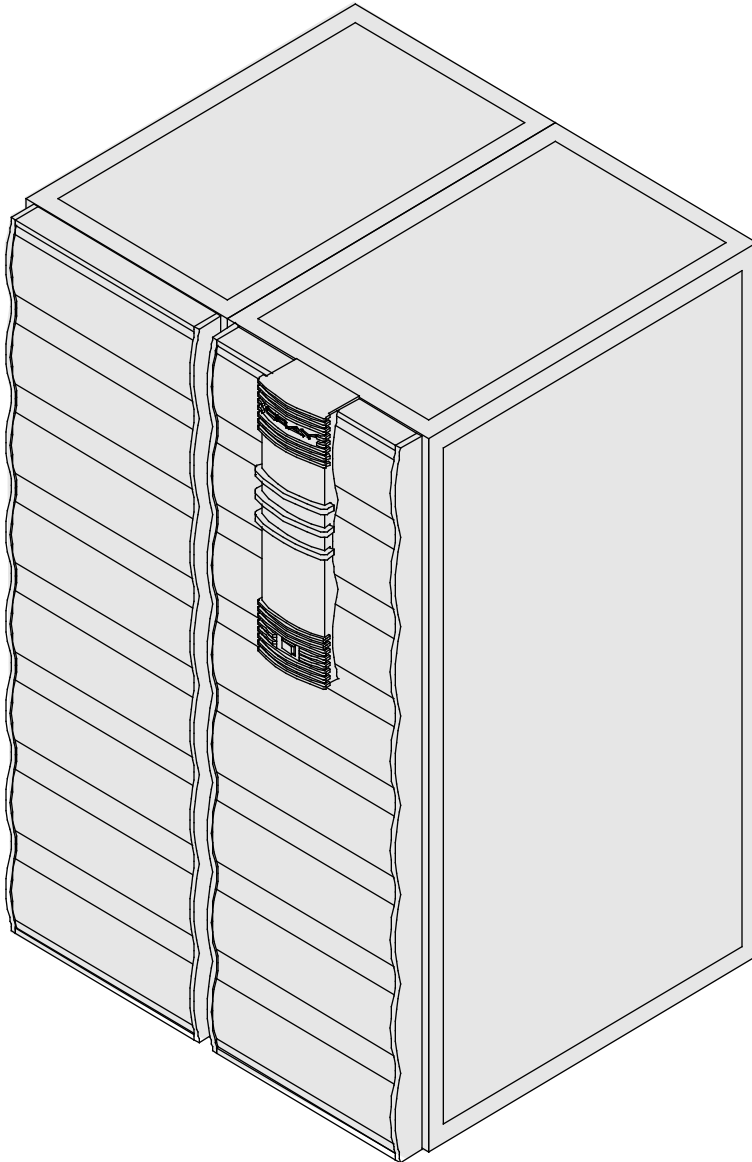# CRAY J90™ Series
CPU Upgrade Procedure
(Includes I/O-X Upgrade Procedure)

HMU-181-A

Cray Research Proprietary

Cray Research, Inc.

Record of Revision

CRAY J90 Series CPU Upgrade Procedure

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Overview

Device to Be Upgraded

This document contains procedures on how to add a processor module to the CRAY J90 series system for the purpose of adding CPU or I/O capabilities.

Description of Upgrade

Customers have the option of increasing the number of CPUs in their CRAY J90 series system. This procedure for performing a CPU or I/O-X 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.

An I/O-X upgrade involves adding processor modules for extra I/O connections such as the Y1 channel or HIPPI channel without increasing the number of CPUs.

This upgrade procedure includes separate hardware and software procedures for adding an additional CPU or CPUs to a CRAY J90 series system. One or both of the following procedures may be used, depending on a site's current CPU configuration.

- Add a processor module to a CRAY J90 series mainframe cabinet.

- Change a CPU Enable Block in the CRAY J916 mainframe cabinet; the CRAY J932 series CPU processor module has no enable blocks.

  The CRAY J916 system processor module has increments of 1 CPU at a time, and the CRAY J932 processor module has a minimum increment of 4 CPUs at a time.

Refer to *CRAY J916 HI-P Upgrade Procedure*, Cray Research publication number HMU-201-0, if you are adding a HIPPI channel as part of this upgrade. Refer to *CRAY J90 Series IOS Upgrade Procedure,* Cray Research Publication number HMU-202-A, if you will be adding I/O capabilities (Y1 channel) as part of this upgrade.

Upgrade Prerequisites

Ensure that the following system configuration items are known before beginning this upgrade:

- CPU Enable Block part number if it is a CRAY J916 system
- Number of processor modules

- Number of memory modules
- Memory type
- Backplane type (2 x 2, 4 x 4, or 8 x 8)
- Super user login and password
- SPR 90103 fix for UNICOS

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.

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.

	CAUTION
	Observe all ESD precautions. Failure to do so could result in damage to the equipment.
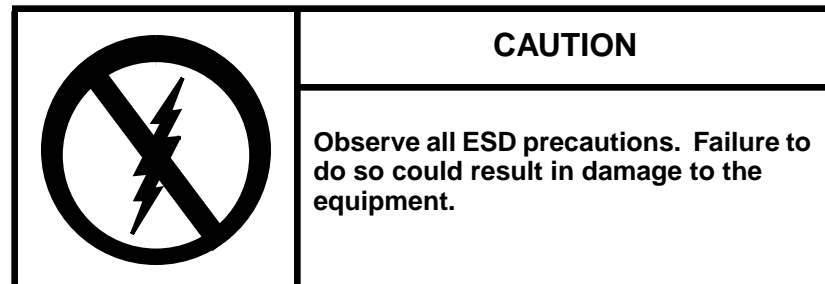
ESD Smock

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.

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

- *Automated Confidence Testing*, Cray Research publication number HDM-110-A

- *CRAY J916 Service Manual 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.

NOTE: If you are installing an I/O-X upgrade, ensure that you allow time for the other upgrades included in the field upgrade notice (FUN) .

Table 1. Estimated Time to Install CPU Upgrade

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

Parts Required for a CRAY J916 CPU Upgrade

All CRAY J916 systems include a CPU Enable Block installed in the mainframe backplane that enables a specific number of CPUs per system configuration. Each CRAY J916 system comes with a minimum of 4 CPUs. Refer to Table 2 for the number of possible CRAY J916 and CRAY J932 CPUs and how many processor modules are required for CRAY J90 series CPU configurations.

Table 2. Processor and CPU Configurations

CPUs Enabled	Number of Processors 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 gives 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 plug part number and the combination of CPUs enabled. Refer to the *Illustrated Parts Catalog* in the *CRAY J916 Service Manual Kit*, Cray Research publication number HMK-101-0, for the processor board part number. Use the following information to ensure that the correct parts are shipped for each CRAY J90 series CPU or I/O-X upgrade.

Table 3. CRAY J916 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	90343600
To 6 CPUs											X	X	X	X	X	X	90343601
To 7 CPUs										X	X	X	X	X	X	X	90343602
To 8 CPUs									X	X	X	X	X	X	X	X	90343603
To 9 CPUs								X	X	X	X	X	X	X	X	X	90343604
To 10 CPUs							X	X	X	X	X	X	X	X	X	X	90343605
To 11 CPUs						X	X	X	X	X	X	X	X	X	X	X	90343606

Table 3. CRAY J916 CPU Configurations

CPUs Enabled	Configuration (Processor Modules 0 through 3)																CPU Enable Block Part Number
	Proc 3				Proc 2				Proc 1				Proc 0				
To 12 CPUs					X	X	X	X	X	X	X	X	X	X	X	X	90343607
To 13 CPUs				X	X	X	X	X	X	X	X	X	X	X	X	X	90343608
To 14 CPUs			X	X	X	X	X	X	X	X	X	X	X	X	X	X	90343609
To 15 CPUs		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	90343610
To 16 CPUs	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	90343611

Table 4. CRAY J916 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	90343612
4								X				X			X	X	90343613
5								X				X		X	X	X	90343614
6								X				X	X	X	X	X	90343615
7								X			X	X	X	X	X	X	90343616
8								X		X	X	X	X	X	X	X	90343617
4			X					X				X				X	90343618
5			X					X				X			X	X	90343619
6			X					X				X		X	X	X	90343620
7			X					X				X	X	X	X	X	90343621
8			X					X			X	X	X	X	X	X	90343622
9			X					X		X	X	X	X	X	X	X	90343623
10			X					X	X	X	X	X	X	X	X	X	90343624
11			X				X	X	X	X	X	X	X	X	X	X	90343625
12			X			X	X	X	X	X	X	X	X	X	X	X	90343626

Parts Required for a CRAY J932 CPU Upgrade

The CRAY J932 series system does not utilize a CPU enable plug. Any processor module installed in that system will have all 4 CPUs enabled.

Parts Required for an I/O-X Upgrade

An I/O-X upgrade includes a processor module and CPU enable block. The remainder of the parts needed for this upgrade is dependent on what else is being added as part of the field upgrade notice (FUN).

Tools Required

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

- #1 Phillips screwdriver
- #1 flat-bladed screwdriver
- 5/32-in. allen wrench

Software Required

- Minimum IOS kernel revision - 1.3 for a CRAY J916 system and 1.5.1 for a CRAY J932 system

- Minimum UNICOS revision - 8.0.3.2J for CRAY J916 systems and 8.0.4.1 for CRAY J932 systems

- No special considerations

Getting Started

Conventions

The following conventions are used throughout this document:

Convention	Meaning
command	This fixed-space 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.
variable	Italic typeface denotes variable entries, words or concepts being defined.
user input	This bold fixed-space font denotes literal items that the user enters in interactive sessions. Output is shown in nonbold, fixed-space font.
<KEY>	This convention indicates a key on the keyboard.

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. See 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.

> **Perform the following procedure if your upgrade requires the addition of a new CRAY J916 processor module.**

Power Down the CRAY J916 Mainframe Cabinet

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 super user 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>
    ```

6. Move the circuit breaker to the 0 or OFF position on the back of the mainframe cabinet.

Perform the following procedure if your upgrade requires the addition of a new CRAY J916 processor module.

Open the CRAY J916 Mainframe Rear Door

1. 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.

2. Grasp the door handle and swing the door open to the right.

Insert the New CRAY J916 Processor Module

1. Connect a grounding strap to the mainframe cabinet.

2. Remove the leftmost module cover plate (two screws) that covers the blank module slot in which the new processor module will be placed. Refer to Figure 1 for slot locations.

2 x 2 System

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

4 x 4 System

Backplane							
Mem Secs 0 4	Mem Secs 2 6					Mem Secs 1 5	Mem Secs 3 7
Mem 0	Mem 2	Proc 0	Proc 1	Proc 2	Proc 3	Mem 1	Mem 3
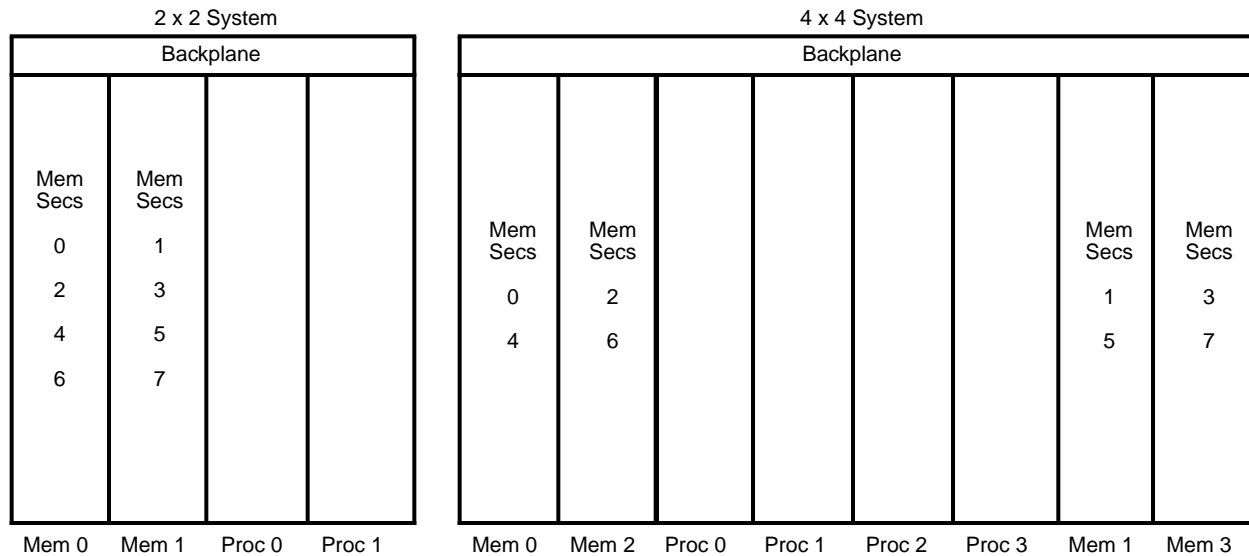
NOTES: Proc 1 slot may be vacant in 2 x 2 configurations.
Proc 1, Proc 2, and Proc 3 slots may be vacant in 4 x 4 configurations.
All memory module slots will always be filled.

Figure 1. Backplane Slot Locations for Memory and Processor Modules

3. Carefully unpack the new processor module. Retain the shipping container for future use.

CAUTION

**The processor and memory modules are heavy.
Use caution when lifting to avoid back injury
and damage to the module.**

---

4. Place the module into the module guides in the mainframe chassis and push the module into the chassis until it contacts the air damper control handle.

5. 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.

6. Turn the jack screws clockwise until the module is fully seated.

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

8. Close the rear door of the cabinet by swinging the door shut and turning the two door-locking fasteners clockwise.

Open Front Door

1. Locate the located on the upper-right corner of the door.

2. Push down on the latch and swing the door open.

Remove Backplane Cover

1. Connect a grounding strap to the mainframe cabinet.

2. Loosen the two restraining screws that secure the backplane cover.

3. Lift off the backplane cover and set it aside.

Remove Old CPU Enable Block

1. Loosen the two restraining screws that secure the CPU Enable Block to the backplane as shown in Figure 2. You may need a flat-bladed screwdriver.

2. Pull out the old CPU Enable Block by grasping and pulling on the restraining screws.

Install CPU Enable Block

1. Refer again to Table 3 to ensure that you have the correct CPU Enable Block for the customer's new CPU configuration. The part number is indicated on its label as shown in Figure 2.

2. Insert the new CPU Enable Block with the label facing to the right. Refer to Figure 2.

3. Tighten the two restraining screws to secure the CPU Enable Block to the backplane.

4. Replace the backplane cover by tightening the two restraining screws that secure the backplane cover.
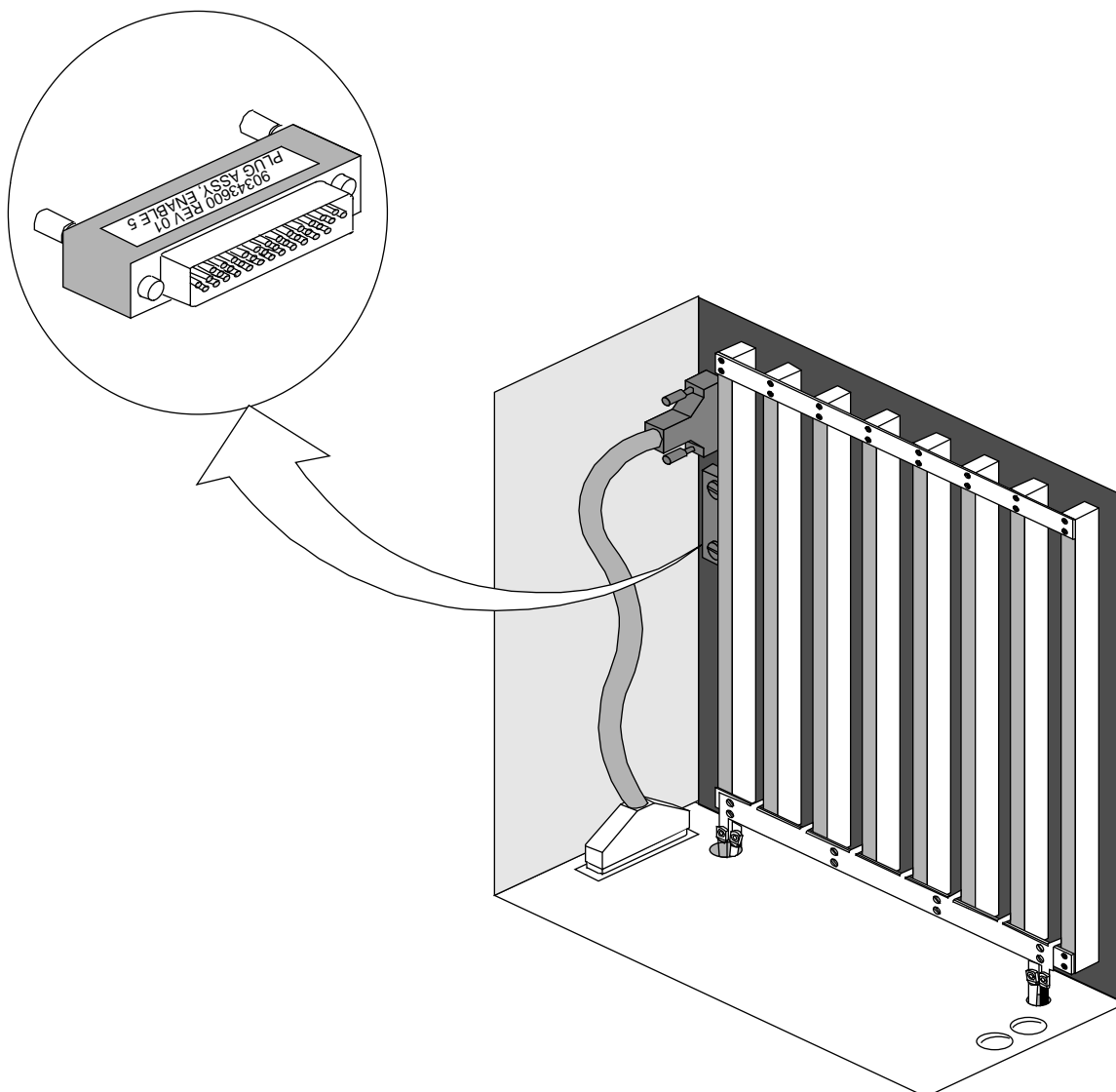
Figure 2. CPU Enable Block

Perform the following procedure if your upgrade requires the addition of a new CRAY J932 processor module.

The CRAY J932 processor modules must be installed in consecutive slot locations.

Front

8 X 8 System

Mem 4	Mem 6	Proc 4	Proc 5	Proc 6	Proc 7	Mem 5	Mem 7

Card Cage A

| | Mem Sec 4 | Mem Sec 6 | CPUs 16 17 18 19 | CPUs 20 21 22 23 | CPUs 24 25 26 27 | CPUs 28 29 30 31 | Mem Sec 5 | Mem Sec 7 |

Midplane

Card Cage B

| | Mem Sec 0 | Mem Sec 2 | CPUs 0 1 2 3 | CPUs 4 5 6 7 | CPUs 8 9 10 11 | CPUs 12 13 14 15 | Mem Sec 1 | Mem Sec 3 |

Mem 0	Mem 2	Proc 0	Proc 1	Proc 2	Proc 3	Mem 1	Mem 3

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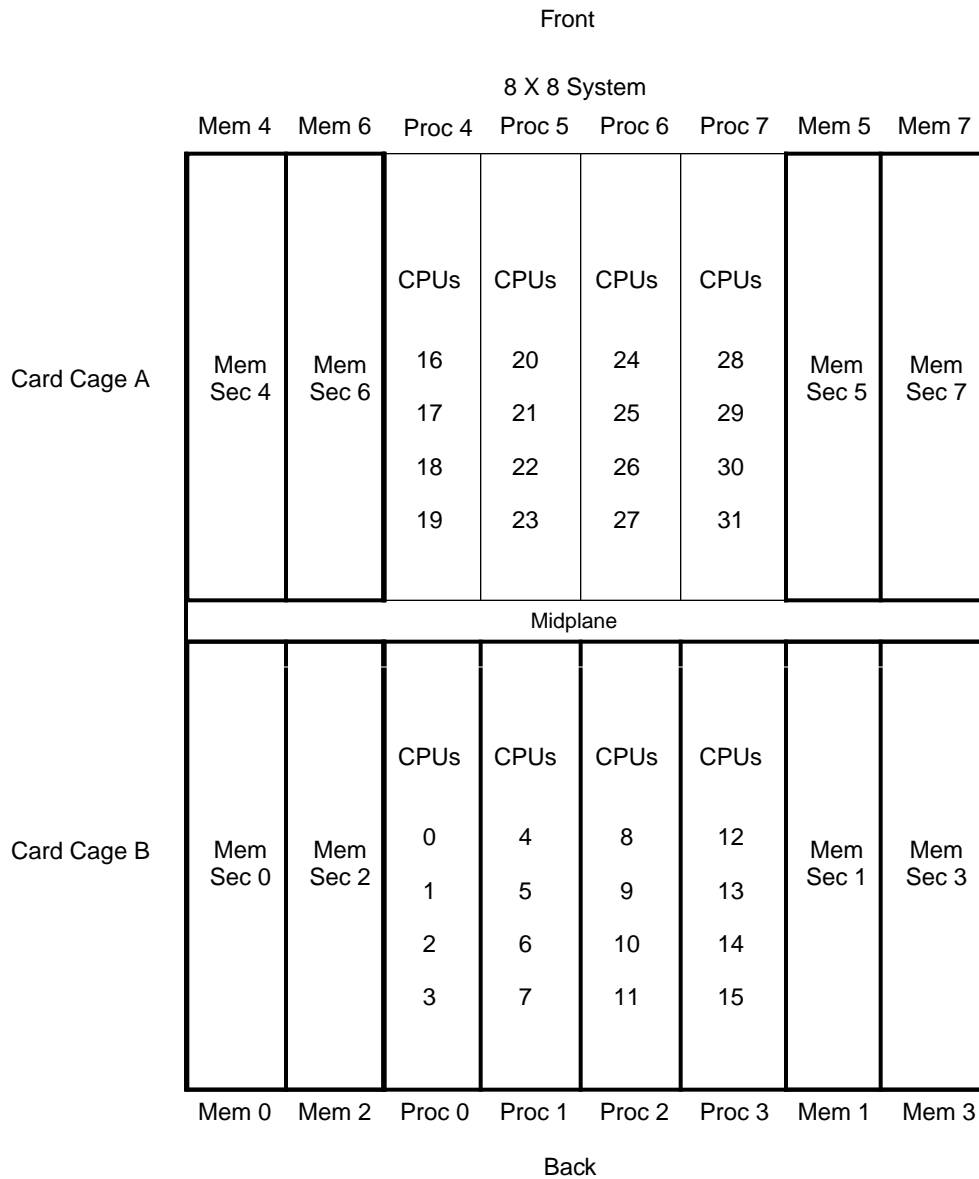
NOTES: Proc 4, Proc 5, Proc 6, and Proc 7 slots may be vacant in an 8 x 8
configuration. All memory module slots will always be filled.

Figure 3. CRAY J932 Processor Module Locations

Power Down the CRAY J932 Mainframe Cabinet

1.   Ensure that the operating system is not running before you proceed.

1.   Move the circuit breaker at the rear of the appropriate cabinet to the 0
(OFF) position.

Install the CRAY J932 Processor Module

Place the module on a static-dissipative surface. If necessary, install the channel paddle boards or HIPPI paddle cards on the new 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.

Refer to the additional upgrade procedure included as part of your FUN to complete this upgrade.

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 or 4 x 4). Refer to Figure 1.

   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 to choose the correct CPU bitmaps for your system.

   d. 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.

   e. Insert a blank DAT cartridge into the system DAT drive located on the front of the VME chassis. When the green light stops blinking, the tape drive is ready.

   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. Press the eject button on the DAT unit and remove the DAT cartridge from the system DAT drive.

9. Using the right mouse button, select the `Workspace` menu.

10. From the `Workspace Menu`, select the `J90 Console` menu item.

11. At the `QLOAD>` prompt, enter the following command and wait for the `BOOT[sn9`*xxx*`-ios0]` prompt:

    QLOAD> **reset**

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

    BOOT[sn9*xxx*-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-110-0, 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 1.3 and the minimum UNICOS revision level is 8.0.3.2J.

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)

NOTE: Do not use the UNICOS Installation/Configuration Menu System until your system is running the UNICOS operating system release 8.0.4 or later.

Perform the following procedure to use the UNICOS ICMS to rebuild the UNICOS operating system. You must have super user privileges. For additional information on the ICMS, see the *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:

   `sn9`*xxx*`-ios0>` **`boot`**

3. Enter multiuser mode by entering the following command:

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

4. Log on as super user (`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 8.0 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 5 or Table 6, depending on which table describes your system's backplane configuration, to verify your system's NBANKS, CHIPSZ, and MEMORY parameters.

Table 5. 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 6. 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 8.0 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 8.0 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:

```
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 `sn9`*xxx*`-ios0>` prompt, start the UNICOS operating system by entering the following command:

   `sn9`*xxx*`-ios0>` **boot**

2. Enter multiuser mode by entering the following command:

   # **/etc/init 2**

3. Log on as super user (`root`).

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

   # **ls /usr/src/uts/cf.9***xxx***/sn.h**

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

   # **mkdir /usr/src/uts/cf.9***xxx***
   # **cd /usr/src/uts/cf.9***xxx***
   # **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.9***xxx***/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 performing the upgrade. 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 5 or Table 6, depending on which table describes your system's backplane configuration, to verify your system's NBANKS, CHIPSZ, and MEMORY parameters.

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.9***xxx***/lib/*.o**
    # **rm -f cf.9***xxx***/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)*
    sn9*xxx*-ios0> **mv /sys/unicos.ymp /sys/unicos.old**
    sn9*xxx*-ios0> **mv /sys/param /sys/param.old**
    sn9*xxx*-ios0> **<CONTROL-a> <RETURN>** *(toggles to UNICOS)*
    # **cd /usr/src/uts/cf.9***xxx*
    # **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

IR Reporting

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