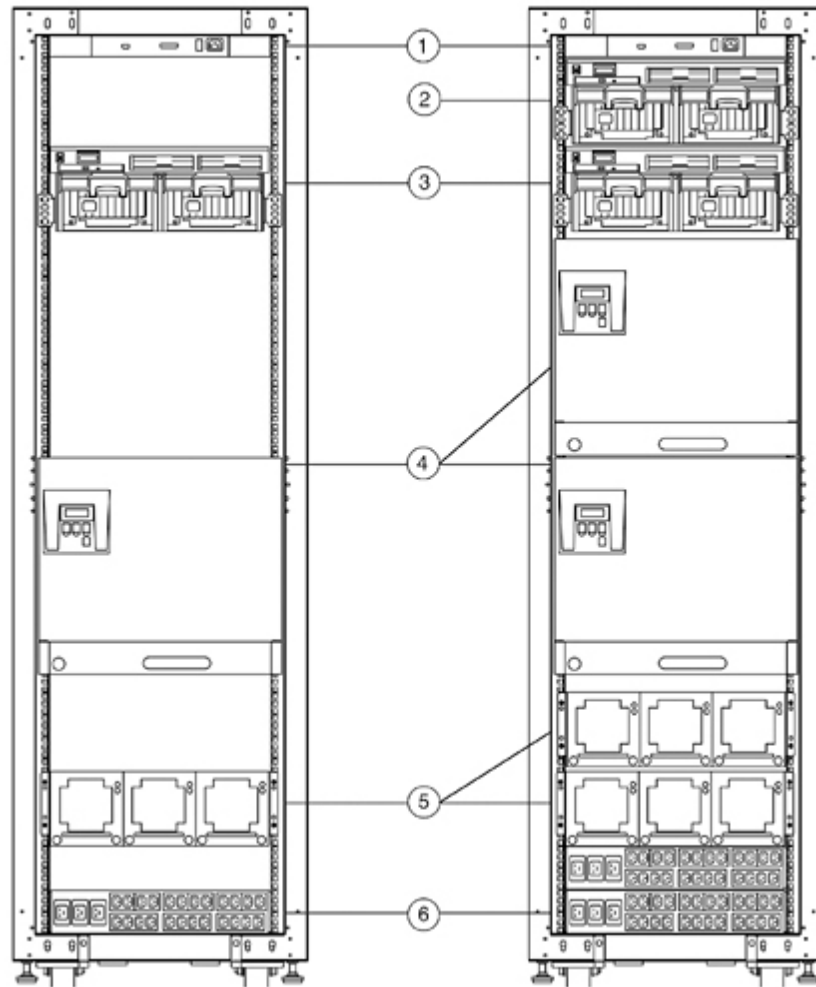


Overview

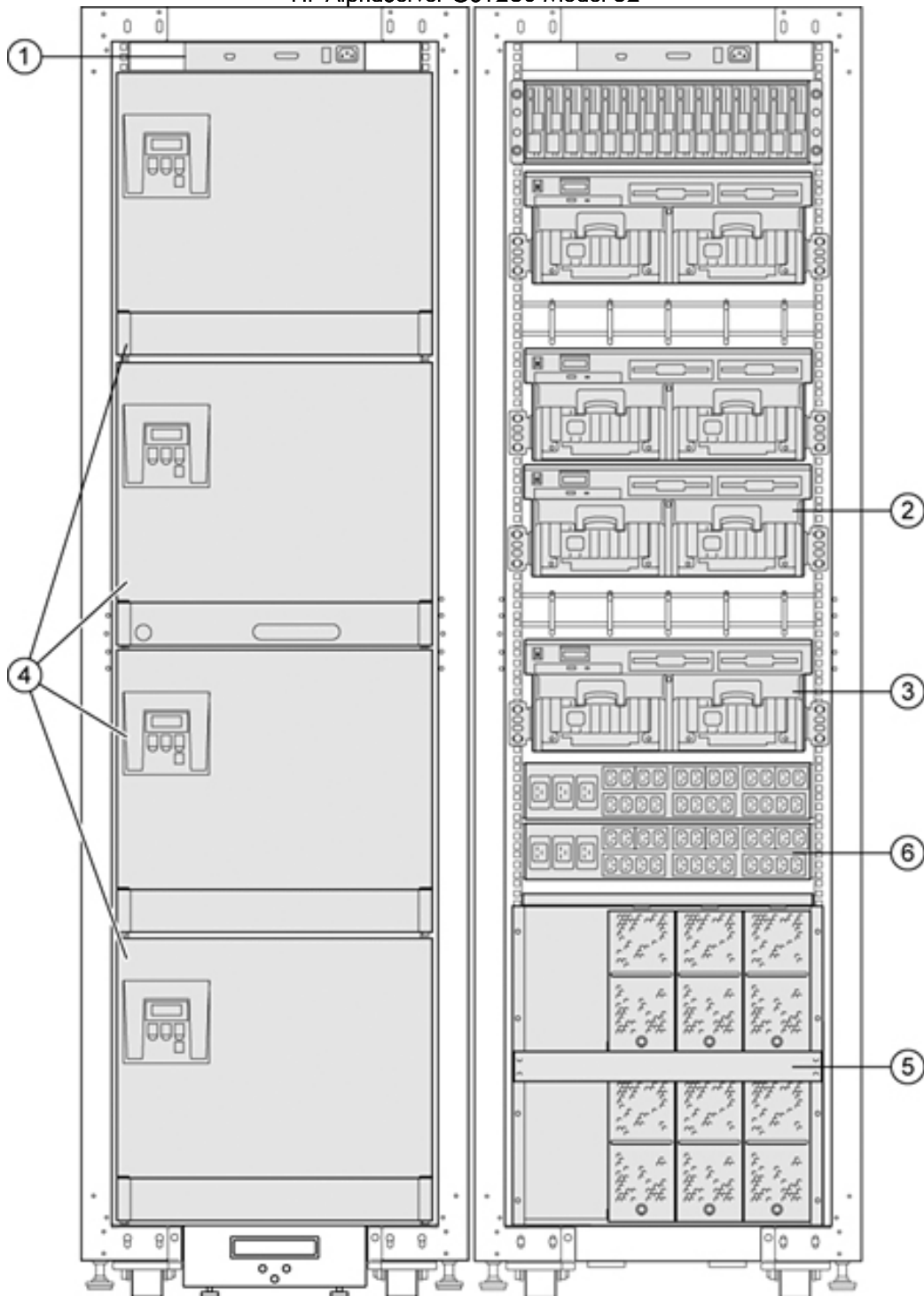
HP AlphaServer GS1280 Models 8 and 16



1. Cable/DSL HUB
2. PCI/PCI-X I/O Expansion Drawer (optional)
3. PCI/PCI-X I/O Master Drawer (mandatory option)
4. System Building Block Drawer (Model 8 Includes 1 drawer, Model 16 includes 2 drawers)
5. 48-volt DC Power shelves, 3 power supplies per shelf (Model 8 includes 1 shelf, Model 16 includes 2 shelves)
6. AC input controller(s) (mandatory option)

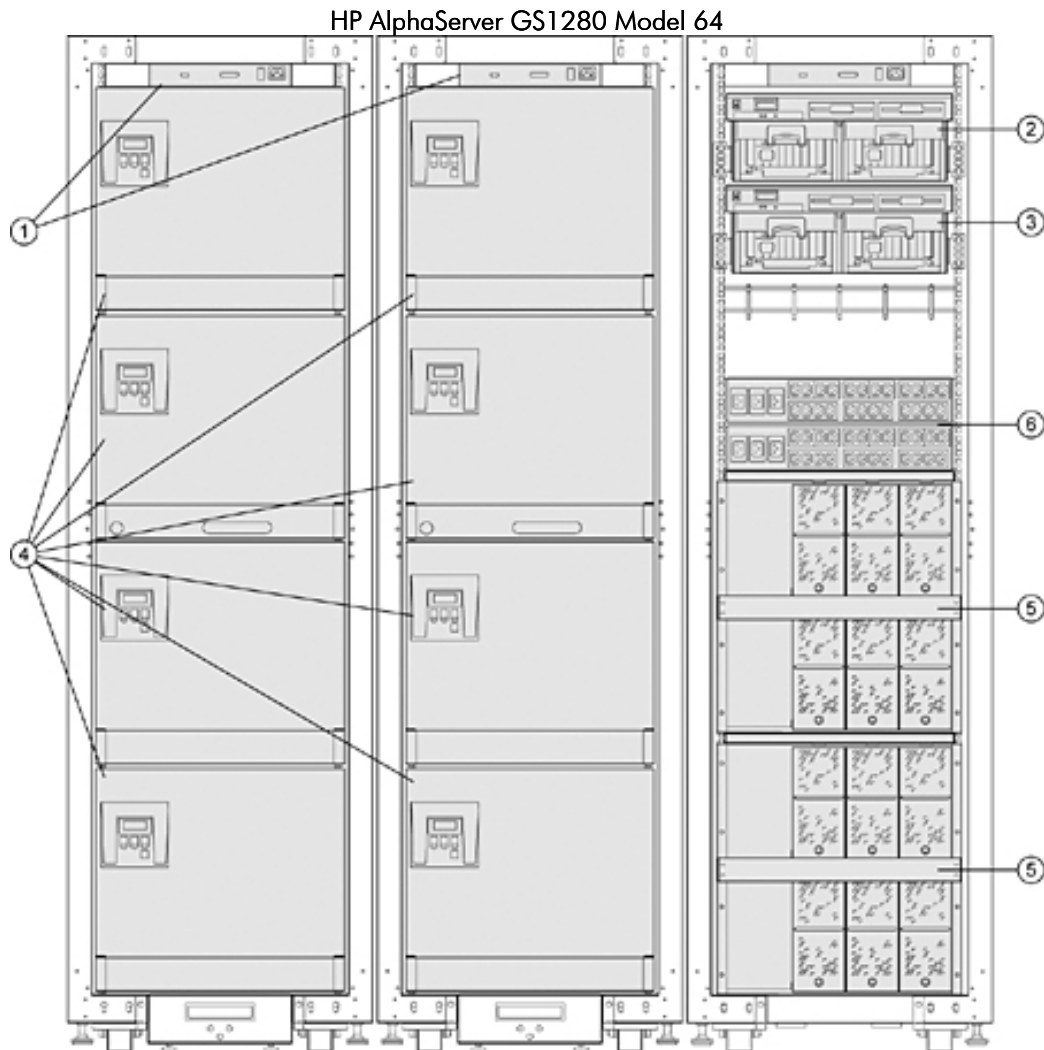
Overview

HP AlphaServer GS1280 Model 32



1. Cable/DSL HUB
2. I/O Expansion Drawer (optional)
3. I/O Master Drawer (mandatory option)
4. System Building Block Drawer (Model 32 includes four drawers)
5. Power supply, dual AC input is standard
6. AC input controllers (two mandatory options for Model 32)

Overview



1. Cable/DSL HUB
2. I/O Expansion Drawer (optional)
3. I/O Master Drawer (one drawer is optional)
4. System Building Block Drawer (Model 64 includes eight drawers)
5. Power supply, dual AC input is standard (two included for Model 64)
6. AC input controllers (two mandatory options for Model 64)

Overview

At A Glance

AlphaServer GS1280 Systems

- Up to 64 Alpha 21364 EV7 processors at 1300 MHz and 1150 MHz with advanced on-chip memory controllers and switch logic capable of providing 12.3 GB/s of memory bandwidth per processor
- Choice of memory options; up to 8 GB of RDRAM memory per CPU supported (512 GB total for a 64P system)
- Redundant features providing maximum uptime - N+1 Voltage Regulator Modules (VRMs); hot-plug redundant power supplies; cooling provided by hot-plug redundant system fans; dual AC input is standard
- Optional RAID memory support
- Standard I/O Drawer with 11 configurable PCI-X/PCI slots and one AGP slot; hot-swap power supplies
- High-performance I/O Drawer with eight PCI-X slots @133 MHz; hot-swap power supplies
- Enhanced reliability with ECC-protected memory, processor cache, and system data paths
- Tru64 UNIX or OpenVMS factory installed software (FIS); optional high availability support with Tru64 UNIX and OpenVMS cluster solutions
- Product warranty, 1-year hardware, on-site next business day and 90-day software, telephone support delivered by HP Services

Base Systems Contents

Step 1	Requirements
Step 1a	System Requirements
Step 1b	Requirements for Partitions
Step 1c	Licensing Systems for Both OpenVMS and Tru64 UNIX
Step 1d	System Management Hardware/Software Requirements
Step 2	Select Base System - Mandatory
Step 3	CPU Building Blocks - Mandatory
Step 4	Select Memory Options - Mandatory
Step 5	System I/O Expansion - Mandatory
Step 5a	Select System Disk - Optional
Step 6	Power Distribution Units - Mandatory
Step 7	Dual AC Power - Optional
Step 8	Internal System Expansion - Optional
Step 9	External Rack Expansion - Optional
ES/GS Common Options	- Hardware Options & Peripherals, Software, and Services
Upgrades	
Technical Specifications	

Standard Features

Processor Up to 64 Alpha 21364 EV7 processors at 1300 MHz and 1150 MHz

Cache Memory 1.75-MB ECC L2 on-chip cache, 7-way set associative

Architecture Glue-less processor-to-processor multiprocessor architecture constructed from a set of basic components:

- System Building Block Drawers
- CPU Building Block Modules
- I/O Expansion Building Block Drawers

CPUs, Memory, and I/O slots	GS1280 Model
Maximum CPUs supported	64 (64 per hard partition for Tru64 UNIX, 32 per hard partition for OpenVMS)
Maximum memory supported	512 GB
Maximum PCI-X/PCI slots supported	704, 176 per hard partition
Maximum AGP slots supported	64, 16 per hard partition

Interfaces	USB	One Dual USB port per System Building Block Drawer
	Server Management	One MBM Server Management LAN Connection per System Building Block Drawer
	Serial	One MBM serial connection per System Building Block Drawer

Form Factor 1 x 41U Rack (Model 8 and Model 16)
2 x 41U Rack (Model 32)
3 x 41U Rack (Model 64)

Boot/Diagnostic Devices	Load Device	One slim-line DVD/CD-RW per Master I/O Drawer
	Hard Drives	Choice of 18.2/36.4/72.8/146-GB/300-GB SCSI disk drives in each Master I/O Drawer

Power Supplies 3-phase power subsystem with power cords, redundant 48 Vdc hot-swap power supplies, and dual AC feed included

OS Support Tru64 UNIX V5.1B + IPK, or later required for EV7 CPU at 1150 MHz
Tru64 UNIX V5.1B* + PK4, or later required for EV7 CPU at 1300 MHz
AlphaServer Tru64 UNIX systems include pre-installed software, Base license, Unlimited User license, Server Extension license, Internet Express, and Secure Web Server
OpenVMS V7.3-1 plus Update Kit, or later
AlphaServer OpenVMS systems include pre-installed software, Base license with System Manager license and Enterprise Integration Server License Package for OpenVMS

Standard Features

Service and Support

Protected by HP Services including a 1-year on-site hardware warranty. Training, consulting, network integration, software support, comprehensive system maintenance and guaranteed uptime services are also available for customers requiring higher levels of service and support.

Systems

Step 1 - Requirements

Step 1a - System Requirements

Mandatory Purchases: The system cannot function without these options or services - the option or service must be ordered with the system.

- Base System (Step 2)
- Dual CPU Building Block Modules (Step 3)
- Memory (Step 4)
- Master I/O Building Block Drawer (Step 5)
- Power Distribution Unit(s) (Step 6)

Optional Purchases:

- I/O Building Block Drawer(s) (Step 5)
- System disk(s) (Step 5)
- Dual AC Power (Step 7)
- Internal System Expansion (Step 8)
- External Rack Expansion - (Step 9)
- Other (see ES/GS Common Options)

Recommended Services:

- HP Care Pack Service Package (see ES/GS Common Options - Step 12)
-

Step 1b - Requirements for Partitions

A single AlphaServer GS1280 can be divided into logical hardware partitions as small as two processors, each running an instance of Tru64 UNIX or an instance of OpenVMS. Each partition is allocated its own dedicated "shared-nothing" set of hardware resources: CPU module(s), memory module(s), and I/O. Each hardware partition is viewed as a unique node, from a system point-of-view, with its own instance of Tru64 UNIX or OpenVMS operating system and application software, independent system console, and error log.

Minimum Hardware and Software Required per Hardware Partition

1. One Dual CPU Building Block Module (Step 3)
2. Memory (Step 4)
3. I/O Drawer (Step 5)
 - a. One Standard I/O Drawer (Master or Expansion), or
 - b. Shared (up to four hard partitions) access to one High Performance I/O Drawer (Master or Expansion)
4. One local disk (Step 5) or external storage for the system software. Network boot can be used in place of the disk storage.
5. User access via the USB port in a Master I/O Drawer, a network connection (requires a LAN or WAN I/O adapter), or local terminal (requires an async I/O adapter).
6. All systems require the following minimum firmware and software revisions to run hard partitions:
 - a. Minimum Firmware console rev: V6.5-8
 - b. Tru64 UNIX: V5.1B + Patch kit - T64V51BB22AS0002-20030415.tar
 - c. OpenVMS: V7.3-1 + TIMA Kits (available at http://h18003.www1.hp.com/alphaserver/gs1280/gs1280_tech.html):
 - i. DEC-AVPVMS-VMS731_PARTITIONING-V0100-4.PCSI
 - ii. AVPVMS-VMS731_PARTITIONING-V0100_CVRLET
 - iii. AVPVMS-VMS731_PARTITIONING-V0100_SUBFORM

Systems

Configuration Guidelines

1. The two processors on a Dual Processor CPU Module cannot be split between hard partitions.
2. The set of processors assigned to a partition must form a continuous rectangle on the system interconnect mesh network.
3. CPU modules in an 8P Building Block Drawer share the same 48v power feed (from a redundant power supply). If the 8P Building Block Drawer contains all or portions of several hard partitions, a power fault in the drawer could affect all the partitions in that drawer. Hard partitions that consist of whole 8P Building Block Drawers limit the risk of a power fault in one drawer to one partition.
4. Base systems include an operating system license (Tru64 UNIX or OpenVMS) that licenses all hardware partitions of the system.
5. The license for an HP software product, the license(s) and license key(s) that represent those licenses, may be applied to any partition (OpenVMS Galaxy instance or hardware partition) within that system. Different versions of the operating system or layered products may be used on different partitions. In this case, the customer must be licensed for the latest version in use. Software products from other suppliers may have different licensing requirements for partitions.

Step 1c - Licensing Systems for Both OpenVMS and Tru64 UNIX

A System requires licenses for both OpenVMS and Tru64 UNIX operating systems, either for dual O/S boot of the entire system or for different operating systems in separate hard partitions. To use a second operating system, order the appropriate base system upgrade license and as many dual CPU SMP licenses as needed.

OpenVMS software base system upgrade for GS1280	QB-63PAQ-AC
Tru64 UNIX software base system upgrade for GS1280	QB-595AN-AB
OpenVMS Alpha dual CPU SMP license for GS1280	QL-MT1A9-6T
Tru64 UNIX Alpha dual CPU SMP license for GS1280	QL-MT4A9-6T

Step 1d - System Management Hardware/Software Requirements

Each AlphaServer ES47, ES80, and GS1280 system includes System Management software that can significantly enhance and simplify monitoring and control of the system. Use of the System Management software is optional. The software, which runs on a separate Intel or Alpha system, consists of two major components:

1. Alpha Management Station (AMS) - for monitoring and control of multiple ES47, ES80, and GS1280 Alpha Systems. AMS offers the highest level of server management functionality for a single or multi-platform environment. The AMS software requires the following hardware in order to operate:
 - o Tru64 UNIX platform with 512-MB memory, 4-GB disk space, and two network interface cards running Tru64 UNIX V5.1B or later.
 - o Intel IA-32 platform running Linux, 500-MHz CPU or faster, 256-MB memory, 4-GB disk space, and one network interface card.
2. Alpha Management Utility (AMU) - for monitoring and control of a single ES47, ES80, or GS1280 Alpha System. The AMU is a GUI based application that provides a sophisticated, yet user-friendly graphics interface. The AMU is a Web-based utility, which allows a user local and remote access from a browser. The AMU software requires one of the following hardware platforms in order to operate:
 - o Intel IA-32 platform running Windows 2000 or later, 500-MHz CPU or faster, 256-MB memory, 4-GB disk space, and one network interface card.
 - o Intel IA-32 platform running Linux, 500-MHz CPU or faster, 256-MB memory, 4-GB disk space, and one network interface card.
 - o Tru64 UNIX platform running V5.1B or later, 512-MB memory, 4-GB disk space, and one network interface card.
 - o OpenVMS platform running V7.3-1 or later, 512-MB memory, 4-GB disk space, and one network interface card.
3. Both the AMS and AMU software require Internet Explorer 5.5 or later or Netscape 4.76 or later.

Systems

- AMS/AMU software kits and instructions may be downloaded from:
<http://ftp.digital.com/pub/Digital/Alpha/firmware/interim/ams/index.html>

Step 2 - Select Base System - Mandatory

Mandatory selection of at least one Base System required.

AlphaServer GS1280 Base Systems

Model	OS	System Building Block Drawers Included	Total CPUs Supported (see Note 1)	41U Rack(s)	Dual AC (see Note 3)	Part Number
Model 8	Tru64 UNIX	1	8	1	Option	DA-1280A-AA
Model 8	OpenVMS	1	8	1	Option	DY-1280A-AA
Model 16	Tru64 UNIX	2	16	1	Option	DA-1280A-BA
Model 16	OpenVMS	2	16	1	Option	DY-1280A-BA
Model 32	Tru64 UNIX	4	32	2	Included	DA-1280A-CC
Model 32	OpenVMS	4	32	2	Included	DY-1280A-CC
Model 64	Tru64 UNIX	8	64	3	Included	DA-1280A-BD
Model 64	OpenVMS	8	64 (see Note 2)	3	Included	DY-1280A-BD

NOTES:

- Base systems do not include CPUs or memory (see Steps 3 and 4).
- OpenVMS maximum processor support is 32P per partition. To achieve 64 processors, 2 x 32P OpenVMS partitions are required.

Step 3 - CPU Building Block Modules – Mandatory

M=Mandatory O=Optional	Supported Configurations																											
CPUs	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	36	40	44	48	52	56	60	64				
Dual CPU Modules	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	22	24	26	28	30	32				
GS1280 Model 8	M	O	O	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
GS1280 Model 16	M	O	O	O	O	O	O	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
GS1280 Model 32	M	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-	-	-	-	-	-	-	-				
GS1280 Model 64	-	-	-	-	-	-	-	M	-	-	-	O	-	-	-	O	O	O	O	O	O	O	O	O				

Configuration Guidelines

- CPU Building Blocks with different clock speeds can co-exist in one system, but must be separated into hard partitions where the CPUs have the same speed.
- CPU Building Block or instant Capacity (iCAP) CPU Building Block Modules type (Tru64 UNIX or OpenVMS) must match the base system operating system selected in Step 2, or purchase a base operating system upgrade license to match the license with the CPU Building Block Module.

Systems

Full Use CPU Building Block Modules	AlphaServer GS1280 Dual CPU Building Block Module, 2xEV7 CPUs, 1300 MHz, Tru64 UNIX SMP License	3X-KN72D-AB
	AlphaServer GS1280 Dual CPU Building Block Module, 2xEV7 CPUs, 1300 MHz, OpenVMS SMP License	3X-KN72D-AC
	AlphaServer GS1280 Dual CPU Building Block Module, 2xEV7 CPUs, 1150 MHz, Tru64 UNIX SMP License	3X-KN72C-AB
	AlphaServer GS1280 Dual CPU Building Block Module, 2xEV7 CPUs, 1150 MHz, OpenVMS SMP License	3X-KN72C-AC

Configuration and Use of instant Capacity (iCAP) CPUs

The instant Capacity (iCAP) program gives HP customers the option to purchase add-on CPU modules at a reduced price and install those modules in systems ready to activate instantly when needed for extra computational capacity. To use the iCAP program for AlphaServers:

1. Order and install iCAP CPU modules along with Full Use CPUs. The total number of Full Use CPU Building Block Modules plus iCAP CPU Building Block Modules must adhere to the limits outlined above for GS1280 systems.
2. Use the iCAP software (supplied with the iCAP CPU Module) to set iCAP CPUs inactive. As long as the total number of active CPUs does not exceed the number of licensed CPUs owned for the system, the owner may choose which CPUs to designate as iCAP.
3. Inactive iCAP CPUs cannot include the primary CPU, CPUs responsible for hardware interrupts, CPUs being used by an application when configuring iCAP, or a CPU connected to an I/O Building Block Drawer.
4. Activate the iCAP CPUs for First Use when extra capacity is needed, and then promptly purchase the iCAP Enablement (Right-to-Use).

iCAP CPU Building Block Module + iCAP Enablement = Full Use CPU Building Block Module

iCAP CPU Building Block Modules	AlphaServer GS1280 iCAP Dual CPU Building Block Module, 1300 MHz, Tru64 UNIX SMP License	3X-KN72D-CB
	AlphaServer GS1280 iCAP Dual CPU Building Block Module, 1300 MHz, OpenVMS SMP License	3X-KN72D-CC
	AlphaServer GS1280 iCAP Dual CPU Building Block Module, 1150 MHz, Tru64 UNIX SMP License	3X-KN72C-CB
	AlphaServer GS1280 iCAP Dual CPU Building Block Module, 1150 MHz, OpenVMS SMP License	3X-KN72C-CC

iCAP Enablement	AlphaServer GS1280 iCAP Enable Dual CPU Building Block Module, 1300 MHz, Tru64 UNIX	3X-KN72D-EB
	AlphaServer GS1280 iCAP Enable Dual CPU Building Block Module, 1300 MHz, OpenVMS	3X-KN72D-EC
	AlphaServer GS1280 iCAP Enable Dual CPU Building Block Module, 1150 MHz, Tru64 UNIX	3X-KN72C-EB
	AlphaServer GS1280 iCAP Enable Dual CPU Building Block Module, 1150 MHz, OpenVMS	3X-KN72C-EC

Systems

TERMS and DEFINITIONS

iCAP CPU MODULE

AlphaServer CPU add-on module including the OpenVMS SMP or Tru64 Unix SMP extension license, end user product warranty, iCAP software, plus limited Rights-to-Access the CPU module and leave inactive until First Use.

FIRST USE

First Use takes place when one or more processors on the iCAP CPU Module are activated for permanent use.

Temporary replacement of a failed CPU with an iCAP CPU does not constitute First Use. Activation of an iCAP CPU after deactivation of a full use CPU does not constitute First Use. For example, owners are permitted to deactivate a Full Use CPU in one hard partition of the system and activate an iCAP CPU in another hard partition without First Use of the iCAP CPU. First Use of an iCAP CPU Module is considered to have taken place only when the number of active CPUs in the system is greater than the number of purchased full use CPUs.

iCAP ENABLEMENT PROGRAM PERIOD

Grants full Right-to-Use for a previously purchased iCAP CPU Module.

There is no time limit to activate an iCAP CPU.

GS Options

Step 4 - Select Memory Options - Mandatory

Configuration Guidelines

1. Mandatory selection of one memory option per CPU (two memory options per Dual CPU Building Block Module).
2. Optional selection of a second memory option for each CPU.
3. Both options must be the same size and speed for a CPU, but different size options can be used on different CPUs.
4. Each memory option consists of four RDRAM Inline Memory Modules (RIMMs). An optional fifth RIMM (RAID option) may be selected for redundancy that will allow uninterrupted operation in case of the loss of an entire RIMM. RAID options must be selected and matched for each memory option on one CPU, but RAID options do not have to be selected for all CPUs.

NOTE: Memory must be ordered for iCAP CPU Modules as well as Full Use CPU Modules. The system will use memory installed on the iCAP CPU Module even when the iCAP CPU is inactive.

Memory Application Examples

The following examples illustrate different ways of configuring one 8P System Building Block Drawer with eight CPUs and a total of 16 GB of memory.

Case	Memory Option	CPU Building Block Module #1				CPU Building Block Module #2			
		CPU 1		CPU 2		CPU 3		CPU 4	
		Controller 1	Controller 2	Controller 1	Controller 2	Controller 1	Controller 2	Controller 1	Controller 2
A	3X-MS7AB-BA (4 x 256 MB)	1	1	1	1	1	1	1	1
B	3X-MS7AB-CA (4 x 512 MB)	1	-	1	-	1	-	1	-
		CPU Building Block Module #3				CPU Building Block Module #4			
		CPU 5		CPU 6		CPU 7		CPU 8	
		Controller 1	Controller 2	Controller 1	Controller 2	Controller 1	Controller 2	Controller 1	Controller 2
A	3X-MS7AB-BA (4 x 256 MB)	1	1	1	1	1	1	1	1
B	3X-MS7AB-CA (4 x 512 MB)	1	-	1	-	1	-	1	-

GS Options

Configuring memory is a compromise between cost, total memory capacity, and memory bandwidth requirements. The following may be used as guidelines:

- Applications, in which large amounts of memory can substantially reduce I/O throughput, may be optimized for total memory capacity and future capacity growth. (Case B)
- Typical commercial applications, such as transaction processing (OLTP) and multi-user timesharing, usually operate efficiently from cache and may not be materially affected by memory bandwidth. Memory configuration is a balance between memory bandwidth and future capacity growth. (Case B)
- Data mining can benefit from additional memory bandwidth. It is best to match the number of memory base modules to the number of CPUs. (Case A)
- The most demanding high-performance technical applications achieve a performance level that is directly proportional to memory bandwidth. In these cases, configure two memory options per CPU. (Case A)

Memory Specification

Use only with the indicated CPU Modules (mandatory)

	800 MHz	1066 MHz
	Must be used only with	May be used with either
	EV7 1.15 GHz (3X-KN72C-**)	EV7 1.3 GHz (3X-KN72D-**)
		or
		EV7 1.15 GHz (3X-KN72C-**)
1-GB RDRAM Memory (4x256) Option	3X-MS7AB-BA	3X-MS7AC-BA
1-GB RDRAM Memory (1x256) RAID Option	3X-MS7AB-BC	3X-MS7AC-BC
2-GB RDRAM Memory (4x512) Option	3X-MS7AB-CA	3X-MS7AC-CA
2-GB RDRAM Memory (1x512) RAID Option	3X-MS7AB-CC	3X-MS7AC-CC
4-GB RDRAM Memory (4x1024) Option	3X-MS7AB-DB	3X-MS7AC-DA
4-GB RDRAM Memory (1x1024) RAID Option	3X-MS7AB-DD	3X-MS7AC-DC

Step 5 - System I/O Expansion - Mandatory

Configuration Guidelines

1. Each AlphaServer GS1280 system requires one I/O Master Building Block Drawer per system. Additional I/O Building Block Drawers are optional.
2. Each additional hard partition in the system requires:
 - o One Standard I/O Drawer (Master or Expansion), or
 - o Shared (up to four hard partitions) access to one High Performance I/O Drawer (Master or Expansion)
3. Each CPU in a GS1280 System Building Block Drawer can provide one I/O connection to an I/O Drawer.
4. Either a Standard I/O Drawer (Expansion or Master) or High Performance I/O Drawer (Expansion or Master) can be used for optional I/O expansion. Any combination of drawers is supported up to the I/O connection limit of 32 per hard partition or 64 per system with 2 or more hard partitions.
 - o The Standard I/O Drawer requires one I/O connection.
 - o The High Performance I/O Drawer requires one and optionally up to four connections.

Example - AlphaServer GS1280 Model 16 with 12 processors

Twelve Processors, one I/O connection each	= 12 I/O connections available
Six Standard I/O Drawers, one I/O connection each	= 6 I/O connections
One High Performance I/O Drawer with four I/O connections	= 4 I/O connections
One High Performance I/O Drawer with two I/O connections	= 2 I/O connections
Total I/O Drawer Connections	= 12 I/O connections used



GS Options

	I/O Module for Connection to CPU in a System Building Block Drawer	I/O Buses	I/O Slots	Dual Redundant Power Supplies	USB/ Ultra3 SCSI Adapter Card	DVD/ CD-RW Drive	Universal Slot for Disks	Part Number
Standard I/O Drawer, Expansion	1	3 PCI-X 1 AGP 4X	8 PCI-X 1 PCI 3.3V; 2 PCI, 5V 1 AGP 4X	Yes	No	No	None	3X-BA70A-BA
Standard I/O Drawer, Master	1	3 PCI-X 1 AGP 4X	8 PCI-X 1 PCI 3.3V; 2 PCI, 5V 1 AGP 4X	Yes	1 in PCI 3.3V Slot	1	2	3X-BA70A-AA
High Performance I/O Drawer, Expansion	1 standard 3 additional, optional ¹	2 to 8 PCI-X	2 to 8 PCI-X	Yes	No	No	None	3X-BA70B-BA
High Performance I/O Drawer, Master	1 standard 3 additional, optional ¹	2 to 8 PCI-X	2 to 8 PCI-X	Yes	1 in PCI-X Slot	1	2	3X-BA70B-AA

Add-in I/O Module for High Performance I/O Drawers. Each module supports two PCI-X slots. Up to three modules may be added to the base High Performance I/O Drawer.

3X-KFMHA-AA

I/O 3.3-meter cable for connection between GS1280 System Building Block Drawer and I/O Building Block Drawers mounted in a system rack or adjacent expansion rack; select one cable for each I/O drawer ordered and one cable per Add-in I/O Module (3X-KFMHA-AA) if ordered.

3X-BNPSA-04

I/O 4.5-meter cable for connection spanning one or two racks between GS1280 System Building Block Drawer and I/O Building Block Drawer mounted in an expansion rack; select one cable for each I/O drawer ordered and one cable per Add-in I/O Module (3X-KFMHA-AA) if ordered.

3X-BNPSA-05

I/O 6.0-meter cable for connection spanning three racks between GS1280 System Building Block Drawer and I/O Building Block Drawer mounted in an expansion rack; select one cable for each I/O drawer ordered and one cable per Add-in I/O Module (3X-KFMHA-AA) if ordered.

3X-BNPSA-06

GS Options

NOTES:

- 1. One High Performance I/O Drawer can be used by up to four separate hard partitions. Each of the four I/O connections (and two associated PCI-X slots) in the High Performance I/O Drawer can be independently controlled (e.g. power on/off) in conjunction with a separate partition.
- 2. A Master I/O Drawer consists of a Standard or High Performance I/O Drawer plus a Combination Adapter in one slot. The Combination Adapter provides an Ultra3 SCSI connection for two disks and a DVD/CD-RW drive in the drawer, plus a USB connection for keyboard, mouse, and monitor. The Master I/O Drawer is required for all GS1280 systems integrated at the manufacturing plant by HP. If the final system configuration does not require these I/O devices, the Combination Adapter may be removed and replaced with the following alternatives:
 - o System Boot - External storage or network boot can be used in place of the disk storage internal to the I/O Drawer.
 - o Software Load - Software can be loaded over the network from a disk on another system or directly from a CD reader attached to another system by using remote mount.
 - o User I/O - User access via a network connection can be used in place of the direct connection via the USB port.
- 3. The two disks in the Master I/O Drawer can only be connected to the system via the Combination Adapter's Ultra3 SCSI connection. The I/O Drawer design does not permit connection from other storage adapters, such as a RAID adapter, that might be installed in the I/O Drawer.

Step 5a - Select System Disk - Optional

Each Master I/O Drawer supports up to two internal hard disk drives.
See **HP SCSI Ultra320 Hard Drive Option Kits QuickSpecs** for configuration details:
http://h18000.www1.hp.com/products/quickspecs/11531_div/11531_div.HTML

300-GB Pluggable Ultra320 SCSI 10,000 rpm Hard Drive	3R-A4952-AA
146.8-GB Pluggable Ultra320 SCSI 10,000 rpm Hard Drive	3R-A3841-AA
72.8-GB Pluggable Ultra320 SCSI 10,000 rpm Hard Drive	3R-A3839-AA
36.4-GB Pluggable Ultra320 SCSI 10,000 rpm Hard Drive	3R-A3838-AA
146-GB Pluggable Ultra320 SCSI 15,000 rpm Hard Drive	3R-A4945-AA
72.8-GB Pluggable Ultra320 SCSI 15,000 rpm Hard Drive	3R-A3851-AA
36.4-GB Pluggable Ultra320 SCSI 15,000 rpm Hard Drive	3R-A3849-AA
18.2-GB Pluggable Ultra320 SCSI 15,000 rpm Hard Drive	3R-A3848-AA

Step 6 - Power Distribution Units - Mandatory

GS Options

			GS1280 Model 8	GS1280 Model 16	GS1280 Model 32	GS1280 Model 64
			DA/DY-1280A-AA	DA/DY-1280A-BA	DA/DY-1280A-CC	DA/DY-1280A-BD
Type A Power Distribution Units Select one variant.	North America/Japan 200 -208V, NEMA L21-30P 30A; 3 x C19 outlets plus 24 x C13 outlets	3X-H7606-AA	1 required (provides receptacles for power cords from all system components)	2 required (provides receptacles for power cords from all system components)	2 required (provides receptacles for power cords from I/O Drawers, LAN Hub, and storage shelves)	2 required (provides receptacles for power cords from I/O Drawers, LAN Hub, and storage shelves)
	International 380/415V Y, IEC 309 32A; 3 x C19 outlets plus 24 x C13 outlets	3X-H7606-AB				
Type B Power Distribution Units Select one variant.	North America/Japan 200 - 208V, IEC 309 60A	3X-H7606-BA	Not applicable	Not applicable	2 required (for M32/M64 Dual AC power supply exclusively for 8P system drawers)	4 required (for M32/M64 Dual AC power supply exclusively for 8P system drawers)
	International 380/415V Y, IEC 309 32A	3X-H7606-BB				

NOTE: Select the same power supply voltage variant for both Type A and Type B Power Distribution Units, e.g. both 200-208V or both 380/415V.

Step 7 - Dual AC Power - Optional

A Dual AC power option provides the capability to connect to two separate AC feeds: a primary AC feed and a secondary AC feed. The feeds can be direct from the power utility, or they can be a combination of utility feeds and UPS or generator feeds. The preferred (primary) feed is determined by the user. In the event of failure of the primary feed, the system will automatically transfer the load to the secondary feed without power interruption.

- Dual AC is included as a standard feature in the:
 - GS1280 Model 32 with Dual AC (DA/DY-1280A-CC)
 - GS1280 Model 64 with Dual AC (DA/DY-1280A-BD)
- Dual AC is an option for:
 - GS1280 Model 8
 - GS1280 Model 16
 - GS1280 Model 32 Single AC (DA/DY-1280A-AC)
 - GS1280 Model 64 Single AC (DA/DY-1280A-AD)

Dual AC Power Options for GS1280 Model 8 and Model 16 Systems

Configuration Guidelines

1. Dual AC power options can be factory configured or installed as a field upgrade.
2. The dual AC assemblies for the Model 16 requires that a second rack (3X-H9A45-ZA Expansion Rack) be mounted adjacent to the system power rack - see Step 9.

Dual AC option for use with AlphaServer GS1280 Model 8 systems

3X-H7514-AC

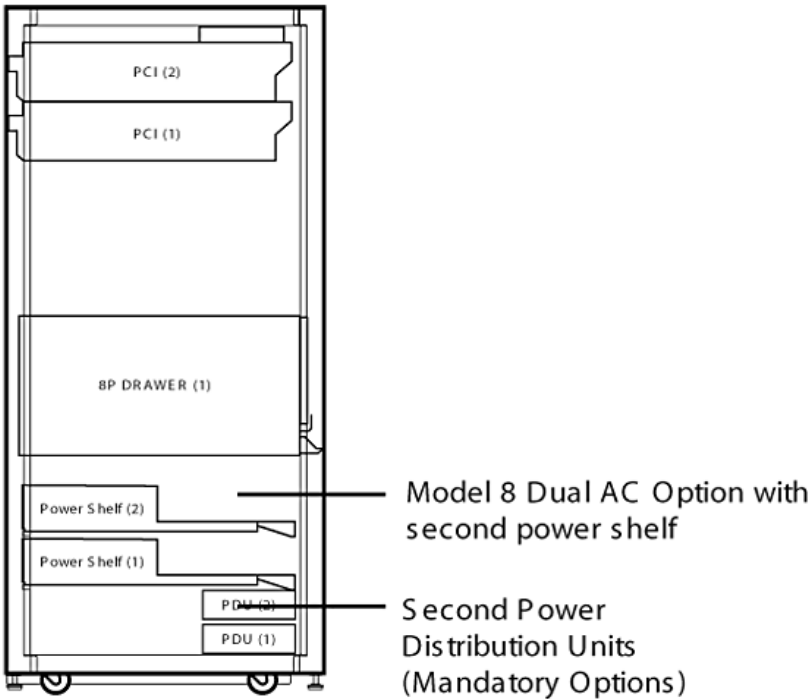
Dual AC option for use with AlphaServer GS1280 Model 16 systems

3X-H7514-AB

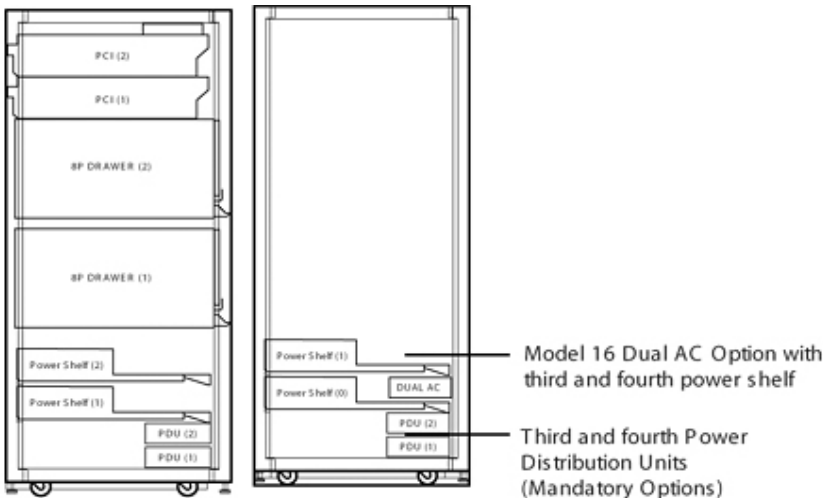
GS Options

Mandatory with Dual AC options above.
Type A Power Distribution Units
Select one variant.

- | | | |
|--|--|-------------|
| • Two required for Model 16 Dual AC Option | North America/Japan 200 -208V, NEMA L21-30P 30A; 3 x C19 outlets plus 24 x C13 outlets | 3X-H7606-AA |
| • One required for Model 8 Dual AC Option | International 380/415V Y, IEC 309 32A; 3 x C19 outlets plus 24 x C13 outlets | 3X-H7606-AB |



AlphaServer GS1280 Model 8 with Dual AC Option



AlphaServer GS1280 Model 16 with Dual AC Option

GS Options

Dual AC Power Options for GS1280 Model 32 and Model 64 Systems not originally equipped with Dual AC (DA/DY-1280A-AC/AD)

GS1280 Model 32 and Model 64 systems that were not originally equipped with power supplies that included dual AC capability (DA/DY-1280A-AC/AD) may be upgraded in the field to a power supply with Dual AC.

Configuration Guidelines

- 1. The upgrade consists of one new power supply rack that replaces the existing power supply rack(s).
- 2. I/O Drawers, storage shelves or other components in the existing power supply racks must be moved to the new power supply rack or an expansion rack.
- 3. Two Type A Power Distribution Units (3X-H7606-Ax) must be moved from the existing power rack to the new power rack to provide power for I/O Drawers and/or storage in the new power rack.

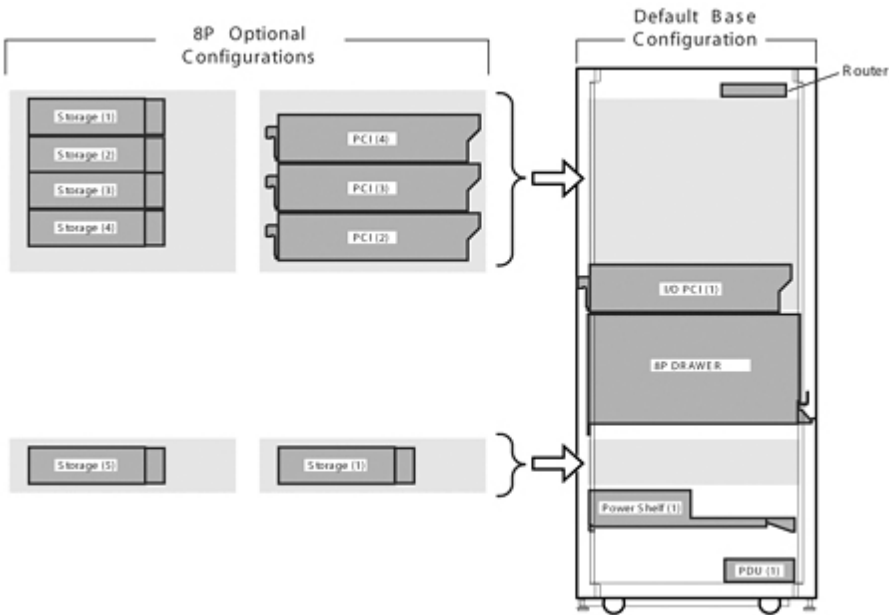
Dual AC option for AlphaServer GS1280 Model 32 system (DA/DY-1280A-AC)	3X-H7514-BC
Dual AC option for AlphaServer GS1280 Model 64 system (DA/DY-1280A-AD)	3X-H7514-BD

Mandatory with Dual AC options above.
Type B Power Distribution Units
Select one variant.

• Two required for Model 32 North America/Japan 200 - Dual AC Option	3X-H7606-BA
• Four required for Model 64 Dual AC Option	3X-H7606-BB

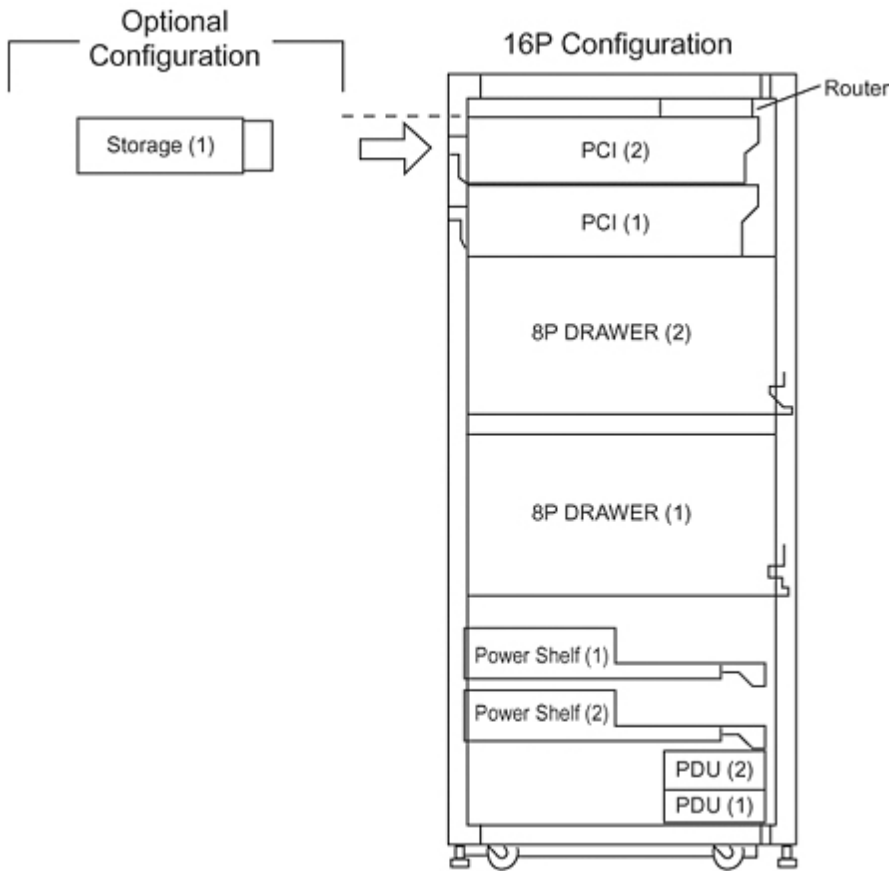
Step 8 - Internal System Expansion - Optional

AlphaServer GS1280 systems can support optional configurations shown below.



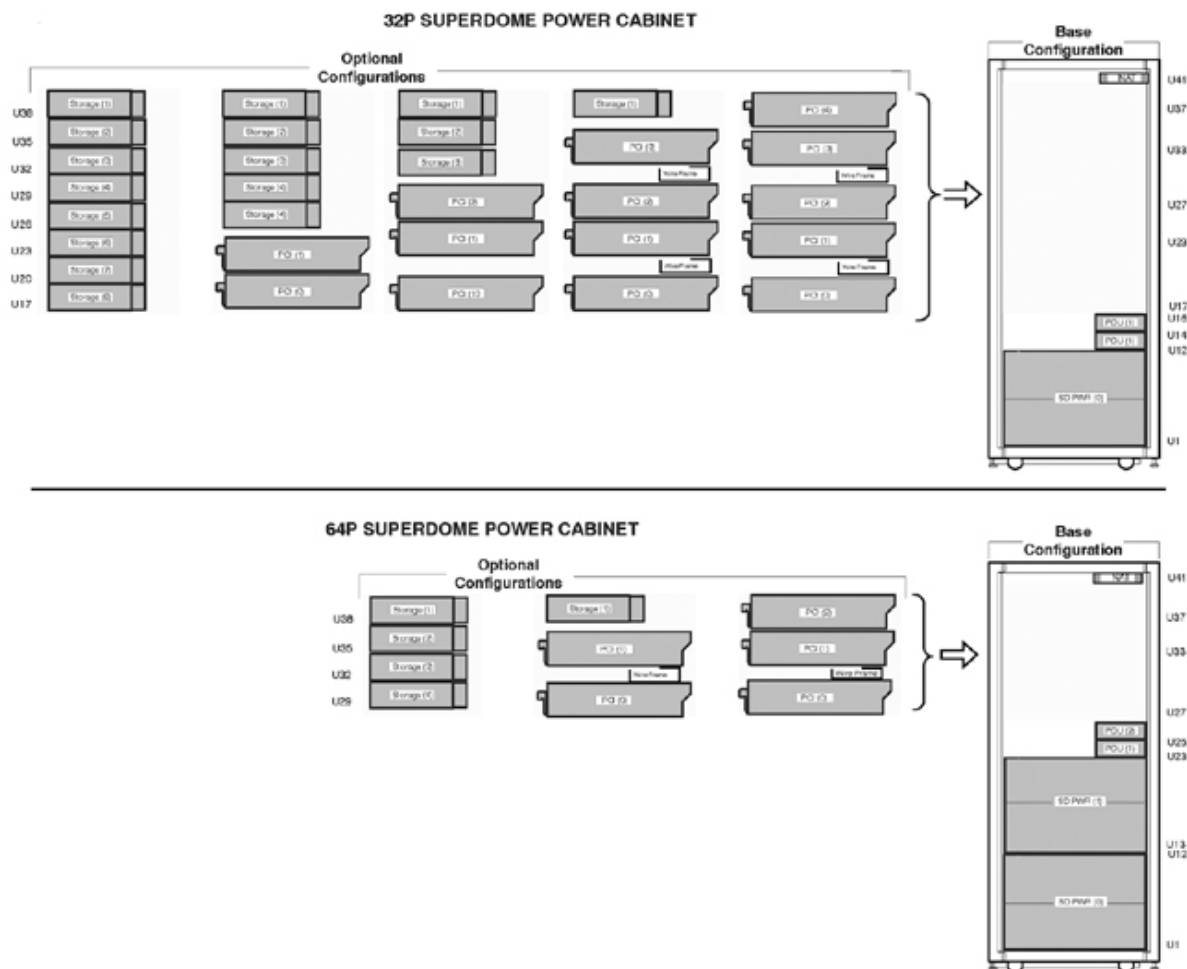
AlphaServer GS1280 Model 8 - Internal System Expansion Options

GS Options



AlphaServer GS1280 Model 16 - Internal System Expansion Options

GS Options



AlphaServer GS1280 Model 32 and Model 64 - Internal System Expansion

Step 9 - External Rack Expansion - Optional

Expansion Racks can be configured to hold I/O Drawers and StorageWorks components.

External Expansion Rack, 41U, 2m

Mandatory with External Expansion Rack, above Type A Power Distribution Units
Select one variant

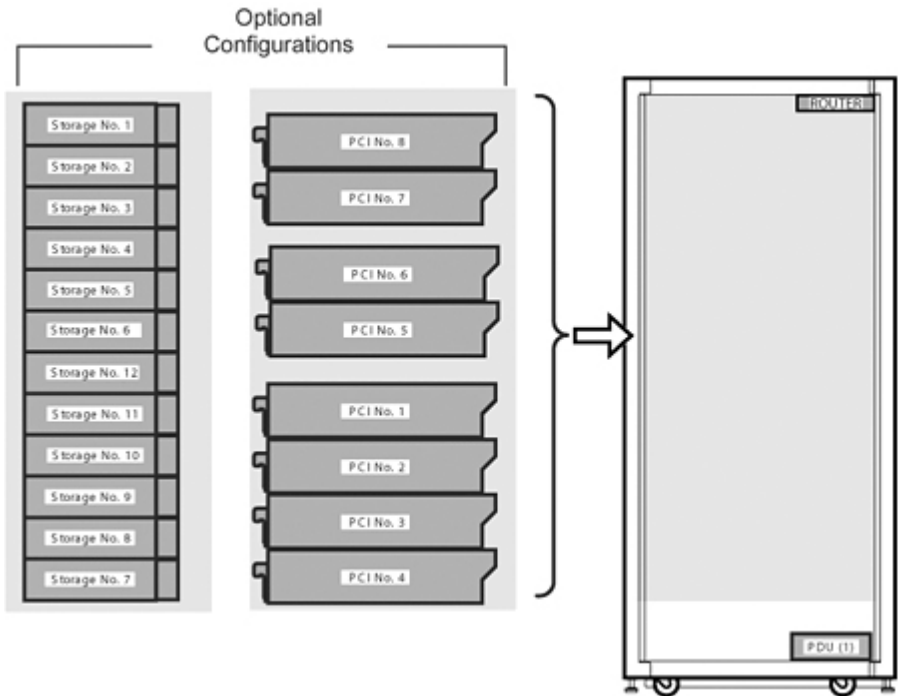
- One required for Model 8 or Model 16 systems. Second optional for Dual AC capability
 - Two required for Model 32 and Model 64 system for Dual AC capability
- North America/Japan 200 -208V, NEMA L21-30P 30A; 3 x C19 outlets plus 24 x C13 outlets
- International 380/415V Y, IEC 309 32A; 3 x C19 outlets plus 24 x C13 outlets

3X-H9A45-ZA

3X-H7606-AA

3X-H7606-AB

GS Options



Hardware Options & Peripherals, Software, and Services for AlphaServers ES47, ES80, and GS1280

At A Glance

- This section serves as a reference for selection and configuration of currently available host based adapters and controllers, peripheral storage and load devices, operating system software add-on products, and services.
- For the complete list of all supported options (both currently available and retired) plus detailed configuration guidelines, refer to "Alpha Options:" <http://h18002.www1.hp.com/alphaserver/products/options.html>

ES/GS Common Options — Contents	
Step 1	Networks and Communications — Optional
Step 2	Memory Channel — Optional
Step 3	Storage Adapters/Controllers — Optional
Step 4	StorageWorks Enclosures for Disks and Tapes — Optional
Step 5	Storage Systems — Optional
Step 6	Tape Drives — Optional
Step 7	Tape Storage Systems — Optional
Step 8	Storage Network Switches, Hubs, and Interconnects — Optional
Step 9	Keyboards, Mouse, Monitors, Power Cords — Optional
Step 10	Graphics Support — Optional
Step 11	System Software — Optional
Step 12	Hardware and Software Support Services — Optional

I/O Configuration Guidelines

Steps 1 through 10 explain how to select and configure I/O options and peripherals for AlphaServer ES47, ES80, and GS1280 Systems. All items are optional.

I/O Bus Standards for AlphaServer ES47/ES80 and AlphaServer GS1280 Systems

AlphaServer ES47/ES80 and GS1280 systems offer three types of I/O bus standards for adapters and controllers.

1. **PCI-X** — Peripheral Component Interconnect Extended is a computer bus interface standard for connecting a microprocessor and attached devices. PCI-X doubles the speed and amount of data exchanged between the computer processor and peripherals from the predecessor PCI bus. PCI-X is backwards-compatible, meaning that users can, for example, install a PCI-X card in a standard PCI slot but expect a decrease in speed to 66 MHz or 33 MHz. Users can also use both PCI and PCI-X cards on the same PCI-X bus, but the bus will run at the speed of the slowest card. PCI-X is more fault tolerant than PCI. For example, PCI-X is able to reinitialize a faulty card or take it offline before computer failure occurs.
2. **PCI** — Peripheral Component Interconnect is a computer bus interface standard for connecting a microprocessor and attached devices.
3. **AGP 4** — Accelerated Graphics Port (AGP) is an interface specification that enables 3-D graphics to display quickly. It is especially useful in conjunction with three-dimensional (3D) video, and sophisticated scientific and engineering graphics programs. AGP runs at several times the bus speed of conventional Peripheral Component Interconnect (PCI). Because of this, the data transfer rate using AGP is significantly greater than with PCI video cards. The AGP 4X mode provides high performance levels with a peak bandwidth of 1066 MB/s. AGP 4X mode is a superset to the 1X and 2X modes; thus, all components supporting AGP 4X must also support 1X and 2X modes.

ES/GS Common Options

The following table presents the matrix of maximum, theoretical I/O throughput for the different standards. Actual I/O throughput will be less than calculated because of protocol overhead and contention for bus capacity.

Calculated Maximum Throughput	32-bit data path	64-bit data path	
PCI, 33 MHz	0.133 GB/s	0.267 GB/s	
PCI or PCI-X, 66 MHz	0.267 GB/s	0.533 GB/s	
PCI-X, 100 MHz	N/A	0.8 GB/s	
PCI-X, 133 MHz	N/A	1.067 GB/s	
Calculated Maximum Throughput	1X	2X	4X
AGP	0.133 GB/s	0.267 GB/s	1.067 GB/s

Overall System Capacities for I/O Adapters and Controllers

	ES47 Tower or Workstation	ES47	ES80	GS1280
Maximum Hard Partitions per system	1	2	4	32
Maximum Quantity Tested & Supported				
	per system	per system	per system	per hard partition: per system
Maximum 2P Building Block Drawers per System	1	2	4	N/A
PCI-X/PCI slots in 2P Drawers	5	10	20	N/A
133-MHz PCI-X/PCI slots in 2P Drawers		2	4	N/A
AGP slots in 2P Drawers	1	2	4	N/A
Maximum External I/O Connections	0	2	4	32 : 64
Maximum Standard I/O Drawers (One I/O connection per drawer)	0	2	4	32 : 64
PCI-X/PCI slots in Standard I/O Drawers		18	36	288 : 576
5V PCI slots in Standard I/O Drawers		4	8	64 : 128
AGP slots in Standard I/O Drawers		2	4	32 : 64
Maximum High Performance I/O Drawers (One I/O connection per drawer)	0	2	4	32 : 64
Maximum High Performance I/O Drawers (Four I/O connections per drawer)	0	1	1	8 : 16
133-MHz PCI-X/PCI slots in High Performance I/O Drawers		4	8	64 : 128
Total Slots	per system	per system	per system	per hard partition: per system
PCI-X/PCI slots	5	28	56	288 : 576
133-MHz PCI-X/PCI slots	1	4	8	32 : 128
5V PCI slots		4	8	32 : 64
AGP slots	1	4	8	32 : 64

ES/GS Common Options

Maximum Possible Slots (PCI-X/PCI plus 5V PCI plus AGP slots)	6	36	72	384 : 768
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I/O for Two-processor System Building Block Drawer used in ES47 and ES80 Systems

- For PCI-X capable slots:
 - All universal or 3.3V PCI and PCI-X cards are supported,
 - EXCEPT: UltraSCSI wide differential adapter, 32-bit/33-MHz PCI adapter (3X-KZPBA-CC)
 - PCI-X protocol is used on the bus, but reverts to PCI protocol in these cases:
 - When one or more PCI cards are in a bus segment
 - Gigabit Ethernet, Rev A (DEGXA-SA/TA) is in the bus segment
- An I/O bus segment will operate at the least common denominator of the adapters installed or the lower speeds dictated by bus loading (as shown in the tables), whichever is less.
- The PCI-X card slots must be populated contiguously starting with slot 1; otherwise the bus will run at 33 MHz PCI.

2P Building Block Drawer Slot Specifications

Port (Bus) #	Slot #	Maximum Bus Speed	Signal Voltage	Bus Loading, Adapters Installed (contiguously starting with Slot 1)	Max Bus Speed
0	1	133 MHz	3.3V	1 PCI 1 PCI-X	66 MHz 133 MHz
1	1	66 MHz	3.3V	1 or 2 PCI 3 or 4 PCI 1 to 4 PCI-X	66 MHz 50 MHz 66 MHz
	2	66 MHz	3.3V		
	3	66 MHz	3.3V		
	4	66 MHz	3.3V		
3	1	4X AGP	1.5V	1 AGP	4X

Standard I/O Drawer used in ES47, ES80, and GS1280 Systems

- For PCI-X capable slots:
 - All universal or 3.3V PCI and PCI-X cards are supported,
 - EXCEPT: UltraSCSI wide differential adapter, 32-bit/33-MHz PCI adapter (3X-KZPBA-CC)
 - PCI-X protocol is used on the bus, but reverts to PCI protocol in these cases:
 - When one or more PCI cards are in a bus segment
 - With more than five (5) cards in a bus segment
 - Gigabit Ethernet, Rev A (DEGXA-SA/TA) is in the bus segment
- PCI 5V slots support ONLY:
 - For cluster support, CI host bus adapter (CIPCA-BA)
 - A legacy UltraSCSI wide differential adapter 32-bit/33-MHz PCI adapter (3X-KZPBA-CC)
- An I/O bus segment will operate at the least common denominator of the adapters installed or the lower speeds dictated by bus loading (as shown in the tables), whichever is less.
- The PCI-X card slots must be populated contiguously starting with slot 1; otherwise the bus will run at 33-MHz PCI.

Standard I/O Building Block Drawer Slot Specifications

Port (Bus) #	Slot #	Maximum Bus Speed	Signal Voltage	Bus Loading, Adapters Installed (contiguously starting with Slot 1)	Max Bus Speed
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ES/GS Common Options

0	1	100 MHz	3.3V	1 PCI 1 PCI-X 2 or 3 PCI (1) (slots 2 and 3 are keyed 5V)	66 MHz 100 MHz 33 MHz
	2	33 MHz	5.0V		
	3	33 MHz	5.0V		
1	1	133 MHz	3.3V	1 PCI-X 2 PCI-X 1 or 2 PCI	133 MHz 100 MHz 66 MHz
	2	133 MHz	3.3V		
2	1	66 MHz	3.3V	1 to 3 PCI (2) 4 or 5 PCI 6 PCI 1 to 5 PCI-X 6 PCI-X	66 MHz 50 MHz 33 MHz 66 MHz 33 MHz
	2	66 MHz	3.3V		
	3	66 MHz	3.3V		
	4	66 MHz	3.3V		
	5	66 MHz	3.3V		
	6	66 MHz	3.3V		
3	1	4X AGP	1.5V	1 AGP	4X

1. Modules designed for 3.3V signaling and 66-MHz bus speed cannot operate in Port 0 – slots 2 and 3.

2. In Port 2 of a Standard I/O Drawer, if PBXGG-AA (RADEON PCI Graphics adapter) is installed together with another card instead of 66 MHz, the bus will run at 50 MHz maximum. If RADEON is alone in slot 1, the bus will run at 66 MHz.

High Performance I/O Drawer used in ES47, ES80, and GS1280 Systems

- All universal or 3.3V PCI and PCI-X cards are supported, EXCEPT: UltraSCSI wide differential adapter, 32-bit/33-MHz PCI adapter (3X-KZPBA-CC)
- PCI-X protocol is used on the bus, but reverts to PCI protocol in these cases:
 - When a PCI card is in the slot
 - When Gigabit Ethernet, Rev A (DEGXA-SA/TA) is in the slot

High-performance I/O Drawer slots specifications:

I/O Connection to EV7 Processor	Port (Bus) #	Slot #	Maximum Bus Speed	Signal Voltage	Bus Loading, Adapters Installed (contiguously starting with Slot 1)	Max Bus Speed
0	1	Slot 1	133 MHz	3.3V	For each slot 1 PCI 1 PCI-X	66 MHz 133 MHz
0	2	Slot 1	133 MHz	3.3V		
1	1	Slot 1	133 MHz	3.3V		
1	2	Slot 1	133 MHz	3.3V		
2	1	Slot 1	133 MHz	3.3V		
2	2	Slot 1	133 MHz	3.3V		
3	1	Slot 1	133 MHz	3.3V		
3	2	Slot 1	133 MHz	3.3V		

Rack Specifications and Rackmount Kits

High-performance I/O Drawer slots specifications:

HP Racks	H9A10	H9A15	9142	10642	H9A45-ZA	H9A45-ZD
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ES/GS Common Options

	M-series	M-series	Series 9000	Series 10000	For GS1280 (includes Operator Control Panel (OCP))	For ES47/80 (no OCP)
Vertical Rack Capacity	59.5"	71.75"	73.5"	73.5"	71.75"	71.75"
(1.75" per Rack Unit)	34U	41U	42U	42U	41U	41U
Rail Spacing	19 inch	19 inch	19 inch	19 inch	19 inch	19 inch
(side-to-side)	RETMA	RETMA	RETMA	RETMA	RETMA	RETMA
Rail Spacing	25 inches	25 inches	29 inches	29 inches	29 inches	29 inches
(front-to-back)						
Hole Pattern	0.281" Round	0.281" Round	Euro-Square	Euro-Square	Euro-Square	Euro-Square
	RETMA	RETMA	RETMA	RETMA	RETMA	RETMA
Max Payload (spec'd)	1000 lbs	1000 lbs	1200 lbs	1600 lbs	1600 lbs	1600 lbs
(equipment weight only, dynamic)	454 kg	454 kg	544 kg	720 kg	720 kg	720 kg
Height	66.9"	78.7"	78.7"	78.7"	78.7"	78.7"
(external dim w/o packaging)	1700 mm	2 meters	2 meters	2 meters	2 meters	2 meters
Width	23.6"	23.6"	23.7"	23.7"	23.6"	23.6"
(external dim w/o packaging)	600 mm	600 mm	603 mm	603 mm	600 mm	603 mm
Depth w/o Extender	36.1"	36.1"	35.8"	39.7"	NA	39.4"
(external dim w/o packaging)	916 mm	916 mm	909 mm	1009 mm		1000 mm
Depth w Rear Extender	41.5"	41.5"	39.7"	Not Available	48.1"	Optional
(external dim w/o packaging)	1054 mm	1054 mm	1009 mm		1222 mm	
Useable Depth	31.7"	31.7"	30"	35.25"	40.25"	32.25"
(front rail to back door)	804 mm	804 mm	762 mm	895 mm	1022 mm	819 mm
Usable Depth w/Extender	37.1"	37.1"	33.9"	NA	NA	40.25
(front rail to back door)	943 mm	943 mm	862 mm			1022 mm
Side Panels	Standard	Standard	Standard	Standard	Standard	Standard
Stabilizer	Single Deployable	Dual Deployable	Single Deployable	Single Deployable	Heavy duty Deployable	None
Top Cover	Vented	Vented	Vented	Vented	Vented	Vented
Rear Door	Standard w/Lock	Standard w/Lock	Standard	Split	Standard w/Lock	Standard w/Lock
			Short w/Lock	Long door w/Lock		
Front Door	Optional	Optional	Standard	Standard	Standard	Standard
	Kit w/Lock	Kit w/Lock	w/Lock	w/Lock	w/Lock	w/Lock
Front Trim Kit	Required if no Front Door	Required if no Front Door	Standard w/Lock	Not Available	Not Available	Not Available
PDU's	Standard	Standard	Optional	Optional	Optional	Optional
Joiner Kit (aka Baying Kit)	Optional	Optional	Optional	Optional	NA	NA

ES/GS Common Options

Shipping Height	76.4"	84.4"	84.4"	86.22"	84.75"	84.75"
(external dim with packaging)	1940 mm	2144 mm	2144 mm	2190 mm	2153 mm	2153 mm
Shipping Width	36"	36"	36"	32"	43.1"	43.1"
(external dim with packaging)	914 mm	914 mm	914 mm	812.8 mm	1096 mm	1096 mm
Shipping Depth	53.75"	53.75"	48"	48"	48"	48"
(external dim with packaging)	1366 mm	1366 mm	1219 mm	1219 mm	1219 mm	1219 mm
Shipping Weight	325 lbs	355 lbs	445 lbs	284 lbs	570 lbs	570 lbs
(empty cab with full packaging)	147 kg	161 kg	202 kg	129 kg	259 kg	259 kg
RACKMOUNT KITS						
DS15	3X-PBX01-DA	3X-PBX01-DA	3X-PBX01-DB	3X-PBX01-DB	3X-PBX01-DB ¹	3X-PBX01-DB ¹
DS25	3X-BA57R-RA	3X-BA57R-RA	3X-BA57R-RC	3X-BA57R-RC	3X-BA57R-RC ¹	3X-BA57R-RC ¹
ES45	BA61R-CR	BA61R-CR	3X-BA61R-RD	3X-BA61R-RD	3X-BA61R-RD ¹	3X-BA61R-RD ¹
ES47	Not Supported	Not Supported	Not Supported	CK-BA60B-AR	Included	Included
ES80	Not Supported	Not Supported	Not Supported	CK-BA60B-AR	Included	Included
Mem. Channel 2	3X-BA61R-MC	3X-BA61R-MC	3X-BA61R-MD	3X-BA61R-MD	3X-BA61R-MD	3X-BA61R-MD
3U LVD enclosure	3R-A3804-AA	3R-A3804-AA	Included	Included	Included	Included
5U LVD/MSL5000 enclosure	254795-001	254795-001	Included	Included	Included	Included
StorageWorks 4315/4354	Included	Included	Included	Included	Included	Included
MSA30/MSA1000	3R-A5281-AA	3R-A5281-AA	Standard	Standard	Standard	Standard

NOTES:

1. Fits mechanically, but HP will not install system in the rack at the factory unless optional integration services are purchased.
2. System/E racks are not configurable with AlphaServers.

Step 1 - Networks and Communications

Step 1a - Ethernet — Optional

NOTE: If an Ethernet NIC is not selected, at least one I/O slot in the system must remain open for connection of the system to the factory test network.

ES/GS Common Options

Description	Device Type	Part Number	Maximum Quantity Tested & Supported			
			U=Tru64 UNIX O=OpenVMS L=Redhat V7.2 Linux			
			per system	per hard partition: per system		
			ES47 Tower Workstation	ES47	ES80	GS1280
Ethernet Network Interface Cards						
Gigabit Ethernet NIC, Twisted-Pair Copper with single-port RJ45, 10/100/1000 Mbps Use BN25G, BN26M, BN24Q, BN28Q, or equivalent cables with RJ45 connectors.	PCI-X 3.3V, 64 b, 133 MHz	3X-DEGXA-TR	5/U 5/O 1/L	16:28/U 16:28/O 1:2L	16:56/U 16:56/O 1:4/L	16:512/U 16:512/O
Gigabit Ethernet NIC, Fiber with duplex-SC connectors, 1000 Mbps only. Use BN34B, or equivalent cables with SC connectors.	PCI-X 3.3V, 64 b, 133 MHz	3X-DEGXA-SR	5/U 5/O 1/L	16:28/U 16:28/O 1:2L	16:56/U 16:56/O 1:4/L	16:512/U 16:512/O
10/100 Ethernet (dual-port UTP/RJ45s) NIC and Base Module. Use BN25G, BN26M, BN24Q, or BN28Q twisted pair RJ45 cables. (Optional, add-on daughter cards 3X-DE602-TR or 3X-DE602-FR)	PCI 3.3V, 64 b, 66 MHz	3X-DE602-BR	5/U 5/O 1/L	8:16/U 8:16/O 1:2L	8:32/U 8:32/O 1:4/L	8:256/U 8:256/O
10/100 Ethernet (dual-port UTP/RJ45s) add-on to 3X-DE602-BR only. Total of four ports for combined 3X-DE602-BR and 3X-DE602-TR modules. Use BN25G, BN26M, BN24Q, BN28Q, or equivalent cables with RJ45 connectors. NOTE: 3X-DE602-TR cannot be used standalone.		3X-DE602-TR				
Single-port 100 Mbps (MMF/duplex-SC) add-on daughter card for use with the 3X-DE602-BR. Combined 3X-DE602-BR and 3X-DE602-FR provides two 10/100 (UTP/RJ45s) and one 100Mbps (MMF/SC) ports. Use BN34B cables. NOTE: 3X-DE602-FR cannot be used standalone.		3X-DE602-FR				

Step 1b - Networks and Communications — Optional

ES/GS Common Options

Description	Device Type	Part Number	Maximum Quantity Tested & Supported			
			U=Tru64 UNIX O=OpenVMS L=Redhat V7.2 Linux			
			per system	per hard partition: per system		
			ES47 Tower Workstation	ES47	ES80	GS1280
Synchronous Communications Network Interface Cards						
Dual-port Intelligent Synchronous Communications NIC; requires one or two BC3xx sync cables.	PCI 3.3V, 32 b, 33 MHz	3X-PBXDD-AA	4/U 4/O	4:8/U 4:8/O	4:16/U 4:16/O	4:128/U 4:128/O
Quad-port Intelligent Synchronous Communications NIC; requires one to four BC3xx sync cables.	PCI 3.3V, 32 b, 33 MHz	3X-PBXDD-AB	4/U 4/O	4:8/U 4:8/O	4:16/U 4:16/O	4:128/U 4:128/O
Asynchronous Communications Network Interface Cards						
4-port Async Communications NIC with DB-25 cable	PCI 3.3V, 32 b, 33 MHz	PBXDA-BA	2/U 2/O	2:4/U 2:4/O	2:8/U 2:8/O	2:64/U 2:64/O
8-port Async Communications NIC	PCI 3.3V, 32 b, 33 MHz	PBXDA-BB	2/U 2/O	2:4/U 2:4/O	2:8/U 2:8/O	2:64/U 2:64/O
16-port Async Communications Controller and rackmount 16-port distribution box with RJ45 connectors	PCI 3.3V, 32 b, 33 MHz	PBXDA-AC	2/U 2/O	2:4/U 2:4/O	2:8/U 2:8/O	2:64/U 2:64/O

Cables for Ethernet, ATM, Synchronous, and Asynchronous Network Interface Cards

Multimode fiber optic (MMF) 62.5/125um duplex cable, with SC-to-SC connectors. xx = 2E, 4E, 01, 03, 10, 20, 30 for 2.4, 4.5, 1, 3, 10, 20, and 30 meters	BN34B-xx
Category 5e (4-Unshielded Twisted Pairs / UTP) straight-through cable with RJ45-to-RJ45 connectors for system to switch, repeater, or hub connectivity. xx = 0B, 0E, 01, 03, 04, 07 for 0.2, 0.5, 1, 3, 4, and 7 meters	BN25G-xx
Category 5e (4-Twisted Pairs, Screened/ ScTP) straight-through cable with RJ45-to-RJ45 connectors for system to switch, repeater, or hub connectivity. xx = 0B, 0E, 01, 03, 04, 07 for 0.2, 0.5, 1, 3, 4, and 7 meters	BN26M-xx
Category 5e (4-Unshielded Twisted Pairs / UTP) Xover cable with RJ45-to-RJ45 connectors for system to switch, repeater, or hub connectivity. xx = 0E, 01, 03, 04, 07 for 0.5, 1, 3, 4, and 7 meters	BN24Q-xx
Category 5e (4-Twisted Pairs, Screened / ScTP) Xover cable with RJ45-to-RJ45 connectors for system to switch, repeater, or hub connectivity. xx = 0E, 01, 03, 04, 07 for 0.5, 1, 3, 4, and 7 meters	BN28Q-xx
EIA-530 Single-port synchronous cable	3X-BC34G-06
V.24/EIA-232 Single-port synchronous cable	3X-BC34L-06
V.11/x.21 Single-port synchronous cable	3X-BC33S-06
V.35 Single-port synchronous cable	3X-BC34T-06
RJ45-to-DB-25 Asynchronous Converter Cable	CXI01-AC

ES/GS Common Options

Step 2 - MEMORY CHANNEL — Optional

Configuration Guidelines

1. Each Memory Channel adapter must be the only device on the PCI/PCI-X bus segment.
2. Two-node clusters can be configured by ordering one adapter (CCMAB-BA) for each node and one cable (BN39B-04 or BN39B-10) between the two systems.
3. For a two-node cluster that will not need to be rebooted when adding additional members, order one adapter (CCMAB-BA) and one cable (BN39B-04 or BN39B-10) for each node plus one hub (CCMHB-AA) for the cluster.
4. For three or four node clusters, order one adapter (CCMAB-BA) and one cable (BN39B-04 or BN39B-10) for each node and one hub (CCMHB-AA) for the cluster.
5. The hub (CCMHB-AA) includes four line cards and supports up to four nodes; expansion up to eight system nodes can be achieved by adding up to four line cards (CCMLB-AA).
6. If two adapters (CCMAB-BA) are configured in each system, a second hub (CCMHB-AA) is required.
7. If nodes must be separated by a distance longer than standard copper cables allow, the CCMFB option converts the output of the standard controller or line card to single-mode fiber optic cable. The fiber optic connection may be up to 2,000 meters long between two controllers connected in virtual hub mode, or 3,000 meters between a controller and a hub. (The connection from the hub to a second system may also be 3,000 meters.) The CCMFB option requires a second PCI slot in the system from which it draws power only. It is normally connected to the corresponding controller with the short cable, BN39B-01. The CCMFB option is also used in the hub where it occupies a slot normally used by a line card, limiting expansion to four radial fiber optic connections.
8. The hub expansion box (CCMHB-BA) provides additional slots for up to eight fiber optic connections. Two standard length single-mode fiber optic cables are available (BN34R-10 and BN34R-31); however, users normally provide this fiber optic connection. Fiber optic connectivity is completely transparent to the systems using it and has no performance impact

Description	Device Type	Part Number	Maximum Quantity Tested & Supported			
			U=Tru64 UNIX O=OpenVMS L=Redhat V7.2 Linux			
			per system	per hard partition: per system		
			ES47 Tower Workstation	ES47	ES80	GS1280
Memory Channel Adapter						
Memory Channel Adapter	PCI 5.0/3.3V, 32 b, 33 MHz	CCMAB-BA	2/U 2/O	2:4/U 2:4/O	2:8/U 2:8/O	2:64/U 2:64/O
Copper-to-single mode fiber optic converter	PCI 5.0/3.3V, 32 b, 33 MHz	CCMFB-BA	2/U 2/O	2:4/U 2:4/O	2:8/U 2:8/O	2:64/U 2:64/O

ES/GS Common Options

Infrastructure for Memory Channel	System Area Network Hub with four line cards; includes BN19P-1K` power cord for Canada, Japan, and U.S. For other regions, order appropriate power cord from list that follows.	CCMHB-AA
	Hub expansion box with no line cards	CCMHB-BA
	Expansion line card for CCMHB hub	CCMLB-AA
	1-meter cable for CCMAAB and CCMHB	BN39B-01
	4-meter cable for CCMAAB and CCMHB	BN39B-04
	7-meter cable for CCMAAB and CCMHB	BN39B-07
	10-meter cable for CCMAAB and CCMHB	BN39B-10
	Rackmount kit (3U) for CCMHB (Memory Channel Hub II); required for mounting in H9A40/H9A45 Cabinets and Series 10000 Racks.	3X-BA61R-MD
	Power cord for rackmount CCMHB hub	BN35S-02
Country-specific Power Cords for Standalone MEMORY CHANNEL Hubs	Australia, New Zealand	3R-A6023-AA
	Central Europe	BN19C-2E
	Denmark	BN19K-2E
	Egypt, India	BN19S-2E
	Ireland, United Kingdom	BN19A-2E
	Israel	3R-A6883-AA
	Italy	BN19M-2E
	Japan, 2.5-meter, Dentori approved	3X-BN46F-02
	Switzerland	BN19E-2E

Step 3 - Storage Adapters/Controllers — Optional

Description	Device Type	Part Number	Maximum Quantity Tested & Supported			
			U=Tru64 UNIX O=OpenVMS L=Redhat V7.2 Linux			
			per system	per hard partition: per system		
			ES47 Tower Workstation	ES47	ES80	GS1280
SCSI Adapters						
Ultra3 (LVD) SCSI adapter, dual-channel. Requires 3X-BC56J-xx cable. Restrictions: HSZxx RAID controllers not supported; Tru64 UNIX requires a graphics adapter to run console utilities (RUN BIOS).	PCI, 3.3V, 64b, 66 MHz	3X-KZPEA-DB	5/U 5/O 1/L Shared Bus 5/U 0/O	28:28/U 12:24/O 1:2/L Shared Bus 6:12/U 0/O	32:56/U 12:48/O 1:4/L Shared Bus 6:24/U 0/O	32:576/U 12:384/O 0/L Shared Bus 6:192/U 0/O
Ultra2 (LVD) SCSI adapter, single-channel. Requires BN38C-xx cable. Restrictions: HSZxx RAID controllers not supported. No support for shared SCSI.	PCI, 3.3V, 32b, 33 MHz	3X-KZPCA-AA	5/U 5/O 1/L	8:16/U 8:16/O 1:2/L	8:32/U 8:32/O 1:4/L	8:256/U 8:256/O 0/L

ES/GS Common Options

Backplane RAID SCSI Controllers						
U320 LVD SCSI Backplane Raid Controller, 64 bit, 2 Channel	PCI-X, 3.3V, 64b 133 MHz	3X-KZPEC-BF	5/O	8:16/O	8:32/O	8:256/O
U320 LVD SCSI Backplane Raid Controller, 64 bit, 4 Channel	PCI-X, 3.3V, 64b 133 MHz	3X-KZPEC-DG	5/O	8:16/O	8:32/O	8:256/O
Ultra3 SCSI, 2-channel, RAID controller	PCI, 3.3V, 64b, 66 MHz	3X-KZPDC-BE	5/U 5/O 1/L	8:16/U 8:16/O 1:2/L	8:32/U 8:32/O 1:4/L	8:256/U 8:256/O 0/L
Ultra3 SCSI, 4-channel, RAID controller	PCI, 3.3V, 64b, 66 MHz	3X-KZPDC-DF	5/U 5/O 1/L	8:16/U 8:16/O 1:2/L	8:32/U 8:32/O 1:4/L	8:256/U 8:256/O 0/L

Cables for SCSI and Backplane RAID Controllers

Ultra3 SCSI cable, VHDCI to VHDCI; xx = 02, 03, 04, meters

3X-BC56J-xx

Ultra2 SCSI 68-pin HD male-to-VHDCI male cable; xx = 02, 03, 05, 10, 20 meters

BN38C-xx

Description	Device Type	Part Number	Maximum Quantity Tested & Supported			
			U=Tru64 UNIX O=OpenVMS L=Redhat V7.2 Linux			
			per system	per hard partition: per system		
			ES47 Tower Workstation	ES47	ES80	GS1280
Fibre Channel Controllers						
2-Gbit Fibre Channel Adapter, single channel, PCI-X LP10000, FCA2684	PCI-X, 3.3V, 64b, 133 MHz	DS-A5132-AA	5/U 5/O	28:28/U 26:28/O	56:56/U 26:56/O	64:576/U 26:576/O
2-Gbit Fibre Channel Adapter, dual channel, PCI-X LP10000, FCA2684DC	PCI-X, 3.3V, 64b, 133 MHz	DS-A5134-AA	5/U 5/O	28:28/U 13:26/O	32:56/U 13:56/O	32:576/U 13:416/O
CIPCA Adapter						
Computer Interconnect (CI) adapter; each CI adapter requires a Standard I/O Building Block Drawer with 5V PCI slots.	PCI, 5V, 32b, 33 MHz, two slots	CIPCA-BA		2:2/O	4:4/O	12:64/O

Cables for Fibre Channel Fibre Channel SC-SC cables (BNGBX-xx); xx=02, 03, 05, 10, 15, 30, 50 meters

BNGBX-xx

ES/GS Common Options

Cross Connect Table	SCSI Ultra3 LVD	SCSI Ultra2 LVD	Ultra3 SCSI Backplane RAID, 2 or 4 channel	U320 LVD SCSI Backplane RAID, 2 or 4 channel
	3X-KZPEA-DB	3X-KZPCA-AA	3X-KZPDC-BE/DF	3X-KZPEC-BF/DG
MSA30 Rack Disk & Tape Drive Enclosure	Yes	Yes	Yes	Yes
4300 Rack Disk & Tape Drive Enclosure	Yes	Yes	Yes	Yes
1U Rackmount Tape Drive Enclosure	Yes	Yes	no	no
3U Rackmount Tape Drive Enclosure	Yes	Yes	no	no
MSA1000 Storage System	no	no	no	no
HP StorageWorks Enterprise Virtual Arrays; EVA3000; EVA4000; EVA6000; EVA8000	no	no	no	no
HP StorageWorks Disk Arrays; xp10000; xp12000	no	no	no	no
DAT Tape Drives; 40; 72	Yes	Yes	no	no
DLT VS Tape Drives; 160	Yes	Yes	no	no
Ultrium LTO Tape Drives; 232; 448; 460; 960	Yes	Yes	no	no
SDLT Tape Drives; 320; 600	Yes	Yes	no	no
DAT 72x6 Autoloader	Yes	Yes	no	no
1/8 Autoloader; SDLT 320; Ultrium 232; 448; 960	Yes	Yes	no	no
MSL5000 Tape Libraries	Yes	Yes	no	no
MSL6000 Tape Libraries	Yes	Yes	no	no
ESL9000 Series Tape Libraries	Yes	Yes	no	no
ESL E-Series Tape Libraries	Yes	Yes	no	no

Cross Connect Table	2-Gbit Fibre Channel Adapter, single channel, PCI-X LP10000, FCA2684	2-Gbit Fibre Channel Adapter, dual channel, PCI-X LP10000, FCA2684DC
	DS-A5132-AA	DS-A5134-AA
MSA30 Rack Disk & Tape Drive Enclosure	no	no
4300 Rack Disk & Tape Drive Enclosure	no	no
1U Rackmount Tape Drive Enclosure	no	no
3U Rackmount Tape Drive Enclosure	no	no
MSA1000 Storage System	Yes ¹	Yes ¹
HP StorageWorks Enterprise Virtual Arrays; EVA3000; EVA4000; EVA6000; EVA8000	Yes ¹	Yes ¹
HP StorageWorks Disk Arrays; xp10000; xp12000	Yes ¹	Yes ¹
DAT Tape Drives; 40; 72	Yes ¹	Yes ¹
DLT VS Tape Drives; 160	Yes ¹	Yes ¹
Ultrium LTD Tape Drives; 232; 448; 460; 960	Yes ¹	Yes ¹
SDLT Tape Drives; 320; 600	Yes ¹	Yes ¹

ES/GS Common Options

DAT 72x6 Autoloader	Yes ¹	Yes ¹
1/8 Autoloader; SDLT320; Ultrium 232; 448; 960	Yes ¹	Yes ¹
MSL5000 Tape Libraries	Yes ¹	Yes ¹
MSL6000 Tape Libraries	Yes ¹	Yes ¹
ESL9000 Series Tape Libraries	no	no
ESL E-Series Tape Libraries	no	no

NOTE 1: Fibre Channel connection to a SCSI tape device requires a Network Storage Router (NSR) (see Step 8) in a Storage Area Network (SAN).

Step 4 – StorageWorks Enclosures for Disks and Tapes — Optional

HP StorageWorks Modular Smart Array 30 Enclosure (formerly known as HP StorageWorks 4400 Enclosure)

The HP StorageWorks Modular Smart Array 30 (MSA30) Enclosure is an Ultra320 SCSI disk drive storage enclosure. The drive carrier is designed to support Ultra320, Ultra3, and Ultra2 hard drives; and DAT tape drives on the same SCSI bus. StorageWorks 4200 or StorageWorks 4300 may be upgraded to the MSA30.

See **HP StorageWorks Modular Smart Array 30 Enclosure QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11738_div/11738_div.HTML

See **HP StorageWorks Modular Smart Array 30 Multi-Initiator Enclosure QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11967_div/11967_div.html

Model MSA30, Single-bus Rackmount, 14-drive enclosure with single bus, dual power supplies 3R-A4075-AA

Model MSA30, Dual-bus Rackmount, 14-drive enclosure with dual bus, dual power supplies 3R-A4076-AA
NOTE: Not supported for shared bus operation.

Model MSA30 Multi-Initiator (Shared) Rackmount, 14-drive enclosure with dual bus, multi-initiator shared access, and dual power supplies . 359645-B21
NOTE: Use SCSI Ultra3 LVD host adapter (3X-KZPEA-DB) for shared bus operation.

HP StorageWorks 4300 Enclosure

The HP StorageWorks Enclosure 4300 is an Ultra3 SCSI disk drive storage enclosure. The drive carrier is designed to support Ultra3 and Ultra2 hard drives and DAT Tape Drives on the same SCSI bus.

See **HP StorageWorks 4300 Enclosure QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/10624_div/10624_div.HTML

NOTE: The depth of a 4300 shelf does not allow front and rear mounting.

Model 4314R Rackmountable 14-drive enclosure with single bus, single power supply DS-SL13R-Ax

Model 4354R Rackmountable 14-drive enclosure with dual bus, dual power supplies DS-SL13R-Bx

ES/GS Common Options

HP StorageWorks Rackmount Tape Drive Enclosures

The 1U and 3U Rackmount Kits are rackmount tape drive enclosures for direct-attach SCSI backup and archiving applications. See **HP StorageWorks Rack-Mount Tape Drive Kits QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/10854_div/10854_div.HTML

1U Rackmount Tape Drive Enclosure	- Supports up to two internal half-height devices including: DAT 40, and DAT 72 Tape Drives - DLT VS160 Tape Drives - Ultrium 232 and 448 Tape Drives	A7445B
3U Rackmount Tape Drive Enclosure	Wide SCSI LVD rackmount enclosure. Supports up to two internal, full-height or four internal, half-height devices including: - DAT 40, and DAT 72 Tape Drives - DAT 72x6 Tape Autoloader - DLT VS160 Tape Drives - SDLT 320, SDLT 600 Tape Drives - Ultrium 232, 448, 460, and 960 Tape Drives	274338-B22

HP SCSI Ultra320 Hard Disk Drives (for use in MSA30 and StorageWorks 4300 Enclosures)

See **HP SCSI Ultra320 Hard Drive Option Kits QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11531_div/11531_div.HTML

300-GB Pluggable Ultra320 SCSI 10,000 rpm Hard Drive	3R-A4952-AA
146.8-GB Pluggable Ultra320 SCSI 10,000 rpm Hard Drive	3R-A3841-AA
72.8-GB Pluggable Ultra320 SCSI 10,000 rpm Hard Drive	3R-A3839-AA
36.4-GB Pluggable Ultra320 SCSI 10,000 rpm Hard Drive	3R-A3838-AA
146.8-GB Pluggable Ultra320 SCSI 15,000 rpm Hard Drive	3R-A4945-AA
72.8-GB Pluggable Ultra320 SCSI 15,000 rpm Hard Drive	3R-A3848-AA
36.4-GB Pluggable Ultra320 SCSI 15,000 rpm Hard Drive	3R-A3849-AA
18.2-GB Pluggable Ultra320 SCSI 15,000 rpm Hard Drive	3R-A3851-AA

DAT Tape Drives

The HP StorageWorks DAT Tape Drives are an entry-level solution for small to medium server storage backup needs. The DAT Tape Drives have backwards compatibility with previous DDS technologies.

See **HP StorageWorks DAT Drives QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11883_div/11883_div.HTML

DAT Hot-Plug Tape Drives (for use in MSA30 and StorageWorks 4300)	DAT 40-GB hot-plug LVD tape drive (Q1546A), uses two Universal storage device slots	3R-A4745-AA
	DAT 72-GB hot-plug LVD tape drive (Q1529A), uses two Universal storage device slots	3R-A4547-AA
DAT Internal Tape Drives (for use in Rackmount Tape Drive Enclosures)	40-GB capacity, DAT 40h, Internal Tape Drive, half-height device (carbon)	3R-A6831-AA or C5686C
	72-GB capacity, DAT 72h, Internal Tape Drive, half-height device (carbon)	3R-A6663-AA or Q1522B

ES/GS Common Options

HP StorageWorks SDLT Tape Drive Family (for use in Rackmount Tape Drive Enclosures)

The HP StorageWorks SDLT Tape Drive is a high-capacity, high-performance streaming tape drive. The HP StorageWorks SDLT 220-GB Tape Drive is backward read compatible with DLT Type IV media. The SDLT 320 offers the same backward-read compatibility to current DLT tape drives as the SDLT 220, and is also write-compatible with the SDLT 220 and utilizes the same DLT1 media and cleaning cartridge. The SDLT 600 offers backward-read compatibility to the DLT VS 160 and to the SDLT 320 and SDLT 220.

See **HP StorageWorks SDLT Tape Drive Family QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11840_div/11840_div.HTML

SDLT Tape Drives	320-GB tape drive, full-height device	257319-B21
	600-GB tape drive, full-height device	A7518B

HP StorageWorks DLT VS Family Tape Drives (for use in Rackmount Tape Drive Enclosures)

The HP StorageWorks DLT VS Tape Drives utilize industry standard DLT Type IV Media. DLT VS Tape Drives offer backward-read compatibility with media previously written in the DLT 40 format. The DLT VS drives are also read and write compatible with data protection solutions utilizing the HP StorageWorks DLT1 Tape Drive, such as the HP StorageWorks DLT1 1280 SuperLoader, and can be read by the HP StorageWorks SDLT 220 and 320 Tape Drives.

See **HP StorageWorks DLT VS Family Tape Drive QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11403_div/11403_div.HTML

DLT VS160 Tape Drive	160-GB DLT Tape Drive, Internal, full-height, (carbon), Worldwide	A7569B
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HP StorageWorks Ultrium LTO Tape Drives (for use in Rackmount Tape Drive Enclosures)

HP StorageWorks Ultrium tape drives are based on LTO Ultrium format, an open standard with a well-defined four-generation roadmap.

See **HP StorageWorks Ultrium Full-Height Tape Drives QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11739_div/11739_div.HTML

See **HP StorageWorks Ultrium Half-Height Tape Drives QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/12128_div/12128_div.HTML

Ultrium 232 Tape Drive	200-GB capacity LTO tape drive, internal, half-height device	DW064A
Ultrium 448 Tape Drive	400-GB capacity LTO tape drive, internal, half-height device	DW016A
Ultrium 460 Tape Drive	400-GB capacity LTO tape drive, internal, full height device	Q1518B
Ultrium 960 Tape Drive	800-GB capacity LTO tape drive, internal, full-height device	Q1538A

ES/GS Common Options

Step 5 – Storage Systems — Optional

HP StorageWorks Modular Smart Array 1000

The HP StorageWorks Modular Smart Array 1000 is a 2-Gb Fibre Channel storage system designed for the entry-level to mid-range Storage Area Network (SAN). The MSA1000 combines the array controller shelf and the drive shelf, which holds up to 14 universal disk drives in a single 4U rackmount enclosure. More storage can be deployed with the addition of up to two drive enclosures for a maximum storage capacity of 6 TB when using the 146-GB drives. Besides the single-port 2-Gb Fibre Channel I/O module that comes standard, there is an 8-port switch that mounts internally. The MSA1000 provides Ultra3 SCSI connections to the hard drives and uses HP Universal Ultra2, Ultra3, and/or Ultra320 drives.

See **HP StorageWorks Modular Smart Array 1000 Specific for Tru64 UNIX or OpenVMS Only QuickSpecs** for configuration details: http://h18000.www1.hp.com/products/quickspecs/11621_div/11621_div.HTML

Modular Smart Array 1000 MSA1000 with 256-MB cache

201723-B22

HP StorageWorks Enterprise Virtual Array

The HP Enterprise Virtual Array storage array products have been designed for high performance, high capacity, and high availability. These products are supported by a powerful and simple suite of management software. EVA storage is designed for improved storage utilization and scalability. EVA storage offers easy capacity expansion, instantaneous replication, and simplified storage administration.

See **HP StorageWorks Enterprise Virtual Array QuickSpecs** for configuration details:

<http://h18006.www1.hp.com/products/quickspecs/Division/10418.html>

Model	EVA3000	EVA4000	EVA6000	EVA8000	EVA8000 with expansion cabinet
Drive Interface	Dual ported 2 Gb/s FC-AL	Dual ported 2 Gb/s FC-AL	Dual ported 2 Gb/s FC-AL	Dual ported 2 Gb/s FC-AL	Dual ported 2 Gb/s FC-AL
Cache per controller pair	1GB	2GB	2GB	4GB	4GB
Host ports	Two 2 Gb/s FC	Four 2 Gb/s FC	Four 2 Gb/s FC	Eight 2 Gb/s FC	Eight 2 Gb/s FC
Device ports	Two 2 Gb/s FC-AL	Four 2 Gb/s FC-AL	Four 2 Gb/s FC-AL	Eight 2 Gb/s FC-AL	Eight 2 Gb/s FC-AL
Device FC-AL switches	0	0	2	4	4
Maximum Drives per model	56	56	112	168	240
QuickSpecs	EVA3000 QuickSpec	EVA4000 QuickSpec	EVA6000 QuickSpec	EVA8000 QuickSpec	EVA8000 QuickSpec with expansion cabinet

HP StorageWorks Disk Array xp10000

The HP StorageWorks Disk Array xp10000 is an enterprise storage system that supports up to 240 Fibre Channel disk drives with up to 69 TB of capacity. The xp10000 supports up to 48 Fiber Channel (2-Gb or 4-Gb) interface connections.

See **HP StorageWorks Disk Array xp10000 Product Information** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/12275_div/12275_div.HTML

ES/GS Common Options

HP StorageWorks Disk Array xp12000

The HP StorageWorks Disk Array xp12000 is an enterprise storage system that supports up to 1152 Fibre Channel disk drives with up to 332 TB of capacity. The xp12000 supports up to 128 Fiber Channel (2-Gb or 4-Gb) interface connections.

See HP StorageWorks Disk Array xp12000 QuickSpecs for configuration details:

http://h18006.www1.hp.com/products/quickspecs/12072_div/12072_div.html

Step 6 – Tape Drives — Optional

DAT Tape Drives, External Tabletop Drives

The HP StorageWorks DAT Tape Drives are an entry-level solution for small to medium server storage backup needs. The DAT Tape Drives have backwards compatibility with previous DDS technologies.

See HP StorageWorks DAT Drives QuickSpecs for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11883_div/11883_div.HTML

DAT Tape Drives	40-GB LVD tabletop tape drive	C5687C
	72-GB LVD tabletop tape drive	Q1523B

HP StorageWorks SDLT Tape Drive Family, External Tabletop Drives

The HP StorageWorks SDLT Tape Drive is a high-capacity, high-performance streaming tape drive. The HP StorageWorks SDLT 220-GB Tape Drive is backward read compatible with DLT Type IV media. The SDLT 320 offers the same backward-read compatibility to current DLT tape drives as the SDLT 220, and is also write-compatible with the SDLT 220 and utilizes the same DLT1 media and cleaning cartridge. The SDLT 600 offers backward-read compatibility to the DLT VS 160 and to the SDLT 320 and SDLT 220.

See HP StorageWorks SDLT Tape Drive Family QuickSpecs for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11840_div/11840_div.HTML

SDLT Tape Drives	220-GB tape drive, tabletop	192103-002
	220-GB tape drive, tabletop	192103-B32
	220-GB tape drive, tabletop	192103-292
	320-GB tape drive, tabletop	257319-001
	320-GB tape drive, tabletop	257319-B31
	320-GB tape drive, tabletop	257319-291
	600-GB tape drive, tabletop	A7519B
	600-GB tape drive, tabletop	A7520B

HP StorageWorks DLT VS Family Tape Drives, External Tabletop Drives

The HP StorageWorks DLT VS Tape Drives utilize industry standard DLT Type IV Media. DLT VS Tape Drives offer backward-read compatibility with media previously written in the DLT 40 format. The DLT VS drives are also read and write compatible with data protection solutions utilizing the HP StorageWorks DLT1 Tape Drive, such as the HP StorageWorks DLT1 1280 SuperLoader, and can be read by the HP StorageWorks SDLT 220 and 320 Tape Drives.

See HP StorageWorks DLT VS Family Tape Drive QuickSpecs for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11403_div/11403_div.HTML

DLT VS160 Tape Drives	160-GB capacity DLT Tape Drive, External, North America (carbon)	A7570B
	160-GB capacity DLT Tape Drive, External, International (carbon)	A7571B

ES/GS Common Options

HP StorageWorks Ultrium LTO Tape Drives, External Tabletop Drives

HP StorageWorks Ultrium tape drives are based on LTO Ultrium format, an open standard with a well-defined four-generation roadmap.

See **HP StorageWorks Ultrium Full-Height Tape Drives QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11739_div/11739_div.HTML

See **HP StorageWorks Ultrium Half-Height Tape Drives QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/12128_div/12128_div.HTML

Ultrium 232 Tape Drive	200-GB capacity LTO tape drive, external, half-height device	DW065B
Ultrium 448 Tape Drive	400-GB capacity LTO tape drive, external, half-height device	DW017B
Ultrium 460 Tape Drive	400-GB capacity LTO tape drive, external, full-height device	Q1520B
Ultrium 960 Tape Drive	800-GB capacity LTO tape drive, external, full-height device	Q1539B

Step 7 – Tape Storage Systems — Optional

HP StorageWorks DAT Tape Autoloaders

Backup solution for small to medium companies with limited IT support or remote sites of larger companies. The autoloader includes a single tape drive inside an enclosure that holds six data cartridges in a removable magazine. HP DDS tape drives are backward read-write compatible with the two previous DDS generations, thus this DDS-4 autoloader also reads and writes DDS-3 and DDS-2.

See **HP StorageWorks DAT 72x6 Tape Autoloader QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11905_div/11905_div.HTML

DAT 72x6 Autoloader	HP StorageWorks DAT 72x6e External (tabletop) Autoloader	Q1567A
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HP StorageWorks 1/8 Tape Autoloader Family

The HP StorageWorks 1/8 Tape Autoloader provides unattended backup in a datacenter rack or on a desk next to the office server. The 1/8 Tape Autoloader in a 2U form factor can house up to eight cartridges.

See **HP StorageWorks 1/8 Tape Autoloader Family QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11841_div/11841_div.HTML

1/8 SDLT 320 Autoloader Table Top		AA926A
1/8 Ultrium LTO 232 Autoloader	Table Top	AA202A
1/8 Ultrium LTO 448 Autoloader	Table Top	AA203A
1/8 Ultrium LTO 960 Autoloader	Table Top	AA204A
Rack Mount Kit	Use to mount Table Top units in a 19" RETMA rack	C9268R

HP StorageWorks MSL5000 Tape Libraries

The MSL5000 Tape Libraries offers storage in two enclosures (5U or 10U form factor), in tabletop or rack configuration. The Libraries provide 26 or 52 media slots with SDLT tape drives.

ES/GS Common Options

	MSL5026S2	MSL5052SL	MSL5052S2
Form Factor	5U	10U	10U
Tape Drives	SDLT 320	SDLT 220	SDLT 320
Number of Drives	up to 2	up to 4	up to 4
Media Slots	26	52	52
Storage per Library, TB	8.32	11.44	16.64
Libraries per rack	8	4	4
Storage per Rack, TB	66.56	45.76	66.56
Interface Connection	Ultra2 LVD SCSI	Ultra2 LVD SCSI	Ultra2 LVD SCSI
QuickSpecs	http://h18000.www1.hp.com/products/quickspecs/11453_div/11453_div.HTML	http://h18000.www1.hp.com/products/quickspecs/11061_div/11061_div.HTML	http://h18000.www1.hp.com/products/quickspecs/11442_div/11442_div.HTML

HP StorageWorks MSL6000 Tape Libraries

The MSL6000 Tape Libraries offer storage in two enclosures (5U or 10U form factor), in tabletop or rack configurations. The MSL6000 has the capability for multi-unit scalability. The Libraries support interface connections using Ultra3 LVD SCSI Interface or Fibre Channel (2 Gb).

See **HP StorageWorks MSL6000 Series Tape Libraries QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11863_div/11863_div.HTML

	MSL6026	MSL6030	MSL6052	MSL6060
Form Factor	5U	5U	10U	10U
Tape Drives	SDLT 600	Ultrium 460 or 960	SDLT 600	Ultrium 460 or 960
Number of Drives	up to 2	up to 2	up to 4	up to 4
Media Slots	26	30	52	60
Storage per Library, TB	15.6	24	31.2	48
Libraries per rack	8	8	4	4
Storage per Rack, TB	124.8	192.0	124.8	192.0
Interface Connection	Ultra3 LVD SCSI Interface or Embedded Fibre (2 Gb)	Ultra3 LVD SCSI Interface or Embedded Fibre (2 Gb)	Ultra3 LVD SCSI Interface or Embedded Fibre (2 Gb)	Ultra3 LVD SCSI Interface or Embedded Fibre (2 Gb)

HP StorageWorks ESL9000 Series Tape Libraries

The HP StorageWorks ESL9000 Series Tape Libraries provide backup and restore solution for high-end enterprise customers. The interface connection is Ultra3 SCSI LVD.

ESL 9000 library frames will no longer be available to order effective January 1st, 2005. ESL 9000 drives, accessories, and extended architecture licenses WILL CONTINUE to be available for installed base customers to upgrade.

See **HP StorageWorks ESL9000 Series Tape Libraries QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11875_div/11875_div.HTML

ES/GS Common Options

	ESL9322		ESL9595		
Capacity native/compressed	222 Slots	322 Slots	400 Slots	500 Slots	595 Slots
Ultrium 460	44.4/88.4 TB	64.4/128.8 TB	80/160 TB	100/200 TB	119/238 TB
Ultrium 230	22/44 TB	32.2/64.4 TB	40/80 TB	50/100 TB	59.5/119TB
SDLT 320	35.5/71 TB	51.5/103 TB	64/128 TB	80/160 TB	95/190 TB
SDLT 600	66.6/133.2 TB	96/193.2 TB	120/240 TB	150/300 TB	178/357 TB

HP StorageWorks ESL E-Series Tape Libraries

The HP StorageWorks Enterprise Storage Libraries (ESL) E-Series enterprise tape libraries offer drive and cartridge density and are available in a variety of configurations, with up to 28.4 TB of native Ultrium 960 storage capacity per square foot. Fully integrated into HP StorageWorks Extended Tape Library Architecture (ETLA), HP provides self-aware tape storage designed specifically for the SAN. ETLA also offers remote management of the entire library system including robotics, drives, Interface Controllers, and the Interface Manager management card.

See **HP StorageWorks ESL E-Series Tape Libraries QuickSpecs** for configuration details:

http://h18006.www1.hp.com/products/quickspecs/11877_div/11877_div.html

	ESL 712e	ESL 322e	ESL 630e	ESL286e
Drive Technology	Ultrium 960 FC Ultrium 460 SCSI Ultrium 460 FC	Ultrium 960 FC Ultrium 460 SCSI Ultrium 460 FC	SDLT 320 SDLT 600	SDLT 320 SDLT 600
Maximum Cartridge Count	712	322	630	286
Maximum Drive Count	24	24	24	24
Maximum Capacity (native)	284.8 TB	128.8 TB	189 TB	85.8 TB

Step 8 – Storage Network Switches, Hubs, and Interconnects — Optional

Network Storage Routers Network Storage Routers enable multiple host servers to communicate with a SCSI tape device over a Fibre Channel link.

For configuration details, see the **Switches, Hubs, and Interconnects QuickSpecs** at:

http://www.compaq.com/products/quickspecs/North_America/10490.html

NSR e2400 – 160 Two Fibre Channel x 4 LVD FC to SCSI Data Router

330839-B21

ES/GS Common Options

Fibre Channel Switches

HP supports three product lines of Fibre Channel switch products that may be used to build SAN fabrics. Each product line provides certain advantages that apply to specific applications. For more information on specific switch models and selection, please refer to Chapter 2 in the **SAN Design Guidelines**:
<http://www.hp.com/go/SANDesignGuide>

The B-Series product line includes a wide range of Fibre Channel switches, described as "SAN switches" and "Core switches." Products in this family include switches from the HP StorageWorks SAN Switch 2/16 to the HP StorageWorks Core Switch 2/64. This product line includes switches with 8, 16, 32, and 64 ports, including both full-function and entry-level models. The HP StorageWorks Core Switch 2/64 includes a pair of independent 64-port switches in a single chassis with a high level internal redundancy.

The C-Series product line includes the Cisco MDS 9506 and 9509 Multilayer Directors and the Cisco MDS 9216, 9120, and 9140 Multilayer Fabric Switches. The MDS 9506 is supported with 224 ports, over seven modular chassis consisting of both 16-port and 32-port modules. The MDS 9506 is supported with 128 ports, over four modular chassis consisting of both 16-port and 32-port modules. The MDS 9216 has a basic configuration with 16 ports. It has an expansion slot that supports either a 16- or a 32-port card, for 32 or 48 ports in total.

The M-Series Fabric product line includes a wide range of Fibre Channel switches described as "Directors" and "Edge switches." A partial list of products in this family includes the HP StorageWorks Director 2/140 and the HP StorageWorks Edge Switch 2/32. This product line includes switches with 16, 24, 32, 64, and 140 ports internal microcode. The HP StorageWorks Director 2/64 and 2/140 switches have a high level of internal redundancy.

For part number and configuration information, see the SAN infrastructure switch information at
<http://www.hp.com/go/san>

Fibre Channel Cables

NOTE: The following LC-SC connector cables support connectivity between 1-Gb and 2-Gb devices.

2-meter LC-SC multi-mode Fibre Channel cable (221691-B21)	3R-A2976-AA
5-meter LC-SC multi-mode Fibre Channel cable (221691-B22)	3R-A2977-AA
15-meter LC-SC multi-mode Fibre Channel cable (221691-B23)	3R-A2978-AA
30-meter LC-SC multi-mode Fibre Channel cable (221691-B26)	3R-A3458-AA
50-meter LC-SC multi-mode Fibre Channel cable (221691-B27)	3R-A3459-AA

NOTE: The following LC-LC connector cables support connectivity between 2-Gb and 2-Gb devices.

2-meter LC-LC multi-mode Fibre Channel cable (221692-B21)	3R-A2979-AA
5-meter LC-LC multi-mode Fibre Channel cable (221692-B22)	3R-A2980-AA
15-meter LC-LC multi-mode Fibre Channel cable (221692-B23)	3R-A2981-AA
30-meter LC-LC multi-mode Fibre Channel cable (221692-B26)	3R-A3454-AA
50-meter LC-LC multi-mode Fibre Channel cable (221692-B27)	3R-A3455-AA

Step 9 – Keyboards, Mouse, Monitors, Power Cords – Optional

ES/GS Common Options

Keyboards - USB Keyboard/Language

N.A./International keyboard

Arabic keyboard

Belgian keyboard

BHCSY keyboard

Canadian/English keyboard

Canadian/French keyboard

Cyrillic keyboard (Russian)

Czech keyboard

Danish keyboard

Dutch keyboard

Finnish keyboard

French keyboard

German keyboard

Greek keyboard

Hebrew keyboard

Hungarian keyboard

International keyboard

Italian keyboard

Japanese keyboard

Korean keyboard

Latin-American keyboard

Norwegian keyboard

Polish keyboard

Portuguese keyboard

Romanian keyboard

Simplified Chinese keyboard

Slovak keyboard

Spanish keyboard

Swedish keyboard

Swiss/French keyboard

Swiss/German keyboard

Traditional Chinese keyboard

Thai keyboard

Turkish Q keyboard

Turkish/F keyboard

UK keyboard

Yugoslavian keyboard

Tru64 UNIX

3R-A6554-AA

3R-A6540-AA

3R-A6541-AA

3R-A6542-AA

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3R-A6543-AA

3R-A6544-AA

3R-A6545-AA

3R-A6546-AA

3R-A6547-AA

3R-A6548-AA

3R-A6549-AA

3R-A6550-AA

3R-A6551-AA

3R-A6552-AA

3R-A6553-AA

3R-A6554-AA

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3R-A6558-AA

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3R-A6565-AA

3R-A6566-AA

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3R-A6567-AA

3R-A6568-AA

3R-A6569-AA

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3R-A6570-AA

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OpenVMS (Note 1)

3X-LK464-A2

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3X-LK464-AB

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3X-LK464-AQ

3X-LK464-AC

3X-LK464-BT

3X-LK464-BV

3X-LK464-AD

3X-LK464-AH

3X-LK464-AF

3X-LK464-AP

3X-LK464-AG

3X-LK464-BH

3X-LK464-AT

3X-LK464-BQ

-

3X-LK464-AI

-

-

-

3X-LK464-AN

3X-LK464-BP

3X-LK464-AV

3X-LK464-BL

-

3X-LK464-CZ

3X-LK464-AS

3X-LK464-AM

3X-LK464-AK

3X-LK464-AL

-

-

3X-LK464-BU

3X-LK464-BW

3X-LK464-A2

3X-LK464-BY

NOTE 1: OpenVMS keyboard (3X-LK464-xx) comes with PS/2 and USB connectors

ES/GS Common Options

Rackmount Keyboard/Drawer and Keyboard/Monitor Options	PS2 to USB Converter – allows for connection of a PS2 keyboard and/or mouse to an AlphaServer ES47 System	3R-A4495-AA
	HP Rackmount Flat Panel Monitor – TF T721OR 17-inch (17-inch viewable image area) 1U rackmount flat panel display. 0.264mm pixel pitch, 1280 x1024 @60/75 Hz high and low voltage power cords, Worldwide	3R-A5187-AA
	Keyboard, Video, Mouse (KVM) Switches	
	HP Server 1 x 8-Port KVM Switch (Tru64 UNIX and OpenVMS)	336044-B21
	USB Interface Adapter – 1 pack (Mandatory option with 336044-B21)	336047-B21
	For more information, refer to the Release Notes at: http://h18002.www1.hp.com/alphaserver/download/es47_es80_gs1280_Console_Switch_Release_Notes.pdf http://h18002.www1.hp.com/alphaserver/download/es47_es80_gs1280_Console_Switch_Release_Notes.html	
	CAT5e Cables	
	3 foot (1m) – 4 pack	263474-B21
	6 foot (2m) – 8 pack	263474-B22
	12 foot (4m) – 8 pack	263474-B23
	20 foot (6m) – 4 pack	263474-B24
	40 foot (12m) – 1 pack	263474-B25
	Integrated Keyboard and Drawer	
	Integrated Keyboard and Drawer (1U), North America	3R-A4404-AA
	Integrated Keyboard and Drawer (1U), International	3R-A4405-AA
	Integrated Keyboard and 17" Monitor (TFT7600RKM)	
	Integrated Keyboard and Monitor, North America	AG052A
	Integrated Keyboard and Monitor, United Kingdom	AG053A
	Integrated Keyboard and Monitor, Germany	AG054A
	Integrated Keyboard and Monitor, France	AG055A
	Integrated Keyboard and Monitor, Italy	AG056A
	Integrated Keyboard and Monitor, Spain	AG057A
	Integrated Keyboard and Monitor, International	AG066A

Mouse	3-button mouse – USB	3R-A6641-AA
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Monitors

Configuration Guidelines

1. Graphics monitors other than those listed can be used if compatible with SVGA graphics ordered with system.
2. A video cable, 6-foot/1.8-meter length, is included with all variants of monitors.
3. Video extension cable required if monitor is located more than 1-meter from server.
4. Monitors will ship with, but not be integrated with systems. – **NOTE:** Taiwan and Australia/New Zealand models ship separately.

ES/GS Common Options

Carbon/Silver Monitors	V7650 17-inch (16-inch viewable image size) 0.24mm FST multi-frequency color monitor, 2-tone (carbon/silver), VGA to 1024 x 768 @85 Hz, MPRII/TCO 03/Energy Star Compliant, Northern Hemisphere with NA power cord, VGA cable	3R-A5853-AA
	Same as above, with Euro power cord	3R-A5854-AA
	Same as above, Taiwan, NA power cord	PF996AA#AB0
	Same as above, PRC power cord, CCIB	PF996AA#AB2
	Same as above, Southern Hemisphere with Australia/New Zealand power cord	PF996AA#ABG

Carbon/Silver Flat Panel Monitors	L2065, 20-inch (20.1-inch viewable image area) flat panel monitor 0.255mm pixel pitch, 1600 x 1200 @60 Hz, A + D, TCO 03, Energy Star compliant, four video input connectors, (VGA, DVI-I, composite video and s-video), North America power cord, VGA and DVI-I cables	3R-A6701-AA
	L2065, 20-inch (20.1-inch viewable image area) flat panel monitor 0.255mm pixel pitch, 1600 x 1200 @60 Hz, A + D, TCO 03, Energy Star compliant, four video input connectors, (VGA, DVI-I, composite video and s-video), Euro power cord, VGA and DVI-I cables	3R-A6702-AA
	L1955, 19" (19" viewable image size) TFT flat panel monitor, 0.294mm pixel pitch, 1280 x 1024 @60Hz, multi-mode support, MPRII/TCO 03/Energy Star compliant, one VGA, one DVI-I input connector. NA power cord, VGA and DVI-D cables	3R-A5713-AA
	L1955, 19" (19" viewable image size) TFT flat panel monitor, 0.294mm pixel pitch, 1280 x 1024 @60Hz, multi-mode support, MPRII/TCO 03/Energy Star compliant, one VGA, one DVI-I input connector. Euro power cord, VGA and DVI-D cables	3R-A5714-AA
	L1506, 15" (15" viewable image size) TFT flat panel monitor, 0.297 mm pixel pitch, 1024 x 768 @60 Hz, multi-mode support, MPR-II/TCO 03/Energy Star compliant, NA power cord, VGA cable	3R-A6515-AA
	Same as above, Euro power cord	3R-A6516-AA

Monitor Power Cords	North America, 120V, 75-inch	BN26J-1K
	Australia, New Zealand, 2.5-meter	3R-A6023-AA
	Central Europe, 2.5-meter	BN19C-2E
	Denmark, 2.5-meter	BN19K-2E
	Egypt, India, South Africa, 2.5-meter	BN19S-2E
	Italy, 2.5-meter	BN19M-2E
	Israel, 1.9-meter	3R-A6883-AA
	Japan, 2.5-meter, Dentori approved	3X-BN46F-02
	Republic of China (103541-001)	BN19H-2E
	Switzerland, 2.5-meter	BN19E-2E
	UK, Ireland, 2.5-meter	BN19A-2E

ES/GS Common Options

Keyboard or Mouse Extension Cable 6-foot/1.8-meter keyboard or mouse extension cable; to extend both keyboard and mouse order two cables 3X-BC34A-06

Video Extension Cable 6-foot/1.8-meter video extension cable BN39C-02

Step 10 - Graphics Support — Optional

Description	Device Type	Part Number	Maximum Quantity Tested & Supported			
			U=Tru64 UNIX O=OpenVMS L=Redhat V7.2 Linux			
			per system	per hard partition: per system		
			ES47 Tower Workstation	ES47	ES80	GS1280
Graphics Adapters						
ATI RADEON 7500 2D/3D AGP graphics accelerator	AGP 4X	3X-PBXGG-AB	1/U 1/O	4:4/U 4:4/O	4:8/U 4:8/O	4:64/U 4:64/O
ATI RADEON 7500 2D/3D PCI graphics accelerator	PCI 3.3V, 66MHz	3X-PBXGG-AA	4/U 4/O	4:4/U 4:4/O	4:8/U 4:8/O	4:64/U 4:64/O
For RADEON 7500 option information see: PCI: http://h18002.www1.hp.com/alphaserver/options/ases47/ases47_3x-pbxgg-aa.html AGP: http://h18002.www1.hp.com/alphaserver/options/ases47/ases47_3x-pbxgg-ab.html Performance NOTE: The AGP version of the Radeon graphics accelerator will deliver significantly better performance for EV7 systems because the AGP bus is faster than the PCI bus; plus the AGP accelerator does not contend with other adapters on the AGP bus (each AGP bus has only one adapter slot). The Radeon AGP graphics accelerator delivers about the same performance on EV7 and EV68 systems. However, the Radeon PCI graphics accelerator delivers noticeably better performance on EV68 systems compared to EV7 systems because the EV7 systems' hardware implementation of "Programmable I/O" is not as fast as the EV68 implementation.						

Graphics Software

Tru64 UNIX Open3D license for RADEON 7500 (required for 3D functionality)	QL-6ZRA9-AA
OpenVMS Open3D license for RADEON 7500 (required for 3D functionality)	QL-0ADA9-AA
Additional Tru64 UNIX media kit for RADEON 7500 (initial kit ships with RADEON card)	QA-6ZRRA-H8
Additional OpenVMS media kit for RADEON 7500 (initial kit ships with RADEON card)	QA-6ZPAA-H8

Step 11 - System Software — Optional

Licensing Policy for HP Add-on Software on Systems with Partitions

The license for an hp software product, the license(s) and license key(s) that represent those licenses, may be applied to any partition (OpenVMS Galaxy instance or hardware partition) within that system. Different versions of the operating system or layered products may be used on different partitions. In this case, the customer must be licensed for the latest version in use. Software products from other suppliers may have different licensing requirements for partitions.

ES/GS Common Options

Tru64 UNIX

1. Tru64 UNIX base systems include pre-installed software, Base license, Unlimited User license, Server Extension license, Internet Express, and Secure Web Server
2. Media and documentation required for first system on site

Software Processor Codes in part numbers

	Layered Software Tier	Part Number Code for 8th character
ES47 Tower and ES47	Workgroup	x = E
ES80	Departmental	x = G
GS1280	Enterprise	x = Q

Tru64 UNIX media and online documentation on CD-ROM	QA-6ADAA-H8
Tru64 UNIX full hard copy documentation	QA-6ADAA-GZ
TruCluster Plus Software Package with licenses for TruCluster Server, Logical Storage Manager and AdvFS Utilities	QP-6R9Ax-AA
TruCluster Server license	QL-6BRAX-AA
Logical Storage Manager license	QL-2GVAX-AA
AdvFS Utilities license	QL-0EGAX-AA
Advanced Server for Tru64 UNIX, 25 client concurrent use license	QL-5U29M-3D
Advanced Server for Tru64 UNIX, 50 client concurrent use license	QL-5U29M-3E
Advanced Server for Tru64 UNIX, 100 client concurrent use license	QL-5U29M-3F
Advanced Server for Tru64 UNIX, 250 client concurrent use license	QL-5U29M-3G
Advanced Server for Tru64 UNIX, 500 client concurrent use license	QL-5U29M-3H
Layered products media and documentation for Tru64 UNIX on CD-ROM	QA-054AA-H8
DECnet/OSI end-system function license for Tru64 UNIX	QL-MTJAX-AA
DECnet/OSI extended license for Tru64 UNIX	QL-MTKAX-AA

OpenVMS

- OpenVMS system base packages include Base license, Enterprise Integration Server for OpenVMS License Package and OpenVMS OS media on CD-ROM.
- Media and documentation required for first system on site
- Enterprise Integration Package includes licenses for TCP/IP Services for OpenVMS, DECwindows Motif for OpenVMS Alpha, DECnet-Plus for OpenVMS Alpha End System, Archive/Backup System for OpenVMS Management Tools, Archive/Backup Agent for Windows NT, Office Server for OpenVMS, Office Server Client Access, PATHWORKS 32, Advanced Server/PATHWORKS for OpenVMS.
- OpenVMS Concurrent Use licenses provide the right to interactively use the operating system by the specified number of concurrent users on a designated OpenVMS system. OpenVMS Concurrent Use licenses can be moved from one system to another at user discretion and can be shared in a mixed OpenVMS VAX and OpenVMS Alpha cluster.
- OpenVMS Traditional Unlimited Use license is system specific and can only be used on one single system at a time. It cannot be shared between systems or in an OpenVMS VAX or OpenVMS Alpha Cluster.

Software Processor Codes in part numbers

	Layered Software Tier	Part Number Code for 8th character
ES47 Tower and ES47	Workgroup	x = E
ES80	Departmental	x = G
GS1280	Enterprise	x = Q

ES/GS Common Options

Concurrent Use 1-user license	QL-MT3AA-3B
Concurrent Use 2-user license	QL-MT3AA-3C
Concurrent Use 4-user license	QL-MT3AA-3D
Concurrent Use 8-user license	QL-MT3AA-3E
Concurrent Use 16-user license	QL-MT3AA-3F
Concurrent Use 32-user license	QL-MT3AA-3G
Concurrent Use 64-user license	QL-MT3AA-3H
Concurrent Use 128-user license	QL-MT3AA-3J
Concurrent Use 256-user license	QL-MT3AA-3K
Traditional unlimited-user license	QL-MT2Ax-AA
OpenVMS media and online documentation on CD-ROM	QA-MT1AA-H8
OpenVMS hard copy documentation	QA-001AA-GZ
OpenVMS base hard copy documentation	QA-09SAA-GZ
OpenVMS Alpha Software Products Library Package: Layered products media and documentation for OpenVMS on CD-ROM, includes media and documentation for all products licensed in the Enterprise Integration Package.	QA-03XAA-H8
DECnet-Plus/DECnet end-system license	QL-MTFAx-AA
DECnet-Plus/DECnet extended-function license	QL-MTHAx-AA
Cluster License for OpenVMS Alpha	QL-MUZAx-AA
OpenVMS Volume shadowing license	QL-2A1Ax-AA

OpenVMS Galaxy

Galaxy Soft Partition Rules

- OpenVMS Galaxy hardware requirements:
 - One or more CPUs per instance.
 - One or more I/O modules per instance.
 - Console port or network access per instance.
 - Memory:
 - Enough private memory for OpenVMS and applications
 - Enough shared memory for the shared memory cluster interconnect, global sections, and so on
- Maximum of eight Galaxy instances per system or hard partition.
- Display for configuration management with either an Alpha or VAX workstation running DECwindows or a Windows NT workstation with an X terminal emulator.
- For each CPU in an OpenVMS Galaxy, one OpenVMS Galaxy License is mandatory.

For more information about OpenVMS Galaxy requirements, configurations, and procedures, refer to the **OpenVMS Alpha Galaxy Guide**. The latest version is always available at <http://h71000.www7.hp.com/availability/galaxy.html>

Galaxy 1-CPU License	QL-66XAA-3B
Galaxy 2-CPU License	QL-66XAA-3C
Galaxy 4-CPU License	QL-66XAA-3D
Galaxy 8-CPU License	QL-66XAA-3E
Galaxy 16-CPU License	QL-66XAA-3F

ES/GS Common Options

Step 12 - Hardware and Software Support Services — Optional

HP Care Pack Services HP Care Pack Services are available for AlphaServer systems running Tru64 UNIX or OpenVMS operating systems. HP Care Pack Services are designed for customers who need support beyond that provided by the hardware product warranty with coverage for both Principal Server systems and SSPs (Subsequent System Packages) - that meet a full range of customer support requirements.

System Codes for Service Part Numbers		
ES47 Tower and Workstation		x = F, yy = GA, aaa = 6JM, bbb = 5LA
ES47 Model 2 and Model 4		x = F, yy = GB, aaa = 6JN, bbb = 5LB
ES80 Model 2 and Model 4		x = F, yy = HA, aaa = 6JP, bbb = 5LB
ES80 Model 6 and Model 8		x = F, yy = HB, aaa = 6JQ, bbb = 5LC
GS1280 Model 8		x = W, yy = BA, aaa = 6JR, bbb = 5LG
GS1280 Model 16		x = W, yy = BB, aaa = 6JS, bbb = 5LG
GS1280 Model 32		x = W, yy = BD, aaa = 6JT, bbb = 5LH
GS1280 Model 64		x = W, yy = BE, aaa = 6JU, bbb = 5LH

Program Features - Principal Server

HP Support Plus

- 13x5 HW/SW support
- 4-hour response on-site hardware support
- 2-hour response for software support
- License Subscription for HP O/S software and embedded L/P (i.e., EIS for OpenVMS, unlimited users, and server extensions for Tru64 UNIX)
- Consolidated Software Media Update Distribution for OpenVMS or Tru64 UNIX and their layered products. (Some layered products are not on the Consolidated Media Update Distribution, but can be ordered separately.)

HP Support Plus, Principal Server, 12 months	HA109A1-aaa	FP-x01yy-12
HP Support Plus, Principal Server, 36 months	HA109A3-aaa	FP-x01yy-36

HP Support Plus 24

- 24x7 HW/SW support
- Named HW engineer
- 4-hour response on-site hardware support
- 2-hour response for software support
- License Subscription for HP O/S software and embedded L/P (i.e., EIS for OpenVMS, unlimited users, and server extensions for Tru64 UNIX)
- Consolidated Software Media Update Distribution for OpenVMS or Tru64 UNIX and their layered products. (Some layered products are not on the Consolidated Media Update Distribution, but can be ordered separately.)

HP Support Plus 24, Principal Server, 12 months	HA110A1-aaa	FP-x02yy-12
HP Support Plus 24, Principal Server, 36 months	HA110A3-aaa	FP-x02yy-36

ES/GS Common Options

HP Proactive 24

- Service-level management
 - Assigned account manager
 - Account support plan
 - Onsite support planning meetings
 - Quarterly activity reviews
 - One HP technical service engagement for selected hardware environments
- Availability management
 - Site environmental survey
 - System healthcheck assessment for central server
- Configuration, change, and release management
 - Semi-annual operating systems patch analysis and management
 - Semi-annual firmware updates and micro-code recommendations
 - Remote monitoring for event notification
- Incident and problem management
 - 24x7 HW/SW support
 - 4-hour response on-site hardware support
 - 2-hour response for software support
 - Phone number for problem resolution

HP Proactive 24, 12 months

HA111A1-aaa

HP Proactive 24, 36 months

HA111A3-aaa

Critical Services

- Service-level management
 - Assigned HP-certified customer support team
 - Remote monitoring of IT environment's stability
 - Quarterly onsite support planning and activity report meetings
 - Two HP technical service engagement for selected hardware environments
- Availability management
 - Site environmental survey
 - Availability checkup to assess state of IT environment against availability objectives
- Configuration, change, and release management
 - Quarterly operating systems patch analysis and management
 - Quarterly firmware updates and micro-code recommendations
 - Remote monitoring for event notification
- Incident and problem management
 - 24x7 HW/SW support
 - Dedicated, mission critical phone number for problem resolution
 - Immediate connection to experts and intervention for critical hardware and software problems
 - Immediate dispatch of an engineer for critical hardware problems
 - Accelerated escalation management

Critical Services, 12 months

HA112A1-aaa

Critical Services, 36 months

HA112A3-aaa

ES/GS Common Options

Program Features - Additional Services

SSPs (Subsequent System Packages)	• For HP Care Pack Support Plus and Support Plus 24 • HW Support at same level as corresponding package for Principal server • License Subscription: HP O/S (where applicable) • Telephone support through Principal server covered by full support package		
	HP Support Plus, Subsequent System, 12 months		FP-x21yy-12
	HP Support Plus, Subsequent System, 36 months		FP-x21yy-36
	HP Support Plus 24, Subsequent System, 12 months		FP-x22yy-12
	HP Support Plus 24, Subsequent System, 36 months		FP-x22yy-36

Installation	• Pre-installation review • Unpacking of equipment • Assemble and test • Basic product usage info • No software installation added		
	Installation	HA113A1-bbb	FP-xINST-yy

Installation and Startup HP O/S	• Pre-installation review • Unpacking of equipment • Assemble and test • Basic product usage info • Install operating systems • Product configuration • Print and network access • Orientation		
	Installation and Startup	HA114A1-bbb	FP-xSTAR-yy

NOTES:	• AlphaServer ES47/ES80 and GS1280 systems include one-year parts and labor warranty with 5x9, on-site Next Business Day response. • HP Care Pack Services include support for new HP branded hardware options internal to the AlphaServer enclosure plus a monitor (17-inch or less excluding flat panel models). • External storage devices/racks carry their own level of warranty and should be quoted separately for uplifted warranty services. • In addition to the HP Care Pack Services shown above, other service packages are available for separate hardware and support. For more information on Hardware and Software Upfront Services and other HP service options available for AlphaServers, consult your Sales Account Manager, HP Services Principal, or visit: http://www.hp.com/hps/		
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ES/GS Common Options

Recommended Factory Integration Services

Value-added Implementation Services (VIS) provides systems integration and delivery services. VIS services, including system integration, extended burn-in, custom documentation, and on-site services can be custom-quoted for the full range of AlphaServer configurations. These pre-packaged services are offered for systems shipped to North America and Japan. For similar services in Europe, e-mail specific requirements to: customsystems.europe@hp.com For similar services in Asia/Pacific, e-mail specific requirements to: customsystems.asiapacific@hp.com

Pre-packaged VIS services are recommended for system configurations that include up to one storage array:

- Basic Integration Service (YT-VISIT-B1) System integration, testing, extended burn-in, custom documentation, and installation of a single operating system instance
- Extra RAID pair service (YT-VISIT-R1)
- Clustering Service (YT-VISIT-C1)
- Partitioning Service (YT-VISIT-P1)

Basic Integration Service

Systems integration and delivery services related to the configuration of the first and/or only instance of an operating system on a single AlphaServer. Includes the following:

YT-VISIT-B1

- Staging and Integration of the AlphaServer
- Software load of a single instance of an operating system and current revisions of firmware
- Hardware configuration, custom placement, and integration of internal options of the server per customer specifications
- Installation of a single instance of either Tru64 UNIX or OpenVMS Operating System
- Configuration, exercise, and test of up to one intelligent RAID array controller and associated disks per customer requirements
- Testing of the system and its components for a full 100-hour burn-in
- Mini-CCD (Custom Configuration Documentation) containing equipment listing, system environmental information, and software version levels

Extra RAID Pair Service

Configuration of additional Intelligent RAID controller pairs beyond the internal and external RAID controller pairs included within the scope of the prerequisite YT-VISIT-B1 on the same single AlphaServer platform. The following services are included in the optional YT-VISIT-R1 Extra RAID Pair Service per each additional pair of Intelligent RAID controllers configured:

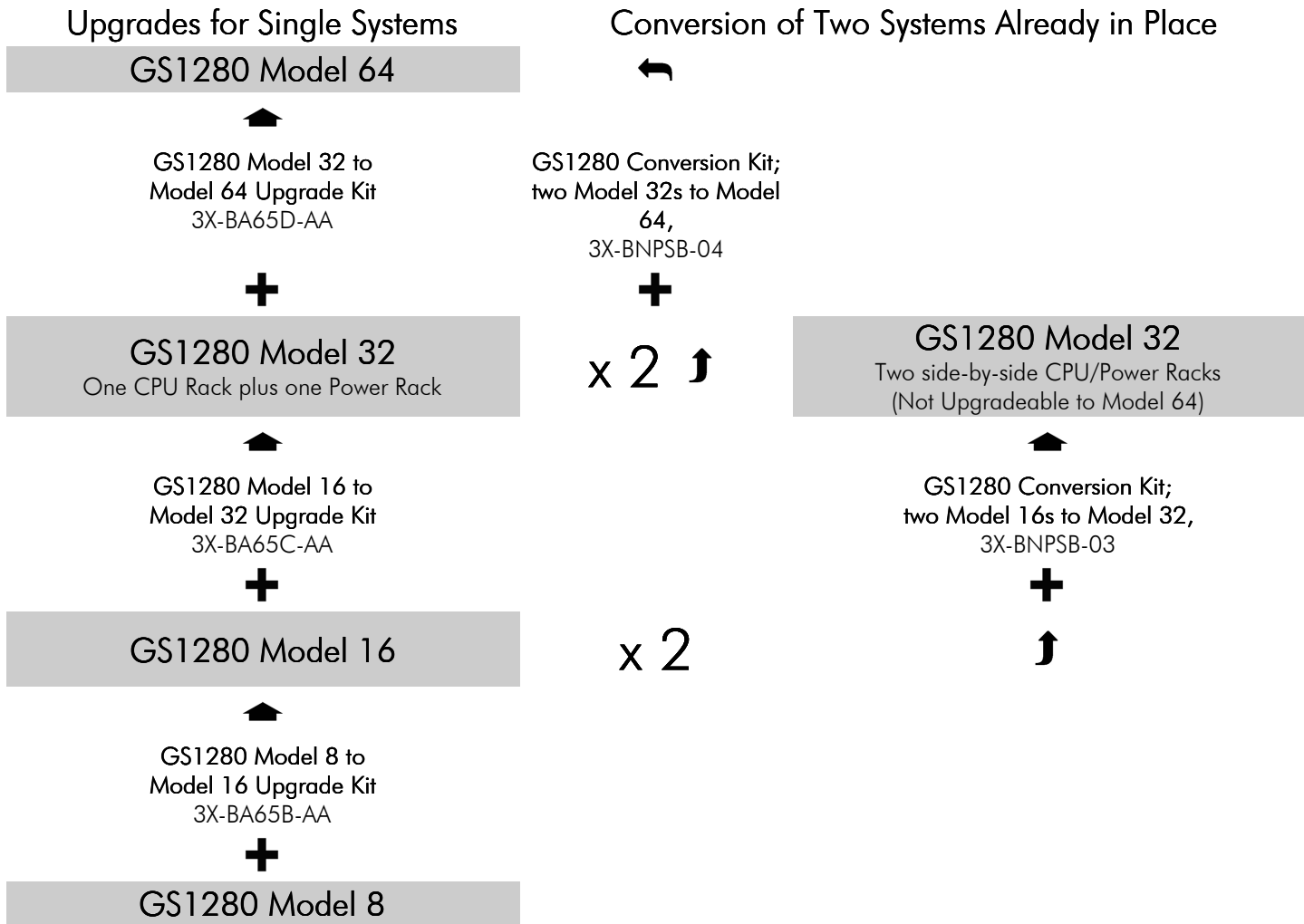
YT-VISIT-R1

- Technical edit of order to guide component selection and option placement
- Configuration of the disks of the additional controller pair per customer specifications
- Hardware configuration verification
- Custom disk placement and verification
- Installation of current revisions of firmware
- Configuration, exercise and testing of up to one pair of additional intelligent array controller pair and associated disk drives for each YT-VISIT-R1
- Controller and disk testing with the system and its components during the 100-hour burn-in

ES/GS Common Options

Clustering Service	Configuration of a single cluster instance for AlphaServer platforms. This is a per-cluster service and is ordered along with the prerequisite YT-VISIT-B1 services. • Technical edit of order to guide component selection and option placement • Configuration of a cluster per specifications • Hardware and software configuration verification • Installation of either Tru64 UNIX TruCluster software or OpenVMS cluster software and configuration of node functions • Installation of current revisions of firmware • Cluster failover testing with the system and its components during the full 100-hour burn-in	YT-VISIT-C1
Partitioning Service	Configuration of multiple, non-clustered instances of a second or subsequent operating system on a single AlphaServer platform. This is a per-partition service and is ordered along with the prerequisite YT-VISIT-B1 services. The first instance of an operating system is included in the YT-VISIT-B1 service, subsequent partitions require the YT-VISIT-P1 partitioning service. • Technical edit of order to guide component selection and option placement • Configuration and hardware integration of the server partition per specifications • Software load of either Tru64 UNIX operating system or OpenVMS operating system on a hardware/software partition. • Partition testing with the system and its components during the full 100-hour burn-in	YT-VISIT-P1
Full Custom Configurations	The Integration Service Packages address the most-common customer requirements. For a wider range of configurations, customers can also choose additional customized services based upon a Statement of Work agreement. This includes: cluster add-on nodes, larger storage configurations, custom option support, custom system packaging, mixed operating system partitions, and configured multi-system clusters. Contact your local sales representative for these services.	

Upgrades



AlphaServer GS1280, Upgrades for Single Systems		
GS1280 Model 8 to Model 16 Upgrade Kit	System expansion hardware to upgrade an AlphaServer GS1280 Model 8 to an AlphaServer GS1280 Model 16. Includes one System Building Block Drawer with one power shelf with three power supplies; one rackmount slide kit; and associated inter-processor cabling. NOTE: Requires the purchase of one Type A Power Distribution Unit (3X-H7606-AA/AB) - see Step 6 for description of choices.	3X-BA65B-AA

Upgrades

GS1280 Model 16 to Model 32 Upgrade Kit	System expansion hardware to upgrade an AlphaServer GS1280 Model 16 to an AlphaServer GS1280 Model 32. Includes: • One CPU rack with four 8P System drawers • One power rack. Installation involves transfer of CPU modules, I/O Drawers and storage from original M16 rack to new Upgrade racks (any new CPU modules and drawers ordered with the Upgrade are integrated at the factory). NOTE: Upgrade order must conform to configuration requirements for a GS1280 Model 32 system (see Configuration starting at Step 3), with: • At least one Dual CPU Module • One I/O Master Drawer • Power Distribution Units - see Step 6 for description of choices.	3X-BA65C-AA
GS1280 Model 32 to Model 64 Upgrade Kit	System expansion hardware to upgrade an AlphaServer GS1280 Model 32 to an AlphaServer GS1280 Model 64. Includes: • One CPU rack with four 8P System drawers • One power rack. • Cable Kit to convert two AlphaServer GS1280 Model 32 systems to one AlphaServer GS1280 Model 64 system. NOTE: Upgrade order must conform to configuration requirements for a GS1280 Model 32 system (see Configuration starting at Step 3), with: • At least one Dual CPU Module • One I/O Master Drawer • Power Distribution Units - see Step 6 for description of choices.	3X-BA65D-AA
AlphaServer GS1280, Conversion for Two Systems		
GS1280 Conversion Kit; two Model 16s to Model 32	Cable Kit to convert two AlphaServer GS1280 Model 16 systems to one AlphaServer GS1280 Model 32 system. NOTE: Mechanical configuration of the GS1280 M32 consists of two side-by-side CPU & Power combination racks. This configuration is not upgradeable to GS1280 Model 64.	3X-BNPSB-03
GS1280 Conversion Kit; two Model 32s to Model 64	Cable Kit to convert two AlphaServer GS1280 Model 32 systems to one AlphaServer GS1280 Model 64 system.	3X-BNPSB-04

Technical Specifications

	North America	Japan	Europe	
Power Requirements				
Voltage	120/208	200	380/415	
Phase/Frequency	3W+G, 50-60 Hz	3W+G, 50-60 Hz	3W+N+G, 50-60 Hz	
Power Distribution Unit (PDU) required for all GS1280 Models	3X-H7606-AA	3X-H7606-AA	3X-H7606-AB	
Rated Current, each PDU	24A	24A	24A	
Typical Current for Models 8 and 16, each PDU	18.5A	19A	10A	
Typical Current for Models 32 and 64, each PDU	2.5A	2.5A	1.3A	
Line Connection	Fixed cord & plug	Fixed cord & plug	Fixed cord & plug	
Power Cord	5 x 10AWG	5 x 10AWG	5 x 4 mm2	
Power Plug	L21-30P, Hubbell 2811	L21-30P, Hubbell 2811	IEC 32A, Hubbell 532P6W	
Main Breaker	30A	30A	30A	
Sub-breakers	3 x 20A(2p), 1 x 20A(3p)	3 x 20A(2p), 1 x 20A(3p)	3 x 15A(2p), 1 x 15A(3p)	
Agency	UL Listed, cUL	UL Listed, cUL	TUV & CB report	
Power Distribution Unit (PDU) required for GS 1280 Models 32 and 64	3X-H7606-BA	3X-H7606-BA	3X-H7606-BB	
Rated Current, each PDU	48A	48A	25A	
Typical Current, each PDU	24A	25A	16A	
Line Connection	Fixed cord & plug	Fixed cord & plug	Fixed cord & plug	
Power Cord	5 x 8AWG	5 x 8AWG	5 x 4 mm2	
Power Plug	IEC 60A, Hubbell 460P9W	IEC 60A, Hubbell 460P9W	IEC 32A, Hubbell 532P6W	
Agency	UL Listed, cUL	UL Listed, cUL	TUV & CB report	
	GS1280 Model 8 1 I/O Drawer, 1 SW Shelf	GS1280 Model 16 1 I/O Drawer, 1 SW Shelf	GS1280 Model 32 1 I/O Drawer, 1 SW Shelf	GS1280 Model 64 1 I/O Drawer, 1 SW Shelf
Power Required, Kva	3.5	5.7	10.1	18.7
Power Distribution Unit (PDU) required for all GS1280 Models 3X-H7606-Ax	1 required; 2 for dual AC	2 required; 4 for dual AC	2 required, dual AC included	2 required, dual AC included
Power Distribution Unit (PDU) required for GS 1280 Models 32 and 64, 3X-H7606-Bx	Not applicable	Not applicable	2 required, dual AC included	4 required, dual AC included

Technical Specifications

Physical Characteristics

Dimensions (H x W x D)	79 x 24 x 47 in (200 x 60 120 cm) (one 41U Rack)			
Shipping Dimensions	86 x 32 x 48 in (217 x 92.5 142 cm) (one 41U Rack)			
	GS1280 Model 8	GS1280 Model 16	GS1280 Model 32	GS1280 Model 64
Installed Weight, base system	870 lb (395 kg)	1,272 lb (577 kg)	2,118 lbs (961 kg)	4,800 lbs (2,176 kg)

Heat dissipation

Max Heat Output, Base Model only, watts	3,405	6,810	14,820	28,440
Max heat Output, Base Model only, Btu/hr	11,622	23,243	50,581	97,066
Typical Heat Output, Base Model only, watts	2,430	3,700	8,000	14,800
Typical Heat Output, Base Model only, Btu/hr	8,297	12,632	27,304	50,513
Airflow, cfm, minimum full rack, each CPU rack	912	1,562	1,800	1,800 x 2 racks
Airflow, cfm, maximum full rack, each CPU rack	1,404	2,454	3,400	3,400 x 2 racks
Airflow, cfm, minimum full rack, power rack for Model 32 and 64			1,324	1,455
Airflow, cfm, maximum full rack, power rack for Model 32 and 64			1,508	1,685

Service Clearances-All Models

Operating

Front	32 in (81 cm)
Rear	44 in (111 cm)
Left Side	None
Right Side	None

Service

32 in (81 cm)
44 in (111 cm)
None
None

Environmental

Operating

Temperature	50° to 95° F (10° to 35° C)
Humidity	10% to 90%

Non-Operating

Altitude	10,000 ft (3,050 m)	40,000 ft (12,200 m)
	NOTE: Maximum operating temperature at sea level; reduce by 1.8° F (1° C) for each 2,000 ft (600 m) above sea level	
Vibration	10 to 500 Hz 0.1G peak	1.03 Grms 5-300 Hz
Shock	5G 30ms, half sine	

Technical Specifications

Acoustics (Declared values per ISO 9296 and ISO 7779)

	Standard I/O Expansion or Master Drawer 3X-BA70A-BA	4300 Series StorageWorks Shelf DS-SL13R-xx	GS1280 Model 8 1 I/O Drawer	GS1280 Model 16 1 I/O Drawer	GS1280 Model 32 1 I/O Drawer	GS1280 Model 64 1 I/O Drawer
Idle/Operating, LwAd, B	7.1	6.9	7.4	7.6	7.7	7.9
Bystander pos., LpAm, dBA	51	53	55	57	58	60

NOTE: Current values for specific configurations are available. 1 B = 10 dBA

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