540 MB (Mode 1, 12 cm)
650 MB (Mode 2, 12 cm)

Capacity

Block Size

Mode 1 2,048
Mode 2 2,340, 2,336
CD-DA 2,352 bytes
CD-XA 2,328 bytes

Access Times (typical)

Random < 100 ms
Full-Stroke < 150 ms

Diameter

4.7 in, 3.15 in/12 cm, 8 cm

Thickness

0.05 in/1.2 mm

Track Pitch

1.6 µm

Audio Output Level

Line-Out

0.7 VRMS at 47 kOhms

Headphone

0.6 VRMS at 32 Ohms (maximum volume)

Data Transfer Rate

Sustained

150 KB/s (sustained 1X)

Burst

2100 to 4800 KB/s (14X to 32X)

Cache Buffer

128 KB (minimum)

Start-up Time (typical)

< 7 seconds; < 30 seconds (multi-session)

Stop Time

< 4 seconds; < 30 seconds (multi-session)

Laser Parameters

Type

Semiconductor Laser GaAlAs

Wave Length

780 ± 25 nm

Divergence Angle

53.5° ± 1.5°

Output Power

0.14mW

Operating Conditions

Temperature

41° to 118°F/5° to 45°C

Humidity

10% to 80%

Dimensions

(HxWxD, maximum)

1.88 x 5.85 x 8.11 in/42.9 x 15 x 208 cm

Weight

2.09 lbs/0.95 kg

Integrated Dual Channel Wide Ultra2 SCSI Adapter

Drives Supported

Up to 15 SCSI devices per channel

Data Transfer Method

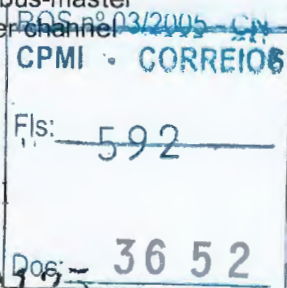
32-bit PCI bus-master

SCSI Channel Transfer Rate

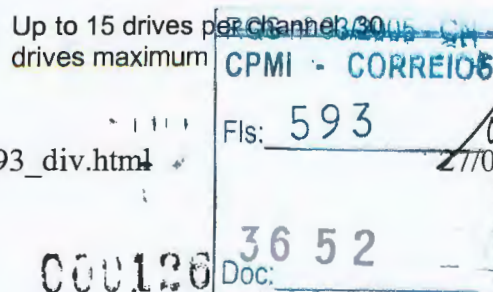
80 MB/s per channel

Maximum Transfer Rate per PCI Bus (peak)

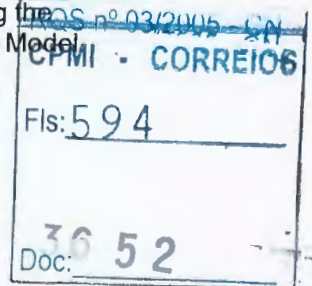
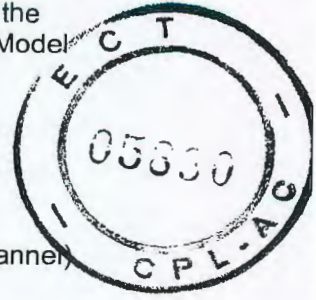
133 MB/s



SCSI Termination	Active Termination
SCSI Connectors	1 external, 2 internal (68-pin)
Compaq NC3163 Fast Ethernet NIC Embedded 10/100 WOL (Wake On LAN)	
Network Interface	10Base-T/100Base-TX
Compatibility	IEEE 802.3/802.3u compliant
Data Transfer Method	32-bit bus-master PCI
Network Transfer Rate	
10Base-T (Half-Duplex)	10 Mb/s
10Base-T (Full-Duplex)	20 Mb/s
100Base-TX (Half-Duplex)	100 Mb/s
100Base-TX (Full-Duplex)	200 Mb/s
Connector	RJ-45
Cable Support	
10Base-T	Categories 3, 4 or 5 UTP; up to 328 feet (100 meters)
100Base-TX	Category 5 UTP; up to 328 feet (100 meters)
Video Controller	
Controller Chip	ATI RAGE IIC PCI
Video DRAM	4 MB Video SGRAM
Data Transfer Method	32-bit PCI
Support Resolution	Supported Color Depths:
640 x 480	16.7M, 64K, 256, 16
800 x 600	16.7M, 64K, 256, 16
1024 x 768	16.7M, 64K, 256, 16
1152 x 864	16.7M, 64K, 256, 16
1280 x 1024	16.7M, 64K, 256, 16
1600 x 1200	64K, 256, 16
Connector	VGA
Integrated Smart Array Controller	(Optional)
Drives Supported	Up to 6 Wide Ultra2/Ultra3 SCSI
	Hard Drives (internal)
SCSI Electrical Interface	Low Voltage Differential
Data Transfer Method	32-Bit PCI bus-master
SCSI Channel Transfer Rate (peak)	80 MB/s (internal)
Maximum Transfer Rate per PCI Bus (peak)	133 MB/s
SCSI Termination	Active Termination
SCSI Connectors	1 external, (68-pin) (Tape only) 2 internal, (68-pin) (Port 1 – Tape only) (Port 2 – RAID 0, 1, 0+1, 5 or Tape)
Cache	8MB Read Cache (ECC protected)
Logical Drives Supported	32
Software Upgradable Firmware	Yes
Reliability Features	
Distributed Data Guarding (RAID 5)	Yes
Data Mirroring (RAID 1)	Yes
Drive Striping (RAID 0)	Yes
Drive Striping & Mirroring (RAID 0+1)	Yes
Dynamic RAID Expansion	Yes
Automatic Data Recovery	Yes
Smart Array 3200 Controller	
Drives Supported	Up to 15 drives per channel, 30 drives maximum



	(The ProLiant ML370 will support up to six internal hard drives or 12 external hard drives using the ProLiant Storage System Model UE storage enclosure.)
Data Transfer Method	32-bit PCI bus-master
Maximum Transfer Rate per PCI Bus (peak)	133 MB/s
Simultaneous Drive Transfer Channels	Two
Total Transfer Rate	160 MB/s (80 MB/s per channel)
Software Upgradable Firmware	Yes
Cache	64-MB Array Accelerator
Reliability Features	
Distributed Data Guarding (RAID 5)	Yes
Data Guarding (RAID 4)	Yes
Drive Mirroring (RAID 1)	Yes
Drive Striping (RAID 0)	Yes
Automatic Data Recovery	Yes
Smart Array 431 Controller Protocol	Wide Ultra3 SCSI
SCSI Electrical Interface	Low Voltage Differential (LVD)
Drives Supported	Up to 14 Drives Wide Ultra3 or Wide Ultra2 SCSI hard drives
SCSI Port Connectors	Single External/Internal SCSI port
Data Transfer Method	64-bit PCI bus-master
Maximum Transfer Rate on System Bus (peak)	266 MB/s
Simultaneous Drive Transfer Channels	One
Channel Transfer Rate	160 MB/s per channel
Software Upgradable Firmware	Yes
Read-Only Cache	16MB Cache Performance Engine
Logical Drives Supported	32
Reliability Features	
Distributed Data Guarding (RAID 5)	Yes
Drive Mirroring (RAID 1)	Yes
Drive Striping (RAID 0, 0+1)	Yes
Automatic Data Recovery	Yes
Disk Drive Protocol Support	Wide Ultra3 and Wide Ultra2 SCSI
Enclosure Support	New StorageWorks Enclosure 4200 Family (Models 4214R and 4214T)
Smart Array 221 Controller Drives Supported	Up to 14 drives per channel (The ProLiant ML370 will support up to six internal hard drives or 12 external hard drives using the ProLiant Storage System Model UE storage enclosure.)
Data Transfer Method	32-bit PCI bus-master
Maximum Transfer Rate per PCI Bus (peak)	133 MB/s
Simultaneous Drive Transfer Channels	One
Total Transfer Rate	80 MB/s per channel
Software Upgradable Firmware	Yes
Cache	6-MB of ECC protected read cache
Reliability Features	
Distributed Data Guarding (RAID 5)	Yes





Drive Mirroring (RAID 1)	Yes
Drive Stripping (RAID 0, 0 + 1)	Yes
Automatic Data Recovery	Yes
Smart Array 4200 Controller	
Protocol	Wide Ultra2 SCSI
SCSI Electrical Interface	Low Voltage Differential
Drives Supported (maximum)	56 drives
Data Transfer Method	64-bit PCI bus-master
Maximum Transfer Rate on PCI Bus (peak)	
Simultaneous Drive Transfer Channels	Four
Total Channel Transfer Rate	320 MB/s
Software Upgradable Firmware Cache	Yes 64 MB battery-backed and removable
Logical Drives Supported	32
Reliability Features	
Cache Battery Backup	Yes
Online Capacity Expansion	Yes
Logical Drive Capacity Extension	Yes
Online RAID Level Migration	Yes
Online Stripe Size Migration	Yes
Automatic Data Recovery	Yes
Distributed Data Guarding (RAID 5)	Yes
Data Guarding (RAID 4)	Yes
Drive Mirroring (RAID 1)	Yes
Drive Striping (RAID 0, 0 + 1)	Yes
64-bit / 66-MHz Single Channel Wide Ultra3 SCSI Adapter	
Drives Supported	Up to 14 SCSI devices
Storage Capacity	254.8 GB
Data Transfer Method	64-bit / 66-MHz PCI bus-master
Maximum SCSI Channel Transfer Rate	160 MB/s per channel
Maximum Transfer Rate per PCI Bus (peak)	532 MB/s per channel
SCSI Protocols	Wide Ultra3 SCSI Wide Ultra2 SCSI Wide-Ultra SCSI-3 Fast-Wide SCSI-2 Fast SCSI-2
Electrical Protocol	Low Voltage Differential (LVD)
SCSI Termination	Active Termination
External SCSI Connectors	One 68-Pin Wide Ultra SCSI-3 connector
Internal SCSI Connectors	Two 68-Pin Wide Ultra SCSI-3 connectors (one LVD and one SE) One 50-Pin Narrow Ultra connector
64-bit / 66-MHz Dual Channel Wide Ultra3 SCSI Adapter	
Drives Supported	Up to 28 SCSI devices (14 per channel)
Storage Capacity	509.6 GB
Data Transfer Method	64-bit / 66-MHz PCI bus-master
Maximum SCSI Channel Transfer Rate	160 MB/s per channel
Maximum Transfer Rate per PCI Bus (peak)	532 MB/s per channel
SCSI Protocols	Wide Ultra3 SCSI Wide Ultra2 SCSI Wide-Ultra SCSI-3

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Electrical Protocol	Fast SCSI-2
SCSI Termination	Low Voltage Differential (LVD)
External SCSI Connectors	Active Termination
Internal SCSI Connectors	Two 68-Pin VHDCI connectors
	Two 68-Pin Wide Ultra SCSI-3 connectors
	One 50-Pin Narrow Ultra connector

64-bit Dual Channel Wide-Ultra2 SCSI Adapter	
Drives Supported	Up to 28 SCSI devices (14 per channel)
Data Transfer Method	64-bit PCI bus-master
SCSI Channel Transfer Rate	80 MB/s per channel
Maximum Transfer Rate per PCI Bus (peak)	133 MB/s per channel
SCSI Protocols	Wide Ultra2 SCSI
	Wide-Ultra SCSI-3
	Fast SCSI-2
	Low Voltage Differential (LVD)
	Active Termination
	Two 80-Pin VHDCI connectors
	Two 68-Pin Wide Ultra SCSI-3 connectors

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Electrical Protocol	Fast SCSI-2
SCSI Termination	Low Voltage Differential (LVD)
External SCSI Connectors	Active Termination
Internal SCSI Connectors	Two 80-Pin VHDCI connectors
	Two 68-Pin Wide Ultra SCSI-3 connectors

Compaq Rack 9142 (42U) (optional)

Dimensions	Total Cabinet	Shipping	Color
Height	78.7 in/2,000 mm	83.38 in/2,168.65 mm	
Depth	35.8 in/909 mm	48 in/121.92 mm	Opal
Width	23.7 in/603 mm	32 in/812.8 mm	
Weight	253 lbs/114.84 kg	325 lbs/147.52 kg	

Compaq Rack 9136 (36U) (optional)

Dimensions	Total Cabinet	Shipping	Color
Height	68.6 in/1,742 mm	75.25 in/1,911.35 mm	
Depth	35.8 in/909 mm	48 in/121.92 mm	Opal
Width	23.7 in/603 mm	32 in/812.8 mm	
Weight	165 lbs/75 kg	234 lbs/106 kg	

Compaq Rack 9122 (22U) (optional)

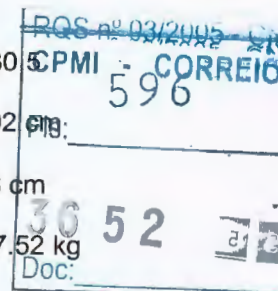
Dimensions	Total Cabinet	Shipping	Color
Height	43 in/1,092 mm	52.25 in/1,327.15 mm	
Depth	35.8 in/909 mm	48 in/121.92 mm	Opal
Width	24 in/610 mm	32 in/812.8 mm	
Weight	176 lbs/79.89 kg	225 lbs/102.13 kg	

Compaq Rack 7142 (42U) (optional)

Dimensions	Total Cabinet	Usable Area	Shipping
Height	85 in/215.9 cm	73.5 in/186.69 cm	90.75 in/230.5 cm
Depth	33.25 in/84.45 cm	29.21 in/74.196 cm	48 in/121.92 cm
Width	23.25 in/59.05 cm	19 in/48.26 cm	32 in/81.28 cm
Weight	253 lbs/114.84 kg		325 lbs/147.52 kg

Compaq Rack 4136 (36U) (optional)

Dimensions	Total Cabinet	Usable Area	Shipping
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Height	67.97 in/172.5 cm	63.05 in/160.02 cm	85.25 in/203.84 cm
Depth	33.25 in/84.45 cm	29.21 in/74.19 cm	48 in/121.92 cm
Width	23.25 in/59.05 cm	19 in/48.26 cm	32 in/81.28 cm
Weight	165 lbs/75 kg	=	234 lbs/106 kg

Compaq Rack 7122 (22U) (optional)

Dimensions	Total Cabinet	Usable Area	Shipping
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Height	49.5 in/125.73 cm	38.5 in/97.79 cm	56.63 in/143.84 cm
Depth	33.25 in/84.45 cm	29.21 in/74.19 cm	48 in/121.92 cm
Width	23.25 in/59.05 cm	19 in/48.26 cm	32 in/81.28 cm
Weight	176 lbs/79.89 kg	=	225 lbs/102.13 kg

OS Driver Support**Operating Systems****Current Drivers****Driver Location**(Punch-out diskettes only.)
SmartStart CD and
www.compaq.comMicrosoft Windows NT
Server 3.51

NTSSD 1.38a

Note: Windows NT
version 3.51 does not
support the Integrated
Smart Array Controller.
Future support is planned
for early Q3, 2000.Microsoft Windows NT
Server 4.0

NTSSD 2.17a

SmartStart CD and
www.compaq.comMicrosoft Windows NT
Server, Enterprise Edition
4.0

NTSSD 2.17a

SmartStart CD and
www.compaq.comMicrosoft Windows NT
Server 4.0,
Terminal Server Edition

NTSSD 2.17a

SmartStart CD and
www.compaq.com

Microsoft Windows 2000

Support
Software Bundle
for Windows
2000 5.02aSmartStart CD and
www.compaq.com

Novell NetWare 3.2

NSSD 5.50a

SmartStart CD and
www.compaq.comNovell NetWare 4.2, 4.2
SMP

NSSD 5.50a

SmartStart CD and
www.compaq.com

Novell NetWare 5.x

NSSD 5.50a

SmartStart CD and
www.compaq.comNovell NetWare for Small
Business Suite 4.2

NSSD 5.50a

SmartStart CD and
www.compaq.comNovell NetWare for Small
Business Suite 5

NSSD 5.50a

SmartStart CD and
www.compaq.comSCO OpenServer 5.0.4,
5.0.5

EFS 5.34

SmartStart CD and
www.compaq.comSCO UnixWare 2.1.2,
2.1.3

EFS 2.34

SmartStart CD and
www.compaq.com

SCO UnixWare 7.1, 7.1.1

EFS 7.34

SmartStart CD and
www.compaq.comIBM OS/2 Warp Connect
3

OS2SSD 4.40

SmartStart CD and
www.compaq.comIBM OS/2 Warp Server 4
(Enterprise)

NICSSD 1.55

SmartStart CD and
www.compaq.com

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(Entry)	NICSSD 1.55	www.compaq.com
IBM OS/2 Warp Server 4 (Advanced)	OS2SSD 4.40	SmartStart CD and www.compaq.com
IBM OS/2 Warp Server 4 (Advanced) SMP	NICSSD 1.55	SmartStart CD and www.compaq.com
Sun Solaris 8 Intel Platform Edition	OS2SSD 4.40	www.compaq.com
Sun Solaris 7 Intel Platform Edition	NICSSD 1.55	www.compaq.com
Sun Solaris 2.6 Intel Platform Edition	Solaris Driver Update 1.10	www.compaq.com
	Solaris Driver Update 1.10	www.compaq.com
	Solaris Driver Update 1.10	www.compaq.com



(Note: Not all storage controllers are supported under Solaris 2.6, 7, and 8. Please refer to the Supported Devices list on the Solaris Driver Update download page.

Please see customer advisories for addition information on Solaris 8 installation.)

Linux RedHat version 6.1 Planned (future support)

Banyan VINES 8.X (Banyan drivers are not available for Intel-based server NICs.)	PAT 3.08 LAT 3.03	SmartStart CD and www.compaq.com
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PROPOSTA TÉCNICA

Especificação do INT3

ProLiant 5500/ML570

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QUICKSPECS

Compaq ProLiant ML530

Overview

WHAT'S NEW

The fastest two-way server now even faster with the new Intel Pentium® III Xeon™ 800-MHz. Completely redesigned chassis for maximum system expansion capabilities.

Redundant options provide maximum uptime.

AT A GLANCE

Intel Pentium III Xeon 800-MHz Processor (dual processor capability)

256-KB level 2 writeback cache per processor

Next generation Highly Parallel System Architecture using the RCC LE 3.0 Chipset with 133-MHz Front Side Bus

PC133MHz Registered ECC SDRAM memory expandable to 4 GB

64-bit PCI for latest I/O performance

Eight total PCI slots: two 64-bit, 66MHz, five 64-bit, 33MHz, and one 32-bit, 33MHz

Integrated Dual Channel Wide Ultra2 SCSI Adapter

Wide Ultra2/Ultra3 SCSI Drive Cage standard (6 x 1)

Optional Wide Ultra2/Ultra3 SCSI Drive Cage (6 x 1)

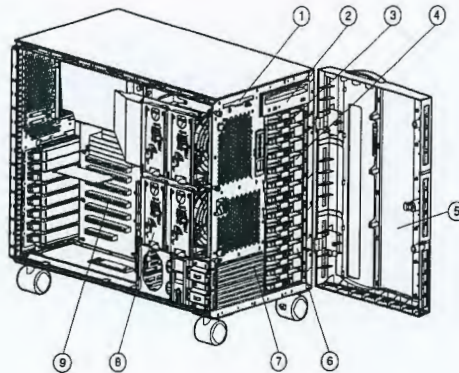
Internal mass storage capacity up to 218.4 GB (with optional 6x1 hot plug drive cage installed)

Integrated Remote Console and Automatic Server Recovery-2 (ASR-2)

450-Watt Hot Pluggable Power Supply with optional Hot Plug Redundant Power Supply (RPS)

Compaq Insight Manager and SmartStart

Protected by a Global three-year, on-site limited warranty with next business day response, and extended Pre-Failure Warranty which covers processors, memory and disk drives, as well as a wide range of Compaq Services — Certain restrictions and exclusions apply. Consult the Compaq Customer Support Center at 1-800-345-1518 for details.

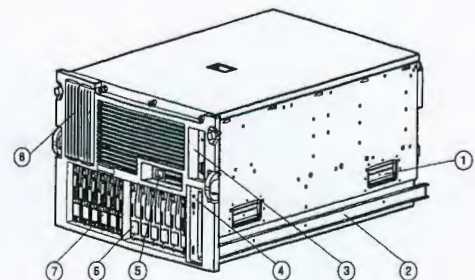


Tower Models

1. 1.44-MB Floppy Drive
2. High Speed IDE CD-ROM
3. Diagnostic Lighting
4. Wide Ultra2/Ultra3 Hot Plug Drive Cage (6 x 1) (Optional)
5. Front Bezel
6. Wide Ultra2/Ultra3 Hot Plug Drive Cage (6 x 1) (Standard)
7. 5.25-inch Removable Media Bays
8. Hot Plug Fans with Optional Redundant Hot Plug Fans shown
9. Eight PCI Slots

Rack Models

1. Rack handles
2. Sliding Rails
3. 1.44MB Floppy Drive
4. High Speed IDE CD-ROM Drive
5. Diagnostic Lighting
6. Wide Ultra2/Ultra3 Hot Plug Drive Cage (6 x 1) (Optional shown)
7. Wide Ultra2/Ultra3 Hot Plug Drive Cage (6 x 1) (standard drive cage)
8. 5.25-inch Removable Media Bays



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QUICKSPECS

Compaq ProLiant ML530

Standard Features

MODELS

Compaq ProLiant ML530
Available in multiple
configurations.

Processor

Intel Pentium III Xeon processor 800 MHz

Cache Memory

256-KB level 2 writeback cache per processor

Upgradability

Upgradable to dual processing

Memory

Standard	128 MB (PC133MHz Registered ECC SDRAM DIMM Memory)
Maximum	4 GB

Network Controller

NC3123 Fast Ethernet NIC PCI 10/100 WOL

Expansion Slots

I/O (Total)	8
64-bit, 66 MHz PCI	2
64-bit, 33 MHz PCI	5
32-bit, 33 MHz PCI	1

Storage Controller

Integrated Dual Channel Wide Ultra2 SCSI Adapter

Storage

Diskette Drive	1.44 MB
CD-ROM	High Speed IDE CD-ROM Drive
Hard Drives	None
Maximum Internal Storage	218.4 GB (with optional drive cage)

Interfaces

Parallel	1
Serial	2
Pointing Device (Mouse)	1
Graphics	1
Hot Plug Keyboard	1
Network RJ-45	1

Graphics

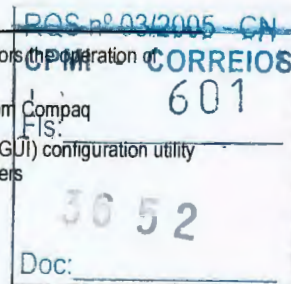
Integrated ATI Rage IIC Video Controller with 4MB Video Memory

Form Factor

Tower or Rack (7U)

Compaq Software

Compaq Insight Manager	The comprehensive system management tool that monitors the operation of Compaq servers, workstations and clients
Compaq SmartStart	The server configuration and software integration tool from Compaq
Array Configuration Utility (ACU) with Smart Array Controllers	Same easy to use yet powerful graphical user interface (GUI) configuration utility and easy to navigate wizards for all Smart Array Controllers





QUICKSPECS

Compaq ProLiant ML530

Standard Features

Manageability

- Automatic Server Recovery-2 (ASR-2)
- Integrated Remote Console (IRC)
 - Hardware Remote Console
 - Full Remote Server Reboot Capability
 - Reset and Failure Sequence Replay
 - Host Hardware Independent
 - Operating System Independent
- Server Health Logging
- Revision History Table
- Automatic Revision Tracking
- Drive Parameter Tracking (with Smart Array Controller)
- Dynamic Sector Repairing (with Smart Array Controller)
- Off-Line Backup Processor capability
- Pre-Failure Warranty (covers processors, hard drives and memory)

Security

- Power-on password
- Hot plug keyboard password
- Diskette drive control
- Diskette boot control
- QuickLock, Network Server Mode
- Parallel and serial interface control
- Administrator's password
- Disk configuration lock

Power Supply

450W Hot Pluggable Power Supply (one standard)

Additional power supply required if a second optional drive cage is installed. A third power supply required for redundancy when the optional drive cage is installed.

Required Cabling

For required cabling information, refer to the Compaq website at <http://www.compaq.com/products/servers/proliantML530>.

Note: This web site is available in English only.

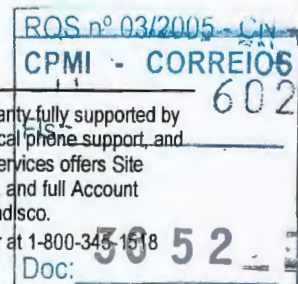
OS Support

- Microsoft Windows NT
- Microsoft Windows 2000
- Novell NetWare
- SCO UnixWare and OpenServer
- IBM OS/2 Warp Family
- Sun Solaris (future support)
- Banyan VINES
- RedHat Linux (future support)

Service and Support

Compaq Services provides a full range of service offerings, including a three-year, limited warranty fully supported by a worldwide network of resellers and service providers, lifetime toll-free 7 x 24 hardware technical phone support, and Pre-Failure Warranty coverage of hard drives, memory and processors. In addition, Compaq Services offers Site Inspection, Installation Support, and Warranty Upgrades to 4 hour response, Software Support, and full Account Management Solutions. Disaster recovery services are available through partnership with Comdisco.

Note: Certain restrictions and exclusions apply. Consult the Compaq Customer Support Center at 1-800-345-1518 for details.





QUICKSPECS

Compaq ProLiant ML530

Standard Features

ML530T01 X800-256K
161148-001

ML530R01 X800-256K
161149-001

Models

Processor(s)	Intel Pentium III Xeon processor 800 MHz	Network Controller	NC3123 Fast Ethernet NIC PCI 10/100 WOL
Cache Memory	256-KB level 2 writeback cache per processor	Storage Controller	Integrated Dual Channel Wide Ultra2 SCSI Adapter
Memory	PC133MHz Registered ECC SDRAM DIMM	Internal Storage	218.4 GB max
Standard	128 MB	Optical Drive	Internal 32X Max IDE CD-ROM Drive
Maximum	4 GB	Form Factor	Tower

Processor(s)	Intel Pentium III Xeon processor 800 MHz	Network Controller	NC3123 Fast Ethernet NIC PCI 10/100 WOL
Cache Memory	256-KB level 2 writeback cache per processor	Storage Controller	Integrated Dual Channel Wide Ultra2 SCSI Adapter
Memory	PC133MHz Registered ECC SDRAM DIMM	Internal Storage	218.4 GB max
Standard	128 MB	Optical Drive	Internal 32X Max IDE CD-ROM Drive
Maximum	4 GB	Form Factor	Rack (7U)

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QUICKSPECS

Compaq ProLiant ML530

Options

Processor

X800 Pentium III 256K Xeon Processor Option Kit	166054-B21
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Memory (DIMMs)

512-MB PC133MHz Registered ECC SDRAM DIMM Memory Option Kit	128279-B21
256-MB PC133MHz Registered ECC SDRAM DIMM Memory Option Kit	128278-B21
128-MB PC133MHz Registered ECC SDRAM DIMM Memory Option Kit	128277-B21
64-MB PC133MHz Registered ECC SDRAM DIMM Memory Option Kit	128276-B21

Optical Drives

DVD-ROM Drive Option Kit (DVD-ROM Drive Option Kit only supported by Windows NT or Windows 2000 OS.)	388481-B21
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Internal Storage

Wide Ultra2/Ultra3 Simplex Drive Cage Option Kit (6x1)	128288-001
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Hard Drives

Wide Ultra2 SCSI - Universal Hot Plug

18.2-GB Wide Ultra2 SCSI 10,000 rpm Drive (1)	128418-B22
18.2-GB Wide Ultra2 SCSI Drive (1)	388144-B22
9.1-GB Wide Ultra2 SCSI 10,000 rpm Drive (1)	328939-B22
9.1-GB Wide Ultra2 SCSI Drive (1)	123065-B22

Wide Ultra3 SCSI - Universal Hot Plug

18.2-GB Wide Ultra3 SCSI 10,000 rpm Drive (1)	142673-B22
9.1-GB Wide Ultra3 SCSI 10,000 rpm Drive (1)	142671-B22

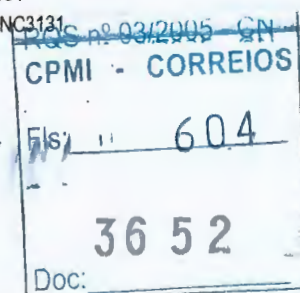
Note: Wide Ultra3 Drives require an optional Wide Ultra3 Controller to support Ultra3 transfer rates.

Storage Controllers

Smart Array 431 Controller	127695-B21
Smart Array 221 Controller	388099-B21
Smart Array 3200 Controller	295643-B21
Smart Array 4200 Controller	295636-B21
64-bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter	129803-B21
64-bit Dual Channel Wide Ultra2 SCSI Adapter	348757-B21
Wide-Ultra SCSI-3 Adapter	272514-001

Communications

Compaq NC3122 Fast Ethernet NIC PCI Dual 10/100	317450-B21
Compaq NC3123 Fast Ethernet NIC PCI 10/100 WOL	174830-B21
Compaq NC3131 Fast Ethernet NIC 64 PCI Dual Base 10/100	338456-B21
Compaq NC3132 Fast Ethernet Module Dual 10/100 Upgrade Module for NC3131	338456-B22
Compaq NC6132 Gigabit Module 1000 SX Upgrade Module for NC3131	338456-B23
Compaq NC6133 Gigabit Module 1000LX Upgrade Module for NC3131	338456-B24
Compaq NC3133 Fast Ethernet Module 100FX Upgrade Module for NC3131	338456-B25
Compaq NC6134 Gigabit NIC 64 PCI 1000SX	174818-B21
Compaq 100 FDDI PCI SAS Fibre-SC Controller	242505-001
Compaq 100 FDDI PCI SAS UTP Controller	242507-001
Compaq 100 FDDI PCI DAS Fibre-SC Controller	242509-001



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QUICKSPECS

Compaq ProLiant ML530

Options

Communications (continued)

Compaq 100 FDDI PCI DAS UTP Controller	242511-001
Compaq 100 FDDI PCI SAS Fibre-MIC Controller	287728-001
Compaq NC4621 Token Ring NIC PCI 4/16 WOL	379956-B21
IBM 16/4 Token Ring PCI Special	133749-B21
Compaq 56K PCI Fax Modem	321500-001
ServerNet PCI Adapter	309833-B22
4M Cable	309834-B23
30M Cable	309834-B22

Internal Tape Drives

Internal 20/40-GB DAT DDS-4 Tape Drive	157769-B21
Internal 12/24-GB DAT Drive (Opal)	295513-B22
Internal 12/24-GB DAT Drive (Opal)	295513-B22
Internal 35/70-GB DLT Drive	242520-B21
Internal 20/40-GB DLT Drive (Opal)	340743-B22
Internal AIT 50-GB Tape Drive	157766-B21
Internal AIT 35-GB Tape Drive	388504-B21
12/24-GB DAT DDS-3 8 Cassette autoloader (internal)	103549-B21
20/40-GB DAT 8 Cassette Autoloader - Internal	166504-B21
4.0-GB DDS-2 DAT Cassette	137611-001
DDS-4 Media (10 pack)	152842-001
12/24-GB DDS-3 DAT 8 Cassette Pre-Filled Magazine (7 data cassettes, 1 cleaning cassette)	134117-B21
20/40-GB DAT 8 Cassette Magazine w/Media	171532-B21
12.0-GB DDS-3 DAT Cassette (10 Pack)	295515-B21
DAT Cleaning Cassette	242781-001
AIT 35-GB Data Cassette (5 pack)	402371-B21
AIT 50-GB Data Cassette (5 pack)	152841-001
AIT Cleaning Cassette	402374-B21

Redundant Options

Redundant Fan Kit	128284-B21
Compaq Hot Plug Redundant Power Supply (The Compaq Hot Plug Redundant Power Supply (306592-B21) ships standard with the ProLiant ML530. A second one is required for redundancy.)	128286-B21

Management Options

Compaq Remote Insight (PCI) LAN + NA Modem	294013-002
Compaq Remote Insight Board (PCI) LAN/Serial without modem	294013-B24
Compaq Remote Insight Board (PCI) LAN only	294013-B25
Compaq Remote Insight Lights-Out Edition	157866-001

Note: The Compaq Remote Insight Lights-Out Edition must be installed in a 32-bit PCI slot in order to function correctly.

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QUICKSPECS

Compaq ProLiant ML530

Options

Monitors

TFT8020 18" Flat Panel Monitor (Opal)	326100-001
TFT8020 18" Flat Panel Monitor (Carbon)	159244-001
TFT8020 18" Flat Panel Monitor (Opal, bulk pack 2 monitor heads per box)	173610-001
TFT8000 Flat Panel (opal, no protective cover)	307906-001
TFT8000 Flat Panel (carbon, no protective cover)	307932-001
TFT8000 Flat Panel (opal, with protective cover)	307931-001
TFT8000 Flat Panel (carbon, with protective cover)	307935-001
TFT5010 15" Flat Panel Monitor (Opal)	104741-001
TFT5010 15" Flat Panel Monitor (Carbon)	154486-001
TFT5000S Flat Panel	122729-001
P1610 Color	305708-001
P1100 Color	325606-001
P900 Color	386326-001
P700 Color	380207-001
V1100 Color Monitor	386472-001
V700 Color (opal)	325800-001
V500 Color	325900-001
S910	138485-001
S710	152991-001

Note: Monitors larger than 17" may be too heavy for use in rack systems.

External Tape Drives

External 20/40-GB DAT DDS-4 Tape Drive	157770-001
External 35/70-GB DLT Drive	242521-B21
External 20/40-GB DLT Drive (Opal)	340744-B22
External AIT 50-GB Tape Drive	157767-001
External AIT 35-GB Tape Drive	388507-001
12/24-GB DAT DDS-3 8 Cassette autoloader (external)	110946-001
20/40-GB DAT 8 Cassette Autoloader - External	166505-001
4.0-GB DDS-2 DAT Cassette	137611-001
DDS-4 Media (10 pack)	152842-001
12/24-GB DDS-3 DAT 8 Cassette Pre-Filled Magazine (7 data cassettes, 1 cleaning cassette)	134117-B21
12.0-GB DDS-3 DAT Cassette (10 Pack)	295515-B21
DAT Cleaning Cassette	242781-001
AIT 35-GB Data Cassette (5 pack)	402371-B21
AIT 50-GB Data Cassette (5 pack)	152841-001

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QUICKSPECS

Compaq ProLiant ML530

Options

External Storage - Tower

Compaq StorageWorks Enclosure Model 4214T (tower) (The Compaq StorageWorks enclosure 4200 Family only supports the Wide Ultra2 1 hot pluggable hard drives.)	124875-001
SCSI Storage Expander II	332609-001
ProLiant Storage System Tower Model UE	348710-002
ProLiant Storage System Tower Model U2	304110-B22
ProLiant Storage System Model F1 or U1 to Model UE Upgrade Kit	348718-B21
ProLiant Storage System Model F2 or U2 to Model UE Upgrade Kit	348706-B21
Conversion Kit, SB to DB/U	304116-B21
Conversion Kit, DB to SB/U	304115-B21
ProLiant Storage System/U Redundant Power Supply Option	224206-001
StorageWorks Enclosure 4200 Redundant Power Supply Option	119826-B21
StorageWorks Enclosure 4200 Ultra2 Dual Bus I/O Module Option	119829-B21
StorageWorks Enclosure Tower to Rack Conversion Kit	150213-B21

External Storage - Rack

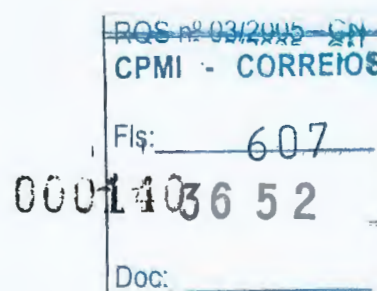
Compaq StorageWorks Enclosure Model 4214R (rack-mountable) (The Compaq StorageWorks Enclosure 4200 Family only supports Wide Ultra2 or Wide Ultra3 1" hot pluggable hard drives.)	103381-001
Rack-Mountable SCSI Storage Expander II	332607-001
Rack-Mountable ProLiant Storage System Model UE	348700-001
Rack-Mountable ProLiant Storage System Model U2	304100-B22
ProLiant Storage System Model F1 or U1 to Model UE Upgrade Kit	348718-B21
ProLiant Storage System Model F2 or U2 to Model UE Upgrade Kit	348706-B21
ProLiant Storage System RPS or /F or /U	224206-B21
StorageWorks Enclosure 4200 Redundant Power Supply Option	119826-B21
StorageWorks Enclosure 4200 Dual Bus Module Option	119829-B21
StorageWorks Enclosure Tower to Rack Conversion Kit	150213-B21

Server Recovery

Recovery Server Option for ProLiant Storage System Model U1 & F1	304117-B21
Tower ProLiant Storage System RSO/U	387490-002
Rack-Mountable ProLiant Storage System RSO/U	387256-001

DLT Libraries

DLT Tape Array Model 0	199860-001
DLT Tape Array II Model 35/70-4 no software	295165-001
35/70 DLT Library Ready Drive	350367-B21
DLT Library 15 Cartridge Model 35/70-1	350365-001
DLT Library 15 Cartridge Model 35/70-2 (Model not available in North America.)	350365-002
20/40 DLT Library Ready Drive	350364-B21
DLT Library 15 Cartridge Model 20/40-1	350362-001
DLT Library 15 Cartridge Model 20/40-2	350362-002
DLT Library Tabletop Conversion Kit	350384-B21
TL891 DLT library unit, 1 drive Table Top	120875-B21
TL891 DLT library unit, 2 drive Table Top	120875-B22
TL881 DLT Library, 1 drive Table Top, FWD	128667-B21
TL881 DLT Library, 2 drive Table Top, FWD	128667-B22
TL881 DLT Library, 1 drive Table Top, FWSE	128668-B21
TL881 DLT Library, 2 drive Table Top, FWSE	128668-B22





QUICKSPECS

Compaq ProLiant ML530

Options

DLT Libraries (continued)

TL891 DLT library unit, 1 drive Rack	120876-B21
TL891 DLT library unit, 2 drive Rack	120876-B22
TL881 DLT Library, 1 drive Rack	128669-B21
TL881 DLT Library, 2 drive Rack	128669-B22
MiniLibrary Data Unit	128670-B21
MiniLibrary Expansion Unit	120877-B21
Type IV DLT Drive Cassette (single)	295194-B21
Type IV DLT Drive Cassette (7 pack)	295192-B21
DLT Cleaning Cartridge	199704-001
DLT Tape Array Cable Kit	242427-001
DLT Magazine with five Type IV DLT Tape	295168-B21
10 Slot Magazine	120881-B21
Add-On 35/70-GB Drive for TL891	120878-B31
Add-On 20/40-GB Drive for TL881	128671-B21
MiniLibrary Pass Thru Mechanism Kit	120880-B21
MiniLibrary Table Top to Rack Mount Conversion Kit, Metric/RETMA racks	120882-B21
MiniLibrary Table Top to Rack Mount Conversion Kit, Compaq racks	120883-B21
DLT7000 drive upgrade kit	349351-B21

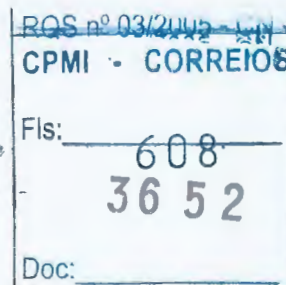
Note: The DLT 15 Cartridge Library Model 20/40 or Model 35/70 can be mounted in a Compaq rack. To use any model of the library on a tabletop, the customer would purchase one of the Library Models listed above and would also order the Tabletop Conversion Kit (350384-B21) to provide metal top and side covers. Refer to the Compaq DLT Libraries QuickSpecs for details.

DLT Library Model 20/40 or 35/70 includes one 20/40 DLT data cartridge or one 35/70 DLT data cartridge and three empty 5-cartridge magazines. US 350362-001/-002 (1 drive/2 drive) includes U.S. power cord, US 350365-001/-002 (1 drive/2 drive) includes U.S. power cord, Int'l -B31/B32 (1 drive/2 drive) CTO power cord for country ordering the unit.

Note: The TL891 library unit (1 & 2 drive) or the TL881 library unit (1 & 2 drive) require country kits (349386-001, 349386-011, 349386-AR1, 349386-021, 349386-031, 349386-111, 349386-061, 349386-081 or 349386-291), SCSI Cable kits (328215-001, 328215-002, 328215-003 or 328215-004) and ProLiant Connectivity Kits (113395-001 or 113396-001). Please refer to the TL895 (96 Slot) DLT Library QuickSpecs or the TL891/881 Automated DLT Tape Library Solution QuickSpecs for further details.

StorageWorks RAID Array 4000

StorageWorks Raid Array 4000 (Tower)	241300-001
StorageWorks Raid Array 4000 (rack)	223100-001
StorageWorks Raid Array 4100 (rack)	146013-001
Fibre Channel Storage Hub 12	295573-001
Fibre Channel Storage Hub 7	234453-001
Compaq Storage Hub 12 Management Option	159262-B21
64-Bit Fibre Channel Host Adapter (66MHz)	120186-B21
Fibre Channel Host Adapter Kit/P	223180-B21
StorageWorks Raid Array 4000 Redundant Array Controller	223187-B21
GBIC-SW Connector Kit (two each)	234459-B21
GBIC-LW Connector Kit (two each)	340412-B21
Fibre Channel Connection Kit, 3 SW GBICS, 2 Cables	380579-B21
Fibre Channel Connection Kit, 2 SW GBICS, 2 Cables	380596-B21
Fibre Channel Short Wave GBIC	380561-B21
Fibre Channel Long Wave GBIC	127508-B21
2m Multi-Mode Fibre Channel Cable	234457-B21
5m Multi-Mode Fibre Channel Cable	234457-B22





QUICKSPECS

Compaq ProLiant ML530

Options

StorageWorks RAID Array 4000 (continued)

15m Multi-Mode Fibre Channel Cable	234457-B23
30m Multi-Mode Fibre Channel Cable	234457-B24
50m Multi-Mode Fibre Channel Cable	234457-B25
Raid Array 4000 Redundant Power Supply	224206-001
Raid Array 4000 Tower to Rack Conversion Kit	297162-B21
Raid Array 4100 Rack to Tower Conversion Kit	154253-B21
Compaq Storage Hub 7 Universal Rack Mount Kit	136127-B21
Upgrade Kit for ProLiant Storage System F and F1	296324-B21
Fibre Channel Troubleshooting Kit	234468-B21

RAID Array 7000

Departmental Subsystem

Dual controller configuration	DS-SWXRA-HA
Single controller configuration	DS-SWXRA-HC
Expansion building block	DS-SWXRA-HB

StorageWorks UltraSCSI Controllers

Redundant UltraSCSI controller with 64 MB cache (requires DS-HS35X-BC/BD battery)	DS-HSZ70-AH
64 MB expansion cache module (redundant controllers require equal amounts of cache)	DS-HSSIM-AB
Single replacement or additional cache battery	HS35X-BA
Dual replacement or additional cache battery	HS35X-BB

Note: Please see the Compaq StorageWorks Fibre Channel RAID Array 8000, RAID Array 7000, ESA12000 or ESA10000 QuickSpecs for FC Hubs, FC switches, platform software, host adapters, disks and options for complete solutions.

StorageWorks RAID Array 8000

Departmental Pedestal Models

RA8000 FC Single Controller (Opal)	380560-B22
RA8000 FC Dual Controller (Opal)	380550-B22
Expansion Cabinet 24 slot (Opal)	380570-B22

Rack Mountable Models

RA8000 FC Single Controller	380670-B21
RA8000 FC Dual Controller	380550-B21
Expansion Cabinet 24 slot	380570-B21

Note: Please see the Compaq StorageWorks Fibre Channel RAID Array 8000, RAID Array 7000, ESA12000 or ESA10000 QuickSpecs for FC Hubs, FC switches, platform software, host adapters, disks and options for complete solutions.

StorageWorks Enterprise Storage Array 10000

High capacity and general business base unit configuration (60Hz)	DS-SWXES-AA
High capacity and general business base unit configuration (50Hz)	DS-SWXES-AB
High bandwidth base unit configuration (60Hz)	DS-SWXES-BA
High bandwidth base unit configuration (50Hz)	DS-SWXES-BB
Dual expansion configuration (60Hz)	DS-SWXES-CA
Dual expansion configuration (50Hz)	DS-SWXES-CB
Single expansion configuration (60Hz)	DS-SWXES-DA
Single expansion configuration (50Hz)	DS-SWXES-DB

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QUICKSPECS

Compaq ProLiant ML530

Options

StorageWorks Enterprise Storage Array 10000 (continued)

Data Center Options

64 MB cache memory upgrade for DS-HSZ70-AH controller (60Hz) DS-HSSIM-AB

Redundant power (requires all 3 parts)

180 watt power supply (60Hz) DS-BA35X-HH

AC input box (60Hz) DS-BA35X-HE

Power distribution unit (60Hz) DS-SW6XP-AA

Power distribution unit (50Hz) DS-SW6XP-AB

Note: Please see the Compaq StorageWorks Fibre Channel RAID Array 8000, RAID Array 7000, ESA12000 or ESA10000 QuickSpecs for FC Hubs, FC switches, platform software, host adapters, disks and options for complete solutions.

StorageWorks Enterprise Storage Array 12000

ESA Building Blocks

High-Capacity/General Business - Dual Controllers 48 slots, 60 Hz (Opal) 380600-002

High-Capacity/General Business - Dual Controllers 48 slots, 50 Hz (Opal) 380610-B22

High Bandwidth Quad controllers 48 slots, 60 Hz (Opal) 380620-002

High Bandwidth Quad controllers 48 slots, 50 Hz (Opal) 380630-B22

Single Expansion Dual controllers 24 slots, 25U extra cabinet space, 60 Hz (Opal) 380580-002

Single Expansion Dual controllers 24 slots, 25U extra cabinet space, 50 Hz (Opal) 380590-B22

Expansion enclosure 48 slots, 60 Hz (Opal) 380640-002

Expansion enclosure 48 slots, 50 Hz (Opal) 380650-B22

Note: Please see the Compaq StorageWorks Fibre Channel RAID Array 8000, RAID Array 7000, ESA12000 or ESA10000 QuickSpecs for FC Hubs, FC switches, platform software, host adapters, disks and options for complete solutions.

StorageWorks Options

Fibre Channel Tape Controller - II 152975-001

Fibre Channel Storage Switch 16 380578-B21

Fibre Channel Storage Switch 8 380591-B21

Fibre Channel SAN Switch/8 with Fabric Operating Software 158222-B21

Fibre Channel SAN Switch/16 with Fabric Operating Software 158223-B21

Uninterruptible Power Systems - Tower

UPS Model T1000 (100-127 volt) 242688-001

UPS Model T1000h (200-240 volt) (Model not available in North America.) 242688-002

UPS Model T1500 (100-127 volt) 242688-003

UPS Model T1500h (200-240 Volt) (Model not available in North America.) 242688-004

UPS Model T2000 (100-127 volt) 242688-005

UPS Model T2400h (200-240 volt) 242688-007

(Customers outside North America should order part number 242688-006 to ensure they receive the proper line cord for their equipment.)

Multi-Server UPS Card 123508-B21

Scalable UPS Card 123509-B21

Uninterruptible Power Systems - Rack

Rack-Mountable UPS R1500 242704-001

Rack-Mountable UPS R1500h (Model not available in North America.) 242704-002

Rack-Mountable UPS R3000 242705-001

Rack-Mountable UPS R3000h (Model not available in North America.) 242705-002

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QUICKSPECS

Compaq ProLiant ML530

Options

Uninterruptible Power Systems - Rack (continued)

Rack-Mountable UPS R3000h-NA (Customers outside North America should order Rack UPS model R3000h (242705-002) in order to receive the correct power cord for your specific country/region.)	242705-003
Rack-Mountable UPS R6000-NA (208-240 VAC)	347207-001
R6000 Extended Runtime Module	347224-B21
SNMP-EN Adapter	347225-B21
High to Low Voltage Transformer (250VA)	388643-B21
Multi-Server UPS Card	123508-B21
Scalable UPS Card	123509-B21

Please see the Compaq Rack Builder for configuration assistance at
www.compaq.com/support/files/server/softpaqs/Rompaq/RackBuilpro.html

Rack Conversion Kit

Compaq ProLiant ML530 Tower to Rack Conversion Kit	128289-B21
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Compaq Rack 9000 Series (Opal)

Compaq Rack 9142 (42U)	120663-B21
Compaq Rack 9136 (36U)	120664-B21
Compaq Rack 9122 (22U)	120665-B21

Compaq Rack 7000 Series (Beach Gray)

Compaq Rack 7142 (42U)	165753-001
Compaq Rack 7122 (22U)	163747-001

Compaq Rack 4000 Series (Beach Gray)

Compaq Rack Frame 4136 (36U)	303668-001
Compaq Rack 4136 (36U)	303656-001

Rack Options for Compaq Rack 9000 Series

Baying Kit	120669-B21
9142 Side Panel Kit	120670-B21
9136 Side Panel Kit	120671-B21
Ballast Option Kit	120672-B21
Stabilizer Option Kit	120673-B21
Rack Rail Adapter Kit (25 depth)	120675-B21
Fan (110 VAC) Roof Mount	120677-B21
Fan (220 VAC) Roof Mount	120678-B21
Bustle Kit	120679-B21
Grounding Rack Option Kit	120682-B21

Rack Options for Compaq Rack 7000 Series

Rack Sidewall Kit (42U only)	165652-001
Coupling Kit (42U only)	165664-001
Stabilizing Feet (42U only)	189907-001
High Air Flow Rack Door Insert for 7122	157847-B21
High Air Flow Rack Door Insert for 7142	327281-B21
High Air Flow Rack Door Insert for 7142 (6 pack)	327281-B22
Compaq Extension Kit for Rack 7142	154192-B21

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Compaq ProLiant ML530

Options

Rack Options for Compaq Rack 4000 Series

Rack Sidewall Kit (36U only)	303658-B21
Coupling Kit (36U only)	303657-B21
Stabilizing Feet (36U only)	303659-B21
Rack Frame 36U Front Door Kit	303669-B21
Rack Frame 36U Back Door Kit	303670-B21

Rack Options for Compaq Rack 4000, 7000 and 9000 Series

Sliding Shelf Kit	332564-B21
Monitor Utility Shelf	303606-B21
Rack Blanking Panel Kit (Beach Gray)	169940-001
Rack Blanking Panel Kit (Opal)	169940-B21
Compaq Networking Cable Management Kit	292407-B21
Compaq Networking Recessed Rail Management Kit	292406-B21
High Capacity Cable Management Arm Kit	124711-B21
Compaq Power Distribution Unit - low voltage	295363-001
Compaq Power Distribution Unit - high voltage - NA	295363-002
Compaq Power Distribution Unit - 30A - NA only	295363-003
Compaq Power Distribution Unit-high voltage	295363-B31
Server Console Switch 1 x 2 port (100-230 VAC)	120206-001
Server Console Switch 1 x 4 port (100-230 VAC)	400336-001
Server Console Switch 1 x 8 port (100-230 VAC)	400337-001
Server Console Switch 2 x 8 port (100-230 VAC)	400338-001
Server Console Switch 2 x 8 port (48VDC)	400542-B21
CPU to Server Console Cable, 12	110936-B21
CPU to Server Console Cable, 20	110936-B22
CPU to Server Console Cable, 40	110936-B23
CPU to Server Console Cable (Plenum Rated) 20	149363-B21
CPU to Server Console Cable (Plenum Rated) 40	149364-B21
Switch Box Connector Kit (115V)	144007-001
Switch Box Connector Kit (230V)	144007-002
Rack Internal Trackball Keyboard (Opal)	185152-406
1U Rack Keyboard Drawer	338056-B21
Keyboard/Monitor/Mouse extension cables	169989-001

Rack Options for Third Party Cabinet Racks

Depth Adjustable Fixed Rails	332558-B21
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Service Upgrades (CarePacs)

Hardware Services 4-Hour On-site Service

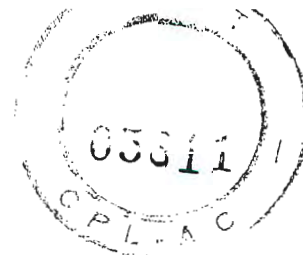
4-Hour On-site Service, 5 x Coverage, 3 Years	FM-MI4HR-36
4-Hour On-site Service, 24-Hour x 7-Day Coverage, 3 Years	FM-MI724-36
6-Hour 7 x 24 Guaranteed Hardware Repair Service	FM-MI6GR-36

Installation & Start-up Services

Hardware Installation	FM-MIINS-IN
O/S & Hardware Installation (Hardware installation plus two days O/S start-up activity (install, configure, network access & orientation).)	FP-CXHSI-03

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QUICKSPECS

Compaq ProLiant ML530

Options

Service Upgrades (CarePacs) (continued)

Business Solutions Priority Service Plan – Priority Level

5 x 9 4-hour H/W, 5 x 9 2-hour O/S (NT & NetWare), Three Years

FP-CX103-36

Business Solutions Priority Service Plan – Priority 24 Level

7 x 24 4-hour H/W, 7 x 24 2-hour O/S (NT & NetWare), Three years

FP-CX203-36

Business Solutions Priority Service Plan – Priority Plus Level

7 x 24 4-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), SPS account review, Three Years

FP-CX303-36

Business Solutions Priority Service Plan – Priority Premier Level

7 x 24 2-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), SPS Account Review, Proactive Management Review, named S/w rep, Three Years

FP-CX503-36

Business Solutions Priority Service Plan – Priority Executive Premier Level

7 x 24 2-hour H/W, 7 x 24 30-minute O/S (NT & NetWare), SPS Account Review, Proactive Management Review, named S/w rep, Three Years

FP-CX703-36

Note: For more information, customer/resellers can contact www.Compaq.com/services.

Note: Service Options listed are specific to North America customers only.

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QUICKSPECS

Compaq ProLiant ML530

Memory

Compaq ProLiant ML530 All Models

STANDARD MEMORY

128-MB PC133-MHz Registered ECC SDRAM DIMM installed (1 x 128-MB SDRAM DIMM)

Standard	Slot							
	1	2	3	4	5	6	7	8
128 MB	128 MB	Empty	Empty	Empty	Empty	Empty	Empty	Empty

STANDARD MEMORY PLUS OPTIONAL MEMORY

Up to 3712 MB memory is available with the optional installation of PC133-MHz Registered ECC SDRAM DIMM memory kits.

Standard	Slot							
	1	2	3	4	5	6	7	8
3712 MB	128 MB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB

STANDARD MEMORY REPLACED WITH OPTIONAL MEMORY

Up to 4096 MB of memory is available with the removal of the standard 128-MB of memory and the optional installation of PC133-MHz Registered ECC SDRAM DIMM memory kits.

Standard	Slot							
	1	2	3	4	5	6	7	8
4096 MB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB

Caution: Exceeding 4 GB total memory will result in a substantial reduction in performance.

Note: This chart does not represent all possible memory configurations.

Following are memory options available from Compaq:

512-MB PC133-MHz Registered ECC SDRAM DIMM Memory Option Kit	128279-B21
256-MB PC133-MHz Registered ECC SDRAM DIMM Memory Option Kit	128278-B21
128-MB PC133-MHz Registered ECC SDRAM DIMM Memory Option Kit	128277-B21
64-MB PC133-MHz Registered ECC SDRAM DIMM Memory Option Kit	128276-B21

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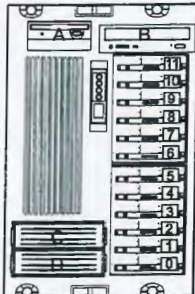


QUICKSPECS

Compaq ProLiant ML530

Storage

TOWER DRIVE SUPPORT



1-inch Drive Locations

0 - 11 - Two 6 x1 inch Wide Ultra2/ Ultra3 SCSI Hot Pluggable Hard Drive Bays

A - 3.5 inch Diskette Drive

B - Low-profile High Speed IDE CD-ROM

C, D - Two available half height bays for tape backup storage

	Quantity Supported	Position Supported	Controller
Removable Media			
1.44-MB Diskette Drive	Up to 1	A	Integrated
IDE CD-ROM Drive	Up to 1	B	Integrated IDE
DVD-ROM Drive Option Kit	Up to 1	B	Integrated IDE

Hard Drives

Wide Ultra2 Hot Pluggable Drives

1-inch	Up to 6	0-5	Integrated Dual Channel Wide Ultra2 SCSI Adapter
18.2-GB 10,000 rpm	Up to 12 (with optional Drive Cage Option Kit)	0-11	Smart Array 3200 Controller
18.2-GB			Smart Array 221 Controller
9.1-GB 10,000 rpm			Smart Array 4200 Controller
9.1-GB			Smart Array 431 Controller
			64-bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter

Wide Ultra3 Hot Pluggable Drives

1-inch	Up to 6	0-5	Integrated Dual Channel Wide Ultra2 SCSI Adapter
18.2-GB 10,000 rpm	Up to 12 (with optional Drive Cage Option Kit)	0-11	Smart Array 3200 Controller
9.1-GB 10,000 rpm			Smart Array 221 Controller
			Smart Array 4200 Controller
			Smart Array 431 Controller
			64-bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter

External Storage

StorageWorks Enclosure 4200 Family (supports Ultra2/Ultra3 drives only)	Up to 12 storage systems supported	External	Smart Array 221 Controller Smart Array 431 Controller Smart Array 3200 Controller Smart Array 4200 Controller 64-bit Dual Channel Wide Ultra2 SCSI Adapter
ProLiant Storage System Models UE ProLiant Storage System Models U2 (supports Wide-Ultra SCSI-3 drives only)	Up to 12 storage systems supported	External	Smart Array 221 Controller Smart Array 3200 Controller Smart Array 4200 Controller 64-bit Dual Channel Wide Ultra2 SCSI Adapter
TL891 DLT Library (1 - 2 Drive) TL881 DLT Library (1 - 2 Drive)	2 drives per SCSI channel	External	Compaq Dual Channel Wide-Ultra SCSI-3 Adapter Compaq Wide-Ultra SCSI Adapter
SCSI Storage Expander II	Up to 3	External	Smart Array 3200 Compaq Dual Channel Wide Ultra2 SCSI Adapter Compaq Wide-Ultra SCSI-3 Adapter

StorageWorks Raid Array 4000 Kit
StorageWorks Raid Array 4100 Kit

Up to 12

External

Fibre Channel Host Adapter

Maximum Storage Capacity (Ultra2/Ultra3 Drive Cage & External Storage)

Internal	218.4 GB (12 x 18.2) (Standard Drive cage & Optional Drive cage installed)
External	3.494 TB (12 ProLiant Storage Systems, each with 8 x 36.4-GB hard drives)
Total	3.712 TB

Maximum Storage Capacity - (Ultra2/Ultra3 Drive Cage & StorageWorks Enclosure)

Internal	218.4 GB (12 x 18.2) (Standard Drive cage & Optional Drive cage installed)
External	3.057 TB hot plug SCSI storage (12 x (14 x 18.2GB 1 Wide Ultra2/Ultra3))
Total	3.276 TB

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QUICKSPECS

Compaq ProLiant ML530

Storage

TOWER DRIVE SUPPORT (continued)

	Quantity Supported	Position Supported	Controller
Tape Drives			
Internal 20/40-GB DAT DDS-4 Internal 12/24-GB DAT Internal 4/8-GB DAT	Up to 2	C,D	Integrated Dual Channel Wide Ultra2 Adapter Wide-Ultra SCSI-3 Adapter
12/24-GB DDS-3 8 Cassette autoloader 20/40-GB DAT DDS-4 8 Cassette Autoloader (internal)	Up to 2	C,D	Compaq Wide-Ultra SCSI-3 Adapter
Internal 35/70-GB DLT Internal 20/40-GB DLT	1	C + D (two bays)	Integrated Dual Channel Wide Ultra2 Adapter Dual Channel Wide-Ultra SCSI-3 Adapter Wide-Ultra SCSI-3 Adapter
Internal AIT 50-GB Tape Drive Internal AIT 35-GB Tape Drive	1	C + D	Integrated Dual Channel Wide Ultra2 Adapter Dual Channel Wide-Ultra SCSI-3 Adapter Wide-Ultra SCSI-3 Adapter
External AIT 50-GB Tape Drive External AIT 35-GB Tape Drive		External	
DLT Tape Array II Model 35/70	1 to 4	External	Integrated Dual Channel Wide Ultra2 Adapter Dual Channel Wide-Ultra SCSI-3 Adapter Wide-Ultra SCSI-3 Adapter
External 35/70-GB DLT External 20/40-GB DLT	Up to 3	External	Integrated Dual Channel Wide Ultra2 Adapter Dual Channel Wide-Ultra SCSI-3 Adapter Wide-Ultra SCSI-3 Adapter
DLT 15 Cartridge Library Model 35/70-1 DLT 15 Cartridge Library Model 35/70-2 DLT 15 Cartridge Library Model 20/40-1 DLT 15 Cartridge Library Model 20/40-2	1 Library per SCSI channel		Integrated Dual Channel Wide Ultra2 Adapter Dual Channel Wide-Ultra SCSI-3 Adapter Wide-Ultra SCSI-3 Adapter
TL891 DLT Library (1 - 2 Drive) TL881 DLT Library (1 - 2 Drive)	2 drives per SCSI channel	External	Compaq Dual Channel Wide-Ultra SCSI-3 Adapter Compaq Wide-Ultra SCSI Adapter

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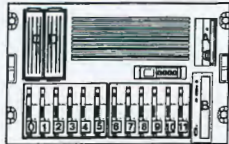


QUICKSPECS

Compaq ProLiant ML530

Storage

RACK DRIVE SUPPORT



1-inch Drive Locations (simplex)

0 - 11 - Two 6 x1 inch Wide Ultra2/ Ultra3 SCSI Hot Pluggable Hard Drive Bays

A - 3.5 inch Diskette Drive

B - Low-profile High Speed IDE CD-ROM

C, D - Two available half height bays for tape backup storage

	Quantity Supported	Position Supported	Controller
Removable Media			
1.44-MB Diskette Drive	Up to 1	A	Integrated
IDE CD-ROM Drive	Up to 1	B	Integrated IDE
DVD-ROM Drive Option Kit	Up to 1	B	Integrated IDE
Hard Drives			
Wide Ultra2 Hot Pluggable Drives			
1-inch	Up to 6	0-5	Integrated Dual Channel Wide Ultra2 SCSI Adapter
18.2-GB 10,000 rpm	Up to 12 (with optional Drive Cage Option Kit)	0-11	Smart Array 3200 Controller
18.2-GB			Smart Array 221 Controller
9.1-GB 10,000 rpm			Smart Array 4200 Controller
9.1-GB			Smart Array 431 Controller
			64-bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter
Wide Ultra3 SCSI - Hot Plug			
1-inch	Up to 6	0-5	Integrated Dual Channel Wide Ultra2 SCSI Adapter
18.2-GB 10,000 rpm	Up to 12 (with optional Drive Cage Option Kit)	0-11	Smart Array 3200 Controller
9.1-GB 10,000 rpm			Smart Array 221 Controller
			Smart Array 4200 Controller
			Smart Array 431 Controller
			64-bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter
External Storage			
StorageWorks Enclosure 4200 Family (supports Ultra2/Ultra3 drives only)	Up to 12 storage systems supported	External	Smart Array 221 Controller Smart Array 431 Controller Smart Array 3200 Controller Smart Array 4200 Controller 64-bit Dual Channel Wide Ultra2 SCSI Adapter
ProLiant Storage System Models UE ProLiant Storage System Models U2 (supports Wide-Ultra drives only)	Up to 12 storage systems supported	External	Smart Array 221 Controller Smart Array 3200 Controller Smart Array 4200 Controller 64-bit Dual Channel Wide Ultra2 SCSI Adapter
TL891 DLT Library (1 - 2 Drive) TL881 DLT Library (1 - 2 Drive)	2 drives per SCSI channel	External	Compaq Dual Channel Wide-Ultra SCSI-3 Adapter Compaq Wide-Ultra SCSI Adapter
SCSI Storage Expander II	Up to 3	External	Smart Array 3200 Compaq Dual Channel Wide Ultra2 SCSI Adapter Compaq Wide-Ultra SCSI-3 Adapter
StorageWorks Raid Array 4000 Kit StorageWorks Raid Array 4100 Kit	Up to 12	External	Fibre Channel Host Adapter
Maximum Storage Capacity (Ultra2/Ultra3 Drive Cage & External Storage)			
Internal	218.4 GB (12 x 18.2) (Standard Drive cage & Optional Drive cage installed)		
External	3.494 TB (12 ProLiant Storage Systems, each with 8 x 36.4-GB hard drives)		
Total	3.712 TB		
Maximum Storage Capacity - (Ultra2/Ultra3 Drive Cage & StorageWorks Enclosure)			
Internal	218.4 GB (12 x 18.2) (Standard Drive cage & Optional Drive cage installed)		
External	3.057 TB hot plug SCSI storage (12 x (14 x 18.2GB 1 Wide Ultra2/Ultra3))		
Total	3.276 TB		

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QUICKSPECS

Compaq ProLiant ML530

Storage

RACK DRIVE SUPPORT (continued)

	Quantity Supported	Position Supported	Controller
Tape Drives			
Internal 20/40-GB DAT DDS-4	Up to 2	C, D	Integrated Dual Channel Wide Ultra2 SCSI Adapter
Internal 12/24-GB DAT			Compaq Wide-Ultra SCSI-3 Adapter
Internal 4/8-GB DAT			
12/24-GB DDS-3 8 Cassette autoloader	Up to 2	C, D	Compaq Wide-Ultra SCSI-3 Adapter
20/40-GB DAT DDS-4 8 Cassette Autoloader (internal)			
Internal 35/70-GB DLT	1	C D (two bays)	Integrated Dual Channel Wide Ultra2 SCSI Adapter
Internal 20/40-GB DLT			Compaq Dual Channel Wide-Ultra SCSI-3 Adapter Compaq Wide-Ultra SCSI-3 Adapter
Internal AIT 50 GB Tape Drive	1	C D	Integrated Dual Channel Wide Ultra2 SCSI Adapter
Internal AIT 35 GB Tape Drive			Compaq Dual Channel Wide-Ultra SCSI-3 Adapter Compaq Wide-Ultra SCSI-3 Adapter
External AIT 50 GB Tape Drive		External	
External AIT 35 GB Tape Drive			
DLT Tape Array II Model 35/70	1 to 4	External	Integrated Dual Channel Wide Ultra2 SCSI Adapter
			Compaq Dual Channel Wide-Ultra SCSI-3 Adapter Compaq Wide-Ultra SCSI Adapter
External 35/70-GB DLT	Up to 3	External	Integrated Dual Channel Wide Ultra2 SCSI Adapter
External 20/40-GB DLT			Compaq Dual Channel Wide-Ultra SCSI-3 Adapter Compaq Wide-Ultra SCSI-3 Adapter
DLT 15 Cartridge Library Model 35/70-1	1 Library per SCSI channel		Compaq Dual Channel Wide-Ultra SCSI-3
DLT 15 Cartridge Library Model 35/70-2			Compaq Wide-Ultra SCSI-3
DLT 15 Cartridge Library Model 20/40-1			
DLT 15 Cartridge Library Model 20/40-2			
TL891 DLT Library (1 - 2 Drive)	2 drives per SCSI channel	External	Compaq Dual Channel Wide-Ultra SCSI-3 Adapter
TL881 DLT Library (1 - 2 Drive)			Compaq Wide-Ultra SCSI Adapter

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QUICKSPECS

Compaq ProLiant ML530

Storage

SUPPORTED TAPE DRIVE OPTIONS

Tape Drive	Operating System	Key
Internal 20/40-GB DAT DDS-4 Tape Drive	Novell NetWare Microsoft Windows NT	AS, SE AS, NT, SE
Internal 12/24-GB DAT Drive	Novell NetWare SCO UNIX Banyan VINES OS/2 Warp and LAN Server Microsoft Windows NT	AS, JS, SE AO, UX VN ST AS, NT, SE
Internal 4/8-GB DAT Drive	Novell NetWare SCO UNIX Banyan VINES OS/2 Warp and LAN Server Microsoft Windows NT	AS, JS, SE AO, UX VN ST AS, NT, SE
AIT 50-GB Tape Drive	Novell NetWare SCO UNIX Banyan VINES OS/2 Warp and LAN Server Microsoft Windows NT	AS, JS, SE AO, UX VN ST AS, NT, SE
AIT 35-GB Tape Drive	Novell NetWare SCO UNIX Banyan VINES OS/2 Warp and LAN Server Microsoft Windows NT	AS, JS, SE AO, UX VN ST AS, NT, SE
12/24-GB DAT DDS-3 8 Cassette Autoloader	Novell NetWare SCO UNIX Banyan VINES OS/2 Warp and LAN Server Microsoft Windows NT	AS, JS, SE AO, UX VN ST AS, NT, SE
20/40-GB DAT DDS-4 8 Cassette Autoloader	Novell NetWare SCO UNIX Banyan VINES OS/2 Warp and LAN Server Microsoft Windows NT	AS, JS, SE AO, UX VN ST AS, NT, SE
35/70-GB DLT Drive	Novell NetWare SCO UNIX OS/2 Warp and LAN Server Microsoft Windows NT	AS, JS, SE AO, UX ST AS, NT, SE
20/40-GB DLT Drive	Novell NetWare SCO UNIX OS/2 Warp and LAN Server Microsoft Windows NT	AS, JS, LG, SE AO, UX NV AS, NT, SE
DLT Tape Array II Model 35/70	Novell NetWare SCO UNIX Microsoft Windows NT	LG UX LG
DLT 15 Cartridge Library Model 35/70-1	Novell NetWare SCO UNIX Microsoft Windows NT	AS, JS, SE AO, UX AS, NT, SE
DLT 15 Cartridge Library Model 35/70-2	Novell NetWare SCO UNIX Microsoft Windows NT	AS, JS, SE AO, UX AS, NT, SE
DLT 15 Cartridge Library Model 20/40-1	Novell NetWare SCO UNIX Microsoft Windows NT	AS, JS, SE AO, UX AS, NT, SE
DLT 15 Cartridge Library Model 20/40-2	Novell NetWare SCO UNIX Microsoft Windows NT	AS, JS, SE AO, UX AS, NT, SE

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QUICKSPECS

Compaq ProLiant ML530

Storage

SUPPORTED TAPE DRIVE OPTIONS *(continued)*

Tape Drive	Operating System	Key
TL891 DLT Library (1 - 2 Drive)	Novell NetWare Microsoft Windows NT 4.0	AS, SE AS, NT, SE, LG
TL881 DLT Library (1 - 2 Drive)	Novell NetWare Microsoft Windows NT 4.0	AS, SE AS, NT, SE

Keys to Chart

AS	Computer Associates ARCserve	VN	Banyan VINES support for Compaq tape drives included in operating system
JS	Computer Associates JETserve	UX	Device drivers for Compaq tape drives available from SCO in the SCO Compaq Supplement
AO	Computer Associates ARCserve Open	NT	Microsoft Windows NT support for Compaq tape drives included in operating system
LG	Legato Networker Software from Legato	NV	Novastor Novaback for OS/2
ST	Sylos Plus software		
SE	Veritas Software Backup Exec		

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QUICKSPECS

Compaq ProLiant ML530

Technical Specifications

System Unit - Tower

Dimensions (HxWxD)	20 x 12.8 x 26.5 in / 50.8 x 32.5 x 67.3 cm	
Weight No hard drives installed, one power supply	100 lbs/45.36 kg	
Input Requirements (per power supply) Rated Input Voltage Rated Input Frequency Input Power Rated Input Current	100 to 127 VAC / 200 to 240 VAC 47 to 63 Hz 690W @ 110 VAC / 7.6A	
BTU Rating	2400 BTU/hr	
SCSI Connectors	Two internal HD68 connectors (supporting Wide Ultra2) One external VHDCI connector (supporting Wide Ultra2) One SCSI knockout	
Power Supply Output Power (per power supply) Rated Steady-State Power Maximum Peak Power	450W	
Temperature Range Operating Non-operating Shipping	50° to 95°F/10° to 35°C -20° to 140°F/-29° to 60°C -22° to 122°F/-30° to 50°C	
Relative Humidity (non-condensing) Operating Non-operating	20% to 80% 5% to 90%	
Maximum Wet Bulb Temperature	101.7°F/38.7°C	
Acoustic Noise Idle (Fixed Disk Drives Spinning) Operating (Random Seeks to Fixed Disks)	NPEL (BELS) 7.1 7.2	AVERAGE SPL (dBA) 6.9 7.1

System Unit - Rack

Dimensions (HxWxD)	17.5 x 12.1 x 25.4 in / 44.4 x 30.7 x 64.5 cm	
Weight No hard drives installed, one power supply	87.4 lbs / 39.6 kg	
Input Requirements (per power supply) Rated Input Voltage Rated Input Frequency Input Power Rated Input Current	100 to 127 VAC / 200 to 240 VAC 47 to 63 Hz 690W @ 110 VAC / 670W @ 220 VAC 7.6A	
BTU Rating	2400 BTU/hr	
SCSI Connectors	Two internal HD68 connectors (supporting Wide Ultra2) One external VHDCI connector (supporting Wide Ultra2) One SCSI knockout	
Power Supply Output Power (per power supply) Rated Steady-State Power Maximum Peak Power	450W	
Temperature Range Operating Non-operating Shipping	50° to 95°F/10° to 35°C -20° to 140°F/-29° to 60°C -22° to 122°F/-30° to 50°C	

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QUICKSPECS

Compaq ProLiant ML530

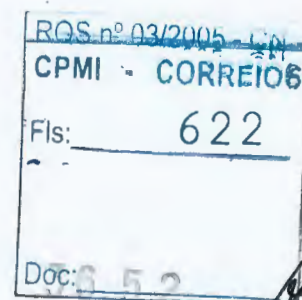
Technical Specifications

System Unit - Rack (continued)

Relative Humidity (non-condensing)		
Operating	20% to 80%	
Non-operating	5% to 90%	
Maximum Wet Bulb Temperature		101.7°F/38.7°C
Acoustic Noise		
	NPEL (BELS)	AVERAGE SPL (dBA)
Idle (Fixed Disk Drives Spinning)	7.1	6.9
Operating (Random Seeks to Fixed Disks)	7.1	7.1

1.44-MB Diskette Drive

Diskette Size	3.5 in
LED Indicators (front panel)	Green
Read/Write Capacity per Diskette (high/low density)	1.44 MB/720 KB
Drive Supported	One
Drive Height	One-third
Drive Rotation	300 rpm
Transfer Rate Synchronous Maximum (high/low)	500/250 Kb/s
Bytes/Sector	512
Sectors/Track (high/low)	18/9
Tracks/Side (high/low)	80/80
Access Times	
Track-to-Track (high/low)	3/6 ms
Average (high/low)	169/94 ms
Settling Time	15 ms
Latency Average	100 ms
Cylinders (high/low)	80/80
Read/Write Heads	Two



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QUICKSPECS

Compaq ProLiant ML530

Technical Specifications

Hot Plug
Wide Ultra2 SCSI
Hard Drives

18.2 GB 10K	Capacity	18209.3 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	5.2 ms
	Interface	Wide Ultra2 SCSI	Full-Stroke	12 ms
	Transfer Rate	80 MB/s	Rotational Speed	10,000 rpm
			Physical Configuration	
	Synchronous (Maximum)		Bytes/Sector	512
			Logical Blocks	35,566,080
			Operating Temperature	
			50 to 95 F/10 to 35 C	

18.2 GB 10K	Capacity	18209.3 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	7.0 ms
	Interface	Wide Ultra2 SCSI	Full-Stroke	15 ms
	Transfer Rate	80 MB/s	Rotational Speed	7200 rpm
			Physical Configuration	
	Synchronous (Maximum)		Bytes/Sector	512
			Logical Blocks	35,565,080
			Operating Temperature	
			50 to 95 F/10 to 35 C	

9.1 GB 10K	Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	5.2 ms
	Interface	Wide Ultra2 SCSI	Full-Stroke	12 ms
	Transfer Rate	80 MB/s	Rotational Speed	10,000 rpm
			Physical Configuration	
	Synchronous (Maximum)		Bytes/Sector	512
			Logical Blocks	17,773,524
			Operating Temperature	
			50 to 95 F/10 to 35 C	

9.1 GB 10K	Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	7.0 ms
	Interface	Wide Ultra2 SCSI	Full-Stroke	15 ms
	Transfer Rate	80 MB/s	Rotational Speed	7200 rpm
			Physical Configuration	
	Synchronous (Maximum)		Bytes/Sector	512
			Logical Blocks	17,773,524
			Operating Temperature	
			50 to 95 F/10 to 35 C	

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QUICKSPECS

Compaq ProLiant ML530

Technical Specifications

Hot Plug
Wide Ultra3 SCSI
Hard Drives

18.2 GB 10K	Capacity	18209.3 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	5.2 ms
	Interface	Wide Ultra3 SCSI	Full-Stroke	12 ms
	Transfer Rate	160 MB/s	Rotational Speed	10,000 rpm
			Physical Configuration	
	Synchronous (Maximum)		Bytes/Sector	512
			Logical Blocks	35,565,080
			Operating Temperature	50 to 95 F/10 to 35 C
9.1 GB 10K	Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	5.0 ms
	Interface	Wide Ultra3 SCSI	Full-Stroke	12 ms
	Transfer Rate	160 MB/s	Rotational Speed	10,000 rpm
			Physical Configuration	
	Synchronous (Maximum)		Bytes/Sector	512
			Logical Blocks	17,773,524
			Operating Temperature	50 to 95 F/10 to 35 C

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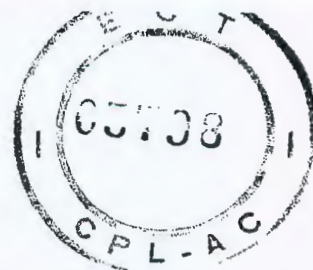
Technical Specifications

32X Max IDE CD-ROM Drive

Disk	
Applicable Disk	CD-ROM (Mode 1 and 2) CD-DA, CD-XA (Mode 2, Form 1 and 2) Photo CD (Single and Multi-session) Mixed Mode (Audio and Data combined)
Capacity	550 MB (Mode 1, 12 cm) 640 MB (Mode 2, 12 cm)
Diameter	4.7 in, 3.15 in/12 cm, 8 cm
Rotational Speed	4200 rpm maximum
Center Hole	0.6 in/15 mm diameter
Thickness	1.2 mm
Track Pitch	1.6 μ m
Block Size	
Mode 1	2,048 bytes
Mode 2	2,340, 2,336, 1,024 bytes
CD-DA	2,352 bytes
CD-XA	2,328 bytes
Interface	IDE (ATAPI)
Access Times (typical)	
Random	100 ms
Full-Stroke	150 ms
Audio Output Level	
Line-Out	0.7 VRMS at 47 kOhms
Headphone	0.6 VRMS at 32 Ohms (maximum volume)
Data Transfer Rate	
Sustained	150 KB/s (1X audio)
Burst	2100 to 4800 KB/s
Cache Buffer	128 KB
Start-up Time (typical)	< 7 seconds
Stop Time	< 4 seconds
Laser Parameters	
Type	Semiconductor Laser GaAlAs
Wave Length	780 25 nm
Divergence Angle	53.5° 1.5°
Output Power	0.14mW
Operating Conditions	
Temperature	41° to 113°F/5° to 45°C
Humidity	10% to 80%
Dimensions	
(HxWxD, maximum)	1.88 x 5.85 x 8.11 in/4.29 x 15 x 20.8 cm
Weight	2.09 lbs/0.95 kg

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QUICKSPECS

Compaq ProLiant ML530

Technical Specifications

Smart Array 4200 Controller

Protocol	Wide Ultra2 SCSI
SCSI Electrical Interface	Low Voltage Differential
Drives Supported (maximum)	56 drives
Data Transfer Method	64-bit PCI bus-master
Maximum Transfer Rate on PCI Bus(peak)	
Simultaneous Drive Transfer Channels	Four
Total Channel Transfer Rate	320 MB/s
Software Upgradable Firmware	Yes
Cache	64 MB battery-backed and removable
Logical Drives Supported	32
Reliability Features	
Cache Battery Backup	Yes
Online Capacity Expansion	Yes
Logical Drive Capacity Extension	Yes
Online RAID Level Migration	Yes
Online Stripe Size Migration	Yes
Automatic Data Recovery	Yes
Distributed Data Guarding (RAID 5)	Yes
Data Guarding (RAID 4)	Yes
Drive Mirroring (RAID 1)	Yes
Drive Striping (RAID 0, 0 + 1)	Yes

Smart Array 3200 Controller

Drives Supported	Up to 15 drives per channel, 30 drives maximum
Data Transfer Method	32-bit PCI bus-master
Maximum Transfer Rate per PCI Bus(peak)	133 MB/s
Simultaneous Drive Transfer Channels	Two
Total Transfer Rate	160 MB/s (80 MB/s per channel)
Software Upgradable Firmware	Yes
Cache	64-MB Array Accelerator
Reliability Features	
Distributed Data Guarding (RAID 5)	Yes
Data Guarding (RAID 4)	Yes
Drive Mirroring (RAID 1)	Yes
Drive Striping (RAID 0)	Yes
Automatic Data Recovery	Yes

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QUICKSPECS

Compaq ProLiant ML530

Technical Specifications

Smart Array 431 Controller

Protocol	Wide Ultra3 SCSI
SCSI Electrical Interface	Low Voltage Differential (LVD)
Drives Supported	Up to 14 Drives Wide Ultra3 or Wide Ultra2 SCSI hard drives
SCSI Port Connectors	Single External/Internal SCSI port
Data Transfer Method	64-bit PCI bus-master
Maximum Transfer Rate on System Bus (peak)	266 MB/s
Simultaneous Drive Transfer Channels	One
Channel Transfer Rate	160 MB/s per channel
Software Upgradable Firmware	Yes
Read-Only Cache	16MB Cache Performance Engine
Logical Drives Supported	32
Reliability Features	
Distributed Data Guarding (RAID 5)	Yes
Drive Mirroring (RAID 1)	Yes
Drive Striping (RAID 0, 0+1)	Yes
Automatic Data Recovery	Yes
Disk Drive Protocol Support	Wide Ultra3 and Wide Ultra2 SCSI
Enclosure Support	New StorageWorks Enclosure 4200 Family (Models 4214R and 4214T)

Smart Array 221 Controller

Drives Supported	Up to 14 drives (The ProLiant ML530 will support up to 12 internal hard drives or 12 external hard drives using the ProLiant Storage System Model UE storage enclosure.)
Data Transfer Method	32-bit PCI bus-master
Maximum Transfer Rate per PCI Bus (peak)	133 MB/s
Simultaneous Drive Transfer Channels	One
Total Transfer Rate	80 MB/s per channel
Software Upgradable Firmware	Yes
Cache	6-MB of ECC protected read cache
Reliability Features	
Distributed Data Guarding (RAID 5)	Yes
Drive Mirroring (RAID 1)	Yes
Drive Striping (RAID 0 + 1)	Yes
Automatic Data Recovery	Yes

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QUICKSPECS

Compaq ProLiant ML530

Technical Specifications

64-bit / 66-MHz Dual
Channel Wide Ultra3
SCSI Adapter

Drives Supported	Up to 28 SCSI devices (14 per channel)
Storage Capacity	1.019 TB
Data Transfer Method	64-bit / 66-MHz PCI bus-master
Maximum SCSI Channel Transfer Rate	160 MB/s per channel
Maximum Transfer Rate per PCI Bus (peak)	532 MB/s per channel
SCSI Protocols	Wide Ultra3 SCSI Wide Ultra2 SCSI Wide-Ultra SCSI-3 Fast SCSI-2
Electrical Protocol	Low Voltage Differential (LVD)
SCSI Termination	Active Termination
External SCSI Connectors	Two 68-Pin VHDCI connectors
Internal SCSI Connectors	Two 68-Pin Wide Ultra SCSI-3 connectors One 50-Pin Narrow Ultra connector

Integrated 64-bit Dual
Channel Wide-Ultra2
SCSI Adapter

Drives Supported	Up to 28 SCSI devices (14 per channel)
Data Transfer Method	64-bit PCI bus-master
SCSI Channel Transfer Rate	80 MB/s per channel
Maximum Transfer Rate per PCI Bus (peak)	133 MB/s per channel
SCSI Protocols	Wide Ultra2 SCSI Wide-Ultra SCSI-3 Fast SCSI-2
Electrical Protocol	Low Voltage Differential (LVD)
SCSI Termination	Active Termination
External SCSI Connectors	Two 80-Pin VHDCI connectors
Internal SCSI Connectors	Two 68-Pin Wide Ultra SCSI-3 connectors

Video Controller

Controller Chip	ATI RAGE IIC PCI
Video DRAM	4 MB Video SGRAM
Data Transfer Method	32-bit PCI
Support Resolution	Supported Color Depths: 640 x 480 800 x 600 1024 x 768 1152 x 864 1280 x 1024 1600 x 1200 16.7M, 64K, 256, 16 16.7M, 64K, 256, 16 16.7M, 64K, 256, 16 16.7M, 64K, 256, 16 64K, 256, 16
Connector	VGA

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QUICKSPECS

Compaq ProLiant ML530

Technical Specifications

OS Driver Support

Operating Systems	Current Drivers	Driver Location (Punch-out diskettes only.)
Microsoft Windows NT Server 3.51	NTSSD 1.37a	SmartStart CD and www.compaq.com
Microsoft Windows NT Server 4.0	NTSSD 2.16a	SmartStart CD and www.compaq.com
Microsoft Windows NT Server, Enterprise Edition 4.0	NTSSD 2.16a	SmartStart CD and www.compaq.com
Microsoft Windows NT Server 4.0, Terminal Server Edition	NTSSD 2.16a	SmartStart CD and www.compaq.com
Microsoft Windows 2000	Support Software Bundle for Windows 2000	SmartStart CD and www.compaq.com
Microsoft Windows 2000 Advanced Server	Support Software Bundle for Windows 2000	SmartStart CD and www.compaq.com
Novell NetWare 3.2	NSSD 5.40	SmartStart CD and www.compaq.com
Novell NetWare 4.2, 4.2 SMP	NSSD 5.40	SmartStart CD and www.compaq.com
Novell NetWare 5.1	NSSD 5.40	SmartStart CD and www.compaq.com
SCO OpenServer 5.0.4, 5.0.5	EFS 5.32	SmartStart CD and www.compaq.com
SCO UnixWare 2.1.2, 2.1.3	EFS 2.32	SmartStart CD and www.compaq.com
SCO UnixWare 7.1.0, 7.1.1	EFS 7.32	SmartStart CD and www.compaq.com
IBM OS/2 Warp Connect	OS2SSD 4.30 NICSSD 1.55	SmartStart CD and www.compaq.com
IBM OS/2 Warp Server Advanced 4	OS2SSD 4.30 NICSSD 1.55	SmartStart CD and www.compaq.com
IBM OS/2 Warp Server SMP 4	OS2SSD 4.30 NICSSD 1.55	SmartStart CD and www.compaq.com
IBM OS/2 Warp Server 4	OS2SSD 4.30 NICSSD 1.55	SmartStart CD and www.compaq.com
IBM OS/2 Warp 4.0	OS2SSD 4.30 NICSSD 1.55	SmartStart CD and www.compaq.com
Sun Solaris Intel Platform Edition 7 (future support)	Planned	
Sun Solaris Intel Platform Edition 2.6 (future support)	Planned	
RedHat Linux version 6.1 (future support)	Planned	

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PROPOSTA TÉCNICA

Especificação do INT4 e INT5

ProLiant 5500/ML570

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COMPAQ

United States April 27, 2000

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ProLiant 5500

ProLiant servers

model information

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- [ProLiant 5500 pentium III xeon 6/550 - new](#)
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general information

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- [question and answer](#)
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technical information

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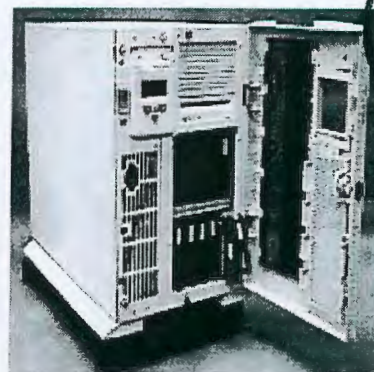
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The ProLiant 5500 server is ideal for large business and enterprise customers requiring an affordable, high performance, multi-purpose server for business critical applications. For customers requiring the latest technology, the ProLiant 5500 enterprise server now offers Intel's powerful new 550 MHz Pentium III Xeon processor for enhanced performance. In addition, the new ProLiant 5500 server incorporates Ultra2 SCSI technology to deliver maximum computing for greater performance results.

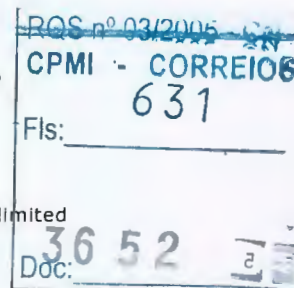


The Compaq ProLiant 5500 combines this new technology in addition to excellent expansion and Compaq's legendary fault tolerant and management capabilities to deliver outstanding value while lowering ownership costs for enterprise computing environments.

Key Features

CONFIGURE & BUY

- The ProLiant 5500 sets the standard for value and performance in the enterprise
- One to four Intel Pentium® III Xeon™ 550-MHz processor with 100-MHz front-side bus & full speed cache (512K or 1M cache standard and 2M cache optional)
- Dual Peer PCI architecture (no need to balance I/O)
- ECC-protected memory bus and cache
- 256 MB of ECC EDO memory expandable to 4 GB
- Seven I/O slots: Six PCI and one shared PCI/ISA
- Compaq 10/100 TX PCI Intel UTP Controller in a slot
- Compaq Dual Channel Wide Ultra2 SCSI Adapter in a slot
- Optional Smart Array 3200 controller
- Internal mass storage capacity up to 182 GB (internal hot plug drive cage only)
- Ultra2 SCSI Drive Cage (simplex) supporting ten 1" Ultra2 hard drives
- Optional Ultra2 Duplex Drive Cage (future availability)
- Optional Wide-Ultra SCSI-3 Simplex/Duplex Drive Cage to support Wide-Ultra SCSI-3 hot plug drives
- Integrated Remote Console
- 750/500-Watt Hot Plug Power Supply with optional redundancy
- Optional redundant fans
- Automatic Server Recovery-2 (ASR-2)
- Optional Integrated Management Display (IMD)
- Preinstalled 32X Max¹ or faster IDE CD-ROM Drive
- NTSL YMARK2000 tested
- Protected by Compaq Services, including a three-year, on-site limited warranty² and extended Pre-Failure Warranty² which covers processors, memory and disk drives



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1. Data transfer rates will vary from 150 KB/s to 4800 KB/s.
2. Certain restrictions and exclusions apply. Consult the Compaq Customer Support Center for details.

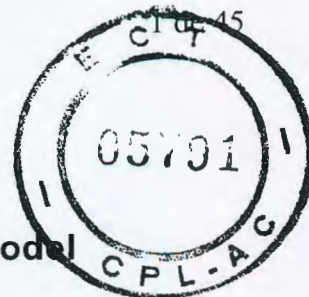
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privacy and legal statement



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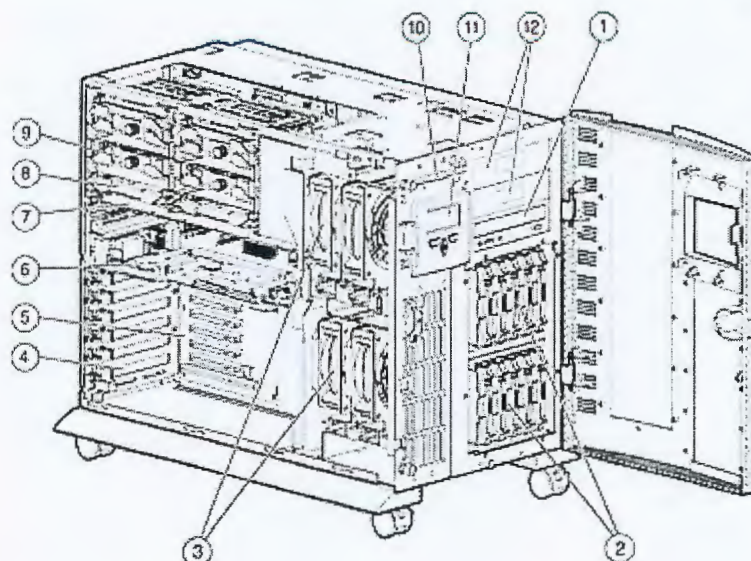
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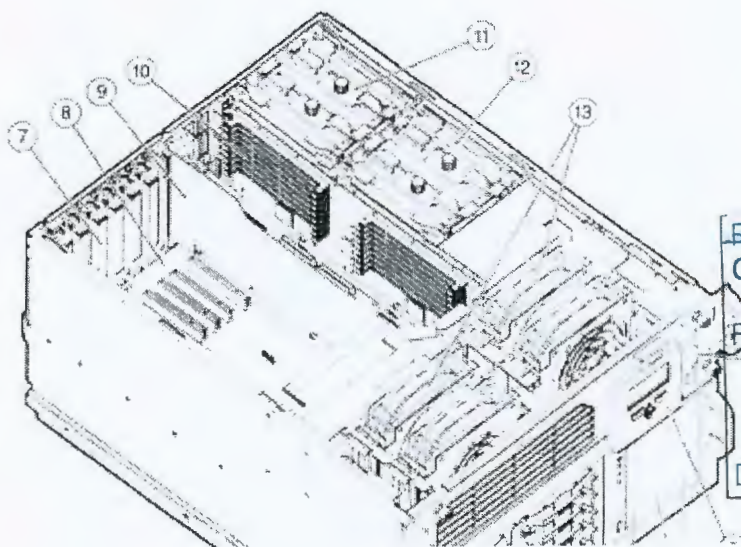
QuickSpecs

Compaq ProLiant 5500 Pentium III Xeon Model



Rack Models

- | | |
|---|--|
| 1. High Speed IDE CD-ROM Drive | 6. Peripheral Board |
| 2. Wide Ultra2 Hot Plug Drive Cage shown (some Models ship with Wide-Ultra SCSI-3 Drive Cage) | 7. Memory Board |
| 3. Two Primary Fans, Two Optional Redundant Fans | 8. Processor Power Module |
| 4. Seven I/O Slots | 9. Intel Pentium III Xeon Processor |
| 5. System Board | 10. Floppy Drive |
| | 11. Optional Integrated Management Display |
| | 12. Half height Bays |



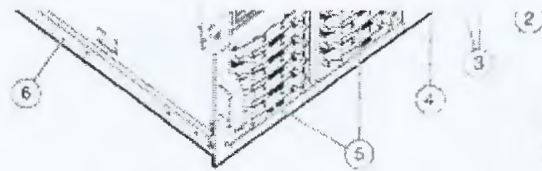
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Tower Models

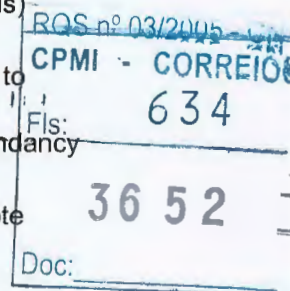
- | | |
|--|---|
| 1. Floppy Drive | 6. Rack Slide Rail |
| 2. Integrated Management Display | 7. I/O Slot Covers |
| 3. Half height Bays | 8. System Board |
| 4. High Speed CD-ROM Drive | 9. Peripheral Board |
| 5. Wide Ultra2/Ultra3 Hot Plug Drive Cage shown (some Models ship with a Wide-Ultra SCSI-3 Drive Cage) | 10. Memory Board |
| | 11. Intel Pentium III Xeon Processor |
| | 12. Processor Power Module |
| | 13. Two Primary Fans, Two Optional Redundant Fans |

What's New

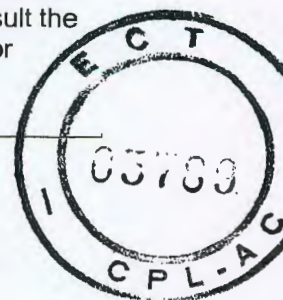
- Intel Pentium® III Xeon™ 550-MHz Processor (quad processor capability)
- Wide-Ultra SCSI-3 Drive Cage Models (500-MHz Models only)

At A Glance

- The ProLiant 5500 sets the standard for value and performance in the enterprise
- One to four Intel Pentium III Xeon 500-MHz or 550-MHz processor with 100-MHz front-side bus & full speed cache (512K or 1M cache standard and 2M cache optional)
- Dual Peer PCI architecture (no need to balance I/O)
- ECC-protected memory bus and cache
- 256 MB of ECC EDO memory expandable to 4 GB
- Seven I/O slots: Six PCI and one shared PCI/ISA
- Compaq NC3120 10/100 TX PCI UTP Controller in a slot
- Compaq 64-Bit Dual Channel Wide Ultra2 SCSI Adapter in a slot (operating at 32-bit speeds) (Wide Ultra2 Models only)
- Internal hot plug capacity up to 182 GB (W/U2 Models) or 218.4 GB (W/U SCSI-3 Models)
- Standard Wide Ultra2/Ultra3 SCSI Drive Cage (simplex) supporting ten 1" Ultra2/Ultra3 hard drives (in Wide Ultra2 Models)
- Standard Wide-Ultra SCSI-3 Drive Cage (in some Models)
- Optional Ultra2/Ultra3 Duplex Drive Cage
- Optional Wide-Ultra SCSI-3 Simplex/Duplex Drive Cage to support Wide-Ultra SCSI-3 hot plug drives
- 750/500-Watt Hot Plug Power Supply with optional redundancy
- Optional redundant fans
- Automatic Server Recovery-2 (ASR-2), Integrated Remote Console (IRC)
- NTSL YMARK2000 tested



- Protected by Compaq Services, including a three-year, on-site limited warranty and extended Pre-Failure Warranty that covers processors, memory and disk drives — Certain restrictions and exclusions apply. Consult the Compaq Customer Support Center at 1-800-345-1518 for details.



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Standard Features

Models

Compaq ProLiant 5500 Pentium III Xeon Models

Available in multiple configurations.

Processor – One of the following

Intel Pentium III Xeon processor 550 MHz

Intel Pentium III Xeon processor 500 MHz

Cache Memory – One of the following

1-MB level 2 writeback cache per processor standard,

512-KB or 2-MB level 2 writeback cache per processor optional

512-KB level 2 writeback cache per processor standard,

1-MB or 2-MB level 2 writeback cache per processor optional

The Compaq ProLiant 5500 6/500 or 6/550 Models support mixing processors of different cache sizes but requires the following:

Use processors of the same speed

Mix cache size in pairs

Please see www.Compaq.com for further details.

Upgradability

Upgradable to quad processing

Upgradable to 550 MHz 2-MB level 2 writeback cache per processor (550-MHz models)

Upgradable to 500 MHz 2-MB level 2 writeback cache per processor (500-MHz models)

Memory

Standard 256 MB

Maximum 4 GB

Network Controller

Compaq NC3120 10/100 TX PCI UTP controller occupying one PCI slot

Expansion Slots

I/O (Total) 7,5 available

PCI 6

Shared PCI/ISA 1

Storage Controller

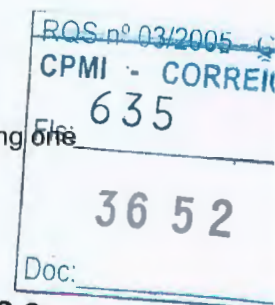
Compaq 64-bit Dual Channel Wide Ultra2 SCSI Adapter occupying one

PCI slot (operating at 32-Bit speeds)

(only in Wide Ultra2 models)

Storage

Diskette Drives 1.44 MB



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CD-ROM	High Speed IDE CD-ROM Drive
Hard Drives	None
Maximum Internal Storage	182 GB (internal hot plug Wide Ultra2/Ultra3 drive cage only) (10 x 18.2)
Maximum Internal Storage	218.4 GB (internal hot plug Wide-Ultra SCSI-3 drive cage only) (6 x 36.4)

Interfaces

Parallel	1
Serial	2
Pointing Device (Mouse)	1
Graphics	1
Hot Plug Keyboard	1
External Wide-Ultra SCSI-3	1
64-Bit Wide Ultra2 SCSI Adapter	1 (Only in Ultra2 models)
Network RJ-45	1

**Graphics**

Integrated 1280 x 1024, 256 color on PCI local bus, 2-MB video memory

Form Factor

Tower or Rack (7U)

Compaq Software

Compaq Insight Manager	The comprehensive system management tool that monitors the operation of Compaq servers, workstations and clients
Compaq SmartStart	The server configuration and software integration tool from Compaq
Array Configuration Utility (ACU) with Smart Array Controllers	Same easy to use yet powerful graphical user interface (GUI) configuration utility and easy to navigate wizards for all Smart Array Controllers

Manageability

Automatic Server Recovery-2 (ASR-2)
 Integrated Remote Console (IRC)
 Hardware Remote Console
 Full Remote Server Reboot Capability
 Reset and Failure Sequence Replay
 Host Hardware Independent
 Operating System Independent
 Server Health Logging
 Revision History Table
 Automatic Revision Tracking
 Drive Parameter Tracking (with Smart Array Controller)
 Dynamic Sector Repairing (with Smart Array Controller)
 Off-Line Backup Processor capability (optional in Canada)
 Pre-Failure Warranty (covers processors, hard drives and memory)
 Redundant Fan Support

Security

Power-on password

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Hot plug keyboard password
 Diskette drive control
 Diskette boot control
 QuickLock, Network Server Mode
 Parallel and serial interface control
 Administrator's password
 Disk configuration lock
 Power supply security bar



Power Supply

750/500-Watt Hot Plug Power Supply

Required Cabling

For required cabling information, refer to the Compaq web site at
<http://www.compaq.com/products/servers/proliant5500-xeon> or
<http://www.compaq.com/products/servers/proliant5500r-xeon>

Note: This web site is available in English only.

OS Support

Microsoft Windows NT
 Microsoft Windows 2000 Server
 Novell NetWare
 SCO UnixWare and OpenServer
 IBM OS/2 Warp Family
 Sun Solaris Intel Platform Edition
 Banyan VINES

Service and Support

Compaq Services provides a wide range of service offerings, including a three-year, limited warranty fully supported by a worldwide network of resellers and service providers, lifetime toll-free 7 x 24 hardware technical phone support and Pre-Failure Warranty coverage of hard drives, memory and processors. Disaster recovery services are available through partnership with Comdisco.

Note: Certain restrictions and exclusions apply. Consult the Compaq Customer Support Center at 1-800-345-1518 for details.

Tower Models

6/550 1 MB Model 2 Tower

100734-xx3

(Includes Wide Ultra2 SCSI Drive Cage)

Processor(s) (2) Intel Pentium III

Xeon 550-MHz

Cache

1-MB Level 2

Memory

writeback per processor

Memory

Standard 256 MB

Maximum 4 GB

Network

Compaq NC3120 10/100

Controller

TX PCI UTP

Storage

64-bit Dual Channel Wide

Controller

Ultra2 SCSI Adapter

Internal

182 GB (10 x 18.2)

Storage

Optical

High Speed IDE CD-

Drive

ROM Drive

Form

Tower

Factor

6/550 512K Model 1 Tower

100751-xx3

(Includes Wide Ultra2 SCSI Drive Cage)

Processor(s) (1) Intel Pentium III

Xeon 550-MHz

Cache

512-KB Level 2

Memory

writeback per

Network

Compaq NC3120 10/100

Controller

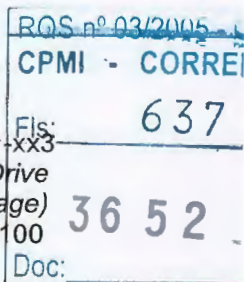
TX PCI UTP

Storage

64-bit Dual Channel Wide

Controller

Ultra2 SCSI Adapter



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Memory	writeback per processor	Controller	Ultra2 SCSI Adapter
Memory		Internal Storage	182 GB (10 x 18.2)
Standard	256 MB	Optical Drive	High Speed IDE CD-ROM Drive
Maximum	4 GB	Form Factor	Tower

6/500 1 MB Model 2 Tower 100734-xx2
(Includes Wide Ultra2 SCSI Drive Cage)

Processor(s)	(2) Intel Pentium III Xeon 500-MHz	Network Controller	Compaq NC3120 10/100 TX PCI UTP
Cache Memory	1-MB Level 2 writeback per processor	Storage Controller	64-bit Dual Channel Wide Ultra2 SCSI Adapter

Memory		Internal Storage	182 GB (10 x 18.2)
Standard	256 MB	Optical Drive	High Speed IDE CD-ROM Drive
Maximum	4 GB	Form Factor	Tower

6/500 1 MB Model 2 Tower 401147-xx2
(Includes Wide-Ultra SCSI-3 Drive Cage)

Processor(s)	(2) Intel Pentium III Xeon 500-MHz	Network Controller	Compaq NC3120 10/100 TX PCI UTP
Cache Memory	1-MB Level 2 writeback per processor	Storage Controller	64-bit Dual Channel Wide Ultra2 SCSI Adapter

Memory		Internal Storage	218.4 GB (6 x 36.4)
Standard	256 MB	Optical Drive	High Speed IDE CD-ROM Drive
Maximum	4 GB	Form Factor	Tower

6/500 512K Model 1 Tower 100751-xx2
(Includes Wide Ultra2 SCSI Drive Cage)

Processor(s)	(1) Intel Pentium III Xeon 500-MHz	Network Controller	Compaq NC3120 10/100 TX PCI UTP
Cache Memory	512-KB Level 2 writeback per processor	Storage Controller	64-bit Dual Channel Wide Ultra2 SCSI Adapter

Memory		Internal Storage	182 GB (10 x 18.2)
Standard	256 MB	Optical Drive	High Speed IDE CD-ROM Drive
Maximum	4 GB	Form Factor	Tower

6/500 512K Model 1 WU Tower 401145-xx2
(Includes Wide-Ultra SCSI-3 Drive Cage)

Processor(s)	(1) Intel Pentium III Xeon 500-MHz	Network Controller	Compaq NC3120 10/100 TX PCI UTP
Cache Memory	512-KB Level 2 writeback per processor	Storage Controller	64-bit Dual Channel Wide Ultra2 SCSI Adapter

Memory		Internal Storage	218.4 GB (6 x 36.4)
Standard	256 MB	Optical Drive	High Speed IDE CD-ROM Drive

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Standard 256 MB
Maximum 4 GB

Optical
Drive
Form
Factor

High Speed IDE CD-
ROM Drive
Tower



Rack Models

6/550 1 MB Model 2 Rack

100745-xx3
(Includes Wide Ultra2 SCSI Drive
Cage)

Processor (s) (2) Intel Pentium III
Xeon 550-MHz
Cache 1-MB Level 2
Memory writeback per
processor

Memory

Standard 256 MB
Maximum 4 GB

Network Controller Compaq NC3120 10/100
TX PCI UTP
Storage Controller 64-bit Dual Channel
Wide Ultra2 SCSI
Adapter

Internal Storage

182 GB (10 x 18.2)
Optical Drive High Speed IDE CD-
ROM Drive
Form Factor Rack (7U)

6/550 512K Model 1 Rack

100738-xx3
(Includes Wide Ultra2 SCSI Drive
Cage)

Processor (s) (1) Intel Pentium III
Xeon 550-MHz
Cache 512-KB Level 2
Memory writeback per
processor

Memory

Standard 256 MB
Maximum 4 GB

Network Controller Compaq NC3120 10/100
TX PCI UTP
Storage Controller 64-bit Dual Channel
Wide Ultra2 SCSI
Adapter

Internal Storage

182 GB (10 x 18.2)
Optical Drive High Speed IDE CD-
ROM Drive
Form Factor Rack (7U)

6/500 1 MB Model 2 Rack

100745-xx2
(Includes Wide Ultra2 SCSI Drive
Cage)

Processor (s) (2) Intel Pentium III
Xeon 500-MHz
Cache 1-MB Level 2
Memory writeback per
processor

Memory

Standard 256 MB
Maximum 4 GB

Network Controller Compaq NC3120 10/100
TX PCI UTP
Storage Controller 64-bit Dual Channel
Wide Ultra2 SCSI
Adapter

Internal Storage

182 GB (10 x 18.2)
Optical Drive High Speed IDE CD-
ROM Drive
Form Factor Rack (7U)

6/500 1 MB Model 1 WU Rack

401148-xx2
(Includes Wide-Ultra SCSI-3 Drive
Cage)

Processor (s) (2) Intel Pentium III
Xeon 500-MHz
Cache 512-KB Level 2
Memory writeback per
processor

Memory

Standard 256 MB

Network Controller Compaq NC3120 10/100
TX PCI UTP
Storage Controller 64-bit Dual Channel
Wide Ultra2 SCSI
Adapter

Internal Storage

218.4 GB (6 x 36.4)
Optical Drive High Speed IDE CD-
ROM Drive

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Maximum 4 GB

Form Factor Rack (7U)

6/500 512K Model 1 Rack

100738-xx2

(Includes Wide Ultra2 SCSI Drive Cage)

Processor (s) (1) Intel Pentium III Xeon 500-MHz
Cache 512-KB Level 2
Memory writeback per processor

Network Controller Compaq NC3120 10/100 TX PCI UTP
Storage Controller 64-bit Dual Channel Wide Ultra2 SCSI Adapter
Internal Storage 182 GB (10 x 18.2)

Memory
Standard 256 MB

Optical Drive High Speed IDE CD-ROM Drive
Form Factor Rack (7U)

Maximum 4 GB

6/500 512K Model 1 WU Rack

401146-xx2

(Includes Wide-Ultra SCSI-3 Drive Cage)

Processor (s) (1) Intel Pentium III Xeon 500-MHz
Cache 512-KB Level 2
Memory writeback per processor

Network Controller Compaq NC3120 10/100 TX PCI UTP
Storage Controller 64-bit Dual Channel Wide Ultra2 SCSI Adapter
Internal Storage 218.4 GB (6 x 36.4)

Memory
Standard 256 MB

Optical Drive High Speed IDE CD-ROM Drive
Form Factor Rack (7U)

Maximum 4 GB

Country Code Key

XX=00 US
XX=02 Int'l
XX=03 Great Britain
XX=29 Japan
XX=37 APD
XX=AA PRC

Options

Processor

Pentium III Xeon 6/550 2MB Processor Option Kit	155224-B21
Pentium III Xeon 6/550 1MB Processor Option Kit	155223-B21
Pentium III Xeon 6/550 512K Processor Option Kit	155222-B21
Pentium III Xeon 6/500 2MB Processor Option Kit	117812-B21
Pentium III Xeon 6/500 1MB Processor Option Kit	117811-B21
Pentium III Xeon 6/500 512K Processor Option Kit	117810-B21

Note: The increasing power of new high-performance processor technology requires increased cooling efficiency for rack-mounted servers. The new Compaq Rack 9000 series (part numbers 120663-001 (42U), 120664-001 (36U), 120665-001 (22U)) provides enhanced airflow for maximum cooling, allowing these racks to be fully loaded with servers using the latest processors.

When installing a server with Pentium III Xeon processors running at speeds of 550MHz or greater in Compaq Rack 7000 and 4000 series racks (part numbers 165753-001 (42U), and 163747-001 (22U)), the new processor technology requires the installation of Compaq's new High Airflow Rack Door Insert, part number 327281-B21 (42U) or 157847-B21 (22U).

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Memory (DIMMs)**50 ns EDO**

1024-MB EDO Memory Expansion Kit (4 x 256-MB buffered EDO DIMMs, 50ns)	328583-B21
512-MB EDO Memory Expansion Kit (4 x 128-MB buffered EDO DIMMs, 50ns)	328582-B21
256-MB EDO Memory Expansion Kit (4 x 64-MB buffered EDO DIMMs, 50ns)	328581-B21

Optical Drives

DVD-ROM Drive Option Kit (Opal)	388481-B21
(DVD-ROM Drive Option Kit only supported by Windows NT or Windows 2000 OS.)	

Internal Storage

Simplex/Duplex Wide-Ultra SCSI-3 Drive Cage Option Kit	328073-B21
(Wide-Ultra SCSI-3 Drives require the purchase of the Simplex/Duplex Wide-Ultra Drive Cage Option Kit (328073-B21) when using in the Wide Ultra2 Models.)	
Wide Ultra2/Ultra3 SCSI Drive Cage Option Kit	382157-B21
(Wide Ultra2/Ultra3 Drives require the purchase of the Wide Ultra2/Ultra3 SCSI Drive Cage Option Kit (382157-B21) when using in Wide-Ultra SCSI-3 Models.)	
Duplex Ultra2/Ultra3 SCSI Drive Cage Option Kit	123135-B21
(Wide Ultra2/Ultra3 Drives require the purchase of the Wide Ultra2/Ultra3 SCSI Drive Cage Option Kit (382157-B21) when using in Wide-Ultra SCSI-3 Models.)	

Hard Drives

(Caution -Check to make sure that you are using the right drive with the correct drive cage)

Wide Ultra3 SCSI-Universal Hot Plug

18.2-GB Wide Ultra3 SCSI 10,000 rpm Drive (1")	142673-B22
9.1-GB Wide Ultra3 SCSI 10,000 rpm Drive (1")	142671-B22

Note: Wide Ultra2/Ultra3 Drives require the purchase of the Wide Ultra2/Ultra3 SCSI Drive Cage Option Kit (382157-B21) when using in Wide-Ultra SCSI-3 Models.

Wide Ultra2 SCSI-Universal Hot Plug

18.2-GB Wide Ultra2 SCSI 10,000 rpm Drive (1")	128418-B22
18.2-GB Wide Ultra2 SCSI Drive (1")	388144-B22
9.1-GB Wide Ultra2 SCSI 10,000 rpm Drive (1")	328939-B22
9.1-GB Wide Ultra2 SCSI Drive (1")	123065-B22

Note: Wide Ultra2/Ultra3 Drives require the purchase of the Wide Ultra2/Ultra3 SCSI Drive Cage Option Kit (382157-B21) when using in Wide-Ultra SCSI-3 Models.

Wide Ultra3 SCSI-Non-Hot Plug

18.2-GB Wide Ultra3 SCSI 10,000 rpm Drive (1")	142674-B21
9.1-GB Wide Ultra3 SCSI 10,000 rpm Drive (1")	142672-B21

Note: Wide Ultra2/Ultra3 Drives require the purchase of the Wide Ultra2/Ultra3 SCSI Drive Cage Option Kit (382157-B21) when using in Wide-Ultra SCSI-3 Models.

Wide Ultra2 SCSI-Non-Hot Plug

18.2-GB Wide Ultra2 SCSI Drive (1")	388143-B21
9.1-GB Wide Ultra2 SCSI Drive (1")	349526-B21

Wide-Ultra SCSI-3 Hot Plug

36.4-GB Wide-Ultra SCSI-3 10,000 rpm Drive (1.6")	128420-B21
36.4-GB Wide-Ultra SCSI-3 Drive (1.6")	400740-B21
18.2-GB Wide-Ultra SCSI-3 10,000 rpm Drive (1")	128417-B21
18.2-GB Wide-Ultra SCSI-3 Drive (1")	400739-B21
9.1-GB Wide-Ultra SCSI-3 10,000 rpm Drive (1")	336357-B21
9.1-GB Wide-Ultra SCSI-3 Drive (1")	313706-B21

Note: Wide-Ultra SCSI-3 Drives require the purchase of the Simplex/Duplex Wide-Ultra Drive Cage Option Kit (328073-B21) when using in the Wide Ultra2 Models.

Storage Controllers

Smart Array 431 Controller	127695-B21
Smart Array 431 Controller (Japan)	127695-291
Smart Array 221 Controller	388099-B21
Smart Array 221 Controller (Japan)	388099-291
Smart Array 3200 Controller	295643-B21
Smart Array 3200 Controller (Japan)	295643-291
Smart Array 4200 Controller	295636-B21
Smart Array 4200 Controller (Japan)	295636-291
64-Bit Dual Channel Wide Ultra2 SCSI Adapter	348757-B21
64-Bit Dual Channel Wide Ultra2 SCSI Adapter (Japan)	348757-291
64-Bit/66Mhz Dual Channel Wide Ultra3 SCSI Adapter	129803-B21

Note: The 64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter (129803-xx1) will default to Wide Ultra2, Wide-Ultra SCSI-3, Fast-Wide SCSI-2 or Fast SCSI-2 when not used with the Wide Ultra3 hard drives.

64-Bit/66Mhz Dual Channel Wide Ultra3 SCSI Adapter (Japan)	129803-291
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Note: The 64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter (129803-xx1) will default to Wide Ultra2, Wide-Ultra SCSI-3, Fast-Wide SCSI-2 or Fast SCSI-2 when not used with the Wide Ultra3 hard drives.

64-Bit/66Mhz Single Channel Wide Ultra3 SCSI Adapter	154457-B21
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Note: The 64-Bit/66MHz Single Channel Wide Ultra3 SCSI Adapter (154457-xx1) will default to Wide Ultra2, Wide-Ultra SCSI-3, Fast-Wide SCSI-2 or Fast SCSI-2 when not used with the Wide Ultra3 hard drives.

64-Bit/66Mhz Single Channel Wide Ultra3 SCSI Adapter	154457-291
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Note: The 64-Bit/66MHz Single Channel Wide Ultra3 SCSI Adapter (154457-xx1) will default to Wide Ultra2, Wide-Ultra SCSI-3, Fast-Wide SCSI-2 or Fast SCSI-2 when not used with the Wide Ultra3 hard drives.

Wide-Ultra SCSI-3 Adapter	272514-001
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Communications

Compaq NC3123 Fast Ethernet NIC PCI 10/100 WOL	174830-B21
Compaq NC3122 Fast Ethernet NIC PCI Dual 10/100	317450-B21
Compaq NC3131 Fast Ethernet NIC 64 PCI Dual Base 10/100	338456-B21
Compaq NC3132 Fast Ethernet Module Dual 10/100 Upgrade Module for NC3131	338456-B22
Compaq NC6132 Gigabit Module 1000 SX Upgrade Module for NC3131	338456-B23
Compaq NC6133 Gigabit Module 1000 LX Upgrade Module for NC3131	338456-B24
Compaq NC3133 Fast Ethernet Module 100 FX Upgrade Module for NC3131	338456-B25
Compaq NC6134 Gigabit NIC 64 PCI 1000 SX	174818-B21
Compaq 100 FDDI PCI SAS Fibre-SC Controller	242505-001
Compaq 100 FDDI PCI SAS UTP Controller	242507-001
Compaq 100 FDDI PCI DAS Fibre-SC Controller	242509-001
Compaq 100 FDDI PCI DAS UTP Controller	242511-001
Compaq 100 FDDI PCI SAS Fibre-MIC Controller	287728-001
Compaq NC4621 Token Ring NIC PCI 4/16 WOL	379956-B21
IBM 16/4 Token Ring PCI Special	133749-B21
Compaq 56K ISA Fax Modem v.90	294900-002

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ServerNet PCI Adapter	309833-B22
4M Cable	309834-B23
30M Cable	309834-B22
Internal Tape Drives	
Internal 20/40-GB DAT DDS-4 Tape Drive	157769-B21
Internal 12/24-GB DAT Drive (Opal)	295513-B22
Internal 12/24-GB DAT Drive (Opal) (Japan)	295513-292
Internal 4/8-GB DAT Drive (Opal)	295353-B22
Internal 4/8-GB DAT Drive (Opal) (Japan)	295353-292
Internal 4/8-GB SLR Drive (Opal)	295480-B22
Internal 4/8-GB SLR Drive (Opal) (Japan)	295480-292
Internal 35/70-GB DLT Drive	242520-B21
Internal 35/70-GB DLT Drive (Japan)	242520-291
Internal 20/40-GB DLT Drive (Opal)	340743-B22
Internal 20/40-GB DLT Drive (Opal) (Japan)	340743-292
Internal AIT 50-GB Tape Drive	157766-B21
Internal AIT 35-GB Tape Drive	388504-B21
20/40-GB DAT 8 Cassette Autoloader - Internal	166504-B21
12/24-GB DAT DDS-3 8 Cassette autoloader (internal)	103549-B21
4-GB DDS-2 DAT Cassette	137611-001
DDS-4 Media (10 pack)	152842-001
12/24-GB DDS-3 DAT 8 Cassette Pre-Filled Magazine (7 data cassettes, 1 cleaning cassette)	134117-B21
20/40-GB DAT 8 Cassette Magazine w/Media	171532-B21
12-GB DDS-3 DAT Cassette (10 pack)	295515-B21
DAT Cleaning Cassette	242781-001
AIT 50-GB Data Cassette (5 pack)	152841-001
AIT 35-GB Data Cassette (5 pack)	402371-B21
AIT Cleaning Cassette	402374-B21
Redundant Options	
Redundant Fan Kit	386121-B21
Compaq Hot Plug DC Power Supply	241729-B21
Compaq Hot Plug Redundant Power Supply (The Compaq Hot Plug Redundant Power Supply (306592-B21) ships standard with the ProLiant 5500. A second one is required for redundancy.)	306592-B21
Management Options	
Integrated Management Display (Beach Gray)	264377-B23
Integrated Management Display Option (Opal)	127409-B21
Compaq Remote Insight Lights-Out Edition	157866-001
Compaq Remote Insight Lights-Out Edition (EURO)	157866-021
Compaq Remote Insight Lights-Out Edition (APD, Japan)	157866-371
Compaq Remote Insight (PCI) LAN + NA Modem	294013-002
Compaq Remote Insight Board (PCI) LAN/Serial without modem	294013-B24
Compaq Remote Insight Board (PCI) LAN only	294013-B25
Monitors	
TFT8020 18" Flat Panel Monitor (opal)	326100-001
TFT8020 18" Flat Panel Monitor (carbon)	159244-001
TFT8020 18" Flat Panel Monitor (opal, bulk pack 2 monitor heads per box)	173610-001
TFT8000 (carbon, with protective cover)	307935-001
TFT8000 (opal, with protective cover)	307931-001
TFT8000 (carbon, no protective cover)	307932-001
TFT8000 (opal, no protective cover)	307906-001
TFT5010 15" Flat Panel Monitor (opal)	104741-001
TFT5010 15" Flat Panel Monitor (carbon)	154486-001
TFT5000S Flat Panel Color Monitor	
TFT5000S Flat Panel Monitor	

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15000R Flat Panel Monitor	120207-001
P1610 Color	315708-001
P1100 Color	B25606-001
P900 Color	366326-001
P700 Color	380207-001
V1100 Color	386472-001
V900 Color	303500-001
V700 Color (opal)	325800-001
V700 Color (carbon)	325800-002
V500 Color	325900-001
S910 Color	138485-001
S710 Color	152991-001
S510 Color	168636-001

Note: Monitors larger than 17" may be too heavy for use in rack systems.

External Tape Drives

External 20/40-GB DAT DDS-4 Tape Drive	157770-001
External 20/40-GB DAT DDS-4 Tape Drive (Int'l)	157770-B31
External 20/40-GB DAT DDS-4 Tape Drive (Japan)	157770-291
External 35/70-GB DLT Drive	242521-B21
External 35/70-GB DLT Drive (Japan)	242521-291
External 20/40-GB DLT Drive (Opal)	340744-B22
External 20/40-GB DLT Drive (Opal) (Japan)	340744-292
External AIT 50-GB Tape Drive	157767-001
External AIT 50-GB Tape Drive (Int'l)	157767-B31
External AIT 50-GB Tape Drive (Japan)	157767-291
External AIT 35-GB Tape Drive	388507-001
External AIT 35-GB Tape Drive (Int'l)	388507-B31
External AIT 35-GB Tape Drive (Japan)	388507-291
20/40-GB DAT 8 Cassette Autoloader - External	166505-001
20/40-GB DAT 8 Cassette Autoloader - External (Int'l)	166505-B31
20/40-GB DAT 8 Cassette Autoloader - External (Japan)	166505-291
12/24-GB DAT DDS-3 8 Cassette autoloader (external)	110946-001
4-GB DDS-2 DAT Cassette	137611-001
DDS-4 Media (10 pack)	152842-001
12/24-GB DDS-3 DAT 8 Cassette Pre-Filled Magazine (7 data cassettes, 1 cleaning cassette)	134117-B21
20/40-GB DAT 8 Cassette Magazine w/Media	171532-B21
12-GB DDS-3 DAT Cassette (10 pack)	295515-B21
DAT Cleaning Cassette	242781-001
AIT 50-GB Data Cassette (5 pack)	152841-001
AIT 35-GB Data Cassette (5 pack)	402371-B21
AIT Cleaning Cassette	402374-B21

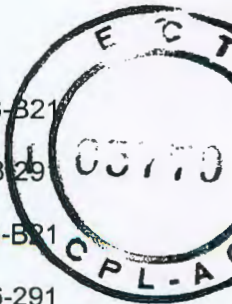
External Storage - Tower

Compaq StorageWorks Enclosure Model 4214T (tower)	124875-001
Compaq StorageWorks Enclosure Model 4214T (tower) (Int'l)	124875-B31
Compaq StorageWorks Enclosure Model 4214T (tower) (Japan)	124875-291

Note: The Compaq StorageWorks Enclosure 4200 Family support the Wide Ultra2/Ultra3 1" Hot Plug Hard Drives.

SCSI Storage Expander II	332609-001
ProLiant Tower Storage System Model UE	348710-002
ProLiant Storage System Tower Model UE (Int'l)	348710-B31
ProLiant Storage System Tower Model UE (Japan)	348710-291
ProLiant Tower Storage System Model U2	304110-B22
ProLiant Storage System Tower Model U2 (Int'l)	304114-B32
ProLiant Storage System Tower Model U2 (Japan)	304114-292

Note: The Compaq ProLiant Storage System Models 01/2000 U2



support the Wide-Ultra SCSI-3 Drives.	
ProLiant Storage System Model F1 or U1 to Model UE Upgrade Kit	348718-B21
ProLiant Storage System Model F1 or U1 to Model UE Upgrade Kit (Japan)	348718-29
ProLiant Storage System Model F2 or U2 to Model UE Upgrade Kit	348706-B21
ProLiant Storage System Model F2 or U2 to Model UE Upgrade Kit (Japan)	348706-291
Conversion Kit, SB to DB/U	304116-B21
Conversion Kit, DB to SB/U	304115-B21
ProLiant Storage System/U Redundant Power Supply Option	224206-001
ProLiant Storage System/U Redundant Power Supply Option (Int'l)	224214-001
StorageWorks Enclosure 4200 Redundant Power Supply Option	119826-B21
StorageWorks Enclosure 4200 Dual Bus Module Option	119829-B21
StorageWorks Enclosure Tower to Rack Conversion Kit	150213-B21
External Storage – Rack	
Compaq StorageWorks Enclosure Model 4214R (rack-mountable)	103381-001
Compaq StorageWorks Enclosure Model 4214R (rack-mountable) (Int'l)	103381-B31
Compaq StorageWorks Enclosure Model 4214R (rack-mountable) (Japan)	103381-291
Compaq StorageWorks Enclosure Model 4254R (rack-mountable)	138151-001
Compaq StorageWorks Enclosure Model 4254R (rack-mountable) (Int'l)	138151-B31
Compaq StorageWorks Enclosure Model 4254R (rack-mountable) (Japan)	138151-291
Note: The Compaq StorageWorks Enclosure 4200 Family support the Wide Ultra2/Ultra3 1" Hot Plug Hard Drives.	
Rack-Mountable SCSI Storage Expander II	332607-001
Rack-Mountable SCSI Storage Expander II (Int'l)	332607-B31
Rack-Mountable ProLiant Storage System Model UE	348700-001
Rack-Mountable ProLiant Storage System Model UE (Int'l)	348700-B31
Rack-Mountable ProLiant Storage System Model UE (Japan)	348700-291
Rack-Mountable ProLiant Storage System Model U2	304100-B22
Rack-Mountable ProLiant Storage System Model U2 (Int'l)	304104-B32
Rack-Mountable ProLiant Storage System Model U2 (Japan)	304104-292
Note: The Compaq ProLiant Storage System Family supports the Wide-Ultra SCSI-3 Hot Plug Hard Drives.	
ProLiant Storage System Model F1 or U1 to Model UE Upgrade Kit	348718-B21
ProLiant Storage System Model F1 or U1 to Model UE Upgrade Kit (Japan)	348718-291
ProLiant Storage System Model F2 or U2 to Model UE Upgrade Kit	348706-B21
ProLiant Storage System Model F2 or U2 to Model UE Upgrade Kit (Japan)	348706-291
ProLiant Storage System/U Redundant Power Supply Option	224206-B21
ProLiant Storage System/U Redundant Power Supply Option (Int'l)	224214-001

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http://www.compaq.com/products/quickspecs/10279_div/10279_div.html

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StorageWorks Enclosure 4200 Redundant Power Supply Option	119826-B21
StorageWorks Enclosure 4200 Dual Bus Module Option	119829-B21
StorageWorks Enclosure Tower to Rack Conversion Kit	150213-B21
Server Recovery	
Recovery Server Option for ProLiant Storage System Model U1 & F1	304117-B21
ProLiant Storage System RSO/U Tower	387490-002
ProLiant Storage System RSO/U Tower (Int'l)	387490-B32
ProLiant Storage System RSO/U Tower (Japan)	387490-292
Rack-Mountable ProLiant Storage System RSO/U	387256-001
Rack-Mountable ProLiant Storage System RSO/U (Int'l)	387256-B31
Rack-Mountable ProLiant Storage System RSO/U (Japan)	387256-291

Note: The Compaq ProLiant Storage System RSO/U Models support the Wide-Ultra SCSI-3 Drives.

DLT Libraries

DLT Tape Array Model 0	199860-001
DLT Tape Array II Model 35/70-4 (U.S.) no software	295165-001
DLT Tape Array II Model 35/70-4 no software (Int'l)	295165-B31
DLT Library 15 Cartridge Model 35/70-1	350365-001
DLT Library 15 Cartridge Model 35/70-2	350365-002
(Models not available in North America.)	
DLT Library 15 Cartridge Model 35/70-1 (Japan)	350365-291
DLT Library 15 Cartridge Model 35/70-2 (Japan)	350365-292
DLT Library 15 Cartridge Model 20/40-1	350362-001
DLT Library 15 Cartridge Model 20/40-2	350362-002
DLT Library 15 Cartridge Model 20/40-1 (Int'l)	350362-B31
DLT Library 15 Cartridge Model 20/40-1 (Japan)	350362-291
DLT Library 15 Cartridge Model 20/40-2 (Int'l)	350362-B32
35/70 DLT Library Ready Drive	295557-B21
35/70 DLT Library Ready Drive (Japan)	295557-291
20/40 DLT Library Ready Drive	350364-B21
20/40 DLT Library Ready Drive (Japan)	350364-B21
DLT Library Tabletop Conversion Kit	295162-B21
ESL9326D Enterprise Library 6 35/70	146205-B23
ESL9326D Enterprise Library 8 35/70	146205-B24
ESL9326D Enterprise Library 10 35/70	146205-B25
ESL9326D Enterprise Library 12 35/70	146205-B26
ESL9326D Enterprise Library 14 35/70	146205-B27
ESL9326D Enterprise Library 16 35/70	146205-B28
TL895 (96 slot) library unit, 2 drive	349350-B22
TL895 (96 slot) library unit, 3 drive	349350-B23
TL895 (96 slot) library unit, 4 drive	349350-B24
TL895 (96 slot) library unit, 5 drive	349350-B25
TL895 (96 slot) library unit, 6 drive	349350-B26
TL895 (96 slot) library unit, 7 drive	349350-B27
TL891 DLT library unit, 1 drive Table Top	120875-B21
TL891 DLT library unit, 2 drive Table Top	120875-B22
TL881 DLT Library, 1 drive Table Top, FWD	128667-B21
TL881 DLT Library, 2 drive Table Top, FWD	128667-B22
TL881 DLT Library, 1 drive Table Top, FWSE	128668-B21
TL881 DLT Library, 2 drive Table Top, FWSE	128668-B22
MiniLibrary Data Unit	128670-B21
MiniLibrary Expansion Unit	120877-B21
Type IV DLT Drive Cassette (single)	295194-B21
Type IV DLT Drive Cassette (7 pack)	295192-B21
DLT Cleaning Cartridge	439704-001
DLT Tape Array Cable Kit	

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DLT Tape Array Cable Kit	242421-001
DLT Magazine with five Type IV DLT Tape	295168-B21
10 Slot Magazine	120881-B21
ESL9326D Add-On 35/70 Drive	146209-B21
Add-On 35/70-GB Drive for TL891	120878-B31
Add-On 20/40-GB Drive for TL881	128671-B21
MiniLibrary Pass Thru Mechanism Kit	120880-B21
MiniLibrary Table Top to Rack Mount Conversion Kit, Metric/RETMA racks	120882-B21
MiniLibrary Table Top to Rack Mount Conversion Kit, Compaq racks	120883-B21
DLT7000 drive upgrade kit	349351-B21

Note: The DLT 15 Cartridge Library Model 20/40 or Model 35/70 can be mounted in a Compaq rack. To use any model of the library on a tabletop, the customer would purchase one of the Library Models listed above and would also order the Tabletop Conversion Kit (350384-B21) to provide metal top and side covers. Refer to the Compaq DLT Libraries QuickSpec for details.

DLT Library Model 20/40 or 35/70 includes one 20/40 DLT data cartridge or one 35/70 DLT data cartridge and three empty 5-cartridge magazines. US 350362-001/-002 (1 drive/2 drive) includes U.S. power cord, US 350365-001/-002 (1 drive/2 drive) includes U.S. power cord, Int'l -B31/B32 (1 drive/2 drive) CTO power cord for country ordering the unit.

Note: The TL895 (96 slot) library unit (2 drive through 7 drive), TL891 library unit (1 & 2 drive) or the TL881 library unit (1 & 2 drive) require country kits (349386-001, 349386-011, 349386-AR1, 349386-021, 349386-031, 349386-111, 349386-061, 349386-081 or 349386-291), SCSI Cable kits (328215-001, 328215-002, 328215-003 or 328215-004) and ProLiant Connectivity Kits (113395-001 or 113396-001). Please refer to the 96 Slot TL895 DLT Library QuickSpecs or the TL891/881 Automated DLT Tape Library Solution QuickSpecs for further details.

RAID Array 4000

StorageWorks Raid Array 4000 (tower)	241300-001
StorageWorks Raid Array 4100 (rack)	146013-001
StorageWorks Raid Array 4100 (rack) (Int'l)	146013-B31
StorageWorks Raid Array 4100 (rack) (Japan)	146013-291
Fibre Channel Storage Hub 12	295573-001
Fibre Channel Storage Hub 7	234453-001
Compaq Storage Hub 7 Universal Rack Mount Kit	136127-B21
Compaq Storage Hub 12 Management Option	159262-B21
Fibre Channel Storage Hub – 12 Port with 41U/42U Bracket	295573-B22
Fibre Channel Host Adapter Kit/P	223180-B21
Raid Array 4000 Redundant Array Controller	223187-B21
64-Bit/66MHZ Fibre Channel Host Adapter	120186-B21
64-Bit/66MHZ Fibre Channel Host Adapter (Japan)	120186-291
GBIC-SW Connector Kit (two each)	234459-B21
GBIC-LW Connector Kit (two each)	340412-B21
Fibre Channel Connection Kit, 3 SW GBICS, 2 Cables	380579-B21
Fibre Channel Connection Kit, 2 SW GBICS, 2 Cables	380596-B21
Fibre Channel Short Wave GBIC	380561-B21
Fibre Channel Long Wave GBIC	127508-B21
2m Multi-Mode Fibre Channel Cable	234457-B21
5m Multi-Mode Fibre Channel Cable	234457-B22
15m Multi-Mode Fibre Channel Cable	234457-B23
30m Multi-Mode Fibre Channel Cable	234457-B24
50m Multi-Mode Fibre Channel Cable	234457-B25
Raid Array 4000 Redundant Power Supply	234457-B25
Raid Array 4000 Tower to Rack Conversion Kit	234457-B25

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Raid Array 4000 Tower to Rack Conversion Kit
 Raid Array 4100 Rack to Tower Conversion Kit
 Fibre Channel Array Controller 64MB Cache Upgrade Kit
 Upgrade Kit for Proliant Storage System F and F1
 Fibre Channel Troubleshooting Kit

297102-B21
 154253-B21
 262398-B21
 296324-B21
 234468-B21

Raid Array 7000**Departmental Subsystem**

Dual controller configuration
 Single controller configuration
 Expansion building block

DS-SWXRA-HA
 DS-SWXRA-HC
 DS-SWXRA-HB

StorageWorks UltraSCSI Controllers

Redundant UltraSCSI controller with 64 MB cache (requires DS-HS35X-BC/BD battery)
 64 MB expansion cache module (redundant controllers require equal amounts of cache)
 Single replacement or additional cache battery
 Dual replacement or additional cache battery

DS-HSZ70-AH

DS-HSSIM-AB

HS35X-BA

HS35X-BB

Note: Please see the Compaq StorageWorks RAID Array 8000, 7000 ESA 10000 or 12000 QuickSpecs for FC Hubs, FC switches, platform software, host adapters, disks and options for complete solutions.

RAID Array 8000**Departmental Pedestal Models**

RA8000 FC Single Controller (Opal)
 RA8000 FC Dual Controller (Opal)
 Expansion Cabinet 24 slot (Opal)

380560-B22
 380550-B22
 380570-B22

Note: Please see the Compaq StorageWorks RAID Array 8000, 7000 ESA 10000 or 12000 QuickSpecs for FC Hubs, FC switches, platform software, host adapters, disks and options for complete solutions.

Enterprise Storage Array 10000

High capacity and general business base unit configuration (60Hz)
 High capacity and general business base unit configuration (50Hz)
 High bandwidth base unit configuration (60Hz)
 Dual expansion configuration (60Hz)
 Dual expansion configuration (50Hz)
 Single expansion configuration (60Hz)
 Single expansion configuration (50Hz)

DS-SWXES-AA
 DS-SWXES-AB
 DS-SWXES-BA
 DS-SWXES-CA
 DS-SWXES-CB
 DS-SWXES-DA
 DS-SWXES-DB

Data Center Options

64 MB cache memory upgrade for DS-HSZ70-AH controller (60Hz)

DS-HSSIM-AB

Redundant power (requires all 3 parts)

180 watt power supply (60Hz)
 AC input box (60Hz)
 Power distribution unit (60Hz)
 Power distribution unit (50Hz)

DS-BA35X-HH
 DS-BA35X-HE
 DS-SW6XP-AA
 DS-SW6XP-AB

Note: Please see the Compaq StorageWorks RAID Array 8000, 7000 ESA 10000 or 12000 QuickSpecs for FC Hubs, FC switches, platform software, host adapters, disks and options for complete solutions.

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Enterprise Storage Array 12000**ESA Building Blocks**

High-Capacity/General Business - Dual Controllers 48 slots, 60Hz (Opal)	380600-002
High-Capacity/General Business - Dual Controllers 48 slots, 50Hz (Opal)	380610-B22
High Bandwidth Quad controllers 48 slots, 60Hz (Opal)	380620-002
High Bandwidth Quad controllers 48 slots, 50Hz (Opal)	380630-B22
Single Expansion Dual controllers 24 slots, 25U extra cabinet space, 60Hz (Opal)	380580-002
Single Expansion Dual controllers 24 slots, 25U extra cabinet space, 50Hz (Opal)	380590-B22
Expansion enclosure 48 slots, 60Hz (Opal)	380640-002
Expansion enclosure 48 slots, 50Hz (Opal)	380650-B22

Note: Please see the Compaq StorageWorks RAID Array 8000, 7000 ESA 10000 or 12000 QuickSpecs for FC Hubs, FC switches, platform software, host adapters, disks and options for complete solutions.

StorageWorks Modular Array 8000/Enterprise Modular Array 12000

EMA12000 D14 60Hz	175990-B21
EMA12000 D14 50Hz	175990-B22
EMA12000 S14 60Hz	175991-B21
EMA12000 S14 50Hz	175991-B22
MA8000 60Hz	175992-B21
MA8000 50Hz	175992-B22
EMA12000 Blue 60Hz	175993-B21
EMA12000 Blue 50Hz	175993-B22

Note: Options include controller, solution kits, ACS. MA8000/EMA12000 includes controller shelf, drive shelves and cabinet. Packaging upgrade to RA8000/ESA12000.

Note: Please see the Compaq StorageWorks MA8000/EMA12000 QuickSpecs for FC Hubs, FC switches, platform software, host adapters, disks and options for complete solutions.

StorageWorks Options

Fibre Channel Tape Controller - II	152975-001
Fibre Channel Tape Controller - II (Int'l)	152975-B31
Fibre Channel Tape Controller - II (Japan)	152975-291
Fibre Channel Storage Switch 16	380578-B21
Fibre Channel Storage Switch 8	380591-B21
Fibre Channel SAN Switch/8 with Fabric Operating Software	158222-B21
Fibre Channel SAN Switch/16 with Fabric Operating Software	158223-B21
F200 Clustering Kit	380357-B21

Uninterruptible Power Systems - Tower

UPS Model T1000 (100-127 volt)	242688-001
UPS Model T1000h (200-240 volt) (Int'l)	242688-002
UPS Model T1500 (100-127 volt)	242688-003
UPS Model T1500h (200-240 Volt) (Int'l)	242688-004
UPS Model T1500j (100-127 Volt) (Japan)	242688-293
UPS Model T2000 (100-127 volt)	242688-005
UPS Model T2000j (100-127 volt) (Japan)	242688-295
UPS Model T2400h-NA (200-240 volt)	242688-006
UPS Model T2400h (200-240 volt) (Int'l)	242688-007
Multi-Server UPS Card	123508-B21
Scalable UPS Card	123509-B21
SNMP-EN Adapter	347225-B21
High to Low Voltage Transformer (250VA)	380645-B21

Uninterruptible Power Systems – Rack

Rack-Mountable UPS R1500 (100-127 VAC) (NA)	242704-001
Rack-Mountable UPS R1500h (200-230 VAC) (Int'l)	242704-002
Rack-Mountable UPS R1500j (100-127 VAC) (Japan)	242704-291
Rack-Mountable UPS R3000 100-127 VAC) (NA)	242705-001
Rack-Mountable UPS R3000h (208-240 VAC) (Int'l)	242705-002
Rack-Mountable UPS R3000h-NA (208-240 VAC)	242705-003
NDC (non-detached cord)	
Rack-Mountable UPS R3000j 100-127 VAC) (Japan)	242705-291
Rack-Mountable UPS R6000 (208 VAC default) (NA)	347207-001
Rack-Mountable UPS R6000 (230 VAC default) (Int'l)	347207-B31
Rack-Mountable UPS R6000 (200 VAC default) (Japan)	347207-291
R6000 Extended Runtime Module	347224-B21
SNMP-EN Adapter	347225-B21
High to Low Voltage Transformer (250VA)	388643-B21
Multi-Server UPS Card	123508-B21
Scalable UPS Card	123509-B21

Please see the Compaq Rack Builder for configuration assistance at www.compaq.com/products/storageworks/rack_accessories/rackbuilderpro2.html or download it at www.compaq.com/support/files/server/us/download/6956.html

Rack Conversion Kit

Compaq ProLiant 5500 Tower to Rack Conversion Kit	306557-B21
Compaq Rack 9000 Series (Opal)	
Compaq Rack 9142 (42U) – Pallet	120663-B21
Compaq Rack 9142 (42U) – Shock Pallet	120663-B22
Compaq Rack 9142 (42U) – Crated	120663-B23
Compaq Rack 9136 (36U) – Pallet	120664-B21
Compaq Rack 9136 (36U) – Shock Pallet	120664-B22
Compaq Rack 9136 (36U) – Crated	120664-B23
Compaq Rack 9122 (22U) – Pallet	120665-B21
Compaq Rack 9122 (22U) – Shock Pallet	120665-B22
Compaq Rack 9122 (22U) – Crated	120665-B23

Note:-B21 part numbers are for all Geos

-B22 part numbers are used to ship configured racks (by custom systems, VARs and Channels)

-B23 part numbers are used for air shipments

Compaq Rack 7000 Series (Beach Gray)

Compaq Rack 7142 (42U) (NA)	165753-001
Compaq Rack 7142 (42U) (Air Shipment)	165753-002
Compaq Rack 7142 (42U) (Int'l)	165753-003
Compaq Rack 7142 (42U) (Japan)	165753-293
Compaq Rack 7122 (22U) (NA)	163747-001
Compaq Rack 7122 (22U) (Int'l)	163747-002
Compaq Rack 7122 (22U) (Japan)	163747-292

Compaq Rack 4000 Series (Beach Gray)

Compaq Rack 4136 (36U) (NA)	303656-001
Compaq Rack 4136 (36U) (Air Shipment)	303656-B21
Compaq Rack 4136 (36U) (Int'l)	303656-B31

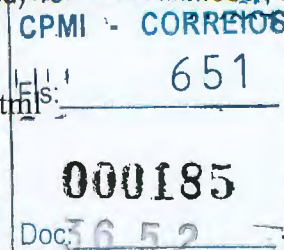
Rack Options for Compaq Rack 9000 Series

Baying Kit	120669-B21
9142 Side Panel Kit	120670-B21
9136 Side Panel Kit	120671-B21
Ballast Option Kit	120672-B21
Stabilizer Option Kit	120673-B21
Rack Rail Adapter Kit (25" depth)	120675-B21
Fan (110 VAC) Roof Mount	120677-B21
Fan (220 VAC) Roof Mount	120678-B21
Rattle Kit	120679-B21

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Grounding Rack Option Kit	120682-B21
Rack Options for Compaq Rack 7000 Series	
Rack Sidewall Kit (42U only)	165652-001
Rack Coupling Kit (42U only)	165664-001
Stabilizing Feet (42U only)	189907-001
High Air Flow Rack Door Insert for 7122	157847-B21
High Air Flow Rack Door Insert for 7142	327281-B21
High Air Flow Rack Door Insert for 7142 (6 pack)	327281-B22
Compaq Rack Extension Kit for 7142	154392-B21
Rack Options for Compaq Rack 4000 Series	
Compaq Rack Frame 4136 (36U)	303668-001
Compaq Rack Frame 4136 (36U) (Air Shipment)	303668-B21
Compaq Rack Frame 4136 (36U) (Int'l)	303668-B31
Rack Sidewall Kit (36U only)	303658-B21
Rack Coupling Kit (36U only)	303657-B21
Stabilizing Feet (36U only)	303659-B21
Rack Frame 36U Front Door Kit	303669-B21
Rack Frame 36U Back Door Kit	303670-B21
Rack Options for Compaq Rack 4000, 7000 and 9000 Series	
Sliding Shelf Kit	332564-B21
Monitor Utility Shelf	303606-B21
Rack Blanking Panel Kit (US) (Beach Gray)	169940-001
Rack Blanking Panel Kit (US) (Opal)	169940-B21
Compaq Networking Cable Management Kit	292407-B21
Compaq Networking Recessed Rail Management Kit	292406-B21
High Capacity Cable Management Arm Kit	124711-B21
Compaq Power Distribution Unit – Low Voltage PDU (NA)	295363-001
Compaq Power Distribution Unit – Low Voltage PDU (Japan)	295363-291
Compaq Power Distribution Unit – High Voltage PDU (NA)	295363-002
Compaq Power Distribution Unit – High Voltage PDUh-WW (Int'l)	295363-B21
Compaq Power Distribution Unit – High Voltage PDUh-NDC (non-detached cord) (Int'l)	295363-B32
Compaq Power Distribution Unit, 30A (NA only)	295363-003
Server Console Switch 1 x 2 port (100-230 VAC)	120206-001
Server Console Switch 1 x 2 port (100-230 VAC) (Int'l)	120206-B31
Server Console Switch 1 x 2 port (100-230 VAC) (Japan)	120206-291
Server Console Switch 1 x 4 port (100-230 VAC)	400336-001
Server Console Switch 1 x 4 port (100-230 VAC) (Int'l)	400336-B31
Server Console Switch 1 x 4 port (100-230 VAC) (Japan)	400336-291
Server Console Switch 1 x 8 port (100-230 VAC)	400337-001
Server Console Switch 1 x 8 port (100-230 VAC) (Int'l)	400337-B31
Server Console Switch 1 x 8 port (100-230 VAC) (Japan)	400337-291
Server Console Switch 2 x 8 port (100-230 VAC)	400338-001
Server Console Switch 2 x 8 port (100-230 VAC) (Int'l)	400338-B31
Server Console Switch 2 x 8 port (100-230 VAC) (Japan)	400338-291
Server Console Switch 2 x 8 port (48VDC)	400542-B21
CPU to Server Console Cable, 12'	110936-B21
CPU to Server Console Cable, 20'	110936-B22
CPU to Server Console Cable, 40'	110936-B23
CPU to Server Console Cable (Plenum Rated) 20'	149363-B21
CPU to Server Console Cable (Plenum Rated) 40'	149363-B21



Switch Box Connector Kit (115V)	144007-001
Switch Box Connector Kit (230V)	144007-002
Switch Box Connector Kit (high voltage) (Int'l)	144007-B33
Rack Internal Trackball Keyboard (Opal) (UK)	185152-036
Rack Internal Trackball Keyboard (Opal) (Germany)	185152-046
Rack Internal Trackball Keyboard (Opal) (France)	185152-056
Rack Internal Trackball Keyboard (Opal) (Italy)	185152-066
Rack Internal Trackball Keyboard (Opal) (Spain)	185152-076
Rack Internal Trackball Keyboard (Opal) (Denmark)	185152-086
Rack Internal Trackball Keyboard (Opal) (Norway)	185152-096
Rack Internal Trackball Keyboard (Opal) (Sweden/Finland)	185152-106
Rack Internal Trackball Keyboard (Opal) (Switzerland)	185152-116
Rack Internal Trackball Keyboard (Opal) (Portugal)	185152-136
Rack Internal Trackball Keyboard (Opal) (Belgium)	185152-186
Rack Internal Trackball Keyboard (Opal) (Japan)	185152-296
Rack Internal Trackball Keyboard (Opal) (US)	185152-406
Rack Internal Trackball Keyboard (Opal) (Int'l)	185152-B36
1U Rack Keyboard Drawer	338056-B21
Keyboard/Monitor/Mouse extension cables	169989-001
Rack Options for Third Party Cabinet Racks	
Depth Adjustable Fixed Rails	332558-B21
Other	
Internal Ultra3 Cable Option Kit, NHP	166389-B21
Internal Ultra3 Cable Option Kit, HP	166390-B21
Service Upgrades (CarePacs)	
Hardware Services 4-Hour On-site Service	
4-Hour On-site Service, 9-Hour x 5-Day Coverage, 3 Years (2-5-2 Part Number for US)	FM-MI4HR-36
4-Hour On-site Service, 9-Hour x 5-Day Coverage, 3 Years (2-5-2 Part Number for Canada)	FP-MI4HR-36
4-Hour On-site Service, 9-Hour x 5-Day Coverage, 3 Years (6-3 Part Number for US)	401783-002
4-Hour On-site Service, 9-Hour x 5-Day Coverage, 3 Years (6-3 Part Number for Canada)	401783-122
4-Hour On-site Service, 9-Hour x 5-Day Coverage, 3 Years (6-3 Part Number for EMEA)	324418-002
4-Hour On-site Service, 24-Hour x 7-Day Coverage, 3 Years (2-5-2 Part Number for US)	FM-MI724-36
4-Hour On-site Service, 24-Hour x 7-Day Coverage, 3 Years (2-5-2 Part Number for Canada)	FP-MI724-36
4-Hour On-site Service, 24-Hour x 7-Day Coverage, 3 Years (6-3 Part Number for US)	401782-002
4-Hour On-site Service, 24-Hour x 7-Day Coverage, 3 Years (6-3 Part Number for Canada)	401782-122
4-Hour On-site Service, 24-Hour x 7-Day Coverage, 3 Years (6-3 Part Number for EMEA)	376911-022
Installation & Start-up Services	
Hardware Installation (2-5-2 Part Number for US)	FM-MIINS-IN
Hardware Installation (2-5-2 Part Number for Canada)	FP-MIINS-IN
Hardware Installation (6-3 Part Number for US)	401793-002
Hardware Installation (6-3 Part Number for Canada)	401793-122
Hardware Installation (6-3 Part Number for EMEA)	Quote
O/S & Hardware Installation (2-5-2 Part Number for US) (Hardware installation plus two days O/S start-up activity (install, configure, network access & orientation).)	FP-CXHSI-03
O/S & Hardware Installation (6-3 Part Number for US) (Hardware installation plus two days O/S start-up activity (install, configure, network access & orientation).)	160557-002
O/S & Hardware Installation (6-3 Part Number for EMEA) (Hardware installation plus two days O/S start-up activity (install, configure, network access & orientation).)	Quote

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(Hardware installation plus two days O/S start-up activity
(install, configure, network access & orientation).)

Business Solutions Priority Service Plan -Priority Level

5 x 9 4-hour H/W, 5 x 9 2-hour O/S (NT & NetWare), FP-CX103-36
Three Years (2-5-2 Part Number for US)

5 x 9 4-hour H/W, 5 x 9 2-hour O/S (NT & NetWare), FP-CZ103-36
Three Years (2-5-2 Part Number for Canada)

5 x 9 4-hour H/W, 5 x 9 2-hour O/S (NT & NetWare), 155325-002
Three Years (6-3 Part Number for US)

5 x 9 4-hour H/W, 5 x 9 2-hour O/S (NT & NetWare), 155325-122
Three Years (6-3 Part Number for Canada)

5 x 9 4-hour H/W, 5 x 9 2-hour O/S (NT & NetWare), 118311-022
Three Years (6-3 Part Number for EMEA)

Business Solutions Priority Service Plan -Priority 24 Level

7 x 24 4-hour H/W, 7 x 24 2-hour O/S (NT & NetWare), FP-CX203-36
Three years (2-5-2 Part Number for US)

7 x 24 4-hour H/W, 7 x 24 2-hour O/S (NT & NetWare), 155329-002
Three years (6-3 Part Number for US)

7 x 24 4-hour H/W, 7 x 24 2-hour O/S (NT & NetWare), 118317-022
Three years (6-3 Part Number for EMEA)

Business Solutions Priority Service Plan -Priority Plus Level

7 x 24 4-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), FP-CX303-36
SPS account review, Three Years
(2-5-2 Part Number for US)

7 x 24 4-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), FP-CZ303-36
SPS account review, Three Years
(2-5-2 Part Number for Canada)

7 x 24 4-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), 155333-002
SPS account review, Three Years
(6-3 Part Number for US)

7 x 24 4-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), 155333-122
SPS account review, Three Years
(6-3 Part Number for Canada)

7 x 24 4-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), 155333-122
SPS account review, Three Years
(6-3 Part Number for Canada)

7 x 24 4-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), 155333-122
SPS account review, Three Years
(6-3 Part Number for Canada)

Business Solutions Priority Service Plan -Priority Premier Level

7 x 24 2-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), FP-CX503-36
SPS Account Review, Proactive Management Review,
named S/w rep, Three Years (2-5-2 Part Number for US)

7 x 24 2-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), FP-CZ503-36
SPS Account Review, Proactive Management Review,
named S/w rep, Three Years (2-5-2 Part Number for
Canada)

7 x 24 2-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), 155337-002
SPS Account Review, Proactive Management Review,
named S/w rep, Three Years (6-3 Part Number for US)

7 x 24 2-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), 155337-122
SPS Account Review, Proactive Management Review,
named S/w rep, Three Years (6-3 Part Number for
Canada)

7 x 24 2-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), 155337-122
SPS Account Review, Proactive Management Review,
named S/w rep, Three Years (6-3 Part Number for
Canada)

7 x 24 2-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), 155337-122
SPS Account Review, Proactive Management Review,
named S/w rep, Three Years (6-3 Part Number for
Canada)

7 x 24 2-hour H/W, 7 x 24 1-hour O/S (NT & NetWare), 155337-122
SPS Account Review, Proactive Management Review,
named S/w rep, Three Years (6-3 Part Number for
Canada)

Business Solutions Priority Service Plan -Priority Executive

Premier Level

7 x 24 2-hour H/W, 7 x 24 30-minute O/S (NT & NetWare), SPS Account Review, Proactive Management Review, named S/w rep, Three Years (2-5-2 Part Number for US) FP-CX703-36

7 x 24 2-hour H/W, 7 x 24 30-minute O/S (NT & NetWare), SPS Account Review, Proactive Management Review, named S/w rep, Three Years (2-5-2 Part Number for Canada) FP-CZ703-36

7 x 24 2-hour H/W, 7 x 24 30-minute O/S (NT & NetWare), SPS Account Review, Proactive Management Review, named S/w rep, Three Years (2-5-2 Part Number for Canada) 155341-002

7 x 24 2-hour H/W, 7 x 24 30-minute O/S (NT & NetWare), SPS Account Review, Proactive Management Review, named S/w rep, Three Years (2-5-2 Part Number for Canada) 155341-002

7 x 24 2-hour H/W, 7 x 24 30-minute O/S (NT & NetWare), SPS Account Review, Proactive Management Review, named S/w rep, Three Years (2-5-2 Part Number for Canada) 155341-002

7 x 24 2-hour H/W, 7 x 24 30-minute O/S (NT & NetWare), SPS Account Review, Proactive Management Review, named S/w rep, Three Years (2-5-2 Part Number for Canada) 155341-002



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Review, named S/w rep, Three Years (6-3 Part Number for US)

7 x 24 2-hour H/W, 7 x 24 30-minute O/S (NT & NetWare), SPS Account Review, Proactive Management Review, named S/w rep, Three Years (6-3 Part Number for Canada)

155341-122

Note: For more information, customer/resellers can contact www.Compaq.com/services.



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- [Standard Features](#)
- [Options](#)
- [Memory](#)
- [Storage](#)
- [TechSpecs](#)

Memory

Compaq ProLiant 5500 Pentium III All Models

Standard Memory

256 MB buffered EDO DIMM memory (4 x 64-MB DIMMs)

Standard

Slot

	1	2	3	4
256 MB	64 MB	64 MB	64 MB	64 MB
	5	6	7	8
	Empty	Empty	Empty	Empty
	9	10	11	12
	Empty	Empty	Empty	Empty
	13	14	15	16
	Empty	Empty	Empty	Empty

Standard Memory Plus Optional Memory

Up to 3328 MB of buffered EDO DIMM memory is available with the installation of optional buffered EDO DIMM memory expansion kits.

Up to

Slot

	1	2	3	4
3328 MB	64 MB	64 MB	64 MB	64 MB
	5	6	7	8
	256 MB	256 MB	256 MB	256 MB
	9	10	11	12
	256 MB	256 MB	256 MB	256 MB
	13	14	15	16
	256 MB	256 MB	256 MB	256 MB

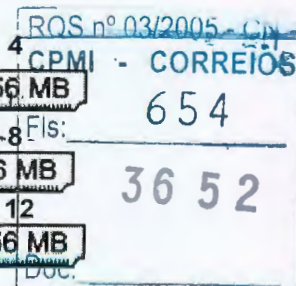
Standard Memory Replaced With Optional Memory

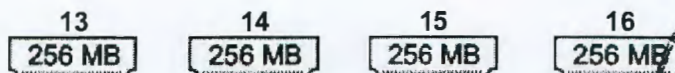
Up to 4096 MB of buffered EDO DIMM memory is available with the removal of standard memory and the installation of optional buffered EDO DIMM memory expansion kits.

Up to

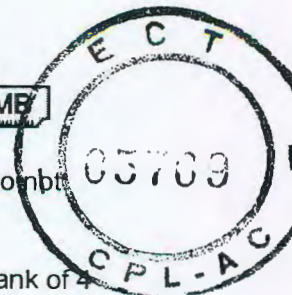
Slot

	1	2	3	4
4096 MB	256 MB	256 MB	256 MB	256 MB
	5	6	7	8
	256 MB	256 MB	256 MB	256 MB
	9	10	11	12
	256 MB	256 MB	256 MB	256 MB





Note: Memory must be added in banks of four DIMMs. Charts don't represent all possible memory configurations.



Mixing of 50ns and 60ns memory is permitted; however, each bank of 4 DIMMs must contain the same size and speed DIMMs. Performance will default to the slower of the two speeds (that is, 60ns).

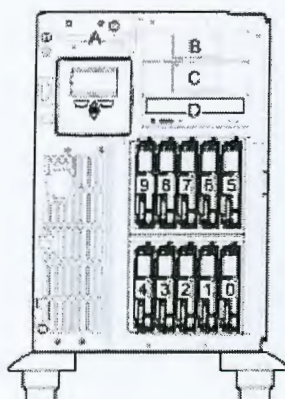
50ns EDO

- 1024-MB Memory Expansion Kit (4 x 256-MB buffered EDO DIMMs, 50ns) 328583-B21
- 512-MB Memory Expansion Kit (4 x 128-MB buffered EDO DIMMs, 50ns) 328582-B21
- 256-MB Memory Expansion Kit (4 x 64-MB buffered EDO DIMMs, 50ns) 328581-B21

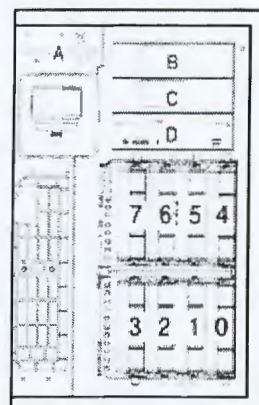
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- [TechSpecs](#)

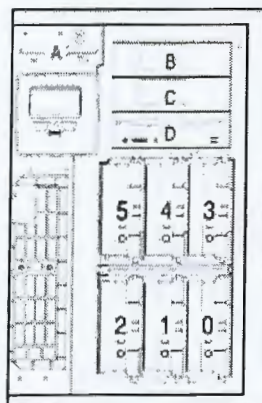
Storage



1-inch Ultra2 Drive Locations
(Standard in some models)



1-inch Wide-Ultra
SCSI-3 Drive Locations
(Standard in some models)



1.6-inch Wide-Ultra
SCSI-3 Drive Locations

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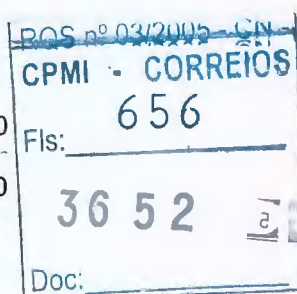
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(Optional Drive Cage Option Kit)

Tower Drive Support

	Quantity Supported	Position Supported	Controller
Removable Media			
1.44-MB Diskette Drive	Up to 1	A	Integrated
IDE CD-ROM Drive	Up to 2	B,C,D	Integrated IDE
DVD-ROM Drive	Up to 2	B,C,D	Integrated IDE
Hard Drives			
Wide Ultra3 Hot Pluggable Drives			
1-inch	Up to 10	0-9	64-Bit Dual Channel Wide Ultra2 SCSI Adapter (occupies 1 PCI slot)
18.2-GB 10,000 rpm			64-Bit/66Mhz Dual Channel Wide Ultra3 SCSI Adapter
9.1-GB 10,000 rpm			64-Bit/66Mhz Single Channel Wide Ultra3 SCSI Adapter
			Smart Array 221 Controller
			Smart Array 431 Controller
			Smart Array 3200 Controller
			Smart Array 4200 Controller
Wide Ultra2 Hot Pluggable Drives			
1-inch	Up to 10	0-9	64-Bit Dual Channel Wide Ultra2 SCSI Adapter (occupies 1 PCI slot)
18.2-GB 10,000 rpm			64-Bit/66Mhz Dual Channel Wide Ultra3 SCSI Adapter
18.2-GB			64-Bit/66Mhz Single Channel Wide Ultra3 SCSI Adapter
9.1-GB 10,000 rpm			Smart Array 221 Controller
9.1-GB			Smart Array 431 Controller
			Smart Array 3200 Controller
			Smart Array 4200 Controller
Wide Ultra3 SCSI – Non-Hot Plug			
1-inch	Up to 3	B,C,D	64-Bit Dual Channel Wide Ultra2 SCSI Adapter (occupies 1 PCI
18.2-GB 10,000 rpm			
9.1-GB 10,000 rpm			



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slot)
64-Bit/66Mhz Dual
Channel Wide Ultra3
SCSI Adapter
64-Bit/66Mhz Single
Channel Wide Ultra3
SCSI Adapter
Smart Array 221
Controller
Smart Array 431
Controller
Smart Array 3200
Controller
Smart Array 4200
Controller



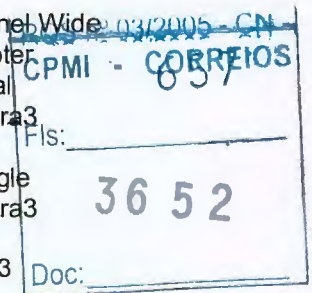
**Wide Ultra2 SCSI –
Non-Hot Plug**

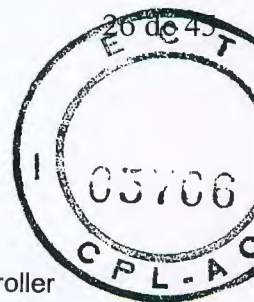
1-inch	Up to 3	B,C,D	64-Bit Dual Channel Wide Ultra2 SCSI Adapter (occupies 1 PCI slot)
18.2-GB			64-Bit/66Mhz Dual Channel Wide Ultra3 SCSI Adapter
9.1-GB			64-Bit/66Mhz Single Channel Wide Ultra3 SCSI Adapter
			Smart Array 221 Controller
			Smart Array 431 Controller
			Smart Array 3200 Controller
			Smart Array 4200 Controller

**Wide-Ultra SCSI-3 - (Supported either in 500-MHz WU models or
Hot Plug in Simplex/Duplex Drive Cage -option 328073-
B21)**

1-inch	Up to 8	0-7	Integrated Dual Channel
18.2-GB 10,000 rpm	(duplex	0-6	Wide-Ultra SCSI-3
18.2-GB	option)		Adapter
9.1-GB 10,000 rpm	Up to 7		Smart Array 221
9.1-GB	(simplex)		Controller
			Smart Array 431
			Controller
			Smart Array 3200
			Controller
			Smart Array 4200
			Controller
			64-Bit Dual Channel Wide
			Ultra2 SCSI Adapter
			64-Bit/66Mhz Dual
			Channel Wide Ultra3
			SCSI Adapter
			64-Bit/66Mhz Single
			Channel Wide Ultra3
			SCSI Adapter
			Wide-Ultra SCSI-3
			Adapter

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1.6-inch Up to 6 0-5
36.4-GB 10,000 rpm
36.4-GB

External Storage

StorageWorks Up to 12 External Smart Array 221 Controller
Enclosure 4200 Smart Array 431 Controller
Family Smart Array 3200 Controller
(supports Wide Smart Array 4200 Controller
Ultra2/Ultra3 drives) 64-Bit Dual Channel Wide
Ultra2 SCSI Adapter
64-Bit/66Mhz Dual Channel
Wide Ultra3 SCSI Adapter
64-Bit/66Mhz Single
Channel Wide Ultra3 SCSI
Adapter

ProLiant Storage Up to 12 External Integrated Dual Channel
System Models UE Wide-Ultra SCSI-3 Adapter
ProLiant Storage Smart Array 221 Controller
System Models U2 Smart Array 3200 Controller
(supports Wide-Ultra Smart Array 4200 Controller
SCSI-3 drives) 64-Bit Dual Channel Wide
Ultra2 SCSI Adapter
Wide-Ultra SCSI-3

TL895 (96 Slot) DLT 2 drives External Compaq Dual Channel
Library (2 – 7 Drive) per Wide-Ultra SCSI-3 Adapter
TL891 DLT Library SCSI Compaq Wide-Ultra SCSI
(1 – 2 Drive) channel Controller
TL881 DLT Library
(1 – 2 Drive)

SCSI Storage Up to 3 External Integrated Dual Channel
Expander II Wide-Ultra SCSI-3 Adapter
Smart Array 3200 Controller
64-Bit Dual Channel Wide
Ultra2 SCSI Adapter
Wide-Ultra SCSI-3 Adapter

StorageWorks Raid Up to 12 External Fibre Channel Host Adapter
Array 4000 or 4100 Kit

Maximum Storage Capacity – Wide Ultra2 Models (SCSI Attached)

Internal: 182 GB (10 x 18.2 1" Wide Ultra2 SCSI hard drives)

External: 3.49 TB (12 ProLiant Storage Systems, each with 8 x 36.4-GB hard drives)

Total: 3.67 TB

Maximum Storage Capacity – (External RAID Array 4000 Attached)

Internal: 182 GB (10 x 18.2 1" Wide Ultra2 SCSI hard drives)

External: 17.47 TB (5 PCI slots x 12 Fibre Channel Arrays, each with 8 x 36.4-GB hard drives)

Total: 17.65 TB

Maximum Storage Capacity – (External StorageWorks Enclosure Attached)

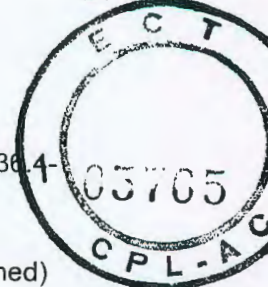
Internal: 182 GB (10 x 18.2 1" Wide Ultra2 SCSI hard drives)

External: 15.288 TB (5 PCI slots x 12 StorageWorks Enclosures, each with 14 x 18.2-GB hard drives)

Total: 15.470 TB

Maximum Storage Capacity – Wide-Ultra SCSI-3 Models (SCSI Attached)

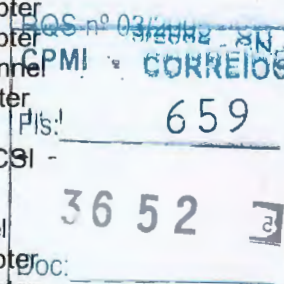
ROS nº 03/2005 - CN
CPMI - CORREIOS
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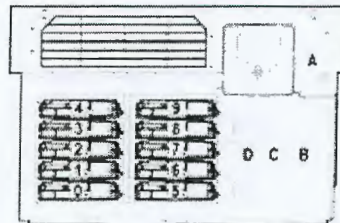
Attached)

Internal: 218.4 GB (6 x 36.4-GB hard drives)**External:** 3.49 TB (12 ProLiant Storage Systems, each with 8 x 36.4-GB hard drives)**Total:** 3.71 TB**Maximum Storage Capacity – (External RAID Array 4000 Attached)****Internal:** 218.4 GB (6 x 36.4-GB hard drives)**External:** 17.47 TB (5 PCI slots x 12 Fibre Channel Arrays, each with 8 x 36.4-GB hard drives)**Total:** 17.69 TB**Maximum Storage Capacity – (External StorageWorks Enclosure Attached)****Internal:** 218.4 GB (6 x 36.4-GB hard drives)**External:** 15.288 TB (5 PCI slots x 12 StorageWorks Enclosures, each with 14 x 18.2-GB hard drives)**Total:** 15.506 TB**Tape Drives**

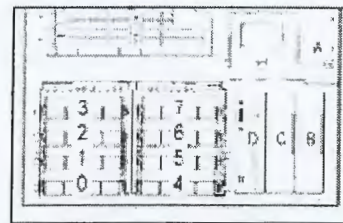
Internal 12/24-GB DAT	Up to 2	B, C	Wide-Ultra SCSI-3 Adapter 64-Bit/66Mhz Dual Channel Wide Ultra3 SCSI Adapter 64-Bit/66Mhz Single Channel Wide Ultra3 SCSI Adapter
Internal 4/8-GB DAT			
20/40-GB DAT DDS-4			
8 Cassette Autoloader			
12/24-GB DAT DDS-3			
8 Cassette Autoloader			
AIT 50-GB Tape Drive 1		B, C	Integrated Dual Channel Wide-Ultra SCSI-3 Adapter Wide-Ultra SCSI-3 Adapter 64-Bit/66Mhz Dual Channel Wide Ultra3 SCSI Adapter 64-Bit/66Mhz Single Channel Wide Ultra3 SCSI Adapter
AIT 35-GB Tape Drive			
Internal 35/70-GB DLT	1	B + C (two bays)	Integrated Dual Channel Wide-Ultra SCSI-3 Adapter Wide-Ultra SCSI-3 Adapter 64-Bit/66Mhz Dual Channel Wide Ultra3 SCSI Adapter 64-Bit/66Mhz Single Channel Wide Ultra3 SCSI Adapter
Internal 20/40-GB DLT			
DLT Tape Array II Model 35/70	1 to 4	External	Integrated Dual Channel Wide-Ultra SCSI-3 Adapter Wide-Ultra SCSI-3 Adapter
35/70-GB DLT	Up to 3	External	Integrated Dual Channel Wide-Ultra SCSI-3 Adapter Wide-Ultra SCSI-3 Adapter 64-Bit/66Mhz Dual Channel Wide Ultra3 SCSI Adapter 64-Bit/66Mhz Single Channel Wide Ultra3 SCSI Adapter
20/40-GB DLT			
DLT 15 Cartridge Library Model 35/70-1	1 per		Integrated Dual Channel Wide-Ultra SCSI-3 Adapter Wide-Ultra SCSI-3 Adapter
DLT 15 Cartridge			



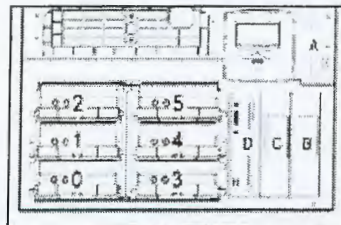
Library Model 35/70-2 SCSI
 DLT 15 Cartridge channel
 Library Model 20/40-1
 DLT 15 Cartridge
 Library Model 20/40-2
 TL895 (96 Slot) DLT 2 drives External Compaq Dual Channel
 Library (2 – 7 Drive) per Wide-Ultra SCSI-3 Adapter
 TL891 DLT Library SCSI Compaq Wide-Ultra SCSI
 (1 – 2 Drive) channel Adapter
 TL881 DLT Library
 (1 – 2 Drive)



1-inch Ultra2 Drive Locations
 (Standard in some models)



1-inch Wide-Ultra SCSI-3 Drive
 Locations (Standard in some
 models)



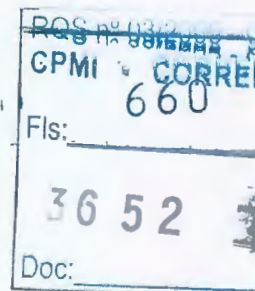
1.6-inch Wide-Ultra SCSI-3 Drive
 Locations (Optional)

Rack Drive Support

	Quantity	Position	Supported Controller
Removable Media			
1.44-MB Diskette Drive	Up to 1	A	Integrated
IDE CD-ROM Drive	Up to 2	B,C,D	Integrated IDE
DVD-ROM Drive	Up to 2	B,C,D	Integrated IDE
Hard Drives			
Wide Ultra3 Hot Pluggable Drives			
1-inch	Up to 10	0-9	64-Bit Dual Channel
18.2-GB 10,000 rpm			Wide Ultra2 SCSI
9.1-GB 10,000 rpm			Adapter (occupies 1 PCI slot)

Smart Array 221
 Controller
 Smart Array 431
 Controller
 Smart Array 3200
 Controller
 Smart Array 4200
 Controller
 64-Bit/66MHz Dual
 Channel Wide Ultra3
 SCSI Adapter

000194



Wide Ultra2 Hot Pluggable Drives

1-inch Up to 10 0-9
18.2-GB 10,000
rpm
18.2-GB
9.1-GB 10,000 rpm
9.1-GB

Wide Ultra3 SCSI -Non-Hot Plug

1-inch Up to 3 B,C,D
18.2-GB 10,000
rpm
9.1-GB 10,000 rpm

Wide Ultra2 SCSI -Non-Hot Plug

1-inch Up to 3 B,C,D
18.2-GB
9.1-GB

64-Bit/66MHz Single
Channel Wide Ultra3
SCSI Adapter

64-Bit Dual Channel
Wide Ultra2 SCSI
Adapter (occupies 1 PCI
slot)

Smart Array 221

Controller

Smart Array 431

Controller

Smart Array 3200

Controller

Smart Array 4200

Controller

64-Bit/66MHz Dual
Channel Wide Ultra3
SCSI Adapter

64-Bit/66Mhz Single
Channel Wide Ultra3
SCSI Adapter

64-Bit Dual Channel

Wide Ultra2 SCSI

Adapter (occupies 1 PCI
slot)

Smart Array 221

Controller

Smart Array 431

Controller

Smart Array 3200

Controller

Smart Array 4200

Controller

64-Bit/66MHz Dual
Channel Wide Ultra3
SCSI Adapter

64-Bit/66Mhz Single
Channel Wide Ultra3
SCSI Adapter

64-Bit Dual Channel

Wide Ultra2 SCSI

Adapter (occupies 1 PCI
slot)

Smart Array 221

Controller

Smart Array 431

Controller

Smart Array 3200

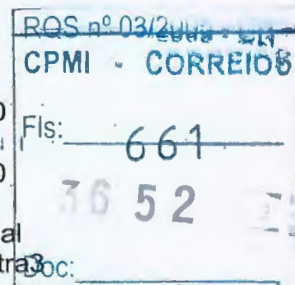
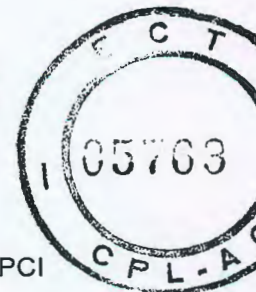
Controller

Smart Array 4200

Controller

64-Bit/66MHz Dual
Channel Wide Ultra3
SCSI Adapter

64-Bit/66Mhz Single
Channel Wide Ultra3



000195

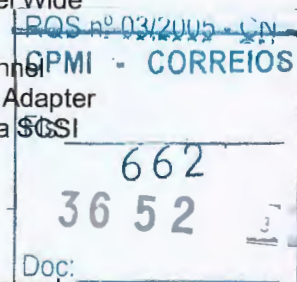
SCSI Adapter

Wide-Ultra SCSI-3 - (Supported either in 500-MHz WU models or in Simplex/Duplex Drive Cage -option 328073-B21)

Hot Plug			
1-inch	Up to 8	0-7	Integrated Dual Channel
18.2-GB 10,000 rpm	(duplex option)	0-6	Wide-Ultra SCSI-3 Adapter
18.2-GB	Up to 7		Smart Array 221 Controller
9.1-GB 10,000 rpm	(simplex)		Smart Array 431 Controller
9.1-GB			Smart Array 3200 Controller
			Smart Array 4200 Controller
			64-Bit Dual Channel Wide Ultra2 SCSI Adapter
			64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter
			64-Bit/66Mhz Single Channel Wide Ultra3 SCSI Adapter
			Wide-Ultra SCSI-3 Adapter
1.6-inch	Up to 6	0-5	
36.4-GB 10,000 rpm			
36.4-GB			

External Storage

StorageWorks Enclosure 4200 Family (supports Wide Ultra2/Ultra3 drives)	Up to 12 External	Smart Array 221 Controller Smart Array 431 Controller Smart Array 3200 Controller Smart Array 4200 Controller 64-Bit Dual Channel Wide Ultra2 SCSI Adapter 64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter 64-Bit/66Mhz Single Channel Wide Ultra3 SCSI Adapter
ProLiant Storage System Models UE ProLiant Storage System Models U2 (supports Wide-Ultra SCSI-3 drives)	Up to 12 External	Integrated Dual Channel Wide-Ultra SCSI-3 Adapter Smart Array 221 Controller Smart Array 3200 Controller Smart Array 4200 Controller 64-Bit Dual Channel Wide Ultra2 SCSI Adapter
TL895 (96 Slot) DLT Library (2 - 7 Drive) TL891 DLT Library (1 - 2 Drive) TL881 DLT Library (1 - 2 Drive)	2 drives per SCSI channel	External Compaq Dual Channel Wide-Ultra SCSI-3 Adapter Compaq Wide-Ultra SCSI Adapter
SCSI Storage Fynander II	Up to 3 External	Integrated Dual Channel Wide-Ultra SCSI-3 Adapter



Expansion

Wide Ultra SCSI-3 Adapter
Smart Array 3200
Controller
64-Bit Dual Channel Wide
Ultra2 SCSI Adapter

StorageWorks Raid Up to 12 External Fibre Channel Host
Array 4000 or 4100 Kit Adapter

Maximum Storage Capacity – Wide Ultra2 Models (SCSI Attached)

Internal: 182 GB (10 x 18.2-GB hard drives)

External: 3.49 TB (12 ProLiant Storage Systems, each with 8 x 36.4-GB hard drives)

Total: 3.67 TB

Maximum Storage Capacity – (External RAID Array 4000 Attached)

Internal: 182 GB (10 x 18.2-GB hard drives)

External: 17.47 TB (5 PCI slots x 12 Fibre Channel Arrays, each with 8 x 36.4-GB hard drives)

Total: 17.65 TB

Maximum Storage Capacity – (External StorageWorks Enclosure Attached)

Internal: 182 GB (10 x 18.2-GB hard drives)

External: 15.288 TB (5 PCI slots x 12 StorageWorks Enclosures, each with 14 x 18.2-GB hard drives)

Total: 15.470 TB

Maximum Storage Capacity – Wide-Ultra SCSI-3 Models (SCSI Attached)

Internal: 218.4 GB (6 x 36.4-GB hard drives)

External: 3.49 TB (12 ProLiant Storage Systems, each with 8 x 36.4-GB hard drives)

Total: 3.71 TB

Maximum Storage Capacity – (External RAID Array 4000 Attached)

Internal: 218.4 GB (6 x 36.4-GB hard drives)

External: 17.47 TB (5 PCI slots x 12 Fibre Channel Arrays, each with 8 x 36.4-GB hard drives)

Total: 17.69 TB

Maximum Storage Capacity – (External StorageWorks Enclosure Attached)

Internal: 218.4 GB (6 x 36.4-GB hard drives)

External: 15.288 TB (5 PCI slots x 12 StorageWorks Enclosures, each with 14 x 18.2-GB hard drives)

Total: 15.506 TB

Tape Drives

Internal 12/24-GB DAT Up to 2 B,C

Internal 4/8-GB DAT

Internal 20/40-GB

DAT DDS-4

20/40-GB DAT DDS-4

8 Cassette Autoloader

12/24-GB DAT DDS-3

8 Cassette Autoloader

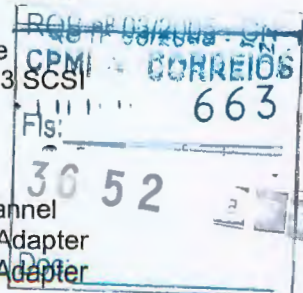
AIT 50-GB Tape Drive 1

AIT 35-GB Tape Drive

B, C

Wide-Ultra SCSI-3 Adapter
64-Bit/66MHz Dual
Channel Wide Ultra3 SCSI
Adapter
64-Bit/66Mhz Single
Channel Wide Ultra3 SCSI
Adapter

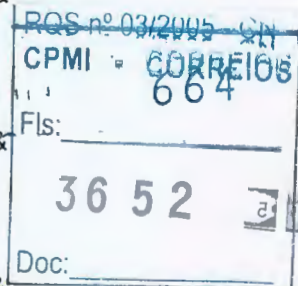
Integrated Dual Channel
Wide-Ultra SCSI-3 Adapter
Wide-Ultra SCSI-3 Adapter



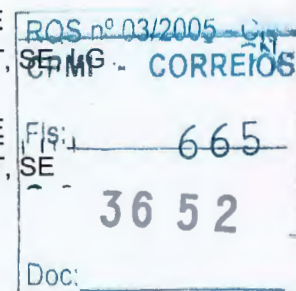
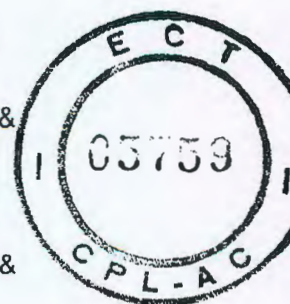
			64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter
			64-Bit/66Mhz Single Channel Wide Ultra3 SCSI Adapter
Internal 35/70-GB DLT	1	B + C (two bays)	Integrated Dual Channel Wide-Ultra SCSI-3 Adapter
Internal 20/40-GB DLT			Wide-Ultra SCSI-3 Adapter
			64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter
			64-Bit/66Mhz Single Channel Wide Ultra3 SCSI Adapter
DLT Tape Array II Model 35/70	1 to 4	External	Integrated Dual Channel Wide-Ultra SCSI-3 Adapter
			Wide-Ultra SCSI-3 Adapter
35/70-GB DLT 20/40-GB DLT	Up to 3	External	Integrated Dual Channel Wide-Ultra SCSI-3 Adapter
			Wide-Ultra SCSI-3 Adapter
			64-Bit/66MHz Dual Channel Wide Ultra3 SCSI Adapter
			64-Bit/66Mhz Single Channel Wide Ultra3 SCSI Adapter
DLT 15 Cartridge Library Model 35/70-1	1 Library per		Integrated Dual Channel Wide-Ultra SCSI-3 Adapter
DLT 15 Cartridge Library Model 35/70-2	SCSI channel		Wide-Ultra SCSI-3 Adapter
DLT 15 Cartridge Library Model 20/40-1			
DLT 15 Cartridge Library Model 20/40-2			
TL895 (96 Slot) DLT Library	2 drives per	External	Compaq Dual Channel Wide-Ultra SCSI-3 Adapter
(2 – 7 Drive)	SCSI		Compaq Wide-Ultra SCSI
TL891 DLT Library (1 – 2 Drive)	channel		Adapter
TL881 DLT Library (1 – 2 Drive)			

Supported Tape Drive Options

Tape Drive	Operating System	Key
Internal 12/24-GB DAT Drive	Novell NetWare SCO UNIX	AS, JS, SE Native (Tar & CPIO)
	Microsoft Windows NT	AS, NT, SE
Internal 20/40-GB DAT Drive	Novell NetWare SCO UNIX	AS, JS, SE Native (Tar & CPIO)
	Microsoft Windows NT	AS, NT, SE
Internal 4/8-GB DAT Drive	Novell NetWare SCO UNIX	AS, JS, SE Native (Tar & CPIO)



AIT 50-GB Tape Drive	Microsoft Windows NT	AS, NT, SE
	Novell NetWare	AS, JS, SE
	SCO UNIX	Native (Tar & CPIO)
AIT 35-GB Tape Drive	Microsoft Windows NT	AS, NT, SE
	Novell NetWare	AS, JS, SE
	SCO UNIX	Native (Tar & CPIO)
20/40-GB DAT DDS-4 8 Cassette Autoloader	Microsoft Windows NT	AS, NT, SE
	Novell NetWare	AS, JS, SE
	Microsoft Windows NT	AS, NT, SE
12/24-GB DAT DDS-3 8 Cassette Autoloader	Novell NetWare	AS, JS, SE
	Microsoft Windows NT	AS, NT, SE
	Novell NetWare	AS, JS, LG, SE
35/70-GB DLT Drive	SCO UNIX	AO, UX
	OS/2 Warp and LAN Server	ST
	Microsoft Windows NT	AS, NT, SE, LG
20/40-GB DLT Drive	Novell NetWare	AS, JS, LG, SE
	SCO UNIX	AO, UX
	OS/2 Warp and LAN Server	NV
DLT Tape Array II Model 35/70	Microsoft Windows NT	AS, NT, SE
	Novell NetWare	LG
	SCO UNIX	UX
DLT 15 Cartridge Library Model 35/70-1	Microsoft Windows NT	LG
	Novell NetWare	AS, JS, SE
	SCO UNIX	AO, UX
DLT 15 Cartridge Library Model 35/70-2	Microsoft Windows NT	AS, NT, SE
	Novell NetWare	AS, JS, SE
	SCO UNIX	AO, UX
DLT 15 Cartridge Library Model 20/40-1	Microsoft Windows NT	AS, NT, SE
	Novell NetWare	AS, JS, SE
	SCO UNIX	AO, UX
DLT 15 Cartridge Library Model 20/40-2	Microsoft Windows NT	AS, NT, SE
	Novell NetWare	AS, JS, SE
	SCO UNIX	AO, UX
TL895 (96 Slot) DLT Library (2 - 7 Drive)	Microsoft Windows NT	AS, NT, SE
	Novell NetWare	AS, SE
	Microsoft Windows NT 4.0	AS, NT, SE, LG
TL891 DLT Library (1 - 2 Drive)	Novell NetWare	AS, SE
	Microsoft Windows NT 4.0	AS, NT, SE
	Novell NetWare	AS, SE
TL881 DLT Library (1 - 2 Drive)	Microsoft Windows NT 4.0	AS, NT, SE
	Novell NetWare	AS, SE



Keys to Chart

AS Computer Associates

ARCserve

JS Computer Associates JETserve

AO Computer Associates

ARCserve Open

LG Legato Networker Software

from Legato

ST Sytos Plus software

SE Veritas Software Backup Exec

VN Banyan VINES support for Compaq tape drives included in operating system

UX Device drivers for Compaq tape drives available from SCO in the SCO Compaq

Supplement

NT Microsoft Windows NT support for Compaq tape drives included in

operating system

NV Novastor Novaback for OS/2

» [Overview](#)» [Standard Features](#)» [Options](#)» [Memory](#)» [Storage](#)» [TechSpecs](#)

TechSpecs

System Unit - Tower**Dimensions (HxWxD)**

23.38 x 15.12 x 25 in/59.4 x 38.4 x 63.5 cm

Weight

No hard drives installed, one power supply

88.2 lbs/40 kg

Input Requirements (per power supply)

Rated Input Voltage

100 to 120 VAC/200 to 240 VAC

Rated Input Frequency

50 to 60 Hz

Input Power

780W @ 110 VAC/1100W @ 220 VAC

Rated Input Current

8A

BTU Rating

2,623 BTU/h @ 500W, 3934 BTU/h @ 750

SCSI Connectors

Wide Ultra2 Models

One External HD68 SCSI connector (from embedded controller)

Wide-Ultra SCSI-3 Models

Three External connectors (2 available) – 1 VHDCI (from array controller) and 1 HD68 (from embedded controller)

Power Supply Output Power

(per power supply)

Rated Steady-State Power

500W/750W (lowline/highline)

Maximum Peak Power

540W/780W (lowline/highline)

Temperature Range

Operating

50° to 95°F/10° to 35°C

Non-operating

-20° to 140°F/-29° to 60°C

Shipping

-22° to 122°F/-30° to 50°C

Relative Humidity (non-condensing)

Operating

20% to 80%

Non-operating

5% to 90%

Maximum Wet Bulb

101.7°F/38.7°C

Temperature**Acoustic Noise**

NPEL (BELS)

AVERAGE SPL (dBA)

Idle (Fixed Disk Drives Spinning) 6

43

Operating (Random Seeks to 6.1

44

Fixed Disks)

000200



System Unit - Rack**Dimensions (HxWxD)**12 x 19 x 24.5 in/30.5 x 48.3 x 62.2
cm**Weight**No hard drives installed, one
power supply

90 lbs/40.9 kg

**Input Requirements (per power
supply)**

Rated Input Voltage

100 to 120 VAC/200 to 240 VAC

Rated Input Frequency

50 to 60 Hz

Input Power

780W @ 110 VAC/1100W @ 220
VAC

Rated Input Current

8A

BTU Rating2,623 BTU/h @ 500W, 3934 BTU/h
@ 750W**SCSI Connectors**

Wide Ultra2 Models

One External HD68 SCSI connector
(from embedded controller)

Wide-Ultra SCSI-3 Models

Three External connectors (2
available) – 1 VHDCI (from array
controller) and 1 HD68 (from
embedded controller)**Power Supply Output Power**

(per power supply)

Rated Steady-State Power

500W/750W (lowline/highline)

Maximum Peak Power

540W/780W (lowline/highline)

Temperature Range

Operating

50° to 95°F/10° to 35°C

Non-operating

-20° to 140°F/-29° to 60°C

Shipping

-22° to 122°F/-30° to 50°C

**Relative Humidity (non-
condensing)**

Operating

20% to 80%

Non-operating

5% to 90%

Maximum Wet Bulb

101.7°F/38.7°C

Temperature**Acoustic Noise**

NPEL (BELS)

AVERAGE SPL
(dBA)

Idle (Fixed Disk Drives Spinning)

6

43

Operating (Random Seeks to
Fixed Disks)

6.1

44

1.44-MB Diskette Drive**Diskette Size**

3.5 in

LED Indicators (front panel)

Green

Read/Write Capacity per

1.44 MB/720 KB

Diskette (high/low density)**Drive Supported**

One

Drive Height

One-third

Drive Rotation

300 rpm

Transfer Rate Synchronous (Max) 500/250 Kb/s
(high/low)**Bytes/Sector**

512

Sectors/Track (high/low)

18/9

Tracks/Side (high/low)

80/80

Access Times

Track-to-Track (high/low)

3/6 ms

Average (high/low)

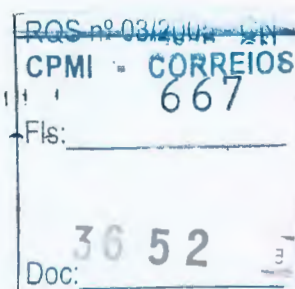
169/94 ms

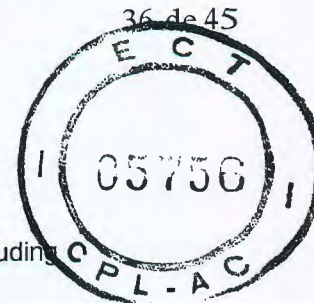
Settling Time

15 ms

Latency Average

100 ms





Cylinders (high/low) 80/80
Read/Write Heads Two
Hot Plug Wide Ultra3 SCSI Hard Drives
18.2 GB 10K

Capacity	18209.3 MB	Seek Time (typical reads, including settling)	
Height	1 in/25.4 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	5.2 ms
Interface	Wide Ultra3 SCSI	Full-Stroke	12 ms
Transfer Rate		Rotational Speed	10,000 rpm
Synchronous (Maximum)	160 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	35,565,080
		Operating Temperature	50° to 95° F/10° to 35° C

9.1 GB 10K

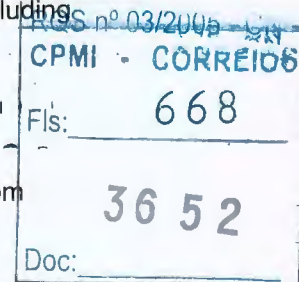
Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
Height	1 in/25.4 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	5.0 ms
Interface	Wide Ultra3 SCSI	Full-Stroke	12 ms
Transfer Rate		Rotational Speed	10,000 rpm
Synchronous (Maximum)	160 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	17,773,524
		Operating Temperature	50° to 95° F/10° to 35° C

Non-Hot Plug Wide Ultra3 SCSI Hard Drives
18.2 GB 10K

Capacity	18209.3 MB	Seek Time (typical reads, including settling)	
Height	1 in/25.4 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	5.5 ms
Interface	Wide Ultra3 SCSI	Full-Stroke	12 ms
Transfer Rate		Rotational Speed	10,000 rpm
Synchronous (Maximum)	160 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	35,565,080
		Operating Temperature	50° to 95° F/10° to 35° C

9.1 GB 10K

Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
Height	1 in/25.4 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	5.0 ms
Interface	Wide Ultra3 SCSI	Full-Stroke	12 ms
Transfer Rate		Rotational Speed	10,000 rpm
Synchronous (Maximum)	160 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	17,773,524
		Operating Temperature	50° to 95° F/10° to 35° C



Operating
Temperature

35° C

Hot Plug Wide Ultra2 SCSI Hard Drives**18.2 GB 10K**

Capacity	18209.3 MB	Seek Time (typical reads, including settling)	
Height	1 in/25.4 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	5.7 ms
Interface	Wide Ultra2 SCSI	Full-Stroke	12.2 ms
Transfer Rate		Rotational Speed	10,000 rpm
Synchronous (Maximum)	80 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	35,565,080
		Operating Temperature	50° to 95° F/10° to 35° C

**18.2 GB**

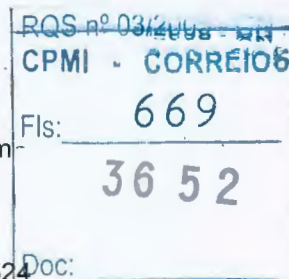
Capacity	18209.3 MB	Seek Time (typical reads, including settling)	
Height	1 in/25.4 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	6.9 ms
Interface	Wide Ultra2 SCSI	Full-Stroke	15.0 ms
Transfer Rate		Rotational Speed	7200 rpm
Synchronous (Maximum)	80 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	35,566,080
		Operating Temperature	50° to 95° F/10° to 35° C

9.1 GB 10K

Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
Height	1 in/25.4 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	5.4 ms
Interface	Wide Ultra2 SCSI	Full-Stroke	12.2 ms
Transfer Rate		Rotational Speed	10,000 rpm
Synchronous (Maximum)	80 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	17,773,524
		Operating Temperature	50° to 95° F/10° to 35° C

9.1 GB

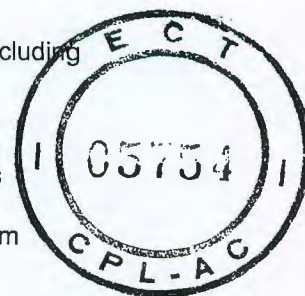
Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
Height	1 in/25.4 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	7.9 ms
Interface	Wide Ultra2 SCSI	Full-Stroke	16.0 ms
Transfer Rate		Rotational Speed	7200 rpm
Synchronous (Maximum)	80 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	17,773,524
		Operating Temperature	50° to 95° F/10° to 35° C



Non-Hot Plug Wide Ultra2 SCSI Hard Drives

18.2 GB

Capacity	18209.3 MB	Seek Time (typical reads, including settling)	
Height	1 in/25.4 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	6.9 ms
Interface	Wide Ultra2 SCSI	Full-Stroke	15.0 ms
Transfer Rate		Rotational Speed	7200 rpm
Synchronous (Maximum)	80 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	35,565,080
		Operating Temperature	50° to 95° F/10° to 35° C



9.1 GB

Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
Height	1 in/25.4 mm	Single Track	1.9 ms
Width	3.5 in/88.9 mm	Average	7.5 ms
Interface	Wide Ultra2 SCSI	Full-Stroke	15.0 ms
Transfer Rate		Rotational Speed	7200 rpm
Synchronous (Maximum)	80 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	17,773,524
		Operating Temperature	50° to 95° F/10° to 35° C

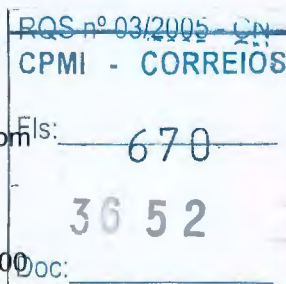
Hot Plug Wide-Ultra SCSI-3 Hard Drives

36.4 GB10K

Capacity	36419.5 MB	Seek Time (typical reads, including settling)	
Height	1.6 in/40.6 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	5.7 ms
Interface	Wide-Ultra SCSI-3	Full-Stroke	12.2 ms
Transfer Rate		Rotational Speed	10,000 rpm
Synchronous (Maximum)	40 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	35,565,080
		Operating Temperature	50° to 95° F/10° to 35° C

36.4 GB

Capacity	36419.5 MB	Seek Time (typical reads, including settling)	
Height	1.6 in/40.6 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	7.4 ms
Interface	Wide-Ultra SCSI-3	Full-Stroke	17.0 ms
Transfer Rate		Rotational Speed	10,000 rpm
Synchronous (Maximum)	40 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	71,132,000
		Operating Temperature	50° to 95° F/10° to 35° C



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**18.2 GB 10K**

Capacity	18209.8 MB	Seek Time (typical reads, including settling)	
Height	1 in/25.4 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	5.7 ms
Interface	Wide-Ultra SCSI-3	Full-Stroke	12.2 ms
Transfer Rate		Rotational Speed	10,000 rpm
Synchronous (Maximum)	40 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	35,566,000
		Operating Temperature	50° to 95° F/10° to 35° C

18.2 GB

Capacity	18209.8 MB	Seek Time (typical reads, including settling)	
Height	1 in/25.4 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	6.9 ms
Interface	Wide-Ultra SCSI-3	Full-Stroke	16.0 ms
Transfer Rate		Rotational Speed	7200 rpm
Synchronous (Maximum)	40 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	35,566,000
		Operating Temperature	50° to 95° F/10° to 35° C

9.1 GB 10K

Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
Height	1 in/25.4 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	5.4 ms
Interface	Wide-Ultra SCSI-3	Full-Stroke	12.2 ms
Transfer Rate		Rotational Speed	10,000 rpm
Synchronous (Maximum)	40 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	17,773,500
		Operating Temperature	50° to 95° F/10° to 35° C

9.1 GB

Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
Height	1 in/25.4 mm	Single Track	0.8 ms
Width	3.5 in/88.9 mm	Average	7.9 ms
Interface	Wide-Ultra SCSI-3	Full-Stroke	17.0 ms
Transfer Rate		Rotational Speed	7200 rpm
Synchronous (Maximum)	40 MB/s	Physical Configuration	
		Bytes/Sector	512
		Logical Blocks	17,773,500
		Operating Temperature	50° to 95° F/10° to 35° C

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32X Max (or faster) IDE CD-ROM Drive**Disk**

Applicable Disk

CD-ROM (Mode 1 and 2)
 CD-DA, CD-XA (Mode 2, Form 1 and 2)
 Photo CD (Single and Multi-session)
 Mixed Mode (Audio and Data combined)

Capacity

550 MB (Mode 1, 12 cm)

640 MB (Mode 2, 12 cm)

Diameter

4.7 in, 3.15 in/12 cm, 8 cm

Rotational Speed

4200 rpm maximum

Center Hole

0.6 in/15 mm diameter

Thickness

1.2 mm

Track Pitch

1.6 μ m**Block Size**

Mode 1

2,048 bytes

Mode 2

2,340, 2,336, 1,024 bytes

CD-DA

2,352 bytes

CD-XA

2,328 bytes

Interface

IDE (ATAPI)

Access Times (typical)

Random

100 ms

Full-Stroke

150 ms

Audio Output Level

Line-Out

0.7 VRMS at 47 kOhms

Headphone

0.6 VRMS at 32 Ohms (maximum volume)

Data Transfer Rate

Sustained

150 KB/s (1X audio)

Burst

2100 to 4800 KB/s

Cache Buffer

128 KB

Start-up Time (typical)

< 7 seconds

Stop Time

< 4 seconds

Laser Parameters

Type

Semiconductor Laser GaAlAs

Wave Length

780 $\pm$ 25nm

Divergence Angle

53.5° $\pm$ 1.5°

Output Power

0.14 mW

Operating Conditions

Temperature

41° to 113°F/5° to 45°C

Humidity

10% to 80%

Dimensions

(HxWxD, maximum)

1.88 x 5.85 x 8.11 in/4.29 x 15 x

20.8 cm

2.09 lbs/0.95 kg

Weight**Smart Array 221 Controller****Drives Supported**

Up to 14 drives

Data Transfer Method

32-bit PCI bus-master

Maximum Transfer Rate per

133 MB/s

PCI Bus (peak)**Simultaneous Drive Transfer**

One

Channels**Total Transfer Rate**

80 MB/s per channel

Software Upgradable Firmware

Yes

Cache

6-MB of ECC protected read cache

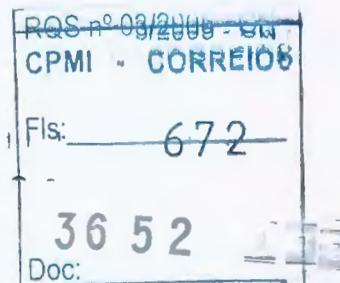
Reliability Features

Distributed Data Guarding (RAID Yes

5)

Drive Mirrorina (RAID 1)

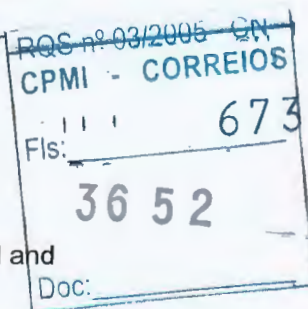
Yes



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Drive Stripping (RAID 0, 0 + 1)	Yes
Automatic Data Recovery	Yes
Smart Array 431 Controller	
Protocol	Wide Ultra3 SCSI
SCSI Electrical Interface	Low Voltage Differential (LVD)
Drives Supported	Up to 14 Drives Wide Ultra3 or Wide Ultra2 SCSI hard drives
SCSI Port Connectors	Single External/Internal SCSI port
Data Transfer Method	64-bit PCI bus-master
Maximum Transfer Rate on System Bus (peak)	266 MB/s
Simultaneous Drive Transfer Channels	One
Channel Transfer Rate	160 MB/s per channel
Software Upgradable Firmware	Yes
Read-Only Cache	16-MB Cache Performance Engine
Logical Drives Supported	32
Reliability Features	
Distributed Data Guarding (RAID 5)	Yes
Drive Mirroring (RAID 1)	Yes
Drive Striping (RAID 0, 0+1)	Yes
Automatic Data Recovery	Yes
Disk Drive Protocol Support	Wide Ultra3 and Wide Ultra2 SCSI
Enclosure Support	New StorageWorks Enclosure 4200 Family (Models 4214R and 4214T)
Smart Array 3200 Controller	
Drives Supported	Up to 15 drives per channel, 30 drives maximum
Data Transfer Method	32-bit PCI bus-master
Maximum Transfer Rate per PCI Bus (peak)	133 MB/s
Simultaneous Drive Transfer Channels	Two
Total Transfer Rate	160 MB/s (80 MB/s per channel)
Software Upgradable Firmware	Yes
Cache	64-MB Array Accelerator
Reliability Features	
Distributed Data Guarding (RAID 5)	Yes
Data Guarding (RAID 4)	Yes
Drive Mirroring (RAID 1)	Yes
Drive Stripping (RAID 0)	Yes
Automatic Data Recovery	Yes
Smart Array 4200 Controller	
Protocol	Wide Ultra2 SCSI
SCSI Electrical Interface	Low Voltage Differential
Drives Supported (maximum)	56 drives
Data Transfer Method	64-bit PCI bus-master
Maximum Transfer Rate on PCI Bus (peak)	
Simultaneous Drive Transfer Channels	Four
Total Channel Transfer Rate	320 MB/s
Software Upgradable Firmware	Yes
Cache	64 MB battery backed and removable
Logical Drives Supported	32



**Reliability Features**

Cache Battery Backup	Yes
Online Capacity Expansion	Yes
Logical Drive Capacity Extension	Yes
Online RAID Level Migration	Yes
Online Stripe Size Migration	Yes
Automatic Data Recovery	Yes
Distributed Data Guarding (RAID 5)	Yes
Data Guarding (RAID 4)	Yes
Drive Mirroring (RAID 1)	Yes
Drive Striping (RAID 0, 0 + 1)	Yes

64-Bit / 66-MHz Single Channel Wide Ultra3 SCSI Adapter

Drives Supported	Up to 14 SCSI devices
Storage Capacity	254.8 GB
Data Transfer Method	64-bit / 66-MHz PCI bus-master
Maximum SCSI Channel Transfer Rate	160 MB/s per channel
Maximum Transfer Rate per PCI Bus (peak)	532 MB/s per channel
SCSI Protocols	Wide Ultra3 SCSI Wide Ultra2 SCSI Wide-Ultra SCSI-3 Fast-Wide SCSI-2 Fast SCSI-2

Electrical Protocol**SCSI Termination****External SCSI Connectors****Internal SCSI Connectors**

Low Voltage Differential (LVD)

Active Termination

One 68-Pin Wide Ultra SCSI-3 connector

Two 68-Pin Wide Ultra SCSI-3 connectors (one LVD and one SE)

One 50-Pin Narrow Ultra connector

64-Bit / 66-MHz Dual Channel Wide Ultra3 SCSI Adapter

Drives Supported	Up to 28 SCSI devices (14 per channel)
Storage Capacity	1.019 TB
Data Transfer Method	64-bit / 66-MHz PCI bus-master
Maximum SCSI Channel Transfer Rate	160 MB/s per channel
Maximum Transfer Rate per PCI Bus (peak)	532 MB/s per channel
SCSI Protocols	Wide Ultra3 SCSI Wide Ultra2 SCSI Wide-Ultra SCSI-3 Fast SCSI-2

Electrical Protocol**SCSI Termination****External SCSI Connectors****Internal SCSI Connectors**

Low Voltage Differential (LVD)

Active Termination

Two 68-Pin VHDCI connectors

Two 68-Pin Wide Ultra SCSI-3 connectors

One 50-Pin Narrow Ultra connector

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Integrated Dual Channel Wide-Ultra SCSI-3 Adapter

Drives Supported Up to seven SCSI devices per channel
Data Transfer Method 32-bit PCI bus-master
SCSI Channel Transfer Rate 40 MB/s per channel
Maximum Transfer Rate per PCI Bus (peak) 133 MB/s
SCSI Termination Active Termination
SCSI Connectors 1 external, (68-pin)
 2 internal, (68-pin)

64-Bit Dual Channel Wide-Ultra2 SCSI Adapter (in a slot)

Drives Supported Up to 15 SCSI devices per channel
Data Transfer Method 64-bit PCI bus-master
SCSI Channel Transfer Rate 80 MB/s per channel
Maximum Transfer Rate per PCI Bus (peak) 133 MB/s
SCSI Termination Active Termination
SCSI Connectors 2 external, (80-pin)
 2 internal, (68-pin)

Compaq 10/100TX PCI Intel UTP Controller (in a slot)

Network Interface 10Base-T/100Base-TX
Compatibility IEEE 802.3/802.3u compliant
Data Transfer Method 32-bit bus-master PCI
Network Transfer Rate
 10Base-T (Half-Duplex), 10Base-2 10 Mb/s
 20 Mb/s
 10Base-T (Full-Duplex) 100 Mb/s
 100Base-TX (Half-Duplex), 200 Mb/s
 100VG-AnyLAN
 100Base-TX (Full-Duplex)
Connector RJ-45
Cable Support
 10Base-T Categories 3, 4 or 5 UTP (2 or 4 pair); up to 328 feet (100 meters)
 100Base-TX Category 5 UTP (2 pair); up to 328 feet (100 meters)

Compaq Rack 9142 (42U)(optional)

Dimensions	Total Cabinet	Shipping	Color
------------	---------------	----------	-------

Height	78.7 in/2,000 mm	83.38 in/2,168.65 mm	
Depth	35.8 in/909 mm	48 in/1219.2 mm	Opal
Width	23.7 in/603 mm	32 in/812.8 mm	
Weight	253 lbs/114.84 kg	325 lbs/147.52 kg	

Compaq Rack 9136 (36U)(optional)

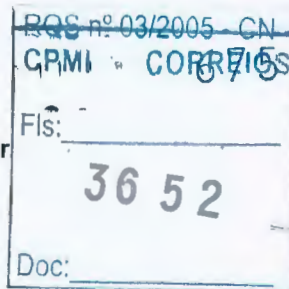
Dimensions	Total Cabinet	Shipping	Color
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Height	68.6 in/1,742 mm	75.25 in/1,911.35 mm	
Depth	35.8 in/909 mm	48 in/1219.2 mm	Opal
Width	23.7 in/603 mm	32 in/812.8 mm	
Weight	165 lbs/75 kg	234 lbs/106 kg	

Compaq Rack 9122 (22U)(optional)

Dimensions	Total Cabinet	Shipping	Color
------------	---------------	----------	-------

Height	43 in/1,092 mm	52.25 in/1,327.15 mm	
Depth	35.8 in/909 mm	48 in/1219.2 mm	Opal





Width 24 in/610 mm 32 in/812.8 mm
Weight 176 lbs/79.89 kg 225 lbs/102.13 kg

Compaq Rack 7142 (42U) (optional)

Dimensions	Total Cabinet	Usable Area	Shipping
Height	85 in/215.9 cm	73.5 in/186.69 cm	90.75 in/230.5 cm
Depth	33.25 in/84.45 cm	29.21 in/74.19 cm	48 in/121.92 cm
Width	23.25 in/59.05 cm	19 in/48.26 cm	32 in/81.28 cm
Weight	253 lbs/114.84 kg—		325 lbs/147.52 kg

Compaq Rack 4136 (36U) (optional)

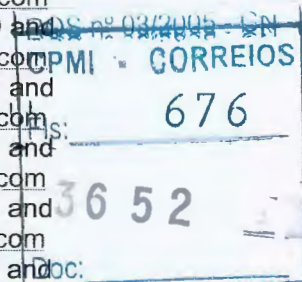
Dimensions	Total Cabinet	Usable Area	Shipping
Height	67.97 in/172.5 cm	63.05 in/160.02 cm	85.25 in/203.84 cm
Depth	33.25 in/84.45 cm	29.21 in/74.19 cm	48 in/121.92 cm
Width	23.25 in/59.05 cm	19 in/48.26 cm	32 in/81.28 cm
Weight	165 lbs/75 kg —		234 lbs/106 kg

Compaq Rack 7122 (22U) (optional)

Dimensions	Total Cabinet	Usable Area	Shipping
Height	49.5 in/125.7 cm	38.5 in/97.79 cm	56.63 in/143.84 cm
Depth	33.25 in/84.45 cm	29.21 in/74.19 cm	48 in/121.92 cm
Width	23.25 in/59.05 cm	19 in/48.26 cm	32 in/81.28 cm
Weight	176 lbs/79.89 kg —		225 lbs/102.13 kg

OS Driver Support

Operating Systems	Current Drivers	Driver Location (Punch-out diskettes only.)
Microsoft Windows NT Server 3.51 (Only supported in the ProLiant 5500 Pentium III Models shipped with the Wide-Ultra SCSI-3 Drive Cage.)	NTSSD 2.17a	SmartStart CD and www.compaq.com
Microsoft Windows NT Server 4.0	NTSSD 2.17a	SmartStart CD and www.compaq.com
Microsoft Windows 2000 Server	Support Software Bundle for Windows 2000 5.02a	SmartStart CD and www.compaq.com
Novell NetWare 3.2	NSSD 5.50	SmartStart CD and www.compaq.com
Novell NetWare 4.2	NSSD 5.50	SmartStart CD and www.compaq.com
Novell NetWare 4.2 SMP	NSSD 5.50	SmartStart CD and www.compaq.com
Novell NetWare 5	NSSD 5.50	SmartStart CD and www.compaq.com
SCO OpenServer 5.0.4, 5.0.5	EFS 5.28	SmartStart CD and www.compaq.com
SCO OpenServer 5.0.4, 5.0.5 SMP	EFS 5.34	SmartStart CD and www.compaq.com





3.0.3 SMP		www.compaq.com
SCO UnixWare 2.1.2, 2.1.3	EFS 2.34	SmartStart CD and www.compaq.com
SCO UnixWare 2.1.2, 2.1.3SMP	EFS 2.34	SmartStart CD and www.compaq.com
SCO UnixWare 7.0.1	EFS 7.34	SmartStart CD and www.compaq.com
SCO UnixWare 7.0.1 SMP	EFS 7.34	SmartStart CD and www.compaq.com
SCO UnixWare 7.1	EFS 7.34	SmartStart CD and www.compaq.com
SCO UnixWare 7.1 SMP	EFS 7.34	SmartStart CD and www.compaq.com
IBM OS/2 Warp Server 4 (Entry)	OS2SSD 4.40A	SmartStart CD and www.compaq.com
IBM OS/2 Warp Server 4 (Advanced)	NICSSD 1.55A	SmartStart CD and www.compaq.com
IBM OS/2 Warp Server 4 (Advanced) SMP	OS2SSD 4.40A	SmartStart CD and www.compaq.com
IBM OS/2 Warp Server 4 for e-business	NICSSD 1.55A	SmartStart CD and www.compaq.com
Sun Solaris 8 Intel Platform Edition	OS2SSD 4.40A	SmartStart CD and www.compaq.com
(Only supported in the ProLiant 5500 Pentium III Models shipped with the Wide-Ultra SCSI-3 Drive Cage.)	NICSSD 1.55A	SmartStart CD and www.compaq.com
Sun Solaris 7 Intel Platform Edition	Solaris Driver Update 1.10	www.compaq.com
(Only supported in the ProLiant 5500 Pentium III Models shipped with the Wide-Ultra SCSI-3 Drive Cage.)		
Sun Solaris 2.6 Intel Platform Edition	Solaris Driver Update 1.10	www.compaq.com
(Only supported in the ProLiant 5500 Pentium III Models shipped with the Wide-Ultra SCSI-3 Drive Cage.)		

(Note: Not all storage controllers are supported under Solaris 2.6, 7, and 8. Please refer to the Supported Devices list on the Solaris Driver Update download page. Please see customer advisories for addition information on Solaris 8 installation.)

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DeskPro EP

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COMPAQ

Compaq Deskpro EP Series Product Overview



The New Compaq Deskpro EP Series of Personal Computers

Featuring:

New Intel® Pentium III processors at speeds up to 500MHz
with 100MHz Front Side Bus

Intel® 810e chipset

"Towerable" chassis that is easily configured as either a desktop or
minitower

September 1999

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Compaq Deskpro EP Series Product Overview

Note: This overview applies only to the Compaq Deskpro EP Series of Personal Computers. Other Compaq Deskpro models are discussed in separate product overviews.

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For More Information, Contact

For more information about the Compaq Deskpro EP Series or any other Compaq product, contact your Compaq Authorized Reseller or visit our World Wide Web Site at www.compaq.com.

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Compaq Deskpro EP Series Product Overview

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COMPAQ



Compaq Deskpro EP Series Product Overview

Executive Summary

Announcement Summary

Compaq introduces new models of the Deskpro EP Series of Personal Computers in conjunction with the Intel® 810e chipset announcement, featuring the Pentium III 450MHz and 500MHz processors with 100MHz Front Side Bus.

Product Positioning

The Compaq Deskpro EP Series delivers the best price/performance in a simple, flexibly designed desktop.

Target Audience

The Compaq Deskpro EP Series is designed for PC customers who desire the latest technologies at the most competitive prices. As new technologies and components are added to the line, Compaq is committed to maintaining original models throughout the life of the processor. Customers who value consistency are able to rely on the Deskpro EP Series of Personal Computers to meet their needs.

What's New

- ☐ Intel Pentium III processors at 450/100MHz and 500/100MHz with 512KB ECC cache & Intel 810e chipset.
- ☐ Intel 810e chipset:
 - 100/133MHz Front Side Bus
 - PC100 Memory (required)
 - Integrated Intel 3D graphics, featuring Intel Dynamic Video Memory Technology with 8MB video memory equivalent performance
 - Ultra ATA/66 support
 - Embedded Intel PRO/100+ Management adapter with NIC-based alert support
 - Enhanced Security
 - Integrated AC '97 audio with Compaq *Premier•Sound*™
- ☐ New Intelligent Manageability features include:
 - Compaq Insight Manager LC, web-based tool to manage PC workgroups
 - System Software Manager for automatic unattended update of system software and management agents
- ☐ Options include:
 - Choice of CD-ROM Drive, including the 52X TrueX CD-ROM Drive and 40X Max tray load CD-ROM
 - 4X/2X/24X CD-RW drive
 - Internal Iomega Zip 250 Drive

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Compaq Deskpro EP Series Product Overview

- TR5 Tape Drive
- LS-120 SuperDisk
- 3Com EtherLink 10/100 PCI NIC

What's Special About This Product

The Compaq Deskpro EP Series offers a broad range of models to deliver highly competitive products with the right set of features at the right price. It achieves an excellent long-term value by combining mainstream to next-generation, industry-standard technologies in a highly flexible design.

The innovative and flexible Deskpro EP Series chassis can be configured as either a desktop or minitower to fit easily into different work environments throughout the lifecycle of the product. This "Towerable" chassis is a unique Compaq design that allows the drive bays to be rotated so they will remain horizontal when configured as either a desktop or minitower. Proven, industry standard components and the intuitive modular design enables smooth integration of customized features and upgrades to meet the requirements of any environment. Standardizing on this flexible solution will reduce Total Cost of Ownership by facilitating upgrades and allowing customers to move the unit between users with either a desktop or minitower requirement.

In a desktop that is priced so competitively, customers typically do not expect extra features, but the new Deskpro EP Series also includes a full set of Intelligent Manageability features that delivers easy control and management throughout the PC lifecycle. Intelligent Manageability is based upon industry standard building blocks including DMI 2.0, SNMP, Intel's "Wired for Management" (WfM), and Net PC Technologies. It is also built upon tight integration with Compaq Management Solutions Partners and Compaq Insight Manager.

Deskpro EP Series of Personal Computers features

- ☐ Wide range of Intel processors:
 - Intel Pentium III 450/100MHz, 500/100MHz, and 550/100MHz processors with 512KB ECC cache
 - Intel Celeron 466/66MHz and 500/66MHz processors with 128KB cache
- ☐ 512KB Level 2 Synchronous Pipeline Burst DRAM cache on Pentium III models (ECC cache available on select models); 128KB ECC Level 2 Synchronous Pipeline Burst DRAM cache on Celeron models
- ☐ ATX chassis with an open design for easy serviceability that is configurable as either a desktop or minitower
- ☐ Intelligent Manageability features include DMI 2.0 support, NIC-based alert support, Remote Wakeup / Remote Shutdown, ROM-Based Setup, Remote ROM Flash, Remote Security Management, and Memory Change Alert

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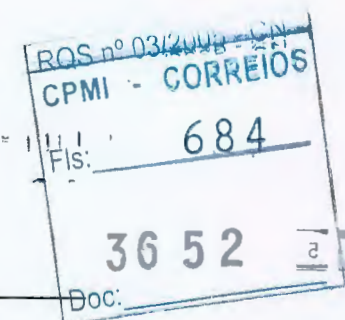


Compaq Deskpro EP Series Product Overview

- ☐ 32MB or 64MB Synchronous DRAM (SDRAM) standard, expandable to 512MB on Celeron models, 768MB on Pentium III models with the 440Bx chipset and 512MB on the Pentium III with the 810e chipset
- ☐ Compaq Restore CD shipped with all units
- ☐ Diagnostic LEDs for quick troubleshooting
- ☐ Integrated Ultra ATA hard drive controller and SMART Ultra ATA hard drives up to 10.0 GB Choice of AGP graphics solutions:
 - Integrated Intel 3D graphics, featuring Intel Dynamic Video Memory Technology with 8MB video memory equivalent performance
 - Matrox Millennium G200-SD AGP 2X graphics with 8MB (upgradeable to 16MB) SDRAM
- ☐ Choice of CD-ROM drive, including the 52X TrueX CD-ROM Drive and 40X Max tray load CD-ROM as an option
- ☐ Integrated AC '97 audio with Compaq *Premier•Sound™*
- ☐ Embedded 16-bit full duplex ISA audio with Compaq *Premier•Sound™* on select models
- ☐ Compaq Enhanced Keyboard with three Windows function keys for increased productivity with Windows 95 and Windows NT
- ☐ Choice of Windows 95/98, or Windows NT 4.0 preinstalled

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Compaq Deskpro EP Series Product Overview

Key Facts / Features / Benefits

High-Performance Intel Processors

The Compaq Deskpro EP Series of Personal Computers feature the new Intel® 810e chipset paired with the Pentium III 450/100MHz and 500/100MHz processors to provide excellent price/performance. These systems offer integrated Intel 3D graphics, featuring Intel Dynamic Video Memory Technology with 8MB video memory equivalent performance, integrated audio, ATA/66 support, NIC-based alert support, as well as 100MHz Front Side Bus, respectively. Also available are Celeron 500/66 and 466/66 models with the 810 platform with 100MHz Front Side Bus support. Regardless of the configuration, the Intel 810e graphics capabilities, features and optimized architecture ensure excellent value.

Performance models of the Compaq Deskpro EP Series of Personal Computers are available with Intel Pentium III processors with speeds at 450/100MHz, 500/100MHz, and 550/100MHz. These systems feature an Intel 440BX AGPset with 100MHz FSB.

The Pentium III processor includes a set of 70 instructions referred to as Streaming SIMD Extensions. These instructions access a set of eight new registers that are 128-bits wide as opposed to the current 80 bits. Most of these instructions pertain to SIMD (Single Instruction, Multiple Data) operations for floating point instructions but also offer new integer MMX instructions. SIMD-style instructions are particularly suited to floating point arithmetic, commonly used in 3D geometry calculations, as well as audio and speech processing.

Pentium III processors with Error Checking and Correcting (ECC) memory are available on select Compaq Deskpro systems. These processors are covered under the Processor Fault Prediction and Prefailure Warranty. If the processor encounters an excessive number of cache memory errors, the system displays a Local Alert Message. This message contains detailed information about the faulty processor, allowing action to be taken before non-correctable cache memory errors occur. The Prefailure Warranty allows replacement of the faulty processor, free of charge, before failure occurs.

Memory

The new Compaq Deskpro EP Series models ship standard with 32MB or 64MB of Synchronous DRAM (SDRAM), expandable to 512MB on Celeron 466MHz and 500MHz models, and 768MB on Pentium III models with the 440BX chipset and 512MB on Pentium III with the 810e chipset.

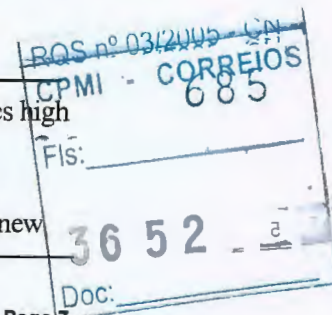
SMART Hard Drives with Drive Protection System

To satisfy the growing storage requirements of users today, the Deskpro EP Series features high performance, high capacity Ultra ATA hard drives. 810e models come standard with 6.4GB/5400 rpm or 13.5GB/7200 rpm drives. They also feature a new Drive Protection System (DPS), which is available on drives with the 810, 810e, and 820 models. DPS, a new

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Compaq Deskpro EP Series Product Overview

ATA industry standard driven by Compaq, allows the user to check the drive for physical faults that indicate a need to replace the drive. The drives include SMART (Self Monitoring Analysis and Reporting Technology) fault prediction technology that monitors and warns of impending problems on the drive before they occur. With advanced warning, it is possible to backup the drive to the network or to tape before a failure occurs and data is lost. Should an impending failure condition arise, the SMART drives are covered under a Prefailure Warranty, which means that Compaq will replace the hard drive free of charge.

The Ultra ATA hard drives also include Ultra ATA Integrity Monitoring. An Intelligent Manageability Agent monitors the integrity of data transferred between the Ultra ATA hard drive and the system core logic. If the agent detects excessive transmission errors, both the user and system administrator receive an alert message that includes recommendations for resolving the problem and improving system performance.

With the Intel 810 chipset introduction, Ultra ATA hard drives transitioned from ATA/33 to ATA/66. Ultra ATA/66 doubles the maximum transfer rate of the hard drive. The drives are backward compatible with ATA/33 and are compatible with the BX platform. All Deskpro PCs with Intel 810 or 810e chipset feature ATA/66 hard drives with Drive Protection System.

AGP Graphics

New Deskpro EP Series, featuring the 810e chipset, ship with integrated Intel 3D graphics, featuring Intel Dynamic Video Memory Technology with 8MB video memory equivalent performance, that provides the following graphics solution:

Systems with Windows 98, Windows 95 OSR2.1, NT4.0, Windows 2000

- 1600 x 1200 resolution / 256 colors @ 85Hz
- 1280 x 1024 resolution / 16.7M colors @ 85Hz

Systems with Windows 95 OSR0/1/2, Windows 3.1x, OS/2

- 1024 x 768 / 256 colors @ 85Hz

Other Deskpro EP Series models ship with Matrox Millennium G200-SD AGP graphics with 8MB SDRAM that provides:

- 1920 x 1080 / 16.7M colors @ 65Hz
- 3D hardware acceleration
- MPEG1 and MPEG2 support

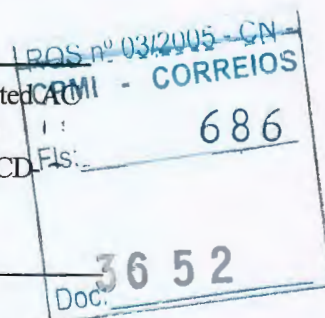
Multimedia Capabilities

Select Deskpro EP Series models ship with 40X Max tray load CD-ROM and integrated AC '97 audio with Compaq Premier•Sound™ or embedded 16-bit full duplex audio with Compaq Premier•Sound™. Other removable storage options include a 72X TrueX CD-ROM drive, and 4X/2X/24X CD-RW drive.

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Compaq Deskpro EP Series Product Overview

Audio with *Premier•Sound™* Speakers

The Deskpro EP Series *Premier•Sound™* audio system is an integrated design solution that incorporates new innovations in system and transducer design. The design provides low cost, best in class, high quality audio for the business user/buyer, without requiring external speakers or depending on monitor based solutions. External *Premier•Sound™* speakers are also available. They are optimized to reduce excess noise for office environments.

Change Control and Change Notification

To ensure a stable and consistent platform, Compaq's Change Control program has been designed to minimize change during the lifecycle of all Deskpro PCs. Another objective is to accumulate change into one transition. However, issues of a critical nature remain top priority. Organized change fosters a more serviceable product and more effective customer communications.

Change Notification is a program for providing proactive, advance communication of product changes. Changes are communicated as soon as identified, with a goal of 60 days advance notice, to ensure that customers are given adequate time to plan and execute the change.

Flexible ATX Chassis

Compaq has taken the idea of the "Towerable" desktop one step further. The Compaq redesign of the ATX chassis allows maximum flexibility and ease of use. This unique design allows any industry standard drive (floppy and CD-ROM drives) to be rotated 90 degrees within the chassis so it can be configured as either a desktop or minitower. Its ability to interchange between desktop and minitower formats allows the Deskpro EP Series units to be adapted to a variety of workspaces and to be easily reconfigured. This interchangeability helps to lower the Total Cost of Ownership by making it easier for a company to standardize on one PC model at initial deployment and then reconfigure the unit later in its lifecycle to meet different end-user requirements.

Easy to Upgrade and Service

The Compaq Deskpro EP Series of Personal Computers offers a broad range of models to deliver highly competitive products with the right set of features at the right price. The Deskpro EP Series achieves an excellent long-term value by combining mainstream to next-generation, industry-standard technologies in a simple, flexibly designed desktop. This allows the PC to change when user needs change. An excellent set of serviceability features adds to this flexibility while reducing TCO.

Tool-Free Access

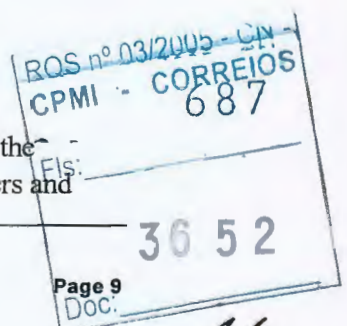
The Compaq unique improvements to the ATX chassis reduce the need for tools.

Open Modular Design

Easy and clear accessibility from the top of the unit simplifies service for all models in the Deskpro EP Series. Memory, processors, graphics, expansion cards, CMOS jumpers and

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Compaq Deskpro EP Series Product Overview

power supplies can be easily upgraded, replaced or serviced. Excellent cable management also makes servicing easier.

The standard modular design features six expansion slots and five drive bays to accommodate upgrades and to install the NIC of choice.

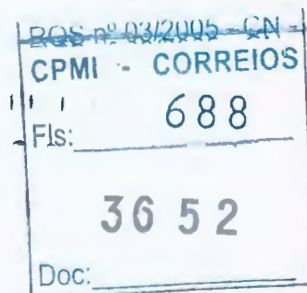
Unique Drive Release System

Compaq's unique quick release drive system facilitates service and upgrades in the Deskpro EP Series. Hard drives, CD-ROMs, floppy drives, DVD ROMs, SuperDisk™ (LS-120



technology), and tape drives can be removed, replaced, or added quickly without using special tools, drive rails or special screws.

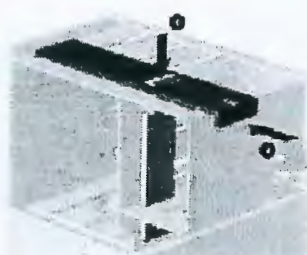
The two captive thumbscrews at the back of the unit are twisted to release the access panel and allow it to be lifted off. A user can open the unit, replace any card or service an item, and reassemble it in less than five minutes. This is approximately half the time that it takes to perform a similar operation on most competitive products.



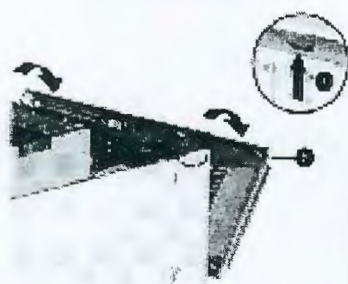
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Compaq Deskpro EP Series Product Overview



With the machine in desktop configuration, simply push the button with the green arrow to release the drives. From the minitower configuration, slide the entire drivelock bar to release the drives. Raised graphic instructions on the green plastic drivelock direct the user or technician

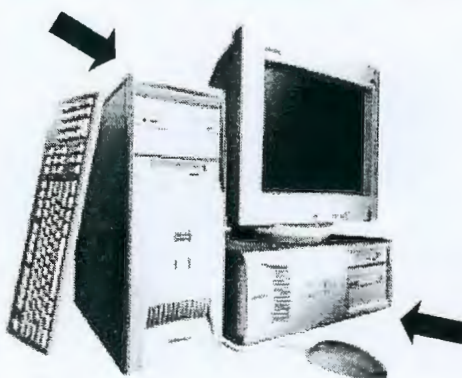


The front bezel can be removed by pushing on the two release tabs and rotating the bezel away from the chassis. Labels clearly guide the user to aid in bezel

Towerability

The Compaq unique towerability feature in the Deskpro EP Series permits easy conversion of the unit from desktop to minitower configuration or vice versa as workspace needs change throughout the product's life. The innovative design allows the drive bays to be rotated so they remain horizontal when configured as either a desktop or minitower. The procedure can be accomplished in just a few minutes, without the need for tools or special training. The ability to standardize on one flexible solution facilitates improved inventory management, consequently lowering Total Cost of Ownership over the life of the PC.

Drives
configured



Drives
configured

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Conclusion

All Deskpros are subject to the same high quality and reliability standards that have made the Deskpro name the hallmark for value in business computing. Buyers get the best price and performance in a flexible design, plus levels of serviceability and manageability not available in competitive products.

Diagnostic LEDs

Compaq Deskpro EP Series of Personal Computers incorporates a number of Diagnostic LEDs to assist users and service personnel in safe, efficient repair and diagnosis. The power-on, hard drive and keyboard LEDs function as diagnostic lights.

LEDs on the front of the units indicate main power and hard drive activity. LEDs on the systemboard alert service personnel if the power cable is connected or capacitor charges are still supplying power to the unit. LEDs on the keyboard, located at the Num Lock, Caps Lock and Scroll Lock keys, assist in preliminary diagnostics. In various combinations, they indicate the following events or states:

- Keyboard LEDs light up to indicate that memory and/or expansion cards are not properly seated.
- Drive LEDs light up to indicate that a drive is currently in use.
- Systemboard Auxiliary Power LEDs stay on to remind those servicing the unit to unplug the power cord before servicing.
- Systemboard Capacitor LEDs light up to warn those servicing the unit to wait until all power has discharged from systemboard capacitors.

Compaq PC Lifecycle Solutions

Compaq PC Lifecycle Solutions provides a portfolio of 29 tools and services from Compaq to alleviate the burden of managing PCs in enterprises. Consequently, IT departments not only realize lower total costs over the lifecycle but also are able to focus resources on IT projects which add strategic value to their business. PC Lifecycle Solutions offers tools and solutions in the areas of Planning, Deployment, Management and Transition. (For more information, check out www.compaq.com/solutions)

Intelligent Manageability

Intelligent Manageability is the Compaq award-winning desktop management solution that provides comprehensive solutions to manage desktops over their lifecycle, reducing their total cost of ownership. The Compaq Deskpro family of PCs support DMI 2.0 and can be integrated with a broad range of leading LAN and enterprise management applications. Intelligent Manageability provides solutions in the area of Initial Configuration and Deployment, Asset Tracking and Security, Software Updating and Management, and Fault Notification and Recovery.

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Compaq Deskpro EP Series Product Overview

All Deskpro EN Series models include a comprehensive set of Intelligent Manageability tools as standard features:

- Remote System Installation (with appropriate NIC)
- Replicated Setup
- Remote ROM Flash
- Remote Wakeup / Remote Shutdown
- Support Software CD and WWW Site
- AssetControl
- DMI 2.0 Support
- Remote Security Management
- Smart Cover Lock
- Smart Cover Sensor (Desktop and Minitower models only)
- Compaq Info Messenger
- SMART Hard Drives, Prefailure Warranty, and Proactive Backup
- ECC Memory and Prefailure Warranty (standard on select models, supported on all)
- Processor Fault Prediction and Prefailure Warranty
- Memory Change Alert
- Ownership Tag
- Thermal Sensor
- Surge Tolerant Power Supply

Compaq Restore CD

A Compaq Restore CD is shipped with all Compaq Deskpro units. Along with the Operating System CD which is also shipped with every unit, the Compaq Restore CD enables full restore of the original Deskpro system software in the event of a hard drive failure or if the customer wants to restore the PC to factory condition.

Microsoft Operating System Compatibility

The Deskpro EP Series of Personal Computers is designed to comply with the PC 98 Hardware Design Guide and is logo certified with Microsoft Windows and Windows NT operating systems. The Deskpro EP Series has been verified against the Microsoft test suite and is certified in the "Designed for Microsoft Windows" logo program for Windows 95, Windows 98, and Windows NT 4.0.

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Compaq Deskpro EP Series Product Overview

The Compaq Advantage

Because these new products are designed, built, and tested by Compaq, customers can be assured of the highest quality and reliability. And since they are manufactured using only industry-standard software and hardware components, customers can easily perform service and upgrades. Compaq is the right choice for commercial PCs.

Uncompromising Quality, Reliability, and Compatibility

- ❑ **Worldwide Leader in PCs.** Compaq Computer Corporation is the largest computer company in the world and the largest global supplier of desktop PCs.
- ❑ **Legendary Quality.** Compaq quality and reliability reduce maintenance, repair, and support costs throughout the PC lifecycle and result in a residual value that is up to 67% higher for Compaq PCs than most other PC brands combined.
- ❑ **Rigorous Testing.** Compaq PCs are extensively tested for compatibility in environments simulating real-world conditions with hundreds of leading hardware components and software products.
- ❑ **Open Industry Standards.** Compaq drives and supports industry standards. Through partnerships with Intel, Microsoft, and many other industry-leading companies, Compaq helps establish industry standards and ensures that Compaq products and technologies provide solutions that maximize interoperability and upgradeability.
- ❑ **Lower Total Cost of Ownership.** Compaq products and technologies are designed to help companies improve PC management practices in order to significantly lower ownership costs.
- ❑ **Increased Customer Satisfaction.** Compaq strives to be #1 in customer satisfaction by providing industry-leading, standards-based commercial computing products and solutions that offer outstanding customer value and ease of ownership. It is the Compaq goal to give customers what they want, when and how they want it, at the lowest cost.
- ❑ **Unmatched Service and Support.** Compaq and its channel partners provide more than 100,000 sales and authorized service professionals world-wide, giving users unparalleled breadth of service and support at the local level. Efficient service minimizes productivity loss due to downtime.

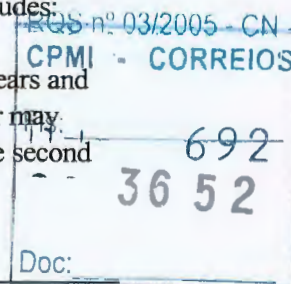
Service and Support

The new Compaq Deskpro EP Series models are protected under the generous Compaq support umbrella known as Compaq Services. This service and support package includes:

- ❑ **On-Site Warranty.** This 3-year limited warranty covers all parts for three years and provides free on-site service (parts and labor) for the first year. The customer may extend or upgrade the warranty to provide labor and/or on-site service for the second and third years.

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Compaq Deskpro EP Series Product Overview

- ❑ **Prefailure Warranty.** The SMART hard drives, optional ECC memory modules, processors with ECC cache on select models on the New Deskpro EP Series are covered for three years under this warranty. If a customer receives a warning of an impending failure, Compaq will replace the hard drive or memory free of charge.
- ❑ **Support Software CD and World Wide Web Site.** The Compaq Support Software CD and WWW Site (www.compaq.com) provide customized software that is preinstalled on the Deskpro. These tools provide easy installation of device drivers and other software that enhance the performance and manageability of the Deskpro.
- ❑ **InfoMessenger.** Through its World Wide Web Site, Compaq delivers proactive updates and information about all Compaq products. InfoMessenger allows each customer to create a customized user profile. Then, anytime Compaq makes a change or update that is of interest to the user (new ROM images, drivers, solutions, etc.), InfoMessenger will send an E-mail notification to the customer. The Compaq World Wide Web Site is located at www.compaq.com

Design for Environment

Compaq practices "Design for Environment" which is the integration of sound environmental practice into product design. Design for Environment currently focuses on:



- ❑ **Energy Conservation.** The Compaq Energy Star-certified products, including the Deskpro EP Series, reduce power consumption during non-active periods.
- ❑ **Disassembly.** Compaq products are easily disassembled at the end of product life to aid in recycling.
- ❑ **Recyclability.** Compaq uses commonly recycled materials that are easily identified.
- ❑ **Packaging.** Product packaging consists of recyclable materials, no heavy metal inks, and minimal packaging material.
- ❑ **CFC-Free.** Both Compaq and its suppliers use only CFC-Free processes.
- ❑ **International Standards.** Compaq products and processes meet worldwide environmental regulatory standards.

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Compaq Deskpro EP Series Product Overview



Specifications/Standard Features

Note that this table applies only to Compaq Deskpro EP Series models. Other Compaq products are discussed in separate product overviews.

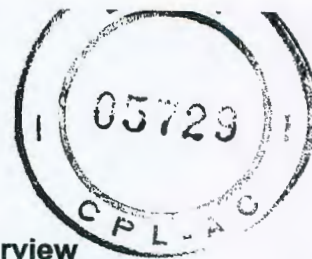
Compaq Deskpro EP Series Towerable Desktop			
	Intel 810e chipset	Intel 810 chipset	Intel 440BX AGPset
Processor	Intel Pentium III 450/100MHz 500/100MHz	Intel Celeron 466/66MHz 500/66MHz	Intel Pentium III 450/100MHz 500/100MHz 550/100MHz
Cache	512KB ECC Level 2 Synchronous Pipeline Burst cache	128KB ECC Level 2 Synchronous Pipeline Burst cache	512KB ECC Level 2 Synchronous Pipeline Burst cache
Architecture	PCI / ISA	PCI / ISA	PCI / ISA / AGP
Memory (Std/max)	64MB SDRAM expandable to 512MB	32MB SDRAM 64MB SDRAM expandable to 512MB	64MB SDRAM 128MB SDRAM expandable to 768MB
Diskette Drives (Std)	1.44MB	1.44MB	1.44MB
Hard Drives	SMART Ultra ATA/66 6.4GB w/Drive Protection System	SMART Ultra ATA/66 4.3GB to 6.4GB w/Drive Protection System	SMART Ultra ATA 6.4GB to 10.0GB w/Drive Protection System
USB Port	2 USB Ports (double stacked)	2 USB Ports (double stacked)	2 USB ports (double stacked)
CD-ROM Drive	32X Max tray load IDE (on select models)	32X Max tray load IDE (on select models)	32X Max tray load IDE (on select models)
Audio	Integrated AC '97 audio w/ Compaq Premier®Sound™	Integrated AC '97 audio w/ Compaq Premier®Sound™	Compaq Premier®Sound™ with ESS ISA 1869 16-bit full duplex audio
Graphics	Integrated Intel 3D graphics, featuring Intel Dynamic Video Memory Technology with 8MB video memory equivalent performance	Integrated Intel 3D graphics, featuring Intel Dynamic Video Memory Technology with 8MB video memory equivalent performance	Matrox Millennium G200-SD AGP Graphics with 8MB SDRAM (upgradeable to 16MB)

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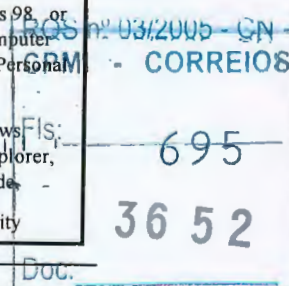


Compaq Deskpro EP Series Product Overview

Compaq Deskpro EP Series Towerable Desktop			
	Intel 810e chipset	Intel 810 chipset	Intel 440BX AGPset
Max Resolution/ Colors	Systems with Windows 98, Windows 95 OSR2.1, NT4.0, Windows 2000 1600 x 1200 resolution / 256 colors @ 85Hz 1280 x 1024 resolution / 16.7M colors @ 85Hz Systems with Windows 95 OSR0/1/2, Windows 3.1x, OS/2 1024 x 768 / 256 colors @ 85Hz	Systems with Windows 98, Windows 95 OSR2.1, NT4.0, Windows 2000 1600 x 1200 resolution / 256 colors @ 85Hz 1280 x 1024 resolution / 16.7M colors @ 85Hz Systems with Windows 95 OSR0/1/2, Windows 3.1x, OS/2 1024 x 768 / 256 colors @ 85Hz	1920 x 1080 @ 16.7M colors @ 65Hz
Keyboard	Compaq Enhanced Keyboard	Compaq Enhanced Keyboard	Compaq Enhanced Keyboard
Expansion Slots	4 PCI 1 ISA 1 PCI / ISA Combo	4 PCI 1 ISA 1 PCI / ISA Combo	3 PCI 1 ISA 1 PCI / ISA Combo 1/(0*) AGP (*1 AGP slot occupied by AGP graphics card)
Expansion Bays	5 bays (2 internal, 3 external) (1 bay occupied by hard drive, 1 bay occupied by floppy drive) (CD models occupy one additional bay)	5 bays (2 internal, 3 external) (1 bay occupied by hard drive, 1 bay occupied by floppy drive) (CD models occupy one additional bay)	5 bays (2 internal, 3 external) (1 bay occupied by hard drive, 1 bay occupied by floppy drive) (CD models occupy one additional bay)
Manageability	Standards-based Intelligent Manageability Agent	Standards-based Intelligent Manageability Agent	Standards-based Intelligent Manageability Agent
Security Features	Memory Change Alert, Cable Lock Provision, Setup Password, Power-On Password, Removable Media Write/Boot Control, Serial, Parallel, USB Port Control	Memory Change Alert, Cable Lock Provision, Setup Password, Power-On Password, Removable Media Write/Boot Control, Serial, Parallel, USB Port Control	Memory Change Alert, Cable Lock Provision, Setup Password, Power-On Password, Removable Media Write/Boot Control, Serial, Parallel, USB Port Control
Software Included	Windows 95/98, or Windows NT 4.0, Computer Setup Utility, Insight Personal Edition, Diagnostics for Windows, Microsoft Internet Explorer, Safety & Comfort Guide, Intelligent Manageability	Windows 95, Windows 98, or Windows NT 4.0, Computer Setup Utility, Insight Personal Edition, Diagnostics for Windows, Microsoft Internet Explorer, Safety & Comfort Guide, Intelligent Manageability Agent	Windows 95, Windows 98, or Windows NT 4.0, Computer Setup Utility, Insight Personal Edition, Diagnostics for Windows, Microsoft Internet Explorer, Safety & Comfort Guide, Intelligent Manageability

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Compaq Deskpro EP Series Product Overview

Compaq Deskpro EP Series Towerable Desktop			
	Intel 810e chipset	Intel 810 chipset	Intel 440BX AGPset
	Agent		Agent

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Compaq Deskpro EP Series Product Overview

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COMPAQ*Standard Series***S710**

The Compaq S710 Standard Series 17" Color CRT Monitor, promotes the transition to larger screen sizes by providing essential functionality at affordable prices.

- Horizontal dot pitch of .23mm for crisp focus
- 1024x768 at 85 Hz and 1280x1024 at 64 Hz for flicker free images and greater comfort of use
- USB Hub Ready
- Intuitive On Screen Display (OSD) lets users optimize their monitor to their preferences
- MPRII compliant, reflecting the latest environmental standards
- Plug and Play monitor
- Essential functionality at an aggressively low price

S710
specifications

Individual Color Control	Yes
Picture Tube (diagonal)	17 in Flat Square
1024x768	75 and 85 Hz
800x600	75 and 85 Hz
640 x 480	60 Hz, 75 Hz, 85 Hz
640 x 350	120Hz
832 x 624	75 Hz
Anti-Glare	Yes
Anti-Static	Yes
MPR-II Complaint	Yes
TCO (Low Emissions)	No
Energy Star Complaint	Yes
On-Screen Controls	Yes
Brightness, Contrast	Yes
Color Temperature	Yes
Viewable (diagonal)	16 in
1280 x 1024	60 Hz
Pincusion	Yes
Tilt	Yes
Parallelogram	Yes
Pin Balance	Yes
Moire Cancellation	Yes
Degauss	Yes
Monitor Size	17 inch
Horizontal Dot Pitch	0.23 mm
User Programmable Modes	8
Plug and Play	Yes
Maximum Refresh	

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Maximum Refresh

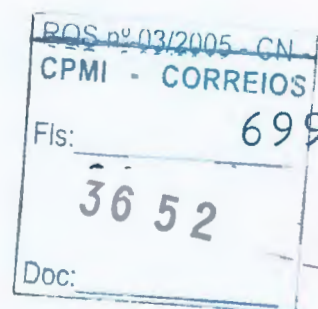
Max Screen Resolution

Trio Dot Pitch

60 Hz at 1280 X 1024

1280 x 1024

0.26 mm



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COMPAQ*Standard Series***S710**

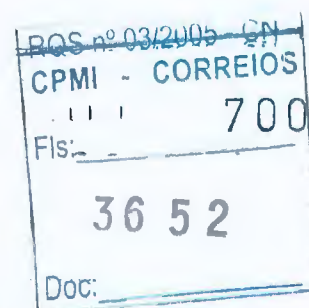
The Compaq S710 Standard Series 17" Color CRT Monitor, promotes the transition to larger screen sizes by providing essential functionality at affordable prices.

- Horizontal dot pitch of .23mm for crisp focus
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- USB Hub Ready
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S710
specifications

Individual Color Control	Yes
Picture Tube (diagonal)	17 in Flat Square
1024x768	75 and 85 Hz
800x600	75 and 85 Hz
640 x 480	60 Hz, 75 Hz, 85 Hz
640 x 350	120Hz
832 x 624	75 Hz
Anti-Glare	Yes
Anti-Static	Yes
MPR-II Complaint	Yes
TCO (Low Emissions)	No
Energy Star Complaint	Yes
On-Screen Controls	Yes
Brightness, Contrast	Yes
Color Temperature	Yes
Viewable (diagonal)	16 in
1280 x 1024	60 Hz
Pincusion	Yes
Tilt	Yes
Parallelogram	Yes
Pin Balance	Yes
Moire Cancellation	Yes
Degauss	Yes
Monitor Size	17 inch
Horizontal Dot Pitch	0.23 mm
User Programmable Modes	8
Plug and Play	Yes
Maximum Refresh	

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Maximum Refresh
Max Screen Resolution
Trio Dot Pitch

60 Hz at 1280 X 1024
1280 x 1024
0.26 mm



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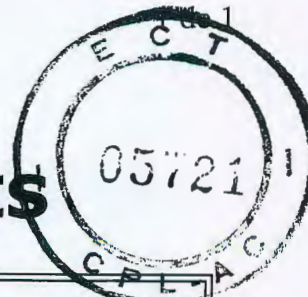
TPC-C Result Highlights

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TPC-C Result Highlights



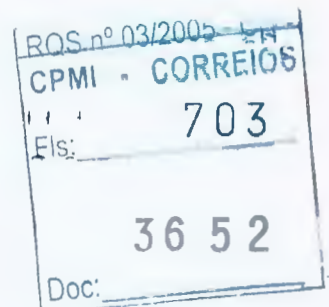
Result ID: 98091601		Result Status: In Review	
COMPAQ	ProLiant 5500-6/400 c/s	TPC-C Rev 3.3	
		Report Date: 09/11/98	
Total System Cost	TPC-C Throughput	Price/Performance	Availability Date
384727.00 US \$	17715.90	21.71 US \$	12/26/98
Database Manager		Operating System	Transaction Monitor
Microsoft SQL Server Enterprise Edition 7.0		Microsoft Windows NT 4.0	Tuxedo
Server		Client	
CPU: Intel Pentium II Xeon 400 MHz		# of clients: 3	
# of CPUs: 4		CPU: Intel Pentium II 400 MHz	
Cluster: N		CPUs per client: 2	

[Executive Summary](#)

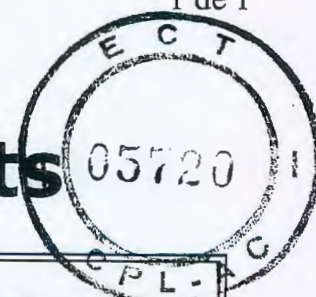
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TPC-C Result Highlights



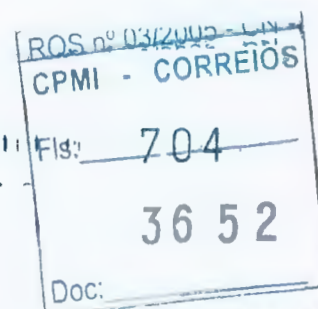
Result ID: 99050701		Result Status: In Review	
COMPAQ		ProLiant 5500-6/500	TPC-C Rev 3.5
			Report Date: 05/07/99
Total System Cost	TPC-C Throughput	Price/Performance	Availability Date
305181.00 US \$	20195.50	15.11 US \$	05/06/99
Database Manager		Operating System	Transaction Monitor
Microsoft SQL Server Enterprise Edition 7.0		Microsoft Windows NT Enterprise Edition 4.0	Compaq Non-Stop Tuxedo CS
Server		Client	
CPU:	Intel Pentium II Xeon 500MHz	# of clients:	3
# of CPUs:	4	CPU:	Intel Pentium II 450 MHz
Cluster:	N	CPUs per client:	2

[Executive Summary](#)

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TPC-C Result Highlights

Result ID: 99050702		Result Status: In Review	
COMPAQ	ProLiant 5500R-6/500	TPC-C Rev 3.5	
		Report Date: 05/07/99	
Total System Cost	TPC-C Throughput	Price/Performance	Availability Date
313351.00 US \$	20195.50	15.51 US \$	05/06/99
Database Manager		Operating System	Transaction Monitor
Microsoft SQL Server Enterprise Edition 7.0		Microsoft Windows NT Enterprise Edition 4.0	Compaq Non-Stop Tuxedo CS
Server		Client	
CPU: Intel Pentium III Xeon 500MHz		# of clients: 3	
# of CPUs: 4		CPU: Intel Pentium II 450 MHz	
Cluster: N		CPUs per client: 2	

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Informações Gerais Sobre STORAGE

- Storage Guide
- RAID Controllers
- Smart Array 3200 Controller
- QuickSpecs – Smart Array 221 Controller
- QuickSpecs – Smart Array 3200 Controller
- DAT/DDS Media
- Disk Drives

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Compaq StorageWorks™



Backup

Storage Guide



COMPAQ
NonStop™

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Volume 2



Contents

Designing your backup solution	5
A basic, step-by-step approach to determining your needs.	
Choosing the backup device	6
Compaq products for your environment	8
Entry-level solutions	11
Workgroup and departmental environments	15
High-end backup and restore solutions	15
Choosing your backup software	24
The backup lineup	26
A look at the entire spectrum of Compaq backup solutions.	
Compaq Enterprise Network Storage Architecture (ENSA)	30

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Your first step toward smarter backup

Enterprise Storage is becoming one of the most critical IT issues any business faces. New applications are more data-intensive than ever. Consumption of disk storage is rising exponentially. And – like never before – your data is absolutely vital to the day-to-day operation of your business. You may be protecting that data against drive failures with RAID or other fault-tolerant systems; but that won't protect you against deleted files, natural disasters or theft the way a rock-solid backup system can. But where do you get started? And how do you choose the right backup technology? By picking up this guide, you've taken the first step.

Compaq created this quick guide to give you a sensible, manageable approach to creating a backup strategy for your enterprise. Because once you understand your business needs, we're quite confident you'll make the smart choice when it comes to backup solutions: Compaq.

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Five reasons

why there's only one brand to choose



1. Compaq knows storage –
As the largest provider of multi-user storage* across all markets, including Microsoft Windows NT,[®] Microsoft Windows 2000, UNIX and NetWare, Compaq understands that backup is a vital part of your storage strategy. So you can count on us to deliver the right solutions for all your enterprise backup needs.

2. Compaq backup solutions are optimized specifically for your servers – Compaq backup solutions integrate and perform with your Compaq servers better than any other brand. Selected, tested and tuned by Compaq engineers specifically for optimal performance with Compaq servers, our backup solutions give you the maximum reliability and performance you need.

3. Compaq backup solutions are proven with software you already rely on – Our industry-leading partnerships with backup software vendors like Computer Associates, VERITAS Software, and Legato are some of the strongest in the business. So you're assured seamless integration and ultimate reliability with your backup software. You're also assured compatibility with your operating systems – whether you run Microsoft[®] Windows NT,[®] Microsoft Windows 2000, Novell NetWare, UNIX — Tru64 and Open VMS, so implementation is quick, easy and nondisruptive to your users.

4. Compaq backup solutions provide choices for all your needs – From cost-effective backup and restore for individual workstations, to massive, enterprise-level automated solutions, to customized consulting services, Compaq gives you options from end to end. A total Compaq backup solution means protection, performance and smooth integration across your entire business – plus one-stop shopping for products, service and support.

5. Compaq backup solutions come with great Compaq quality – Although it's unlikely you'll ever need it, Compaq backup solutions come with a warranty you can count on. All Compaq tape libraries carry a three-year limited warranty. All other Compaq backup products are warranted for three years for parts. Once installed into a Compaq system, the product carries the remainder of the warranty period for the Compaq product in which it is installed.

*Based on combined 1998 revenue. IDC Flash #17812 – January 1999.



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Designing your backup solution

Investing in a particular backup/restore technology without closely analyzing your needs can end up costing you a lot – either in wasted resources or insufficient solutions. Taking a methodical approach to planning will pay off in the end, and make choosing the right technology simple. Here are the basics.

1. First, you'll want to conduct a backup needs analysis for your environment. Determine what information needs to be protected and where it resides. A few questions to ask yourself include:

- Is there any storage to which you may not have rights, but which is part of the network to be protected?
- Is the environment growing and likely to need more capacity soon?
- How critical is the information to your business? Mission-critical data will require a higher level of protection and accessibility than less critical databases like e-mail.

- How many generations of backup do you want to keep? If you're comfortable overwriting your only current backup, you may be able to save money on media.
- Is it convenient for your users to have the system shut down for backup? Do you need to address the needs of international users?
- If the environment is 7 x 24, when will a performance slowdown cause the least disruption?

2. Next, you'll create backup "domains," manageable sub-segments of the production server networks, each with a dedicated backup server with one or more tape drives or tape libraries.

- Identify the acceptable backup window for your application network.
- Identify the level of bandwidth available in your backup environment (i.e., local or over the network at 10 or 100 Mb/s Ethernet or over Fibre Channel).
- Select the maximum size of backup domains to enable you to reach your desired backup window.

$$\left[\frac{\text{Quantity of data}}{\text{network performance}} \div \text{backup window} = \text{number of domains} \right]$$

3. Now you can choose a backup solution for each backup domain. With your backup window and capacity in mind, the charts on the next two pages will help you determine the type of technology you'll need to achieve your goals.

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YOU NEED TO BACK UP A 1 TB ACCOUNTING NETWORK IN LESS THAN EIGHT HOURS. NETWORK BANDWIDTH PERFORMANCE IS ABOUT 15 GB/HR. AS A SINGLE DOMAIN, THE NETWORK WOULD REQUIRE 67 HOURS OF BACKUP TIME. SO TO ACHIEVE THE 8-HOUR WINDOW, YOU WILL NEED TO DIVIDE THE NETWORK INTO 10 DOMAINS OF 100 GB EACH, WHICH EQUATES TO 150 GB/HR. THOSE DOMAINS CAN NOW BE BACKED UP SIMULTANEOUSLY – ALL IN UNDER 7 HOURS.

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Choosing the

backup device

BACKUP WINDOW

BACKUP WINDOW																		
GB / Hr	1 Hour			2 Hour			4 Hour			8 Hour		16 Hour		24 Hour				
0 - 4 GB	One 4/8 DAT Drive		One 4/8 SLR Drive	One 4/8 DAT Drive		One 4/8 SLR Drive	One 4/8 DAT Drive		One 4/8 SLR Drive			One 4/8 SLR Drive						
5 - 8 GB	Two 4/8 DAT Drives		Two 4/8 SLR Drives	Two 4/8 DAT Drives		Two 4/8 SLR Drives	One 4/8 DAT Drive		One 4/8 SLR Drive			One 4/8 SLR Drive						
9 - 16 GB	One 35/70 AIT Drives	Four 4/8 DAT Drives	Four 4/8 SLR Drives	Two 4/8 DAT Drives		Two 4/8 SLR Drives	Two 4/8 DAT Drives		One 4/8 SLR Drive			One 4/8 SLR Drive						
17 - 48 GB	One 35/70 DLT Drive	Two 35/70 AIT Drives	Four 12/24 DAT Drives	Two 35/70 AIT Drives	Two 20/40 DLT Drives	Two 12/24 DAT Drives	One 35/70 AIT Drive	One 20/40 DLT Drive	One 12/24 DAT Drive	One 20/40 DLT Drive	One 12/24 DAT Drive	One 20/40 DLT Drive	One 12/24 DAT Drive	One 20/40 DLT Drive	One 12/24 DAT Drive			
49 - 90 GB	Two 35/70 DLT Drives	Six 35/70 AIT Drives	Eight 20/40 DLT Drives	One 35/70 DLT Drive	Two 35/70 AIT Drives	Four 20/40 DLT Drives	One 35/70 DLT Drive	One 35/70 AIT Drive	Two 20/40 DLT Drives	One 35/70 AIT Drive	One 20/40 DLT Drive	One 20/40 DLT Drive						
91 - 180 GB	One DLT Tape Array II			Two 35/70 DLT Drives	Six 35/70 AIT Drives	Eight 20/40 DLT Drives	One 35/70 DLT Drive	Two 35/70 AIT Drives	Four 20/40 DLT Drives	One 35/70 DLT Drive	One 35/70 AIT Drive	Two 20/40 DLT Drives	One 35/70 AIT Drive	One 20/40 DLT Drive	One 20/40 DLT Drive			
181 - 360 GB	Two DLT Tape Array II			One DLT Tape Array II			Two 35/70 DLT Drives	Six 35/70 AIT Drives	Eight 20/40 DLT Drives	One 35/70 DLT Drive	Two 35/70 AIT Drives	Four 20/40 DLT Drives	One 35/70 DLT Drive	One 35/70 AIT Drive	One 20/40 DLT Drive			
361 - 720 GB				Two DLT Tape Array II			One DLT Tape Array II			Two 35/70 DLT Drives	Six 35/70 AIT Drives	Eight 20/40 DLT Drives	One 35/70 DLT Drive	Two 35/70 AIT Drives	Four 20/40 DLT Drives			
721 - 1000 GB							Two DLT Tape Array II			One DLT Tape Array II			Two 35/70 DLT Drives	Six 35/70 AIT Drives	Eight 20/40 DLT Drives			
1001 - 2000 GB										Two DLT Tape Array II			One DLT Tape Array II			Two 35/70 DLT Drives	Six 35/70 AIT Drives	Eight 20/40 DLT Drives
2001 - 3000 GB													Two DLT Tape Array II					

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Choosing the automated backup device

BACKUP WINDOW

GB / Hr	1 Hour		2 Hour		4 Hour		8 Hour		16 Hour		24 Hour	
0 - 4 GB	One 2-Drive TL881 MiniLibrary	One 12/24 DAT Autoloader	One 2-Drive TL881 MiniLibrary				One 12/24 DAT Autoloader					
5 - 8 GB	One 2-Drive TL881 MiniLibrary	Two 12/24 DAT Autoloaders	One 2-Drive TL881 MiniLibrary				One 12/24 DAT Autoloader					
9 - 16 GB	One 2-Drive TL881 MiniLibrary		One 2-Drive TL881 MiniLibrary	Two 12/24 DAT Autoloaders	One 1-Drive TL881 MiniLibrary	One 12/24 DAT Autoloader	One 1-Drive TL881 MiniLibrary		One 12/24 DAT Autoloader			
17 - 48 GB	One 2-Drive TL895 Library	One 2-Drive TL891 MiniLibrary	One 2-Drive TL891 MiniLibrary	Two 2-Drive TL891 MiniLibrary*					One 1-Drive TL881 MiniLibraries			
49 - 90 GB	One 5-Drive TL895 Library	Two 2-Drive TL891 MiniLibrary*	One 2-Drive TL891 MiniLibrary	One 2-Drive TL891 MiniLibrary		Two 2-Drive TL881 MiniLibrary*		One 2-Drive TL881 MiniLibrary	One 1-Drive TL881 MiniLibraries			
91 - 180 GB	One 7-Drive TL895 Library (c)	Three 2-Drive TL891 MiniLibrary*	One 5-Drive TL895 Library	Two 2-Drive TL891 MiniLibrary*	One 2-Drive TL895 Library	One 2-Drive TL891 MiniLibrary	Two 2-Drive TL881 MiniLibrary	Two 2-Drive TL881 MiniLibrary	One 2-Drive TL881 MiniLibrary		One 2-Drive TL881 MiniLibrary	
181 - 360 GB	One 12-Drive ESL9326D Enterprise Library**		One 7-Drive TL895 Library	Three 2-Drive TL891 MiniLibrary*	One 5-Drive TL895 Library	Two 2-Drive TL891 MiniLibrary*	One 2-Drive TL895 Library	One 2-Drive TL891 MiniLibrary	One 1-Drive TL891 MiniLibrary	Two 2-Drive TL881 MiniLibrary*	One 2-Drive TL881 MiniLibrary	
361 - 720 GB	One 16-Drive ESL9326D Enterprise Library**		One 12-Drive ESL9326D Enterprise Library**		One 7-Drive TL895 Library	Three 2-Drive TL891 MiniLibraries*	One 5-Drive TL895 Library	Two 2-Drive TL891 MiniLibraries*	One 2-Drive TL895 Library	One 2-Drive TL881 MiniLibrary	One 1-Drive TL891 MiniLibrary***	
721 - 1000 GB			One 16-Drive ESL9326D Enterprise Library**		One 10-Drive ESL9326D Ent. Library**	Five 2-Drive TL891 MiniLibraries*+**	One 5-Drive TL895 Library		One 2-Drive TL895 Library	One 2-Drive TL891 MiniLibraries*	One 2-Drive TL895 Library	One 2-Drive TL891 MiniLibrary*
1001 - 2000 GB					One 16-Drive ESL9326D Enterprise Library**		One 10-Drive ESL9326D Ent. Library**	Five 2-Drive TL891 MiniLibrary*+**	One 5-Drive TL895 Library	Three 2-Drive TL891 MiniLibraries*	Two 2-Drive TL891 MiniLibraries*	
2001 - 3000 GB							One 12-Drive ESL9326D Enterprise Library**		One 7-Drive TL895 Library		One 5-Drive TL895 Library	
3001 - 4000 GB							One 12-Drive ESL9326D Enterprise Library**		One 7-Drive ESL9326D Enterprise Library**		One 5-Drive TL895 Library	

- * Requires expansion unit and pass through
- ** Suggest multihost backup configuration with Compaq StorageWorks Enterprise Backup Solution
- *** Requires expansion unit if storage exceeds 700 GB

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Entry-level solutions

For entry-level backup, you'll want solutions that are simple, cost-effective and easy to integrate, but still provide investment protection as you grow. For those needs, the Compaq 4/8 GB SLR Drive and Compaq 4/8 GB DAT Drive are two great alternatives.

environments

For smaller local backups of individual workstations or small business servers with broader backup windows, Compaq offers a range of affordable entry-level solutions.

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Compaq 4/8 GB SLR drive

This extremely affordable mainstream solution, utilizing fifth-generation SLR technology, actually delivers higher capacity than a DDS-1 (2¼ GB) DAT Drive – at a lower initial cost and lower cost per MB. Its simple, reliable tape mechanism gives you low-cost, high-performance data protection of up to 8 GB.



- 1.3 to 2.7 GB/hr data transfer rate – over twice as fast as DDS-1 DAT technology, cutting backup time in half. In most cases this would allow an incremental backup* to be completed over a lunch hour.
- 8 GB SLR data cartridge, cleaning cartridge and live trial software included**
- 4 GB native capacity (8 GB with 2:1 compression)
- For use in low media rotation strategy environments
- Backup time is reduced even further thanks to built-in hardware data compression and Read While Write capability, which automatically verifies data as it is written, so there's no need for a second pass to verify data integrity.
- Durable and reliable to further protect your investment; 80 percent of its wearable parts are in the data cartridge itself

Compaq 4/8 GB DAT drive

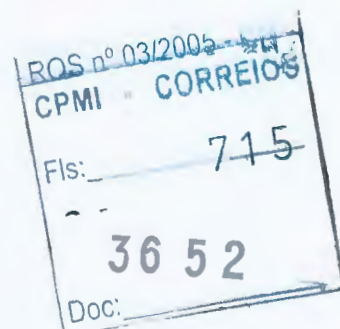
For entry-level environments with shorter backup windows, this entry-level DAT solution uses DDS-2 helical scan technology to provide higher backup performance for mainstream servers and workstations – all in an affordable internal solution kit.



- A 2.8 to 5.6 GB/hr data transfer rate
- 4/8 GB DAT data cassette, cleaning cassette and live trial software included*
- 4 GB native capacity (8 GB with 2:1 compression)
- Internal automated head cleaner lowers your total cost of ownership by reducing failure rates.

*An incremental backup will protect all data modified since last backup.
**Purchase may be necessary for software use beyond the trial period.

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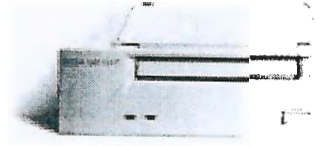




Compaq 12/24 GB DAT drive

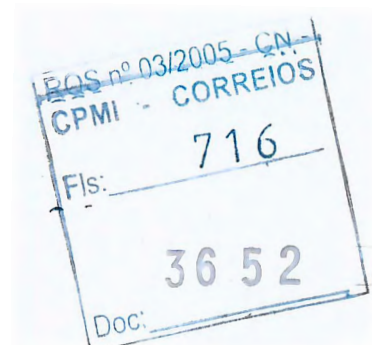
Backward-read compatible (with both DDS-1 and DDS-2 drives) to protect your current DAT media investments, this device allows you to achieve the highest backup capacities possible while maintaining your current DAT standard.

- 12 GB native capacity (24 GB with 2:1 compression)
- DDS-3 helical scan technology delivers 4.2 to 8.4 GB/hr
- Internal automated head cleaner reduces failure rates and dramatically reduces user maintenance
- 12/24 GB DAT DDS-3 data cassette, cleaning cassette and live trial software included*
- Fits in Compaq workstation and server bays or in an External SCSI Storage Expander II Cabinet for a rack-mounted solution



*Purchase may be necessary for software use beyond the trial period.

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Workgroup

departmental

environments

For larger workgroups and
departments with higher back-
up loads and smaller backup
windows, Compaq offers higher
performing, more manageable
backup solutions.

These domains may not only
need higher capacity and
performance, but more manage-
ability and automation as well –
so you can automate reliable
backups and focus energy
resources on other things.

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Compaq 12/24 GB DAT 8 cassette auto loader

A high-capacity automated solution with increased reliability, performance and backward-read compatibility with DDS-1, DDS-2 and DDS-3 media.

- 192 GB* of total capacity based on using a "random accessed" 8-cassette magazine
- 8.4 GB/hr. transfer rate
- Fast cartridge load time – 58 seconds average from any position in the magazine
- Read-after-write data verification
- Compaq Insight Manager support for better fault detection
- Internal and external models configurations (Auto Loader only)

* Based on 2:1 data compression



Compaq 20/40 GB DAT drive

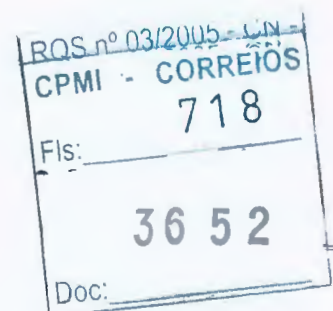
The 20/40-GB DAT DDS-4 tape drive is a high-performance, low-cost tape backup solution and the next generation in a long line of reliable DAT products from Compaq.

- 20 GB native capacity, up to 40 GB with 2:1 compression
- 2.4 MB/s data transfer rate, up to 4.8 MB/s with 2:1 compression
- Backward read/write compatible with DDS-1, DDS-2 and DDS-3 media
- Uses a helical-scan recording technique, which has been specifically designed to suit the special requirements of digital data storage devices
- Internal 5.25" or external tabletop form factors
- 20/40 GB DAT data cassette, cleaning cassette and live trial software included*

*Purchase may be necessary for software use beyond the trial period.



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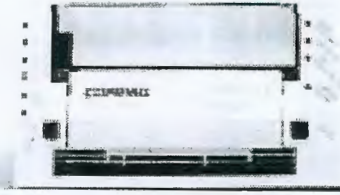


Compaq 20/40 GB DLT tape drive

A flexible, reliable internal or external solution with generous capacity for a wide range of environments.

- 20 GB native capacity (40 GB with 2:1 compression) – plenty for even a mid-sized business
- Backup speeds of up to 10.6 GB/hr
- Easily backward-read compatible with existing DLT 10/20 and 15/30 GB media
- Internal 5.25" or external tabletop form factor
- 20/40 GB data cartridge and live trial software included*

* Purchase may be necessary for software use beyond the trial period.



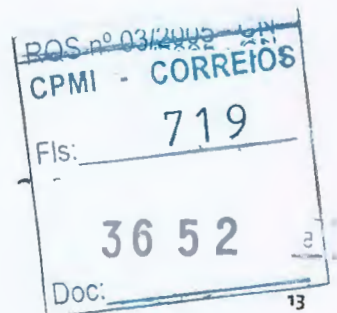
Compaq AIT 35 GB tape drive

Bringing the advantages of Advanced Intelligent Tape (AIT) to Compaq customers, the AIT 35 GB tape drive offers three times the capacity of DDS-3 at only twice the price. The AIT 35 GB drive integrates into Compaq rack and storage cabinet configurations.

- Three times the capacity and performance and only twice as much as DAT
- A new standard for Departmental Backup from a company you can trust – Compaq
- Extreme reliability with increased backup capacity designed for strenuous, high duty-cycle applications
- Achieves outstanding capacity and reliability in a 3.5-inch form factor



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Compaq AIT 50 GB tape drive

For businesses with growing needs for departmental and work-group backup, the Compaq AIT (Advanced Intelligent Tape) 50 GB drive is the "just right" solution.

- 50 GB native capacity, up to 100 GB with 2 to 1 compression
- 6 MB/s data transfer rate, up to 12 MB/s with 2 to 1 compression
- Backward read/write compatible with AIT-1 25 GB, 35 GB or TZ5 20 media
- Automatic head cleaning with exceptional abrasion resistance, for virtually contamination-free operation in a typical computer room environment
- Available in 5.25" internal and external tabletop form factors
- AIT 50 GB data cassette, cleaning cassette and live trial software included*

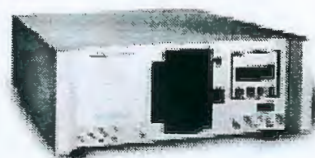
*Purchase may be necessary for software use beyond the trial period.



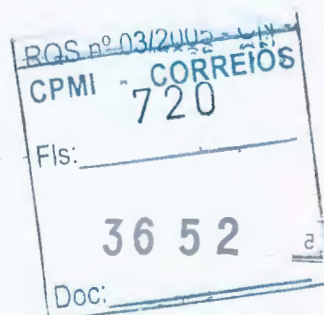
StorageWorks Enterprise Backup Solution (EBS) for Workgroups

Brings automated, centralized backup to distributed *ProLiant* servers in Windows NT and NetWare environments. EBS for Workgroups delivers high-performance Fibre Channel storage area network (SAN) backup for about the same price as backing up individual servers via tape drive.

- An independent 100 MB/s Fibre Channel storage network
- One Fibre Channel Storage Hub 7 connects up to seven servers or tape controllers to the Fibre Channel Loop.
- The Fibre Channel Tape Controller allows the tape library to be shared by all the servers on the Fibre Channel loop.
- Backup and restore management software takes advantage of the added bandwidth of Fibre Channel to maximize performance and allows multiple servers to access one or more tape libraries simultaneously.
- EBS Backpaq provides low-cost EBS for workgroup bundle.
- EBS for Departments with 12 port hub cascaded and Fibre Channel Tape Controller II



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backup/restoration solutions

IN CRITICAL ENVIRONMENTS WITH low. Often, you'll need 7 x 24, mission-critical protection with-
massive backup requirements in minimal backup windows.
and virtually no time for down-
time, Compaq offers highly
automated and manageable
backup solutions. These
demanding environments need
more than just high capacity
and transfer rates. They need
intelligent, high-availability
olutions that provide maxi-
mum control over backup while
keeping administration costs
low. Often, you'll need 7 x 24,
mission-critical protection with-
in minimal backup windows.
Once again, Compaq offers a
range of alternatives from fast,
dense, yet basic DLT drives to
fully automated intelligent tape
arrays and libraries with
advanced media management,
RAIT (Redundant Array of
Independent Tapes) fault-
tolerance (when combined
with Computer Associates
ARCserve/T) and full lights-out
automation.

- Compaq 35/70 GB DLT Drive
- Compaq DLT Array II
- Compaq TL881 MiniLibrary, 20/40 DLT-based scalable library
- Compaq TL891 MiniLibrary, 35/70 DLT-based scalable library
- Compaq TL895, 96-slot 35/70 DLT-based library
- Compaq ESL 9326D 326 slot 35/70 DLT-based Enterprise Library
- Compaq Enterprise Backup Solution

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Compaq 35/70 GB DLT drive

For large departmental and high-end servers that don't require automated backup, this solution offers the fastest and largest half-inch tape technology for the money.

- 35 GB native capacity (70 GB with 2:1 compression)
- Up to 36 GB/hr. maximum transfer rate
- Reads and writes 10/20, 15/30, 20/40, and 35/70 GB DLT formats, so you can use media you may already own
- 35/70 GB data cartridge and live trial software included



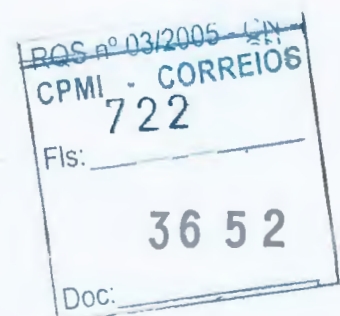
Compaq DLT Tape Array II

A cost-effective array solution for your high-end, high-availability requirements, the DLT Tape Array II provides the fault protection of RAIT plus the protection of locating the array off-site from your production servers.

- 140 GB native capacity (280 with 2:1 compression)
- 170 GB/hr. maximum transfer rate
- Reads and writes 10/20, 15/30, 20/40, and 35/70 GB DLT formats, so you can use media you may already own
- Rack-mountable for protection and manageability in datacenter environments



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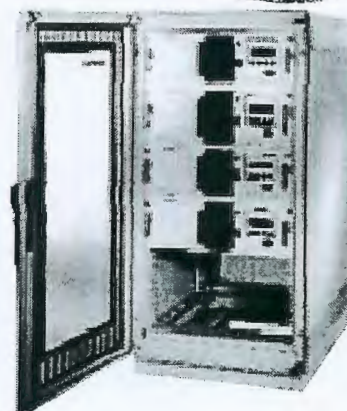




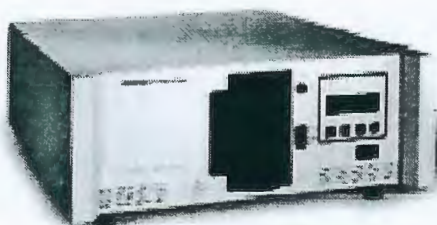
Compaq TL881 scalable DLT MiniLibrary

Designed for either local backup or over a 1 GB/s LAN.

- Low-cost entry-level DLT automation solutions with upgradability
- Back up as much as 3.6 TB of data within a multi-unit library configuration or start with just a single 400 GB solution
- From 10.8 GB/hr to 54 GB/hr (native) performance
- Software RAIT-capable for added performance and fault protection*
- A rack-mountable solution supporting up to six modules in a single rack
- DLT base units and data units for a fully scalable and custom configurable solution



* Requires CA Arcserve/ITRAID Director/IT



LAN Backup Solution

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Compaq TL891 scalable DLT MiniLibrary

This model can be used for either local backup or over a 1 GB/s LAN for SAN.

- Back up as much as 6.3 TB of data within a multi-unit library configuration or start with just a single 700 GB solution
- From 36 GB/hr to 180 GB/hr. (native) performance, providing transfer of up to one TB in less than six hours (using 10 drives in a multi-unit library configuration)
- Software RAIT-capable for added performance and fault protection*
- A rack-mountable solution supporting up to six modules in a single rack
- DLT Base Units and Data Units for a fully scalable and custom configurable solution
- Qualified for the *Compaq StorageWorks Enterprise Backup Solution*

* Requires CA Arcserve/T RAID Director/T



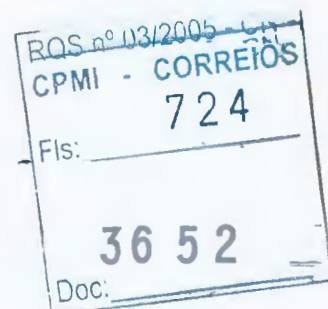
Enterprise Backup Solution



LAN Backup Solution



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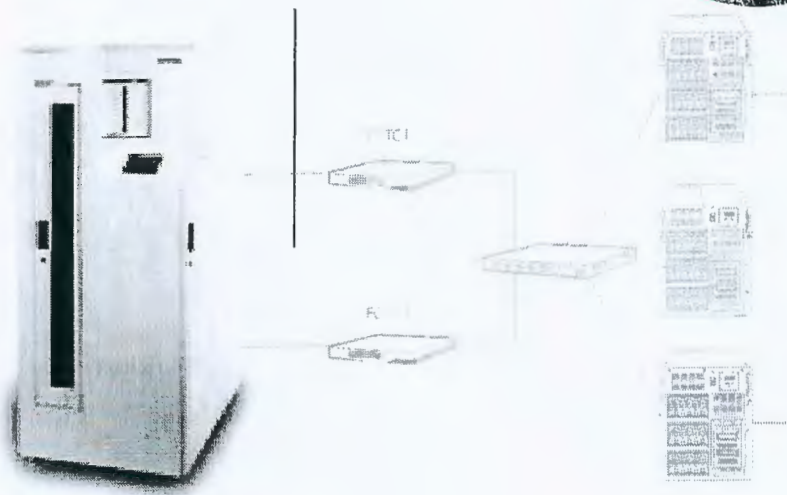
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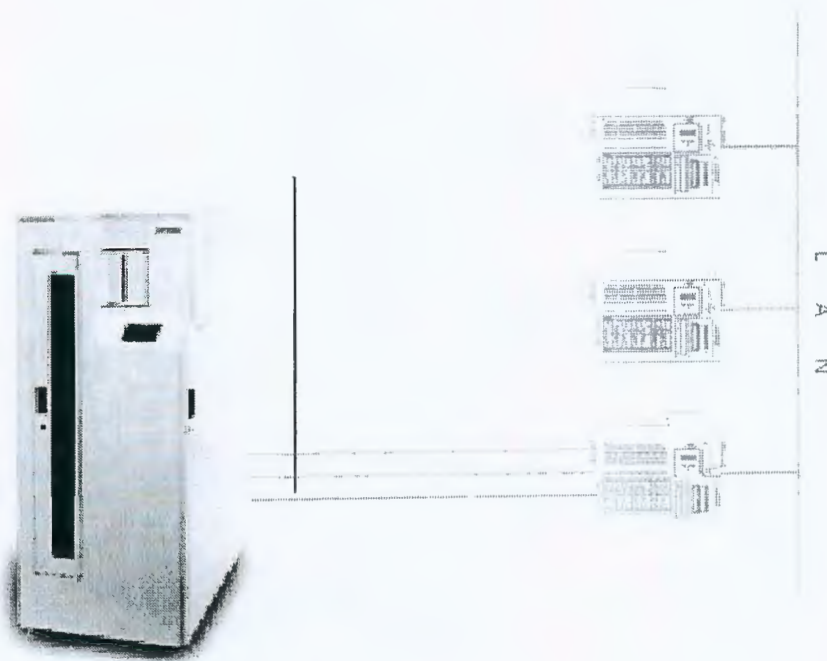
Compaq TL895 DLT MiniLibrary

Back up as much as 6.7 TB of data within a single stand-alone library.

- From 36 GB/hr to 126 GB/hr (native) performance
- Software RAIT-capable for added performance and fault protection (with third-party software)
- Highest reliability of any DLT automation device with 2 million mean swaps (MSBF)
- Qualified behind the *Compaq StorageWorks* Enterprise Backup Solution



Enterprise Backup Solution



LAN Backup Solution

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StorageWorks ESL9326D Enterprise Storage Library

Delivers unprecedented flexibility, capacity, availability, and investment protection in the most demanding enterprise environments.

- Stores up to 11.4 terabytes of data (native) and delivers transfer rates up to 288 GB per hour (native)
- Future pass-through capability will allow creation of a "virtual library" that stores up to 57 TB native
- Continuous uptime via hot swappable drives, power supplies and cooling fans
- Mission-critical availability with redundant power, power supplies and fans
- Drive and robotics status reported via the Compaq Insight Manager

Qualified for Alpha and ProLiant servers running Compaq Tru64 UNIX, OpenVMS, NetWare or Microsoft Windows NT.



LAN Backup Solution

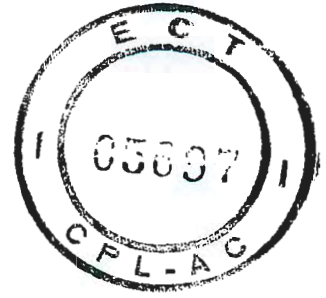


Multi Host Backup Solution

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The Compaq StorageWorks Enterprise Backup Solution



The *Compaq StorageWorks* Enterprise Backup Solution is a complete backup/restore solution for consolidated backup at local server speeds. It combines SCSI-based backup technology with Fibre Channel technology to link multiple servers to a single backup device, creating an independent, high-speed network just for backup/restore.

Consolidating your backup systems to a designated Enterprise Storage Network reduces the time, effort and staff devoted to monitoring and management, which reduces

your total cost of ownership. Data backups won't slow down user productivity, and Fibre Channel technology provides transfer rates up to five times faster than SCSI – for reliable backup in less time.

- Backup speeds of up to 100 MB/s dramatically reduce backup time.
- Cable lengths up to 500m allow greater flexibility without compromising performance.
- Fewer tape devices per server lowers your hardware costs.
- Compatibility with current DLT 35/70, TL891 and TL895 libraries protects your investment.

When it's time for a scheduled backup, a quick message is sent across your network signaling each server to begin backup.

Data is converted to Fibre Channel format via the host bus adapter in each server and transmitted directly from up to twenty servers to the Fibre Channel Storage Hub 12 or from up to six servers to the Fibre Channel Storage Hub 7.

From the Hub, data passes to Fibre Channel Tape Controllers (one for up to four tape drives) where it is reconverted to SCSI for storage on your tape backup device.

The entire process bypasses your corporate network and takes advantage of the high speeds and longer distances of Fibre Channel technology.

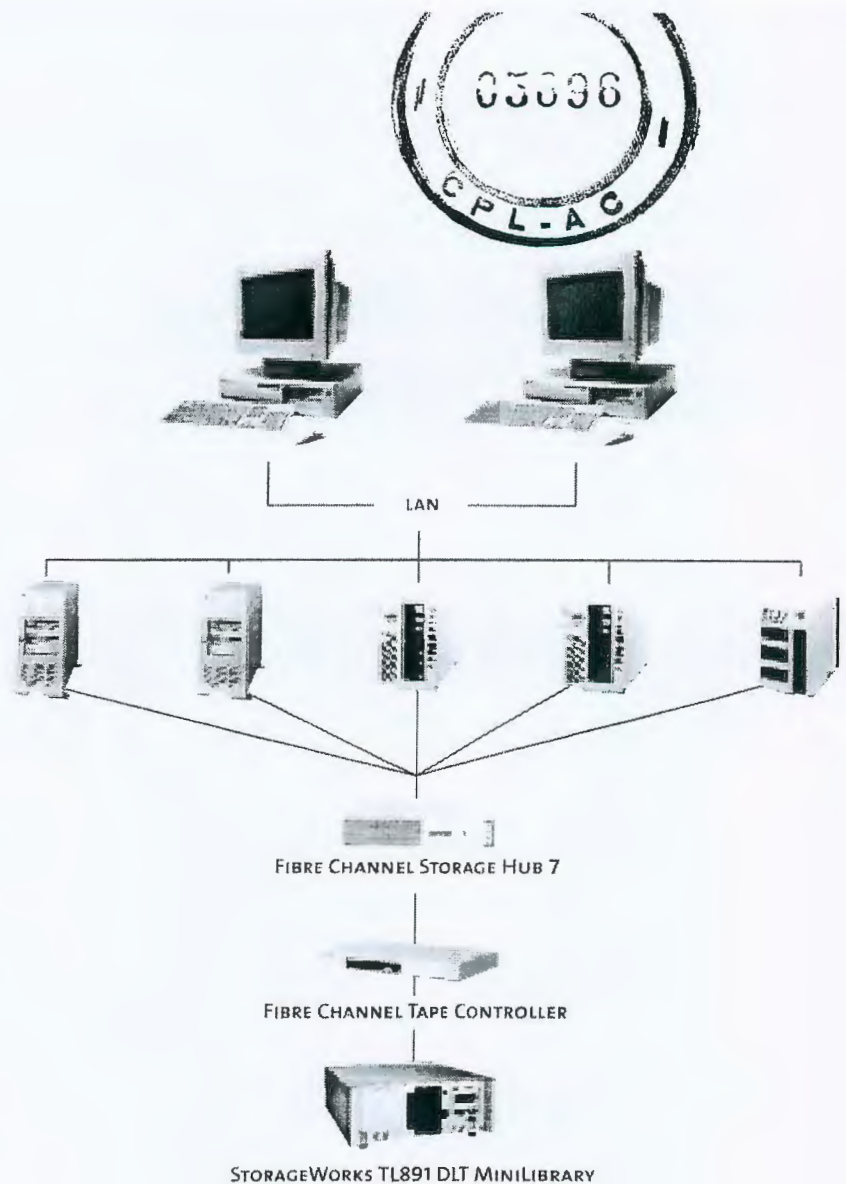
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PCI controller occupies one server slot and links your server to the Fibre Channel Storage Hub 12 or Fibre Channel Storage Hub 7.

- Enables you to connect multiple servers and tape devices onto a single Fibre Channel Storage Network
- Provides 12 or 7 direct Fibre Channel connections for centralized backup to up to 12 or 7 devices (single hub connections to servers and DLT tape libraries)
- Rack-mountable, utilizing just 1U of rack space
- Supports a minimum of three DLT tape libraries
- Cascading hub support with the Fibre Channel Storage Hub 12 provides added connectivity to an existing Fibre Channel Arbitrated Loop, reducing your total costs (up to 22 Fibre Channel ports).

- Provides network connectivity and sharing for Compaq 35/70 DLT Tape libraries over a Fibre Channel network
- Each controller connects to four 35/70 GB DLT tape drives.
- Rack-mountable, utilizing just 1U of rack space



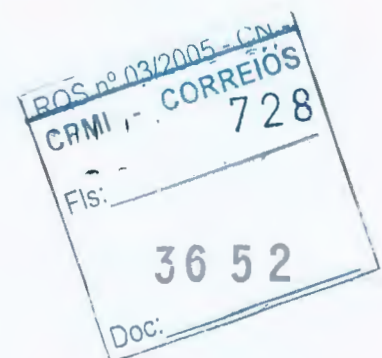
Enterprise Backup Solutions for Workgroups

COMPAQ MODEL 35/70 DLT LIBRARY
(SEE PAGE 16)

COMPAQ TL891 LIBRARY
(SEE PAGE 18)

COMPAQ TL895 LIBRARY
(SEE PAGE 19)

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Why Compaq Tape Media?

When you're helping customers choose the right Compaq storage solution, some of the best guidance you can give them is to choose Compaq branded storage media.

Only Compaq-branded tape media are thoroughly tested and qualified for Compaq servers and storage devices. That assures your customer a level of reliability, performance, and confidence they can only get from Compaq.

CRITICAL RELIABILITY

Stored data is a business-critical asset and the most important asset to a company right behind its people. Putting that data at risk with inferior media can be a disastrous short-sighted decision. Compaq qualifies only the highest quality media for Compaq storage products, for the most reliable storage and data protection possible. We hold media with our name to the highest standards of quality and performance. In fact, only the best of breed pass Compaq's stringent qualification requirements.

Compaq media is carefully screened to ensure that defective media products never get to the market. If a single screened unit fails, the entire lot never reaches our customers. Our media testing programs are as rigorous as the testing our

drives undergo. Street and functionality testing includes thousands of inserts, loads, and unloads and tape passes from beginning to end – more abuse than your media will receive in even the most demanding business environment.

ONE-STOP STORAGE SHOPPING

Compaq offers complete storage solutions – drives, media, servers, and tape libraries. So customers can look to one company for all their storage needs, from storage products to services. When you choose Compaq media, you can count on the full support from Compaq if you should ever encounter a media defect.

ENHANCED SALES

OPPORTUNITIES FOR YOU

For our reseller partners, selling Compaq tape media not only generated satisfied customers, it also provides great opportunities for incremental and add-on sales – as well as lucrative promotional opportunities built around complete drive, library and media solutions.

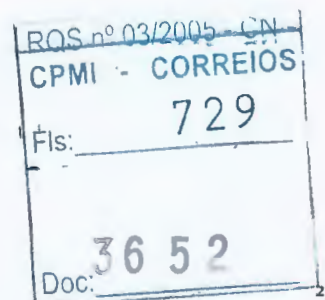
Your customers can choose the right media from you when they purchase their storage solutions, and they can look to you for additional media down the road – knowing they're getting a tested, qualified and reliable solution fully supported by you and Compaq.



Key benefits of Compaq-branded media:

- Reliable, high-performance media fully qualified for Compaq storage devices
- The highest standards for testing, qualification, and quality assurance
- A single source for customer storage needs
- Compaq support for both media and hardware
- Additional sales opportunities, satisfied customers, and higher revenues

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Software

With the availability of both Fibre Channel connectivity and traditional SCSI-based attached backup solutions, customers have a choice when it comes to backup software. Today, you can choose from VERITAS Backup Exec., Computer Associates ARCserve/T or Legato NetWorker to run your SCSI attached backup. VERITAS and Computer Associates also support Fibre Channel-based backup with support modules such as the VERITAS Shared Storage Option and the Computer Associates Enterprise Library Option.

Choose your backup software

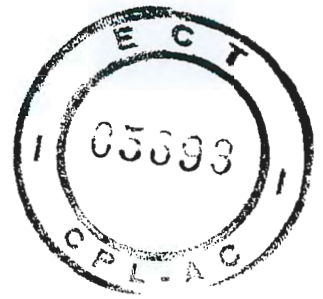
Hardware is just part of your backup picture. You also need robust, reliable software to make it all happen how and when you need it to. Compaq has partnered with industry-leading backup software suppliers VERITAS, Computer Associates and Legato to bring you a choice of software in designing the solutions that best meet your needs. We've worked closely with these leading vendors to engineer, test and tune your backup solution for optimal integration and performance.

All Compaq backup products and the Compaq Enterprise Backup Solution are fully compatible and optimized for:

- VERITAS Backup Exec for Windows NT® and/or NetWare
- VERITAS Backup Exec provides automated, scalable protection of your data enterprise-wide. As a client-server-based network storage solution, Backup Exec protects mission-critical data from the desktop to multiple distributed heterogeneous Compaq servers.
- VERITAS NetBackup 550 for Enterprise Backup Solutions
- Computer Associates for Windows NT® or NetWare – Computer Associates ARCserve/T offers a 32-bit, multi-threaded modular architecture optimized for high performance in PC LAN multi-server environments. Performance features include parallel streaming, optimized device support, data compression and client push agents.
- Computer Associates JETserve Plus for NetWare – A high-speed backup and disaster recovery solution for NetWare file servers, JETserve Plus can achieve backup performance of over 100 GB/hr, independent of the number of files in the file system and with RAID 5 fault tolerance. JETserve Plus does not support the Enterprise Backup Solution.
- Legato NetWorker™

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How do you get the software you need?

Compaq even makes it easy and convenient to obtain, install and support backup software. A live 60-day trial copy of your backup software is included with your solution. It's easy to install and use, and you're ready to go right out of the box; but you've still got time to evaluate software before you buy. Then when you're ready, you can purchase software quickly and easily through our software partners' global distribution networks. After that, just one call to Compaq provides installation and configuration support for both your hardware and software. Now that's making partnership work for you.

For more information on available software features, visit our partners' Web sites through www.compaq.com or at www.VERITAS.com and www.cai.com (for Computer Associates).

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The backup lineup



Take a look at our entire product spectrum, with solutions for all your environments and all your backup priorities.

Backup glossary

TYPES OF BACKUP

Backups are classified by the status of the network server (online or offline), when the backup takes place and by the amount of information that is backed up (full or partial, also referred to as differential, incremental or user-defined). Full, differential, incremental and partial backups can be used in either online or offline mode.

ONLINE BACKUP

An online backup takes place with the server online and available to users. A file may thus be open and not available for backup by some backup applications. There are applications that can protect open files, but if the file is changed while it is being backed up, then the file on tape

may be different from the file on disk. The only sure way to protect open files is to use an open file manager available with Computer Associates (CA) ARCserve/T, VERITAS Backup Exec, and Legato Networker.

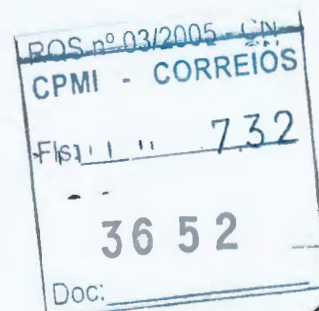
OFFLINE BACKUP

For an offline backup, the system administrator's first step is to take the server offline, making it unavailable to users for the duration of the backup operation. The typical offline backup takes place when user demand is at its lowest.

FULL BACKUP

A complete backup. All files are copied.

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DIFFERENTIAL BACKUP

Backs up only files changed since the last full backup. This type of backup is useful when it's important to have the latest version of each file. If the same tapes are used for consecutive differential backups, the newer versions of backed up files are often allowed to overwrite older versions of the same file on the tape.

INCREMENTAL BACKUP

Backs up all files changed since the last backup, regardless of what kind of backup it was. This type of backup is used when each revision of a file must be maintained. If the same tapes are used for consecutive incremental backups, the newer versions of backed-up files are not allowed to overwrite earlier versions. Rather, the newer files are usually appended to the backup medium.

USER-DEFINED BACKUP

Copies a user-defined set of files.

PARTIAL BACKUP

There are three types of partial backup:

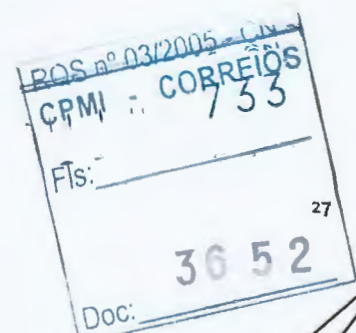
- All applications – Saves all files in the area defined by the user, including settings, customizations, passwords, etc. Application backups are particularly useful after a major change or upgrade in software.
- Applications and data – Creates a stand-alone copy of the user's information base. Application and data backups allow easy restoration of the user's organization's records. These backups can also be used to migrate information to another server.
- Data only – May be segregated by project or department, or may include all information created within a certain time frame, or both. Clearly, the amount of backed-up information

varies with the type of backup selected. This, in turn, directly affects the overall strategy in terms of capacity and transfer rate.

PUSH AGENT

A Push Agent is defined as a software function that uses the remote server to process the file and directories to be backed up. This drastically reduces the processing required of the backup server and thus improves performance. If the database manager, such as SAP or Oracle, compresses the data as it is extracted and presented to the backup application push agent, even greater performance can be achieved for LAN backups.

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The

Group



	PROSIGNIA 700 SERIES	PROLIANT 400 FAMILY*	PROLIANT 800 FAMILY	PROLIANT 1600 FAMILY	PROLIANT 1800 FAMILY	PROLIANT 3000 FAMILY	PROLIANT 5000 FAMILY
4/8 SLR							
4/8 DAT							
12/24 DAT							
20/40 DAT							
12/24 DAT AUTO LOADER							
AIT 35							
AIT 50							
20/40 DLT							
35/70 DLT							
TL891							
TL895							
ESL9326D							
EBS FOR WORKGROUPS							
EBS FOR DEPARTMENTS							
EBS FOR DATA CENTERS							

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* not available in North America

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PROLIANT
6000 FAMILY



PROLIANT
7000 FAMILY



PROLIANT
8000 FAMILY



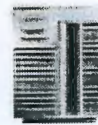
ALPHASERVER
1200



ALPHASERVER
4100



ALPHASERVER
DS10/DS20



ALPHASERVER
GS60/GS140

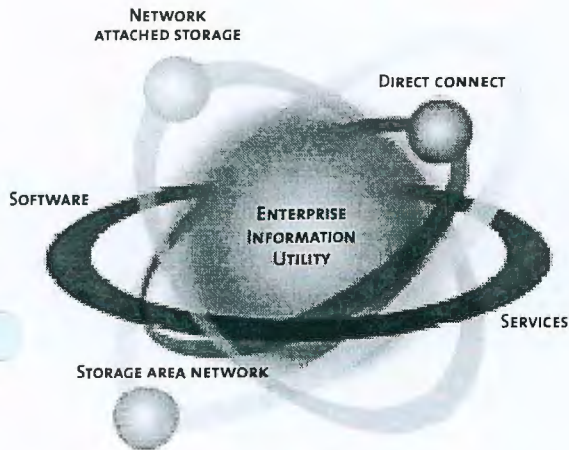


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Compaq Enterprise Network Storage Architecture



Enabling *NonStop* eBusiness environments

In this emerging era of dynamic trade and global competition, businesses that adopt online technologies, and apply them in innovate ways, will quickly gain – and maintain – the competitive edge. Compaq's mission is to help our customers become market leaders by providing them with the computing capabilities that support Internet-enabled sales, procurement, customer management and supply chain systems. Compaq *NonStop* eBusiness is a strategy that delivers the levels of service, availability and responsiveness required by applications, and features solutions, services, products and technologies that enable customers to compete effectively in a global marketplace.

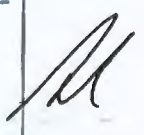
Compaq defines its *NonStop* eBusiness vision and strategy for storage with the Compaq

Enterprise Network Storage Architecture (ENSA). This model builds on a set of core technologies that service application platforms through direct attachment and through storage area networks. Compaq ENSA leverages industry standards – providing the benefits of distributed enterprise-wide data availability with the strength of centralized storage management – and provides an open architecture for developing *NonStop* eBusiness solutions with leading partners and independent software vendors.

Compaq ENSA creates pools of highly available storage that can be deployed anywhere in the enterprise, yet centrally managed, independent of computing systems and applications. Storage is transformed into an enterprise-wide, flexible, shared resource, analogous to a telephone service utility. This delivers a solution that is easier to manage, lower in cost, and higher in performance and capacity than other architectures.

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Compaq Enterprise Network Storage Architecture (ENSA) comprises *StorageWorks* storage solutions, network infrastructure, and tools to administer, monitor and manage the entire environment. It enhances overall storage system functionality by developing and refining storage topologies through Fibre Channel-connected storage, using Storage Area Networks (SANs) and direct storage-to-host connections. All these elements act cooperatively to solve storage and data management problems. Applications see only reliable, available disks that are accessible on demand. Compaq augments these components with a strong services organization that can create, install and maintain *StorageWorks* solutions.

Leveraging the Fibre Channel foundation

The *Compaq Enterprise Network Storage Architecture* (ENSA) creates an environment in which storage can reside on a high-performance Fibre Channel-based Storage Area Network (SAN). This

network delivers high-performance storage capabilities without adding overhead to other computing networks, and without being slowed down by other network traffic. ENSA will evolve to distribute the network far beyond the distances today's Fibre Channel can span! It provides disaster tolerant features within the context of the storage pool – and the span of the pool continually increases over time. Standard Fibre Channel components, such as switches and hubs, are combined with wide area networking technologies for increased distribution.

Benefits of Compaq ENSA

- Compaq Enterprise Network Storage Architecture (ENSA) virtualizes storage, allowing vast amounts of storage capacity to be pooled across an enterprise for use by a variety of application servers.
- It simplifies the process of managing data across the entire enterprise – free of the many complexities of heterogeneous computing environments.

Storage resources can be allocated online from a single, common pool that scales from gigabytes to petabytes and beyond as needed.

→ Data can be replicated instantly for uses such as backup and restore, report generation, and application testing.

→ Customers can manage distributed primary and backup storage resources centrally with new policy-based management capabilities, including dynamic allocation, automatic re-deployment, intelligent data replication and protection, and performance tuning.

→ Compaq ENSA can be incorporated into many existing environments, as business needs demand, existing harmoniously with any storage products that already are installed.

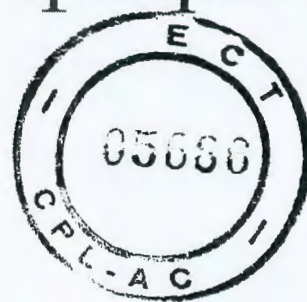
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web site: **www.compaq.com**



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What's Hot:

ProLiant 6400R, StorageWorks Enclosure 4214, and Smart Array 4200 Controller combo wins Network World's World Class award

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Help Us Celebrate!

Compaq is breaking records by selling it's 2,000,000 Smart Array Controller this year. FREE giveaways available.

Controllers for ProLiant Systems

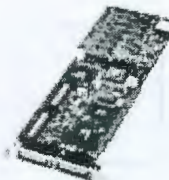
Controllers for AlphaSystems

Controllers for OpenVMS Systems

Controllers for ProLiant Systems

Smart Array 4200 Controller

This four-channel Ultra2 controller is a major leap forward in performance and capacity. It provides an innovative architecture that sets a new standard in I/O performance bandwidth.



Smart Array 3200 Controller

This two-channel Ultra2 controller is an excellent combination of performance, robust features and long-term reliability.



Smart Array 431 Controller

The Smart Array 431 Controller is Compaq's entry-level array controller with support for the Wide Ultra3 SCSI protocol. Consistent with Compaq's LVD strategy, the SA-431 allows customers the flexibility of mixing and matching Ultra2 and Ultra3 devices, providing an unparalleled degree of investment protection.



Smart Array 221 Controller

This Ultra2 single channel controller offers affordable hardware-based RAID for smaller or remote corporate offices. This PCI-based controller is the ideal choice for entry-level storage needs.

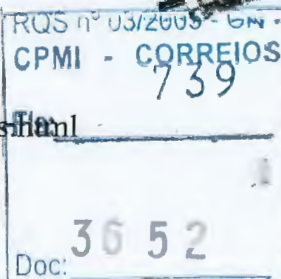


Smart Array 4250ES Controller

Designed to optimize storage availability and performance in the ProLiant 8000 server, the Smart Array 4250ES controller offer unique fault tolerance fail-over capability to insure higher data availability.



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✦ **Smart Array 3100ES Controller**

This controller offers three Wide Ultra SCSI-3 channels, allowing a single controller to support all three internal hot plug hard drive cages in the ProLiant 7000 and ProLiant 6000 models.



✦ **Integrated Smart Array Controller**

Designed to provide entry level RAID for data protection and availability. The Integrated Smart Array delivers true hardware RAID while allowing data compatibility with all Compaq Smart Array controllers. This product has consistent configuration and management tools that include the ACU configuration utility and wizards and Compaq Insight Manager support.



Controllers for Alpha Systems

✦ **RAID Array 230/Plus**

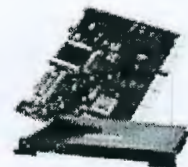
For fast, easy data access, high data availability, support across multiple platforms, and the ability to add industry-standard, SCSI-2 storage as needed, consider StorageWorks RAID controllers.



Controllers for OpenVMS Systems

✦ **HSJ80 Array Controller**

This controller extends the highly reliable Computer Interconnect (CI) architecture and utilizes a fully implemented Mass Storage Control Protocol (MSCP). The HSJ80 delivers data protection, high availability, and improved performance for large clustered, mission critical storage requirements in OpenVMS CI computing environments.



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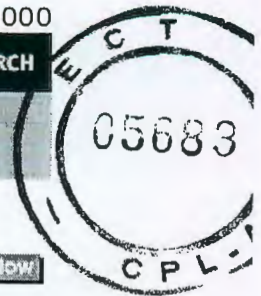
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Smart Array 221

Smart Array 221 Controller

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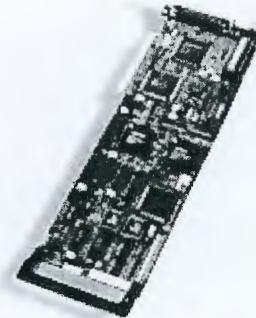
-  [Product Description](#)
-  [QuickSpec](#)
-  [Q & A](#)
-  [SA 221 Controller User Guide](#)

related links

-  [Questions to Ask Before Buying a Controller](#)
213 KB pdf
-  [Array Diagnostic Utility \(ADU\)](#)
-  [The Smart Array Advantage \(Quick Tour\)](#)
-  [Smart Array Products Feature Matrix](#)
-  [Smart Array Products Compatibility Matrix](#)
8 KB pdf
-  [Which Smart Array Controller is the one I need?](#)
-  [Smart Array Naming Nomenclature](#)
-  [Hardware v. Software Fault Tolerance](#)
212 KB, .doc Format
-  [Hardware RAID, no longer a luxury](#)
313 KB pdf
-  [Smart Array Family Advantage Flyer](#)
596 KB pdf

The new Smart Array 221 Controller is an intelligent array controller for entry level hardware based fault tolerance with support for up to 15 Wide Ultra2 SCSI hard drives.

The SA-221 provides one of the most cost effective alternatives to software based RAID in the market today-thus lowering entry level server ownership costs. Designed and integrated with Compaq workgroup and entry level servers, this product provides worry-free data protection and gives the customer a single point of contact for all server data questions or issues.



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MODELS

Smart Array 221 Controller
388099-B21

KEY PRODUCT FEATURES

- Low cost, entry-level array controller
- Wide Ultra2 SCSI
- Single channel
- Up to 12 drives supported
- Pre-Failure warranty
- Upgrade path to higher capacity PCI array controllers
- Online spares support
- Auto rebuild of failed drives
- Software integration with Array Configuration Utility and Compaq Insight Manager

Overview

The Smart Array 221 brings exceptional performance, data availability and entry-level server costs to customers that once believed that reliable data protection had to be expensive.

The SA-221 is Compaq's second entry-level class array controller, replacing the SMART-2SL, built on seven generations of array controller design and integration for Compaq servers.

The Smart Array Advantage

Compaq's innovative design and integration work for the Smart Array family of products adds customer value that is unmatched in the industry. Large scale use of Smart Array products facilitates a much lower cost of ownership than many competitive server storage products. The Compaq Smart Array family brings unparalleled return on invested dollars through these product family benefits:

Data Compatibility between all models of Smart Array Controllers means customers can upgrade from other models of Smart Array products to get higher performance, capacity and availability. Unlike competitive products, successive generations of Smart Array products understand the data format of other Smart Array controllers¹.

Consistent Configuration and Management Tools. All Smart Array products utilize a standard set of management and utility software. These tools consistently lower the cost of ownership by reducing training and technical expertise necessary to install and maintain the Compaq server storage. Configuration, management and diagnostic software tools includes: Array Configuration Utility, Array Diagnostic Utility, Compaq Insight Manager (CIM), and Compaq SmartStart.

Snapshots and Storage Pools. Compaq delivers the next step towards the Enterprise Network Storage Architecture vision with support for StorageWorks Virtual Replicator. With this optional software, users can: instantly create "snapshots" of production data to reduce backup and restore windows from hours to minutes, pool storage for quick response to changing storage capacity needs, create "virtual volumes" of up to 1 terabyte and enjoy policy-based automation to simplify system data and storage management.

Pre-Failure Warranty² means that CIM not only tells you when a drive is going bad, but allows you to replace failing drives before they actually fail.

Target Environments

The Smart Array 221 controller offers investment protection for branch offices and businesses that can't afford to leave their data unprotected, or that depend on software-based RAID products.

Small/Medium Business: Server environments with fewer clients and businesses with tight budgets can now afford the protection and recovery benefits of hardware array controller technology.

Branch Office/Offsite Workgroups: With the highest price/performance ratio in the industry, business can now afford to protect data at branch offices and workgroups with a true hardware-based array controller. Because data is compatible between the SA-221 and SA-3200 array controller, upgrading to the next generation array controller is seamless.

Entry-Level Array Technology: For businesses without previous RAID protection or experience with array technology, the Compaq SA-221 controller is easy to purchase, easy to set up and easy to maintain.

STANDARD FEATURES

Fault Prevention Features

Allows detection of possible failures before they occur, allowing preventive action to be taken.

S.M.A.R.T.: Self Monitoring Analysis and Reporting Technology first developed at Compaq detects possible hard disk failures, before they occur, allowing Compaq to replace the failed component before the actual failure occurs.

Drive Parameter Tracking: Monitors over 15 drive operational parameters, predicting failures, and notifying administrator of possible failures.

Dynamic Sector Repairing: Scans hard drives and automatically remaps bad sectors, ensuring data integrity in the background during server idle time.

Environment Parameter Tracking: Monitors fan and cabinet temperature of ProLiant Storage System/U family of products.

Drive & Array Movement: The users can move (detach & attach) drives in any order on the same controller (drive movement) or add a configured drive array to another controller (array movement), and maintain configuration information. This feature requires the system to be powered down, and there must not be any failed drives or active spare drives in the array.

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STANDARD FEATURES *(continued)*

Fault Tolerance

Keeps data available and server running while a failed drive is being replaced; several fault tolerance configurations are supported including:

Distributed Data Guarding (RAID 5): Allocates parity data across multiple drives and allows simultaneous write operations.

Drive Mirroring (RAID 1, 0+1): Allocates half of the drive array to data and the other half to mirrored data, providing two copies of every file.

Fault Recovery

Minimizes downtime and facilitates a quick recovery from component failures.

On-Line Spares: Up to four spare drives can be installed prior to drive failure. If a failure occurs, recovery begins with an On-Line spare and data is reconstructed automatically.

Performance

32-bit Bus-Master Host Interface: 32-bit PCI bus-master technology delivers maximum data burst performance, transferring information directly to system memory.

Intelligent Array Engines: Processing tasks are divided between two engines. Working simultaneously, one engine generates fault tolerance, while the other prepares and sorts array storage commands.

Wide Ultra2 SCSI: This single channel controller provides for a maximum of 15 drives³ per server slot with a total controller bandwidth of 80 MB/s.

Data Distribution: Data is distributed across multiple drives, optimizing drive efficiency and performance.

ECC Protected Read Cache: 6 MB of ECC protected read cache memory dramatically reduces wait times for read-intensive applications.

SOFTWARE COMPONENTS

Compaq Smart Array software makes setup, storage management, configuration and trouble shooting a breeze. Compaq storage servers and Smart Array products utilize a single, consistent set of utility software for storage and RAID management. This consistency across the Smart Array product line reduces the cost of ownership by reducing training and technical expertise necessary to install and maintain your Compaq server storage solution.

Array Configuration Utility & Array Diagnostic Utility

- Powerful configuration and diagnostic utilities for all Smart Array controllers
- Provides a graphical view of Compaq drive array configurations
- Easy to use Wizards for configuration
- Runs online on NT 4.0 and NetWare

Compaq Insight Manager

- Powerful server and server options/storage monitoring tool
- Monitors over 1200 different server parameters

SmartStart

- Simple to use server and storage installation tools

Compaq StorageWorks Virtual Replicator (sold separately)

- **Snapshot Back Up and Restore:** Instantly create "snapshots" of production data to reduce backup and restore windows from hours to minutes.
- **Storage Pools:** For quick response to changing storage capacity needs, create "virtual volumes" of up to 1 terabyte and enjoy policy-based automation to simplify system data and storage administration.
- **System requirements:** Windows NT 4.0 SP3, IE 3.02, 32 MB memory, and 30 MB disk space.

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SPECIFICATIONS

Protocol	Wide Ultra2 SCSI
Electrical Interface	Low Voltage Differential
Drives Supported	Up to a maximum of 15 Wide Ultra2 SCSI ³ or Wide-Ultra SCSI-3 ³ drives
Data Transfer Method	32-bit PCI bus-master
Maximum Transfer Rate on System Bus (peak)	133 MB/s
Total Channel Transfer Rate	80 MB/s
Software Upgradable Firmware	Yes
Cache Memory	6 MB of ECC protected read cache
Logical Drives Supported	32
Operating Systems Supported	Microsoft NT 3.51, 4.0, and later Novell NetWare 3.20, 4.11, 5 SCO OpenServer 5 UnixWare 2.1, 7.1 IBM OS/2 Warp Server Family Banyan Vines 6.x, 7.x, 8.x

RELIABILITY FEATURES

Distributed Data Guarding (RAID 5)	Yes
Drive Mirroring (RAID 1, 1+0)	Yes
Drive Striping (RAID 0)	Yes
Automatic Data Recovery	Yes

Kit Contents

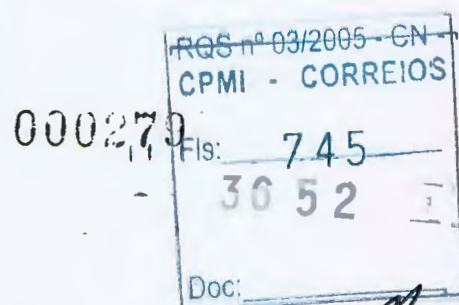
Controller, warranty card, support software CD, user guide, quick install poster, Compaq Systems Reference Library CD

Warranty

Maximum: The remaining warranty of the Compaq product in which it is installed (to a maximum three-year, limited warranty¹)

Minimum: One-year, on-site limited warranty¹

Pre-Failure Warranty: Drives attached to the Smart Array Controller and monitored under Compaq Insight Manager are supported by a Pre-Failure (replacement) Warranty².



OPTIONS

Software

Compaq StorageWorks Virtual Replicator

License & Media (CD-ROM)	388931-B21
License Only	388932-B21
Upgrade License & Media (CD-ROM)	135438-B21
Upgrade License Only	135439-B21

Hard Drives⁴

Wide Ultra2 SCSI Drives - Hot Plug

18.2-GB Ultra2 SCSI Drive (1")	388144-B21
9.1-GB Ultra2 SCSI 10,000 rpm Drive (1")	328939-B21
9.1-GB Ultra 2 SCSI Drive (1")	349514-B21
4.3-GB Ultra2 SCSI 10,000 rpm Drive	328938-B21
4.3-GB Ultra 2 SCSI Drive	349513-B21

Wide Ultra2 SCSI Drives - Non-Hot Plug

18.2-GB Ultra2 SCSI 10,000 rpm Drive (1.6")	328943-B21
18.2-GB Ultra2 SCSI Drive (1")	388143-B21
9.1-GB Ultra2 SCSI 10,000 rpm Drive (1")	328942-B21
9.1-GB Ultra 2 SCSI Drive (1")	349526-B21
4.3-GB Ultra2 SCSI 10,000 rpm Drive	328941-B21
4.3-GB Ultra 2 SCSI Drive	349525-B21

Wide-Ultra SCSI-3 Drives - Hot Plug

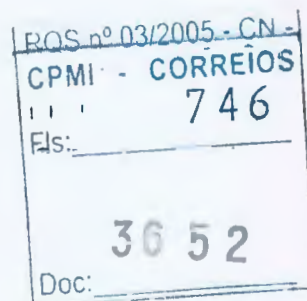
36.4-GB Wide-Ultra SCSI-3 Drive (1.6")	400740-B21
18.2-GB Wide-Ultra SCSI-3 Drive (1")	400739-B21
18.2-GB Wide-Ultra SCSI-3 10,000 rpm Drive (1.6")	336358-B21
18.2-GB Wide-Ultra SCSI-3 Drive (1.6")	313756-B21
9.1-GB Wide-Ultra SCSI-3 10,000 rpm Drive (1")	336357-B21
9.1-GB Wide-Ultra SCSI-3 Drive (1")	313706-B21
4.3-GB Ultra2 SCSI 10,000 rpm Drive	336356-B21
4.3-GB Wide-Ultra SCSI-3 Drive (1")	272577-001

Wide-Ultra SCSI-3 Drives - Non-Hot Plug

18.2-GB Wide-Ultra SCSI-3 10,000 rpm Drive (1.6")	336370-B21
9.1-GB Wide-Ultra SCSI-3 10,000 rpm Drive (1")	336369-B21
9.1-GB Wide-Ultra SCSI-3 Drive (1")	339509-B21
4.3-GB Ultra2 SCSI 10,000 rpm Drive	336368-B21
4.3-GB Wide-Ultra SCSI-3 Drive (1")	339506-B21

ProLiant Storage System/U Family

ProLiant Storage System Model UE (Single bus, Tower)	348710-B21
ProLiant Storage System Model UE (Single bus, Rack)	348700-B21
ProLiant Storage System Model U2 (Dual Bus, Tower)	304110-B22
ProLiant Storage System Model U2 (Dual Bus, Rack)	304100-B22
Recovery Server Option	304117-B21
Redundant Power Supply Option	224206-001



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QUICKSPECS

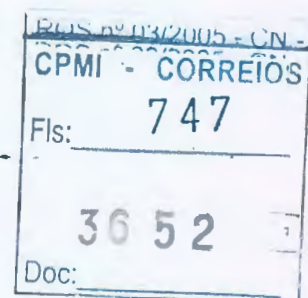
Compaq Smart Array 221 Controller

¹ Certain restrictions and exclusions apply. Consult the Compaq Customer Support Center at 1-(800)-345-1518 for details.

² Pre-Failure Warranty is available on all Compaq Prosignia and Compaq ProLiant servers using Compaq Insight Manager 2.1 or higher, and covers Pentium®Pro processors, ECC memory and server hard drives (except the 535 MB Fast-SCSI-2 hard drive) using Compaq IDA, IDA-2, Compaq SMART SCSI Array Controllers, Compaq SMART-2 Array Controllers or Compaq Smart Array Controllers. Certain restrictions and exclusions apply. Consult the Compaq Customer Support Center for details.

³ The ProLiant Storage System Model UE will support up to 12 external hard disk drives—most ProLiant servers support fewer than 15 internal hard disk drives.

⁴ For complete compatibility information, refer to the Compaq SCSI Hard Drive Compatibility table located at <http://www.compaq.com/products/servers/storage/compatibility.html> and <http://www.compaq.com/products/server/storage/non-hotplug-compatibility.html>. Using hard drives in unsupported configurations will result in voiding of the warranty and could result in damage to the drive and/or loss of data.



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United States April 30, 2000

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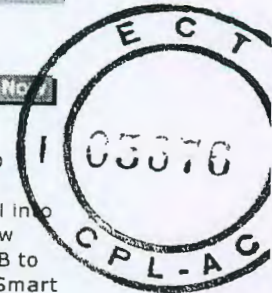
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RAID controllers

Smart Array 3200

Compaq Smart Array 3200 Controller

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product information

- [QuickSpec](#)
- [Q & A](#)
- [Compaq Smart Array Software Upgrade](#)
- [Upgrading the Smart Array 3200 Controller to the Smart Array 4200 Controller](#)
White Paper

related links

- [Questions to Ask Before Buying a Controller](#)
213 KB pdf
- [Array Diagnostic Utility \(ADU\)](#)
- [Ultra3 Low Voltage Differential \(LVD\)](#)
- [The Smart Array Advantage \(Quick Tour\)](#)
- [Smart Array Products Feature Matrix](#)
- [Smart Array Products Compatibility Matrix](#)
8 KB pdf
- [Which Smart Array Controller is the one I need?](#)
- [Smart Array Naming Nomenclature](#)
- [Smart Array 4200 Controller](#)
- [Hardware RAID, no longer a luxury](#)
313 KB pdf
- [Smart Array Family Advantage Flyer](#)
596 KB pdf
- [Online Spares Recommendations](#)



Continuing its promise to provide customers with new leading edge RAID subsystems, Compaq introduces the Smart Array 3200 Controller. This controller marks the introduction of 80 MB/sec Wide Ultra2 SCSI protocol into the Compaq server family. Compaq increases the performance of this new Array Controller by increasing the on-board accelerator cache from 16 MB to 64 MB. When used with Compaq's Wide-Ultra2 internal hard drives, the Smart Array 3200 Controller can attain maximum data transfer rates of up to 80 MB/s per channel, or 160 MB/s total. The Smart Array 3200 controller is compatible with Compaq PCI servers.

The Smart Array 3200 Controller continues to deliver the data availability and management features required to increase business productivity and lower the customer's total cost of ownership. The controller supports up to 15 HDD per channel, enabling higher capacities with future high-density enclosures. The Smart Array 3200 Controller is based on the field proven SMART-2 Intelligent Architecture which enables truly breakthrough capabilities for managing high performance storage:

On-Line Capacity Expansion: Simplifies storage management by allowing on-line addition of more storage in RAID configurations, eliminating the need to back up, reconfigure, and restore.

Array Configuration Utility: Graphical user interface that simplifies array configuration and facilitates on-line capacity expansion.

Array Performance Monitor: Monitors key parameters and provides information for proactive system planning.

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United States April 30, 2000

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RAID controllers

Compaq Smart Array 3200 Controller QuickSpec

[Smart Array 3200](#)

product information

- [QuickSpec](#)
- [Q & A](#)
- [Compaq Smart Array Software Upgrade](#)
- [Upgrading the Smart Array 3200 Controller to the Smart Array 4200 Controller](#)
- [White Paper](#)

➤ [View or Download QuickSpec](#) - in .pdf format, 32 KB (2Q1999)

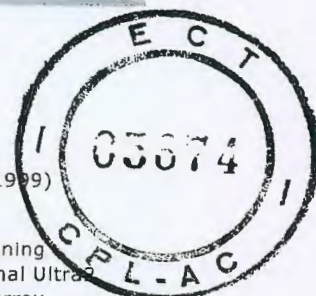
The Smart Array 3200 Controller is Compaq's premier award-winning workgroup RAID controller. Supporting two internal or two external Ultra SCSI connections, this controller replaces the most popular PCI array controller in the market today-the SMART-2DH Array Controller. With great performance, strong PCI controller availability and support for more than typical workgroup capacity, this controller is a hallmark of the Compaq Smart Array storage solutions.

Models

Compaq Smart Array 3200 Controller	295643-B21
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related links

- [Questions to Ask Before Buying a Controller](#)
213 KB pdf
- [Array Diagnostic Utility \(ADU\)](#)
- [Ultra3 Low Voltage Differential \(LVD\)](#)
- [The Smart Array Advantage \(Quick Tour\)](#)
- [Smart Array Products Feature Matrix](#)
- [Smart Array Products Compatibility Matrix](#)
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- [Which Smart Array Controller is the one I need?](#)
- [Smart Array Naming Nomenclature](#)
- [Smart Array 4200 Controller](#)
- [Hardware RAID, no longer a luxury](#)
313 KB pdf
- [Smart Array Family Advantage Flyer](#)
596 KB pdf
- [Online Spares Recommendations](#)



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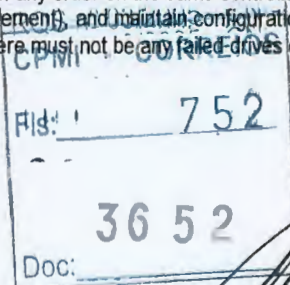
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Fault Tolerance

Keeps data available and server running while a failed drive is being replaced; several fault tolerance configurations are supported including:

Distributed Data Guarding (RAID 5): Allocates parity data across multiple drives and allows simultaneous write operations

Data Guarding (RAID 4): Writes parity data to a single, dedicated parity drive

Drive Mirroring (RAID 1, 0+1): Allocates half of the drive array to data and the other half to mirrored data, providing two copies of every file

Fault Recovery

Minimizes downtime and facilitates a quick recovery from component failures.

On-Line Spares: Up to four spare drives can be installed prior to drive failure. If a failure occurs, recovery begins with an On-Line spare and data is reconstructed automatically.

Array Accelerator: Onboard, battery backed cache memory protects data in the event of a controller, server or power failure. This daughter board is uniquely removable from the array in the unlikely event of a controller failure—saving critical user data for up to four days.

High Availability

Saves training and administration costs by providing online storage management tools:

Online RAID Level Migration: allows for online post-configuration change to RAID level without destroying data or volume information.

Online Capacity Expansion: lets you add storage to a live server—reducing expensive server downtime.

Volume Capacity Extension: allows for the capacity growth of existing logical volumes.

Logical Drive Capacity Extension: allows the user to increase the size of existing logical drives.

Global Online Spare: reduces the risk of data loss by facilitating automatic rebuilds after a drive failure.

Pre-Failure Warranty³: Drives attached to the Smart Array Controller and monitored under Compaq Insight Manager are supported by a Pre-Failure (replacement) Warranty.

SOFTWARE COMPONENTS

Compaq Smart Array software makes setup, storage management, configuration and trouble shooting a breeze. Compaq Smart Array products utilize a single, consistent set of utility software for storage and RAID management. This consistency across the Smart Array product line reduces the cost of ownership by reducing training and technical expertise necessary to install and maintain your Compaq server storage solution.

Array Configuration Utility & Array Diagnostic Utility

- Powerful configuration and diagnostic utilities for all Smart Array controllers
- Provides a graphical view of Compaq drive array configurations
- Easy to use Wizards for configuration
- Runs online on NT 4.0 and NetWare

Compaq Insight Manager

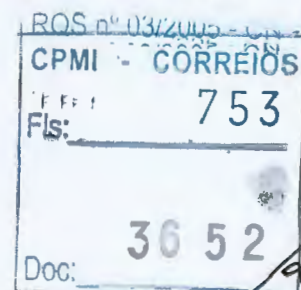
- Powerful server and server options/storage monitoring tool
- Monitors over 1200 different server parameters

SmartStart

- Simple to use server and storage installation tools

Compaq StorageWorks Virtual Replicator (sold separately)

- **Snapshot Back Up and Restore:** Instantly create "snapshots" of production data to reduce backup and restore windows from hours to minutes.
- **Storage Pools:** For quick response to changing storage capacity needs, create "virtual volumes" of up to 1 terabyte and enjoy policy-based automation to simplify system data and storage administration.
- **System requirements:** Windows NT 4.0 SP3, IE 3.02, 32 MB memory, and 30 MB disk space





SPECIFICATIONS

Protocol	Wide Ultra2 SCSI, Wide-Ultra SCSI-3, Fast Wide SCSI-2 or Fast SCSI-2
SCSI Electrical Interface	Low Voltage Differential (LVD)
Drives Supported	Up to 15 Wide Ultra2 SCSI, Wide-Ultra SCSI-3, Fast-Wide SCSI-2 or Fast SCSI-2 Hard Drives. When used with the ProLiant Storage System Model UE, the SA-3200 supports up to 12 HDD per channel.
Maximum Transfer Rate on System Bus (peak)	133 MB/s
Simultaneous Drive Transfer Channels	Two
Total Channel Transfer Rate	160 MB, 80 MB/s per channel ⁴
Software Upgradable Firmware	Yes
Read/Write Cache	64-MB ¹ ECC protected, battery-backed read/write cache built on Compaq's uniquely removable daughter board technology
Logical Drives Supported	32
Reliability Features	
Distributed Data Guarding (RAID 5)	Yes
Data Guarding (RAID 4)	Yes
Drive Mirroring (RAID 1, 0+1)	Yes
Drive Striping (RAID 0)	Yes
Automatic Data Recovery	Yes

Kit Contents

Controller, warranty card, support software CD, installation guide, quick install poster, and Compaq Systems Reference Library CD

Warranty

Maximum:	The remaining warranty of the Compaq server product in which it is installed (to a maximum three-year limited warranty ²)
Minimum:	One-year, on-site limited warranty ²
Pre-Failure Warranty:	Drives attached to the Smart Array Controller and monitored under Compaq Insight Manager are supported by a Pre-Failure (replacement) Warranty ³

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QUICKSPECS

Compaq Smart Array
3200 Controller

OPTIONS

Hard Drives⁵

Wide Ultra2 SCSI Drives – Hot Plug

18.2-GB Ultra2 SCSI Drive (1")	388144-B21
9.1-GB Ultra2 SCSI 10,000 rpm Drive (1")	328939-B21
9.1-GB Ultra 2 SCSI Drive (1")	349514-B21
4.3-GB Ultra2 SCSI 10,000 rpm Drive (1")	328938-B21
4.3-GB Ultra2 SCSI Drive (1")	349513-B21

Wide-Ultra SCSI-3 Drives – Hot Plug

36.4-GB Wide-Ultra SCSI-3 Drive (1.6")	400740-B21
18.2-GB Wide-Ultra SCSI-3 Drive (1")	400739-B21
18.2-GB Wide-Ultra SCSI-3 10,000 rpm Drive (1.6")	336358-B21
18.2-GB Wide-Ultra SCSI-3 Drive (1.6")	313756-B21
9.1-GB Wide-Ultra SCSI-3 10,000 rpm Drive (1")	336357-B21
9.1-GB Wide-Ultra SCSI-3 Drive (1")	313706-B21
4.3-GB Wide-Ultra SCSI-3 10,000 rpm Drive (1")	336356-B21
4.3-GB Wide-Ultra SCSI-3 Drive (1")	272577-001

ProLiant Storage System/U Family

ProLiant Storage System Model UE (Single bus, Tower)	348710-B21
ProLiant Storage System Model UE (Single bus, Rack)	348700-B21
ProLiant Storage System Model U2 (Dual Bus, Tower)	304110-B22
ProLiant Storage System Model U2 (Dual Bus, Rack)	304100-B22
Recovery Server Option	304117-B21
Redundant Power Supply Option	224206-001

Software

Compaq StorageWorks Virtual Replicator

License & Media (CD-ROM)	388931-B21
License Only	388932-B21
Upgrade License & Media (CD-ROM)	135438-B21
Upgrade License Only	135439-B21

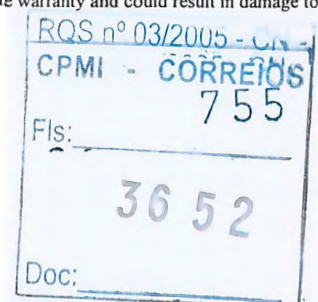
¹ 56 MB useable for Read/Write cache, 8 MB used for transfer buffer and scripts memory.

² Certain restrictions and exclusions apply. Consult the Compaq Customer Support Center at 1-800-345-1518 for details.

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⁴ In order to function at Wide Ultra2 SCSI transfer rates, the Smart Array 3200 controller must be used with Wide Ultra2 SCSI capable HDD, drives and servers.

⁵ For complete compatibility information, refer to the Compaq SCSI Hard Drive Compatibility table located at <http://www.compaq.com/products/servers/storage/compatibility.html> and <http://www.compaq.com/products/server/storage/non-hotplug-compatibility.html>. Using hard drives in unsupported configurations will result in voiding of the warranty and could result in damage to the drive and/or loss of data.





QUICKSPECS

Compaq Smart Array 221
Controller

MODELS

Smart Array 221
Controller
388099-B21

KEY PRODUCT FEATURES

- Low cost, entry-level array controller
- Wide Ultra2 SCSI
- Single channel
- Up to 12 drives supported
- Pre-Failure warranty
- Upgrade path to higher capacity PCI array controllers
- Online spares support
- Auto rebuild of failed drives
- Software integration with Array Configuration Utility and Compaq Insight Manager

Overview

The Smart Array 221 brings exceptional performance, data availability and entry-level server costs to customers that once believed that reliable data protection had to be expensive.

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Small/Medium Business: Server environments with fewer clients and businesses with tight budgets can now afford the protection and recovery benefits of hardware array controller technology.

Branch Office/Offsite Workgroups: With the highest price/performance ratio in the industry, business can now afford to protect data at branch offices and workgroups with a true hardware-based array controller. Because data is compatible between the SA-221 and SA-3200 array controller, upgrading to the next generation array controller is seamless.

Entry-Level Array Technology: For businesses without previous RAID protection or experience with array technology, the Compaq SA-221 controller is easy to purchase, easy to set up and easy to maintain.

STANDARD FEATURES

Fault Prevention Features

Allows detection of possible failures before they occur, allowing preventive action to be taken.

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QUICKSPECS

Compaq Smart Array 221
Controller

STANDARD FEATURES *(continued)*

Fault Tolerance

Keeps data available and server running while a failed drive is being replaced; several fault tolerance configurations are supported including:

Distributed Data Guarding (RAID 5): Allocates parity data across multiple drives and allows simultaneous write operations.

Drive Mirroring (RAID 1, 0+1): Allocates half of the drive array to data and the other half to mirrored data, providing two copies of every file.

Fault Recovery

Minimizes downtime and facilitates a quick recovery from component failures.

On-Line Spares: Up to four spare drives can be installed prior to drive failure. If a failure occurs, recovery begins with an On-Line spare and data is reconstructed automatically.

Performance

32-bit Bus-Master Host Interface: 32-bit PCI bus-master technology delivers maximum data burst performance, transferring information directly to system memory.

Intelligent Array Engines: Processing tasks are divided between two engines. Working simultaneously, one engine generates fault tolerance, while the other prepares and sorts array storage commands.

Wide Ultra2 SCSI: This single channel controller provides for a maximum of 15 drives³ per server slot with a total controller bandwidth of 80 MB/s.

Data Distribution: Data is distributed across multiple drives, optimizing drive efficiency and performance.

ECC Protected Read Cache: 6 MB of ECC protected read cache memory dramatically reduces wait times for read-intensive applications.

SOFTWARE COMPONENTS

Compaq Smart Array software makes setup, storage management, configuration and trouble shooting a breeze. Compaq storage servers and Smart Array products utilize a single, consistent set of utility software for storage and RAID management. This consistency across the Smart Array product line reduces the cost of ownership by reducing training and technical expertise necessary to install and maintain your Compaq server storage solution.

Array Configuration Utility & Array Diagnostic Utility

- Powerful configuration and diagnostic utilities for all Smart Array controllers
- Provides a graphical view of Compaq drive array configurations
- Easy to use Wizards for configuration
- Runs online on NT 4.0 and NetWare

Compaq Insight Manager

- Powerful server and server options/storage monitoring tool
- Monitors over 1200 different server parameters

SmartStart

- Simple to use server and storage installation tools

Compaq StorageWorks Virtual Replicator (sold separately)

- **Snapshot Back Up and Restore:** Instantly create "snapshots" of production data to reduce backup and restore windows from hours to minutes.
- **Storage Pools:** For quick response to changing storage capacity needs, create "virtual volumes" of up to 1 terabyte and enjoy policy-based automation to simplify system data and storage administration.
- **System requirements:** Windows NT 4.0 SP3, IE 3.02, 32 MB memory, and 30 MB disk space.

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QUICKSPECS

Compaq Smart Array 221 Controller

SPECIFICATIONS

Protocol	Wide Ultra2 SCSI
Electrical Interface	Low Voltage Differential
Drives Supported	Up to a maximum of 15 Wide Ultra2 SCSI ³ or Wide-Ultra SCSI-3 ³ drives
Data Transfer Method	32-bit PCI bus-master
Maximum Transfer Rate on System Bus (peak)	133 MB/s
Total Channel Transfer Rate	80 MB/s
Software Upgradable Firmware	Yes
Cache Memory	6 MB of ECC protected read cache
Logical Drives Supported	32
Operating Systems Supported	Microsoft NT 3.51, 4.0, and later Novell NetWare 3.20, 4.11, 5 SCO OpenServer 5 UnixWare 2.1, 7.1 IBM OS/2 Warp Server Family Banyan Vines 6.x, 7.x, 8.x

RELIABILITY FEATURES

Distributed Data Guarding (RAID 5)	Yes
Drive Mirroring (RAID 1, 1+0)	Yes
Drive Striping (RAID 0)	Yes
Automatic Data Recovery	Yes

Kit Contents

Controller, warranty card, support software CD, user guide, quick install poster, Compaq Systems Reference Library CD

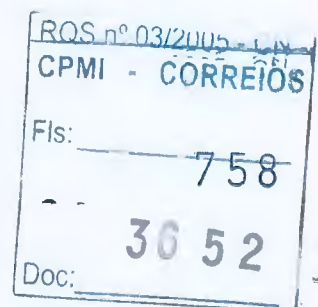
Warranty

Maximum: The remaining warranty of the Compaq product in which it is installed (to a maximum three-year, limited warranty¹)

Minimum: One-year, on-site limited warranty¹

Pre-Failure Warranty: Drives attached to the Smart Array Controller and monitored under Compaq Insight Manager are supported by a Pre-Failure (replacement) Warranty².

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QUICKSPECS

Compaq Smart Array 221
Controller

OPTIONS

Software

Compaq StorageWorks Virtual Replicator

License & Media (CD-ROM)	388931-B21
License Only	388932-B21
Upgrade License & Media (CD-ROM)	135438-B21
Upgrade License Only	135439-B21

Hard Drives⁴

Wide Ultra2 SCSI Drives - Hot Plug

18.2-GB Ultra2 SCSI Drive (1")	388144-B21
9.1-GB Ultra2 SCSI 10,000 rpm Drive (1")	328939-B21
9.1-GB Ultra 2 SCSI Drive (1")	349514-B21
4.3-GB Ultra2 SCSI 10,000 rpm Drive	328938-B21
4.3-GB Ultra 2 SCSI Drive	349513-B21

Wide Ultra2 SCSI Drives - Non-Hot Plug

18.2-GB Ultra2 SCSI 10,000 rpm Drive (1.6")	328943-B21
18.2-GB Ultra2 SCSI Drive (1")	388143-B21
9.1-GB Ultra2 SCSI 10,000 rpm Drive (1")	328942-B21
9.1-GB Ultra 2 SCSI Drive (1")	349526-B21
4.3-GB Ultra2 SCSI 10,000 rpm Drive	328941-B21
4.3-GB Ultra 2 SCSI Drive	349525-B21

Wide-Ultra SCSI-3 Drives - Hot Plug

36.4-GB Wide-Ultra SCSI-3 Drive (1.6")	400740-B21
18.2-GB Wide-Ultra SCSI-3 Drive (1")	400739-B21
18.2-GB Wide-Ultra SCSI-3 10,000 rpm Drive (1.6")	336358-B21
18.2-GB Wide-Ultra SCSI-3 Drive (1.6")	313756-B21
9.1-GB Wide-Ultra SCSI-3 10,000 rpm Drive (1")	336357-B21
9.1-GB Wide-Ultra SCSI-3 Drive (1")	313706-B21
4.3-GB Ultra2 SCSI 10,000 rpm Drive	336356-B21
4.3-GB Wide-Ultra SCSI-3 Drive (1")	272577-001

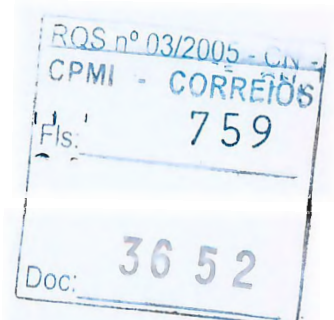
Wide-Ultra SCSI-3 Drives - Non-Hot Plug

18.2-GB Wide-Ultra SCSI-3 10,000 rpm Drive (1.6")	336370-B21
9.1-GB Wide-Ultra SCSI-3 10,000 rpm Drive (1")	336369-B21
9.1-GB Wide-Ultra SCSI-3 Drive (1")	339509-B21
4.3-GB Ultra2 SCSI 10,000 rpm Drive	336368-B21
4.3-GB Wide-Ultra SCSI-3 Drive (1")	339506-B21

ProLiant Storage System/U Family

ProLiant Storage System Model UE (Single bus, Tower)	348710-B21
ProLiant Storage System Model UE (Single bus, Rack)	348700-B21
ProLiant Storage System Model U2 (Dual Bus, Tower)	304110-B22
ProLiant Storage System Model U2 (Dual Bus, Rack)	304100-B22
Recovery Server Option	304117-B21
Redundant Power Supply Option	224206-001

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QUICKSPECS

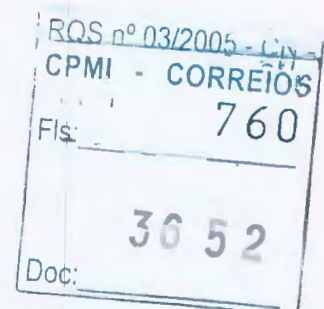
Compaq Smart Array 221 Controller

¹ Certain restrictions and exclusions apply. Consult the Compaq Customer Support Center at 1-(800)-345-1518 for details.

² Pre-Failure Warranty is available on all Compaq Prosignia and Compaq ProLiant servers using Compaq Insight Manager 2.1 or higher, and covers Pentium®Pro processors, ECC memory and server hard drives (except the 535 MB Fast-SCSI-2 hard drive) using Compaq IDA, IDA-2, Compaq SMART SCSI Array Controllers, Compaq SMART-2 Array Controllers or Compaq Smart Array Controllers. Certain restrictions and exclusions apply. Consult the Compaq Customer Support Center for details.

³ The ProLiant Storage System Model UE will support up to 12 external hard disk drives—most ProLiant servers support fewer than 15 internal hard disk drives.

⁴ For complete compatibility information, refer to the Compaq SCSI Hard Drive Compatibility table located at <http://www.compaq.com/products/servers/storage/compatibility.html> and <http://www.compaq.com/products/server/storage/non-hotplug-compatibility.html>. Using hard drives in unsupported configurations will result in voiding of the warranty and could result in damage to the drive and/or loss of data.





QUICKSPECS

Compaq Smart Array
3200 Controller

MODELS

Smart Array 3200 Controller 295643-B21

- High-performance PCI intelligent array controller
- Two Wide Ultra2 SCSI Channels providing 160 MB/s total bandwidth - two internal and two external SCSI connectors
- 64-MB¹ ECC-protected and battery-backed removable read/write cache
- Configuration flexibility and intelligent storage management to ensure continuous high-performance
- Configuration flexibility and intelligent storage management to ensure continuous high-performance access to network data

Overview

The Smart Array 3200 Controller is Compaq's premier award-winning workgroup RAID controller. Supporting two internal or two external Ultra2 SCSI connections, this controller replaces the most popular PCI array controller in the market today—the SMART-2DH Array Controller. With great performance, strong PCI controller availability and support for more than typical workgroup capacity, this controller is a hallmark of the Compaq Smart Array storage solutions.

The Smart Array Advantage

Compaq's innovative design and integration work for the Smart Array family of products adds customer value unmatched in the industry. Large scale use of Smart Array products facilitates a much lower cost of ownership than many competitive server storage products. The Compaq Smart Array family brings unparalleled return on invested dollars through these product family benefits:

Data Compatibility between all models of Smart Array Controllers means customers can upgrade from other models of Smart Array products to get to higher performance, capacity and availability. Unlike competitive products, successive generations of Smart Array products understand the data format of other Smart Array controllers².

Consistent Configuration and Management Tools. All Smart Array products utilize a standard set of management and utility software. These tools consistently lower the cost of ownership by reducing training and technical expertise necessary to install and maintain the Compaq server storage. Configuration, management and diagnostic software tools includes: Array Configuration Utility, Array Diagnostic Utility, Compaq Insight Manager (CIM), and Compaq SmartStart.

Snapshots and Storage Pools. Compaq delivers the next step towards the Enterprise Network Storage Architecture vision with support for StorageWorks Virtual Replicator. With this optional software, users can: instantly create "snapshots" of production data to reduce backup and restore Windows from hours to minutes, pool storage for quick response to changing storage capacity needs, create "virtual volumes" of up to 1 terabyte and enjoy policy-based automation to simplify system data and storage management.

Pre-Failure Warranty³ means that CIM not only tells you when a drive is going bad, but allows you to replace failing drives before they actually fail.

Key Features

Integrated components ensure continuous high-performance system access with ensured fault tolerance.

Host Interface: 32-bit bus-master technology delivers maximum data performance, transferring information directly to system memory at rates up to 133 MB per second (PCI); enhanced command interface reduces command latency and maximizes transfer rates.

Intelligent Array Engines: Processing tasks are divided between two engines. Working simultaneously, one engine generates fault tolerance information and manages data flow, while the other prepares and sorts array storage commands.

Dual Wide Ultra2 SCSI Channels: Two Ultra2 SCSI channels double data bandwidth for up to 160 MB/s total controller band width.

Enhanced Array Accelerator: 64-MB read/write cache module¹ maximizes I/O performance without sacrificing data integrity. Prediction of sequential operations and retrieval of data prior to a request further enhances performance.

Fault Prevention

Allows detection of possible failures before they occur, allowing preventive action to be taken

S.M.A.R.T.: Self Monitoring Analysis and Reporting Technology first developed at Compaq detects possible hard disk failures, before they occur, allowing Compaq to replace the failed component before the actual failure occurs.

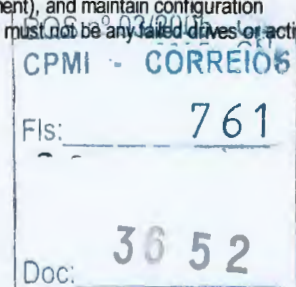
Drive Parameter Tracking: Monitors over 15 drive operational parameters, predicting failures and notifying the administrator.

Dynamic Sector Repairing: Continually performs background surface scans on the hard disk drives during inactive periods and automatically remaps bad sectors, thus ensuring data integrity.

Array Accelerator Tracking: Monitors integrity of Array Accelerator Cache, allowing Pre-Failure preventive maintenance.

Environment Tracking for External Storage System: Monitors fan speed and cabinet temperature of ProLiant Storage System and newer Compaq storage enclosures.

Drive & Array Movement: The users can move (detach & attach) drives in any order on the same controller (drive movement) or add a configured drive array to another controller (array movement), and maintain configuration information. This feature requires the system to be powered down, and there must not be any failed drives or active spare drives in the array.





QUICKSPECS

Compaq Smart Array
3200 Controller

Fault Tolerance

Keeps data available and server running while a failed drive is being replaced; several fault tolerance configurations are supported including:

Distributed Data Guarding (RAID 5): Allocates parity data across multiple drives and allows simultaneous write operations

Data Guarding (RAID 4): Writes parity data to a single, dedicated parity drive

Drive Mirroring (RAID 1, 0+1): Allocates half of the drive array to data and the other half to mirrored data, providing two copies of every file

Fault Recovery

Minimizes downtime and facilitates a quick recovery from component failures.

On-Line Spares: Up to four spare drives can be installed prior to drive failure. If a failure occurs, recovery begins with an On-Line spare and data is reconstructed automatically.

Array Accelerator: Onboard, battery backed cache memory protects data in the event of a controller, server or power failure. This daughter board is uniquely removable from the array in the unlikely event of a controller failure—saving critical user data for up to four days.

High Availability

Saves training and administration costs by providing online storage management tools:

Online RAID Level Migration: allows for online post-configuration change to RAID level without destroying data or volume information.

Online Capacity Expansion: lets you add storage to a live server—reducing expensive server downtime.

Volume Capacity Extension: allows for the capacity growth of existing logical volumes.

Logical Drive Capacity Extension: allows the user to increase the size of existing logical drives.

Global Online Spare: reduces the risk of data loss by facilitating automatic rebuilds after a drive failure.

Pre-Failure Warranty³: Drives attached to the Smart Array Controller and monitored under Compaq Insight Manager are supported by a Pre-Failure (replacement) Warranty.

SOFTWARE COMPONENTS

Compaq Smart Array software makes setup, storage management, configuration and trouble shooting a breeze. Compaq Smart Array products utilize a single, consistent set of utility software for storage and RAID management. This consistency across the Smart Array product line reduces the cost of ownership by reducing training and technical expertise necessary to install and maintain your Compaq server storage solution.

Array Configuration Utility & Array Diagnostic Utility

- Powerful configuration and diagnostic utilities for all Smart Array controllers
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- Easy to use Wizards for configuration
- Runs online on NT 4.0 and NetWare

Compaq Insight Manager

- Powerful server and server options/storage monitoring tool
- Monitors over 1200 different server parameters

SmartStart

- Simple to use server and storage installation tools

Compaq StorageWorks Virtual Replicator (sold separately)

- **Snapshot Back Up and Restore:** Instantly create "snapshots" of production data to reduce backup and restore windows from hours to minutes.
- **Storage Pools:** For quick response to changing storage capacity needs, create "virtual volumes" of up to 1 terabyte and enjoy policy-based automation to simplify system data and storage administration.
- **System requirements:** Windows NT 4.0 SP3, IE 3.02, 32 MB memory, and 30 MB disk space

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QUICKSPECS



Compaq Smart Array
3200 Controller

SPECIFICATIONS

Protocol	Wide Ultra2 SCSI, Wide-Ultra SCSI-3, Fast Wide SCSI-2 or Fast SCSI-2
SCSI Electrical Interface	Low Voltage Differential (LVD)
Drives Supported	Up to 15 Wide Ultra2 SCSI, Wide-Ultra SCSI-3, Fast-Wide SCSI-2 or Fast SCSI-2 Hard Drives. When used with the ProLiant Storage System Model UE, the SA-3200 supports up to 12 HDD per channel.
Maximum Transfer Rate on System Bus (peak)	133 MB/s
Simultaneous Drive Transfer Channels	Two
Total Channel Transfer Rate	160 MB, 80 MB/s per channel ⁴
Software Upgradable Firmware	Yes
Read/Write Cache	64-MB ¹ ECC protected, battery-backed read/write cache built on Compaq's uniquely removable daughter board technology
Logical Drives Supported	32
Reliability Features	
Distributed Data Guarding (RAID 5)	Yes
Data Guarding (RAID 4)	Yes
Drive Mirroring (RAID 1, 0+1)	Yes
Drive Striping (RAID 0)	Yes
Automatic Data Recovery	Yes

Kit Contents

Controller, warranty card, support software CD, installation guide, quick install poster, and Compaq Systems Reference Library CD

Warranty

Maximum:	The remaining warranty of the Compaq server product in which it is installed (to a maximum three-year limited warranty ²)
Minimum:	One-year, on-site limited warranty ²
Pre-Failure Warranty:	Drives attached to the Smart Array Controller and monitored under Compaq Insight Manager are supported by a Pre-Failure (replacement) Warranty ³

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QUICKSPECS

Compaq Smart Array
3200 Controller

OPTIONS

Hard Drives⁵

Wide Ultra2 SCSI Drives – Hot Plug

18.2-GB Ultra2 SCSI Drive (1")	388144-B21
9.1-GB Ultra2 SCSI 10,000 rpm Drive (1")	328939-B21
9.1-GB Ultra 2 SCSI Drive (1")	349514-B21
4.3-GB Ultra2 SCSI 10,000 rpm Drive (1")	328938-B21
4.3-GB Ultra2 SCSI Drive (1")	349513-B21

Wide-Ultra SCSI-3 Drives – Hot Plug

36.4-GB Wide-Ultra SCSI-3 Drive (1.6")	400740-B21
18.2-GB Wide-Ultra SCSI-3 Drive (1")	400739-B21
18.2-GB Wide-Ultra SCSI-3 10,000 rpm Drive (1.6")	336358-B21
18.2-GB Wide-Ultra SCSI-3 Drive (1.6")	313756-B21
9.1-GB Wide-Ultra SCSI-3 10,000 rpm Drive (1")	336357-B21
9.1-GB Wide-Ultra SCSI-3 Drive (1")	313706-B21
4.3-GB Wide-Ultra SCSI-3 10,000 rpm Drive (1")	336356-B21
4.3-GB Wide-Ultra SCSI-3 Drive (1")	272577-001

ProLiant Storage System/U Family

ProLiant Storage System Model UE (Single bus, Tower)	348710-B21
ProLiant Storage System Model UE (Single bus, Rack)	348700-B21
ProLiant Storage System Model U2 (Dual Bus, Tower)	304110-B22
ProLiant Storage System Model U2 (Dual Bus, Rack)	304100-B22
Recovery Server Option	304117-B21
Redundant Power Supply Option	224206-001

Software

Compaq StorageWorks Virtual Replicator

License & Media (CD-ROM)	388931-B21
License Only	388932-B21
Upgrade License & Media (CD-ROM)	135438-B21
Upgrade License Only	135439-B21

¹ 56 MB useable for Read/Write cache, 8 MB used for transfer buffer and scripts memory.

² Certain restrictions and exclusions apply. Consult the Compaq Customer Support Center at 1-800-345-1518 for details.

³ Pre-Failure Warranty is available on all Compaq Prosignia and Compaq ProLiant servers using Compaq Insight Manager 2.1 or higher, and covers Pentium® Pro processors, ECC memory and server hard drives (except the 535 MB Fast-SCSI-2 hard drive) using Compaq IDA, IDA-2, Compaq SMART SCSI Array Controllers, Compaq SMART-2 Array Controllers or Compaq Smart Array Controllers. Certain restrictions and exclusions apply. Consult the Compaq Customer Support Center for details.

⁴ In order to function at Wide Ultra2 SCSI transfer rates, the Smart Array 3200 controller must be used with Wide Ultra2 SCSI capable HDD, drives and servers.

⁵ For complete compatibility information, refer to the Compaq SCSI Hard Drive Compatibility table located at <http://www.compaq.com/products/servers/storage/compatibility.html> and <http://www.compaq.com/products/server/storage/non-hotplug-compatibility.html>. Using hard drives in unsupported configurations will result in voiding of the warranty and could result in damage to the drive and/or loss of data.

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StorageWorks

products

Compaq Media Family

product information

DLT Media
- DLT Drives

AIT Media
- AIT Drives
- Memory In Cassette
370 KB pdf

DAT/DDS Media
- DAT/DDS Drives

SLR Media
- SLR Drives

Media Warranty

related links

Why Compaq Tape Media?
154 KB pdf

Which Tape Product is
Right for Your Customer?
412 KB pdf

click
here
easy
upgrade

click here
buy
now!

DAT/DDS Media Information

Part Number	Description
SKU-6-3	
152842-001	20/40 DAT Cartridge (10 pack)
171532-B21	20/40 DAT 8 Cassette Magazine w/media (7 data & 1 Cleaning)
295515-B21	12/24 DAT Cartridge (10 pack)
134117-B21	12/24 DAT 8 Cassette Magazine w/media (7 data & 1 Cleaning)
295538-B21	12/24 DAT 6 Cassette Magazine w/media (5 data & 1 Cleaning)
137611-0021	4/8 DAT Cartridge
131107-002	2/4 DAT Cartridge
242781-001	DAT Cleaning Cartridge

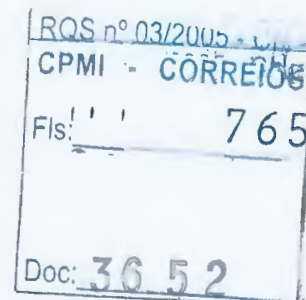
Confused between the terms "DAT" and "DDS" and "4mm and "helical scan"?"

DAT stands for Digital AudioTape. This acronym was originally established to talk about a consumer audio recording technology based on 4mm (actually 3.81mm) wide tape used in a helical scan recorder compatible with the DAT Conference Standard. DDS stands for Digital Data Storage and is based on the same physical standard but records data and not audio. 4mm is simply the tape size associated with both DAT and DDS. Even though DAT audio has not shared the same success as the DAT data recording products (DDS), people commonly use the terms interchangeably. Helical scan is the method used to record data which can be associated with DDS products (4mm) and 8mm data recording products/video recording products. I commonly envision and associate the "old barbershop pole" with helical scan.

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StorageWorks

tape and optical drives

> products

12/24 GB DAT Drives

Compaq StorageWorks 12/24 GB DAT Drives

For reliable, speedy protection of up to 24 GB of storage capacity, Compaq DAT drives provide an affordable backup solution. And with the Compaq DAT Autoloader, you can have weeks or even months of unattended backup.



product information

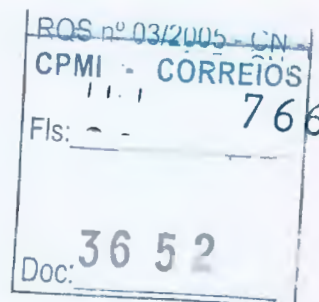
- [Product Description](#)
- [QuickSpec](#)
- [Q & A](#)
- [DDS-3 Enhancing DAT Reliability, Capacity, and Performance White Paper](#)
- [Tape Options ROMPac Version 1.40A](#)



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tape and optical drives

> products

12/24 GB DAT Drives

Compaq StorageWorks 12/24 GB DAT Drives QuickSpec

product information

- [Product Description](#)
- [QuickSpec](#)
- [Q & A](#)
- [DDS-3 Enhancing DAT Reliability, Capacity, and Performance White Paper](#)
- [Tape Options ROMPaq Version 1.40A](#)

➤ **View or Download QuickSpec** - in .pdf format, 19 KB
DA-10239-01-002-11.16.1999

Next-generation DAT drive utilizes DDS-3 technology to perform up to 8.4 GB/hr; a new Automatic Head Cleaning mechanism reduces the need for cleaning; protects servers up to 24 GB in capacity.

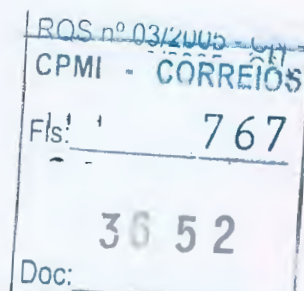
Models	
12/24 GB DAT Drive	295513-B22



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<http://www.compaq.com/products/storageworks/Tape-and-Optical-S.../datdriveQuickspec.htm> 30/04/00

QUICKSPECS



Compaq 12/24 GB
DAT Drive

MODELS

12/24 GB DAT Drive
295513-B22

Next-generation DAT drive utilizes DDS-3 technology to perform up to 8.4 GB/hr; a new Automatic Head Cleaning mechanism reduces the need for cleaning; protects servers up to 24 GB in capacity

Improved Reliability

New advancements in tape technology have produced a tape drive which requires less cleaning and provides improved backup/restore operation. Some of these new advancements include an automatic rotating head cleaning sweeper that can be used during the write or read recovery procedure to dislodge debris from the tape path and recording heads and drum. This DDS-3 drive has a MTBF rating of 300,000 hours at a 12 percent duty cycle.

Automated Head Cleaning

Reduces head cleaning cycles by four times over DDS-2

Performance

This version of the industry-standard DDS-3 DAT Drive provides an 8.4 GB/hr data transfer rate.

Industry-Standard DDS-3

DDS-3 format has a drum rotation speed of 4251 rpm while the tape moves at 11.6 mm/s. Features of the format and implementation of it allow a linear bit density, which is double that of DDS-2 drives, achieving a greater transfer rate and capacity.

Compression

Built-in hardware compression

Compatibility and Integration Testing

Fully tested on a variety of Compaq servers; including Prosignia and ProLiant

Operating Environment Support

Windows NT: Supported under Windows NT using the Windows NT 4.0 Backup utility; supported using ARCserveIT 6.61 and higher for Windows NT and VERITAS Backup Exec 7.3 and higher for NT

NetWare: Supported under NetWare 3.x and higher using ARCserveIT 6.61 and higher for NetWare and VERITAS Backup Exec 8.0 and higher for NetWare

SCO UNIX: Native support under SCO OpenServer v 5.x and SCO UnixWare v 7.x

Option Kit Contents

12/24-GB DAT Drive
12-GB DDS-3 DAT Data Cassette
Cleaning Cassette
Mounting Bracket
Documentation
Live Trial Partner Software

Warranty

Maximum

The remaining warranty of the Compaq PC product in which it is installed (to a maximum three-year limited warranty¹)

Minimum

Three-year parts, one-year, 24-hour swap

SPECIFICATIONS

Recommended Maximum Server Size Capacity

24 GB or less

	Native	2-1 DC
60 Meter (DDS-1)	1.3 GB	2.6 GB
90 Meter (DDS-1)	2.0 GB	4 GB
120 Meter (DDS-2)	4.0 GB	8 GB
125 Meter (DDS-3)	12.0 GB	24 GB

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QUICKSPECS

Compaq 12/24 GB
DAT Drive



SPECIFICATIONS *(continued)*

Transfer Rates

Native (maximum)	4.2 GB/hr
Native (typical)	2.1 GB/hr
2:1 ² Compression (maximum)	8.4 GB/hour
2:1 ² Compression (typical)	4.2 GB/hour

Data Access Time

Average load/unload swap time	< 32 seconds
Search Speed	Average of 45 seconds to any point on a 125

Physical Dimensions

5.25 inch Half Height (HxWxD)	1.6 x 4 x 5.9 in/41 x 102 x 150 mm
Tape Width	0.15 in/3.81 mm
Tape Length	410 ft/125 m

Tape Format

Recording Method	Helical Scan
Recording Format	ECMA-236, DDS3
Data Compression	Lempel-Ziv (DCLZ)
Error Detection/Correction	Reed Solomon (3 levels)
Interface	Fast SCSI-2

RELATED OPTIONS

12-GB DDS-3 DAT Cassette 10 Pack	295515-B21
4-GB DDS-2 DAT Cassette	137611-001
DAT 4mm Cleaning Cassette	242781-001

COMPATIBILITY

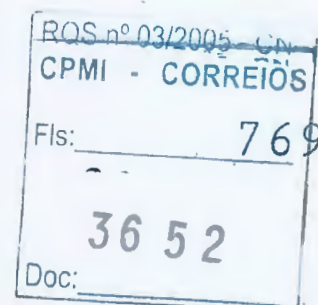
Portables *(Docking Bay or within external Storage Cabinet)*

Compaq Armada 7800
Compaq Armada 7700
Compaq Armada 7400
Compaq Armada 7300
Compaq Armada 6500
Compaq Armada 4000
Compaq Armada 3500
Compaq Armada 1750
Compaq Armada 1700
Compaq Armada 1500c
Compaq Armada 1500

Desktops

Compaq Deskpro EN Series Desktop
Compaq Deskpro EN Series Minitower
Compaq Deskpro EN Series Small Form Factor
Compaq Deskpro EP Series
Compaq Deskpro EP Series, Small Business Solutions

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COMPATIBILITY *(continued)*

Workstations

Compaq Professional Workstation XP1300
Compaq Professional Workstation SP700
Compaq Professional Workstation AP500
Compaq Professional Workstation AP400
Compaq Professional Workstation AP200



Servers

Compaq ProLiant 7000 Xeon™
Compaq ProLiant 6500 Xeon
Compaq ProLiant 6400R Xeon
Compaq ProLiant 6000 Xeon
Compaq ProLiant 5500R Xeon
Compaq ProLiant 5500 Xeon
Compaq ProLiant 3000R 6/450
Compaq ProLiant 3000 6/450
Compaq ProLiant 1850R
Compaq ProLiant 1600R (100 MHz)
Compaq ProLiant 1600 (100 MHz)
Compaq ProLiant 800 6/350E, 6/400, 6/450 MHz
Compaq ProLiant 400

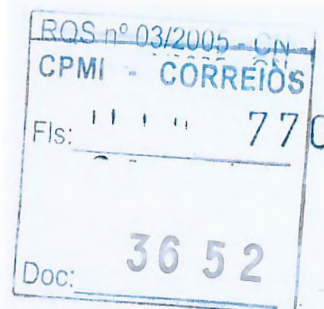
SMB

Compaq Prosignia Notebook Family of Personal Computers
Compaq Prosignia Desktop Family of Personal Computers
Compaq Prosignia 740
Compaq Prosignia 720

¹ Certain restrictions and exclusions apply. Consult the Compaq Customer Support Center for details. In Canada consult the Product Information Center at 1-800-567-1616 for details.

² Typically, users will be able to compress their data at a 2:1 ratio; however, compression ratios will vary based on the type of data being compressed

000303



United States April 30, 2000

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disk drives

Wide Ultra2 Universal Hot-Plug Disk Drives

product information

- > Product Description
- > QuickSpec
- > Q & A
- > Disk Drive-Specific Information

supporting documentation

- > Whitepapers, Technology Briefs and more

servers, workstations and options

- > Prosignia Servers
- > ProLiant Servers
- > Alpha NT Servers
- > Workstations
- > AlphaServer Systems
- > Integrity Systems
- > Nonstop Himalaya Systems

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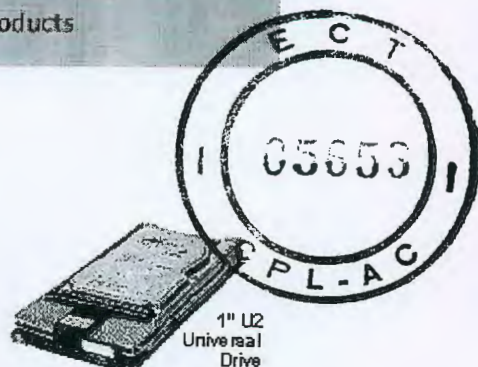
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- > Non-Hot Plug Disk Drives
- > Solid State Disk Drives

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Wide Ultra2 Universal Hot-Plug Disk Drives

Ultra2 Universal disk drives from Compaq provide an unequalled level of investment protection and simplification for customers by enabling drive compatibility across the many Compaq Ultra2 enterprise platforms. Users are free to deploy and re-deploy these drives to quickly deliver increased storage capacity. Compaq Ultra2 Universal disk drives are the first high performance hot plug drives sharing compatibility across Ultra2 ProLiant servers, StorageWorks Ultra2 capable enclosures and Ultra2 Alphaservers. Choose from 9.1 GB and 18.2 GB capacities in 7200 and 10,000 rpm spindle speeds.



Commonality across the various Compaq Ultra2 platforms requires that a 1" drive can be installed into a 1.6" drive bay. To accomplish this, Compaq has developed a drive height converter. The drive height converter easily snaps onto the top of a 1" drive enabling the conversion and compatibility within the 1.6" drive bay on platforms such as Alphaserver. Drive height converters are sold in packages of four under Compaq P/N 148649-B21.



Benefits of U2 Universal Drives:

- Reduced cost of ownership - Drives can be utilized across all Ultra2 enterprise platforms.
- Investment protection - Drives can easily be re-deployed within Ultra2 solutions wherever storage capacity is needed most.
- Reduced risk - Drives eliminate the risk of firmware incompatibility.
- Flexibility - Order the storage capacity you need then deploy whenever or wherever you choose.
- Ease of doing business - Customers can easily select the drives they need regardless of the application in which they will be deployed.
- Reduced spares inventory - Having a common Ultra2 drive across platforms minimizes spares volume.
- Minimized storage complexity - Improved logistics through minimizing the number of drives and part numbers.
- Available in 9GB and 18GB capacities in 7,200 and 10,000 rpm spindle speeds.

Available Drives

18.2-GB Pluggable Ultra2 SCSI 10,000 rpm Universal Hard Drive (1")	128418-B22
18.2-GB Pluggable Ultra2 SCSI 7200 rpm Universal Hard Drive (1")	388144-B22
9.1-GB Pluggable Ultra2 SCSI 10,000 rpm Universal Hard Drive (1")	328939-B22
9.1-GB Pluggable Ultra2 SCSI 7200 rpm Universal Hard Drive (1")	123065-B22

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<http://www.compaq.com/products/storageworks/uhd/uhdindex.html>

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OPTION KITS

A wide variety of rigorously tested, Compaq-qualified, SMART capable, Wide Ultra3 SCSI, Wide Ultra2 SCSI and Wide-Ultra SCSI Hard Drives offering data integrity and availability in hot pluggable and non-pluggable models. Compaq 10,000 rpm Hard Drives provide up to 40 percent better performance over standard 7200 rpm drives. Actual performance increases will vary depending upon application and configuration.



All Compaq hard drives pass a rigorous qualification process which ensures that every Compaq drive is proven to perform in your Compaq server or workstation. Before final certification, all Compaq hard drives are provided with Compaq-unique firmware specifically designed to optimize compatibility and functionality, including support of SMART and the Compaq Insight Manager.



Compaq received the 1999 Gold Idea Award for design excellence for the innovative design of the new Hot Pluggable drive carrier. The new carrier is praised for both its ergonomics and aesthetics, as well as its many functional enhancements such as the compact design, improved cooling properties, and more secure drive mounting for reduced vibration.

COMPAQ

Drive Quality

Today's distributed enterprise is seeing larger, more complex applications, an increase of mission-critical data moving to the server, increasing demand for transaction processing and critical server consolidation. In this environment, storage has become a critical component of the information system, significantly defining both the systems reliability and performance. This is why Compaq drives undergo an intense qualification process that eliminates data integrity problems, firmware and O/S incompatibilities and other causes of data corruption or premature failure. All drive firmware is specific to our drives and is designed to maximize both functionality and compatibility. All drives are proven to perform in the Compaq systems for which they were designed.

Performance

Only those drives whose performance is suitable for an enterprise environment are selected through the Compaq qualification process and are labeled "best-in-class." All our drives are proven to be reliable and tuned for optimum performance in the Compaq equipment for which they were designed.

Pre-Failure Warranty

When used in conjunction with a SMART Array Controller and Compaq Insight Manager, the SMART capable firmware in Compaq hard drives enables extensive fault prediction capabilities. If potential problems develop in one of the drives, the SMART Array Controller, Compaq Insight Manager and/or SMART hard disk drive lets you know in advance so you can have the drive replaced, before it fails, under the Compaq Pre-Failure Warranty.

Note: All drives are protected by a Pre-Failure Warranty when used with a Compaq array controller (SMART or SMART-2) and Compaq Insight Manager, allowing hard drives to be replaced before failure free of charge. In addition, all drives are covered by a one to three-year limited on-site warranty, or the remaining warranty of the Compaq CPU in which it is installed (up to three years).

Integration

Many issues customers have with third party drives are "simple" integration issues. When buying from another supplier, there is no guarantee that a drive has been correctly set for proper operation with Compaq servers and storage systems. These incompatibilities can create problems in configuration, can rob your system of performance, or at their worst, can cause you to lose data. Compaq hard drives are specifically designed and tested for flawless operation in your Compaq equipment. The integration of hard drives in Compaq systems means that cables, SCSI ID settings, termination, hot plug drive trays and firmware are right for your Compaq server or storage system.

Wide-Ultra SCSI-3 Hard Drives

Wide-Ultra SCSI-3 hard drives are compatible with Compaq Fast-Wide, Wide-Ultra SCSI-3, and Wide Ultra2 SCSI controllers, but will run at Fast-Wide speeds if used with Fast-Wide controllers. These Wide-Ultra SCSI-3 drives may also be combined with Fast-Wide SCSI-2 drives on the same SCSI bus. Wide-Ultra SCSI-3 drives use the same cables and connectors as Fast-Wide drives. Wide-Ultra drives provide enterprise-level performance and continued support of the existing ProLiant-style hot plug drive tray.

Wide Ultra3 SCSI & Wide Ultra2 SCSI Hard Drives

Compaq's Ultra3 and Ultra2 hard drives increase the maximum transfer rate of the SCSI bus to 160 MB/s (Ultra3) or 80 MB/s (Ultra2). By reducing the opportunity for SCSI bus saturation, this increased data rate allows all SCSI devices to perform at optimum levels. Ultra3 and Ultra2 hard drives are being offered in an improved hot plug drive carrier and can be used interchangeably in Compaq Ultra2 or Ultra3 capable systems. In addition to improved drive performance and increased storage density, the new carrier will also help prevent the inadvertent insertion of single-ended SCSI drives into Low Voltage Differential SCSI capable equipment (avoiding inadvertent performance degradation of LVD-capable systems). To achieve the maximum (160 MB/s) transfer rates of Ultra3, the hard drive and the array controller (or SCSI host bus adapter) must both be Ultra3 capable.

Wide Ultra3 SCSI & Wide Ultra2 Universal Hard Disk Drives

Compaq Ultra3 and Ultra2 SCSI Universal hard drives provide storage commonality across the enterprise. Ultra3 and Ultra2 Universal drives add the feature of hot plug compatibility between any Ultra3 or Ultra2 capable ProLiant Servers, ProLiant Storage Systems, AlphaServers, and StorageWorks enclosures. These hot plug drives are offered in several capacities and spindle speeds. Storage commonality across these platforms provides many benefits including reduced cost of ownership, reduced storage complexity, and a minimized hard drive spares inventory.

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WIDE ULTRA3 UNIVERSAL HARD DISK DRIVES

(For ease of deployment it is recommended that RAID sets not contain a combination of Ultra2/3 drives and previous version SCSI drives. Mixed RAID sets may be used if desired, however some combinations may require reconfiguring the RAID array (such as adding Ultra2 drives to an existing RAID array of ProLiant-type Wide-Ultra drives).)

Application Information

Compaq Ultra3 SCSI hard drives provide a maximum data transfer rate of 160 MB/s – twice the rate of Ultra2 systems. These Universal Hard Disk Drives provide the ability to hot plug between various Compaq Ultra3 and Ultra2 SCSI platforms. All Compaq Hard Disk Drives are required to meet our rigorous standards for reliability and performance. These drives are intended for use in today's demanding, data-critical enterprise environments. Universal option kits are configured and pre-mounted in the appropriate hot plug tray for immediate installation into your Compaq server or storage system.

**18.2-GB Pluggable Ultra3 SCSI
10,000 rpm Universal Hard
Drive (1")**
142673-B22

18.2 GB	Capacity	18209.3 MB	Seek Time (typical reads, including settling)	
10K	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	5.2 ms
	Interface	Wide Ultra3 SCSI	Full-Stroke	12 ms
	Transfer Rate		Rotational Speed	10,000 rpm
	Synchronous (Maximum)	160 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	35,565,080
			Operating Temperature	50° to 95°F/10° to 35°C

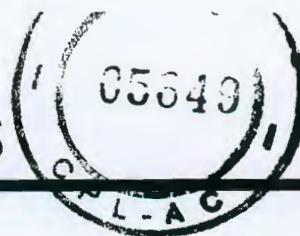
**9.1-GB Pluggable Ultra3 SCSI
10,000 rpm Universal Hard
Drive (1")**
142671-B22

9.1 GB	Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
10K	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	5.0 ms
	Interface	Wide Ultra3 SCSI	Full-Stroke	12 ms
	Transfer Rate		Rotational Speed	10,000 rpm
	Synchronous (Maximum)	160 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	17,773,524
			Operating Temperature	50° to 95°F/10° to 35°C

Note: When used in a rack mounted server in conjunction with the Compaq Hot Plug Redundant Power Supply (283697-B21/291) at altitudes above 5,000 feet (1,520 meters) the server should not be operated in ambient temperatures exceeding 95°F (35°C).

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WIDE ULTRA3 SCSI NON-HOT PLUG HARD DISK DRIVES

(For ease of deployment it is recommended that RAID sets not contain a combination of Ultra2/3 drives and previous version SCSI drives. Mixed RAID sets may be used if desired, however some combinations may require reconfiguring the RAID array (such as adding Ultra2 drives to an existing RAID array of ProLiant-type Wide-Ultra drives).)

Application Information

Compaq non-plug hard disk drives provide an economical, reliable, fully Compaq supported primary storage solution. These drives provide functionality and features to satisfy our business and professional users. All non-plug hard disk drive kits provide mounting hardware for both 3.5-inch and 5.25-inch bays and include detailed instructions for mounting and configuring your new hard disk drive in your Compaq server or workstation.

**36.4-GB Ultra3 SCSI
10,000 rpm Hard Drive (1.6")
142676-B21**

36.4 GB 10K	Capacity	36419.5 MB	Seek Time (typical reads, including settling)	
	Height	1.6 in/40.6 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	5.7 ms
	Interface	Wide Ultra3 SCSI	Full-Stroke	13 ms
	Transfer Rate		Rotational Speed	10,000 rpm
	Synchronous (Maximum)	160 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	71,132,000
			Operating Temperature	
			50° to 95°F/10° to 35°C	

**18.2-GB Ultra3 SCSI
10,000 rpm Hard Drive (1")
142674-B21**

18.2 GB 10K	Capacity	18209.3 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	5.5 ms
	Interface	Wide Ultra3 SCSI	Full-Stroke	12 ms
	Transfer Rate		Rotational Speed	10,000 rpm
	Synchronous (Maximum)	160 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	35,565,080
			Operating Temperature	
			50° to 95°F/10° to 35°C	

**9.1-GB Ultra3 SCSI 10,000 rpm
Hard Drive (1")
142672-B21**

9.1-GB 10k	Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	5.0 ms
	Interface	Wide Ultra3 SCSI	Full-Stroke	12 ms
	Transfer Rate		Rotational Speed	10,000 rpm
	Synchronous (Maximum)	160 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	17,773,524
			Operating Temperature	
			50° to 95°F/10° to 35°C	

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WIDE ULTRA2 UNIVERSAL HARD DISK DRIVES

(For ease of deployment it is recommended that RAID sets not contain a combination of Ultra2/3 drives and previous version SCSI drives. Mixed RAID sets may be used if desired, however some combinations may require reconfiguring the RAID array (such as adding Ultra2 drives to an existing RAID array of ProLiant-type Wide-Ultra drives).)

Application Information

Compaq Ultra2 Universal Hard Disk Drives provide the ability to hot plug between various Compaq Ultra2 and Ultra3 platforms. Our Ultra2 Universal Hard Disk Drives are required to meet our rigorous standards for reliability and performance. These drives are intended for use in today's demanding, data-critical enterprise environments. Universal option kits are configured and pre-mounted in the appropriate hot plug tray for immediate installation into your Compaq server or storage system.

**18.2-GB Pluggable Ultra2 SCSI
10,000 rpm Hard Drive (1")**
128418-B22

18.2 GB 10K	Capacity	18209.3 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	5.2 ms
	Interface	Wide Ultra2 SCSI	Full-Stroke	12 ms
	Transfer Rate		Rotational Speed	10,000 rpm
	Synchronous (Maximum)	80 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	35,565,080
			Operating Temperature	
			50° to 95°F/10° to 35°C	

(When used in a rack mounted server in conjunction with the Compaq Hot Plug Redundant Power Supply (283697-B21/291) at altitudes above 5,000 feet (1,520 meters) the server should not be operated in ambient temperatures exceeding 95°F (35°C).)

**18.2-GB Pluggable Ultra2 SCSI
Universal Hard Drive (1")**
388144-B22

18.2 GB	Capacity	18209.3 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	7.0 ms
	Interface	Wide Ultra2 SCSI	Full-Stroke	15 ms
	Transfer Rate		Rotational Speed	7200 rpm
	Synchronous (Maximum)	80 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	35,565,080
			Operating Temperature	
			50° to 95°F/10° to 35°C	

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QUICKSPECS



Compaq SCSI Hard Drive
Option Kits (Servers)

9.1-GB Pluggable Ultra2 SCSI
10,000 Universal Hard Drive
(1")⁵
328939-B22

9.1-GB Pluggable Ultra2 SCSI
Universal Hard Drive (1")
3065-B22

WIDE ULTRA2 UNIVERSAL HARD DISK DRIVES *(continued)*

9.1 GB 10K⁵	Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	5.2 ms
	Interface	Wide Ultra2 SCSI	Full-Stroke	12 ms
	Transfer Rate		Rotational Speed	10,000 rpm
	Synchronous (Maximum)	80 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	17,773,524
			Operating Temperature	
			50° to 95°F/10° to 35°C	

(When used in a rack mounted server in conjunction with the Compaq Hot Plug Redundant Power Supply (283697-B21/291) at altitudes above 5,000 feet (1,520 meters) the server should not be operated in ambient temperatures exceeding 95°F (35°C).)

9.1 GB	Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	7.0 ms
	Interface	Wide Ultra2 SCSI	Full-Stroke	15 ms
	Transfer Rate		Rotational Speed	7200 rpm
	Synchronous (Maximum)	80 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	17,773,524
			Operating Temperature	
			50° to 95°F/10° to 35°C	

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WIDE ULTRA2 SCSI NON-HOT PLUG HARD DISK DRIVES

(For ease of deployment it is recommended that RAID sets not contain a combination of Ultra2/3 drives and previous version SCSI drives. Mixed RAID sets may be used if desired, however some combinations may require reconfiguring the RAID array (such as adding Ultra2 drives to an existing RAID array of ProLiant-type Wide-Ultra drives).)

Application Information

Compaq non-plug hard disk drives provide an economical, reliable, fully Compaq supported primary storage solution. These drives provide functionality and features to satisfy our business and professional users. All non-plug hard disk drive kits provide mounting hardware for both 3.5-inch and 5.25-inch bays and include detailed instructions for mounting and configuring your new hard disk drive in your Compaq server or workstation.

**18.2-GB Ultra2 SCSI
10,000 rpm Hard Drive (1")**
128419-B21

18.2 GB 10K	Capacity	18209.3 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	5.5 ms
	Interface	Wide Ultra2 SCSI	Full-Stroke	12 ms
	Transfer Rate		Rotational Speed	10,000 rpm
	Synchronous (Maximum)	80 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	35,565,080
			Operating Temperature	
			50° to 95°F/10° to 35°C	

**18.2-GB Ultra2 SCSI Hard
Drive (1")**
388143-B21

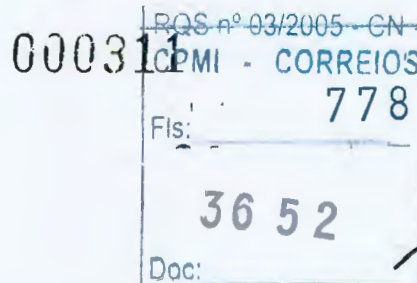
18.2 GB 10K	Capacity	18209.3 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	7.0 ms
	Interface	Wide Ultra2 SCSI	Full-Stroke	15 ms
	Transfer Rate		Rotational Speed	7200 rpm
	Synchronous (Maximum)	80 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	35,565,080
			Operating Temperature	
			50° to 95°F/10° to 35°C	

**9.1-GB Ultra2 SCSI
10,000 rpm Hard Drive (1")**
328942-B21

9.1 GB 10K	Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	5.2 ms
	Interface	Wide Ultra2 SCSI	Full-Stroke	12 ms
	Transfer Rate		Rotational Speed	10,000 rpm
	Synchronous (Maximum)	80 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	17,773,524
			Operating Temperature	
			50° to 95°F/10° to 35°C	

**9.1-GB Ultra2 SCSI
Hard Drive (1")**
349526-B21

9.1 GB 10K	Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	7.1 ms
	Interface	Wide Ultra2 SCSI	Full-Stroke	16 ms
	Transfer Rate		Rotational Speed	7200 rpm
	Synchronous (Maximum)	80 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	17,773,524
			Operating Temperature	
			50° to 95°F/10° to 35°C	



QUICKSPECS



Compaq SCSI Hard Drive
Option Kits (Servers)

WIDE-ULTRA SCSI-3 HOT PLUG HARD DISK DRIVES

Application Information

Compaq hot pluggable hard disk drives provide the ability to install or remove drives on-line. Our hot pluggable hard disk drives are required to meet our rigorous standards for reliability and performance. These drives are intended for use in today's demanding, data-critical enterprise environments and are ideal for use in RAID applications. Hot pluggable option kits are pre-mounted in the appropriate hot plug tray for immediate installation into your Compaq server or storage system with no additional configuration necessary.

36.4-GB Pluggable Wide-Ultra SCSI-3 10,000 rpm Hard Drive (1.6")
128420-B21

36.4 GB 10K	Capacity	36419.5 MB	Seek Time (typical reads, including settling)	
	Height	1.6 in/40.6 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	5.7 ms
	Interface	Wide-Ultra SCSI-3	Full-Stroke	13 ms
	Transfer Rate		Rotational Speed	10,000 rpm
	Synchronous (Maximum)	40 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	71,132,000
			Operating Temperature	
			50° to 95°F/10° to 35°C	

(When used in a tower mounted server in conjunction with the Compaq Hot Plug Redundant Power Supply (283697-B21/291) at altitudes above 5,000 feet (1,520 meters), the server should not be operated in ambient temperatures exceeding 95°F (35°C). 18-GB 1.6" 10k-II hard drives are not supported in rack configurations in conjunction with the Compaq Hot Plug Redundant Power Supply.)

36.4-GB Pluggable Wide-Ultra SCSI-3 Hard Drive (1.6")
400740-B21

36.4 GB 10K	Capacity	36419.5 MB	Seek Time (typical reads, including settling)	
	Height	1.6 in/40.6 mm	Single Track	0.9 ms
	Width	3.5 in/88.9 mm	Average	7.6 ms
	Interface	Wide-Ultra SCSI-3	Full-Stroke	16 ms
	Transfer Rate		Rotational Speed	7200 rpm
	Synchronous (Maximum)	40 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	71,132,000
			Operating Temperature	
			50° to 95°F/10° to 35°C	

18.2-GB Pluggable Wide-Ultra SCSI-3 10,000 rpm Hard Drive (1")
128417-B21

18.2 GB 10K	Capacity	18209.8 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	5.2 ms
	Interface	Wide-Ultra SCSI-3	Full-Stroke	12 ms
	Transfer Rate		Rotational Speed	10,000 rpm
	Synchronous (Maximum)	40 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	35,566,000
			Operating Temperature	
			50° to 95°F/10° to 35°C	

(When used in a rack mounted server in conjunction with the Compaq Hot Plug Redundant Power Supply (283697-B21/291) at altitudes above 5,000 feet (1,520 meters) the server should not be operated in ambient temperatures exceeding 95°F (35°C).)

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QUICKSPECS



Compaq SCSI Hard Drive
Option Kits (Servers)

18.2-GB Pluggable
Wide-Ultra SCSI-3
Hard Drive (1")
400739-B21

9.1-GB Pluggable
Wide-Ultra SCSI-3
10,000 rpm Hard Drive (1")
336357-B21

9.1-GB Pluggable
Wide-Ultra SCSI-3
Hard Drive (1")
313706-B21

WIDE-ULTRA SCSI-3 HOT PLUG DISK DRIVES (continued)

18.2 GB	Capacity	18209.8 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	7.0 ms
	Interface	Wide-Ultra SCSI-3	Full-Stroke	16 ms
	Transfer Rate		Rotational Speed	7200 rpm
	Synchronous (Maximum)	40 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	35,566,000
			Operating Temperature	
			50° to 95°F/10° to 35°C	

9.1 GB 10K	Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	5.6 ms
	Interface	Wide-Ultra SCSI-3	Full-Stroke	12 ms
	Transfer Rate		Rotational Speed	10,000 rpm
	Synchronous (Maximum)	40 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	17,773,500
			Operating Temperature	
			50° to 95°F/10° to 35°C	

(When used in a rack mounted server in conjunction with the Compaq Hot Plug Redundant Power Supply (283697-B21/291) at altitudes above 5,000 feet (1,520 meters) the server should not be operated in ambient temperatures exceeding 95°F (35°C).)

9.1 GB	Capacity	9100.0 MB	Seek Time (typical reads, including settling)	
	Height	1 in/25.4 mm	Single Track	0.8 ms
	Width	3.5 in/88.9 mm	Average	7.9 ms
	Interface	Wide-Ultra SCSI-3	Full-Stroke	17 ms
	Transfer Rate		Rotational Speed	7200 rpm
	Synchronous (Maximum)	40 MB/s	Physical Configuration	
			Bytes/Sector	512
			Logical Blocks	17,773,500
			Operating Temperature	
			50° to 95°F/10° to 35°C	

Note: For complete information on compatibility, refer to the Compaq SCSI Hard Drive Compatibility Table located at <http://www.compaq.com/products>. Please note this website is available in English only. Using Compaq hard drives in unsupported configurations will result in voiding of the warranty and could result in damage to the drive and/or loss of data.

RQS nº 03/2005
CPMI - CORREIOS
Fls: 780
3652
Doc:

000313



PROPOSTA TÉCNICA

Informações Gerais Sobre

***Monitores**

***Compaq Insight Manager**

***S.O. Windows NT Workstation**

000314

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CPMI - CORREIOS	
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36 52	
Doc:	

COMPAQ

monitores



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Brasil

> Produtos

Product Specifications:

Geral

Número de peça

325400-xxx

Tipo de tubo de imagem (diagonal)

14 pol. (35,5 cm) CRT

Fabricante do monitor

ADI

Fabricante do CRT

indefinido

Área de imagem visível

13,2 pol. (33,5 cm)

Abertura do bisel (LxA)

10,7 pol. x 7,95 pol. (27,2 cm x 20,2 cm)

Densidade dos pontos (dot pitch)

0,28 mm

Modos gráficos

Modos predefinidos de fábrica

7

1024 x 768

60 Hz (48,4 kHz)

800 x 600

60 Hz (37,8 kHz), 75 Hz (46,9 kHz)

640 x 480

60 Hz (31,5 kHz) e 75 Hz (37,5kHz)

640 x 350

70 Hz (31,5 kHz)

Modos Mac: 1152 x 864

N/A

832 x 624

N/A

720 x 400

70 Hz (31,5kHz)

Modos programáveis pelo usuário

-

Potência/entrada relacionada

Frequência horizontal

31 a 48,4 kHz

Frequência vertical

50 a 100 Hz

Largura de banda de vídeo

50 Hz a 60 MHz

Velocidade máx. do clock de pixel

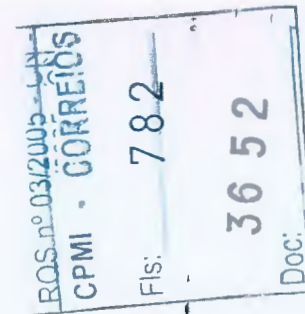
65 MHz

Tela anti-reflexiva

Sim

Antiestática

Sim



1 de 4

000315

Antiestática	Sim
Fonte de alimentação	90 a 265 VAC
ALS	47,5 a 63 Hz
Potência máxima de saída	< 85 watts
Consumo de energia (modo suspenso)	<8 watts / <8 watts
Entrada de sincronização	Sincronização separada TTL
Cabo de sinal	D-sub miniatura de 15 pinos
Controles	
Controles analógicos	Tamanho e posicionamento vertical/horizontal, contraste e brilho
Especificações físicas/ambientais	
Dimensões (AxPxL)	36,4 x 36,45 x 39,1 cm 14,3 x 14,35 x 15,39 pol.
Peso	12 kg (26,4 lb)
Base com inclinação: (para cima/para baixo)	Sim / Sim
Inclinação: (para cima/para baixo)	15 graus para cima / 5 graus para baixo
Rotação	+/- 60 graus
Temperatura - em operação	10° a 40° C 50° a 104°F
Temperatura - sem operação	-30° a 60° C -22° a 140°F
Umidade	10% - 90%
Umidade - sem operação	10% - 95%
Atualização máxima	75 Hz nos modelos pré-configurados
Aprovações/Certificações	
Aprovações de segurança do produto	

IEC 950	Sim
Certificado CB Scheme	Sim
Aprovação UL	Sim
Aprovação CSA	Sim
Aprovação VDE/ TUV /Identificação "GS"	Sim
Aprovação de segurança nórdica	Sim
Aprovação de segurança mexicana	Sim

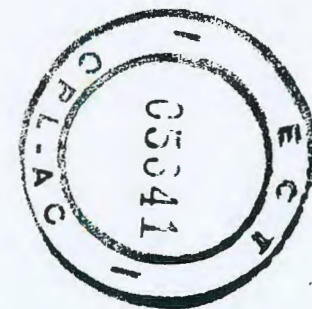
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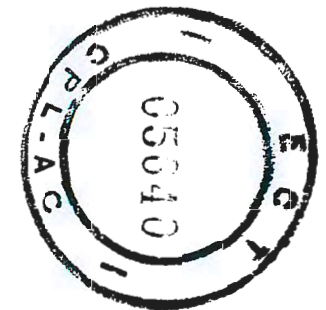
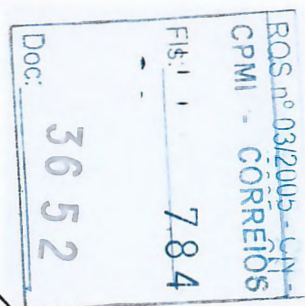
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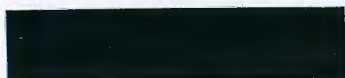
CPMI - CORPES



Aprovação de segurança mexicana	Sim
Aprovação para uso na Polônia (PCBC)	Sim
Aprovação para uso na Rússia (GOST)	Sim
Aprovação para uso na República Tcheca (EZU)	Sim
Aprovação para uso na Hungria (MEEI)	Sim
Aprovação para uso na Eslovênia (SIQ)	Sim
CPRS de Cingapura	Sim
Aprovação para uso na China	Sim
Aprovação para uso na República Eslovaca (EVPU)	Sim
Aprovação para uso na Croácia (KONKAR)	Sim
Aprovação DHHS	Sim
Aprovação PTB	Sim
Reg. dispositivos emissores de radiação	Sim
Aprovações/Certificados continuação	
Requisitos ergonômicos	
Aprovação de conformidade às normas ISO9241-3 VDT	Sim
Conformidade com MPR-II	Sim
Aprovação ergonômica alemã	Sim
Conformidade com TCO '95	Não
Requisitos e aprovações relativas a EMC	
Aprovação FCC	Sim
Requisitos C.I.S.P.R.	Sim
Aprovação V.C.C.I.	Sim
Requisitos M.I.C. (Nova Zelândia)	Sim
Requisitos canadenses	Sim
Aprovação SMA da Austrália	Sim

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[informações e avisos legais](#)

Marca CE	Sim
Conformidade com Energy Star	Sim
Conectividade/ serviço	
Recurso AssetControl	Sim
Gerenciamento de falhas	Não
Recurso Plug-and-Play	Sim
Garantia	Varia, dependendo da região

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CPMI - CORREIOS
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Doc: 36 52 - 2

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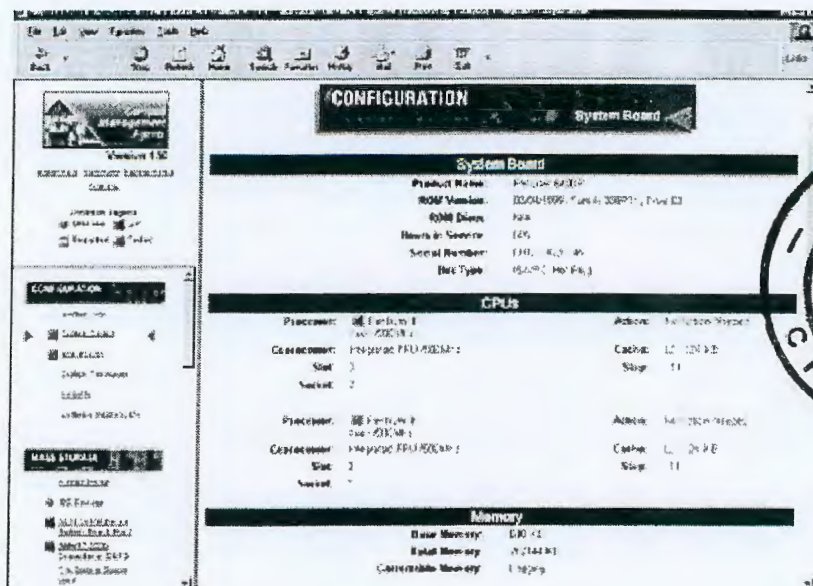


Figure 2: Compaq Management Agent

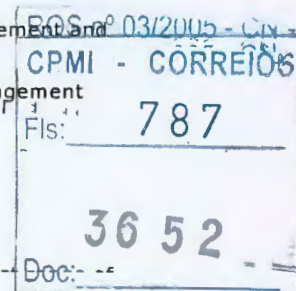
Key Features

- Comprehensive fault management-allows proactive management of the distributed enterprise by alerting in advance of system failures. Alarms can be sent to systems administrator via electronic mail or pager. Also, Windows NT and NetWare monitoring capability allows faster determination of the root cause of system and application faults by being able to quickly determine if an event is caused by hardware or software.
- Broad configuration management-detailed inventory collection, Insight Version Control and Integration Server Maintenance enable effective deployment and maintenance of consistent, manageable configurations.
- Performance management/resource utilization-helps to determine how servers are utilized. The ability to monitor and report on exceeded thresholds helps identify performance bottlenecks and keep systems running at peak levels
- Remote management- minimizes costly downtime by supporting a full complement of remote maintenance and control facilities that assist in quick recovery from critical failures. Compaq Remote Insight board and ProLiant Integrated Remote Console ensure customers are never out of touch with their systems, even when they are off-line or without power.

Benefits at a Glance

- Reduces system management cost by providing centralized fault, configuration and performance information.
- Improves operational efficiency through extensive remote management capabilities.
- Decreases server downtime through proactive fault management and version control.
- Enhances information provided by existing enterprise management products such as HP OpenView and IBM NetView

Compaq Advantage



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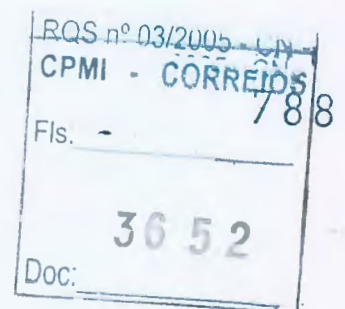
- Most comprehensive systems management across the widest range of operating systems.
- Web based management for anytime - anywhere access to management information.
- Breadth of remote management capabilities from in-band to out-of-band and configuration to diagnostics.
- Predictive fault management and Pre-Failure Warranty for storage, memory and CPU
- Ability to provide up-to-date version control information for server and workstation firmware, drivers and utilities.
- UPS management and multi-server shutdown capabilities
- Extensive online help documentation.
- Integration with management software products such as BMC PATROL, Boole & Babbage Ensign, Cabletron SPECTRUM, CA Unicenter TNG, HP OpenView, Microsoft Systems Management Server, Seagate Nervecenter Pro, SunNet Manager and Tivoli NetView.



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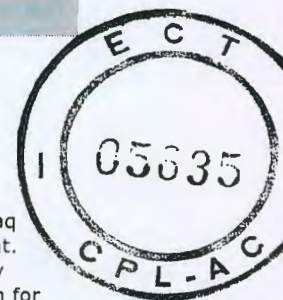
United States April 30, 2000

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systems management

Compaq Insight Manager



Overview

Compaq Insight Manager, the comprehensive systems management tool that monitors the operation of Compaq servers, workstations and clients, is designed to be a key component in the systems management environment. Compaq Insight Manager is the established leader in systems management. This indispensable tool proactively monitors and manages your systems resources and provides you with more useful IT management information for better utilization of your resources. It provides extensive fault, configuration, and performance management, and a graphical user interface provides extensive on-line documentation and context-sensitive help

This management software is comprised of two components:

Compaq Insight Manager application which runs on the management console, and
Compaq Management Agents the operating system-specific agents which run on the managed system

Web-enabled UnixWare 7 agents

Compaq Management Agents for Servers for UnixWare 7 is now web-enabled. Users can now directly browse to a system from anywhere, using a standard browser, for retrieving management information. This marks another milestone in Compaq's strategic direction to enable web access to management information on all Compaq platforms.

Enhanced NetWare Operating System management

This release enhances the Compaq OS Management for NetWare feature by providing SET capability on key NetWare parameters. It allows the administrator to remotely change the system's operating systems configurations and parameters through the web-enabled Compaq Management Agents.

Late last year, in the 4.50 release of the Compaq Management Agents for NetWare, Compaq added OS management for NetWare environments to its superior hardware availability management, enabling users to get an integrated hardware and software view of their NetWare environments via the web-enabled Compaq Management Agents.

Change in defaults in Compaq Management Agents for Agents for Windows installer

With the 4.70 release, the installer for the Compaq Management Agents will install only the Compaq Foundation Agents, Compaq Server Agents, Compaq Storage Agents, Compaq NIC Agents and the Compaq Web Agent by default. The other components of the agents - Compaq OS Management for Windows, Compaq WMI agent and Compaq Agent Event Notifier are now optional items in the installer requiring user selection for a fresh install. During an upgrade from an earlier version of the agents, the installer will check for components that are already installed, and upgrade the components already installed.

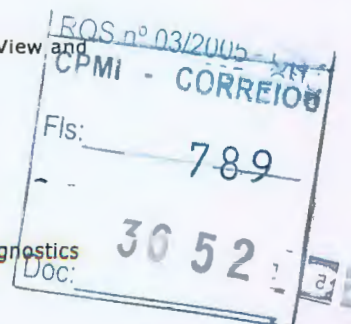
Compaq Insight Manager Benefits

- **Reduces system management cost**-by providing centralized fault, configuration and performance information
- **Improves operational efficiency**-through extensive remote management capabilities
- **Decreases server downtime**-through proactive fault management and version control
- **Enhances information**-provided by existing enterprise management products such as HP OpenView and Tivoli NetView

Compaq Advantage

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- Most comprehensive systems management across the widest range of operating systems
- Breadth of remote management capabilities from in-band to out-of-band and configuration to diagnostics



<http://www.compaq.com/products/servers/management/cim47-quickspecs.html>

30/04/00

- Ability to provide up-to-date version control information for server and workstation firmware, drivers and utilities
- Extensive online Help documentation
- Predictive fault management and Pre-Failure Warranty for storage, memory and CPU
- UPS management and multi-server shutdown capabilities
- Integration with management software products such as BMC PATROL, Boole & Babbage Ensign, Cabltron SPECTRUM, CA Unicenter TNG, HP OpenView, Tivoli NetView, Microsoft Systems Management Server, Seagate NerveCenter Pro and SunNet Manager
- Integration with Dialogic CT components



Compaq Insight Manager Capabilities

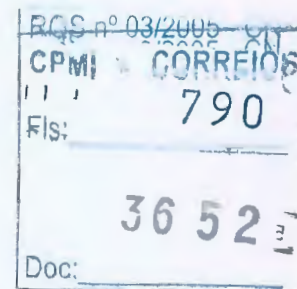
- **Comprehensive Fault Management**-allows proactive management of the distributed enterprise by alerting in advance of system failures.
- **Broad Configuration Management**-detailed inventory collection, Insight Version Control and Integration Server Maintenance enable effective deployment and maintenance of consistent, manageable configurations.
- **Performance Management/Resource Utilization**-helps to determine how servers are utilized.
- **Remote Management**-Compaq Remote Insight board and ProLiant Integrated Remote Console ensure customers are never out of touch with their systems, even when they are off-line or without power.
- **Version Control and Integration Server Maintenance**-allows administrators to monitor and update versions of server and workstation firmware, drivers and utilities.
- **SNMP and HTTP Standards-based**-provides integration with other management products and browser access.
- **Flexible Network Connectivity**-supports multiple transport protocols including IPX, TCP/IP and PPP to operate over LANs, WANs and modems.
- **Database Export**-lets users quickly and easily export Compaq Insight Manager configuration and alarm data to their preferred database or spreadsheet for configuration or asset management and reporting.
- **Support for Leading Operating Systems**-including Microsoft Windows; Novell NetWare, IntraNetWare and IntraNetWare for Small Business; SCO UnixWare and OpenServer; IBM OS/2 Warp, Compaq Tru64 Unix, Compaq OpenVMS

Availability and Usage

- Compaq Insight Manager console application and Compaq Management Agents are distributed as part of the Compaq Server Setup and Management package included with every Compaq server, and via a SmartStart subscription
- Updates and upgrades of Compaq Insight Manager console and Compaq Management Agents may be downloaded from <http://www.compaq.com/support/files/server/us/index.html> Compaq's management page on the World Wide Web, and installed on additional devices after accepting the click-wrap license agreement.
- The Compaq Insight Manager console and agent software may be used on any number of networked clients and servers.

SPECIFICATIONS

User Interface	Microsoft Windows 2000 Microsoft Windows NT 4.0 Microsoft Windows 95 Microsoft Windows 98
Browser Support	Internet Explorer 4.01 or later Netscape Navigator 4.03 or later with JDK 1.1 patch
Protocols Supported	IP, IPX, and PPP
SNMP V1 Compliance	Standard MIB Support including RFC1213, RFC1398 and RFC1231
Pager Support	Numeric and Alphanumeric Paging using Global System for Mobile Communication (GSM)/Short Messaging Service (SMS) via Telocator Access Protocol (TAP)



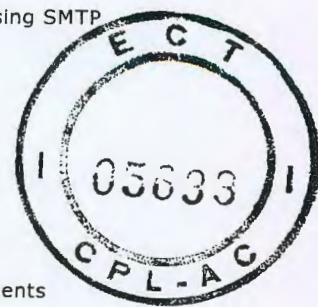
Email support

Alarms received at the console can be forwarded via email using Simple MAPI compliant email client

NT event notifier application forwards alarms via electronic mail using SMTP

Remote Management Support

Remote Console, Compaq Utilities
Integrated Remote Console
Remote Insight Board (EISA & PCI)
Remote Insight Lights-Out Edition

**Management Agent Requirements****Management Protocol**

Simple Network Management Protocol (SNMP) - for Servers and Clients
Hyper Text Transfer Protocol (HTTP) - for Servers and Clients
Desktop Management Interface (DMI) - for Clients

Free disk space

Compaq Management Agent for Servers - Windows - At least 25 MB
Compaq Management Agent for Servers - NetWare - At least 15 MB
Compaq Management Agent for Servers - UnixWare2 - At least 15 MB
Compaq Management Agent for Servers - UnixWare7 - At least 15 MB
Compaq Management Agent for Servers - SCO5 - At least 15MB
Compaq Management Agent for Servers - OS/2 - At least 15MB
Compaq Management Agents for AlphaServers - OVMS - At least 15 MB
Compaq Management Agents for AlphaServers - Tru64 UNIX - At least 15 MB

Supported Models**Servers**

Compaq Prosignia, Compaq ProLiant, Compaq AlphaServers

Supported Operating Systems on Compaq Prosignia and ProLiant servers

Novell	NetWare 3.12, 3.20, 4.11, 4.20 , 5, IntraNetWare, intraNetWare for Small Business
Microsoft	Windows 2000, Windows NT 4.0
SCO	UnixWare, 2.1.3, 7.1, 7.1.1 OpenServer Release 5.04, 5.05
IBM	OS/2 Warp Version 3, Version 4

Supported Operating Systems on Alpha servers

Compaq	Tru64 UNIX V4.0F, 5.0 OpenVMS 7.1, 7.1-1H1, 7.1-1H2, 7.1-1H3, 7.1-2 and 7.2
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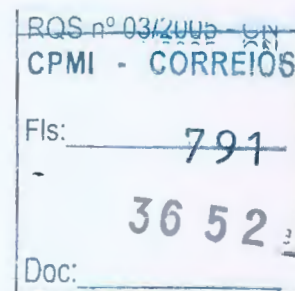
Workstations

Supported Models	Compaq Professional Workstation
Supported Operating Systems	Microsoft Windows 2000, Windows NT Workstation 4.0

Desktops

Supported Models	Compaq Deskpro
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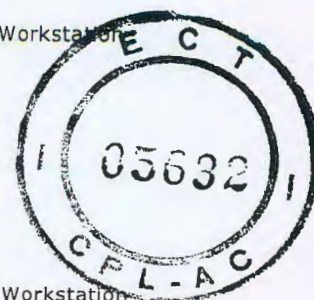


Supported Operating Systems Microsoft Windows 2000, Windows 95, Windows 98, Windows NT Workstation 4.0

Portables

Supported Models Compaq Armada, LTE 5000 (Win 95 & Win NT)

Supported Operating Systems Microsoft Windows 2000, Windows 95, Windows 98, Windows NT Workstation 4.0



Uninterruptible Power Supplies

Supported Models All Compaq UPS Models:
T700, T700h, T1000, T1000h, T1500, T1500h, T2000, T2400h, R1500, R1500h, R3000, R3000h

Supported Operating Systems Microsoft Windows 2000, Windows NT 3.51, 4.0

Supported Standards

Request for Comment	Description
RFC 1212	Concise MIB definitions
RFC 1215	Convention for defining SNMP traps
RFC 1213	Management Information Base (MIB II)
RFC 1398	Ether-Like Interface Type MIB
RFC 1231	IEEE 802.5 Token Ring Interface Type MIB

Management MIBs

Server and Workstation Management Parameters Over 1,000

Server and Workstation Management Traps Over 60

Client Management Parameters Over 300

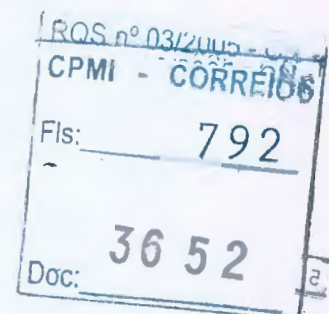
Client Management Traps 15

Insight Manager Integration TechNotes

The following Compaq TechNotes are available:

Integrating Compaq Insight Manager with Enterprise Management Platforms
Integrating Compaq Insight Manager with BMC PATROL
Integrating Compaq Insight Manager with Cabletron SPECTRUM
Integrating Compaq Insight Manager with CA Unicenter TNG
Integrating Compaq Insight Manager with Microsoft Systems Management Server

145806-005
297458-001
276461-001
276463-001
184720-005



Integrating Compaq Insight Manager with Novell ManageWise
Updating Compaq Systems Software from an Integration Server
Integrating Compaq Insight Manager with Tivoli TME 10
Integrating Compaq Insight Manager with Dialogic BoardWatch (available on the Dialogic Web site)

ECG056/1298
219467-003
ECG009/0498

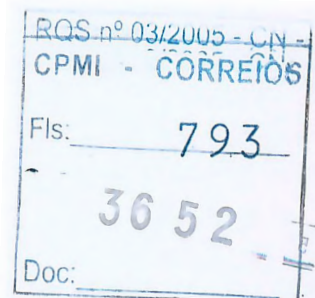
Electronic copies of the TechNotes are available on the Compaq Management CD or at
<http://www.compaq.com/support/techpubs/technotes/index.html>

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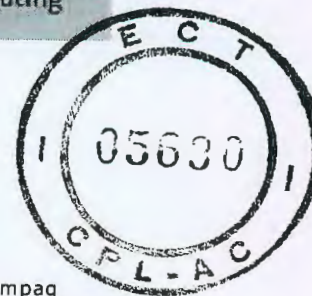
United States April 30, 2000

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systems management

> enterprise computing



Product Description

Compaq Insight Manager XE v1.1

Compaq Insight Manager XE provides web-based management for Compaq servers, and any HTTP, SNMP MIB-2, or DMI v2 compliant device. The strength of Compaq Insight Manager XE lies in its ability to provide system administrators real control through an easy to use industry standards-based web interface. It's feature rich, intuitive, extensible, and designed to unlock the built-in manageability of Compaq hardware.

Compaq Insight Manager XE was built from the ground up as a web application to work with industry-standard management agents. With its integrated Cluster Monitor, Compaq Insight Manager XE provides system managers with a single monitor point for both stand-alone systems and Compaq ProLiant Clusters with Microsoft Cluster Server (MSCS). The Cluster Monitor provides aggregated system data and presents it to administrators as a single view of their cluster configuration.

Compaq Insight Manager XE's user interface is intuitive and packed with functionality. Accessed from anywhere in the Intranet, systems administrators can manage devices, manage events, and administer Insight Manager XE. Pre-configured common system views and customizable queries and events provide out-of-box productivity. Predictive fault management and Pre-Failure Warranty protect your storage, memory, and CPU investment.

New in Version 1.1

Compaq Insight Manager XE version 1.1 extends its database support to meet user requirements. Support for the Microsoft Data Engine (MSDE) has been added to the existing support for Microsoft SQL Server 6.5 and 7.0. MSDE is a compatible database solution for Microsoft SQL Server 7, and a perfect solution for managing smaller workgroups with up to 300 devices. MSDE is a fully binary compatible alternative database solution for Microsoft SQL Server 7, and is provided free of charge on the Compaq Insight Manager XE CD. Other features of version 1.1 include its expanded OS support for AlphaServers with OpenVMS and Tru64 Unix, and support for the latest Compaq servers and clients. Among the new products supported are T1000 and T1500 Thin Clients, and Cabletron Switches.

Management Agents - A Core Component

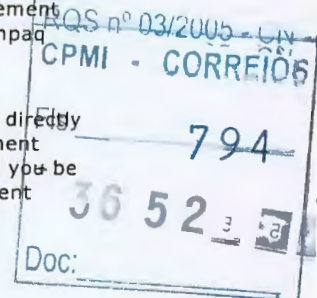
The instrumentation of the hardware subsystems by the Compaq Management Agents is the cornerstone of Insight Manager XE. The Compaq Management Agents provide in-depth subsystem information, status and faults on Compaq servers, workstations, desktops and portables. The Compaq Management Agents communicate directly with Compaq Insight Manager XE. Web access provides a user-friendly interface to the DMI and SNMP management protocols. The web-enabled Compaq Management Agents have the ability to announce themselves to Compaq Insight Manager XE when they are powered up, limiting the need to perform auto-discovery. The web-enabled Compaq Management Agents are accessible either directly through a browser or through Compaq Insight Manager XE.

Today most Compaq Management Agents provide the ability to browse directly through Compaq systems for real-time system, subsystem and component information and status. With Compaq Insight Manager XE, not only will you be able to browse directly to the systems with the web-enabled Management Agent, but you will also be able to browse to systems with:

- > [question and answer](#)
- > [QuickSpecs](#)
- > [product profile](#)
- > [whitepapers](#)
- > [resources/tools](#)

downloadable
SoftPaks

- > [Compaq server software](#)
 - Compaq Insight Manager**
 - Compaq Insight Manager XE**
 - Systems Management toolkit**
 - Compaq Management Agents for:**
 - Windows NT
 - Windows 2000
 - NetWare
 - UnixWare 2
 - UnixWare 7
 - OpenServer 5
 - OS/2
- > [Management Agents for Digital](#)



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- SNMP or DMI management agents
- Third-party devices with SNMP MIB-2 or DMI V2 agents
- Non-Compaq web services running on a device
- Compaq Insight Manager LC (light console for clients)
- Compaq Intelligent Cluster Administrator
- Compaq Server Management Agents (V3.1 or higher)
- Compaq Client Management Agents (V3.51 or higher)
- Web-Enabled Compaq Management Agents (V4.0 and higher)



In addition to support for monitoring the Windows NT Operating System, Compaq Management Agents v4.5 adds monitoring support for the NetWare Operating System. Compaq Insight Manager XE users can easily determine if an event is caused by hardware or an operating system error.

Key Features

- Accessibility to management information anywhere on the Intranet, more securely than SNMP
- Automatic discovery and identification of industry standard SNMP MIB-2, DMI-2, and HTTP based web servers and compliant devices (Including non-Compaq devices)
- Comprehensive event management allows proactive management of distributed devices by alerting in advance of system failures
- Predictive fault management and Pre-Failure Warranty for storage, memory and CPU protect your hardware investment
- SQL compatible repository for discovered devices, alarms, asset, and status reporting. Supports Microsoft SQL Server 6.5 and 7.0, and Microsoft Data Engine (MSDE)
- Integrated Cluster Monitor provides a one-step management control point for cluster management
- Highly scalable architecture designed for extensibility

Benefits at a Glance

Reduces systems management cost

SQL database compatibility - Support for MSDE lowers the cost of entry for smaller businesses. Compaq Insight Manager XE provides the optional MSDE on the management CD at no charge. MSDE eliminates the need for a separate Microsoft SQL Server 7 license for managing workgroups with up to 300 devices.

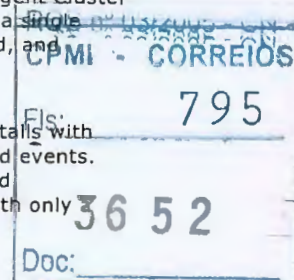
One tool for DMI and SNMP Management - For example, if DMI V2 is used on the clients and SNMP is used on the servers, Compaq Insight Manager XE uses the appropriate management protocol to access the device and then present the information consistently to the user. There is no longer the need for two separate tools. There is no requirement to understand the DMI MIF or SNMP MIB. The information from the desktop and server is represented by the same tool and in the same database.

One Stop Cluster Management and Administration - Compaq Intelligent Cluster Administrator can be launched from the Cluster Monitor to provide a single interface for the cluster administrator to monitor, modify as needed, and deploy clusters throughout the enterprise.

Immediate use of the application - Compaq Insight Manager XE installs with pre-configured common system views and customizable queries and events. This feature reduces the learning curve by simplifying the setup and configuration, and makes the management capabilities available with only limited investment in time.

Improves operational efficiency and effectiveness

Compaq Insight Manager XE provides the means for customers to manage



Compaq Insight Manager XE provides the means for customers to manage their computing infrastructure -- the way they want, when they want, where they want -- with web browser access to the management server or directly to the web-enabled management agents.

Decreases downtime by indicating what to fix, not just what's wrong

Compaq Management Agents provide health status to either Compaq Insight Manager or Compaq Insight Manager XE. The Agents interpret data supplied by the device drivers into useful information that assists the user in correctly diagnosing the problem. Compaq Insight Manager or Compaq Insight Manager XE then provides extensive help information on how to address the problem, reducing the time needed to resolve the problem.

Product Availability

Compaq Insight Manager XE v1.1 is available for immediate fulfillment by submitting an electronic request form. To obtain your free CD, simply register at <http://www.compaq.com/manage>.



Specifications

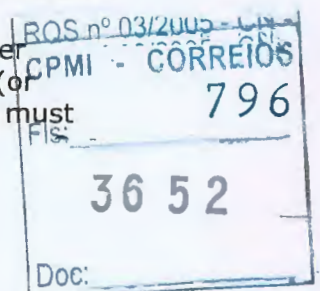
Compaq Insight Manager XE requires the following hardware and software:

Hardware and Software Minimum Requirements

Hardware System Memory	Compaq ProSignia or ProLiant Server 128 MB of RAM with Microsoft SQL Server on same server 96 MB of RAM with Microsoft SQL Server running on a remote system 64MB of RAM with Microsoft Data Engine (MSDE)
Disk Space	300 MB for the Microsoft SQL Server database 35 MB for the Management Application 55 MB for the Microsoft Data Engine (MSDE)
Server Operating System	Microsoft Windows NT Server 4.0, with SP3 (or higher) Microsoft Windows NT Server 4.0, with SP4 is required to run MSDE Note: The XE Server requires Microsoft Windows NT 4.0 English version only
Server Software TCP/IP installed	SNMP services installed and active SNMP Trap services are not required, but recommended Microsoft Internet Explorer 4.01 with SP1 or 5.0 Microsoft Data Engine (MSDE) with SP4 or higher or Microsoft SQL Server 6.5 or 7.0 with SP4 or higher Compaq SSD for Windows NT 4.0 v. 2.08 or higher Note: If you install SNMP services after installing Microsoft Windows NT SP3 (or higher), Windows NT SP3 (or higher) must be reinstalled.

Compaq Management Agents Requirements

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By default , Compaq Insight Manager XE installs Compaq Management Agents version 4.50 on the XE server.

Compaq Insight Manager XE supports managed devices with the following Compaq Management Agents installed:

Server Management Agents version 3.1 or higher running on Compaq ProLiant and ProSignia servers with:

- Microsoft Windows NT Server 3.51, 4.0
- Novell NetWare 3.12, 5.0; IntraNetWare 4.11, 4.12; IntraNetWare for Small Business
- SCO OpenServer 5.03, 5.04; UnixWare 2.12, 2.13

Client Management Agents running on Compaq Deskpros, Armadas, and Professional Workstations with:

- Windows NT Workstation 3.51 and 4.0, Windows 95, or Windows 98
Note: Professional Workstations only support Client Agents for Windows NT.
Note: Compaq Server Management Agents 4.21 or higher are required for Cluster Monitoring.
Note: To download the latest client or server agents, visit the Systems Management web page at <http://www.compaq.com/sysmanage> for the server agents or <http://www.compaq.com/support/files> for the client agents.
- TCP/IP protocol is required to remotely manage clients

Browser Requirements

Hardware and Software	Minimum Requirements
Web Browser	Microsoft Internet Explorer version 4.01 (with SP1) or v5.0
System Memory	64 MB of RAM for Windows 9x/64 MB of RAM for Windows NT
Monitor Resolution	1024 X 768, 256 colors

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COMPAQ

United States April 30, 2000

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*systems management***Compaq Insight Manager XE 1.1****QuickSpecs**

Compaq Insight Manager XE is available to Compaq users by request. Please visit <http://www.compaq.com/manage> to submit a request form.

**Key Features:**

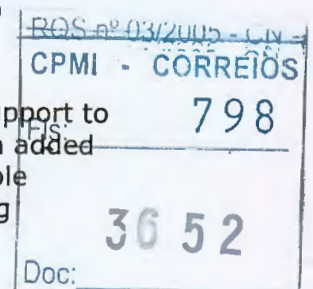
- Accessibility to management information from anywhere on the Intranet- more securely than SNMP
- Automatic discovery and identification of industry standard SNMP MIB-2, DMI-2, and HTTP compliant devices (including non-Compaq devices)
- Comprehensive event management allows proactive management of distributed devices by alerting in advance of system failures
- SQL compatible repository for discovered devices, alarms, asset and status reporting
- Supports Microsoft SQL Server 6.5, 7.0 and Microsoft Data Engine (MSDE)
- Manages systems consistent with how they are used, either as a single device or part of a logical group
- Integrated Cluster Monitor provides a one-step management control point for clusters management
- Support for all ProLiant Cluster kits
- Year 2000 Ready

Overview

Compaq Insight Manager XE - the extensible systems management platform for the Internet age. This new product provides web-based management for Compaq servers, desktops, clusters, and 3rd party HTTP, SNMP MIB-2, or DMI v2 compliant devices. By enabling browser access to both managed devices and the management application, Compaq Insight Manager XE provides management of devices and groups of devices from anywhere on the Intranet.

Compaq Insight Manager XE was built from the ground up as a web application to work with industry-standard management agents. With its integrated Cluster Monitor, Compaq Insight Manager XE provides system managers with a single monitor point for both stand-alone systems and Compaq ProLiant Clusters with Microsoft Cluster Server (MSCS). The Cluster Monitor provides aggregated system data and presents it to administrators as a single view of their cluster configuration.

The latest version of Compaq Insight Manager XE , v1.1, extends its database support to meet user requirements. Support for the Microsoft Data Engine (MSDE) has been added to the existing support for Microsoft SQL Server 6.5 and 7.0. MSDE is a compatible database solution for Microsoft SQL Server 7, and a perfect solution for managing



<http://www.compaq.com/products/servers/management/cim-xe11-quickspecs.html>

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smaller workgroups with up to 300 devices. MSDE is a fully binary compatible alternative database solution for Microsoft SQL Server 7, and is provided free of charge on the Compaq Insight Manager XE CD. Other features of version 1.1 include its expanded OS support for AlphaServers with OpenVMS and Tru64 Unix, and support for the latest Compaq servers and clients. Among the new products supported are T1000 and T1500 Thin Clients, and Cabletron Switches.

The management application, Compaq Insight Manager XE, is driven through these primary functions:

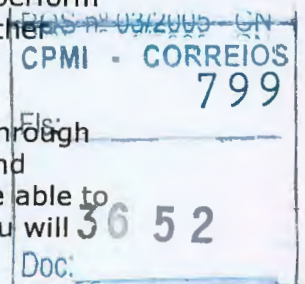
- Manage Devices provides basic access to the devices on your network and their overall status. The main screen classifies your devices together based on their type and condition and provides one-click access to those groupings. Custom queries can be performed and scheduled without programming. These query results can either be viewed in a live database table on screen or be used to actuate notification, control or polling tasks. Manage Devices also contains Cluster Monitor that provides the administrator the capability to monitor Windows NT Microsoft Cluster Server (MSCS) clusters from a browser. The Cluster Monitor allows the administrator to customize cluster monitor points, polling rates, and views of clusters, so business critical applications can be monitored different ways from standard servers if required.
- Manage Events uses the same basic concepts as Manage Devices but for events. An event is defined as something that happens, such as an informational alert when a new device is discovered, predictive alerts, threshold notifications or failure warnings. Events are grouped and classified on the main screen for one-click access to the details and you can define your own queries to present the information in any manner or grouping that you need. When an event occurs, Insight Manager XE can trigger a task to perform notification, control or polling operations.
- Administer Insight Manager XE allows you to create and edit user accounts, configure the Cluster Monitor and determine the frequency and scope of discovery tasks. Compaq Insight Manager XE features on-line HTML documentation and robust context-based help. Compaq Insight Manager XE continues to build on the Compaq commitment to superior systems management capabilities, which provide unmatched ROI by delivering a leadership management product.

Compaq Management Agents

The instrumentation of the hardware subsystems by the Compaq Management Agents is the cornerstone of Insight Manager XE. The Compaq Management Agents provide in-depth subsystem information, status and faults on Compaq servers, workstations, desktops and portables. The Compaq Management Agents communicate directly with Compaq Insight Manager XE. Web access provides a user-friendly interface to the DMI and SNMP management protocols.

The web-enabled Compaq Management Agents have the ability to announce themselves to Compaq Insight Manager XE when they are powered up, limiting the need to perform auto-discovery. The web-enabled Compaq Management Agents are accessible either directly through a browser or through Compaq Insight Manager XE.

Today most Compaq Management Agents provide the ability to browse directly through Compaq systems for real-time system, subsystem and component information and status. With the introduction of Compaq Insight Manager XE, not only will you be able to browse directly to the systems with the web-enabled Management Agent, but you will also be able to browse to:



- Web-Enabled Compaq Management Agents (V4.0 and higher)
- Compaq Insight Manager LC
- Compaq Intelligent Cluster Administrator
- Non-Compaq web services running on a device
- SNMP or DMI management agentsCompaq Server Management Agents (V3.1 or higher)Compaq Client Management Agents V3.51 or higher)Third-party devices with SNMP MIB-2 or DMI V2 agents



Benefits

- Reduces system management cost-one tool for the management of Compaq and monitoring of non-Compaq systems no matter what management protocol is utilized-DMI or SNMP-and across a multitude of operating systems. The information is consistently represented to the user and stored in a common database. Compaq Insight Manager XE provides HTTP services as part of the management application, eliminating the need to run a separate HTTP server.
- Improves operational efficiency and effectiveness-manage your business- the way you want, when you want, where you want-with web browser access to the management application. Compaq Insight Manager XE also provides web access to systems without web-enhanced agents, permitting the user to view real-time system data-SNMP or DMI-via a browser. Additionally, it provides configuration information on Compaq and non-Compaq systems, centralized events on Compaq Systems and the ability to perform management operations across groups of Compaq systems.
- Decreases system downtime-by knowing what to fix, not just what's wrong. Compaq Management Agents provide status information on subsystems and components to Systems Manager in addition to sending SNMP traps. This useful information, along with the extensive context-based help information assists the user in quickly diagnosing the problem. Compaq additionally provides Pre-Failure warranty on disks, memory and CPU.
- Decreases cluster downtime - Through proactive fault management and performance threshold controls which can be customized to meet specific cluster processing needs eliminating "hung" systems.
- One Stop Cluster Management and Administration Utility - integrating Compaq Intelligent Cluster Administrator provides a single interface for the cluster administrator to monitor, modify as needed, and deploy clusters throughout the enterprise. This single point of contact through Insight Manager XE - Cluster Monitor and the integration of Compaq Intelligent Cluster Administrator provide a higher level of cluster administration.
- Immediate use of the management application-Right out of the box, Compaq Insight Manager XE provides common system views with one-click access from the main page. Even when you first use it, the application knows how to discover and report on your systems. Additional queries and events can be customized and defined by you without programming.
- Integration with no effort - by automatic discovery of devices with internal HTTP web-servers. Links are provided directly to web-servers used for configuring the device or for monitoring status (networking devices, printers or 3rd party devices with web agents)

Key Features

- Pre-configured and customizable management application and management

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agents-providing immediate use of application

- Accessibility to management information anywhere, anytime-browser accessed management application and agents request authorization of user at log-in
- Automatic discovery and identification-of Compaq Systems and Clusters, non-Compaq devices, and devices containing internal HTTP web-servers
- Customized Cluster Monitor Points for business critical systems - display key clusters by application, location administrator
- Cluster Events Prioritized for quick identification and resolution - minimize potentially destabilizing events by rapid response and problem remedies presented to the administrator for ease of administration
- Data collection-of basic inventory information across a broad range of Compaq and non-Compaq devices
- Based on industry standards-consistent management of DMI V2, SNMP and HTTP Compaq systems
- Comprehensive event management-allows proactive management of the distributed enterprise by alerting in advance of Compaq system failures
- System-wide disk threshold setting-across a group of Compaq servers
- ODBC Database Support-lets users quickly and easily access data for reporting with Industry Standard reporting applications
- Flexible network connectivity-supports TCP/IP and IPX transport protocols



Advantages

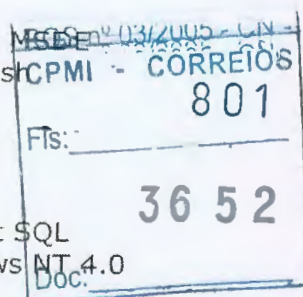
- One integrated tool for all managed devices
- Most comprehensive systems management, detailed system and subsystem status and information, across the widest range of operating systems
- Accessibility-anytime, anywhere, anything-using open industry-standards
- Extensive online help documentation
- Predictive fault management and Pre-Failure warranty for disks, memory and CPU

Specifications

Compaq Insight Manager XE requires the following hardware and software:

Hardware and Software Minimum Requirements

Hardware	Compaq ProSignia or ProLiant Server
System Memory	128 MB of RAM with Microsoft SQL Server on same server 96 MB of RAM with Microsoft SQL Server running on a remote system 64MB of RAM with Microsoft Data Engine (MSDE)
Disk Space	300 MB for the Microsoft SQL Server database 35 MB for the Management Application 55 MB for the Microsoft Data Engine (MSDE)
Server Operating System	Microsoft Windows NT Server 4.0, with SP3 (or higher) Microsoft Windows NT Server 4.0, with SP4 is required to run MSDE Note: The XE Server requires Microsoft Windows NT 4.0 English version only
Server Software	SNMP services installed and active
TCP/IP installed	SNMP Trap services are not required, but recommended Microsoft Internet Explorer 4.01 with SP1 or 5.0 Microsoft Data Engine (MSDE) with SP4 or higher or Microsoft SQL Server 6.5 or 7.0 with SP4 or higher Compaq SSD for Windows NT 4.0 v. 2.08 or higher



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Note: If you install SNMP services after installing Microsoft Windows NT SP3 (or higher), Windows NT SP3 (or higher) must be reinstalled.

Compaq Management Agents Requirements

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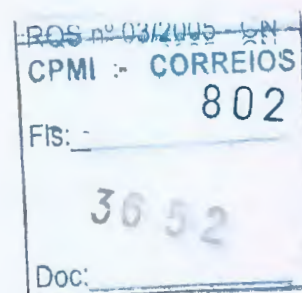
- Windows NT Workstation 3.51 and 4.0, Windows 95, or Windows 98
Note: Professional Workstations only support Client Agents for Windows NT.
Note: Compaq Server Management Agents 4.21 or higher are required for Cluster Monitoring.
Note: To download the latest client or server agents, visit the Systems Management web page at <http://www.compaq.com/sysmanage> for the server agents or <http://www.compaq.com/support/files> for the client agents.
- TCP/IP protocol is required to remotely manage clients

Browser Requirements

Hardware and Software	Minimum Requirements
Web Browser	Microsoft Internet Explorer version 4.01 (with SP1) or v5.0
System Memory	64 MB of RAM for Windows 9x/64 MB of RAM for Windows NT
Monitor Resolution	1024 X 768, 256 colors

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- 32 MB recomendados.
- 110 MB de espaço em disco disponível.
- Drive de CD-ROM, ou acesso a CD-ROM através da rede.
- VGA, Super VGA, ou adaptador de vídeo compatível com o Windows NT Workstation.
- Microsoft Mouse ou compatível.

Sistemas baseados em RISC:

- Workstations com processadores Alpha AXP, MIPS R4x00, ou PowerPC.
- 16 MB de memória RAM.
- 110 MB de espaço em disco.
- Drive de CD-ROM, ou acesso a CD-ROM através da rede.
- VGA, Super VGA, ou adaptador de vídeo compatível com o Windows NT Workstation.
- Microsoft Mouse ou compatível.

uma relação dos hardware compatíveis, Hardware Compatibility List - Suporte à processadores adicionais são disponíveis através dos fabricantes originais de hardware. O Windows NT Workstation 4.0 suporta um máximo de dez conexões de redes simultâneas.

Opções de Conectividade de Redes

Além do suporte a redes peer-to-peer, o Microsoft Windows NT Workstation 4.0 suporta os seguintes padrões de redes:

- Banyan® VINES®.
- DEC™ PATHWORKS™.
- IBM® LAN Server.
- Internet.
- Microsoft LAN Manager.
- Microsoft Windows NT Server.
- Novell NetWare.

Para maiores informações visite o site do Windows NT Workstation na World Wide Web no endereço <http://www.microsoft.com/brasil/ntworkstation>.

Por que para você?

98

a operacional voltado para usuários. Excelente opção para empresas podem migrar para o Windows NT Workstation.

melhoria de performance e estabilidade em relação ao Windows 3.1 vs 95. Total Integração à Internet. -Play para uma fácil detecção de erros. O melhor suporte para computação portáteis, câmeras digitais, dispositivos para jogos, res. compatibilidade com periféricos atuais. i. Compatível com aplicativos DOS, 3.1 e Windows 95. porte para jogos e multimídia.

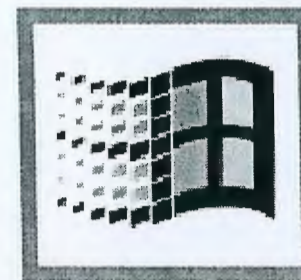
processadores 486/ 66 MHz ou superior. e memória RAM. de espaço em disco.

Windows NT Workstation 4.0

- Sistema operacional robusto para aplicações corporativas, agora com a interface do Windows 98.
- A melhor performance e confiabilidade para aplicações corporativas.
- Máxima segurança e robustez.
- Menor compatibilidade com hardware e softwares antigos, especialmente aplicativos DOS e jogos.
- Suporte para processadores Alpha AXP, MIPS R4x00, PowerPC e computadores multiprocessados.
- Processadores Pentium ou superior.
- 16 MB de memória RAM (32 MB recomendados).
- 110 MB de espaço em disco.

Windows NT Workstation

O mais poderoso sistema operacional para que.



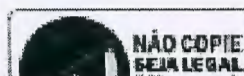
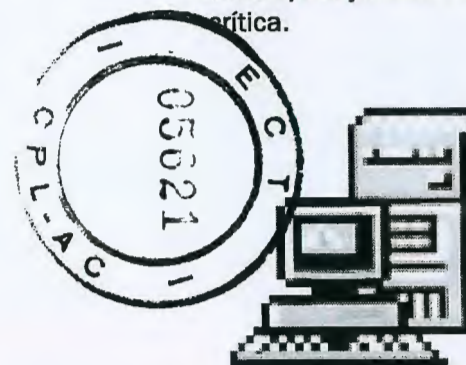
Visão Geral

Perda de produtividade é uma consequência da falta de performance do sistema operacional e, em grande parte, uma questão de facilidade de uso, ou seja, quão fácil de usar é o meu sistema operacional? O Windows NT Workstation 4.0 agora possui a interface do usuário do Windows 98, a qual aumenta a facilidade de uso e consequentemente a produtividade dos usuários. Isto significa uma redução nos custos em treinamento e despesas com helpdesk, em função de um menor número de chamadas.

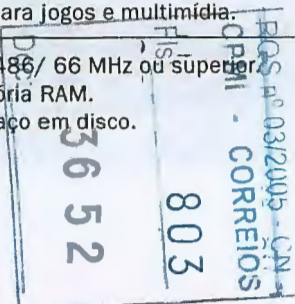
O Windows NT Workstation 4.0 tem a vantagem de uma estabilidade já comprovada. Eventuais "crashes" que venham a ser causados por uma determinada aplicação é isolado das demais tarefas, aplicativos e o próprio sistema operacional, minimizando perda de produtividade. Isto é possível porque os drivers, dados e a principal parte do código do sistema operacional trabalham em um espaço de memória protegido.

Tradicionalmente desenvolvedores, engenheiros, pesquisadores e demais usuários técnicos têm utilizado uma combinação de UNIX Workstations e computadores pessoais para poderem rodar aplicações avançadas que requerem um alto nível de processamento e softwares de produtividade pessoal. O Windows NT Workstation 4.0 está apto a rodar os dois tipos de aplicações, com uma tecnologia sem precedente, propiciando a performance de uma workstation por uma fração do custo.

Em um mundo de negócios cada vez mais competitivo, aonde tempo perdido significa perda de dinheiro, é fundamental ter uma plataforma de computação confiável e de alta performance. Em função de suas novas características o Windows NT Workstation 4.0 é a melhor opção para empresas que dependem de computadores para executar suas aplicações de missão crítica.



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um ambiente comum para todos os usuários.

- Inclui as ferramentas Performance e Event Monitor para a resolução de problemas tanto local como remotamente.

Alta Performance e Produtividade

- Roda em Intel® e RISC oferecendo uma grande flexibilidade na escolha de plataformas.
- Multitask preemptiva para aplicações de 16 e 32-bits para uma melhor performance.
- Suporte a múltiplos protocolos de rede, incluindo Client Services for Netware®, TCP/IP (DHCP, WINS, PPP, PPTP, e SLIP), RAS, Windows Sockets Standards, NetBEUI e IPX-SPX.

Segurança e Estabilidade

- Aloca espaço de memória separado para aplicações de 16-bits. Caso uma aplicação de 16-bits venha a apresentar algum problema as demais aplicações estarão intactas, inclusive o próprio sistema operacional.
- Protege as áreas críticas do sistema operacional, drivers e dados de aplicativos evitando perda de produtividade.

administradores determinarem quais grupos de programas, arquivos, e comandos de usuário estarão disponíveis para os diversos usuários.

- Inclui auto reboot, sistema de backup em fitas e suporte a fornecimento de força ininterrupto (Uninterruptible Power Supply - UPS) para uma segurança adicional.

Facilidade de Uso ampliada para ampliar Produtividade

Vantagens da Tecnologia 32-bits

Windows NT Workstation 4.0, parte da família Windows 32-bits, possui a interface do usuário do Windows 98, tornando-o ainda mais fácil de usar. Adicionalmente, os aplicativos para negócios, Internet e Intranet estão sendo desenvolvidos para tirar vantagem da arquitetura de 32-bits da família Windows.

Interface

- Possui a interface do usuário do Windows 98, como o botão Start, Taskbar, Explorer, Network Neighborhood e Briefcase.

Networking

- Suporta clientes Netware e login script.
- Suporte para 15 protocolos de rede.
- Possui características de servidores peer-to-peer e FTP.
- Software para Telnet e FTP inclusos.

como: Event Viewer, Performance Monitor, Service Controller e Registry Editor.

- Capacidade para conectar-se a servidores remotos (Dial-out).
- Capacitado a receber chamadas.

Remote Access Services (RAS)

- Acesso remoto através de linha discada a servidores Windows NT.
- Acesso através da Internet para o Windows NT Server e DNS.
- Recebimento de chamadas de outras workstations.
- Total funcionalidade de rede através de links remotos para os protocolos NetBEUI, IPX-SPX e TCP/IP.
- Suporte ao RAS Multilink, o qual permite utilizar duas ou mais linhas discadas como uma banda única.

Segurança

- Segurança de arquivos e diretórios através do NTFS.
- Segurança no desktop; identificação do usuário e senha são necessários para utilizar o computador.
- Lockout disponível para número máximo de tentativas de senha.
- Complacente com o nível de segurança C-2 do governo americano.

Suporte a Aplicações

- Suporte nativo para todas as aplicações baseadas em Windows 98, Win32®, 16-bit Windows, 16-bit MS-DOS®, 16-bit OS/2® e POSIX® 1003.1.
- Espaço de memória separado para aplicações de 16-bits (múltiplas memórias virtuais MS-DOS).

O Windows NT Workstation possui a mesma interface gráfica do Windows 98, como o botão Start, Taskbar, Explorer, Network Neighborhood e Briefcase



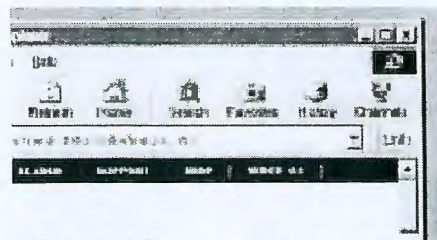
- Multitask preemptivo para aplicações 16-bits e 32-bits.
- Emulador 486 permite aplicativos 16-bits otimizados para 386 rodarem em computadores RISC.
- Suporte para OLE para todas as aplicações Windows de 16 e 32-bits.
- Filas de I/O assíncronas para um melhor tempo de resposta.

Multimídia e Gráficos

- Ótima performance para aplicações gráficas.
- OpenGL APIs para gráficos coloridos tridimensionais.
- Suporte para as características do Vídeo for Windows 1.1.

Utilitários

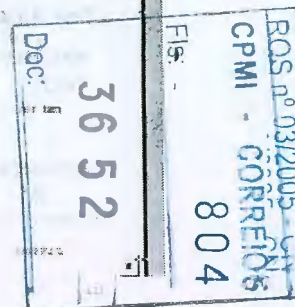
- Compressão de dados através de NTFS.
- Gerenciamento de usuários para configuração e segurança.
- Disk Administration permite configurar o disco rígido graficamente.



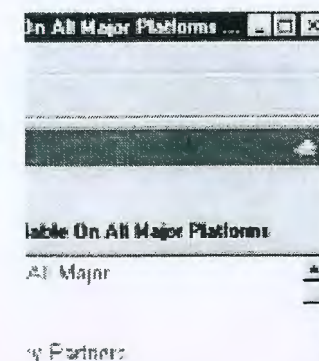
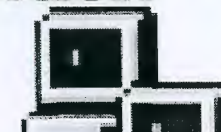
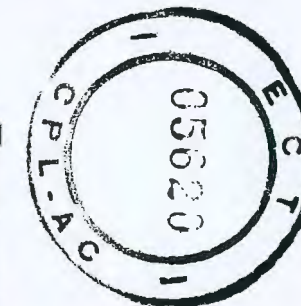
Features of
Windows NT
Workstation

World Performance
& Reliability

Windows NT Workstation is designed to provide the highest performance and reliability for your business. It is the only operating system that can run on a wide range of hardware platforms, from 386 to Alpha, and it can run on a wide range of software platforms, from DOS to Unix. It is the only operating system that can run on a wide range of hardware platforms, from 386 to Alpha, and it can run on a wide range of software platforms, from DOS to Unix.



Microsoft
Windows NT
Workstation



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Poderosa Performance e Confiabilidade

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Facilidade de Uso

- Possui a interface do usuário do Windows 95. Com a nova interface, facilidade de uso e eficiência são aprimoradas através da incorporação Explorer, menu Start, wizards, help interativo e muito mais.
- Permite aos usuários gerenciarem mensagens de correio eletrônico localmente ou através da Internet com o cliente do Windows Message
- Possibilita o uso do botão da direita do mouse para acesso as tarefas freqüentes.

Acesso à Internet

- Propicia acesso a Internet através da mais alta tecnologia de browser
- Inclui todos os componentes TCP/IP como Windows Sockets, FTP, Tel Ping, e IPConfig.
- Permite trabalhar com outros aplicativos enquanto se traz informação Internet.
- Inclui Internet Explorer permitindo aos usuários acessarem arquivos World Wide Web com a mesma facilidade que se acessa arquivos no próprios computadores ou rede local.

Baixo Custo de Propriedade

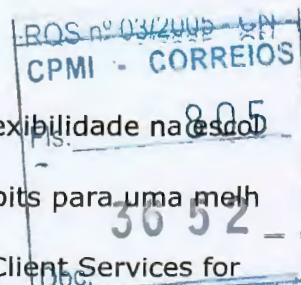
- Reduz custo de propriedade, em relação ao ambiente Windows 3.1, e função da melhor estabilidade e administração remota.
- Diminui custos com Help Desk e a necessidade de suporte técnico local

Gerenciamento Eficiente

- Inclui ferramentas de administração remota e resolução de problemas para um gerenciamento eficiente.
- Permite aos administradores implementarem políticas e padrões de desktop para a empresa inteira criando um ambiente comum para todos os usuários.
- Inclui as ferramentas Performance e Event Monitor para a resolução de problemas tanto local como remotamente.

Alta Performance e Produtividade

- Roda em Intel® e RISC oferecendo uma grande flexibilidade na escolha de plataformas.
- Multitask preemptiva para aplicações de 16 e 32-bits para uma melhor performance.
- Suporte a múltiplos protocolos de rede, incluindo Client Services for Natware®, TCP/IP (DHCP, WINS, PPP, PPTP, e SLIP), RAS, Windows Sockets Standard, NetBEUI e IDV-CDV



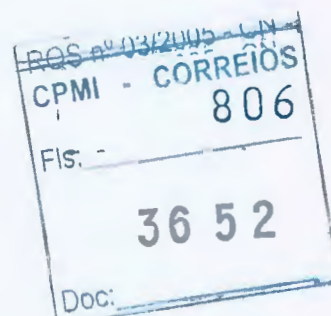
SOCKETS STANDARDS, NEEDLE E IFAT-SFA.



Segurança e Estabilidade

- Aloca espaço de memória separado para aplicações de 16-bits. Caso a aplicação de 16-bits venha a apresentar algum problema as demais aplicações estarão intactas, inclusive o próprio sistema operacional.
- Protege as áreas críticas do sistema operacional, drivers e dados de aplicativos evitando perda de produtividade.
- Provém um ambiente de segurança integrado o que garante às aplicações críticas, dados, e a base do sistema operacional segurança contra erros de usuários ou "hackers".
- Suporta múltiplos perfis de usuários em um mesmo PC, permitindo administradores determinarem quais grupos de programas, arquivos, comandos do menu estarão disponíveis para os diversos usuários.
- Inclui auto reboot, sistema de backup em fitas e suporte a fornecimento de força ininterrupto (Uninterruptible Power Supply - UPS) para uma segurança adicional.

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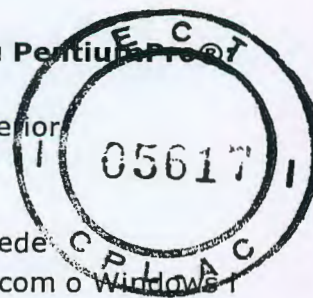
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Configuração Necessária

Sistemas utilizando processadores 486, Pentium® ou Pentium Pro®

- Computadores com processador 486/25 MHz ou superior
- 12 MB de memória RAM; 16 MB recomendado
- 110 MB de espaço em disco disponível
- Drive de CD-ROM, ou acesso a CD-ROM através da rede
- VGA, Super VGA, ou adaptador de vídeo compatível com o Windows NT



Workstation

- Microsoft Mouse ou compatível
- Sistemas baseados em RISC:
- Workstations com processadores Alpha AXP, MIPS R4x00, ou PowerPC
- 16 MB de memória RAM
- 110 MB de espaço em disco
- Drive de CD-ROM, ou acesso a CD-ROM através da rede
- VGA, Super VGA, ou adaptador de vídeo compatível com o Windows NT Workstation
- Microsoft Mouse ou compatível

Opcional:

- Placa de rede
- Placa de som

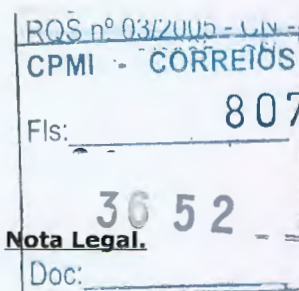
Observação: O Windows NT Workstation 4.0 não inclui licenças de acesso clientes. O software deve ser utilizado em computadores com um ou dois processadores. Peça para seu revendedor uma relação dos hardware compatíveis, Hardware Compatibility List - HCL. Suporte à processadores adicionais são disponíveis através dos fabricantes originais de hardware. O Windows NT Workstation 4.0 suporta um máximo de dez conexões de rede simultâneas.

Opções de Conectividade de Redes

Além do suporte a redes peer-to-peer, o Microsoft Windows NT Workstation suporta os seguintes padrões de redes:

- Banyan® VINES®
- DECTM PATHWORKSTM
- IBM® LAN Server
- Internet
- Microsoft LAN Manager
- Microsoft Windows NT Server
- Novell NetWare

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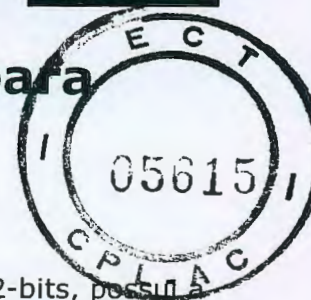
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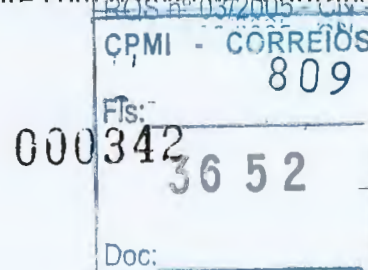
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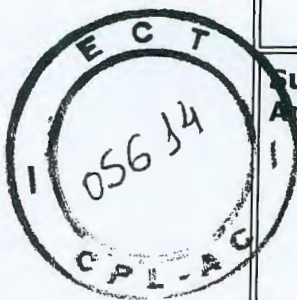
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Vantagens da Tecnologia 32-bits

Windows NT Workstation 4.0, parte da família Windows 32-bits, possui a interface do usuário do Windows 95, tornando-o ainda mais fácil de usar. Adicionalmente, os aplicativos para negócios, Internet e Intranet estão sendo desenvolvidos para tirar vantagem da arquitetura de 32-bits da família Windows.

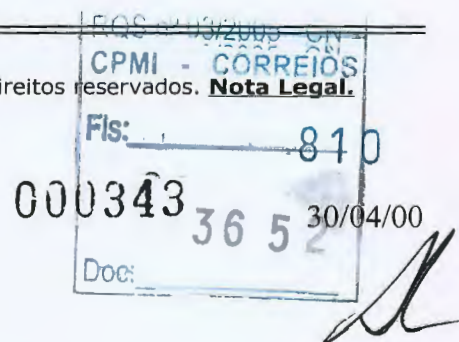
Interface	Possui a interface do usuário do Windows 95, como o botão Start, Taskbar, Explorer, Network Neighborhood e Briefcase
Networking	- Suporta clientes Netware e login script - Suporte para 15 protocolos de rede - Possui características de servidores peer-to-peer FTP - Software para Telnet e FTP inclusos
Características de Messaging	- Inclui clientes do Microsoft Exchange, Schedule MSN™, The Microsoft Network, e Internet Explorer - WINCHAT, NET MESSAGE, ou Net DDE
Remote Access Services (RAS)	- Acesso remoto através de linha discada à servidores Windows NT - Acesso através da Internet para o Windows NT Server e DNS - Recebimento de chamadas de outras workstations - Total funcionalidade de rede através de links remotos para os protocolos NetBEUI, IPX-SPX e TCP/IP - Suporte ao RAS Multilink, o qual permite utilizar duas ou mais linhas discadas como uma banda única
Segurança	- Segurança de arquivos e diretórios através do NTFS - Segurança no desktop; identificação do usuário e senha são necessários para utilizar o computador - Lockout disponível para número máximo de tentativas de senha - Conplacente com o nível de segurança C-2 do





	• Confiável com o nível de segurança 3 do governo americano
Suporte a Aplicações	• Suporte nativo para todas as aplicações baseadas em Windows 95, Win32®, 16-bit Windows, 16 MS-DOS®, 16-bit OS/2® e POSIX® 1003.1 • Espaço de memória separado para aplicações 16-bits (múltiplas memórias virtuais MS-DOS) • Multitask preemptivo para aplicações 16-bits e 32-bits • Emulador 486 permite aplicativos 16-bits otimizados para 386 rodarem em computadores RISC • Suporte para OLE para todas as aplicações Windows de 16 e 32-bits. • Filas de I/O assíncronas para um melhor tempo de resposta
Multimídia e Gráficos	• Ótima performance para aplicações gráficas • OpenGL APIs para gráficos coloridos tridimensionais • Suporte para as características do Vídeo for Windows 1.1
Utilitários	• Compressão de dados através de NTFS • Gerenciamento de usuários para configuração de segurança • Disk Administration permite configurar o disco rígido graficamente • Utilitário de diagnóstico para detalhar informações básicas de sistema • Performance Monitor para resolução de problemas tanto local como remotamente • Backup através de fita • Event Viewer e utilitário de logging para resolução de problemas de sistema • Suporte para arquivos longos nos ambientes FAT e NTFS
Suporte a Hardware	• Múltiplas configurações de hardware; usuários podem especificar configuração de hardware durante o processo de boot • Suporte a plataformas Intel, Alpha AXP™, MIPS® e PowerPC™ • Suporte a multiprocessamento simétrico (SMP)

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Windows NT 4.0 Service Pack 3

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1) O que é o Windows NT Service Pack 3?

Microsoft® Windows NT Service Pack 3 contém uma série de novos componentes, os quais adicionam algumas funcionalidades ao servidor Wet Windows NT, Microsoft Internet Information Server, incluindo:

- Microsoft Active Server Pages 1.0 beta
- Microsoft Index Server 1.1
- Microsoft Windows NT Server NetShow 1.0
- Microsoft FrontPage® 97
- Crystal Reports



Inclui também um série de componentes de segurança e interfaces de programação de aplicações, incluindo:

- Assintaura SMB
- Filtro de senha
- Restrição de acesso a usuário não autorizado
- Utilização de uma chave de sistema para forte encriptação da informação de senha
- CryptoAPI 2.0
- Novo transporte RPC para Microsoft Message Queue Server
- Interface de programação de aplicação Microsoft DirectX® 3.0 (API)
- Microsoft Direct3D® API
- ODBC 3.0
- Microsoft Win32® APIs e SDK para Service Pack 3

Além disso, o Service Pack 3 contém algumas funcionalidades necessárias para o cliente do Windows NT utilizar o software de vídeo conferência Microsoft NetMeeting 2.0 e traz correções e melhorias ao Windows NT.

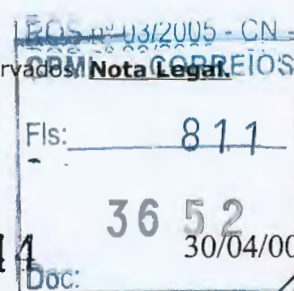
2) Configuração necessária

Possuir o Windows NT Workstation ou Windows NT Server

3) Download do Windows NT Service pack 3

Para obter o Service Pack 3 para Windows NT em inglês, [clique aqui](#).

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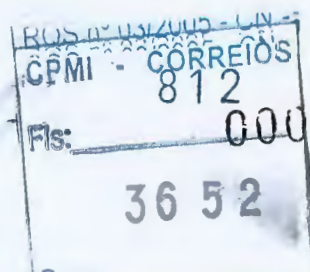
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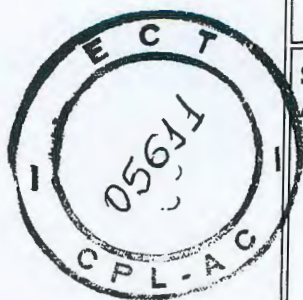
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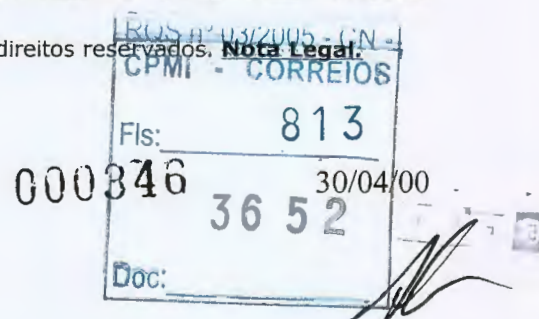
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- **Certificação ISO 9002 da Compaq Computer Brasil (BSI)**
- **Certificação ISO 9001 da Compaq Computer Corporation (QMI)**

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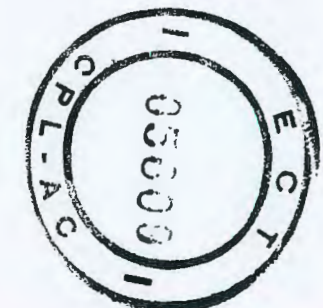
Windows 98

Windows NT4 x86

Windows 2000 x86

Windows NT4 alpha

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System/Server Multiprocessor	Compaq Computer Corporation	ProLiant 5500R Model 6/450-512 (1P)					
System/Server Multiprocessor	Compaq Computer Corporation	ProLiant 5500 Model 6/450-512 (4P)					
System/Server Multiprocessor	Compaq Computer Corporation	ProLiant 5500R Model 6/450-1M (4P)					
System/Server Multiprocessor	Compaq Computer Corporation	ProLiant 5500R Model 6/450-2MB (4P)					
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System/Server Multiprocessor	Compaq Computer Corporation	ProLiant 5500R Model 6/450-512 (4P)					
System/Server Multiprocessor	Compaq Computer Corporation	Compaq ProLiant 5500					
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System/Server	Compaq Computer	ProLiant 5500 Model 6/450-1M					

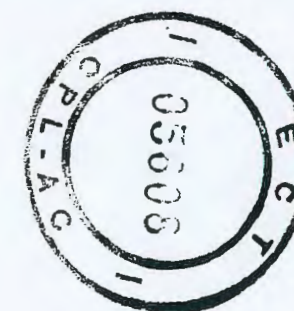


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System/Server Multiprocessor	Compaq Computer Corporation	ProLiant 5500 6/200-512K (4P)
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System/Server Multiprocessor	Compaq Computer Corporation	ProLiant 5500 6/500-2MB (4P)
System/Server Multiprocessor	Compaq Computer Corporation	ProLiant 5500R Model 6/500-2MB (4P)
System/Server Multiprocessor	Compaq Computer Corporation	ProLiant 5500 6/500-2MB Xeon 500 (4p)
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System/Server Multiprocessor	Compaq Computer Corporation	ProLiant 5500R 6/400-512 (4p)
System/Server	Compaq Computer	ProLiant 5500R



System/Server Multiprocessor	Compaq Computer Corporation	ProLiant 5500R 6/400-1m (4p)				
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System/Server Multiprocessor	Compaq Computer Corporation	ProLiant ML530 6/733-256K (2P)					



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System/Server Multiprocessor	Compaq Computer Corporation	ProLiant ML370 6/733 256Kb (2P)					

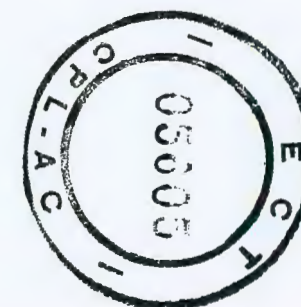


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Windows
95

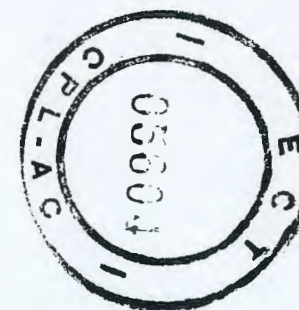
Windows
98

Windows
NT4
x86

Windows
2000
x86

Windows
NT4
alpha

System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6266					
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6266C					
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6300					
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6333					
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6333					
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6333C					
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6266C					
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6300					
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System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6366C					



System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6400C
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6300A
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6333
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6333C
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6266
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6266C
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6300
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6433C
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6350
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6400
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6450
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6450+
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6500
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series C466/810
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series C500/810
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series P550
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series P600
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP



000354

System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series P600/810e
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series P550E\810e
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series P600E\810e
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series C466\810e
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series C500\810e
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series P500E\810e
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series P600
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series P650
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series P700
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6450+
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6500
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series P550
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6350
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6400
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series 6450
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series P667/810e
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series P733/810e



000355

Uniprocessor	Corporation	Series P733/810e				
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series P600/810e				
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series P667/810e				
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series P733/810e				
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series P450+/810e				
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series P500/810e				
System/Desktop Uniprocessor	Compaq Computer Corporation	Deskpro EP Series P533/810e				

bank

RQS nº 03/2005 - L.A.

CPMI - CORRÊDOS

Fls.: 823

Doc: 36 52





FUNDAÇÃO VANZOLINI

CERTIFICADO DE SISTEMA DA QUALIDADE

A FUNDAÇÃO CARLOS ALBERTO VANZOLINI

certifica que a empresa

COMPAQ COMPUTER BRASIL



Projeto, comercialização e integração de sistemas de informática
(São Paulo, Rio de Janeiro e Jaguariúna)

Rua José de Oliveira Coutinho, 73 - São Paulo - SP - Brasil

implementou e mantém um

Sistema da Qualidade

Através de auditoria da Fundação Vanzolini foi comprovado que
esse Sistema da Qualidade cumpre os requisitos da norma :

NBR ISO 9001

Sistemas da Qualidade.
Modelo para Garantia da Qualidade
em projeto, desenvolvimento, produção, instalação e serviços associados
(1994)

Este certificado é válido até : 02 de agosto de 2002

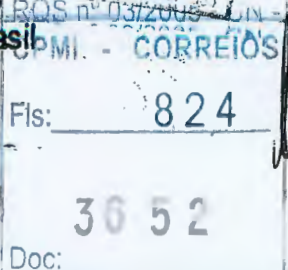
Número do Certificado: **SQ-743-990/99**

São Paulo, 03 de agosto de 1999



FUNDAÇÃO CARLOS ALBERTO VANZOLINI

Av. Prof. Almeida Prado, Trav. 2, nº 128
Cidade Universitária - São Paulo - SP - Brasil



000357



Certificate Number FM 32774

**COMPAQ COMPUTER BRASIL IND.
& COM. LTDA.**

RODOVIA CAMPINAS MOGI-MIRIM, KM 133
13820-000 JAGUARIUNA
SAO PAULO
BRASIL

quality management system which complies with the requirements
of BS EN ISO 9002:1994

N. Wither

Signature on behalf of BSI, N. Wither, General Manager

Originally registered 16 November 1995 Amendments to 09 December 1997

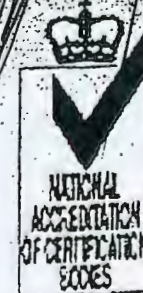
This certificate remains the property of BSI. It is not to be used for any other purpose than the one for which it was issued. It is not to be used in conjunction with any other certificate.

This certificate is issued in accordance with the requirements of BS EN ISO 9002:1994.

BSI, 1880 Chiswick Park Road, London W4 4AL



Accredited by the Dutch
Council for Certification



Registration Number 003

Appendix

to Certificate Number FM 32774

Number One

Page 1

This appendix declares the scope of registration of the certificate granted to

05598

Compaq Computer Brasil Inc.
 Lc Com. Ltda.
 Rodovia Campinas Mogi-Mirim, KM 133
 13020-000 Jaguariúna
 SÃO PAULO
 Brasil

Licence Scope

The manufacture, test and distribution of printed circuit assemblies, desktops, portable computers and low end servers.



CARTORIO MANOEL SANTOS - 17º Ofício de Justiça
 Sucursal Centro - Travessa do Ouvidor, 17 - Centro - RJ
AUTENTICACAO
 Rio de Janeiro, 30 de Abril de 1999. Conf. por:
 Certifico e dou fé que a presente cópia é a reprodução
 original que me foi apresentada.

41521

Renata de Araujo Ribeiro - Supl.



Signed on behalf of BSI QA

Date 9 December 1997

N. Wilkey
 Director

000359

RQS nº 03/11/95 - CN
 CPMI - CORREIOS

Fls. 826

This Appendix is an integral part of the BSI Certificate and should only be used in conjunction with the Certificate.
 The Appendix is the property of BSI and its use is restricted to the purposes for which it was issued by BSI.



CYNTHIA COWIE RIBEIRO

05507

Tradutora Pública e Intérprete Comercial
Public Certified Translator

MATRICULADA NA JUNTA COMERCIAL
DO ESTADO DE SÃO PAULO SOB
Nº 436 LIVRO Nº 11 - FLS. Nº 158

IDIOMA - INGLÊS
C.P.F.M.F. 006.542.288-04

04532-070 - Rua Dr. João Climaco Pereira, 93 - Cj. 6 - Fone: (011) 829-6447 - São Paulo - SP - Brasil

Tradução n.º **9892** Livro n.º **132** Folhas **105**
Translation n.º **9892** Book n.º **132** Pages **106**



Certifico e dou fé, para os devidos fins, que nesta data, me foi apresentado um documento em
idioma **INGLÊS** com a seguinte identificação **Certificado de Registro**

o qual traduzo para o **VERNACULO**, no seguinte teor

CERTIFICADO DE REGISTRO

Logotipo: Empresa Registrada pela BSI.

Certificado número FM 32774

A COMPAQ COMPUTER BRASIL IND. & COM. LTDA., Rodovia Campinas Mogi-Mirim, km 133, 13820-000 Jaguariúna, São Paulo, Brasil, opera um sistema de gerência de qualidade que atende às exigências de BS EN ISO 9002:1994.

(segue-se assinatura) Assinado em nome da BSI

Originalmente registrado em 16 de novembro de 1995. Alterações até 16 de novembro de 1995.

Este certificado permanece de propriedade do British Standards Institution e será devolvido imediatamente após solicitação. Este certificado não expira. Para verificar sua validade, telefone para + 44 (0) 1908 227700.

O British Standards Institution é constituído por Alvará Régio.

BSI Quality Assurance, Caixa Postal 375 Milton Keynes, Reino Unido MK14 6LL

Programa de Empresas Registradas pela BSI

Anexo do Certificado número FM 32774

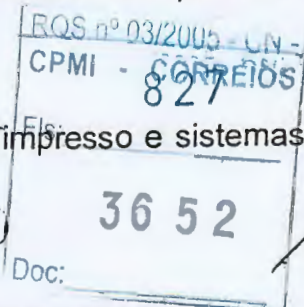
Número UM

Este anexo declara a abrangência de registo do certificado concedido a:

COMPAQ COMPUTER BRASIL IND. & COM. LTDA., Rodovia Campinas Mogi-Mirim, km 133, 13820-000 Jaguariúna, São Paulo, Brasil

Abrangência do registro

A fabricação, teste e distribuição de montagens de circuito impresso e sistemas de computador pessoal.



000360

36 52

Doc:



CCSCC

99 Burnhamthorpe Road West, Suite 709
Mississauga, Ontario, Canada L5B 3C3
Telephone: (905) 272-3420
Facsimile: (905) 272-3942
A Division of CSA

CERTIFICATE OF REGISTRATION

QMI issues this certificate to:

COMPAQ COMPUTER CORPORATION

9 Northeastern Boulevard
Salem, New Hampshire
03079-1994 USA

which has demonstrated that its quality system is in compliance with:

ISO 9001-1994

The following scope of registration applies:

Compaq's Salem Facility manufactures multi-platform systems and Storage Products such as: Workstations, Servers, Data Center Servers, Controllers, Storage Building Blocks and Storage Systems. The facility also builds and installs Custom Configured Systems, repairs Storage Sub-Systems and provides Refurbished Computer Products as an alternative to "New Build".

Certificate Number:

001036

SIC Number:

3571

Date of Original Registration:

March 1, 1992

Date of Current Registration:

June 5, 1998

Date Registration Expires:

June 5, 2001



Catherine Neville
Catherine Neville
President



05504

REPÚBLICA FEDERATIVA DO BRASIL

TRADUÇÃO
TRANSLATION 488/1998

Certifico que eu, Marco Antônio Rochadel, Tradutor Público e Intérprete Comercial, nomeado e empossado no Ofício de acordo com o Diário Oficial de 23 de junho de 1982, página 5428, recebi e traduzi, em boa fé e com o melhor do meu conhecimento, um documento com o seguinte conteúdo:

[Logotipo da empresa QMI]

QMI

90 Burnhamthorpe Road West, Suite 300, Mississauga, Ontario, Canada L5B 3C3

Telefone: (905) 272-3920; Fac-símile: (905) 272-3942

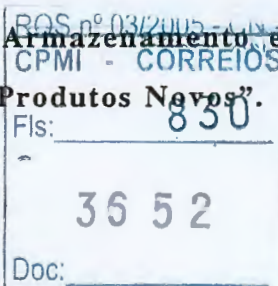
Uma Subsidiária da CSA

CERTIFICADO DE REGISTRO

A *QMI* emite este **CERTIFICADO** à **COMPAQ COMPUTER CORPORATION** com endereço em *9 Northeastern Boulevard, Salem, New Hampshire, 03079-1994 USA*, que demonstrou que seu sistema de qualidade está em conformidade com a norma **ISO 9001 - 1994**.

A abrangência do registro aplica-se a:

A Instalação da **COMPAQ** em Salem fabrica sistemas de plataformas múltiplas e Produtos para Armazenamento, tais como: Estações de Trabalho, Servidores, Servidores Centrais de Dados (*Data Center Servers*), Controladores, Blocos Construtores de Armazenamento (*Storage Building Blocks*) e Sistemas de Armazenamento. A mesma instalação também constrói e instala Sistemas Configurados para Cliente, repara Subsistemas de Armazenamento e fornece Produtos Compaq Renovados como alternativa para "Produtos Novos".



fl. 1 de 2
pg. of

000363

E-mail: rochadel@nutecnet.com.br

MARCO ANTONIO ROCHADEL - TRADUTOR PÚBLICO E INTÉRPRETE COMERCIAL

CPF 030253491-15 - ISS 07304386/001-57 - JCDF 21

SCS ED. JOCKEY CLUB - SALA 205 - 70300 500 - BRASÍLIA DF BRASIL - FONE (061) 225-2520



REPÚBLICA FEDERATIVA DO BRASIL



TRADUÇÃO 488/1998
TRANSLATION

Número do Certificado: 001036
Número SIC: 3571
Data do Registro Original: 1º de março de 1992
Data do Registro Atual: 5 de junho de 1998
Data de Validade do Registro: 5 de junho de 2001

[Assinado]: [Assinatura de Catherine Neville], Catherine Neville, Presidente.

[Chancela dos seguintes órgãos de certificação: [ilegível], ANSI-RAB; Duch Council of Accreditation; IQNet; QMI; aplicados na margem inferior do documento e acima da assinatura de Catherine Neville].

[Reverso do documento em branco].

Em Testemunho do que, firmo a presente Certidão na Cidade de Brasília, Distrito Federal, nesta segunda-feira, novembro 23, 1998.

Emolumentos de acordo com

Res. JCDF 07, de 11/10/1995

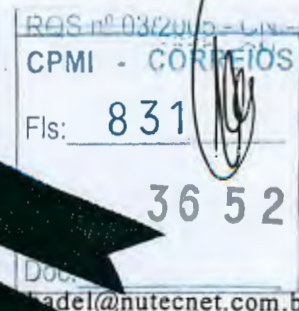
D.O. de 24/10/1995, pag 16808

Marco Antônio Rochadel

Tradutor Público

fl. 2 de 2
pg. of

000364



PROPOSTA TÉCNICA



Declarações Gerais

000365

RQS nº 03/2005 - CPMI - CORREIOS	
Fls:	832
36 52	
Doc:	

A handwritten signature in black ink, located at the bottom right of the page, below the stamp.

Microsoft Informática Ltda
Av. Rio Branco 1 - salas 808 e 808 - Bloco B
20090-003 - Rio de Janeiro - RJ
Brasil

Tel: (021) 518-2616
Fax: (021) 263-7685

Rio de Janeiro, 17 de abril de 2000.

A
Empresa Brasileira de Correios e Telegrafos - ECT
Brasília DF



Ref. Concorrência Pública Nº 001 e 004/2000 – CPL/AC

Declaração

A Microsoft Informática Ltda, declara, para os devidos fins que a empresa **Compaq Computer Brasil**, possui contrato para aquisição de nossos produtos, em regime de estando habilitada a prestar serviços de instalação, assistência técnica, manutenção e treinamento, sendo de sua inteira responsabilidade, nos computadores por ela fabricados.

Esta declaração tem validade até 30 de junho de 2000, ao menos que rescindida antecipadamente, a critério da Microsoft com 15 dias de antecedência.

Atenciosamente

Juliano Tubino
Gerente de Desenvolvimento de Parceiros
Microsoft Informática Ltda.

000361

RQS nº 03/2005 - UN -
CPMI - CORREIOS
Fls: 833
36 52
Doc:

COMPAQ



À
Comissão Especial de Licitação / AC - ECT
SBN Quadra 01 Bloco "A" 4º andar - Ala Norte
70002-900 - Brasília - DF

Ref.: Concorrência - 001/2000 - CPL/AC

DECLARAÇÃO

(Atendendo ao Atributo, subitem 2.5, dos Itens I.1, I.2, I.3, I.4, I.5, I.6 e I.7 do Edital)

COMPAQ COMPUTER BRASIL IND. E COM. LTDA., já devidamente qualificada, por meio de seu representante legal, em atendimento ao subitem em epígrafe, declara expressamente que os produtos ora cotados são:

- a) Item I.1: Servidor Tipo INT1, marca Compaq, modelo ProLiant ML 370;
- b) Item I.2: Servidor de Rede Tipo INT2, marca Compaq, modelo ProLiant ML 370;
- c) Item I.3: Servidor de Aplicação Tipo INT3, marca Compaq, modelo ProLiant ML 530;
- d) Item I.4: Servidor de Aplicação Tipo INT.4, marca Compaq, modelo ProLiant ML 570/5500;
- e) Item I.5: Servidor de Aplicação Tipo INT5, marca Compaq, modelo ProLiant ML 570/5500;
- f) Item I.6: Servidor de Rede Tipo INT6, marca Compaq, modelo ProLiant ML 370;
- g) Item I.7: Servidor de Desenvolvimento Tipo INT7, marca Compaq, modelo DeskPro EP;
- h) Os equipamentos INT3 (ProLiant ML 530), INT4 (ProLiant ML 570/5500) e INT5 (ProLiant ML 570/5500) são fabricados nos Estados Unidos da América - EUA, pela COMPAQ COMPUTER CORPORATION e são importados diretamente pela subsidiária no país a COMPAQ COMPUTER BRASIL IND. E COM. LTDA., inscrita no CNPJ sob o nº. CNPJ/MF:67.612.937/0001-99, sito à Rua Alexandre Dumas, 2.220, São Paulo, SP;

000367-3552

RQS nº 03/2005 - CN -	
CPMI - CORREIOS	
Fls:	834
Doc:	

Compaq Computer Brasil Ind. e Com. Ltda.
Rua Alexandre Dumas, 2220
04717-004 - São Paulo - SP - Brasil

Tel. 011 5188-4600
Fax 011 5181-8050

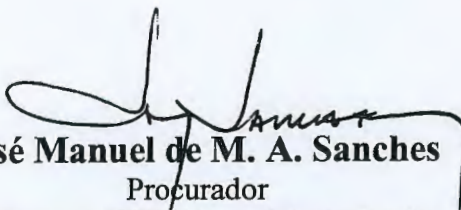


COMPAQ

- i) A NT SYSTEMS INFORMÁTICA LTDA., inscrita no CNPJ sob o nº. 37.164.258/0001-33, sito à SCN Quadra 01 – Bloco “C” nº. 85 – Edifício Brasília Trade Center – 17º. Andar – Salas 1.709/1.711 – Brasília, DF é representante legal da Compaq Computer Brasil para a praça local, para fins de comercialização de toda a linha de produtos e bem como a Assistência Técnica Autorizada.

Sendo expressão da verdade, firma a presente.

Brasília (DF), 09 de maio de 2000.



José Manuel de M. A. Sanches
Procurador

C.I./RG nº. V077.973-J DPMAF/DPF

Compaq Computer Brasil Indústria e Comércio Ltda.

000369

BQS nº 03/2005 - CPMI - CORREIO
Fls: 835
36 52
Doc:

Compaq Computer Brasil Ind. e Com. Ltda.
Rua Alexandre Dumas, 2220
04717-004 - São Paulo - SP - Brasil

Tel: 011 5188-4600
Fax: 011 5181-8050



COMPAQ

PROPOSTA TÉCNICA

Concorrência – 001 – CPL/AC

O total de páginas desta Proposta Técnica é de 369
(Trezentos, sessenta e nove), folhas incluindo esta.

000369

RQS nº 03/2005 - C.N.	
CPMI - CORRÊIOS	
Fls:	836
3652	
Doc:	

CORREIOS

DOC
000232

CONCORRÊNCIA 001/2000

PASTA - 16

CORREIOS

ROS nº 03/200 - CN
CPMI - CORREIOS

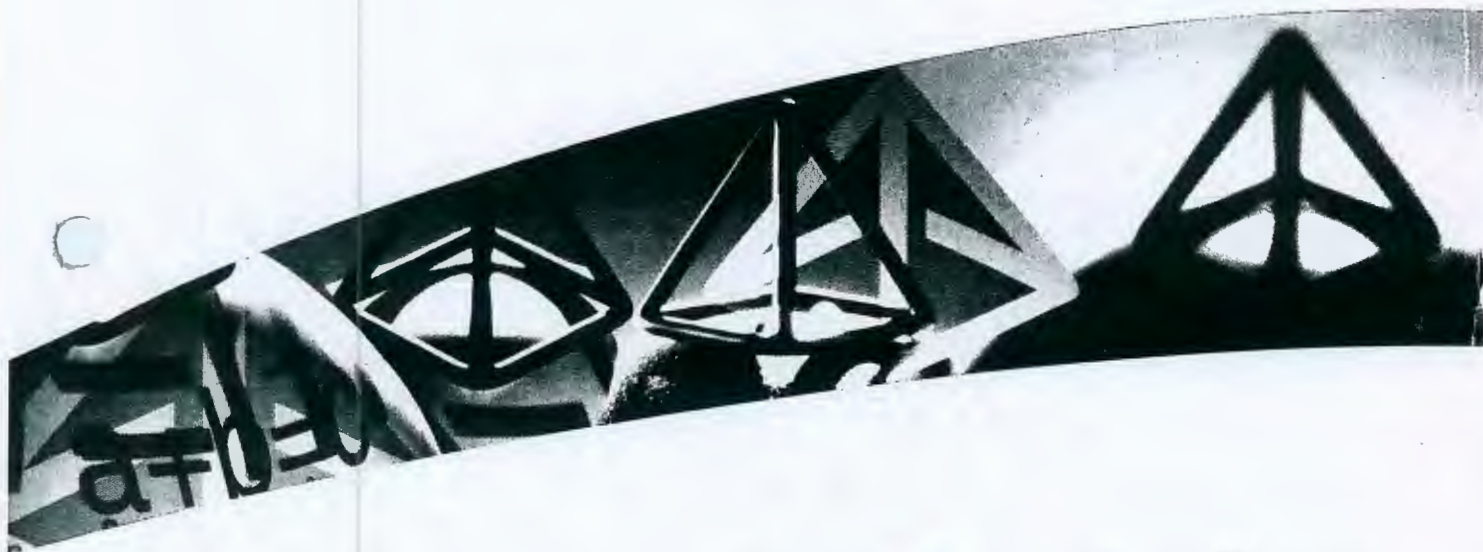
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3652

Pasta

16

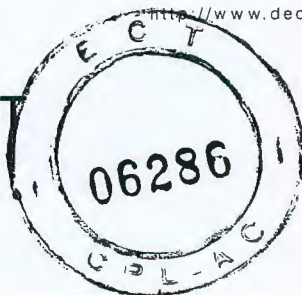
BOS nº 03/2005 - CN	
CPMI - CORREIOS	
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	3652
Doc:	



Dedalus sistemas

RQS nº 03/2005 - CIN	
CPMI - CORREIOS	
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3652	
Doc:	

COMISSÃO ESPECIAL DE LICITAÇÃO – AC – ECT
SBN – Quadra 01 – Bloco A – 4º andar – Ala Norte
70002-900 – Brasília - DF



CONCORRÊNCIA Nº. 001/2000
ABERTURA: 03/05/00 – 9:30 hs

PROPOSTA TÉCNICA
INVÓLUCRO Nº 2

LICITANTE:

Dedalus Comércio e Sistemas Ltda.

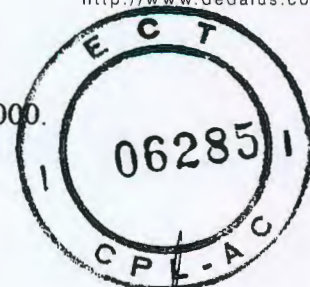
CNPJ 73.101.990/0001-28

**Rua Jardim Ivone, 17 – 10º. Andar – Vl. Mariana
04105-905 – São Paulo – SP**

Handwritten signatures and initials:
- Top right: "Ph or"
- Middle right: "48"
- Bottom right: "20" and a circular stamp with a signature inside.

RQS nº 03/2000 - ECT
CPMI - CORREIOS
840
Fls: _____
3652
Doc: _____

São Paulo, 09 de Maio de 2000.
Proposta Nº 397/00-JF



À
ECT – Empresa Brasileira de Correios e Telégrafos
At.: Comissão Especial de Licitação/AC
SBN – Qd. 01 – Bloco A – 4º andar – Ala Norte
70002-9000 – Brasília/DF

Ref.: Proposta Técnica
Concorrência 001/2000-CPL/AC

Prezados Senhores,

Apresentamos proposta Técnica para o processo acima, do qual estaremos participando dos Itens 8, 9, 10 e 11. Informamos ainda que estamos de acordo com todos os termos e condições do edital.

A Dedalus Sistemas tem a satisfação de apresentar-se à ECT, como integradora de soluções em plataformas computacionais, as quais são desenvolvidas em produtos *Sun Microsystems, Oracle, Xylan, NetworkAppliance e Legato Software*.

Nosso objetivo é fornecer recursos para informatização e desenvolvimento de projetos personalizados à nossos clientes.

Entre os principais produtos e serviços destacamos a transferência de tecnologia em sistemas Unix, banco de dados e soluções de alta disponibilidade.

Executamos também serviços de consultoria em novas tecnologias, implantação de redes e suporte técnico, na área de sistemas.

Colocamo-nos à disposição para quaisquer esclarecimentos.

Atenciosamente,

Jane Fraga
Gerente Comercial
DEDALUS SISTEMAS



AUTHORIZED DISTRIBUTOR

São Paulo

Campinas

Curitiba

R. João Est. 30
1306-04 - Campinas - SP - BRASIL
Tel. 55 19 213 8688 Fax 55 19 213 3345

R. João Est. 30
1306-04 - Campinas - SP - BRASIL
Tel. 55 19 213 8688 Fax 55 19 213 3345

Av. Cândido de Abreu, 140 - Cj. 904
8053-00 - Curitiba - PR - BRASIL
Tel. Fax 51 41212 - 41212

Oracle Alliances

BUS 001/2000-UN-
CPMI - CORREIOS
Fls: 841
SM
Doc 3652
Brasília

PROPOSTA TÉCNICA

1. Especificação Técnica dos equipamentos e Serviços ofertados:

Vide a seguir.

2. Prazo de Garantia:

2 (dois anos), contados a partir da data de emissão do último termo de aceitação relativo aos equipamentos entregues.

3. Prazo de Entrega :

150 (cento e cinquenta) dias para o **RISC tipo 1**, 150 (cento e cinquenta) dias para o **RISC tipo 2**, 120 (cento e vinte) dias para o **RISC tipo 3** e 45 (quarenta e cinco) dias para o **RISC tipo 4**, a contar da data de assinatura do contrato, de acordo com a Pauta de Distribuição - Anexo III.

4. Quantidades a serem entregues:

Conforme definido na Pauta de Distribuição, nos termos do Anexo III, do edital.

5. Local de Entrega:

Os equipamentos serão entregues nos Almoxerifados das Diretorias Regionais da ECT, nos endereços constantes no Anexo IV, do edital.

6. Planilha de Pontuação:

Vide anexo.

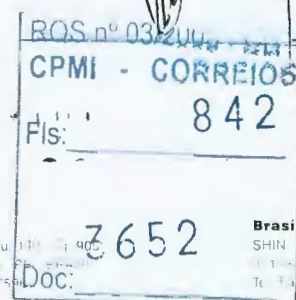
7. Relação da rede credenciada de Assistência Técnica :

Vide relação em anexo.

O atendimento às chamadas técnicas efetuadas pela ECT será recepcionado pela SUN através do telefone toll-free 0800-118988.

8. Declaração de Solidariedade do Fabricante:

Em anexo.





COMISSÃO ESPECIAL DE LICITAÇÃO – AC – ECT
SBN – Quadra 01 – Bloco A – 4º andar – Ala Norte
70002-900 – Brasília - DF

CONCORRÊNCIA Nº. 001/2000
ABERTURA: 03/05/00 – 9:30 hs

PROPOSTA TÉCNICA
INVÓLUCRO Nº 2
SERVIDOR RISC 1

LICITANTE:

Dedalus Comércio e Sistemas Ltda.

CNPJ 73.101.990/0001-28

Rua Jardim Ivone, 17 – 10º. Andar – Vl. Mariana

04105-905 – São Paulo – SP



RQS nº 03/2000
CPMI - CORREIOS
Fis: 843
Doc: 3652



3

São Paulo

R. Jardim Ivone, 17 - 9º andar
04105-905 - São Paulo - SP - BRASIL
Tel 55 11 575-8011 - Fax 55 11 575-5813

Campinas

Av. João Erbolato, 30 - 1º andar - Jd. Chapadão
13066-640 - Campinas - SP - BRASIL
Tel./Fax 55 19 243-8688

Curitiba

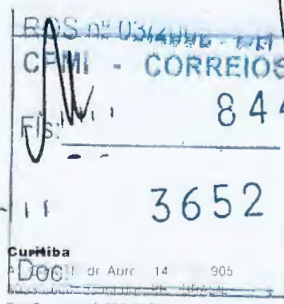
Av. Cândido de Abreu, 140 - Cj. 905
80530-000 - Curitiba - PR - BRASIL
Tel./Fax. 55 41 222-7596

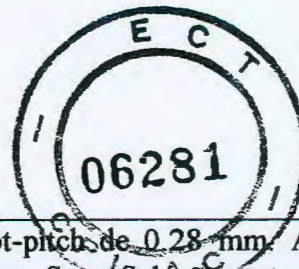
Brasília

SHIN - QL14 - Cj. 01 - Casa 12 - Lago Norte
071530-015 - Brasília - DF - BRASIL
Tel./Fax 55 61 368-4461

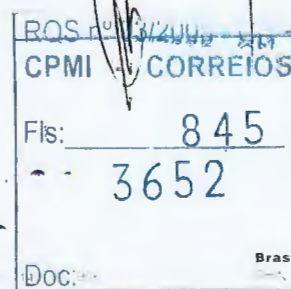

ITEM I.8 – SERVIDOR DE REDE TIPO RISC 1 – SUN-E450

ATRIBUTO	CONFIGURAÇÃO
CPU	Processador RISC, de 64 bits, em número igual a 2 (dois), expansível a 4 (quatro) processadores. (Pag. 4 e 5, da documentação técnica).
Memória Cache – Instr. + Data (primary + secondary)	Memória cache instalada de 4MBytes por processador. (Pag. 5, da documentação técnica)
Memória R A M	ECC com capacidade instalada de 1 GByte, expansível até 4 Gbytes, "on-board", tempo de acesso máximo de 60 ns. (Pag. 6 e 10, da documentação técnica).
Performance	SPECint_rate95 igual a 313 SPECfp_rate95 igual a 446 (Pag. 61 a 64, da documentação técnica e Declaração do Fabricante).
Suporte à arquitetura	SMP – Symetric Multi Processing. (Pag. 9 e 25, da documentação técnica)
Slots	Apresenta 8 slots livres de 32 bits, após montada a configuração proposta. (Pag. 5, da documentação Técnica).
Fonte de Alimentação Interna	02 (duas) fontes de alimentação de 560Watts, Bivolts, compatível com configuração máxima do equipamento. (Pag. 12, da documentação Técnica)
Controladora e HD Rígido Interno	Padrão Ultra SCSI, com capacidade de 18 (dezoito) Gbytes, formatado, tempo médio de acesso igual a 10ms. (Pag. 5 e 85, da documentação Técnica).





Monitor de Vídeo	Policromático, com 19", dot-pitch de 0,28 mm. Atende às normas MPR II, EPA Energy Star. Seleção automática de tensão entre 100-240 VAC – full-range, suportando uma resolução mínima de 1280 x 1024. (Pag. 65 e 66, da documentação técnica)
Teclado Alfanumérico	Com 101 teclas. (Pag. 16, da documentação técnica)
Mouse	3 teclas com resolução de 320 dpi, mouse-pad e driver de instalação. (Pag. 16, da documentação técnica).
Unidade de Disco flexível	Uma unidade de 3 1/2" com capacidade de 1,44 Mbytes. (Pag. 11, da documentação técnica)
Interface Serial	Duas interfaces seriais padrão RS-232C. (Pag. 11 e 17, da documentação técnica)
Unidade de CD-ROM	Velocidade de 32 X – SCSI-II, instalada e reconhecida pelo Sistema Operacional SUN Solaris fornecido. (Pag. 11, da documentação técnica).
Unidade de Fita DLT	Uma unidade de fita padrão DLT para utilização de mídias, com capacidade de 35 Gbytes, sem compressão e com taxa de transferência sustentada de 5 Mbytes/seg. (Pag. 83, da documentação técnica)



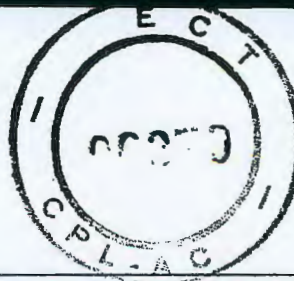


ATRIBUTO	CONFIGURAÇÃO
Placa de Rede	Uma placa padrão ethernet de 32 bits. – IEEE 802-3 – CSMA/CD, com driver para UNIX, saída 100Base-TX (RJ45), velocidade dupla de 10 ou 100 Mbps autosense ou configurável por SW, possibilidade de gerenciamento SNMP, compatível com TCP/IP, acompanhada dos respectivos manuais e documentação. <i>(Pag. 17, 27 e 28, da documentação técnica).</i>
Sistema Operacional	Sistema Operacional SUN SOLARIS7, Padrão Unix, 64 bits, instalado e configurado para Rede Local e Corporativa da ECT, com suporte para 3 acessos simultâneos, com capacidade para suportar a Plataforma de Gerenciamento HP Open View – NNM (Network Node Management) na versão 5.0 ou superior e os módulos HP Open View, entregue em mídia CD-ROM com toda documentação e licenças. <i>(Pag. 21, 25, 115 e 120, da documentação técnica)</i>
Imunidade	O produto é imune a quaisquer problemas decorrentes do “Bug do milênio”, devidamente comprovada na documentação que acompanha e por declaração do fabricante. <i>(Declaração do Fabricante)</i>
Documentação Técnica	Será entregue a ECT toda a documentação técnica exigida no edital, com respectivos grifos que comprovam a veracidade das informações constantes na descrição das características técnicas do Hardware e Software proposto. O Técnico responsável na DEDALUS SISTEMAS para responder questionamentos sobre as características técnicas do produto em pauta é o Sr. Neimar Fernando Oler – Tel 011-575-8011. O endereço da SUN Brasil, fabricante dos equipamentos e responsável pela manutenção dos equipamentos propostos é Rua Alexandre Dumas, nº 2016 – tel.: 011-5187-2100. O endereço da DEDALUS SISTEMAS é Rua Jardim Ivone, nº 17 – 12º andar – tel. 011-575-8011. (www.dedalus.com.br) Os produtos SUN ofertados são importados e distribuídos pela DEDALUS SISTEMAS – Rua Jardim Ivone, 17 – 12º andar, representada por sua Filial em Brasília, sob a responsabilidade da Gerente Comercial Jane Fraga. (E-mail: Jane@dedalus.com.br) O endereço da página do Site da SUN www.sun.com.br

FIS: 846

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Doc:



Garantia	Garantia total do fabricante por prazo de 2 (dois) anos. (Declaração do Fabricante, junto Proposta Técnica).
Outros	Os equipamentos serão entregues com todos os cabos, acessórios e documentação necessários ao pleno funcionamento dos mesmos.
Certificação	Apresentamos ISO 9000 do fabricante dos equipamentos, Sistema Operacional e Serviços de manutenção SUN, emitido pelo órgão certificador e devidamente traduzido para língua portuguesa.
Assistência Técnica	Apresentamos carta de Solidariedade do Fabricante dos equipamentos propostos, assegurando o fornecimento e a garantia dos produtos ofertados. Anexamos relação completa da Rede de Assistência Técnica Autorizada para os produtos ofertados, em todo o território nacional.
Chamado de Suporte	O atendimento será "on-site", no prazo de 2 horas e prazo máximo de solução do problema de até 24 (vinte e quatro) horas. Caso o problema não seja resolvido neste prazo, o fornecedor fará a substituição do equipamento, até o restabelecimento integral do equipamento com defeito.
Horário de Atendimento	O atendimento se dará 7 dias por semana, 24 horas por dia.

A Dedalus Sistemas declara que **ATENDE** plenamente os atributos técnicos que constituem a configuração mínima obrigatória exigida para este produto.

Sao Paulo

R. João Erbolini, 30
11.011-140 - Jd. Barão
Tel: (11) 474-8080 - Fax: (11) 474-8081

Campinas

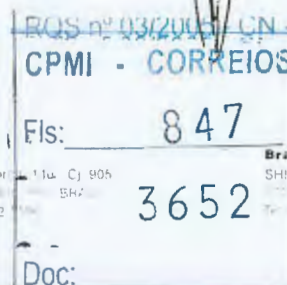
R. João Erbolini, 30
13.011-140 - Jd. Barão
Tel: (11) 474-8080 - Fax: (11) 474-8081

Curitiba

R. João Erbolini, 30
81.011-140 - Jd. Barão
Tel: (11) 474-8080 - Fax: (11) 474-8081

Brasília

R. João Erbolini, 30
70.011-140 - Jd. Barão
Tel: (11) 474-8080 - Fax: (11) 474-8081



**Dedalus** sistemas<http://www.dedalus.com.br>**PONTUAÇÃO TÉCNICA****Servidor de rede tipo RISC 1****DESEMPENHO (DE)****PESO 06****PERFORMANCE**

SPECint_rate95 igual ou superior a 240	ATENDE	01
SPECfp_rate95 igual ou superior a 250	ATENDE	01

*Pág. 61 a 64, da documentação Técnica e Declaração do Fabricante***MEMÓRIA RAM**

Igual ou superior a 1 Gbyte	ATENDE	01
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*Pag. 6 e 10, da documentação técnica e Proposta do Licitante.***CAPACIDADE DE DISCO RÍGIDO**

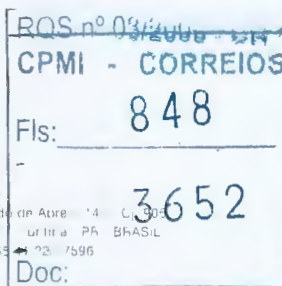
Igual ou superior a 30 Gbytes	ATENDE	01
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*Pag. 5 e 85 da documentação técnica e Proposta do Licitante.***FONTE DE ALIMENTAÇÃO REDUNDANTE**

Fonte de alimentação redundante hotswappable.	ATENDE	02
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*Pag. 5, da documentação técnica.***Sao Paulo**R. do Estado, 1111 - 11º andar
05508-900 - São Paulo - SP - BRASIL
Tel: (11) 5081-1111 Fax: (11) 5081-1112

397- Página 7 de 23

CampinasR. do Estado, 30
13064-100 - Campinas - SP - BRASIL
Tel: (19) 313-8688 Fax: (19) 313-3130**Curitiba**Av. Cândido de Abreu, 14 - C. 305
81303-900 - Curitiba - PR - BRASIL
Tel: (41) 323-7596 Fax: (41) 323-7596**Brasilia**SHIN - O-14 - 01 - Casa 12 - Lago Norte
70150-900 - Brasilia - DF - BRASIL
Tel: (61) 326-3181 Fax: (61) 326-3181

**Dedalus** sistemas<http://www.dedalus.com.br>**QUALIDADE (QD)****PESO 04****CERTIFICAÇÃO**

ISO 9002 referente a serviços de suporte de hardware e software	ATENDE	01
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SUPORTE DE SERVIÇOS (SS)**PESO 06****PRAZO DE ATENDIMENTO**

Atendimento em até 02 horas	ATENDE	02
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*Declaração do fabricante***HORÁRIO DE ATENDIMENTO E SUPORTE**

Horário Integral – 24horas/7 dias por semana	ATENDE	02
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CENTRAL DE ATENDIMENTO E SUPORTE

Está disponível o tel. Toll-free: 0800-11 8988	ATENDE	01
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TOTAL DE PONTOS: 70 PONTOS**DURAÇÃO DA GARANTIA**

O fabricante oferece garantia para o produto por um período de 2 anos, conforme Declaração, em anexo.

São Paulo

Campinas

Curitiba

Brasília

Av. Caridade de Ar... 140... 905
8... PR BRASÍLIA
Tel: (41) 5141... 759

SH... 11... Lagoa N...
PR BRASÍLIA

Doc:

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COMISSÃO ESPECIAL DE LICITAÇÃO – AC – ECT
SBN – Quadra 01 – Bloco A – 4º andar – Ala Norte
70002-900 – Brasília - DF

CONCORRÊNCIA Nº. 001/2000
ABERTURA: 03/05/00 – 9:30 hs

PROPOSTA TÉCNICA
INVÓLUCRO Nº 2
SERVIDOR RISC 2

LICITANTE:

Dedalus Comércio e Sistemas Ltda.

CNPJ 73.101.990/0001-28

Rua Jardim Ivone, 17 – 10º. Andar – Vl. Mariana

04105-905 – São Paulo – SP

001/2000-01
CPMI - CORREIOS
Fls: 850
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Doc:

São Paulo

R. Jardim Ivone, 17 - 9º andar
04105-905 - São Paulo - SP - BRASIL
Tel 55 11 575-8011 - Fax 55 11 575-5813

Campinas

Av. João Erbolato, 30 - 1º andar - Jd. Cnapadão
13066-640 - Campinas - SP - BRASIL
Tel/Fax 55 19 243-8688

Curitiba

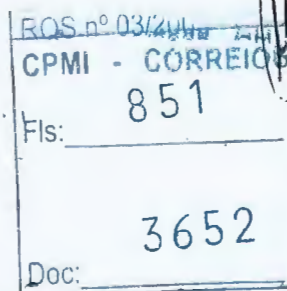
Av. Cândido de Abreu, 140 - Cj. 905
80530-000 - Curitiba - PR - BRASIL
Tel/Fax 55 41 222 7596

Brasília

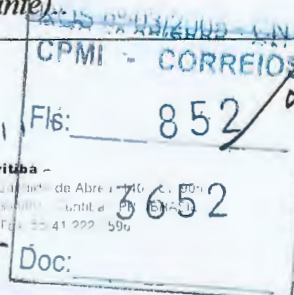
SHN - QL14 - Cj. 01 - Casa 12 - Lago Nor
071530-015 - Brasília - DF - BRASIL
Tel/Fax 55 61 368-4461


ITEM I.9 – SERVIDOR DE REDE TIPO RISC 2 – SUN- U10

ATRIBUTO	CONFIGURAÇÃO
CPU	Processador RISC, de 64 bits, em número igual a 01 (um) processador. <i>(pag. 10, da documentação técnica)</i>
Memória Cache – Instr. + Data (primary + secondary)	Memória cache instalada de 2 Mbytes por processador. <i>(Pag. 3, da documentação técnica).</i>
Memória R A M	ECC com capacidade instalada de 512 Mbytes, expansível até 1 Gbytes, “on-board”, tempo de acesso máximo de 60 ns. <i>(pag. 3, da documentação técnica).</i>
Performance	SPECint_rate95 igual a 160 SPECfp_rate95 igual a 199 <i>(Pag. 63 e 64, da documentação técnica)</i>
Slots	Apresenta 3 slots livres de 32 bits, após montada a configuração proposta. <i>(pag. 4, da documentação técnica).</i>
Fonte de Alimentação Interna	1 (uma) fonte de alimentação, Bivolt, compatível com configuração Máxima do equipamento. <i>(Pag. 131, da documentação técnica)</i>
Controladora e HD Rígido Interno	Padrão EIDE , com capacidade instalada de 18 (dezoito) GBytes formatados, tempo médio de acesso igual a 9,5 ms e taxa de transferência de 16,7 MBytes/seg. <i>(pag. 13 e 72, da documentação técnica).</i>



Monitor de Vídeo	Policromático, com 19", dot-pitch máximo de 0.28 mm. Atende "as normas MPR II, EPA Energy Star. Seleção automática de tensão entre 100-240 VAC – full-range. Com resolução mínima de 1280 x 1024. (pag. 68 e Declaração do Fabricante).
Teclado Alfanumérico	Com 101 teclas. (Pag. 14, da documentação técnica)
Mouse	3 teclas com resolução de 320 dpi, mouse-pad e driver de instalação. (Pag. 14, da documentação técnica).
Interface Serial	Duas interfaces seriais padrão RS-232C. (Pag. 13, da documentação técnica)
Unidade de CD-ROM	Velocidade de 32 X – EIDE, instalada e reconhecida pelo Sistema Operacional SUN Solaris fornecido. (Pag. 15, da documentação técnica).
Unidade de Fita DLT	Uma unidade de fita padrão DLT para utilização de mídias, com capacidade de 35 Gbytes, sem compressão e com taxa de transferência sustentada de 5 Mbytes/seg. (Pag. 89, da documentação técnica)
Placa de Rede	Uma placa padrão ethernet de 32 bits. – IEEE 802-3 – CSMA/CD, com driver para UNIX, saída 100Base-TX (RJ45), velocidade dupla de 10 ou 100 Mbps autosense ou configurável por SW, possibilidade de gerenciamento SNMP, compatível com TCP/IP, acompanhada dos respectivos manuais e documentação. (Pag. 3, 115 e 116, da documentação técnica).
Sistema Operacional	Sistema Operacional SUN SOLARIS7, Padrão Unix, 64 bits, instalado e configurado para Rede Local e Corporativa da ECT, com suporte para 3 acessos simultâneos, com capacidade para suportar a Plataforma de Gerenciamento HP Open View – NNM (Network Node Management) na versão 5.0 ou superior e os módulos HP Open View, entregue em mídia CD-ROM com toda documentação e licenças. (Pag. 123 a 126, da documentação técnica).
Imunidade	O produto é imune a quaisquer problemas decorrentes do "Bug do milênio", devidamente comprovada na documentação que acompanha e por declaração do fabricante. (Declaração do Fabricante).



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Documentação Técnica	Anexamos a documentação técnica exigida no edital, com respectivos grifos, que comprovam a veracidade das informações constantes na descrição das características técnicas do Hardware e Software proposto. O Técnico responsável na DEDALUS SISTEMAS para responder questionamentos sobre as características técnicas do produto em pauta é o Sr. Neimar Fernando Oler – Tel 011-575-8011. O endereço da SUN Brasil, fabricante e responsável pela Asssitência Técnica dos equipamentos propostos é Rua Alexandre Dumas, nº 2016 – tel.: 011-5187-2100. O endereço da DEDALUS SISTEMAS é Rua Jardim Ivone, nº 17 – 12º andar – tel. 011-575-8011. (www.dedalus.com.br) Os produtos SUN ofertados são importados e distribuídos pela DEDALUS SISTEMAS – Rua Jardim Ivone, 17 – 12º andar, representada por sua Filial em Brasília, sob a responsabilidade da Gerente Comercial Jane Fraga. (jane@dedalus.com.br) O endereço da página do Site da SUN www.sun.com.br.
Garantia	Garantia total do fabricante por prazo de 2 (dois) anos. <i>Declaração do Fabricante</i>).
Outros	Os equipamentos serão entregues com todos os cabos, acessórios e documentação necessários ao pleno funcionamento dos mesmos.
Certificação	Apresentamos ISO 9000 do fabricante dos equipamentos, Sist. Operacional e Manutenção de equipamentos SUN, emitido pelo órgão certificador e devidamente traduzido para língua portuguesa.
Assistência Técnica	Apresentamos carta de Solidariedade do Fabricante dos equipamentos propostos, assegurando o fornecimento e a garantia dos produtos ofertados. Anexamos relação completa da Rede de Assistência Técnica Autorizada para os produtos ofertados, em todo o território nacional.
Chamado de Suporte	O atendimento será “on-site” , no prazo de 2 horas e prazo máximo de solução do problema de, até 24 (vinte e quatro) horas. Caso o problema não seja resolvido neste prazo, o fornecedor fará a substituição do equipamento, até o restabelecimento integral do equipamento com defeito.



Horário de Atendimento	O atendimento se dará 7 dias por semana, 24 horas por dia.
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A Dedalus Sistemas declara que **ATENDE** plenamente os atributos técnicos que constituem a configuração mínima obrigatória exigida para este produto.

PONTUAÇÃO TÉCNICA

Servidor de rede tipo RISC 2

DESEMPENHO (DE)**PESO 06**

PERFORMANCE

SPECint_95 igual ou superior a 19 ou SPECint_rate95 igual ou superior a 92.	ATENDE	01
SPECfp_95 igual ou superior a 27 ou SPECfp_rate95 igual ou superior a 115.	ATENDE	01

Pag. 63 e 64, da documentação técnica.

MEMÓRIA RAM

Igual ou superior a 1 Gbyte	ATENDE	01
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Pag. 3, da documentação técnica, e proposta do Licitante.

CAPACIDADE DE DISCO RÍGIDO

Igual ou superior a 10 Gbytes	ATENDE	Fls: 01 854
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Pag. 3, da documentação técnica e proposta do Licitante.

São Paulo

Ecuritiba

Brasilia

Av. Ca. Juan de Ayala 411 903

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397- Página 12 de 23

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<http://www.dedalus.com.b>

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Fonte de alimentação redundante hotswappable.	NÃO ATENDE	02
Fonte de alimentação redundante.	NÃO ATENDE	01

PESO 04

ISO 9002 referente a serviços de suporte de hardware e software	ATENDE	01
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PESO 06

Atendimento em até 02 horas	ATENDE	02
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Proposta do Licitante.

Horário Integral – 24horas/7 dias por semana	ATENDE	02
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Está disponível o tel. Toll-free: 0800- 118988	ATENDE	01
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TOTAL DE PONTOS: 70 PONTOS

15

O fabricante oferece garantia para o produto por um período de 2 anos, conforme Declaração, em anexo.

Sao Paulo
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397- Página 13 de 23

Campinas
R. Joao Erbulato 30
13061-21 Campinas SP BRASIL
Tel 51 19 243 8688 Fax 51 19 243 331

Curitiba
A. Cândido de Araújo 140 - Centro
Bairro: Centro - Curitiba - PR - Fone: 333-1111
Tel.: 333-5541 - Fax: 333-1111

Brasília
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COMISSÃO ESPECIAL DE LICITAÇÃO – AC – ECT
SBN – Quadra 01 – Bloco A – 4º andar – Ala Norte
70002-900 – Brasília - DF

CONCORRÊNCIA Nº. 001/2000
ABERTURA: 03/05/00 – 9:30 hs

PROPOSTA TÉCNICA
INVÓLUCRO Nº 2
SERVIDOR RISC 3

LICITANTE:

Dedalus Comércio e Sistemas Ltda.

CNPJ 73.101.990/0001-28

Rua Jardim Ivone, 17 – 10º. Andar – Vl. Mariana

04105-905 – São Paulo – SP

RQS nº 03/2000
CPMI - CORREIO6
Fls: 856
Doc: 3652

São Paulo

R. Jardim Ivone, 17 - 9º andar
04105-905 - São Paulo - SP - BRASIL
Tel 55 11 575-8011 - Fax 55 11 575-5813

Campinas

Av. João Erbolato 30 - 1º andar - Jd. Chapadão
13066-640 - Campinas - SP - BRASIL
Tel /Fax 55 19 243 8688

Curitiba

Av. Cândido de Abreu 140 - Cj. 905
80530-000 - Curitiba - PR - BRASIL
Tel /Fax 55 41 222 7596

Brasília

SHIN - QL14 - Cj. 01 - Casa 12 - Lago Nor
071530-015 - Brasília - DF - BRASIL
Tel /Fax 55 61 368-4461

**Dedalus** sistemas<http://www.dedalus.com.br>**ITEM I.10 – SERVIDOR DE REDE TIPO RISC 3 – SUN E4500**

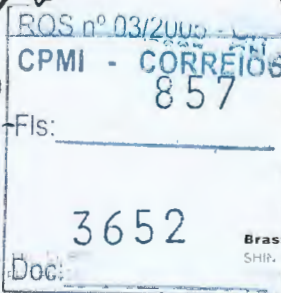
ATRIBUTO	CONFIGURAÇÃO
CPU	Processador RISC, de 64 bits, em número igual a 8 (oito) processadores. (Pag. 217, da documentação técnica)
Memória Cache – Instr. + Data (primary + secondary)	Memória cache instalada de 8 Mbytes por processador. Pag. 5 e 107, da documentação técnica).
Memória R A M	ECC com capacidade instalada de 8 GBytes, expansível até 28 Gbytes, “on-board”, tempo de acesso máximo de 60 ns. (Pag. 107, da doc. técnica e Declaração do fabricante).
Performance	TpmC igual a 28.724, expansível a 50.268,07, auditados segundo o TPC-C, cujos resultados estão publicados no site www.tpc.org na Internet. (pag. 107 a 109, da documentação técnica).
Suporte à arquitetura	SMP – Symetric Multi Processing. (pag. 14 e 214, da documentação técnica).
Slots	Apresenta 06 (seis) slots livres, após montada configuração proposta, de pelo menos 64 bits. Entendo-se cada “slot” livre como sendo uma interface de I/O disponível. (Pag. 50 e proposta do licitante).
Fonte de Alimentação Interna	04 (quatro) fontes de alimentação de 300Watts, Bivolt, compatível com config. Máxima do equipamento. (Pag. 34, da documentação técnica e folder do equipamento)
Controladora e HD Rígido Interno	Padrão Wide Ultra SCSI, com capacidade de 18 (dezoito) Gbytes, formatado, espelhados, com tempo médio de acesso igual a 9ms e rotação de 7.200RPM. (Pag. 11 e 101, da documentação técnica).

São Paulo

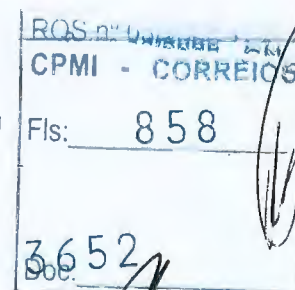
Campinas

Curitiba

Brasília



Controladora de Array e Array de Discos	Controladora Ultra SCSI, com suporte para RAID 0, 1, 0+1 e 5, por hardware, com 08 (oito) unidades de 18GBytes cada, totalizando 108(cento e oito) Gbytes formatados, líquidos, com tempo médio de acesso igual a 9ms, rotação de 10.000RPM, Hot- swappable e com Hot Spair. <i>(Pag. 103, 126 e 127, da documentação técnica)</i>
Monitor de Vídeo	Policromático, com 17", dot-pitch de 0.28 mm. Atende "as normas MPR II, EPA Energy Star. Seleção automática de tensão entre 100-240 VAC – full-range. Com resolução mínima de 800 x 600. <i>(Pag. 104 e 105, da documentação técnica).</i>
Placa de vídeo	Gráfica com 15MB de memória. <i>(pag. 26, da documentação técnica).</i>
Teclado Alfanumérico	Com 101 teclas. <i>(Pag. 21, da documentação técnica).</i>
Mouse	3 teclas com resolução de 320 dpi, mouse-pad e driver de instalação. <i>(Pag. 21, da documentação técnica).</i>





ATRIBUTO	CONFIGURAÇÃO
Unidade de Disco flexível	Uma unidade de 3 ½" com capacidade de 1,44 Mbytes.
Interface Serial	Duas interfaces seriais padrão RS-232C. (Pag. 21, da documentação técnica).
Unidade de CD-ROM	Velocidade de 32 X – SCSI-II, instalada e reconhecida pelo Sistema Operacional SUN Solaris fornecido. (Pag. 6, da documentação técnica).
Unidade de Fita DLT	Uma unidade de fita padrão DLT para utilização de mídias, com capacidade de 35 Gbytes, sem compressão e com taxa de transferência sustentada de 5 Mbytes/seg, com uma controladora exclusiva para a unidade DLT. (Pag. 188, da documentação técnica).
Placa de Rede	Uma placa padrão ethernet de 32 bits. – IEEE 802-3 – CSMA/CD, com driver para UNIX, saída 100Base-TX (RJ45), velocidade dupla de 10 ou 100 Mbps autosense ou configurável por SW, possibilidade de gerenciamento SNMP, compatível com TCP/IP, acompanhada dos respectivos manuais e documentação. (Pag. 9, 51 e 63, da documentação técnica).
Sistema Operacional	O Sistema Operacional SUN SOLARIS 7, é padrão Unix de 64 bits, instalado e configurado para Rede Local e Corporativa dos Correios - CorreiosNet, com número ilimitado de usuários simultâneos entregues em mídia CD-ROM com toda documentação e licenças. Possui capacidade para suportar a Plataforma de Gerenciamento HP Open View - NNM (Network Node Management) na versão 5.0 ou superior, os módulos HP Open View. Também possui capacidade para suportar o Maestro Tivoli e compatível com a Solução Integrada de Gestão Empresarial dos Correios. (Pag. 110 e 123, da documentação técnica).
Imunidade	O produto é imune a quaisquer problemas decorrentes do "Bug do milênio", devidamente comprovada na documentação que acompanha e por declaração do fabricante. (Declaração do Fabricante, em anexo).

São Paulo
Praça do Comércio, 9 andar
40014-000 São Paulo, SP, BRASIL
Tel: 51 3758 11 Fax: 51 3758 11

Campinas
R. João Erbolato, 30
13067-64 Campinas SP BRASIL
Tel. 55 19 243 8688 Fax 55 19 243 3345

Curitiba 365
Av. Cândido de Abreu 140 Cj 905
80531-000 Curitiba PR BRASIL
Tel/Fax 041 333-1111

Brasilia
SHIN 0114 01 01 12 LIND
OF BRAS
Ex 3 6130 441

19



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http://www.dedalus.com.br

ATRIBUTO	CONFIGURAÇÃO
Documentação Técnica	Será entregue a ECT toda a documentação técnica exigida no edital, com respectivos grifos que comprovam a veracidade das informações constantes na descrição das características técnicas do Hardware e Software proposto. O Técnico responsável na DEDALUS SISTEMAS para responder questionamentos sobre as características técnicas do produto em pauta é o Sr. Neimar Fernando Oler – Tel 011-575-8011. O endereço da SUN Brasil, fabricante dos equipamentos proposto é Rua Alexandre Dumas, nº 2016 – tel.: 011-5187-2100. O endereço da DEDALUS SISTEMAS é Rua Jardim Ivone, nº 17 – 12º andar – tel. 011-575-8011.(www.dedalus.com.br) Os produtos SUN ofertados são importados e distribuídos pela DEDALUS SISTEMAS – Rua Jardim Ivone, 17 – 12º andar, representada por sua Filial em Brasília, sob a responsabilidade da Gerente Comercial Jane Fraga.(jane@dedalus.com.br) O endereço da página do Site da SUN www.sun.com.br.
Garantia	Garantia total do fabricante por prazo de 2 (dois) anos.
Outros	Os equipamentos serão entregues com todos os cabos, acessórios e documentação necessários ao pleno funcionamento dos mesmos.
Certificação	Apresentamos ISO 9000 do fabricante SUN dos equipamentos, S. Operacional e Serviços técnicos para os equipamentos propostos, emitido pelo órgão certificador e devidamente traduzido para língua portuguesa.
Assistência Técnica	Apresentamos carta de Solidariedade do Fabricante dos equipamentos propostos, assegurando o fornecimento e a garantia dos produtos ofertados. Anexamos relação completa da Rede de Assistência Técnica Autorizada para os produtos ofertados, em todo o território nacional. Fls: 808
Chamado de Suporte	O atendimento será “on-site” , no prazo de 2 horas e prazo máximo de solução do problema de até 24 (vinte e quatro) horas. Caso o problema não seja resolvido neste prazo, o fornecedor fará a substituição do equipamento, até o restabelecimento integral do equipamento com defeito. Doc: 3052
Horário de Atendimento	O atendimento se dará 7 dias por semana, 24 horas por dia.

Sao Paulo

R. J. Jim Ivone, 17 - 12º andar

011 - 9 - São Paulo, SP, BRASIL

Tel: 011 575-8011 Fax: 55 11 575-8011

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Campinas

R. José Erbulino, 10

011 - 4 - Campinas, SP, BRASIL

Tel: 19 243 8688 Fax: 55 19 243 3345

Curitiba

A. Cardoso de Alencar, 146 - C. 905

80530-000 Curitiba, PR, BRASIL

Tel: Fax: 55 41 222 7596

Paraná

R. J. Jim Ivone, 17 - 12º andar

011 - 9 - São Paulo, SP, BRASIL

Tel: 011 575-8011 Fax: 55 11 575-8011

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A Dedalus Sistemas declara que **ATENDE** plenamente os atributos técnicos que constituem a configuração mínima obrigatória exigida para este produto.

PONTUAÇÃO TÉCNICA

Servidor de rede tipo RISC 3

DESEMPENHO (DE)

PESO 06

ESCALABILIDADE DE PERFORMANCE

TpmC igual ou superior (50000)	ATENDE	03
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Pag. 107, da documentação técnica.

PERFORMANCE AUDITADA OU ESTIMADA

TpmC igual ou superior a (28000)	ATENDE	03
-----------------------------------	--------	----

Pag. 107 e Declaração do Fabricante.

MEMÓRIA RAM

Igual ou superior a 8 Gbytes	ATENDE	02
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Declaração do Fabricante

MEMÓRIA CACHE

8 Mbytes por processador	ATENDE	03
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Pag. 107, da documentação técnica

EXPANSIBILIDADE DE MEMÓRIA RAM

Acima de 16 Gbytes	ATENDE	01
--------------------	--------	----

Pag. 107 e Declaração do Fabricante

São Paulo
R. Jardim - one 117 9 andar
14 São Paulo SP BRASIL
Tel 11 575 8011 - Fax 11 575 5814
397- Página 18 de 23

Campinas
R. João Eriberto 30
13061 640 Campinas SP BRASIL
Tel 55 19 243-8688 - Fax 55 19 243 3345

Curitiba
Av. Cândido de Abreu 14 C 905
80530-000 Curitiba PR BRASIL
Tel Fax 55 41 222 7596

Brasília
SHB - Q. 1 - C. 12 - Caixa 12 Lago Norte
70000-000 Brasília DF BRASIL
Fax 55 61 366 1441

LEI Nº 03/2005 - CN
CPMI - CORREIOS
Fls: 861
3652
Doc: 01



DISCO INTERNO E CONTROLADORA DE DISCO SCSI

Raid 1 por Hardware para controladora SCSI (Discos Interno)	NÃO ATENDE	02
--	------------	----

CONTROLADORA DE ARRAY DE DISCO

RAID1 por Hardware para controladora de Array de disco	ATENDE	02
--	--------	----

Pag. 126, da documentação técnica.

FONTE DE ALIMENTAÇÃO INTERNA HOT-SWAPPABLE

Fonte hotswappable.	ATENDE	01
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Pag. 9, da documentação técnica.

QUALIDADE (QD)

PESO 04

CERTIFICAÇÃO

ISO 9002 referente a serviços de suporte de hardware e software	ATENDE	01
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SUPORTE DE SERVIÇOS (SS)

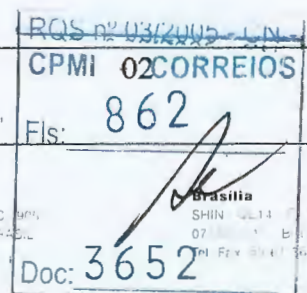
PESO 06

PRAZO DE ATENDIMENTO

Atendimento em até 02 horas	ATENDE	02
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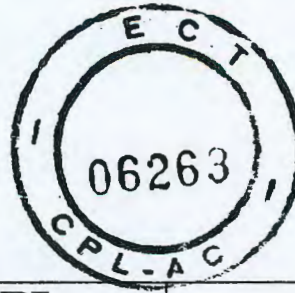
HORÁRIO DE ATENDIMENTO E SUPORTE

Horário Integral – 24horas/7 dias por semana	ATENDE	
--	--------	--





dedalus sistemas



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CENTRAL DE ATENDIMENTO E SUPORTE

Está disponível o tel. Toll-free: 0800-11 8988	ATENDE	01
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TOTAL DE PONTOS: 124 PONTOS

DURAÇÃO DA GARANTIA

O fabricante oferece garantia para o produto por um período de 2 anos, conforme Declaração, em anexo.

São Paulo

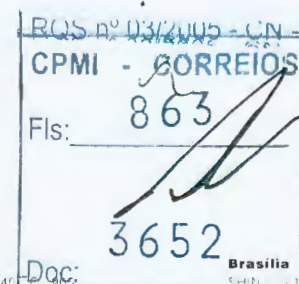
R. Jarolim Vene 17 9 andar
04531-000 São Paulo SP BRASIL
Tel 11 577 8711 Fax 11 575 5813
397- Página 20 de 23

Campinas

R. João Erasmão
13061-640 Campinas SP BRASIL
Tel 35 14 24 8000 Fax 35 19 243 3345

Curitiba

Av. Cândido de Abreu 146
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Tel Fax 55 41 222 7596



Brasília
Tel Fax 55 61 308 4161

COMISSÃO ESPECIAL DE LICITAÇÃO – AC – ECT
SBN – Quadra 01 – Bloco A – 4º andar – Ala Norte
70002-900 – Brasília - DF



CONCORRÊNCIA Nº. 001/2000
ABERTURA: 03/05/00 – 9:30 hs

PROPOSTA TÉCNICA
INVÓLUCRO Nº 2
SERVIDOR RISC 4

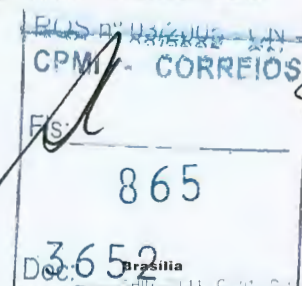
LICITANTE:

Dedalus Comércio e Sistemas Ltda.
CNPJ 73.101.990/0001-28
Rua Jardim Ivone, 17 – 10º. Andar – Vl. Mariana
04105-905 – São Paulo – SP

BOS nº 03/2000 - Cj
CPMI - CORREIOS
Fls: 864
Doc: 3652


ITEM I.11 – SERVIDOR DE REDE TIPO RISC 4 – SUN-E 3500

ATRIBUTO	CONFIGURAÇÃO
CPU	Processador RISC, de 64 bits, em número igual a 3 (três) processadores. <i>(pag. 112 e 113, da documentação técnica)</i>
Performance	TpmC igual a 10.771, expansível a 28.724, com base em valor auditado por uma configuração diferente da cotada, porém da mesma família de equipamentos do mesmo fabricante. <i>(pag. 100 e 101, da documentação técnica e Declaração do Fabricante).</i>
Memória Cache – Instr. + Data (primary + secondary)	Memória cache instalada de 8 Mbytes por processador. <i>(Pag. 100, da doc. técnica e declaração do Fabricante).</i>
Memória R A M	ECC com capacidade instalada de 6 (seis) GBytes, expansível até 16 GBytes, on-board, tempo de acesso máximo de 60 ns. <i>(pag. 100, da doc. Técnica e Declaração do Fabricante).</i>
Suporte à arquitetura	SMP – Symetric Multi Processing. <i>(pag. 112 e 113, da documentação técnica).</i>
Slots	Apresenta 2 slots livres de 64 bits, após montada a configuração proposta. <i>(Pag. 49, da doc. Técnica e proposta do licitante).</i>
Fonte de Alimentação Interna	03 (três) fontes de alimentação de 300Watts, Bivolt, compatível com configuração máxima do equipamento. <i>(pag. 117, da documentação técnica).</i>
Controladora e HD Rígido Interno	Padrão FC-AL (Fibre Channel Arbitrated Loop) de 100(cem) Mbytes/segundo, com capacidade de 18 (dezoito) Gbytes, formatados, espelhados, com tempo médio de acesso igual a 9ms e rotação de 10.000RPM. <i>(Pag. 11, 16, 49 e 99, da documentação técnica).</i>



**Dedalus** sistemas<http://www.dedalus.com.br>

Monitor de Vídeo	Policromático, com 17", dot-pitch máximo de 0.28 mm. Atende "as normas MPR II, EPA Energy Star. Seleção automática de tensão entre 100-240 VAC – full-range. Com resolução mínima de 1280 x 1024. <i>(pag. 96 e 97, da documentação técnica).</i>
Placa de vídeo	Gráfica com 15MB de memória. <i>(Pag. 26, da documentação técnica).</i>
Teclado Alfanumérico	Com 101 teclas. <i>(Pag. 21, da documentação técnica).</i>
Mouse	3 teclas com resolução de 320 dpi, mouse-pad e driver de instalação. <i>(Pag. 21, da documentação técnica).</i>
Interface Serial	Duas interfaces seriais padrão RS-232C. <i>(Pag. 21, da documentação técnica)</i>
Unidade de CD-ROM	Velocidade de 32 X – SCSI-II, instalada e reconhecida pelo Sistema Operacional SUN Solaris fornecido. <i>(Pag. 6, da documentação técnica).</i>
Unidade de Fita DAT	Uma unidade de fita padrão DAT para utilização de mídias, com capacidade de 12 Gbytes, sem compressão com uma controladora SCSI compartilhada pela unidade de CD-ROM. <i>(pag. 21, da documentação técnica e proposta do licitante).</i>
Placa de Rede	Uma placa padrão Ethernet de 32 bits. – IEEE 802-3 – CSMA/CD, com driver para UNIX, saída 100Base-TX (RJ45), velocidade dupla de 10 ou 100 Mbps autosense ou configurável por SW, possibilidade de gerenciamento SNMP, compatível com TCP/IP, acompanhada dos respectivos manuais e documentação. <i>(Pag. 9 e 49, da documentação técnica).</i>
Sistema Operacional	O Sistema Operacional SUN SOLARIS 7 ofertado é padrão UNIX 64 bits, será instalado e configurado para Rede Local e Corporativa da ECT, com um número ilimitado de usuários simultâneos. <i>(Pag. 103 a 107, da documentação técnica).</i>
Imunidade	O produto é imune a quaisquer problemas decorrentes do "Bug do milênio", devidamente comprovada na documentação que acompanha e por declaração do fabricante.

CPMI - CORREIOS
866

Fls.

3652

Brasília

Doc.

São Paulo

R. João Erbolato, 30
Jd. Iguatemi - Jd. Iguatemi - Jd. Iguatemi
11.111-111 - Jd. Iguatemi - Jd. Iguatemi
FAX: 11.111-111

Campinas

R. João Erbolato, 30
Jd. Iguatemi - Jd. Iguatemi - Jd. Iguatemi
13.111-111 - Jd. Iguatemi - Jd. Iguatemi
Tel: 19.243.8688 Fax: 55.19.24.3345

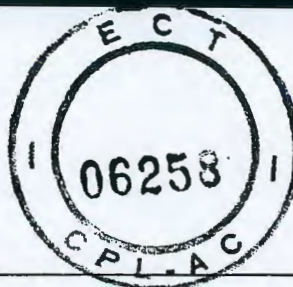
Curitiba

Av. Cândido de Abreu, 14
80530-000 - Curitiba - PR - BRASIL
Tel: Fax: 55.41.222.7596Brasília
SHIP, 14 01 Jd. Iguatemi - Jd. Iguatemi
Tel: 55.61.369.4171



Documentação Técnica	Será entregue a ECT toda a documentação técnica exigida no edital, com respectivos grifos que comprovam a veracidade das informações constantes na descrição das características técnicas do Hardware e Software proposto. O Técnico responsável na DEDALUS SISTEMAS para responder questionamentos sobre as características técnicas do produto em pauta é o Sr. Neimar Fernando Oler – Tel 011-575-8011. O endereço da SUN Brasil, fabricante dos equipamentos proposto e responsável pela Assistência técnica é Rua Alexandre Dumas, nº 2016 – tel.: 011-5187-2100. O endereço da DEDALUS SISTEMAS é Rua Jardim Ivone, nº 17 – 12º andar – tel. 011-575-8011.(www.dedalus.com.br) Os produtos SUN ofertados são importados e distribuídos pela DEDALUS SISTEMAS – Rua Jardim Ivone, 17 – 12º andar, representada por sua Filial em Brasília, sob a responsabilidade da Gerente Comercial Jane Fraga. O endereço da página do Site da SUN www.sun.com.br.
Garantia	Garantia total do fabricante por prazo de 2 (dois) anos. (<i>Declaração do Fabricante</i>).
Outros	Os equipamentos serão entregues com todos os cabos, acessórios e documentação necessários ao pleno funcionamento dos mesmos.
Certificação	Apresentamos ISO 9000 do fabricante dos equipamentos SUN, S. Operacional e Serviços técnicos, emitido pelo órgão certificador e devidamente traduzido para língua portuguesa.
Assistência Técnica	Apresentamos carta de Solidariedade do Fabricante dos equipamentos propostos, assegurando o fornecimento e a garantia dos produtos ofertados. Anexamos relação completa da Rede de Assistência Técnica Autorizada para os produtos ofertados, em todo o território nacional.
Chamado de Suporte	O atendimento será “on-site” , no prazo de 2 horas e prazo máximo de solução do problema de até 24 (vinte e quatro) horas. Caso o problema não seja resolvido neste prazo, o fornecedor fará a substituição do equipamento, até o restabelecimento integral do equipamento com defeito.
Horário de Atendimento	O atendimento se dará 7 dias por semana, 24 horas por dia

28



A Dedalus Sistemas declara que ATENDE plenamente os atributos técnicos que constituem a configuração mínima obrigatória exigida para este produto.	

PONTUAÇÃO TÉCNICA

Servidor de rede tipo RISC 4

DESEMPENHO (DE)

PESO 06

PERFORMANCE AUDITADA OU ESTIMADA

TpmC igual ou superior a 10000	ATENDE	02
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Pag. 100 e 102, da documentação técnica e Declaração do Fabricante.

MEMÓRIA RAM

Igual ou superior a 6 Gbytes	ATENDE	04
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Declaração do Fabricante e proposta do licitante.

MEMÓRIA CACHE

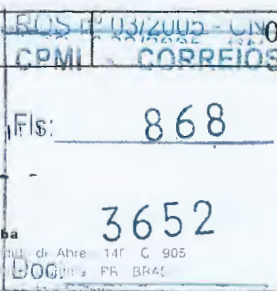
8 Mbytes por processador	ATENDE	03
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Pag. 100, da documentação técnica e Declaração do Fabricante.

EXPANSIBILIDADE DE MEMÓRIA RAM

Acima de 8 Gbytes	ATENDE	
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Declaração do Fabricante.




DISCO INTERNO E CONTROLADORA DE DISCO SCSI

RAID 1 por Hardware para controladora SCSI (Discos Internos)	NÃO ATENDE	01
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FONTE DE ALIMENTAÇÃO INTERNA

Fonte hotswappable.	ATENDE	01
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Pag. 9, da documentação técnica e proposta do licitante.

QUALIDADE (QD)
PESO 04
CERTIFICAÇÃO

ISO 9002 referente a serviços de suporte de hardware e software	ATENDE	01
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SUPORTE DE SERVIÇOS (SS)
PESO 06
PRAZO DE ATENDIMENTO

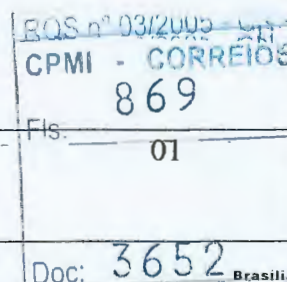
Atendimento em até 02 horas	ATENDE	02
-----------------------------	--------	----

HORÁRIO DE ATENDIMENTO E SUPORTE

Horário Integral – 24horas/7 dias por semana	ATENDE	02
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CENTRAL DE ATENDIMENTO E SUPORTE

Está disponível o tel. Toll-free: 0800- 11 8988.	ATENDE	01
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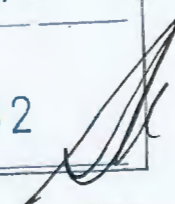
TOTAL DE PONTOS: 100 PONTOS

DURAÇÃO DA GARANTIA

☒ O fabricante oferece garantia para o produto por um período de 2 anos.

h



REC. nº 03/2005 - CN -
CPMI - CORREIOS
Fls: 870
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Doc: 





São Paulo, 27 de abril de 2000

À
EMPRESA BRASILEIRA DE CORREIOS E TELÉGRAFOS/ECT
COMISSÃO ESPECIAL DE LICITAÇÃO DA ADMINISTRAÇÃO CENTRAL – CEL/AC
SBN Quadra 01 – Bloco A – 4º andar – Ala Norte
Brasília - DF

Ref. Concorrência nº. 001/2000 – CPL/AC

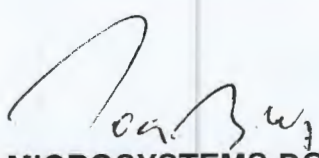
CARTA DE SOLIDARIEDADE

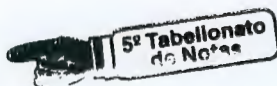
Nós, da **Sun Microsystems do Brasil**, estabelecida na Rua Alexandre Dumas, 2016 - Chácara Santo Antonio - 04717-004, inscrita no CNPJ sob nº. 65.497.745/0001-53, subsidiária da Sun Microsystems Inc., Declara é solidária com a Licitante Dedalus Comércio e Sistemas Ltda., inscrita no CNPJ sob nº. 73.101.990/0001-28, localizada à Rua Jardim Ivone, 17 – 10º. andar - Vila Mariana - São Paulo - SP., quanto a sua proposta, responsabilizando-se com os termos de garantia e serviços de assistência técnica exigidos e pelo treinamento para os técnicos da ECT, se for o caso.

Os serviços da assistência técnica e a garantia dos equipamentos SUN ofertados pela licitante em sua proposta serão prestados pela rede de assistência técnica, conforme declaração anexa.

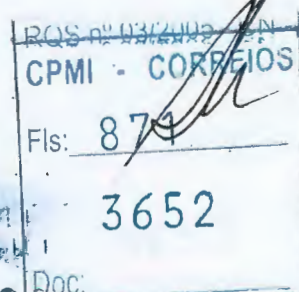
Declaramos, ainda, que a licitante é distribuidora autorizada a fornecer e instalar os equipamentos da Sun Microsystems.

Por ser expressão da verdade, firmamos a presente.


SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA
João Antônio Alves



Sun Microsystems do Brasil Ltda
Rua Alexandre Dumas, 2016
CEP 04717-004 - São Paulo - SP
Pabx: (011) 5181-8988 Fax: (011) 5181-0974 / 5181-3076



31



São Paulo, 27 de abril de 2000



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À
EMPRESA BRASILEIRA DE CORREIOS E TELÉGRAFOS/ECT
COMISSÃO ESPECIAL DE LICITAÇÃO DA ADMINISTRAÇÃO CENTRAL – CEL/AC
SBN Quadra 01 – Bloco A – 4º andar – Ala Norte
Brasília - DF

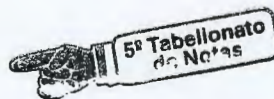
Ref. Concorrência nº. 001/2000 – CPL/AC

DECLARAÇÃO DE BUG ANO 2000

Nós, da **Sun Microsystems do Brasil**, estabelecida na Rua Alexandre Dumas, 2016 - Chácara Santo Antonio - 04717-004, inscrita no CNPJ sob nº. 65.497.745/0001-53, subsidiária da Sun Microsystems Inc., DECLARAMOS para os fins da participação da Licitante Dedalus Comércio e Sistemas Ltda., que todos os produtos ofertados pela Licitante (incluindo todos os seus componentes de hardware, software e sistema operacional), possuem tratamento correto no processamento de datas de modo a evitar quaisquer problemas relativos ao BUG do ano 2000.

Por ser expressão da verdade, firmamos a presente.

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SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA
João Antônio Alves
Country Manager
São Paulo, 27 de abril de 2000

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5º Tabelionato de Notas - José Roberto Pacheco Frayre - Tabelião
F.º João Manoel Pacheco Frayre - Fone: 56416092 - MO 080400110173
Endereço: Rua Alexandre Dumas, 2016 - Chácara Santo Antonio - 04717-004 - São Paulo - SP



CORREIOS
872
3652

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Sun Microsystems do Brasil Ltda.
Rua Alexandre Dumas, 2016
CEP 04717-004 - São Paulo - SP
Pabx: (011) 5181-8988 Fax: (011) 5181-0974 / 5181-3076



Brasília, 03 de maio de 2000.

À

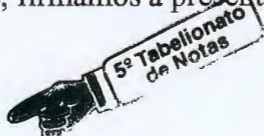
ECT Empresa Brasileira de Correios e Telégrafos
Comissão Especial de Licitação da Administração Central – CEL/AC
SBN Quadra 01 Bloco A 4º andar – Ala Norte – Brasília-DF
CEP 70002-900
Att. Sr. Benedito Medeiros Neto
Presidente da CEL/AC.

Ref.: Concorrência 001/2000 – CPL/AC
Abertura: 03/05/2000 às 9:30hs.

DECLARAÇÃO

A Sun Microsystems do Brasil, inscrita no CNPJ sob nº. 65.497.745/0001-53, estabelecida na Rua Alexandre Dumas, 2016 – Chácara Santo Antonio – 04717-004, São Paulo/SP., subsidiária da Sun Microsystems Inc., DECLARA para os fins da participação da Licitante Dedalus Comércio e Sistemas Ltda., situada na Rua Jardim Ivone, 17 – 10º andar – Vila Mariana – São Paulo, SP – CEP 04105-905, CNPJ 73.101.990.0001-28 na Licitação acima referenciada, que todos os produtos de nossa fabricação ofertados pela Licitante possuem monitores com 100-240 V de seleção automática e mouses de 3 teclas com 320 dpi de resolução e drivers de instalação.

Por ser expressão da verdade, firmamos a presente,



SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antônio Alves
Country Manager

5º Tabelionato de Notas - José Roberto Pereira Franco - Tabelião
Av. João Dias, 2320-Santa Amara - Fone: 56414097 NO 050500095977
Reconhecido por assinatura e firma SUPRA de: JOÃO ANTÔNIO ALVES
Contador: Alexandre
VALIDO SOMENTE COM O SELLO DE AUTENTICIDADE
Data: 03 de Maio de 2000
Firma de: 1491 Es. Testemunha
O. Dado de: 0.001
Total de: 1491
João Antônio Alves Junior - Es. Testemunha



RQS nº 03/2000-UN
CPMI - CORREIOS
Fls. 873
3652
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**17ª ALTERAÇÃO DO CONTRATO SOCIAL DE
"SUN MICROSYSTEMS DO BRASIL INDÚSTRIA
E COMÉRCIO LTDA."**

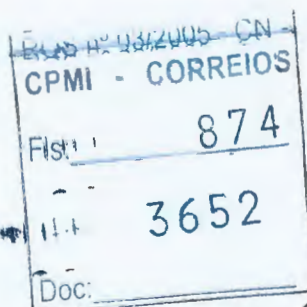
CNPJ/MF nº: 65.497.745/0001-53

NIRE nº: 35.209.923.643

Pelo presente instrumento particular, e na melhor forma de direito, as partes abaixo:

1. **SUN MICROSYSTEMS, INC.**, uma sociedade organizada e existente de acordo com as leis do Estado de Delaware, Estados Unidos da América, com sede em 901 San Antonio Road, Palo Alto, Califórnia, Estados Unidos da América, neste ato representada por seu bastante procurador, José Augusto Caleiro Regazzini, brasileiro, solteiro, advogado, portador da Cédula de Identidade RG nº 4.977.914 SSP/SP e do CIC nº 535.965.288-87, com escritório na cidade de São Paulo, Estado de São Paulo, na Rua Líbero Badaró, 293, 19º andar, conforme instrumento de mandato anexo; e
2. **SUN MICROSYSTEMS OF CALIFORNIA, INC.**, uma sociedade organizada e existente de acordo com as leis do Estado da Califórnia, Estados Unidos da América, com sede em 901 San Antonio Road, Palo Alto, Califórnia, Estados Unidos da América, neste ato representada por seu bastante procurador, José Augusto Caleiro Regazzini, acima qualificado, conforme instrumento de mandato anexo,

únicas quotistas da sociedade por quotas, de responsabilidade limitada denominada **SUN MICROSYSTEMS DO BRASIL INDÚSTRIA E COMÉRCIO LTDA.**, (a "Sociedade"), com sede na cidade de São Paulo, Estado de São Paulo, na Rua Alexandre Dumas, 2016, Bairro Chácara Santo Antônio, cujo Contrato Social, datado de 5 de fevereiro de 1991, encontra-se devidamente arquivado na Junta Comercial do Estado de São Paulo ("JUCESP") sob NIRE n.º 35.209.923.643, em sessão de 7 de fevereiro de 1991, e posteriores alterações também arquivadas na mesma JUCESP, estando a 16ª e mais recente delas, datada de 03 de julho de 1999, registrada sob nº 130.940/99-9, em sessão de 04 de agosto de 1999, têm entre si, justo e contratado, alterar referido Contrato Social, como segue:



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1. **ALTERAR** os itens (iii) e (iv) do Artigo 8º do Contrato Social, que passam a vigorar com a redação constante da consolidação abaixo;
2. **CONSOLIDAR**, tendo em vista a deliberação acima, o Contrato Social, que passa a vigorar como segue:

**"CONTRATO SOCIAL DE
SUN MICROSYSTEMS DO BRASIL INDÚSTRIA E COMÉRCIO LTDA."**



DENOMINAÇÃO, SEDE, FORO JURÍDICO E FILIAIS

Artigo 1º - A Sociedade denomina-se **SUN MICROSYSTEMS DO BRASIL INDÚSTRIA E COMÉRCIO LTDA.** e tem sua sede e foro jurídico na Rua Alexandre Dumas, 2016, Bairro Chácara Santo Antônio, Edifício "SPOP III", na cidade de São Paulo, Estado de São Paulo. A Sociedade poderá abrir novas agências, escritórios e filiais em qualquer parte do território nacional, mediante deliberação unânime das quotistas nesse sentido.

Parágrafo Único - A Sociedade mantém, ainda, os estabelecimentos abaixo relacionados, os quais têm um capital em separado, para fins fiscais, de R\$ 100,00 cada um:

- Filial na cidade de Belo Horizonte, Estado de Minas Gerais, na Rua Paraíba, 1000, 6º andar, conjunto C, "Edifício Asamar";
- Filial na cidade do Rio de Janeiro, Estado do Rio de Janeiro, na Av. Rio Branco, 1, conjunto 702;
- Filial na cidade de São Paulo, Estado de São Paulo, na Rua Stefano, 196/196B, Bairro do Cambuci; e
- Filial em Brasília, Distrito Federal, na SCN, Quadra 4, Bloco B, 100 - Conjunto 303 (parte A).

OBJETO SOCIAL

Artigo 2º - A Sociedade tem por objeto social a fabricação, utilização, importação e exportação, venda, locação, sublocação, distribuição e licença de produtos e equipamentos de informática, "hardware", "software" e quaisquer produtos e equipamentos relacionados, bem como a prestação de serviços na área de informática. A Sociedade poderá, ainda, desempenhar qualquer atividade relacionada à promoção de seu objeto social, bem como poderá



representar e prestar serviços a outras sociedades brasileiras ou estrangeiras. A Sociedade agirá por conta própria ou de outra forma permitida por lei.

DURAÇÃO

Artigo 3º - O prazo de duração da Sociedade é indeterminado.



CAPITAL SOCIAL

Artigo 4º - O capital da sociedade, totalmente subscrito, é de R\$ 1.450.000,00 (um milhão, quatrocentos e cinquenta mil reais), dividido em 1.450.000 (um milhão, quatrocentas e cinquenta mil) quotas, no valor nominal de R\$ 1,00 (um real) cada uma, distribuídas entre as quotistas da seguinte forma:

1. **SUN MICROSYSTEMS OF CALIFORNIA INC.**, detém 1.305.000 (um milhão, trezentas e cinco mil) quotas, no valor nominal total de R\$ 1.305.000,00 (um milhão, trezentos e cinco mil reais), das quais 1.291.828 (um milhão, duzentas e noventa e uma mil, oitocentas e vinte e oito) encontram-se integralizadas.
2. **SUN MICROSYSTEMS INC.**, detém 145.000 (cento e quarenta e cinco mil) quotas, no valor nominal total de R\$ 145.000,00 (cento e quarenta e cinco mil reais), que se encontram totalmente integralizadas.

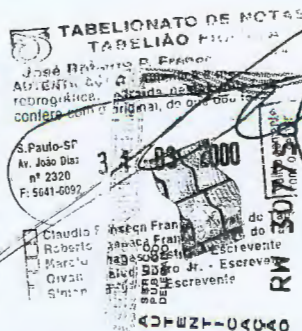
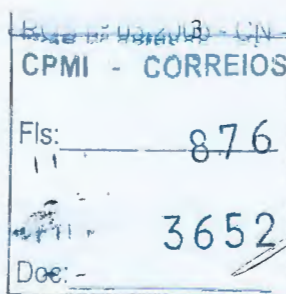
Parágrafo Primeiro - De acordo com o artigo 2º, "in fine", do Decreto n.º 3.708, de 10 de janeiro de 1919, a responsabilidade das quotistas é limitada à importância total do capital social.

Parágrafo Segundo - As 13.172 (treze mil, cento e setenta e duas) quotas remanescentes deverão ser integralizadas até 05 de outubro de 2000, em moeda corrente nacional, em bens ou em créditos, pela quotista **SUN MICROSYSTEMS OF CALIFORNIA, INC.**

Parágrafo Terceiro - Na proporção do número de quotas que possuírem, as quotistas terão preferência para a subscrição do aumento de capital.

CESSÃO E TRANSFERÊNCIA DE QUOTAS

Artigo 5º - A alienação de quotas somente será válida com a prévia e expressa autorização das quotistas representando a maioria do capital social, e desde que refletida em alteração deste Contrato Social.



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GERÊNCIA E ADMINISTRAÇÃO

Artigo 6º - A Sociedade será administrada pela quotista **SUN MICROSYSTEMS OF CALIFORNIA, INC.**, que poderá delegar poderes a um indivíduo residente no país que terá o título de Gerente Delegado e será responsável pela administração diária da Sociedade.

Parágrafo Primeiro - A quotista gerente poderá, a qualquer tempo, com ou sem causa, e sem qualquer aviso prévio, destituir o Gerente Delegado e delegar poderes a um novo.

Parágrafo Segundo - O Gerente Delegado da Sociedade está autorizado a pagar todos os valores devidos pela Sociedade às suas quotistas ou qualquer empresa do grupo societário destas, incluindo, mas não se limitando a, valores devidos por produtos adquiridos.

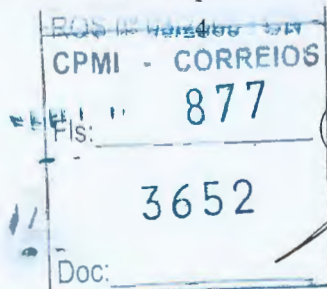
Artigo 7º - A Sociedade somente se obrigará pelos atos ou assinatura:

- (a) da quotista gerente; ou
- (b) do Gerente Delegado, agindo isoladamente; ou
- (c) de dois procuradores, agindo em conjunto e dentro dos limites estabelecidos nas respectivas procurações; ou
- (d) de um procurador com poderes especiais, agindo individualmente e dentro dos limites estabelecidos na respectiva procuração.

Parágrafo Único - As procurações outorgadas pela Sociedade deverão ser sempre e exclusivamente assinadas pelo Gerente Delegado, devendo ser expressamente identificados os poderes outorgados e, com exceção daquelas com poderes "ad judícia", terão prazo de validade determinado, que não poderá ser superior a 1 (um) ano, observado o disposto no Artigo 8º (i) abaixo.

Artigo 8º - Os seguintes atos estão sujeitos ao prévio e expresso consentimento das quotistas representando a maioria do capital social:

- (i) nomeação de procuradores para representar a Sociedade na prática dos atos ou atividades abaixo listados, observado o prazo de validade previsto no Parágrafo Único do Artigo 7º acima;
- (ii) transferências entre contas correntes bancárias da Sociedade, cujo valor exceda o montante equivalente em reais a US\$ 500.000,00 (quinhentos mil dólares americanos).

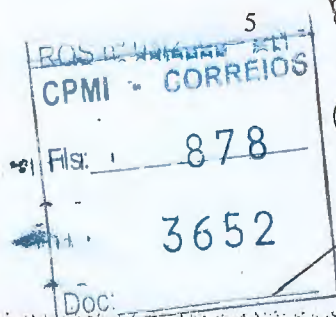


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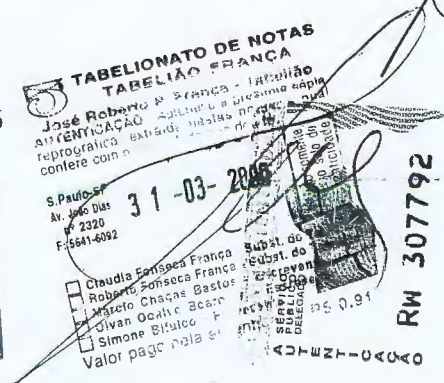
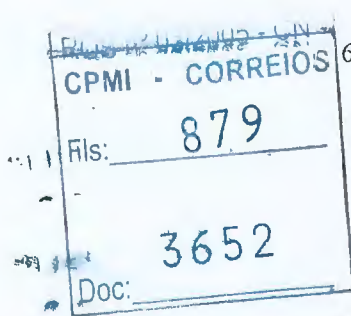
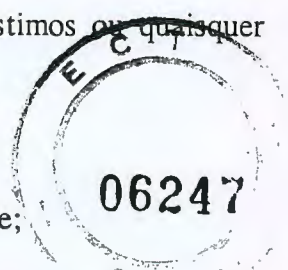


- (iii) pagamento de tributos relacionados à importação e revenda de produtos Sun Microsystems, ou pagamento de montantes relacionados à importação de produtos Sun Microsystems, incluindo, mas não se limitando a, preços, custos de transporte e seguro, quantias devidas à trading company utilizada pela Sociedade, ou pagamento de folhas de pagamento, cujos valores excedam o equivalente em reais a US\$ 1.000.000,00 (um milhão de dólares dos Estados Unidos);
- (iv) assinatura de quaisquer contratos de câmbio relacionados à remessa de fundos para o exterior, cujos valores excedam o equivalente em reais a US\$ 1.000.000,00 (um milhão de dólares dos Estados Unidos);
- (v) implementação de transações de empréstimo (sob Resolução No. 63 do Banco Central do Brasil) para financiar importação de produtos das próprias quotistas da Sociedade ou de empresas do mesmo grupo societário, tendo a Sociedade como importadora, cujo valor exceda o equivalente em reais a US\$ 1.000.000,00 (um milhão de dólares dos Estados Unidos), por transação;
- (vi) implementação de transações de empréstimo (sob Resolução No. 63 do Banco Central do Brasil) para financiar importação de produtos de quaisquer terceiros que não do grupo da Sociedade, tendo a Sociedade como importadora, cujo valor exceda o equivalente em reais a US\$ 250.000,00 (duzentos e cinquenta mil dólares dos Estados Unidos), por transação;
- (vii) implementação de transações de empréstimos (sob Resolução No. 63 do Banco Central do Brasil) para financiar importações de produtos quando o revendedor for o importador e a Sociedade for a parte interveniente, cujo valor exceda o equivalente em reais a US\$ 150.000,00 (cento e cinquenta mil dólares dos Estados Unidos), por transação;
- (viii) pagamento de qualquer despesa que não esteja descrita neste Artigo, cujo valor exceda o equivalente em reais a US\$ 75.000,00 (setenta e cinco mil dólares dos Estados Unidos);
- (ix) reinvestimento de lucros e/ou distribuição de dividendos de outra forma que não a disposta no Artigo 9º abaixo;
- (x) estabelecimento de novos negócios não relacionados aos da Sociedade;
- (xi) criação de novas linhas de produtos da Sociedade através de importação, fabricação, montagem, utilização, venda ou distribuição de produtos;
- (xii) a fusão da Sociedade com outras entidades, ou a venda ou aquisição de participação societária da Sociedade em outras entidades, independentemente da forma de organização societária destas entidades;



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- (xiii) exercício dos direitos de voto, oneração, transferência ou disposição de ações ou quotas que a Sociedade possua em outras sociedades a ela afiliadas ou não;
- (xiv) emissão ou resgate de títulos ou obrigações da Sociedade (que não títulos de crédito relativos aos negócios normais da Sociedade);
- (xv) a não ser que de outra forma disposto neste Artigo, garantia de empréstimos ou quaisquer obrigações de terceiros, sejam pessoas físicas ou jurídicas;
- (xvi) concessão de empréstimos;
- (xvii) organização, dissolução ou liquidação de qualquer subsidiária da Sociedade;
- (xviii) compra e venda de ativos permanentes da Sociedade que tenham um valor de mercado superior ao equivalente em reais a US\$ 75.000,00 (setenta e cinco mil dólares dos Estados Unidos);
- (xix) licença do uso ou qualquer outra forma de divulgação de tecnologia, patenteada ou não, dados técnicos, know-how, ou de qualquer outra informação confidencial que tenha sido transferida ou revelada à Sociedade;
- (xx) contratação de qualquer empregado cuja remuneração anual total (incluindo bônus, salário *in natura*, etc.) exceda ao equivalente em reais a US\$ 100.000,00 (cem mil dólares dos Estados Unidos);
- (xxi) assinatura de quaisquer contratos ou acordos, com exceção dos contratos (i) que tenham especial disposição neste Artigo; (ii) de locação de imóveis, cujo valor exceda ao equivalente em reais a US\$ 100.000,00 (cem mil dólares dos Estados Unidos) por mês; (iii) comerciais para venda, licença ou distribuição de produtos das quotistas da Sociedade ou de empresas de seu grupo societário, de qualquer valor; e (iv) de prestação de serviços pela Sociedade, de qualquer valor;
- (xxii) tomada de qualquer iniciativa em relação à dissolução ou liquidação da Sociedade;
- (xxiii) tomada de qualquer iniciativa em relação a direitos de propriedade industrial; e
- (xxiv) tomada de empréstimos bancários de curto prazo (um a sete dias) e, na forma de "hot money", operação de conta garantida, cheque especial ou descontos de duplicatas de valores superiores ao equivalente em reais a US\$ 150.000,00 (cento e cinquenta mil dólares dos Estados Unidos).



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EXERCÍCIO SOCIAL, BALANÇO E LUCROS



Artigo 9º - O exercício social se encerra no dia 31 de dezembro de cada ano, data em que serão levantadas as demonstrações financeiras do exercício, com observância das prescrições legais, sendo assinadas pelo gerente delegado e por contabilista devidamente registrado perante os órgãos competentes. Cópia autêntica das demonstrações financeiras deverá ser distribuída às quotistas no prazo de 3 (três) meses a contar do encerramento do exercício social.

Parágrafo Primeiro - Os resultados apurados ao final de cada exercício social deverão ter o destino que vier a ser determinado pelas quotistas representando a maioria do capital social. A distribuição de lucros, se houver, será feita às quotistas na proporção de sua participação no capital social, salvo deliberação em contrário tomada pelas quotistas representando a maioria do capital social.

Parágrafo Segundo - A Sociedade, por deliberação das quotistas representando a maioria do capital social, poderá distribuir lucros à conta dos lucros acumulados ou à conta de reservas de lucros existentes no mais recente balanço anual.

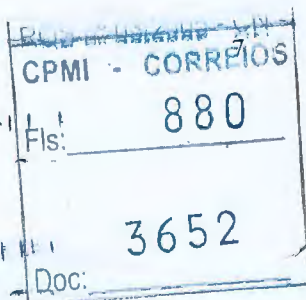
Parágrafo Terceiro - A Sociedade, por deliberação das quotistas representando a maioria do capital social, poderá levantar balanço e distribuir lucros em períodos menores.

Parágrafo Quarto - A Sociedade, por deliberação das quotistas representando a maioria do capital social, poderá capitalizar estes lucros, total ou parcialmente, devendo os mesmos ser atribuídos às quotistas na proporção da participação que cada uma detém no capital da Sociedade.

DIREITO DE INSPEÇÃO

Artigo 10 - Cada quotista terá o direito de inspecionar, examinar e fazer cópias de livros, arquivos e registros contábeis da Sociedade durante o horário normal de trabalho da mesma.

Parágrafo Único - Os livros fiscais e demonstrativos financeiros da Sociedade poderão ser auditados anualmente por uma firma de auditoria renomada indicada pelas quotistas representando a maioria do capital social. Se necessária, essa auditoria realizar-se-á imediatamente após a conclusão de cada exercício social da Sociedade.





ALTERAÇÃO DO CONTRATO SOCIAL

Artigo 11 - O presente Contrato Social poderá ser alterado, a qualquer tempo e em qualquer de seus aspectos, por resolução das quotistas representando a maioria do capital social. O correspondente instrumento de alteração será válido quando celebrado pelas quotistas que tiverem votado a favor de aludida resolução.

DISSOLUÇÃO E LIQUIDAÇÃO DA SOCIEDADE

Artigo 12 - A Sociedade entrará em liquidação por deliberação das quotistas representando a maioria do capital social. Neste caso, o liquidante será a quotista gerente ou alguém por ela indicado. Os ativos da Sociedade deverão ser utilizados para a quitação de seu passivo, devendo o saldo, se existente, ser dividido entre as quotistas na proporção de sua participação no capital social.

Artigo 13 - No caso de exclusão de qualquer quotista, ou morte ou incapacidade de quotista pessoa física, ou liquidação ou falência de quotista pessoa jurídica, a Sociedade não se dissolverá, salvo se assim decidido pelas quotistas. A apuração e pagamento dos haveres da quotista excluída, falecida, incapacitada, em liquidação ou falida seguirá as regras que serão então estabelecidas pelas quotistas.

TRANSFORMAÇÃO

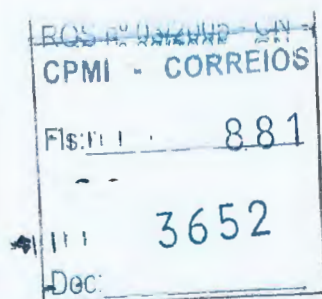
Artigo 14 - A Sociedade poderá adotar qualquer outro tipo societário por resolução das quotistas representando a maioria do capital social. As quotistas desde já renunciam expressamente ao direito de retirada previsto na legislação.

LEGISLAÇÃO APLICÁVEL

Artigo 15 - A Sociedade será regida pelos dispositivos do Decreto nº 3.708, de 10 de janeiro de 1919 e, subsidiariamente, no que for aplicável, pelos dispositivos da Lei nº 6.404/76 e alterações posteriores."

DISPOSIÇÕES TRANSITÓRIAS

Nos termos do Artigo 6º do Contrato Social, a quotista gerente SUN MICROSYSTEMS OF CALIFORNIA, INC. ratifica a nomeação do Sr. João Antônio Alves, brasileiro, casado, administrador, portador da Carteira de Identidade RG nº 4.253.920 SSP-SP e inscrito no CPF/MF sob o nº 194.101.318-04, residente e domiciliado na cidade de São Paulo, Estado de São Paulo, na



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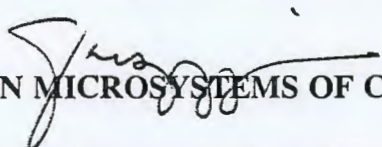
Rua Pará, 81, apto. 61, para o cargo de Gerente Delegado da Sociedade, por prazo indeterminado, podendo praticar os atos necessários ou convenientes à administração da Sociedade.

E, estando assim justas e contratadas, as partes acima qualificadas assinam o presente instrumento em 4 (quatro) vias de igual teor e forma, na presença de duas testemunhas abaixo assinadas.

São Paulo, 25 de setembro de 1999.


SUN MICROSYSTEMS, INC.

p.p. José Augusto Caleiro Regazzini

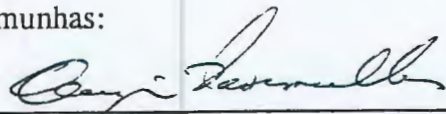

SUN MICROSYSTEMS OF CALIFORNIA, INC.

p.p. José Augusto Caleiro Regazzini

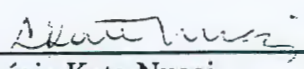


Testemunhas:

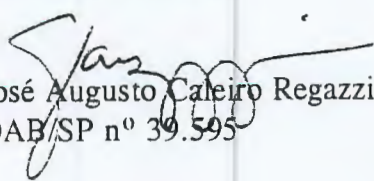
1.


Nome: Cinyra Azevedo de Vasconcellos
R.G.: 4.247.864-SSP/SP
CIC: 789.469.647-15

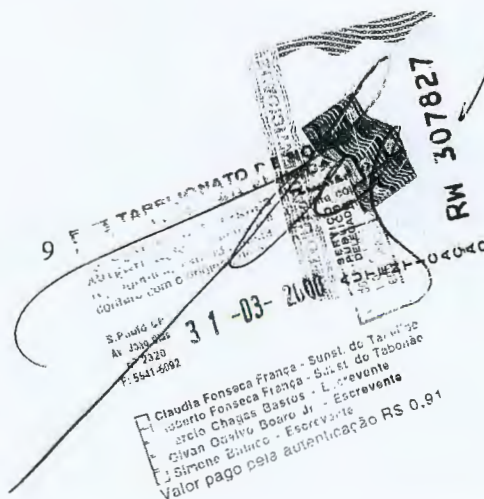
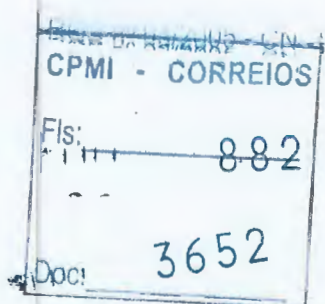
2.


Nome: Lígia Kate Nucci
R.G.: 7.613.876-SSP/SP
CIC: 046.595.178-37

Visto do Advogado:


José Augusto Caleiro Regazzini
OAB/SP nº 39.595

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República Federativa do Brasil

Magnolia Yazbek Pereira

Tradutora Pública e Intérprete Comercial

C. P. F. 020522028-20

Matriculada na Junta Comercial do Estado de São Paulo sob nº 333

IDIOMA: PORTUGUÊS - INGLÊS



Nº da tradução / versão: 3977 livro nº 31 fls. 305

Certifico e dou fé, para os devidos fins, que nesta data me foi apresentado um documento, no idioma inglês, com a seguinte identificação --DECLARAÇÃO DE REGISTRO DO CERTIFICADO ISO 9000 DADA PELA SUN -- para que o traduzisse para o vernáculo no seguinte teor:

Papel Timbrado:

Sun

CERTIFICADO DE REGISTRO - ISO 9000

Eu, Kuljit Rai, Gerente de Logística da Sun Microsystems Computer Company, uma empresa organizada sob as leis do Estado da Califórnia, E.U.A. e tendo a sua sede no seguinte endereço: 2550 Garcia Avenue, Mountain View, Califórnia 94043, E.U.A. (a "Empresa"), certifico pelo presente que apenso ao presente encontra-se uma cópia fiel e autêntica dos Registros ISO 9000 da Empresa e de suas coligadas e que os referidos Registros permanecem em pleno vigor e efeito.

EM TESTEMUNHO DO QUE, assinei o presente neste dia 23 de janeiro de 1996.

SUN MICROSYSTEMS COMPUTER COMPANY

Por: (Ass.)

Kuljit Rai
Gerente de Logística

Carimbo: CHARLOTTE MAGNONE
Comissionamento Nº 1069658
Notária Pública - Califórnia
Condado de Alameda
Meu comissionamento expira em 20 de agosto de 1999

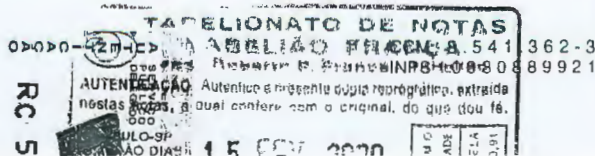
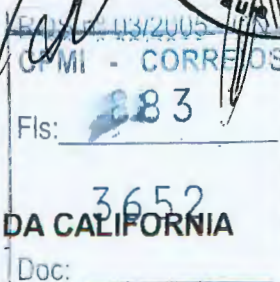
Apenso ao documento supra havia a seguinte legalização:

RECONHECIMENTO PARA TODOS OS FINS DO ESTADO DA CALIFORNIA

(Somente os itens assinalados ou preenchidos foram incluídos na tradução)

Estado da Califórnia

RUA CANÁRIO, 515 - APTº 121 CEP 04521-002
TEL.: 530-0906 - SÃO PAULO - SP



43



State of California

SECRETARY OF STATE



I, BILL JONES, Secretary of State of the State of California, hereby certify:

That Patrick O'Connell, whose name appears on the annexed certificate, was on February 5, 1996, the duly elected, qualified and acting County Clerk of the County of Alameda in said State.

That the seal affixed thereto is the seal of said County; that the signature thereon appears to be the signature of Patrick O'Connell, County Clerk and that the annexed certificate is in due form and by the proper officer.

IN WITNESS WHEREOF, I execute
this certificate and affix the Great
Seal of the State of California this
8th day of February, 1996.

Bill Jones

BILL JONES
Secretary of State

By *Dee Antello*
Deputy



SP-4407A



3652

Doc:

03000-12M-4C4

RC 512655



BELIONATO DE NOTAS
TABELIAO FRANÇA
João P. França - Tabelião
A - Autentico a presente cópia
extraída nestas notas, a qual confere
do que dou fé, verso e anverso.
S. Paulo - SP

h

f

44

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

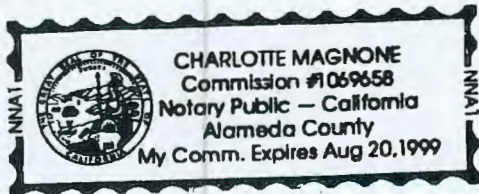
State of California

County of Alameda

On Jan. 29, 1996 before me, Charlotte Magnone
Date Name and Title of Officer (e.g., "Jane Doe, Notary Public")

personally appeared Kuljit Rai
Name(s) of Signer(s)

☐ personally known to me - OR - ☒ proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s) or the entity upon behalf of which the person(s) acted, executed the instrument.



WITNESS my hand and official seal.

Charlotte Magnone
Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: Registration Certification

Document Date: 1/23/96 Number of Pages: 1

Signer(s) Other Than Named Above: NONE

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

- ☐ Individual
☐ Corporate Officer
 Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney-in-Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____

RIGHT THUMBPRINT
OF SIGNER
Top of thumb here

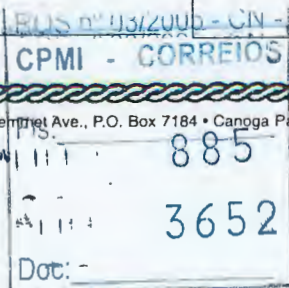
Signer Is Representing: _____

Signer's Name: _____

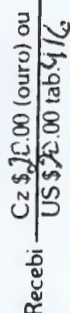
- ☐ Individual
☐ Corporate Officer
 Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney-in-Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____

RIGHT THUMBPRINT
OF SIGNER
Top of thumb here

Signer Is Representing: _____



45



YEE----- Escrivão _____ da Corte do Condado de
Santa Clara Estado Califórnia Estados Unidos da America.

The legalization of this document does not imply approval or acceptance of its contents.

São Francisco, 01 de março de 1967

NOEMIA WAINER
Vice - Consul

POS nº 03/2002 - CN -
CPMI - CORREIOS

File: 886

3652

Dec:

SERVICO
PUBLICO
DELEGADO

RC 512661

ABE - LIONATO DE NOTAS
TABELIÃO FRANÇA
João Roberto P. França - Tabelião

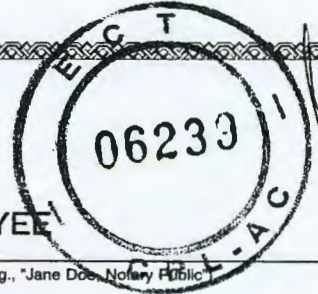
AUTENTICACAO - / identico a presente copia reprografica, extrai-

S. PAULO-SP
15 DEZ 2030

AV. JOAO DUTRA
Nº 2320
F.: 5041-5092

19-10-1964
 Dr. João Frenco Freixo - Subst. de Tabaco -
 100 mg. de Tabaco -

45



CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California

County of San Mateo

On March 28, 1997 before me, MEI-CHI YEE
Date Name and Title of Officer (e.g., "Jane Doe, Notary Public")

personally appeared Robert B. Macfitchie
Name(s) of Signer(s)

- ☒ personally known to me
☐ proved to me on the basis of satisfactory evidence

to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.



WITNESS my hand and official seal.

Mei-chi Yee
Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: _____

Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

- ☐ Individual
☐ Corporate Officer
Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney-in-Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____

RIGHT THUMBPRINT
OF SIGNER
Top of thumb here

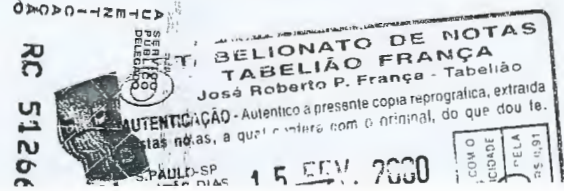
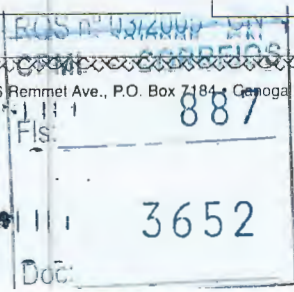
Signer Is Representing: _____

Signer's Name: _____

- ☐ Individual
☐ Corporate Officer
Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney-in-Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____

RIGHT THUMBPRINT
OF SIGNER
Top of thumb here

Signer Is Representing: _____



[Handwritten signature]



A

CONSULADO GERAL DO BRASIL EM SÃO FRANCISCO



Reconheço verdadeiro(a) o(a) assinatura de BILL JONES, Secretário
de Estado do Estado da Califórnia, EUA.-

E, para constar onde convier, mandei passar o presente, que assinei e fiz selar com o Selo deste Consulado. Dispensado reconhecimento de firma de acordo com o Decreto nº 84.451, do 31-01-1980. A legalização deste documento não implica aceitação ou aprovação de seu conteúdo.

The legalization of this document does not imply approval or acceptance of its contents.

São Francisco, 13 de fevereiro de 19 96

Noemia Wainer
NOEMIA WAINER
Vice - Consul



Recibi Cz \$ 22.00 tab 4/6
US \$ 22.00 tab 4/6

RQS nº 03/2002 - L. 11
CPMI - CORREIOS
Fls: 888
3652
Doc:

RC 512663

TABELIONATO DE NOTAS
TABELIÃO FRANÇA
Us. só Roberto P. França - Tabelião

AUTENTICAÇÃO - Autentico a presente cópia reprográfica, extraída destas notas a qual contém com o original, do que dou fé.

15 FEV. 2000

AV. JOÃO DIAS
Nº 332
F.: 364-7092

Noemia Wainer

☒ Noemia Fonseca França - Subst. do Tabelião	SELO DE AUTENTICAÇÃO
☒ Roberto Fonseca França - Subst. do Tabelião	VALOR PAGO PELA
☒ Oivan Calvo Boaro Jr. - Escrevente	AUTENTICAÇÃO R\$ 0,91
☒ Simão Bitulco - Escrevente	
☒ Márcio Chagas Bastos - Escrevente	



COUNTY CLERK'S CERTIFICATE AS TO NOTARY PUBLIC

No. 54327

State of California }
County of Alameda } ss

I, Patrick O'Connell, County Clerk of Alameda, State of California, having by law a seal, do hereby certify that

CHARLOTTE MAGNONE

whose name is subscribed to the attached certificate of proof, acknowledgement or affidavit, was at the time of taking such proof, acknowledgement or affidavit a Notary Public in and for said Alameda County, duly commissioned and qualified and residing in said county, and was as such an officer of the State of California, duly authorized by the laws hereof to administer oaths or affirmations and to take and certify the proof and acknowledgement of deeds and other instruments in writing to be recorded in said State, and that full faith and credit are and ought to be given all his official acts as such Notary Public, and that I am well acquainted with the handwriting of said Notary Public and verily believe that the signature to the attached certificate is his genuine signature and that the annexed instrument is executed and acknowledged according to the laws of the State of California, and I further certify that an impression of the seal of said Notary Public is not required by law to be filed in my office

In witness whereof I have hereunto set my hand and affixed my official seal

Seal

Patrick O'Connell
County Clerk of the County of Alameda, State of California

CPMI - CORREIOS
Fls: 889
Doc: 3652

RC 512664
TABELIONATO DE NOTAS
TABELIAO FRANCA
José Roberto P. França - Tabelião
AUTENTICAÇÃO - Autentico a presente cópia reprográfica, extraída nestas notas, a qual confere com o original, do que dou fé.
S. PAULO-SP
AV. JOÃO DIAS
Nº 2220
F. 35.47-8092
15-FEV. 2000
Cláudia Fonseca França - Subst. do Tabelião
Roberto Fonseca França - Subst. do Tabelião
Oivan Odalvo Boaro Jr. - Escrevente
Simone Bifulco - Escrevente
Mário Chagas Bastos - Escrevente
V. 100 SOBRE COM O
SELO DE AUTENTICIDADE
VALOR PAGO PELA
AUTENTICAÇÃO R\$ 0,91



ISO 9000 REGISTRATION CERTIFICATION



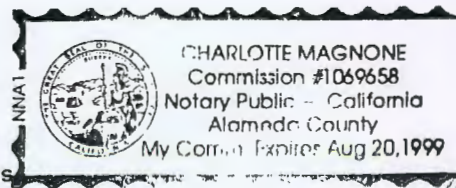
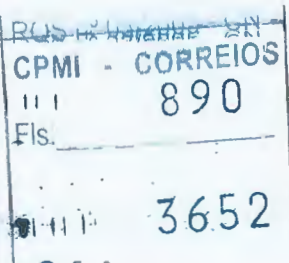
I, Kuljit Rai, Logistics Manager of Sun Microsystems Computer Company, a corporation organized under the laws of the State of California, U.S.A. and having its principal office at 2550 Garcia Avenue, Mountain View, California 94043, U.S.A. (the "Corporation"), hereby certify that attached hereto is a true and accurate copy of the ISO 9000 Registrations of the Corporation and its affiliates and that such Registrations remain in full force and effect.

IN WITNESS WHEREOF, I hereunto set my hand this 23rd day of January, 1996.

SUN MICROSYSTEMS COMPUTER COMPANY

By:


Kuljit Rai
Logistics Manager





República Federativa do Brasil

Magnolia Yazbek Pereira

Tradutora Pública e Intérprete Comercial

C. P. F. 020522028-20

Matriculada na Junta Comercial do Estado de São Paulo sob nº 333

IDIOMA: PORTUGUÊS - INGLÊS



Nº da tradução / versão: 3977 livro nº 3/ fls. 306
Condado de Alameda

Em 29 de janeiro de 1996 perante mim, CHARLOTTE MAGNONE, Notária Pública, pessoalmente compareceu Kuljit Rai, certificado com base em prova satisfatória, como sendo a pessoa cujo nome se encontra subscrito no instrumento anexo e confirmou perante mim ter sido ela a pessoa que assinou o mesmo de acordo com a sua capacidade autorizada e que, através da sua assinatura no instrumento, a pessoa ou entidade, em cujo nome agiu, assinou o instrumento.

Em testemunho do que, apus a minha assinatura e meu selo oficial.

(Assinatura) - CHARLOTTE MAGNONE - Notária Pública

Selo Oficial

Carimbo: CHARLOTTE MAGNONE

Comissionamento Nº 1069658

Notária Pública - California

Condado de Alameda

Meu comissionamento expira em 20 de agosto de 1999



SEÇÃO OPCIONAL

Embora as leis não exijam que o Notário preencha os dados abaixo, o fato de fazê-lo poderá ser muito importante para as pessoas que dependem do documento e poderão evitar que o presente seja apenso ou removido de forma fraudulenta.

Descrição do Documento Apenso

Título ou Tipo de Documento: Certificado de Registro

Número de Páginas: 1

Data do Documento: 23 de janeiro de 1996

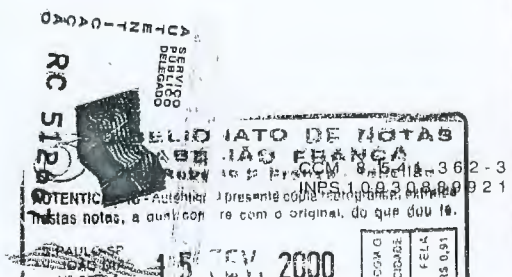
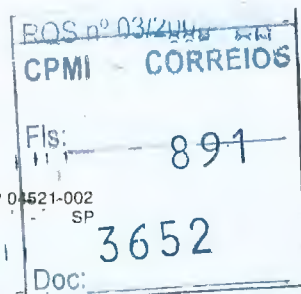
Signatário além do acima nomeado: nenhum

ESTADO DA CALIFORNIA

Secretário de Estado

EU, BILL JONES, Secretário de Estado da California, certifico pelo presente:

RUA CANÁRIO, 515 - APTº 121 CEP 04521-002
TEL.: 530-0906 - SÃO PAULO - SP





República Federativa do Brasil

Magnolia Yazbek Pereira

Tradutora Pública e Intérprete Comercial

C. P. F. 020522028-20

Matriculada na Junta Comercial do Estado de São Paulo sob nº 333

IDIOMA: PORTUGUÊS - INGLÊS



Nº da tradução / versão: 3277 livro nº 31 fls. 308

instrumentos escritos para serem registrados no referido Estado e que total fé e crédito são e deverão ser dados a todos os seus atos oficiais como Notária Pública e que estou perfeitamente familiarizado com a escrita da referida NOTÁRIA PÚBLICA e creio ser autêntica a assinatura aposta ao certificado apenso e que o instrumento apenso foi assinado e reconhecido de acordo com as leis do Estado da Califórnia e certifico ainda que a lei não exige que uma impressão do carimbo da referida Notária Pública seja arquivada em meu gabinete.

EM TESTEMUNHO DO QUE, assinei o presente e afixei o meu selo oficial neste dia 5 de fevereiro de 1996

(Ass.) PATRICK O'CONNELL

Escrivão do Condado de Alameda, Estado da Califórnia

Legalização Consular:

CONSULADO GERAL DO BRASIL EM SÃO FRANCISCO

Reconheço verdadeira a assinatura, no documento anexo, de BILL JONES, Secretário de Estado do Estado da Califórnia, Estados Unidos da América. E, para constar onde convier, mandei passar o presente que assinei e fiz selar com o Selo deste Consulado.

Dispensado reconhecimento de firma de acordo com o Decreto N°84.451, de 31-01-1980. A legalização deste documento não implica aceitação ou aprovação de seu conteúdo.

São Francisco, 13 de fevereiro de 1996

(Ass.) Noemia Wainer
Vice-Cônsul

Carimbo e Selo Consular

Recebi CZ\$20.00 (ouro) ou US\$20.00 - Tab.416

Nada mais constava do documento acima que devolvo juntamente com esta tradução, a qual conferi, achei conforme e assino. DOU FÉ.

São Paulo, 21 de janeiro de 1997

Recibo: 2054
Emolumentos:

RQS nº 03/2002 - UN
CPMI - CORREIOS
Fls: 892
3652
Doc:

Magnolia Yazbek Pereira



República Federativa do Brasil

Magnolia Yazbek Pereira

Tradutora Pública e Intérprete Comercial

C. P. F. 020522028-20

Matriculada na Junta Comercial do Estado de São Paulo sob nº 333

IDIOMA: PORTUGUÊS - INGLÊS



Nº da tradução / versão: 3977 livro nº 31 fls. 37

Que Patrick O'Connell, cujo nome aparece no certificado anexo, era em 5 de fevereiro de 1996 o Escrivão do Condado de Alameda no referido Estado.

Que o selo afixado ao mesmo é o selo de referido Condado; que a assinatura ali aposta, de acordo com o meu conhecimento, é a assinatura de Patrick O'Connell, Escrivão do Condado e que o certificado apenso foi devidamente preparado e assinado pelo dirigente competente.

EM TESTEMUNHO DO QUE, assinei este certificado e afixei o Grande Selo do Estado da Califórnia neste dia 8 de fevereiro de 1996

(Assinatura) - BILL JONES - Secretário de Estado

GRANDE SELO DO ESTADO DA CALIFORNIA

Apenso ao documento havia o seguinte certificado:

Nº 54327

CERTIFICADO DO ESCRIVÃO DO CONDADO

EM RELAÇÃO AO NOTÁRIO PÚBLICO

ESTADO DA CALIFORNIA)

) FAZEM SABER:

CONDADO DE ALAMEDA)

Eu, Patrick O'Connell, Escrivão do Condado de Alameda, Estado da Califórnia, tendo por lei um selo, certifico pelo presente que

CHARLOTTE MAGNONE

cujo nome se encontra subscrito na declaração juramentada, depoimento, certificado de reconhecimento ou prova acima, era, na ocasião em que a mesma foi prestada, uma NOTÁRIA PÚBLICA em e para o referido Condado de Alameda, devidamente comissionada e habilitada e residente no referido condado, e como tal, um oficial no Estado da Califórnia, devidamente autorizada pelas suas leis a receber juramentos ou declarações e a receber e certificar escrituras e outros



3652



República Federativa do Brasil

Magnolia Yazbek Pereira

Tradutora Pública e Intérprete Comercial

C. P. F. 020522028-20

Matriculada na Junta Comercial do Estado de São Paulo sob nº 333

IDIOMA: PORTUGUÊS - INGLÊS



Nº da tradução / versão: 3978 livro nº 31 fls. 309

Certifico e dou fé, para os devidos fins, que nesta data me foi apresentado um documento, no idioma inglês, com a seguinte identificação --CÓPIA DE UM CERTIFICADO - ISO 9002-- para que o traduzisse para o vernáculo no seguinte teor:

BSI REGISTERED FIRM
(FIRMA REGISTRADA NA BSI)
BRITISH STANDARDS INSTITUTION
(INSTITUIÇÃO BRITÂNICA DE PADRÕES)

O presente certifica que a

Sun Microsystems
Computer Corporation

(Sun Microsystems - Empresa de Computadores)

WWOPS, US Sites, 1421 California Circle
Milpitas, California 95035, E.U.A.

é a detentora do Certificado No. FM 14854, e opera um sistema de gerenciamento de qualidade que atende às exigências da BS EN ISO 9002 :1994 em relação às atividades detalhadas no escopo do registro

Originalmente registrada em 19 de março de 1996

Este certificado não expira. Para verificar a sua validade telefone + 44 (0) 1908 227700
(Ass.)

Diretor e Gerente Geral
BSI Quality Assurance

BSI Quality Assurance P.O.Box 375 Milton Keynes - Reino Unido - MK14 6LL
(Símbolo)

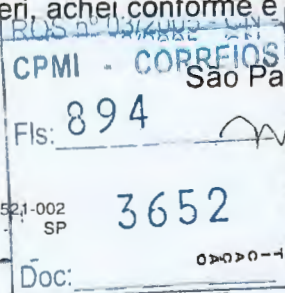
A British Standards Institution foi constituída de acordo com documento constitutivo real.

Observação: este não é um documento legal e não deverá ser usado como tal.

Nada mais constava do documento acima que devolvo juntamente com esta tradução, a qual conferi, achei conforme e assino. DOU FÉ.

Recibo: 2054
Emolumentos:

RUA CANÁRIO, 515 - APTº 121 CEP. 04521-002
TEL.: 530-0906 - SÃO PAULO - SP

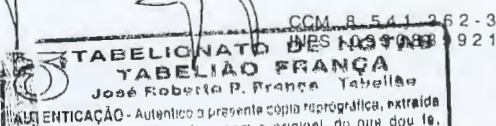


São Paulo, 21 de janeiro de 1997

Fls: 894

3652

Doc:





República Federativa do Brasil

Magnolia Yazbek Pereira

Tradutora Pública e Intérprete Comercial

C. P. F. 020522028-20

Matriculada na Junta Comercial do Estado de São Paulo sob nº 333

IDIOMA: PORTUGUÊS - INGLÊS



Nº da tradução / versão:3979..... livro nº 31..... fls. 312.....

Certifico e dou fé, para os devidos fins, que nesta data me foi apresentado um documento, no idioma inglês, com a seguinte identificação --CÓPIA DE UM CERTIFICADO - ISO 9001-- para que o traduzisse para o vernáculo no seguinte teor:

BSI REGISTERED FIRM

(FIRMA REGISTRADA NA BSI)

CERTIFICADO DE REGISTRO
DE UMA FIRMA DE CAPACIDADE AVALIADA

O presente certifica que a

SUN MICROSYSTEMS INC. - SUNSERVICE

EMPRESA DE ATENDIMENTO A CLIENTES DOS E.U.A.

é a detentora do Certificado No. FS 31168, datado de 10 de abril de 1995

para fabricar os produtos ou prestar os serviços relativos ao
Apêndice apenso ao mesmo e de conformidade com o

BS EN ISO 9001: 1994

Assinado por e em nome da BSI (Ass.) - Diretor

BSI

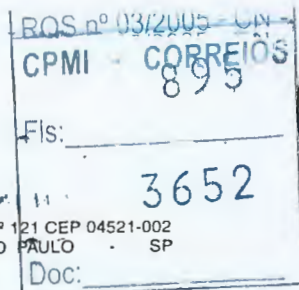
Nada mais constava do documento acima que devolvo juntamente com esta tradução, a qual conferi, achei conforme e assino. DOU FÉ.

São Paulo, 21 de janeiro de 1997

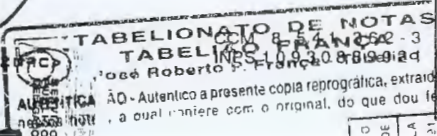
Recibo: 2054

Emolumentos:

Magnolia Yazbek Pereira



RUA CANÁRIO, 515 - APTº 121 CEP 04521-002
TEL.: 530-0906 - SÃO PAULO - SP





Certificate of Registration of a Firm of Assessed Capability

This is to certify that

SUN MICROSYSTEMS INC - SUNSERVICE
US CUSTOMER SERVICE

holds Certificate No. *FS 31168* dated *10 April 1995*

to produce goods or provide services in respect of the
Appendix attaching thereto and in accordance with

BS EN ISO 9001 : 1994

Signed for and on behalf of BSI

Director

BSI	03/04/95
CPMI	CORREIOS
896	
3652	



RU 129630

56



Certificate of Registration

This is to certify that

**Sun Microsystems
Computer Corporation**

**WWOPS, US Sites, 1421 California Circle
Milpitas, California 95035, U S A**

hold Certificate No. FM 14854 and operate a quality management system which complies with the requirements of BS EN ISO 9002:1994 for the activities detailed in the scope of registration.

Originally registered 19 March 1996.

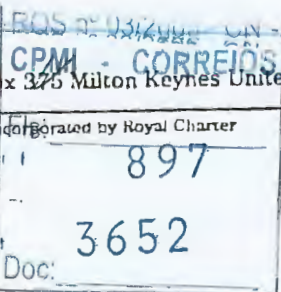
This certificate does not expire. To check its validity telephone +44 (0) 1908 227700

Director and General Manager
BSI Quality Assurance



BSI Quality Assurance PO Box 375 Milton Keynes United Kingdom

The British Standards Institution is incorporated by Royal Charter



document and cannot be used as such.
P121 Issue 5

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Brasília, 03 de Maio de 2000.

À Empresa Brasileira de Correios e Telégrafos - ECT
Comissão Especial de Licitação da Administração Central - CEL/AC
SBN Quadra 01, Bloco A, 4.o Andar, Ala Norte
Brasília/DF, CEP: 70002-900

At. : Benedito Medeiros Neto - Presidente

Ref.: Concorrência Pública 001/2000
Abertura: 03/Maio/2000

DECLARAÇÃO

A SUN Microsystems do Brasil Indústria e Comércio Ltda, estabelecida à Alexandre Dumas, 2016, em São Paulo-SP, inscrita no CNPJ: 65.497.745/0001-53, declara que a prestação dos serviços de instalação, treinamento, suporte e manutenção nos produtos (SUN) propostos, para atender ao certame acima referenciado, serão efetuados diretamente por nós, através da nossa Divisão de Serviços Enterprise Services.

Abaixo indicamos nossa rede de empresas credenciadas pela SUN:

Empresa: Cobra Computadores
Base: CAT-ARA
Responsável: Djalma Melo Bacelar/Daybe (Tecnica)
Endereço: Rua Santa Luzia, 157 - Centro
CEP: 49010-310
Cidade: ARACAJU
Estado: SE
Fone: (079) 214-0123
Fax: (079) 211-2387
E-Mail: catara@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-BEM
Responsável: Geraldo Pantoja/Jorge Dias
Endereço: Av. Conselheiro Furtado, 757 - Altos Batista Campos
CEP: 66025-160
Cidade: BELÉM
Estado: PA
Fone: (091) 222-4718/4099/4784/4765
E-Mail: catbem@cobra.com.br j.dias@zipmail.com.br

RQS nº 03/2000 - 03/2000	
CPMI - CORREIOS	
Fis:	898
Doc:	3652

Handwritten signatures and the number 58.



Empresa: Cobra Computadores
Base: CAT-BEL
Responsável: Orlando Versiani Rodrigues/Eduardo Silva
Endereço: R. Ceará, 1566 - 4º e 5º andar - Funcionários
CEP: 30150-311
Cidade: BELO HORIZONTE
Estado: MG
Fone: (031) 281-2955 (Hw)
(031) 281-2900 (Sw)
Fax: (031) 227-0763
E-Mail: catbel@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-BRA
Responsável: Márcia Bezerra de Araujo /Zila/Rosangela/Flavio
Endereço: SEPN 511 Bl. B, 57 Ed. Bittar III - 3º andar - Asa Norte
CEP: 70750-527
Cidade: BRASILIA
Estado: DF
Fone: (061) 349-2400
Pager: (061) 321-0410 - cód.: 4700
Fax: (061) 349-3930
E-Mail: getec_rebra@cobra.com.br
catbra@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-CGR
Responsável: Jorge Mashanori Oshiro
Endereço: R. 14 de Julho, 1198 - Centro
CEP: 79004-393
Cidade: CAMPO GRANDE
Estado: MS
Fone: (067) 782-5259
Fax: (067) 782-5259
E-Mail: catcgr@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-CUI
Responsável: Luis Artur da Rocha Almeida
Endereço: Av. Pres. Castelo Branco, 1268 - 4º andar-Cj. A
CEP: 78045-610
Cidade: CUIABÁ
Estado: MT
Fone: (065) 624-1604/624-9448
Fax: (065) 624-1604

ROS nº 03/2000	
CPMI - CORREIOS	
Fls:	899
Doc:	3652

Handwritten signatures and initials, including a large 'S' and '59'.



Empresa: Cobra Computadores
Base: CAT-CUR
Responsável: Eduardo Schleder/Mauricio
Endereço: R. Amintas de Barros, 144 - 4º ao 6º andar - Ed. Luiz - Napodamo - Centro
CEP: 80060-200
Cidade: CURITIBA
Estado: PR
Fone: (041) 322-1424
Fax: (041) 322-1424 / 324-6585
E-Mail: Catcur@cobra.com.br
mauriciomvg@netscape.net

Empresa: Cobra Computadores
Base: CAT-FLO
Responsável: Sonia
Endereço: Av. Osmar Cunha, 183 - Bl. C - Sala 801 - Ed. Ceisa Center
CEP: 88015-500
Cidade: FLORIANÓPOLIS
Estado: SC
Fone: (048) 224-2588
Fax: (048) 224-2588
E-Mail: catflo@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-FOR
Responsável: Aristóteles Teixeira Jr. / Mesquita
Endereço: Av. Santos Dumont, 2088 S/401 a 405 - Aldeota
CEP: 60150-160
Cidade: FORTALEZA
Estado: CE
Fone: (085) 244-9200
Fax: (085) 244-2920
E-Mail: catfor@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-GOI
Responsável: Gilvan Porto Gonçalves/Marcos Roberto
Endereço: R. 09, 481 - Ed. Heitor Piva - 5º andar - Centro
CEP: 74013-040
Cidade: GOIÂNIA
Estado: GO
Fone: (062) 224-3040
Fax: (062) 224-3040
E-Mail: catgoi@cobra.com.br
marcobra@zipmail.com.br

RECIBO Nº 03/2005 - C.N.

CPMI - CORREIOS
Fls: 900
3652
Déc:

4

60



Empresa: Cobra Computadores
Base: CAT-MAC
Responsável: Abimael Ferreira da Rocha
Endereço: R. Barão de Alagoas, 164 S/107 a 109 - Centro
CEP: 57020-210
Cidade: MACEIÓ
Estado: AL
Fone: (082) 221-4856/4233/4147
Fax: (082) 221-4147
E-Mail: catmac@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-MAN
Responsável: Manoel Virgílio Rodrigues Chaves/João Luis / Furlan
Endereço: R. Major Gabriel, 1818/A - 3º andar - Pça. 14 de Janeiro
CEP: 69020-060
Cidade: MANAUS
Estado: AM
Fone: (092) 633-4648
Fax: (092) 622-6566
E-Mail: catman@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-NAT
Responsável: Maria dos Prazeres Cavalcante
Endereço: R. Coronel Estevam, 1139 S/104 e 105 - Alecrim
CEP: 59030-000
Cidade: NATAL
Estado: RN
Fone: (084) 211-4491/4795
Fax: (084) 211-4491
E-Mail: catnat@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-PAL
Responsável: José Agripino C. de Araújo/Ricardo Vanzo
Endereço: R. Carlos Trein Filho, 63 e 69 - Auxiliadora
CEP: 90450-120
Cidade: PORTO ALEGRE
Estado: RS
Fone: (051) 332-7111
Fax: (051) 332-7710
E-Mail: catpal@cobra.com.br

RQS nº 03/2011	
CPMI - CORREIOS	
Fls:	901
3652	
Doc:	

Handwritten signatures and the number 61.



Empresa: Cobra Computadores

Base: CAT-REC

Responsável: Roberto Augusto S. Freire/Vera/Erivaldo /Eriberto/Xavier

Endereço: Av. Dantas Barreto, 1200 - Ed. San Diego - S/901, 902 e 904 - São José

CEP: 50020-000

Cidade: RECIFE

Estado: PE

Fone: (081) 424-5988

Fax: (081) 424-4797

E-Mail: catrec@cobra.com.br

rerec@cobra.com.br

Empresa: Cobra Computadores

Base: CAT-RIO

Responsável: Rubem Maciel Gomes/Humberto Lyra

Endereço: R. Santa Luzia, 651 - 32º andar - Ed. Santos Dumont - Centro

CEP: 20030-040

Cidade: RIO DE JANEIRO

Estado: RJ

Fone: (021) 852-4632/852-4633

(021) 852-4695

(021) 852-4694/852-4696

Pager: (021) 460-3030 Cod. 827520 - BIP Plantao

Fax: (021) 220-5301

E-Mail: catrio@cobra.com.br

Empresa: Cobra Computadores

Base: CAT-SAL

Responsável: Arnaldo Alves Costa/Carlos

Silveira/Antonio(931-6814/071-983-7210

Endereço: Rua Conselheiro Saraiva, 26 - 8º andar - Ed. 15 de Julho - Comércio

CEP: 40015-100

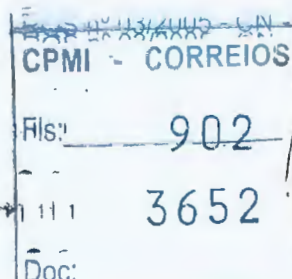
Cidade: SALVADOR

Estado: BA

Fone: (071)-450-7880

Fax: (071) 351-7881

E-Mail: catsal@cobra.com.br





Empresa: Cobra Computadores

Base: CAT-SLU

Responsável: George Luiz Santos

Endereço: Av. Castelo Branco, 333 S/202, 203 - São Francisco

CEP: 65076-090

Cidade: SÃO LUIZ

Estado: MA

Fone: (098) 235-6664

Fax: (098) 235-6939

E-Mail: catslu@cobra.com.br

Empresa: Cobra Computadores

Base: CAT-SPO

Responsável: Laerte Souza

Anselmo Alencar

Hideki Sadatsuki

Endereço: Alameda Santos, 1000 - 7º e 8º andar - Cerqueira Cesar

CEP: 01418-100

Cidade: SÃO PAULO

Estado: SP

Fone: (011) 251-3311

Fax: (011) 287-1740

E-Mail: catspo@cobra.com.br

respo@cobra.com.br

getec_respo@cobra.com.br

Empresa: Cobra Computadores

Base: CAT-BAU

Responsável: Adevenir Aparecido Mendes Barbaresco

Endereço: R. Rio Branco, 5-38 - 4º andar S/41 e 43 - Ed. Centro Empresarial Rio Branco

CEP: 17040-190

Cidade: BAURU

Estado: SP

Fone: (014) 232-5844/6360

Fax: (014) 232-6360

E-Mail: catbau@cobra.com.br

RQS nº 03/2002 - 121	
CPMI - CORREIOS	
Fls:	903
Doc:	3652



Empresa: Cobra Computadores
Base: CAT-TER
Responsável: Francivaldo Ostemo Souza
Endereço: R. Elizeu Martins, 1294 S/301 a 303 - Centro
CEP: 64000-120
Cidade: TERESINA
Estado: PI
Fone: (086) 221-2909/2741
Fax: (086) 221-2741
E-Mail: catter@cobra.com.br

Empresa: Cobra Computadores
Base: CAT-VIT
Responsável: Claudionor Santos Júnior
Endereço: Av. N. Senhora da Penha, 699 S/1110 a 1113 - Ed. Century - Towers - Praia do Canto
CEP: 29055-131
Cidade: VITÓRIA
Estado: ES
Fone: (027) 227-1022
Fax: (027) 225-1419
E-Mail: catvit@cobra.com.br

Empresa: Integris
Responsável : Sr. Paulo Sérgio ou Jane
Endereço: Av. Almirante Barroso, 974 - Centro - João Pessoa- Paraíba
Cidade: JOÃO PESSOA
Estado: PB
Telefone (083) 221-0243
(083)222-2411
(083)982-4570

Empresa: Integris
Responsável : Sr. Ricardo José
Endereço: Av. Pinheiro Machado, 2011 - Bairro S. Cristovão
Cidade: RONDONIA
Estado: Porto Velho
Cep 78902-100
Telefone (069) 221-8666
(069) 223-4255

RQS nº 03/2002 - L.P.	
CPMI - CORREIOS	
Fls.	904
	3652
Doc:	

64



Empresa: Integris
Responsavel : José Fernandes Muniz
Endereço: Conjunto Xavier Maia - Quadra 5 Casa 26 - Vila Ivonete
Cidade: Rio Branco
Estado: ACRE
Tel (068) 220-1959
Tel (068) 224-0734

Os técnicos acima descritos são treinados em serviços de suporte aos equipamentos de marca SUN diretamente pela SUN MICROSYSTEMS.

Procedimentos para Abertura de Chamados

O cliente poderá requisitar suporte para o Centro de Soluções da Sun do Brasil através de contato telefônico, fax, correio eletrônico via Internet ou Pager. Excetuando-se o Pager, qualquer que seja o meio utilizado, o cliente precisará fornecer as seguintes informações:

- Número de série e modelo do equipamento Sun;
- Número do contrato (quando aplicável);
- Versão do sistema operacional;
- Produto e versão do software Sun;
- Descrição clara do problema.

No momento do registro do chamado, o cliente receberá o *Número do Chamado*, que será de referência utilizada para acompanhamento do caso.

Uma vez registrado o chamado, um engenheiro de suporte entrará em contato com o cliente respeitando sempre o tempo de resposta de acordo com a cobertura do equipamento afetado.
Telefone

O seguinte número telefônico deverá ser utilizado para abertura chamados de suporte técnico junto ao Centro de Soluções da Sun do Brasil:

0800-11-8988

O Centro de Soluções da Sun do Brasil aceita abertura de chamados da 8:00 as 20:00hs, de segundas as sextas-feiras, em dias úteis.

Para o cliente que possui atendimento 7x24, dispomos de um número de telefone Toll Free exclusivo para clientes de Missão Crítica,

0800-55-4653

RQS nº 03/2002 - 111	
CPMI - CORREIOS	
Fls:	905
3652	
Doc:	

Handwritten signatures and initials, including a large 'b5' and a signature.



Correio-eletrônico

O seguinte endereço de correio-eletrônico deve ser utilizado para abertura chamados de suporte técnico junto ao Centro de Soluções da Sun do Brasil:

suporte@Brazil.Sun.COM

Cabe observar que a Sun do Brasil não recomenda a abertura de chamados com severidade 1 e 2 sejam feitos via Internet. Para estes casos, pedimos que utilizem a orientação descrita acima.

Por ser a expressão da verdade, firmamos a presente.

João Antônio Alves
Diretor Geral
RG: 4.253.920-SSP-SP

RQS nº 03/2002	
CPMI - CORREIOS	906
Fls:	3652
Doc:	

66



São Paulo, 27 de abril de 2000

À
EMPRESA BRASILEIRA DE CORREIOS E TELÉGRAFOS/ECT
COMISSÃO ESPECIAL DE LICITAÇÃO DA ADMINISTRAÇÃO CENTRAL – CEL/AC
SBN Quadra 01 – Bloco A – 4º andar – Ala Norte
Brasília - DF

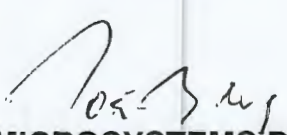
Ref. Concorrência nº. 001/2000 – CPL/AC

DECLARAÇÃO DE DESEMPENHO

Nós, da Sun Microsystems do Brasil, inscrita no CNPJ sob nº 65.497.745/0001-53, estabelecida na Rua Alexandre Dumas, 2016 – Chácara Santo Antônio – 04717-004, São Paulo/SP., subsidiária da Sun Microsystems Inc., declaramos que a performance para o Servidor SMP modelo Enterprise E450, SERVIDOR TIPO RISC 1, com 02 (dois) Processadores de 400MHz cada e cache externo de 4MB, ofertado pela Licitante Dedalus Comércio e Sistemas Ltda., situada na Rua Jardim Ivone, 17 – 10º andar – Vila Mariana – São Paulo/SP – CEP 04105-905, CNPJ 73.101.990.0001-28, é:

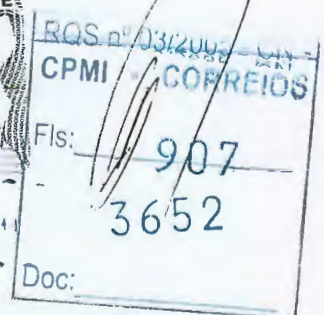
SPECint_rate95 = 313

SPECfp_rate95 = 446


SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antônio Alves
Country Manager



5º Tabelionato de Notas - José Roberto Pacheco Franco - Tabelião
Av. João Dias, 2320 - Porto Alegre - Fone: 55416090 - NE 25040-174/23
Reconhecido por semelhança e firma RUBENS dos SANTOS ANTONIO ALVES
Conferido por: Especialista
VALIDO CONFORME COM O SELO DE AUTENTICIDADE
18.04.2000 de 27 de Abril de 2000
Folha 1 de 1
Cidade: São Paulo - Estado: SP
Data: 27/04/2000



Sun Microsystems do Brasil Ltda.
Rua Alexandre Dumas, 2016
CEP 04717-004 - São Paulo - SP
Pabx: (011) 5181-8988 Fax: (011) 5181-0974 / 5181-3076



São Paulo, 27 de abril de 2000

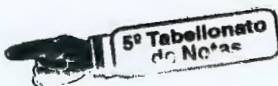
À
EMPRESA BRASILEIRA DE CORREIOS E TELÉGRAFOS/ECT
COMISSÃO ESPECIAL DE LICITAÇÃO DA ADMINISTRAÇÃO CENTRAL – CEL/AC
SBN Quadra 01 – Bloco A – 4º andar – Ala Norte
Brasília - DF

Ref. Concorrência nº. 001/2000 – CPL/AC

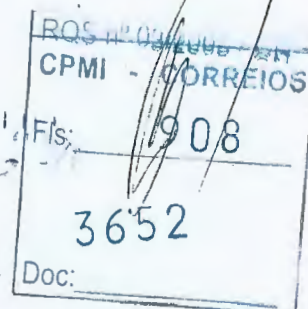
DECLARAÇÃO DE DESEMPENHO

Nós, da **Sun Microsystems do Brasil**, estabelecida na Rua Alexandre Dumas, 2016 - Chácara Santo Antonio - 04717-004, inscrita no CNPJ sob nº. 65.497.745/0001-53, subsidiária da Sun Microsystems Inc., Declaramos que o Servidor Sun Enterprise 3500 ofertado pela Licitante Dedalus Comércio e Sistemas Ltda., inscrita no CNPJ sob nº. 73.101.990/0001-28, localizada à Rua Jardim Ivone, 17 – 10º. andar - Vila Mariana - São Paulo - SP., em sua proposta técnica, **SERVIDOR DE REDE TIPO RISC 4**, possui performance estimada com base no valor auditado para o equipamento da mesma família da SUN Microsystems E4500, de 10.772,71 TpmCE com 3 processadores de 400MHz e 8MB de memória cache, calculado a partir da definição: $NPC \geq (ITpmCE \times NPA) / TpmCA$, e é expansível a 28.724,57 TpmCE, com 8 processadores, também estimados com base no valor auditado para o equipamento da mesma família da Sun Microsystems E4500, com 14c processadores, que é de 50.268,07 TpmCA.

Por ser expressão da verdade, firmamos a presente.



SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA
João Antônio Alves
Country Manager



Sun Microsystems do Brasil Ltda.
Rua Alexandre Dumas, 2016
CEP 04717-004 - São Paulo - SP
Pabx: (011) 5181-8988 Fax: (011) 5181-0974 / 5181-3076



São Paulo, 27 de abril de 2000

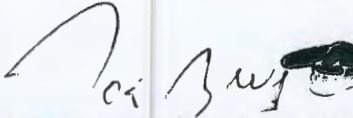
À
EMPRESA BRASILEIRA DE CORREIOS E TELÉGRAFOS/ECT
COMISSÃO ESPECIAL DE LICITAÇÃO DA ADMINISTRAÇÃO CENTRAL – CEL/AC
SBN Quadra 01 – Bloco A – 4º andar – Ala Norte
Brasília - DF

Ref. Concorrência nº. 001/2000 – CPL/AC

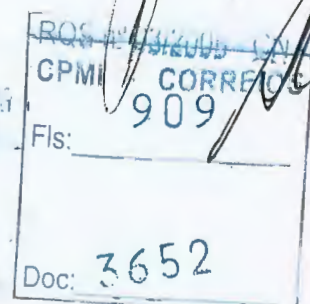
DECLARAÇÃO DE DESEMPENHO

Nós, da **Sun Microsystems do Brasil**, inscrita no CNPJ sob nº. 65.497.745/0001-53, estabelecida à Rua Alexandre Dumas, 2016 – Chácara Santo Antonio – 04717-004, São Paulo/SP., subsidiária da Sun Microsystems INC., declaramos que o Servidor Sun Enterprise 4500 ofertado pela licitante Dedalus Comércio e Sistemas Ltda., situada a Rua Jardim Ivone, 17 – 10º andar – Vila Mariana – São Paulo/SP, em sua proposta técnica, **SERVIDOR DE REDE TIPO RISC 3**, possui performance estimada com base no valor auditado para o mesmo equipamento de 28.724,61 TpmCE com 8 processadores de 400 MHz e 8MB de memória cache, calculando a partir da definição: $NPC \geq (TpmCE \times NPA) / TpmCA$, e é expansível a 50.268,07 TpmCA, com 14 processadores.

Por ser expressão da verdade, firmamos a presente.


SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antonio Alves
Country Manager

Sun Microsystems do Brasil Ltda.
Rua Alexandre Dumas, 2016
CEP 04717-004 - São Paulo - SP
Pabx: (011) 5181-8988 Fax: (011) 5181-0974 / 5181-3076





Ref. Concorrência nº. 001/2000 – CPL/AC

DECLARAÇÃO DE EXPANSIBILIDADE DE MEMORIA RAM

A Sun Microsystems do Brasil, inscrita no CNPJ sob nº. 65.497.745/0001-53, estabelecida na Rua Alexandre Dumas, 2016 - Chácara Santo Antonio - 04717-004, São Paulo/SP., subsidiária da Sun Microsystems Inc., DECLARA para os fins da participação da Dedalus Comércio e Sistemas Ltda., inscrita no CNPJ sob nº. 73.101.990/0001-28, na Licitação acima referenciada que o **SERVIDOR TIPO RISC 3 - E4500**, pode atingir o máximo de 28GB de memória Ram.

E por ser esta a expressão da verdade, assinamos a presente.

SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antonio Alves
Country Manager

50 Tabelionato de Notas - José Roberto Pacheco França - Tabelião
Av. João Dias, 2700 - Santo Amaro - Fone: 56416092 NE 28000034123
Reconheço por semelhança a firma SUPRA de: JOÃO ANTONIO OLIVEIRA.
Conferido por: Revisor
VALIDO SOMENTE COM O SELLO DE AUTENTICIDADE
13.04.2000 22 de Abril de 2000
de testemunho 19 verbas.
Palavras: 1.000
Linha: 1.000
Folhas: 1.000
Lig.: 1.000
13.04.2000 22 de Abril de 2000 - 19 verbas





São Paulo, 27 de abril de 2000



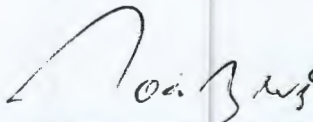
À
EMPRESA BRASILEIRA DE CORREIOS E TELÉGRAFOS/ECT
COMISSÃO ESPECIAL DE LICITAÇÃO DA ADMINISTRAÇÃO CENTRAL – CEL/AC
SBN Quadra 01 – Bloco A – 4º andar – Ala Norte
Brasília - DF

Ref. Concorrência nº. 001/2000 – CPL/AC

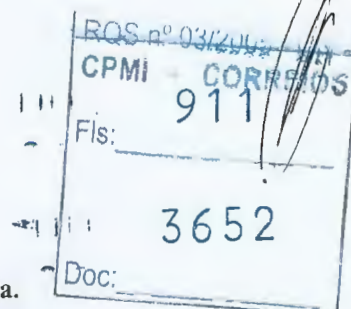
DECLARAÇÃO DE EXPANSIBILIDADE DE MEMÓRIA RAM

A Sun Microsystems do Brasil, inscrita no CNPJ sob nº. 65.497.745/0001-53, estabelecida na Rua Alexandre Dumas, 2016 - Chácara Santo Antonio - 04717-004, São Paulo/SP., subsidiária da Sun Microsystems Inc., DECLARA para os fins da participação da Dedalus Comércio e Sistemas Ltda., inscrita no CNPJ sob nº. 73.101.990/0001-28, na Licitação acima referenciada que o **SERVIDOR TIPO RISC 4 - E3500**, pode atingir o máximo de 16GB de memória Ram.

Por ser expressão da verdade, firmamos a presente.

SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antonio Alves
Country Manager



Sun Microsystems do Brasil Ltda.
Rua Alexandre Dumas, 2016
CEP 04717-004 - São Paulo - SP
Pabx: (011) 5181-8988 Fax: (011) 5181-0974 / 5181-3076



São Paulo, 27 de abril de 2000



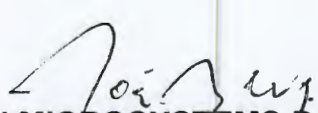
À
EMPRESA BRASILEIRA DE CORREIOS E TELÉGRAFOS/ECT
COMISSÃO ESPECIAL DE LICITAÇÃO DA ADMINISTRAÇÃO CENTRAL – CEL/AC
SBN Quadra 01 – Bloco A – 4º andar – Ala Norte
Brasília - DF

Ref. Concorrência nº. 001/2000 – CPL/AC

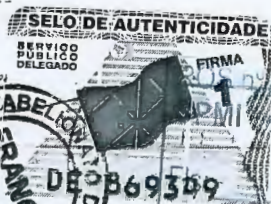
DECLARAÇÃO DE BUG ANO 2000

Nós, da **Sun Microsystems do Brasil**, estabelecida na Rua Alexandre Dumas, 2016 - Chácara Santo Antonio - 04717-004, inscrita no CNPJ sob nº. 65.497.745/0001-53, subsidiária da Sun Microsystems Inc., DECLARAMOS para os fins da participação da Licitante Dedalus Comércio e Sistemas Ltda., que todos os produtos ofertados pela Licitante (incluindo todos os seus componentes de hardware, software e sistema operacional), possuem tratamento correto no processamento de datas de modo a evitar quaisquer problemas relativos ao BUG do ano 2000.

Por ser expressão da verdade, firmamos a presente.


SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA
João Antônio Alves
Country Manager
São Paulo, 27 de abril de 2000

5º Tabelionato de Notas - José Roberto Pacheco Franca - Tabelião
A. José Dias, 2000-Santo Amaro - Fone: 56416092 NE 2004001-123
Reconheço por assinatura a firma GUERRA dos JOÃO ANTONIO ALVES.
Interferido por: Registrador
Unidade somente com o 5º Tabelionato de Notas
Valores: R\$ 1.000,00
Data: 27/04/2000
Assinatura: [Assinatura]



Sun Microsystems do Brasil Ltda.
Rua Alexandre Dumas, 2016
CEP 04717-004 - São Paulo - SP

Pabx: (011) 5181-8988 Fax: (011) 5181-0974 / 5181-3076

Doc:



São Paulo, 27 de abril de 2000



À
EMPRESA BRASILEIRA DE CORREIOS E TELÉGRAFOS/ECT
COMISSÃO ESPECIAL DE LICITAÇÃO DA ADMINISTRAÇÃO CENTRAL – CEL/AC
SBN Quadra 01 – Bloco A – 4º andar – Ala Norte
Brasília - DF

Ref. Concorrência nº. 001/2000 – CPL/AC

CARTA DE SOLIDARIEDADE

Nós, da **Sun Microsystems do Brasil**, estabelecida na Rua Alexandre Dumas, 2016 - Chácara Santo Antonio - 04717-004, inscrita no CNPJ sob nº. 65.497.745/0001-53, subsidiária da Sun Microsystems Inc., Declara é solidária com a Licitante Dedalus Comércio e Sistemas Ltda., inscrita no CNPJ sob nº. 73.101.990/0001-28, localizada à Rua Jardim Ivone, 17 – 10º. andar - Vila Mariana - São Paulo - SP., quanto a sua proposta, responsabilizando-se com os termos de garantia e serviços de assistência técnica exigidos e pelo treinamento para os técnicos da ECT, se for o caso.

Os serviços da assistência técnica e a garantia dos equipamentos SUN ofertados pela licitante em sua proposta serão prestados pela rede de assistência técnica, conforme declaração anexa.

Declaramos, ainda, que a licitante é distribuidora autorizada a fornecer e instalar os equipamentos da Sun Microsystems.

Por ser expressão da verdade, firmamos a presente.



SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA
João Antônio Alves

Sun Microsystems do Brasil Ltda.
Rua Alexandre Dumas, 2016
CEP 04717-004 - São Paulo - SP
Pabx: (011) 5181-8988 Fax: (011) 5181-0974 / 5181-3076

ROS nº	001/2000
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SBN – Quadra 01 – Bloco A – 4º andar – Ala Norte
70002-900 – Brasília - DF



CONCORRÊNCIA Nº. 001/2000
ABERTURA: 03/05/00 – 9:30 hs

PROPOSTA TÉCNICA
INVÓLUCRO Nº 2
SERVIDOR RISC 1

LICITANTE:

Dedalus Comércio e Sistemas Ltda.

CNPJ 73.101.990/0001-28

**Rua Jardim Ivone, 17 – 10º. Andar – Vl. Mariana
04105-905 – São Paulo – SP**

RQS nº 03/2000 - 12/11	
CPMI - CORREIOS	
Fls:	914
Doc:	3652

Sao Paulo

R. Jardim Ivone, 17 - 9º andar
04105-905 - São Paulo - SP - BRASIL
Tel 55 11 575-8011 - Fax 55 11 575-5813

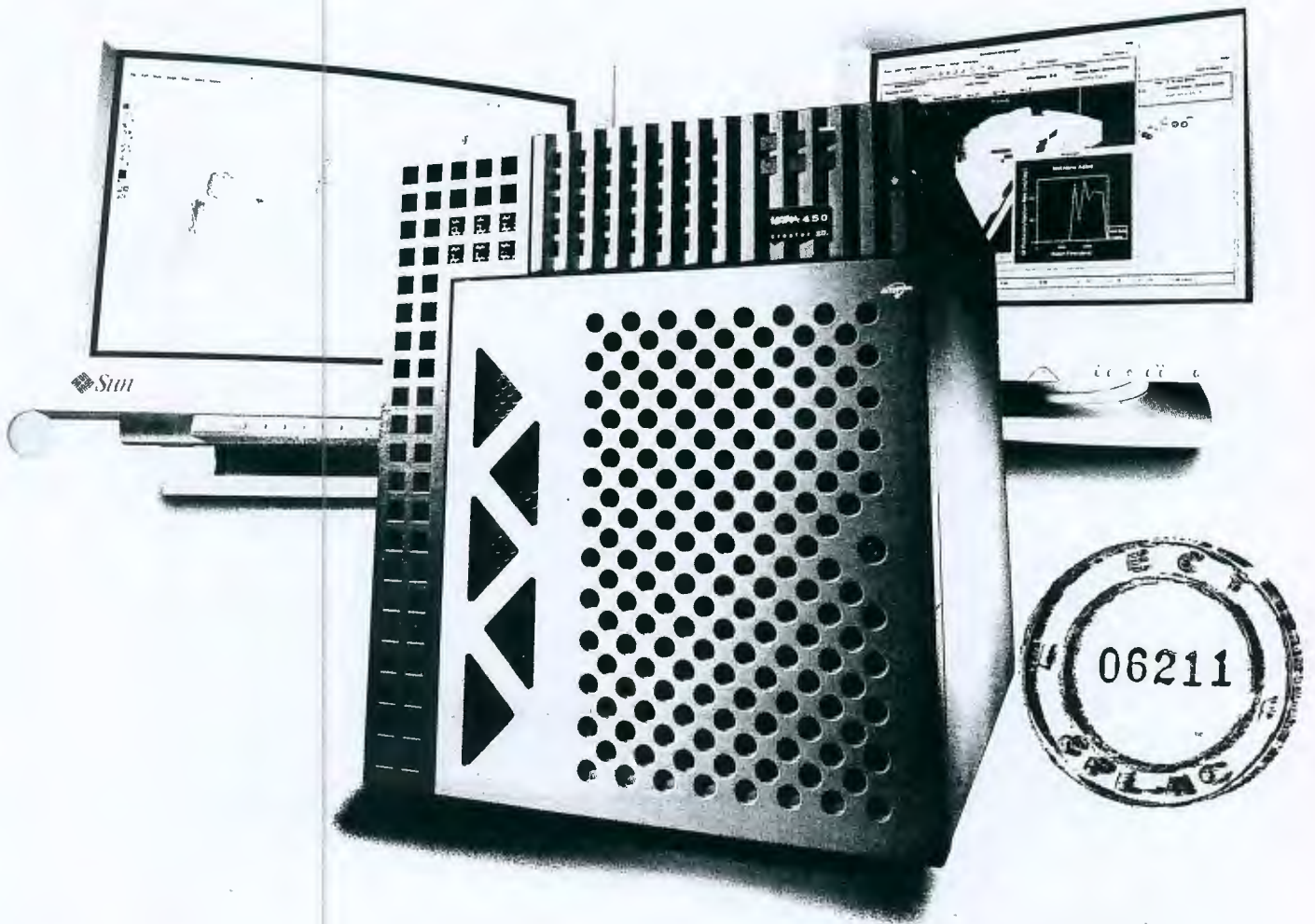
Campinas

Av. João Erasmato 30 - 1º andar - J. Cheloni
13066-640 - Campinas - SP - BRASIL
Tel / Fax 55 19 243 8564

Curitiba

Av. Cândido de Abreu 11 - 903
81335-900 - Curitiba - PR - BRASIL
Tel 55 41 422 1120

Page 1 of 1



... 213, 100%, scientific visualization - you're ready for the Sun?
... inside system delivers better price, performance, and
...
...
... or contact your local Sun representative.

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SUN ULTRA 450 SPECIFICATIONS

PROCESSOR OPTIONS

Architecture	Superscalar SPARC™ Version 9, UltraSPARC-II
Number of CPUs	Up to 4
Memory management	MMU with 64 I-TLB entries and 64 D-TLB entries; 8192 hardware-supported contexts
Cache	16-KB data and 16-KB instruction on chip Secondary: 2-MB external

MAIN MEMORY

Total of 16 DIMM memory slots available
32-, 64-, 128- and 256-MB DIMM expansion
512 MB maximum (with 32-MB DIMMs)
1 GB maximum (with 64-MB DIMMs)
2 GB maximum (with 128-MB DIMMs)
4 GB maximum (with 256-MB DIMMs)

Note: Install DIMMs in sets of four for best system performance.

STANDARD INTERFACES

Network	Ethernet/Fast Ethernet, twisted pair standard (10-BaseT and 100-BaseT) or MII for external transceiver
I/O	40-MB/sec Ultra SCSI (SCSI-3) (synchronous)
Serial	Two RS-232C/RS-423 serial ports (DB25)
Parallel	Centronics-compatible parallel port (DB25) (ECP mode capable)
Audio	16-bit audio, 8 kHz to 48 kHz; internal speaker and external microphone; line in, line out, headphone output
Expansion bus	10 PCI slots Three 32-bit 33-MHz 5v slots Four 64-bit 33-MHz 5v slots Three 64-bit 66-MHz 3.3v slots
UPA graphics slots	Two UPA graphics slots supporting up to two Creator3D or two Elite3D m6 graphics options

MASS STORAGE AND MEDIA

Internal floppy disk	3.5-in. MS-DOS/IBM compatible (720 KB, 1.2 MB, 1.44 MB formatted)
Internal hard disk	Up to four 3.5- x 1-in. disks (4.2 GB or 9 GB formatted) Optional disk bays/backplanes for 16 additional 3.5- x 1-in. disks
Internal CD	644-MB SunCD™ 32X Photo CD compatible
Internal tape	Optional tape storage includes 14-GB 8-mm, 7- to 14-GB 8-mm, 20- to 40-GB 8-mm, 12- to 24-GB DDS3, 4- to 8-GB DDS2, 2.5-GB QIC Disk: Sun StorEdge™ UniPack 4.2- to 18.2-GB, UltraSCSI Sun StorEdge MultiPack 8.4- to 109.2-GB, UltraSCSI
External storage	Tape: 2.5-GB QIC; 20- to 40-GB 8-mm, 4- to 8-GB 4-mm DDS2, 12- to 24-GB 4-mm DDS3, 72- to 144-GB 4-mm DDS3 auto-loader; 140-GB Sun StorEdge L140; 35- to 70-GB Sun StorEdge DLT7000; 20- to 40-GB Sun StorEdge DLT4000

GRAPHICS AND IMAGING

Creator3D

High-performance 8-bit and 24-bit windowing, high-resolution 24-bit color imaging, high-performance 3-D graphics, 24-bit double buffering with a 28-bit Z-buffer, built-in stereo video output support, support for 24-bit color at up to 1920 x 1200 resolution on the latest 24-in. monitors, hardware acceleration of color-space conversion during video playback, four 8-bit colormaps for dynamic colormap segment allocation within the 8-bit color overlay plane, and adjustable gamma correction for optimal display quality. Two Creator3D frame buffers are supported.

Elite3D m6

Highest performance Sun graphics with integrated imaging and very high performance accelerated 24-bit double-buffered 3-D graphics with 28-bit Z-buffer and 8-bit overlay plane. Gouraud shading, alpha-blending and screen-door transparency, line and dot antialiasing, per-pixel depth-cueing, per-pixel alpha interpolation, 4-bit stencil support with hardware acceleration of OpenGL stencil functions, compressed geometry decompression, four 256 entry colormaps for dynamic colormap segment allocation and adjustable gamma correction. NTSC/PAL video timing support. 1280 x 1024 at 76 Hz gamma standard, stereo 960 x 680 at 112 Hz supported with 21-in. monitor. Two Elite3D m6 frame buffers are supported.

MONITOR OPTIONS

21-in. color	1280 x 1024 resolution, 76- or 67-Hz refresh rate, 89 dots per inch 1152 x 900 resolution, 76- or 66-Hz refresh rate, 84 dots per inch 960 x 680 resolution, 112-Hz refresh rate, 70 dots per inch
24-in. wide-screen color	1920 x 1200 resolution, 70-Hz refresh rate, 103 dots per inch 1600 x 1000 resolution, 76- or 66-Hz refresh rate, 86 dots per inch 1440 x 900 resolution, 1280 x 800 resolution, 76-Hz refresh rate, 69 dots per inch

INPUT DEVICES

Keyboard	Sun Type 5; AT 101 or UNIX® layout available More than 18 international keyboards available
Mouse	Opto-mechanical, 3-button microphone SunMicrophone™ II

SOFTWARE

Operating system	Solaris™ 2.5.1, Hardware: 11/97 Solaris 2.6, Hardware: 3/98 Solaris NEO™ 2.0, Solaris OpenStep 1.0 OpenWindows™ Version 3.5, Common Desktop Environment Version 1.0.1
Windowing system	Sun WorkShop™; Internet WorkShop 1.0, WorkShop OpenStep 1.0
Development environments	C, C++, Pascal, FORTRAN, Java™
Languages	ONC™ NFS™ TCP/IP, SunLink™ OSI, MHS, IPX/SPX, DCE
Networking	XGL™, XIL™, OpenGL, Xlib, PostScript™

ENVIRONMENT

AC power	85-264 VAC, 47-63 Hz, 13.4 A
Operating	5° C to 40° C (41° F to 104° F) 20% to 80% relative humidity, noncondensing
Nonoperating	-20° C to 60° C (-40° F to 140° F) 5% to 93% relative humidity, noncondensing
Operating acoustic noise	5.6 bels
Idling acoustic noise	5.6 bels
Declared noise emissions in accordance with ISO 9296, measured at 23° C	

REGULATIONS

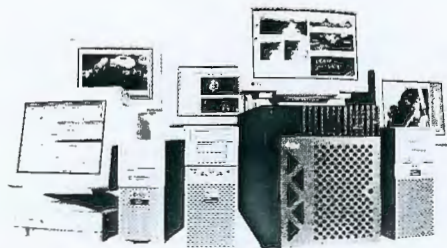
Meets or exceeds the following requirements:	
Safety	EN60950/IEC950, UL 1950, CSA C22.2 No 950, IEC CB Scheme, DEMKO, TÜV
RFI/EMI	EN55022/CISPR22 Class B, VCCI Class II, FCC part 15 Sub Part B
Immunity	EN50082/IEC-1000-2, IEC-1000-3, IEC-1000-4, IEC-1000-5
X-ray	DHHS 21 Subchapter J; PTB German X-ray Decree

DIMENSIONS AND WEIGHTS

Sun Ultra 450 workstation chassis	
Height	51.4 cm (20.2 in.)
Width	44.3 cm (17.4 in.)
Depth	62.5 cm (24.6 in.)
Shipping weight	94 kg (205 lb.) maximum
21-in. color monitor	
Height	50.2 cm (19.9 in.)
Width	50.0 cm (19.4 in.)
Depth	47.6 cm (18.9 in.)
Shipping weight	31.0 kg (68.3 lb.)
24-in. wide-screen color monitor	
Height	50.0 cm (19.7 in.)
Width	58.0 cm (22.8 in.)
Depth	54.8 cm (21.6 in.)
Shipping weight	41.4 kg (91.0 lb.)

UPGRADES

Upgrades are available from SPARCstation™ and Ultra systems.



Sun open systems span desktops, enterprise servers and storage, and network computers.

SALES OFFICES

Sun
microsystems

THE NETWORK IS THE COMPUTER



Sun Enterprise™ 450 Server

Just the Facts



RQS nº 03/0011 - 12/81	
CPMI	CORREIOS
Fls:	917
Doc:	3652



São Paulo, 27 de abril de 2000

À
EMPRESA BRASILEIRA DE CORREIOS E TELÉGRAFOS/ECT
COMISSÃO ESPECIAL DE LICITAÇÃO DA ADMINISTRAÇÃO CENTRAL – CEL/AC
SBN Quadra 01 – Bloco A – 4º andar – Ala Norte
Brasília - DF

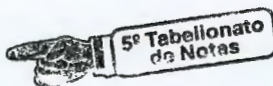
Ref. Concorrência nº. 001/2000 – CPL/AC

DECLARAÇÃO DE DESEMPENHO

Nós, da Sun Microsystems do Brasil, inscrita no CNPJ sob nº 65.497.745/0001-53, estabelecida na Rua Alexandre Dumas, 2016 – Chácara Santo Antônio – 04717-004, São Paulo/SP., subsidiária da Sun Microsystems Inc., declaramos que a performance para o Servidor SMP modelo Enterprise E450, SERVIDOR TIPO RISC 1, com 02 (dois) Processadores de 400MHz cada e cache externo de 4MB, ofertado pela Licitante Dedalus Comércio e Sistemas Ltda., situada na Rua Jardim Ivone, 17 – 10º andar – Vila Mariana – São Paulo/SP – CEP 04105-905, CNPJ 73.101.990.0001-28, é:

SPECint_rate95 = 313

SPECfp_rate95 = 446



SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.

João Antônio Alves

Country Manager

5º Tabelionato de Notas - João Roberto Pacheco França - Tabelião
A. João Dias, 2700 - Porto Alegre - Fone: 50416000 - NE 280400134127
Declaração de desempenho e firma pública de: JOÃO ANTÔNIO ALVES.
[Assinado com Assinador]
NA PRESENÇA DO SELO DE AUTENTICIDADE
Data: 27 de Abril de 2000
[Assinado]



RDS nº 03/2000 - CN -	
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Sun Microsystems do Brasil Ltda.
Rua Alexandre Dumas, 2016
CEP 04717-004 - São Paulo - SP
Pabx: (011) 5181-8988 Fax: (011) 5181-0974 / 5181-3076



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UNIX and X/Open are registered trademarks in the United States and other countries, exclusively licensed through X/Open Company, Ltd.

X/Open is a registered trademark, and the "X" device is a trademark, of X/Open Company Limited.

DLT is claimed as a trademark of Quantum Corporation in the United States and other countries.

Just the Facts



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Positioning

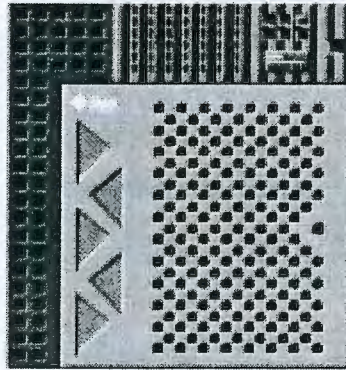


Figure 1. Sun Enterprise™ 450 server, front view

Introduction

The Sun Enterprise™ 450 server is the latest member of Sun's powerful line of UltraSPARC™-based servers for enterprise network computing. This tremendously flexible and versatile mid-range server delivers a potent combination of stellar performance, outstanding reliability, and a remarkably affordable price. This rackmountable tower server's exceptional blend of computing power, storage capacity, disk I/O throughput, and network I/O performance make it perfect for running or front-ending databases from Oracle, Sybase, and Informix, delivering e-mail or web services to hundreds of concurrent users, or for implementing thousands of other critical two-tier and three-tier client-server business applications.

With up to four 250-MHz, 300-MHz, or 400-MHz UltraSPARC-II 64-bit RISC microprocessors, 4 GB of memory, 20 internal 18.2-GB UltraSCSI-3 disk drives, and six high-performance PCI I/O buses that can move over one gigabyte of data per second, the Sun Enterprise 450 server is ideal for applications that demand more processing power, integrated storage, or expandability than offered by the Sun Enterprise 250 server, but that do not require the seamless growth path or extensive datacenter RAS features offered by the Sun Enterprise 3000–6000 server family. The Sun Enterprise 450 server is designed to satisfy many of the demanding information management, processing, and delivery requirements found in medium-sized businesses, branch offices, workgroups, and distributed applications within large-scale or global enterprises.

Positioning

Just the Facts



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Features include the following:

- Database management or digital media management (20 GB to 2000 GB)
- Distributed database access
- Distributed file management, HTTP, and FTP services, and NC boot services
- E-mail, web mail services, Internet gateway, and legacy host gateway
- On-line transaction processing (OLTP) and electronic commerce
- Decision support and on-line analytical processing (OLAP)
- Simulation
- Groupware (such as Lotus Notes)
- Print services
- Network management, message routing, and network backup

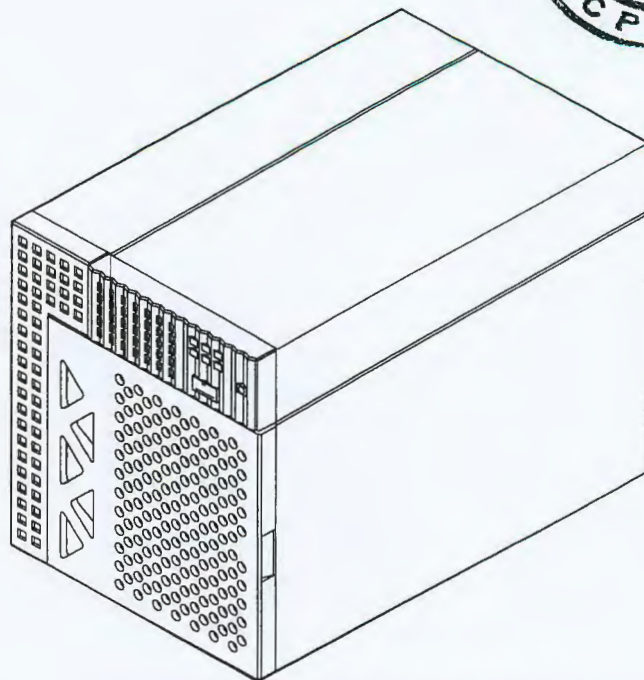


Figure 2. Sun Enterprise 450 server, side view

Key Features

Rackmountable Tower	• Fits in open office or standard 19-inch rack • 22.9 x 17.6 x 27.4 (inches) / 58.1 x 44.8 x 69.6 (cm)
One to Four CPUs	• 250-MHz, 300-MHz, or 400-MHz UltraSPARC-II
Up to 4-GB Memory	• 16 DIMM slots • SPARCstation 20-style memory modules
Up to 364-GB Internal Storage	• Up to 20 18.2-GB, 10000-rpm UltraSCSI disks • Five separate UltraSCSI channels • 200 MB per second internal disk I/O
Up to 6-TB External Storage	• Up to 20 Fast/Wide or UltraSCSI channels
Ten PCI Slots	• Seven 64-bit slots • Three PCI66 (66-MHz) slots
1 GB/second I/O Throughput	• Six independent PCI I/O buses
17,674-TPM	• OLTP performance (TPC-C)
Datacenter RAS Features	• Automatic System Recovery (ASR) • Hot-swap disks • Redundant hot-swap power supplies • Thermal sensing, auto fan control • Sun Enterprise SymON™ system monitor
Operating Environment Support	• Solaris™ 2.5.1: Hardware 4/97 • Solaris 2.5.1: Hardware 8/97 • Solaris 2.6 • Solaris 7

Positioning

Just the Facts



RQS nº 03/2005

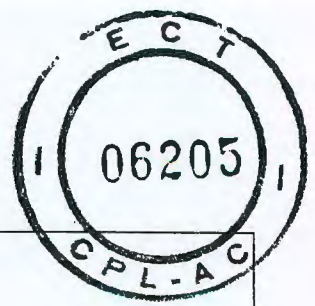
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Typical Customer Applications	• Database/datamart • Business-critical applications • Workgroup support/groupware • Intranet/Internet/Web • Digital media/video
Key Messages	• Scalable performance • Price/performance • Reliability and availability • Application growth path

Key Features and Benefits

Features

- Up to four 250-MHz, 300-MHz or 400-MHz UltraSPARC-2 CPUs, with 1-MB, 2-MB or 4-MB Ecache respectively; up to 4 GB of ECC memory (requires 256-MB DIMMs) with two-way or four-way interleaving
- Five-segment Ultra™ port architecture (UPA) crossbar datapath moves up to 1.6 GB of data per second between CPUs, memory, and I/O channels
- Six high-performance industry-standard PCI I/O buses supporting ten PCI slots plus onboard UltraSCSI, 10/100 Ethernet, and serial and parallel ports deliver up to 1-GB per second total I/O throughput
- Five 40 MB/second UltraSCSI controllers support up to 20 internal 18.2-GB, 10000-rpm disks; supports up to 6-TB external storage
- Multiple independent datapaths, error correcting code (ECC) protection for memory and data paths, Automatic System Recovery (ASR), redundant hot-swap power supplies, hot-swap disk drives, RAID 0, 1, 0+1, and 5, thermal sensing and auto fan control, overtemp protection, four levels of diagnostics, and high-availability cluster configuration options

Benefits

- Scalable computing performance provides support for heavy compute-intensive applications such as database management, decision support, or simulation
- High-speed, parallel data flows provide minimum latency and maximum system resource utilization for sustained high performance under the heaviest workloads
- Blazing I/O performance makes the Sun Enterprise 450 server a superior file, web, or database server, especially for large multimedia files; it is also a premier boot server for Java technology-enabled "thin client" desktop systems
- With up to ten times the disk I/O performance of similarly priced systems, the Sun Enterprise 450 server surpasses every machine in its price range for file, web, database, or digital media server applications
- The extensive array of reliability, high-availability, and serviceability features of the Sun Enterprise 450 server allows customers to deploy these systems in their most business-critical environments with complete confidence

Positioning

Just the Facts



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August 1999

06



Features

- The Sun Enterprise 450 server runs Sun's powerful and dependable Solaris Operating Environment and is 100 percent binary compatible with all software that runs on Sun's Enterprise 3000-6000 server family
- Solaris for Intranets includes many features, such as Solaris easy installer, Sun Enterprise SyMON, Sun WebServer™, DHCP, PPP, and file and print support for Windows, NetWare, and Macintosh clients

Benefits

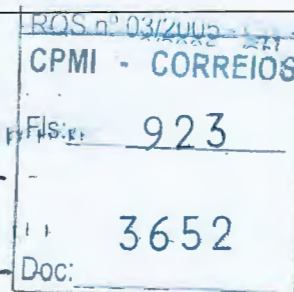
- Solaris, recognized as the industry's leading enterprise network operating environment, runs over 12,000 of the most extensively tested, highest quality software packages available today for both commercial and technical applications
- Sun Enterprise 450 server customers can deploy systems with confidence, knowing their applications can grow and their investment in network technology, software, and training will be protected
- Extensive software tools make it easier than ever to install and use Sun Enterprise servers for a wide range of applications throughout the enterprise network

Target Industries

Industry	Applications
Financial Services – Insurance – Banking – Securities traders and brokerages	• Branch office servers, customer management (CMS), and electronic commerce
Publishing	• Digital media management, web publishing, and electronic commerce
Manufacturing – Automotive – Aerospace – Electronics – Pharmaceuticals and process industries	• IT, finance and accounting, HR, manufacturing, engineering, sales and marketing, customer service/CMS, and electronic commerce
Telecommunications and Internet Services – Long distance carriers, PTTs – RBOCs – Cable operators – Wireless operators – Internet service providers – Equipment OEMs	• Internet HTTP, e-mail, FTP, directory servers, and electronic commerce • CMS, billing, fraud detection, network monitoring and reporting, and software development
Retail – Major retail chains	• In-store electronic retail systems, HQ customer management, merchandising systems, inventory management, distribution, and electronic commerce
Government – Federal/national – State/provincial	• Branch office systems
Health Care – Hospitals and clinics – HMOs and managed care providers – Medical equipment OEMs	• Satellite office servers, patient records, billing, claims processing, medical imaging systems, picture archival, and communications systems
Education – Colleges and universities	• Registration and student records, library management, financial aid administration, and academic research

Positioning

Just the Facts



August 1999

07



Target Applications

Target Applications	Key Features to Highlight
E-mail Web mail services Internet gateway Legacy host gateway	- Connectivity with heterogeneous systems and networks - TCP/IP, IPX™/SPX, NetBEUI, NetBIOS, OSI, X.25, SNA, DECnet - Ethernet, Token Ring, FDDI, ATM, ISDN, T1, E1 - MS mail, UNIX® mail, POP3, IMAP - Exceptionally scalable multithread performance - Exceptional total system throughput
Database or digital media management - From 20 GB to 2000 GB - Oracle, Informix, Sybase	- Storage capacity (364-GB internal, 6-TB external) - Outstanding storage I/O performance - Exceptional network connectivity and I/O bandwidth
Distributed database access	- Outstanding network connectivity, computing power, network I/O performance, total system throughput - Reliability and availability features
On-line transaction processing (OLTP) Electronic commerce Business applications	- Outstanding computing power, storage I/O performance, network I/O performance, reliability and availability features - Over 12,000 top software applications - Robust development environment - Scalable O/S, broad product line for enterprise-wide deployment
Groupware, collaboration Lotus Notes	- Enterprise networking and PC interoperability - Supports hundreds of UNIX or PC clients
Decision support and On-line analytical processing (OLAP)	- Outstanding computing power - Storage capacity and storage I/O performance
Distributed file access, file management - Distributed NFS™, NetWare, LAN Manager file management - HTTP and FTP services - NC boot services	- Robust, secure, distributed file sharing with NFS version 3 - Enterprise networking and PC interoperability
Internet	- Secure, reliable, and cost-effective - Sun is the leading Internet provider; the majority of the servers on the Internet are Sun servers
Simulation	
Network monitoring and management Message routing Network backup	- Infrastructure and tools to reduce systems management effort - Proven expertise in large-scale networking; eases difficulties in managing PC LANs

Positioning

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August 1999



Sun Enterprise Server Family Comparisons

Sun Enterprise 450 Server versus Sun Enterprise 250 and 3500 Servers

As a member of Sun's Enterprise family of servers, the Sun Enterprise 450 server is positioned between the Enterprise 250 and the Enterprise 3500 servers. The charts below compare the features of these three servers.

Key Features	Sun Enterprise 250 Server (2-CPU Configuration)	Sun Enterprise 450 Server (4-CPU Configuration)	Sun Enterprise 3500 Server ¹ (4-CPU Configuration)
Product Positioning	• Compact, versatile dual-processor network application server for medium-sized workgroups and compute-intensive applications • Suitable for small-to-medium database applications and web sites	• Affordable high performance 4-way <u>SMP</u> network application server • Reliable, high-capacity mid-range tower server • For larger web sites, branch offices, workgroups, or distributed enterprise applications • Ideal for managing larger files	• Highly reliable and expandable mid-range server • For fast-growing small-to-medium-size business-critical applications • Exceptional investment protection for high growth applications
Packaging	• Deskside or rackmounted • 517 mm x 262 mm x 732 mm (H x W x D)	• Rackmountable deskside tower • 581 mm x 448 mm x 696 mm (H x W x D)	• Rackmountable tower • 650 mm x 430 mm x 600 mm (H x W x D)
CPUs	• 250 MHz, 300 MHz, or 400 MHz • 1-MB, 2-MB, or 4-MB Ecache • Up to two CPUs • Modular CPUs can be added one at a time	• 250 MHz, 300 MHz, or 400 MHz • 1-MB, 2-MB, or 4-MB Ecache • Up to four CPUs • Modular CPUs can be added one at a time	• 250 MHz, 336 MHz, or 400 MHz • 4-MB Ecache • Up to eight CPUs • Modular CPUs can be added one at a time
¹ For this comparison, the Sun Enterprise 3500 server is configured as a 4-way server with two CPU/memory boards and two I/O boards.			

Positioning

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Key Features	Sun Enterprise 250 Server (2-CPU Configuration)	Sun Enterprise 450 Server (4-CPU Configuration)	Sun Enterprise 3500 Server (4-CPU Configuration)
I/O	- Two PCI buses, four PCI slots 40 MB/second UltraSCSI, 20 MB/second Fast/Wide SCSI 10/100 Ethernet port - Two 384K sync or 460K async ports; DB25 - Parallel port 350 MB/second maximum system I/O throughput	- Six PCI buses, ten PCI slots 40 MB/second UltraSCSI, 20 MB/second Fast/Wide SCSI 10/100 Ethernet port - One 384K sync serial port, one 460K async port; DB25 - Parallel port 1 GB/second maximum system I/O throughput	(4-CPU configuration) - Four SBuses, six SBus slots - Four 25 MB/second FC ports - Two 20 MB/second Fast/Wide SCSI - Two 10/100 Ethernet ports or - Four PCI buses, six PCI slots - Two 20 MB/second Fast/Wide SCSI - Two 10/100 Ethernet ports Either configuration includes two sync/async serial ports and one parallel port
Storage	- Internal bays for up to six 9.1-GB, 10000-rpm, 1-inch or 18-GB, 10000-rpm, 1-inch, hot-plug drives 1 x 20 MB/second Fast/Wide SCSI - Up to 108 GB internal storage - Up to 1-TB external storage	- Internal bays for up to twenty 9.1-GB, 10000-rpm, 1-inch, or 18.2-GB, 10000-rpm, 1-inch, hot-plug drives 5 x 40 MB/second UltraSCSI - Up to 364 GB internal storage - Up to 6-TB external storage	- Internal bays for up to ten 9.1-GB, 10000-rpm, 1-inch or 18-GB, 10000-rpm, 1.6-inch, hot-plug drives 1 x 20 MB/second Fast/Wide SCSI - Up to 182 GB internal storage - Up to 6-TB external storage
Removable Media	1.44-MB floppy drive (optional) 32X CD-ROM (standard) - Internal 5.25-inch, half-height, SCSI 4-mm or 8-mm tape device (optional) - External SCSI tape devices (optional)	1.44-MB floppy drive (standard) 32X CD-ROM (standard) - Internal 5.25-inch, half-height, SCSI 4-mm or 8-mm tape device (optional) - External SCSI tape devices (optional)	- No floppy drive 32X CD-ROM (standard) - Internal 5.25-inch, half-height, SCSI 4-mm, 8-mm, or QIC tape device (optional) - External SCSI tape devices (optional)

For this comparison, the Sun Enterprise 3500 server is configured as a 4-way server with two CPU/memory boards and two I/O boards.

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Key Features	Sun Enterprise 250 Server (2-CPU Configuration)	Sun Enterprise 450 Server (4-CPU Configuration)	Sun Enterprise 550 Server (4-CPU Configuration)
System Console	• Low-cost PCI frame buffer with 17-inch or 20-inch color monitor	• Low-cost PCI frame buffer with 17-inch or 20-inch color monitor	• TurboGX™ SBus or PGX™ PCI frame buffer with 17-inch or 20-inch color monitor
Power	• 110/220 volts • 360 watts	• 110/220 volts • 1120 watts	• 110/220 volts • 1100 watts
Performance	@ 1 x 400 MHz, 2-MB Ecache • SPECint95 = 16.8 @ 2 x 400 MHz, 2-MB Ecache • SPECfp95 = 26.4 • SPECint_rate95 = 303 • SPECfp_rate95 = 334 • SPECweb96 = 4,277	@ 1 x 400 MHz, 4-MB Ecache • SPECint95 = 17.4 @ 4 x 400 MHz, 4-MB Ecache • SPECfp95 = 40.8 • SPECint_rate95 = 609 • SPECfp_rate95 = 758 • SPECweb96 = 9115 • Notesmark Users Supported = 8,200 • Notesmark = 12,540 tpm • TPC-C = 17,674 • \$/TPC-C = \$27.24 Note: TPC-C results submitted 2/2/99	@ 1 x 400 MHz, 4-MB Ecache • SPECint95 = 18.3 @ 4 x 400 MHz, 4-MB Ecache • SPECfp95 = 47.9 @ 6 x 400 MHz, 4-MB Ecache • SPECint_rate95 = 955 • SPECfp_rate95 = 1519 @ 8 x 400 MHz, 4-MB Ecache • TPC-C = 21,871 • \$/TPC-C = \$77.56 Note: TPC-C results submitted 4/28/98
RAS Features	• Integrated design, fewer connections • ECC protection for memory and datapaths • Automatic System Recovery • Redundant hot-swap power supplies • Hot-swap disk drives • RAID 0, 1, 0+1, and 5 • Thermal sensing and auto fan control • Overtemp protection • Four levels of diagnostics • High-availability cluster configuration options	• Integrated design, fewer connections • Multiple independent datapaths • ECC protection for memory and datapaths • Automatic System Recovery • Redundant hot-swap power supplies • Hot-swap disk drives • RAID 0, 1, 0+1, and 5 • Thermal sensing and auto fan control • Overtemp protection • Four levels of diagnostics • High-availability cluster configuration options	• Multiple independent datapaths • ECC protection for memory and datapaths • Automatic System Recovery • Dynamic System Reconfiguration • Redundant hot-swap power supplies • Hot-swap disk drives • RAID 0, 1, 0+1, and 5 • Hot-swap CPU and I/O modules • Thermal sensing and auto fan control • Fault-tolerant cooling with overtemp protection • Four levels of diagnostics • High-availability cluster configuration options
Warranty *	• 3-year, on-site, second-day service	• 3-year, on-site, second-day service	• 1-year, on-site, next-day service
Note: * Product warranty may vary by geographical location. Check with the local SunService representative for applicable warranty coverage.			
For this comparison, the Sun Enterprise 3500 server is configured as a 4-way server with two CPU/memory boards and two I/O boards.			

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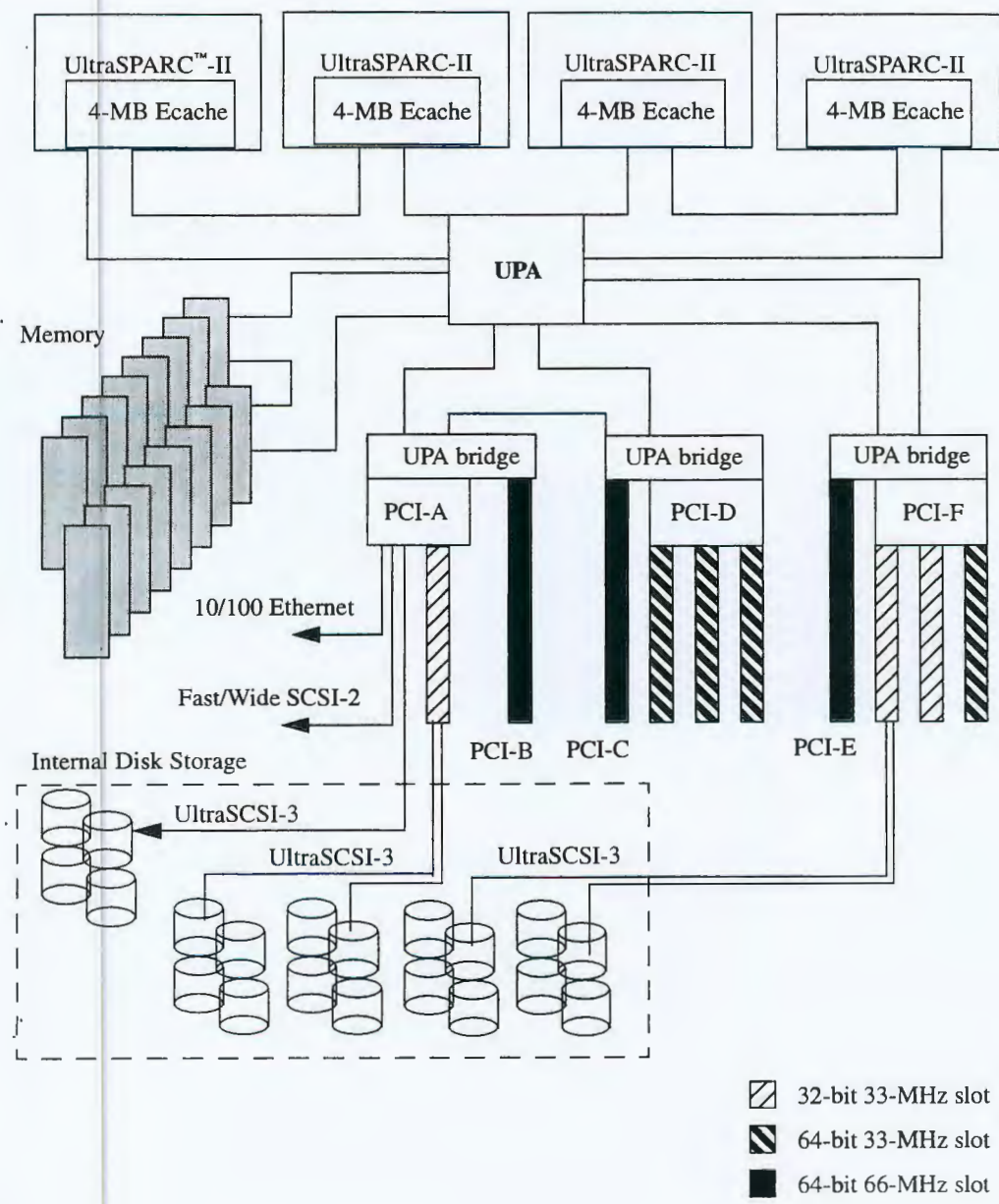
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System Architecture



System Architecture

Figure 3. Sun Enterprise™ 450 server architecture

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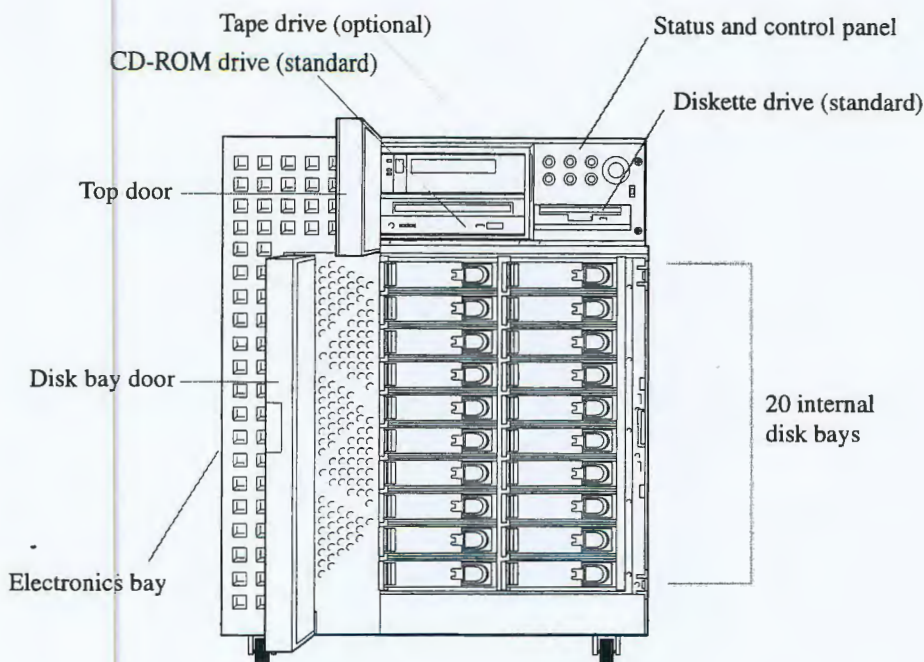


Figure 4. Sun Enterprise 450 server, front view, panels open

UltraSPARC™-II Processors

The Sun Enterprise™ 450 server is a shared-memory, symmetric-multiprocessing system built around the UltraSPARC™-II microprocessor. The UltraSPARC-II processor is Sun's latest generation of the SPARC™ family and the second generation of 64-bit UltraSPARC chips. It utilizes the latest 0.35-micron technology (versus the 0.5-micron technology of the UltraSPARC-I processor), which shrinks the die size to 149 mm (from 218 mm). This reduced die size is the key to the higher clock rates and increased performance of the UltraSPARC-II processor. This smaller die size also enables the UltraSPARC-II processor to operate at a core voltage of 2.5 volts, rather than at the 3.3 volts, of the UltraSPARC-I processor. 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.

UltraSPARC-II processors used in the Sun Enterprise 450 server are individually mounted on 4-inch x 6-inch field-installable module cards along with associated Ultra™ port architecture (UPA) data buffers and up to 4 MB of high-speed SRAM external cache memory (2-MB cache with 300-MHz CPU). These modules are similar to those used in the Sun Enterprise 250 server and Ultra 60 workstations. This modular design facilitates easy system expansion (adding additional CPUs), processor upgrades (to higher performance UltraSPARC processors), and system service.

The Sun Enterprise 450 server is designed to exploit the full processing power of up to four high performance UltraSPARC-II CPUs. Processors with clock rates of 250 MHz, 300 MHz, or 400 MHz are supported, and all processors installed in a single system must operate at the same clock frequency. The system's UPA interconnect, main memory, and I/O subsystems have been carefully architected to sustain the high data rates necessary to use these processors fully, resulting in highly scalable system performance that is remarkably linear from a lightly loaded uniprocessor configuration to a "maxed-out" four-processor system.

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Ultra Port Architecture System Interconnect

The processors, memory, and I/O subsystems of the Sun Enterprise 450 server are interconnected by a high-speed, five-segment UPA crossbar datapath. This is an enhanced implementation of the same UPA design used in the Sun Enterprise 2 and 250 servers. Two UPA segments support pairs of CPU modules, two support system I/O, and one provides the system datapath to main memory. The two CPU datapaths are 144 bits wide, with 128 bits for data and 16 bits for error correcting code (ECC). The two UPA datapaths that support system I/O are 72 bits wide, with 64 bits for data and 8 bits for ECC. The memory datapath is 576 bits wide, with 512 bits (64 bytes) for data and 64 bits for ECC.

Each UPA segment operates independently of the others and moves data blocks over a parallel datapath between client buffers and UPA switch buffers. Transfers are completed at a clock rate that is automatically synchronized by the system controller to one-third or one-quarter that of the system's CPU clock rate. With 250-MHz CPUs installed, the UPA clocks at 83.3 MHz, and with 300-MHz or 400-MHz CPUs installed, the UPA transfers data at 100 MHz, or one transfer every ten nanoseconds. CPU segments, which transfer 16 bytes of data in parallel each clock cycle, each have a maximum transfer rate of 1.6 GB per second. I/O segments, which transfer 8 bytes in parallel each clock cycle, each have a maximum transfer rate of 800 MB per second. Memory transfers require three UPA clock cycles to complete (depending on clock speed), producing a maximum memory I/O throughput of 1.78 GB per second.

Since each UPA segment operates independently of the others, all segments can be transferring data between local and switch buffers concurrently. CPU segments move data from 64-byte buffers at the crossbar switch to 16-byte local buffers during four consecutive UPA clock cycles, and I/O segments move data from 64-byte crossbar buffers to 8-byte local buffers during eight consecutive UPA clock cycles. Once its local buffer is filled with outbound data, a client on a shared UPA segment arbitrates for control of the segment, then transfers its data to the segment's switch buffer during the requisite number of clock pulses.

All UPA addressing and arbitration occurs over signal lines which are separate from the datapaths. This arrangement allows arbitration and addressing to occur in parallel with data transfers, reducing transfer latency and improving datapath utilization.

Memory

The Sun Enterprise 450 server supports up to 4 GB of 60 nanoseconds, 5-volt, dynamic RAM memory (4 GB with currently available 256-MB Sun memory DIMMs). DIMMs used by the Sun Enterprise 450 server are the same type as those used in the Sun Enterprise 2 and 250 servers. Memory is organized into four banks of four dual in-line memory modules (DIMMs). All four DIMMs within the same bank must be identical, and can range in capacity from 32 MB each to 256 MB each. DIMMs in different banks can have different capacities.

Data moves between memory and the UPA crossbar switch buffers over an ECC protected 64-byte-wide datapath. A memory read or write operation to a single memory location requires approximately twelve UPA clock cycles to complete (approximately 120 nanoseconds with current memory chips).

With two banks of identical DIMMs installed, memory operations are two-way interleaved, reducing the average latency for reads and writes almost by half, and nearly doubling the memory throughput over non-interleaved operations. With four banks of identical DIMMs installed, memory read-write operations are four-way interleaved, nearly doubling throughput again over two-way interleaved operation. With four-way interleaving enabled, average memory latency is reduced to approximately 36 nanoseconds, yielding an average memory throughput of 1.6 GB per second. If only one or three banks of DIMMs are present, or if the DIMMs in different banks have different capacities, interleaving will not occur.



System I/O

All system communications with storage peripherals and network interface devices is mediated by three UPA-to-PCI bridges, located on the system's main logic board. Each of these bridge chips manages communication between the UPA bus and two industry-standard peripheral component interconnect (PCI) data buses, giving the system a total of six separate PCI buses. Two bridges (four PCI buses) share one 800 MB per second UPA segment while the third bridge has uncontested use of the other UPA I/O segment.

Each bridge chip provides buffered data transfers between the UPA and one 66-MHz PCI bus and one 33-MHz PCI bus. Each bridge is capable of sustained data transfer rates of over 334 MB per second with either one or both supported PCI buses active. With all three bridges transferring data, total system I/O can exceed one gigabyte per second.

Together, the system's six PCI buses support slots for up to ten PCI interface cards. One PCI bus (bus B) also handles communications between the system and devices connected to the main logic board's SCSI, FastEthernet, serial, parallel, and keyboard/mouse ports. All PCI buses in the Sun Enterprise 450 server comply with the 2.1 revision of the PCI specification, released in March 1995.

- PCI buses A, C, and E operate at 33 MHz or 66 MHz and provide one slot each for either a 32-bit or 64-bit 3.3-volt or universal PCI card.
- PCI bus B operates at 33 MHz and provides one slot for a 32-bit 5-volt or universal PCI card. PCI-B also supports all system-board I/O (see below).
- PCI bus D operates at 33 MHz and provides two slots for 32-bit 5-volt or universal cards and one slot for a 32-bit or 64-bit 5-volt or universal card.
- PCI bus F operates at 33 MHz and provides three slots for either 32-bit or 64-bit 5-volt, or universal PCI cards.

Sun Enterprise 450 Server PCI Bus/Slot Layout and Slot Characteristics					
PCI Slot Number	PCI-UPA Bridge	PCI Bus	Slot Width/ Card Widths Supported	PCI Clock Rate, MHz	Card Input Voltages Supported
10	1	B	32/32 bits only	33	5V or Universal
9	3	F	32/32, 64 (as 32)	33	5V or Universal
8	3	F	32/32, 64 (as 32)	33	5V or Universal
7	3	F	64/32, 64	33	5V or Universal
6	3	E	64/32, 64	33, 66	3.3V or Universal
5	1	A	64/32, 64	33, 66	3.3V or Universal
4	2	C	64/32, 64	33, 66	3.3V or Universal
3	2	D	64/32, 64	33	5V or Universal
2	2	D	64/32, 64	33	5V or Universal
1	2	D	64/32, 64	33	5V or Universal

In addition to the I/O capabilities available through PCI option cards, the Sun Enterprise 450 server provides the following I/O channels directly from the main system board through PCI bus B:

- One internal-only 40 MB per second UltraSCSI-3 channel which supports the system's four standard 3.5-inch UltraSCSI disk bays
- One internal/external 20 MB per second Fast/Wide SCSI-2 channel; supports the standard CD-ROM drive plus one optional, internal, narrow (8-bit) SCSI tape device; one external 68-pin SCSI connector supports connections to up to four external SCSI tape devices or a single Sun StorEdge™ MultiPack
- One internal-only floppy drive controller port supports the standard 3.5-inch 1.44-MB floppy drive
- One external 10/100 auto-select Ethernet port that supports either a Cat-5 UTP (RJ45 connector) or 40-pin miniature "D" MII connection
- Two external EIA-232D or EIA-423 serial ports, one synchronous and one asynchronous, via one DB25 connector with a Y splitter cable (without the splitter cable, the default output is synchronous); supports EIA-423 synchronous data rates from 50 baud to 384 Kbps, and asynchronous data rates from 50 baud to 460.8 Kbaud
- One external 2 MB per second Centronics-compatible, bi-directional EPP parallel port with one DB25 connector
- One external standard Sun keyboard/mouse port (mini DIN-8 connector)

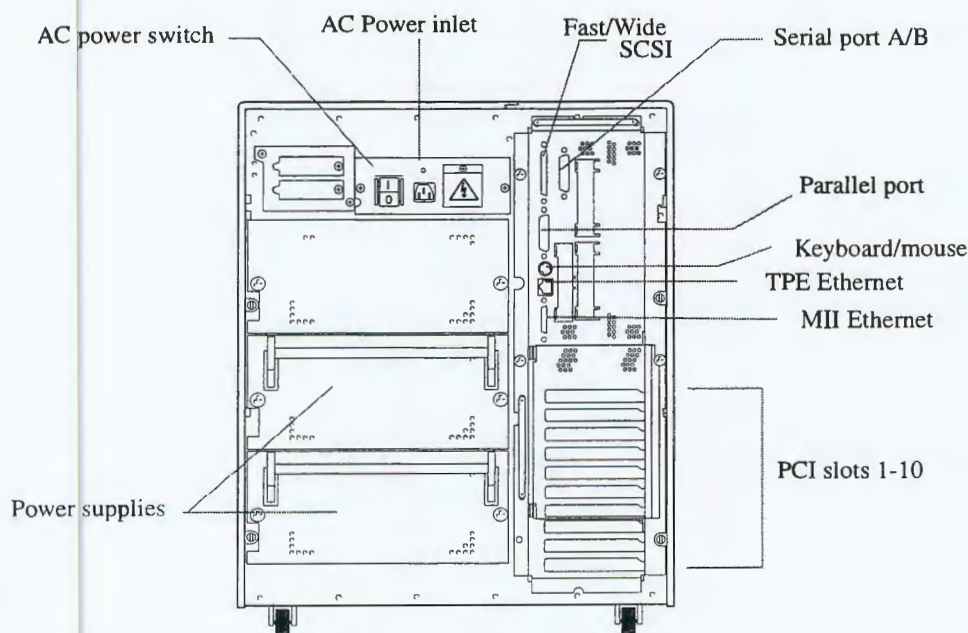


Figure 5. Sun Enterprise 450 server, rear view, panels open

Storage

Primary (internal) data storage for the Sun Enterprise 450 server is provided by up to twenty 18.2-GB, 3.5-inch by 1-inch, hot-swappable UltraSCSI-3 disk drives. These 10000-rpm drives have an average access time of 14 milliseconds and a peak internal transfer rate of up to 140 Mbits per second. Drives are attached in groups of four to five separate single-ended UltraSCSI controllers, each of which offers a peak data transfer rate of 40 MB per second, twice the transfer rate of Fast/Wide SCSI controllers. The first four



drives attach to the UltraSCSI port on the system motherboard. Drives five through twenty attach to two dual-channel UltraSCSI controllers, which occupy two PCI slots. With all five controllers installed, disk I/O between internal drives and the UPA can approach 200 MB per second.

Spreading the internal drives across five UltraSCSI buses allows multiple system processes to execute disk read-write operations simultaneously. This significantly reduces disk I/O latency by reducing the number of queued I/O requests at each controller and by reducing contention between drives for access to the SCSI bus. It also allows large files of data to be striped across multiple drives and controllers, further enhancing disk I/O performance by reducing request queueing and bus arbitration delays. The result is superior total disk I/O throughput compared with single- or dual-controller implementations. Multiple disk I/O channels also increase total system availability by allowing drives on one controller channel to be hot-swapped without disrupting user access to data stored on other SCSI buses.

To satisfy the needs of customers with larger data storage requirements, the Sun Enterprise 450 server supports a variety of external storage subsystems. PCI storage controllers provide support for Sun StorEdge UniPack and MultiPack systems. With 20 fully configured Sun StorEdge arrays attached through ten dual-channel UltraSCSI storage controllers, the Sun Enterprise 450 server can access over 6 TB of local data.

Storage management software such as Sun's Solstice DiskSuite™ and VERITAS Volume Manager software enables the Sun Enterprise 450 server to support disk striping (RAID 0), mirroring (RAID 1), striping with parity (RAID 5), and striping plus mirroring (RAID 0+1).

In addition to its internal and external high-speed fixed storage capabilities, the Sun Enterprise 450 server provides a standard 32X CD-ROM drive and a 1.44-MB 3.5-inch, manual-eject, floppy drive for software installation and system management. An internal 5.25-inch, half-height (1.6-inch high) drive bay is provided for an additional narrow (8-bit) SCSI device, such as a 4-mm DDS-2 or DDS-3 tape drive, or an 8-mm tape drive. Additional externally attached tape drives, autoloaders, or libraries can be attached by to the system's external Fast/Wide SCSI port or to optional PCI SCSI controller cards.

Console System

The Sun Enterprise 450 server can be managed from either a local or remote (network) console device. A local character terminal console device can be attached through one of the system's two serial ports, or a color monitor, keyboard, and mouse can be attached to any supported PCI graphics controller/framebuffer and the keyboard/mouse port. The system can be managed remotely from any X-windows terminal or workstation.

The four-position front panel key switch controls system power as well as administrator access to the system's power-on self-test (POST) diagnostics and flash-upgradable PROM.

The system flash-upgradable boot PROM provides standard OpenBoot™ capabilities, power-on self-test, and extensive OpenBoot diagnostics.

Six front panel LEDs provide system administrators with easy to interpret status information about the health of the system motherboard, CPUs, memory, disks, cooling fans, and power supplies.

Power Distribution System

System power is provided by one, two, or three 560-watt, universal DC power supplies. These modular hot-swap units are easily installed and removed from the rear of the system, even while the machine is operational. Maximally configured systems will operate continuously with two power supplies installed.

Power supplies feed all active system components through a common power distribution bus. Power is drawn equally from all supplies installed in the system. If service from one power supply is interrupted, the system power demand shifts automatically to the remaining active supplies. If the combined output of the remaining supplies satisfies the system's requirements, the machine continues to operate with no interruption of service. With a hot standby or "n+1" power supply installed, the system can continue operating while a replacement power supply is installed. If power demands exceed the output of the active supplies, the system automatically notifies the console and suspends operation.

The base server includes one power supply that provides sufficient power for maximum memory, ten PCI cards, four internal disks, an optional tape drive, and up to three CPU modules. When either a fourth CPU or more than four internal disks are required, a second power supply must be installed.

Environmental Monitoring and Control (EM&C) System

The environmental monitoring and control system of the Sun Enterprise 450 server continuously monitors temperatures at several critical locations throughout the machine. Readings from thermal sensors provide input to the server's airflow management system, which automatically adjusts fan speeds as necessary to keep component operating temperatures within acceptable ranges. If measured temperatures exceed safe operating limits and fans are already operating at maximum speed, the system automatically notifies the console and suspends operation.

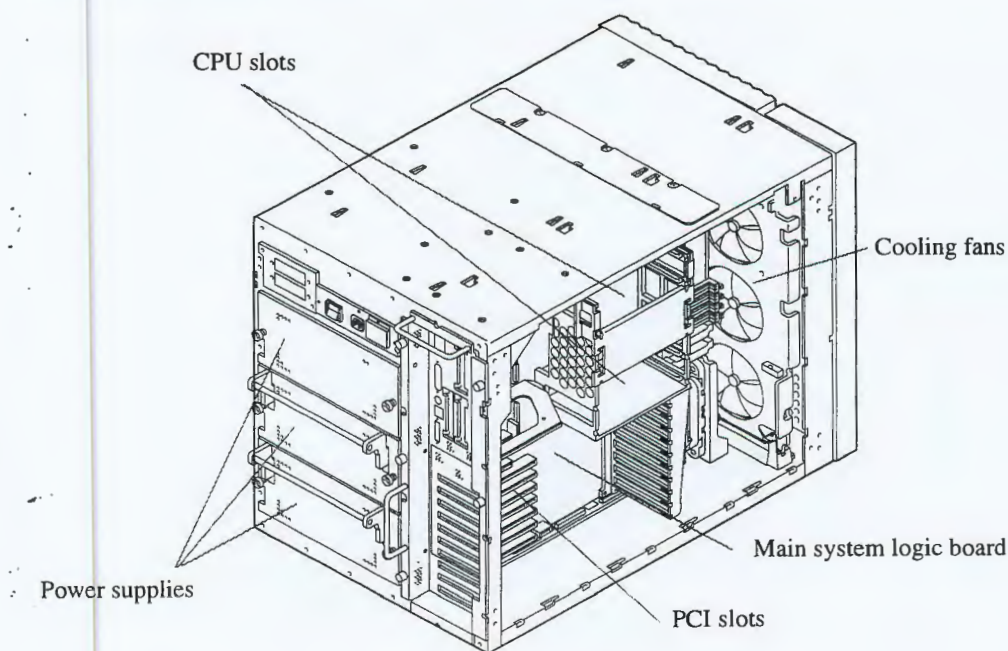


Figure 6. Sun Enterprise 450 server, rear cut-away view

System Enclosure and Mechanical Specifications

The Sun Enterprise 450 system is housed in a desktide tower enclosure that measures 22.87-inches high x 17.64-inches wide x 27.4-inches deep (581 mm x 448 mm x 696 mm). The system chassis is mounted on four swivel casters that lock to provide system stability. Depending on the number and type of options installed, the system weighs between 120 pounds and 205 pounds.



Access to operator controls, all internal disk drives, and removable media drives is provided through two hinged doors on the front of the system. The disk bay door has a key lock for added system security. All front panel status indicator LEDs are visible through windows in the media bay door.

Power supplies and the main power switch are easily accessible from the rear of the chassis for serviceability, and all three power supplies may be secured in place by a removable locking device for additional peace of mind. Each power supply has status indicator lights visible from the rear of the system showing power-on and fault conditions.

Internal service access to the system requires simply unlocking and lifting off the server's left and right cover panels. CPU modules, memory DIMMs, and PCI option cards can be installed or removed easily through the left side of the machine. The main system board, which is oriented vertically from front-to-back, can be removed or installed easily through the rear of the system.

Airflow through the system is front-to-back, allowing the system to be rackmounted in any standard 19-inch EIA rack (minimum 30-inch depth required). Cooling is provided by two slide-mounted fan tray assemblies. One cools the system board electronic components while the other cools the disk drives and power supplies. Each is easily removable through the side of the system.

System Rackmounting Kit

The Sun Enterprise 450 server is designed to be rackmounted in its desktide tower configuration. The optional rackmounting kit, which consists of a depth-adjustable, slide-mounted shelf and retaining brackets, can be installed in any EIA 19-inch-wide rack with:

- Front and rear vertical mounting rail flanges between 28.5 and 34.875 inches apart
- Standard front- and rear-facing mounting flanges
- At least 24 inches of available vertical mounting space
- Sufficient load-bearing capacity

The system is simply placed on the shelf and secured in position with the brackets supplied in the kit. Because of the weight of the system, racks must be either bolted to the floor or must be equipped with stabilizer legs to prevent rack tipping when the system is pulled out for servicing.

Solaris Server Features and Benefits

Installation and Administration

Features

- Solaris Web Start software, part of Solaris 2.6, enables fast, easy network-based installation of the Solaris Operating Environment

Benefits

- Eases and speeds the installation of the Solaris Operating Environment on hosts and clients

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System Management

Solaris™ Operating Environment

The Sun Enterprise™ 450 server offers customers the reliability, performance, scalability, and interoperability of Sun's industry leading Solaris™ Operating Environment. Customers who plan to continue running Solaris 2.5.1 on their existing Sun servers and desktop systems can easily integrate the Sun Enterprise 450 server into their environments by installing the system with Solaris 2.5.1

Hardware: 4/97 (or later). Sun Enterprise 450 server customers who are ready for the latest Solaris release will be able to take full advantage of all the powerful new server features added to Solaris 2.6 and Solaris 7 with this system. Sun Enterprise 450 customers will be especially interested in the new installation and administration features, intranet and Internet capabilities, and desktop services for PCs, Macintosh systems, UNIX® workstations, and Java™ technology-based network computers added to this new Solaris Operating Environment release.

Key Workgroup Server Features in the Solaris 2.5.1 Operating Environment

Ease of Installation and Administration	Reliability/Serviceability	Web Features	PC Connectivity
Bundled with Solaris 2.5.1			
- Solstice AdminSuite™ - Solstice DiskSuite™ - Solstice Backup™ (single server)	- Sun Enterprise SyMON™ - SunVTS™		
Available Separately			
Solstice AutoClient™		Sun Internet Mail Server™	- Solaris PC NetLink (server and unlimited clients) - Syntax TotalNET - Solstice NFS Client™

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Key Workgroup Server Features Available with the Solaris 2.6 Operating Environment



Ease of Installation and Administration	Reliability/Serviceability	Web/Java™ Features	PC Connectivity
- Solaris™ Web Start/ Solaris Web Start Server - Solstice AdminSuite - Solstice AutoClient (server plus 1 client) - Solstice DiskSuite - Solstice Backup (single server)	- ShowMe How™ - Sun Enterprise SyMON - Sun VTS	- Sun WebServer™ - HotJava™ Browser - Java™ virtual machine - Simple Key Management for IP (SKIP) - Dynamic host configuration protocol (DHCP) - WebNFS™ - PPP - Sun Internet Mail Server (30 day "Try & Buy" only)	- Solaris PC NetLink (server and unlimited clients) - SunLink PC™ (TotalNET) (server plus 1 client) - Solstice NFS Client (1 client)

Key Workgroup Server Features Available with the Solaris 7 Operating Environment

Ease of Installation and Administration	Reliability/Serviceability	Web Features	PC Connectivity / Interoperability
- Solaris Web Start/ Solaris Web Start Wizards™ - Solstice AdminSuite - Solstice AutoClient (server plus 1 client) - Solstice DiskSuite - Solstice Backup (single server) - Solaris Management Console	- ShowMe How - Sun VTS	- Sun WebServer - HotJava Browser - Java virtual machine - Simple Key Management for IP (SKIP) - Dynamic host configuration protocol (DHCP) - WebNFS - Solstice™ PPP	- Solaris PC NetLink (server and unlimited clients) - SunLink PC (server plus one client) - Solstice NFS Client (one client) - Sun Directory Services

System Management

Sun Enterprise 450 server customers who are ready for the latest Solaris Operating Environment release will be able to take full advantage of all the powerful new server features added to Solaris 7 Operating Environment. The Solaris 7 Operating Environment has a 64-bit kernel and provides enhancements in overall performance, scalability, reliability, availability, security, and ease of use, while maintaining backwards compatibility for all Solaris Operating Environment-certified existing 32-bit applications.

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The Solaris 7 Operating Environment delivers the following major enhancements over the Solaris 2.6 Operating Environment:

- **Data center-class reliability, availability, and serviceability (RAS)**

Data center-class RAS features that can provide greater system stability and lower system downtime by allowing customers to add, remove, or replace defective hardware without rebooting the system.

- **Higher performance**

- Ⓢ A complete 64-bit computing environment provides greater capacity, precision, and performance. By increasing capacity from 32 bits to 64 bits, customers can realize significantly better performance for certain functions. The 64-bit virtual addressing and file system allows greater application flexibility enabling the creation of a new class of applications. New 64-bit applications unleash the full power of Sun systems based on UltraSPARC™ technology. Some newly architected applications offer a performance boost of 10-100 over customers' existing systems.

An updated version of the Java Development Kit (JDK™) 1.1.6 software, with software-enhanced Java virtual machine and optimizing "Just-In-Time" (JIT) compiler technologies, provides significantly improved scalability. These benefits will be significantly enhanced in the JDK 1.2 software version (currently available in early access from the Web). The JDK 1.2 software enhancements include a highly tuned, multithreaded VM architecture with faster thread synchronization, a new memory system with generational garbage collection, and a highly optimizing JIT compiler.

- **Improved scalability**

The complete 64-bit kernel also provides increased scalability by enabling access to more system resources, by allowing many more applications to be consolidated onto a single server that utilizes the Solaris software and to handle much larger problem sets, and by adding more capacity to existing hardware.

The benefits of improved scalability are not just limited to servers, the Solaris 7 Operating Environment enables a new application environment for desktop users. No model is too complex or too large to visualize and solve as a whole.

- **Greater ease of use**

The easy-to-use, web-based installation, GUI-based text/voice notes, and process manager make Solaris software easy to install and use. Command line entries are no longer required for some of the most often used desktop utilities.

- **Comprehensive global product**

The Solaris Operating Environment includes support for the Euro currency symbol, complex text formats for Arabic, Thai, and Hebrew languages, and support for the development of multilingual applications.

- **Software investment protection**

Complete binary compatibility enables all of today's Solaris Operating Environment-certified 32-bit applications to continue running on the Solaris 7 Operating Environment without modification.



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Solaris Server Features and Benefits

Installation and Administration

Features

- Solaris Web Start enables fast, easy network-based installation of the Solaris Operating Environment
- Solaris Web Start Server, available free from the Web, makes it easier to perform replicated installs onto numerous systems simultaneously
- Includes Solstice AdminSuite software, which provides a consistent, easy-to-use, graphical interface for common system administration functions. Includes a user manager for managing user accounts, a database manager for manipulating Solaris administration data, a host manager for connecting client systems to the network, a software manager for controlling installation of Solaris software packages, a serial port manager for managing serial ports remotely, and a print manager for network printing
- Includes AnswerBook™ software for on-line network access to all Sun manuals, including browse and network print capability
- Solstice SunNet Manager™ enables administration, monitoring, and troubleshooting of LANs and WANs
- Third-party network and system management tools provide administration, monitoring, and troubleshooting tools for distributed systems

Benefits

- Eases and speeds the installation of the Solaris Operating Environment on hosts and clients
- Lowers cost of deployment; easy-to-use graphical user interface increases the number and type of personnel who can install Sun software
- Eases system administration
- Speeds access to information, reduces cost
- Remote monitoring and control of networks lowers costs, increases uptime
- Users have a choice of network management solutions

System Management

Just the Facts



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Compatibility

Features

- The Sun Enterprise 450 server runs Sun's powerful and dependable Solaris Operating Environment and is 100 percent binary compatible with all software that runs on the Sun Enterprise 3500-6500 server family
- The Solaris Operating Environment is binary-compatible across all SPARC™ platforms, from desktops to enterprise servers
- The Solaris Operating Environment is supported on SPARC, x86, and PowerPC platforms

Benefits

- Runs over 12,000 of some of the most extensively tested, highest quality software packages available today for both commercial and technical applications
- Allows customers to deploy systems with confidence, knowing their applications can grow and their investment in network technology, software, and training will be protected
- Makes it easy to deploy applications developed on SPARC platforms on other platforms

Performance and Scalability

Features

- Outstanding performance and functionality in a variety of application areas, including database, networking, groupware, and multiuser business applications
- Highly scalable symmetric multiprocessing (SMP)
- Multithreading

Benefits

- Provides maximum productivity for individuals and workgroups
- Accelerates application throughput by distributing tasks among multiple processors (MP)
- Delivers exceptional MP system price/performance and investment protection
- Enables a single application to be partitioned into independent components that can be executed simultaneously, reducing response time and increasing throughput

Reliability

Feature

- Proven and reliable network operating system

Benefit

- Maximum uptime for running business-critical applications



Low-cost Data Management and Backup

Features

- Solstice DiskSuite provides data redundancy and enhanced disk system performance using RAID technology
- Journaling File System improves performance of directory operations and reduces file system check times during system restarts
- Solstice Backup automates network backup, recovery, and media management

Benefits

- Increases data availability and speeds system throughput
- Enhances system throughput and increases system availability
- Simplifies data administration, improves data security and availability

Global Networking and Resource Sharing

Features

- Connectivity for TCP/IP, NFS™, NetWare, IPX™/SPX, LAN Manager, and AppleTalk
- NFS

Benefits

- Enables complete corporate-wide connectivity and integration
- Provides easy transparent network access to remote file systems, applications, and data on heterogeneous computer systems

Security

Feature

- Simple Key Management for IP is a standard protocol that provides privacy and authentication services for data over the network

Benefit

- Allows for secure communications over the Internet or intranet, without requiring any changes to the application

Electronic Mail

Feature

- Sun Internet Mail Server, a high-performance, Internet-standard mail server that supports diverse types of e-mail clients from a single mail server

Benefit

- Provides fast e-mail response, scalability to support large numbers of users and large quantities of data

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Internet Services

Features

- WebNFS is a robust and scalable file system that enables users to quickly access and share files over the Web
- Dynamic host configuration protocol (DHCP) allows administrators to easily add clients to the intranet by dynamically assigning IP addresses
- HotJava Browser provides an easy-to-use, customizable user interface
- Sun WebServer

Benefits

- Enables users to quickly access and share files over the Web
- Eliminates need for administrator to assign IP addresses manually to each client
- Provides easy-to-use interface for installing software, performing web-based administration tasks, and accessing data over the Web
- Provides fast response for accessing data over the Internet or when performing Web-based administration tasks

PC Integration and PC Interoperability

Solaris™ PC NetLink 1.0 software, formerly code named Project Cascade, is a software product that allows Sun servers to run native Microsoft Windows NT 4.0 network services on the Solaris Operating Environment software. Solaris PC NetLink software provides Microsoft Windows NT naming, authentication, file, and print services on Sun Enterprise servers, increasing the reliability, scalability, and manageability of Microsoft Windows NT networks.

Solaris PC NetLink software is a key addition to Sun's Microsoft Windows NT interoperability product line. Based on AT&T's Advanced Server for UNIX product, Solaris PC NetLink software provides transparent connectivity into Microsoft Windows NT network environments, allowing customers to replace Microsoft Windows NT servers with the more reliable and scalable Sun solution. Solaris PC NetLink 1.1 software adds support for Solaris 7 Operating Environment (SPARC Platform Edition and Intel Platform Edition) and will be included in the Solaris Easy Access Server 3.0 (SEAS 3.0) product which is available with any WGS.

Sun's strategy is to support any client, including PCs, Macintoshes, UNIX workstations, and Java technology-based Network Computers. Because PCs are by far the most common desktop, Sun is focusing its integration strategy on PC services and PC interoperability.

To achieve this strategy, Sun remains focused on supporting open industry standards. By supporting interoperability and open standards, Sun is able to provide the same services (network services, including file, print, directory, security, messaging, and objects) required by PC clients.

Examples of open industry standards include:

Network	 TCP/IP, FTP, HTTP, Telnet
File and print	SMB, CIFS, NFS, WebNFS
Directory	LDAP, X.500, DNS
Security	X.509, Kerberos, SSL, IPV6Sec
E-mail	SMTP, MIME, POP, IMAP
Objects	IIOP (CORBA), RMI, DCOM

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System Management

Data Access

X/Open® XA, OLEDB/ODBC,
Java Database Connectivity (JDBC™)

Management

SNMP, CIM, WBEM, Java



PC Interoperability Features in the Solaris 7 and Solaris 2.6 Operating Environments

File/Print		
• Solaris PC NetLink (Cascade)		Allows Sun servers to run native Windows NT 4.0 network services on the Solaris Operating Environment software. Solaris PC NetLink provides Windows NT naming, authentication, file, and print services on Sun Enterprise servers. Software installed only on server, not on the client. No per client licensing.
• SunLink PC (TotalNET)		This server-side software allows a Sun server to provide file and print services to PCs running LAN Manager or Novell NetWare and Macintosh systems running AppleTalk. Nothing is required on the client.
• Solstice NFS Client		This client software allows a PC running Microsoft Windows 95 or Microsoft Windows NT to use NFS file and print services on a network without having to install and pay for additional network applications and functionality that the average user does not require. It provides higher performance and more robust services than Syntax TotalNET, but requires changes to the client.
E-mail		
• Sun Internet Mail Server (SIMS)		SIMS supports IMAP4 and POP3. Most PC e-mail solutions today, including Microsoft Exchange, support POP3. Eventually, the industry will move to IMAP4, which is the Internet mail standard.
• Solstice NFS Client		Solstice NFS Client allows a PC running Microsoft Windows 95 or Microsoft Windows NT to use NFS file and print services. It provides higher performance and more robust services than Syntax TotalNET, but requires changes to the client.

System Management

Future Interoperability Features

Management		
• Manage PC clients		Sun's ISVs, including Computer Associates (CA) and Tivoli, offer best-of-breed software tools for managing PC clients. In addition, once these are enhanced with Java technology, these products can be integrated into the Solstice family of tools. Over 40 management ISVs, including CA and Tivoli, will enhance their applications with Java Management API (JMAPI).
• Manage from anywhere, manage from a PC		Sun's Solstice tools are being enhanced with Java technology and will soon conform to the Java Management API (JMAPI). That means they will be managed over the Web from any console that has a browser enabled by Java technology.

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Ordering Information

Ordering the Sun Enterprise™ 450 Server

The Sun Enterprise™ 450 server is an assemble-to-order product. Assemble-to-order Sun Enterprise 450 configurations begin with a base chassis that includes two power supplies, a CD-ROM drive, a floppy drive, two internal and one external UltraSCSI buses, PCI and EPCI buses, 20 internal hard disk bays, and a removable media bay for one internal tape device. Valid system configurations must include at least one CPU module, at least two identical memory options, and at least one internal disk.

Assemble-to-order Configurations

Assemble-to-order configurations are customized from the options listed below. Valid sales orders must specify at least one CPU module, at least two identical memory options, and at least one internal disk.

Note: When ordering CPU, memory and disk for assemble-to-order configurations, use the appropriate part number without the preceding "X."

All customer-specified system components and buildable options that appear on a sales order on the same line item with a base system will be installed in that system at the factory for no additional charge.

Assemble-to-order sales orders for the Sun Enterprise 450 server must specify:

- The family part number (A25) as the first entry in a line item
- A server base part number
- System components: CPU module, memory, and internal disk
- Internal options: memory, I/O cards, and so on

Ordering Information



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Base Systems

Order Number

A25-BA

Title and Description

Sun Enterprise 450 server zero base

The Sun Enterprise 450 server base configuration includes:

- Sun Enterprise 450 server tower enclosure (rackmountable)
- SunCD™ 32
- 1.44-MB floppy drive
- Two 560-watt, hot-swap power supplies
- Two external 68-pin Fast/Wide SCSI port
- FastEthernet port (either RJ45 or MII)
- Parallel and serial ports
- Slots for:
 - Four 250-MHz/1-MB, 300-MHz/2-MB or 400-MHz/4-MB UltraSPARC™-II CPUs
 - 8 memory options (16 memory modules)
 - 10 PCI option cards
 - One 5.25-inch half height removable drive
 - One additional hot swap power supply
- Disk cage for up to 20 low profile UltraSCSI hot swap disks with a standard backplane for four drives
- Supports 9.1-GB, 10000-rpm disks and 18.2-GB, 10000-rpm disks
- Solaris™ server license
- 3-year, second-day, on-site hardware warranty *
- 90-day software SunSpectrum™ warranty *

* Product warranty may vary by geographical location. Check with the local SunService™ representative for applicable warranty coverage.

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Ordering Process for Systems and Factory-Installed Components

Follow the steps listed below to prepare a complete and valid sales order. Steps 1 to 4, 6, and 11 are required. Step 5 is required if more than four internal disks are ordered. Step 10 is required if four CPUs or more than four internal disks are ordered. Steps 7 to 9 and 12 to 14 are optional.

Step 1: Enter the Family Part Number (required)

Specify one: **A25** Sun Enterprise 450 server

Step 2: Order Base Package (required)

Order one: **A25-BA** Sun Enterprise 450 server base

Step 3: Order CPU Modules (1 required, maximum of 4)

Order one to four:	2230A	250-MHz UltraSPARC-II CPU module with 1-MB Ecache and DC to DC converter
	2240A	300-MHz UltraSPARC-II CPU module with 2-MB Ecache and DC to DC converter
	2244A	400-MHz UltraSPARC-II CPU module with 4-MB Ecache and DC to DC converter

- Notes:
- All CPUs ordered for one system must be the same part number.
 - A third power supply is recommended when 4 CPUs are installed.

Step 4: Order Memory (2 required, maximum of 8)

Order two, four, six or eight:	7002A	64-MB ECC memory (2 x 32-MB DIMMs)
	7003A	128-MB ECC memory (2 x 64-MB DIMMs)
	7004A	256-MB ECC memory (2 x 128-MB DIMMs)
	7005A	512-MB ECC memory (2 x 256-MB DIMMs)

- Notes:
- Each memory option includes 2 DIMMs.
 - Each Sun Enterprise 450 server order must include a minimum of 2 memory options (4 DIMMs).
 - Maximum memory configuration: 16 DIMMs (4 groups of 4).
 - DIMMs must be added in matched groups of 4 (e.g., 2 x 7005A).
 - Order additional memory options in pairs.
 - For best performance, systems should be configured with 4 or 8 identical memory options (8 or 16 DIMMs).

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Step 5: Order Internal Storage Expansion Option (may be required, maximum of 2)



- Order one or two:
- (X)6601A Eight-bay storage expansion option
 - (X)6602A Eight-bay storage expansion option with SRC/P Intelligent SCSI RAID Controller

Notes:

- The Sun Enterprise 450 server system base provides 4 drive-ready internal disk bays. If more than 4 internal disks are to be installed in the server, then 1 or more internal storage expansion options are required.
- One (X)6601A or (X)6602A options must be installed to support 5 to 12 drives.
- Two (X)6601A or (X)6602A options must be installed to support 13 to 20 drives.
- When installing 5 to 12 disks without SRC/P, order one (X)6601A option. When installing 13 to 20 disks without SRC/P, order two (X)6601A options.
- Until SRC/P boot support is available, in addition to drives installed in (X)6602A, at least 1 internal drive must be installed for booting.
- When installing 1 to 8 disks with SRC/P, order one (X)6602A. At least one additional drive is still needed in one of the first 4 drive slots for booting.
- When installing 9 to 16 disks with SRC/P, order two (X)6602As. At least one additional drive is still needed in one of the first four drive slots for booting.
- Maximum of two (X)6601A or (X)6602A options per system.
- Each (X)6601A or (X)6602A uses one PCI slot (either 32 or 64 bit).
- A third power supply is recommended when SRC/P is installed.

Step 6: Order Internal Disks (1 required, maximum of 20)

- Order one to twenty:
- (X)5229A 9.1-GB, 7200-rpm, hot-swap UltraSCSI disk drive
 - (X)5234A 9.1-GB, 10000-rpm, hot-swap UltraSCSI disk drive
 - (X)5237A 18.2-GB, 10000-rpm, hot-swap UltraSCSI disk drive

Notes:

- Internal disks may be added individually.
- Maximum configuration: 20 internal disks.
- One (X)6601A or (X)6602A 8-bay storage expansion option must be installed to support 5 to 12 disks.
- Two (X)6601A or (X)6602A 8-bay storage expansion options must be installed to support 13 to 20 disks.

Step 7: Order Internal Removable Storage Device (optional, maximum of 1)

- Order one internal removable media device:
- (X)6286A 12 to 24-GB, 4-mm DDS-3 tape drive
 - (X)6213A 7 to 14-GB, 8-mm tape drive
 - (X)6107A 4 to 8-GB SLR tape drive

Notes:

- Maximum of one internal 5.25-inch, half-height tape drive may be installed.

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Step 8: Order PCI Host Adapters and Network Interface Cards (optional)

- Order up to ten: (X)6540A Dual-channel single-ended UltraSCSI host adapter, PCI
(X)6541A Dual-channel differential UltraSCSI host adapter, PCI
- Order up to eight: (X)1032A 10/100BASE-T Fast/Wide UltraSCSI adapter, 1.0, PCI
(X)1033A SunFastEthernet™ controller, PCI
- Order up to seven: (X)6729A Single-loop PCI FC-AL host adapter (*see note, below*)
- Order up to six: (X)1152A SunFDDI™/P single-attach adapter, PCI
(X)1153A SunFDDI/P dual-attach adapter, PCI
(X)6542A SRC/P Intelligent SCSI RAID controller to support external Sun StorEdge MultiPack systems. (See step 9 for additional SRC/P configuration information.)
- Order up to four: (X)1034A Sun QFE/P Sun Quad FastEthernet™ controller, PCI
(X)1154A Sun TRI/P™ token ring interface, PCI
(X)1155A Sun HSI/P™ high-speed serial interface, PCI
(X)1156A Sun SAI/P multiport serial interface, PCI
(X)3668A PGX32 graphics card, PCI
- Order up to two: (X)1141A Sun Gigabit Ethernet card, PCI
- Notes:
- Maximum configuration: 10 PCI cards less any PCI slots occupied by Sun Enterprise 450 server 8-disk backplanes.
 - Note that each 8-slot disk backplane installed in a Sun Enterprise 450 server occupies a PCI slot.
 - 6729A, the single-loop PCI FC-AL host adapter, requires Solaris 2.6 Operating Environment or a later operating system.

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Step 9: Sun StorEdge SRC/P Intelligent SCSI RAID Controller™ (optional)



Order up to six:

(X)6542A SRC/P Intelligent SCSI RAID controller to support external Sun StorEdge MultiPack systems.

X3832A 2-meter SCSI data cable to connect SRC/P controller to external Sun StorEdge MultiPack systems.

Notes:

- Up to 6 (X)6542A options may be installed in the Sun Enterprise 450 server to control external Sun StorEdge MultiPack systems. Each (X)6542A or (X)6602A occupies a PCI slot. Therefore, if two (X)6602A options (the 8-disk internal storage expansion kit with SRC/P) are installed, then up to 4 (X)6542A options may be installed.
- Each (X)6542A includes 2 external 2-meter SCSI data cables and can control 2 external Sun StorEdge MultiPack systems. To connect a third MultiPack to an (X)6542A, order X3832A.
- A third power supply is recommended for Sun Enterprise 450 servers using Sun StorEdge SRC/P.

Step 10: Order Additional Power Supplies (2 are supplied with the Sun Enterprise 450 server base system; order up to 1 additional power supply)

Order one:

9682A 560-watt universal power supply

Notes:

- Maximum configuration: 3 power supplies (2 are standard).
- A fully loaded system will operate on 2 power supplies. The third power supply provides redundancy for greater system availability.
- A third power supply is recommended for systems in which CPUs, memory, PCI cards, and internal storage populate more than 50 percent of available slots.

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Step 11: Order Power Cord/Country Kit (required, maximum of 1)



Order: X3XXL Power cord
X35XXA Type-5 Country Kit

- Notes:
- Order an X3XXL power cord if the system will not require a local graphics console.
 - Order an X35XXA Country Kit if the system will host a local graphics console.
 - See *Sun Enterprise 450 Server Options* for a list of available Power Cord and country kits.

Step 12: Order External Disk Storage Options (optional)

Order: See options list.

- Notes:
- One Sun StorEdge MultiPack or up to 4 Sun StorEdge UniPack disks may be attached to the system's Fast/Wide SCSI port.
 - Additional SCSI storage devices may be supported by PCI SCSI host adapters.

Step 13: Order External Tape Options (optional)

Order: See options list.

- Notes:
- Up to four external SCSI tape devices may be attached to the system's Fast/Wide SCSI port.
 - Additional SCSI tape devices may be supported by PCI SCSI host adapters.

Step 14: Order Other Options (optional)

Order: See options list.

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Typical Sun Enterprise 450 Server Configuration

Sun Enterprise 450 server with internal SunCD 32, floppy, two power supplies, two 400-MHz UltraSPARC-II processors, 512-MB main memory, 12 internal disk bays, 72.8-GB internal disk storage, internal 7 to 14-GB, 8-mm tape drive, and local color graphics console with 17-inch monitor.

Quantity	Order Number	Description
1	A25	Sun Enterprise 450 server family
1	A25-BA	Sun Enterprise 450 server, zero base; SunCD 32, floppy, two 560-watt power supplies, Solaris server license; no CPU, memory, disk drives or tape drives
2	2244A	400-MHz UltraSPARC-II CPU module, 4-MB external cache
4	7003A	128-MB memory (2 x 64-MB DIMMs)
1	6601A	Eight-bay storage expansion option
8	5234A	9.1-GB, internal, hot-plug disk drive, 10000 rpm, 1 inch high
1	6213A	Internal 14-GB, 8-mm tape drive
1	3668A	PGX32™ color graphics frame buffer option
1	X7126A	17-inch entry color monitor
1	X3500A	Type-5 Country Kit, U.S.

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Maximum Sun Enterprise 450 Server Configuration

Sun Enterprise 450 server with internal SunCD 32, floppy, four 400-MHz UltraSPARC-II CPUs, 4-GB main memory, 20 internal disk bays, 364-GB disk storage, 7 to 14-GB, 8-mm tape drive, three fully redundant power supplies, local graphics console with 17-inch monitor, and cabinet with rackmounting kit, seven available PCI slots to support network cards, and external storage options.

Quantity	Order Number	Description
1	A25	Sun Enterprise 450 server family
1	A25-BA	Sun Enterprise 450 server, zero base; SunCD 32, floppy, two 560-watt power supplies, Solaris server license; no CPU, memory, disk
4	2244A	400-MHz UltraSPARC-II CPU module, 4-MB external cache
8	7005A	512-MB memory (2 x 256-MB DIMMs)
2	6602A	Eight-bay storage expansion option with SRC/P controller card, internal and external SCSI cables
3	6542A	SRC/P Intelligent SCSI RAID Controller to support external storage MultiPacks
20	5237A	18.2-GB, internal, hot-plug disk drive, 10000 rpm, 1 inch high
1	6213A	Internal, 14-GB, 8-mm tape drive
1	3668A	PGX32 graphics card, PCI
4	6729A	Single Loop PCI FC-AL host adapter
1	9682A	560-watt power supply
1	X7126A	17-inch entry color monitor
1	X3500A	Type-5 Country Kit, U.S.
1	SG-XARY030A	72-inch Sun StorEdge expansion cabinet
1	X3800A	Power cord for Sun Enterprise expansion cabinet
1	X9690A	Sun Enterprise 450 server rackmounting kit

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Options



Below is a partial list of options available for the Sun Enterprise 450 system. Refer to the Sun Price Book for complete option listings, configuration notes, and ordering information. When no maximum number is listed, consult the configuration information for that option.

Part Number	Option Description	Maximum Number Supported per System	Comments
CPUs			
(X)2230A	250-MHz UltraSPARC-II CPU module with 1-MB Ecache	4	
(X)2240A	300-MHz UltraSPARC-II CPU module with 2-MB Ecache	4	
(X)2244A	400-MHz UltraSPARC-II CPU module with 4-MB Ecache	4	
Memory			
(X)7002A	64-MB, 60-ns memory expansion (2 x 32-MB DIMMs)	8	See memory configuration requirements
(X)7003A	128-MB, 60-ns memory expansion (2 x 64-MB DIMMs)	8	
(X)7004A	256-MB, 60-ns memory expansion (2 x 128-MB DIMMs)	8	
(X)7005A	512-MB, 60-ns memory expansion (2 x 256-MB DIMMs)	8	
Internal Storage Expansion Kit			
(X)6601A	Eight-bay internal storage expansion option	2	A third power supply is recommended when (X)6602A is installed
(X)6602A	Eight-bay storage expansion option with SRC/P Intelligent SCSI RAID Controller	2	
Internal Storage Devices			
(X)5229A	9.1-GB, 7200-rpm, 3.5 x 1 inch, low-profile UltraSCSI disk drive	20	
(X)5234A	9.1-GB, 10000-rpm, 3.5 x 1 inch, low-profile UltraSCSI disk drive	20	
(X)5237A	18.2 GB 10000 rpm, 3.5 x 1 inch, low-profile UltraSCSI disk drive	20	
Internal Removable Storage Devices			
(X)6286A	12 to 24-GB, 4-mm DDS-3 tape drive	1	
(X)6213A	7 to 14-GB, 8-mm tape drive	1	
(X)6107A	4 to 8-GB, SLR tape drive	1	

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Part Number	Option Description	Maximum Number Supported per System	Comments
External Storage Interfaces			
(X)6542A	Sun StorEdge SRC/P Intelligent SCSI RAID Controller to support external Sun StorEdge MultiPack systems	6	A third power supply is recommended for systems that include (X)6542A
(X)6540A	Dual-channel, single-ended UltraSCSI host adapter, PCI	10	
(X)6541A	Dual-channel, differential UltraSCSI host adapter, PCI	10	
(X)6729A	Single-loop PCI FC-AL host adapter—requires Solaris Operating Environment version 2.6 or later	7	
(X)1032A	SunSwift™, PCI (FastEthernet plus UltraSCSI)	8	
Network Interfaces			
(X)1032A	SunSwift, PCI (FastEthernet plus UltraSCSI)	8	
(X)1033A	SunFastEthernet, PCI	8	
(X)1034A	Sun QFE/P QuadFastEthernet, PCI	4	
(X)1141A	Sun GigabitEthernet PCI adapter 2.0	2	
(X)1152A	SunFDDI/P, single-attach, PCI	6	
(X)1153A	SunFDDI/P, dual-attach, PCI	6	
(X)1154A	Sun TRI/P token ring interface, PCI	4	
(X)1155A	Sun HSI/P high-speed serial interface, PCI	4	
(X)1156A	Sun SAI/P serial asynchronous interface, PCI	4	
X1157A	SunATM-155/MFiber PCI adapter	4	
X1158A	SunATM-155/UTP PCI adapter	4	
X1159A	SunATM-622/MFiber PCI adapter	4	
External Sun StorEdge Tape Libraries			
SG-XLIBDLT1-280G	280 to 560-GB Sun StorEdge L280 tape autoloader (desktop)	20	Sun StorEdge L1000, L1800, L3500 and L11000 tape libraries require the dual-channel differential SCSI controller, (X)6541A.
SG-XLIBDLT1-1TB-2	Sun StorEdge L1000 deskside tape library with one DLT™ 7000 tape drive	4	
SG-XLIBDLT4-1TB-2	Sun StorEdge L1000 deskside tape library with four DLT 7000 tape drives	4	
SG-XLIBDLT1R-1TB-2	Sun StorEdge L1000 rackmountable tape library with one DLT 7000 tape drive	4	
SG-XLIBDLT4R-1TB-2	Sun StorEdge L1000 rackmountable tape library with four DLT 7000 tape drives	4	
X6077A	Sun StorEdge L1800 with two DLT 7000 tape drives	4	
X6078A	Sun StorEdge L1800 with four DLT 7000 tape drives	4	
X6079A	Sun StorEdge L3500 with two DLT 7000 tape drives	4	
X6080A	Sun StorEdge L3500 with seven DLT 7000 tape drives	4	
SG-XLIBDLT4-11TB	Sun StorEdge L11000 tape library with four DLT 7000 tape drives	4	
SG-XLIBDLT16-11TB	Sun StorEdge L11000 tape library with 16 DLT 7000 tape drives	4	

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Part Number	Option Description	Maximum Number Supported per System	Comments
Sun StorEdge Tape UniPack Systems			
SG-STAPSLR-010A	4-GB SLR tape drive UniPack	20	
SG-XTAP4MM-011A	12-GB, 4-mm DDS-3 tape drive in a UniPack desktop enclosure	20	
SG-XTAP8MM-011A	20-GB, 8-mm drive in a UniPack desktop enclosure	20	
SG-XTAP8MM-011A	20-GB, 8-mm drive in a UniPack desktop enclosure	20	
Sun StorEdge Disk Drive UniPack Systems			
SG-XDSK010A-9G	9.1-GB, 7200-rpm StorEdge UniPack	20	
SG-XDSK010B-18G	18.2-GB, 7200-rpm Sun StorEdge UniPack	20	
Sun StorEdge FlexiPack Systems			
SG-XTAPSLR-020A	4-GB, SLR tape drive	20	
SG-XTAP4MM-021A	12-GB, 4-mm DDS-3 tape drive	20	
SG-XTAP4MM-031A	72-GB, 4-mm DDS-3 autoloader	20	
SG-XTAP8MM-020A	7-GB, 8-mm drive	20	
SG-XTAP8MM-021A	20-GB, 8-mm drive	20	
SG-XTAPDLT-020A	20-GB DLT 4000 tape drive	20	
SG-XTAPDLT-021A	35-GB DLT 7000 tape drive	20	
Expansion Drives for FlexiPack Systems			
X6106A	4-GB SLR5 internal tape drive for Ultra 30, 60, and FlexiPack		A maximum of one expansions drive may be installed in each Sun StorEdge FlexiPack
X6236A	20 to 40-GB, 8-mm internal tape drive for FlexiPack		
X6166A	32X internal CD-ROM drive for Ultra 30 and 60 systems		
X6212A	7-GB, 8-mm internal tape drive for Ultra 1, 2, 30, and 60 systems		
X6282A	12-GB, 4-mm DDS-3 internal tape drive for Ultra 1, 2, 30, 60, and FlexiPack		
External Sun StorEdge MultiPack Systems			
SG-XDSK020C-18G	Sun StorEdge MultiPack 18.2 GB, 2 x 9.1-GB, 10000-rpm disk drives	20	
SG-XDSK020C-36G	Sun StorEdge MultiPack 36.4 GB, 2 x 18.2-GB, 10000- rpm disk drives	20	
SG-XDSK040C-36G	Sun StorEdge MultiPack 36.4 GB, 4 x 9.1-GB, 10000-rpm disk drives	20	
SG-XDSK040C-72G	Sun StorEdge MultiPack 72.8 GB, 4 x 18.2-GB, 10000-rpm disk drives	20	
SG-XDSK060C-54G	Sun StorEdge MultiPack 54.6 GB, 6 x 9.1-GB, 10000-rpm disk drives	20	
SG-XDSK060C-109G	Sun StorEdge MultiPack 109.2 GB, 6 x 18.2-GB, 10000-rpm disk drives	20	

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Part Number	Option Description	Maximum Number Supported per System	Comments
Expansion Drives for Desktop MultiPacks			
X5229A	9.1-GB, 7200-rpm UltraSCSI expansion drive for MultiPack	4	
X5232A	18.2-GB, 7200-rpm UltraSCSI expansion drive for MultiPack	4	
<i>Note: Up to six drives may be installed in a Sun StorEdge MultiPack. The maximum number of drives supported depends on the number ordered with the MultiPack option.</i>			
External Differential SCSI Disk Storage			
SG-XARY144A-36G	36-GB (4 x 9.1-GB, 10000-rpm disks) Sun StorEdge A1000 tabletop or deskside with HW RAID controller	20 ¹	External Differential SCSI Disk Storage options require the Dual Channel Differential SCSI Controller, (X)6541A
SG-XARY144A-109G	109-GB (12 x 9.1-GB, 10000-rpm disks) Sun StorEdge A1000 tabletop or deskside with HW RAID controller	20 ¹	
SG-XARY151A-72G	72-GB (4 x 18-GB, 10000-rpm disks) Sun StorEdge A1000 tabletop or deskside with HW RAID controller	20 ¹	
SG-XARY151A-218G	144-GB (12 x 18-GB, 10000-rpm disks) Sun StorEdge A1000 tabletop or deskside with HW RAID controller	20 ¹	
SG-XARY146A-36G	36-GB (4 x 9.1-GB, 10000-rpm disks) Sun StorEdge A1000 for rackmounting in Sun StorEdge or Enterprise expansion racks	20 ¹	
SG-XARY152A-72G	72-GB (4 x 18-GB, 10000-rpm disks) Sun StorEdge A1000 for rackmounting in Sun StorEdge or Enterprise expansion racks	20 ¹	
SG-XARY145A-109G	109-GB (12 x 9.1-GB, 10000-rpm disks) Sun StorEdge D1000 tabletop or deskside	20 ¹	
SG-XARY153A-72G	72-GB (4 x 18-GB, 10000-rpm disks) Sun StorEdge D1000 tabletop or deskside	20 ¹	
SG-XARY153A-218G	218-GB (12 x 18-GB, 10000-rpm disks) Sun StorEdge D1000 tabletop or deskside	20 ¹	
SG-XARY147A-36G	36-GB (4 x 9.1 GB 10000-rpm disks) Sun StorEdge D1000 for rackmounting in Sun StorEdge or Enterprise expansion racks	20 ¹	
SG-XARY154A-72G	72-GB (4 x 18-GB 10000-rpm disks) Sun StorEdge D1000 array for rackmounting in Sun StorEdge or Sun Enterprise expansion racks	20 ¹	
SG-XARY366A-72G	72-GB Sun StorEdge A3500-Light (8 x 9.1-GB, 10000-rpm drives)	20 ¹	
SG-ARY370A-91G	91-GB Sun StorEdge A3500 (10 x 9.1-GB, 10000-rpm drives)	20 ¹	
SG-ARY372A-182G	182-GB Sun StorEdge A3500 (20 x 9.1-GB, 10000-rpm drives)	20 ¹	
SG-XARY360A-545G	545-GB Sun StorEdge A3500 (60 x 9.1-GB, 10000-rpm drives)	20 ¹	
SG-XARY374A-273G	273-GB Sun StorEdge A3500 (30 x 9.1-GB, 10000-rpm drives)	20 ¹	
¹ Requires Solaris 2.6 Operating Environment or a more recent version of the Solaris operating system			

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Part Number	Option Description	Maximum Number Supported per System	Comments
External Differential SCSI Disk Storage (cont.)			
SG-ARY380A-182G	182-GB Sun StorEdge A3500 (10 x 18.2-GB, 10000-rpm drives)	20 ¹	
SG-ARY382A-364G	180-GB Sun StorEdge A3500 (20 x 18.2-GB, 10000-rpm drives)	20 ¹	
SG-XARY384A-546G	546-GB Sun StorEdge A3500 (30 x 18.2-GB, 10000-rpm drives)	20 ¹	
¹ Requires Solaris 2.6 Operating Environment or a more recent version of the Solaris operating system			
External Fiber Channel Disk Storage			
SG-XARY530A-91G	91-GB Sun StorEdge A5100 (5 x 18.2-GB 7200-rpm half-height FC-AL drives)	7 ¹	External Fiber Channel disk storage options require the single-loop PCI FC-AL host adapter, (X)6729A.
SG-XARY530A-254G	254.8-GB Sun StorEdge A5100 (14 x 18.2-GB 7200 rpm half-height FC-AL drives)	7 ¹	
SG-XARY531A-254G	254.8-GB Sun StorEdge A5100 (14 x 18.2-GB 7200-rpm half-height FC-AL drives)	7 ¹	
SG-XARY533A-509G	509.6-GB Sun StorEdge A5000 including two 254.8-GB arrays (14 x 18.2-GB 1.625-inch 7200-rpm FC-AL drives)	7 ¹	
SG-XARY533A-1528G	1528.8-GB Sun StorEdge A5100 including six 254.8-GB arrays (14 x 18.2-GB 1.625-inch 7200-rpm FC-AL drives)	7 ¹	
¹ Requires Solaris 2.6 Operating Environment or a more recent version of the Solaris operating system			

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Part Number	Option Description	Maximum Number Supported per System	Comments
Other Options			
X180A	SunButtons - 32 key function I/O device	1	
X985A	Serial port Y splitter cable	1	
(X)1046A	SunSwitch—Gigabit Ethernet switch	*	
(X)3668A	PGX32 PCI graphics card	4	
X3800A	Power cord for EE cabinet, U.S.	1	
X3830A	4-meter SCSI cable; VHDC to 68-pin SCSI; for use with 6541A	*	
X3831A	10-meter SCSI cable; VHDC to 68-pin SCSI; for use with 6541A	*	
X3832A	2-meter SCSI data cable to connect SRC/P Controller to external Sun StorEdge MultiPack systems	6	
X3848A	Power cord for EE cabinet, international	1	
X3856A	Fast-wide 68-68 pin SCSI cable and geo-specific power cord	*	
X3857A	Fast-narrow 50-68 pin SCSI cable and geo-specific power cord	*	
X3872A	Video connector adapter, HD15 female to 13W3 male	2	
X7119A	19-inch color monitor	2	
X7121A	21-inch color monitor, 19.8 inch v.a.	2	
X7124A	24-inch wide screen color monitor	2	
X7126A	17-inch entry color monitor	2	
X9602A	Sun Enterprise cabinet floor brackets	1	
(X)9682A	560-watt hot-swap power supply	1	
X9690A	Sun Enterprise 450 server rackmounting kit	1	
Other Options (cont.)			
SG-XARY030A	72-inch Sun StorEdge expansion cabinet		
SOLMS-070W9999	Solaris 7 English server media kit, includes CD and documentation		
Note: The number of cables and Gigabit Ethernet switches required varies by configuration and is determined by the requirements of the individual configuration.			

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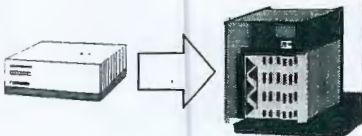
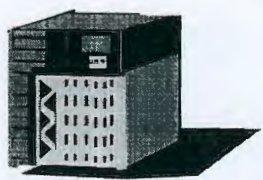


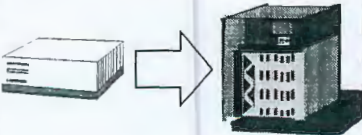
Upgrades

Sun offers customers a variety of flexible upgrade paths to the most popular Sun systems. Customers can choose among full system, non-full system, CPU and memory upgrades. To protect customers' investments, Sun upgrades allow customers to move as many components forward as possible. Existing investments in non-Sun hardware can be preserved by trading in non-Sun systems for Sun systems or CPU modules with competitive upgrades

System Upgrades

Partial System Upgrades (chassis)

UG14-5UNC-9S-000NK	Receive	Return
 Any Sun Enterprise 2 Model 1300 or 2300 to Sun Enterprise 450 server	 Sun Enterprise 450 server chassis, SunCD32, floppy, two power supplies, two DC/DC converters, four disk brackets; assume CPU, disk, and memory migrate	 Sun Enterprise 2 Model 1300 or 2300 chassis, and CD-ROM

UG14-A25-9S-000NK	Receive	Return
 Any UltraSPARC server with 7200-rpm, 1-inch high, 2.1-GB or 4.2-GB disk drives to Sun Enterprise 450 server	 Sun Enterprise 450 server chassis, SunCD32, floppy, two power supplies, four disk brackets, plus required choice of CPU; assume disk and memory migrate	 UltraSPARC server chassis, CPU, and CD-ROM

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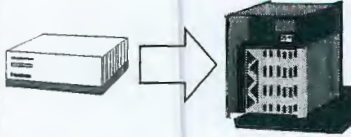
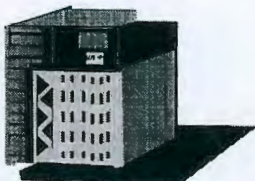
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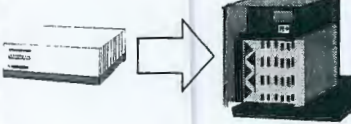
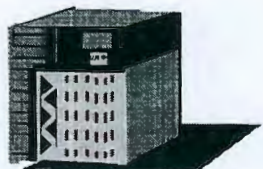
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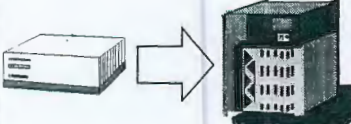
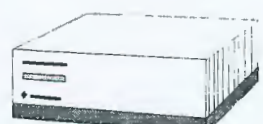


UG14-A25-9S-000-BA	Receive	Return
 Any UltraSPARC or SPARCserver 20 system with 4 x 32-MB memory SIMMs to Sun Enterprise 450 server	 Sun Enterprise 450 server chassis, SunCD32, floppy plus required choice of CPU and internal drive; assume memory migrates	 UltraSPARC or SPARCserver 20 system including chassis, CPU, disk, and CD-ROM

Full System Upgrade

UG10-A25-BA	Receive	Return
 Any SPARCstation10 or earlier Sun server to Sun Enterprise 450 server	 Sun Enterprise 450 server zero base system plus required choice of CPU, memory, and disk	 Complete SPARCstation10 or earlier Sun server system including chassis, disk, and CD-ROM

Competitive System Upgrades

CU-PC-A25-BA CU-UX-A25-BA	Receive	Return
 Any Category 2 or 3 competitive PC or UNIX server to Sun Enterprise 450 server	 Sun Enterprise 450 server zero base system plus required choice of CPU, memory, and disk	 Any category 2 or 3 competitive server system including chassis, disk, and CD-ROM

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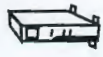
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Module Upgrade

UG-M22XX-M2244* UGFA-M22XX-M2244*	Receive	Return
 Any UltraSPARC 300-MHz CPU module to 400-MHz UltraSPARC-II CPU module with 4-MB Ecache and DC/DC converter	 UltraSPARC-II 400-MHz, 4-MB Ecache, CPU module, and DC/DC converter; installable only on Sun Enterprise 450 systems with 400-MHz/4-MB enabled motherboard	 UltraSPARC 300-MHz CPU module

UG-MXXXX-M2244* UGFA-MXXXX-M2244*	Receive	Return
 Any UltraSPARC 167/200/250-MHz CPU module to 400-MHz UltraSPARC-II CPU Module with 4-MB Ecache and DC/DC converter	 UltraSPARC-II 400-MHz, 4-MB Ecache CPU module and DC/DC converter; installable only on Sun Enterprise 450 systems with 400-MHz/4-MB enabled motherboard	 UltraSPARC 167/200/250-MHz CPU module

UG-MXXX-M300	Receive	Return
 Any UltraSPARC CPU module to 300-MHz UltraSPARC-II CPU Module with 2-MB Ecache and DC/DC converter	 300-MHz UltraSPARC-2 CPU module with 2-MB Ecache and DC/DC converter	 Any UltraSPARC CPU module

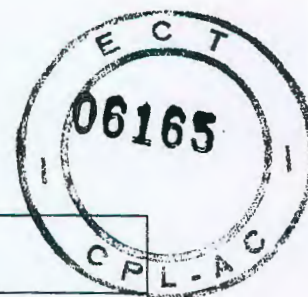
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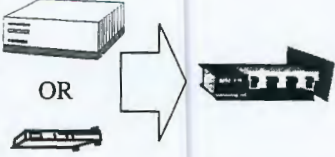
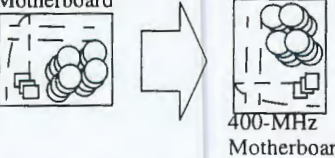
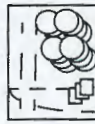
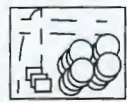
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CU-CONSL-A25-M2244* CUCONSLEA-A25M2244*	Receive	Return
 OR Any Cat 2 or 3 competitive system or CPU board to 400-MHz UltraSPARC-II CPU Module with 4-MB Ecache and DC/DC converter	 UltraSPARC-II 400-MHz, 4-MB Ecache CPU module and DC/DC converter; installable only on Sun Enterprise 450 systems with 400-MHz/4-MB enabled motherboard	 OR UltraSPARC 167/200/250-MHz CPU module
UG-MEM128-MEM512	Receive	Return
 Upgrade from 128 MB of Sun memory to 512-MB (4 x 128-MB Sun DIMM modules) memory	 512-MB (4 x 128-MB Sun memory DIMM modules) memory	 Any Sun memory SIMMs totaling 128 MB of memory
UGMB-A25AA-A25BA*	Receive	Return
250/300-MHz Motherboard  400-MHz Motherboard Upgrade from Sun Enterprise 450 250/300-MHz motherboard to Sun Enterprise 450 server 250/300/400-MHz enabled motherboard	 Sun Enterprise 450 250/300/400-MHz enabled motherboard	 Sun Enterprise 450 250/300-MHz motherboard

Ordering Information

When to Install a Motherboard Upgrade

A motherboard upgrade may be required when upgrading CPU speed from 250-MHz or 300-MHz to 400-MHz, 4-MB CPU. New systems after 11/10/98 do not require this motherboard change. To learn whether the system requires a motherboard upgrade, follow these steps.

1. Using the **Sun Enterprise 450 Server Owner's Guide** complete the procedure in the section "How to Power Off the System."
2. Bring the system to the ok prompt. Use the **Sun Enterprise 450 Server Owner's Guide** and follow Steps 1 through 7 in the procedure, "How to Initiate a Reconfiguration Boot."

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3. When the ok prompt is displayed, enter the command: `ok cd /`
4. Enter the following command for the list of data about the system: `ok .prp`

Examine the output listed for the model property. If the system board is not part number 501-5270 (or if there is no part number listing), you cannot install the UltraSPARC II 400-MHz module. You will need to order a new motherboard UGMB-A25AA-A25BA that is 400-MHz ready. Contact your local sales representative to order this new board.

Ordering Process for Chassis and Base System Upgrades

The Sun Enterprise 450 server is a configure-to-order product. All required customer-specified system components and configurable options appearing on a customer's order with a base system will be installed at the factory for no additional charge.

As with other Sun configure-to-order systems, Sales Orders for upgrading to the Sun Enterprise 450 server specify:

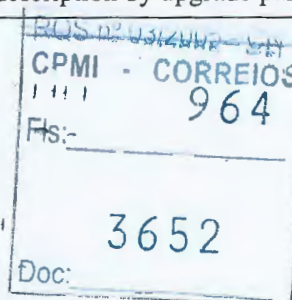
- The family part number as the first entry in a line item
- A full system upgrade or non-full system upgrade
- Required system components—country kit or power cord
- Internal (configured) options—CPU, memory, disk, storage expansion kits, I/O cards, etc.
- External (non-configured) options

Sun Enterprise 450 Server Non-Full System Upgrades

Non-full system upgrades require migration of Sun Enterprise 450 server-compatible components from the Sun server being upgraded (i.e., 300-MHz UltraSPARC CPU modules; 7200-rpm, 1-inch high, 2.1-GB or 4.2-GB disk drives; 32-MB or greater memory DIMMs). Valid non-full system upgrade orders must declare the compatible components that are migrating using Configtool 4.4. A Configuration List Report generated by Configtool must be attached to any non-full system upgrade quote to the customer. The following are Sun Enterprise 450 server non-full system upgrades:

Order Number	Title and Description
UG14-5UNC-9S-000NK UG14-A25-9S-000NK UG14-A25-9S-000-BA	Tower system—non-full system upgrade to Sun Enterprise 450 server in deskside tower enclosure includes: • 3.5-inch floppy disk • SunCD 32 • Four internal 3.5-inch x 1-inch hot-swap UltraSCSI drive bays • Fast/Wide SCSI port • 10/100 Ethernet • Two 560-watt, hot-swap power supplies • Solaris Server license • 3-year second day, on-site hardware warranty • 90-day software SunSpectrumSM warranty • Assumes CPU, disk, or memory is migrated or ordered see the previous section for a detailed description by upgrade part number

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Sun Enterprise 450 Server Full System Upgrades

Order Number	Title and Description
UG10-A25-BA CU-PC-A25-BA CU-UX-A25-BA	Sun Enterprise 450 server CTO zero base system in desktide tower enclosure includes: • 3.5-inch floppy disk • SunCD 32 • Four internal 3.5-inch x 1-inch hot-swap UltraSCSI drive bays • Fast/Wide SCSI port • 10/100 Ethernet • Two 560-watt, hot-swap power supplies • Solaris server license • 3-year second day, on-site hardware warranty • 90-day software SunSpectrum warranty • Choice of CPU, memory, and internal drive for list of options

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To order:

Follow the steps listed below to prepare a complete and valid Upgrade Sales Order.

Step 1: Enter the Family Part Number

Specify: UG-A25 Sun Enterprise 450 server upgrades

Step 2: Order Base Package

Order:	UG14-5UNC-9S-000NK	Sun Enterprise 450 server chassis only
	UG14-A25-9S-000NK	Sun Enterprise 450 server, chassis and choice of 400MHz, 4-MB Ecache; 300-MHz, 2-MB Ecache; or 250-MHz, 1-MB Ecache CPU
	UG14-A25-9S-000BA	Sun Enterprise 450 server, chassis and choice of 400-MHz, 4-MB Ecache; 300-MHz, 2-MB Ecache; or 250-MHz, 1-MB Ecache CPU and choice of internal drive
	UG10-A25-BA*	Sun Enterprise 450 server CTO base system, no CPU, memory or drive
	CU-PC-A25-BA*	Sun Enterprise 450 server CTO base system, no CPU, memory or drive
	CU-UX-A25-BA*	Sun Enterprise 450 server CTO base system, no CPU, memory or drive
	*UG-RMA	RMA Kit required for CTO base system

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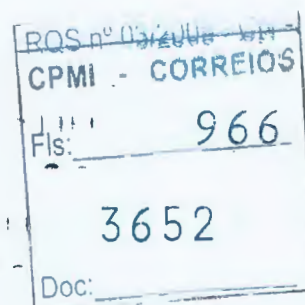
Step 3: Order CPU (required for full system CTO or UG14-A25 partial system)

Order one to four:	2230A	250-MHz UltraSPARC-II CPU module with 1-MB Ecache
	2240A	300-MHz UltraSPARC-II CPU module with 2-MB Ecache
	2244A	400-MHz UltraSPARC-II CPU module with 4-MB Ecache

Notes:

- 1 to 4 CPUs can be installed in a system
- All CPUs ordered for one system must be the same processor speed and must match the CPU that is being migrated in non-full system upgrades or in the base system

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Step 4: Order Memory (required for full system CTO)

Order two, four, six or eight:	7002A	64-MB ECC memory (2 x 32-MB DIMMs)
	7003A	28-MB ECC memory (2 x 64-MB DIMMs)
	7004A	256-MB ECC memory (2 x 128-MB DIMMs)
	7005A	512-MB ECC memory (2x 256-MB DIMMs)

Notes:

- Memory is configured with 4 identical memory DIMMs)
- Maximum memory configuration: 16 DIMMs (4 groups of 4)
- Each memory option includes two DIMMs
- DIMMs must be added in matched groups of four (e.g., 2, 4, or 6 x 7002A)
- For best performance, systems should be configured with 8 or 16 identical DIMMs (add 2 or 6 identical memory options)

Step 5: Order Internal Storage Expansion Option (may be required, maximum of 2)

Order one or two: **(X)6601A** Eight-bay storage expansion option

Notes:

- The Sun Enterprise 450 server system base provides four drive-ready internal disk bays. If more than four internal disks are to be installed in the server, then one or more internal storage expansion options are required.
- When installing 5 to 12 disks, order one 6601A.
- When installing 13 to 20 disks, order two 6601As.
- Maximum of two per system
- Each 6601A uses one PCI slot (either 32- or 64-bit)
- A second power supply is a prerequisite for installing a 6601A

Step 6: Order Internal Disks (required for full system CTO)

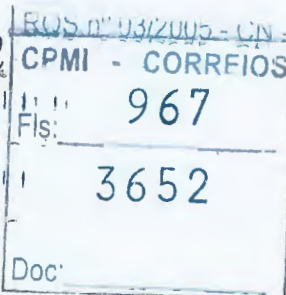
Order:	5229A	9.1-GB, 7200-rpm, hot-swap UltraSCSI disk drive
	5234A	9.1-GB, 10000-rpm, hot-swap UltraSCSI disk drive

Notes:

- Internal disks may be added individually.
- Maximum configuration: 20 internal disks
- One 6601A 8-bay storage expansion option must be installed to support 5 to 12 disks
- Two 6601A 8-bay storage expansion options must be installed to support 13 to 20 disks
- A second power supply is required if 6601A is installed

Steps 7 through 13 are identical to the New System orders and documented in that section. See "Ordering Information" for Sun Enterprise 450 systems in the earlier section.

Ordering Information



Step 14: Submit "Sun Enterprise 450 Component Migration Assessment Form" with Order (Required)



Obtain assessment from Configtool 4.4:

UG14-5UNC-9S-000NK	Valid Non-Full System upgrade orders must declare the compatible components that are migrating using Configtool 4.4.
UG14-A25-9S-000NK	
UG14-A25-9S-000BA	

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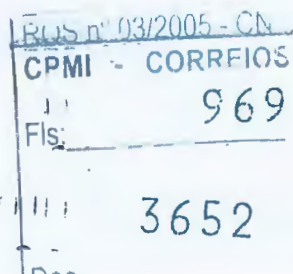
Service and Support

The SunSpectrumSM 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 SolarisTM Operating Environment software, and telephone support for SunTM 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 EnterpriseTM 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
Local customer support management	No	Yes	No	No
Personal technical account support	Yes	Yes	Option	No
SunStart TM installation service	Yes	No	No	No
Account support plan	Yes	Yes	No	No
Software release planning	Yes	No	No	No
On-site account reviews	Monthly	Semiannual	No	No
Skills assessment	Yes	No	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	Option
7-day/24-hour on-site coverage	Yes	Option	Option	N/A
7-day/12-hour on-site coverage	No	Option	No	No
5-day/24-hour on-site coverage	No	Option	No	No

Service and Support

Just the Facts



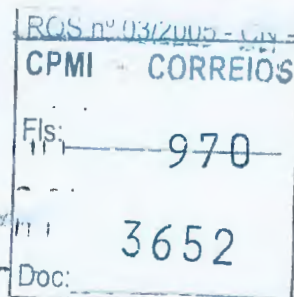
August 1999



FEATURE	SUNSPECTRUM PLATINUM SM Mission-critical Support	SUNSPECTRUM GOLD SM Business-critical Support	SUNSPECTRUM SILVER SM Systems Support	SUNSPECTRUM BRONZE SM Self Support
Coverage / Response Time (cont.)				
Customer-defined priority setting	Yes	Yes	Yes	Option
• 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
2-hour on-site response	Yes	Option	Option	N/A
Additional contacts	Option	Option	Option	Option
Premier Support Features				
Mission-critical support team	Yes	For urgent problems	No	No
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
Hardware Support Delivery				
Replacement hardware parts	On-site technician	On-site technician	On-site technician	Courier
Two day parts delivery	N/A	N/A	N/A	Yes
Overnight parts delivery	N/A	N/A	N/A	Option
Same-day parts delivery	Yes	Yes	Yes	Option
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

Service and Support

Just the Facts



August 1999

Glossary



Glossary

Just the Facts



RQS nº 03/2005 - CN	
CPMI	CORREIOS
Fls:	971
3652	
Doc:	

August 1999



Materials Abstract

All materials will be available on SunWIN except where noted otherwise.

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Powerpack				
– Sun Enterprise™ 450 Server Just the Facts	Reference Guide (this document)	Training, Sales Tool	SunWIN, Reseller Web	71649
– Sun Enterprise 450 Server Customer Presentation	Customer Presentation and Notes (in Four Parts)	Sales Tool	SunWIN, Reseller Web	73645, 73649, 73653, 73657
References				
– Sun Product Intro: Sun Enterprise 450 and HPC 450 Servers	Introduction E-mail	Sales Tool	web site SunWIN, E-mail, Reseller Web	95455
– Sun Product Intro: Sun Enterprise 450 and HPC 450 Servers	Introduction E-mail	Sales Tool	SunWIN, E-mail, Reseller Web	95455
– Sun Workgroup Server Product Line Overview	Quick Reference Card	Sales Tool	SunWIN, Reseller Web, First Resort	24517
– Sun Workgroup Server/Competitive Summary	Quick Reference Card	Sales Tool	SunWIN, Reseller Web, First Resort	24515
– Workgroup Server Sales and Marketing Tools Guide	Reference Guide	Sales Tool	SunWIN	88195
– Product: 400-MHz Sun Enterprise 450 Server TPC-C Results, 2/2/99	Product Performance Information	Sales Tool	SunWIN	99320
Presentations				
– Sun Solutions for the Enterprise Workgroup Golden Pitch Presentation and Slide Notes	Information on Product Launch	Sales Tool	SunWIN, Reseller Web	88148

Materials Abstract

Just the Facts



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3652
Doc:

August 1999



Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Product Literature				
- Sun Enterprise 450 and 250 Server Architecture White Paper	Technical White Paper	Sales Tool	SunWIN, Reseller Web	72523
- Literature: Sun Enterprise 450 Server Data Sheet	Data Sheet	Sales Tool	SunWIN, Reseller Web, COMAC	63029
- Sun Enterprise 450 Server Performance Brief	Product Brief	Sales Tool	SunWIN, Reseller Web	74025
- Solaris for ISPs™ Product Brief	Product Brief	Sales Tool	SunWIN	88146
- Sun Enterprise Server and Storage Family Brochure	Enterprise Server and Storage Family Brochures	Sales Tool	COMAC	BE607-1
- Sun Enterprise 450 Server Product Book, 10/97	Product Pricing Information	Sales Tool	SunWIN, Reseller Web	75933
- Product Update Bulletin: Sun Enterprise 450 Server Disk Support, 6/99	Product Update	Sales Tool	SunWIN, Reseller Web	104931
Competitive				
- Workgroup Server Competitive Brief	Competitive Brief	Sales Tool	SunWIN	53106
Success Stories				
- Success Story: Sun Enterprise 450 Workgroup Servers Get the Job for U.S. & Canadian Career Planning Web Site, 4/99	Customer Success Story	Sales Tool	SunWIN	103095
- Success Story: See's Candies' Sweet E-commerce Site Ramps Up on Sun Enterprise 450 Workgroup Server, 4/99	Customer Success Story	Sales Tool	SunWIN	103100
- PRODUCT: Sun Enterprise 450 EMC Compliance, 5/99	Customer Success Story	Sales Tool	SunWIN	103641
- Success Story: University of Scranton Upgrades Campus Intranet with Sun Enterprise 450 Workgroup Servers, 6/99	Customer Success Story	Sales Tool	SunWIN	106406
External Web Sites				
- UltraSPARC™ information	http://www.sun.com/sparc.html			
- Sun Enterprise 450 Server Information	http://www.sun.com/servers/workgroup/450/			

Materials Abstract



Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Internal Web Sites - <i>Internal SE information</i> - <i>Competition Profiles (USA)</i> - <i>Performance Information</i>	http://edss.corp/workgroup/450.html http://edss.corp/workgroup/hwraid.html http://onestop.eng/hw/e450.shtml http://nafo.corp/profiles/competitive.html http://perfwww.eng			

Materials Abstract

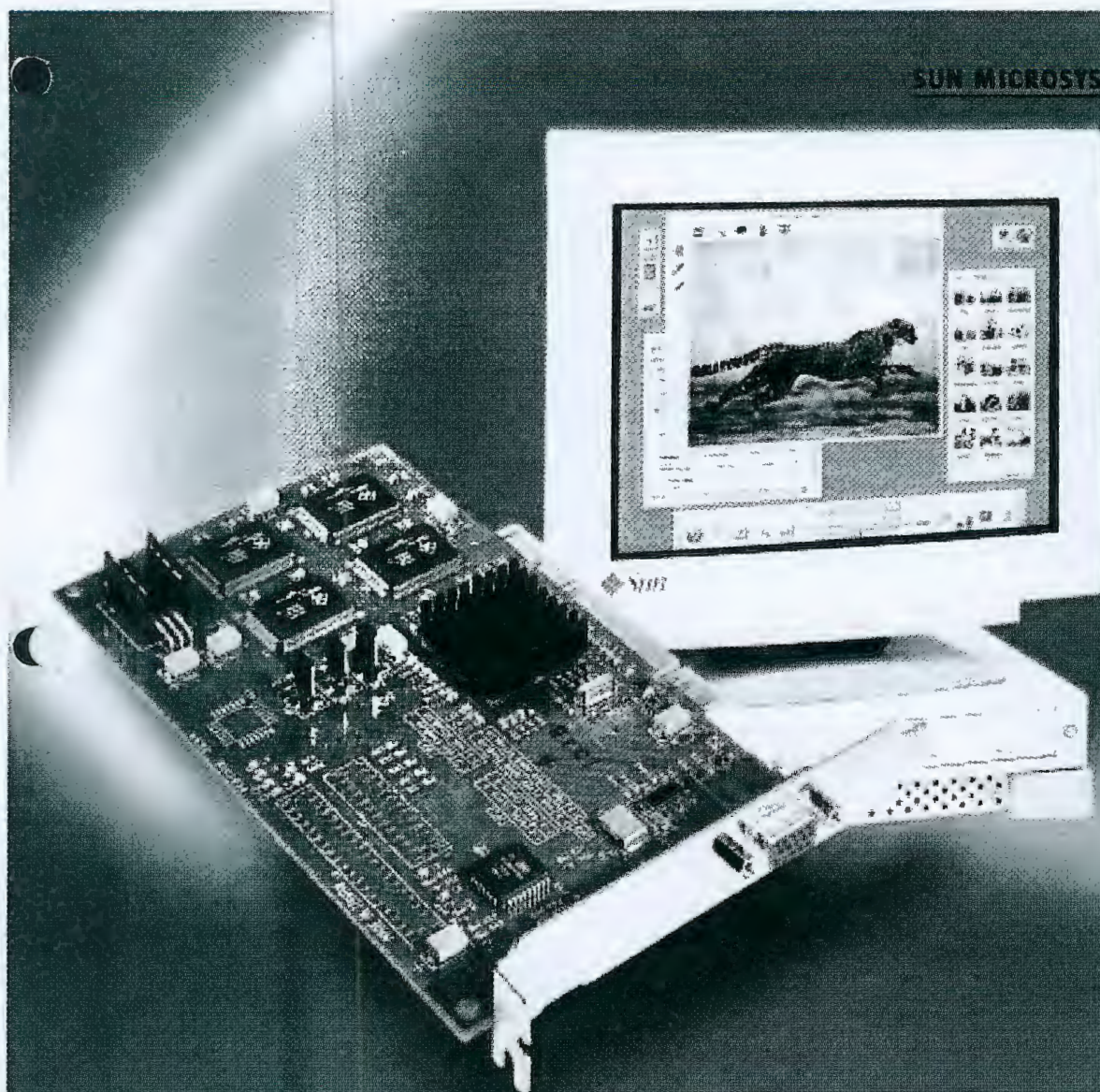
Just the Facts



Bus 11/13/2005 - 1st

CPMI - CORREIOS
Fls: 974
3652
Doc:

August 1999



PGX32 GRAPHICS ACCELERATOR CARD

The high-resolution, low-cost 24-bit graphics solution for Sun™ PCI systems.

For applications that require fast 2-D windowing performance and both true- and pseudo-color graphics support, Sun has the solution: the PGX32™ graphics card. The PGX32 card gives all Sun PCI-based systems the capability to run the latest 24-bit applications at full speed, right alongside 8-bit applications. The PGX32 card supports VIS™ graphics and

media acceleration, and its 8 MB of SGRAM are capable of providing full 8- and 24-bit hardware double buffering at high resolutions. And with support for Sun and PC color displays in true-color modes, the PGX32 card is the clear choice for price-conscious graphics users.

HIGHLIGHTS

- Runs 24-bit true-color and 8-bit pseudo-color applications simultaneously
- Comes with 8 MB of high-speed SGRAM memory
- Supports 8- and 24-bit color up to 1280 X 1024 @ 85 Hz, 8-bit color up to 1600 X 1200 @ 80 Hz
- Supports VIS multimedia and graphics instruction set via the UltraSPARC™ CPU

- Compatible with both OpenWindows™ and CDE environments
- Includes HD15-13W3 video adapter to support Sun 13W3 high-resolution displays
- Provides backward compatibility with previous PGX™ frame buffer
- Supports OpenGL® pipeline via DPA software extension

Doc 3652

Sun's PGX32 graphics accelerator card delivers fast X-windowing performance and simultaneous 8- and 24-bit color support—the perfect solution for PCI-based systems running desktop publishing, multiple display, CAD/CAM/CAE, imaging, and other color- and imaging-intensive applications.

FEATURES

- Simultaneous 8- and 24-bit display visual support
- 24-bit true-color video support
- Support for high resolutions
- 33 MHz PCI format
- 1280 X 1024 @ 76 Hz resolution standard
- Multiple color display support (up to four PGX32 cards per system)
- 8-bit overlay plane

BENEFITS

- Eliminates most colormap flashing when running both 8- and 24-bit applications; allows you to run legacy 8-bit applications while running the latest 24-bit applications
- High-quality color onscreen
- Displays more information with higher quality and image detail
- Supports all Sun PCI-based systems
- High-resolution display quality
- Ideal for users performing multiple tasks simultaneously, such as command and control, engineering design, and analysis
- Overlay 8-bit windows on 24-bit visuals without damaging underlying visual, for seamless window integration and manipulation

PGX32 SPECIFICATIONS

- Memory Configuration 8-MB SGRAM
- Horizontal Sync Signals 31.5 KHz - 100 KHz
- Vertical Refresh Rates 60 Hz - 200 Hz
- Dot Clock Maximum 250 MHz
- Video Output Signal Analog RS-343
- Video Connector Standard 15-pin D-shell
- Bus Architecture 32-bit PCI local bus

Temperature

Operating	0° to 70°, 10% to 95%, noncondensing
Nonoperating	-10° to 100°, 10% to 95%, noncondensing

Power	+5V @ 1.5A
-------	------------

Dimensions

Length	145 mm/5.7 inches
Width	91 mm/3.5 inches
Regulations	FCC Class B Certified, DCU Mark TUV

Color Displays	Standard and multifrequency analog
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Software	OpenWindows and CDE for Solaris 2.6 and 7 Operating Environment™ software
----------	---

Boot Support OBP	IEEE 1275-compliant FCode
------------------	---------------------------

RESOLUTIONS SUPPORTED

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

PLATFORMS SUPPORTED

- All Sun PCI-based workstations including the Sun Ultra™ 5, Ultra 10, Ultra 60, Ultra 450 and Sun Enterprise™ 250 and 450 workgroup servers running Solaris 2.6 Operating Environment software or higher
- All Sun color displays including Sun's 24-inch monitor and many VESA standard PC displays
- Supports Sun graphics APIs, including XGL™, XIL™, and Sun™ OpenGL® 1.1.2 for Solaris™

NOTE:

- Sun color displays prior to 1996 may require a special composite sync adapter (FRU# F130-4195-01).
- OpenGL API runs via direct pixel access (DPA) extension, a software pipeline which is dependent on CPU performance.

HEADQUARTERS

SALES OFFICES



THE NETWORK IS THE COMPUTER™

Doc: 3652

60

SPEC CINT95rate Results

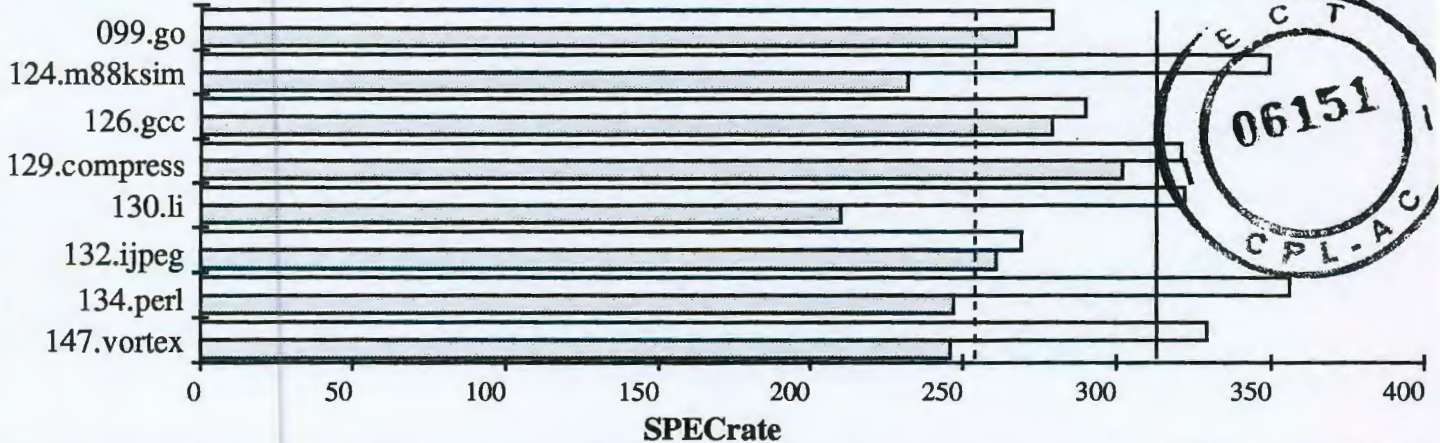
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**Sun Microsystems
Sun Enterprise 450**

SPECint_rate95 = 313

SPECint_rate_base95 = 254

SPEC license # 6 Tested By: Sun, Palo Alto Test Date: Oct-98 Hardware Avail: Nov-98 Software Avail: Feb-9



Hardware/Software Configuration for:
Sun Enterprise 450

Hardware
Model Name: Sun Enterprise 450
CPU: 400 MHz UltraSPARC-II
FPU: Integrated
Number of CPU(s): 2
Primary Cache: 16KBI+16KBD on chip
Secondary Cache: 4MB (I+D) off chip
Other Cache: None
Memory: 512MB
Disk Subsystem: 2 x 4.2GB
Other Hardware: Fast Ethernet

Software
Operating System: Solaris 7 (kernel/unix)
Compiler: Sun C 5.0 Early Access
File System: UFS
System State: Single User
Kernel Extensions: consistent_coloring=1

Benchmark # and Name	Base Copies	Base Run Time	Base SPEC Ratio	Copies	Run Time	SPEC Ratio
099.go	2	310	267	4	593	279
124.m88ksim	2	147	232	2	98	349
126.gcc	2	110	279	4	211	290
129.compress	2	107	302	2	101	321
130.li	2	163	210	2	106	322
132.jpeg	2	165	261	2	161	269
134.perl	2	138	247	2	96	356
147.vortex	2	197	246	2	148	329
SPECint_rate_base95 (G. Mean)			254			
			SPECint_rate95 (G. Mean)		313	

Notes/Tuning Information

P1= -xprofile=collect: 'pwd'../feedback; P2= -xprofile=use: 'pwd'../feedback
Baseline: -fast -x05 -xarch=v8plusa; PASS1= \${P1}; PASS2= \${P2}
CULTRA= -xarch=v8plusa -xchip=ultra; ALIGN = -Wc, -Qiselect-funcalign=32, -Qicache-L1-bsize=4-bbits=7
099.go: -fast -x04 -xarch=v8plus -xrestrict -xcrossfile -W2, -04+ansi_alias+bopt
099.go: PASS1= \${P1}; PASS2= \${P2} \${ALIGN} -dn
124.m88ksim: -fast -x05 -xsafe=mem -xarch=v8plus -xcrossfile -xrestrict -W2, -04+cond_elim+pde, -ldstr,
124.m88ksim: -Mt8500 -Wc, -Qiselect-sw_pf_tbl_th=20; PASS1= \${P1}; PASS2= \${P2} -dn
126.gcc: -fast -x04 -xarch=v8plus -W2, -04+ansi_alias+cond_elim; PASS1= \${P1}; PASS2= \${P2} -dn
129.compress: -fast -x05 -xsafe=mem -xarch=v8plus -xrestrict -xcrossfile -W2, -04+ansi_alias+pde -Wc -Qms_pipe+unoovf
129.compress: PASS1= \${P1}; PASS2= \${P2} -dn
130.li: -fast -x04 \${CULTRA}; PASS1= -fast -x04 -xarch=v8plus -xcrossfile \${P1}
130.li: PASS2= -fast -x05 -xsafe=mem -xarch=v8plus -xcrossfile
130.li: -W2, -04+ansi_alias+cond_elim+pde, -Mt350, -whole, -crit \${P2} -dn
132.jpeg: -fast -x05 -xsafe=mem -xarch=v8plus -W2, -04+ansi_alias+cond_elim
132.jpeg: PASS1= \${P1}; PASS2= \${P2} -dn
134.perl: -fast -x04 \${CULTRA} -xcrossfile -W2, -Mpl, -ANSI_S, -04+cond_elim -Wc, -Qiselect-sw_pf_tbl_th=30
134.perl: PASS1= \${P1}; PASS2= \${P2} -dn
147.vortex: -fast -x04 \${CULTRA}; PASS1= -fast -x04 -xarch=v8plus -xcrossfile \${P1}
147.vortex: PASS2= -fast -x05 -xsafe=mem -xarch=v8plus -xcrossfile \${P2} -W2, -04+cond_elim, -Mt500, -Mr6000, -crit -dn
Portability: 124.m88ksim, 132.jpeg: -DSYSV -Xc, 126.gcc: -Dalloca=__builtin_alloca -Xc
others: -Xc
Shell limits: # ulimit -n 1024 or % limit descriptors 1024; Config file: 2CPU.r.E450_DT.pub.int.fp2.cfg 98/10/22

For More
Information
Contact:

SPEC
10754 Ambassador Drive, Suite 201
Manassas, VA 20109

ROS 03/2005-11
CPMI CORRECTIONS

Fls: 977

Doc: 3652

(703) 331-0180
info@specbench.org
http://www.specbench.org/

Prepared By: Sun Palo Alto

SPEC CFP95rate Results

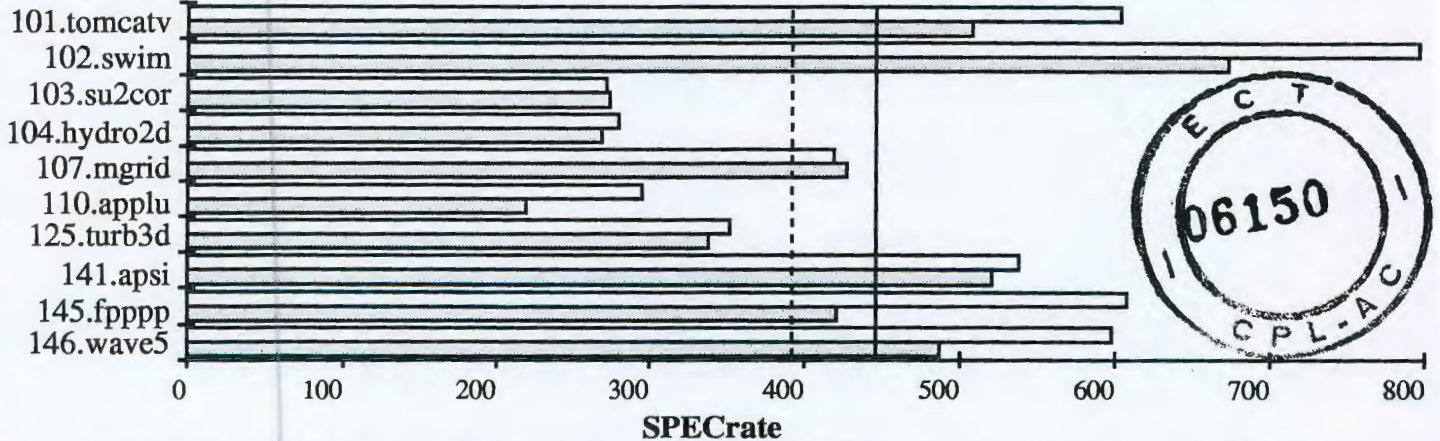
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Sun Microsystems
Sun Enterprise 450

SPECfp_rate95 = 446

SPECfp_rate_base95 = 392

SPEC license # 6 Tested By: Sun, Palo Alto Test Date: Oct-98 Hardware Avail: Nov-98 Software Avail: Feb-9



Hardware/Software Configuration for: Sun Enterprise 450

Hardware
Model Name: Sun Enterprise 450
CPU: 400 MHz UltraSPARC-II
FPU: Integrated
Number of CPU(s): 2
Primary Cache: 16KBI+16KBD on chip
Secondary Cache: 4MB (I+D) off chip
Other Cache: None
Memory: 512MB
Disk Subsystem: 2 x 4.2GB
Other Hardware: Fast Ethernet

Software
Operating System: Solaris 7 (kernel/unix)
Compiler: Sun f77 5.0 Early Access
File System: UFS
System State: Single User
Kernel Extensions: consistent_coloring=1

Benchmark # and Name	Base Copies	Base Run Time	Base SPEC Ratio	Copies	Run Time	SPEC Ratio
101.tomcatv	2	131	508	2	110	604
102.swim	2	230	674	2	194	797
103.su2cor	2	92.1	274	2	93	272
104.hydro2d	2	161	269	2	154	280
107.mgrid	2	105	427	2	108	419
110.applu	2	181	219	2	134	295
125.turb3d	2	218	338	2	210	352
141.apsi	2	72.5	521	2	70	538
145.fpppp	2	410	421	2	284	608
146.wave5	2	111	487	2	90	598
SPECfp_rate_base95 (G. Mean)			392			
			SPECfp_rate95 (G. Mean)		446	

Notes/Tuning Information

```
P1= -xprofile=collect:'pwd'../feedback; P2= -xprofile=use:'pwd'../feedback
BCOPY= -Option iropt -O4+bcopy; INV= -Option iropt -O4+invccexp
Baseliner: -fast -xarch=v8plusa -fsimple=2 -xprefetch
101.tomcatv: -fast -xarch=v8plusa -xpad=local:23 -xprefetch -Option iropt -O4+data_access
102.swim: -fast -xarch=v8plusa -xpad=common:15 -xprefetch -fsimple=2
103.su2cor: -fast -xarch=v8plusa -xvector -Option cg -Cms_pipe+nfll=5 -fsimple=2 $(BCOPY)
103.su2cor: PASS1= -xO4 $(P1); PASS2= -xO5 -xsafe=mem $(P2);
104.hydro2d: -fast -xarch=v8plusa -xprefetch -Option iropt -O4+pde -fsimple=2
104.hydro2d: PASS1= $(P1); PASS2= $(P2);
107.mgrid: -fast -xarch=v8plusa -xprefetch -fsimple=2 $(BCOPY)
107.mgrid: PASS1= -xO4 $(P1); PASS2= -xO5 -xsafe=mem $(P2);
110.applu: -fast -xarch=v8plusa -Option iropt -O4+scalarep+ddint+perfect+loop_dist+pde+algassoc -Mt6000 -Mr20000 -Ma140 -ldstr -fsimple=2
125.turb3d: -fast -xarch=v8plusa -stackvar -xpad -fsimple=2 -Option iropt -O4+bcopy $(INV) -xvector=yes
125.turb3d: PASS1= -xO4 $(P1); PASS2= -xO5 -xsafe=mem $(P2);
141.apsi: -fast -xarch=v8plusa -xchipultra3 -fsimple=2 -stackvar -Option iropt -Si36
141.apsi: $(INV) -Option iropt -O4+algassoc; PASS1= -xO4 $(P1); PASS2= -xO5 -xsafe=mem $(P2);
145.fpppp: -fast -xarch=v8plusa -xO5 -xsafe=mem -fsimple=2 -nodepend -Option iropt -O4+algassoc -Option iropt -reroll=1
145.fpppp: PASS1= $(P1); PASS2= $(P2);
146.wave5: -fast -xarch=v8plusa -stackvar -fsimple=2 -Option iropt -O4+unroll $(BCOPY)
Shell limits: # ulimit -n 1024 or & limit descriptors 1024
Config file: 2CPU.r.E450_DT.pub.int.fp_2.cfg
```

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3652

For More
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Contact:

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Manassas, VA 20109

(703) 331-0180
info@specbench.org
http://www.specbench.org/
Doc:

Prepared By: Sun Palo Alto

SPEC CINT95rate Results

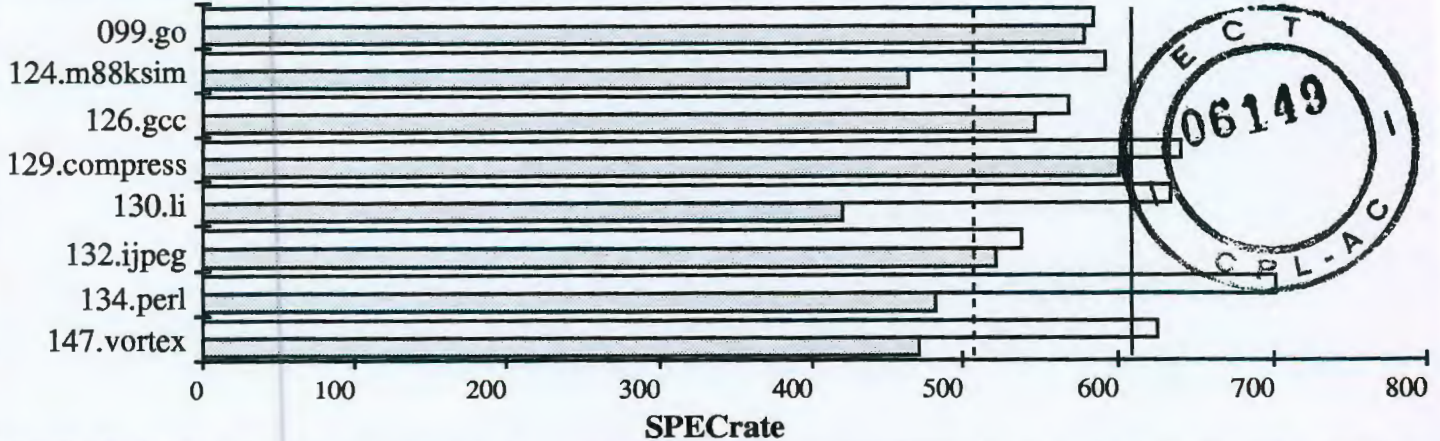
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Sun Microsystems
Sun Enterprise 450

SPECint_rate95 = 609

SPECint_rate_base95 = 507

SPEC license # 6 Tested By: Sun, Palo Alto Test Date: Oct-98 Hardware Avail: Nov-98 Software Avail: Feb-9



Hardware/Software Configuration for: Sun Enterprise 450

Hardware
Model Name: Sun Enterprise 450
CPU: 400 MHz UltraSPARC-II
FPU: Integrated
Number of CPU(s): 4
Primary Cache: 16KBI+16KBD on chip
Secondary Cache: 4MB (I+D) off chip
Other Cache: None
Memory: 1024MB
Disk Subsystem: 2 x 4.2GB
Other Hardware: Fast Ethernet

Software
Operating System: Solaris 7 (kernel/unix)
Compiler: Sun C 5.0 Early Access
File System: UFS
System State: Single User
Kernel Extensions: consistent_coloring=1

Benchmark # and Name	Base Copies	Base Run Time	Base SPEC Ratio	Copies	Run Time	SPEC Ratio
099.go	4	286	578	4	283	584
124.m88ksim	4	147	464	8	231	592
126.gcc	4	112	546	8	215	568
129.compress	4	108	601	4	101	642
130.li	4	163	420	4	108	635
132.jpeg	4	166	521	4	161	537
134.perl	4	142	482	8	195	701
147.vortex	4	206	471	8	311	626
SPECint_rate_base95 (G. Mean)			507			
			SPECint_rate95 (G. Mean)			609

Notes/Tuning Information

P1= -xprofile=collect:'pwd'../feedback; P2= -xprofile=use:'pwd'../feedback
Baseline: -fast -x05 -xarch=v8plusa; PASS1= \${P1}; PASS2= \${P2}
CULTRA= -xarch=v8plusa -xchip=ultra; ALIGN = -Wc, -Qiselect-funcalign=32, -Qicache-L1-bsize=4-bbits=7
099.go: -fast -x04 -xarch=v8plus -xrestrict -xcrossfile -W2, -O4+ansi_alias+bopt
099.go: PASS1= \${P1}; PASS2= \${P2} \${ALIGN} -dn
124.m88ksim: -fast -x05 -xsafe=mem -xarch=v8plus -xcrossfile -xrestrict -W2, -O4+cond_elim+pde, -ldstr,
124.m88ksim: -Mt8500 -Wc, -Qiselect-sw_pf_tbl_th=20; PASS1= \${P1}; PASS2= \${P2} -dn
126.gcc: -fast -x04 -xarch=v8plus -W2, -O4+ansi_alias+cond_elim; PASS1= \${P1}; PASS2= \${P2} -dn
129.compress: -fast -x05 -xsafe=mem -xarch=v8plus -xrestrict -W2, -O4+ansi_alias+pde -Wc -Qms_pipe+unoovf
129.compress: PASS1= \${P1}; PASS2= \${P2} -dn
130.li: -fast -x04 \${CULTRA}; PASS1= -fast -x04 -xarch=v8plus -xcrossfile \${P1}
130.li: PASS2= -fast -x05 -xsafe=mem -xarch=v8plus -xcrossfile
130.li: -W2, -O4+ansi_alias+cond_elim+pde, -Mt350, -whole, -crit \${P2} -dn
132.jpeg: -fast -x05 -xsafe=mem -xarch=v8plus -W2, -O4+ansi_alias+cond_elim
132.jpeg: PASS1= \${P1}; PASS2= \${P2} -dn
134.perl: -fast -x04 \${CULTRA} -xcrossfile -W2, -Mpl, -ANSI_S, -O4+cond_elim -Wc, -Qiselect-sw_pf_tbl_th=30
134.perl: PASS1= \${P1}; PASS2= \${P2} -dn
147.vortex: -fast -x04 \${CULTRA}; PASS1= -fast -x04 -xarch=v8plus -xcrossfile \${P1}
147.vortex: PASS2= -fast -x05 -xsafe=mem -xarch=v8plus -xcrossfile \${P2} -W2, -O4+cond_elim, -Mt500, -Mr6000, -crit -dn
Portability: 124.m88ksim, 132.jpeg: -DSYSV -Xc, 126.gcc: -Dalloca=__builtin_alloca -Xc
others: -Xc
Shell limits: # ulimit -n 1024 or % limit descriptors 1024; Config file: 4CPU, 450, DT, pub, 10/12/98 98/10/22

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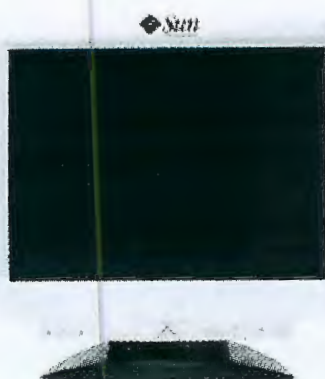
MONITORS

- [24" Wide Screen Color Monitor](#)
- [21" Flat Screen Aperture Grille \(AG\) Color Monitor](#)
- [19" Flat Screen Aperture Grille \(AG\) Color Monitor](#)
- [18.1" TFT LCD Monitor](#) **NEW!**
- [17" Sun Color Monitor](#)



24" Wide Screen Color Monitor

- 24-inch CRT size, 22.5" viewable area
- 0.26mm aperture grille pitch
- Up to 1920 x 1200 @ 70Hz (16:10 aspect ratio mode)
- 2-meter non-detachable 13W3 video input cable and HD15-pin video input connector
- 580mm (W) x 500mm (H) x 548mm (D)



21" Flat Screen Aperture Grille (AG) Color Monitor (new)

- 21-inch Flat Screen AG CRT, 19.8" viewable area
- 0.24mm aperture grille pitch
- 1152x900 @ 66Hz, 76Hz
- 1280x1024 @ 67Hz, 76Hz
- 1600x1200 @ 75Hz
- 2-meter non-detachable 13W3 video input cable and HD15-pin video input connector
- 499mm (W) x 495mm (H) x 500mm (D)

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07



Sun StorEdge™ MultiPack, FlexiPack, and UniPack Systems

Just the Facts



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Positioning

Introduction

As the cost of magnetic media continues to drop, the amount of on-line data grows at accelerating rates. Existing and emerging applications such as databases, imaging, and multimedia are demanding ever-increasing capacity and performance from storage products. The Sun StorEdge™ MultiPack, Sun StorEdge FlexiPack, and Sun StorEdge UniPack systems are desktop storage systems that complement the Sun storage product line and bring a host of competitive features to the desktop.

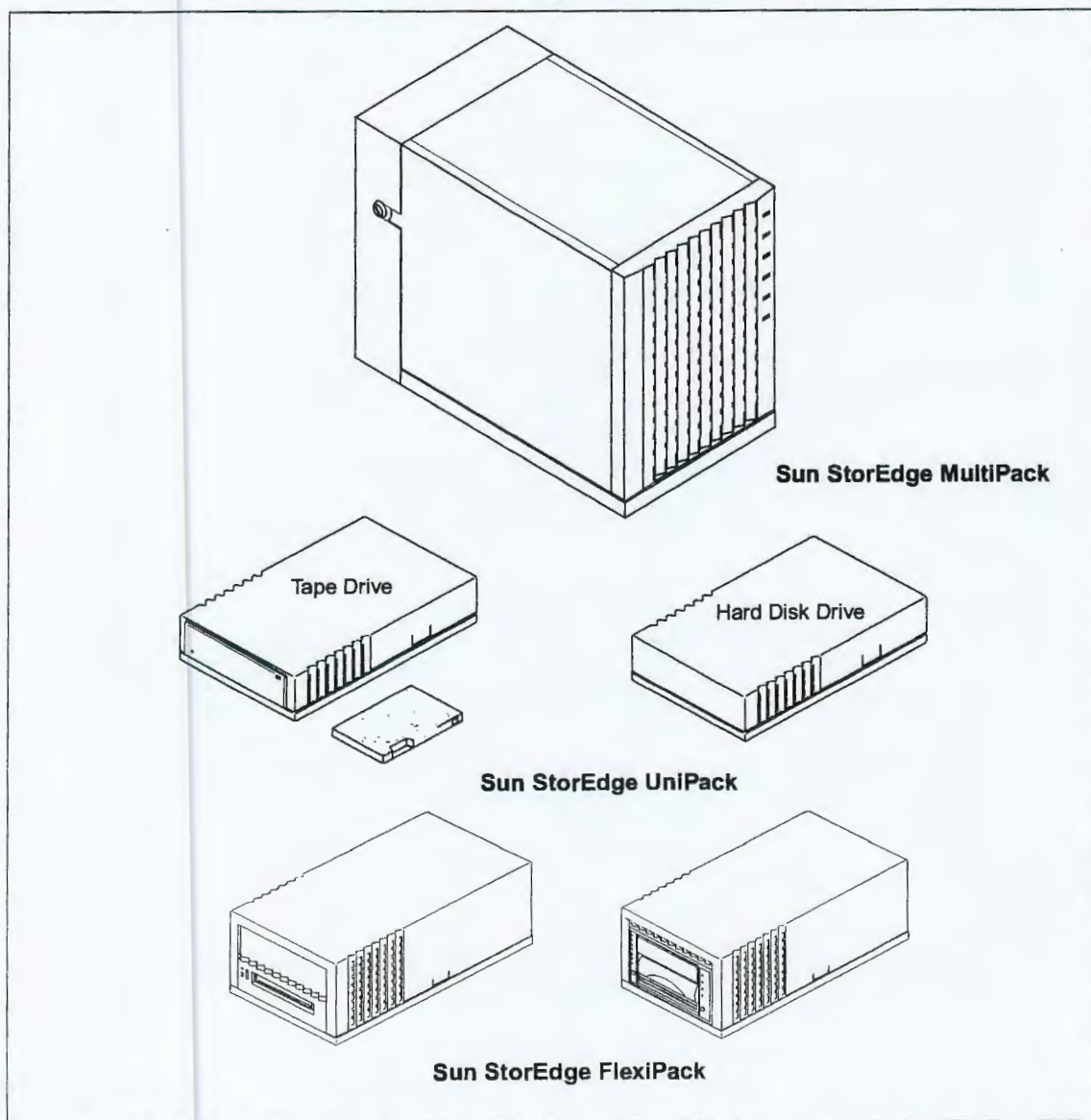


Figure 1. Sun StorEdge desktop storage enclosures



Sun StorEdge MultiPack

The Sun StorEdge MultiPack storage system accommodates six single-connector attachment (SCA) UltraSCSI drives. The individual drives can have either a 1.0-inch or 1.6-inch high form factor. The Sun StorEdge MultiPack system replaces the older 12-drive SPARCstorage™ MultiPack system and provides UltraSCSI functionality.

The Sun StorEdge MultiPack system complements Sun's mass-storage product line and brings competitive features to the desktop. Geographical SCSI addressing simplifies SCSI ID selection. Hot-pluggable drives using the SCA-2 connector give customers high reliability and ease-of-use. The signature packaging complements the Sun StorEdge UniPack system, desktop workstations, and servers.

The Sun StorEdge MultiPack system is configured with two, four, or six 1-inch high, 9.1-, 18.2-, or 36.4-GB, 10000-rpm UltraSCSI drives. Additional X-option drives may be ordered to customize the Sun StorEdge MultiPack system to meet users' needs.

Key Messages

- Maximum 216 GB of storage capacity
- Multiple UltraSCSI-capable drives in a single desktop enclosure
- Low cost/MB
- Good price/IOPS (input/output operations per second) option
- Hot-swappable drives with multiple active spindles
- Geographical addressing
- Easily serviced and expanded

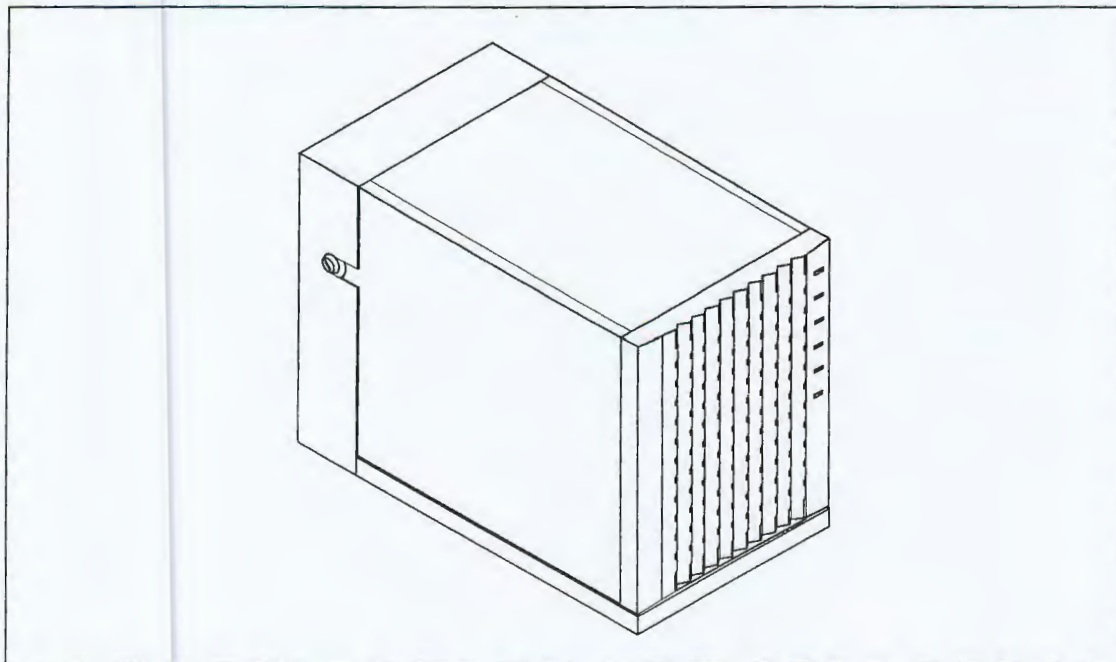


Figure 2. Sun StorEdge MultiPack storage system

Positioning

Just the Facts



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Availability

The Sun StorEdge MultiPack storage system began shipping February 1998.

Target Users

- Customers needing large-capacity add-on storage and high performance on the desktop
- Customers requiring additional desktop storage
- Customers in the growing database, imaging, and multimedia markets

Key Features and Benefits

Features

- Maximum 216-GB capacity
- UltraSCSI
- Price/performance
- Hot-plug-ready drives
- Single-connector drives
- Geographical SCSI addressing
- Key-locking door
- 10000-rpm disks

Benefits

- Easy modular growth for desktop servers and power-user workstations
- 16-bit data bus provides users with up to 40 MB/second burst transfer rates
- Sustained transfer rates of over 15.2 MB/second
- Good IOPS/dollar
- Low cost/MB
- Multiple active spindles, overlapped seeks, and optimum SCSI-bus bandwidth provide excellent performance
- On-line, user-serviceable drives make it easy to configure and service
- Offers better reliability with fewer internal cables and connections
- Simplifies address selection
- Deters inadvertent removal of devices and protects user's data
- Improves I/O performance by approximately 25 percent as compared to 7200-rpm disks of similar capacities

Positioning

Just the Facts



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Sun StorEdge FlexiPack

Sun StorEdge FlexiPack storage system is a desktop device enclosure that accommodates either one full-height or two half-height removable-media devices. Sun StorEdge FlexiPack desktop storage products offer external storage and backup solutions for Sun's workstations and servers.

Key Messages

- Accommodates 5.25-inch half-height or full-height devices with industry-standard bezels
- Can configure different tape drives within the same unit
- Can accommodate both fast SCSI and fast/wide SCSI devices in the same unit
- Narrow footprint
- Easy to open and service
- Acoustically engineered
- Available with the following devices:
 - Sun StorEdge DLT 7000 or Sun StorEdge DLT 4000
 - 72-GB to 144-GB, 4-mm DDS-3 autoloader
 - 20-GB to 40-GB, 8-mm tape drive
 - 7-GB to 14-GB, 8-mm tape drive

The Sun StorEdge FlexiPack system complements the storage product line and brings competitive features to the desktop. While it was designed with the intention of holding full-height devices like DLT drives, its incredible flexibility enables the user to have multiple configurations which could include multiple half-height tape drives, tape drive, or a 4-mm DDS-3 autoloader. Users now have the ability to store up to 144 GB on the desktop. The signature packaging complements Sun StorEdge MultiPack and UniPack storage system, desktop workstations, and servers.

Positioning

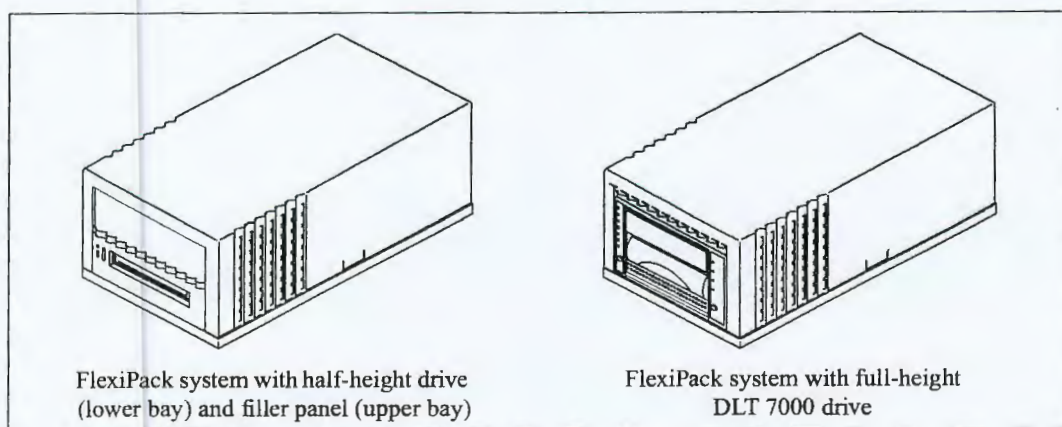
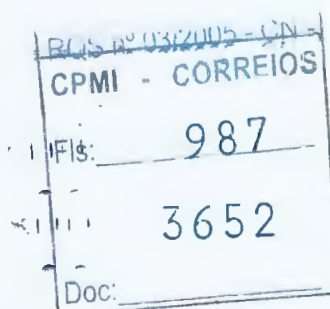


Figure 3. Sun StorEdge FlexiPack storage system

Just the Facts



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Availability

The Sun StorEdge FlexiPack storage system configurations with the Sun StorEdge DLT 7000 autoloader, Sun StorEdge DLT 4000 autoloader, and the 72-GB to 144-GB, 4-mm DDS-3 autoloader became available in February 1998.

Target Users

External devices provide additional desktop storage with fast/wide SCSI performance, doubling the throughput of typical fast SCSI devices. The digital world is driving up storage capacity requirements because image and graphics data files are typically very large. The higher capacity and flexibility of the Sun StorEdge FlexiPack system enables significant desktop and deskside backup/archive ability. The fast/wide devices support burst transfer rates of 20 MB/second and data rates up to 10 MB/second per device, depending on how well the data can be compressed.

Desktop backup solutions have made advances in capacity and performance. Unattended backups of up to 144 GB (compressed capacity if the data can be compressed 2:1) are now possible using the DDS-3 autoloader with six cartridges in the Sun StorEdge FlexiPack system. The 8-mm tape drives and DLT drives are higher end solutions for the desktop and can also serve desktop and workgroup servers because of their performance and capacity.

Key Features and Benefits

Features

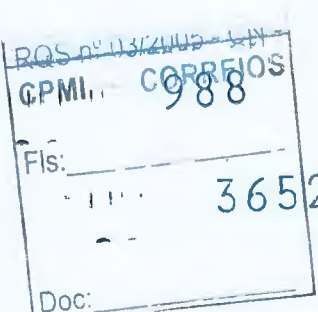
- Configuration flexibility
- Fast/wide SCSI capable
- Narrow footprint
- Easy-to-open enclosure
- Acoustically engineered

Benefits

- Can configure one full-height drive in a Sun StorEdge FlexiPack system or multiple options of different half-height tape drives to meet users' needs
- Can accommodate fast/wide and fast/narrow devices within the same enclosure
- Provides 20 MB/second burst rates, twice that of the fast/narrow enclosures, making it ideal for transferring large sequential files
- Saves desktop space (same width as the Sun StorEdge UniPack storage system)
- Saves service time
- Easily serviced by customer
- Makes the office quieter when fan operation is not necessary

Positioning

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Sun StorEdge UniPack

Sun StorEdge UniPack desktop storage products offer external storage and backup solutions for Sun's workstations and servers. These products are easily connected to a workstation or server through the built-in SCSI host adapter port or through a SCSI/SBus adapter.

Key Messages

- UltraSCSI (hard disk versions) or fast/wide SCSI (for tape) capable
- Narrower footprint
- Easy to open and service
- Single-connector attachment (SCA) disks
- Acoustically engineered
- Available with the following devices
 - 9.1-GB UltraSCSI, 10000-rpm hard disk
 - 18.2-GB UltraSCSI, 10000-rpm hard disk
 - 36.4-GB UltraSCSI, 10000-rpm hard disk
 - 4-GB to 8-GB (compressed), SLR tape drive
 - 12-GB to 24-GB (compressed) 4-mm DDS-3 tape drive
 - 20-GB to 40-GB (compressed), 4-mm DDS-4 tape drive
 - 7-GB to 14-GB (compressed), 8-mm tape drive
 - 20-GB to 40-GB (compressed), 8-mm tape drive

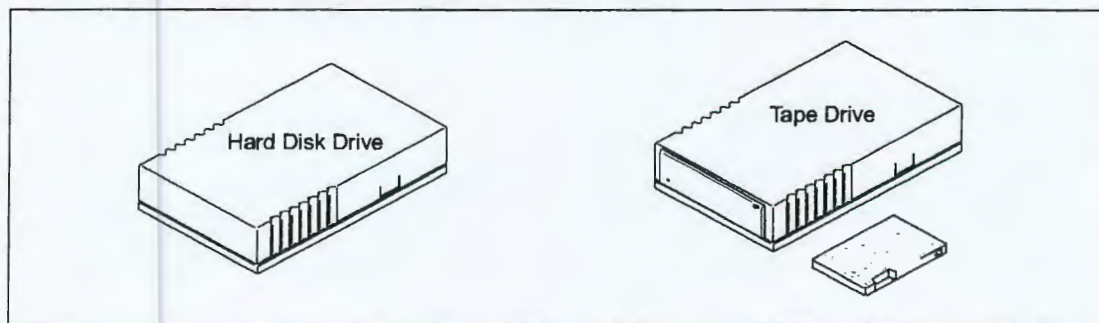


Figure 4. Sun StorEdge UniPack desktop storage products

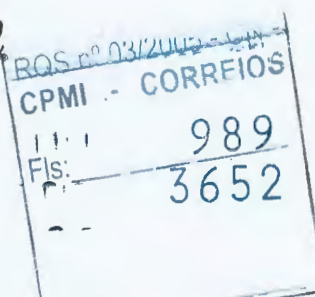
Availability

The Sun StorEdge UniPack storage system began shipping in February 1998.

Target Users

External disks provide additional on-line storage with increased performance for NFS™ software, multimedia, database, and Internet applications. Image and graphics data files are typically very large, driving up disk-capacity requirements in the ever-expanding digital world. The higher performance of the Sun StorEdge UniPack system improves application performance because there is more data movement

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and processing. The UltraSCSI disks support burst transfer rates of 40 MB/second and data rates averaging 15.2 MB/second per disk. It is possible to scale the storage performance on a bus using the new, higher performance UltraSCSI drives to a sustained transfer rate of over 15.2 MB/second with multiple spindles.

Desktop backup solutions have made advances in capacity and performance. Unattended backups of up to 40 GB (compressed) are now possible. The 20-GB to 40-GB, 4-mm tape drives continue to be a popular backup solution for the desktop. The 7-GB to 14-GB and 20-GB to 40-GB, 8-mm tape drive is a high-end solution for the desktop, offering greater performance and capacity.

Key Features and Benefits

Features

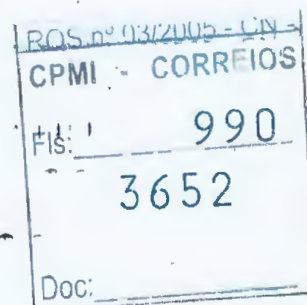
- UltraSCSI-capable disks
- Narrower footprint
- Single-connector disks
- Easy-to-open enclosure
- Acoustically engineered

Benefits

- Provides 40 MB/second burst rates, twice that of the fast/wide enclosures, making it ideal for transferring large sequential files
- Saves desktop space
- Makes it easy to replace disks; one connection for power, interface and SCSI ID
- Improves system reliability; fewer internal cables used
- Saves service time
- Makes the office quieter when fan operation is not necessary

Positioning

Just the Facts



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Enabling Technology

Hot-plug Capability

Key Innovation: Single-connector Drive

Sun Microsystems co-invented a type of drive-connector scheme called the single-connector attachment (SCA). In the SCA design, all electrical signals for SCSI interface, power, and jumpers are passed through one small connector, which is integrated directly onto the disk drive's printed circuit board. The drive plugs directly into the Sun StorEdge™ MultiPack system backplane with no cables or jumpers to set. This design improves reliability and serviceability.

The second-generation version of this connector, called the SCA-2, includes hot-plug features. The drive is grounded before signal pins make contact through the use of hot-plug pins. The drives also reserve two pins to carry signals that indicate whether all pins have successfully connected. The single-connector design has been made available to the disk industry's Small Form Factor Committee and is produced by multiple disk-drive manufacturers (spec SFF8046).

Many disk subsystems offer hot-plug disks. Unfortunately, they are inherently unreliable and cumbersome. To be pluggable, a standard disk drive is enclosed in a metal or plastic canister. Internal connections use multiple flex cables, jumpers, and other wires—parts that increase the likelihood of failures. These pluggable-drive schemes cause a disk subsystem to be *less* reliable.

Therefore, SCA-2 gives Sun customers many benefits, the most important being higher reliability. Using SCA-2 provides other valuable advantages:

- SCA-2 is one of the keys to the higher storage density of the Sun StorEdge MultiPack system
- SCA-2 costs less than other drive-carrier schemes
- SCA-2 is more customer-serviceable

With other pluggable-drive schemes, removing the failed drive from the carrier and replacing it with a new drive is tedious and fraught with risks and potential mistakes.

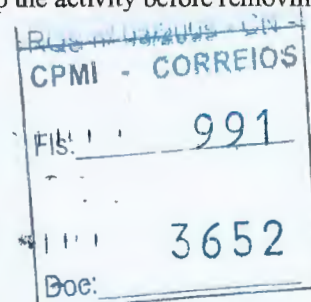
Hot Plug Defined

Annex A of the SCSI-3 Parallel Interface (SPI) document draft proposal (X3T10/855D revision 15a *Removal and insertion of SCSI devices*) outlines four cases of plugging devices:

- Case 1: Power-off during removal or insertion
- Case 2: RST signal asserted continuously during removal or insertion
- Case 3: Current I/O processes not allowed during insertion or removal
- Case 4: Current I/O processes allowed during insertion or removal

Hot Plug in the Sun Environment

The Sun StorEdge MultiPack system conforms to all SCSI-3 SPI specifications for Case 4 at the disk-interface level. Activity on the SCSI bus can continue without interruption while a device is being removed or inserted. However, drives should not be pulled out randomly. The Sun StorEdge MultiPack storage system design is intended to allow users to replace failed drives in redundant (mirrored or RAID) configurations. If there is activity against a drive, users need to stop the activity before removing the drive.





This can be done without bringing down the operating system or powering down the Sun StorEdge MultiPack storage system. The *Installation Supplement of the SPARCstorage MultiPack Product Note* contains detailed information for removing, replacing, and adding drives.

Hardware Considerations

The Sun StorEdge MultiPack storage system fully supports hot-plugging. The SCA-2 drive connector eliminates the use of internal drive cables and allows for hot-plugging drives. Sun has done extensive electrical evaluation of the hot-plug operation to prove that there is no signal or power disturbance during hot-plug. However, Sun cannot guarantee that hot-plugging will never result in the corruption or loss of data any more than Sun can guarantee that any SCSI bus will never experience a double-bit error (which would be undetectable with parity detection). In mission-critical data areas, it is still recommended that a user suspend all operations over the SCSI bus during hot-plug.

Software Considerations

When supported by high-availability software solutions (such as VERITAS Volume Manager or Solstice DiskSuite™ software) the disk drives are hot-pluggable. Without the protection of a RAID implementation, outstanding data requests to a removed device may not complete. The *SPARCstorage MultiPack Product Note* has detailed information for various scenarios, including instructions for removing, replacing, and adding drives.

Configuration Considerations

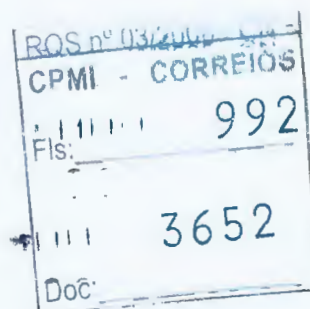
The Sun StorEdge MultiPack system uses geographic addressing, which means that devices inserted into the enclosure assume the SCSI ID of the slot occupied. For example, if a device is removed from the ID 4 slot and replaced by a new drive, the new drive ID is 4.

Hot Plug in the Solaris™ Operating Environment

Several levels of device plugging are defined in the Solaris™ Operating Environment. The operations required to support these features are listed below.

Hot Reconfiguration	Tasks
Adding disk drive to increase capacity	• Quiesce the SCSI bus into which the drive will be inserted • Select a slot for the new disk drive • Add the disk drive • Configure the Solaris Operating Environment to recognize the drive • Configure the application to recognize the drive
Replacing a failed disk drive while the system is running	• Identify the failed drive at the system level • Detach the drive from the application using it • Map the device to a physical drive and determine its physical location • Quiesce and spin down the drive • Remove the drive • Insert the replacement drive • Configure the replacement drive to be similar to the failed drive at the system level • Reattach the replacement drive to the application • Rebuild the data on the new drive if possible

Enabling Technology





Hot Reconfiguration	Tasks
Removing a disk drive from a system that no longer needs it	• Identify the drive to be removed • Detach the drive from any applications that are using it • Map the device to a physical drive and determine its location • Quiesce and spin down the drive • Remove the drive • Reconfigure the Solaris Operating Environment to recognize that the drive is no longer available

Enabling Technology

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System Architecture

Sun StorEdge™ MultiPack Technology Overview

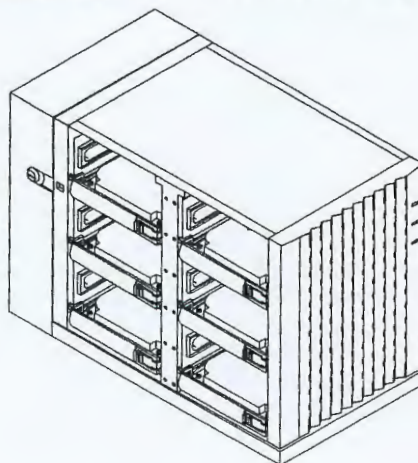
The Sun StorEdge™ MultiPack storage system drive enclosure uses 3.5-inch form factor, and UltraSCSI SCA-2 disk drives. The maximum number of disks per enclosure is six one-inch or 1.6-inch high drives.

For UltraSCSI functionality, the host or host adapter connected to the Sun StorEdge MultiPack unit must be capable of UltraSCSI speeds. A Sun StorEdge MultiPack system enclosure can be connected to a host adapter capable of fast/wide or narrow SCSI, but in such a case the Sun StorEdge MultiPack unit performs at the lower speed.

Geographical Addressing

Each drive bay in the Sun StorEdge MultiPack storage system is preassigned a SCSI ID to eliminate the chance of setting duplicate IDs. This feature also eliminates using external ID switches, minimizes the risk of breaking internal cables, and increases the reliability of the drive enclosure.

The Sun StorEdge MultiPack storage system has two sets of pre-selected SCSI IDs. The user can choose to use IDs 1, 2, 3, 4, 5, and 6 or IDs 9, 10, 11, 12, 13, and 14. A switch allows customers to select IDs 1–6 or IDs 9–14, allowing daisy-chaining of Sun StorEdge MultiPack systems on a fast/wide SCSI bus.



Address ID switch in the 1–6 position:

SCSI ID 1	SCSI ID 4
SCSI ID 2	SCSI ID 5
SCSI ID 3	SCSI ID 6

Address ID switch in the 9–14 position:

SCSI ID 9	SCSI ID 12
SCSI ID 10	SCSI ID 13
SCSI ID 11	SCSI ID 14

Figure 5. Sun StorEdge MultiPack system enclosure



Power Supply

The 180-Watt auto-ranging power supply.

Easy to Open and Service

The Sun StorEdge MultiPack system is designed with a key-locking door that gives users quick access to the drive bays while protecting valuable data from inadvertent removal. Engaging the lock is not required to keep the door shut.

Single-connector Attachment (SCA) Disks

All disk drives use the single-connector attachment (SCA) interface. The SCA interface eliminates the need for internal cables, improving reliability and serviceability. The tape drives continue to use the standard three-cable/connector interface.

System Architecture

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Sun StorEdge FlexiPack System Architecture

Sun StorEdge FlexiPack Technology Overview

The Sun StorEdge FlexiPack storage device enclosure is designed for either one full-height or two half-height removable-media devices.

Highly Configurable

Designed to hold any two half-height devices, users can configure numerous options within a Sun StorEdge FlexiPack system, including different assortments of tape drives. In addition, if the user prefers, a full-height device such as the Sun StorEdge DLT 7000 tape drive or DDS-3 autoloader can be placed in the Sun StorEdge FlexiPack storage system.

Fast/wide SCSI Capable

The Sun StorEdge FlexiPack device is designed for 20 MB/second fast/wide SCSI-2 tape drives with two 68-pin SCSI P-type connectors. However, both *fast/wide* and *fast* SCSI-2 modes are supported even within the same enclosure. The drive connections are all made internally, and then the Sun StorEdge FlexiPack system has a 68-pin (fast/wide) SCSI connection out the back of the enclosure.

Auto SCSI Termination

Auto-termination eliminates the need for external terminators. Circuitry in the enclosure automatically terminates an 8-bit or 16-bit SCSI bus if the Sun StorEdge FlexiPack unit is the last device on the bus. It also *split-terminates* in the middle of the bus and adapts to the change from a 16-bit to an 8-bit bus.

Narrow Footprint

The width of the Sun StorEdge FlexiPack storage system is the same as the Sun StorEdge UniPack storage system. The narrow width allows for more effective use of desktop space. The dimensions are 190 mm (7.48 inches) wide, 392 mm (15.43 inches) deep, and 134 mm (5.28 inches) high.

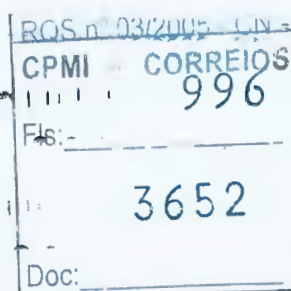
Easy to Open and Service

The Sun StorEdge FlexiPack storage system opens easily once the lock block on the rear is removed. The enclosure lid is removed by depressing the two latches on either side and lifting up. Removable media devices are mounted on a metal sled that makes them very easy to slide out.

Acoustically Engineered

Fan speed control circuitry helps make the office environment quieter while providing drive reliability in hotter environments.

System Architecture





Technical Facts

Below are product features of the Sun StorEdge FlexiPack drive and removable subsystems.

Tape Drive Options	DLT 7000	DLT 4000	7-14 GB, 8 mm	20-40 GB, 8 mm	4-mm DDS-3 Autoloader
Formatted capacity (uncompressed)	35 GB	20 GB	7 GB	20 GB	72 GB
Formatted capacity (compressed ¹)	70 GB @ 2:1	40 GB @ 2:1	14 GB @ 2:1	40 GB @ 2:1	144 GB @ 2:1
Tape speed	100+ ips	100+ ips	0.872 ips	0.43 ips	0.41 ips
Burst data rate (max.)	12 MB/sec. (asynch) 20 MB/sec. (synch)	10 MB/sec.	3 MB/sec.	7 MB/sec. (asynch) 20 MB/sec. (synch/native)	3 MB/sec. (asynch) 10 MB/sec. (synch)
Transfer rate (uncompressed)	5 MB/sec.	1.5 MB/sec.	500 KB/sec.	3 MB/sec.	1 MB/sec.
Transfer rate (compressed ¹)	10 MB/sec.	3 MB/sec.	1 MB/sec.	6 MB/sec.	2 MB/sec.
Buffer	—	—	256 KB	4 MB	2 MB

¹ Actual compression ratio achieved is dependent on data type and applications; therefore, each customer's results may vary.

System Architecture

Just the Facts



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Sun StorEdge UniPack System Architecture

Sun StorEdge UniPack Technology Overview

The Sun StorEdge UniPack single-device enclosure is designed for either UltraSCSI SCA-2 disk drives with a 3.5-inch form factor, or fast/wide SCSI removable devices.

UltraSCSI Capable

The disk Sun StorEdge UniPack storage system is designed for UltraSCSI applications. It has two 68-pin SCSI P-type host connectors. However, fast/wide and fast SCSI-2 modes are also supported. The tape drive Sun StorEdge UniPack system is designed for fast SCSI-2 applications only.

Auto SCSI Termination

Auto-termination eliminates the need for external terminators. Circuitry in the enclosure automatically terminates an 8-bit or 16-bit SCSI bus if the Sun StorEdge UniPack unit is the last device on the bus. It also split-terminates in the middle of the bus and adapts to the change from a 16-bit bus to an 8-bit bus.

Narrower Footprint

The footprint is smaller than the desktop storage pack. The narrower width allows for more effective use of desktop space. The dimensions are 190 mm (7.5 inches) wide, 310 mm (12.2 inches) deep, and 70 mm (2.8 inches) high.

Easy to Open and Service

The Sun StorEdge UniPack storage system opens easily once the lock block on the rear is removed. The enclosure lid is removed by depressing the two latches on either side and lifting up. Disk and tape drives are mounted on a metal sled that makes them very easy to slide out.

Single-Connector Attachment (SCA) Disks

All disk drives use the single-connector attachment (SCA) interface currently used in the Ultra™ 2, Ultra 30, and Ultra 60 systems, as well as Sun Enterprise™ 2, 250, 450, 3000, 4000, 3500, and 4500 servers and Sun StorEdge A1000, D1000, and A3500 array subsystems. The SCA interface eliminates the need for internal cables, improving reliability and serviceability. The tape drives continue to use the standard three-cable/connector interface.

Acoustically Engineered

Fan speed control circuitry helps make the office environment quieter while providing drive reliability in hotter environments.

System Architecture



Technical Facts

Below are product features of the Sun StorEdge UniPack drive and removable subsystems.

Disk Drives	9.1 GB	18.2 GB	36.4 GB
Average seek read	7.5 ms	8.0 ms	8.0 ms
Average seek write	8.3 ms	9.0 ms	9.0 ms
Average latency	3.0 ms	3.0 ms	3.0 ms
Interface data transfer rate	40 MB/sec.	40 MB/sec.	40 MB/sec.
HDA data transfer rate	12.5 MB/sec.	12.5 MB/sec.	12.5 MB/sec.
Rotational speed	10,000 rpm	10,000 rpm	10,000 rpm
Buffer	512 KB	512 KB	512 KB

Tape Drive	4-mm DDS-3	4-mm DDS-4	20-40 GB, 8 mm	7-14 GB, 8 mm
Formatted capacity (uncompressed)	12 GB	20 GB	20 GB	7 GB
Formatted capacity (compressed ¹)	24 GB@ 2:1	40 GB@ 2:1	40 GB @2:1	14 GB @ 2:1
Tape speed	0.41 ips	0.41 ips	0.43 ips	0.872 ips
Burst data rate (max.)	10 MB/sec. (synch) 3 MB/sec. (asynch)	40 MB/sec. (synch) 6 MB/sec. (asynch)	10 MB/sec. (synch) 7 MB/sec. (asynch)	5 MB/sec.
Transfer rate (uncompressed)	1 MB/sec.	3 MB/sec.	3 MB/sec.	500 KB/sec.
Transfer rate (compressed ¹)	2 MB/sec.	6 MB/sec.	6 MB/sec.	1 MB/sec.
Buffer	2 MB	8 MB	4 MB	1 MB

¹ Actual compression ratio achieved is dependent on data type and applications; therefore, each customer's results may vary.

Actual compression ratio achieved is dependent on data type and applications; therefore, each customer's results may vary.

System Architecture

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Specifications

Physical Specifications

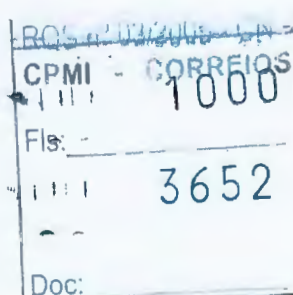
Specification	Sun StorEdge MultiPack		Sun StorEdge FlexiPack		Sun StorEdge UniPack	
	U.S.	Metric	U.S.	Metric	U.S.	Metric
Height	8.86 in.	225 mm	5.28 in.	134 mm	3.8 in.	70 mm
Width	7.48 in.	190 mm	7.48 in.	190 mm	7.5 in.	190 mm
Depth	15.55 in.	395 mm	15.43 in.	392 mm	12.2 in.	310 mm
Weight (enclosure)	24.0 lb.	10.9 kg	—	—	5.0 lb.	2.3 kg
Weight (9.1-GB drives)	24.0 lb. 1.6 lb. per drive (6)	10.9 kg 0.7 kg per drive (6)	—	—	1.6 lb. (device alone)	0.7 kg (device alone)
Weight (18.2-GB drives)	28.2 lb. 2.3 lb. per drive (6)	12.8 kg 1.0 kg per drive (6)	—	—	2.6 lb. (device alone)	1.2 kg (device alone)
Weight (DLT 7000)	—	—	15 lb. 5 oz.	6.7 kg	—	—
Weight (DLT 4000)	—	—	14 lb. 12 oz.	6.4 kg	—	—
Weight (DDS-3 autoloader)	—	—	14 lb. 3 oz.	6.2 kg	—	—
Weight (DDS-4 tape drive)	—	—	11 lb. 8 oz.	5.0 kg	2.2 lb. (device alone)	1.0 kg (device alone)
Weight (7- to 14-GB, 8-mm tape drive)	—	—	11 lb. 11 oz.	5.1 kg	2.6 lb. (device alone)	1.2 kg (device alone)
Weight (20- to 40-GB, 8-mm tape drive)	—	—	11 lb. 14 oz.	5.2 kg	3.0 lb. (device alone)	1.36 kg (device alone)

Specifications

Electrical Specifications

Specification	Sun StorEdge MultiPack	Sun StorEdge FlexiPack	Sun StorEdge UniPack
Input voltage	100–240 VAC	100–240 VAC	100–240 VAC
Maximum input current	3.0 A	0.6 A	0.6 A
Maximum input VA	300 VA	60 VA at 100 VAC, 82 VA at 240 VAC	60 VA at 100 VAC, 82 VA at 240 VAC
Maximum input power	265 Watts	36.5 Watts	36.5 Watts
Maximum heat output	900 BTU/hour	125 BTU/hour	125 BTU/hour

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Environmental Specifications

Specification	Sun StorEdge MultiPack	Sun StorEdge FlexiPack and Sun StorEdge UniPack
AC power	100 to 240 VAC, 47 to 63 Hz	100 to 240 VAC, 47 to 63 Hz
Operating range	5 to 40°C (41 to 104°F), 20 to 80% RH, max. wet bulb 27%	- Disk drive (UniPack only): 5 to 40°C (41 to 104°F), 10 to 90% RH, max. wet bulb 26% - Removable devices (UniPack): 5 to 35°C (41 to 95°F), 20 to 80% RH, max. wet bulb 26% - Removable devices (FlexiPack): 10 to 35°C (50 to 95°F), 20 to 80% RH, 27°C max. wet bulb
Non-operating range	-40 to 60°C (-40 to 140°F), 93% max. RH, noncondensing	- Disk drive (UniPack): -30 to 65°C (-22 to 149°F), 95% max. RH, noncondensing - Removable devices (UniPack): -30 to 60°C (-22 to 140°F), 95% max. RH, noncondensing - Removable devices (FlexiPack): -30 to 60°C (-22 to 140°F), 90% RH, noncondensing
Operating acoustic noise	6.2 bels (at 23°C) for 4 and 18 GB 6.9 bels (at 23°C) for 9 GB	- Disk drive: max. 6.0 bels (at 23°C) - Removable devices (UniPack): max. 5.8 bels (at 23°C) - Removable devices (FlexiPack): max. 5.3 bels
Idling acoustic noise	5.3 bels (at 23°C) for all disks	- Disk drive: max. 5.3 bels (at 23°C) - Removable devices (UniPack): max. 4.7 bels (at 23°C) - Removable devices (FlexiPack): max. 4.6 bels
Operating altitude	0 to 3 km (0 to 10,000 ft.)	0 to 3 km (0 to 10,000 ft.)
Non-operating altitude	0 to 12 km (0 to 40,000 ft.)	0 to 12 km (0 to 40,000 ft.)

Specifications

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Regulations

The Sun StorEdge MultiPack, FlexiPack and UniPack storage systems each pass the following specifications:

Category	Sun StorEdge MultiPack, UniPack, and FlexiPack
Safety	UL 1950; CSA-C22.2 No.950-M89 EN 60950 CB-Scheme with Nordic Deviations; Low Voltage Directive (73/23/EEC)
RFI/EMI	47 CFR Part 15, Subpart J C108.8-M1983 VCCI Requirements EN 55022; EN 60555-2 EMC Directive (89/336/EEC)
Immunity	EMC Directive (89/336/EEC) IEC 801-2, -3, -4, -5 EN 55082-1
Product label	UL, ULc, GS (TUV) FCC Class B Canadian Class B VCCI Class 2, CE

Specifications

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Requirements and Configuration

Sun StorEdge™ System Support

The Sun StorEdge™ storage subsystems are supported on the systems shown in the table below. The Sun StorEdge FlexiPack storage system is supported on the platforms that support each specific drive used in the Sun StorEdge FlexiPack storage system. However, in general, the drives typically used with the Sun StorEdge FlexiPack system are listed here.

Sun StorEdge MultiPack	Sun StorEdge UniPack	Sun StorEdge FlexiPack
Netra™ t 1120 server	Netra t 1120 server	Netra t 1120 server
Netra t 1125 server	Netra t 1125 server	Netra t 1125 server
Ultra™ 2 workstation	Ultra 2 workstation	Ultra 2 workstation
Ultra 5 ¹ workstation	Ultra 5 ¹ workstation	Ultra 5 ¹ workstation
Ultra 10 ¹ workstation	Ultra 10 ¹ workstation	Ultra 10 ¹ workstation
Ultra 60 workstation	Ultra 60 workstation	Ultra 60 workstation
Sun Enterprise™ 2 server	Sun Enterprise 2 server	Sun Enterprise 2 server
Sun Enterprise 250 server	Sun Enterprise 250 server	Sun Enterprise 250 server
Sun Enterprise 450 server	Sun Enterprise 450 server	Sun Enterprise 450 server
Sun Enterprise 3000 / 4000 servers	Sun Enterprise 3000 / 4000 servers	Sun Enterprise 3000 / 4000 servers
Sun Enterprise 3500 / 4500 servers	Sun Enterprise 3500 / 4500 servers	
	Sun Enterprise 10000 ² server	

¹ A SunSwift™ PCI host adapter is required.
² Sun StorEdge UniPack systems (one or more) are available as internal (in-cabinet boot disk drive), factory configured or X-options for the Sun Enterprise 10000 server.

Additionally, Sun StorEdge FlexiPack storage system configurations for the Sun StorEdge DLT 7000 autoloader, and 20-GB to 40-GB, 8-mm tape drives are supported on the Sun Enterprise 5500, 6500, and 10000 servers.

SCSI ID Conflict

The Sun StorEdge MultiPack system has fixed SCSI IDs. Therefore, if additional external devices are daisy-chained with a Sun StorEdge MultiPack system on the same SCSI bus, a SCSI ID conflict can result.

SCSI ID	Device Assigned to SCSI ID
SCSI ID 0	First internal disk on an embedded SCSI interface of Sun Ultra 1 and later platforms is assigned to ID 0
SCSI ID 1	Second internal disk on all platforms is usually assigned to ID 1 if there is a second internal disk installed
SCSI ID 3	First internal disk on SPARCstation™ and Ultra 1 platforms is usually assigned to ID 3
SCSI ID 4	Tape drive is usually assigned ID 4
SCSI ID 6	CD-ROM devices are usually assigned ID 6
SCSI ID 7	The initiator (SCSI host adapter) is always address 7 for narrow and wide interfaces
No SCSI ID reserved	No address IDs are reserved for any of the SBus/PCIBus SCSI option cards



Sun StorEdge MultiPack Under Solaris™ 2.x Operating Environment

The Sun StorEdge MultiPack is supported on Solaris™ 2.5.1 Operating Environment and later releases. In order to address SCSI ID 8 and above, a wide on-board host or host bus adapter (such as the SunSwift PCI or US2S) is required.

Sun StorEdge FlexiPack Software Requirements

Sun StorEdge FlexiPack Drive	Solaris 1.x Operating Environment Support	Solaris 2.x Operating Environment Support
7-GB to 14-GB, 8-mm tape drive	Solaris 1.1.1 (SunOS™ 4.1.3) and later releases	Solaris 2.3 and later releases
4-mm DDS-3 tape drive 4-mm DDS-3 autoloader SLR tape drive	Solaris 1.1.2 and later releases	Solaris 2.4 and later releases
Sun StorEdge DLT 4000 tape drive	N/A	Solaris 2.4 and later releases
20-GB to 40-GB, 8-mm tape drive Sun StorEdge DLT 7000 tape drive	N/A	Solaris 2.5 and later releases

All Sun StorEdge FlexiPack configurations are supported by most of the leading data management software packages such as Solstice Backup™ software.

Please reference applicable documents (for example, *Just The Facts*, *Product Brief*, customer presentations, and so on) associated with the specific devices you are using in the Sun StorEdge FlexiPack storage system in order to get more detailed information on software requirements for a particular device. These associated documents are available in SunWIN.

Sun StorEdge UniPack Software Requirements

The 9.1-, 18.2-, and 36.4-GB Sun StorEdge UniPack storage systems are supported on Solaris 2.5.1 Operating Environment and later releases.

The 7-GB to 14-GB, 8-mm tape is supported on Solaris 1.1.1 Operating Environment (SunOS 4.1.3) and later releases, and on Solaris 2.3 Operating Environment and later releases. The 4-mm DDS-3 tape and 4-GB SLR tape drives are supported on Solaris Operating Environment versions 1.1.2 and 2.4 and later releases. The 20-GB to 40-GB 8-mm tape is supported on Solaris 2.5 Operating Environment and later releases.

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Sun StorEdge MultiPack System Configuration

Sun StorEdge MultiPack, FlexiPack, and UniPack System Configuration Guidelines

The daisy-chain configuration rules depend on whether the user installs the Sun StorEdge MultiPack, FlexiPack, or UniPack storage device, which workstation or server platform host is used, and which host bus adapter is used.

Wide SCSI and UltraSCSI support up to 15 target devices, whereas narrow SCSI supports up to seven target devices. In all cases, the total length of the SCSI bus must be taken into account when daisy-chaining multiple devices on a bus. The maximum allowable accumulated bus length is six meters. However, in order to operate reliably, the following maximum daisy-chain configurations must not be exceeded.

External Subsystem Daisy-Chain Configurations	UltraSCSI Onboard Host or Host Bus Adapter	UltraSPARC™ Fast/Wide Onboard Hosts	Fast/Wide Host Bus Adapter (SWIS/S, SunSwift)	Fast/Narrow Onboard Hosts	Fast/Narrow Host Bus Adapter
MultiPack	1 MultiPack only	1 MultiPack + 1 UniPack	2 MultiPack + 1 UniPack	1 MultiPack + 1 UniPack ¹	1 MultiPack + 1 UniPack ¹
9.1-, 18.2-, or 36.4-GB 10000-rpm UniPack	4 ²	4	4	4	4
Tape UniPack	—	4 ³	4 ³	4 ³	4 ³
Tape FlexiPack	—	4 ³	4 ³	4 ³	4 ³

¹ A maximum of seven devices are allowed on a SCSI bus (including internal devices).
² Mixing with tape devices will result in loss of UltraSCSI performance.
³ When mixing disk and tape devices on a SCSI chain, a maximum of only two tape devices are allowed.

Requirements and Configuration

Available Sun StorEdge MultiPack SCSI IDs

Depending on how systems are configured, specific SCSI IDs pre-selected in the Sun StorEdge MultiPack system may not be used. SCSI ID 0 and 1 may be assigned to installed internal hard drives in Ultra 1 and later systems. SCSI ID 1 and 3 may be assigned to installed internal hard drives in SPARCstation and Ultra 1 systems. SCSI ID 4 and 6 may already be assigned to a CD-ROM or tape drive.

Sun StorEdge MultiPack	Enclosure SCSI ID	Host SCSI ID	SCSI IDs Remaining
One MultiPack	1, 2, 3, 4, 5, 6 or 9, 10, 11, 12, 13, 14	7	0, 8, 9, 10, 11, 12, 13, 14, 15 or 0, 1, 2, 3, 4, 5, 6, 8, 15
Two daisy-chained MultiPacks	1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 13, 14	7	0, 8, 15



Sun StorEdge MultiPack SCSI

For UltraSCSI functionality, the user needs one of the following host adapters:

- UltraSCSI onboard host adapter
- US2S host bus adapter
- SunSwift PCI host bus adapter

For fast/wide SCSI functionality, the user needs one of the following host adapters:

- Wide onboard host adapter
- SWIS/S host bus adapter
- SunSwift host bus adapter

The Sun StorEdge MultiPack is supported on the following SCSI host adapters as well as on all onboard host adapters on currently shipping workstation and server platforms.

Host Adapters	Sun StorEdge MultiPack 9.1, 18.2, or 36.4 GB
Onboard fast/narrow HA	✓ Address switch to 1-6
Onboard fast/wide HA	✓ Address switch to 1-6 or 9-14
Onboard UltraSCSI HA	✓ Address switch to 1-6 or 9-14
SBus fast SCSI-2/buffered Ethernet (FSBE/S)	✓ Address switch to 1-6
SBUS single-ended, fast/wide, intelligent SCSI-2 (SWIS/S)	✓ Address switch to 1-6 or 9-14
Single-ended, fast/wide SCSI-2, 10/100 Mbps Ethernet (SunSwift/SBus)	✓ Address switch to 1-6 or 9-14
PCI UltraSCSI host adapter (SunSwift/PCI)	✓ Address switch 1-6 or 9-14
PCI UltraSCSI dual channel host adapter (US2S)	✓ Address switch 1-6 or 9-14

Sun StorEdge MultiPack SCSI Host Adapters Support

The Sun StorEdge MultiPack products are supported on the following SCSI host adapters, as well as on all onboard host adapters on currently shipping workstation and server platforms:

- For fast/wide SCSI functionality, the SWIS/S or Sunswift host adapter is required. The 2.5-GB QIC, 4-mm tape, and 8-mm tape are supported on the SWIS/S card with the Solaris 2.5 Operating Environment, but still run in narrow mode.
- For UltraSCSI functionality, the SunSwift PCI or US2S host adapter is required.

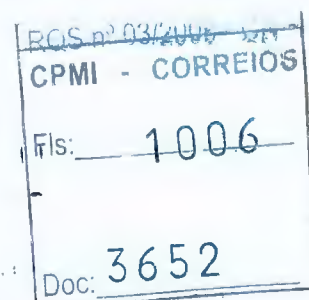
Sun StorEdge MultiPack Cabling

All Sun StorEdge MultiPack products must be ordered with a separate 68-to-68-pin or 50-to-68-pin SCSI cable and power cord kit. Cabling guidelines are as follows:

68-to-68-pin Cable Connection

The 68-to-68-pin SCSI cable kit with power cord (X3856A) allows connections to other Sun StorEdge MultiPack systems, to a fast/wide host adapter (SWIS/S or SunSwift), or to an UltraSCSI host adapter (SunSwift PCI or US2S). Always connect the fast/wide or UltraSCSI devices *first* when using a 68-pin host adapter. When cabling fast/narrow devices on a wide bus, the 50-pin devices should be cabled last and need to be actively terminated.

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50-to-68-pin Cable Connection

The 50-to-68-pin SCSI cable kit with power cord (X3857A) allows connections to 50-pin onboard host adapters offered on older desktop products such as any SPARCstation model, Ultra 1 Model 170 or the older 50-pin storage enclosures.

Sun StorEdge MultiPack System on an UltraSCSI Onboard Host or Host Bus Adapter

One Sun StorEdge MultiPack six-drive enclosure can be connected to a single UltraSCSI bus. Select SCSI ID addresses 9-14. For UltraSCSI operation, do not use the external terminator. The on-board auto-terminator functions in the UltraSCSI mode.

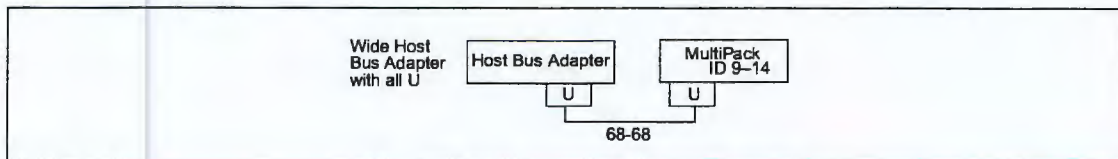


Figure 6. Sun StorEdge MultiPack system on an UltraSCSI onboard host or host bus adapter

Sun StorEdge MultiPack System on a Wide Onboard Host

Only one Sun StorEdge MultiPack six-drive enclosure can be connected to a single SCSI bus. Select SCSI ID addresses 9-14.

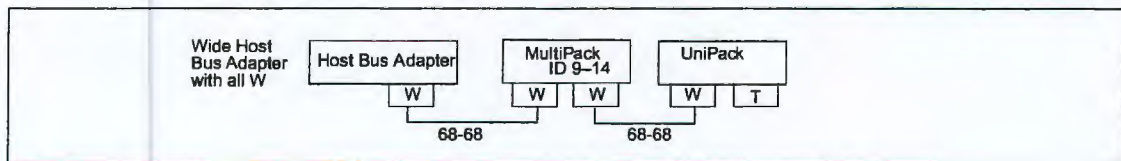


Figure 7. Sun StorEdge MultiPack system on a wide onboard host

Sun StorEdge MultiPack System on a Wide Host Bus Adapter

Two Sun StorEdge MultiPack six-drive enclosures can be connected to a single SCSI bus, provided there are no conflicts with internal devices. Select SCSI ID addresses 1-6 and 9-14.

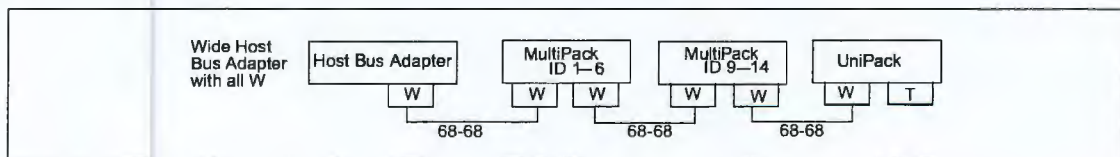


Figure 8. Sun StorEdge MultiPack system on a wide host bus adapter



Sun StorEdge MultiPack System and Narrow Devices on a Fast/Wide Bus

When mixing Sun StorEdge MultiPack system with a narrow drive or tape device on a wide SCSI bus, chain the narrow devices last with an external terminator. In general, a 50-to-68-pin cable kit with power cord (X3857A) is required.

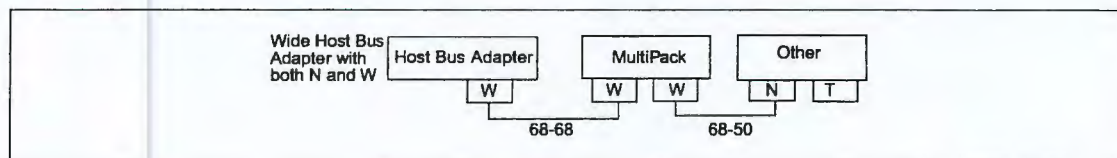


Figure 9. Sun StorEdge MultiPack system and narrow devices on a fast/wide bus

Chaining Sun StorEdge MultiPack System to Narrow Host Interfaces

One Sun StorEdge MultiPack drive enclosure may be chained to a narrow host adapter. The address-select switch must be set to 1-6 and a 50-to-68-pin cable is required.

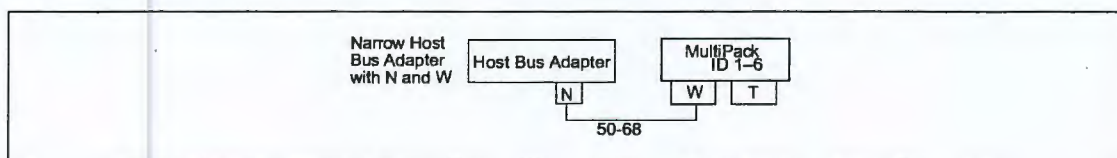


Figure 10. Chaining Sun StorEdge MultiPack system to narrow host interfaces

Requirements and Configuration



Sun StorEdge FlexiPack System Configuration

Sun StorEdge FlexiPack System Configuration Guidelines

The Sun StorEdge FlexiPack system has the following host adapter and cable restrictions.

Sun StorEdge FlexiPack SCSI Host Adapters Support

The Sun StorEdge FlexiPack products are supported on the following SCSI host adapters, as well as on all onboard host adapters on currently shipping Sun workstation and server platforms.

For fast/wide SCSI functionality, the SWIS/S host adapter is required. The 4-mm tape drives and autoloader, 7-GB to 14-GB, 8-mm tape drive, and Sun StorEdge DLT 4000 autoloader tape drive are supported on the SWIS/S card with Solaris 2.5 Operating Environment, but still run in narrow mode.

Sun StorEdge FlexiPack Cabling

All Sun StorEdge FlexiPack products must be ordered with either a 68-to-68-pin or 50-to-68-pin SCSI cable and power-cord kit (the Sun StorEdge FlexiPack system does not come with any cables included). Cabling guidelines are as follows:

- **68-to-68-pin cable connection**

The 68-to-68-pin SCSI cable with power cord kit (X3856A) allows connections to other Sun StorEdge FlexiPack systems, UniPack systems, or a fast/wide host adapter (SWIS/S or SunSwift). Always connect the fast/wide devices first when using a 68-pin host adapter. When cabling fast/narrow devices on a wide bus, the 50-pin devices should be cabled last and need to be actively terminated.

- **50-to-68-pin cable connection**

The 50-to-68-pin SCSI cable with power cord kit (X3857A) allows connections to

- 50-pin onboard host adapters offered on some current desktop products or
- The older 50-pin storage enclosures

When cabling a daisy chain of fast/narrow SCSI devices and Sun StorEdge FlexiPack storage system to a narrow (50-pin) onboard host adapter, the Sun StorEdge FlexiPack systems must always be put at the end of the SCSI chain. This provides auto-termination to the SCSI bus.

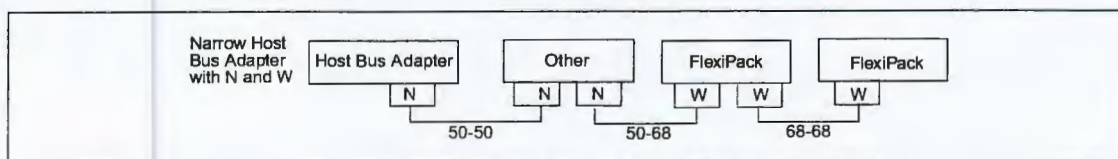


Figure 11. Cabling a daisy chain of fast/narrow SCSI devices and Sun StorEdge FlexiPack systems to a narrow (50-pin) onboard host adapter

Requirements and Configuration

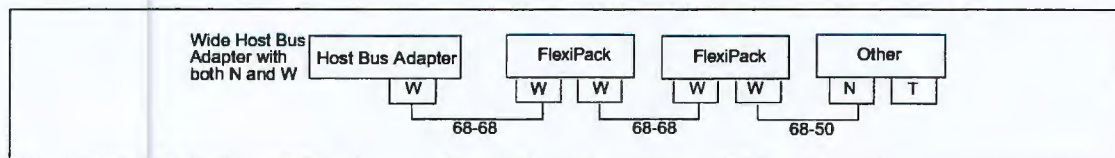
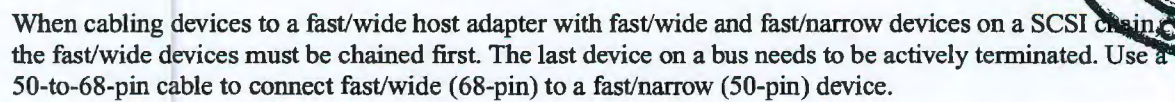


Figure 12. Cabling devices to a fast/wide host adapter with fast/wide and fast/narrow devices on a SCSI chain



Sun StorEdge UniPack System Configuration

Sun StorEdge UniPack System SCSI Host Adapters Support

The Sun StorEdge UniPack products are supported on the following SCSI host adapters, as well as on all onboard host adapters on currently shipping workstation and server platforms:

- For fast/wide SCSI functionality, the SWIS/S or SunSwift host adapter is required. The 4-mm tape, and 8-mm tape drives are supported on the SWIS/S card with Solaris 2.5 Operating Environment, but still run in narrow mode.
- For UltraSCSI functionality, the SunSwift PCI or US2S host adapter is required.

Sun StorEdge UniPack System Cabling

All Sun StorEdge UniPack products must be ordered with a separate 68-to-68-pin or 50-to-68-pin SCSI cable and power cord kit (the Sun StorEdge UniPack system does not come with any cables included). Cabling guidelines are as follows:

68-to-68-pin Cable Connection

The 68-to-68-pin SCSI cable kit with power cord kit (X3856A) allows connections to other Sun StorEdge UniPack systems, to a fast/wide host adapter (SWIS/S or SunSwift), or to an UltraSCSI host adapter (SunSwift PCI or US2S). Always connect the fast/wide or UltraSCSI devices *first* when using a 68-pin host adapter. When cabling fast/narrow devices on a wide bus, the 50-pin devices should be cabled last and need to be actively terminated.

50-to-68-pin Cable Connection

The 50-to-68-pin SCSI cable kit with power cord kit (X3857A) allows connections to 50-pin onboard host adapters offered on older desktop products such as any SPARCstation model, Ultra 1 Model 170 or the older 50-pin storage enclosures.

Sun StorEdge UniPack System on an UltraSCSI Onboard Host or Host Bus Adapter

Up to four Sun StorEdge UniPack system enclosures can be connected to a single UltraSCSI bus. The Sun StorEdge UniPack system is auto-terminated. Do not add tape devices to an UltraSCSI bus.

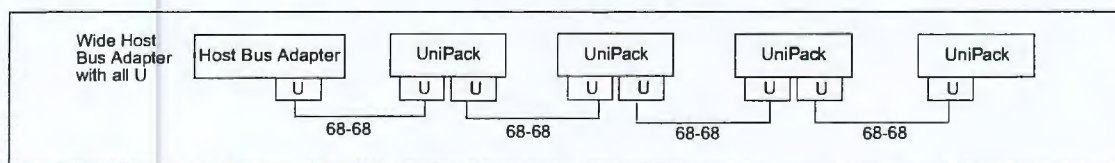


Figure 13. Sun StorEdge UniPack system on an UltraSCSI onboard host or host bus adapter



Sun StorEdge UniPack System on a Wide Onboard Host or Host Bus Adapter

Up to four Sun StorEdge UniPack system enclosures can be connected to a single SCSI bus. The Sun StorEdge UniPack is auto-terminated.

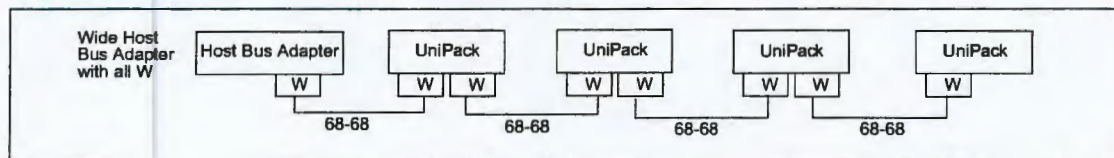


Figure 14. Sun StorEdge UniPack system on a wide onboard host or host bus adapter

Sun StorEdge UniPack System on Narrow Host Interfaces

When cabling a daisy chain of fast/narrow SCSI devices and Sun StorEdge UniPack systems to a narrow (50-pin) onboard host adapter, the Sun StorEdge UniPack systems must always be put at the end of a SCSI chain. This provides auto-termination to the SCSI bus.

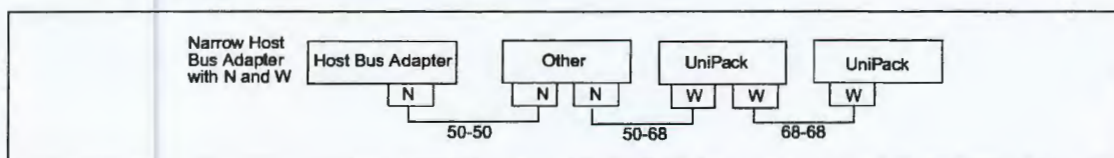


Figure 15. Cabling a daisy chain of fast/narrow SCSI devices and Sun StorEdge UniPack systems to a narrow (50-pin) onboard host adapter

Sun StorEdge UniPack System and Narrow Devices on a Fast/Wide Bus

When cabling devices to a fast/wide host adapter with fast/wide and fast/narrow devices on a SCSI chain, the fast/wide devices must be chained first. The last device on a bus must be actively terminated. Use a 50-to-68-pin cable to connect a fast/wide (68-pin) to a fast/narrow (50-pin) device.

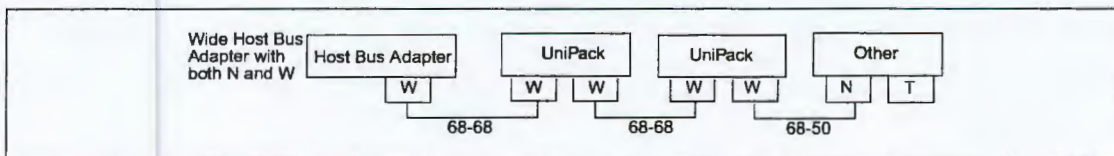


Figure 16. Cabling devices to a fast/wide host adapter with fast/wide and fast/narrow devices on a SCSI chain



Sun StorEdge Configuration Cable Lengths

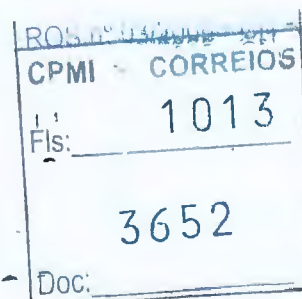
Internal Cable Lengths for Supported Systems

The following table lists the internal cable lengths of supported systems.

Product	Cable Length (meters)
Sun StorEdge UniPack disk	0.3
Sun StorEdge UniPack tapes	0.4
Sun StorEdge FlexiPack (with DLT 7000, DLT 4000, or DDS-3 autoloader)	0.6
Sun StorEdge FlexiPack (all other devices)	0.8
Sun StorEdge MultiPack	0.9
Desktop disk pack	0.3
Desktop storage disk pack	0.3
Sun Ultra systems	0.9
SPARCstation 5	1.6
Other desktops	~ 0.9
SBus cards, SunSwift PCI	0.1
Two-channel PCI adapter	0.2
Interconnect cables	0.3 to 2.0

Requirements and Configuration

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Ordering Information

Sun StorEdge™ MultiPack Marketing Part Numbers

Part Number	Option Description	Maximum Number Supported	Comments
SG-XDSK020C-18G	Sun StorEdge™ MultiPack, 2 x 9.1-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK040C-36G	Sun StorEdge MultiPack, 4 x 9.1-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK060C-54G	Sun StorEdge MultiPack, 6 x 9.1-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK020C-36G	Sun StorEdge MultiPack, 2 x 18.2-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK040C-72G	Sun StorEdge MultiPack, 4 x 18.2-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK060C-109G	Sun StorEdge MultiPack, 6 x 18.2-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK020C-72G	Sun StorEdge MultiPack, 2 x 36.4-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK040C-144G	Sun StorEdge MultiPack, 4 x 36.4-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK060C-216G	Sun StorEdge MultiPack, 6 x 36.4-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus

Ordering Information

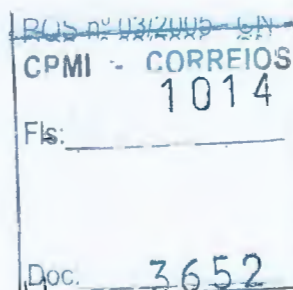
Sun StorEdge FlexiPack Marketing Part Numbers

Part Number	Option Description	Maximum Drives per FlexiPack
SG-XTAPDLT-021A	Sun StorEdge FlexiPack, DLT 7000	1
SG-XTAPDLT-020A	Sun StorEdge FlexiPack, DLT 4000	1
SG-XTAP8MM-021A	Sun StorEdge FlexiPack, 20-GB to 40-GB, 8-mm tape drive	2
SG-XTAP8MM-020A	Sun StorEdge FlexiPack, 7-GB to 14-GB, 8-mm tape drive	2
SG-XTAP4MM-031A	Sun StorEdge FlexiPack, 4-mm DDS-3 autoloader	1
SG-XTAP4MM-021A	Sun StorEdge FlexiPack, 4-mm DDS-3 tape drive	2

Sun StorEdge UniPack Marketing Part Numbers

Part Number	Option Description
SG-XDSK010C-9G	Sun StorEdge UniPack, 9.1-GB, 10000-rpm, UltraSCSI disks
SG-XDSK010C-18G	Sun StorEdge UniPack, 18.2-GB, 10000-rpm, UltraSCSI disks
SG-XDSK010C-36G	Sun StorEdge UniPack, 36.4-GB, 10000-rpm, UltraSCSI disks
SG-XTAP8MM-011A	Sun StorEdge UniPack, 20-GB to 40-GB, 8-mm tape drive
SG-XTAP8MM-010A	Sun StorEdge UniPack, 7-GB to 14-GB, 8-mm tape drive

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Part Number	Option Description
SG-XTAP4MM-011A	Sun StorEdge UniPack, 4-mm DDS-3 tape drive
SG-XTAP4MM-012A	Sun StorEdge UniPack, 4-mm DDS-4 tape drive

Ordering Information

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Sun StorEdge™ MultiPack Drive and Cable X-options

Part Number	Option Description	Maximum Number Supported	Comments
X5234A	9.1-GB, 10000-rpm, internal X-option UltraSCSI disk drive	4	Plus the first two installed drives
X5237A	18.2-GB, 10000-rpm, internal X-option UltraSCSI disk drive	4	Plus the first two installed drives
X5242A	36.4-GB, 10000-rpm, internal X-option UltraSCSI disk drive	4	Plus the first two installed drives
X5243A	36.4-GB, 10000-rpm, internal X-option UltraSCSI disk drive with barrier plate	4	Plus the first two installed drives
X3856A	68-pin to 68-pin SCSI cable kit with power cord	—	0.8 meter cable
X3857A	50-pin to 68-pin SCSI cable kit with power cord	—	0.8 meter cable
X901A	68-pin, 0.8-meter, external SCSI cable	—	0.8 meter cable
X902A	68-to-68-pin, 2.0-meter, external SCSI cable	—	
X903A	50-to-68-pin, 1.2-meter, external SCSI cable	—	
X904A	50-to-68-pin, 2.0-meter, external SCSI cable	—	

Configuration Guidelines

- On a Sun StorEdge™ MultiPack, two-drive subsystem may be expanded with up to four additional X5234A, X5237A, X5342A, or X5243A X-option drives.
- The 68-to-68-pin cable kit with power cord is required when chaining the Sun StorEdge MultiPack system to an UltraSCSI or fast/wide onboard host adapter (like most Sun workstations and servers) or another external 68-pin connector device (such as other Sun StorEdge FlexiPack, UniPack, or MultiPack devices).
- The option with 50-to-68-pin cables is required when chaining the Sun StorEdge MultiPack to a narrow onboard host adapter or another external 50-pin connector device (such as desktop storage module tape drives).
- The SunCD™ 32X is not supported in the Sun StorEdge UniPack or FlexiPack systems.

Sun StorEdge FlexiPack System Options

Configuration Guidelines

The Sun StorEdge FlexiPack enclosure is initially configured with one of the following options:

- One DLT 7000
- One DLT 4000
- One 72-GB to 144-GB, 4-mm DDS-3 autoloader
- One 20-GB to 40-GB, 8-mm tape drive with Sun-light-gray standard bezel and an open bay with filler panel in Sun light-gray

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- One 7-GB to 14-GB, 8-mm tape drive with Sun-light-gray standard bezel and an open bay with filler panel in Sun light-gray

The 68-to-68-pin cable kit with power cord is required when chaining the Sun StorEdge FlexiPack system to a fast/wide onboard host adapter (like most Sun workstations and servers) or another external 68-pin connector device (such as other Sun StorEdge FlexiPack, UniPack, or MultiPack devices).

The 50-to-68-pin cable kit with power cord is required when chaining the Sun StorEdge FlexiPack system to a narrow onboard host adapter or another external 50-pin connector device (such as desktop storage module tape drives).

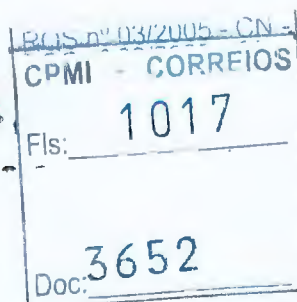
The half-height drives in a Sun StorEdge FlexiPack system base configuration are always installed in the lower storage bay of the Sun StorEdge FlexiPack system with the upper storage bay being open (no drive installed) and covered by a filler panel. This open bay can be filled by another half-height drive, thereby fully populating the Sun StorEdge FlexiPack. The options available for this upper storage bay are listed below.

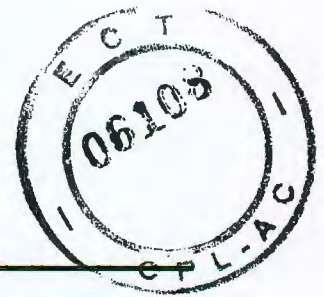
Sun StorEdge FlexiPack System Options for the Upper Storage Bay

The following X-options are for use in the available upper storage bay of the Sun StorEdge FlexiPack system. When ordering the Sun StorEdge FlexiPack system with a half-height drive, the option includes the enclosure and one drive located in the lower storage bay. The upper storage bay is covered by a filler panel initially, but any of the following field-installable options may be ordered for use in the upper storage bay:

Part Number	Option Description
X6282A	4-mm DDS-3 internal tape drive
X6212A	7-GB to 14-GB, 8-mm internal tape drive
X6236A	20-GB to 40-GB, 8-mm internal tape drive

Options





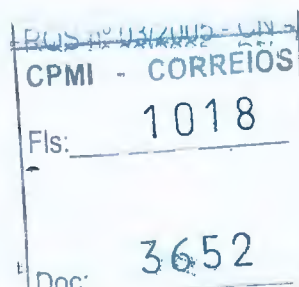
Service and Support

The SunSpectrumSM 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 SolarisTM Operating Environment software, and telephone support for SunTM 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
Local customer support management	No	Yes	No	No
Personal technical account support	Yes	Yes	Option	No
SunStart SM installation service	Yes	No	No	No
Account support plan	Yes	Yes	No	No
Software release planning	Yes	No	No	No
On-site account reviews	Monthly	Semiannual	No	No
Skills assessment	Yes	No	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	Option
7-day/24-hour on-site coverage	Yes	Option	Option	N/A
7-day/12-hour on-site coverage	No	Option	No	No
5-day/24-hour on-site coverage	No	Option	No	No

Service and Support

Just the Facts



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FEATURE	SUNSPECTRUM PLATINUM SM Mission-critical Support	SUNSPECTRUM GOLD SM Business-critical Support	SUNSPECTRUM SILVER SM Systems Support	SUNSPECTRUM BRONZE SM Self Support
Coverage / Response Time (cont.)				
Customer-defined priority setting	Yes	Yes	Yes	Option
• 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
2-hour on-site response	Yes	Option	Option	N/A
Additional contacts	Option	Option	Option	Option
Premier Support Features				
Mission-critical support team	Yes	For urgent problems	No	No
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
Hardware Support Delivery				
Replacement hardware parts	On-site technician	On-site technician	On-site technician	Courier
Two day parts delivery	N/A	N/A	N/A	Yes
Overnight parts delivery	N/A	N/A	N/A	Option
Same-day parts delivery	Yes	Yes	Yes	Option
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 SM license	Yes	Yes	Yes	Yes
SunSolve EarlyNotifier SM Service	Yes	Yes	Yes	Yes

Service and Support

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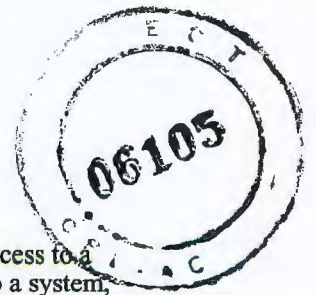
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Glossary

Active termination, regulated	Terminates the SCSI bus with a series of resistors tied to +5 volts. The terminator is labeled <i>Regulated</i> but is often referred to as <i>Active Terminator</i> .
Bandwidth	A measure of the capacity of a communication channel, usually specified in MB/second.
DSBE/S	SBus fast differential SCSI-2/buffered Ethernet card.
DWIS/S	SBus differential fast/wide intelligent SCSI-2 host adapter.
Fast SCSI	Data transfer rate of 10 MB/second.
Fast/wide SCSI	Data transfer rate of 20 MB/second wide devices can be connected to a narrow SCSI interface, but the extra data lines need to be terminated.
FSBE/S	Fast SCSI Buffered Ethernet.
GB	Gigabyte. A gigabyte is 1,073,741,824 (2^{30}) bytes.
GUI	Graphical user interface. The VERITAS Volume Manager software provides a powerful, easy-to-use GUI.
Host adapter	A device that connects a peripheral device I/O protocol and medium to the computer system's I/O bus.
Hot plug	The ability to remove, replace or add a device while current I/O processes continue on the bus.
Hot spare	A drive in an array that is held in reserve to replace any other drive that fails.
Hot swap	The specific case of hot-plugging which involves replacing a device with another of the same size, type, and layout.
IOPS	Input/output operations per second. A measure of I/O performance, IOPS is usually used to quote random I/O performance. See Throughput.
MTBF	Mean time between failures. A measure of reliability, this is the average expected time between failures of equipment, usually measured in operating hours.
RAID	Redundant array of independent disks. A set of disk drives that appears to be a single logical disk drive to an application such as a database or file system. Different RAID levels provide different capacity, performance, availability, and cost characteristics.
Release	A SCSI command to release a previously granted reservation. See Reserve.



Reserve	A SCSI command issued by a host system to reserve access to a controller or disk drive. Once a reservation is granted to a system, commands to the controller or disk drive by any other system are rejected. This is a valuable safety feature in dual-hosted Sun StorEdge Array configurations.
SBE/S	SCSI controller 5 MB/second transfer rate.
SCSI address	The octal representation of the unique address (0–7) assigned to a narrow device; or the hex representation of the unique address (0–15) assigned to a wide SCSI device.
Single connector	A SCSI disk connector technology co-invented by Sun Microsystems. The single connector attachment (SCA) provides all SCSI, power, and control signals in a single connector, and enables easy servicing and highly reliable, pluggable disk drives.
SSHA	SBus SCSI host adapter.
SunSwift™	Single-ended fast/wide SCSI-2 10/100 Mbps Ethernet SBUS host adapter.
SunSwift PCI	Single-ended UltraSCSI 10/100 Mbps Ethernet PCI host adapter.
SWIS/S	Single-ended wide intelligent SCSI.
Throughput	A measure of sequential I/O performance, measured in MB/second. See IOPS.
UltraSCSI	Data transfer rate of 40 MB/second. Wide devices can be connected to a narrow SCSI interface, but the extra data lines need to be terminated.
US2S	PCI UltraSCSI dual channel host adapter.
Volume	In the VERITAS Volume Manager software, a volume is a virtual disk partition into which a file system, DBMS, or other application can place data. A volume can physically be a single disk partition or multiple disk partitions on one or more physical disk drives. Applications that use volumes do not need to be aware of their underlying physical structure. The Volume Manager handles mapping of virtual partition addresses to physical addresses.
Warm plug	The ability to remove, replace or add a device while power is still applied, but only while all I/O processes are suspended.



Materials Abstract

All materials will be available on SunWIN except where noted otherwise.

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Powerpack				
– <i>Sun StorEdge™ MultiPack, FlexiPack, and UniPack Systems, Just the Facts</i>	Just The Facts	Training Sales Tool	SunWIN, Reseller Web	50843
References				
– <i>Sun StorEdge MultiPack Desktop Storage Product Brief</i>	Product Brief	Sales Tool	SunWIN, Reseller Web, E-mail	50845
Product Literature				
– <i>Literature - StorEdge MultiPack Data Sheet</i>	Data Sheet on Sun StorEdge MultiPack	Sales Tool	SunWIN, Reseller Web, E-mail	66769
– <i>Sun Intro - New Sun StorEdge UniPack, FlexiPack, and MultiPack Enhancements</i>	Sun Product Intro on Sun StorEdge Product Enhancements	Sales Tool	SunWIN, Reseller Web	80969
– <i>Sun Product Intro - Introduction and Transition of Sun StorEdge Products and MultiPack Configurations</i>	Sun Product Intro on Product Transitions	Sales Tool	SunWIN, Reseller Web	95833
– <i>Literature - StorEdge UniPack Datasheet</i>	Data Sheet on Sun StorEdge UniPack	Sales Tool	SunWIN, Reseller Web	66767
– <i>Sun StorEdge UniPack Desktop Storage Product Brief</i>	Product Brief on Sun StorEdge UniPack	Sales Tool	SunWIN, Reseller Web	46703
External Web Sites				
– <i>Sun Home Page</i>	http://www.sun.com			
– <i>Site for Information on Sun StorEdge MultiPack</i>	http://www.sun.com/storage/multipack/			
– <i>Site for Information on Sun StorEdge UniPack</i>	http://www.sun.com/storage/unipack/			

Materials Abstract

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- Spare Parts List
- Spares Search Tool
- Spares Ordering Policies & Guidelines
- FE Handbook
- MAL List
- Registration Form
- Order Request Form

StorEdge UniPack and MultiPack

Description	Order Number	List Price	Discount Category
-------------	--------------	------------	-------------------

SG-XDSK010A-4G 4.2-Gbyte 7200 RPM Disk Drive in UniPack enclosure

UNIPACK POWER SUPPLY	#300-1282	\$60	H
UNIPACK FAN ASSEMBLY	#370-1986	\$25	B
BOARD, ULTRASCSI DISK CNTRLR	#501-4823	\$180	H
INT POWER CABLE, UNIPACK	#530-2180	\$15	B
UNIPACK LED CABLE	#530-2183	\$30	H
UNIPACK ULTRSCSI EMPTY CHASSIS	#595-4726	\$550	A

SG-XDSK010A-9G 9.1-Gbyte 7200 RPM Disk Drive in UniPack enclosure

UNIPACK POWER SUPPLY	#300-1282	\$60	H
UNIPACK FAN ASSEMBLY	#370-1986	\$25	B
9GB Disk Dr, Fujitsu MAB3091SC	#370-3413	\$1,000	H
BOARD, ULTRASCSI DISK CNTRLR	#501-4823	\$180	H
INT POWER CABLE, UNIPACK	#530-2180	\$15	B
UNIPACK LED CABLE	#530-2183	\$30	H
UNIPACK ULTRSCSI EMPTY CHASSIS	#595-4726	\$550	A

SG-XDSK010B-18G 18.2GB (2 x 9.1-Gbyte) 7200 RPM StorEdge UniPack

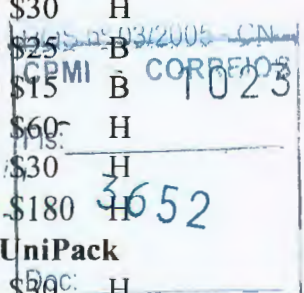
UNIPACK POWER SUPPLY	#300-1282	\$60	H
UNIPACK FAN ASSEMBLY	#370-1986	\$25	B
18.2GB Disk drive	#370-3414	\$1,595	H
BOARD, ULTRASCSI DISK CNTRLR	#501-4823	\$180	H
INT POWER CABLE, UNIPACK	#530-2180	\$15	B
UNIPACK LED CABLE	#530-2183	\$30	H
18.2GB 7200RPM Dsk Dr FRU Assy	#540-3719	\$1,600	H
UNIPACK LED CABLE	#530-2183	\$30	H
UNIPACK ULTRSCSI EMPTY CHASSIS	#595-4726	\$550	A

SG-XDSK010C-9G 9.1GB 10000 RPM StorEdge UniPack

UNIPACK LED CABLE	#530-2183	\$30	H
UNIPACK FAN ASSEMBLY	#370-1986	\$25	B
INT POWER CABLE, UNIPACK	#530-2180	\$15	B
UNIPACK POWER SUPPLY	#300-1282	\$60	H
UNIPACK LED CABLE	#530-2183	\$30	H
BOARD, ULTRASCSI DISK CNTRLR	#501-4823	\$180	H

SG-XDSK010C-18G 18.2GB 10000 RPM StorEdge UniPack

UNIPACK LED CABLE	#530-2183	\$30	H
UNIPACK POWER SUPPLY	#300-1282	\$60	H



INT POWER CABLE, UNIPACK	#530-2180	\$15	B
BOARD, ULTRASCSI DISK CNTRLR	#501-4823	\$180	H
UNIPACK FAN ASSEMBLY	#370-1986	\$25	B
DRV,SEA,18GB,10K,1",USCSI	#390-0002	\$1,625	H

SG-XDSK020A-8G 8.4GB (2 x 4.2-Gbyte) 7200 RPM StorEdge MultiPack

68 PIN SCSI TERMINATOR FST/WID	#150-2267	\$75	B
POWER SUPPLY, 185W E150	#300-1330	\$270	A
ULTRA SCSI COMBO 6-PK BOARD	#501-4747	\$700	A
9GB Disk Dr,Fujitsu MAB3091SC	#370-3413	\$1,000	H
4.2GB 72000RPM Disk Drive Assy	#540-2938	\$700	H

SG-XDSK020A-18G and SG-XDSK020C-18G 18.2GB (2 x 9.1-Gbyte) 7200 RPM StorEdge MultiPack

68 PIN SCSI TERMINATOR FST/WID	#150-2267	\$75	B
POWER SUPPLY, 185W E150	#300-1330	\$270	A
ULTRA SCSI COMBO 6-PK BOARD	#501-4747	\$700	A
9GB Disk Dr,Fujitsu MAB3091SC	#370-3413	\$1,000	H
CABLE ULTRA SCSI 68PIN, .8M	#530-2383	\$45	H
USCSI COMBO 6 SKIN KIT	#540-3423	\$110	A
INT DISK 9.1GB/10K USCSI	#540-3881	\$1,050	H

SG-XDSK020B-36G 36.4GB (2 x 18.2-Gbyte) 7200 RPM StorEdge MultiPack

68 PIN SCSI TERMINATOR FST/WID	#150-2267	\$75	B
POWER SUPPLY, 185W E150	#300-1330	\$270	A
18.2GB Disk drive	#370-3414	\$1,595	H
ULTRA SCSI COMBO 6-PK BOARD	#501-4747	\$700	A
18.2GB 7200RPM Dsk Dr FRU Assy	#540-3719	\$1,600	H

SG-XDSK020C-18G 18G (2 x 9.1-Gbyte) 1000RPM StorEDGE MultiPack

68 PIN SCSI TERMINATOR FST/WID	#150-2267	\$75	B
POWER SUPPLY, 185W E150	#300-1330	\$270	A
ULTRA SCSI COMBO 6-PK BOARD	#501-4747	\$700	A
INT DISK 9.1GB/10K USCSI	#540-3881	\$1,050	H

SG-XDSK020C-36G 36.4G (2 x 18.2-Gbyte) 1000RPM StorEDGE MultiPack

68 PIN SCSI TERMINATOR FST/WID	#150-2267	\$75	B
POWER SUPPLY, 185W E150	#300-1330	\$270	A
ULTRA SCSI COMBO 6-PK BOARD	#501-4747	\$700	A
FRU,Int Disk 18.2GB/10k USCSI	#540-4177	\$1,400	H

SG-XDSK040A-16G 16.8GB (4 x 4.2-Gbyte) 7200 RPM StorEdge MultiPack

68 PIN SCSI TERMINATOR FST/WID	#150-2267	\$75	B
POWER SUPPLY, 185W E150	#300-1330	\$270	A
ULTRA SCSI COMBO 6-PK BOARD	#501-4747	\$700	A
9GB Disk Dr,Fujitsu MAB3091SC	#370-3413	\$1,000	H
4.2GB 7200RPM Disk Drive Assy	#540-2938	\$700	H

SG-XDSK040A-36G and SG-XDSK040C-36G 36.4GB (4 x 9.1-Gbyte) 7200 RPM StorEdge MultiPack

68 PIN SCSI TERMINATOR FST/WID	#150-2267	\$75	B
POWER SUPPLY, 185W E150	#300-1330	\$270	A



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ULTRA SCSI COMBO 6-PK BOARD	#501-4747	\$700	A
CABLE ULTRA SCSI 68PIN, .8M	#530-2383	\$45	H
9GB Disk Dr,Fujitsu MAB3091SC	#370-3413	\$1,000	H
USCSI COMBO 6 SKIN KIT	#540-3423	\$110	A
INT DISK 9.1GB/10K USCSI	#540-3881	\$1,050	H

SG-XDSK040B-72G 72.8GB (4 x 18.2-Gbyte) 7200 RPM StorEdge MultiPack

68 PIN SCSI TERMINATOR FST/WID	#150-2267	\$75	B
ULTRA SCSI COMBO 6-PK BOARD	#501-4747	\$700	A
18.2GB 7200RPM Dsk Dr FRU Assy	#540-3719	\$1,600	H
18.2GB Disk drive	#370-3414	\$1,595	H
POWER SUPPLY, 185W E150	#300-1330	\$270	A

SG-XDSK040C-72G 72.8GB (4 x 18.2-Gbyte) 10000 RPM StorEdge MultiPack

68 PIN SCSI TERMINATOR FST/WID	#150-2267	\$75	B
POWER SUPPLY, 185W E150	#300-1330	\$270	A
FRU,Int Disk 18.2GB/10k USCSI	#540-4177	\$1,400	H

SG-XDSK060A-25G 25.2GB (6 x 4.2-Gbyte) 7200 RPM StorEdge MultiPack

68 PIN SCSI TERMINATOR FST/WID	#150-2267	\$75	B
POWER SUPPLY, 185W E150	#300-1330	\$270	A
ULTRA SCSI COMBO 6-PK BOARD	#501-4747	\$700	A
9GB Disk Dr,Fujitsu MAB3091SC	#370-3413	\$1,000	H
4.2GB 7200RPM Disk Drive Assy	#540-2938	\$700	H

SG-XDSK060B-109G 109GB (6 x 18.2-Gbyte) 7200 RPM StorEdge MultiPack

68 PIN SCSI TERMINATOR FST/WID	#150-2267	\$75	B
ULTRA SCSI COMBO 6-PK BOARD	#501-4747	\$700	A
18.2GB 7200RPM Dsk Dr FRU Assy	#540-3719	\$1,600	H
18.2GB Disk drive	#370-3414	\$1,595	H
POWER SUPPLY, 185W E150	#300-1330	\$270	A

SG-XDSK060C-54G 54.6GB (6 x 9.1-Gbyte) 10000 RPM StorEdge MultiPack

INT DISK 9.1GB/10K USCSI	#540-3881	\$1,050	H
POWER SUPPLY, 185W E150	#300-1330	\$270	A
ULTRA SCSI COMBO 6-PK BOARD	#501-4747	\$700	A
68 PIN SCSI TERMINATOR FST/WID	#150-2267	\$75	B
USCSI COMBO 6 SKIN KIT	#540-3423	\$110	A

General Notes: Refer to the Rebuilt website <http://www.sun.com/ibb> for the Remanufactured Parts List.

Sun Spare Parts : Spare Parts Fact Sheet | Spare Parts List | Spare Search | Spare Request Form | Order Request Form

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HP OPENVIEW

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The HP OpenView Network Management solution is a complete, comprehensive solution that gives IT organizations the control they need to deliver reliable network services to their business customers. Leading the industry in network management, the HP OpenView solution manages all aspects of the increasingly complex and business-dependent network environment. HP OpenView Network Node Manager delivers the network availability component, and forms the foundation of the complete network management solution.

The Smart Way to Manage the Network

HP OpenView Network Node Manager is the market leading network availability management solution, providing in-depth views of the network in an intuitive graphical format. Network Node Manager discovers network devices and provides a map to illustrate what the network actually looks like. The multi-level map indicates which devices and network segments are healthy and which areas need attention. When a flood of events is generated from the failure of a major device, Network Node Manager's powerful event correlation engine immediately correlates the event stream and pinpoints the root cause of the failure. Trend analysis and thresholding, together with out-of-the-box reports and data warehousing, enable proactive network management.

Network Node Manager immediately pinpoints the source of network problems and assists network management staff in planning for network growth and designing network changes.

Network Node Manager's remote user access provides the flexibility to access network management tools from anywhere on the web. Using these powerful features, network administrators are able to more intelligently manage the network, leading to increased network uptime and lower costs.

The Most Comprehensive Network Management Solution

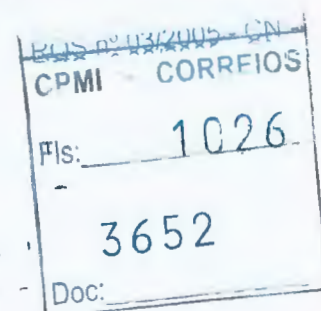
Automated Discovery and Layout.

Network Node Manager discovers TCP/IP, IPX and Level 2 devices on the network and presents this information in an intuitive graphical format. Level 2 discovery includes devices that support the Bridge, Repeater/802.3, or MAU MIBs.

Network Node Manager continuously monitors the network for new devices and for the status of equipment on the network. Discovery and monitoring also detect devices that are located across Wide Area Networks (WANs).

Event Correlation Technology.

Network Node Manager identifies problems faster through an advanced event correlation engine. The engine intelligently correlates events into high-level alarms, immediately pinpointing the root cause of network problems. The drill-down capability allows network administrators to see all of the contributing events for each of the alarms.





Out-of-the-box correlation circuits are included for some of the most common network management problems. The pre-configured correlation circuits lead to more efficient network polling based on the latest topology data. The HP OpenView ECS Designer for Network Node Manager allows development and testing of correlation circuits for very specific correlation requirements through an easy-to-use GUI. These circuits can then be deployed to any number of collection stations or management stations in the environment.

Java-based user interface.

Network Node Manager now provides easy access to network maps and enables management of data from anywhere via the Web.

The HP OpenView Web Launcher allows dedicated IT staff to start HP OpenView Java-based applications such as the Network Presenter, the Alarms Browser and the SNMP Data Presenter from anywhere. A log-in facility with password authentication ensures the security of management data. The Launcher also allows user roles to be defined and information to be filtered based on the user's management objective.

The Network Presenter and the Alarms Browser dynamically update maps and events automatically – no intervention is required. Network topology is presented in either graphical or tabular form. In addition, the SNMP Data Presenter allows users to query the network for SNMP data such as interface traffic, CPU load or traffic routing to assist with network diagnosis and planning.

Proactive management through reporting and data warehouse.

Out-of-the-box reports enable proactive trend analysis on the health of the network. These Web based reports point out trends on performance, availability, inventory, and exceptions. Analysis of this historical data provides a clear picture about the devices in the network and allows network managers to become more proactive by taking action before there is a problem in the network.

Additionally, Network Node Manager's valuable topology, event and SNMP-collected data is exported to its data warehouse. The data is then intelligently aggregated and trimmed. The data warehouse includes an open schema to allow access from reporting and data mining tools.

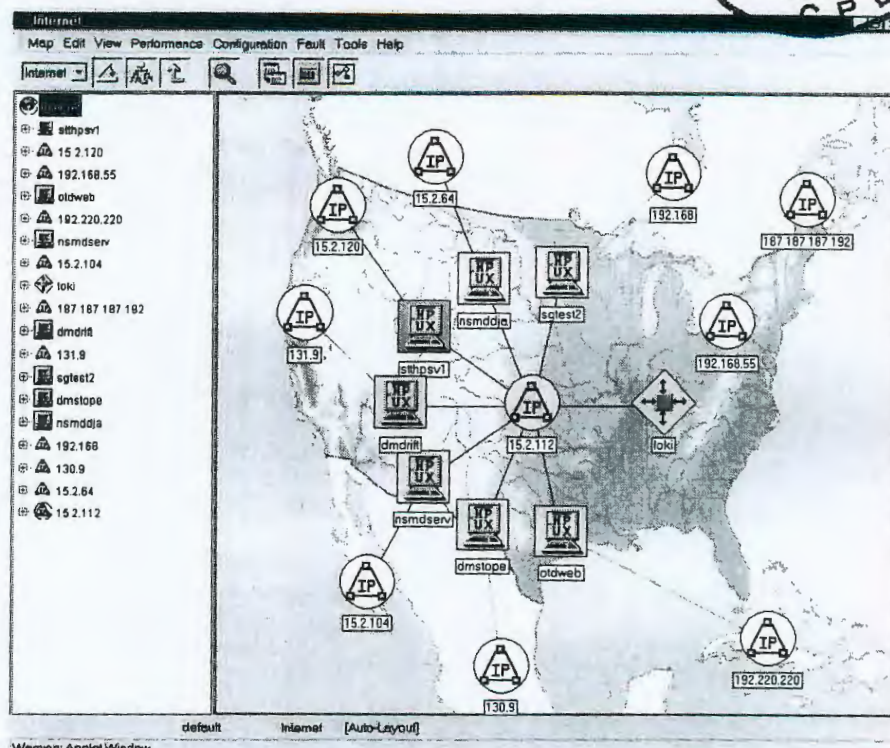


Figure 1. Java-based Network Presenter. The Network Presenter provides shared access to the network topology. Maps may be viewed in graphical or tabular form. A scoping pane allows easy navigation, which lets operators view the entire network from one window.

Ack	Cont	Severity	Date and Time	Source	Message
		Major	Mon Apr 20 16:19:12 1998	setup4.cnd.hp.com	sunbind.cnd.hp.com reports a different physical address for setup4.cnd.hp.com than i
		Major	Mon Apr 20 16:21:04 1998	setup4.cnd.hp.com	rdnt.cnd.hp.com reports a different physical address for setup4.cnd.hp.com than repoi
✓		Normal	Mon Apr 20 16:22:10 1998	ntsrif.cnd.hp.com	Node up
✓		Normal	Mon Apr 20 16:22:38 1998	jdg85.cnd.hp.com	Node up
		Major	Mon Apr 20 16:22:50 1998	hpcndrm.cnd.hp.com	nsmdemo.cnd.hp.com reports address 0x080009F21E67 for 15 2 113 168. hpcndrm
		Major	Mon Apr 20 16:24:16 1998	setup4.cnd.hp.com	sunstone.cnd.hp.com reports a different physical address for setup4.cnd.hp.com than
		Major	Mon Apr 20 16:24:48 1998	dealer.cnd.hp.com	sunstone.cnd.hp.com reports address 0x080009DD1C55 for 15 2 113 168. dealer.cnd
✓		Normal	Mon Apr 20 16:30:14 1998	HP-6B62AA	Node up
		Warning	Mon Apr 20 16:32:24 1998	HP-A12377	Node down
		Warning	Mon Apr 20 16:32:34 1998	HP-6B62AA	Node down
		Major	Mon Apr 20 16:35:31 1998	dealer.cnd.hp.com	2k5u01.cnd.hp.com reports address 0x080009DD1C55 for 15 2 113 168. dealer.cnd
		Major	Mon Apr 20 16:36:03 1998	hpcndrm.cnd.hp.com	2k5u16.cnd.hp.com reports address 0x080009F21E67 for 15 2 113 168. hpcndrm.cnd
		Normal	Mon Apr 20 16:36:43 1998	nsmdemo.cnd.hp.com	Node added
		Major	Mon Apr 20 16:47:05 1998	hpcndrm.cnd.hp.com	2k5u06.cnd.hp.com reports address 0x080009F21E67 for 15 2 113 168. hpcndrm.cnd
		Normal	Mon Apr 20 16:48:00 1998	15 2 113 232	Node added
		Major	Mon Apr 20 16:48:26 1998	dealer.cnd.hp.com	2k5u33.cnd.hp.com reports address 0x080009DD1C55 for 15 2 113 168. dealer.cnd
		Major	Mon Apr 20 16:59:08 1998	hpcndrm.cnd.hp.com	pinge.cnd.hp.com reports address 0x080009F21E67 for 15 2 113 168. hpcndrm.cnd
		Warning	Mon Apr 20 17:02:52 1998	bliss.cnd.hp.com	Node down
		Warning	Mon Apr 20 17:02:52 1998	erif.cnd.hp.com	Node down

Total	Critical	Major	Minor	Warning	Normal
2382	0	557	5	564	1256

Summary of All Alarms in Event Database April 20, 1998

Unsigned Java Applet Window

Name	Severity	Count
HP-6B62AA	Warning	1
HP-A12377	Warning	1
HP-6B62AA	Warning	1

Figure 2. Alarms Browser with Correlated Event Stream. The Alarms Browser pinpoints the root cause of the network problems. Operators can delete and acknowledge alarms and the contributing events from anywhere, and have those changes immediately propagated to other Web users.

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Fault tolerance capabilities.

With Network Node Manager, users can schedule back-ups for business-critical network management information while continuing to manage critical network elements.

Additionally, Network Node Manager collection stations can be configured to fail over to Network Node Manager management stations so that in the event of a collection station failure, network monitoring will continue uninterrupted.

Designed for Growth

A scalable solution.

Windows NT and UNIX collection stations can be distributed throughout the environment so that data can be collected locally and then forwarded to one or more Windows NT/UNIX management stations. Windows NT remote consoles connected to UNIX management and collection stations allow multiple operators access at a lower cost. The new Java-based Web UI increases the number of supported operators and offers connectivity over WAN links.

Flexible pricing.

Network Node Manager is packaged in a variety of node increments to allow the software to scale as network requirements increase. Network Node Manager Enterprise for UNIX or Windows NT is the appropriate choice for larger environments and Network Node Manager 250 is an appropriate choice for environments of 250 or fewer nodes. Additional nodes can be added in 250-node increments as the network grows.

Partnerships Ensure Success

Network Node Manager has the strongest partnership program in the industry, resulting in over 300 integrated applications. This level of partnership support offers our customers the highest degree of flexibility to create a comprehensive, customized network management solution.

System Requirements

The hardware and software recommendations for HP and Sun systems are for management of a 2,500 node network with one HP OpenView Network Node Manager session on a management or collection station. Management of larger networks requires more RAM and swap space. Please refer to the HP OpenView Network Node Manager Performance and Configuration Guide for detailed product requirement information.

HP Systems

- HP 9000 Servers and Workstations, including multiprocessors (threads not supported)
- HP-UX 10.20, 11.0 including X-Windows and OSF/Motif
- RAM: 96 MB recommended
- Bit-mapped display or X-terminal
- Color graphics: 1024x768 minimum resolution (1280x1024 recommended for optimum clarity); 6 color planes minimum (8 color planes recommended)
- Free disk space: 500 MB plus 192 MB of swap space
- LAN/Link for HP 9000
- ARPA Services/9000

Sun Systems

- SunSPARC and Ultra Servers and Workstations including multiprocessors (threads not supported)

- Solaris 2.5.1, 2.6, 2.7
- RAM: 96 MB recommended
- Bit-mapped display or X-Terminal
- Color graphics: 1024x768 minimum resolution (1280x1024 recommended for optimum clarity); 6 color planes minimum (8 color planes recommended)
- Free disk space: 500 MB plus 192 MB of swap

Windows NT Systems

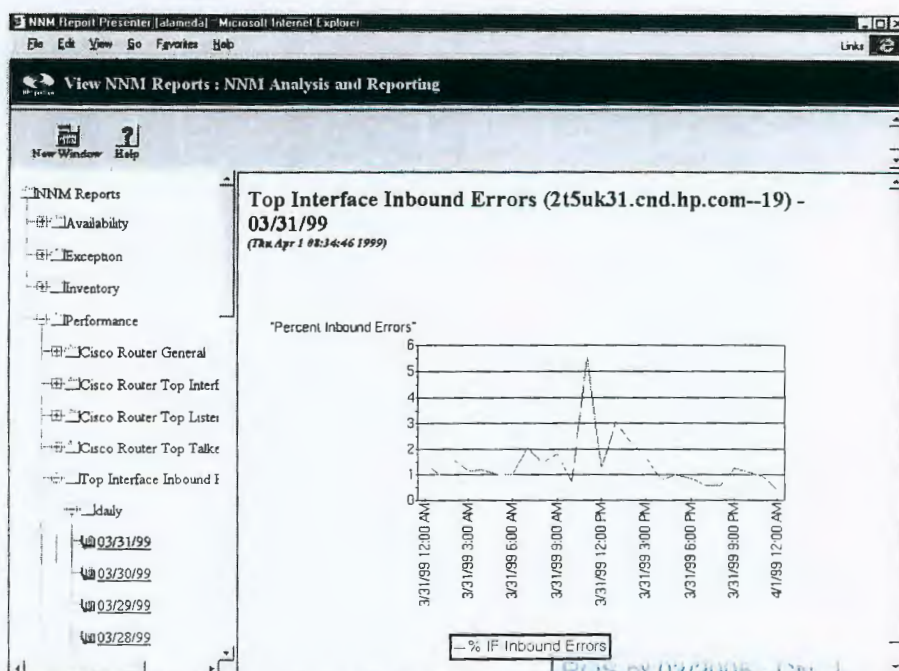
- Intel Pentium processor
- Microsoft Windows NT Workstation (or Server) version 4.0 with TCP/IP networking installed and configured
- Ram: 96 MB RAM
- 800x600 monitor with SVGA graphics card
- Free disk space: 500 MB plus 192 MB free paging file space
- Network Adapter Card

Web Servers Supported

- Apache on HP-UX and Solaris
- Microsoft Peer Web Services or Internet Information Services on the Windows NT operating system

Web Browsers Supported

- Netscape Navigator 4.51 for HP-UX, Windows NT, and Solaris
- Microsoft Internet Explorer 5.0 for NT



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Ordering Information

J1240AA, J1247AA, J1254AA

HP OpenView Network Node Manager Enterprise 6.1 for the Windows NT, HP-UX, or Solaris operating systems. Includes License-to-Use, media, and manuals.

J1241AA, J1248AA, J1255AA

HP OpenView Network Node Manager 250 6.1 for the Windows NT, HP-UX, or Solaris operating systems. Includes License-to-Use, media, and manuals.

J1242AB, J1249AB, J1256AB

HP OpenView 250-Node Increment for HP OpenView Network Node Manager 250 6.1 License-to-Use. Product numbers correspond to Windows NT, HP-UX, and Solaris.

J1243AB, J1250AB, J1257AB

HP OpenView Network Node Manager 250 6.1 to work Node Manager Enterprise 6.1 for Windows NT, HP-UX, or Solaris operating systems.

Upgrades

J1242UB, J1253AB, J1260AB

Upgrade from HP OpenView 250-Node increment to Network Node Manager 6.1 for Windows NT, HP-UX, and Solaris.

J1251AA, J1258AA

HP OpenView Network Node Manager Enterprise Version Upgrade. Unlimited/Enterprise 3.31/4.x/5.x to Network Node Manager Enterprise 4.11/5.01/6.1 for HP-UX or Solaris. Only one version may be installed/run at a time.

J1240UA

HP OpenView Network Node Manager Unlimited 5.x for Windows NT Upgrade to HP OpenView Network Node Manager Enterprise for 6.1 for Windows NT.

J1252AA, J1259AA

HP OpenView Network Node Manager 250 Version Upgrade 3.31/4.x/5.x to Network Node Manager 250 4.11/5.01/6.1 for HP-UX, or Solaris. Only one version may be installed/run at a time.

J1241UA

HP OpenView Network Node Manager 250 5.x for Windows NT Upgrade to HP OpenView Network Node Manager 250 6.1 for Windows NT.

J1261AA, J1262AA, J1263AA

HP OpenView Network Node Manager 6.1 Developer's Toolkit for Windows NT, HP-UX, and Solaris.

J1264AA

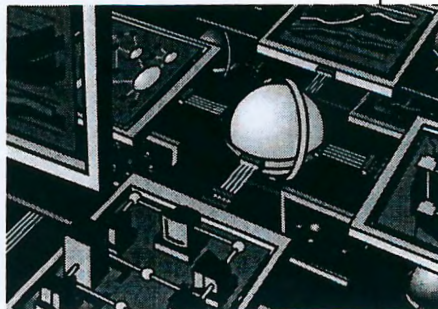
HP OpenView ECS Designer for IT/Operations and Network Node Manager 6.1 for HP-UX.

J1265AA

HP OpenView ECS Designer for Network Node Manager 6.1 for Solaris.

J1266AA

HP OpenView ECS Designer for Network Node Manager 6.1 for Windows NT.



For More Information

For more information on HP OpenView Network Node Manager please contact your local HP reseller or HP sales office.

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Visit the HP OpenView website:

<http://www.openview.hp.com/nnm>



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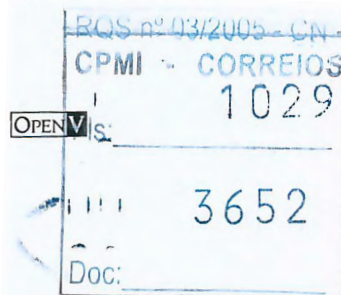
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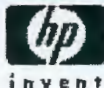


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HP OpenView Network Node Manager & CiscoWorks2000 Integration Package for NNM 5.x

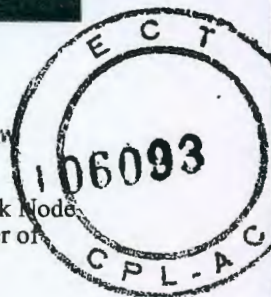


This package combines the network management power of HP OpenView Network Node Manager for Solaris and Windows NT with the network device management power of CiscoWorks2000. Integration that is made possible through the package:

- NNM Web Interface can launch Cisco Resource Manager Essentials
- Cisco Resource Manager Essentials can launch NNM Web Interface
- NNM newly discovered nodes automatically and dynamically propagated to Cisco Resource Manager Essentials inventory
- NNM event history and deleted nodes reports accessible from Cisco Resource Manager Essentials

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HP OpenView Network Node Manager Year 2000 Compliance Information

HP OPENVIEW

The HP OpenView Network Node Manager team is working to ensure NNM's ability to handle dates for the millenium transition. All Network Node Manager versions 4.0 and greater are Year 2000 compliant, when run on a Year 2000 compliant system. Some of these versions will require the use of a software patch, as detailed in the chart below.

HP has made every effort to ensure the accuracy of our product testing. However, because each customer's environment is different from HP's laboratory test environment, it is the customer's responsibility to validate the Year 2000 readiness of these products in their own environment. Therefore, information about the Year 2000 status of HP products is provided "as is" without warranties of any kind. HP encourages customers to be fully aware of the potential impact that the Year 2000 could have on their business environment and their ability to compete in the 21st century. HP also encourages its customers to take responsibility for addressing needed changes as quickly as possible.

HP cannot attest to the Year 2000 compliance of solutions from independent software vendors that appear in our Solutions Catalog. We recommend that customers consult directly with these third-party vendors about the Year 2000 status of those products.

If you need more information on the definition of Year 2000 compliance, please go to </year2000/compliance.html>. Additionally, if you want more general information regarding Hewlett-Packard and the Year 2000, please visit <http://www.hp.com/go/year2000>.

NNM Version/Platform Support for Year 2000

Network Node Manager versions 4.x and 5.x are Year 2000 Compliant. NNM versions 5.01 and later are Year 2000 Compliant as shipped. NNM versions 4.x and 5.0 require the latest consolidated patch to be installed. The table below lists the earliest versions of these consolidated patches to support Year 2000 Compliance; subsequent consolidated patches will have higher numbers and will continue to include Year 2000 support.

Product	4.1 SunOs	2.x Solaris	10.x HP-UX	Windows NT	Status
Network Node Manager 3.31	Upgrade	Upgrade	Upgrade	N/A	N/A
Network Node Manager 4.0x	PSOV_01887	PSOV_01888	PHSS_13866	N/A	Y2K Compliant
Network Node Manager 4.1x	N/A	PSOV_01782	PHSS_12649	N/A	Y2K Compliant
Network Node Manager 5.0	N/A	PSOV_01863	PHSS_13569	NNM_00061	Y2K Compliant
Network Node Manager > 5.0	All versions greater than 5.0 will include Year 2000 compliance.				

NOTE: NNM versions 3.31 and earlier will NOT be made Year 2000 compliant. Customers with those versions should upgrade to a newer version of NNM before December 1999. Please contact an HP Sales Representative.

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Solaris™ 7 Operating Environment



The Solaris™ 7 Operating Environment is the premier environment for network computing. Delivering today what others are only promising for the future, Solaris 7 with 64-bits provides data-center reliability, superior scalability, and unprecedented performance.

Solaris™ Operating Environment

The Solaris™ Operating Environment is the only choice for serious enterprise computing. With Solaris, you get a 64-bit environment that's optimized for Java™ computing — from the creators of Java — and is Year 2000 safe. Superior reliability and availability mean that your systems and data are always accessible when you need them. Extensive scalability ensures that your systems won't top out in just a few years, let alone a few months. High performance delivers the power to get the job done fast. And simplified installation and administration lets you concentrate more on running your business, not your network. The Solaris Operating Environment delivers the information and services you need to anyone, anytime, anywhere.

The Power of 64-bit Computing

Advanced 64-bit technology is at the heart of the Solaris 7 Operating Environment. For your business, this means dramatic increases in performance, capacity, and scalability — all while maintaining complete binary compatibility with current 32-bit applications. Your software investments are protected — and so is your future.

The Solaris 7 Operating Environment helps make you more competitive today by delivering enhanced performance on a wide variety of applications. These applications range from Enterprise Resource Planning (ERP) to e-commerce, data mining to digital content creation, and Web search engines to scientific data analysis.

And upcoming 64-bit applications will run dramatically faster — up to 10 times. With 64 bits, applications can address more data directly from memory instead of from disk. So operations that used to take a long time — like database queries — now happen in a fraction of the time. The result? Faster access to information, increased operating efficiency, and lower operating costs.

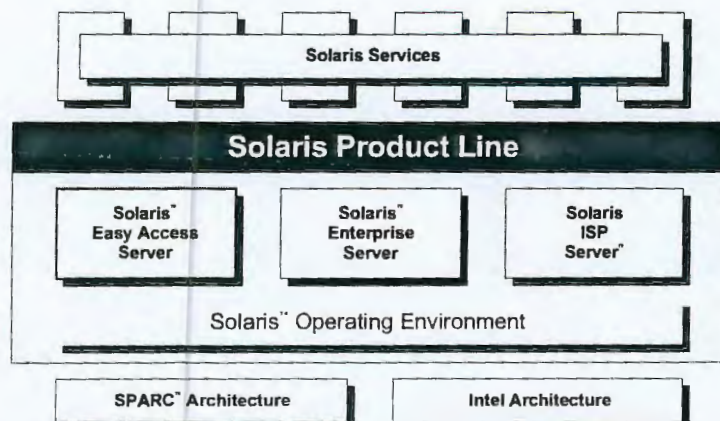
Scalability

The Solaris 7 Operating Environment can handle just about anything you throw at it: heavy network traffic, huge data sets, enormously compute-intensive problems. That's because this 64-bit environment is inherently scalable. Applications can access more files concurrently with 64-bit technology, increasing overall system efficiency. More processes can run simultaneously, allowing individual servers to run more applications. And more network connections are available in the Solaris 7 Operating Environment, enabling Web servers to handle many more users.

Simply put, the Solaris 7 Operating Environment scales from desktop to data center. Which means it's always ready to handle your changing needs.

Reliability

The Solaris 7 Operating Environment is the clear choice for business. It provides data center-class reliability, availability, and serviceability (RAS) features at a fraction of a mainframe's cost.



The Solaris product line delivers three different extensions that focus more on specific needs for workgroup, enterprise, or service provider computing.

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Even a few minutes of downtime can cost your company thousands, or even millions, of dollars in lost revenues and customer loyalty. Integrated in the Solaris 7 Operating Environment is dynamic reconfiguration. It allows a system to continue running even if a system board fails. What's more, you can replace the faulty board while the system continues to operate — and your people remain productive. Other enhancements include improved logging for easier debugging and improved core dump analysis. The bottom line: Solaris provides the most reliable operating environment for network computing.

Ease of Use

An integral component of the Solaris 7 Operating Environment, Solaris™ Web Start makes installing Solaris software as easy as clicking a button. Solaris Web Start offers the industry's first Web-based installation process, which means that all of the setup and administration can be done locally or remotely through a Web browser. Solaris Web Start simplifies installation by eliminating the UNIX® system administration normally associated with software installation and setup.

Solaris™ Web Start Wizards™ technology extends the point-and-click simplicity of Solaris Web Start, bringing this same ease of use to applications written for the Solaris Operating Environment. With Solaris Web Start Wizards software, installing applications on the Solaris Operating Environment is just like installing them on Microsoft Windows.

The Flexibility of Java Technology

Nothing runs the Java development environment better than the Solaris Operating Environment. Solaris provides a fast and reliable environment for developing and deploying mission-critical Java applications. That's because Java

technology is tightly integrated into the operating environment, and can leverage its multithreaded capabilities to deliver the scalability, performance, and stability needed for enterprise applications.

Standards-Based Networking

Driven by a vision of seamless access to information, and backed by 16 years of consistent execution, Sun is recognized as a world leader in open network computing. And we continue to invest in the core technologies required to deliver network connections as reliable as the dial tone. We call this the Webtone.

With standards-based networking, such as TCP/IP, NFS™, and LDAP, built into the software right from the beginning, the Solaris 7 Operating Environment offers proven interoperability and includes the leading-edge features to make networking easier. Sun continues to improve performance, and includes the protocols needed to support new applications as they become available.

Security

Moving from private to public networks, businesses require built-in security. The Solaris 7 Operating Environment has dramatically improved authentication, data integrity, data privacy, and single sign-on capabilities to keep your data safe from tampering, snooping, or eavesdropping. The Solaris Operating Environment also makes security administration easier, because system entry services such as *login* and *rlogin* do not have to be modified when changing authentication mechanisms.

Globalization

The Solaris 7 Operating Environment is designed for global business. Solaris supports 37 languages that cover 95% of the world's markets in a standards-based environment for true multilingual computing.

Summary of Features

- Full 64-bit functionality
- Industry-leading Java technology performance
- TCP with Selective Acknowledgment
- Web-based installation for the Solaris Operating Environment and Solaris applications
- Web-based administration and configuration
- Global-ready and Year 2000 compliant

RAS Enhancements

- Dynamic reconfiguration (not available on all systems)
- UNIX File System (UFS) logging
- Kernel debugging enhancements
- Improved core dump analysis
- Hot-plug capability
- Improved kernel errors and events logging

Standards

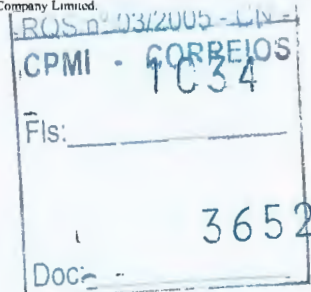
- Year 2000 Compliance: follows X/Open® guidelines
- Interface Standards: X/Open UNIX 98
- Graphics Standards: X11, PostScript®, Display PostScript®, OpenGL®
- Desktop Standards: CDE (Common Desktop Environment), Motif
- Object Standards: Java IDL
- Connectivity Standards: ONC™, ONC+™, NFS, WebNFS™, and optional NetWare IPX/SPX, SNA, SMB, AppleTalk, DECnet, and others
- Internet Standards: HTTP, FTP, Telnet, DNS, NTP, IMAP4, DHCP, SNMP, SMTP
- LDAPv3 IETF RFCs 1323, 1510, 1652, 1869, 1870, 1891-1894, 1985, 1996, 2018, 2136, 2045, 2078

System Requirements

- SPARC™ or Intel 486 (100 MHz) or Pentium platforms
- Disk Space: 600 Mbytes minimum (desktop); 600 Mbytes to 1 Gbyte (server)
- Memory: 32 Mbytes minimum

Notes: Web Start requires 64 Mbytes (minimum) of memory. Memory requirements can vary depending upon the number of clients and users. Maximum memory support on the Intel platform is 8 Gbytes.

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Sun Ultra™ 10 Workstation

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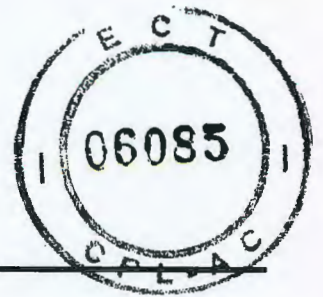
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Positioning

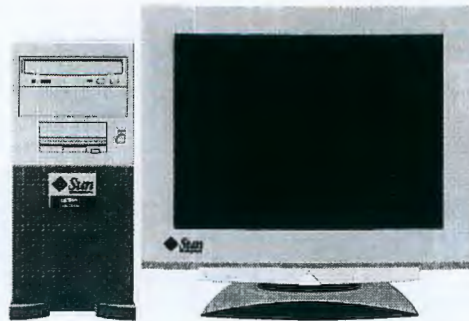


Figure 1. The Sun Ultra 10 workstation

The Sun Ultra™ 10 workstation is based upon the UltraSPARC™-III processor running at 440 MHz. The Ultra 10 workstation features PCI I/O, Sun's Ultra port architecture (UPA), a high-speed graphics interconnect slot, and a mini-tower enclosure, which allows for additional PCI card expansion, memory expansion, Sun Creator3D and Sun Elite3D m3 and m6 graphics accelerators.

The Ultra 10 workstation allows Sun to compete on both price and performance with Pentium-II, Pentium-III, and Xeon-class PC personal workstations. When combined with the optional UPA graphics cards, the Ultra 10 workstation offers powerful computing and world-class graphics performance at aggressive prices.

The Ultra 10 workstation includes the following features:

- **Processor**

- 440-MHz UltraSPARC-III
- 2-MB external cache

- **Graphics**

- Onboard PGX24™ 24-bit graphics, standard
- Sun Creator3D graphics
- Sun Elite3D m3 graphics
- Sun Elite3D m6 graphics

- **Internal Storage**

- Up to two 9.1-GB, 7200-rpm EIDE hard disks
- 32X-speed CD-ROM drive standard
- 1.44-MB floppy standard

- **Memory**

- Up to 1-GB EDO error correcting DRAM (50 ns)

- **Networking**

- 10/100BASE-T Ethernet

Positioning



Just the Facts

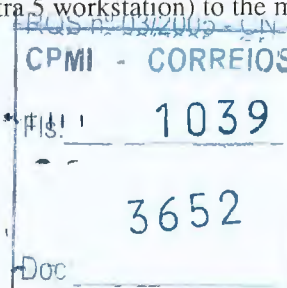
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Key Messages

- **High performance for an entry price-point workstation**
 - 440-MHz UltraSPARC-III processor with 2-MB external cache
 - Up to 1 GB of 168-pin, 50 ns EDO JEDEC DRAM with ECC error correction
 - Provides both performance and capacity for the most demanding technical applications and solutions
- **Powerful graphics for interactive media and 3-D applications**
 - UPA slot provides a fast, large-bandwidth data path from processor to UPA graphics cards
 - Integrated visual instruction set (VIS™) in the UltraSPARC-III processor provides support for multimedia applications
 - On-board PGX24 graphics provides 24-bit video support up to a resolution of 1152 x 900 and 8-bit support up to a resolution of 1280 x 1024. PGX24 can also be used to support a second monitor on systems configured with Sun Creator3D, Sun Elite3D m3, or Sun Elite3D m6 graphics accelerators.
 - Advanced, fast 24-bit accelerated Sun Creator3D, Sun Elite3D m3, and Sun Elite3D m6 UPA graphics cards available
 - Sun Creator3D graphics supports 24-bit color up to 1920 x 1200 resolution at 70 Hz on the 24-inch, wide-screen monitor
 - The Ultra 10 workstation is clearly the entry point for Sun's high-performance graphics systems. Customers can choose the level of graphics performance they need now and in the future
- **Multiple PCI options available**
 - * – Four full-size PCI slots provide access to a variety of Sun and third-party PCI cards
 - High-speed networking, such as Sun Quad FastEthernet™, ATM, token ring, and FDDI, plus many more, are ready and available
 - 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
- **Easy internal storage and expansion**
 - Up to two fast internal 9.1-GB, 7200-rpm EIDE hard disks
 - Internal mirroring supported on systems with two internal EIDE hard disks
 - Internal 32X-speed EIDE CD-ROM, photo-CD compatible
 - PCMCIA bay provided for third-party PCMCIA options
 - Ample local storage capacity for large multimedia files, data, and technical applications
- **Advanced networking capabilities**
 - Fast Ethernet, 100BASE-T, auto-sensing, and autoswitching down to 10BASE-T for backward compatibility
 - Simply plug in and turn on; the Ultra 10 workstation adjusts automatically to the customer's network environment
- **Robust, reliable, scalable, secure, network-centric Solaris™ Operating Environment**
 - The Solaris 7 64-bit ready-to-run operating environment is preinstalled on all Ultra 10 workstations
 - 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

Positioning





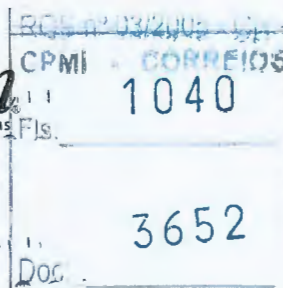
- Sun server (the Sun Enterprise™ 10000 server), the Solaris Operating Environment provides the ability to scale both up and down as a customer's business needs change
- The Solaris™ Desktop Extensions administration tools provide simple setup, use, and management, facilitating more reliable installations and simpler system maintenance
 - **World-class Sun Enterprise Services offers the SunClientSM program, 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 customers

Product Family Placement

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

Ultra 5	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. Target markets include software development, 2-D content creation, finance, EDA, telecommunications, and embedded systems.
Ultra 10	The Ultra 10 workstation 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. Target markets for this workstation include software development, MCAD, electronic design automation, financial analysis, and modeling. With the installation of Sun Creator3D, Sun Elite3D m3, or Sun Elite3D m6 graphics, the markets are extended to animation, 3-D content creation, and simulation.
Ultra 2	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. 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.
Ultra 60	The Ultra 60 workstation is a more advanced Ultra 2 workstation. Like the Ultra 2 workstation, 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 workstation users have grown accustomed. 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 workstations. 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.

Positioning





Sun Ultra 10 Workstation Configurations

The Sun Ultra 10 workstation is offered in a variety of workstation configurations based upon the DRAM and graphics accelerator options. The graphics options are:

- PGX24 24-bit graphics built into the motherboard with 4 MB of SGRAM
 - 24-bit support for up to 1152 x 900 resolution at 85 Hz
 - 8-bit support for up to 1280 x 1024 resolution at 76 Hz
- Accelerated 24-bit, 2-D and 3-D Sun Creator3D graphics
- Accelerated high-performance 24-bit, 2-D and 3-D Sun Elite3D m3 or Sun Elite3D m6 Graphics

Processor speed	440 MHz
Cache size	2 MB
SPECint_95	17.9
SPECfp_95	22.7

Target Users

The Ultra 10 workstation is ideal for customers who require a powerful workstation with exceptional graphics capabilities but do not need the added expansion and throughput capabilities of the Ultra 60 workstation. The Ultra 10 workstation spans the needs of the cost-conscious customers and those requiring more powerful and capable graphic options.

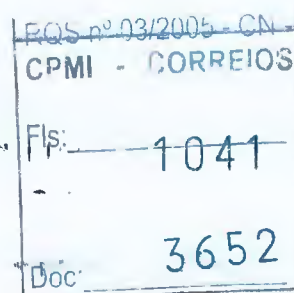
Target Markets

The market opportunities for the Sun Ultra 10 workstation are technical and commercial areas in which high-performance computing and advanced graphics capability are required.

Industry	Key Features to Highlight
Electronic Design (EDA) • Chip designers, board designers • System houses • Telco	• High-performance CPUs • High memory capacity • Availability of applications
Entertainment/DCC Industry • Animation and rendering • Displaying and viewing completed animations	• CPU performance • High-performance graphics
Financial • Stock and commodity traders • Banks	• High performance • Multimedia capabilities
Mechanical Design (MCAD/MCAE) • Automotive • Aerospace • Defense industry • Mechanical equipment designers	• High-performance CPUs • High-end graphics performance and functionality • Availability of applications

Positioning

Just the Facts



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Industry	Key Features to Highlight
Publishing and Imaging • Newspapers • Magazines • Image banks • Advertising agencies	• High-performance CPUs • High-end performance and functionality for both graphics and imaging operations • Wide-screen 24-inch color monitors, 24-bit at 1920 x 1200 resolution (Sun Creator3D graphics only)
Research and Development • In-house development • Research institutions	• High computing performance • Feature-rich Solaris Operating Environment
Software and Java™ Development • ISVs • In-house development at large organizations	• High-performance Solaris Operating Environment • Availability of applications • Multithreaded application development

Positioning

Just the Facts



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Selling Highlights

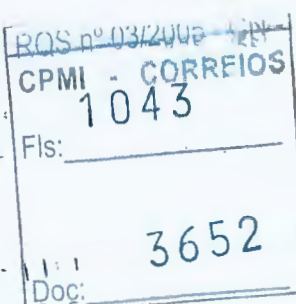
Key Applications

Sun works closely with major software vendors in testing their applications and making them available and officially supported soon after all new releases. All major applications that are available can be found in the Sun Developer ConnectionSM program catalog of third-party solutions.

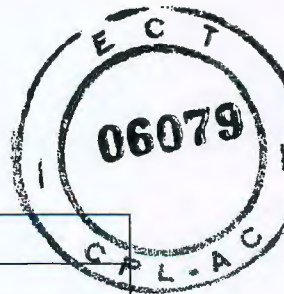
Target Market	ISV— Software Applications	
Entertainment, Animation, and Content Creation	Adobe ArSciMed Electric Image Engineering Animation Inc. Lightwork NewTek Nichimen XaosTools	PhotoShop Kinema/Sim Electric Image Vislab Kinetix (rendering tool kit) Lightwave 3D NWorld Pandemonium
EDA	Avant!/ISS 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	
Health Care	Cemax Context Vision ISG Virtual Vision Software	VIP 2.0 Imaging processing for refining MR data Silohet

Selling Highlights

Just the Facts



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Target Market	ISV— Software Applications	
MCAE	ANSYS, Inc.	ANSYS
	Computational Dynamics, Inc.	StarCD
	ESI	Pam-Crash
	EXA Corporation	Powerflow
	Fluent, Inc.	Fluent, Fluent UNS, Rampant, Nekton
	Fluid Dynamics, Inc. (FDI)	FIDAP
	Hibbitt, Karlsson & Sorensen, Inc	ABAQUS
	Livermore Software Technology Corporation (LSTC)	LSDyna 3D
	MacNeal-Schwendler (MSC)	PATRAN, NASTRAN
	MARC Analysis Research Corp	Mentat, MARC
	For general information see: http://www.sun.com/desktop	
MCAD	Computervision	CADDS5, Medusa
	Dassault	Catia, Catia Studio
	EDS/ Unigraphics	Unigraphics
	Matra Vision	Euclid
	Parametric Technology Corp	Pro Engineer, Pro CDRS, ProFlythrough
	SDRC	I-Deas Master Series

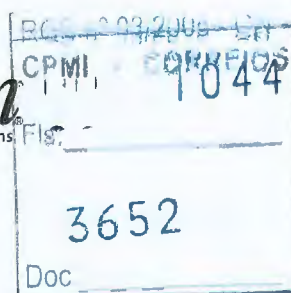
Selling Highlights

Compatibility

The 440-MHz Ultra™ 10 workstation runs the following Solaris™ Operating Environments:

- Solaris 7 Hardware: 3/99 preinstalled
- Solaris 2.6 Hardware: 5/98
- Solaris 2.5.1 Hardware: 11/97

As a result, it can run 32-bit applications unmodified from the Solaris 2.3 and Solaris 2.4 Operating Environments, so these new systems are totally compatible with previous systems and software.





Enabling Technology

UltraSPARC™-III Processor

- ☛ The Sun Ultra™ 10 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 processor is part of a second generation of products based on the UltraSPARC processor architecture. In addition to using a new process technology, the UltraSPARC-III processor 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.

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.

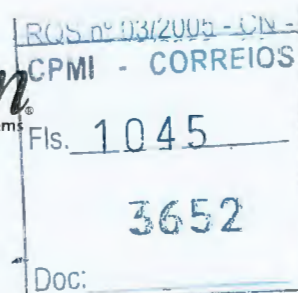
- **PCI is standardized**

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. The SunPCi card 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.





SunPCi Card Feature Summary

- Full PC compatibility
- Solaris Operating Environment/PC interoperability
- 400-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

Note: A Microsoft Windows license is not included with the SunPCi coprocessor card.

PGX24™ Graphics

PGX24™ graphics is the new on-board graphics built into the motherboard of the Ultra 10 workstation. PGX24 graphics 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 graphics 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 Sun Creator3D 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 or move up to Sun Creator3D or Sun Elite3D graphics.

PGX24 graphics includes 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 @ 85Hz
 - 8-bit-only pseudo color video support up to 1280 x 1024 @ 76Hz
- HD15 video connector on the motherboard supports composite and separate video sync timing
- Compatible with OpenWindows™ environment and CDE

Sun Creator3D Graphics, Series 3

Creator Graphics leads the way, integrating high-performance graphics with 24-bit imaging, windowing, video playback and 2-D/3-D graphics with Sun's UltraSPARC-II processors. For accelerated imaging and video playback, Creator is combined with the visual instruction set (VIS™), an extremely comprehensive set of imaging and graphics instructions built into the CPU.

Creator Graphics is designed as an integral part of the workstation system and is able to draw on system resources for functions traditionally built into the graphics board with specialized hardware. The result is that Creator is very fast and cost effective.



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Sun Creator3D graphics, series 3 is the latest generation of the Creator Graphics family of accelerators. It can accelerate and support diverse types of graphics needs ranging from 8-bit and 24-bit windowing to high-end 3-D graphics. Sun Creator3D graphics provides fast, high-quality transformation and display of 3-D solid and wireframe objects.

Creator 3D Graphics, series 3 has four 8-bit color maps for better dynamic color map segment allocation to applications running in 8-bit and 24-bit color. This feature gives applications better access to private color map segments that do not interfere with other applications. Adjustable gamma correction, which gives the user the ability to adjust display color to best match individual preferences is also supported. Sun Creator3D, series 3 adds hardware acceleration of OpenGL® stencil planes. This results in increased application performance for many applications based on OpenGL technology.

Lastly, Sun Creator3D series 3 supports a 1920 x 1200 resolution with Sun's 24-inch monitors (in single-buffer mode). Typical uses for configurations with the 24-inch monitor are in prepress, publishing, imaging, and in other situations in which high-quality 2-D imaging or large amounts screen real estate are essential.

Sun Elite3D Graphics

Sun Elite3D graphics represents a high-powered graphics subsystem for the 3-D graphics market and is complementary to the Creator Graphics product line. Sun Elite3D graphics retains the basic underlying architecture of Creator Graphics, and maintains full API layer compatibility and transparent acceleration of 3-D graphics APIs. Like the Creator Graphics, Sun Elite3D graphics is combined with the visual instruction set. Sun Elite3D comes in two models: Sun Elite3D m3 is twice as fast as Sun Creator3D and Sun Elite3D m6 graphics four to five times the performance of Sun Creator3D graphics.

Sun Elite3D provides very fast, high-quality transformation and display of 3-D solid and wireframe objects, and dramatically accelerates high-end functionality, such as double-buffering, triangle and quad rendering, and lighting and shading. At the same time, Sun Elite3D accelerates 2-D objects that meet X11 rules. Fast 8-bit and 24-bit window system and imaging performance are provided. Sun Elite3D systems provide 96-bit planes, including full 24-bit double-buffer planes required for smooth animation. A 28-bit Z-buffer is included to provides hardware assistance for hidden surface removal and dynamic rendering for 3-D objects.

Sun Elite3D systems utilize 3D-RAM technology. This technology is responsible for implementing fast, inexpensive 3-D frame buffers. In addition, Sun Elite3D has three or six (depending on the model) on-board floating-point processors that speed up floating-point-intensive operations such as transformations, clip tests, face determinations, and lighting.

Sun Elite3D is fully compatible with Sun Creator3D accelerators, and does not compromise the windowing system, 2-D graphics, imaging, or video performance. Sun Elite3D simply adds significant performance gains for 3-D applications.

Enabling Technology

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System Architecture

Product Architecture

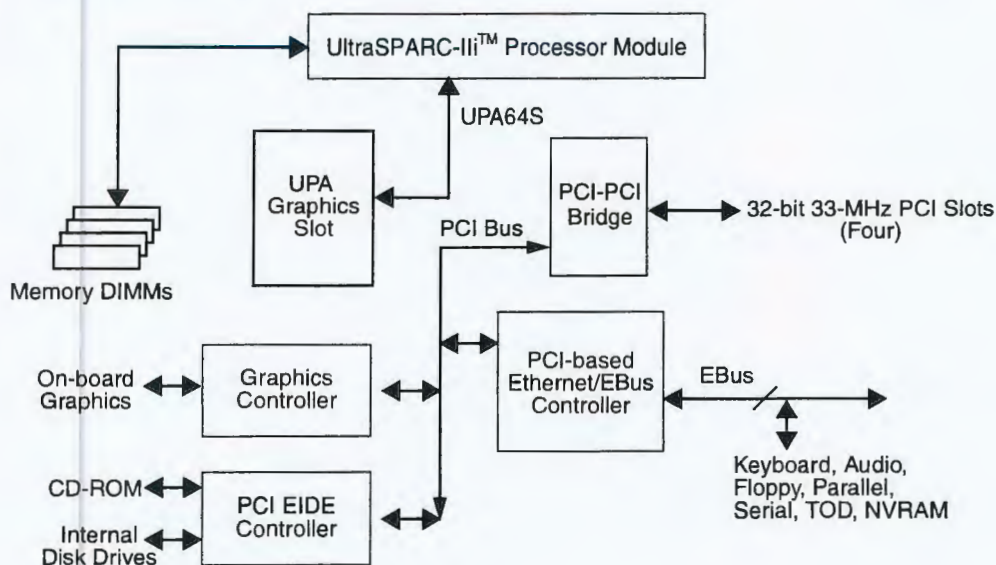


Figure 2. Sun Ultra™ 10 workstation block diagram

The Sun Ultra™ 10 workstation was designed to provide high performance, scalability, and flexibility at low cost. The use of high-volume components and application-specific integrated circuits (ASICs) has 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.

On the Ultra 10 workstation, a single LPX-sized motherboard is used. Features integrated into or supported by the motherboard include:

- Modular processor card with 2 MB of external cache
- Four 168-pin EDO JEDEC DRAM DIMM sockets with ECC error correction
 - 50-ns memory for Model 440
- Riser-card connector to support four full-size, 32-bit, 33-MHz, 5-volt PCI slots
- UPA64s vertical connector for Creator, Sun Creator3D, and Sun Elite3D graphics cards
- 10BASE-T/100BASE-T self-sensing Fast Ethernet
- Two 16.7-MB/second EIDE connectors for hard disk(s) 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, compatible with Type 5
- CD-quality, EBus-based audio
- PGX24™ on-board graphics with 4-MB VRAM (DB15 connector)
 - 24-bit-only support for resolutions up to 1152 x 900 @ 85 Hz
 - 8-bit-only support for resolutions up to 1280 x 1024 @ 76 Hz
 - Supports 17-inch color, 19-inch color, and 21-inch color monitors
- Time-of-day NVRAM for clock and ID functions

See the *Ultra 5 and Ultra 10 Architecture* White Paper for more detailed information about the product architecture.

UltraSPARC™-III Processor

The Ultra 10 workstation is a high-performance system built around the UltraSPARC™-III microprocessor. The UltraSPARC-III processor is Sun's latest release of the SPARC™ processor family and the second generation of 64-bit UltraSPARC processors. It utilizes the latest 0.22-micron technology. This process technology is the key to the UltraSPARC-III processor's higher clock rates and increased performance. This process technology also enables the UltraSPARC-III processor to operate at a core voltage of 1.9 volts. This low 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 processor 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, optimizing power utilization and supporting manufacturability and ease-of-use.

Features

- Integrated VIS instruction set
- Uses the latest 0.22-micron process technology which greatly decreases the die size
- CPU is mounted on a field-installable module card with associated UPA data buffers and external cache

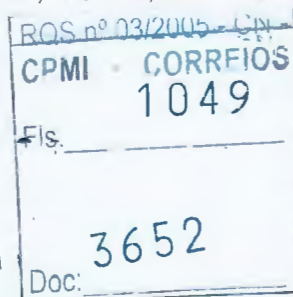
Benefits

- 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 low core voltage of 1.9 volts)
- Facilitates easy system service and upgrades

Memory

The Ultra 10 workstation supports up to 1 GB of 168-pin EDO JEDEC DRAM with ECC error correction. The four double in-line memory modules (DIMMs) used by the Ultra 10 workstation are the same as those used in the Ultra 5 workstation, but are not compatible with DRAM modules used in any other Sun Workstation™. The Ultra 10 workstation supports 32-MB, 64-MB, 128-MB, and 256-MB DIMM units.

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Note: The Ultra 10 Models 440 is factory configured with 50-ns DRAM. DRAM DIMMs must be installed in pairs of identical size. Adding DIMMs in a set of four identical-sized DIMMs results in the best memory-system performance for the Ultra 10 workstation.

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

Storage

- Internal data storage for the Ultra 10 workstation is provided by up to two internal 9.1-GB, 7200-rpm disk drives.
- The Ultra 10 workstation includes a CD-ROM bay for the standard internal 32X-speed ATAPI CD-ROM drive.
- A 1.44-MB, 3.5-inch, manual-eject floppy drive is standard.

Features

- Up to two fast 9.1-GB, 7200-rpm, enhanced IDE internal disk drives
- Photo-CD compatible internal CD-ROM drive

Benefits

- Ample storage capacity for storing large files and applications locally
- Provides access to large multimedia and data files

The Ultra 10 workstation minitower enclosure features the following device bays:

- Two 1.6-inch, half-height, 5.25-inch, front-accessible bays (for CD-ROM and second hard drive)
- One 3.5-inch, internal hard-drive mount (for primary hard disk)
- One 3.5-inch, floppy-drive bay
- One PCMCIA-ready, front-access bay with flip-up access door

System I/O—High-performance PCI Technology

System I/O for the Ultra 10 workstation is provided by the industry-standard peripheral component interconnect (PCI) data bus. The PCI bus in the Ultra 10 workstation complies with the 2.1 revision of the PCI specification, released in March 1995. To provide maximum expandability, the Ultra 10 workstations feature four full-size 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 10 workstation.



Refer to the "Ordering Information" section of this document for a listing of Sun PCI cards that have been qualified on the Ultra 10 workstation. The cards listed below are currently available or are under development.

- Fast Ethernet/SCSI - Quad Fast Ethernet - ISDN—basic rate - ISDN—primary rate - Hard bus - "TGX+-like" - RAID arrays - IEEE-488 - DR11W - T1/E1 - 8/16/32 Port MUX - Imaging and cameras - Parallel - Audio - SBus expansion - PCMCIA	- Ultra/Diff/SCSI - 10/100 Ethernet - Gigabit Ethernet - Token ring (TRI/S) - High-speed serial - VDC/MPEG - Video teleconference - HIPPI - 1394 - PCI bus expansion - SCSI - SS7 - Fax - Fibre Channel - 1553	- ATM 155 single and multi - ATM 155/622 (PCI 66) - ATM 25 MB - FDDI single attach - FDDI dual attach - Serial-parallel controller - 2K x 2K frame buffers - Video frame grabber - X.25 - ESCON - Telephony - A/D and enablers - Voice/speech - SCI - DR-11W
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See http://www.sun.com/io_technologies/pci/index.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. The SunPCi card 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 card 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
- 400-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

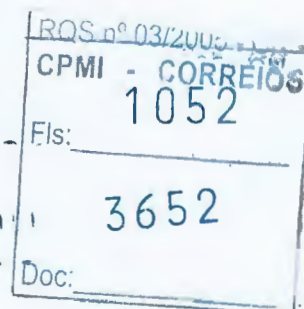
Benefits

- 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 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, 1600 x 1200 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

Note: A Microsoft Windows license is not included with the SunPCi coprocessor card.

System Architecture

Just the Facts



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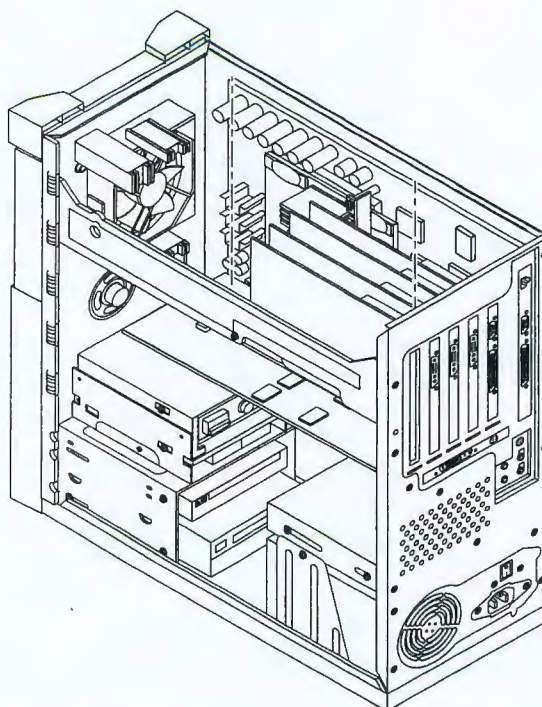


Figure 3. Ultra 10 Workstation chassis with access panel removed, providing full access to internal options

PGX32™ PCI-based Graphics

PGX32™ graphics 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 Operating Environment and the latest Solaris 7 Operating Environment release. The product has not been tested with all configurations with Solaris 2.5 Operating Environment.

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
- Multiheaded (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

Creator Graphics Series 3 Overview

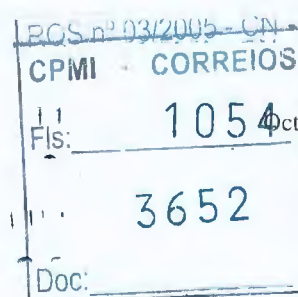
Creator Graphics Series 3 is the latest generation of the Creator Graphics product family. Creator Graphics accelerates and supports diverse types of graphics needs ranging from 8-bit and 24-bit windowing to high-end 3-D graphics.

Creator Graphics Series 3 is designed to match CPU performance increases beyond the currently available CPU speeds. Series 3 accelerators have one clock for internal graphics processing and another clock for the frame buffer, enabling each part to run at maximum speed independently from each other.

Creator Graphics performance is based on a unique system-level approach to designing graphics.

• UltraSPARC-III processor

Creator Graphics relies on the power of the UltraSPARC-III processor for floating-point calculations, and on the VIS to accelerate imaging. This eliminates the need for a dedicated graphics processor, and results in a significant cost advantage with Creator Graphics.





- **UPA graphics interconnect**

UPA provides a high-speed, high-bandwidth interconnect between the CPU, Creator Graphics, and system memory. It raises overall graphics performance while maintaining a balanced throughput. UPA interconnect ties Creator Graphics directly to the CPU and memory, and delivers orders-of-magnitude greater bandwidth compared to the traditional way of attaching graphics accelerators through a peripheral bus such as PCI.

- **Creator rendering ASIC**

A powerful ASIC renders graphics primitives at very high speeds. The Creator ASIC accelerates fills, scroll, text, lines, polygon rendering, and color space conversion.

- **3D-RAM graphics memory**

Specialized graphics memory provides high bandwidth and built-in acceleration for 3-D graphics. Creator Graphics Series 3 uses the fastest available 3D-RAM chips.

Creator Graphics Model Features

Creator Graphics is available in two configurations: Creator, a single-buffered version that provides hardware acceleration of 2-D graphics; and Sun Creator3D graphics, a double-buffered version that has the full capabilities of Creator, plus increased 3-D graphics acceleration. Only Sun Creator3D graphics is supported on the Ultra 10 workstation.

The features provided by Creator Graphics Series 3 on both the single-buffered and double-buffered cards are:

- Accelerated video decompression (playback) by YCC-to-RGB color space conversion
- Imaging and windowing support, including contrast stretch and consecutive-block prefetch for SFB reads
- High-resolution video and monitor support
 - Line doubling for interlaced video writes
 - DDC2B monitor serial communication, with EDID default resolution support in the Creator bootprom
 - Provides a utility to change the resolution within the upper and lower limits of what the new Creator Graphics boards can easily support
- Accelerated imaging and advanced 3-D graphics with Gouraud shading, line antialiasing, per-pixel depth cueing, subpixel addressing, transparency, and stereo viewing with monitor
- Four 8-bit color maps for intelligent and dynamic color-map segment allocation give 8-bit and 24-bit color applications better color access and virtually eliminate interference (such as color flashing) between color-intensive applications
- Adjustable gamma correction offers the user the ability to adjust color to individually preferred settings and optimal display quality

The double-buffered (Sun Creator3D graphics) option has the following additional features:

- Buffer B addressing for stateless (DFB) and video accesses
- Single-buffered, high-resolution (2.3 million pixels) support
 - 1920 x 1200 landscape mode (HDTV-style 16:10 format) on the available 24-inch color monitor
- Hardware acceleration of OpenGL[®] stencil functions are provided for the double-buffered, including overlay SOV support



Sun Creator3D Graphics Summary

- Full 2-D imaging and windowing acceleration, plus full 3-D acceleration
- Ideal for high-end 2-D, mid-range 3-D graphics, and solids in MCAD and MCAE, as well as high-end imaging and color publishing applications
- 24-bit true color, double-buffered up to 1280 x 1024
- 28-bit Z-buffer
- 8-bit overlay and visual planes
- Stereo display up to 960 x 680 at 112-Hz non-interlaced, double- and Z-buffered
- 15-MB 3D-RAM memory
- 1280 x 1024 at 76 Hz standard with programmable bootprom resolution
- NTSC/PAL video timings
- 128-bit DAC
- High resolution 1920 x 1200 at 70 Hz (single-buffered) supporting 24-inch, wide-screen display

System Architecture

Just the Facts



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Sun Elite3D Graphics Overview

Sun Elite3D graphics greatly accelerates the rendering of 3-D triangles, vectors, and texture maps over what is possible with 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.

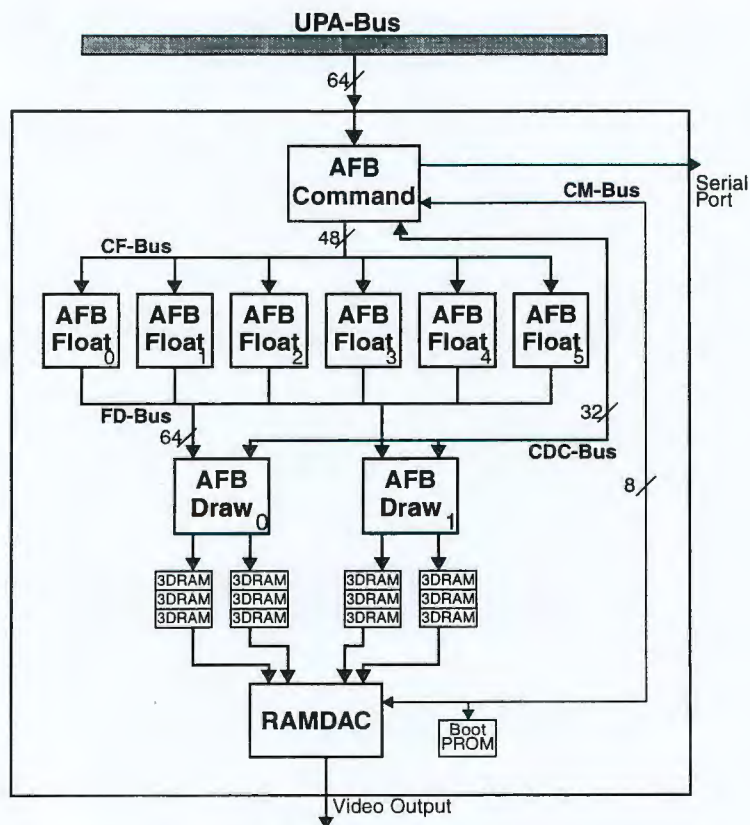


Figure 4. Sun Elite3D m6 graphics chip-level diagram

Sun Elite3D graphics has a highly parallel and efficient graphics pipeline. The Sun Elite3D 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 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 OpenGL.

Given the technological changes brought on by 3D-RAM, the primary justification for the existence of a 3-D 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.

System Architecture



Features

- Integrated imaging
- High-performance accelerated 24-bit double-buffered 3-D graphics
- 28-bit Z-buffer
- 8-bit overlay plane
- Gouraud shading
- Alpha blending and screen-door transparency
- Line and dot antialiasing
- Per-pixel depth cueing
- Per-pixel alpha interpolation
- 4-bit stencil support with hardware acceleration of OpenGL stencil functions
- Accelerated lighting
- Compressed geometric decompression
- Four 8-bit color maps
- Adjustable gamma correction
- NTSC/PAL video timing support
- Stereo video output (960 x 680 at 112 Hz) supported with 19- and 21-inch monitors
- 1280 x 1024 at 76-Hz resolution standard
- Dual-headed support (two Sun Elite3D m6 frame buffers)

Benefits

- Performs fast imaging and 3-D on unified frame buffer
- Smooth animation and interactivity of 3-D 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; allows seamless integration and manipulation of windows
- Allows smooth shading of solid geometry
- Simulates transparent materials such as glass
- Needed in MCAD and visualization for better visual quality
- More accurate depth cueing or fog
- Greater accuracy and image quality
- Provides greater performance
- More lights can be turned on for enhanced visual display without encountering large performance penalties
- Allows much more geometric data to be stored in the available memory, but also reduces bus bandwidth needs as well; for efficient geometry handling to enable network-centric graphics collaboration
- For dynamic colormap 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 output
- With frame buffer, monitor, and window systems support for stereo, users can get more accurate representation of 3-D data
- High-resolution display quality
- For users who need to do multiple things simultaneously, such as command and control applications, 3-D, and video playback for animators, or design and analysis for engineers



Features

- OpenGL 1.1.2., XGL™ 3.0, XIL™, X Windows, Java 3D™, Java™ Media Framework, and MediaLib 1.2 (SDK) support
- Binary compatibility with Creator Graphics product family

Benefits

- A choice of APIs
- Interoperability with existing applications and users

Sun Ultra 10 Workstation UPA-based Graphics Performance

Graphics Supported	PGX24 Ultra 10 440-MHz (24-bit mode)	Sun Creator3D Ultra 10 440-MHz	Sun Elite3D m3 Ultra 10 440-MHz	Sun Elite3D m6 Ultra 10 440-MHz
Xmark93	10.2	29.6	30.8	30.8
2-D vectors/sec.	873	5.0 M	5.0 M	5.0 M
3-D vectors/sec.	521 K	3.7 M	4.9 M	8.8 M
3-D triangles/sec.	—	1.5 M	3.0 M	5.9 M
3-D quads/sec.	—	698 K	1.2 M	1.3 M
PLBwire93	18.3	250	303	435
PLBsurf93	—	403	519	673
ViewPerf OpenGL				
• ProCDRS-01	—	8.2	13.7	19.0
• DX-04	—	11.2	27.8	30.7
Notes • Performance data as of April 1999; Configuration for timing includes Solaris 2.6 Operating Environment, Hardware: 5/98 and OpenGL 1.1.2. • Performance data is subject to change. Please see Sun's web site at http://www.sun.com for latest performance numbers.				

System Architecture

Metrics Defined

- 2-D vectors are 10 pixels long, X11 perf numbers
- 3-D vectors are 10 pixels long, depth-cued, clip tested, perspective projection, and solid line through XGL
- 3-D mesh are 25 pixel triangle mesh, one light source
- 3-D quads are 100 pixel, independent quadrilaterals, with one directional light source
- Both 3-D mesh and quads are Gouraud shaded, randomly oriented, transformed, clip tested, with perspective projection and Z-buffered through XGL
- Configuration with 24-inch monitor uses Sun Creator3D graphics in single-buffer mode unless otherwise noted
- 3-D quads are 100-pixel 3-D quads, one light—ambient, diffuse, isolated, perspective, Gouraud shaded, and Z-buffered with culling (in thousands)
- XIL numbers are in million pixels (megapixels per second) for a single-band image

Just the Facts



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Special Features

Accelerated imaging and advanced 3-D graphics with Gouraud shading, line antialiasing, per-pixel depth cueing, subpixel addressing, transparency, and stereo viewing with monitor

Sun Ultra 10 Workstation Configuration

	Model 440
Dimensions • Height • Width • Depth	402 mm (15.8-inches) 176 mm (6.9-inches) 435 mm (17.1-inches)
CPU and UPA • Architecture • Clock rate • External cache	UltraSPARC-III 440 MHz 2 MB
Memory • Memory type • Number of slots • Capacity • DRAM speed • DIMM sizes	168-pin EDO JEDEC, ECC error correction 4 128 MB to 1 GB (minimum factory-configured system is 128 MB) 50 ns 32 MB, 64 MB, 128 MB, and 256 MB (installed in pairs)
Storage Maximum internal	Up to two 9.1-GB, 7200-rpm EIDE hard disks
Graphics • UPA • On-board PGX24™ 24-bit graphics	One slot supports optional Sun Creator3D, and Sun Elite3D m3, and Sun Elite3D m6 graphics cards • On-board 24-bit frame buffer with accelerated text, windowing, 2-D and 3-D wireframe • Support for color monitors up to 21 inches • 24-bit support for resolutions up to 1152 x 900 @ 85 Hz • 8-bit support for resolutions up to 1280 x 1024 @ 76 Hz
I/O Interfaces • PCI I/O bus • Serial ports • Parallel port • PCMCIA bay	Four full-size 33-MHz PCI slots (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 • Floppy • CD-ROM	1.44-MB, 3.5-inch, manual-eject floppy 32X-speed ATAPI, photo-CD compatible
Operating Environment	Solaris 7 Hardware: 3/99 (preinstalled) Solaris 2.6 Hardware: 5/98 Solaris 2.5.1 Hardware: 11/97

System Architecture

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Operating Environment

The Solaris™ 7 Operating Environment

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.

The Sun Ultra™ 10 workstation runs the following Solaris Operating Environments:

- Solaris 7 Hardware: 3/99 preinstalled
- Solaris 2.6 Hardware: 5/98
- Solaris 2.5.1 Hardware: 11/97

As a result, it can run 32-bit applications unmodified from the Solaris 2.3 and Solaris 2.4 Operating Environments, so these new systems are totally compatible with previous systems and software.

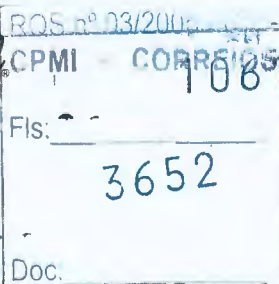
The Solaris 7 Operating Environment Features and Benefits

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 without 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 Solaris reliability consists of four interrelated activities: leading-edge features, stringent quality standards, extensive product testing, and a robust global support model.

The Solaris 7 Operating Environment delivers several major enhancements over the Solaris 2.6 operating environment:

- **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 among the Solaris 7, Solaris 2.5, and Solaris 2.6 Operating Environments allows all of Sun's customers' 32-bit applications to 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.

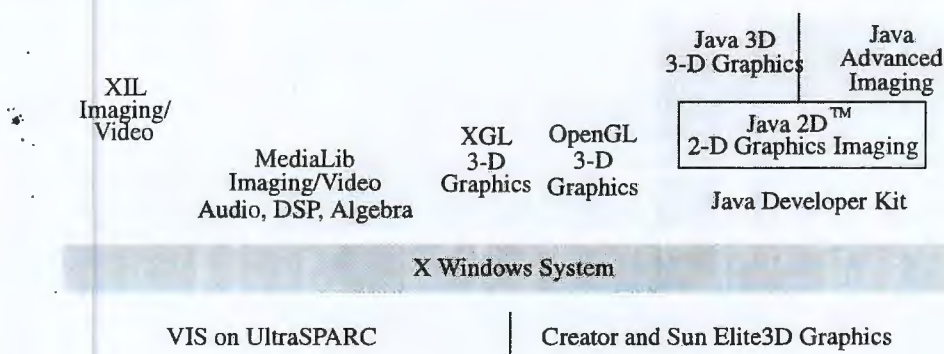


Figure 5. Graphics software interfaces

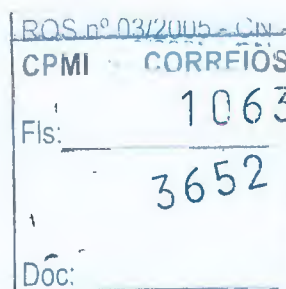
The Solaris Operating Environment System Requirements

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.

Just the Facts



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Operating Environment



Ultra 10 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 Ultra 5 and Ultra 10 workstations. This 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 (Hardware: 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™ 2.0 (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

Operating Environment



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- The Solaris 7 Operating Environment preinstalled software comes with the following languages:
 - English
 - French
 - German
 - Italian
 - Spanish
 - Swedish
 - Traditional Chinese
 - Simplified Chinese
 - Korean
 - Japanese

Sun OpenGL 1.1.2 API for the Solaris Operating Environment

Sun OpenGL API for the Solaris Operating Environment provides a complete solution for developing and deploying interactive 3-D applications across SPARC workstations. It enables mainstream, industry-leading 3-D graphics and visualization applications to be deployed on Sun's Ultra family of graphics workstations at a compelling price-to-performance ratio. The OpenGL API is an application programming interface (API) that provides 2-D and 3-D graphics functions, including modeling, transformations, color, lighting, and smooth shading, as well as advanced features such as texture mapping, NURBS, fog, alpha blending, and motion blur. The OpenGL API works in both immediate and non-editable display-list graphics modes.

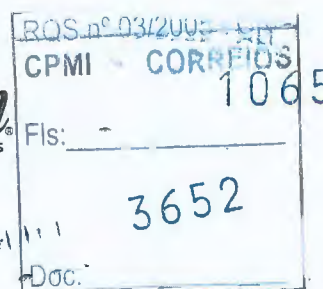
The OpenGL API is targeted at developers creating interactive 3-D applications for the enterprise, the intranet, and the Internet. These developers are affiliated with ISVs or VEUs in technical markets or in research labs. Potential users include those in computer-aided design and manufacturing, global information systems, simulation, industrial design and modeling, entertainment, biochemistry, and petroleum exploration market segments.

Widespread multivendor availability of the OpenGL API allows source-code portability of 3-D graphics clients. The OpenGL API 1.1.2 for the Solaris Operating Environment is a compliant implementation of OpenGL 1.1 from the OpenGL Architecture Review Board (ARB) and is, therefore, source-code compatible with other conformant OpenGL applications on the market. Most existing OpenGL applications need only to be recompiled in order to run with OpenGL 1.1.2 for the Solaris Operating Environment software.

The OpenGL API 1.1.2 for the Solaris Operating Environment is available for the Creator, and Sun Elite3D graphics product families, where the OpenGL functionality is accelerated in hardware. In addition, it is available on all the legacy SPARCstation™ systems equipped with SX, ZX, GX, GXplus, TurboGX™, TurboGXplus™, S24™, TCX, or FSV frame buffers, which is made possible through an optimized software-rendering pipeline.

Operating Environment

Just the Facts



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Features and Benefits

Sun OpenGL API 1.1.2 for the Solaris Operating Environment provides the following new features:

Features

- 64-bit OpenGL libraries
- Occlusion culling test extension
- Improvements in DPA rendering support
- Constant texture data extension
- General performance improvements

Benefits

- Allows OpenGL applications to take advantage of the full 64-bit addressing in Solaris 7 Operating Environment
- Enables applications to trivially reject occluded objects in a scene, resulting in big improvements in interactive rendering performance for visualization of large models
- Enables OpenGL rendering on Ultra 5 and Ultra 10 systems using the PGX™ or PGX24™ frame buffers
- Reduces texture mapping memory utilization and loading time
- Enables 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

Sun OpenGL 1.1.2 for the Solaris Operating Environment Tech Facts

Sun OpenGL 1.1.2 for the Solaris Operating Environment system requirements:

Platforms	Sun Elite3D, Sun Creator3D, Creator, PGX, ZX, GX, TCX, SX product families
• Operating environments supported	Solaris 2.5.1 Maintenance Update 3 Solaris 2.6 or higher Solaris 7
• Window system supported	CDE or OpenWindows™
Disk space	
• For end-user runtimes	32 MB for 32-bit 55 MB for 64-bit
• For developers	
– Runtime binaries and header files	44 MB for 32-bit 67 MB for 64-bit
– To build examples	54 MB for 32-bit 77 MB for 64-bit
Memory	64 MB minimum 128 MB or more recommended



System Management

Many of the Sun™ workstations deliver the kind of power and graphics needed by 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 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 software 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



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AnswerBook2™: System Administration Guide

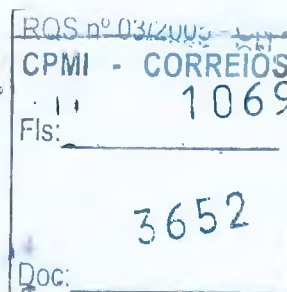
The AnswerBook2™ product is Sun's on-line documentation system. It uses a web-browser interface that lets you view and print a variety of Solaris information, including SGML-based AnswerBook™ collections, Display PostScript™ AnswerBook collections, and man pages.

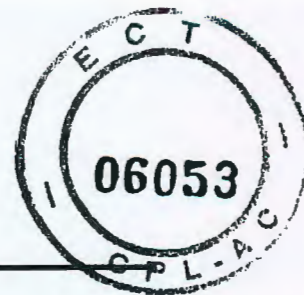
The AnswerBook2 product provides a search engine that lets you find information throughout the documentation library. You can install AnswerBook2 document collections on a centralized documentation server or on a local server.

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

System Management

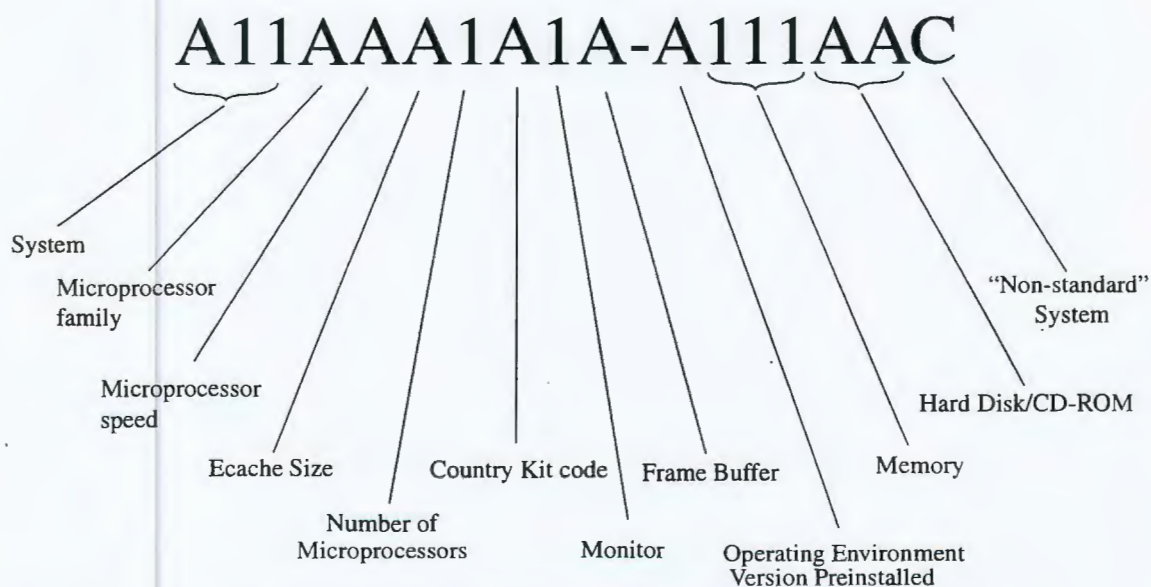




Ordering Information

Sun Ultra™ 10 Workstation Ordering Information

The Sun Ultra™ 10 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.



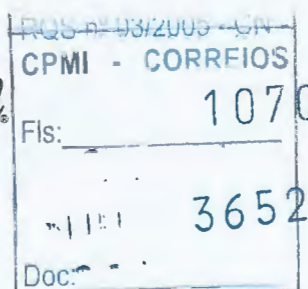
(Note: A = alpha character, 1 = numeric character, C = optional alpha or numeric character)

Ordering Information

Model Key (Subset of Part-Number Definitions)

System A22 = Sun Ultra 10	Number of Processors 1 = Single processor	Monitor 9 = No monitor	Memory 128 = 128 MB 256 = 256 MB 512 = 512 MB
Microprocessor Family U = UltraSPARC™-IIi	Country Kit Code A = North America UNIX® B = Japanese Language C = Japanese Logoless D = German Language E = United Kingdom F = French Language Z = No Country Kit	Frame Buffer L = Sun Creator3D Series 3 M = Sun Elite3D m6 Q = Sun Elite3D m3 P = On-board PGX24™	Hard Disk/CD-ROM CP = 9.1-GB, 32X CD-ROM
Microprocessor Speed H = 333 MHz K = 440 MHz		Operating Environment Version Preinstalled B = Solaris™ 7 C = Solaris 7 3/99	
Ecache Size C = 2 MB			

Just the Facts



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Choice of Country Kit

Unlike traditional Sun systems, the Ultra 10 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 10 workstation marketing part number. The eighth character of the Ultra 10 workstation marketing part number specifies the choice of Country Kit. The single-character Country Kit codes are listed below.

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

Japanese Language and Japanese Logoless Kits no longer include the contents of the Country Kit in the CPU box when shipped from the point of manufacture. 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 10 systems ordered with Country Kit code B, C, and Z do not include the contents of the Country Kit within the CPU box. In other words, the customer receives the CPU system in one box and the Country Kit in a separate box (this may vary in Japan). Customers who order Country Kit codes A, D, E, and F receive the CPU system and Country Kit in a single box.

Three examples using the same base Ultra 10 workstation configuration (128-MB DRAM, 9.1-GB, 7200-rpm hard disk, CD-ROM, on-board PGX24 graphics) are:

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

A22UKC1A9P-C128CP
X7103A

Note that the eighth character is "A" for North American UNIX
Marketing number for 17-inch entry color monitor

2. German Language with 21-inch color monitor

A22UKC1D9P-C128CP
X7121A
X470A

Note that the eighth character is "D" for German Language
Marketing number for 21-inch color monitor
Marketing number for required 13W3-to-HD15 video adapter cable

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

A22UKC1Z9P-C128CP
X3574A
X7121A
X470A

Note that the eighth character is "Z" for No Country Kit
Marketing number for separate Italian Country Kit
Marketing number for 21-inch color monitor
Marketing number for required 13W3-to-HD15 video adapter cable



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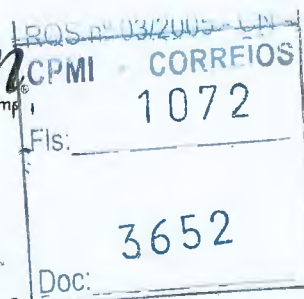


Ultra 10 Model 440 with On-board 24-bit PGX24 Graphics

Part Number	System
A22UKC1A9P-C128CP A22UKC1B9P-C128CP A22UKC1C9P-C128CP A22UKC1D9P-C128CP A22UKC1E9P-C128CP A22UKC1F9P-C128CP A22UKC1Z9P-C128CP	Ultra 10 Model 440 , 2-MB Ecache, 128-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, on-board 24-bit PGX24 graphics, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit
A22UKC1A9P-C256CP A22UKC1B9P-C256CP A22UKC1C9P-C256CP A22UKC1D9P-C256CP A22UKC1E9P-C256CP A22UKC1F9P-C256CP A22UKC1Z9P-C256CP	Ultra 10 Model 440 , 2-MB Ecache, 256-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, on-board 24-bit PGX24 graphics, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit
A22UKC1A9P-C512CP A22UKC1B9P-C512CP A22UKC1C9P-C512CP A22UKC1D9P-C512CP A22UKC1E9P-C512CP A22UKC1F9P-C512CP A22UKC1Z9P-C512CP	Ultra 10 Model 440 , 2-MB Ecache, 256-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, on-board 24-bit PGX24 graphics, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit

Ordering Information

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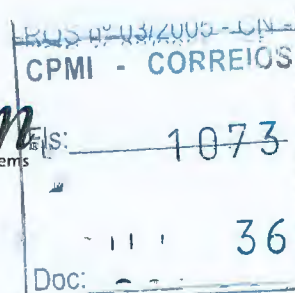


Ultra 10 Model 440 with Sun Creator3D Series 3 Graphics

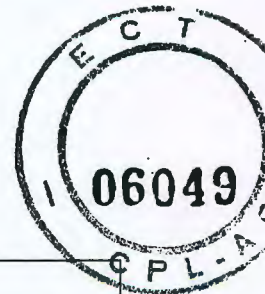
Part Number	System
A22UKC1A9L-C128CP A22UKC1B9L-C128CP A22UKC1C9L-C128CP A22UKC1D9L-C128CP A22UKC1E9L-C128CP A22UKC1F9L-C128CP A22UKC1Z9L-C128CP	Ultra 10 Model 440 , 2-MB Ecache, 128-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Creator3D graphics Series 3, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit
A22UKC1A9L-C256CP A22UKC1B9L-C256CP A22UKC1C9L-C256CP A22UKC1D9L-C256CP A22UKC1E9L-C256CP A22UKC1F9L-C256CP A22UKC1Z9L-C256CP	Ultra 10 Model 440 , 2-MB Ecache, 256-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Creator3D graphics Series 3, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit
A22UKC1A9L-C512CP A22UKC1B9L-C512CP A22UKC1C9L-C512CP A22UKC1D9L-C512CP A22UKC1E9L-C512CP A22UKC1F9L-C512CP A22UKC1Z9L-C512CP	Ultra 10 Model 440 , 2-MB Ecache, 512-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Creator3D graphics Series 3, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit

Ordering Information

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Ultra 10 Model 440 with Sun Elite3D m3 Graphics

Part Number	System
A22UKC1A9Q-C128CP A22UKC1B9Q-C128CP A22UKC1C9Q-C128CP A22UKC1D9Q-C128CP A22UKC1E9Q-C128CP A22UKC1F9Q-C128CP A22UKC1Z9Q-C128CP	Ultra 10 Model 440 2-MB Ecache, 128-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit (included) Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit
A22UKC1A9Q-C256CP A22UKC1B9Q-C256CP A22UKC1C9Q-C256CP A22UKC1D9Q-C256CP A22UKC1E9Q-C256CP A22UKC1F9Q-C256CP A22UKC1Z9Q-C256CP	Ultra 10 Model 440 2-MB Ecache, 256-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit (included) Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit
A22UKC1A9Q-C512CP A22UKC1B9Q-C512CP A22UKC1C9Q-C512CP A22UKC1D9Q-C512CP A22UKC1E9Q-C512CP A22UKC1F9Q-C512CP A22UKC1Z9Q-C512CP	Ultra 10 Model 440 , 2-MB Ecache, 512-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, Solaris 7 Hardware: 3/99 Operating Environment preinstalled North American UNIX Country Kit (included) Japanese Language Japanese Logoless German Language United Kingdom French Language No Included Country Kit

Ordering Information

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Ultra 10 Model 440 with Sun Elite3D m6 Graphics

Part Number	System
Ultra 10 Model 440 2-MB Ecache, 256-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Elite3D m6 Graphics, Solaris 7 Hardware: 3/99 Operating Environment preinstalled	
A22UKC1A9M-C256CP	North American UNIX Country Kit (included)
A22UKC1B9M-C256CP	Japanese Language
A22UKC1C9M-C256CP	Japanese Logoless
A22UKC1D9M-C256CP	German Language
A22UKC1E9M-C256CP	United Kingdom
A22UKC1F9M-C256CP	French Language
A22UKC1Z9M-C256CP	No Included Country Kit
Ultra 10 Model 440 , 2-MB Ecache, 512-MB DRAM, 9.1-GB, 7200-rpm hard disk, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Elite3D m6 Graphics, Solaris 7 Hardware: 3/99 Operating Environment preinstalled	
A22UKC1A9M-C512CP	North American UNIX Country Kit (included)
A22UKC1B9M-C512CP	Japanese Language
A22UKC1C9M-C512CP	Japanese Logoless
A22UKC1D9M-C512CP	German Language
A22UKC1E9M-C512CP	United Kingdom
A22UKC1F9M-C512CP	French Language
A22UKC1Z9M-C512CP	No Included Country Kit

Ordering Information

Ordering Guidelines and Notes

• Memory

- The Ultra 10 workstation supports up to 1 GB of 50-ns, 168-pin EDO JEDEC DRAM with ECC error correction. The DIMMs are the same as those used in the Ultra 5 but are not compatible with other Sun workstations. The Ultra 10 workstation supports 32-MB, 64-MB, 128-MB, and 256-MB DIMM units.
- The Ultra 10 workstation can accommodate up to four DIMM units which must be installed in pairs. Adding DIMMs in the same set of four results in the best memory system performance.

Memory Expansion Options	Part Number
64-MB 50-ns ECC DRAM expansion kit (two 32-MB DIMMs)	X7036A
128-MB 50-ns ECC DRAM expansion kit (two 64-MB DIMMs)	X7037A
256-MB 50-ns ECC DRAM expansion kit (two 128-MB DIMMs)	X7038A
512-MB 50-ns ECC DRAM expansion kit (two 256-MB DIMMs)	X7039A

• Keyboard

Type 6 keyboard and mouse is included with Model 440, except for configurations which are ordered with the "B", "C", or "Z" Country Kit code.

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- **Internal storage devices**

The internal hard-disk drive and CD-ROM drive are unique to the Ultra 5 and Ultra 10 workstations and are not compatible with other Sun Workstation™ systems. In addition, all other Sun internal hard disks, CD-ROM drives, and other storage devices are not compatible with the Ultra 10 workstation.

Internal Storage Device	Part Number
Internal 9.1-GB, 7200-rpm, EIDE hard disk	X5236A
Internal 32X-speed ATAPI CD-ROM	X6171A

Note: The internal 32X-speed CD-ROM is standard on the Ultra 10 workstation.

- **External and internal SCSI devices**

A PCI SCSI adapter card is required to attach any external SCSI device since SCSI is not a feature of the Ultra 10 workstation. In addition, all internal SCSI options are not supported by the Ultra 10 workstation.

- **Monitors**

The choice of monitors is not reflected in the Ultra 10 workstation marketing part number. A monitor is required and is ordered as a separate line item. The Ultra 10 workstation supports the monitors listed below. For some monitor and frame buffer combinations, a video adapter cable may be required; consult the table below.

Monitor	Video Adapter Required		
	On-board 8-bit	Sun Creator3D Series	Sun Elite3D
17-inch color (X7103A)	None	X3872A	X3872A
19-inch color (X7119A)	None	X3872A	X3872A
21-inch color (X7121A)	X470A	None	None
24-inch wide-screen (X7124A)	Not recommended	None	Not recommended

Ordering Information

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Options

Below is a comprehensive list of system expansion, networking, graphics, and multimedia options that are supported by Sun Ultra 10 workstation. The options listed below, which are in *italic font*, 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, 50-ns ECC DRAM expansion kit (two 32-MB DIMMs)	2	These are all pairs of DIMM units
X7037A	128-MB, 50-ns ECC DRAM expansion kit (two 64-MB DIMMs)	2	
X7038A	256-MB, 50-ns ECC DRAM expansion kit (two 128-MB DIMMs)	2	
X7039A	512-MB, 50-ns ECC DRAM expansion kit (two 256-MB DIMMs)	2	
Mass Storage—Internal			
X5236A	Internal 9.1-GB, 7200-rpm EIDE hard disk	2	
X6171A	Internal 32X-speed ATAPI CD-ROM	1	
Mass Storage—External			
X814A	5-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	

Ordering Information

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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)	1	
X5253A	9.1-GB, 7200-rpm fast/wide SCSI-2 disk UniPack (68–68 pin)	1	
X6151A	SunCD™ 4X CD-ROM UniPack	4	
X6201A	14-GB, 8-mm tape UniPack	4	
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	A PCI SCSI adapter card is required to attach any external SCSI device to the Ultra 5 and Ultra 10
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	
X6102A	2.5-GB QIC tape UniPack	4	
X6152A	SunCD 4x CD-ROM UniPack	4	
X6160A	SunCD 12X CD-ROM (50-pin)	4	
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	

Ordering Information

Just the Facts



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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 Mammoth tape 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	
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	

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Part Number	Option Description	Maximum Number Supported	Comments
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		
PCI Expansion Cards			
X1032A	10/100BASE-T Ethernet with SunPCI UltraSCSI	4	
X1033A	10/100BASE-T with MII PCI adapter	4	
X1034A	PCI Quad Fast Ethernet controller PCI adapter	1	
X1035A	SunFDDI™ single-attach PCI adapter (SAS/5.0)	4	
X1036A	SunFDDI dual-attach PCI adapter (DAS/5.0)	4	
X1039A	SunLink™ token ring interface/PCI adapter	4	Universal
X1040A	High-speed serial interface PCI adapter (SunHSI™), 1 port	4	
X1041A	Serial Asynchronous Interface (SunSAI) PCI adapter 8 ports	4	Universal
X1066A	SunATM™/P-155 Multimode Fiber	2	
X1067A	SunATM/P-155 Cat-5 UTP	2	
X1068A	SunATM/P-622 Multimode Fiber	1	
X3668A	PGX32™ 32-bit color PCI graphics frame buffer	4	
X6541A	Dual-channel, differential UltraSCSI controller	4	
X1131A-64.2	SunPCi™ 400-MHz K6-2 coprocessor card	1	
Monitors and Graphics			
X3663A	Sun Creator3D Series 3, 24-bit color, double-buffered graphics, vertical	1	UPA
X3664A	Sun Elite3D m3, 24-bit color graphics accelerator, vertical	1	UPA
X3665A	Sun Elite3D m6 graphics accelerator	1	UPA
X3670A	Sun Creator3D Series 3, 24-bit color, double-buffered graphics, vertical	1	UPA
X3668A	PGX32™ 32-bit color PCI graphics frame buffer	4	
X7103A	17-inch 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		

Ordering Information

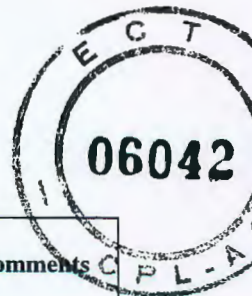
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Part Number	Option Description	Maximum Number Supported	Comments
Other Options			
X901A	0.8-meter wide-to-narrow 68–68-pin UltraSCSI	1	A PCI SCSI adapter card is required to attach any external SCSI device to the Ultra 5 and Ultra 10
X902A	2.0-meter 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	
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	

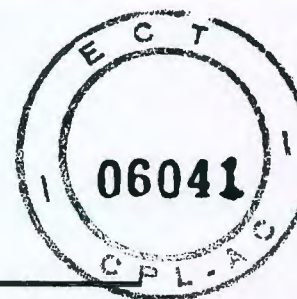
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Upgrades

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 leverage by upgrading to Sun through competitive upgrades

Sun Ultra™ 10 Workstation Upgrade Paths

From	Receive	Return
Chassis upgrade from Any SLC™, ELC™, SunIPC™, 1/1+, SPARCclassic™, LX, IPX™, or SPARCstation™ 2 to Ultra 10 workstation	Sun Ultra 10 workstation	Workstation chassis, including CPU board, primary memory, frame buffer, and internal disk
Chassis upgrade from SPARCstation 4 or SPARCstation 5 to Ultra 10 workstation	Sun Ultra 10 workstation	Workstation chassis, including CPU board, primary memory, frame buffer, and internal disk
Chassis upgrade from SPARCstation 10 or SPARCstation 20 to Ultra 10 workstation	Sun Ultra 10 workstation	Workstation chassis, including CPU board, primary memory, frame buffer, and internal disk
Chassis upgrade from Ultra 1 to Ultra 10 workstation	Sun Ultra 10 workstation	Workstation chassis, including CPU board, primary memory, frame buffer, and internal disk
Competitive upgrade to Ultra 10 workstation	Sun Ultra 10 workstation	Competitive workstation

Ordering Information

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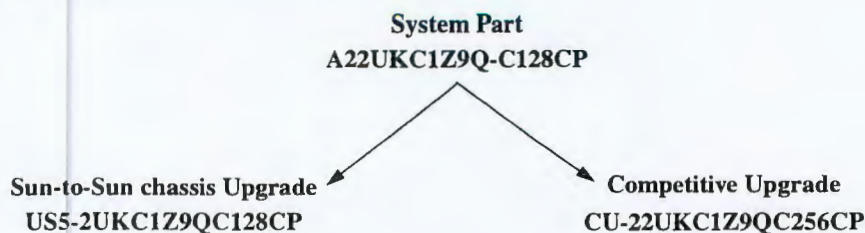


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Marketing Upgrade Numbering Scheme



- 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 eighteen characters.

CPU Module Upgrade

Part Number	Description
UG-MXXX-M440	CPU module upgrade from any Ultra 10 CPU module to the 440-MHz UltraSPARC-IIi CPU module

440-MHz Sun Ultra 10 Workstation Upgrades with PGX24 Graphics

Part Number	Description
UES-2UKC1Z9PC128CP	Upgrade from any low-end Sun Workstation (such as SLC, ELC, IPC, 1/1+, SPARCclassic, LX, IPX, SPARCstation 2) to Ultra 10 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 128-MB DRAM, 32X-speed CD-ROM, 10/100BASE-T Ethernet 9.1-GB, 7200-rpm hard drive, on-board PGX24 graphics, with North American UNIX Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled
UES-2UKC1Z9PC512CP	Upgrade from any low-end Sun Workstation (such as SLC, ELC, IPC, 1/1+, SPARCclassic, LX, IPX, SPARCstation 2) to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 512-MB DRAM, 10/100BASE-T Ethernet, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, on-board PGX24 graphics, with North American UNIX Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

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**US5-2UKC1Z9PC128CP**

Upgrade from SPARCstation 4 or SPARCstation 5 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 128-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 10/100BASE-T Ethernet, on-board PGX24 graphics, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

US5-2UKC1Z9PC512CP

Upgrade from SPARCstation 4 or SPARCstation 5 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 10/100BASE-T Ethernet, on-board PGX24 graphics, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

USS-2UKC1Z9PC128CP

Upgrade from SPARCstation 10 or SPARCstation 20 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 128-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 10/100BASE-T Ethernet, on-board PGX24 graphics, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

USS-2UKC1Z9PC512CP

Upgrade from SPARCstation 10 or SPARCstation 20 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 10/100BASE-T Ethernet, on-board PGX24 graphics, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

UG1-2UKC1Z9PC128CP

Upgrade from Ultra 1 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 128-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 10/100BASE-T Ethernet, on-board PGX24 graphics, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

UG1-2UKC1Z9PC512CP

Upgrade from Ultra 1 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 10/100BASE-T Ethernet, on-board PGX24 graphics, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

Ordering Information

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440-MHz Sun Ultra 10 Workstation Upgrades with Sun Creator3D Graphics

Part Number

Description

UES-2UKC1Z9LC128CP

Upgrade from any low-end Sun Workstation (such as SLC, ELC, IPC, 1/1+, SPARCclassic, LX, IPX, SPARCstation 2) to Ultra 10 440-MHz UltraSPARC-III processor workstation with 2-MB Level II cache, 128-MB DRAM, 32X-speed CD-ROM, 10/100BASE-T Ethernet 9.1-GB, 7200-rpm hard drive, Sun Creator3D graphics Series 3, with North American UNIX Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

UES-2UKC1Z9LC512CP

Upgrade from any low-end Sun Workstation (such as SLC, ELC, IPC, 1/1+, SPARCclassic, LX, IPX, SPARCstation 2) to Ultra 10, 440-MHz UltraSPARC-III processor workstation with 2-MB Level II cache, 512-MB DRAM, 10/100BASE-T Ethernet, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, Sun Creator3D graphics Series 3, with North American UNIX Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

US5-2UKC1Z9LC128CP

Upgrade from SPARCstation 4 or SPARCstation 5 workstation to Ultra 10, 440-MHz UltraSPARC-III processor workstation with 2-MB Level II cache, 128-MB DRAM, 9.1-GB, 7200-rpm hard drive, Sun Creator3D graphics Series 3, 32X-speed CD-ROM, 10/100BASE-T Ethernet, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

US5-2UKC1Z9LC512CP

Upgrade from SPARCstation 4 or SPARCstation 5 workstation to Ultra 10, 440-MHz UltraSPARC-III processor workstation with 2-MB Level II cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, Sun Creator3D graphics Series 3, 32X-speed CD-ROM, 10/100BASE-T Ethernet, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

USS-2UKC1Z9LC128CP

Upgrade from SPARCstation 10 or SPARCstation 20 workstation to Ultra 10, 440-MHz UltraSPARC-III processor workstation with 2-MB Level II cache, 128-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, Sun Creator3D graphics series 3, 10/100BASE-T Ethernet, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

USS-2UKC1Z9LC512CP

Upgrade from SPARCstation 10 or SPARCstation 20 workstation to Ultra 10, 440-MHz UltraSPARC-III processor workstation with 2-MB Level II cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, Sun Creator3D graphics series 3, 10/100BASE-T Ethernet, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

Ordering Information

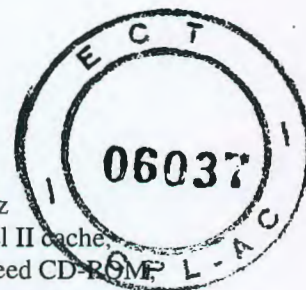
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UG1-2UKC1Z9LC128CP

Upgrade from Ultra 1 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 128-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, Sun Creator3D graphics Series 3, 10/100BASE-T Ethernet, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

UG1-2UKC1Z9LC512CP

Upgrade from Ultra 1 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, Sun Creator3D graphics Series 3, 10/100BASE-T Ethernet, no Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

440-MHz Sun Ultra 10 Workstation Upgrades with Elite3D m3 Graphics

Part Number

Description

US5-2UKC1Z9QC128CP

Upgrade from SPARCstation 4 or 5 to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level-II cache, 128-MB DRAM, 9.1-GB, 7200-rpm hard drive, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, 32X-speed CD-ROM, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

UG1-2UKC1Z9QC256CP

Upgrade from Ultra 1 or Ultra 30 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level-II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, 32X-speed CD-ROM, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

USS-2UKC1Z9QC256CP

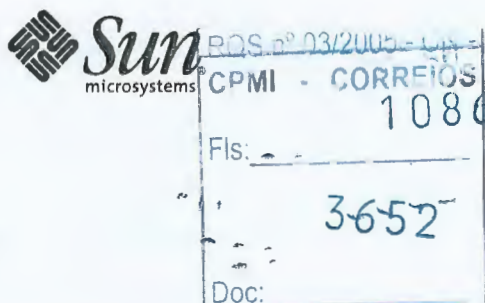
Upgrade from SPARCstation 10 or 20 to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II-cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

US5-2UKC1Z9QC256CP

Upgrade from SPARCstation 4 or 5 to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level-II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, 32X-speed CD-ROM, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

Ordering Information

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**Part Number****UES-2UKC1Z9QC256CP****Description**

Upgrade from early SPARCstation systems to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level-II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, 32X-speed CD-ROM, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

UG1-2UKC1Z9QC512CP

Upgrade from Ultra 1 or Ultra 30 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level-II cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, 32X-speed CD-ROM, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

USS-2UKC1Z9QC512CP

Upgrade from SPARCstation 10 or 20 to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II-cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Elite3D m3 Graphics, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

440-MHz Sun Ultra 10 Workstation Upgrades with Elite3D m6 Graphics**Part Number****UG1-2UKC1Z9MC256CP****Description**

Upgrade from Ultra 1 or Ultra 30 workstation to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level-II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 1.44-MB floppy drive, Sun Elite3D m6 Graphics, 32X-speed CD-ROM, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

USS-2UKC1Z9MC256CP

Upgrade from SPARCstation 10 or 20 to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level II-cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Elite3D m6 Graphics, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

US5-2UKC1Z9MC256CP

Upgrade from SPARCstation 4 or 5 to Ultra 10, 440-MHz UltraSPARC-IIi processor workstation with 2-MB Level-II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 1.44-MB floppy drive, Sun Elite3D m6 Graphics, 32X-speed CD-ROM, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

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**Part Number****UES-2UKC1Z9MC256CP****Description**

Upgrade from early SPARCstation systems to Ultra 10, 440-MHz UltraSPARC-III processor workstation with 2-MB Level-II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 1.44-MB floppy drive, Sun Elite3D m6 Graphics, 32X-speed CD-ROM, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

UG1-2UKC1Z9MC512CP

Upgrade from Ultra 1 or Ultra 30 workstation to Ultra 10, 440-MHz UltraSPARC-III processor workstation with 2-MB Level-II cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, 1.44-MB floppy drive, Sun Elite3D m6 Graphics, 32X-speed CD-ROM, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

USS-2UKC1Z9MC512CP

Upgrade from SPARCstation 10 or 20 to Ultra 10, 440-MHz UltraSPARC-III processor workstation with 2-MB Level II-cache, 512-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, 1.44-MB floppy drive, Sun Elite3D m6 Graphics, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, no country kit

440-MHz Sun Ultra 10 Workstation Competitive Upgrades**Part Number****CU-22UKC1A9PC256CP****Description**

Upgrade from competitive system to Ultra 10, 440-MHz UltraSPARC-III processor workstation with 2-MB Level II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, on-board PGX24 graphics, 10/100BASE-T Ethernet, North American UNIX Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

CU-22UKC1A9LC256CP

Upgrade from competitive system to Ultra 10, 440-MHz UltraSPARC-III processor workstation with 2-MB Level II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, Sun Creator3D graphics series 3, 10/100BASE-T Ethernet, North American UNIX Country Kit, and Solaris 7 Operating Environment (Hardware: 3/99) preinstalled

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**Part Number****CU-22UKC1Z9QC256CP****Description**

Upgrade from competitive system to Ultra 10, 440-MHz UltraSPARC-III processor workstation with 2-MB Level II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, Sun Elite3D m3 Graphics, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, and no country kit

CU-22UKC1Z9MC256CP

Upgrade from competitive system to Ultra 10, 440-MHz UltraSPARC-III processor workstation with 2-MB Level II cache, 256-MB DRAM, 9.1-GB, 7200-rpm hard drive, 32X-speed CD-ROM, Sun Elite3D m6 Graphics, 10/100BASE-T Ethernet, Solaris 7 Operating Environment (Hardware: 3/99) preinstalled, and no country kit

Ultra 10 Workstation Upgrade Ordering Notes

- **No disks, memory, or CD-ROM drives migrate to the Ultra 10 workstation**
- **Country Kits (keyboard and localized manuals)**
 - The Ultra 10 workstation has the Country Kit physically included within the System Ship Kit. Please note other Country Kit choices are also available.
 - Country kits are not provided with upgrades from SPARCstation 4, SPARCstation 5, SPARCstation 10, SPARCstation 20, and Ultra 1 systems. These platforms are very likely to have Type-5 keyboards and can be migrated to the Ultra 10 workstation.
 - The Ultra 10 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 10 workstation.
- **Monitors**
 - Monitors are not included with any Ultra 10 workstation upgrades. If a monitor is needed, order the appropriate X-option or refer to monitor upgrade section of the price book.
 - 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 (i.e., 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 Ultra 10 workstations. Customer may migrate any of these monitors. However, an adapter is required for operation.
 - For Ultra 10 workstation competitive upgrades, a monitor must be ordered and entered as a separate line item. Customers have a choice of ordering either an X-option monitor or a competitive monitor upgrade.

Ordering Information

EOS 03/2005-CP	
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3652	
Doc:	



Service and Support

Sun Enterprise™ Services Offerings

Sun Enterprise™ Services now provides two service offerings: the new SunClientSM for low-level, low-cost support and SunSpectrumSM for high-level support and mission-critical response. Both support programs are available to service Ultra™ 10 workstations.

SunClientSM

Now there is a way to reduce hardware and software support costs for 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/on site)	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 SM Service	Not Applicable	Not Applicable	*
Software Updates	Not Applicable	Not Applicable	Not Applicable

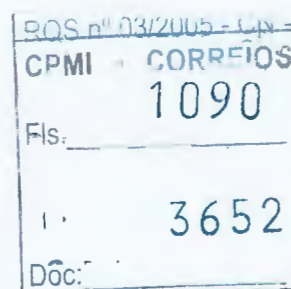
* Can only be sold as an option to SunClient Maintenance or SunClient Central Maintenance.

† Next-business-day, on-site response requires that the request for service be received by 3 p.m. If the call is received after 3 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.

Service and Support

Just the Facts



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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're 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>.

Service and Support

Just the Facts



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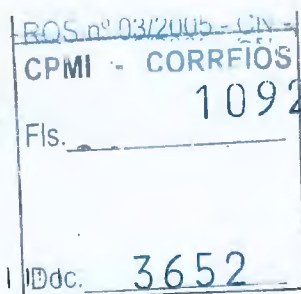
SunSpectrum

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.

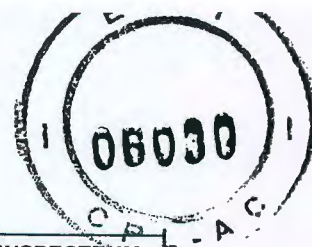
FEATURE	SUNSPECTRUM PLATINUM SM Mission-critical Support	SUNSPECTRUM GOLD SM Business-critical Support	SUNSPECTRUM SILVER SM Systems Support	SUNSPECTRUM BRONZE SM Self Support
Systems Features				
Systems approach coverage	Yes	Yes	Yes	Yes
System availability guarantee	Customized	No	No	No
Account Support Features				
Service account management team	Yes	No	No	No
Local customer support management	No	Yes	No	No
Personal technical account support	Yes	Yes	Option	No
SunStart SM installation service	Yes	No	No	No
Account support plan	Yes	Yes	No	No
Software release planning	Yes	No	No	No
On-site account reviews	Monthly	Semiannual	No	No
Skills assessment	Yes	No	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	Option
7-day/24-hour on-site coverage	Yes	Option	Option	N/A
7-day/12-hour on-site coverage	No	Option	No	No
5-day/24-hour on-site coverage	No	Option	No	No

Service and Support

Just the Facts



October 1999



FEATURE	SUNSPECTRUM PLATINUM SM Mission-critical Support	SUNSPECTRUM GOLD SM Business-critical Support	SUNSPECTRUM SILVER SM Systems Support	SUNSPECTRUM BRONZE SM Self Support
Coverage / Response Time (cont.)				
Customer-defined priority setting	Yes	Yes	Yes	Option
• 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
2-hour on-site response	Yes	Option	Option	N/A
Additional contacts	Option	Option	Option	Option
Premier Support Features				
Mission-critical support team	Yes	For urgent problems	No	No
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
Hardware Support Delivery				
Replacement hardware parts	On-site technician	On-site technician	On-site technician	Courier
Two day parts delivery	N/A	N/A	N/A	Yes
Overnight parts delivery	N/A	N/A	N/A	Option
Same-day parts delivery	Yes	Yes	Yes	Option
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 license	Yes	Yes	Yes	Yes
SunSolve EarlyNotifier Service	Yes	Yes	Yes	Yes

Service and Support

Just the Facts



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Doc: _____

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Glossary



24-bit color	The ability to render objects from a palette of 16.7 million colors. It is often referred to as <i>true color</i> 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	Also known as Fast Ethernet, the IEEE standard for 100-Mb 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.
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 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.

XGL™

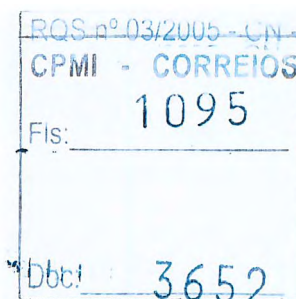
A foundation geometry-oriented 2-D/3-D graphics library that provides high functionality and performance to geometry applications and application program interfaces (APIs).

XIL™

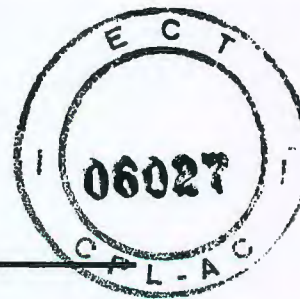
A foundation imaging-oriented graphics library providing high functionality and performance to imaging applications.

Glossary

Just the Facts



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Materials Abstract

All materials are available on SunWIN except where noted otherwise.

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Powerpack				
– <i>Sun Ultra™ 10 Workstation: Just the Facts</i>	Reference Guide for Sun Ultra 10 Workstation	Training Sales Tool	SunWIN, Reseller Web	76924
References				
– <i>Sun Intro—New Sun Ultra 10 Workstation with PGX24™ Graphics</i>	Introduction E-mail	Sales Tool	SunWIN, Reseller Web, E-mail	93320
Just-the-Facts				
– <i>Sun Elite3D: Just the Facts</i>	Reference Guide for Sun Elite3D m6	Training Sales Tool	SunWIN, Reseller Web	75245
– <i>Creator Graphics Series 3: Just the Facts</i>	Reference Guide for Creator Graphics, Series 3	Training Sales Tool	SunWIN, Reseller Web	75246
Quick Reference Cards				
– <i>Quick Reference Card—Sun Workstation Product Line Overview</i>	Quick Reference Card	Sales Tool	SunWIN, Reseller Web, First Resort	10826
– <i>Quick Reference Card—Sun Workstation Graphics Products Overview</i>	Quick Reference Card	Sales Tool	SunWIN, Reseller Web, First Resort	24507
– <i>Quick Reference Card—Competitive Summary Workstations</i>	Quick Reference Card	Sales Tool	SunWIN, Reseller Web, First Resort	12259
– <i>Quick Reference Card—Upgrade Paths</i>	Quick Reference Card	Sales Tool	SunWIN, Reseller Web, First Resort	24513
Product Literature				
– <i>Sun Ultra Desktop Family Brochure</i>	Data Sheet	Sales Tool	SunWIN, Reseller Web COMAC	69376 BE604-3
– <i>Sun Ultra 10 Workstation Data Sheet</i>	Data Sheet	Sales Tool	SunWIN, Reseller Web COMAC	69377 DE778-2
– <i>Graphics Brochure—Imagine It</i>	Data Sheet	Sales Tool	SunWIN, Reseller Web COMAC	60585 BE508-3
Competitive Analyses				
– <i>PC Workstation Battle Brief</i>	Competitive Brief	Sales Tool	SunWIN	75270
– <i>SGI Competitive Battle Brief</i>	Competitive Brief	Sales Tool	SunWIN	70605

Materials Abstract

Just the Facts



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CPMI - CORREIOS
Fls: 1096
3652
Doc:

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Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Product Presentations				
- <i>Graphics Product Presentation</i>	Product Presentation, with Notes	Sales Tool	SunWIN, Reseller Web	75254
- <i>Sun in Software Development Customer Presentation</i>	Product Presentation, with Notes	Sales Tool	SunWIN, Reseller Web	59375
- <i>Sun in EDA Customer Presentation</i>	Product Presentation, with Notes	Sales Tool	SunWIN, Reseller Web	59078
- <i>Sun in MCAD/MCAE Customer Presentation</i>	Product Presentation, with Notes	Sales Tool	SunWIN, Reseller Web	59074
White Paper				
- <i>Ultra 5 and Ultra 10 Architecture White Paper</i>	White Paper	Sales Tool Training	SunWIN, Reseller Web	75258
External Web Sites				
- <i>Sun Home Page</i>	http://www.sun.com/desktop			
- <i>List of Tested PCI Cards</i>	http://www.sun.com/pci/pci.cards.ihv.html			
- <i>SunClientSM Support Web Site</i>	http://www.sun.com/service/support/sunclient			

Materials Abstract

Just the Facts



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CPMI - CORREIOS
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3652
Doc:

October 1999

06025

SPEC CINT95rate Results

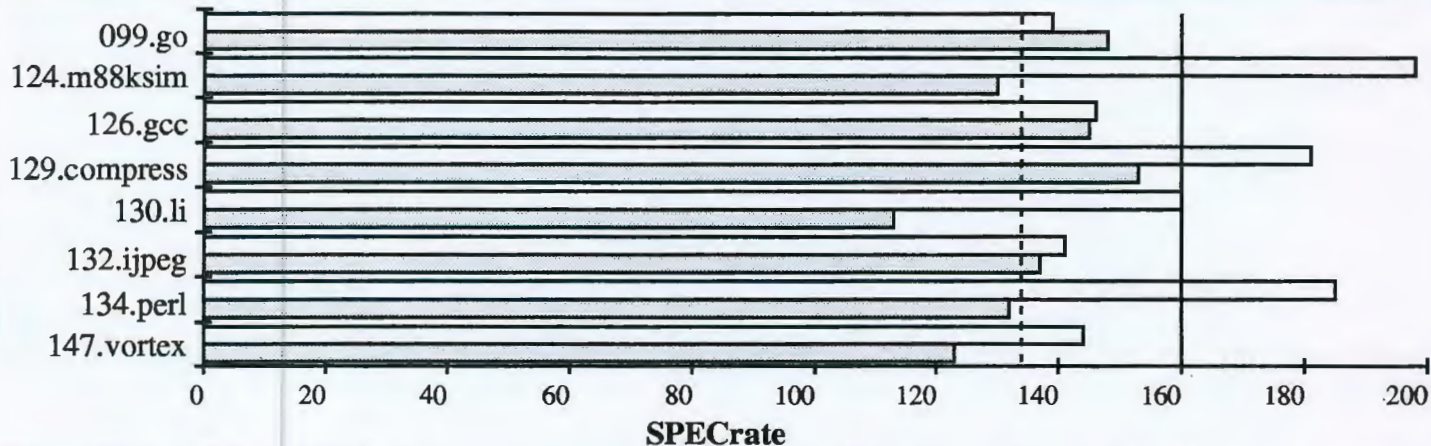
©Copyright 1995, Standard Performance Evaluation Corporation

Sun Microsystems
Ultra 10 Model 440

SPECint_rate95 = 160

SPECint_rate_base95 = 134

SPEC license # 6 Tested By: Sun, Palo Alto Test Date: Apr-99 Hardware Avail: May-99 Software Avail: Feb-99



Hardware/Software Configuration for: Ultra 10 Model 440

Hardware
Model Name: Ultra 10 Model 440
CPU: 440 MHz UltraSPARC-IIi
FPU: Integrated
Number of CPU(s): 1
Primary Cache: 16KBI+16KBD on chip
Secondary Cache: 2MB(I+D) off chip
Other Cache: None
Memory: 512MB
Disk Subsystem: 2 x 9GB (7200 RPM)
Other Hardware: Fast Ethernet
System clock frequency: 110 MHz

Software
Operating System: Solaris 7 (64bit)
Compiler: Sun WorkShop C 5.0
File System: UFS
System State: Single User
Kernel Extensions: consistent_coloring=1

Benchmark # and Name	Base Copies	Base Run Time	Base SPEC Ratio	Copies	Run Time	SPEC Ratio
099.go	2	558	148	2	594	139
124.m88ksim	2	264	130	2	173	198
126.gcc	2	211	145	2	210	146
129.compress	2	211	153	2	179	181
130.li	2	303	113	2	214	160
132.jpeg	2	316	137	2	305	141
134.perl	2	260	132	2	185	185
147.vortex	2	395	123	2	338	144
SPECint_rate_base95 (G. Mean)			134			
			SPECint_rate95 (G. Mean)		160	

Notes/Tuning Information

P1= -xprofile=collect: 'pwd' ../feedback; P2= -xprofile=use: 'pwd' ../feedback; FOPTION= -fast -xarch=v8plusa -s
Baseline: -fast -xO5 -xarch=v8plusa
Baseline: PASS1= \${P1}; PASS2= \${P2}
099.go: \${FOPTION} -xO4 -xrestrict -xcrossfile -W2, -O4+ansi_alias+bopt
099.go: PASS1= \${P1}; PASS2= \${P2} \${ALIGN} -dn
124.m88ksim: \${FOPTION} -xO5 -xsafe=mem -xcrossfile -xrestrict -W2, -O4+cond_elim+pde, -ldstr, -Mt8500 -Wc, -Qiselect-sw_pf_tbl_th=20
124.m88ksim: PASS1= \${P1}; PASS2= \${P2} -dn
126.gcc: \${FOPTION} -xO4 -W2, -O4+ansi_alias+cond_elim
126.gcc: PASS1= \${P1}; PASS2= \${P2}
129.compress: \${FOPTION} -xO5 -xrestrict -W2, -O4+ansi_alias+pde -Wc, -Qms_pipe+unoovf
129.compress: PASS1= \${P1}; PASS2= \${P2} -dn
130.li: PASS1= -xO4 -xcrossfile \${P1}
130.li: PASS2= -xO5 -xsafe=mem -xcrossfile -W2, -O4+ansi_alias+cond_elim+pde, -Mt350, -whole, -crit \${P2} -dn
132.jpeg: \${FOPTION} -xO5 -xsafe=mem -W2, -O4+ansi_alias+cond_elim
132.jpeg: PASS1= \${P1}; PASS2= \${P2} -dn
134.perl: \${FOPTION} -xO4 -xcrossfile -W2, -ANSI_S, -Mpl, -O4+cond_elim -Wc, -Qiselect-sw_pf_tbl_th=30
134.perl: EXTRA_LIBS= -lfast; PASS1= \${P1}; PASS2= \${P2} -dn
147.vortex: PASS1= -xO4 -xcrossfile \${P1}
147.vortex: PASS2= -xO5 -xsafe=mem -xcrossfile \${P2} -W2, -O4+cond_elim, -Mt500, -Mr6000, -dn
Portability: 124.m88ksim, 132.jpeg: -DSYSV -Xc, 126.gcc: -Dalloca__builtin_alloca -Xc
others: -Xc
Shell limits: # ulimit -n 1024 or # limit descriptors 1024
Config file: ultrabest.cfg

For More
Information
Contact:

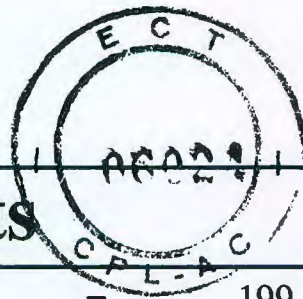
SPEC
10754 Ambassador Drive, Suite 201
Manassas, VA 20109

(703) 331-0180
info@spec.org
http://www.spec.org/

Prepared By: gnam

SPEC CFP95rate Results

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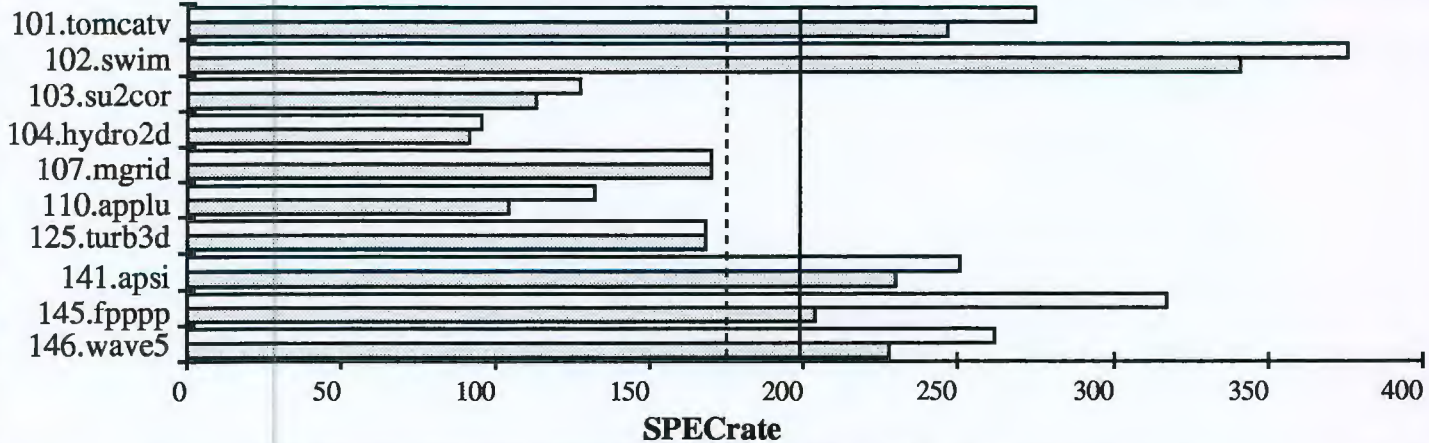


Sun Microsystems
Ultra 10 Model 440

SPECfp_rate95 = 199

SPECfp_rate_base95 = 175

SPEC license # 6 Tested By: Sun, Palo Alto Test Date: Apr-99 Hardware Avail: May-99 Software Avail: Feb-99



Hardware/Software Configuration for: Ultra 10 Model 440

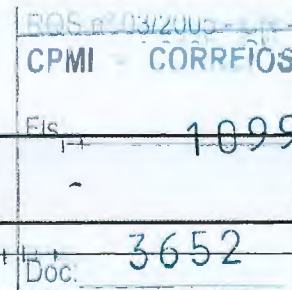
Hardware
Model Name: Ultra 10 Model 440
CPU: 440 MHz UltraSPARC-III
FPU: Integrated
Number of CPU(s): 1
Primary Cache: 16KBI+16KBD on chip
Secondary Cache: 2MB(I+D) off chip
Other Cache: None
Memory: 512MB
Disk Subsystem: 2 x 9GB (7200 RPM)
Other Hardware: Fast Ethernet
System clock frequency: 110 MHz

Software
Operating System: Solaris 7 (64bit)
Compiler: Sun WorkShop FORTRAN 77 5.0
File System: UFS
System State: Single User
Kernel Extensions: consistent_coloring=1

Benchmark # and Name	Base Copies	Base Run Time	Base SPEC Ratio	Copies	Run Time	SPEC Ratio
101.tomcatv	2	270	247	2	242	275
102.swim	2	454	341	2	411	376
103.su2cor	2	223	113	2	199	127
104.hydro2d	2	474	91.2	2	453	95.1
107.mgrid	2	265	170	2	264	170
110.applu	2	379	104	2	301	132
125.turb3d	2	439	168	2	438	168
141.apsi	2	164	230	2	151	251
145.fpppp	2	845	204	2	546	317
146.wave5	2	237	228	2	206	262
SPECfp_rate_base95 (G. Mean)			175			
			SPECfp_rate95 (G. Mean)			199

Notes/Tuning Information

```
P1= -xprofile=collect: 'pwd'/'../feedback'; P2= -xprofile=use: 'pwd'/'../feedback'; FOPTION= -fast -xarch=v8plusa -s
BCOPY= -Qoption iropt -O4+bcopy; INV= -Qoption iropt -O4+invccexp; BMR= -Qoption iropt -O4+bmerge
Baseline= -fast -xarch=v8plusa -fsimple=2 -xprefetch
101.tomcatv: -fast -xarch=v8plusa -xpad=local:23 -xprefetch -Qoption iropt -O4+data_access
102.swim: -fast -xarch=v8plusa -xpad=common:15 -xprefetch -fsimple=2
103.su2cor: $(FOPTION) -xvector -Qoption cg -Qns_pipe+fill=5 -fsimple=2 $(BCOPY)
103.su2cor: PASS1= -xO4 $(P1); PASS2= -xO5 -xsafe=mem $(P2)
104.hydro2d: $(FOPTION) -xprefetch -Qoption iropt -O4+pde -fsimple=2
104.hydro2d: PASS1= $(P1); PASS2= $(P2)
107.mgrid: $(FOPTION) -xprefetch -fsimple=2 $(BCOPY)
107.mgrid: PASS1= -xO4 $(P1); PASS2= -xO5 -xsafe=mem $(P2)
110.applu: -fast -xarch=v8plusa -Qoption iropt -O4+scalarrrep+ddint+perfect+loop_dist+pde+algassoc, -Mc6000, -Mr20000, -Ma140, -ldstr -fsimple=2
125.turb3d: $(FOPTION) -stackvar -xpad -fsimple=2 -Qoption iropt -O4+bcopy $(INV) -xvector=yes
125.turb3d: PASS1= -xO4 $(P1); PASS2= -xO5 -xsafe=mem $(P2)
141.apsi: $(FOPTION) -fsimple=2 -stackvar -Qoption iropt -S136 $(INV) $(BMR) -Qoption iropt -O4+algassoc
141.apsi: PASS1= -xO4 $(P1); PASS2= -xO5 -xsafe=mem $(P2)
145.fpppp: -fast -xarch=v8plusa -xO5 -xsafe=mem -fsimple=2 -nodepend -Qoption iropt -O4+algassoc -Qoption iropt -reroll=1
145.fpppp: PASS1= $(P1); PASS2= $(P2)
146.wave5: $(FOPTION) -stackvar -fsimple=2 -Qoption iropt -O4+unroll $(BCOPY)
Shell limits: # ulimit -n 1024 or # limit descriptors 1024
Config file: ultrabest.cfg
```



For More
Information
Contact:

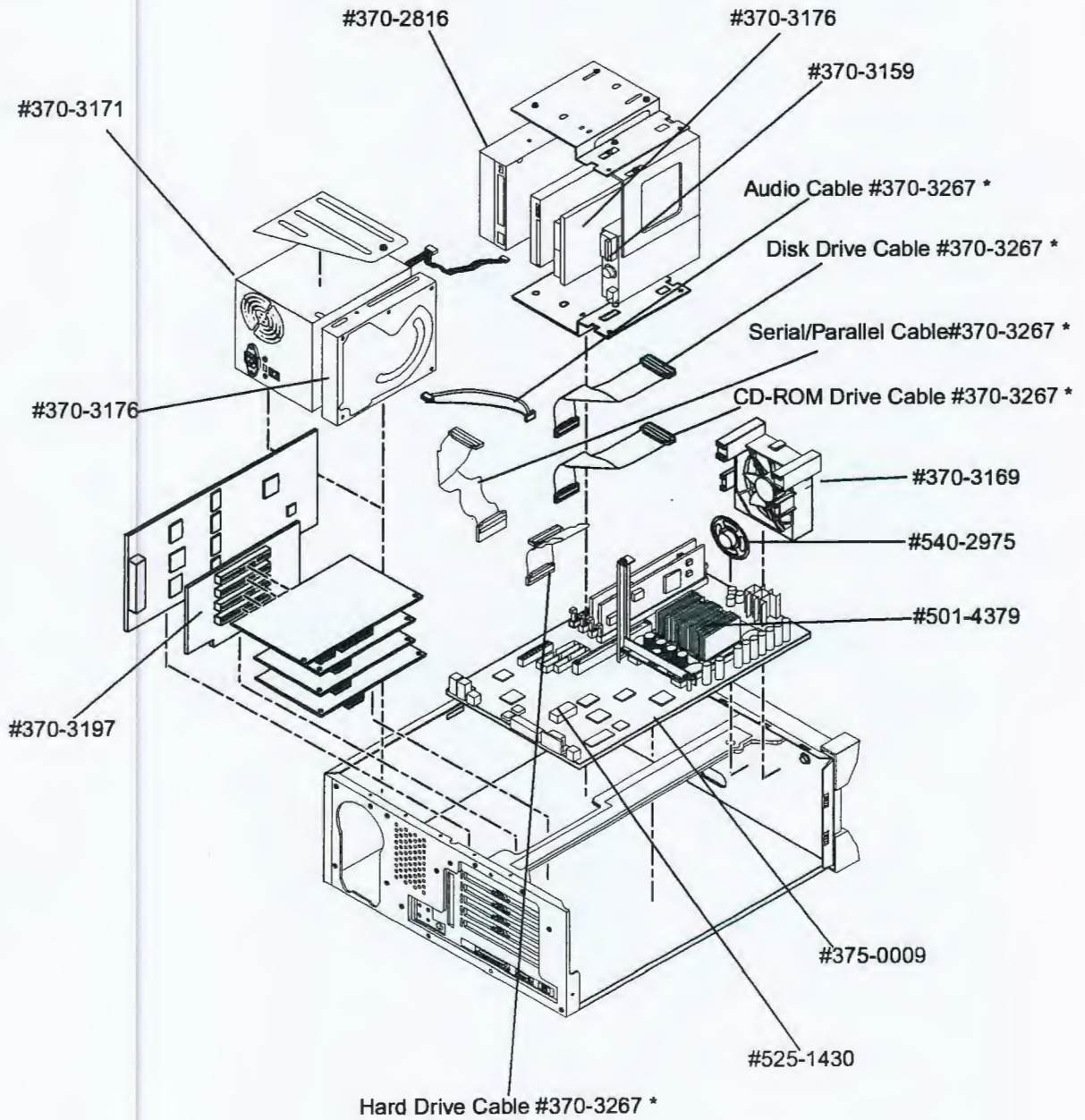
SPEC
10754 Ambassador Drive, Suite 201
Manassas, VA 20109

(703) 331-0180
info@spec.org
<http://www.spec.org/>

Prepared By: gnan

64

Sun Ultra 10



* = Service Kit #370-3159
includes:
Diskette Drive Cable,
Serial/Parallel Cable,
CD-ROM Drive Cable,
Hard Drive Cable

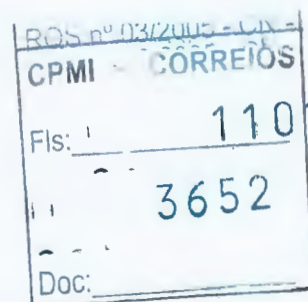
RQS n° 03/2005 - C.N.	
CPI	CORREIOS
1100	
Fls: _____	
3652	
Doc: _____	

Desktop Systems

Sun Ultra 10



Description	Order Number	Discount Category	Stocking Level		
			25	100	500
System Boards and Modules					
MOTHERBOARD,DARWIN	#375-0009	A	1	1	1
ASSY,SABRE,1/2MB,2-2MODE,MODUL	#501-4379	A	1	1	1
ASSY,SABRE,2-2-2,256K MODULE	#501-4477	A	1	1	1
SABRE,333MHZ,CERA,2M	#501-5090	H	1	1	1
Graphics					
ASSY,FFB2+,SB-VERTICAL,TSTD	#501-4789	H	1	1	2
ASSY,FFB2+,DBZ-VERTICAL,TSTD	#501-4788	H	1	1	2
FRU,ASSY,AFBLITE	#501-4860	H	1	1	2
PGX COLOR FRAME BUFFER	#370-2256	H	1	1	2
Memory and Mass Storage					
ASSY, FLOPPY ULTRA 5	#370-3159	A	1	1	2
16X INT CDROM, ULTRA 5 & 10	#370-3161	A	1	1	2
DISK DRIVE, 4.3GB, ULTRA5&10	#370-3176	H	1	1	3
DIMM,32MB,ULTRA 5 & 10	#370-3198	H	1	1	3
DIMM,64MB,ULTRA 5 & 10	#370-3199	H	1	1	3
DIMM, 128MB,ULTRA 5 & 10	#370-3200	H	1	1	2
DIMM,256MB,ULTRA10	#370-3201	H	2	6	26
24X INT CDROM, ULTRA 5 & 10	#370-3319	H	1	1	2
Monitors					
MONITOR, 21IN COLOR W/ CABLE	#365-1383	H	1	1	2
20" COLOR MONITOR W/13W3 CABLE	#365-1335	A	1	1	2
MONITOR, 17 IN, 15PIN	#365-1354	H	1	1	2
MONITOR, 24 HDTV COLOR	#365-1352	H	1	1	2
MONITOR, 19" COLOR	#365-1380	H	1	1	2
Refer to the "Reburbished" section for additional monitor options.					
Chassis, Cables and Accessories					
CABLE, MON ADPTER HD15F/13W3M	#130-3034	H	1	1	2
ELECTRO CONDENSOR MICROPHONE	#370-1678	B	1	1	2
COMPACT MOUSE	#370-1586	N/D	1	1	2
TYPE5 KEYBOARD W/CABLE, US	#320-1233	H	1	1	2
AC POWER CORD (115V)	#180-1097	B	1	1	2
ASSY, FAN, 9CM, ULTRA 10	#370-3169	A	1	1	1
POWER SUPPLY, 250W ULTRA 10	#370-3171	A	1	1	1
RISER CARDM ULTRA 10	#370-3197	A	1	1	1
SPEAKER, ULTRA 10	#370-3264	A	1	1	1
SERVICE KIT W/CBLS, ULTRA 10	#370-3267	A	1	1	2
ULTRA 1 TIMEKEEPER PROM	#525-1430	A	1	1	1
6' KEYBOARD CABLE M TO M	#530-1442	A	1	1	2
CBL,MON ADAPTER,15HDM/13W3F	#530-2357	H	1	1	2
ULTRA 1 TIMEKEEPER PROM	#525-1430	A	1	1	2




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MONITORS

- [24" Wide Screen Color Monitor](#)
- [21" Flat Screen Aperture Grille \(AG\) Color Monitor](#)
- [19" Flat Screen Aperture Grille \(AG\) Color Monitor](#)
- [18.1" TFT LCD Monitor](#) **NEW!**
- [17" Sun Color Monitor](#)



24" Wide Screen Color Monitor

- 24-inch CRT size, 22.5" viewable area
- 0.26mm aperture grille pitch
- Up to 1920 x 1200 @ 70Hz (16:10 aspect ratio mode)
- 2-meter non-detachable 13W3 video input cable and HD15-pin video input connector
- 580mm (W) x 500mm (H) x 548mm (D)



21" Flat Screen Aperture Grille (AG) Color Monitor (new)

- 21-inch Flat Screen AG CRT, 19.8" viewable area
- 0.24mm aperture grille pitch
- 1152x900 @ 66Hz, 76Hz
- 1280x1024 @ 67Hz, 76Hz
- 1600x1200 @ 75Hz
- 2-meter non-detachable 13W3 video input cable and HD15-pin video input connector
- 499mm (W) x 495mm (H) x 500mm (D)

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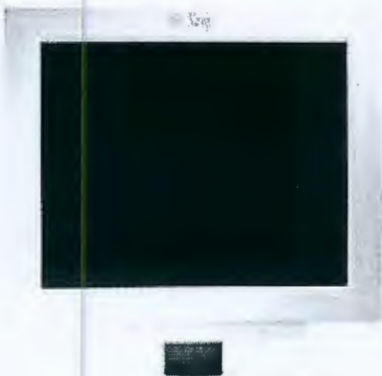
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19" Flat Screen Aperture Grille (AG) Color Monitor (new)

- 19-inch Flat Screen AG CRT, 18" viewable area
- 0.24mm aperture grille pitch
- 1152x900 @ 66Hz, 76Hz
- 1280x1024 @ 67Hz, 76Hz
- 1600x1200 @ 75Hz
- 2-meter non-detachable HD15-pin video input cable
- 449mm(W) x 463mm(H) x 463mm (D)



18.1" TFT LCD Monitor (new)

- 18.1" actual viewable area (equivalent to 19"/20" CRT)
- 0.28mm pixel pitch
- True 24-bit, 256 gray scale levels, 16.7M colors
- 1280x1024 @ 60Hz* or 76Hz
- 160 degree horizontally and vertically
- < 50W POWER
- Analog interface
- 2-meter detachable 13W3 video input cable and HD15-pin video input connector
- Complete assembly:
 - * Total width: 449.5mm
 - * Total Height: 459.8mm
 - * Total Depth: 218.6mm
- (*) recommended resolution on the 18.1" flat panel
- Wall-mounting capability - wall-mounting solutions from Ergotron, Inc.
- Security Lock Slot



17" Sun Color Monitor

- 15.7" viewable image size
- 0.28mm dot pitch
- 1152 x 900 @ 66Hz, 76Hz
- 1024x x 768 @ 60Hz, 75Hz for JavaStation platforms
- 800 x 600 @ 75Hz for JavaStation platforms
- 2-meter non-detachable HD15-pin video signal cable
- 10-language user's guide

Peripherals : Printers | Displays | Input Devices | PCMCIA

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Comments and Suggestions

PREVIOUS **DISK** **NEXT**

Last updated: November 26, 1999

Seagate ST39140A (9.1GB)

3 1/2" 7200 RPM Ultra ATA

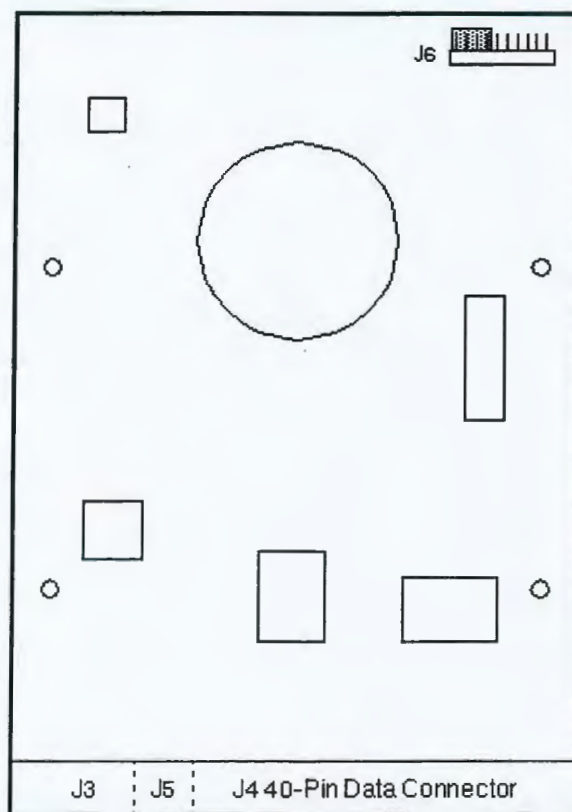
**A21 / A22
Option 5226**

370-3693

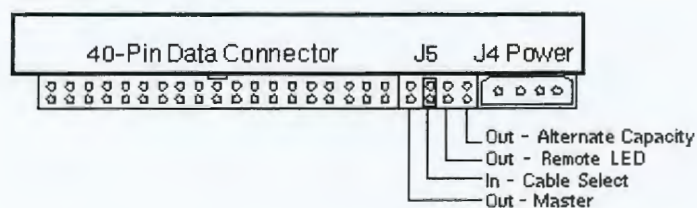
Medalist Pro 9140



Bottom View



End View



Note:

The Ultra 10 primary/rear drive requires Mounting Bracket 370-3721.

RCS n° 132005-01	
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Fis	
Doc: 3652	

References

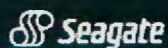
1. Ultra 5/10 Service Manual, 805-0423.
2. Ultra 5/10 CD-ROM and Hard Drive Installation Guide, 805-3085.



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ST39140A

Medalist Pro 9140

Capacity: 9.12 GB
 Speed: 7200 rpm
 * Seek time: 9.5 ms
 Cylinders: 1023
 Heads: 256
 Sectors: 63
 SeaFAX#: 391402

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 1-800-SEAGATE
<http://www.seagate.com>
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ST-39140A (Medalist Pro 9140 Ultra ATA-4)

 ° REAR VIEW °

J2 40 pin I/O Cable Connection

***** J5
 ***** TOP (HDA)
 fu.....u.....l' :- :- ' 0 0 0 0 'ff
 ***** BOTTOM

pin-20 removed AÜ

 * * * AAA Alternate Capacity (see below)
 * * * (spare jumpers stored on pins A-C)
 * * * and pins E-G)
 * * * AAAA Remote LED (C-, D+)
 * * * AAAAA Cable Select (when Slave OFF)
 AAAAAA Master ON, Slave OFF

Alternate Capacity jumper sets the default cylinder translation to 4092 to solve issues with certain BIOS that only auto-detect. Total available sectors are still at full capacity as reported via Identify Drive data words 52 - 61. Third party partitioning software may be needed to achieve full capacity if this option jumper is used.

ST-39140A
Medalist Pro 9140 AT

FORMATTED CAPACITY (MB)	9115.3
ACTUATOR TYPE	VOICE COIL
CYLINDERS	PHYSICAL 9006
HEADS	PHYSICAL 8
DISCS (3.5 in)	4
MEDIA TYPE	THIN FILM
HEAD TYPE	MR
RECORDING METHOD	ZBR EPRML (16/17)
INTERNAL TRANSFER RATE (Mbits/sec)	up to 193.88
EXTERNAL TRANSFER RATE (Mbytes/sec)	up to 33.3
PIO/DMA/UDMA MODE (max)	4/2/2
DMA SUPPORT	EISA Type B
SPINDLE SPEED (RPM)	7200
AVERAGE LATENCY (mSEC)	4.16
BUFFER	512K
Read/Write Multiple, Read Look-Ahead, Multi-Segmented	
INTERFACE	Ultra ATA-4
SECTORS PER DRIVE (LBA mode)	17,803,440
TPI (TRACKS PER INCH)	9570
BPI (KBITS PER INCH)	179.2
AVERAGE ACCESS (ms seek/read/write)	/9.5/10.0
SINGLE TRACK SEEK (ms seek/read/write)	2.0/2.5/3.5
MAX FULL SEEK (ms seek/read/write)	21.0/22.0/23.5
MTBF (power-on hours) Office	400,000
SHOCK (G's, 11/2 ms):	
operating (Read/Write)	10




```

nonoperating _____/200
ACOUSTICS (Bels typ/max) _____3.9/4.7
POWER DISSIPATION (watts) _____
POWER REQUIREMENTS: +12V START-UP (amps) _____2.5
POWER MANAGEMENT (Watts):
    ACTIVE _____13.0
    IDLE _____11.0
    STANDBY _____3.0
WRITE PRECOMP (cyl) _____N/A
REDUCED WRITE CURRENT (cyl) _____N/A
LANDING ZONE (cyl) _____AUTO
IBM AT DRIVE TYPE _____*

```

Physical:

```

Height (inches/mm): 1.027/26.09
Width (inches/mm): 4.023/101.9
Depth (inches/mm): 5.787/146.99
Weight (lbs/g): 1.5/680

```

* MAY REQUIRE FORMATTING AND PARTITIONING SOFTWARE. ALSO, CHECK TO SEE IF YOUR CMOS SETUP HAS A "CUSTOM" OR "USER DEFINABLE" DRIVE TYPE AVAILABLE. (see below)

Possible Capacity Limited CHS translations:

This translation is generally acceptable, as is, for non-DOS operating systems:

16,383 cyl, 16 heads, 63 sectors = 8,455,200,780

DOS operating systems may require a translation that uses larger values for the CMOS head parameter which lowers cylinders below 1024:

1023 cyl, 256 heads, 63 sectors = 8,447,459,328

Other FULL-CAPACITY solutions for DOS operating systems include third-party drive preparation software, system BIOS which supports LBA mode or bios driven host adapters. Otherwise, capacity may be limited to:

1024 cyl, 16 heads, 63 sectors = 528,482,304

Some systems BIOS have capacity limitations.

Types that have been identified are:

- a 2.113GB or 4095 cylinder limitation
- a 3.262GB or 6322 cylinder limitation
- a 4.22GB or 8192 cylinder limitation
- a 8.45GB Standard INT13 limitation (CHS[1024x256x63]x512)

and, if exceeded, may cause the system to hang during boot, capacity reduction or it can truncate or wrap the cylinders when auto-detect options set in the CMOS. FAT16 based operating systems are also limited to 8.4GB. New INT13 Extensions in BIOS and FAT32 based operating systems are both required to achieve full capacity.

DOS 16-bit FAT file system cannot access more than 2.147 Gbytes per partition. FAT32 file system can create single partitions and logical drives up to 2TB.

Note: A "custom" or "user-defined" CMOS drivetype may ask for a numerical value for the Write Precompensation cylinder and for the Landing Zone cylinder. A basic rule-of-thumb for drive models that do not require the old Write Precomp technique or a Landing Zone because they are Auto-Parking is to add 1 to the cylinder value being used. As an example: If cylinders equaled 820, then both Write Precomp and Landing Zone would be entered as 821. Some BIOS will convert this to 65535 or -1, which are functionally equivalent to "none (not used)".

Already low-level formatted at the factory.

Since a User-definable or Custom translation geometry may be used, it is imperative that the values be written down and kept with your permanent records for retrieval in the event of CMOS battery failure.

Seagate reserves the right to change, without notice, product offerings or specifications. (06/01/98)

A copy of this specification file may be obtained by FTP at ftp.seagate.com/techsuppt/ata/st39140a.

Odd characters? Click here for help A version of this specification with the linedraw characters approximated by text is available by clicking here.

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Sun StorEdge™ MultiPack, FlexiPack, and UniPack Systems

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Positioning

Introduction

As the cost of magnetic media continues to drop, the amount of on-line data grows at accelerating rates. Existing and emerging applications such as databases, imaging, and multimedia are demanding ever-increasing capacity and performance from storage products. The Sun StorEdge™ MultiPack, Sun StorEdge FlexiPack, and Sun StorEdge UniPack systems are desktop storage systems that complement the Sun storage product line and bring a host of competitive features to the desktop.

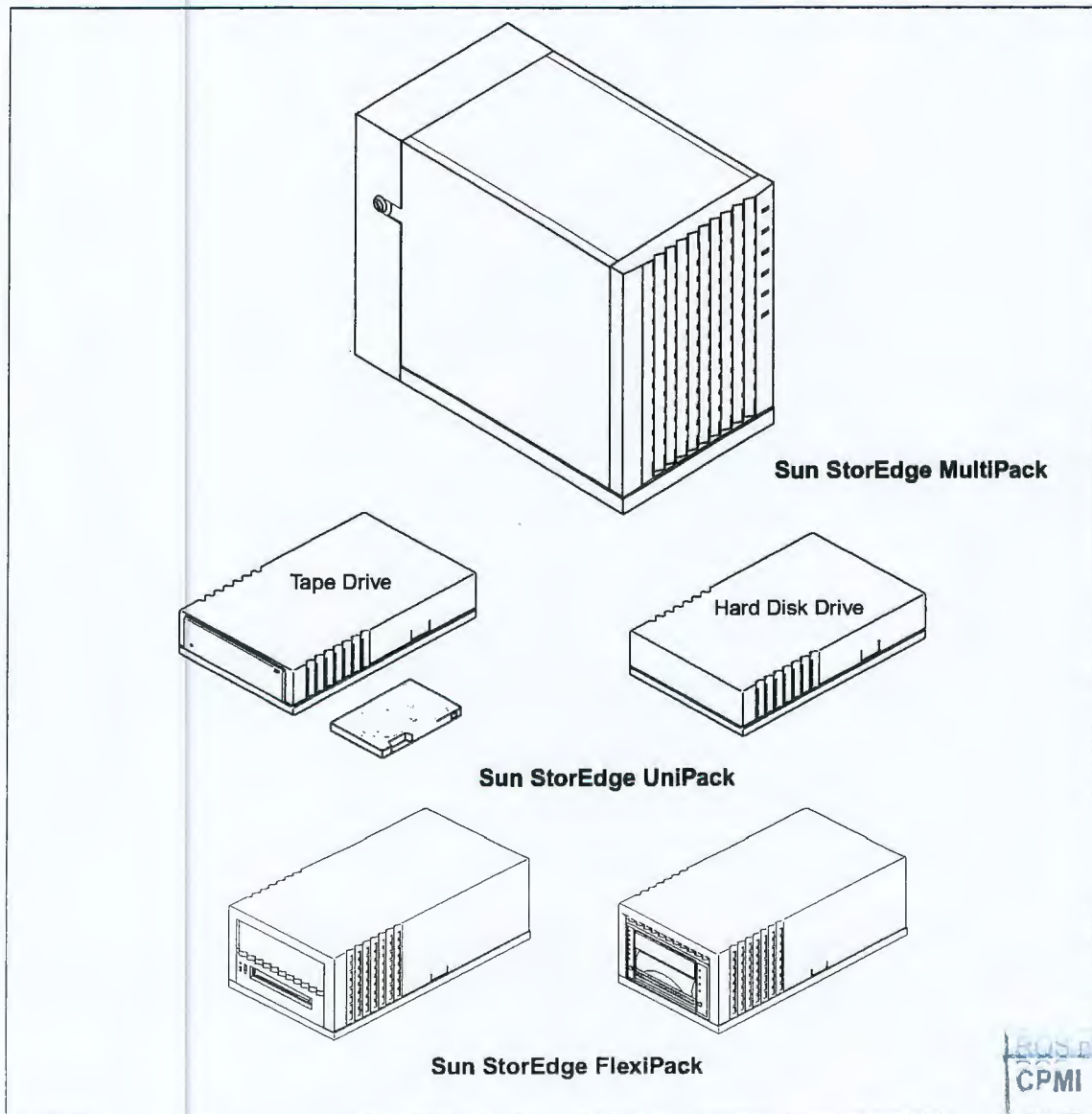


Figure 1. Sun StorEdge desktop storage enclosures





Sun StorEdge MultiPack

The Sun StorEdge MultiPack storage system accommodates six single-connector attachment (SCA) UltraSCSI drives. The individual drives can have either a 1.0-inch or 1.6-inch high form factor. The Sun StorEdge MultiPack system replaces the older 12-drive SPARCstorage™ MultiPack system and provides UltraSCSI functionality.

The Sun StorEdge MultiPack system complements Sun's mass-storage product line and brings competitive features to the desktop. Geographical SCSI addressing simplifies SCSI ID selection. Hot-pluggable drives using the SCA-2 connector give customers high reliability and ease-of-use. The signature packaging complements the Sun StorEdge UniPack system, desktop workstations, and servers.

The Sun StorEdge MultiPack system is configured with two, four, or six 1-inch high, 9.1-, 18.2-, or 36.4-GB, 10000-rpm UltraSCSI drives. Additional X-option drives may be ordered to customize the Sun StorEdge MultiPack system to meet users' needs.

Key Messages

- Maximum 216 GB of storage capacity
- Multiple UltraSCSI-capable drives in a single desktop enclosure
- Low cost/MB
- Good price/IOPS (input/output operations per second) option
- Hot-swappable drives with multiple active spindles
- Geographical addressing
- Easily serviced and expanded

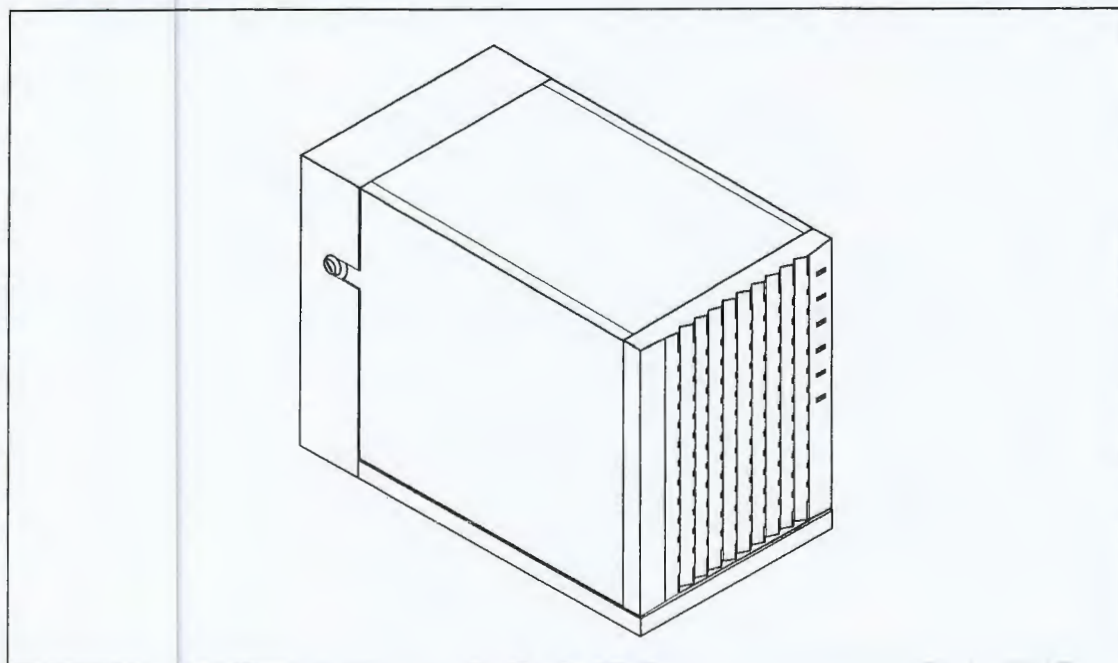
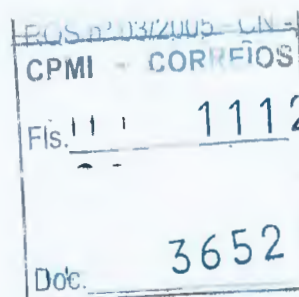


Figure 2. Sun StorEdge MultiPack storage system

Positioning

Just the Facts



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Availability

The Sun StorEdge MultiPack storage system began shipping February 1998.

Target Users

- Customers needing large-capacity add-on storage and high performance on the desktop
- Customers requiring additional desktop storage
- Customers in the growing database, imaging, and multimedia markets

Key Features and Benefits

Features

- Maximum 216-GB capacity
- UltraSCSI
- Price/performance
- Hot-plug-ready drives
- Single-connector drives
- Geographical SCSI addressing
- Key-locking door
- 10000-rpm disks

Benefits

- Easy modular growth for desktop servers and power-user workstations
- 16-bit data bus provides users with up to 40 MB/second burst transfer rates
- Sustained transfer rates of over 15.2 MB/second
- Good IOPS/dollar
- Low cost/MB
- Multiple active spindles, overlapped seeks, and optimum SCSI-bus bandwidth provide excellent performance
- On-line, user-serviceable drives make it easy to configure and service
- Offers better reliability with fewer internal cables and connections
- Simplifies address selection
- Deters inadvertent removal of devices and protects user's data
- Improves I/O performance by approximately 25 percent as compared to 7200-rpm disks of similar capacities

Positioning

Just the Facts



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Sun StorEdge FlexiPack

Sun StorEdge FlexiPack storage system is a desktop device enclosure that accommodates either one full-height or two half-height removable-media devices. Sun StorEdge FlexiPack desktop storage products offer external storage and backup solutions for Sun's workstations and servers.

Key Messages

- Accommodates 5.25-inch half-height or full-height devices with industry-standard bezels
- Can configure different tape drives within the same unit
- Can accommodate both fast SCSI and fast/wide SCSI devices in the same unit
- Narrow footprint
- Easy to open and service
- Acoustically engineered
- Available with the following devices:
 - Sun StorEdge DLT 7000 or Sun StorEdge DLT 4000
 - 72-GB to 144-GB, 4-mm DDS-3 autoloader
 - 20-GB to 40-GB, 8-mm tape drive
 - 7-GB to 14-GB, 8-mm tape drive

The Sun StorEdge FlexiPack system complements the storage product line and brings competitive features to the desktop. While it was designed with the intention of holding full-height devices like DLT drives, its incredible flexibility enables the user to have multiple configurations which could include multiple half-height tape drives, tape drive, or a 4-mm DDS-3 autoloader. Users now have the ability to store up to 144 GB on the desktop. The signature packaging complements Sun StorEdge MultiPack and UniPack storage system, desktop workstations, and servers.

Positioning

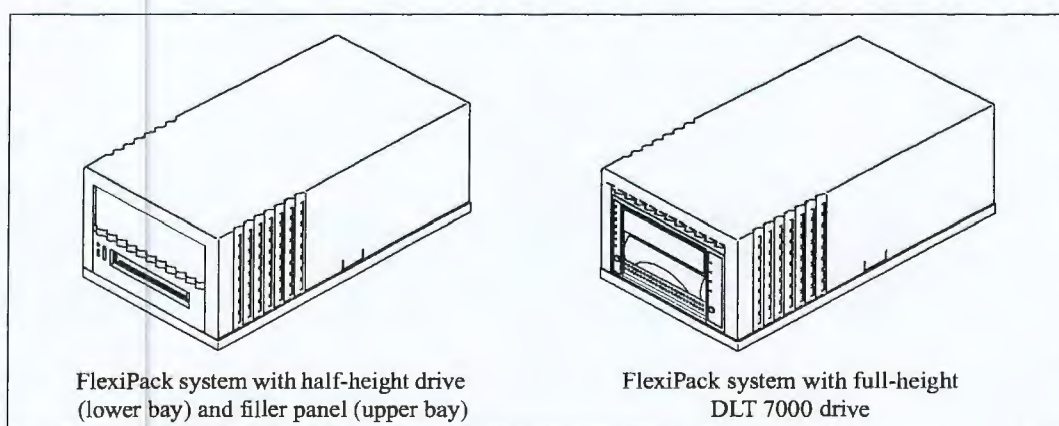
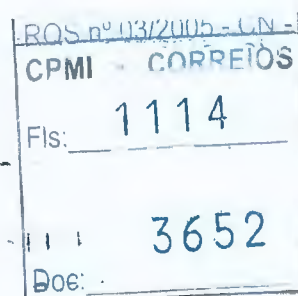


Figure 3. Sun StorEdge FlexiPack storage system

Just the Facts



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Availability

The Sun StorEdge FlexiPack storage system configurations with the Sun StorEdge DLT 7000 autoloader, Sun StorEdge DLT 4000 autoloader, and the 72-GB to 144-GB, 4-mm DDS-3 autoloader became available in February 1998.

Target Users

External devices provide additional desktop storage with fast/wide SCSI performance, doubling the throughput of typical fast SCSI devices. The digital world is driving up storage capacity requirements because image and graphics data files are typically very large. The higher capacity and flexibility of the Sun StorEdge FlexiPack system enables significant desktop and desktide backup/archive ability. The fast/wide devices support burst transfer rates of 20 MB/second and data rates up to 10 MB/second per device, depending on how well the data can be compressed.

Desktop backup solutions have made advances in capacity and performance. Unattended backups of up to 144 GB (compressed capacity if the data can be compressed 2:1) are now possible using the DDS-3 autoloader with six cartridges in the Sun StorEdge FlexiPack system. The 8-mm tape drives and DLT drives are higher end solutions for the desktop and can also serve desktop and workgroup servers because of their performance and capacity.

Key Features and Benefits

Features

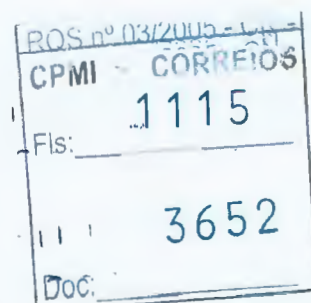
- Configuration flexibility
- Fast/wide SCSI capable
- Narrow footprint
- Easy-to-open enclosure
- Acoustically engineered

Benefits

- Can configure one full-height drive in a Sun StorEdge FlexiPack system or multiple options of different half-height tape drives to meet users' needs
- Can accommodate fast/wide and fast/narrow devices within the same enclosure
- Provides 20 MB/second burst rates, twice that of the fast/narrow enclosures, making it ideal for transferring large sequential files
- Saves desktop space (same width as the Sun StorEdge UniPack storage system)
- Saves service time
- Easily serviced by customer
- Makes the office quieter when fan operation is not necessary

Positioning

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Sun StorEdge UniPack

Sun StorEdge UniPack desktop storage products offer external storage and backup solutions for Sun's workstations and servers. These products are easily connected to a workstation or server through the built-in SCSI host adapter port or through a SCSI/SBus adapter.

Key Messages

- UltraSCSI (hard disk versions) or fast/wide SCSI (for tape) capable
- Narrower footprint
- Easy to open and service
- Single-connector attachment (SCA) disks
- Acoustically engineered
- Available with the following devices
 - 9.1-GB UltraSCSI, 10000-rpm hard disk
 - 18.2-GB UltraSCSI, 10000-rpm hard disk
 - 36.4-GB UltraSCSI, 10000-rpm hard disk
 - 4-GB to 8-GB (compressed), SLR tape drive
 - 12-GB to 24-GB (compressed) 4-mm DDS-3 tape drive
 - 20-GB to 40-GB (compressed), 4-mm DDS-4 tape drive
 - 7-GB to 14-GB (compressed), 8-mm tape drive
 - 20-GB to 40-GB (compressed), 8-mm tape drive

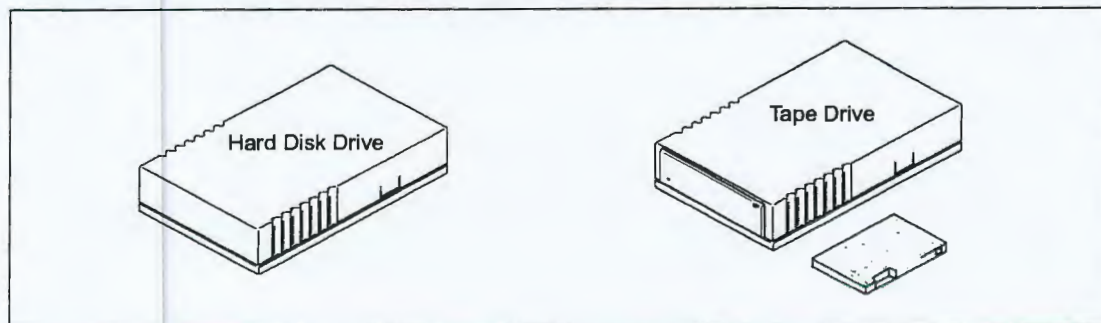


Figure 4. Sun StorEdge UniPack desktop storage products

Availability

The Sun StorEdge UniPack storage system began shipping in February 1998.

Target Users

External disks provide additional on-line storage with increased performance for NFSTM software, multimedia, database, and Internet applications. Image and graphics data files are typically very large, driving up disk-capacity requirements in the ever-expanding digital world. The higher performance of the Sun StorEdge UniPack system improves application performance because there is more data movement

Just the Facts



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and processing. The UltraSCSI disks support burst transfer rates of 40 MB/second and data rates averaging 15.2 MB/second per disk. It is possible to scale the storage performance on a bus using the new, higher performance UltraSCSI drives to a sustained transfer rate of over 15.2 MB/second with multiple spindles.

Desktop backup solutions have made advances in capacity and performance. Unattended backups of up to 40 GB (compressed) are now possible. The 20-GB to 40-GB, 4-mm tape drives continue to be a popular backup solution for the desktop. The 7-GB to 14-GB and 20-GB to 40-GB, 8-mm tape drive is a high-end solution for the desktop, offering greater performance and capacity.

Key Features and Benefits

Features

- UltraSCSI-capable disks
- Narrower footprint
- Single-connector disks
- Easy-to-open enclosure
- Acoustically engineered

Benefits

- Provides 40 MB/second burst rates, twice that of the fast/wide enclosures, making it ideal for transferring large sequential files
- Saves desktop space
- Makes it easy to replace disks; one connection for power, interface and SCSI ID
- Improves system reliability; fewer internal cables used
- Saves service time
- Makes the office quieter when fan operation is not necessary

Positioning

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Enabling Technology

Hot-plug Capability

Key Innovation: Single-connector Drive

Sun Microsystems co-invented a type of drive-connector scheme called the single-connector attachment (SCA). In the SCA design, all electrical signals for SCSI interface, power, and jumpers are passed through one small connector, which is integrated directly onto the disk drive's printed circuit board. The drive plugs directly into the Sun StorEdge™ MultiPack system backplane with no cables or jumpers to set. This design improves reliability and serviceability.

The second-generation version of this connector, called the SCA-2, includes hot-plug features. The drive is grounded before signal pins make contact through the use of hot-plug pins. The drives also reserve two pins to carry signals that indicate whether all pins have successfully connected. The single-connector design has been made available to the disk industry's Small Form Factor Committee and is produced by multiple disk-drive manufacturers (spec SFF8046).

Many disk subsystems offer hot-plug disks. Unfortunately, they are inherently unreliable and cumbersome. To be pluggable, a standard disk drive is enclosed in a metal or plastic canister. Internal connections use multiple flex cables, jumpers, and other wires—parts that increase the likelihood of failures. These pluggable-drive schemes cause a disk subsystem to be *less* reliable.

Therefore, SCA-2 gives Sun customers many benefits, the most important being higher reliability. Using SCA-2 provides other valuable advantages:

- SCA-2 is one of the keys to the higher storage density of the Sun StorEdge MultiPack system
- SCA-2 costs less than other drive-carrier schemes
- SCA-2 is more customer-serviceable

With other pluggable-drive schemes, removing the failed drive from the carrier and replacing it with a new drive is tedious and fraught with risks and potential mistakes.

Hot Plug Defined

Annex A of the SCSI-3 Parallel Interface (SPI) document draft proposal (X3T10/855D revision 15a *Removal and insertion of SCSI devices*) outlines four cases of plugging devices:

- Case 1: Power-off during removal or insertion
- Case 2: RST signal asserted continuously during removal or insertion
- Case 3: Current I/O processes not allowed during insertion or removal
- Case 4: Current I/O processes allowed during insertion or removal

Hot Plug in the Sun Environment

The Sun StorEdge MultiPack system conforms to all SCSI-3 SPI specifications for Case 4 at the disk-interface level. Activity on the SCSI bus can continue without interruption while a device is being removed or inserted. However, drives should not be pulled out randomly. The Sun StorEdge MultiPack storage system design is intended to allow users to replace failed drives in redundant (mirrored or RAID) configurations. If there is activity against a drive, users need to stop the activity before removing the drive.

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Enabling Technology



This can be done without bringing down the operating system or powering down the Sun StorEdge MultiPack storage system. The *Installation Supplement* of the *SPARCstorage MultiPack Product Note* contains detailed information for removing, replacing, and adding drives.

Hardware Considerations

The Sun StorEdge MultiPack storage system fully supports hot-plugging. The SCA-2 drive connector eliminates the use of internal drive cables and allows for hot-plugging drives. Sun has done extensive electrical evaluation of the hot-plug operation to prove that there is no signal or power disturbance during hot-plug. However, Sun cannot guarantee that hot-plugging will never result in the corruption or loss of data any more than Sun can guarantee that any SCSI bus will never experience a double-bit error (which would be undetectable with parity detection). In mission-critical data areas, it is still recommended that a user suspend all operations over the SCSI bus during hot-plug.

Software Considerations

When supported by high-availability software solutions (such as VERITAS Volume Manager or Solstice DiskSuite™ software) the disk drives are hot-pluggable. Without the protection of a RAID implementation, outstanding data requests to a removed device may not complete. The *SPARCstorage MultiPack Product Note* has detailed information for various scenarios, including instructions for removing, replacing, and adding drives.

Configuration Considerations

The Sun StorEdge MultiPack system uses geographic addressing, which means that devices inserted into the enclosure assume the SCSI ID of the slot occupied. For example, if a device is removed from the ID 4 slot and replaced by a new drive, the new drive ID is 4.

Hot Plug in the Solaris™ Operating Environment

Several levels of device plugging are defined in the Solaris™ Operating Environment. The operations required to support these features are listed below.

Hot Reconfiguration	Tasks
Adding disk drive to increase capacity	• Quiesce the SCSI bus into which the drive will be inserted • Select a slot for the new disk drive • Add the disk drive • Configure the Solaris Operating Environment to recognize the drive • Configure the application to recognize the drive
Replacing a failed disk drive while the system is running	• Identify the failed drive at the system level • Detach the drive from the application using it • Map the device to a physical drive and determine its physical location • Quiesce and spin down the drive • Remove the drive • Insert the replacement drive • Configure the replacement drive to be similar to the failed drive at the system level • Reattach the replacement drive to the application • Rebuild the data on the new drive if possible



Hot Reconfiguration	Tasks
Removing a disk drive from a system that no longer needs it	• Identify the drive to be removed • Detach the drive from any applications that are using it • Map the device to a physical drive and determine its location • Quiesce and spin down the drive • Remove the drive • Reconfigure the Solaris Operating Environment to recognize that the drive is no longer available

Enabling Technology

Just the Facts



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System Architecture

Sun StorEdge™ MultiPack Technology Overview

The Sun StorEdge™ MultiPack storage system drive enclosure uses 3.5-inch form factor, and UltraSCSI SCA-2 disk drives. The maximum number of disks per enclosure is six one-inch or 1.6-inch high drives.

For UltraSCSI functionality, the host or host adapter connected to the Sun StorEdge MultiPack unit must be capable of UltraSCSI speeds. A Sun StorEdge MultiPack system enclosure can be connected to a host adapter capable of fast/wide or narrow SCSI, but in such a case the Sun StorEdge MultiPack unit performs at the lower speed.

Geographical Addressing

Each drive bay in the Sun StorEdge MultiPack storage system is preassigned a SCSI ID to eliminate the chance of setting duplicate IDs. This feature also eliminates using external ID switches, minimizes the risk of breaking internal cables, and increases the reliability of the drive enclosure.

The Sun StorEdge MultiPack storage system has two sets of pre-selected SCSI IDs. The user can choose to use IDs 1, 2, 3, 4, 5, and 6 or IDs 9, 10, 11, 12, 13, and 14. A switch allows customers to select IDs 1–6 or IDs 9–14, allowing daisy-chaining of Sun StorEdge MultiPack systems on a fast/wide SCSI bus.

System Architecture

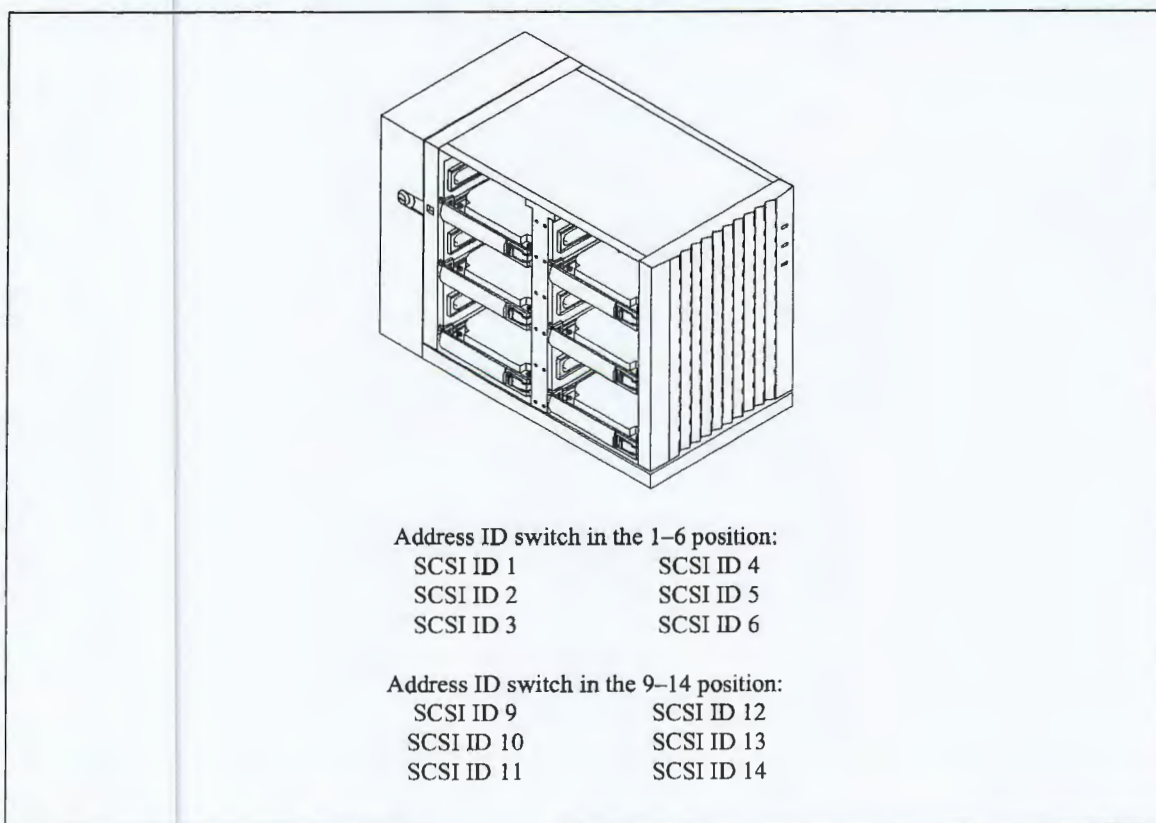


Figure 5. Sun StorEdge MultiPack system enclosure



Power Supply

The 180-Watt auto-ranging power supply.

Easy to Open and Service

The Sun StorEdge MultiPack system is designed with a key-locking door that gives users quick access to the drive bays while protecting valuable data from inadvertent removal. Engaging the lock is not required to keep the door shut.

Single-connector Attachment (SCA) Disks

All disk drives use the single-connector attachment (SCA) interface. The SCA interface eliminates the need for internal cables, improving reliability and serviceability. The tape drives continue to use the standard three-cable/connector interface.

System Architecture

Just the Facts



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Sun StorEdge FlexiPack System Architecture

Sun StorEdge FlexiPack Technology Overview

The Sun StorEdge FlexiPack storage device enclosure is designed for either one full-height or two half-height removable-media devices.

Highly Configurable

Designed to hold any two half-height devices, users can configure numerous options within a Sun StorEdge FlexiPack system, including different assortments of tape drives. In addition, if the user prefers, a full-height device such as the Sun StorEdge DLT 7000 tape drive or DDS-3 autoloader can be placed in the Sun StorEdge FlexiPack storage system.

Fast/wide SCSI Capable

The Sun StorEdge FlexiPack device is designed for 20 MB/second fast/wide SCSI-2 tape drives with two 68-pin SCSI P-type connectors. However, both *fast/wide* and *fast* SCSI-2 modes are supported even within the same enclosure. The drive connections are all made internally, and then the Sun StorEdge FlexiPack system has a 68-pin (fast/wide) SCSI connection out the back of the enclosure.

Auto SCSI Termination

Auto-termination eliminates the need for external terminators. Circuitry in the enclosure automatically terminates an 8-bit or 16-bit SCSI bus if the Sun StorEdge FlexiPack unit is the last device on the bus. It also *split-terminates* in the middle of the bus and adapts to the change from a 16-bit to an 8-bit bus.

Narrow Footprint

The width of the Sun StorEdge FlexiPack storage system is the same as the Sun StorEdge UniPack storage system. The narrow width allows for more effective use of desktop space. The dimensions are 190 mm (7.48 inches) wide, 392 mm (15.43 inches) deep, and 134 mm (5.28 inches) high.

Easy to Open and Service

The Sun StorEdge FlexiPack storage system opens easily once the lock block on the rear is removed. The enclosure lid is removed by depressing the two latches on either side and lifting up. Removable media devices are mounted on a metal sled that makes them very easy to slide out.

Acoustically Engineered

Fan speed control circuitry helps make the office environment quieter while providing drive reliability in hotter environments.



Technical Facts

Below are product features of the Sun StorEdge FlexiPack drive and removable subsystems.

Tape Drive Options	DLT 7000	DLT 4000	7-14 GB, 8 mm	20-40 GB, 8 mm	4-mm DDS-3 Autoloader
Formatted capacity (uncompressed)	35 GB	20 GB	7 GB	20 GB	72 GB
Formatted capacity (compressed ¹)	70 GB @ 2:1	40 GB @ 2:1	14 GB @ 2:1	40 GB @ 2:1	144 GB @ 2:1
Tape speed	100+ ips	100+ ips	0.872 ips	0.43 ips	0.41 ips
Burst data rate (max.)	12 MB/sec. (asynch) 20 MB/sec. (synch)	10 MB/sec.	3 MB/sec.	7 MB/sec. (asynch) 20 MB/sec. (synch/native)	3 MB/sec. (asynch) 10 MB/sec. (synch)
Transfer rate (uncompressed)	5 MB/sec.	1.5 MB/sec.	500 KB/sec.	3 MB/sec.	1 MB/sec.
Transfer rate (compressed ¹)	10 MB/sec.	3 MB/sec.	1 MB/sec.	6 MB/sec.	2 MB/sec.
Buffer	—	—	256 KB	4 MB	2 MB

¹ Actual compression ratio achieved is dependent on data type and applications; therefore, each customer's results may vary.

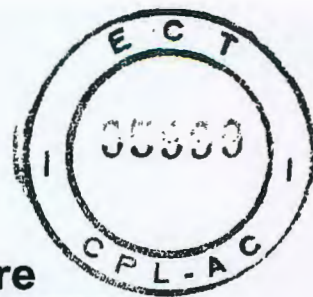
System Architecture

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Sun StorEdge UniPack System Architecture

Sun StorEdge UniPack Technology Overview

The Sun StorEdge UniPack single-device enclosure is designed for either UltraSCSI SCA-2 disk drives with a 3.5-inch form factor, or fast/wide SCSI removable devices.

UltraSCSI Capable

The disk Sun StorEdge UniPack storage system is designed for UltraSCSI applications. It has two 68-pin SCSI P-type host connectors. However, fast/wide and fast SCSI-2 modes are also supported. The tape drive Sun StorEdge UniPack system is designed for fast SCSI-2 applications only.

Auto SCSI Termination

Auto-termination eliminates the need for external terminators. Circuitry in the enclosure automatically terminates an 8-bit or 16-bit SCSI bus if the Sun StorEdge UniPack unit is the last device on the bus. It also split-terminates in the middle of the bus and adapts to the change from a 16-bit bus to an 8-bit bus.

Narrower Footprint

The footprint is smaller than the desktop storage pack. The narrower width allows for more effective use of desktop space. The dimensions are 190 mm (7.5 inches) wide, 310 mm (12.2 inches) deep, and 70 mm (2.8 inches) high.

Easy to Open and Service

The Sun StorEdge UniPack storage system opens easily once the lock block on the rear is removed. The enclosure lid is removed by depressing the two latches on either side and lifting up. Disk and tape drives are mounted on a metal sled that makes them very easy to slide out.

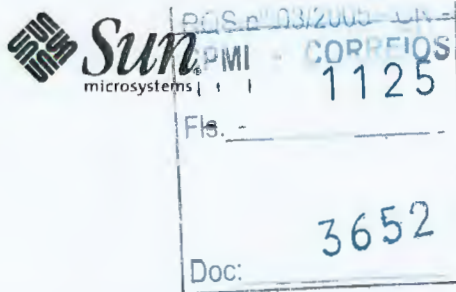
Single-Connector Attachment (SCA) Disks

All disk drives use the single-connector attachment (SCA) interface currently used in the Ultra™ 2, Ultra 30, and Ultra 60 systems, as well as Sun Enterprise™ 2, 250, 450, 3000, 4000, 3500, and 4500 servers and Sun StorEdge A1000, D1000, and A3500 array subsystems. The SCA interface eliminates the need for internal cables, improving reliability and serviceability. The tape drives continue to use the standard three-cable/connector interface.

Acoustically Engineered

Fan speed control circuitry helps make the office environment quieter while providing drive reliability in hotter environments.

System Architecture





Technical Facts

Below are product features of the Sun StorEdge UniPack drive and removable subsystems.

Disk Drives	9.1 GB	18.2 GB	36.4 GB
Average seek read	7.5 ms	8.0 ms	8.0 ms
Average seek write	8.3 ms	9.0 ms	9.0 ms
Average latency	3.0 ms	3.0 ms	3.0 ms
Interface data transfer rate	40 MB/sec.	40 MB/sec.	40 MB/sec.
HDA data transfer rate	12.5 MB/sec.	12.5 MB/sec.	12.5 MB/sec.
Rotational speed	10,000 rpm	10,000 rpm	10,000 rpm
Buffer	512 KB	512 KB	512 KB

Tape Drive	4-mm DDS-3	4-mm DDS-4	20-40 GB, 8 mm	7-14 GB, 8 mm
Formatted capacity (uncompressed)	12 GB	20 GB	20 GB	7 GB
Formatted capacity (compressed ¹)	24 GB@ 2:1	40 GB@ 2:1	40 GB @2:1	14 GB @ 2:1
Tape speed	0.41 ips	0.41 ips	0.43 ips	0.872 ips
Burst data rate (max.)	10 MB/sec. (synch) 3 MB/sec. (asynch)	40 MB/sec. (synch) 6 MB/sec. (asynch)	10 MB/sec. (synch) 7 MB/sec. (asynch)	5 MB/sec.
Transfer rate (uncompressed)	1 MB/sec.	3 MB/sec.	3 MB/sec.	500 KB/sec.
Transfer rate (compressed ¹)	2 MB/sec.	6 MB/sec.	6 MB/sec.	1 MB/sec.
Buffer	2 MB	8 MB	4 MB	1 MB

¹ Actual compression ratio achieved is dependent on data type and applications; therefore, each customer's results may vary.

System Architecture

Just the Facts



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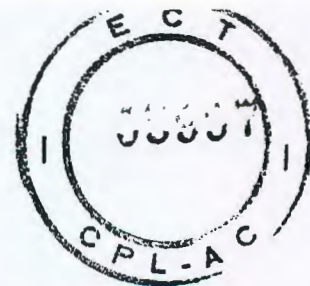
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Specifications

Physical Specifications

Specification	Sun StorEdge MultiPack		Sun StorEdge FlexiPack		Sun StorEdge UniPack	
	U.S.	Metric	U.S.	Metric	U.S.	Metric
Height	8.86 in.	225 mm	5.28 in.	134 mm	3.8 in.	70 mm
Width	7.48 in.	190 mm	7.48 in.	190 mm	7.5 in.	190 mm
Depth	15.55 in.	395 mm	15.43 in.	392 mm	12.2 in.	310 mm
Weight (enclosure)	24.0 lb.	10.9 kg	—	—	5.0 lb.	2.3 kg
Weight (9.1-GB drives)	24.0 lb. 1.6 lb. per drive (6)	10.9 kg 0.7 kg per drive (6)	—	—	1.6 lb. (device alone)	0.7 kg (device alone)
Weight (18.2-GB drives)	28.2 lb. 2.3 lb. per drive (6)	12.8 kg 1.0 kg per drive (6)	—	—	2.6 lb. (device alone)	1.2 kg (device alone)
Weight (DLT 7000)	—	—	15 lb. 5 oz.	6.7 kg	—	—
Weight (DLT 4000)	—	—	14 lb. 12 oz.	6.4 kg	—	—
Weight (DDS-3 autoloader)	—	—	14 lb. 3 oz.	6.2 kg	—	—
Weight (DDS-4 tape drive)	—	—	11 lb. 8 oz.	5.0 kg	2.2 lb. (device alone)	1.0 kg (device alone)
Weight (7- to 14-GB, 8-mm tape drive)	—	—	11 lb. 11 oz.	5.1 kg	2.6 lb. (device alone)	1.2 kg (device alone)
Weight (20- to 40-GB, 8-mm tape drive)	—	—	11 lb. 14 oz.	5.2 kg	3.0 lb. (device alone)	1.36 kg (device alone)

Specifications

Electrical Specifications

Specification	Sun StorEdge MultiPack	Sun StorEdge FlexiPack	Sun StorEdge UniPack
Input voltage	100–240 VAC	100–240 VAC	100–240 VAC
Maximum input current	3.0 A	0.6 A	0.6 A
Maximum input VA	300 VA	60 VA at 100 VAC, 82 VA at 240 VAC	60 VA at 100 VAC, 82 VA at 240 VAC
Maximum input power	265 Watts	36.5 Watts	36.5 Watts
Maximum heat output	900 BTU/hour	125 BTU/hour	125 BTU/hour

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Environmental Specifications

Specification	Sun StorEdge MultiPack	Sun StorEdge FlexiPack and Sun StorEdge UniPack
AC power	100 to 240 VAC, 47 to 63 Hz	100 to 240 VAC, 47 to 63 Hz
Operating range	5 to 40°C (41 to 104°F), 20 to 80% RH, max. wet bulb 27%	- Disk drive (UniPack only): 5 to 40°C (41 to 104°F), 10 to 90% RH, max. wet bulb 26% - Removable devices (UniPack): 5 to 35°C (41 to 95°F), 20 to 80% RH, max. wet bulb 26% - Removable devices (FlexiPack): 10 to 35°C (50 to 95°F), 20 to 80% RH, 27°C max. wet bulb
Non-operating range	-40 to 60°C (-40 to 140°F), 93% max. RH, noncondensing	- Disk drive (UniPack): -30 to 65°C (-22 to 149°F), 95% max. RH, noncondensing - Removable devices (UniPack): -30 to 60°C (-22 to 140°F), 95% max. RH, noncondensing - Removable devices (FlexiPack): -30 to 60°C (-22 to 140°F), 90% RH, noncondensing
Operating acoustic noise	6.2 bels (at 23°C) for 4 and 18 GB 6.9 bels (at 23°C) for 9 GB	- Disk drive: max. 6.0 bels (at 23°C) - Removable devices (UniPack): max. 5.8 bels (at 23°C) - Removable devices (FlexiPack): max. 5.3 bels
Idling acoustic noise	5.3 bels (at 23°C) for all disks	- Disk drive: max. 5.3 bels (at 23°C) - Removable devices (UniPack): max. 4.7 bels (at 23°C) - Removable devices (FlexiPack): max. 4.6 bels
Operating altitude	0 to 3 km (0 to 10,000 ft.)	0 to 3 km (0 to 10,000 ft.)
Non-operating altitude	0 to 12 km (0 to 40,000 ft.)	0 to 12 km (0 to 40,000 ft.)

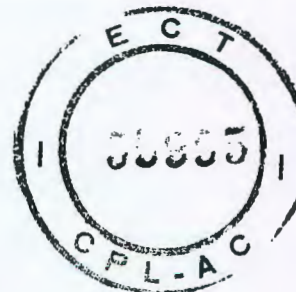
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Regulations

The Sun StorEdge MultiPack, FlexiPack and UniPack storage systems each pass the following specifications:

Category	Sun StorEdge MultiPack, UniPack, and FlexiPack
Safety	UL 1950; CSA-C22.2 No.950-M89 EN 60950 CB-Scheme with Nordic Deviations; Low Voltage Directive (73/23/EEC)
RFI/EMI	47 CFR Part 15, Subpart J C108.8-M1983 VCCI Requirements EN 55022; EN 60555-2 EMC Directive (89/336/EEC)
Immunity	EMC Directive (89/336/EEC) IEC 801-2, -3, -4, -5 EN 55082-1
Product label	UL, ULc, GS (TUV) FCC Class B Canadian Class B VCCI Class 2, CE

Specifications

Just the Facts



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Requirements and Configuration

Sun StorEdge™ System Support

The Sun StorEdge™ storage subsystems are supported on the systems shown in the table below. The Sun StorEdge FlexiPack storage system is supported on the platforms that support each specific drive used in the Sun StorEdge FlexiPack storage system. However, in general, the drives typically used with the Sun StorEdge FlexiPack system are listed here.

Sun StorEdge MultiPack	Sun StorEdge UniPack	Sun StorEdge FlexiPack
Netra™ t 1120 server	Netra t 1120 server	Netra t 1120 server
Netra t 1125 server	Netra t 1125 server	Netra t 1125 server
Ultra™ 2 workstation	Ultra 2 workstation	Ultra 2 workstation
Ultra 5 ¹ workstation	Ultra 5 ¹ workstation	Ultra 5 ¹ workstation
Ultra 10 ¹ workstation	Ultra 10 ¹ workstation	Ultra 10 ¹ workstation
Ultra 60 workstation	Ultra 60 workstation	Ultra 60 workstation
Sun Enterprise™ 2 server	Sun Enterprise 2 server	Sun Enterprise 2 server
Sun Enterprise 250 server	Sun Enterprise 250 server	Sun Enterprise 250 server
Sun Enterprise 450 server	Sun Enterprise 450 server	Sun Enterprise 450 server
Sun Enterprise 3000 / 4000 servers	Sun Enterprise 3000 / 4000 servers	Sun Enterprise 3000 / 4000 servers
Sun Enterprise 3500 / 4500 servers	Sun Enterprise 3500 / 4500 servers	
	Sun Enterprise 10000 ² server	

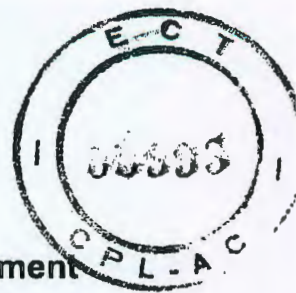
¹ A SunSwift™ PCI host adapter is required.
² Sun StorEdge UniPack systems (one or more) are available as internal (in-cabinet boot disk drive), factory configured or X-options for the Sun Enterprise 10000 server.

Additionally, Sun StorEdge FlexiPack storage system configurations for the Sun StorEdge DLT 7000 autoloader, and 20-GB to 40-GB, 8-mm tape drives are supported on the Sun Enterprise 5500, 6500, and 10000 servers.

SCSI ID Conflict

The Sun StorEdge MultiPack system has fixed SCSI IDs. Therefore, if additional external devices are daisy-chained with a Sun StorEdge MultiPack system on the same SCSI bus, a SCSI ID conflict can result.

SCSI ID	Device Assigned to SCSI ID
SCSI ID 0	First internal disk on an embedded SCSI interface of Sun Ultra 1 and later platforms is assigned to ID 0
SCSI ID 1	Second internal disk on all platforms is usually assigned to ID 1 if there is a second internal disk installed
SCSI ID 3	First internal disk on SPARCstation™ and Ultra 1 platforms is usually assigned to ID 3
SCSI ID 4	Tape drive is usually assigned ID 4
SCSI ID 6	CD-ROM devices are usually assigned ID 6
SCSI ID 7	The initiator (SCSI host adapter) is always address 7 for narrow and wide interfaces
No SCSI ID reserved	No address IDs are reserved for any of the SBus/PCibus SCSI option cards



Sun StorEdge MultiPack Under Solaris™ 2.x Operating Environment

The Sun StorEdge MultiPack is supported on Solaris™ 2.5.1 Operating Environment and later releases. In order to address SCSI ID 8 and above, a wide on-board host or host bus adapter (such as the SunSwift PCI or US2S) is required.

Sun StorEdge FlexiPack Software Requirements

Sun StorEdge FlexiPack Drive	Solaris 1.x Operating Environment Support	Solaris 2.x Operating Environment Support
7-GB to 14-GB, 8-mm tape drive	Solaris 1.1.1 (SunOS™ 4.1.3) and later releases	Solaris 2.3 and later releases
4-mm DDS-3 tape drive 4-mm DDS-3 autoloader SLR tape drive	Solaris 1.1.2 and later releases	Solaris 2.4 and later releases
Sun StorEdge DLT 4000 tape drive	N/A	Solaris 2.4 and later releases
20-GB to 40-GB, 8-mm tape drive Sun StorEdge DLT 7000 tape drive	N/A	Solaris 2.5 and later releases

All Sun StorEdge FlexiPack configurations are supported by most of the leading data management software packages such as Solstice Backup™ software.

Please reference applicable documents (for example, *Just The Facts*, *Product Brief*, customer presentations, and so on) associated with the specific devices you are using in the Sun StorEdge FlexiPack storage system in order to get more detailed information on software requirements for a particular device. These associated documents are available in SunWIN.

Sun StorEdge UniPack Software Requirements

The 9.1-, 18.2-, and 36.4-GB Sun StorEdge UniPack storage systems are supported on Solaris 2.5.1 Operating Environment and later releases.

The 7-GB to 14-GB, 8-mm tape is supported on Solaris 1.1.1 Operating Environment (SunOS 4.1.3) and later releases, and on Solaris 2.3 Operating Environment and later releases. The 4-mm DDS-3 tape and 4-GB SLR tape drives are supported on Solaris Operating Environment versions 1.1.2 and 2.4 and later releases. The 20-GB to 40-GB 8-mm tape is supported on Solaris 2.5 Operating Environment and later releases.

Requirements and Configuration



Sun StorEdge MultiPack System Configuration

Sun StorEdge MultiPack, FlexiPack, and UniPack System Configuration Guidelines

The daisy-chain configuration rules depend on whether the user installs the Sun StorEdge MultiPack, FlexiPack, or UniPack storage device, which workstation or server platform host is used, and which host bus adapter is used.

Wide SCSI and UltraSCSI support up to 15 target devices, whereas narrow SCSI supports up to seven target devices. In all cases, the total length of the SCSI bus must be taken into account when daisy-chaining multiple devices on a bus. The maximum allowable accumulated bus length is six meters. However, in order to operate reliably, the following maximum daisy-chain configurations must not be exceeded.

External Subsystem Daisy-Chain Configurations	UltraSCSI Onboard Host or Host Bus Adapter	UltraSPARC™ Fast/Wide Onboard Hosts	Fast/Wide Host Bus Adapter (SWIS/S, SunSwift)	Fast/Narrow Onboard Hosts	Fast/Narrow Host Bus Adapter
MultiPack	1 MultiPack only	1 MultiPack + 1 UniPack	2 MultiPack + 1 UniPack	1 MultiPack + 1 UniPack ¹	1 MultiPack + 1 UniPack ¹
9.1-, 18.2-, or 36.4-GB 10000-rpm UniPack	4 ²	4	4	4	4
Tape UniPack	—	4 ³	4 ³	4 ³	4 ³
Tape FlexiPack	—	4 ³	4 ³	4 ³	4 ³

¹ A maximum of seven devices are allowed on a SCSI bus (including internal devices).

² Mixing with tape devices will result in loss of UltraSCSI performance.

³ When mixing disk and tape devices on a SCSI chain, a maximum of only two tape devices are allowed.

Available Sun StorEdge MultiPack SCSI IDs

Depending on how systems are configured, specific SCSI IDs pre-selected in the Sun StorEdge MultiPack system may not be used. SCSI ID 0 and 1 may be assigned to installed internal hard drives in Ultra 1 and later systems. SCSI ID 1 and 3 may be assigned to installed internal hard drives in SPARCstation and Ultra 1 systems. SCSI ID 4 and 6 may already be assigned to a CD-ROM or tape drive.

Sun StorEdge MultiPack	Enclosure SCSI ID	Host SCSI ID	SCSI IDs Remaining
One MultiPack	1, 2, 3, 4, 5, 6 or 9, 10, 11, 12, 13, 14	7	0, 8, 9, 10, 11, 12, 13, 14, 15 or 0, 1, 2, 3, 4, 5, 6, 8, 15
Two daisy-chained MultiPacks	1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 13, 14	7	0, 8, 15

Requirements and Configuration



Sun StorEdge MultiPack SCSI

For UltraSCSI functionality, the user needs one of the following host adapters:

- UltraSCSI onboard host adapter
- US2S host bus adapter
- SunSwift PCI host bus adapter

For fast/wide SCSI functionality, the user needs one of the following host adapters:

- Wide onboard host adapter
- SWIS/S host bus adapter
- SunSwift host bus adapter

The Sun StorEdge MultiPack is supported on the following SCSI host adapters as well as on all onboard host adapters on currently shipping workstation and server platforms.

Host Adapters	Sun StorEdge MultiPack 9.1, 18.2, or 36.4 GB
Onboard fast/narrow HA	✓ Address switch to 1-6
Onboard fast/wide HA	✓ Address switch to 1-6 or 9-14
Onboard UltraSCSI HA	✓ Address switch to 1-6 or 9-14
SBus fast SCSI-2/buffered Ethernet (FSBE/S)	✓ Address switch to 1-6
SBus single-ended, fast/wide, intelligent SCSI-2 (SWIS/S)	✓ Address switch to 1-6 or 9-14
Single-ended, fast/wide SCSI-2, 10/100 Mbps Ethernet (SunSwift/SBus)	✓ Address switch to 1-6 or 9-14
PCI UltraSCSI host adapter (SunSwift/PCI)	✓ Address switch 1-6 or 9-14
PCI UltraSCSI dual channel host adapter (US2S)	✓ Address switch 1-6 or 9-14

Sun StorEdge MultiPack SCSI Host Adapters Support

The Sun StorEdge MultiPack products are supported on the following SCSI host adapters, as well as on all onboard host adapters on currently shipping workstation and server platforms:

- For fast/wide SCSI functionality, the SWIS/S or Sunswift host adapter is required. The 2.5-GB QIC, 4-mm tape, and 8-mm tape are supported on the SWIS/S card with the Solaris 2.5 Operating Environment, but still run in narrow mode.
- For UltraSCSI functionality, the SunSwift PCI or US2S host adapter is required.

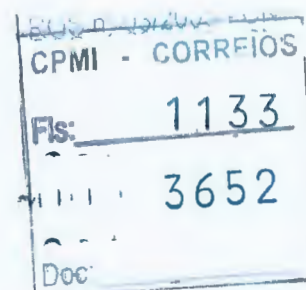
Sun StorEdge MultiPack Cabling

All Sun StorEdge MultiPack products must be ordered with a separate 68-to-68-pin or 50-to-68-pin SCSI cable and power cord kit. Cabling guidelines are as follows:

68-to-68-pin Cable Connection

The 68-to-68-pin SCSI cable kit with power cord (X3856A) allows connections to other Sun StorEdge MultiPack systems, to a fast/wide host adapter (SWIS/S or SunSwift), or to an UltraSCSI host adapter (SunSwift PCI or US2S). Always connect the fast/wide or UltraSCSI devices *first* when using a 68-pin host adapter. When cabling fast/narrow devices on a wide bus, the 50-pin devices should be cabled last and need to be actively terminated.

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50-to-68-pin Cable Connection

The 50-to-68-pin SCSI cable kit with power cord (X3857A) allows connections to 50-pin onboard host adapters offered on older desktop products such as any SPARCstation model, Ultra 1 Model 170 or the older 50-pin storage enclosures.

Sun StorEdge MultiPack System on an UltraSCSI Onboard Host or Host Bus Adapter

One Sun StorEdge MultiPack six-drive enclosure can be connected to a single UltraSCSI bus. Select SCSI ID addresses 9-14. For UltraSCSI operation, do not use the external terminator. The on-board auto-terminator functions in the UltraSCSI mode.

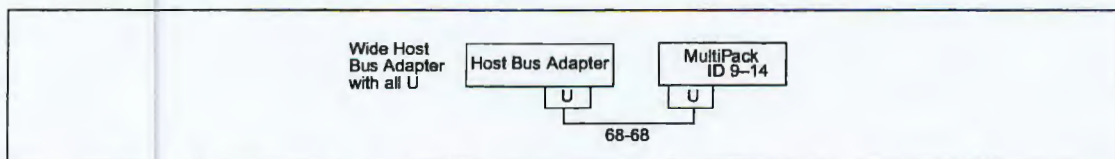


Figure 6. Sun StorEdge MultiPack system on an UltraSCSI onboard host or host bus adapter

Sun StorEdge MultiPack System on a Wide Onboard Host

Only one Sun StorEdge MultiPack six-drive enclosure can be connected to a single SCSI bus. Select SCSI ID addresses 9-14.

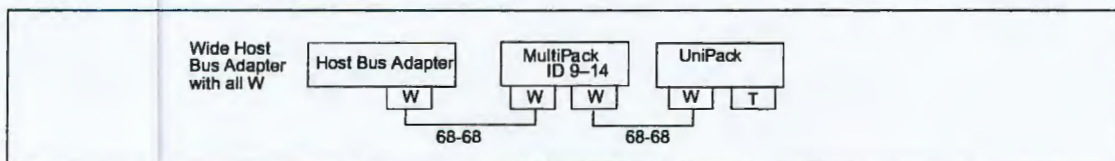


Figure 7. Sun StorEdge MultiPack system on a wide onboard host

Sun StorEdge MultiPack System on a Wide Host Bus Adapter

Two Sun StorEdge MultiPack six-drive enclosures can be connected to a single SCSI bus, provided there are no conflicts with internal devices. Select SCSI ID addresses 1-6 and 9-14.

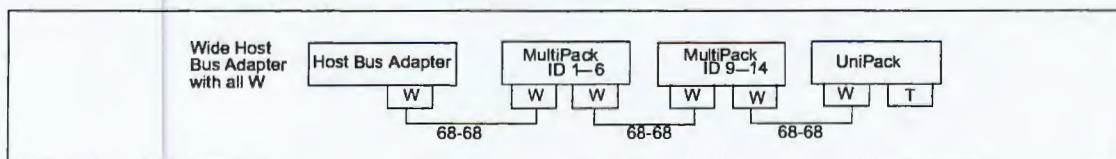


Figure 8. Sun StorEdge MultiPack system on a wide host bus adapter



Sun StorEdge MultiPack System and Narrow Devices on a Fast/Wide Bus

When mixing Sun StorEdge MultiPack system with a narrow drive or tape device on a wide SCSI bus, chain the narrow devices last with an external terminator. In general, a 50-to-68-pin cable kit with power cord (X3857A) is required.

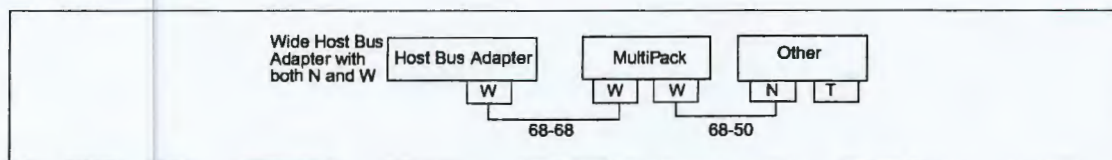


Figure 9. Sun StorEdge MultiPack system and narrow devices on a fast/wide bus

Chaining Sun StorEdge MultiPack System to Narrow Host Interfaces

One Sun StorEdge MultiPack drive enclosure may be chained to a narrow host adapter. The address-select switch must be set to 1-6 and a 50-to-68-pin cable is required.

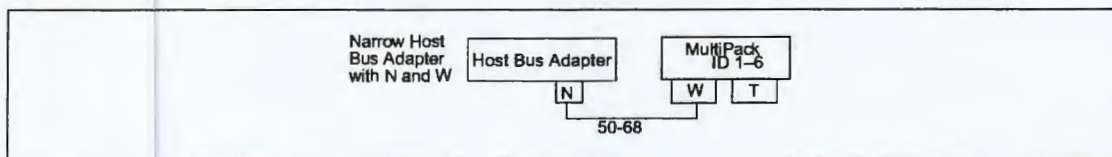
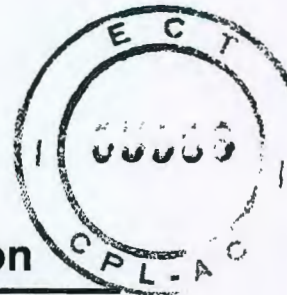


Figure 10. Chaining Sun StorEdge MultiPack system to narrow host interfaces

Requirements and Configuration



Sun StorEdge FlexiPack System Configuration

Sun StorEdge FlexiPack System Configuration Guidelines

The Sun StorEdge FlexiPack system has the following host adapter and cable restrictions.

Sun StorEdge FlexiPack SCSI Host Adapters Support

The Sun StorEdge FlexiPack products are supported on the following SCSI host adapters, as well as on all onboard host adapters on currently shipping Sun workstation and server platforms.

For fast/wide SCSI functionality, the SWIS/S host adapter is required. The 4-mm tape drives and autoloader, 7-GB to 14-GB, 8-mm tape drive, and Sun StorEdge DLT 4000 autoloader tape drive are supported on the SWIS/S card with Solaris 2.5 Operating Environment, but still run in narrow mode.

Sun StorEdge FlexiPack Cabling

All Sun StorEdge FlexiPack products must be ordered with either a 68-to-68-pin or 50-to-68-pin SCSI cable and power-cord kit (the Sun StorEdge FlexiPack system does not come with any cables included). Cabling guidelines are as follows:

- **68-to-68-pin cable connection**

The 68-to-68-pin SCSI cable with power cord kit (X3856A) allows connections to other Sun StorEdge FlexiPack systems, UniPack systems, or a fast/wide host adapter (SWIS/S or SunSwift). Always connect the fast/wide devices first when using a 68-pin host adapter. When cabling fast/narrow devices on a wide bus, the 50-pin devices should be cabled last and need to be actively terminated.

- **50-to-68-pin cable connection**

The 50-to-68-pin SCSI cable with power cord kit (X3857A) allows connections to

- 50-pin onboard host adapters offered on some current desktop products or
- The older 50-pin storage enclosures

When cabling a daisy chain of fast/narrow SCSI devices and Sun StorEdge FlexiPack storage system to a narrow (50-pin) onboard host adapter, the Sun StorEdge FlexiPack systems must always be put at the end of the SCSI chain. This provides auto-termination to the SCSI bus.

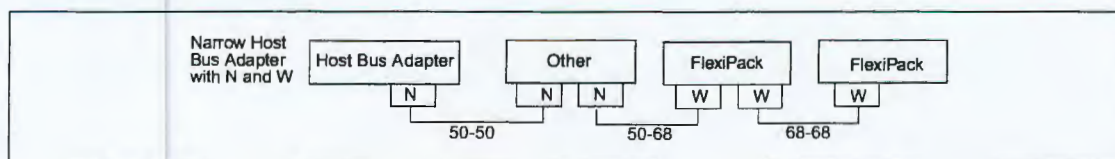


Figure 11. Cabling a daisy chain of fast/narrow SCSI devices and Sun StorEdge FlexiPack systems to a narrow (50-pin) onboard host adapter



When cabling devices to a fast/wide host adapter with fast/wide and fast/narrow devices on a SCSI chain, the fast/wide devices must be chained first. The last device on a bus needs to be actively terminated. Use a 50-to-68-pin cable to connect fast/wide (68-pin) to a fast/narrow (50-pin) device.

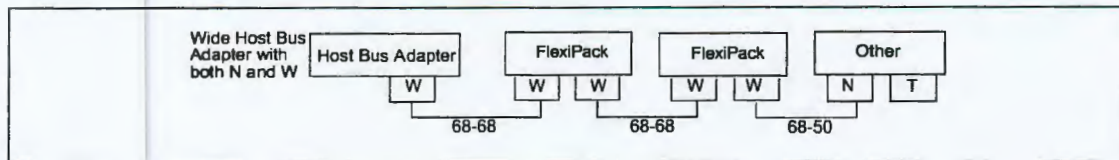
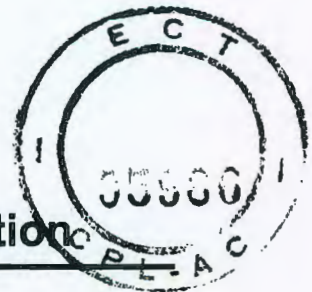


Figure 12. Cabling devices to a fast/wide host adapter with fast/wide and fast/narrow devices on a SCSI chain



Sun StorEdge UniPack System Configuration

Sun StorEdge UniPack System SCSI Host Adapters Support

The Sun StorEdge UniPack products are supported on the following SCSI host adapters, as well as on all onboard host adapters on currently shipping workstation and server platforms:

- For fast/wide SCSI functionality, the SWIS/S or SunSwift host adapter is required. The 4-mm tape, and 8-mm tape drives are supported on the SWIS/S card with Solaris 2.5 Operating Environment, but still run in narrow mode.
- For UltraSCSI functionality, the SunSwift PCI or US2S host adapter is required.

Sun StorEdge UniPack System Cabling

All Sun StorEdge UniPack products must be ordered with a separate 68-to-68-pin or 50-to-68-pin SCSI cable and power cord kit (the Sun StorEdge UniPack system does not come with any cables included). Cabling guidelines are as follows:

68-to-68-pin Cable Connection

The 68-to-68-pin SCSI cable kit with power cord kit (X3856A) allows connections to other Sun StorEdge UniPack systems, to a fast/wide host adapter (SWIS/S or SunSwift), or to an UltraSCSI host adapter (SunSwift PCI or US2S). Always connect the fast/wide or UltraSCSI devices *first* when using a 68-pin host adapter. When cabling fast/narrow devices on a wide bus, the 50-pin devices should be cabled last and need to be actively terminated.

50-to-68-pin Cable Connection

The 50-to-68-pin SCSI cable kit with power cord kit (X3857A) allows connections to 50-pin onboard host adapters offered on older desktop products such as any SPARCstation model, Ultra 1 Model 170 or the older 50-pin storage enclosures.

Sun StorEdge UniPack System on an UltraSCSI Onboard Host or Host Bus Adapter

Up to four Sun StorEdge UniPack system enclosures can be connected to a single UltraSCSI bus. The Sun StorEdge UniPack system is auto-terminated. Do not add tape devices to an UltraSCSI bus.

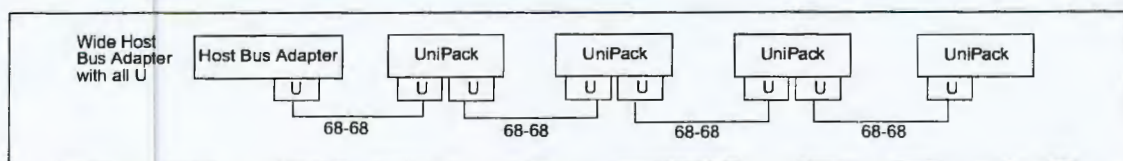
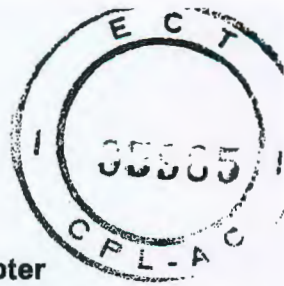


Figure 13. Sun StorEdge UniPack system on an UltraSCSI onboard host or host bus adapter

Requirements and Configuration



Sun StorEdge UniPack System on a Wide Onboard Host or Host Bus Adapter

Up to four Sun StorEdge UniPack system enclosures can be connected to a single SCSI bus. The Sun StorEdge UniPack is auto-terminated.

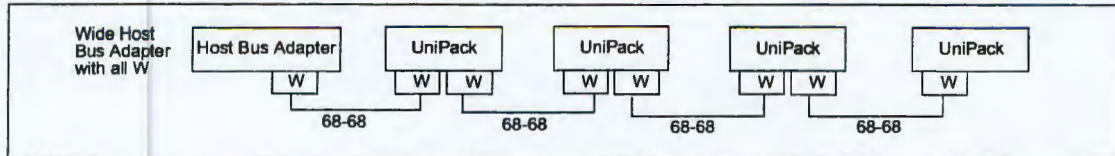


Figure 14. Sun StorEdge UniPack system on a wide onboard host or host bus adapter

Sun StorEdge UniPack System on Narrow Host Interfaces

When cabling a daisy chain of fast/narrow SCSI devices and Sun StorEdge UniPack systems to a narrow (50-pin) onboard host adapter, the Sun StorEdge UniPack systems must always be put at the end of a SCSI chain. This provides auto-termination to the SCSI bus.

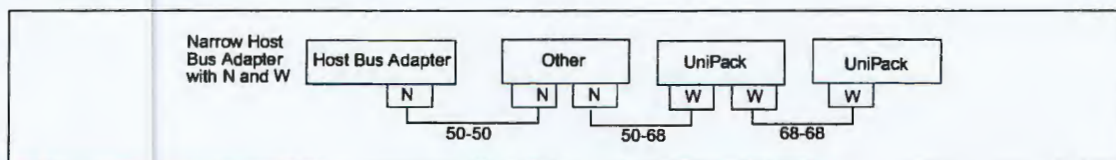


Figure 15. Cabling a daisy chain of fast/narrow SCSI devices and Sun StorEdge UniPack systems to a narrow (50-pin) onboard host adapter

Sun StorEdge UniPack System and Narrow Devices on a Fast/Wide Bus

When cabling devices to a fast/wide host adapter with fast/wide and fast/narrow devices on a SCSI chain, the fast/wide devices must be chained first. The last device on a bus must be actively terminated. Use a 50-to-68-pin cable to connect a fast/wide (68-pin) to a fast/narrow (50-pin) device.

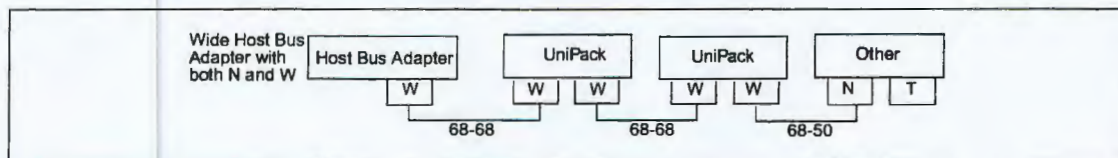
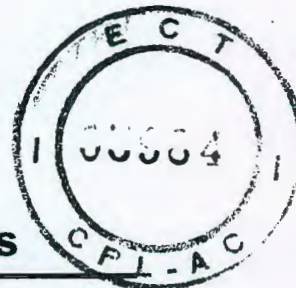


Figure 16. Cabling devices to a fast/wide host adapter with fast/wide and fast/narrow devices on a SCSI chain



Sun StorEdge Configuration Cable Lengths

Internal Cable Lengths for Supported Systems

The following table lists the internal cable lengths of supported systems.

Product	Cable Length (meters)
Sun StorEdge UniPack disk	0.3
Sun StorEdge UniPack tapes	0.4
Sun StorEdge FlexiPack (with DLT 7000, DLT 4000, or DDS-3 autoloader)	0.6
Sun StorEdge FlexiPack (all other devices)	0.8
Sun StorEdge MultiPack	0.9
Desktop disk pack	0.3
Desktop storage disk pack	0.3
Sun Ultra systems	0.9
SPARCstation 5	1.6
Other desktops	~ 0.9
SBus cards, SunSwift PCI	0.1
Two-channel PCI adapter	0.2
Interconnect cables	0.3 to 2.0

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Ordering Information

Sun StorEdge™ MultiPack Marketing Part Numbers

Part Number	Option Description	Maximum Number Supported	Comments
SG-XDSK020C-18G	Sun StorEdge™ MultiPack, 2 x 9.1-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK040C-36G	Sun StorEdge MultiPack, 4 x 9.1-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK060C-54G	Sun StorEdge MultiPack, 6 x 9.1-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK020C-36G	Sun StorEdge MultiPack, 2 x 18.2-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK040C-72G	Sun StorEdge MultiPack, 4 x 18.2-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK060C-109G	Sun StorEdge MultiPack, 6 x 18.2-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK020C-72G	Sun StorEdge MultiPack, 2 x 36.4-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK040C-144G	Sun StorEdge MultiPack, 4 x 36.4-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK060C-216G	Sun StorEdge MultiPack, 6 x 36.4-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus

Ordering Information

Sun StorEdge FlexiPack Marketing Part Numbers

Part Number	Option Description	Maximum Drives per FlexiPack
SG-XTAPDLT-021A	Sun StorEdge FlexiPack, DLT 7000	1
SG-XTAPDLT-020A	Sun StorEdge FlexiPack, DLT 4000	1
SG-XTAP8MM-021A	Sun StorEdge FlexiPack, 20-GB to 40-GB, 8-mm tape drive	2
SG-XTAP8MM-020A	Sun StorEdge FlexiPack, 7-GB to 14-GB, 8-mm tape drive	2
SG-XTAP4MM-031A	Sun StorEdge FlexiPack, 4-mm DDS-3 autoloader	1
SG-XTAP4MM-021A	Sun StorEdge FlexiPack, 4-mm DDS-3 tape drive	2

Sun StorEdge UniPack Marketing Part Numbers

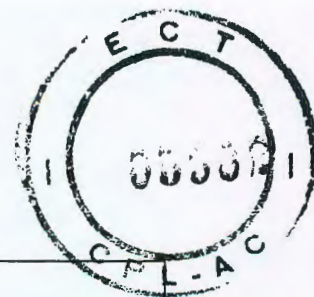
Part Number	Option Description
SG-XDSK010C-9G	Sun StorEdge UniPack, 9.1-GB, 10000-rpm, UltraSCSI disks
SG-XDSK010C-18G	Sun StorEdge UniPack, 18.2-GB, 10000-rpm, UltraSCSI disks
SG-XDSK010C-36G	Sun StorEdge UniPack, 36.4-GB, 10000-rpm, UltraSCSI disks
SG-XTAP8MM-011A	Sun StorEdge UniPack, 20-GB to 40-GB, 8-mm tape drive
SG-XTAP8MM-010A	Sun StorEdge UniPack, 7-GB to 14-GB, 8-mm tape drive

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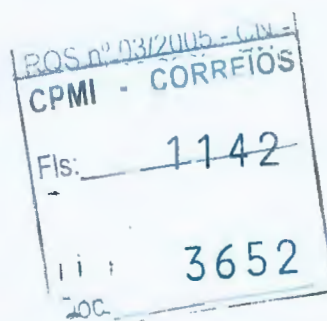
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Part Number	Option Description
SG-XTAP4MM-011A	Sun StorEdge UniPack, 4-mm DDS-3 tape drive
SG-XTAP4MM-012A	Sun StorEdge UniPack, 4-mm DDS-4 tape drive

Ordering Information

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Options

Sun StorEdge™ MultiPack Drive and Cable X-options

Part Number	Option Description	Maximum Number Supported	Comments
X5234A	9.1-GB, 10000-rpm, internal X-option UltraSCSI disk drive	4	Plus the first two installed drives
X5237A	18.2-GB, 10000-rpm, internal X-option UltraSCSI disk drive	4	Plus the first two installed drives
X5242A	36.4-GB, 10000-rpm, internal X-option UltraSCSI disk drive	4	Plus the first two installed drives
X5243A	36.4-GB, 10000-rpm, internal X-option UltraSCSI disk drive with barrier plate	4	Plus the first two installed drives
X3856A	68-pin to 68-pin SCSI cable kit with power cord	—	0.8 meter cable
X3857A	50-pin to 68-pin SCSI cable kit with power cord	—	0.8 meter cable
X901A	68-pin, 0.8-meter, external SCSI cable	—	0.8 meter cable
X902A	68-to-68-pin, 2.0-meter, external SCSI cable	—	
X903A	50-to-68-pin, 1.2-meter, external SCSI cable	—	
X904A	50-to-68-pin, 2.0-meter, external SCSI cable	—	

Configuration Guidelines

- On a Sun StorEdge™ MultiPack, two-drive subsystem may be expanded with up to four additional X5234A, X5237A, X5342A, or X5243A X-option drives.
- The 68-to-68-pin cable kit with power cord is required when chaining the Sun StorEdge MultiPack system to an UltraSCSI or fast/wide onboard host adapter (like most Sun workstations and servers) or another external 68-pin connector device (such as other Sun StorEdge FlexiPack, UniPack, or MultiPack devices).
- The option with 50-to-68-pin cables is required when chaining the Sun StorEdge MultiPack to a narrow onboard host adapter or another external 50-pin connector device (such as desktop storage module tape drives).
- The SunCD™ 32X is not supported in the Sun StorEdge UniPack or FlexiPack systems.

Sun StorEdge FlexiPack System Options

Configuration Guidelines

The Sun StorEdge FlexiPack enclosure is initially configured with one of the following options:

- One DLT 7000
- One DLT 4000
- One 72-GB to 144-GB, 4-mm DDS-3 autoloader
- One 20-GB to 40-GB, 8-mm tape drive with Sun-light-gray standard bezel and an open bay with filler panel in Sun light-gray

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- One 7-GB to 14-GB, 8-mm tape drive with Sun-light-gray standard bezel and an open bay with filler panel in Sun light-gray

The 68-to-68-pin cable kit with power cord is required when chaining the Sun StorEdge FlexiPack system to a fast/wide onboard host adapter (like most Sun workstations and servers) or another external 68-pin connector device (such as other Sun StorEdge FlexiPack, UniPack, or MultiPack devices).

The 50-to-68-pin cable kit with power cord is required when chaining the Sun StorEdge FlexiPack system to a narrow onboard host adapter or another external 50-pin connector device (such as desktop storage module tape drives).

The half-height drives in a Sun StorEdge FlexiPack system base configuration are always installed in the lower storage bay of the Sun StorEdge FlexiPack system with the upper storage bay being open (no drive installed) and covered by a filler panel. This open bay can be filled by another half-height drive, thereby fully populating the Sun StorEdge FlexiPack. The options available for this upper storage bay are listed below.

Sun StorEdge FlexiPack System Options for the Upper Storage Bay

The following X-options are for use in the available upper storage bay of the Sun StorEdge FlexiPack system. When ordering the Sun StorEdge FlexiPack system with a half-height drive, the option includes the enclosure and one drive located in the lower storage bay. The upper storage bay is covered by a filler panel initially, but any of the following field-installable options may be ordered for use in the upper storage bay:

Part Number	Option Description
X6282A	4-mm DDS-3 internal tape drive
X6212A	7-GB to 14-GB, 8-mm internal tape drive
X6236A	20-GB to 40-GB, 8-mm internal tape drive

Options

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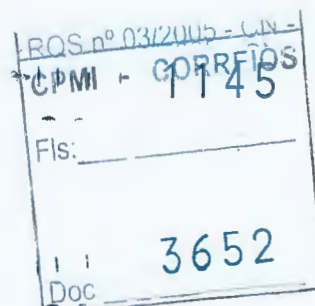
Service and Support

The SunSpectrumSM 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 SolarisTM Operating Environment software, and telephone support for SunTM 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
Local customer support management	No	Yes	No	No
Personal technical account support	Yes	Yes	Option	No
SunStart SM installation service	Yes	No	No	No
Account support plan	Yes	Yes	No	No
Software release planning	Yes	No	No	No
On-site account reviews	Monthly	Semiannual	No	No
Skills assessment	Yes	No	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	Option
7-day/24-hour on-site coverage	Yes	Option	Option	N/A
7-day/12-hour on-site coverage	No	Option	No	No
5-day/24-hour on-site coverage	No	Option	No	No

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FEATURE	SUNSPECTRUM PLATINUM SM Mission-critical Support	SUNSPECTRUM GOLD SM Business-critical Support	SUNSPECTRUM SILVER SM Systems Support	SUNSPECTRUM BRONZE SM Self Support
Coverage / Response Time (cont.)				
Customer-defined priority setting	Yes	Yes	Yes	Option
• 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
2-hour on-site response	Yes	Option	Option	N/A
Additional contacts	Option	Option	Option	Option
Premier Support Features				
Mission-critical support team	Yes	For urgent problems	No	No
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
Hardware Support Delivery				
Replacement hardware parts	On-site technician	On-site technician	On-site technician	Courier
Two day parts delivery	N/A	N/A	N/A	Yes
Overnight parts delivery	N/A	N/A	N/A	Option
Same-day parts delivery	Yes	Yes	Yes	Option
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 SM license	Yes	Yes	Yes	Yes
SunSolve EarlyNotifier SM Service	Yes	Yes	Yes	Yes

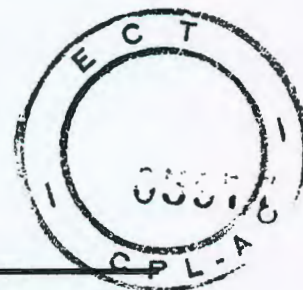
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Glossary

Active termination, regulated	Terminates the SCSI bus with a series of resistors tied to +5 volts. The terminator is labeled <i>Regulated</i> but is often referred to as <i>Active Terminator</i> .
Bandwidth	A measure of the capacity of a communication channel, usually specified in MB/second.
DSBE/S	SBus fast differential SCSI-2/buffered Ethernet card.
DWIS/S	SBus differential fast/wide intelligent SCSI-2 host adapter.
Fast SCSI	Data transfer rate of 10 MB/second.
Fast/wide SCSI	Data transfer rate of 20 MB/second wide devices can be connected to a narrow SCSI interface, but the extra data lines need to be terminated.
FSBE/S	Fast SCSI Buffered Ethernet.
GB	Gigabyte. A gigabyte is 1,073,741,824 (2 ³⁰) bytes.
GUI	Graphical user interface. The VERITAS Volume Manager software provides a powerful, easy-to-use GUI.
Host adapter	A device that connects a peripheral device I/O protocol and medium to the computer system's I/O bus.
Hot plug	The ability to remove, replace or add a device while current I/O processes continue on the bus.
Hot spare	A drive in an array that is held in reserve to replace any other drive that fails.
Hot swap	The specific case of hot-plugging which involves replacing a device with another of the same size, type, and layout.
IOPS	Input/output operations per second. A measure of I/O performance, IOPS is usually used to quote random I/O performance. See Throughput.
MTBF	Mean time between failures. A measure of reliability, this is the average expected time between failures of equipment, usually measured in operating hours.
RAID	Redundant array of independent disks. A set of disk drives that appears to be a single logical disk drive to an application such as a database or file system. Different RAID levels provide different capacity, performance, availability, and cost characteristics.
Release	A SCSI command to release a previously granted reservation. See Reserve.



Reserve	A SCSI command issued by a host system to reserve access to a controller or disk drive. Once a reservation is granted to a system, commands to the controller or disk drive by any other system are rejected. This is a valuable safety feature in dual-hosted Sun StorEdge Array configurations.
SBE/S	SCSI controller 5 MB/second transfer rate.
SCSI address	The octal representation of the unique address (0–7) assigned to a narrow device; or the hex representation of the unique address (0–15) assigned to a wide SCSI device.
Single connector	A SCSI disk connector technology co-invented by Sun Microsystems. The single connector attachment (SCA) provides all SCSI, power, and control signals in a single connector, and enables easy servicing and highly reliable, pluggable disk drives.
SSHA	SBus SCSI host adapter.
SunSwift™	Single-ended fast/wide SCSI-2 10/100 Mbps Ethernet SBUS host adapter.
SunSwift PCI	Single-ended UltraSCSI 10/100 Mbps Ethernet PCI host adapter.
SWIS/S	Single-ended wide intelligent SCSI.
Throughput	A measure of sequential I/O performance, measured in MB/second. See IOPS.
UltraSCSI	Data transfer rate of 40 MB/second. Wide devices can be connected to a narrow SCSI interface, but the extra data lines need to be terminated.
US2S	PCI UltraSCSI dual channel host adapter.
Volume	In the VERITAS Volume Manager software, a volume is a virtual disk partition into which a file system, DBMS, or other application can place data. A volume can physically be a single disk partition or multiple disk partitions on one or more physical disk drives. Applications that use volumes do not need to be aware of their underlying physical structure. The Volume Manager handles mapping of virtual partition addresses to physical addresses.
Warm plug	The ability to remove, replace or add a device while power is still applied, but only while all I/O processes are suspended.



Materials Abstract

All materials will be available on SunWIN except where noted otherwise.

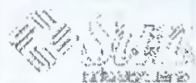
Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Powerpack – <i>Sun StorEdge™ MultiPack, FlexiPack, and UniPack Systems, Just the Facts</i>	Just The Facts	Training Sales Tool	SunWIN, Reseller Web	50843
References – <i>Sun StorEdge MultiPack Desktop Storage Product Brief</i>	Product Brief	Sales Tool	SunWIN, Reseller Web, E-mail	50845
Product Literature – <i>Literature - StorEdge MultiPack Data Sheet</i>	Data Sheet on Sun StorEdge MultiPack	Sales Tool	SunWIN, Reseller Web, E-mail	66769
– <i>Sun Intro - New Sun StorEdge UniPack, FlexiPack, and MultiPack Enhancements</i>	Sun Product Intro on Sun StorEdge Product Enhancements	Sales Tool	SunWIN, Reseller Web	80969
– <i>Sun Product Intro - Introduction and Transition of Sun StorEdge Products and MultiPack Configurations</i>	Sun Product Intro on Product Transitions	Sales Tool	SunWIN, Reseller Web	95833
– <i>Literature - StorEdge UniPack Datasheet</i>	Data Sheet on Sun StorEdge UniPack	Sales Tool	SunWIN, Reseller Web	66767
– <i>Sun StorEdge UniPack Desktop Storage Product Brief</i>	Product Brief on Sun StorEdge UniPack	Sales Tool	SunWIN, Reseller Web	46703
External Web Sites – <i>Sun Home Page</i> – <i>Site for Information on Sun StorEdge MultiPack</i> – <i>Site for Information on Sun StorEdge UniPack</i>	http://www.sun.com http://www.sun.com/storage/multipack/ http://www.sun.com/storage/unipack/			

Materials Abstract

Just the Facts



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- Specifications
- FAQ
- Technical Brief

- Related:**
- Upgrades
 - Solution Scenarios
 - White Papers

- See Also:**
- Networking Systems

SUNFASTETHERNET™ Specifications

Sun FastEthernet 2.0 and SunSwift Adapter Highlights

SunFastEthernet Adapter

- [Features](#)
- [Performance](#)
- [Standard Interfaces](#)
- [Requirements](#)
- [Regulations](#)
- [Dimensions](#)

SunSwift Adapter

- [Features](#)
- [Performance](#)
- [Standard Interfaces](#)
- [Requirements](#)
- [Regulations](#)
- [Dimensions](#)



SunFastEthernet Adapter

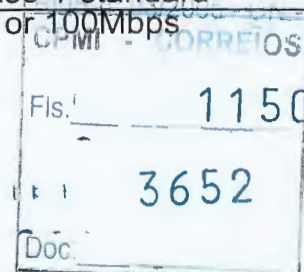
SunFastEthernet adapter is a single-wide network interface card that offers 10Mbps or 100Mbps network bandwidth over a variety of wiring types (e.g., category 3, 4, 5 unshielded twisted pair (UTP) and Fiberoptic cables) via either the on-board RJ45 or MII (Media Independent Interface) connectors.

Features

- 10Mbps or 100Mbps Ethernet operation
- Features both a RJ45 and a MII connector
- 10Mbps supported over 2-pair Category 3 or better UTP wiring via the RJ 45 connector
- 100Mbps supported over 2-pair Category 5 UTP wiring via the RJ 45 connector
- 10Mbps or 100Mbps operation over 4-pair Category 3,4,5 UTP or Fiber via the MII connector (external transceiver required)
- Conforms with IEEE 802.3u 10Base-T standard
- Auto-negotiation between 10Mbps or 100Mbps

Performance

- SBus Clock: 16.67MHz to 25 MHz
- Transfer size: 32 bit and 64 bit



- Burst Sizes: 16/32/64 bytes
- SBus version: Conforms to IEEE 1496

Standard Interfaces

- Ethernet: 10/100 Mbps category 5 UTP via the RJ45 connector. Other wiring types supported via external transceiver connected through the MII connector

Requirements

- Solaris 1.1.2 or Solaris 2.4 or later releases

Regulations

- Meets or exceed the following requirements: FCC Class B, VCCI-2

Dimensions

- Length: 147.70mm (5.78 in.)
- Width: 83.82 mm (3.30 in.)
- Weight: 158 g (5.52 oz.)

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SunSwift Adapter

SunSwift adapter is industry's first single-wide network interface card that offers 10Mbps and 100Mbps Ethernet connection and fast/wide SCSI-2 interface.

Features

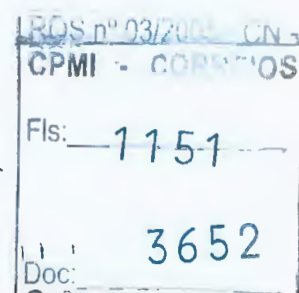
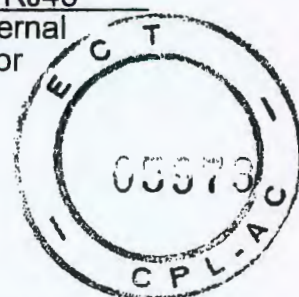
- 10Mbps or 100Mbps Ethernet operation
- 20MBps Single-ended fast/wide SCSI-2 connection
- RJ45 connector for 10/100 Mbps Ethernet and 68-pin connector for fast/wide SCSI-2
- 10Mbps supported over 2-pair Category 3 or better UTP wiring via the RJ 45 connector
- 100Mbps supported over 2-pair Category 5 UTP wiring via the RJ 45 connector
- Auto-negotiation between 10Mbps or 100Mbps
- Interoperates with Fast Ethernet hub/switch products that conforms with the 100Base-TX standard
- Conforms with IEEE 802.3 100Base-TX standard
- Conforms with ANSI X3T9.2 SCSI-2 standard

Performance

- SBus Clock: 16.67MHz to 25 MHz
- Transfer size: 32 bit and 64 bit
- Burst Sizes: 16/32/64 bytes
- SBus version: Conforms to IEEE 1496

Standard Interfaces

- Ethernet: 10/100 Mbps category 5 UTP via the RJ45



L16

- connector
- SCSI: 20 MBps fast/wide (single-ended) SCSI-2 68-pin connector

Requirements

- Solaris 2.4 or later releases

Regulations

- Meets or exceeds the following requirements: FCC Class B, VCCI-2

Dimensions

- Length: 147.70 mm (5.78 in.)
- Width: 83.82 mm (3.30 in.)
- Weight: 158 g (5.52 oz.)

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[Sun FastEthernet/SunSwift : Overview](#) | [Specifications](#) | [FAQ](#) | [Technical Brief](#)

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HP OpenView Network Node Manager 6.1

for the UNIX and Windows NT® operating system

HP OpenView Solutions



Network Management

HP OpenView solutions target specific IT management challenges to solve today's pressing problem, today. Delivering swift results incrementally, the multiple solutions are the "building blocks" to a complete IT management solution. The nimble OpenView approach meets emerging business needs with short-term success driven by longer term business objectives.

HP OPENVIEW

Works | Right | Now

The HP OpenView Network Management solution is a complete, comprehensive solution that gives IT organizations the control they need to deliver reliable network services to their business customers. Leading the industry in network management, the HP OpenView solution manages all aspects of the increasingly complex and business-dependent network environment.

HP OpenView Network Node Manager delivers the network availability component, and forms the foundation of the complete network management solution.

The Smart Way to Manage the Network

HP OpenView Network Node Manager is the market leading network availability management solution, providing in-depth views of the network in an intuitive graphical format. Network Node Manager discovers network devices and provides a map to illustrate what the network actually looks like. The multi-level map indicates which devices and network segments are healthy and which areas need attention. When a flood of events is generated from the failure of a major device, Network Node Manager's powerful event correlation engine immediately correlates the event stream and pinpoints the root cause of the failure. Trend analysis and thresholding, together with out-of-the-box reports and data warehousing, enable proactive network management.

Network Node Manager immediately pinpoints the source of network problems and assists network management staff in planning for network growth and designing network changes.

Network Node Manager's remote user access provides the flexibility to access network management tools from anywhere on the web. Using these powerful features, network administrators are able to more intelligently manage the network, leading to increased network uptime and lower costs.

The Most Comprehensive Network Management Solution

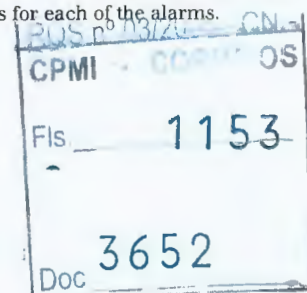
Automated Discovery and Layout.

Network Node Manager discovers TCP/IP, IPX and Level 2 devices on the network and presents this information in an intuitive graphical format. Level 2 discovery includes devices that support the Bridge, Repeater/802.3, or MAU MIBs.

Network Node Manager continuously monitors the network for new devices and for the status of equipment on the network. Discovery and monitoring also detect devices that are located across Wide Area Networks (WANs).

Event Correlation Technology.

Network Node Manager identifies problems faster through an advanced event correlation engine. The engine intelligently correlates events into high-level alarms, immediately pinpointing the root cause of network problems. The drill-down capability allows network administrators to see all of the contributing events for each of the alarms.



Out-of-the-box correlation circuits are included for some of the most common network management problems. The pre-configured correlation circuits lead to more efficient network polling based on the latest topology data. The HP OpenView ECS Designer for Network Node Manager allows development and testing of correlation circuits for very specific correlation requirements through an easy-to-use GUI. These circuits can then be deployed to any number of collection stations or management stations in the environment.

Java-based user interface.

Network Node Manager now provides easy access to network maps and enables management of data from anywhere via the Web.

The HP OpenView Web Launcher allows dedicated IT staff to start HP OpenView Java-based applications such as the Network Presenter, the Alarms Browser and the SNMP Data Presenter from anywhere. A log-in facility with password authentication ensures the security of management data. The Launcher also allows user roles to be defined and information to be filtered based on the user's management objective.

The Network Presenter and the Alarms Browser dynamically update maps and events automatically – no intervention is required. Network topology is presented in either graphical or tabular form. In addition, the SNMP Data Presenter allows users to query the network for SNMP data such as interface traffic, CPU load or traffic routing to assist with network diagnosis and planning.

Proactive management through reporting and data warehouse.

Out-of-the-box reports enable proactive trend analysis on the health of the network. These Web based reports point out trends on performance, availability, inventory, and exceptions. Analysis of this historical data provides a clear picture about the devices in the network and allows network managers to become more proactive by taking action before there is a problem in the network.

Additionally, Network Node Manager's valuable topology, event and SNMP-collected data is exported to its data warehouse. The data is then intelligently aggregated and trimmed. The data warehouse includes an open schema to allow access from reporting and data mining tools.

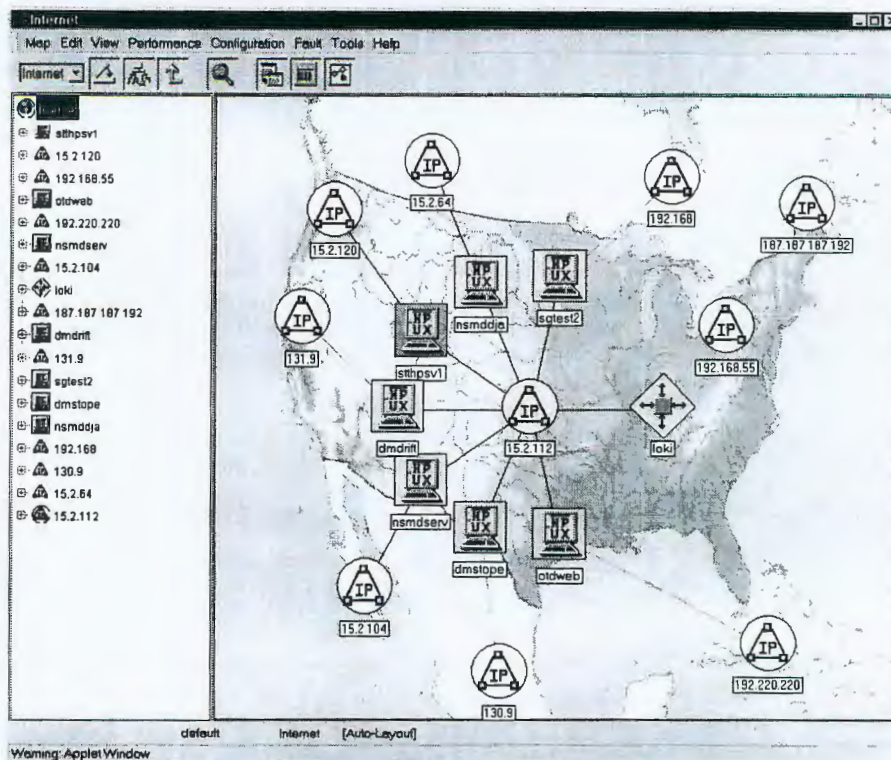


Figure 1. Java-based Network Presenter. The Network Presenter provides shared access to the network topology. Maps may be viewed in graphical or tabular form. A scoping pane allows easy navigation, which lets operators view the entire network from one window.

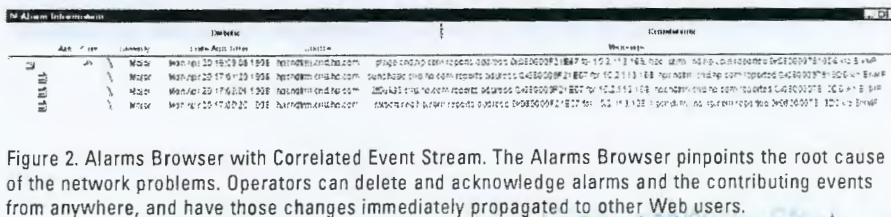
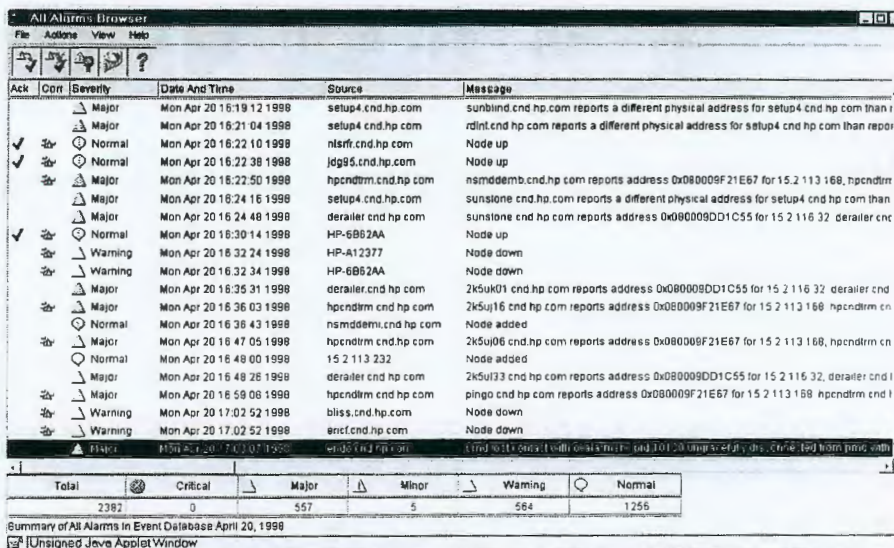
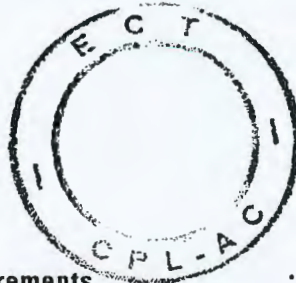


Figure 2. Alarms Browser with Correlated Event Stream. The Alarms Browser pinpoints the root cause of the network problems. Operators can delete and acknowledge alarms and the contributing events from anywhere, and have those changes immediately propagated to other Web users.

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Fault tolerance capabilities.

With Network Node Manager, users can schedule back-ups for business-critical network management information while continuing to manage critical network elements.

Additionally, Network Node Manager collection stations can be configured to fail over to Network Node Manager management stations so that in the event of a collection station failure, network monitoring will continue uninterrupted.

Designed for Growth

A scalable solution.

Windows NT and UNIX collection stations can be distributed throughout the environment so that data can be collected locally and then forwarded to one or more Windows NT/UNIX management stations. Windows NT remote consoles connected to UNIX management and collection stations allow multiple operators access at a lower cost. The new Java-based Web UI increases the number of supported operators and offers connectivity over WAN links.

Flexible pricing.

Network Node Manager is packaged in a variety of node increments to allow the software to scale as network requirements increase. Network Node Manager Enterprise for UNIX or Windows NT is the appropriate choice for larger environments and Network Node Manager 250 is an appropriate choice for environments of 250 or fewer nodes.

Additional nodes can be added in 250-node increments as the network grows.

Partnerships Ensure Success

Network Node Manager has the strongest partnership program in the industry, resulting in over 300 integrated applications. This level of partnership support offers our customers the highest degree of flexibility to create a comprehensive, customized network management solution.

System Requirements

The hardware and software recommendations for HP and Sun systems are for management of a 2,500 node network with one HP OpenView Network Node Manager session on a management or collection station. Management of larger networks requires more RAM and swap space. Please refer to the HP OpenView Network Node Manager Performance and Configuration Guide for detailed product requirement information.

HP Systems

- HP 9000 Servers and Workstations, including multiprocessors (threads not supported)
- HP-UX 10.20, 11.0 including X-Windows and OSF/Motif
- RAM: 96 MB recommended
- Bit-mapped display or X-terminal
- Color graphics: 1024x768 minimum resolution (1280x1024 recommended for optimum clarity); 6 color planes minimum (8 color planes recommended)
- Free disk space: 500 MB plus 192 MB of swap space
- LAN/Link for HP 9000
- ARPA Services/9000

Sun Systems

- SunSPARC and Ultra Servers and Workstations including multiprocessors (threads not supported)

- Solaris 2.5.1, 2.6, 2.7
- RAM: 96 MB recommended
- Bit-mapped display or X-Terminal
- Color graphics: 1024x768 minimum resolution (1280x1024 recommended for optimum clarity); 6 color planes minimum (8 color planes recommended)
- Free disk space: 500 MB plus 192 MB of swap

Windows NT Systems

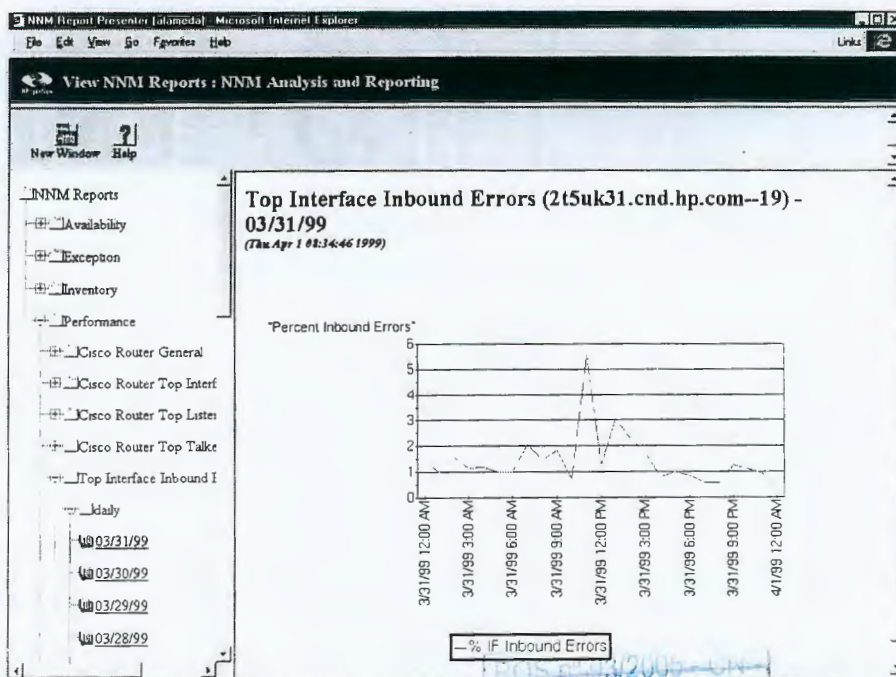
- Intel Pentium processor
- Microsoft Windows NT Workstation (or Server) version 4.0 with TCP/IP networking installed and configured
- Ram: 96 MB RAM
- 800x600 monitor with SVGA graphics card
- Free disk space: 500 MB plus 192 MB free paging file space
- Network Adapter Card

Web Servers Supported

- Apache on HP-UX and Solaris
- Microsoft Peer Web Services or Internet Information Services on the Windows NT operating system

Web Browsers Supported

- Netscape Navigator 4.51 for HP-UX, Windows NT, and Solaris
- Microsoft Internet Explorer 5.0 for NT



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Ordering Information

J1240AA, J1247AA, J1254AA

HP OpenView Network Node Manager Enterprise 6.1 for the Windows NT, HP-UX, or Solaris operating systems. Includes License-to-Use, media, and manuals.

J1241AA, J1248AA, J1255AA

HP OpenView Network Node Manager 250 6.1 for the Windows NT, HP-UX, or Solaris operating systems. Includes License-to-Use, media, and manuals.

J1242AB, J1249AB, J1256AB

HP OpenView 250-Node Increment for HP OpenView Network Node Manager 250 6.1 License-to-Use. Product numbers correspond to Windows NT, HP-UX, and Solaris.

J1243AB, J1250AB, J1257AB

HP OpenView Network Node Manager 250 6.1 to Network Node Manager Enterprise 6.1 for Windows NT, HP-UX, or Solaris operating systems.

Upgrades

J1242UB, J1253AB, J1260AB

Upgrade from HP OpenView 250-Node increment to Network Node Manager 6.1 for Windows NT, HP-UX, and Solaris.

J1251AA, J1258AA

HP OpenView Network Node Manager Enterprise Version Upgrade. Unlimited/Enterprise 3.31/4.x/5.x to Network Node Manager Enterprise 4.11/5.01/6.1 for HP-UX or Solaris. Only one version may be installed/run at a time.

J1240UA

HP OpenView Network Node Manager Unlimited 5.x for Windows NT Upgrade to HP OpenView Network Node Manager Enterprise for 6.1 for Windows NT.

J1252AA, J1259AA

HP OpenView Network Node Manager 250 Version Upgrade 3.31/4.x/5.x to Network Node Manager 250 4.11/5.01/6.1 for HP-UX, or Solaris. Only one version may be installed/run at a time.

J1241UA

HP OpenView Network Node Manager 250 5.x for Windows NT Upgrade to HP OpenView Network Node Manager 250 6.1 for Windows NT.

J1261AA, J1262AA, J1263AA

HP OpenView Network Node Manager 6.1 Developer's Toolkit for Windows NT, HP-UX, and Solaris.

J1264AA

HP OpenView ECS Designer for IT/Operations and Network Node Manager 6.1 for HP-UX.

J1265AA

HP OpenView ECS Designer for Network Node Manager 6.1 for Solaris.

J1266AA

HP OpenView ECS Designer for Network Node Manager 6.1 for Windows NT.

For More Information

For more information on HP OpenView Network Node Manager please contact your local HP reseller or HP sales office.

Australia/New Zealand

+613 9272 2895

Europe

openview_ccc@hp.com

Hong Kong

+852 2599 7051

Japan

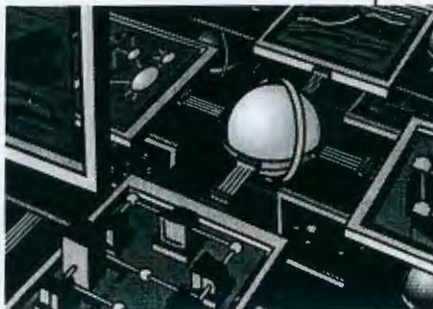
+813 3331 6111

United States of America

+800 637 7740

Visit the HP OpenView website:

<http://www.openview.hp.com/nnm>



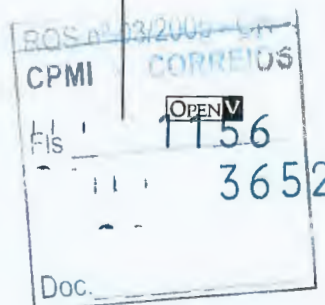
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HP OpenView Network Node Manager & CiscoWorks2000 Integration Package for NNM 5.x



HP OPENVIEW

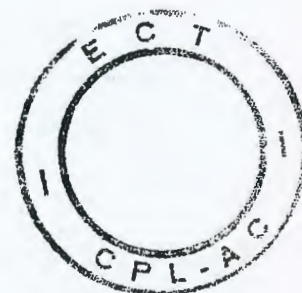
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This package combines the network management power of HP OpenView Network Node Manager for Solaris and Windows NT with the network device management power of CiscoWorks2000. Integration that is made possible through the package:

- NNM Web Interface can launch Cisco Resource Manager Essentials
- Cisco Resource Manager Essentials can launch NNM Web Interface
- NNM newly discovered nodes automatically and dynamically propagated to Cisco Resource Manager Essentials inventory
- NNM event history and deleted nodes reports accessible from Cisco Resource Manager Essentials

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HP OpenView Network Node Manager Year 2000 Compliance Information



The HP OpenView Network Node Manager team is working to ensure NNM's ability to handle dates for the millenium transition. All Network Node Manager versions 4.01 and greater are Year 2000 compliant, when run on a Year 2000 compliant system. Some of these versions will require the use of a software patch, as detailed in the chart below.

HP has made every effort to ensure the accuracy of our product testing. However, because each customer's environment is different from HP's laboratory test environment, it is the customer's responsibility to validate the Year 2000 readiness of these products in their own environment. Therefore, information about the Year 2000 status of HP products is provided "as is" without warranties of any kind. HP encourages customers to be fully aware of the potential impact that the Year 2000 could have on their business environment and their ability to compete in the 21st century. HP also encourages its customers to take responsibility for addressing needed changes as quickly as possible.

HP cannot attest to the Year 2000 compliance of solutions from independent software vendors that appear in our Solutions Catalog. We recommend that customers consult directly with these third-party vendors about the Year 2000 status of those products.

If you need more information on the definition of Year 2000 compliance, please go to [/year2000/compliance.html](#) . Additionally, if you want more general information regarding Hewlett-Packard and the Year 2000, please visit <http://www.hp.com/go/year2000>.

NNM Version/Platform Support for Year 2000

Network Node Manager versions 4.x and 5.x are Year 2000 Compliant. NNM versions 5.01 and later are Year 2000 Compliant as shipped. NNM versions 4.x and 5.0 require the latest consolidated patch to be installed. The table below lists the earliest versions of these consolidated patches to support Year 2000 Compliance; subsequent consolidated patches will have higher numbers and will continue to include Year 2000 support.

Product	4.1 SunOs	2.x Solaris	10.x HP-UX	Windows NT	Status
Network Node Manager 3.31	Upgrade	Upgrade	Upgrade	N/A	N/A
Network Node Manager 4.0x	PSOV_01887	PSOV_01888	PHSS_13866	N/A	Y2K Compliant
Network Node Manager 4.1x	N/A	PSOV_01782	PHSS_12649	N/A	Y2K Compliant
Network Node Manager 5.0	N/A	PSOV_01863	PHSS_13569	NNM_00061	Y2K Compliant
Network Node Manager > 5.0	All versions greater than 5.00 will include Year 2000 compliance.				

NOTE: NNM versions 3.31 and earlier will NOT be made Year 2000 compliant. Customers with those versions should upgrade to a newer version of NNM before December 1999. Please contact an HP Sales Representative.

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Solaris™ 7 Operating Environment



The Solaris™ 7 Operating Environment is the premier environment for network computing. Delivering today what others are only promising for the future, Solaris 7 with 64-bits provides data-center reliability, superior scalability, and unprecedented performance.

Solaris™ Operating Environment

The Solaris™ Operating Environment is the only choice for serious enterprise computing. With Solaris, you get a 64-bit environment that's optimized for Java™ computing — from the creators of Java — and is Year 2000 safe. Superior reliability and availability mean that your systems and data are always accessible when you need them. Extensive scalability ensures that your systems won't top out in just a few years, let alone a few months. High performance delivers the power to get the job done fast. And simplified installation and administration lets you concentrate more on running your business, not your network. The Solaris Operating Environment delivers the information and services you need to anyone, anytime, anywhere.

The Power of 64-bit Computing

Advanced 64-bit technology is at the heart of the Solaris 7 Operating Environment. For your business, this means dramatic increases in performance, capacity, and scalability — all while maintaining complete binary compatibility with current 32-bit applications. Your software investments are protected — and so is your future.

The Solaris 7 Operating Environment helps make you more competitive today by delivering enhanced performance on a wide variety of applications. These applications range from Enterprise Resource Planning (ERP) to e-commerce, data mining to digital content creation, and Web search engines to scientific data analysis.

And upcoming 64-bit applications will run dramatically faster — up to 10 times. With 64 bits, applications can address more data directly from memory instead of from disk. So operations that used to take a long time — like database queries — now happen in a fraction of the time. The result? Faster access to information, increased operating efficiency, and lower operating costs.

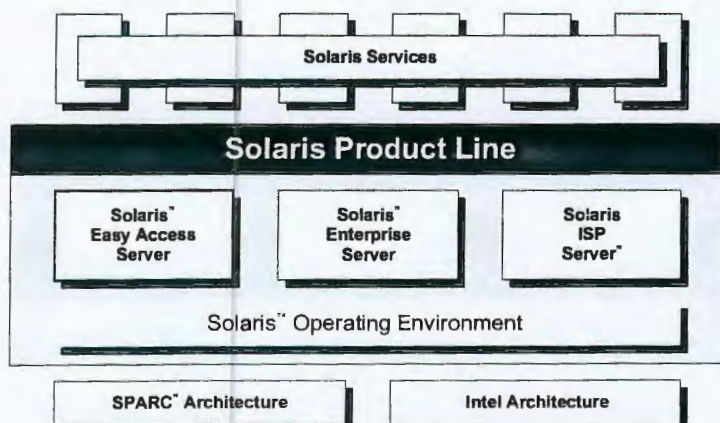
Scalability

The Solaris 7 Operating Environment can handle just about anything you throw at it: heavy network traffic, huge data sets, enormously compute-intensive problems. That's because this 64-bit environment is inherently scalable. Applications can access more files concurrently with 64-bit technology, increasing overall system efficiency. More processes can run simultaneously, allowing individual servers to run more applications. And more network connections are available in the Solaris 7 Operating Environment, enabling Web servers to handle many more users.

Simply put, the Solaris 7 Operating Environment scales from desktop to data center. Which means it's always ready to handle your changing needs.

Reliability

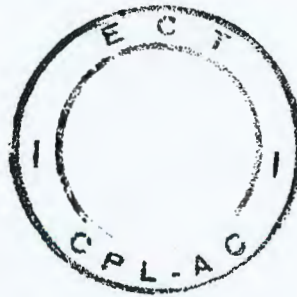
The Solaris 7 Operating Environment is the clear choice for business. It provides data center-class reliability, availability, and serviceability (RAS) features at a fraction of a mainframe's cost.



The Solaris product line delivers three different extensions that focus more on specific needs for workgroup, enterprise, or service provider computing.

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Even a few minutes of downtime can cost your company thousands, or even millions, of dollars in lost revenues and customer loyalty. Integrated in the Solaris 7 Operating Environment is dynamic reconfiguration. It allows a system to continue running even if a system board fails. What's more, you can replace the faulty board while the system continues to operate — and your people remain productive. Other enhancements include improved logging for easier debugging and improved core dump analysis. The bottom line: Solaris provides the most reliable operating environment for network computing.

Ease of Use

An integral component of the Solaris 7 Operating Environment, Solaris™ Web Start makes installing Solaris software as easy as clicking a button. Solaris Web Start offers the industry's first Web-based installation process, which means that all of the setup and administration can be done locally or remotely through a Web browser. Solaris Web Start simplifies installation by eliminating the UNIX® system administration normally associated with software installation and setup.

Solaris™ Web Start Wizards™ technology extends the point-and-click simplicity of Solaris Web Start, bringing this same ease of use to applications written for the Solaris Operating Environment. With Solaris Web Start Wizards software, installing applications on the Solaris Operating Environment is just like installing them on Microsoft Windows.

The Flexibility of Java Technology

Nothing runs the Java development environment better than the Solaris Operating Environment. Solaris provides a fast and reliable environment for developing and deploying mission-critical Java applications. That's because Java

technology is tightly integrated into the operating environment, and can leverage its multithreaded capabilities to deliver the scalability, performance, and stability needed for enterprise applications.

Standards-Based Networking

Driven by a vision of seamless access to information, and backed by 16 years of consistent execution, Sun is recognized as a world leader in open network computing. And we continue to invest in the core technologies required to deliver network connections as reliable as the dial tone. We call this the Webtone.

With standards-based networking, such as TCP/IP, NFS™, and LDAP, built into the software right from the beginning, the Solaris 7 Operating Environment offers proven interoperability and includes the leading-edge features to make networking easier. Sun continues to improve performance, and includes the protocols needed to support new applications as they become available.

Security

Moving from private to public networks, businesses require built-in security. The Solaris 7 Operating Environment has dramatically improved authentication, data integrity, data privacy, and single sign-on capabilities to keep your data safe from tampering, snooping, or eavesdropping. The Solaris Operating Environment also makes security administration easier, because system entry services such as *login* and *rlogin* do not have to be modified when changing authentication mechanisms.

Globalization

The Solaris 7 Operating Environment is designed for global business. Solaris supports 37 languages that cover 95% of the world's markets in a standards-based environment for true multilingual computing.

Summary of Features

- Full 64-bit functionality
- Industry-leading Java technology performance
- TCP with Selective Acknowledgment
- Web-based installation for the Solaris Operating Environment and Solaris applications
- Web-based administration and configuration
- Global-ready and Year 2000 compliant

RAS Enhancements

- Dynamic reconfiguration (not available on all systems)
- UNIX File System (UFS) logging
- Kernel debugging enhancements
- Improved core dump analysis
- Hot-plug capability
- Improved kernel errors and events logging

Standards

- Year 2000 Compliance: follows X/Open® guidelines
- Interface Standards: X/Open UNIX 98
- Graphics Standards: X11, PostScript®, Display PostScript®, OpenGL®
- Desktop Standards: CDE (Common Desktop Environment), Motif
- Object Standards: Java IDL
- Connectivity Standards: ONC™, ONC+™, NFS, WebNFS™, and optional NetWare IPX/SPX, SNA, SMB, AppleTalk, DECnet, and others
- Internet Standards: HTTP, FTP, Telnet, DNS, NTP, IMAP4, DHCP, SNMP, SMTP
- LDAPv3 IETF RFCs 1323, 1510, 1652, 1869, 1870, 1891-1894, 1985, 1996, 2018, 2136, 2045, 2078

System Requirements

- SPARC™ or Intel 486 (100 MHz) or Pentium platforms
- Disk Space: 600 Mbytes minimum (desktop); 600 Mbytes to 1 Gbyte (server)
- Memory: 32 Mbytes minimum

Notes: Web Start requires 64 Mbytes (minimum) of memory. Memory requirements can vary depending upon the number of clients and users. Maximum memory support on the Intel platform is 8 Gbytes.

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ULTRA 10 WORKSTATION Datasheet

05982

The Powerful, Expandable Ultra System That's Easy To Afford.

For demanding technical and commercial applications like 3-D modeling, workstations are the best solution. And the Sun Ultra™10 system sets new standards for performance and value in a desktop work station. With 440 MHz and a large 2-MB external cache you get the scalable performance you need.

Sun's Ultra Port Architecture 3-D graphics accelerators Creator3D, Sun Elite3D™ m3, and Sun Elite3D m6, provide the throughput and processing power for high-performance 3-D graphics computing. Additionally, with the available SunPCi™ coprocessor card you can now run your PC productivity applications at native speeds alongside your UNIX® technical applications for unmatched versatility and productivity. And with the preinstalled 64-bit Solaris™7 Operating Environment software and new graphical desktop tools for simple setup and management, all that power is easy to use. A better solution, and a better value than the Sun Ultra 10 workstation.

Highlights

- 440-MHz UltraSPARC™-IIi processor with large 2-MB cache for industry leading performance.
- Up to 1-GB DRAM, up to two 9-GB hard disks, and four PCI slots for maximum flexibility and expandability.
- Great for 2-D and 3-D digital content creation, software and Java™ application development, financial analysis, EDA, MCAD, MCAE, and GIS applications.
- SunClient[sm] support offers flexible, low cost service and support options.
- Elite3D m6, Elite3D m3 and Creator3D graphics accelerator options for the most demanding graphics applications.
- Web-enhanced Common Desktop Environment (CDE) is easy to use, customize, and manage.
- Robust, scalable Solaris Operating Environment software provides 100% binary compatibility across the entire product line protecting your investment.

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Sun Ultra™ 10 Workstation Series Specifications**05901****Processor Options****Architecture**

440-MHz UltraSPARC-IIi with 2-MB external cache

Main Memory

Install DIMMs in pairs

Memory1 GB maximum, ECC error-correction
Four DIMM slots, 50ns 168-pin JEDEC DIMMs**Standard Interfaces****Expansion bus**

Four 32-bit PCI slots, full-size, 33 MHz, 5 volt

UPA graphics slot

One UPA graphics slot, supports Creator, Creator3D, and Elite3D high-performance graphics options

Network

Ethernet/Fast Ethernet, twisted pair standard (10-BaseT and 100-BaseT), self-sensing

Serial

One D-Sub 25-pin connector, synchronous/asynchronous One D-Sub 9-pin connector, asynchronous

Parallel

One D-Sub 25-pin connector, IEEE 1284 (bidirectional)

Audio

One line-in/line-out One microphone-in/speaker-out

Mass Storage and Media**Internal disk**

9.1 GB, 7200 rpm, 3.5-in. Enhanced IDE HDD

Internal CD

32X-speed CD-ROM

Internal floppy disk

One 3.5-in. 1.44-MB floppy

PCMCIA

One front-access bay for third-party options

Expansion

One empty full-height storage device bay

[Back to Top](#)**Graphics and Imaging****• Standard**

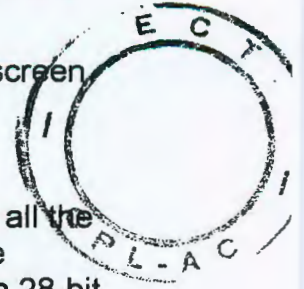
Onboard 8-or 24-bit user configurable frame buffer with accelerated text, windowing, 2-D and 3-D wireframe, 1152 x 900 in 24-bit mode or 1280 x 1024 in 8-bit mode at 76 Hz, high-resolution support.

• Creator3D

All the imaging features of Creator plus accelerated 24-bit double-buffered 3-D graphics with 28-bit Z-buffer and 8-bit overlay plane. Gouraud shading, alpha-blending and screen-door transparency, line antialiasing, depth-cueing, 4-bit stencil support with hardware acceleration of OpenGL stencil functions, four 256-entry colormaps for dynamic color map segment allocation and adjustable gamma correction. NTSC/PAL video timing support. 1280 x 1024 at 76 Hz resolution standard, stereo 960 x 680 at 112 Hz supported with 21-in. monitor. Option to reconfigure frame buffer to

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high-resolution single-buffered Creator for imaging applications supporting 24-in. high-resolution wide-screen monitors, up to 1920 x 1200 t 70 Hz.



- **Elite3D m3**

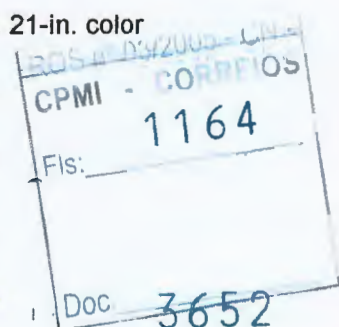
Three on-board graphics floating-point engines with all the imaging features of Creator plus higher performance accelerated 24-bit double-buffered 3-D graphics with 28-bit Z-buffer and 8-bit overlay plane. Gouraud shading, alpha-blending and screen-door transparency, line and dot antialiasing, per-pixel depth-cueing, per-pixel lpha interpolation, 4-bit stencil support with hardware acceleration of OpenGL stencil functions, four 256-entry colormaps for dynamic colormap segment allocation and adjustable gamma correction. NTSC/PAL video timing support. 1280 x 1024 t 76 Hz resolution standard, stereo 960 x 680 t 112 Hz supported with 21-in. monitor.

- **Elite3D m6**

Highest performance Sun graphics with the integrated imaging features of Creator3D, plus very high-performance accelerated 24-bit double-buffered 3-D graphics with 28-bit Z-buffer and 8-bit overlay plane. Gouraud shading, alpha-blending and screen-door transparency, line and dot-antialiasing, per-pixel depth-cueing, per-pixel alpha interpolation, 4-bit stencil support with hardware acceleration of OpenGL ® stencil functions, four 256-entry colormaps for dynamic colormap segmental location and adjustable gamma correction, NTSC/PAL video timing support. 1280 x 1024 t 76 MHz resolution standard, stereo 960 x 680 t 112 Hz supported with 21-in. monitor.

Monitor Options

Resolution	Screen
1600 x 1200 resolution, 75-Hz refresh rate	19-in. color, 21-in. color
1280 x 1024 resolution, 60-, 76- or 67-Hz refresh rate	19-in. color, 21-in. color, Flat Panel
1152 x 900 resolution, 76- or 66-Hz refresh rate	17-in. color, 19-in. color, 21-in. color, Flat Panel
1024 x 768 resolution, 76-Hz refresh rate	17-in. color, 19-in. color, 21-in. color
960 x 680 resolution, 112-Hz refresh rate	19-in. color, 21-in. color
1920 x 1200 resolution, 70-Hz refresh rate	24-in. wide screen color
1600 x 1000 resolution, 76- or 66-Hz refresh rate	24-in. wide screen color
1440 x 900 resolution, 76-Hz refresh rate	24-in. wide screen color
1280 x 800 resolution, 76-Hz refresh rate	24-in. wide screen color

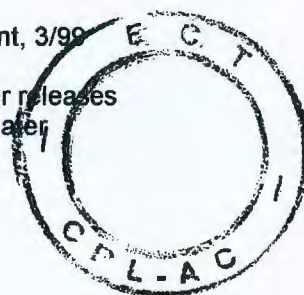


Software

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Operating system

Solaris™7 Operating Environment, 3/99
preinstalled
Solaris 2.6, Hardware: 5/98 or later releases
Solaris 2.5.1, Hardware: 11/97 or later
releases

**Environment**

AC power	100-120; 220-240 VAC, 47-63 Hz, 0.4 K VA
Operating	10 °C to 35 °C (50 °F to 95 °F) 40% to 80% relative humidity, noncondensing
NonOperating	-20 °C to 60 °C (-4 °F to 140 °F) 30% to 90% relative humidity, noncondensing
Operating acoustic noise	5.2 bels
Idling acoustic noise	5.2 bels
Declared noise emissions	in accordance with ISO 9296, measured t 23 °C

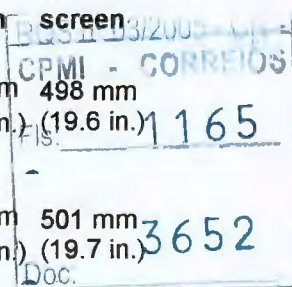
Regulations

Meets or exceeds the following requirements:

Safety	UL 1950, CSA C22.2 No.950, TUV EN 60950, CB Scheme with Nordic deviations, EMKO-TSE (74-SEC)203, ZH1/618
RFI/EMI	FCC Class B, DOC Class B, VCCI Class 2, EN 55022 Class B, EN 61000-3-2
Immunity	EN 50082-1
X-ray	DHHS 21 Subchapter J; PTB German X-ray Decree
Power management	Energy Star compliant

Weights and Measurements

Models	Sun Ultra 10 chassis	17-in. color monitor	24-in. wide-screen color monitor	18.1-in. flat panel	19-in. flat screen	21-in. flat screen
Height	40.2 cm (15.8 in.)	421 mm (16.6 in.)	50.0 cm (19.7 in.)	459.8 mm (18.1 in.)	449 mm (17.7 in.)	498 mm (19.6 in.)
Width	17.6 cm (6.9 in.)	420 mm (16.6 in.)	58.0 cm (22.8 in.)	449.5 mm (17.7 in.)	463 mm (18.2 in.)	501 mm (19.7 in.)
Depth	43.5 cm (17.1 in.)	425 mm (16.8 in.)	54.8 cm (21.6 in.)	32.9 mm (1.3 in.)	463 mm (18.2 in.)	498 mm (19.6 in.)
Shipping weight	20.0 kg (44 lb.)	16.5 kg (36.3 lb.)	41.4 kg (91.0 lb.)	8.8 kg (19.5 lb.)	26 kg (57.3 lb.)	32.5 kg (71.6 lb.)



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Ultra 10 Workstation : **Datasheet** | Architecture | Key Technologies | Just the Facts | Guided Tour

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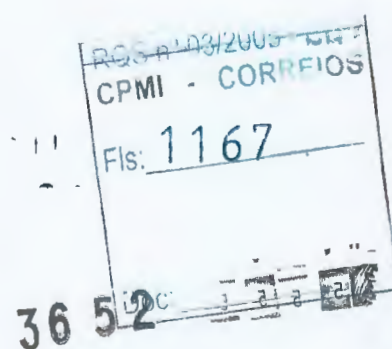
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SUN™ ENTERPRISE™ 4500 SERVER

COMPACT DESIGN, YET HIGHLY EXPANDABLE MIDRANGE SYSTEM



A compact midrange server with tremendous computing power, the Sun™ Enterprise™ 4500 server nearly doubles the expandability of the Sun Enterprise 3500 server. What's more, it delivers mission-critical availability and advanced system management tools perfect for databases, business applications, and electronic commerce. The common, modular design of the Sun server family—from the Sun Enterprise 3500 system to the Sun Enterprise 6500 system—simplifies upgrades and delivers exceptional investment protection. Sun servers support the Sun Solaris™ operating environment so you can choose from more than 12,000 off-the shelf applications. All this makes the Sun Enterprise 4500 server a safe, versatile investment for growing businesses.

HIGHLIGHTS

- Advanced availability features maximize application uptime, with the ability to reconfigure and repair system components while the server remains on-line.
- Delivers up to fourteen processors in a small package, and up to four Sun Enterprise 4500 servers may be rack mounted in a single data center cabinet.
- Sun Enterprise SymON™ software simplifies system management, lowering your total cost of ownership with an easy-to-use interface and proactive hardware failure prediction.
- Flexible, dependable service offerings from SunService provide mission-critical support that fits your budget.

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SUN ENTERPRISE 4500 SERVER SPECIFICATIONS

PROCESSOR	
Number of processors	One to 24
Architecture	SuperScalar SPARC™ Version 9, UltraSPARC
Cache per processor	Primary: 16-KB instruction, and 16-KB data on chip Secondary: 4 MB external cache
CPU interface	One to 14, 128-bit Ultra Port Architecture (UPA) slots
System Interconnect	Gigaplane™, 2.68 GB/sec (at 84 MHz), 3.2 GB/sec (at 100 MHz)

SYSTEM BOARDS

Number of boards	Maximum of eight boards per system; minimum configuration requires one CPU/Memory board and one I/O board
CPU/Memory board	Holds up to two processors and 16 memory SIMMs
SBus I/O board	Offers two SBus channels, three SBus slots, SunFastEthernet™, fast/wide SCSI-2, two FC-AL sockets
Graphics I/O board	Offers one SBus channel, two SBus slots, one UPA slot for Creator and Creator3D graphics, SunFastEthernet, fast/wide SCSI-2, two FC-AL sockets
PCI I/O board	Offers four PCI channels, two (short) PCI slots, SunFastEthernet, fast/wide SCSI-2
Main Memory	256-MB to 14-GB memory capacity per system 256-MB and 1-GB memory expansion options (each a group of 8 SIMMs)

STANDARD INTERFACES

Serial	Two RS-232/423 ports on clock board
SBus	64-bit data bus width, 25 MHz
PCI	64-bit data bus width, 66 MHz
Keyboard and mouse port	One each per system
Ethernet	10/100 MB/sec twisted pair standard (10-BaseT and 100-BaseT) and/or MII transceiver per I/O board
SCSI	On-board 20-MB/sec fast/wide SCSI-2 (synchronous) per I/O board
Fibre channel	Two on-board sockets (100 MB/sec full duplex) per SBus and Graphics I/O boards

MASS STORAGE

Internal disk	Up to four 8.4-GB disk boards
Internal tape	8mm, 4mm, and .25-inch tape options available
CD-ROM	SunCD™ 32 drive standard
External storage	Supports over 4-TB of storage

CONSOLE OPTIONS

Monitor	17- or 20-inch color monitor
Frame buffer	TurboGX™, TurboGXplus™, Creator, or Creator3D frame buffer
SBus options	SunFastEthernet, SunATM™ 155 and 622, Quad FastEthernet, Differential Fast/Wide Intelligent SCSI-2 (DWIS/S), Single-Ended Fast/Wide Intelligent SCSI-2 (SWIS/S), High-Speed Serial Interface (HSI/S), Token Ring Interface (TRI/S), Single- and Dual-Attach FDDI, Serial Parallel Controller (SPC/S), 100BaseT Fast/Wide SCSI, ISDN, Fast Differential SCSI-2 Buffered Ethernet (DSBE/S), Fast SCSI-2 Buffered Ethernet (FSBE/S), Sun Gigabit Ethernet, FC-AL

PCI options	10/100BaseT Fast/Wide UltraSCSI, 10/100BaseT FastEthernet, Quad FastEthernet, Single- and Dual-Attach FDDI, Token Ring, High Speed Serial Interface, Serial Asynchronous Interface, Gigabit Ethernet Network, SunATM 155 and 622
Power supplies	One 184-watt Peripheral Power Supply standard. Up to four hot swappable 300-watt Power Cooling Modules (PCM) with redundant, dual-speed fans. One PCM required per two systems boards. Fully-redundant power and cooling available on this system.
Availability features	Automatic System Recovery Dynamic Reconfiguration Alternate Pathing CPU Power Control Redundant Power and Cooling Hot-swap Power/Cooling Modules Hardware Failure Prediction Remote Power Control Modular components and more...

SOFTWARE

Operating system	Solaris 2.5.1 or later operating environment
Languages	C, C++, Pascal, FORTRAN, Java™
Networking	ONC™ NFS™ TCP/IP, SunNet™ OSI, MHS, X.25, DCE, Netware
Windowing system	CDE, OpenWindows™ Version 3 optional
System monitoring	Enterprise SymON™
System and network management	Solaris Web Start, Solstice AdminSuite™, Solstice Domain Manager, Solstice Enterprise Manager, Solstice DiskSuite™, Solstice Backup™, Veritas File System and more...

ENVIRONMENT

AC power	100-240 VAC, 47-63 Hz, 12A
Operating	5° C to 40° C (41° F to 104° F) 20% to 80% relative humidity, noncondensing
Nonoperating	-20° C to 60° C (-4° F to 140° F) 5% to 93% relative humidity, noncondensing

REGULATIONS

Meets or exceeds the following requirements:	
Safety	UL 1950, CSA 950, TUV EN60950, CB Scheme (Nordic Deviation)
RFI/EMI	FCC Class A, DOC Class A, EN5022 Class A, VCCI Class 1
Immunity	EN50082-1
Harmonics	EN61000-3-2

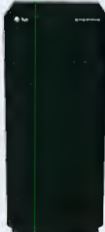
DIMENSIONS AND WEIGHT

Height	34 cm (13.5 in.)
Width	50 cm (19.7 in.)
Depth	56 cm (22 in.)
Weight, main cabinet	68 kg (150 lb.) approximate
Power cord	1.83 m (6 ft.)

UPGRADES

Full system upgrades are available for SPARCcenter 2000/2000E, SPARCserver 1000/1000E, SPARCserver 6X0, 4X0, and 3X0 systems. Chassis upgrades are available for Enterprise 3000 and Enterprise 3500 servers. Competitive server trade-ins are also available.

SERVER FAMILY OF PRODUCTS

SUN ENTERPRISE 3500	SUN ENTERPRISE 4500	SUN ENTERPRISE 5500	SUN ENTERPRISE 6500
			

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São Paulo, 27 de abril de 2000



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EMPRESA BRASILEIRA DE CORREIOS E TELÉGRAFOS/ECT
COMISSÃO ESPECIAL DE LICITAÇÃO DA ADMINISTRAÇÃO CENTRAL – CEL/AC
SBN Quadra 01 – Bloco A – 4º andar – Ala Norte
Brasília - DF

Ref. Concorrência nº. 001/2000 – CPL/AC

DECLARAÇÃO DE DESEMPENHO

Nós, da **Sun Microsystems do Brasil**, inscrita no CNPJ sob nº. 65.497.745/0001-53, estabelecida à Rua Alexandre Dumas, 2016 – Chácara Santo Antonio – 04717-004, São Paulo/SP., subsidiária da Sun Microsystems INC., declaramos que o Servidor Sun Enterprise 4500 ofertado pela licitante Dedalus Comércio e Sistemas Ltda., situada a Rua Jardim Ivone, 17 – 10º andar – Vila Mariana – São Paulo/SP, em sua proposta técnica, **SERVIDOR DE REDE TIPO RISC 3**, possui performance estimada com base no valor auditado para o mesmo equipamento de 28.724,61 TpmCE com 8 processadores de 400 MHz e 8MB de memória cache, calculando a partir da definição: $NPC \geq (TpmCE \times NPA) / TpmCA$, e é expansível a 50.268,07 TpmCA, com 14 processadores.

Por ser expressão da verdade, firmamos a presente.



SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antonio Alves
Country Manager

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São Paulo, 27 de abril de 2000

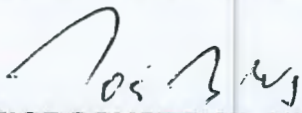
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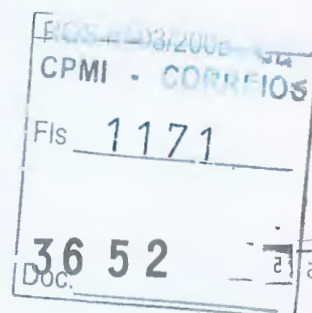
DECLARAÇÃO DE EXPANSIBILIDADE DE MEMORIA RAM

A Sun Microsystems do Brasil, inscrita no CNPJ sob nº. 65.497.745/0001-53, estabelecida na Rua Alexandre Dumas, 2016 - Chácara Santo Antonio - 04717-004, São Paulo/SP., subsidiária da Sun Microsystems Inc., DECLARA para os fins da participação da Dedalus Comércio e Sistemas Ltda., inscrita no CNPJ sob nº. 73.101.990/0001-28, na Licitação acima referenciada que o **SERVIDOR TIPO RISC 3 - E4500**, pode atingir o máximo de 28GB de memória Ram.

E por ser esta a expressão da verdade, assinamos a presente.


SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antonio Alves
Country Manager

5º Tabelionato de Notas - José Roberto Pacheco França - Tabelião
Av. João Dias, 2320-Santo Amaro - Fone: 56416092 NE 280400134123
Reconheço por semelhança a firma SUPRA de: JOAO ANTONIO ALVES.
Conferido por: Reginaldo
VALIDO SOMENTE COM O SELO DE AUTENTICIDADE
Valores: (R\$), CP de Abril de 2000
Firmas: R\$...: 1,49! Em testemunho
e. Códigos R\$...: 0,00!
Total: R\$...: 1,49! O Tabelião de Notas - Representante





Sun Enterprise™

3500–6500 Servers

Just the Facts



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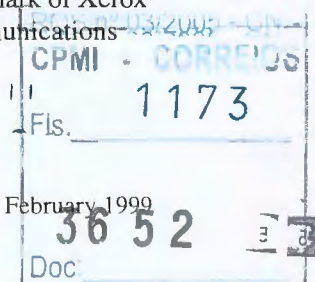
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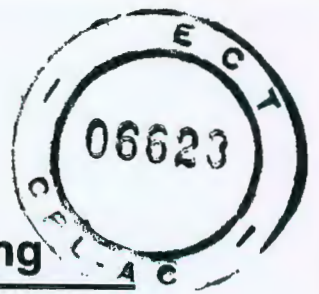
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Just the Facts





Sun Enterprise™ 3500–6500 Server Positioning

Product Overview

The Sun Enterprise™ server family is ideally suited for mission-critical network computing environments. Family members range from the entry-level Sun Enterprise Ultra™ 5S workgroup server up to the mainframe-class Sun Enterprise 10000 server. This document focuses on the Sun Enterprise 3500–6500 servers. These servers represent the next generation of the popular Sun Enterprise 3000–6000 servers, which have been enhanced in the following areas:

- System expandability
- Improved availability for internal disks
- Higher datacenter storage density
- Improved availability with Dynamic Reconfiguration and Alternate Pathing
- Improved investment protection for the Sun Enterprise 3500–5500 with the enhanced Gigaplane™ system interconnect

Product Line Enhancements in Sun Enterprise 3500–6500 Servers

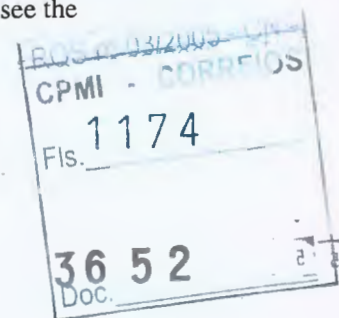
Enhanced Gigaplane™ System Interconnect

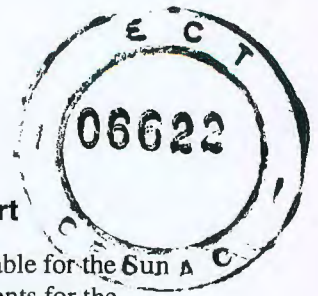
All of the Sun Enterprise 3500–6500 servers include a revised Gigaplane system interconnect. The Sun Enterprise 3000–6000 server Gigaplane bus has a maximum speed of 84 MHz. This bus is sufficient to support the UltraSPARC™ processors running at up to 336 MHz when operating with a 4:1 processor-to-Gigaplane speed ratio. The enhanced Gigaplane system bus on the Sun Enterprise 3500–5500 servers is capable of running up to 100 MHz, delivering a throughput of 3.2 GB per second. The Gigaplane system bus must run at 100 MHz in order to support the new 400-MHz UltraSPARC processor with 4 MB of external cache, without changing the processor-to-Gigaplane speed ratio. This new 400-MHz/4-MB processor is supported on the Sun Enterprise 3500–5500. The Gigaplane on the Sun Enterprise 6500 server cannot run at 100 MHz and therefore does not support this 400-MHz/4-MB processor. The maximum Gigaplane speed on the Sun Enterprise 6500 will remain at 84 MHz. Please note, however, that a future UltraSPARC processor which runs faster than 336 MHz will be available for the Sun Enterprise 6500 as well as the Sun Enterprise 6000 servers. Please see the “System Architecture” section for further details regarding the enhanced Gigaplane system interconnect.

New System Boards

New system boards (CPU/memory boards, SBus I/O boards, Graphics I/O boards, and PCI I/O boards) are available to support the Sun Enterprise 3500–6500 servers. These boards are designed to support the enhanced Gigaplane system bus. In addition, the on-board fibre channel sockets on the Graphics I/O board have been modified to support 100-MB-per-second Fibre Channel Arbitrated Loop (FC-AL) connectivity. These systems boards may also be used in the Sun Enterprise 3000–6000 servers. Please see the “CPU/Memory Board” and “I/O Board” sections for further details.

Sun Enterprise™ 3500–6500 Server Positioning





Availability of Sun Elite3D m6 and Creator3D series 3 Graphics Support

The high-performance graphics previously available in the Ultra workstations is now available for the Sun Enterprise 3500–6500 workstations. These products address the graphics market requirements for the superworkstation to technical server segments. In Sun Enterprise servers, the product is targeted at users who need the high-performance compute, memory, I/O, and other server support features. These users need more—more graphics, more CPUs, more I/O, more disk—to get their jobs done.

New Disk Board

The 4.2-GB disk board used on the Sun Enterprise 4000–6000 servers has been replaced by an 8.4-GB disk board. This disk board may be used in the Sun Enterprise 4500–6500 servers as well as the Sun Enterprise 4000–6000 servers.

Faster CD-ROM

All of the Sun Enterprise 3500–6500 servers include a new internal Sun StorEdge™ CD32 drive. These 32X CD-ROM drives (the drive reads information 32 times as fast as a music CD) are faster than the 12X CD-ROM drives that were included with the Sun Enterprise 3000–6000 servers.

Dynamic Reconfiguration

Dynamic Reconfiguration (DR) is the ability to alter the configuration of a running system by bringing components online or taking them offline without disrupting system operation or requiring a system reboot. With the availability of Dynamic Reconfiguration, system boards can be logically and physically included into the system configuration, or logically deactivated and removed while the system is running.

Dynamic Reconfiguration for I/O boards is available for Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers with Solaris™ 2.6 Hardware: 5/98 and Dynamic Reconfiguration for CPU/memory boards is expected to be available with a future version of the Solaris Operating Environment™ in the first half of calendar year 1999. Please refer to the “Reliability, Availability, and Serviceability” section for more details on Dynamic Reconfiguration.

Alternate Pathing

Alternate Pathing (AP) is an extension of Dynamic Reconfiguration. It allows dynamic reconfiguration of the I/O boards without disrupting the network or external storage connection. Alternate Pathing increases overall system availability by maintaining crucial network and storage access for mission-critical environments. As with Dynamic Reconfiguration, the Alternate Pathing feature has previously been available on the Sun Enterprise 10000 server platform. These features are currently unavailable on any other general purpose UNIX® platform.

Alternate Pathing is available for Sun Enterprise 3000–6000 server and Sun Enterprise 3500–6500 servers with Solaris 2.6 Hardware: 5/98. Please refer to the “Reliability, Availability, and Serviceability” section for more details on Alternate Pathing.

Sun Enterprise™ 3500–6500 Server Positioning



Just the Facts

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Product Platform-Specific Enhancements

Sun Enterprise 3500 Server

- **Additional System Slot:**

The Sun Enterprise 3500 server is an enhanced Sun Enterprise 3000 server with an additional system slot. The Sun Enterprise 3500 server supports five system boards and can, therefore, support up to eight UltraSPARC processors and 8 GB of memory, whereas the Sun Enterprise 3000 server accommodates four system boards with a maximum of six processors and 6 GB of memory. Alternatively, the additional system slot can be used to provide greater I/O connectivity.

- **Internal FC-AL Drives:**

The Sun Enterprise 3500 server has two internal disk banks (four disks per disk bank) that support up to eight 9.1-GB FC-AL disks, each with dual port connections, while the Sun Enterprise 3000 server supports ten internal SCSI disks with a single connection. The number of internal disks supported in the Sun Enterprise 3500 server was reduced in order to provide room for the additional system slot in the rear of the server. The newer drives, however, provide greater throughput and can be configured to increase the disk redundancy when compared to the Sun Enterprise 3000 server. Please see the "Sun Enterprise 3500 System Cabinet" section for further details.

Sun Enterprise 4500 Server

The only differences from the current Sun Enterprise 4000 server are the enhanced Gigaplane system bus and the faster 32X CD-ROM mentioned in the "Product Line Enhancements" above.

Sun Enterprise 5500 Server

In addition to the faster Gigaplane system bus and 32X CD-ROM changes, the Sun Enterprise 5500 server is now housed in a taller, data center cabinet. The new cabinet is 68 inches tall, compared to 56 inches for the Sun Enterprise 5000 cabinet. The taller cabinet was designed to support additional storage devices such as an additional Sun StorEdge A5X00 array without increasing the system footprint. The width and depth of the new data center cabinet remain the same as the Sun Enterprise 5000 cabinet.

Sun Enterprise 6500 Server

As with the Sun Enterprise 5500 server, the Sun Enterprise 6500 server includes the 32X CD-ROM and is also housed in a new, 68-inch data center cabinet, compared to 56 inches for the Sun Enterprise 6000 cabinet. As indicated earlier, the Gigaplane system bus on the Sun Enterprise 6500, unlike the Sun Enterprise 3500-5500 servers, does not run faster than 84 MHz.

Sun Enterprise™ 3500-6500 Server Positioning

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Key Messages

The Sun Enterprise servers offer excellent performance, reliability, availability, and serviceability (RAS), along with expandability, investment protection, and upgradability (Performance excellence can be substantiated by comparing Sun Enterprise 6500 SPECint-rate95, SPECfp_rate95, and TPC-C results to competitive systems from HP, IBM, and DEC /Compaq).

- **Performance**

The Sun Enterprise 3500–6500 servers share a common architecture that is designed to offer balanced system performance. The systems feature outstanding integer and floating-point performance, supporting up to thirty UltraSPARC modules in the Sun Enterprise 6500 server. The system interconnect, the Gigaplane bus, delivers 2.68-GB-per-second throughput at 84 MHz and 3.2-GB-per-second at 100 MHz. High-speed networking is supported with integrated 10/100 Mb Ethernet and optional FDDI, ISDN, Token Ring, and ATM interfaces. Fast I/O capability is supported through either 64-bit/25 MHz SBus or 64-bit/66 MHz PCI channels.

- **Reliability, Availability, and Serviceability**

Extensive RAS capabilities are among the key strengths of the Sun Enterprise 3500–6500 servers. For details on these features, see “Reliability, Availability, and Serviceability” later in this document.

- **Expandability**

Sun Enterprise 3500–6500 servers can be expanded from small, entry-level configurations to system configurations that handle terabytes of data and thousands of users.

- **Scalability**

Sun Enterprise 3500–6500 servers are designed as highly modular systems. Customers can easily configure these systems to meet their application requirements by using the appropriate mix of CPU/memory boards and I/O boards. In addition, as their computing or I/O performance needs increase, customers can easily increase the capability of these systems by simply adding UltraSPARC modules, memory modules, or I/O boards. The high-throughput Gigaplane system bus and I/O architecture eliminate system bottlenecks and provide balanced system performance, even in a system with the maximum number of UltraSPARC modules or I/O devices.

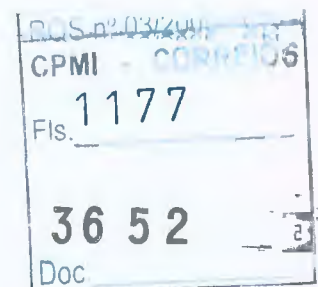
- **Investment Protection**

Virtually all of the components used in the Sun Enterprise 3500–6500 servers are interchangeable. These components include CPU/memory boards, I/O boards, disk boards, UltraSPARC modules, memory modules, power/cooling modules, clock boards, and peripherals. Therefore, when upgrading to a larger system (for example, from a Sun Enterprise 4500 server to a Sun Enterprise 6500 server), customers can move these components from the existing system to the new system, protecting their investment. Even the previous-generation Sun Enterprise 3000–6000 server components can be carried over to the Sun Enterprise 3500–6500 server.

- **Upgradability**

The modular design of the Sun Enterprise 3500–6500 servers means that upgrading to new technologies and higher performance is easy. These systems are designed to support future generations of UltraSPARC processors, disk arrays, tape devices, and networking interface cards.

Sun Enterprise™ 3500–6500 Server Positioning





Sun Enterprise 3500-6500 Server Key Facts

- Each server can support multiple processors:

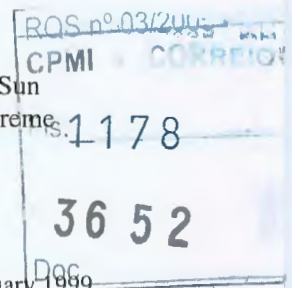
Sun Enterprise 3500	Sun Enterprise 4500-5500	Sun Enterprise 6500
1-8	1-14	1-30

- The Sun Enterprise 3500-6500 servers can be ordered with 250-MHz/4-MB or 336-MHz/4-MB UltraSPARC modules.
- The Sun Enterprise 3500-5500 servers can also be ordered with the 400-MHz/4-MB UltraSPARC modules.
- 167-MHz/0.5-MB, 167-MHz/1-MB, and 250-MHz/1-MB UltraSPARC modules are supported when carried over from existing Sun Enterprise 3000-6000 systems.
- The Gigaplane system bus delivers a throughput rate of 2.68 GB per second at 84 MHz (when using the 167-MHz, 250-MHz or 336-MHz processors). This throughput rate increases to 3.2 GB per second when running at 100 MHz (when using the 400-MHz processors in the Sun Enterprise 3500-5500).
- Several boards can be installed in each server:

Sun Enterprise 3500	Sun Enterprise 4500-5500	Sun Enterprise 6500
Up to 5 boards	Up to 8 boards	Up to 16 boards

- Five types of plug-in boards are available:
 - CPU/memory board
 - SBus, Graphics, and PCI I/O boards
 - Disk board (Sun Enterprise 4500, Sun Enterprise 5500, and Sun Enterprise 6500 only)
- CPU/memory boards can support up to two UltraSPARC modules and two memory banks (up to 2 GB).
- CPU/memory boards are hot pluggable. Hot-swap software support (Dynamic Reconfiguration) will be available with an upcoming version of the Solaris 7 Operating Environment.
- The SBus I/O board with FC-AL has three SBus slots, two empty FC-AL sockets, one fast/wide SCSI port, and one 10/100-Mb-per-second Ethernet port. This board has two SBus channels.
- Graphics I/O boards contain two SBus slots, one UPA slot for a Creator3D or Sun Elite3D graphics board, two empty FC-AL sockets, one fast/wide SCSI port, and one 10/100-Mb Ethernet port. This board has one SBus channel.
- PCI I/O boards have two PCI slots, on-board fast/wide SCSI, and 10/100-Mb-per-second Ethernet. This board has two PCI-66 (66-MHz, 64-bit) channels and two standard PCI (33-MHz, 32-bit) channels.
- I/O boards are hot swappable with the Alternate Pathing and Dynamic Reconfiguration software (Solaris 2.6 Hardware: 5/98).
- The 8.4-GB disk board contains two 4.2-GB, 7200-rpm, fast/wide SCSI-2 disk drives.
- The Sun Enterprise 3500-6500 servers support redundant, hot-swappable power/cooling modules.
- The Sun Enterprise 3500-6500 servers run on the following operating environments: Solaris 2.5.1 Hardware: 11/97 (or later), Solaris 2.6 Hardware: 3/98 (or later) or the Solaris 7 Operating Environment.
- Memory options include 256 MB (8 x 32-MB modules) and 1 GB (8 x 128-MB modules).
- Floor brackets may be installed to help prevent the Sun Enterprise 3500, Sun Enterprise 5500, Sun Enterprise 6500 servers, and Sun Enterprise expansion cabinet from shifting in the event of extreme floor movement.

Sun Enterprise™ 3500-6500 Server Positioning





- The Sun Enterprise 4500 may be rack mounted into a Sun Enterprise expansion cabinet or Sun Enterprise 5500 or 6500 system cabinet.
- The Sun StorEdge A5X00 arrays, Sun StorEdge A1000/D1000 disk trays, Sun StorEdge FlexiPack removable storage trays, and Sun StorEdge Tape Libraries may be installed in the Sun Enterprise 5500 or Sun Enterprise 6500 system cabinet.

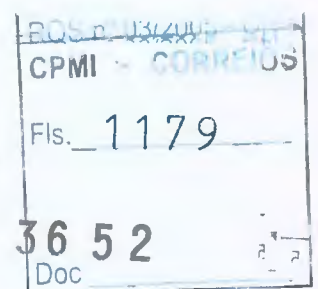
Performance Comparison

The table below illustrates the significant performance increases from the entry-level Sun Enterprise 3500 to the high-end Sun Enterprise 6500 server. (Results are based on 400-MHz, 4-MB Ecache modules for the Sun Enterprise 3500-5500 and 336-MHz, 4-MB Ecache modules for the Sun Enterprise 6500.) The SPECint_rate95, SPECfp_rate95, and LADDIS results are available at <http://www.specbench.org/results.html>.

Specifications	Sun Enterprise 3500 (8 CPUs)	Sun Enterprise 4500 (12 CPUs)	Sun Enterprise 5500 (12 CPUs)	Sun Enterprise 6500 (30 CPUs)
Processor	400 MHz/4 MB	400 MHz/4 MB		336 MHz/4 MB
Sun Microsystems relative OLTP performance (based on Solaris 7) ⁱ	7.92	10.72		14.74 (24 CPUs)
SPECint_rate95	1,234	1,828		3,480 (30 CPUs)
SPECfp_rate95	1,611	2,209		3,021 (30 CPUs)
LADDIS (based on Solaris 2.6)	11,681@15.8 (6 x 336 MHz CPUs)	21,192@15.7 (12 x 336 MHz CPUs)		28,993@20.4 (24 CPUs)
Linpack DP 1000 (based on Sol. 2.6)	2.95	4.50 (14 CPUs)		5.19 (30 CPUs)
Linpack DP Rmax (based on Sol. 2.6)	5.77	10.05 (14 CPUs)		17.89 (30 CPUs)

ⁱ Relative OLTP performance compared to an Sun Enterprise server with a single 336-MHz UltraSPARC processor with 4-MB Ecache

Sun Enterprise™ 3500-6500 Server Positioning





The following table shows a performance comparison of the SPARCserver™ 1000E, the Sun Enterprise 3000–5000, and Sun Enterprise 3500–5500 servers.

Performance Type	SPARCserver 1000E	Sun Enterprise 3000	Sun Enterprise 3500	Sun Enterprise 4000/4500/5000/5500
Relative CPU performance				
• integer	1 (8)	approx. 4.1 (6)	approx. 6.6 (8)	approx. 11.3 (14)
• floating point	1 (8)	approx. 5.3 (6)	approx. 8.2 (8)	approx. 12.6 (14)
System bus throughput	312 MB/sec.	2.68 GB/sec. @84 MHz 3.2 GB/sec. @100 MHzⁱ		
Memory latency	1200 ns	approx. 300 ns		approx. 300 ns
Networking performance	10 MB/sec.	100 MB/sec.		
I/O performance (aggregate)	1-to-4 SBuses, 100 MB/sec. each	1-to-6 SBuses, 200 MB/sec. each 1-to-6 PCI buses, 528 MB/sec. each	1-to-8 SBuses, 200 MB/sec. each 1-to-8 PCI buses, 528 MB/sec. each	1-to-14 SBuses, 200 MB/sec. each 1-to-12 PCI buses, 528 MB/sec. each
SCSI performance	10 MB/sec.	20 MB/sec.		
Fibre channel performance	25 MB/sec.	100 MB/sec.		

ⁱ The Sun Enterprise 3000–5000 servers require a Gigaplane field upgrade to run the Gigaplane system bus at 100 MHz.

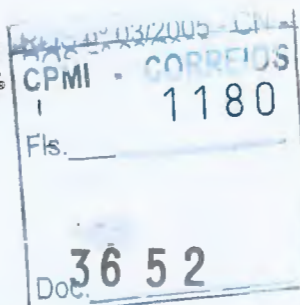
The following table shows a performance comparison of the SPARCcenter™ 2000E and the Sun Enterprise 6000 and 6500 servers:

Performance Type	SPARCcenter 2000E	Sun Enterprise 6000/6500
Relative CPU performance		
• integer	1 (20)	approx. 5.6 (30)
• floating point	1 (20)	approx. 7.6 (30)
System bus throughput	625 MB/sec.	2.68 GB/sec. @84 MHz
Memory latency	1200 ns	approx. 300 ns
Networking performance	10 MB/sec.	100 MB/sec.
I/O performance	1 to 10 SBuses, 100 MB/sec.	1 to 30 SBuses, 200 MB/sec. each 1 to 12 PCI buses, 528 MB/sec. each
SCSI performance	10 MB/sec.	20 MB/sec.
Fibre channel performance	25 MB/sec.	100 MB/sec.

Sun Enterprise™ 3500–6500 Server Positioning



Just the Facts



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Product Line Summary

The Sun Enterprise family of servers is targeted at strategic markets chosen by Sun: manufacturing, finance, telecommunications, government, education, health care, retail, design automation, and oil and gas. The following pages describe how each server in the Sun Enterprise family has different characteristics and is therefore deployed in a different capacity within the target markets.

Target Markets and Users for the Sun Enterprise 3500 Server

The Sun Enterprise 3500 server is an affordable server with unprecedented power and reliability in its class. The Sun Enterprise 3500 server enables customers to deploy sophisticated business and technical applications with the kind of performance and reliability previously available only in very expensive, large-scale systems.

The Sun Enterprise 3500 server is ideal for customers who need application servers with tremendous network throughput and processing power, in addition to high reliability, availability, and serviceability. The Sun Enterprise 3500 server is also ideal for price-sensitive customers who need integrated storage or want the investment protection offered by an expandable family of servers. Typical Sun Enterprise 3500 server customers may already own a SPARCserver 20 or an entry-level SPARCserver 1000E system.

The Sun Enterprise 3500 server is recommended for running the new generation of network-based business programs, such as SAP R/3, Oracle Financials, or PeopleSoft Human Resources. The Sun Enterprise 3500 server is also recommended for use in technical environments. The Sun Enterprise 3500 server can be used for running dedicated, computation-intensive applications and high-end graphics applications, such as ECAD and MCAD.

Sun also offers the Sun HPC 3500 which combines the Sun Enterprise 3500 server with High-Performance Computing (HPC) software that allows the platform to scale in the most demanding technical and supercomputing environments.

The Sun Enterprise 3500 server is designed to be primarily a single-enclosure system; however, it does support external peripherals such as the Sun StorEdge A1000, D1000, A3500 and Sun StorEdge A5X00 products. The Sun Enterprise 3500 server should be recommended over the Sun Enterprise 450 server when the customer requires more than four CPUs and 4 GB of memory, or when the customer needs the expandability and investment protection offered by the Sun Enterprise 3500-6500 server family.

Target Markets and Users for the Sun Enterprise 4500 Server

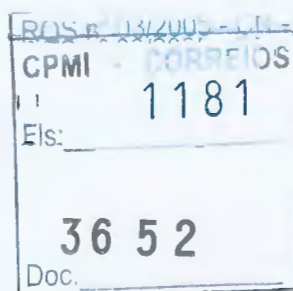
The Sun Enterprise 4500 server is a versatile server with exceptional value and scalability for companies requiring an affordable business server with tremendous computing power, plus the ability to scale system performance and capacity as their needs grow.

The Sun Enterprise 4500 server is ideal for customers who need an enterprise-wide application server with high reliability, availability, and serviceability. Typical Sun Enterprise 4500 server customers may already own a six-to-eight CPU SPARCserver 1000E system.

The Sun Enterprise 4500 server is recommended for running business-critical applications that support thousands of users. These applications include large departmental databases, customer-management applications, or decision-support applications.

The Sun Enterprise 4500 server is recommended over the Sun Enterprise 3500 server if the customer's I/O and CPU growth requirements go beyond the capacity of the Sun Enterprise 3500 server.

Sun Enterprise™ 3500-6500 Server Positioning





Target Markets and Users for the Sun Enterprise 5500 server

The Sun Enterprise 5500 server is a scalable and reliable datacenter server capable of running mission-critical applications, supporting thousands of users.

The Sun Enterprise 5500 server is ideal for customers who have mainframe-class system requirements. With features previously available only in proprietary fault-tolerant and mainframe systems, the Sun Enterprise 5500 server has a comprehensive set of uptime features. Typical Sun Enterprise 5500 server customers may already own a six-to-eight CPU SPARCserver 1000E system in a stacker unit or data center cabinet. Typical Sun Enterprise 5500 server customers may also have two-to-six CPU SPARCcenter 2000E systems.

The Sun Enterprise 5500 server is recommended over the Sun Enterprise 4500 server if the customer needs a rack-mount system with integrated mass storage. The Sun Enterprise 5500 server is also ergonomically better suited for a data center environment because it has easily accessible CD-ROM and tape drives and direct access to the Sun StorEdge tape library. The Sun Enterprise 5500 server also has an enhanced warranty which includes more comprehensive ServerStartSM system installation compared to basic installation on the Sun Enterprise 4500 server.

Target Markets and Users for the Sun Enterprise 6500

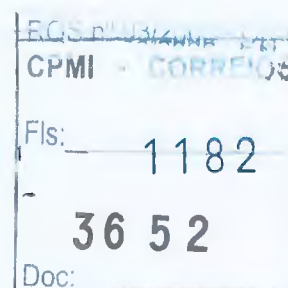
The Sun Enterprise 6500 server is ideal for customers who need to build network computing applications of a size and scale that previously required mainframes. The customer receives the benefits of improved data access and flexibility even as databases grow to multiple terabytes. Typical Sun Enterprise 6500 server customers may already own large SPARCcenter 2000 systems.

The Sun Enterprise 6500 server offers more than twice the CPU and memory expandability of the Sun Enterprise 5500. The Sun Enterprise 6500 server should be recommended when the Sun Enterprise 5500 server does not offer enough expandability. The Sun Enterprise 6500 server should be recommended over the Sun Enterprise 10000 server when:

- The customer's simultaneous processing and I/O requirements can be met with one Sun Enterprise 6500 server
- The Sun Enterprise 6500 server meets the customer's availability requirements
- Customer is driven to clustering for seamless failover requirements
- Customer prefers to distribute smaller systems rather than take a centralized approach with one large system

The Sun Enterprise 6500 server should be recommended over the Sun Enterprise 5500 server when the Sun Enterprise 5500 server does not offer enough CPU and I/O growth for the customer.

Sun EnterpriseTM 3500-6500 Server Positioning





Target Markets and Users for the Sun Enterprise 10000

The Sun Enterprise 10000 server is the industry's highest-performance (according to TPC-D results.), most-balanced SMP system (competitors of the Sun Enterprise 10000 do not have SMP, but NUMA or MPP). It has the highest availability in UNIX systems other than fault-tolerant systems. The Sun Enterprise 10000 server has the following high-availability features, which the competitors do not have: fault-tolerant power/cooling, dynamic reconfiguration with hot-swappable system boards, alternate pathing, dynamic domains and fail-over between internal domains. Other features employed by the Sun Enterprise 10000 server and the competitors include system service processor and clustering.

Its RAS features are comparable to mainframes. In fact, it can be configured to have no single point of hardware failure.

The Sun Enterprise 10000 server is targeted for high-end commercial and technical markets. Key applications include data warehousing, data mining, high-volume OLTP, LAN consolidation, analytics, and Internet/intranet.

The Sun Enterprise 10000 server should be recommended over the Sun Enterprise 6500 server when:

- The customer's simultaneous processing and I/O requirements cannot be met with one Sun Enterprise 6500 server
- Customer's availability requirements cannot be met by one Sun Enterprise 6500 server
- There is no reason to prefer clustered Sun Enterprise 6500 servers over one Sun Enterprise 10000 server (for example, if failover is not required)
- System administration prefers one large, centralized system (potentially split into domains) over multiple, smaller ones

Note: See Sun Enterprise 10000 server Just the Facts for more detailed information on this product.

Sun Enterprise™ 3500-6500 Server Positioning

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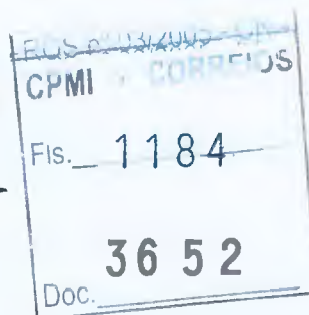


Product Line Comparisons

Product	Positioning	Applications	Markets
Sun Enterprise 10000	Highest-end server for customers who require the highest performance and availability. For main-frame-class, mission-critical applications.	- Data warehousing - Data mining - High-volume OLTP - LAN consolidation - Analytics - Internet/intranet	- Financial services - Telecommunications - Government - Petroleum - Education
Sun Enterprise 6500	Highly scalable and expandable, offering performance and availability required for large-scale database applications.	- Data warehousing - Data mining - Business apps - CMS™ OLTP - NFS™ - Design automation - Analysis and simulation - Video	- Manufacturing - Finance - Telecommunications - Government - Education - Healthcare - Retail - Oil and gas - Pharmaceuticals - Chemical - Internet commerce
Sun Enterprise 5500	Affordable datacenter system designed to deliver high performance and high availability for enterprise-wide applications supporting thousands of users.		
Sun Enterprise 4500	Highly expandable yet compact system delivering high-performance scalability for department applications in a distributed network-computing environment.		
Sun Enterprise 3500	An affordable system for departmental business applications supporting up to hundreds of users in office environments. For customers that want the investment protection of an upgrade path in an expandable family of servers.	- Database server - Business apps - NFS - CMS - Graphics/imaging - Modeling, simulation analysis - Video	- Manufacturing - Finance - Telecommunications - Government - Education - Healthcare - Retail - Oil and gas - ECAD/MCAD - Internet commerce
Sun Enterprise 450	Affordable high-performance SMP network application server. Ideal for workgroups, larger web sites, branch offices or distributed enterprise applications.	- Database server - Business apps - OLTP - NFS - Internet gateway - Web mail services - Groupware	- Manufacturing - Finance - Telecommunications - Government - Education - Retail - Healthcare

Sun Enterprise™ 3500-6500 Server Positioning

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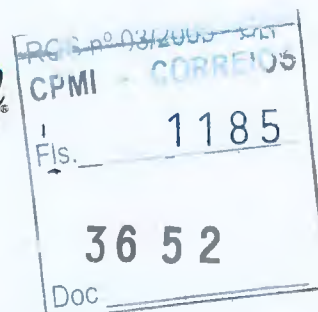
Product Line Specification Summary

The following chart illustrates the specifications of the Sun Enterprise Server product line.

Specifications	Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500	Sun Enterprise 6500	Sun Enterprise 10000
Packaging	Tower/Deskside	Tabletop	Datacenter Cabinet		
Number of CPUs	1 to 8	1 to 14		1 to 30	16 to 64
CPU clock rate	250 MHz, 336 MHz, 400 MHz				
Ecache per CPU	4 MB				
Maximum memory	8 GB	14 GB		30 GB	64 GB
System bus	2.68 GB/sec.@84 MHz 3.2 GB/sec.@100 MHz ⁱ				10.67 GB/sec@84 MHz 12.8 GB/sec.@100MHz
Maximum SBus/PCI slots	SBus: 12 PCI: 8	SBus: 21 PCI: 12		SBus: 45 PCI: 12	64
Maximum internal disk	72.8 GB	33.6 GB	720 GB	576 GB	191 GB
Maximum total disk	> 6 TB	>10 TB	>10 TB	>20 TB	> 20 TB
Maximum number Creator3D/ Sun Elite3D m6 graphics boards	3	4		8	—
RAS features (see “Reliability, Availability, and Serviceability” section for complete RAS details)	• Hot-plug boards • Hot-swap power • Hot-swap cooling • Redundant power • ASR • Remote control • ECC-protected data paths • ECC memory • CPU power control (Solaris 2.6 Operating Environment) • Hot-swap FC-AL disks • RAID 0, 1, 5 • Hot-disk sparing				• Hot-swap boards • Fault-tolerant power • ASR • Hostview • Remote control • ECC-protected data paths • ECC memory • Dynamic domains
RAS features with Solaris 2.6 Hardware: 5/98	Dynamic Reconfiguration (Hot swap for I/O boards) Alternate Pathing				Currently available
Latest RAS and Resource Management features	Sun Enterprise SyMON™ (replaced Solstice SyMON™ Solaris Resource Manager)				
Future RAS features	Dynamic Reconfiguration (Hot swap for CPU/memory boards)				Currently available

Sun Enterprise™ 3500-6500 Server Positioning

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Specifications	Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500	Sun Enterprise 6500	Sun Enterprise 10000
Operating Environment	Solaris 2.5.1 Hardware: 11/97 ⁱⁱ or Solaris 2.6 Hardware: 3/98 ⁱⁱⁱ (or later) or Solaris 7				
Warranty (may vary according to geography)	One year, next day, on site 8-hour phone		One year, 4 hours, on site 4-hour phone		

- ⁱ Sun Enterprise 6500 system bus cannot run at 100 MHz, and, therefore, does not support the 400-MHz/4-MB UltraSPARC processor.
- ⁱⁱ Two patches are required for Sun Enterprise 3500–6500 servers running Solaris 2.5.1 Hardware: 11/97. Please refer to the “Solaris Operating Environment” section for details.
- ⁱⁱⁱ Although Dynamic Reconfiguration and Alternate Pathing have been available on the Sun Enterprise 10000 server when running Solaris 2.5.1 Operating Environment, a minimum of Solaris 2.6 Hardware: 5/98 is required for these features when running the Solaris 2.6 Operating Environment.

Sun Enterprise™ 3500–6500 Server Positioning

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Reliability, Availability, and Serviceability

The Sun Enterprise™ 3500–6500 servers offer excellent reliability, availability, and serviceability (RAS) features. They have the most availability features in their class.

Reliability

- Passive, centerplane bus (Sun Enterprise 4000–6000 and Sun Enterprise 4500–6500 servers), or backplane bus (Sun Enterprise 3000 and Sun Enterprise 3500 server), increases mean time between failures (MTBF) of the system compared to previous-generation servers
- Simple, elegant, centerplane bus design reduces the amount of bus circuitry required, increasing the MTBF of the system
- Current-sharing power circuitry supports redundant power capability
- ECC-protected data throughout the system increases data integrity
- Parity-protected address and control signals increase the integrity of these signals

Availability

- Effective system diagnostics minimize downtime
- Multiple UltraSPARC™ modules, CPU/memory boards, and I/O boards provide redundancy
- Redundant power supplies and current-sharing power circuitry keep the system running if a power supply fails
- Enhanced Automatic System Recovery (ASR) quickly reconfigures the system around any failed components
- Dual variable-speed fans in each power/cooling module keep the system cool if one fan within a module fails
- Dual disk array host interfaces
- Dual, independent connections to FC-AL internal disks (Sun Enterprise 3500 server)
- CPU Power Control (available with the Solaris™ 2.6 Operating Environment) removes an active CPU from the system configuration and powers it off if environmental sensors detect that the processor is running too hot due to a cooling problem. This is done without any interruption to running processes and without a reboot of the server
- Remote administration control allows remote reboots and power cycling
- The Sun Enterprise SyMON™ system monitor software, which is included with the Sun Enterprise 3500–6500 servers, maximizes uptime by predicting hardware failures

Reliability, Availability, and Serviceability

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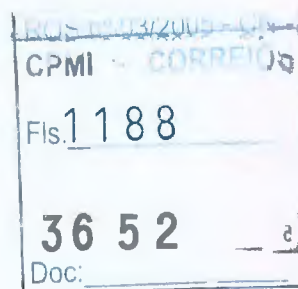


- The Sun Enterprise SyMON software also provides an easy user interface and multi-system management capability
- Redundant, time-of-day clock
- Dynamic Reconfiguration of I/O boards (Solaris 2.6 Hardware: 5/98) and CPU/memory boards (future Solaris 7 Operating Environment release) allows boards to be attached to and detached from the system online, without requiring a reboot
- Alternate Pathing (Solaris 2.6 Hardware: 5/98) enables the network or storage connection to be moved from an active controller to a stand-by controller, thereby enabling Dynamic Reconfiguration of the I/O boards while preserving the network/storage connection
- Solaris Resource Manager provides the ability to allocate critical resources such as CPU and virtual memory to specific applications or users. This provides efficient utilization of resources and availability of resources for important applications - thus specific service levels can be delivered.

Serviceability

- Modular system design makes it easy to replace failed components
- Hot-swap I/O boards (Solaris 2.6 Hardware: 5/98) make it possible to perform a full hardware installation and reconfiguration without system interruption
- Hot-plug CPU/memory boards make it possible to perform the hardware installation without system interruption (CPU/memory boards will become hot-swap once Dynamic Reconfiguration becomes available with upcoming release of the Solaris 7 Operating Environment)
- Hot-swap power/cooling modules make it easy to replace failed modules or to upgrade the power and cooling capacity of the system
- Ability of Sun Enterprise SyMON software to notify a system administrator of a failure allows the system administrator to determine immediately which components have failed and need to be serviced
- Ability of Sun Enterprise SyMON software to predict memory and disk failures enables proactive hardware service and prevents hard failures
- Ability of Sun Enterprise SyMON to monitor all of the Solaris systems in the network from any desktop (UNIX®, Windows NT, Macintosh, etc)
- Improved remote administration control allows users to reboot and power cycle in a "lights out" environment
- Sun Validation Test Suite (SunVTS™) allows users to perform UNIX diagnostics

Reliability, Availability, and Serviceability





New RAS Features

Dynamic Reconfiguration

Dynamic Reconfiguration is the ability to alter the configuration of a running system by bringing components online or taking them offline without disrupting system operation or requiring a system reboot. With the availability of Dynamic Reconfiguration, system boards can be logically and physically included in the system configuration, or logically deactivated and removed while the system is running.

This is particularly useful in mission-critical environments if a system board has failed and needs to be replaced or if new system boards need to be added to the system for additional performance and capacity.

Dynamic Reconfiguration increases system availability and flexibility by allowing the hot-swap CPU/memory and I/O board functionality that the Sun Enterprise 3000–6000 server hardware has supported from the beginning. Hot-swap functionality means that the components can be physically and logically removed or added while the system is running.

Dynamic Reconfiguration has previously been available only on the Sun Enterprise 10000 server within the Sun Enterprise server product line. This feature is currently unavailable with any other general purpose UNIX platform. Dynamic Reconfiguration includes:

- **Dynamic attach:** Logically (rather than physically) including I/O boards and CPU/memory boards into the system configuration and making them available for use without rebooting the system. For example, both I/O boards and CPU/memory boards can be installed and logically attached while the system is online.
- **Dynamic detach:** Logically (rather than physically) removing components from a configuration, including taking the components offline and powering them down, thus making them ready for physical removal.

Dynamic Reconfiguration for I/O boards is available for Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers with Solaris 2.6 Hardware: 5/98 and Dynamic Reconfiguration for CPU/memory boards is expected to be available with a future version of the Solaris 7 Operating Environment in the first half of calendar 1999. Note that Dynamic Reconfiguration for I/O boards requires Flashprom software release 3.2.14 or later.

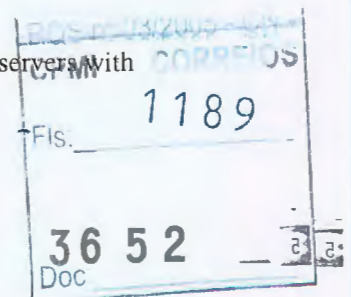
Please refer to *Availability Features in the Sun Enterprise 3500 to Sun Enterprise 6500 Server Family—A Technical White Paper* for more information on Dynamic Reconfiguration.

Alternate Pathing

Alternate Pathing is an extension of Dynamic Reconfiguration that enhances network and external storage availability. It allows dynamic reconfiguration of the I/O boards without disrupting the network or external storage connection. For example, assume that the active Ethernet connection resides on an I/O board that needs to be removed from the system. Removal of the I/O board means that the Ethernet controller must be taken offline, however that would disconnect the network access. Alternate Pathing provides the ability to switch the logical Ethernet connection to another, stand-by Ethernet controller residing on a different I/O board, thereby enabling the I/O board with the original Ethernet connection to be removed without any disruption to the network connection.

Alternate Pathing is available for Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers with Solaris 2.6 Hardware: 5/98.

Reliability, Availability, and Serviceability





System Architecture

Overview

The Sun Enterprise™ 4500, Sun Enterprise 5500, and Sun Enterprise 6500 servers are designed around a centerplane, with system slots in both the front and rear. Each slot can accommodate either a CPU/memory, I/O, or disk board with some limitations. Almost any combination of boards is allowed, as long as the required minimum of one CPU/memory board and one I/O board is met. One I/O board must be inserted into slot 1 in order to provide the SCSI connection to the CD-ROM drive and the optional internal tape device. In addition, the Sun Enterprise 4500 and Sun Enterprise 5500 servers support a maximum of four 8.4-GB disk boards, while the Sun Enterprise 6500 server supports a maximum of two disk boards.

The Sun Enterprise 3500 server is the smallest member of the Sun Enterprise 3500–6500 server family. There is little need for a centerplane arrangement because it has only five slots. The centerplane arrangement allows for larger configurations in less physical space. Intended as a deskside system, the Sun Enterprise 3500 server uses a traditional backplane configuration with all five boards plugged into one side of the system. The Sun Enterprise 3500 server also has internal mounting for up to eight FC-AL 3.5 x 1.6-inch (or 1.0-inch) disks along with a CD-ROM and tape drive.

Each CPU/memory board in the Sun Enterprise 3500–6500 servers supports up to two UltraSPARC™ modules and 2 GB of memory (see the “CPU/Memory Board” section for more details). SBus, Graphics, and PCI I/O boards are available for the Sun Enterprise 3500–6500 servers (see the “I/O Boards” section for more details). CPU/memory boards, I/O boards, power/cooling modules, and clock boards are interchangeable within the Sun Enterprise 3500–6500 product line. The clock board contains the keyboard and mouse port, two serial ports, time-of-day clock, and the IDPROM. The frequency of the clock, the processor clock, and the system clock are all programmable through firmware.

System Architecture

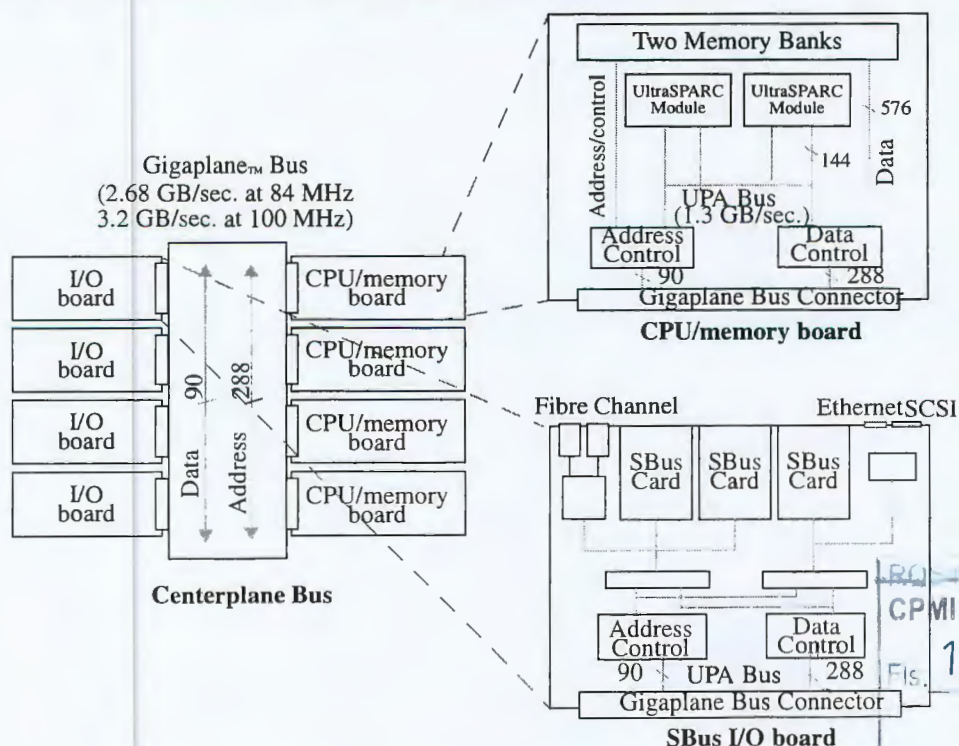


Figure 1. The Sun Enterprise 3500–6500 system bus architecture





System Bus

The system bus for the Sun Enterprise 3500–6500 servers is the Gigaplane™ system bus, a packet-switched bus. This bus has a split-transaction design with separate buses for address and data. This design provides a faster transfer rate than system buses that have the same paths for address and data.

The Gigaplane system bus has been revised from the one used in the Sun Enterprise 3000–6000 servers, which has a maximum speed of 84 MHz—sufficient to support the UltraSPARC processors running at up to 336 MHz when operating with a 4:1 processor-to-Gigaplane speed ratio. The enhanced Gigaplane system bus on the Sun Enterprise 3500–5500 servers runs at a rate of up to 100 MHz. This enables support for the new 400-MHz/4-MB UltraSPARC processor without changing the processor-to-Gigaplane speed ratio. The maximum throughput is 2.68 GB per second at 84 MHz and 3.2 GB per second at 100 MHz.

The physical length of the Gigaplane in the Sun Enterprise 6500 (and Sun Enterprise 6000) prohibits the Gigaplane from running at 100 MHz. The maximum Gigaplane speed on the Sun Enterprise 6500 will remain at 84 MHz. As a result, with a 4:1 processor-to-Gigaplane speed ratio, this new 400-MHz processor cannot be supported. A future UltraSPARC processor, with a clock speed greater than 336 MHz will be available for the Sun Enterprise 6500 as well as the Sun Enterprise 6000.

In order to realize the increased Gigaplane bus speed, the Sun Enterprise 3500–5500 servers ship with new, enhanced CPU/memory and I/O boards that are also capable of running at 100 MHz. These boards are backwards compatible and will, therefore, be supported on existing Sun Enterprise 3000–6000 systems. However, the maximum Gigaplane speed will be limited to 84 MHz, unless the Gigaplane is upgraded (see the “Upgrades” section for details).

In addition, the previous-generation of CPU/memory boards and I/O boards (84-MHz boards) are supported on the Sun Enterprise 3500–6500 servers (no factory installation). However, such systems run the Gigaplane system bus at a maximum of 84 MHz.

The previous-generation Sun Enterprise 3000–5000 systems are field upgradeable to support the enhanced Gigaplane speed of up to 100 MHz and thereby support the new 400-MHz processor. The upgrade involves system boards, UltraSPARC modules, and a base package upgrade kit. The base package upgrade kit varies among the server models and may include a new clock board, Gigaplane centerplane, and an enhanced SCSI peripheral tray for the Sun Enterprise 5000 system. In most cases, the clock board and four-slot backplane can run the Gigaplane system bus at up to 100 MHz in the Sun Enterprise 3000 server without requiring a base package upgrade (see the “Upgrades” section for details).

The Ultra™ Port Architecture (UPA) bus is used as an intermediate bus connecting CPU/memory boards and I/O boards to the Gigaplane bus. The UPA bus also runs at the same speed as the Gigaplane system bus, with a peak throughput of 1.3 GB per second at 84 MHz and 1.55 GB per second at 100 MHz.

Reducing the memory latency of the system bus was one of the primary system bus design goals. The memory latency for the Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers is approximately one-fourth the memory latency of the SPARCcenter™ 2000E system. This reduction was the result of the following design changes:

- **Separate address, data, and control signals.** In the SPARCserver™ 1000E system, the address and data shared the same bus. In the Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers, the address and data use separate buses. This allows read requests to be transmitted on the address bus at the same time data from the previous read request is being transmitted on the data bus.
- **Wider data buses.** The data buses throughout the Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers are two-to-four times wider than the data buses in the SPARCserver 1000E systems.

System Architecture



Just the Facts





Data Bus	Sun Enterprise 3000-6000; Sun Enterprise 3500-6500	SPARCserver 1000E	Difference compared to SPARCserver 1000E	SPARCcenter 2000E	Difference compared to SPARCcenter 2000E
Memory data bus	576 bits	72 bits	8 times	144 bits	4 times
Data bus	288 bits	72 bits	4 times	72 bits	2 times
CPU data bus	144 bits	64 bits	2 times	64 bits	2 times

- **Faster bus.** The Gigaplane bus, which runs at 84 MHz (with the potential of running up to 100 MHz), is faster than the 50-MHz XDBus™ used in the SPARCserver 1000E and SPARCcenter 2000E.
- **Enhanced arbitration cycles.** Zero cycle arbitration mode, used in certain situations, greatly reduces bus arbitration time. Additionally, by using two cycle address and data packets (versus two-to-nine cycles on the SPARCserver 1000E system), devices have much less time to wait in order to get on the bus.
- **Faster memory response.** A number of techniques are employed to get a faster response to data requests:
 - 576-bit-wide memory
 - 16-way memory interleave
 - Read bypass writes in memory controller
 - Queue bypasses for requests and data
 - Writebacks handled after miss

System Bus RAS Features

The following four attributes of the system bus architecture contribute to many of the RAS features of the Sun Enterprise 3500-6500 (and Sun Enterprise 3000-6000) servers:

- **Passive backplane system bus.** A passive backplane bus minimizes the number of active components required to control the bus. This results in a more reliable system.
- **Sturdy connectors and better board-insertion guides.** The SPARCserver 1000E has 100 pins on a connector. The Sun Enterprise 3500-6500 servers are much sturdier, with 450 pins on a connector that is only twice the size of the SPARCserver 1000E connector. The sturdier connectors, combined with better guides for board insertion, minimize the chance of the system being disabled due to bent pins from a faulty board insertion.
- **ECC-protected data paths.** All the data paths in the Sun Enterprise 3500-6500 servers are fully protected by error checking and correction (ECC), which is able to detect single-bit and double-bit errors and to correct single-bit errors.
- **Parity-protected address and data paths.** All the address and data paths in the Sun Enterprise 3500-6500 servers are protected by parity.

System Architecture

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System Bus Questions and Answers

Why didn't Sun use UPA crossbar bus technology in the Sun Enterprise 3500–6500 servers as in the Ultra 1 desktop workstation?

The crossbar bus used in the Ultra 1 desktop workstation supports a maximum of four devices. The Sun Enterprise 4500 and Sun Enterprise 5500 servers have eight slots and the Sun Enterprise 6500 server has 16 slots, with multiple devices per slot. Perhaps more importantly, crossbar bus technology was not needed for the Sun Enterprise 3500–6500 system interconnect because the Gigaplane bus is fast enough to support 30 CPUs without the use of crossbar technology.

At 100 MHz, the Gigaplane bus provides 3.2 GB per second of sustained throughput making it suitable for large symmetrical multiprocessor (SMP) servers. The Gigaplane bus runs at 84 MHz, provides a throughput of 2.68 GB per second and is able to support up to 16 boards in the Sun Enterprise 6500 server. Each board contains a UPA bus that connects to the Gigaplane bus and “multiplexes” the associated component loads, such as CPU and SBus, onto a single connection to the Gigaplane bus. This design is able to support many more CPU and SBus slots than if they were connected directly to the Gigaplane bus.

Why is the Gigaplane-XB™ crossbar technology used in the Sun Enterprise 10000 server not used in the Sun Enterprise 3500–6500 servers?

The implementation of the Gigaplane-XB interconnect would have increased the cost of the system substantially. The Gigaplane-XB technology provides higher system throughput, supports more devices (64 processors) and enables partitioning (domains), which are essential in the Sun Enterprise 10000 server.

Will there be a latency penalty for memory access relative to the single-level bus implementation of the Ultra 1 desktop?

There will be some penalty, but exceptional effort has gone into minimizing this penalty. Relative to the Ultra 1 desktop, the penalty for access to the first word in a data request is five clock cycles, or 60 ns. This decreases to two clock cycles (or 24 ns) by the last word in a data request. This minimal latency penalty should be imperceptible to the user, as it was in systems based on XDBus technology.

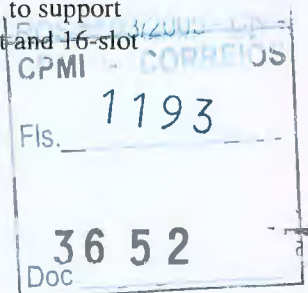
How can the sustained data transfer rate on the Gigaplane bus be so close to the peak bandwidth?

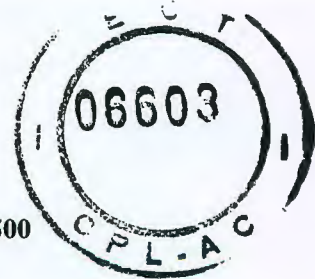
There are two reasons why the sustained data transfer rate on the Gigaplane bus is so close to the peak bandwidth. The first is separate address and data buses. With separate address and data buses, data requests can be sent out on the address bus at the same time that data from a previous data request is on the data bus. The second is out-of-order data transmission, which allows data to be put on the data bus in a different order than requested. This helps maximize the bus usage by minimizing unused data bus bandwidth.

Why does the Sun Enterprise 3500 server have a new clock board and backplane if the Sun Enterprise 3000 server backplane is capable of running at up to 100 MHz?

The new backplane on the Sun Enterprise 3500 server is required to support the additional (fifth) system slot, not to support the faster Gigaplane speed. The new centerplane on the Sun Enterprise 4500–5500 servers is required to support the faster Gigaplane speed. The new clock board is required to support the new five-slot backplane on the Sun Enterprise 3500 server and the enhanced eight-slot and 16-slot centerplane on the Sun Enterprise 4500, Sun Enterprise 5500, and Sun Enterprise 6500 servers, respectively.

System Architecture





Why did Sun move from a backplane to a centerplane design (Sun Enterprise 4500–6500 servers only)?

The centerplane design allows the system to support twice as many boards for a given length of system bus. This reduced length translates into an electrically shorter bus than would be possible with a backplane. This is important because bus speed (frequency) is, in part, determined by bus length. All other things being equal, the shorter the bus, the faster it can run.

The more densely packed centerplane also allows for more compact packaging. With this configuration, the Sun Enterprise 4500 server can support eight slots with a smaller footprint than the SPARCserver 1000E system that supports four slots. Also, the Sun Enterprise 6500 server can support 16 slots in the same size data center cabinet that supports a ten-slot SPARCcenter 2000E system.

What happens if there isn't an I/O board in slot 1? Will the system be functional?

Yes, it will be fully functional, with the exception that the internal CD-ROM and tape drives will not be accessible.

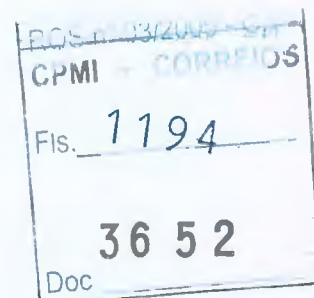
Will the new, enhanced Gigaplane system bus provide increased system performance while running 250-MHz or 336-MHz UltraSPARC processors?

No, the performance benefits of the enhanced Gigaplane system bus is realized only when using processors with clock speeds in excess of 336 MHz. The Gigaplane system bus runs at up to 84 MHz when using 250-MHz or 336-MHz processors. However, the new 400-MHz UltraSPARC processor increases the speed and throughput of the Gigaplane system bus, enabling it to run at up to 100 MHz and provide a throughput rate of up to 3.2 GB per second (2.68 GB per second on the Sun Enterprise 6500 Gigaplane system bus, which is capable of running at 84 MHz.)

Does the change to the Gigaplane system bus mean that the Sun Enterprise 3500–5500 servers perform better than similarly configured Sun Enterprise 3000–5000 servers?

No. There are three component speeds that determine the speed of the server: the speed of the Gigaplane system bus, the speed of the system boards, and the speed of the UltraSPARC module. These systems use the same processors as the previous systems. Therefore the Gigaplane system bus runs at the same speed in all systems providing the same performance.

System Architecture





Graphics Support

Creator3D Graphics series 3 Overview

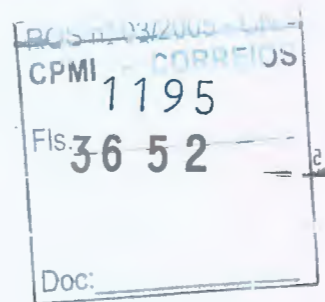
Creator3D Graphics series 3 is the latest generation of the Creator Graphics product family accelerates and supports diverse types of graphics needs ranging from 8-bit and 24-bit windowing to high-end 3-D graphics.

Creator3D Graphics series 3 is designed to match the CPU performance increase beyond the currently available CPU speeds. Series 3 accelerators have one clock for the internal graphics processing and another clock for the frame buffer enabling each part to run at maximum speed independently from each other.

Creator3D graphics has the following features:

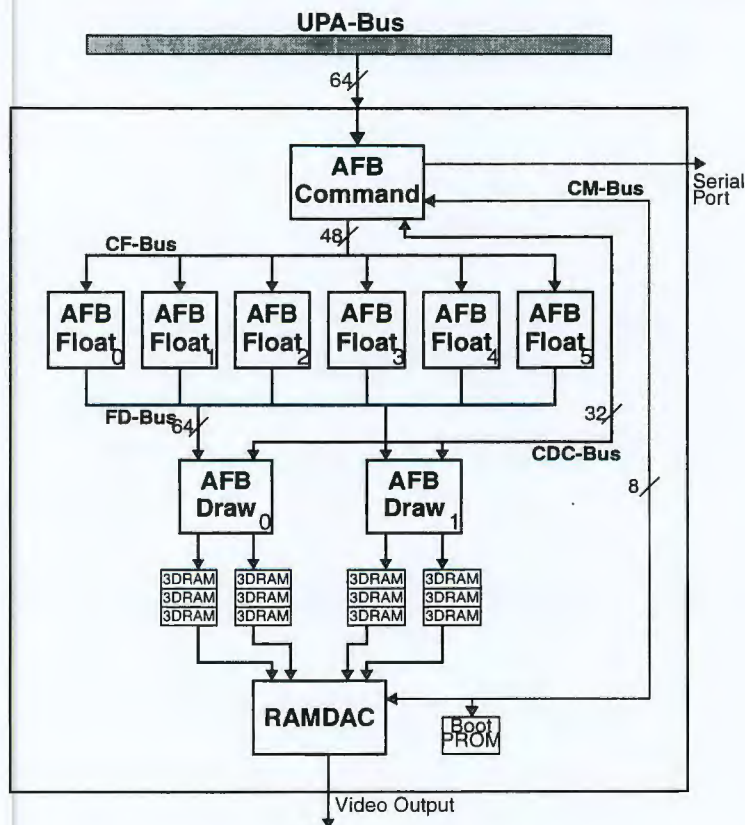
- Full 2-D imaging and windowing acceleration, plus full 3-D acceleration
- Ideal for high-end 2-D, mid-range 3-D graphics, and solids in MCAD and MCAE, as well as high-end imaging and color publishing applications
- 24-bit true color, double-buffered up to 1280 x 1024
- 28-bit Z-buffer
- 8-bit overlay and visual planes
- Stereo display up to 960 x 680 at 112-Hz non-interlaced, double- and Z-buffered
- 15-MB 3D-RAM memory
- 1280 x 1024 at 76 Hz standard with programmable bootprom resolution
- NTSC/PAL video timings
- 128-bit DAC
- High resolution 1920 x 1200 at 70 Hz (single buffered) supporting 24-inch wide screen display

System Architecture



Sun Elite3D Graphics Overview

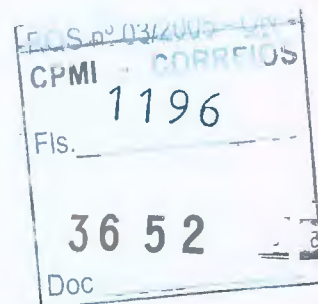
Sun Elite3D greatly accelerates the rendering of 3-D triangles, vectors, and texture maps over what is possible with Creator or a raw CPU. It does this by adding specialized graphics floating-point units and more powerful pixel-drawing chips. It supports a 1280 x 1024 96-bit deep frame buffer, configured the same as the double buffered and Z-buffered Creator3D. 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.



System Architecture

Figure 2. Sun Elite3D Chip-level Diagram

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



Sun Elite3D Features and Benefits

• Features

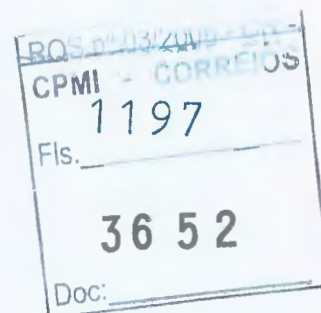
- Integrated imaging
- Very high performance accelerated 24-bit double-buffered 3-D graphics
- 28-bit Z-buffer
- 8-bit overlay plane
- Gouraud shading
- Alpha blending and screen door transparency
- Line and dot anti-aliasing
- Per pixel depth-cueing
- Per pixel alpha interpolation
- 4-bit stencil support with hardware acceleration of OpenGL stencil functions
- Accelerated lighting
- Four 8-bit color maps

• Benefits

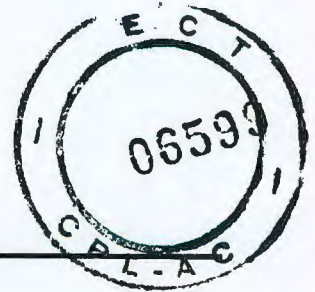
- Can perform fast imaging and 3-D on unified frame buffer
- Smooth animation and interactivity of 3-D graphics
- Improves visual quality and depth accuracy
- Allows overlay of 8 bit windows on top of the 24 bit visuals without damaging the underlying visual. This allows seamless integration and manipulation of windows
- Allows smooth shading of solid geometry
- Used to simulate transparent materials such as glass
- Needed in MCAD and visualization for better visual quality
- More accurate depth-cueing or fog
- Greater accuracy and image quality
- Provide greater performance
- More lights can be turned on for enhanced visual Sun display without encountering large performance penalties
- For dynamic colormap segment allocation when running 8-bit window systems should eliminate color flashing problems



System Architecture



Sun Enterprise™ 3500 Server



Sun Enterprise 3500 System Cabinet

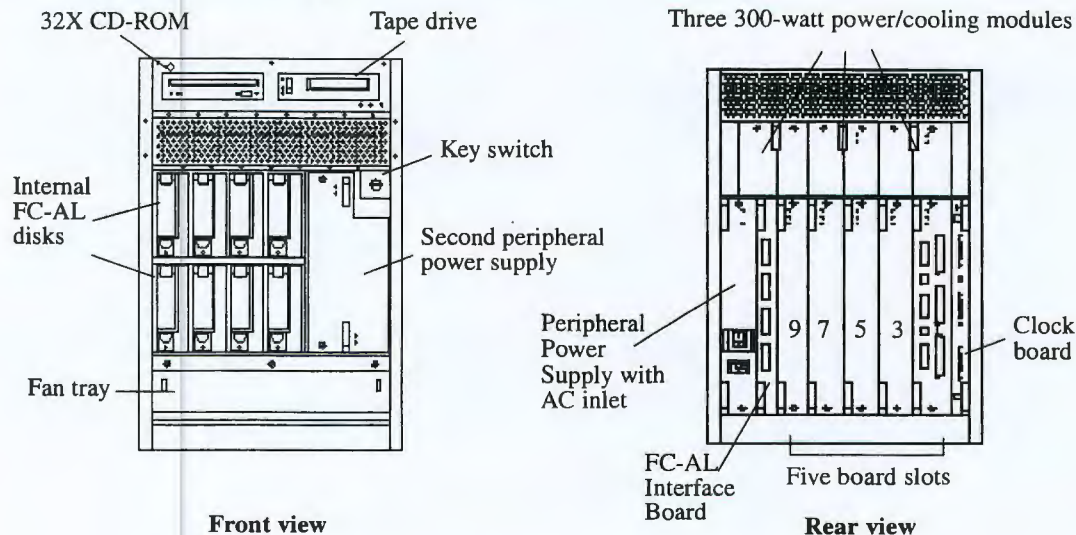


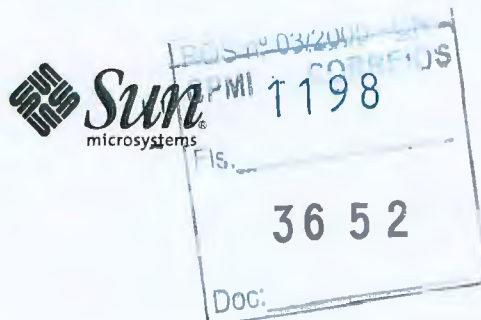
Figure 3. The Sun Enterprise™ 3500 System Cabinet

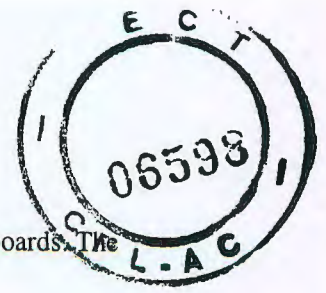
The Sun Enterprise 3500 server is a desktide tower enclosure, measuring approximately 65 cm x 43 cm x 44 cm (65 cm x 43 cm x 64 cm with the rear bumper and cable organizer which protects the cables.) In addition to the enhanced Gigaplane system bus, which runs up to 100 MHz and supports the fifth system slot, the Sun Enterprise 3500 server also features a 32X CD-ROM drive and improved disk availability with Fibre Channel Arbitrated Loop (FC-AL) internal disk drives. Despite the expansion of system slots and the changes to the internal disks, the Sun Enterprise 3500 server maintains the footprint, compact overall dimensions and power supply redundancy of the Sun Enterprise 3000 server.

Features

- A hinged door, covering the lower three-quarters of the cabinet, offers easy access to internal disk drives and the key switch.
- Two built-in disk banks hold up to eight internal hot-swap FC-AL disk drives. This is fewer than the ten SCSI disk drives offered with the Sun Enterprise 3000 server. The newer drives, however, can be configured to provide better disk availability (please see the "Sun Enterprise 3500 Internal Disk Drives" section for details on the FC-AL disks).
- A Fibre-Channel Interface board is located in a dedicated slot, between the fifth system board slot and the peripheral power supply. This board serves as the interface between the FC-AL drives and the first I/O board (please see the "Sun Enterprise 3500 Internal Disk Drives" section for details regarding the Fibre-Channel Interface board).
- A Sun StorEdge™ CD32 drive is installed in the upper left of the cabinet.
- An optional tape drive may be installed to the right of the CD-ROM drive. The tape drive can be a 4-mm, 8-mm, or one-quarter-inch tape drive.
- The key switch is located behind the door in the upper-right corner.

Sun Enterprise™ 3500 Server





- There are five slots in the bottom portion of the cabinet for CPU/memory boards and I/O boards. The slots are numbered 1, 3, 5, 7, and 9 from right to left.
- The Sun Enterprise 3500 server comes with at least one power/cooling module located above slots 1 and 3. If a second power/cooling module is required, it would fit above slots 5 and 7, to the left of the first power/cooling module.
- A fan tray above the peripheral power supply is also included in an entry configuration.
- A third power/cooling module can be used for redundant power in a system with three or more boards. To install the third power/cooling module, the existing fan tray, located to the left of the second power/cooling module, must be removed. The third power/cooling module fits into this slot.
- In addition to three power/cooling modules, a second peripheral power supply is required for full N+1 power supply redundancy in a five-board Sun Enterprise 3500 server configuration.
- The first peripheral power supply is located in the lower left of the cabinet rear. A spot for the second, optional peripheral power supply is located in the lower right of the Sun Enterprise 3500 cabinet front. This second peripheral power supply is located in the rear of the Sun Enterprise 3000 system cabinet. It was redesigned and moved to the front of the Sun Enterprise 3500 system cabinet in order to provide space for the additional system slot.
- The second peripheral power supply on the Sun Enterprise 3500 server is now 195 watts, instead of the 184 watts peripheral power supply used on the Sun Enterprise 3000 server.
- The clock board is located in the lower right, next to board slot 1. The clock board has its own slot and does not use any of the five slots for the CPU/memory or I/O boards.
- A cable organizer is included with the Sun Enterprise 3500 server base package. This will protect the 2-meter fibre channel cable (used for connecting to the internal FC-AL disk drives) from excessive bending, thereby maintaining optimum fibre channel performance.

Sun Enterprise™ 3500 Server

Sun Enterprise 3500 Internal Disk Drives

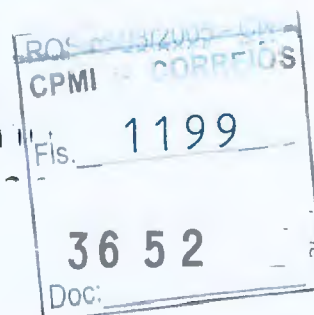
Internal FC-AL Drives

The Sun Enterprise 3500 server has two internal disk banks (four disks per disk bank), which support up to eight 9.1-GB FC-AL disks with optional dual-port connections, while the Sun Enterprise 3000 server supports ten internal SCSI disks with a single connection. The number of internal disks supported in the Sun Enterprise 3500 server was reduced in order to provide room for the additional system slot in the rear of the server. The inclusion of the fifth system slot in the back of the cabinet required that the optional second peripheral power supply be redesigned and moved to the front of the cabinet, resulting in less space in the front of the cabinet for disk drives.

The newer drives, however, can be configured to provide better disk availability than that offered by the Sun Enterprise 3000 server. In the Sun Enterprise 3000 server, all ten disk drives are connected to a single SCSI channel. The Sun Enterprise 3500 server eliminates this single point of failure. Each of the two disk banks can have one or two FC-AL loops connected to the installed drives for a total of up to four loops. Dual-loop configurations provide a highly-available, redundant hardware configuration.

Because the two banks are independent, a full configuration of eight disk drives requires a minimum of two loops: one for each bank of four drives. On the other hand, a minimum configuration requires only one FC-AL connection for up to four disk drives.

The new FC-AL drives in the Sun Enterprise 3500 server still provide the hot-swap capability offered with the internal SCSI drives on the Sun Enterprise 3000 server.





Both Solstice DiskSuite™ and VERITAS/Sun Enterprise Volume Manager™ are supported disk management software for the internal FC-AL drives.

VERITAS/Sun Enterprise Volume Manager releases 2.3, 2.4, 2.5 and 2.6 are supported with the Solaris 2.5.1 Operating Environment. VERITAS/Sun Enterprise Volume Manager releases 2.4, 2.5 and 2.6 are supported with the Solaris 2.6 Operating Environment. Patches are associated with all of these releases. VERITAS/Sun Enterprise Volume Manager is not currently supported with the Solaris 7 Operating Environment.

Solstice DiskSuite version 4.1 is supported on both Solaris 2.5.1 and Solaris 2.6. Solstice DiskSuite version 4.2 is supported on both Solaris 2.6 and the Solaris 7 Operating Environment.

Note: A license is needed to install Sun Enterprise Volume Manager. An additional license is needed to enable advanced Sun Enterprise Volume Manager capabilities such as RAID 5.

Fibre Channel Interface Board

This is a new board, designed to provide connectivity to the internal FC-AL disk drives in the Sun Enterprise 3500 server. The internal FC-AL disk drives support up to four FC-AL loops. Each of the four potential FC-AL loops corresponds to one of four GBICs on the FC-AL Interface board.

The FC-AL board comes with two GBIC modules and one 2-meter fibre channel cable to establish one loop (connection). One GBIC module is installed on the FC-AL Interface board and, typically, the other is installed on the I/O board (or SBus card) leaving three empty FC-AL sockets on the FC-AL Interface board. Each additional loop requires two additional GBIC modules and one 2-meter fibre channel cable. The GBIC modules on the FC-AL Interface board are exactly the same as those used in the Sun StorEdge A5X00 arrays, FC-AL SBus Host Adapter, and on the SBus I/O board.

The Sun Enterprise 3500 server can be ordered without internal disk drives. Any of the bootable Sun StorEdge disk products (such as the Sun StorEdge UniPack, MultiPack, D1000, A3500, and A5X00 products) can be used as a boot device for a Sun Enterprise 3500 server without internal disk drives. Such a configuration does not require an FC-AL Interface board.

The individual FC-AL connections on the FC-AL Interface board are logically independent. The components do get their power through a single connection. However, the power to the FC-AL Interface board comes from the backplane which is supported by redundant power supplies. Therefore the design has practically no single point of failure.

Sun Enterprise™ 3500 Server

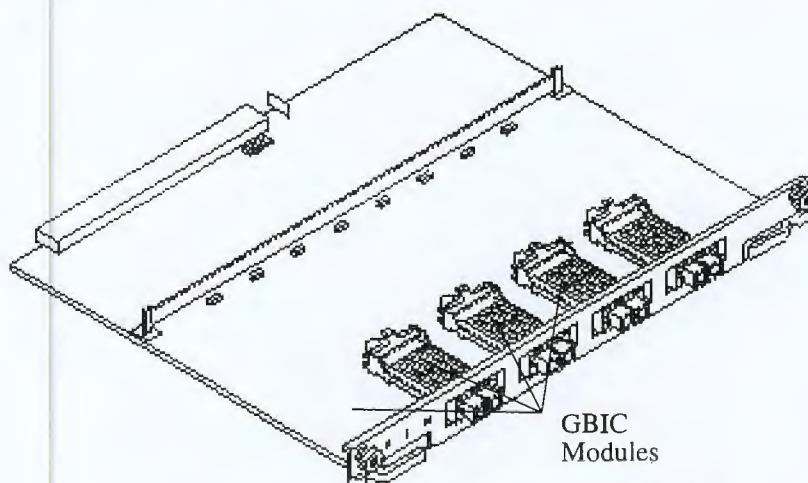


Figure 4. FC-AL Interface board



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Sun Enterprise 3500 Server Questions and Answers

Is the FC-AL drive supported in the Sun Enterprise 3500 server the same as the FC-AL drive supported in the Sun StorEdge A5X00 disk array?

Yes, the same FC-AL drives are supported in both the StorEdge A5X00 and the Sun Enterprise 3500.

What is the purpose of the cable organizer?

The cable organizer, which is shipped with all Sun Enterprise 3500 servers, attaches easily to the rear bumper on the Sun Enterprise 3500 server. Fiber cables that connect the GBICs on the FC-AL Interface board and the GBICs on the I/O boards should be routed through the cable organizer in a "figure eight" pattern. This will keep the cables out of the way and secure so that they are less likely to be inadvertently detached from the system. The cable organizer also provides that the fibre channel cables are not bent beyond their supported bend radius, preventing the cables from crimping and damage; it also provides mounting for the power cord restrainer that comes installed on the rear bumper.

Can the GBIC sockets be used on the FC-AL Interface board to connect (daisy-chain) Sun StorEdge A5X00 disk arrays to the Sun Enterprise 3500 server?

No, the GBIC sockets on the FC-AL Interface board can only be used to connect the internal FC-AL drives of the Sun Enterprise 3500 server. Sun StorEdge A5X00 systems must be connected to FC-AL sockets on system I/O boards, through the on-board sockets or through SBus Host Adapters.

Is the Sun Enterprise 3500 FC-AL Interface Board orderable in a factory configuration?

The Sun Enterprise 3500 FC-AL Interface board can be ordered either as factory configured or standalone.

Can pairs of FC-AL sockets support both the Sun Enterprise 3500 server internal disks and Sun StorEdge A5X00 system?

Yes. The SBus I/O board and the Graphics I/O board both come with a pair of on-board 100-MB-per-second FC-AL sockets. In addition, both types of boards support an SBus host adapter that has a pair of 100-MB-per-second FC-AL sockets. Each of these pairs of sockets can support the internal disk drives in the Sun Enterprise 3500 server and/or the Sun StorEdge A5X00 array. They can be split up so that one supports one type of device while the other socket supports a different type of device.

For example, if one of the two on-board FC-AL sockets is being used as the connection to the internal drives in the Sun Enterprise 3500 server, its matching empty socket *can* be used to connect a Sun StorEdge A5X00 disk array.

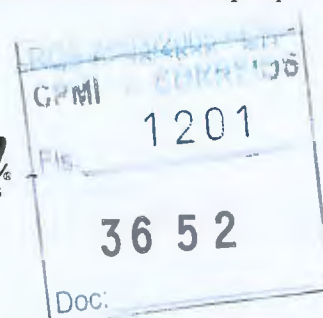
Is the LUXADM disk administration facility supported with the Sun Enterprise 3500 internal disk drives?

Yes, a specific set of LUXADM commands are supported currently and more will be added in the first half of calendar year 1999. The following commands are currently supported on both Solaris 2.5.1, Solaris 2.6 and the Solaris 7 Operating Environment: luxadm inquiry, stop, start, -e forcelp, -e rdls, set_boot_dev.

Why is there a new second peripheral power supply?

When the second peripheral power supply was moved to the front of the Sun Enterprise 3500 server, it had to be redesigned to fit its new space. When this second peripheral power supply is not used, a thermal protection module is inserted in its place. This light-weight component can be recognized by the warning labels on it and should *not* be discarded. It should only be removed when a second peripheral power supply is installed.

Sun Enterprise™ 3500 Server





As the internal disk drives are no longer SCSI, can the on-board SCSI connection be used on the first I/O board in the Sun Enterprise 3500 server?

Yes. This connection may be used to connect certain SCSI devices as long as the total SCSI length (including the connection to the tape and internal CD to the Sun Enterprise 3500 server) does not exceed SCSI specifications (6 meters). The internal SCSI bus length is 1.56 meters. This means that up to two Sun StorEdge UniPacks or one Sun StorEdge MultiPack (with six drives or fewer) may be daisy chained from the on-board SCSI port located on the first I/O board of the Sun Enterprise 3500 server.

Sun Enterprise™ 3500 Server

Just the Facts



February, 1999



Sun Enterprise™ 4500 Server

Sun Enterprise 4500 System Enclosure

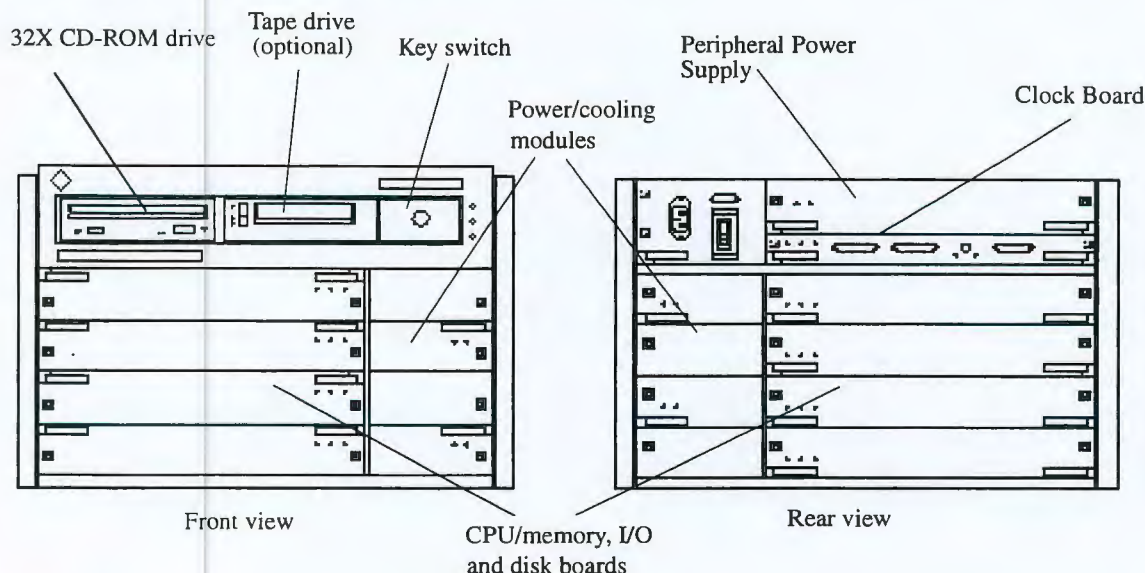


Figure 5. The Sun Enterprise™ 4500 System Enclosure

The Sun Enterprise 4500 server package is a tabletop enclosure, which is identical to the Sun Enterprise 4000 server and similar in size to the external package of the SPARCserver™ 1000E system. In addition to the enhanced Gigaplane™ system bus, the Sun Enterprise 4500 server also has a faster 32X CD-ROM, compared to the 12X CD-ROM used in the Sun Enterprise 4000 server. The Sun Enterprise 4500 server also includes a power cord locking module that prevents the power cord from being accidentally removed from the system.

- Inside the enclosure is an eight-slot card cage for CPU/memory, I/O, or disk boards, allowing four boards to be installed from the front of the cabinet and four boards to be installed from the rear. Typically, the I/O boards and disk boards are installed from the rear for ease of cabling.
- ✱ In the card cage, next to the board slots, are slots for the power/cooling modules. Up to four power/cooling modules can be installed, two from the front and two from the rear. Power/cooling modules must be installed adjacent to CPU/memory, I/O, and disk boards.
- The peripheral power supply is located at the top rear of the card cage.
- The Sun StorEdge™ CD32 drive is located at the upper left front of the enclosure. Next to the SunCD™ 32 is a slot for an optional half-height tape device. The tape device can be a 4-mm, 8-mm, or one-quarter-inch tape drive. Next to the slot for the optional tape device are the key switch and system LEDs.
- The clock board is located in the card cage below the peripheral power supply. The clock board has its own slot and does not use one of the eight board slots for the CPU/memory, I/O, or disk boards.

Sun Enterprise™ 4500 Server



Sun Enterprise™ 5500 Server

Sun Enterprise 5500 System Cabinet

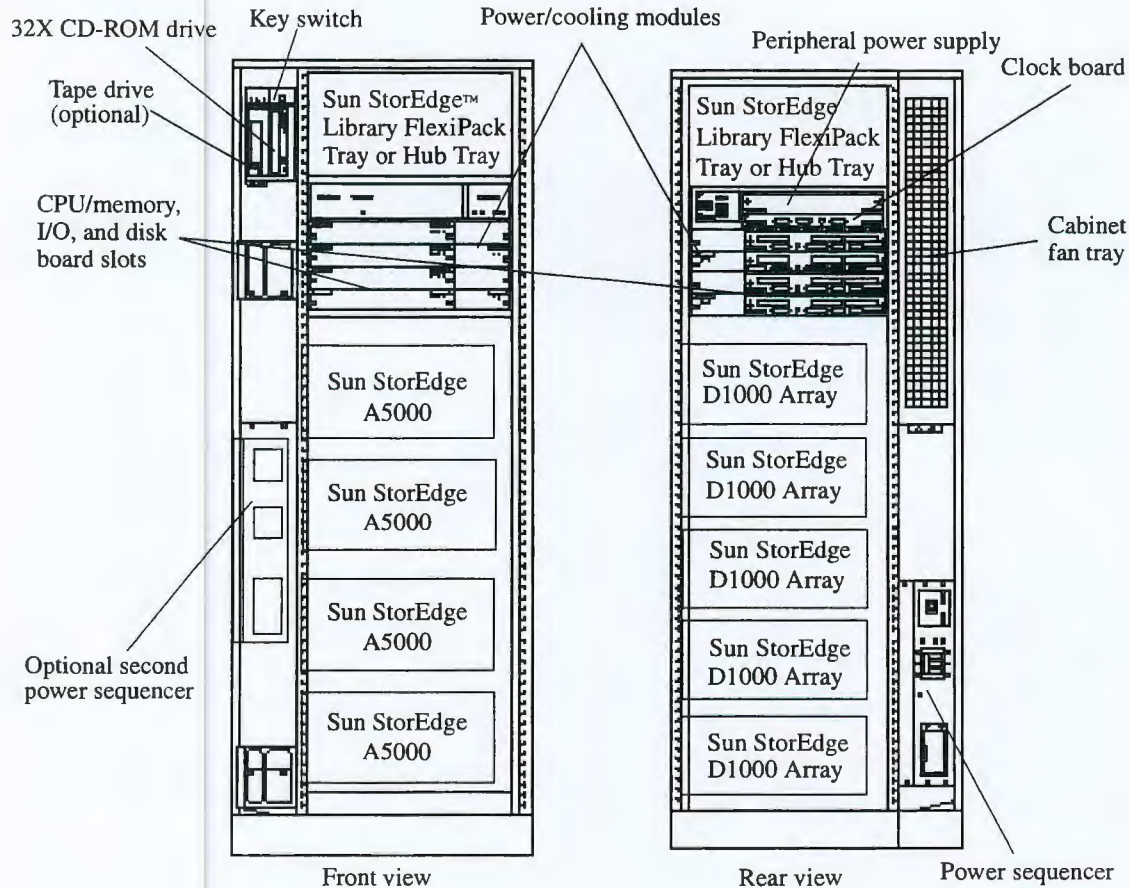


Figure 6. The Sun Enterprise™ 5500 System Cabinet

The Sun Enterprise 5500 system enclosure is a 68-inch data-center cabinet, 12 inches taller than both the Sun Enterprise 5000 system cabinet as well as the SPARCcenter™ 2000E system cabinet. In addition to the enhanced Gigaplane™ system bus, the Sun Enterprise 5500 server also has a faster 32X CD-ROM, compared to the 12X CD-ROM used in the Sun Enterprise 5000 server. The fan tray that supports the internal SCSI devices (internal tape and CD) in the Sun Enterprise 5500 server has also been modified to enable support for new, higher performing tape devices.

- Inside the cabinet is an eight-slot card cage for CPU/memory, I/O, or disk boards, allowing four boards to be installed from the front of the cabinet and four boards to be installed from the rear. Typically, the I/O boards and disk boards will be installed from the rear for ease of cabling.
- In the card cage, next to the board slots, are slots for the power/cooling modules. Up to four power/cooling modules can be installed, two from the front and two from the rear. Power/cooling modules must be installed adjacent to CPU/memory, I/O, and disk boards.



- The peripheral power supply is located at the top rear of the card cage.
- The clock board is located in the card cage below the peripheral power supply. The clock board has its own slot and does not use one of the eight board slots for the CPU/memory, I/O, or disk boards.
- The cabinet fan tray contains four fans that blow hot air out the rear of the cabinet.
- An optional Sun StorEdge™ FlexiPack removable storage tray, Sun StorEdge Tape Library, or FC-AL hub tray (supporting two hubs) can be installed above the card cage. The FC-AL hub tray can also be installed below the card cage in the Sun Enterprise 5500 server in all cases, except maximum configurations, with four Sun StorEdge A5X00 arrays.
- The following devices can be installed in the system cabinet below the card cage:
 - Up to four Sun StorEdge A5X00 disk arrays
 - Up to five Sun StorEdge A1000/D1000 arrays
 - Up to two Sun Enterprise 4000 or Sun Enterprise 4500 servers (using the rack-mount rails for Sun Enterprise 4000 or Sun Enterprise 4500 server)

Note: The SPARCstorage™ Array Model 100 series subsystems and the Sun StorEdge RSM™ disk trays are still supported in the Sun Enterprise 5500 system cabinet, however they are no longer orderable. The Sun Enterprise 5500 system cabinet can support up to four SPARCstorage Array Model 100 series subsystems or up to six StorEdge RSM disk trays.

- A hinged door covering the lower four-fifths of the cabinet offers easy access to internal components.
- A Sun StorEdge CD32 drive is installed in the upper left front of the system cabinet. Next to the SunCD™ 32 is a slot for an optional half-height tape device. The tape device can be a 4-mm, 8-mm, or one-quarter-inch tape drive. Next to the slot for the optional, half-height tape device are the key switch and system LEDs. The SunCD 32 CD-ROM, the optional tape device, and the key switch are mounted behind a separate, small door.
- The top panel does not have a hinged door. The upper right front of the system cabinet will either have a bezel for the Sun StorEdge FlexiPack removable storage tray or Sun StorEdge Tape Library, or a blank panel when no peripherals are installed above the card cage.
- Customers who wish to include two or more Sun StorEdge A5X00 arrays in the Sun Enterprise 5500 system cabinet must also order the Sun StorEdge A5000 screen door, which provides additional electro-magnetic interference shielding.
- A 9-inch air baffle is required when three Sun StorEdge A5X00 arrays are installed in a Sun Enterprise 5500 system cabinet.
- An optional, second power sequencer is offered to provide a second power source for configurations where the aggregate power requirements of the devices exceed the power provided by a single power sequencer. The second power sequencer also provides a second power source for storage devices that support dual power inlets.
- When the Second Power Sequencer is ordered for installation in the system cabinets (Sun Enterprise 5500 and Sun Enterprise 6500 servers), the second sequencer mounting brackets for Sun Enterprise 5500 and 6500 servers must also be ordered.

Sun Enterprise™ 5500 Server



Sun Enterprise™ 6500 Server

Sun Enterprise 6500 System Cabinet

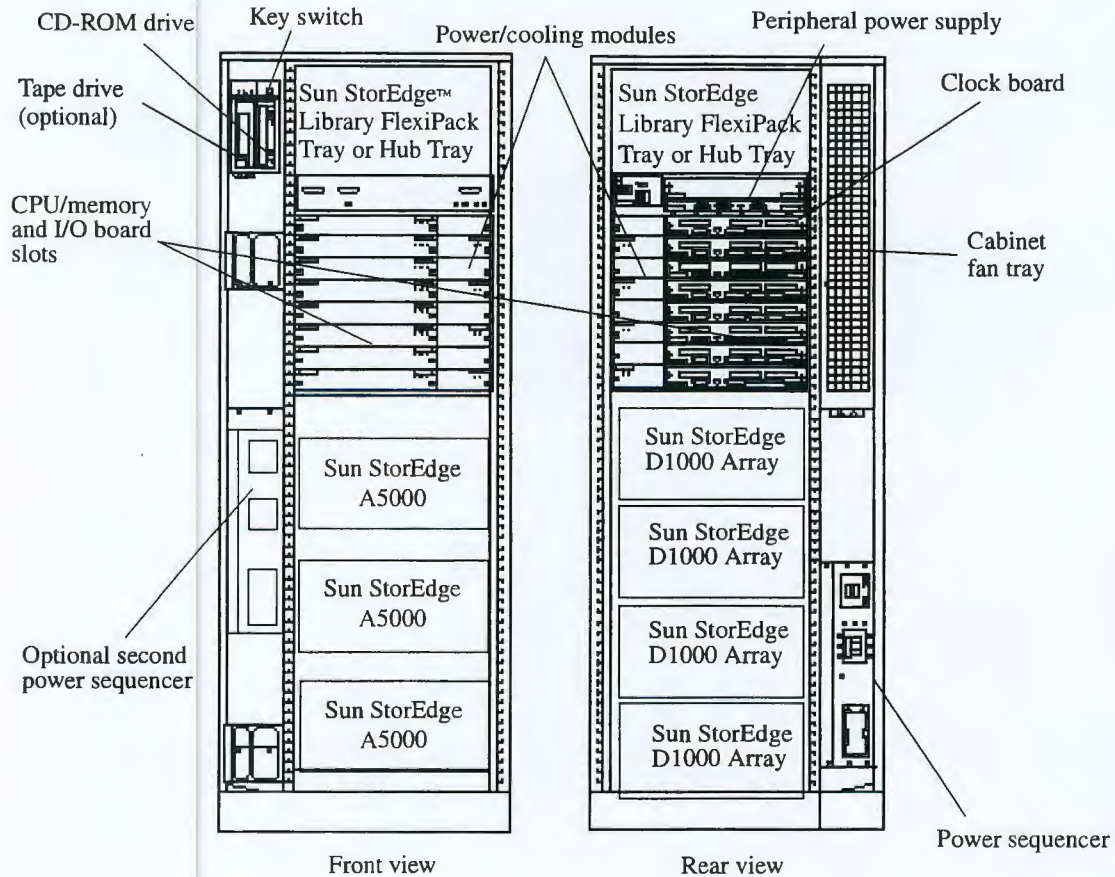
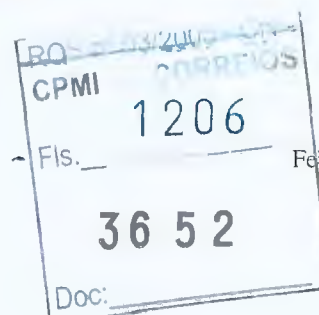


Figure 7. The Sun Enterprise™ 6500 System Cabinet

The Sun Enterprise 6500 system enclosure is a 68-inch tall data-center cabinet, 12 inches taller than both the Sun Enterprise 6000 cabinet and the SPARCcenter™ 2000E cabinet. The Sun Enterprise 6500 server also has a faster 32X CD-ROM, compared to the 12X CD-ROM used in the Sun Enterprise 6000 server. The fan tray that supports the internal SCSI devices (internal tape and CD) in the Sun Enterprise 6500 server has also been modified to enable support for new, higher-performing tape devices.

- Inside the cabinet is a 16-slot card cage for CPU/memory boards, I/O boards and disk boards, allowing eight boards to be installed from the front of the cabinet and eight boards to be installed from the rear of the cabinet. Typically, the I/O boards are installed from the rear for ease of cabling.
- The physical length of the 16-slot Gigaplane system bus in the Sun Enterprise 6500 server limits the maximum speed of the system interconnect. Therefore the Sun Enterprise 6500 server runs the Gigaplane system bus at a maximum of 84 MHz with 16 slots.
- In the card cage, next to the board slots, are slots for the power/cooling modules. Up to eight power/cooling modules can be installed, four from the front and four from the rear. Power/cooling modules must be installed adjacent to CPU/memory and I/O boards.

Just the Facts



Sun Enterprise™ 6500 Server

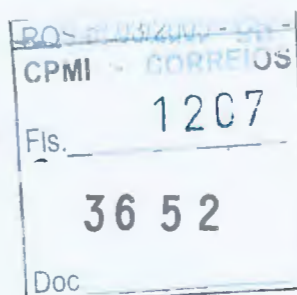


- The peripheral power supply is located at the top rear of the card cage. The clock board is located in the card cage below the peripheral power supply. The clock board has its own slot and does not use one of the 16-board slots for the CPU/memory or I/O boards.
- The cabinet fan tray contains four fans that blow hot air out the rear of the cabinet.
- An optional Sun StorEdge FlexiPack removable storage tray, Sun StorEdge Tape Library or FC-AL hub tray (supporting two hubs) can be installed above the card cage. The hub tray can also be installed below the card cage in the Sun Enterprise 6500 server in all cases except maximum configurations, with three Sun StorEdge A5X00 arrays.
- The following storage devices can be installed in the system cabinet below the card cage:
 - Up to three Sun StorEdge A5X00 disk arrays
 - Up to four Sun StorEdge A1000/D1000 arrays
 - Up to two Sun Enterprise 4000 or Sun Enterprise 4500 servers (using the rack-mount rails for Sun Enterprise 4000 or Sun Enterprise 4500 servers)

Note: The SPARCstorage™ Array Model 100 series subsystems and Sun StorEdge RSM™ trays are still supported in the Sun Enterprise 6500 system cabinet, however they are no longer orderable. The Sun Enterprise 6500 system cabinet can support up to three SPARCstorage Array Model 100 series subsystems or up to five StorEdge RSM disk trays.

- A hinged door covering the lower three-quarters of the cabinet offers easy access to internal components.
- A Sun StorEdge CD32 drive is installed in the upper left front of the system cabinet. Next to the SunCD™ 32 is a slot for an optional half-height tape device. The tape device can be a 4-mm, 8-mm, or one-quarter-inch tape drive. Above the slot for the optional half-height tape device is the key switch. The SunCD 32 CD-ROM, the optional tape device, and the key switch are mounted behind a separate, small door.
- The top panel does not have a hinged door as on the SPARCcenter 2000E. The upper right front of the system cabinet will have either a bezel for the Sun StorEdge FlexiPack removable storage tray or Sun StorEdge Tape Library, or a blank panel when no peripherals are installed above the card cage.
- Customers who wish to include two or more Sun StorEdge A5X00 arrays in the Sun Enterprise 6500 system cabinet must also order the Sun StorEdge A5000 screen door, which provides additional electro-magnetic interference shielding.
- A 9-inch air baffle is required when two Sun StorEdge A5X00 arrays are installed in a Sun Enterprise 6500 system cabinet.
- An optional, second power sequencer is offered to provide a second power source for configurations where the aggregate power requirements of the devices exceed the power provided by a single power sequencer. The second power sequencer also provides a second power source for storage devices that support dual power inlets.
- When the Second Power Sequencer is ordered for installation in the system cabinets (Sun Enterprise 5500 and Sun Enterprise 6500 servers), the second sequencer mounting brackets for Sun Enterprise 5500 and 6500 servers must also be ordered.

Sun Enterprise™ 6500 Server



Sun Enterprise™ Expansion Cabinet



Sun Enterprise Expansion Cabinet

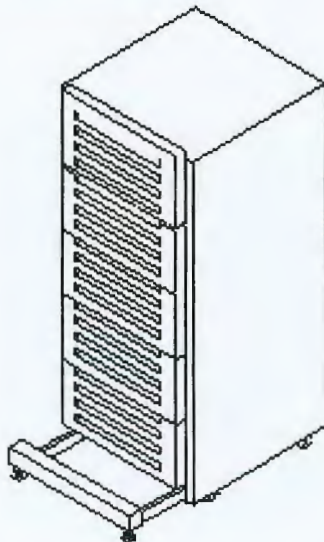


Figure 8. The Sun Enterprise™ Expansion Cabinet

The 68-inch Sun Enterprise expansion cabinet is primarily used to rack mount Sun Enterprise 4000 and Sun Enterprise 4500 servers and is ordered without factory-installed devices. This data center cabinet is similar in look and size to the Sun Enterprise 5500 and Sun Enterprise 6500 system cabinets.

This section describes the features of the new 68-inch Sun Enterprise expansion cabinet. Refer to the *Sun Enterprise 3000–6000 Just the Facts* document for details regarding the 56-inch expansion cabinet.

Each expansion cabinet includes a cable for connecting the expansion cabinet to a system cabinet. The cable allows control and status information to be transferred between the expansion cabinet and the system cabinet (see “Expansion Cabinet Cooling” for more details). Multiple expansion cabinets can be daisy-chained to the system cabinet.

- The following devices may be installed in an expansion cabinet:
 - Sun Enterprise 4000 and Sun Enterprise 4500 servers
 - Sun StorEdge™ A5X00 disk arrays
 - Sun StorEdge A1000/D1000 arrays
 - Sun StorEdge FlexiPack removable storage trays
 - Sun StorEdge Tape Library
- The expansion cabinet has a full-height hinged door, offering easy access.
- Sun Enterprise cabinet floor brackets may be installed to help prevent the cabinet from shifting in cases of extreme floor movement.

Sun Enterprise™ Expansion Cabinet



Expansion Cabinet Capacity

- A maximum of six Sun StorEdge A5X00 arrays and two FC-AL hub trays (supporting two hubs each) can be installed in an expansion cabinet, offering up to 1.2 TB of storage (with the StorEdge A5200 array).
- A maximum of eight Sun StorEdge A1000/D1000 arrays are supported per cabinet (a second power sequencer is required if more than four A1000/D1000 arrays are installed in the expansion cabinet).
- A maximum of two Sun StorEdge FlexiPack removable storage trays are supported per expansion cabinet; a maximum of five Sun StorEdge FlexiPack removable storage trays are supported per system.
- Up to four tape devices are supported per Sun StorEdge FlexiPack removable storage tray.
- A maximum of four Sun StorEdge Tape Libraries are supported per expansion cabinet.
- Expansion cabinets with Sun StorEdge FlexiPack removable storage trays or Sun StorEdge Tape Libraries must be adjacent to the system cabinet. This is required because the maximum length of the single-ended SCSI cable is 6 meters.
- Customers who wish to include two or more Sun StorEdge A5X00 arrays in the Sun Enterprise expansion cabinet must also order the Sun StorEdge A5000 screen door, which provides additional electro-magnetic interference shielding.
- A 9-inch air baffle is required when five Sun StorEdge A5X00 arrays are installed in a Sun Enterprise expansion cabinet.
- An optional, second power sequencer is offered to provide a second power source for configurations where the aggregate power requirements of the devices exceed the power provided by a single power sequencer. The second power sequencer also provides a second power source for storage devices that support dual power inlets. The Expansion cabinet comes with mounting brackets already installed so no Second Sequencer mounting brackets need be ordered.

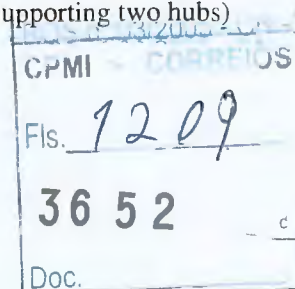
Note: Please note that the SPARCstorage™ Array model 100 series subsystems, model 200 series controllers and Sun StorEdge RSM™ trays are supported in the 68-inch Sun Enterprise expansion cabinet system cabinet, however they are no longer orderable. The Sun Enterprise expansion cabinet can support a maximum of seven SPARCstorage Array Model 100 Series disk arrays or a maximum of ten StorEdge RSM disk trays (an expansion cabinet with 8 or more RSM disk trays requires the second power sequencer).

- Up to four Sun Enterprise 4000 or Sun Enterprise 4500 servers may be mounted in a Sun Enterprise expansion cabinet (using the rack-mount rails for the Sun Enterprise 4000 or Sun Enterprise 4500 server). An expansion cabinet with four Sun Enterprise 4000 or Sun Enterprise 4500 systems requires the second power sequencer.
 - The following combinations of rack-mounted devices are supported with *one* Sun Enterprise 4500 server in the Sun Enterprise expansion cabinet:
 - Five Sun StorEdge A5X00 arrays with one hub tray (supporting two hubs)
 - Up to six Sun StorEdge A1000/D1000 arrays (a second power sequencer is required if more than four Sun StorEdge A1000/D1000 arrays are installed in the expansion cabinet).
 - Up to eight Sun StorEdge RSM disk trays (an expansion cabinet with eight or more Sun StorEdge RSM disk trays requires the second power sequencer).
 - Up to five SPARCstorage Array Model 100 Series
 - The following combinations of rack-mounted devices are supported with *two* Sun Enterprise 4500 servers in the Sun Enterprise expansion cabinet:
 - Three Sun StorEdge A5X00 arrays with one hub tray (supporting two hubs)
 - Up to four Sun StorEdge A1000/D1000 arrays

Sun Enterprise™ Expansion Cabinet



Just the Facts



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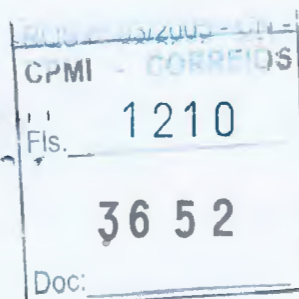
- Up to five Sun StorEdge RSM disk trays
- Up to three SPARCstorage Array Model 100 Series
- The following combinations of rack-mounted devices are supported with *three* Sun Enterprise 4500 servers in the Sun Enterprise expansion cabinet:
 - Exactly three Sun Enterprise 4X00 systems (no other devices in the cabinet) require one 9-inch air baffle (X9622A) and two 6-inch air baffles (X9625A).
 - Three Sun Enterprise 4X00 systems and one Sun StorEdge A5X00 array (or one SPARCstorage Array Model 100) require two 6-inch baffles (X9625A).
 - Three Sun Enterprise 4X00 systems and two Sun StorEdge A5X00 arrays (or two SPARCstorage Arrays Model 100) require no baffles
 - Three Sun Enterprise 4X00 systems and any other devices (Sun StorEdge RSM tray, Sun StorEdge A1000/D1000 array, etc) in any quantity requires no baffles

No additional devices can be mounted in the 68-inch Sun Enterprise expansion cabinet with four Sun Enterprise 4X00 servers. One 6-inch air baffle (X9625A) is required when four Sun Enterprise 4500 system chassis are installed in a Sun Enterprise expansion cabinet. A second power sequencer is also required with four Sun Enterprise 4X00 systems in a 68-inch Expansion Cabinet.

Expansion Cabinet Cooling

- Each expansion cabinet has one cabinet fan tray that includes four fans supported by two power supplies. Each power supply supports two fans.
- The expansion cabinet features redundant cooling. If a power supply fails, two fans stop running and two fans continue to operate, providing enough cooling to keep the devices in the expansion cabinet cool.
- Expansion cabinets can be controlled by the Sun Enterprise 4500-6500 server and can send status information to the system cabinet, through a connection between the expansion cabinets and the system cabinet. Specifically, the connection supports the following:
 - When a cabinet fan tray fails in an expansion cabinet, the Sun Enterprise 4500-6500 server is notified of this failure. A system administrator monitoring the Sun Enterprise 4500-6500 server status will be able to see when a cabinet fan tray fails in an expansion cabinet.
 - The system administrator is able to turn off the Sun Enterprise 4500-6500 server and all expansion cabinets connected to the Sun Enterprise 4500 server with either the Sun Enterprise 4500-6500 server key switch or through a software command.

Sun Enterprise™ Expansion Cabinet





Expansion Cabinet Questions and Answers

What is the difference between the 56-inch and 68-inch Sun Enterprise expansion cabinet?

Basically the only difference is the height of the cabinet. One more 12-inch door panel was added to increase the height to 68 inches. Additional space allows more devices in the cabinet, which in turn requires more power. Therefore an optional, second power sequencer is offered. As mentioned earlier, if two or more Sun StorEdge A5X00 arrays are to be installed in the Sun Enterprise expansion cabinet the customer must also order the Sun StorEdge A5000 front screen door, which provides additional electro-magnetic interference shielding.

Can the peripherals in an existing SPARCcenter™ expansion cabinet be migrated and moved to the new Sun Enterprise expansion cabinet?

Yes, the peripheral devices in the SPARCcenter expansion cabinet can be migrated to the Sun Enterprise expansion cabinet. The only device supported in the SPARCcenter expansion cabinet that is not supported in the Sun Enterprise expansion cabinet is the half-inch tape drive.

Sun Enterprise™ Expansion Cabinet

Just the Facts



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CPU/Memory Board

CPU/Memory Board

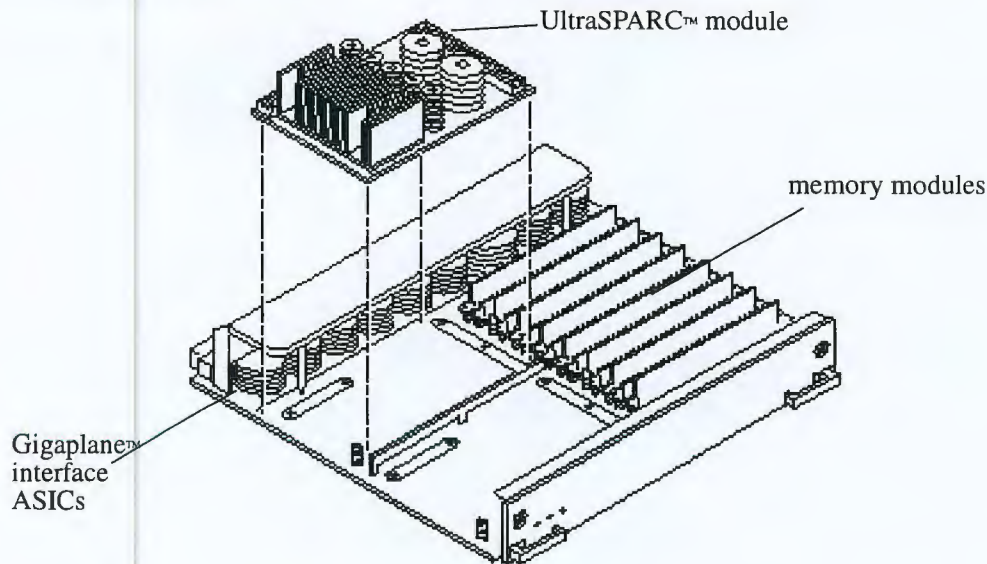


Figure 9. CPU/memory board

CPU/memory boards connect to the Gigaplane™ bus. On the CPU/memory boards, the Ultra™ Port Architecture (UPA) bus connects the Gigaplane bus to the two UltraSPARC™ modules and two memory banks.

- The latest CPU/memory board (2602A) is capable of running at up to 100-MHz Gigaplane speed.
- Each CPU/memory board can support zero, one, or two UltraSPARC modules. CPU/memory boards with no UltraSPARC modules can be added to systems requiring more memory capacity.
- The Sun Enterprise™ 3500–5500 servers support 167-MHz, 250-MHz, 336-MHz and 400-MHz UltraSPARC modules.
- The Sun Enterprise 6500 server support 167-MHz, 250-MHz and 336-MHz UltraSPARC modules.
- The CPU/memory board has two banks of 60-ns, 3.3-V memory modules. Each memory bank consists of eight memory modules. Two types of memory options are available: 256 MB (8 x 32-MB memory modules), and 1 GB (8 x 128-MB memory modules).
- Each CPU/memory board supports up to 2 GB of memory.
- The CPU/memory boards have temperature sensors located under the UltraSPARC modules that control the fan speed in the adjacent power/cooling module and allow the actual temperature of individual boards to be monitored through the Sun Enterprise SymON™ software.
- With a system design that supports multiple CPU/memory boards, a failure of a single UltraSPARC module or memory module will result in a temporary interruption of system operation while the system reboots itself around the failed component.
- The part number for the new, 100 MHz-capable CPU/memory boards is 2602A. This CPU/memory board includes two empty CPU slots, two empty memory banks, no processors, and no memory.

Note: The 84 MHz-capable CPU/memory boards (2600A and 2601A) have been transitioned off of the price list. CPU/memory Board

Just the Facts



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CPU/Memory Board Questions and Answers

Why did Sun change from using a single system board that included everything in the SPARCserver 1000/2000 (CPU, memory, and I/O) to offering two types of boards, CPU/memory boards and I/O boards with the Sun Enterprise 3X00-6X00 servers?

There are many advantages gained by offering separate CPU/memory boards and I/O boards. The primary advantage is configuration flexibility. With one system board, a customer who wants to increase memory capacity must purchase an entire system board. With separate CPU/memory and I/O boards, customers can purchase only what they need. If they want to add additional memory, they purchase a CPU/memory board. This allows customers to configure systems as computing engines or I/O engines, which are not only less expensive, but also offer much higher performance, since they can configure more CPUs (and memory) or more I/O bandwidth, depending upon their application needs.

Another reason is design flexibility. With separate CPU/memory and I/O boards, Sun can make modifications to each type of board independently. For example, Sun can upgrade the Fibre Channel Interface on the I/O board and not affect the CPU/memory board. Sun also recently introduced the new, PCI I/O board. Ultimately, this allows Sun to bring out new CPU/memory and I/O board modifications, as well as new technologies, more quickly.

In addition, because the I/O board has much more functionality than before, one I/O board in the Sun Enterprise 4500 server has the same I/O capability as two system boards in the SPARCserver 1000E. This means Sun offers greater CPU, memory, and I/O expandability in these systems by offering separate CPU/memory and I/O boards.

Can the UltraSPARC modules be inserted and removed by anyone?

No. Only qualified personnel should insert and remove UltraSPARC modules.

Why did Sun go to a new UltraSPARC module connector?

The new connector is more reliable than the type of connector used in the SPARCserver 1000E. Also, the previous connectors did not provide the number of pins required for the new modules.

Are there any special requirements for upgrading to the 250-MHz/4-MB or 336-MHz/4-MB UltraSPARC modules?

Yes, the 250-MHz and 336-MHz modules with 4 MB of external cache should be installed on either the 2601A or the latest CPU/memory board (2602A) which replaced the 2601A. Although the 250-MHz/4-MB and 336-MHz/4-MB modules will function and are supported on the original CPU/memory board (2600A) only 2 MB of Ecache will be used per module.

What is the software requirement for the 336-MHz modules?

The 336-MHz UltraSPARC module requires the Solaris™ 2.5.1 Operating Environment or later releases. It also requires Sun Enterprise Flashprom Update 3.2.12 or later.

Can the newer 100 MHz-capable CPU/memory boards be used in Sun Enterprise 3000-6000 servers?

Yes. The previous 84-MHz CPU/memory boards are being transitioned off the price list and these new CPU/memory boards are compatible with existing Sun Enterprise 3000-6000 servers. There is no problem mixing these CPU/memory boards in a Sun Enterprise 3000-6000 server that already uses the previous boards.

CPU/Memory Board





Is there any new hardware or software required to support the 400-MHz module in the Sun Enterprise 3X00-5X00 servers?

Yes, the 400-MHz modules will require Ultra Sun Enterprise Flashprom update 3.2.18 or above. Other than the Flashprom version, no new hardware or software is required from what is being shipped currently in the Sun Enterprise 3500-5500 servers.

They will run in existing Sun Enterprise 3000-5000 servers if they have the following:

- 100-MHz capable CPU/memory and I/O boards (2602A, 2612A, 2622A, 2632A)
- An upgraded 100-MHz capable Gigaplane in the Sun Enterprise 4000 and 5000 (Sun Enterprise 3000 excluded as mentioned above.) See "Upgrades" section for details regarding system board and Gigaplane upgrades.
- Ultra Sun Enterprise Flashprom update 3.2.18 or above.
- 100-MHz clock board (manufacturing part number 501-4946) which is required to support 100-MHz Gigaplane. A 100-MHz clock board upgrade is available (part number UG-ENT-100MHCLOCKB

The clock board in the latest Sun Enterprise 3000 and Gigaplane in all Sun Enterprise 3000 servers are already 100-MHz capable so in most cases only the system boards need to be upgraded in order to support the 400-MHz/4-MB modules. Only original Sun Enterprise 3000 base packages need to have the clock board upgraded. This is because the original clock board in Sun Enterprise 3000 base package did not support any modules above 167-MHz and therefore needs to be upgraded to support 400-MHz modules. Base packages with order numbers "E3001" and "E3002" do not need to have the clock board upgraded because they shipped with a second generation clock board which supported modules above 167-MHz.

Is the 400-MHz/4-MB UltraSPARC module supported in a system with any 84-MHz system boards (2600A, 2601A, 2610A, 2611A, 2620A, or 2630A)?

No, the 400-MHz/4-MB UltraSPARC module is not supported in a system with any 84-MHz system boards due to the fact that it runs at a 4:1 CPU-to-Gigaplane speed ratio and requires the Gigaplane (and associated system boards) to run at 100-MHz.

What CPU modules are supported in the Sun Enterprise 3500-6500 servers?

The Sun Enterprise 3500-5500 servers can be ordered with factory-configured 250-MHz/4-MB, 336-MHz/4-MB or 400-MHz/4-MB UltraSPARC modules. The Sun Enterprise 6500 can be factory-configured with either 250-MHz/4MB or 336-MHz/4-MB UltraSPARC modules. The 250-MHz/1-MB, 167-MHz/1-MB, and 167-MHz/0.5-MB UltraSPARC Modules are also supported, but they not available as factory-configured options.

Note: Customers with 167-MH UltraSPARC modules who wish to migrate their modules to Sun Enterprise 3500-6500 servers might require a PROM upgrade as the minimum PROM level supported is 3.2.10

Why isn't the 400-MHz/4-MB UltraSPARC module supported in the Sun Enterprise 6500 & 6000 Servers?

The 400-MHz/4-MB module requires the Gigaplane to run at 100-MHz. The Sun Enterprise 6000 and 6500 cannot support running the Gigaplane at 100-MHz due to the physical length of the bus.

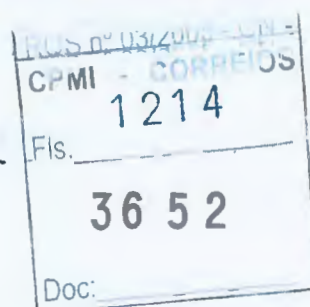
Will the 400-MHz/4-MB module ever be supported in the Sun Enterprise 6000 and 6500 Servers?

No, the 400-MHz/4-MB module will never be supported in the Sun Enterprise 6000 and 6500 Servers.

CPU/Memory Board



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Will there be a faster than 336-MHz UltraSPARC module available for the Sun Enterprise 6000 and 6500 Servers?

Yes, there will be a future module available that will run faster than 336-MHz and will not require the Gigaplane, I/O boards, or 2601A/2602A CPU/memory boards to be upgraded (2600A CPU/memory boards will need to be upgraded). Up to 30 of these future modules will be supported in a single system and all 16 Gigaplane slots will be usable.

Is it necessary to upgrade the Gigaplane in order to support faster than 336-MHz modules in the Sun Enterprise 3000-5000 servers?

At this time yes, but in the future there will be a new module available that will run at faster than 336-MHz speeds and will not require the Gigaplane, I/O boards, or 2601A/2602A CPU/memory boards to be upgraded (2600A CPU/memory boards will need to be upgraded).

Will an Sun Enterprise 3500-5500 system support a mixture of different processor speeds (for example, 336-MHz and 400-MHz)?

Mixing 167-MHz, 250-MHz modules, 336-MHz modules, or 400-MHz modules in a single system is not supported. Mixing same frequency modules with different external cache is supported as long as all modules on a single CPU/memory Board have the same size external cache.

CPU/Memory Board



Memory Subsystem

Memory Subsystem

The memory in the Sun Enterprise™ 3000–6000 and Sun Enterprise 3500–6500 servers is located on the CPU/memory boards. Up to 2 GB of RAM can be installed on each CPU/memory board. The memory subsystem in Sun Enterprise 3500–6500 servers is designed to offer fast, reliable data access.

- The memory controller manages two banks of memory on each CPU/memory board. Each bank of memory consists of eight standard JEDEC memory module modules, implemented in 3.3-V CMOS.
- The memory banks on the CPU/memory boards are very “wide.” Each bank can deliver 512 bits (64 bytes) in a single cycle, meaning that a 64-byte cache miss can be supplied in one memory cycle. This results in faster memory subsystem performance.
- Sun Enterprise 3500–6500 servers support up to 16-way memory interleave. Extensive interleave is required to support the high memory access rates possible in systems with many UltraSPARC™ modules.
- Interleaved memory banks can be different sizes, which is an improvement from the memory interleaving scheme used in the SPARCserver™ 1000E and SPARCcenter™ 2000E systems.

Memory Interleaving

Memory interleaving helps increase memory subsystem performance by reducing the probability of “hot spots” or contention in a few memory banks by spreading access to multiple memory banks. In a two-way interleaved system, the first cacheline is supplied by bank 0 while the second is supplied by bank 1. The size and extent of interleave is arranged so that a single typical request is satisfied by one bank. This permits memory requests to be fulfilled with a minimum amount of contention from other UltraSPARC modules.

Interleaved memory on Sun Enterprise 3500–6500 systems is considerably more important than on previous-generation systems because the UltraSPARC modules generate requests faster and the bandwidth of a single bank of memory is a smaller fraction of the Gigaplane™ bus bandwidth.

Configuring Memory for Best Performance

Configuring the memory for optimal system performance is easier than doing so for the SPARCserver 1000E and SPARCcenter 2000E systems because the memory interleave algorithm used for Sun Enterprise 3500–6500 server is much more flexible. Here are some general guidelines that should be used as a starting point in configuring a memory subsystem:

- Each UltraSPARC module should have at least 128 MB of RAM.
- Spread the amount of memory equally among the available banks. If there are one 1024-MB bank and one 256-MB bank, 80 percent ($1024 \times 100 / (1024 + 256)$) of all accesses on average will go to the 1024-MB bank and the bandwidth available will be limited by that bank, even though the 256-MB bank has the same available bandwidth. If most of the memory is in a few big banks, the interleaving of those big banks is more important than the interleaving of the other banks.
- In general, it is better to have more banks of smaller size than a smaller number of bigger banks.
- Fill up one bank on every board before filling the second bank on any board.
- If there are some boards with both banks filled and some boards with only one bank, the smaller banks must be put on the boards with two banks; the bigger banks must be kept on boards with only one bank.



Memory Subsystem Questions and Answers

What is the difference between the memory interleaving in the Sun Enterprise 3500-6500 servers and the memory interleaving in the SPARCserver 1000E system?

The SPARCserver 1000E system used a simple interleaving system that produced up to eight-way interleave. Sun Enterprise 3000-6000 and Sun Enterprise 3500-6500 servers have an improved design with fewer restrictions on the interleave configuration. They can support up to 16-way interleave and these interleaved memory banks can also be different sizes. The previous-generation systems interleaved memory only when memory banks were the same size. This meant that a SPARCserver 1000E system with two 32-MB banks and two 256-MB banks would use a two-way interleave between the 32-MB banks and two-way interleave between the 256-MB banks.

A similarly configured Sun Enterprise 3500-6500 server can use four-way interleave on the two 256-MB banks when combined with the first 256 MB of the 1-GB banks, and two-way interleave on the remaining memory. This permits considerably higher memory subsystem performance.

Why can't the memory modules from the SPARCcenter 2000E or SPARCserver 1000E be used in Sun Enterprise 3500-6500 servers? The Ultra™ 1 systems use the memory modules from the previous generation of desktops.

Sun Enterprise 3500-6500 server architecture requires 3.3-volt memory modules. All of Sun's previous generation memory modules were 5 volt. In addition, the desktop memory modules are too tall for the CPU/memory board spacing. The JEDEC memory modules fit both the form factor and voltage requirements.

Does the use of industry-standard memory modules mean that customers can buy off-the-shelf memory modules for use in Sun Enterprise 3500-6500 servers?

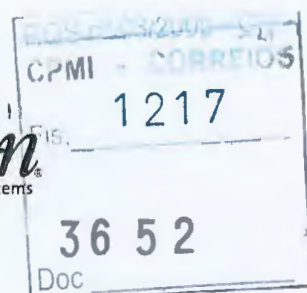
Yes, as long as the memory modules are the correct size (density), form, and voltage. However, Sun cannot guarantee that memory modules from third-party vendors will operate properly in Sun Enterprise 3500-6500 servers. Sun does not support third-party memory options.

Do Sun Enterprise 3500-6500 servers need more memory per processor compared to the SPARCcenter 2000E and SPARCserver 1000E systems? If so, why and how much?

Yes. With the SPARCcenter 2000E system, the general rule is that each processor should have at least 64 MB of RAM. With Sun Enterprise 3500-6500 servers, the general rule is that each processor should have at least 128 MB of RAM. The reason is that the UltraSPARC modules in the Sun Enterprise 3500-6500 servers are much higher performance than the CPU modules in the SPARCcenter 2000E system, so they require more memory for a balanced system.

How can one tell what interleave factor a Sun Enterprise 3500-6500 server is using?

Use `prtdiag (1M)`, located in the `/usr/platform/sun4u/sbin` directory.





I/O Boards

Overview

Most of the I/O connectivity for Sun Enterprise™ 3000–6000 and Sun Enterprise 3500–6500 servers is supported through I/O boards. Three types of I/O boards—SBus, Graphics, and PCI—offer a wide range of I/O connectivity.

One of the significant improvements over the I/O subsystem in the SPARCserver™ 1000E and SPARCcenter™ 2000E systems is the use of dual SBus channels on each SBus I/O board. In these previous-generation servers, each system board had one 32-bit SBus channel, offering a maximum I/O bandwidth of 100 MB per second per system board. With dual 64-bit SBus channels on each SBus I/O board, the maximum bandwidth in a Sun Enterprise 3500–6500 server is 400 MB per second per board.

The SBus and Graphics I/O boards also provide 100 MB per second Fibre Channel Arbitrated Loop (FC-AL) connectivity.

The PCI I/O board has two PCI-66 channels and two standard 33-MHz PCI channels. The PCI I/O board has two PCI slots, 20-MB-per-second fast-wide SCSI, and 10/100-Mb-per-second Ethernet. The Ultra™ Port Architecture (UPA) interface that connects the PCI I/O board to the Gigaplane™ system bus has a throughput of 668 MB per second. Thus, the PCI I/O board throughput is 668 MB per second.

The I/O boards also offer environmental monitoring. The I/O boards have temperature sensors, allowing the actual temperature of individual boards to be monitored through the Sun Enterprise SyMON™ software.

I/O boards connect to the Gigaplane bus (see I/O board diagrams on following pages).

- On the SBus I/O board, the UPA bus connects the Gigaplane bus to two SBus channels, which connect the various I/O ports to the UPA bus.
- On the graphics I/O board, the UPA bus connects the Gigaplane bus to one SBus channel and one UPA slot for a graphics card (Creator or Creator3D).
- On the PCI I/O board, the UPA interface connects the Gigaplane bus to two PCI-66 channels and two standard PCI channels.

Sun Enterprise 3500–6500 servers can be PCI- or SBus-only systems. Up to four PCI I/O boards are supported per Sun Enterprise 3500 system and up to six PCI I/O boards are supported per Sun Enterprise 4500–6500 system. Mixed PCI and SBus systems are also supported.

I/O boards are hot-swappable, with the Dynamic Reconfiguration software enhancement provided with Solaris™ 2.6 Hardware: 5/98. This means new I/O boards can be installed and logically configured into the system while the system is online, or I/O boards that have been deconfigured from the system can be removed while the system is online. See the “Reliability, Availability, and Serviceability” section for more details.



SUN-3500/2000-CM	
CPMI - CORREIOS	
1218	
3652	
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SBus I/O Board

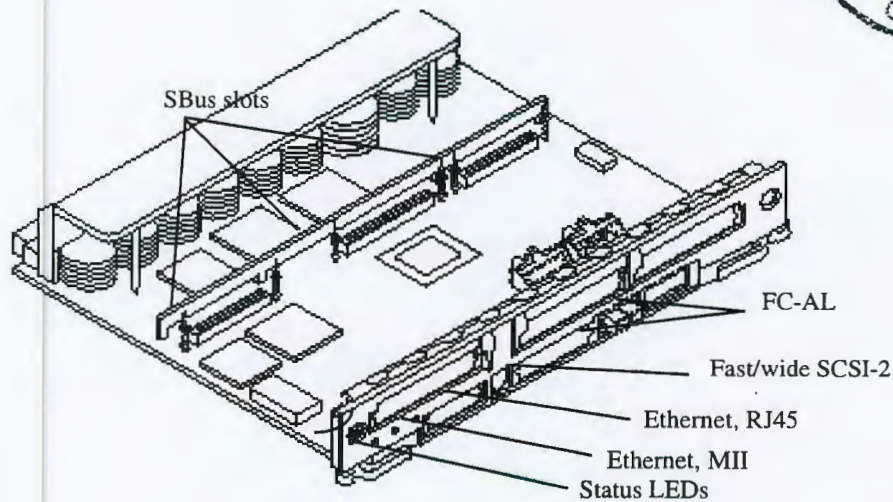


Figure 10. SBus I/O board

SBus I/O board features:

- The latest SBus I/O board (2612A) is capable of running at up to 100-MHz Gigaplane speed
- One on-board, 10/100-Mb-per-second Ethernet port (twisted pair and MII connector)
- One 20-MB-per-second, fast/wide SCSI-2 port
- Two empty 100-MB-per-second FC-AL sockets for GBIC modules
- Three 64-bit SBus slots running at 25 MHz
- Two 64-bit SBus channels, offering a peak throughput of 400 MB per second

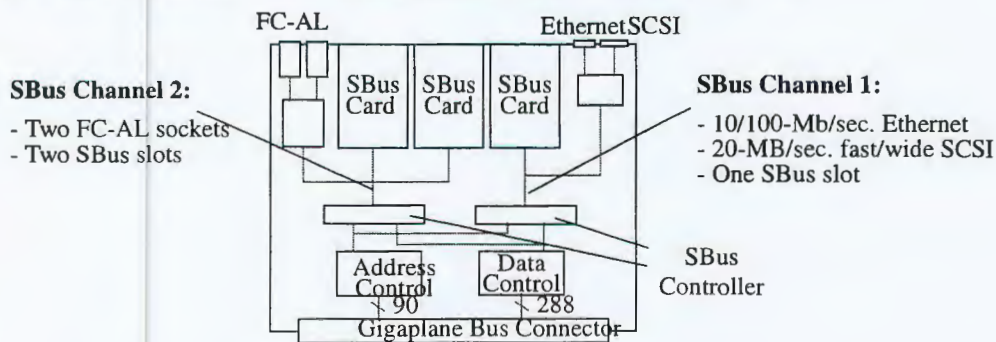
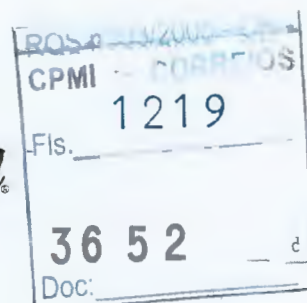


Figure 11. SBus I/O Block Diagram

Note: The 84 MHz-capable SBus I/O boards (2610A and 2611A) have been transitioned off of the price list.

In order to populate the FC-AL sockets on the newer SBus I/O boards (2611A and 2612A) and enable connectivity to a Sun StorEdge™ A5X00 array, order one or two GBIC modules (6731A).

I/O Boards



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Graphics I/O Board

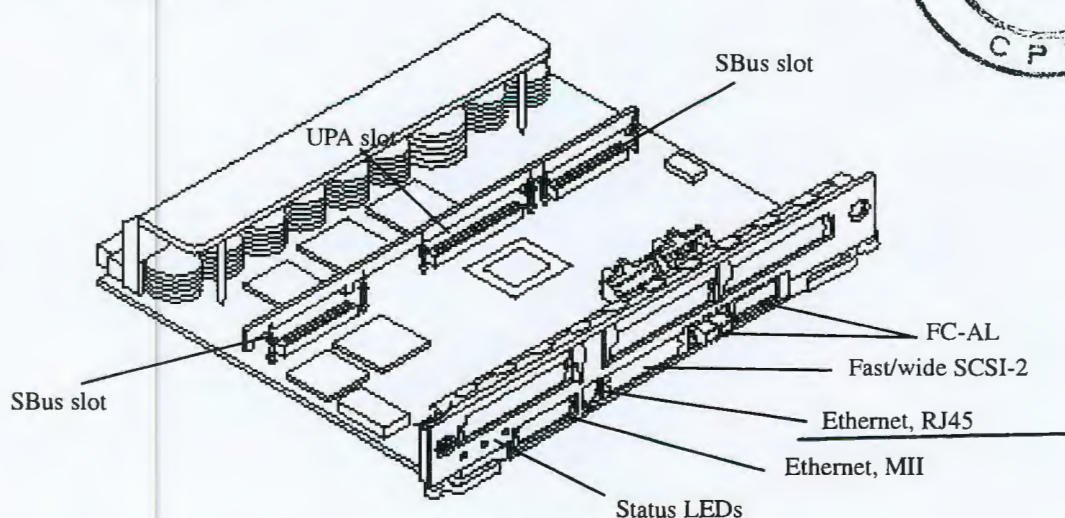


Figure 12. Graphics I/O board

The graphics I/O board, as shown, includes the following features:

- The latest Graphics I/O board (2622A) is capable of running at up to 100-MHz Gigaplane speed
- One on-board, 10/100-Mb-per-second Ethernet port (twisted pair and MII connector)
- One 20-MB-per-second, fast/wide SCSI-2 port
- Two empty 100-MB-per-second FC-AL sockets for GBIC modules
- Two 64-bit SBus slots running at 25 MHz
- One UPA slot for a Creator3D series 3 or Sun Elite3D m6 graphics board
- One 64-bit SBus channel, offering 200-MB-per-second data transfer

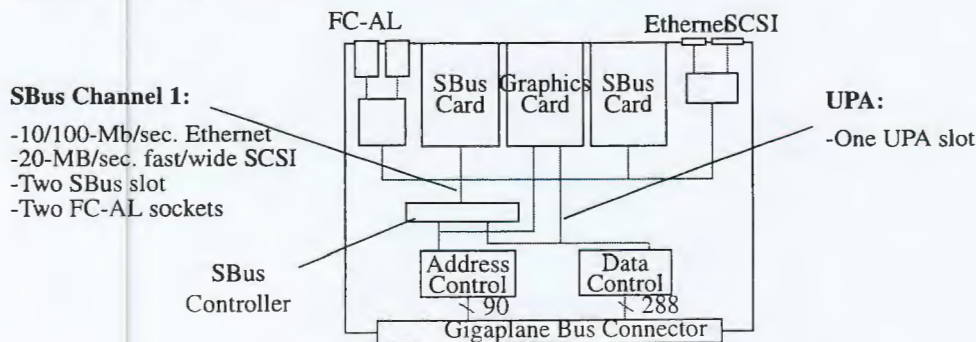


Figure 13. Graphics I/O Board Block Diagram

Note: The 84 MHz-capable Graphics I/O board (2620A) has transitioned off of the price list.



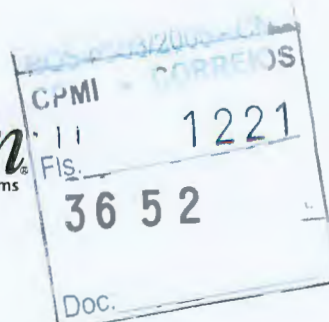
Graphics Frame Buffers Supported

The Graphics I/O board can support both Creator3D series 3 and Sun Elite3D m6 frame buffers in the horizontal form factor. As shown in the table below, the Sun Enterprise 3500–6500 servers can support multiple board configurations.

System		Maximum Number of Creator3D series 3 or Sun Elite3D m6 Frame Buffers	Maximum Number of CPUs
Sun Enterprise 3500 Sun Elite3D (5 slots)		3	4
Sun Enterprise 4500 Sun Elite3D (6 slots)			
• Configuration 1		1	10
• Configuration 2		2	8
• Configuration 3		3	6
• Configuration 4		4	4
Sun Enterprise 6500 Sun Elite3D (16 slots)			
• Configuration 1		1	30
• Configuration 2		2	28
• Configuration 3		3	26
• Configuration 4		4	24
• Configuration 5		5	22
• Configuration 6		6	20
• Configuration 7		7	18
• Configuration 8		8	16

I/O Boards

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PCI I/O Board

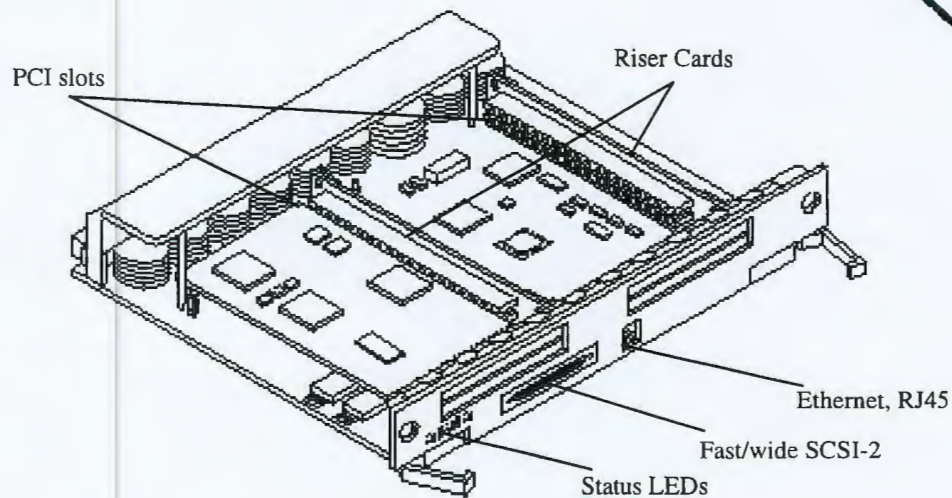


Figure 14. PCI I/O board

The PCI I/O board, as shown, includes the following features:

- The latest PCI I/O board (2632A) is capable of running at up to 100-MHz Gigaplane speed
- One on-board 10/100-Mb-per-second Ethernet port (twisted pair)
- One 20-MB-per-second, fast/wide SCSI-2 port
- Two 64-bit PCI slots running at 66 MHz (also supports 33 MHz)
- Two 64-bit PCI channels, each offering 528-MB-per-second data transfer

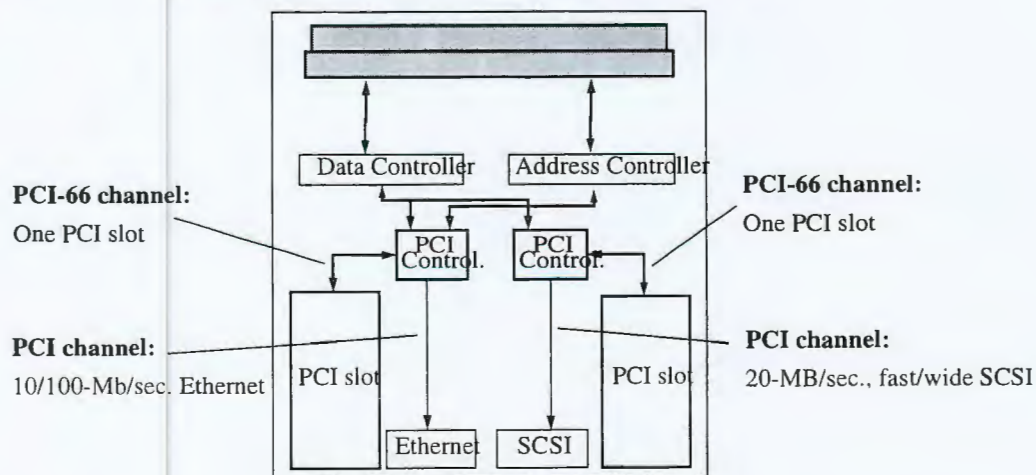


Figure 15. PCI I/O Board Block Diagram

Note: The 84 MHz-capable PCI I/O board (2630A) has transitioned off of the price list.



I/O Boards Questions and Answers

Are the 32-bit SBus cards supported on the SPARCcenter 2000E and SPARCserver 1000E systems also supported on Sun Enterprise 3500–6500 servers?

Yes.

Does the graphics I/O board also support the TurboGX™ graphics card?

Yes. Both the Graphics I/O board and the SBus I/O board support the TurboGX graphics card.

Do dual-wide SBus cards work with the SBus I/O board or graphics I/O board?

One dual-wide SBus card will fit on an SBus I/O board. Only single-wide SBus cards will work with the Graphics I/O board.

What type of PCI cards can be used in the Sun Enterprise 3500–6500 servers?

Sun supports 3.3-volt or 5.0-volt PCI short cards (4.200 x 6.875 inches).

What PCI card speeds are supported in the Sun Enterprise 3500–6500 servers?

The PCI slots accept either 66-MHz or 33-MHz PCI cards. They can be either 64-bit or 32-bit cards.

Does Sun support (service) third-party PCI cards?

No. Sun does not support (service) third-party PCI cards. However, Sun has been working with third-party independent hardware vendors to ensure a robust supply of cards for Sun platforms. PCI cards that have been verified by Sun to operate properly on Sun platforms are subject to stringent testing. A list of these third-party PCI cards can be found at URL <http://www.sun.com/sunready/vendors.html>.

What is included with the PCI I/O board?

The board comes with two 5.0-volt riser cards preinstalled. The PCI card plugs into the riser card. The PCI I/O board also comes with two 3.3-volt riser cards. If your PCI card is 3.3-volt, then a 5.0-volt riser card must be removed and a 3.3-volt riser card must be installed.

Do PCI cards on the same PCI I/O board have to be the same voltage?

No. There may be one 5.0-volt card and one 3.3-volt card on the same PCI I/O board. It must be ascertained that the appropriate riser card for each PCI card are being used.

Are there any software requirements for the PCI I/O board?

Yes. The PCI I/O board requires Solaris 2.5.1. Hardware: 4/97 or higher. The CPU/memory boards must also have at least OpenBoot™ PROM software, version 3.2.8 or later.

Can the new 100 MHz-capable I/O boards be used in Sun Enterprise 3000–6000 servers?

Yes. The previous 84-MHz I/O boards are being transitioned off the price list and these new I/O boards are compatible with existing Sun Enterprise 3000–6000 servers. There is no problem mixing these I/O boards in a Sun Enterprise 3000–6000 server that already uses the previous boards.



Does the Sun Enterprise 3500-6500 server family support SBus-only and mixed I/O board configurations?

Yes. However, a PCI-only configuration in a Sun Enterprise 3500 server does not provide a way to connect the internal FC-AL disk drives. This is because the PCI I/O board does not have on-board FC-AL sockets and currently there is no PCI FC-AL card available. So, to be able to use the internal disk drives in the Sun Enterprise 3500, there must be at least one SBus I/O or one Graphics I/O board installed.

Are there plans to add on-board FC-AL sockets to the PCI I/O board?

No, there is not enough physical space on the board to accommodate on-board FC-AL sockets.

I/O Boards

Just the Facts





Power and Cooling

Power and Cooling

The Sun Enterprise™ 3500–6500 servers offer a highly flexible, highly reliable power and cooling environment. With an N+1 system configuration (where N is the minimum number of power supplies required), Sun Enterprise 3500–6500 servers offer redundant power, using power/cooling modules that are hot swappable. This offers customers a system that will almost never fail due to a power supply or a fan failure.

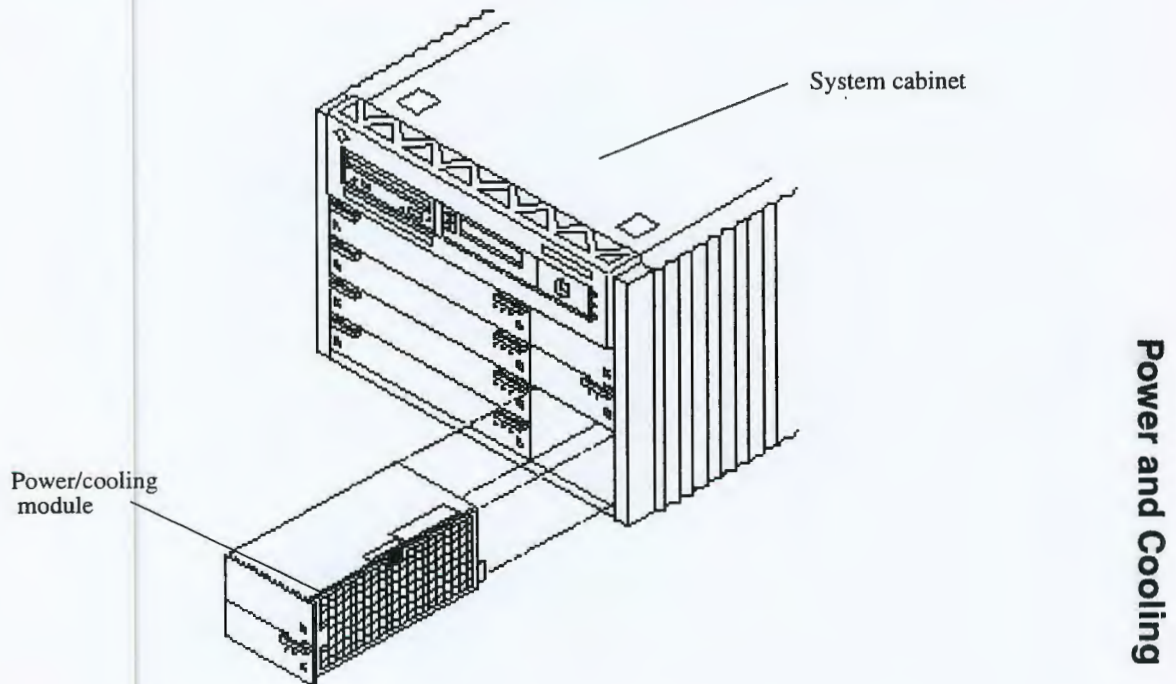
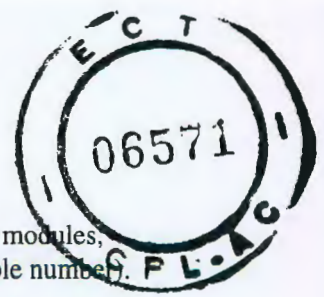


Figure 16. The Sun Enterprise 4500 Server Hot-swappable Power/Cooling Module

Power Circuitry

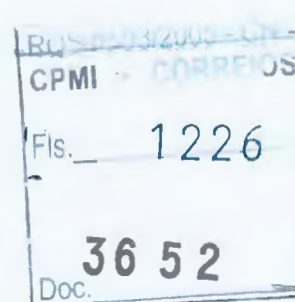
There are two different types of power supplies in Sun Enterprise 3500–6500 servers: power/cooling modules and peripheral power supplies.

- Power/cooling modules contain a 300-watt power supply and two variable-speed fans. The number of power/cooling modules installed in a system depends on the system configuration.
- One power/cooling module is required for every two adjacent boards on each side of the centerplane.
- The Sun Enterprise 3500 server supports a maximum of three power/cooling modules.
- The Sun Enterprise 4500 and Sun Enterprise 5500 servers support a maximum of four power/cooling modules.
- The Sun Enterprise 6500 server supports a maximum of eight power/cooling modules.
- Power from the power/cooling modules is distributed throughout the system using current-sharing circuitry, so that if the power supply in one power/cooling module fails, power from the other power/cooling modules keeps the system running (if the system is configured for redundant power).



- To configure a system *without* redundant power, the system must have $x/2$ power/cooling modules, where x is the number of CPU/memory, I/O and disk boards (round up to the nearest whole number).
- To configure a system *with* redundant power, the system must have $(x/2 + 1)$ power/cooling modules, where x is the number of CPU/memory, I/O and disk boards (round up to the nearest whole number). However all of the Sun Enterprise 3500–6500 server platforms are able to provide redundant power for maximum board configurations with only $x/2$ power/cooling modules, therefore providing the following exceptions to the $x/2 + 1$ rules:
 - When configuring the Sun Enterprise 3500 server, the $x/2+1$ configuration rule implies that a Sun Enterprise 3500 system with five boards would require four power/cooling modules ($5/2 + 1 = 4$). But there are only three power/cooling module slots. In order to resolve this issue, each power/cooling module is able to supply slightly more power than is required, so a Sun Enterprise 3500 server with five boards can operate on two power/cooling modules plus a second peripheral power supply. Thus, a second peripheral power supply is required for full $N+1$ power supply redundancy in a five-board Sun Enterprise 3500 server configuration.
 - Similarly, a Sun Enterprise 6500 system with 16 boards would require nine power/cooling modules ($16/2 + 1 = 9$). But there are only eight power/cooling module slots. Each power/cooling module is able to supply slightly more power than is required, so a Sun Enterprise 6500 server with 16 boards can operate on seven power/cooling modules.
 - Sun Enterprise 4500 and Sun Enterprise 5500 servers with eight boards are able to run on three power supplies, so only four power supplies are required for redundancy. The peripheral power supply is connected to the same power circuitry as the power/cooling modules, providing the additional power required for redundancy. Note that there are some limitations with regard to power supply redundancy with certain configurations of the Sun Enterprise 4500 and 5500 when using the 400-MHz processor. See the “Power and Cooling Questions and Answers” section for more details.
- The power/cooling module is hot swappable. Therefore, if a power supply fails, the power/cooling module can be replaced (assuming the system is configured for power/cooling redundancy) while the system is running without any adverse effects to the system.
- The Sun Enterprise 4500–6500 servers have one peripheral power supply. The peripheral power supply is hot pluggable but not redundant in these platforms.
- The Sun Enterprise 3500 server supports a second, hot-swappable, peripheral power supply. The peripheral power supply provides power for the internal SCSI devices and the FC-AL internal disk drives, as well as additional power for the system boards. If the primary peripheral power supply fails, the system continues to run, but the internal SCSI devices are not functional unless the system has a second peripheral power supply. The primary peripheral power supply includes the AC inlet so it is not hot swappable. Only the second peripheral power supply is hot swappable.

Power and Cooling





System Cooling

Sun Enterprise 3500–6500 servers have multiple power/cooling modules for cooling the CPU/memory I/O, and disk boards (Sun Enterprise 4500–6500 server only), and one set of dual fans to cool the AC distribution assembly, clock board, and peripherals.

- The power/cooling modules include a power supply and two variable-speed fans.
- With dual, variable-speed fans, if one fan fails, the other fan speeds up to increase its cooling capacity.
- The power/cooling module is hot swappable. Therefore, if a fan fails, the power/cooling module can be replaced (assuming the system is configured for power/cooling redundancy) while the system is running without any adverse effects to the system.
- The fans within a power/cooling module are powered by all the power supplies in the system through current sharing. With this design, if a power supply fails, the fans within that power/cooling module continue to run.
- Variable-speed fans minimize system noise.
- The Sun Enterprise 5500 and Sun Enterprise 6500 system cabinets includes one cabinet fan tray. The cabinet fan tray includes four fans supported by two power supplies. Each power supply supports two fans. The cabinet fan tray in the system cabinet directs the hot air from the card cage and peripheral devices out the rear of the cabinet.
- Each Sun Enterprise expansion cabinet also contains one cabinet fan tray. The cabinet fan tray in an expansion cabinet can be connected to the system cabinet so that the Sun Enterprise SyMON™ software is able to detect the failure of a cabinet fan tray in an expansion cabinet. The cabinet fan tray is not hot pluggable.

Power and Cooling Questions and Answers

If a fully configured, eight-board Sun Enterprise 4500 server can operate on three power/cooling modules, can an identically configured eight-board Sun Enterprise 6500 server also operate with three power/cooling modules?

No. In the Sun Enterprise 4500 server, the peripheral power supply and the power/cooling modules are connected to the same power circuit. Therefore, if one power/cooling module fails, power from the other three power/cooling modules plus power from the peripheral power supply provide enough power to run the system. This allows eight boards to be powered by three power/cooling modules.

However, in the Sun Enterprise 6500 server, the peripheral power supply and power/cooling modules have different power circuits. Therefore, if one power/cooling module fails, the only power available is from the three remaining power/cooling modules, which is not enough to support the systems.

Are there any limitations in regard to power supply redundancy (N+1) associated with the 400-MHz/4-MB UltraSPARC™ module?

Yes, 100-MHz Gigaplane™ capable 8-slot systems (Sun Enterprise 4500, 5500, and Sun Enterprise 4000 and 5000 servers with upgraded 100-MHz Gigaplane) have an N+1 power limitation. These systems do not support N+1 power if the system has seven CPU/memory boards installed (even with four power/cooling modules installed). N+1 power is supported in any other configurations of these systems assuming the correct number of power/cooling modules are installed. The N+1 power limitation is due to the fact that the 100-MHz system speed consumes more power than the 84-MHz system speed that we currently run at. The increased power consumption does not leave enough spare power to continue running a system with seven CPU/memory boards installed if one of the power/cooling modules fails.

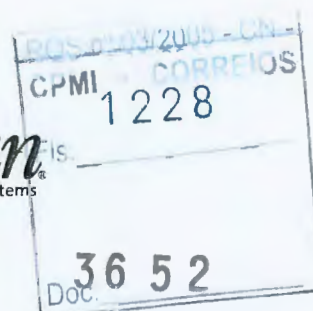


Do fully configured Sun Enterprise 4500 or 5500 servers with twelve 400-MHz/4-MB modules, seven CPU/memory boards, two I/O boards, and four power/cooling modules have N+1 power?

Yes, the N+1 power limitation is applicable only when the configuration includes seven CPU/memory boards.

Power and Cooling

Just the Facts



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System Management

System Diagnostics

There are three types of system diagnostics tools available for the Sun Enterprise™ 3000–6000 and Sun Enterprise 3500–6500 servers: the Sun Validation Test Suite (SunVTS™), Automatic System Recovery, and Remote Administration Control.

SunVTS™

SunVTS is the replacement product for SunDiag™ diagnostics tool. Like SunDiag, SunVTS is run at the UNIX® level and is designed to exercise the entire system. It supports either a graphical user interface (GUI) or TTY user interface, and provides error and information logging. The key features of SunVTS are:

- **UNIX-level diagnostics**

System tests execute UNIX code under the Solaris Operating Environment™.

- **Automatic system probing**

The system configuration is displayed through the user interface.

- **Two user interfaces**

Both a graphical user interface and a character-based interface are available. The SunVTS kernel is cleanly separable from the user interface, such that multiple user interfaces can communicate with the same SunVTS kernel. The character-based interface permits the writing of shell scripts to control SunVTS.

- **Application programming interface (API)**

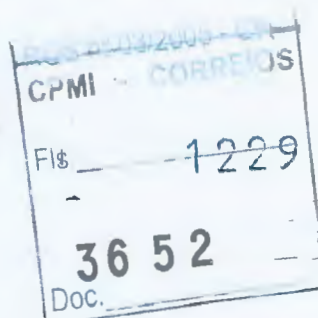
The API provides a defined interface into the SunVTS kernel from other processes, as well as the user interfaces. A SunVTS execution could be initiated in a cron-like fashion, with no direct user interface at all.

- **Advanced configuration and execution control**

Tests can be grouped together based on user requirements, with fine-grained execution control for status and logging information.

Automatic System Recovery

Automatic System Recovery operates the same way in Sun Enterprise 3500–6500 servers as in the Sun Enterprise 3000–6000 and SPARCcenter™ 2000E systems. Automatic System Recovery allows Sun Enterprise 3500–6500 servers to recover after a component, such as a UltraSPARC™ module, CPU/memory board, memory module, or I/O board fails. Upon failure, the system reboots. While rebooting, Automatic System Recovery tests system components and identifies the failed component; the system reboots around the failed component.





Automatic System Recovery is driven by power-on self-test (POST) software. The POST software in Sun Enterprise 3500–6500 systems includes two significant changes from the POST used in the SPARCcenter 2000E:

- **Uses a flash EPROM**

Flash EPROM makes it simple to update the OpenBoot™ PROM software in the field. New PROM code can be installed from a CD-ROM while the system is running.

- **Uses a configurable rule-based expert system**

A configurable rule-base expert system allows the user to customize the boot/diagnostic control flow.

Remote Administration Control

The Remote Administration Control feature on Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers allows a user to reboot, power cycle, or perform extensive operating system debugging through one of the serial ports (serial port A only). A special serial processor on the system clock board scans the input for system commands.

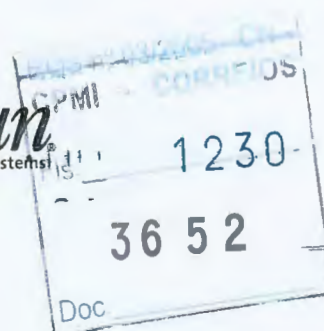
This remote console functionality allows for true “lights out” management of a system, giving system administrators more flexibility in point of management and control. This also enhances the serviceability aspect of the systems by providing a method of retrieving the system state on “hung” systems.

Remote control can be disabled by putting the key switch in the “secure” position.

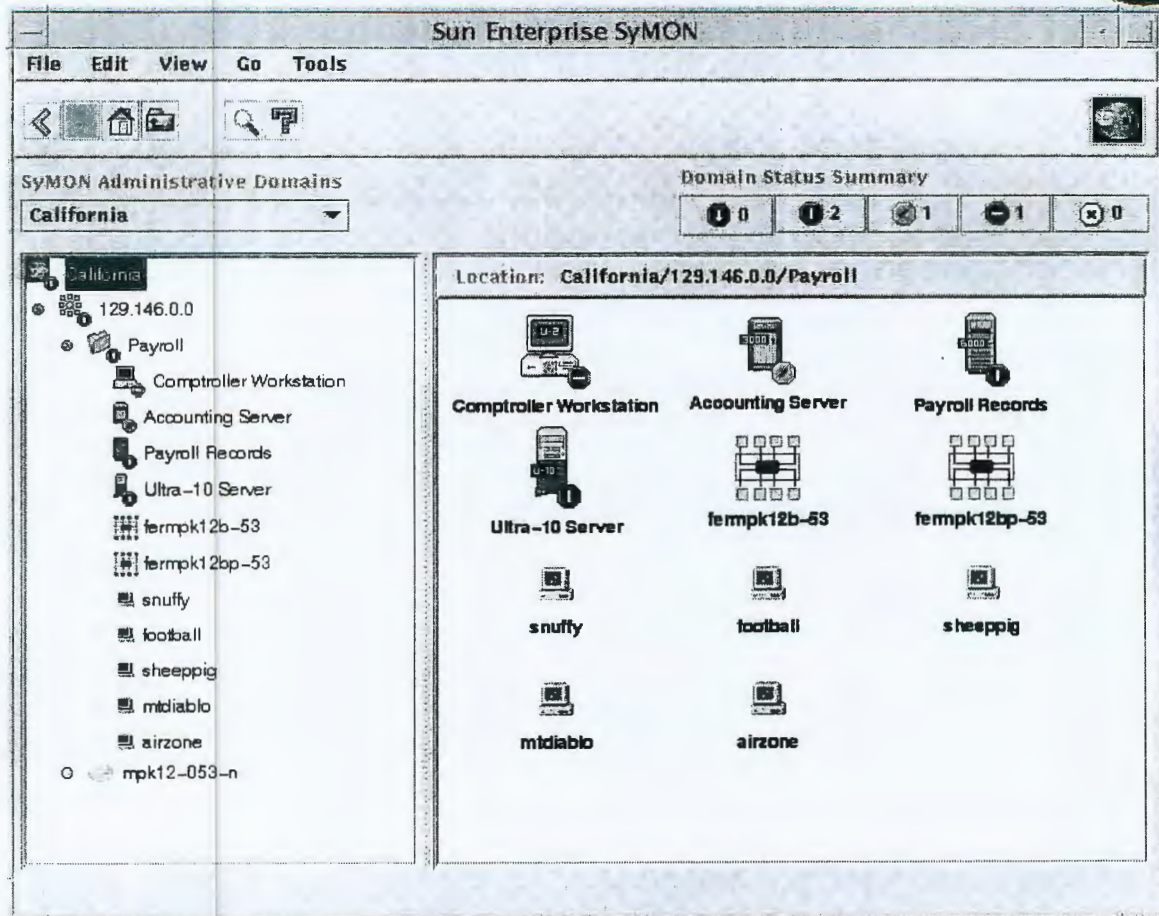
System Management



Sun
microsystems



Sun Enterprise SyMON™



Sun Enterprise SyMON™

Figure 17. Sun Enterprise SyMON™

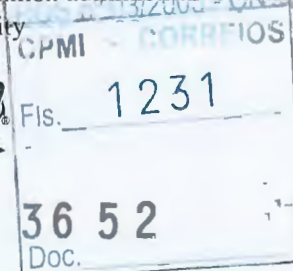
Key Features

Sun Enterprise SyMON software is Sun's next-generation enterprise system management tool for Sun Enterprise™ 3500–6500 servers. Designed to support Sun systems, Sun Enterprise SyMON technology provides a platform upon which the enterprise can base its administrative and management operations to help ensure all systems and the services they provide are highly available. A powerful tool for managing the enterprise network, the Sun Enterprise SyMON product enables system administrators to perform remote system configuration, monitor performance, and isolate hardware and software faults all through an easy-to-use graphical user interface.

Key features of Sun Enterprise SyMON software include:

- Common management platform, scalable from a single system to thousands of server and desktop systems
- Single point of management, enabling effective use of administrative resources
- Proactive and automated management of complex and common administrative tasks, reducing the likelihood for costly errors and helping to ensure availability

Just the Facts



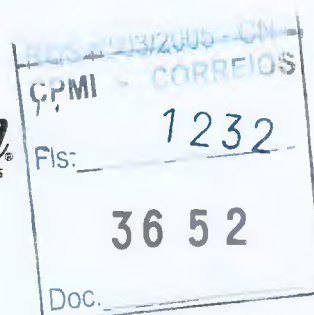
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- Configuration flexibility, enabling Sun Enterprise SyMON technology to be configured out of the box to best fit the needs of the environment, as well providing easy customization for new rules, scripts, actions, etc.
- Extensible agent architecture, enabling administrators to add functionality and management features with ease
- Dynamic agents, enabling functionality to be extended asynchronously
- Active configuration management controls, providing a secure interface for remote dynamic reconfiguration capabilities and helping to ensure availability
- Single event model, enabling information to be shared with multiple consoles or users with ease
- Multiple system support, enabling administrators to monitor and manage all Solaris™ systems remotely
- Predictive failure analysis, enabling administrators to predict potential memory and disk hardware failures on a statistical basis, thereby enhancing decision making and increasing availability
- Health monitoring, a sophisticated set of heuristics that incorporates a large body of administrative knowledge, including an intelligent rules-based health monitor that correlates metrics and gives suggested steps for resolution, resulting in simplified administration
- Log-file scanning, enabling administrators to search and parse logs and registers for a particular status—the foundation for application health monitoring
- Logical element grouping, enabling the grouping of Sun systems by geographical location, server role, administrative responsibility, etc. The status of the individual systems are summarized by the group, as events and alarms are issued to each system
- Hierarchy and topology viewer, a central management application that displays the hierarchy and a topology map of all the objects that are being managed
- Automatic discovery of Sun systems, including IP address, subnet address, hostnames, and OIDs to identify specific types of systems, as well as parametric scheduling
- Physical viewer, displaying photo-realistic images of hardware components and pointing to components with an associated event, enabling administrators unfamiliar with a particular Sun platform to quickly determine which components need to be replaced
- Logical viewer, presenting a tree hierarchy of the managed host or domain, including all hardware and operating system components. If an event is associated with a particular component, the logical viewer will identify its exact location within the hierarchy
- Event and alarm management, providing administrators with the information they need when they need it
- Enterprise-wide security measures, such as authentication, data integrity, and access control lists for management of data and active management functions
- Real-time performance analysis, enabling administrators to isolate potential and existing bottlenecks
- Standard interfaces and protocols, enabling integration with third-party management tools, including Tivoli and Computer Associates, thereby providing a complete enterprise management solution
- Full SNMP connectivity, enabling information to be shared with other enterprise management tools
- GUI using Java™ technology, providing heterogeneous GUI support, a common “look-and-feel” for all Sun Enterprise SyMON applications, and the flexibility to manage the enterprise from any platform using Java technology, thereby increasing administrator efficiency

Sun Enterprise SyMON™

Just the Facts



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Sun Enterprise SyMON software can be extended through the use of sophisticated add-on products to provide additional functionality:

- Trend analysis and historical data storage, supporting system performance analysis, configuration fault analysis, system sizing, and long term capacity planning and forecasting efforts
- Host application and database fault management, increasing data and service availability through integration with third-party products like BMC PATROL
- Firmware and patch management, providing administrators with the ability to upgrade systems when needed with the addition of Sun Enterprise Configuration and Service Tracker
- On-line diagnostics, enabling hardware and software problems to be predicted, detected, isolated, and resolved, thereby increasing system and service availability with the addition of Sun Enterprise Diag Tool

Sun Enterprise SyMON 2.0 Compatibility

The Sun Enterprise SyMON 2.0 software platform supports all systems running Solaris 2.5.1, 2.6 and Solaris 7 Operating Environments.

Hardware-dependent configuration management functions support includes:

- Sun Ultra™ 1, Ultra 2, Ultra 5, Ultra 10, Ultra 30, Ultra 60 and Ultra 450 workstations
- Sun Enterprise 3X00, Sun Enterprise 4X00, Sun Enterprise 5X00, and Sun Enterprise 6X00 servers
- SPARCserver™ 1000 and SPARCserver 1000E servers
- SPARCcenter™ 2000 and SPARCcenter 2000E servers

Additional hardware-dependent configuration management function support will be available from the Sun Enterprise SyMON web site (www.sun.com/products/symon) after version 2.0 ships. These platforms include, but are not limited to: Sun Enterprise 150, Sun Enterprise 250, Sun Enterprise 450, and Sun Enterprise 10000 servers, and the Sun StorEdge™ A5X00 array.

Sun Enterprise SyMON Licensing/Usage

Sun Enterprise SyMON 2.0 software is available off the web free-of-charge to manage an individual server or desktop (www.sun.com/products/symon). A right-to-use license is required to manage additional servers or desktops/network devices from one Sun Enterprise SyMON server layer.

Sun Enterprise SyMON™





Sun Enterprise SyMON System Monitor Questions and Answers

How is Sun Enterprise SyMON different from previous versions?

Sun Enterprise SyMON is a major new release compared to the existing release. It provides several new and enhanced features such as:

- Multiple system support: Administrators can remotely monitor and manage all the Solaris systems in their environments and have the ability to define Sun systems by geography, server role, administrative responsibility, etc.
- Heterogeneous GUI support (Java technology-based GUI): the Java technology UI in Sun Enterprise SyMON allows administrators to have the flexibility to manage from a Java platform and be more efficient through the use of a easy-to-use interface.
- Enhanced event/alarm management: Sun Enterprise SyMON has state-of-the-art event management capabilities that enables cooperative management between multiple system administrators.
- Logical element grouping: ability to group multiple managed systems into one managed entity. Allows IT-organization to map individual managed components into groups related to applications and business processes.
- Active configuration management controls: Sun Enterprise SyMON is a secure interface for remote dynamic reconfiguration capabilities (dynamic attach/detach, etc).
- Application monitoring capabilities: Sun Enterprise SyMON can monitor health and performance of application processes, monitor and act upon error log entries, monitor application files and monitor directory statistics.
- State-of-the-art standard interfaces such as SNMPv2c, SNMPv2usec, and SNMPv1 for interoperability, end-to-end security, and efficient data transfer.
- Integration with major system management platform vendors such as Tivoli and Computer Associates: Sun Enterprise SyMON integrates with the major commercial system and network management platforms to ensure an enterprise solution.

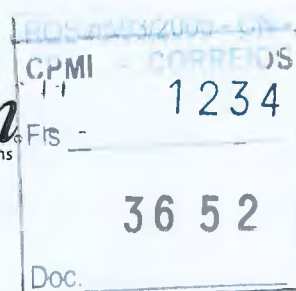
Does Sun Enterprise SyMON integrate with Computer Associates Unicenter TNG, Tivoli TMS, and Hewlett-Packard OpenView?

Sun Enterprise SyMON can send SNMP traps to any SNMP-compliant management platform. For the near future, Sun is working closely with the leading Sun Enterprise Management vendors to provide a tightly integrated solution.

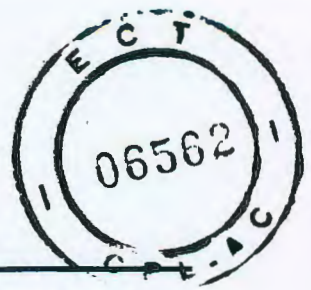
Is Sun Enterprise SyMON 2.x compatible with Solstice SyMON™ 1.x?

Sun Enterprise SyMON 2.0 is not backward compatible with Solstice SyMON 1.x

Sun Enterprise SyMON™



Software



The Solaris Operating Environment™

The Sun Enterprise 3500–6500 servers run on an industry-leading enterprise operating environment, Solaris™. The Sun Enterprise 3500–6500 servers require Solaris 2.5.1 Hardware: 11/97 with two patches: 104595-03 (or later) and 104594-01 (or later). In addition, patch number 105310-04 (or later), which is an FC-AL patch, is highly recommended. The Sun Enterprise 3500–6500 servers can also run Solaris 2.6 Hardware: 3/98 and the Solaris 7 Operating Environment with no required patches. However, patch number 105375-04 (or later), an FC-AL patch, is highly recommended for both releases.

The Solaris product line is the premier software environment for network computing, delivering unparalleled scalability and performance. Designed for IT professionals, line of business managers, Internet Service Providers and power desktop users, the Solaris software environment safely delivers information to anyone, any time, any place, on anything including PCs, workstations, and all other Internet devices.

Unlike other operating environments, Solaris delivers what companies require today and anticipates the innovation they will require tomorrow. Solaris is reliable, scalable, easy to administer, fast, safe, Year-2000 and Euro compliant, and unleashes the full power of SPARC™ processor- and Intel-based computers.

The Solaris Operating Environment contains the base level functionality required for all systems. It includes a rock solid, scalable 32-bit and 64-bit kernel; standards-based networking; platform support for both SPARC and Intel; and Java™ support. These technologies provide the foundation for building and deploying enterprise class systems for multi-vendor, multi-client workgroup environments and for highly available data center environments.

The strengths of the Solaris Operating Environment lie in enterprise-class reliability, scalability and performance. The Solaris 7 Operating Environment extends these strengths.

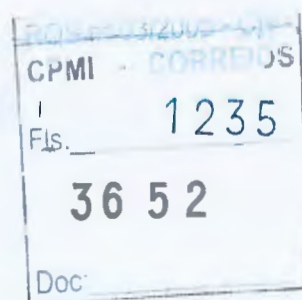
Features

Along with the features available in the Solaris 2.5.1 and 2.6 Operating Environment, the Solaris 7 Operating Environment includes support for several new features and capabilities listed below.

RAS Features

- Dynamic Reconfiguration—support for hot-swap I/O boards on Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 systems
- UFS Logging—logs changes to the UFS files system before updates are applied to the UFS
- Year 2000 compliance—no errors result when moving from date 12/31/99 to 1/1/00 or from 2/29/00 to 3/1/00
- System Crash Dump Utility Enhancement—faster capture of system data and the ability to dump data to a specified dump partition at time of system crash while also using less disk space
- Traceroute Utility—traces the route of an IP packet to an Internet host
- New system commands: pgrep(1) and pkill(1)—replaces combination of ps, grep, egrep, awk, and kill
- UNIX® 98 and UNIX 95 branding—complies with industry standards specification

Just the Facts



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Software



Performance Enhancements

- Complete 64-bit Operating Environment—process addressing beyond 4-GB, 32-bit barrier, supports 64-bit data types, and 64-bit logical and arithmetic operations
- Improved Poll System Call—system call for querying files
- TCP SACK—selective packet acknowledgment
- SCSI Driver—support for shared disk SCSI driver

Scalability Enhancements

- 64-bit Computing—64-bit virtual addressing, more file descriptors, processes and more available sockets
- Open Sockets—15,000 times as many open sockets available to applications
- Light Weight Processes—support for up to 10 million times more light weight processes
- File Descriptors—support for 15 million times as many file descriptors

Ease-of-use Features

- CDE Administration Enhancements—process manager, perfmeter, system info monitor
- CDE Productivity Enhancements—file finder, customizable graphical front panel and workspace menu, address manager, and text and voice post-it notes
- Printing Enhancements—enhanced font management
- 64-bit and AnswerBook™ Installation—menu-based selection of 64-bit or 32-bit environment, and AnswerBook
- Netscape™ 4.05 Communicator—Netscape e-mail, HTML editor, and browser
- AnswerBook Enhancements—Web browser interface for on-line AnswerBook documentation, man pages are now available in SGML format; can now be run directly from the CD
- man utility displays SGML format in addition to nroff format

Global Language Support Enhancements

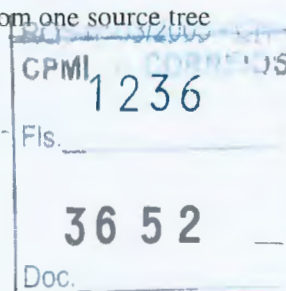
- Expanded Unicode Support—support for Unicode 2.1 standard
- Expanded Native Language Support—support for up to 37 languages and 95 locales
- Complex Text Format—support for bidirectional, composite, and context sensitive text
- Euro Currency—support for Euro currency symbol
- More locale selections—English and European versions combined on a single CD
- Fully Globalized—All localized versions share a single global binary

Security and Stability Features

- Generic Security Services—Modified remote procedure call (RPC) based on standard GSS-API
- NIS+ Extended Security—Diffie Helman key extended from 192 bits to 640 or 1024
- Directory Naming Service(DNS)—Berkeley Internet Name Daemon (BIND) upgraded to version 8.1.2. Control Lists.
- Sendmail—Upgraded to version 8.9
- 32-bit Compatibility—all existing 32-bit applications run without modification.
- Single source base for all platforms—all platforms developed from one source tree



Just the Facts



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Software



Options

Disk Options

The preferred disk solution for the Sun Enterprise™ 3500–6500 servers depends on the server model as well as the customer's environment. The following is a summary of the disk options available.:

Server

Sun Enterprise 3500

Disk Option

- Internal 9.1-GB, 3.5-inch FC-AL, disk drive(s)
- Sun StorEdge™ A1000/D1000, Sun StorEdge A3500, Sun StorEdge A5X00, and Sun StorEdge A7000 disk arrays
- Sun StorEdge UniPack, MultiPack, FlexiPack
- Sun StorEdge Tape Library

Sun Enterprise 4500

- Internal 8.4-GB disk board
- Sun StorEdge A1000/D1000, Sun StorEdge A3500, Sun StorEdge A5X00, and Sun StorEdge A7000 disk arrays
- Sun StorEdge UniPack, MultiPack, FlexiPack
- Sun StorEdge Tape Library

Sun Enterprise 5500

- Internal, 8.4-GB disk board
- Sun StorEdge A1000/D1000, Sun StorEdge A3500, Sun StorEdge A5X00, and Sun StorEdge A7000 disk arrays
- Sun StorEdge FlexiPack removable storage tray
- Sun StorEdge Tape Library

Sun Enterprise 6500

- Internal, 8.4-GB disk board
- Sun StorEdge A1000/D1000, Sun StorEdge A3500, Sun StorEdge A5X00, and Sun StorEdge A7000 disk arrays
- Sun StorEdge FlexiPack removable storage tray
- Sun StorEdge Tape Library

Options

Keep in mind that the above list is not a complete listing. For example, a Sun Enterprise 3500 server may also boot from external disk drives, but the internal FC-AL disk drives is the most commonly chosen option. Also note that the SPARCstorage™ Array Models 100 and 200 are still supported with the above platforms, although they are no longer factory-configurable.

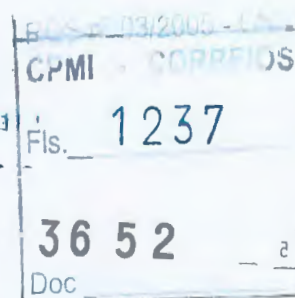
The disk board is designed to be used only as a system disk in the Sun Enterprise 4500–6500 server. Its capacity is not large enough for anything else. It also does not make sense to use several system slots for internal capacity in these systems. External disk options can also be used as system disks.

Refer to the *Sun Enterprise 3500–6500 Servers System Options* document for a list of supported disk options. For Sun Enterprise 3500–6500 servers with certain internal disk options, the Solstice JumpStart™ Boot Image software may be factory installed at no charge. The Solstice JumpStart software may be installed on the following disk storage products:

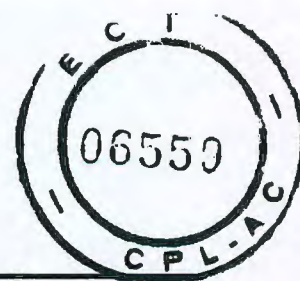
- Internal FC-AL disk drives on the Sun Enterprise 3500 server
- 8.4-GB disk board in the Sun Enterprise 4500, Sun Enterprise 5500, and Sun Enterprise 6500 servers

The Solstice JumpStart software is not supported with the Sun StorEdge A5X00 array

Just the Facts



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Upgrades

Sun offers customers a variety of flexible upgrade paths to the Sun Enterprise™ 3500–6500 servers that protect their investment. Customers can choose among full-system, chassis only, Gigaplane™ system bus, CPU, board and memory upgrades. To protect customers' investments, Sun upgrades allow customers to carry forward as many components as possible to a Sun Enterprise 3500, Sun Enterprise 4500, Sun Enterprise 5500 or Sun Enterprise 6500 server.

Sun-to-Sun Upgrades (Trade ins) to the Sun Enterprise Server Family

FROM:	TO:	Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500	Sun Enterprise 6500
Full System Workgroup Server		Yes	No	No	No
Full System Sun 3X0/4X0		Yes	Yes	No	No
Full System Sun 6X0/SS1000		Yes	Yes	Yes	No
Full System Sun SC2000		No	Yes	Yes	Yes
Intra-Family Chassis Upgrade from Sun Enterprise 3000 or Sun Enterprise 3500		No	Yes	Yes	No
Intra-Family Chassis Upgrade from Sun Enterprise 4000 or Sun Enterprise 4500		No	No	No	Yes
Intra-Family Chassis Upgrade from Sun Enterprise 5000 or Sun Enterprise 5500		No	No	No	Yes
Gigaplane Field Upgrade		N/A	Yes	Yes	No
CPU/Memory Board Upgrades		Yes	Yes	Yes	Yes
I/O Board Upgrades		Yes	Yes	Yes	Yes
CPU Module Upgrades		Yes	Yes	Yes	Yes
Memory Upgrade		Yes	Yes	Yes	Yes

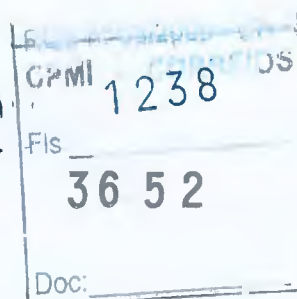
Upgrades

Competitive Upgrades (Trade ins) to the Sun Enterprise Server Family

Existing investments in other hardware not by Sun can be preserved by upgrading to Sun Enterprise 3500–6500 systems through competitive upgrades.

FROM:	TO:	Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500	Sun Enterprise 6500
Server System		Yes	Yes	Yes	Yes
CPU Boards		Yes	Yes	Yes	Yes
CPU Modules		Yes	Yes	Yes	Yes

Just the Facts



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Upgrades to the Sun Enterprise 3500 and Sun Enterprise 4500 Servers

The following system upgrades are available for Sun Enterprise 3500 and 4500 servers:

- Full-system upgrade from workgroup servers
- Full-system upgrade from the older-generation Sun servers
- Full-system upgrade from qualified competitive servers
- Chassis upgrade from Sun Enterprise 3000 to the Sun Enterprise 3500 or Sun Enterprise 4500 servers
- Gigaplane field upgrade for Sun Enterprise 4000 servers

Full-System Upgrades

The full-system upgrades to the Sun Enterprise 3500 server include the chassis, a power/cooling module, one CPU/memory board, and two CPU modules. The chassis upgrades to the Sun Enterprise 4500 server includes the chassis, clock board, and CD. The full-system upgrades are intended to be used in conjunction with the CPU/memory board and UltraSPARC™ module upgrades, and other options to provide a method of upgrading a range of sizes of Sun and competitive systems. This allows Sun to offer excellent value for large and small servers

Note: The Return Material Authorization Kit (no-charge part number UG-RMA) is **required** to be ordered with any factory-installed system or component upgrade. This part number will ship return material information..

Order	Receive	Return
Workgroup Server Full-System Upgrade to two-CPU Sun Enterprise 3500 Base		
UG-WRKGP-E3500-C52 (250/4) UG-WRKGP-E3500-C62 (336/4) UG-WRKGP-E3500-C72 (400/4)	Server base package: one CPU/memory board, and two CPU modules, one Power/Cooling Mod.	Chassis, system board, primary memory board, and internal peripherals
Workgroup Server Full-System Upgrades to four-CPU Sun Enterprise 3500 Base (Note: Transition Announced 1/99)		
UG-WRKGP-E3500-C54 (250/4) UG-WRKGP-E3500-C64 (336/4)	Server base package: two CPU/memory board, and four CPU modules and one Power/Cooling modules	Chassis, system board, primary memory board, and internal peripherals
Sun-3™/Sun-4™ or SPARCserver™ 6X0MP Desksides and SPARCserver 1000 Full-System Upgrade to two-CPU Sun Enterprise 3500 Base		
UG-SUNSV-E3500-C52 (250/4) UG-SUNSV-E3500-C62 (336/4) UG-SUNSV-E3500-C72 (400/4)	Server base package: chassis, one CPU/memory board, and two CPU modules, one Power/Cooling module	Chassis, system board (except SPARCcenter™ 1000E, see system board upgrade below), primary memory board, and internal peripherals
Sun-3/Sun-4 /6X0MP Desksides and SPARCserver 1000 Full-System Upgrade to four-CPU Sun Enterprise 3500 base (Note: Transition Announced 1/99)		
UG-SUNSV-E3500-C54 (250/4) UG-SUNSV-E3500-C64 (336/4)	Server base package: two CPU/memory boards, four CPU modules, and one power/cooling modules	Chassis, system board (except SPARCcenter 1000, see system board upgrade below), primary memory board, and internal peripherals

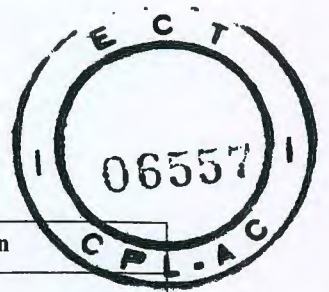
Upgrades

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Order	Receive	Return
Competitive Full-System Upgrade to two-CPU Sun Enterprise 3500 base		
CU-E3500-C52 (250/4) CU-E3500-C62 (336/4) CU-E3500-C72 (400/4)	Server base package: chassis, one CPU/memory board, and two CPU modules	Chassis, system board, primary memory board, and internal peripherals
Competitive Full-System Upgrade to four-CPU Sun Enterprise 3500 base (Note: Transition Announced 1/99)		
CU-E3500-C54 (250/4) CU-E3500-C64 (336/4)	Server base package: two CPU/memory boards, four CPU modules, and one power/cooling modules	Chassis, system board, primary memory board, and internal peripherals
Sun-3/Sun-4 or SPARCserver 6X0MP Desksides SPARCserver 1000 Full System or SPARCcenter 2000 Upgrade		
UG-SUNSV-E4500	Server base package: chassis, clock board, CD, two power/cooling modules, one CPU/memory board, and one SBus I/O board	Chassis, system board, (except SPARCcenter 1000 and 2000, see system board upgrade below) primary memory board, and internal peripherals
Competitive Full-System Upgrade to Sun Enterprise 4500 Base		
CU-E4500	Server base package: chassis, clock board, CD, two power/cooling modules, one CPU/memory board, and one SBus I/O board	Chassis, system board, primary memory board, and internal peripherals

Upgrades

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Intra-Family Chassis Upgrades

Sun Enterprise 3000 Component Migration

The following is a summary table detailing which components will or will not migrate when upgrading from the Sun Enterprise 3000 server to Sun Enterprise 3500, 4500, or 5500 server:

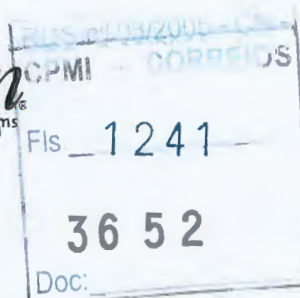
FROM:	TO:	
Sun Enterprise 3000	Sun Enterprise 3500	Sun Enterprise 4500/5500
Internal Disk	No	No
Memory	Yes	Yes
CPU Module*	Yes	Yes
I/O Boards*	Yes	Yes
CPU/memory Board*	Yes	Yes
Power/Cooling Modules	Yes	Yes
Internal Tape Drive	Yes	Yes
Peripheral Power Supply with AC Inlet	Yes	No
Fan Tray (Above Peripheral Power Supply Only)	Yes	No
* Migrate these boards/modules only if current speed is to be maintained. Migrating 167-MHz modules might require a PROM upgrade as the minimum PROM level supported is 3.2.10. (See product announcement for details on downloading the patch for a PROM level upgrade).		

While the Sun Enterprise 3000 server internal disks are not compatible in the Sun Enterprise 3500-6500 server family, an upgrade (trade in) offering is available. See product announcement for details.

Order	Receive	Return
Sun Enterprise 3000-to-Sun Enterprise 3500 Intra-family Upgrade		
UG-E3000-E3500	Sun Enterprise 3500 system enclosure with clock board, CD, card cage, one board filler panel for power/cooling module	Sun Enterprise 3000 system enclosure, clock board, CD, card cage, fan tray (under disks)
Sun Enterprise 3000-to-Sun Enterprise 4500 Intra-family Upgrade		
UG-E3000-E4500	Sun Enterprise 4500 system enclosure with clock board, CD, card cage, one peripheral power supply, and one power/cooling module, four board filler panels	Sun Enterprise 3000 system enclosure, clock board, CD, card cage, and peripheral power supplies, fan tray
Sun Enterprise 3000-to-Sun Enterprise 5500 Intra-family Upgrade		
UG-E3000-E5500	Sun Enterprise 5500 rack system enclosure with clock board, CD, card cage, one peripheral power supply, and one power/cooling module, four board filler panels	Sun Enterprise 3000 system enclosure, clock board, CD, card cage, and peripheral power supplies

Upgrades

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Sun Enterprise 3500 Component Migration

The following is a summary table detailing which components will or will not migrate when upgrading from the Sun Enterprise 3500 server to an Sun Enterprise 4500 or Sun Enterprise 5500 server:

FROM:	TO:	
Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500
Internal Disk	No	No
Clock board	Yes	Yes
CD	Yes	Yes
Memory	Yes	Yes
CPU Module	Yes	Yes
I/O Boards	Yes	Yes
CPU/Memory Board	Yes	Yes
Power/Cooling Modules	Yes	Yes
Internal Tape Drive	Yes	Yes
Peripheral Power Supplies	No	No
IB Board	No	No

While the Sun Enterprise 3500 server internal disks are not compatible in the Sun Enterprise 4500 or Sun Enterprise 5500 servers, an upgrade (trade-in) offering is available. See product announcement for details.

Order	Receive	Return
Sun Enterprise 3500-to-Sun Enterprise 4500 Intra-family Upgrade:		
UG-E3500-E4500	Sun Enterprise 4500 system enclosure with card cage, one peripheral power supply, and one power/cooling module	Sun Enterprise 3500 system enclosure, card cage, and peripheral power supplies
Sun Enterprise 3500-to-Sun Enterprise 5500 Intra-family Upgrade:		
UG-E3500-E5500	Sun Enterprise 5500 rack system enclosure with card cage, one peripheral power supply, and one power/cooling module	Sun Enterprise 3500 system enclosure, card cage, and peripheral power supplies
Sun Enterprise 4000-to-Sun Enterprise 4500 Gigaplane Upgrade:		
UG-E4000-100GIGPLN	100-MHz-capable centerplane, 100-MHz-capable clockboard, 32X SunCD™, Sun Enterprise 4500 nameplate	Sun Enterprise 4000 centerplane, SunCD, clockboard, nameplate

Upgrades

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Upgrades to the Sun Enterprise 5500 and Sun Enterprise 6500 Servers

The following system upgrades are available for Sun Enterprise 5500 and Sun Enterprise 6500 Servers:

- Full-system upgrade from Sun SPARCserver 6X0MP Desksides, SPARCserver 1000 and SPARCcenter 2000 servers
- System board upgrades for the SPARCserver 1000 and SPARCcenter 2000 servers
- Full-system upgrade from qualified competitive servers
- Intra-Family chassis upgrades: Sun Enterprise 3000–5500, Sun Enterprise 3500–5500, Sun Enterprise 4500–6500, and Sun Enterprise 5500–6500
- Inter-Family chassis upgrades: Sun Enterprise 4000–6500
- Gigaplane field upgrade: Sun Enterprise 5000

Full-System Upgrades

The full-system upgrades include the chassis, and, two power/cooling modules, one CPU/memory board, and one SBus I/O board with FC-AL. The full-system upgrades are intended to be used in conjunction with the system board upgrades and other Sun Enterprise server options to provide a method of upgrading a range of sizes of SPARCserver 1000E and SPARCcenter 2000E servers. This allows Sun to offer excellent value for large and small SPARCserver 1000E and SPARCcenter 2000E servers in the installed base.

Order	Receive	Return
SPARCserver 6X0MP Deskside, SPARCserver 1000 or SPARCcenter 2000 System Upgrade:		
UG-SUNSV-E5500	Server base package: Rack enclosure, chassis, clock board, CD, two power/cooling modules, one CPU/memory board, and one SBus I/O board	Chassis, CPU board, primary memory board, and internal peripheral
SPARCcenter 2000E System Upgrade:		
UGS2000-E6500	Server base package: Rack enclosure, chassis, clock board, CD, two power/cooling modules, one CPU/memory board, and one SBus I/O board	Chassis, CPU board, primary memory board, and internal peripheral
Competitive Full-System Upgrade:		
CU-E5500 CU-E6500	Server base package: Rack enclosure, chassis, clock board, CD, two power/cooling modules, one CPU/memory board, and one SBus I/O board	Chassis, CPU board, primary memory board, and internal peripheral

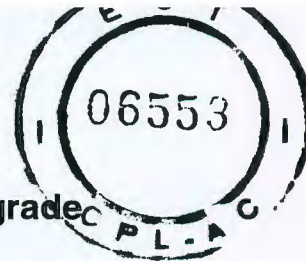
Upgrades

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Sun Enterprise 5500 and Sun Enterprise 6500 Intra-Family Upgrade

Sun Enterprise 4000 Component Migration

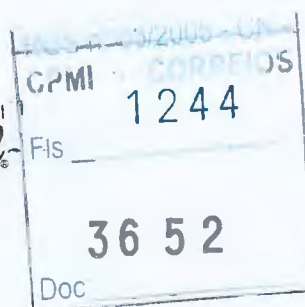
The following is a summary table detailing which components will migrate when upgrading from the Sun Enterprise 4000 to an Sun Enterprise 6500 server:

FROM Sun Enterprise 4000:	TO Sun Enterprise 6500:
Memory	Yes
CPU Module*	Yes
I/O Boards*	Yes
CPU/Memory Board*	Yes
Power/Cooling Modules	Yes
Internal Tape Drive	Yes
Peripheral Power Supplies	Yes
Optional Disk Board	Yes
* Migrate these boards/modules only if current speed is to be maintained. Migrating 167-MHz modules might require a PROM upgrade as the minimum PROM level supported is 3.2.10. (See product announcement for details on downloading the patch for a PROM level upgrade).	

Upgrades

Order	Receive	Return
Sun Enterprise 4000-to-Sun Enterprise 6500 Intra-family Upgrade:		
UG-E4000-E6500	Sun Enterprise 6500 rack system enclosure with clock board, CD, and card cage	Sun Enterprise 4000 system enclosure, clock board, CD, and card cage

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Sun Enterprise 4500 Component Migration

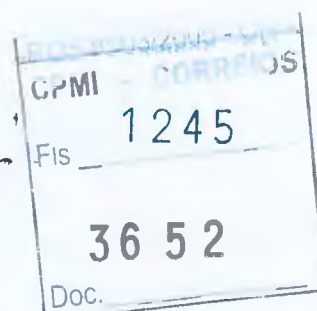
The following is a summary table detailing which components will migrate when upgrading from the Sun Enterprise 4500 to an Sun Enterprise 6500 server:

FROM Sun Enterprise 4000:	TO Sun Enterprise 6500:
Memory	Yes
CPU Module	Yes
I/O Boards	Yes
CPU/Memory Board	Yes
Power/Cooling Modules	Yes
Internal Tape Drive	Yes
Peripheral Power Supplies	Yes
Optional Disk Board	Yes

Order	Receive	Return
Sun Enterprise 4500-to-Sun Enterprise 6500 Intra-family Upgrade:		
UG-E4500-E6500	Sun Enterprise 6500 rack system enclosure and card cage	Sun Enterprise 4500 system enclosure, and card cage

Upgrades

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Sun Enterprise 5000 Component Migration

The following is a summary table detailing which components will migrate when upgrading from the Sun Enterprise 5000 to an Sun Enterprise 6500 server:

FROM Sun Enterprise 5000:	TO Sun Enterprise 6500:
Memory	Yes
CPU Module*	Yes
I/O Boards*	Yes
CPU/Memory Board*	Yes
Power/Cooling Modules	Yes
Internal Tape Drive	Yes
Peripheral Power Supplies	Yes
Optional Disk Board	Yes
* Migrate these boards/modules only if current speed is to be maintained. Migrating 167-MHz modules might require a PROM upgrade as the minimum PROM level supported is 3.2.10. (See product announcement for details on downloading the patch for a PROM level upgrade).	

Order	Receive	Return
Sun Enterprise 5000-to-Sun Enterprise 6500 Intra-family Upgrade:		
UG-E5000-E6500	Sun Enterprise 6500 rack system enclosure with clock board, CD and card cage	Sun Enterprise 5000 system enclosure, clock board, CD and card cage
Sun Enterprise 5000 Gigaplane Upgrade:		
UG-E5000-100GIGPLN	100-MHz-capable centerplane, 100-MHz-capable clockboard, 32xSunCD, CD tray assembly	Sun Enterprise 5000 centerplane, SunCD, clockboard, tray assembly

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Sun Enterprise 5500 Component Migration

The following is a summary table detailing which components will migrate when upgrading from the Sun Enterprise 5500 to an Sun Enterprise 6500 server:

FROM Sun Enterprise 5500:	TO Sun Enterprise 6500:
Memory	Yes
CPU Module	Yes
I/O Boards	Yes
CPU/Memory Board	Yes
Power/Cooling Modules	Yes
Internal Tape Drive	Yes
Peripheral Power Supplies	Yes
Optional Disk Board	Yes

Order	Receive	Return
Sun Enterprise 5500-to-Sun Enterprise 6500 Intra-family Upgrade:		
UG-E5500-E6500	Sun Enterprise 6500 rack system enclosure with and card cage	Sun Enterprise 5500 system enclosure, and card cage

Upgrades

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CPU Module, Board, and Memory Upgrades

The following processor module, board and memory upgrades are common to all Sun Enterprise 3500–6500 systems:

- UltraSPARC CPU module upgrades
- System board upgrades from existing Sun Enterprise 3000–6000 compatible boards. Also, board upgrades for customers with Sun SPARCserver 1000E or SPARCcenter 2000E systems
- Sun memory upgrade

UltraSPARC module upgrades from 167-MHz and 250-MHz UltraSPARC modules are available for field installation or, if ordered with an Intra-Family chassis upgrade, can be installed at the factory.

System board upgrades from Sun Enterprise 3000–6000 systems are shipped separately for field installation only.

System board upgrades and UltraSPARC module upgrades from pre-UltraSPARC processor systems or competitive systems are factory configured and intended to be used in conjunction with chassis upgrades.

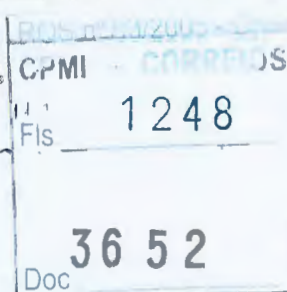
Memory upgrades are shipped separately for field installation only.

Note: The Return Material Authorization Kit (no-charge part number UG-RMA) is **required** to be ordered with any factory-installed system or component upgrade. This part number will ship return material information.

Order	Receive	Return
UltraSPARC Module Upgrade, Field Installed:		
	UltraSPARC Processor module:	
UG-M2510-M2550	250-MHz, 4-MB Ecache	167-MHz, 512-KB or 1-MB Ecache
UG-M2530-2560	336-MHz, 4-MB Ecache	250-MHz, 1-MB or 4-MB Ecache
UG-M2510-M2560	336-MHz, 4-MB Ecache	167-MHz, 512-KB or 1-MB Ecache
UG-M2510-M2570	400-MHz, 4-MB Ecache	167-MHz, 512-KB or 1-MB Ecache
UG-M2550-M2570	400-MHz, 4-MB Ecache	250-MHz, 1-MB or 4-MB Ecache
UG-M2560-M2570	400-MHz, 4-MB Ecache	336-MHz, 4-MB Ecache
UltraSPARC Module Upgrade, Factory Installed:		
	UltraSPARC Processor module:	
UG-M2550,	250-MHz, 4-MB Ecache	SuperSPARC™ processor module
CU-M2550	250-MHz, 4-MB Ecache	Qualified competitive CPU module
UGFA-M2530-M2560	336-MHz, 4-MB Ecache	250-MHz, 1-MB or 4-MB Ecache
UGFA-M2510-M2560	336-MHz, 4-MB Ecache	167-MHz, 512-KB or 1-MB Ecache
UG-M2560	336-MHz, 4-MB Ecache	SuperSPARC processor module
CU-M2560	336-MHz, 4-MB Ecache	Qualified competitive CPU module
UGFA-M2510-M2570	400-MHz, 4-MB Ecache	167-MHz, 512-KB or 1-MB Ecache
UGFA-M2550-M2570	400-MHz, 4-MB Ecache	250-MHz, 1-MB or 4-MB Ecache
UGFA-M2560-M2570	400-MHz, 4-MB Ecache	336-MHz, 4-MB Ecache
UG-M2570	400-MHz, 4-MB Ecache	SuperSPARC processor module
CU-M2570	400-MHz, 4-MB Ecache	Qualified competitive CPU module

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Order	Receive	Return
CPU/Memory Board Upgrades:		
UGFA-SB260X-2602	CPU/memory board that supports 100-MHz centerplane; factory installed	One 2600 or 2601 CPU/memory board
UGSB260X-2602	CPU/memory board that supports 100-MHz centerplane; field installed	One 2600 or 2601 CPU/memory board
CU-2602	CPU/memory board that supports 100-MHz centerplane; factory installed	A qualified competitive system board
UGSB1000-X-256M-C	100 MHz-compatible CPU/memory board with 256 MB of RAM; factory installed	SPARCserver 1000 system board
UGSB1000-X-1GB-C	100 MHz-compatible CPU/memory board with 1 GB of RAM; factory installed	SPARCserver 1000 system board
UGSB2000-X-0M-C	100 MHz-compatible CPU/memory board, no memory; factory installed	SPARCserver 1000 or SPARCserver 2000 system board
UGSB2000-X-256M-C	100 MHz-compatible CPU/memory board with 256 MB of RAM; factory installed	SPARCcenter 2000 system board
UGSB2000-X-1GB-C	100 MHz-compatible CPU/memory board with 1 GB of RAM; factory installed	SPARCcenter 2000 system board
I/O Board Upgrades:		
UGFA-SB261X-2612	Sbus I/O board that supports 100-MHz centerplane; factory install	One 2610 or 2611 Sbus I/O board
UGSB261X-2612	Sbus I/O board that supports 100-MHz centerplane; field installed	One 2610 or 2611 Sbus I/O board
UGFA-SB262X-2622	Graphics I/O board that supports 100-MHz centerplane; factory install	One 262x Graphics I/O board
UGSB262X-2622	Graphics I/O board that supports 100-MHz centerplane; field install	One 262x Graphics I/O board
UGFA-SB263X-2632	PCI I/O board that supports 100-MHz centerplane; factory install	One 263x PCI I/O board
UGSB263X-2632	PCI I/O board that supports 100-MHz centerplane; field install	One 263x PCI I/O board
UGSB261X-2632	PCI I/O board that supports 100-MHz centerplane; field install	One 261x SBus I/O board
Sun Enterprise Server Memory Upgrades:		
UGFA-MEM256-MEM1GB	1 GB of memory; factory installed	One 256-MB memory module (7022A)
UG-MEM256-MEM1GB	1 GB of memory; field installed	One 256-MB memory module (7022A)

Upgrades

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Configuration Guidelines

All upgrades to Sun Enterprise 3500–6500 servers require Solaris™ 2.5.1 Hardware: 11/97 with two patches: 104595-03 (or later) and 104594-01 (or later). In addition, patch number 105310-04, which is an FC-AL patch, is highly recommended. The Sun Enterprise 3500–6500 servers can also run Solaris 2.6 Hardware: 3/98 with no required patches. However, patch number 105375-04, an FC-AL patch, is highly recommended.

Note: *The Return Material Authorization Kit (no-charge part number UG-RMA) is required to be ordered with any factory-installed system or component upgrade. This part number will ship return material information*

Configtool now supports Intra-Family Upgrades. A declaration of the compatible components that will be migrated is required when configuring a Intra-Family Upgrade. Configtool now has the ability to assess existing components when determining a valid configuration.

Upgrades

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Upgrades Questions and Answers

Why is the Return Material Authorization kit (no-charge part number UG-RMA) required for all Sun Enterprise 3500-6500 upgrades?

Ordering part number UG-RMA will ship a Return Material Authorization kit to the customer who is trading in a server. This kit houses the terms and conditions of the upgrade.

Is there any hardware or software required to support the 400-MHz/4-MB module in the Sun Enterprise 3X00 through 5X00 servers?

The 400-MHz/4-MB modules will require Sun Enterprise Flashprom update 3.2.18 or above. Other than the Flashprom version, no new hardware or software is required from what is being shipped currently in the Sun Enterprise 3500 through 5500 servers. They will run in existing Sun Enterprise 3000 through 5000 servers if they have the following:

- Sun Enterprise Flashprom update 3.2.18 or above
- 100-MHz clock board which is required to support 100-MHz Gigaplane

The Sun Enterprise 3000 clock board and Gigaplane are already 100-MHz capable, so, in most cases, only the system boards need to be upgraded in order to support the 400-MHz/4-MB modules. Only original Sun Enterprise 3000 base packages need to have the clock board upgraded. This is because the original clock board in Sun Enterprise 3000 base package did not support any modules above 167 MHz and, therefore, needs to be upgraded to support 400-MHz/4-MB modules. Sun Enterprise "3001" and "3002" base packages do not need to have the clock board upgraded because they shipped with a second-generation clock board that supported modules above 167 MHz.

A 100-MHz clock board upgrade is also available (part number UG-ENT-100MHCLOCKB).

- 100-MHz capable CPU/memory and I/O boards (2602A, 2612A, 2622A, and 2632A)

See the previous upgrade pages for a list of available 100-MHz CPU/memory and I/O board upgrades.

- An upgraded 100-MHz capable Gigaplane in the Sun Enterprise 4000 and 5000

Is the 400-MHz/4-MB UltraSPARC module supported in a system with any 84-MHz system boards?

No, the 400-MHz/4-MB UltraSPARC module is not supported in a system with any 84-MHz system boards, due to the fact that it runs at a 4:1 CPU-to-Gigaplane speed ratio and requires the Gigaplane (and associated system boards) to run at 100 MHz.

Why isn't the 400-MHz/4-MB UltraSPARC module supported in the Sun Enterprise 6500 and 6000 servers?

The 400-MHz/4-MB module requires the Gigaplane to run at 100-MHz. The Sun Enterprise 6500 and 6000 servers cannot support running the Gigaplane at 100-MHz due to the physical length of the bus.

Will there be a faster-than-336-MHz UltraSPARC module available for the Sun Enterprise 6500 and 6000 servers?

Yes, there will be a module available that will run faster than 336-MHz and will not require the Gigaplane, I/O boards, or 2601A/2602A CPU/memory boards to be upgraded (2600A CPU/memory boards will need to be upgraded). Up to 30 of these future modules will be supported and all sixteen Gigaplane slots will be able to be utilized.

Will the 400-MHz/4-MB module ever be supported in the Sun Enterprise 6500 and 6000 Servers?

No, the 400-MHz/4-MB module will never be supported in the Sun Enterprise 6500 and 6000 Servers.

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Is it necessary to upgrade the Gigaplane in order to support faster-than 336-MHz modules in the Sun Enterprise 3000 through 5000 servers?

At this time yes, but in the future there will be a new module available that will run at faster-than-336-MHz speeds and will not require the Gigaplane, I/O boards, or 2601A/2602A CPU/memory boards to be upgraded (2600A CPU/memory boards will need to be upgraded).

What is the benefit of the enhanced Gigaplane system bus and system boards?

Sun provides investment protection for near term performance growth requirements on the Sun Enterprise 4000 and Sun Enterprise 5000. Offering this Gigaplane upgrade enables customers to use the faster 400-MHz/4-MB processors. All system boards in the Sun Enterprise 4000/Sun Enterprise 5000 must be upgraded to be 100 MHz-compatible to take advantage of the Gigaplane upgrade.

Why does Sun have new system boards?

The new system boards are capable of supporting the faster (over 84 MHz) Gigaplane speeds. In addition, the Graphics I/O board has been modified: the pair of on-board, 25-MB-per second fiber channel sockets has been replaced by a pair of on-board, 100-MB-per-second FC-AL sockets. These new FC-AL sockets provide on-board connection to the internal disk drives in the Sun Enterprise 3500 server or to Sun StorEdge™ A5000 disk arrays.

Can I use the 100-MHz-compatible system boards in Sun Enterprise 3000–6000 servers?

Yes. These new system boards are compatible with existing Sun Enterprise 3000–6000 servers. There is no problem mixing these system boards in a Sun Enterprise 3000–6000 server that already uses the previous system boards.

What CPU modules are supported in the Sun Enterprise 3500–6500 servers?

The Sun Enterprise 3500–6500 servers can be ordered with factory-configured, 250-MHz/4-MB, 336-MHz/4-MB or 400-MHz/4-MB UltraSPARC modules. The 250-MHz/1-MB, 167-MHz/1-MB, and 167-MHz/0.5-MB UltraSPARC modules are also supported, but they not available as factory-configured options.

Note: Customers with 167-MHz UltraSPARC processors who wish to migrate their modules to Sun Enterprise 3500–6500 servers might require a PROM upgrade as the minimum PROM level supported is 3.2.10.

How does a customer determine the PROM level on their system? And if the PROM level is below 3.2.10 how can the customer obtain a PROM upgrade?

The system POST (Power On Self Test) displays the OpenBoot™ PROM software version of the system during the POST. Customers with versions below 3.2.10 can download a patch for the PROM level upgrade at URL: <http://sunsolve.sun.com/> (access is limited to customers on Sun Enterprise Services contract).

Do the Sun Enterprise 4500–6500 servers support the previous 4.2-GB disk board?

Yes.

Do current Sun Enterprise 3000–5000 server customers need to upgrade their existing CPU/memory and I/O boards?

Only if 400-MHz/4-MB CPU modules are being installed will the customer be required to have 26X2A 100-MHz-compatible CPU/memory and I/O boards installed. Otherwise, their current CPU/memory boards are capable of supporting 167-MHz, 250-MHz, or 336-MHz UltraSPARC modules. However, in

Upgrades



order to take advantage of the 4-MB cache of either the 250-MHz/4-MB or 336-MHz/4-MB CPU modules, either the 2601A or 2602A CPU/memory board is needed. The older 2600A CPU/memory boards support modules with 4-MB cache but only 2 MB of cache per processor is used.

Can Sun Enterprise Server systems support a combination of new and older CPU/memory boards and/or I/O boards?

No, if 400-MHz/4-MB CPU modules are installed. Yes, if slower speed modules are installed in which case the old and new boards may be mixed in the Sun Enterprise 3500–6500 servers and in the Sun Enterprise 3000–6000 servers. In a mixed configuration the server runs at the speed of the lowest-speed component in the system (system board(s) speed(s) and the Gigaplane speed).

Which components can a customer carry forward during an Intra-Family Upgrade from the Sun Enterprise 3000–5000 server to Sun Enterprise 4500–6500 server?

Existing memory, power/cooling modules, and internal tape devices. can be carried forward. In addition, the following components will migrate if the customer is upgrading in order to use more system slots and plans to expand their configuration with the same speed UltraSPARC processors as they have in their existing Sun Enterprise 3000–5000 server: existing CPU/memory boards, I/O boards, and UltraSPARC CPU modules.

What options are available to customers who are upgrading from the Sun Enterprise 3000 server to Sun Enterprise 3500, 4500 or Sun Enterprise 5500 server, where the internal disk does not migrate?

Sun offers the following disk upgrade (trade in) options to customers:

- Trade in 4 GB of disk and upgrade to 9.1-GB FC-AL disk drive
- Trade in 30 GB of disk and upgrade to Sun StorEdge A3000 disk array

Can customers install their own upgraded system? What services are available to aid them?

The Sun Enterprise 3500–6500 server upgrades can be accomplished by the customer. However, it is strongly recommended that the customer purchase installation services from Sun Enterprise Services. Because of the variability in customer configurations, installation services purchased from Sun Enterprise Services need to be quoted on a time and material basis.

When does a customer need a clock board upgrade?

A customer needs to purchase a clock board upgrade if the Sun Enterprise 3000–6000 server was purchased prior to November 19, 1996 and the customer wants to upgrade from 167-MHz processors to the 250-MHz or 336-MHz processor module. Or, if the customer is upgrading the Sun Enterprise 3000–5000 to run the 400-MHz/4-MB CPU module

Can existing Sun Enterprise 4000–5000 systems be upgraded to support faster than 84-MHz Gigaplane system bus?

Yes. See announcement dated January 26, 1999 or refer to pages earlier in this section for details

Where do I find more information on which servers are eligible in each of the competitive server trade-in categories?

Contact the Installed Base Business representative in your area.

Are there any software-compatibility issues with applications migrating to the servers based on the UltraSPARC processor architecture?

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The UltraSPARC processor-based servers require a new version of the Solaris Operating Environment[™] (Solaris 2.5.1). This new version of the Solaris Operating Environment is fully binary-compatible with the current version of the Solaris Operating Environment (Solaris 2.5). Sun does not anticipate any major problems with ISVs supporting their application software on the next version of the Solaris Operating Environment.

Which SPARCserver 1000E and SPARCcenter 2000E system components can be used in the systems based on the UltraSPARC processor architecture?

Upgrading from a SPARCserver 1000E or SPARCcenter2000E system requires a chassis swap. The chassis, system boards, SuperSPARC processors, and memory must be replaced. The components from a SPARCcenter 2000E or SPARCserver 1000E systems that can be migrated to an UltraSPARC processor-based server include SPARCstorage[™] Array subsystems, and disk trays.

Upgrades

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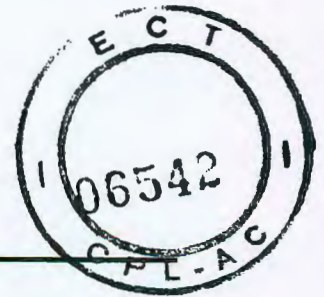
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Service and Support

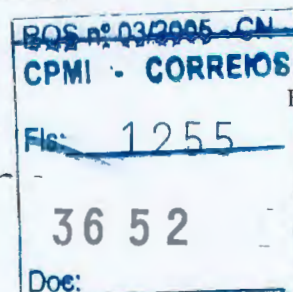


The SunSpectrumSM program is an innovative and flexible service offering that allows customers to choose the level of service best suited to their needs—ranging from mission-critical support for maximum solution availability to backup assistance for self-support customers. The SunSpectrum program provides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

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	Semi-annual	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	Option
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

Service and Support

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FEATURE	SUNSPECTRUM PLATINUM SM Mission-Critical Support	SUNSPECTRUM GOLD SM Business-Critical Support	SUNSPECTRUM SILVER SM Systems Support	SUNSPECTRUM BRONZE SM Self Support
Enhanced Support Features				
Mission-critical support team	Yes	Yes	No	No
Sun Vendor Integration Program (SunVIP TM)	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

Service and Support

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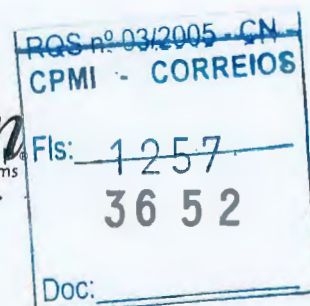
Warranty

The Sun Enterprise family of servers offers extensive warranties that can be enhanced through the Sun Enterprise Services SunSpectrum product offering. The table below describes the Sun Enterprise XX00 server warranties (warranties may vary in different countries).

	Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500	Sun Enterprise 6500
Hardware	1 year	1 year	1 year	1 year
Software	90 days	90 days	90 days	90 days
Telephone Assistance	8 a.m.–8 p.m., Monday–Friday 8-hour response	8 a.m.–8 p.m., Monday–Friday 8-hour response	8 a.m.–8 p.m., Monday–Friday 4-hour response	8 a.m.–8 p.m., Monday–Friday 4-hour response
On-site Assistance	8 a.m.–5 p.m., Monday–Friday next day	8 a.m.–5 p.m., Monday–Friday next day	8 a.m.–5 p.m., Monday–Friday 4-hour	8 a.m.–5 p.m., Monday–Friday 4-hour
Installation	Basic	Basic	ServerStart SM installation	ServerStart installation

Service and Support

Just the Facts



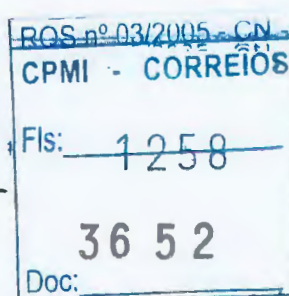
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Glossary

Circuit-switched bus	A bus in which a transaction is normally implemented in an automatic fashion. Simple and easy to construct, a circuit-switched bus is often less efficient than a comparable packet-switched bus. SBus is a circuit-switched bus.
ECC	Error checking and correcting. ECC code is used to verify the integrity of data and can be used to correct some data errors. The ECC code used in the Sun Enterprise™ 3500–6500 servers is able to detect and correct single-bit errors, and detect double-bit errors.
Fault-resistant	Systems that are fault-resistant are able to withstand and recover from many types of system problems.
Fault-tolerant	Systems that are fault-tolerant are able to withstand and recover from any system problem and offer 100 percent uptime. These systems are typically more expensive than comparable fault-resistant systems.
FC-AL	Fibre Channel Arbitrated Loop
Gigaplane™	Gigaplane is the system bus that is used in the Sun Enterprise 3500, Sun Enterprise 4500, Sun Enterprise 5500, and Sun Enterprise 6500 servers. The Gigaplane bus is a packet-switched bus, capable of offering a sustained data transfer rate of 3.2 GB per second at 100 MHz.
High availability	Availability is the time a particular resource, such as a system, application, or data is accessible and usable. High availability means the resource is accessible and usable a maximum amount of time.
Hot-plug	A hot-plug component means that it is electrically safe to remove or add that component while the machine is still running. Typically, the system must be rebooted before the hot-plug component is configured into the system.
Hot-swap	A hot-swap component can be installed or removed by simply pulling the component out and putting the new one in. The system will either automatically recognize the component change and configure itself as necessary or will require user interaction to configure the system; however, in neither case is a reboot required. All hot-swappable components are hot pluggable, but not all hot-pluggable components are hot-swappable.
Interleaved memory	Interleaved memory helps reduce memory access time by permitting multiple memory components to operate in parallel. In interleaved memory schemes, memory is divided into n banks arranged so that every n th byte is supplied by a different memory bank. In a two-way interleaved system, the first doubleword is supplied by bank 0 while the second is supplied by bank 1. Normally, the size and extent of interleave is arranged so that a single typical request is satisfied by as many banks as possible. This arrangement permits a single memory request to be fulfilled without waiting for memory recycle time.
OBP	OpenBoot™ PROM.

Just the Facts



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Glossary



Packet-switched bus

A bus in which information is transmitted in fixed-sized units. This type of bus is often associated with the use of split transactions. Gigaplane and UPA are packet-switched buses.

Parity

Parity is a simple technique used to verify the integrity of data. Parity detects single-bit errors.

POST

Power-on self-test. POST is a suite of hardware integrity tests implemented in firmware that verifies the integrity of system components.

RAS

Reliability, availability, and serviceability. Reliability is a measure of the likelihood that problems will occur. A highly reliable system will have few problems. Once a problem occurs, availability is the measure of how the system will protect the user from being adversely affected by the problem. Serviceability is a measure of how easy it is to repair the problem.

SunVTS™

Sun Validation Test Suite. This is the replacement for SunDiag™.

UPA Bus

Ultra™ Port Architecture bus. Used as an intermediate bus on the CPU/memory and I/O boards.

XBus™

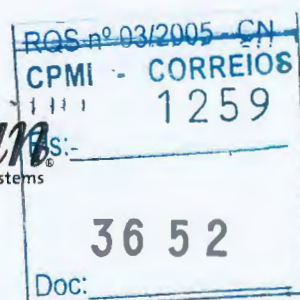
Intermediate bus used on system boards for the SPARCserver™ 1000E and SPARCcenter™ 2000E servers. The Sun Enterprise 3500, Sun Enterprise 4500, Sun Enterprise 5500, and Sun Enterprise 6500 servers use the UPA bus in place of the XBus.

Glossary

Just the Facts



Sun
microsystems



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Materials Abstract

All materials are available on SunWIN except where noted otherwise.

Collateral	Description	Purpose	Distribution	Token # or Comac order #
Powerpack				
– Sun Enterprise™ 3500–6500 Servers: <i>Just the Facts</i> , 2/99	Reference guide for the Sun Enterprise 3500–6500 servers	Sales tool Training	SunWIN, Reseller web	83501
– Sun Enterprise 3500–6500 Servers: <i>Customer Presentation</i> 2/99	Overview, strategy, and details of the Sun Enterprise 3500–6500 Servers	Sales tool	SunWIN, Reseller web	83552
References				
– Sun Intro: <i>New 400 MHz, 4-MB CPU Modules and Upgrades</i> , 1/99	Introduction e-mail	Sales tool	SunWIN, Reseller web, E-mail	98881
– Sun Intro: <i>Sun Enterprise and Sun HPC 3500–6500 Server Family and Related Upgrades; Repricing of 250-MHz, 4-MB and 336-MHz, 4-MB UltraSPARC Modules</i> , 4/98	Introduction e-mail	Sales tool	SunWIN, Reseller web, E-mail	83553
– Sun Intro: <i>Transition of Sun Enterprise 3000–6000 Upgrades, Sun HPC Servers and System Boards; Transition of 250-MHz, 1-MB UltraSPARC Module</i> , 4/98	Introduction e-mail	Sales tool	SunWIN, Reseller web, E-mail	84906
– Sun Intro: <i>New 336 MHz, 4-MB UltraSPARC™ Module, Server Base Packages and Upgrades; Repricing of Sun Enterprise and Sun HPC 6000 and Upgrades</i> , 2/98	Introduction e-mail	Sales tool	Reseller web, E-mail	80960
– Sun Intro: <i>PROMOTION: Sun Enterprise 3000–6000 167-MHz, 1-MB UltraSPARC Module</i> , 1/98	Introduction e-mail	Sales tool	Reseller web, E-mail	77887
– Sun Intro: <i>New CPU/Memory Board and Options for Sun Enterprise 3000 through 6000 Servers</i> , 4/97	Introduction e-mail	Sales tool	Reseller web, E-mail	70253

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Collateral	Description	Purpose	Distribution	Token # or Coman order #
References (continued)				
- <i>Sun Intro: New 250-MHz UltraSPARC Module, Server Base Packages, and Options for Sun Enterprise 3000 through 6000 Servers, 4/97</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	70255
- <i>Sun Intro: 250-MHz UltraSPARC Module and Other Options for Sun Enterprise X000 Servers, 1/97</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	70250
- <i>Sun Intro: Enhanced Ultra™ Sun Enterprise X000 Servers; Sun Enterprise Clock Board Upgrade, 11/96</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	73346
- <i>Sun Intro: Ultra Sun Enterprise X000 Memory and CPU Module, 10/96</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	73338
- <i>Sun Intro: New Sun Enterprise X000 Configurations and Options, 7/96</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	73339
- <i>Sun Intro: Ultra Sun Enterprise X000 Server Family, 4/96</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	73335
- <i>Sun Server Product Line Overview, 4/98</i>	Quick reference card	Sales tool	SunWIN, Reseller web, E-mail	24517
- <i>Competitive Summary—Servers, 4/98</i>	Quick reference card	Sales tool	SunWIN, Reseller web, E-mail	24515
- <i>Sun Enterprise X000 Server Family All-in-One, 8/97</i>	Specification summary	Sales tool	SunWIN, Reseller web	53152
Training				
- <i>IQ Kit: Sales Information Quickstart, 4/98</i>	Detailed sales and marketing information for Sun Enterprise 3500–6500 servers and related software	Sales tool	SunWIN, Reseller web	83556
- <i>IQ Kit: Reference Information Quickstart, 4/98</i>	Detailed resource catalog for Sun Enterprise 3500–6500 servers and related software	Sales tool	SunWIN, Reseller web	83558

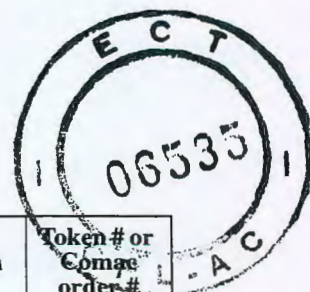
Materials Abstract

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Collateral	Description	Purpose	Distribution	Token # or Comac order #
Product Literature				
- <i>Sun Enterprise 3000-6000 Servers: Just the Facts, 3/98</i>	Reference guide for the Sun Enterprise 3000-6000 servers (in two parts)	Sales tool Training	SunWIN, Reseller web	52489 52966
- <i>Sun Enterprise SyMON™: Just the Facts, 11/98</i>	Reference guide for the Solstice SyMON monitoring software	Sales tool Training	SunWIN, Reseller web	52499
- <i>Sun Enterprise XX00 Servers System Options, 4/98</i>	Comprehensive reference guide for Sun Enterprise 3000-6000 and 3500-6500 server options	Sales tool	SunWIN	63142
- <i>Sun Enterprise 3000-6000 Servers: Customer Presentation 3/98</i>	Overview, Strategy, and Details of the Sun Enterprise 3000-6000 Servers	Sales tool	SunWIN, Reseller web	81540
- <i>Server Family Brochure, 4/98</i>	High-level overview brochure on Sun server and storage products	Sales tool	SunWIN, Reseller web, Comac	69480 BE607-1
- <i>Sun Enterprise 3500 Datasheet, 4/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	81065 DE827-0
- <i>Sun Enterprise 4500 Datasheet, 4/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	81067 DE828-1
- <i>Sun Enterprise 5500 Datasheet, 4/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	81070 DE829-0
- <i>Sun Enterprise 6500 Datasheet, 4/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	81072 DE830-0
- <i>Sun Enterprise 3000 Datasheet, 1/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	53188 DE647-1
- <i>Sun Enterprise 4000 Datasheet, 1/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	53190 DE644-2
- <i>Sun Enterprise 5000 Datasheet, 1/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	53194 DE658-1
- <i>Sun Enterprise 6000 Datasheet, 1/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	53221 DE643-1

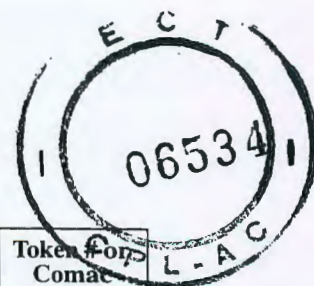
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Collateral	Description	Purpose	Distribution	Token Corp Comat order #
Product Literature (continued)				
- Sun Enterprise 3500-6500 Server Family: Architecture and Implementation White Paper, 4/98	In-depth discussion of Sun Enterprise 3500-6500 server architecture	Sales tool	SunWIN, Reseller web	84915
- Ultra Sun Enterprise 3000-6000 Server Family: Architecture and Implementation White Paper, 4/98	In-depth discussion of Sun Enterprise 3000-6000 server architecture	Sales tool	SunWIN, Reseller web	53094
- Availability Features in the Sun Enterprise 3500-6500 Server Family White Paper, 4/98	In-depth technical discussion of Sun Enterprise 3500-6500 server availability features	Sales tool	SunWIN, Reseller web	88368
- Sun Enterprise 3500 Ordering Flow Chart, 2/99	Ordering information	Sales tool	SunWIN, Reseller web	84910
- Sun Enterprise 4500 Ordering Flow Chart, 2/99	Ordering information	Sales tool	SunWIN, Reseller web	84911
- Sun Enterprise 5500 Ordering Flow Chart, 2/99	Ordering information	Sales tool	SunWIN, Reseller web	84912
- Sun Enterprise 6500 Ordering Flow Chart, 2/99	Ordering information	Sales tool	SunWIN, Reseller web	84913
- Sun Enterprise 3000 Ordering Flow Chart, 4/98	Ordering information	Sales tool	SunWIN, Reseller web	53154
- Sun Enterprise 4000 Ordering Flow Chart, 4/98	Ordering information	Sales tool	SunWIN, Reseller web	53156
- Sun Enterprise 5000 Ordering Flow Chart, 4/98	Ordering information	Sales tool	SunWIN, Reseller web	53158
- Sun Enterprise 6000 Ordering Flow Chart, 4/98	Ordering information	Sales tool	SunWIN, Reseller web	53160
- 56-Inch Sun Enterprise Expansion Cabinet Ordering Flow Chart, 4/98	Ordering information	Sales tool	SunWIN, Reseller web	53162
Product Brief				
- Sun Enterprise 3000 Product Brief, 7/97	On-line version of datasheet	Sales tool	SunWIN, Reseller web	53247
- Sun Enterprise 4000 Product Brief, 7/97	On-line version of datasheet	Sales tool	SunWIN, Reseller web	53250
- Sun Enterprise 5000 Product Brief, 7/97	On-line version of datasheet	Sales tool	SunWIN, Reseller web	53256
- Sun Enterprise 6000 Product Brief, 7/97	On-line version of datasheet	Sales tool	SunWIN, Reseller web	53264
- Solstice SyMON Product Brief, 7/97	Overview of Solstice SyMON monitoring software	Sales tool	SunWIN, Reseller web	53243

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Collateral	Description	Purpose	Distribution	Token # or Comac order #
External Web Sites – <i>List of Sun-tested PCI cards</i> – <i>SPEC home page</i>	http://www.sun.com/pci http://www.specbench.org/results.html			

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Materials Abstract

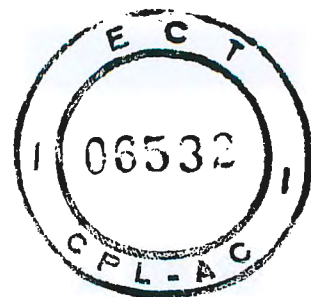
Just the Facts



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Hard Disk Compatibility Matrix

February, 1998



RQS nº 03/2005 - CN
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Doc:



Hard Disk Compatibility Matrix

February, 1998

Overview

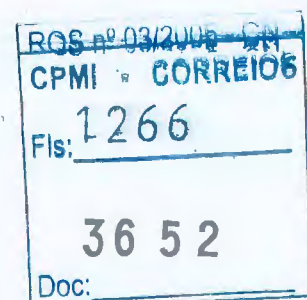
The 3.5-inch rigid disk drive products of Sun Microsystems™ provide the performance, reliability and overall high quality required in today's computing environment at competitive prices. Sun™ invests significant resources into qualifying and integrating these devices on Sun workstations, servers and disk arrays. Sun mass storage products are also tested for compatibility across a large number of system hardware and software configurations to ensure that Sun I/O products perform as expected. This means that Sun customers get the very best mass storage value.

To keep pace with rapid technological advancements and to maintain Sun's high quality standards, the qualification and integration process is an on-going one. Sun's close working relationship with its suppliers allows Sun to be involved up-front in the design process. Sun supplier engineers ensure consistent high quality standards by implementing special Sun processes right in the supplier's manufacturing facility.

Product Descriptions

Sun's current 3.5" disk drives are UltraSCSI and Fibre Channel capable with formatted capacities ranging from 4.2-GBytes to 18.2-GBytes. The latest offering is the 18.2-GByte 7,200 RPM disk drive which doubles the capacity in previous 3.5" half-height disk drives. All these 3.5" drives are available in external enclosures and most are also available as internal expansion drives. This flexibility gives customers an opportunity to add larger capacity drives or incorporate the latest technology to a Sun workstation.

Below are two tables summarizing disk drive and enclosure compatibility with workstation and server products.



External Expansion Options 2/98 - Desktop Storage

	StorEdge UniPack (1)			StorEdge MultiPack (1)								
Capacity/RPM	4.2 G 7200	9.1 G 7200	18.2 G 7200	8.4 G 7200	16.8 G 7200	25.2 G 7200	18.2 G 7200	36.4 G 7200	54.6 G 7200	36.4 G 7200	72.8 G 7200	109.2 G 7200
Order Number	SG- XDSK010A -4G	SG- XDSK010A -9G	SG- XDSK010B -18G	SG- XDSK020A -8G (2x4.2G)	SG- XDSK040A -16G (4x4.2G)	SG- XDSK060A -25G (6x4.2G)	SG- XDSK020A -18G (2x9.1G)	SG- XDSK040A -36G (4x9.1G)	SG- XDSK060A -54G (6x9.1G)	SG- XDSK020B -36G (2x18.2G)	SG- XDSK040B -72G (4x18.2G)	SG- XDSK060B -109G (6x18.2G)
SSI, SSI+, IPC	✓ (2)	✓ (2)	✓ (2)	✓ (2)	✓ (2)	✓ (2)	✓ (2)	✓ (2)	✓ (2)	✓ (2)	✓ (2)	✓ (2)
SS2, ELC, Classic, IPX, LX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SPARCStation 10	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)
SPARCStation 4	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)
SPARCStation 5	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)
SPARCStation 20	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)
Ultra 1	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)
Ultra 1E	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ultra 2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ultra 5	✓ (4)	✓ (4)	✓ (4)	✓ (4)	✓ (4)	✓ (4)	✓ (4)	✓ (4)	✓ (4)	✓ (4)	✓ (4)	✓ (4)
Ultra 10	✓ (4)	✓ (4)	✓ (4)	✓ (4)	✓ (4)	✓ (4)	✓ (4)	✓ (4)	✓ (4)	✓ (4)	✓ (4)	✓ (4)
Ultra 30	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)
Ultra 60	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)
SPARCserver 1000(E)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)
Enterprise 150	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)	✓ (3)
Enterprise 450	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)	✓ (5)
Enterprise 3/4000	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

1) A separate 68-68 pin (X3856A) or a 50-68 pin (X3857A) SCSI cable kit with power cord must be ordered with either a UniPack or MultiPack. Most customers will want the 68-68 pin cable unless planning to connect a UniPack or MultiPack to a 50 pin wide FSBE/S host adapter (X1053A), SPARCstation, SPARCserver; Enterprise 150 or an Ultra 1.

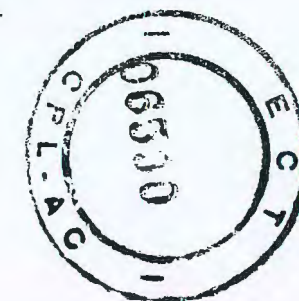
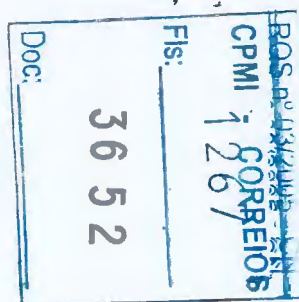
2) Device is not supported on the on-board SCSI host adapter. An FSBE/S or fast/wide HBA is required.

3) A SWIS/S or SunSwift Host Adapter with Solaris 2.5.1 or later is required for wide SCSI functionality.

4) A SunSwift PCI Host Adapter is required.

5) These configurations alone provide UltraSCSI functionality.

3.5-inch SCSI Disk Compatibility Matrix





External Expansion Options 2/98 - Data Center Storage

3.5-inch SCSI Disk Compatibility Matrix

Model	StorEdge D1000	StorEdge A3000		StorEdge A5000			StorEdge A7000
Capacity/RPM	50G 10,000rpm	63G 147G 7200rpm	136G 318G 7200rpm	45G 127G 7200rpm	127G 7200rpm	254G 509G 7200rpm	54G min 2.95T max 7200rpm
Order Number Total 3.5" drives	SG-XARY023A-50G (12x4.2G)	6532A (15x4.2G) X6533A (35x4.2G)	X6534A (15x 9.1G) X6535A (35x 9.1G)	Tabletop SG-XARY010A-45G (5x9.1G) SG-XARY010A-127G (14x9.1G)	Rack-ready SG-XARY011A-127G (14x9.1G)	Rack-mounted SG-XARY012A-254G (28x9.1G) SG-XARY012A-509G (56x9.1G)	SG-ARY002A-0G
Ultra 1	✓						
Ultra 1E	✓						
Ultra 2	✓	✓	✓				
Ultra 30	✓						
SPARCserver 1000		✓	✓				
SPARCcenter 2000		✓	✓				
Enterprise 150		✓	✓				
Enterprise 450	✓	✓	✓				
Enterprise 3/4000		✓	✓	✓	✓	✓	✓
Enterprise 5/6000		✓	✓	✓	✓	✓	✓
Enterprise 10000		✓	✓	✓	✓	✓	✓

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Internal Expansion Disk Options 2/98

	2.1 GB 7200	4.2 GB 7200	4.2 GB 10,000	4.3 GB 5400	9.1 GB 7200	9.1 GB 7200	18.2 GB 7200
	Fast Wide SCSI-2	Ultra SCSI	Ultra SCSI	E-IDE	Ultra SCSI	Fibre Channel	Ultra SCSI
Ultra 1 170/200E		X5214A					
Ultra 2		X5214A			X5229A		
Ultra 10				X5227A			
Ultra 30		X5214A			X5229A		X5232A
Ultra 60		X5214A					
Enterprise 150		X5214A					
Enterprise 450		X5214A			X5229A		
Enterprise 3000		X5214A			X5251A		
Enterprise 4000	X5161A 2x2.1G						
Enterprise 5000/6000	X5161A 2x2.1G						
SPARCstorage Array		X5206A X5207A 6x4.2G					
SPARCstorage RSM		X6509A			X6516A		
StorEdge MultiPack		X5214A			X5229A		X5232A
StorEdge D1000			X5228A				
StorEdge A3000		X6509A			X6516A		
StorEdge A5000						X6708A	
StorEdge A7000					X6287A 6x9.1G		

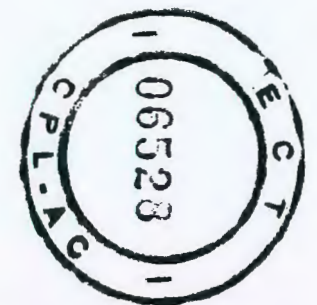
3.5-inch SCSI Disk Compatibility Matrix

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CPMI - CORREIOS

POS nº 03/2005





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3.5" SCSI Disk Drive Specifications ↓

	4.2 GByte 7200 UltraSCSI	4.2 GByte 10000 UltraSCSI	9.1 GByte 7200 UltraSCSI	9.1 GByte 7200 Fibre-Channel	18.2 GByte 7200 UltraSCSI
Part Number	X5214A	X5228A	X5229A	X6708A	X5232A
Formatted Capacity	4.2 GByte	4.2 GByte	9.1 Gbyte	9.1 Gbyte	18.2 Gbyte
Average Seek (Read)	7.5 ms	7.7 ms	7.5 ms	9.7 ms	8.0 ms
Average Seek (Write)	8.3 ms	8.7 ms	<u>8.3 ms</u>	10.7 ms	9.0 ms
Average Latency	4.17 ms	3.0 ms	4.17 ms	4.17 ms	4.17 ms
Burst Data Transfer Rate	40 MB/s	40 MB/s	40 MB/s	106 MB/s	40 MB/s
Maximum Sustained Data Rate	12.5 MB/s	12.5 MB/s	12.5 MB/s	12.5 MB/s	12.5 MB/s
Rotational Velocity	7200 rpm	10,000 rpm	7200 rpm	7200 rpm	7200 rpm
Buffer Size	512 KByte	512 KByte	512 KByte	512 KByte	512 KByte
MTBF at 40° C	1000k hrs	1000k hrs	1000k hrs	1000k hrs	1000k hrs

3.5-inch SCSI Disk Compatibility Matrix

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DISK ARRAYS

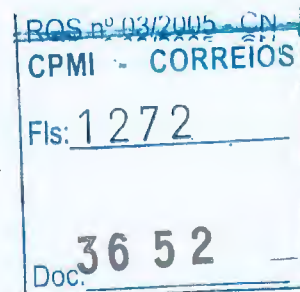
Disk Drive Specifications

	9.1 GByte 7200 UltraSCSI	9.1 GByte 10000 UltraSCSI	18.2 GByte 10000 UltraSCSI
Part Number	X5229A	X5234A	X5232A
Formatted Capacity	9.1 Gbyte	9.1 Gbyte	18.2 Gbyte
Average Seek (Read)	8.0 ms	8.0 ms	8.0 ms
Average Seek (Write)	9.0 ms	9.0 ms	9.0 ms
Average Latency	4.17 ms	3 ms	3 ms
Burst Data Transfer Rate	40 MB/s	40 MB/s	40 MB/s
Maximum Sustained Data Rate	12.5 MB/s	12.5 MB/s	12.5 MB/s
Rotational Velocity	7200 rpm	10000 rpm	10000 rpm
Buffer Size	512 KByte	512 KByte	512 KByte
MTBF at 40o C	1000k hrs	1000k hrs	1000k hrs

Disk Arrays : Sun StorEdge A5x00 | Sun StorEdge A5100 | Sun StorEdge A5200 |
 Sun StorEdge A3500 | Sun StorEdge A1000/D1000 | Arrays & Intelligent Storage
 server Options | Internal Expansion Disk Options | Disk Drive Specifications

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MONITORS



- [24" Wide Screen Color Monitor](#)
- [21" Flat Screen Aperture Grille \(AG\) Color Monitor](#)
- [19" Flat Screen Aperture Grille \(AG\) Color Monitor](#)
- [18.1" TFT LCD Monitor](#) **NEW!**
- [17" Sun Color Monitor](#)



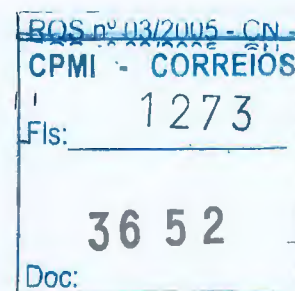
24" Wide Screen Color Monitor

- 24-inch CRT size, 22.5" viewable area
- 0.26mm aperture grille pitch
- Up to 1920 x 1200 @ 70Hz (16:10 aspect ratio mode)
- 2-meter non-detachable 13W3 video input cable and HD15-pin video input connector
- 580mm (W) x 500mm (H) x 548mm (D)



21" Flat Screen Aperture Grille (AG) Color Monitor (new)

- 21-inch Flat Screen AG CRT, 19.8" viewable area
- 0.24mm aperture grille pitch
- 1152x900 @ 66Hz, 76Hz
- 1280x1024 @ 67Hz, 76Hz
- 1600x1200 @ 75Hz
- 2-meter non-detachable 13W3 video input cable and HD15-pin video input connector
- 499mm (W) x 495mm (H) x 500mm (D)



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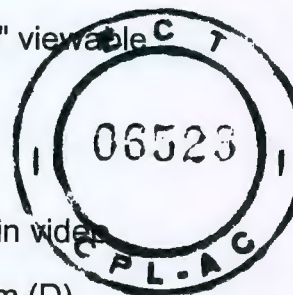
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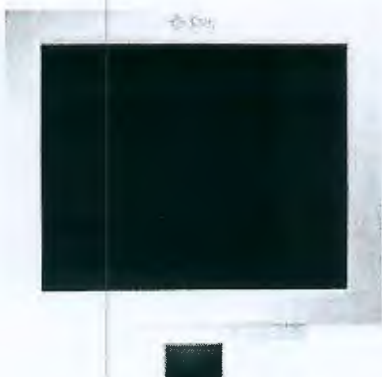
19" Flat Screen Aperture Grille (AG) Color Monitor (new)



- 19-inch Flat Screen AG CRT, 18" viewable area
- 0.24mm aperture grille pitch
- 1152x900 @ 66Hz, 76Hz
- 1280x1024 @ 67Hz, 76Hz
- 1600x1200 @ 75Hz
- 2-meter non-detachable HD15-pin video input cable
- 449mm(W) x 463mm(H) x 463mm (D)

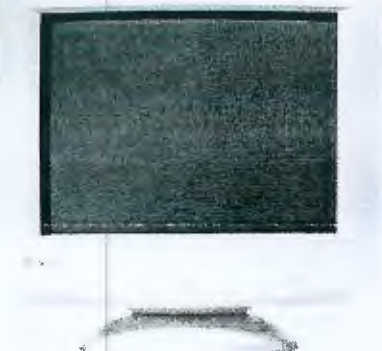


18.1" TFT LCD Monitor (new)

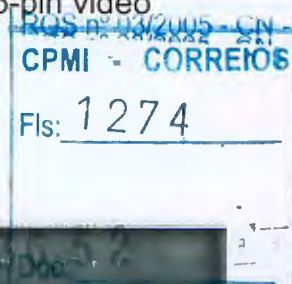


- 18.1" actual viewable area (equivalent to 19"/20" CRT)
- 0.28mm pixel pitch
- True 24-bit, 256 gray scale levels, 16.7M colors
- 1280x1024 @ 60Hz* or 76Hz
- 160 degree horizontally and vertically
- < 50W POWER
- Analog interface
- 2-meter detachable 13W3 video input cable and HD15-pin video input connector
- Complete assembly:
 - * Total width: 449.5mm
 - * Total Height: 459.8mm
 - * Total Depth: 218.6mm
- (*) recommended resolution on the 18.1" flat panel
- Wall-mounting capability - wall-mounting solutions from Ergotron, Inc.
- Security Lock Slot

17" Sun Color Monitor



- 15.7" viewable image size
- 0.28mm dot pitch
- 1152 x 900 @ 66Hz, 76Hz
- 1024 x 768 @ 60Hz, 75Hz for JavaStation platforms
- 800 x 600 @ 75Hz for JavaStation platforms
- 2-meter non-detachable HD15-pin video signal cable
- 10-language user's guide



Peripherals : Printers | Displays | Input Devices | PCMCIA

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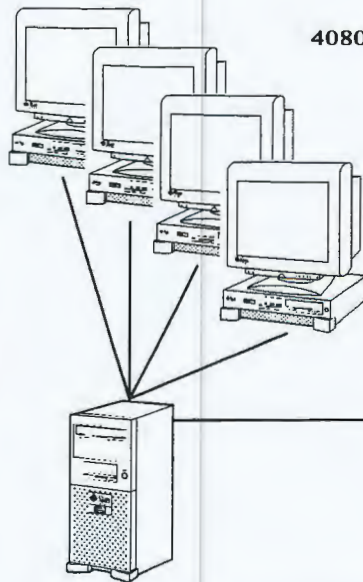


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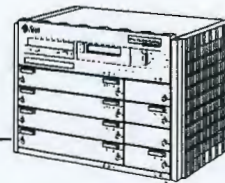


 Sun Sybase, Inc.		Sun Enterprise 4500 C/S w/15 Front-Ends		TPC-C 3.5
				Report Date: November 22, 1999
Total System Cost	TPC-C Throughput	Price/Performance	Availability Date	
\$2,507,453	50268.07	\$49.88	March 30, 2000	
Processors	Database Manager	Operating System	Other Software	Number of Users
14 * 400MHz UltraSPARC II	Sybase ASE 11.9.3 GA	Solaris 7	BEA Tuxedo 6.3	40800

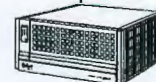


40800 User Connections to 15 Clients

Sun Enterprise 4500 Server
 14 * 400 Mhz UltraSPARC CPU
 28 Gb RAM



4 * Sun StorEdge
 A1000 Array
 - 12 * 9GB Each

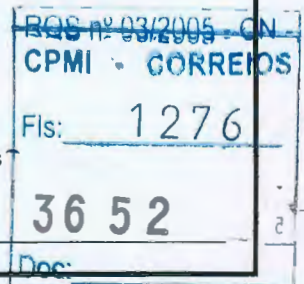


18 * Sun StorEdge A5200 Array
 - 22 * 9GB Each

15 * Sun Ultra Model 333 Server

Configuration

	Server System	Front End Systems
Database Nodes:	1 Sun Enterprise 4500 Servers	15 * Ultra 10 Model 333
Processors	14* 400 MHz UltraSPARC II	1 * 333 MHz UltraSPARC II each
Cache memory	32KB (D+I), 8MB external	32KB (D+I), 512KB external, each
Main memory	28 GB	1 GB each
Disk controllers	3 Dualport FC-AL, 2 Fast/Wide SCSI-2	1 * SSCSI-2 each
Disk Drives	444 * 9GB FC-AL (18 * A5200, 4 * A1000), 6 * 9GB SCSI-2 (1 * MultiPack)	1 * 9 GB disk
Total Disk Storage	4050 GB	9 GB each
10 BaseT Hub	None	5100* 9-Port Hubs
100 Base T Hubs	None	None
100 BaseT Switches	1 * 16-Port	None





Sun Enterprise 4500 C/S w/15 Front-Ends

TPC-C

Report Date:
November 22, 1999

Pricing Summary

Description	Part Number	Source	Unit Price	Qty	Ext. Price	5 Yr. Maint.
Server Hardware						
E4500	E4501	2	23,360	1	23,360	30,967
CPU/Memory board	2602A	2	4,380	7	30,660	71,098
400MHz/9MB UltraSPARC II	2590A	2	10,950	14	153,300	
2GB memory (8 * 256 MB)	7026A	2	12,045	14	168,630	
PS/300W for E4000	954A	2	1,314	2	2,628	
SBus I/O board	2612A	2	4,745	1	4,745	
FCAL SBus Host adapter	6730A	2	1,971	2	3,942	
DWIS/S SBus Host Adapter	1062A	2	945	1	945	
200GB StorEdge A5200 Array	SG-XARY520A-200G	2	51,120	18	920,160	254,016
109-Gbyte StorEdge A1000 Array	SG-XARY144A-109G	2	18,036	4	72,144	40,320
54.6-Gbyte StorEdge MultiPack	SG-XDSK060C-54G	2	6512	1	6,512	
SCSI Cable 68 pin	3856A	2	40	1	40	
Opt Int Tape 12Gb 4MM	6283A	2	986	1	986	
Wyse Terminal	WYSE-WY55-A	1	430	1	430	
Server Hardware Subtotal					1,388,480	396,401
Server Software						
Solaris Server Software	SOLMS-26ZW9999	1	100	1	100	
SPARC Compiler C/C++ 5.0	WCCIS-500-T999	1	995	1	995	1,080
Sybase Adaptive Server Enterprise 11.9.3		3	295000	1	295,000	236,000
Sybase Development		3	9600	1	9,600	7,680
Sybase Open Client		3	795	1	795	636
Sybase Discount (10%)					(30,640)	
Server Software Subtotal					275,951	246,396
Client Hardware						
Ultra 10 Server Model 393	A22UHC129S-B5 12CP	2	5,496	15	82,434	64,584
512MB Memory for Ultra 10	7039A	2	1,580	15	23,694	
PCI QEF Card	1034A	2	1,310	15	19,655	
Color Monitor	x7 126	2	343	15	5,148	
Client Hardware Subtotal					130,931	64,584
Client Software						
BEA Tuxedo GFS 6.3		4	3,000	15	45,000	36,000
Client Software Subtotal					45,000	36,000
User Connectivity						
16-port 10/100Mbps Fast Ethernet Hub	Z179489	5	420	3	1,260	
9-port 10Mbps Ethernet Hub	Z179489	5	27	5610	151,470	
User Connectivity Subtotal					152,730	
Sun Enterprise Services discounts						
Total					1,993,092	
5 Yr. cost					2,507,453	
tpmO Rating					50,269	
\$/tpmO					\$49.88	

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Notes:

1. Sun Microsystems Inc. 2. CATT Technology Inc. 3. Sybase 4. BEA Systems, Inc. 5. Software House, Inc.



Audited by: Francois Raab, Infosizing Inc.

Prices used in TPC benchmarks reflect the actual prices a customer would pay for a one-time purchase of the stated components. Individually negotiated discounts are not permitted. Special prices based on assumptions about past or future purchase are not permitted. All discounts reflect standard pricing policies for the listed components. For complete details, see the pricing sections of the TPC benchmark specifications. If you find the stated prices are not available according to these terms, please inform the TPC at pricing@tpc.org. Thank you.

06519



Sun Enterprise 4500 C/S w/15 Front-Ends

TPC-C 3.5

Report Date:
November 22, 1999

Numerical Quantity Summary

MQTH, Computed Maximum Qualified Throughput
tpmC = 50268.07
% throughput difference, reported & reproducibility runs = < 0.1%

Response Times (in secs)	90th Percentile	Average	Maximum
Menu	0.50	0.25	0.65
New-Order	0.80	0.34	24.14
Payment	1.00	0.47	25.52
Order-Status	1.00	0.51	21.63
Delivery(interactive)	0.26	0.25	0.35
Delivery(deferred)	2.00	0.64	5.00
Stock-level	2.00	0.67	5.44

Transaction Mix, in percent of total transactions

New-Order	44.85%
Payment	43.06%
Order-Status	4.02%
Delivery	4.04%
Stock-level	4.03%

Keying/Think Times (in secs)	Average.	Min.	Maximum
New-Order	18.02/12.20	18.01/0	18.17/122.00
Payment	3.02/12.20	3.01/0	3.13/122.00
Order-Status	2.02/10.25	2.01/0	2.14/102.50
Delivery	2.02/5.19	2.01/0	2.10/52.00
Stock-level	2.02/5.20	2.01/0	2.10/52.00

Test Duration		
Ramp-up time		25 minutes
Measurement Interval		60 minutes
Number of checkpoints		4
Checkpoint Interval		15 minutes
Number of transactions (all types) completed in measurement interval		6724854

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Solaris™ 7 Operating Environment



The Solaris™ 7 Operating Environment is the premier environment for network computing. Delivering today what others are only promising for the future, Solaris 7 with 64-bits provides data-center reliability, superior scalability, and unprecedented performance.

Solaris™ Operating Environment

The Solaris™ Operating Environment is the only choice for serious enterprise computing. With Solaris, you get a 64-bit environment that's optimized for Java™ computing — from the creators of Java — and is Year 2000 safe. Superior reliability and availability mean that your systems and data are always accessible when you need them. Extensive scalability ensures that your systems won't top out in just a few years, let alone a few months. High performance delivers the power to get the job done fast. And simplified installation and administration lets you concentrate more on running your business, not your network. The Solaris Operating Environment delivers the information and services you need to anyone, anytime, anywhere.

The Power of 64-bit Computing

Advanced 64-bit technology is at the heart of the Solaris 7 Operating Environment. For your business, this means dramatic increases in performance, capacity, and scalability — all while maintaining complete binary compatibility with current 32-bit applications. Your software investments are protected — and so is your future.

The Solaris 7 Operating Environment helps make you more competitive today by delivering enhanced performance on a wide variety of applications. These applications range from Enterprise Resource Planning (ERP) to e-commerce, data mining to digital content creation, and Web search engines to scientific data analysis.

And upcoming 64-bit applications will run dramatically faster — up to 10 times. With 64 bits, applications can address more data directly from memory instead of from disk. So operations that used to take a long time — like database queries — now happen in a fraction of the time. The result? Faster access to information, increased operating efficiency, and lower operating costs.

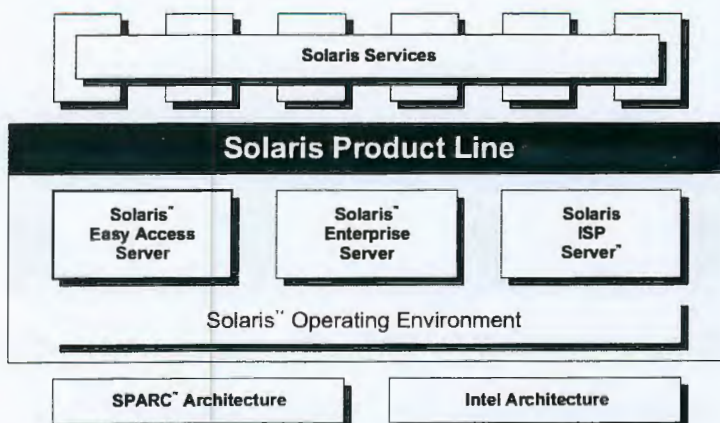
Scalability

The Solaris 7 Operating Environment can handle just about anything you throw at it: heavy network traffic, huge data sets, enormously compute-intensive problems. That's because this 64-bit environment is inherently scalable. Applications can access more files concurrently with 64-bit technology, increasing overall system efficiency. More processes can run simultaneously, allowing individual servers to run more applications. And more network connections are available in the Solaris 7 Operating Environment, enabling Web servers to handle many more users.

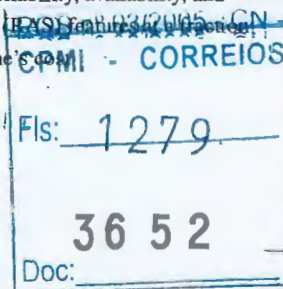
Simply put, the Solaris 7 Operating Environment scales from desktop to data center. Which means it's always ready to handle your changing needs.

Reliability

The Solaris 7 Operating Environment is the clear choice for business. It provides data center-class reliability, availability, and serviceability. It's the only operating environment of a mainframe's class.



The Solaris product line delivers three different extensions that focus more on specific needs for workgroup, enterprise, or service provider computing.





Even a few minutes of downtime can cost your company thousands, or even millions, of dollars in lost revenues and customer loyalty. Integrated in the Solaris 7 Operating Environment is dynamic reconfiguration. It allows a system to continue running even if a system board fails. What's more, you can replace the faulty board while the system continues to operate — and your people remain productive. Other enhancements include improved logging for easier debugging and improved core dump analysis. The bottom line: Solaris provides the most reliable operating environment for network computing.

Ease of Use

An integral component of the Solaris 7 Operating Environment, Solaris™ Web Start makes installing Solaris software as easy as clicking a button. Solaris Web Start offers the industry's first Web-based installation process, which means that all of the setup and administration can be done locally or remotely through a Web browser. Solaris Web Start simplifies installation by eliminating the UNIX® system administration normally associated with software installation and setup.

Solaris™ Web Start Wizards™ technology extends the point-and-click simplicity of Solaris Web Start, bringing this same ease of use to applications written for the Solaris Operating Environment. With Solaris Web Start Wizards software, installing applications on the Solaris Operating Environment is just like installing them on Microsoft Windows.

The Flexibility of Java Technology

Nothing runs the Java development environment better than the Solaris Operating Environment. Solaris provides a fast and reliable environment for developing and deploying mission-critical Java applications. That's because Java

technology is tightly integrated into the operating environment, and can leverage its multithreaded capabilities to deliver the scalability, performance, and stability needed for enterprise applications.

Standards-Based Networking

Driven by a vision of seamless access to information, and backed by 16 years of consistent execution, Sun is recognized as a world leader in open network computing. And we continue to invest in the core technologies required to deliver network connections as reliable as the dial tone. We call this the Webtone.

With standards-based networking, such as TCP/IP, NFS™, and LDAP, built into the software right from the beginning, the Solaris 7 Operating Environment offers proven interoperability and includes the leading-edge features to make networking easier. Sun continues to improve performance, and includes the protocols needed to support new applications as they become available.

Security

Moving from private to public networks, businesses require built-in security. The Solaris 7 Operating Environment has dramatically improved authentication, data integrity, data privacy, and single sign-on capabilities to keep your data safe from tampering, snooping, or eavesdropping. The Solaris Operating Environment also makes security administration easier, because system entry services such as *login* and *rlogin* do not have to be modified when changing authentication mechanisms.

Globalization

The Solaris 7 Operating Environment is designed for global business. Solaris supports 37 languages that cover 95% of the world's markets in a standards-based environment for true multilingual computing.

Summary of Features

- Full 64-bit functionality
- Industry-leading Java technology performance
- TCP with Selective Acknowledgment
- Web-based installation for the Solaris Operating Environment and Solaris applications
- Web-based administration and configuration
- Global-ready and Year 2000 compliant

RAS Enhancements

- Dynamic reconfiguration (not available on all systems)
- UNIX File System (UFS) logging
- Kernel debugging enhancements
- Improved core dump analysis
- Hot-plug capability
- Improved kernel errors and events logging

Standards

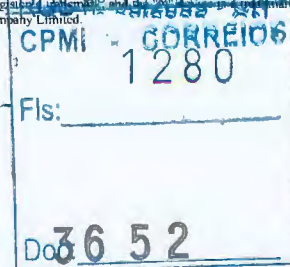
- Year 2000 Compliance: follows X/Open® guidelines
- Interface Standards: X/Open UNIX 98
- Graphics Standards: X11, PostScript®, Display PostScript®, OpenGL®
- Desktop Standards: CDE (Common Desktop Environment), Motif
- Object Standards: Java IDL
- Connectivity Standards: ONC™, ONC+™, NFS, WebNFS™, and optional NetWare IPX/SPX, SNA, SMB, AppleTalk, DECnet, and others
- Internet Standards: HTTP, FTP, Telnet, DNS, NTP, IMAP4, DHCP, SNMP, SMTP
- LDAPv3 IETF RFCs 1323, 1510, 1652, 1869, 1870, 1891-1894, 1985, 1996, 2018, 2136, 2045, 2078

System Requirements

- SPARC™ or Intel 486 (100 MHz) or Pentium platforms
- Disk Space: 600 Mbytes minimum (desktop); 600 Mbytes to 1 Gbyte (server)
- Memory: 32 Mbytes minimum

Notes: Web Start requires 64 Mbytes (minimum) of memory. Memory requirements can vary depending upon the number of clients and users. Maximum memory support on the Intel platform is 8 Gbytes.

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HP OpenView Network Node Manager & CiscoWorks2000 Integration Package for NNM 5.x

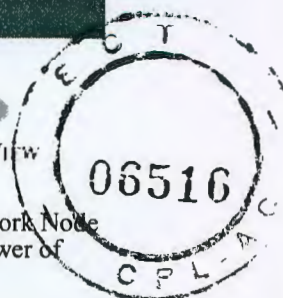
HP OPENVIEW

This package combines the network management power of HP OpenView Network Node Manager for Solaris and Windows NT with the network device management power of CiscoWorks2000. Integration that is made possible through the package:

- NNM Web Interface can launch Cisco Resource Manager Essentials
- Cisco Resource Manager Essentials can launch NNM Web Interface
- NNM newly discovered nodes automatically and dynamically propagated to Cisco Resource Manager Essentials inventory
- NNM event history and deleted nodes reports accessible from Cisco Resource Manager Essentials

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HP OpenView Network Node Manager Year 2000 Compliance Information

HP OPENVIEW

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The HP OpenView Network Node Manager team is working to ensure NNM's ability to handle dates for the millenium transition. All Network Node Manager versions 4.01 and greater are Year 2000 compliant, when run on a Year 2000 compliant system. Some of these versions will require the use of a software patch, as detailed in the chart below.

HP has made every effort to ensure the accuracy of our product testing. However, because each customer's environment is different from HP's laboratory test environment, it is the customer's responsibility to validate the Year 2000 readiness of these products in their own environment. Therefore, information about the Year 2000 status of HP products is provided "as is" without warranties of any kind. HP encourages customers to be fully aware of the potential impact that the Year 2000 could have on their business environment and their ability to compete in the 21st century. HP also encourages its customers to take responsibility for addressing needed changes as quickly as possible.

HP cannot attest to the Year 2000 compliance of solutions from independent software vendors that appear in our Solutions Catalog. We recommend that customers consult directly with these third-party vendors about the Year 2000 status of those products.

If you need more information on the definition of Year 2000 compliance, please go to [/year2000/compliance.html](http://year2000/compliance.html). Additionally, if you want more general information regarding Hewlett-Packard and the Year 2000, please visit <http://www.hp.com/go/year2000>.

NNM Version/Platform Support for Year 2000

Network Node Manager versions 4.x and 5.x are Year 2000 Compliant. NNM versions 5.01 and later are Year 2000 Compliant as shipped. NNM versions 4.x and 5.0 require the latest consolidated patch to be installed. The table below lists the earliest versions of these consolidated patches to support Year 2000 Compliance; subsequent consolidated patches will have higher numbers and will continue to include Year 2000 support.

Product	4.1 SunOs	2.x Solaris	10.x HP-UX	Windows NT	Status
Network Node Manager 3.31	Upgrade	Upgrade	Upgrade	N/A	N/A
Network Node Manager 4.0x	PSOV_01887	PSOV_01888	PHSS_13866	N/A	Y2K Compliant
Network Node Manager 4.1x	N/A	PSOV_01782	PHSS_12649	N/A	Y2K Compliant
Network Node Manager 5.0	N/A	PSOV_01863	PHSS_13569	NNM_00061	Y2K Compliant
Network Node Manager > 5.0	All versions greater than 5.00 will include Year 2000 compliance.				

NOTE: NNM versions 3.31 and earlier will NOT be made Year 2000 compliant. Customers with those versions should upgrade to a newer version of NNM before December 1999. Please contact an HP Sales Representative.

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HEWLETT®
PACKARD

HP OpenView Network Node Manager 6.1

for the UNIX and Windows NT* operating system

HP OpenView Solutions



Network
Management

HP OpenView solutions target specific IT management challenges to solve today's pressing problem, today. Delivering swift results incrementally, the multiple solutions are the "building blocks" to a complete IT management solution. The nimble OpenView approach meets emerging business needs with short-term success driven by longer term business objectives.

HP OPENVIEW

Works | Right | Now

The HP OpenView Network Management solution is a complete, comprehensive solution that gives IT organizations the control they need to deliver reliable network services to their business customers. Leading the industry in network management, the HP OpenView solution manages all aspects of the increasingly complex and business-dependent network environment. HP OpenView Network Node Manager delivers the network availability component, and forms the foundation of the complete network management solution.

The Smart Way to Manage the Network

HP OpenView Network Node Manager is the market leading network availability management solution, providing in-depth views of the network in an intuitive graphical format. Network Node Manager discovers network devices and provides a map to illustrate what the network actually looks like. The multi-level map indicates which devices and network segments are healthy and which areas need attention. When a flood of events is generated from the failure of a major device, Network Node Manager's powerful event correlation engine immediately correlates the event stream and pinpoints the root cause of the failure. Trend analysis and thresholding, together with out-of-the-box reports and data warehousing, enable proactive network management.

Network Node Manager immediately pinpoints the source of network problems and assists network management staff in planning for network growth and designing network changes.

Network Node Manager's remote user access provides the flexibility to access network management tools from anywhere on the web. Using these powerful features, network administrators are able to more intelligently manage the network, leading to increased network uptime and lower costs.

The Most Comprehensive Network Management Solution

Automated Discovery and Layout

Network Node Manager discovers TCP/IP, IPX and Level 2 devices on the network and presents this information in an intuitive graphical format. Level 2 discovery includes devices that support the Bridge, Repeater/802.3, or MAU MIBs.

Network Node Manager continuously monitors the network for new devices and for the status of equipment on the network. Discovery and monitoring also detect devices that are located across Wide Area Networks (WANs).

Event Correlation Technology

Network Node Manager identifies problems faster through an advanced event correlation engine. The engine intelligently correlates events into high-level alarms, immediately pinpointing the root cause of network problems. The drill-down capability allows network administrators to see all of the contributing events for each of the alarms.

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Fault tolerance capabilities.

With Network Node Manager, users can schedule back-ups for business-critical network management information while continuing to manage critical network elements.

Additionally, Network Node Manager collection stations can be configured to fail over to Network Node Manager management stations so that in the event of a collection station failure, network monitoring will continue uninterrupted.

Designed for Growth

A scalable solution.

Windows NT and UNIX collection stations can be distributed throughout the environment so that data can be collected locally and then forwarded to one or more Windows NT/UNIX management stations. Windows NT remote consoles connected to UNIX management and collection stations allow multiple operators access at a lower cost. The new Java-based Web UI increases the number of supported operators and offers connectivity over WAN links.

Flexible pricing.

Network Node Manager is packaged in a variety of node increments to allow the software to scale as network requirements increase. Network Node Manager Enterprise for UNIX or Windows NT is the appropriate choice for larger environments and Network Node Manager 250 is an appropriate choice for environments of 250 or fewer nodes. Additional nodes can be added in 250-node increments as the network grows.

Partnerships Ensure Success

Network Node Manager has the strongest partnership program in the industry, resulting in over 300 integrated applications. This level of partnership support offers our customers the highest degree of flexibility to create a comprehensive, customized network management solution.

System Requirements

The hardware and software recommendations for IIP and Sun systems are for management of a 2,500 node network with one IIP OpenView Network Node Manager session on a management or collection station. Management of larger networks requires more RAM and swap space. Please refer to the IIP OpenView Network Node Manager Performance and Configuration Guide for detailed product requirement information.

HP Systems

- IIP 9000 Servers and Workstations, including multiprocessors (threads not supported)
- IIP-UX 10.20, 11.0 including X-Windows and OSF/Motif
- RAM: 96 MB recommended
- Bit-mapped display or X-terminal
- Color graphics: 1024x768 minimum resolution (1280x1024 recommended for optimum clarity); 6 color planes minimum (8 color planes recommended)
- Free disk space: 500 MB plus 192 MB of swap space
- LAN/Link for IIP 9000
- ARPA Services/9000

Sun Systems

- SunSPARC and Ultra Servers and Workstations including multiprocessors (threads not supported)

- Solaris 2.5.1, 2.6, 2.7
- RAM: 96 MB recommended
- Bit-mapped display or X-Terminal
- Color graphics: 1024x768 minimum resolution (1280x1024 recommended for optimum clarity); 6 color planes minimum (8 color planes recommended)
- Free disk space: 500 MB plus 192 MB of swap

Windows NT Systems

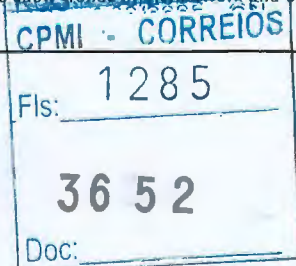
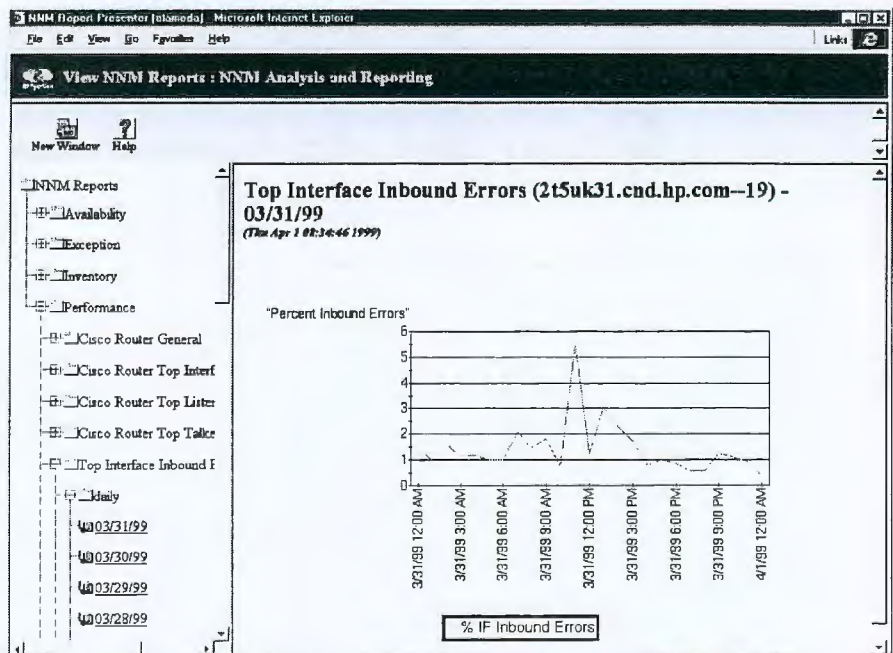
- Intel Pentium processor
- Microsoft Windows NT Workstation (or Server) version 4.0 with TCP/IP networking installed and configured
- Ram: 96 MB RAM
- 800x600 monitor with SVGA graphics card
- Free disk space: 500 MB plus 192 MB free paging file space
- Network Adapter Card

Web Servers Supported

- Apache on IIP-UX and Solaris
- Microsoft Peer Web Services or Internet Information Services on the Windows NT operating system

Web Browsers Supported

- Netscape Navigator 4.51 for IIP-UX, Windows NT, and Solaris
- Microsoft Internet Explorer 5.0 for NT





Out-of-the-box correlation circuits are included for some of the most common network management problems. The pre-configured correlation circuits lead to more efficient network polling based on the latest topology data. The IIP OpenView ECS Designer for Network Node Manager allows development and testing of correlation circuits for very specific correlation requirements through an easy-to-use GUI. These circuits can then be deployed to any number of collection stations or management stations in the environment.

Java-based user interface.

Network Node Manager now provides easy access to network maps and enables management of data from anywhere via the Web.

The IIP OpenView Web Launcher allows dedicated IT staff to start IIP OpenView Java-based applications such as the Network Presenter, the Alarms Browser and the SNMP Data Presenter from anywhere. A log-in facility with password authentication ensures the security of management data. The Launcher also allows user roles to be defined and information to be filtered based on the user's management objective.

The Network Presenter and the Alarms Browser dynamically update maps and events automatically - no intervention is required. Network topology is presented in either graphical or tabular form. In addition, the SNMP Data Presenter allows users to query the network for SNMP data such as interface traffic, CPU load or traffic routing to assist with network diagnosis and planning.

Proactive management through reporting and data warehouse.

Out-of-the-box reports enable proactive trend analysis on the health of the network. These Web based reports point out trends on performance, availability, inventory, and exceptions. Analysis of this historical data provides a clear picture about the devices in the network and allows network managers to become more proactive by taking action before there is a problem in the network.

Additionally, Network Node Manager's valuable topology, event and SNMP-collected data is exported to its data warehouse. The data is then intelligently aggregated and trimmed. The data warehouse includes an open schema to allow access from reporting and data mining tools.

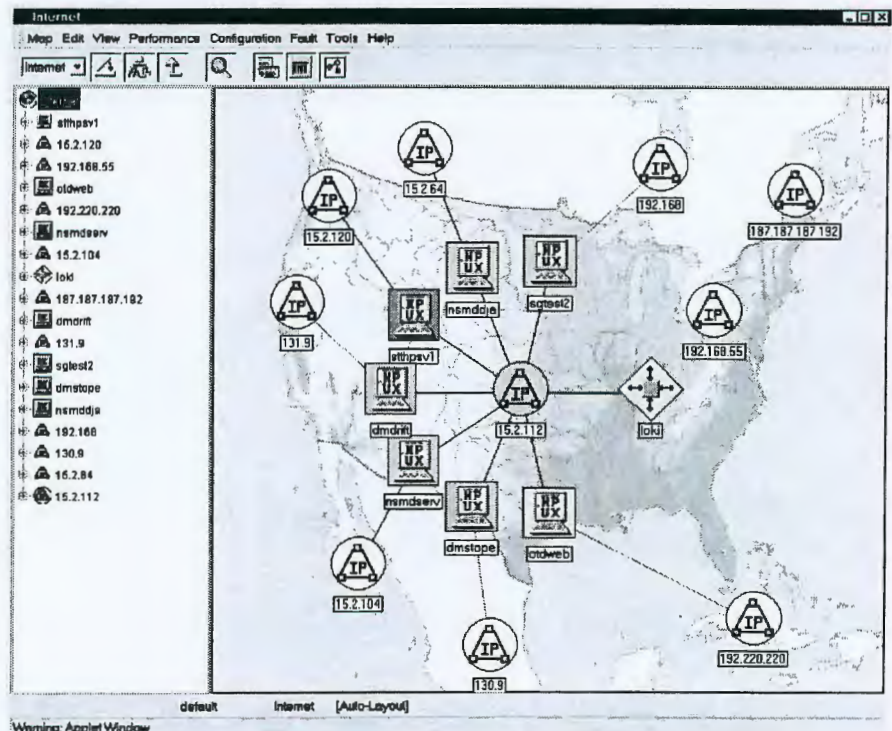


Figure 1. Java-based Network Presenter. The Network Presenter provides shared access to the network topology. Maps may be viewed in graphical or tabular form. A scoping pane allows easy navigation, which lets operators view the entire network from one window.

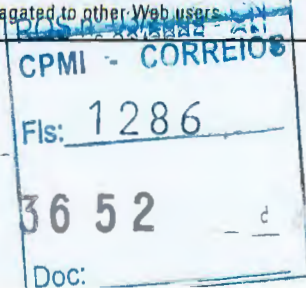
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		Major	Mon Apr 20 18:19:12 1998	sunblind.cnd.hp.com	sunblind.cnd.hp.com reports a different physical address for setup4.cnd.hp.com than it
		Major	Mon Apr 20 18:21:04 1998	setup4.cnd.hp.com	rdies.cnd.hp.com reports a different physical address for setup4.cnd.hp.com than repo
✓		Normal	Mon Apr 20 18:22:10 1998	nsrft.cnd.hp.com	Node up
		Normal	Mon Apr 20 18:22:38 1998	jd95.cnd.hp.com	Node up
		Major	Mon Apr 20 18:22:50 1998	hpcndrm.cnd.hp.com	nsmdemb.cnd.hp.com reports address 0x080009F21E87 for 15.2.113.168, hpcndrm
		Major	Mon Apr 20 18:24:18 1998	setup4.cnd.hp.com	sunstone.cnd.hp.com reports a different physical address for setup4.cnd.hp.com than
		Major	Mon Apr 20 18:24:48 1998	dealer.cnd.hp.com	sunstone.cnd.hp.com reports address 0x080009DD1C55 for 15.2.113.32, dealer.cnd
✓		Normal	Mon Apr 20 18:20:14 1998	HP-6B62AA	Node up
		Warning	Mon Apr 20 18:32:24 1998	HP-A12377	Node down
		Warning	Mon Apr 20 18:32:34 1998	HP-6B62AA	Node down
		Major	Mon Apr 20 18:35:31 1998	dealer.cnd.hp.com	2k5u01.cnd.hp.com reports address 0x080009DD1C55 for 15.2.113.32, dealer.cnd
		Major	Mon Apr 20 18:38:03 1998	2k5u16.cnd.hp.com	2k5u16.cnd.hp.com reports address 0x080009F21E87 for 15.2.113.168, hpcndrm.cnd
		Normal	Mon Apr 20 18:38:43 1998	nsmdemb.cnd.hp.com	Node added
		Major	Mon Apr 20 18:47:05 1998	hpcndrm.cnd.hp.com	2k5u08.cnd.hp.com reports address 0x080009F21E87 for 15.2.113.168, hpcndrm.cnd
		Normal	Mon Apr 20 18:48:00 1998	15.2.113.232	Node added
		Major	Mon Apr 20 18:48:26 1998	dealer.cnd.hp.com	2k5u33.cnd.hp.com reports address 0x080009DD1C55 for 15.2.113.32, dealer.cnd
		Major	Mon Apr 20 18:59:08 1998	hpcndrm.cnd.hp.com	pingo.cnd.hp.com reports address 0x080009F21E87 for 15.2.113.168, hpcndrm.cnd
		Warning	Mon Apr 20 17:02:52 1998	bliss.cnd.hp.com	Node down
		Warning	Mon Apr 20 17:02:52 1998	arict.cnd.hp.com	Node down

Total: 2382, Critical: 0, Major: 567, Minor: 5, Warning: 664, Normal: 1256

Summary of All Alarms in Event Database April 20, 1998

[Unsigned Java Applet Window]

Figure 2. Alarms Browser with Correlated Event Stream. The Alarms Browser pinpoints the root cause of the network problems. Operators can delete and acknowledge alarms and the contributing events from anywhere, and have those changes immediately propagated to other Web users.





Ordering Information

J1240AA, J1247AA, J1254AA

HP OpenView Network Node Manager Enterprise 6.1 for the Windows NT, HP-UX, or Solaris operating systems. Includes License-to-Use, media, and manuals.

J1241AA, J1248AA, J1255AA

HP OpenView Network Node Manager 250 6.1 for the Windows NT, HP-UX, or Solaris operating systems. Includes License-to-Use, media, and manuals.

J1242AB, J1249AB, J1256AB

HP OpenView 250-Node Increment for HP OpenView Network Node Manager 250 6.1 License-to-Use. Product numbers correspond to Windows NT, HP-UX, and Solaris.

J1243AB, J1250AB, J1257AB

HP OpenView Network Node Manager 250 6.1 to Network Node Manager Enterprise 6.1 for Windows NT, HP-UX, or Solaris operating systems.

Upgrades

J1242UB, J1253AB, J1260AB

Upgrade from HP OpenView 250-Node increment to Network Node Manager 6.1 for Windows NT, HP-UX, and Solaris.

J1251AA, J1258AA

HP OpenView Network Node Manager Enterprise Version Upgrade. Unlimited/Enterprise 3.31/4.x/5.x to Network Node Manager Enterprise 4.11/5.01/6.1 for HP-UX or Solaris. Only one version may be installed/run at a time.

J1240UA

HP OpenView Network Node Manager Unlimited 5.x for Windows NT Upgrade to HP OpenView Network Node Manager Enterprise for 6.1 for Windows NT.

J1252AA, J1259AA

HP OpenView Network Node Manager 250 Version Upgrade 3.31/4.x/5.x to Network Node Manager 250 4.11/5.01/6.1 for HP-UX, or Solaris. Only one version may be installed/run at a time.

J1241UA

HP OpenView Network Node Manager 250 5.x for Windows NT Upgrade to HP OpenView Network Node Manager 250 6.1 for Windows NT.

J1261AA, J1262AA, J1263AA

HP OpenView Network Node Manager 6.1 Developer's Toolkit for Windows NT, HP-UX, and Solaris.

J1264AA

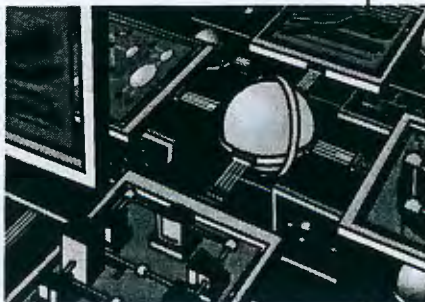
HP OpenView ECS Designer for IT/Operations and Network Node Manager 6.1 for HP-UX.

J1265AA

HP OpenView ECS Designer for Network Node Manager 6.1 for Solaris.

J1266AA

HP OpenView ECS Designer for Network Node Manager 6.1 for Windows NT.



For More Information

For more information on IIP OpenView Network Node Manager please contact your local IIP reseller or IIP sales office.

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Visit the HP OpenView website:
<http://www.openview.hp.com/nmm>

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Tivoli Software Distribution

To download Tivoli Software Distribution in PDF Format, get the most up-to-date Adobe Acrobat Reader to view or print the manuals online. See the Adobe support web site for printing requirements for PDF files.

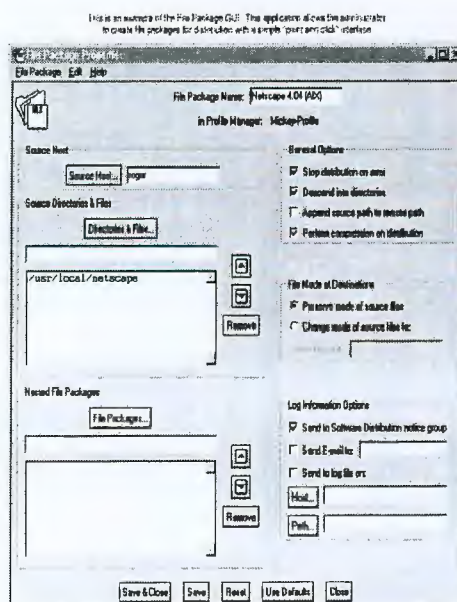


Product Overview

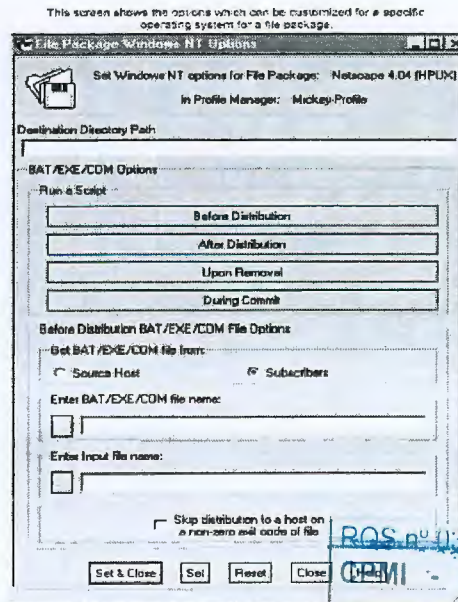
The heart of Tivoli's full-cycle deployment offering, Tivoli Software Distribution is the industry's most efficient, reliable and secure solution for software distribution in distributed environments. Tivoli Software Distribution is a must-have tool if you need to rapidly and consistently deploy mission-critical client/server and desktop productivity applications across distributed networks from a central location. Tivoli Software Distribution simplifies the process by continually deploying and synchronizing all the components of today's complex applications. You can now easily package, distribute, and install software on clients and servers on an enterprise-wide scale.

On Time, On Target, In Synch

Tivoli Software Distribution uses transaction-based technology to guarantee that all client and server software components are installed in an accurate, error-free and fully synchronized manner. You can deploy applications with distributed, interdependent components as a single unit to activate an application update or create a new application on all clients and servers across your network simultaneously.



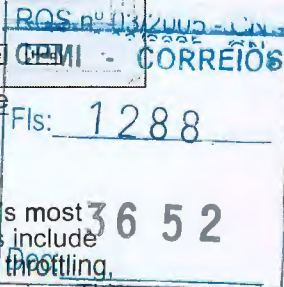
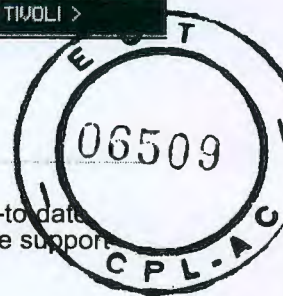
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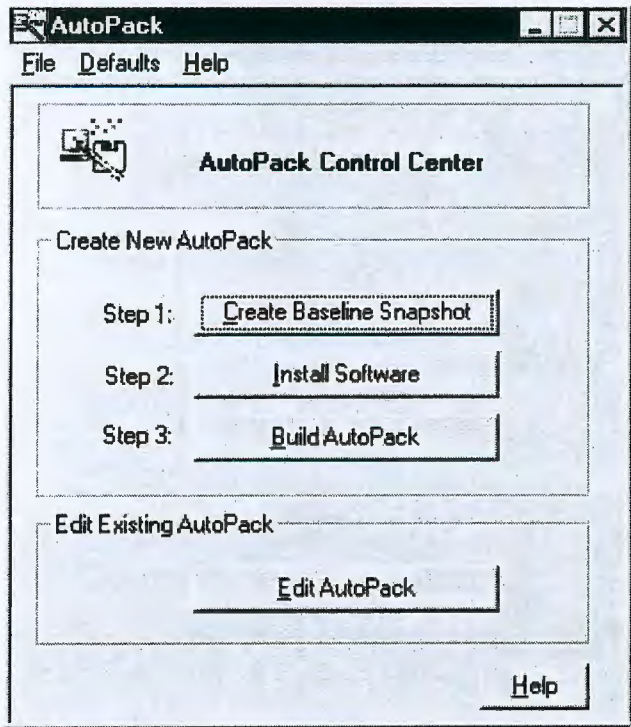
WAN-Smart Distribution

WAN-Smart capabilities make Tivoli Software Distribution the industry's most reliable, highest-performance transport mechanism. These capabilities include fan-out for parallel distribution, staging, network bandwidth tuning and throttling, difference-based distributions that transmit only changes, and compression. This approach enables you to take optimal advantage of network bandwidth to provide fast and efficient distributions. Tivoli Software Distribution gives you unparalleled control and automation in distributing software across your network. For example, from a software distribution server running on UNIX, IBM® OS/390 or Microsoft®



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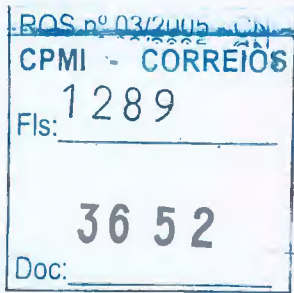
Windows NT®, you can efficiently fan-out software over NetWare, Windows NT and UNIX servers using the IP or IPX protocols to tens of thousands of client systems with a single management action. You can use the robust scheduling capabilities of Tivoli Software's Distribution to take advantage of network capacity fluctuations and specify the number of automatic retries.



AutoPack Control Center

Full-Cycle Deployment

Tivoli Software Distribution integrates seamlessly with Tivoli Inventory, Tivoli's application for tracking and viewing client/server hardware and software components across networked environments. You can feed query results from Tivoli Inventory directly into Tivoli Software Distribution to determine the right target servers and desktops for receiving updates. Applications written to the Tivoli Application Management Specification—an industry-supported standard for creating manageable applications—can be immediately integrated by Tivoli Software Distribution, which takes embedded management information and automatically generates distribution packages and scripts. Tivoli Software Distribution also includes powerful facilities for the packaging of shrink-wrapped and custom applications for installation.



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MANAGEMENT SERVICE	WHAT IT DOES	WHAT IT MEANS FOR YOU
Push and pull interfaces	Provides increased flexibility in defining and initiating updates.	Enables you to initiate secure and timely distributions to intermittently connected end users (such as mobile computer users), or users missed during a scheduled distribution.
Tight integration with Tivoli Inventory	Uses Tivoli Inventory query results.	Automatically determines target servers and desktops for software distributions.
WAN-smart capabilities	Increases efficiency of network bandwidth usage.	Enables you to consistently install a single software application on every desk in the enterprise • From a central point • In a single step • Regardless of the branch server in the environment • Regardless of the protocol stack running on the desktop
Tivoli's Application Management Specification support	Enables compliant applications to automatically connect to Tivoli Software Distribution.	Automatically generates distribution packages and dependency scripts based on information from these applications.
AutoPack scriptless installation for PCs	Provides flexibility to install shrink-wrapped and custom applications.	Eliminates the need to write scripts to package and distribute PC-based software.
Transaction-based service	Enables client/server software to be deployed as a single unit.	Simultaneously activates heterogeneous components for smooth cut-overs to new versions of applications.

Supported Platforms

Source Servers

IBM®, OS/390, AIX®, HP-UX, Sun, Solaris™, and many other UNIX platforms, and Microsoft Windows NT environments. Tivoli Software Distribution can also be operated from a Windows 3.x or Windows 95 desktop using Tivoli Desktop for Windows.

Distribution Clients

Microsoft Windows NT, Windows 3.x, Windows 95, Windows 98, NetWare 3.x, NetWare 4.x, IBM OS/2, OS/400, AIX, HP-UX, Sun Solaris, SunOS, and many other UNIX platforms.



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Tivoli Workload Scheduler (formerly Maestro) for Oracle

Product Overview

Tivoli Maestro for Oracle from Tivoli Systems offers direct integration with Oracle Applications, a comprehensive global business solution. Tivoli Maestro, the best commercial-strength scheduler for open systems, allows you to manage enterprise scheduling with common policies, from a single point of control.

Tivoli Maestro for Oracle:

- Introduces Tivoli Maestro's sophisticated scheduling features into the Oracle Applications environment
- Enables batch job coordination between Oracle Applications and other environments
- Is certified by Oracle Corporation

Automate Oracle Job Scheduling

For integration with Oracle Applications, Tivoli Maestro interfaces with Oracle Concurrent Manager through a series of open application program interfaces (APIs). This allows data sharing, and gives users the ability to automate job scheduling operations across the enterprise. With automation, Tivoli Maestro frees IT staff from manually running routine tasks and writing complicated scripts, and allows them to concentrate on other important issues and business goals.

Tivoli Maestro's robust scheduling features transcend the rudimentary functions that Oracle Concurrent Manager provides. Managing workload from beginning to end, Tivoli Maestro prepares jobs for execution, resolves interdependencies, and launches and tracks each job. The advantages? Minimized idle time, improved throughput, and augmented dependency handling. And Tivoli Maestro handles the recovery process with little or no operator intervention.

Simplify Enterprise Workload Management

From one console, Tivoli Maestro manages and coordinates Oracle and other enterprise scheduling, allowing IT a single point of control. Tivoli Maestro's online reporting and logging facilities consolidate data and simplify troubleshooting by providing up-to-the-minute job status and statistics. Oracle output is copied into Tivoli Maestro, so error detection for Oracle jobs can be done from within the Tivoli Maestro console. And if you need a higher degree of centralized management, Tivoli Maestro is integrated with popular management frameworks, such as Tivoli Management Framework, HP IT/Operations, and BMC Patrol.

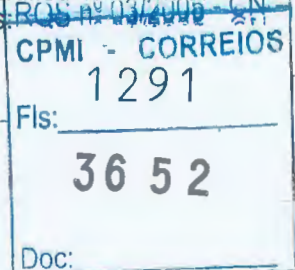
Reduce Support Costs

Tivoli Systems' expertise and market presence translate into reduced support costs for the user. Tivoli provides detailed documentation written with the Oracle user in mind. And by relying on an established vendor for Oracle integration rather than a custom solution from an independent consultant, users are assured of purchasing a product from a company that understands Oracle and keeps pace as new versions are released.

Oracle's Seal of Approval

Through Oracle's Cooperative Applications Initiative (CAI), Tivoli Systems worked closely with Oracle's Design and Migration Services (DMS) to integrate Tivoli Maestro with Oracle Applications. DMS has officially certified Tivoli Maestro as an approved, best-in-class solution for Oracle Applications.





MANAGEMENT SERVICE	WHAT IT DOES	WHAT IT MEANS FOR YOU
Central console	Allows a single point of control for Oracle and non-Oracle scheduling	Saves money through reduced training and simplifies troubleshooting through consolidated information
Cross-application support	Allows scheduling dependencies between disparate system	Enables Oracle jobs to be dependent on non-Oracle jobs, and vice-versa
Fault tolerance	Allows processing to continue in the event of a node or network failure	Ensures reliability in the Oracle scheduling environment
Rules-based processing	Introduces advanced scheduling features into the Oracle environment through Tivoli Maestro	Improves and expands data integrity enterprise wide



Supported Platforms

Supported Versions

* Maestro 5.0 and higher; Oracle Applications 10.6 and higher

Supported Operating Systems

HP-UX; IBM AIX; Sun Solaris™

Manage. Anything. Anywhere.™

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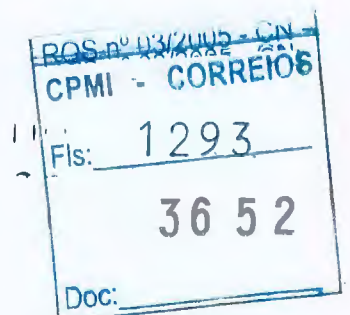
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Sun StorEdge™ A1000/D1000 Storage Arrays

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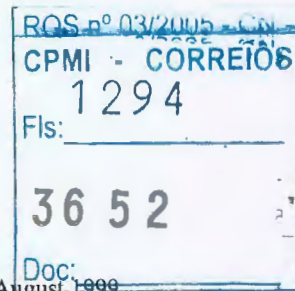
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Just the Facts





The Sun StorEdge A1000 Array—Low-cost, Hardware-RAID Solution

The Sun StorEdge A1000 array is a controller-based (hardware) RAID solution that provides for superior RAID 5 performance and minimal cost for data protection. System I/O throughput is improved as the controller frees the CPU by handling more of the I/O load and doing prefetching and write coalescing with the cache. The Sun StorEdge A1000 array is managed using the same RAID Manager 6 software that is used with the Sun StorEdge A3500 arrays. This software provides status and error indicators, remote system monitoring, and configuration maintenance and monitoring.

The Sun StorEdge A1000 array is a hardware-RAID solution that offers a wide range of capabilities and features:

- Expands on the highly successful SPARCstorage Array
- High-performance, controller-based RAID system with high-RAS features for the desktop
- Superior RAID 3/RAID 5 performance through an intelligent caching controller (includes RAID 0, 1, and 1+0)
- Simple setup and administration using RAID Manager GUI
- Configurations with 36- to 291-GB storage using 9-, 18-, or 36-GB, 10000-rpm drives
- RAID 5 sequential reads at 32 MB per second, sequential writes at 31 MB per second
- UltraSCSI connections to the host system(s) and to the disk drives
- Enhanced RAID Manager 6
- Up to 15 Sun StorEdge A1000 arrays can be daisy-chained on the same UltraSCSI bus (up to nine in a single rack)
- Open storage—UltraSCSI connections to Microsoft Windows NT systems

The Sun StorEdge D1000 Array—Low-Cost Software-RAID Solution

The Sun StorEdge D1000 array does not have a hardware RAID controller. Instead, software RAID solutions are achieved by combining the Sun StorEdge D1000 array with the VERITAS Volume Manager software. The Sun StorEdge D1000 array has two UltraSCSI channels (four UltraSCSI connections). The Sun StorEdge D1000 array backplane is split into two 6-drive or 4-drive segments. Two of the UltraSCSI connections can be jumpered to create a single 12-drive or 8-drive segment.

The Sun StorEdge D1000 array is a software-RAID solution that offers a host of capabilities and features:

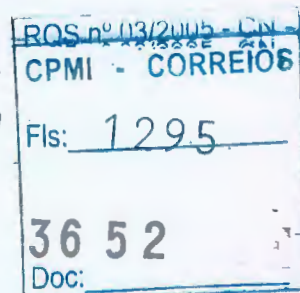
- Replaces the RSM 214/219 tray
- Configurations with 36-GB to 291-GB storage using 9-, 18-, or 36-GB, 10000-rpm disk drives
- Software RAID using VERITAS Volume Manager software (Solstice DiskSuite™ software also supported)
- Higher RAS than a Sun StorEdge MultiPack system

The Sun StorEdge D1000 array can be configured with dual, 40-MB-per-second UltraSCSI channels. In combination with 10000-rpm drives, the array excels at bandwidth-intensive applications such as web servers, seismic analysis, video production, MCAD, and other technical applications.

Positioning



Just the Facts



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Product Family Placement

The Sun StorEdge A1000 and D1000 arrays replace the SPARCstorage Array family and the RSM 214/219 tray for the most price-sensitive customers. The Sun StorEdge D1000 array is nominally more costly than a Sun StorEdge MultiPack system. This cost is minimal for most customers when compared with the availability, capacity, and performance benefits.

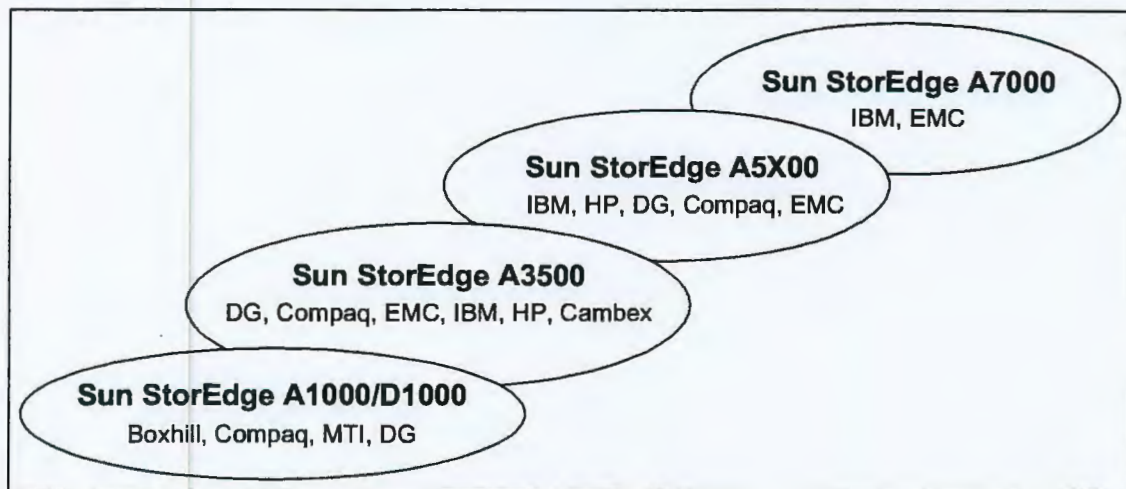
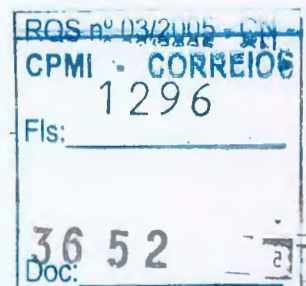
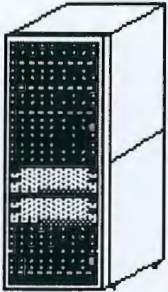


Figure 2. Sun storage product offerings

Positioning





Sun StorEdge A1000 and D1000 Arrays	Sun StorEdge A3500 Array	Sun StorEdge A5000 Array	Sun StorEdge A7000 Array
			
Workgroup	Department to data center	Department to data center	Data center
Controller-based RAID (A1000) Host-based RAID (D1000)	Controller-based RAID	Host-based RAID	Intelligent Storage Server™ (dual-SMP UNIX® servers used as controllers)
Solaris™ Operating Environment, Microsoft Windows NT	Solaris Operating Environment, Microsoft Windows NT	Solaris Operating Environment, Microsoft Windows NT	Simultaneous OS/390, MVS/ESA, MVS/XA, VM/ESA, VSE/ESA, Solaris Operating Environment, HP-UX, AIX, Microsoft Windows NT
When to sell • Price/performance • Bridges gap between Sun StorEdge MultiPack systems and higher end products • For apps requiring less than 291 GB in a single array • Performance and flexibility for price-sensitive customers	When to sell • RAS + price/performance • Dual-controller, cached architecture • High availability • Best performance for write-intensive apps • High-performance OLTP • SCSI or Fibre Channel (future) host interface • Proven stability for mission-critical data	When to sell • RAS + price/performance • Fibre Channel storage networking • Replaces SPARCstorage Array • High sequential performance • High-performance data warehousing and DSS • Campus-area remote mirroring • Flexible configurations (up to 500 m)	When to sell • Mainframe-class RAS • Mainframe-class performance • Only true information sharing in the industry, allowing mainframe, UNIX, Microsoft Windows NT simultaneous, multi-platform access to the same data • Mainframe backup of open systems • Storage consolidation • Mission-critical data • MF data migration

Positioning

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Sun StorEdge A1000 and D1000 Arrays	Sun StorEdge A3500 Array	Sun StorEdge A5000 Array	Sun StorEdge A7000 Array
When NOT to sell • Applications requiring more than 291 GB in a single array • Customer requires Fibre Channel today	When NOT to sell • Solaris Operating Environment user who wants FC-AL headroom today • Non-Solaris Operating Environment or Microsoft Windows NT operating environment	When NOT to sell • Hardware RAID 5 required • Non-Solaris Operating Environment or Microsoft Windows NT host attach required	When NOT to sell • Price is a primary selection criteria

Sun StorEdge A1000 and D1000 Arrays Key Messages

The Sun StorEdge A1000 and D1000 arrays offer a choice of hardware or software RAID. They offer high performance, high RAS, and industry-standard UltraSCSI technology in a compact desktop package.

The Sun StorEdge A1000 and D1000 array subsystems include either one (Sun StorEdge A1000 array) or two (Sun StorEdge D1000 array) UltraSCSI (40-MB-per-second burst rate) channels to the host. The Sun StorEdge A1000 array is Sun's highest RAS storage solution designed for desktop applications. The system is highly redundant with hot-plug drives, power, and cooling systems.

The same hot-plug disks are designed into both the Sun StorEdge A1000 and D1000 arrays, as well as the Sun StorEdge A3500 array. They are customer serviceable and can be added or removed without interrupting system operation.

Sun StorEdge A1000 Array

The Sun StorEdge A1000 array is Sun's controller-based RAID system for desktop and workgroup RAID 5 performance. The Sun StorEdge A1000 array is a scalable storage subsystem providing a 40-MB-per-second UltraSCSI host interface and UltraSCSI performance drives. Configurations scale from 36 GB to 2.6 TB using nine rackmounted units in a single cabinet (rack).

Performance results are impressive. The Sun StorEdge A1000 array provides exceptional desktop/workgroup system performance utilizing controller-based RAID. How exceptional? Over 2,300 IOPS (input/output operations per second) per array and 32 MB per second of actual user-data bandwidth per array.

Sun StorEdge D1000 Array

The Sun StorEdge D1000 array is a storage subsystem providing two UltraSCSI host interfaces and UltraSCSI performance drives. Like the Sun StorEdge A1000 array, its configurations scale from 36 GB to 2.6 TB using nine rackmounted units in a single cabinet (rack).

Positioning



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High RAS (Reliability, Availability, Serviceability)

The RAS features of this array exceed those of the SPARCstorage Array and RSM array families.

Feature	Sun StorEdge MultiPack System	SPARCstorage Array	Sun StorEdge A1000/D1000 Array
Hardware RAID controller	No	No	Yes (A1000)
Redundant power	No	No	Yes
Hot-swappable drives	Yes	No	Yes
Hot-swappable power	No	No	Yes
Hot-swappable cooling	No	No	Yes
Power supply fault sensing and failover	No	No	Yes
Fan tray fault sensing and failover	No	No	Yes

Availability

The Sun StorEdge A1000 and D1000 arrays ship in a variety of configurations, including 9-GB, 18-GB, and 36-GB disk drives, and desktop, desktide, and rackmountable versions of the systems.

Target Markets

The Sun StorEdge A1000 and D1000 arrays are well-suited for the performance requirements of modern desktop and workgroup applications, network data services, web servers, and performance-oriented systems with capacity needs up to 291 GB.

The Sun StorEdge A1000 array is a hardware RAID, internal controller storage subsystem that provides high-performance RAID 5 capabilities. This array is one of Sun's best storage choices for OLTP-type applications (random I/O) that are heavily used in the financial, retail, health care, and Telco industries.

The Sun StorEdge A1000 array is ideally suited for the workgroup and desktop markets with scalability, high-RAS, high-performance RAID 5, UltraSCSI throughput, and priced to be competitive in the desktop/workgroup segment.

Industry/Customer	Key Features to Highlight
Departmental storage	Tabletop design with proper capacity to support department sizes
Technical computing	High-performance data storage for engineering design projects
Scientific computing	High bandwidth for data capture, retrieval and storage
High-performance computing	40-MB-per-second UltraSCSI interface(s) and 10000-rpm drives for the most demanding performance needs

Positioning



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Target Customer Environments and Applications

The Sun StorEdge A1000 and D1000 arrays are designed for a variety of cost-sensitive storage environments and applications where high performance and availability are required.

Customer Environment	Key Features to Highlight
Solaris Operating Environment only	• Single-vendor systems support and service • High storage density in a compact desktop/deskside enclosure. • Sun commitment to continued support and enhancement • Centralized storage management capability, capacity, and RAS features
Microsoft Windows NT host systems	• Desktop and workgroup capacities, RAS features, compatibility, configurability • Hardware RAID (Sun StorEdge A1000 array) and software RAID (Sun StorEdge D1000 array) for Microsoft Windows NT

Application	Requirements
Workgroup shared storage	Scalable capacity with high RAS support
Web server	Scalable capacity with fast sequential throughput for web content delivery
Technical and scientific	Scalable capacity with high RAS support
Decision support systems	High, scalable throughput for delivery of large records and reports
On-line transaction processing	Fast I/O in support of multiple transactions
Network file service	Fastest random-read performance for file delivery service
Enterprise clusters	Business-critical application availability

Positioning

Market Value Proposition

The Sun StorEdge A1000 and D1000 arrays offer flexibility, high performance, and availability in a small footprint. The Sun StorEdge A1000 and D1000 arrays provide flexible configuration offerings, including desktop, deskside, and rackmount versions that are supported on the entire range of Sun server products. With a 40 MB per second UltraSCSI bus and hardware- and software-based RAID options, these arrays excel in the most demanding OLTP (Sun StorEdge A1000 array) and data warehousing and DSS (Sun StorEdge D1000 array) environments.

High-performance, 10000-rpm disks are available in 9-GB, 18-GB, and 36-GB capacities. These drives offer outstanding price/performance, making the arrays excellent choices for OLTP applications.

The Sun StorEdge A1000 and D1000 arrays offer flexible, high-performance storage subsystems with a variety of configurations, capacities, RAID capabilities (hardware versus software), and RAS, which make them ideally suited for the desktop, workgroup, and departmental environments.

Sun StorEdge A1000 and D1000 Arrays Key Features and Benefits

Features

- High-density chassis
- Controller-based RAID (Sun StorEdge A1000 array)

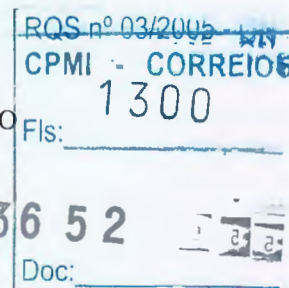
Benefits

- Provides scalable configurations in a small footprint
- Delivers high performance by decreasing CPU drain for I/O processing, prefetching, and write coalescing



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Features

- Sun StorEdge RAID Manager software (Sun StorEdge A1000 array)
- RAID 0, 1, 1+0, 3, and 5
- 10000-rpm disk drives
- 36-GB, 1.6-inch high disks
- Redundant power supplies, cooling, and hot-plug disk drives
- Multiple configurations
- UltraSCSI interface to the host
- UltraSCSI between controller board and disk trays
- Environmental sensing in each disk tray
- Daisy chaining
- Open SCSI host interface

Benefits

- Easy configuration, management, and recovery of RAID implementation
- Easy-to-use graphical user interface (GUI) as well as command line interface (CLI) for scripting
- High data availability for OLTP, data warehousing, and DSS applications
- RAID 5 performance multiplies the power of the industry's most popular line of scalable UNIX servers: Sun Enterprise™ servers, SPARCserver™ systems, and SPARCcenter™ systems
- Approximately 25 to 30 percent faster data access in OLTP applications than 7200-rpm disks
- Doubles capacity per footprint in eight-disk trays, reducing price per MB
- Redundancy provides high availability for the business-critical applications
- Each power supply can support the power requirements of the intelligent controller
- Hot-plug components permit immediate servicing without system downtime
- Enables customers to design storage solutions that fit their needs and scale into the future
- Provides high bandwidth (40 MB per second) data transfers
- Increases RAID performance
- Environmental monitoring and reporting for temperature, controller voltage, fan failure, power supply status, and a complete health check of each disk tray
- Increases storage capacity with fewer host connections
- Protects customers' storage subsystem investment by providing interoperability with other host environments

Positioning

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System Architecture

Overview of System Architecture

The Sun StorEdge™ A000 and D1000 arrays are high-availability, mass-storage subsystems that use a disk enclosure capable of supporting up to 291 GB of storage, with greater capacities to come as disk capacities grow. The systems employ the same enclosure and drive subsystem architecture. However, the Sun StorEdge A1000 array incorporates an additional intelligent RAID controller.

Sun StorEdge A1000 Array System Architecture

The heart of the Sun StorEdge A1000 system is the controller module, an intelligent RAID controller. There are redundant power supplies and cooling units in the system, as well as backup batteries on the controller board.

- Power and fan components in the disk enclosure are redundant and may be replaced while the subsystem is operating.
- Dual power supplies, choice of DC or AC power
- Dual fan trays, each with two fans. Fans speed up in response to higher temperatures. Three fans active out of four will cool the controller indefinitely. Two fans will support the tray for at least eight hours.
- One controller module with either 24 MB or 80 MB of DRAM and battery pack.

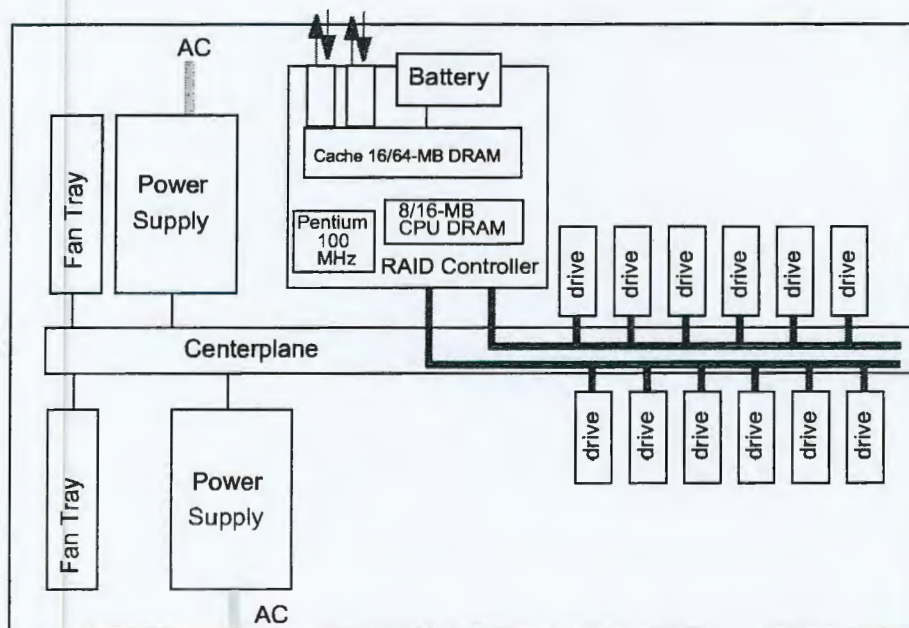


Figure 3. Sun StorEdge A1000 array system architecture

System Architecture

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Sun StorEdge D1000 Array System Architecture

- Dual power supplies
- Dual fan trays, each with two fans. Fans speed up in response to higher temperatures. Three fans active out of four will cool the interface board indefinitely. Two fans will support the tray for eight hours.
- Environmental service module board
- Two independent differential UltraSCSI channels. Each uses a 53C120 SCSI interface chip and a GEM200 SAF-TE (SCSI accessed fault-tolerant enclosure) chip.
- Each SCSI channel supports either six 1-inch UltraSCSI disks or four 1.6-inch UltraSCSI disks. Either 4-GB, 9-GB, 18-GB, or 36-GB drives are supported.
- The two channels can be daisy-chained together to form a single SCSI bus.

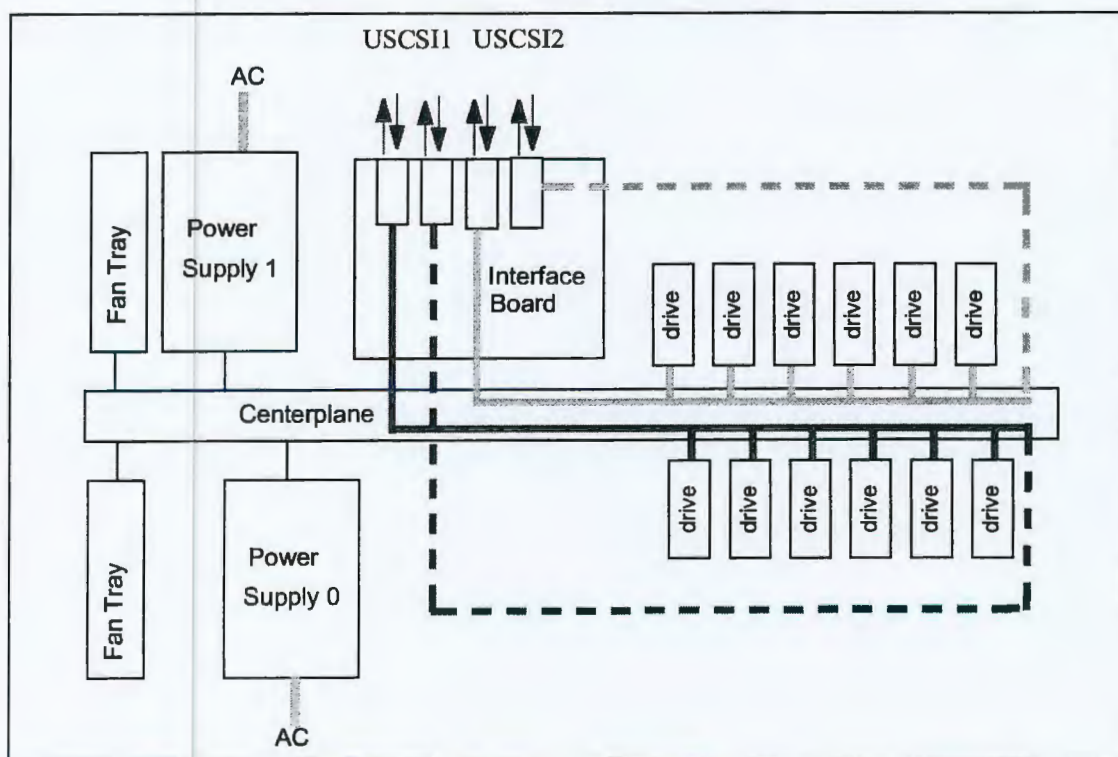
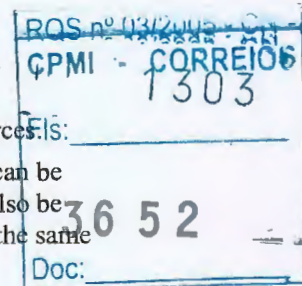


Figure 4. Sun StorEdge D1000 array system architecture

Sun StorEdge A1000 and D1000 Arrays Key Facts

- High RAS is achieved through the use of redundant components.
- The system includes two cooling units (two fans each) and two power supplies.
- The battery system includes battery cells and charger (Sun StorEdge A1000 array).
- The Sun StorEdge A1000 and D1000 arrays require two 100-volt to 240-volt AC power sources.
- 1-inch disks (4 GB, 10000 rpm; 9 GB, 7200 rpm; 9 GB, 10000 rpm; or 18 GB, 10000 rpm) can be mixed in the same enclosure. 1.6-inch disks (18 GB, 7200 rpm; or 36 GB, 10000-rpm) can also be mixed in the same enclosure. However, 1-inch disks cannot be mixed with 1.6-inch disks in the same enclosure.





- The Sun StorEdge A1000 and D1000 arrays and the SPARCstorage™ Array may coexist on the same server system but not on the same SCSI chain.
- The Sun StorEdge A1000 and D1000 arrays are supported on Solaris™ 2.5.1 Operating Environment or later releases. Configurations with the 18-GB, 10000-rpm, 1-inch disks or the 36-GB, 10000-rpm, 1.6-inch disks are supported on Solaris 2.6 Operating Environment or higher.

Sun StorEdge A1000 Array Controller Module Technical Facts

The Sun StorEdge A1000 array disk enclosure is capable of supporting up to twelve 1-inch disk drives or eight 1.6-inch drives. The enclosure is designed to be mounted in a standard Sun rack, in a tower stand, or on a table top. No cables are used inside the Sun StorEdge A1000 array disk enclosure.

- The intelligent hardware controller in the Sun StorEdge A1000 array supports RAID 0, 1, 1+0, 3, and 5. The controller microprocessor does all RAID calculations for I/O and volume management. This improves system performance by reducing the CPU load and I/O traffic between the host and the array.
- The controller board includes capacity for 16 MB of CPU memory and 64 MB of data cache memory. Below are the possible configurations for cache memory.

Configuration	Per Controller Board
• Base configuration	8-MB microprocessor program memory 16-MB data cache
• Upgrade	Add on to a maximum 16-MB microprocessor program memory Add-on to a maximum 64-MB data cache

- The Pentium chip is a 100-MHz processor, which is a socketed PGA part.
- The Sun StorEdge A1000 array base configuration is 16 MB of DRAM for controller data cache and 8 MB of DRAM for instruction cache.
- The data cache uses 60-ns DRAM, organized x 36 (either 2 MB x 36 or 8 MB x 36) in a 72-pin package.
- The data cache is controlled by the RPA (RAID parity assist) chipset. There are two slots for data cache memory and the slots need to be filled one pair at a time.
- The data cache is protected from a power failure by a lead acid rechargeable battery. A fully charged battery will protect the cache for a minimum of three days.
- Users can expand the controller DRAM up to a maximum of 80 MB.
- The controller module has six LEDs visible from the rear of the tray. They indicate the status of the controller module.

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Sun StorEdge A1000 Array Controller Board Key Facts

The Sun StorEdge A1000 array controller board includes a 100-MHz Pentium processor and an upgradeable 16-MB data cache.

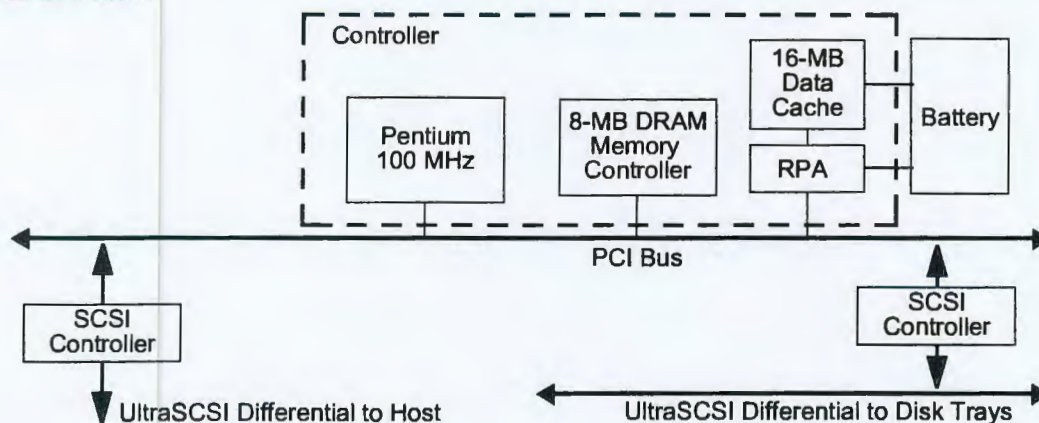


Figure 5. Sun StorEdge A1000 array controller board architecture

Disk Tray and Hot-plug Disk Module Key Facts

- Each Sun StorEdge A1000 and D1000 disk tray holds a maximum of twelve 1-inch, or eight 1.6-inch hot-plug disk modules. Six drive types are supported, including
 - 4 GB, 10000 rpm, 1-inch high
 - 9 GB, 7200 rpm, 1-inch high
 - 9 GB, 10000 rpm, 1-inch high
 - 18 GB, 7200 rpm, 1.6-inch high
 - 18 GB, 10000 rpm, 1-inch high
 - 36 GB, 10000 rpm, 1.6-inch high

All drives fit a 3.5-inch form factor.

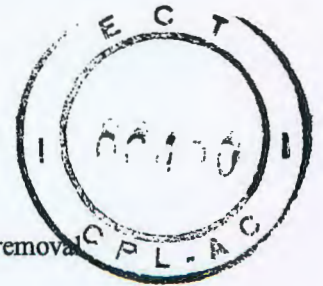
- All drives are mounted in a "spud" bracket for easy installation and removal from the tray.
- The drives use SCA-2 connectors in which the ground leads make contact first for hot-plug support. This ensures electrical hot-plugging. The cable free drives plug directly into backplanes to provide higher reliability.
- Redundant power supplies and cooling. Each power supply unit is capable of running in non-degraded operation in the event of a power supply failure. A single power supply can handle the start-up power surge for all disks. In addition, a power supply can be replaced while the Sun StorEdge A1000 and D1000 trays are in operation. Each cooling unit can maintain operating temperatures in the event of a single fan failure.

Disk Tray and Hot-plug Disk Module Technical Facts

- Supported 1-inch disks include 4 GB, 10000 rpm; 9 GB, 7200 and 10000 rpm; and 18 GB 10000 rpm. 1.6-inch, 18-GB, 7200-rpm and 36-GB, 10000-rpm disks are also supported.
- Each drive tray holds a maximum of twelve 1-inch disks, or eight 1.6-inch disks. These are the same disk drives used in the Sun StorEdge A3500 array.

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- The 3.5-inch form-factor drives are mounted in a plastic bracket for easy installation and removal from the tray.
- In the event of a power supply failure, a single power supply can handle the start-up power surge for all disks. In addition, a power supply can be replaced while the tray and disks are in operation. Each cooling unit can maintain operating temperatures in the event of a single fan failure.
- The drives use SCA-2 connectors in which the ground leads make contact first for hot-plug support. The drives plug directly into the disk tray backplane without any cabling, providing higher reliability.
- An environmental service module board at the rear of the Sun StorEdge D1000 disk tray enables the host system to obtain environmental status information over the SCSI bus. The environmental service module board also provides status and control information for individual drive faults back to the host system.

Host Bus Adapter Key Facts

- For SBus-based hosts: SBus-to-differential UltraSCSI adapter, UDWIS/S Model X1065A.
- For PCI-based hosts: PCI-to-differential UltraSCSI adapter, Model X6541A.

Host Bus Adapter Technical Facts

The UDWIS/S host bus adapter:

- Allows data transfer up to 40 MB per second per channel
- Is rated at an average of 10.5 Watts (15 Watts maximum)
- Measures 5.776 x 3.3-inches (146.70 mm x 83.82 mm)
- Weighs less than 1 pound (0.45 kg)

The PCI differential UltraSCSI host bus adapter:

- Supports data transfers up to 40 MB per second per channel
- Provides dual UltraSCSI channels per card

To avoid a single point of failure and enhance availability, it is recommended that customers attach the controller to channels on different host bus adapter cards.

- Measures 7.5-inches long by 4-inches wide
- Uses the following input power from the host's PCI slot: +5.0VDC @ 3A max., +3.3VDC @ 130ma max., +12.0VDC @ 50ma max.
- Weighs less than 1 pound (0.45 kg)
- Requires a 68-pin to UHDC differential SCSI cable to connect to a Sun StorEdge A1000 or D1000 array

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Enclosure Service

Enclosure services provide and/or accept configuration and maintenance information. Information about the Sun StorEdge A1000 array is obtained through use of the RAID Manager 6 host software.

The following units generate or receive enclosure status or control information:

- Power supplies
- Fan trays
- Disk drives

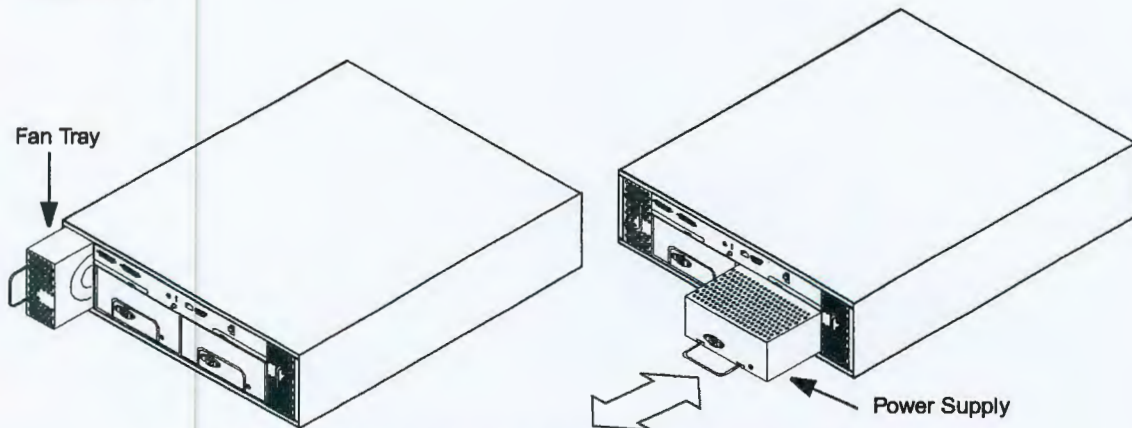


Figure 6. Sun StorEdge A1000 and D1000 arrays fan trays and power supplies

Front Panel Indicators

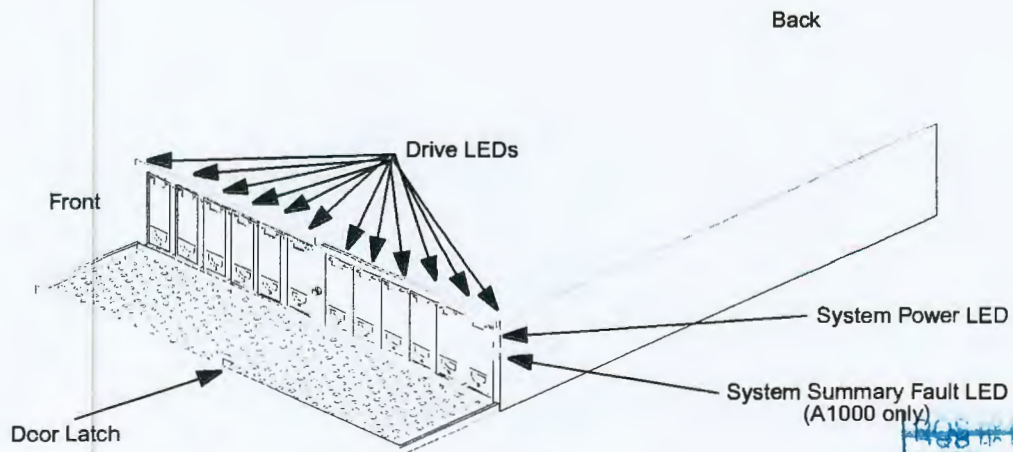
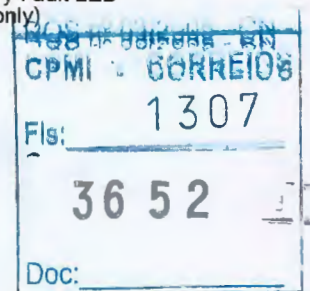


Figure 7. Sun StorEdge A1000 and D1000 arrays front view

System Architecture





Rear Panel Indicators and Switches

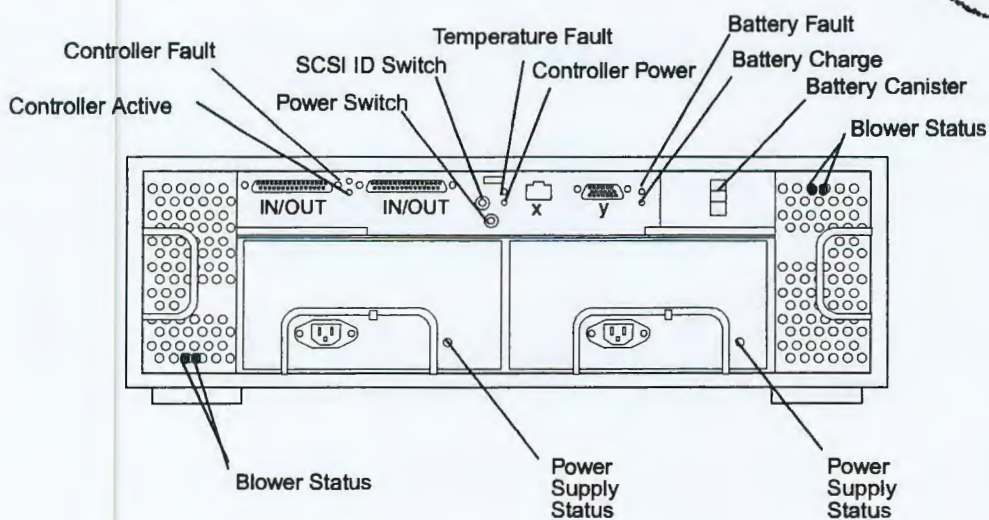


Figure 8. Sun StorEdge A1000 array rear view

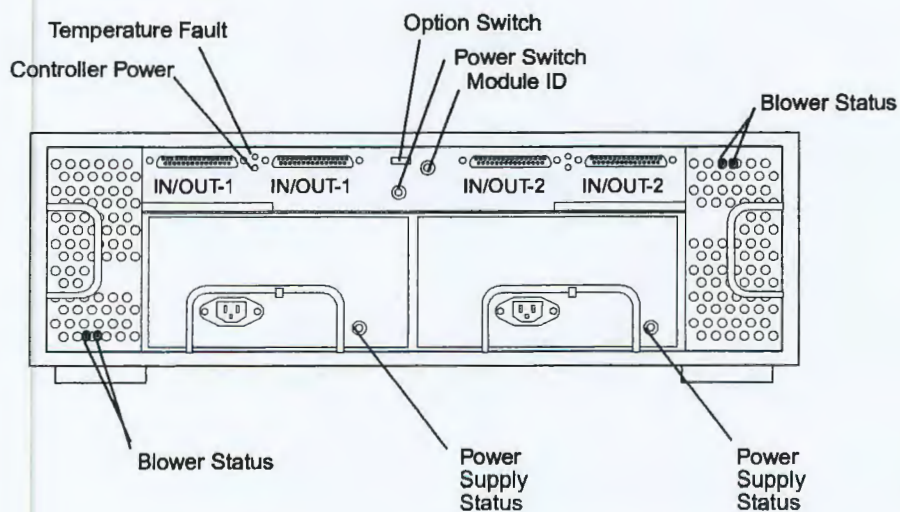


Figure 9. Sun StorEdge D1000 array rear view

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Requirements and Configuration

Sun StorEdge™ A1000 and D1000 Arrays Configuration Guidelines

Sun StorEdge™ A1000 and D1000 arrays are supported on the following host platforms:

- Sun Enterprise™ 10000 server (Sun StorEdge D1000 array only)
- Sun Enterprise 6000, 5000, and 4000 servers
- Sun Enterprise 6500, 5500, and 4500 servers
- Sun Enterprise 3000 and 3500 servers
- Sun Enterprise 250 and 450 servers
- Sun Enterprise Ultra™ 5S and 10S servers
- Ultra™ 5, 10, 30, and 60 workstations
- Ultra 2 (Sun Enterprise 2) server
- Ultra 1 (Sun Enterprise 1) server (excludes 18-GB, 10000-rpm and 36-GB, 10000-rpm disk configurations)
- Microsoft Windows NT servers (9-GB, 10000-rpm disk configurations only)

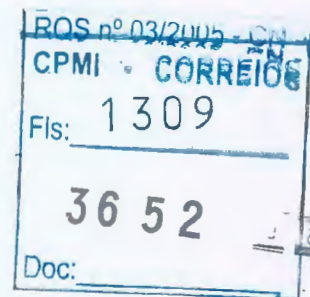
Supported Configurations

The Sun StorEdge A1000 array is supported in the following configurations:

- | | |
|---------------|---------------|
| • Single host | • Tabletop |
| • Daisy chain | • Tower stand |
| • Box sharing | • Rackmount |
| • Cluster | |

Refer also to the *Sun StorEdge A1000 Installation, Operation, and Service Guide*. This guide contains detailed information about correct Sun StorEdge A1000 array SCSI cabling, SCSI bus termination requirements, and power sequencing for each of these configurations.

Requirements and Configuration





Sun StorEdge A1000 Array Single-host Configuration

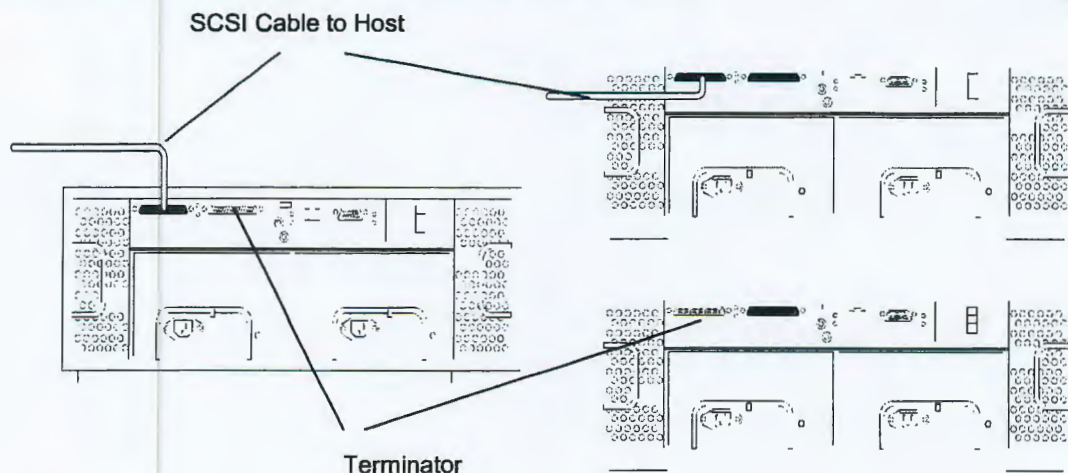


Figure 10. Single and Daisy-chained Sun StorEdge A1000 array connected to a single host

Sun StorEdge A1000 Array Cluster Support Configuration

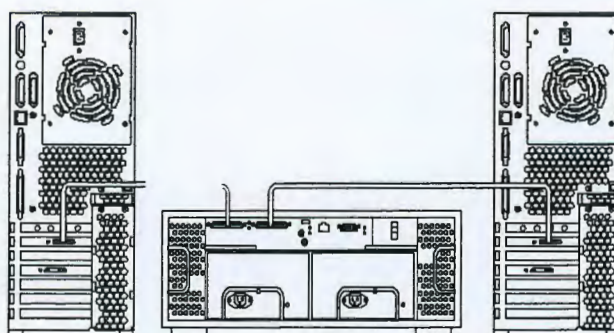
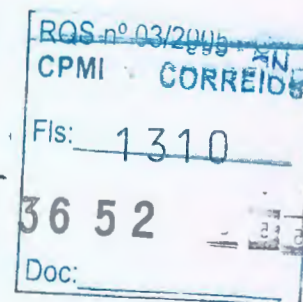


Figure 11. Sun StorEdge A1000 array connected to two hosts

- Single host is the basic configuration. Clustering is also supported. Each Sun StorEdge A1000 array controller module interfaces to the host through an UltraSCSI differential host bus adapter.
- The SCSI Out ports on the Sun StorEdge A1000 array controller module must be terminated unless the array is daisy-chained to another array or clustered with two hosts. (Refer to the *Sun StorEdge A1000 Installation, Operation, and Service Guide*.)

Requirements and Configuration





Sun StorEdge D1000 Array Single-host Configuration

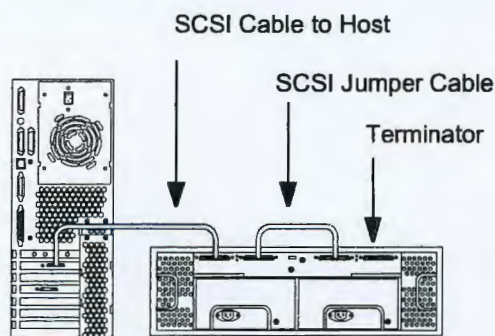


Figure 12. Bridged Sun StorEdge D1000 Array connected to single host

Sun StorEdge D1000 Array Split-box Configuration

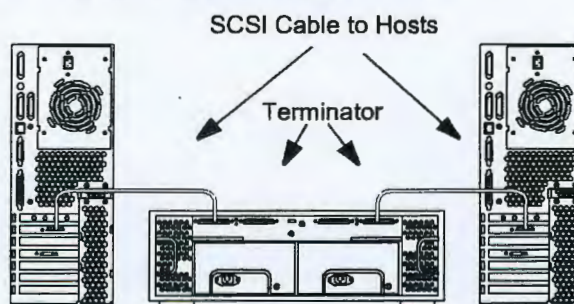


Figure 13. Unbridged Sun StorEdge D1000 array connected to two hosts

Sun StorEdge D1000 Array Cluster Support

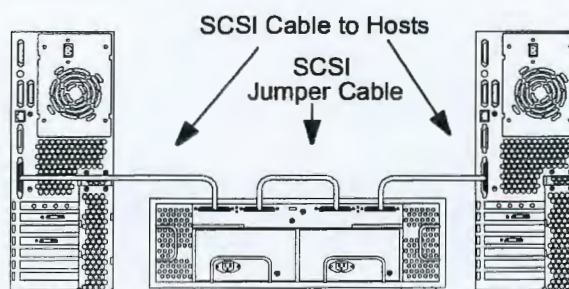


Figure 14. Bridged Sun StorEdge D1000 array connected to dual hosts

- Single host is the basic configuration. Box sharing and clustering are also supported.
- Each Sun StorEdge D1000 array interfaces to the host through an UltraSCSI differential host bus adapter.
- The SCSI out ports on the Sun StorEdge D1000 array must be terminated unless the array is clustered with two hosts. (Refer to the Sun StorEdge D1000 Installation, Operation, and Service Guide.)

Requirements and Configuration

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Daisy-chained Configuration

- Daisy-chaining enables higher capacity storage solutions per host.
- The Sun StorEdge A1000 array controller module can be daisy-chained in the same or separate cabinets. Up to a maximum of fifteen units may be daisy-chained together (up to nine units in a single enclosure total). For optimal performance, a maximum of three Sun StorEdge A1000 arrays is recommended.

Some customers will require large, multiple terabyte storage capacities. These customers will need to configure and daisy-chain multiple Sun StorEdge A1000 arrays.

Server Platform	Maximum Number of Sun StorEdge A1000 and D1000 Subsystems Single/Daisy Chain ¹	Maximum Supported Capacity 9-GB, 10000-rpm Drives Single/Daisy Chain	Maximum Supported Capacity 18-GB, 10000-rpm Drives Single/Daisy Chain ¹	Maximum Supported Capacity 36-GB, 10000-rpm Drives Single/Daisy Chain ¹
Sun Enterprise 10000 server	45 / 45 (D1000 only)	4914 / 4914 GB (D1000 only)	9828 / 9828 GB (D1000 only)	13104 / 13104 GB (D1000 only)
Sun Enterprise 6X00/5X00/4X00 servers	18 / 18	1965 / 1965 GB	3931 / 3931 GB	5241 / 5241 GB
Sun Enterprise 3X00 servers	9 / 9	982 / 982 GB	1965 / 1965 GB	2620 / 2620 GB
Sun Enterprise 450 and 250 servers	8 / 20	873 / 2184 GB	1747 / 4368 GB	2329 / 5824 GB
Sun Enterprise Ultra 5S and 10S servers	6 / 8	655 / 873 GB	1310 / 1747 GB	1747 / 2329 GB
Ultra 30 and Ultra 60 workstations	8 / 8	873 / 873 GB	1747 / 1747 GB	2329 / 2329 GB
Ultra 5 and Ultra 10 workstations	6 / 8	655 / 873 GB	1310 / 1747 GB	1747 / 2329 GB
Ultra 2 workstation and Sun Enterprise 2 server	2 / 4	218 / 436 GB	436 / 873 GB	582 / 1164 GB
Ultra 1 workstation and Sun Enterprise 1 server	2 / 4	218 / 436 GB	not supported	not supported
Microsoft Windows NT server	2 / 4	218 / 436 GB	not supported	not supported

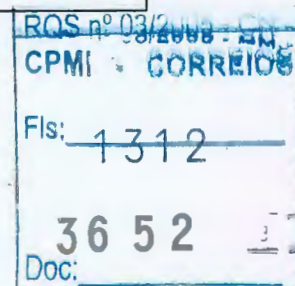
¹ The Sun StorEdge D1000 array cannot be daisy-chained.

Note: The last Sun StorEdge A1000 array controller module in any daisy-chain must have one terminator in the SCSI Out port. Refer to the *Sun StorEdge A1000 Installation, Operation, and Service Guide*.

Requirements and Configuration



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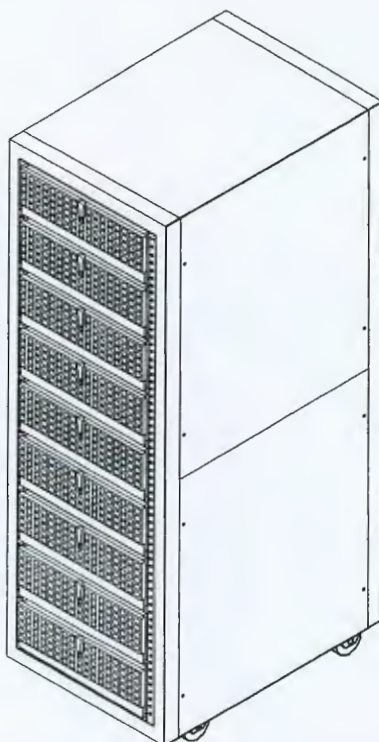


Sun StorEdge A1000 and D1000 Arrays Rackmount Configuration

The Sun StorEdge A1000 and D1000 arrays can be rackmounted to create larger configurations in a single enclosure. Up to nine Sun StorEdge A1000 or D1000 systems can be mounted in the Sun StorEdge expansion cabinet. In this configuration it is possible to store up to 2.6 TB in a single cabinet. The array may be rackmounted in the field with optional hardware.

In order to rackmount the Sun StorEdge A1000 or D1000 arrays, customers must:

- Install mounting brackets onto tabletop configurations or order rackmount configurations
- Install the Sun StorEdge A1000 or D1000 arrays in the enclosure
- Cable the units

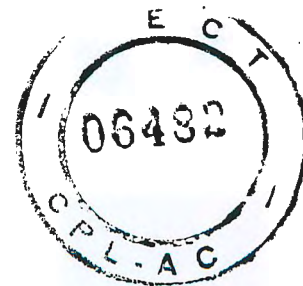


Requirements and Configuration

Figure 15. Rackmounting the Sun StorEdge A1000 and D1000 arrays

Detailed information on rackmounting procedures can be found in the *Sun StorEdge A1000 and D1000 Rackmount Installation* guide, part number 805-2626-10.

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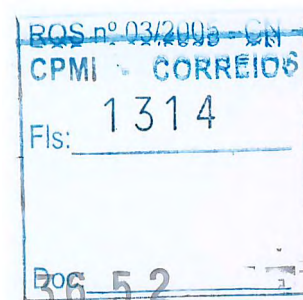


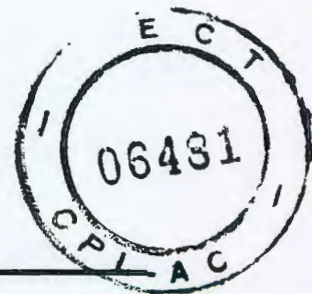
Other Configuration Guidelines

The total length of all SCSI cables on any one bus should not exceed 25 meters. The Sun StorEdge A1000 array ships with one 2-meter UltraSCSI differential cable. The Sun StorEdge D1000 array ships with two 2-meter UltraSCSI differential cables and one 0.8 meter cable (for jumper into single drive chain). See the ordering information for part numbers of other cables. Cable lengths are as follows:

- External differential UltraSCSI cable, 10.0 meters
- External differential UltraSCSI cable, 4.0 meters
- External differential UltraSCSI cable, 2.0 meters
- UltraSCSI host bus adapter, 0.1 meter of internal cable length
- Sun StorEdge A1000 array controller, 0.1 meter of internal cable length

Requirements and Configuration





Software Architecture

Sun StorEdge™ RAID Manager Key Facts (Sun StorEdge A1000 Array)

The Sun StorEdge™ RAID Manager software includes both graphical and command line interfaces for configuring, monitoring, maintenance, tuning of the RAID configuration. For the Sun StorEdge A1000 array, version 6.1.1 or above is required.

The graphical user interface (GUI) of the Sun StorEdge RAID Manager software displays this menu.

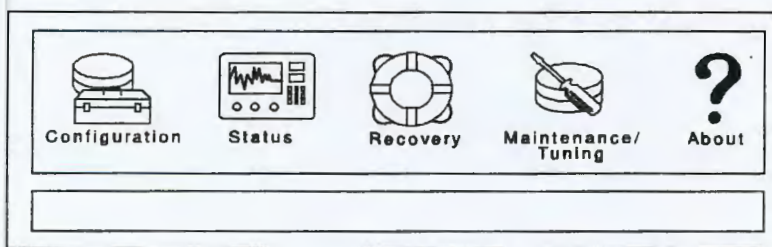


Figure 16. The RAID Manager GUI

Application

- Configuration application

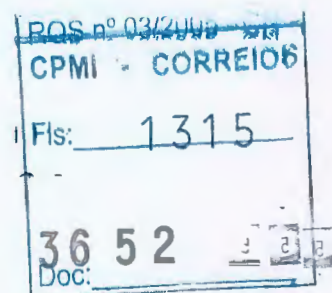
- Status application

- Recovery application

Functions

- Design flexible RAID configurations
- Locate a drive group
- Create logical units (LUNs) and hot spares from unassigned drives
- Add LUNs to an existing drive group
- Delete LUNs in a drive group or a hot-spare drive
- Real-time view of log files with system information about failures, parity checks, and system events
- Perform health check on RAID modules
- View the status of LUN reconstructions or change the LUN reconstruction rate
- On-line instructions for easy restoration of failed components in a RAID module
- Manual parity check/repair of LUNs
- Manual recovery of drives and controllers. You can fail, reconstruct, and revive drives, format and revive LUNs, and change the status of controllers
- Automatic LUN reconstruction

Software Architecture





Application

- Maintenance/tuning application
- About

Functions

- Change LUN reconstruction rate
- Balance LUNs between active controllers
- View/set cache parameters for each LUN
- Upgrade controller firmware
- Change/set automatic parity check
- Manage error log file
- Software version information

Sun StorEdge RAID Manager Tech Facts

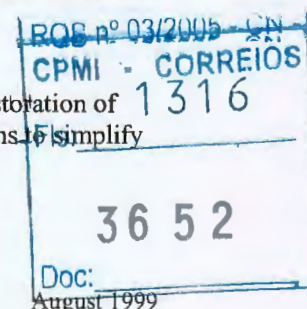
- The Sun StorEdge RAID Manager software includes both graphical and command line interfaces for configuring and managing the RAID configurations.
- A RAID module is a set of associated drives, controllers, power supplies, and cooling fans.
- The Solaris™ Operating Environment sees each LUN as one virtual disk drive. With Solaris 2.6 Operating Environment Hardware: 5/98, each SCSI device driver can support a maximum of 16 LUNs, each capable of supporting seven partitions. For the Sun StorEdge A1000 array, the RAID Manager software supports a maximum of 16 LUNs.
- A drive group is a logical grouping of drives. Drive groups are renumbered automatically on the next reconfiguration boot after configuration changes.
- RAID Manager uses the standard device code (cX tY dZ s0)
 - cX = Host bus adapter with a maximum of 16 LUNs per target.
 - tY = The controller SCSI target ID. This is limited to 8 under the Solaris 2.5.1 Operating Environment.
 - dZ = The LUN
 - s0 = Slice number. With the Sun StorEdge RAID Manager, the slice number is always "0."
- The RAID Manager supports global hot spares, which are disks that contain no data and act as a standby in case of a drive failure. Once a failed disk has been replaced, data is returned automatically to the original disk to preserve the original configuration and performance; the spare disk is then made available again as a global hot spare.

The RAID Manager supports global hot spares, which are disks that contain no data and act as a standby in case of a drive failure. Once a failed disk has been replaced, data is returned automatically to the original disk to preserve the original configuration and performance; the spare disk is then made available again as a global hot spare.

- The RAID Manager software allows the user to customize how data is cached.
- By enabling write caching, data can be written from the host to the controller's cache. This improves overall performance because the host considers the write operation complete once the data is written to cache. By default, write caching is enabled.
Fast writes to the data cache are enabled by default.
- The Recovery Guru in the RAID Manager GUI provides on-line instructions for easy restoration of failed components. The Recovery Guru provides step-by-step failure recovery instructions to simplify administration and minimize the possibility of error.



Just the Facts



Software Architecture



- Message/event logging is provided by default, and can be customized to meet customer needs.
- Parity checks are run automatically to verify that there are no parity errors. If any parity errors are found, the parity is automatically repaired and rewritten to disk.
- Simple network management protocol (SNMP) support is provided, enabling integration with network management tools such as Solstice Domain Manager™ (SunNet Manager™) and Sun Enterprise SyMON™ 2.0 software.

Other RAID Manager 6.1 Enhancements

- Added information to show how drives are mirrored in a logical representation. The RAID Manager 6.1.1 graphical user interface has been enhanced to show how drives are mirrored in a RAID 1 configuration.
- Frozen node names map LUNs to controllers even after a controller failover (check).
- User-defined module selection/removal assigns abstract names for each Sun StorEdge A1000 array module instead of using the device name (dev/ [r] RAID_Module_NN).

Default Configuration

The Sun StorEdge A1000 array comes preconfigured with a default LUN configurations, which may be reconfigured to match the customer's specific requirements.

	4-Drive Configuration	12-Drive Configuration
Default Configuration	1 x (3+1) = 4 (RAID 5)	2 x (5 + 1) = 12 (RAID 5)

Year 2000 Compliance

The Sun StorEdge A1000 array with RAID Manager 6.1.1 is year 2000 compliant.

Sun StorEdge A1000 and D1000 Arrays Software Requirements

- Solaris 2.5.1 Operating Environment (Hardware: 8/97) or above with the required operating system patches must be used to support the Sun StorEdge A1000 and D1000 arrays. Configurations with 18-GB, 10000-rpm, 1-inch or 36-GB, 10000-rpm, 1.6-inch disks are supported on the Solaris 2.6 Operating Environment or higher.
- Sun StorEdge RAID Manager 6.1.1 update 1 (Sun StorEdge A1000 array)

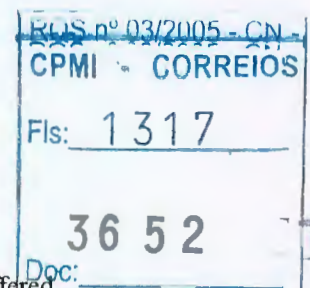
Other Supported Software

- VERITAS Volume Manager software, versions 2.4, 2.5, 2.5.x, and 2.6
- Solstice DiskSuite™ software version 4.1
- Sun Cluster 2.1, 2.2 software

VERITAS Volume Manager (VxVM) Software

VERITAS Volume Manager software (also known as Sun StorEdge Volume Manager™) is offered primarily for use with the Sun StorEdge D1000 array in order to support software-based RAID solutions. However, VERITAS Volume Manager software can be used as a shell with the Sun StorEdge A1000 array and RAID Manager software to enable the mirroring across storage units.

Software Architecture





VERITAS Volume Manager software supports RAID technology to optimize performance, availability, and user cost. This technology improves performance, reduces recovery time in the event of file system errors, and increases data availability even in the event of a disk failure. VERITAS Volume Manager software supports four RAID levels that provide varying degrees of availability with corresponding trade-offs in performance and cost:

- RAID 0 (striping and concatenation) enables data to span more than a single disk. While performance is improved, the lack of redundancy in this level leaves data unprotected.
- RAID 1 (mirroring) enables users to keep multiple copies of their data. In the event of a disk failure, data can be obtained from the remaining good copy, increasing data availability.
- RAID 0+1 (striping plus mirroring) provides the data protection of RAID 1 with the performance benefit of RAID 0.
- RAID 5 (striping with distributed parity) offers the ability to reconstruct data in the event of a single disk failure. Significantly less expensive than mirroring, RAID 5 is a common choice when low-cost availability is desired.

Disk Groups

In the event of a system failure, users need assurance that access to their data can be obtained quickly. Sun VERITAS Volume Manager software enables users to group disks and the volumes and file system that reside on them into disk groups. A disk group can be exported from a failed system and imported onto another system, providing users with access to the data.

On-line Resizing

File systems, and consequently the volumes on which they reside, change and grow over time. In the past, as file systems became full, administrators were required to take the file system offline, back up the data, create a larger file system and restore the data. With VERITAS Volume Manager software, volumes and their UNIX[®] file systems (UFS) can grow online, without disruption of user access. This capability increases data availability and eases administration.

On-line Backups

Backups are an essential part of any data management strategy yet pose problems in enterprises that run 24 hours a day, 7 days a week, for 365 days a year. The traditional technique of performing backups during scheduled downtimes may be unacceptable for many organizations and application environments.

VERITAS Volume Manager software supports online backups through the use of snapshots, read-only copies of the volume and/or file system. When a snapshot is created, write operations continue to modify the active volume or file system, enabling application access to continue without interruption.

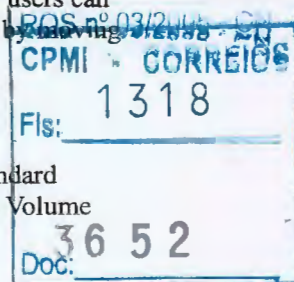
Performance Analysis Tools

VERITAS Volume Manager software includes performance analysis tools. The system can monitor the I/O load and obtain statistics on reads and writes at the disk and volume level. With this capability, users can monitor I/O performance and isolate bottlenecks. Once identified, bottlenecks can be removed by reorganizing data, resulting in improved performance.

VERITAS Volume Manager Software and the Sun StorEdge D1000 Array

When using the VERITAS Volume Manager software with the Sun StorEdge D1000 array, standard installation procedures should be followed. See the installation guide provided with VERITAS Volume Manager software.

Software Architecture





VERITAS Volume Manager Software and the Sun StorEdge A1000 Array and RAID Manager

The VERITAS Volume Manager software is supported with the Sun StorEdge A1000 array. However, certain caveats apply:

- **Installation**

Installation ordering is very sensitive. The Sun StorEdge A1000 array installation procedures must be followed exactly as documented in the Sun StorEdge A1000 product release notes, the Sun StorEdge A1000 system manual, and the Sun StorEdge RAID Manager manual.

- **Installation guide**

Deviation from the following sequence can and will cause incompatibility between Sun StorEdge A1000 array and VERITAS Volume Manager software.

VERITAS Volume Manager software should be installed only after the following steps have been completed:

1. Sun StorEdge A1000 array hardware is properly installed and connected to the host.
2. Sun StorEdge A1000 array software is properly installed.
3. Sun StorEdge A1000 array devices (LUNs) are properly configured using RAID Manager.
4. The host system is rebooted using the `-r` option. On reboot the RAID Manager must recognize the configured LUNs and create the appropriate device nodes.

It is also important to modify start-up scripts as necessary to ensure that Sun StorEdge A1000 array daemons are invoked prior to VERITAS Volume Manager software.

- **Device naming**

Sun StorEdge A1000 array device entries in `/etc/vfstab`, which will be encapsulated using Sun VERITAS Volume Manager software, must use the standard Solaris Operating Environment device names (e.g., `/dev/rdisk/c3t4d0s0`). Do not use the device names generated by the Sun StorEdge RAID Manager (e.g., `/dev/rRAID_module01/0s0`).

- **Boot volumes**

For information on utilizing the Sun StorEdge A1000 array as a boot device, contact your sales representative for information.

- **Configuration**

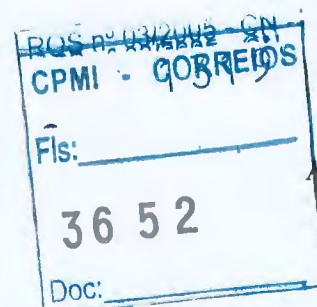
It is recommended that you do not build VERITAS Volume Manager software RAID 5 volumes from Sun StorEdge A1000 array devices, and in particular, that you do not build them from Sun StorEdge A1000 array RAID 5 LUNs.

RAID Implementation

Hardware versus Software-based RAID

In any RAID storage product, RAID functionality may be implemented in hardware (on the array controller, as with the Sun StorEdge A1000 array), or it may be implemented in software on the host (as is done in Sun StorEdge D1000 array configurations). Each method has its advantages:

Software Architecture





- In most configurations, controller-based RAID delivers higher performance than host-based RAID. For RAID 5, the system I/O bus traffic is lower because the controller does the parity calculations. This decreases host/array bus traffic and improves system I/O throughput. In the Sun StorEdge A1000 array, an intelligent cache controller does all the multistripe I/O and performs prefetch. The controller converts small sequential I/O into full-stripe I/O to even further improve RAID 5 performance. In host-based RAID systems, each read/write command requires multiple I/O requests to the disk, increasing bus traffic and impacting I/O performance for RAID 5.
- The primary advantage of host-based software RAID is flexibility. In this type of RAID implementation, software on the host system controls the RAID configuration, as well as management and redundant data synchronization operations. This provides a high degree of flexibility, allowing many different RAID levels to be configured, and even allows RAID groups to span multiple disk controllers. Host software RAID also enables configurations to be easily changed over time, as customers' needs change.

RAID Levels Supported

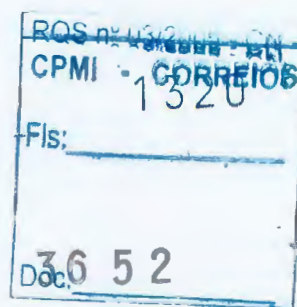
The Sun StorEdge A1000 and D1000 arrays are RAID subsystems that enables users to achieve the ideal balance of high data availability, performance, capacity, and cost.

RAID Level	Characteristics
RAID 0—Striping	• Spreads data across multiple-disk spindles for better performance • Can be tuned to optimize either random or sequential I/O performance • No redundant data protection, lower reliability than independent disks • Same low cost per usable megabyte as independent disks
RAID 1—Mirroring	• Maintains duplicate copies of data, so if a disk fails, data is available and applications keep running • Same performance as independent disks • Highest cost per usable megabyte
RAID 1+0—Mirroring and striping	• Combines performance of striping with data protection of mirroring • Duplicate copies of striped data remain available even if a disk fails • Same cost per usable megabyte as mirroring
RAID 3—Striping with parity on single disk	• Good for large sequential data transfers per I/O request, and low I/O request rates • When selecting RAID 3, the Sun StorEdge RAID Manager actually implements RAID 5, eliminating the typical RAID 3 bottleneck of parity information being written to a single disk
RAID 5—Striping with Parity	• Provides data protection by storing parity information on all disks in the LUN, so data can be reconstructed if a single disk fails; good for applications with high I/O request rates. • Stripes data across multiple-disk spindles to optimize random or sequential performance • Higher cost per megabyte than independent disks or RAID 0, but much lower than RAID 1 or 1+0 • Lower performance on small-sized writes than in RAID 0, 1, 1+0 or independent disks

Software Architecture

These RAID levels are implemented via a hardware controller in the Sun StorEdge A1000 array, and through host software in Sun StorEdge D1000 array configurations.

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High Availability with Sun StorEdge A1000 and D1000 Arrays RAID Implementations

Features

- Independent disks, plus RAID levels 0, 1, 1+0, 3, and 5 are all available at the same time within the same array
- RAID groups may span multiple arrays
- RAID levels 5, 1, and 1+0 yield predicted steady-state uptimes in excess of 99.99 percent per array and mean time between data loss (MTBDL) in the millions of hours
- Hot spares are automatically swapped in to replace any failed disk in a RAID 5, 1, or 1+0 group
- RAID stripe sizes are adjustable to optimize for random or sequential I/O patterns

Benefits

- Can easily match data layouts to meet users' specific requirements for capacity, performance, high availability, and cost
- Greater flexibility; allows creation of fully redundant configurations
- High availability, so customers can be confident that data will be available when needed and that it will not be lost
- Continuous redundant data protection even if a disk fails; maintenance can be deferred for days or weeks, if necessary
- Users can tune performance for their specific applications. See the *Sun StorEdge A3000 Performance Tuning and Configuration* white paper at <http://www.sun.com/storage/white-papers/a3000-tuning.html> for more details.

RAID Technical Facts

- Each array may have several hot-spare drives. If a drive in a RAID 5, 1, or 1+0 volume fails, a hot-spare drive is assigned and the Sun StorEdge RAID Manager (Sun StorEdge A1000 array) or VERITAS Volume Manager software (Sun StorEdge D1000 array) detects the failure and automatically rebuilds the data from the failed drive onto a hot-spare drive.
- Striped-data organizations (RAID 0, 1+0, 3, and 5) can be tuned to optimize for either random or sequential I/O performance.
- To optimize for random performance, the I/O load must be evenly balanced across the disk spindles. This is done by setting the stripe width as large or larger than the typical application I/O request. For example, if the typical I/O request is 8 KB, setting the stripe width to 64 KB might be appropriate. This tends to evenly distribute I/O requests across all the disk spindles in the LUN.
- Sequential performance is optimized when data is spread out so that each application I/O spans all the drives in the RAID group. This requires setting the stripe width so that it is small relative to the size of the typical I/O request. For example, in a RAID group with four data disks, if typical application I/O size is 8 KB to 16 KB, a stripe width of 2 KB may be best.

Software Architecture

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Performance Summary

- The Sun StorEdge™ A1000 array's highest bandwidth is 32 MB per second when performing sequential reads with a 320-KB I/O size.
- The Sun StorEdge D1000 array's highest bandwidth is 63 MB per second when performing sequential reads with a 128-KB I/O size.
- The Sun StorEdge A1000 array's highest I/O operations per second (IOPS) is over 2,300 with 2 KB when performing random reads.
- The Sun StorEdge D1000 array's highest IOPS is 919 KB when performing random reads.

RAID Benchmark Configuration

Benchmark testing on the Sun StorEdge A1000 and D1000 arrays was performed on a Sun Enterprise™ 4000 server running Solaris™ 2.5.1 Operating Environment. The server was configured with 512 MB of memory, two 167-MHz UltraSPARC™ processors, and two SBus host-bus adapters.

The Sun StorEdge A1000 array used for performance testing was configured with a single controller with 24 MB of NVRAM. RAID Manager 6.1 was used to configure the array subsystem.

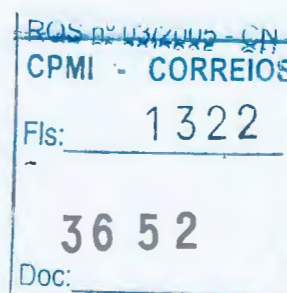
All tests were performed using the vxbench utility.

Test Results

Test Parameter	RAID 1+0		RAID 5		JBOD	
	Sun StorEdge A1000 Array		Sun StorEdge A1000 Array		Sun StorEdge D1000 Array	
Configuration	12 x 4.2-GB drives		12 x 4.2-GB drives		8 x 9-GB drives	
Workload	IOPS	MB/sec	IOPS	MB/sec	IOPS	MB/sec
Random read	749		> 2,300		919	
Random write	361		400		627	
Sequential read		31		32		> 62
Sequential write		26		25		60

System Management

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Standards and Conformance

Environmental Specifications

Temperature range (dry bulb)	
Operating	5 to 40 degrees C
Non-operating	-20 to 60 degrees C
Relative humidity	
Operating	20 percent to 80 percent RH @ 27 C, maximum wet bulb non-condensing
Non-operating	93 percent RH non-condensing
Altitude	
Operating and non-operating	30.5 m (100 ft.) below to 3,048m (10,000 ft.) above sea level
Heat dissipation (operating)	260 Watts, 1092 BTU per hour
Sound power and pressure (operating)	6.6 bels (power), 63.7 dBA (pressure)

Physical Specifications

Height	17.78 cm/7.0 in.	
Width (single rack)	53.34 cm/21.0 in.	
Depth (single rack)	44.7 cm/17.6 in.	
Weight		
A1000 array	Without disk drives	19.3 kg/42.5 lbs.
	Fully loaded	28.4 kg/62.5 lbs.
D1000 array	Without disk drives	18.6 kg/41.0 lbs.
	Fully loaded	27.4 kg/60.5 lbs.

Drive Tray Physical Specifications

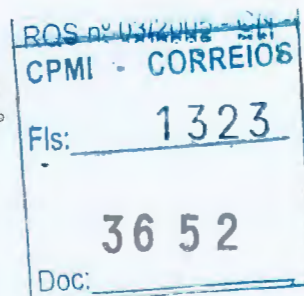
Height	175 mm / 6.9 in.
Width	445 mm / 17.5 in.
Depth	525 mm / 20.7 in.
Weight (2 power modules)	17.25 kg / 38 lb. without drives 26 kg / 57 lb. with drives

Drive Tray Electrical Specifications

Input voltage	100-240 VAC 50/60 Hz
Input current	24 amps
Power output	260 Watts
VA	~300 VA
Heat output	1092 BTU

System Management

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Sun StorEdge A1000 and D1000 Array Regulation

System Regulation	Specifications
Safety	• UL1950 • CSA C22 No.950 • EN60950 (TUV)
RFI/EMI	• VCCI Class 2 • FCC Part 15 Class B • CISPR 22 Class B
Immunity	• EN50082-1 • EMC Directive (89/336/EEC)
Product label	• FCC Class B • VCCI Class 2 • Industry Canada Class A • UL Mark • cUL Mark • TUV Mark • CE Mark

System Management

Just the Facts



ROS n° 03/2005 - CN -
CPMI - CORREIOS
Fls: 1324
36 52
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Ordering Information

Sun StorEdge™ A1000 and D1000 Array Systems

Order Number	Title and Description
SG-XARY144A-36G	36-GB Sun StorEdge A1000 array including four 9-GB, 10000-rpm, 1-inch UltraSCSI drives, two power supplies, battery module, two dual-fan modules, one controller card with 24-MB data cache; RAID Manager 6 software.
SG-XARY144A-109G	109-GB Sun StorEdge A1000 array including twelve 9-GB, 10000-rpm, 1-inch UltraSCSI drives, two power supplies, battery module, two dual-fan modules, one controller card with 24-MB data cache; RAID Manager 6 software.
SG-XARY146A-36G	36-GB Sun StorEdge A1000 array rackmount X-option including four 9-GB, 10000-rpm, 1-inch UltraSCSI drives, two power supplies, battery module, two dual-fan modules, one controller card with 24-MB data cache; RAID Manager 6 software. Available as R5 expansion rack.
SG-XARY151A-72G	72-GB Sun StorEdge A1000 array including four 18-GB, 10000-rpm, 1-inch UltraSCSI drives, two power supplies, battery module, two dual-fan modules, one controller card with 24-MB data cache; RAID Manager 6 software.
SG-XARY151A-218G	218-GB Sun StorEdge™ A1000 array including twelve 18-GB, 10000-rpm, 1-inch UltraSCSI drives, two power supplies, battery module, two dual-fan modules, one controller card with 24-MB data cache; RAID Manager 6 software.
SG-XARY152A-72G	72-GB Sun StorEdge A1000 array rackmount X-option including four 18-GB, 10000-rpm, 1-inch UltraSCSI drives, two power supplies, battery module, two dual-fan modules, one controller card with 24-MB data cache; RAID Manager 6 software. Available as R5 expansion rack.
SG-XARY161A-145G	145-GB Sun StorEdge A1000 array including four 36-GB, 10000-rpm, 1.6-inch UltraSCSI drives, two power supplies, battery module, two dual-fan modules, one controller card with 24-MB data cache, and RAID Manager 6 software.

Ordering Information

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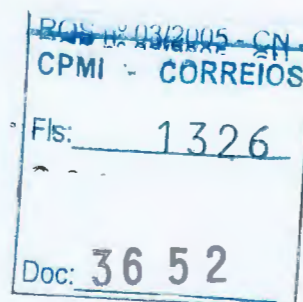
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Order Number	Title and Description
SG-XARY161A-291G	291-GB Sun StorEdge A1000 array including eight 36-GB, 10000-rpm, 1.6-inch UltraSCSI drives, two power supplies, battery module, two dual-fan modules, one controller card with 24-MB data cache, and RAID Manager 6 software.
SG-XARY162A-145G	145-GB Sun StorEdge A1000 array rackmount X-option including four 36-GB, 10000-rpm, 1.6-inch UltraSCSI drives, two power supplies, battery module, two dual-fan modules, one controller card with 24-MB data cache, and RAID Manager 6 software. Available as R5 expansion rack.
SG-XARY145A-36G	36-GB Sun StorEdge D1000 array including four 9-GB, 10000-rpm, 1-inch UltraSCSI drives, two power supplies, battery module, and two dual-fan modules.
SG-XARY145A-109G	109-GB Sun StorEdge D1000 array including twelve 9-GB, 10000-rpm, 1-inch UltraSCSI drives, two power supplies, battery module, and two dual-fan modules.
SG-XARY147A-36G	36-GB Sun StorEdge D1000 array rackmount X-option including four 9-GB, 10000-rpm, 1-inch UltraSCSI drives, two power supplies, two UltraSCSI host interface modules, and two dual-fan modules. Available as R4 or R5 expansion racks.
SG-XARY153A-72G	72-GB Sun StorEdge D1000 array including four 18-GB, 10000-rpm, 1-inch UltraSCSI drives, two power supplies, battery module, and two dual-fan modules.
SG-XARY153A-218G	218-GB Sun StorEdge D1000 array including twelve 18-GB, 10000-rpm, 1-inch UltraSCSI drives, two power supplies, battery module, and two dual-fan modules.
SG-XARY154A-72G	72-GB Sun StorEdge D1000 array rackmount X-option including four 18-GB, 10000-rpm, 1-inch UltraSCSI drives, two power supplies, two UltraSCSI host interface modules, and two dual-fan modules. Available as R4 or R5 expansion racks.
SG-XARY163A-145G	145-GB Sun StorEdge D1000 array including four 36-GB, 10000-rpm, 1.6-inch UltraSCSI drives, two power supplies, battery module, and two dual-fan modules.

Ordering Information

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**Order Number****Title and Description****SG-XARY163A-291G**

291-GB Sun StorEdge D1000 array including eight 36-GB, 10000-rpm, 1.6-inch UltraSCSI drives, two power supplies, battery module, and two dual-fan modules.

SG-XARY164A-145G

145-GB Sun StorEdge D1000 array rackmount X-option including four 36-GB, 10000-rpm, 1.6-inch UltraSCSI drives, two power supplies, battery module, and two dual-fan modules. Available as R4 or R5 expansion rack.

Ordering Information

Just the Facts



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CPMI	CORREIOS
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Options

Sun StorEdge A1000 and D1000 Array Options

Order Number	Option Description
X5235A ¹	9.1-GB, 10000-rpm, 1-inch UltraSCSI disk drive
X5238A ¹	18.2-GB, 10000-rpm, 1-inch UltraSCSI disk drive
X5233A ¹	18-GB, 7200-rpm, 1.6-inch UltraSCSI disk drive
X5240A ¹	36.4-GB, 10000-rpm, 1.6-inch UltraSCSI disk drive
X1065A	UDWIS/S SBus differential UltraSCSI host bus adapter
X6541A	UD2S PCI dual-port UltraSCSI host bus adapter
SG-XARY030A ²	Sun StorEdge empty rack ¹
X9653A	Sun StorEdge/Sunfire rackmount kit
X9606A	Tower stand kit
X7040A	64-MB add-on cache memory
X9818A	Front door assembly for 72-inch StorEdge rack
ARRAYNT-6221-B	Volume management software for Microsoft Windows NT hosts
¹ Remove the "X" to order factory installed into an R4 or R5 rackmount Sun StorEdge A1000 or D1000 array configuration	
² Remove the "X" to order with a minimum quantity of three Sun StorEdge A1000 or D1000 trays installed	

Sun StorEdge A1000 and D1000 Array Cables

Order Number	Option Description
X3830A	4-meter, 68-pin to UHDC Differential SCSI Cable
X3831A	10-meter, 68-pin to UHDC Differential SCSI Cable
X979A	12.0-meter UltraSCSI external cable

Ordering Information

Reg. n. 0012000-001
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Upgrades

Upgrade Paths

Sun-to-Sun and competitive upgrades to the Sun StorEdge™ A1000 and D1000 arrays provide excellent trade-in values for older SPARCstorage™ Array systems, desktop drive enclosure modules, and older drives; making it more cost-effective to migrate to the latest technology. See the ordering information below for available upgrade configurations.

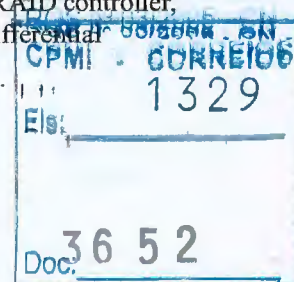
Upgrade Options

Order Number	Title and Description
UG-AX000-DISK-9G-2	Upgrade to internal 9.1-GB, 10000-rpm, 1-inch high, UltraSCSI expansion hard drive with barrier plate.
UG-AX000-DISK-18G	Upgrade to internal 18.2-GB, 10000-rpm, 1-inch high, UltraSCSI expansion hard drive with barrier plate.
UGFA-AX000-DISK-36G	Upgrade to internal 36.4-GB, 10000-rpm, 1.6-inch high, UltraSCSI expansion hard drive with barrier plate. Factory installed.
UG-D1000-36G-10K	Upgrade to 36-GB (4 x 9.1-GB, 10000-rpm disks) Sun StorEdge D1000 array tabletop or deskside system, one software RAID interface card, two power supplies, two fan trays (four fans), and four differential UltraSCSI-to-host-ports.
UG-D1000-36G-RK-2	Upgrade to 36-GB (4 x 9.1-GB, 10000-rpm disks) Sun StorEdge D1000 array for rackmounting in the Sun StorEdge or Sun Enterprise™ expansion racks, one software RAID interface card, two power supplies, two fan trays (four fans), and four differential UltraSCSI-to-host-ports.
UG-A1000-36G-10K	Upgrade to 36-GB (4 x 9.1-GB, 10000-rpm disks) Sun StorEdge A1000 array tabletop or deskside system, one hardware RAID controller, two power supplies, two fan trays (four fans), and two differential UltraSCSI-to-host-ports.
UG-A1000-109G-10K	Upgrade to 109-GB (12 x 9.1-GB, 10000-rpm disks) Sun StorEdge A1000 array tabletop or deskside system, one hardware RAID controller, two power supplies, two fan trays (four fans), and two differential UltraSCSI-to-host-ports.

Upgrades



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**Order Number****Title and Description****UG-A1000-36G-RK-2**

Upgrade to 36-GB (4 x 9.1-GB, 10000-rpm disks) Sun StorEdge A1000 array for rackmounting in the Sun StorEdge or Sun Enterprise expansion racks, one hardware RAID controller, two power supplies, two fan trays (four fans), and two differential UltraSCSI-to-host-ports.

UG-A1K-72G-18G10K

Upgrade to 72-GB (4 x 18.2-GB, 10000-rpm disks) Sun StorEdge A1000 array tabletop or deskside system, one hardware RAID controller, two power supplies, two fan trays (four fans), two differential UltraSCSI ports, and 24-MB standard cache.

UG-A1K-218G-18G10K

Upgrade to 218-GB (12 x 18.2-GB, 10000-rpm disks) Sun StorEdge A1000 array tabletop or deskside system, one hardware RAID controller, two power supplies, two fan trays (four fans), two differential UltraSCSI ports, and 24-MB standard cache.

UG-A1K-72G-18G-RK

Upgrade to 72-GB (4 x 18.2-GB, 10000-rpm disks) Sun StorEdge A1000 array for rackmounting in the Sun StorEdge or Sun Enterprise expansion racks, one hardware RAID controller, two power supplies, two fan trays (four fans), and two differential UltraSCSI ports.

UG-A1K-145G-36G10K

Upgrade to 145-GB (4 x 36-GB, 10000-rpm disks) Sun StorEdge A1000 array tabletop or deskside system, one hardware RAID controller, two power supplies, two fan trays (four fans), and four differential UltraSCSI ports, and 24-MB standard cache.

UG-A1K-291G-36G10K

Upgrade to 291-GB (8 x 36-GB, 10000-rpm disks) Sun StorEdge A1000 array tabletop or deskside system, one hardware RAID controller, two power supplies, two fan trays (four fans), and four differential UltraSCSI ports, and 24-MB standard cache.

UG-A1K-145G-RK

Upgrade to 145-GB (4 x 36-GB, 10000-rpm disks) Sun StorEdge A1000 array for rackmounting in Sun StorEdge or Sun Enterprise expansion racks, one hardware RAID controller, two power supplies, two fan trays (four fans), and four differential UltraSCSI-to-host ports.

UG-A1000-CONTBD

Upgrade to Sun StorEdge A1000 array controller. Customer returns Sun StorEdge D1000 array controller board.

UG-D1K-72G-18G10K

Upgrade to 72-GB (4 x 18.2-GB, 10000-rpm disks) Sun StorEdge D1000 array tabletop or deskside system, one interface card, two power supplies, two fan trays (four fans), and four differential UltraSCSI-to-host ports.

Upgrades

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**Order Number****Title and Description****UG-D1K-72G-18G-RK**

Upgrade to 72-GB (4 x 18.2-GB, 10000-rpm disks) Sun StorEdge D1000 array for rackmounting in the Sun StorEdge or Sun Enterprise expansion racks, one interface card, two power supplies, two fan trays (four fans), and four differential UltraSCSI ports.

UG-D1K-218G-18G10K

Upgrade to 218-GB (12 x 18.2-GB, 10000-rpm disks) Sun StorEdge D1000 array tabletop or deskside system, one interface card, two power supplies, two fan trays (four fans), and four differential UltraSCSI-to-host ports.

UG-D1K-145G-36G10K

Upgrade to 145-GB (4 x 36-GB, 10000-rpm disks) Sun StorEdge D1000 array tabletop or deskside system, one interface card, two power supplies, two fan trays (four fans), and four differential UltraSCSI-to-host ports.

UG-D1K-291G-36G10K

Upgrade to 291-GB (8 x 36-GB, 10000-rpm disks) Sun StorEdge D1000 array tabletop or deskside system, one interface card, two power supplies, two fan trays (four fans), and four differential UltraSCSI-to-host ports.

UG-D1K-145G-RK

Upgrade to 145-GB (4 x 36-GB, 10000-rpm disks) Sun StorEdge D1000 array for rackmounting in Sun StorEdge or Sun Enterprise expansion racks, one interface card, two power supplies, two fan trays (four fans), and four differential UltraSCSI-to-host ports.

Upgrades**Competitive Upgrade Ordering****Order Number****Title and Description****CU-A1K-72G-18G10K**

Competitive upgrade to 72-GB (4 x 18.2-GB, 10000-rpm disks) Sun StorEdge A1000 array tabletop or deskside system, one hardware RAID controller, two power supplies, two fan trays (four fans), two differential UltraSCSI ports, and 24-MB standard cache.

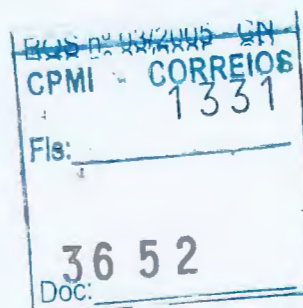
CU-A1K-218G-18G10K

Competitive upgrade to 218-GB (12 x 18.2-GB, 10000-rpm disks) Sun StorEdge A1000 array tabletop or deskside system, one hardware RAID controller, two power supplies, two fan trays (four fans), two differential UltraSCSI ports, and 24-MB standard cache.

CU-A1K-72G-18G-RK

Competitive upgrade to 72-GB (4 x 18.2-GB, 10000-rpm disks) Sun StorEdge A1000 array for rackmounting in the Sun StorEdge or Sun Enterprise expansion racks, one interface card, two power supplies, two fan trays (four fans), and two differential UltraSCSI ports.

Just the Facts



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**Order Number****Title and Description****CU-A1K-145G-36G10K**

Competitive upgrade to 145-GB (4 x 36-GB, 10000-rpm disks) Sun StorEdge A1000 array tabletop or deskside system, one hardware RAID controller, two fan trays (four fans), four differential UltraSCSI-to-host ports, and 24-MB standard cache.

CU-A1K-291G-36G10K

Competitive upgrade to 291-GB (8 x 36-GB, 10000-rpm disks) Sun StorEdge A1000 array tabletop or deskside system, one hardware RAID controller, two power supplies, two fan trays (four fans), four differential UltraSCSI-to-host ports, and 24-MB standard cache.

CU-A1K-145G-RK

Competitive upgrade to 145-GB (4 x 36-GB, 10000-rpm disks) Sun StorEdge A1000 array for rackmounting in Sun StorEdge or Sun Enterprise expansion racks, one hardware RAID controller, two power supplies, two fan trays (four fans), and four differential UltraSCSI-to-host ports.

CU-D1K-72G-18G10K

Competitive upgrade to 72-GB (4 x 18.2-GB, 10000-rpm disks) Sun StorEdge D1000 array tabletop or deskside system, one interface card, two power supplies, two fan trays (four fans), and four differential UltraSCSI-to-host ports.

CU-D1K-218G-18G10K

Competitive upgrade to 218-GB (12 x 18.2-GB, 10000-rpm disks) Sun StorEdge D1000 array tabletop or deskside system, one interface card, two power supplies, two fan trays (four fans), and four differential UltraSCSI-to-host ports.

CU-D1K-72G-18G-RK

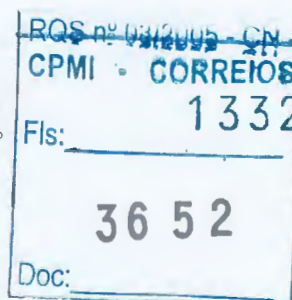
Competitive upgrade to 72-GB (4 x 18.2-GB, 10000-rpm disks) Sun StorEdge A1000 array for rackmounting in the Sun StorEdge or Sun Enterprise expansion racks, one interface card, two power supplies, two fan trays (four fans), and four differential UltraSCSI ports.

CU-D1K-145G-36G10K

Competitive upgrade to 145-GB (4 x 36-GB, 10000-rpm disks) Sun StorEdge D1000 array tabletop or deskside system, one interface card, two power supplies, two fan trays (four fans), and four differential UltraSCSI-to-host ports.

Upgrades

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**Order Number****Title and Description****CU-D1K-291G-36G10K**

Competitive upgrade to 291-GB (8 x 36-GB, 10000-rpm disks) Sun StorEdge D1000 array tabletop or desktide system, one interface card, two power supplies, two fan trays (four fans), and four differential UltraSCSI-to-host ports.

CU-D1K-145G-RK

Competitive upgrade to 145-GB (4 x 36-GB, 10000-rpm disks) Sun StorEdge D1000 array for rackmounting in Sun StorEdge or Sun Enterprise expansion racks, one interface card, two power supplies, two fan trays (four fans), and four differential UltraSCSI-to-host ports.

Upgrades

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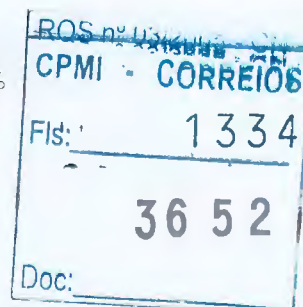
Service and Support

The SunSpectrumSM 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 SolarisTM Operating Environment software, and telephone support for SunTM 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 EnterpriseTM Services representatives for program and feature availability in their areas.

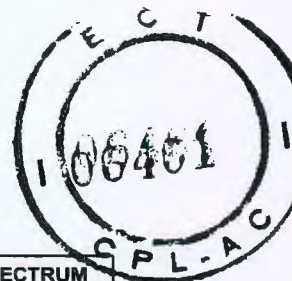
FEATURE	SUNSPECTRUM PLATINUM SM Mission-critical Support	SUNSPECTRUM GOLD SM Business-critical Support	SUNSPECTRUM SILVER SM Systems Support	SUNSPECTRUM BRONZE SM Self Support
Systems Features				
Systems approach coverage	Yes	Yes	Yes	Yes
System availability guarantee	Customized	No	No	No
Account Support Features				
Service account management team	Yes	No	No	No
Local customer support management	No	Yes	No	No
Personal technical account support	Yes	Yes	Option	No
SunStart TM installation service	Yes	No	No	No
Account support plan	Yes	Yes	No	No
Software release planning	Yes	No	No	No
On-site account reviews	Monthly	Semiannual	No	No
Skills assessment	Yes	No	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	Option
7-day/24-hour on-site coverage	Yes	Option	Option	N/A
7-day/12-hour on-site coverage	No	Option	No	No
5-day/24-hour on-site coverage	No	Option	No	No

Service and Support

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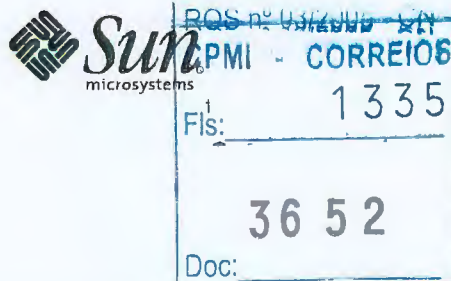
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FEATURE	SUNSPECTRUM PLATINUM SM Mission-critical Support	SUNSPECTRUM GOLD SM Business-critical Support	SUNSPECTRUM SILVER SM Systems Support	SUNSPECTRUM BRONZE SM Self Support
Coverage / Response Time (cont.)				
Customer-defined priority setting	Yes	Yes	Yes	Option
• 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
2-hour on-site response	Yes	Option	Option	N/A
Additional contacts	Option	Option	Option	Option
Premier Support Features				
Mission-critical support team	Yes	For urgent problems	No	No
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
Hardware Support Delivery				
Replacement hardware parts	On-site technician	On-site technician	On-site technician	Courier
Two day parts delivery	N/A	N/A	N/A	Yes
Overnight parts delivery	N/A	N/A	N/A	Option
Same-day parts delivery	Yes	Yes	Yes	Option
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

Service and Support

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Warranty

The warranty on the array hardware is two years. In addition, the Sun StorEdge A1000 and D1000 arrays carry a one year on-site warranty. Software warranty is 90 days.

Education

- Support Readiness Training
- IQ Kit Sales Guide
- IQ Kit Tech Guide
- SunU

Professional Services

Sun StorEdge ArrayStart™ Service

The Sun StorEdge ArrayStart™ service provides an installation and custom-configuration service that quickly gets mission-critical data-center applications up and running. For one fixed fee, this service includes consultation for determining the configuration that best meets the customer's needs, installation of the hardware and RAID management software, and configuration to the appropriate RAID profile determined during the consultation.

Solstice DiskSuite™ to VERITAS Volume Manager Software Data Migration

A Sun Professional Service consultant will deliver four days of onsite consulting services to assist customers who wish to migrate their mission-critical data from existing storage system to a new array. This service will help customers complete the transition with minimal downtime and without risking loss of their valuable data. Specially trained Sun consultants will use their extensive data-migration expertise to complete the service in the most cost- and time-effective manner available. Sun consultants will also fully integrate and optimize the Sun StorEdge A1000 and D1000 arrays into the customer's computing environment.

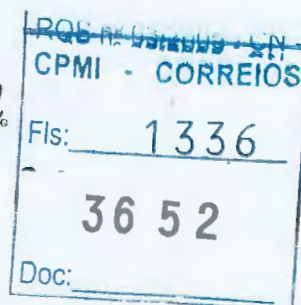
If desired, customers can choose tasks from the following list to customize the service to meet their specific business needs:

- Design and configuration planning
- Capacity planning
- Performance tuning and optimization

Travel and expenses incur an additional charge for delivery requiring more than 50 miles of travel. When this service is desired by the customer, the account manager will contact the SunPS™ Data and Storage Management Competency Practice to schedule delivery of the service.

Service and Support

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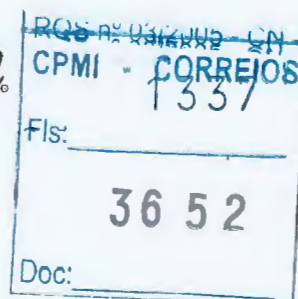
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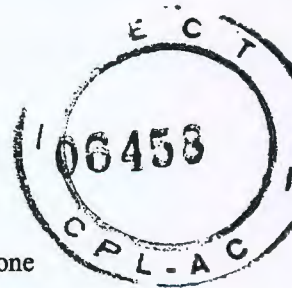


Glossary

Active termination, regulated	Terminates the SCSI bus with a series of resistors tied to +5 volts. The terminator is labeled Regulated but is often referred to as an Active Terminator.
Bandwidth	A measure of the capacity of a communication channel, usually specified in MB per second.
CLI	Command line interface.
Data cache	24 MB to 80 MB of cache memory for fast writes to cache and read-ahead cache operations. Cache memory permits intermediate storage of read and write data without physically reading/writing to the disk, increasing overall performance.
Device name	Software device address that identifies the controller/LUN, such as cXtYdZs0, where X is the host bus adapter, Y is the controller, and Z is the LUN. s0 slice number is used by the system, not by RAID Manager.
Disk array	A subsystem that contains multiple disk drives, designed to provide performance, high availability, serviceability, or other benefits.
Drive group	A physical set of drives in the RAID module. Drive groups are defined during configuration.
Fast write	Allows disk write commands to be safely acknowledged to the host before the data is actually written to the disk media. This can be enabled/disabled through RAID Manager.
Fast/wide SCSI	Data transfer rate of 20 MB/sec. Wide devices can be connected to a standard SCSI interface but the extra data lines need to be terminated.
Full-duplex	Data transmission in both directions at the same time. See also Half-duplex and Simplex.
GB	Gigabyte. A disk GB is 1 billion (1,000,000,000) bytes. A memory GB is 1,073,741,824 bytes (2 to the 30th power).
GUI	Graphical user interface. The Sun StorEdge™ RAID Manager provides a powerful, easy-to-use GUI.

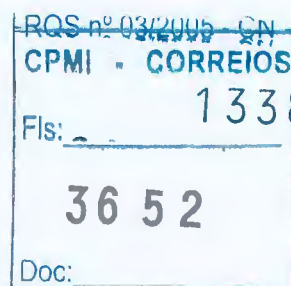
Glossary





Half-duplex	Refers to an interface, such as SCSI, that can transmit data in only one direction at a time. See also Full-duplex and Simplex.
Host adapter	A card that connects a peripheral device to the computer system's I/O bus.
Hot plug	The ability to remove, replace, or add a device while current I/O processes continue.
Hot spare	A drive in an array that is held in reserve to replace any other drive that fails. After a reconstruction, the hot-spare drive is returned to the standby status.
Hot swap	A specific case of hot plug which involves replacing a device with another of the same size, type, and layout, without any notification to the operating environment.
IOPS	Input/output operations per second. A measure of I/O performance, this is usually used to quote random I/O performance. See throughput.
LUN	Logical unit number. A LUN is a set of physical drives in a RAID configuration which are seen by the operating system as one virtual drive.
MTBF	Mean time between failures. A measure of reliability, this is the average expected time between failures of equipment, usually measured in operating hours.
MTBDL	Mean time between data loss. In a RAID system, this is the average expected time between two rapid disk failures that would cause irreparable data loss.
Parity	Additional information stored along with the data that allows the controller to reconstruct lost data on RAID 3 or 5 LUNs if a single drive fails.
Reconstruction	Process used to restore a degraded RAID 1, 3, or 5 LUN to its original state after replacing a single failed drive.
RDAC	Redundant disk array controller. The RDAC driver is included in the RAID Manager software, and manages the rerouting of active I/O operations when a controller fails.
RAID	Redundant array of independent disks. A RAID is a set of disk drives that appears to be a single logical disk drive to an application such as a database or file system. Different RAID levels provide different capacity, performance, high availability, and cost characteristics.
RAID module	A set of drives, controllers, power supplies and cooling.
RAS	Reliability, availability, and serviceability. Features that enhance these attributes, including hot-pluggable capability and redundancy, are important for keeping mission-critical applications and data on-line.
RAID Manager	The software that allows the customer to configure and manage the Sun StorEdge A1000 array.

Glossary





SCA	Single connector attachment. A SCSI disk connector technology invented by Sun Microsystems. The SCA provides all SCSI, power, and control signals in a single connector, and enables easy servicing and highly reliable, pluggable disk drives.
SCSI address	The octal representation of the unique address (0-7) assigned to a narrow device; or hex representation of the unique address (0-15) assigned to a wide SCSI device.
Simplex	Transmission in one preassigned direction only. See also Full-duplex and Half-duplex.
SNMP	Simple network management protocol. SNMP enables RAID events to be remotely monitored by designated network management stations.
Striping	Spreading, or interleaving, logically contiguous blocks of data across multiple independent disk spindles. The amount of data written on each disk before moving to the next drive is the stripe width.
TB	Terabyte. A disk terabyte is 1 trillion (1,000,000,000,000) bytes. A memory terabyte is 1,099,511,627,776 bytes (2 to the 40th power).
Throughput	A measure of sequential I/O performance, quoted in MB/sec. See IOPS.
Volume	In VERITAS Volume Manager software, a volume is a virtual disk partition into which a file system, DBMS, or other application can place data. A volume can physically be a single disk partition or multiple disk partitions on one or more physical disk drives. Applications that use volumes do not need to be aware of their underlying physical structure. The VERITAS Volume Manager software handles mapping of virtual partition addresses to physical addresses.
Warm plug	The ability to remove, replace or add a device while power is still applied but all I/O processes are suspended.
UltraSCSI	Data transfer rate of 40 MB per second per channel.
XOR	eXclusive OR. A binary mathematical operation performed on data to produce parity information. In RAID levels 3 and 5, parity is generated from the user data, stored, and used to regenerate lost data if a drive failure occurs.



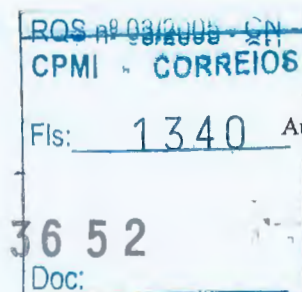
Materials Abstract

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

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Powerpack				
– <i>Sun StorEdge™ A1000/D1000 Storage Arrays Just the Facts</i>	Reference Guide for the <i>Sun StorEdge A1000/D1000 Storage Arrays (this document)</i>	Sales Tool	SunWIN, Reseller Web	97468
– <i>Sun StorEdge A1000/D1000 Customer Presentation</i>	Customer Presentation and Slide Notes	Sales Tool	SunWIN, Reseller Web	76742
References				
– <i>Sun Product Intro: Sun StorEdge A1000/D1000 Workgroup Storage Arrays, 2/24/98</i>	Introduction E-mail	Sales Tool	SunWIN, Reseller Web	80987 80988
– <i>Sun Product Intro: Sun StorEdge A1000 and Sun StorEdge D1000 Arrays, 4/28/98</i>	Introduction E-mail	Sales Tool	SunWIN, Reseller Web	85159
– <i>Sun Product Intro: Sun StorEdge A1000 and D1000 Disk Arrays Support 9-GB and 18-GB Drives, 5/19/98</i>	Introduction E-mail	Sales Tool	SunWIN, Reseller Web	87112
– <i>Sun Product Intro: Sun StorEdge Expansion Rack and Drive Trays for Sun StorEdge A1000/D1000, 5/19/98</i>	Introduction E-mail	Sales Tool	SunWIN, Reseller Web	87065
– <i>Sun Product Intro: Sun StorEdge A1000, D1000, and A3500 Products and Repricing, 11/10/98</i>	Introduction E-mail	Sales Tool	SunWIN, Reseller Web	95418
Product Literature				
– <i>Sun StorEdge A1000 Data Sheet</i>	Two-page Color Data Sheet	Sales Tool	SunWIN, Reseller Web, COMAC	75836 DE807-2
– <i>Sun StorEdge Product Overview Quick Reference Card</i>	Sun Product Quick Reference Card	Sales Tool	SunWIN, First Resort, Reseller Web	73691
– <i>Pocket Guide</i>		Sales Tool	SunWIN, Reseller Web, COMAC	88967 SE608-0
External Web Site				
– <i>Sun StorEdge A1000/D1000 Array Information Site</i>	http://www.sun.com/storage/A1000			

Materials Abstract

Just the Facts





Sun StorEdge™ MultiPack, FlexiPack, and UniPack Systems

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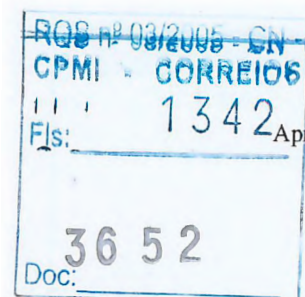
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Positioning

Introduction

As the cost of magnetic media continues to drop, the amount of on-line data grows at accelerating rates. Existing and emerging applications such as databases, imaging, and multimedia are demanding ever-increasing capacity and performance from storage products. The Sun StorEdge™ MultiPack, Sun StorEdge FlexiPack, and Sun StorEdge UniPack systems are desktop storage systems that complement the Sun storage product line and bring a host of competitive features to the desktop.

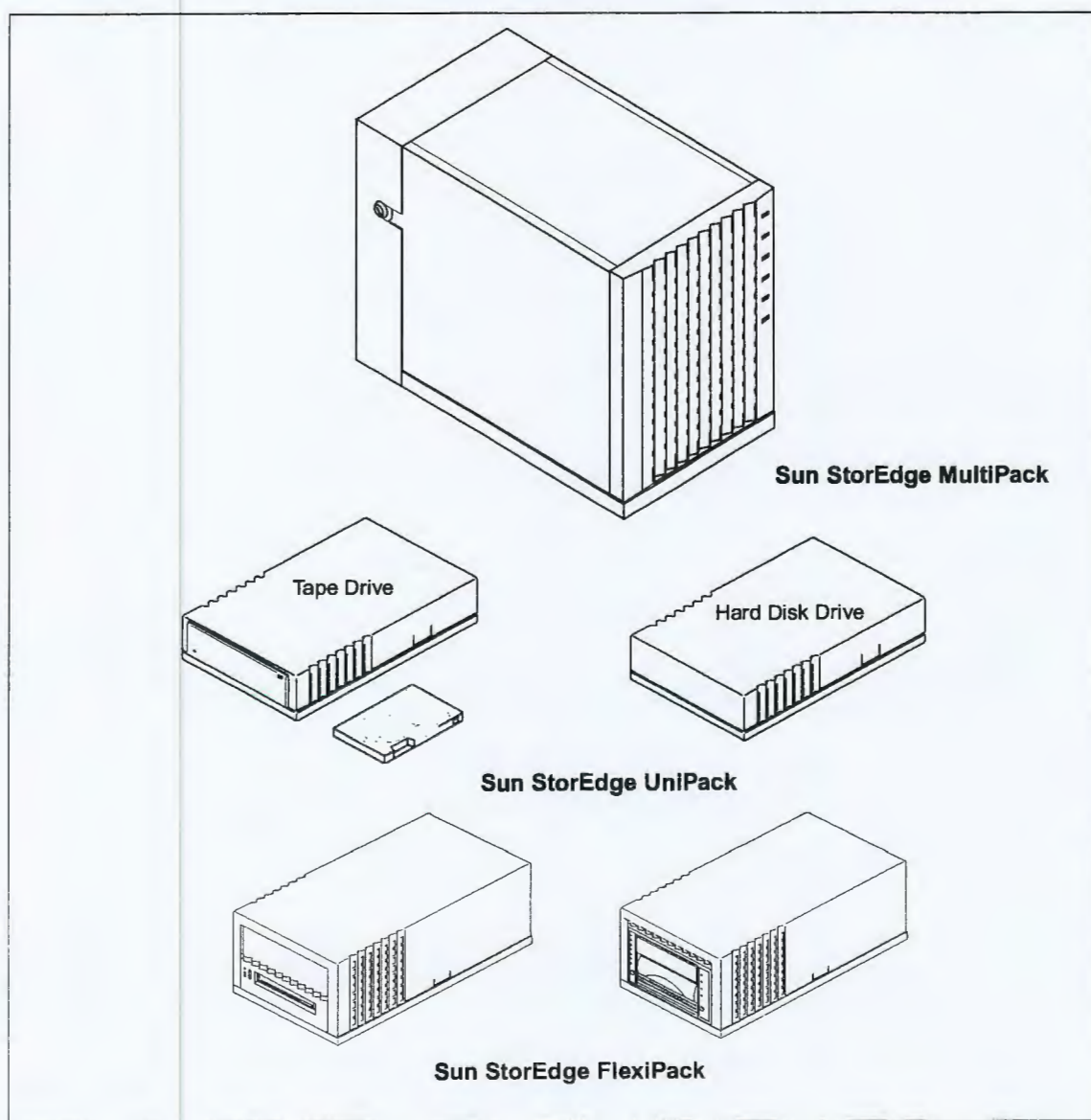


Figure 1. Sun StorEdge desktop storage enclosures



Sun StorEdge MultiPack

The Sun StorEdge MultiPack storage system accommodates six single-connector attachment (SCA) UltraSCSI drives. The individual drives can have either a 1.0-inch or 1.6-inch high form factor. The Sun StorEdge MultiPack system replaces the older 12-drive SPARCstorage™ MultiPack system and provides UltraSCSI functionality.

The Sun StorEdge MultiPack system complements Sun's mass-storage product line and brings competitive features to the desktop. Geographical SCSI addressing simplifies SCSI ID selection. Hot-pluggable drives using the SCA-2 connector give customers high reliability and ease-of-use. The signature packaging complements the Sun StorEdge UniPack system, desktop workstations, and servers.

The Sun StorEdge MultiPack system is configured with two, four, or six 1-inch high, 9.1-, 18.2-, or 36.4-GB, 10000-rpm UltraSCSI drives. Additional X-option drives may be ordered to customize the Sun StorEdge MultiPack system to meet users' needs.

Key Messages

- Maximum 216 GB of storage capacity
- Multiple UltraSCSI-capable drives in a single desktop enclosure
- Low cost/MB
- Good price/IOPS (input/output operations per second) option
- Hot-swappable drives with multiple active spindles
- Geographical addressing
- Easily serviced and expanded

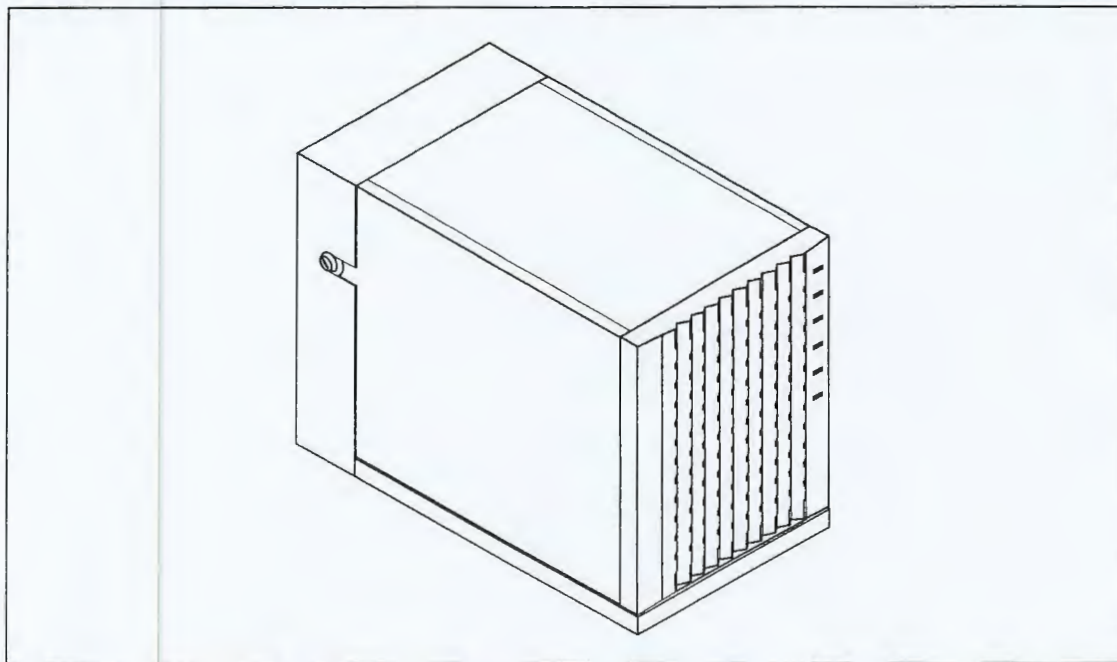


Figure 2. Sun StorEdge MultiPack storage system

Positioning

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Availability

The Sun StorEdge MultiPack storage system began shipping February 1998.

Target Users

- Customers needing large-capacity add-on storage and high performance on the desktop
- Customers requiring additional desktop storage
- Customers in the growing database, imaging, and multimedia markets

Key Features and Benefits

Features

- Maximum 216-GB capacity
- UltraSCSI
- Price/performance
- Hot-plug-ready drives
- Single-connector drives
- Geographical SCSI addressing
- Key-locking door
- 10000-rpm disks

Benefits

- Easy modular growth for desktop servers and power-user workstations
- 16-bit data bus provides users with up to 40 MB/second burst transfer rates
- Sustained transfer rates of over 15.2 MB/second
- Good IOPS/dollar
- Low cost/MB
- Multiple active spindles, overlapped seeks, and optimum SCSI-bus bandwidth provide excellent performance
- On-line, user-serviceable drives make it easy to configure and service
- Offers better reliability with fewer internal cables and connections
- Simplifies address selection
- Deters inadvertent removal of devices and protects user's data
- Improves I/O performance by approximately 25 percent as compared to 7200-rpm disks of similar capacities

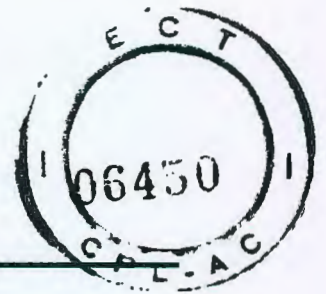
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Sun StorEdge FlexiPack

Sun StorEdge FlexiPack storage system is a desktop device enclosure that accommodates either one full-height or two half-height removable-media devices. Sun StorEdge FlexiPack desktop storage products offer external storage and backup solutions for Sun's workstations and servers.

Key Messages

- Accommodates 5.25-inch half-height or full-height devices with industry-standard bezels
- Can configure different tape drives within the same unit
- Can accommodate both fast SCSI and fast/wide SCSI devices in the same unit
- Narrow footprint
- Easy to open and service
- Acoustically engineered
- Available with the following devices:
 - Sun StorEdge DLT 7000 or Sun StorEdge DLT 4000
 - 72-GB to 144-GB, 4-mm DDS-3 autoloader
 - 20-GB to 40-GB, 8-mm tape drive
 - 7-GB to 14-GB, 8-mm tape drive

The Sun StorEdge FlexiPack system complements the storage product line and brings competitive features to the desktop. While it was designed with the intention of holding full-height devices like DLT drives, its incredible flexibility enables the user to have multiple configurations which could include multiple half-height tape drives, tape drive, or a 4-mm DDS-3 autoloader. Users now have the ability to store up to 144 GB on the desktop. The signature packaging complements Sun StorEdge MultiPack and UniPack storage system, desktop workstations, and servers.

Positioning

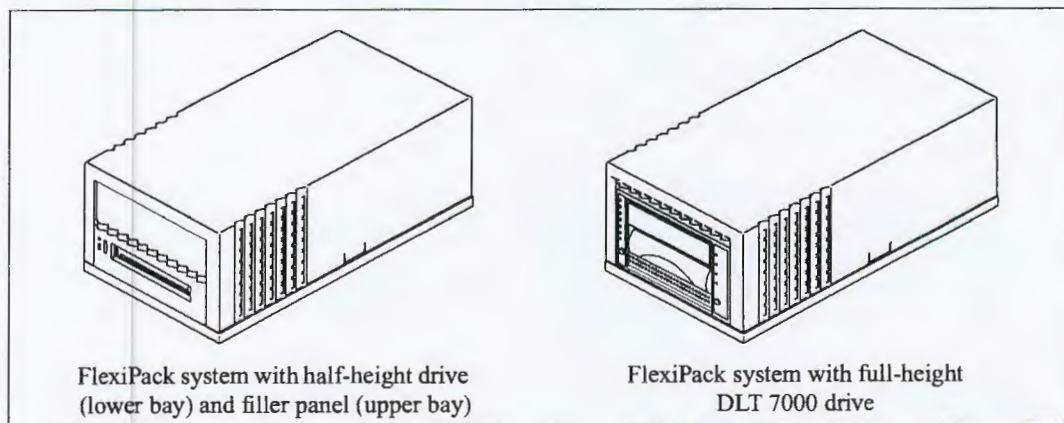
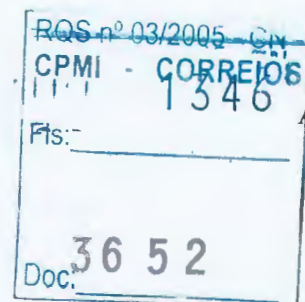


Figure 3. Sun StorEdge FlexiPack storage system

Just the Facts





Availability

The Sun StorEdge FlexiPack storage system configurations with the Sun StorEdge DLT 7000 autoloader, Sun StorEdge DLT 4000 autoloader, and the 72-GB to 144-GB, 4-mm DDS-3 autoloader became available in February 1998.

Target Users

External devices provide additional desktop storage with fast/wide SCSI performance, doubling the throughput of typical fast SCSI devices. The digital world is driving up storage capacity requirements because image and graphics data files are typically very large. The higher capacity and flexibility of the Sun StorEdge FlexiPack system enables significant desktop and desktide backup/archive ability. The fast/wide devices support burst transfer rates of 20 MB/second and data rates up to 10 MB/second per device, depending on how well the data can be compressed.

Desktop backup solutions have made advances in capacity and performance. Unattended backups of up to 144 GB (compressed capacity if the data can be compressed 2:1) are now possible using the DDS-3 autoloader with six cartridges in the Sun StorEdge FlexiPack system. The 8-mm tape drives and DLT drives are higher end solutions for the desktop and can also serve desktop and workgroup servers because of their performance and capacity.

Key Features and Benefits

Features

- Configuration flexibility
- Fast/wide SCSI capable
- Narrow footprint
- Easy-to-open enclosure
- Acoustically engineered

Benefits

- Can configure one full-height drive in a Sun StorEdge FlexiPack system or multiple options of different half-height tape drives to meet users' needs
- Can accommodate fast/wide and fast/narrow devices within the same enclosure
- Provides 20 MB/second burst rates, twice that of the fast/narrow enclosures, making it ideal for transferring large sequential files
- Saves desktop space (same width as the Sun StorEdge UniPack storage system)
- Saves service time
- Easily serviced by customer
- Makes the office quieter when fan operation is not necessary

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Sun StorEdge UniPack

Sun StorEdge UniPack desktop storage products offer external storage and backup solutions for Sun's workstations and servers. These products are easily connected to a workstation or server through the built-in SCSI host adapter port or through a SCSI/SBus adapter.

Key Messages

- UltraSCSI (hard disk versions) or fast/wide SCSI (for tape) capable
- Narrower footprint
- Easy to open and service
- Single-connector attachment (SCA) disks
- Acoustically engineered
- Available with the following devices
 - 9.1-GB UltraSCSI, 10000-rpm hard disk
 - 18.2-GB UltraSCSI, 10000-rpm hard disk
 - 36.4-GB UltraSCSI, 10000-rpm hard disk
 - 4-GB to 8-GB (compressed), SLR tape drive
 - 12-GB to 24-GB (compressed) 4-mm DDS-3 tape drive
 - 20-GB to 40-GB (compressed), 4-mm DDS-4 tape drive
 - 7-GB to 14-GB (compressed), 8-mm tape drive
 - 20-GB to 40-GB (compressed), 8-mm tape drive

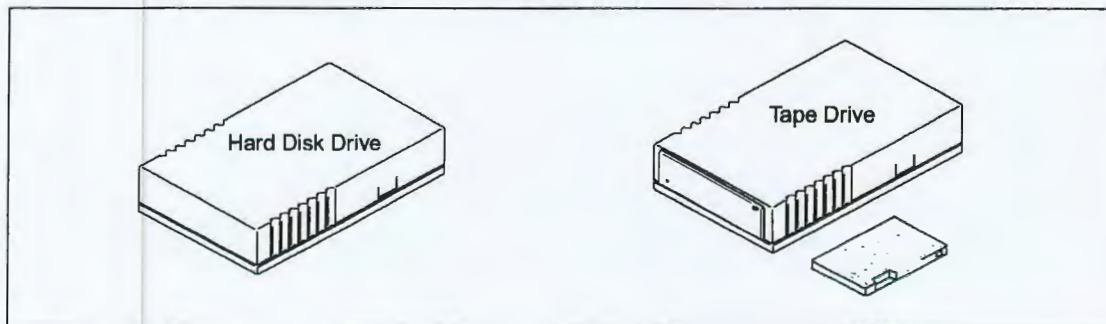


Figure 4. Sun StorEdge UniPack desktop storage products

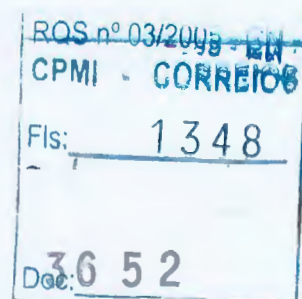
Availability

The Sun StorEdge UniPack storage system began shipping in February 1998.

Target Users

External disks provide additional on-line storage with increased performance for NFS™ software, multimedia, database, and Internet applications. Image and graphics data files are typically very large, driving up disk-capacity requirements in the ever-expanding digital world. The higher performance of the Sun StorEdge UniPack system improves application performance because there is more data movement

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and processing. The UltraSCSI disks support burst transfer rates of 40 MB/second and data rates averaging 15.2 MB/second per disk. It is possible to scale the storage performance on a bus using the new, higher performance UltraSCSI drives to a sustained transfer rate of over 15.2 MB/second with multiple spindles.

Desktop backup solutions have made advances in capacity and performance. Unattended backups of up to 40 GB (compressed) are now possible. The 20-GB to 40-GB, 4-mm tape drives continue to be a popular backup solution for the desktop. The 7-GB to 14-GB and 20-GB to 40-GB, 8-mm tape drive is a high-end solution for the desktop, offering greater performance and capacity.

Key Features and Benefits

Features

- UltraSCSI-capable disks
- Narrower footprint
- Single-connector disks
- Easy-to-open enclosure
- Acoustically engineered

Benefits

- Provides 40 MB/second burst rates, twice that of the fast/wide enclosures, making it ideal for transferring large sequential files
- Saves desktop space
- Makes it easy to replace disks; one connection for power, interface and SCSI ID
- Improves system reliability; fewer internal cables used
- Saves service time
- Makes the office quieter when fan operation is not necessary

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Enabling Technology

Hot-plug Capability

Key Innovation: Single-connector Drive

Sun Microsystems co-invented a type of drive-connector scheme called the single-connector attachment (SCA). In the SCA design, all electrical signals for SCSI interface, power, and jumpers are passed through one small connector, which is integrated directly onto the disk drive's printed circuit board. The drive plugs directly into the Sun StorEdge™ MultiPack system backplane with no cables or jumpers to set. This design improves reliability and serviceability.

The second-generation version of this connector, called the SCA-2, includes hot-plug features. The drive is grounded before signal pins make contact through the use of hot-plug pins. The drives also reserve two pins to carry signals that indicate whether all pins have successfully connected. The single-connector design has been made available to the disk industry's Small Form Factor Committee and is produced by multiple disk-drive manufacturers (spec SFF8046).

Many disk subsystems offer hot-plug disks. Unfortunately, they are inherently unreliable and cumbersome. To be pluggable, a standard disk drive is enclosed in a metal or plastic canister. Internal connections use multiple flex cables, jumpers, and other wires—parts that increase the likelihood of failures. These pluggable-drive schemes cause a disk subsystem to be *less* reliable.

Therefore, SCA-2 gives Sun customers many benefits, the most important being higher reliability. Using SCA-2 provides other valuable advantages:

- SCA-2 is one of the keys to the higher storage density of the Sun StorEdge MultiPack system
- SCA-2 costs less than other drive-carrier schemes
- SCA-2 is more customer-serviceable

With other pluggable-drive schemes, removing the failed drive from the carrier and replacing it with a new drive is tedious and fraught with risks and potential mistakes.

Hot Plug Defined

Annex A of the SCSI-3 Parallel Interface (SPI) document draft proposal (X3T10/855D revision 15a *Removal and insertion of SCSI devices*) outlines four cases of plugging devices:

- Case 1: Power-off during removal or insertion
- Case 2: RST signal asserted continuously during removal or insertion
- Case 3: Current I/O processes not allowed during insertion or removal
- Case 4: Current I/O processes allowed during insertion or removal

Hot Plug in the Sun Environment

The Sun StorEdge MultiPack system conforms to all SCSI-3 SPI specifications for Case 4 at the disk-interface level. Activity on the SCSI bus can continue without interruption while a device is being removed or inserted. However, drives should not be pulled out randomly. The Sun StorEdge MultiPack storage system design is intended to allow users to replace failed drives in redundant (mirrored or RAID) configurations. If there is activity against a drive, users need to stop the activity before removing the drive.



This can be done without bringing down the operating system or powering down the Sun StorEdge MultiPack storage system. The *Installation Supplement* of the *SPARCstorage MultiPack Product Note* contains detailed information for removing, replacing, and adding drives.

Hardware Considerations

The Sun StorEdge MultiPack storage system fully supports hot-plugging. The SCA-2 drive connector eliminates the use of internal drive cables and allows for hot-plugging drives. Sun has done extensive electrical evaluation of the hot-plug operation to prove that there is no signal or power disturbance during hot-plug. However, Sun cannot guarantee that hot-plugging will never result in the corruption or loss of data any more than Sun can guarantee that any SCSI bus will never experience a double-bit error (which would be undetectable with parity detection). In mission-critical data areas, it is still recommended that a user suspend all operations over the SCSI bus during hot-plug.

Software Considerations

When supported by high-availability software solutions (such as VERITAS Volume Manager or Solstice DiskSuite™ software) the disk drives are hot-pluggable. Without the protection of a RAID implementation, outstanding data requests to a removed device may not complete. The *SPARCstorage MultiPack Product Note* has detailed information for various scenarios, including instructions for removing, replacing, and adding drives.

Configuration Considerations

The Sun StorEdge MultiPack system uses geographic addressing, which means that devices inserted into the enclosure assume the SCSI ID of the slot occupied. For example, if a device is removed from the ID 4 slot and replaced by a new drive, the new drive ID is 4.

Hot Plug in the Solaris™ Operating Environment

Several levels of device plugging are defined in the Solaris™ Operating Environment. The operations required to support these features are listed below.

Hot Reconfiguration	Tasks
Adding disk drive to increase capacity	• Quiesce the SCSI bus into which the drive will be inserted • Select a slot for the new disk drive • Add the disk drive • Configure the Solaris Operating Environment to recognize the drive • Configure the application to recognize the drive
Replacing a failed disk drive while the system is running	• Identify the failed drive at the system level • Detach the drive from the application using it • Map the device to a physical drive and determine its physical location • Quiesce and spin down the drive • Remove the drive • Insert the replacement drive • Configure the replacement drive to be similar to the failed drive at the system level • Reattach the replacement drive to the application • Rebuild the data on the new drive if possible



Hot Reconfiguration	Tasks
Removing a disk drive from a system that no longer needs it	• Identify the drive to be removed • Detach the drive from any applications that are using it • Map the device to a physical drive and determine its location • Quiesce and spin down the drive • Remove the drive • Reconfigure the Solaris Operating Environment to recognize that the drive is no longer available

Enabling Technology

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System Architecture

Sun StorEdge™ MultiPack Technology Overview

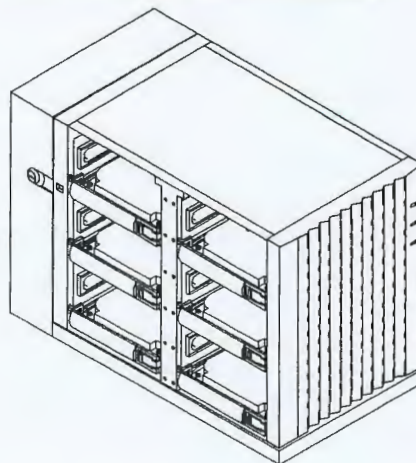
The Sun StorEdge™ MultiPack storage system drive enclosure uses 3.5-inch form factor, and UltraSCSI SCA-2 disk drives. The maximum number of disks per enclosure is six one-inch or 1.6-inch high drives.

For UltraSCSI functionality, the host or host adapter connected to the Sun StorEdge MultiPack unit must be capable of UltraSCSI speeds. A Sun StorEdge MultiPack system enclosure can be connected to a host adapter capable of fast/wide or narrow SCSI, but in such a case the Sun StorEdge MultiPack unit performs at the lower speed.

Geographical Addressing

Each drive bay in the Sun StorEdge MultiPack storage system is preassigned a SCSI ID to eliminate the chance of setting duplicate IDs. This feature also eliminates using external ID switches, minimizes the risk of breaking internal cables, and increases the reliability of the drive enclosure.

The Sun StorEdge MultiPack storage system has two sets of pre-selected SCSI IDs. The user can choose to use IDs 1, 2, 3, 4, 5, and 6 or IDs 9, 10, 11, 12, 13, and 14. A switch allows customers to select IDs 1–6 or IDs 9–14, allowing daisy-chaining of Sun StorEdge MultiPack systems on a fast/wide SCSI bus.



Address ID switch in the 1–6 position:

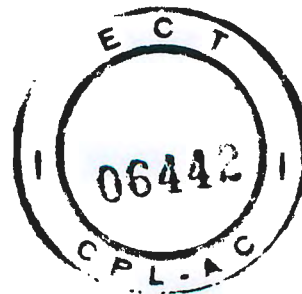
SCSI ID 1	SCSI ID 4
SCSI ID 2	SCSI ID 5
SCSI ID 3	SCSI ID 6

Address ID switch in the 9–14 position:

SCSI ID 9	SCSI ID 12
SCSI ID 10	SCSI ID 13
SCSI ID 11	SCSI ID 14

Figure 5. Sun StorEdge MultiPack system enclosure

System Architecture



Power Supply

The 180-Watt auto-ranging power supply.

Easy to Open and Service

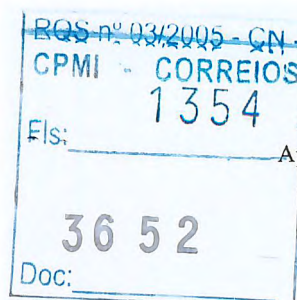
The Sun StorEdge MultiPack system is designed with a key-locking door that gives users quick access to the drive bays while protecting valuable data from inadvertent removal. Engaging the lock is not required to keep the door shut.

Single-connector Attachment (SCA) Disks

All disk drives use the single-connector attachment (SCA) interface. The SCA interface eliminates the need for internal cables, improving reliability and serviceability. The tape drives continue to use the standard three-cable/connector interface.

System Architecture

Just the Facts





Sun StorEdge FlexiPack System Architecture

Sun StorEdge FlexiPack Technology Overview

The Sun StorEdge FlexiPack storage device enclosure is designed for either one full-height or two half-height removable-media devices.

Highly Configurable

Designed to hold any two half-height devices, users can configure numerous options within a Sun StorEdge FlexiPack system, including different assortments of tape drives. In addition, if the user prefers, a full-height device such as the Sun StorEdge DLT 7000 tape drive or DDS-3 autoloader can be placed in the Sun StorEdge FlexiPack storage system.

Fast/wide SCSI Capable

The Sun StorEdge FlexiPack device is designed for 20 MB/second fast/wide SCSI-2 tape drives with two 68-pin SCSI P-type connectors. However, both *fast/wide* and *fast* SCSI-2 modes are supported even within the same enclosure. The drive connections are all made internally, and then the Sun StorEdge FlexiPack system has a 68-pin (fast/wide) SCSI connection out the back of the enclosure.

Auto SCSI Termination

Auto-termination eliminates the need for external terminators. Circuitry in the enclosure automatically terminates an 8-bit or 16-bit SCSI bus if the Sun StorEdge FlexiPack unit is the last device on the bus. It also *split-terminates* in the middle of the bus and adapts to the change from a 16-bit to an 8-bit bus.

Narrow Footprint

The width of the Sun StorEdge FlexiPack storage system is the same as the Sun StorEdge UniPack storage system. The narrow width allows for more effective use of desktop space. The dimensions are 190 mm (7.48 inches) wide, 392 mm (15.43 inches) deep, and 134 mm (5.28 inches) high.

Easy to Open and Service

The Sun StorEdge FlexiPack storage system opens easily once the lock block on the rear is removed. The enclosure lid is removed by depressing the two latches on either side and lifting up. Removable media devices are mounted on a metal sled that makes them very easy to slide out.

Acoustically Engineered

Fan speed control circuitry helps make the office environment quieter while providing drive reliability in hotter environments.

System Architecture

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Technical Facts

Below are product features of the Sun StorEdge FlexiPack drive and removable subsystems.

Tape Drive Options	DLT 7000	DLT 4000	7-14 GB, 8 mm	20-40 GB, 8 mm	4-mm DDS-3 Autoloader
Formatted capacity (uncompressed)	<u>35 GB</u>	20 GB	7 GB	20 GB	72 GB
Formatted capacity (compressed ¹)	70 GB @ 2:1	40 GB @ 2:1	14 GB @ 2:1	40 GB @ 2:1	144 GB @ 2:1
Tape speed	100+ ips	100+ ips	0.872 ips	0.43 ips	0.41 ips
Burst data rate (max.)	12 MB/sec. (asynch) 20 MB/sec. (synch)	10 MB/sec.	3 MB/sec.	7 MB/sec. (asynch) 20 MB/sec. (synch/native)	3 MB/sec. (asynch) 10 MB/sec. (synch)
Transfer rate (uncompressed)	<u>5 MB/sec.</u>	1.5 MB/sec.	500 KB/sec.	3 MB/sec.	1 MB/sec.
Transfer rate (compressed ¹)	10 MB/sec.	3 MB/sec.	1 MB/sec.	6 MB/sec.	2 MB/sec.
Buffer	—	—	256 KB	4 MB	2 MB

¹ Actual compression ratio achieved is dependent on data type and applications; therefore, each customer's results may vary.

System Architecture

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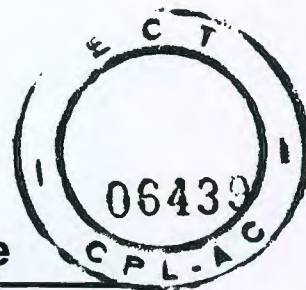
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Sun StorEdge UniPack System Architecture

Sun StorEdge UniPack Technology Overview

The Sun StorEdge UniPack single-device enclosure is designed for either UltraSCSI SCA-2 disk drives with a 3.5-inch form factor, or fast/wide SCSI removable devices.

UltraSCSI Capable

The disk Sun StorEdge UniPack storage system is designed for UltraSCSI applications. It has two 68-pin SCSI P-type host connectors. However, fast/wide and fast SCSI-2 modes are also supported. The tape drive Sun StorEdge UniPack system is designed for fast SCSI-2 applications only.

Auto SCSI Termination

Auto-termination eliminates the need for external terminators. Circuitry in the enclosure automatically terminates an 8-bit or 16-bit SCSI bus if the Sun StorEdge UniPack unit is the last device on the bus. It also split-terminates in the middle of the bus and adapts to the change from a 16-bit bus to an 8-bit bus.

Narrower Footprint

The footprint is smaller than the desktop storage pack. The narrower width allows for more effective use of desktop space. The dimensions are 190 mm (7.5 inches) wide, 310 mm (12.2 inches) deep, and 70 mm (2.8 inches) high.

Easy to Open and Service

The Sun StorEdge UniPack storage system opens easily once the lock block on the rear is removed. The enclosure lid is removed by depressing the two latches on either side and lifting up. Disk and tape drives are mounted on a metal sled that makes them very easy to slide out.

Single-Connector Attachment (SCA) Disks

All disk drives use the single-connector attachment (SCA) interface currently used in the Ultra™ 2, Ultra 30, and Ultra 60 systems, as well as Sun Enterprise™ 2, 250, 450, 3000, 4000, 3500, and 4500 servers and Sun StorEdge A1000, D1000, and A3500 array subsystems. The SCA interface eliminates the need for internal cables, improving reliability and serviceability. The tape drives continue to use the standard three-cable/connector interface.

Acoustically Engineered

Fan speed control circuitry helps make the office environment quieter while providing drive reliability in hotter environments.

System Architecture

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Technical Facts

Below are product features of the Sun StorEdge UniPack drive and removable subsystems.

Disk Drives	9.1 GB	18.2 GB	36.4 GB
Average seek read	7.5 ms	8.0 ms	8.0 ms
Average seek write	8.3 ms	9.0 ms	9.0 ms
Average latency	3.0 ms	3.0 ms	3.0 ms
Interface data transfer rate	40 MB/sec.	40 MB/sec.	40 MB/sec.
HDA data transfer rate	12.5 MB/sec.	12.5 MB/sec.	12.5 MB/sec.
Rotational speed	10,000 rpm	10,000 rpm	10,000 rpm
Buffer	512 KB	512 KB	512 KB

Tape Drive	4-mm DDS-3	4-mm DDS-4	20-40 GB, 8 mm	7-14 GB, 8 mm
Formatted capacity (uncompressed)	12 GB	20 GB	20 GB	7 GB
Formatted capacity (compressed ¹)	24 GB @ 2:1	40 GB @ 2:1	40 GB @ 2:1	14 GB @ 2:1
Tape speed	0.41 ips	0.41 ips	0.43 ips	0.872 ips
Burst data rate (max.)	10 MB/sec. (synch) 3 MB/sec. (asynch)	40 MB/sec. (synch) 6 MB/sec. (asynch)	10 MB/sec. (synch) 7 MB/sec. (asynch)	5 MB/sec.
Transfer rate (uncompressed)	1 MB/sec.	3 MB/sec.	3 MB/sec.	500 KB/sec.
Transfer rate (compressed ¹)	2 MB/sec.	6 MB/sec.	6 MB/sec.	1 MB/sec.
Buffer	2 MB	8 MB	4 MB	1 MB

¹ Actual compression ratio achieved is dependent on data type and applications; therefore, each customer's results may vary.

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Specifications

Physical Specifications

Specification	Sun StorEdge MultiPack		Sun StorEdge FlexiPack		Sun StorEdge UniPack	
	U.S.	Metric	U.S.	Metric	U.S.	Metric
Height	8.86 in.	225 mm	5.28 in.	134 mm	3.8 in.	70 mm
Width	7.48 in.	190 mm	7.48 in.	190 mm	7.5 in.	190 mm
Depth	15.55 in.	395 mm	15.43 in.	392 mm	12.2 in.	310 mm
Weight (enclosure)	24.0 lb.	10.9 kg	—	—	5.0 lb.	2.3 kg
Weight (9.1-GB drives)	24.0 lb. 1.6 lb. per drive (6)	10.9 kg 0.7 kg per drive (6)	—	—	1.6 lb. (device alone)	0.7 kg (device alone)
Weight (18.2-GB drives)	28.2 lb. 2.3 lb. per drive (6)	12.8 kg 1.0 kg per drive (6)	—	—	2.6 lb. (device alone)	1.2 kg (device alone)
Weight (DLT 7000)	—	—	15 lb. 5 oz.	6.7 kg	—	—
Weight (DLT 4000)	—	—	14 lb. 12 oz.	6.4 kg	—	—
Weight (DDS-3 autoloader)	—	—	14 lb. 3 oz.	6.2 kg	—	—
Weight (DDS-4 tape drive)	—	—	11 lb. 8 oz.	5.0 kg	2.2 lb. (device alone)	1.0 kg (device alone)
Weight (7- to 14-GB, 8-mm tape drive)	—	—	11 lb. 11 oz.	5.1 kg	2.6 lb. (device alone)	1.2 kg (device alone)
Weight (20- to 40-GB, 8-mm tape drive)	—	—	11 lb. 14 oz.	5.2 kg	3.0 lb. (device alone)	1.36 kg (device alone)

Specifications

Electrical Specifications

Specification	Sun StorEdge MultiPack	Sun StorEdge FlexiPack	Sun StorEdge UniPack
Input voltage	100-240 VAC	100-240 VAC	100-240 VAC
Maximum input current	3.0 A	0.6 A	0.6 A
Maximum input VA	300 VA	60 VA at 100 VAC, 82 VA at 240 VAC	60 VA at 100 VAC, 82 VA at 240 VAC
Maximum input power	265 Watts	36.5 Watts	36.5 Watts
Maximum heat output	900 BTU/hour	125 BTU/hour	125 BTU/hour

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Environmental Specifications

Specification	Sun StorEdge MultiPack	Sun StorEdge FlexiPack and Sun StorEdge UniPack
AC power	100 to 240 VAC, 47 to 63 Hz	100 to 240 VAC, 47 to 63 Hz
Operating range	5 to 40°C (41 to 104°F), 20 to 80% RH, max. wet bulb 27%	- Disk drive (UniPack only): 5 to 40°C (41 to 104°F), 10 to 90% RH, max. wet bulb 26% - Removable devices (UniPack): 5 to 35°C (41 to 95°F), 20 to 80% RH, max. wet bulb 26% - Removable devices (FlexiPack): 10 to 35°C (50 to 95°F), 20 to 80% RH, 27°C max. wet bulb
Non-operating range	-40 to 60°C (-40 to 140°F), 93% max. RH, noncondensing	- Disk drive (UniPack): -30 to 65°C (-22 to 149°F), 95% max. RH, noncondensing - Removable devices (UniPack): -30 to 60°C (-22 to 140°F), 95% max. RH, noncondensing - Removable devices (FlexiPack): -30 to 60°C (-22 to 140°F), 90% RH, noncondensing
Operating acoustic noise	6.2 bels (at 23°C) for 4 and 18 GB 6.9 bels (at 23°C) for 9 GB	- Disk drive: max. 6.0 bels (at 23°C) - Removable devices (UniPack): max. 5.8 bels (at 23°C) - Removable devices (FlexiPack): max. 5.3 bels
Idling acoustic noise	5.3 bels (at 23°C) for all disks	- Disk drive: max. 5.3 bels (at 23°C) - Removable devices (UniPack): max. 4.7 bels (at 23°C) - Removable devices (FlexiPack): max. 4.6 bels
Operating altitude	0 to 3 km (0 to 10,000 ft.)	0 to 3 km (0 to 10,000 ft.)
Non-operating altitude	0 to 12 km (0 to 40,000 ft.)	0 to 12 km (0 to 40,000 ft.)

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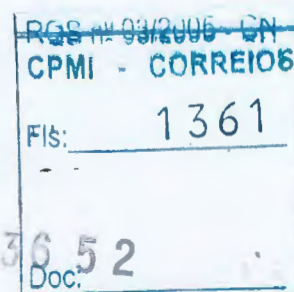
Regulations

The Sun StorEdge MultiPack, FlexiPack and UniPack storage systems each pass the following specifications:

Category	Sun StorEdge MultiPack, UniPack, and FlexiPack
Safety	UL 1950; CSA-C22.2 No.950-M89 EN 60950 CB-Scheme with Nordic Deviations; Low Voltage Directive (73/23/EEC)
RFI/EMI	47 CFR Part 15, Subpart J C108.8-M1983 VCCI Requirements EN 55022; EN 60555-2 EMC Directive (89/336/EEC)
Immunity	EMC Directive (89/336/EEC) IEC 801-2, -3, -4, -5 EN 55082-1
Product label	UL, ULc, GS (TUV) FCC Class B Canadian Class B VCCI Class 2, CE

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Sun StorEdge™ System Support

The Sun StorEdge™ storage subsystems are supported on the systems shown in the table below. The Sun StorEdge FlexiPack storage system is supported on the platforms that support each specific drive used in the Sun StorEdge FlexiPack storage system. However, in general, the drives typically used with the Sun StorEdge FlexiPack system are listed here.

Sun StorEdge MultiPack	Sun StorEdge UniPack	Sun StorEdge FlexiPack
Netra™ t 1120 server	Netra t 1120 server	Netra t 1120 server
Netra t 1125 server	Netra t 1125 server	Netra t 1125 server
Ultra™ 2 workstation	Ultra 2 workstation	Ultra 2 workstation
Ultra 5 ¹ workstation	Ultra 5 ¹ workstation	Ultra 5 ¹ workstation
Ultra 10 ¹ workstation	Ultra 10 ¹ workstation	Ultra 10 ¹ workstation
Ultra 60 workstation	Ultra 60 workstation	Ultra 60 workstation
Sun Enterprise™ 2 server	Sun Enterprise 2 server	Sun Enterprise 2 server
Sun Enterprise 250 server	Sun Enterprise 250 server	Sun Enterprise 250 server
Sun Enterprise 450 server	Sun Enterprise 450 server	Sun Enterprise 450 server
Sun Enterprise 3000 / 4000 servers	Sun Enterprise 3000 / 4000 servers	Sun Enterprise 3000 / 4000 servers
Sun Enterprise 3500 / 4500 servers	Sun Enterprise 3500 / 4500 servers	
	Sun Enterprise 10000 ² server	

¹ A SunSwift™ PCI host adapter is required.
² Sun StorEdge UniPack systems (one or more) are available as internal (in-cabinet boot disk drive), factory configured or X-options for the Sun Enterprise 10000 server.

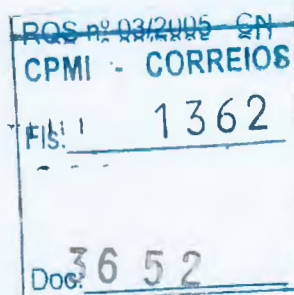
Additionally, Sun StorEdge FlexiPack storage system configurations for the Sun StorEdge DLT 7000 autoloader, and 20-GB to 40-GB, 8-mm tape drives are supported on the Sun Enterprise 5500, 6500, and 10000 servers.

SCSI ID Conflict

The Sun StorEdge MultiPack system has fixed SCSI IDs. Therefore, if additional external devices are daisy-chained with a Sun StorEdge MultiPack system on the same SCSI bus, a SCSI ID conflict can result.

SCSI ID	Device Assigned to SCSI ID
SCSI ID 0	First internal disk on an embedded SCSI interface of Sun Ultra 1 and later platforms is assigned to ID 0
SCSI ID 1	Second internal disk on all platforms is usually assigned to ID 1 if there is a second internal disk installed
SCSI ID 3	First internal disk on SPARCstation™ and Ultra 1 platforms is usually assigned to ID 3
SCSI ID 4	Tape drive is usually assigned ID 4
SCSI ID 6	CD-ROM devices are usually assigned ID 6
SCSI ID 7	The initiator (SCSI host adapter) is always address 7 for narrow and wide interfaces
No SCSI ID reserved	No address IDs are reserved for any of the SBus/PCibus SCSI option cards

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Sun StorEdge MultiPack Under Solaris™ 2.x Operating Environment

The Sun StorEdge MultiPack is supported on Solaris™ 2.5.1 Operating Environment and later releases. In order to address SCSI ID 8 and above, a wide on-board host or host bus adapter (such as the SunSwift PCI or US2S) is required.

Sun StorEdge FlexiPack Software Requirements

Sun StorEdge FlexiPack Drive	Solaris 1.x Operating Environment Support	Solaris 2.x Operating Environment Support
7-GB to 14-GB, 8-mm tape drive	Solaris 1.1.1 (SunOS™ 4.1.3) and later releases	Solaris 2.3 and later releases
4-mm DDS-3 tape drive 4-mm DDS-3 autoloader SLR tape drive	Solaris 1.1.2 and later releases	Solaris 2.4 and later releases
Sun StorEdge DLT 4000 tape drive	N/A	Solaris 2.4 and later releases
20-GB to 40-GB, 8-mm tape drive Sun StorEdge DLT 7000 tape drive	N/A	Solaris 2.5 and later releases

All Sun StorEdge FlexiPack configurations are supported by most of the leading data management software packages such as Solstice Backup™ software.

Please reference applicable documents (for example, *Just The Facts*, *Product Brief*, customer presentations, and so on) associated with the specific devices you are using in the Sun StorEdge FlexiPack storage system in order to get more detailed information on software requirements for a particular device. These associated documents are available in SunWIN.

Sun StorEdge UniPack Software Requirements

The 9.1-, 18.2-, and 36.4-GB Sun StorEdge UniPack storage systems are supported on Solaris 2.5.1 Operating Environment and later releases.

The 7-GB to 14-GB, 8-mm tape is supported on Solaris 1.1.1 Operating Environment (SunOS 4.1.3) and later releases, and on Solaris 2.3 Operating Environment and later releases. The 4-mm DDS-3 tape and 4-GB SLR tape drives are supported on Solaris Operating Environment versions 1.1.2 and 2.4 and later releases. The 20-GB to 40-GB 8-mm tape is supported on Solaris 2.5 Operating Environment and later releases.

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Sun StorEdge MultiPack System Configuration

Sun StorEdge MultiPack, FlexiPack, and UniPack System Configuration Guidelines

The daisy-chain configuration rules depend on whether the user installs the Sun StorEdge MultiPack, FlexiPack, or UniPack storage device, which workstation or server platform host is used, and which host bus adapter is used.

Wide SCSI and UltraSCSI support up to 15 target devices, whereas narrow SCSI supports up to seven target devices. In all cases, the total length of the SCSI bus must be taken into account when daisy-chaining multiple devices on a bus. The maximum allowable accumulated bus length is six meters. However, in order to operate reliably, the following maximum daisy-chain configurations must not be exceeded.

External Subsystem Daisy-Chain Configurations	UltraSCSI Onboard Host or Host Bus Adapter	UltraSPARC™ Fast/Wide Onboard Hosts	Fast/Wide Host Bus Adapter (SWIS/S, SunSwift)	Fast/Narrow Onboard Hosts	Fast/Narrow Host Bus Adapter
MultiPack	1 MultiPack only	1 MultiPack + 1 UniPack	2 MultiPack + 1 UniPack	1 MultiPack + 1 UniPack ¹	1 MultiPack + 1 UniPack ¹
9.1-, 18.2-, or 36.4-GB 10000-rpm UniPack	4 ²	4	4	4	4
Tape UniPack	—	4 ³	4 ³	4 ³	4 ³
Tape FlexiPack	—	4 ³	4 ³	4 ³	4 ³

¹ A maximum of seven devices are allowed on a SCSI bus (including internal devices).

² Mixing with tape devices will result in loss of UltraSCSI performance.

³ When mixing disk and tape devices on a SCSI chain, a maximum of only two tape devices are allowed.

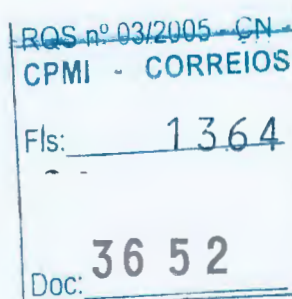
Available Sun StorEdge MultiPack SCSI IDs

Depending on how systems are configured, specific SCSI IDs pre-selected in the Sun StorEdge MultiPack system may not be used. SCSI ID 0 and 1 may be assigned to installed internal hard drives in Ultra 1 and later systems. SCSI ID 1 and 3 may be assigned to installed internal hard drives in SPARCstation and Ultra 1 systems. SCSI ID 4 and 6 may already be assigned to a CD-ROM or tape drive.

Sun StorEdge MultiPack	Enclosure SCSI ID	Host SCSI ID	SCSI IDs Remaining
One MultiPack	1, 2, 3, 4, 5, 6 or 9, 10, 11, 12, 13, 14	7	0, 8, 9, 10, 11, 12, 13, 14, 15 or 0, 1, 2, 3, 4, 5, 6, 8, 15
Two daisy-chained MultiPacks	1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 13, 14	7	0, 8, 15

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Sun StorEdge MultiPack SCSI

For UltraSCSI functionality, the user needs one of the following host adapters:

- UltraSCSI onboard host adapter
- US2S host bus adapter
- SunSwift PCI host bus adapter

For fast/wide SCSI functionality, the user needs one of the following host adapters:

- Wide onboard host adapter
- SWIS/S host bus adapter
- SunSwift host bus adapter

The Sun StorEdge MultiPack is supported on the following SCSI host adapters as well as on all onboard host adapters on currently shipping workstation and server platforms.

Host Adapters	Sun StorEdge MultiPack 9.1, 18.2, or 36.4 GB
Onboard fast/narrow HA	✓ Address switch to 1-6
Onboard fast/wide HA	✓ Address switch to 1-6 or 9-14
Onboard UltraSCSI HA	✓ Address switch to 1-6 or 9-14
SBus fast SCSI-2/buffered Ethernet (FSBE/S)	✓ Address switch to 1-6
SBus single-ended, fast/wide, intelligent SCSI-2 (SWIS/S)	✓ Address switch to 1-6 or 9-14
Single-ended, fast/wide SCSI-2, 10/100 Mbps Ethernet (SunSwift/SBus)	✓ Address switch to 1-6 or 9-14
PCI UltraSCSI host adapter (SunSwift/PCI)	✓ Address switch 1-6 or 9-14
PCI UltraSCSI dual channel host adapter (US2S)	✓ Address switch 1-6 or 9-14

Requirements and Configuration

Sun StorEdge MultiPack SCSI Host Adapters Support

The Sun StorEdge MultiPack products are supported on the following SCSI host adapters, as well as on all onboard host adapters on currently shipping workstation and server platforms:

- For fast/wide SCSI functionality, the SWIS/S or Sunswift host adapter is required. The 2.5-GB QIC, 4-mm tape, and 8-mm tape are supported on the SWIS/S card with the Solaris 2.5 Operating Environment, but still run in narrow mode.
- For UltraSCSI functionality, the SunSwift PCI or US2S host adapter is required.

Sun StorEdge MultiPack Cabling

All Sun StorEdge MultiPack products must be ordered with a separate 68-to-68-pin or 50-to-68-pin SCSI cable and power cord kit. Cabling guidelines are as follows:

68-to-68-pin Cable Connection

The 68-to-68-pin SCSI cable kit with power cord (X3856A) allows connections to other Sun StorEdge MultiPack systems, to a fast/wide host adapter (SWIS/S or SunSwift), or to an UltraSCSI host adapter (SunSwift PCI or US2S). Always connect the fast/wide or UltraSCSI devices *first* when using a 68-pin host adapter. When cabling fast/narrow devices on a wide bus, the 50-pin devices should be cabled last and need to be actively terminated.

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50-to-68-pin Cable Connection

The 50-to-68-pin SCSI cable kit with power cord (X3857A) allows connections to 50-pin onboard host adapters offered on older desktop products such as any SPARCstation model, Ultra 1 Model 170 or the older 50-pin storage enclosures.

Sun StorEdge MultiPack System on an UltraSCSI Onboard Host or Host Bus Adapter

One Sun StorEdge MultiPack six-drive enclosure can be connected to a single UltraSCSI bus. Select SCSI ID addresses 9-14. For UltraSCSI operation, do not use the external terminator. The on-board auto-terminator functions in the UltraSCSI mode.

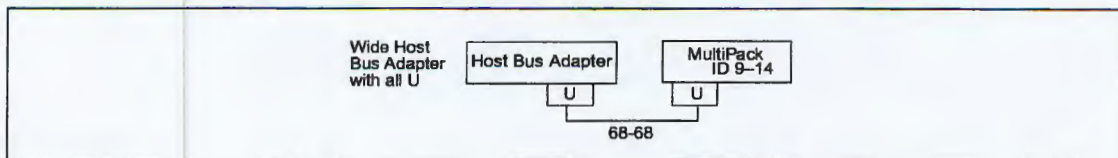


Figure 6. Sun StorEdge MultiPack system on an UltraSCSI onboard host or host bus adapter

Sun StorEdge MultiPack System on a Wide Onboard Host

Only one Sun StorEdge MultiPack six-drive enclosure can be connected to a single SCSI bus. Select SCSI ID addresses 9-14.

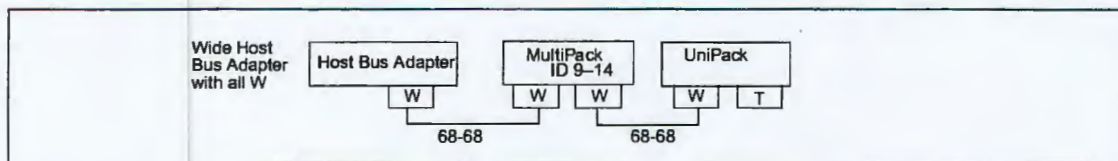


Figure 7. Sun StorEdge MultiPack system on a wide onboard host

Sun StorEdge MultiPack System on a Wide Host Bus Adapter

Two Sun StorEdge MultiPack six-drive enclosures can be connected to a single SCSI bus, provided there are no conflicts with internal devices. Select SCSI ID addresses 1-6 and 9-14.

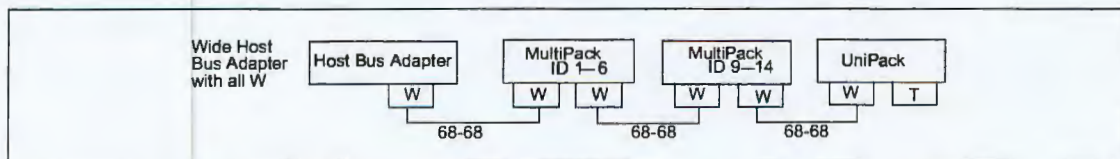


Figure 8. Sun StorEdge MultiPack system on a wide host bus adapter

Requirements and Configuration



Sun StorEdge MultiPack System and Narrow Devices on a Fast/Wide Bus

When mixing Sun StorEdge MultiPack system with a narrow drive or tape device on a wide SCSI bus, chain the narrow devices last with an external terminator. In general, a 50-to-68-pin cable kit with power cord (X3857A) is required.

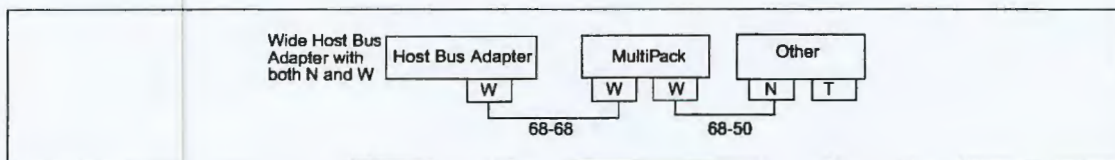


Figure 9. Sun StorEdge MultiPack system and narrow devices on a fast/wide bus

Chaining Sun StorEdge MultiPack System to Narrow Host Interfaces

One Sun StorEdge MultiPack drive enclosure may be chained to a narrow host adapter. The address-select switch must be set to 1-6 and a 50-to-68-pin cable is required.

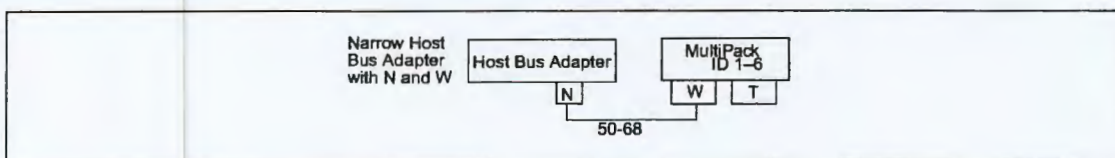


Figure 10. Chaining Sun StorEdge MultiPack system to narrow host interfaces

Requirements and Configuration



Sun StorEdge FlexiPack System Configuration

Sun StorEdge FlexiPack System Configuration Guidelines

The Sun StorEdge FlexiPack system has the following host adapter and cable restrictions.

Sun StorEdge FlexiPack SCSI Host Adapters Support

The Sun StorEdge FlexiPack products are supported on the following SCSI host adapters, as well as on all onboard host adapters on currently shipping Sun workstation and server platforms.

For fast/wide SCSI functionality, the SWIS/S host adapter is required. The 4-mm tape drives and autoloader, 7-GB to 14-GB, 8-mm tape drive, and Sun StorEdge DLT 4000 autoloader tape drive are supported on the SWIS/S card with Solaris 2.5 Operating Environment, but still run in narrow mode.

Sun StorEdge FlexiPack Cabling

All Sun StorEdge FlexiPack products must be ordered with either a 68-to-68-pin or 50-to-68-pin SCSI cable and power-cord kit (the Sun StorEdge FlexiPack system does not come with any cables included). Cabling guidelines are as follows:

- **68-to-68-pin cable connection**

The 68-to-68-pin SCSI cable with power cord kit (X3856A) allows connections to other Sun StorEdge FlexiPack systems, UniPack systems, or a fast/wide host adapter (SWIS/S or SunSwift). Always connect the fast/wide devices first when using a 68-pin host adapter. When cabling fast/narrow devices on a wide bus, the 50-pin devices should be cabled last and need to be actively terminated.

- **50-to-68-pin cable connection**

The 50-to-68-pin SCSI cable with power cord kit (X3857A) allows connections to

- 50-pin onboard host adapters offered on some current desktop products or
- The older 50-pin storage enclosures

When cabling a daisy chain of fast/narrow SCSI devices and Sun StorEdge FlexiPack storage system to a narrow (50-pin) onboard host adapter, the Sun StorEdge FlexiPack systems must always be put at the end of the SCSI chain. This provides auto-termination to the SCSI bus.

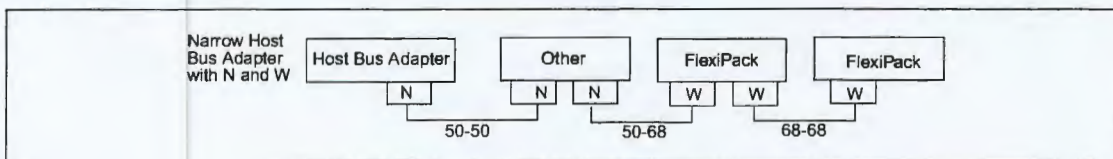


Figure 11. Cabling a daisy chain of fast/narrow SCSI devices and Sun StorEdge FlexiPack systems to a narrow (50-pin) onboard host adapter

Requirements and Configuration



When cabling devices to a fast/wide host adapter with fast/wide and fast/narrow devices on a SCSI chain, the fast/wide devices must be chained first. The last device on a bus needs to be actively terminated. Use a 50-to-68-pin cable to connect fast/wide (68-pin) to a fast/narrow (50-pin) device.

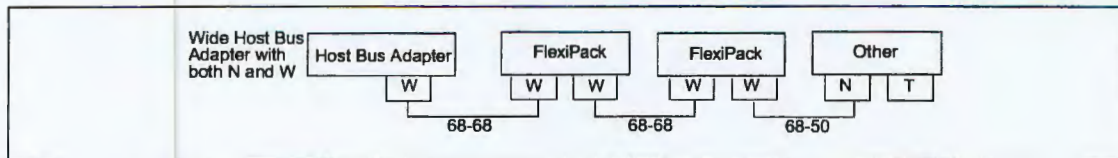


Figure 12. Cabling devices to a fast/wide host adapter with fast/wide and fast/narrow devices on a SCSI chain

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Sun StorEdge UniPack System Configuration

Sun StorEdge UniPack System SCSI Host Adapters Support

The Sun StorEdge UniPack products are supported on the following SCSI host adapters, as well as on all onboard host adapters on currently shipping workstation and server platforms:

- For fast/wide SCSI functionality, the SWIS/S or SunSwift host adapter is required. The 4-mm tape, and 8-mm tape drives are supported on the SWIS/S card with Solaris 2.5 Operating Environment, but still run in narrow mode.
- For UltraSCSI functionality, the SunSwift PCI or US2S host adapter is required.

Sun StorEdge UniPack System Cabling

All Sun StorEdge UniPack products must be ordered with a separate 68-to-68-pin or 50-to-68-pin SCSI cable and power cord kit (the Sun StorEdge UniPack system does not come with any cables included). Cabling guidelines are as follows:

68-to-68-pin Cable Connection

The 68-to-68-pin SCSI cable kit with power cord kit (X3856A) allows connections to other Sun StorEdge UniPack systems, to a fast/wide host adapter (SWIS/S or SunSwift), or to an UltraSCSI host adapter (SunSwift PCI or US2S). Always connect the fast/wide or UltraSCSI devices *first* when using a 68-pin host adapter. When cabling fast/narrow devices on a wide bus, the 50-pin devices should be cabled last and need to be actively terminated.

50-to-68-pin Cable Connection

The 50-to-68-pin SCSI cable kit with power cord kit (X3857A) allows connections to 50-pin onboard host adapters offered on older desktop products such as any SPARCstation model, Ultra 1 Model 170 or the older 50-pin storage enclosures.

Sun StorEdge UniPack System on an UltraSCSI Onboard Host or Host Bus Adapter

Up to four Sun StorEdge UniPack system enclosures can be connected to a single UltraSCSI bus. The Sun StorEdge UniPack system is auto-terminated. Do not add tape devices to an UltraSCSI bus.

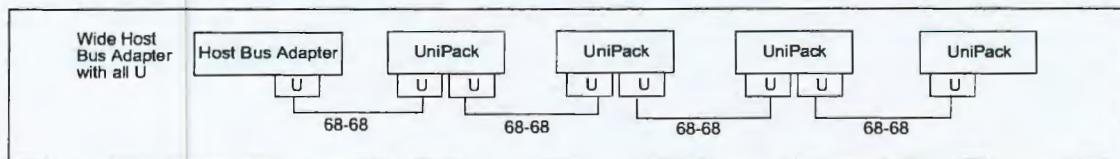


Figure 13. Sun StorEdge UniPack system on an UltraSCSI onboard host or host bus adapter

Requirements and Configuration



Sun StorEdge UniPack System on a Wide Onboard Host or Host Bus Adapter

Up to four Sun StorEdge UniPack system enclosures can be connected to a single SCSI bus. The Sun StorEdge UniPack is auto-terminated.

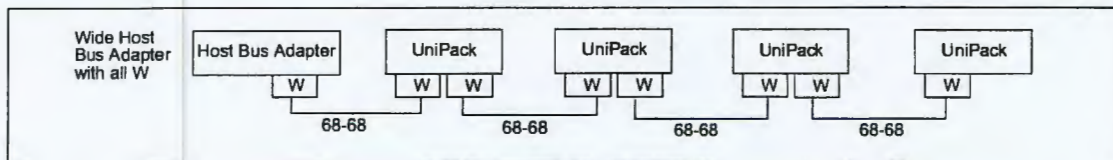


Figure 14. Sun StorEdge UniPack system on a wide onboard host or host bus adapter

Sun StorEdge UniPack System on Narrow Host Interfaces

When cabling a daisy chain of fast/narrow SCSI devices and Sun StorEdge UniPack systems to a narrow (50-pin) onboard host adapter, the Sun StorEdge UniPack systems must always be put at the end of a SCSI chain. This provides auto-termination to the SCSI bus.

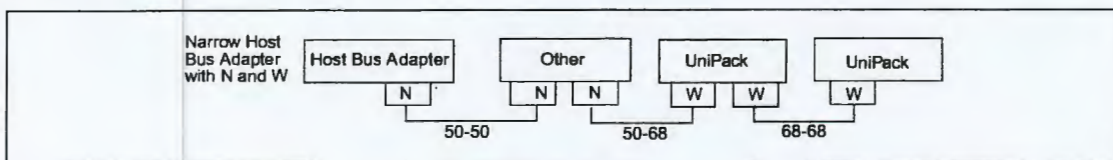


Figure 15. Cabling a daisy chain of fast/narrow SCSI devices and Sun StorEdge UniPack systems to a narrow (50-pin) onboard host adapter

Sun StorEdge UniPack System and Narrow Devices on a Fast/Wide Bus

When cabling devices to a fast/wide host adapter with fast/wide and fast/narrow devices on a SCSI chain, the fast/wide devices must be chained first. The last device on a bus must be actively terminated. Use a 50-to-68-pin cable to connect a fast/wide (68-pin) to a fast/narrow (50-pin) device.

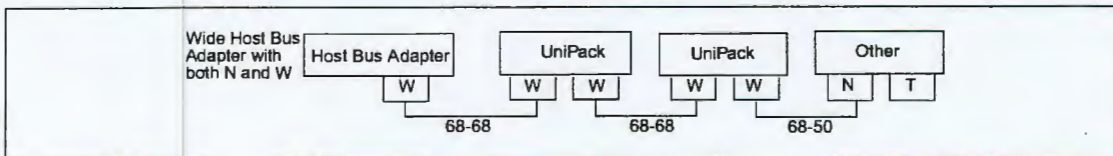


Figure 16. Cabling devices to a fast/wide host adapter with fast/wide and fast/narrow devices on a SCSI chain

Requirements and Configuration



Sun StorEdge Configuration Cable Lengths

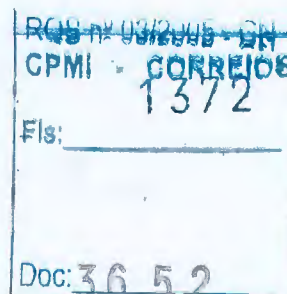
Internal Cable Lengths for Supported Systems

The following table lists the internal cable lengths of supported systems.

Product	Cable Length (meters)
Sun StorEdge UniPack disk	0.3
Sun StorEdge UniPack tapes	0.4
Sun StorEdge FlexiPack (with DLT 7000, DLT 4000, or DDS-3 autoloader)	0.6
Sun StorEdge FlexiPack (all other devices)	0.8
Sun StorEdge MultiPack	0.9
Desktop disk pack	0.3
Desktop storage disk pack	0.3
Sun Ultra systems	0.9
SPARCstation 5	1.6
Other desktops	~ 0.9
SBus cards, SunSwift PCI	0.1
Two-channel PCI adapter	0.2
Interconnect cables	0.3 to 2.0

Requirements and Configuration

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Ordering Information

Sun StorEdge™ MultiPack Marketing Part Numbers

Part Number	Option Description	Maximum Number Supported	Comments
SG-XDSK020C-18G	Sun StorEdge™ MultiPack, 2 x 9.1-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK040C-36G	Sun StorEdge MultiPack, 4 x 9.1-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK060C-54G	Sun StorEdge MultiPack, 6 x 9.1-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK020C-36G	Sun StorEdge MultiPack, 2 x 18.2-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK040C-72G	Sun StorEdge MultiPack, 4 x 18.2-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK060C-109G	Sun StorEdge MultiPack, 6 x 18.2-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK020C-72G	Sun StorEdge MultiPack, 2 x 36.4-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK040C-144G	Sun StorEdge MultiPack, 4 x 36.4-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK060C-216G	Sun StorEdge MultiPack, 6 x 36.4-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus

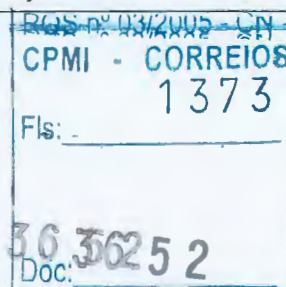
Sun StorEdge FlexiPack Marketing Part Numbers

Part Number	Option Description	Maximum Drives per FlexiPack
SG-XTAPDLT-021A	Sun StorEdge FlexiPack, DLT 7000	1
SG-XTAPDLT-020A	Sun StorEdge FlexiPack, DLT 4000	1
SG-XTAP8MM-021A	Sun StorEdge FlexiPack, 20-GB to 40-GB, 8-mm tape drive	2
SG-XTAP8MM-020A	Sun StorEdge FlexiPack, 7-GB to 14-GB, 8-mm tape drive	2
SG-XTAP4MM-031A	Sun StorEdge FlexiPack, 4-mm DDS-3 autoloader	1
SG-XTAP4MM-021A	Sun StorEdge FlexiPack, 4-mm DDS-3 tape drive	2

Sun StorEdge UniPack Marketing Part Numbers

Part Number	Option Description
SG-XDSK010C-9G	Sun StorEdge UniPack, 9.1-GB, 10000-rpm, UltraSCSI disks
SG-XDSK010C-18G	Sun StorEdge UniPack, 18.2-GB, 10000-rpm, UltraSCSI disks
SG-XDSK010C-36G	Sun StorEdge UniPack, 36.4-GB, 10000-rpm, UltraSCSI disks
SG-XTAP8MM-011A	Sun StorEdge UniPack, 20-GB to 40-GB, 8-mm tape drive
SG-XTAP8MM-010A	Sun StorEdge UniPack, 7-GB to 14-GB, 8-mm tape drive

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Part Number	Option Description
SG-XTAP4MM-011A	Sun StorEdge UniPack, 4-mm DDS-3 tape drive
SG-XTAP4MM-012A	Sun StorEdge UniPack, 4-mm DDS-4 tape drive

Ordering Information

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Sun StorEdge™ MultiPack Drive and Cable X-options

Part Number	Option Description	Maximum Number Supported	Comments
X5234A	9.1-GB, 10000-rpm, internal X-option UltraSCSI disk drive	4	Plus the first two installed drives
X5237A	18.2-GB, 10000-rpm, internal X-option UltraSCSI disk drive	4	Plus the first two installed drives
X5242A	36.4-GB, 10000-rpm, internal X-option UltraSCSI disk drive	4	Plus the first two installed drives
X5243A	36.4-GB, 10000-rpm, internal X-option UltraSCSI disk drive with barrier plate	4	Plus the first two installed drives
X3856A	68-pin to 68-pin SCSI cable kit with power cord	—	0.8 meter cable
X3857A	50-pin to 68-pin SCSI cable kit with power cord	—	0.8 meter cable
X901A	68-pin, 0.8-meter, external SCSI cable	—	0.8 meter cable
X902A	68-to-68-pin, 2.0-meter, external SCSI cable	—	
X903A	50-to-68-pin, 1.2-meter, external SCSI cable	—	
X904A	50-to-68-pin, 2.0-meter, external SCSI cable	—	

Configuration Guidelines

- On a Sun StorEdge™ MultiPack, two-drive subsystem may be expanded with up to four additional X5234A, X5237A, X5342A, or X5243A X-option drives.
- The 68-to-68-pin cable kit with power cord is required when chaining the Sun StorEdge MultiPack system to an UltraSCSI or fast/wide onboard host adapter (like most Sun workstations and servers) or another external 68-pin connector device (such as other Sun StorEdge FlexiPack, UniPack, or MultiPack devices).
- The option with 50-to-68-pin cables is required when chaining the Sun StorEdge MultiPack to a narrow onboard host adapter or another external 50-pin connector device (such as desktop storage module tape drives).
- The SunCD™ 32X is not supported in the Sun StorEdge UniPack or FlexiPack systems.

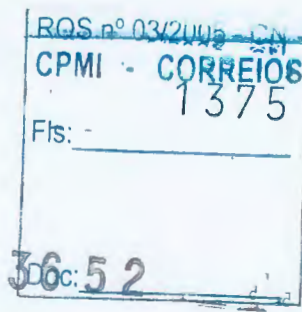
Sun StorEdge FlexiPack System Options

Configuration Guidelines

The Sun StorEdge FlexiPack enclosure is initially configured with one of the following options:

- One DLT 7000
- One DLT 4000
- One 72-GB to 144-GB, 4-mm DDS-3 autoloader
- One 20-GB to 40-GB, 8-mm tape drive with Sun-light-gray standard bezel and an open bay with filler panel in Sun light-gray

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- One 7-GB to 14-GB, 8-mm tape drive with Sun-light-gray standard bezel and an open bay with filler panel in Sun light-gray

The 68-to-68-pin cable kit with power cord is required when chaining the Sun StorEdge FlexiPack system to a fast/wide onboard host adapter (like most Sun workstations and servers) or another external 68-pin connector device (such as other Sun StorEdge FlexiPack, UniPack, or MultiPack devices).

The 50-to-68-pin cable kit with power cord is required when chaining the Sun StorEdge FlexiPack system to a narrow onboard host adapter or another external 50-pin connector device (such as desktop storage module tape drives).

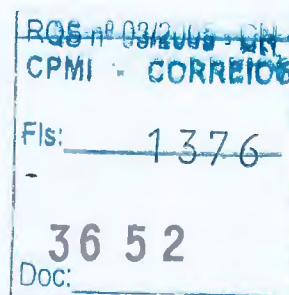
The half-height drives in a Sun StorEdge FlexiPack system base configuration are always installed in the lower storage bay of the Sun StorEdge FlexiPack system with the upper storage bay being open (no drive installed) and covered by a filler panel. This open bay can be filled by another half-height drive, thereby fully populating the Sun StorEdge FlexiPack. The options available for this upper storage bay are listed below.

Sun StorEdge FlexiPack System Options for the Upper Storage Bay

The following X-options are for use in the available upper storage bay of the Sun StorEdge FlexiPack system. When ordering the Sun StorEdge FlexiPack system with a half-height drive, the option includes the enclosure and one drive located in the lower storage bay. The upper storage bay is covered by a filler panel initially, but any of the following field-installable options may be ordered for use in the upper storage bay:

Part Number	Option Description
X6282A	4-mm DDS-3 internal tape drive
X6212A	7-GB to 14-GB, 8-mm internal tape drive
X6236A	20-GB to 40-GB, 8-mm internal tape drive

Options





Service and Support

The SunSpectrumSM 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 SolarisTM Operating Environment software, and telephone support for SunTM 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
Local customer support management	No	Yes	No	No
Personal technical account support	Yes	Yes	Option	No
SunStart SM installation service	Yes	No	No	No
Account support plan	Yes	Yes	No	No
Software release planning	Yes	No	No	No
On-site account reviews	Monthly	Semiannual	No	No
Skills assessment	Yes	No	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	Option
7-day/24-hour on-site coverage	Yes	Option	Option	N/A
7-day/12-hour on-site coverage	No	Option	No	No
5-day/24-hour on-site coverage	No	Option	No	No

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FEATURE	SUNSPECTRUM PLATINUM SM Mission-critical Support	SUNSPECTRUM GOLD SM Business-critical Support	SUNSPECTRUM SILVER SM Systems Support	SUNSPECTRUM BRONZE SM Self Support
Coverage / Response Time (cont.)				
Customer-defined priority setting	Yes	Yes	Yes	Option
• 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
2-hour on-site response	Yes	Option	Option	N/A
Additional contacts	Option	Option	Option	Option
Premier Support Features				
Mission-critical support team	Yes	For urgent problems	No	No
Sun Vendor Integration Program (Sun VIP SM)	Yes	Yes	No	No
Software patch management assistance	Yes	No	No	No
Field change order (FCO) management assistance	Yes	No	No	No
Hardware Support Delivery				
Replacement hardware parts	On-site technician	On-site technician	On-site technician	Courier
Two day parts delivery	N/A	N/A	N/A	Yes
Overnight parts delivery	N/A	N/A	N/A	Option
Same-day parts delivery	Yes	Yes	Yes	Option
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 SM license	Yes	Yes	Yes	Yes
SunSolve EarlyNotifier SM Service	Yes	Yes	Yes	Yes

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Glossary

Active termination, regulated	Terminates the SCSI bus with a series of resistors tied to +5 volts. The terminator is labeled <i>Regulated</i> but is often referred to as <i>Active Terminator</i> .
Bandwidth	A measure of the capacity of a communication channel, usually specified in MB/second.
DSBE/S	SBus fast differential SCSI-2/buffered Ethernet card.
DWIS/S	SBus differential fast/wide intelligent SCSI-2 host adapter.
Fast SCSI	Data transfer rate of 10 MB/second.
Fast/wide SCSI	Data transfer rate of 20 MB/second wide devices can be connected to a narrow SCSI interface, but the extra data lines need to be terminated.
FSBE/S	Fast SCSI Buffered Ethernet.
GB	Gigabyte. A gigabyte is 1,073,741,824 (2^{30}) bytes.
GUI	Graphical user interface. The VERITAS Volume Manager software provides a powerful, easy-to-use GUI.
Host adapter	A device that connects a peripheral device I/O protocol and medium to the computer system's I/O bus.
Hot plug	The ability to remove, replace or add a device while current I/O processes continue on the bus.
Hot spare	A drive in an array that is held in reserve to replace any other drive that fails.
Hot swap	The specific case of hot-plugging which involves replacing a device with another of the same size, type, and layout.
IOPS	Input/output operations per second. A measure of I/O performance, IOPS is usually used to quote random I/O performance. See Throughput.
MTBF	Mean time between failures. A measure of reliability, this is the average expected time between failures of equipment, usually measured in operating hours.
RAID	Redundant array of independent disks. A set of disk drives that appears to be a single logical disk drive to an application such as a database or file system. Different RAID levels provide different capacity, performance, availability, and cost characteristics.
Release	A SCSI command to release a previously granted reservation. See Reserve.



Reserve	A SCSI command issued by a host system to reserve access to a controller or disk drive. Once a reservation is granted to a system, commands to the controller or disk drive by any other system are rejected. This is a valuable safety feature in dual-hosted Sun StorEdge Array configurations.
SBE/S	SCSI controller 5 MB/second transfer rate.
SCSI address	The octal representation of the unique address (0-7) assigned to a narrow device; or the hex representation of the unique address (0-15) assigned to a wide SCSI device.
Single connector	A SCSI disk connector technology co-invented by Sun Microsystems. The single connector attachment (SCA) provides all SCSI, power, and control signals in a single connector, and enables easy servicing and highly reliable, pluggable disk drives.
SSHA	SBus SCSI host adapter.
SunSwift™	Single-ended fast/wide SCSI-2 10/100 Mbps Ethernet SBUS host adapter.
SunSwift PCI	Single-ended UltraSCSI 10/100 Mbps Ethernet PCI host adapter.
SWIS/S	Single-ended wide intelligent SCSI.
Throughput	A measure of sequential I/O performance, measured in MB/second. See IOPS.
UltraSCSI	Data transfer rate of 40 MB/second. Wide devices can be connected to a narrow SCSI interface, but the extra data lines need to be terminated.
US2S	PCI UltraSCSI dual channel host adapter.
Volume	In the VERITAS Volume Manager software, a volume is a virtual disk partition into which a file system, DBMS, or other application can place data. A volume can physically be a single disk partition or multiple disk partitions on one or more physical disk drives. Applications that use volumes do not need to be aware of their underlying physical structure. The Volume Manager handles mapping of virtual partition addresses to physical addresses.
Warm plug	The ability to remove, replace or add a device while power is still applied, but only while all I/O processes are suspended.



Materials Abstract

All materials will be available on SunWIN except where noted otherwise.

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Powerpack <i>Sun StorEdge™ MultiPack, FlexiPack, and UniPack Systems, Just the Facts</i>	Just The Facts	Training Sales Tool	SunWIN, Reseller Web	50843
References <i>Sun StorEdge MultiPack Desktop Storage Product Brief</i>	Product Brief	Sales Tool	SunWIN, Reseller Web, E-mail	50845
Product Literature <i>Literature - StorEdge MultiPack Data Sheet</i> <i>Sun Intro - New Sun StorEdge UniPack, FlexiPack, and MultiPack Enhancements</i> <i>Sun Product Intro - Introduction and Transition of Sun StorEdge Products and MultiPack Configurations</i> <i>Literature - StorEdge UniPack Datasheet</i> <i>Sun StorEdge UniPack Desktop Storage Product Brief</i>	Data Sheet on Sun StorEdge MultiPack Sun Product Intro on Sun StorEdge Product Enhancements Sun Product Intro on Product Transitions Data Sheet on Sun StorEdge UniPack Product Brief on Sun StorEdge UniPack	Sales Tool Sales Tool Sales Tool Sales Tool	SunWIN, Reseller Web, E-mail SunWIN, Reseller Web SunWIN, Reseller Web SunWIN, Reseller Web	66769 80969 95833 66767 46703
External Web Sites <i>Sun Home Page</i> <i>Site for Information on Sun StorEdge MultiPack</i> <i>Site for Information on Sun StorEdge UniPack</i>	http://www.sun.com http://www.sun.com/storage/multipack/ http://www.sun.com/storage/unipack/			

Materials Abstract

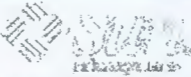
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HIGH PERFORMANCE DESIGN

Symmetric Multiprocessing Power

Sun HPC Servers deliver consistent, cost-effective performance. Our integrated SMP systems provide the level of performance usually reserved for expensive legacy or supercomputing systems - and performance can be boosted even higher by configuring these systems into clusters.

Processing power must be balanced against a systems' capacity to sustain the required data movement throughout the system. For solving increasingly complex analysis and simulating increasingly large models, you need a compute engine with tremendous power and scalability. Sun HPC Servers deliver such an engine by leveraging three fundamental technologies:

- UltraSPARC Processors
- SMP Fat Nodes
- Clustering

UltraSPARC II Processor

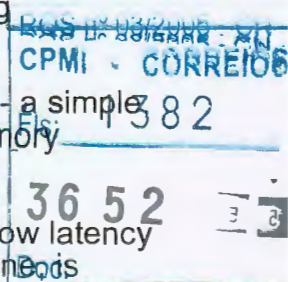
The heart of every current Sun HPC system is the UltraSPARC II processor, the second in a family of high-performance superscalar 64-bit RISC processors. Fabricated in 0.35 micron CMOS technology, the UltraSPARC II offers truly impressive performance: A single UltraSPARC II running at 400 MHz provides dual launch floating point capability, resulting in a peak performance of 800 MFLOPS.

SMP Fat Nodes

In designing its current HPC systems, Sun has chosen a fat node strategy: SMP nodes that scale sufficiently to support at least 95% of the HPC applications run by Sun's customers. Allowing a single application to run within the boundaries of a single node, the fat node avoids long internode latencies and the need for developers and system operators to manage data locality in a hierarchical memory structure.

Sun chose the strategy of fat SMP nodes because it provides the lowest latencies while offering the simplest programming and operations environment. As a result, today Sun's HPC server line delivers lower memory-to-processor latencies for systems of 2 to 64 processors than do competitive systems. To implement the fat node strategy, Sun has developed three types of processor-to-memory interconnect. While using a common operating system, CPU module, and I/O architecture, implementing different interconnects allows for nodes of varying capacities:

- For systems requiring between one and four processors -- a simple high-bandwidth (1.6 GB/s), low latency, processor-to-memory interconnect is used.
- For systems requiring between 4 and 30 processors -- a low latency (200-300 ns), high bandwidth (2.7 GB/s) bus, the Gigaplane is



employed.

- For systems requiring up to 64 processors -- a sophisticated interconnect called the Gigaplane-XB has been developed. Combining a 16x16 data crossbar switch with 4-way parallel / point-to-point address routers, the Gigaplane-XB achieves bandwidth of up to 10.5 GB/s, latencies of 400 to 600 ns, and supports up to 64 processors.



Clusters

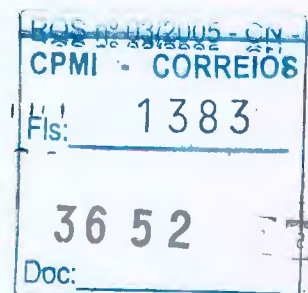
The third part of Sun's implementation strategy is built around the use of clustering. Though fat nodes obviate the need for most applications to span node boundaries, clustering fat nodes still delivers three important benefits:

- **Workload aggregation:**
While individual nodes are sized to support the largest individual job, a cluster of nodes can support a very large workload consisting of many individual jobs. Tools like LSF, part of the Sun HPC Software which is bundled with every HPC server, allow the cluster to be managed as a single resource.
- **Incremental growth path:**
Clusters allow incremental growth of the computing resources as the computing environment and workload grows, by the addition of another SMP node.
- **Fault resilience:**
Because each node in the cluster contains its own copy of the operating system, system or software problems that bring down one node need not propagate to other nodes. This is important in an HPC environment where many jobs may be running at one time. This additional resilience is over and above that provided by the extensive RAS features found in the Sun HPC servers.

For large, highly parallel HPC applications, which span beyond even a 64-processor node, Sun's parallel development environment facilitates execution of a single application across multiple clustered nodes. Even here, fat nodes provide an advantage: Larger individual nodes reduce substantially the number of inter- node transfers, thus keeping average effective latencies much lower.

Performance : Architecture | [Software](#) | [Scalability](#)

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SUN ENTERPRISE™ 4500

Specifications

Processor

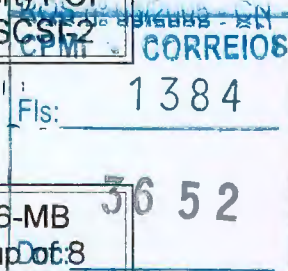
Number of processors	One to 14
Architecture	Superscalar SPARC Version 9, UltraSPARC
Cache per processor	Primary: 16-KB instruction, and 16-KB data on chip Secondary: 4 MB external cache
CPU interface	One to 14, 128-bit Ultra Port Architecture (UPA) slots
System Interconnect	Gigaplane, 2.68 GB/sec (at 84 MHz), 3.2 GB/sec (at 100 MHz)

System Boards

Number of boards	Maximum of eight boards per system; minimum configuration requires one CPU/Memory board and one I/O board
CPU/Memory board	Holds up to two processors and 16 memory SIMMs
SBus I/O board	Offers two SBus channels, three SBus slots, SunFastEthernet, fast/wide SCSI-2, two FC-AL sockets
Graphics I/O board	Offers one SBus channel, two SBus slots, one UPA slot for Creator and Creator3D graphics, SunFastEthernet, fast/wide SCSI-2, two FC-AL sockets
PCI I/O board	Offers four PCI channels, two (short) PCI slots, SunFastEthernet, fast/wide SCSI-2

Main Memory

256-MB to 14-GB memory capacity per system 256-MB and 1-GB memory expansion options (each a group of 8 SIMMs)



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Standard Interfaces

Serial	Two RS-232/423 ports on clock board
SBus	64-bit data bus width, 25 MHz
PCI	64-bit data bus width, 66 MHz
Keyboard and mouse port	One each per system
Ethernet	10/100 MB/sec twisted pair standard (10-BaseT and 100-BaseT) and/or MII transceiver per I/O board
SCSI	On-board 20-MB/sec fast/wide SCSI-2 (synchronous) per I/O board
Fibre channel	Two on-board sockets (100 MB/sec full duplex) per SBus and Graphics I/O boards

Mass Storage

Internal disk	Up to four 8.4-GB disk boards
Internal tape	8mm, 4mm, and .25-inch tape options available
CD-ROM	SunCD 32 drive standard

External storage

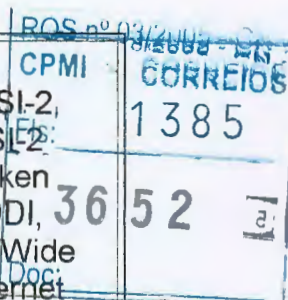
Supports over 4-TB of storage

Console options

Monitor	17- or 20-in color monitor
Frame buffer	TurboGX, TurboGXplus, Creator, or Creator3D frame buffer

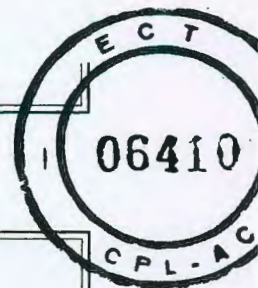
SBus options

SunFastEthernet, SunATM 155 and 622, Quad FastEthernet, Differential Fast/Wide Intelligent SCSI-2, (DWIS/S), Single-Ended Fast/Wide Intelligent SCSI-2, (SWIS/S), High-Speed Serial Interface (HSI/S), Token Ring Interface (TRI/S), Single- and Dual-Attach FDDI, Serial Parallel Controller (SPC/S), 100BaseT Fast/Wide SCSI, ISDN, Fast Differential SCSI-2 Buffered Ethernet (DSBE/S), Fast SCSI-2 Buffered Ethernet (FSBE/S), Sun



91.4

Gigabit Ethernet, FC-AL



PCI options

10/100BaseT Fast/Wide UltraSCSI, 10/100BaseT FastEthernet, Quad FastEthernet, Single- and Dual-Attach FDDI, Token Ring, High Speed Serial Interface, Serial Asynchronous Interface, Gigabit Ethernet Network, SunATM 155 and 622

Power supplies

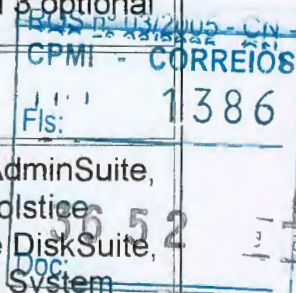
One 184-watt Peripheral Power Supply standard. Up to four hot swappable 300-watt Power Cooling Modules (PCM) with redundant, dual-speed fans. One PCM required per two systems boards. Fully-redundant power and cooling available on this system.

Availability features

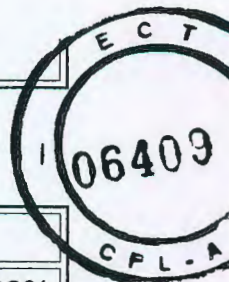
Automatic System Recovery
Dynamic Reconfiguration
Alternate Pathing
CPU Power Control
Redundant Power and Cooling
Hot-swap Power/Cooling Modules
Hardware Failure Prediction
Remote Power Control
Modular components
and more...

Software

Operating system	Solaris 2.5.1 or later operating environment
Languages	C, C++, Pascal, FORTRAN, Java
Networking	ONC, NFS, TCP/IP, SunNet OSI, MHS, X.25, DCE, Netware
Windowing system	CDE, OpenWindows Version 3 optional
System monitoring	Enterprise SyMON
System and network management	Solaris Web Start, Solstice AdminSuite, Solstice Domain Manager, Solstice Enterprise Manager, Solstice DiskSuite, Solstice Backup, Veritas File System



and more...



Environment

AC power	100-240 VAC, 47-63 Hz, 12A
Operating	5° C to 40° C (41° F to 104° F) 20% to 80% relative humidity, noncondensing
Nonoperating	-20° C to 60° C (-4° F to 140° F) 5% to 93% relative humidity, noncondensing
Plug Type	NEMA 5-15P

Regulations

Meets or exceeds the following requirements:

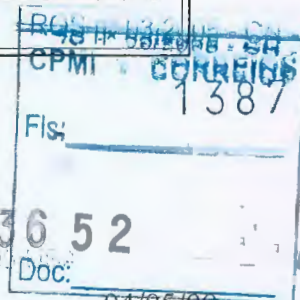
Safety	UL 1950, CSA 950, TUV EN60950, CB Scheme (Nordic Deviation)
RFI/EMI	FCC Class A, DOC Class A, EN55022 Class A, VCCI Class 1
Immunity	EN50082-1
Harmonics	EN61000-3-2

Dimensions and Weight

Height	34 cm (13.5 in.)
Width	50 cm (19.7 in.)
Depth	56 cm (22 in.)
Weight, main cabinet	68 kg (150 lb.) approximate
Power cord	1.83 m (6 ft.)

Upgrades

Full system upgrades are available for SPARCcenter 2000/2000E, SPARCserver 1000/1000E, SPARCserver 6X0, 4X0, and 3X0 systems. Chassis upgrades are available for Enterprise 3000 and Enterprise 3500 servers. Competitive server trade-ins are also available.



SUN Enterprise 4500 : Specifications

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70002-900 – Brasília - DF



CONCORRÊNCIA Nº. 001/2000
ABERTURA: 03/05/00 – 9:30 hs

PROPOSTA TÉCNICA
INVÓLUCRO Nº 2
SERVIDOR RISC 4

LICITANTE:

Dedalus Comércio e Sistemas Ltda.

CNPJ 73.101.990/0001-28

Rua Jardim Ivone, 17 – 10º. Andar – Vl. Mariana

04105-905 – São Paulo – SP

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Av. João Emanuel, 30 - 1º andar - Jd. Chanoad
3066-640 - Campinas - SP - BRASIL
Tel: 55 19 243-8688

Curitiba

Av. Francisco de Paula, 14 - Cj. 101
81300-000 - Curitiba - PR - BRASIL
Tel: 55 41 222-7596

SUN™ ENTERPRISE™ 3500 SERVER

POWERFUL MIDRANGE SYSTEM WITH EXCEPTIONAL AVAILABILITY



If you're deploying critical business applications or Internet/intranet services, the Sun™ Enterprise™ 3500 server delivers the same exceptional availability and performance features found in our high-end systems. Down time is significantly reduced by the server's resilient architecture, advanced system management tools, and software enhancements such as Dynamic Reconfiguration and Alternate Pathing. The combination of Sun's scalable Solaris™ operating environment, which runs on all Sun servers, and the system's modular hardware components delivers unmatched investment protection and makes it easy to expand performance and capacity. That's lasting value.

HIGHLIGHTS

- Advanced availability features maximize application uptime, with the ability to reconfigure and repair system components while the server remains on-line.
- Up to eight processors using Sun's high-speed Gigaplane™ system interconnect deliver leading application performance.
- Leveraged design of the Sun Enterprise 3500 server to the Sun Enterprise 6500 server family enables on-site upgrades all the way to 30 processors.
- Sun Enterprise SymON™ software simplifies system management, lowering your total cost of ownership with an easy-to-use interface and proactive hardware failure prediction.

SERVERS

Doc: 3652390

SUN ENTERPRISE 3500 SERVER SPECIFICATIONS

PROCESSOR	
Number of processors	One to eight
Architecture	Superscalar SPARC™ Version 9, UltraSPARC
Cache per processor	Primary: 16-KB instruction, and 16-KB data on chip Secondary: 4 MB external cache
CPU interface	One to eight, 128-bit Ultra Port Architecture (UPA) slots
System Interconnect	Gigaplane™, 2.68 GB/sec (at 84 MHz), 3.2 GB/sec (at 100 MHz)

SYSTEM BOARDS	
Number of boards	Maximum of five boards per system; minimum configuration requires one CPU/Memory board and one I/O board
CPU/Memory board	Holds up to two processors and 16 memory SIMMs
SBus I/O board	Offers two SBus channels, three SBus slots, SunFastEthernet™, fast/wide SCSI-2, two FC-AL sockets
Graphics I/O board	Offers one SBus channel, two SBus slots, one UPA slot for Creator and Creator3D graphics, SunFastEthernet, fast/wide SCSI-2, two FC-AL sockets
PCI I/O board	Offers four PCI channels, two (short) PCI slots, SunFastEthernet, fast/wide SCSI-2
Main Memory	256-MB to 8-GB memory capacity per system 256-MB and 1-GB memory expansion options (each a group of 8 SIMMs)

STANDARD INTERFACES	
Serial	Two RS-232/423 ports on clock board
SBus	64-bit data bus width, 25 MHz
PCI	64-bit data bus width, 66 MHz
Keyboard and mouse port	One each per system
Ethernet	10/100 MB/sec twisted pair standard (10-BaseT and 100-BaseT) and/or MII transceiver per I/O board
SCSI	On-board 20-MB/sec fast/wide SCSI-2 (synchronous) per I/O board
Fibre channel	Two on-board sockets (100 MB/sec full duplex) per SBus and Graphics I/O boards

MASS STORAGE	
Internal disk	Maximum eight 3.5-in. hot-swappable FC-AL disk drives with dual connections
Internal tape	8mm, 4mm, and .25-inch tape options available
CD-ROM	SunCD™ 32 drive standard
External storage	Supports over 2-TB of storage

CONSOLE OPTIONS	
Monitor	17- or 20-in color monitor
Frame buffer	TurboGX™, TurboGXplus™, Creator, or Creator3D frame buffer
SBus options	SunFastEthernet, SunATM™ 155 and 622, Quad FastEthernet, Differential Fast/Wide Intelligent SCSI-2 (DWIS/S), Single-Ended Fast/Wide Intelligent SCSI-2 (SWIS/S), High-Speed Serial Interface (HSI/S), Token Ring Interface (TRI/S), Single- and Dual-Attach FDDI, Serial Parallel Controller (SPC/S), 100BaseT Fast/Wide SCSI, ISDN, Fast Differential SCSI-2 Buffered Ethernet (DSBE/S), Fast SCSI-2 Buffered Ethernet (FSBE/S), Sun Gigabit Ethernet, FC-AL

PCI options	10/100BaseT Fast/Wide UltraSCSI, 10/100BaseT FastEthernet, Quad FastEthernet, Single- and Dual-Attach FDDI, Token Ring, High Speed Serial Interface, Serial Asynchronous Interface, Gigabit Ethernet Network, SunATM 155 and 622
Power supplies	One 184-watt AC Inlet/Peripheral Power Supply standard. Optional, 195-watt Second Peripheral Power Supply available. Up to three hot swappable 300-watt Power Cooling Modules (PCM) with redundant, dual-speed fans. One PCM required per two systems boards. Fully-redundant power and cooling available on this system.
Availability features	Automatic System Recovery Dynamic Reconfiguration Alternate Pathing CPU Power Control Redundant Power and Cooling Hot-swap Power/Cooling Modules and Disk Drives Internal Disk Drives with Dual Connections Hardware Failure Prediction Remote Power Control Modular components and more...

SOFTWARE	
Operating system	Solaris 2.5.1 or later operating environment
Languages	C, C++, Pascal, FORTRAN, Java™
Networking	ONC™, NFS™, TCP/IP, SunNet™ OSI, MHS, X.25, DCE, Netware
Windowing system	CDE, OpenWindows™ Version 3 optional
System monitoring	Enterprise SyMON™
System and network management	Solaris Web Start, Solstice AdminSuite™, Solstice Domain Manager, Solstice Enterprise Manager, Solstice DiskSuite™, Solstice Backup™, Veritas File System and more...

ENVIRONMENT	
AC power	100-240 VAC, 47-63 Hz, 9.5A
Operating	5° C to 35° C (41° F to 95° F) 20% to 80% relative humidity, noncondensing
Nonoperating	-20° C to 60° C (-4° F to 140° F) 5% to 93% relative humidity, noncondensing

REGULATIONS	
Meets or exceeds the following requirements:	
Safety	UL 1950, CSA 950, TUV EN60950, CB Scheme (Nordic Deviation)
RFI/EMI	FCC Class A, DOC Class A, EN55022 Class A, VCCI Class 1
Immunity	EN50082-1
Harmonics	EN61000-3-2

DIMENSIONS AND WEIGHT	
Height	65 cm (25.5 in.)
Width	43 cm (17.0 in.)
Depth	60 cm (23.5 in.)
Weight, main cabinet	72.5 kg (160 lb.) approximate
Power cord	1.83 m (6 ft.)

UPGRADES	
System upgrades are available for Enterprise 1, Enterprise 2, Enterprise 150, Enterprise 3000, SPARCserver 10/20, SPARCserver 1000/1000E, SPARCserver 6X0, 4X0, and 3X0 systems. Competitive server trade-ins are also available.	

SERVER FAMILY OF PRODUCTS

SUN ENTERPRISE 3500	SUN ENTERPRISE 4500	SUN ENTERPRISE 5500	SUN ENTERPRISE 6500
			

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THE NETWORK IS THE COMPUTER™



São Paulo, 27 de abril de 2000

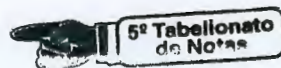
À
EMPRESA BRASILEIRA DE CORREIOS E TELÉGRAFOS/ECT
COMISSÃO ESPECIAL DE LICITAÇÃO DA ADMINISTRAÇÃO CENTRAL – CEL/AC
SBN Quadra 01 – Bloco A – 4º andar – Ala Norte
Brasília - DF

Ref. Concorrência nº. 001/2000 – CPL/AC

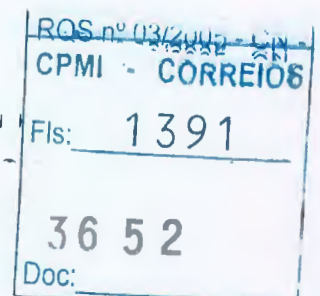
DECLARAÇÃO DE DESEMPENHO

Nós, da **Sun Microsystems do Brasil**, estabelecida na Rua Alexandre Dumas, 2016 - Chácara Santo Antonio - 04717-004, inscrita no CNPJ sob nº. 65.497.745/0001-53, subsidiária da Sun Microsystems Inc., Declaramos que o Servidor Sun Enterprise 3500 ofertado pela Licitante Dedalus Comércio e Sistemas Ltda., inscrita no CNPJ sob nº. 73.101.990/0001-28, localizada à Rua Jardim Ivone, 17 – 10º. andar - Vila Mariana - São Paulo - SP., em sua proposta técnica, **SERVIDOR DE REDE TIPO RISC 4**, possui performance estimada com base no valor auditado para o equipamento da mesma família da SUN Microsystems E4500, de 10.772,71 TpmCE com 3 processadores de 400MHz e 8MB de memória cache, calculado a partir da definição: $NPC >= (ITpmCE \times NPA) / TpmCA$, e é expansível a 28.724,57 TpmCE, com 8 processadores, também estimados com base no valor auditado para o equipamento da mesma família da Sun Microsystems E4500, com 14c processadores, que é de 50.268,07 TpmCA.

Por ser expressão da verdade, firmamos a presente.



SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA
João Antônio Alves
Country Manager



Sun Microsystems do Brasil Ltda.
Rua Alexandre Dumas, 2016
CEP 04717-004 - São Paulo - SP
Pabx: (011) 5181-8988 Fax: (011) 5181-0974 / 5181-3076



São Paulo, 27 de abril de 2000



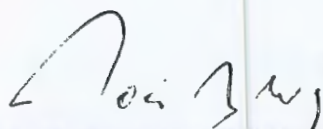
À
EMPRESA BRASILEIRA DE CORREIOS E TELÉGRAFOS/ECT
COMISSÃO ESPECIAL DE LICITAÇÃO DA ADMINISTRAÇÃO CENTRAL – CEL/AC
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Brasília - DF

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DECLARAÇÃO DE EXPANSIBILIDADE DE MEMÓRIA RAM

A Sun Microsystems do Brasil, inscrita no CNPJ sob nº. 65.497.745/0001-53, estabelecida na Rua Alexandre Dumas, 2016 - Chácara Santo Antonio - 04717-004, São Paulo/SP., subsidiária da Sun Microsystems Inc., DECLARA para os fins da participação da Dedalus Comércio e Sistemas Ltda., inscrita no CNPJ sob nº. 73.101.990/0001-28, na Licitação acima referenciada que o **SERVIDOR TIPO RISC 4 - E3500**, pode atingir o máximo de 16GB de memória Ram.

Por ser expressão da verdade, firmamos a presente.




SUN MICROSYSTEMS DO BRASIL IND. E COM. LTDA.
João Antonio Alves
Country Manager

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Sun Enterprise™

3500–6500 Servers

Just the Facts



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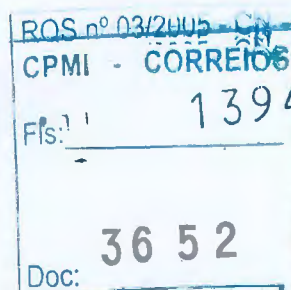
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Just the Facts



February 1999

Sun Enterprise™ 3500–6500 Server Positioning

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Product Overview

The Sun Enterprise™ server family is ideally suited for mission-critical network computing environments. Family members range from the entry-level Sun Enterprise Ultra™ 5S workgroup server up to the mainframe-class Sun Enterprise 10000 server. This document focuses on the Sun Enterprise 3500–6500 servers. These servers represent the next generation of the popular Sun Enterprise 3000–6000 servers, which have been enhanced in the following areas:

- System expandability
- Improved availability for internal disks
- Higher datacenter storage density
- Improved availability with Dynamic Reconfiguration and Alternate Pathing
- Improved investment protection for the Sun Enterprise 3500–5500 with the enhanced Gigaplane™ system interconnect

Product Line Enhancements in Sun Enterprise 3500–6500 Servers

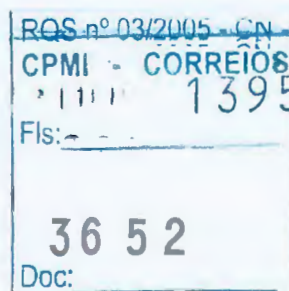
Enhanced Gigaplane™ System Interconnect

All of the Sun Enterprise 3500–6500 servers include a revised Gigaplane system interconnect. The Sun Enterprise 3000–6000 server Gigaplane bus has a maximum speed of 84 MHz. This bus is sufficient to support the UltraSPARC™ processors running at up to 336 MHz when operating with a 4:1 processor-to-Gigaplane speed ratio. The enhanced Gigaplane system bus on the Sun Enterprise 3500–5500 servers is capable of running up to 100 MHz, delivering a throughput of 3.2 GB per second. The Gigaplane system bus must run at 100 MHz in order to support the new 400-MHz UltraSPARC processor with 4 MB of external cache, without changing the processor-to-Gigaplane speed ratio. This new 400-MHz/4-MB processor is supported on the Sun Enterprise 3500–5500. The Gigaplane on the Sun Enterprise 6500 server cannot run at 100 MHz and therefore does not support this 400-MHz/4-MB processor. The maximum Gigaplane speed on the Sun Enterprise 6500 will remain at 84 MHz. Please note, however, that a future UltraSPARC processor which runs faster than 336 MHz will be available for the Sun Enterprise 6500 as well as the Sun Enterprise 6000 servers. Please see the “System Architecture” section for further details regarding the enhanced Gigaplane system interconnect.

New System Boards

New system boards (CPU/memory boards, SBus I/O boards, Graphics I/O boards, and PCI I/O boards) are available to support the Sun Enterprise 3500–6500 servers. These boards are designed to support the enhanced Gigaplane system bus. In addition, the on-board fibre channel sockets on the Graphics I/O board have been modified to support 100-MB-per-second Fibre Channel Arbitrated Loop (FC-AL) connectivity. These systems boards may also be used in the Sun Enterprise 3000–6000 servers. Please see the “CPU/Memory Board” and “I/O Board” sections for further details.

Just the Facts



February 1999

Sun Enterprise™ 3500–6500 Server Positioning



Availability of Sun Elite3D m6 and Creator3D series 3 Graphics Support

The high-performance graphics previously available in the Ultra workstations is now available for the Sun Enterprise 3500–6500 workstations. These products address the graphics market requirements for the superworkstation to technical server segments. In Sun Enterprise servers, the product is targeted at users who need the high-performance compute, memory, I/O, and other server support features. These users need more—more graphics, more CPUs, more I/O, more disk—to get their jobs done.

New Disk Board

The 4.2-GB disk board used on the Sun Enterprise 4000–6000 servers has been replaced by an 8.4-GB disk board. This disk board may be used in the Sun Enterprise 4500–6500 servers as well as the Sun Enterprise 4000–6000 servers.

Faster CD-ROM

All of the Sun Enterprise 3500–6500 servers include a new internal Sun StorEdge™ CD32 drive. These 32X CD-ROM drives (the drive reads information 32 times as fast as a music CD) are faster than the 12X CD-ROM drives that were included with the Sun Enterprise 3000–6000 servers.

Dynamic Reconfiguration

Dynamic Reconfiguration (DR) is the ability to alter the configuration of a running system by bringing components online or taking them offline without disrupting system operation or requiring a system reboot. With the availability of Dynamic Reconfiguration, system boards can be logically and physically included into the system configuration, or logically deactivated and removed while the system is running.

Dynamic Reconfiguration for I/O boards is available for Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers with Solaris™ 2.6 Hardware: 5/98 and Dynamic Reconfiguration for CPU/memory boards is expected to be available with a future version of the Solaris Operating Environment™ in the first half of calendar year 1999. Please refer to the “Reliability, Availability, and Serviceability” section for more details on Dynamic Reconfiguration.

Alternate Pathing

Alternate Pathing (AP) is an extension of Dynamic Reconfiguration. It allows dynamic reconfiguration of the I/O boards without disrupting the network or external storage connection. Alternate Pathing increases overall system availability by maintaining crucial network and storage access for mission-critical environments. As with Dynamic Reconfiguration, the Alternate Pathing feature has previously been available on the Sun Enterprise 10000 server platform. These features are currently unavailable on any other general purpose UNIX® platform.

Alternate Pathing is available for Sun Enterprise 3000–6000 server and Sun Enterprise 3500–6500 servers with Solaris 2.6 Hardware: 5/98. Please refer to the “Reliability, Availability, and Serviceability” section for more details on Alternate Pathing.



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Product Platform-Specific Enhancements

Sun Enterprise 3500 Server

- **Additional System Slot:**

The Sun Enterprise 3500 server is an enhanced Sun Enterprise 3000 server with an additional system slot. The Sun Enterprise 3500 server supports five system boards and can, therefore, support up to eight UltraSPARC processors and 8 GB of memory, whereas the Sun Enterprise 3000 server accommodates four system boards with a maximum of six processors and 6 GB of memory. Alternatively, the additional system slot can be used to provide greater I/O connectivity.

- **Internal FC-AL Drives:**

The Sun Enterprise 3500 server has two internal disk banks (four disks per disk bank) that support up to eight 9.1-GB FC-AL disks, each with dual port connections, while the Sun Enterprise 3000 server supports ten internal SCSI disks with a single connection. The number of internal disks supported in the Sun Enterprise 3500 server was reduced in order to provide room for the additional system slot in the rear of the server. The newer drives, however, provide greater throughput and can be configured to increase the disk redundancy when compared to the Sun Enterprise 3000 server. Please see the "Sun Enterprise 3500 System Cabinet" section for further details.

Sun Enterprise 4500 Server

The only differences from the current Sun Enterprise 4000 server are the enhanced Gigaplane system bus and the faster 32X CD-ROM mentioned in the "Product Line Enhancements" above.

Sun Enterprise 5500 Server

In addition to the faster Gigaplane system bus and 32X CD-ROM changes, the Sun Enterprise 5500 server is now housed in a taller, data center cabinet. The new cabinet is 68 inches tall, compared to 56 inches for the Sun Enterprise 5000 cabinet. The taller cabinet was designed to support additional storage devices such as an additional Sun StorEdge A5X00 array without increasing the system footprint. The width and depth of the new data center cabinet remain the same as the Sun Enterprise 5000 cabinet.

Sun Enterprise 6500 Server

As with the Sun Enterprise 5500 server, the Sun Enterprise 6500 server includes the 32X CD-ROM and is also housed in a new, 68-inch data center cabinet, compared to 56 inches for the Sun Enterprise 6000 cabinet. As indicated earlier, the Gigaplane system bus on the Sun Enterprise 6500, unlike the Sun Enterprise 3500-5500 servers, does not run faster than 84 MHz.



Key Messages

The Sun Enterprise servers offer excellent performance, reliability, availability, and serviceability (RAS), along with expandability, investment protection, and upgradability (Performance excellence can be substantiated by comparing Sun Enterprise 6500 SPECint-rate95, SPECfp_rate95, and TPC-C results to competitive systems from HP, IBM, and DEC /Compaq).

- **Performance**

The Sun Enterprise 3500–6500 servers share a common architecture that is designed to offer balanced system performance. The systems feature outstanding integer and floating-point performance, supporting up to thirty UltraSPARC modules in the Sun Enterprise 6500 server. The system interconnect, the Gigaplane bus, delivers 2.68-GB-per-second throughput at 84 MHz and 3.2-GB-per-second at 100 MHz. High-speed networking is supported with integrated 10/100 Mb Ethernet and optional FDDI, ISDN, Token Ring, and ATM interfaces. Fast I/O capability is supported through either 64-bit/25 MHz SBus or 64-bit/66 MHz PCI channels.

- **Reliability, Availability, and Serviceability**

Extensive RAS capabilities are among the key strengths of the Sun Enterprise 3500–6500 servers. For details on these features, see “Reliability, Availability, and Serviceability” later in this document.

- **Expandability**

Sun Enterprise 3500–6500 servers can be expanded from small, entry-level configurations to system configurations that handle terabytes of data and thousands of users.

- **Scalability**

Sun Enterprise 3500–6500 servers are designed as highly modular systems. Customers can easily configure these systems to meet their application requirements by using the appropriate mix of CPU/memory boards and I/O boards. In addition, as their computing or I/O performance needs increase, customers can easily increase the capability of these systems by simply adding UltraSPARC modules, memory modules, or I/O boards. The high-throughput Gigaplane system bus and I/O architecture eliminate system bottlenecks and provide balanced system performance, even in a system with the maximum number of UltraSPARC modules or I/O devices.

- **Investment Protection**

Virtually all of the components used in the Sun Enterprise 3500–6500 servers are interchangeable. These components include CPU/memory boards, I/O boards, disk boards, UltraSPARC modules, memory modules, power/cooling modules, clock boards, and peripherals. Therefore, when upgrading to a larger system (for example, from a Sun Enterprise 4500 server to a Sun Enterprise 6500 server), customers can move these components from the existing system to the new system, protecting their investment. Even the previous-generation Sun Enterprise 3000–6000 server components can be carried over to the Sun Enterprise 3500–6500 server.

- **Upgradability**

The modular design of the Sun Enterprise 3500–6500 servers means that upgrading to new technologies and higher performance is easy. These systems are designed to support future generations of UltraSPARC processors, disk arrays, tape devices, and networking interface cards.



Sun Enterprise 3500–6500 Server Key Facts

- Each server can support multiple processors:

Sun Enterprise 3500	Sun Enterprise 4500–5500	Sun Enterprise 6500
1–8	1–14	1–30

- The Sun Enterprise 3500–6500 servers can be ordered with 250-MHz/4-MB or 336-MHz/4-MB UltraSPARC modules.
- The Sun Enterprise 3500–5500 servers can also be ordered with the 400-MHz/4-MB UltraSPARC modules.
- 167-MHz/0.5-MB, 167-MHz/1-MB, and 250-MHz/1-MB UltraSPARC modules are supported when carried over from existing Sun Enterprise 3000–6000 systems.
- The Gigaplane system bus delivers a throughput rate of 2.68 GB per second at 84 MHz (when using the 167-MHz, 250-MHz or 336-MHz processors). This throughput rate increases to 3.2 GB per second when running at 100 MHz (when using the 400-MHz processors in the Sun Enterprise 3500–5500).
- Several boards can be installed in each server:

Sun Enterprise 3500	Sun Enterprise 4500–5500	Sun Enterprise 6500
Up to 5 boards	Up to 8 boards	Up to 16 boards

- Five types of plug-in boards are available:
 - CPU/memory board
 - SBus, Graphics, and PCI I/O boards
 - Disk board (Sun Enterprise 4500, Sun Enterprise 5500, and Sun Enterprise 6500 only)
- CPU/memory boards can support up to two UltraSPARC modules and two memory banks (up to 2 GB).
- CPU/memory boards are hot pluggable. Hot-swap software support (Dynamic Reconfiguration) will be available with an upcoming version of the Solaris 7 Operating Environment.
- The SBus I/O board with FC-AL has three SBus slots, two empty FC-AL sockets, one fast/wide SCSI port, and one 10/100-Mb-per-second Ethernet port. This board has two SBus channels.
- Graphics I/O boards contain two SBus slots, one UPA slot for a Creator3D or Sun Elite3D graphics board, two empty FC-AL sockets, one fast/wide SCSI port, and one 10/100-Mb Ethernet port. This board has one SBus channel.
- PCI I/O boards have two PCI slots, on-board fast/wide SCSI, and 10/100-Mb-per-second Ethernet. This board has two PCI-66 (66-MHz, 64-bit) channels and two standard PCI (33-MHz, 32-bit) channels.
- I/O boards are hot swappable with the Alternate Pathing and Dynamic Reconfiguration software (Solaris 2.6 Hardware: 5/98).
- The 8.4-GB disk board contains two 4.2-GB, 7200-rpm, fast/wide SCSI-2 disk drives.
- * The Sun Enterprise 3500–6500 servers support redundant, hot-swappable power/cooling modules.
- The Sun Enterprise 3500–6500 servers run on the following operating environments: Solaris 2.5.1 Hardware: 11/97 (or later), Solaris 2.6 Hardware: 3/98 (or later) or the Solaris 7 Operating Environment.
- Memory options include 256 MB (8 x 32-MB modules) and 1 GB (8 x 128-MB modules).
- Floor brackets may be installed to help prevent the Sun Enterprise 3500, Sun Enterprise 5500, Sun Enterprise 6500 servers, and Sun Enterprise expansion cabinet from shifting in the event of extreme floor movement.

Sun Enterprise™ 3500–6500 Server Positioning

Just the Facts



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- The Sun Enterprise 4500 may be rack mounted into a Sun Enterprise expansion cabinet or Sun Enterprise 5500 or 6500 system cabinet.
- The Sun StorEdge A5X00 arrays, Sun StorEdge A1000/D1000 disk trays, Sun StorEdge FlexiPack removable storage trays, and Sun StorEdge Tape Libraries may be installed in the Sun Enterprise 5500 or Sun Enterprise 6500 system cabinet.

Performance Comparison

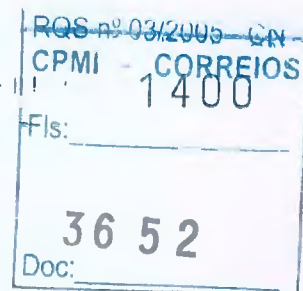
The table below illustrates the significant performance increases from the entry-level Sun Enterprise 3500 to the high-end Sun Enterprise 6500 server. (Results are based on 400-MHz, 4-MB Ecache modules for the Sun Enterprise 3500-5500 and 336-MHz, 4-MB Ecache modules for the Sun Enterprise 6500.) The SPECint_rate95, SPECfp_rate95, and LADDIS results are available at

<http://www.specbench.org/results.html>.

Specifications	Sun Enterprise 3500 (8 CPUs)	Sun Enterprise 4500 (12 CPUs)	Sun Enterprise 5500 (12 CPUs)	Sun Enterprise 6500 (30 CPUs)
Processor	400 MHz/4 MB	400 MHz/4 MB		336 MHz/4 MB
Sun Microsystems relative OLTP performance (based on Solaris 7) ⁱ	7.92	10.72		14.74 (24 CPUs)
SPECint_rate95	1,234	1,828		3,480 (30 CPUs)
SPECfp_rate95	1,611	2,209		3,021 (30 CPUs)
LADDIS (based on Solaris 2.6)	11,681@15.8 (6 x 336 MHz CPUs)	21,192@15.7 (12 x 336 MHz CPUs)		28,993@20.4 (24 CPUs)
Linpack DP 1000 (based on Sol. 2.6)	2.95	4.50 (14 CPUs)		5.19 (30 CPUs)
Linpack DP Rmax (based on Sol. 2.6)	5.77	10.05 (14 CPUs)		17.89 (30 CPUs)

ⁱ Relative OLTP performance compared to an Sun Enterprise server with a single 336-MHz UltraSPARC processor with 4-MB Ecache

Sun Enterprise™ 3500-6500 Server Positioning





The following table shows a performance comparison of the SPARCserver™ 1000E, the Sun Enterprise 3000–5000, and Sun Enterprise 3500–5500 servers.

Performance Type	SPARCserver 1000E	Sun Enterprise 3000	Sun Enterprise 3500	Sun Enterprise 4000/4500/5000/5500
Relative CPU performance				
• integer	1 (8)	approx. 4.1 (6)	approx. 6.6 (8)	approx. 11.3 (14)
• floating point	1 (8)	approx. 5.3 (6)	approx. 8.2 (8)	approx. 12.6 (14)
System bus throughput	312 MB/sec.	2.68 GB/sec. @84 MHz 3.2 GB/sec. @100 MHzⁱ		
Memory latency	1200 ns	approx. 300 ns		approx. 300 ns
Networking performance	10 MB/sec.	100 MB/sec.		
I/O performance (aggregate)	1-to-4 SBuses, 100 MB/sec. each	1-to-6 SBuses, 200 MB/sec. each 1-to-6 PCI buses, 528 MB/sec. each	1-to-8 SBuses, 200 MB/sec. each 1-to-8 PCI buses, 528 MB/sec. each	1-to-14 SBuses, 200 MB/sec. each 1-to-12 PCI buses, 528 MB/sec. each
SCSI performance	10 MB/sec.	20 MB/sec.		
Fibre channel performance	25 MB/sec.	 100 MB/sec.		

ⁱ The Sun Enterprise 3000–5000 servers require a Gigaplane field upgrade to run the Gigaplane system bus at 100 MHz.

The following table shows a performance comparison of the SPARCcenter™ 2000E and the Sun Enterprise 6000 and 6500 servers:

Performance Type	SPARCcenter 2000E	Sun Enterprise 6000/6500
Relative CPU performance		
• integer	1 (20)	approx. 5.6 (30)
• floating point	1 (20)	approx. 7.6 (30)
System bus throughput	625 MB/sec.	2.68 GB/sec. @84 MHz
Memory latency	1200 ns	approx. 300 ns
Networking performance	10 MB/sec.	100 MB/sec.
I/O performance	1 to 10 SBuses, 100 MB/sec.	1 to 30 SBuses, 200 MB/sec. each 1 to 12 PCI buses, 528 MB/sec. each
SCSI performance	10 MB/sec.	20 MB/sec.
Fibre channel performance	25 MB/sec.	100 MB/sec.



Product Line Summary

The Sun Enterprise family of servers is targeted at strategic markets chosen by Sun: manufacturing, finance, telecommunications, government, education, health care, retail, design automation, and oil and gas. The following pages describe how each server in the Sun Enterprise family has different characteristics and is therefore deployed in a different capacity within the target markets.

Target Markets and Users for the Sun Enterprise 3500 Server

The Sun Enterprise 3500 server is an affordable server with unprecedented power and reliability in its class. The Sun Enterprise 3500 server enables customers to deploy sophisticated business and technical applications with the kind of performance and reliability previously available only in very expensive, large-scale systems.

The Sun Enterprise 3500 server is ideal for customers who need application servers with tremendous network throughput and processing power, in addition to high reliability, availability, and serviceability. The Sun Enterprise 3500 server is also ideal for price-sensitive customers who need integrated storage or want the investment protection offered by an expandable family of servers. Typical Sun Enterprise 3500 server customers may already own a SPARCserver 20 or an entry-level SPARCserver 1000E system.

The Sun Enterprise 3500 server is recommended for running the new generation of network-based business programs, such as SAP R/3, Oracle Financials, or PeopleSoft Human Resources. The Sun Enterprise 3500 server is also recommended for use in technical environments. The Sun Enterprise 3500 server can be used for running dedicated, computation-intensive applications and high-end graphics applications, such as ECAD and MCAD.

Sun also offers the Sun HPC 3500 which combines the Sun Enterprise 3500 server with High-Performance Computing (HPC) software that allows the platform to scale in the most demanding technical and supercomputing environments.

The Sun Enterprise 3500 server is designed to be primarily a single-enclosure system; however, it does support external peripherals such as the Sun StorEdge A1000, D1000, A3500 and Sun StorEdge A5X00 products. The Sun Enterprise 3500 server should be recommended over the Sun Enterprise 450 server when the customer requires more than four CPUs and 4 GB of memory, or when the customer needs the expandability and investment protection offered by the Sun Enterprise 3500-6500 server family.

Target Markets and Users for the Sun Enterprise 4500 Server

The Sun Enterprise 4500 server is a versatile server with exceptional value and scalability for companies requiring an affordable business server with tremendous computing power, plus the ability to scale system performance and capacity as their needs grow.

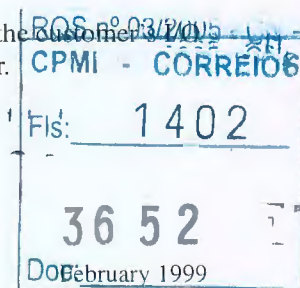
The Sun Enterprise 4500 server is ideal for customers who need an enterprise-wide application server with high reliability, availability, and serviceability. Typical Sun Enterprise 4500 server customers may already own a six-to-eight CPU SPARCserver 1000E system.

The Sun Enterprise 4500 server is recommended for running business-critical applications that support thousands of users. These applications include large departmental databases, customer-management applications, or decision-support applications.

The Sun Enterprise 4500 server is recommended over the Sun Enterprise 3500 server if the customer's memory and CPU growth requirements go beyond the capacity of the Sun Enterprise 3500 server.



Just the Facts





Target Markets and Users for the Sun Enterprise 5500 server

The Sun Enterprise 5500 server is a scalable and reliable datacenter server capable of running mission-critical applications, supporting thousands of users.

The Sun Enterprise 5500 server is ideal for customers who have mainframe-class system requirements. With features previously available only in proprietary fault-tolerant and mainframe systems, the Sun Enterprise 5500 server has a comprehensive set of uptime features. Typical Sun Enterprise 5500 server customers may already own a six-to-eight CPU SPARCserver 1000E system in a stacker unit or data center cabinet. Typical Sun Enterprise 5500 server customers may also have two-to-six CPU SPARCcenter 2000E systems.

The Sun Enterprise 5500 server is recommended over the Sun Enterprise 4500 server if the customer needs a rack-mount system with integrated mass storage. The Sun Enterprise 5500 server is also ergonomically better suited for a data center environment because it has easily accessible CD-ROM and tape drives and direct access to the Sun StorEdge tape library. The Sun Enterprise 5500 server also has an enhanced warranty which includes more comprehensive ServerStartSM system installation compared to basic installation on the Sun Enterprise 4500 server.

Target Markets and Users for the Sun Enterprise 6500

The Sun Enterprise 6500 server is ideal for customers who need to build network computing applications of a size and scale that previously required mainframes. The customer receives the benefits of improved data access and flexibility even as databases grow to multiple terabytes. Typical Sun Enterprise 6500 server customers may already own large SPARCcenter 2000 systems.

The Sun Enterprise 6500 server offers more than twice the CPU and memory expandability of the Sun Enterprise 5500. The Sun Enterprise 6500 server should be recommended when the Sun Enterprise 5500 server does not offer enough expandability. The Sun Enterprise 6500 server should be recommended over the Sun Enterprise 10000 server when:

- The customer's simultaneous processing and I/O requirements can be met with one Sun Enterprise 6500 server
- The Sun Enterprise 6500 server meets the customer's availability requirements
- Customer is driven to clustering for seamless failover requirements
- Customer prefers to distribute smaller systems rather than take a centralized approach with one large system

The Sun Enterprise 6500 server should be recommended over the Sun Enterprise 5500 server when the Sun Enterprise 5500 server does not offer enough CPU and I/O growth for the customer.

Sun EnterpriseTM 3500-6500 Server Positioning



Just the Facts

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Target Markets and Users for the Sun Enterprise 10000

The Sun Enterprise 10000 server is the industry's highest-performance (according to TPC-D results.), most-balanced SMP system (competitors of the Sun Enterprise 10000 do not have SMP, but NUMA or MPP). It has the highest availability in UNIX systems other than fault-tolerant systems. The Sun Enterprise 10000 server has the following high-availability features, which the competitors do not have: fault-tolerant power/cooling, dynamic reconfiguration with hot-swappable system boards, alternate pathing, dynamic domains and fail-over between internal domains. Other features employed by the Sun Enterprise 10000 server and the competitors include system service processor and clustering.

Its RAS features are comparable to mainframes. In fact, it can be configured to have no single point of hardware failure.

The Sun Enterprise 10000 server is targeted for high-end commercial and technical markets. Key applications include data warehousing, data mining, high-volume OLTP, LAN consolidation, analytics, and Internet/intranet.

The Sun Enterprise 10000 server should be recommended over the Sun Enterprise 6500 server when:

- The customer's simultaneous processing and I/O requirements cannot be met with one Sun Enterprise 6500 server
- Customer's availability requirements cannot be met by one Sun Enterprise 6500 server
- There is no reason to prefer clustered Sun Enterprise 6500 servers over one Sun Enterprise 10000 server (for example, if failover is not required)
- System administration prefers one large, centralized system (potentially split into domains) over multiple, smaller ones

Note: See Sun Enterprise 10000 server Just the Facts for more detailed information on this product.

Sun Enterprise™ 3500-6500 Server Positioning

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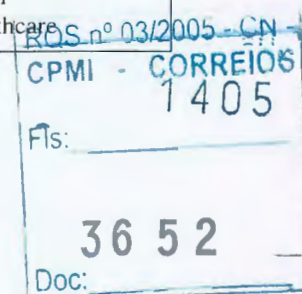




Product Line Comparisons

Product	Positioning	Applications	Markets
Sun Enterprise 10000	Highest-end server for customers who require the highest performance and availability. For main-frame-class, mission-critical applications.	• Data warehousing • Data mining • High-volume OLTP • LAN consolidation • Analytics • Internet/intranet	• Financial services • Telecommunications • Government • Petroleum • Education
Sun Enterprise 6500	Highly scalable and expandable, offering performance and availability required for large-scale database applications.	• Data warehousing • Data mining • Business apps • CMS™ OLTP • NFS™ • Design automation • Analysis and simulation • Video	• Manufacturing • Finance • Telecommunications • Government • Education • Healthcare • Retail • Oil and gas • Pharmaceuticals • Chemical • Internet commerce
Sun Enterprise 5500	Affordable datacenter system designed to deliver high performance and high availability for enterprise-wide applications supporting thousands of users.		
Sun Enterprise 4500	Highly expandable yet compact system delivering high-performance scalability for department applications in a distributed network-computing environment.		
Sun Enterprise 3500	An affordable system for departmental business applications supporting up to hundreds of users in office environments. For customers that want the investment protection of an upgrade path in an expandable family of servers.	• Database server • Business apps • NFS • CMS • Graphics/imaging • Modeling, simulation analysis • Video	• Manufacturing • Finance • Telecommunications • Government • Education • Healthcare • Retail • Oil and gas • ECAD/MCAD • Internet commerce
Sun Enterprise 450	Affordable high-performance SMP network application server. Ideal for workgroups, larger web sites, branch offices or distributed enterprise applications.	• Database server • Business apps • OLTP • NFS • Internet gateway • Web mail services • Groupware	• Manufacturing • Finance • Telecommunications • Government • Education • Retail • Healthcare

Sun Enterprise™ 3500-6500 Server Positioning





Product Line Specification Summary

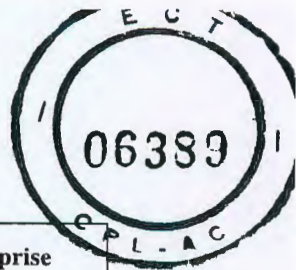
The following chart illustrates the specifications of the Sun Enterprise Server product line.

Specifications	Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500	Sun Enterprise 6500	Sun Enterprise 10000
Packaging	Tower/Deskside	Tabletop	Datacenter Cabinet		
Number of CPUs	1 to 8	1 to 14		1 to 30	16 to 64
CPU clock rate	250 MHz, 336 MHz, 400 MHz				
Ecache per CPU	4 MB				
Maximum memory	8 GB	14 GB		30 GB	64 GB
System bus	2.68 GB/sec. @84 MHz 3.2 GB/sec. @100 MHz ⁱ				10.67 GB/sec@84 MHz 12.8 GB/sec. @100MHz
Maximum SBus/PCI slots	SBus: 12 PCI: 8	SBus: 21 PCI: 12		SBus: 45 PCI: 12	64
Maximum internal disk	72.8 GB	33.6 GB	720 GB	576 GB	191 GB
Maximum total disk	> 6 TB	>10 TB	>10 TB	>20 TB	> 20 TB
Maximum number Creator3D/ Sun Elite3D m6 graphics boards	3	4		8	—
RAS features (see “Reliability, Availability, and Serviceability” section for complete RAS details)	• Hot-plug boards • Hot-swap power • Hot-swap cooling • Redundant power • ASR • Remote control • ECC-protected data paths • ECC memory • CPU power control (Solaris 2.6 Operating Environment) • Hot-swap FC-AL disks • RAID 0, 1, 5 • Hot-disk sparing				• Hot-swap boards • Fault-tolerant power • ASR • Hostview • Remote control • ECC-protected data paths • ECC memory • Dynamic domains
RAS features with Solaris 2.6 Hardware: 5/98	Dynamic Reconfiguration (Hot swap for I/O boards) Alternate Pathing				Currently available
Latest RAS and Resource Management features	Sun Enterprise SyMON™ (replaced Solstice SyMON™ Solaris Resource Manager)				
Future RAS features	Dynamic Reconfiguration (Hot swap for CPU/memory boards)				Currently available

Sun Enterprise™ 3500-6500 Server Positioning

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Specifications	Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500	Sun Enterprise 6500	Sun Enterprise 10000
Operating Environment	Solaris 2.5.1 Hardware: 11/97 ⁱⁱ or Solaris 2.6 Hardware: 3/98 ⁱⁱⁱ (or later) or Solaris 7				
Warranty (may vary according to geography)	One year, next day, on site 8-hour phone		One year, 4 hours, on site 4-hour phone		

- ⁱ Sun Enterprise 6500 system bus cannot run at 100 MHz, and, therefore, does not support the 400-MHz/4-MB UltraSPARC processor.
- ⁱⁱ Two patches are required for Sun Enterprise 3500–6500 servers running Solaris 2.5.1 Hardware: 11/97. Please refer to the “Solaris Operating Environment” section for details.
- ⁱⁱⁱ Although Dynamic Reconfiguration and Alternate Pathing have been available on the Sun Enterprise 10000 server when running Solaris 2.5.1 Operating Environment, a minimum of Solaris 2.6 Hardware: 5/98 is required for these features when running the Solaris 2.6 Operating Environment.

Sun Enterprise™ 3500–6500 Server Positioning

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Reliability, Availability, and Serviceability

The Sun Enterprise™ 3500–6500 servers offer excellent reliability, availability, and serviceability (RAS) features. They have the most availability features in their class.

Reliability

- Passive, centerplane bus (Sun Enterprise 4000–6000 and Sun Enterprise 4500–6500 servers), or backplane bus (Sun Enterprise 3000 and Sun Enterprise 3500 server), increases mean time between failures (MTBF) of the system compared to previous-generation servers
- Simple, elegant, centerplane bus design reduces the amount of bus circuitry required, increasing the MTBF of the system
- Current-sharing power circuitry supports redundant power capability
- ECC-protected data throughout the system increases data integrity
- Parity-protected address and control signals increase the integrity of these signals

Availability

- Effective system diagnostics minimize downtime
- Multiple UltraSPARC™ modules, CPU/memory boards, and I/O boards provide redundancy
- Redundant power supplies and current-sharing power circuitry keep the system running if a power supply fails
- Enhanced Automatic System Recovery (ASR) quickly reconfigures the system around any failed components
- Dual variable-speed fans in each power/cooling module keep the system cool if one fan within a module fails
- Dual disk array host interfaces
- Dual, independent connections to FC-AL internal disks (Sun Enterprise 3500 server)
- CPU Power Control (available with the Solaris™ 2.6 Operating Environment) removes an active CPU from the system configuration and powers it off if environmental sensors detect that the processor is running too hot due to a cooling problem. This is done without any interruption to running processes and without a reboot of the server
- Remote administration control allows remote reboots and power cycling
- The Sun Enterprise SyMON™ system monitor software, which is included with the Sun Enterprise 3500–6500 servers, maximizes uptime by predicting hardware failures

Reliability, Availability, and Serviceability

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- The Sun Enterprise SyMON software also provides an easy user interface and multi-system management capability
- Redundant, time-of-day clock
- Dynamic Reconfiguration of I/O boards (Solaris 2.6 Hardware: 5/98) and CPU/memory boards (future Solaris 7 Operating Environment release) allows boards to be attached to and detached from the system online, without requiring a reboot
- Alternate Pathing (Solaris 2.6 Hardware: 5/98) enables the network or storage connection to be moved from an active controller to a stand-by controller, thereby enabling Dynamic Reconfiguration of the I/O boards while preserving the network/storage connection
- Solaris Resource Manager provides the ability to allocate critical resources such as CPU and virtual memory to specific applications or users. This provides efficient utilization of resources and availability of resources for important applications - thus specific service levels can be delivered.

Serviceability

- Modular system design makes it easy to replace failed components
- Hot-swap I/O boards (Solaris 2.6 Hardware: 5/98) make it possible to perform a full hardware installation and reconfiguration without system interruption
- Hot-plug CPU/memory boards make it possible to perform the hardware installation without system interruption (CPU/memory boards will become hot-swap once Dynamic Reconfiguration becomes available with upcoming release of the Solaris 7 Operating Environment)
- Hot-swap power/cooling modules make it easy to replace failed modules or to upgrade the power and cooling capacity of the system
- Ability of Sun Enterprise SyMON software to notify a system administrator of a failure allows the system administrator to determine immediately which components have failed and need to be serviced
- Ability of Sun Enterprise SyMON software to predict memory and disk failures enables proactive hardware service and prevents hard failures
- Ability of Sun Enterprise SyMON to monitor all of the Solaris systems in the network from any desktop (UNIX®, Windows NT, Macintosh, etc)
- Improved remote administration control allows users to reboot and power cycle in a "lights out" environment
- Sun Validation Test Suite (SunVTS™) allows users to perform UNIX diagnostics

Reliability, Availability, and Serviceability

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New RAS Features

Dynamic Reconfiguration

Dynamic Reconfiguration is the ability to alter the configuration of a running system by bringing components online or taking them offline without disrupting system operation or requiring a system reboot. With the availability of Dynamic Reconfiguration, system boards can be logically and physically included in the system configuration, or logically deactivated and removed while the system is running.

This is particularly useful in mission-critical environments if a system board has failed and needs to be replaced or if new system boards need to be added to the system for additional performance and capacity.

Dynamic Reconfiguration increases system availability and flexibility by allowing the hot-swap CPU/memory and I/O board functionality that the Sun Enterprise 3000–6000 server hardware has supported from the beginning. Hot-swap functionality means that the components can be physically and logically removed or added while the system is running.

Dynamic Reconfiguration has previously been available only on the Sun Enterprise 10000 server within the Sun Enterprise server product line. This feature is currently unavailable with any other general purpose UNIX platform. Dynamic Reconfiguration includes:

- **Dynamic attach:** Logically (rather than physically) including I/O boards and CPU/memory boards into the system configuration and making them available for use without rebooting the system. For example, both I/O boards and CPU/memory boards can be installed and logically attached while the system is online.
- **Dynamic detach:** Logically (rather than physically) removing components from a configuration, including taking the components offline and powering them down, thus making them ready for physical removal.

Dynamic Reconfiguration for I/O boards is available for Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers with Solaris 2.6 Hardware: 5/98 and Dynamic Reconfiguration for CPU/memory boards is expected to be available with a future version of the Solaris 7 Operating Environment in the first half of calendar 1999. Note that Dynamic Reconfiguration for I/O boards requires Flashprom software release 3.2.14 or later.

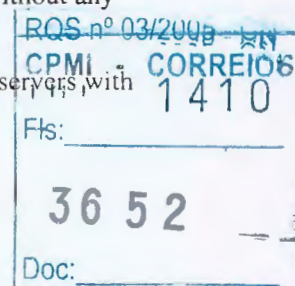
Please refer to *Availability Features in the Sun Enterprise 3500 to Sun Enterprise 6500 Server Family—A Technical White Paper* for more information on Dynamic Reconfiguration.

Alternate Pathing

Alternate Pathing is an extension of Dynamic Reconfiguration that enhances network and external storage availability. It allows dynamic reconfiguration of the I/O boards without disrupting the network or external storage connection. For example, assume that the active Ethernet connection resides on an I/O board that needs to be removed from the system. Removal of the I/O board means that the Ethernet controller must be taken offline, however that would disconnect the network access. Alternate Pathing provides the ability to switch the logical Ethernet connection to another, stand-by Ethernet controller residing on a different I/O board, thereby enabling the I/O board with the original Ethernet connection to be removed without any disruption to the network connection.

Alternate Pathing is available for Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers with Solaris 2.6 Hardware: 5/98.

Reliability, Availability, and Serviceability



System Architecture



Overview

The Sun Enterprise™ 4500, Sun Enterprise 5500, and Sun Enterprise 6500 servers are designed around a centerplane, with system slots in both the front and rear. Each slot can accommodate either a CPU/memory, I/O, or disk board with some limitations. Almost any combination of boards is allowed, as long as the required minimum of one CPU/memory board and one I/O board is met. One I/O board must be inserted into slot 1 in order to provide the SCSI connection to the CD-ROM drive and the optional internal tape device. In addition, the Sun Enterprise 4500 and Sun Enterprise 5500 servers support a maximum of four 8.4-GB disk boards, while the Sun Enterprise 6500 server supports a maximum of two disk boards.

The Sun Enterprise 3500 server is the smallest member of the Sun Enterprise 3500–6500 server family. There is little need for a centerplane arrangement because it has only five slots. The centerplane arrangement allows for larger configurations in less physical space. Intended as a deskside system, the Sun Enterprise 3500 server uses a traditional backplane configuration with all five boards plugged into one side of the system. The Sun Enterprise 3500 server also has internal mounting for up to eight FC-AL 3.5 x 1.6-inch (or 1.0-inch) disks along with a CD-ROM and tape drive.

Each CPU/memory board in the Sun Enterprise 3500–6500 servers supports up to two UltraSPARC™ modules and 2 GB of memory (see the “CPU/Memory Board” section for more details). SBus, Graphics, and PCI I/O boards are available for the Sun Enterprise 3500–6500 servers (see the “I/O Boards” section for more details). CPU/memory boards, I/O boards, power/cooling modules, and clock boards are interchangeable within the Sun Enterprise 3500–6500 product line. The clock board contains the keyboard and mouse port, two serial ports, time-of-day clock, and the IDPROM. The frequency of the clock, the processor clock, and the system clock are all programmable through firmware.

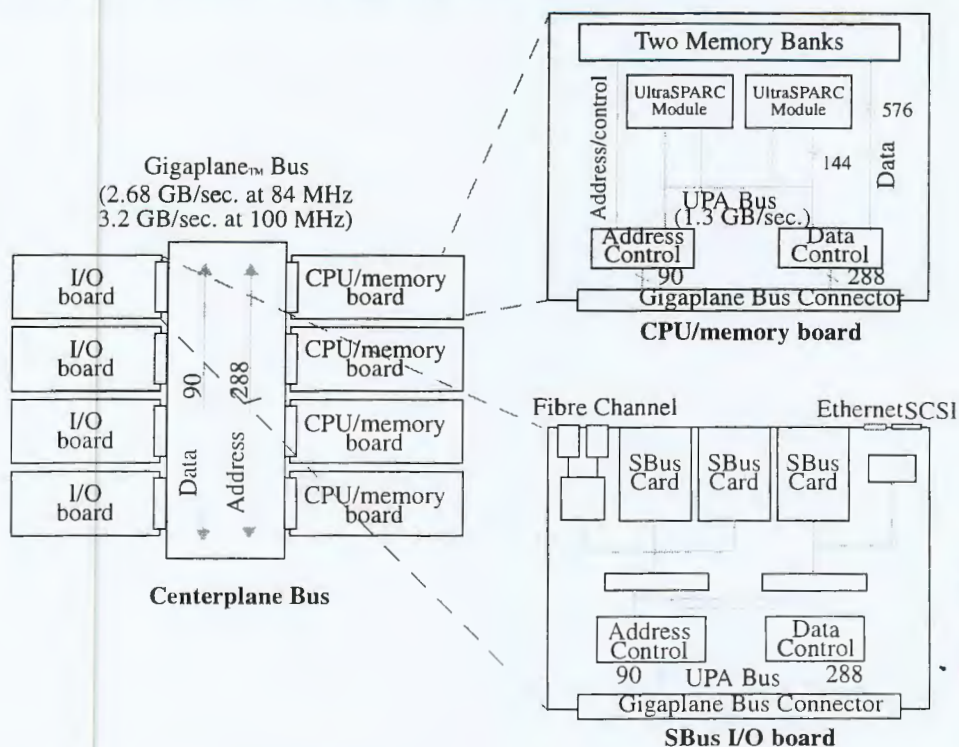


Figure 1. The Sun Enterprise 3500–6500 system bus architecture



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System Bus

The system bus for the Sun Enterprise 3500–6500 servers is the Gigaplane™ system bus, a packet-switched bus. This bus has a split-transaction design with separate buses for address and data. This design provides a faster transfer rate than system buses that have the same paths for address and data.

The Gigaplane system bus has been revised from the one used in the Sun Enterprise 3000–6000 servers, which has a maximum speed of 84 MHz—sufficient to support the UltraSPARC processors running at up to 336 MHz when operating with a 4:1 processor-to-Gigaplane speed ratio. The enhanced Gigaplane system bus on the Sun Enterprise 3500–5500 servers runs at a rate of up to 100 MHz. This enables support for the new 400-MHz/4-MB UltraSPARC processor without changing the processor-to-Gigaplane speed ratio. The maximum throughput is 2.68 GB per second at 84 MHz and 3.2 GB per second at 100 MHz.

The physical length of the Gigaplane in the Sun Enterprise 6500 (and Sun Enterprise 6000) prohibits the Gigaplane from running at 100 MHz. The maximum Gigaplane speed on the Sun Enterprise 6500 will remain at 84 MHz. As a result, with a 4:1 processor-to-Gigaplane speed ratio, this new 400-MHz processor cannot be supported. A future UltraSPARC processor, with a clock speed greater than 336 MHz will be available for the Sun Enterprise 6500 as well as the Sun Enterprise 6000.

In order to realize the increased Gigaplane bus speed, the Sun Enterprise 3500–5500 servers ship with new, enhanced CPU/memory and I/O boards that are also capable of running at 100 MHz. These boards are backwards compatible and will, therefore, be supported on existing Sun Enterprise 3000–6000 systems. However, the maximum Gigaplane speed will be limited to 84 MHz, unless the Gigaplane is upgraded (see the “Upgrades” section for details).

In addition, the previous-generation of CPU/memory boards and I/O boards (84-MHz boards) are supported on the Sun Enterprise 3500–6500 servers (no factory installation). However, such systems run the Gigaplane system bus at a maximum of 84 MHz.

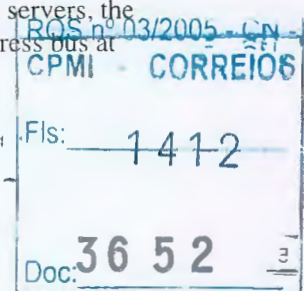
The previous-generation Sun Enterprise 3000–5000 systems are field upgradeable to support the enhanced Gigaplane speed of up to 100 MHz and thereby support the new 400-MHz processor. The upgrade involves system boards, UltraSPARC modules, and a base package upgrade kit. The base package upgrade kit varies among the server models and may include a new clock board, Gigaplane centerplane, and an enhanced SCSI peripheral tray for the Sun Enterprise 5000 system. In most cases, the clock board and four-slot backplane can run the Gigaplane system bus at up to 100 MHz in the Sun Enterprise 3000 server without requiring a base package upgrade (see the “Upgrades” section for details).

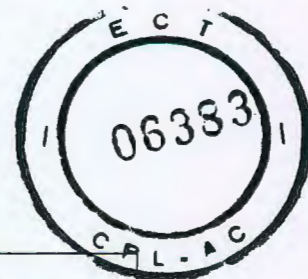
The Ultra™ Port Architecture (UPA) bus is used as an intermediate bus connecting CPU/memory boards and I/O boards to the Gigaplane bus. The UPA bus also runs at the same speed as the Gigaplane system bus, with a peak throughput of 1.3 GB per second at 84 MHz and 1.55 GB per second at 100 MHz.

Reducing the memory latency of the system bus was one of the primary system bus design goals. The memory latency for the Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers is approximately one-fourth the memory latency of the SPARCcenter™ 2000E system. This reduction was the result of the following design changes:

- **Separate address, data, and control signals.** In the SPARCserver™ 1000E system, the address and data shared the same bus. In the Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers, the address and data use separate buses. This allows read requests to be transmitted on the address bus at the same time data from the previous read request is being transmitted on the data bus.
- **Wider data buses.** The data buses throughout the Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers are two-to-four times wider than the data buses in the SPARCserver 1000E systems.

System Architecture





Data Bus	Sun Enterprise 3000-6000; Sun Enterprise 3500-6500	SPARCserver 1000E	Difference compared to SPARCserver 1000E	SPARCcenter 2000E	Difference compared to SPARCcenter 2000E
Memory data bus	576 bits	72 bits	8 times	144 bits	4 times
Data bus	288 bits	72 bits	4 times	72 bits	2 times
CPU data bus	144 bits	64 bits	2 times	64 bits	2 times

- **Faster bus.** The Gigaplane bus, which runs at 84 MHz (with the potential of running up to 100 MHz), is faster than the 50-MHz XDBus™ used in the SPARCserver 1000E and SPARCcenter 2000E.
- **Enhanced arbitration cycles.** Zero cycle arbitration mode, used in certain situations, greatly reduces bus arbitration time. Additionally, by using two cycle address and data packets (versus two-to-nine cycles on the SPARCserver 1000E system), devices have much less time to wait in order to get on the bus.
- **Faster memory response.** A number of techniques are employed to get a faster response to data requests:
 - 576-bit-wide memory
 - 16-way memory interleave
 - Read bypass writes in memory controller
 - Queue bypasses for requests and data
 - Writebacks handled after miss

System Bus RAS Features

The following four attributes of the system bus architecture contribute to many of the RAS features of the Sun Enterprise 3500-6500 (and Sun Enterprise 3000-6000) servers:

- **Passive backplane system bus.** A passive backplane bus minimizes the number of active components required to control the bus. This results in a more reliable system.
- **Sturdy connectors and better board-insertion guides.** The SPARCserver 1000E has 100 pins on a connector. The Sun Enterprise 3500-6500 servers are much sturdier, with 450 pins on a connector that is only twice the size of the SPARCserver 1000E connector. The sturdier connectors, combined with better guides for board insertion, minimize the chance of the system being disabled due to bent pins from a faulty board insertion.
- **ECC-protected data paths.** All the data paths in the Sun Enterprise 3500-6500 servers are fully protected by error checking and correction (ECC), which is able to detect single-bit and double-bit errors and to correct single-bit errors.
- **Parity-protected address and data paths.** All the address and data paths in the Sun Enterprise 3500-6500 servers are protected by parity.

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System Bus Questions and Answers

Why didn't Sun use UPA crossbar bus technology in the Sun Enterprise 3500–6500 servers as in the Ultra 1 desktop workstation?

The crossbar bus used in the Ultra 1 desktop workstation supports a maximum of four devices. The Sun Enterprise 4500 and Sun Enterprise 5500 servers have eight slots and the Sun Enterprise 6500 server has 16 slots, with multiple devices per slot. Perhaps more importantly, crossbar bus technology was not needed for the Sun Enterprise 3500–6500 system interconnect because the Gigaplane bus is fast enough to support 30 CPUs without the use of crossbar technology.

At 100 MHz, the Gigaplane bus provides 3.2 GB per second of sustained throughput making it suitable for large symmetrical multiprocessor (SMP) servers. The Gigaplane bus runs at 84 MHz, provides a throughput of 2.68 GB per second and is able to support up to 16 boards in the Sun Enterprise 6500 server. Each board contains a UPA bus that connects to the Gigaplane bus and “multiplexes” the associated component loads, such as CPU and SBus, onto a single connection to the Gigaplane bus. This design is able to support many more CPU and SBus slots than if they were connected directly to the Gigaplane bus.

Why is the Gigaplane-XB™ crossbar technology used in the Sun Enterprise 10000 server not used in the Sun Enterprise 3500–6500 servers?

The implementation of the Gigaplane-XB interconnect would have increased the cost of the system substantially. The Gigaplane-XB technology provides higher system throughput, supports more devices (64 processors) and enables partitioning (domains), which are essential in the Sun Enterprise 10000 server.

Will there be a latency penalty for memory access relative to the single-level bus implementation of the Ultra 1 desktop?

There will be some penalty, but exceptional effort has gone into minimizing this penalty. Relative to the Ultra 1 desktop, the penalty for access to the first word in a data request is five clock cycles, or 60 ns. This decreases to two clock cycles (or 24 ns) by the last word in a data request. This minimal latency penalty should be imperceptible to the user, as it was in systems based on XDBus technology.

How can the sustained data transfer rate on the Gigaplane bus be so close to the peak bandwidth?

There are two reasons why the sustained data transfer rate on the Gigaplane bus is so close to the peak bandwidth. The first is separate address and data buses. With separate address and data buses, data requests can be sent out on the address bus at the same time that data from a previous data request is on the data bus. The second is out-of-order data transmission, which allows data to be put on the data bus in a different order than requested. This helps maximize the bus usage by minimizing unused data bus bandwidth.

Why does the Sun Enterprise 3500 server have a new clock board and backplane if the Sun Enterprise 3000 server backplane is capable of running at up to 100 MHz?

The new backplane on the Sun Enterprise 3500 server is required to support the additional (fifth) system slot, not to support the faster Gigaplane speed. The new centerplane on the Sun Enterprise 4500–5500 servers is required to support the faster Gigaplane speed. The new clock board is required to support the new five-slot backplane on the Sun Enterprise 3500 server and the enhanced eight-slot and 16-slot centerplane on the Sun Enterprise 4500, Sun Enterprise 5500, and Sun Enterprise 6500 servers, respectively.

System Architecture



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Why did Sun move from a backplane to a centerplane design (Sun Enterprise 4500–6500 servers only)?

The centerplane design allows the system to support twice as many boards for a given length of system bus. This reduced length translates into an electrically shorter bus than would be possible with a backplane. This is important because bus speed (frequency) is, in part, determined by bus length. All other things being equal, the shorter the bus, the faster it can run.

The more densely packed centerplane also allows for more compact packaging. With this configuration, the Sun Enterprise 4500 server can support eight slots with a smaller footprint than the SPARCserver 1000E system that supports four slots. Also, the Sun Enterprise 6500 server can support 16 slots in the same size data center cabinet that supports a ten-slot SPARCcenter 2000E system.

What happens if there isn't an I/O board in slot 1? Will the system be functional?

Yes, it will be fully functional, with the exception that the internal CD-ROM and tape drives will not be accessible.

Will the new, enhanced Gigaplane system bus provide increased system performance while running 250-MHz or 336-MHz UltraSPARC processors?

No, the performance benefits of the enhanced Gigaplane system bus is realized only when using processors with clock speeds in excess of 336 MHz. The Gigaplane system bus runs at up to 84 MHz when using 250-MHz or 336-MHz processors. However, the new 400-MHz UltraSPARC processor increases the speed and throughput of the Gigaplane system bus, enabling it to run at up to 100 MHz and provide a throughput rate of up to 3.2 GB per second (2.68 GB per second on the Sun Enterprise 6500 Gigaplane system bus, which is capable of running at 84 MHz.)

Does the change to the Gigaplane system bus mean that the Sun Enterprise 3500–5500 servers perform better than similarly configured Sun Enterprise 3000–5000 servers?

No. There are three component speeds that determine the speed of the server: the speed of the Gigaplane system bus, the speed of the system boards, and the speed of the UltraSPARC module. These systems use the same processors as the previous systems. Therefore the Gigaplane system bus runs at the same speed in all systems providing the same performance.

System Architecture



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Graphics Support

Creator3D Graphics series 3 Overview

Creator3D Graphics series 3 is the latest generation of the Creator Graphics product family accelerates and supports diverse types of graphics needs ranging from 8-bit and 24-bit windowing to high-end 3-D graphics.

Creator3D Graphics series 3 is designed to match the CPU performance increase beyond the currently available CPU speeds. Series 3 accelerators have one clock for the internal graphics processing and another clock for the frame buffer enabling each part to run at maximum speed independently from each other.

Creator3D graphics has the following features:

- Full 2-D imaging and windowing acceleration, plus full 3-D acceleration
- Ideal for high-end 2-D, mid-range 3-D graphics, and solids in MCAD and MCAE, as well as high-end imaging and color publishing applications
- 24-bit true color, double-buffered up to 1280 x 1024
- 28-bit Z-buffer
- 8-bit overlay and visual planes
- Stereo display up to 960 x 680 at 112-Hz non-interlaced, double- and Z-buffered
- 15-MB 3D-RAM memory
- 1280 x 1024 at 76 Hz standard with programmable bootprom resolution
- NTSC/PAL video timings
- 128-bit DAC
- High resolution 1920 x 1200 at 70 Hz (single buffered) supporting 24-inch wide screen display

System Architecture



Just the Facts

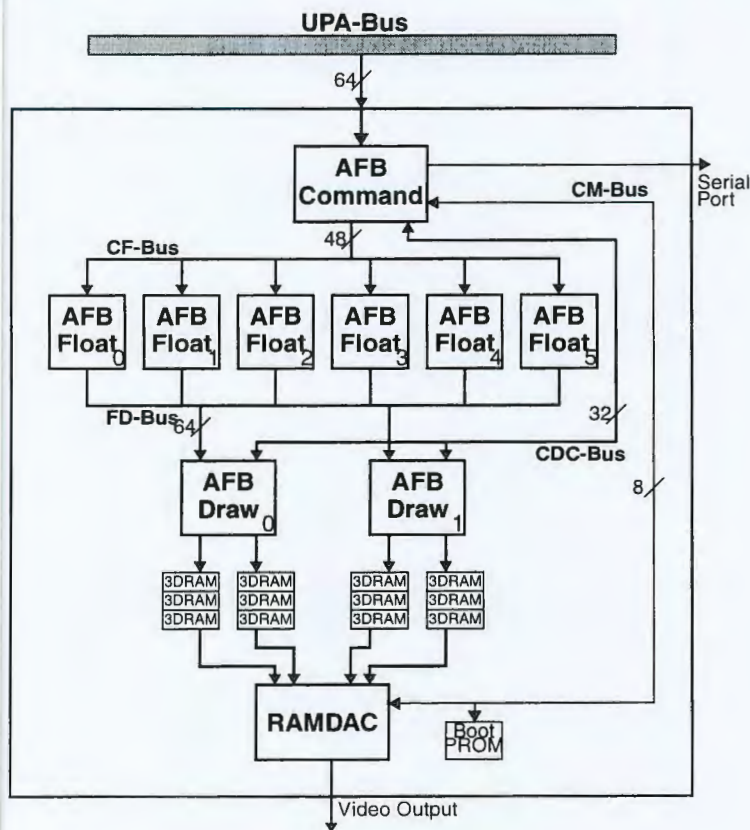
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Sun Elite3D Graphics Overview

Sun Elite3D greatly accelerates the rendering of 3-D triangles, vectors, and texture maps over what is possible with 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 Creator3D. 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.



System Architecture

Figure 2. Sun Elite3D Chip-level Diagram

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

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Sun Elite3D Features and Benefits

• Features

- Integrated imaging
- Very high performance accelerated 24-bit double-buffered 3-D graphics
- 28-bit Z-buffer
- 8-bit overlay plane
- Gouraud shading
- Alpha blending and screen door transparency
- Line and dot anti-aliasing
- Per pixel depth-cueing
- Per pixel alpha interpolation
- 4-bit stencil support with hardware acceleration of OpenGL stencil functions
- Accelerated lighting
- Four 8-bit color maps

• Benefits

- Can perform fast imaging and 3-D on unified frame buffer
- Smooth animation and interactivity of 3-D 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. This allows seamless integration and manipulation of windows
- Allows smooth shading of solid geometry
- Used to simulate transparent materials such as glass
- Needed in MCAD and visualization for better visual quality
- More accurate depth-cueing or fog
- Greater accuracy and image quality
- Provide greater performance
- More lights can be turned on for enhanced visual Sun display without encountering large performance penalties
- For dynamic colormap segment allocation when running 8-bit window systems should eliminate color flashing problems

System Architecture

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Sun Enterprise™ 3500 Server



Sun Enterprise 3500 System Cabinet

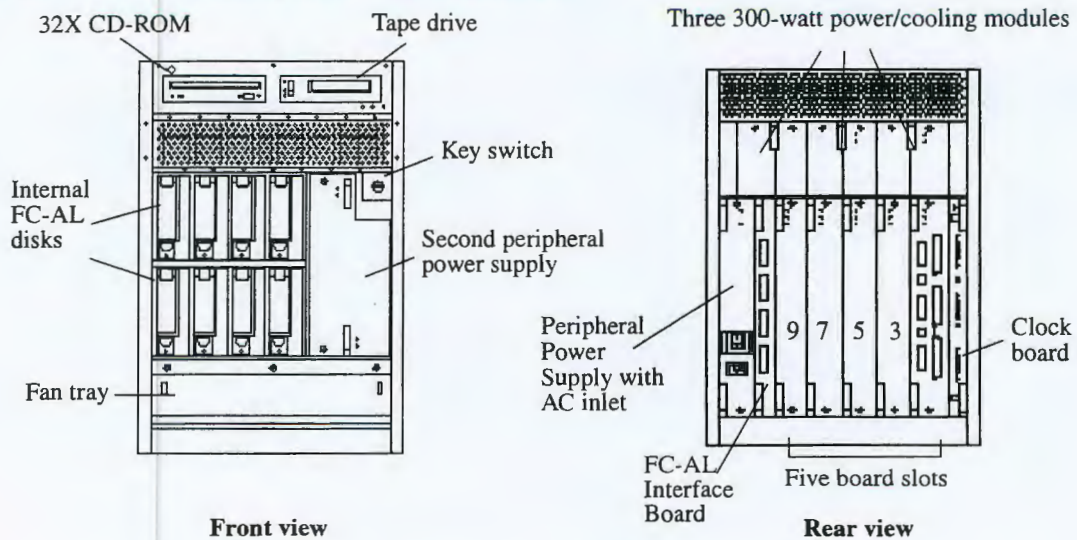
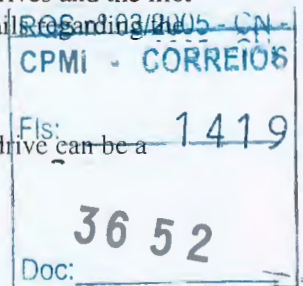


Figure 3. The Sun Enterprise™ 3500 System Cabinet

The Sun Enterprise 3500 server is a desktide tower enclosure, measuring approximately 65 cm x 43 cm x 44 cm (65 cm x 43 cm x 64 cm with the rear bumper and cable organizer which protects the cables.) In addition to the enhanced Gigaplane system bus, which runs up to 100 MHz and supports the fifth system slot, the Sun Enterprise 3500 server also features a 32X CD-ROM drive and improved disk availability with Fibre Channel Arbitrated Loop (FC-AL) internal disk drives. Despite the expansion of system slots and the changes to the internal disks, the Sun Enterprise 3500 server maintains the footprint, compact overall dimensions and power supply redundancy of the Sun Enterprise 3000 server.

Features

- A hinged door, covering the lower three-quarters of the cabinet, offers easy access to internal disk drives and the key switch.
- Two built-in disk banks hold up to eight internal hot-swap FC-AL disk drives. This is fewer than the ten SCSI disk drives offered with the Sun Enterprise 3000 server. The newer drives, however, can be configured to provide better disk availability (please see the "Sun Enterprise 3500 Internal Disk Drives" section for details on the FC-AL disks).
- A Fibre-Channel Interface board is located in a dedicated slot, between the fifth system board slot and the peripheral power supply. This board serves as the interface between the FC-AL drives and the first I/O board (please see the "Sun Enterprise 3500 Internal Disk Drives" section for details regarding the Fibre-Channel Interface board).
- A Sun StorEdge™ CD32 drive is installed in the upper left of the cabinet.
- An optional tape drive may be installed to the right of the CD-ROM drive. The tape drive can be a 4-mm, 8-mm, or one-quarter-inch tape drive.
- The key switch is located behind the door in the upper-right corner.





- There are five slots in the bottom portion of the cabinet for CPU/memory boards and I/O boards. The slots are numbered 1, 3, 5, 7, and 9 from right to left.
- The Sun Enterprise 3500 server comes with at least one power/cooling module located above slots 1 and 3. If a second power/cooling module is required, it would fit above slots 5 and 7, to the left of the first power/cooling module.
- A fan tray above the peripheral power supply is also included in an entry configuration.
- A third power/cooling module can be used for redundant power in a system with three or more boards. To install the third power/cooling module, the existing fan tray, located to the left of the second power/cooling module, must be removed. The third power/cooling module fits into this slot.
- In addition to three power/cooling modules, a second peripheral power supply is required for full N+1 power supply redundancy in a five-board Sun Enterprise 3500 server configuration.
- The first peripheral power supply is located in the lower left of the cabinet rear. A spot for the second, optional peripheral power supply is located in the lower right of the Sun Enterprise 3500 cabinet front. This second peripheral power supply is located in the rear of the Sun Enterprise 3000 system cabinet. It was redesigned and moved to the front of the Sun Enterprise 3500 system cabinet in order to provide space for the additional system slot.
- The second peripheral power supply on the Sun Enterprise 3500 server is now 195 watts, instead of the 184 watts peripheral power supply used on the Sun Enterprise 3000 server.
- The clock board is located in the lower right, next to board slot 1. The clock board has its own slot and does not use any of the five slots for the CPU/memory or I/O boards.
- A cable organizer is included with the Sun Enterprise 3500 server base package. This will protect the 2-meter fibre channel cable (used for connecting to the internal FC-AL disk drives) from excessive bending, thereby maintaining optimum fibre channel performance.

Sun Enterprise™ 3500 Server

Sun Enterprise 3500 Internal Disk Drives

Internal FC-AL Drives

The Sun Enterprise 3500 server has two internal disk banks (four disks per disk bank), which support up to eight 9.1-GB FC-AL disks with optional dual-port connections, while the Sun Enterprise 3000 server supports ten internal SCSI disks with a single connection. The number of internal disks supported in the Sun Enterprise 3500 server was reduced in order to provide room for the additional system slot in the rear of the server. The inclusion of the fifth system slot in the back of the cabinet required that the optional second peripheral power supply be redesigned and moved to the front of the cabinet, resulting in less space in the front of the cabinet for disk drives.

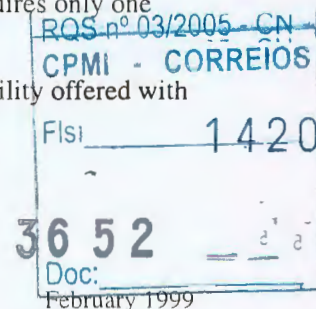
The newer drives, however, can be configured to provide better disk availability than that offered by the Sun Enterprise 3000 server. In the Sun Enterprise 3000 server, all ten disk drives are connected to a single SCSI channel. The Sun Enterprise 3500 server eliminates this single point of failure. Each of the two disk banks can have one or two FC-AL loops connected to the installed drives for a total of up to four loops. Dual-loop configurations provide a highly-available, redundant hardware configuration.

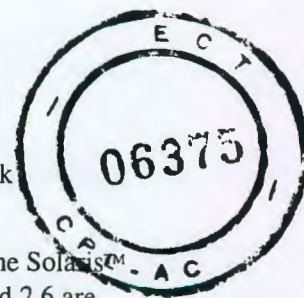
Because the two banks are independent, a full configuration of eight disk drives requires a minimum of two loops: one for each bank of four drives. On the other hand, a minimum configuration requires only one FC-AL connection for up to four disk drives.

The new FC-AL drives in the Sun Enterprise 3500 server still provide the hot-swap capability offered with the internal SCSI drives on the Sun Enterprise 3000 server.



Just the Facts





Both Solstice DiskSuite™ and VERITAS/Sun Enterprise Volume Manager™ are supported disk management software for the internal FC-AL drives.

VERITAS/Sun Enterprise Volume Manager releases 2.3, 2.4, 2.5 and 2.6 are supported with the Solaris™ 2.5.1 Operating Environment. VERITAS/Sun Enterprise Volume Manager releases 2.4, 2.5 and 2.6 are supported with the Solaris 2.6 Operating Environment. Patches are associated with all of these releases. VERITAS/Sun Enterprise Volume Manager is not currently supported with the Solaris 7 Operating Environment.

Solstice DiskSuite version 4.1 is supported on both Solaris 2.5.1 and Solaris 2.6. Solstice DiskSuite version 4.2 is supported on both Solaris 2.6 and the Solaris 7 Operating Environment.

Note: A license is needed to install Sun Enterprise Volume Manager. An additional license is needed to enable advanced Sun Enterprise Volume Manager capabilities such as RAID 5.

Fibre Channel Interface Board

This is a new board, designed to provide connectivity to the internal FC-AL disk drives in the Sun Enterprise 3500 server. The internal FC-AL disk drives support up to four FC-AL loops. Each of the four potential FC-AL loops corresponds to one of four GBICs on the FC-AL Interface board.

The FC-AL board comes with two GBIC modules and one 2-meter fibre channel cable to establish one loop (connection). One GBIC module is installed on the FC-AL Interface board and, typically, the other is installed on the I/O board (or SBus card) leaving three empty FC-AL sockets on the FC-AL Interface board. Each additional loop requires two additional GBIC modules and one 2-meter fibre channel cable. The GBIC modules on the FC-AL Interface board are exactly the same as those used in the Sun StorEdge A5X00 arrays, FC-AL SBus Host Adapter, and on the SBus I/O board.

The Sun Enterprise 3500 server can be ordered without internal disk drives. Any of the bootable Sun StorEdge disk products (such as the Sun StorEdge UniPack, MultiPack, D1000, A3500, and A5X00 products) can be used as a boot device for a Sun Enterprise 3500 server without internal disk drives. Such a configuration does not require an FC-AL Interface board.

The individual FC-AL connections on the FC-AL Interface board are logically independent. The components do get their power through a single connection. However, the power to the FC-AL Interface board comes from the backplane which is supported by redundant power supplies. Therefore the design has practically no single point of failure.

Sun Enterprise™ 3500 Server

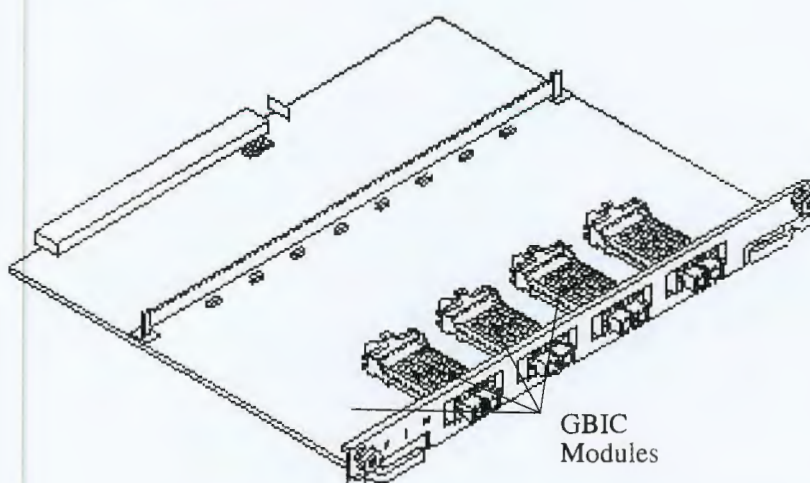


Figure 4. FC-AL Interface board



Just the Facts



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Sun Enterprise 3500 Server Questions and Answers

Is the FC-AL drive supported in the Sun Enterprise 3500 server the same as the FC-AL drive supported in the Sun StorEdge A5X00 disk array?

Yes, the same FC-AL drives are supported in both the StorEdge A5X00 and the Sun Enterprise 3500.

What is the purpose of the cable organizer?

The cable organizer, which is shipped with all Sun Enterprise 3500 servers, attaches easily to the rear bumper on the Sun Enterprise 3500 server. Fiber cables that connect the GBICs on the FC-AL Interface board and the GBICs on the I/O boards should be routed through the cable organizer in a "figure eight" pattern. This will keep the cables out of the way and secure so that they are less likely to be inadvertently detached from the system. The cable organizer also provides that the fibre channel cables are not bent beyond their supported bend radius, preventing the cables from crimping and damage; it also provides mounting for the power cord restrainer that comes installed on the rear bumper.

Can the GBIC sockets be used on the FC-AL Interface board to connect (daisy-chain) Sun StorEdge A5X00 disk arrays to the Sun Enterprise 3500 server?

No, the GBIC sockets on the FC-AL Interface board can only be used to connect the internal FC-AL drives of the Sun Enterprise 3500 server. Sun StorEdge A5X00 systems must be connected to FC-AL sockets on system I/O boards, through the on-board sockets or through SBus Host Adapters.

Is the Sun Enterprise 3500 FC-AL Interface Board orderable in a factory configuration?

The Sun Enterprise 3500 FC-AL Interface board can be ordered either as factory configured or standalone.

Can pairs of FC-AL sockets support both the Sun Enterprise 3500 server internal disks and Sun StorEdge A5X00 system?

Yes. The SBus I/O board and the Graphics I/O board both come with a pair of on-board 100-MB-per-second FC-AL sockets. In addition, both types of boards support an SBus host adapter that has a pair of 100-MB-per-second FC-AL sockets. Each of these pairs of sockets can support the internal disk drives in the Sun Enterprise 3500 server and/or the Sun StorEdge A5X00 array. They can be split up so that one supports one type of device while the other socket supports a different type of device.

For example, if one of the two on-board FC-AL sockets is being used as the connection to the internal drives in the Sun Enterprise 3500 server, its matching empty socket *can* be used to connect a Sun StorEdge A5X00 disk array.

Is the LUXADM disk administration facility supported with the Sun Enterprise 3500 internal disk drives?

Yes, a specific set of LUXADM commands are supported currently and more will be added in the first half of calendar year 1999. The following commands are currently supported on both Solaris 2.5.1, Solaris 2.6 and the Solaris 7 Operating Environment: luxadm inquiry, stop, start, -e forcelp, -e rdls, set_boot_dev.

Why is there a new second peripheral power supply?

When the second peripheral power supply was moved to the front of the Sun Enterprise 3500 server, it had to be redesigned to fit its new space. When this second peripheral power supply is not used, a thermal protection module is inserted in its place. This light-weight component can be recognized by the warning labels on it and should *not* be discarded. It should only be removed when a second peripheral power supply is installed.

Sun Enterprise™ 3500 Server



As the internal disk drives are no longer SCSI, can the on-board SCSI connection be used on the first I/O board in the Sun Enterprise 3500 server?

Yes. This connection may be used to connect certain SCSI devices as long as the total SCSI length (including the connection to the tape and internal CD to the Sun Enterprise 3500 server) does not exceed SCSI specifications (6 meters). The internal SCSI bus length is 1.56 meters. This means that up to two Sun StorEdge UniPacks or one Sun StorEdge MultiPack (with six drives or fewer) may be daisy chained from the on-board SCSI port located on the first I/O board of the Sun Enterprise 3500 server.

Sun Enterprise™ 3500 Server

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Sun Enterprise™ 4500 Server



Sun Enterprise 4500 System Enclosure

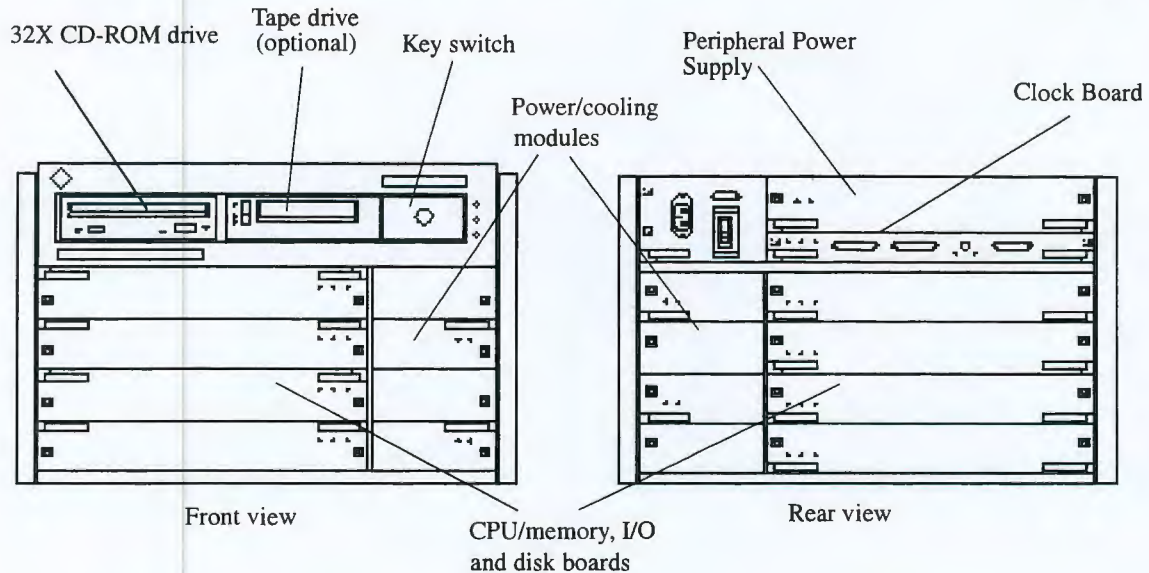


Figure 5. The Sun Enterprise™ 4500 System Enclosure

The Sun Enterprise 4500 server package is a tabletop enclosure, which is identical to the Sun Enterprise 4000 server and similar in size to the external package of the SPARCserver™ 1000E system. In addition to the enhanced Gigaplane™ system bus, the Sun Enterprise 4500 server also has a faster 32X CD-ROM, compared to the 12X CD-ROM used in the Sun Enterprise 4000 server. The Sun Enterprise 4500 server also includes a power cord locking module that prevents the power cord from being accidentally removed from the system.

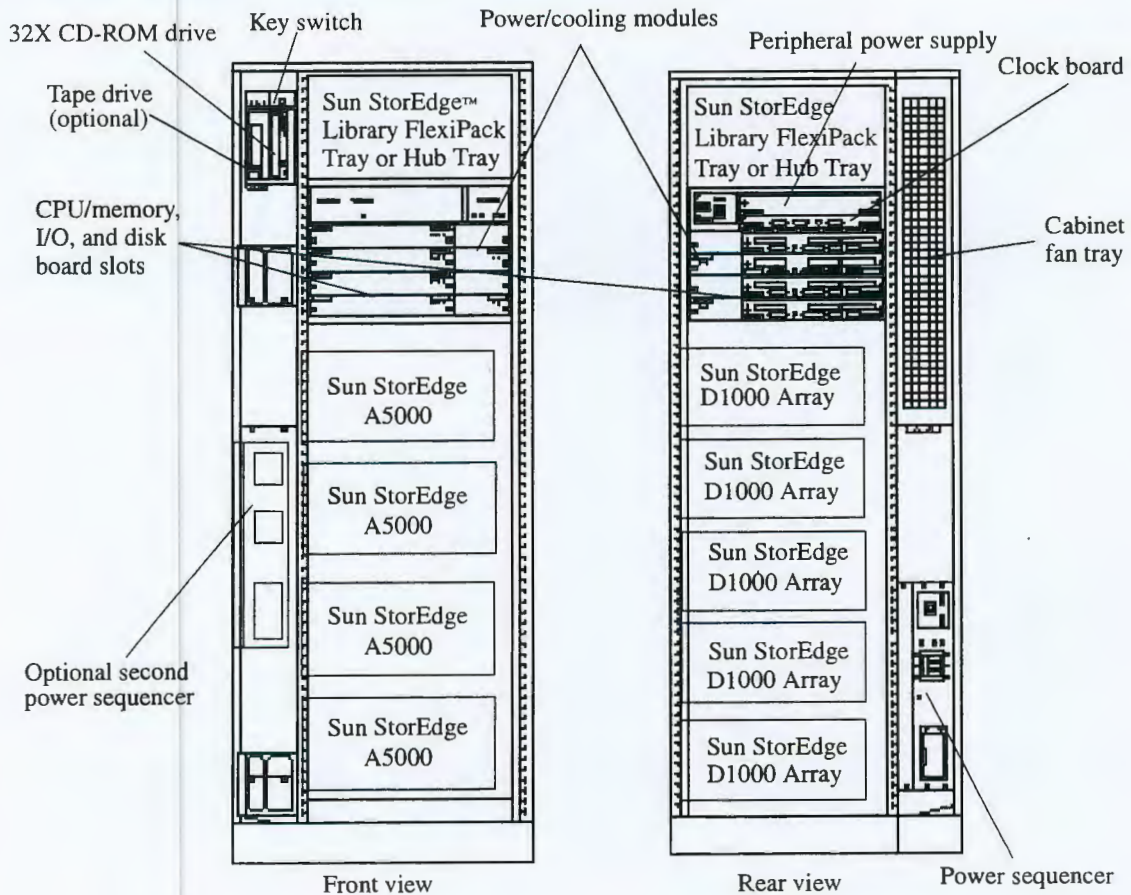
- Inside the enclosure is an eight-slot card cage for CPU/memory, I/O, or disk boards, allowing four boards to be installed from the front of the cabinet and four boards to be installed from the rear. Typically, the I/O boards and disk boards are installed from the rear for ease of cabling.
- In the card cage, next to the board slots, are slots for the power/cooling modules. Up to four power/cooling modules can be installed, two from the front and two from the rear. Power/cooling modules must be installed adjacent to CPU/memory, I/O, and disk boards.
- The peripheral power supply is located at the top rear of the card cage.
- The Sun StorEdge™ CD32 drive is located at the upper left front of the enclosure. Next to the SunCD™ 32 is a slot for an optional half-height tape device. The tape device can be a 4-mm, 8-mm, or one-quarter-inch tape drive. Next to the slot for the optional tape device are the key switch and system LEDs.
- The clock board is located in the card cage below the peripheral power supply. The clock board has its own slot and does not use one of the eight board slots for the CPU/memory, I/O, or disk boards.

Sun Enterprise™ 4500 Server

Sun Enterprise™ 5500 Server



Sun Enterprise 5500 System Cabinet



Sun Enterprise™ 5500 Server

Figure 6. The Sun Enterprise™ 5500 System Cabinet

The Sun Enterprise 5500 system enclosure is a 68-inch data-center cabinet, 12 inches taller than both the Sun Enterprise 5000 system cabinet as well as the SPARCcenter™ 2000E system cabinet. In addition to the enhanced Gigaplane™ system bus, the Sun Enterprise 5500 server also has a faster 32X CD-ROM, compared to the 12X CD-ROM used in the Sun Enterprise 5000 server. The fan tray that supports the internal SCSI devices (internal tape and CD) in the Sun Enterprise 5500 server has also been modified to enable support for new, higher performing tape devices.

- Inside the cabinet is an eight-slot card cage for CPU/memory, I/O, or disk boards, allowing four boards to be installed from the front of the cabinet and four boards to be installed from the rear. Typically, the I/O boards and disk boards will be installed from the rear for ease of cabling.
- In the card cage, next to the board slots, are slots for the power/cooling modules. Up to four power/cooling modules can be installed, two from the front and two from the rear. Power/cooling modules must be installed adjacent to CPU/memory, I/O, and disk boards.

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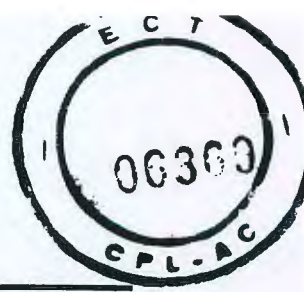


- The peripheral power supply is located at the top rear of the card cage.
- The clock board is located in the card cage below the peripheral power supply. The clock board has its own slot and does not use one of the eight board slots for the CPU/memory, I/O, or disk boards.
- The cabinet fan tray contains four fans that blow hot air out the rear of the cabinet.
- An optional Sun StorEdge™ FlexiPack removable storage tray, Sun StorEdge Tape Library, or FC-AL hub tray (supporting two hubs) can be installed above the card cage. The FC-AL hub tray can also be installed below the card cage in the Sun Enterprise 5500 server in all cases, except maximum configurations, with four Sun StorEdge A5X00 arrays.
- The following devices can be installed in the system cabinet below the card cage:
 - Up to four Sun StorEdge A5X00 disk arrays
 - Up to five Sun StorEdge A1000/D1000 arrays
 - Up to two Sun Enterprise 4000 or Sun Enterprise 4500 servers (using the rack-mount rails for Sun Enterprise 4000 or Sun Enterprise 4500 server)

Note: The SPARCstorage™ Array Model 100 series subsystems and the Sun StorEdge RSM™ disk trays are still supported in the Sun Enterprise 5500 system cabinet, however they are no longer orderable. The Sun Enterprise 5500 system cabinet can support up to four SPARCstorage Array Model 100 series subsystems or up to six StorEdge RSM disk trays.

- A hinged door covering the lower four-fifths of the cabinet offers easy access to internal components.
- A Sun StorEdge CD32 drive is installed in the upper left front of the system cabinet. Next to the SunCD™ 32 is a slot for an optional half-height tape device. The tape device can be a 4-mm, 8-mm, or one-quarter-inch tape drive. Next to the slot for the optional, half-height tape device are the key switch and system LEDs. The SunCD 32 CD-ROM, the optional tape device, and the key switch are mounted behind a separate, small door.
- The top panel does not have a hinged door. The upper right front of the system cabinet will either have a bezel for the Sun StorEdge FlexiPack removable storage tray or Sun StorEdge Tape Library, or a blank panel when no peripherals are installed above the card cage.
- Customers who wish to include two or more Sun StorEdge A5X00 arrays in the Sun Enterprise 5500 system cabinet must also order the Sun StorEdge A5000 screen door, which provides additional electro-magnetic interference shielding.
- A 9-inch air baffle is required when three Sun StorEdge A5X00 arrays are installed in a Sun Enterprise 5500 system cabinet.
- An optional, second power sequencer is offered to provide a second power source for configurations where the aggregate power requirements of the devices exceed the power provided by a single power sequencer. The second power sequencer also provides a second power source for storage devices that support dual power inlets.
- When the Second Power Sequencer is ordered for installation in the system cabinets (Sun Enterprise 5500 and Sun Enterprise 6500 servers), the second sequencer mounting brackets for Sun Enterprise 5500 and 6500 servers must also be ordered.

Sun Enterprise™ 5500 Server



Sun Enterprise™ 6500 Server

Sun Enterprise 6500 System Cabinet

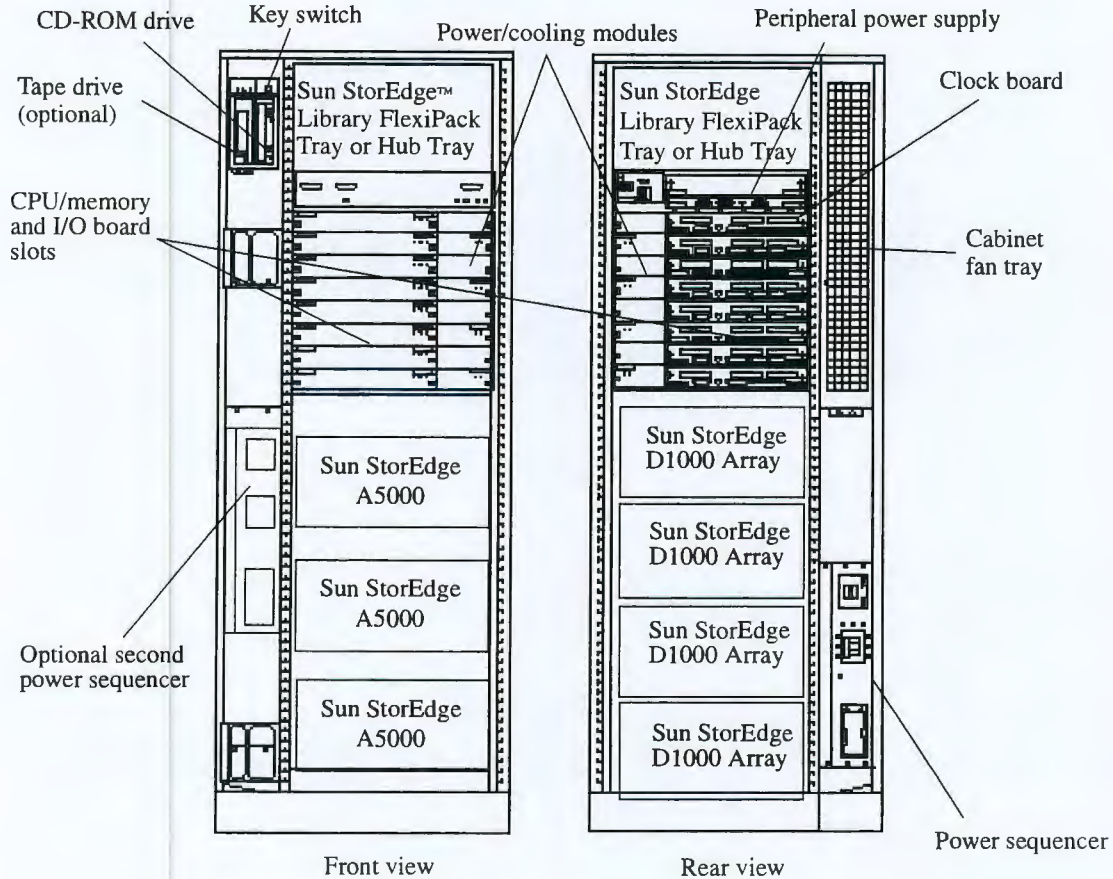


Figure 7. The Sun Enterprise™ 6500 System Cabinet

The Sun Enterprise 6500 system enclosure is a 68-inch tall data-center cabinet, 12 inches taller than both the Sun Enterprise 6000 cabinet and the SPARCcenter™ 2000E cabinet. The Sun Enterprise 6500 server also has a faster 32X CD-ROM, compared to the 12X CD-ROM used in the Sun Enterprise 6000 server. The fan tray that supports the internal SCSI devices (internal tape and CD) in the Sun Enterprise 6500 server has also been modified to enable support for new, higher-performing tape devices.

- Inside the cabinet is a 16-slot card cage for CPU/memory boards, I/O boards and disk boards, allowing eight boards to be installed from the front of the cabinet and eight boards to be installed from the rear of the cabinet. Typically, the I/O boards are installed from the rear for ease of cabling.
- The physical length of the 16-slot Gigaplane system bus in the Sun Enterprise 6500 server limits the maximum speed of the system interconnect. Therefore the Sun Enterprise 6500 server runs the Gigaplane system bus at a maximum of 84 MHz with 16 slots.
- In the card cage, next to the board slots, are slots for the power/cooling modules. Up to eight power/cooling modules can be installed, four from the front and four from the rear. Power/cooling modules must be installed adjacent to CPU/memory and I/O boards.

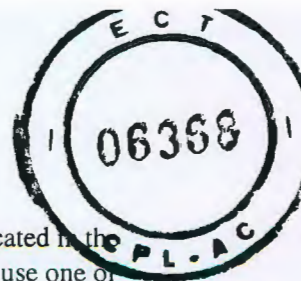
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Sun Enterprise™ 6500 Server



- The peripheral power supply is located at the top rear of the card cage. The clock board is located in the card cage below the peripheral power supply. The clock board has its own slot and does not use one of the 16-board slots for the CPU/memory or I/O boards.
- The cabinet fan tray contains four fans that blow hot air out the rear of the cabinet.
- An optional Sun StorEdge FlexiPack removable storage tray, Sun StorEdge Tape Library or FC-AL hub tray (supporting two hubs) can be installed above the card cage. The hub tray can also be installed below the card cage in the Sun Enterprise 6500 server in all cases except maximum configurations, with three Sun StorEdge A5X00 arrays.
- The following storage devices can be installed in the system cabinet below the card cage:
 - Up to three Sun StorEdge A5X00 disk arrays
 - Up to four Sun StorEdge A1000/D1000 arrays
 - Up to two Sun Enterprise 4000 or Sun Enterprise 4500 servers (using the rack-mount rails for Sun Enterprise 4000 or Sun Enterprise 4500 servers)

Note: The SPARCstorage™ Array Model 100 series subsystems and Sun StorEdge RSM™ trays are still supported in the Sun Enterprise 6500 system cabinet, however they are no longer orderable. The Sun Enterprise 6500 system cabinet can support up to three SPARCstorage Array Model 100 series subsystems or up to five StorEdge RSM disk trays.

- A hinged door covering the lower three-quarters of the cabinet offers easy access to internal components.
- A Sun StorEdge CD32 drive is installed in the upper left front of the system cabinet. Next to the SunCD™ 32 is a slot for an optional half-height tape device. The tape device can be a 4-mm, 8-mm, or one-quarter-inch tape drive. Above the slot for the optional half-height tape device is the key switch. The SunCD 32 CD-ROM, the optional tape device, and the key switch are mounted behind a separate, small door.
- The top panel does not have a hinged door as on the SPARCcenter 2000E. The upper right front of the system cabinet will have either a bezel for the Sun StorEdge FlexiPack removable storage tray or Sun StorEdge Tape Library, or a blank panel when no peripherals are installed above the card cage.
- Customers who wish to include two or more Sun StorEdge A5X00 arrays in the Sun Enterprise 6500 system cabinet must also order the Sun StorEdge A5000 screen door, which provides additional electro-magnetic interference shielding.
- A 9-inch air baffle is required when two Sun StorEdge A5X00 arrays are installed in a Sun Enterprise 6500 system cabinet.
- An optional, second power sequencer is offered to provide a second power source for configurations where the aggregate power requirements of the devices exceed the power provided by a single power sequencer. The second power sequencer also provides a second power source for storage devices that support dual power inlets.
- When the Second Power Sequencer is ordered for installation in the system cabinets (Sun Enterprise 5500 and Sun Enterprise 6500 servers), the second sequencer mounting brackets for Sun Sun Enterprise 5500 and 6500 servers must also be ordered.

Sun Enterprise™ 6500 Server



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Sun Enterprise™ Expansion Cabinet

Sun Enterprise Expansion Cabinet

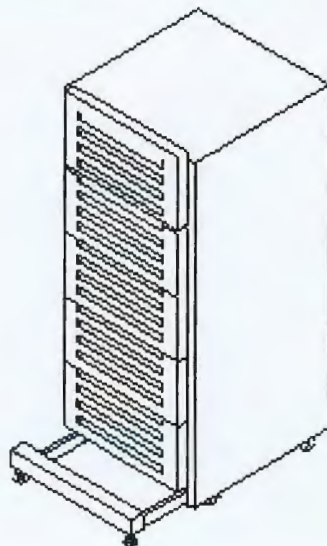


Figure 8. The Sun Enterprise™ Expansion Cabinet

The 68-inch Sun Enterprise expansion cabinet is primarily used to rack mount Sun Enterprise 4000 and Sun Enterprise 4500 servers and is ordered without factory-installed devices. This data center cabinet is similar in look and size to the Sun Enterprise 5500 and Sun Enterprise 6500 system cabinets.

This section describes the features of the new 68-inch Sun Enterprise expansion cabinet. Refer to the *Sun Enterprise 3000–6000 Just the Facts* document for details regarding the 56-inch expansion cabinet.

Each expansion cabinet includes a cable for connecting the expansion cabinet to a system cabinet. The cable allows control and status information to be transferred between the expansion cabinet and the system cabinet (see “Expansion Cabinet Cooling” for more details). Multiple expansion cabinets can be daisy-chained to the system cabinet.

- The following devices may be installed in an expansion cabinet:
 - Sun Enterprise 4000 and Sun Enterprise 4500 servers
 - Sun StorEdge™ A5X00 disk arrays
 - Sun StorEdge A1000/D1000 arrays
 - Sun StorEdge FlexiPack removable storage trays
 - Sun StorEdge Tape Library
- The expansion cabinet has a full-height hinged door, offering easy access.
- Sun Enterprise cabinet floor brackets may be installed to help prevent the cabinet from shifting in cases of extreme floor movement.

Sun Enterprise™ Expansion Cabinet



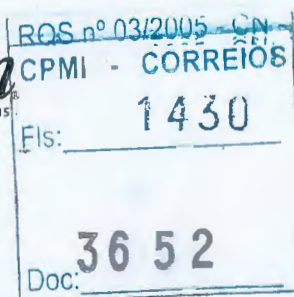
Expansion Cabinet Capacity

- A maximum of six Sun StorEdge A5X00 arrays and two FC-AL hub trays (supporting two hubs each) can be installed in an expansion cabinet, offering up to 1.2 TB of storage (with the StorEdge A5200 array).
- A maximum of eight Sun StorEdge A1000/D1000 arrays are supported per cabinet (a second power sequencer is required if more than four A1000/D1000 arrays are installed in the expansion cabinet).
- A maximum of two Sun StorEdge FlexiPack removable storage trays are supported per expansion cabinet; a maximum of five Sun StorEdge FlexiPack removable storage trays are supported per system.
- Up to four tape devices are supported per Sun StorEdge FlexiPack removable storage tray.
- A maximum of four Sun StorEdge Tape Libraries are supported per expansion cabinet.
- Expansion cabinets with Sun StorEdge FlexiPack removable storage trays or Sun StorEdge Tape Libraries must be adjacent to the system cabinet. This is required because the maximum length of the single-ended SCSI cable is 6 meters.
- Customers who wish to include two or more Sun StorEdge A5X00 arrays in the Sun Enterprise expansion cabinet must also order the Sun StorEdge A5000 screen door, which provides additional electro-magnetic interference shielding.
- A 9-inch air baffle is required when five Sun StorEdge A5X00 arrays are installed in a Sun Enterprise expansion cabinet.
- An optional, second power sequencer is offered to provide a second power source for configurations where the aggregate power requirements of the devices exceed the power provided by a single power sequencer. The second power sequencer also provides a second power source for storage devices that support dual power inlets. The Expansion cabinet comes with mounting brackets already installed so no Second Sequencer mounting brackets need be ordered.

Note: Please note that the SPARCstorage™ Array model 100 series subsystems, model 200 series controllers and Sun StorEdge RSM™ trays are supported in the 68-inch Sun Enterprise expansion cabinet system cabinet, however they are no longer orderable. The Sun Enterprise expansion cabinet can support a maximum of seven SPARCstorage Array Model 100 Series disk arrays or a maximum of ten StorEdge RSM disk trays (an expansion cabinet with 8 or more RSM disk trays requires the second power sequencer).

- Up to four Sun Enterprise 4000 or Sun Enterprise 4500 servers may be mounted in a Sun Enterprise expansion cabinet (using the rack-mount rails for the Sun Enterprise 4000 or Sun Enterprise 4500 server). An expansion cabinet with four Sun Enterprise 4000 or Sun Enterprise 4500 systems requires the second power sequencer.
 - The following combinations of rack-mounted devices are supported with *one* Sun Enterprise 4500 server in the Sun Enterprise expansion cabinet:
 - Five Sun StorEdge A5X00 arrays with one hub tray (supporting two hubs)
 - Up to six Sun StorEdge A1000/D1000 arrays (a second power sequencer is required if more than four Sun StorEdge A1000/D1000 arrays are installed in the expansion cabinet).
 - Up to eight Sun StorEdge RSM disk trays (an expansion cabinet with eight or more Sun StorEdge RSM disk trays requires the second power sequencer).
 - Up to five SPARCstorage Array Model 100 Series
 - The following combinations of rack-mounted devices are supported with *two* Sun Enterprise 4500 servers in the Sun Enterprise expansion cabinet:
 - Three Sun StorEdge A5X00 arrays with one hub tray (supporting two hubs)
 - Up to four Sun StorEdge A1000/D1000 arrays

Sun Enterprise™ Expansion Cabinet





- Up to five Sun StorEdge RSM disk trays
- Up to three SPARCstorage Array Model 100 Series
- The following combinations of rack-mounted devices are supported with *three* Sun Enterprise 4500 servers in the Sun Enterprise expansion cabinet:
 - Exactly three Sun Enterprise 4X00 systems (no other devices in the cabinet) require one 9-inch air baffle (X9622A) and two 6-inch air baffles (X9625A).
 - Three Sun Enterprise 4X00 systems and one Sun StorEdge A5X00 array (or one SPARCstorage Array Model 100) require two 6-inch baffles (X9625A).
 - Three Sun Enterprise 4X00 systems and two Sun StorEdge A5X00 arrays (or two SPARCstorage Arrays Model 100) require no baffles
 - Three Sun Enterprise 4X00 systems and any other devices (Sun StorEdge RSM tray, Sun StorEdge A1000/D1000 array, etc) in any quantity requires no baffles

No additional devices can be mounted in the 68-inch Sun Enterprise expansion cabinet with four Sun Enterprise 4X00 servers. One 6-inch air baffle (X9625A) is required when four Sun Enterprise 4500 system chassis are installed in a Sun Enterprise expansion cabinet. A second power sequencer is also required with four Sun Enterprise 4X00 systems in a 68-inch Expansion Cabinet.

Expansion Cabinet Cooling

- Each expansion cabinet has one cabinet fan tray that includes four fans supported by two power supplies. Each power supply supports two fans.
- The expansion cabinet features redundant cooling. If a power supply fails, two fans stop running and two fans continue to operate, providing enough cooling to keep the devices in the expansion cabinet cool.
- Expansion cabinets can be controlled by the Sun Enterprise 4500–6500 server and can send status information to the system cabinet, through a connection between the expansion cabinets and the system cabinet. Specifically, the connection supports the following:
 - When a cabinet fan tray fails in an expansion cabinet, the Sun Enterprise 4500–6500 server is notified of this failure. A system administrator monitoring the Sun Enterprise 4500–6500 server status will be able to see when a cabinet fan tray fails in an expansion cabinet.
 - The system administrator is able to turn off the Sun Enterprise 4500–6500 server and all expansion cabinets connected to the Sun Enterprise 4500 server with either the Sun Enterprise 4500–6500 server key switch or through a software command.

Sun Enterprise™ Expansion Cabinet



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Expansion Cabinet Questions and Answers

What is the difference between the 56-inch and 68-inch Sun Enterprise expansion cabinet?

Basically the only difference is the height of the cabinet. One more 12-inch door panel was added to increase the height to 68 inches. Additional space allows more devices in the cabinet, which in turn requires more power. Therefore an optional, second power sequencer is offered. As mentioned earlier, if two or more Sun StorEdge A5X00 arrays are to be installed in the Sun Enterprise expansion cabinet the customer must also order the Sun StorEdge A5000 front screen door, which provides additional electro-magnetic interference shielding.

Can the peripherals in an existing SPARCcenter™ expansion cabinet be migrated and moved to the new Sun Enterprise expansion cabinet?

Yes, the peripheral devices in the SPARCcenter expansion cabinet can be migrated to the Sun Enterprise expansion cabinet. The only device supported in the SPARCcenter expansion cabinet that is not supported in the Sun Enterprise expansion cabinet is the half-inch tape drive.

Sun Enterprise™ Expansion Cabinet

Just the Facts



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CPU/Memory Board

CPU/Memory Board

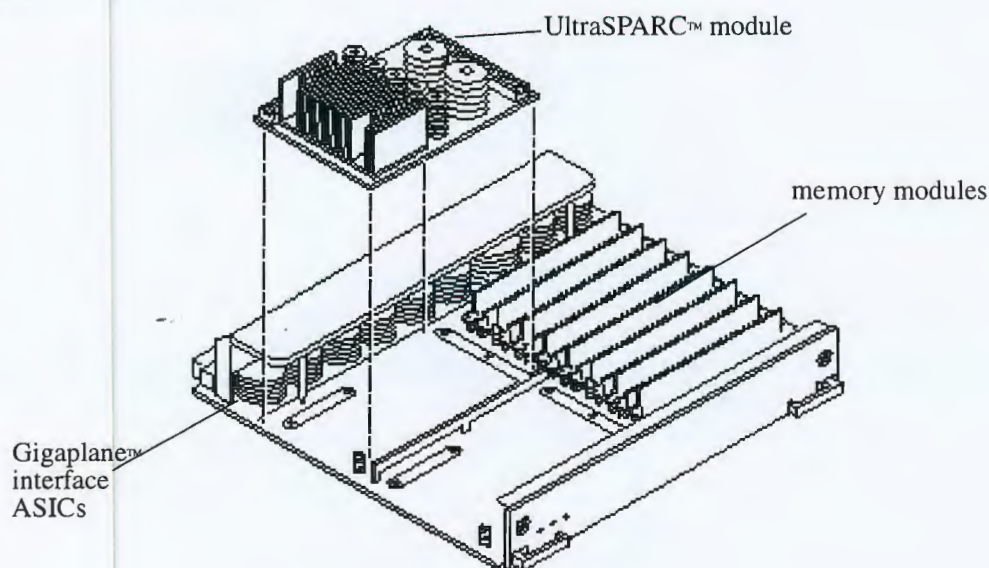


Figure 9. CPU/memory board

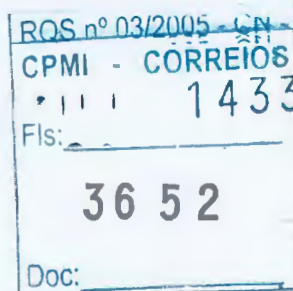
CPU/memory boards connect to the Gigaplane™ bus. On the CPU/memory boards, the Ultra™ Port Architecture (UPA) bus connects the Gigaplane bus to the two UltraSPARC™ modules and two memory banks.

- The latest CPU/memory board (2602A) is capable of running at up to 100-MHz Gigaplane speed.
- Each CPU/memory board can support zero, one, or two UltraSPARC modules. CPU/memory boards with no UltraSPARC modules can be added to systems requiring more memory capacity.
- The Sun Enterprise™ 3500–5500 servers support 167-MHz, 250-MHz, 336-MHz and 400-MHz UltraSPARC modules.
- The Sun Enterprise 6500 server support 167-MHz, 250-MHz and 336-MHz UltraSPARC modules.
- The CPU/memory board has two banks of 60-ns, 3.3-V memory modules. Each memory bank consists of eight memory modules. Two types of memory options are available: 256 MB (8 x 32-MB memory modules), and 1 GB (8 x 128-MB memory modules).
- Each CPU/memory board supports up to 2 GB of memory.
- The CPU/memory boards have temperature sensors located under the UltraSPARC modules that control the fan speed in the adjacent power/cooling module and allow the actual temperature of individual boards to be monitored through the Sun Enterprise SyMON™ software.
- With a system design that supports multiple CPU/memory boards, a failure of a single UltraSPARC module or memory module will result in a temporary interruption of system operation while the system reboots itself around the failed component.
- The part number for the new, 100 MHz-capable CPU/memory boards is 2602A. This CPU/memory board includes two empty CPU slots, two empty memory banks, no processors, and no memory.

Note: The 84 MHz-capable CPU/memory boards (2600A and 2601A) have been transitioned off of the price list. CPU/memory Board



Just the Facts



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CPU/Memory Board



CPU/Memory Board Questions and Answers

Why did Sun change from using a single system board that included everything in the SPARCserver 1000/2000 (CPU, memory, and I/O) to offering two types of boards, CPU/memory boards and I/O boards with the Sun Enterprise 3X00–6X00 servers?

There are many advantages gained by offering separate CPU/memory boards and I/O boards. The primary advantage is configuration flexibility. With one system board, a customer who wants to increase memory capacity must purchase an entire system board. With separate CPU/memory and I/O boards, customers can purchase only what they need. If they want to add additional memory, they purchase a CPU/memory board. This allows customers to configure systems as computing engines or I/O engines, which are not only less expensive, but also offer much higher performance, since they can configure more CPUs (and memory) or more I/O bandwidth, depending upon their application needs.

Another reason is design flexibility. With separate CPU/memory and I/O boards, Sun can make modifications to each type of board independently. For example, Sun can upgrade the Fibre Channel Interface on the I/O board and not affect the CPU/memory board. Sun also recently introduced the new, PCI I/O board. Ultimately, this allows Sun to bring out new CPU/memory and I/O board modifications, as well as new technologies, more quickly.

In addition, because the I/O board has much more functionality than before, one I/O board in the Sun Enterprise 4500 server has the same I/O capability as two system boards in the SPARCserver 1000E. This means Sun offers greater CPU, memory, and I/O expandability in these systems by offering separate CPU/memory and I/O boards.

Can the UltraSPARC modules be inserted and removed by anyone?

No. Only qualified personnel should insert and remove UltraSPARC modules.

Why did Sun go to a new UltraSPARC module connector?

The new connector is more reliable than the type of connector used in the SPARCserver 1000E. Also, the previous connectors did not provide the number of pins required for the new modules.

Are there any special requirements for upgrading to the 250-MHz/4-MB or 336-MHz/4-MB UltraSPARC modules?

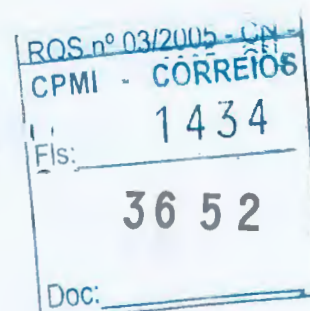
Yes, the 250-MHz and 336-MHz modules with 4 MB of external cache should be installed on either the 2601A or the latest CPU/memory board (2602A) which replaced the 2601A. Although the 250-MHz/4-MB and 336-MHz/4-MB modules will function and are supported on the original CPU/memory board (2600A) only 2 MB of Ecache will be used per module.

What is the software requirement for the 336-MHz modules?

The 336-MHz UltraSPARC module requires the Solaris™ 2.5.1 Operating Environment or later releases. It also requires Sun Enterprise Flashprom Update 3.2.12 or later.

Can the newer 100 MHz-capable CPU/memory boards be used in Sun Enterprise 3000–6000 servers?

Yes. The previous 84-MHz CPU/memory boards are being transitioned off the price list and these new CPU/memory boards are compatible with existing Sun Enterprise 3000–6000 servers. There is no problem mixing these CPU/memory boards in a Sun Enterprise 3000–6000 server that already uses the previous boards.





Is there any new hardware or software required to support the 400-MHz module in the Sun Enterprise 3X00-5X00 servers?

Yes, the 400-MHz modules will require Ultra Sun Enterprise Flashprom update 3.2.18 or above. Other than the Flashprom version, no new hardware or software is required from what is being shipped currently in the Sun Enterprise 3500-5500 servers.

They will run in existing Sun Enterprise 3000-5000 servers if they have the following:

- 100-MHz capable CPU/memory and I/O boards (2602A, 2612A, 2622A, 2632A)
- An upgraded 100-MHz capable Gigaplane in the Sun Enterprise 4000 and 5000 (Sun Enterprise 3000 excluded as mentioned above.) See "Upgrades" section for details regarding system board and Gigaplane upgrades.
- Ultra Sun Enterprise Flashprom update 3.2.18 or above.
- 100-MHz clock board (manufacturing part number 501-4946) which is required to support 100-MHz Gigaplane. A 100-MHz clock board upgrade is available (part number UG-ENT-100MHCLOCKB)

The clock board in the latest Sun Enterprise 3000 and Gigaplane in all Sun Enterprise 3000 servers are already 100-MHz capable so in most cases only the system boards need to be upgraded in order to support the 400-MHz/4-MB modules. Only original Sun Enterprise 3000 base packages need to have the clock board upgraded. This is because the original clock board in Sun Enterprise 3000 base package did not support any modules above 167-MHz and therefore needs to be upgraded to support 400-MHz modules. Base packages with order numbers "E3001" and "E3002" do not need to have the clock board upgraded because they shipped with a second generation clock board which supported modules above 167-MHz.

Is the 400-MHz/4-MB UltraSPARC module supported in a system with any 84-MHz system boards (2600A, 2601A, 2610A, 2611A, 2620A, or 2630A)?

No, the 400-MHz/4-MB UltraSPARC module is not supported in a system with any 84-MHz system boards due to the fact that it runs at a 4:1 CPU-to-Gigaplane speed ratio and requires the Gigaplane (and associated system boards) to run at 100-MHz.

What CPU modules are supported in the Sun Enterprise 3500-6500 servers?

The Sun Enterprise 3500-5500 servers can be ordered with factory-configured 250-MHz/4-MB, 336-MHz/4-MB or 400-MHz/4-MB UltraSPARC modules. The Sun Enterprise 6500 can be factory-configured with either 250-MHz/4MB or 336-MHz/4-MB UltraSPARC modules. The 250-MHz/1-MB, 167-MHz/1-MB, and 167-MHz/0.5-MB UltraSPARC Modules are also supported, but they not available as factory-configured options.

Note: Customers with 167-MH UltraSPARC modules who wish to migrate their modules to Sun Enterprise 3500-6500 servers might require a PROM upgrade as the minimum PROM level supported is 3.2.10

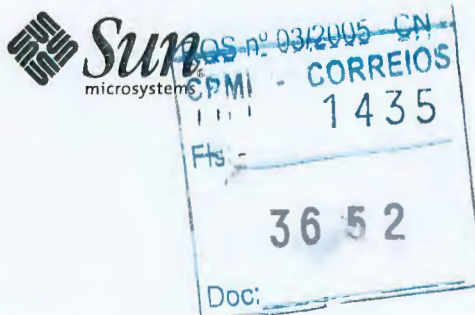
Why isn't the 400-MHz/4-MB UltraSPARC module supported in the Sun Enterprise 6500 & 6000 Servers?

The 400-MHz/4-MB module requires the Gigaplane to run at 100-MHz. The Sun Enterprise 6000 and 6500 cannot support running the Gigaplane at 100-MHz due to the physical length of the bus.

Will the 400-MHz/4-MB module ever be supported in the Sun Enterprise 6000 and 6500 Servers?

No, the 400-MHz/4-MB module will never be supported in the Sun Enterprise 6000 and 6500 Servers.

CPU/Memory Board





Will there be a faster than 336-MHz UltraSPARC module available for the Sun Enterprise 3000 and 6500 Servers?

Yes, there will be a future module available that will run faster than 336-MHz and will not require the Gigaplane, I/O boards, or 2601A/2602A CPU/memory boards to be upgraded (2600A CPU/memory boards will need to be upgraded). Up to 30 of these future modules will be supported in a single system and all 16 Gigaplane slots will be usable.

Is it necessary to upgrade the Gigaplane in order to support faster than 336-MHz modules in the Sun Enterprise 3000-5000 servers?

At this time yes, but in the future there will be a new module available that will run at faster than 336-MHz speeds and will not require the Gigaplane, I/O boards, or 2601A/2602A CPU/memory boards to be upgraded (2600A CPU/memory boards will need to be upgraded).

Will an Sun Enterprise 3500-5500 system support a mixture of different processor speeds (for example, 336-MHz and 400-MHz)?

Mixing 167-MHz, 250-MHz modules, 336-MHz modules, or 400-MHz modules in a single system is not supported. Mixing same frequency modules with different external cache is supported as long as all modules on a single CPU/memory Board have the same size external cache.

CPU/Memory Board

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Memory Subsystem

Memory Subsystem

The memory in the Sun Enterprise™ 3000–6000 and Sun Enterprise 3500–6500 servers is located on the CPU/memory boards. Up to 2 GB of RAM can be installed on each CPU/memory board. The memory subsystem in Sun Enterprise 3500–6500 servers is designed to offer fast, reliable data access.

- The memory controller manages two banks of memory on each CPU/memory board. Each bank of memory consists of eight standard JEDEC memory module modules, implemented in 3.3-V CMOS.
- The memory banks on the CPU/memory boards are very “wide.” Each bank can deliver 512 bits (64 bytes) in a single cycle, meaning that a 64-byte cache miss can be supplied in one memory cycle. This results in faster memory subsystem performance.
- Sun Enterprise 3500–6500 servers support up to 16-way memory interleave. Extensive interleave is required to support the high memory access rates possible in systems with many UltraSPARC™ modules.
- Interleaved memory banks can be different sizes, which is an improvement from the memory interleaving scheme used in the SPARCserver™ 1000E and SPARCcenter™ 2000E systems.

Memory Interleaving

Memory interleaving helps increase memory subsystem performance by reducing the probability of “hot spots” or contention in a few memory banks by spreading access to multiple memory banks. In a two-way interleaved system, the first cacheline is supplied by bank 0 while the second is supplied by bank 1. The size and extent of interleave is arranged so that a single typical request is satisfied by one bank. This permits memory requests to be fulfilled with a minimum amount of contention from other UltraSPARC modules.

Interleaved memory on Sun Enterprise 3500–6500 systems is considerably more important than on previous-generation systems because the UltraSPARC modules generate requests faster and the bandwidth of a single bank of memory is a smaller fraction of the Gigaplane™ bus bandwidth.

Configuring Memory for Best Performance

Configuring the memory for optimal system performance is easier than doing so for the SPARCserver 1000E and SPARCcenter 2000E systems because the memory interleave algorithm used for Sun Enterprise 3500–6500 server is much more flexible. Here are some general guidelines that should be used as a starting point in configuring a memory subsystem:

- Each UltraSPARC module should have at least 128 MB of RAM.
- Spread the amount of memory equally among the available banks. If there are one 1024-MB bank and one 256-MB bank, 80 percent ($1024 \times 100 / (1024 + 256)$) of all accesses on average will go to the 1024-MB bank and the bandwidth available will be limited by that bank, even though the 256-MB bank has the same available bandwidth. If most of the memory is in a few big banks, the interleaving of those big banks is more important than the interleaving of the other banks.
- In general, it is better to have more banks of smaller size than a smaller number of bigger banks.
- Fill up one bank on every board before filling the second bank on any board.
- If there are some boards with both banks filled and some boards with only one bank, the smaller banks must be put on the boards with two banks; the bigger banks must be kept on boards with only one bank.



Memory Subsystem Questions and Answers

What is the difference between the memory interleaving in the Sun Enterprise 3500–6500 servers and the memory interleaving in the SPARCserver 1000E system?

The SPARCserver 1000E system used a simple interleaving system that produced up to eight-way interleave. Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers have an improved design with fewer restrictions on the interleave configuration. They can support up to 16-way interleave and these interleaved memory banks can also be different sizes. The previous-generation systems interleaved memory only when memory banks were the same size. This meant that a SPARCserver 1000E system with two 32-MB banks and two 256-MB banks would use a two-way interleave between the 32-MB banks and two-way interleave between the 256-MB banks.

A similarly configured Sun Enterprise 3500–6500 server can use four-way interleave on the two 256-MB banks when combined with the first 256 MB of the 1-GB banks, and two-way interleave on the remaining memory. This permits considerably higher memory subsystem performance.

Why can't the memory modules from the SPARCcenter 2000E or SPARCserver 1000E be used in Sun Enterprise 3500–6500 servers? The Ultra™ 1 systems use the memory modules from the previous generation of desktops.

Sun Enterprise 3500–6500 server architecture requires 3.3-volt memory modules. All of Sun's previous generation memory modules were 5 volt. In addition, the desktop memory modules are too tall for the CPU/memory board spacing. The JEDEC memory modules fit both the form factor and voltage requirements.

Does the use of industry-standard memory modules mean that customers can buy off-the-shelf memory modules for use in Sun Enterprise 3500–6500 servers?

Yes, as long as the memory modules are the correct size (density), form, and voltage. However, Sun cannot guarantee that memory modules from third-party vendors will operate properly in Sun Enterprise 3500–6500 servers. Sun does not support third-party memory options.

Do Sun Enterprise 3500–6500 servers need more memory per processor compared to the SPARCcenter 2000E and SPARCserver 1000E systems? If so, why and how much?

Yes. With the SPARCcenter 2000E system, the general rule is that each processor should have at least 64 MB of RAM. With Sun Enterprise 3500–6500 servers, the general rule is that each processor should have at least 128 MB of RAM. The reason is that the UltraSPARC modules in the Sun Enterprise 3500–6500 servers are much higher performance than the CPU modules in the SPARCcenter 2000E system, so they require more memory for a balanced system.

How can one tell what interleave factor a Sun Enterprise 3500–6500 server is using?

Use `prtdiag(1M)`, located in the `/usr/platform/sun4u/sbin` directory.



I/O Boards

Overview

Most of the I/O connectivity for Sun Enterprise™ 3000–6000 and Sun Enterprise 3500–6500 servers is supported through I/O boards. Three types of I/O boards—SBus, Graphics, and PCI—offer a wide range of I/O connectivity.

One of the significant improvements over the I/O subsystem in the SPARCserver™ 1000E and SPARCcenter™ 2000E systems is the use of dual SBus channels on each SBus I/O board. In these previous-generation servers, each system board had one 32-bit SBus channel, offering a maximum I/O bandwidth of 100 MB per second per system board. With dual 64-bit SBus channels on each SBus I/O board, the maximum bandwidth in a Sun Enterprise 3500–6500 server is 400 MB per second per board.

* The SBus and Graphics I/O boards also provide 100 MB per second Fibre Channel Arbitrated Loop (FC-AL) connectivity.

The PCI I/O board has two PCI-66 channels and two standard 33-MHz PCI channels. The PCI I/O board has two PCI slots, 20-MB-per-second fast-wide SCSI, and 10/100-Mb-per-second Ethernet. The Ultra™ Port Architecture (UPA) interface that connects the PCI I/O board to the Gigaplane™ system bus has a throughput of 668 MB per second. Thus, the PCI I/O board throughput is 668 MB per second.

The I/O boards also offer environmental monitoring. The I/O boards have temperature sensors, allowing the actual temperature of individual boards to be monitored through the Sun Enterprise SyMON™ software.

I/O boards connect to the Gigaplane bus (see I/O board diagrams on following pages).

- On the SBus I/O board, the UPA bus connects the Gigaplane bus to two SBus channels, which connect the various I/O ports to the UPA bus.
- On the graphics I/O board, the UPA bus connects the Gigaplane bus to one SBus channel and one UPA slot for a graphics card (Creator or Creator3D).
- On the PCI I/O board, the UPA interface connects the Gigaplane bus to two PCI-66 channels and two standard PCI channels.

Sun Enterprise 3500–6500 servers can be PCI- or SBus-only systems. Up to four PCI I/O boards are supported per Sun Enterprise 3500 system and up to six PCI I/O boards are supported per Sun Enterprise 4500–6500 system. Mixed PCI and SBus systems are also supported.

I/O boards are hot-swappable, with the Dynamic Reconfiguration software enhancement provided with Solaris™ 2.6 Hardware: 5/98. This means new I/O boards can be installed and logically configured into the system while the system is online, or I/O boards that have been deconfigured from the system can be removed while the system is online. See the “Reliability, Availability, and Serviceability” section for more details.

I/O Boards

SBus I/O Board

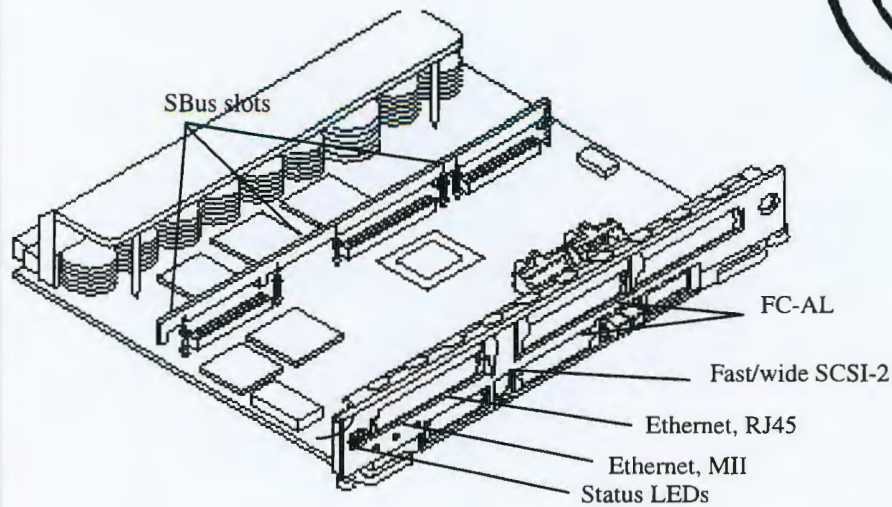


Figure 10. SBus I/O board

SBus I/O board features:

- The latest SBus I/O board (2612A) is capable of running at up to 100-MHz Gigaplane speed
- One on-board, 10/100-Mb-per-second Ethernet port (twisted pair and MII connector)
- One 20-MB-per-second, fast/wide SCSI-2 port
- Two empty 100-MB-per-second FC-AL sockets for GBIC modules
- Three 64-bit SBus slots running at 25 MHz
- Two 64-bit SBus channels, offering a peak throughput of 400 MB per second

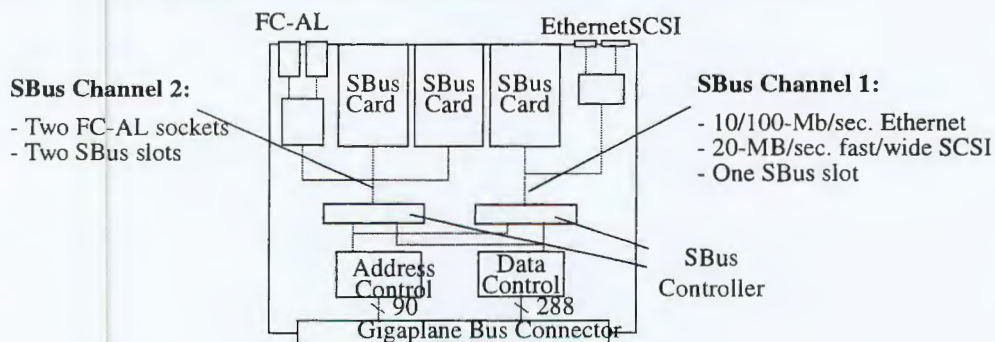


Figure 11. SBus I/O Block Diagram

Note: The 84 MHz-capable SBus I/O boards (2610A and 2611A) have been transitioned off of the price list.

In order to populate the FC-AL sockets on the newer SBus I/O boards (2611A and 2612A) and enable connectivity to a Sun StorEdge™ A5X00 array, order one or two GBIC modules (6731A).

Graphics I/O Board

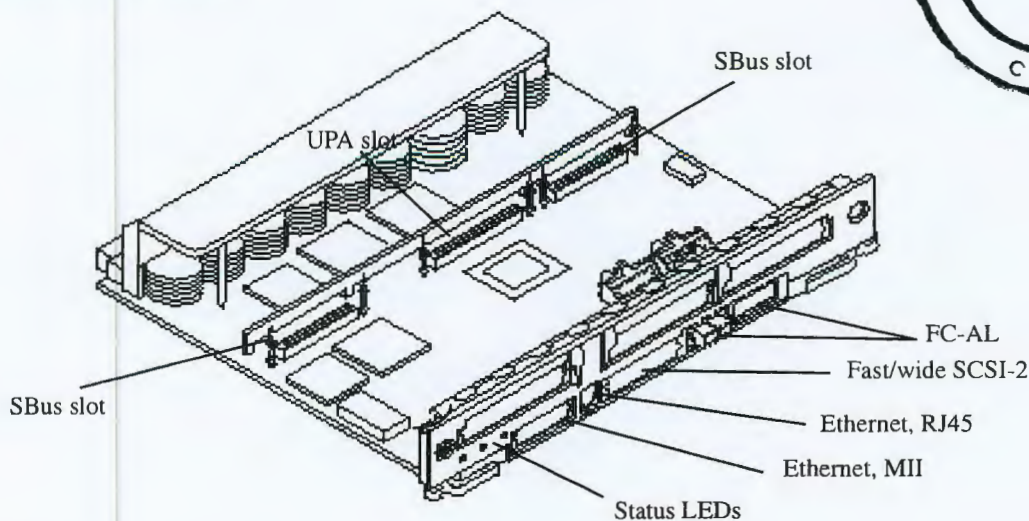


Figure 12. Graphics I/O board

The graphics I/O board, as shown, includes the following features:

- The latest Graphics I/O board (2622A) is capable of running at up to 100-MHz Gigaplane speed
- One on-board, 10/100-Mb-per-second Ethernet port (twisted pair and MII connector)
- One 20-MB-per-second, fast/wide SCSI-2 port
- Two empty 100-MB-per-second FC-AL sockets for GBIC modules
- Two 64-bit SBus slots running at 25 MHz
- One UPA slot for a Creator3D series 3 or Sun Elite3D m6 graphics board
- One 64-bit SBus channel, offering 200-MB-per-second data transfer

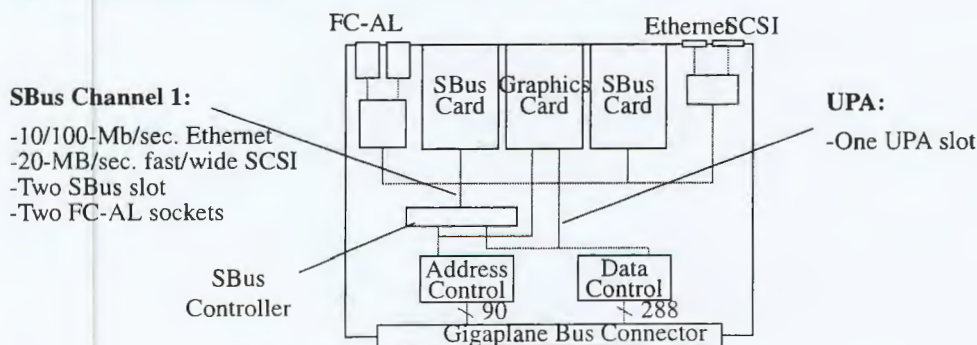


Figure 13. Graphics I/O Board Block Diagram

Note: The 84 MHz-capable Graphics I/O board (2620A) has transitioned off of the price list.



Graphics Frame Buffers Supported

The Graphics I/O board can support both Creator3D series 3 and Sun Elite3D m6 frame buffers in the horizontal form factor. As shown in the table below, the Sun Enterprise 3500–6500 servers can support multiple board configurations.

System	Maximum Number of Creator3D series 3 or Sun Elite3D m6 Frame Buffers	Maximum Number of CPUs
Sun Enterprise 3500 Sun Elite3D (5 slots)	3	4
Sun Enterprise 4500 Sun Elite3D (6 slots)		
• Configuration 1	1	10
• Configuration 2	2	8
• Configuration 3	3	6
• Configuration 4	4	4
Sun Enterprise 6500 Sun Elite3D (16 slots)		
• Configuration 1	1	30
• Configuration 2	2	28
• Configuration 3	3	26
• Configuration 4	4	24
• Configuration 5	5	22
• Configuration 6	6	20
• Configuration 7	7	18
• Configuration 8	8	16

I/O Boards

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PCI I/O Board

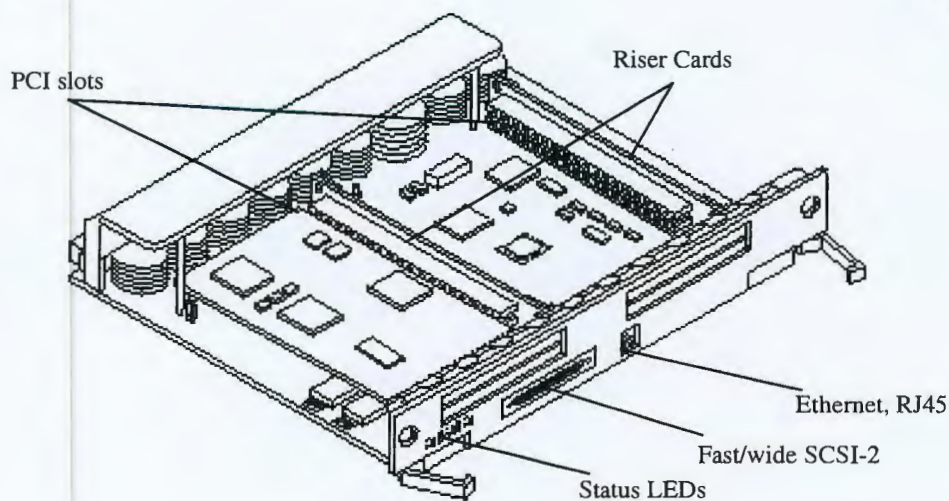


Figure 14. PCI I/O board

The PCI I/O board, as shown, includes the following features:

- The latest PCI I/O board (2632A) is capable of running at up to 100-MHz Gigaplane speed
- One on-board 10/100-Mb-per-second Ethernet port (twisted pair)
- One 20-MB-per-second, fast/wide SCSI-2 port
- Two 64-bit PCI slots running at 66 MHz (also supports 33 MHz)
- Two 64-bit PCI channels, each offering 528-MB-per-second data transfer

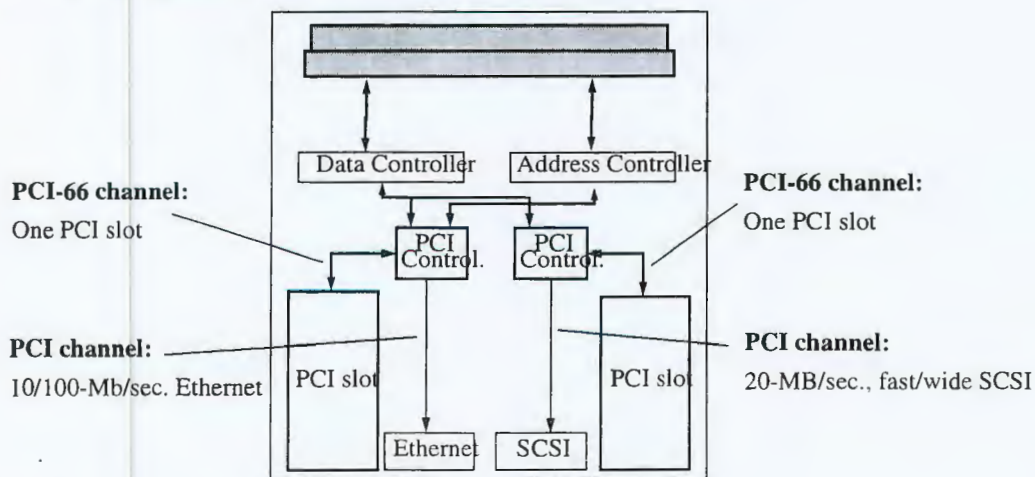


Figure 15. PCI I/O Board Block Diagram

Note: The 84 MHz-capable PCI I/O board (2630A) has transitioned off of the price list.

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I/O Boards Questions and Answers

Are the 32-bit SBus cards supported on the SPARCcenter 2000E and SPARCserver 1000E systems also supported on Sun Enterprise 3500–6500 servers?

Yes.

Does the graphics I/O board also support the TurboGX™ graphics card?

Yes. Both the Graphics I/O board and the SBus I/O board support the TurboGX graphics card.

Do dual-wide SBus cards work with the SBus I/O board or graphics I/O board?

One dual-wide SBus card will fit on an SBus I/O board. Only single-wide SBus cards will work with the Graphics I/O board.

What type of PCI cards can be used in the Sun Enterprise 3500–6500 servers?

Sun supports 3.3-volt or 5.0-volt PCI short cards (4.200 x 6.875 inches).

What PCI card speeds are supported in the Sun Enterprise 3500–6500 servers?

The PCI slots accept either 66-MHz or 33-MHz PCI cards. They can be either 64-bit or 32-bit cards.

Does Sun support (service) third-party PCI cards?

No. Sun does not support (service) third-party PCI cards. However, Sun has been working with third-party independent hardware vendors to ensure a robust supply of cards for Sun platforms. PCI cards that have been verified by Sun to operate properly on Sun platforms are subject to stringent testing. A list of these third-party PCI cards can be found at URL <http://www.sun.com/sunready/vendors.html>.

What is included with the PCI I/O board?

The board comes with two 5.0-volt riser cards preinstalled. The PCI card plugs into the riser card. The PCI I/O board also comes with two 3.3-volt riser cards. If your PCI card is 3.3-volt, then a 5.0-volt riser card must be removed and a 3.3-volt riser card must be installed.

Do PCI cards on the same PCI I/O board have to be the same voltage?

No. There may be one 5.0-volt card and one 3.3-volt card on the same PCI I/O board. It must be ascertained that the appropriate riser card for each PCI card are being used.

Are there any software requirements for the PCI I/O board?

Yes. The PCI I/O board requires Solaris 2.5.1. Hardware: 4/97 or higher. The CPU/memory boards must also have at least OpenBoot™ PROM software, version 3.2.8 or later.

Can the new 100 MHz-capable I/O boards be used in Sun Enterprise 3000–6000 servers?

Yes. The previous 84-MHz I/O boards are being transitioned off the price list and these new I/O boards are compatible with existing Sun Enterprise 3000–6000 servers. There is no problem mixing these I/O boards in a Sun Enterprise 3000–6000 server that already uses the previous boards.

I/O Boards



Does the Sun Enterprise 3500-6500 server family support SBus-only and mixed I/O board configurations?

Yes. However, a PCI-only configuration in a Sun Enterprise 3500 server does not provide a way to connect the internal FC-AL disk drives. This is because the PCI I/O board does not have on-board FC-AL sockets and currently there is no PCI FC-AL card available. So, to be able to use the internal disk drives in the Sun Enterprise 3500, there must be at least one SBus I/O or one Graphics I/O board installed.

Are there plans to add on-board FC-AL sockets to the PCI I/O board?

No, there is not enough physical space on the board to accommodate on-board FC-AL sockets.

I/O Boards

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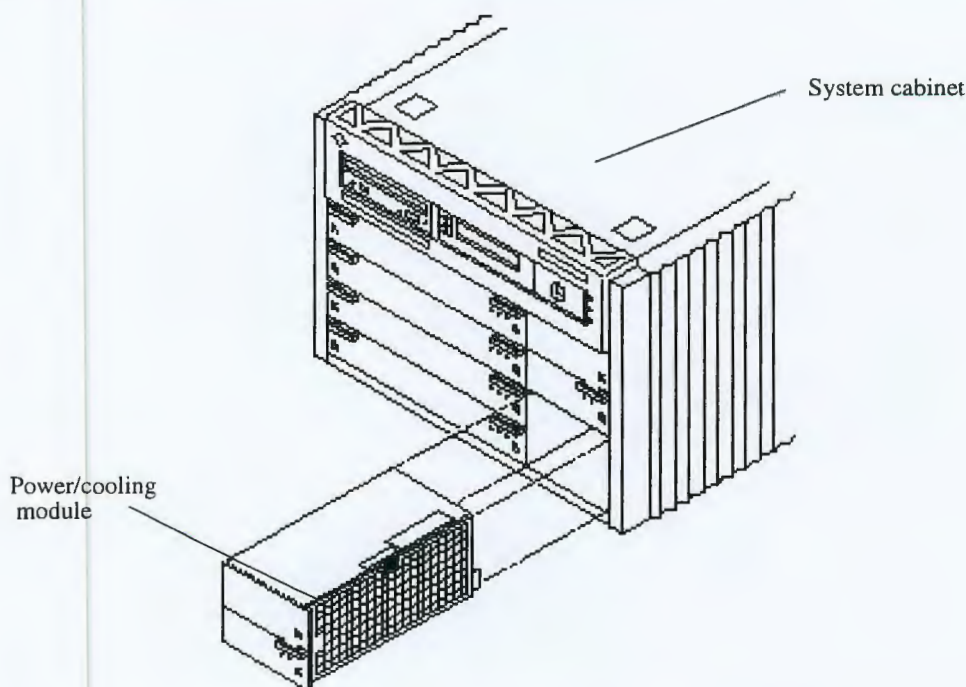
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Power and Cooling

Power and Cooling

The Sun Enterprise™ 3500–6500 servers offer a highly flexible, highly reliable power and cooling environment. With an N+1 system configuration (where N is the minimum number of power supplies required), Sun Enterprise 3500–6500 servers offer redundant power, using power/cooling modules that are hot swappable. This offers customers a system that will almost never fail due to a power supply or a fan failure.



Power and Cooling

Figure 16. The Sun Enterprise 4500 Server Hot-swappable Power/Cooling Module

Power Circuitry

There are two different types of power supplies in Sun Enterprise 3500–6500 servers: power/cooling modules and peripheral power supplies.

- Power/cooling modules contain a 300-watt power supply and two variable-speed fans. The number of power/cooling modules installed in a system depends on the system configuration.
- One power/cooling module is required for every two adjacent boards on each side of the centerplane.
- The Sun Enterprise 3500 server supports a maximum of three power/cooling modules.
- The Sun Enterprise 4500 and Sun Enterprise 5500 servers support a maximum of four power/cooling modules.
- The Sun Enterprise 6500 server supports a maximum of eight power/cooling modules.
- Power from the power/cooling modules is distributed throughout the system using current-sharing circuitry, so that if the power supply in one power/cooling module fails, power from the other power/cooling modules keeps the system running (if the system is configured for redundant power).

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- To configure a system *without* redundant power, the system must have $x/2$ power/cooling modules, where x is the number of CPU/memory, I/O and disk boards (round up to the nearest whole number).
- To configure a system *with* redundant power, the system must have $(x/2 + 1)$ power/cooling modules, where x is the number of CPU/memory, I/O and disk boards (round up to the nearest whole number). However all of the Sun Enterprise 3500–6500 server platforms are able to provide redundant power for maximum board configurations with only $x/2$ power/cooling modules, therefore providing the following exceptions to the $x/2 + 1$ rules:
 - When configuring the Sun Enterprise 3500 server, the $x/2+1$ configuration rule implies that a Sun Enterprise 3500 system with five boards would require four power/cooling modules ($5/2 + 1 = 4$). But there are only three power/cooling module slots. In order to resolve this issue, each power/cooling module is able to supply slightly more power than is required, so a Sun Enterprise 3500 server with five boards can operate on two power/cooling modules plus a second peripheral power supply. Thus, a second peripheral power supply is required for full N+1 power supply redundancy in a five-board Sun Enterprise 3500 server configuration.
 - Similarly, a Sun Enterprise 6500 system with 16 boards would require nine power/cooling modules ($16/2 + 1 = 9$). But there are only eight power/cooling module slots. Each power/cooling module is able to supply slightly more power than is required, so a Sun Enterprise 6500 server with 16 boards can operate on seven power/cooling modules.
 - Sun Enterprise 4500 and Sun Enterprise 5500 servers with eight boards are able to run on three power supplies, so only four power supplies are required for redundancy. The peripheral power supply is connected to the same power circuitry as the power/cooling modules, providing the additional power required for redundancy. Note that there are some limitations with regard to power supply redundancy with certain configurations of the Sun Enterprise 4500 and 5500 when using the 400-MHz processor. See the “Power and Cooling Questions and Answers” section for more details.
- The power/cooling module is hot swappable. Therefore, if a power supply fails, the power/cooling module can be replaced (assuming the system is configured for power/cooling redundancy) while the system is running without any adverse effects to the system.
- The Sun Enterprise 4500–6500 servers have one peripheral power supply. The peripheral power supply is hot pluggable but not redundant in these platforms.
- The Sun Enterprise 3500 server supports a second, hot-swappable, peripheral power supply. The peripheral power supply provides power for the internal SCSI devices and the FC-AL internal disk drives, as well as additional power for the system boards. If the primary peripheral power supply fails, the system continues to run, but the internal SCSI devices are not functional unless the system has a second peripheral power supply. The primary peripheral power supply includes the AC inlet so it is not hot swappable. Only the second peripheral power supply is hot swappable.



System Cooling

Sun Enterprise 3500–6500 servers have multiple power/cooling modules for cooling the CPU/memory, I/O, and disk boards (Sun Enterprise 4500–6500 server only), and one set of dual fans to cool the AC distribution assembly, clock board, and peripherals.

- The power/cooling modules include a power supply and two variable-speed fans.
- With dual, variable-speed fans, if one fan fails, the other fan speeds up to increase its cooling capacity.
- The power/cooling module is hot swappable. Therefore, if a fan fails, the power/cooling module can be replaced (assuming the system is configured for power/cooling redundancy) while the system is running without any adverse effects to the system.
- The fans within a power/cooling module are powered by all the power supplies in the system through current sharing. With this design, if a power supply fails, the fans within that power/cooling module continue to run.
- Variable-speed fans minimize system noise.
- The Sun Enterprise 5500 and Sun Enterprise 6500 system cabinets includes one cabinet fan tray. The cabinet fan tray includes four fans supported by two power supplies. Each power supply supports two fans. The cabinet fan tray in the system cabinet directs the hot air from the card cage and peripheral devices out the rear of the cabinet.
- Each Sun Enterprise expansion cabinet also contains one cabinet fan tray. The cabinet fan tray in an expansion cabinet can be connected to the system cabinet so that the Sun Enterprise SyMON™ software is able to detect the failure of a cabinet fan tray in an expansion cabinet. The cabinet fan tray is not hot pluggable.

Power and Cooling Questions and Answers

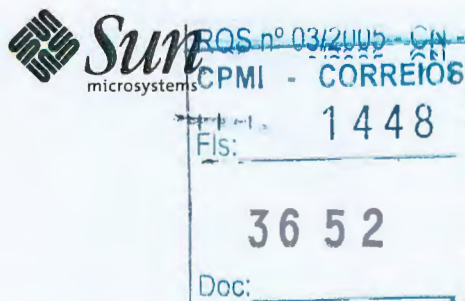
If a fully configured, eight-board Sun Enterprise 4500 server can operate on three power/cooling modules, can an identically configured eight-board Sun Enterprise 6500 server also operate with three power/cooling modules?

No. In the Sun Enterprise 4500 server, the peripheral power supply and the power/cooling modules are connected to the same power circuit. Therefore, if one power/cooling module fails, power from the other three power/cooling modules plus power from the peripheral power supply provide enough power to run the system. This allows eight boards to be powered by three power/cooling modules.

However, in the Sun Enterprise 6500 server, the peripheral power supply and power/cooling modules have different power circuits. Therefore, if one power/cooling module fails, the only power available is from the three remaining power/cooling modules, which is not enough to support the systems.

Are there any limitations in regard to power supply redundancy (N+1) associated with the 400-MHz/4-MB UltraSPARC™ module?

Yes, 100-MHz Gigaplane™ capable 8-slot systems (Sun Enterprise 4500, 5500, and Sun Enterprise 4000 and 5000 servers with upgraded 100-MHz Gigaplane) have an N+1 power limitation. These systems do not support N+1 power if the system has seven CPU/memory boards installed (even with four power/cooling modules installed). N+1 power is supported in any other configurations of these systems assuming the correct number of power/cooling modules are installed. The N+1 power limitation is due to the fact that the 100-MHz system speed consumes more power than the 84-MHz system speed that we currently run at. The increased power consumption does not leave enough spare power to continue running a system with seven CPU/memory boards installed if one of the power/cooling modules fails.





Do fully configured Sun Enterprise 4500 or 5500 servers with twelve 400-MHz/4-MB modules, six CPU/memory boards, two I/O boards, and four power/cooling modules have N+1 power?

Yes, the N+1 power limitation is applicable only when the configuration includes seven CPU/memory boards.

Power and Cooling

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System Management

System Diagnostics

There are three types of system diagnostics tools available for the Sun Enterprise™ 3000–6000 and Sun Enterprise 3500–6500 servers: the Sun Validation Test Suite (SunVTS™), Automatic System Recovery, and Remote Administration Control.

SunVTS™

SunVTS is the replacement product for SunDiag™ diagnostics tool. Like SunDiag, SunVTS is run at the UNIX® level and is designed to exercise the entire system. It supports either a graphical user interface (GUI) or TTY user interface, and provides error and information logging. The key features of SunVTS are:

- **UNIX-level diagnostics**

System tests execute UNIX code under the Solaris Operating Environment™.

- **Automatic system probing**

The system configuration is displayed through the user interface.

- **Two user interfaces**

Both a graphical user interface and a character-based interface are available. The SunVTS kernel is cleanly separable from the user interface, such that multiple user interfaces can communicate with the same SunVTS kernel. The character-based interface permits the writing of shell scripts to control SunVTS.

- **Application programming interface (API)**

The API provides a defined interface into the SunVTS kernel from other processes, as well as the user interfaces. A SunVTS execution could be initiated in a cron-like fashion, with no direct user interface at all.

- **Advanced configuration and execution control**

Tests can be grouped together based on user requirements, with fine-grained execution control for status and logging information.

Automatic System Recovery

Automatic System Recovery operates the same way in Sun Enterprise 3500–6500 servers as in the Sun Enterprise 3000–6000 and SPARCcenter™ 2000E systems. Automatic System Recovery allows Sun Enterprise 3500–6500 servers to recover after a component, such as a UltraSPARC™ module, CPU/memory board, memory module, or I/O board fails. Upon failure, the system reboots. While rebooting, Automatic System Recovery tests system components and identifies the failed component; the system reboots around the failed component.



Automatic System Recovery is driven by power-on self-test (POST) software. The POST software in Sun Enterprise 3500–6500 systems includes two significant changes from the POST used in the SPARCcenter 2000E:

- **Uses a flash EPROM**

Flash EPROM makes it simple to update the OpenBoot™ PROM software in the field. New PROM code can be installed from a CD-ROM while the system is running.

- **Uses a configurable rule-based expert system**

A configurable rule-base expert system allows the user to customize the boot/diagnostic control flow.

Remote Administration Control

The Remote Administration Control feature on Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 servers allows a user to reboot, power cycle, or perform extensive operating system debugging through one of the serial ports (serial port A only). A special serial processor on the system clock board scans the input for system commands.

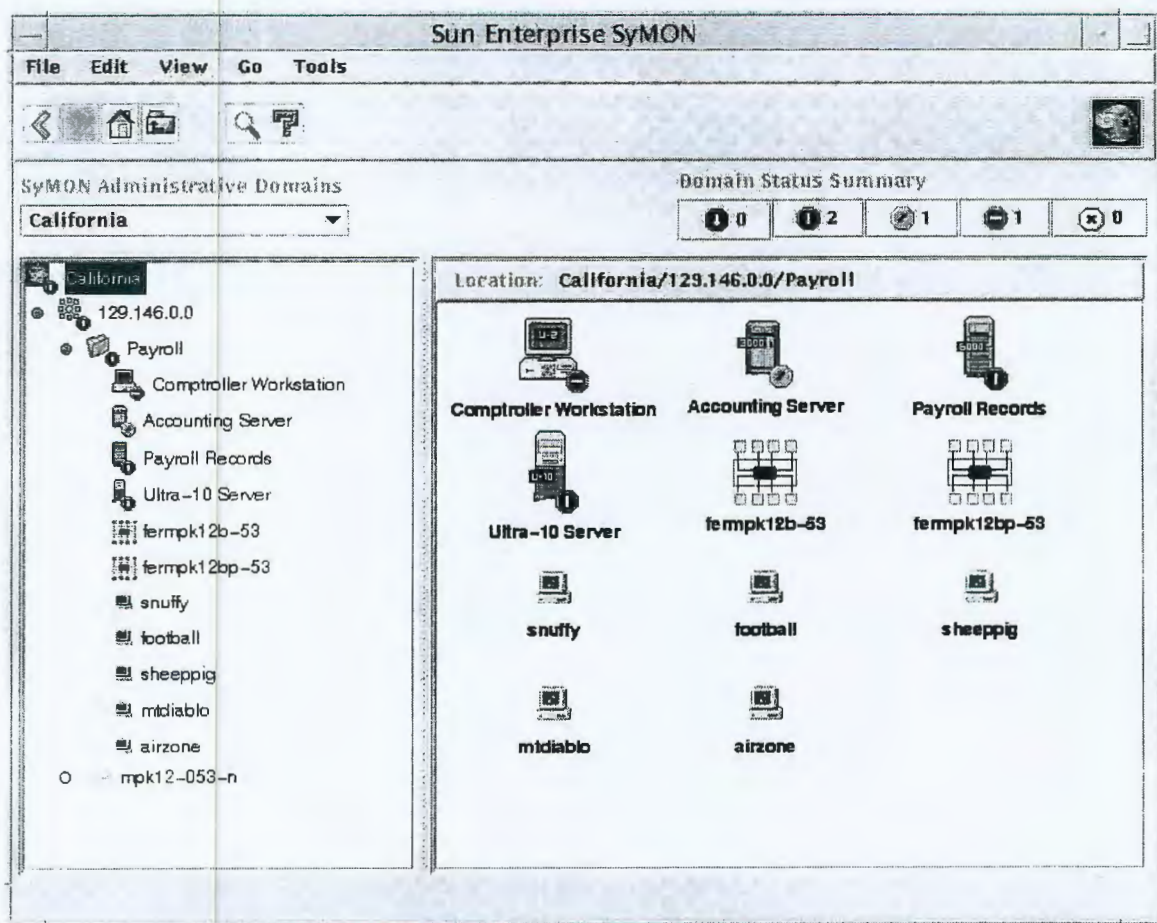
This remote console functionality allows for true “lights out” management of a system, giving system administrators more flexibility in point of management and control. This also enhances the serviceability aspect of the systems by providing a method of retrieving the system state on “hung” systems.

Remote control can be disabled by putting the key switch in the “secure” position.

System Management



Sun Enterprise SyMON™



Sun Enterprise SyMON™

Figure 17. Sun Enterprise SyMON™

Key Features

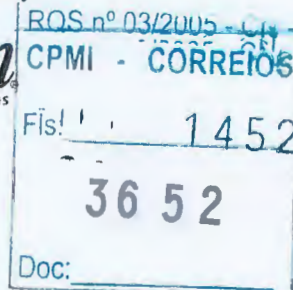
Sun Enterprise SyMON software is Sun's next-generation enterprise system management tool for Sun Enterprise™ 3500–6500 servers. Designed to support Sun systems, Sun Enterprise SyMON technology provides a platform upon which the enterprise can base its administrative and management operations to help ensure all systems and the services they provide are highly available. A powerful tool for managing the enterprise network, the Sun Enterprise SyMON product enables system administrators to perform remote system configuration, monitor performance, and isolate hardware and software faults all through an easy-to-use graphical user interface.

Key features of Sun Enterprise SyMON software include:

- Common management platform, scalable from a single system to thousands of server and desktop systems
- Single point of management, enabling effective use of administrative resources
- Proactive and automated management of complex and common administrative tasks, reducing the likelihood for costly errors and helping to ensure availability



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- Configuration flexibility, enabling Sun Enterprise SyMON technology to be configured out of the box to best fit the needs of the environment, as well providing easy customization for new rules, scripts, actions, etc.
- Extensible agent architecture, enabling administrators to add functionality and management features with ease
- Dynamic agents, enabling functionality to be extended asynchronously
- Active configuration management controls, providing a secure interface for remote dynamic reconfiguration capabilities and helping to ensure availability
- Single event model, enabling information to be shared with multiple consoles or users with ease
- Multiple system support, enabling administrators to monitor and manage all Solaris™ systems remotely
- Predictive failure analysis, enabling administrators to predict potential memory and disk hardware failures on a statistical basis, thereby enhancing decision making and increasing availability
- Health monitoring, a sophisticated set of heuristics that incorporates a large body of administrative knowledge, including an intelligent rules-based health monitor that correlates metrics and gives suggested steps for resolution, resulting in simplified administration
- Log-file scanning, enabling administrators to search and parse logs and registers for a particular status—the foundation for application health monitoring
- Logical element grouping, enabling the grouping of Sun systems by geographical location, server role, administrative responsibility, etc. The status of the individual systems are summarized by the group, as events and alarms are issued to each system
- Hierarchy and topology viewer, a central management application that displays the hierarchy and a topology map of all the objects that are being managed
- Automatic discovery of Sun systems, including IP address, subnet address, hostnames, and OIDs to identify specific types of systems, as well as parametric scheduling
- Physical viewer, displaying photo-realistic images of hardware components and pointing to components with an associated event, enabling administrators unfamiliar with a particular Sun platform to quickly determine which components need to be replaced
- Logical viewer, presenting a tree hierarchy of the managed host or domain, including all hardware and operating system components. If an event is associated with a particular component, the logical viewer will identify its exact location within the hierarchy
- Event and alarm management, providing administrators with the information they need when they need it
- Enterprise-wide security measures, such as authentication, data integrity, and access control lists for management of data and active management functions
- Real-time performance analysis, enabling administrators to isolate potential and existing bottlenecks
- Standard interfaces and protocols, enabling integration with third-party management tools, including Tivoli and Computer Associates, thereby providing a complete enterprise management solution
- Full SNMP connectivity, enabling information to be shared with other enterprise management tools
- GUI using Java™ technology, providing heterogeneous GUI support, a common “look-and-feel” for all Sun Enterprise SyMON applications, and the flexibility to manage the enterprise from any platform using Java technology, thereby increasing administrator efficiency

Sun Enterprise SyMON™

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Sun Enterprise SyMON software can be extended through the use of sophisticated add-on products to provide additional functionality:

- Trend analysis and historical data storage, supporting system performance analysis, configuration fault analysis, system sizing, and long term capacity planning and forecasting efforts
- Host application and database fault management, increasing data and service availability through integration with third-party products like BMC PATROL
- Firmware and patch management, providing administrators with the ability to upgrade systems when needed with the addition of Sun Enterprise Configuration and Service Tracker
- On-line diagnostics, enabling hardware and software problems to be predicted, detected, isolated, and resolved, thereby increasing system and service availability with the addition of Sun Enterprise Diag Tool

Sun Enterprise SyMON 2.0 Compatibility

The Sun Enterprise SyMON 2.0 software platform supports all systems running Solaris 2.5.1, 2.6 and Solaris 7 Operating Environments.

Hardware-dependent configuration management functions support includes:

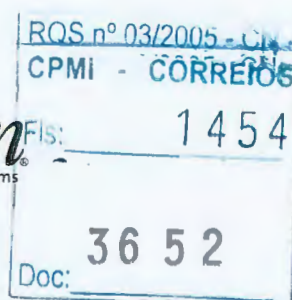
- Sun Ultra™ 1, Ultra 2, Ultra 5, Ultra 10, Ultra 30, Ultra 60 and Ultra 450 workstations
- Sun Enterprise 3X00, Sun Enterprise 4X00, Sun Enterprise 5X00, and Sun Enterprise 6X00 servers
- SPARCserver™ 1000 and SPARCserver 1000E servers
- SPARCcenter™ 2000 and SPARCcenter 2000E servers

Additional hardware-dependent configuration management function support will be available from the Sun Enterprise SyMON web site (www.sun.com/products/symon) after version 2.0 ships. These platforms include, but are not limited to: Sun Enterprise 150, Sun Enterprise 250, Sun Enterprise 450, and Sun Enterprise 10000 servers, and the Sun StorEdge™ A5X00 array.

Sun Enterprise SyMON Licensing/Usage

Sun Enterprise SyMON 2.0 software is available off the web free-of-charge to manage an individual server or desktop (www.sun.com/products/symon). A right-to-use license is required to manage additional servers or desktops/network devices from one Sun Enterprise SyMON server layer.

Sun Enterprise SyMON™





Sun Enterprise SyMON System Monitor Questions and Answers

How is Sun Enterprise SyMON different from previous versions?

Sun Enterprise SyMON is a major new release compared to the existing release. It provides several new and enhanced features such as:

- Multiple system support: Administrators can remotely monitor and manage all the Solaris systems in their environments and have the ability to define Sun systems by geography, server role, administrative responsibility, etc.
- Heterogeneous GUI support (Java technology-based GUI): the Java technology UI in Sun Enterprise SyMON allows administrators to have the flexibility to manage from a Java platform and be more efficient through the use of a easy-to-use interface.
- Enhanced event/alarm management: Sun Enterprise SyMON has state-of-the-art event management capabilities that enables cooperative management between multiple system administrators.
- Logical element grouping: ability to group multiple managed systems into one managed entity. Allows IT-organization to map individual managed components into groups related to applications and business processes.
- Active configuration management controls: Sun Enterprise SyMON is a secure interface for remote dynamic reconfiguration capabilities (dynamic attach/detach, etc).
- Application monitoring capabilities: Sun Enterprise SyMON can monitor health and performance of application processes, monitor and act upon error log entries, monitor application files and monitor directory statistics.
- State-of-the-art standard interfaces such as SNMPv2c, SNMPv2usec, and SNMPv1 for interoperability, end-to-end security, and efficient data transfer.
- Integration with major system management platform vendors such as Tivoli and Computer Associates: Sun Enterprise SyMON integrates with the major commercial system and network management platforms to ensure an enterprise solution.

Does Sun Enterprise SyMON integrate with Computer Associates Unicenter TNG, Tivoli TMS, and Hewlett-Packard OpenView?

Sun Enterprise SyMON can send SNMP traps to any SNMP-compliant management platform. For the near future, Sun is working closely with the leading Sun Enterprise Management vendors to provide a tightly integrated solution.

Is Sun Enterprise SyMON 2.x compatible with Solstice SyMON™ 1.x?

Sun Enterprise SyMON 2.0 is not backward compatible with Solstice SyMON 1.x

Sun Enterprise SyMON™



The Solaris Operating Environment™

The Sun Enterprise 3500–6500 servers run on an industry-leading enterprise operating environment, Solaris™. The Sun Enterprise 3500–6500 servers require Solaris 2.5.1 Hardware: 11/97 with two patches: 104595-03 (or later) and 104594-01 (or later). In addition, patch number 105310-04 (or later), which is an FC-AL patch, is highly recommended. The Sun Enterprise 3500–6500 servers can also run Solaris 2.6 Hardware: 3/98 and the Solaris 7 Operating Environment with no required patches. However, patch number 105375-04 (or later), an FC-AL patch, is highly recommended for both releases.

The Solaris product line is the premier software environment for network computing, delivering unparalleled scalability and performance. Designed for IT professionals, line of business managers, Internet Service Providers and power desktop users, the Solaris software environment safely delivers information to anyone, any time, any place, on anything including PCs, workstations, and all other Internet devices.

Unlike other operating environments, Solaris delivers what companies require today and anticipates the innovation they will require tomorrow. Solaris is reliable, scalable, easy to administer, fast, safe, Year-2000 and Euro compliant, and unleashes the full power of SPARC™ processor- and Intel-based computers.

The Solaris Operating Environment contains the base level functionality required for all systems. It includes a rock solid, scalable 32-bit and 64-bit kernel; standards-based networking; platform support for both SPARC and Intel; and Java™ support. These technologies provide the foundation for building and deploying enterprise class systems for multi-vendor, multi-client workgroup environments and for highly available data center environments.

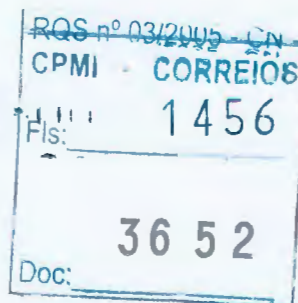
The strengths of the Solaris Operating Environment lie in enterprise-class reliability, scalability and performance. The Solaris 7 Operating Environment extends these strengths.

Features

Along with the features available in the Solaris 2.5.1 and 2.6 Operating Environment, the Solaris 7 Operating Environment includes support for several new features and capabilities listed below.

RAS Features

- Dynamic Reconfiguration—support for hot-swap I/O boards on Sun Enterprise 3000–6000 and Sun Enterprise 3500–6500 systems
- UFS Logging—logs changes to the UFS files system before updates are applied to the UFS
- Year 2000 compliance—no errors result when moving from date 12/31/99 to 1/1/00 or from 2/29/00 to 3/1/00
- System Crash Dump Utility Enhancement—faster capture of system data and the ability to dump data to a specified dump partition at time of system crash while also using less disk space
- Traceroute Utility—traces the route of an IP packet to an Internet host
- New system commands: pgrep(1) and pkill(1)—replaces combination of ps, grep, egrep, awk, and kill
- UNIX® 98 and UNIX 95 branding—complies with industry standards specification





Performance Enhancements

- Complete 64-bit Operating Environment—process addressing beyond 4-GB, 32-bit barrier; supports 64-bit data types, and 64-bit logical and arithmetic operations
- Improved Poll System Call—system call for querying files
- TCP SACK—selective packet acknowledgment
- SCSI Driver—support for shared disk SCSI driver

Scalability Enhancements

- 64-bit Computing—64-bit virtual addressing, more file descriptors, processes and more available sockets
- Open Sockets—15,000 times as many open sockets available to applications
- Light Weight Processes—support for up to 10 million times more light weight processes
- File Descriptors—support for 15 million times as many file descriptors

Ease-of-use Features

- CDE Administration Enhancements—process manager, perfmeter, system info monitor
- CDE Productivity Enhancements—file finder, customizable graphical front panel and workspace menu, address manager, and text and voice post-it notes
- Printing Enhancements—enhanced font management
- 64-bit and AnswerBook™ Installation—menu-based selection of 64-bit or 32-bit environment, and AnswerBook
- Netscape™ 4.05 Communicator—Netscape e-mail, HTML editor, and browser
- AnswerBook Enhancements—Web browser interface for on-line AnswerBook documentation, man pages are now available in SGML format; can now be run directly from the CD
- man utility displays SGML format in addition to nroff format

Software

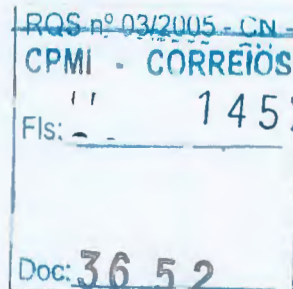
Global Language Support Enhancements

- Expanded Unicode Support—support for Unicode 2.1 standard
- Expanded Native Language Support—support for up to 37 languages and 95 locales
- Complex Text Format—support for bidirectional, composite, and context sensitive text
- Euro Currency—support for Euro currency symbol
- More locale selections—English and European versions combined on a single CD
- Fully Globalized—All localized versions share a single global binary

Security and Stability Features

- Generic Security Services—Modified remote procedure call (RPC) based on standard GSS-API
- NIS+ Extended Security—Diffie Helman key extended from 192 bits to 640 or 1024
- Directory Naming Service(DNS)—Berkeley Internet Name Daemon (BIND) upgraded to version 8.1.2. Control Lists.
- Sendmail—Upgraded to version 8.9
- 32-bit Compatibility—all existing 32-bit applications run without modification.
- Single source base for all platforms—all platforms developed from one source tree

Just the Facts



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Options

Disk Options

The preferred disk solution for the Sun Enterprise™ 3500–6500 servers depends on the server model as well as the customer's environment. The following is a summary of the disk options available.:

Server

Sun Enterprise 3500

Disk Option

- Internal 9.1-GB, 3.5-inch FC-AL, disk drive(s)
- Sun StorEdge™ A1000/D1000, Sun StorEdge A3500, Sun StorEdge A5X00, and Sun StorEdge A7000 disk arrays
- Sun StorEdge UniPack, MultiPack, FlexiPack
- Sun StorEdge Tape Library

Sun Enterprise 4500

- Internal 8.4-GB disk board
- Sun StorEdge A1000/D1000, Sun StorEdge A3500, Sun StorEdge A5X00, and Sun StorEdge A7000 disk arrays
- Sun StorEdge UniPack, MultiPack, FlexiPack
- Sun StorEdge Tape Library

Sun Enterprise 5500

- Internal, 8.4-GB disk board
- Sun StorEdge A1000/D1000, Sun StorEdge A3500, Sun StorEdge A5X00, and Sun StorEdge A7000 disk arrays
- Sun StorEdge FlexiPack removable storage tray
- Sun StorEdge Tape Library

Sun Enterprise 6500

- Internal, 8.4-GB disk board
- Sun StorEdge A1000/D1000, Sun StorEdge A3500, Sun StorEdge A5X00, and Sun StorEdge A7000 disk arrays
- Sun StorEdge FlexiPack removable storage tray
- Sun StorEdge Tape Library

Options

Keep in mind that the above list is not a complete listing. For example, a Sun Enterprise 3500 server may also boot from external disk drives, but the internal FC-AL disk drives is the most commonly chosen option. Also note that the SPARCstorage™ Array Models 100 and 200 are still supported with the above platforms, although they are no longer factory-configurable.

The disk board is designed to be used only as a system disk in the Sun Enterprise 4500–6500 server. Its capacity is not large enough for anything else. It also does not make sense to use several system slots for internal capacity in these systems. External disk options can also be used as system disks.

Refer to the *Sun Enterprise 3500–6500 Servers System Options* document for a list of supported disk options. For Sun Enterprise 3500–6500 servers with certain internal disk options, the Solstice JumpStart™ Boot Image software may be factory installed at no charge. The Solstice JumpStart software may be installed on the following disk storage products:

- Internal FC-AL disk drives on the Sun Enterprise 3500 server
- 8.4-GB disk board in the Sun Enterprise 4500, Sun Enterprise 5500, and Sun Enterprise 6500 servers

The Solstice JumpStart software is not supported with the Sun StorEdge A5X00 array



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Upgrades

Sun offers customers a variety of flexible upgrade paths to the Sun Enterprise™ 3500–6500 servers that protect their investment. Customers can choose among full-system, chassis only, Gigaplane™ system bus, CPU, board and memory upgrades. To protect customers' investments, Sun upgrades allow customers to carry forward as many components as possible to a Sun Enterprise 3500, Sun Enterprise 4500, Sun Enterprise 5500 or Sun Enterprise 6500 server.

Sun-to-Sun Upgrades (Trade ins) to the Sun Enterprise Server Family

FROM:	TO:	Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500	Sun Enterprise 6500
Full System Workgroup Server		Yes	No	No	No
Full System Sun 3X0/4X0		Yes	Yes	No	No
Full System Sun 6X0/SS1000		Yes	Yes	Yes	No
Full System Sun SC2000		No	Yes	Yes	Yes
Intra-Family Chassis Upgrade from Sun Enterprise 3000 or Sun Enterprise 3500		No	Yes	Yes	No
Intra-Family Chassis Upgrade from Sun Enterprise 4000 or Sun Enterprise 4500		No	No	No	Yes
Intra-Family Chassis Upgrade from Sun Enterprise 5000 or Sun Enterprise 5500		No	No	No	Yes
Gigaplane Field Upgrade		N/A	Yes	Yes	No
CPU/Memory Board Upgrades		Yes	Yes	Yes	Yes
I/O Board Upgrades		Yes	Yes	Yes	Yes
CPU Module Upgrades		Yes	Yes	Yes	Yes
Memory Upgrade		Yes	Yes	Yes	Yes

Upgrades

Competitive Upgrades (Trade ins) to the Sun Enterprise Server Family

Existing investments in other hardware not by Sun can be preserved by upgrading to Sun Enterprise 3500–6500 systems through competitive upgrades.

FROM:	TO:	Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500	Sun Enterprise 6500
Server System		Yes	Yes	Yes	Yes
CPU Boards		Yes	Yes	Yes	Yes
CPU Modules		Yes	Yes	Yes	Yes

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Upgrades to the Sun Enterprise 3500 and Sun Enterprise 4500 Servers

The following system upgrades are available for Sun Enterprise 3500 and 4500 servers:

- Full-system upgrade from workgroup servers
- Full-system upgrade from the older-generation Sun servers
- Full-system upgrade from qualified competitive servers
- Chassis upgrade from Sun Enterprise 3000 to the Sun Enterprise 3500 or Sun Enterprise 4500 servers
- Gigaplane field upgrade for Sun Enterprise 4000 servers

Full-System Upgrades

The full-system upgrades to the Sun Enterprise 3500 server include the chassis, a power/cooling module, one CPU/memory board, and two CPU modules. The chassis upgrades to the Sun Enterprise 4500 server includes the chassis, clock board, and CD. The full-system upgrades are intended to be used in conjunction with the CPU/memory board and UltraSPARC™ module upgrades, and other options to provide a method of upgrading a range of sizes of Sun and competitive systems. This allows Sun to offer excellent value for large and small servers

Note: The Return Material Authorization Kit (no-charge part number UG-RMA) is **required** to be ordered with any factory-installed system or component upgrade. This part number will ship return material information..

Order	Receive	Return
Workgroup Server Full-System Upgrade to two-CPU Sun Enterprise 3500 Base		
UG-WRKGP-E3500-C52 (250/4) UG-WRKGP-E3500-C62 (336/4) UG-WRKGP-E3500-C72 (400/4)	Server base package: one CPU/memory board, and two CPU modules, one Power/Cooling Mod.	Chassis, system board, primary memory board, and internal peripherals
Workgroup Server Full-System Upgrades to four-CPU Sun Enterprise 3500 Base (Note: Transition Announced 1/99)		
UG-WRKGP-E3500-C54 (250/4) UG-WRKGP-E3500-C64 (336/4)	Server base package: two CPU/memory board, and four CPU modules and one Power/Cooling modules	Chassis, system board, primary memory board, and internal peripherals
Sun-3™/Sun-4™ or SPARCserver™ 6X0MP Desksides and SPARCserver 1000 Full-System Upgrade to two-CPU Sun Enterprise 3500 Base		
UG-SUNSV-E3500-C52 (250/4) UG-SUNSV-E3500-C62 (336/4) UG-SUNSV-E3500-C72 (400/4)	Server base package: chassis, one CPU/memory board, and two CPU modules, one Power/Cooling module	Chassis, system board (except SPARCcenter™ 1000E, see system board upgrade below), primary memory board, and internal peripherals
Sun-3/Sun-4 /6X0MP Desksides and SPARCserver 1000 Full-System Upgrade to four-CPU Sun Enterprise 3500 base (Note: Transition Announced 1/99)		
UG-SUNSV-E3500-C54 (250/4) UG-SUNSV-E3500-C64 (336/4)	Server base package: two CPU/memory boards, four CPU modules, and one power/cooling modules	Chassis, system board (except SPARCcenter 1000, see system board upgrade below), primary memory board, and internal peripherals

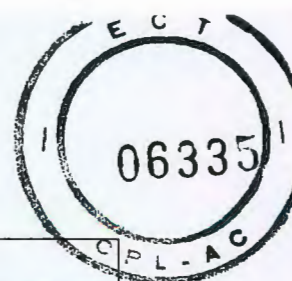
Upgrades

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Order	Receive	Return
Competitive Full-System Upgrade to two-CPU Sun Enterprise 3500 base		
CU-E3500-C52 (250/4) CU-E3500-C62 (336/4) CU-E3500-C72 (400/4)	Server base package: chassis, one CPU/memory board, and two CPU modules	Chassis, system board, primary memory board, and internal peripherals
Competitive Full-System Upgrade to four-CPU Sun Enterprise 3500 base (Note: Transition Announced 1/99)		
CU-E3500-C54 (250/4) CU-E3500-C64 (336/4)	Server base package: two CPU/memory boards, four CPU modules, and one power/cooling modules	Chassis, system board, primary memory board, and internal peripherals
Sun-3/Sun-4 or SPARCserver 6X0MP Desksides SPARCserver 1000 Full System or SPARCcenter 2000 Upgrade		
UG-SUNSV-E4500	Server base package: chassis, clock board, CD, two power/cooling modules, one CPU/memory board, and one SBus I/O board	Chassis, system board, (except SPARCcenter 1000 and 2000, see system board upgrade below) primary memory board, and internal peripherals
Competitive Full-System Upgrade to Sun Enterprise 4500 Base		
CU-E4500	Server base package: chassis, clock board, CD, two power/cooling modules, one CPU/memory board, and one SBus I/O board	Chassis, system board, primary memory board, and internal peripherals

Upgrades

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Intra-Family Chassis Upgrades

Sun Enterprise 3000 Component Migration

The following is a summary table detailing which components will or will not migrate when upgrading from the Sun Enterprise 3000 server to Sun Enterprise 3500, 4500, or 5500 server:

FROM:	TO:	
Sun Enterprise 3000	Sun Enterprise 3500	Sun Enterprise 4500/5500
Internal Disk	No	No
Memory	Yes	Yes
CPU Module*	Yes	Yes
I/O Boards*	Yes	Yes
CPU/memory Board*	Yes	Yes
Power/Cooling Modules	Yes	Yes
Internal Tape Drive	Yes	Yes
Peripheral Power Supply with AC Inlet	Yes	No
Fan Tray (Above Peripheral Power Supply Only)	Yes	No

* Migrate these boards/modules only if current speed is to be maintained. Migrating 167-MHz modules might require a PROM upgrade as the minimum PROM level supported is 3.2.10. (See product announcement for details on downloading the patch for a PROM level upgrade).

While the Sun Enterprise 3000 server internal disks are not compatible in the Sun Enterprise 3500–6500 server family, an upgrade (trade in) offering is available. See product announcement for details.

Order	Receive	Return
Sun Enterprise 3000-to-Sun Enterprise 3500 Intra-family Upgrade		
UG-E3000-E3500	Sun Enterprise 3500 system enclosure with clock board, CD, card cage, one board filler panel for power/cooling module	Sun Enterprise 3000 system enclosure, clock board, CD, card cage, fan tray (under disks)
Sun Enterprise 3000-to-Sun Enterprise 4500 Intra-family Upgrade		
UG-E3000-E4500	Sun Enterprise 4500 system enclosure with clock board, CD, card cage, one peripheral power supply, and one power/cooling module, four board filler panels	Sun Enterprise 3000 system enclosure, clock board, CD, card cage, and peripheral power supplies, fan tray
Sun Enterprise 3000-to-Sun Enterprise 5500 Intra-family Upgrade		
UG-E3000-E5500	Sun Enterprise 5500 rack system enclosure with clock board, CD, card cage, one peripheral power supply, and one power/cooling module, four board filler panels	Sun Enterprise 3000 system enclosure, clock board, CD, card cage, and peripheral power supplies

Upgrades

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Sun Enterprise 3500 Component Migration

The following is a summary table detailing which components will or will not migrate when upgrading from the Sun Enterprise 3500 server to an Sun Enterprise 4500 or Sun Enterprise 5500 server:

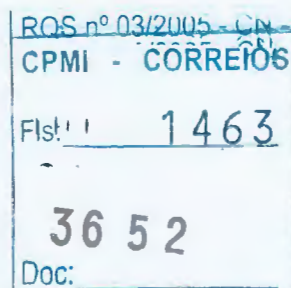
FROM:	TO:	
Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500
Internal Disk	No	No
Clock board	Yes	Yes
CD	Yes	Yes
Memory	Yes	Yes
CPU Module	Yes	Yes
I/O Boards	Yes	Yes
CPU/Memory Board	Yes	Yes
Power/Cooling Modules	Yes	Yes
Internal Tape Drive	Yes	Yes
Peripheral Power Supplies	No	No
IB Board	No	No

While the Sun Enterprise 3500 server internal disks are not compatible in the Sun Enterprise 4500 or Sun Enterprise 5500 servers, an upgrade (trade-in) offering is available. See product announcement for details.

Order	Receive	Return
Sun Enterprise 3500-to-Sun Enterprise 4500 Intra-family Upgrade:		
UG-E3500-E4500	Sun Enterprise 4500 system enclosure with card cage, one peripheral power supply, and one power/cooling module	Sun Enterprise 3500 system enclosure, card cage, and peripheral power supplies
Sun Enterprise 3500-to-Sun Enterprise 5500 Intra-family Upgrade:		
UG-E3500-E5500	Sun Enterprise 5500 rack system enclosure with card cage, one peripheral power supply, and one power/cooling module	Sun Enterprise 3500 system enclosure, card cage, and peripheral power supplies
Sun Enterprise 4000-to-Sun Enterprise 4500 Gigaplane Upgrade:		
UG-E4000-100GIGPLN	100-MHz-capable centerplane, 100-MHz-capable clockboard, 32X SunCD™, Sun Enterprise 4500 nameplate	Sun Enterprise 4000 centerplane, SunCD, clockboard, nameplate

Upgrades

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Upgrades to the Sun Enterprise 5500 and Sun Enterprise 6500 Servers

The following system upgrades are available for Sun Enterprise 5500 and Sun Enterprise 6500 servers:

- Full-system upgrade from Sun SPARCserver 6X0MP Desksides, SPARCserver 1000 and SPARCcenter 2000 servers
- System board upgrades for the SPARCserver 1000 and SPARCcenter 2000 servers
- Full-system upgrade from qualified competitive servers
- Intra-Family chassis upgrades: Sun Enterprise 3000–5500, Sun Enterprise 3500–5500, Sun Enterprise 4500–6500, and Sun Enterprise 5500–6500
- Inter-Family chassis upgrades: Sun Enterprise 4000–6500
- Gigaplane field upgrade: Sun Enterprise 5000



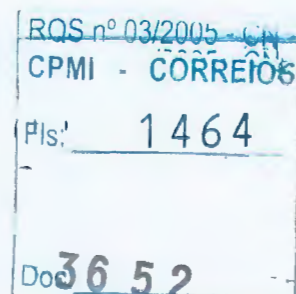
Full-System Upgrades

The full-system upgrades include the chassis, and, two power/cooling modules, one CPU/memory board, and one SBus I/O board with FC-AL. The full-system upgrades are intended to be used in conjunction with the system board upgrades and other Sun Enterprise server options to provide a method of upgrading a range of sizes of SPARCserver 1000E and SPARCcenter 2000E servers. This allows Sun to offer excellent value for large and small SPARCserver 1000E and SPARCcenter 2000E servers in the installed base.

Order	Receive	Return
SPARCserver 6X0MP Deskside, SPARCserver 1000 or SPARCcenter 2000 System Upgrade:		
UG-SUNSV-E5500	Server base package: Rack enclosure, chassis, clock board, CD, two power/cooling modules, one CPU/memory board, and one SBus I/O board	Chassis, CPU board, primary memory board, and internal peripheral
SPARCcenter 2000E System Upgrade:		
UGS2000-E6500	Server base package: Rack enclosure, chassis, clock board, CD, two power/cooling modules, one CPU/memory board, and one SBus I/O board	Chassis, CPU board, primary memory board, and internal peripheral
Competitive Full-System Upgrade:		
CU-E5500 CU-E6500	Server base package: Rack enclosure, chassis, clock board, CD, two power/cooling modules, one CPU/memory board, and one SBus I/O board	Chassis, CPU board, primary memory board, and internal peripheral

Upgrades

Just the Facts



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Sun Enterprise 5500 and Sun Enterprise 6500 Intra-Family Upgrade

Sun Enterprise 4000 Component Migration

The following is a summary table detailing which components will migrate when upgrading from the Sun Enterprise 4000 to an Sun Enterprise 6500 server:

FROM Sun Enterprise 4000:	TO Sun Enterprise 6500:
Memory	Yes
CPU Module*	Yes
I/O Boards*	Yes
CPU/Memory Board*	Yes
Power/Cooling Modules	Yes
Internal Tape Drive	Yes
Peripheral Power Supplies	Yes
Optional Disk Board	Yes
* Migrate these boards/modules only if current speed is to be maintained. Migrating 167-MHz modules might require a PROM upgrade as the minimum PROM level supported is 3.2.10. (See product announcement for details on downloading the patch for a PROM level upgrade).	

Order	Receive	Return
Sun Enterprise 4000-to-Sun Enterprise 6500 Intra-family Upgrade:		
UG-E4000-E6500	Sun Enterprise 6500 rack system enclosure with clock board, CD, and card cage	Sun Enterprise 4000 system enclosure, clock board, CD, and card cage

Upgrades

Just the Facts



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Sun Enterprise 4500 Component Migration

The following is a summary table detailing which components will migrate when upgrading from the Sun Enterprise 4500 to an Sun Enterprise 6500 server:

FROM Sun Enterprise 4000:	TO Sun Enterprise 6500:
Memory	Yes
CPU Module	Yes
I/O Boards	Yes
CPU/Memory Board	Yes
Power/Cooling Modules	Yes
Internal Tape Drive	Yes
Peripheral Power Supplies	Yes
Optional Disk Board	Yes

Order	Receive	Return
Sun Enterprise 4500-to-Sun Enterprise 6500 Intra-family Upgrade:		
UG-E4500-E6500	Sun Enterprise 6500 rack system enclosure and card cage	Sun Enterprise 4500 system enclosure, and card cage

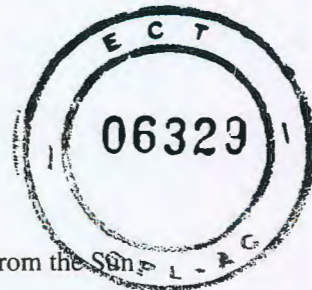
Upgrades

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Sun Enterprise 5000 Component Migration

The following is a summary table detailing which components will migrate when upgrading from the Sun Enterprise 5000 to an Sun Enterprise 6500 server:

FROM Sun Enterprise 5000:	TO Sun Enterprise 6500:
Memory	Yes
CPU Module*	Yes
I/O Boards*	Yes
CPU/Memory Board*	Yes
Power/Cooling Modules	Yes
Internal Tape Drive	Yes
Peripheral Power Supplies	Yes
Optional Disk Board	Yes
* Migrate these boards/modules only if current speed is to be maintained. Migrating 167-MHz modules might require a PROM upgrade as the minimum PROM level supported is 3.2.10. (See product announcement for details on downloading the patch for a PROM level upgrade).	

Order	Receive	Return
Sun Enterprise 5000-to-Sun Enterprise 6500 Intra-family Upgrade:		
UG-E5000-E6500	Sun Enterprise 6500 rack system enclosure with clock board, CD and card cage	Sun Enterprise 5000 system enclosure, clock board, CD and card cage
Sun Enterprise 5000 Gigaplane Upgrade:		
UG-E5000-100GIGPLN	100-MHz-capable centerplane, 100-MHz-capable clockboard, 32xSunCD, CD tray assembly	Sun Enterprise 5000 centerplane, SunCD, clockboard, tray assembly

Upgrades

Just the Facts



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Sun Enterprise 5500 Component Migration

The following is a summary table detailing which components will migrate when upgrading from the Sun Enterprise 5500 to an Sun Enterprise 6500 server:

FROM Sun Enterprise 5500:	TO Sun Enterprise 6500:
Memory	Yes
CPU Module	Yes
I/O Boards	Yes
CPU/Memory Board	Yes
Power/Cooling Modules	Yes
Internal Tape Drive	Yes
Peripheral Power Supplies	Yes
Optional Disk Board	Yes

Order	Receive	Return
Sun Enterprise 5500-to-Sun Enterprise 6500 Intra-family Upgrade:		
UG-E5500-E6500	Sun Enterprise 6500 rack system enclosure with and card cage	Sun Enterprise 5500 system enclosure, and card cage

Upgrades

Just the Facts



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CPU Module, Board, and Memory Upgrades

The following processor module, board and memory upgrades are common to all Sun Enterprise 3500–6500 systems:

- UltraSPARC CPU module upgrades
- System board upgrades from existing Sun Enterprise 3000–6000 compatible boards. Also, board upgrades for customers with Sun SPARCserver 1000E or SPARCcenter 2000E systems
- Sun memory upgrade

UltraSPARC module upgrades from 167-MHz and 250-MHz UltraSPARC modules are available for field installation or, if ordered with an Intra-Family chassis upgrade, can be installed at the factory.

System board upgrades from Sun Enterprise 3000–6000 systems are shipped separately for field installation only.

System board upgrades and UltraSPARC module upgrades from pre-UltraSPARC processor systems or competitive systems are factory configured and intended to be used in conjunction with chassis upgrades.

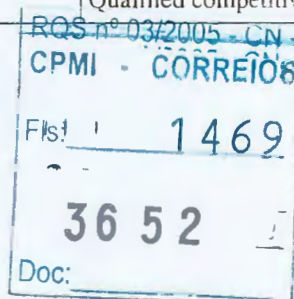
Memory upgrades are shipped separately for field installation only.

Note: The Return Material Authorization Kit (no-charge part number UG-RMA) is **required** to be ordered with any factory-installed system or component upgrade. This part number will ship return material information.

Order	Receive	Return
UltraSPARC Module Upgrade, Field Installed:		
	UltraSPARC Processor module:	
UG-M2510-M2550	250-MHz, 4-MB Ecache	167-MHz, 512-KB or 1-MB Ecache
UG-M2530-2560	336-MHz, 4-MB Ecache	250-MHz, 1-MB or 4-MB Ecache
UG-M2510-M2560	336-MHz, 4-MB Ecache	167-MHz, 512-KB or 1-MB Ecache
UG-M2510-M2570	400-MHz, 4-MB Ecache	167-MHz, 512-KB or 1-MB Ecache
UG-M2550-M2570	400-MHz, 4-MB Ecache	250-MHz, 1-MB or 4-MB Ecache
UG-M2560-M2570	400-MHz, 4-MB Ecache	336-MHz, 4-MB Ecache
UltraSPARC Module Upgrade, Factory Installed:		
	UltraSPARC Processor module:	
UG-M2550,	250-MHz, 4-MB Ecache	SuperSPARC™ processor module
CU-M2550	250-MHz, 4-MB Ecache	Qualified competitive CPU module
UGFA-M2530-M2560	336-MHz, 4-MB Ecache	250-MHz, 1-MB or 4-MB Ecache
UGFA-M2510-M2560	336-MHz, 4-MB Ecache	167-MHz, 512-KB or 1-MB Ecache
UG-M2560	336-MHz, 4-MB Ecache	SuperSPARC processor module
CU-M2560	336-MHz, 4-MB Ecache	Qualified competitive CPU module
UGFA-M2510-M2570	400-MHz, 4-MB Ecache	167-MHz, 512-KB or 1-MB Ecache
UGFA-M2550-M2570	400-MHz, 4-MB Ecache	250-MHz, 1-MB or 4-MB Ecache
UGFA-M2560-M2570	400-MHz, 4-MB Ecache	336-MHz, 4-MB Ecache
UG-M2570	400-MHz, 4-MB Ecache	SuperSPARC processor module
CU-M2570	400-MHz, 4-MB Ecache	Qualified competitive CPU module

Upgrades

Just the Facts



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Order	Receive	Return
CPU/Memory Board Upgrades:		
UGFA-SB260X-2602	CPU/memory board that supports 100-MHz centerplane; factory installed	One 2600 or 2601 CPU/memory board
UGSB260X-2602	CPU/memory board that supports 100-MHz centerplane; field installed	One 2600 or 2601 CPU/memory board
CU-2602	CPU/memory board that supports 100-MHz centerplane; factory installed	A qualified competitive system board
UGSB1000-X-256M-C	100 MHz-compatible CPU/memory board with 256 MB of RAM; factory installed	SPARCserver 1000 system board
UGSB1000-X-1GB-C	100 MHz-compatible CPU/memory board with 1 GB of RAM; factory installed	SPARCserver 1000 system board
UGSB2000-X-0M-C	100 MHz-compatible CPU/memory board, no memory; factory installed	SPARCserver 1000 or SPARCserver 2000 system board
UGSB2000-X-256M-C	100 MHz-compatible CPU/memory board with 256 MB of RAM; factory installed	SPARCcenter 2000 system board
UGSB2000-X-1GB-C	100 MHz-compatible CPU/memory board with 1 GB of RAM; factory installed	SPARCcenter 2000 system board
I/O Board Upgrades:		
UGFA-SB261X-2612	Sbus I/O board that supports 100-MHz centerplane; factory install	One 2610 or 2611 Sbus I/O board
UGSB261X-2612	Sbus I/O board that supports 100-MHz centerplane; field installed	One 2610 or 2611 Sbus I/O board
UGFA-SB262X-2622	Graphics I/O board that supports 100-MHz centerplane; factory install	One 262x Graphics I/O board
UGSB262X-2622	Graphics I/O board that supports 100-MHz centerplane; field install	One 262x Graphics I/O board
UGFA-SB263X-2632	PCI I/O board that supports 100-MHz centerplane; factory install	One 263x PCI I/O board
UGSB263X-2632	PCI I/O board that supports 100-MHz centerplane; field install	One 263x PCI I/O board
UGSB261X-2632	PCI I/O board that supports 100-MHz centerplane; field install	One 261x SBus I/O board
Sun Enterprise Server Memory Upgrades:		
UGFA-MEM256-MEM1GB	1 GB of memory; factory installed	One 256-MB memory module (7022A)
UG-MEM256-MEM1GB	1 GB of memory; field installed	One 256-MB memory module (7022A)

Upgrades

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Configuration Guidelines

All upgrades to Sun Enterprise 3500–6500 servers require Solaris™ 2.5.1 Hardware: 11/97 with two patches: 104595-03 (or later) and 104594-01 (or later). In addition, patch number 105310-04, which is an FC-AL patch, is highly recommended. The Sun Enterprise 3500–6500 servers can also run Solaris 2.6 Hardware: 3/98 with no required patches. However, patch number 105375-04, an FC-AL patch, is highly recommended.

Note: *The Return Material Authorization Kit (no-charge part number UG-RMA) is required to be ordered with any factory-installed system or component upgrade. This part number will ship return material information*

Configtool now supports Intra-Family Upgrades. A declaration of the compatible components that will be migrated is required when configuring a Intra-Family Upgrade. Configtool now has the ability to assess existing components when determining a valid configuration.

Upgrades

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Upgrades Questions and Answers

Why is the Return Material Authorization kit (no-charge part number UG-RMA) required for all Sun Enterprise 3500-6500 upgrades?

Ordering part number UG-RMA will ship a Return Material Authorization kit to the customer who is trading in a server. This kit houses the terms and conditions of the upgrade.

Is there any hardware or software required to support the 400-MHz/4-MB module in the Sun Enterprise 3X00 through 5X00 servers?

The 400-MHz/4-MB modules will require Sun Enterprise Flashprom update 3.2.18 or above. Other than the Flashprom version, no new hardware or software is required from what is being shipped currently in the Sun Enterprise 3500 through 5500 servers. They will run in existing Sun Enterprise 3000 through 5000 servers if they have the following:

- Sun Enterprise Flashprom update 3.2.18 or above
- 100-MHz clock board which is required to support 100-MHz Gigaplane

The Sun Enterprise 3000 clock board and Gigaplane are already 100-MHz capable, so, in most cases, only the system boards need to be upgraded in order to support the 400-MHz/4-MB modules. Only original Sun Enterprise 3000 base packages need to have the clock board upgraded. This is because the original clock board in Sun Enterprise 3000 base package did not support any modules above 167 MHz and, therefore, needs to be upgraded to support 400-MHz/4-MB modules. Sun Enterprise "3001" and "3002" base packages do not need to have the clock board upgraded because they shipped with a second-generation clock board that supported modules above 167 MHz.

A 100-MHz clock board upgrade is also available (part number UG-ENT-100MHCLOCKB).

- 100-MHz capable CPU/memory and I/O boards (2602A, 2612A, 2622A, and 2632A)

See the previous upgrade pages for a list of available 100-MHz CPU/memory and I/O board upgrades.

- An upgraded 100-MHz capable Gigaplane in the Sun Enterprise 4000 and 5000

Is the 400-MHz/4-MB UltraSPARC module supported in a system with any 84-MHz system boards?

No, the 400-MHz/4-MB UltraSPARC module is not supported in a system with any 84-MHz system boards, due to the fact that it runs at a 4:1 CPU-to-Gigaplane speed ratio and requires the Gigaplane (and associated system boards) to run at 100 MHz.

Why isn't the 400-MHz/4-MB UltraSPARC module supported in the Sun Enterprise 6500 and 6000 servers?

The 400-MHz/4-MB module requires the Gigaplane to run at 100-MHz. The Sun Enterprise 6500 and 6000 servers cannot support running the Gigaplane at 100-MHz due to the physical length of the bus.

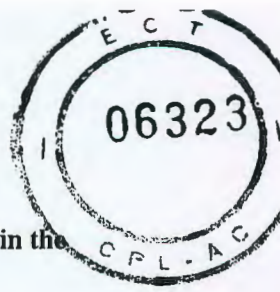
Will there be a faster-than-336-MHz UltraSPARC module available for the Sun Enterprise 6500 and 6000 servers?

Yes, there will be a module available that will run faster than 336-MHz and will not require the Gigaplane, I/O boards, or 2601A/2602A CPU/memory boards to be upgraded (2600A CPU/memory boards will need to be upgraded). Up to 30 of these future modules will be supported and all sixteen Gigaplane slots will be able to be utilized.

Will the 400-MHz/4-MB module ever be supported in the Sun Enterprise 6500 and 6000 Servers?

No, the 400-MHz/4-MB module will never be supported in the Sun Enterprise 6500 and 6000 Servers.

Upgrades



Is it necessary to upgrade the Gigaplane in order to support faster-than 336-MHz modules in the Sun Enterprise 3000 through 5000 servers?

At this time yes, but in the future there will be a new module available that will run at faster-than-336-MHz speeds and will not require the Gigaplane, I/O boards, or 2601A/2602A CPU/memory boards to be upgraded (2600A CPU/memory boards will need to be upgraded).

What is the benefit of the enhanced Gigaplane system bus and system boards?

Sun provides investment protection for near term performance growth requirements on the Sun Enterprise 4000 and Sun Enterprise 5000. Offering this Gigaplane upgrade enables customers to use the faster 400-MHz/4-MB processors. All system boards in the Sun Enterprise 4000/Sun Enterprise 5000 must be upgraded to be 100 MHz-compatible to take advantage of the Gigaplane upgrade.

Why does Sun have new system boards?

The new system boards are capable of supporting the faster (over 84 MHz) Gigaplane speeds. In addition, the Graphics I/O board has been modified: the pair of on-board, 25-MB-per second fiber channel sockets has been replaced by a pair of on-board, 100-MB-per-second FC-AL sockets. These new FC-AL sockets provide on-board connection to the internal disk drives in the Sun Enterprise 3500 server or to Sun StorEdge™ A5000 disk arrays.

Can I use the 100-MHz-compatible system boards in Sun Enterprise 3000–6000 servers?

Yes. These new system boards are compatible with existing Sun Enterprise 3000–6000 servers. There is no problem mixing these system boards in a Sun Enterprise 3000–6000 server that already uses the previous system boards.

What CPU modules are supported in the Sun Enterprise 3500–6500 servers?

The Sun Enterprise 3500–6500 servers can be ordered with factory-configured, 250-MHz/4-MB, 336-MHz/4-MB or 400-MHz/4-MB UltraSPARC modules. The 250-MHz/1-MB, 167-MHz/1-MB, and 167-MHz/0.5-MB UltraSPARC modules are also supported, but they not available as factory-configured options.

Note: Customers with 167-MHz UltraSPARC processors who wish to migrate their modules to Sun Enterprise 3500–6500 servers might require a PROM upgrade as the minimum PROM level supported is 3.2.10.

How does a customer determine the PROM level on their system? And if the PROM level is below 3.2.10 how can the customer obtain a PROM upgrade?

The system POST (Power On Self Test) displays the OpenBoot™ PROM software version of the system during the POST. Customers with versions below 3.2.10 can download a patch for the PROM level upgrade at URL: <http://sunsolve.sun.com/> (access is limited to customers on Sun Enterprise Services contract).

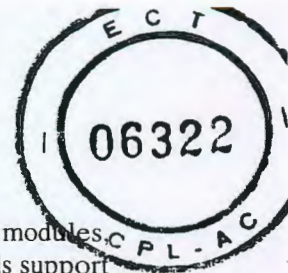
Do the Sun Enterprise 4500–6500 servers support the previous 4.2-GB disk board?

Yes.

Do current Sun Enterprise 3000–5000 server customers need to upgrade their existing CPU/memory and I/O boards?

Only if 400-MHz/4-MB CPU modules are being installed will the customer be required to have 26X2A 100-MHz-compatible CPU/memory and I/O boards installed. Otherwise, their current CPU/memory boards are capable of supporting 167-MHz, 250-MHz, or 336-MHz UltraSPARC modules. However, in

Upgrades



order to take advantage of the 4-MB cache of either the 250-MHz/4-MB or 336-MHz/4-MB CPU modules, either the 2601A or 2602A CPU/memory board is needed. The older 2600A CPU/memory boards support modules with 4-MB cache but only 2 MB of cache per processor is used.

Can Sun Enterprise Server systems support a combination of new and older CPU/memory boards and/or I/O boards?

No, if 400-MHz/4-MB CPU modules are installed. Yes, if slower speed modules are installed in which case the old and new boards may be mixed in the Sun Enterprise 3500–6500 servers and in the Sun Enterprise 3000–6000 servers. In a mixed configuration the server runs at the speed of the lowest-speed component in the system (system board(s) speed(s) and the Gigaplane speed).

Which components can a customer carry forward during an Intra-Family Upgrade from the Sun Enterprise 3000–5000 server to Sun Enterprise 4500–6500 server?

Existing memory, power/cooling modules, and internal tape devices, can be carried forward. In addition, the following components will migrate if the customer is upgrading in order to use more system slots and plans to expand their configuration with the same speed UltraSPARC processors as they have in their existing Sun Enterprise 3000–5000 server: existing CPU/memory boards, I/O boards, and UltraSPARC CPU modules.

What options are available to customers who are upgrading from the Sun Enterprise 3000 server to Sun Enterprise 3500, 4500 or Sun Enterprise 5500 server, where the internal disk does not migrate?

Sun offers the following disk upgrade (trade in) options to customers:

- Trade in 4 GB of disk and upgrade to 9.1-GB FC-AL disk drive
- Trade in 30 GB of disk and upgrade to Sun StorEdge A3000 disk array

Can customers install their own upgraded system? What services are available to aid them?

The Sun Enterprise 3500–6500 server upgrades can be accomplished by the customer. However, it is strongly recommended that the customer purchase installation services from Sun Enterprise Services. Because of the variability in customer configurations, installation services purchased from Sun Enterprise Services need to be quoted on a time and material basis.

When does a customer need a clock board upgrade?

A customer needs to purchase a clock board upgrade if the Sun Enterprise 3000–6000 server was purchased prior to November 19, 1996 and the customer wants to upgrade from 167-MHz processors to the 250-MHz or 336-MHz processor module. Or, if the customer is upgrading the Sun Enterprise 3000–5000 to run the 400-MHz/4-MB CPU module

Can existing Sun Enterprise 4000–5000 systems be upgraded to support faster than 84-MHz Gigaplane system bus?

Yes. See announcement dated January 26, 1999 or refer to pages earlier in this section for details

Where do I find more information on which servers are eligible in each of the competitive server trade-in categories?

Contact the Installed Base Business representative in your area.

Are there any software-compatibility issues with applications migrating to the servers based on the UltraSPARC processor architecture?

Upgrades



The UltraSPARC processor-based servers require a new version of the Solaris Operating Environment™ (Solaris 2.5.1). This new version of the Solaris Operating Environment is fully binary-compatible with the current version of the Solaris Operating Environment (Solaris 2.5). Sun does not anticipate any major problems with ISVs supporting their application software on the next version of the Solaris Operating Environment.

Which SPARCserver 1000E and SPARCcenter 2000E system components can be used in the systems based on the UltraSPARC processor architecture?

Upgrading from a SPARCserver 1000E or SPARCcenter2000E system requires a chassis swap. The chassis, system boards, SuperSPARC processors, and memory must be replaced. The components from a SPARCcenter 2000E or SPARCserver 1000E systems that can be migrated to an UltraSPARC processor-based server include SPARCstorage™ Array subsystems, and disk trays.

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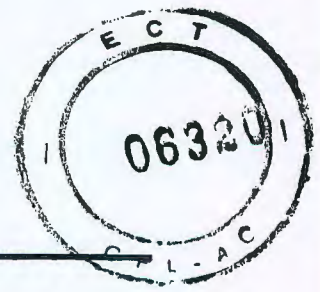
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Service and Support

The SunSpectrumSM 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 softwareTM, and telephone support for Sun software packages. The majority of Sun Microsystems, Inc., customers today take advantage of the SunSpectrum program, underscoring the value it represents. Customers should check with their local Sun EnterpriseTM Services representative for program/feature variance and availability in their area.

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	Semi-annual	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	Option
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

Service and Support

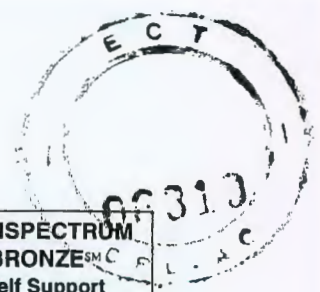
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FEATURE	SUNSPECTRUM PLATINUM SM Mission-Critical Support	SUNSPECTRUM GOLD SM Business-Critical Support	SUNSPECTRUM SILVER SM Systems Support	SUNSPECTRUM BRONZE SM Self Support
Enhanced Support Features				
Mission-critical support team	Yes	Yes	No	No
Sun Vendor Integration Program (SunVIP TM)	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

Service and Support

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Warranty

The Sun Enterprise family of servers offers extensive warranties that can be enhanced through the Sun Enterprise Services SunSpectrum product offering. The table below describes the Sun Enterprise XX00 server warranties (warranties may vary in different countries).

	Sun Enterprise 3500	Sun Enterprise 4500	Sun Enterprise 5500	Sun Enterprise 6500
Hardware	1 year	1 year	1 year	1 year
Software	90 days	90 days	90 days	90 days
Telephone Assistance	8 a.m.–8 p.m., Monday–Friday 8-hour response	8 a.m.–8 p.m., Monday–Friday 8-hour response	8 a.m.–8 p.m., Monday–Friday 4-hour response	8 a.m.–8 p.m., Monday–Friday 4-hour response
On-site Assistance	8 a.m.–5 p.m., Monday–Friday next day	8 a.m.–5 p.m., Monday–Friday next day	8 a.m.–5 p.m., Monday–Friday 4-hour	8 a.m.–5 p.m., Monday–Friday 4-hour
Installation	Basic	Basic	ServerStart SM installation	ServerStart installation

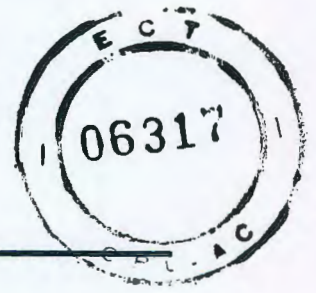
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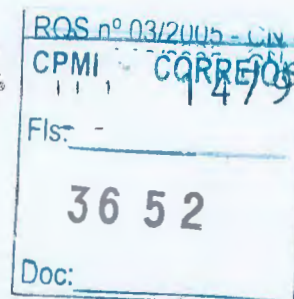
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Glossary

Circuit-switched bus	A bus in which a transaction is normally implemented in an automatic fashion. Simple and easy to construct, a circuit-switched bus is often less efficient than a comparable packet-switched bus. SBus is a circuit-switched bus.
ECC	Error checking and correcting. ECC code is used to verify the integrity of data and can be used to correct some data errors. The ECC code used in the Sun Enterprise™ 3500–6500 servers is able to detect and correct single-bit errors, and detect double-bit errors.
Fault-resistant	Systems that are fault-resistant are able to withstand and recover from many types of system problems.
Fault-tolerant	Systems that are fault-tolerant are able to withstand and recover from any system problem and offer 100 percent uptime. These systems are typically more expensive than comparable fault-resistant systems.
FC-AL	Fibre Channel Arbitrated Loop
Gigaplane™	Gigaplane is the system bus that is used in the Sun Enterprise 3500, Sun Enterprise 4500, Sun Enterprise 5500, and Sun Enterprise 6500 servers. The Gigaplane bus is a packet-switched bus, capable of offering a sustained data transfer rate of 3.2 GB per second at 100 MHz.
High availability	Availability is the time a particular resource, such as a system, application, or data is accessible and usable. High availability means the resource is accessible and usable a maximum amount of time.
Hot-plug	A hot-plug component means that it is electrically safe to remove or add that component while the machine is still running. Typically, the system must be rebooted before the hot-plug component is configured into the system.
Hot-swap	A hot-swap component can be installed or removed by simply pulling the component out and putting the new one in. The system will either automatically recognize the component change and configure itself as necessary or will require user interaction to configure the system; however, in neither case is a reboot required. All hot-swappable components are hot-pluggable, but not all hot-pluggable components are hot-swappable.
Interleaved memory	Interleaved memory helps reduce memory access time by permitting multiple memory components to operate in parallel. In interleaved memory schemes, memory is divided into n banks arranged so that every n th byte is supplied by a different memory bank. In a two-way interleaved system, the first doubleword is supplied by bank 0 while the second is supplied by bank 1. Normally, the size and extent of interleave is arranged so that a single typical request is satisfied by as many banks as possible. This arrangement permits a single memory request to be fulfilled without waiting for memory recycle time.
OBP	OpenBoot™ PROM.





Packet-switched bus

A bus in which information is transmitted in fixed-sized units. This type of bus is often associated with the use of split transactions. Gigaplane and UPA are packet-switched buses.

Parity

Parity is a simple technique used to verify the integrity of data. Parity detects single-bit errors.

POST

Power-on self-test. POST is a suite of hardware integrity tests implemented in firmware that verifies the integrity of system components.

RAS

Reliability, availability, and serviceability. Reliability is a measure of the likelihood that problems will occur. A highly reliable system will have few problems. Once a problem occurs, availability is the measure of how the system will protect the user from being adversely affected by the problem. Serviceability is a measure of how easy it is to repair the problem.

SunVTS™

Sun Validation Test Suite. This is the replacement for SunDiag™.

UPA Bus

Ultra™ Port Architecture bus. Used as an intermediate bus on the CPU/memory and I/O boards.

XBus™

Intermediate bus used on system boards for the SPARCserver™ 1000E and SPARCcenter™ 2000E servers. The Sun Enterprise 3500, Sun Enterprise 4500, Sun Enterprise 5500, and Sun Enterprise 6500 servers use the UPA bus in place of the XBus.

Glossary



Materials Abstract

All materials are available on SunWIN except where noted otherwise.

Collateral	Description	Purpose	Distribution	Token # or Comac order #
Powerpack				
– Sun Enterprise™ 3500–6500 Servers: <i>Just the Facts</i> , 2/99	Reference guide for the Sun Enterprise 3500–6500 servers	Sales tool Training	SunWIN, Reseller web	83501
– Sun Enterprise 3500–6500 Servers: <i>Customer Presentation</i> 2/99	Overview, strategy, and details of the Sun Enterprise 3500–6500 Servers	Sales tool	SunWIN, Reseller web	83552
References				
– Sun Intro: <i>New 400 MHz, 4-MB CPU Modules and Upgrades</i> , 1/99	Introduction e-mail	Sales tool	SunWIN, Reseller web, E-mail	98881
– Sun Intro: <i>Sun Enterprise and Sun HPC 3500–6500 Server Family and Related Upgrades; Repricing of 250-MHz, 4-MB and 336-MHz, 4-MB UltraSPARC Modules</i> , 4/98	Introduction e-mail	Sales tool	SunWIN, Reseller web, E-mail	83553
– Sun Intro: <i>Transition of Sun Enterprise 3000–6000 Upgrades, Sun HPC Servers and System Boards; Transition of 250-MHz, 1-MB UltraSPARC Module</i> , 4/98	Introduction e-mail	Sales tool	SunWIN, Reseller web, E-mail	84906
– Sun Intro: <i>New 336 MHz, 4-MB UltraSPARC™ Module, Server Base Packages and Upgrades; Repricing of Sun Enterprise and Sun HPC 6000 and Upgrades</i> , 2/98	Introduction e-mail	Sales tool	Reseller web, E-mail	80960
– Sun Intro: <i>PROMOTION: Sun Enterprise 3000–6000 167-MHz, 1-MB UltraSPARC Module</i> , 1/98	Introduction e-mail	Sales tool	Reseller web, E-mail	77887
– Sun Intro: <i>New CPU/Memory Board and Options for Sun Enterprise 3000 through 6000 Servers</i> , 4/97	Introduction e-mail	Sales tool	Reseller web, E-mail	70253

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Collateral	Description	Purpose	Distribution	Token # or Comac order #
References (continued)				
- <i>Sun Intro: New 250-MHz UltraSPARC Module, Server Base Packages, and Options for Sun Enterprise 3000 through 6000 Servers, 4/97</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	70255
- <i>Sun Intro: 250-MHz UltraSPARC Module and Other Options for Sun Enterprise X000 Servers, 1/97</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	70250
- <i>Sun Intro: Enhanced Ultra™ Sun Enterprise X000 Servers; Sun Enterprise Clock Board Upgrade, 11/96</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	73346
- <i>Sun Intro: Ultra Sun Enterprise X000 Memory and CPU Module, 10/96</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	73338
- <i>Sun Intro: New Sun Enterprise X000 Configurations and Options, 7/96</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	73339
- <i>Sun Intro: Ultra Sun Enterprise X000 Server Family, 4/96</i>	Introduction e-mail	Sales tool	Reseller web, E-mail	73335
- <i>Sun Server Product Line Overview, 4/98</i>	Quick reference card	Sales tool	SunWIN, Reseller web, E-mail	24517
- <i>Competitive Summary—Servers, 4/98</i>	Quick reference card	Sales tool	SunWIN, Reseller web, E-mail	24515
- <i>Sun Enterprise X000 Server Family All-in-One, 8/97</i>	Specification summary	Sales tool	SunWIN, Reseller web	53152
Training				
- <i>IQ Kit: Sales Information Quickstart, 4/98</i>	Detailed sales and marketing information for Sun Enterprise 3500–6500 servers and related software	Sales tool	SunWIN, Reseller web	83556
- <i>IQ Kit: Reference Information Quickstart, 4/98</i>	Detailed resource catalog for Sun Enterprise 3500–6500 servers and related software	Sales tool	SunWIN, Reseller web	83558

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Collateral	Description	Purpose	Distribution	Token# or Comac order #
Product Literature				
- <i>Sun Enterprise 3000-6000 Servers: Just the Facts, 3/98</i>	Reference guide for the Sun Enterprise 3000-6000 servers (in two parts)	Sales tool Training	SunWIN, Reseller web	52489 52966
- <i>Sun Enterprise SyMON™: Just the Facts, 11/98</i>	Reference guide for the Solstice SyMON monitoring software	Sales tool Training	SunWIN, Reseller web	52499
- <i>Sun Enterprise XX00 Servers System Options, 4/98</i>	Comprehensive reference guide for Sun Enterprise 3000-6000 and 3500-6500 server options	Sales tool	SunWIN	63142
- <i>Sun Enterprise 3000-6000 Servers: Customer Presentation 3/98</i>	Overview, Strategy, and Details of the Sun Enterprise 3000-6000 Servers	Sales tool	SunWIN, Reseller web	81540
- <i>Server Family Brochure, 4/98</i>	High-level overview brochure on Sun server and storage products	Sales tool	SunWIN, Reseller web, Comac	69480 BE607-1
- <i>Sun Enterprise 3500 Datasheet, 4/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	81065 DE827-0
- <i>Sun Enterprise 4500 Datasheet, 4/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	81067 DE828-1
- <i>Sun Enterprise 5500 Datasheet, 4/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	81070 DE829-0
- <i>Sun Enterprise 6500 Datasheet, 4/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	81072 DE830-0
- <i>Sun Enterprise 3000 Datasheet, 1/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	53188 DE647-1
- <i>Sun Enterprise 4000 Datasheet, 1/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	53190 DE644-2
- <i>Sun Enterprise 5000 Datasheet, 1/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	53194 DE658-1
- <i>Sun Enterprise 6000 Datasheet, 1/98</i>	Datasheet	Sales tool	SunWIN, Reseller web, Comac	53221 DE643-1

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Collateral	Description	Purpose	Distribution	Token # or Comac order #
Product Literature (continued)				
– Sun Enterprise 3500–6500 Server Family: Architecture and Implementation White Paper, 4/98	In-depth discussion of Sun Enterprise 3500–6500 server architecture	Sales tool	SunWIN, Reseller web	84915
– Ultra Sun Enterprise 3000–6000 Server Family: Architecture and Implementation White Paper, 4/98	In-depth discussion of Sun Enterprise 3000–6000 server architecture	Sales tool	SunWIN, Reseller web	53094
– Availability Features in the Sun Enterprise 3500–6500 Server Family White Paper, 4/98	In-depth technical discussion of Sun Enterprise 3500–6500 server availability features	Sales tool	SunWIN, Reseller web	88368
– Sun Enterprise 3500 Ordering Flow Chart, 2/99	Ordering information	Sales tool	SunWIN, Reseller web	84910
– Sun Enterprise 4500 Ordering Flow Chart, 2/99	Ordering information	Sales tool	SunWIN, Reseller web	84911
– Sun Enterprise 5500 Ordering Flow Chart, 2/99	Ordering information	Sales tool	SunWIN, Reseller web	84912
– Sun Enterprise 6500 Ordering Flow Chart, 2/99	Ordering information	Sales tool	SunWIN, Reseller web	84913
– Sun Enterprise 3000 Ordering Flow Chart, 4/98	Ordering information	Sales tool	SunWIN, Reseller web	53154
– Sun Enterprise 4000 Ordering Flow Chart, 4/98	Ordering information	Sales tool	SunWIN, Reseller web	53156
– Sun Enterprise 5000 Ordering Flow Chart, 4/98	Ordering information	Sales tool	SunWIN, Reseller web	53158
– Sun Enterprise 6000 Ordering Flow Chart, 4/98	Ordering information	Sales tool	SunWIN, Reseller web	53160
– 56-Inch Sun Enterprise Expansion Cabinet Ordering Flow Chart, 4/98	Ordering information	Sales tool	SunWIN, Reseller web	53162
Product Brief				
– Sun Enterprise 3000 Product Brief, 7/97	On-line version of datasheet	Sales tool	SunWIN, Reseller web	53247
– Sun Enterprise 4000 Product Brief, 7/97	On-line version of datasheet	Sales tool	SunWIN, Reseller web	53250
– Sun Enterprise 5000 Product Brief, 7/97	On-line version of datasheet	Sales tool	SunWIN, Reseller web	53256
– Sun Enterprise 6000 Product Brief, 7/97	On-line version of datasheet	Sales tool	SunWIN, Reseller web	53264
– Solstice SyMON Product Brief, 7/97	Overview of Solstice SyMON monitoring software	Sales tool	SunWIN, Reseller web	53243

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Collateral	Description	Purpose	Distribution	Token # or Comac order #
External Web Sites - <i>List of Sun-tested PCI cards</i> - <i>SPEC home page</i>	http://www.sun.com/pci http://www.specbench.org/results.html			

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- Displays
- Input Devices
- PCMCIA

MONITORS

- [24" Wide Screen Color Monitor](#)
- [21" Flat Screen Aperture Grille \(AG\) Color Monitor](#)
- [19" Flat Screen Aperture Grille \(AG\) Color Monitor](#)
- [18.1" TFT LCD Monitor](#) **NEW!**
- [17" Sun Color Monitor](#)



24" Wide Screen Color Monitor

- 24-inch CRT size, 22.5" viewable area
- 0.26mm aperture grille pitch
- Up to 1920 x 1200 @ 70Hz (16:10 aspect ratio mode)
- 2-meter non-detachable 13W3 video input cable and HD15-pin video input connector
- 580mm (W) x 500mm (H) x 548mm (D)



21" Flat Screen Aperture Grille (AG) Color Monitor (new)

- 21-inch Flat Screen AG CRT, 19.8" viewable area
- 0.24mm aperture grille pitch
- 1152x900 @ 66Hz, 76Hz
- 1280x1024 @ 67Hz, 76Hz
- 1600x1200 @ 75Hz
- 2-meter non-detachable 13W3 video input cable and HD15-pin video input connector
- 499mm (W) x 495mm (H) x 500mm (D)

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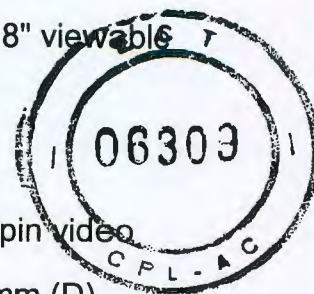
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28/04/00 16:35



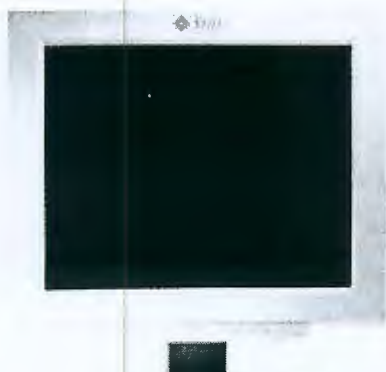
19" Flat Screen Aperture Grille (AG) Color Monitor (new)

- 19-inch Flat Screen AG CRT, 18" viewable area
- 0.24mm aperture grille pitch
- 1152x900 @ 66Hz, 76Hz
- 1280x1024 @ 67Hz, 76Hz
- 1600x1200 @ 75Hz
- 2-meter non-detachable HD15-pin video input cable
- 449mm(W) x 463mm(H) x 463mm (D)



18.1" TFT LCD Monitor (new)

- 18.1" actual viewable area (equivalent to 19"/20" CRT)
- 0.28mm pixel pitch
- True 24-bit, 256 gray scale levels, 16.7M colors
- 1280x1024 @ 60Hz* or 76Hz
- 160 degree horizontally and vertically
- < 50W POWER
- Analog interface
- 2-meter detachable 13W3 video input cable and HD15-pin video input connector
- Complete assembly:
 - * Total width: 449.5mm
 - * Total Height: 459.8mm
 - * Total Depth: 218.6mm
- (*) recommended resolution on the 18.1" flat panel
- Wall-mounting capability - wall-mounting solutions from Ergotron, Inc.
- Security Lock Slot



17" Sun Color Monitor

- 15.7" viewable image size
- 0.28mm dot pitch
- 1152 x 900 @ 66Hz, 76Hz
- 1024x x 768 @ 60Hz, 75Hz for JavaStation platforms
- 800 x 600 @ 75Hz for JavaStation platforms
- 2-meter non-detachable HD15-pin video signal cable
- 10-language user's guide



Peripherals : Printers | Displays | Input Dev

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Technical Facts

Below are product features of the Sun StorEdge UniPack drive and removable subsystems.

Disk Drives	9.1 GB	18.2 GB	36.4 GB
Average seek read	7.5 ms	8.0 ms	8.0 ms
Average seek write	8.3 ms	9.0 ms	9.0 ms
Average latency	3.0 ms	3.0 ms	3.0 ms
Interface data transfer rate	40 MB/sec.	40 MB/sec.	40 MB/sec.
HDA data transfer rate	12.5 MB/sec.	12.5 MB/sec.	12.5 MB/sec.
Rotational speed	10,000 rpm	10,000 rpm	10,000 rpm
Buffer	512 KB	512 KB	512 KB

Tape Drive	4-mm DDS-3	4-mm DDS-4	20-40 GB, 8 mm	7-14 GB, 8 mm
Formatted capacity (uncompressed)	12 GB	20 GB	20 GB	7 GB
Formatted capacity (compressed ¹)	24 GB@ 2:1	40 GB@ 2:1	40 GB @2:1	14 GB @ 2:1
Tape speed	0.41 ips	0.41 ips	0.43 ips	0.872 ips
Burst data rate (max.)	10 MB/sec. (synch) 3 MB/sec. (asynch)	40 MB/sec. (synch) 6 MB/sec. (asynch)	10 MB/sec. (synch) 7 MB/sec. (asynch)	5 MB/sec.
Transfer rate (uncompressed)	1 MB/sec.	3 MB/sec.	3 MB/sec.	500 KB/sec.
Transfer rate (compressed ¹)	2 MB/sec.	6 MB/sec.	6 MB/sec.	1 MB/sec.
Buffer	2 MB	8 MB	4 MB	1 MB

¹ Actual compression ratio achieved is dependent on data type and applications; therefore, each customer's results may vary.

System Architecture

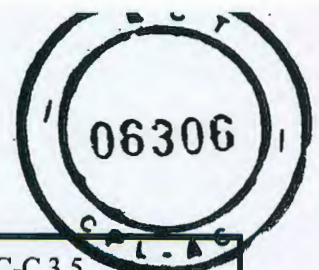
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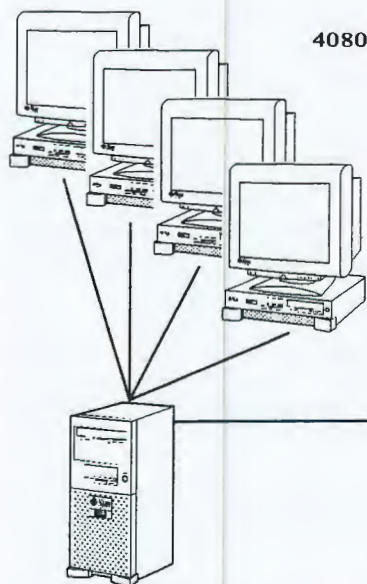
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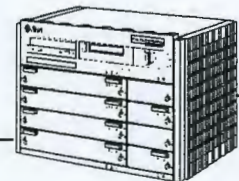


 Sun Sybase, Inc.	Sun Enterprise 4500 C/S w/15 Front-Ends		TPC-C 3.5	
			Report Date: November 22, 1999	
Total System Cost	TPC-C Throughput	Price/Performance	Availability Date	
\$2,507,453	50268.07	\$49.88	March 30, 2000	
Processors	Database Manager	Operating System	Other Software	Number of Users
14 * 400MHz UltraSPARC II	Sybase ASE 11.9.3 GA	Solaris 7	BEA Tuxedo 6.3	40800

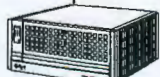


40800 User Connections to 15 Clients

Sun Enterprise 4500 Server
 14 * 400 Mhz UltraSPARC CPU
 28 Gb RAM



4 * Sun StorEdge
 A1000 Array
 - 12 * 9GB Each



18* Sun StorEdge A5200 Array
 - 22 * 9GB Each

15 * Sun Ultra Model 333 Server

Configuration

	Server System	Front End Systems
Database Nodes:	1 Sun Enterprise 4500 Servers	15 * Ultra 10 Model 333
Processors	14* 400 MHz UltraSPARC II	1 * 333 MHz UltraSPARC II each
Cache memory	32KB (D+I), 8MB external	32KB (D+I), 512KB external, each
Main memory	28 GB	1 GB each
Disk controllers	3 Dualport FC-AL, 2 Fast/Wide SCSI-2	1 * SSCSI-2 each
Disk Drives	444 * 9GB FC-AL (18 * A5200, 4 * A1000), 6 * 9GB SCSI-2 (1 * MultiPack)	1 * 9 GB disk
Total Disk Storage	4050 GB	9 GB each
10 BaseT Hub	None	5100* 9-Port Hubs
100 Base T Hubs	None	None
100 BaseT Switches	1 * 16-Port	None

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100.



Sun Enterprise 4500 C/S w/15 Front-Ends

TPC-C 3.5

Report Date:
November 22, 1999

Pricing Summary

Description	Part Number	Source	Unit Price	Qty	Ext. Price	5 Yr. Maint.
Server Hardware						
E4500	E4501	2	23,360	1	23,360	30,967
CPU/Memory board	2602A	2	4,360	7	30,660	71,098
400MHz/8MB UltraSPARC II	2580A	2	10,950	14	153,300	
2GB memory (8 * 256MB)	7026A	2	12,045	14	168,630	
PS/300W for E4500	954A	2	1,314	2	2,628	
SBus IO board	2612A	2	4,745	1	4,745	
FCAL SBus Host adapter	6730A	2	1,971	2	3,942	
DWIS/S SBus Host Adapter	1062A	2	945	1	945	
200GB StorEdge A5200 Array	SG-XARY320A-200G	2	51,120	18	920,160	254,016
109-Gbyte StorEdge A1000 Array	SG-XARY144A-109G	2	18,036	4	72,144	40,320
54.6-Gbyte StorEdge MultiPack	SG-XDSK060C-54G	2	6,512	1	6,512	
SCSI Cable 68 pin	3856A	2	40	1	40	
Opt Ink Tape 12Gb 4MM	6283A	2	986	1	986	
Wyse Terminal	WYSE-WY55-A	1	430	1	430	
Server Hardware Subtotal					1,388,480	396,401
Server Software						
Solaris Server Software	SOLMS-26ZW9999	1	100	1	100	
SPARC Compiler C/C++ 5.0	WCCIS-500-T999	1	995	1	995	1,080
Sybase Adaptive Server Enterprise 11.9.3		3	295,000	1	295,000	236,000
Sybase Development		3	9,600	1	9,600	7,680
Sybase Open Client		3	795	1	795	636
Sybase Discount (10%)					(30,540)	
Server Software Subtotal					275,961	246,396
Client Hardware						
Ultra 10 Server Model 333	A22UHC129S-B512CP	2	5,496	15	82,434	64,584
512MB Memory for Ultra 10	7039A	2	1,580	15	23,694	
PCI QEF Card	1034A	2	1,310	15	19,655	
Color Monitor	x7 126	2	343	15	5,148	
Client Hardware Subtotal					130,931	64,584
Client Software						
BEA Tuxedo CFS 6.3		4	3,000	15	45,000	36,000
Client Software Subtotal					45,000	36,000
User Connectivity						
16-port 10/100Mbps Fast Ethernet Hub	Z179489	5	420	3	1,260	
9-port 10Mbps Ethernet Hub	Z179489	5	27	5610	151,470	
User Connectivity Subtotal					152,730	
Sun Enterprise Services discounts						(228,020)
Total					1,993,092	514,361
5Yr. cost					2,507,453	
tpm O Rating					50,268	
\$/tpm O					\$49.88	

Service for all Sun products is from Sun Microsystems, Inc.

Notes:

1. Sun Microsystems Inc. 2. CAT Technology Inc. 3. Sybase 4. BEA Systems, Inc. 5. Software House Inc.

Audited by: Francois Raab, Infosizing Inc.

Prices used in TPC benchmarks reflect the actual prices a customer would pay for a one-time purchase of the stated components. Individually negotiated discounts are not permitted. Special prices based on assumptions about past or future purchase are not permitted. All discounts reflect standard pricing policies for the listed components. For complete details, see the pricing sections of the TPC benchmark specifications. If you find the stated prices are not available according to these terms, please inform the TPC at pricing@tpc.org. Thank you.

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Sun Enterprise 4500 C/S w/15 Front-Ends

TPC-C 3.5

Report Date:
November 22, 1999

Numerical Quantity Summary

MQTH, Computed Maximum Qualified Throughput
tpmC = 50268.07
% throughput difference, reported & reproducibility runs = < 0.1%

Response Times (in secs)	90th Percentile	Average	Maximum
Menu	0.50	0.25	0.65
New-Order	0.80	0.34	24.14
Payment	1.00	0.47	25.52
Order-Status	1.00	0.51	21.63
Delivery (interactive)	0.26	0.25	0.35
Delivery (deferred)	2.00	0.64	5.00
Stock-level	2.00	0.67	5.44

Transaction Mix, in percent of total transactions

New-Order	44.85%
Payment	43.06%
Order-Status	4.02%
Delivery	4.04%
Stock-level	4.03%

Keying/Think Times (in secs)	Average.	Min.	Maximum
New-Order	18.02/12.20	18.01/0	18.17/122.00
Payment	3.02/12.20	3.01/0	3.13/122.00
Order-Status	2.02/10.25	2.01/0	2.14/102.50
Delivery	2.02/5.19	2.01/0	2.10/52.00
Stock-level	2.02/5.20	2.01/0	2.10/52.00

Test Duration

Ramp-up time	25 minutes
Measurement Interval	60 minutes
Number of checkpoints	4
Checkpoint Interval	15 minutes
Number of transactions (all types) completed in measurement interval	6724854

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Solaris™ 7 Operating Environment



The Solaris™ 7 Operating Environment is the premier environment for network computing. Delivering today what others are only promising for the future, Solaris 7 with 64-bits provides data-center reliability, superior scalability, and unprecedented performance.

Solaris™ Operating Environment

The Solaris™ Operating Environment is the only choice for serious enterprise computing. With Solaris, you get a 64-bit environment that's optimized for Java™ computing — from the creators of Java — and is Year 2000 safe. Superior reliability and availability mean that your systems and data are always accessible when you need them. Extensive scalability ensures that your systems won't top out in just a few years, let alone a few months. High performance delivers the power to get the job done fast. And simplified installation and administration lets you concentrate more on running your business, not your network. The Solaris Operating Environment delivers the information and services you need to anyone, anytime, anywhere.

The Power of 64-bit Computing

Advanced 64-bit technology is at the heart of the Solaris 7 Operating Environment. For your business, this means dramatic increases in performance, capacity, and scalability — all while maintaining complete binary compatibility with current 32-bit applications. Your software investments are protected — and so is your future.

The Solaris 7 Operating Environment helps make you more competitive today by delivering enhanced performance on a wide variety of applications. These applications range from Enterprise Resource Planning (ERP) to e-commerce, data mining to digital content creation, and Web search engines to scientific data analysis.

And upcoming 64-bit applications will run dramatically faster — up to 10 times. With 64 bits, applications can address more data directly from memory instead of from disk. So operations that used to take a long time — like database queries — now happen in a fraction of the time. The result? Faster access to information, increased operating efficiency, and lower operating costs.

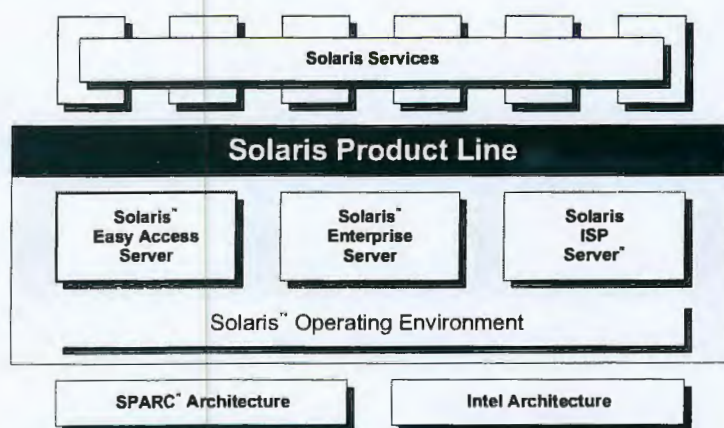
Scalability

The Solaris 7 Operating Environment can handle just about anything you throw at it: heavy network traffic, huge data sets, enormously compute-intensive problems. That's because this 64-bit environment is inherently scalable. Applications can access more files concurrently with 64-bit technology, increasing overall system efficiency. More processes can run simultaneously, allowing individual servers to run more applications. And more network connections are available in the Solaris 7 Operating Environment, enabling Web servers to handle many more users.

Simply put, the Solaris 7 Operating Environment scales from desktop to data center. Which means it's always ready to handle your changing needs.

Reliability

The Solaris 7 Operating Environment is the clear choice for business. It provides data center-class reliability, availability, and serviceability (RAS) features at a fraction of a mainframe's cost.



The Solaris product line delivers three different extensions that focus more on specific needs for workgroup, enterprise, or service provider computing.

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Even a few minutes of downtime can cost your company thousands, or even millions, of dollars in lost revenues and customer loyalty. Integrated in the Solaris 7 Operating Environment is dynamic reconfiguration. It allows a system to continue running even if a system board fails. What's more, you can replace the faulty board while the system continues to operate — and your people remain productive. Other enhancements include improved logging for easier debugging and improved core dump analysis. The bottom line: Solaris provides the most reliable operating environment for network computing.

Ease of Use

An integral component of the Solaris 7 Operating Environment, Solaris™ Web Start makes installing Solaris software as easy as clicking a button. Solaris Web Start offers the industry's first Web-based installation process, which means that all of the setup and administration can be done locally or remotely through a Web browser. Solaris Web Start simplifies installation by eliminating the UNIX® system administration normally associated with software installation and setup.

Solaris™ Web Start Wizards™ technology extends the point-and-click simplicity of Solaris Web Start, bringing this same ease of use to applications written for the Solaris Operating Environment. With Solaris Web Start Wizards software, installing applications on the Solaris Operating Environment is just like installing them on Microsoft Windows.

The Flexibility of Java Technology

Nothing runs the Java development environment better than the Solaris Operating Environment. Solaris provides a fast and reliable environment for developing and deploying mission-critical Java applications. That's because Java

technology is tightly integrated into the operating environment, and can leverage its multithreaded capabilities to deliver the scalability, performance, and stability needed for enterprise applications.

Standards-Based Networking

Driven by a vision of seamless access to information, and backed by 16 years of consistent execution, Sun is recognized as a world leader in open network computing. And we continue to invest in the core technologies required to deliver network connections as reliable as the dial tone. We call this the Webtone.

With standards-based networking, such as TCP/IP, NFS™, and LDAP, built into the software right from the beginning, the Solaris 7 Operating Environment offers proven interoperability and includes the leading-edge features to make networking easier. Sun continues to improve performance, and includes the protocols needed to support new applications as they become available.

Security

Moving from private to public networks, businesses require built-in security. The Solaris 7 Operating Environment has dramatically improved authentication, data integrity, data privacy, and single sign-on capabilities to keep your data safe from tampering, snooping, or eavesdropping. The Solaris Operating Environment also makes security administration easier, because system entry services such as *login* and *rlogin* do not have to be modified when changing authentication mechanisms.

Globalization

The Solaris 7 Operating Environment is designed for global business. Solaris supports 37 languages that cover 95% of the world's markets in a standards-based environment for true multilingual computing.

Summary of Features

- Full 64-bit functionality
- Industry-leading Java technology performance
- TCP with Selective Acknowledgment
- Web-based installation for the Solaris Operating Environment and Solaris applications
- Web-based administration and configuration
- Global-ready and Year 2000 compliant

RAS Enhancements

- Dynamic reconfiguration (not available on all systems)
- UNIX File System (UFS) logging
- Kernel debugging enhancements
- Improved core dump analysis
- Hot-plug capability
- Improved kernel errors and events logging

Standards

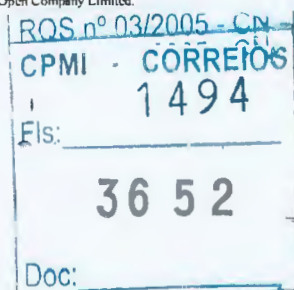
- Year 2000 Compliance: follows X/Open® guidelines
- Interface Standards: X/Open UNIX 98
- Graphics Standards: X11, PostScript™, Display PostScript™, OpenGL®
- Desktop Standards: CDE (Common Desktop Environment), Motif
- Object Standards: Java IDL
- Connectivity Standards: ONC™, ONC+™, NFS, WebNFS™, and optional NetWare IPX/SPX, SNA, SMB, AppleTalk, DECnet, and others
- Internet Standards: HTTP, FTP, Telnet, DNS, NTP, IMAP4, DHCP, SNMP, SMTP
- LDAPv3 IETF RFCs 1323, 1510, 1652, 1869, 1870, 1891-1894, 1985, 1996, 2018, 2136, 2045, 2078

System Requirements

- SPARC™ or Intel 486 (100 MHz) or Pentium platforms
- Disk Space: 600 Mbytes minimum (desktop); 600 Mbytes to 1 Gbyte (server)
- Memory: 32 Mbytes minimum

Notes: Web Start requires 64 Mbytes (minimum) of memory. Memory requirements can vary depending upon the number of clients and users. Maximum memory support on the Intel platform is 8 Gbytes.

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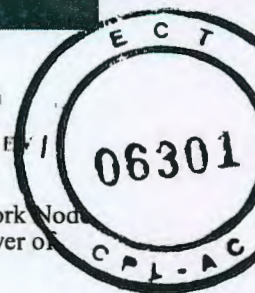
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HP OpenView Network Node Manager & CiscoWorks2000 Integration Package for NNM 5.x



HP OPENVIEW /



This package combines the network management power of HP OpenView Network Node Manager for Solaris and Windows NT with the network device management power of CiscoWorks2000. Integration that is made possible through the package:

- NNM Web Interface can launch Cisco Resource Manager Essentials
- Cisco Resource Manager Essentials can launch NNM Web Interface
- NNM newly discovered nodes automatically and dynamically propagated to Cisco Resource Manager Essentials inventory
- NNM event history and deleted nodes reports accessible from Cisco Resource Manager Essentials

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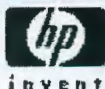
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HP OpenView-Telecom

HP OpenView Network Node Manager Year 2000 Compliance Information



The HP OpenView Network Node Manager team is working to ensure NNM's ability to handle dates for the millenium transition. All Network Node Manager versions 4.01 and greater are Year 2000 compliant, when run on a Year 2000 compliant system. Some of these versions will require the use of a software patch, as detailed in the chart below.

HP has made every effort to ensure the accuracy of our product testing. However, because each customer's environment is different from HP's laboratory test environment, it is the customer's responsibility to validate the Year 2000 readiness of these products in their own environment. Therefore, information about the Year 2000 status of HP products is provided "as is" without warranties of any kind. HP encourages customers to be fully aware of the potential impact that the Year 2000 could have on their business environment and their ability to compete in the 21st century. HP also encourages its customers to take responsibility for addressing needed changes as quickly as possible.

HP cannot attest to the Year 2000 compliance of solutions from independent software vendors that appear in our Solutions Catalog. We recommend that customers consult directly with these third-party vendors about the Year 2000 status of those products.

If you need more information on the definition of Year 2000 compliance, please go to </year2000/compliance.html>. Additionally, if you want more general information regarding Hewlett-Packard and the Year 2000, please visit <http://www.hp.com/go/year2000>.

NNM Version/Platform Support for Year 2000

Network Node Manager versions 4.x and 5.x are Year 2000 Compliant. NNM versions 5.01 and later are Year 2000 Compliant as shipped. NNM versions 4.x and 5.0 require the latest consolidated patch to be installed. The table below lists the earliest versions of these consolidated patches to support Year 2000 Compliance; subsequent consolidated patches will have higher numbers and will continue to include Year 2000 support.

Product	4.1 SunOs	2.x Solaris	10.x HP-UX	Windows NT	Status
Network Node Manager 3.31	Upgrade	Upgrade	Upgrade	N/A	N/A
Network Node Manager 4.0x	PSOV_01887	PSOV_01888	PHSS_13866	N/A	Y2K Compliant
Network Node Manager 4.1x	N/A	PSOV_01782	PHSS_12649	N/A	Y2K Compliant
Network Node Manager 5.0	N/A	PSOV_01863	PHSS_13569	NNM_00061	Y2K Compliant
Network Node Manager > 5.0	All versions greater than 5.00 will include Year 2000 compliance.				

NOTE: NNM versions 3.31 and earlier will NOT be made Year 2000 compliant. Customers with those versions should upgrade to a newer version of NNM before December 1999. Please contact an HP Sales Representative.

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HEWLETT
PACKARD

HP OpenView Network Node Manager 6.1

for the UNIX and Windows NT® operating system

HP OpenView Solutions



Network
Management

HP OpenView solutions target specific IT management challenges to solve today's pressing problem, today. Delivering swift results incrementally, the multiple solutions are the "building blocks" to a complete IT management solution. The nimble OpenView approach meets emerging business needs with short-term success driven by longer term business objectives.

HP OPENVIEW

Works | Right | Now

The HP OpenView Network Management solution is a complete, comprehensive solution that gives IT organizations the control they need to deliver reliable network services to their business customers. Leading the industry in network management, the HP OpenView solution manages all aspects of the increasingly complex and business-dependent network environment. HP OpenView Network Node Manager delivers the network availability component, and forms the foundation of the complete network management solution.

The Smart Way to Manage the Network

HP OpenView Network Node Manager is the market leading network availability management solution, providing in-depth views of the network in an intuitive graphical format. Network Node Manager discovers network devices and provides a map to illustrate what the network actually looks like. The multi-level map indicates which devices and network segments are healthy and which areas need attention. When a flood of events is generated from the failure of a major device, Network Node Manager's powerful event correlation engine immediately correlates the event stream and pinpoints the root cause of the failure. Trend analysis and thresholding, together with out-of-the-box reports and data warehousing, enable proactive network management.

Network Node Manager immediately pinpoints the source of network problems and assists network management staff in planning for network growth and designing network changes.

Network Node Manager's remote user access provides the flexibility to access network management tools from anywhere on the web. Using these powerful features, network administrators are able to more intelligently manage the network, leading to increased network uptime and lower costs.

The Most Comprehensive Network Management Solution

Automated Discovery and Layout

Network Node Manager discovers TCP/IP, IPX and Level 2 devices on the network and presents this information in an intuitive graphical format. Level 2 discovery includes devices that support the Bridge, Repeater/802.3, or MAU MIBs.

Network Node Manager continuously monitors the network for new devices and for the status of equipment on the network. Discovery and monitoring also detect devices that are located across Wide Area Networks (WANs).

Event Correlation Technology

Network Node Manager identifies problems faster through an advanced event correlation engine. The engine intelligently correlates events into high-level alarms, immediately pinpointing the root cause of network problems. The drill-down capability allows network administrators to see all of the contributing events for each of the alarms.

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Fault tolerance capabilities.

With Network Node Manager, users can schedule back-ups for business-critical network management information while continuing to manage critical network elements.

Additionally, Network Node Manager collection stations can be configured to fail over to Network Node Manager management stations so that in the event of a collection station failure, network monitoring will continue uninterrupted.

Designed for Growth

A scalable solution.

Windows NT and UNIX collection stations can be distributed throughout the environment so that data can be collected locally and then forwarded to one or more Windows NT/UNIX management stations. Windows NT remote consoles connected to UNIX management and collection stations allow multiple operators access at a lower cost. The new Java-based Web UI increases the number of supported operators and offers connectivity over WAN links.

Flexible pricing.

Network Node Manager is packaged in a variety of node increments to allow the software to scale as network requirements increase. Network Node Manager Enterprise for UNIX or Windows NT is the appropriate choice for larger environments and Network Node Manager 250 is an appropriate choice for environments of 250 or fewer nodes. Additional nodes can be added in 250-node increments as the network grows.

Partnerships Ensure Success

Network Node Manager has the strongest partnership program in the industry, resulting in over 300 integrated applications. This level of partnership support offers our customers the highest degree of flexibility to create a comprehensive, customized network management solution.

System Requirements

The hardware and software recommendations for IIP and Sun systems are for management of a 2,500 node network with one IIP OpenView Network Node Manager session on a management or collection station. Management of larger networks requires more RAM and swap space. Please refer to the IIP OpenView Network Node Manager Performance and Configuration Guide for detailed product requirement information.

HP Systems

- IIP 9000 Servers and Workstations, including multiprocessors (threads not supported)
- IIP-UX 10.20, 11.0 including X-Windows and OSF/Motif
- RAM: 96 MB recommended
- Bit-mapped display or X-terminal
- Color graphics: 1024x768 minimum resolution (1280x1024 recommended for optimum clarity); 6 color planes minimum (8 color planes recommended)
- Free disk space: 500 MB plus 192 MB of swap space
- LAN/Link for IIP 9000
- ARPA Services/9000

Sun Systems

- SunSPARC and Ultra Servers and Workstations including multiprocessors (threads not supported)

- Solaris 2.5.1, 2.6, 2.7
- RAM: 96 MB recommended
- Bit-mapped display or X-Terminal
- Color graphics: 1024x768 minimum resolution (1280x1024 recommended for optimum clarity); 6 color planes minimum (8 color planes recommended)
- Free disk space: 500 MB plus 192 MB of swap

Windows NT Systems

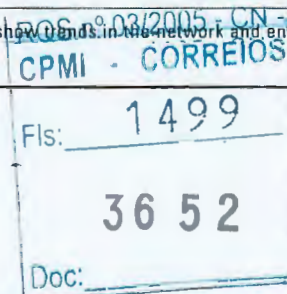
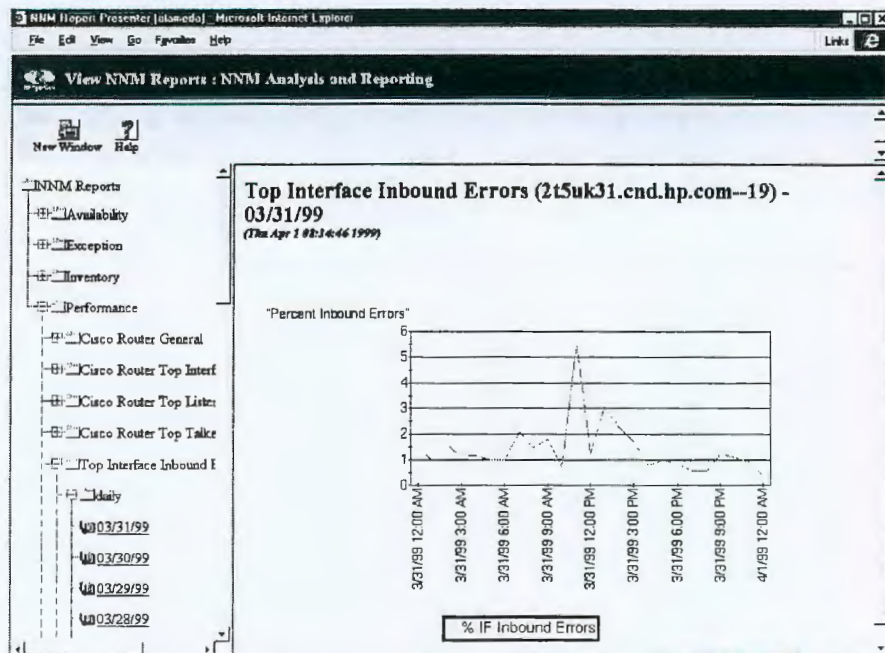
- Intel Pentium processor
- Microsoft Windows NT Workstation (or Server) version 4.0 with TCP/IP networking installed and configured
- Ram: 96 MB RAM
- 800x600 monitor with SVGA graphics card
- Free disk space: 500 MB plus 192 MB free paging file space
- Network Adapter Card

Web Servers Supported

- Apache on IIP-UX and Solaris
- Microsoft Peer Web Services or Internet Information Services on the Windows NT operating system

Web Browsers Supported

- Netscape Navigator 4.51 for IIP-UX, Windows NT, and Solaris
- Microsoft Internet Explorer 5.0 for NT





Out-of-the-box correlation circuits are included for some of the most common network management problems. The pre-configured correlation circuits lead to more efficient network polling based on the latest topology data. The IIP OpenView ECS Designer for Network Node Manager allows development and testing of correlation circuits for very specific correlation requirements through an easy-to-use GUI. These circuits can then be deployed to any number of collection stations or management stations in the environment.

Java-based user interface.

Network Node Manager now provides easy access to network maps and enables management of data from anywhere via the Web.

The IIP OpenView Web Launcher allows dedicated IT staff to start IIP OpenView Java-based applications such as the Network Presenter, the Alarms Browser and the SNMP Data Presenter from anywhere. A log-in facility with password authentication ensures the security of management data. The Launcher also allows user roles to be defined and information to be filtered based on the user's management objective.

The Network Presenter and the Alarms Browser dynamically update maps and events automatically - no intervention is required. Network topology is presented in either graphical or tabular form. A scoping pane allows easy navigation, which lets operators view the entire network from one window.

Proactive management through reporting and data warehouse.

Out-of-the-box reports enable proactive trend analysis on the health of the network. These Web based reports point out trends on performance, availability, inventory, and exceptions. Analysis of this historical data provides a clear picture about the devices in the network and allows network managers to become more proactive by taking action before there is a problem in the network.

Additionally, Network Node Manager's valuable topology, event and SNMP-collected data is exported to its data warehouse. The data is then intelligently aggregated and trimmed. The data warehouse includes an open schema to allow access from reporting and data mining tools.

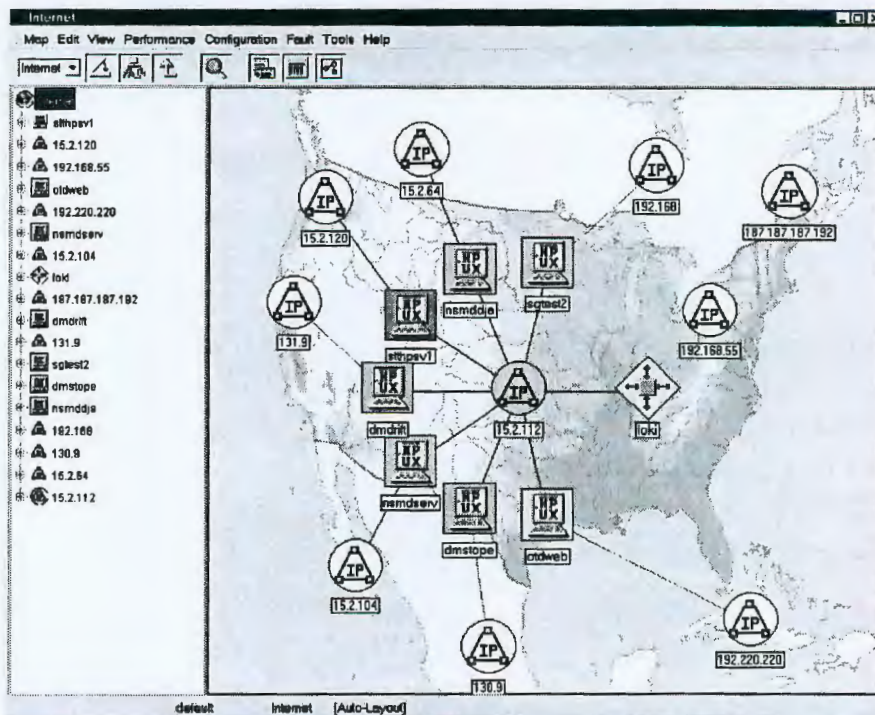


Figure 1. Java-based Network Presenter. The Network Presenter provides shared access to the network topology. Maps may be viewed in graphical or tabular form. A scoping pane allows easy navigation, which lets operators view the entire network from one window.

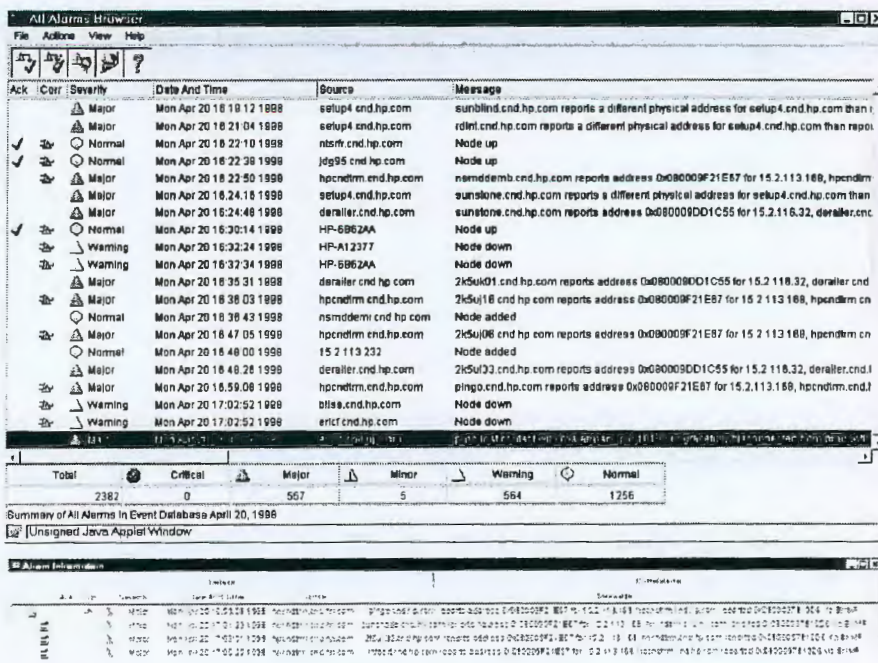
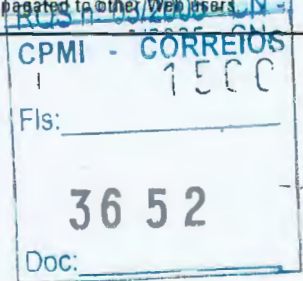
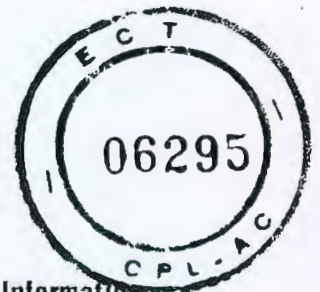


Figure 2. Alarms Browser with Correlated Event Stream. The Alarms Browser pinpoints the root cause of the network problems. Operators can delete and acknowledge alarms and the contributing events from anywhere, and have those changes immediately propagated to other Web users.





Ordering Information

J1240AA, J1247AA, J1254AA

HP OpenView Network Node Manager Enterprise 6.1 for the Windows NT, HP-UX, or Solaris operating systems. Includes License-to-Use, media, and manuals.

J1241AA, J1248AA, J1255AA

HP OpenView Network Node Manager 250 6.1 for the Windows NT, HP-UX, or Solaris operating systems. Includes License-to-Use, media, and manuals.

J1242AB, J1249AB, J1256AB

HP OpenView 250-Node Increment for HP OpenView Network Node Manager 250 6.1 License-to-Use. Product numbers correspond to Windows NT, HP-UX, and Solaris.

J1243AB, J1250AB, J1257AB

HP OpenView Network Node Manager 250 6.1 to Network Node Manager Enterprise 6.1 for Windows NT, HP-UX, or Solaris operating systems.

Upgrades

J1242UB, J1253AB, J1260AB

Upgrade from HP OpenView 250-Node increment to Network Node Manager 6.1 for Windows NT, HP-UX, and Solaris.

J1251AA, J1258AA

HP OpenView Network Node Manager Enterprise Version Upgrade. Unlimited/Enterprise 3.31/4.x/5.x to Network Node Manager Enterprise 4.11/5.01/6.1 for HP-UX or Solaris. Only one version may be installed/run at a time.

J1240UA

HP OpenView Network Node Manager Unlimited 5.x for Windows NT Upgrade to HP OpenView Network Node Manager Enterprise for 6.1 for Windows NT.

J1252AA, J1259AA

HP OpenView Network Node Manager 250 Version Upgrade 3.31/4.x/5.x to Network Node Manager 250 4.11/5.01/6.1 for HP-UX, or Solaris. Only one version may be installed/run at a time.

J1241UA

HP OpenView Network Node Manager 250 5.x for Windows NT Upgrade to HP OpenView Network Node Manager 250 6.1 for Windows NT.

J1251AA, J1252AA, J1263AA

HP OpenView Network Node Manager 6.1 Developer's Toolkit for Windows NT, HP-UX, and Solaris.

J1264AA

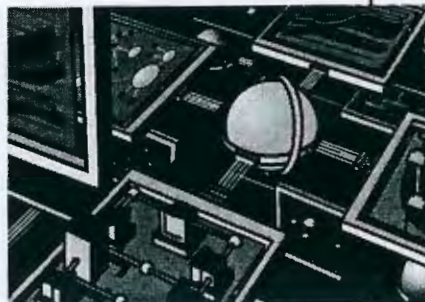
HP OpenView ECS Designer for IT/Operations and Network Node Manager 6.1 for HP-UX.

J1265AA

HP OpenView ECS Designer for Network Node Manager 6.1 for Solaris.

J1266AA

HP OpenView ECS Designer for Network Node Manager 6.1 for Windows NT.



For More Information

For more information on IIP OpenView Network Node Manager please contact your local IIP reseller or IIP sales office.

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United States of America

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Visit the HP OpenView website:

<http://www.openview.hp.com/nnm>

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- Sun HPC Servers

HIGH PERFORMANCE DESIGN

Symmetric Multiprocessing Power

Sun HPC Servers deliver consistent, cost-effective performance. Integrated SMP systems provide the level of performance usually reserved for expensive legacy or supercomputing systems - and performance can be boosted even higher by configuring these systems into clusters.

Processing power must be balanced against a system's capacity to sustain the required data movement throughout the system. For solving increasingly complex analysis and simulating increasingly large models, you need a compute engine with tremendous power and scalability. Sun HPC Servers deliver such an engine by leveraging three fundamental technologies:

- UltraSPARC Processors
- SMP Fat Nodes
- Clustering

UltraSPARC II Processor

The heart of every current Sun HPC system is the UltraSPARC II processor, the second in a family of high-performance superscalar 64-bit RISC processors. Fabricated in 0.35 micron CMOS technology, the UltraSPARC II offers truly impressive performance: A single UltraSPARC II running at 400 MHz provides dual launch floating point capability, resulting in a peak performance of 800 MFLOPS.

SMP Fat Nodes

In designing its current HPC systems, Sun has chosen a fat node strategy: SMP nodes that scale sufficiently to support at least 95% of the HPC applications run by Sun's customers. Allowing a single application to run within the boundaries of a single node, the fat node avoids long internode latencies and the need for developers and system operators to manage data locality in a hierarchical memory structure.

Sun chose the strategy of fat SMP nodes because it provides the lowest latencies while offering the simplest programming and operations environment. As a result, today Sun's HPC server line delivers lower memory-to-processor latencies for systems of 2 to 64 processors than do competitive systems. To implement the fat node strategy, Sun has developed three types of processor-to-memory interconnect. While using a common operating system, CPU module, and I/O architecture, implementing different interconnects allows for nodes of varying capacities:

- For systems requiring between one and four processors -- a simple, high-bandwidth (1.6 GB/s), low latency, processor-to-memory interconnect is used.

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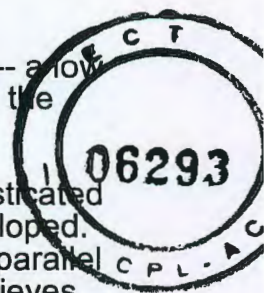
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- For systems requiring between 4 and 30 processors -- a low latency (200-300 ns), high bandwidth (2.7 GB/s) bus, the Gigaplane, is employed.
- For systems requiring up to 64 processors -- a sophisticated interconnect called the Gigaplane-XB has been developed. Combining a 16x16 data crossbar switch with 4-way parallel point-to-point address routers, the Gigaplane-XB achieves bandwidth of up to 10.5 GB/s, latencies of 400 to 600 ns, and supports up to 64 processors.



Clusters

The third part of Sun's implementation strategy is built around the use of clustering. Though fat nodes obviate the need for most applications to span node boundaries, clustering fat nodes still delivers three important benefits:

- **Workload aggregation:**
While individual nodes are sized to support the largest individual job, a cluster of nodes can support a very large workload consisting of many individual jobs. Tools like LSF, part of the Sun HPC Software which is bundled with every HPC server, allow the cluster to be managed as a single resource.
- **Incremental growth path:**
Clusters allow incremental growth of the computing resources as the computing environment and workload grows, by the addition of another SMP node.
- **Fault resilience:**
Because each node in the cluster contains its own copy of the operating system, system or software problems that bring down one node need not propagate to other nodes. This is important in an HPC environment where many jobs may be running at one time. This additional resilience is over and above that provided by the extensive RAS features found in the Sun HPC servers.

For large, highly parallel HPC applications, which span beyond even a 64-processor node, Sun's parallel development environment facilitates execution of a single application across multiple clustered nodes. Even here, fat nodes provide an advantage: Larger individual nodes reduce substantially the number of inter-node transfers, thus keeping average effective latencies much lower.

Performance : Architecture | Software | Scalability

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SUN ENTERPRISE™ 3500

Specifications

Processor

Number of processors	One to eight
Architecture	Superscalar SPARC Version 9, UltraSPARC
Cache per processor	Primary: 16-KB instruction, and 16-KB data on chip Secondary: 4 MB external cache
CPU interface	One to eight, 128-bit Ultra Port Architecture (UPA) slots
System Interconnect	Gigaplane, 2.68 GB/sec (at 84 MHz), 3.2 GB/sec (at 100 MHz)

System Boards

Number of boards	Maximum of five boards per system; minimum configuration requires one CPU/Memory board and one I/O board
CPU/Memory board	Holds up to two processors and 16 memory SIMMs
SBus I/O board	Offers two SBus channels, three SBus slots, SunFastEthernet, fast/wide SCSI-2, two FC-AL sockets
Graphics I/O board	Offers one SBus channel, two SBus slots, one UPA slot for Creator and Creator3D graphics, SunFastEthernet, fast/wide SCSI-2, two FC-AL sockets
PCI I/O board	Offers four PCI channels, two (short) PCI slots, SunFastEthernet, fast/wide SCSI-2

Main Memory

256-MB to 8-GB memory capacity per system
256-MB and 1-GB memory expansion options (each a group of 8 SIMMs)

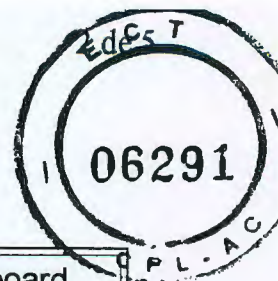


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Standard Interfaces

Serial	Two RS-232/423 ports on clock board
SBus	64-bit data bus width, 25 MHz
PCI	64-bit data bus width, 66 MHz
Keyboard and mouse port	One each per system
Ethernet	10/100 MB/sec twisted pair standard (10-BaseT and 100-BaseT) and/or MII transceiver per I/O board
SCSI	On-board 20-MB/sec fast/wide SCSI-2 (synchronous) per I/O board
Fibre channel	Two on-board sockets (100 MB/sec full duplex) per SBus and Graphics I/O boards

Mass Storage

Internal disk	Maximum eight 3.5-in. hot-swappable FC-AL disk drives with dual connections
Internal tape	8mm, 4mm, and .25-inch tape options available
CD-ROM	SunCD 32 drive standard

External storage

Supports over 2-TB of storage

Console options

Monitor	17- or 20-in color monitor
Frame buffer	TurboGX, TurboGXplus, Creator or Creator3D frame buffer

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SBus options

SunFastEthernet, SunATM 155 and 622, Quad FastEthernet, Differential Fast/Wide Intelligent SCSI-2 (DWIS/S), Single-Ended Fast/Wide Intelligent SCSI-2 (SWIS/S), High-Speed Serial Interface (HSI/S), Token Ring Interface (TRI/S), Single- and Dual-Attach FDDI, Serial Parallel Controller (SPC/S), 100BaseT Fast/Wide SCSI, ISDN, Fast Differential SCSI-2 Buffered Ethernet

(DSBE/S), Fast SCSI-2 Buffered Ethernet (FSBE/S), Sun Gigabit Ethernet, FC-AL

PCI options

10/100BaseT Fast/Wide UltraSCSI, 10/100BaseT FastEthernet, Quad FastEthernet, Single- and Dual-Attach FDDI, Token Ring, High Speed Serial Interface, Serial Asynchronous Interface, Gigabit Ethernet Network, SunATM 155 and 622

Power supplies

One 184-watt AC Inlet/Peripheral Power Supply standard. Optional, 195-watt Second Peripheral Power Supply available.

Up to three hot swappable 300-watt Power Cooling Modules (PCM) with redundant, dual-speed fans. One PCM required per two systems boards. Fully-redundant power and cooling available on this system.

Availability features

Automatic System Recovery
Dynamic Reconfiguration
Alternate Pathing
CPU Power Control
Redundant Power and Cooling
Hot-swap Power/Cooling Modules and Disk Drives
Internal Disk Drives with Dual Connections Hardware
Failure Prediction
Remote Power Control
Modular components
and more...

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Software

Operating system	Solaris 2.5.1 or later operating environment
Languages	C, C++, Pascal, FORTRAN, Java
Networking	ONC, NFS, TCP/IP, SunNet OSI, MHS, X.25, DCE, Netware
Windowing system	CDE, OpenWindows Version 3 optional
System monitoring	Sun Management Center
	Solaris Web Start, Solstice AdminSuite,

System and
network
management

Solstice Domain Manager, Solstice
Enterprise Manager, Solstice DiskSuite,
Solstice Backup, Veritas File System
and more...



Environment



AC power	100-240 VAC, 47-63 Hz, 9.5A
Operating	5° C to 35° C (41° F to 95° F) 20% to 80% relative humidity, noncondensing
Nonoperating	-20° C to 60° C (-4° F to 140° F) 5% to 93% relative humidity, noncondensing
Plug Type	NEMA 5-15P

Regulations

Meets or exceeds the following requirements:

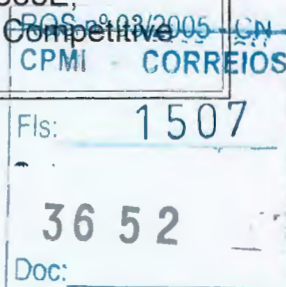
Safety	UL 1950, CSA 950, TUV EN60950, CB Scheme (Nordic Deviation)
RFI/EMI	FCC Class A, DOC Class A, EN55022 Class A, VCCI Class 1
Immunity	EN50082-1
Harmonics	EN61000-3-2

Dimensions and Weight

Height	65 cm (25.5 in.)
Width	43 cm (17.0 in.)
Depth	60 cm (23.5 in.)
Weight, main cabinet	72.5 kg (160 lb.) approximate
Power cord	1.83 m (6 ft.)

Upgrades

System upgrades are available for Enterprise 1, Enterprise 2, Enterprise 150, Enterprise 3000, SPARCserver 10/20, SPARCserver 1000/1000E, SPARCserver 6X0, 4X0, and 3X0 systems. Competitive server trade-ins are also available.



Specifications

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