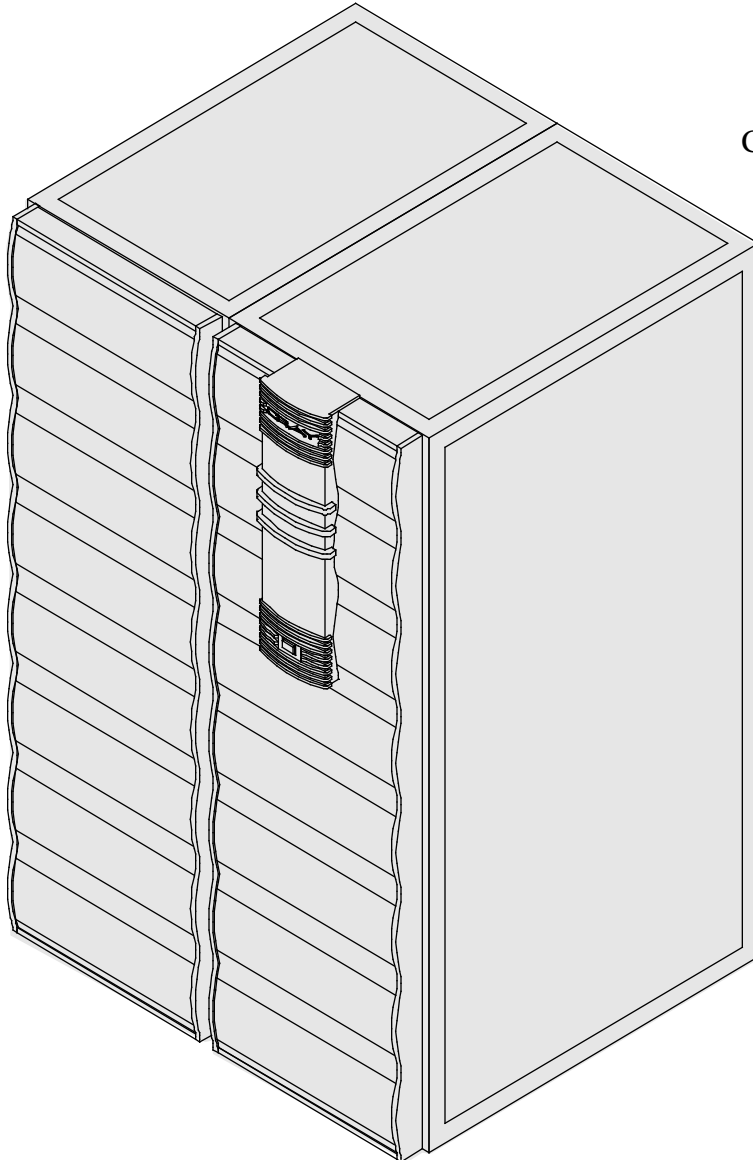


# **CRAY J916™ MDDS-10 Migration Procedure**

**HMU-189-0**

Cray Research Proprietary



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**Cray Research, Inc.**

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# Record of Revision

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Comments about this publication should be directed to:

CRAY RESEARCH, INC.  
Hardware Publications and Training  
890 Industrial Blvd.  
Chippewa Falls, WI 54729

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## Overview

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### Device to Be Migrated

This document contains procedures on how to transfer a customer's disk drive subsystem with DD-5S drives (DDS-10) from a CRAY EL series system to a CRAY J916 system.

### Description of Migration

Cray Research customers have the option of transferring their DDS-10 subsystem from their CRAY EL series system to their CRAY J916 system. This procedure is written to aid CRI support personnel in the task of removing the DD-5S drives from a CRAY EL series system and installing them into a CRAY J916 system. You may want to check off each step of this procedure as you complete it.

The MDDS kit includes a peripheral tray (PE-10S), an SI-3 controller, and cables.

The instructions presented in this procedure provide the CRAY J916 system with added operational DDS-10 disks. The software upgrade procedure creates two TEMPORARY scratch file systems on these new disks. It is then the responsibility of the customer to integrate these disks into the existing CRAY J916 system disk configuration. The "Disk Device Integration" section, near the end of this document, provides some pointers to useful disk integration information.

The procedures in this document destroy data on the disks being migrated. The site should dump all file systems from the disks before the disk drives are deinstalled from the CRAY EL series system. The disks should be repopulated with data after the migration procedures have been completed. These procedures add the migrated disks to the CRAY J916 system as empty disks that are made into temporary scratch file systems for testing purposes. Once these scratch file systems are functional, the migration is complete. The site should decide how and when to integrate the new disks into the existing CRAY J916 disk configuration and how and when to populate the new disks with data. If these procedures do not meet the migration requirements at your site, please contact the SPS group to discuss alternatives.

## DDS-10 Migration Prerequisites

Special configuration considerations:

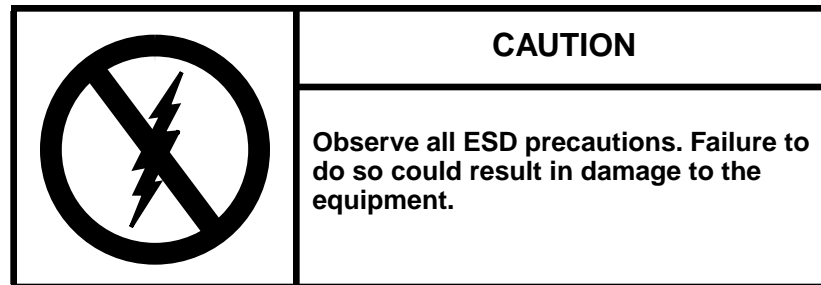
- It is recommended that the “Software Configuration Preparation” section of this migration be completed prior to taking dedicated maintenance time on the system. This section involves configuring the new disks into temporary scratch file systems, and may be completed while the system is in multiuser mode prior to the migration.
- The customer may also want to prepare a production version UNICOS configuration (`param`) file prior to the migration in order to integrate these new disks into the existing CRAY J916 system disk configuration. This `param` file will then be available for the “Disk Device Integration” section of this migration.
- It is recommended that a full backup of existing file systems on both the CRAY EL and CRAY J90 series systems be completed before this migration is started.
- The maximum number of SI-3 controllers per IOS is three if no network controllers reside on the same IOS. Decrement the maximum by 1 for each network controller in that IOS.
- The procedures for integrating new disks into existing file systems are located in Section 5 of the *UNICOS Basic Administration Guide for CRAY J90 and CRAY EL Series*, Cray Research publication number SG-2416. For more information about migrating file systems, refer to CSH J90-ADM-9505B.

## Training Requirements

Cray Research personnel who perform this migration must have completed training in CRAY J916 hardware and system administration. If this is not possible, a hardware-trained person must have a system administrator available during this migration. Experience in upgrading or installing the UNICOS operating system on a CRAY J916 system or CRAY EL series system is advised.

## ESD Precautions

Observe ESD precautions during the entire migration process. Required apparel includes an ESD smock and an ESD wrist strap. Do not wear watches or jewelry when you work on a CRAY EL series or CRAY J916 system cabinet.



### ESD Smock

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

### Wrist Strap

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

### Reference Publications

Refer to the following publications if you have questions when performing this migration:

- *UNICOS Basic Administration Guide for CRAY J90 and CRAY EL Series*, Cray Research publication number SG-2416
- *CRAY IOS-V Commands Reference Manual*, Cray Research publication number SR-2170
- *CRAY IOS-V Messages*, Cray Research publication number SQ-2172
- *Automated Confidence Testing*, Cray Research publication number HDM-110-0
- *CRAY J916 Service Manual Kit*, Cray Research publication number HMK-101-0
- *UNICOS Installation and Configuration Tool Reference Manual*, Cray Research publication number SR-3090

## Estimated Time to Perform Migration

[Table 1](#) divides the DDS-10 migration process into three separate procedures. Use this table to determine how much system time you should request to complete this migration.

**NOTE:** It is recommended that you contact the customer and request that he or she complete a full backup prior to this migration.

Table 1. Estimated Times to Perform DDS-10 Migration

Migration Task	Estimated Time
Hardware Install	5 hours
Hardware Verification Testing	1 hour
Software Configuration	1 hour
Software Verification Testing	1/2 hour

## Parts Required

Refer to [Table 2](#) for a list of PE-10S migration parts.

## Tools Required

The majority of the tools required for performing these procedures are common hand-held tools that are included with the Customer Service toolkit. You may need a small hammer, which is not included in this toolkit.

## Software Required

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



Table 2. PE-10S Migration Kit (P/N 90392700) Contents

CRI Part Number	Quantity	Description
90360800	1	Module Assembly, SI-3 (DC-6S)
90305000	1	Tray Assembly, PE-10
90266400	2	Cable Assembly, PE-10S Tray, Internal
90202400	6	Screwlock Kit, Female
90205301	2	Adhesive, Threadlock
90030500	14	Cable Tie, Mounting Nylon 4 in.
90210503	4	Label, Wht .25×1.875
90210500	4	Label, Wht .25×1.50
90267600	0	Process Spec, Label Making
90305200	4	Base, Drive
90305300	4	Handle, Drive
90029000	32	Screw, Sem Pan Head Phillips 6-32×1/4
90305500	1	Cover, Drive Tray
90169500	1	Label, Identification
90418401	1	Label, PE-10S Tray
90427804	1	Label, Fuse Rating 4 Amp 250 Vac
90142400	1	Label, Mult Hazard
90312200	4	Bracket, Slide Mount
90116301	8	Screw, Sem Pan Head Phillips 8-32×1/4
90141400	8	Clip Nut 1/4-20
90054600	6	Clip Nut, Captive 10-32
90141500	8	Screw, Sem Pan Head Phillips 1/4-20×1/2
90307200	1	Cable Carrier, Steel
90029200	2	Screw, Sem Pan Head Phillips 10-32×3/8
90307100	1	Power Cord, Universal, 10 Amp
90266200	2	Terminator, Differential, 68 Position, Low Profile
90307000	1	Harness Assembly, Control, External
90272200	2	Harness Assembly, SCSI-3, Bulkhead-Device
90317400	2	Cable Assembly, Intermediate SCSI-3
90360701	2	Plate Assembly, 68 Pin
90030502	10	Cable Tie, Mounting Nylon 8 in.
90154100	4	Screw, Truss Head Phillips 10-32×1/2SS
90306600	1	Filter Assembly, Air
90441400	1	Shipping Container, Disk Tray

## 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 Starting

---

### 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 migration procedures. Refer to the *UNICOS Basic Administration Guide for CRAY J90 and CRAY EL Series*, publication number SG-2416, for details on how to create a backup copy of the UNICOS file system for CRAY EL98 systems.

### Power Down the CRAY EL Series System

1. Ensure that all customer jobs have been completed before you start to power down the system.
2. From the UNICOS kernel, shut down UNICOS; refer to the *UNICOS Basic Administration Guide for CRAY J90 and CRAY EL Series*, publication number SG-2416, for details. This procedure should take approximately 15 minutes.

CAUTION
<p><b>When you perform maintenance on the CRAY EL series system, press the EPO button to power down the system. This ensures that all safety features are working correctly.</b></p>

3. Press the EPO button.
4. Ensure that the AC Power Loss LED is illuminated.

## Hardware Migration Procedure

---

### Open and Remove the CRAY EL Series Rear and Side Panels

**NOTE:** If the DD-5S drives are located in the left side of the CRAY EL series cabinet 1, you must remove the rear panel before you can remove the side panel.

1. Release the lower two spring catches located on the bottom of the rear panel (one spring catch is located in each corner) and push up on the release rod. The bottom of the panel has now been released and the panel is hanging from the panel mounting screws.
2. Position one person at each end of the panel to lift the panel and ease it outward.
3. Remove the inner back-panel EMI shield by removing the two screws located near the upper corners of the panel.
4. Turn the side panel latch counterclockwise one-half turn to unlatch it, and swing the panel open.
5. Lift the panel upward, keeping it as straight as possible, until it clears the hinge pins.

### Remove DD-5S Drives from the CRAY EL Series System

1. Remove the four retaining screws from the front of PE-10S tray.
2. Extend the PE-10S tray.
3. Remove the PE-10S top cover by removing a screw from each side of the tray front.
4. Disconnect the power and data cables from each of the four DD-5S drives.
5. Before you remove the drives, write 0, 1, 2, or 3 on the label on the drive according to the following diagram. (You will install the drives in the same physical locations.)

1	3
0	2

Front

6. Grasp the drive handle and lift the drive from the CRAY EL series peripheral tray.
7. Place the drive on an ESD-protected work surface.
8. Repeat [Step 6](#) and [Step 7](#) for each drive.

## Replace Drive Handle Hardware

1. Remove the two screws from each side of the drive, which will enable you to remove the two side plates and handle.
2. Install the CRAY J916 baseplate on the bottom of the drive (with the chips facing down) using the four screws (P/N 90029000) provided.
3. Turn the drive over and install the CRAY J916 drive handle in the top two screw holes by replacing two screws (P/N 90029000) on each side.

## Power Down the CRAY J916 System

1. Ensure that the customer has brought the system to single-user mode.
2. Using the right mouse button, click on any open working space. The `Workspace` menu will appear.
3. From the `Workspace` Menu, select the `J90 Console` menu item.

**NOTE:** You must have superuser privileges to perform [Step 4](#).

4. Log into the UNICOS operating system by entering `<CONTROL-a>` to get a UNICOS prompt and enter the root login and password.
5. Shut down the UNICOS operating system by entering the following commands at a UNICOS prompt:

```
# cd /
# /etc/shutdown 120 (takes 120 seconds to execute)
# /bin/sync
# /bin/sync
# /bin/sync
# /etc/ldsync (if you are using ldcache)
```

6. Stop the J90 Console connection by entering the following commands:

```
# <CONTROL-a> (toggles to the IOS)
sn9xxx-ios0> mc
sn9xxx-ios0> reset (takes 30 – 45 seconds to execute)
BOOT[sn9xxx-ios0]> ~. <CONTROL-c>
```

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

**The PE-10S trays may or may not have already been installed in the CRAY J916 system. If they have not been, you must install the PE-10S tray(s) in the CRAY J916 system before you install the DD-5S drives in the PE-10S tray(s). If the PE-10S trays are already installed, skip to “Install the DD-5S Drives in the CRAY J916 PE Tray.”**

### Remove the CRAY J916 I/O Cabinet Rear Door

1. At the rear of the I/O cabinet, turn the two door fasteners 1/4-turn counterclockwise with a 5/32-in. allen wrench.
2. Grasp the door handle and swing the door open to the right.
3. Remove the screw that connects the green and yellow ground wire to the I/O cabinet.
4. Lift the door up about 1 in. (2.54 cm) and remove the rear I/O door from its hinges.

## Remove the CRAY J916 I/O Cabinet Front Door

1. At the front of the I/O cabinet, push down on the latch and swing the door open.
2. There is a cable that prevents the door from swinging back. Remove the retaining screw that attaches the ground wire cable to the I/O cabinet.
3. Lift up and remove the front I/O door from its hinges.

## Gain Access to the Side of the I/O Cabinet

1. Remove the I/O cabinet side panel if only one I/O cabinet is located on each side of the mainframe cabinet.
  - a. Carefully pry the eight screw covers from the side panel using a very thin, strong pry or knife blade.
  - b. Loosen the eight captive screws that were revealed in the previous step.
  - c. Lift off the panel and set it aside.

**If you have a system that includes two I/O cabinets on the same side, you will have to separate the cabinets if the upgrade is being installed into the inner cabinet. Use the following procedure to separate the cabinets.**

2. Raise the levelers on the I/O and mainframe cabinets.
3. Remove the three frame-joining screws from the frame joiners on the I/O cabinet.
4. Separate and pull apart the cabinets.
5. Move the I/O cabinet so that the protruding flanges move back and away from the mainframe cabinet frame.
6. Insert the frame-joining screws on the I/O cabinet.

## Install the PE-10S Slides

Install the PE-10S tray in the lowest available position (numbered 1 – 36 on the side of the frame). You must use the lowest position to prevent the cabinet from becoming top-heavy.

1. Remove the four screws from the filler plate that covers the empty position to be occupied by the new PE-10S tray. Additional filler plates may need to be removed if access space is desired for the migration. Retain the four screws to secure the new tray.
2. Place four large clip nuts (P/N 90141400) on each side of the cabinet (Refer to [Figure 1](#)); there are eight clip nuts that will be used for installing the tray slides.
  - a. Place a clip nut into the 4th hole up from the clip nut of the last drive tray slide. Refer to [Figure 1](#).

**NOTE:** If you are installing a tray immediately above the VME chassis, insert the clip nut on the 7th hole up from the VME chassis slide.

- b. Install the upper clip nuts into the 5th hole above the lower clip nut. Refer to [Figure 1](#).
  - c. **IMPORTANT:** Align each clip nut by centering it on the hole, using a #2 Phillips screwdriver and inserting a screw in each clip nut before you install the slides.

**NOTE:** It may be necessary to use a small hammer to tap the clip nuts into place.



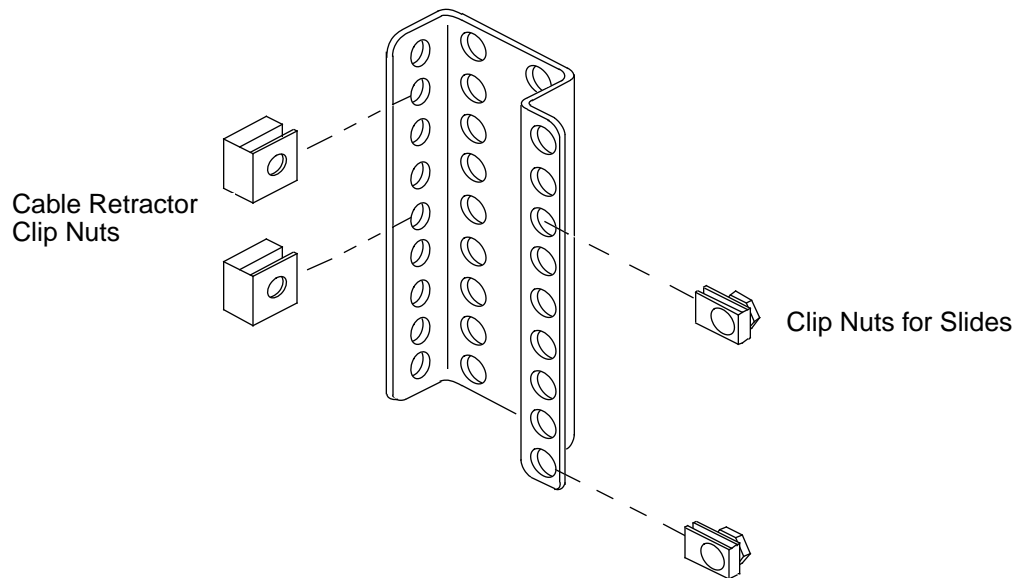


Figure 1. Clip Nut Locations on Chassis Slide

3. Place a slide against one side of the cabinet chassis over the clip nuts. Loosely attach it with four 1/4-20 X 1/2 Phillips screws (P/N 90141500). Do not tighten these screws yet.

**NOTE:** Ensure that the slides are pushed up as high as possible to prevent interference with the tray located below the tray being installed. Refer to the other clip nuts on the tray below for the correct position of the slide.

4. Place the other slide on the other side of the cabinet and loosely attach it with four Phillips screws.
5. Now, tighten all eight screws.

### Install the PE-10S Tray

**NOTE:** The inner slides come already installed on the PE tray.

1. Extend the inner part of the slides.

**NOTE:** The slides are greasy. You may want to wash your hands after working with the slides.

2. Before installing the PE-10S into the system cabinet, ensure that all screws securing the top cover of the PE tray are tightened.
3. Slide the PE-10S onto the newly mounted slides in the I/O cabinet.

You may have to slide the ballbearing section to the front to get the tray to slide onto the ballbearing section of the slides. You may also want to push up on the slide backstop.

**NOTE:** If the new tray interferes with the PE below; some adjustments of the slides will be necessary.

4. Snap the air filter onto the front of the PE tray.

### **Install the DD-5S Drives in the CRAY J916 PE Tray**

1. Extend the PE-10S tray.
2. Remove the cover from the CRAY J916 PE tray.
3. Install the four drives in the PE tray.
4. Secure each drive with the three screws that are attached to the baseplate.
5. Attach the power and data cables.
6. Replace the CRAY J916 PE tray cover.
7. Push the PE tray into the cabinet.
8. Power on the PE tray.
9. Install one screw in the front of the PE tray to secure it.

### **Install the SI-3 Controller**

Insert the new SI-3 (also known as DC-6S) controller into the correct IOS using the next available slot in that IOS. The position of this new controller depends on the customer's system configuration.

1. Pull out the VME chassis drawer.
  - a. Remove the four screws securing the IOS drawer to the cabinet.
  - b. Pull out the IOS drawer as far as it will go.
  - c. Release 14 1/4-captive screws holding the top plate to the IOS tray.
  - d. Remove the top plate of the IOS drawer and set it aside.

2. Unpack the new controller board (P/N 90360800).
3. Place the new board on an ESD-protected surface.
4. Change any jumpers necessary on the new SI-3 controller board. Refer to [Figure 2](#).
5. Remove the VME slot filler.
6. Insert the new controller board into the guide slots in the IOS chassis and ensure that it is completely seated.
7. Attach the male end of the SI-3 cables (P/N 90317400) to the front of the SI-3 controller. The port closest to the front of the VME is port 0 while the port closest to the back of the VME is port 1.

**NOTE:** Controller cables are labeled with the VME slot number, which will be C1 through C20, and the port numbers, which will be either 0 or 1; for example: C5 Port 0. These labels are located in the document holding tray just below the CPU card cage in the mainframe cabinet.

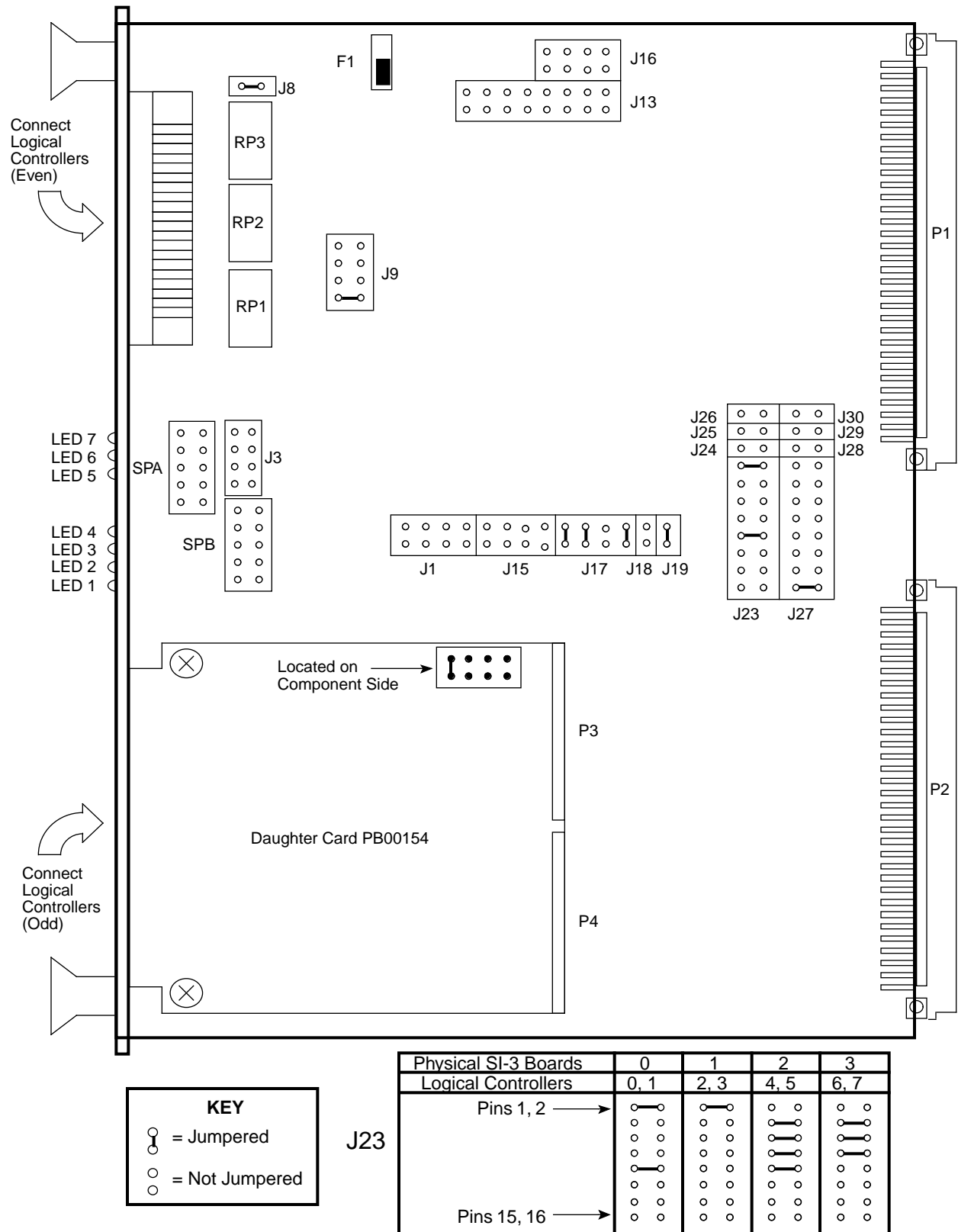


Figure 2. SI-3 Board with J32 Address Jumper

## Make Bulkhead Plate Connections

**NOTE:** Try to use a location on the bulkhead that is in line with the newly installed controller card in the IOS to minimize the crossing of cables. Refer to [Figure 3](#).

1. Push the VME tray in and secure it with a single screw.
2. Push out the PE tray above the VME to gain better access.
3. Remove the two appropriate bulkhead plates that are attached to the bulkhead by two screws each.
4. Install the bulkhead plates and secure them with the two screws removed from each of the blank plates.

**NOTE:** Ensure that the plate gasket is positioned away from the adjacent plate gasket.

5. Attach the other end of the SCSI cable to the VME bulkhead using two standoff screws for each cable.

**NOTE:** Ensure that the standoff screws are seated into the bulkhead plate before you tighten them. As viewed from the back, port 0 is connected to the left of port 1 connector. Orient connector so D points to the right.

6. Use a small amount of thread adhesive on the threads of each standoff screw.
7. Tighten the standoff screws lightly with a nut driver and ensure proper seating.

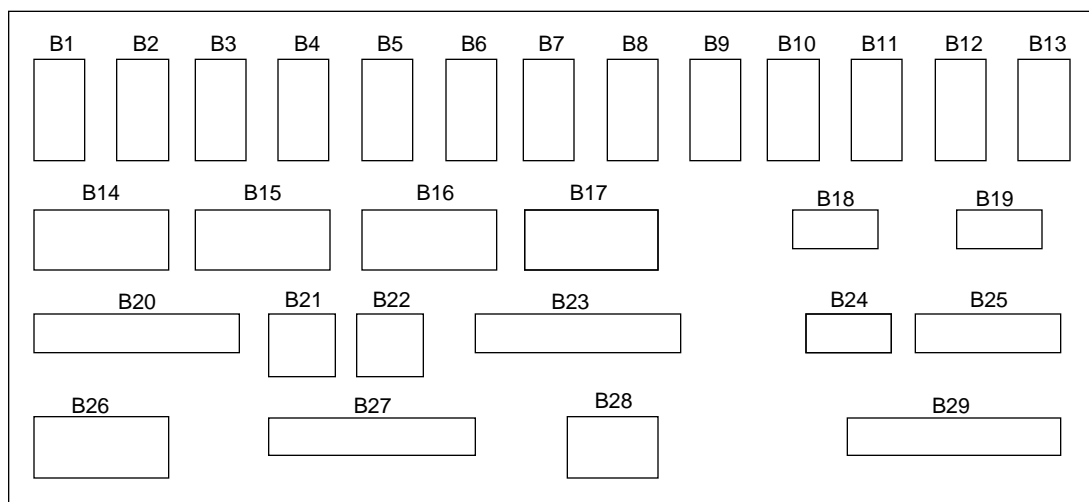


Figure 3. VME Bulkhead

## Connect the Power, Control, and SCSI Cables to the Rear of the PE Tray

1. Install the terminators (P/N 90266100) on J1 and J3 on the rear of the PE-10S tray as shown in Figure 4.
2. Connect the power cable (P/N 90307100) into the power cord outlet on the rear of the PE-10S tray. Refer to Figure 4.
3. Connect the control cable (P/N 90307000) into the connector labeled J5. Refer to Figure 4.
4. Connect the SCSI cables (P/N 90268100) into connectors labeled J2 and J4. Refer to Figure 4.
5. Label both of the SCSI cables with the J designator (J2 or J4) on the end connected to the PE tray and with the U number of the drawer start. Also label the other end with the B VME bulkhead designator. J2 connects to SI-3 Port 0 and J4 connects to SI-3 Port 1 at the VME bulkhead.

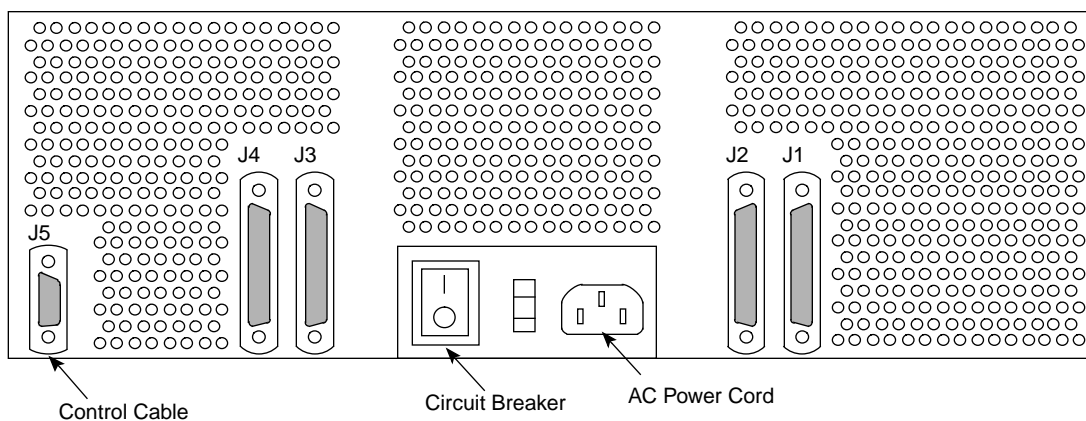


Figure 4. J1 and J3 Connections

## Install Cable Retractor

Refer to [Figure 5](#) for an illustration of the cable retractor (P/N 90307200).

1. Install small clip nuts in the 5th and 8th holes up from the previous tray or on the 6th and 9th holes up from the previous cable retractor.

**NOTE:** In order to have easier access, it may be necessary to unplug the power cable or control cable from the power and control distribution rail.

2. Install the cable retractor arm, on the clip nuts using two Phillips screws inserted into the top and bottom holes of the cable retractor.

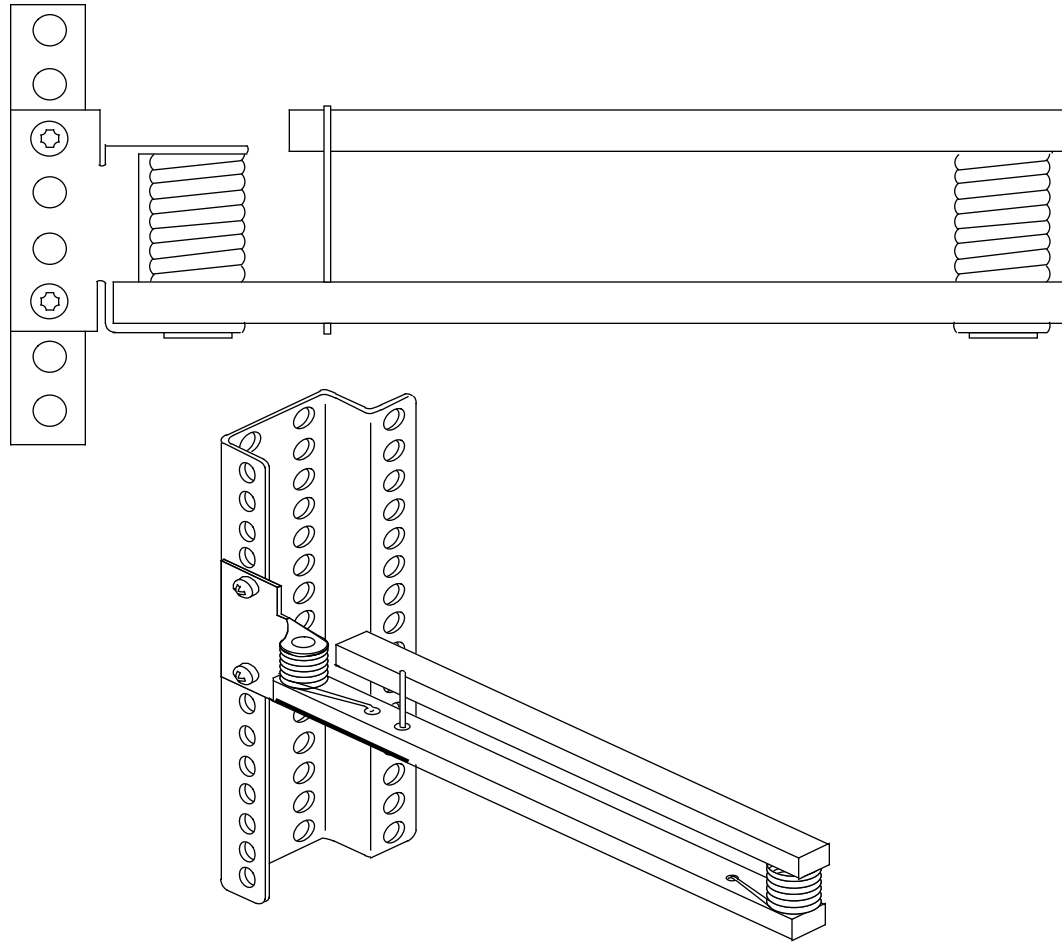


Figure 5. Cable Retractor

### Route Cables through Cable Retractor

If you are installing a PE tray in the lower units of an I/O cabinet, it may be necessary to remove the I/O bulkhead. Refer to the *CRAY J916 Service Manual Kit*, Cray Research publication number HMK-101-0, for procedures on how to remove and replace the bulkhead.

1. Remove the single retaining screw and extend the new PE-10S tray about 6 inches (15.2 cm).
2. The following list describes the suggested slack for the cables.
  - J2 is 14 inches (35.6 cm)
  - J4 is 9 inches (22.9 cm)
  - Power connection is 12 inches (30.5 cm)
  - Remote alarm cable is 7 inches (17.8 cm) (J5 at back of PE-10S)

3. Route the power, control, and SCSI cables from the rear of the new PE-10S tray through the cable retractor. Ensure that there is adequate slack between the cable retractor and the drive connection to allow the tray to be fully extended.
4. Loosely install, but do not tighten, three tie wraps (P/N 90030502) on each side of the cable retractor to keep the cables in place and to allow for adjustments of cable end lengths later.
5. Connect the power cable to the most convenient outlet on the power and control distribution rail.
6. Connect the control cable to the most convenient 9db connectors on the power and control distribution rail.
7. Fold the power and control cables on the cable retractor to take up any excess slack. Use cable ties and the holes in the cable retractor to secure the power and control cables.
8. Adjust and tighten the tie wraps.

### **Disconnect all Cables from VME Bulkhead**

1. Disconnect all cables from the VME bulkhead that are routed through one or both of the two flexible cable ways.

**NOTE:** You will disconnect one or both of the flexible cable ways, depending on the number of cables being routed and where on the VME bulkhead the cables will be attached.

2. Disconnect the flexible cable ways by removing the two screws that secure them to the VME tray. Refer to [Figure 6](#).
3. Lay the cable ways flat.
4. Loosen the two 1/4-turn screws at the front of the I/O cabinet just below the VME tray.
5. Remove the single screw from the front of the VME.
6. Extend the VME tray completely.
7. Remove the cable tray cover by sliding the cover out through the front of the I/O cabinet and set it aside.



**NOTE:** If the DDS-10 cables will be routed through only one of the two flexible cable ways, only the crossbars for that flexible cable way need to be opened. If cables will be routed through both of the flexible cable ways, both crossbars will have to be opened.

8. Pry open each crossbar of the cable way, using a standard 1/8-in flat-bladed screwdriver and leave the inner side attached. Refer to [Figure 7](#).

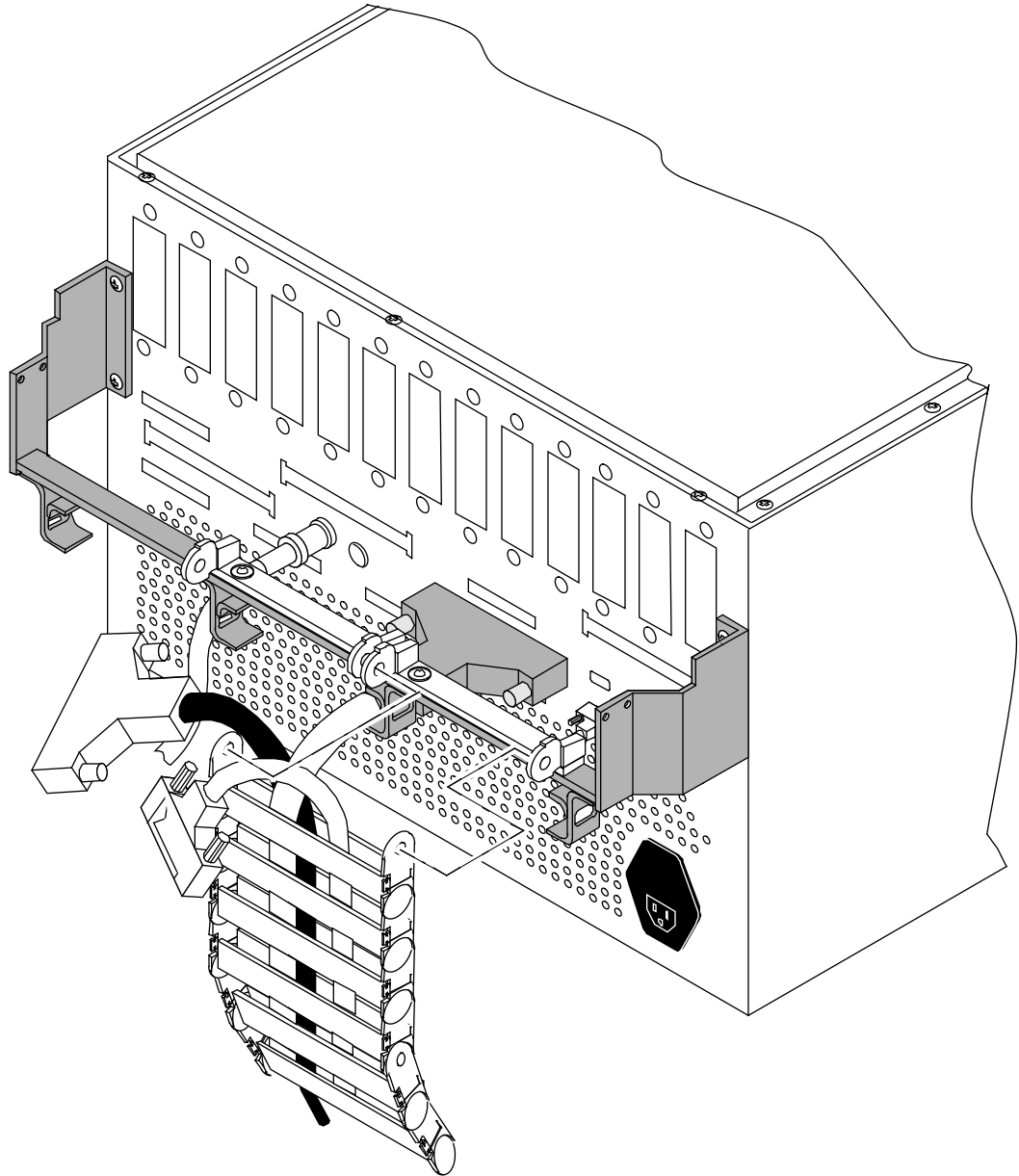


Figure 6. Flexible Cable Way

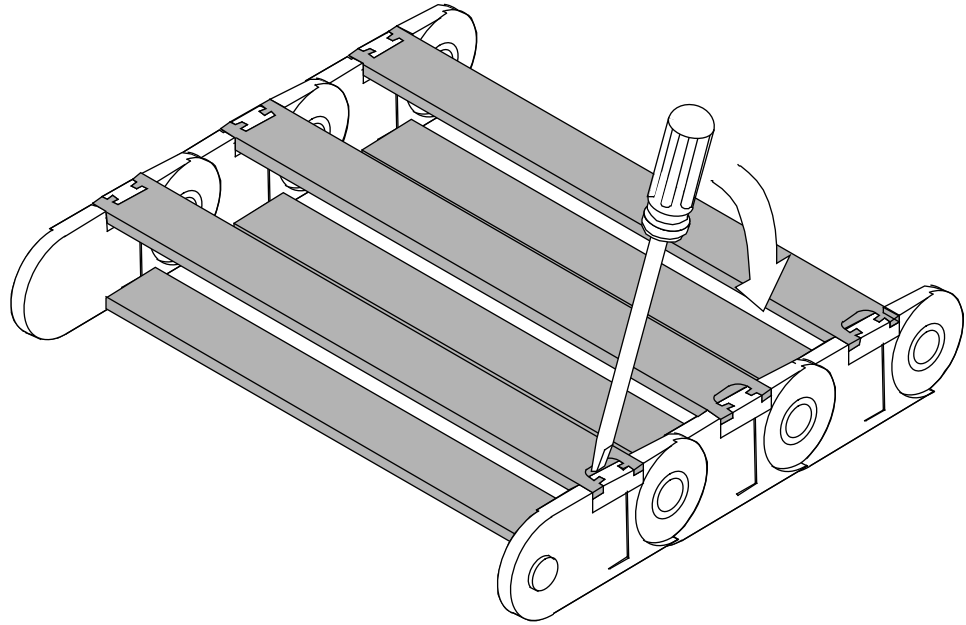


Figure 7. Flexible Cable Way Crossbars

### Route Cables through Cable Tray and Flexible Cable Way

1. Route the SCSI cables down or up the side of the I/O cabinet next to the power and control distribution rail and secure them with tie wraps.
2. Place the SCSI cables in the flexible cable way and in the cable-routing tray beginning with the lowest tray installed with this migration. Ensure that the cables do not cross in the flexible cable way because this will make adjusting the cables more difficult.
3. After the cables have been routed, loosely secure the SCSI cables with tie wraps.
4. Snap down all crossbars for the flexible cable way. (This is not easy!) Then, ensure that both ends of each crossbar are secure.
5. Slide the VME tray into the cabinet carefully and secure it with one screw.

**CAUTION**

**Do not pinch the cables when sliding in the VME tray or the cable cover.**

**NOTE:** Y1, power, and control cables are routed below the VME flexible cable-way attachment bar.

6. Reconnect the flexible cable way using the two screws originally removed from the flexible cable-way bar. Refer to [Figure 6](#).
7. Reattach the Y1 cables to the VME bulkhead.
8. Reattach the rest of the cables to the VME bulkhead using cable and bulkhead labels.
9. Remove the single retaining screw and extend the VME tray out until the tray slides lock.
10. Adjust the cables inside the cable tray and flexible cable way if there is excess slack at the VME bulkhead.
11. Tighten all tie wraps.
12. Reinstall the cable tray cover by sliding it carefully in and over the cable tray from the front of the I/O cabinet.
13. Secure the cable tray cover at the front of the I/O cabinet with two 1/4-turn screws.
14. Install the VME cover.
15. Slide the VME tray in.
16. Install the four screws in the front of the VME tray.
17. Install the remaining screws in the front of the PE-10S.
18. Turn on the power switches on the front and the rear of the PE-10S tray.

## Replace Side Panels or Push Cabinets Together

1. Replace the side panels.
  - a. Place the side panel into the recess on the side of the cabinet.
  - b. Tighten the eight captive screws.
  - c. Replace the eight screw covers.

### **OR**

1. Remove the three frame-joining screws from the frame joiners on the I/O cabinet.
2. Connect the cabinets.
  - a. Move the I/O cabinet so that the protruding flanges hook over the mainframe cabinet frame.
  - b. Insert and tighten the three I/O cabinet bracket screws that connect the cabinets.
  - c. Adjust the physical location of the cabinets, if necessary.
3. Lower the levelers on all cabinets so that the weight of each cabinet is distributed evenly.

## Replace Front I/O Door

1. Place the door on its hinge pins.
2. Reattach the front door's cable wire to the I/O chassis.
3. Close the door.

## Replace Rear I/O Door

1. Place the door onto the two hinge pins.
2. Reattach the green and yellow ground wire to the I/O cabinet.
3. Swing the door shut.
4. Turn the fasteners clockwise with a 5/32-in. allen wrench until the two circle symbols meet and the fastener is latched.

## Power Up the System

**NOTE:** If the J90 Console window is already up, skip to [Step 3](#).

1. Using the right mouse button, click on any open working space. The Workspace menu will appear.
2. Select the J90 Console menu item.
3. Move the circuit breaker on the back of the I/O cabinet to the ON position first, and then move the circuit breaker on the mainframe cabinet to the ON position.
4. Press the Alarm Acknowledge button on the CCU.
5. Press the CPU RESET button on the CCU.
6. Press the VME RESET button on the CCU.
7. Verify that the SYSTEM READY light on the control panel illuminates.
8. Close the mainframe front door.
9. Watch the J90 console window to ensure that the system powers up correctly. If the `/diag/scripts/powerup` script exists on the IOS's file system, then this script will execute to test the IOBB. If no errors exist, the only output from this diagnostic is the message `Powerup IOBB test in progress`. You should see the `BOOT[sn9xxx-ios0]` prompt when power-up is complete.

## Edit the IOS Configuration File

Open an xterm window on the system console and use the `vi` command to update the `/opt/ios/9xxx/config` file. The IOS definition section of `config`, which corresponds to the IOS that is receiving the new disk hardware, should contain the following entries:

Entry name	Entry definition
<code>/dev/disk</code>	The disk strategy module
<code>/dev/si2</code>	First SCSI disk driver module
<code>/dev/sdisk</code>	Second SCSI disk driver module

The `si2` entry must precede the `sdisk` entry. These are permanent additions. These entries may already exist in the given IOS section if that IOS already contains hardware that uses one or more of these modules.

Each of these entries should be listed only once in an IOS definition section of the `config` file, but they should be listed in every IOS definition section that relates to an IOS receiving these disks.

## Verify That the Migrated Hardware is Functional

1. Load the IOS kernel by entering the following command (this step takes 3 to 30 minutes, depending on the number of peripherals in the system):

```
BOOT[sn9xxx-ios0]> load
```

2. Confirm that the new disks and controllers are correctly recognized in the output of the IOS `load` command. The following example is a partial sample of output for a DDS-10 subsystem:

```
SI-3 ctrlr 0 unit 0 [s00], type = DD5S
SI-3 ctrlr 0 unit 1 [s01], type = DD5S
SI-3 ctrlr 1 unit 0 [s10], type = DD5S
SI-3 ctrlr 1 unit 1 [s11], type = DD5S
```

The information in the `[sxy]` notation is used in Steps 6, 7, and 8. The `x` refers to the controller number within an IOS (0 and 1 in this example, corresponding to `eiop20` and `eiop21`, respectively). The `y` refers to the unit or device number (0 and 1 in this example).

If all the new disks and controllers are not recognized, verify that the IOS configuration file was properly edited. If that file looks correct, verify that the hardware was properly installed by completing the following tasks:

- Examine all cable connections and terminators to make sure they are functional.
- Examine all terminator pins to ensure that they are straight.
- Verify that both the front and rear power enable switches on the new PE tray are enabled.
- Verify that the LEDs on the SI-3 board are as follows: BDOK (board OK) LED is green; TPWR (termination power) LED is yellow.

3. The `bldact` IOS command, which you will be instructed to execute in [Step 4](#), will prompt you for information about which Y1 channels are attached to each IOS. Make note of this channel information by viewing the `/sys/param` file before running the `bldact` command. The following type of line, which tells which Y1 channel (`channel 020`) is connected to which IOS (`cluster 0`), is in the `HARDWARE INFORMATION` section of the `/sys/param` file:

```
channel 020 is lowspeed to cluster 0;
```

4. Enter the `bldact` IOS command. This will update the `ACT frstload` script (`/diag/scripts/frstload`) as necessary with one call to the `dd5sql` diagnostic in each section of the script that relates to an IOS that contains DD-5S disk drives. The `bldact` command should take less than 1 minute to complete. The following text is sample output:

```
sn9xxx-ios0> bldact
Build Automated Confidence Test script file, IOS-V version.
File /diag/scripts/frstload.
Is Y1 input channel 20 cabled to IOS 0? (y)es, (n)o: y
sn9xxx-ios0>
```

5. After the `bldact` script has completed, execute the newly created `frstload` script by hand to ensure that it functions correctly. This will take several minutes to execute (the length of execution depends on the number and type of peripherals on the system). Execute the `frstload` script as follows:

```
sn9xxx-ios0> /diag/scripts/frstload
```

6. Run the `dd5stest` diagnostic on each IOS that has new DD-5S disks installed. The `dd5stest` diagnostic will prompt you for a controller number. The controller number is the value you noted in [Step 2](#). Run test number 99 on each new drive to ensure that all possible tests are executed on each new drive. This will take about 5 minutes per drive.
7. Optional step: Do a surface analysis of the disk by entering the `dsurf` command. Use the output from the `load` command ([Step 2](#)) to get the correct device names for use on the `dsurf` command line (the disk type designator on the `dsurf` command line is `s` for DD-5S drives). This command will take approximately 30 minutes per drive to complete. For example:

```
sn9xxx-ios0> dsurf s02 -v1 1
```

8. Enter the following command once for each new drive to make a backup copy of the flaw table for each new drive. Use the output from the `load` command (Step 2) to get the correct device names for use on the `dflawr` command line:

```
sn9xxx-ios0> dflawr s00
```

## Software Configuration Preparation

---

This section may be completed prior to taking dedicated maintenance time on the system. If you have already completed this section, continue with the “[Software Change Procedure](#)” section.

Update and verify the UNICOS configuration file. Save a copy of the original version by entering the following commands:

```
sn9xxx-ios0> cd /sys
sn9xxx-ios0> cp param param.disk
```

The changes you will be making in the following “[IOS Information](#)” section should be considered permanent. Portions of the “[Disk Configuration](#)” section will reflect the temporary scratch file systems created in this migration procedure.

**NOTE:** The customer must integrate these disks into the existing CRAY J916 system disk configuration following completion of these migration procedures.

On the system console, use the `vi` command to update the `/opt/ios/9xxx/sys/param.disk` file with the new disk information. Ensure that you update all appropriate information in the following subsections.

### IOS Information

Note the IOP (cluster) where the SI-3 controller has been installed. Add the appropriate `eiop` value to the `cluster` definition statement for that IOP.

The `eiop` values for SI-3 disk controllers range between 20 and 25, inclusive. The first physical SI-3 disk controller board on an IOS will be assigned `eiop` values 20 and 21, correlating to the two SCSIbus ports on that SI-3 board. The second physical SI-3 disk controller board on that same IOS will be assigned `eiop` values of 22 and 23. The third physical SI-3 disk controller board will have `eiop` values of 24 and 25.



The following example cluster statement defines IOS 0 as having two SI-3 controller boards in it with disks, either DD-5S or DD-6S, attached to these two boards:

```
cluster 0 {
    muxiop; eiop 0; eiop 20; eiop 21; eiop 22; eiop 23;
}
```

These values are used regardless of the type of disk being controlled by the SI-3 board. One physical SI-3 controller contains two ports, 0 and 2, each of which connects to an independent SCSIbus. Each port is treated by the software as a separate logical SI-3 controller. SI-3 controller boards that are not controlling disks should not have associated `eiop` values included in the cluster statement.

## Disk Configuration

If you need more information on disk configuration syntax, refer to the *UNICOS Basic Administration Guide for CRAY J90 and CRAY EL Series*, publication number SG-2416.

Add the appropriate information to define the new physical device configuration.

1. Specify the `cluster` (IOS) and `eiop` (logical controller) numbers. These are the same values chosen in the preceding “[IOS Information](#)” subsection.
2. Specify the `channel` using the Y1 channel value (in octal) that corresponds with the specified IOP cluster.
3. Specify the `type` parameter for DD-5S drives (DDS-10) to be DD5S.
4. The `unit` parameter will either be 0 or 1, signifying the two disk drives that are attached to that `eiop` (logical controller) number.
5. The capacity of each DD-5S drive is 781,000 sectors (1 sector = 4096 bytes). The capacity of each DD-6S drive is 2,389,000 sectors (1 sector = 4096 bytes).

You must use system-wide unique names and minor numbers for each physical device definition (`pdd`) statement for the new disks. Do not use existing names or `pdd` minor numbers. The name of the disk itself also must be unique throughout the entire UNICOS configuration file.

The following example shows possible physical device definition statements for one DDS-10 (four DD-5S drives on two logical controllers):

```
disk S10_100 {type DD5S; iopath{cluster 1; eiop 20; channel 040;} unit 0;
  pdd scratch_a0 {minor 26; sector 0; length 500000 sectors;}
  pdd scratch_b0 {minor 27; sector 500000; length 281000 sectors;}
}
disk S10_101 {type DD5S; ipath{cluster 1; eiop 20; channel 040;} unit 1;
  pdd scratch_a1 {minor 28; sector 0; length 781000 sectors;}
}
disk S10_110 {type DD5S; ipath{cluster 1; eiop 21; channel 040;} unit 0;
  pdd scratch_b2 {minor 32; sector 0; length 781000 sectors;}
}
disk S10_111 {type DD5S; ipath{cluster 1; eiop 21; channel 040;} unit 1;
  pdd scratch_b3 {minor 30; sector 0; length 781000 sectors;}
```

## Disk Configuration - Logical Definition

Add the appropriate information to define the logical devices that relate to the new physical devices.

1. You must use system-wide unique names and minor numbers for each logical device definition (ldd) statement relating to the new disks. You cannot use existing names or ldd minor numbers.
2. Following are possible logical device definitions for the temporary scratch file systems created in this migration procedure:

```
ldd scratcha {
  minor 20;
  pdd scratch_a0;
  pdd scratch_a1;
}
ldd scratchb {
  minor 21;
  pdd scratch_b0;
  pdd scratch_b2;
  pdd scratch_b3;
}
```

3. The values for PDDMAX, PDDSLMAX, and LDDMAX may require adjustment. Refer to the *UNICOS Basic Administration Guide for CRAY J90 and CRAY EL Series*, publication number SG-2416, for more information.

PDDMAX represents the maximum number of physical disks allowed. Physical disks are the disk entries in the `param` file. PDDMAX should be at least equal to the number of configured physical disk devices.

PDDSLMAX represents the maximum number of physical slices allowed. Physical slices are the `pdd` definitions in the `param` file. PDDSLMAX should be set to at least one more than the highest minor number used by a `pdd` statement in the `param` file. (PDDSLMAX is used to calculate the size of a kernel table, and the minor numbers are used to index into that table.) A value of at least 256 is recommended for PDDSLMAX. This is needed for the correct operation of the `pddconf(8)` command.

LDDMAX represents the maximum number of logical devices allowed. Logical devices are the `ldd` definitions in the `param` file (and the devices created in the directory `/dev/dsk`). LDDMAX should be set at least one higher than the highest minor number used by an `ldd` statement in the `param` file. (LDDMAX is used to calculate the size of a kernel table, and the minor numbers are used to index into that table.)

Validate your changes to the `param` file by performing the following steps:

1. UNICOS must now be in single-user or multiuser mode. If UNICOS has not been booted, boot to single-user mode now by entering the following command:

```
sn9xxx-ios0> /bin/boot
```

2. On UNICOS, copy the `param.disk` file from the SPARC console's file system to a UNICOS file, such as `/param_test`, as follows:

```
# exdf -i /sys/param.disk > /param_test
```

3. To validate the syntax of your `param` file changes, enter the following command:

```
# /etc/econfig /param_test
```

If the `econfig` command detects a problem with your configuration file, you must correct that problem **before** continuing with the next step. It also is worthwhile to manually review the changes made to the `param_test` file at this time, to make sure you have not made any logical errors.

If changes are made to the `param_test` file while validating it under UNICOS, copy the changed version back to the system console before proceeding by entering the following command:

```
# exdf -ro /sys/param.disk < /param_test
```

4. Return to the IOS prompt (if not already there), and make a backup copy of the existing `param` file, and then replace it with the newly created version of the `param` file. Enter the following commands:

```
# <CONTROL-a> (toggles to the IOS console if in single user mode)
sn9xx-ios0>
sn9xx-ios0> cd /sys
sn9xx-ios0> cp param param.bak
sn9xx-ios0> cp param.disk param
```

This is the end of the “[Software Configuration Preparation](#)” section.

## Software Change Procedure

---

1. Boot UNICOS to single-user mode, with the new `param` file, by entering the following command:

```
sn9xx-ios0> /bin/boot
```

2. On UNICOS, use the `exdf` command to copy the `param` file from the SPARC console’s file system to a UNICOS file, such as `/param_test`:

```
# exdf -i /sys/param > /param_test
```

3. Create the device nodes for the new disk configuration by entering the following UNICOS commands:

```
# /bin/mv /dev/mkdev.sh /dev/mkdev.sh.bak
# /etc/econfig -d /param_test > /dev/mkdev.sh
# chmod 700 /dev/mkdev.sh
# cd /dev
# rm -f dsk/* pdd/* mdd/* sdd/* ldd/*
# /dev/mkdev.sh
```

4. Create the two new temporary scratch file systems by entering the following commands:

```
# /etc/mkfs -q /dev/dsk/scratcha
# /etc/mkfs -q /dev/dsk/scratchb
```

5. Verify the two new temporary scratch file systems by entering the following commands:

```
# /etc/fsck /dev/dsk/scratcha
# /etc/fsck /dev/dsk/scratchb
```

6. If you are running MLS, use the `/etc/labelit` command to label the file systems appropriately.
7. Ensure that you can mount the two new scratch file systems by entering the following commands:

```
# /bin/mkdir /scratcha ; chmod 755 /scratcha
# /etc/mount /dev/dsk/scratcha /scratcha
```

```
# /bin/mkdir /scratchb ; chmod 755 /scratchb
# /etc/mount /dev/dsk/scratchb /scratchb
```

8. To verify that the migration was successful, copy data to the scratch file systems by entering the following commands:

```
# cp /unicos /scratcha/uni1
# cp /unicos /scratcha/uni2
# cp /unicos /scratchb/uni3
# cp /unicos /scratchb/uni4
# cp /unicos /scratchb/uni5
```

Verify that each file is the proper size; then remove these files.

9. Unmount all file systems by entering the following command:

```
# /etc/umountem
```

10. The system can now be booted to multiuser mode or the customer may proceed to the “[Disk Device Integration](#)” section. Enter multiuser mode by entering the following command:

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

## Disk Device Integration

---

Now that it has been verified that the DDS-10 migration has been successful, it is necessary for the customer to integrate these new disks with existing file systems. This requires further editing of the `param` file: the file that was previously edited in this migration to create the scratch file systems.

Refer to the *UNICOS Basic Administration Guide for CRAY J90 and CRAY EL Series*, publication number SG-2416, for details. The procedure pages in the File Systems section of that manual describe the necessary steps. The alterations are described both with and without the use of the UNICOS Installation / Configuration Menu System (ICMS). The change procedures outlined in this migration document can be used to supplement SG-2416.

**NOTE:** Create backup copies of any file systems that will be changed in the UNICOS configuration file (`param`).

The changes made to the IOS configuration file and some changes made to the UNICOS configuration file (`param`) in the “[Software Configuration Preparation](#)” section should be retained. These include the addition of `eiop` values to the IOS cluster definition and any changes to `PDDSLMAX`, `LDDMAX`, and `PDDMAX` in the UNICOS definition section.

If the UNICOS dump device (called logical device dump in the `param` file) will be moved to one of the new disks, then edit the `/opt/ios/9xx/sys/mfdumpa.arg` file on the system console to reflect this new location. In the `mfdumpa.arg` file, set the `disktype` keyword to be `DD5S`.

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