CRAY T3E AC System: Single-cabinet Installation

HMM-164-0

Figures

Tables

Record of Revision

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Original printing.

Overview

These installation procedures are intended to assist Cray Research personnel with the mechanical installation of a single CRAY T3E air-cooled (AC) cabinet. In addition, the procedures provide an overview of the *system* installation, which includes the installation of the peripheral cabinet (PC-10) and the system workstation (SWS). The installation includes the following tasks:

- Unpacking and positioning the system components
- Verifying the hardware and connecting the cables
- Powering on the system initially and verifying cabinet operation
- Verifying system functionality with validation diagnostics

Perform the procedures in the order that they are presented.

This document does not contain troubleshooting procedures, nor does it contain installation procedures for peripheral equipment.

For information on the PC-10 installation, refer to *Peripheral Cabinet (PC-10) Installation,* publication HMM-371. For information on the SWS installation, refer to *System Workstation,* publication HTM-222.

For information on the CRAY T3E software installation, refer to the *CRAY T3E Software Installation and Configuration Guide,* publication SG-2610.

Installation personnel should have a basic knowledge of computer system power processes. They should also have a basic understanding of the control system, the layout of the various cabinet components, and of running offline diagnostics.

The installation coordinator is responsible for CRUISE (Cray Research Unified System Enterprise) registration and for installation reporting. The system log book in the “OPEN FIRST” box contains a printout from the Web-based Installation Reporting tool. You may use the paper copy to help track the installation and, if necessary, to fax the information.

Important Safety Information

The following subsections contain important safety information that you must read and understand before you begin the CRAY T3E AC system installation.

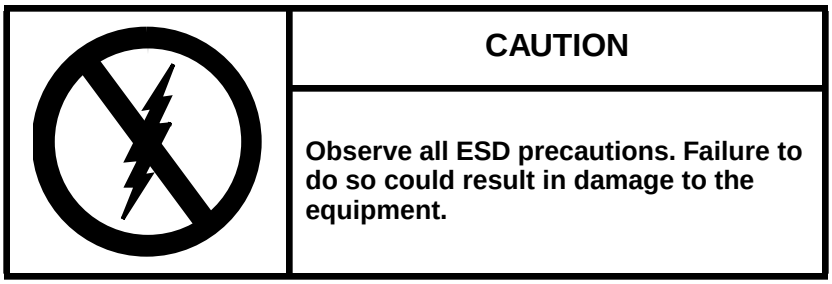
Hazard Statements

During the installation of the computer system, be alert for hazard advisory statements. The following list describes the hazard statement signal words:

- **Danger** indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.
- **Warning** indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.
- **Caution** indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. This signal word is also used to alert personnel against unsafe practices that can result in equipment damage and/or data corruption.

ESD Precautions

Observe electrostatic discharge (ESD) precautions during the entire installation process. Required apparel includes an ESD smock and an ESD wrist strap.



ESD Smock

Wear a Cray Research-approved static-dissipative smock when servicing or handling an ESD-sensitive device. Completely button the smock and wear it as the outermost layer of clothing. You must have a portion of the smock's sleeves in direct contact with the skin of your arms. Skin contact is essential for a dissipative path-to-earth ground through your wrist strap. Tuck hair that exceeds shoulder length inside the back of the smock.

Wrist Strap

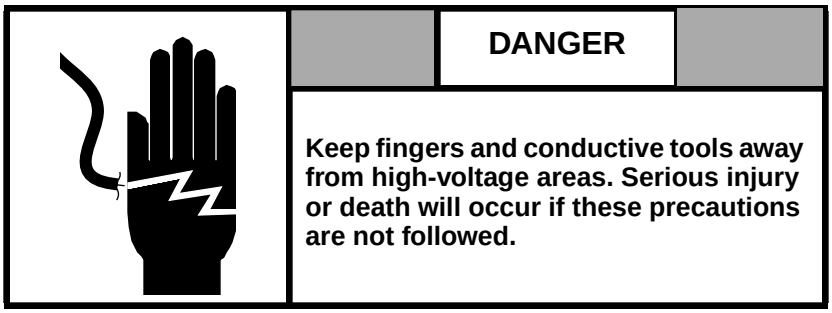
Wear a Cray Research-approved wrist strap when servicing or handling an ESD-sensitive device to eliminate possible ESD damage to equipment. Connect the wrist strap cord directly to earth ground.

NOTE: The CRAY T3E AC cabinet contains two sets of jacks (front and rear) for a mating ESD ground strap.

Safety Precautions

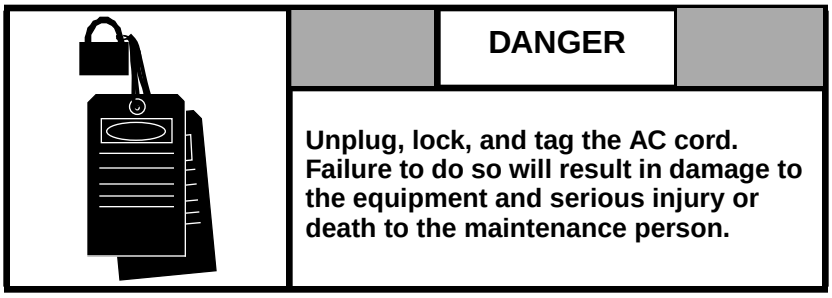
Before you perform the procedures in this document, take a few minutes to review the *Safety and ESD Guidelines*, publication number HGM-016-A. In addition, observe the following safety measures when installing, repairing, or maintaining the system.

- Use caution when removing the cabinets from the ramps. Moving these cabinets can cause personal injury or property damage if the cabinets are not handled properly.
- Ensure that the cabinet crates are positioned close to their final positions before you unpack them.
- Do not move the cabinets while they are connected to power.
- Do not wear watches or jewelry when you work on a CRAY T3E system cabinet.



- Keep fingers and conductive tools away from high-voltage areas and from high-current areas.
- Ensure that a qualified electrician has properly installed the power receptacles.

- Set all circuit breakers to the OFF (0) position before you plug in the system power cord.
- Unplug, lock, and tag the cabinet power plug before you work on the power system components.



- Remove all tools from the system cabinets after you service them.
- Replace all covers and panels that you removed from the system during servicing.
- Power off the system only after the system software has been shut down in an orderly manner.

CAUTION

If you power off the system before you halt the operating system, you may lose customer data.

Preinstallation Activities

Before you install your system, read the following subsections and verify that your site meets all site requirements. In addition, reread the "Important Safety Information" section of this document as part of your preinstallation activities.

Tools Required

Ensure that you have the following tools, which are necessary to complete the hardware installation. These tools are available from Cray Research's Customer Service Logistics department or from any hand-tool vendor. (The Logistics part number for the CRAY T3E tool kit is 57247800.)

- Multimeter
- Cutters
- Adjustable wrench or 11-mm, 15-mm, and 16-mm wrenches
- 3-mm and 4-mm hex (allen) wrenches with hex driver
- #1 and #2 Phillips screwdrivers
- Small and medium flatblade screwdrivers
- Flashlight
- Heat gun (optional -- to verify operation of remote alarm, if used)

Checking Site Planning Requirements

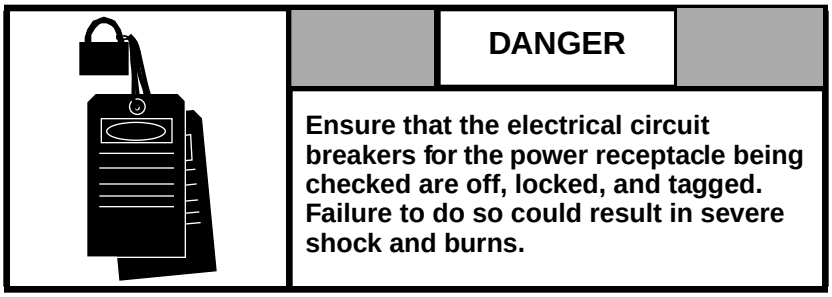
Before you install your CRAY T3E system, ensure that your site meets all of the site planning requirements included in *Preparing for a CRAY T3E Air-cooled System Installation*, Cray Research publication number HR-04118. For example, take some time to verify the following things:

- Verify that the site has appropriate means (pallet jacks, etc.) for unloading and transporting the system components.
- Verify that the route to the computer room is free of obstacles.
- Verify that the computer room floor is prepared according to the floor layout diagram for the system.
- Verify that all electrical services meet site planning specifications.
- Verify that the air-conditioning equipment meets site planning specifications.
- Verify that the ground clamp (for grounding the mainframe to the floor grid) is in the correct location near the floor cutout for I/O cables.

Checking the Power Cord Receptacle

Ensure that a qualified technician installed the correct power receptacle according to site planning specifications. Then Cray Research-trained personnel with the appropriate skills should use the following procedure to ensure that the power receptacle is properly wired. Refer to Figure 1 for drawings of the 3-phase power plugs and receptacles that are available for CRAY T3E AC cabinets.

1. Turn off, lock, and tag the customer's circuit breaker(s) that control power for the CRAY T3E AC cabinet power receptacle before you perform Step 2 and Step 3.



2. Set the multimeter to a low-resistance setting.

3. Measure between the power receptacle ground-post hole and an appropriate earth-ground location and ensure that resistance is less than 1 ohm. Figure 1 shows the post hole locations. (Appropriate earth-ground locations could include the floor grid, a metal case receptacle, and a circuit breaker shell.)

4. Remove the lock and tag and restore power through the customer's circuit breaker(s).

5. Set the multimeter to a high AC voltage range.

6. Measure between the ground-post hole and an appropriate earth-ground location. **If you detect voltage on the ground-post hole, contact a site-approved electrician. Do not proceed with the installation.**

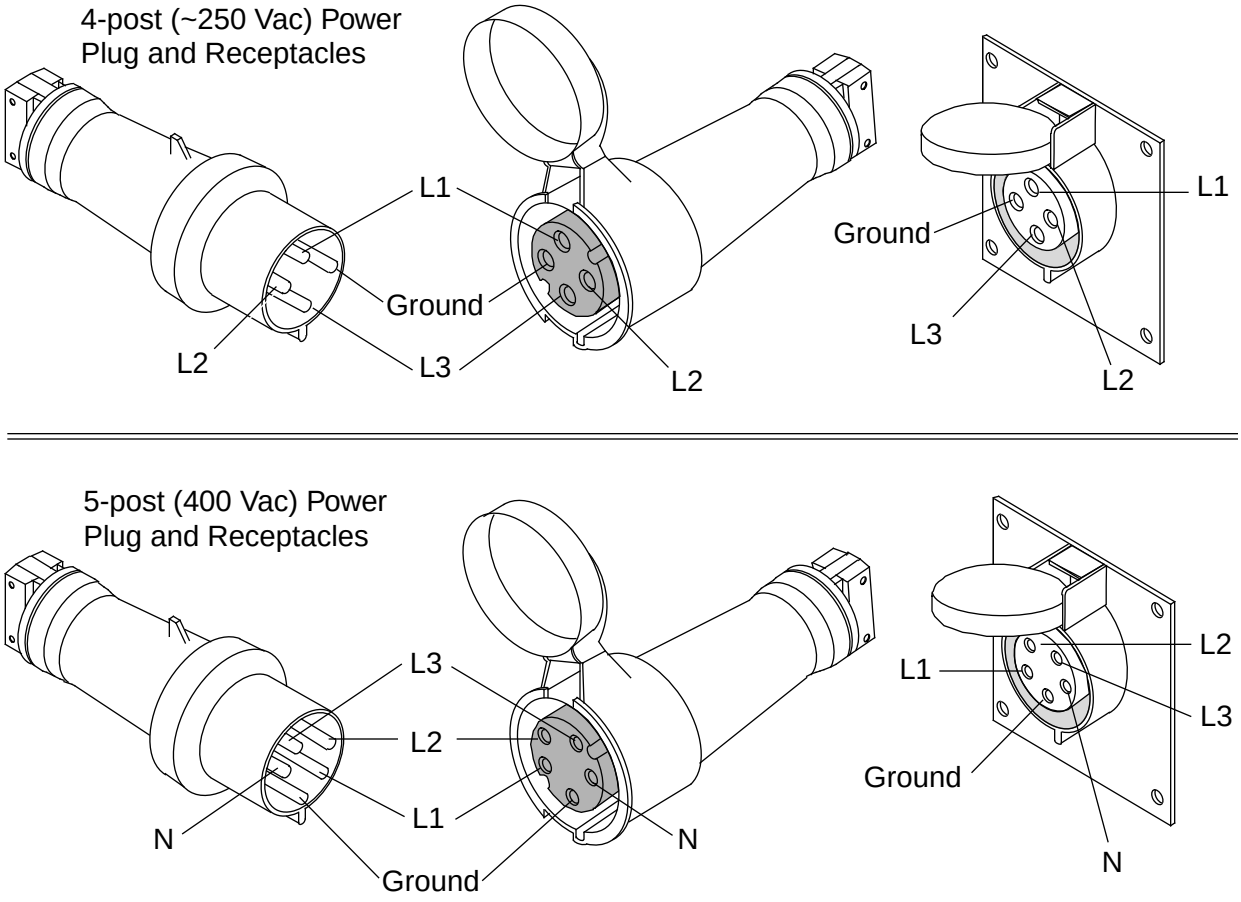
   NOTE: The ground wire may act as an antenna and, through impedance, generate a low voltage (usually less than 1 Vac). This is normal.

7. Perform voltage checks between the posts listed in Table 1. Refer again to Figure 1, which shows the post locations. (Table 1 is based on a wye-connected power *source*.)

Table 1. Required Power Receptacle Test Readings

Cord Assembly	From Post	To Post	Meter Reading
P/N 57181600	L1	G	Not to exceed 140 Vac
60 A, 250 Vac (4-post cord used commonly in North America and Japan)	L2	G	Not to exceed 140 Vac
	L3	G	Not to exceed 140 Vac
	L1	L2	Between 180 and 240 Vac
	L2	L3	Between 180 and 240 Vac
	L1	L3	Between 180 and 240 Vac
P/N 57181700	L1	N	Not to exceed 260 Vac
32 A, 400 Vac (5-post cord used commonly in Europe)	L2	N	Not to exceed 260 Vac
	L3	N	Not to exceed 260 Vac
	L1	L2	Between 360 and 440 Vac
	L2	L3	Between 360 and 440 Vac
	L1	L3	Between 360 and 440 Vac

Figure 1. Power Plugs and Receptacles



Power Wiring for High-leakage Current

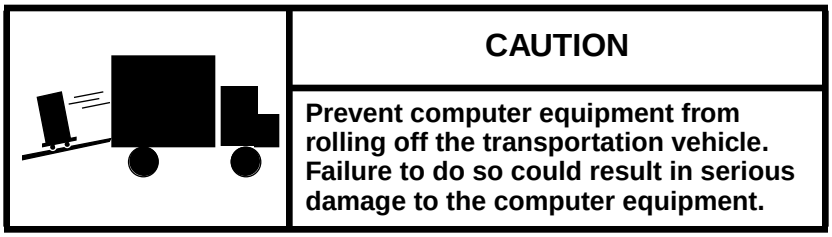
Please note the following statement by Underwriters Laboratories, Inc.

An insulated earthing conductor that is identical in size, insulation material, and thickness to the earthed and unearthed branch-circuit supply conductors except that it is green with or without one or more yellow stripes is to be installed as part of the branch circuit that supplies the unit or system. The earthing conductor described is to be connected to earth at the service equipment or, if supplied by a separately derived system, at the supply transformer or motor-generator (UL 60 95).

Unloading the Computer System Equipment

In most cases, if your loading dock is the same height as the transportation vehicle, you may use pallet jacks to unload the system from the transportation vehicle. Follow any instructions that are printed on the packing crates.

If the loading dock is not the same height as the vehicle, you must provide a forklift or another approved method to unload the system. A platform or ramp may be used to obtain the desired level as long as the ramp does not exceed a ratio of 1 unit vertical to 6 units horizontal. Refer to *Preparing for a CRAY T3E Air-cooled System Installation*, publication HR-04118, for more information on site requirements.

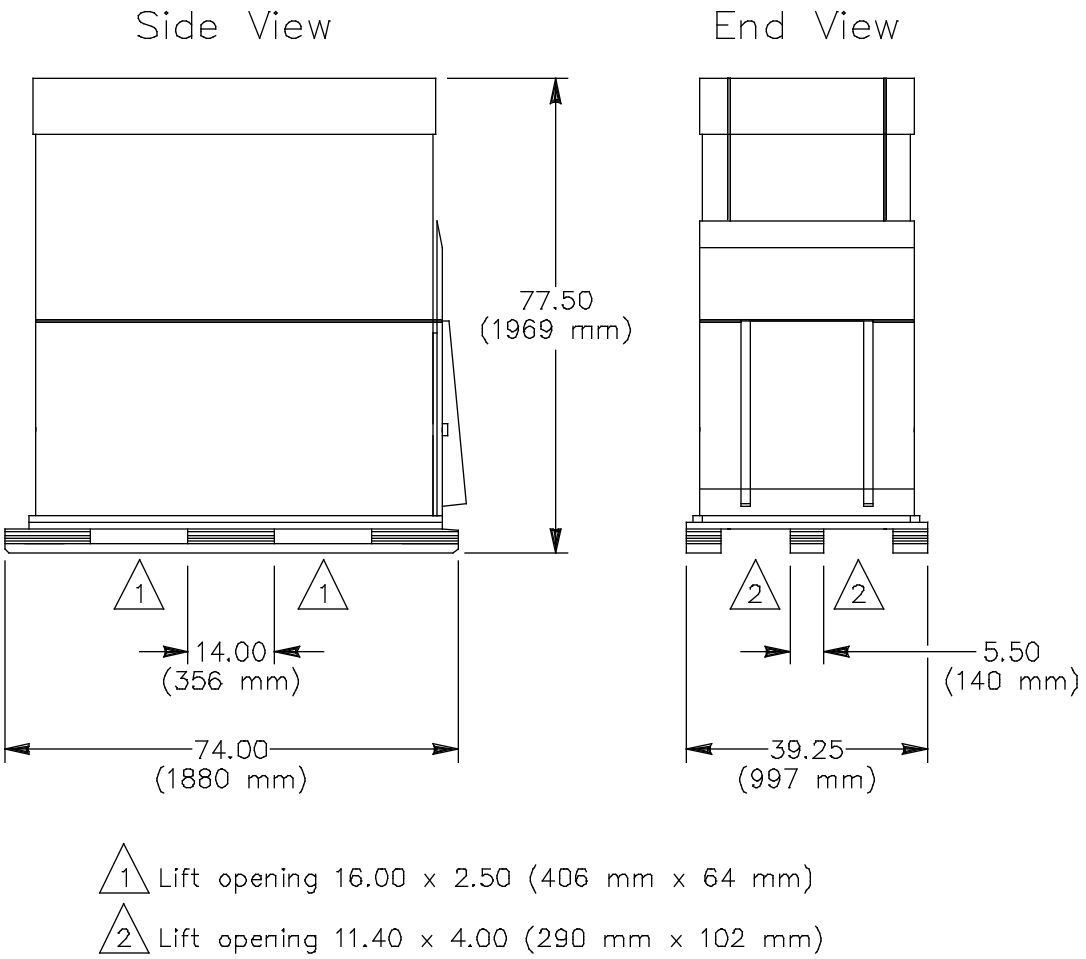


If the computer site does not have a loading dock, arrange for a forklift to remove the computer from the transportation vehicle.

Ensure that three or four personnel are available to help move the mainframe chassis. Perform all movement of the chassis slowly and carefully.

Figure 2 shows the CRAY T3E AC cabinet shipping configuration, lift openings, and dimensions.

Figure 2. CRAY T3E AC Cabinet Shipping Configuration



Inspecting the System Crates and Boxes

The shipping crates contain the mainframe, PC-10, system workstation, additional system components, and system maintenance and user documentation. After the system is unloaded from the truck, perform the following steps before you transport and unpack it.

1. Ensure that the boxes arrived unopened. If any boxes are open, identify and record the opened boxes through the CRUISE system.

2. Inspect the shipping crate for signs of external damage such as dents, holes, crushed corners, and water marks. Record any signs of external damage as an installation defect through the CRUISE system.

Transporting the System to the Designated Location

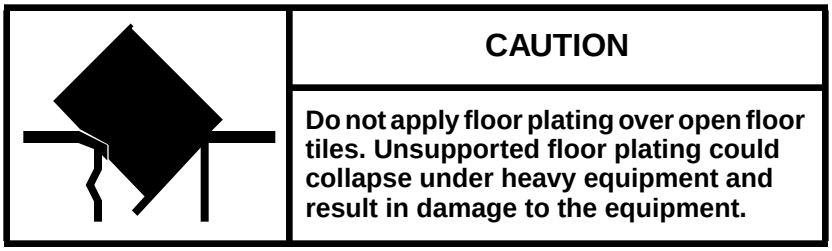
Use pallet jacks to move the system to its designated location. For the crate that contains the CRAY T3E cabinet, use a regular-length pallet jack (positioned on the side of the crate) to transport the cabinet. You may also use a long pallet jack (approximately 60 in. [152 cm]) positioned on the end of the crate. If necessary, you may use regular-length pallet jacks at each end of the crate to move the cabinet a **short** distance. Follow any instructions that are printed on the crates.

Cray Research recommends that you leave each system cabinet in its shipping crate until it reaches its final location. If the crate does not fit through the planned access route, you may need to partially disassemble the crate.

The entire route to the computer room should meet the following requirements:

- Floor loading: maximum weight per cabinet is 1,640 lbs (744 kg)
- Minimum door height: 78.75 in. (2,000 mm)
- Minimum door width: 40.00 in. (1,016 mm)
- Maximum incline: 10 degrees (height:length = 1:6)

Refer to the appropriate installation documents for details on other equipment.



Opening the “OPEN FIRST” Box

To ensure that you have the most accurate information available, use the installation documents from the “OPEN FIRST” box to complete the installation. This box contains up-to-date versions of this document and associated installation documents. This box also includes the following documents that you will refer to during the installation:

- System configuration documentation
- System deviation documentation
- Cable list

Unpacking the CRAY T3E AC Cabinet

If the system shipping or storage environment is significantly colder than the environment in which it is to be installed [40 °F (22 °C) or greater disparity], leave the system cabinets in their shipping crates for at least 24 hours at room temperature before you start the installation. This acclimation prevents damage to the equipment that could result from thermal shock and condensation.

After you move the system to its designated location, use the following procedure to unpack the mainframe shipping crate and to carefully roll the mainframe off the pallet ramp. As you unpack the system, check the contents of each shipping crate against the packing list, which is attached to the outside of the shipping crate.

NOTE: This procedure applies to CRAY T3E AC mainframes only. To obtain unpacking procedures for additional system equipment, refer to the installation documents that are specific to that equipment.

CAUTION

Steps 1 through Step 19 require two people to ensure personal safety and to protect the equipment. Failure to use two people could result in injury to personnel or damage to the equipment.

1. Locate the front of the shipping crate; it is marked FRONT. The ramp is attached to the front of the crate. (Figure 3 shows the shipping crate.)

2. Cut the vertical straps that hold the cardboard shipping panels in place. These straps are tight and may snap when you cut them.

CAUTION

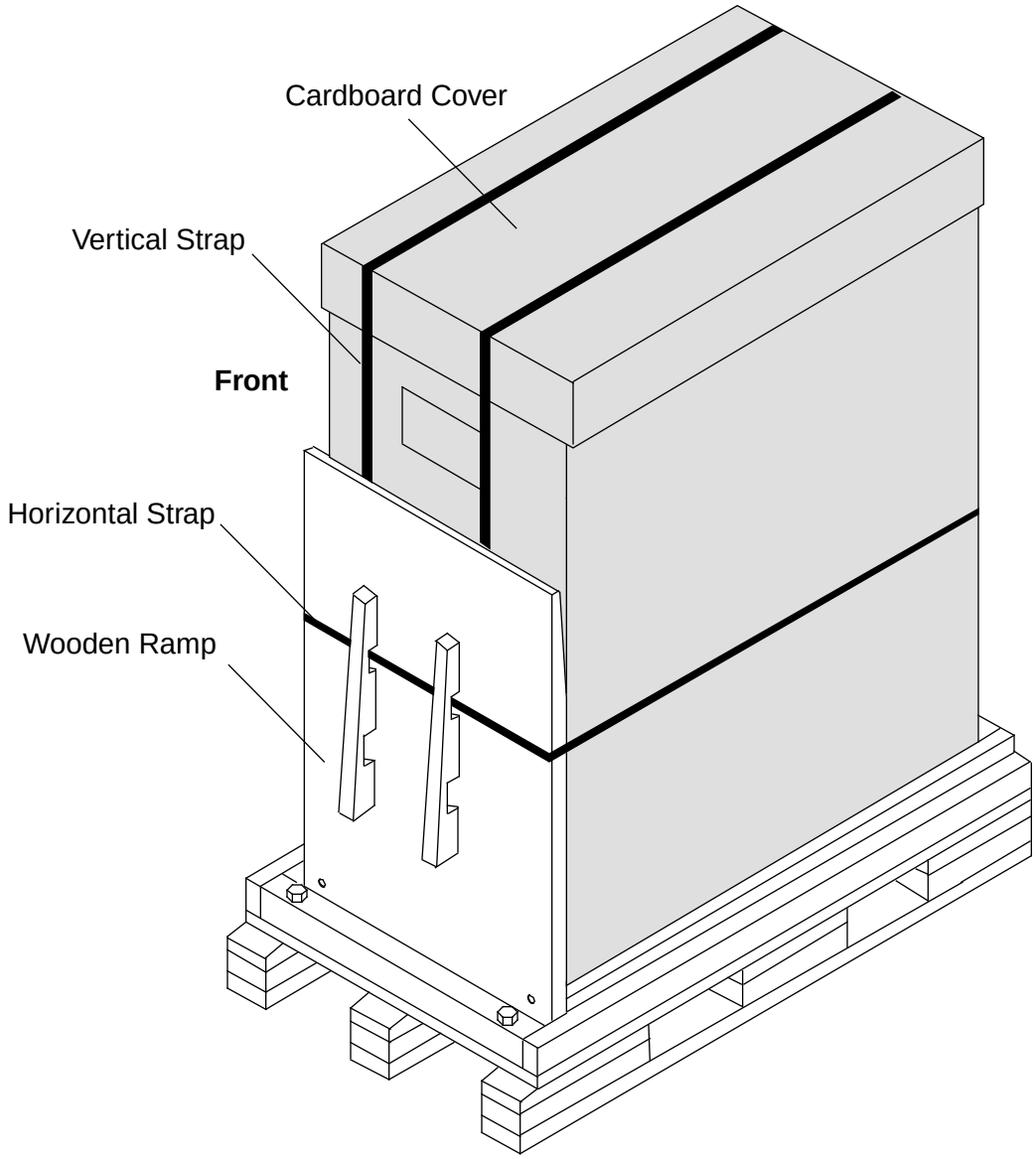
The restraining straps are tight and may hit you or someone nearby when you cut them. Wear eye protection and protect your body and face when you cut the straps. Ensure that other personnel either stand clear or protect themselves. Failure to do so may result in injury.

3. While someone holds the ramp, cut the horizontal strap.

   NOTE: The ramp may be positioned as shown below or upside down.

CAUTION
Someone must hold the ramp when you cut the strap. Failure to do so may cause the ramp to fall and result in injury to personnel.

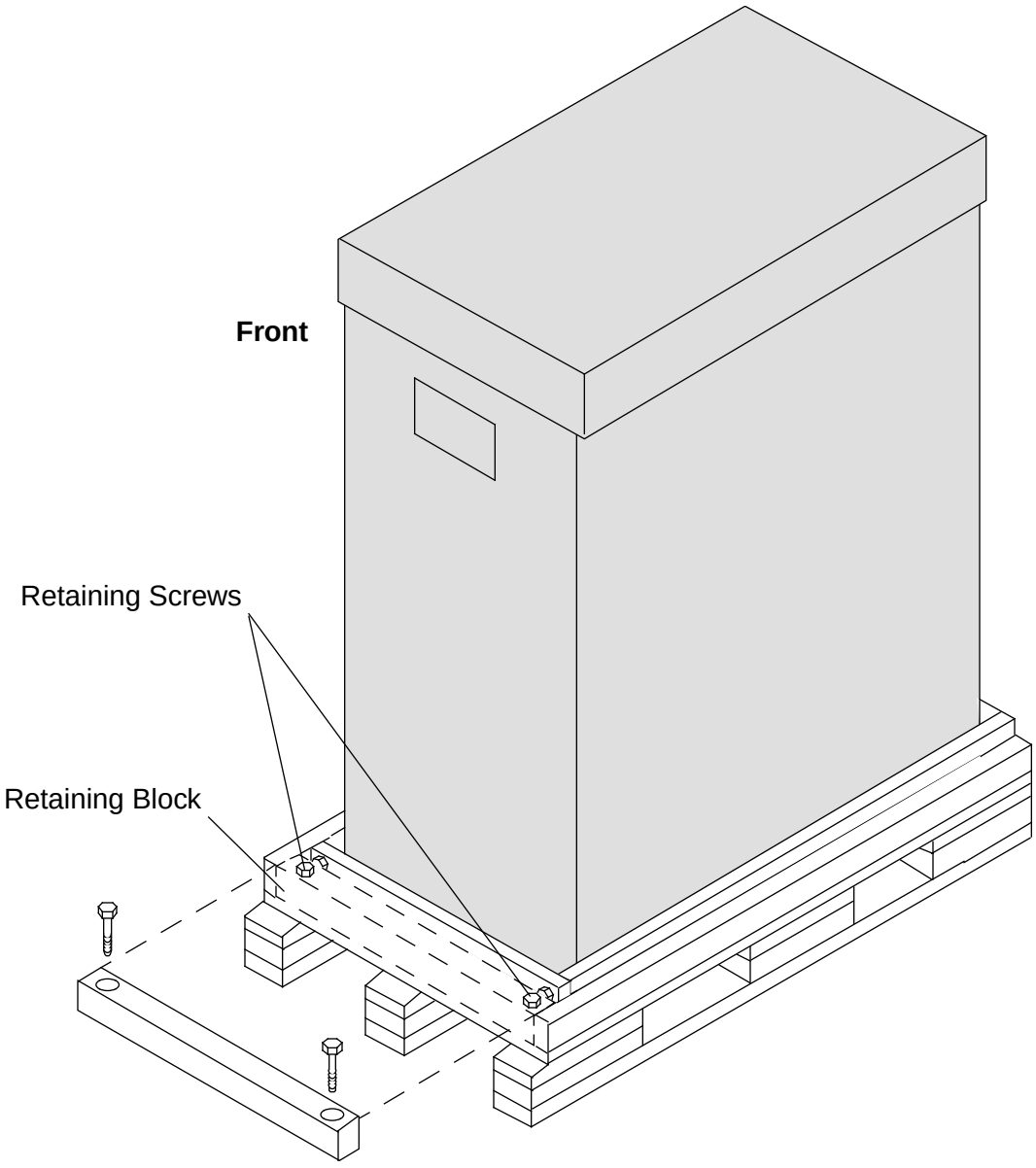
Figure 3. Cabinet Shipping Crate



4. Set the wooden ramp aside temporarily.

5. With an 11-mm wrench, remove the 2 retaining screws that secure the retaining block to the shipping crate, then remove the block, as shown in Figure 4. Retain the screws for the next step.

Figure 4. Retaining Block and Screws

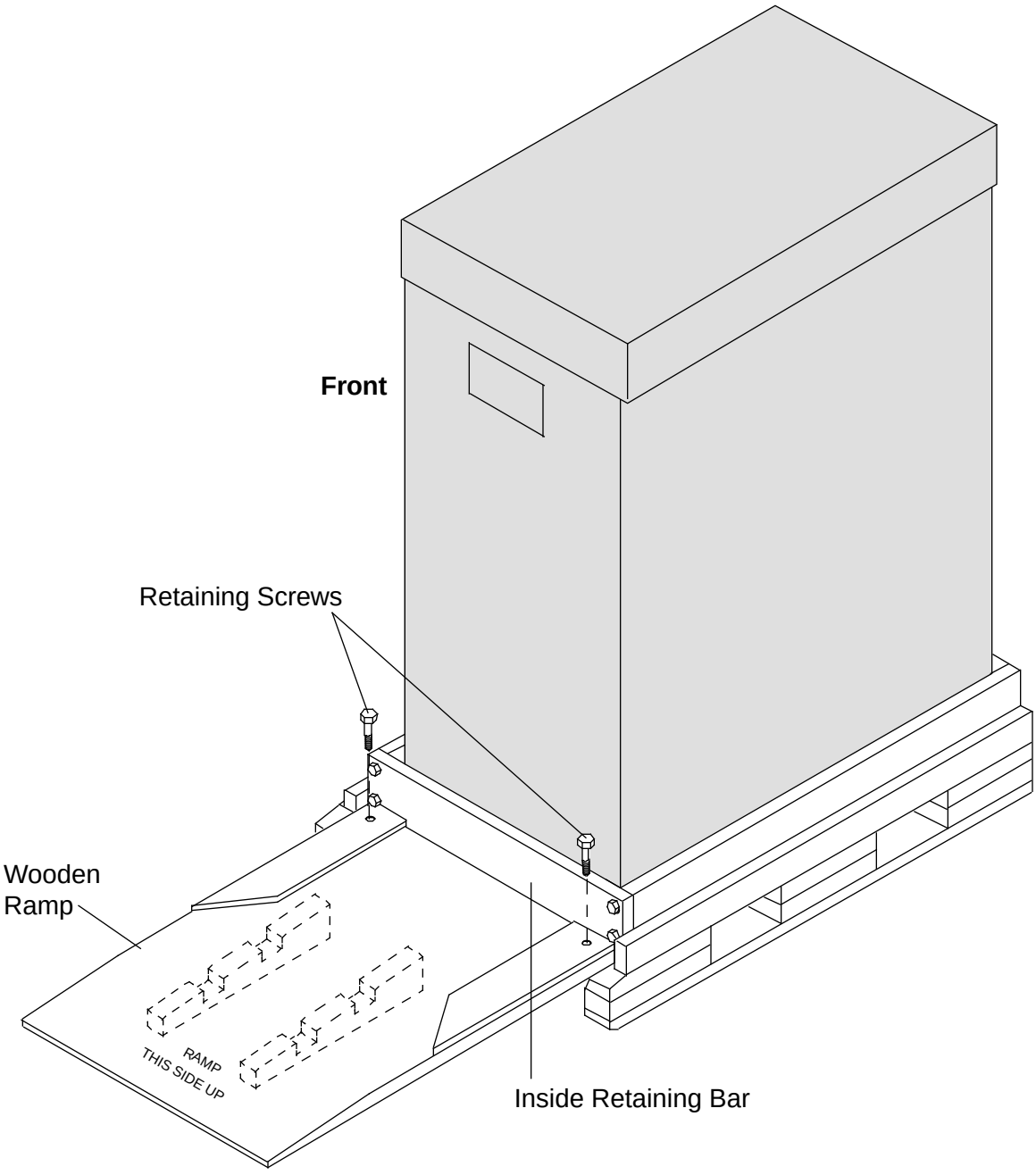


6. Use the following procedure to install the wooden ramp:

   a. Position the ramp as shown in Figure 5, so that the screw holes on the ramp align with the holes on the pallet.

   b. Insert the screws that you removed in Step 5 through the holes.

Figure 5. Installing the Ramp

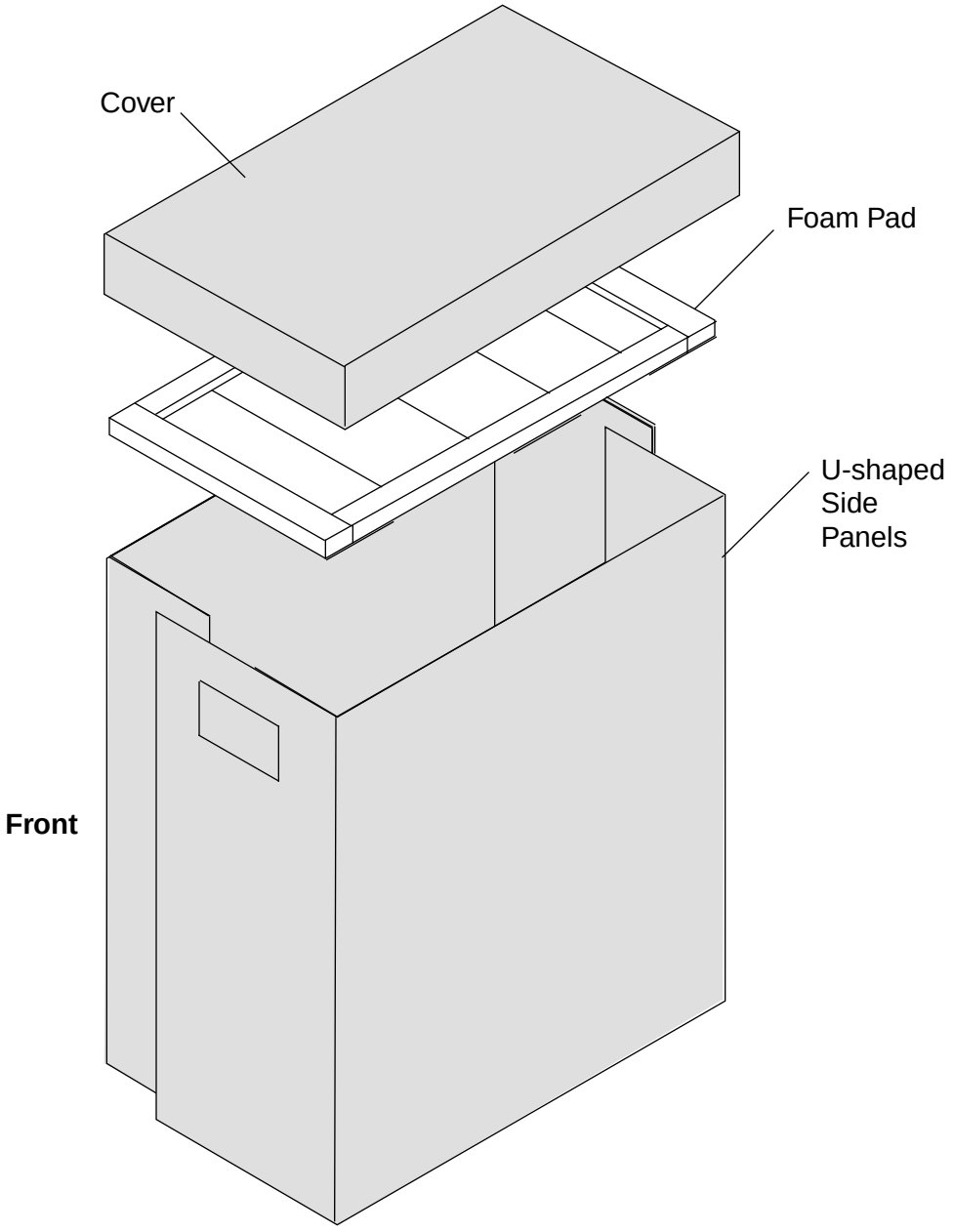


7. Remove the cardboard cover from the top of the shipping crate.

8. Remove the two U-shaped side panels from the crate by lifting up and then out. Refer to Figure 6.

9. If applicable, remove any additional cardboard panels from the crate.

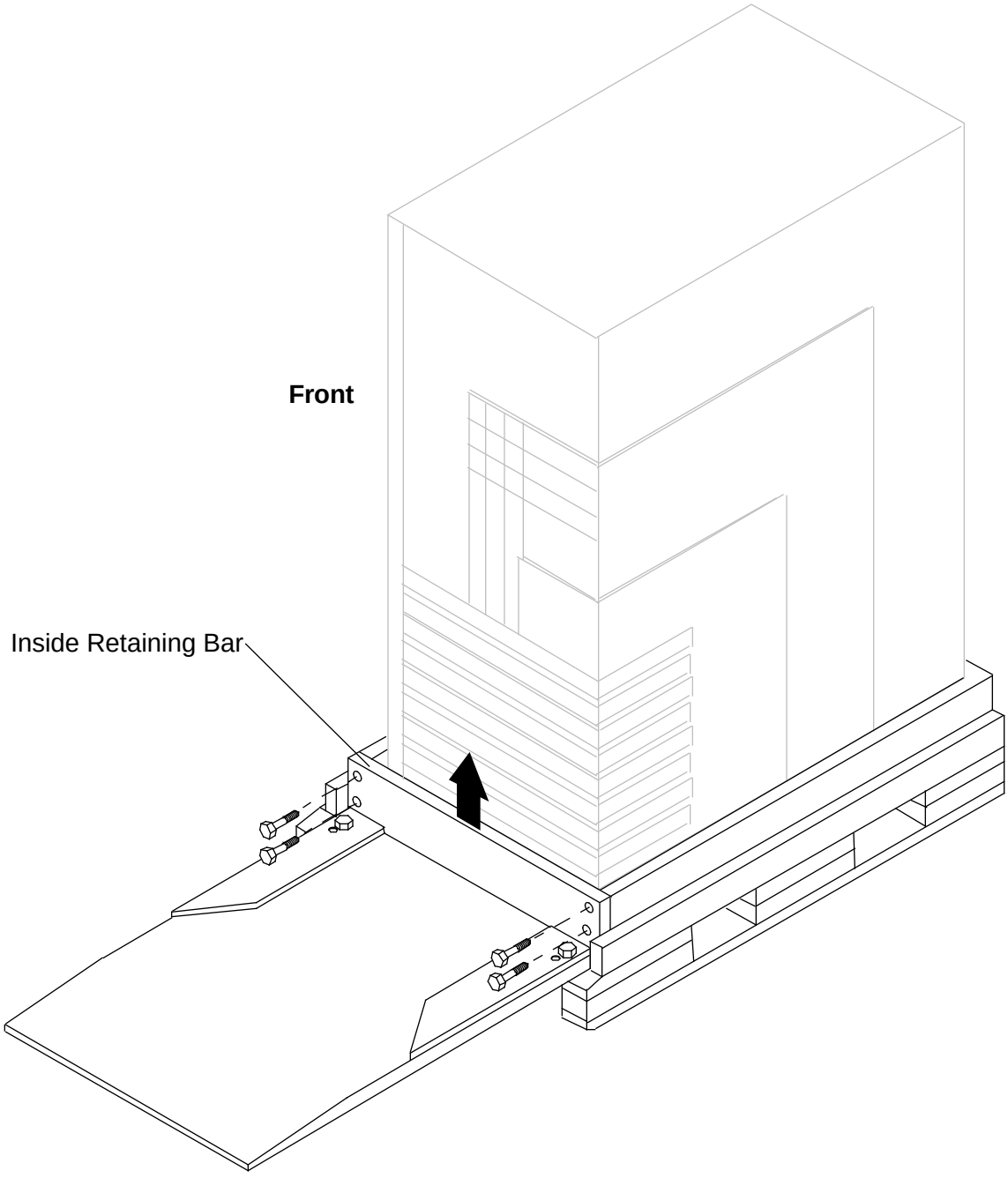
Figure 6. Cardboard Shipping Container



10. Remove the foam pad from the top of the cabinet; the pad is a single unit. If there is any padding on the side of the cabinet, remove the padding.

11. Use an 11-mm wrench to remove the inside retaining bar. Four screws secure the bar to the shipping crate as shown in Figure 7.

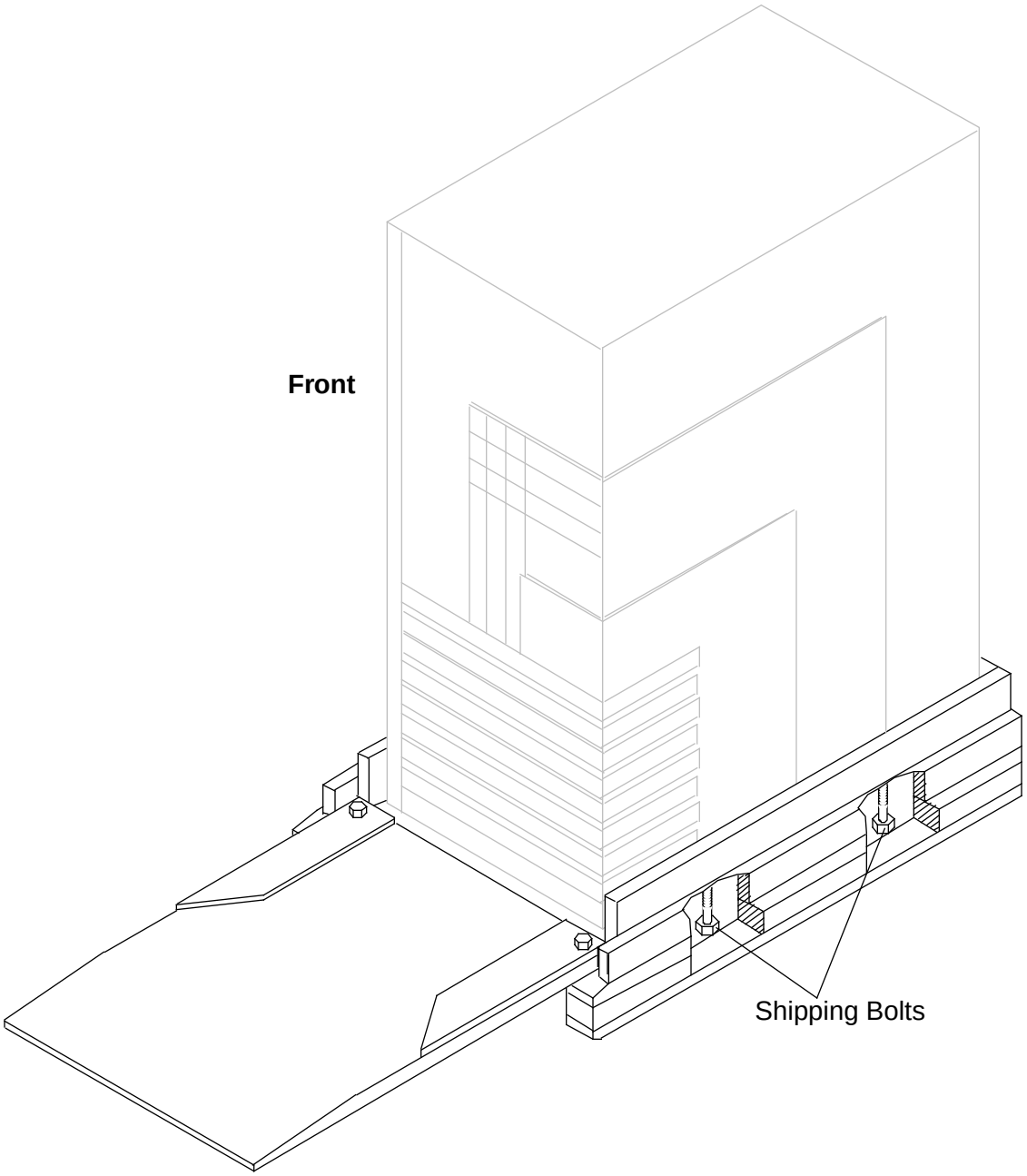
Figure 7. Removing the Inside Retaining Bar



12. Use an adjustable wrench (or a 16-mm wrench) to remove the 4 shipping bolts that secure the cabinet to the pallet. To access them, reach under the shipping pallet between the floor pads. There are 2 bolts (with washers) on each side of the pallet. Refer to Figure 8.

13. Ensure that the cabinet levelers (legs) are raised completely and, if possible, ensure that the front casters (wheels) face the ramp.

Figure 8. Shipping Bolts

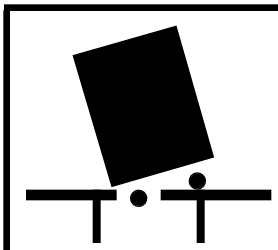


14. With *at least* one partner, carefully roll the cabinet down the ramp.

CAUTION

The system is heavy, and momentum may carry it down the ramp quickly. Ensure that the system does not roll off the pallet or the system may be damaged. Do not attempt to perform this step without help.

15. Move the cabinet close to the final location indicated on your site plan.

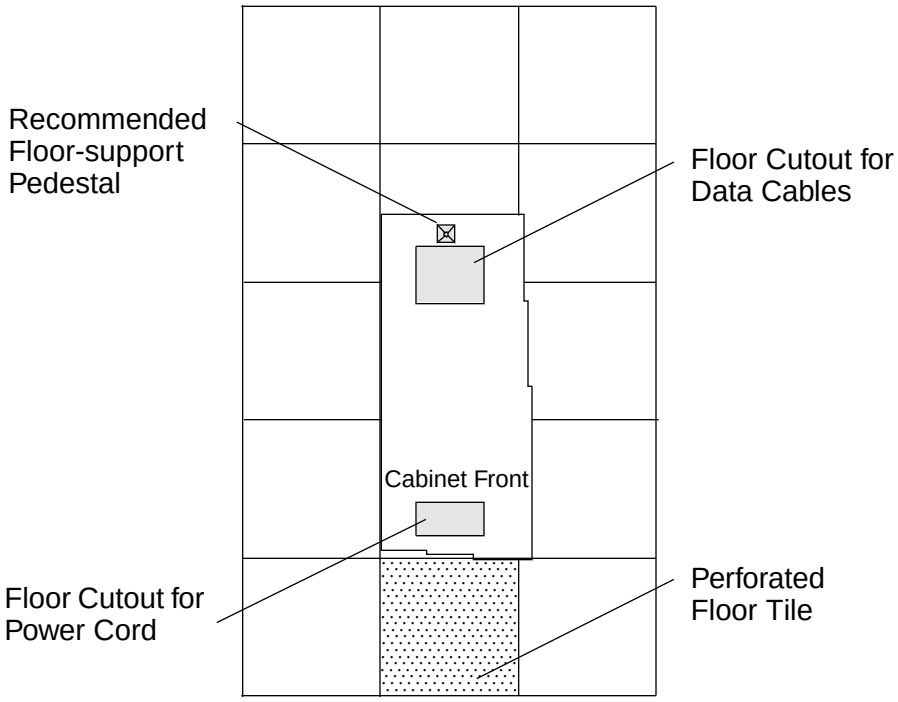


CAUTION

Ensure that cabinet casters (wheels) do not fall into floor cutouts. Failure to do so could result in damage to the computer equipment and injury to personnel.

16. Remove the ESD-protective plastic cover from the cabinet.

Figure 9. Example Cabinet Floor Plan

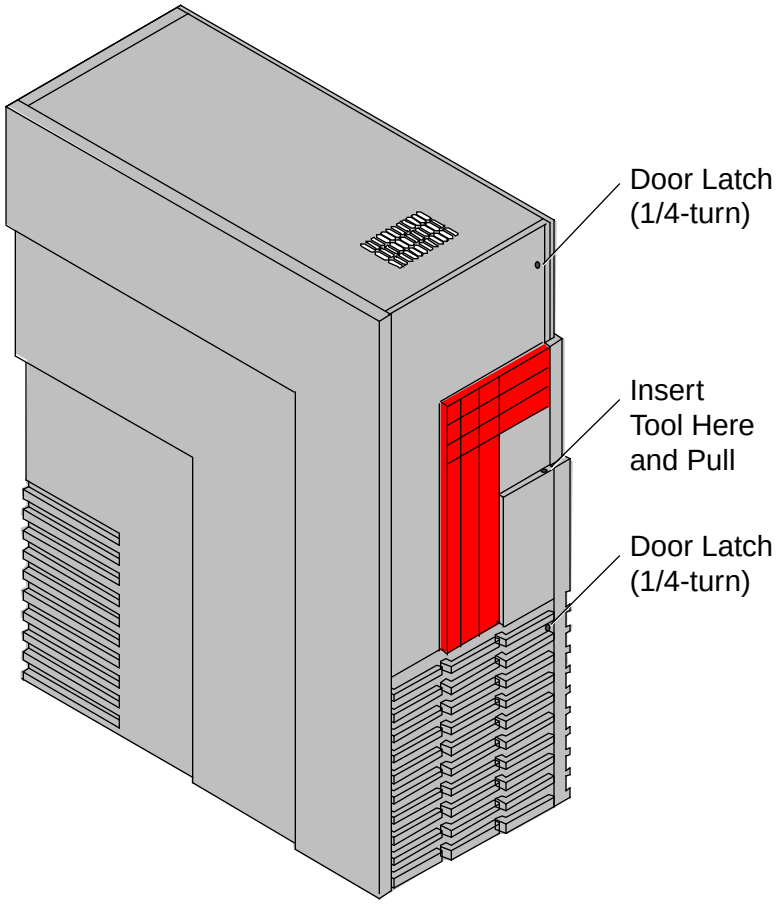


17. Open the front cabinet door:

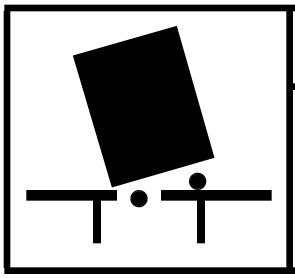
    a. The door has two latches: top and bottom. For each latch, insert a 4-mm ball-end hex (allen) wrench into the latch and turn the latch counterclockwise 1/4 turn. (You may use a 5/32-in. hex wrench instead.)

    b. Grasp the door and swing it open. (The door contains a hole that aids in opening. You may insert a tool, such as a #2 Phillips screwdriver, in the hole to improve your grip and serve as a door handle. Refer to Figure 10. **NOTE:** Be careful not to press the tool against the fiberglass trim. The fiberglass cracks and chips easily.)

Figure 10. Door Latches and Handle (Front Door)



18. Lower the cabinet power cord through the bottom of the cabinet, through the appropriate floor cutout, and into the underfloor area. **Do not connect the power cord**. If needed, move the cabinet to provide access to the floor cutout. If the computer area does not have a raised floor, position the power cord under the cabinet.



CAUTION

Ensure that cabinet casters (wheels) do not fall into floor cutouts. Failure to do so could result in damage to the computer equipment and injury to personnel.

19. Position the cabinet in the final location as indicated on your site plan.

20. Use an adjustable wrench (or 15-mm open-end wrench) to lower the cabinet levelers (legs) until they hold the cabinet in place when you push it. Level the cabinet; use the bottom of the cabinet frame to determine when the cabinet is level.

21. Cut the strap that holds the UL tag to the front air grill and remove the tag.

Unpacking and Positioning the PC-10

At this point, you should unpack and position the PC-10 cabinet. Refer to *Peripheral Cabinet (PC-10) Installation*, Cray Research publication HMM-371, for details on unpacking the PC-10.

NOTE: Do not begin cabling the system until you read "Completing the Cabling," which starts on page 35 of this document. In addition, do not plug in or power up the PC-10.

Unpacking and Positioning the System Workstation (SWS)

At this point, you should unpack and position the system workstation (SWS), then connect the mouse, keyboard, and monitor. Refer to *System Workstation*, Cray Research publication HTM-222, for details on unpacking and positioning the SWS. You will cable and power up the SWS later.

Unpacking and Positioning Additional System Components

At this point, you should unpack and position any additional system components that shipped with your CRAY T3E AC cabinet. Refer to the appropriate installation documents for details on unpacking additional system components.

Grounding the Mainframe Chassis

Use the following procedure to ground the chassis:

NOTE: The chassis is grounded through the power cord; however, Cray Research recommends that you connect an additional chassis ground. If your site chooses not to connect an additional ground, you must remove the ground strap, which could act as an antenna.

1. Open the rear cabinet door.

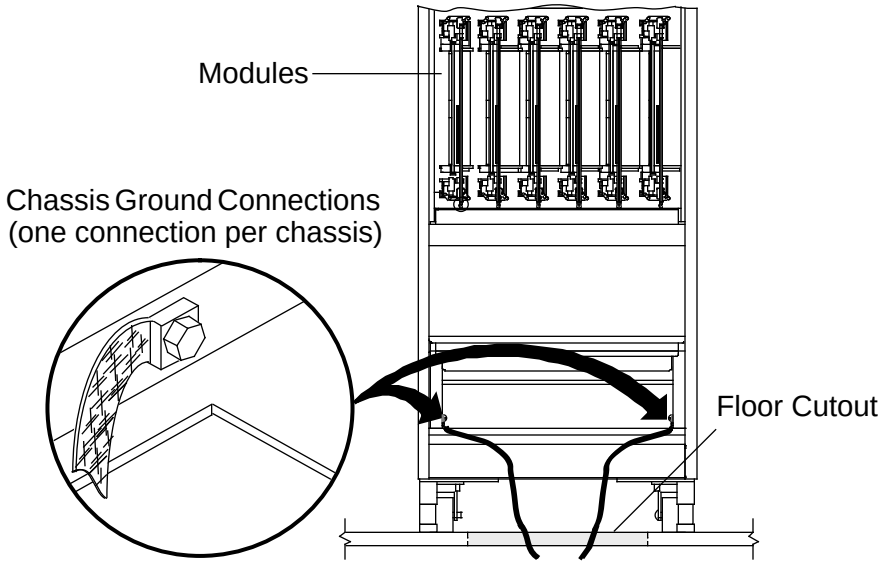
   a. The door has two latches: top and bottom. For each latch, insert a 4-mm ball-end hex (allen) wrench into the latch and turn the latch counterclockwise 1/4 turn.

   b. Grasp the door and swing the door open. (The door contains a hole that aids in opening. The hole is near the middle/right side of the door, on the underside of a raised panel. You may insert a tool, such as a #2 Phillips screwdriver, in the hole to improve your grip and serve as a door handle. **NOTE:** Be careful not to press the tool against the fiberglass trim. The fiberglass cracks and chips easily.)

2. Remove the panel that covers the I/O bulkhead area. Eight 1/4-turn captive screws (#2 Phillips) secure the panel.

3. Locate the grounding strap (near the I/O bulkhead). Uncoil the grounding strap, and ground the mainframe to the floor grid. Figure 11 shows two possible locations for the chassis ground connections.

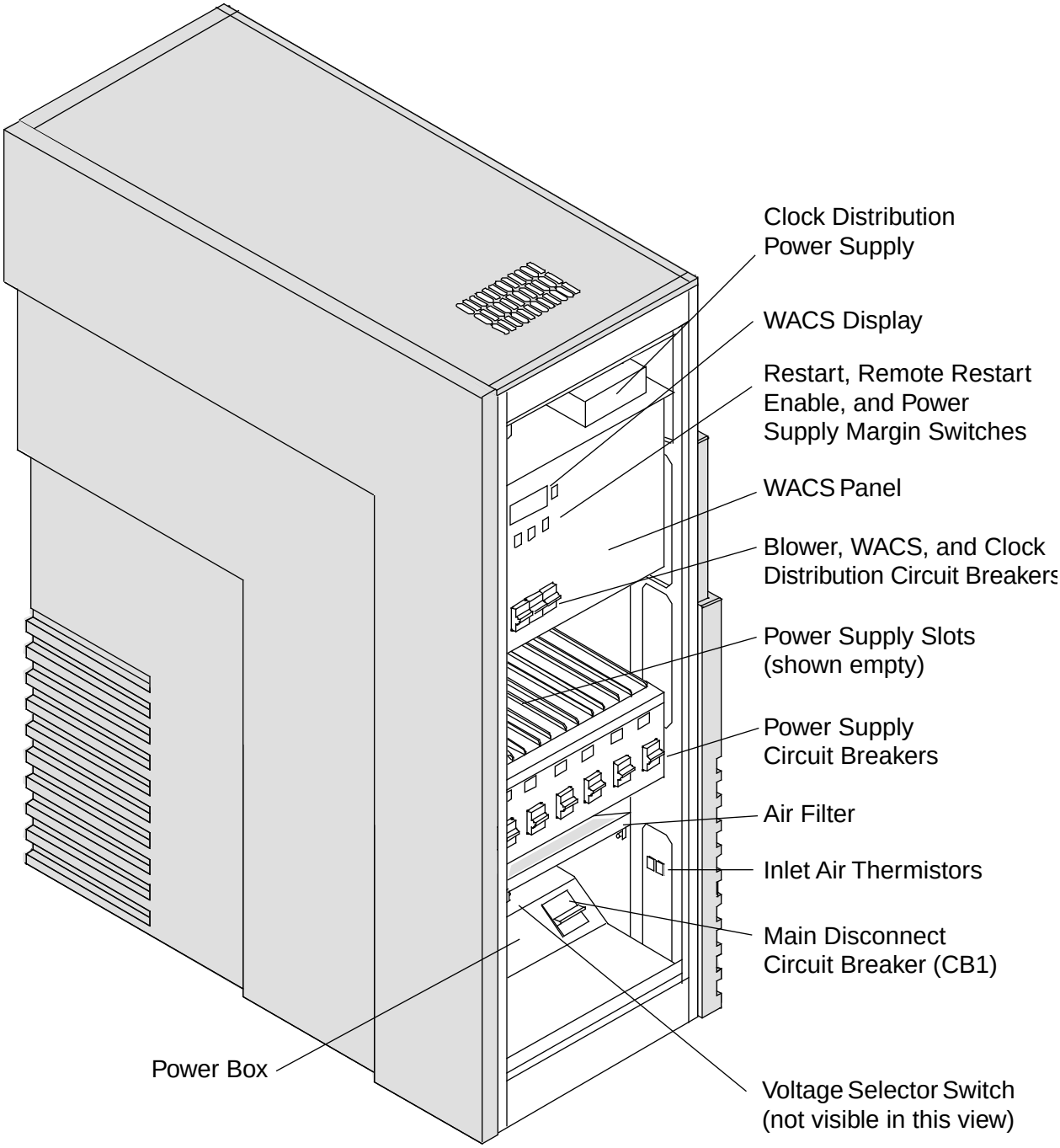
Figure 11. Chassis Ground Connections (Rear View of Cabinet)



Verifying the CRAY T3E AC Hardware

Complete the following procedures to verify that the condition of cabinet components is suitable for power-up. Figure 12 shows several of the cabinet components; refer to Figure 12 as you complete the verification procedures.

Figure 12. CRAY T3E Cabinet Components -- Front View

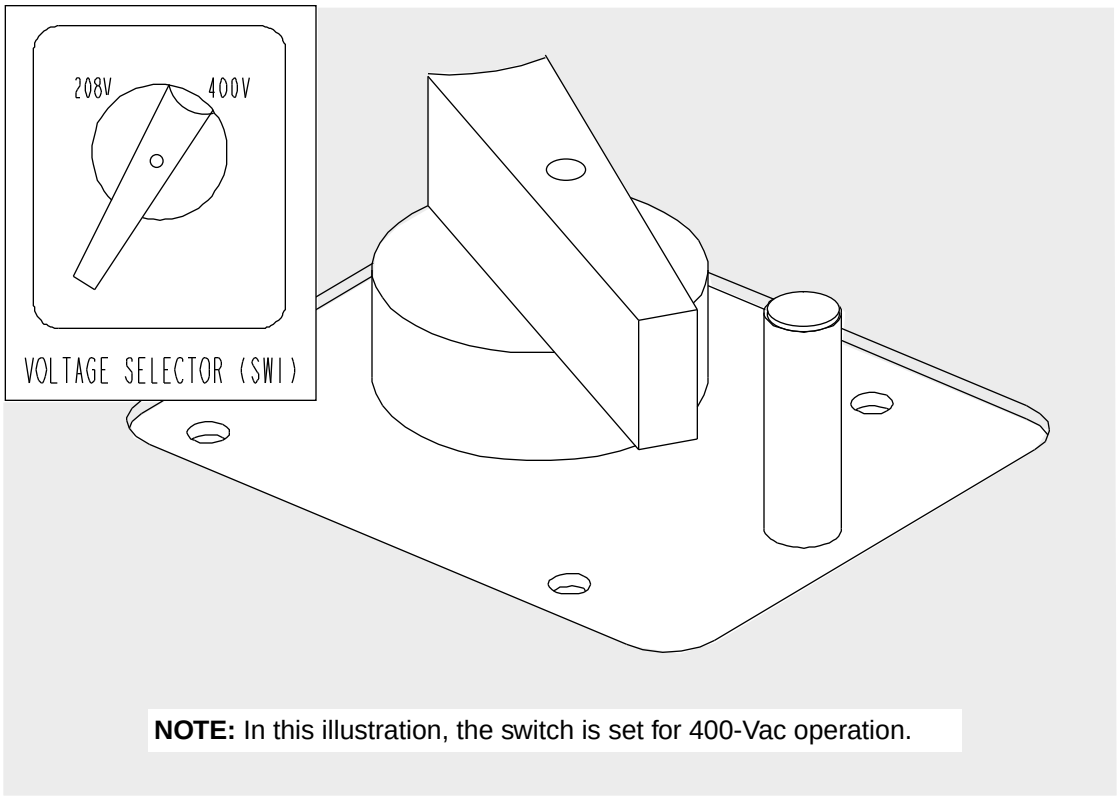


Verifying the Voltage Selector Switch

1. Locate the Voltage Selector switch (SW1), which is on the top of the power box at the front of the cabinet.

2. Ensure that the voltage selector switch is set for the proper customer-site voltage. Figure 13 shows the switch (set for 400-Vac operation).

Figure 13. Voltage Selector Switch (SW1)

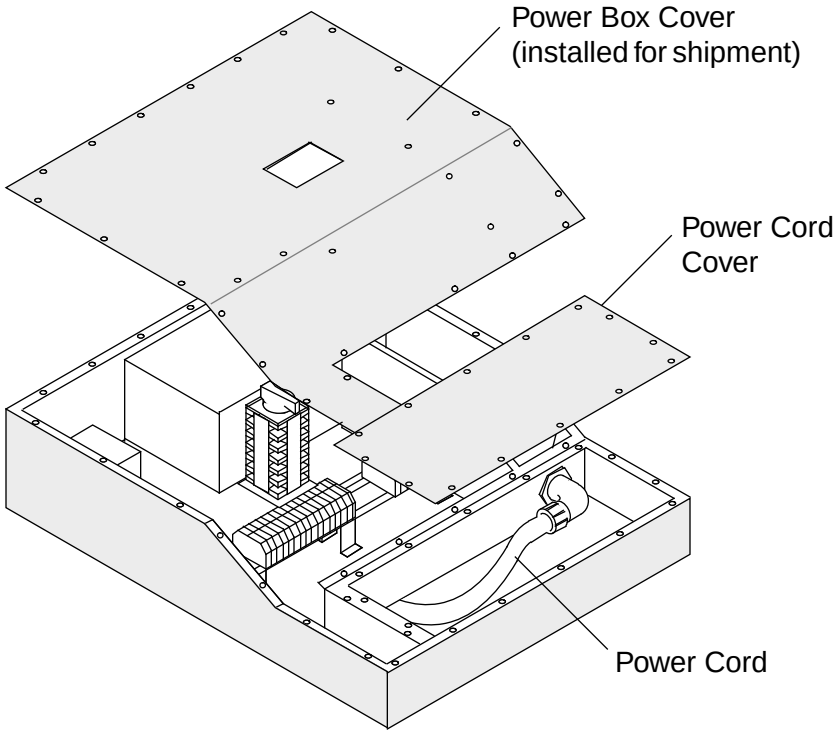


NOTE: In this illustration, the switch is set for 400-Vac operation.

3. If the customer *does not* plan to connect an optional alarm to the CRAY T3E AC cabinet, install the power cord cover now. (The cover is not preinstalled. Instead, it is wedged between the left side of the power box and the side of the cabinet. The screws are in a plastic bag that is taped to the top of the power box.) Figure 14 shows the power cord cover.

   If the customer *does* plan to connect the alarm, complete the following procedure.

Figure 14. Power-cord Cover and Power-box Cover (Removed)



Connecting the Optional Customer Alarm

If the CRAY T3E cabinet will connect to the customer's alarm system, use the following procedure to connect it now:

1. Remove the air filter, which will provide greater access to the power box and remote alarm contacts:

   a. Use a medium flatblade screwdriver to loosen the retaining screw on the front end of one filter bracket. Refer to Figure 15.

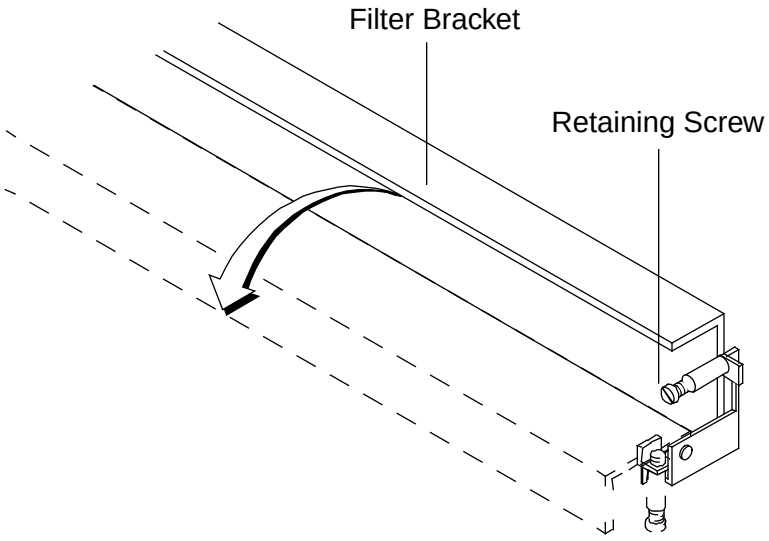
   b. Rotate the filter bracket 90˚ toward the center of the cabinet, as shown in Figure 15.

   c. Repeat Step a and Step b for the other bracket.

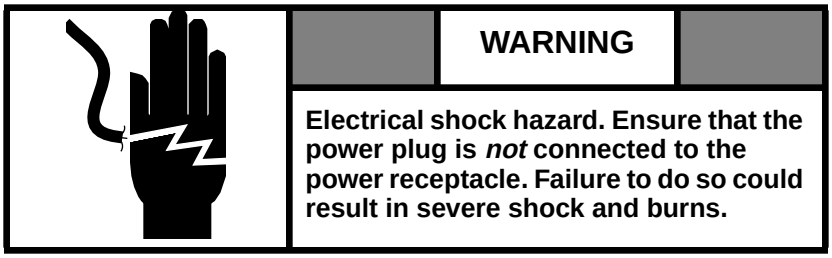
      With the brackets in the new position, the filter should drop down approximately 1.5 inches (4 cm).

   d. Ensure that the cabinet door is fully open, then pull the filter out of the cabinet. Set the filter in a clean, protected location.

Figure 15. Filter Bracket



2. Remove the cover from the power box:



   a. Use a #2 Phillips screwdriver to remove the 33 screws that hold the cover in place. Figure 14 shows the power box cover removed.

   b. Pull the cover straight up, then angle it as you remove it from the cabinet. Be careful not to damage the inlet air thermistors or the EMI gasket on the bottom of the cover.

3. Remove the knock-out plug that is near the remote alarm contacts terminal block (TB2).

4. Pass the customer's alarm wires through the knock-out hole. (If a clamp is provided, use it to secure the wires as they pass through the hole.)

5. Connect the customer's alarm wires to the terminal blocks, using a medium flatblade screwdriver. Figure 16 shows TB2, and Table 2 contains descriptions of the terminal blocks.

Figure 16. Remote Alarm Contacts - Locations

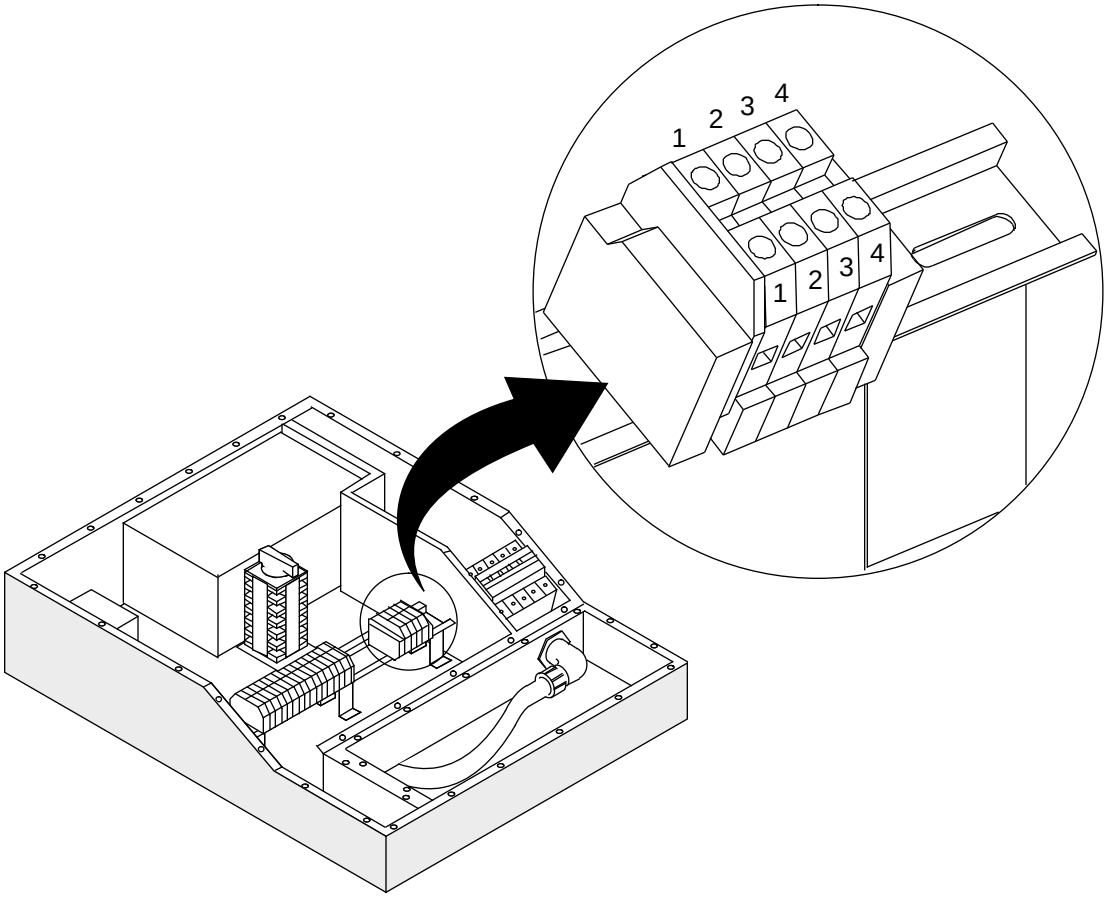


Table 2. Remote Alarm Contacts - Descriptions

Contact	Description
TB2-1	NC (normally closed)
TB2-2	Remote alarm common
TB2-3	NO (normally open)
TB2-4	Shield (ground)

6. Ensure that the other end of the alarm wires are connected to the customer’s alarm system.

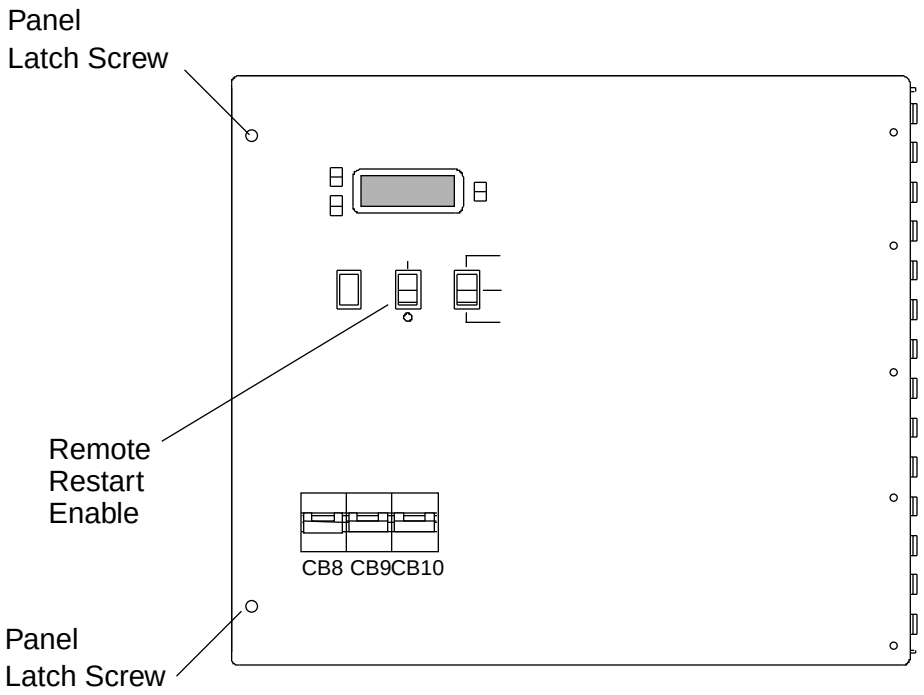
7. Replace the power box cover and power cord cover. Tighten the screws.

8. Replace the air filter and install it in the operating position. If necessary, use tie straps to prevent the logic and GigaRing cables from touching the filter.

Verifying the Control System Hardware

1. Open the warning and control system (WACS) panel, which is shown in Figure 17. Use a medium flatblade screwdriver to turn the 2 panel latch screws *clockwise*, which loosens them. Then rotate the latches clockwise by hand and open the panel.

Figure 17. WACS Panel



2. Visually inspect the WACS scanner boards for any defects and ensure that the connections are complete.

3. Verify on the *bottom* WACS scanner (labelled *Scanner A* or *Backup Scanner*) that DIP switch position 1 is On (pushed in), and set the other WACS DIP switches as needed for your site.

   DIP switches on scanner A determine the remote alarm functions, the display temperature scale (celsius or Fahrenheit), and whether the WACS displays the auxiliary clock voltage. Figure 18 shows the switch locations. Table 3 lists the switch functions.

Figure 18. WACS with Front Panel Open

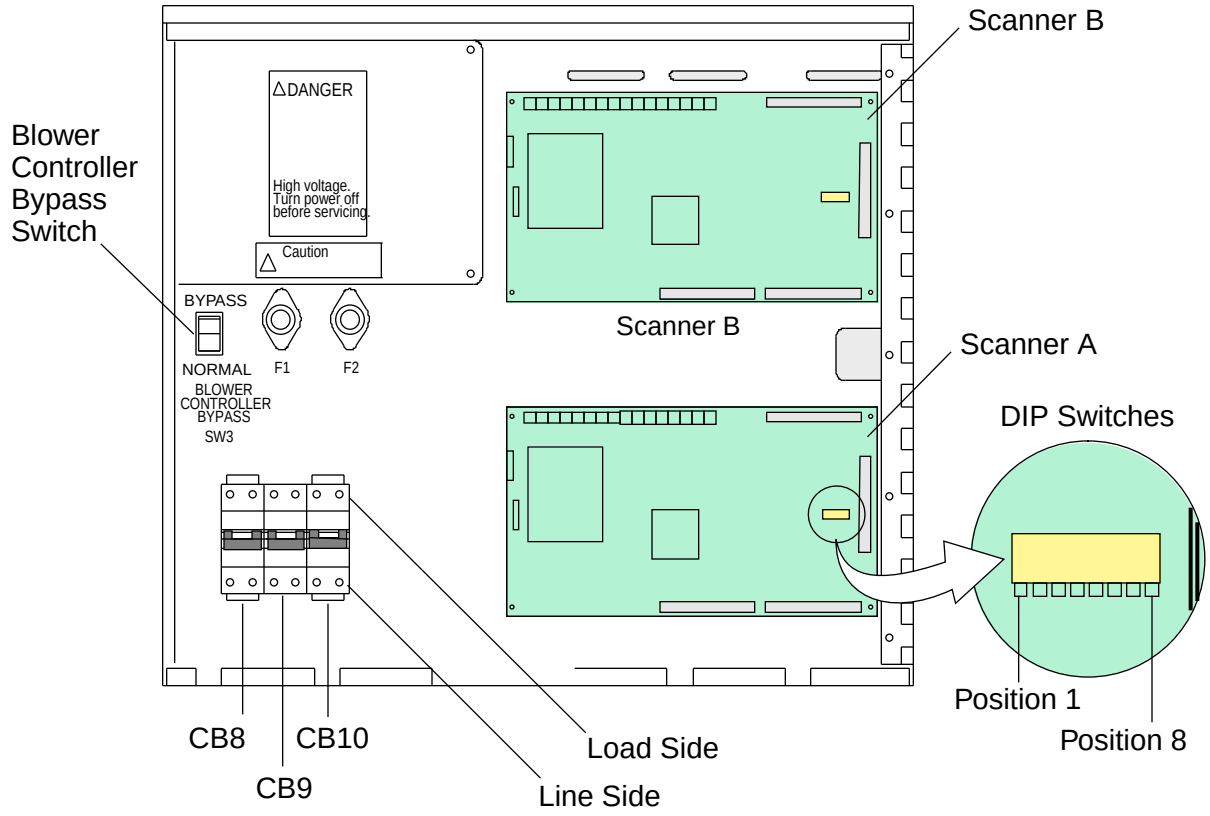


Table 3. Bottom Scanner DIP Switch Functions

Positions	"On" (Pushed In) Function
1	Display auxiliary clock voltage
2 through 4	Not used
5	Remote alarm energized (picked) if good – dropped if input power is lost (Determines whether a 1 equals "Good" or "Bad." Normally set to "Off.")
6	Remote alarm enabled on warning and fault (off = alarm on fault only)
7	Remote alarm enabled if cabinet is powered off
8	WACS display temperature scale in Celsius (off = Fahrenheit)

4. Ensure that the Blower Controller Bypass switch (refer again to Figure 18) is in the Off (0) position.

5. Close the WACS panel and latch it.

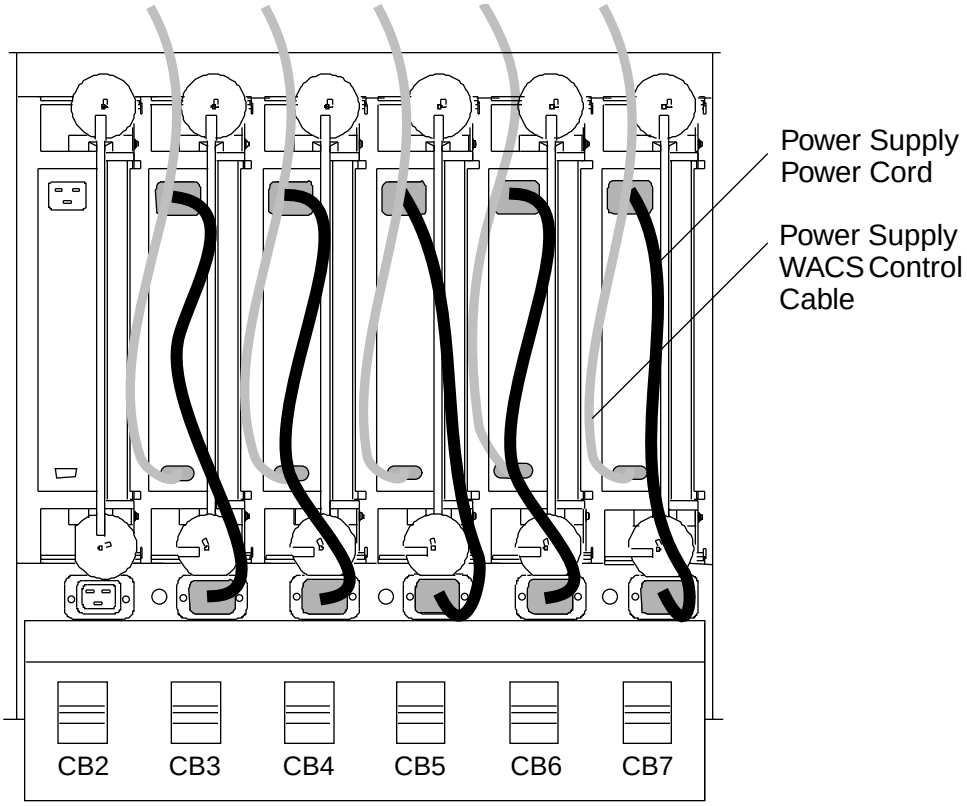
Verifying Additional Power Hardware

1. Ensure that all of the power supply cords and power supply control cables are properly seated. Refer to Figure 19.

2. Ensure that the Remote Restart Enable switch (refer again to Figure 17) is in the disabled (0) position.

3. Ensure that the Cabinet Power switch is in the on (1) position. The Cabinet Power switch (SW2) is on the front cabinet door.

Figure 19. Power Supply Rack

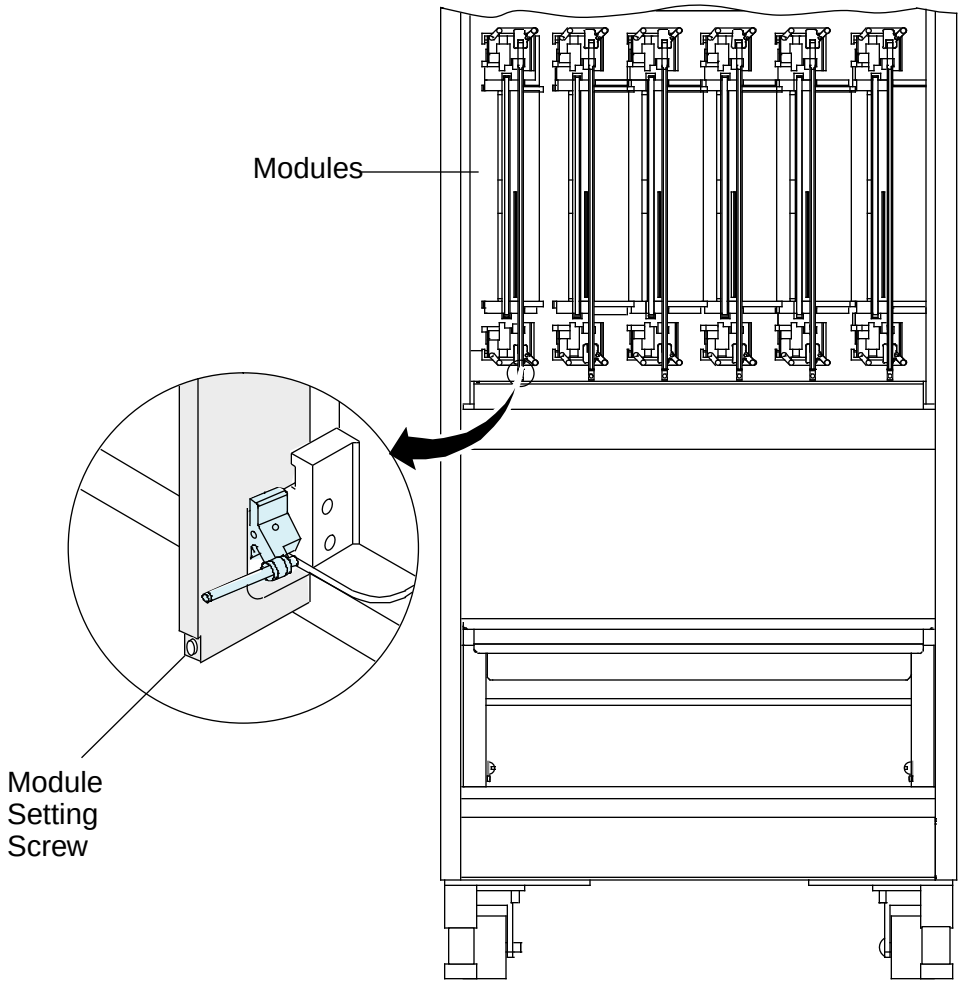


Verifying that the Modules Are Seated and Cammed

1. On the module end of the chassis, use a #2 Phillips screwdriver to remove the module panel. Eight 1/4-turn screws secure the panel. Pull the panel out at an angle.

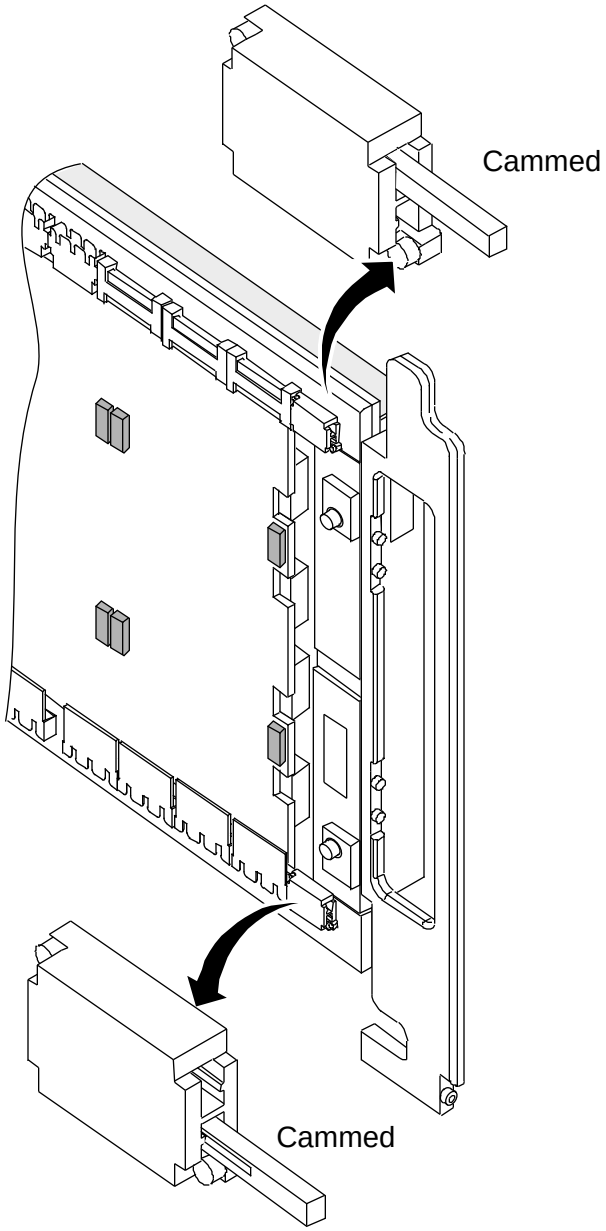
2. Visually inspect the module area for damage or debris. Ensure that the module setting screws are tight. Refer to Figure 20 for the location of the module setting screws, which require a 3-mm hex (allen) wrench.

Figure 20. Module Setting Screw Locations (Rear View of Cabinet)



3. Visually inspect the modules to ensure that they are cammed. If the modules contain plastic cams, the plastic cams should be in the *outside* cam slots, as shown in Figure 21. (The plastic cams help keep the shuttles in place during shipment and operation.)

Figure 21. Module Camming

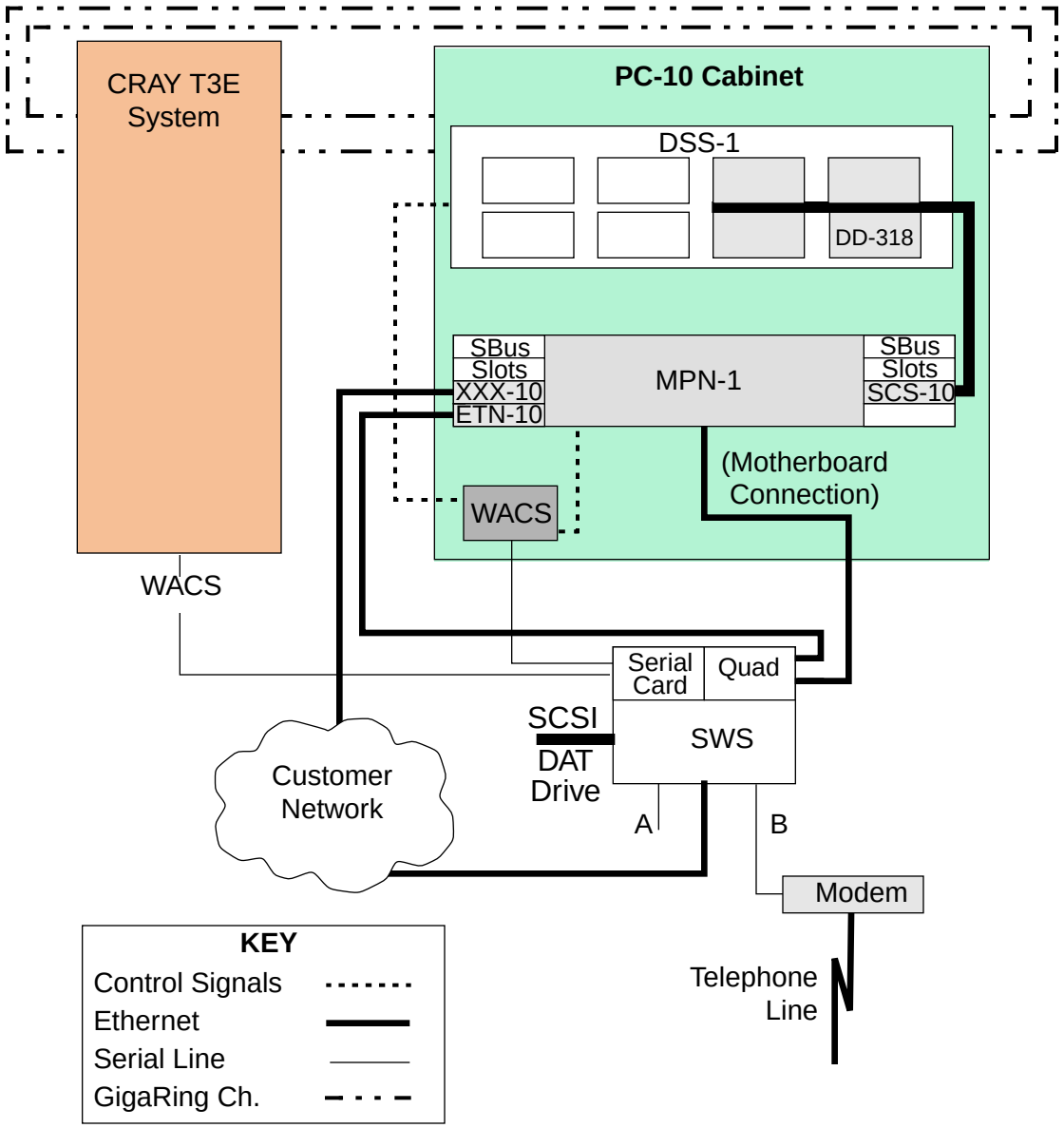


Completing the Cabling

Before you connect external cables to the CRAY T3E cabinet, become familiar with the layout of your system by reading the configuration and cabling documents shipped with your system, as well as other installation documents that apply to your system. System cabling is variable, and the cabling plan for your system may require modification of the following cabling procedures.

Figure 22 is a block diagram of a typical single-cabinet CRAY T3E system.

Figure 22. Typical System - Block Diagram



Cable Labels

Cable connections depend upon the customer's system configuration. Ensure that each cable is labeled at both ends with the source and destination connection.

For connections to the PC-10, the cable labels refer to the position of the PC-10 subrack where the cable connects. The position is designated in standard units (SUs). If applicable, the cable labels also refer to the NSR-1 module slot where the cable connects. The position is designated from left to right as N1, N2, N3, or N4.

Refer to Table 4 for a description of cable labels and to Table 5 for an example.

Table 4. Cable Labels

Cable Label Line	Description
1	States the mainframe serial number; the peripheral cabinet serial number; or the type of attached device.
2	States the lowest standard unit (SU) that the subrack occupies; states both the lowest SU that the subrack occupies and the node slot; or states the product name of the attached device.
3	States the port name for the cable connection.

Table 5. Example Cable Label

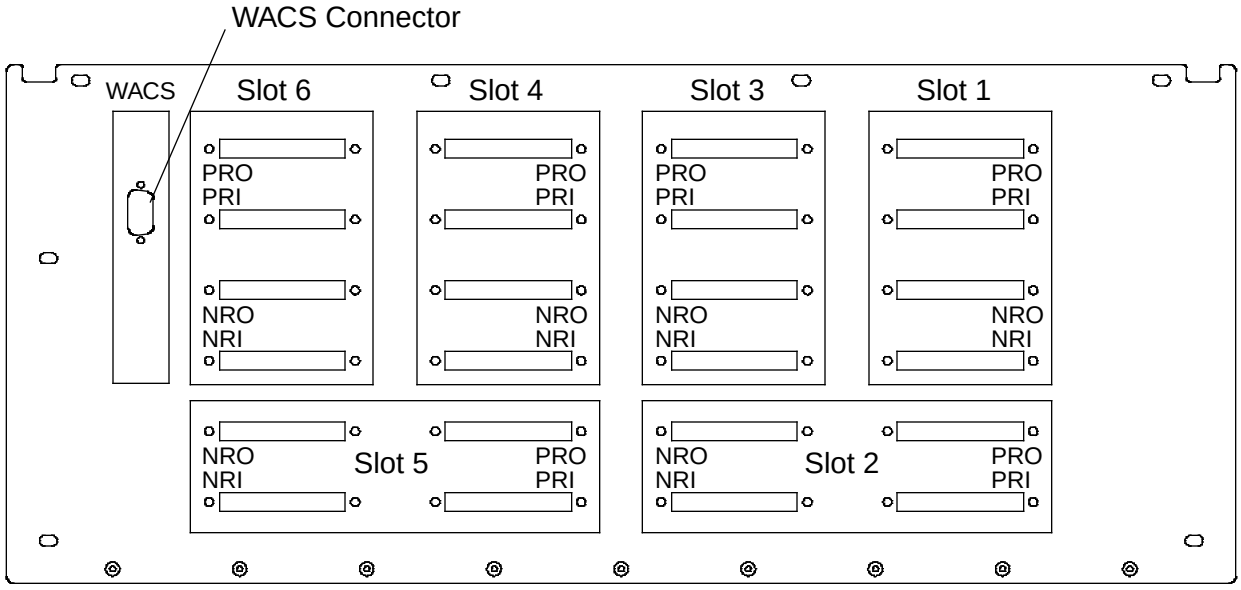
Connection	Source	Destination
SPN to Mainframe	S/N 8008 IPN-1 SU20/N3/GigaRing NEG IN	S/N 6502 T3E SLOT #2/GigaRing NEG OUT

Connecting the WACS

Use the following procedure to connect the CRAY T3E AC WACS serial-port cable:

1. Locate the WACS serial-port cable (P/N 13303300).
2. Refer to the cable labels and to the system configuration documentation for details on the WACS cabling configuration.
3. Route the serial-port cable between the CRAY T3E cabinet and the SWS (or the serial-port concentrator). The 9-pin connector connects to the CRAY T3E cabinet, and the RJ45 connector connects to the SWS. If applicable to the site environment, route the cable beneath the floor tiles.
4. Connect the serial-port cable's 9-pin connector to the DSub (DB9) WACS connector on the CRAY T3E cabinet. The connector is on the I/O bulkhead on the rear (module side) of the cabinet. Refer to Figure 23. Use a small flatblade screwdriver to secure the connector to the bulkhead.
5. Connect the other end of the serial-port cable to the appropriate connector. (For example, depending on your system configuration, you may connect it to a connector in the WACS SBus slot on the SWS or to a connector in the serial-port concentrator.)

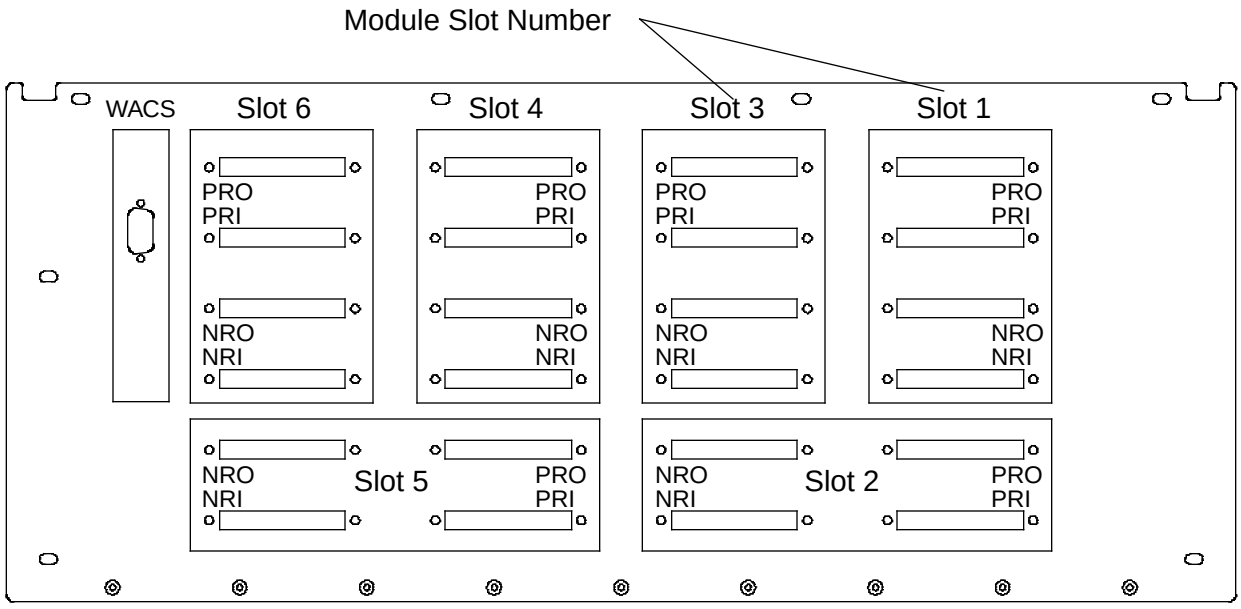
Figure 23. WACS Connector Location on I/O Bulkhead



Connecting the GigaRing Cables

In the CRAY T3E system, data input and output takes place via GigaRing channels. If connected on a GigaRing channel, a PEM serves as a GigaRing node and connects to an MPN (and to other nodes, if applicable) via four GigaRing connections: two for the positive ring and two for the negative ring. These connections are made through GigaRing cables that connect to the PEMs at the cabinet's I/O bulkhead. Figure 24 shows the cabinet I/O bulkhead.

Figure 24. I/O Bulkhead - Connector Locations



NOTE: In some systems, GigaRing connections *within* a CRAY T3E cabinet are not made at the I/O bulkhead. Instead, they are made in the wiremat via loopback adapters (P/N 15255500).

One end of each cable has two screws (male), and the other end has two threaded posts (female). These correspond to jackposts on the I/O bulkhead, as described in Table 6. Use a flatblade screwdriver (straight slot) to make the connections.

Table 6. CRAY T3E AC I/O Bulkhead GigaRing Connections

Description	Jackpost Screw Reference (on bulkhead)
Negative Ring In (NRI)	Female
Positive Ring Out (PRO)	Male
Negative Ring Out (NRO)	Male
Positive Ring In (PRI)	Female

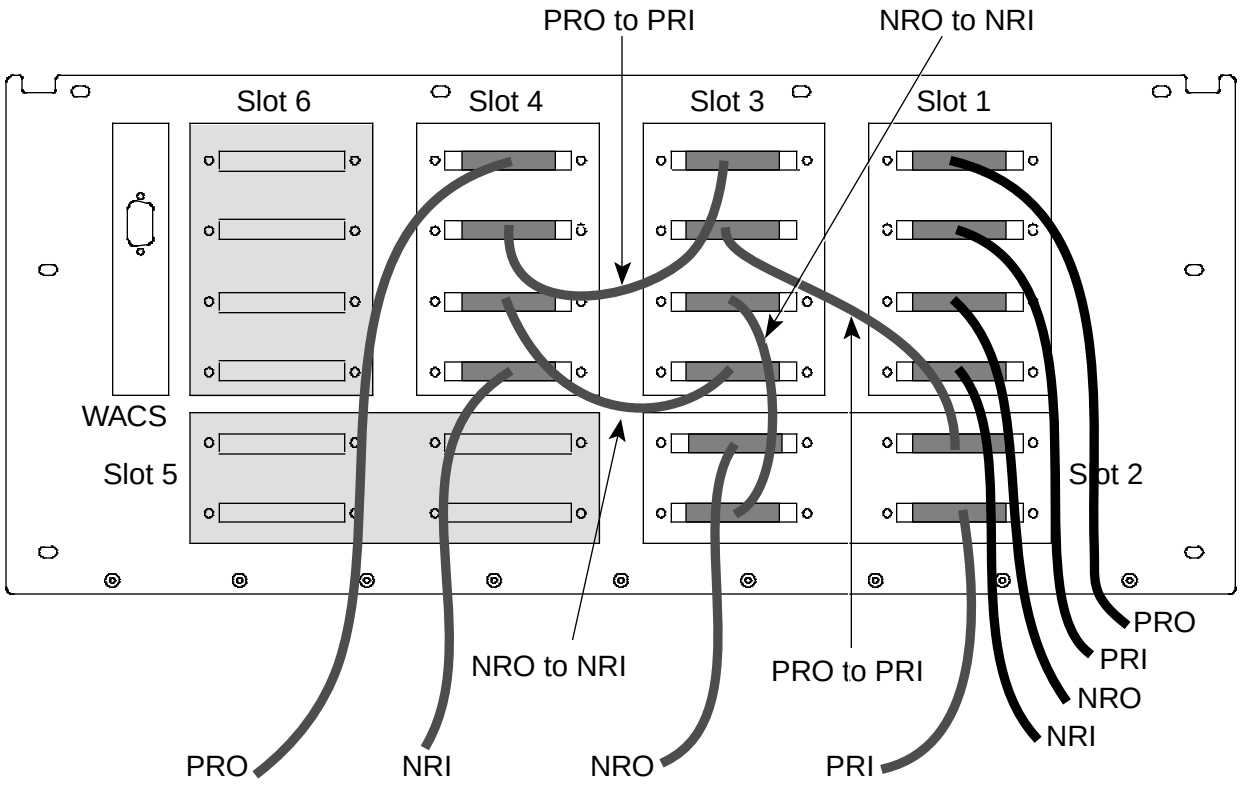
Use the following procedure to connect the GigaRing channels to the cabinet:

1. Connect the boundary scan GigaRing channel to slot 1 (slot 1 contains the scan master PEM, which requires a dedicated MPN, usually MPN0). Refer to the cable labels and to the system configuration documentation for details on the GigaRing cabling configuration. Refer to Figure 25 for an example.

   NOTE: The scan master PEM must connect to one (and only one) MPN. Do not physically connect any other nodes (including CRAY T3E nodes) to this ring.

2. Connect the customer I/O GigaRing channel(s) to the cabinet. Refer to the cable labels and to the system configuration documentation for the specific locations.

Figure 25. Example GigaRing Connections



NOTE: In this example, slots 2, 3, and 4 are on a customer I/O GigaRing channel. PEM 0, in slot 1, is the only CRAY T3E node on the shared boundary scan and support channel.

3. Ensure that the other ends of the GigaRing Cables connect to the MPN, SPN, etc. Figure 26 is a rear view of a PC-10 cabinet and shows GigaRing connections on the MPN-1 and NSR-1 subracks. Figure 27 shows detail of an NSR-1 subrack, and Figure 28 shows detail of an MPN-1.

Figure 26. GigaRing Connectors on PC-10 (Rear View)

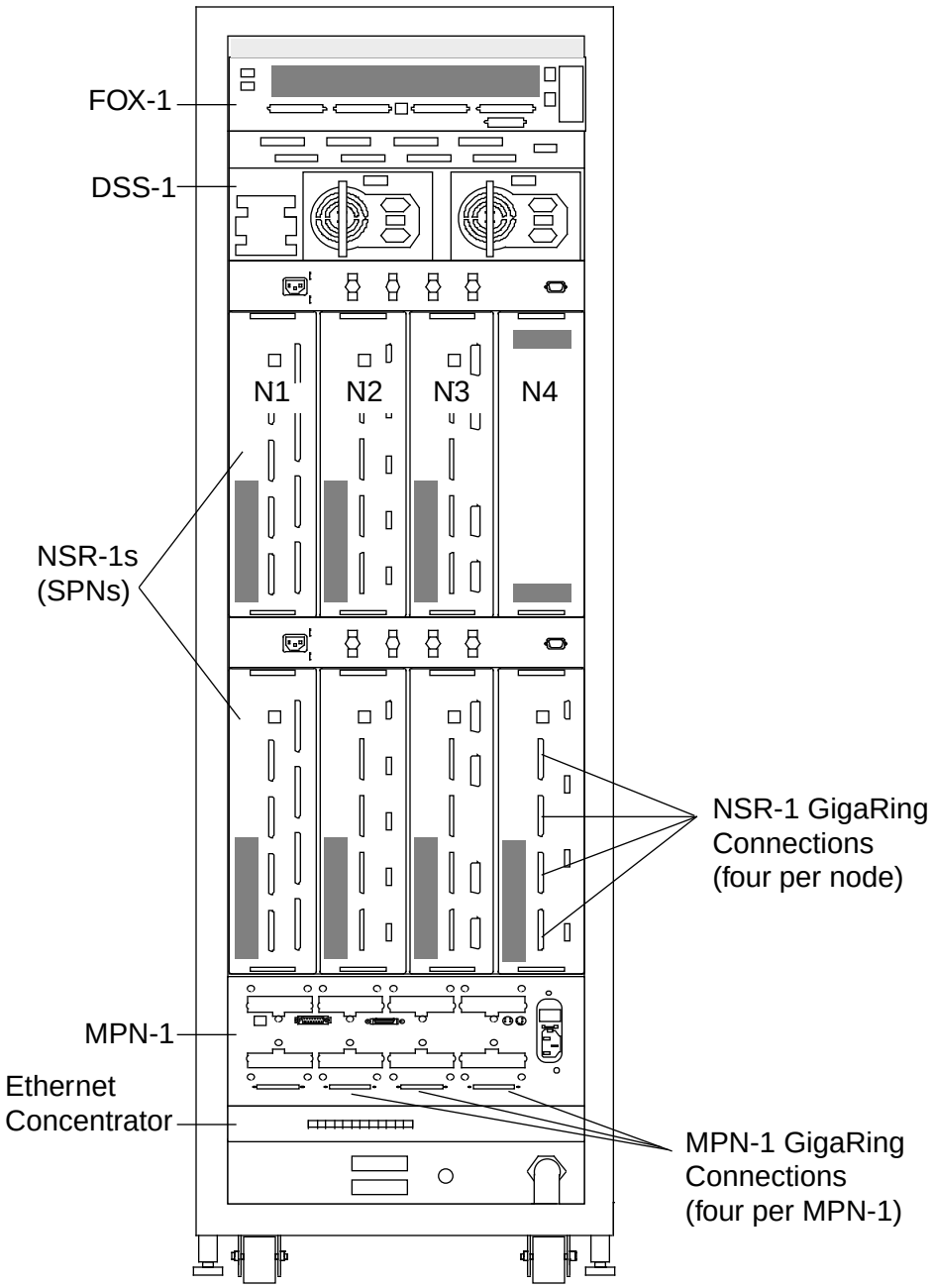


Figure 27. NSR-1 GigaRing Connectors

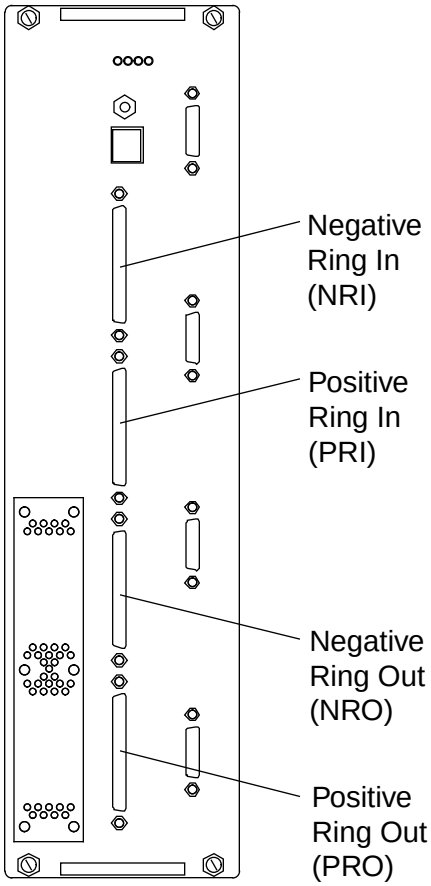
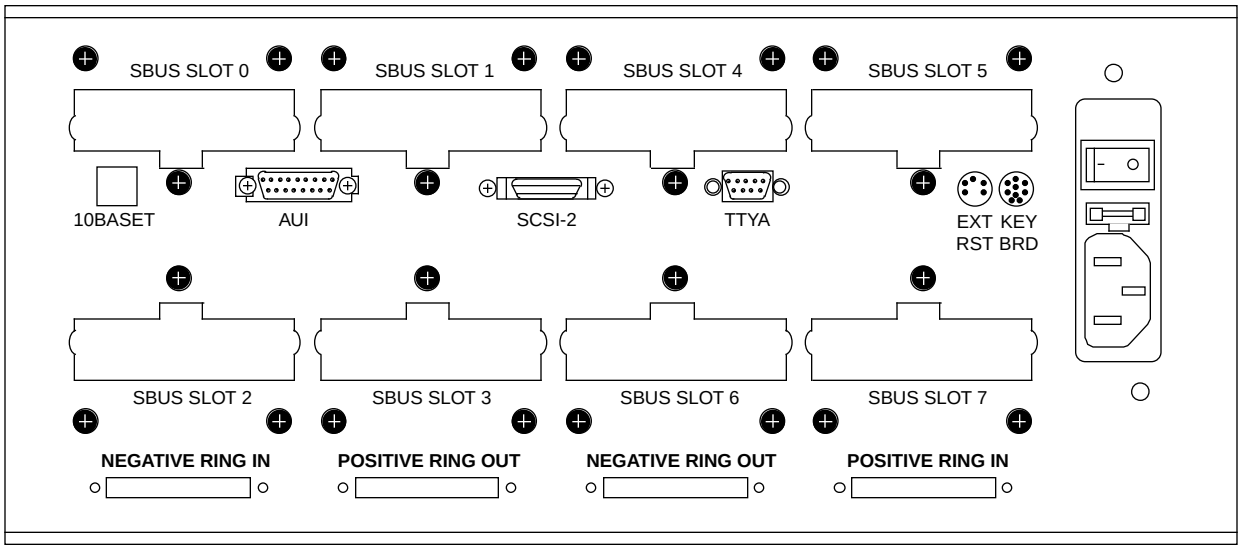


Figure 28. MPN-1 GigaRing Connectors



Verifying System Cabling

When you complete the cabling between the CRAY T3E cabinet and the other system components, ensure that all other system connections are complete, including GigaRing, WACS, Ethernet, and remote support connections.

Refer to the system configuration documentation and to *Peripheral Cabinet (PC-10) Installation*, HMM-371, for more details on system cabling.

Powering Up the System Workstation (SWS)

At this point, you should power up the SWS and bring up the common desktop environment (CDE). Refer to *System Workstation*, Cray Research publication HTM-222.

Powering Up the PC-10

At this point, you should power up the PC-10 as described in the *Peripheral Cabinet (PC-10) Installation* document, Cray Research publication HMM-371.

Connecting the Input Power to the CRAY T3E Cabinet

1. Verify that the main disconnect circuit breaker (CB1), power supply circuit breakers (CB2 through CB7), blower circuit breaker (CB8), WACS circuit breaker (CB9), and clock-distribution power-supply circuit breaker (CB10) are in the open (0) position.
2. Open (0) the customer breaker that supplies power to the CRAY T3E cabinet.
3. Plug the cabinet power cord into the power receptacle.
4. Close (1) the customer breaker that supplies power to the CRAY T3E cabinet.
5. Close (1) the cabinet’s main disconnect circuit breaker (CB1).

Verifying Cabinet Operation

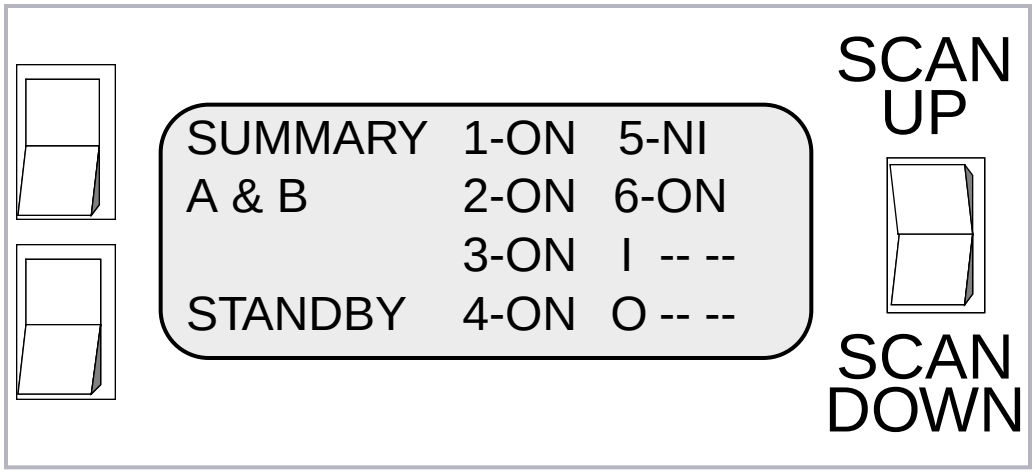
Complete the following procedures to verify operation of cabinet components.

Verifying WACS Control

Verify correct operation of the WACS control system by using the following procedure:

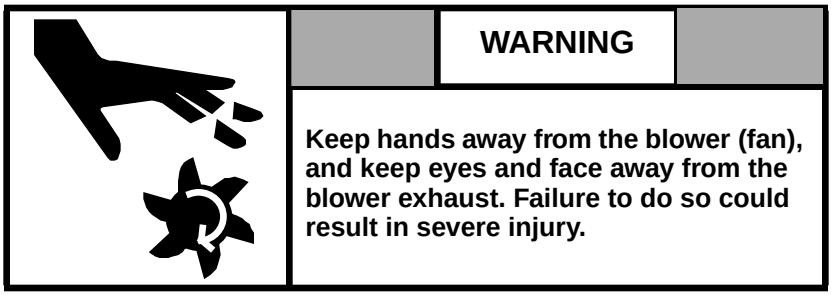
1. Close the WACS circuit breaker (CB9).
2. Set the Remote Restart Enable switch to the enable (1) position. Verify that the switch indicator light is on.
3. Check the WACS display. It should display a summary page. Verify that the bottom line on the summary page reads STANDBY (as shown in Figure 29).
4. Set the Remote Restart Enable switch to the disable (0) position, then press the Restart button and listen for the main contactor to close. Verify that the summary page now reads CAB ON instead of STANDBY.

Figure 29. WACS Summary Screen - Standby Mode



Verifying Correct Operation of the Blower

1. Turn on the blower circuit breaker (CB8).



NOTE: If none of the modules are cammed, the WACS will not close the contactor; therefore, the blower will not function.

2. Close (1) the Blower Controller Bypass switch, and verify that the blower operates at full speed.

3. Open the Blower Controller Bypass switch, and verify that the blower speed drops. (The blower normally operates at approximately half speed.)

Verifying Correct Operation of the Thermistors

1. At the WACS display, scroll through the screens to verify that the module thermistor readings show temperatures that are equal to the computer room temperature ±5 ^{o}F or ±3 ^{o}C.

2. At the WACS display, verify that the Air In and Air Out readings show a temperature that is equal to the computer room temperature ±5 ^{o}F or ±3 ^{o}C.

Verifying Cabinet Power Switch and Shunt Trip Operation

1. Toggle the Cabinet Power switch to the Off (0) position and verify that the main input circuit breaker (CB1) trips. This verifies that the CB1 shunt/trip is operational. The Cabinet Power switch is on the front door of the cabinet.

2. Return the Cabinet Power switch (SW2) to the On (1) position.

3. Reset CB1.

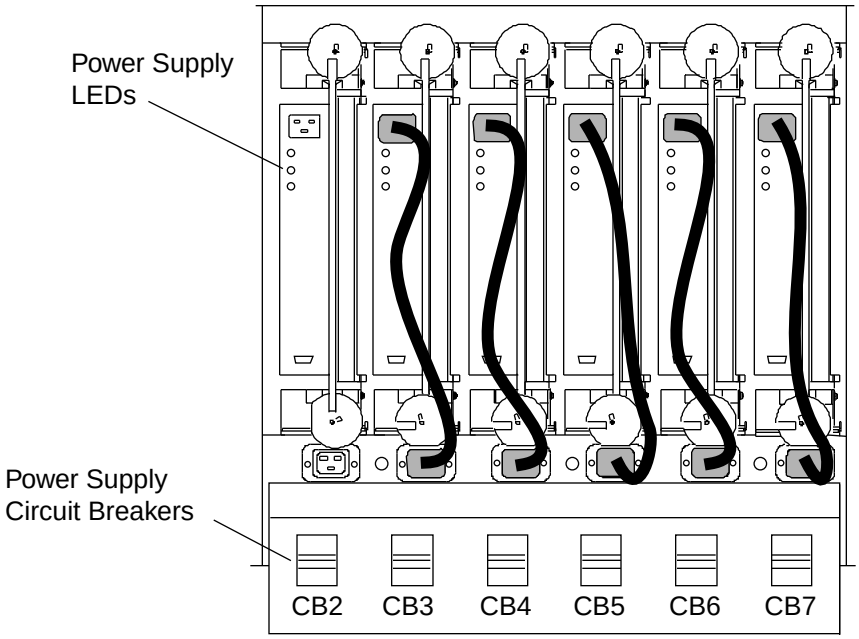
Verifying Remote Alarm Operation (Optional, if Connected)

1. Use a heat gun to apply heat to the inlet air thermistors and create a fault.
2. Listen for the main contactor (CT1) to open and remove power from the blower (and module power supplies).
3. Verify that the customer's remote alarm system detects and signals the fault.
4. Check the cabinet WACS display and the nwacs display for the fault information.
5. Push the Restart switch.

Powering up the Modules

1. Turn on (1) the clock distribution power supply. This power supply is controlled by circuit breaker CB10, which is on the WACS panel next to the WACS breaker.
2. Turn on (1) the power supply circuit breakers. Start with the clock circuit breaker (CB7), then power on CB2 and continue working to the right until the necessary circuit breakers are on.

Figure 30. Power Supply Circuit Breakers and LEDs



3. Verify that the green LED lights (located on the end of each power supply) are on. Verify that no amber LED fault lights are illuminated on the power supplies.

4. At the WACS display, verify that the output of each module power supply is approximately -3.4 Vdc. (This value is subject to change.)

   NOTE: The clock module's main power supply is not set for -3.4 Vdc output. In addition, the clock module has an auxiliary voltage of approximately -4.4 Vdc.

5. At the Power Supply Margin switch, which is below the WACS display, press the Margin High (top) portion of the switch. Check the WACS display to ensure that the voltage increased by approximately 0.1 Vdc.

   NOTE: On most cabinets, the Power Supply Margin switch does not affect the voltage on the clock module.

6. Press the Margin Low (bottom) portion of the Power Supply Margin switch. Check the WACS display to ensure that the voltage decreased by approximately 0.1 Vdc.

7. Press the Normal (middle) portion of the Power Supply Margin switch to return the voltages to the normal settings.

Verifying Remote Power On/Off

Before you begin the following procedure, you must bring up nwacs.

1. Close (1) the Remote Restart Enable switch to enable remote power on/off.

2. At the SWS, use the nwacs Switches window to perform a remote power-off.

3. Check the CRAY T3E AC cabinet to ensure that the main contactor opened and removed power from the blower and the module power supplies.

4. At the SWS, use the nwacs Switches window to perform a remote power-on.

5. Check the CRAY T3E AC cabinet to ensure that the main contactor closed and supplied power to the blower and the module power supplies.

Preparing the System for Initial Operation

When you complete the mechanical installation of the CRAY T3E AC cabinet, the PC-10, and the SWS, you are ready to prepare the system for operation. The current procedure consists of the following tasks:

1. Ensure that all system connections are complete, including GigaRing, WACS, and Ethernet connections.
2. Replace all covers and panels that you removed during the installation.
3. Ensure that the SWS is powered up.
4. Ensure that the nodes (MPN and SPN) are powered up.

   Firmware that resides in each node initiates power-up self tests and broadcasts the IP address. The SWS then recognizes the nodes and downloads VxWorks onto the nodes.
5. Ensure that the MPNs and SPNs are checked out with appropriate tests.
6. Ensure that the CRAY T3E cabinet is powered up.
7. Check the following switch settings on the CRAY T3E AC cabinet:
   - Ensure that the margins are set to normal.
   - Ensure that the clock is set to normal.
   - Ensure that the boundary scan hard-enable switch is set to enable.
8. Run the GigaRing channel clearing utility for each GigaRing channel that connects to your system. On some systems, the `rc_both` script (which is in `/opt/home/craydiag`) calls the `ring_clear` command:

   ```
   sws# ./rc_both
   ```

   If you have multiple GigaRing channels, the SWS may contain an `rc_both` script for each channel, and each script will have its own filename. For example, the following filename (command) is commonly used to clear the GigaRing channel that connects to mpn0:

   ```
   sws# ./rc1_both
   ```

   In most cases, the following command would also clear a 2-node GigaRing channel that connects to mpn0:

   ```
   sws# /opt/CYRIsws/bin/ring_clear -l sn6505-mpn0
   ```

   Where `sn65`*`05`*`-mpn`*`0`* is the name of the MPN on the ring.

9. In nwacs, set the CRAY T3E soft switches for boundary scan operation:

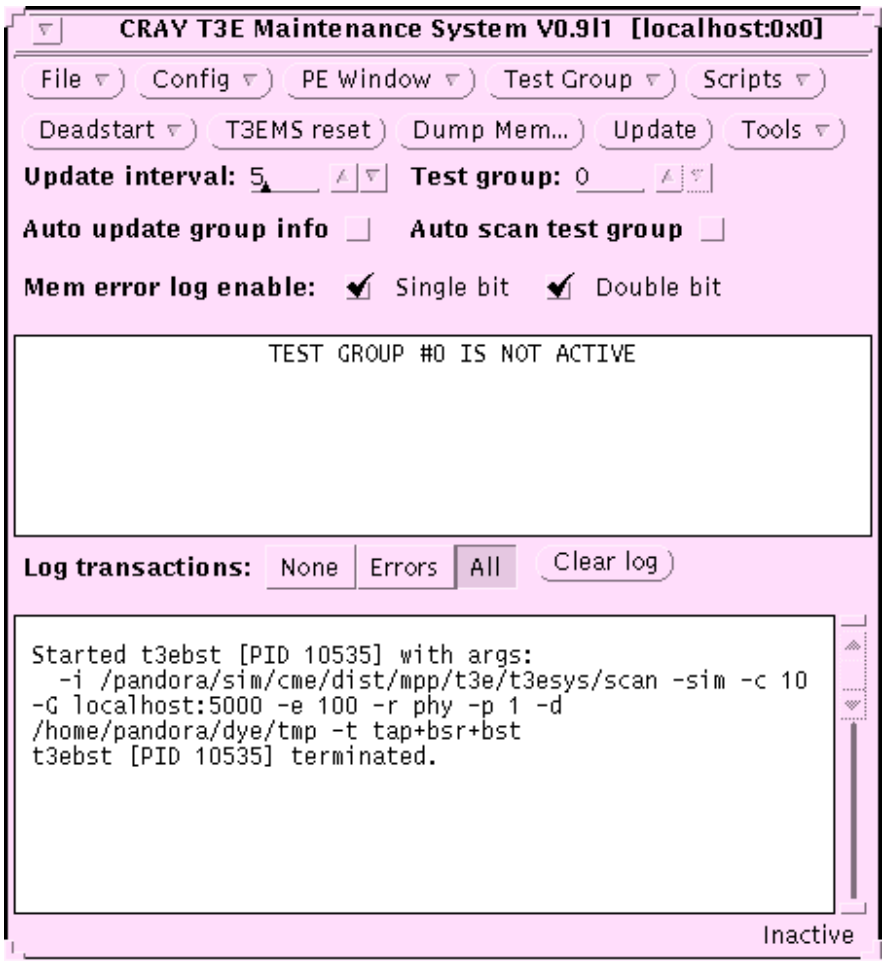
   a. Set the Soft Scan Enable switch (formerly the Testmode switch) to ON.

   b. Set the TCK Select (test clock select soft switch) to TCKS.

   c. Press the Write Switches button.

10. Use the pull-down menu to start T3EMS, which establishes communication with the CRAY T3E AC cabinet. Figure 31 shows the T3EMS window.

Figure 31. T3EMS Main Window

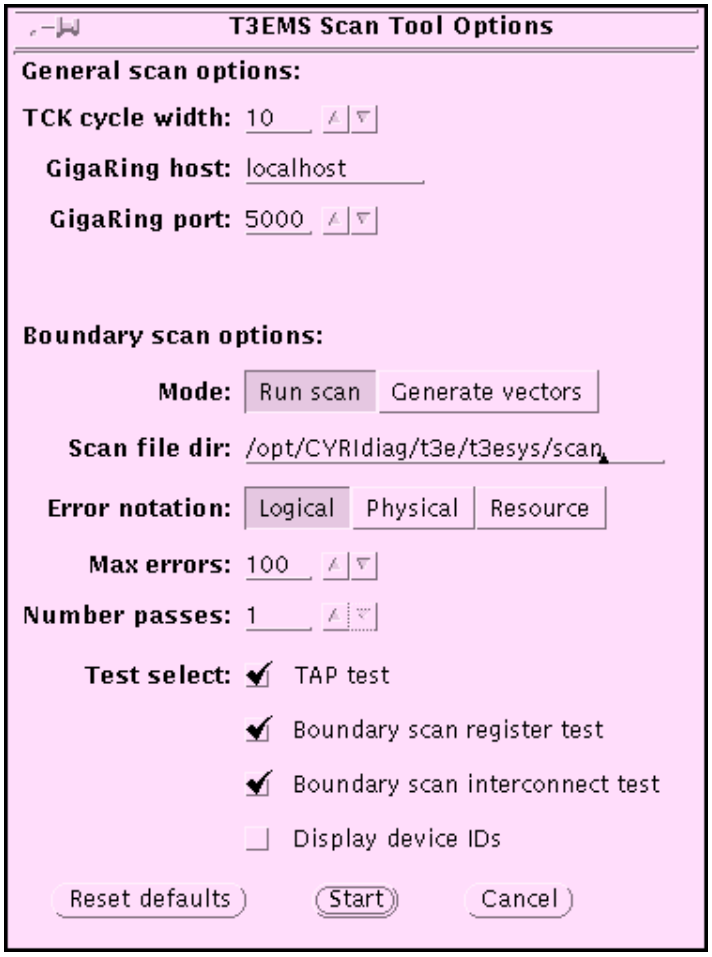


11. Under the Tools menu item in the T3EMS window, select Boundary Scan. When the T3EMS Scan Tool Options window appears, click on the Start button to run boundary scan on the CRAY T3E AC cabinet. Figure 32 shows the T3EMS Scan Tool Options window.

12. When boundary scan is complete, close the window and check off the Boundary Scan item from the Offline Diagnostic Test checklist in the *Installation Checklist*, publication HMM-372.

13. Under the Tools menu item in the T3EMS window, select Scan clear (t3etap) to reset the clock for normal operation.

Figure 32. T3EMS Scan Tool Options Window



14. Under the Scripts menu item in the T3EMS window, select Load & Run. The Load Program window appears, as shown in Figure 33.

15. Select the giga_diag.pgm diagnostic from the Load Program window and click on the Accept button. The giga_diag.pgm diagnostic offers a series of interactive windows that contain program choices. The following list contains a current set of program choices; base your choices on the status of the diagnostic when you run it and on any installation-specific needs:

    a. When the Section Selects window appears, click on the Done button.

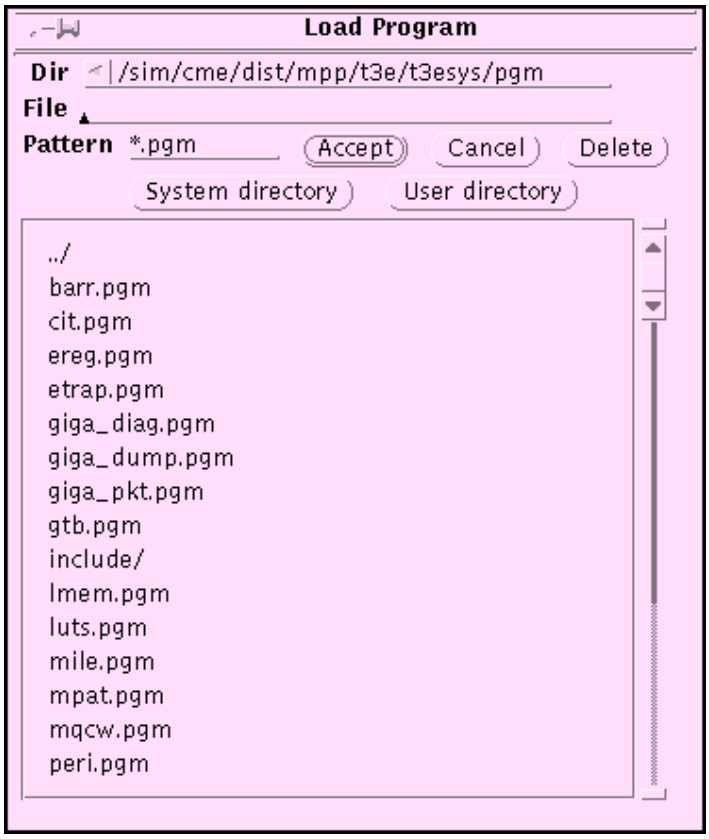
    b. When the SCX Node Select window appears, ensure that the correct target node ID(s) are entered, then click on Done.

    c. When the Target Router Selects window appears, click on Done.

    d. When the Number Of Passes To Run window appears, change the pass count to 1 and click on Done. The diagnostic will then run.

    e. When the diagnostic completes, close the window and check off the giga_diag item from the Offline Diagnostic Test checklist in the *Installation Checklist*, HMM-372.

Figure 33. Load Program Window



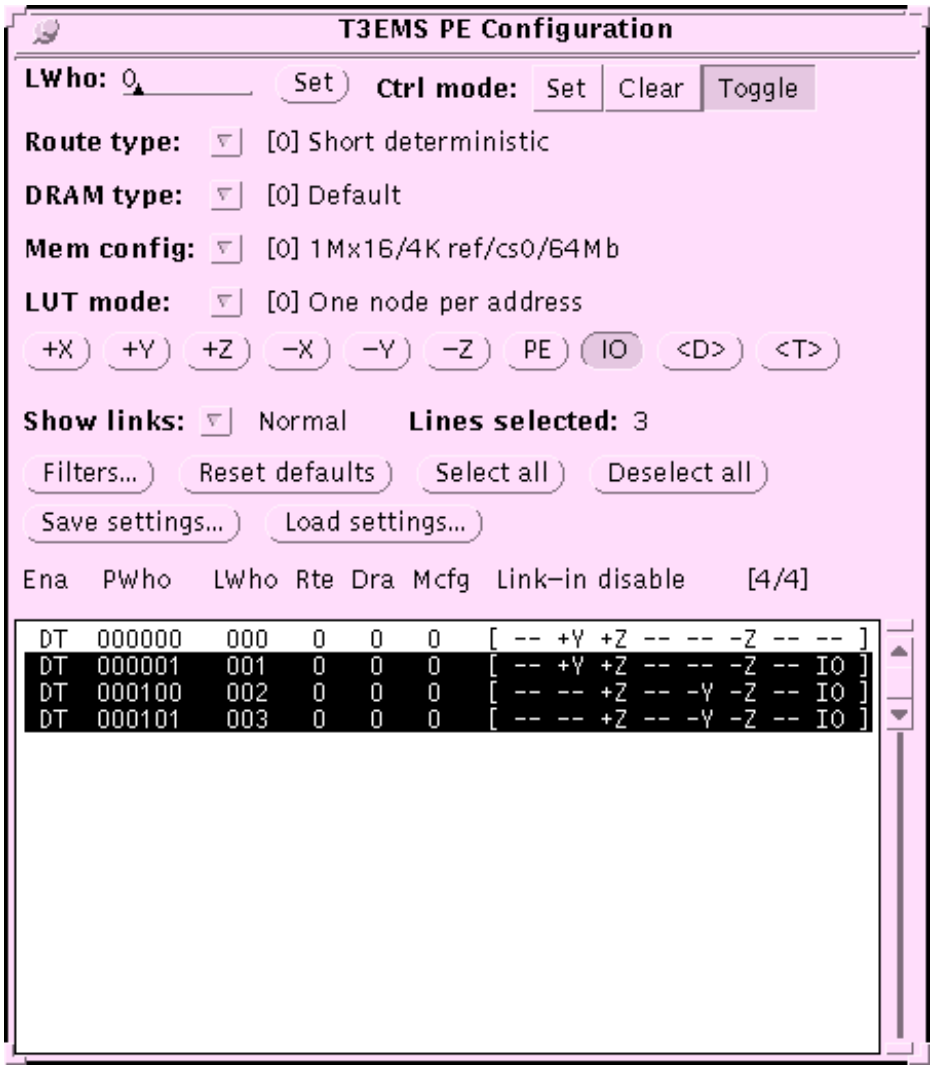
16. Disable the IO ports on all PEs that do not connect to GigaRing channels or have loopback cables. (This is necessary to run the cit diagnostic, which you will run under the mile.pgm command buffer in the next step.)

    a. Under the `Config` menu item in the T3EMS window, select `PE` configuration. The `PE Configuration` window appears. Refer to Figure 34.

    b. In the bottom half of the `PE Configuration` window, click and drag your cursor over the PEs where you will disable the I/O ports.

    c. Click on the `IO` button to disable the I/O ports on the selected PEs. The letters IO appear on the right side of the selected PEs to signify that the I/O ports are disabled (as shown in Figure 34).

Figure 34. PE Configuration Window



17. Select the mile.pgm command buffer from the Load Program window and click on the Accept button. This starts the offline diagnostic suite listed in Table 7. This diagnostic offers a series of interactive windows that contain program choices. The following list contains a current set of program choices; base your choices on the status of the diagnostic when you run it and on any installation-specific needs:

    NOTE: The mile.pgm command buffer performs deadstart functions, which clear memory and load PAL (Privileged Architecture Language) code.

    a. The first window provides a choice about which test to begin with. Click on the Done button to start the diagnostic suite with the todt test.

    b. The next window enables you to choose which tests run. Click on Done; you will run all of the tests.

    NOTE: For cit to run under mile.pgm, the rings must be initialized and the IO ports on all PEs -- except for the PEs on modules that connect to GigaRing channels -- must be disabled.

    c. The next window enables you to choose whether the program will log single-bit errors (SBEs) or stop when it detects an SBE. Select the button that logs SBEs, then click on Done.

    d. The next window enables you to choose whether to dump the SBE information to a file. Select Yes, then click on Done.

    e. The next window enables you to choose whether the suite will run once or continuously. Select Single, then click on Done.

    f. The next window enables you to choose the margins (clock speed and power margin). Select Normal/Normal, then click on Done.

    The diagnostic suite will run now.

    g. When the diagnostics complete, close the window and check off the individual diagnostics from the Offline Diagnostic Testing checklist in the *Installation Checklist*, HMM-372.

Table 7. Offline Diagnostic Tests

Test	Pass Count
The following test runs alone under the *T3EMS scripts*	
giga_diag	1
The following tests run under the *mile.pgm* command buffer	
todt (time_of_day_test)	1,000
ereg (E-register local test)	40
barr (barrier/eureka)	50
lmem (local memory test) Preset the config file for correct memory size	1
peri (PE random instruction test)	2,000
rchip (basic router test)	10
xnet (network test)	50
luts (look-up table)	5
mqcw (message test)	3,000
gtb (global translation test)	4
segt (segment translation test)	5
etrap (error trap test)	100
pst (processor stall test)	20
rmem (remote memory test)	1
rlo	2,000
cit	5

18. If applicable, have remote support tested from a remote location. Contact the local technical support office if necessary. Refer to *System Workstation*, HTM-222, for details.

This completes the mechanical installation procedures for a CRAY T3E single-cabinet system. Refer to the *CRAY T3E Software Installation and Configuration Guide*, publication SG-2610, for the software installation and initialization procedures.