

# CRAY J90 Series Systems with GigaRing™ Based I/O Memory Upgrade Procedure

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CRAY J90se Series Systems  
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## Record of Revision

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## Overview

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This document contains the procedures for adding memory to the CRAY J90 with GigaRing I/O subsystem series systems. Hereinafter the CRAY J90 series systems are referred to as the J90, and the CRAY J90se series systems will be referred to as the J90se.

## Description of Upgrade

Customers have the option of increasing the amount of memory in their J90. This procedure for performing a memory upgrade procedure is written for Customer and Professional Services (CPS) support personnel. The upgrade kit includes all the parts and instructions that the support person will need to complete the upgrade. Refer to [Table 1](#) for the J90 memory configurations.

*Table 1. J90 Series System Memory Configuration*

Backplane Type	Number of CPU Modules	Number of Memory Modules	Memory Chip Sizes 4 Mbit DRAM		Memory Chip Sizes 16 Mbit DRAMs		Memory Chip Sizes 64 Mbit DRAMS	
			MEM16	MEM32	MEM64	MEM128	MEM256	MEM512
2 × 2	1 or 2	2	32 MW 256 MB	64 MW 512 MB	128 MW 1,024 MB	256 MW 2,048MB	512MW 4,096 MB	1,024 MW 8,192 MB
4 × 4	1, 2, 3, or 4	4	64 MW 512 MB	128 MW 1,024 MB	256 MW 2,048 MB	512 MW 4,096MB	1024 MW 8,192 MB	2,048 MW 16,384 MB
8 × 8	5, 6, 7, or 8	8	128 MW 1,024 MB	256 MW 2,048 MB	512 MW 4,096 MB	1,024 MW 8,192MB	2048 MW 16,384 MB	4,096 MW 32,568 MB

A label that indicates the Memory Board Type of the system is located on the faceplate of each memory module. [Table 6](#), [Table 7](#), and [Table 8](#) contain specific configuration information for each memory board type.

This upgrade procedure includes separate hardware and software procedures for adding additional memory to a J90. The procedures require you to swap out the existing memory modules and insert the new memory modules.

## Upgrade Prerequisites

Ensure that the following system configuration items are available before the installer begins this upgrade:

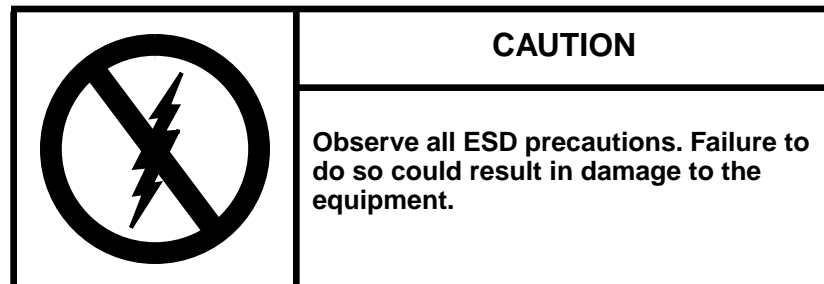
- Backplane type (2 X 2, 4 X 4, or 8 X 8)
- Memory module type label value
- Super user login and password
- Memory size that you are upgrading to
- Boundary scan number for each module, which can be found on a label on the faceplate of each module (BSN = X; X is the revision letter)

## Training Requirements

CPS personnel who perform this memory upgrade should have completed training in at least J90 or J90se 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 J90 or J90se series system is required.

## 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 J90 cabinet.



## ESD Smock

Wear a CPS-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 CPS-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

The following publications can be found in the  
<http://servinfo.cray.com/> or  
<http://wwwsdiv.cray.com/~wwwpubs/department/>

- *UNICOS Basic Administration Guide for CRAY J90se GigaRing based Systems*, Cray publication number SG-2210.
- *CRAY J90se Service Manual Kit*, Cray publication number HMK-209-0
- *CRAY Scalable I/O Messages*, Cray publication number SG-2209 3.4
- *SWS-ION Administration and Operations Guide*, Cray publication number SG-2204 3.7
- *UNICOS Installation Menu and Configuration Tool Reference Manual*, Cray publication number SR-3090
- The errata for the customer's current UNICOS version

## Estimated Time to Install Upgrade

Table 2 divides the memory upgrade process into 3 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	1/2 hour
Hardware Verification Testing	1 hour
Software Setup	1 hour

## Parts Required

All memory module slots in a mainframe cabinet are always occupied. A system configuration with a 2 x 2 backplane has 2 memory module slots filled (see Table 3), a 4 x 4 backplane configuration has 4 memory module slots filled (see Table 4), and an 8 x 8 backplane configuration has 8 memory module slots filled (see Table 5).

Table 3. 2 x 2 Backplane Memory Upgrade Overview

Memory Upgrade	Remove	Install	Part Number
64 MW (512 MB)	Two memory modules	Two MEM32 memory modules	90380500
128 MW (1,024 MB)	Two memory modules	Two MEM64 memory modules	90373200
256 MW (2,048 MB)	Two memory modules	Two MEM128 memory modules	90373100
512 MW (4,096 MB)	Two memory modules	Two MEM256 memory modules	90481100
1,024 MW (8192 MB)	Two memory modules	Two MEM512 memory modules	90481200

Table 4. 4 x 4 Backplane Memory Upgrade Overview

Memory Upgrade	Remove	Install	Part Number
128 MW (1,024 MB)	Four memory modules	Four MEM32 memory modules	90380500
256 MW (2,048 MB)	Four memory modules	Four MEM64 memory modules	90373200
512 MW (4,096 MB)	Four memory modules	Four MEM128 memory modules	90373100
1,024 MW (8192 MB)	Four memory modules	Four MEM256 memory modules	90481100
2,048 MW (16,384 MB)	Four memory modules	Four MEM512 memory modules	90481200

Table 5. 8 x 8 Backplane Memory Upgrade Overview

Memory Upgrade	Remove	Install	Part Number
256 MW (2,048 MB)	Eight memory modules	Eight MEM32 memory modules	90424200
512 MW (4,096 MB)	Eight memory modules	Eight MEM64 memory modules	90424300
1,024 MW (8,192 MB)	Eight memory modules	Eight MEM128 memory modules	90424400
2,048 MW (16,384 MB)	Eight memory modules	Eight MEM256 memory modules	90481400
4,096 MW (32,568 MB)	Eight memory modules	Eight MEM512 memory modules	90481500

### Tools Required

A 5/32-in. allen wrench (provided in the toolkit) is required to open the system doors. Other common hand-held tools needed for this upgrade are also included in the toolkit.

### Recommended Software Revisions

- For a J90 system with GigaRing, the minimum UNICOS is 10.0.
- Latest SWS-ION release 3.8 or later

### Conventions

The following conventions are used throughout this document:

<u>Convention</u>	<u>Meaning</u>
command	This fixed-space font denotes literal items such as commands, files, routines, path names, signals, messages, and programming language structures.
manpage ( <i>x</i> )	Man page section identifiers appear in parentheses after man page names.
<i>variable</i>	Italic typeface denotes variable entries, words or concepts being defined.
<b>user input</b>	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.

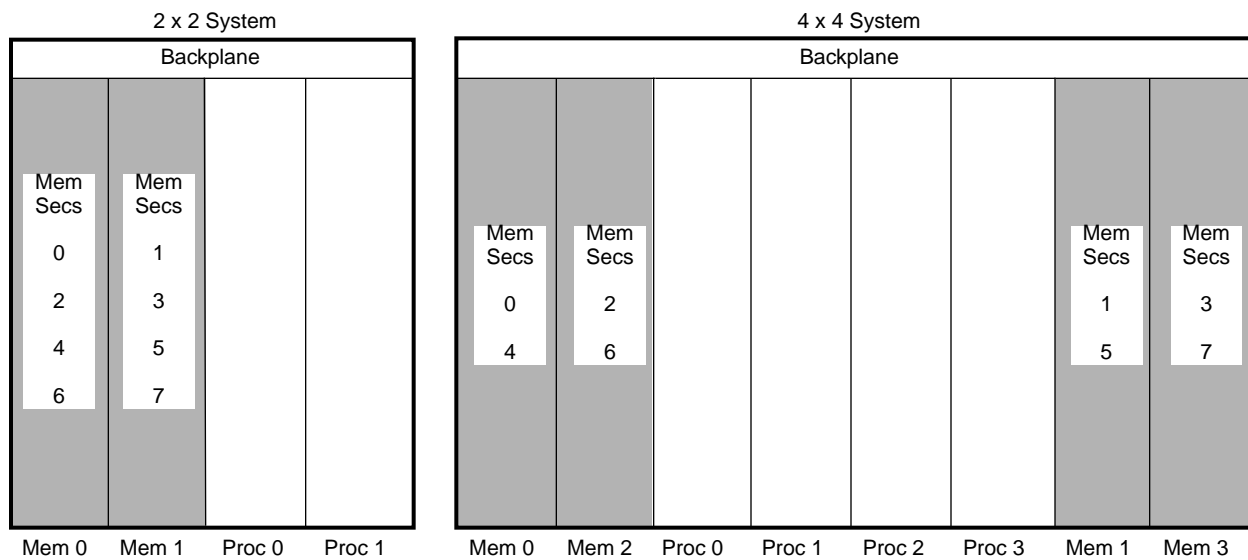
## Getting Started

Refer to [Figure 1](#) for a top view of the module slot locations in 2 x 2 and 4 x 4 backplane configurations. Refer to [Figure 2](#) on [page 9](#) for 8 x 8 midplane configurations.

The following procedures must be performed to begin the memory upgrade procedure.

**Note:** Check off each step or procedure as you complete it to avoid missing a step.

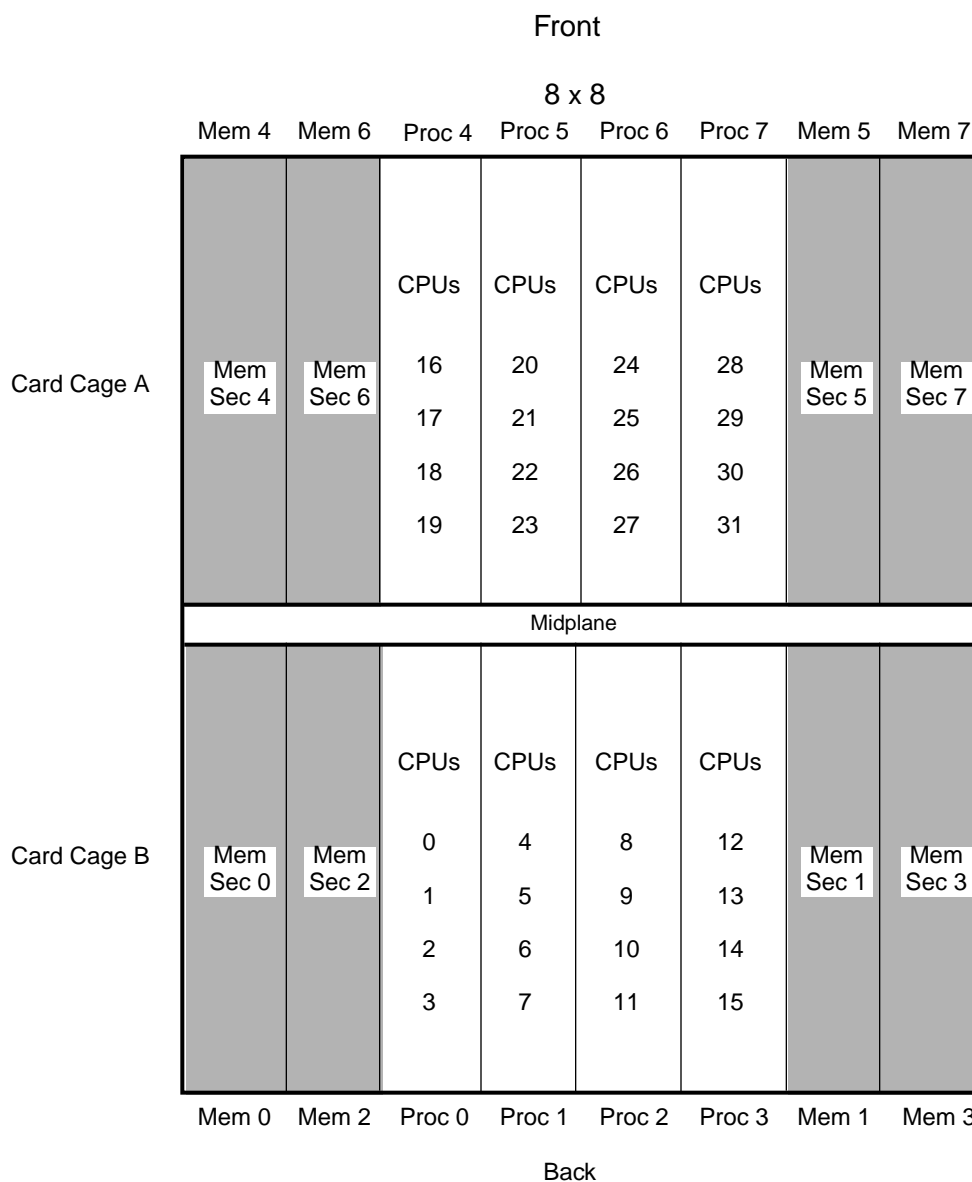
*Figure 1. Module Slot Locations (Top View)*



**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 2. Backplane Slot Locations for Memory and Processor Modules



**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.

## 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 J90se GigaRing based Systems*, Cray Research publication number SG-2210, for details on how to create a backup copy of the UNICOS file system.

## Power Down the Mainframe Cabinet

1. Using the right mouse button click on the workspace menu.
2. Open an xterm window and enter the following command:  

```
$ bootsys -c
```
3. Shut down the UNICOS operating system by entering the following commands at the UNICOS prompt:  

```
# cd /  
# /etc/shutdown 120  
(this step takes 120 seconds to execute; wait  
for the UNICOS prompt)  
# /bin/sync  
# /bin/sync  
# /bin/sync  
# /etc/ldsync (if you are using ldcache)
```
4. Stop the J90 workstation connection by entering the following commands from the SWS:  

```
# <CONTROL- ]>  
$ haltsys
```
5. Move the circuit breaker to the 0 or OFF position on the back of the mainframe cabinet.

## Open the Mainframe Rear Door

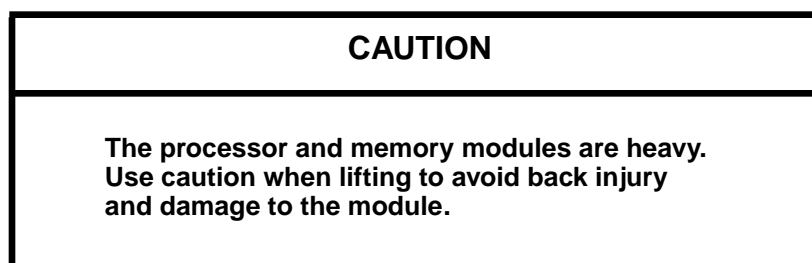
1. At the rear of the mainframe cabinet, locate the two door-locking fasteners at the left top and left bottom of the door. Turn these fasteners counterclockwise with a 5/32-in. allen wrench.
2. Grasp the door handle and swing the door open to the right.

**Note:** Step 3 through Step 6 refer to the J932 system only.

3. At the front of the mainframe cabinet, locate the latch on the upper-right corner of the door.
4. Push down on the latch and swing the door open.
5. Locate the two screws on the internal door. Loosen these screws by turning them counterclockwise with a Phillips screwdriver.
6. Swing the door open to the left.

### Remove the Existing Memory Modules

1. Connect a wrist grounding strap to the grounding points provided on the mainframe cabinet.
2. Turn the jack screws located at the top and bottom of the module faceplate counterclockwise until the module is loose in the chassis.
3. Grasp the module securely and remove it from the chassis.



4. Place the module on an ESD-safe surface.
5. Repeat [Step 1](#) through [Step 3](#) for each memory module that you remove (2 x 2 has 2 memory modules, 4 x 4 has 4 memory modules, 8 x 8 has 8 memory modules).

### Insert the New Memory Modules

1. Carefully unpack the new memory module. 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 memory slot air damper to its open position by turning the air damper handle one-fourth turn counterclockwise. Continue to push the processor 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. Pack the removed memory modules into the new module shipping containers. Refer to the “Removed Parts Disposition” section at the end of this document.
7. Ensure that the memory 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.
9. (CRAY J932 system only) Close the internal door by swinging the door shut and tightening the two screws.

## Power Up the Mainframe

1. Using the right mouse button click on the workspace menu.
2. Enter the following command from the SWS:  

```
$ bootsys -c
```
3. Move the circuit breaker on the back of the mainframe cabinet to the ON position.
4. Press the Alarm Acknowledge button on the central control unit (CCU).
5. Press the CPU RESET button on the CCU.
6. Press the I/O RESET button on the CCU.
7. Verify that the SYSTEM READY light on the CCU illuminates and no fault conditions exist (no other lights are illuminated).
8. Close the mainframe front door.
9. Check the console window for error messages and the `BOOT snxxxx>` prompt.

## Update the Hardware Configuration Registers Using jconfig

Perform the following procedure to update the hardware configuration registers. You will start from the J90 console's root window.

1. From the SWS, enter jconfig's interactive menu to update the system's configuration.

```
sws% jconfig
```

- a. Appropriate backplane type (2 x 2, 4 x 4, or 8 x 8).
  - 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 (See [Table 6](#), [Table 7](#), and [Table 8](#)).
2. Verify the number of processor modules and the appropriate CPU bitmap for each CPU processor module. For example, for a J916, the CPU bitmap for a 7-CPU system would be a value of "f" (1111) for processor module 0 and "7" (0111) for processor module 2. Use the CPU Enable Block part number and [Table 9](#) to choose the correct CPU bitmaps for your system. For a J932 system, the CPU bitmap would be a hex value depending on the number processor modules installed.
  3. To verify that your hardware configuration is correct, display the System Hardware Configuration by entering the jconfig command. The following 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, return to [Step 1](#) in this subsection and repeat all steps. If the values displayed match your system's new configuration, enter <CONTROL-C>.

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

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

CPU BOARD TYPE:        0   1
MEM BOARDS PRESENT:   0   1
MEMORY BOARD TYPES:   0   0
```

```
Backplane Type:       2x2
Is This Configuration Correct (y, n, <CTRL-C>)?
```

4. Select **4**-Update config files from the menu.

Table 6. Configuration Values for a 2 x 2 Backplane

Memory Board Type	MegaWords (MEGAWD-1) Value	NBANKS Value	CHIPSZ Value	Memory Module Name
8	32	128	M4MCH	MEM16
0	64	256	M4MCH	MEM32
B	128	128	M16MCH	MEM64
3	256	256	M16MCH	MEM128
F	512	128	M64MCH	MEM256
U	1024	256	M64MCH	MEM512

Table 7. Configuration Values for a 4 x 4 Backplane

Memory Board Type	Megawords (MEGAWD-1) Value	NBANKS Value	CHIPSZ Value	Memory Module Name
8	64	256	M4MCH	MEM16
0	128	512	M4MCH	MEM32
B	256	256	M16MCH	MEM64
3	512	512	M16MCH	MEM128
F	1024	256	M64MCH	MEM256
U	2048	512	M64MCH	MEM512

Table 8. Configuration Values for an 8 x 8 Backplane

Memory Board Type	Megawords (MEGAWD-1) Value	NBANKS Value	CHIPSZ Value	Memory Module Name
V	128	512	M4MCH	MEM16
P	256	1024	M4MCH	MEM32
Y	512	512	M16MCH	MEM64
S	1024	1024	M16MCH	MEM128
F	2048	512	M64MCH	MEM256
U	4096	1024	M64MCH	MEM512

Table 9. 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	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	90473310
To 16 CPUs	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	90473311

- With the successful writing of the new configuration using, you will need to reboot the IONs by entering the following command:

```
sws% bootsys
```

- Exit the xterm window by entering the `exit` command.

## Use ACT to Verify Hardware Operation

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

- Invoke the ACT menu system by entering the following command:

```
sws$ act
```

- Configure the J90 boundary scan revision number for the new module 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.

- 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>**

- 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 faceplate 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 2 X 2 backplane system with one processor module at revision A and two memory modules, one at revision A and the other at revision B. 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 B
- 2. PROC1 : -----
- 3. MEM0 : rev A
- 4. MEM1 : rev B
- D. Default Settings
- W. Write Changes
- P. Previous Menu

Enter selection:

- Exit (quit) the JBS - J90 Boundary Scan submenu by entering **q**.
- Select **1** to run all basic tests from the Automated Confidence (BASIC) Test menu. This step takes 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 takes 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 J90 with GigaRing based I/O memory upgrade. You can do this by using one of the following procedures explained in this section:

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

The software verification procedure consists of ensuring that additional memory is accessible from the UNICOS operating system. When the system boots, it should report the amount of available memory.

**Note:** The minimum requirement for the SWS-ION is 3.8 or later, and the minimum UNICOS revision level is 10.0.0.3.

The following is a list of high level tasks that need to be performed:

- Prepare to make kernel file changes
- Make `param` and kernel configuration file changes
- Build a new UNICOS kernel
- Use new `param` file and UNICOS kernel
- Backup the existing UNICOS kernel and `param` file
- Boot the system to multi-user mode
- Log on as superuser
- Ensure the `param` file on the system is up-to-date
- Update the `param` file on the system
- Update the hardware information

- Build a new kernel
- Transfer the new UNICOS kernel and param file back to the SWS
- Shutdown the system
- Re-boot the system with the new param file and kernel

## Prepare to Make Kernel File Changes

This section covers things that should be done prior to making param file and kernel configuration file changes.

**Note:** If you have not already done so, it is recommended that you create a backup copy of the UNICOS `root`, `usr` and `src` file systems.

1. Backup the existing UNICOS kernel and param file on the SWS:

```
sws% cd /opt/CYRIos/snSerialNumber/  
sws% cp unicos unicos.old  
sws% cp param param.old
```

2. Boot the system:

```
sws% bootsys snSerialNumber
```

3. Boot the system into multiuser mode:

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

4. Log in as superuser(root).

5. Make sure the `/etc/config/param` file on the mainframe matches the version that was used to boot the system by using FTP to transfer the file from the SWS to the mainframe.

## Make param and Kernel Configuration File Changes

There are two methods to update the param and kernel configuration files; you may use UNICOS's ICMS utility or make the changes by hand

### Use the ICMS Tool

1. Enter the ICMS utility by entering the following command:

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

2. Proceed to the “Mainframe Hardware Configuration” menu:
 

```

      UNICOS 10.0 Installation / Configuration Menu System
      . Configure System
      . . Mainframe Hardware Configuration
      
```
3. Ensure the ICMS database is up-to-date with the information contained in the param file that was transferred to the system in [Step 5](#) of Prepare to Make Kernel File Changes by selecting A:
 

```

      A-> Import the hardware configuration...

      Answer yes (y) to the question, Do you want to continue?
      
```
4. Verify that the Number of CPUs (NCPU) to the number of CPUs the system has after the upgrade.
5. Verify that the Number of cluster registers (MAXCLUS) to the number of CPUs in the system plus one (NCPU+1). This value reflects the maximum number of CPU clusters for this system.
6. Update Bits per memory chip (CHIPSZ), Number of memory banks (NBANKS), Physical memory size in Mwords, and Running system memory size in Mwords for your system. Refer back to [Table 6](#), [Table 7](#), and [Table 8](#), to choose the correct NBANKS value, Megawords value, memory label, and CHIPSZ information for a 2 x 2 backplane, 4 x 4 backplane, or 8 x 8 backplane, respectively.
7. Update the hardware configuration in the param file and the kernel configuration files by selecting A:
 

```

      A-> Activate the hardware configuration ...

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

      You should now proceed to “Build a New UNICOS kernel” section.
      
```

### Manually Change the param and Kernel Configuration File Changes

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

```

      unicos# ls /usr/src/uts/cf.SerialNumber/sn.h
      
```

If this file does not exist, create it by entering the following commands:

```

      unicos# mkdir -p /usr/src/uts/cf.SerialNumber
      
```

```
unicos# cd /usr/src/uts/cf.SerialNumber
unicos# cp /usr/src/uts/cl/sys/sn.J90.h sn.h
```

2. Edit the sn.h file by entering the following commands:

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

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

```
#define SN                9001
#define NBANKS            512
#define CHIPSZ            M64MCH
#define NCPU              8
#define MAXCLUS           9
#define MEMORY            2048*MEGAWD-1
```

The SN value should be set to the mainframe's Serial Number.

The NBANKS, CHIPSZ, and MEMORY values should be set appropriately for your system backplane configuration. Refer to [Table 6](#), [Table 7](#), and [Table 8](#) to determine the correct values for your system.

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.

4. Change the cpus and memory value in the 'mainframe' section of the param file, /etc/param, to reflect the number of CPUs and the total amount of memory in the system after the upgrade has been completed.
5. The following example are the entries for an 8-CPU system with 2048 MWords of memory:

```
mainframe {
    8 cpus;
    2048 Mwords memory;
    ....
}
```

## Build a New UNICOS Kernel

There are two methods to build a new UNICOS kernel. If you used ICMS to change the param and kernel configuration files, it is recommended that you continue to use ICMS, otherwise you may build the new UNICOS kernel by hand.

### Use ICMS to Build a New UNICOS Kernel

1. Proceed to the Build/Install System menu:

```
UNICOS 10.0 Installation / Configuration Menu System
. Build/Install System
```

2. Verify that the following parameters are configured as shown:

```
Build/Install System

Release type executable          relocatable
Build options ==>
/usr/src reconfiguration files ==>
Build action to take build only
Build object sys
Components to build specific component
Major components selection ==>
Specific component to build uts
Do the build in batch?                NO
NQS submission options ==>
Assign cache during build?           NO
Logical device cache ==>

A-> Do the build ...

Restart the build ==>
Review last build summary ...
Escape to a chroot shell ...

Keys:  ^? Commands  H Help    Q Quit    W WhereAmI
```

3. Build the new UNICOS kernel by selecting A:

```
A-> Do the build ...
```

4. Exit ICMS.

### Manually Build a New UNICOS Kernel

1. Rebuild the kernel by entering the following commands which takes about 35 minutes to complete:

```
unicos# cd /usr/src/uts
unicos# rm -f cf.SerialNumber/*.o
unicos# rm -f cf.SerialNumber/Nmakefile*
unicos# /usr/bin/nmake rmexe
unicos# /usr/bin/nmake install
```

## Use the New param file and UNICOS Kernel

This section covers things that should be after making changes to the param and kernel configuration files, and re-building a new UNICOS kernel.

1. Transfer the new `/etc/config/param` file from the mainframe onto the SWS in `/opt/CYRIos/snSerialNumber` via FTP.
2. Transfer the new UNICOS kernel, `/usr/src/uts/cf.SerialNumber/unicos.o` onto the SWS in `/opt/CYRIos/snSerialNumber` via FTP.
3. It may be necessary to update the `options(5)` file, `/opt/config/options`, on the SWS to use the new param file and kernel configuration file.
4. Shut down the UNICOS operating system by entering the following commands at the UNICOS prompt:

```
# cd /
# /etc/shutdown 120
(this step takes 120 seconds to execute)
# /bin/sync
# /bin/sync
# /bin/sync
# /etc/ldsync
```

5. Halt, then re-boot the mainframe, and bring the system back into multiuser mode from the SWS by executing the following commands:

```
sws% haltsys snSerialNumber
sws% bootsys snSerialNumber
unicos# /etc/init 2
```

When the system boots, it should report the number of CPUs that were started.

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

6. Enter multiuser mode by entering the following command

```
sws$ /etc/init 2
```

## Dump the J90 Mainframe

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You should take a dump image of the J90 common memory after performing the memory upgrade.

1. Within a window on the SWS entering the following command:

```
sws% dumpsys
```

## Removed Parts Disposition

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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

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

