Site Preparation and Requirements Guide

T Class

HP 3000 99x Family Systems, HP 9000 Enterprise Servers

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Preface

This *Site Preparation and Requirements Guide* contains site prrreparation information and technical information about HP 3000 Corporate Business Systems (99x Family) and HP 9000 Corporate Business Servers (T-Class Systems).

At the time of publication, HP 3000 Cporporate Business Systems and HP 9000 Corporate Enterprise Servers included the following models:

HP 3000 99x Family

990/992		991/995		996[1]	997
990CX	990DX	991CX	991DX	996/80	997/100
991/100CX	992/100DX	995/100CX	995/100DX	996/100	997/200
992/200CX	992/200DX	995/200CX	995/200DX	996/200	997/300
992/300CX	992/300DX	995/300CX	995/300DX	996/300	997/400
992/400CX	992/400DX	995/400CX	995/400DX	996/400	997/500
		995/500CX	995/500DX	996/500	
		995/600CX	995/600DX	996/600	
		995/700CX	995/700DX	996/700	
		995/800CX	995/800DX	996/800	

1. A 996 System may be field upgraded to 9, 10, 11, or 12 processors. Factory integrated servers aresold with a maximum of 8 processors.

HP 9000 T-Class Systems

890	T500	T520	T600

1 Introduction

How To Use This Manual

This manual contains site preparation information for Hewlett-Packard 3000 Corporate Business Systems (99x Family) and 9000 Corporate Business Servers (T-Class Systems). Specifically, this manual is to be used in conjunction with one of the following manuals:

If you ordered an HP 3000 Corporate Business System (99x Family), you will receive the HP 3000 *Computer Products Site Preparation Resource Guide* (HP Part Number 5958-5859), along with this manual. The HP 3000 Corporate Business Systems include the 990, 992, 991/995, 996, and 997 systems.

If you ordered an HP 9000 Corporate Business Server, you will receive the HP 1000/9000 *Computer Products Site Preparation Resource Guide* (HP Part Number 5959-0941), along with this manual. The HP 9000 Corporate Business Servers include the 890, T500, T520, and T600 servers.

This manual is also to be used in conjunction with the *HP CEO Site Prep Handbook* (HP Part Number 5958-2370). The HP CEO Site Prep Handbook is a reference document for Hewlett-Packard Customer Engineers specializing in computer site preparations.

Proper site preparation is vital to the reliability of any computer system. As our customer, it is your responsibility to ensure that your facility conditions are maintained in accordance with the information and specifications contained in this manual and in the Computer Products Site Preparation Resource Guide. 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 contains a brief introduction to the Hewlett-Packard service organization, a description of Hewlett-Packard's site planning and verification services, and a description of our customer's site preparation responsibilities.
- Chapter 2 contains site preparation and planning information specifically for HP 3000 Corporate Business Systems and HP 9000 Corporate Business Servers, plus suggested topics that should be considered for larger computer system sites.
- Chapter 3 contains information pertaining to the actual receipt and installation of your computer.
- Appendix A contains pre-installation worksheets, a space planning kit, and computer system worksheets.
- Appendix B contains specifications for the HP 3000 Corporate Business Systems and HP 9000 Corporate Business Servers.
- Appendix C contains information about HP 9000 Enterprise Parallel Server configurations, upgrades, and site planning.

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.

Table 1-1 Technical Tasks/Responsible Personnel

Technical Task	Person Responsible
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/Vendor
Total air conditioning required	Customer/Contractor

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 schedule and installation. The Sales Representative is also responsible for arranging for additional computer system capabilities and staff training.

Customer Engineer

The Hewlett-Packard Customer Engineer (CE) is trained and experienced in computer equipment and peripherals service, with 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

The Hewlett-Packard Applications Engineer (AE) is a technical specialist for HP 3000 Corporate Business Systems and HP 9000 Corporate Business 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.

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

The Hewlett-Packard CE (or Site Preparation Specialist) will verify that your site meets or exceeds your computer system's requirements and specifications prior to or 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. (Refer to Section 1 of the *Computer Products Site Preparation Resource Guide*.)

Third Party Service

If an HP 3000 Corporate Business System or HP 9000 Corporate Business 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 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 Corporate Business Systems and HP 9000 Corporate Business 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 safety codes
- Space limitations/system accessibility
- Environmental requirements (temperature, humidity, etc.)
- Electrical 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 site 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 defining your local regulations.

Data Communications Equipment

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

- Modems (Consult with CE for Hewlett-Packard requirements.)
- Telephone equipment

- Equipment supplied by companies other than HP
- Any hardware or cables for connection or installation of data communications equipment

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.

2 Site Preparation Guidelines

This chapter contains general site preparation guidelines for all Hewlett-Packard computer systems and specific site requirements for the HP 3000 Corporate Business Systems and HP 9000 Corporate Business Servers. The Hewlett-Packard CE will assist you in advance planning as the Site Planning Summary is completed.

Site Planning Time Table

The guidelines below are a summary of the Pre-Installation Worksheet contained in Appendix A of this manual. The worksheet should be used to monitor preparation progress and to ensure that your site is ready for the computer system's delivery. Since the time from placing an order to actual delivery is flexible, the following suggested lead times should be compressed or expanded accordingly.

There 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

Because of 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. Note that to schedule a site planning visit, three days advance notice is required.
- 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.

The computer cabinet is designed to sit on uncarpeted floors. The computer cabinet is 63.8 inches (162 centimeters) high, 29.5 inches (75 centimeters) wide, and 35.6 inches (90.5 centimeters) deep.

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 at least 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 can result in equipment damage.

Floor Space Requirements

Select a location for the cabinet that will provide adequate space for the doors to be fully opened. The cabinet requires a minimum of 60 cm (24 inches) for door clearance. A three-foot clearance in front and in back of the cabinet is recommended.

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.

Floor Loading

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.

Because the weight of the equipment in the cabinet is concentrated over the casters, the floor must withstand a load of 2000 lbs/inch^2 (141 kg/cm^2). This requirement is based on calculations for the heaviest recommended gross weight. Any questions regarding the adequacy of floor construction should be referred to and evaluated by a qualified structural engineer.

WARNING **The customer must determine the floor loading capacity, especially for a raised floor. Failure to do so could result in equipment damage and/or personal injury.**

Heavily loaded cabinets may require reinforced tiles (or a sub-structure) on a raised floor.

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 contained in Appendix B of this manual).
- Total weight of your computer 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 dollys, etc.).

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 Corporate Business Systems and HP 9000 Corporate Business Servers are listed in <Undefined Cross-Reference>. (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 2-1 Power Requirements

Line Voltage	Nominal Voltages (Single-Phase): 200-240 V line-to-line, or 200-240 V line-to-neutral.
Line Frequency	50/60 Hz ±5%
Voltage Waveform Harmonic Distortion	<5%
Recommended Circuit Breaker Rating: Computer system 3kVA UPS 5.5kVA UPS	 30A (motor start rating) 30A (motor start rating) 50A (motor start rating)

NOTE 99x and T-Class systems require single-phase power (in contrast to 3-phase power). Single-phase power may be obtained in one of two ways:

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

In North America, 99x and T-Class systems would have to be supplied line-to-line to obtain 200-240 Volts. Other countries might require line-to-neutral to obtain 200-240 Volts. In neither case is 3-phase power required.

Line Voltage

The line voltage (AC) at the wall power outlet is a function of the local power utility company and the building power distribution network. Voltages outside the operating range of the system can cause intermittent system errors, or a complete system shutdown. If required, the Hewlett-Packard CE along with your electrician can determine the current 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, especially if the computer system is supported by a PowerTrust UPS (Uninterruptible Power System). Refer to "PowerTrust UPS Power Requirements" below.

PowerTrust UPS Power Requirements

Each PowerTrust UPS installed in the computer system's A1884A/A1897A expansion cabinet(s) requires an AC power source that meets the specifications listed in <Undefined Cross-Reference>. Make sure that there are enough of these AC power sources to match the number of PowerTrust UPSs in the system.

If PowerTrust UPSs are to be added to an existing system (for example, as part of a system upgrade), each expansion cabinet into which a PowerTrust UPS is to be installed must be provided with a power source meeting the specifications listed in <Undefined Cross-Reference>. The computer SPU and the A2998A 3kVA UPS must be provided with a 30A source (moter start rating), and the A3589A 5.5 kVA UPS must be provided with a 50A source (motor start rating). The new 30A or 50A source 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. Such power conditioning equipment might interact with the PowerTrust unit, causing faulty operation.

If using power conditioning equipment between the PowerTrust unit and the AC mains power source is unavoidable, the output of the power conditioning equipment should be capable of supporting 3% voltage regulation for an additional dynamic input current surge to the PowerTrust unit of four times the PowerTrust's operating input current rating.

When in doubt, consult a qualified site-preparation expert.

Frequency

Frequency is normally a function of the local power utility company. In rare cases, electrical power is supplied from a motorized generator located within the building. Frequency shifts can cause intermittent system errors or terminal display "jitter". If required, the Hewlett-Packard CE can measure the power line frequency and make recommendations.

Dedicated Circuits

The HP 3000 Corporate Business Systems and HP 9000 Corporate Business Servers require dedicated or individual branch circuits (separate circuit breakers). There are two reasons for requiring individual branch circuits. The first reason is to ensure that no other electrical devices are connected to the circuit, thus preventing unnecessary tripping of the circuit breaker. The second reason for individual branch circuits is to ensure that there is enough power to run the system. The lack of a dedicated circuit can cause low voltages (insufficient power) and intermittent system problems.

Circuit breakers are rated in amperes. The ampere load in each individual circuit breaker should allow a margin for startup and surge current drawn by the system. Refer to Section 3 of the Computer Products Site Preparation Resource Guide to determine your recommended circuit breaker requirements. Also, consult with the Hewlett-Packard CE.

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*. You should consult with the Hewlett-Packard CE and your electrician to ensure that your electrical system meets all national and local safety 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 hard conduit.)

When installing the receptacles, make sure that each receptacle has its own neutral (if required) and ground. Using the same neutral/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.

For 60-Hz operation, the HP 3000 Corporate Business Systems and HP 9000 Corporate Business Servers are shipped with a power cord and plug that requires a 250V, 30A, 2-pole 3-wire-grounding L6-30R receptacle. (Isolated ground receptacles and associated National Electrical Manufacturers Association part numbers are illustrated in Section 2 of the *Computer Products Site Preparation Resource Guide*). For 50-Hz operation, the computers are shipped without a power cord and plug. Your Hewlett-Packard Sales Representative and CE can assist you in determining the power cord and plug requirements that are compatible with local requirements.

Computer equipment power cord and plug requirements vary from country to country. Power cords and plugs that cannot be ordered must be fabricated by an electrician to meet local requirements.

Power Line Transients

Heavy electrical loads from nearby machinery or equipment (i.e., elevators or electric welders) can cause intermittent system errors even if that equipment is on a separate circuit breaker. When faced with these conditions, you should provide a separate, completely independent power panel with an isolated ground and circuit breaker coming directly from the main building power source or secondary power source. Refer to Section 3 of the *Computer Products Site Preparation Resource Guide* for additional information.

If required, the Hewlett-Packard CE can measure your power line noise level and make appropriate recommendations concerning the use of line treatment 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 separate from the computer system panel. The ground wires from these outlets must be connected to the normal building distribution panel; not the computer system ground.

If a separate power source and separate ground are not provided, operation of janitorial equipment can induce electrical noise and cause abnormal operation of the computer system. Your electrician can verify whether or not maintenance outlets are on separate panels.

Lightning

In some geographical areas it may by advisable to install lightning protection for both personnel and 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 recommendations on lightning protection equipment.

Vibration

Continuous vibration can cause a slow degradation of mechanical parts and, when severe, can cause data errors in disc drives. Mechanical connections such as printed circuit assembly (PCA) connectors, cable connectors, and processor backplane wiring can also be affected by vibration.

If you suspect that vibration may be a problem at your computer site, contact the local Hewlett-Packard sales office for advise and consultation.

Electromagnetic Interference

The HP 3000 Corporate Business Systems and HP 9000 Corporate Business 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 Corporate Business Systems and HP 9000 Corporate Business 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 than three feet from 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 warpage; 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.

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 your responsibility to have the equipment unpacked and moved to its selected 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 cartons containing, system tapes, cables, and installation hardware intact for the Hewlett-Packard CE.

Locate and refer to the *99x Family, 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.

A Site Preparation Kit

Appendix A 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. Appendix C contains additional worksheets and equipment templates for Enterprise Parallel Servers.

Pre-Installation Worksheet

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. - Assign a person the responsibility of system principal operator. - Plan the physical arrangement of the system and its peripherals. The space planning kit allows you to plan details before the system arrives. - Order supplies that are required for uninterrupted operation of the system (consumable supplies).	
At system delivery	- Inspect each shipment as it is delivered. Note comments and dates in shipment schedule. - 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.	
System installation	- Arrange for the system manager to assist the CE with the installation process.	

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:

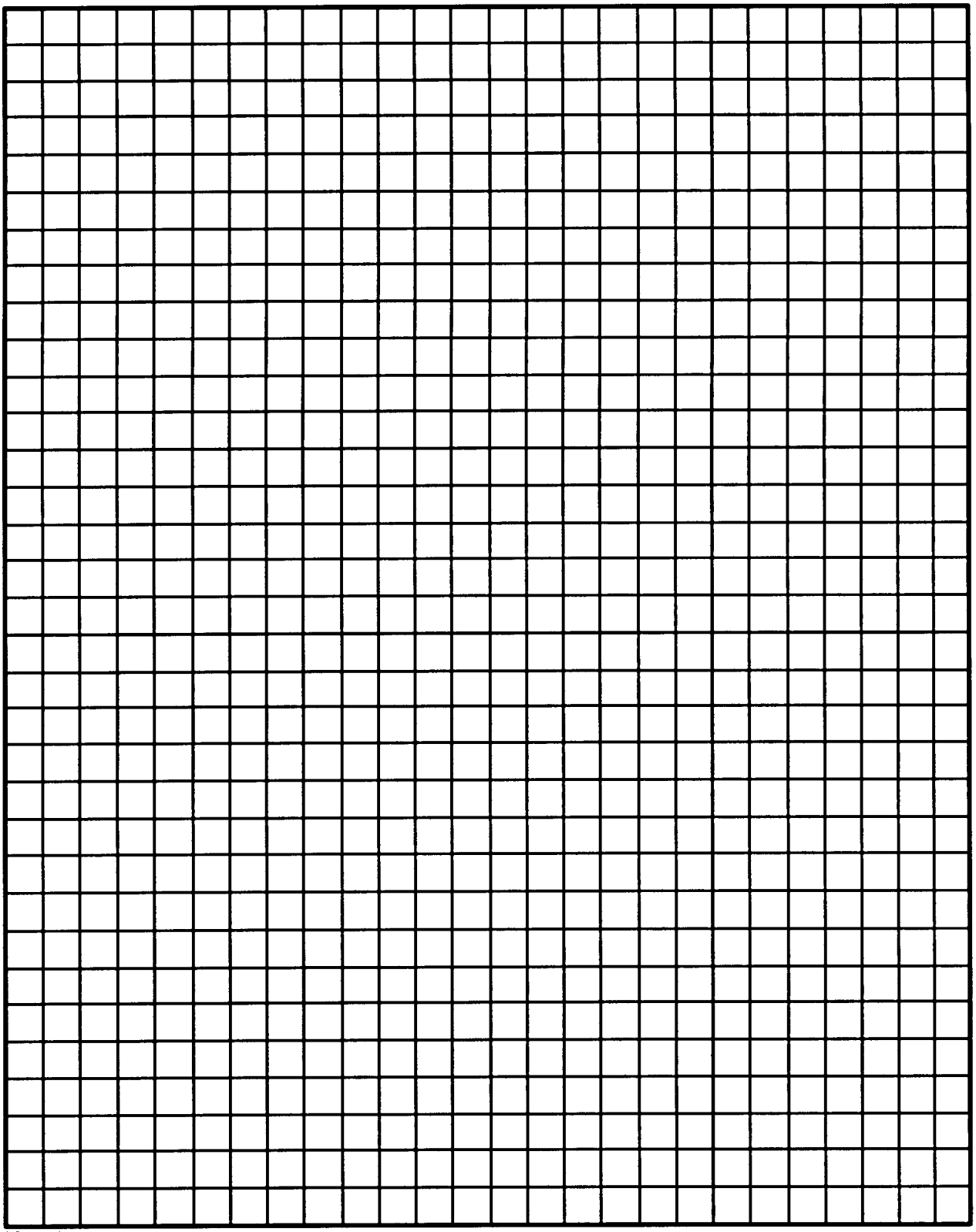
1. On the grid sheet, draw the room (walls, electrical outlets, immovable objects, floor vents, etc.) where the computer will be located. The grid is drawn to a 1/4 inch = 12 inches (6.35mm = 30.48cm) scale.
2. Cut out the models required to represent the system ordered. Include any office furniture that will be used.
3. Move the cutouts about on the grid to determine the best room arrangement

NOTE Be sure to allow room for maintenance in front and back of serviceable equipment. Also, avoid placing the computer system cabinets over floor vents; air flow from such vents could interfere with the cooling arrangement of the computer system.

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

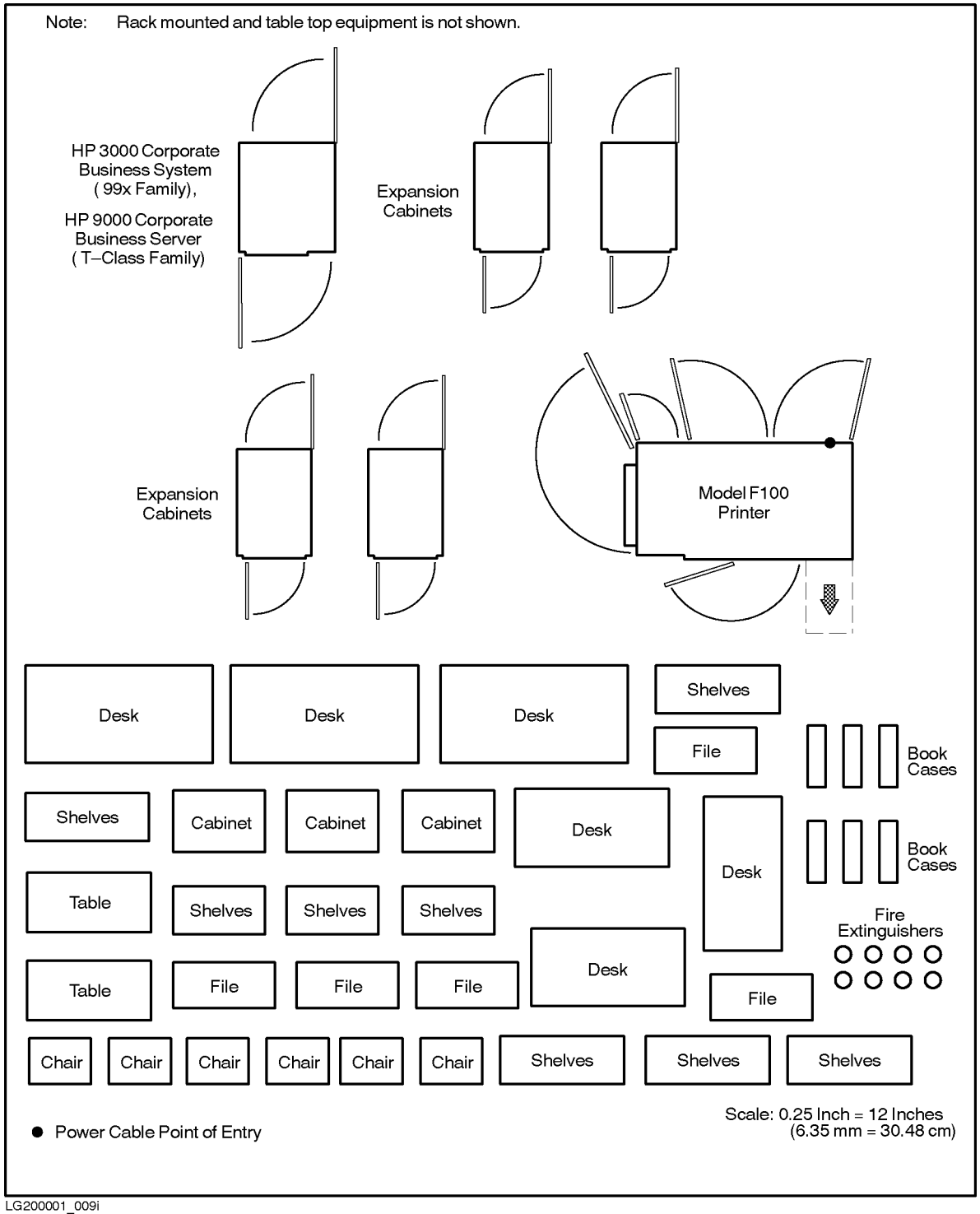
Space Planning Grid Sheet:

Scale is .25 inches equals 1 foot (6.35mm = 30.48cm)



LG200001_008

System Cutouts:



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Tables and Worksheets

Use Table A-1 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.

Use Table A-2 to calculate the system's heat dissipation. Depending on the component combination used, the air conditioning requirements differ between systems.

Table A-1 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					

Table A-2 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-3 Calculation of Total Heat Dissipation

		BTU/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 (1ton = 12,000BTU)	.....	_____

B Specifications

Introduction

This appendix contains regulatory, electrical, physical, and environmental specifications and information for HP 3000 Corporate Business Systems, HP 9000 Corporate Business 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:

- Table B-1. Regulatory Standards
- Table B-2. SPU Electrical Specifications
- Table B-3. SPU Physical and Environmental Specifications
- Table B-4. 890/990/992 SPU Configurations Used to Calculate Line Current, Power Consumption, and Heat Dissipation Specifications
- Table B-5. 991/995/996/T500/T520 SPU Configurations Used to Calculate Line Current, Power Consumption, and Heat Dissipation Specifications
- Table B-6. 997/T600 SPU Configurations Used to Calculate Line Current, Power Consumption, and Heat Dissipation Specifications
- Table B-7. Expansion Cabinet and HP-PB I/O Card Cage Electrical Specifications
- Table B-8. Expansion Cabinet and HP-PB I/O Card Cage Physical Specifications
- Table B-9. HP-PB I/O Card Cage Environmental Specifications
- Table B-10. A2998A 3kVA PowerTrust UPS Specifications
- Table B-11. A3589A 5.5kVA PowerTrust UPS Specifications

Regulatory Standards

The HP 3000 Corporate Business Systems and HP 9000 Corporate Business Servers comply with the regulatory standards listed in Table B-1.

Table B-1 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-TSE(74-SEC)207/94	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
IMMUNITY	to EN 50082-1:1992 as follows:		
	IEC 801-2:1991/pr EN 55024-2:1992	HP Verified	European Community
	(ESD)		
	8 kV - Air Discharge		
	4 kV - Contact Discharge		
	IEC 801-3:1984/pr EN 55024-3:1991	HP Verified	European Community
	(Radiated Immunity)		
	3 V/m		
	IEC 801-4:1988/pr EN 55024-4:1992	HP Verified	European Community
	(Electrical Fast-Transient/Burst)		
	1 kV Power Line		
	0.5kV Signal Line		

Specifications

Table B-2 and Table B-3 list the electrical, physical, and environmental specifications for the SPU. Table B-4 and Table B-5 list the configurations used to calculate line current, power consumption, and heat dissipation specifications for the 99x/T-Class SPUs.

NOTE 99x and T-Class systems require single-phase power (in contrast to 3-phase power). Single-phase power may be obtained in one of two ways:

- **Line-to-neutral:** 200-240V across a phase wire (hot wire) and a neutral wire.
- **Line-to-line:** 200-240V across two different phase wires (hot wires).

In North America, 99x and T-Class systems would have to be supplied line-to-line to obtain 200-240 Volts. Other countries might require line-to-neutral to obtain 200-240 Volts. In neither case is 3-phase power required.

Table B-2 SPU Electrical Specifications

Description	Specification
Nominal voltage single-phase (line-to-line or line-to-neutral)	200 - 240 Vac (See note above)
Voltage tolerance	±10% of nominal voltage
Line frequency/tolerance	50/60 Hz ±5%
Rated input current	24 A (maximum at 200 Vac)
Maximum input line current (AC) at maximum configuration	23.6 A (maximum at 200 Vac)
Inrush current	<100 A for 1/2 second
Power consumption at maximum configuration	4020 W (maximum)
Power fail carry-over (ride-through)	At least 20 ms. Can be more depending on line and load conditions.

Description	Specification
Battery backup time (with 5.5kVA PowerTrust UPS installed)	At least 15 minutes with a fully charged battery
Power line susceptibility	IEEE-587 Category B
Power factor	0.98 W/Volt-Amp
Power cord length	10 feet (North America) Not supplied (International)
Electrical receptacle required	NEMA L6-30R 250 Volts 30 A (North America)
Service panel circuit breaker required (U.S.)	30 A (motor start rating)

Table B-3 SPU Physical and Environmental Specifications

Description	Specification	
Dimensions:		
Height	63.8 inches (162 cm)	
Width	29.5 inches (75 cm)	
Depth	35.6 inches (90.5 cm)	
Unpackaged weight	800 lb (363 kg)	
Packaged weight	953 lb (433 kg)	
Maximum point floor loading	400lb (182kg)	
Minimum service access:		
Front	36 inches (91.5 cm)	
Sides	0 inches (0 cm)	
Rear	36 inches (91.5 cm)	
Shock Requirements:		
End use handling	4-inch (10.2 cm), free-fall drop	
Transportation (TYPE 2)	45 *g*, trapezoidal	
(Delta velocity of 100 in/sec)		
Vibration:		
Sinusoidal sweep	5 to 500Hz at 0.5 *g* (0 peak)	
Random operational	5-350Hz	0.0001 g^2/Hz
	350-500Hz	–6 dB/Octave
	500Hz	0.00005 g^2/Hz (≈0.21 G_{rms})
Random non-operational	5-100Hz	0.015 g^2/Hz
	100-137Hz	–6 dB/Octave

Description	Specification	
	137-350Hz	0.0080 g^2/Hz
	350-500Hz	–6.0 dB/Octave
	500Hz	0.0039 g^2/Hz (≈2.09 G_{rms})
Operating temperature range	41.0° to 104.0° F (5.0° to 40.0° C)	
Recommended operating temperature range	68.0° to 77.0° F (20.0° to 25.0° C)	
Overtemperature shutdown at ambient temperature	>113.0°F (>45.0° C)	

Table B-3 SPU physical and Envirormental Specifications (Continued)

Description	Specification
Maximum operating rate of temp. change	36° F (20° C) per hour
Non-operating temperature range (storage)	–40.0° to 158.0° F (–40.0° to 70.0° C) Anytime the computer is subjected to a non-operating temperature less than 0° C, it must be allowed to stabilize at its operating temperature range for a period of four hours. This is to allow condensation to evaporate before the computer is turned on.
Operating humidity	15 to 80% R.H. at 104.0° F (40.0° C)
Recommended operating humidity	40 to 60% R.H. at 68.0° to 86.0° F (20° to 30.0° C)
Non-operating humidity (storage)	90% R.H. at 149.0° F (65.0° C)
Operating altitude	10,000 feet (3,000 meters). Note: Derate maximum operating temperature –1.98° F per 1,000 feet over 7,500 feet (–1.1° C per 304.8 meters over 2,286 meters).
Non-operating altitude (storage)	15,000 feet (4,572 meters)
Electrostatic discharge	0 to 15 kV, no effect; >15 kV to 25kV, non-destructive (possible system interruption)
Electromagnetic Immunity IEC 801-2:1991 / pr EN 55024-2:1992	8 kV - Air discharge 4 kV - Contact discharge
Magnetic field immunity (Maximum level without affecting functionality)	1 Gauss (p-p)

Description	Specification
Radiated field immunity (14kHz to 1GHz)	No frequencies at a field strength of 10 V/m cause any functional anomalies
Conducted immunity	1 Vrms (50kHz to 400 MHz)
Heat dissipation at maximum configuration	4680 W maximum (15,960 BTU/hour maximum)
Sound power	<7.5 Bels (A-Weighted) below 30° C
Bystander sound pressure (L_pA)	61 dB (A-Weighted) below 30° C

Table B-4, Table B-5, and Table B-6 list the Minimum, Mid, High, and Maximum configurations. Note that the configurations listed in the following tables are field configurations; they do not represent what is shipped from the factory. Also, the listed configurations do NOT include a PowerTrust UPS.

CAUTION The values for "Nominal input current" in Table B-4 and Table B-5 are based on the configurations noted in the tables. They do not represent maximum nominal input current values for future product upgrades. When selecting power cords and branch circuit breaker protection, use the maximum rated input current of 24 Amps.

Table B-4 890/990/992 SPU Configurations Used to Calculate Line Current, Power Consumption, and Heat Dissipation Specifications

PCA	Min	Mid	High	Max
Processors	1 [1]	2	3	4
Memory Boards	1	3	6	8
Bus Converter Boards (2 modules/board)	1	2	3	4
Total input Watts (with Max internal I/O)	1187	1548	2013	2407
Total VA at 200VA	1199	1564	2033	2431
BTUs/hr	4091	5334	6935	8291
Nominal input current at 200V	6.00	7.82	10.17	12.16
Nominal input current at 208V	5.77	7.52	9.78	11.69
Nominal input current at 220V	5.45	7.11	9.24	11.05
Nominal input current at 230V	5.22	6.80	8.84	10.57
Nominal input current at 240V	5.00	6.52	8.47	10.13

1. The maximum number of processors for HP 3000 990 systems is 1.

Table B-5 991/995/996/T500/T520 SPU Configurations Used to Calculate Line Current, Power Consumption, and Heat Dissipation Specifications

PCA	Min	Mid	High	Max
Processors (two per processor card)	1	4	8 [1]	12 [2]
Memory Boards	1	4	8	6
Bus Converter Boards (2 modules/board)	1	2	3	4
Power Modules	1	1	1	2
PFCs	1	1	1	1
Total input Watts (with Max internal I/O)	1436	1774	2378	2727
Total VA at 200VA	1505	1835	2432	2780
BTUs/hr	4898	6050	8108	9298
Nominal input current at 200V	7.5	9.2	12.2	13.9
Nominal input current at 208V	7.2	8.8	11.7	13.4
Nominal input current at 220V	6.8	8.3	11.1	12.6
Nominal input current at 230V	6.5	8.0	10.6	12.1
Nominal input current at 240V	6.3	7.6	10.1	11.6

1. The maximum number of processors for HP 3000 995 systems is 8.
2. The maximum number of processors for HP 3000 996 systems and HP 9000 T500/520 servers is 12.

Table B-6 997/T600 SPU Configurations Used to Calculate Line Current, Power Consumption, and Heat Dissipation Specifications

PCA	Min	Mid	High	Max
Processors (two per processor card)	1	4	8	12 [1]
Memory Boards	1	4	8	6
Bus Converter Boards (2 modules/board)	1	2	4	4
Power Modules	1	2	3	4
PFCs	1	2	2	2
Total input Watts (with max internal I/O)	1450	2210	3420	4020
Total VA at 200VA	1480	2260	3490	4100
BTUs/hr	4930	7540	11,660	12,200
Nominal input current at 200V	7.4	11.3	17.5	20.5
Nominal input current at 208V	7.1	10.9	16.8	19.7
Nominal input current at 220V	6.7	10.3	15.9	18.6
Nominal input current at 230V	6.4	9.8	15.2	17.8
Nominal input current at 240V	6.2	9.4	14.5	17.1

1. The maximum number of slots for processor, memory, and bus converter boards in 997/T600 servers is 16. The maximum number of processors is 12 (i.e., 6 boards), the maximum number of memory boards is 11, and the maximum number of bus converter boards is 6.

Expansion Cabinet and HP-PB I/O Card Cage Specifications

Table B-7 Expansion Cabinet and HP-PB I/O Card Cage Electrical Specifications

Description	Specification
EXPANSION CABINET:	
Input power requirements:	
Voltage	200-240Vac
Frequency	50/60Hz ±5%
Current	16A maximum
Heat Dissipation	≈3000W maximum with instruments incorporating front-to-back cooling (≈10,230 BTU/Hr maximum)
Electrical receptacle required	(U.S.) NEMA L6-20R (International) Power cord with no plug is provided.
Battery backup	None
HP-PB I/O CARD CAGE:	
Input power requirements:	
Voltage	Autoranging 200-240Vac
Voltage tolerance	±10%
Voltage unbalance	5%
Frequency	50/60Hz ±5%
Frequency tolerance	±5%
Rated input current	
(maximum at 100 Vac)	Not supported
(maximum at 200 Vac)	3.5A

Description	Specification
Total harmonic distortion	5%
Power consumption (maximum)	400W
Battery backup time	At least 15 minutes
Powerfail carry-over	20ms
Electrical receptacle required	IEC 320 (Expansion cabinet PDU receptacle)

Table B-8 Expansion Cabinet and HP-PB I/O Card Cage Physical Specifications

Description	Specification
A1884A/A1897A EXPANSION CABINET:	
Height	63.8 inches (162.0 cm)
Width	23.6 inches (60.0 cm)
Depth	35.6 inches (90.5 cm)
Weight	1500 pounds (653.6 kg) maximum
Cooling and access space	24 inches (front and rear)
HP-PB I/O CARD CAGE:	
Height	11.98 inches (30.42 cm) (7 EIA units)
Width	16.73 inches (42.50 cm)
Depth	20.89 inches (53.05 cm)
Weight	55 pounds (24.95 kg)

Table B-9 HP-PB I/O Card Cage Environmental Specifications

Description	Specification
Temperature Requirements:	
Recommended operating temperature	68.0° to 77.0° F (20° to 25° C)
Operating temperature range	41° to 104° F (5° to 40° C)
Maximum operating rate of change	36° F (20° C) per hour
Non-Operating (storage) temperature range	–40° to 158° F (–40° to 70° C)
Humidity Requirements:	
Recommended operating humidity	40% to 60% R. H.
Operating humidity	15% to 80% R. H. at 104° F (40° C)
Non-Operating (storage) humidity	90% R. H. at 149° F (65° C)
Heat Dissipation:	360 W (maximum) (1230 BTU/hour)
Altitude Requirements:	
Maximum operating	10,000 feet (3,000 meters). Note: Derate maximum operating temperature –1.98° F per 1,000 feet over 7,500 feet (–1.1° C per 304.8 meters over 2,286 meters).
Maximum non-operating	15,000 feet (4,572 meters)
Vibration Requirements:	
Operating random (5-500Hz)	≈0.21 G_{rms}
Sinusoidal sweep survival (5-500Hz)	0.5 *g* (0 peak)
Random survival (5-500Hz)	≈2.09 G_{rms}

Description	Specification
Shock Requirements:	
End use handling	4 inch (10.2 cm) free-fall drop
Transportation (Delta velocity of 368cm/sec)	30 *g*, trapezoidal
Acoustic Requirements:	
Sound power	4.2 Bels (A-Weighted)
Bystander sound pressure (L_pA)	42 dB (A-Weighted)

Powertrust UPS Specifications

Table B-10 lists the specifications for the A2998A PowerTrust UPS (Uninterruptible Power System); Table B-11 lists the specifications for the A3589A PowerTrust UPS.

Table B-10 A2998A 3kVA PowerTrust UPS Specifications

Description	Specification
Electrical Specifications	
AC Line Input:	
Rated Voltage	200 - 240 Vac
Rated Current	20 A (30 A Max branch circuit overcurrent protection)
Online	180 - 255 Vac
Maximum	300 Vac
Nominal AC Frequency	50 or 60 Hz
AC Frequency Range:	
50 Hz	47 - 53 Hz
60 Hz	57 - 63 Hz
AC Output	
Rated Power	Up to 3000 VA Up to 3000 W
Loading (% of rated power	
in normal (not bypass) mode):	
0 - 110%	UPS will operate indefinitely
110 - 130%	UPS will operate up to 5 minutes
>130%	UPS will shut down in <10 seconds
Voltage:	
Normal Mode	223 - 237 Vac
Frequency:	
50 Hz	47 - 53 Hz
60 Hz	57 - 63 Hz
Current:	
Maximum	13 A rms
Crest Factor	≤3 (A peak/A rms)
Waveshape	True sinewave with <5% Total Harmonic Distortion

Description	Specification
Transfer Time	AC failure - approximately 4msec AC restored - 20 second delay returning to AC
Phasing	Phase locked to within 5° of utility AC
AC Line Input (continued):	
Safety Agency Approvals	UL, CSA, TUV-GS Mark
Fuse [1]	20A 250V UL listed time delay (slow-blow)
Battery	
Type	120V DC maintenance-free lead acid (20AHr)
Battery Runtime	
20° C or above	15 minutes over battery lifetime
New battery	15 minutes over full temperature range
Charging Time (20° C or above)	<14 hours
Battery Lifetime (25° C or below)	4 years (approx.)
Environmental Specifications	
Operating Limits	
Operating Temperature [2]	5° to 40°C (41° to 104°F)[2].
Recommended Temperature[2]	20° to 30°C (68° to 86°F)[2]
Humidity	15% to 80% Relative Humidity, non-condensing
Altitude	3,000 meters (10,000 feet)
Non-Operating Limits	
Storage Temperature	
Electronics unit	–30° to 50°C (–22° to 122°F)
Battery box	–30° to 50°C (–22° to 122°F)
Humidity	5% to 80% Relative Humidity, non-condensing
Altitude	4,572 meters (15,000 feet)
Physical Specifications - Electronics Unit	
Dimensions packaged:	Height - 28.0cm (11.0in) Width - 57.0cm (22.5in) Depth - 72.5cm (28.4in) Weight - 67.0kg (147.5lbs)

Description	Specification
Dimensions unpackaged:	Height - 25.5cm (10.0in) - 6 EIA units Width - 42.5cm (17.0in) Depth - 61.0cm (24.0in) Weight - 61.0kg (135.0lbs)
Physical Specifications - Battery Boxes (2 per 3kVA PowerTrust UPS)	
Dimensions packaged:	Height - 41.0cm (16.0in) Width - 57.0cm (22.5in) Depth - 72.1cm (28.4in) Weight (with batteries) - 65.0kg (143.5lbs) Weight (without batteries) - 23.0kg (51.5lbs)
Dimensions unpackaged:	Height - 12.7cm (5.0in) - 3 EIA units Width - 42.5cm (17.0in) Depth - 61.0cm (24.0in) Weight (with batteries) - 60.0kg (133.0lbs) Weight (without batteries) - 19.0kg (41.0lbs)
Minimum Required Service Access	
Service access space:	Rear - 76.0cm (30.0in) Side - 0.0cm (0.0in) Front - 91.0cm (36.0in)
Communication Specifications	
RS-232 Port pinouts	pin 1: Receive Data pin 2: Transmit Data pins 3-8: Reserved pin 9: Signal Ground
Communication protocol	8 data bits, 1 stop bit, no parity, 1200 baud

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

Table B-11 A3589A 5.5kVA PowerTrust UPS Specifications

Description	Specification
Electrical Specifications	
AC Line Input:	
Rated Voltage	200-240 VAC @ 50/60 Hz
Rated Current [1]	28A
Normal Operating Frequency Range	50 ±3 Hz or 60 ± Hz [2]
Normal Operating Voltage Range	180-256 VAC
AC Line Input Transfer Points:	
On-line to On-battery:	
Normal to Overvoltage	262-272 VAC
Normal to Undervoltage	162-168 VAC
Normal to Underfrequency:	
For 50 Hz operation	below 46.5 Hz
For 60 Hz operation	below 56.5 Hz
Normal to Overfrequency:	
For 50 Hz operation	below 53.5 Hz
For 60 Hz operation	below 63.5 Hz
On-battery to On-line:	
Overvoltage to Normal	256-266 VAC
Undervoltage to Normal	174-180 VAC
Underfrequency to Normal:	
For 50 Hz operation	above 47.0 Hz
For 60 Hz operation	below 57.0 Hz
Overfrequency to Normal:	
For 50 Hz operation	below 53.0 Hz
For 60 Hz operation	below 63.0 Hz

Description	Specification
AC Output:	
Output Voltage (and tolerance):	
On-line	230 VAC (+6%/-13%)
On-battery	230 VAC (±3%)
Auto or Service Bypass	Same as the AC line input
Output Frequency (and tolerance):	
On-line	Tracks input frequency [3]
On-battery	50 ±3 Hz or 60 ±3 Hz [4]
Auto or Service Bypass	Same as the AC line input
Rated Output volt-amperes (VA):	
On-line [5]	5500 VA, continuous
On-battery [5]	5500 VA, until fully discharged
Auto or Service Bypass [6]	5500 VA, continuous
Rated Power:	
On-line [7]	5500 W, continuous
On-battery [7]	5500 W, until fully discharged
Auto or Service Bypass[6]	5500 VA, continuous
Output Waveshape:	
On-line	Matches the input waveshape
On-battery	Sine wave (with ≤5% THD) [8]
Auto or Service Bypass	Matches the input waveshape
Overload Protection:	
On-line or On-battery:	
Firmware protection:	
For >110% load	Shuts down after a delay [9]
Input Breaker protection:	Main UPS circuit breaker (50A)
Auto or Service Bypass:	Bypass circuit breaker (40A)

Description	Specification
Output Overload Protection:	
At Ouput #1	Output circuit breaker #1 (16A)
At Ouput #2	Output circuit breaker #2 (16A)
At Ouput #3	Output circuit breaker #3 (16A)
At Ouput #4	Output circuit breaker #4 (30A)
Battery	
Type	Maintenance-free sealed lead acid
Nominal voltage	48 VDC
Runtime (@ +25°C or above)	15 min. over battry lifetime
Runtime (new battery)	15 min. (+5°C to +40°C; at 0-3000 m)
Charging Time (@ +25°C)	≤14.5 hours
Lifetime	Approximately 4 years
Environmental Specifications	
Operating Limits:	
Temperature [10]	5° to 40°C[10] —up to maximum operating altitude
Recommended Temperature[10]	20° to 25°C[10]
Humidity	15% to 80% Relative Humidity, non-condensing at 40°C
Altitude	0 to 3,000 meters (10,000 feet)
Non-Operating Limits:	–40°C to 70°C –15°C to 25°C for maximum battery life
Relative Humidity (noncondensing)	5% to 90% at 65° C
Altitude	0 - 4572 m (15,000 feet)
Acoustic Noise:	7.5 Bels (max.) A-weighted sound power from any surface
Physical Specifications - Electronics Unit	
Dimensions packaged	Height - 43.82cm (17.25in) Width - 59.69cm (23.50in) Length - 95.25cm (37.50in) Weight - 77.73kg (171.0 lbs)

Description	Specification
Dimensions unpackaged	Height - 34.4cm (13.54in) - 8 EIA units Width - 48.16cm (18.96in) Length - 80.74cm (30.79in) Weight - 68.19kg (150.0 lbs)
Physical Specifications - Battery Box (1 per 5.5kVA PowerTrust UPS)	
Dimensions packaged	Height - 41.91cm (16.50in) Width - 55.25cm (21.75in) Length - 83.82cm (33.0in) Weight (with batteries) - 187.27kg (412 lbs)
Dimensions unpackaged	Height - 30.84cm (12.14in) - 7 EIA units Width - 44.88cm (17.67in) Length - 70.15cm (27.62in) Weight (with batteries) - 180kg (396 lbs) Weight (without batteries) - 30kg (66 lbs)
Physical Specifications - Battery Pack	
Dimensions packaged	Height - 39.37cm (15.50in) Width - 23.18cm (9.13in) Length - 50.80cm (20.00in) Weight - 18.18kg (40 lbs)
Dimensions unpackaged	Height - 25.88cm (10.19in) Width - 8.0cm (3.15in) Length - 37.47cm (14.75in) Weight - 15kg (33 lbs)
Physical Specifications - Service Bypass Unit	
Dimensions packaged	Height - 33.02 cm (13.00 in) Width - 40.64 cm (16.00 in) Length - 55.88 cm (22 in) Weight - 13.63 kg (30.0 lbs)
Dimensions unpackaged	Height - 27.86cm (10.97in) Width - 22.1cm (8.70in) Length - 47.14cm (18.56in) Weight - 10.45kg (23 lbs)
Minimum Required Service Access	
Service access space	Rear - 76.0cm (30.0in) Side - 0.0cm (0.0in) Front - 91.0cm (36.0in)

Description	Specification
Communication Specifications	
RS-232 port pinouts	pin 1: Receive Data pin 2: Transmit Data pins 3-8: Reserved (Do not use) pin 9: Signal Ground
Communication protocol	8 data bits, 1 stop bit, no parity, 1200 baud

1. 50A max branch circuit overcurrent protection.
2. Outside these ranges the A3589A UPS may not turn on, or it may switch to On-battery operation if it is already on. Frequency range, specified above.
3. For input frequencies within the range specified in "Normal Operating Frequency Range."
4. The first number applies when the UPS operates within 50 ±3 Hz before the input power fails (or violates the operating limits). The second number applies when the UPS operates within 60 ±3 Hz before the input power fails (or violates the operating limits).
5. For loads with crest factors of 3.0 or less.
6. For loads with power factors of 1.0 (resistive or PFC).
7. Independent of load power factor or crest factor.
8. For purely resistive load.
9. Shutdown delay is implemented by PFC firmware. Delay decreases in inverse relation to the degree of output overload. In addition, UPS Outputs 1 through 4 are protected by corresponding Output circuit breakers 1 through 4.
10. Battery life is severely shortened if temperature exceeds 25°C (77°F) for extended periods of time.

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 setup.

System Application Summary

The Enterprise Parallel Server System functions as a Decision Support Server (DSS). A DSS 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 supports the following application environments:

- Concurrent Shared Data "share disk" Access with High Availability (HA) failover
- OLTP/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 modules
- The second has a T-Class base module and T-Class add-on modules

Enterprise Parallel Server Model configurations are discussed in the following sections.

Model EPS 22 Configuration

The EPS 22 is comprised of an HP 9000 K-460 in a 1.6 meter rack, 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 (Uninterruptible Power Systems (UPS), FDDI concentrators, etc.) are installed in extension cabinets associated with the 2-meter cabinet.

There are High Availability (HA) and non-HA versions available. In addition, a 1.6-meter extension cabinet with two 3.0 kVA UPS is also available.

Model EPS 30 Configuration

The Model EPS 30 is comprised of an HP 9000 T520 base node, in a 1.6-meter rack, and the following:

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

NOTE Power Distribution Units (PDU) are not installed in 2-meter cabinets containing two K-460 SPUs or 1.6-meter cabinets containing two 3.0 kVA UPSs.

Node Upgrade

The K-460 and T520 nodes can be upgraded as follows:

K-460 Node—Each K-460 can be upgraded with up to three more PA-RISC processors and up to 3.75 GB of memory. A 3.0 kVA 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* (HP P/N 5965-4749E).

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. A 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* (HP P/N 5965-4749E).

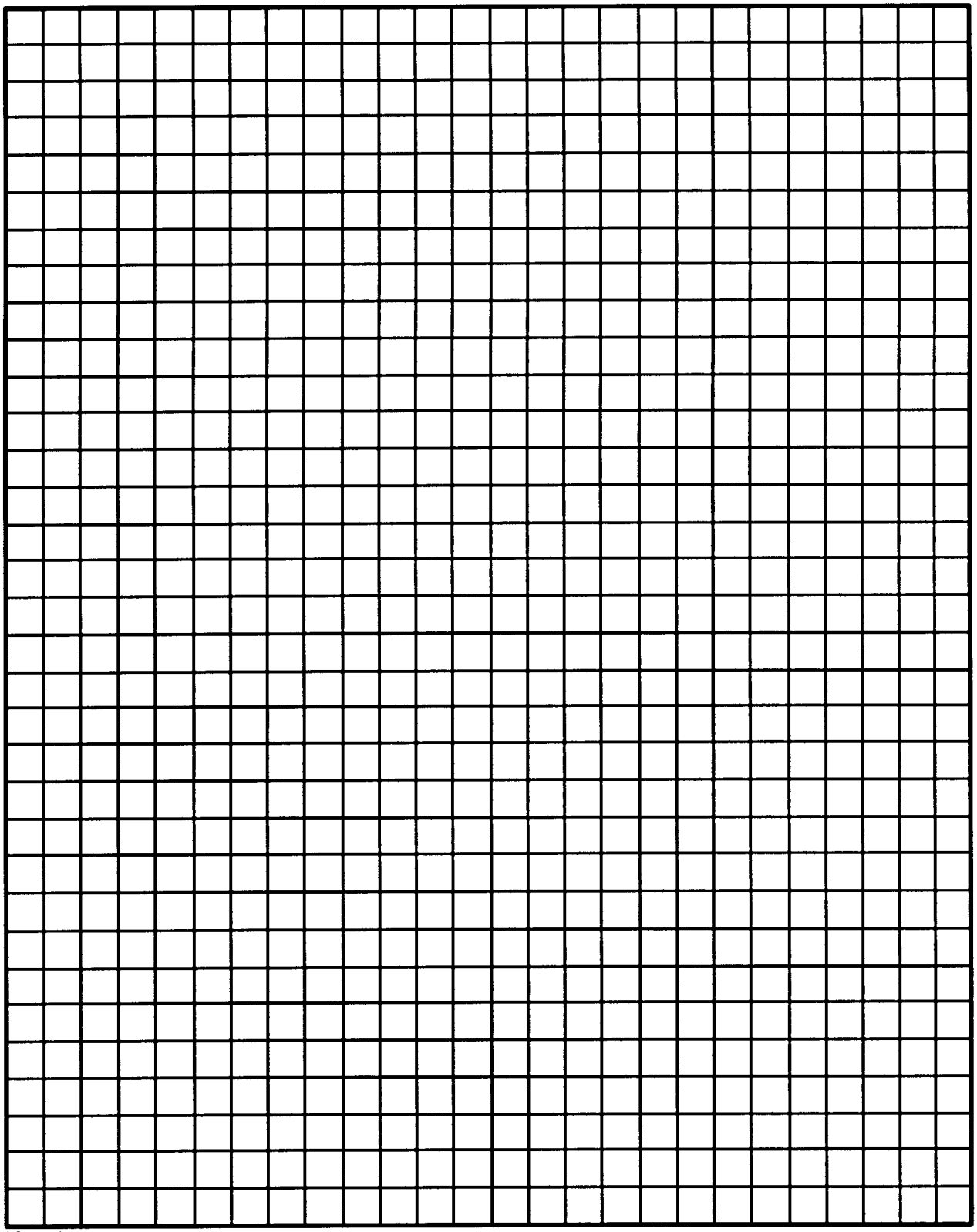
Space Planning

Only one space planning requirement 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 extension cabinet. Maintenance access space on the left side of the base node extension cabinet must be allowed for access to the Terminal Server.

Use the grid (1/4 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.

Figure C-1 Space Planning Grid



LG200001_008

Figure C-2 K-Class Equipment Cutouts

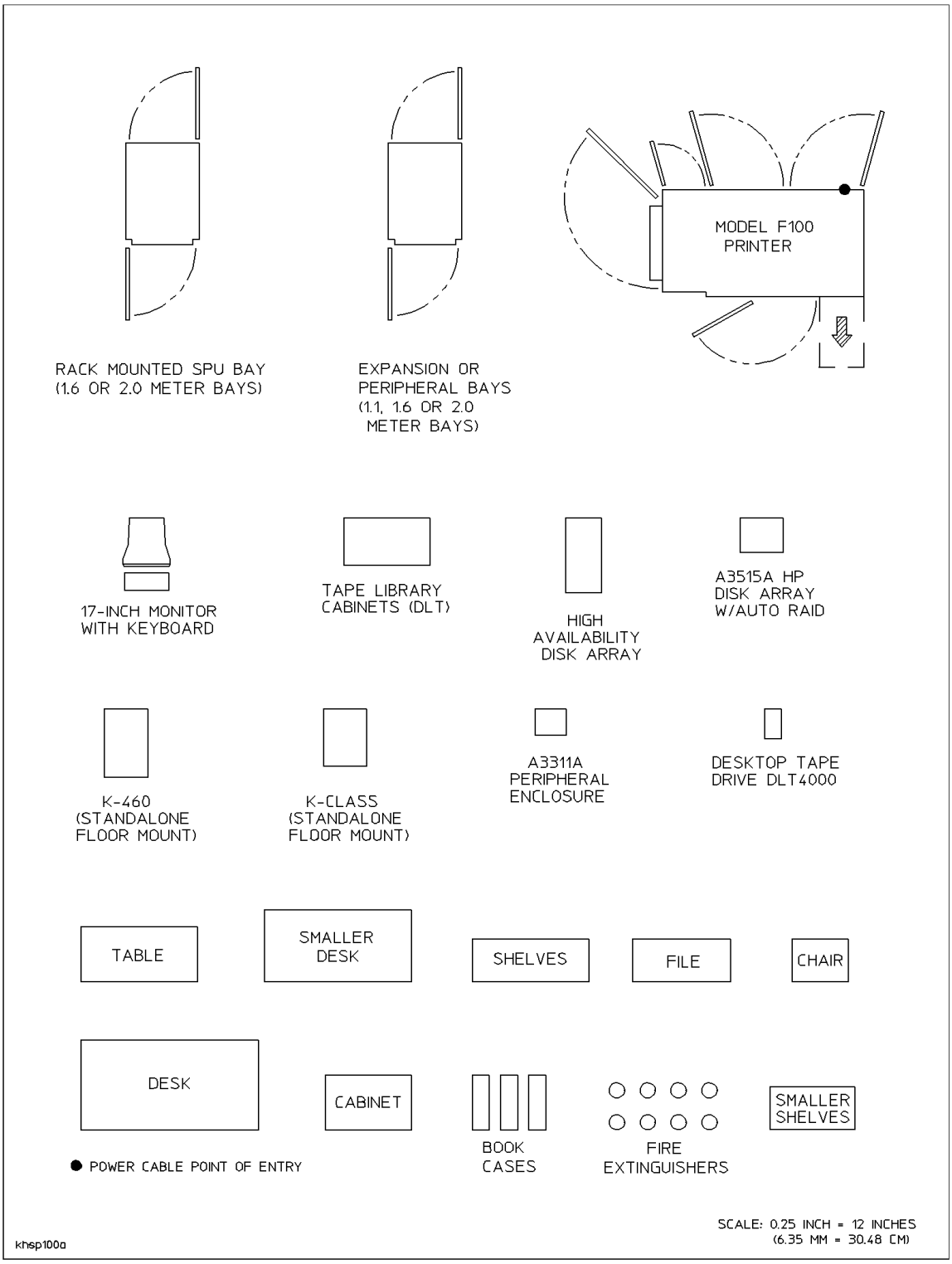
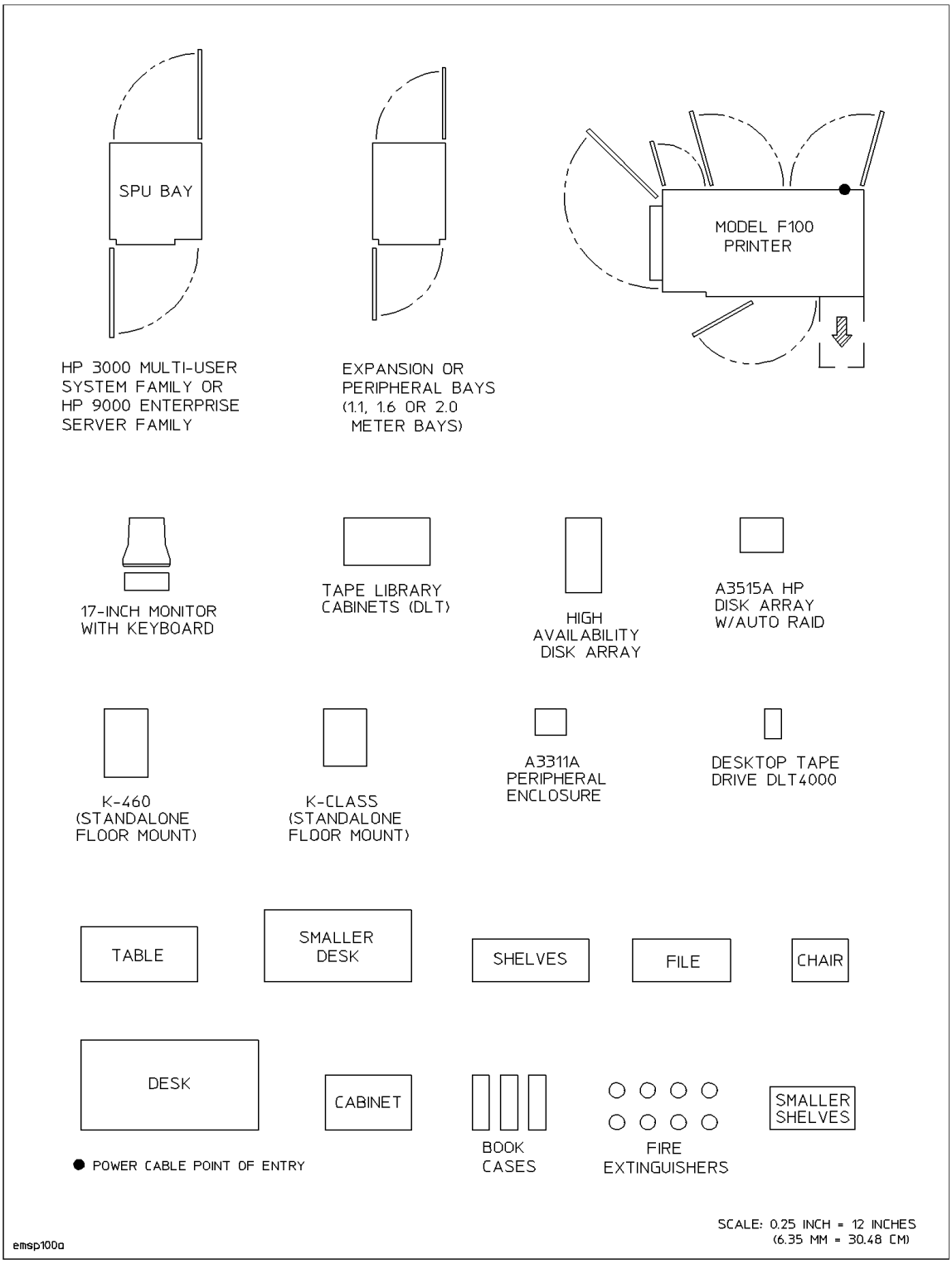


Figure C-3 T-Class Equipment Cutouts



Supported Configurations

Two K-Class Enterprise Parallel Server configurations are currently supported:

- All K-Class Configurations - All base and add-on nodes are K-Class servers.
- All T-Class Configurations - All base and add-on nodes are T-Class servers.

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-1 Worksheet for Power Requirement Calculations

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

Use Table C-2 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-2 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-3.

Table C-3 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)	