Sun Fire™ E6900/E4900 Systems Site Planning Guide

Sun Microsystems, Inc.
www.sun.com

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Preface

The *Sun Fire™ E6900/E4900 Systems Site Planning Guide* helps management and site preparation personnel identify and create suitable environments for the Sun Fire cabinet-mounted systems and standalone systems.

Due to the amount of time required to plan and properly prepare a site for installation of a Sun Fire™ server system, you must fulfill all of the requirements outlined in this manual before your equipment arrives. Your Sun Microsystems account manager is available to help.

How This Document Is Organized

This book is organized into three chapters:

Chapter 1 is a worksheet for planning your space and double-checking details.

Chapter 2 lists system components, size and space requirements, and cable lengths and limitations.

Chapter 3 lists electrical and cooling specifications requirements.

Related Documentation

The documents listed as online are available at:

http://www.sun.com/products-n-solutions/hardware/docs/

Application	Title
Installation	*Sun Fire E6900/E4900 Systems Installation Guide*
Operation	*Sun Fire Cabinet Installation and Reference Guide*
	Sun Fire E6900/E4900 Systems Getting Started
	Sun Fire E6900/E4900 Systems Service Manual
	Sun Fire E6900/E4900 Systems Overview Manual

Documentation, Support, and Training

Sun Function	URL
Documentation	http://www.sun.com/documentation/
Support	http://www.sun.com/support/
Training	http://www.sun.com/training/

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Sun Fire E6900/E4900 Systems Site Planning Guide, part number 817-4117-14(v2)

CHAPTER 1

Site Planning Checklist

Prior to system installation, confirm that the following requirements have been met.

1.1 System Components

- ❑ Has the system configuration been determined?
- ❑ What is the total number of systems?

1.2 Miscellaneous

- ❑ Have system administrators and operators taken the necessary Sun Microsystems training courses?

1.3 Environmental Requirements

- ❑ Does the computer room environment meet the temperature and humidity specifications listed in Table 3-1?
- ❑ Can the computer room environment specifications be maintained satisfactorily?
- ❑ Is additional fire suppression equipment required?

1.4 Facility Power Requirements

- ❑ Have you determined at what voltage the system cabinet and peripheral cabinet(s) will be operated?
- ❑ Have sufficient power receptacles been ordered for each system, monitor, and peripheral?
- ❑ Are circuit breakers properly installed and labeled?
- ❑ Are the power receptacles within 11.5 feet (3.5 meters) of the server cabinet system, or within 6 feet (1.8 meters) of the standalone server system?

1.5 Physical Specifications

- ❑ Has the system location been established?
- ❑ Does the equipment floor layout meet the equipment maintenance access and air flow requirements?
- ❑ Is the equipment positioned so that the exhaust air of one device does not enter the air inlet of another?

1.6 Planning Your Access Route

- ❑ Has the access route been checked against Table 2-5 for clearances of the packaged system?
- ❑ Has a proper pallet jack been checked against Table 2-6 for weight limitation for moving the system?
- ❑ Has the elevator been checked against Table 2-5 for clearances and Table 2-6 for weight restrictions of the packaged system?

CHAPTER 2

Physical Specifications

This chapter provides information about the physical characteristics of the Sun Fire E6900/E4900 systems, including dimensions, space needs, cable sizes, and limitations.

2.1 System Components

Sun Fire systems are available in the following enclosures:

TABLE 2-1 Sun Fire System Components

Sun Fire E6900 system	Standard 19-inch x 75-inch cabinet 6-slot CPU/Memory card cage
Sun Fire E4900 system	3-slot CPU/Memory card cage

The same CPU/Memory boards, PCI/PCI+/PCI-X I/O assemblies, and memory modules are used in the Sun Fire systems.

Internal storage devices are not supported.

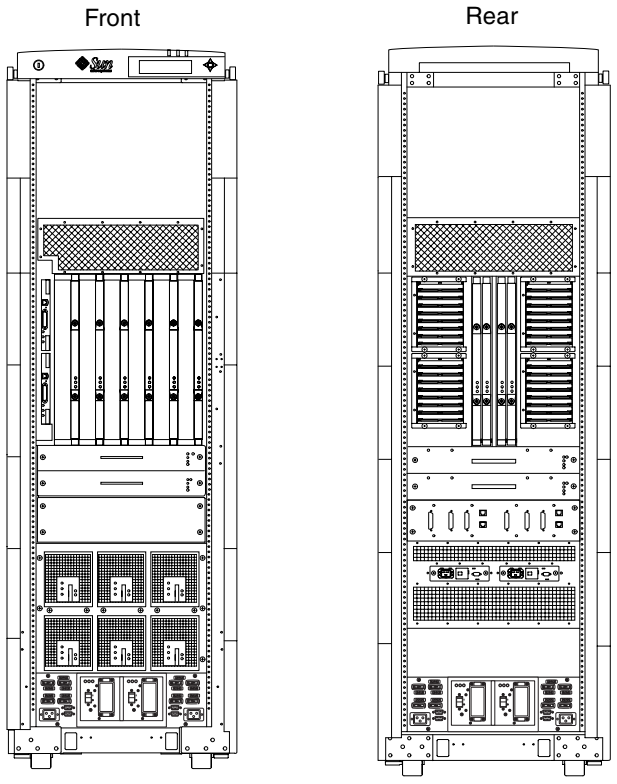


FIGURE 2-1 Sun Fire E6900 System

The maximum configuration for the Sun Fire E6900 system is:

- Data center system cabinet
- Power supply modules (PSM) (6)
- Fan trays (4)
- System Controller boards (2)
- Repeater boards (4)
- CPU/Memory boards (6)
  - UltraSPARC® IV/IV+ CPU (24)
  - Main memory (192 DIMM sockets)
- I/O assemblies (4)
  - PCI/PCI+/PCI-X I/O assemblies (8 slots per I/O assembly)
- Board filler panels for any unpopulated board slots
- Redundant Transfer Units (2)
- Redundant Transfer Switches (4)

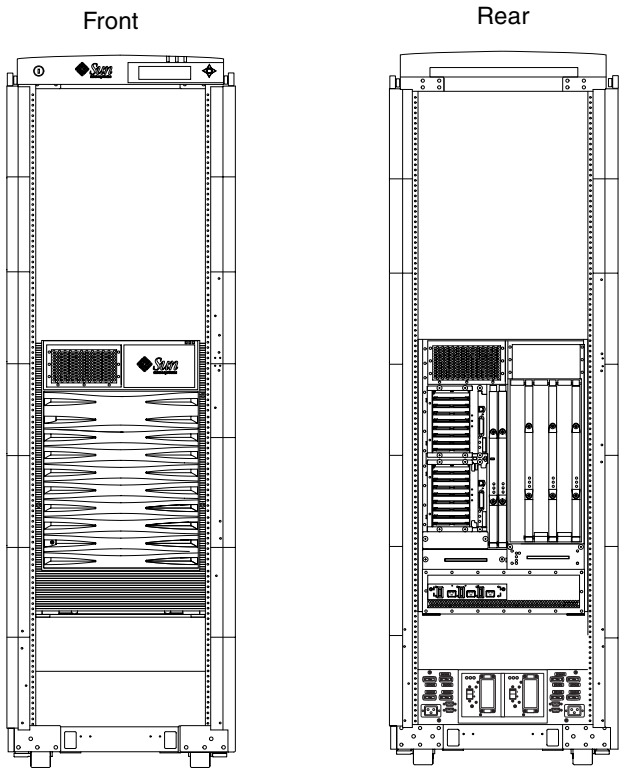


FIGURE 2-2 Sun Fire E4900 System Mounted in Optional Sun Fire Cabinet

The maximum configuration for the Sun Fire E4900 system is:

- Power supply modules (PSM) (3)
- CPU and I/O Fan trays (3)
- System Controller boards (2)
- Repeater boards (2)
- CPU/Memory Boards (3)
  - UltraSPARC IV/IV+ CPU (12)
  - Main memory (96 DIMM sockets)
- I/O assemblies (2)
  - PCI/PCI+/PCI-X I/O assemblies (8 slots per I/O assembly)
- Board filler panels for any unpopulated board slots

2.2 General Physical Guidelines

As you plan your space needs for the Sun Fire E6900/E4900 systems, keep these conditions in mind:

- *Each* system requires its own power cords, connected to separate power outlets. See Chapter 3 for details on electrical requirements.
- The Sun Fire E6900 system and Sun Fire cabinet require a 30A circuit and detachable cables. The 30A 200–240 VAC circuit breakers are supplied by the customer.
- The systems require electrical circuits that are grounded to earth.

Consult your specific Sun Fire system installation guide for complete installation details.

2.2.1 Size and Space Specifications

Sun Fire systems and expansion cabinets can be placed next to each other, without space between them, since there are no side clearance requirements during operation. However, if access is desired, allow approximately 2 feet (60 centimeters) of space on each side to access and remove side panels.

2.2.1.1 Thermal Clearance Specifications

The Sun Fire E6900/E4900 systems must maintain the minimum thermal distance between the rear of the system and any obstructions or walls. Requirements during operation are listed in the following table.

TABLE 2-2 Thermal Clearance for Sun Fire E6900/E4900 Systems

System	Front Clearance	Rear Clearance
Sun Fire E6900	48 in. (122 cm)	36 in. (91.4 cm)
Sun Fire E4900	48 in. (122 cm)	36 in. (91.4 cm)

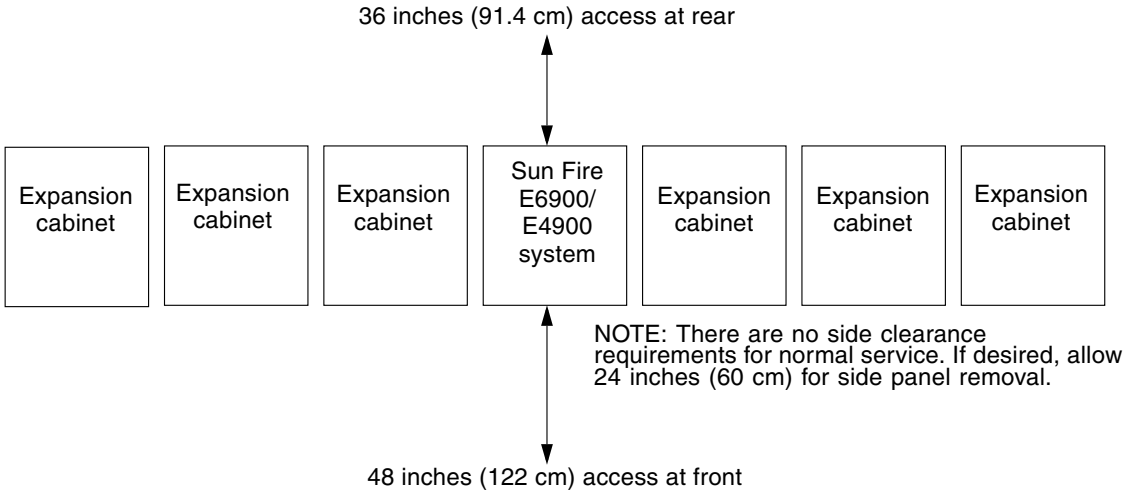


FIGURE 2-3 Sun Fire E6900/E4900 Systems Access Areas—Top View

To determine space requirements for Sun Fire systems, use the following tables:

- Table 2-3 discusses the Sun Fire E6900 system and Sun Fire cabinet physical specifications
- Table 2-4 discusses the Sun Fire E4900 system, when not mounted in the Sun Fire cabinet.

TABLE 2-3 Physical Specifications for Sun Fire E6900 System and Sun Fire Cabinet

Characteristic	Value
Shipping height (package on pallet)	Sun Fire E6900 system = 80.25 in. (203.8 cm) Sun Fire cabinet = 80.25 in. (203.8 cm)
Shipping width (package on pallet)	Sun Fire E6900 system = 42.5 in. (108 cm) Sun Fire cabinet = 42.5 in. (108 cm)
Shipping depth (package on pallet)	Sun Fire E6900 system = 59.3 in. (150.6 cm) Sun Fire cabinet = 47 in. (119.5 cm)
Shipping weight (package on pallet)	Sun Fire E6900 system = 1465 lb (664.5 kg) Sun Fire cabinet = 558 lb (253.1 kg)
Height	75 in. (190.5 cm)

TABLE 2-3 Physical Specifications for Sun Fire E6900 System and Sun Fire Cabinet

Characteristic	Value
Width	24 in. (61 cm)
Depth	Sun Fire E6900 system = 53 in. (134.6 cm) Sun Fire cabinet = 37 in. (94 cm)
Weight	Sun Fire E6900 system = 1200 lbs (544.3 kg) Sun Fire cabinet = 325 lbs (147 kg)
Power cord length	13.13 ft. (4.0 m)
Access requirement for front	48 in. (122 cm)
Access requirement for rear	36 in. (91 cm)
Air flow requirement for left and right sides	none

TABLE 2-4 Physical Specifications for Sun Fire E4900 System (System only)

Characteristic	Value
Shipping height	45.3 in. (115 cm)
Shipping width	29.1 in. (74 cm)
Shipping depth	40.5 in. (103 cm)
Shipping weight (package on pallet)	350 lbs (158.8 kg)
Height	30 in. (76.2 cm)
Width	17.5 in. (44.6 cm)
Depth	28.5 in. (72.4 cm)
Weight	289 lbs (131.1 kg)
Power cord length	8.2 ft. (2.5 m)
Access requirement for front	36 in. (91 cm)
Access requirement for rear	36 in. (91 cm)

FIGURE 2-4 shows the dimensions of the Sun Fire E6900/E4900 systems crates.

FIGURE 2-5 shows the dimensions of the Sun Fire E6900 system cabinet.

FIGURE 2-6 shows the footprint dimensions of the Sun Fire E6900 system cabinet and the Sun Fire cabinet.

See Table 3-3 and Table 3-4 for system electrical specifications and receptacle model numbers.

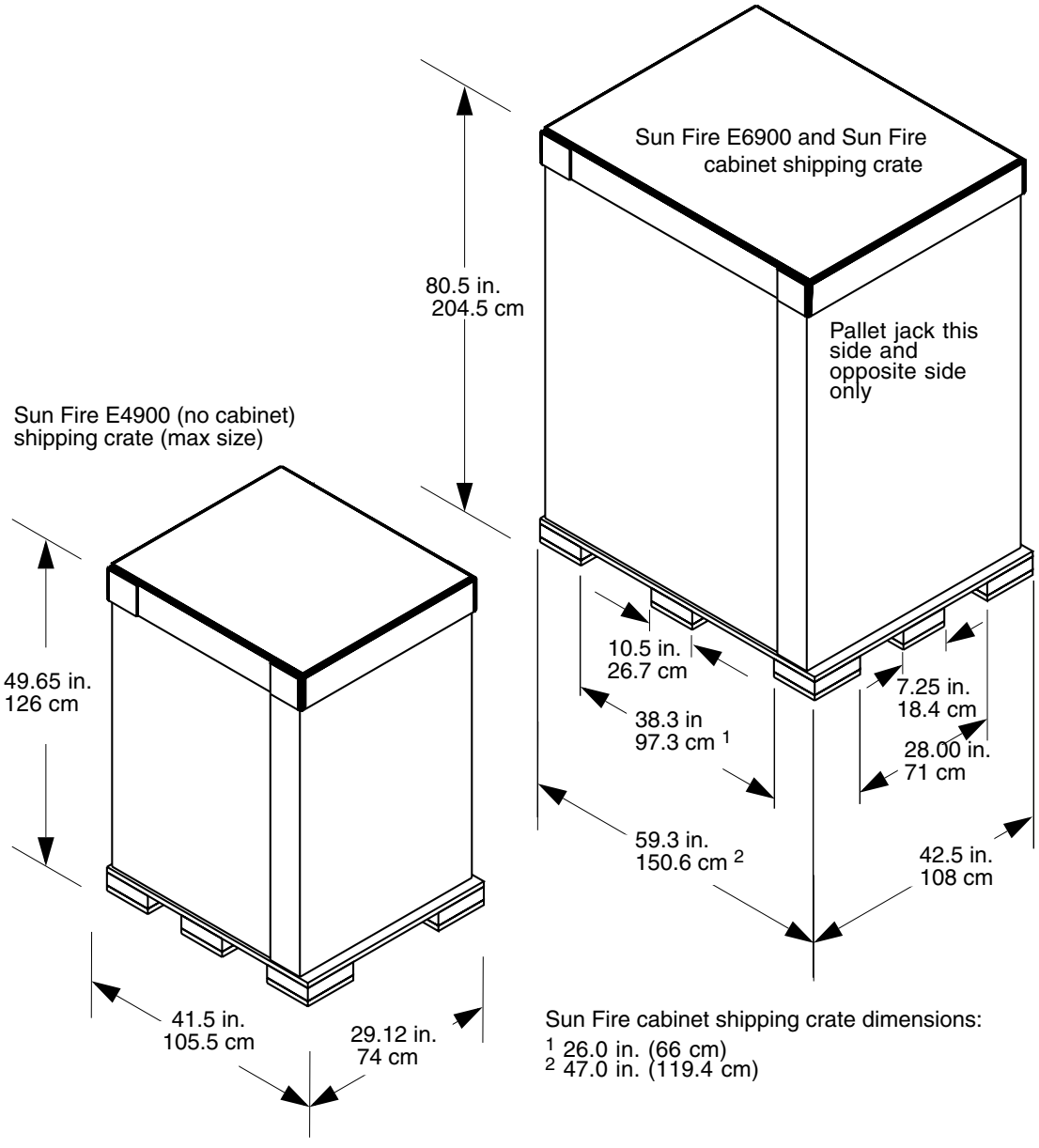


FIGURE 2-4 Shipping Crate Dimensions

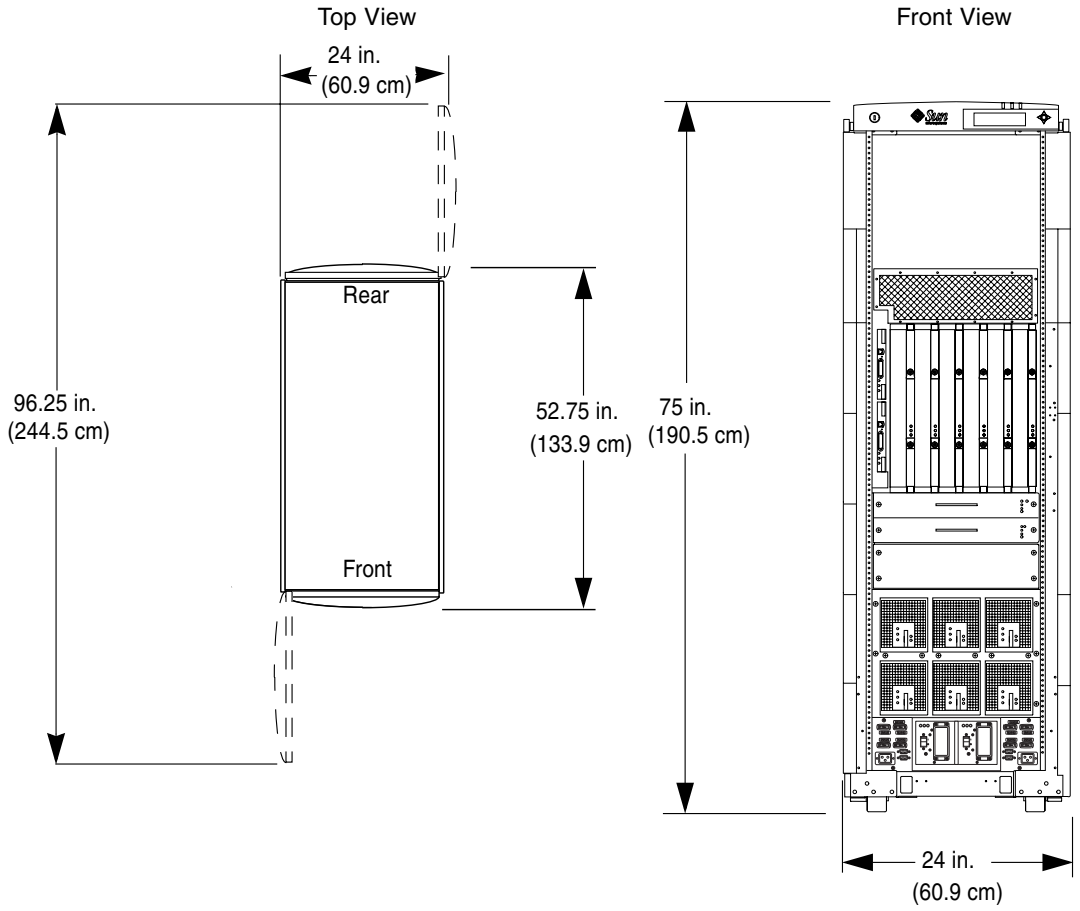
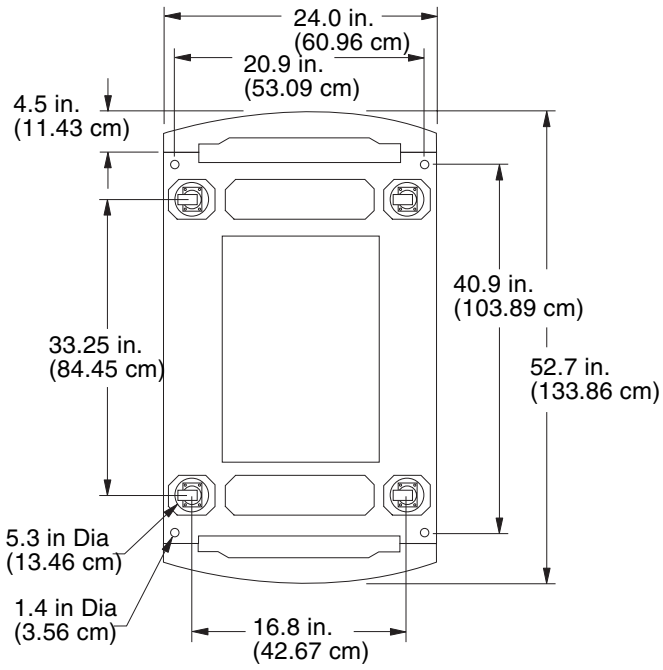


FIGURE 2-5 Sun Fire E6900 System Cabinet Dimensions

Note – For any peripheral tray in the processor cabinet OVER 20 in. (50.8 cm) in length, allow additional space for access to the front or rear doors where the peripheral will be loaded.

Sun Fire E6900



Sun Fire Cabinet

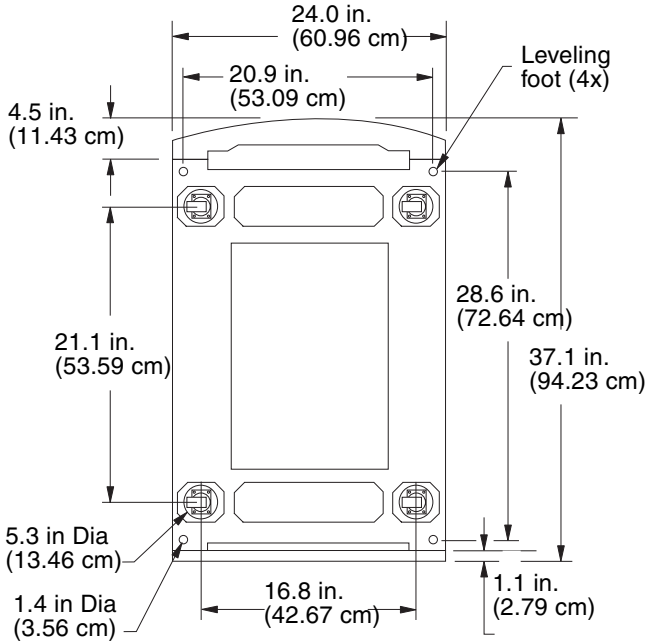


FIGURE 2-6 Sun Fire E6900 and Sun Fire Cabinet—Bottom Views

Note – The holes in the hold down brackets are large enough to accommodate a 3/8-inch or 10-mm bolt using a flat washer and a split washer.

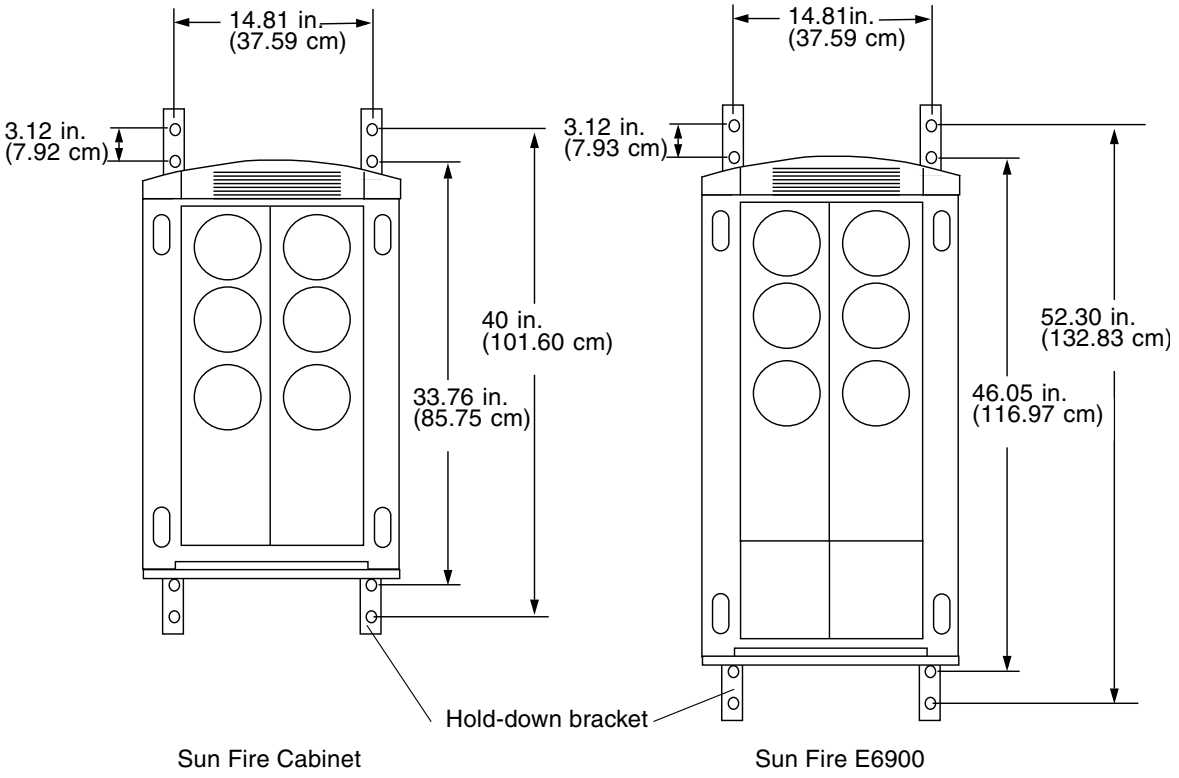


FIGURE 2-7 Sun Fire Cabinet and Sun Fire E6900 System With Hold-Down Brackets—Top View

2.3 Planning Your Access Route

If your existing loading dock meets height or ramp requirements for a standard freight carrier truck, you can use a pallet jack to unload the system. If not, you must provide a standard forklift[1] or other means to unload the system, or request the system be shipped in a truck with a lift gate.

See FIGURE 2-4 for an illustration of the system shipping crate and its dimensions. Each system is shipped in a separate crate. A pallet jack is required to move each shipping crate to the system location.

Leave each system in its shipping crate until it reaches its final destination. If the crate does not fit through the planned access route, partially disassemble it.

All systems not shipped in a cabinet should only be lifted by proper computer-lifting equipment to prevent personal injury and/or damage to system equipment.

The entire access route to your computer room should be free of raised patterns that can cause vibration, and the route must meet the following requirements:

TABLE 2-5 Access Route Clearance

	With Shipping Pallet	Without Shipping Pallet
Minimum door height	81 in. (205 cm)	75 in. (190.5 cm)
Minimum hallway and door width	44 in. (112 cm)	25 in. (64 cm)
Minimum elevator depth	65.5 in. (166 cm)	61 in. (155 cm)
Maximum incline	10°	10°

TABLE 2-6 Weight Requirements

Minimum elevator, pallet jack, and floor loading capacity (maximum weight per system)	1200 lbs (544 kg)

1. A standard forklift has a maximum outside tine dimension of 27 in. (69 cm) and a minimum inside tine dimension of 15 in. (38 cm).

2.4 Network Connection Planning

This section provides network setup information for system startup and network connections for the Sun Fire E6900/E4900 systems and domains.

2.4.1 Setup and Network Connections

For system setup and continued administrative tasks, one serial cable and one RJ-45 Ethernet cable are required. Once the system has been set up, the Ethernet port can be used for most system administration tasks.

2.4.1.1 Serial Connection

The initial system setup requires an ASCII terminal device connected to the serial port of the main system controller with a null modem cable or a network terminal server (NTS) connection.

2.4.1.2 Ethernet Connections

Once the system is set up, most system administration tasks can be performed through the network via the Ethernet port, using a Category-5 Ethernet cable.

Table 2-7 provides information on the number of Ethernet connections required for each system and domain.

TABLE 2-7 Ethernet Connections

Sun Fire System	System Controllers	Solaris Domains	
	Max	Min.	Max
E6900	2	1	4
E4900	2	1	2

2.4.2 Platform and Domain Setup Information

Before installing a Sun Fire E6900/E4900 system, determine the following information:

- For any platform:
  - Netmask
  - Gateway
  - DNS Domain
  - Loghost
- For each system controller and each domain:
  - hostname
  - IP address

TABLE 2-8 Host Names and IP Addresses

Sun Fire System	Maximum Host Names and IP Addresses	
	For Domains	For System Controllers
E6900	4	2 (1 for each System Controller board)
E4900	2	2 (1 for each System Controller board)

CHAPTER 3

Environmental and Electrical Specifications

3.1 Environmental Requirements

The design of your environmental control system—such as computer room air-conditioning units—must ensure that intake air to the server system complies with the limits specified in this section.

To avoid overheating:

- Guard against directing any warmed air toward the bottom of the cabinet or standalone server.
- Guard against directing warmed air toward the server access panels.

The air intake screens act as electro-magnetic interference (EMI) and radio frequency interference (RFI) filters, stopping both EMI and RFI emissions from the system. These screens are a honeycomb-type screens, which also collect and trap dust and debris particles.

The Sun Fire E6900/E4900 systems have been designed for maximum availability. Air intake screens can be cleaned or changed without the need to power off the system.

The Sun Fire E6900/E4900 system's air intake screens require periodic inspection and cleaning. To prevent restricted airflow and possible equipment failure, the air intake screens should be inspected for debris and trapped particles every three months of operation. The level of debris found on the screens and surrounding area should be considered in the decision of when to remove and clean the air intake screen.

The environmental limits for Sun Fire E6900/E4900 systems are listed in Table 3-1.

TABLE 3-1 Environmental Limits for Sun Fire E6900/E4900 Systems

Environmental Factor	Temperature Range	Relative Humidity	Altitude
Operating	41°F to 95°F (5°C to 35°C) derate 2°C for every 1 km up to 3 km	20% to 80%, 27°C max wet bulb (noncondensing)	sea level to 9,843 ft (3000m) (Up to 7,000 ft (2134m) for UltraSPARC® IV+ 1.8 GHz CPU/Memory boards)
Nonoperating	-4°F to 140°F (-20°C to 60°C)	93%, 38°C max wet bulb (noncondensing)	39,370 ft (12,000m)

TABLE 3-2 Optimum Ambient Environmental Operating Conditions for Sun Fire E6900/E4900 Systems

Environmental Factor	Ambient Temperature Range	Ambient Relative Humidity
Operating	70°F to 73.5°F (21°C to 23°C)	45% to 50%,

The operating environmental limits in Table 3-1 reflect what the systems have been tested to, in order to meet all functional requirements. The optimum operating condition in Table 3-2 is the recommended operating environment. Operating computer equipment for extended periods of time at or near the temperature or humidity extremes is known to significantly increase the failure rate of hardware components.

Note – In order to minimize any chance of down-time due to component failure, it is strongly recommended that customers plan and use the optimal temperature and humidity ranges.

3.1.1 Ambient Temperature Recommendations

The ambient temperature range of 70°F to 74°F (21°C to 23°C) is optimal for system reliability and operator comfort levels. Most computer equipment can operate within a wide temperature range, but a level near 72°F (22°C) is desirable because it is easier to maintain safe associated relative humidity levels at this temperature. Operating in this temperature range provides a safety buffer in case the environmental support systems go down for a period of time. Though individual standards vary slightly, 70°F to 74°F (21°C to 23°C) should be used as an optimal recommendation.

3.1.2 Ambient Relative Humidity Recommendations

The ambient relative humidity levels between 45% and 50% are the most suitable for safe data processing operations. Under certain circumstances, most data processing equipment can operate within a fairly wide environmental range (20% to 80%), but the optimal goal should be between 45% to 50% for several reasons:

- The optimal range helps protect computer systems from corrosivity problems associated with high humidity levels.
- It provides the greatest operating time buffer in the event of environmental control system failure.
- This range helps avoid failures or temporary malfunctions caused by intermittent interference from static discharges that occur when relative humidity is too low.

Electrostatic discharge (ESD) is easily generated and less easily dissipated in areas where the relative humidity is below 35%, and becomes critical when levels drop below 30%. The 5% relative humidity range may seem unreasonably tight when compared to the guidelines used in typical office environments or other loosely controlled areas, but it is not so difficult to maintain in a data center because of the high efficiency vapor barrier and low rate of air changes normally present.

3.2 Facility Power Requirements

To prevent catastrophic failures, the design of your power system must ensure that adequate power is provided to your Sun Fire system. Use dedicated AC breaker panels for all power circuits that supply power to your system. Electrical work and installations must comply with applicable local, state, or national electrical codes.

Provide a stable power source, such as an uninterruptible power system (UPS), to reduce the possibility of component failures. If the computer equipment is subjected to repeated power interruptions and fluctuations, it is susceptible to a higher component failure rate than it would be with a stable power source. Every Sun Fire system requires its own customer-supplied circuit breaker and AC receptacle for each power cord.

Each power cord will also supply your system with proper earth ground. Sun has tested both Sun Fire E6900 cabinets and Sun Fire cabinets for radiated and conducted emissions and have determined there is no difference in emissions with or without a ground strap grounding the cabinets. No additional earth grounding is necessary but, it may be added if desired.

The Sun Fire E6900 system has dual Redundant Transfer Units (RTUs) with four Redundant Transfer Switches (RTSs). Two totally independent AC power sources are needed for input power redundancy. The AC power sources must be derived from independent power company utility feeds and Sun recommends that each be backed

up with an on-line UPS. The power sources are not independent if they are only distinguished by having separate circuit breakers. One RTS hooked to an AC power source and the second RTS hooked to a UPS that is connected to the same AC power source is not supported because when the UPS is by-passed for maintenance both RTSs will be hooked up to the same source. If both RTSs are hooked to one utility feed then both lines must be backed up with on-line UPSs to ensure input power redundancy.

- In configurations with two RTU assemblies and two independent AC power source there will be four cables to connect, two on the front, and two on the rear of the system (FIGURE 3-1).

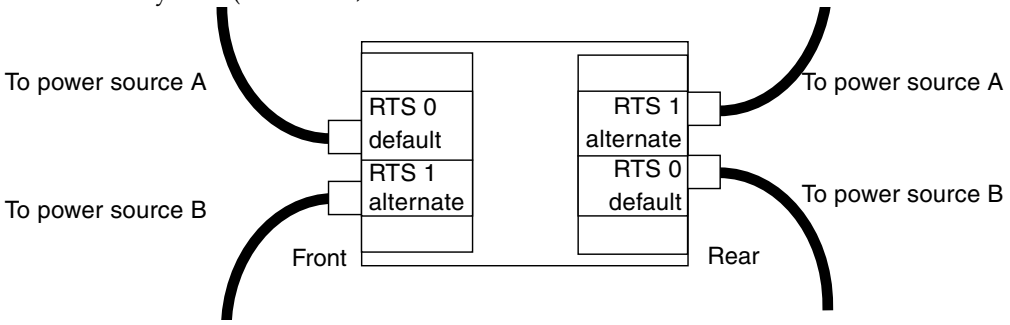


FIGURE 3-1 Sun Fire E6900 Configuration: Two RTU Assemblies and Two Independent AC Power Source

- In configurations with one RTU assembly and two independent AC power sources there will be two cables to connect, both in the rear of the system (FIGURE 3-2).

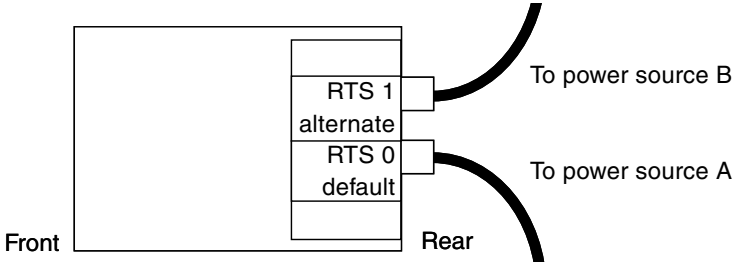


FIGURE 3-2 Sun Fire Cabinet for E4900 Configuration: One RTU Assembly and Two Independent AC Power Sources

- In configurations with two RTU assemblies and one AC power sources there will be two cables to connect, one in the front (on the left), and one in the rear of the system (on the left) (FIGURE 3-3).

Caution – Connecting the alternate RTS units to outlets that use the same power source as the default RTS units is not supported and will adversely affect reliability.

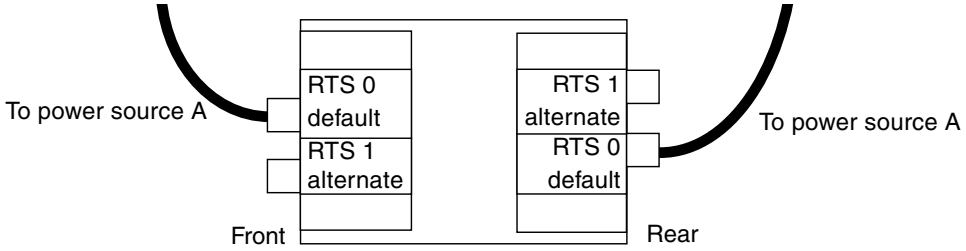


FIGURE 3-3 Sun Fire E6900 Configuration: Two RTU Assemblies and One AC Power Source

- In configurations with one RTU assembly and one AC power sources there will be only one cable to connect (in the rear of the system on the left) ().

Caution – Connecting the alternate RTS unit to an outlet that uses the same power source as the default RTS unit is not supported and will adversely affect reliability.

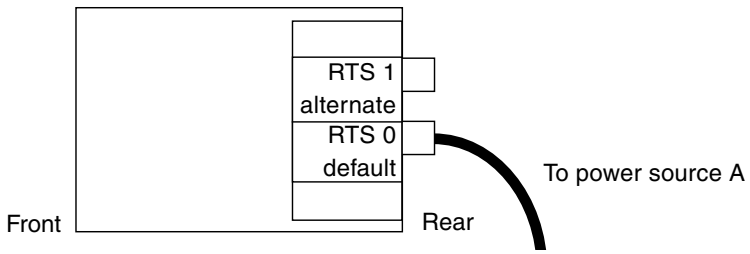


FIGURE 3-4 Sun Fire Cabinet for Sun Fire E4900 Configuration: One RTU Assembly and One AC Power Source

Every piece of support equipment requires its own customer-supplied circuit breaker and receptacle(s).

3.3 Electrical and Cooling Specifications

This section provides guidelines and requirements for cooling your Sun Fire systems. For electrical and cooling specifications, see the following tables:

- Table 3-3 for the Sun Fire E6900 system
- Table 3-4 for the Sun Fire E4900 system
- Table 3-5 for the Sun Fire cabinet

Be aware of the following system cooling rules and guidelines:

- The room should have sufficient air-conditioning capacity to support the cooling needs of the entire system.
- The air-conditioning system should have controls that prevent excessive temperature changes.

Note – The following power numbers are maximums and are based on fully configured systems. Actual numbers might vary according to your system configuration.

TABLE 3-3 Electrical Specifications for the Sun Fire E6900 Cabinet

Parameter		Value
Input current	Voltage range	200–240 VAC
	Current, maximum	48A at 200 VAC
	Current frequency range	47–63 Hz
Input power rating	Total continuous power	9410W
Volt-ampere rating		9600 VA
Btu rating		32100 Btu/hr
Power factor		0.98 (with Sun Products)
Connector type	North American	4 - NEMA L6-30P for 200–240 VAC*
	International	4 - 32A, single-phase IEC 309, for 200–240 VAC[1]
Receptacle type	North American	4 - NEMA L6-30R for 200–240 VAC\

* One power cord for each RTS installed. Minimum required is two and maximum is four.

\ One receptacle type for each power cord installed.

TABLE 3-4 Electrical Specifications for the Sun Fire E4900 System

Parameter		Value
Input current	Voltage range	200-240 VAC
	Current, maximum	20A at 230 VAC for each power cord (2+1 redundancy)
	Current frequency range	47-63 Hz
Input power rating	Total continuous power	4508W
Volt-Ampere rating		4600 VA
Btu rating		15380 Btu/hr
Power factor		0.98 (with Sun Products)
Connector type	North American	3 - NEMA 6-15P for 200–240 VAC*
	International	3 - 10A, single-phase IEC 320, for 200–240 VAC[1]
Receptacle type	North American	3 - NEMA 6-15R for 200–240 VAC\

* One power cord for each power supply installed. Minimum required is two and maximum is three.

\ One receptacle type for each power cord installed.

TABLE 3-5 Electrical Specification for the Sun Fire Cabinet (Empty)

Parameter		Value
Input current	Voltage range	200-240 VAC
	Current, maximum	24A at 208 VAC for each RTU
	Current frequency range	47-63 Hz
Volt-Ampere rating		4,992 VA
Connector type	North American	NEMA L6-30P for 200–240 VAC*
	International	32A, single-phase IEC 309, for 200–240 VAC[1]
Receptacle type	North American	NEMA L6-30R for 200–240 VAC\

* One power cord for each RTS installed. Minimum required is one and maximum is four.

\ One receptacle type for each power cord installed.

3.4 Thermal Guidelines for Sun Fire E6900/E4900 Systems

These guidelines are intended to assist those who would install the Sun Fire E6900/E4900 systems at the end users' site. These guidelines address cooling issues only.

It is the ultimate responsibility of the end user to ensure that the environment in which these systems are mounted meet the following:

- All systems specifications
- Safety requirements specifications

3.4.1 Conditions

- Any systems mounted in a rack with Sun systems must have front-to-back cooling (no side to side).
- The front of the cabinet should not be facing, nor be in the path of, the exhaust air from any other systems or cabinets.
- It is recommended that the cabinet allow 0.188 cubic meters per second (600 cubic feet per minute) of exhaust air out of the cabinet by way of the exhaust fans located at the top of the cabinet.
- The cabinet must allow for airflow to enter from the front and exhaust to the rear. Do not use a closed cabinet that prevents airflow into the front and out of the rear of the enclosure.
- A cabinet front filler panels must be attached so that no gaps appear between panels and between the panel and the system. If the panels cannot completely fill in the area above the system, make sure the gap appears at the top of the cabinet, away from the system. Cabinet front panels prevent hot air that is expelled from the rear of the cabinet from reentering the system from the front.
- Multiple systems in the same cabinet must be mounted as close together as possible without air gaps in between, to avoid exhaust air recirculating back into the front air intake.
- All systems must be mounted in the lowest possible locations within the rack, to prevent the cabinet from tipping over.

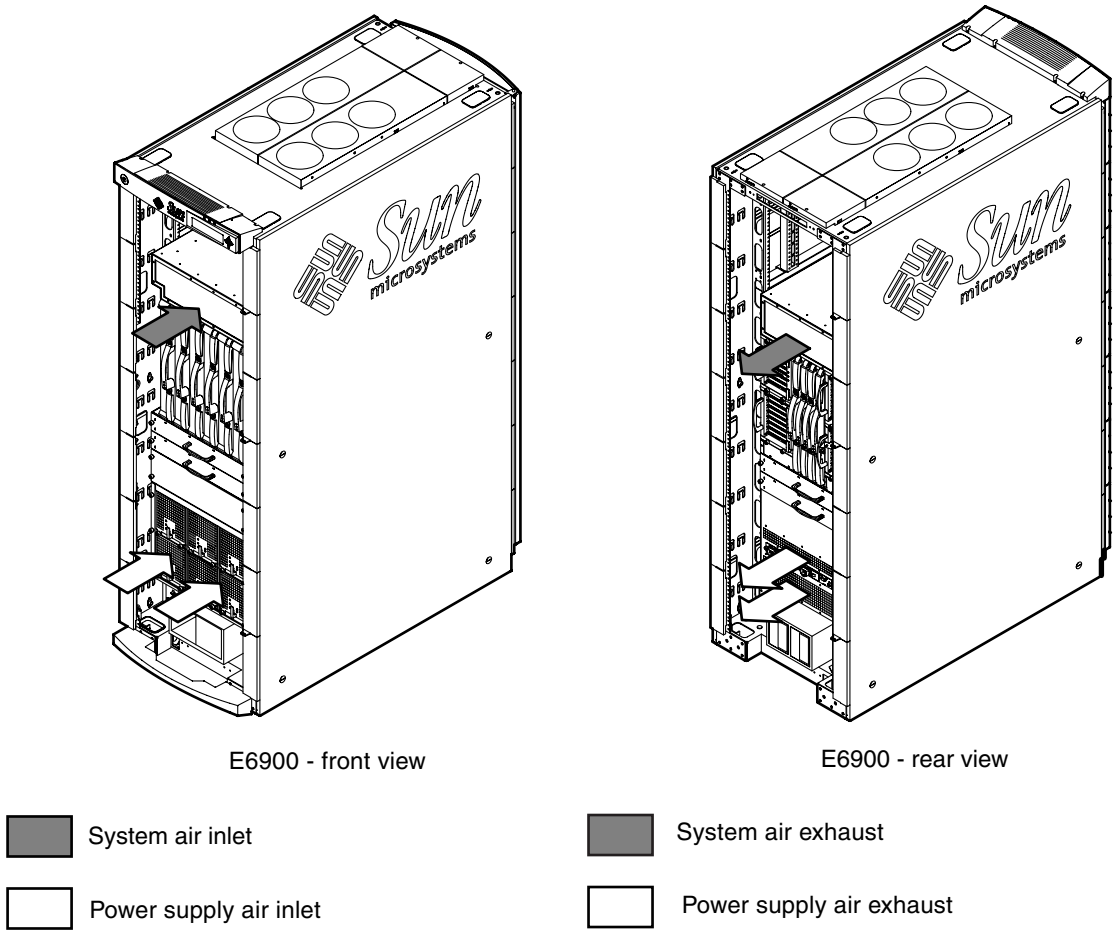


FIGURE 3-5 Sun Fire E6900 System Air Flow—Front and Rear

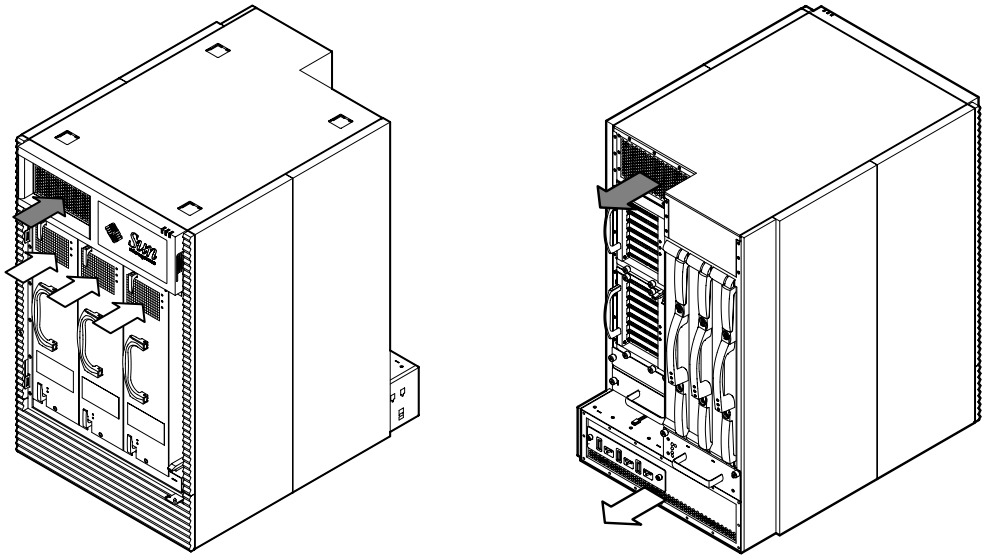


FIGURE 3-6 Sun Fire E4900 System Air Flow—Front and Rear