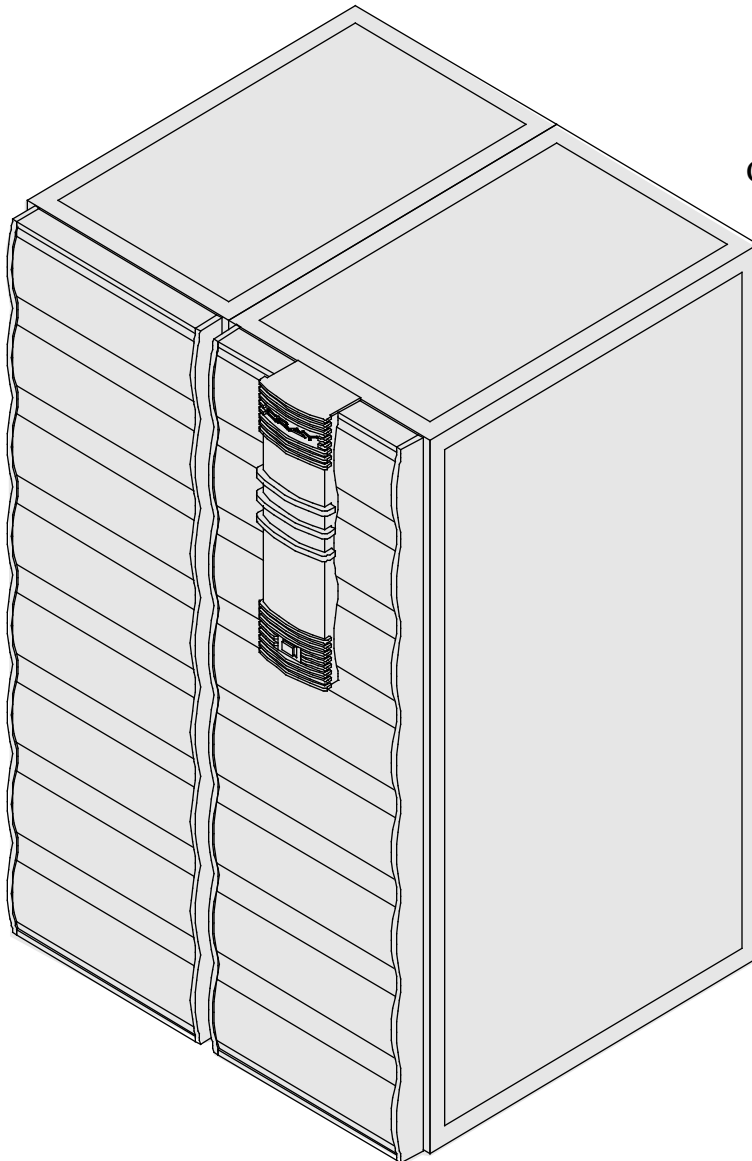# CRAY J916™
2 X 2 to 4 X 4 Backplane Upgrade Procedure

Cray Research Proprietary

Cray Research, Inc.

Record of Revision

REVISION   DESCRIPTION

June 1995. Original distribution.

Comments about this upgrade should be directed to:

CRAY J916 Backplane Upgrade Procedure

Figures

Tables

Overview

Device to Be Upgraded

This procedure documents upgrading a CRAY J916 system with a 2 X 2 backplane to a 4 X 4 backplane.

Description of Upgrade

CRI customers have the option of upgrading their 2 X 2 backplane to a 4 X 4 backplane. This procedure includes separate hardware and software procedures for upgrading to a 4 X 4 backplane. You will have to remove existing processor and memory modules and the 2 X 2 backplane. You will then install the 4 X 4 backplane, existing processor and memory modules, and two new memory modules. This publication fully documents the memory upgrade procedure. For a separate CPU upgrade, refer to *CRAY J916 CPU Upgrade Procedure*, Cray Research publication number HMU-181-0. Table 1 lists the memory upgrade configurations.

Table 1. Memory Upgrade Configurations

Current Memory Configurations	Install	Part Number	New Memory Configuration
32 MW (256 MB)	Two MEM16 memory modules	90373001	64 MW (512 MB)
64 MW (512 MB)	Two MEM32 memory modules	90380501	128 MW (1024 MB)
128 MW (1,024 MB)	Two MEM64 memory modules	90373201	256 MW (2048 MB)
256 MW (2,048 MB)	Two MEM128 memory modules	90373101	512 MW (4096 MB)

Backplane Upgrade Prerequisites

Ensure that the following system configuration items are available before you begin this upgrade:

- Memory module type label value (which is located on the faceplate of each memory module)

- Memory size that you are upgrading to

- Boundary scan number for each module, which can be found on a label on the back of each module (BSN=*X*; *X* is the revision letter)

Training Requirements

Cray Research personnel who perform this backplane upgrade must have completed training in CRAY J916 hardware and system administration. 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 J916 system or CRAY Y-MP EL 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 J916 system cabinet.

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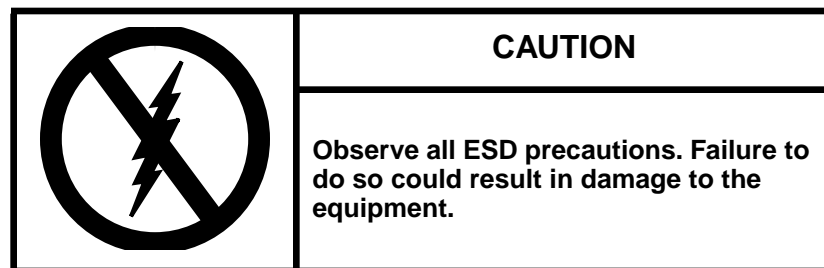
ESD Smock

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

- *Automated Confidence Testing*, Cray Research publication number HDM-110-0

- *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

- *CRAY J916 Memory Upgrade Procedure*, Cray Research publication number HMU-183-0

Estimated Time to Install Upgrade

Table 2 divides the backplane upgrade process into three separate procedures. Use this table to determine how much system time you should request to complete this upgrade.

Table 2. Estimated Time to Install Upgrade

Install Task	Estimated Time to Install Upgrade
Hardware Install	2 hours
Hardware Verification Testing	1 hour
Software Reconfiguration	1 hour

Parts Required

Table 3 lists the 4 X 4 backplane parts.

Table 3. 4 X 4 Backplane Parts

CRI Part Number	Quantity	Description
90441700	1	Tool, Pin Protector Removal, Backplane Connector
90397600	24	Pin Protector, Backplane Connector
90362700	1	Module Assembly, Backplane 4 X 4
90442800	1	Tool, Wrench, Allen, Ball-head socket, 5/32-in.

Tools Required

You will need the common hand-held tools that are included with the Customer Service toolkit. Refer to your parts list for additional tools that are needed exclusively for this upgrade.

Software Required

- Minimum IOS kernel revision - 1.3
- Minimum UNICOS revision - 8.0.3.2J
- No special considerations

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.

Getting Started

Check the parts list enclosed with the kit to ensure that you have received all items that should be included with the kit. Do not begin this upgrade procedure unless all necessary parts are available on-site.

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.

Power Down the CRAY J916 Mainframe Cabinet

1. Ensure that the customer has brought the system to single user mode.

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 Console` menu item.

    NOTE: You must have super user privileges to perform Step 4.

4. Log into the UNICOS operating system by entering `<CONTROL-a>` to get a UNICOS prompt and enter the root login and password.

5. 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)
    ```

6. 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>
    ```

7. Power off the system by pressing the CCU SYSTEM OFF button.

8. Ensure that the mainframe cabinet circuit breaker is in the OFF (0) position.

9. Remove mainframe cabinet AC power plug from its source.

Open the Mainframe Cabinet Rear Door

1. At the rear of the mainframe cabinet, turn the two door fasteners located at the right top and bottom 1/4-turn counterclockwise with a 5/32-in. allen wrench.

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

Remove the Mainframe Cabinet Front Door

1. Push down on the latch located on the upper-right corner of the front door and swing the door open.

2. Remove the retaining screw that attaches the ground wire cable to the mainframe cabinet.

3. Lift up and remove the front door off its hinges.

Remove Clock/Scan Module

1. Remove the backplane cover by loosening the two captive screws.

2. Remove the cover located directly below the backplane cover.

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 backplane.

4. Pull the clock/scan module out of the guide slots and remove it from the cabinet. Place the module in an antistatic bag.

Remove Mainframe Processor and Memory Modules

> **NOTE:** Before you start the following procedure ensure that you have a place where you can temporarily place the processor and memory modules while removing the backplane.

1. Turn the jack screws located at the top and bottom of the module counterclockwise until the module is loose in the chassis.

   > **NOTE:** All modules must be removed. You will need to place backplane connector pin protectors (P/N 90397600) on the 2 X 2 backplane being removed and remove 48 pin protectors from the 4 X 4 backplane after it is installed. Use the pin protector removal tool (P/N 90441700) to remove these protectors.

2. Remove the Y1 and HIPPI channels from the processor modules. Ensure that these cables are labeled.

3. Grasp the module securely and remove it from the chassis.

4. Remove all of the blank module slot covers.

5. Install (24) pin protectors on the existing backplane using the prescribed tool included with the upgrade kit. You may want to use a flashlight.

Remove the Power Bus, Power Cables, Sense Cable, and CPU Enable Block

Retain all of the hardware as you are removing the components because you will be reusing it later.

> **NOTE:** Use tape to cover the holes of the clock module cooling ducts and the holes that the 48 Vdc power cables route through to prevent screws or nuts from dropping into other assemblies.

1. Using a 3/8-in. socket, remove the four nuts and flatwashers that secure the 48 Vdc power cables to the 48 Vdc power bus and remove the power cables from the studs. Push the power bus cables down outside of the chassis.

2. Disconnect and remove the entire sense cable assembly. There is an external extension to this assembly located below the chassis. Refer to Figure 1. Remove the two jackscrews and nut plate retaining sense cable to CPU chassis using a 3/16-in. socket.

3. Remove the CPU Enable Block.
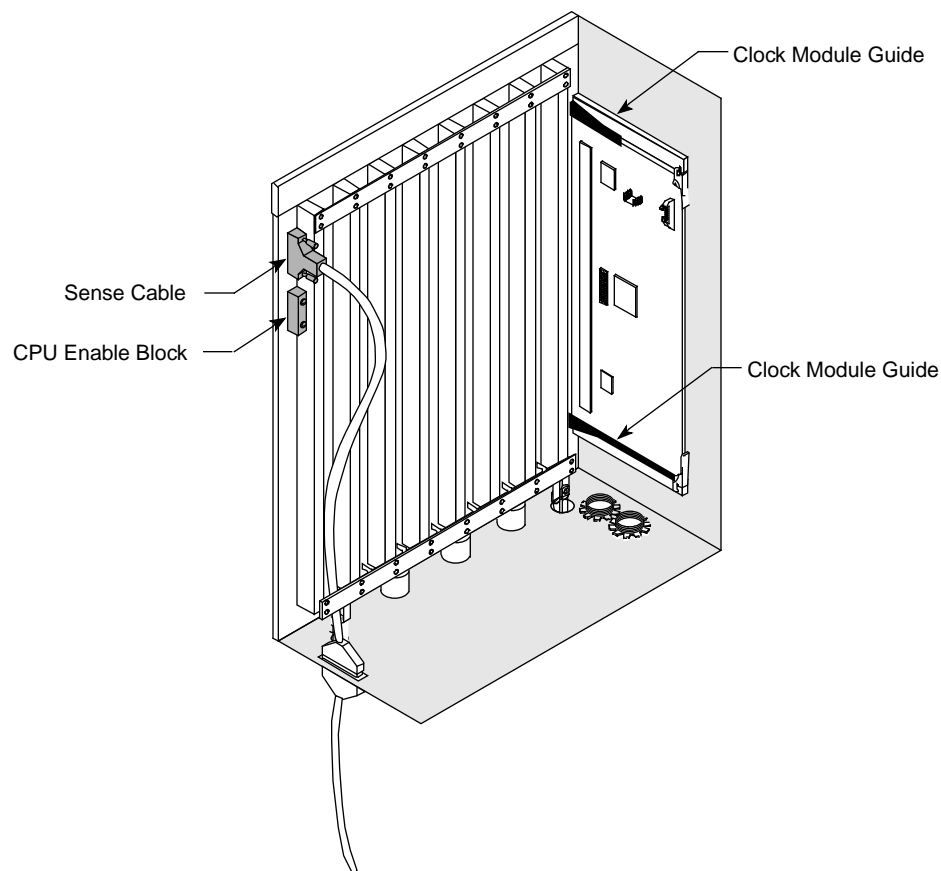
Figure 1. CPU Enable Block and Sense Cable

Remove the Backplane

```
                          CAUTION

        The backplane is heavy. Remove the 13 side screws
        first, then the bottom 8 screws, and then the top 8
        screws, removing the middle screw last. Support the
        backplane while removing this last screw. Failure to do
        so may result in damage to the backplane.
```

1. Remove the 29 perimeter screws that secure the backplane to the chassis. Remove the middle top screw last while supporting the backplane at the same time. Refer to Figure 2.

2. When all the screws are removed, tip the top of the backplane toward the front of the mainframe cabinet and bring the right side forward.

3. Remove the clock module guides from the 2 X 2 backplane and retain them for installation on the 4 X 4 backplane. Refer to Figure 1. Take note of the screw length and location as you remove the screws.

Four Nuts
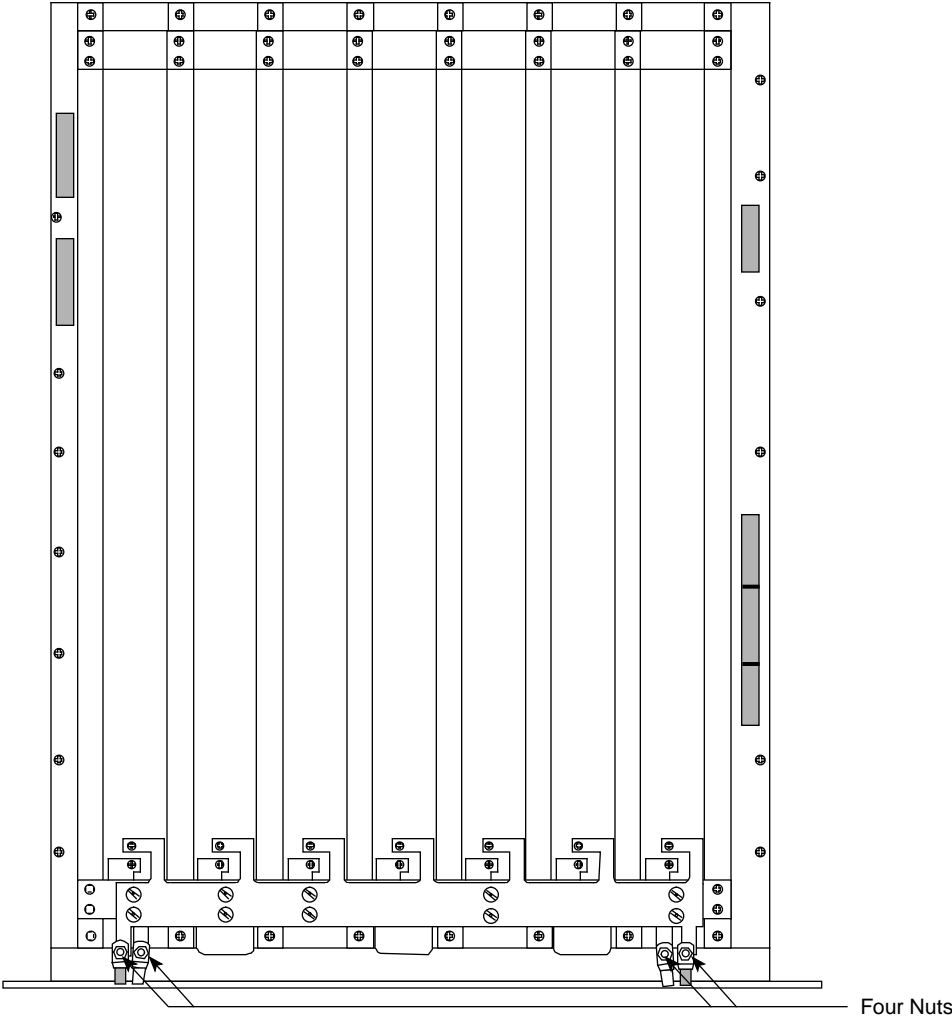
Figure 2. CRAY J916 Backplane

Install the New Backplane

> **NOTE:** Ensure that you have a 10-32 socket-head cap screw and 5/32-in. allen wrench within reach when you begin to position the backplane.

1. Unpack the new 4 X 4 backplane. Save the packing material for reuse when you return the 2 X 2 backplane to Removed Parts Distribution.

2. Install the clock module guides that you removed from the 2 X 2 backplane you removed.

3. Place the 4 X 4 backplane into the front of the mainframe cabinet.

4. Loosely insert one of the 16 socket-head cap screws along the top and in the middle of the backplane.

5. Loosely replace all of the perimeter screws to secure the backplane to the chassis. There are 13 Phillips screws that secure the sides of the backplane and 16 #10-32 socket-head cap screws that secure the top and bottom of the backplane.

6. Tighten all of the perimeter screws.

> **NOTE:** The two outside 48 Vdc wires are black (-) wires, and the two inside 48 Vdc wires are white (+) wires.

7. Use a 3/8-in. nut driver to replace the 48 Vdc cables onto the studs of the 48 Vdc power bus and secure them with the four nuts and flat washers that you removed earlier. These connections must be tight to prevent power loss. The bus bar and cables are labeled with either a + or -.

8. Replace the sense cable on the upper connector (J2) in the upper-left corner of the backplane and the other end along the plate below the backplane.

9. Replace the CPU enable block on the lower connector (J3) in the upper-left corner of the backplane.

10. Connect the lower cable assembly to the sense cable.

Replace the Clock/Scan Module

1. Set the clock/scan module in the guide slots.

2. Push the clock/scan module into the chassis until it contacts the backplane connectors.

3. Using the ejector handles as push-pads, seat the clock/scan module firmly in the backplane connector.

4. Remove the 48 pin protectors from the new 4 X 4 backplane using the pin protector removal tool (P/N 90441700).

Reinstall Original Processor and Memory Modules

1. At the rear of the cabinet, reinstall all of the mainframe modules you removed before you replaced the backplane.

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

   b. Open the slot air damper to its open position by turning the air damper handle 1/4-turn counterclockwise. Continue to push the module into the chassis until it contacts the backplane.

   c. Tighten the jack screws until the module is fully seated.

   d. Ensure that each module's DC enable indicator is green.

2. Reattach the Y1 and HIPPI channels.

Insert the New Memory Modules

1. Carefully unpack the new memory modules. Retain the shipping container for future use.

2. 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.

3. Open the slot air damper to its open position by turning the air damper handle 1/4-turn counterclockwise. Continue to push the module into the chassis until it contacts the backplane.

4. Tighten the jack screws until the module is fully seated.

5. Repeat Steps 1 through 4 for each memory module inserted.

6. Ensure that each module's DC enable indicator is green.

7. Install the module slot cover plates as required.

Power Up CRAY J916 System

1. Reconnect the mainframe cabinet AC power plug to its source.

2. Using the right mouse button, click on any open working space. The `Workspace` menu will appear.

3. Select the `J90 Console` menu item.

4. Move the circuit breaker on the back of the mainframe cabinet to the `ON` position first, and then move the circuit breaker on the back of the I/O cabinet to the `ON` position.

5. Press the `Alarm Acknowledge` button on the CCU.

6. Press the `CPU RESET` button on the CCU.

7. Press the `VME RESET` button on the CCU.

8. Observe any errors on the console screen.

9. Ensure that the DC enable indicators for the memory and processor modules are green.

10. Verify that the SYSTEM READY light on the control panel illuminates.

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

12. Replace the backplane cover and the cover below it and tighten the retaining screws.

13. Install and close the front door of the cabinet by reconnecting the ground wire and swinging the door shut, ensuring that the door latches are connected.

Update Hardware Configuration Registers

Perform the following procedure to update the hardware configuration registers. You will start from the CRAY J916 workstation root window.

1. Close the current `J90 Console` session by entering the following:

   `~. <CONTROL-c>`

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

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 (4 X 4).

   b. Appropriate number of memory modules and the memory type of each module. The memory type is on a label on the front of the module. The possible memory type values are 8, 0, B, and 3.

   c. Verify the number of processor modules and the appropriate bitmap for each CPU processor module. 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 4 to choose the correct CPU bitmaps for your system.

Table 4. 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
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

    d.   Open the door of I/O cabinet #1.

    e.   If your CRAY J916 system is running the UNICOS 8.0.3.2J release, insert a blank Digital Audio Tape (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. This step is required for the listed release to successfully update the hardware configuration. The DAT cartridge does not contain information that must be archived; it can be immediately reused.

    f.   Select the `Configure Hardware` button (no activity indicators are presented; this step may take 3 to 5 minutes).

    g.   Wait for the `J90 Mainframe Hardware Configuration Acknowledgment` window to appear.

    h.   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.   If you inserted a DAT cartridge in Step 6e, 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:

    QLOAD0> **reset**

12. Load the IOS kernel by entering the following command (this step takes 3 to 30 minutes):

    BOOT[sn9*xxx*-ios0]> **load**

13. To verify that your hardware configuration is correct, display the System Hardware Configuration by entering the `jconfig` command. Exit `jconfig` by entering `<CONTROL-c>`.

    The following output is a sample output for an 8-CPU system with a system memory size of 64 Mwords. If the values displayed in the `jconfig` output do not match your system's new configuration, enter `<CONTROL-c>` and return to Step 1 in this subsection ("Update Hardware Configuration Registers") and repeat all steps. If the values displayed match your system's new configuration, enter `<CONTROL-c>`.

```
sn9xxx-ios0> jconfig

**********System Hardware Configuration **********

CP BOARDS PRESENT    CPUs PRESENT ON EACH CP BOARD
------------------- -------------------------------
0                    0    1    2    3
1                    0    1    2    3

MEM BOARDS PRESENT: 0    1    2    3
MEMORY BOARD TYPES: 0    0    0    0

Backplane Type:     4x4
Is This Configuration Correct (y, n, <CTRL-C>)?
<Control-c>
```

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

15. From the `Workspace` menu, select the `xterm` menu item.

16. From the xterm window, use `vi` to edit the `boot` script and change the memory size parameter on the fill memory command (`fm`) line:

    # **vi /opt/ios/9*xxx*/bin/boot**

    The following text is an example of a `boot` script (the number you will change is in bold):

```
#!
mc
echo Zeroing memory. Please wait...
fm 0 0x4000000 0 0 0 0
echo Clear memory complete. Loading UNICOS 8.0.4...
lu /sys/unicos.ymp /sys/param
echo Starting unicos
iostart
ds
conswitch
```

Refer to Table 5 for a 4 X 4 backplane determine the correct Fill Memory (`fm`) Value to insert on the `fm` command line.

Table 5. Configuration Values for a 4 X 4 Backplane

Memory Board Label	Megawords (MEGAWD-1) Value	NBANKS Value	CHIPSZ Value	Fill Memory Value	Memory Module Type
8	64	256	M4MCH	0x4000000	MEM16
0	128	512	M4MCH	0x8000000	MEM32
B	256	256	M16MCH	0x10000000	MEM64
3	512	512	M16MCH	0x20000000	MEM128

17. Exit the xterm window by entering the following command:

    # **exit**

Use ACT to Verify Hardware Operation

The second level of ACT provides a menu-driven interface that selects and runs specific diagnostics. If ACT detect a failure, refer to *Automated Confidence Testing*, Cray Research publication number HDM-110-0.

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

    sn9*xxx*-ios0> **act_menu**

2. Configure the J90 boundary scan revision number for the new memory configuration and verify that the other module revisions are correct by entering the JBS – J90 Boundary Scan submenu. Enter 3 and <RETURN> to start Run System Boundary Scan.

3. The following menu will be displayed. Enter 2 and <RETURN> to select the Boards Specified for Test.

    ```
            JBS – J90 BOUNDARY SCAN

      1.    Boundary Scan Test Level   : All tests
      2.    Boards Specified for Test  : Default
      3.    Number of Passes           : 1
      4.    Error Information          : Standard
      5.    Number of Errors           : 10000

      R.    Run Selected Tests(s)

      H.    Help Screen
      Q.    Quit Program

            Enter Selection: 2 <RETURN>
    ```

4. The `Boards Specified for Test` menu appears, displaying the boundary scan revision numbers. Verify that the revision number of each board listed in the display matches the revision number located on the module sticker on the back of the module (BSN=*X*; *X* is the revision number). If any of the listed values differ from the module stickers, change the value in the menu to match the sticker by choosing the appropriate module (by number) and selecting the correct revision letter. Below is a sample display of a 4 X 4 backplane system with two processor modules, one at revision A and one at revision B. All four memory modules in this example are at revision A. If you make any changes, write the changes to the `/sys/config.jbs` file by selecting the `W` option. When all revisions are correct, exit this submenu by selecting `P`.

```
          Boards Specified for Test

               1.  PROC0  : rev A
               2.  PROC1  : rev B
               3.  PROC2  : -----
               4.  PROC4  : -----
               5.  MEM0   : rev A
               6.  MEM1   : rev A
               7.  MEM2   : rev A
               8.  MEM3   : rev A
               D.  Default Settings
               W.  Write Changes
               P.  Previous Menu

               Enter selection:
```

5. Exit (quit) the `JBS - J90 Boundary Scan` submenu by entering `q`.

6. Select `1` to run all basic tests from the `Automated Confidence (BASIC) Test` menu. This step will take 4 to 16 minutes, depending on the system configuration.

7. Select `n` from the `Automated Confidence (BASIC) Test Menu` to go to the `Automated Confidence (INTERMEDIATE) Test` menu.

8. Select `1` to run all intermediate tests. This step will take 3 to 7 minutes, depending on the system configuration.

9. Select `n` from the `Automated Confidence (INTERMEDIATE) Test menu` to go to the `Automated Confidence (COMPREHENSIVE) Test` menu.

10. Select 1 to run all comprehensive tests. This step takes about 20 minutes, depending on the system configuration.

11. Select q to quit the ACT menu system.

Software Change Procedure

You must rebuild the UNICOS operating system as part of the CRAY J916 2 X 2 to 4 X 4 backplane upgrade. This is necessary to reflect the altered memory configuration. 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 memory is accessible from UNICOS. When the system boots, it should report the amount of available memory.

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 (for more information on bringing your system to multiuser mode, refer to the *UNICOS Basic Administration Guide for CRAY J90 and CRAY EL Series*, publication SG-2416):

    `#` **`/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 `Physical memory size in Mwords` to the number of Mwords of memory the system will have after the upgrade:

    `S->` `Physical memory size in Mwords`   **`#`**

10. Change the value of `Number of memory banks (NBANKS)` to the number that corresponds to the number of memory boards the system will have after the upgrade. Use Table 5 to choose the correct NBANKS value for a 4 X 4 backplane.

> **`S->`** `Number of memory banks (NBANKS)`   **`#`**

11. Change the value of `Bits per memory chip (CHIPSZ)` to the number that corresponds to the label on your memory modules. If your memory modules are labeled 0 or 8, use the value M4MCH; otherwise, use the value M16MCH.

12. Verify that the rest of the configuration information is correct.

13. Execute the following action:

> **`A->`** `Activate the hardware configuration...`

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

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

```
UNICOS 8.0 Installation / Configuration Menu System
. Build/Install System
```

15. 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 Quit V ViewDoc W WhereAmI
```

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

    A-> `Do the build ...`

17. 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
    ```

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

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

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

    ```
    sn9xxx-ios0> reload
    sn9xxx-ios0> boot
    ```

    Verify that the kernel recognizes all of the system memory by reviewing the output of the `boot` command. The value associated with `Memory Configured` is the number of Cray words that is configured for the system. This number will not be an exact multiple of 1048576 (megaword) due to aligning the bits for the Exchange Package; however, it should be very close. The following line is sample output of `Memory Configured` for a 128-Mword system:

```
May  9 08:22:06 sn9001 unicos: Memory Configured = 134216704 words
```

20. Enter multiuser mode by entering the following command (for more information on bringing your system to multiuser mode, refer to the *UNICOS Basic Administration Guide for CRAY J90 and CRAY EL Series*, publication number SG-2416):

```
# /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.

Perform the following procedure to manually change the kernel configuration files to rebuild the UNICOS operating system. Refer to the *UNICOS Basic Administration Guide for CRAY J90 and CRAY EL Series*, publication number SG-2416, for details on these steps.

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

```
sn9xxx-ios0> boot
```

2. Enter multiuser mode by entering the following command (for more information on bringing your system to multiuser mode, refer to the *UNICOS Basic Administration Guide for CRAY J90 and CRAY EL Series*, publication number SG-2416):

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

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

4. Verify that the `/usr/src/uts/cf.9xxx/sn.h` file exists by typing the following command:

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

If it does not, create it by entering the following commands (9*xxx* 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:

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

This file contains values for the system serial number, number of CPUs, and memory parameters. Use Table 5, on page 19, to obtain the correct memory parameters for your 4 X 4 backplane system.

6. Update kernel configuration values in the sn.h file. The following file is a sample file for an 8-CPU, 128-Mword system with a memory label=0 in a 4 X 4 backplane system:

```
#define NBANKS  512
#define CHIPSZ  M4MCH
#define VHISPS  0
#define L2CS    0
#define MEMORY  128*MEGAWD-1
#define NCPU    8
#define MAXCLUS 9
```

The NBANKS value reflects the number of memory banks in the system. Refer to Table 5, on page 19, to obtain the correct memory parameters for your 4 X 4 backplane system.

The CHIPSZ is the size of the memory chips on each memory module in the system. Refer to Table 5, on page 19, to determine the appropriate value for your 4 X 4 backplane system.

The VHISPS value should be set to 0.

The L2CS value should be set to 0.

The MEMORY value is the total number of Mwords of memory in the system. Refer to Table 5, on page 19, to determine the appropriate value for your 4 X 4 backplane system.

The NCPU value is the number of CPUs configured for your system.

The MAXCLUS should be set to the number of CPUs configured for your system plus 1 (NCPU+1).

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

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

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

   # **vi /etc/config/param**

   Change the following memory value in the `/etc/config/param` file. Refer to Table 5, on page 19, to determine the appropriate value for your 4 X 4 backplane system.

9. The following value is the entry for a 128-megaword system:

   128 Mwords memory;

10. Verify that the `/etc/config/param` file is correct by executing the `econfig` command against the updated `/etc/config/param` file. Enter the following command line:

    # **/etc/econfig /etc/config/param**

    Correct any errors displayed before proceeding to the next step. Refer to the *UNICOS Basic Administration Guide for CRAY J90 and CRAY EL Series*, publication number SG-2416, for specific information on configuring the `param` file for the CRAY J916 system.

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** *(this step takes 20 – 35 minutes)*

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  (may take 2 minutes)
# exdf -ro /sys/param < /etc/config/param
```

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

```
# cd /
# /etc/shutdown 120 (this step will execute after 120 seconds)
# /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
```

Verify that the kernel recognizes all of the system memory by reviewing the output of the `boot` command. The value associated with `Memory Configured` is the number of Cray words that is configured for the system. This number will not be an exact multiple of 1048576 (megaword) due to aligning the bits for the Exchange Package; however, it should be very close. A sample output of `Memory Configured` follows for a 128-Mword system.

```
May  9 08:22:06 sn9001 unicos: Memory Configured = 134216704 words
```

15. Enter multiuser mode by entering the following command (for more information on bringing your system to multiuser mode, refer to the *UNICOS Basic Administration Guide for CRAY J90 and CRAY EL Series*, publication number SG-2416):

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

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. Refer to
CSH # ADM-COM-9307. Please fill one out.