I/O Module Upgrade (Cray SV1™ Series)

H20-6018-0

Cray Proprietary

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H20-6018-0
Cray SV1™ Series
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Figures

Tables

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Upgrade Overview

Customers who have Cray SV1 series systems with empty processor module slots can upgrade their system by adding I/O modules. I/O modules are previous generation processor modules that have their CPUs disabled in the `param` file of the UNICOS kernel.

This procedure for performing a Cray SV1 I/O module upgrade is written for Cray service personnel. The upgrade kit includes all the parts and instructions that the support person needs to complete the upgrade. Hereinafter the Cray SV1 series system is referred to as the SV1 series.

Description of Upgrade

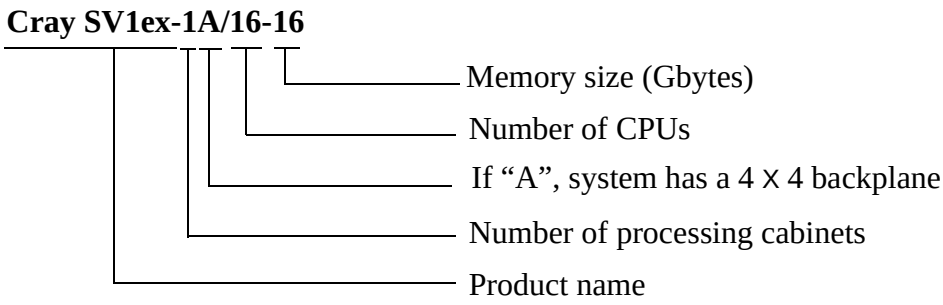
This document contains the hardware and software procedures required to add I/O modules to existing SV1 series systems.

Upon completion of the hardware upgrade, hardware verification and software changes (described in this document) are required.

You can also use this procedure to install additional I/O modules in a Cray SV1 series system that has I/O modules already installed. The Cray SV1 series systems include the following systems:

- Cray SV1-1
- Cray SV1-1A
- Cray SV1ex-1
- Cray SV1ex-1A

An explanation of the SV1 series product name and configuration follows.



You may locate Cray SV1 series hardware publications at the following URL:

http://techinfo.cray.com/.

Upgrade Prerequisites

You must have the following items before you begin the upgrade:

- UNICOS release package 10.0.0.8 or later is required. For more information, refer to the *UNICOS Installation Guide for Cray J90se and Cray SV1 GigaRing Based Systems*, publication number SG-5296.

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

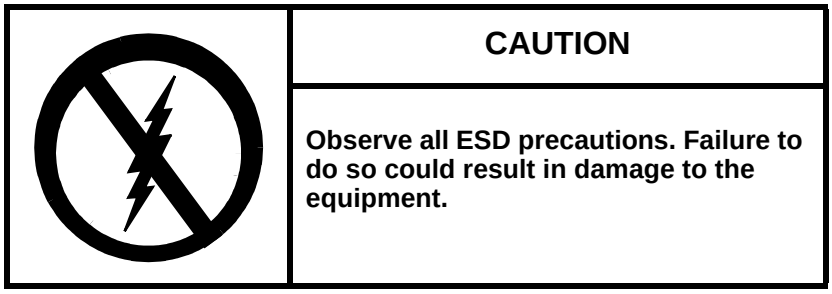
- Processor module type
- Number of processor modules
- Number of memory modules
- Memory type
- Backplane type (4 x 4 or 8 x 8)
- Superuser login and password
- Boundary scan number (BSN) of all modules

Training Requirements

Support personnel who perform this upgrade should have completed training in Cray SV1 or Cray 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 Cray SV1 or Cray J90se 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 an SV1 series system cabinet.



CAUTION

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

ESD Smock

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

ESD Shoes

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

Wrist Strap

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

Hazard Statements

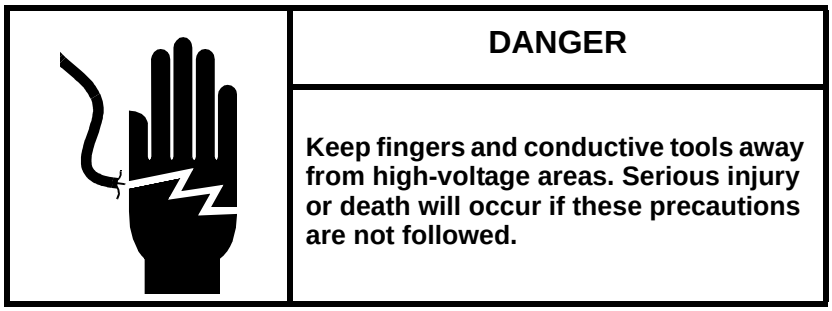
During removal and installation of the computer system components, be alert for hazard advisory statements. The following list describes the hazard statement signal words:

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

Safety Measures

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

- Do not wear watches or jewelry while working on a Cray SV1 cabinet.
- Keep fingers and conductive tools away from high-voltage areas and from high-current areas.



- Set circuit breakers to the OFF or OPEN position, where indicated, before you start the removal and installation process.
- Remove all tools from the system cabinets after you service them.

- Several procedures require two people to complete; do not perform those procedures alone.
- Replace all panels that you removed from the system during service.
- Power off the system only after the system software has been shut down in an orderly manner.

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

Getting Started

The following section provides information for the installers in preparation for upgrading an SV1 series system with additional modules.

Reference Publications

You may refer to the following publications at:

http://swpubs-internal.cray.com:8085/dynaweb/

- *UNICOS Basic Administration Guide for Cray J90, J90se and Cray SV1 GigaRing Based Systems*, publication number 004-2210
- *UNICOS Installation Guide for Cray J90se and Cray SV1 GigaRing Based Systems*, publication number S-5296
- *SWS Solaris Operating System and Devices Installation Guide*, publication number 004-5293

SV1 series hardware publications are available at the following URL:

http://techinfo.cray.com/.

Estimated Time to Install the Upgrade

Table 1 divides the upgrade process into separate procedures. Use this table to determine how much system time you should request to complete this upgrade.

Table 1. Estimated Time to Install I/O Module Upgrade

Installation 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 an SV1 Series I/O Module Upgrade

Table 2 is a list of the parts that may be included with this upgrade. The parts and their quantities may vary according to the customer's system configuration.

Table 2. I/O Module Upgrade Parts

Part Number	Quantity	Description
9048-0101		Module Assembly, J90se CPU with GigaRing Adapter
9053-5600		Module Assembly, SV1 CPU with GigaRing Adapter
9052-6700	1	GigaRing Bulkhead Cable Kit

Tools Required

Ensure that you have the following tools for this procedure:

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

Software Required

- SV1 I/O modules require UNICOS 10.0.0.8 or later
- Any applicable software patches that were communicated via field notice (FN)

  http://wwwcst.mw.cray.com/fntool/

Conventions

The following conventions are used throughout this document:

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

Power Down the SV1 Series System

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, J90se and Cray SV1 GigaRing Based Systems,* publication number 004-2210 for details on how to create a backup copy of the UNICOS `root`, `usr`, and `src` file systems.

Bring Down the Operating System

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

   ```
   # cd /
   # /etc/shutdown 120 (executes in120 seconds)
   # /bin/sync
   # /bin/sync
   # /bin/sync
   # /etc/ldsync   (if you are using ldcache)
   ```

2. Halt the mainframe by entering the following command on the SWS as `crayadm`:

   ```
   sws% haltsys SystemName
   ```

Power Down the Mainframe Cabinet

1. Move the circuit breaker on the rear of the mainframe cabinet to the 0 or OFF position.

2. Press the ALARM ACKNOWLEDGE button on the central control unit (CCU) to disable the alarm.

Install the I/O Modules

In this portion of the upgrade, you will install the I/O modules in empty processor module slots. I/O modules are previous- generation processor modules that have their CPUs disabled in the `param` file of the UNICOS kernel.

The upgrade procedures for the SV-1 and SV-1A series systems are identical except for the location of the processor module slots.

1. Open either the front or back mainframe cabinet door, depending on the location of the I/O modules that you want to install.

   a. At the front of the cabinet, locate the latch in the upper-right corner of the door. Push down on the latch and swing the door open.

   b. 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. Grasp the door handle and swing the door open.

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

2. Connect a grounding strap to the mainframe cabinet.

3. Remove the module filler plates from the empty slots where you need to install the I/O modules.

4. Unpack the new I/O module.

5. Record the I/O module type and boundary scan number (BSN) (located on the faceplate labels) as you insert each module. You will use this data later in hardware verification.

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

7. 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).

8. Turn the jack screws clockwise to tighten them until the module is fully seated.

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

9. Connect the correct GigaRing cables for each new module.

10. Repeat this procedure for each new I/O module that you install.

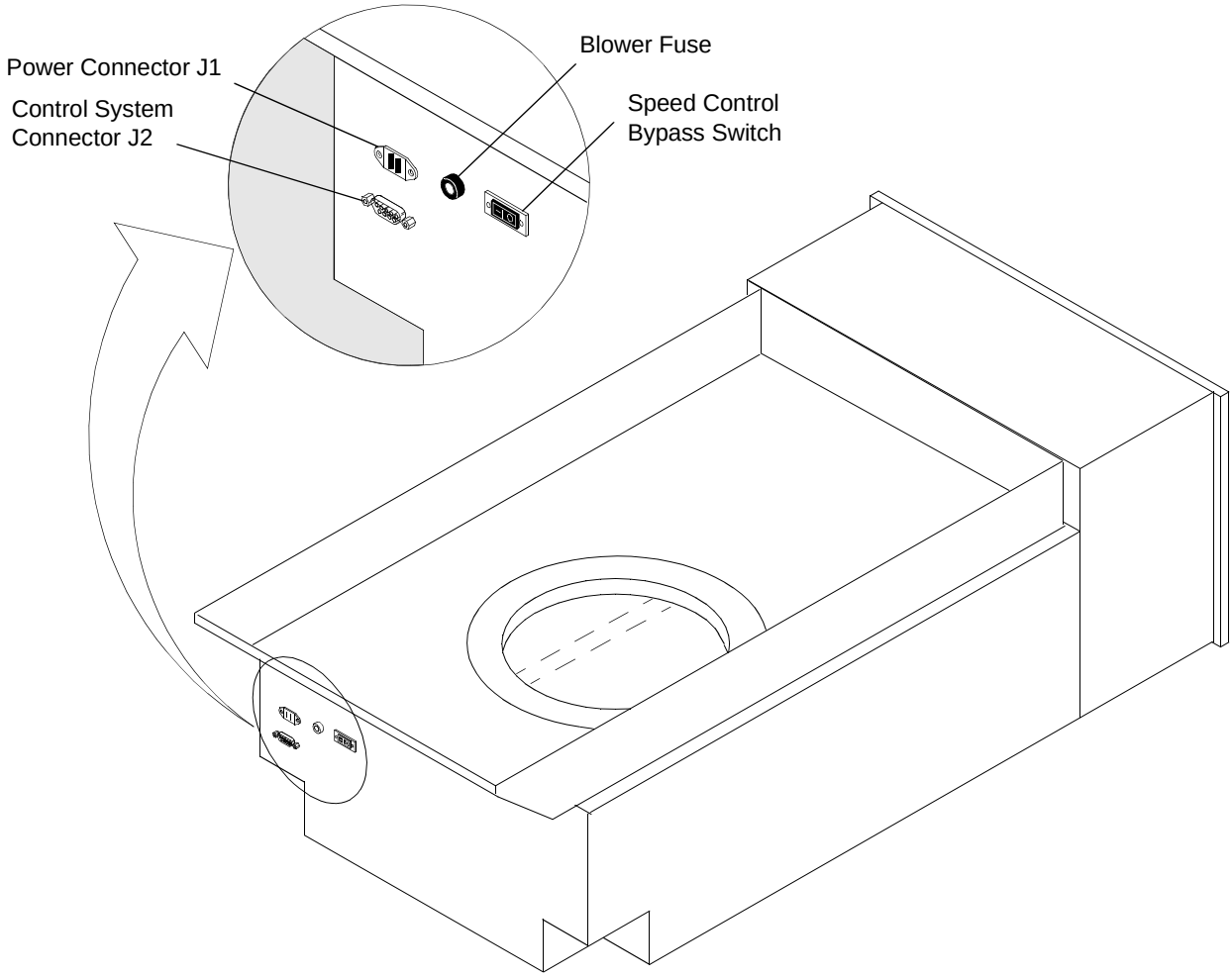
11. Ensure that the DC power switches on the I/O, processor and memory modules are enabled; the indicator should be green.

12. Ensure that the blower assembly speed control bypass switch (refer to Figure 1) is in the correct position.

    The blower assembly speed control bypass switch must be set to the 1 (ON) position on all SV1 series 8x8 chassis containing SV1 series processor modules. This ensures proper cooling for the SV1 series processor modules.

    Note: The bypass switch can be set to the 1 (ON) position (bypass mode) while the system is running.

Figure 1. 8x8 Chassis Blower Assembly



Power Up the Mainframe Cabinet

1. At the front of the mainframe cabinet, move the circuit breaker to the 1 (ON) position
2. Press the CPU RESET button on the central control unit (CCU).
3. Press the I/O RESET button on the CCU.
4. Press the ALARM ACKNOWLEDGE button on the CCU to disable the alarm.
5. Ensure that the SYSTEM READY LED on the CCU is illuminated.

Hardware Installation Verification

The I/O modules must be configured as processor modules. The CPUs on the I/O modules are disabled in the `param` file of the UNICOS kernel during software verification.

You must be logged in as `crayadm` for this procedure.

Note: View the man page for information about the `edittopo` command.

1. Use the **`edittopo`** command to modify the topology file located in the following directory:

   `/opt/config/topology`

   All processor and I/O modules use SV1 as a label in the topology file. The example in Figure 2 shows:

   - sn3304-0 = SV1e processor module
   - sn3304-1 = SV1e processor module
   - sn3304-2 = SV1 I/O module
   - sn3304-3 = J90se I/O module

Figure 2. Topology File

```
> RING    ring-1  1
> MPN-1   sn3304-mpn0     1       MAINTENANCE
> FCN-1   sn3304-fcn0     2
> SV1     sn3304-0        14      BOOTNODE CONNECTION=0
> RING    ring-2  2
> FCN-1   sn3304-fcn1     1       MAINTENANCE
> SV1     sn3304-1        14      CONNECTION=1
> RING    ring-3  3
> FCN-1   sn3304-fcn2     1       MAINTENANCE
> SV1     sn3304-2        14      CONNECTION=2
> RING    ring-4  4
> FCN-1   sn3304-fcn3     1       MAINTENANCE
> SV1     sn3304-3        14      CONNECTION=3
```

2. Reset the CPU, MPN, and SPN.

3. After the reset cycles complete, enter the following command to verify and initialize the nodes:

   `$` **`dring -a initnode`**

Update the Processor Module Type Using jconfig

The `jconfig` utility requires hardware configuration information (refer to Figure 4 and Figure 5) such as which CPU slots have processor modules in them, which memory slots have memory modules in them, the number of CPUs per processor module, the backplane type, and the memory module type codes.

The `jconfig` utility attempts to read the slot configuration if you invoke `jconfig` without the `-hwconfig` or `-bpmt` command line options. Then `jconfig` searches for a `.cfg` file. If one is located, `jconfig` reads the backplane type and memory module type codes for all memory modules. If either of these operations fails, `jconfig` informs you and displays an information screen that you may edit to reflect the actual hardware configuration.

Use the editor commands to enter information and enter `z` to save the configuration. At this point, `jconfig` prompts you for verification of the information that you entered. If no errors occur during hardware configuration sensing, `jconfig` prompts you for verification of the hardware configuration and then displays the main menu.

Note: If you are unfamiliar with the `jconfig` utility, you can corrupt the system configuration files and make the system inoperable. This tool should be used only by qualified support personnel.

`jconfig` enables you to edit all fields of all ASIC configuration registers. These fields are grouped into two types: `Diagnostic` (fields that can be used to diagnose problems on an SV1 series system or alter the way the system runs) and `All` (any and all configuration fields). Each field can also be controlled by scope. You can alter certain parameters for the entire system, a specific module, a specific ASIC type on a module, or a specific ASIC type on the entire system.

Note: Typically, the system-wide diagnostic settings are the most appropriate to use.

The edit screens (refer to Figure 5) display each configuration register field, an explanation of what the field is for, and how many bits it occupies. All fields are expressed as 8-digit hexadecimal numbers. A footer at the bottom of the screen has the current field type and scope, editing instructions, and the current edit page number.

Move the cursor with the same cursor keys as the `vi` editor. Enter `z` to save the edit(s), after which the main menu is displayed. To discard edits, press the escape key (Esc). After you make your changes, you must save and update the configuration files.

The `jconfig` utility enables you to save the current configuration files (`.cfg` files) and ASCII files using the `Update Config File(s)` option from the main menu. You must save and update the configuration files if you made changes in the editor window.

Note: The `.cfg` files are saved automatically if you use the `-nocr` command line option.

1. Ensure that the UNICOS operating system is shut down.
2. Enter **`jconfig`** at the `SWS` prompt.
3. Select `<3> View System Configuration` from the main menu. (Refer to Figure 3.)

Figure 3. Main Menu Screen

```
MAIN MENU

     <1> Edit Diagnostic Parameters
     <2> Edit ALL Parameters
     <3> View System Configuration
     <4> Update Config File(s)
     <5> Configure Bart
     <6> Exit

      Enter # Of Choice:
```

4. On the `System Hardware Configuration` screen, answer `n` (no) to `Is this Configuration Correct?` (Refer to Figure 4.)

Figure 4. jconfig Hardware Configuration Display

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

CP BOARDS PRESENT       CPUs PRESENT ON EACH CP BOARD       CP TYPE
-----------------       -----------------------------       -------
0                        0   1   2   3                       SV1e
1                        0   1   2   3                       SV1e
2                        0   1   2   3                       SV1
3                        0   1   2   3                       J90se

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

Backplane Type:         4x4

Is This configuration Correct (y, n, <CTRL-C>)?
```

5. From the `jconfig Editor Screen` (refer to Figure 5), select the correct number of CPU boards/CPUs and the CP type.

   The example for the CP Type field in Figure 5 shows:

   - Processor 0 = SV1e processor module
   - Processor 1 = SV1e processor module
   - Processor 2 = SV1 I/O module
   - Processor 3 = J90se I/O module

Figure 5. jconfig Editor Screen

```
CP Boards/CPUs:       1 HEX Digit Per Board, 1 Bit Per CPU On That CP.
                      Example:  0000ffff  (CP 0-3, all cpus present/CP)
                                00000001  (CP 0, cpu0 only present)

CP Type:              1 Digit Per CP Board.  3 == SV1e 2 == SV1, 1 == J90se,
                                               0 == J90

MEMORY Boards:        1 Digit Per Board.  1 == Board Present, 0 == Not Present

Memory Type:          1 Digit Per Memory Board.  Get Type Code From Memory Board
                      Sticker.  Valid Type Codes Are 0-5,8,9,A-F,N, P-Y.

Backplane Type:       8==8x8, 4==4x4, 2==2x2, 1==1x1

================================================================================
CP Boards/CPUs:       0000FFFF  (Leftmost Digit is CP 7, Rightmost is CP 0)
CP Type:              00001233 (Leftmost Digit is CP 7, Rightmost is CP 0)
MEMORY Boards:        00001111  (Leftmost Digit is MEM 7, Rightmost is MEM 0)
Memory Type:          0000ssss (Leftmost Digit is MEM 7, Rightmost is MEM 0)
Backplane Type:       00000004  (8==8x8, 4==4x4, 2==2x2, 1==1x1)

<h,l,k,j,CR,p> Left,Right,Up,Down,Next Line,Page   <z> Save   <ESC> Discard
                                                              [Page 1 of 1]
```

6. Enter **z** to save the configuration.

7. On the `System Hardware Configuration` screen, verify that the correct number of CPU boards/CPUs and the CP type are selected. (Refer to Figure 4.)

8. Confirm the configuration by typing a **y**.

9. Select `<4> Update Config File(s)` from the main menu. (Refer to Figure 3.)

BART Training

BART training is required for SV1 processor module swaps or first module installs and requires 3 minutes per module. Refer to Figure 6 for an example of BART training.

Note: You must perform BART training on each new processor module. If `jconfig` is running and you notice that the processor modules are not identified correctly, **press the CPU reset button on the CCU.**

Important! BART training must be run offline. Run BART training only during installation or when you upgrade a processor module, replace the backplane, or replace the clock in the system. You must also run BART if you move a processor module (or modules) to a different slot.

Use the following procedure to run BART:

1. Select `<5> Configure BART` from the main menu. (Refer to Figure 3)

2. Select `<1> Configure Bart For The System` from the Configure BART menu. BART training completes in approximately 3 to 5 minutes per processor module.

   Note: While BART training is running, up to 50 nets (ASIC interconnects) per CPU are displayed during training. The information in these net messages indicates that the delay line values have changed. BART logic compensates for these corrections in each system.

3. When the `MAIN_MENU` appears again, select `<4> Update Config Files(s).`

4. When the `MAIN_MENU` appears again, select `<6> Exit.` This completes BART training.

Figure 6. BART Training Example

```
Training BART for selected slots: 0 1
Create Files On Error parameter is OFF

Training slot 0
Setting config to train CA receivers
Generating One cp characterization data.......
Generating 1p5 cp characterization data.......
Generating Two cp characterization data.......
Setting config to train PV and VAB receivers
Generating One cp characterization data.......
Generating 1p5 cp characterization data.......
Generating Two cp characterization data.......
Creating system bart vector
Running verify on system vector
nominal......fast......slow......superslow......
Slot 0: 0 errors, modified 11 nets for increased margin.
Rerun verify on modified vector
nominal......fast......slow......superslow......
Slot 0: 0 errors, modified 2 nets for increased margin.
Rerun verify on modified vector
nominal......fast......slow......superslow......
Slot 0: 0 errors
Dumping bart binary: /opt/config/sn9281/pm0.bart
Dumping bart text:   /opt/config/sn9281/pm0.bart.txt
Dumping report:      /tmp/pm0.bart.rpt.sn9281
Dumping summary:     /tmp/pm0.bart.summary.sn9281

Training slot 1
Setting config to train CA receivers
Generating One cp characterization data.......
Generating 1p5 cp characterization data.......
Generating Two cp characterization data.......
Setting config to train PV and VAB receivers
Generating One cp characterization data.......
Generating 1p5 cp characterization data.......
Generating Two cp characterization data.......
Creating system bart vector
Running verify on system vector
nominal......fast......slow......superslow......
Slot 1: 0 errors, modified 10 nets for increased margin.
Rerun verify on modified vector
nominal......fast......slow......superslow......
Slot 1: 0 errors, modified 3 nets for increased margin.
Rerun verify on modified vector
nominal......fast......slow......superslow......
Slot 1: 0 errors
Dumping bart binary: /opt/config/sn9281/pm1.bart
Dumping bart text:   /opt/config/sn9281/pm1.bart.txt
Dumping report:      /tmp/pm1.bart.rpt.sn9281
Dumping summary:     /tmp/pm1.bart.summary.sn9281


System bart configuration completed successfully.

Hit <RETURN> to continue...
```

JBS Boundary Scan

Note: For detailed information on running JBS Boundary Scan, refer to *Cray SV1 Mainframe Troubleshooting*, publication number 108-0202.

1. Enter **`/opt/CYRIdiag/sv1/bin/jbs -menu`** or **`jbs -menu`** to display the main JBS menu. The main JBS menu enables you to run the boundary scan test on a specific board configuration. The following screen shows the default settings for the JBS main menu:

```
          JBS - SV1 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 Test(s)

H.   Help Screen
Q.   Quit Program

               Enter selection:
```

2. Select **`1`** from the JBS main menu to choose a board-level or system-level test.

   Select **`4`** to run all the tests.

   Select **`P`** to return to the previous (JBS main) menu.

   Note: The setting shown in brackets at the top of the menu is the default setting.

```
        Boundary Scan Test Level [All tests]

             1. Integrity
             2. Board
             3. Backplane
             4. All tests
             P. Previous Menu

              Enter selection:
```

3. In the JBS main menu, select **2** to display specific boards to test (as shown below). This menu enables you to specify which boards you want to test and also displays the boundary scan revision level for each board.

Important! For JBS to run properly, the board revision level in JBS must match the boundary scan number (BSN) revision level of the modules that are tested. The BSN revision level is located on a label on the faceplate of each module.

In the following example:

- `PROC0 : rev E` = SV1e processor module
- `PROC1 : rev E` = SV1e processor module
- `PROC2 : rev D` = SV1 I/O module
- `PROC3 : rev C` = J90se I/O module

Note: If "-----" displays after the board designator, it means that the board will not be tested.

```
Boards Specified for Test

     1.  PROC0 : rev E
     2.  PROC1 : rev E
     3.  PROC2 : rev D
     4.  PROC3 : rev C
     5.  MEM0  : rev A
     6.  MEM1  : rev B
     7.  MEM2  : rev B
     8.  MEM3  : rev A
     D.  Default Settings
     W.  Write Changes
     P.  Previous Menu

    Enter selection:
```

4. Select the correct number from the `Boards Specified for Test` menu to display the various revision levels for a specific board. The following menu shows the revision levels for the `PROC0` board.

```
          PROC0 [rev D]

     1. -----
     2. rev A
     3. rev B
     4. rev C
     5. rev D
     6. rev E
     P. Previous Menu

     Enter selection:
```

5. Select the proper BSN revision level for the modules that were installed (refer to Step 3).
6. Select **`P`** to return to the Boards Specified for Test menu.
7. Repeat Step 4 through Step 6 for each module that you installed.
8. Select **`W`** from the Boards Specified for Test menu to write the new BSN revision levels to file.
9. Select **`P`** to return to the JBS main menu to run the selected test.
10. Select **`R`** from the JBS main menu to run selected tests.
11. Select **`Q`** from the JBS main menu to quit.

Use ACT to Verify Hardware Operation

Note: For detailed information on running Automated Confidence Test (ACT) refer to *Cray SV1 Mainframe Troubleshooting*, publication number 108-0202.

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

```
sws$ act
```

2. Select **`1) Run All Basic Tests`** to run all basic tests from the `Automated Confidence (BASIC) Test` menu. This step completes in 4 to 16 minutes, depending on the system configuration.

3. Select **`n) Next level tests (intermediate) menu`** from the `Automated Confidence (BASIC) Test` menu to go to the `Automated Confidence (INTERMEDIATE) Test` menu.

4. Select **`1) Run All Intermediate Tests.`** This step completes in 3 to 7 minutes, depending on the system configuration.

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

6. Select **`1) Run All Comprehensive Tests.`** This step completes in about 20 minutes, depending on the system configuration.

7. Refer to FN #5010a - *Testing and Verification of Mainframe GigaRing Nodes* to check out the GigaRing nodes.

8. Select **`q`** to quit the ACT menu system.

Software Procedures

If you changed the system serial number or the memory configuration during this upgrade, you must rebuild the UNICOS kernel as part of this upgrade. It is not necessary to rebuild the kernel if you only changed the number of CPUs or I/O modules in the system. The kernel automatically detects the number and type of CPUs in the system.

Because the CPUs on the I/O modules must be disabled in the `param` file, the kernel configuration files must be manually changed.

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

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.

Warning: The target must be explicitly set to `cray-j90` by adding `cray-j90` as the value of CONFIG_TARGET in `/etc/config/config.mh`. This setting is required to maintain the Cray J90 binary compatibility of system commands.

Manually Change the Kernel Configuration Files

Perform the following procedure to manually change the `param` file and the UNICOS kernel configuration files and to rebuild the UNICOS operating system. You must have superuser privileges.

1. Back up the existing UNICOS kernel and `param` file.

```
sws% cd /opt/CYRIos/snSerialNumber
sws% cp unicos unicos.sv1
sws% cp param param.sv1
```

2. Boot the system:

```
sws% bootsys snSerialNumber
```

3. Enter multiuser mode by entering the following command:

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

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

5. Verify that the `/usr/src/uts/cf.`*`SerialNumber`*`/sn.h` file exists by entering the following command:

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

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

```
unicos# mkdir /usr/src/uts/cf.SerialNumber
unicos# cd /usr/src/uts/cf.SerialNumber
unicos# cp /usr/src/uts/c1/sys/sn.3202.h sn.h
```

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

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

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

```
#define SN              3202
#define NBANKS          512
#define CHIPSZ          M64MCH
#define NCPU            8
#define MAXCLUS         9
#define MEMORY          2048*MEGAWD-1
```

   a. Set the `SN` value to the mainframe's serial number.

b. Set the NCPU value to the number of CPUs in the system after the upgrade is complete.

Note: Installing I/O modules **does not** increase the number of CPUs.

c. Set the MAXCLUS value to the number of CPUs in the system plus 1 (NCPU+1) to indicate the maximum number of CPU clusters in the system.

d. Set the NBANKS, CHIPSZ, and MEMORY values appropriately for your system backplane configuration. Refer to Table 3 or Table 4 to choose the correct values for your system.

Table 3. 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
P	128	512	M4MCH	MEM32
B	256	256	M16MCH	MEM64
Y	256	256	M16MCH	MEM64
3	512	512	M16MCH	MEM128
S	512	512	M16MCH	MEM128
D	1,024	256	M64MCH	MEM256
F	1,024	256	M64MCH	MEM256
5	2,048	512	M64MCH	MEM512
U	2,048	512	M64MCH	MEM512
N	2,048	512	M64MCH	MEM512

Table 4. Configuration Values for an 8 x 8 Backplane

Memory Board Type	Megawords (MEGAWD-1) Value	NBANKS Value	CHIPSZ Value	Memory Module Name
P	256	1024	M4MCH	MEM32
Y	512	512	M16MCH	MEM64
S	1,024	1,024	M16MCH	MEM128
F	2,048	512	M64MCH	MEM256
U	4,096	1,024	M64MCH	MEM512
N	4,096	1,024	M64MCH	MEM512

8. Edit the 'mainframe' section of the `param` file (`/etc/config/param`) as follows:

   a. Ensure that the `CPUs` and `memory` values indicate the number of CPUs and the total amount of memory in the system after the upgrade is complete.

   Note: Installing I/O modules **does not** increase the number of CPUs.

   b. Add or update the following `iomodule` value to disable the CPUs on the I/O modules:

   ```
   iomodule(s) sn sn;
   ```

   The `s` is not required. `sn` indicates the processor slots that have I/O modules installed. Use spaces between the slot numbers.

   The following example shows the entries for an 8-CPU system with 2048 Mwords of memory and I/O modules in processor slots 2 and 3:

   ```
   mainframe {
     8 cpus;
     2048 Mwords memory;
     iomodules 2 3;
   }
   ```

9. Rebuild the kernel by entering the following commands; this procedure completes in about 35 minutes:

   ```
   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
   ```

10. Use FTP to transfer the new `/etc/config/param` file from the mainframe onto the SWS in /`opt/CYRIos/sn`*`SerialNumber`*.

11. Use FTP to transfer the new UNICOS kernel, `/usr/src/uts/cf.`*`SerialNumber`*`/unicos` onto the SWS in `/opt/CYRIos/sn`*`SerialNumber`* via FTP.

12. 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.

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

```
unicos# cd /
unicos# /etc/shutdown 120 (executes in120 seconds)
unicos# /bin/sync
unicos# /bin/sync
unicos# /bin/sync
unicos# /etc/ldsync
```

14. Halt, then reboot 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 and the amount of memory that is configured as follows:

```
Memory Configured = 2147482624 words
...
CPUs Configured = 8, started = 8 (0, 1, 2, 3, 4, 5, 6, 7)
```

GigaRing Based System and System Workstation (SWS) File Locations

Table 5 shows where the following files reside on a GigaRing based system and on the SWS.

Table 5. System Files and SWS Locations

Location on Cray System	Location on SWS
/usr/src/uts.cf.*SerialNumber*/unicos	/opt/CYRIos/sn*SerialNumber*/unicos
/etc/config/param	/opt/CYRIos/sn*SerialNumber*/param
/usr/src/c1/stand/grsysdump	/opt/CYRIos/sn*SerialNumber*/grsysdump

Software Verification

Verify that the kernel recognizes all CPUs by entering the following command (the number of idle processes that the command displays 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
```

CRUISE Reporting

Create a CRUISE ticket using the “Install” reason and the appropriate “Install FUN/Upgrade Hardware” activity to record the installation of upgrades on existing sites. Refer to FN#2364 *Reporting Hardware Upgrades* and FN#2396 *Reporting Hardware Upgrades: Not Always FUN*.

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