

CRAY J90se CPU Upgrade for VME I/O

HMU-379-0

CRAY J90se Series Systems

Last Modified: January 1997

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CRAY J90se CPU Upgrade Overview

Customers have the option of upgrading their CRAY J90 (classic) series system to CRAY J90se (se) series CPU. This procedure for performing a CPU upgrade is written for Cray Research support personnel. The upgrade kit includes all the parts and instructions that the support person will need to complete the upgrade.

This document covers the CPU upgrade only. For information on the VME to SIO upgrade, refer to *CRAY J90se Series PC-10 Upgrade Procedure*, HMU-383-0.

Description of Upgrade

This document contains hardware procedures that describe how to remove a “classic” CRAY J90 series CPU module and replace it with a CRAY J90se series processor module. Upon completion of the hardware upgrade, software changes (included in this document) are required. Hereinafter the CRAY J90 series system will be referred to as the classic or J90 series, and the CRAY J90se series system will be referred to as the J90se series.

The document provides background information for performing a CRAY J90se CPU upgrade for three possible upgrade configurations:

- To add a J90se CPU to an existing J90 system without an I/O paddle board.
- To replace an existing CPU board with a J90se CPU and move the VME I/O paddle boards to the new CPU.
- To add J90se CPU modules at a later date.

Upgrade Prerequisites

Ensure that you know the following system configuration information before you begin this upgrade:

- UNICOS release 9.0.2.3 or later is required for installing a J90se CPU in a VME I/O system. This can be installed prior to the hardware upgrade.
- CPU Enable Block and Sense Cable part numbers if it is a CRAY J98se or CRAY J916se system
- Number of processor modules
- Number of memory modules
- Memory type
- Backplane type (2 x 2, 4 x 4, or 8 x 8)
- Superuser login and password

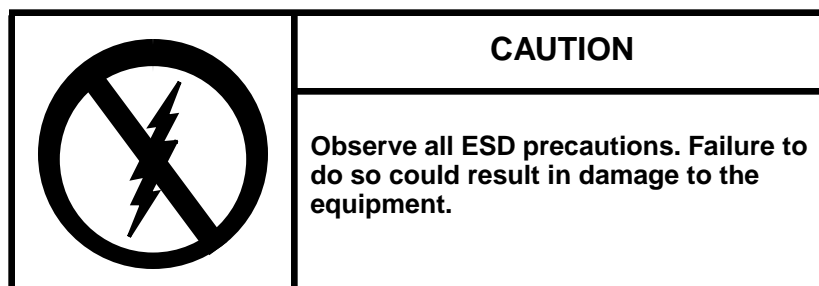
Training Requirements

Cray Research personnel who perform this upgrade should have completed training in CRAY J90 series hardware and software. If this is not possible, a hardware-trained person should have a system administrator available during this upgrade. Prior experience in upgrading or installing the UNICOS operating system on a CRAY J90 series system or CRAY EL series system is advised.

Safety Information

ESD Precautions

Observe ESD precautions during the entire upgrade process. Required apparel includes an ESD smock and an ESD wrist strap. Do not wear watches or jewelry when you work on a CRAY J90 series system cabinet.



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.

ESD Shoes

Wear approved static-dissipative shoes or approved dissipative heel straps on both shoes when servicing or handling an ESD-sensitive device. When sensitive equipment is exposed to static discharge, ESD shoes provide a backup to the wrist straps and grounding cords and help prevent an excessive charge from building up on you when you are in contact with conductive flooring. Use dissipative footwear in addition to, not as an alternative to, a wrist strap.

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.

Hazard Statements

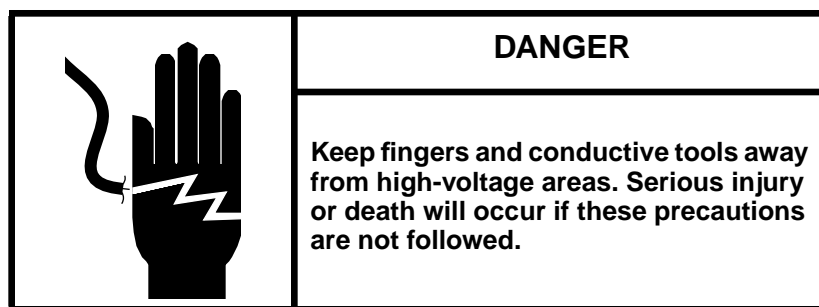
During removal and installation of the computer system parts, be alert for hazard advisory statements. The following list describes the hazard statement signal words:

- **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.

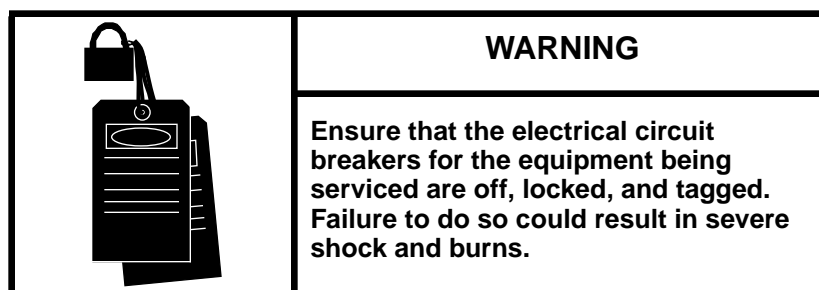
Safety Measures

Observe the following safety measures when you remove, install, repair, or maintain the system.

- Do not wear watches or jewelry when you work on a CRAY J90 series system cabinet.
- Keep fingers and conductive tools away from high-voltage areas and from high-current areas.



- Set circuit breakers to the OFF or OPEN position, where indicated, before you start the removal and installation process.



- Remove all tools from the system cabinets after you service them.
- Several procedures require two people to complete; do not perform the procedure alone.
- Ensure that a qualified electrician has properly installed the power wiring.
- Replace all covers and panels that you removed from the system during service.

- 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.

Getting Started

The following section provides information for the installers in preparation for upgrading a CRAY J90 series system with additional CPUs. Because several procedures are required for either a CRAY J98, CRAY J916, or CRAY J932 upgrade, these procedures are written once and reference the appropriate system as required.

Reference Publications

Refer to the following publications if you have questions when performing this upgrade.

- *UNICOS Basic Administration Guide for CRAY J90 and CRAY EL Series*, Cray Research publication number SG-2416
- *CRAY IOS-V Commands Reference Manual*, Cray Research publication number SR-2170
- *CRAY IOS-V Messages*, Cray Research publication number SQ-2172
- *CRAY J90se Service Kit*, Cray Research publication number HMK-101-0
- *UNICOS Installation and Configuration Tool Reference Manual*, Cray Research publication number SR-3090

Estimated Time to Install Upgrade

[Table 1](#) divides the CPU upgrade process into four separate procedures. Use this table to determine how much system time you should request to complete this upgrade.

Table 1. Estimated Time to Install CPU Upgrade

Installation Task	Estimated Time to Install Upgrade
Hardware Install	2 hours
Hardware Verification Testing	1 hour
Software Install	1 hour
Software Verification Testing	15 minutes

Parts Required for a CRAY J98se or CRAY J916se CPU Upgrade

All CRAY J98se and CRAY J916se systems include a CPU Enable Block and Sense Cable, which is installed in the mainframe backplane, that enables a specific number of CPUs per system configuration. Each J90se system is shipped with a minimum of 4 CPUs. Refer to [Table 2](#) for the number of possible J90se CPUs and how many processor modules are required for CRAY J90se series CPU configurations.

Table 2. Processor and CPU Configurations

CPUs Enabled	Number of Processor Modules Required
4	1
5 to 8	2
9 to 12	3
13 to 16	4
20	5
24	6
28	7
32	8

Only one CPU Enable Block is used in a system to enable from 4 to 16 CPUs per system. [Table 3](#) lists the part number of the CPU Enable Block that you will install and the number of CPUs you will upgrade to. [Table 4](#) lists the CPU enable cable part number and the combination of CPUs enabled. Refer to the *Illustrated*

Parts Catalog in the *CRAY J90se Service Manual Kit*, Cray Research publication number HMK-209-0, for the processor board part number. Use the following information to ensure that the correct parts are shipped for each J90se CPU or I/O-X upgrade.

Table 3. CRAY J90se CPU Configurations

CPUs Enabled	Configuration (Processor Modules 0 through 3)																CPU Enable Block Part Number
	Proc 3				Proc 2				Proc 1				Proc 0				
To 5 CPUs												X	X	X	X	X	90473300
To 6 CPUs											X	X	X	X	X	X	90473301
To 7 CPUs										X	X	X	X	X	X	X	90473302
To 8 CPUs									X	X	X	X	X	X	X	X	90473303
To 9 CPUs							X	X	X	X	X	X	X	X	X	X	90473304
To 10 CPUs						X	X	X	X	X	X	X	X	X	X	X	90473305
To 11 CPUs					X	X	X	X	X	X	X	X	X	X	X	X	90473306
To 12 CPUs				X	X	X	X	X	X	X	X	X	X	X	X	X	90473307
To 13 CPUs			X	X	X	X	X	X	X	X	X	X	X	X	X	X	90473308
To 14 CPUs		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	90473309
To 15 CPUs	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	90473310
To 16 CPUs	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	90473311

Table 4. CRAY J90se I/O-X CPU Configurations

CPUs Enabled	CPUs Enabled																CPU Enable Block Part Number
	Proc 3				Proc 2				Proc 1				Proc 0				
	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0	
4												X		X	X	X	90473312
4								X				X			X	X	90473313
5								X				X		X	X	X	90473314
6								X				X	X	X	X	X	90473315
7								X			X	X	X	X	X	X	90473316
8								X		X	X	X	X	X	X	X	90473317
4				X				X				X				X	90473318
5				X				X				X			X	X	90473319
6				X				X				X		X	X	X	90473320
7				X				X				X	X	X	X	X	90473321
8				X				X			X	X	X	X	X	X	90473322
9				X				X		X	X	X	X	X	X	X	90473323
10				X				X	X	X	X	X	X	X	X	X	90473324
11				X			X	X	X	X	X	X	X	X	X	X	90473325
12				X		X	X	X	X	X	X	X	X	X	X	X	90473326

Tools Required

No special tools are required for this upgrade; you will need the common hand-held tools that are included in the Customer Service toolkit. Ensure that you have the following tools available for this procedure:

- #1 Phillips screwdriver
- #1 slotted screwdriver
- 5/32-in. allen wrench
- Tie wraps

Software Required

- CRAY J90se CPUs with VME based I/O requires UNICOS 9.0.2.3 or greater/later
- CRAY J90se CPUs with GigaRing based I/O requires UNICOS 9.2 or greater/later

- SWS-ION package 1.11 is the minimum package needed for GigaRing I/O
- Any applicable software patches communicated via the field notice (FN)

Conventions

The following conventions are used throughout this document:

<u>Convention</u>	<u>Meaning</u>
command	This fixed-space courier font denotes literal items such as commands, files, routines, path names, signals, messages, and programming language structures.
manpage(x)	Man page section identifiers appear in parentheses after man page names.
<i>variable</i>	Italic typeface denotes variable entries, words or concepts being defined.
user input	This bold fixed-space courier font denotes literal items that the user enters in interactive sessions. Output is shown in nonbold, fixed-space courier font.
<KEY>	This convention indicates a key on the keyboard.

Software Preparation

Create a Backup Copy of the UNICOS File System

It is recommended that you create a backup copy of the UNICOS file system before you proceed with the upgrade procedures. Refer to the *UNICOS Basic Administration Guide for CRAY J90 and CRAY EL Series*, publication number SG-2416, for details on how to create a backup copy of the UNICOS file system.

Bring Down the Operating System

Perform this procedure for either a CRAY J98, CRAY J916, or a CRAY J932 system upgrade.

1. Using the right mouse button, click on any open working space. The `Workspace` menu will appear.
2. From the `Workspace` Menu, select the `J90 Console` menu item.
3. Log into the UNICOS operating system by entering `<CONTROL-a>` to get a UNICOS prompt and enter the root login and password.

NOTE: You must have superuser privileges to perform [Step 4](#).

4. Shut down the UNICOS operating system by entering the following commands at a UNICOS prompt:

```
# cd /
# /etc/shutdown 120 (takes 120 seconds to execute)
# /bin/sync
# /bin/sync
# /bin/sync
# /etc/ldsync (if you are using ldcache)
```

5. Stop the `J90 Console` connection by entering the following commands:

```
# <CONTROL-a> (toggles to the IOS)
sn9xxx-ios0> mc
sn9xxx-ios0> reset (takes 30-45 seconds to execute)
BOOT[sn9xxx-ios0]> ~. <CONTROL-c>
```

Replace CRAY J98 or CRAY J916 Classic CPU with se CPU

Perform the following procedure if you are upgrading to a CRAY J98se or CRAY J916se processor module.

Power Down the Mainframe Cabinet

1. Move the circuit breaker to the 0 or OFF position on the back of the mainframe cabinet.
2. At the rear of the mainframe cabinet, locate the two door-locking fasteners at the left top and left bottom of the door. Turn these fasteners counterclockwise with a 5/32-in. allen wrench.
3. Grasp the door handle and swing the door open to the right.

NOTE: If your upgrade consists of *adding* new se modules only, skip to the [“Install the New se CPU Module”](#) procedure.

Remove the Classic CRAY J98 or CRAY J916 Processor Module(s)

1. Connect yourself via a grounding strap to the mainframe cabinet.
2. Remove the channel cables that connect to the front of the module.
3. Turn the jack screws located at the top and bottom of the module counterclockwise until the module is loose in the chassis.
4. Grasp the module securely and remove it from the chassis.

CAUTION

The modules are heavy. Use proper lifting techniques to avoid back injury and module damage.

5. Place the module on a static-dissipative surface.

6. Repeat steps 3 through 5 for each processor module to be upgraded.

Move the I/O Paddle Boards from the Classic CPU to the se CPU

Based on availability of existing I/O paddle boards, your new J90se CPU module may have Y1, HIPPI, or both paddle boards installed. If you must move paddle boards from your existing CPU modules to the new J90se CPU modules, perform the following procedure. Use [Table 5](#) to place the programmable array logic (PAL) chips for HIPPI and Y1 channels.

Table 5. PAL U8 and U9 - Part Numbers

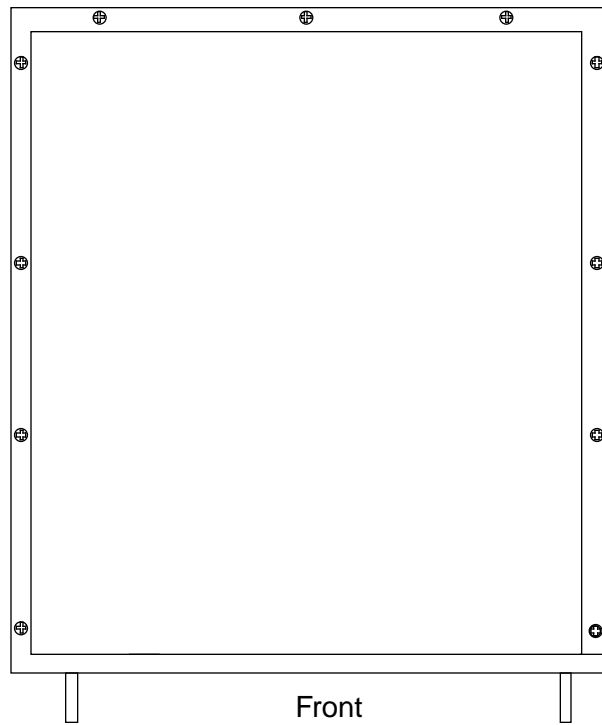
Channels	PAL U8 Part Number	PAL U9 Part Number
HIPPI on upper channels	90458500	Empty
HIPPI on lower channels	Empty	90458500
Y1 on upper channels	90475100	Empty
Y1 on lower channels	Empty	90475100

1. Lay the processor module on its side on a static-protected work surface.

NOTE: Because the module could contain up to 4 paddle boards, complete one side of the module before you turn the module over.

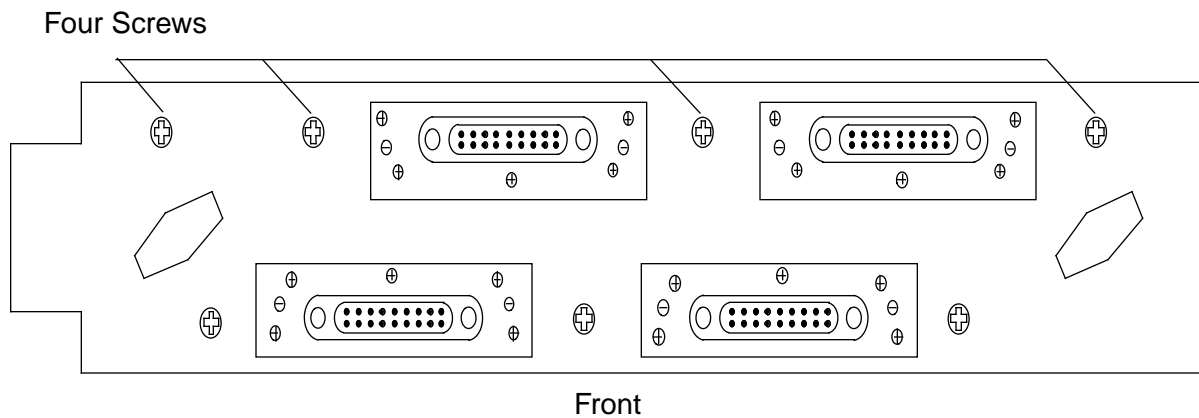
2. Remove the 11 screws that secure the metal side cover in place. Refer to [Figure 1](#).

Figure 1. Processor Module (Side View)

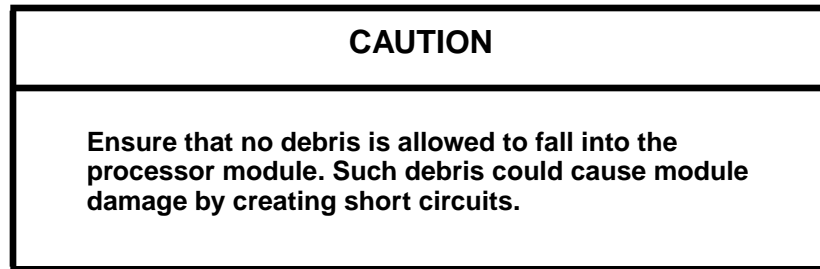


3. Remove the 4 screws that secure the cover to the front of the processor module. Refer to [Figure 2](#).

Figure 2. Processor Module (Front View)



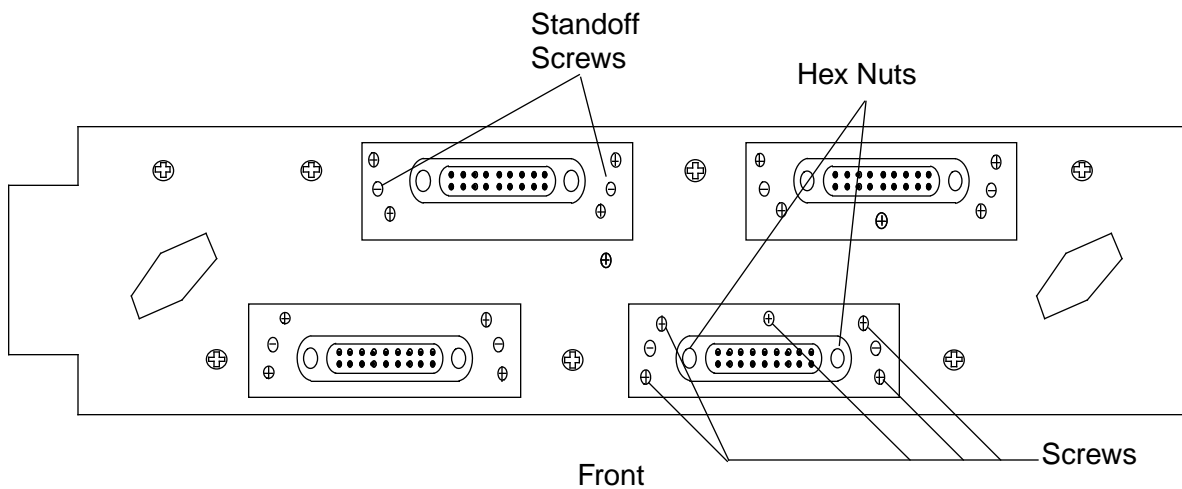
4. Remove the cover from the processor module by lifting straight up. Set the cover aside.



NOTE: Do not remove the 2 standoff screws shown in [Figure 3](#).

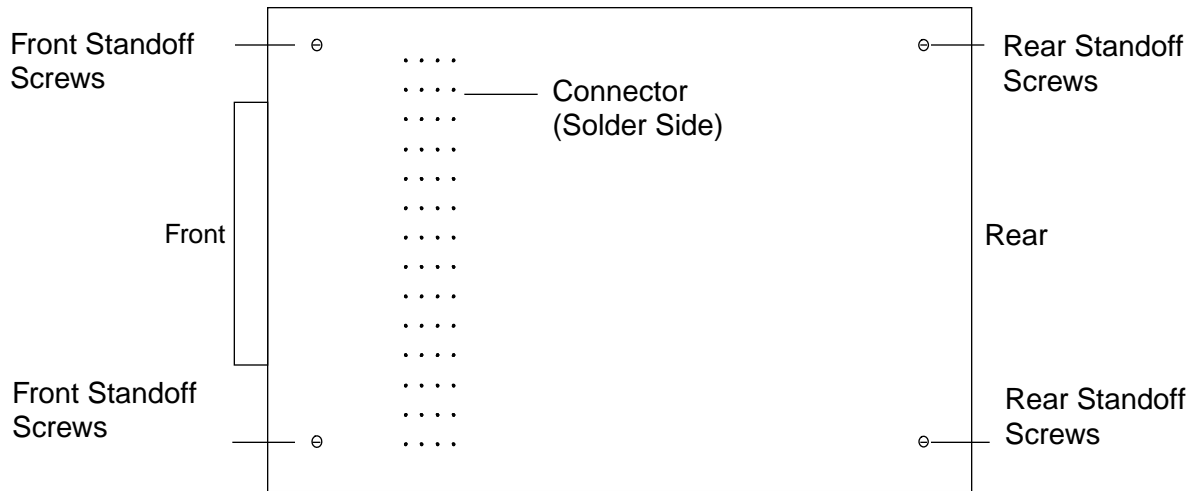
5. Remove the 5 screws that secure the channel paddle board to the front of the processor module. Refer to [Figure 3](#).

Figure 3. Paddle Board Securing Screws



6. Remove the 2 standoff screws from the rear of the paddle board. Refer to [Figure 4](#).
7. Remove the 2 standoff screws from the front of the paddle board. Refer to [Figure 4](#).
8. Remove the two hex nuts from the front of the paddle board. Refer to [Figure 3](#). After you remove the hex nuts, you can remove the paddle board faceplate.

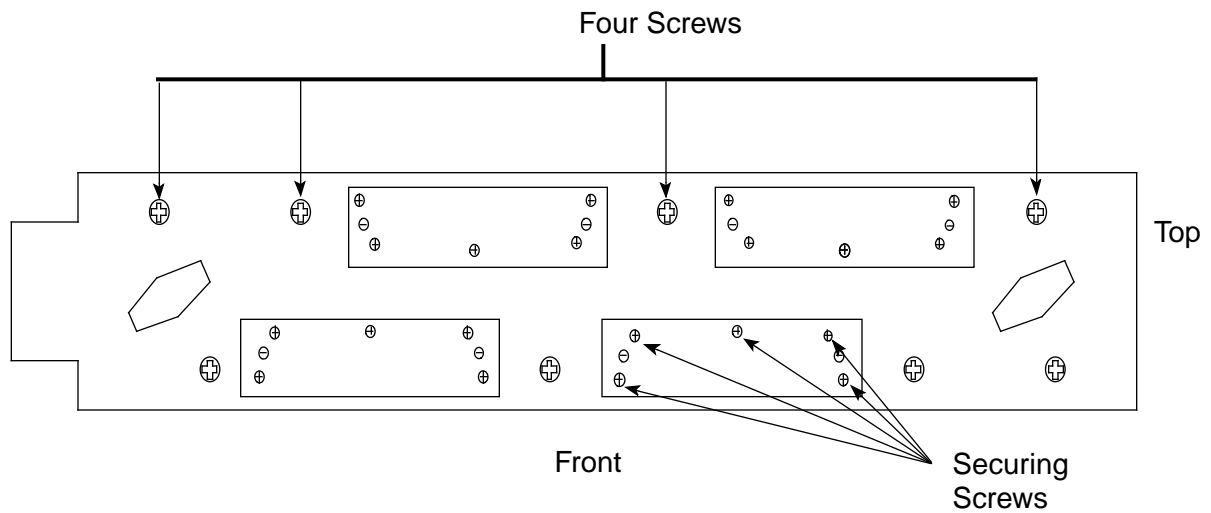
Figure 4. Paddle Board Standoff Screws (Top View)



CAUTION
<p>Use caution when you remove the paddle boards. Do not use an object such as a screwdriver to pry the paddle board out of the chassis or you will damage the components.</p>

9. The paddle board is mounted with a 128-pin connector and may be difficult to remove. Pull the paddle board straight up until it is clear of the processor module.
10. Place the paddle board on a static-protected surface.

Figure 5. Connector Hardware Screws



11. Prepare the new se CPU module.
 - a. Orient the module as shown in [Figure 5](#).
 - b. Remove the 15 screws (11 on the side and 4 on the front) that secure the metal side cover to the processor module.
 - c. Remove the 5 screws that secure the blank faceplate connector cover to the processor module for each Y1/HIPPI paddle board on this first side.
12. Install the paddle board(s) into the new se CPU.
 - a. Align the 128 pins on the paddle board that you just removed with the 128 sockets on the processor module and press the paddle board into position. Apply pressure directly to the solder side of the connector on the paddle board.
13. Install the paddle board faceplate(s).
14. Insert and tighten the 5 screws that secure each of the paddle board(s) to the front panel of the processor module. Refer to [Figure 3](#).
15. Insert and tighten the 4 standoff screws on the front and rear of the paddle board(s). Refer to [Figure 4](#).
16. Install the 2 hex nuts to secure each faceplate to the front of the paddle board.

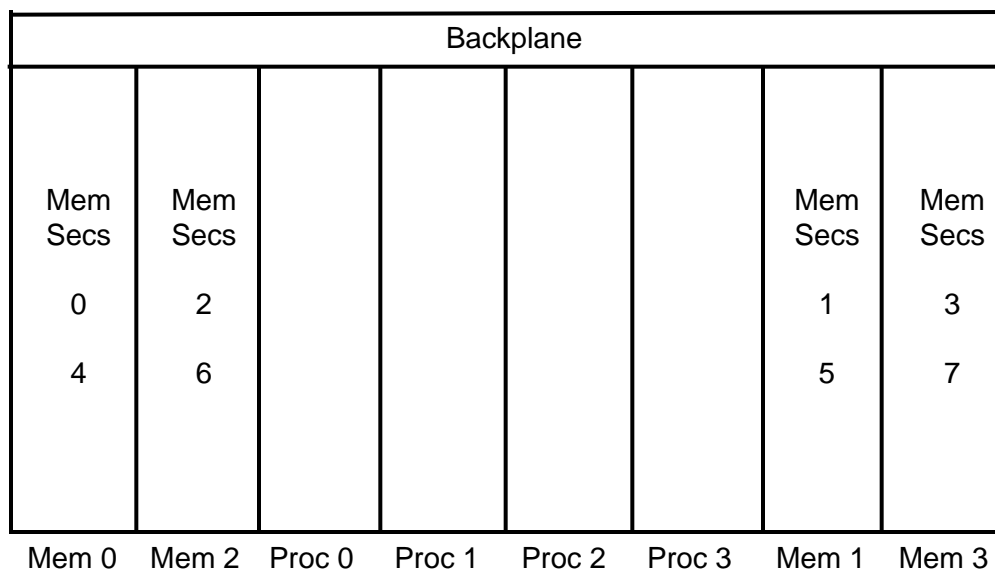
17. Replace the cover of the processor module.
18. Insert and tighten the 11 screws to secure the cover to the side of the processor module. Refer to [Figure 1](#).
19. Insert and tighten the 4 screws to secure the cover to the front of the processor module. Refer to [Figure 2](#).
20. Repeat this procedure for the I/O paddle boards on the opposite side of the processor module.

Install the New se CPU Module

Once you have moved/installed the I/O paddle boards:

1. Connect a grounding strap to the mainframe cabinet.
2. Place the new module into the module guides in the mainframe chassis and push the module into the chassis until it contacts the air damper control handle. [Figure 6](#) and [Figure 7](#) show the slot configurations for CRAY J98se and CRAY J916se systems.

Figure 6. Backplane for a 4 x 4 System



NOTES: Proc 1, Proc 2, and Proc 3 slots may be vacant in 4 x 4 configurations. All memory module slots will always be filled.

Figure 7. Backplane for a 2 x 2 System

Backplane			
Mem Secs	Mem Secs		
0	1		
2	3		
4	5		
6	7		
Mem 0	Mem 1	Proc 0	Proc 1

NOTE: Proc slot 1 may be vacant in 2 x 2 configurations.

3. Open the CPU slot air damper to its open position by turning the air damper handle 1/4-turn counterclockwise. Continue to push the processor module into the chassis until it contacts the backplane.
4. Turn the jack screws clockwise until the module is fully seated.

NOTE: Turn both jackscrews at the same rate to avoid binding the module.

5. Ensure that the processor module DC enable indicator is green.
6. Reconnect the channel cables to the front of the module.

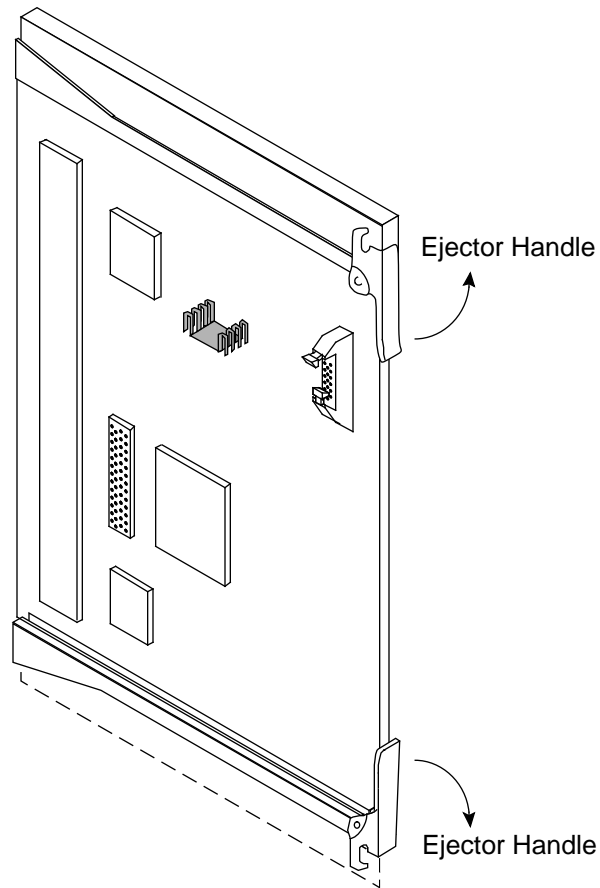
Replace the Clock Module in a CRAY J98se or CRAY J916se System

You must replace the clock module when you upgrade to the J90se CPU modules.

Removal Procedure

1. Release the 2 restraining screws that secure the cover to the clock/scan module.
2. Grasp the ejector handles on the clock/scan module and press upward on the top handle and downward on the bottom handle to release the module from the backplane. Refer to [Figure 8](#).

Figure 8. Ejector Handles on Clock/Scan Module



3. Pull the clock/scan module out of the guide slots and remove it from the cabinet.

CAUTION
Place the old clock/scan module on an ESD-safe surface to prevent damage to the module.

Replacement Procedure

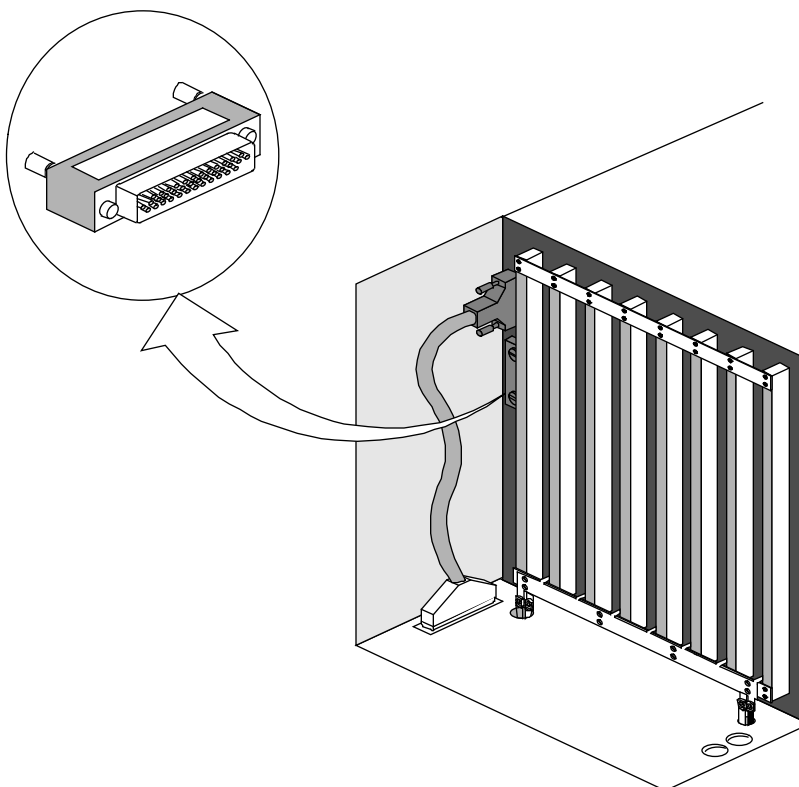
1. Unpack the new clock/scan module, P/N 90278612. Retain the packing material for reuse when you return the old module to Logistics in Chippewa Falls.

2. Set the clock/scan module in the guide slots.
3. Push the clock/scan module into the chassis until it contacts the backplane connectors.
4. Using the ejector handles as push-pads, seat the clock/scan module firmly in the backplane connector.

Remove the Old CPU Enable Block

1. Connect yourself via a grounding strap to the mainframe cabinet.
2. Loosen the 2 restraining screws that secure the backplane cover.
3. Lift off the backplane cover and set it aside.
4. Loosen the 2 restraining screws that secure the CPU enable block to the backplane as shown in [Figure 9](#). You may need a slotted screwdriver.
5. Pull out the old CPU enable block by grasping and pulling on the restraining screws.

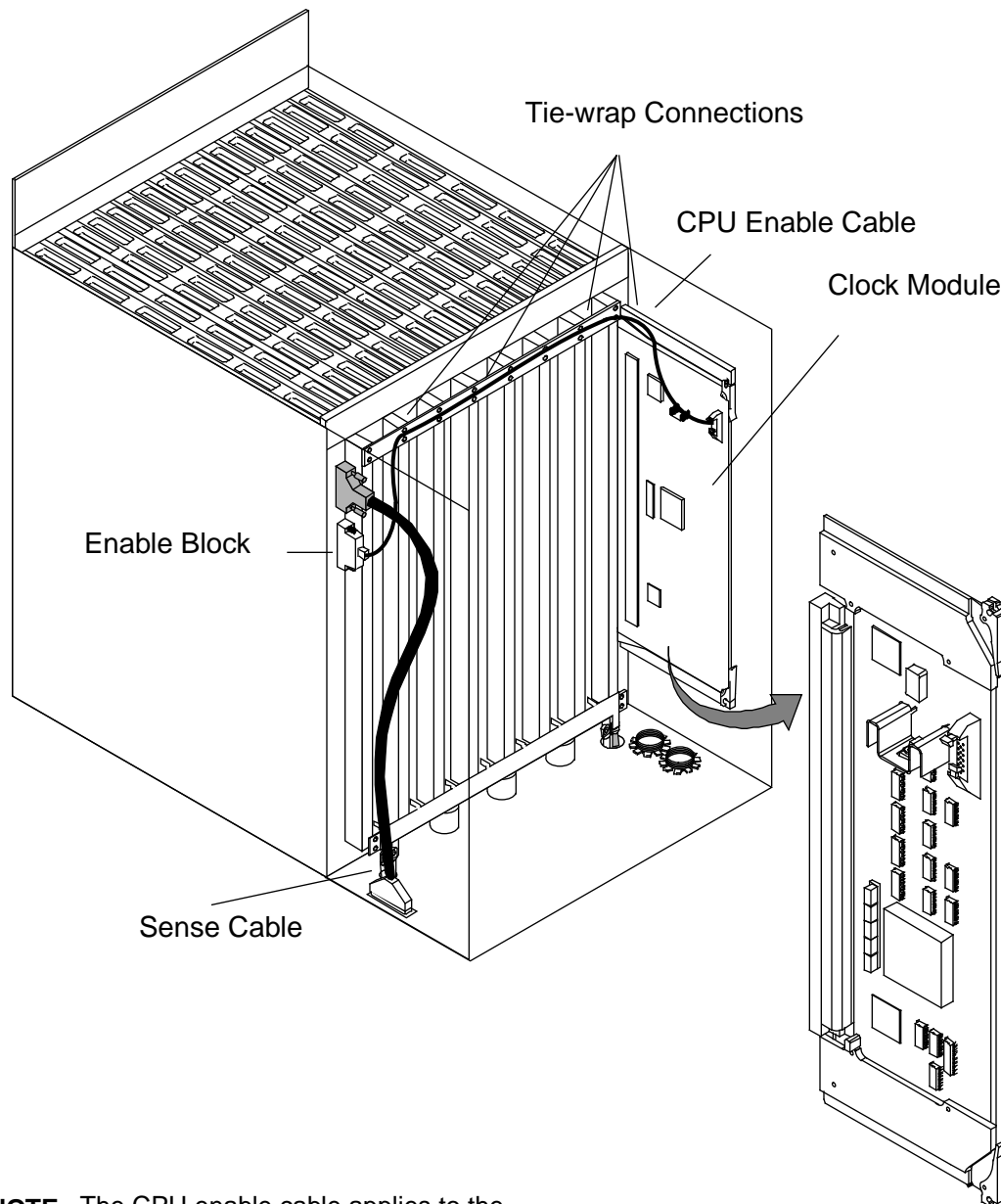
Figure 9. Old CPU Enable Block



Install the New CPU Enable Block and Enable Cable

1. Refer again to [Table 3](#) or [Table 4](#) to ensure that you have the correct CPU enable block for the customer's new CPU configuration.
2. Install the new CPU enable block; refer to [Figure 10](#). Tighten the two restraining screws to secure the CPU enable block to the backplane.
3. Install the CPU enable cable, P/N 90473900, from the enable block to the clock module.
4. Use tie wraps to secure the enable cable to the backplane.

Figure 10. New CPU Enable Cable Assembly



NOTE: The CPU enable cable applies to the CRAY J98se and CRAY J916se systems only.

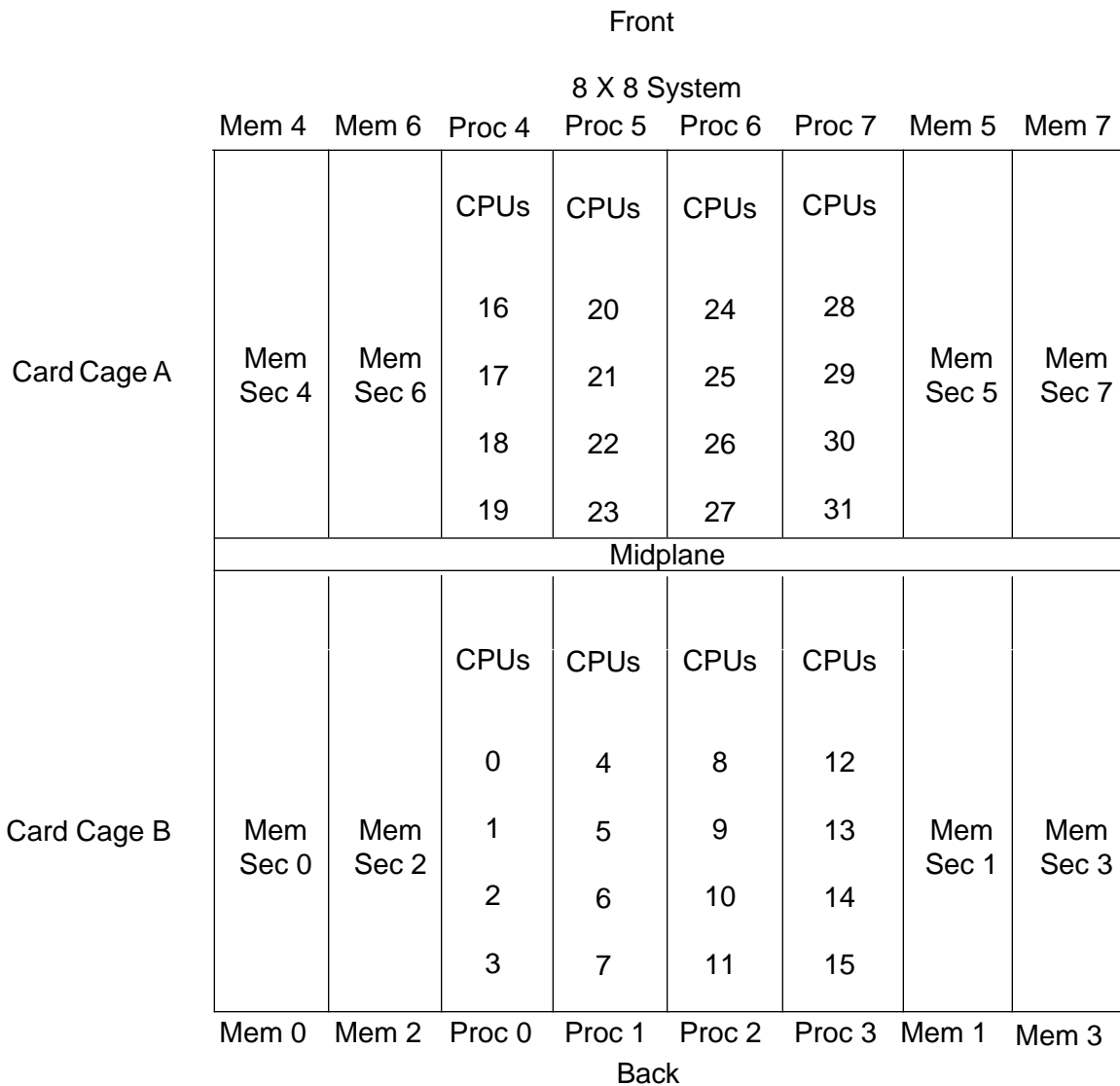
5. Replace the backplane cover by tightening the two restraining screws that secure the backplane cover.
6. Move the main circuit breaker to the 1 or ON position and power on the system.
7. Proceed to the [“Software Change Procedure”](#) in this document.

Replace CRAY J932 Classic CPU with se CPU

Perform the following procedure if you are upgrading to a CRAY J932se processor module.

The CRAY J932 processor modules must be installed in consecutive slot locations (refer to [Figure 11](#)).

Figure 11. CRAY J932 Processor Module Locations



NOTES: Proc 4, Proc 5, Proc 6, and Proc 7 slots may be vacant in an 8 x 8 configuration. All memory module slots will always be filled.

Power Down the CRAY J932se Mainframe Cabinet

1. Ensure that the operating system is not running before you proceed; refer to the “[Software Preparation](#)” section.
2. Move the circuit breaker to the 0 or OFF position on the rear of the mainframe cabinet.
3. At the rear of the mainframe cabinet, locate the two door-locking fasteners at the left top and left bottom of the door. Turn these fasteners counterclockwise with a 5/32-in. allen wrench.
4. Grasp the door handle and swing the door open.

NOTE: If your upgrade consists of *adding* new modules only, proceed to the “[Install the CRAY J932se Processor Module](#)” section.

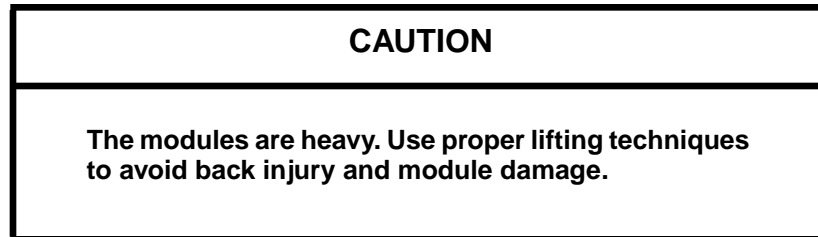
Remove the Classic CRAY J932 Processor Module(s)

1. Connect a grounding strap to the mainframe cabinet.
2. At the rear of the mainframe cabinet, locate the two door-locking fasteners at the left top and left bottom of the door. Turn these fasteners counterclockwise with a 5/32-in. allen wrench.
3. Grasp the door handle and swing the door open to the right.
4. Remove any channel cables that are connected to the front of the module.
5. Turn the jack screws located at the top and bottom of the module counterclockwise until the module is loose in the chassis.

CAUTION
The modules are heavy. Use proper lifting techniques to avoid back injury and module damage.

6. Grasp the module securely and remove it from the chassis.
7. Place the module on a static-dissipative surface.

8. Open the front door of the mainframe. If you are removing a module from the front of the mainframe, open the card cage door by loosening the two captive screws.
9. Remove any channel cables that are connected to the front of the module.
10. Turn the jack screws located at the top and bottom of the module counterclockwise until the module is loose in the chassis.



11. Grasp the module securely and remove it from the chassis.
12. Place the module on a static-dissipative surface.

NOTE: Before you install the new CPU module, determine whether the I/O paddle boards of the old CPU module need to be moved to the new CPU module. If the paddle boards have to be moved, refer to the [“Move the I/O Paddle Boards from the Classic CPU to the se CPU”](#) procedure.

Install the CRAY J932se Processor Module

1. Place the module into the module guides in the mainframe chassis and push the module into the chassis until it contacts the damper handles.
2. Turn the damper handle counterclockwise 1/4-turn, and push the module the rest of the way into the chassis (until it contacts the midplane).
3. Turn the jack screws clockwise to tighten them until the module is fully seated.

NOTE: Turn both jackscrews at the same rate to avoid binding the module.

4. Ensure that the processor module DC enable indicator is green.

5. Connect any channel cables that you previously removed.

NOTE: Refer to the additional upgrade procedure included as part of your field upgrade notice (FUN) to complete this upgrade.

Replace the Clock Module in a CRAY J932 System

You must replace the clock module when you upgrade to the J90se CPU modules.

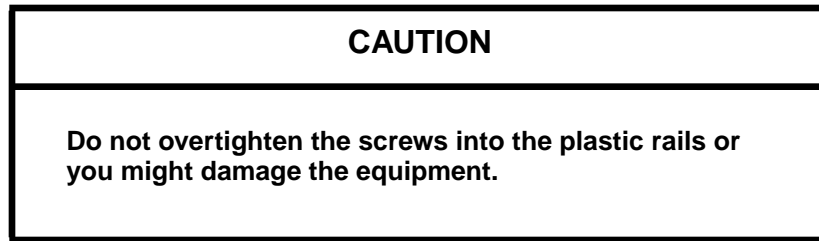
Removal Procedure

1. Open the rear door of the mainframe cabinet.
2. Loosen the 2 restraining screws that secure the cover to the clock/scan module and remove the cover. Refer to [Figure 12](#).
3. Grasp the ejector handles on the clock/scan module and press upward on the top handle and downward on the bottom handle to release the module from the midplane. Refer to [Figure 13](#).
4. Pull the clock/scan module out of the guide slots and remove it from the cabinet.
5. Place the old clock/scan module on an ESD-safe surface to prevent damage to the module.
6. Remove the clock module cover by removing the 4 cover screws. Refer to [Figure 13](#).
7. Remove the clock module by removing the 4 screws and 4 flat washers that secure the clock module to the clock unit frame. Refer to [Figure 13](#).

Replacement Procedure

1. Unpack the new clock/scan module. Retain the packing material for reuse when you return the old module to Logistics in Chippewa Falls.

2. Install the new clock module on the clock unit frame. The clock module fits into the recessed edge of the top and bottom guide rails.



3. Install the 4 screws and 4 flat washers to secure the clock module to the clock unit frame.
4. Install the 4 cover screws to secure the clock module cover to the clock unit frame.
5. Push the clock/scan module into the chassis until it contacts the midplane connectors.
6. Using the ejector handles as push-pads, seat the clock/scan module firmly in the midplane connector.
7. Replace the cover; then tighten the 2 restraining screws.

Figure 12. Clock/Scan Module Location

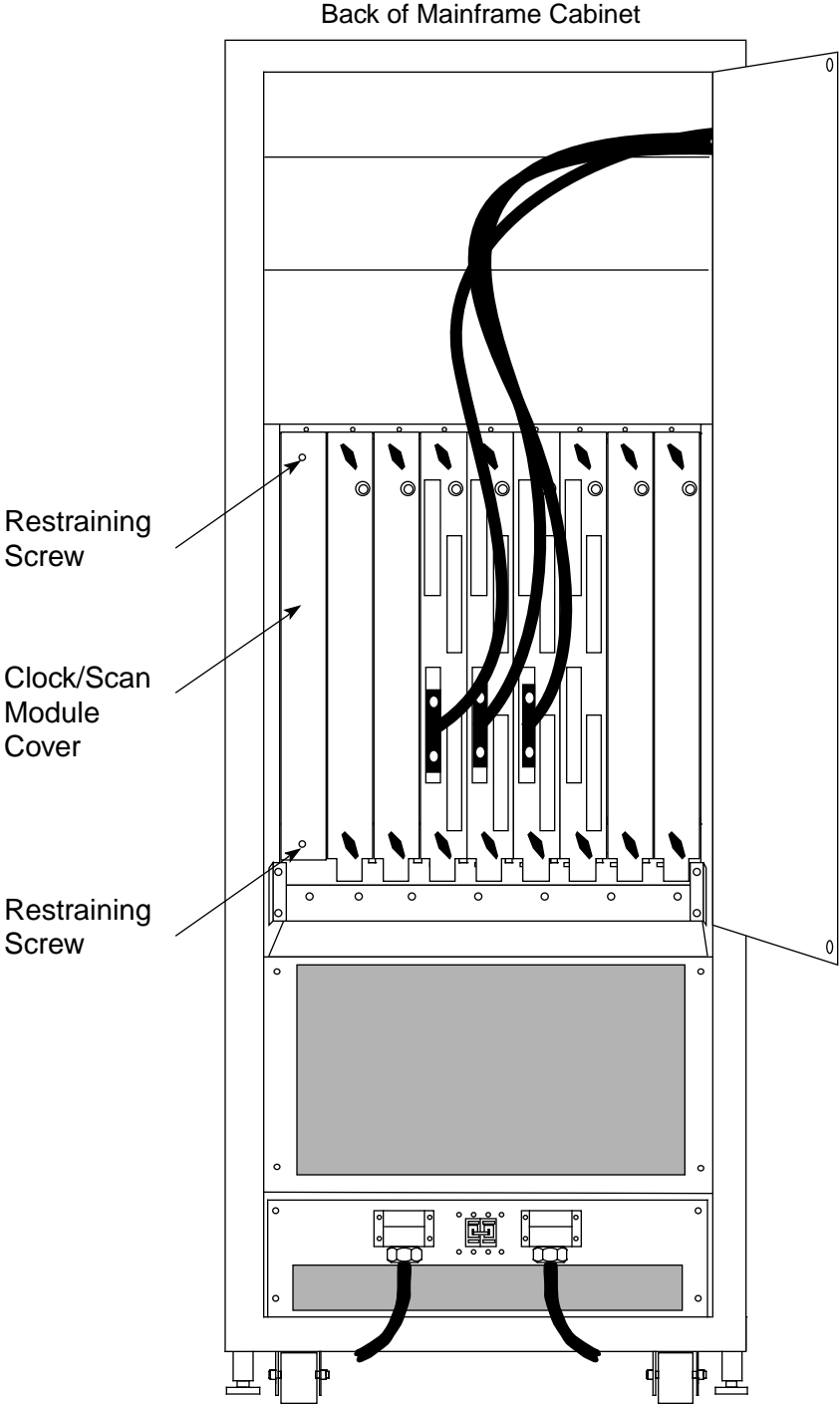
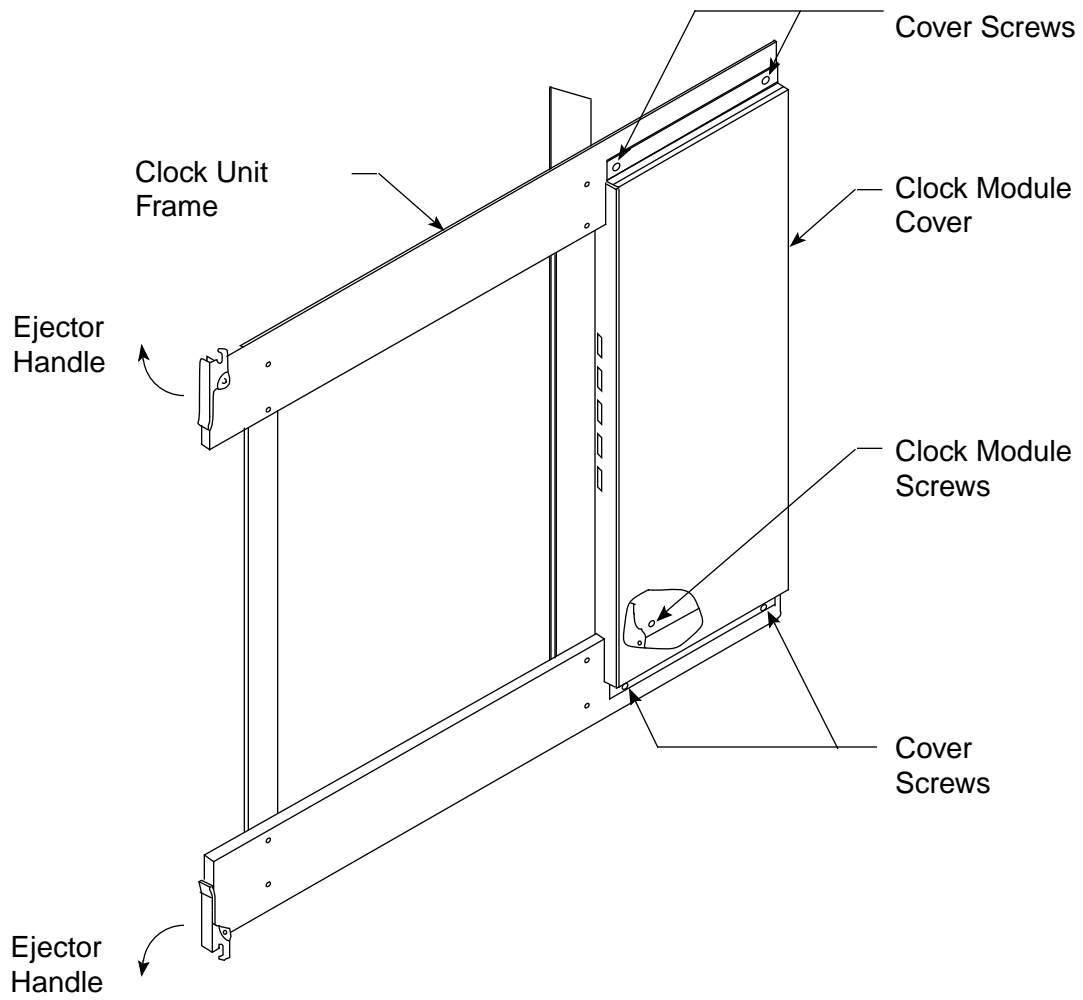


Figure 13. Clock/Scan Module



Install Additional J90se CPU Modules

The following procedure applies to either the CRAY J98se, CRAY J916se, or the CRAY J932se system when you are adding CPU modules only. Before you perform this procedure, refer to the [“Software Preparation”](#) section.

Power Down the Mainframe Cabinet

1. Move the circuit breaker to the 0 or OFF position on the back of the mainframe cabinet.
2. At the rear of the mainframe cabinet, locate the two door-locking fasteners at the left top and left bottom of the door. Turn these fasteners counterclockwise with a 5/32-in. allen wrench.
3. Grasp the door handle and swing the door open to the right.

Install the Additional Processor Modules

For the following steps, it is best to work with one module at a time.

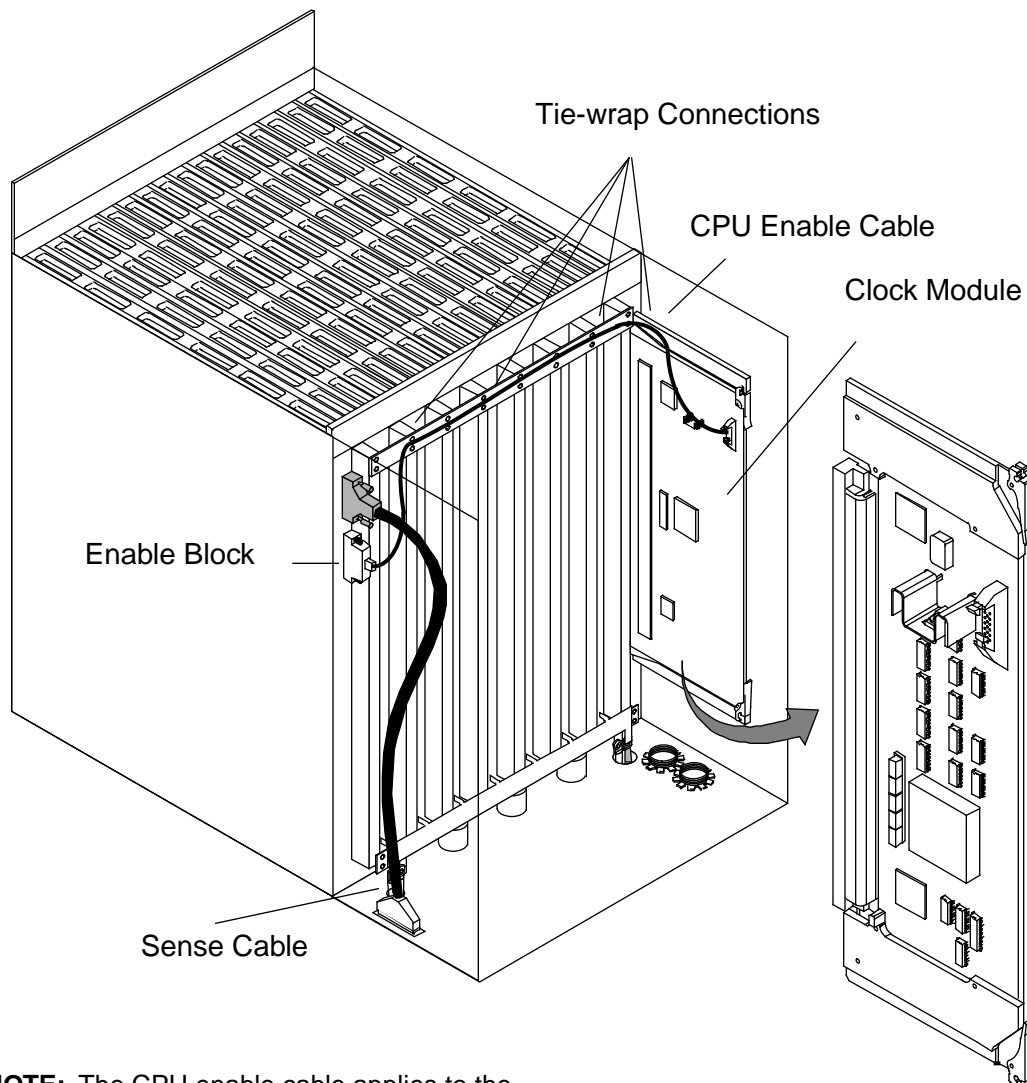
1. Connect yourself via a grounding strap to the mainframe chassis.
2. Remove the module slot cover in the mainframe chassis.
3. Unpack the new processor module.
4. Place the module into the module guides in the mainframe chassis and push the module into the chassis until it contacts the damper handles.
5. Turn the damper handle counterclockwise 1/4-turn, and push the module the rest of the way into the chassis (until it contacts the midplane).
6. Turn the jack screws clockwise to tighten them until the module is fully seated.

NOTE: Turn both jackscrews at the same rate to avoid binding the module.

7. Ensure that the processor module DC enable indicator is green.

Install a New CPU Enable Block (CRAY J98se or CRAY J916se system only)

1. Refer again to [Table 3](#) or [Table 4](#) to ensure that you have the correct CPU enable block for the customer's new CPU configuration.
2. Disconnect the sense cable at the enable block end.
3. Remove the old enable block and install the new CPU enable block; refer to [Figure 14](#). Tighten the 2 restraining screws to secure the CPU enable block to the backplane.

Figure 14. Enable Block

NOTE: The CPU enable cable applies to the CRAY J98se and CRAY J916se systems only.

4. Reconnect the sense cable to the newly installed enable block.

5. Replace the backplane cover by tightening the 2 restraining screws that secure the backplane cover.
6. Close and secure all cabinet doors.

Update Hardware Configuration Registers

Perform the following procedure to update the hardware configuration registers. You will start from the CRAY J90 series workstation root window.

1. Close the current J90 Console session by entering:

```
~. <CONTROL-C>
```
2. Using the right mouse button, click on any open working space. The Workspace menu will appear.
3. From the Workspace menu, select the J90 Install menu item.
4. From the J90 Install menu, select the Initial Installation menu item.
5. From the Initial Installation menu, select the Mainframe Hardware Setup menu item.
6. Select the appropriate mainframe serial number. Then select the Setup Hardware Button. From within that window, select the following items:
 - a. Appropriate backplane type (2 x 2, 4 x 4, or 8 x 8). Refer to [Figure 6](#), [Figure 7](#), and [Figure 11](#).
 - b. Appropriate number of processor modules.
 - c. Select the appropriate number of CPUs per processor module by configuring the CPU bitmap. For example, the bitmap for a 7-CPU system would be a value of “f” (1111) for CPU module 1 and “7” (0111) for CPU module 2. Use the CPU enable block part number and [Table 3](#) or [Table 4](#) to choose the correct CPU bitmaps for your system.
 - d. Select the CPU type (0=J90, 1=J90se).
 - e. Verify the number of memory modules and the memory type of each module. The memory type is on a label on the front of the module.
 - f. Select the Configure Hardware button (no activity indicators are presented; this step may take 3 to 5 minutes).
 - g. Click on OK to acknowledge the hardware configuration completion status message window.

7. The hardware configuration register files are now updated. Select `Return to Main Menu` and then `Quit` to exit the `J90 Install` menu(s).
8. Using the right mouse button, select the `Workspace` menu.
9. From the `Workspace Menu`, select the `J90 Console` menu item.
10. At the `QLOAD>` prompt, enter the following command and wait for the `BOOT[sn9xxx-ios0]` prompt:

```
QLOAD> reset
```

11. Load the IOS kernel by entering the following command:

```
BOOT[sn9xxx-ios0]> load
```

Use ACT to Verify Hardware Operation

The second level of ACT, the menu system, provides a menu-driven interface that selects and runs specific diagnostics. Refer to *Automated Confidence Testing*, Cray Research publication number HDM-110-A, for more ACT information.

1. Invoke the ACT menu system by entering the following command:

```
sn9xxx-ios0> act_menu
```

2. Select `1` to run all basic tests from the `Automated Confidence (BASIC) Test Menu`. This step may take 3 to 7 minutes, depending on the system configuration.
3. Select `n` from the `Automated Confidence (BASIC) Test Menu` to get to the `Automated Confidence (INTERMEDIATE) Test Menu`.
4. Select `1` to run all intermediate tests. This step may take 3 to 7 minutes, depending on the system configuration.
5. Select `n` from the `Automated Confidence (INTERMEDIATE) Test Menu` to get to the `Automated Confidence (COMPREHENSIVE) Test Menu`.
6. Select `1` to run all comprehensive tests. This step may take 3 to 7 minutes, depending on the system configuration.
7. Select `q` to quit the ACT menu system.

Software Change Procedure

You must rebuild the UNICOS kernel as part of the CRAY J916 CPU upgrade. You can do this by using one of the following procedures:

- The UNICOS Installation / Configuration Menu System
- Manually changing kernel configuration files

Both procedures are included in this section. The minimum requirement for the IOS kernel revision is 2.3 and the minimum UNICOS revision level is 9.0.2.3.

The software verification procedure consists of ensuring that additional CPUs are accessible from the UNICOS operating system. When the system boots, it should report the number of CPUs started.

Use the UNICOS Installation / Configuration Menu System (ICMS)

Perform the following procedure to use the UNICOS ICMS to rebuild the UNICOS operating system. You must have superuser privileges. For additional information on the ICMS, refer to *UNICOS Installation and Configuration Tool Reference Manual*, publication SR-3090.

NOTE: If you have not already done so, it is recommended that you create a backup copy of the UNICOS file system.

1. Save the existing UNICOS kernel and `/sys/param` file by entering the following commands:

```
sn9xxx-ios0> cd /sys
sn9xxx-ios0> cp unicos unicos.old
sn9xxx-ios0> cp param param.old
```

2. Start the UNICOS operating system by entering the following command:

```
sn9xxx-ios0> boot
```

3. Enter multiuser mode by entering the following command:

```
# /etc/init 2
```

4. Log on as superuser (root).

5. To ensure that the /etc/config/param file is up-to-date, copy it from the IOS disk to the UNICOS file system by entering the following command:

```
# exdf -i /sys/param > /etc/config/param
```

6. Enter the UNICOS Installation / Configuration Menu System by entering the following command:

```
# /etc/install/install
```

7. Select the following menu:

```
UNICOS 9.0 Installation / Configuration Menu System
. Configure System
.. Mainframe Hardware Configuration
```

8. Execute the following action to ensure that the install tool database is up-to-date:

```
A-> Import the hardware configuration...
```

Answer yes (y) to the question, Do you want to continue?

9. Change the value of NCPU to the number of CPUs the system will have after the upgrade:

```
S-> Number of CPUs (NCPU) #
```

10. Change the MAXCLUS value to the number of CPUs in the system plus one (NCPU+1). This value reflects the maximum number of CPU clusters for this system.

```
Number of cluster registers (MAXCLUS) #
```

11. Use [Table 6](#) or [Table 7](#), as appropriate for your system's backplane configuration, to verify the NBANKS, CHIPSZ, and MEMORY parameters for your system.

Table 6. NBANKS Values for CRAY J916 2 X 2 Backplane

Memory Label	CHIPSZ	Memory Boards	NBANKS Value	MegaWords (MW)
8	M4MCH	2	128	32
0	M4MCH	2	256	64
B	M16MCH	2	128	128
3	M16MCH	2	256	256

Table 7. NBANKS Values for CRAY J916 4 X 4 Backplane

Memory Label	CHIPSZ	Memory Boards	NBANKS Value	MegaWords (MW)
8	M4MCH	4	256	64
0	M4MCH	4	512	128
B	M16MCH	4	256	256
3	M16MCH	4	512	512

12. Execute the following action:

A-> Activate the hardware configuration...

Answer yes (y) to the question, Do you want to proceed with the configuration update?

13. Select the following menu to configure the parameters to build a new UNICOS kernel:

```
UNICOS 9.0 Installation / Configuration Menu System
. Build/Install System
```


14. Verify that the following parameters are configured:

Build/Install System

```

M-> Build options ==>
      /usr/src reconfiguration files ==>
      Build action to take           install
      Build object                   all objects
      Components to build            specific component
      Major components section ==>
      Specific component to build    uts
      Do the build in batch?         NO
      NQS submission options ==>
      Do the build...
      Restart the build ==>
      Review last build summary...
      Escape to a chroot shell...

```

Keys: ^? Commands H Help Q Quite V ViewDoc W WhereAmI

15. Execute the build action to build the new UNICOS kernel:

```

A-> Do the build...

```

16. Select the following menu to copy the UNICOS kernel and param files to the IOS:

```

UNICOS 9.0 Installation / Configuration Menu System
. Utilities
.. Expander File Transfers

```

17. Verify that the following parameters are configured to transfer the UNICOS kernel (/usr/src/uts/cf.9xxx/unicos) to the IOS:

```

Expander File Transfers
s-> Transfer UNICOS kernel to the expander?  YES
      Transfer CSL param file to the expander? NO

Expander directory name           sys
Expander file name suffix         .ymp

Do the transfer to the expander...

```

18. Execute the transfer by selecting the following option:

A-> Do the transfer to the expander...

19. Verify that the following parameters are configured to transfer the /etc/config/param file to the IOS:

```

          Expander File Transfers
Transfer UNICOS kernel to the expander?  NO
S-> Transfer CSL param file to the expander? YES

Expander directory name                    sys
Expander file name suffix

Do the transfer to the expander...
```

20. Execute the transfer by selecting the following option:

A-> Do the transfer to the expander...

21. Exit the UNICOS Installation and Configuration Menu System by typing **q** and answering **y** to the question: Do you want to quit? (n/y)

22. Shut down the UNICOS operating system by entering the following commands:

```

# cd /
# /etc/shutdown 120 (takes 120 seconds to execute)
# /bin/sync
# /bin/sync
# /bin/sync
# /etc/ldsync (if you are using ldcache)
# <CONTROL-a> (toggles to the IOS console)
```

23. Reload the IOS and boot UNICOS by entering the following commands:

```

sn9xxx-ios0> reload
sn9xxx-ios0> boot
# /etc/init 2
```

Manually Change the Kernel Configuration Files

NOTE: If you have already used the UNICOS Installation / Configuration Menu System to rebuild the UNICOS kernel, do not perform the following procedure.

To manually change the kernel configuration files to rebuild the UNICOS operating system, perform the following procedure:

1. At the `sn9xxx-ios0>` prompt, start the UNICOS operating system by entering the following command:

```
sn9xxx-ios0> boot
```

2. Enter multiuser mode by entering the following command:

```
# /etc/init 2
```

3. Log on as superuser (`root`).

4. Verify that the `/usr/src/uts/cf.9xxx/sn.h` file exists by entering the following command (9xxx is the serial number of your system):

```
# is /usr/src/uts/cf.9xxx/sn.h
```

If this file does not exist, create it by entering the following commands (9xxx is the serial number of your machine):

```
# mkdir /usr/src/uts/cf.9xxx
# cd /usr/src/uts/cf.9xxx
# cp /usr/src/uts/c1/sys/sn.9001.h sn.h
```

5. Edit the `sn.h` file by executing the following commands:

```
# TERM=vt100; export TERM
# vi /usr/src/uts/cf.9xxx/sn.h
```

6. Change the following values in the `sn.h` file. The following text is an example for an 8-CPU system.

```
#define NCPU      8
#define MAXCLUS   9
```

The `NCPU` value should reflect the number of CPUs in the system after the upgrade has been completed. The `MAXCLUS` value should be set to the number of CPUs in the system plus 1 (`NCPU+1`). The `MAXCLUS` reflects the number of CPU clusters in the system.

7. Use [Table 6](#) or [Table 7](#), as appropriate for your system's backplane configuration, to verify the NBANKS, CHIPSZ, and MEMORY parameters for your system.

8. Update the `/etc/config/param` file by entering the following command:

```
# exdf -i /sys/param > /etc/config/param
```

9. Edit the `/etc/config/param` file by entering the following command:

```
#vi /etc/config/param
```

10. Change the `cpus` value in the `/etc/config/param` file. The following example is the entry for an 8-CPU system:

```
8 cpus;
```

11. Rebuild the kernel by entering the following commands:

```
# cd /usr/src/uts
# rm -f cf.9xxx/lib/*.o
# rm -f cf.9xxx/Nmakefile*
# /usr/bin/nmake rmexe
# /usr/bin/nmake install (takes 20 – 35 minutes to execute)
```

12. Save the old `unicos` kernel and `/sys/param` file and move the new `unicos` kernel and `/sys/param` file to the IOS disk by executing the following commands:

```
# <CONTROL-a> (toggles to the IOS console)
sn9xxx-ios0> mv /sys/unicos.ymp /sys/unicos.old
sn9xxx-ios0> mv /sys/param /sys/param.old
sn9xxx-ios0> <CONTROL-a> <RETURN> (toggles to UNICOS)
# cd /usr/src/uts/cf.9xxx
# exdf -ro /sys/unicos.ymp < unicos
# exdf -ro /sys/param < /etc/config/param
```

13. Shut down the UNICOS operating system by entering the following commands:

```
# cd /
# /etc/shutdown 120 (takes 120 seconds to execute)
# /bin/sync
# /bin/sync
# /bin/sync
# /etc/ldsync (if you are using ldcache)
# <CONTROL-a> (toggles to the IOS console)
```

14. Reload the IOS and boot UNICOS by entering the following commands:

```
sn9xxx-ios0> reload
sn9xxx-ios0> boot
# /etc/init 2
```

Software Verification

Verify that the kernel recognizes all CPUs by entering the following command (the number of idle processes displayed should equal the number of configured CPUs):

```
# ps -ale | grep idle
```

The following display is an example of the output from the `ps` command for an 8-CPU system:

```
 3 R 0 2 0 999 21 104164 12 ? 70:35 idle
 3 R 0 3 0 999 21 104200 12 ? 69:39 idle
 3 R 0 4 0 999 21 104214 12 ? 67:56 idle
 3 R 0 5 0 999 21 104230 12 ? 72:52 idle
103 R 0 6 0 999 21 104244 12 cpu-04 ? 71:04 idle
103 R 0 7 0 999 21 104260 12 cpu-05 ? 70:34 idle
 3 R 0 8 0 999 21 104272 12 ? 74:51 idle
 3 R 0 9 0 999 21 104310 12 ? 74:47 idle
```

Removed Parts Disposition

Do not dispose of removed parts locally; return the removed parts to:

Cray Research, Inc.
1000 Halbleib Road
Chippewa Falls, WI 54729
Attention: Removed Equipment Management

CRUISE Reporting

There is a separate incident report for upgrades. Please fill one out. Refer to *CSH # ADM-COM-9307*.