

CRAY T932 SITE PLANNING AND PREPARATION OVERVIEW

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Introduction

Preparing your site for a CRAY T932 computer installation involves a number of steps and stages. This document provides an overview of the CRAY T932 computer system and the general site planning and preparation requirements for the CRAY T932 computer system installation. Site planning and preparation information for individual components is provided in additional documents that are specific to each component. Refer to the next subsection, “Documentation Map,” for a guide to CRAY T932 site planning documentation.

This document also provides a bibliography for CRAY T932 computer system site planning documents.

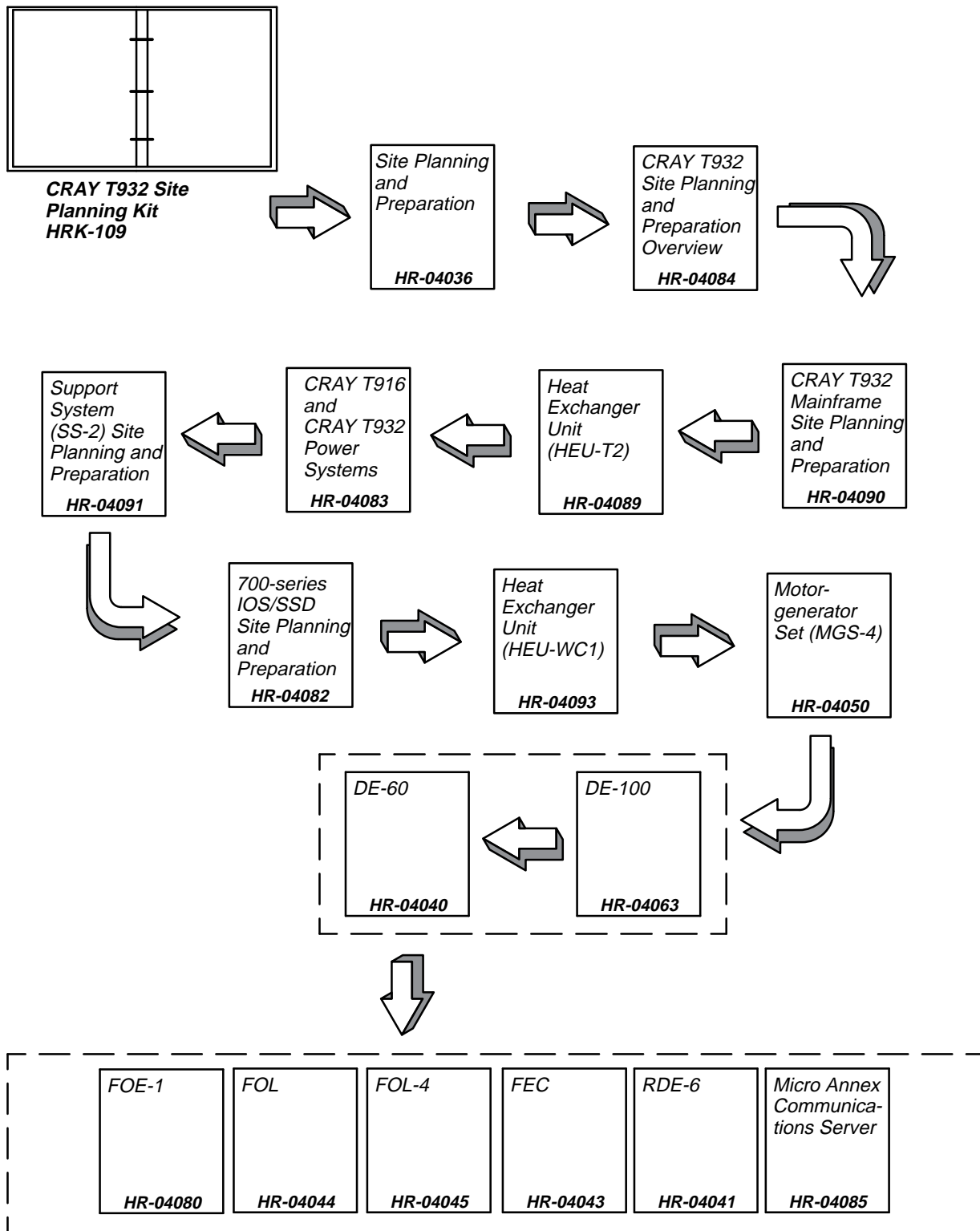
Prior to any site planning and preparation, you should review the *Site Planning and Preparation* document, Cray Research publication number HR-04036. This document provides general site planning and preparation guidelines. It also provides recommendations that will help you prepare your site for a CRAY T932 computer system installation.

Documentation Map

Figure 1 is a site planning documentation map for the CRAY T932 computer system. This map provides a list of all available site planning documentation for the CRAY T932 computer system. The map includes the name of the publication and the publication number. If you know what your system configuration will include, you can order the documents that apply to your system configuration using the individual document numbers; however, if you would like to have all the documents for the CRAY T932 computer system, you can order the *CRAY T932 Site Planning Kit*, kit number HRK-109.

In Figure 1, the documents enclosed with a dashed box (☐ — ☐) provide information about system components that are not standard with the computer system; you can order these documents if they apply to your system configuration. The other documents apply to standard CRAY T932 components; these documents must be ordered to ensure proper site planning for your computer system.

Figure 1. CRAY T932 Site Planning Documentation Map



Service Personnel Office Requirements

Cray Research provides trained hardware and software service personnel on a contractual basis to support Cray Research computer systems. The following subsections provide information about preparing your facility if you choose to have on-site service.

Hardware Service Personnel Office

You may need to provide the hardware service personnel with a locking office that is approximately 150 square feet (13.50 square meters). The office should be in a quiet environment and large enough to efficiently store and provide access to the following items:

- One locking desk
- One 3-shelf bookcase
- One locking 4-drawer file cabinet
- Two chairs
- One telephone
- Two locking parts cabinets, approximately 36 in. x 72 in. (914 mm x 1,829 mm) each
- One 30 in. x 42 in. (762 mm x 1,067 mm) cart (Cray Research provided)

Unless otherwise indicated, you must provide the office equipment listed above. Consult with your service manager to determine which items are needed for your hardware service personnel office.

Software Service Personnel Office

You may need to provide the software service personnel with a locking office or offices that are approximately 150 square feet (13.50 square meters). The office(s) should be in a quiet environment and large enough to efficiently store and provide access to the following items:

- Two locking desks
- Two 3-shelf bookcases
- One locking 4-drawer file cabinet
- One worktable, 30 in. x 60 in. (762 mm x 1,524 mm)
- Four chairs
- Two telephones
- One terminal connected to the Cray Research system
- One terminal connected to the front-end systems

Depending on your system configuration, site personnel may require any of the items listed above. You must provide these items. Consult with your service manager to determine which items are needed for your software service personnel office.

Modem Requirements

Cray Research support personnel use a modem data communications link to administrate, troubleshoot, and maintain Cray Research computer systems.

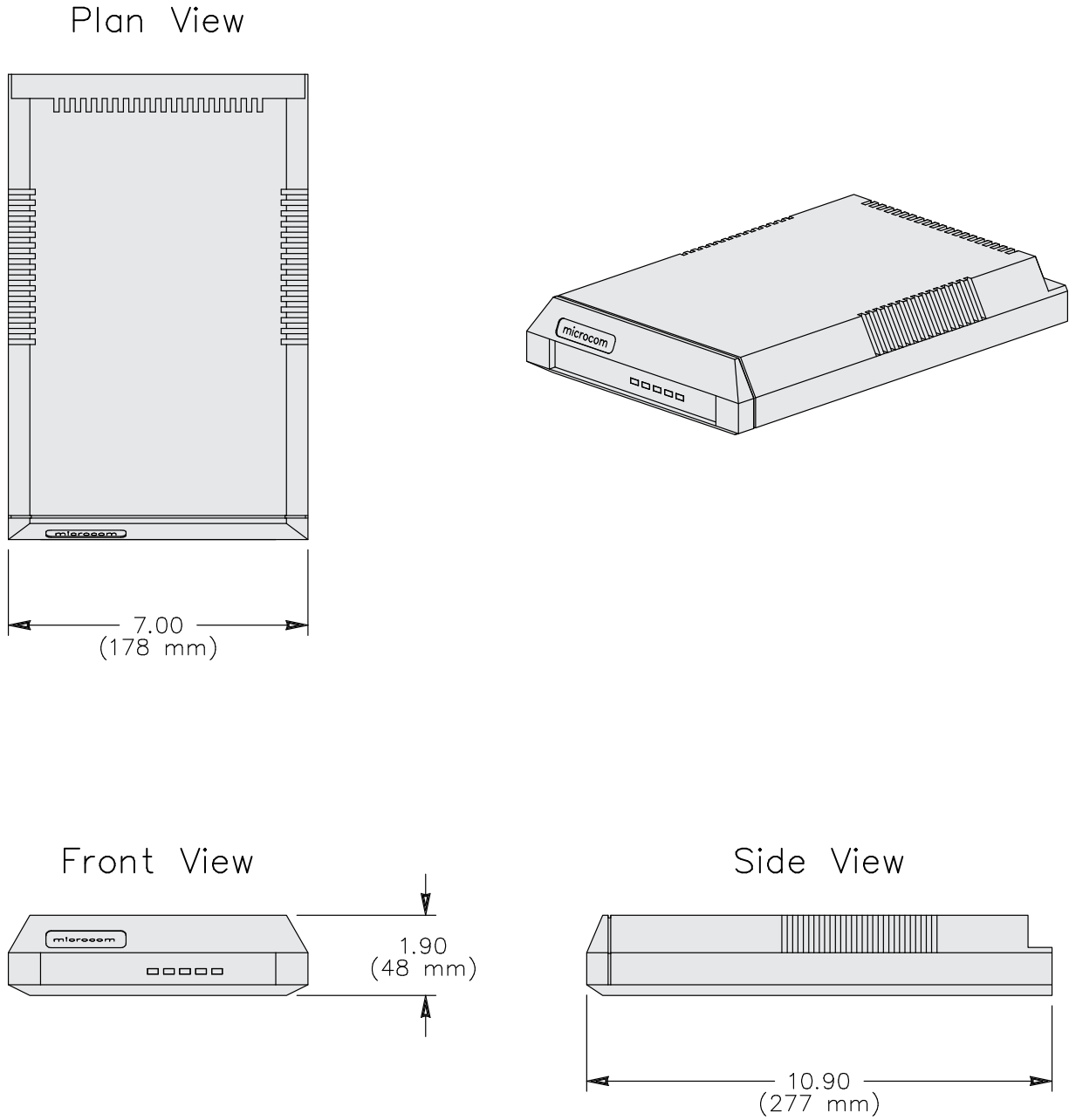
If site security regulations permit the use of a modem, contact the local telephone company well in advance of system delivery to arrange for installation of the telephone line required for the modem. You must supply a private, analog telephone line that is not routed through a PBX telephone system. Make arrangements with Cray Research for your payment of monthly service charges.

Cray Research supplies the Microcom DeskPorte *FAST* ES 28.8 modem for systems located in the United States and Canada. For computer system installations outside of the United States and Canada, contact your local Cray Research field engineering office for the modem type and telephone line requirements. Refer to Table 1 for the basic modem specifications and to Figure 2 for an illustration of the modem.

Table 1. Modem Specifications

Characteristic	Specification
Height	1.90 in. (48 mm)
Width	7.00 in. (178 mm)
Depth	10.90 in. (277 mm)
Weight	2 lbs (1 kg)
Cooling requirement	Ambient air
Power consumption	20 watts (maximum)
Input voltage	Single phase, 100 – 120 or 200 – 240 Vac
Frequency	60 Hz
Power cable	6-ft (1.8-m) plug-compatible drop cord
Receptacle: North America/Japan	NEMA #5-15R or equivalent

Figure 2. Microcom Modem



Telephone company representatives might request information about modem requirements. Refer to Table 2 for these requirements.

Table 2. Modem Requirements

Option	Specification
FCC registration number	CLB USA-75946-MME
Transmission rate	V.fast/V.32/V.42bis (28,800 bps)
Telephone	Standard, with voice-grade line
Telephone connector	RJ11C
Line interface connector	RJ45S
Touch tone/rotary dial	Touch tone preferred
Ringer equivalence	0.8 Bd
External/internal clock	Internal
Grounding	Chassis ground to signal ground
Transmit level	Up to 115.2 kBps
Private/dial-up line	Dial-up line
Receive long space disconnect	Disabled
Transmit long space disconnect	Disabled
Data terminal ready disconnect	Enabled
Carrier fail disconnect	Enabled
Auto-answer/manual-answer	Auto-answer
Make busy in analog loopback	Disabled
Permanent/DTR controlled auto-answer	DTR controlled auto-answer
Synchronous/asynchronous	Asynchronous
9-bit/10-bit/11-bit character	10-bit character

Cray Research also supplies the Telebit NetBlazer PN2 dial-up router, which is used in conjunction with the Microcom modem to provide Transmission Control Protocol/Internet Protocol (TCP/IP) dial-up access to the Cray Research Area Service Centers. The NetBlazer dial-up router is positioned on top of the maintenance workstation (MWS).

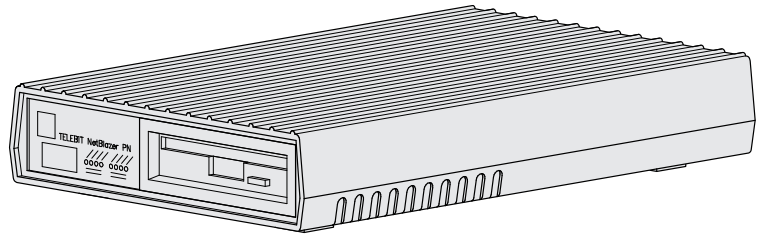
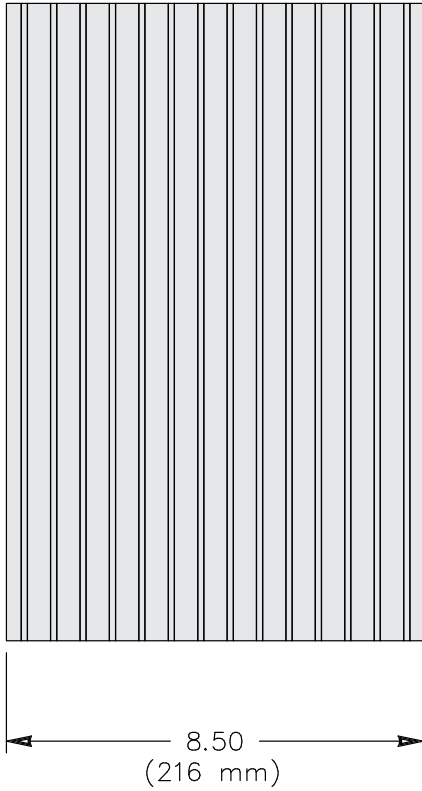
Table 3 provides the specifications for the NetBlazer PN2 dial-up router. Refer to Figure 3 for an illustration of the NetBlazer PN2 dial-up router.

Table 3. NetBlazer PN2 Specifications

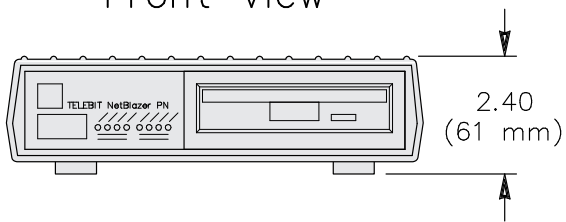
Characteristic	Specification
Height	2.40 in. (61 mm)
Width	8.50 in. (216 mm)
Depth	13.00 in. (330 mm)
Weight	4 lbs (1.8 kg)
LAN interface	Ethernet (AUI, BNC, 10Base-T), switch select
Input voltage	Single phase, 100 – 120 or 200 – 240 Vac
Power consumption	25 watts (maximum)
Power cable	8-ft (2.4-m) plug-compatible drop cord
Power receptacle: North America International	NEMA #5-15R or equivalent IEC 309, single phase, 16 amp
Agency approvals Safety: Emissions:	UL478, CSA C22.2, EN 60950, TUV VDE 805 FCC ER9 USA-74674-MD-E, EN55022, TUV Vfg 243

Figure 3. NetBlazer PN2 Dial-up Router

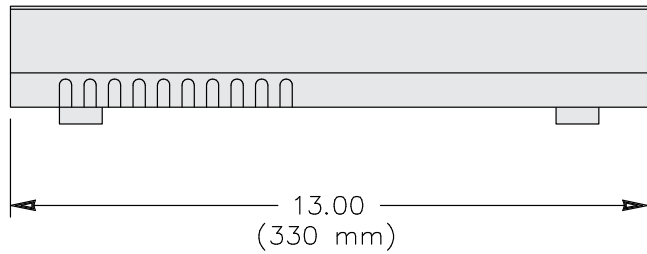
Plan View



Front View



Side View



System Configurations

The CRAY T932 computer system consists of a variety of standard and optional equipment. Each computer system has different configurations, depending on customer needs and requirements.

A standard CRAY T932 computer system consists of the following components:

- Mainframe chassis (MFC)
- Two heat exchanger units (HEU-T2s)
- Combined input/output subsystem and SSD solid-state storage device chassis (700-series IOS/SSD chassis)
- Heat exchanger unit (HEU-WC1)
- Power system
- Motor-generator set (MGS-4)
- Support system (SS-2)
- Disk drives and other peripheral equipment

The CRAY T932 mainframe chassis houses various configurations of logic and memory modules, as well as power supplies and other components.

The two heat exchanger units (HEU-T2s) are dielectric coolant-to-water heat exchangers that route dielectric coolant through the mainframe to absorb heat generated by the modules and power supplies. After the dielectric coolant absorbs the heat, it flows back to the HEU-T2 where the heat is transferred to customer-supplied water.

One to four 700-series IOS/SSD chassis can be configured with a CRAY T932 computer system. Each 700-series IOS/SSD chassis houses up to 8 I/O clusters and up to 4,096 Mwords of SSD memory.

The heat exchanger unit (HEU-WC1) is a dielectric coolant-to-water heat exchanger that routes dielectric coolant through the IOS/SSD chassis to absorb heat generated by the modules and power supplies. After the dielectric coolant absorbs the heat, it flows back to the HEU-WC1 where heat transfers to customer-supplied chilled water.

The power system used by the CRAY T932 computer system consists of a number of power distribution components, including an uninterruptable power system (UPS) and two high-voltage DC (HVDC-160) cabinets. These components are described in detail in the *CRAY T916 and CRAY T932 Power Systems* document, Cray Research publication number HR-04083. Refer to this document for more information.

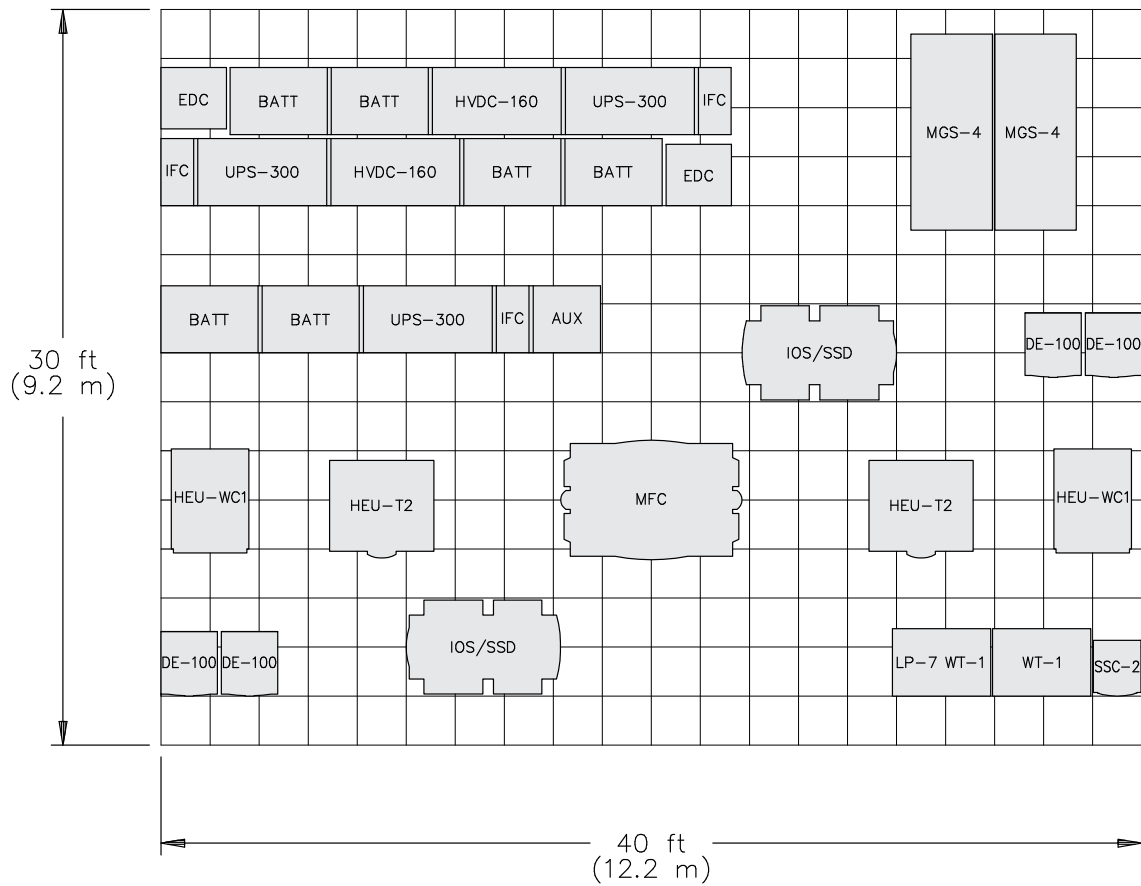
A motor-generator set (MGS-4) supplies 400-Hz AC power to the IOS/SSD chassis.

A support system (SS-2) is also configured with the CRAY T932 computer system. This support system consists of a support system chassis (SSC-2), two workstation terminals (WT-1s), and a laser printer (LP-7). One workstation terminal is dedicated for the operator workstation (OWS), and the other workstation is dedicated for the maintenance workstation (MWS). Both of these workstations connect to the SSC-2, and the MWS connects to the LP-7 laser printer. Although it is desirable to locate the MWS near the SSC-2 for maintenance activities, it is not a requirement to locate the OWS near the SSC-2.

Disk drives and other peripheral equipment are also used with the CRAY T932 computer system. The number of disk drives and other peripheral equipment depends on individual customer needs.

Figure 4 illustrates a typical computer room floor plan for a CRAY T932 computer system with two 700-series IOS/SSD chassis. The computer system is configured on a 40 ft x 30 ft (12.2 m x 9.2 m) floor with 24 in. x 24 in. (610 mm x 610 mm) floor panels.

Figure 4. CRAY T932 Typical Floor Plan



NOTE: The OWS terminal can be located either inside or outside the parameters of the typical floor plan. Refer to Figure 5 or contact your Cray Research representative for details.

Site Access Requirements

Prior to system installation, your site must meet certain site access requirements. For more information about general site access requirements, refer to the *Site Planning and Preparation* document, Cray Research publication number HR-04036.

Table 4 provides site access requirements for the CRAY T932 computer system.

Table 4. CRAY T932 Site Access Requirements

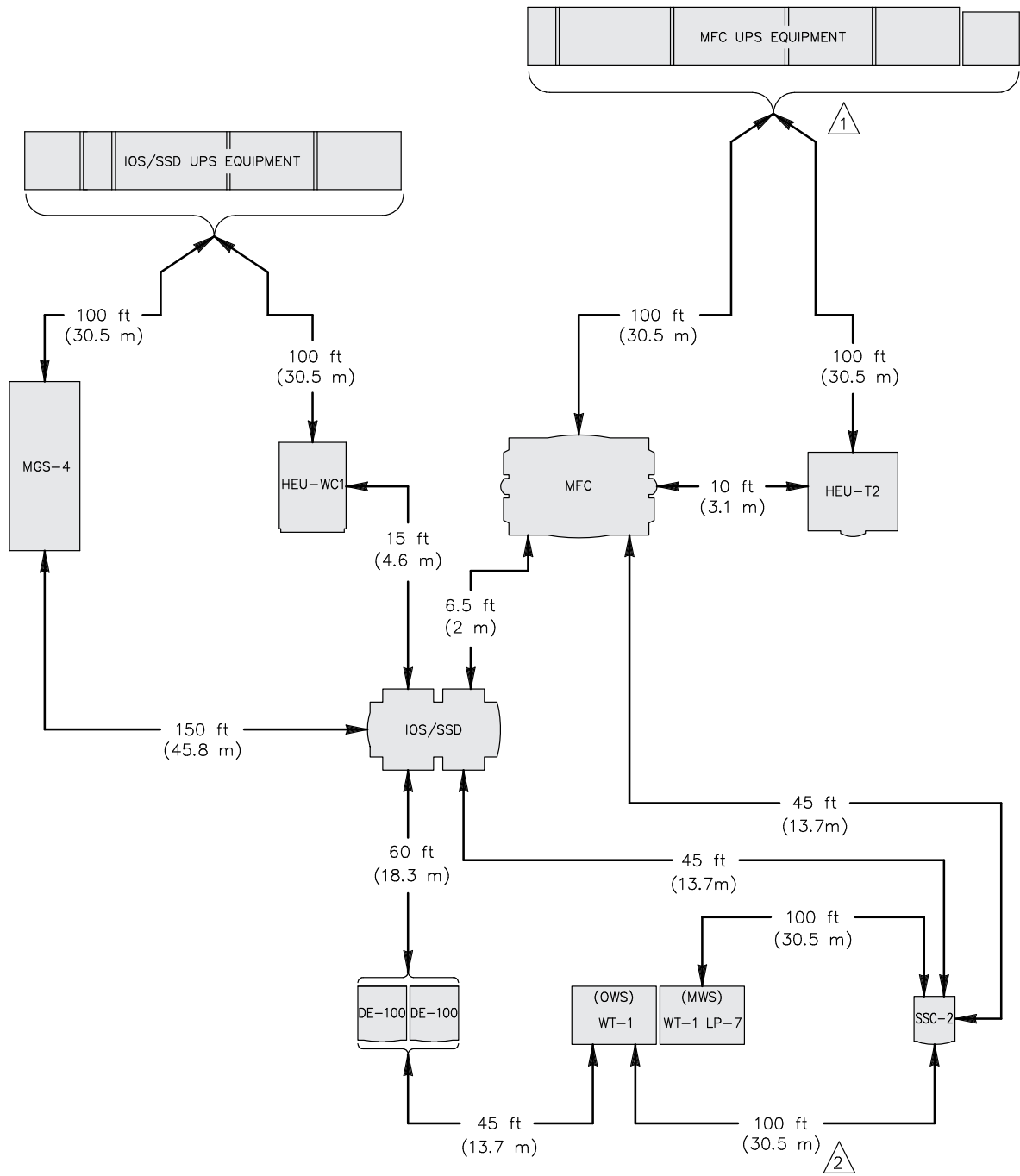
Area	Requirement
Loading dock height	46.00 in. to 50.00 in. (1,168 mm to 1,270 mm)
Ceiling and door height (minimum)	80.00 in. (2,032 mm)
Hallway and door width (minimum)	60.00 in. (1,524 mm)
Delivery route slope (maximum)	One unit of height for every six units of length

Equipment Separation Limits

Prior to any site preparation, the arrangement of computer equipment within the facility must meet certain placement and separation requirements. You must prepare drawings that illustrate the arrangement and location of the computer equipment; Cray Research site planning personnel must approve these drawings prior to any site preparation.

Figure 5 illustrates the equipment separation limits for the CRAY T932 computer system.

Figure 5. CRAY T932 Computer System Equipment Separation Limits



1 Two power systems and HEU-T2s are required for the CRAY T932 computer system.

2 The standard cable provided with the SSC-2 to the OWS is 100 ft (30.5 m). Longer cables can be ordered through your Cray Research account manager.

Electrical Requirements

The CRAY T932 computer system equipment has certain voltage and frequency requirements.

The uninterruptable power system (UPS-300) requires either 400- or 480-Vac input power. If the facility input voltage is 200 or 208 Vac, then a Cray Research-provided step-up transformer is installed with the UPS-300.

Each high-voltage DC (HVDC-160) cabinet requires one of the following input voltages:

- 200 Vac (+10% to –20%), 3 phase, 45 to 65 Hz
- 208 Vac (+10% to –20%), 3 phase, 55 to 65 Hz
- 380 to 415 Vac (+10% to –20%), 3 phase, 45 to 55 Hz
- 460 to 480 Vac (+10% to –20%) 3 phase, 55 to 65 Hz

The two HVDC-160s provide 330-Vdc power to the mainframe power supplies, 120-Vac power to the mainframe control system, and 400/480-Vac power to the two HEU-T2 cabinets.

The motor-generator set (MGS-4) and heat exchanger unit (HEU-WC1) require either a 480-Vac, 60-Hz input or 400-Vac, 50-Hz input.

Each support system component requires 120- or 220-Vac, 50- or 60-Hz, single-phase power.

Disk enclosure units (DE-60s and DE-100s) require either 208-Vac or 400-Vac, 50- or 60-Hz, 3-phase power.

Table 5 provides the basic electrical service requirements unless otherwise stated.

Table 5. Electrical Service Requirements

Electrical Service	Requirement
Voltage tolerance	± 10%
Phase imbalance	5% maximum (line-to-line, line-to-line neutral)
Voltage harmonics	5% maximum total, 3% largest
Voltage deviation from sine wave	5% to -10%
Voltage modulation	3% maximum
Transient voltage surges	+5%
Transient voltage sags	-5%
Frequency tolerance	± 5%
Frequency rate of change	Less than 1.0 Hz during any 10-cycle period

Total kilowatt power requirements depend on system configuration and equipment upgrade plans. During the initial site planning meeting, Cray Research will provide documentation that you can use to estimate the power requirements for your specific system configuration.

General Power Wiring Requirements

You must install all power and control wiring for the following components: CRAY T932 mainframe chassis, all 700-series IOS/SSD chassis, two HEU-T2s, HEU-WC1, uninterruptible power system (UPS-300), two HVDC-160s, MGS-4, disk enclosures, and support system.

This subsection provides general power wiring requirements for the CRAY T932 computer system. Refer to the specific component site planning and preparation document for additional power wiring requirements.

Figure 6 through Figure 8 illustrate the power wiring for CRAY T932 computer systems.

- Figure 6 provides the CRAY T932 power wiring diagram for sites where a 400- or 480-Vac UPS has been provided by the customer.
- Figure 7 provides the CRAY T932 power wiring diagram for sites where a 200- or 208-Vac UPS has been provided by the customer. A Cray Research-supplied transformer attaches to each HVDC-160 to step up the input voltage to 400 Vac or 480 Vac as required by each HEU-T2.
- Figure 8 provides the CRAY T932 power and control wiring diagram.

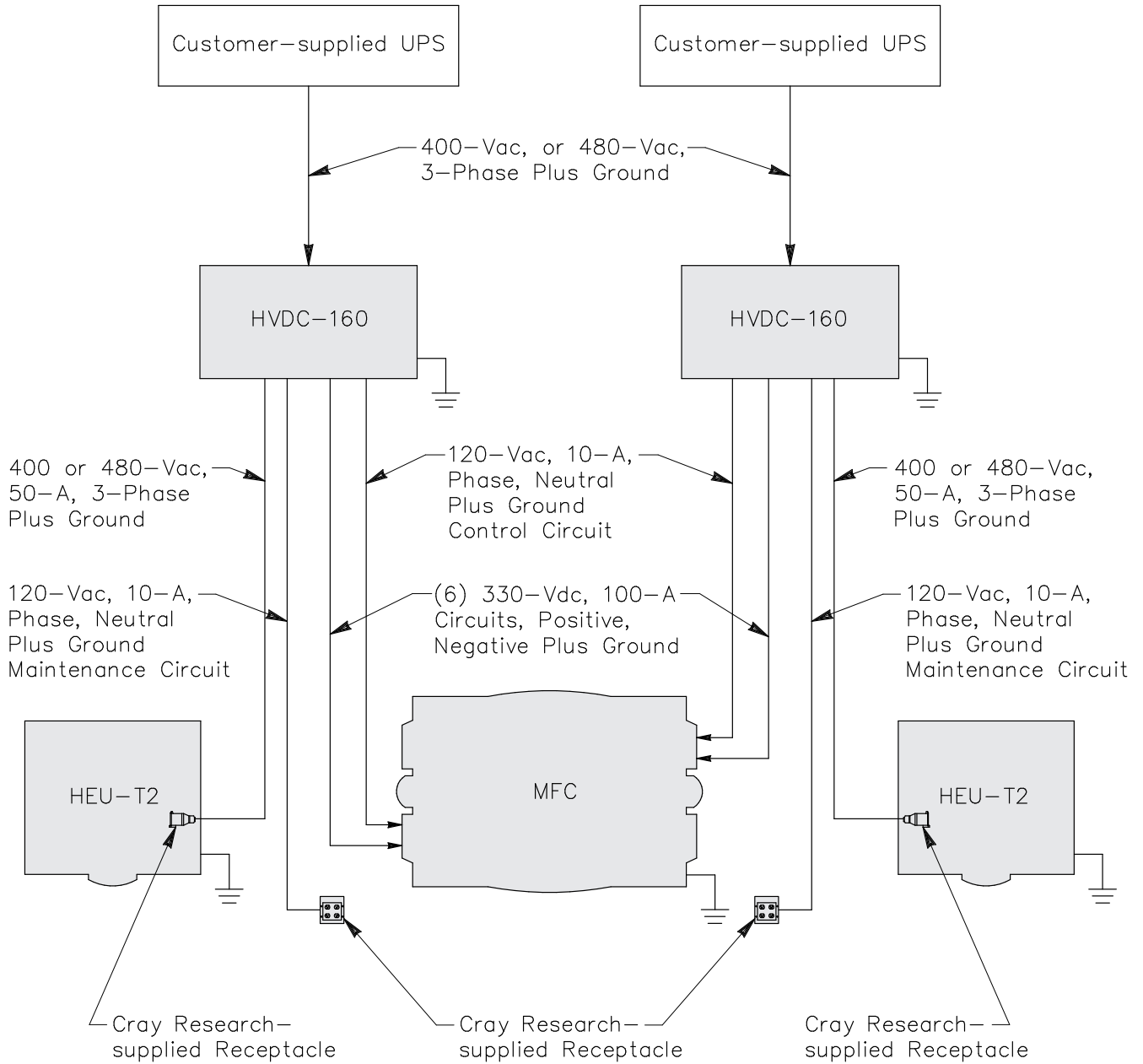
As stated previously, each component has specific wiring requirements. However, some general information applies to all circuits. The following list provides information additional to the power wiring diagrams:

- Figure 6 through Figure 8 are guides for your electrical design engineer and must not be used as bid documents or working drawings.
- The equipment arrangements in Figure 6 through Figure 8 are not actual equipment layouts.
- Your site preparation design should allow for circuit additions proportionate to system upgrade plans.
- All wiring should be prepared according to applicable local and national codes.

- Any circuit breakers provided by the customer must be capable of being locked out to facilitate “Lock-out/Tag-out” procedures. Delays in system installation may occur if the devices cannot be locked out.
- Cray Research recommends the installation of one emergency OFF switch at each computer room exit. All emergency OFF switches should be wired in series and should interrupt power to the computer equipment and to all air-circulating units in the computer room.
- All circuit breakers, circuit breaker panels, magnetic contactors, main power disconnect switches, junction boxes, power wiring, raceways, and conduits must be provided and installed by you.
- The minimum suggested control wiring size is #14 AWG (2.5 mm²).
- All conduits ending at computer equipment should be secured with approved fittings at the equipment wiring entrance.
- A minimum of 36.00 in. (914 mm) of excess wire length should be allowed above the floor surface to ensure adequate wire length for system connection.
- Detailed point-to-point diagrams for all wiring connections to the CRAY T932 mainframe, HEU-T2s, 700-series IOS/SSD chassis, HEU-WC1, disk enclosures, support system, and HVDC-160s are provided in separate site planning documents provided by Cray Research.

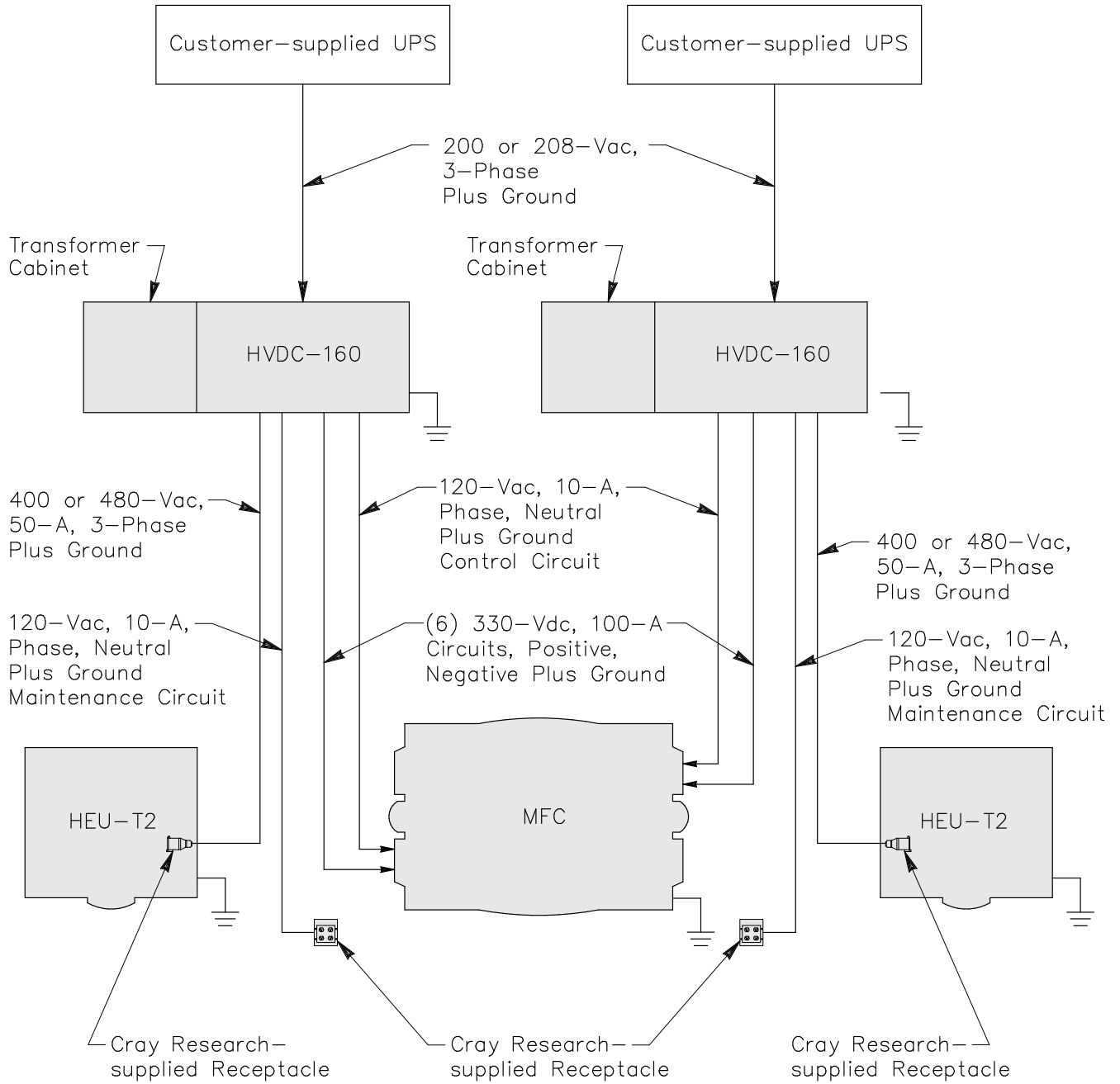
All Cray Research computer equipment must be earth grounded. Refer to the *Equipment Grounding for Cray Research, Inc. Computer Systems*, Site Engineering document number 10658002, for more information about equipment grounding.

Figure 6. CRAY T932 (400- or 480-Vac) Power Wiring



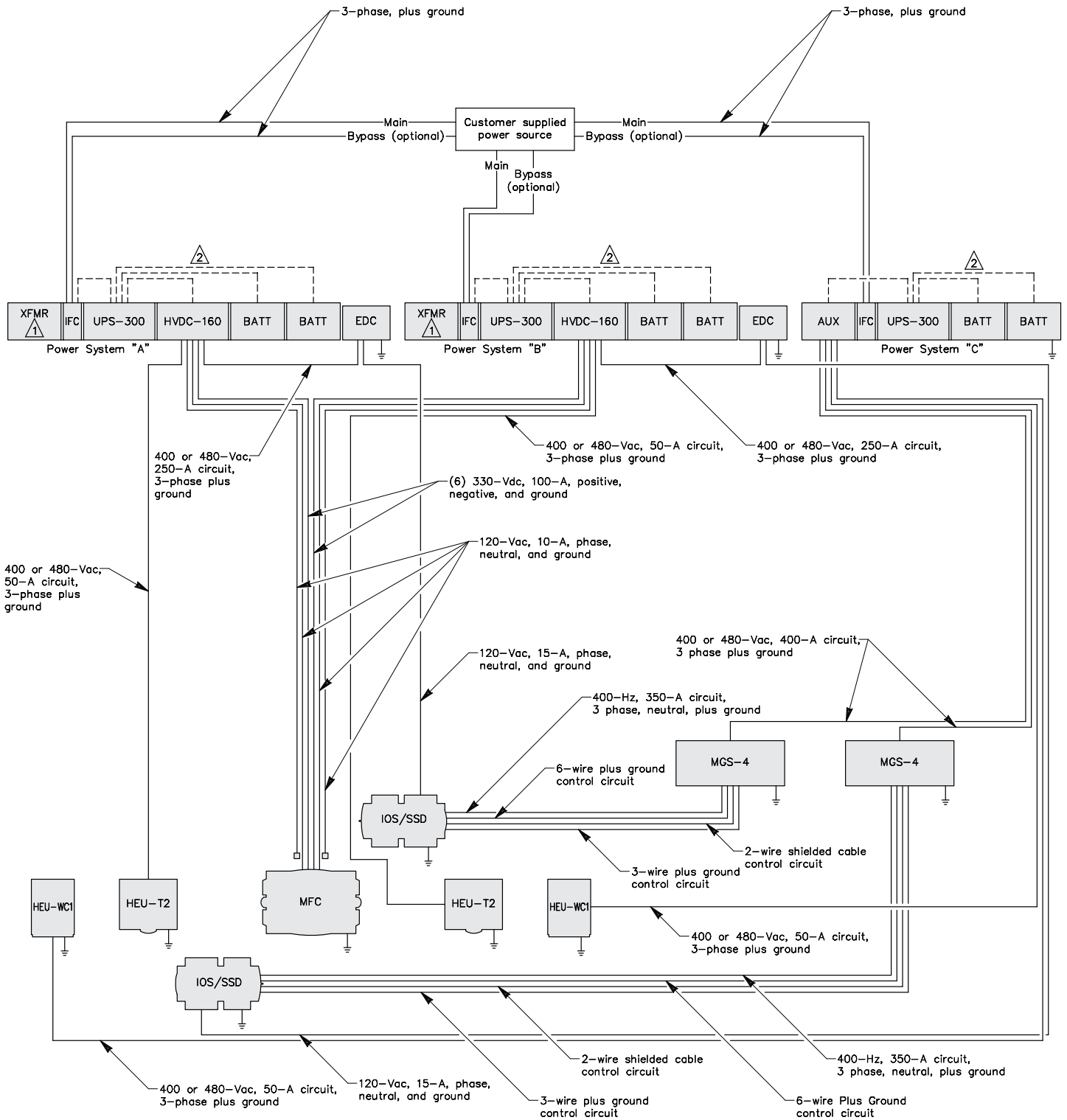
NOTE: Cray Research supplies all shaded equipment. You must supply all other devices and materials.

Figure 7. CRAY T932 (200- or 208-Vac) Power Wiring



NOTE: Cray Research supplies all shaded equipment. You must supply all other devices and materials.

Figure 8. CRAY T932 Power and Control Wiring



① Transformer cabinet (XFMR) required at 200 or 208-Vac installations.
 ② Dashed lines represent wiring supplied by Cray Research and installed by Customer.

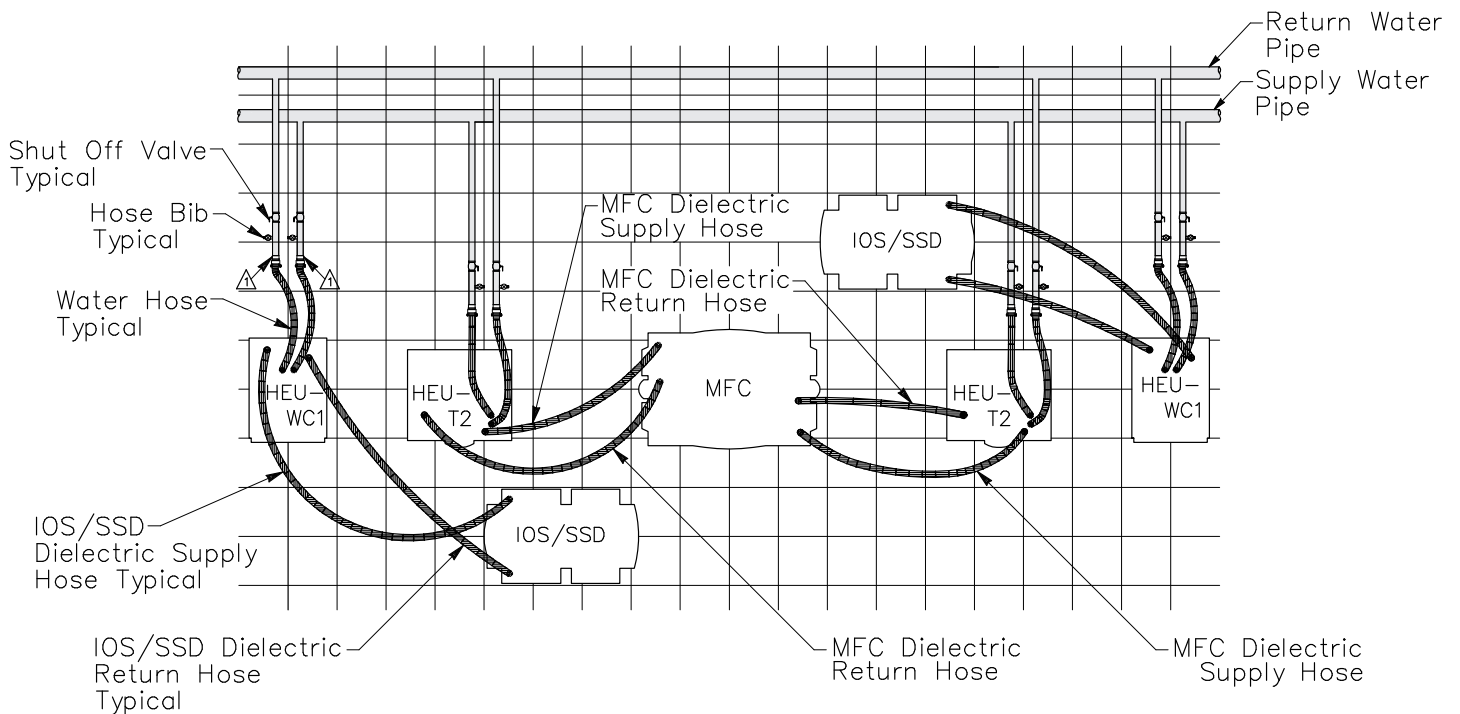
Cooling Requirements

The CRAY T932 computer system uses a dielectric-cooling technique that requires special piping and hoses.

Flexible hoses are required to complete the dielectric-coolant network between the HEU-T2s and the CRAY T932 mainframe chassis, and between the 700-series IOS/SSD chassis and HEU-WC1. Cray Research supplies and installs all flexible hoses for the dielectric coolant at the time of system installation.

In order to connect the customer-supplied water pipes to the HEU-T2s and HEU-WC1s, you must install the Cray Research-supplied water-line flange assemblies on both the supply and return water pipes. Refer to Figure 9 for an illustration of the water-line flange assemblies, water hoses, and dielectric-coolant hoses. Cray Research installs the flexible water hoses at the time of the system installation.

Figure 9. CRAY T932 Water-line Flange Assembly and Dielectric-coolant Hoses



⚠ You must install the eight 3-in. water-line flange assemblies, Cray Research part number 10658965, prior to system installation.

Bibliography

Cray Research, Inc. Customer Publications

Submit orders for the Cray Research, Inc. publications listed below, and the documents provided in this site planning reference kit, to the following address, or telephone 800-284-2729, extension 35907, or 612-683-5907.

Cray Research, Inc.
Distribution
2360 Pilot Knob Road
Mendota Heights, MN 55120

or E-mail: orderdisk@cray.com

Principles of Computer Room Design, Cray Research publication number HR-04013.

This manual describes computer room design principles to help computer room facility managers prepare, inspect, and maintain a stable, problem-free environment. Information on computer room and raised-floor construction, system cooling, environmental control, fire and lightning protection, power, and grounding is also discussed.

Safe Use and Handling of Fluorinert Liquids, Cray Research publication number HR-00306.

This manual is written for Cray Research, Inc. customers and field engineers whose Cray Research computer systems use Fluorinert liquid. This manual also describes the Material Safety Data Sheets (MSDS) and explains the significance of using Fluorinert liquid or any other chemical.

Cray Research, Inc. Site Engineering Documents

Submit orders for Cray Research, Inc. Site Engineering documents to the following address, or telephone 800-284-2729, extension 62820, or 715-726-2820.

Cray Research, Inc.
Site Engineering
1620 Olson Drive
Chippewa Falls, WI 54729

or E-mail: *site@cray.com*

Equipment Grounding for Cray Research, Inc. Computer Systems, Site Engineering document number 10658002.

This document describes the equipment grounding requirements for Cray Research computer equipment.

Forklift Size Requirements for the Handling of Cray Research Equipment, Site Engineering document number 10658374.

This document provides forklift requirements and recommendations for the safe handling of Cray Research computer equipment.

Vibration and Shock Limits for Installed Computer Systems, Site Engineering document number 10658300.

This document identifies the limits of vibration and shock levels that an installed Cray Research computer system can tolerate.

Water Quality Requirements, Site Engineering document number 10658280.

This document identifies the cooling water quality requirements for a Cray Research computer system.