
**HP 3000 9X9/KS
and
HP 9000 K-Class Enterprise Servers**

**Site Preparation
and
Requirements Guide**



Copyright Hewlett-Packard Company 1996
All rights reserved.

Edition 1
E1196
A2375-90073
November 1996

Notice

The information contained in this document is subject to change without notice.

Warranty - A copy of the specific warranty terms applicable to your Hewlett-Packard product and/or replacement parts can be obtained from your local Sales and Service Office.

Hewlett-Packard makes no warranty of any kind with regard to this manual, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Hewlett-Packard shall not be liable for errors contained herein or for direct, indirect, special, incidental, or consequential damages in connection with the furnishing, performance, or use of this material. Specifications listed in this manual are subject to change without notice.

Copyright 1996 Hewlett-Packard Company.

Reproduction, adaptation, or translation without prior written permission is prohibited, except as allowed under the copyright laws.

Restricted Rights Legend - Use, duplication, or disclosure by the U.S. Government is subject to restrictions as set forth in sub-paragraph (c) (1) (ii) of the Rights in Technical Data and Computer Software clause in DFARS 252.227-7013

Hewlett-Packard Company
8000 Foothills Blvd.
Roseville, CA 95747

Rights for non-DOD U.S. Government Departments and Agencies are as set forth in FAR 52.227-19 (c) (1,2). All rights reserved.

Printing History

New editions are complete revisions of the manual. Update packages, which are issued between editions, contain additional and replacement pages to be merged into the manual by the customer. The dates on the title page change only when a new edition or a new update is published. No information is incorporated into a reprinting unless it appears as a prior update; the edition does not change when an update is incorporated.

Many product updates and fixes do not require manual changes and, conversely, manual corrections may be done without accompanying product changes. Therefore, do not expect a one-to-one correspondence between product updates and manual updates.

Edition 1November 1996

List of Effective Pages

The List of Effective Pages gives the date of the current edition and of any pages changed in updates to that edition. Within the manual, any page changed since the last edition is indicated by printing the date the changes were made on the bottom of the page. No information is incorporated into a reprinting unless it appears as a prior update.

AllNovember 1995

Preface

This Site Preparation and Requirements Guide contains site preparation information and technical information about HP 3000 Corporate Business Servers and the HP 9000 Enterprise Parallel Servers.

The HP 3000 9X9/KS and HP 9000 K-Class Enterprise Servers include the following model numbers:

HP 3000 Server Family				
939KS	959KS	969KS	969KS/x00	969KS/x20
979KS				
HP 9000 Enterprise Server Family				
K100	K200	K210	K220	K250
K260	K400	K410	K420	K450
K460				

Notice	ii
Printing History	iii
List of Effective Pages	iii
Preface	iv

Chapter 1 - Introduction

How To Use This Manual	1-1
Hewlett-Packard Service Organization	1-2
Sales Representative	1-2
Customer Engineer (CE)	1-2
Applications Engineer (AE)	1-2
Hewlett-Packard Site Preparation Services	1-4
Site Planning Visit	1-4
Site Verification Visit	1-4
Third Party Service	1-4
Customer Responsibilities	1-5
Local Codes	1-6
Data Communications Equipment	1-6
Selection of Site Personnel	1-7
Site Coordinator	1-7
Principal Operator	1-7
Site Planning Team	1-8

Chapter 2 - Site Preparation Guidelines

Site Preparation Guidelines	2-1
Site Planning Time Table	2-1
Preparing For Installation	2-2
Computer Site Safety Considerations	2-2
Fire Safety	2-2
Emergency Power Shut Off	2-2
Floor Plan	2-3
Computer Room Construction	2-4

Power Requirements	2-6
Line Voltage	2-7
PowerTrust UPS Power Requirements	2-7
Frequency	2-8
Dedicated Circuits	2-8
Safety and Dedicated Grounds	2-8
Receptacles	2-9
Power Line Transients and Noise	2-9
Sources of Electrical Interference	2-10
Convenience Wall Outlets	2-10
Lightning	2-10
Vibration	2-10
Electromagnetic Interference	2-11
Environmental Considerations	2-11
Flammable Materials	2-11
Airborne Contaminants	2-11
Temperature and Humidity	2-11
Electrostatic Discharge	2-12
Miscellaneous Requirements	2-13
Computer Supplies	2-13
Media Storage	2-13
Protection of Valuable Records	2-14
Telephone	2-14

Chapter 3 - Receiving The Computer System

Equipment Arrivals	3-1
Checking for Shipping Shortage and Damage	3-1
Unpacking the Cartons	3-2

Appendix A - Site Preparation Kit

Pre-Installation Worksheet	A-1
Space Planning Kit	A-3
Tables and Worksheets	A-6

Appendix B - Specifications

Introduction	B-1
Regulatory Standards	B-2
Specifications	B-3
Configurations	B-9
Cabinet Specifications	B-11
Powertrust UPS Specifications	B-13

Appendix C- Enterprise Parallel Server Considerations

Introduction	C-1
System Application Summary	C-1
Enterprise Parallel Server Configurations	C-2
Model EPS 22 Configuration	C-2
Model EPS 30 Configuration	C-2
Node Upgrade	C-3
Space Planning	C-4
Supported Configurations	C-8
Enterprise Parallel Server Configuration Worksheets	C-9

LIST OF FIGURES

Figure A-1 . Space Planning Grid Sheet.	A-4
Figure A-2 . System Cutouts	A-5
Figure C-3 . Space Planning Grid.	C-5
Figure C-4 . K-Class Equipment Profiles.	C-6
Figure C-5 . T-Class Equipment Profiles	C-7

LIST OF TABLES

Table 1-1 . Site Preparation Technical Tasks.	1-3
Table 2-2 . Power Requirements.	2-6
Table A-3 . Pre-Installation Activities.	A-1
Table A-4 . Shipment Schedule.	A-2
Table A-5 . Worksheet for Power Requirement Calculations.	A-6
Table A-6 . Worksheet for Heat Dissipation Calculations by Machine Type	A-7
Table A-7 . System Heat Dissipation Worksheet.	A-8
Table B-8 . Regulatory Standards.	B-2
Table B-9 . Environmental Specifications.	B-3
Table B-10 . Electrical Specifications.	B-5
Table B-11 . DC Voltage Specifications.	B-6
Table B-12 . Electromagnetic and Electrostatic Specifications.	B-7
Table B-13 . SPU Physical Specifications.	B-8
Table B-14 . HP 3000 - 939KS, 959KS, 929KS, 969KS/x00, & 969KS/x20 SPU Configurations.	B-9
Table B-15 . HP 9000 - K100, K200, K400, K210, K410, K220, & K420 SPU Configurations.	B-10
Table B-16 . HP 9000 - K250, K260, K450, & K460 and HP 3000 - 979KS SPU Configurations	B-10
Table B-17 . Cabinet Electrical Specifications.	B-11
Table B-18 . Cabinet Physical Specifications.	B-11
Table B-19 . Expansion Cabinets - Environmental Specifications.	B-12
Table B-20 . PowerTrust UPS Model Listing	B-13
Table B-21 . A2941A PowerTrust UPS Specifications.	B-14
Table B-22 . A2994A PowerTrust UPS Specifications.	B-16
Table B-23 . A2996A PowerTrust UPS Specifications.	B-18
Table B-24 . A2997A PowerTrust UPS Specifications.	B-21
Table B-25 . A2998A PowerTrust UPS Specifications.	B-24
Table C-26 . Worksheet for Power Requirement Calculations	C-9
Table C-27 . Worksheet for Heat Dissipation Calculations	C-10
Table C-28 . Heat Dissipation (Miscellaneous) Worksheet	C-11

Chapter 1 - Introduction

How To Use This Manual

This manual contains site preparation information for Hewlett-Packard HP 3000 9x9/KS and HP 9000 K-Class Enterprise Servers. Other site preparation resources may also be available to you. Consult with a Hewlett Packard Customer Engineer (CE) specializing in computer site preparations.

Proper site preparation and maintenance is vital to the reliability of any computer system. As our customer, it is your responsibility to ensure that the proper facility resources and conditions are maintained. This will allow Hewlett-Packard to provide support services in accordance with the "Customer Support Services Agreement."

The content of this manual is arranged as follows:

- **Chapter 1** - Is an introduction to Hewlett-Packard's service organization, site planning services, and outlines our site preparation responsibilities and those of our customers.
- **Chapter 2** - Contains site preparation and planning information specifically for HP 3000 9x9/KS and HP 9000 K-Class Enterprise Servers, and suggested topics that must be considered for larger computer system sites.
- **Chapter 3** - Contains information on receipt and installation of your computer.
- **Appendix A** - Contains worksheets space and installation planning.
- **Appendix B** - Contains installation planning specifications for the HP 3000 9x9/KS and HP 9000 K-Class Enterprise Servers.
- **Appendix C** - Contains Enterprise Parallel Server specific sites preparation information. This information complements the stand-alone information provided elsewhere in this manual.

Hewlett-Packard Service Organization

Each member of the Hewlett-Packard service organization is dedicated to making sure that each customer realizes maximum benefits from their computer. Brief descriptions of Hewlett-Packard service representatives and how they can assist you are contained in the following paragraphs. Table 1-1 summarizes a number of site preparation technical tasks and lists the personnel who should be responsible for completing each task.

The Hewlett-Packard service organization includes the following representatives:

Sales Representative

The Hewlett-Packard Sales Representative is the customer's primary point of contact. Each Sales Representative coordinates all of the Hewlett-Packard resources required to ensure a successful delivery and installation. The Sales Representative is also responsible for arranging for additional computer system capabilities (options) and staff training.

Customer Engineer (CE)

The Hewlett-Packard Customer Engineer (CE) is trained and experienced in computer equipment and peripherals service. They have the tools, parts, and knowledge to install and maintain Hewlett-Packard computer systems. The CE will assist you in determining your computer site preparation requirements.

Applications Engineer (AE)

The Hewlett-Packard Applications Engineer (AE) is a technical specialist for HP 3000 9x9/KS and HP 9000 K-Class Enterprise Servers and programming languages. The AE organization provides a host of training courses and technical consulting services in support of your computer system's languages, utility programs, data base management, and system performance.

Table 1-1. Site Preparation Technical Tasks.

Technical Tasks	Responsible Personnel
Line voltage measurement	Electrician and Customer Engineer (CE)
Line voltage measured	Electrician and Customer Engineer (CE)
Power line frequency measured (if required)	CE
Power line noise levels measured (if required)	CE
Neutral or ground noise/voltage levels measured	CE
Safety and ground connections verified	Electrician and CE
Advice on correct circuit breakers and wire size	Electrician and CE
Verification that maintenance power outlets (those used for floor cleaning, etc.) are on separate circuits from the computer system	Electrician and CE
Recommendations about lightning protection	CE
Measurements and recommendations on radiated interference	CE
Answers to questions concerning modems and modem options	Applications Engineer (AE)
Thermal load of HP equipment	CE
Thermal load of non-HP equipment	Customer and Equipment Vendor
Modifications to Existing Electrical Service	Electrician and Customer
Modifications to Existing Air Conditioning	A/C Contractor and Customer
Environmental Contaminants	CE and Environmental Engineer/Contractor
Placement of Equipment (For Service Access)	CE

Hewlett-Packard Site Preparation Services

The following paragraphs outline Hewlett-Packard's site planning and verification services.

Site Planning Visit

Upon receipt of a purchase order, a Hewlett-Packard Customer Engineer (CE) will make arrangements for an on-site meeting with your principal operator and electrician. As a part of this on-site meeting, the CE will discuss site planning and preparation needs including electrical, mechanical, and physical system requirements. If required, a Hewlett-Packard Site Preparation Specialist Engineer will be available for consultation. The forms in Section 2 of the Computer Products Site Preparation Resource Guide will be completed at this time.

As a result of this visit, a site layout plan agreeable to you and Hewlett-Packard will be created. All of your computer requirements and specifications are contained in either this manual or the Computer Products Site Preparation Resource Guide.

Site Verification Visit

A Hewlett-Packard CE or Site Preparation Specialist will verify that your site meets or exceeds your computer system's requirements and specifications prior to and during system installation. Sites failing to meet the system requirements and specifications may incur additional service charges.

Hewlett-Packard provides service under the conditions of the Computer Products Warranty & Installation Terms, Customer Support Services Agreement, Installation Support Plan, and on a time and materials basis. (See Section 1 of the Computer Products Site Preparation Resource Guide.)

Third Party Service

If an HP 3000 9x9/KS or HP 9000 K-Class Enterprise Server and/or applications software is purchased from a "third party vendor", that third party is responsible for providing consultation services on the system operation and applications software.

In the situation of a third party purchase, a maintenance agreement for hardware and an Account Management Service (AMS) for software are available directly from Hewlett-Packard.

Customer Responsibilities

The customer is responsible for scheduling, planning, and preparing a suitable environment for the installation and operation of a complete computer system. The Hewlett-Packard CE will be available to assist you throughout the planning and preparation for and the installation of your system.

Read the Site Planning and Warranty Information (Section 1) and the On-Site Customer Documents (Section 2) in the Computer Products Site Preparation Resource Guide. Pay particular attention to the contents of the Customer Responsibilities page in Section 1 and the forms contained in Section 2. (The forms in Section 2 will be completed as the site planning/preparation and equipment installation progresses.)

The HP 3000 9x9/KS and HP 9000 K-Class Enterprise Servers are primarily designed to be installed and operated in computer room environments. If computers are new to your site, you will need to pay particular attention to the following items:

- Local building codes
- Local electrical codes
- Local safety codes
- Space and weight limitations/system accessibility
- Environmental requirements (temperature, humidity, etc.)
- Electrical and grounding requirements

If your computer is to be installed in an existing computer room, you should analyze the following items and integrate them into your site plan:

- Available space
- Environmental requirements
- Electrical requirements

Local Codes

Special local codes exist in some locations regulating the installation of computer equipment. The customer is responsible for making sure their computer system installation is in compliance with all local laws, regulations, and codes for mechanical, building, and electrical distribution systems prior to system installation. The Hewlett-Packard CE can assist you in determining your local regulations.

Data Communications Equipment

The customer is responsible for ordering and installing all required data communications equipment such as:

- Any hardware or cables for connection or installation of data communications equipment
- Network Links
- Telephone equipment
- Modems (Consult with CE for Hewlett-Packard requirements.)
- Equipment supplied by companies other than HP

NOTE

Communications equipment at the computer site is not part of the computer and must be considered separately for power, space, interface cables, and cooling requirements.

Selection of Site Personnel

Depending on the complexity of the computer system, the customer is responsible for selecting a Site Coordinator, Principal Operator, and a Site Planning Team. Depending on customer requirements, the Principal Operator may or may not perform all of these tasks. In some installations there may be two or three people assigned to the various “operator” responsibilities.

Site Coordinator

The Site Coordinator is responsible for the following tasks:

- Establishing and maintaining site preparation schedules
- Coordinating construction efforts
- Primary liaison with Hewlett-Packard representatives

Principal Operator

The Principal Operator is responsible for the following tasks:

- System operation
- Monitoring site preparation
- Ordering computer supplies
- Scheduling user training
- Maintaining maintenance schedules

Site Planning Team

The Site Planning Team is responsible for the following tasks:

- Determining site location and size
- Reviewing construction requirements
- Reviewing local codes
- Reviewing insurance requirements
- Scheduling all events related to site completion

Members of the Site Planning Team should include the Site Coordinator, Principal Operator, Hewlett-Packard CE, electrical contractor, a site construction coordinator (familiar with local electrical codes), and an air conditioning specialist.

Chapter 2 - Site Preparation Guidelines

Site Preparation Guidelines

This chapter provides specific site preparation guidelines for the HP 3000 and HP 9000 Enterprise Servers. The Hewlett-Packard CE will assist you in advance as the Site Planning Summary is completed.

Site Planning Time Table

The guidelines below are a summary of the Pre-Installation Worksheet in Appendix A of this manual. The worksheet should be used to monitor the progress of pre-installation preparation. Since the time from placing an order to actual delivery can vary, it is suggested that you confer with your Hewlett Packard CE and sales representative, your electrician, and others to determine the best estimated delivery dates for the preparation of your site.

The following are four items that may require several weeks lead time:

- Arranging for an electrician
- Adding air conditioning
- Building alterations
- Placing orders for data communications equipment

Due to potential delays, Hewlett-Packard recommends that the suppliers of the above services be contacted as soon as possible after your computer system has been ordered.

There are three items that may require up to six weeks lead time:

- Assigning your Principal Operator and scheduling a site planning visit with the Hewlett-Packard CE to answer your questions about site preparation.

<p style="text-align: center;">NOTE</p>
--

<p style="text-align: center;">To schedule a site planning visit, three days advance notice is required.</p>
--

- Selecting an appropriate system location and planning the physical arrangement of the system, including any related furniture.
- Ordering any consumable supplies, including any appropriate storage mediums (i.e., flexible discs, tape cartridges, magnetic tapes, etc.).

Preparing For Installation

The following paragraphs contain information to help you properly plan for the arrival and installation of your computer system.

Computer Site Safety Considerations

The two major safety considerations for any computer site are fire safety and emergency power shut off (electrical). When considering safety precautions, emphasis should be exercised on all matters concerning personnel and equipment. The Hewlett-Packard CE, your insurance carrier, and local building inspectors can advise you on these matters.

Fire Safety

When considering fire safety, the customers insurance carrier should be consulted for suggestions and recommendations as to the adequacy of existing or proposed fire control systems. If a new site is to be built or an existing structure modified, consult local building codes for fire prevention and protection. Also, consult with the Hewlett-Packard CE and local fire inspector for additional information.

Emergency Power Shut Off

The computer system power panel should include a shunt-trip wired to an emergency shut-off switch and a thermostat device. This is for deactivating all equipment power in case of an emergency or in case room temperature exceeds safe operating conditions. Refer to Section 3 of the Computer Products Site Preparation Resource Guide for additional information.

Floor Plan

Hewlett-Packard recommends that a floor plan be prepared showing the overall location and arrangement of your computer system components. Enough space should be provided for people to work efficiently on a daily basis and for periodic servicing of the equipment. A three-foot clearance in front and in back of each major computer system component usually satisfies this requirement.

Select a location that can accommodate the addition of more equipment as your requirements increase. Be sure to consider interconnecting cable and power cord lengths when planning your layout. Identify the location of all power outlets on your floor plan. Plan to keep cables away from traffic paths to prevent accidents and equipment failures. Hewlett-Packard strongly discourages the use of power extension cords with computer system components.

CAUTION

Hewlett-Packard strongly discourages the use of carpeting, including so called anti-static varieties, within 20 feet (6.0 meters) of the computer system. If this advice is not followed, you should place static discharge mats where computer operators and/or service personnel *must* walk across them before touching any part of the computer system. Failure to comply with this precaution can result in equipment damage through static discharge.

The Space Planning Kit, in Appendix A of this manual, can be used to plan a physical layout. The kit contains scaled views of the computer cabinet, typical Hewlett-Packard computer system peripherals, typical computer room equipment/furniture, and a scaled grid layout that can be used to develop your floor plan. Remember to plan the layout to satisfy both your current and future system requirements.

Computer Room Construction

If you are planning to construct a new computer room or modify an existing site, first consult with your Hewlett-Packard representatives and local contractors. Remember to plan the site with future expansion in mind so that equipment can be added without disrupting the computer system's operation.

The computer room floor must be able to support the total weight of your computer system as well as the localized weight at each caster or foot of the equipment cabinets. The most common method of preparing an adequate floor for a computer room is to construct a raised floor over the building floor. This method spreads weight more evenly, provides an area through which interconnecting cables can be run conveniently and unobtrusively, and allows optimum distribution of conditioned air.

To estimate floor strength requirements, you should consider the following items:

- Total weight of your computer (the crated and uncrated weights of the computer are listed in Appendix B of this manual).
- Total weight of your computer system's peripherals. (The System Configuration Table in Section 2 of the Computer Products Site Preparation Guide contains a list of your system's peripherals. Your Hewlett-Packard Sales Representative and CE can assist you in determining peripheral weights.)
- Total weight of furniture such as desks, chairs, tables, cabinets, etc. (Refer to your floor plan and estimate furniture weights.)
- Total approximate weight of computer room personnel.
- Weight of moving equipment (i.e., forklifts, transport dollies, etc.).

Office building floors are usually rated at 50 pounds per square foot (244 kilograms per square meter) with an additional allowance of 20 pounds per square foot (98 kilograms per square meter) for partitions. If you are planning for a large computer system, your computer room floor and/or raised floor must be able to support 100 pounds per square foot (488 kilograms per square meter). Any questions regarding the adequacy of floor construction should be referred to and evaluated by a qualified structural engineer.

CAUTION

In addition to determining the adequacy of the computer site floor, ensure that all floors, stairs, and elevators which might be used when the computer equipment is moved to its destination can support the weight of both the computer equipment and the moving equipment. Failure to comply can result in damage to the computer equipment.

If you are planning to construct a raised floor, first consult with the Hewlett-Packard CE. The preferred height for a raised floor above the main floor is 12 inches (30 centimeters) and the height should not be less than 4.5 inches (11 centimeters).

WARNING

If metal is used to construct the raised floor, ensure that there is a common ground connection between the raised floor and main floor to avoid possible build up of different voltage potentials. Failure to comply can result in serious injury to personnel and/or damage to equipment.

Power Requirements

The most important installation considerations are for power requirements. The basic power requirements for the HP 3000 and HP 9000 Enterprise Servers are listed in Table 2-2. (Additional power specifications are contained in Appendix B of this manual.) Also, refer to Section 3 of the Computer Products Site Preparation Resource Guide. Your Hewlett-Packard Sales Representative and CE can assist you in determining peripheral power requirements.

Table 2-2. Power Requirements.

Line Voltage	90-127 VAC or 200-240 VAC <i>(Nominal)</i>
Line Frequency	50-60 Hz \pm 5%
Voltage Waveform Harmonic Distortion	<5%
Recommended Circuit Breaker Rating	30 Amps ⁱ <i>(motor start rating)</i>

i. 20 Amps for: HP 9000 Models K100, K200, K210, K220, K400, K410, & K420 and HP 3000 Models 929KS, 939KS, 959KS, 969KS/x00, and 969KS/x20

NOTE

Some systems require single-phase power. Single-phase power may be obtained by making power connections in one of the following ways:

- Line-to-neutral: 200-240 Volts (One hot (phase) wire and a neutral).
- Line-to-line: 200-240 Volts. Connect across two phase (hot) wires.

Line Voltage

The AC line voltage available from a wall outlet is determined by the local electrical power provider and the building power distribution network. Voltages outside the operating range of the system can cause system errors, or a system shutdown. If required, the Hewlett-Packard CE along with your electrician can determine the line voltage and make recommendations. Avoid the use of a line voltage conditioner.

NOTE

Make sure that there are enough wall outlets at the correct voltage to support the entire system including its PowerTrust UPS if so equipped. See “PowerTrust UPS Power Requirements” below.

PowerTrust UPS Power Requirements

Each PowerTrust UPS installed in the computer system’s expansion cabinet(s) requires an AC power source that meets the specifications in Table 2-2. Ensure that there are enough AC power sources to match the number of PowerTrust UPSs in the system.

If PowerTrust UPSs are to be added to an existing system, each expansion cabinet in which a PowerTrust UPS is installed must be provided with its own 30A power source which meets the specifications in Table 2-2. This 30A source for the UPS is *in addition to* the original 20A source for each expansion cabinet.

CAUTION

It is recommended that you do not place intervening power conditioning equipment between the PowerTrust UPS and the AC mains power source. Some power conditioning equipment can interact with the PowerTrust unit and cause faulty operation.

Frequency

AC Line frequency is normally determined by your local power provider. In some cases, electrical power is supplied by a customer's motor-generators. Shifts in AC line frequency can cause system errors or terminal display "jitter". Your Hewlett-Packard CE can monitor the frequency of the input AC line power and make recommendations, if required.

Dedicated Circuits

The HP 3000 and HP 9000 Enterprise Servers require dedicated circuits or individual branch circuits (separate circuit breakers). This ensures that there are no other devices trip the circuit breaker and ensures that there is sufficient power to run the system.

The ampere load of each circuit breaker should be designed to allow a margin for system start-up surge current. Refer to Section 3 of the Computer Products Site Preparation Resource Guide and consult with the Hewlett-Packard CE, to determine the circuit breaker requirements for your installation.

Safety and Dedicated Grounds

The primary reason for grounding electrical systems is safety. The safety ground is required by the National Electrical Code (USA) and most other local, regional, and national codes. In addition to the safety ground, Hewlett-Packard requires that a dedicated (earth reference) ground be installed as a common reference point for all system components.

Basic principles of safe and effective grounding for any Hewlett-Packard computer system are illustrated in Section 2 of the Computer Products Site Preparation Resource Guide. Consult with your Hewlett-Packard CE and electrician to ensure that your system meets all national and local codes.

Receptacles

When receptacles are used to connect system components to AC power, the receptacles must include a dedicated ground connection that is insulated from the receptacle box. It is important that the receptacle box be grounded with an additional ground connection that is non-dedicated. (The additional ground can be a hard metal conduit.)

When installing receptacles, ensure that each receptacle has its own neutral (if required) and ground. Using the same neutral or ground for more than one circuit will cause voltage loss, heat problems, and can result in a fire hazard. A shared neutral conductor that fails open-circuit will result in possible over-voltage damage to equipment.

Computer equipment power cord and plug requirements also vary from country to country. Unusual power cords and plugs that cannot be ordered must be fabricated by a qualified electrician to meet local safety codes and requirements.

Power Line Transients and Noise

Heavy electrical loads from nearby machinery or equipment (i.e., elevators or electric welders) can cause power transients and noise which may cause system errors. This can occur even if the other equipment is on a separate circuit breaker. Under these conditions, you should provide a separate (completely independent) power panel. This should have an isolated ground and separate circuit breaker and be fed directly from the main building power source or a secondary power source. See the Computer Products Site Preparation Resource Guide, Section 3, for additional information.

Your Hewlett-Packard CE can monitor your power line for electrical noise and transients. If found, they can make appropriate recommendations concerning the use of line conditioning devices.

Sources of Electrical Interference

Convenience Wall Outlets

Power outlets for building maintenance equipment (i.e., vacuum cleaners, floor buffers, etc.) must be wired from circuit breakers on a power panel *completely separate* from the computer system panel. The ground connections from these outlets must be connected to a building power distribution panel; *not* the computer system ground. Your electrician can verify whether maintenance outlets are on separate panels and grounds.

NOTE

If a separate power source and ground are not provided, operation of janitorial equipment can induce electrical noise and cause abnormal operation of the computer system.

Lightning

In some geographical areas, it may be advisable to install lightning protection for safety of personnel and to protect computer systems. In the United States (USA), the installation of lightning or surge arrestors on power and communication lines is described in the National Electrical Code, Article 280.

The principles of lightning protection and personnel safety are outlined in detail in the lightning protection code contained in the National Fire Protection Association (NFPA) Handbook. The Hewlett-Packard CE can make lightning protection equipment recommendations.

Vibration

Continuous vibration can cause a degradation of mechanical parts. Vibration can cause data losses on disc drives. Mechanical connections on printed circuit assemblies, connectors, cables, and backplane wiring can also be adversely affected by vibration.

If you suspect that vibration may be a problem at your computer site, contact your Hewlett-Packard CE or local sales office for assistance.

Electromagnetic Interference

The HP 3000 and HP 9000 Enterprise Servers are specifically designed to reduce their susceptibility to radiated and conducted interference. Electromagnetic interference can cause a variety of computer system problems. The Hewlett-Packard CE can advise you about many of the most common causes of electromagnetic interference.

Environmental Considerations

NOTE

There are different environmental requirements for each peripheral that can be used in your computer system. When you add peripherals, refer to the peripheral's associated data sheets to determine its environmental specifications.

Flammable Materials

Fundamental safeguards for computer systems should include a site well away from any sources of potential damage. The system should not be installed or operated in an environment where there is a risk of fire or explosion due to the existence of highly flammable gases, volatile liquids, or combustible dust.

Airborne Contaminants

Airborne contaminants and particles of a certain size and hardness can damage your computer system, particularly disc drives. Corrosive gases and/or solvent vapors such as those from liquid spirit duplicating equipment and wet-process photo copiers can also cause damage. Some of the most common contaminants are dust, smoke, ash, eraser debris, food crumbs, and salty air.

The Hewlett-Packard CE can assist you in determining whether or not you need be concerned about airborne contamination. If contamination is known or suspected, Hewlett-Packard will be available for consultation.

Temperature and Humidity

Temperature and humidity specifications for the HP 3000 and HP 9000 Enterprise Servers are contained in Appendix B of this manual. A good rule of thumb is to avoid extremes of either temperature or humidity at your computer site.

Temperature - The computer cabinet and expansion bay cabinet are air cooled with fans bringing cool air into the equipment, circulating it, and then exhausting whatever heat is generated into the room. To ensure that airflow is not impeded, do not place the cabinets closer than three feet to walls or obstructions.

The computer system operates most reliably if room temperature is maintained between 68 and 77 degrees Fahrenheit (20 and 25 degrees Celsius). Appendix A of this manual contains computer/expansion bay heat dissipation information to assist you in determining your air conditioning requirements. Refer to Section 3 of the Computer Products Site Preparation Resource Guide for additional air conditioning information. The Hewlett-Packard CE can assist you in determining the heat dissipation of recommended system peripherals.

Humidity - The computer and expansion bay humidity specifications are contained in Appendix B of this manual. High humidity levels can cause improper feeding and stacking of printer paper and/or improper system equipment operation. Extremely low humidity levels aggravate problems of static electricity. Refer to Section 3 of the Computer Products Site Preparation Resource Guide for additional information.

Electrostatic Discharge

If there is an abnormally high level of static electricity at your computer system's location (15 KV or higher), personnel will probably be "sparking" upon contact with the equipment. Carpeting and/or low humidity will probably be the source of static electricity, especially in dry and cold climates. Static electricity can often be significantly reduced by using a humidifier. (Hewlett-Packard recommends a heat evaporating type humidifier and strongly recommends against using a cold water atomizer type humidifier.

Other ways to minimize electrostatic discharge are by using specially grounded mats in front of the computer system or by treating carpeting with anti-static spray. Anti-static spray is not recommended because it finds its way into the system intake filter and tends to coat the circuitry. If spray is used, it should be applied while the system is turned off. Refer to Section 3 of the Computer Products Site Preparation Resource Guide for additional information.

Miscellaneous Requirements

The following paragraphs contain information not directly related to the computer system's installation process, but each category should be considered in your planning. Your Hewlett-Packard Sales Representative can help you determine what supplies you will require and the CE can help you with decisions concerning storage, record protection, and telephone support.

Computer Supplies

Ask your Hewlett-Packard Sales Representative for a catalog of available supplies such as printer paper, printer ribbon, ink cartridges, plotter paper, tape cartridges, etc.

Media Storage

You should make provisions for storing disc packs, tape cartridges, magnetic tape, and flexible discs in or near the area where the work is to be performed. The magnetic media storage environment should be similar to that of the computer; clean and dust free with no exposure to extremes of heat or cold.

Extreme humidity or temperature differences between the working and storage areas can alter the size of the media when it is moved from one area to the next. This rapid change can result in warping; the most common media related computer system problem.

If your working and storage areas cannot be kept at the same humidity and temperature, allow ample time (usually one hour or longer) for the media to achieve a moisture and temperature balance before using. The maximum rate of temperature change for the media must not exceed 36 degrees Fahrenheit (20 degrees Celsius) per hour.

Data on magnetic media can be erased by magnetic fields. These magnetic fields are found in power generating equipment such as motors, alternators, transformers, and data processing equipment (disc drives). Do not place disc cartridges, tape cartridges, or flexible discs on top of disc drives or power generating devices.

Protection of Valuable Records

Safeguards should be taken to protect business records and any other information that is either very expensive or impossible to duplicate. Duplicate or master records should be maintained so that vital information can be retrieved quickly in case of an accident. Copies of vital data should be stored well away from the computer area; normally in some type of fireproof storage device.

A regular updating process should be put into place to ensure that the value of the stored information is maintained. Electronic data processing insurance is also available to cover both hardware and software. Contact your local Hewlett-Packard Sales and Service office for details.

Telephone

You should plan to install a telephone with a long cord near your computer system to expedite consultations with Hewlett-Packard Sales Representatives, CEs, AEs, and Response Center personnel. Additional phone lines, appropriately placed, should be planned if a remote support modem is to be installed with your computer system. Remote support allows system problems to be diagnosed from a remote location via the telephone lines.

NOTE

Check with your local telephone company to be sure the telephone service at the site can accommodate modem/data quality transmission.

Chapter 3 - Receiving The Computer System

Equipment Arrivals

All Hewlett-Packard equipment is delivered directly from its point of manufacture. Hewlett-Packard coordinates the shipment of equipment from all locations so that it arrives at your site at approximately the same time.

In some cases, factors beyond the control of Hewlett-Packard may cause delivery delays. If all equipment is not received within a two week period, notify your Hewlett-Packard Sales Representative. The Sales Representative will trace your order and expedite delivery completion.

Checking for Shipping Shortage and Damage

As shipments arrive, check the carrier's "Bill of Lading" carefully to ensure that every item shipped by Hewlett-Packard is delivered. Notify the carrier immediately if there are any items missing.

Inspect all of the shipping containers for signs of damage before actually unpacking any of the equipment. Some typical signs of shipping damage are dents, scratches, cuts, or water marks. If any damage is found, note on the Bill of Lading that there is "Apparent damage subject to inspection" and arrange for both the carrier's representative and the Hewlett-Packard CE to be present when the item is unpacked.

Regardless of the circumstances, the Hewlett-Packard CE will take immediate action to replace any damaged parts without waiting for the settlement of claims.

Unpacking the Cartons

The equipment cartons can be unpacked at your convenience, but it is the customer's responsibility to have the equipment unpacked and moved to its proper installation location prior to the actual day of installation. You should consider providing additional insurance to cover moving the system equipment from the receiving area to its installation site.

Locate the packing list (invoice) for each carton that is to be unpacked and ensure that each item on the list can be accounted for. Contact your Hewlett-Packard Sales Representative immediately if there are any missing items or if the items received are not the same as you ordered.

Leave the sealed cartons containing, system tapes, cables, and installation hardware intact for the Hewlett-Packard CE.

Locate and refer to the CS 99x Family, CS 890/T-Class Family Installation Guide (HP Part Number A1809-90001) for the HP 3000 Corporate Business Systems and HP 9000 Corporate Business Servers for specific unpacking and inspection procedures.

Locate and refer to the installation manual associated with each system peripheral for specific unpacking and inspection procedures.

Appendix A - Site Preparation Kit

This Appendix contains the following information:

- Pre-installation Worksheet
- Space Planning Kit
- System power requirements and heat dissipation worksheets

Hewlett-Packard recommends that you copy the worksheets before you begin using them. Then, if more copies are needed in the future, you will have an unmarked copy of the worksheets available.

Pre-Installation Worksheet

Table A-3. Pre-Installation Activities.

Timing	Activity	✓	Date
6 weeks before installation	Select the location for the system. Use the Site Preparation Guide to satisfy any requirements to ensure the site is ready when the system arrives.	<input type="checkbox"/>	
	Assign a person the responsibility of system principal operator.	<input type="checkbox"/>	
	Plan the physical arrangement of the system and its peripherals. The space planning kit allows you to plan details before the system arrives.	<input type="checkbox"/>	
	Order supplies that are required for uninterrupted operation of the system (consumable supplies).	<input type="checkbox"/>	
At system delivery	Inspect each shipment as it is delivered. Note comments and dates in shipment schedule.	<input type="checkbox"/>	
	When all equipment arrives, contact the CE to schedule the installation and verify that the site meets the system requirements. Installation will be scheduled within three working days after Hewlett-Packard has been contacted.	<input type="checkbox"/>	
System installation	Arrange for the system manager to assist the CE with the installation process.	<input type="checkbox"/>	

Table A-4. Shipment Schedule.

Equipment Type	Scheduled Ship Date	Arrival Date	Comments
Computer			
Printer			
Terminal			
Disk Drive			
Tape Drive			
Peripherals or other equipment			

Space Planning Kit

The top view of the system components are drawn to scale and can be used for designing the floor plan for the system. When cut out and used on a scaled drawing of the computer site, the cutouts can be arranged to help determine the best room arrangement. The next page is a sheet of grid paper drawn to the same scale. It can be used to prepare the scale drawing of the proposed system. Use the grid and cutouts as follows:

- On the grid sheet, draw the room (walls, electrical outlets, immovable objects, floor vents, etc.) where the computer will be located.

NOTE

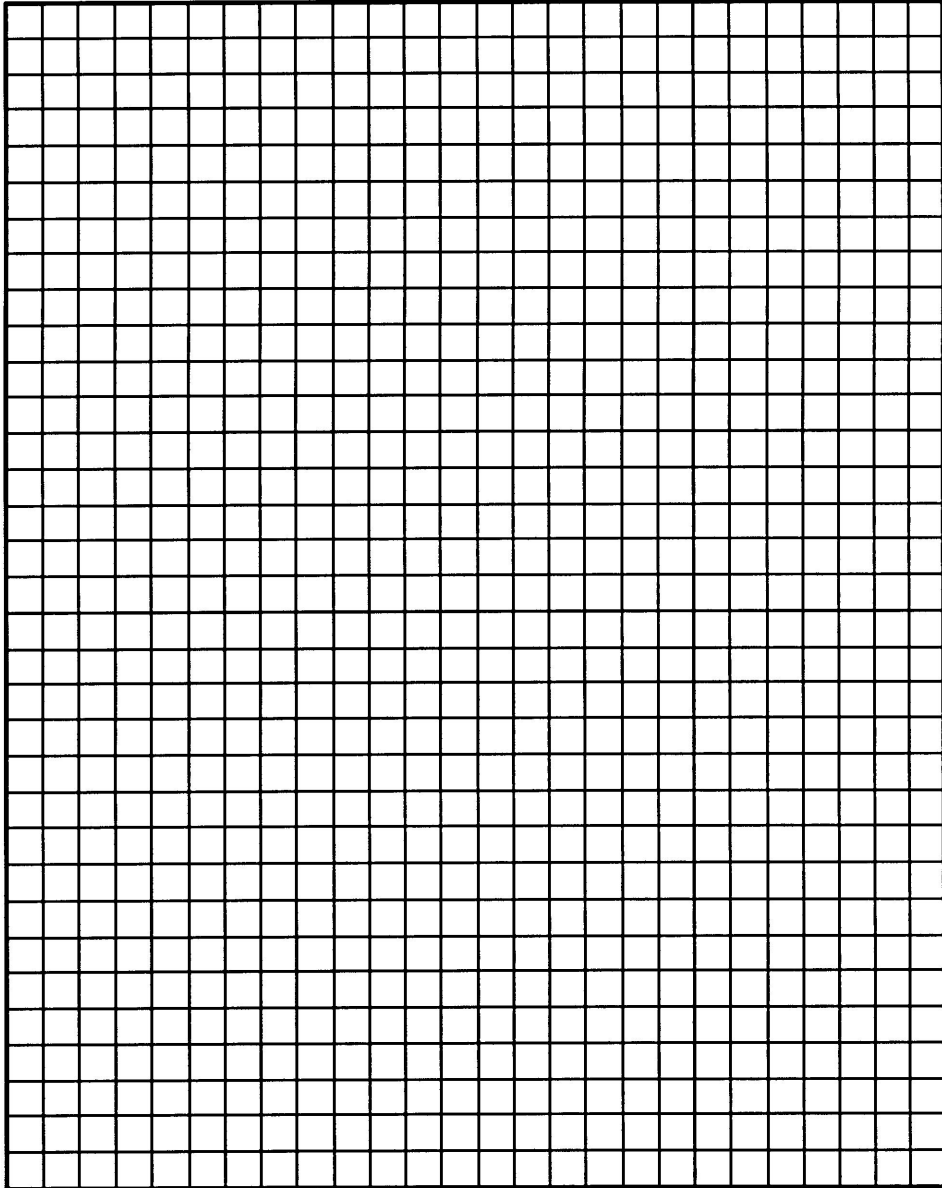
The grid is $\frac{1}{4}$ inch = 1 foot (6.35 mm = 30.48cm) scale.

- Cut out the models required to represent the system ordered. Include any office furniture that will be used.
- Move the cutouts about on the grid to determine the best room arrangement

NOTE

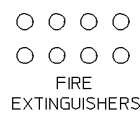
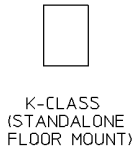
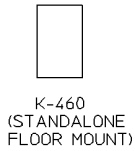
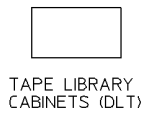
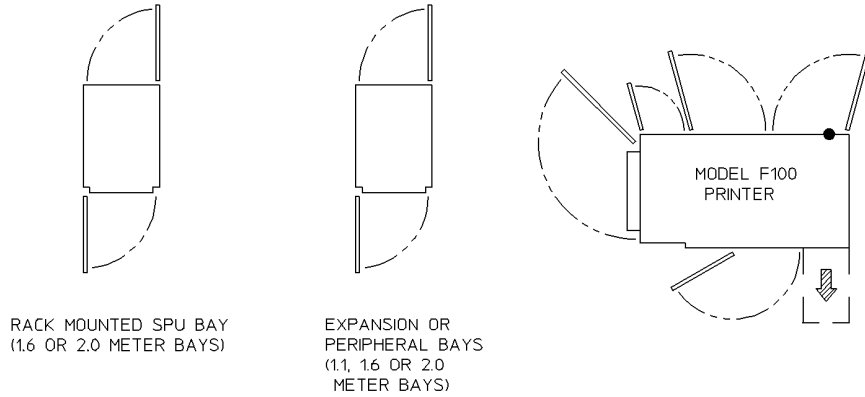
Be sure to allow room for maintenance in the front and back of the equipment/cabinets. Avoid placing the computer system cabinets over floor vents. Air flow from such vents could interfere with the cooling arrangement of the computer system.

- Cabling is required between the computer and each peripheral. Mark each cable's path and indicate its necessary length.



LG200001_008

Figure A-1. Space Planning Grid Sheet.



● POWER CABLE POINT OF ENTRY

Figure A-2. System Cutouts

SCALE: 0.25 INCH = 12 INCHES
(6.35 MM = 30.48 CM)

khsp100a

Tables and Worksheets

Use Table A-5 to calculate the system's power requirements. Depending on the component combination used, the power requirements differ between systems. Have an electrician double check the calculations. The specifications in the following tables should be taken directly from the service manual of each specific equipment

Table A-5. Worksheet for Power Requirement Calculations.

Equipment Type	Product Number	Voltage (V)	Amperage (A)	Number of Machines (B)	Total Amperage (A x B)
Computer					
Expansion Cabinet					
Disk Drive					
Mag Tapes					
Printers					
Terminals					
Other					

Use Table A-6 to calculate the system's heat dissipation. Depending on the component combination used, the air conditioning requirements differ between systems.

Table A-6. Worksheet for Heat Dissipation Calculations by Machine Type

Equipment Type	Product Number	Watts (W)	BTU/hr	Number of Machines (B)	Total Heat Dissipation
Computer					
Expansion Cabinet					
Disk Drive					
Mag Tapes					
Printers					
Terminals					
Other					

To account for the heat dissipation by accessory equipment, lights, and people, complete Table A-3 using the following guidelines:

- Consider the heat dissipated by special interface equipment (supplied by other vendors) as well as that produced by auxiliary equipment such as electric typewriters or any other electronic instruments. For these values, consult the appropriate vendors documentation.
- Estimate the heat produced by the lights used to illuminate the facility.
- Calculate the heat dissipation of all individuals working within the site. A reasonable estimate is approximately 176 Watts/hr (600 BTU/hr) per person.

- Make allowances for heat dissipation by equipment to be added during any planned future expansion.
- Calculate the heat dissipated by any other factors not considered above. These factors include situations particular to the site and room loss factors.

Table A-7. System Heat Dissipation Worksheet.

Factor	BTUs/Hour (Watts)
System Heat Dissipation	
Site Variables	
Interface Auxiliary Equipment	
Lights	
Personnel	
Future Expansion	
Other Factors	
Total Heat Dissipated	
Total heat dissipation in tons of AC (1 ton = 12,000BTU)	

Appendix B - Specifications

Introduction

This appendix contains regulatory, electrical, physical, and environmental specifications and information for HP 3000 and HP 9000 Enterprise Servers, the A1884A/A1897 Expansion Cabinet, and the external HP-PB I/O card cage.

The information in this chapter is arranged in the following order:

- Regulatory Standards
- SPU Electrical Specifications
- SPU Physical and Environmental Specifications
- SPU Configurations Used to Calculate Line Current, Power Consumption, and Heat Dissipation Specifications
- SPU Configurations Used to Calculate Line Current, Power Consumption, and Heat Dissipation Specifications
- Expansion Cabinet Electrical Specifications
- Expansion Cabinet Physical Specifications
- Expansion Cabinet Environmental Specifications
- A2941A (600 VA) PowerTrust UPS Specifications
- A2944A (1300 VA) PowerTrust UPS Specifications
- A2996A (1.3 KVA) PowerTrust UPS Specifications
- A2997A (1.8 KVA) PowerTrust UPS Specifications
- A2998A (3.0 KVA) PowerTrust UPS Specifications

Regulatory Standards

The HP 3000 and HP 9000 Enterprise Servers comply with the regulatory standards in Table B-8.

Table B-8. Regulatory Standards.

	Specification	Certification	Country
SAFETY	CSA C22.2 No. 950	CSA Certified	Canada
	IEC 950	HP Verified	International
	EN 60 950	HP Verified	European Community
	EMKO-TUE(74)203/91	HP Verified	Nordic Countries
	UL 1950	UL Listed	U.S.
EMI	FCC Part 15, Class A	HP Verified	U.S.
	EN 55 022 Class A	HP Verified	European Community
	CISPR 22 Class A	HP Verified	International
	VCCI Type 1	VCCI Registered	Japan
EM IMMUNITY to EN 50082-1:1992 as indicated:	IEC 801-2:1991/pr EN 55024-2:1992 Air Discharge 8 kV Contact Discharge 4 kV	HP Verified	European Community
	IEC 801-3:1984 pr EN 55024-3:1991 <i>Radiated Immunity</i> 3 V/m	HP Verified	European Community
	IEC 801-4:1988/pr EN 55024-4:1992 <i>Electrical Fast Transients:</i> 1 kV Power Line 0.5kV Signal Line	HP Verified	European Community

Specifications

The following tables contain the environmental, electrical, and physical specifications for the HP3000 and HP 9000 Enterprise Server systems.

Table B-9. Environmental Specifications.

Description	Specification	
	HP 9000 - K100, K200, K210, K220, K400, K410, & K420 HP 3000 - 929KS, 939KS, 959KS, 969KS/x00, & 969KS/x20	HP 9000 - K250, K260, K450, & K460 HP 3000 - 979KS
Operating Temperature	5° to 40° C (41° to 104° F)	5° to 40° C (41° to 104° F)
Non-operating Temperature	-40° to 65° C (-40° to 149° F) <i>(without internal tape media device)</i> -40° to 45° C (-40° to 113° F) <i>(with internal tape media device)</i>	-40° to 65° C (-40° to 149° F) <i>(without internal tape media device)</i> -40° to 45° C (-40° to 113° F) <i>(with internal tape media device)</i>
Temperature Rate of Change	20° C (36° F)/hr. <i>(with no internal tape media device)</i> 10° C (18° F)/hr. <i>(with internal tape media device)</i>	20° C (36° F)/hr. <i>(with no internal tape media device)</i> 10° C (18° F)/hr. <i>(with internal tape media device)</i>
Over Temperature 1st Warning	35° C (95° F)	35° C (95° F)
Over Temperature 2nd Warning	40° C (104° F)	40° C (104° F)
Over Temperature Shutdown	43° C (109° F)	43° C (109° F)
Operating Humidity Range	15% to 80% Relative Humidity <i>(Non-condensing at 26° C (79° F) with internal tape media device)</i>	15% to 80% Relative Humidity <i>(Non-condensing at 22° C (72° F) with internal tape media device)</i>
Non-operating Humidity Range	5% to 90% Relative Humidity <i>(Non-condensing at 65° C (149° F))</i>	5% to 80% Relative Humidity <i>(Non-condensing at 65° C (149° F))</i>
Relative Humidity Change Rate	30% Relative Humidity Change/Hr <i>(Maximum)</i>	30% Relative Humidity Change/Hr <i>(Maximum)</i>

Table B-9. Environmental Specifications. (Continued)

Description	Specification	
	HP 9000 - K100, K200, K210, K220, K400, K410, & K420 HP 3000 - 929KS, 939KS, 959KS, 969KS/x00, & 969KS/x20	HP 9000 - K250, K260, K450, & K460 HP 3000 - 979KS
Operating Altitude Range	0 to 3048 m (0 to 10,000 ft.) <i>above sea level</i>	0 to 3048 m (0 to 10,000 ft.) <i>above sea level</i>
Non-operating Altitude Range	0 to 4572 m (0 to 15,000 ft.) <i>above sea level</i>	0 to 4572 m (0 to 15,000 ft.) <i>above sea level</i>
Heat Dissipation	4263 BTU/hr (<i>Maximum Load</i>)	5846 BTU/hr (<i>Maximum Load</i>)
Acoustics	Deskside (LwA) = <4.7 Bel at < 31° C (<88° F) <5.1 Bel at <31° C (<88° F) Operator Post = 45 dB-LpA no prominent tone Racked System (LwA) = <5.5 Bel at < 31° C (<88° F) <5.1 Bel at <31° C (<88° F)	Deskside (LwA) = <4.7 Bel at < 31° C (<88° F) <5.1 Bel at <31° C (<88° F) Operator Post = 45 dB-LpA no prominent tone Racked System (LwA) = <5.5 Bel at < 31° C (<88° F) <5.1 Bel at <31° C (<88° F)
Safety	UL Listed to UL1950 CSA Certified to CSA C22-2 No. 950 TUV GS Mark, compliant with EN60950, and EN41003	UL Listed to UL1950 CSA Certified to CSA C22-2 No. 950 TUV GS Mark, compliant with EN60950, and EN41003

Table B-10. Electrical Specifications.

Description	Specification	
	HP 9000 - K100, K200, K400, K210, K410, K220, & K420 HP 3000 - 939KS, 959KS, 929KS, 969KS/x00, & 969KS/x20	HP 9000 - K250, K260, K450, & K460 HP 3000 - 979KS
AC Input Voltage Range ⁱ	100 to 127 VAC or 200 to 240 VAC	90 to 143 VAC or 180 to 269 VAC
AC Input Line frequency ⁱ	50 to 60 Hz	50 to 60 Hz
AC Input Current	12.5 A (max load at 100 VAC) 10.5 A (max load at 120 VAC) 6.0 A (max load at 200 VAC)	19.5 A (max load at 100 VAC) 16.0 A (max load at 120 VAC) 10.0 A (max load at 200 VAC)
AC Inrush Current	16 A peak, one cycle	48.65 A peak @ 140 VAC/60Hz
AC Input Power	1250 VA maximum	1700 VA maximum
Power Supply Output Rating	925 watts DC continuous	1200 watts DC continuous
Holdup without system reset	25ms at 50/60Hz (1 cycle, or 500ms)	20ms at 50/60Hz (1 cycle, or 500ms)
Battery Backup Time	15 minutes <i>With optional external PowerTrust UPS. Without the optional UPS there is no battery backup.</i>	15 minutes <i>With optional external PowerTrust UPS. Without the optional UPS there is no battery backup.</i>

i. The power supply auto-ranges to the AC voltage and frequency. It does not have to be reconfigured to operate over its rated operating ranges.

Table B-11. DC Voltage Specifications.

Minimum Voltage	Maximum Voltage	Minimum Current	Maximum Current	Peak to Peak Ripple
HP 9000 - K100, K200, K400, K210, K410, K220, & K420				
HP 3000 - 939KS, 959KS, 929KS, 969KS/x00, & 969KS/x20				
+3.3 VDC	+3.4 VDC	0.0 Amps	20 Amps	≤ 50 mVDC
+5.1 VDC	+5.25 VDC	22 Amps	110 Amps	≤ 50 mVDC
+4.4 VDC	+4.53 VDC	0.0 Amps	27.0 Amps	≤ 50 mVDC
+11.64 VDC	+12.60 VDC	0.0 Amps	15.0 Amps	≤ 100 mVDC
-11.64 VDC	-12.60 VDC	0.0 Amps	4.0 Amps	≤ 100 mVDC
HP 9000 - K250, K260, K450, & K460				
HP 3000 - 979KS				
3.30 VDC	3.45 VDC	10 Amps	100 Amps	≤ 50 mVDC
3.30 VDC	3.40 VDC	13 Amps	130 Amps	≤ 50 mVDC
5.10 VDC	5.25 VDC	7 Amps	90 Amps	≤ 50 mVDC
11.64 VDC	12.60 VDC	0 Amps	15 Amps	≤ 100 mVDC
-11.64 VDC	-12.60 VDC	0 Amps	4 Amps	≤ 100 mVDC

Table B-12. Electromagnetic and Electrostatic Specifications.

Description	Specification	
	HP 9000 - K100, K200, K400, K210, K410, K220, & K420 HP 3000 - 939KS, 959KS, 929KS, 969KS/x00, & 969KS/x20	HP 9000 - K250, K260, K450, & K460 HP 3000 - 979KS
Radiated Field Immunity	3 Volts/Meter (27 MHz to 1 GHz)	3 Volts/Meter (27 MHz to 1 GHz)
Magnetic Field Immunity	1 Gauss (47.5 Hz to 198 Hz)	1 Gauss (47.5 Hz to 198 Hz)
Electrostatic Discharge Immunity	15 kV (Maximum, with no loss of function) 25 kV (Maximum, with no component damage)	15 kV (Maximum, with no loss of function) 25 kV (Maximum, with no component damage)
Electrostatic Contact Discharge	3 kV (No Effect)	3 kV (No Effect)

Table B-13. SPU Physical Specifications.

Description	Specification	
		HP 9000 - K100, K200, K400, K210, K410, K220, & K420 HP 3000 - 939KS, 959KS, 929KS, 969KS/x00, & 969KS/x20
<i>Crated Equipment</i>		
Height	87.00 cm (34.25 in)	87.00 cm (34.25 in)
Width	88.90 cm (35.00 in)	88.90 cm (35.00 in)
Depth	57.15 cm (22.50 in)	77.47 cm (30.50 in)
Weight	47.17 kg (104.13 lb)	76.66 kg (169.00 lb)
<i>Uncrated Equipment</i>		
Height	63.50 cm (25.0 in)	63.50 cm (25.0 in)
Width	43.18 cm (17.0 in)	43.18 cm (17.0 in)
Depth	58.42 cm (23.0 in)	69.85 cm (27.50 in)
Weight	63.56 kg (140.13 lb)	75.00 kg (165.35 lbs)

Configurations

The following tables list Minimum, Mid, High, and Maximum SPU configurations used to calculate line current, M & consumption, and heat dissipation specifications.

The configurations listed in these tables:

- Are field configurations
- Do not necessarily represent what is shipped from the factory for an individual customer, and
- *Does not* include Uninterruptible Power Supply (UPS) Data.

Table B-14. HP 3000 - 939KS, 959KS, 929KS, 969KS/x00, & 969KS/x20 SPU Configurations.

PCA	Min	Max
Processors	1	1
Memory Modules	2	8
I/O Modules	0	5
Total input Watts	<i>Dependent on configuration and options installed.</i>	
Total VA at 200 VA		
BTUs/hr		
<i>See Worksheets in Appendices B & C</i>		

Table B-15. HP 9000 - K100, K200, K400, K210, K410, K220, & K420 SPU Configurations.

PCA	Min	Max
Processors	1	4
Memory Modules	2	16
I/O Modules	0	5
Total input Watts	<i>Dependent on configuration and options installed.</i>	
Total VA at 200 VA		
BTUs/hr		
		<i>See Worksheets in Appendices B & C</i>

Table B-16. HP 9000 - K250, K260, K450, & K460 and HP 3000 - 979KS SPU Configurations

PCA	Min	Max
Processors	1	4
Memory Modules	2	32
I/O Modules	0	13
Total input Watts	<i>Dependent on configuration and options installed.</i>	
Total VA at 200 VA		
BTUs/hr		
		<i>See Worksheets in Appendices B & C</i>

Cabinet Specifications

Table B-17. Cabinet Electrical Specifications.

Description	Specification		
	A1896A (C2785A) 1.1 Meter Cabinet	A1897A (C2786A) 1.6 Meter Cabinet	A3656A ⁱ (C2787A) 2.0 Meter Cabinet
PDU Input Voltage	100-120/200-240 VAC (Nominal)	100-120/200-240 VAC (Nominal)	100-120/200-240 VAC (Nominal)
PDU Current (Max.)	16 Amps	16 Amps	16 Amps
PDU Electrical Outlets Provided	6/10 Depending on option	6/10 Depending on option	6/10 Depending on option
Electrical ⁱⁱ Receptacle Required	5-20P, L5-20P, L6-20R, L6-30P, IEC-320 (C19/20) NEMA depending on PDU option selected. International Power cord supplied with no plug installed		
Cooling Fans	2 (Optional)	2 (Optional)	2 (Optional)

- i. This cabinet model is only available in the EPS 22 configuration and does not include a fan or a PDU assembly.
- ii. PDU Input plug/receptacle types and numbers will vary depending on the PDU option(s) selected. An optional second PDU can be installed. Optional higher current (20 Amp) PDUs are available for cabinets with Uninterruptible Power Supplies (UPS) installed.

Table B-18. Cabinet Physical Specifications.

Description	Specification		
	A1896A (C2785A) 1.1 Meter Cabinet	A1897A (C2786A) 1.6 Meter Cabinet	A3656A (C2787A) 2.0 Meter Cabinet
Height	112.01 cm (44.1 inches)	162.00 cm (63.8 inches)	20.19 cm (79.5 inches)
Width	48.26 cm (19.0 inches)	48.26 cm (19.0 inches)	48.26 cm (19.0 inches)
Depth	71.60 cm (28.2 inches)	71.60 cm (28.2 inches)	71.60 cm (28.2 inches)
Weight			
Crated	119.0 kg (262.4 lbs.)	140.0 kg (308.6 lbs.)	175.0 kg (385.8 lbs.)
Uncrated	81.0 kg (178.5 lbs.)	100.0 kg (220.4 lbs.)	116.0 kg (255.7 lbs.)
Cooling and Access	60.90 cm (24.0 inches) (Front & Rear)	60.90 cm (24.0 inches) (Front & Rear)	60.90 cm (24.0 inches) (Front & Rear)

Table B-19. Expansion Cabinets - Environmental Specifications.

Description		Specification
Temperature Requirements:		
	Recommended operating temperature	20° to 25° C (68.0° to 77.0° F)
	Operating temperature range	5° to 40° C (41° to 104° F)
	Maximum Operating Rate of Change	20° C (36° F) per hour
	Non-Operating (Storage) Temperature Range	-40° to 70° C (- 40° to 158° F)
Humidity Requirements:		
	Recommended Operating Humidity	40% to 60% Relative Humidity
	Operating Humidity	15% to 80% Relative Humidity at 40° C (104° F)
	Non-Operating (storage) Humidity	90% Relative Humidity at 65° C (149° F)
	Heat Dissipation:	360 Watts (Maximum) (1227 BTU/hour)
Altitude Requirements:		
	Maximum Operating	3,000.0 meters (9842.5 feet) ⁱ
	Maximum non-operating	4,572 meters (>15,000 feet)
Vibration Requirements:		
	Operating Random (5-500Hz)	Approx 0.21 G rms
	Sinusoidal Sweep Survival (5-500Hz)	0.5 g (0 peak)
	Random survival (5-500Hz)	Approx 2.09 G rms
Shock Requirements:		
	End Use Handling	10.20 cm (4.0 inch) Free-fall Drop
	Transportation	30 g trapezoidal (Delta velocity of 368.0 cm/sec)
Acoustic Requirements:		
	Sound Power	4.2 Bels (A-Weighted)
	Bystander sound pressure (L _p A)	42 dB (A-Weighted)

- i. Derate maximum operating temperature -1.98° F per 1,000 feet over 7,500 feet
(-1.1° C per 305 meters above 2,286 meters)

Powertrust UPS Specifications

The table below lists the specifications for the A2998A PowerTrust UPS (Uninterruptible Power System).

- Replace fuses only with fuses of the same type and rating.
- Battery life is severely shortened if temperature exceeds 25° C (77° F) for extended periods of time.

The specifications for the following PowerTrust UPS systems are provided in this section:

Table B-20. PowerTrust UPS Model Listing

Model	Mounting	Power Output Rating
A2994A	Floor Mount	600 VA
A2994A	Floor Mount	1300 VA
A2996A	Cabinet Mount	1.3 kVA
A2997A	Cabinet Mount	1.8 kVA
A2998A	Cabinet Mount	3.0 kVA

Table B-21. A2941A PowerTrust UPS Specifications.

Description	Specification
Electrical Specifications:	
AC Line Input:	
Rated Voltage	100-120/200-240 VAC 50/60 Hz (Auto-ranging) (Compatible with 127 VAC input power systems)
Rated Current	6.75/3.80 Amps
AC Output:	
Output VAC (On Line Power)	Same as AC line input power
Output VAC (On Battery)	115 VAC or 230 VAC at 50/60Hz (± 10% with full load)
Range VA/Watts	650/420 @ 0.65 power factor 760/420 @ 0.55 power factor
Transfer Time	AC Failure - ≤ 10 msec to switch to battery power AC Restored -5 Second delay returning to input AC phase lock
Phasing	Phase locked to within 5° of input utility AC
Safety Agency Approvals	UL, CSA, TUV, FI, and CB Certificate
Fuse	Cartridge Type - 10 Amp 250VAC
Battery:	
Type	Maintenance-free, sealed, lead-acid type
Nominal open circuit voltage	24 VDC
Reserve time	Approximately 15 minutes (at full load)
Battery Recharge Time	14 Hours
Optimum Battery Lifetime	3.5 to 5 years

Table B-21. A2941A PowerTrust UPS Specifications. (Continued)

Description	Specification
Environmental Specifications	
Operating Temperature	5° to 40° C (41° to 104° F) 15% - 80% relative humidity (non-condensing)
Storage Temperature	-30° to 40° C (-20° to 122° F) Battery life is shortened severely when temperature exceeds 25° C (77° F) for extended periods.
Operating Altitude	3000 meters (10,000 ft.)
Physical Specifications	
Electronics Unit	
Dimensions Packaged:	Height - 44.8 cm (17.6 inches) Width - 33.0 cm (13.0 inches) Depth - 49.5 cm (19.5 inches) Weight - 27.2 kg (60.0 lbs)
Dimensions Unpackaged:	Height - 34.5 cm (13.6 inches) Width - 22.7 cm (9.0 inches) Depth - 39.5 cm (15.5 inches) Weight - 22.3 kg (49.0 lbs)
Communications Specifications:	
RS-232 Port Pinout	Pin 1 - Receive Data Pin 2 - Transmit Data Pin 9 - Signal Ground
Communications Protocol	8 Data Bits 1 Stop Bit No Parity Baud rate is 1200

Table B-22. A2994A PowerTrust UPS Specifications.

Description	Specification
Electrical Specifications:	
AC Line Input:	
Rated Voltage	100-120/200-240 VAC 50/60 Hz (Auto-ranging)
Rated Current	14 to 12 Amps and 7 to 6 Amps (20 Amp max branch circuit overcurrent protection)
AC Output:	
Output VAC (On Line Power)	Approximately equal to AC line input power
Output VAC (On Battery)	115 VAC or 230 VAC at 50/60Hz (± 10% with full load)
Range VA/Watts	1300/1300 @ 0.5 to 1.0 power factor
Transfer Time	AC Failure - ≤ 10 msec to switch to battery power AC Restored - 5 Second delay returning to input AC phase lock
Phasing	Phase locked to within 5° of input utility AC
Safety Agency Approvals	Agency approvals: UL, CSA, and TUV
Battery:	
Type	Maintenance-free, sealed, computer grade, lead-acid type
Nominal open circuit voltage	60 VDC
Reserve time	Approximately 15 minutes (at full load)
Battery Recharge Time	≤ 14 Hours with output switch in the ON position (after full discharge) ≤ 24 Hours with output switch in the OFF position (after full load discharge)
Optimum Battery Lifetime	3.5 to 5 years

Table B-22. A2994A PowerTrust UPS Specifications. (Continued)

Description	Specification
Environmental Specifications	
Operating Temperature	5° to 40° C (41° to 104° F) 15% - 80% relative humidity (non-condensing)
Storage Temperature	-30° to 50° C (-22° to 122° F) Battery life is shortened severely when temperature exceeds 25° C (77° F) for extended periods.
Operating Altitude	3000 meters (10,000 ft.)
Physical Specifications	
Electronics Unit	
Dimensions Packaged:	Height - 60.3 cm (23.75 inches) Width - 34.3 cm (13.5 inches) Depth - 72.4 cm (28.5 inches) Weight - 87.0 kg (191.5 lbs)
Dimensions Unpackaged:	Height - 47.6 cm (18.7 inches) Width - 22.7 cm (9.0 inches) Depth - 59.7 cm (23.5 inches) Weight - 77.0 kg (170.0 lbs)
Communications Specifications:	
RS-232 Port Pinout	Pin 1 - Receive Data Pin 2 - Transmit Data Pin 9 - Signal Ground
Communications Protocol	8 Data Bits 1 Stop Bit No Parity Baud rate is 1200

Table B-23. A2996A PowerTrust UPS Specifications.

Description	Specification
Electrical Specifications:	
AC Line Input:	
Rated Voltage	100-120/200-240 VAC 50/60 Hz (Auto-ranging)
Rated Current	14-12 Amps and 7-6 Amps (20 Amp max. branch circuit overcurrent protection)
AC Output:	
Output VAC (On Line Power)	Same as line input power
Output VAC (On Battery)	115 VAC or 230 VAC ($\pm 10\%$ on battery with full load) at 50/60 Hz (± 3 Hz)
Rated Voltage & Current	100-120/200-240 VAC at 50/60 Hz 13-10.2 Amps and 6.5-5.4 Amps Max
Supported Load Crest Factor	≤ 2.8 Amps (A Peak to A rms)
Rated power VA	1.3 kVA max with a 0.5 to 1.0 power factor
Rated Power Watts	1300 Watts assuming a 1.0 power factor
Waveshape	True sine wave with $< 10\%$ total harmonic distortion (on a purely resistive load)
Transfer Time	AC Failure - ≤ 10 msec to switch to battery power AC Restored -5 Second delay returning to phase lock to input AC
Phasing	Phase locked to within 5° of input utility AC
Safety Agency Approvals	UL, CSA, and TUV
Battery:	
Type	Maintenance-free, sealed, lead-acid type (10 Amp/Hour)
Nominal open circuit voltage	60 VDC

Table B-23. A2996A PowerTrust UPS Specifications. (Continued)

Description	Specification
Battery Runtime 20° C (68° F) or above New battery	15 minutes over battery lifetime 15 minutes over full temperature range
Battery Recharge Time	< 14 Hours (UPS OFF) < 24 Hours (UPS Operating)
Optimum Battery Lifetime (25° C/77° F)	3.5 to 5 years
Environmental Specifications	
Operating Temperature	5° to 40° C (41° to 104° F) 15% - 80% relative humidity (non-condensing)
Storage Temperature	-30° to 50° C (-20° to 122° F) Battery life is shortened severely when temperature exceeds 25° C (77° F) for extended periods. 5% - 80% relative humidity (non-condensing)
Operating Altitude	3000 meters (10,000 ft.)
Storage Altitude	4572 meters (15,000 ft.)
Physical Specifications	
Electronics Unit	
Dimensions Packaged:	Height - 41.0 cm (16.0 inches) Width - 57.0 cm (22.5 inches) Depth - 72.0 cm (28.4 inches) Weight - 90.0 kg (198 lbs)
Dimensions Unpackaged:	Height - 25.5 cm (10.0 inches) - 6 EIA rack units Width - 42.5 cm (17.0 inches) Depth - 61.0 cm (24.0 inches) Weight - 84.0 kg (185.0 lbs)
Minimum Required Service Access Space:	
Rear:	76.0 cm (30.0 inches)
Side:	0.0 cm (0.0 inches)
Front:	91.0 cm (36.0 inches)

Table B-23. A2996A PowerTrust UPS Specifications. (Continued)

Description	Specification
Communications Specifications:	
RS-232 Port Pinout	Pin 1 - Receive Data Pin 2 - Transmit Data Pins 3-8 Reserved (Do not use) Pin 9 - Signal Ground
Communications Protocol	8 Data Bits 1 Stop Bit No Parity Baud rate is 1200

Table B-24. A2997A PowerTrust UPS Specifications.

Description	Specification
Electrical Specifications:	
AC Line Input:	
Rated Voltage	100/120-127/200-240 VAC 50/60 Hz (Auto-ranging)
Rated Current	20.0 - 16.0 Amps and 10.0 - 8.2Amps (20 Amp max. branch circuit overcurrent protection)
AC Output:	
Output VAC (On Line Power)	Same as line input power
Output VAC (On Battery)	115 VAC or 230 VAC ($\pm 10\%$ on battery with full load) at 50/60 Hz (± 3 Hz)
Rated Voltage & Current	100/120-127/200-240 VAC at 50/60 Hz 16.0 - 14.2 Amps and 9.0 - 7.5 Amps Max
Supported Load Crest Factor	≤ 2.3 Amps (A Peak to A rms)
Rated power VA	1.8 kVA max with a 0.5 to 1.0 power factor
Rated Power Watts	1800 Watts assuming a 1.0 power factor
Waveshape	True sine wave with $< 10\%$ total harmonic distortion (on a purely resistive load)
Transfer Time	AC Failure - ≤ 10 msec to switch to battery power AC Restored -5 Second delay returning to phase lock to input AC
Phasing	Phase locked to within 5° of input utility AC
Safety Agency Approvals	UL, CSA, and TUV
Fuse	10 Amp/250 VAC

Table B-24. A2997A PowerTrust UPS Specifications. (Continued)

Description	Specification
Battery:	
Type	Maintenance-free, sealed, lead-acid type (10 Amp/Hour)
Nominal open circuit voltage	60 VDC
Battery Runtime 20° C (68° F) or above New battery	15 minutes over battery lifetime 15 minutes over full temperature range
Battery Recharge Time	< 14 Hours (UPS OFF) < 24 Hours (UPS Operating)
Optimum Battery Lifetime (25° C/77° F)	3.5 to 5 years
Environmental Specifications	
Operating Temperature	5° to 40° C (41° to 104° F) 15% - 80% relative humidity (non-condensing)
Storage Temperature	-30° to 50° C (-20° to 122° F) Battery life is shortened severely when temperature exceeds 25° C (77° F) for extended periods. 5% - 80% relative humidity (non-condensing)
Operating Altitude	3000 meters (10,000 ft.)
Storage Altitude	4572 meters (15,000 ft.)
Physical Specifications	
Electronics Unit	
Dimensions Packaged:	Height - 41.0 cm (16.0 inches) Width - 57.0 cm (22.5 inches) Depth - 72.0 cm (28.4 inches) Weight - 69.0 kg (151.5 lbs)
Dimensions Unpackaged:	Height - 25.5 cm (10.0 inches) - 6 EIA rack units Width - 42.5 cm (16.7 inches) Depth - 61.0 cm (24.0 inches) Weight - 63.0 kg (139.0 lbs)

Table B-24. A2997A PowerTrust UPS Specifications. (Continued)

Description	Specification
Battery Box	
Dimensions Packaged:	Height - 28.0 cm (11.0 inches) Width - 57.6 cm (22.5 inches) Depth - 72.7 cm (28.0 inches) Weight With Batteries - 65.0 kg (143.5 lbs) Weight Without Batteries - 23.0 kg (51.5 lbs)
Dimensions Unpackaged:	Height - 12.8 cm (5.0 inches) - 3 EIA rack units Width - 43.5 cm (17.1 inches) Depth - 61.5 cm (24.0 inches) Weight With Batteries - 60.0 kg (133.0 lbs) Weight Without Batteries - 19.0 kg (41.0 lbs)
Minimum Required Service Access Space:	
Rear: Side: Front:	76.0 cm (30.0 inches) 0.0 cm (0.0 inches) 91.0 cm (36.0 inches)
Communications Specifications:	
RS-232 Port Pinout	Pin 1 - Receive Data Pin 2 - Transmit Data Pins 3-8 Reserved (Do not use) Pin 9 - Signal Ground
Communications Protocol	8 Data Bits 1 Stop Bit No Parity Baud rate is 1200

Table B-25. A2998A PowerTrust UPS Specifications.

Description	Specification
Electrical Specifications:	
AC Line Input:	
Rated Voltage	200 - 240 VAC 50/60 Hz (300 VAC Max)
Frequency Ranges	47 - 53 Hz or 57 - 63 Hz
Rated Current	20.0 Amps (30 Amp max. branch circuit overcurrent protection)
AC Output:	
Output VAC (On Line Power)	Same as line input power
Rated Power	Up to 3000 VA Up to 3000 Watts (Power factor of 1.0 assumed)
Loading(% of rated power in Normal (not Bypass) mode): 0 - 110% 110 - 130% > 130%	UPS will operate indefinitely UPS will operate for up to 5 minutes UPS will operate for <10 seconds
Voltage Normal Mode	223 - 237 VAC 47 - 53 Hz or 57 - 63 Hz
Current: Maximum Supported Load Chrst Factor	13 Amps (rms) ≤ 3 Amps peak/Amps rms)
Waveshape	True sine wave with < 5% total harmonic distortion
Transfer Time	AC Failure - ≤ 10 msec to switch to battery power Input disconnect delay - 4 msec AC Restored -20 Sec delay returning to phase lock with input AC
Phasing	Phase locked to within 5° of input utility AC
Safety Agency Approvals	UL, CSA, and TUV
Fuse	20 Amp/250 VAC UL Listed Time Delay (Slow-Blow) Type

Table B-25. A2998A PowerTrust UPS Specifications. (Continued)

Description	Specification
Battery:	
Type	Maintenance-free, sealed, lead-acid type (20 Amp/Hour)
Nominal open circuit voltage	120 VDC
Battery Runtime 20° C (68° F) or above New battery	15 minutes over battery lifetime 15 minutes over full temperature range
Battery Recharge Time	< 14 Hours (UPS OFF) (at 20° C (68° F) or above) < 24 Hours (UPS Operating) (at 20° C (68° F) or above)
Optimum Battery Lifetime at ≤ 25° C (≤ 77° F)	4 years
Environmental Specifications	
Operating Temperature	5° to 40° C (41° to 104° F) 15% - 80% relative humidity (non-condensing)
Storage Temperature	-30° to 50° C (-20° to 122° F) Battery life is shortened severely when temperature exceeds 25° C (77° F) for extended periods. 5% - 80% relative humidity (non-condensing)
Operating Altitude	3000 meters (10,000 ft.)
Storage Altitude	4572 meters (15,000 ft.)

Table B-25. A2998A PowerTrust UPS Specifications. (Continued)

Description	Specification
Physical Specifications	
Electronics Unit	
Dimensions Packaged:	Height - 41.0 cm (16.0 inches) Width - 57.0 cm (22.5 inches) Depth - 72.0 cm (28.4 inches) Weight With Batteries - 60.0 kg (133.0 lbs) Weight Without Batteries - 19.0 kg (41.0 lbs)
Dimensions Unpackaged:	Height - 12.8 cm (5.0 inches) - 3 EIA rack units Width - 42.5 cm (16.7 inches) Depth - 61.5 cm (24.0 inches) Weight With Batteries - 65.0 kg (143.5 lbs) Weight Without Batteries - 23.0 kg (51.5 lbs)
Battery Box	
Dimensions Packaged:	Height - 28.0 cm (11.0 inches) Width - 57.0 cm (22.5 inches) Depth - 72.7 cm (28.0 inches) Weight With Batteries - 65.0 kg (143.5 lbs) Weight Without Batteries - 23.0 kg (51.5 lbs)
Dimensions Unpackaged:	Height - 12.8 cm (5.0 inches) - 3 EIA rack units Width - 43.5 cm (17.1 inches) Depth - 61.5 cm (24.0 inches) Weight With Batteries - 60.0 kg (133.0 lbs) Weight Without Batteries - 19.0 kg (41.0 lbs)
Minimum Required Service Access Space:	
Rear: Side: Front:	76.0 cm (30.0 inches) 0.0 cm (0.0 inches) 91.0 cm (36.0 inches)
Communications Specifications:	
RS-232 Port Pinout	Pin 1 - Receive Data Pin 2 - Transmit Data Pins 3-8 Reserved (Do not use) Pin 9 - Signal Ground

Table B-25. A2998A PowerTrust UPS Specifications. (Continued)

Description	Specification
Communications Protocol	8 Data Bits 1 Stop Bit No Parity Baud rate is 1200

Appendix C- Enterprise Parallel Server Considerations

Introduction

Enterprise Parallel Server Systems are groups of high-performance, PA-RISC-based Symmetrical Multiprocessor (SMP) servers integrated with high performance FDDI or Fibre Channel interconnect and HP MC/System Environment (MCSE) system administration software, for ease of administration and system set-up.

System Application Summary

The Enterprise Parallel Server System functions as a Decision Support Server (DSS). A DSS server provides high performance parallel query capabilities against a very large, centralized data base. Both multi-user interactive data access and large batch job executions are expected.

The DSS server supports the following application environments:

- Concurrent Shared Data “share disk” Access with High Availability (HA) failover
- OLT'P/HA General Server
- Distributed Data “shared nothing” Access with HA failover

Enterprise Parallel Server Configurations

There are two basic Enterprise Parallel Server configurations currently supported.

- The first consists of K-Class base and K-Class add-on nodes
- The second has a T-Class base node and T-Class add-on nodes

Enterprise Parallel Server Models including:

Model EPS 22 Configuration

The EPS 22 is comprised of an HP 9000 K-460 in a 1.6 meter cabinet, and up to seven K-460 add-on nodes. The add-on nodes can be in 1.6-meter cabinets or 2-meter cabinets.

When in 2-meter cabinets, there are two K-460 SPUs mounted in one 2-meter cabinet.

Peripheral components (UPS's, FDDI concentrators etc.) are installed in expansion cabinets.

A 1.6-meter expansion cabinet with two 3.0 kVA UPS's is also available.

- There are High Availability (HA) and non-HA versions available.
- Add-on nodes can be installed in 1.6 meter cabinets or 2-meter cabinets.
- If two meter cabinets are used, two K-460 SPUs are installed in one 2-meter cabinet.
- Peripheral components are installed in an expansion cabinet associated with the 2-meter cabinet.

Model EPS 30 Configuration

The Model EPS 30 is comprised of an HP 9000 T-520 base node, in a 1.6-meter cabinet, and the following:

- 8 Node FDDI connect - High Availability, and
- 8 Node - Service Guard/4-node - OPS - High Availability

NOTE

Power Distribution Units (PDUs) are not installed in 2-meter cabinets containing two K-460 SPU's or 1.6 meter cabinets containing two 3.0 kVA UPS's.

Node Upgrade

The K460 and T520 nodes can be upgraded as follows.

K460 Node - Each K460 can be upgraded with up to three more PA-RISC processors and up to 3.75 GB of memory. A 3.0KV Uninterruptible Power Supply (UPS) and various I/O, network, and storage options are available for each node. For more information, contact your local HP sales representative or see the *HP 9000 Enterprise Servers Configuration Guide* (5965-4747E).

T520 Nodes - Each T520 can be upgraded to a total of 14, 120 MHz PA-RISC processors and up to 3.75 GB of memory. An Uninterruptible Power Supply (UPS) and various network, I/O, and storage options are available for each node. For more information, contact your local HP sales representative or see the *HP 9000 Enterprise Servers Configuration Guide* (5965-4747E)

Space Planning

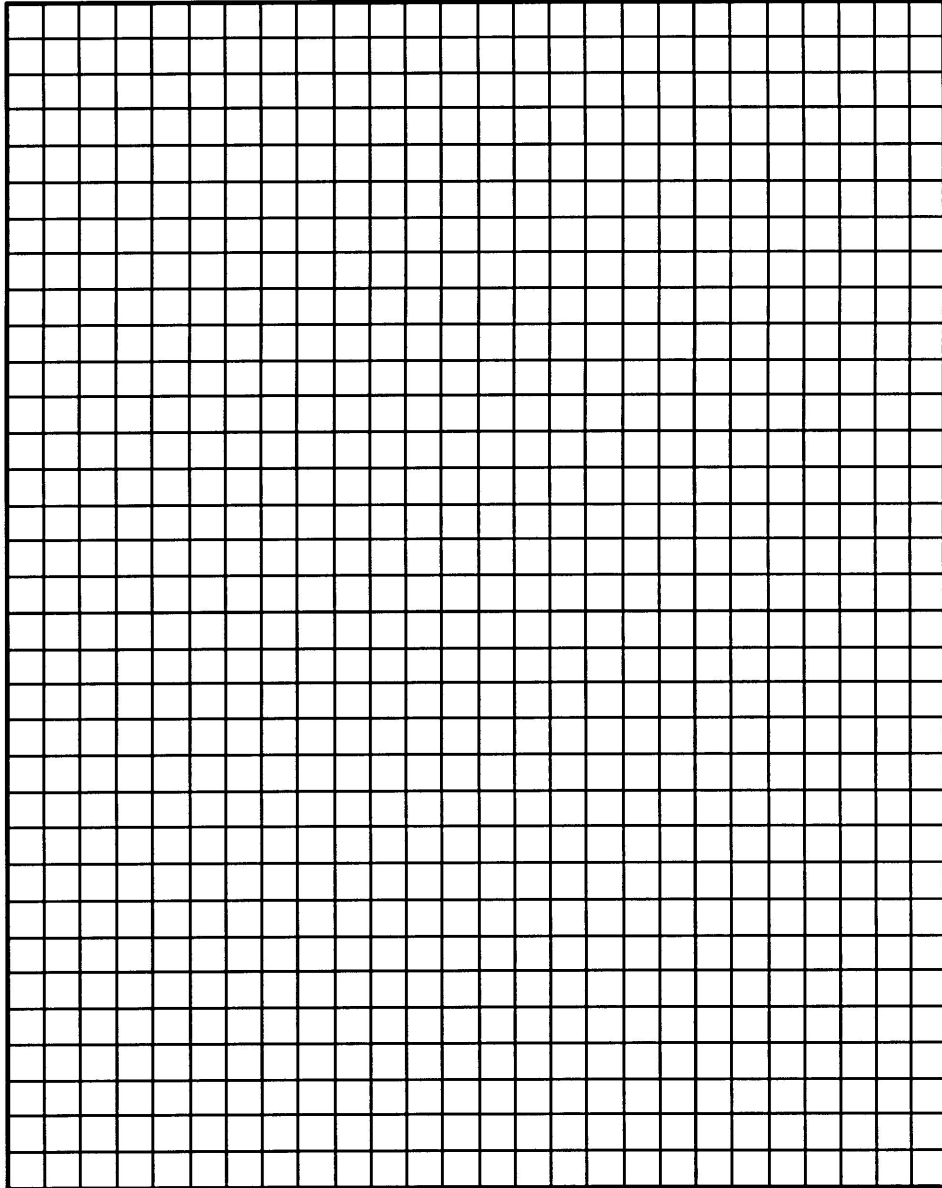
There is only one space planning requirement that is peculiar to an HP 9000 Parallel Server environment. In this environment the Terminal Server is mounted just inside the outer cover panel on the left side (from the front) of the expansion cabinet. Maintenance access space on the left side of the base node expansion cabinet must be allowed for access to the Terminal Server.

For detailed site planning information on K- Class Servers, refer to the “*Space Planning*” section in this manual.

For detailed site planning information on the T- Class Server, refer to the “*Space Planning*” section in it’s Site Preparation Manual (A1809-90002).

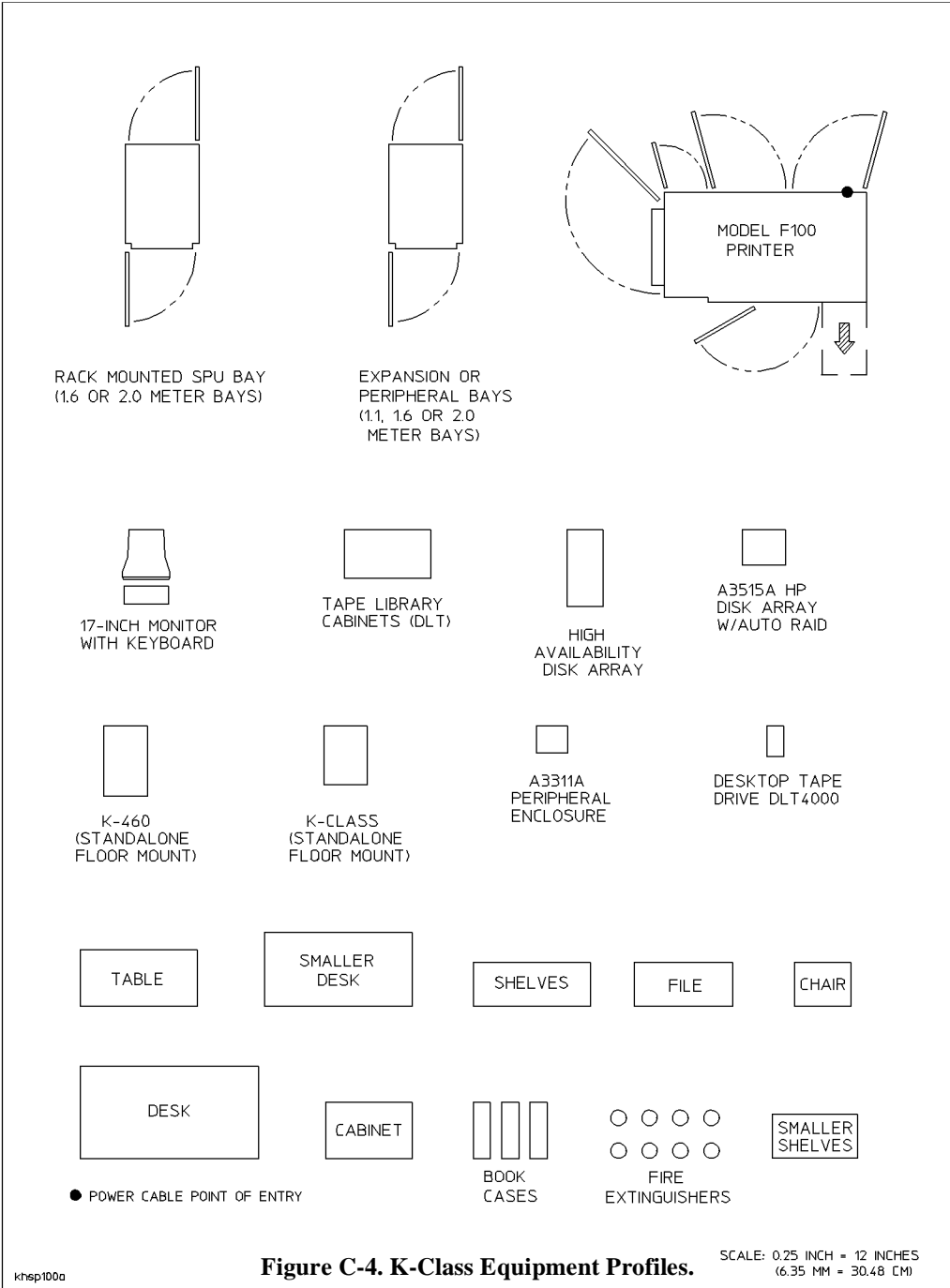
Use the grid (¼ inch to 1 foot scale) and the equipment top view “footprints” of the K-Class and T-Class system components, on the following pages, to assist you in initial equipment layout.

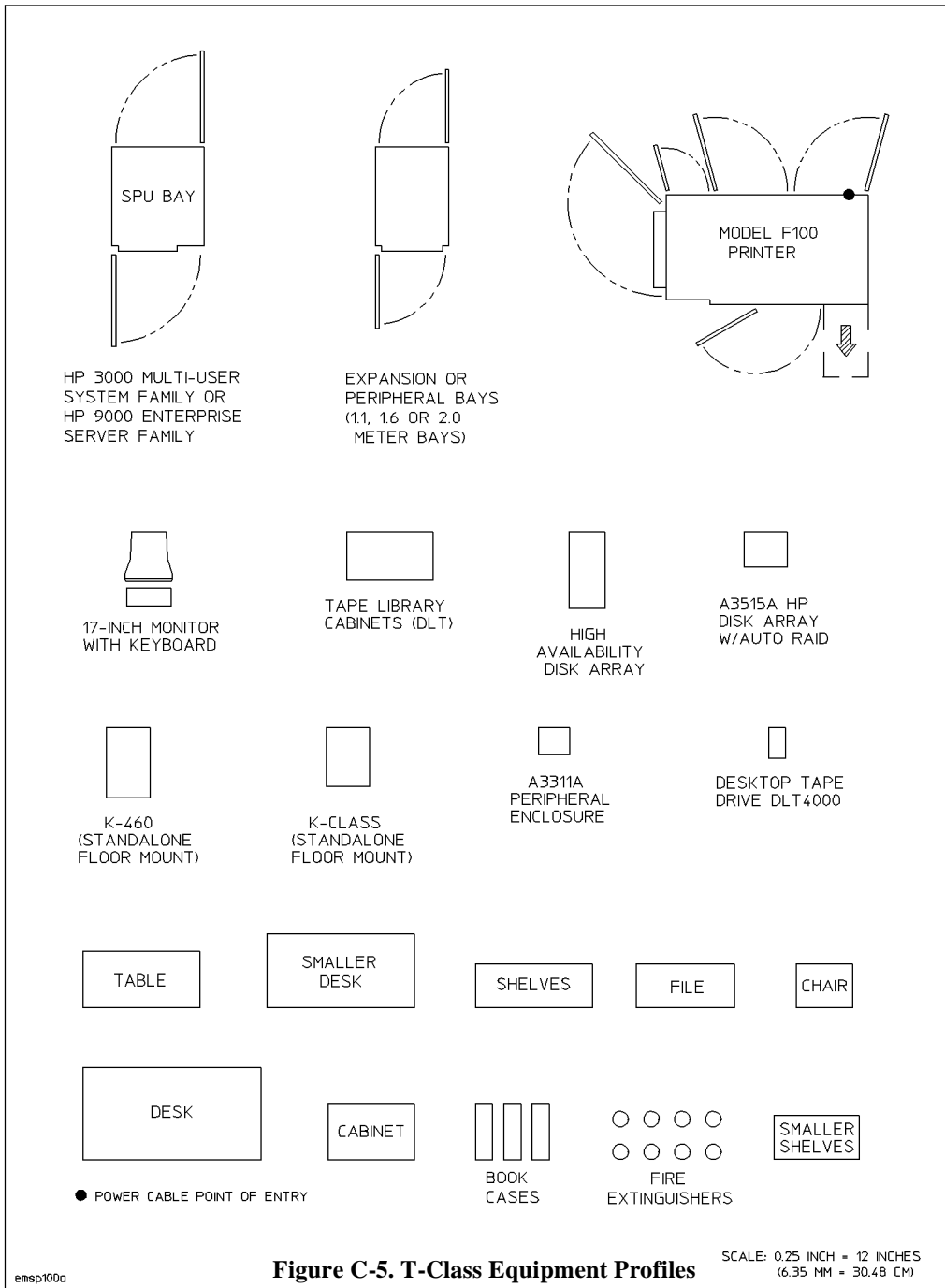
It is recommended that you photocopy these pages before cutting them out, making multiple copies as needed. When cut out and used on a scale drawing of the computer room site, the cutouts can provide a simple way to determine the best equipment arrangement.



LG200001_008

Figure C-3. Space Planning Grid.





Supported Configurations

Two Enterprise Parallel Server configurations are currently supported, as follows:

- All K-Class Configuration - All base and add-on nodes are K-Class systems.
- Mixed Configuration - One K-Class base node with two T-Class add-on nodes

Enterprise Parallel Server Configuration Worksheets

The following worksheets may be used to determine the power and environmental requirements of Enterprise Parallel Server configurations consisting of multiple K-Class or T-Class systems.

Table C-26. Worksheet for Power Requirement Calculations

Equipment Type	Product Number	Voltage (V)	Amperage (A)	Number of Machines (B)	Total Amperage (A x B)
Computer					
Expansion Cabinet					
Disk Drive					
Mag Tapes					
Printers					
Terminals					
Other					
Total:					

Use Table C-27 to calculate the total heat dissipation required for your installation. Depending on the component combination and number installed, the air conditioning requirements may differ widely between systems.

Table C-27. Worksheet for Heat Dissipation Calculations

Equipment Type	Product Number	Watts (W)	BTU/hr	Number of Machines (B)	Total Heat Dissipation
Computer					
Expansion Cabinet					
Disk Drive					
Mag Tapes					
Printers					
Terminals					
Other					
Total:					

To account for the heat dissipation by accessory equipment, lights, people, etc. Fill in Table C-28.

Table C-28. Heat Dissipation (Miscellaneous) Worksheet

Factor	BTUs/Hour (Watts)
System Heat Dissipation	
Site Variables	
Interface Auxiliary Equipment	
Lights	
Personnel	
Future Expansion	
Other Factors	
Total Heat Dissipated:	
Total heat dissipation in tons of AC (12,000 BTUs = 1 Ton of AC)	

