SV1ex Memory Upgrade
(Cray SV1™ Series)

H20-6019-0

Cray Proprietary

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SV1ex Memory Upgrade Procedures

H20-6019-0
Cray SV1™ Series
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Upgrade Overview

Customers have the option of upgrading their Cray SV1 memory modules to Cray SV1ex memory modules. This procedure for performing a Cray SV1ex memory 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 is referred to as the SV1 series.

Description of Upgrade

This document contains the software and hardware procedures required to upgrade an SV1 system that has SV1e processor modules by installing SV1ex memory modules. Read the entire document before installing the upgrade.

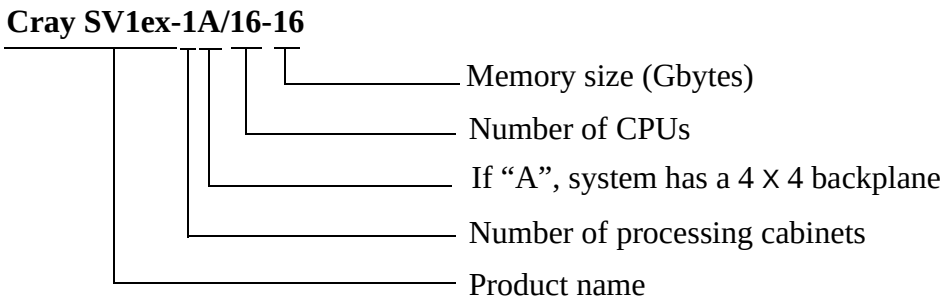
Because the software changes must be done first, the upgrade must be performed in the following sequence:

1. "Software Procedures"
2. "Power Down the SV1 Series System"
3. "Install the SV1ex Memory Module Upgrade"
4. "Power Up the Mainframe Cabinet"
5. "Hardware Installation Verification"
6. "Software Verification"

The Cray SV1 series includes 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.



Upgrade Prerequisites

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

- UNICOS release package 10.0.1.0 or later is required. For more information, refer to the *UNICOS Installation Guide for Cray J90se and Cray SV1 GigaRing Based Systems*, software publication number SG-5296.
- SWS-ION 6.2 software or later is required. For more information, refer to the *SWS-ION Release Overview*, software publication number 004-5292 and the *SWS Solaris Operating System and Devices Installation Guide*, software publication number *004-5293*.
- Any applicable software fix packages that were communicated via field notice (FN). Refer to the Field Notice Tool at the following URL:

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

- Clock module with part number 90563300.
- SV1e processor module with part number 90537400 or 90537500.

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

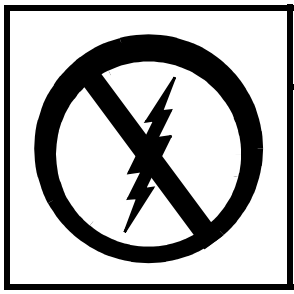
- Backplane type (4 x 4 or 8 x 8)
- Number of memory modules
- Memory type (Refer to Table 3 and Table 4)
- Processor module type
- Number of processor modules
- Boundary scan number (BSN) of all modules
- Superuser login and password

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. Wear 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 you service or handle 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 you service or handle 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 you service or handle an ESD-sensitive device to eliminate possible ESD damage to equipment. Connect the wrist strap cord directly to earth ground.

Hazard Statements

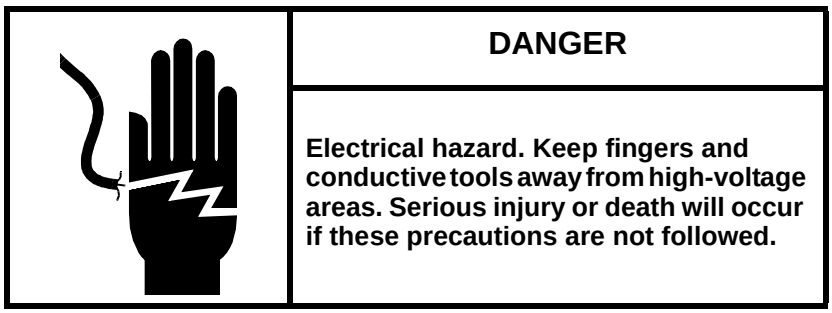
During removal and installation of the computer system components, be alert for hazard advisory statements. The following list describes the hazard statement signal words:

- **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 you work 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, when the procedure requires it, 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 to SV1ex memory modules.

Reference Publications

Software publications are available at the following URL:

http://swpubs.mw.cray.com/craydoc/

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

- *SWS-ION Release Overview,* software publication number 004-5292

Hardware publications are available at the following URL:

http://techinfo.cray.com/

- *Field Replacement Procedures (Cray SV1 Series),* hardware publication number 108-203
- *Mainframe Troubleshooting (Cray SV1 Series),* hardware publication number 108-0202

Estimated Time to Install the Upgrade

Table 1 divides the memory 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 the Upgrade

Installation Task	Estimated Time to Install Upgrade
Software Install	1 hour
Hardware Install	1 hour
Hardware Verification Testing	2.5 hour
Software Verification Testing	15 minutes

Parts Required for an SV1ex memory 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. SV1ex Memory Upgrade Parts

Part Number	Quantity	Description
9055-0000		MEM8192 (8192 Mbytes) Memory Modules
9055-0200		MEM16384 (16384 Mbytes) Memory Modules
9055-3500		Memory Module Backplane, SV1ex-1A (4x4)
9056-3300		Clock Module Assembly, Sv1ex
9055-6801		Damper Cover, SV1ex

Tools Required

Ensure that you have the following tools for this procedure:

- #1 Phillips screwdriver
- #1 slotted screwdriver
- #2 Phillips screwdriver
- Channel-lock pliers
- 5/32-in. allen wrench
- Tie wraps

Software Required

- UNICOS operating system release 10.0.1.0 or later.
- SWS-ION 6.2 release or later.
- Any applicable software fix packages that were communicated via field notice (FN). Refer to "Upgrade Prerequisites" for more detail or to the Field Notice Tool at the following URL:

  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.

Software Procedures

You **must** rebuild the UNICOS kernel as part of this upgrade. The UNICOS 10.0.1.0 kernel and getfix packages must be built and saved to the SWS before the hardware installation of the new SV1ex memory. This ensures that the system can run with UNICOS 10.0.1.0 and the getfix packages before installing the SV1ex memory modules.

You can rebuild the kernel by using one of the following procedures, which are explained in this section:

- Use the UNICOS Installation / Configuration Menu System (ICMS)
- Manually change the kernel configuration files

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.

Use the UNICOS Installation / Configuration Menu System (ICMS)

Use ICMS to rebuild the UNICOS operating system. You must have superuser privileges. Refer to *UNICOS System Configuration Using ICMS,* publication number 004-2412, for more information.

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

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

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

```
sws% bootsys snSerialNumber
```

3. Enter multiuser mode by entering the following command:

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

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

5. To ensure that the `/etc/config/param` file is current, `ftp` it from the SWS disk to the UNICOS file system.

6. Enter the UNICOS ICMS by entering the following command:

```
unicos# cd /etc/install
unicos# ./install
```

7. Select the following menu:

```
UNICOS 10.0 Installation / Configuration Menu System
.Configure System
.. Mainframe Hardware Configuration
```

8. Ensure that the database is current by choosing:

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

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

9. Ensure that the CPU value of NCPU is correct for your system.

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

10. Ensure that the MAXCLUS value is correct for your system (NCPU+1). This value indicates the maximum number of CPU clusters for this system.

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

11. Set `Bits per memory chip (CHIPSZ)`, `Number of memory banks (NBANKS)`, `Physical memory size in Mwords`, and `Running system memory size in Mwords` to the correct values for your system. Refer to Table 3 or Table 4 to choose the correct information.

Table 3. SV1ex Configuration Values for a 4 x 4 Backplane

Memory Board Type	Megawords (MEGAWD-1) Value	XMemory (SSD) (Mwords)	NBANKS Value	CHIPSZ Value	Memory Module Name
AA	4,096	0	2,048	M128MCH	MEM8192
AC	4,096	4,096	2,048	M256MCH	MEM16384

Table 4. SV1ex Configuration Values for an 8 x 8 Backplane

Memory Board Type	Megawords (MEGAWD-1) Value	XMemory (SSD) (Mwords)	NBANKS Value	CHIPSZ Value	Memory Module Name
AA	4,096	4,096	2,048	M128MCH	MEM8192
AC	4,096	12,288	2,048	M256MCH	MEM16384

12. Change the `Amount of extended memory (XMEMORY) for SV1ex` to the correct value in Mwords. Refer to Table 3 or Table 4 to choose the correct information.

    The following display is an example configuration of an SV1 series (8x8) system that has been upgraded with MEM16384 memory modules.

```
Mainframe Hardware Configuration

Cray machine serial number                    3398
Physical memory size in Mwords                4096
Running system memory size in Mwords          4096
Amount of extended memory for SV1ex(XMEMORY) 12288
Number of memory banks (NBANKS)               2048
Bits per memory chip (CHIPSZ)                 M256MCH
Number of CPUs (NCPU)                         32
Number of cluster registers (MAXCLUS)         33
Number of MSPs                                0
Mainframe type (MFTYPE)                       CRAYYMP
Physical channel configuration ==>
Mainframe CPU attributes ==>
Import the hardware configuration ...
Activate the hardware configuration ...
```

13. Choose 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 10.0 Installation / Configuration Menu System
. Build/Install System
```

15. Verify that the following parameters are configured:

```
Build/Install System

Release type                                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
```

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

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

17. Select `Q` to exit ICMS.

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

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

20. It may be necessary to update the `options`(5) file, `/opt/config/options`, on the SWS to use the new `param` file and kernel file.

21. Proceed to "Power Down the SV1 Series System".

Manually Change the Kernel Configuration Files

Note: If you already used the UNICOS ICMS to rebuild the UNICOS kernel, do not perform the following procedure.

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/sn<SerialNumber>
sws% cp unicos unicos.sv1
sws% cp param param.sv1
```

2. Boot the system:

```
sws% bootsys sn<SerialNumber>
```

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.3001.h sn.h
   ```

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

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

7. Change the following values (as necessary) in the sn.h file. (This is an example for an 8-CPU system.)

   ```
   #define SN              3001
   #define NBANKS          2048
   #define CHIPSZ          M256MCH
   #define NCPU            8
   #define MAXCLUS         9
   #define MEMORY          4096*MEGAWD-1
   ```

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

   b. 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.

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

   d. 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.

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

   a. Ensure that the cpus and iomodules values indicate the correct number of CPUs and the correct slot locations for I/O modules.

   b. Add or update the total amount of memory and xmemory:

The following example shows the entries for an 8-CPU system with 4,096 Mwords of memory, 4,096 Mwords of xmemory and I/O modules in processor slots 2 and 3:

```
mainframe {
  8 cpus;
  4,096 Mwords memory;
  4,096 Mwords xmemory;
  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/gen/bin/nmake rmexe
unicos# /usr/gen/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`*.

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 file.

13. Proceed to "Power Down the SV1 Series System".

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*, software publication number 004-221, 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:

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

Note: Do not power down the entire system.

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.
3. Proceed to "Install the SV1ex Memory Module Upgrade".

Install the SV1ex Memory Module Upgrade

Ensure that you follow the correct procedures for your type of mainframe cabinet.

If you have an **SV1-1 (8x8)** system and you are installing SV1ex memory modules, proceed to "Install the SV1-1 (8x8) Memory Module Upgrade".

Note: The SV1ex memory upgrade on an SV1-1 (8x8) system requires a new clock module and memory modules.

If you have an **SV1-1A (4x4)** system and you are installing SV1ex memory modules, proceed to "Install the SV1-1A (4x4) Memory Module Upgrade".

Note: The SV1ex memory upgrade on an SV1-1A (4x4) system requires a new backplane, clock module and memory modules.

Install the SV1-1 (8x8) Memory Module Upgrade

This portion of the document contains the hardware procedures required to upgrade an SV1-1 (8x8) system from SV1e memory modules to SV1ex memory modules.

Remove the Existing Memory Modules

1. Open both the front and back mainframe cabinet doors.

   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 2 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.

2. Connect a grounding strap to the mainframe cabinet.

3. Turn the jackscrews at the top and bottom of the memory module faceplate counterclockwise and simultaneously at the same speed until the module is loose in the chassis.

   Note: Turning the screws simultaneously at the same speed prevents the module from binding in the chassis.

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

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

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

6. Repeat Step 3 through Step 5 for each memory module that you remove.

Remove the Clock/Scan Module

1. Release the 2 screws that secure the clock/scan module cover. (Refer to Figure 1.)

2. Grasp the ejector handles on the clock/scan module and press upward on the top handle and downward on the bottom handle to release the module from the midplane. (Refer to Figure 2.)

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

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

4. Remove the clock module cover by removing the 7 cover screws. (Refer to Figure 2.)

5. Remove the clock module by removing the 4 hex-head nylon screws that secure the clock module to the clock unit frame. (Refer to Figure 2.)

Install the New SV1ex Clock/Scan Module

1. Unpack the new clock/scan module (PN 90563300). Retain the packing material for reuse when you return the module to Logistics in Chippewa Falls.

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

CAUTION
Do not overtighten the screws in the plastic rails: you can damage the equipment.

3. Install the 4 hex-head nylon screws to secure the clock module to the clock unit frame.
4. Install the 7 cover screws to secure the clock module cover to the clock unit frame.
5. Push the clock/scan module into the chassis until it contacts the midplane connectors.
6. Using the ejector handles as push-pads, seat the clock/scan module firmly in the midplane connector.
7. Replace the cover; then tighten the 2 screws. (Refer to Figure 1.)

Figure 1. Clock/Scan Module Location

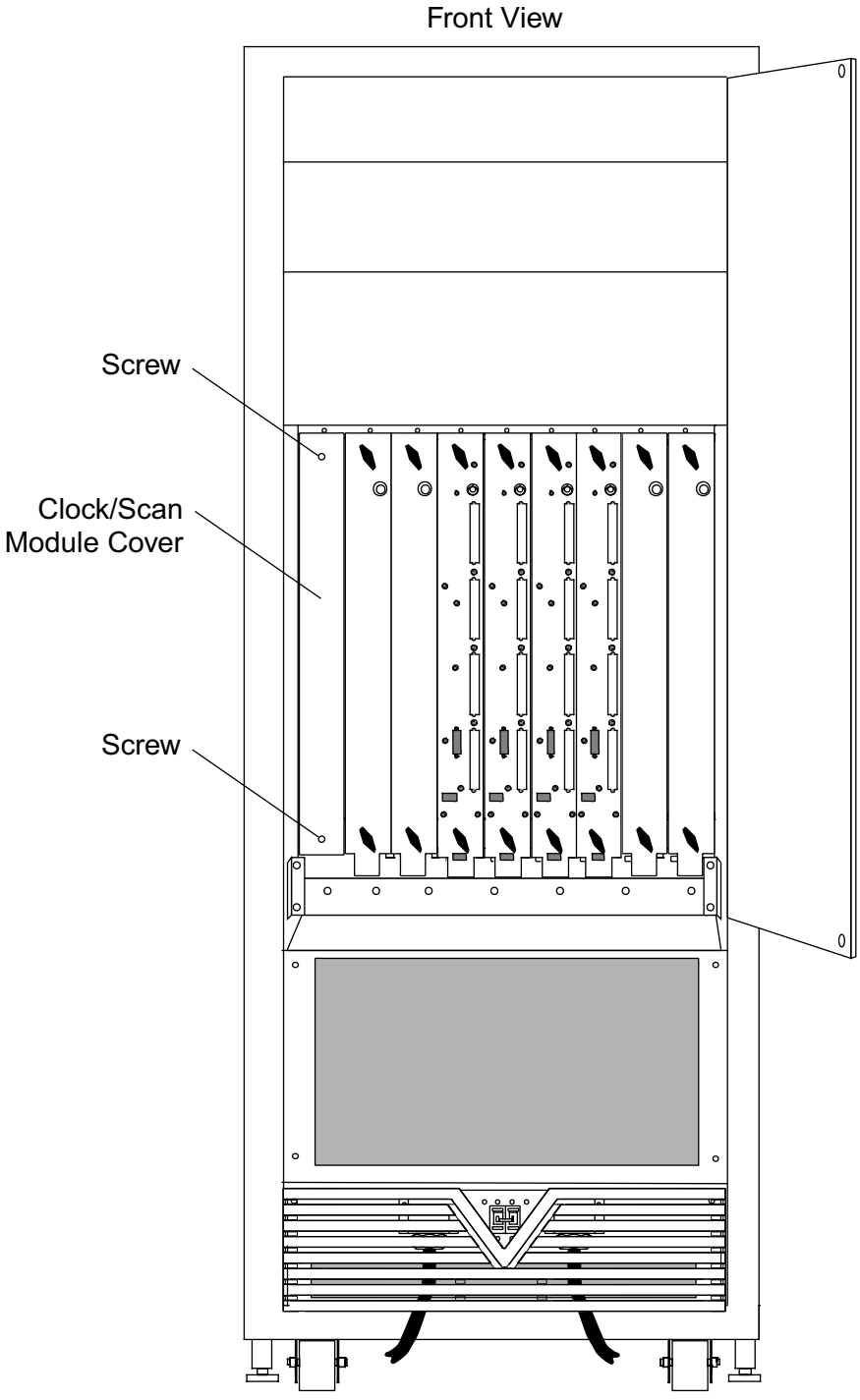
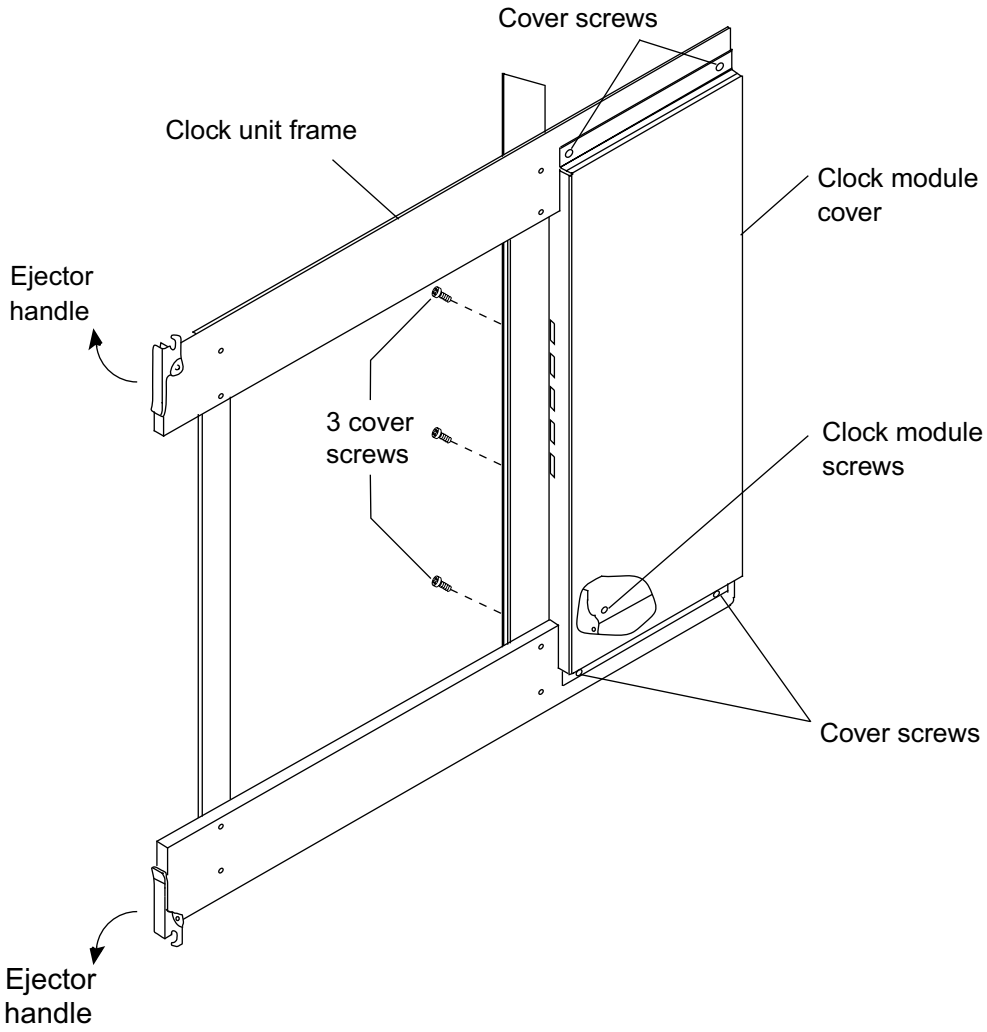


Figure 2. Clock/Scan Module



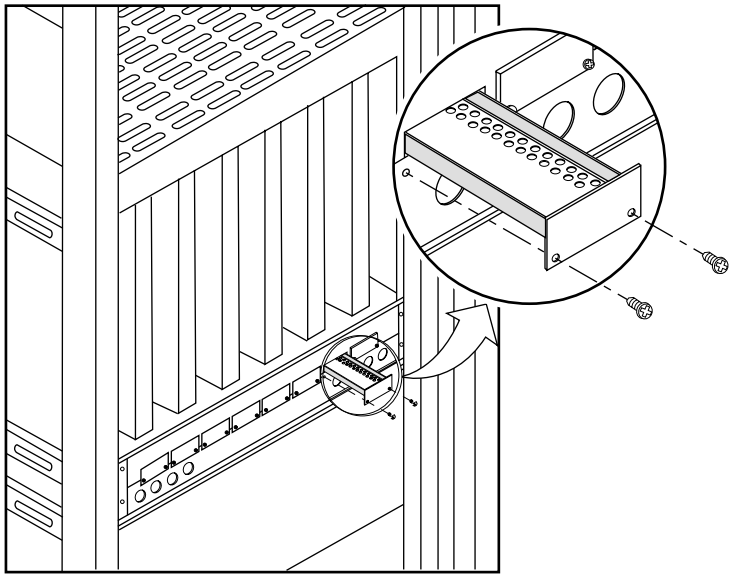
Remove the Air Restrictor Plates

Note: Cover the opening below the card cage to prevent screws or nuts from falling into the blower assembly.

1. Remove the 2 screws from the air restrictor plate under each memory module slot as shown in Figure 3.

2. Completely pull out and remove the air restrictor plate under each memory module slot.

Figure 3. Air Restrictor Plates

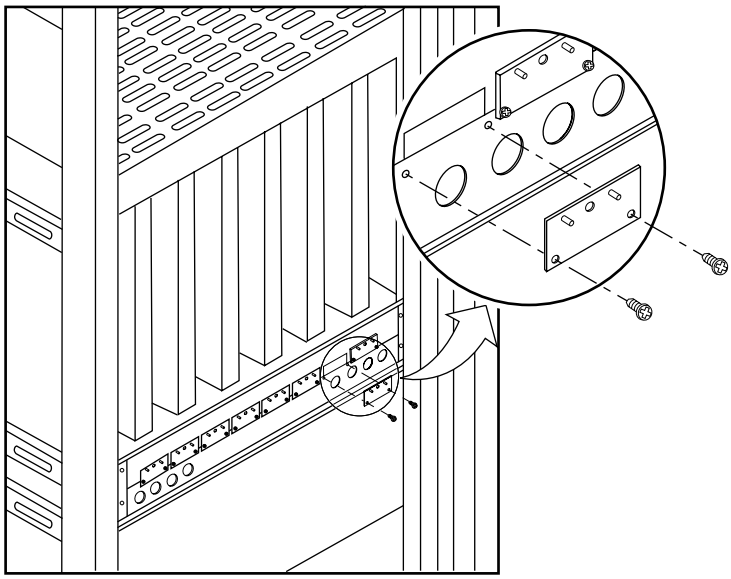


Install the New SV1ex Damper Covers

Note: Cover the opening below the card cage to prevent screws or nuts from falling into the blower assembly.

1. Install the new damper cover (PN 90556801) for each memory module slot. (Refer to Figure 4.)

Figure 4. Damper Cover



Install the New SV1ex Memory Modules

1. Connect a grounding strap to the mainframe cabinet.
2. Unpack the new memory module.
3. Record the memory 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.
4. Place the module into the module guides in the mainframe chassis and push the module into the chassis until it contacts the midplane.
5. Turn the jackscrews clockwise to tighten them until the module is fully seated.

   Note: Turn both jackscrews at the same rate to avoid binding the module.
6. Repeat this procedure for each new memory module that you install.
7. Proceed to "Power Up the Mainframe Cabinet".

Install the SV1-1A (4x4) Memory Module Upgrade

This portion of the document contains the hardware procedures required to upgrade an SV1-1A (4x4) system from SV1e memory modules to SV1ex memory modules.

Note: The SV1ex memory upgrade on an SV1-1A (4x4) system requires a new backplane, clock module and memory modules.

Remove the Existing Memory Modules

1. Open the front mainframe cabinet door.

   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.
2. Connect a grounding strap to the mainframe cabinet.
3. Turn the jackscrews at the top and bottom of the module faceplate counterclockwise and simultaneously at the same speed until the module is loose in the chassis.

Note: Turning the screws simultaneously at the same speed prevents the module from binding in the chassis.

CAUTION

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

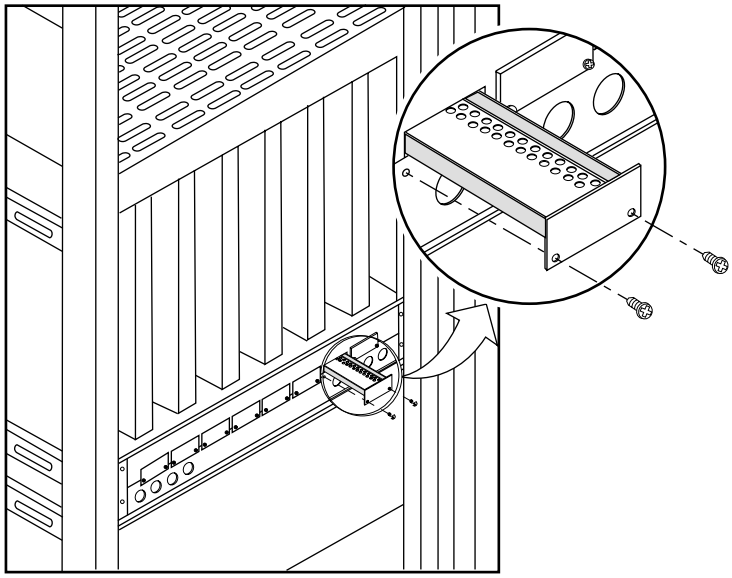
4. Grasp the module securely and remove it from the chassis.
5. Place the module on a static-dissipative surface.
6. Repeat Step 3 through Step 5 for each memory module that you remove.

Remove the Air Restrictor Plates

Note: Do not remove the air restrictor plates under the processor module slots.

1. Remove the 2 screws from the air restrictor plate under each memory module slot as shown in Figure 5.
2. Completely pull out and remove the air restrictor plate under each memory module slot.

Figure 5. Air Restrictor Plates



Remove the SV1e Processor Modules

Note: Record the serial number and location of each processor module as you remove it. This information ensures that you reinstall each processor into its original position.

1. At the front of the cabinet, turn the jackscrews at the top and bottom of the processor module faceplate counterclockwise and simultaneously at the same speed until the module is loose in the chassis.

   Note: Turning the screws simultaneously at the same speed prevents the module from binding in the chassis.

2. Partially extract all of the processor modules. It is not necessary to completely remove these modules, but they must be released from the backplane and moved forward approximately 2 in. (5 cm).

Remove the Clock/Scan Module

1. Release the 2 screws that secure the backplane cover. (Refer to Figure 6.)

2. Grasp the ejector handles on the clock/scan module and press upward on the top handle and downward on the bottom handle to release the module from the backplane. (Refer to Figure 7.)

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

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

Figure 6. Mainframe Cabinet (Rear View)

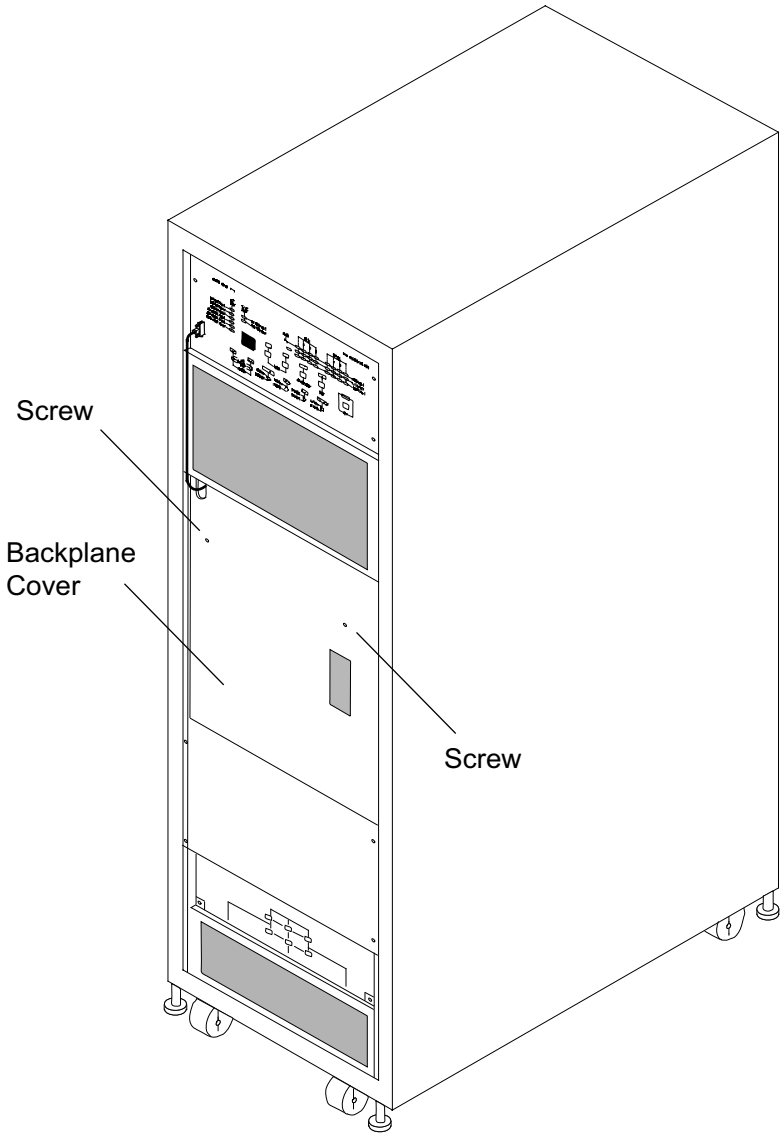
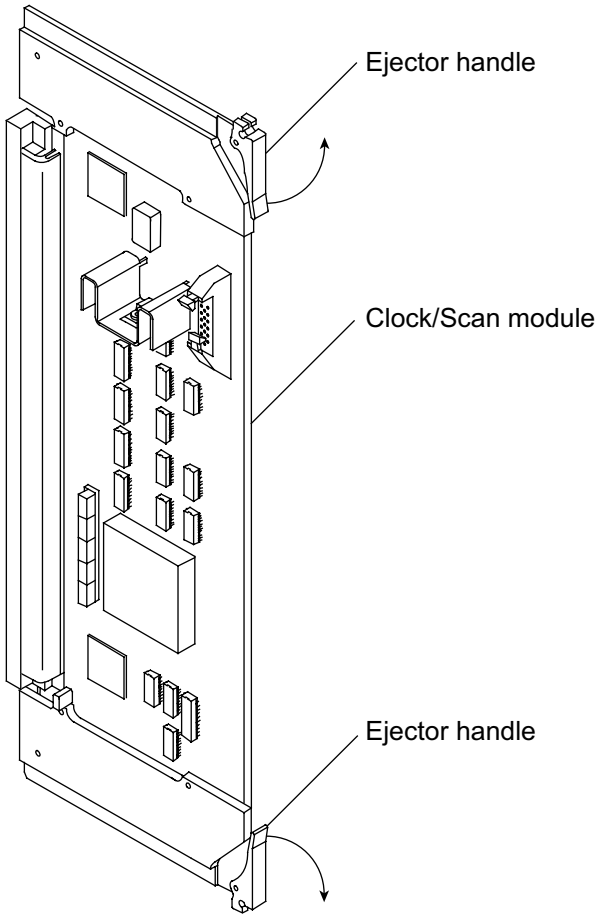


Figure 7. Ejector Handles on Clock/Scan Module



Remove the Backplane

Note: Cover the holes of the clock module cooling ducts and the 48 Vdc power cable holes to prevent screws or nuts from dropping into other assemblies.

1. Remove the 4 nuts that secure the 48 Vdc power cables to the 48 Vdc power bus and remove the power cables from the studs. (Refer to Figure 8.)

2. Remove the sense cable from the upper-left corner of the backplane. (Refer to Figure 9.)

3. Remove the CPU enable connector from the lower connector in the upper-left corner of the backplane. (Refer to Figure 9.)

Figure 8. Backplane Power Bus Connections

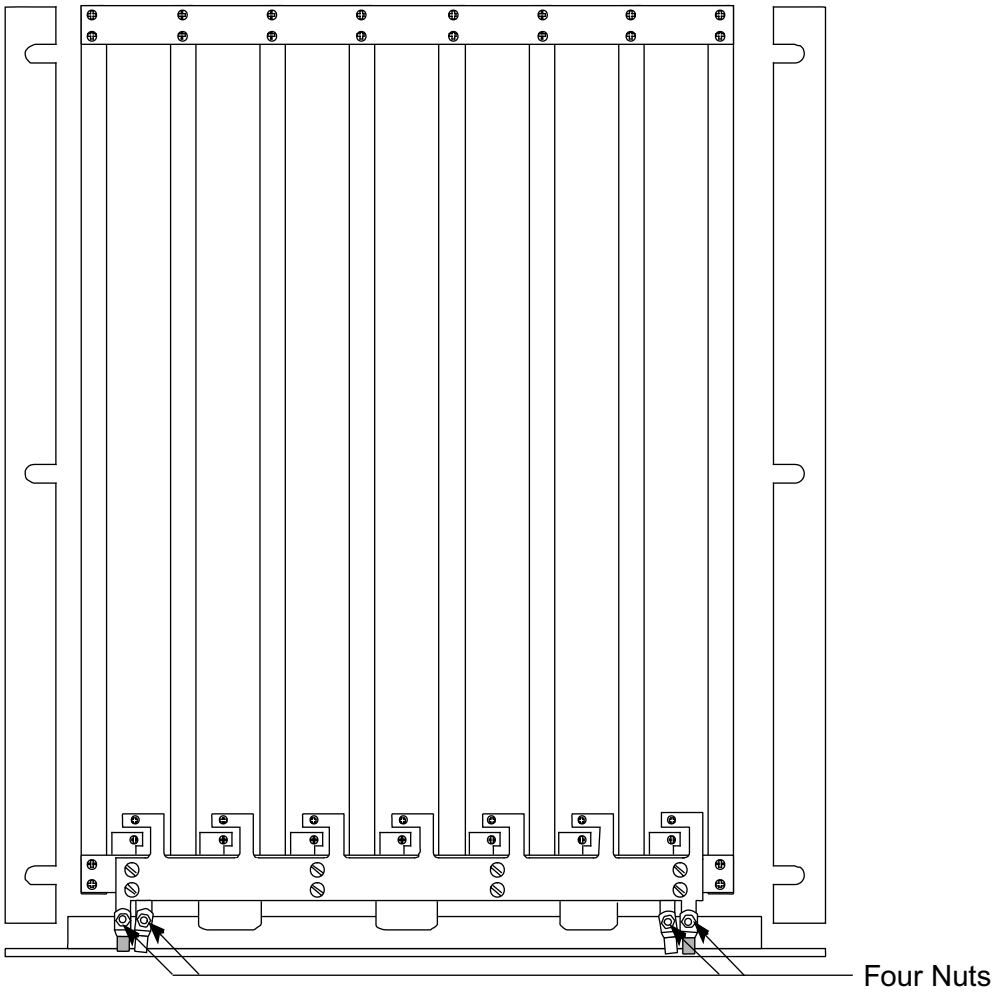
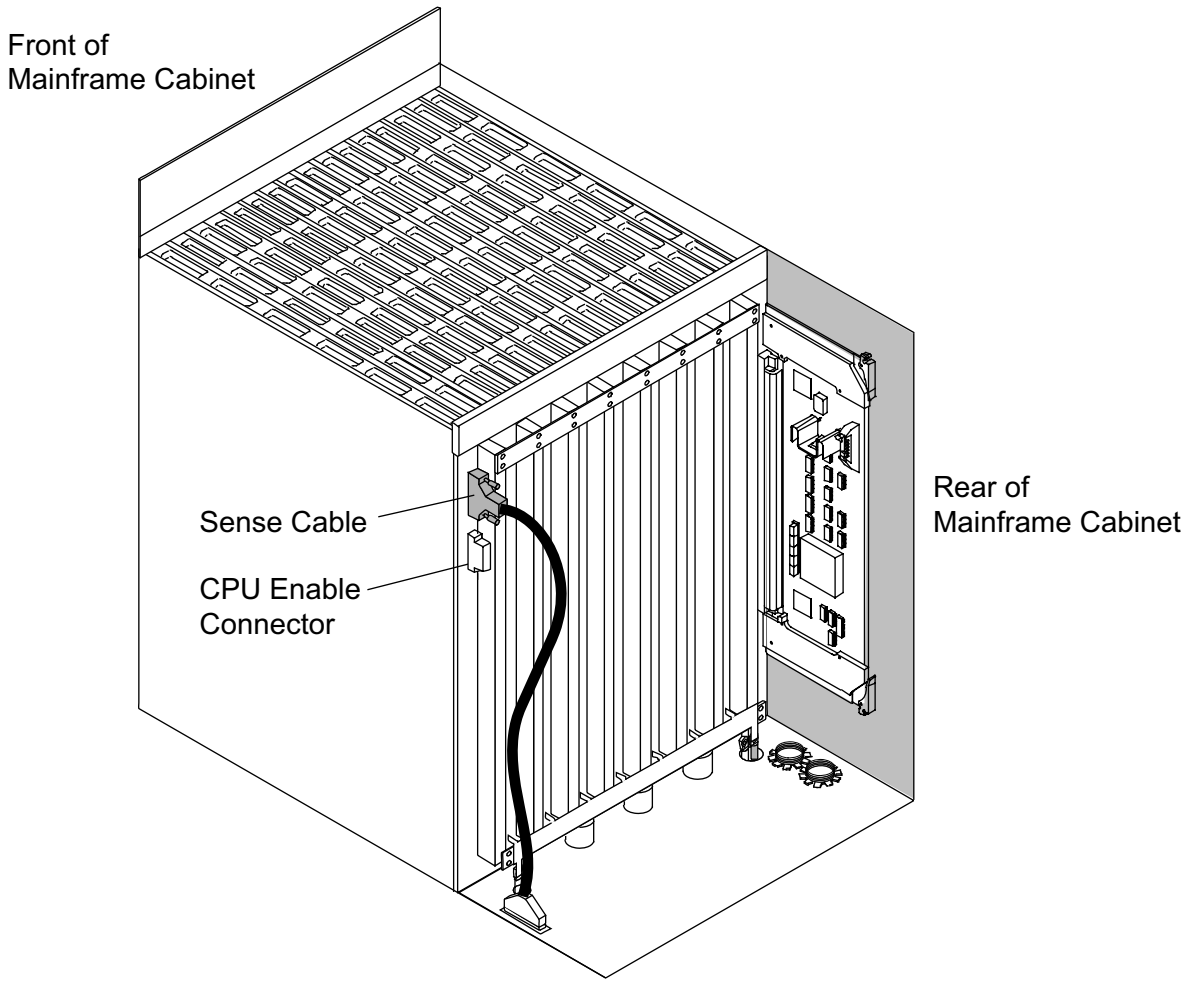


Figure 9. Backplane Sense Cables



CAUTION

The backplane is heavy. Remove the side screws first, then the bottom screws, and finally the top screws. Failure to do so can damage the backplane.

4. Remove the perimeter screws that secure the backplane to the chassis.

   After you remove all of the screws, tip the top of the backplane forward and bring the right side forward. Remove the backplane from the chassis.

Install the New SV1ex Backplane

1. Unpack the new backplane (PN 90553500). Save the packing material for reuse when you return the old backplane to Logistics in Chippewa Falls.

CAUTION
Remove the protective covers from the backplane connectors very carefully to avoid bending the pins. Use the pin protector removal tool (P/N 90441700) provided with the new backplane. Place the pin protector removal tool in the package when you return the old backplane to Logistics in Chippewa Falls.

2. Place the new backplane into the rear of the mainframe cabinet.
3. Replace all of the perimeter screws to secure the backplane to the chassis.
4. Replace the sense cable on the upper connector in the upper-left corner of the backplane. (Refer to Figure 9.)
5. Replace the 48 Vdc cables on the studs of the 48 Vdc power bus and secure them with the 4 nuts that you removed earlier. These connections must be tight to prevent power loss. (Refer to Figure 8.)

Note: The CPU enable connector is no longer needed because all CPUs are enabled.

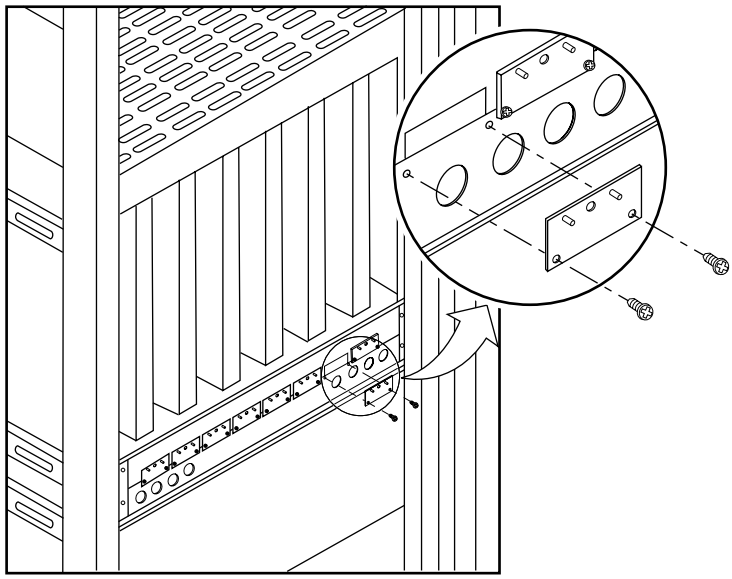
Install the New SV1ex Clock/Scan Module

1. Unpack the new clock/scan module (PN 90563300). Retain the packing material for reuse when you return the old module to Logistics in Chippewa Falls.
2. Set the clock/scan module in the guide slots.
3. Push the clock/scan module into the chassis until it contacts the backplane connectors.
4. Using the ejector handles as push-pads, seat the clock/scan module firmly in the backplane connector.

Install the New SV1ex Damper Covers

1. Install the new damper cover (PN 90556801) for each memory module slot. (Refer to Figure 10.)

Figure 10. Damper Cover



Install the New SV1ex Memory Modules

1. Connect a grounding strap to the mainframe cabinet.
2. Unpack the new memory module.
3. Record the memory 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.
4. Place the module into the module guides in the mainframe chassis and push the module into the chassis until it contacts the midplane.
5. Turn the jackscrews clockwise to tighten them until the module is fully seated.

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

6. Repeat this procedure for each new memory module that you install.

Install the SV1e Processor Modules

Note: Use the information recorded in "Remove the SV1e Processor Modules" to ensure that each processor is installed in its original position.

1. Place the processor module into the module guides in the mainframe chassis and push the module into the chassis until it contacts the midplane.
2. Turn the jackscrews clockwise to tighten them until the module is fully seated.

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

3. Repeat this procedure for each processor module that you install.
4. Proceed to "Power Up the Mainframe Cabinet".

Note: The Bethard Adaptive Receiver/Transmitters (BART) must be configured by using `jconfig` during "Hardware Installation Verification". (Refer to "BART Training".)

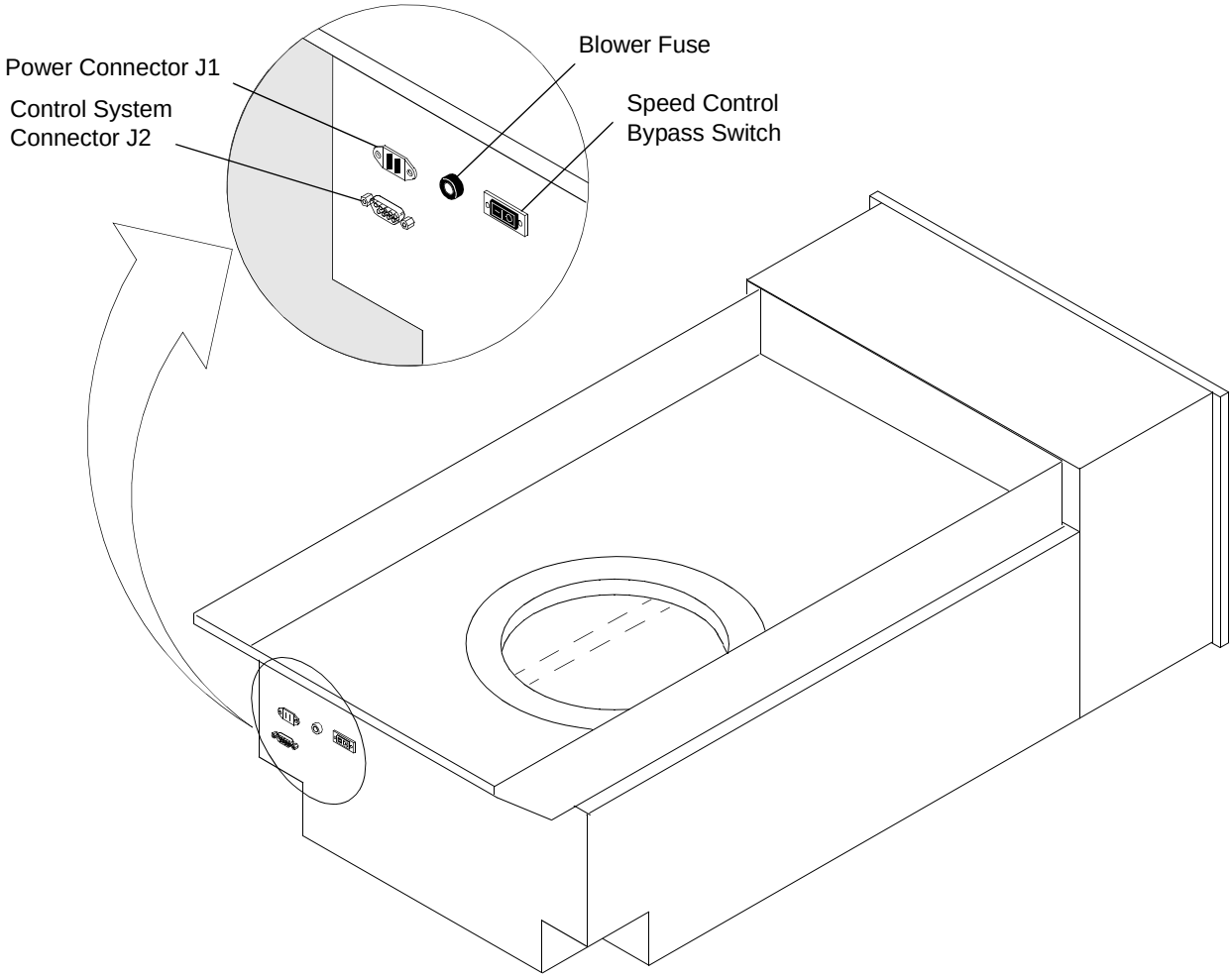
Power Up the Mainframe Cabinet

1. Ensure that the DC power switches on the processor and memory modules are enabled; the indicator should be green.
2. Ensure that the blower assembly speed control bypass switch (8x8 only) is in the correct position. (Refer to Figure 11.)

   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.

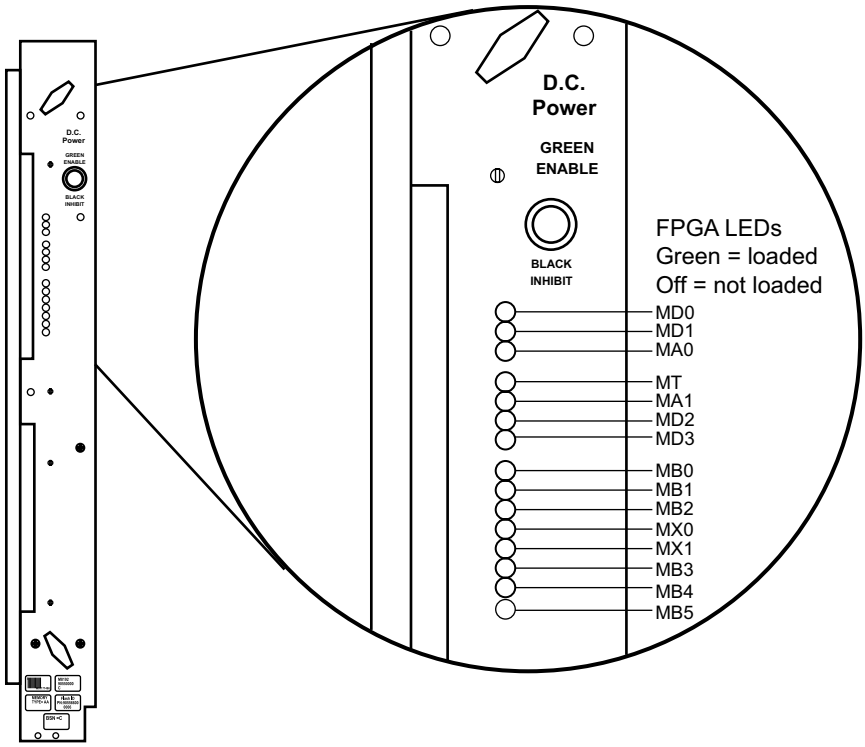
Figure 11. Blower Assembly



3. At the front of the mainframe cabinet, move the circuit breaker to the 1 (ON) position.
4. Press the CPU RESET button on the central control unit (CCU).
5. Press the I/O RESET button on the CCU.
6. Press the ALARM ACKNOWLEDGE button on the CCU to disable the alarm.
7. Ensure that the SYSTEM READY LED on the CCU is illuminated.
8. Ensure that all of the LEDs on the Sv1ex memory modules are on (green). (Refer to Figure 12.)

Note: If all of the LEDs are not on (green), refer to *Mainframe Troubleshooting (Cray SV1™ Series)*, hardware publication number 108-0202.

Figure 12. Cray SV1ex Memory Module LEDs



Hardware Installation Verification

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

Note: View the man page for information about edittopo.

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 following example shows:

   - sn3304-0 = SV1e processor module
   - sn3304-1 = SV1e processor module

- sn3304-2 = SV1 series I/O module
- sn3304-3 = J90se I/O module

Figure 13. 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 on all rings:

   ```
   $ dring -a initnode
   ```

Update the Memory Module Type Using jconfig

The `jconfig` utility requires hardware configuration information (refer to Figure 15 and Figure 16) 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. Only qualified support personnel should use this tool.

`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 16) display each configuration register field, an explanation of the purpose of the field, 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 14.)

Figure 14. 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 15.)

Figure 15. 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                        SV1e
3                       0  1  2  3                        SV1e

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

Backplane Type:         4x4

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

5. From the `jconfig Editor Screen` (refer to Figure 16), enter the correct memory type.

   The example for the `Memory Type:` field in Figure 16 shows:

   - AA = MEM8192
   - AC = MEM16384

Figure 16. jconfig Editor Screen

```
***************** System Hardware Configuration ******************
CP Boards/CPUs:      1 HEX Digit Per Board, 1 Bit Per CPU On That CP.
                     Example:     0  0  0  0  F  F  F  F  (CP 0-3, all 4 cpus/CP)
                                  0  0  0  0  0  0  0  1  (CP 0, cpu 0 only)

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,AA-AE.

Backplane Type:      8==8x8, 4==4x4, 2==2x2, 1==1x1
================================================================================
CP/MEMORY Module:    7  6  5  4  3  2  1  0
CP Boards/CPUs:      0  0  0  0  F  F  F  F
CP Type:             0  0  0  0  3  3  3  3
MEMORY Boards:       0  0  0  0  1  1  1  1
Memory Type:         00 00 00 00 AA AA AC AC
Backplane Type:      4



<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 `MEMORY BOARDS PRESENT:` and the `MEMORY BOARDS TYPES:` fields are correct. (Refer to Figure 15.)
8. Confirm the configuration by typing a **y**.
9. Select `<4> Update Config File(s)` from the main menu. (Refer to Figure 14.)

BART Training

BART training is required for SV1 series processor module swaps, first module installs, clock/scan module replacements and backplane replacements. This takes approximately 3 minutes per module. (Refer to Figure 17 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! You must run BART training 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 14.)

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.`

Figure 17. 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 *Mainframe Troubleshooting (Cray SV1 Series)*, hardware 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.

   From this menu, you have the following options:

   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 series I/O module
- `PROC3 : rev C` = J90se I/O module
- `MEM1-3 : rev C` = MEM8192 or MEM16384

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 C
      6.  MEM1  : rev C
      7.  MEM2  : rev C
      8.  MEM3  : rev C
      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.
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

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

Note: If ACT detects memory failures, refer to *Mainframe Troubleshooting (Cray SV1 Series)*, hardware 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. Select **`q`** to quit the ACT menu system.

8. Test the GigaRing nodes on **all** channels. Refer to FN #5010a - *Testing and Verification of Mainframe GigaRing Nodes.*

9. Run offline diagnostics jmemx and jtlb. Refer to *Mainframe Troubleshooting (Cray SV1 Series),* hardware publication number 108-0202.

Note: Do not run jtlb on an SV1ex-1A (4x4) system with memory size MEM8192 installed. The jtlb diagnostic tests SSD memory. MEM8192 on an SV1ex-1A (4x4) system does not have SSD memory. (Refer to Table 3.)

Software Verification

1. Halt, then reboot, the mainframe and bring the system back into multiuser mode from the SWS by entering the following commands:

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

When the system boots, it reports the number of CPUs that started and the amount of memory that is configured. The following display is an example of the system boot messages.

```
System gen time    = 11/14/01 15:13:55
```

```
UNICOS binary size = 3704511 words
Memory configured  = 4294966272 words
Memory allowed     = 4294965248 words
Memory downed      = 260096 words @ address 0037777000000
Extended memory configured  = 12884901888 words
Block transfer engine available
sysmem             = 3155516 words
maxmem             = 4284976349 words
Buffer pool size   = 5120000 words (10000 buffers)
User memory avail  = 4254214144 words
CPUs configured    = 32, started = 32 (0, 1, 2, 3, 4, 5, 6,
7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22,
23, 24, 25, 26, 27, 28, 29, 30, 31)
```

2. Enter the either of the following commands to verify that the kernel detects the new memory.

   - # **target |head**

     The following display is an example of SV1 series (8x8) system that has been upgraded with MEM16384 memory modules.

```
Primary machine type is:  CRAY-SV1
   banks    = 2048
   numcpus  = 32
   bufsize = 32
   memsize  = 4294967296
   emspeed = 33
   clocktim = 10000
   numclstr = 33
   bankbusy = 14
   subtype = SVX
```

   - # **sysconf |grep MEM**

     The following display is an example of SV1 series (8x8) system that has been upgraded with MEM16384 memory modules.

```
MEM=4294704896 NBANKS=2048 CHIPZ=268435456 XMEM=25165824
SYSMEM=41181184 WRDS USRMEM=4253523712 WRDS
```

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*.

System File 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`

Reader Comment Form

Title: SV1ex Memory Upgrade (Cray SV1™ Series) **Number: H20-6019-0**

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