RS/6000 7025 F40 Series

IBM

User's Guide

Second Edition (June 1997)

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Requests for technical information about products should be made to your authorized reseller or marketing representative.

Contents

Communications Statements

The following statement applies to this product. The statement for other products intended for use with this product appears in their accompanying manuals.

If the Graphics Subsystem or the Video Output Option is NOT installed, this system complies with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules.

Federal Communications Commission (FCC) Statement

Note: The IBM 7025 Model F40 has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult an authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from authorized dealers. Neither the provider nor the manufacturer are responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Responsible Party:

International Business Machines Corporation
Old Orchard Road
Armonk, New York 10504
Telephone: (919) 543-2193

European Union (EU) Statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. The manufacturer cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of option cards supplied by third parties. Consult with your dealer or sales representative for details on your specific hardware.

This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to CISPR 22 / European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication devices.

International Electrotechnical Commission (IEC) Statement

This product has been designed and built to comply with IEC Standard 950.

United Kingdom Telecommunications Safety Requirements

This equipment is manufactured to the International Safety Standard EN60950 and as such is approved in the UK under the General Approval Number NS/G/1234/J/100003 for indirect connection to the public telecommunication network.

The network adapter interfaces housed within this equipment are approved separately, each one having its own independent approval number. These interface adapters, supplied by the manufacturer, do not use or contain excessive voltages. An excessive voltage is one which exceeds 70.7 V peak ac or 120 V dc. They interface with this equipment using Safe Extra Low Voltages only. In order to maintain the separate (independent) approval of the manufacturer's adapters, it is essential that other optional cards, not supplied by the manufacturer, do not use main voltages or any other excessive voltages. Seek advice from a competent engineer before installing other adapters not supplied by the manufacturer.

Avis de conformité aux normes du ministère des Communications du Canada

Cet appareil numérique de la classe B respecte toutes les exigences du Réglement sur le matériel brouilleur du Canada.

Canadian Department of Communications Compliance Statement

This Class B digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

VCCI Statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＢ情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

The following is a summary of the VCCI Japanese statement in the box above.

This equipment is in the Class 2 category (information equipment to be used in a residential area or an adjacent area thereto) and conforms to the standards set by the Voluntary Control Council For Interference by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in such residential area.

When used near a radio or TV receiver, it may become the cause of radio interference.

Read the instructions for correct handling.

Radio Protection for Germany

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen EMVG vom 9.Nov.92 das EG–Konformitätszeichen zu führen.

Der Aussteller der Konformitätserklärung ist die IBM Germany.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse B.

If the Graphics Subsystem (Feature Code 7252 or 7253) or the Video Output Option (Feature Code 7254) IS installed, this system complies with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules.

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Neither the provider nor the manufacturer are responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference,and (2) this device must accept any interference received, including interference that may cause undesired operation.

European Union (EU) Statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. The manufacturer cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of option cards supplied by third parties. Consult with your dealer or sales representative for details on your specific hardware.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22 / European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

International Electrotechnical Commission (IEC) Statement

This product has been designed and built to comply with IEC Standard 950.

United Kingdom Telecommunications Safety Requirements

This equipment is manufactured to the International Safety Standard EN60950 and as such is approved in the UK under the General Approval Number NS/G/1234/J/100003 for indirect connection to the public telecommunication network.

The network adapter interfaces housed within this equipment are approved separately, each one having its own independent approval number. These interface adapters, supplied by the manufacturer, do not use or contain excessive voltages. An excessive voltage is one which exceeds 70.7 V peak ac or 120 V dc. They interface with this equipment using Safe Extra Low Voltages only. In order to maintain the separate (independent) approval of the manufacturer's adapters, it is essential that other optional cards, not supplied by the manufacturer, do not use main voltages or any other excessive voltages. Seek advice from a competent engineer before installing other adapters not supplied by the manufacturer.

Avis de conformité aux normes du ministère des Communications du Canada

Cet appareil numérique de la classe A respecte toutes les exigences du Réglement sur le matériel brouilleur du Canada.

Canadian Department of Communications Compliance Statement

This Class A digital apparatus meets the requirements of the Canadian Interference–Causing Equipment Regulations.

VCCI Statement

　この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に
基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を
引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求
されることがあります。

The following is a summary of the VCCI Japanese statement in the box above.

This equipment is in the Class 1 category (information equipment to be used in
commercial and/or industrial areas) and conforms to the standards set by the
Voluntary Control Council For Interference by Data Processing Equipment and
Electronic Office Machines aimed at preventing radio interference in commercial
and/or industrial areas.

Consequently, when used in a residential area or in an adjacent area thereto, radio
interference may be caused to radios and TV receivers, etc.

Read the instructions for correct handling. VCCI-1.

Radio Protection for Germany

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen EMVG vom 9.Nov.92 das EG–Konformitätszeichen zu führen.

Der Aussteller der Konformitätserklärung ist die IBM Germany.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse A. Für diese von Geräten gilt folgende Bestimmung nach dem EMVG:

Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind.

(Auszug aus dem EMVG vom 9.Nov.92, Para.3, Abs.4)

Hinweis

Dieses Genehmigungsverfahren ist von der Deutschen Bundespost noch nicht veröffentlicht worden.

Safety Notices

A *danger* notice indicates the presence of a hazard that has the potential of causing death or serious personal injury.

A *caution* notice indicates the presence of a hazard that has the potential of causing moderate or minor personal injury.

Electrical Safety

Observe the following safety instructions any time you are connecting or disconnecting devices attached to the workstation.

DANGER

> **An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**
>
> **Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.**
>
> **When adding or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.**
>
> **Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.**
>
> **During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communication lines.**

CAUTION:
This product is equipped with a three–wire power cable and plug for the user's safety. Use this power cable with a properly grounded electrical outlet to avoid electrical shock.

DANGER

> **To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.**

Laser Safety Information

The optical drive in this system unit is a laser product. The optical drive has a label that identifies its classification. The label, located on the drive, is shown below.

CLASS 1 LASER PRODUCT
LASER KLASSE 1
LUOKAN 1 LASERLAITE
APPAREIL À LASER DE CLASSE 1
IEC 825:1984   CENELEC EN 60 825:1991

The optical drive in this system unit is certified in the U.S. to conform to the requirements of the Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J for Class 1 laser products. Elsewhere, the drive is certified to conform to the requirements of the International Electrotechnical Commission (IEC) 825 (1st edition 1984) and CENELEC EN 60 825:1991 for Class 1 laser products.

CAUTION:
A class 3 laser is contained in the device. Do not attempt to operate the drive while it is disassembled. Do not attempt to open the covers of the drive as it is not serviceable and is to be replaced as a unit.

Class 1 laser products are not considered to be hazardous. The optical drive contains internally a Class 3B gallium-arsenide laser that is nominally 30 milliwatts at 830 nanometers. The design incorporates a combination of enclosures, electronics, and redundant interlocks such that there is no exposure to laser radiation above a Class 1 level during normal operation, user maintenance, or servicing conditions.

Power Cables

Index	Part Number	Country
1	1838574	Bahamas, Barbados, Bolivia, Brazil, Canada, Costa Rica, Dominican Republic, El Salvador, Ecuador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Netherlands Antilles, Panama, Peru, Philippines, Taiwan, Thailand, Trinidad, Tobago, U.S.A. (except Chicago), Venezuela
2	6952300	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Puerto Rico, Saudi Arabia, Suriname, Trinidad, Taiwan, U.S.A. (except Chicago), Venezuela
2	62X1045	Chicago, U.S.A.
3	6952311	Argentina, Australia, New Zealand
4	13F9979	Abu Dhabi, Austria, Belgium, Bulgaria, Botswana, Egypt, Finland, France, Germany, Greece, Iceland, Indonesia, Korea (South), Lebanon, Luxembourg, Macau, Netherlands, Norway, Portugal, Saudi Arabia, Spain, Sudan, Sweden, Turkey, Yugoslavia
5	13F9997	Denmark
6	14F0015	Bangladesh, Burma, Pakistan, South Africa, Sri Lanka
7	14F0033	Bahrain, Bermuda, Brunei, Channel Islands, Cyprus, Ghana, Hong Kong, India, Iraq, Ireland, Jordan, Kenya, Kuwait, Malawi, Malaysia, Nigeria, Oman, People's Republic of China, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Arab Emirates (Dubai), United Kingdom, Zambia

Index	Part Number	Country
8	14F0051	Liechtenstein, Switzerland
9	14F0069	Chile, Ethiopia, Italy
10	14F0087	Israel
11	6952291	Paraguay, Colombia, Uruguay

About This Book

This book provides information on how to install and remove options, use the system, use diagnostics, use service aids, and verify system operation. This book also provides information to help you solve some of the simpler problems that might occur.

ISO 9000

ISO 9000 registered quality systems were used in the development and manufacturing of this product.

Related Publications

The following publications are available:

- The *RS/6000 7025 F40 Series Service Guide* contains reference information, maintenance analysis procedures (MAPs), error codes, removal and replacement procedures, and a parts catalog.

- The *RS/6000 Diagnostic Information for Multiple Bus Systems* contains diagnostic information, service request numbers (SRNs), and failing function codes (FFCs).

- The *RS/6000 Adapter, Device, and Cable Information for Multiple Bus Systems* contains information about adapters, devices, and cables for your system. This manual is intended to supplement the service information found in the *RS/6000 Diagnostic Information for Multiple Bus Systems*.

- The *Site and Hardware Planning Information* contains information to help you plan your installation.

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- PEX is a trademark of Massachusetts Institute of Technology.

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- Velcro is a trademark of Velcro Industries.

Chapter 1. System Startup

Thank you for selecting an RS/6000 7025 F40 Series system!

The RS/6000 7025 F40 Series system combines PowerPC 604 microprocessor performance and system expandability, ensuring that your system adapts to handle ever-changing operating requirements. The system is specifically designed to support the demands of network environments.

The RS/6000 7025 F40 Series system incorporates the new, advanced peripheral component interconnect (PCI) bus, which is faster than the industry standard architecture (ISA) bus. But the system also offers ISA as a secondary bus architecture, to accommodate businesses that already have invested in ISA and ISA-based devices.

This book helps you set up and use the system, install and remove options, configure the system, and use the system programs that are provided. This book also provides information to help you solve some of the simpler problems that might occur, and how to obtain assistance and service. Appendix A, "System Records" on page A-1 provides a section for you to record all the important information about your system.

Before You Begin

- Make sure you have an adequate number of properly grounded electrical outlets for your system, display, and any other options you intend to install.

- Place your system in a location that is dry. Rain or spilled liquids might damage your system.

- Always operate your system in the upright position and do not place any heavy objects on top of your system.

- Leave about 51 mm (2 in.) of space on all sides of the system to allow the system's cooling system to work properly.

- Collect the following tools, and keep them handy:

  - Small flat-blade screwdriver
  - Medium flat-blade screwdriver
  - Trays to hold screws

Unpacking Your System

CAUTION:
To avoid possible injury while moving or lifting the system, ask another person to help you.

Moving the System

When the system is in the normal upright position, move it by lifting up on the handle on the front and moving it forward or backward as shown. (There is a roller built into the rear of the system's base.)

Lift Here
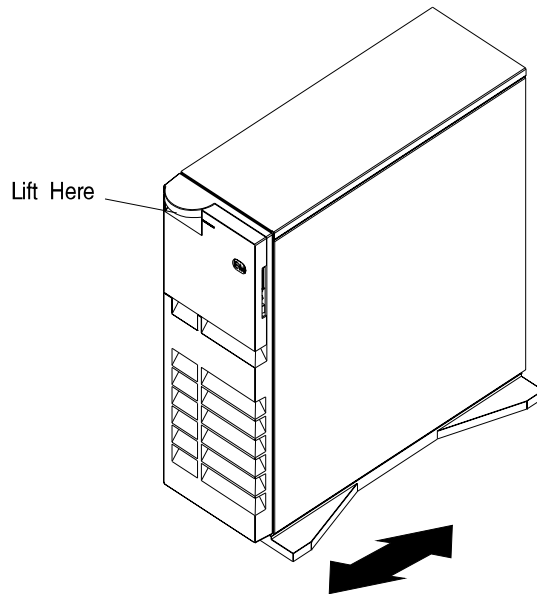
Preinstallation Checklist

After you unpack your system, display or ASCII terminal, and optional devices, make sure you have the following items:

- ☐ System and power cord

- ☐ ASCII terminal (or keyboard, keyboard cable, display, display cable, and display power cord)

- ☐ Mouse (if using display and keyboard)

- ☐ Other publications and media (for example, CD-ROM) that came with the system

- ☐ Options you want to install

Contact your authorized reseller or marketing representative if any items are missing or damaged.

Connecting the Cables

1. If you are using a keyboard, attach the keyboard cable to the keyboard connector (▦).

2. If you are using a display, attach the display to the display connector on the back of the display adapter in one of the expansion slots. See the *About Your Machine* document for information on preinstalled adapters.

3. If you are using an ASCII terminal, connect the terminal to serial port 1 (⊞).

4. If you are installing a mouse or other pointing device, connect that cable to the mouse connector (☌).

5. If you are installing a tablet, connect that cable to the tablet connector (▨).

6. Connect the display or ASCII terminal power cord to the display or ASCII terminal.

7. Attach adapter cables to any adapters installed in the expansion slots. See the *About Your Machine* document for information on preinstalled adapters. For more instructions on adapter cabling, see the documentation that came with your adapter, or to the *RS/6000 Adapter, Device, and Cable Information for Multiple Bus Systems*.

8. Make sure the system's power is turned off.

9. Connect the system connector power cord to the power connector. *Secure all these connections,* then plug the display power cord and the system power cord into properly grounded electrical outlets.

Audio In

Serial Connectors

Parallel Connector

Expansion Slots

Audio Out

Mouse Connector

Keyboard Connector

Tablet Connector

Ethernet Connector

Ethernet Twisted Pair

External SCSI Connector

Power Connector
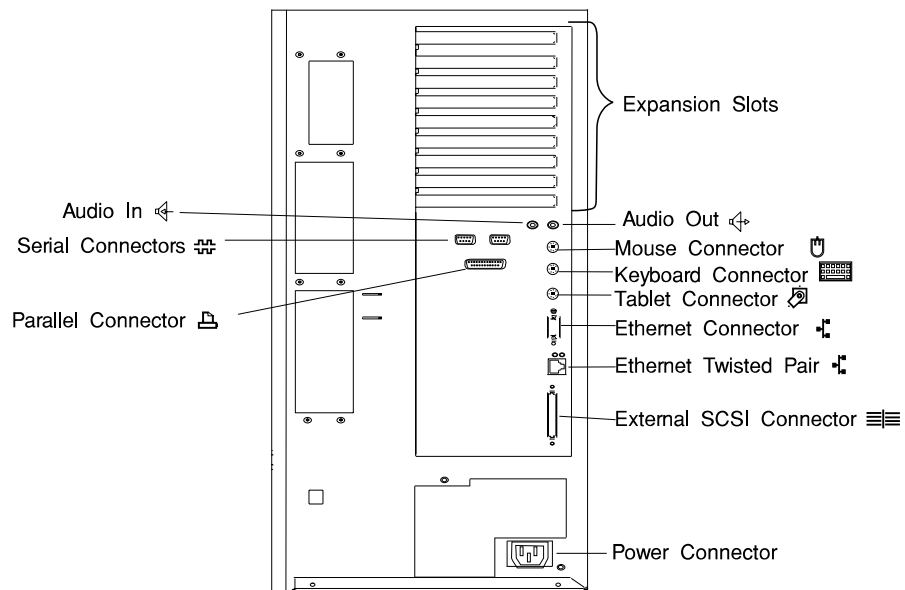
Starting the System

1. Open the door. If the diskette drive contains packing material or a diskette, remove it from the drive.

2. Remove the extra key and ID tag that is taped inside the door and store them in a secure place.

Extra Key
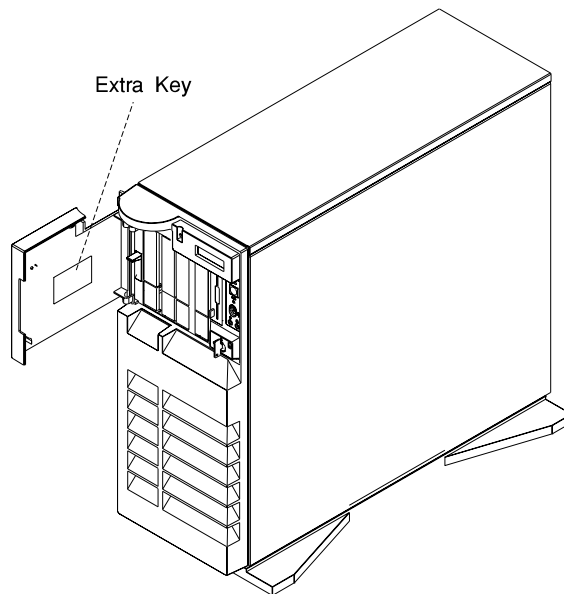
3. Turn on all external devices, such as printers, plotters, or modems.

4. Press the Power On switch.

Power On
Switch

Power On
Light

Reset Button

Headphone Jack

Microphone Jack
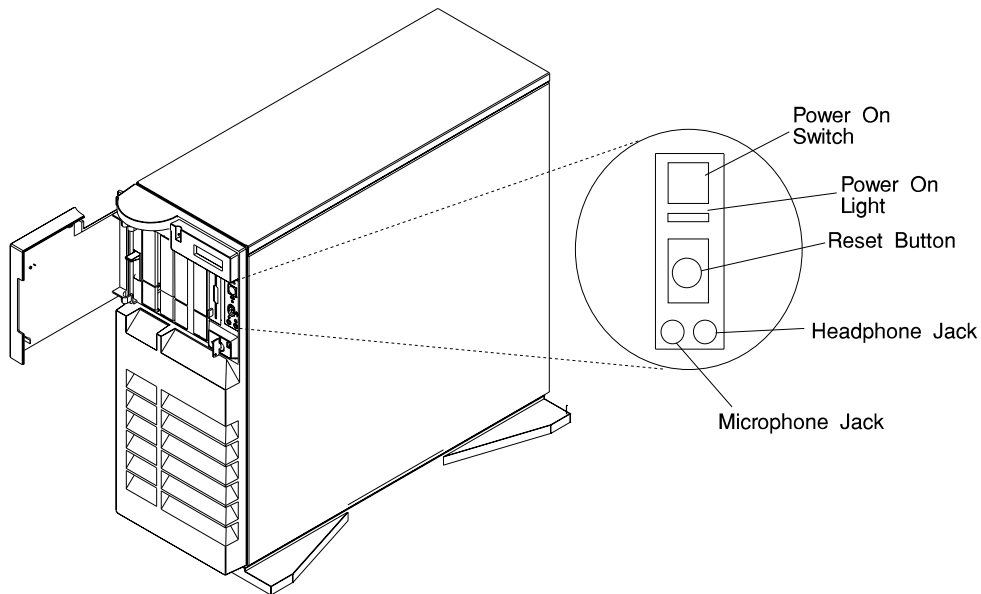
5. Check your display or ASCII terminal for configuration information displayed as the *power-on self-test (POST)* begins. The system beeps once to indicate it is working properly.

If no operating system is installed, you are prompted to select the operating system installation device.

Finishing the Installation

┌─ **Important** ───┐

- Be sure to maintain at least 51 mm (2 in.) of space on all sides of the system
  to allow the system's cooling system to work properly. Blocking the air vents
  can cause overheating, which might result in a malfunction or permanent
  damage.

└──┘

Your system hardware is set up, and you are ready to learn about your system and
make backup copies of important software. The order in which you do these tasks is
up to you. Use the following checklist as a guide.

☐ **Record your identification numbers**

Your system has important identification information that you might need if you
have it serviced. Appendix A, "System Records" on page A-1 shows where to
find these numbers, and provides space to record and retain this information.

☐ **Install options**

If you decided earlier to delay installing your options, you might want to
complete these installations now. See Chapter 4, "Installing Options" on
page 4-1 for handling and installation instructions.

☐ **Install the Operating System**

If AIX is preinstalled in your system unit, or if you plan to install AIX yourself,
refer to the Quick Installation and Startup Guide for instructions.

Some options that you might install come with a diskette that contains device
drivers, configuration files, or test programs. To install these files (after your
operating system is installed), follow the instructions that come with the
diskettes.

☐ **Install application programs**

To install application programs, follow the instructions supplied with each
application program.

Chapter 2. Using the System Unit

Starting the System Unit

1. Set the power switches of the attached devices to On.

2. Press the Power On switch.

Power On
Switch

Power On
LED

Reset Button

Headphone Jack

Microphone Jack
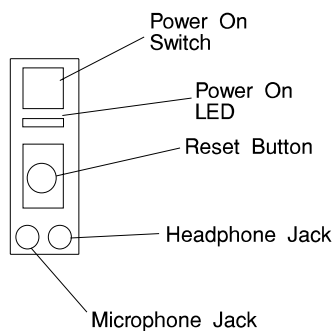
   When you press the Power On switch, the Power On LED comes on and the system starts a POST (power-on self test).

   During POST, progress codes display in the operator panel display.

3. If power does not come on when you press the Power On switch, ensure that the power cord, located at the back of the system unit, is plugged into a grounded electrical outlet. If this does not solve the problem, go to Chapter 8, "Hardware Problem Determination" on page 8-1.

Stopping the System Unit

Attention: When using the shutdown procedure for your system, enter the correct command before you stop the system unit. Failure to do so may result in the loss of data. If you need information on the shutdown procedure for your operating system, see your operating system information.

1. Before stopping the system unit, you must first perform a shutdown procedure of the operating system to prevent the loss of data.

2. After you shut down the operating system, set the power switches of the attached devices to Off.

3. Stop the system unit by pressing the Power On switch.

Reading the Operator Panel Display

The operator panel display is used to:

- Track the progress of the system unit self tests and configuration program.
- Display codes when the operating system comes to an abnormal end.
- Display system messages.
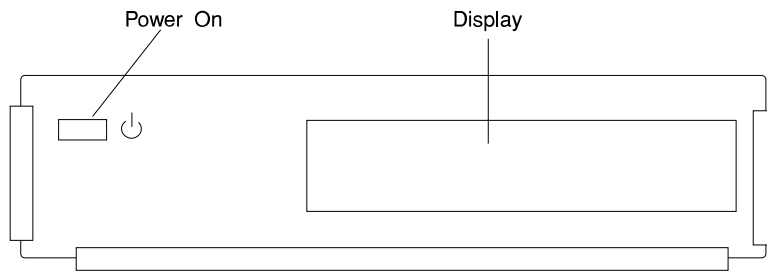
Power On   Display

During power-on self-test (POST), 3 characters display indicating the progress of the testing. If an error is detected that requires attention, the system unit halts and an 8 digit number displays in the operator panel display to identify the error.

Using the Keyboards

There are several keyboards available for the system unit. The keyboards have various keys that enter data and control the cursor location. The keyboards can be engraved for the languages of different countries.

The functions of each keyboard depend on the software used. The character sets for the keyboards are contained and explained in the information for your operating system.
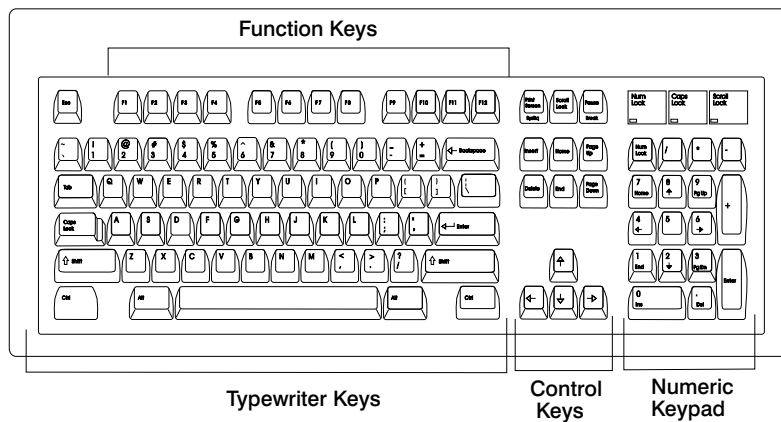
The keyboard is divided into four sections:

- Function keys are multipurpose keys and their function is controlled by the operating system.

- Typewriter keys are similar to a standard typewriter. Their function is controlled by the software.

- Control keys move the cursor on the screen and do programmed control functions. The movement and functions depend upon the application used.

- Numeric keypad is arranged like a calculator to help when typing numbers.

On all of the keyboards, you can adjust the tilt position for typing comfort. To tilt the keyboard, pull out on the keyboard legs. The legs snap into position. To decrease the tilt of the keyboard, rotate the keyboard legs until they snap into the bottom of the keyboard case.

The keyboard cable plugs into the keyboard connector at the rear of the system unit.
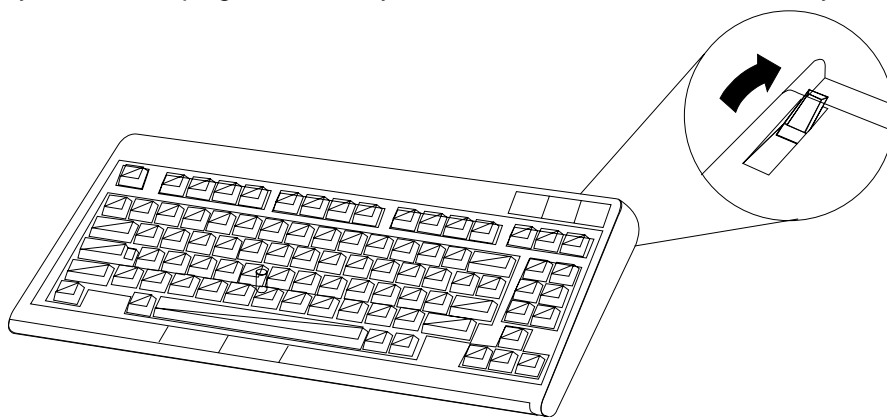
Using the Three–Button Mouse

The mouse is a hand–operated locating device. A three–button mouse is available for use with the system unit.

Consult your application publication for the exact use of the three–button mouse.

You can use the mouse to perform such functions as positioning a cursor, selecting items from a menu, or moving around in your document much easier and faster than if you used only the keyboard. The cursor moves exactly as you move the mouse on a flat surface, such as a desktop.

When you move the mouse around on a flat surface as shown in this illustration, the cursor moves on the display screen; the movement changes the position of the cursor.

With the mouse buttons, you can perform functions such as selecting and deselecting options, extending your selection, or choosing a command. The precise function of your mouse depends on the software you are using.

The mouse has a cable that plugs into the mouse connector at the rear of the system unit.

Handling the Mouse Correctly

For best operation, handle the mouse with care. Incorrect handling can damage the mouse.

Do not:

- Operate the mouse on cloth, unfinished wood, newspaper, or carpet.
- Drop or hit the mouse.
- Carry the mouse by holding onto the cable.
- Expose the mouse to extreme temperatures or direct sunlight.
- Place the mouse in liquid spills.

Care of the Mouse

The operating surface for the mouse should be smooth, clean, and flat. For example, you can operate the mouse on the following surfaces:

- Finished wood
- Glass
- Enamel
- Plastic
- Paper (except newspaper)
- Metal

Rough surfaces collect contaminants that can be transferred to the interior of the mouse by the ball. The surface you use should be free from spills, dirt, dust, lint, wax, eraser dust, and other foreign matter. Rough surfaces can also cause the pads located on the bottom of the mouse to prematurely wear. A deeply pitted surface could cause erratic operation of the mouse.

- Inspect the work surface for spills or other contaminants.
- Dust the work surface.
- If you are using a paper pad, inspect it for wear and replace it if necessary.

Cleaning the Mouse

1. Remove the retaining ring by turning it counterclockwise, in the direction of the arrow as shown in the illustration.

Retaining Ring
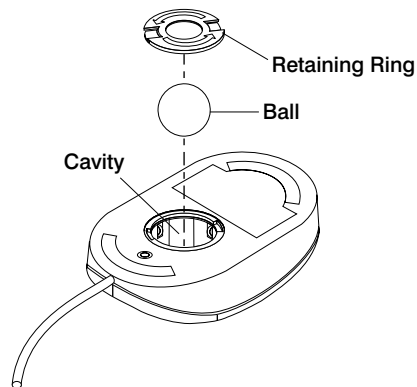
Ball

Cavity

2. Remove the ball.

3. Inspect the ball for contaminants. Wipe it clean with a dry, lint–free cloth.

4. If the ball is dirty, wash it in warm, soapy water. Rinse and wipe the ball with a lint–free cloth until dry.

5. Inspect the ball cavity in the mouse for foreign materials. If there are any foreign materials, remove them.

6. Replace the ball.

7. Replace the retaining ring on the mouse and align it with the open slots in the ball cavity.

8. Turn the retaining ring clockwise until the open slots are covered and you hear the ring snap into place.

Using the 3.5–Inch Diskette Drive

Diskette Compatibility

The system unit has a 1.44MB diskette drive installed.

The 1.44MB diskette drive can format, read, and write diskettes compatible with the following diskette drives:

* 1.0MB diskettes with 720KB formatted data capacity.
* 2.0MB diskettes with 1.44MB formatted data capacity (HD).

Format the diskette according to its specified capacity.

Write–Protecting 3.5–Inch Diskettes

Write–protecting diskettes is necessary so that important information is not accidentally lost.

When diskettes are write–protected, you can read information from the diskettes, but you cannot write information on to them.

There is a write–protect tab on the 3.5–inch diskette.

To locate the write–protect tab, turn the diskette over with the label facing down.

* To prevent writing onto a diskette, slide the write–protect tab, to open the protect slot.
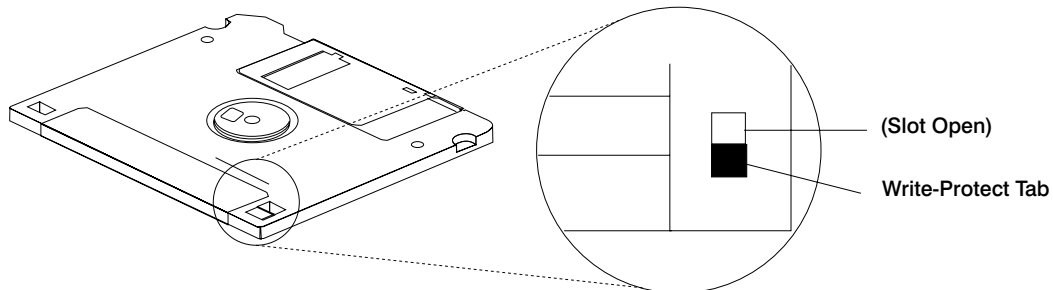
- To allow writing onto a diskette, slide the write–protect tab to cover the protect slot.

(Slot Closed)

Write-Protect Tab
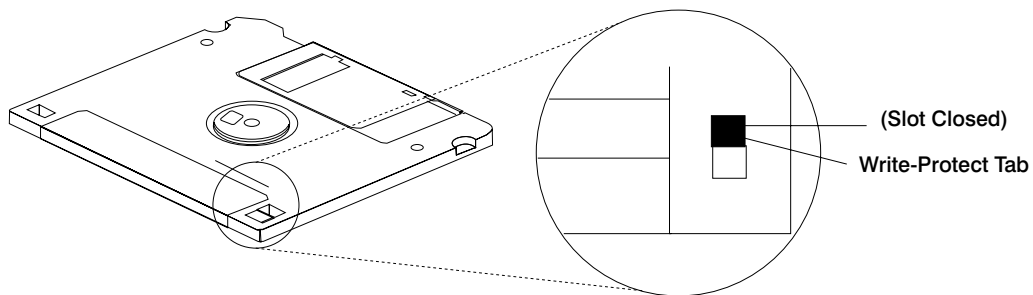
Loading and Unloading the 3.5–Inch Diskette

To load a diskette into the drive, insert the diskette in the diskette drive with the labeled metal shutter first. Push the diskette into the drive until you hear a click. The click indicates that the diskette is securely in position in the drive.

To unload the diskette, push the diskette–unload button. The diskette unloads partially from the drive. Pull the diskette out.

Using the CD–ROM Drive

CAUTION:
A Class 3 laser is contained in the device. Do not attempt to operate the device while it is disassembled. Do not attempt to open the covers of the device, as it is not serviceable and is to be replaced as a unit.

The CD–ROM is located in bay A1 of the system unit. Your CD–ROM drive looks like the one shown in the illustration, and the controls are located as indicated.
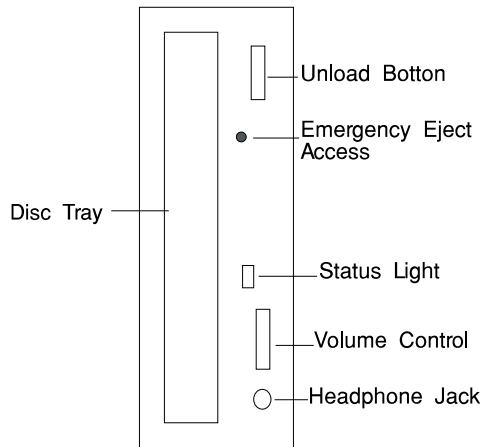
When the CD–ROM is set to On, the status light indicates one of several conditions. The following are status light states and the respective conditions of the CD–ROM drive:

- Off during standby with the tray loaded or unloaded.

- Blinks from insertion of the tray to completion of initialization.

- Blinks slowly when either the lens or disc is dusty (lens should be cleaned by running the cleaning disc).

- Blinks fast when in the audio mode.

- Lights during data transfer operations.

- Lights steady when:

    - No disc is in the tray.

    - The disc is in the tray upside down.

    - Some condition exists that should be checked. If this occurs, contact your service representative.

Loading the CD–ROM Drive

Press the unload button to open the tray. Place the disc, with the printed side away from the tray, into the tray. If the CD–ROM drive is in the vertical position, slip out the bottom tabs to hold the disc in place. Push gently on the load/unload button. The drive automatically pulls the tray into the drive and prepares the disc for reading.

Tabs
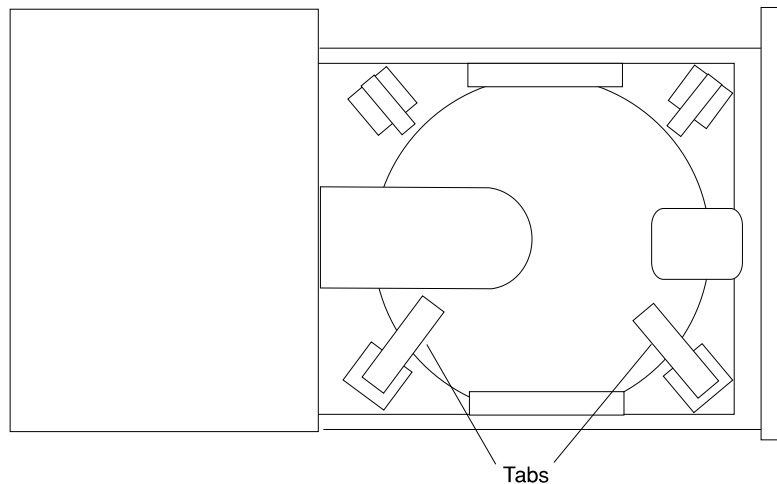
Unloading the CD–ROM Drive

Push and hold the unload button until the drawer comes out and then remove the disc.

Cleaning the CD–ROM Drive

This CD–ROM drive has an internal head–cleaning mechanism, and therefore does not require an external cleaning device. The internal cleaning mechanism cleans the head every time the tray is operated.

Always handle discs carefully by the edges to avoid leaving fingerprints or scratching the disc. (This helps the disc to maintain good readability.) Discs can be wiped with a soft, lint–free cloth or lens tissue. Always wipe in a straight line from the inner hub to the outer rim.

Emergency Eject

Note: Execute the following procedure only in an emergency (caddy will not eject although pressing the unload button).

1. Insert a small diameter rod, such as a straightened paper clip, into the emergency eject hole. (Refer to the illustration below for the location of the emergency eject hole.)

2. Push the tool in until some resistance is felt.

3. Maintain a small amount of pressure on the rod while pulling on the tray with your finger nail.

4. Pull the tray open and remove the disc.
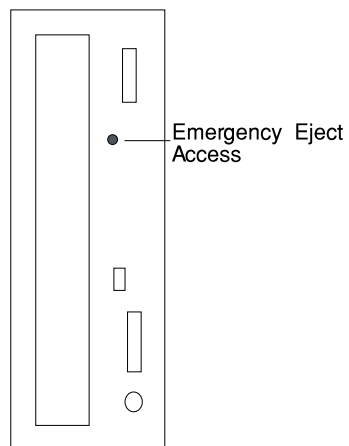
Note: Normally the tray makes a ratcheting sound when pulling it open using the above procedure.

Using the Hot Swap Disk Drives

For information on installing SCSI hot swap drives refer to "Installing a Hot-Swap SCSI Disk Drive in Bank C, D, or E." on page 4-48.

For information on installing SSA hot swap drives refer to "Installing a Hot-Swap SSA Disk Drive in Bank C, D, or E" on page 4-52.

For information on removing SCSI hot swap drives refer to "Removing a Hot-Swap SCSI Disk Drive from Bank C, D, or E" on page 4-80.

For information on removing SSA hot swap drives refer to "Removing a Hot-Swap SSA Disk Drive from Bank C, D, or E" on page 4-84

Relationship of AIX Prompts and Physical Drive Location

A SCSI adapter and a SCSI drive address can be displayed on a user display. The AIX command **lscfg** lists the attached devices on the system display. A SCSI adapter and drives might be listed as:

```
scsi0     00 - 01                    SCSI I/O Controller
hdisk0    00 - 01 - 00 - 0,0         1.08GB SCSI Disk Drive
hdisk1    00 - 01 - 00 - 3,0         2.2GB SCSI Disk Drive
                                 SCSI ID
                                 SCSI Bus
                                 PCI Slot Address for SCSI Adapter
                                 PCI Bus Indicator
```

Labels on the right side of each bank, identify the PCI Bus indicator and PCI Slot address for the SCSI adapter attached to each bank.

Physical Slot of SCSI Adapter	Bank Label
9I/P	04 - 09
8I/P	04 - 08
7P	04 - 07
6P	04 - 06
5P	04 - 05
4P	04 - 04
3P	04 - 03
2P	04 - 02
1P	04 - 01
Second Integrated SCSI Controller	04 - F0
First Integrated SCSI Controller	04 - E0

Bank C
Bays: 1-6
SCSI IDs:
  0-5 or 8-13

Bank D
Bays: 1-6
SCSI IDs:
  0-5 or 8-13

Bank E
Bays: 1-6
SCSI IDs:
  0-5 or 8-13

B1   B2   A1   A2

C1.   C2.   C3.   C4.   C5.   C6.
ID: ID: ID: ID: ID: ID:
1   2   3   4   5   6
or   or   or   or   or   or
8   9   10   11   12   13

D1.   D2.   D3.   D4.   D5.   D6.
ID: ID: ID: ID: ID: ID:
1   2   3   4   5   6
or   or   or   or   or   or
8   9   10   11   12   13

E1.   E2.   E3.   E4.   E5.   E6.
ID: ID: ID: ID: ID: ID:
1   2   3   4   5   6
or   or   or   or   or   or
8   9   10   11   12   13

Bank
Labels
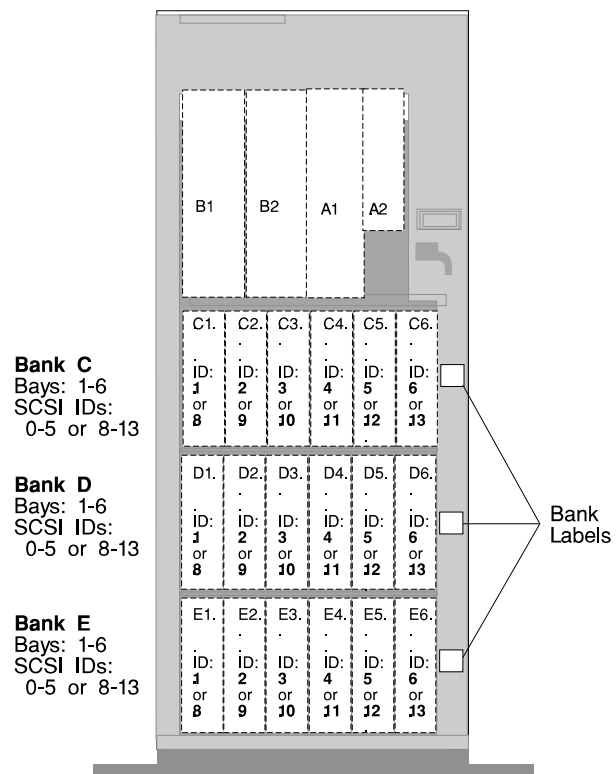
Handling Guidelines

The hot-swap disk drive is a sensitive device. Handle the hot-swap carrier and disk drive with care.

- Do not drop the disk drive or subject the drive to excessive shock.
- Do not expose the disk drive to temperatures lower than -40° F (-40° C) or higher than 158 ° F (70° C).
- If drive temperature changes, allow approximately one hour of temperature acclimatization for every 18° F (10° C) of temperature change.
- Never allow moisture to condense on the drive.
- Static electricity can damage your equipment. Take these precautions to avoid static electricity damage:
    - Always handle your disk drive carefully.
    - Handle the drive by the edges and never touch any exposed circuitry.
    - Prevent others from touching the drive.
- Store the hot-swap disk drive in a protective container such as an instrument case or in a protected area.
- Failure to observe these precautions may lead to product failure, damage, and invalidation of all warranties.

Labels

Several labels are included in your system ship group which may be attached to the handle of the hot-swap drive. The labels may be marked in any way that the user can easily identify the drive for removal or installation.

Disk Drive Status LED States

SCSI Disk Drives: The following table explains the meaning of the green and amber status LEDs and spin down button.

Amber ———

Green ———
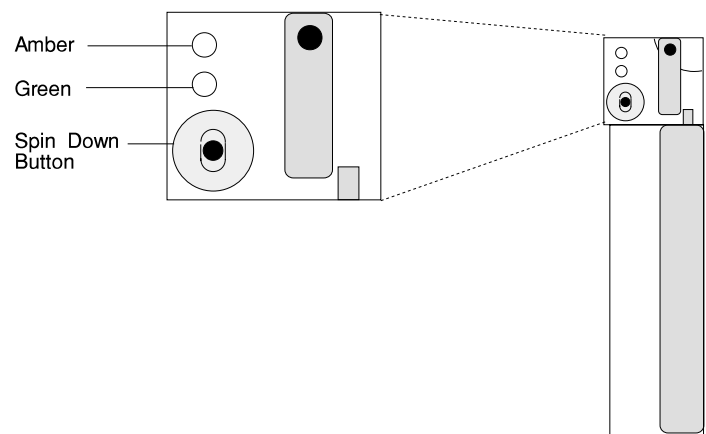
Spin Down
Button ———

Status LEDs		
LED or Button	**Status**	**Definition**
Amber	On	Drive spinning
	Off	Drive not spinning
Green	On	Power On
	Off	Power Off
	Blinking	Power Off/Drive identify
Spin down	Depressed	Spin down drive and remove power

SSA Disk Drives: The following table explains the meaning of the Power, Ready and Check status LEDs.
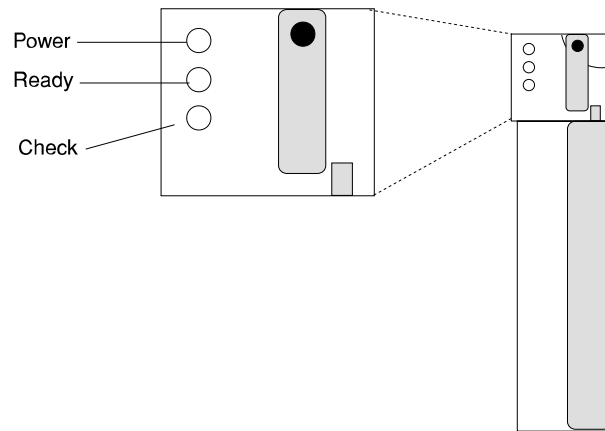
Status LEDs		
LED	**Status**	**Definition**
Power	On	Power On
	Off	Power Off
Ready	On	Both SSA connections good and drive is ready
	Blinking	Only one SSA connection good
	Flickering	Drive is executing a command
Check	On	Disk drive failure
		Self-test running
		Drive in service mode
	Blinking	Disk drive selected

General Information for 5.0GB 8-mm Tape Drive

Requirements

The 5.0GB 8-mm Tape Drive requires that firmware version TR97038 or later be installed in your system unit. To check the level of firmware installed, see Chapter 3, "System Management Services" on page 3-1.

Recommendations

- Use only Data Grade 8-mm tape cartridges. These cartridges are identified by either a Data, D, or D8 marking on the data cartridge. Use of video grade cartridges can damage the 8-mm tape drive and can void the warranty of your 8-mm tape drive, and data written on these tapes may be lost over a short period of time.

- Remove the tape cartridge from the tape drive when it is not in use, and store the cartridge in the cartridge case.

- Do not open the door on the data tape cartridge. This door covers and protects the magnetic tape material from dirt, dust, and damage.

- Avoid touching the tape since this can cause loss of data.

- Keep the tape drive door closed except when loading or unloading a tape cartridge.

- Back up and then discard any tape cartridge that repeatedly produces error messages. The error information is in the system error log.

- Clean the tape path regularly according to the cleaning procedure of the 8-mm tape drive. Use only recommended cleaning cartridges; other cleaning cartridges can permanently damage your 8-mm tape drive.

Attention: Do not use video grade cartridges in the 8-mm tape drive. Video grade tapes may be unreliable and may cause permanent damage to the 8-mm tape drive.

Types of 8-mm Tape Cartridges

- Test Tape Cartridge: This is a specially labeled tape cartridge that is in the media kit with the 8-mm tape drive. Use this cartridge only when checking the operation of the drive or running diagnostics; do not use it to save programs or data.

- Data Tape Cartridge: This is a non-labeled blank tape cartridge that is in the media kit. Use this cartridge for saving your programs or data. The same data tape cartridge can be used in either a 2.3GB 8-mm tape drive or a 5.0GB 8-mm tape drive.

- Cleaning Tape Cartridge: Use this cartridge for cleaning the 8-mm tape path. For more information, see "Cleaning the Tape Path on the 5.0GB 8-mm Tape Drive" on page 2-26.

Tape Cartridge Compatibility

The 8-mm tape drive is compatible with existing 8-mm tape subsystems that comply to the American National Standard (ANSI) X3B5/89-136, Helical-scan Digital Computer Tape Cartridge, 8-mm for Information Exchange. Data compression effectively increases the cartridge capacity and data transfer rate for the 5.0GB tape cartridges.

Note: 160 meter cartridges are not processed and are automatically ejected by the drive.

Format Modes (C=compression mode)				
8-mm Tape Drive	**2.3GB**	**2.3GB (C)**	**5.0GB**	**5.0GB (C)**
2.3GB	Read/Write			
5.0GB	Read/Write	Read only	Read/Write	Read/Write

Setting the Write-Protect Tab on 8-mm Tape Cartridges

Setting the write-protect tab on a tape cartridge is necessary so that information is not accidentally lost. When the write-protect tab of a tape cartridge is set (window closed), information can be read from the tape, but cannot be written to it.

The window on the tape cartridge controls write-protection.

Write Enabled

Window Closed

Write-Protect Tab Set

Window Open
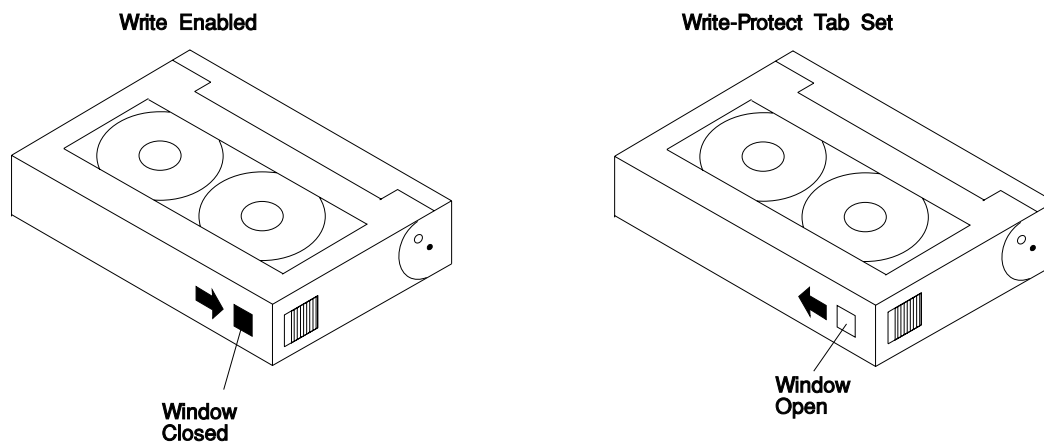
Environment Considerations for 8-mm Data Cartridges

Information in this section describes operating and storage conditions including temperature, relative humidity, and maximum wet bulb data.

Attention: The manufacturer has specified a set of temperature and humidity ranges in which the 8-mm data cartridge can operate with ease. Only regular cleaning procedures are required when operating the cartridge within this range. The risk of possible data loss is increased if 8-mm tape cartridges are operated, stored, or shipped outside the temperature or humidity ranges shown in the following table.

Before using a cartridge, always let it adjust (acclimate) to the operating environment. Do this by placing the cartridge with its container in the operating environment for as long as it has been away from this environment or for 24 hours, whichever is less.

Acclimation is necessary for any data cartridge that has been exposed to a different humidity environment or a temperature change of 11°C or 20°F or more.

	Operating Ranges	Storage	Shipping
Temperature	16°C to 32°C (60°F to 90°F)	5°C to 32°C (40°F to 90°F)	-40°C to 52°C (-40°F to 125°F)
Relative Humidity (non-condensing)	20 to 80%	20 to 80%	5 to 80%
Maximum Wet Bulb	26°C (79°F)	26°C (79°F)	26°C (79°F)

Operating in Harsh Environments

The 8-mm tape drive is ideally suited to streaming operations, as opposed to tape movement operations involving multiple stop/starts and random searches. When the tape is used for frequent stop and start operations, streaming movement is beneficial and should be used whenever possible. This can be accomplished by ensuring that any save or restore operation is the only active operation performed by a device connected to this SCSI I/O controller.

Any tape that has been used outside the ranges specified in the table on 2-21 for an extended period of time (50 passes in 40 hours of nonstop operation) should not be used as an archival tape. Exposure to the environment will deteriorate the magnetic and physical strength of the tape. Do not store important data on a tape that has been used outside the specified ranges; transfer the data to a new tape for reliable archiving.

8-mm Data Cartridge Erasure

Most bulk eraser devices do not have the capability to erase 8-mm data cartridges. To properly erase an 8-mm data cartridge with a bulk eraser device, the erasure rating must be at least 1500 oersted.

The 2.3GB and the 5.0GB 8-mm tape drives erase residual data before writing new data on the data tape.

Tape Cartridge Data Efficiency

The 8-mm tape cartridge efficiency is defined as the amount of data that can be stored on the cartridge. The following variables affect the amount of data that can be stored on a tape cartridge:

- Size of the data file
- Number of file marks per file
- File mark size used
- Compatibility mode (2.3GB or 5.0GB)
- Media rewrites.

Using the 5.0GB 8-mm Tape Drive

The optional 5.0GB 8-mm tape drive is a half-height device.

Status Lights

The 5.0GB 8-mm tape drive has two green status lights and one amber status light. The on and off combinations of the status lights indicate the conditions of the 8-mm tape drive.

Each of the International Organization for Standards (ISO) symbols located next to a status light indicates a specific condition of the tape drive as follows:
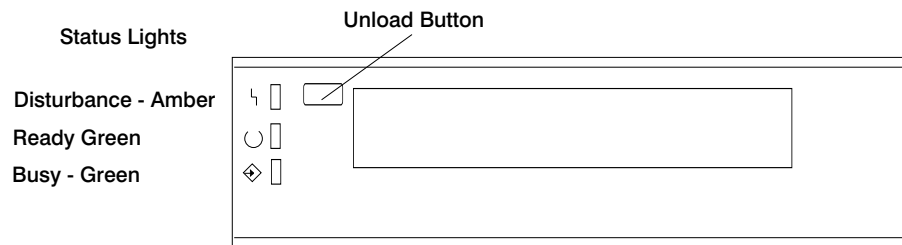
Status Light States

The following table explains the meaning of the green and amber status lights.

Status Lights on the 5.0GB 8-mm Tape Drive			
Status	**Ready (green)**	**Busy (green)**	**Disturbance (amber)**
The power-on self-test (POST) is running or the system has issued a Reset to the drive.	On	On	On
One of the following has occurred: • The power is off. • The POST has completed successfully, but no tape cartridge has been inserted.	Off	Off	Off or On
A tape cartridge has been inserted and the 8-mm tape drive is ready to receive commands from the system.	On	Off	Off or On
A tape cartridge has been inserted and the 8-mm tape drive is performing a tape load or unload operation.	Off	Flashing	Off or On
The tape is in motion and the 8-mm tape drive is busy running a device operation.	On	Flashing	Off or On
The 8-mm tape drive has detected an internal fault that requires corrective action. If this occurs, see the following note.	Off	Off	Flashing
The tape path requires cleaning. Refer to "Cleaning the Tape Path on the 5.0GB 8-mm Tape Drive" on page 2-26.	Off or On	Off or Flashing	On

Note: If a fault or an error condition occurs, first try to recover by pressing the unload button. If this does not correct the fault, switch off the power to the 8-mm tape drive and then switch on the power to the drive. If the condition continues, call your service representative.

Loading the 8-mm Tape Cartridge

Before loading the tape cartridge, make sure the power is on and the write-protect tab on the tape cartridge is properly set. Refer to "Setting the Write-Protect Tab on 8-mm Tape Cartridges" on page 2-20. The tape drive loads the tape from the cartridge and prepares it for reading and writing.

To load the 8-mm tape cartridge, do the following:

1. Grasp the edges of the 8-mm tape cartridge with the write-protect tab toward you and the window side of the cartridge facing up.

2. Slide the tape cartridge into the opening on the front of the 8-mm tape drive until the loading mechanism pulls the cartridge into the drive and the drive door closes. The ready status light (green) goes on if the load operation was successful.
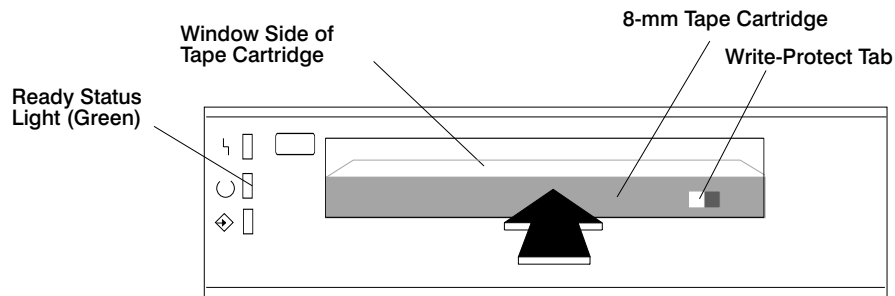
The 8-mm tape drive is ready for data operations when the tape cartridge is inserted. After the cartridge is inserted into the tape drive, the tape takes about 25 seconds to load; this does not interfere with beginning the data operations.

Commands can be entered while the tape is loading. Any commands to the tape drive start running once the tape has finished loading. Commands not requiring the tape cartridge are run immediately.

Unloading the 8-mm Tape Cartridge

Before performing the unload operation, make sure the power to the 8-mm tape drive is on.

To unload and eject the tape cartridge, press the unload button. The 8-mm tape drive rewinds the tape and then ejects the tape cartridge from the tape drive.

After pressing the unload button, the following occurs:

1. The ready status light goes off.

2. The busy status light flashes during the unload operation.

3. The busy status light will goes off when the cartridge is ejected from the tape drive.
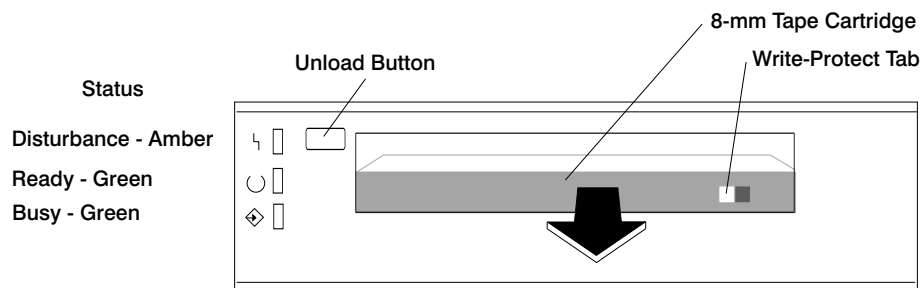
The time required for a tape to rewind and unload is between 18 seconds and 3 minutes, depending on the position of the tape when the unload button is pushed.

If the tape cartridge cannot unload and has to be removed manually from the drive, contact your service representative.

Cleaning the Tape Path on the 5.0GB 8-mm Tape Drive

Attention: Do not use video cleaning cartridges in the 8-mm tape drive. Video cleaning cartridges can damage the 8-mm tape drive.

The 8-mm tape path should be cleaned either approximately every 30 hours of tape motion or once a month, whichever occurs first. The 5.0GB 8-mm tape drive counts the number of hours of tape motion and indicates when the tape path requires cleaning when the lighted disturbance status light (amber) is on.

More frequent cleaning may be required if the drive is operated in a dusty environment or in humid conditions. If the dust is allowed to accumulate, the drive

has to perform more reads and writes. This can cause data loss, and may be prevented by regularly scheduled cleaning of the drive.

The cleaning cartridge cleans the 8-mm tape drive. If you attempt to use an 8-mm cleaning cartridge more times than allowed, the tape drive automatically detects the error and ejects the cleaning cartridge. The disturbance status light (amber) remains on if it was on prior to the cleaning operation being attempted.

Some video cleaning cartridges are extremely abrasive. An 8-mm tape drive may be permanently damaged after only a few cleaning operations using an abrasive-type cleaning cartridge.

Before loading the cleaning cartridge, make sure the power to the 8-mm tape drive is on.

To load the 8-mm cleaning cartridge, do the following:

1. Grasp the edges of the 8-mm cleaning cartridge with the window side of the cartridge facing up.

2. Slide the cleaning cartridge into the opening on the front of the 8-mm tape drive until the loading mechanism pulls the cartridge into the drive.
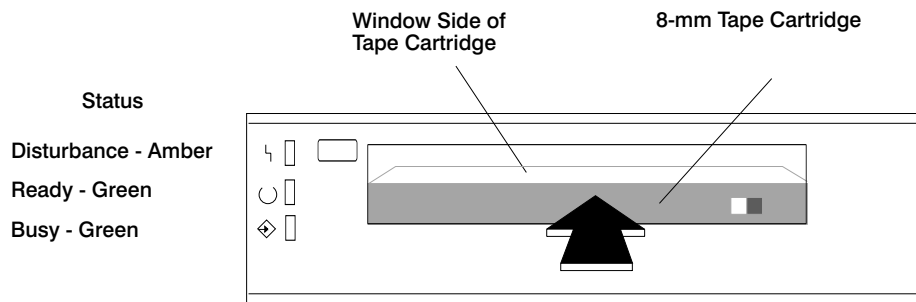
After the 8-mm cleaning cartridge has been fully inserted into the 8-mm tape drive, the following cleaning operations are performed automatically:

1. The cleaning tape is loaded into the tape path.

2. The drive is cleaned by moving the cleaning tape forward for approximately two minutes.

3. The tape is unloaded and the cleaning cartridge is ejected from the tape drive when the cleaning operation is complete.

4. A successful cleaning operation is indicated when the disturbance status light (amber) goes off.

General Information for 4.0GB 4-mm Tape Drive

The 4.0GB 4-mm tape drive is a streaming tape drive that is used to:

- Save and restore system data files.
- Archive important records.
- Distribute operating system software upgrades.

The 4-mm tape drive can be attached to any system using a single-ended interface meeting the Small Computer System Interface ll (SCSI-ll) Standard ANSI X3.131-199X Rev. 10h.

The 4-mm tape drive has the following features:

- Capacity of 4.0 GB per cartridge. 8 GB is typical with data compression and with DDS2 data cartridges.

  The actual capacity per cartridge varies depending on the application and the type of data cartridge being used.

- Data transfer rate is 400 KBps. 800 KBps is typical with data compression.

  Note: Data compression activated is the default setting from the factory. Data compression is usually controlled by the application software.

- Read and write of DDS|||| tape cartridges in 2.0 GB per cartridge format.
- A status light that indicates when it is time to clean the tape path.
- Internal diagnostics that are activated when the 4 mm Diagnostic Cartridge is inserted and loaded into the drive.
- Media recognition system: only data grade media can be written with this tape drive.

The 4-mm tape drive uses a 4-mm data cartridge for saving and restoring your system data. The 4-mm tape drive writes and reads only 4-mm Digital Data Storage (DDS|||| or DDS2) cartridges.

Recommendations

Attention: Tape cartridges that do not carry the proper DDS symbol cannot be written to and their use may cause the 4-mm tape drive to report an error.

- Use only 4-mm Digital Data Storage (DDS|||| or DDS2) cartridges.

    Attention: Use of other than recommended cleaning cartridges can damage your tape drive and will void the drive warranty.

- Clean the tape path by using the recommended cleaning cartridge. Follow the instructions on the cartridge.

- Back up and then discard any tape cartridge that repeatedly produces error messages. The error information is in the system error log.

- Do not open the door on the data cartridge that covers the tape. This door protects the magnetic tape material from dirt, dust, and damage.

- Do not operate in a dusty environment.

- Do not touch the tape material. Any substance transferred to the tape by touching it could cause loss of data.

Types of 4-mm Tape Cartridges

The 4-mm tape drive is shipped with three 4-mm cartridges to help start your tape operations immediately.

4-mm Data Cartridge: Use this non-labeled cartridge for saving or restoring your programs or data. Additional data cartridges can be ordered.

4-mm Diagnostic Cartridge: Use this specially labeled cartridge to perform diagnostics on the drive. Do not use it to save or restore programs or data.

Cleaning Cartridge: Use this cartridge for cleaning the 4-mm tape path. For more information, see "Cleaning the Tape Path on the 4.0GB 4-mm Tape Drive" on page 2-37.

Tape Cartridge Compatibility

The 4-mm Tape Drive is compatible with existing 4mm tape subsystems that are designed to operate with Digital Data Storage approved media, which meet the following standards:

- For DDS||||

  - American National Standard (ANSI) standard, X3.203-191, Helical-scan Digital Computer Tape Cartridge, 3.81mm.

  - European Computer Manufacturers Association (EMCA) standard, EMCA-150 , 3.81mm Wide Magnetic Tape Cartridge and DDS|||| format.

- For DDS2

  - European Computer Manufacturers Association (EMCA) standard, EMCA/TC17/93/20, 3.81mm Wide Magnetic Tape Cartridge for Information Interchange Helical Scan Recording, DDS2 format.

You cannot change the density setting of the drive, because the device reconfigures itself automatically, depending on the media type installed, as follows:

Media Type	Device Configuration
Non-DDS	Read-only
DDS||||	Read/write in 2.0GB mode only.
DDS2	Read in either density; write in 4.0GB mode only.

Setting the Write-Protect Tab on 4-mm Tape Cartridges

The window on the tape cartridge controls write-protection. When the write-protect tab of a tape cartridge is set (window open), information can be read from the tape, but cannot be written to it. When the write-protect tab of a tape cartridge is not set (window closed), information can be both written to and read from the tape. Trying to write to a 4-mm data cartridge with the window open causes an error.

Write Enabled — Window Closed

Write-Protect Tab Set — Window Open
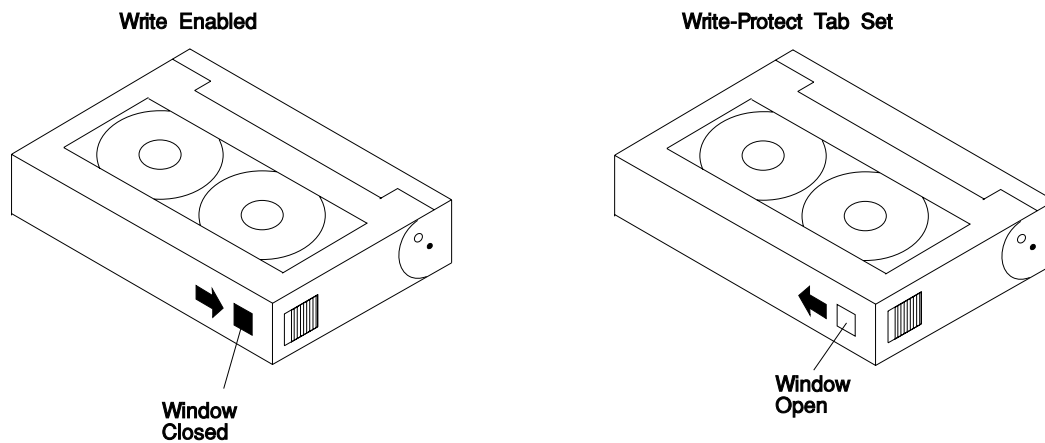
Environmental Considerations for 4-mm Data Cartridges

Information in this section describes operating and storage conditions including temperature, relative humidity, and maximum wet bulb data.

Attention: The manufacturer has specified a set of temperature and humidity ranges in which the 4-mm data cartridge can operate with ease. Only regular cleaning procedures, as described in "Cleaning the Tape Path on the 4.0GB 4-mm Tape Drive" on page 2-37 are required when operating the cartridge within this range. The risk of possible data loss is increased if 4-mm tape cartridges are operated, stored, or shipped outside the temperature or humidity ranges shown in the following table.

Before using a cartridge, always let it adjust (acclimate) to the operating environment. Do this by placing the cartridge with its container in the operating environment for as long as it has been away from this environment or for 24 hours, whichever is less.

Acclimation is necessary for any data cartridge that has been exposed to a different humidity environment or a temperature change of 11°C or 20°F or more.

	Operating Ranges	Storage	Shipping
Temperature	16°C to 32°C (60°F to 90°F)	5°C to 32°C (40°F to 90°F)	-40°C to 52°C (-40°F to 125°F)
Relative Humidity (non-condensing)	20 to 80%	20 to 80%	5 to 80%
Maximum Wet Bulb	26°C (79°F)	26°C (79°F)	26°C (79°F)

Operating in Harsh Environments

The 4-mm tape drive is ideally suited to streaming operations, as opposed to tape movement operations involving multiple stop/starts and random searches. When the tape is used for frequent stop and start operations, streaming movement is beneficial and should be used whenever possible. This can be accomplished by ensuring that any save or restore operation is the only active operation performed by a device connected to this SCSI I/O controller.

Any tape that has been used outside the ranges specified in the previous table for an extended period of time (50 passes in 40 hours of nonstop operation) should not be used as an archival tape. Exposure to the environment will deteriorate the magnetic and physical strength of the tape. Do not store important data on a tape that has been used outside the specified ranges; transfer the data to a new tape for reliable archiving.

4-mm Data Cartridge Erasure

Most bulk eraser devices do not have the capability to erase 4-mm data cartridges. To properly erase an 4-mm data cartridge with a bulk eraser device, the erasure rating must be at least 2000 oersted.

The 4-mm tape drive erases residual data before writing new data on the data tape.

Tape Cartridge Data Capacity

The 4-mm tape cartridge capacity is defined as the amount of data that can be stored on the cartridge. The following variables affect the amount of data that can be stored on a tape cartridge:

- Size of the data file

- Number of file marks per file

- Compatibility mode (2GB or 4GB)

- Media rewrites.

Using the 4.0GB 4-mm Tape Drive

The optional 4.0GB 4-mm tape drive is a half-high device.

Status Lights

The 4.0GB 4-mm tape drive has two green status lights and one amber status light. The on and off combinations of the status lights indicate the conditions of the 4-mm tape drive.

Each of the International Organization for Standards (ISO) symbols located over a status light indicates a specific condition of the tape drive as follows:

4-mm Tape (Front View)

Tape Drive Door

Ready (Green)

Read/Write (Green)

Status Lights

Unload Button
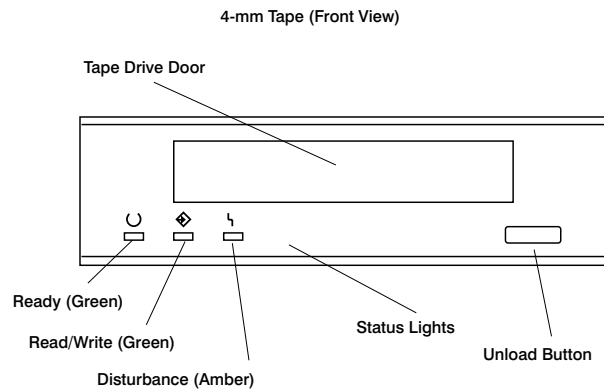
Disturbance (Amber)

Status Light States

The following tables explain the meaning of the green and amber status lights.

	Ready (green)	Read-Write (green)	Disturbance (amber)
Off	No cartridge installed or error condition	No cartridge or no activity	No error condition
Steady	Cartridge installed or loading/unloading		Cleaning required or worn media
Flashing	Power-on self- test in progress	Cartridge activity	Error condition

Status Lights on the 4.0GB 4-mm Tape Drive			
Status	**Ready (green)**	**Read-Write (green)**	**Disturbance (amber)**
LED test.	On 2 seconds at power on	On 2 seconds at power on	On 2 seconds at power on
The power-on self-test (POST) is running or the Diagnostic Cartridge is running.	Flashing	Off	Off
One of the following has occurred: • The power is off. • The POST has completed successfully, but no tape cartridge has been loaded.	Off	Off	Off or On
A tape cartridge has been inserted and the 4-mm Tape Drive is Ready to receive commands from the system.	On	Off	Off or ON
The tape is in motion and the 4-mm Tape Drive is running a device operation or cleaning.	On	Flashing	Off or On
The 4-mm Tape Drive has detected an internal error that requires corrective action such as tape cartridge failure, high humidity, or no SCSI terminator. Refer to the service guide or contact your service representative. (See note below)	Off	Off	Flashing
The tape path requires cleaning or a poor quality tape cartridge is being used. See "Cleaning the Tape Path on the 4.0GB 4-mm Tape Drive" on page 2-37.	Off or On	Off or Flashing	On

Note: If an error condition occurs, first try to recover by pressing the unload button. If this does not correct the error, switch off the power to the 4-mm tape drive and then switch on the power to the drive. If the condition continues, call your service representative.

Loading the 4-mm Tape Cartridge

Before loading the tape cartridge, make sure the power is on and the write-protect switch on the tape cartridge is properly set. Refer to "Setting the Write-Protect Tab on 4-mm Tape Cartridges" on page 2-31. The tape drive loads the tape from the cartridge and prepares it for reading and writing.

To load the 4-mm tape cartridge, do the following:

1. Grasp the edges of the 4-mm tape cartridge with the write-protect tab towards you and the window side of the cartridge facing up.

2. Slide the tape cartridge into the opening on the front of the 4-mm tape drive until the loading mechanism pulls the cartridge into the drive and the drive door closes. The ready status light (green) goes on if the load operation was successful.
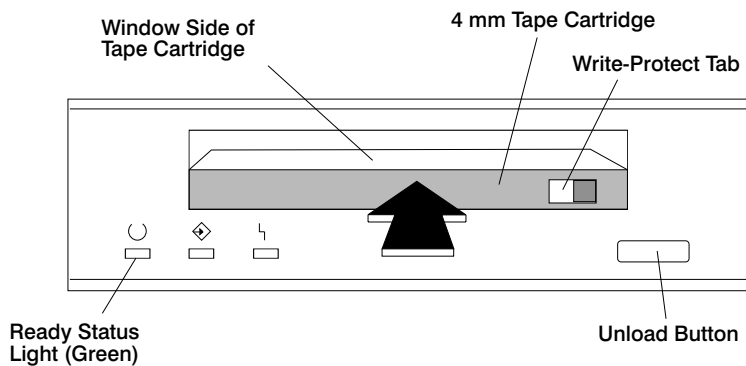
The 4-mm tape drive is ready for data operations when the tape cartridge is inserted. After the cartridge is inserted into the tape drive, the tape takes about 15 seconds to load.

Unloading the 4-mm Tape Cartridge

Before performing the unload operation, make sure the power to the 4-mm tape drive is on.

To unload and eject the tape cartridge, press the unload button. The 4-mm tape drive rewinds the tape and then ejects the tape cartridge from the tape drive.

After pressing the unload button, the following occurs:

1. The Read-Write status light flashes during the unload operation.

2. The Ready status light and the Read-Write status light turns off when the cartridge is ejected from the tape drive.
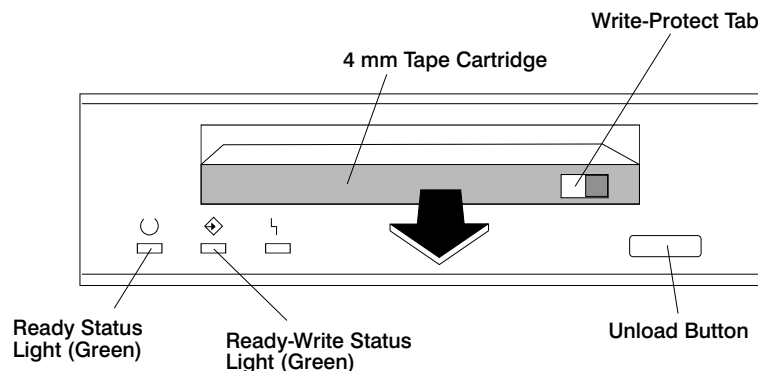
The time required for a tape to rewind and unload is between 10 seconds and 1.5 minutes, depending on the position of the tape when the unload button is pushed.

If the tape cartridge cannot unload and has to be removed manually from the drive, contact your service representative.

Cleaning the Tape Path on the 4.0GB 4-mm Tape Drive

The 4-mm tape path should be cleaned either approximately every 30 hours of tape motion or once a month, whichever occurs first. The 4-mm tape drive monitors the recording quality of the tape cartridge and indicates that the tape path requires cleaning when the disturbance status light (amber) is on.

More frequent cleaning may be required if the drive is operated in a dusty environment or in humid conditions. If the dust is allowed to accumulate, the drive has to perform more reads and writes. This can cause data loss, and may be prevented by regularly scheduled cleaning of the drive.

The cleaning cartridge cleans the 4-mm tape drive 50 times before it needs to be discarded. If you attempt to use a 4-mm cleaning cartridge more than 50 times, the tape drive automatically detects the error and ejects the cleaning cartridge with the disturbance status light (amber) remaining on.

Before loading the cleaning cartridge, make sure the power to the 4-mm tape drive is on.

To load the 4-mm cleaning cartridge, do the following:

1. Grasp the edges of the 4-mm cleaning cartridge with the window side of the cartridge facing up.

2. Slide the cleaning cartridge into the opening on the front of the 4-mm tape drive until the loading mechanism pulls the cartridge into the drive.
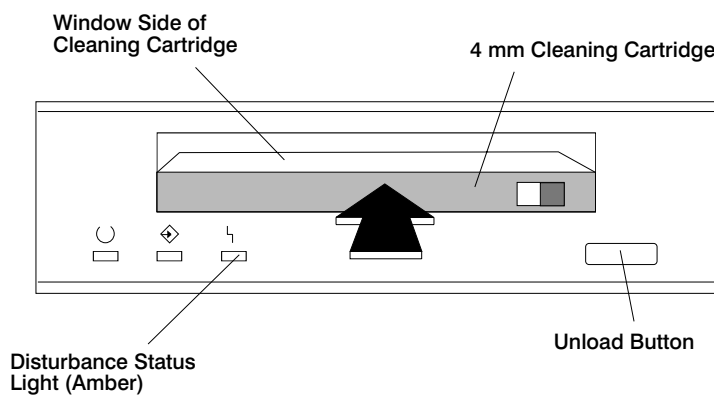
After the 4-mm cleaning cartridge has been fully inserted into the 4-mm tape drive, the following cleaning operations are performed automatically:

1. The cleaning tape is loaded into the tape path.

2. The drive is cleaned by moving the cleaning tape forward for approximately 30 seconds.

3. The tape is unloaded and the cleaning cartridge is ejected from the tape drive when the cleaning operation is complete.

4. A successful cleaning operation is indicated when the disturbance status light (amber) goes off (if it was activated before the cleaning operation).

If the cleaning cartridge has been used more than 50 times the disturbance status light (Amber) will flash.

Using the 24/48GB DDS-2 4-mm Tape Autoloader

There are two versions of the 4-mm Tape Autoloader. One is vertically oriented and the other is horizontally oriented. Your system type determines which version you use. Both versions operate the same although the front bezel is labeled vertically or horizontally. The vertical version is shown.

Attention: Never remove, install, or transport the 4-mm Tape Autoloader with tape cartridges loaded in the drive. They can become dislodged and jam the mechanism.

Controls and Indicators
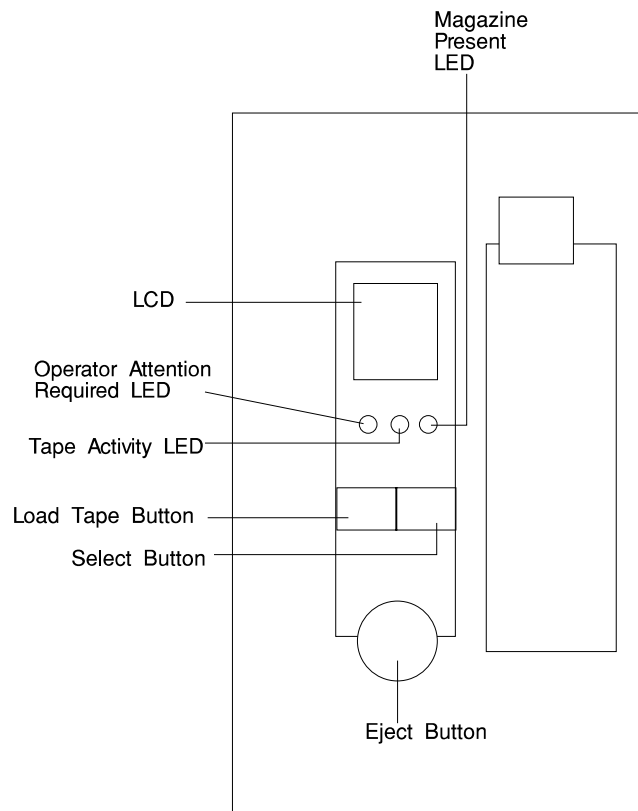
Select Button: The Select button allows you to select a cartridge from the magazine in the unit. The number of the cartridge selected is displayed on the left side of the LCD. If you press the Select button repeatedly, the display cycles through the cartridges available in the magazine.

Eject Button: The Eject button starts the unload process. The drive unloads any currently loaded cartridge, and the changer mechanism returns it to the magazine. The magazine is then ejected.

Load Tape Button: The Load Tape button loads the selected cartridge from the magazine into the drive. The drive then goes into sequential mode. See "Modes" on page 2-45.

Note: When in Random Mode, the select and load buttons are disabled. Their function is controlled by host software.

Magazine Present (LED)

- Steady Green: A magazine is in the Autoloader.

- Flashing Green: A magazine is being loaded, checked, or ejected.

Tape Activity (LED): This light indicates what is happening to the cartridge in the drive:

- Steady Green: A cartridge is present in the drive

- Rapidly Flashing (twice per second) Green: Data is being read or written

- Slowly Flashing (once per second) Green: A cartridge is being loaded or unloaded.

Operator Attention Required (LED): This light indicates that the operator needs to take some action:

- Steady Amber: A serious hardware error has occurred. If a power reset does not eliminate the problem, the Tape Autoloader requires service.

- Flashing Amber: A user-recoverable error has occurred:

  - The front-panel door is open.

  - A cartridge is in the drive, but no magazine is present.

  - The tape heads need cleaning.

  - The tape is nearing the end of its useful life.

  - A firmware upgrade is occurring.

When the Operator Attention Required LED is on or flashing, an error message might be displayed in the Status LCD.

Status Liquid Crystal Display
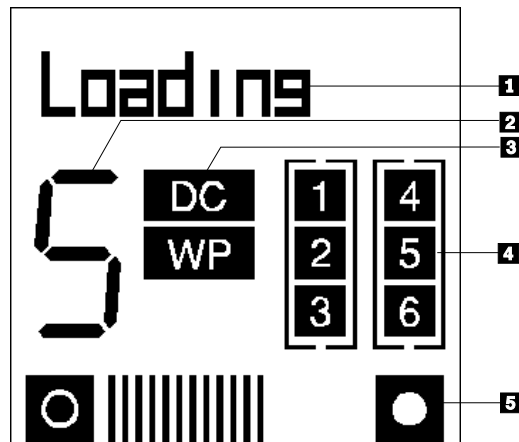
The Status LCD displays a range of autoloader status information in each of its five display regions:

1 A 10-character display provides operating status information and potential error conditions.

2 A 7-segment display shows the number of the cartridge currently loaded in the drive, or the cartridge selected when the Select button is pressed repeatedly.

3 "DC" indicates that data compression is being used for writing; "WP" indicates a Write-Protected cartridge.

4 Six numbered boxes individually light to show which magazine slots contain a cartridge.

5 An "odometer" line shows how much tape has been used in the active partition of the current cartridge. The more lines that are shown, the more tape that has been used.

Loading a Magazine

Attention: Cartridge and magazine labels must be firmly affixed to the recessed label areas; otherwise, the mechanism will jam.

- Labels must not be peeling off.
- Labels must not go over the edge of the label area.
- Labels must not be folded over the edge of cartridges.
- Labels must not be stuck on top of another label.

Attention: Only cartridges labeled with the DDS or DDS2 logo should be used in the Autoloader.

It is recommended that you store cartridges in their magazines, so that cartridges belonging to a multi-volume backup are kept together and in the correct order.

1. Align the arrow on the cartridge with the arrow on the magazine and insert the cartridge in the magazine. Insert as many cartridges as you need. You can insert up to 6 cartridges, and they can be placed in any of the magazine slots.
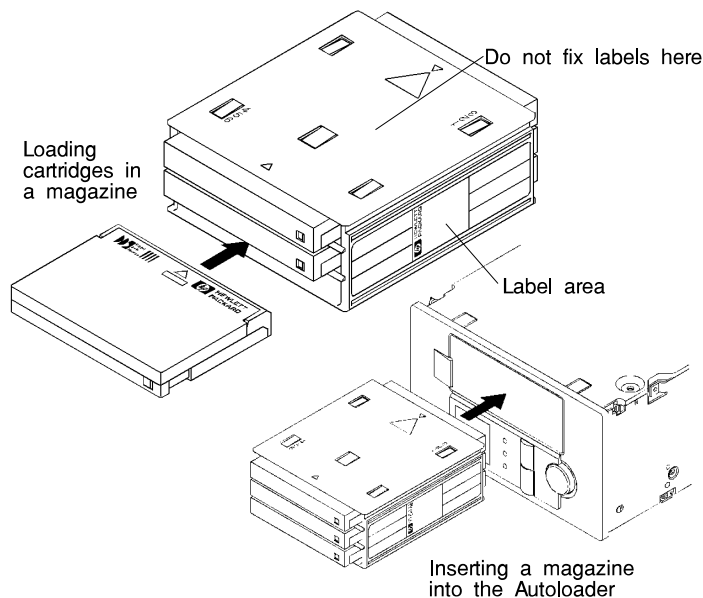
2. Insert the cartridge magazine into the slot in the front of the Autoloader with the large arrow on the magazine pointing towards the Autoloader. Apply steady pressure until the mechanism takes the magazine and pulls it into the Autoloader.
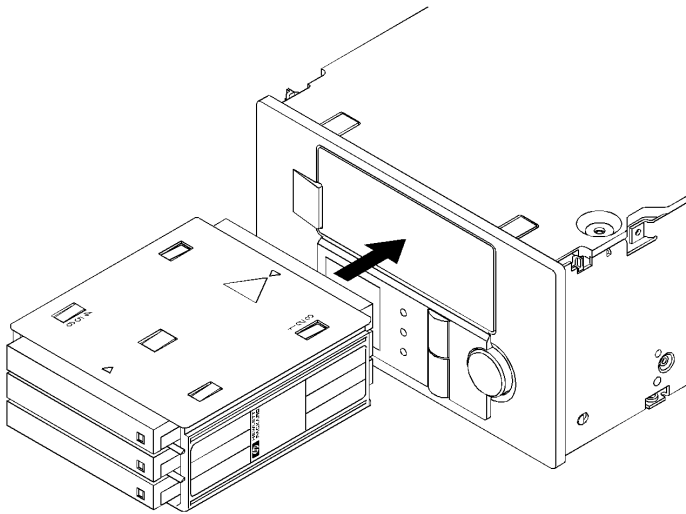
Ejecting a Magazine

To eject the magazine, press the Eject button. When you do this:

1. The tape rewinds to the beginning of the partition (BOP).

2. If the tape is write-enabled, the updated copy of the Tape log is written back to tape.

3. The tape rewinds to BOM and is unthreaded.

4. The changer replaces the cartridge in the magazine.

5. The magazine is ejected.

Forcing an Ejection

Attention: Force an ejection only as a last resort to recover a cartridge. Never use it as a quick way of ejecting the cartridge. You can lose data if you force an eject. The tape also might end up invalidly formatted, because EOD might not have been written.

If you press the Eject button when the drive is busy, the drive first completes the current task. Then it responds to the ejection request. This ensures that the task is terminated in a controlled manner and that no data is lost.

There might be occasions when you need to unload a cartridge urgently, even at the risk of losing data. To do this, you must force an ejection:

1. Press and hold the Eject button for at least 5 seconds. The LCD displays "Force Eject."

2. The Autoloader waits 35 seconds to give the normal ejection process a chance to occur.

3. When this period elapses, any tape in the drive is immediately unthreaded, and the cartridge is ejected, regardless of what operation the drive was performing. The cartridge then is returned to its slot in the magazine, and the drive is reset as though power had been cycled. Because forced ejection might interrupt an operation, it is possible that the drive will not write EOD before the cartridge is ejected. This will cause a loss of data and an invalid formatting of the cartridge. The data on such a cartridge should be readable up to the point where the format violation occurred.

4. If no cartridge is loaded in the drive, the Autoloader waits 35 seconds, ejects the magazine, and then resets as though power had been cycled.

Modes

The Autoloader can operate in two modes, sequential or random.

Sequential: In sequential mode, the Autoloader does not depend on host implementation of changer commands. You select which cartridge you want to start with by using the Select and Load buttons on the front panel. When a cartridge is ejected from the drive following a host UNLOAD command, the cartridge is placed back in it's slot and the the Autoloader automatically loads the next available cartridge from the magazine into the drive.

Random: In random mode, the host views the Autoloader as two devices:

- A changer mechanism to which SCSI Medium Changer commands can be sent.

- A tape drive to which SCSI Sequential Access commands can be sent.

The controlling host computer therefore has full random access to any cartridge. Most backup/restore applications automatically load, unload the Autoloader using the random access mode. Refer to your backup/restore software instructions for additional details.

Loading and Unloading Cartridges

When a magazine containing cartridges has been inserted into the autoloader, some applications can begin, because they use the Move Medium commands which can select and load cartridges. However, many applications, and the AIX commands **mksysb**, **tar**, **backup**, **cpio**, operate only with a tape drive which has media loaded (is Ready). Also, the drive must be loaded with an appropriate cartridge to boot from the drive, or to run diagnostics on the drive. You can load the drive manually using the controls on the front of the Autoloader.

To load a cartridge into the tape drive contained in the Autoloader, you use the Select button on the front of the Autoloader to select one of the cartridges from the magazine. Then, pressing the Load Tape button causes the selected cartridge to be moved from the magazine to the drive, where the drive starts a Load cycle automatically. Pressing the Load Tape button when the Select digit is "0" causes the loading of the first available cartridge in the magazine.

The tape drive may encounter difficulties in loading the cartridge. If it does, AIX and most using applications are unaware of the difficulty because applications and AIX typically communicate with "Ready" devices. You should observe the loading process to ensure it completes successfully. If the Load Tape process fails, the Autoloader retries the cycle several times. Failure to load after retrying is signaled to the

operator through the LCD panel and Operator Attention Required LED on the control panel.

Load failures are indicated by a flashing (Yellow) Operator Attention Required LED and messages on the LCD. If an error message (for example, Error 112) is displayed alternating with the instruction PressEject, the operator should press the Eject button which causes the magazine to be ejected with the unloadable cartridge. Try another cartridge. If a second cartridge also fails to load, the drive may be defective. However, if a substitute cartridge loads successfully, the original cartridge may be defective. You can try to load it into another 4-mm tape drive, or examine it for obvious problems (such as tape disconnected from one of the reels).

When a cartridge has been loaded, the LCD displays the READY message, and the application, diagnostic, or command can be initiated or continued. On initial manual loading, the Autoloader is in a sequential mode. In this mode, an Unload command issued to the drive causes the cartridge to be placed back in its assigned slot in the magazine and the next available cartridge to be loaded. This process ends when the cartridge in the highest numbered occupied slot of the magazine has been processed.

Most AIX commands such as **mksysb**, **tar** and **backup** do not issue Unload commands at the end of the command or at the end of the tape. When not controlled by the command or application, the operator should cause the unload by pressing the Eject button (making sure that the application or command is finished with the cartridge). The magazine ejects when operating in this single cartridge mode. Re-insert the magazine, and select the next or appropriate cartridge to continue or to initiate a new command or application. Don't reuse the cartridge just unloaded if it contains important data (such as your backup data).

Autoloader Status Messages

See the *24/48GB DDS-2 4-mm Tape Autoloader Installation and User's Guide* for information about status messages.

Error Messages

See the *24/48GB DDS-2 4-mm Tape Autoloader Installation and User's Guide* for information about error messages.

Head Cleaning

The tape heads should be cleaned regularly, as indicated in the following table. Tape heads also should be cleaned if the "Clean Me" message is displayed on the LCD and the Operator Attention Required LED is flashing amber.

Number of DDS cartridges used each day	Cleaning Interval
1	Weekly
2 to 3	Twice a week
4 or more	Daily

Clean the heads using a cleaning cartridge as follows.

Sequential Mode

1. Place the cleaning cartridge into one of the magazine slots (for example, slot 1) and insert the magazine into the Autoloader.

2. Use the Select button to select the slot in which you placed the cleaning cartridge.

3. Press the Load Tape button to load the cleaning cartridge into the drive. The Autoloader then automatically performs a cleaning cycle.

4. Press the eject button to unload the magazine and remove the cleaning cartridge.

5. Record the date on the label of the cleaning cartridge. After 25 uses, discard the cartridge.

Random Mode

1. Some backup software will perform the cleaning operation automatically. Using this process, the cleaning cartridge could be in any one of the six magazine slots. The Autoloader recognizes that the cartridge is a cleaning cartridge once it is loaded into the drive.

2. The drive then automatically carries out a cleaning cycle.

3. The drive automatically ejects the cartridge when the cleaning cycle is complete. The changer returns the cartridge to its magazine slot without any additional user involvement. Refer to your backup/restore software instructions for additional details.

Chapter 3. System Management Services

The System Management Services make it possible for you to view information about your computer and to perform such tasks as setting passwords and changing device configurations.

If you have chosen a graphical display as your system console, you can use the graphical System Management Services described below. If you are using an ASCII display as your system console, see "Text-Based System Management Services" on page 3-24.

Graphical System Management Services

To start the Open Firmware command line or graphical System Management Services, turn on or restart the computer.

The firmware version installed in your system unit is displayed at the bottom right-hand corner of the initial logo screen. Please note the version number; processor upgrades may require a specified version of firmware to be installed in your system unit. (Update System Firmware is an option under the Utilities menu in the System Management Services.)

After the logo displays, initialization icons appear across the bottom of the screen.

To enter the Open Firmware command line, you must press the **F8** key *after the keyboard icon appears* during startup.

If you press the **F8** key, the Open Firmware command line (an "OK" prompt) appears after the initialization and power-on self test (POST) are complete.

The Open Firmware command line is used to set up adapters that are not configurable with the System Management Services. Your adapter documentation directs you to use this option if it is needed.

To enter the graphical System Management Services instead of the Open Firmware command line, you must press the **F1** key *after the keyboard icon appears* during startup. and prior to the audible tone.

Note: If you do not press the **F1** key prior to the tone, the Sysystem Management Services screen will not appear. If this happens, turn off the system and re-start this process.

After the System Management Services starts, the following screen appears.

The System Management Services screen contains the following choices.

Config: Enables you to view your system configuration.

Boot: Allows you to set the sequence in which devices are searched for operating system startup code.
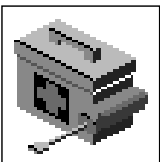
Utilities: Enables you to set and remove passwords, control the playing of system tones, enable the unattended start mode, set and view the addresses of your system's SCSI controllers, select the active console, and view or clear the error log.
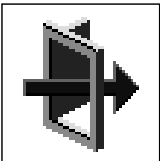
Exit: Returns you to the previous screen.

To select an icon, move the cursor with the arrow keys to choose which icon is highlighted, then press the **Enter** key. You can also select an icon by clicking on it with your left mouse button. To leave the current screen, either press the **Esc** key or select the **Exit** icon.

Config
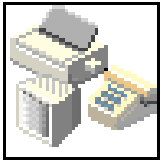
Selecting this icon makes it possible for you to view information about the setup of your system unit. A list similar to the following appears when you select the **Config** icon.

```
<Device Name>

PowerPC, 604
L2-Cache, 0512K
Memory
      slot A=8 MB
      slot B=8 MB
LPT
      addr=3BC
IDE
      addr=1F0
COM
      addr=3F8
COM
      addr=2F8
Audio
Keyboard
Mouse
Diskette
      addr=3F0
Integrated Ethernet
      addr=9999FF111B
Video
      enhanced graphics
```


Exit

Selecting the down arrow displays the next configuration screen, which lists your computer's firmware version, the date of its development, and the firmware part number.

The following screen appears if you DO NOT have a service processor in your system.

```
SCSI cntlr   id=7
    CD-ROM   id=3
    1084  MB  Harddisk id=6

PCI  Adapters
    SCSI cntlr   id=7
        slot=1

Security          OK
x.x               Firmware  Version
1/06/1997         Firmware  Date
40H5174           Firmware  P/N
xxxxxxxx          Serial  Number
```

Exit

The following screen appears if you have a service processor in your system.

```
SCSI cntlr   id=7
    CD-ROM   id=3
    1084 MB Harddisk id=6

PCI Adapters
    SCSI cntlr   id=7
        slot=1

Security          OK
<System Information>
x.x              Firmware Version
1/06/1997        Firmware Date
40H5174          Firmware P/N
xxxxxxxx         Serial Number

<IO Information>
xxxxxxxx         Serial Number
xxxxxxxx         Part Number
xxxxxxxx         EC Number
xxxxxxxx         FRU Number

<Service Processor Information>
xxxxxxxx         Serial Number
xxxxxxxx         Part Number
xxxxxxxx         EC Number
xxxxxxxx         FRU Number
```

Exit

Boot

This selection enables you to view and change the custom boot list (the sequence in which devices are searched for operating system startup code).

```
   New              List of Boot Devices

    -      [1]       Diskette

    1      [2]       SCSI CD-ROM id=3 (slot=1)

    3      [3]       SCSI 2168 MB Harddisk id=6 (slot=1)

    2      [4]       Ethernet (Integrated)




         Save      Default                        Exit
```

Attention: If you change your startup sequence, you must be extremely careful when performing *write* operations (for example, copying, saving, or formatting). You can accidentally overwrite data or programs if you select the wrong drive.

The default boot sequence is:

- The primary diskette drive
- CD-ROM drive
- Hard disk drive
- Network device.

To change the custom boot list, enter a new order in the **New** column, then select **Save**. The List of Boot Devices is updated to reflect the order you have chosen.

You can choose 1 to 4 devices for the custom boot list. To change the boot sequence back to the default values, select **Default**. (The default sequence is automatically saved.)

Utilities
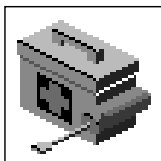
Selecting this icon enables you to perform various tasks and view additional information about your computer.
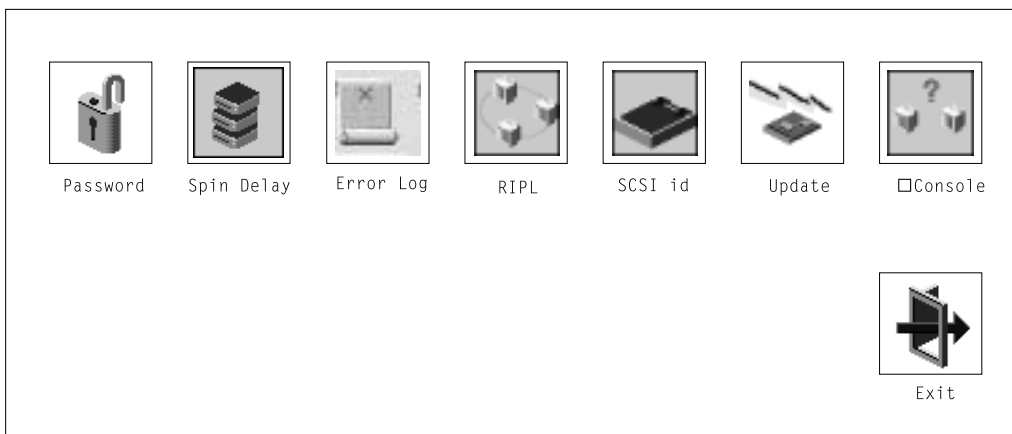
The following describes the choices available on this screen.
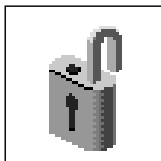
Password: Enables you to set password protection for turning on the computer and for using system administration tools.
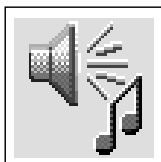
Audio: Enables you to turn on or off the system tones heard when the system is turned on.
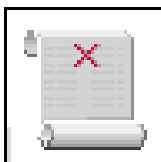
Error Log: Enables you to view and clear error log information for your computer.
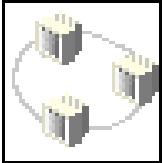
RIPL (Remote Initial Program Load): Allows you to select a remote system from which to load programs via a network adapter when your system unit is first turned on. This option also allows you to configure network adapters which require setup.

Update: Allows you to update the firmware programs on your computer.
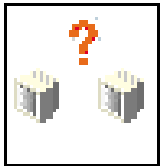
Console: If you have more than one keyboard and display attached to your system unit, or if you have an ASCII terminal attached to your system unit in addition to a keyboard and display, this tool allows you to define which one is active.

Password
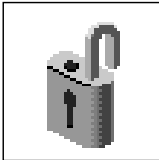
When you select this icon, the following screen is displayed.
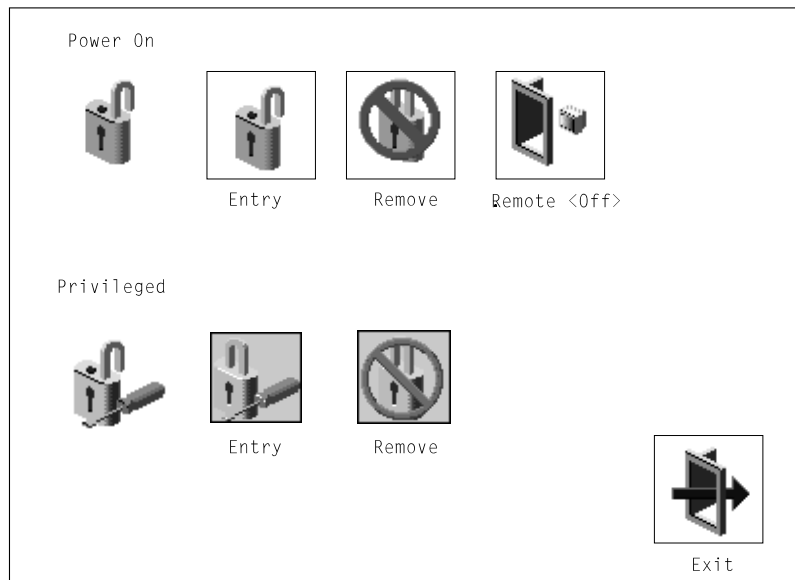
Power-On Password: Setting a power-on password helps protect information stored in your computer. If a power-on password is set for your computer, the Power On icon is shown in the locked position; if a power-on password is not set, then the Power On icon is shown in the unlocked position (as in the screen above).

When you select the Entry icon, a screen with 8 empty boxes appears. Type your password in these boxes. You can use any combination of up to eight characters (A–Z, a–z, and 0–9) for your password. As you type a character, a key appears in the box.
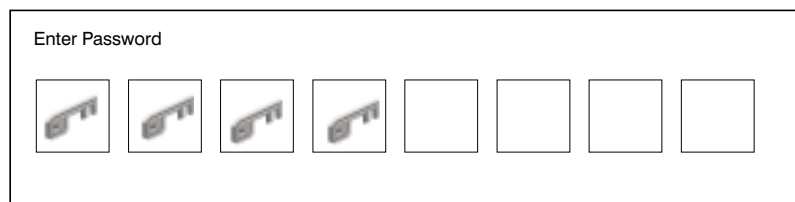
Press **Enter** when you are finished; you are required to type the password again for verification.

```
Verify Password


  ☐☐    ☐☐    ☐☐    ☐☐    ☐☐    ☐☐    ☐☐

```

If you make a mistake, press the **Esc** key and start again.

After you have entered and verified the password, the power-on password icon flashes and changes to the locked position to indicate that the power-on password is set.

If you previously had set a power-on password and want to remove it, select the Remove icon.
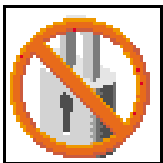
Note: If you *forget* the power-on password, you must remove the battery for at least 30 seconds to disable this password. See Appendix B, "Replacing the Battery" on page B-1 for details.

A password can be set only after the system is turned off and on again.
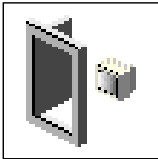
Remote Mode: The remote mode, when enabled, allows the system to start from the defined boot device. This mode is ideal for network servers and other computers that operate unattended. You *must* set a power-on password before you can enable the remote mode. When the remote mode is set, the icon changes to **Remote <On>**.

If you remove the power-on password, the remote mode is automatically reset, and the icon returns to **Remote <Off>**.
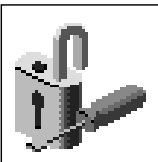
Privileged-Access Password: The privileged-access password protects against the unauthorized starting of the system programs.

When you select the Entry icon, a screen with 8 empty boxes appears. Type your password in these boxes. You can use any combination of up to eight characters (A–Z, a–z, and 0–9) for your password. As you type a character, a key appears in the box.

Press **Enter** when you are finished; you are required to type the password again for verification.

If you make a mistake, press the **Esc** key and start again.

After you have entered and verified the password, the privileged-access password icon flashes and changes to the locked position to indicate that your computer now requires the password you just entered before running system programs.

Note: If you *forget* the privileged-access password, you must remove the battery for at least 30 seconds to disable this password. See Appendix B, "Replacing the Battery" on page B-1 for details.

Audio

This icon enables you to turn on or off the system tones heard at power-on time. To change the audio status, use the arrow keys to highlight the audio icon, then press the Enter key.

Error Log
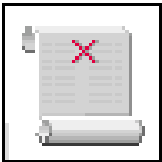
Selecting this icon displays the log of the first and the last errors your computer has encountered during operations.

```
                         System Error Log


        Date      Time      Error Code      Location
     1. 00/04/13  00:51:32   25C38005        P1-M1.10
     2. No entry




```


     Clear   Exit

Selecting the Clear icon erases the entries in this log.

RIPL
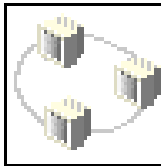
Selecting the Remote Initial Program Load (RIPL) icon above gives you access to the following selections.
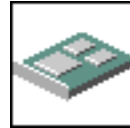
Set Address   Ping   Config
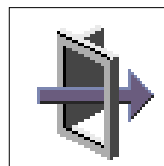
Exit
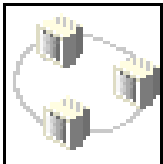
The Set Address icon allows you to define addresses from which your computer can receive RIPL code.

```
                    Remote  IPL  Setup


            Client  Addr        000.000.000.000     *
            Server  Addr        000.000.000.000     *
            Gateway  Addr       000.000.000.000
            Subnet  Mask        000.000.000.000




                 Save                    Exit
```

Notes:

1. Those addresses indicated with an (*) are required.

2. Some applications may require that IP addresses contain leading zeroes for numbers less than 100. For example, 129.132.4.20 may need to be entered as 123.132.004.020. If you are using the NIM application, do not specify leading zeroes in the IP parameters section. Leading zeroes can cause subsequent attempts to initiate a network boot to fail.

If any of the addresses is incomplete or contains a number other than 0 to 255, an error message is displayed when you select the Save icon. To clear this error, change the improper address and select Save again.
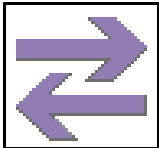
The Ping icon allows you to confirm that a specified address is valid by sending a test transmission to that address.

After choosing the Ping option, you may be asked to indicate which communications adapter (Token Ring or Ethernet) should be used to send the test transmission.
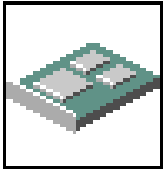
The Config icon allows you to configure network adapters which require setup. Selecting the Config icon presents a list of the adapters requiring configuration. Use the arrow keys to highlight an adapter, press the spacebar to select the adapter, then highlight the OK icon and press the Enter key.


```
    ▣    10/100 Ethernet slot=1

    ☐    10/100 Ethernet slot=2




         OK                              Exit
```
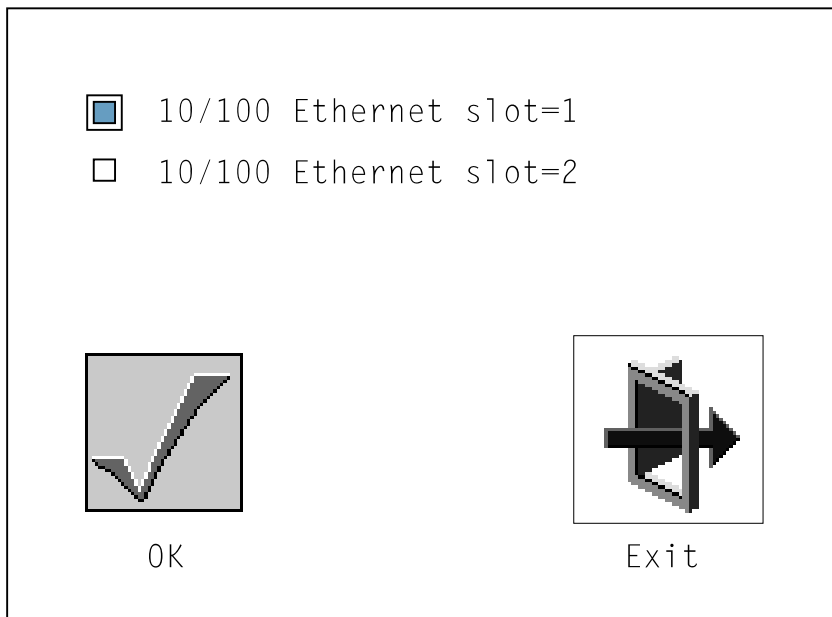
The next screen allows you to select the type of adapter you have just chosen (or allow the system to select the type automatically). You can also select the communications mode of the chosen adapter (or allow the system to select the communications mode automatically). As on the previous screen, use the arrow keys to highlight, press the space bar to select, then highlight the OK icon and press enter.

After choosing the adapter to configure, you can select the communications mode of the chosen adapter (or allow the system to select the communications mode automatically). As on the previous screen, use the arrow keys or mouse to highlight, then press the spacebar to select. When you have selected the communications mode, highlight the OK icon and press the Enter key.

SCSI ID
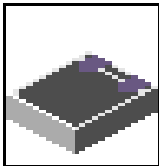
This selection allows you to view and change the addresses (IDs) of the SCSI controllers attached to your system unit. To change an ID, highlight the entry by moving the arrow keys, then enter another number. After you have entered the new address, use the arrow keys to highlight the Save icon and press the Enter key.

At any time in this process, you can select the Default icon to change the SCSI IDs to the default values.

Change SCSI ID

Type	Slot	ID	Max ID
Fast	5	7	7
Fast/Wide	7	7	15

Save   Default   Exit

Update

System Without Service Processor

System With Service Processor
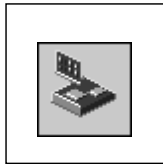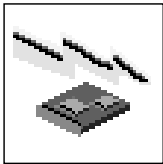
This selection allows you to update the firmware in your system unit from an image on a 3.5 inch diskette.

In order to create a firmware diskette with the latest level of firmware available, see

`http://www.rs6000.ibm.com/support/micro`

After choosing the Update option in the System Management Services, and confirming this choice, you must insert the diskette containing the firmware image.

ATTENTION: While the new firmware image is being copied into your system unit, **you must not turn off the system unit**. Turning off the system unit during the update process may render your system unit inoperable.

After the flash update is complete, the system unit restarts.

If the flash update does not complete successfully or the system unit does not restart after the flash update, contact your authorized reseller or marketing representative.

Firmware Recovery

If a troubleshooting procedure has indicated that the firmware information in your system unit has been corrupted, then you must perform a firmware recovery.

To perform a firmware recovery, do the following:

1. Locate your firmware update diskette.

2. Using another system unit, rename the ***.img** file on the firmware update diskette to **precover.img**.

3. Make sure your system unit is turned off.

4. Insert the firmware recovery diskette into your system unit.

5. Turn on your system unit.

6. When the keyboard indicator appears, press the **1** key if the system console is an ASCII terminal, or the **F1** key if the system console is a directly-attached keyboard.

7. When the System Management Services appear, choose Utilities and perform a Firmware Update as described under "Update" on page 3-22.

Text-Based System Management Services

The text-based Open Firmware command line and System Management Services are available if an ASCII terminal is attached to your system unit. The text-based Open Firmware command line allows you to configure some adapters, and the System Management Services makes it possible for you to view information about your system unit and to perform such tasks as setting passwords and changing device configurations.

To enter the Open Firmware command line, you must press the **8** key *after the keyboard text symbol appears* during startup.

If you have pressed the **8** key, the Open Firmware command line (an "OK" prompt) appears after the initialization and power-on self tests (POST) are complete.

The Open Firmware command line can be used to set up adapters that are not configurable with the System Management Services. Your adapter documentation directs you to use this option if it is needed.

To start the text-based System Management Services instead of the Open Firmware command line, press 1 on the ASCII terminal keyboard when the keyboard text symbol appears during startup.

After the text-based System Management Services starts, the following screen appears:

The firmware version installed in your system unit is displayed at the top of each screen in the text-based System Management Services. Please note the version number; processor upgrades may require a specified version of firmware to be installed in your system unit. (Update System Firmware is an option under the Utilities menu in the System Management Services.)

```
System Management Services


 1.  Display Configuration
 2.  Select Boot Devices
 3.  Utilities
 4.  Select Language


                                            .------.
                                            |X=Exit|
                                             ------'

 ====>
```
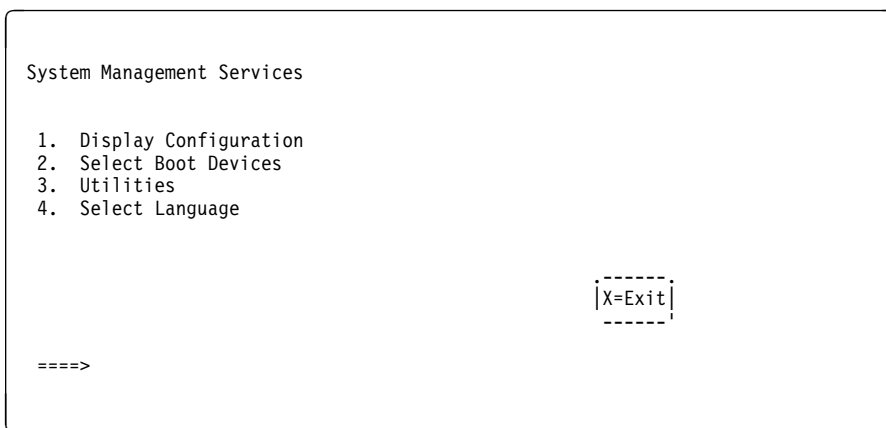
Selecting the numbered options provide capabilities described on the following pages.

After you have finished using the text-based System Management Services, entering **x** (for exit) boots your computer.

Display Configuration

This option provides information about the setup of your computer. A screen similar to the following displays:

```
    Device

    PowerPC 604
    L2-Cache, 0512K
    Memory
        slotA=8MB
        slotB=8MB
    LPT
        addr=3BC
    COM
        addr=3F8
    COM
        addr=2F8
    Audio
    Keyboard
    Mouse
    Diskette
        addr=3F0
    Integrated Ethernet
        addr=80005AF67BD
    SCSI cntlr id=7

    PCI Adapters

    .-----------. .-----------.                            .------.
    |P=prev-page| |N=next-page|                            |x=Exit|
    '-----------' '-----------'                            '------'
```

Note that this configuration information does not include ISA adapters installed in the system unit.

Select Boot Devices

This selection enables you to view and change the custom boot list, which is the sequence of devices read at startup time.

```
Select Boot Devices

 1. Display Current Settings
 2. Restore Default Settings
 3. Configure 1st Boot Device
 4. Configure 2nd Boot Device
 5. Configure 3rd Boot Device
 6. Configure 4th Boot Device


                                          .------.
                                          |X=Exit|
                                          '------'

 ====>
```

Selecting the Display Current Settings option lists the current order of devices in the boot list. The following screen shows an example of this display.

```
Current Boot Sequence

 1. Diskette
 2. Ethernet (Integrated)
 3. SCSI CD-ROM          id=3   (slot=1)
 4. SCSI 500MB Hard Disk  id=6   (slot=1)



                                          .------.
                                          |X=Exit|
                                          '------'

 ===>
```

Selecting any of the Configure Boot Device options displays the following screen:

```
      Configure Nth Boot Device

      Device Number        Current Position        Device Name

            1                    1                  Diskette
            2                    2                  Ethernet
            3                    3                  SCSI CD-ROM
            4                    4                  SCSI 500MB Hard Disk
            5                    -




      .-----------. .-----------.                       .------.
      |P=prev-page| |N=next-page|                       |X=Exit|
      -----------' -----------'                       ------'


  ===>
```

Utilities

The Utilities screen enables you to select from the following system management tools.

The following screen appears if you DO NOT have a service processor installed in your system:

```
Utilities

 1. Set Password and Unattended Start Mode
 2. Audio <ON>
 3. Display Error Log
 4. Remote Initial Program Load Setup
 5. Change SCSI id
 6. Update System Firmware
 7. Select Console



                                          .------.
                                          |X=Exit|
                                          '------'
 ===>

```

The following screen appears if you have a service processor installed in your system:

```
Utilities

 1. Set Password and Unattended Start Mode
 2. Audio <ON>
 3. Display Error Log
 4. Remote Initial Program Load Setup
 5. Change SCSI id
 6. Update System Firmware
 7. Update Service Processor
 8. Select Console


                                          .------.
                                          |X=Exit|
                                          '------'
 ===>

```

Set Password and Unattended Start Mode: Entering this selection permits
access to the following options:
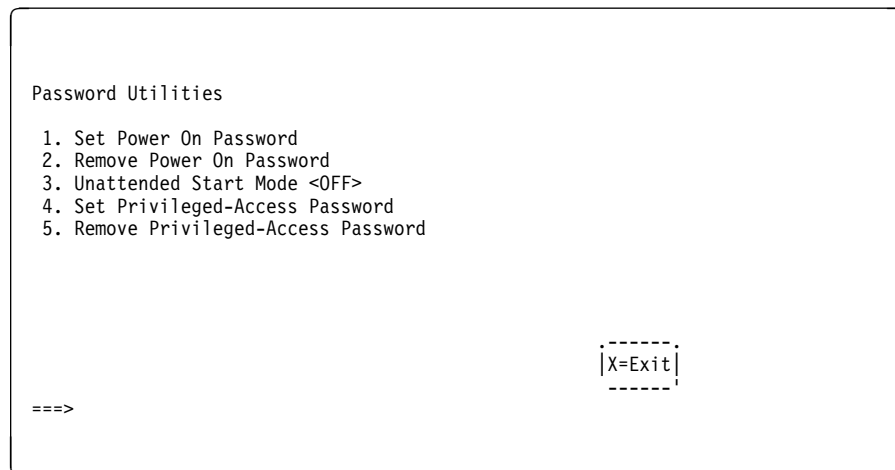
```
Password Utilities

 1. Set Power On Password
 2. Remove Power On Password
 3. Unattended Start Mode <OFF>
 4. Set Privileged-Access Password
 5. Remove Privileged-Access Password




                                      .------.
                                      |X=Exit|
                                      '------'
 ===>
```

Set Power On Password: Setting a power-on password helps protect information
stored in your computer. You can use any combination of up to eight characters
(A–Z, a–z, and 0–9) for your password. The password you type is not displayed on
the screen. Press **Enter** when you are finished; you are required to type the
password again for verification.

If you previously had set a power-on password and wanted to remove it, select
Remove Power-On Password.

Note: If you *forget* your password, you must shut down the computer and remove
the battery for at least 30 seconds to disable the password. See
Appendix B, "Replacing the Battery" on page B-1 for details.

A password can be set only after the system is turned off and on again.

Set Privileged-Access Password: The privileged-access password protects against the unauthorized starting of the system programs.

If you previously had set a privileged-access password and want to remove it, select **Remove Privileged-Access Password**.

Note: If you *forget* your password, you must shut down the computer and remove the battery for at least 30 seconds to disable the password. See Appendix B, "Replacing the Battery" on page B-1 for details.

Audio: Selecting this utility turns on or off the system tones heard at power-on time.

Remote Initial Program Load Setup: This option allows you to enable and set up the remote startup capability of your computer. First, you are asked to specify the network parameters.

```
Network Parameters

 1. IP Parameters
 2. Adapter Parameters
 3. Ping




                                          .------.
                                          |X=Exit|
                                          '------'

 ===>
```

Note: Some applications may require that IP addresses contain leading zeroes for numbers less than 100. For example, 129.132.4.20 may need to be entered as 123.132.004.020.

Selecting the IP Parameters option displays the following screen.

```
IP Parameters

 1. Client IP Address    000.000.000.000
 2. Server IP Address    000.000.000.000
 3. Gateway IP Address   000.000.000.000
 4. Subnet Mask          000.000.000.000




                                          .------.
                                          |X=Exit|
                                           ------'

 ===>
```

Selecting the Adapter Parameters option allows you to view an adapter's hardware
address as well as configure network adapters that require setup.

```
Adapter Parameters

    Device            HW Address

 1. 3Com,3C905         80005AFC67BD
 2. Token-Ring         800032E54A12




                                          .------.
                                          |X=Exit|
                                           ------'
```

Selecting option 1 (3Com,3C905) displays the following 100Mb Ethernet
configuration menus:

```
3Com Etherlink Fast XL


1. Media Type          fflAuto"
2. Full Duplex         fflAuto"




                                          .------.
                                          |X=Exit|
                                           ------'
```
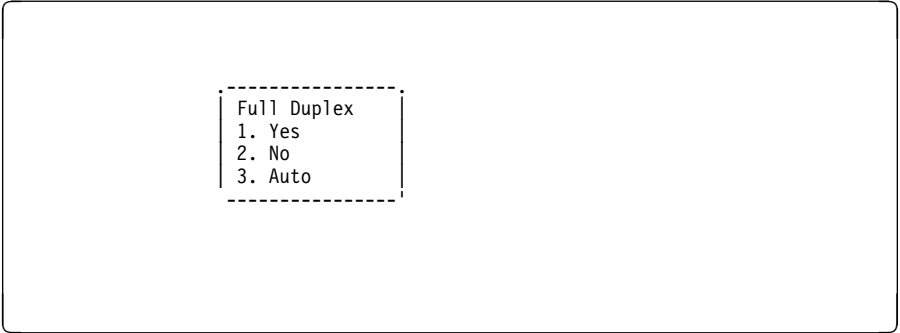
Selecting the Media Type option allows you the change the media employed by the
Ethernet adapter:

```
                    .----------------.
                    | MEDIA TYPE     |
                    | 1. 10 BaseT    |
                    | 2. 100 Base TX |
                    | 3. Auto        |
                     ----------------'
```

Selecting the Full Duplex option allows you to change how the Ethernet adapter
communicates with the network:

```
                     .----------------.
                     | Full Duplex    |
                     | 1. Yes         |
                     | 2. No          |
                     | 3. Auto        |
                     '----------------'
```

Ping, the last option available from the Network Parameters menu, allows you to test
a connection to a remote system unit. After selecting the Ping option, you must
choose which adapter communicates with the remote system.

```
 Interface

  1. Ethernet (Integrated)
  2. Token Ring (Slot=3)




 ===>
```

After choosing which adapter to use to ping the remote system, you must provide the addresses needed to communicate with the remote system.

```
Ping

 1. Client IP Address    129.132.4.20
 2. Server IP Address    129.132.4.10
 3. Gateway IP Address   129.132.4.30
 4. Subnet Mask          255.255.255.0




        .---------.                              .------.
        |E=Execute|                              |X=Exit|
        '---------'                              '------'

 ===>
```

Display Error Log: A screen similar to the following is displayed when you select this option. Here, you can view or clear your computer's error log.

```
        .---------------------------------------------------------.
        |                     Error Log                           |
        |                                                         |
        |          Date       Time        ErrorCode     Location  |
        |  Entry 1. 96/04/01   12:13:22    25A80011       00-00    |
        |  Entry 2. no error logged                               |
        '---------------------------------------------------------'




        .-----------------.                       .------.
        |C=Clear Error Log|                       |X=Exit|
        '-----------------'                       '------'
```

Change SCSI ID: This option allows you to view and change the addresses of the SCSI controllers attached to you computer.

Update System Firmware: This selection allows you to update the firmware in your system unit from an image on a 3.5 inch diskette.

In order to create a firmware diskette with the latest level of firmware available, see

`http://www.rs6000.ibm.com/support/micro`

After choosing the Update option in the System Management Services, you must insert the diskette containing the firmware image after you see the following prompt.

```
 .----------------------------------------------------------------.
 | This selection will update your System Firmware. Do you want   |
 | to continue? Press Y(Yes) N(No).                               |
 '----------------------------------------------------------------'
```

Firmware Recovery: If a troubleshooting procedure has indicated that the firmware information in your system unit has been corrupted, then you must perform a firmware recovery.

To perform a firmware recovery, do the following:

1. Locate your firmware update diskette.

2. Using another system unit, rename the ***.img** file on the firmware update diskette to **precover.img**.

3. Make sure your system unit is turned off.

4. Insert the firmware recovery diskette into your system unit.

5. Turn on your system unit.

6. When the keyboard indicator appears, press the **1** key on the system console ASCII terminal.

7. When the System Management Services appear, choose Utilities and perform a System Firmware Update as described above.

Select Console: Selecting this option allows you to define which display is used by the system for system management.

Select Language

This option allows you to change the language used by the text-based System Management Services screens:

```
SELECT LANGUAGE

  1.  English
  2.  Francais
  3.  Deutsch
  4.  Italiano
  5.  Espanol
  6.  Svenska


====>                                      .------.
                                           |x=Exit|
                                            ------'
```

Note: Your ASCII terminal must support the ISO-8859 character set in order to properly display languages other than English.

Chapter 4. Installing Options

This chapter provides instructions to help you add options to your system. Some option-removal instructions are provided, in case you need to remove one option to install another. If you have several internal options to install, these instructions enable you to add them all at one time.

Safety Considerations

Observe the following safety precautions any time you work with this system unit.

DANGER

> **An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent and electrical shock.**
>
> **Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.**
>
> **When adding or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.**
>
> **Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.**
>
> **During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communication lines.**

CAUTION:
This product is equipped with a three–wire power cable and plug for the user's safety. Use this power cable with a properly grounded electrical outlet to avoid electrical shock.

DANGER

> **To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.**

Handling Static-Sensitive Devices

Attention: Adapters, planars, diskette drives, and disk drives are sensitive to static electricity discharge. These devices are wrapped in antistatic bags, as shown in this illustration, to prevent this damage.

Take the following precautions:

- If you have an antistatic wrist strap available, use it while handling the device.
- Do not remove the device from the antistatic bag until you are ready to install the device in the system unit.
- With the device still in its antistatic bag, touch it to a metal frame of the system.
- Grasp cards and boards by the edges. Hold drives by the frame. Avoid touching the solder joints or pins.
- If you need to lay the device down while it is out of the antistatic bag, lay it on the antistatic bag. Before picking it up again, touch the antistatic bag and the metal frame of the system unit at the same time.
- Handle the devices carefully in order to prevent permanent damage.
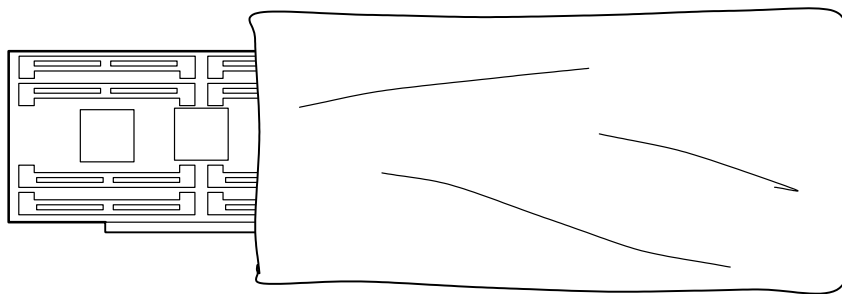
Expansion Bays

Your system comes with one 3.5-inch, 1.44MB diskette drive and a SCSI CD-ROM drive. The number of preinstalled disk drives in your system varies according to the model you ordered.
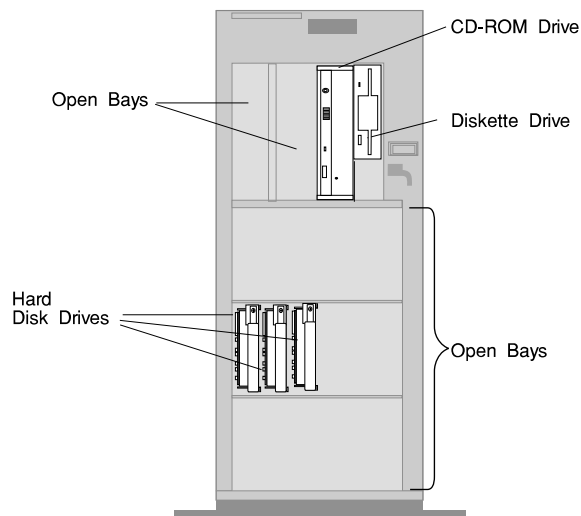
Diskette Drive: The 3.5-inch, 1.44MB diskette drive uses 1MB, and 2MB diskettes.

Open Bays: Your system's special design gives you the flexibility to use up to eighteen 3.5-inch disk drives. There are two additional open spaces in the top left bay for additional media devices. For installation instructions and information on the types of drives that you can install in each bay, see "Installing Internal Drives" on page 4-36.

Disk Drive: All models come with one or more integrated SCSI-2 disk drives. The capacity of the disk drives varies, depending on your configuration.

Input/Output Connectors

Expansion Slots

Audio In

Serial Connectors

Parallel Connector

Audio Out

Mouse Connector

Keyboard Connector

Tablet Connector

Ethernet Connector

Ethernet Twisted Pair

External SCSI Connector

Power Connector
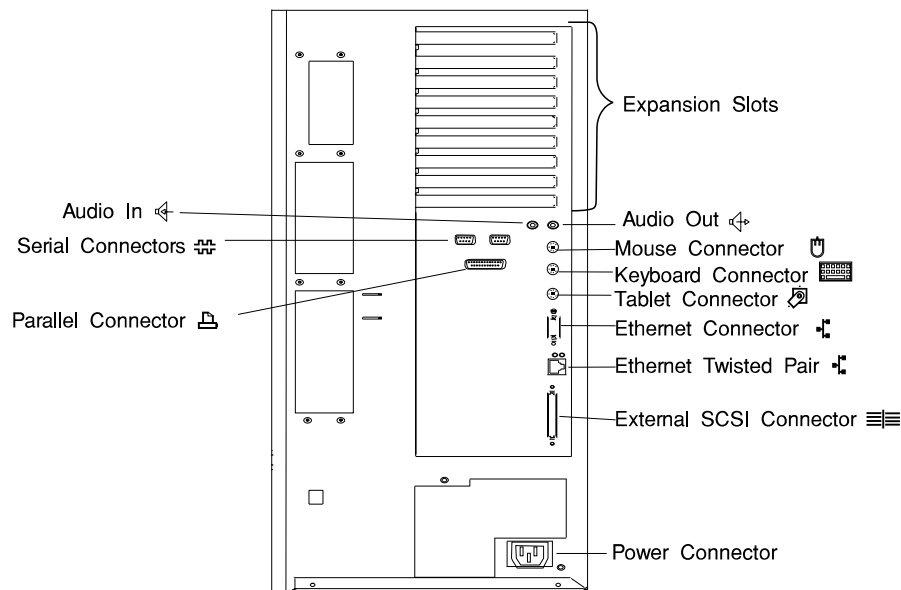
Parallel Connector: One 25-pin parallel port is provided.
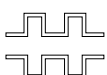
Serial Connectors: Two 9-pin serial connectors (1 and 2) are provided. If you are using a 25-pin signal cable, you need a 9-pin-to-25-pin adapter cable.

Mouse Connector: This is where the mouse cable connects to the system. This connector sometimes is called an auxiliary-device or pointing-device port.
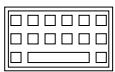
Keyboard Connector: The cable from your keyboard connects here.

Tablet Connector: The cable from your tablet connects here.

Ethernet Connector: The cable from your Ethernet LAN connects here.
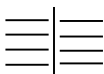
External SCSI Connector: The cable from your external SCSI bus connects here.

Removing the Front Covers Only

Note: If you are removing or installing hot-swap drives, only the front covers need to be removed. Other options may require removal of both the front and side covers as described in "Removing Both the Front and Side Covers" on page 4-10.

1. Open the door.
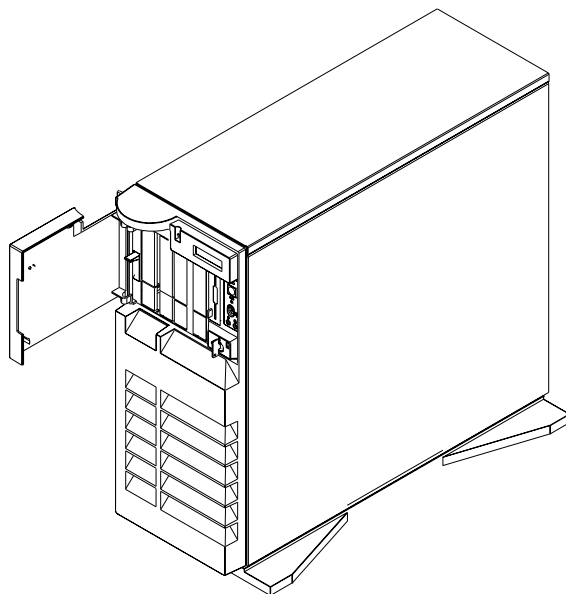
2. Remove the door by carefully lifting it up and off the hinges. Store it in a safe
   place.
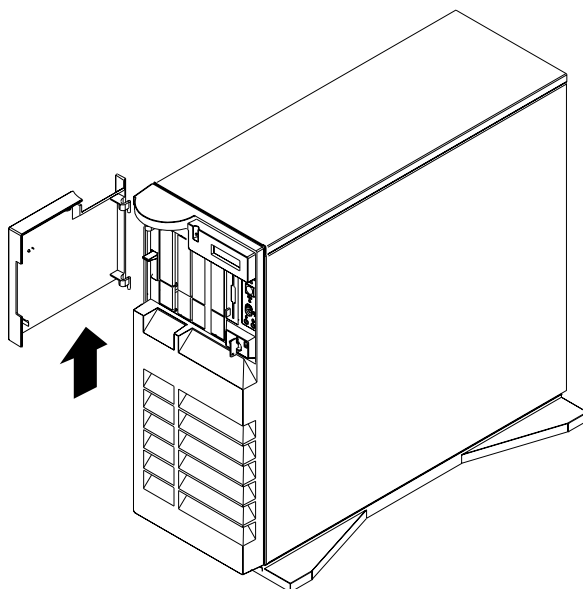
3. Remove the front cover:

   a. Unlock the keylock on the front cover.

   b. Lift up on the latch on the left side of the front cover.

Keylock
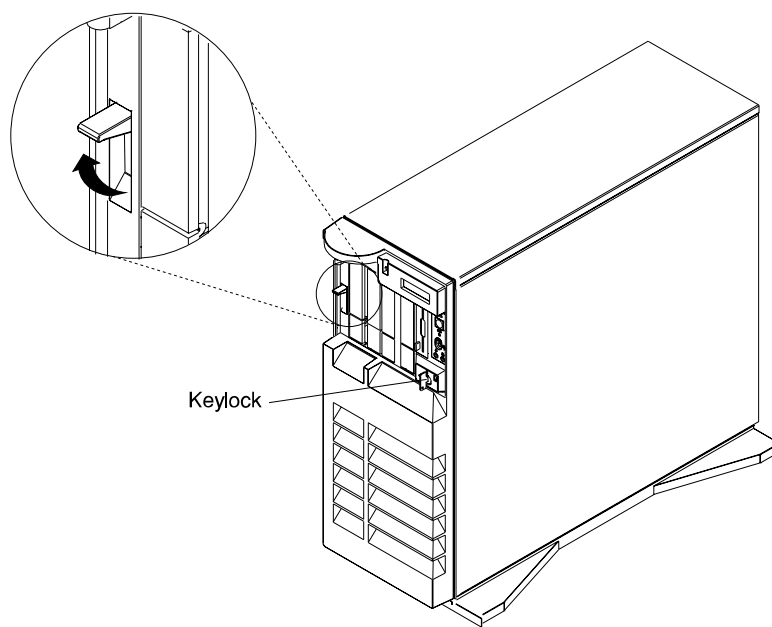
c. Grasp the sides of the front cover at the top of the system and pull it forward. (The front cover is held in place by two spring detented ball studs.)

d. Detach the front cover's bottom hooks from the grooves located on the bottom of the system, and lift the front cover off the bottom of the system.
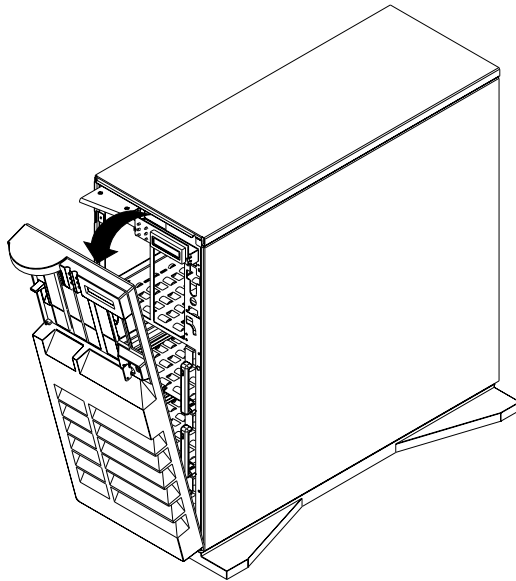
Removing Both the Front and Side Covers

Note: If you previously removed the front covers, go to Step 3.

1. Open the door.
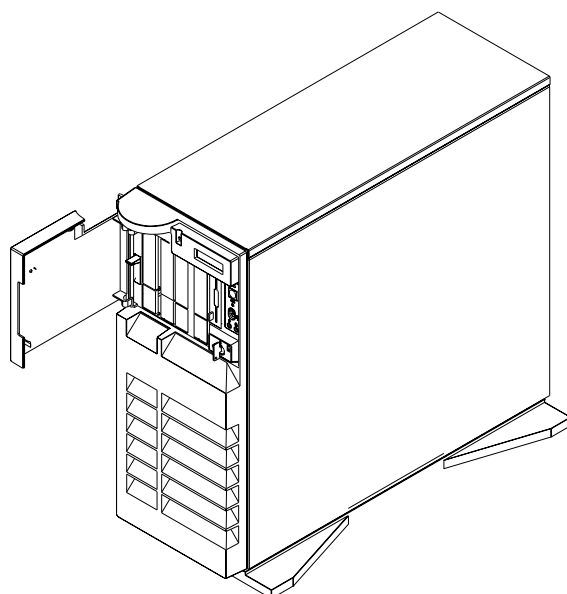
2. Remove the door by carefully lifting it up and off the hinges. Store it in a safe place.
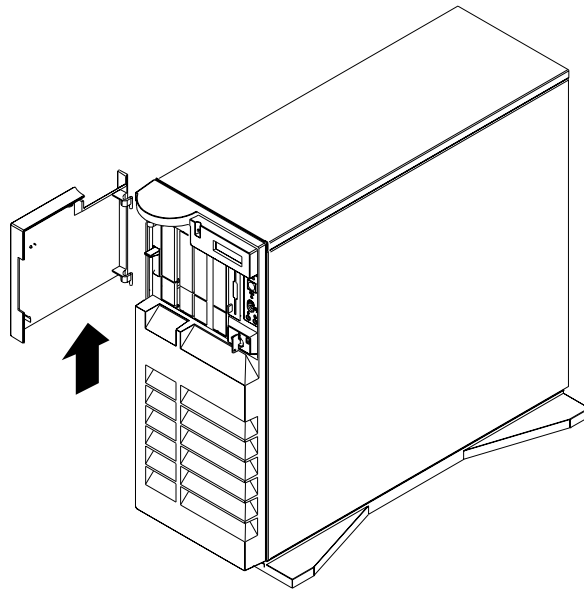
3. Remove all media (diskettes, CDs, tapes) from the drives.

4. Shutdown the operating system.

5. Turn off power to the system and all attached options.

   Note: If you are upgrading the microprocessor, you must first record the level of firmware installed in your system unit. See Chapter 3, "System Management Services" on page 3-1 for instructions on recording the level of firmware installed in your system unit, then return here.

6. If you have a modem or fax machine attached to the system, disconnect the telephone line.
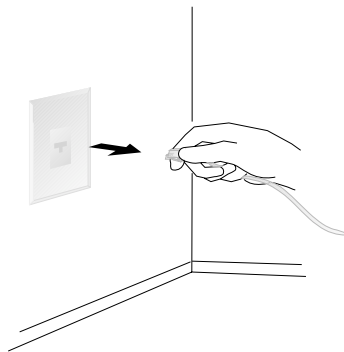
7. Unplug all power cords (cables) from electrical outlets.

   Note the location of the following; then disconnect them from the back of the system:

   - Power cord
   - Display cable
   - Keyboard cable
   - Any other cables and cords
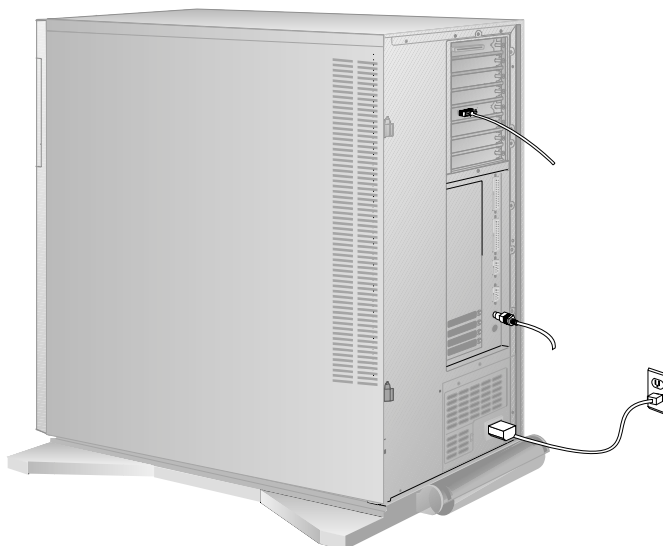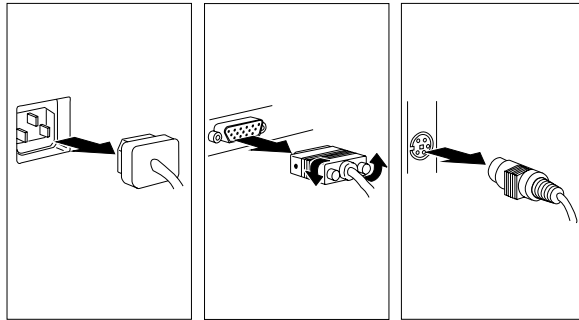
8. Remove the front cover:

    a. Unlock the keylock on the front cover.

    b. Lift up on the latch on the left side of the front cover.

Keylock
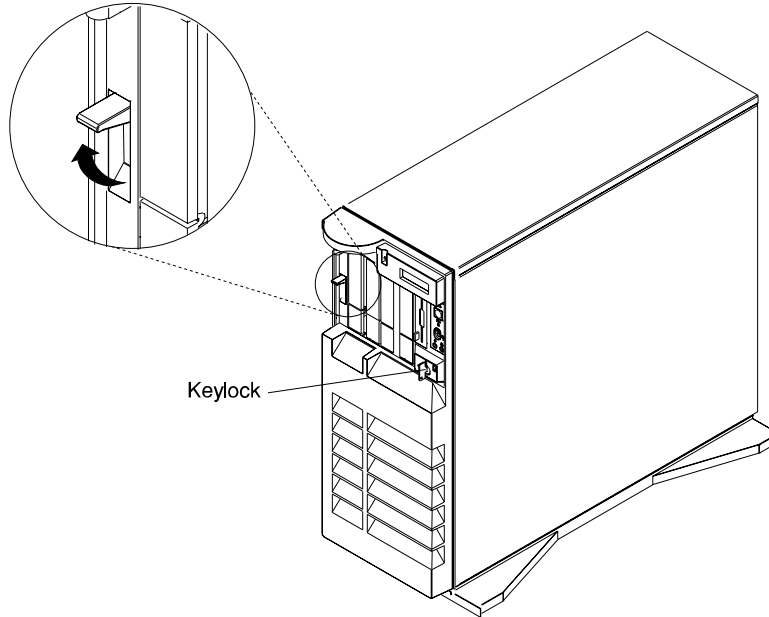
c. Grasp the sides of the front cover near the top of the system and pull it forward. (The front cover is held in place by two spring detented ball studs.)

d. Detach the front cover's bottom hooks from the grooves located on the bottom of the system, and lift the front cover off the bottom of the system.
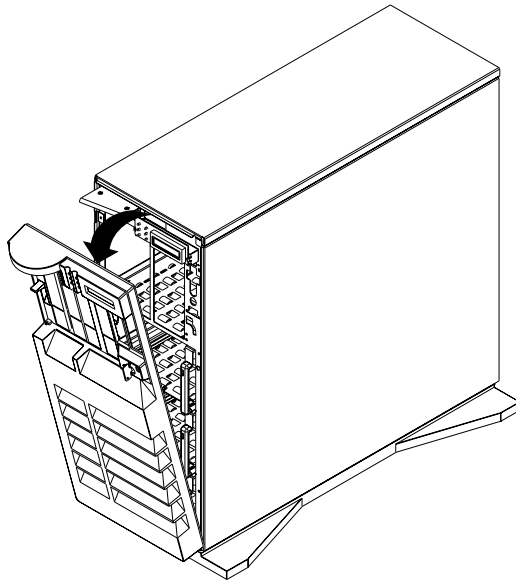
9. Remove the side cover:

   a. Pivot the side cover 90° away from the front of the system.

   b. Remove the cover by carefully lifting it up and off the hinges. Store it in a safe place.
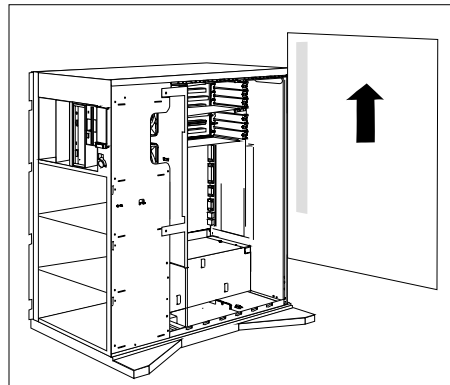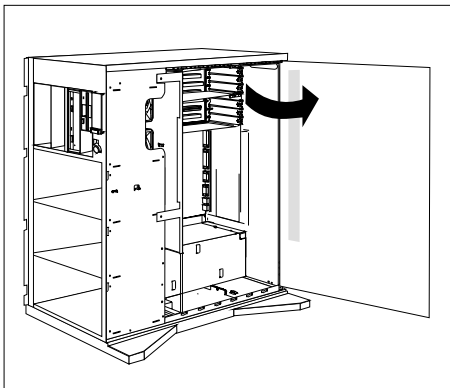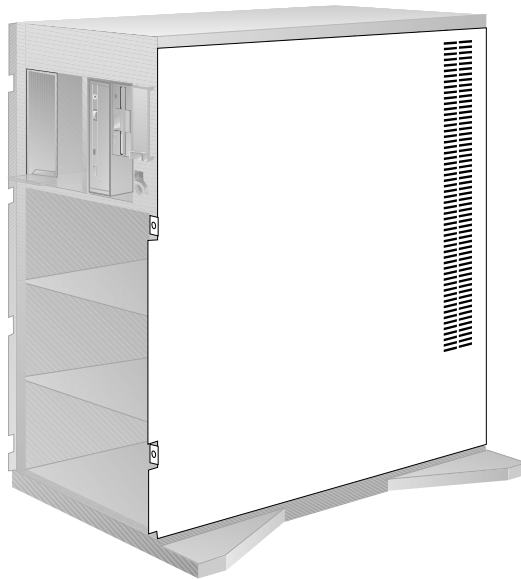
Removing the System Board Cover

1. If you have not already done so, remove the covers as described in "Removing Both the Front and Side Covers" on page 4-10.

2. If a POWER GXT1000 is installed, go to "Removing the POWER GXT1000 Enclosure" on page C-5 for instructions on how to remove it. Return here to continue.

3. Loosen the three screws (2 turns) on the system board cover and unlatch the cover.

Latches
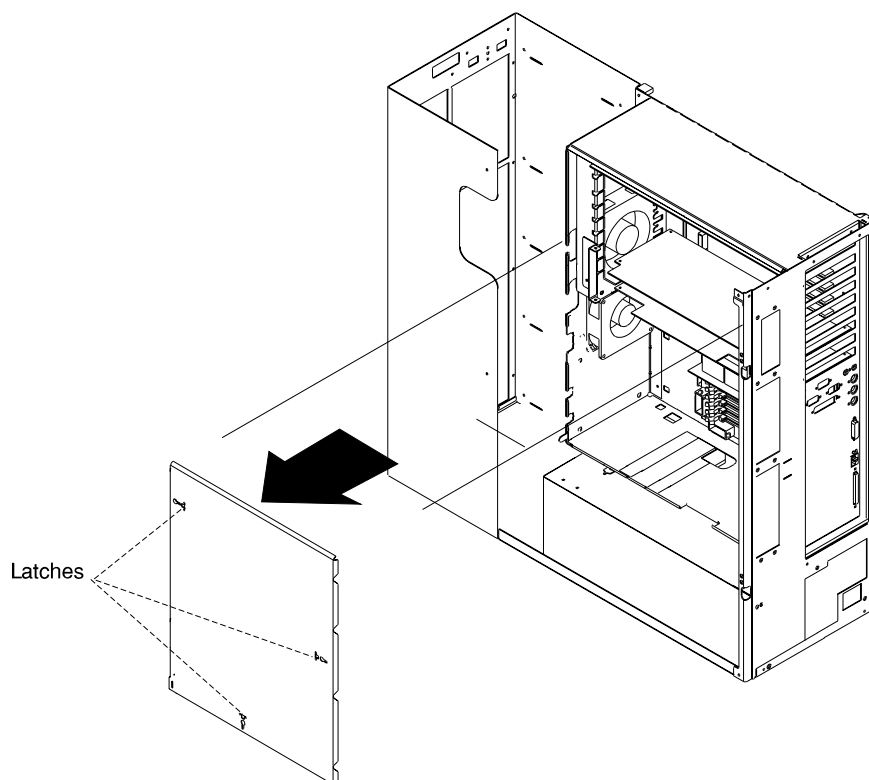
4. Remove the system board cover.

Option List

- Installing Memory–Modules — Go to page 4-18.
- Removing Memory–Modules — Go to page 4-22.
- Installing Adapters — Go to page 4-25.
- Removing Adapters — Go to page 4-30.
- Upgrading or Adding CPU Card — Go to page 4-33.
- Installing Internal Drives — Go to page 4-36.
- Installing a Disk Drive, Tape Drive or CD-ROM in Bay A or Bay B — Go to page 4-41.
- Installing a Hot-Swap SCSI Disk Drive in Bank C, D, or E — Go to page 4-48.
- Installing a Hot-Swap SSA Disk Drive in Bank C, D, or E — Go to page 4-52.
- Installing a SCSI Backplane in Bank C — Go to page 4-56.
- Installing a SSA Backplane in Bank C or E — Go to page 4-63.
- Removing Internal Drives — Go to page 4-78.
- Removing a Disk Drive, Tape Drive or CD-ROM from Bay A or Bay B — Go to page 4-79.
- Removing a Hot-Swap SCSI Disk Drive from Bank C, D, or E — Go to page 4-80.
- Removing a Hot-Swap SSA Disk Drive from Bank C, D, or E — Go to page 4-84.
- Installing a Service Processor. Go to page "Installing a Service Processor" on page 4-88.
- Installing a U-Bolt — Go to page 4-91.

Installing Memory-Modules

Before you begin:

- Read "Safety Considerations" on page 4-1 and "Handling Static-Sensitive Devices" on page 4-3.

You can increase the amount of memory in your system by installing *memory-modules.* Your system uses 168-pin, dual inline Error Correcting Code (ECC) memory modules (DIMMs) to increase system memory.

You install memory-modules into connectors inside the system. You can install up to 1024MB of ECC memory. The memory-module sizes available for your system are 8MB, 16MB, 32MB, 64MB, and 128MB. The available speed for these kits is 60 ns.

Attention: Memory modules must be installed in identical pairs (size and speed). This system does not support channel memory, such as memory expansion adapters.

1. If you have not already done so, remove the covers as described in "Removing Both the Front and Side Covers" on page 4-10.

2. If a POWER GXT1000 is installed, go to "Removing the POWER GXT1000 Enclosure" on page C-5 for instructions on how to remove it; then return here to determine your next step.

3. Remove the system board cover as described in "Removing the System Board Cover" on page 4-16; then return here to determine your next step.

4. With one hand, touch any metal surface of the chassis to minimize static electrical charges, and then pick up a memory-module.

5. Locate the memory module connectors on the system board. Some memory
   modules are already installed in your system.
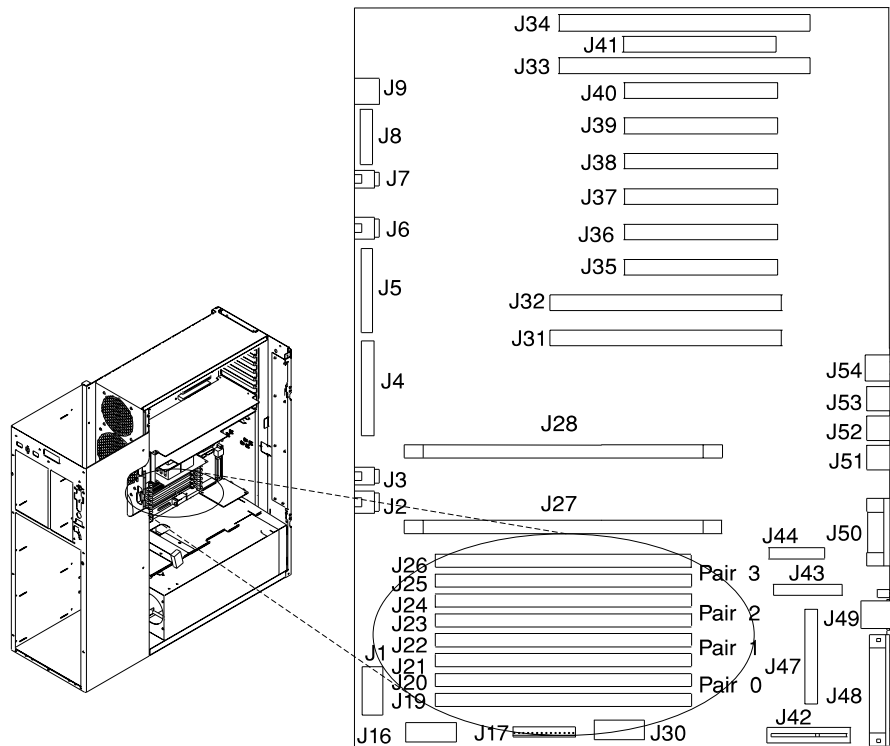
6. Install the memory module.

Note: Memory modules must be installed in identical pairs (size and speed).
New memory modules must be installed in the first available pair of vacant
connectors, starting at pair 0 and progressing to pair 3. Refer to the figure on
the previous page.

a. The memory modules are keyed so that they can only be inserted one way.
Align the memory module notches with the keys in the memory-module
connectors.
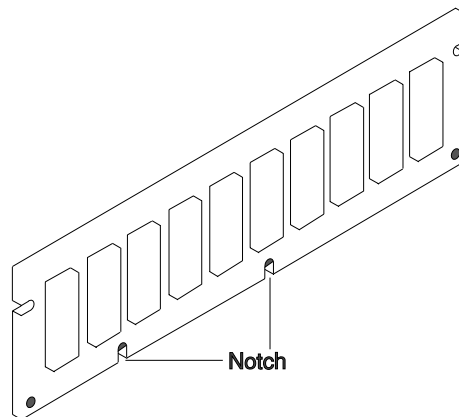
b. Insert the memory module into the next unused memory module connector.
Ensure that the tabs are in the unlocked position as shown prior to memory
module insertion. After insertion, the tabs should be in the locked position
(up).
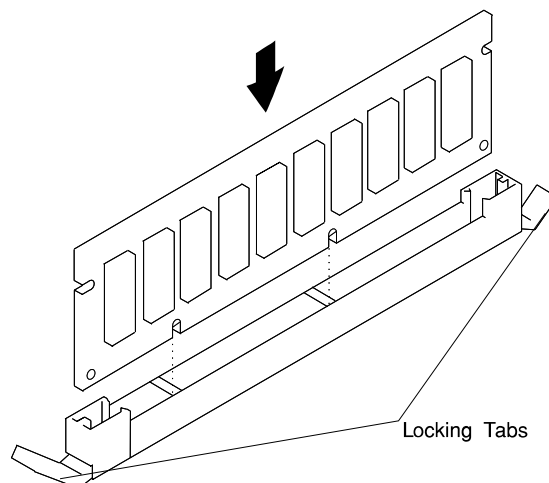
Attention: Inserting the memory-module diagonally may damage the memory-module.

7. Go to "Device Records" on page A-2 to record the size of the memory-module and the connector into which it is installed; then return here to determine your next step.

8. Replace the system board cover as described in "Replacing the System Board Cover" on page 4-101; then return here to determine your next step.

9. If a POWER GXT1000 was removed, go to "Reinstalling the POWER GXT1000 Enclosure" on page C-12 for instructions on how to replace it; then return here to determine your next step.

10. If you have other procedures to perform, refer to "Option List" on page 4-17.

11. If you do not have any other procedures to perform, replace the covers as described in "Replacing Both the Front and Side Covers" on page 4-96.

Removing Memory-Modules

Before you begin:

- Read "Safety Considerations" on page 4-1 and "Handling Static-Sensitive Devices" on page 4-3.

1. If you have not already done so, remove the covers as described in "Removing Both the Front and Side Covers" on page 4-10.

2. If a POWER GXT1000 is installed, go to "Removing the POWER GXT1000 Enclosure" on page C-5 for instructions on how to remove it; then return here to determine your next step.

3. Remove the system board cover as described in "Removing the System Board Cover" on page 4-16; then return here to determine your next step.

4. Locate the memory module connectors and determine which memory modules you want to remove.

   Note: Pair 0 (Slots J19 and J20) must contain memory modules in order for system unit to function.
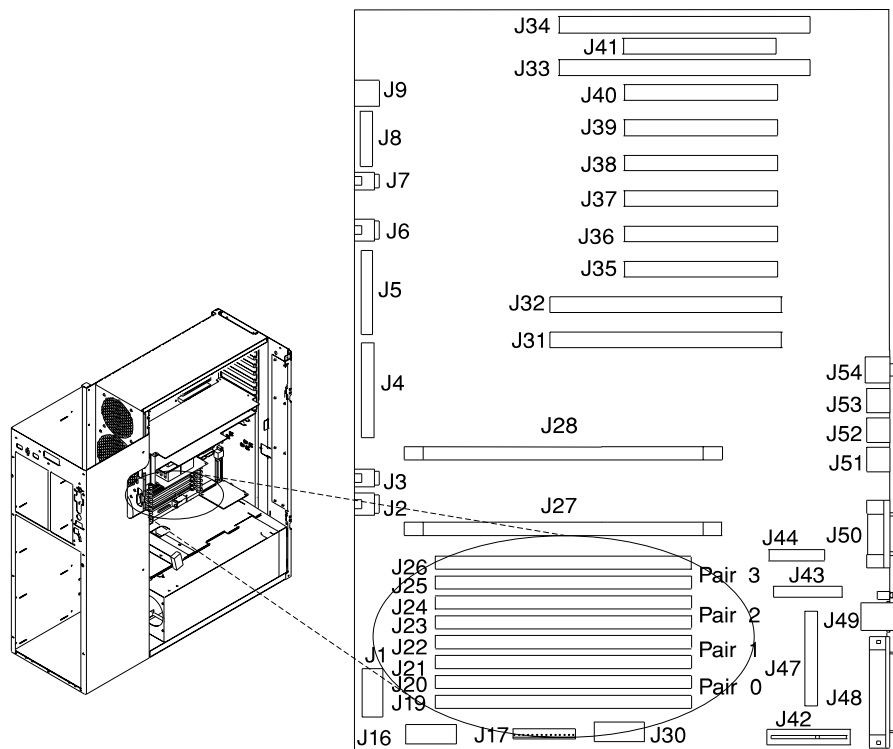
5. Remove the memory modules by pushing the tabs out on the memory connectors as shown.

2

1

1

Push Locking Tabs
Out to Release Memory
Module
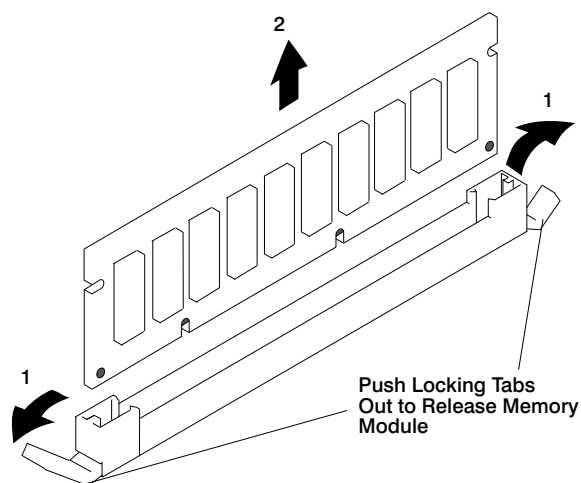
6. Store any memory modules you are no longer using in a static-protective package. Make a note of the kit size and speed for future reference.

Static
Devices

7. Replace the system board cover as described in "Replacing the System Board Cover" on page 4-101; then return here to determine your next step.

8. If a POWER GXT1000 was removed, go to "Reinstalling the POWER GXT1000 Enclosure" on page C-12 for instructions on how to replace it; then return here to determine your next step.

9. If you are not installing memory modules in the empty connectors, go to "Device Records" on page A-2 to update the memory information; then return here to determine your next step.

10. If you have other procedures to perform, refer to "Option List" on page 4-17.

11. If you do not have any other procedures to perform, replace the covers as described in "Replacing Both the Front and Side Covers" on page 4-96.

Installing Adapters

Adding an adapter, such as audio, communication, or specialized graphics, extends the capabilities and power of your system. Your system has nine *expansion slots* for connecting adapters. The expansion slots are numbered on the back of the system as shown below. You can install ISA and PCI adapters.

Memory adapters cannot be installed in your system, because it does not support channel memory.

Before you begin:

- Read "Safety Considerations" on page 4-1 and "Handling Static-Sensitive Devices" on page 4-3.

---

1. If you have not already done so, remove the covers as described in "Removing Both the Front and Side Covers" on page 4-10.

2. If a POWER GXT1000 is installed, go to "Removing the POWER GXT1000 Enclosure" on page C-5 for instructions on how to remove it; then return here to determine your next step.

3. Remove the system board cover as described in "Removing the System Board Cover" on page 4-16; then return here to determine your next step.

4. Determine which expansion slot you will use for the adapter. Check the instructions that came with the adapter for any requirements or restrictions. If there are no restrictions, you can use any empty slot that matches your adapter type (PCI, or ISA).
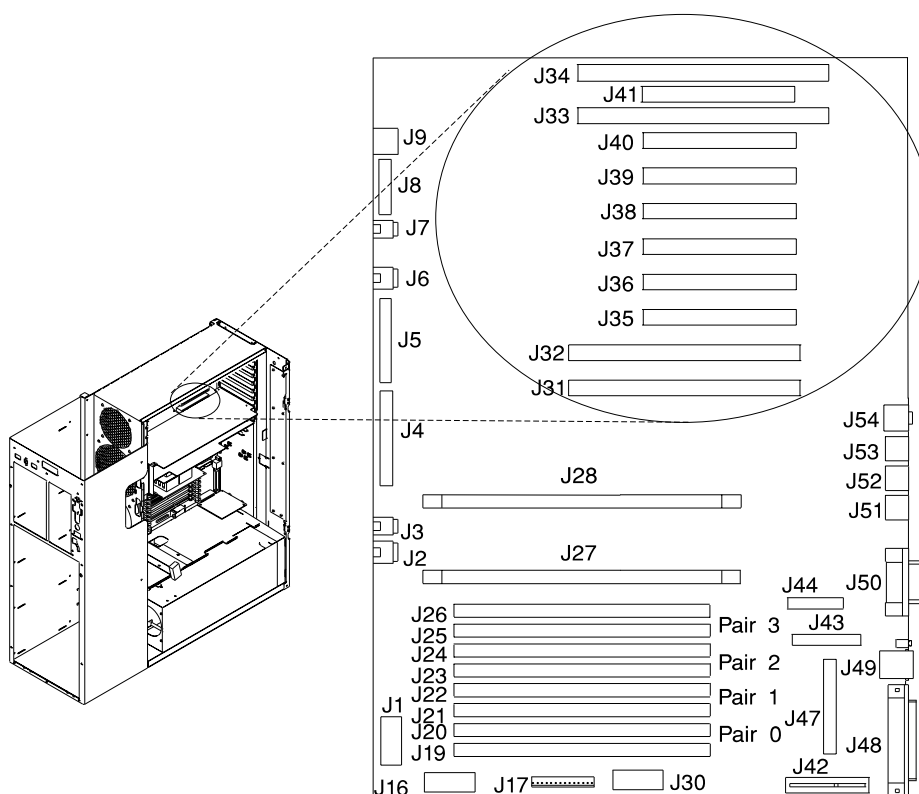
5. Remove the expansion-slot cover:

    a. Loosen and remove the screw with a screwdriver.

    b. Slide the expansion-slot cover out of the system.

    c. Store the expansion-slot cover in a safe place for future use.

    d. Save the screw for use in securing the adapter.
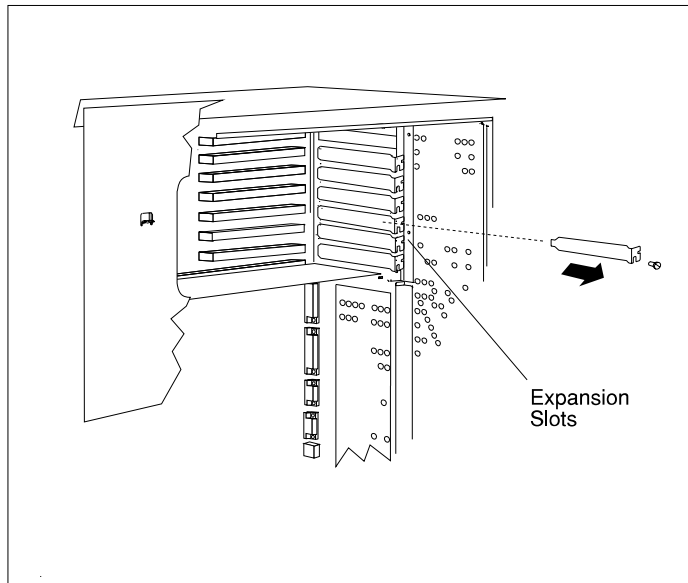
Expansion
Slots

6. Install the adapter:

   a. Carefully grasp the adapter and align the adapter with the expansion slot connector.

   b. Press the adapter *firmly* into the expansion slot.
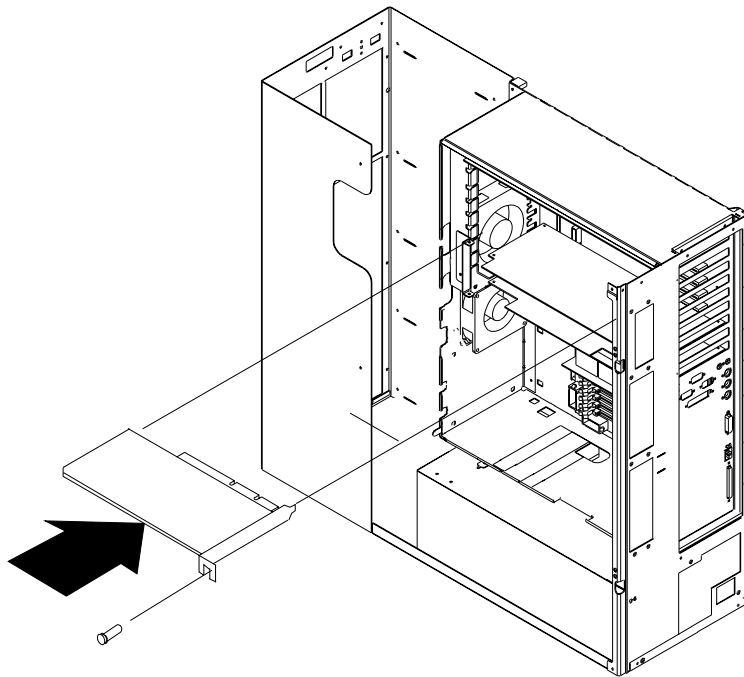
   c. Install and tighten the expansion-slot screw you removed earlier.

d. If you are installing a GXT800P adapter, you must install a support bracket from the GXT800P adapter to the adapter card bracket as shown.
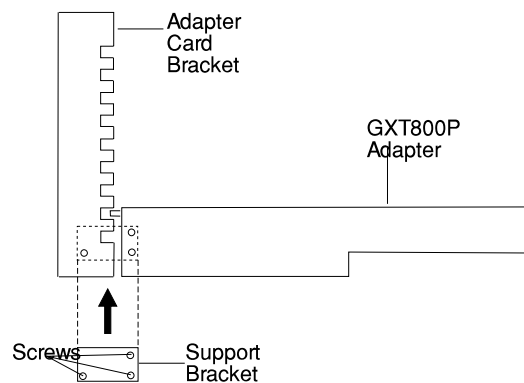
7. Replace the system board cover as described in "Replacing the System Board Cover" on page 4-101; then return here to determine your next step.

8. If a POWER GXT1000 was removed, go to "Reinstalling the POWER GXT1000 Enclosure" on page C-12 for instructions on how to replace it; then return here to determine your next step.

9. In order to prevent radio frequency interference, you must ensure that the spring contacts on the metal shield between the feature card and the rear bulkhead of the system are in contact all the way around the opening. If a piece of paper can easily be slipped in between the bulkhead and the spring contacts, you must reshape the bulkhead by pressing on it until good contact is made.

10. Go to "Device Records" on page A-2 and write the adapter name next to the slot into which it is installed; then return here to determine your next step.

11. If you have other procedures to perform, refer to "Option List" on page 4-17.

12. If you do not have any other procedures to perform, replace the covers as described in "Replacing Both the Front and Side Covers" on page 4-96.

Removing Adapters

1. If you have not already done so, remove the covers as described in "Removing Both the Front and Side Covers" on page 4-10.

2. If a POWER GXT1000 is installed, go to "Removing the POWER GXT1000 Enclosure" on page C-5 for instructions on how to remove it; then return here to determine your next step.

3. Remove the system board cover as described in "Removing the System Board Cover" on page 4-16; then return here to determine your next step.

4. Remove the adapter:

   a. Note the slot number of the adapter you are removing.

   b. If there are any cables attached to the adapter, disconnect them.

   c. Remove the screw for the adapter.
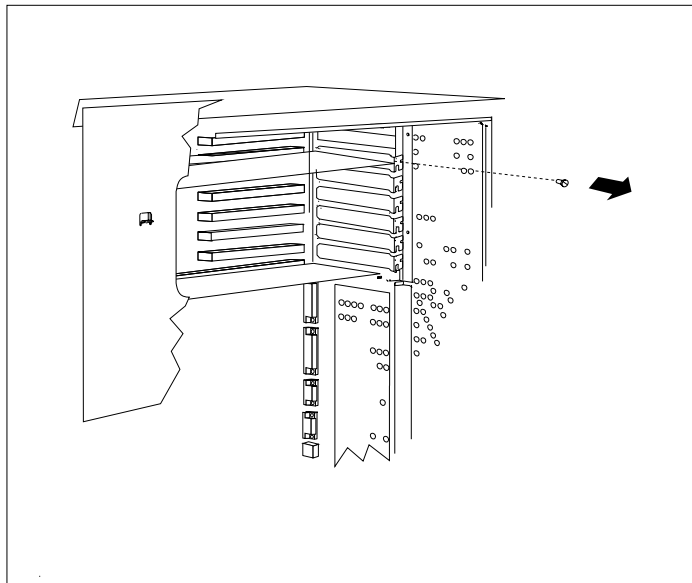
d. Carefully pull the adapter out of the system.
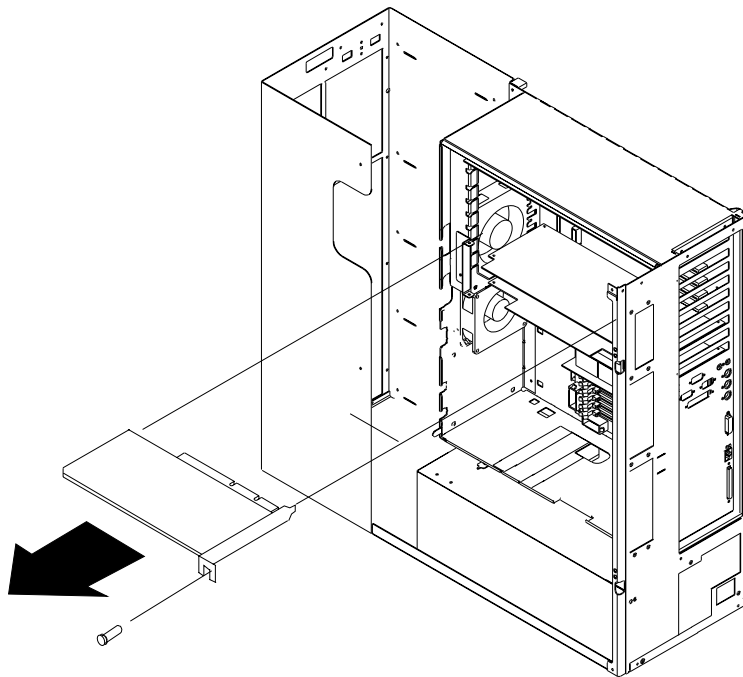
5. If you are not installing another adapter in this expansion slot, reinstall the expansion-slot cover:

    a. Slide the cover over the open expansion slot.

    b. Install the screw and tighten with a screwdriver.

    c. If the adapter removed had cables that are no longer required, you may want to remove them.
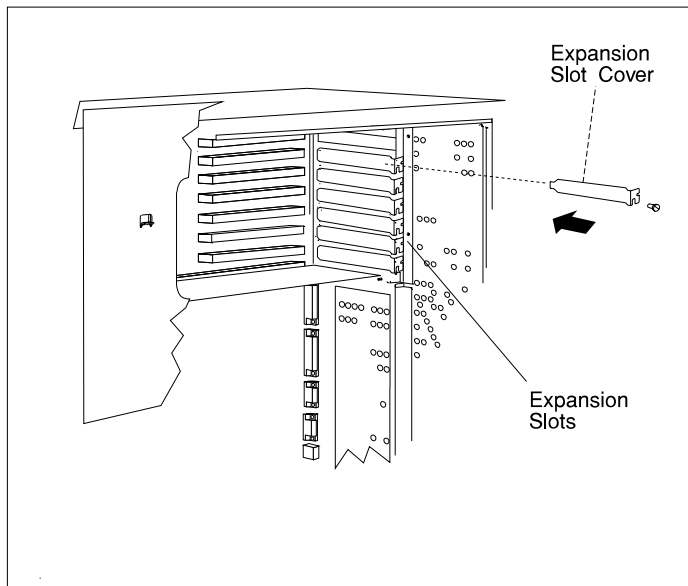
6. Replace the system board cover as described in "Replacing the System Board Cover" on page 4-101; then return here to determine your next step.

7. If a POWER GXT1000 was removed, go to "Reinstalling the POWER GXT1000 Enclosure" on page C-12 for instructions on how to replace it; then return here to determine your next step.

8. Go to "Device Records" on page A-2 and delete the name of the adapter you removed; then return here to determine your next step.

9. If you have other procedures to perform, refer to "Option List" on page 4-17.

10. If you do not have any other procedures to perform, replace the covers as described in "Replacing Both the Front and Side Covers" on page 4-96.

Upgrading or Adding CPU Card

> **Before you begin:**
>
> - Read "Safety Considerations" on page 4-1 and "Handling Static-Sensitive Devices" on page 4-3.
> - Firmware level TR97069 or later must be installed in order to upgrade the CPU card. To check which level of firmware is currently installed and install new firmware (if necessary), see Chapter 3, "System Management Services" on page 3-1.
> - Note that if more than one CPU card is installed, both CPU cards must be the same speed and type.

1. If you have not already done so, remove the covers as described in "Removing Both the Front and Side Covers" on page 4-10.

2. If a POWER GXT1000 is installed, go to "Removing the POWER GXT1000 Enclosure" on page C-5 for instructions on how to remove it; then return here to determine your next step.

3. Remove the system board cover as described in "Removing the System Board Cover" on page 4-16; then return here to determine your next step.

4. Locate the CPU card connectors.
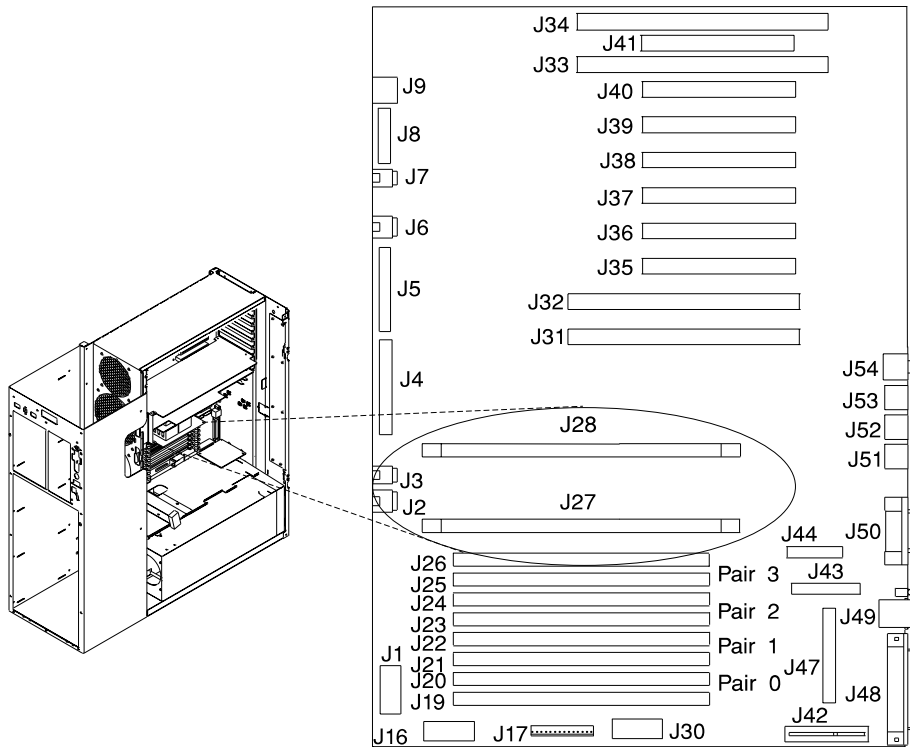
5. If you are **replacing** a CPU card that is already installed, remove it from the system unit now and store it in a static-protective bag. However, if you are installing an **additional** CPU card, do not remove the CPU card already installed.

6. Install the new CPU card or cards. Note that if more than one CPU card is installed, both must be the same speed and type.
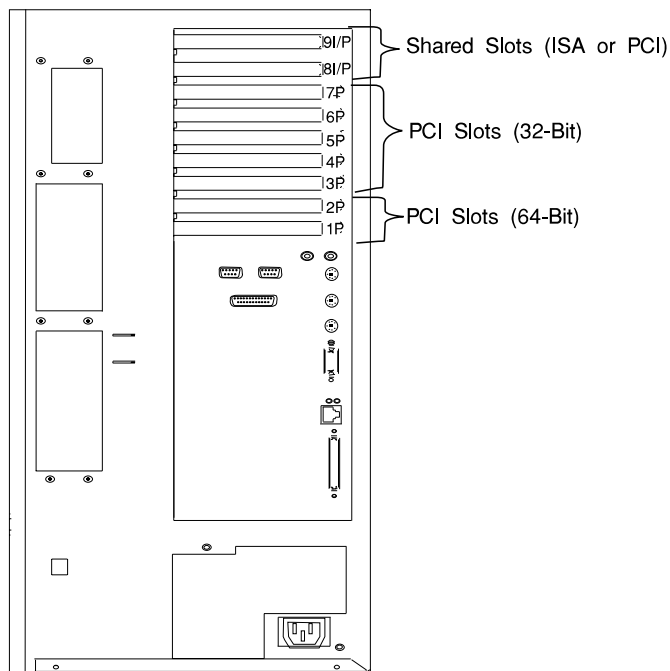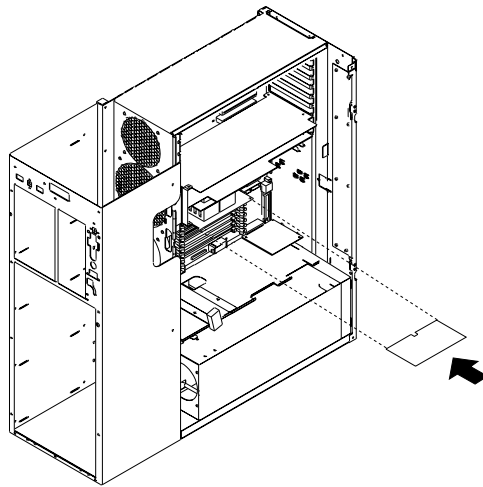

7. Replace the system board cover as described in "Replacing the System Board Cover" on page 4-101; then return here to determine your next step.

8. If a POWER GXT1000 was removed, go to "Reinstalling the POWER GXT1000 Enclosure" on page C-12 for instructions on how to replace it; then return here to determine your next step.

9. If you have other procedures to perform, refer to "Option List" on page 4-17.

10. If you do not have any other procedures to perform, replace the covers as described in "Replacing Both the Front and Side Covers" on page 4-96.

Installing Internal Drives

If you add different types of drives, your system can read mulitple types of media and store more data. Several types of drives are available, such as:

- Diskette
- Disk drive
- CD-ROM
- Tape

Note: If you are installing a CD-ROM drive, refer to page /CAUT1/ before installing the drive.

Internal drives are installed in *bays.* A diskette drive is preinstalled in bay A2 and a CD-ROM drive is preinstalled in bay A1 in all models. You can install a media drive in bay B1 or B2.

The base system has a non hot-swap backplane installed in bank D. You can install six non hot-swappable disk drives into the bays in bank D. You can order additional non hot-swap backplanes for banks C and E. Banks C, D, and E each contain six bays. You can install up to six disk drives in bank C, bank D, or bank E.

You can order an optional feature that lets you install hot-swappable disk drives into the bays in banks C, D, and E. You can install up to six disk drives in bank C, bank D, or bank E.

Note: The bank letter-designations are located on both vertical rails on the front of the system. The bay-slot numbers are located on the top of bank C and the bottom of bank E.

Open Bay
SCSI ID 5

Open Bay
SCSI ID 6

CD-ROM
SCSI ID 4

Diskette Drive

B1 B2 A1 A2

Bank C
Bays: 1-6
SCSI IDs:
 0-5 or 8-13

Bank D
Bays: 1-6
SCSI IDs:
 0-5 or 8-13

Open Bays

Bank E
Bays: 1-6
SCSI IDs:
 0-5 or 8-13
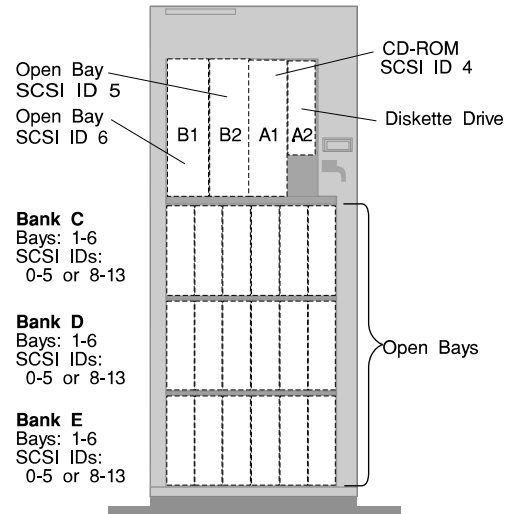
Considerations

Bay A comes with one 3.5-inch, 1.44MB diskette drive in A2 and a CD-ROM in A1.

Bay B supports two 5.25-inch, half-high, removable-media devices.

You cannot install non hot-swappable or hot-swappable drives in bays A or B.

If you have POWER GXT1000 installed, you cannot install drives in bank C or E.

Banks C, D, and E can accommodate six slim-high drives or three half-high drives, or a combination of both drive sizes. If you use a combination, remember that one half-high drive uses the equivalent space of two slim-high drives.

Your system supports eighteen 3.5-inch, slim-high (1.0 inch), disk drives or nine 3.5-inch, half-high (1.6 inch) disk drives in the bottom three banks (C, D, and E) or a combination of slim and half-high drives.

Before installing disk drives in bank E, you must also order a disk drive backplane for bank E and an additional power supply. You may also want to order and install an additional SCSI-2 adapter. To order, contact your authorized reseller or marketing representative.)

The disk drive backplane for bank E and the additional power supply must be installed by a trained service person.

Hot-Swap and Non Hot-Swap Drives

The base system has a non hot-swap backplane installed in bank D. You can install
six non hot-swappable disk drives into the bays in bank D. You can order additional
non hot-swap backplanes for banks C and E. Banks C, D, and E each contain six
bays. You can install up to six disk drives in bank C, bank D, or bank E.

You can order an optional feature that lets you install hot-swappable disk drives into
the bays in banks C, D, and E. You can install up to six disk drives in bank C, bank
D, or bank E.

The backplane determines whether a bank is hot-swappable or non hot-swappable A
backplane is the connection between the disk drives and the system. The hot-swap
and non hot-swap backplanes both accept the same disk drive carriers. The
hot-swap backplane contains more logic and allows you to remove disk drive without
turning the system power off. Non hot-swap drives cannot be removed with system
power on and must be removed by a trained service person.

Attention: Proper procedures must be followed whenever you remove a disk drive.
Hot-swap capability is available only with hot-swap backplanes. While the disk drives
are always packaged in a hot-swap capable carrier and carry the designation
"Hot-Swap Disk Drive", hot swap capability is not available when they are utilized
with the standard not hot-swap backplane.

To determine which type of drives you have installed in your system, remove the
front cover. If there is a retaining bar installed across a bank, you have non
hot-swappable backplane installed. If there is no retaining bar across a bank a
hot-swappable backplane is installed.

Preinstallation Steps (All Bays)

Note: All internal drives in this system are mounted vertically.

1. Touch the static-protective bag containing the drive to any unpainted metal surface on the system; then remove the drive from the bag.
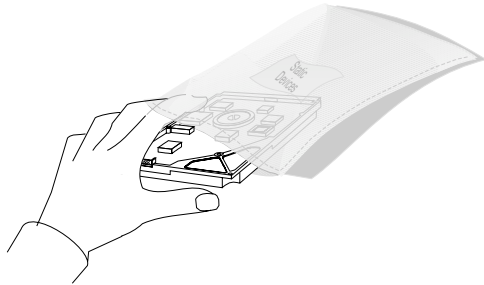
2. Check the instructions that came with the drive to see if you need to set any switches or jumpers on the drive, or if you need to attach a tray to the drive.

   Notes:

   - Automatic SCSI ID setting applies only to non hot-swappable and hot-swappable disk drives. Therefore, if you install a SCSI media drive (in bay B), you must set a SCSI ID for that drive. See Table A-2 on page A-4 in Appendix A for SCSI ID's.

   - Remove the terminator from the media drive you plan to install in bay B. The cable that connects to bays A and B already has a terminator.

3. Choose the location in which you want to install the drive.

- To install a disk drive, tape drive, or CD-ROM in bay A or Bay B, go to page 4-41.
- To install a SCSI disk drive in bank C, D, or E, go to page 4-48.
- To install a SSA disk drive in bank C, D, or E, go to page 4-52.

Installing a Disk Drive, Tape Drive, or CD-ROM in Bay A or Bay B

Before you begin:

- Read "Safety Considerations" on page 4-1 and "Handling Static-Sensitive Devices" on page 4-3.
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1. If you have not already done so, remove the covers as described in "Removing Both the Front and Side Covers" on page 4-10.

2. Each device you install in bay B must have a tray like that shown below. If your drive came with a different tray, remove it and install the correct tray. (Your system has extra trays in the bay.)
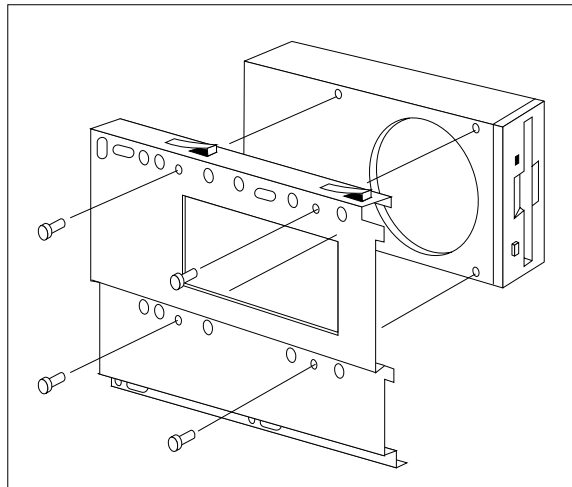
3.5-inch drive
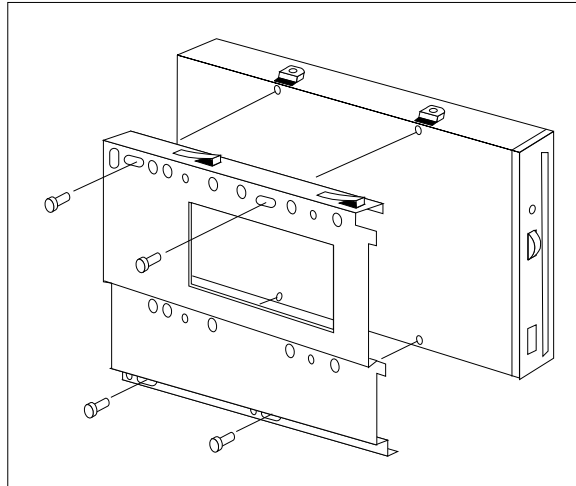
5.25-inch device

3. When installing a boot disk in Bay B1 or Bay B2 install the disk drive into the disk carrier.
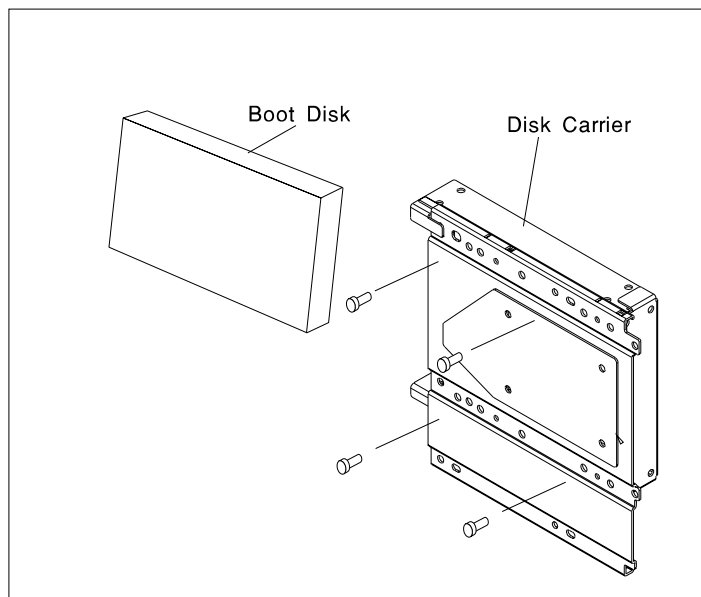
SCSI Boot Disk

4. You must also install the two gaskets that are shipped with the disk carrier if they were not previously installed. Make sure the gaskets are installed as shown behind the front lip. One gasket goes above the mounting hole and one gasket goes below the mounting hole.
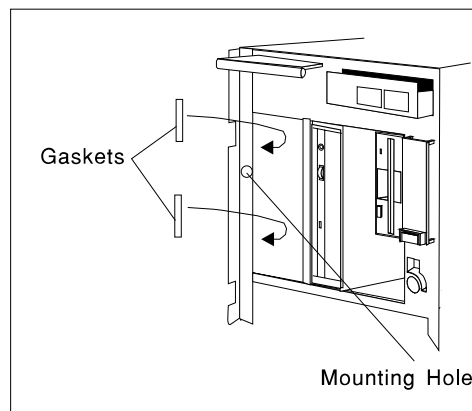
5. If a 16-bit to 8-bit interposer came with your SCSI device, connect the interposer to the SCSI device and connect the SCSI cable to the interposer. Note that most disk drives do not require an 16-bit to 8-bit interposer.
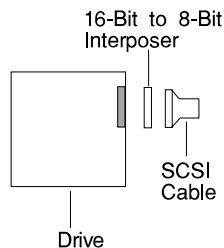
6. Check and place SCSI ID jumpers in correct position on the drive for correct ID. See Table A-2 on page A-4 for SCSI ID addresses.

7. Install the device:

   a. Position the device vertically, with the connectors facing the rear of the system.

   b. Align the device with the guides on the bottom of the bay and slide it to the rear of the bay until it stops.
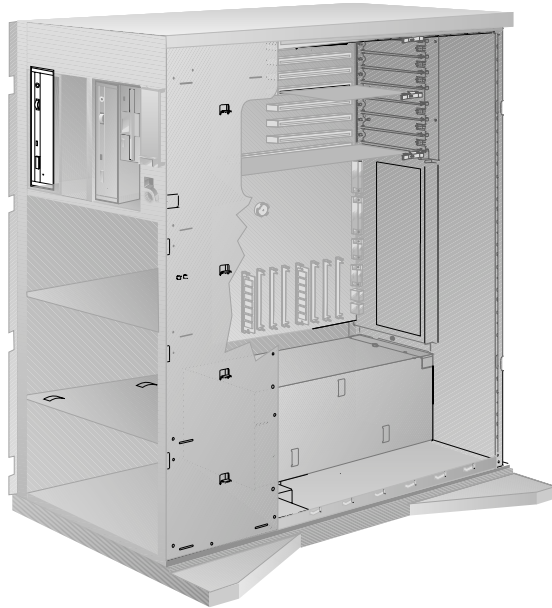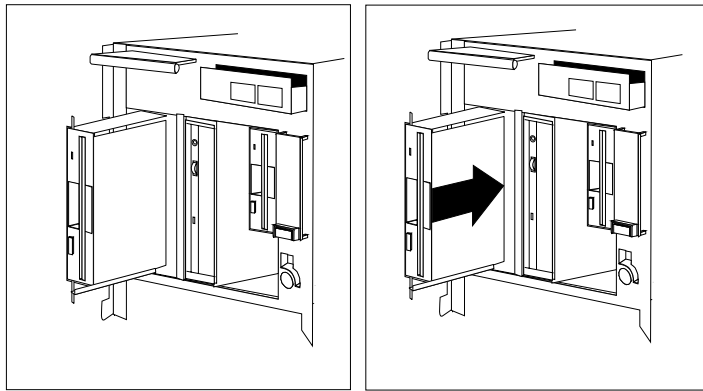
8. Slide the diskette drive and the CD-ROM drive forward in their guides to allow more room for connecting cables to the new drive.

   a. Connect the cables:

      1) If you are installing a SCSI drive, locate an unused SCSI drive connector at the back of the bay. Connect the SCSI drive connector to the drive.
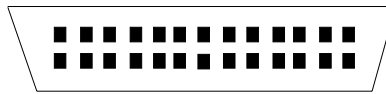
SCSI
Connector

      2) Connect the power cable connector to the 4-pin connector on the drive.

Power
Connector

      3) The following illustration shows the possible cable connectors and routing for backplane D and the media devices in bay A and bay B. The diskette, CD-ROM and backplane D are factory installed.

• Cable connections for connecting the integrated SCSI on the system board to backplane D.

16-Bit to 8-Bit
Interposer

SCSI
Cable

Drive

Bay
A2
D
i
s
k
e
t
t
e

Bay
A1
C
D
R
O
M

Bay
B2

Bay
B1

J5

J4

System Board

Diskette cable

SCSI cable

Power cable

Backplane D

Main Power Supply
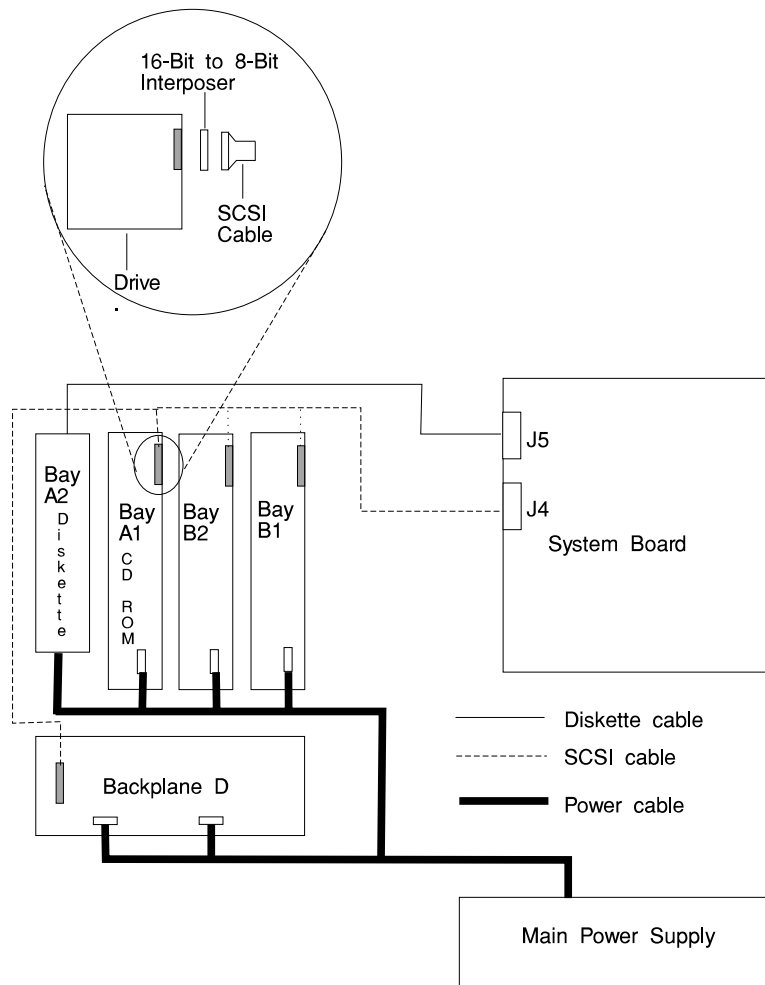
Attention: Route the cables (SCSI-2 and power) at the rear of the media drives so they do not block airflow or bind between the fans and media drives.

9. If you installed a removable-media drive in bay B1 or bay B2, remove the cover plate from the front cover. A cover plate (complete bezel) is in place in the system's front cover, which you removed earlier. Remove the cover plate by pushing it, gently, out of the front cover.
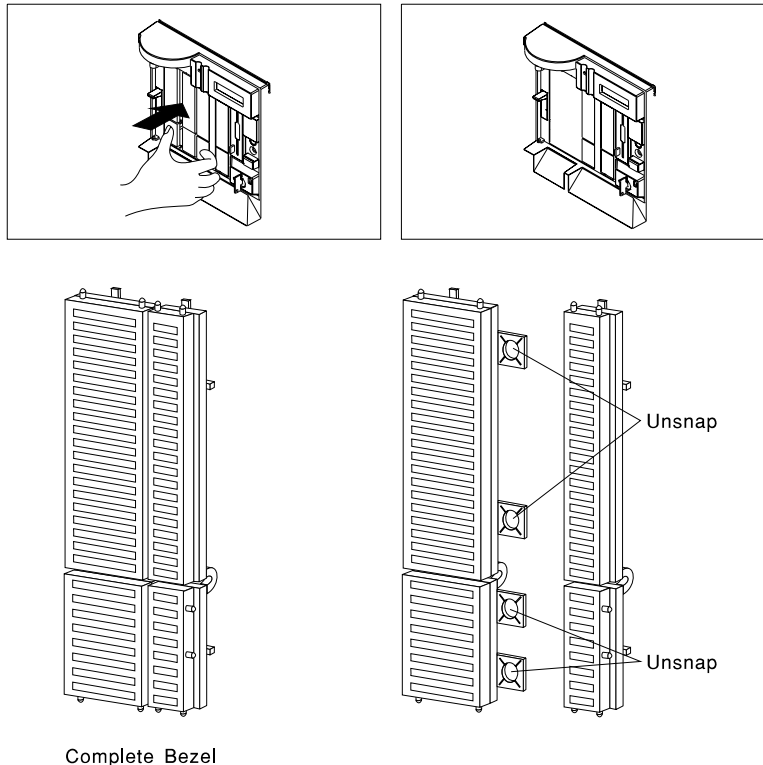
Complete Bezel

10. Go to Table A-2 on page A-4 to record the drive location (diskette interface devices do not require a SCSI ID); then return here to determine your next step.

11. If you have other drives to install, go to page 4-40.

12. If you have other procedures to perform, refer to "Option List" on page 4-17.

13. If you do not have any other procedures to perform, replace the covers as described in "Replacing Both the Front and Side Covers" on page 4-96.

Installing a Hot-Swap SCSI Disk Drive in Bank C, D, or E.

Before you begin:

- Read "Safety Considerations" on page 4-1 and "Handling Static-Sensitive Devices" on page 4-3.

Notes:

- SCSI IDs are automatically assigned by the backplane for each bank. Therefore, no address jumpers are required on the drives.

- 1.6 inch half-high (9.1 GB) drives require two bays for each drive.

- SCSI disk drives and SSA disk drives are not interchangeable.

- To ease installation, disk drives should be installed in bank E (if you plan to do so) before installing disk drives in bank C.

- Before installing disk drives in bank E, you must also order and install:

    - A disk drive backplane for bank E

    - A SCSI PCI adapter that drives Bank E.

    - A SCSI cable that connects the SCSI PCI adapter to Bank E.

- Before installing disk drives in bank C, you must also order:

    - A disk drive backplane for bank C.

    To order, contact your authorized reseller or marketing representative.

- After the backplane is completely installed, you do not have to turn off the system to install additional hot-swappable disk drives. However, you must turn off the system when performing the steps that involve installing or removing backplanes, cables, adapters, memory, and CPU cards.

1. If you have not already done so, remove the front covers as described in "Removing the Front Covers Only" on page 4-6

2. Each drive you plan to install in bank C, D, or E must have the hot-swap SCSI disk drive carrier attached.

   Note: SCSI disk drives carriers have a white plastic bezel around the status lights of the carrier. SSA disk carriers have a black bezel.

   Attention: Handle the disk drive with care as it is very fragile and can be easily damaged if exposed to shock, electrostatic discharge, or rough handling.

3. It is recommended that you install the disk drive in the next unused position of bank C, D, or E.

   Attention: Attaching SCSI address jumpers on the drive rather than using the automatic ID furnished by the backplane is not advised. Attaching jumpers can cause service problems, multiple drives at the same address, or confusion locating the correct drive.

   a. Rotate the carrier latch to the open position.
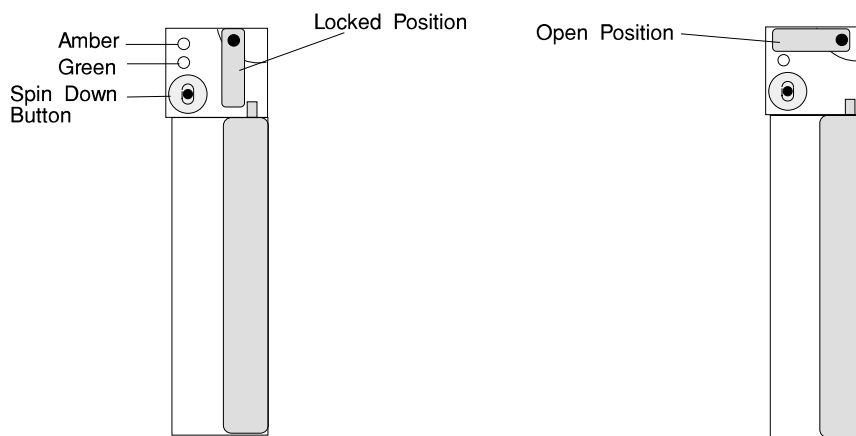
   b. Position the drive carrier assembly vertically, with the connector facing the rear of the system.

c. Align the side of the carrier with the raised guides on the bottom of the bay.

d. Slide the carrier into the bay gently to keep from damaging the disk drive. Slide the carrier to the rear of the bay until it stops.
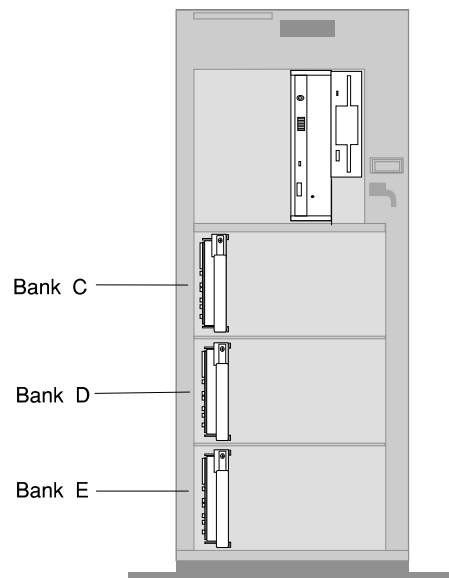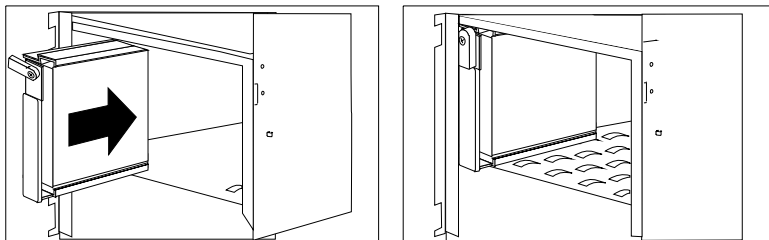
e. Move the carrier latch to the locked position. If the carrier will not lock, check that the drive carrier is fully seated in the backplane. When the drive carrier is fully seated and power is turned on, the green LED on the drive carrier will illuminate.
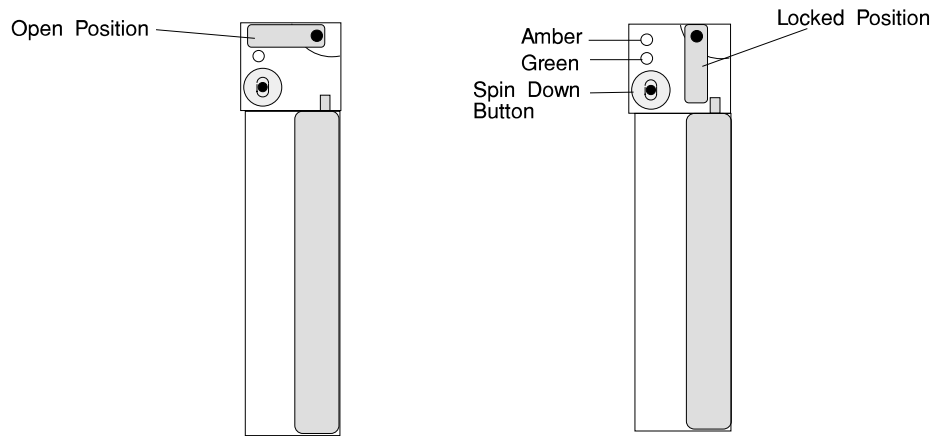
4. See "Disk Drive Status LED States" on page 2-16 for information on disk drive lights.

5. Go to Table A-2 on page A-4 to record the drive location for the drive; then return here to determine your next step.

6. If you have other drives to install, go to page 4-40.

7. If you have other procedures to perform, refer to "Option List" on page 4-17.

8. If you do not have any other procedures to perform, replace the covers as described in "Replacing the Front Covers" on page 4-93.

Installing a Hot-Swap SSA Disk Drive in Bank C, D, or E

Before you begin:

- Read "Safety Considerations" on page 4-1 and "Handling Static-Sensitive Devices" on page 4-3.

Notes:

- SSA disk drive carriers and SCSI disk drive carriers are not interchangeable.

- 9.1 GB drives (1.6 inches high) require two bays for each drive.

- To ease installation, disk drives should be installed in bank E (if you plan to do so) before installing disk drives in bank C.

- Before installing disk drives in bank C or E, you must also order and install a disk drive backplane at the rear of bank C or E. You must also order and install an SSA adapter and an SSA cable that connects the disk drive backplane to the SSA adapters.

- To order, contact your authorized reseller or marketing representative. The disk drive backplane for bank E must be installed by a trained service person.

- After the backplane is completely installed, you do not have to turn off the server to install additional hot-swappable disk drives. However, you must turn off the system when performing the steps that involve installing or removing backplanes, cables, adapters, memory, and CPU cards.

1. If you have not already done so, remove the front covers as described in "Removing the Front Covers Only" on page 4-6

2. If you are installing drives in bank C or E for the first time, you must install an additional backplane before you can install drives. See "Installing a SSA Backplane in Bank C or E" on page 4-63 for information on how to install the backplane.

3. Each drive you plan to install in bank C, D, or E must have the hot-swap SSA disk drive carrier attached.

   Note: SSA disk drives carriers have a black plastic bezel around the status lights of the carrier. SCSI disk carriers have a white bezel.

   Attention: Handle the disk drive with care as it is very fragile and can be easily damaged if exposed to shock, electrostatic discharge, or rough handling.

4. A minimum of two SSA disk drives are required when populating individual banks C, D, or E. They must be located in bays 1 and 5 prior to installing additional disk drives in the next unused position of banks C, D, or E.

   Attention: SSA backplanes must be fully populated. Each backplane connector must have a disk drive or a blank carrier installed at all times. If you are installing a disk drive in a bay that was not previously utilized, you must remove the blank carrier prior to installing the disk drive.

   a. Rotate the carrier latch to the open position.
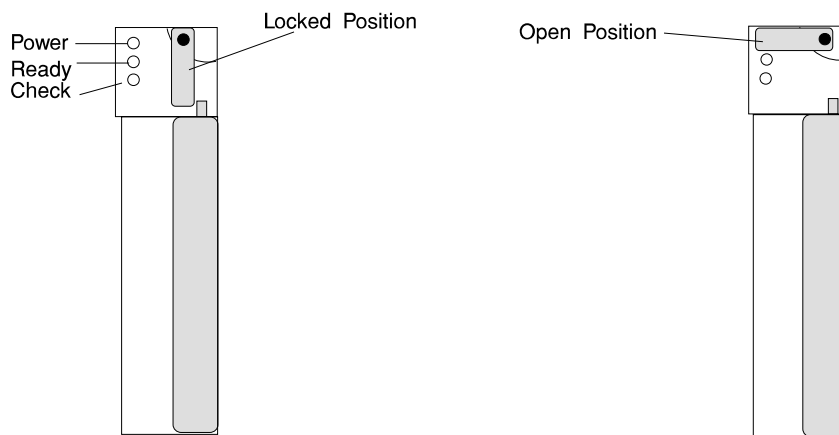
   b. Position the drive carrier assembly vertically, with the connector facing the rear of the system.

c. Align the side of the carrier with the raised guides on the bottom of the bay.

d. Slide the carrier into the bay gently to keep from damaging the disk drive. Slide the carrier to the rear of the bay until it stops.

Bank C

Bank D

Bank E
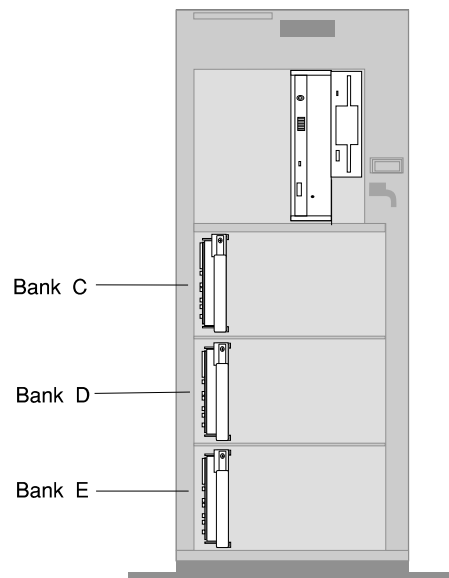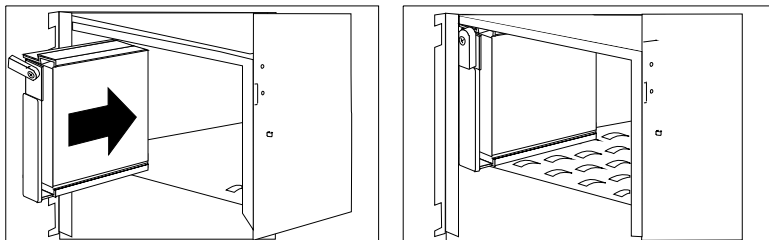
e. Move the carrier latch to the locked position. If the carrier will not lock, check that the drive carrier is fully seated in the backplane. When the drive carrier is fully seated and power is turned on, the Ready LED on the drive carrier will illuminate.

Open Position

Locked Position

Power
Ready
Check
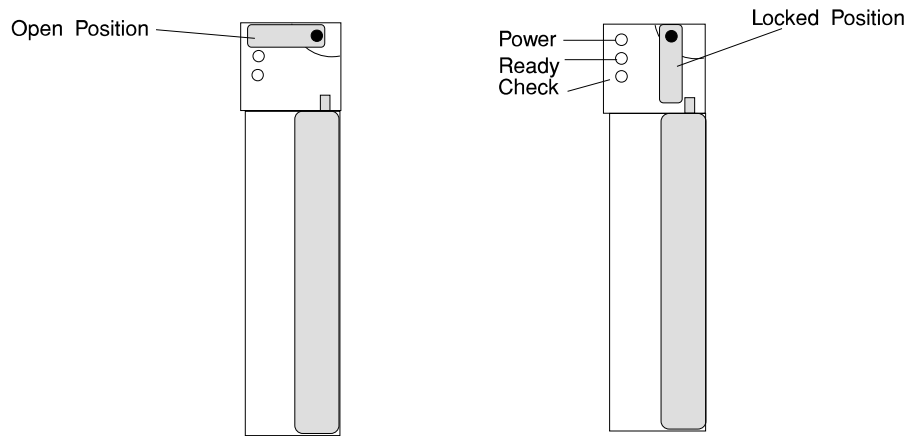
5. See "Disk Drive Status LED States" on page 2-16 for information on disk drive lights.

6. Go to Table A-2 on page A-4 to record the drive location for the drive; then return here to determine your next step.

7. If you have other drives to install, go to page 4-40.

8. If you have other procedures to perform, refer to "Option List" on page 4-17.

9. If you do not have any other procedures to perform, replace the covers as described in "Replacing the Front Covers" on page 4-93.

Installing a SCSI Backplane in Bank C

Before you begin:

- Read "Safety Considerations" on page 4-1 and "Handling Static-Sensitive Devices" on page 4-3.

Notes:

- If you have a POWER GXT1000 installed, you cannot install a backplane in bank C.
- Before installing SCSI disk drives in bank C, you must also order and install:

    – A SCSI disk drive backplane for bank C

    To order, contact your authorized reseller or marketing representative.

1. Inventory your parts and tools.

   a. backplane

   b. power cable

   c. one screw (with backplane)

   d. SCSI-2 adapter

   e. SCSI-2 cable

   f. Long flat blade screwdriver

2. If you have not already done so, remove the covers as described in "Removing Both the Front and Side Covers" on page 4-10.

3. Locate the new backplane (C).

4. Check the jumpers on the new backplane for proper setting. The jumpers should be set as shown.
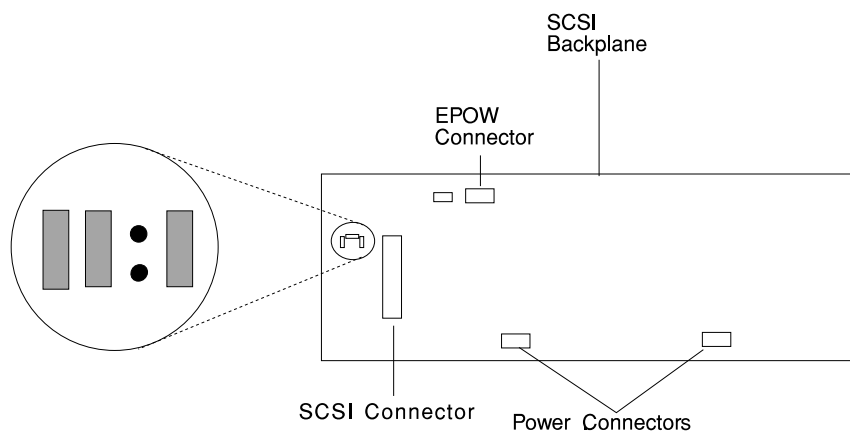
5. Install the backplane at the rear of bank C:

   a. Align the top screw hole on the left side of the backplane with the top screw hole on the left side of bank C, making sure the dimples on the backplane line up with the holes on the frame of the system.

   b. Secure the backplane with one screw.
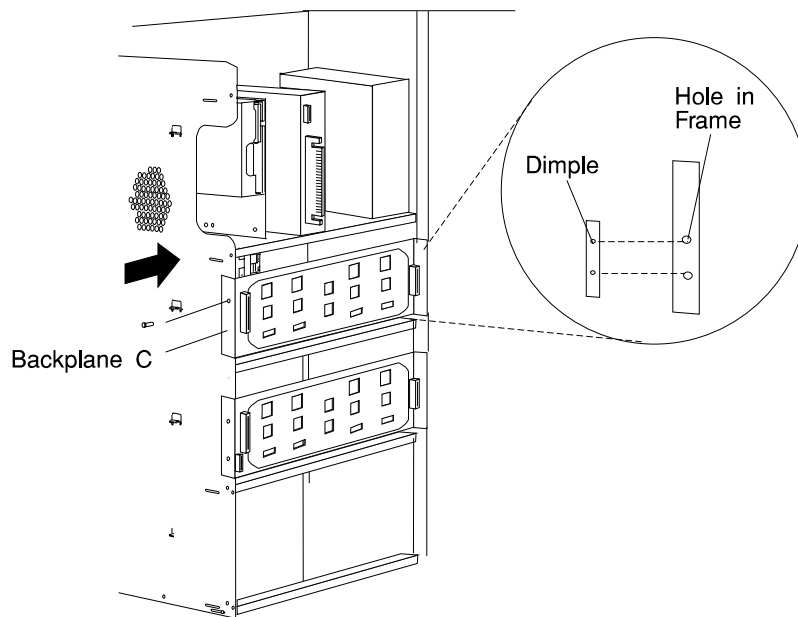
6. Install an additional SCSI-2 adapter or RAID adapter (if necessary) in one of the empty PCI expansion slots. Refer to "Installing Adapters" on page 4-25 for installation instructions; then continue to the next step.

7. Attach cables to backplane C.

   a. If installing a hot-swap backplane, connect the connector from the EPOW cable to backplane C as shown.

      Note: The EPOW cable is only on the hot swap backplane.
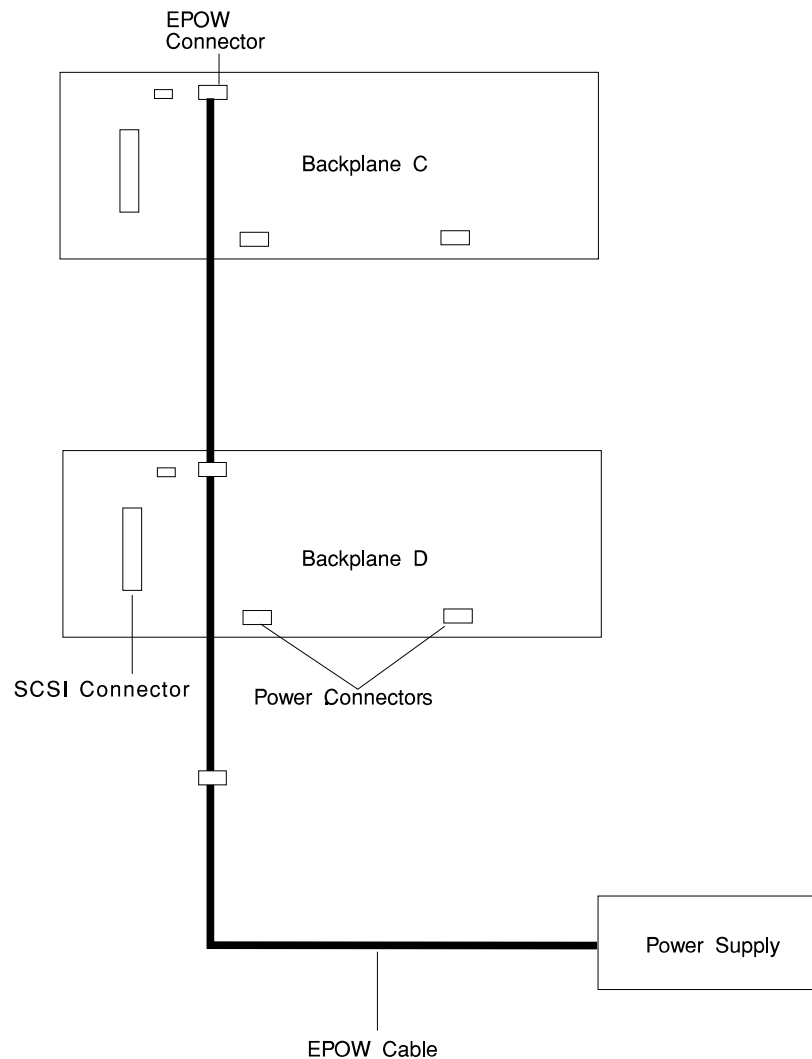
b. Attach the new power cable to backplane C.

New Backplane

Power
Cable
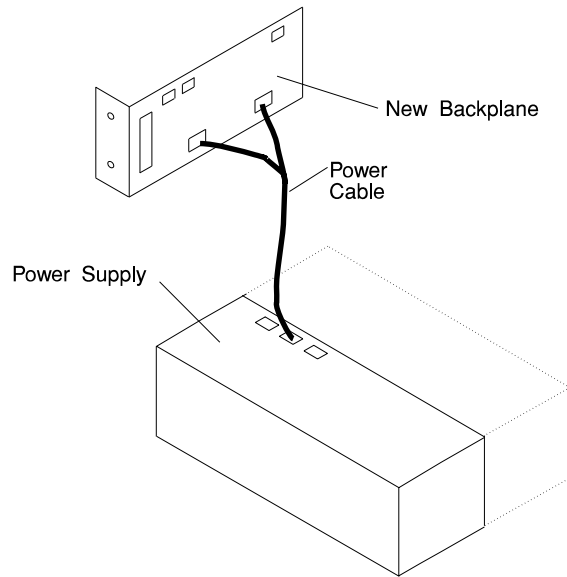
Power Supply

c. Connect the other end of the power cable to the power supply.

d. Locate the SCSI cable.

e. Before connecting the SCSI cable, fill in your SCSI cable labels. Fill in the
bank identifier (C) and the adapter slot (such as 1P, 2P, 3P). Refer to the
following illustration to help you label your cable properly.

Bank
Identifier
Label

Adapter
Slot Label

D
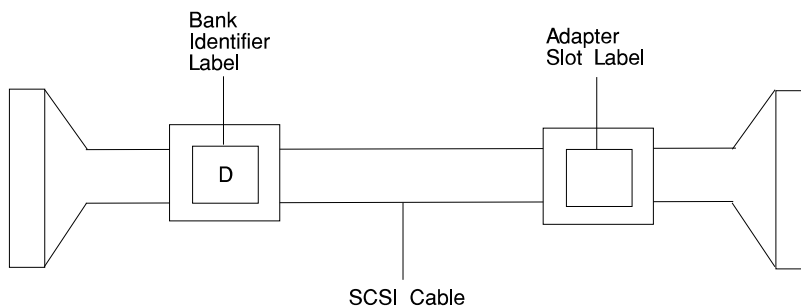
SCSI Cable

f. Connect the SCSI cable from the SCSI adapter you just installed to the new backplane (C). Refer to the following illustrations to help you connect the cables properly.
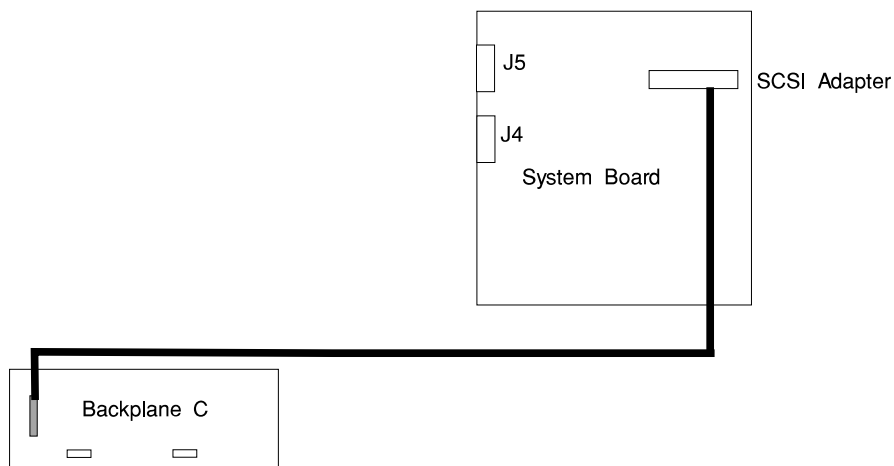
8. Fill in the bank label. The bank label is located in the front of the system at the right side of the machine. Use the following table to help you determine the proper numbers to enter on to the label.

Physical Slot of SCSI Adapter	Bank Label
9I/P	04 - 09
8I/P	04 - 08
7P	04 - 07
6P	04 - 06
5P	04 - 05
4P	04 - 04
3P	04 - 03
2P	04 - 02
1P	04 - 01
Second Integrated SCSI Controller	04 - F0
First Integrated SCSI Controller	04 - E0

B1 B2 A1 A2

Bank C
Bays: 1-6
SCSI IDs:
  0-5 or 8-13

| C1. | C2. | C3. | C4. | C5. | C6. |
| ID:
1
or
8 | ID:
2
or
9 | ID:
3
or
10 | ID:
4
or
11 | ID:
5
or
12 | ID:
6
or
13 |

Bank D
Bays: 1-6
SCSI IDs:
  0-5 or 8-13

| D1. | D2. | D3. | D4. | D5. | D6. |
| ID:
1
or
8 | ID:
2
or
9 | ID:
3
or
10 | ID:
4
or
11 | ID:
5
or
12 | ID:
6
or
13 |

Bank E
Bays: 1-6
SCSI IDs:
  0-5 or 8-13

| E1. | E2. | E3. | E4. | E5. | E6. |
| ID:
1
or
8 | ID:
2
or
9 | ID:
3
or
10 | ID:
4
or
11 | ID:
5
or
12 | ID:
6
or
13 |
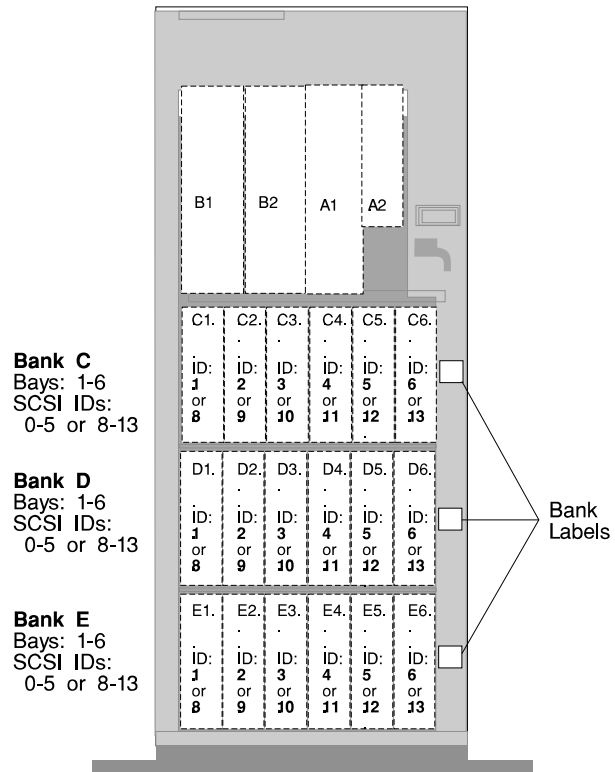
Bank
Labels

Installing a SSA Backplane in Bank C or E

Notes:

- If you have a POWER GXT1000 installed, you cannot install a backplane in bank C.

- Before installing SSA disk drives in bank C, you must use FC3006 to move the SCSI ultra boot disk drive to the media bay.

- Before installing SSA disk drives in bank C or E, you must also order and install a SSA disk drive backplane at the rear of bank C or E. You must order and install a SSA adapter. To order, contact your authorized reseller or marketing representative.

- After the backplane is completely installed, you do not have to turn off the server to install additional hot-swappable drives. However, you must turn off the system when performing the steps that involve installing or removing backplanes, cables, adapters, memory, and CPU cards

1. Inventory your parts and tools.

   a. SSA backplane

   b. power cable

   c. SSA daisy chain cable (only needed if more than one SSA backplane is installed)

   d. one screw (with backplane)

   e. SSA adapter

   f. SSA cables

   g. SSA bulkhead connectors with cables

   h. SSA documentation

   i. Long flat blade screwdriver

   j. Three cable retainers.

2. If you have not already done so, remove the covers as described in "Removing Both the Front and Side Covers" on page 4-10.

3. Install the SSA adapter, see "Installing Adapters" on page 4-25.

4. Replace the I/O planar cover as described in "Replacing the System Board Cover" on page 4-101; then return here to determine your next step.

5. If you are installing a backplane in bank E or bank E and bank C, proceed with the next step. If you are installing a backplane only in bank C, go to step 16 on page 4-69.

6. Remove the outside SSA cable from Backplane D, this cable is attached later in these procedures. One end of the SSA daisy chain cable connects here.

SSA Cable

Backplane D

Outside Cable

7. Locate the new backplane.

Power Connectors

SSA Connectors
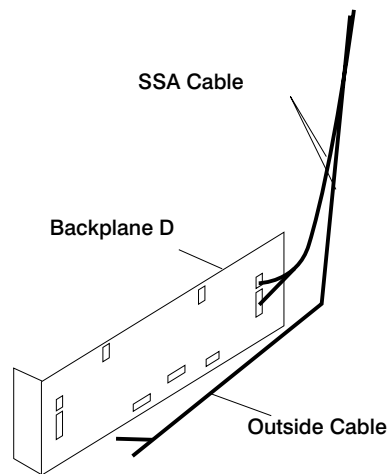
SSA Connectors

EPOW Connector

SSA Backplane

8. Attach the new power cable to backplane E.

New Backplane

Power
Cable

Power Supply
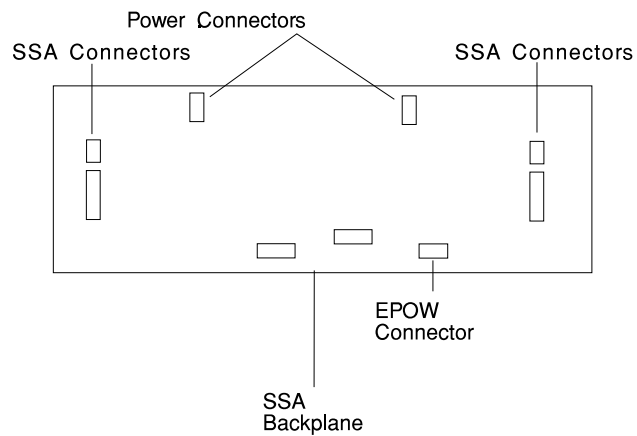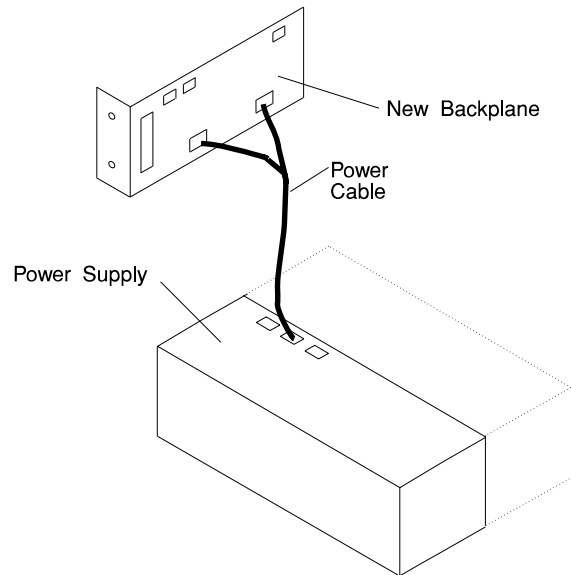
9. Attach the SSA daisy chain cable to the connector on Backplane D.

10. If the other end is not attached to the inside SSA connector on Backplane E.

11. Connect the connector from the EPOW cable to backplane E as shown.

Backplane C

Backplane D

EPOW
Connector

Backplane E

Power Supply

EPOW Cable
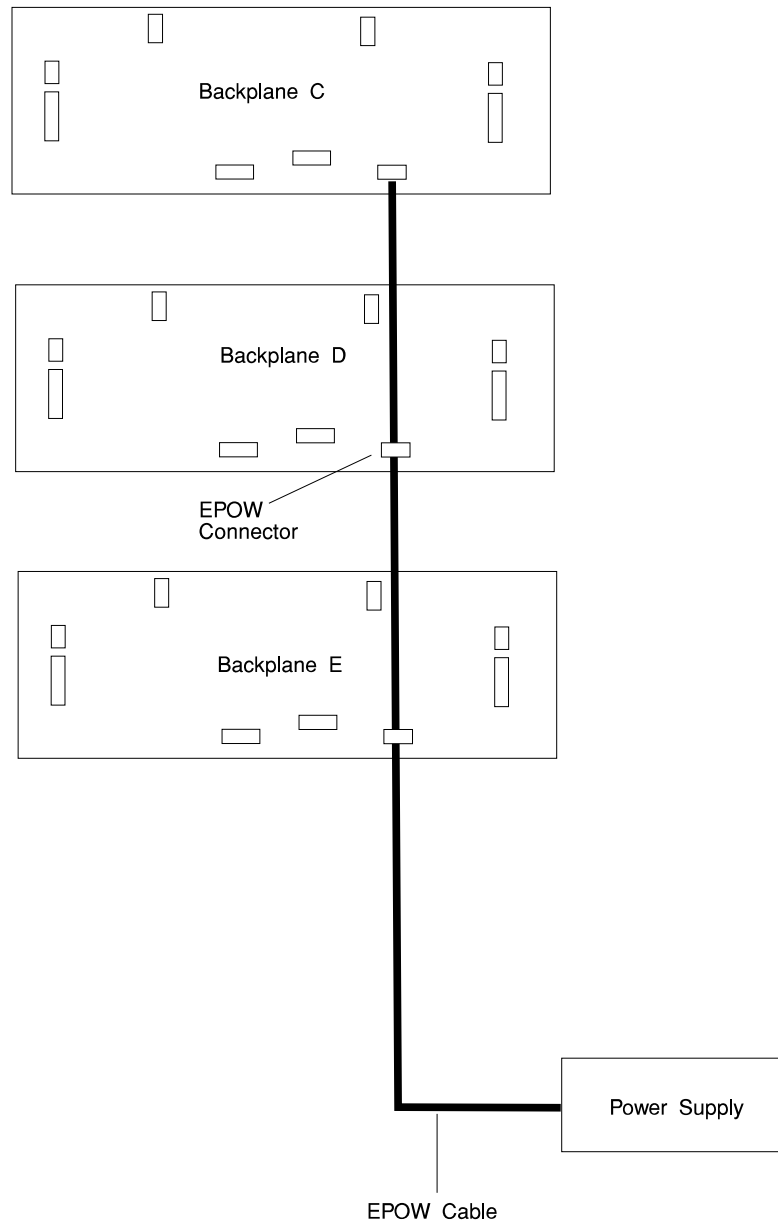
12. Install the backplane at the rear of bank E:

    a. Align the top screw hole on the left side of the backplane with the top screw hole on the left side of bank E, making sure the dimples on the backplane line up with the holes on the frame of the server.

    b. Secure the backplane with one screw.
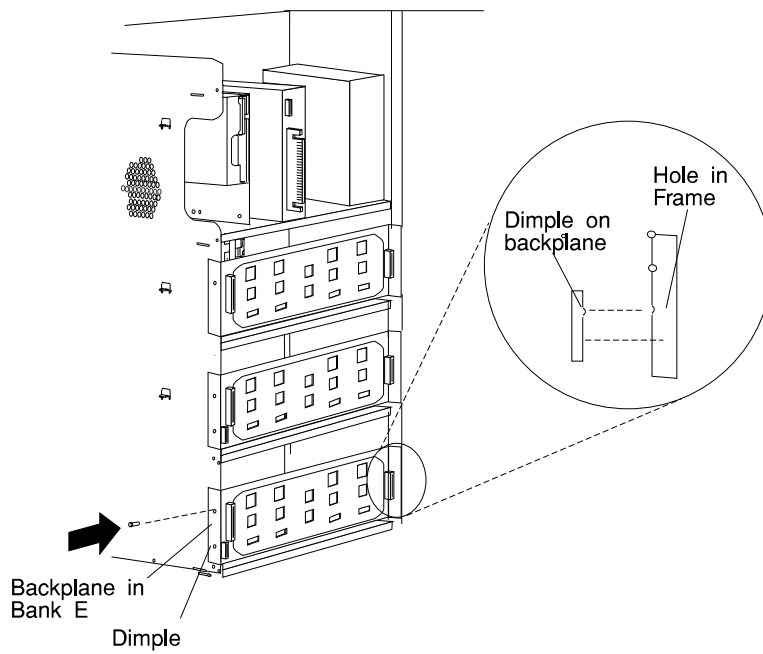
13. Connect the other end of the power cable to the power supply.
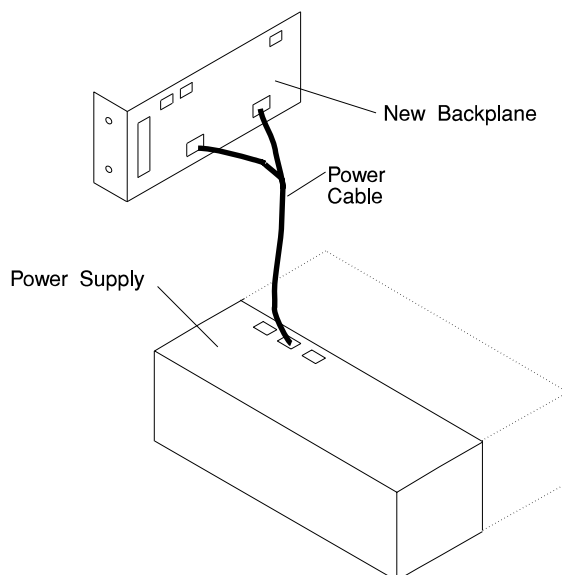
14. Connect the SSA cables that were removed from backplane D to the outside SSA connector on backplane E.
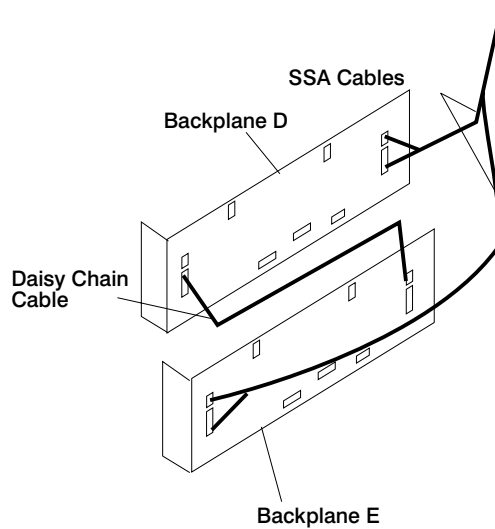
15. Backplane E installation is complete. If you are installing a backplane in bank C, continue with the next step. Otherwise, go to step 26 on page 4-77.

16. Locate the new backplane.

Power Connectors

SSA Connectors

SSA Connectors

EPOW
Connector

SSA
Backplane

17. Attach the new power cable to backplane C.

New Backplane

Power
Cable

Power Supply
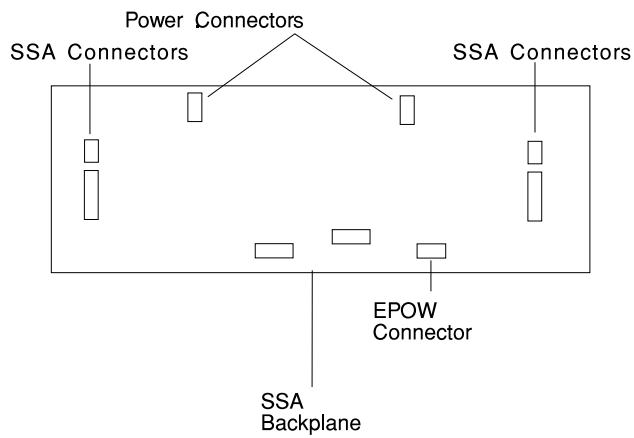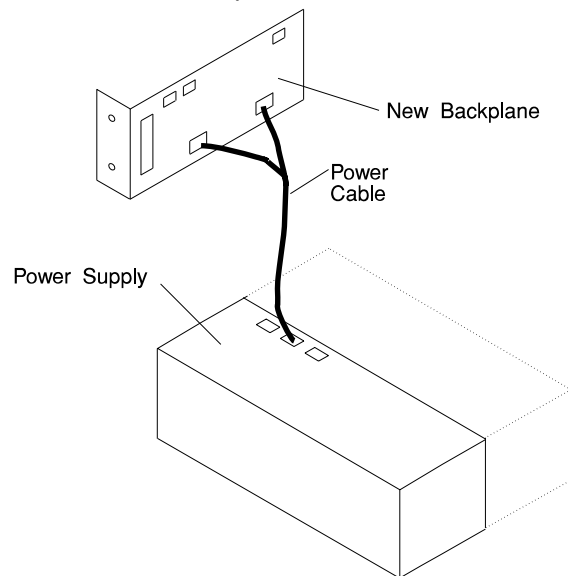
18. Locate the SSA bulkhead cable or internal SSA cable.
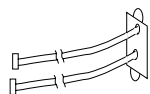
19. Connect the SSA cable to the new backplane. Refer to the following illustrations to help you connect the cables properly.

SSA Cable

Backplane

20. Connect the connector from the EPOW cable to backplane C as shown.

Backplane C

EPOW
Connector

Backplane D

EPOW
Connector

Power Supply

EOPW Cable
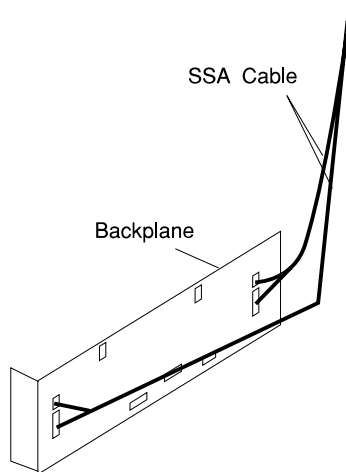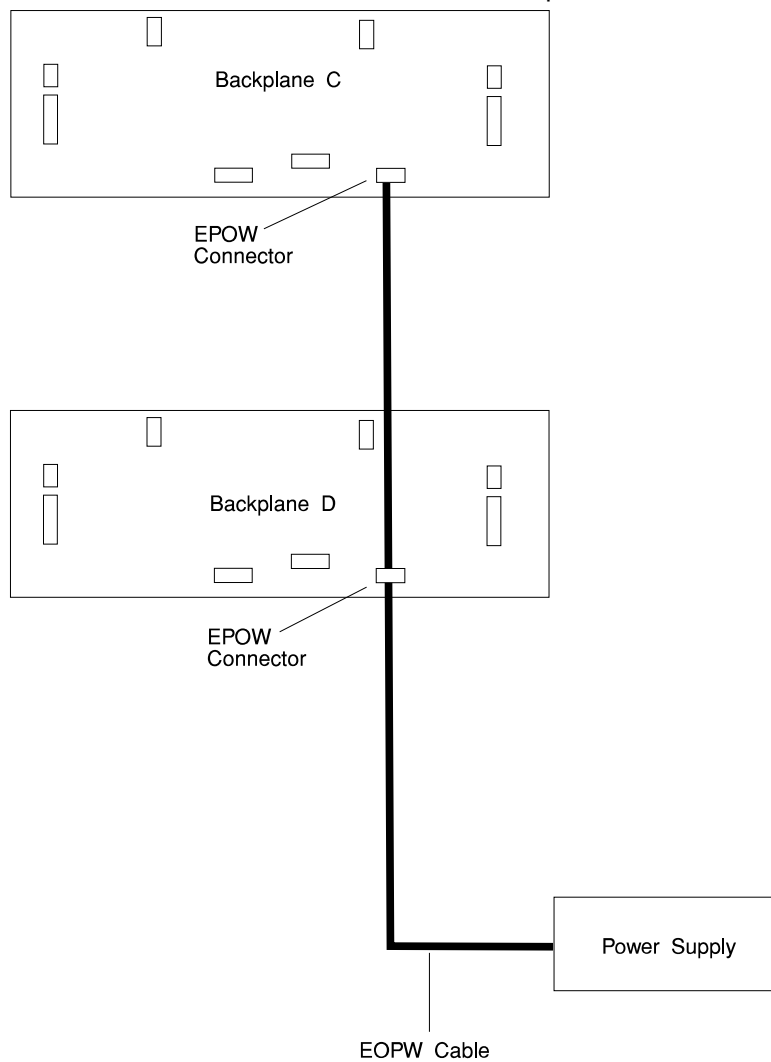
21. Install the backplane at the rear of bank C:

   a. Align the top screw hole on the left side of the backplane with the top screw hole on the left side of bank C, making sure the dimples on the backplane line up with the holes on the frame of the server.

   b. Secure the backplane with one screw.

c. Connect the other end of the power cable to the power supply.

New Backplane
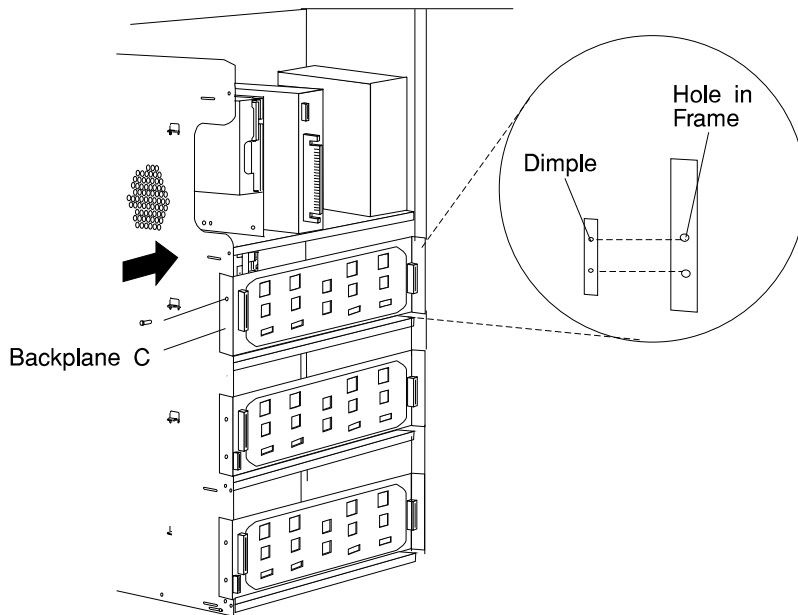
Power
Cable

Power Supply
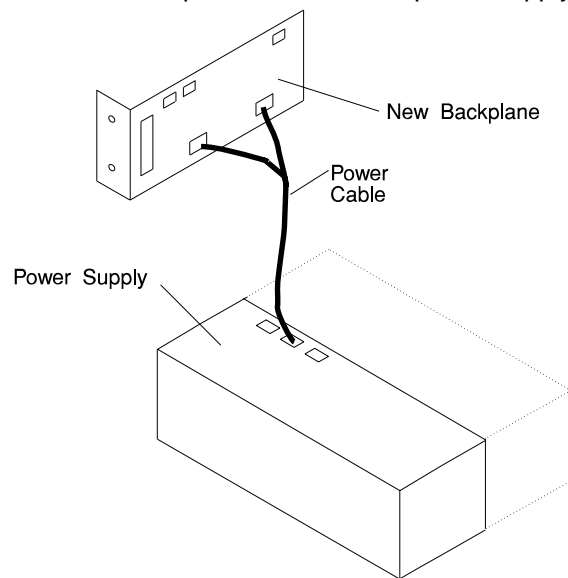
22. If you are using an internal SSA cable, connect the SSA cable to the SSA adapter. Refer to the *PCI SSA 4-Port RAID Adapter Installation Guide* for information on connecting the SSA cable to the SSA adapter. The cable should be routed up and placed in the cable holders under the top of the system and routed through the top cable exit hole beside the fan assembly.
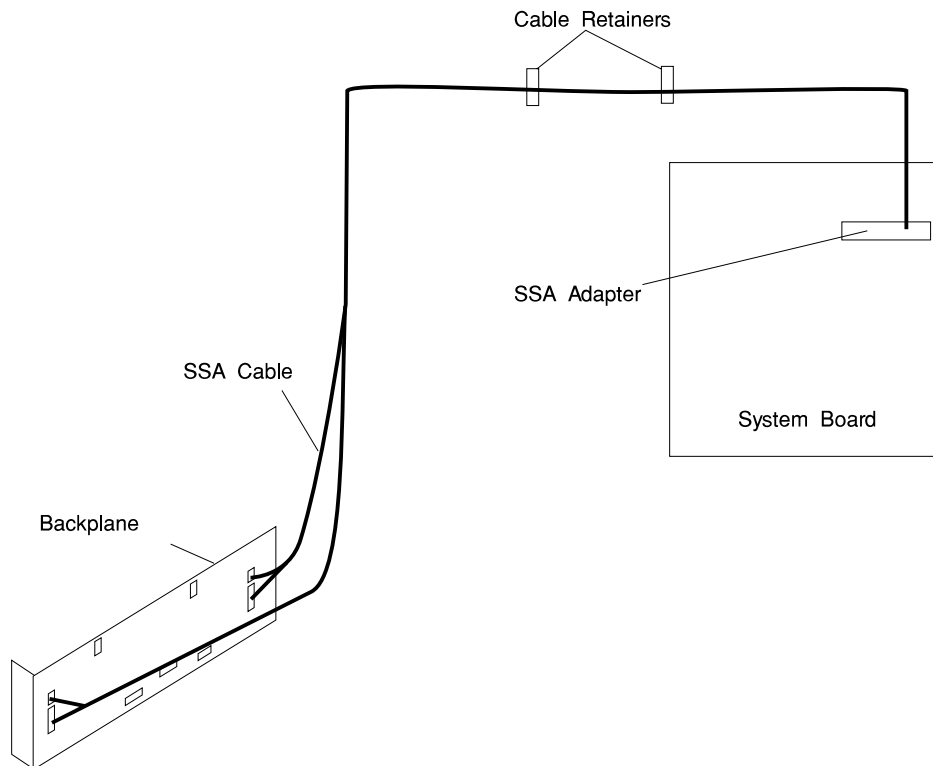
23. If you are using the external SSA bulkhead cable:

   a. Remove the bulkhead plate at the rear of the system.

   b. Attach the SSA bulkhead cable to the inside rear of the system using the two screws that you removed from the plate.

   c. Apply the three cable retainers as shown in the illustration.

   Attention: The cable retainers must be applied with the clamp opening towards the I/O planar cover against the inside lip away from the I/O planar cover, as shown.

   d. Place the SSA bulkhead cables into the three retainers.

e. Attach the SSA cables from the SSA adapter to the SSA bulkhead connectors, as show. Refer to the SSA documentation for information on connecting these cables.
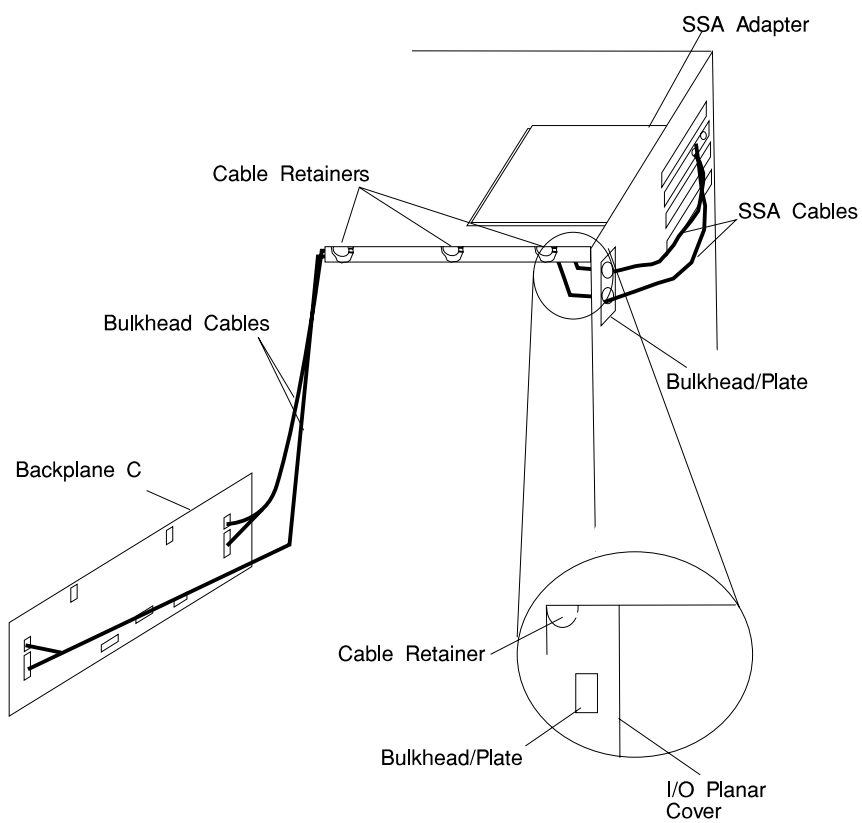
24. Backplane C installation is complete.

25. SSA cables connected to SSA backplanes C, D, and E are shown below.

Backplane C

Daisy Chain
Cable

Backplane D

SSA Cables

Backplane E
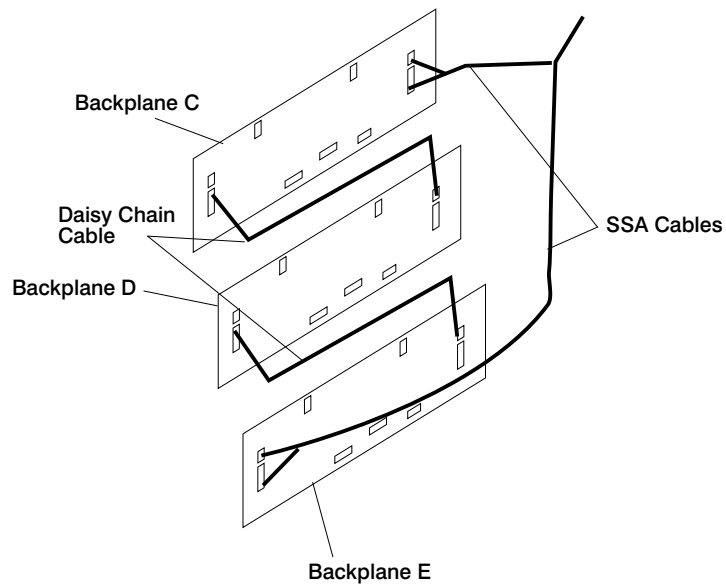
26. If you have other procedures to perform, refer to "Option List" on page 4-17.

27. If you do not have any other procedures to perform, replace the covers as
    described in "Replacing Both the Front and Side Covers" on page 4-96.

Removing Internal Drives

- To remove a disk drive, tape drive, or CD-ROM from bay A or bay B, go to page 4-79.

- To remove a drive from bank C, D, or E, go to page 4-80.

CD-ROM
SCSI ID 4

Open Bay
SCSI ID 5

Open Bay
SCSI ID 6

Diskette Drive

B1 B2 A1 A2

Bank C
Bays: 1-6
SCSI IDs:
 0-5 or 8-13

Bank D
Bays: 1-6
SCSI IDs:
 0-5 or 8-13

Open Bays

Bank E
Bays: 1-6
SCSI IDs:
 0-5 or 8-13
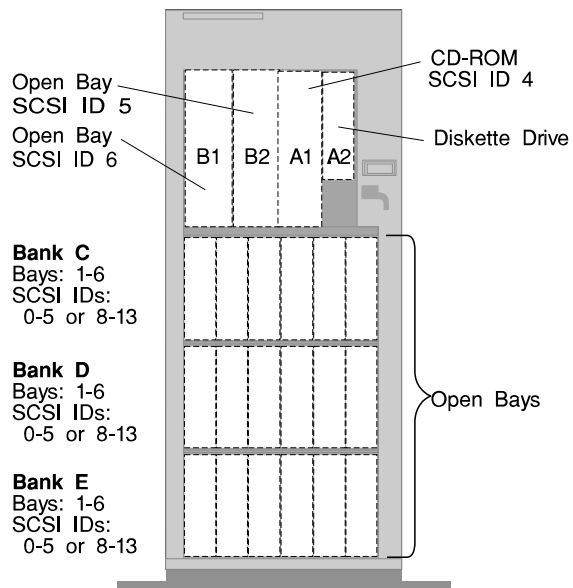
Removing a Disk Drive, Tape Drive, or CD-ROM from Bay A or Bay B

Before you begin:

- Read "Safety Considerations" on page 4-1 and "Handling Static-Sensitive Devices" on page 4-3.

Note: To locate bay A or bay B, see the illustration given on page 4-78.

To remove a drive from bay A or bay B, do the following steps:

1. If you have not already done so, remove the covers as described in "Removing Both the Front and Side Covers" on page 4-10.

2. Locate the drive you want to remove.

3. Slide the drive halfway out of the front of the bay.

4. Disconnect the cables from the back of the drive.

5. Remove the drive from the bay. Store the drive in a safe place.

6. Go to Table A-2 on page A-4 and update the drive information; then return here to determine your next step.

7. If you are removing another internal drive from bay A or bay B, return to step 2.

8. If you are installing another internal drive in bay A or bay B, go to step "Installing a Disk Drive, Tape Drive, or CD-ROM in Bay A or Bay B" on page 4-41.

9. If you have other procedures to perform, refer to "Option List" on page 4-17.

10. If you do not have any other procedures to perform, replace the covers as described in "Replacing Both the Front and Side Covers" on page 4-96.

Removing a Hot-Swap SCSI Disk Drive from Bank C, D, or E

┌─ **Before you begin:** ──────────────────────────────────┐
│   │
│ • Read "Safety Considerations" on page 4-1 and "Handling Static-Sensitive │
│   Devices" on page 4-3.   │
│   │
└──┘

Notes:

- To locate banks C, D, and E, see the illustration given on page 4-78.

- You do not have to turn off the system to remove a hot-swappable drive from banks C, D, and E.

The lights on the disk drive provide status of the drives. See "Disk Drive Status LED States" on page 2-16 for a definition of the disk drive status.

Attention: An application procedure unique to your operating system must be followed which logically removes the drive from the system and spins it down. If you remove a drive while it is in use, you risk losing valuable data.

To remove a hot-swap drive from bank C, D, or E, do the following steps:

1. If you have not already done so, remove the covers as described in "Removing the Front Covers Only" on page 4-6.

2. Locate the drive you want to remove.

3. Ensure that you have selected the correct drive.

4. Press the spin down button on the drive carrier to remove power from the drive. The green LED should flash.

5. Unlock the drive by turning the carrier latch 90 degrees clockwise to the open position.

6. Disconnect the drive from the connector on the backplane, by grasping the handle on the drive tray and carefully pulling the drive out of the system. Store the drive in a safe place.

   Attention: Handle the disk drive with care as it is very fragile and can be easily damaged if exposed to shock, ESD, or rough handling.

Bank C

Bank D

Bank E
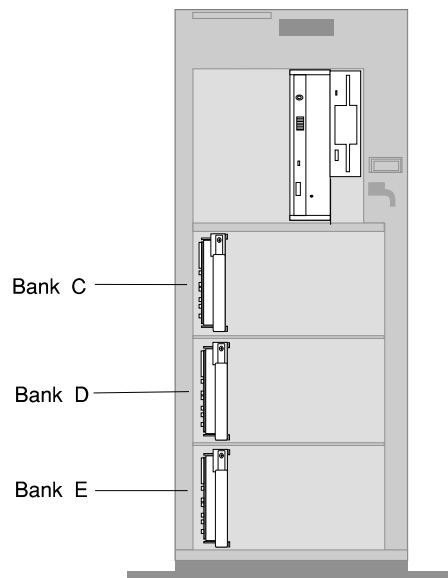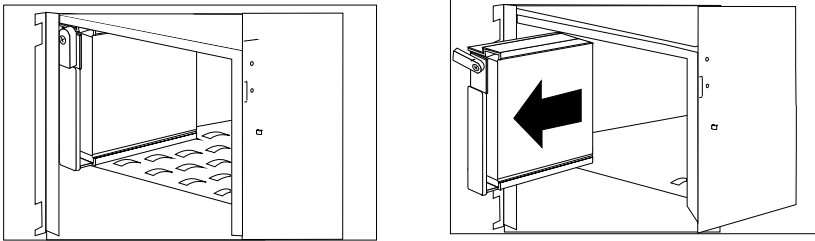
7. If you are removing another SCSI drive, return to step 2 on page 4-81.

8. If you are installing another SCSI drive in bank C, D, or E, go to "Installing a Hot-Swap SCSI Disk Drive in Bank C, D, or E." on page 4-48.

9. Go to Table A-2 on page A-4 and update the drive information; then return here to determine your next step.

10. If you have other procedures to perform, refer to "Option List" on page 4-17.

11. If you do not have any other procedures to perform, replace the covers as described in "Replacing the Front Covers" on page 4-93.

Removing a Hot-Swap SSA Disk Drive from Bank C, D, or E

Before you begin:

- Read "Safety Considerations" on page 4-1 and "Handling Static-Sensitive Devices" on page 4-3.

Notes:

- To locate banks C, D, and E, see the illustration given on page 4-78.

- You do not have to turn off the system to remove a hot-swappable drive from banks C, D, and E.

The lights on the disk drive provide status of the drives. See "Disk Drive Status LED States" on page 2-16 for a definition of the disk drive status.

Attention: An application procedure unique to your operating system must be followed which logically removes the drive from the system and spins it down. If you remove a drive while it is in use, your system may lose valuable data.

To remove a hot-swap drive from bank C, D, or E, do the following steps:

1. If you have not already done so, remove the covers as described in "Removing the Front Covers Only" on page 4-6.

2. Locate the drive you want to remove.

3. Ensure that you have selected the correct drive.

4. Press the spin down button on the drive carrier to remove power from the drive. The green LED should flash.

5. Unlock the drive by turning the carrier latch 90 degrees clockwise to the open position.
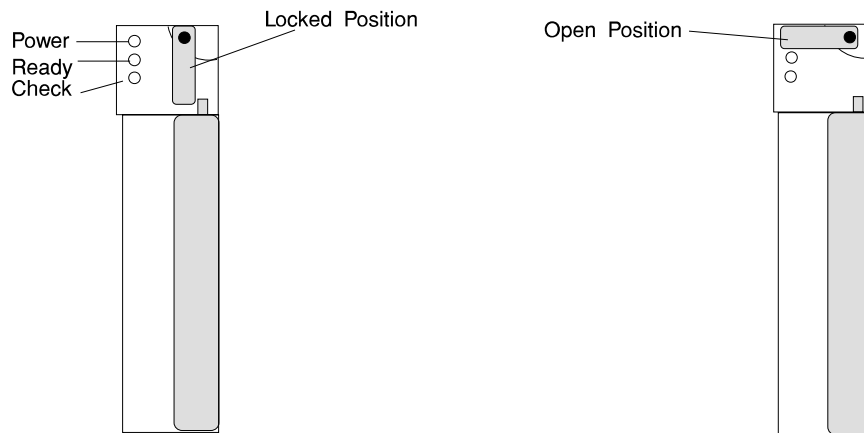
Attention: SSA backplanes must be fully populated. Each bay must have a disk drive or a dummy carrier installed at all times. If you remove a disk drive from a bay and do not replace it with another disk drive, you must install a dummy carrier in that bay.

6. Disconnect the drive from the connector on the backplane, by grasping the handle on the drive tray and carefully pulling the drive out of the system. Store the drive in a safe place.

Attention: Handle the disk drive with care as it is very fragile and can be easily damaged if exposed to shock, ESD, or rough handling.
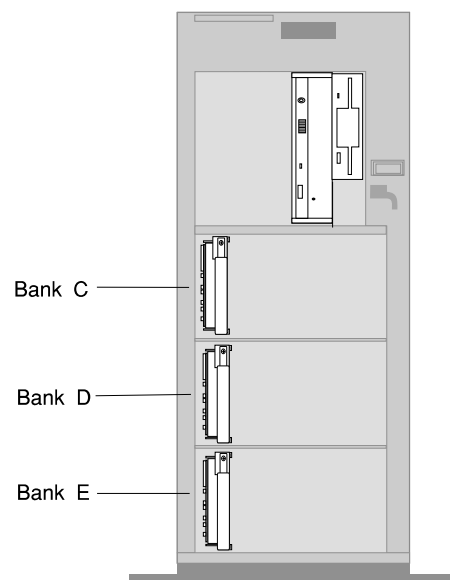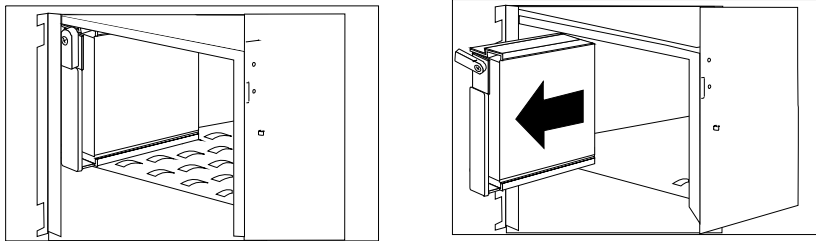
7. If you are removing another SSA drive, return to step 2 on page 4-85.

8. If you are installing another SSA drive in bank C, D, or E, go to "Installing a Hot-Swap SCSI Disk Drive in Bank C, D, or E." on page 4-48.

9. Go to Table A-2 on page A-4 and update the drive information; then return here to determine your next step.

10. If you have other procedures to perform, refer to "Option List" on page 4-17.

11. If you do not have any other procedures to perform, replace the covers as described in "Replacing the Front Covers" on page 4-93.

Installing a Service Processor

> **Before you begin:**
>
> - Read "Safety Considerations" on page 4-1 and "Handling Static-Sensitive Devices" on page 4-3.

1. If you have not already done so, remove the covers as described in "Removing Both the Front and Side Covers" on page 4-10.

2. If a POWER GXT1000 is installed, go to "Removing the POWER GXT1000 Enclosure" on page C-5 for instructions on how to remove it; then return here to determine your next step.

3. Remove the system board cover as described in "Removing the System Board Cover" on page 4-16; then return here to determine your next step.

4. Locate the service processor connector.
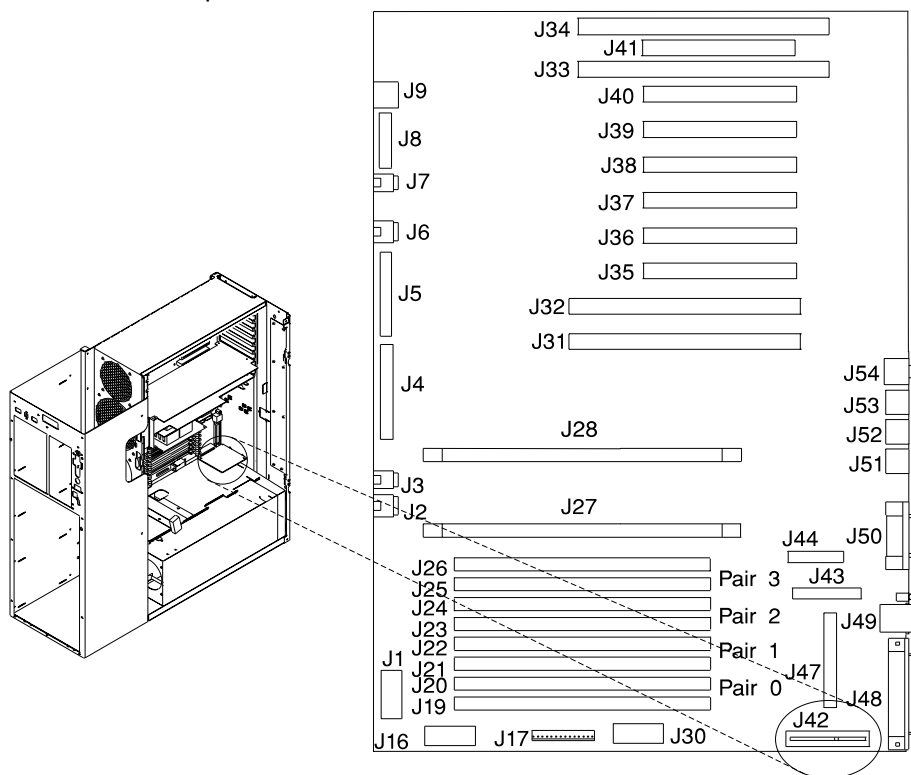
Attention: Make sure the power cord is unplugged and the power LED is OFF before installing the service processor.

5. Install the service processor.
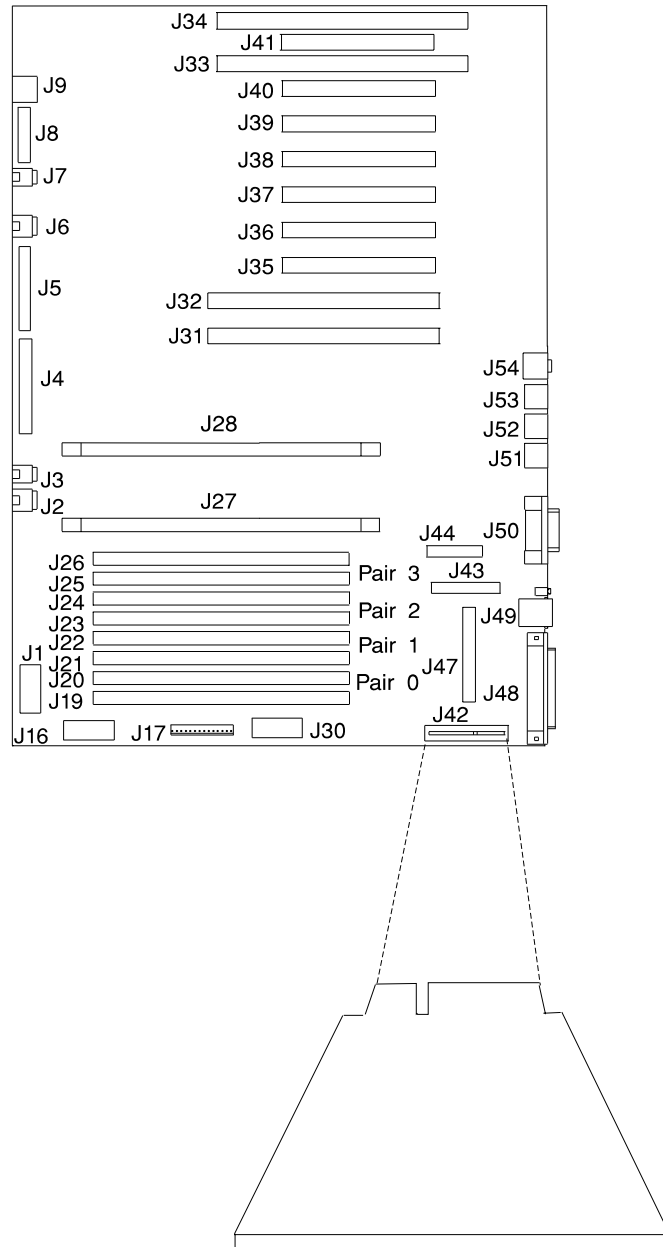
6. Replace the system board cover as described in "Replacing the System Board Cover" on page 4-101; then return here to determine your next step.

7. If a POWER GXT1000 is removed, go to "Reinstalling the POWER GXT1000 Enclosure" on page C-12 for instructions on how to replace it; then return here to determine your next step.

8. If you have other procedures to perform, refer to "Option List" on page 4-17.

9. If you do not have any other procedures to perform, replace the covers as described in "Replacing Both the Front and Side Covers" on page 4-96.

Installing a U-Bolt

> **Before you begin:**
>
> - Read "Safety Considerations" on page 4-1 and "Handling Static-Sensitive Devices" on page 4-3.
>
> Make sure you have:
>
> - A 19 mm (3/4 in.) U-bolt or wire rope (similar to National Manufacturing No. 3230, STK No. 176-735).
>
> - A security cable.
>
> - A lock, such as a combination lock or padlock.
>
> - Remove the system covers as described in "Removing Both the Front and Side Covers" on page 4-10.

1. Install the U-bolt:

   a. Use a screwdriver to remove the two plastic inserts, if present, from the U-bolt opening in the rear panel.
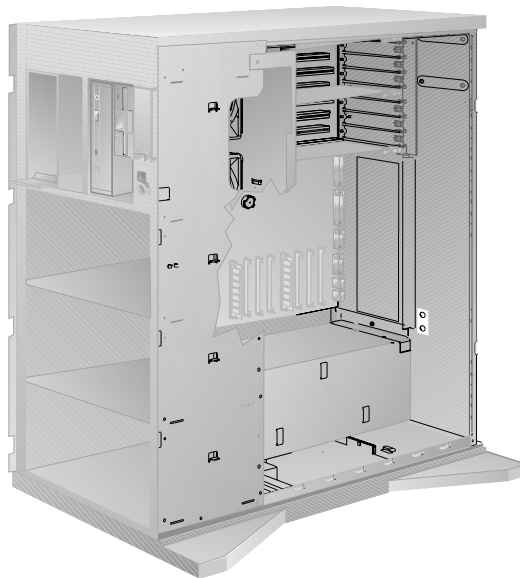
   b. Insert the U-bolt through the holes and secure it in place with the nuts.
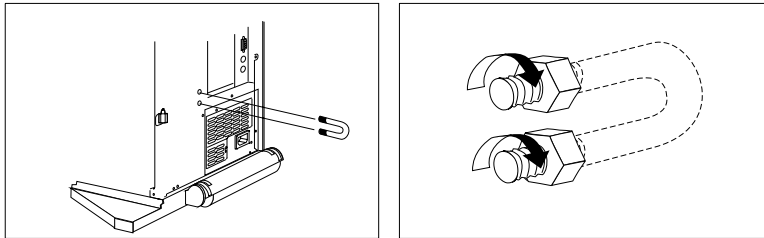
2. Reinstall the system's side and front covers, and attach the cables (see "Replacing Both the Front and Side Covers" on page 4-96).

3. Insert the security cable through the U-bolt. Loop the cable around (or through) an object from which it cannot be removed; then fasten the cable ends together with the lock.
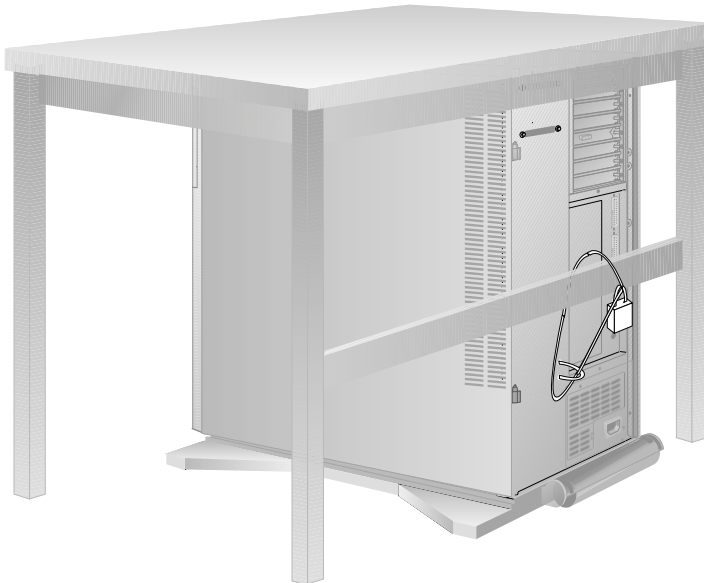
Replacing the Front Covers

 1. Reinstall the front cover:

   Note: Before installing the front cover, verify that the side cover is installed correctly. If the side cover is not properly installed, the front cover will not align correctly when you attempt to install it.

   a. Align the bottom of the front cover with the bottom of the system.

   b. Fit the front cover's bottom hooks into the grooves located on the bottom of the system.

   c. Make sure the keylock is in the unlocked position.

   d. Pivot the front cover upward and press the top of the cover into the top of the system until they snap together and the latch on the left side catches.

e. Lock the keylock on the front cover.

f. Close the latch located on the left side of the front cover.

Keylock

2. Reinstall the door at the front of the system by aligning the pins with the hinges, and sliding the door down.

3. Close the door.
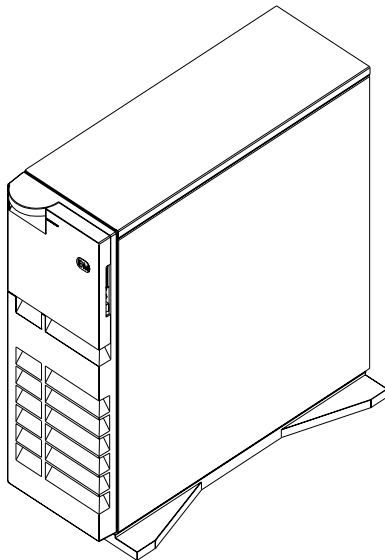
Attention: Be sure to maintain a clearance of at least 51 mm (2 inches) on all sides of the system to allow for air circulation.

Replacing Both the Front and Side Covers

1. Reinstall the side cover:

   a. Align the pins on the rear of the side cover with the two hinges on the rear of the system. Open the side cover to a 90 degree angle.

   b. Slide the side cover down.

   c. Push the side cover to close it.

2. Reinstall the front cover:

   Note: Before installing the front cover, verify that the side cover is installed correctly. If the side cover is not properly installed, the front cover will not align correctly when you attempt to install it.

   a. Align the bottom of the front cover with the bottom of the system.

   b. Fit the front cover's bottom hooks into the grooves located on the bottom of the system.

   c. Make sure the keylock is in the unlocked position.

   d. Pivot the front cover upward and press the top of the cover into the top of the system until they snap together and the latch on the left side catches.

e. Lock the keylock on the front cover.

f. Close the latch located on the left side of the front cover.

Keylock

3. Reinstall the door at the front of the system by aligning the pins with the hinges, and sliding the door down.

4. Close the door.
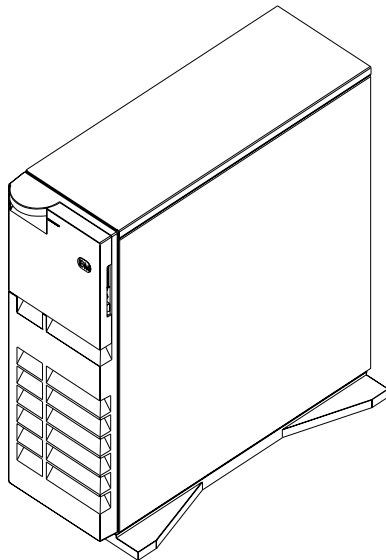
Attention: Be sure to maintain a clearance of at least 51 mm (2 inches) on all sides of the system to allow for air circulation.

5. Connect all cables to the back of the system, then plug all power cords into properly grounded electrical outlets.

   Note: If you are in the United Kingdom and have a modem or fax machine attached to your system, reconnect the telephone line *after* you plug in the power cords.
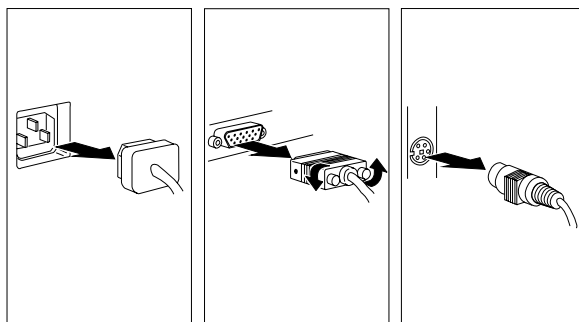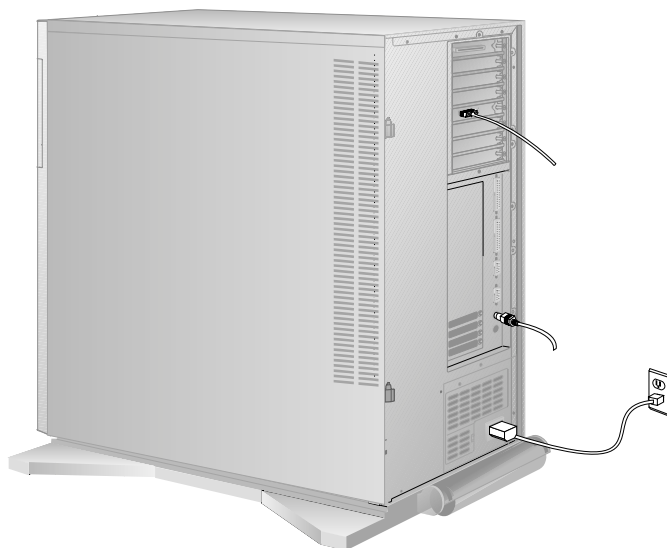
Replacing the System Board Cover

1. Replace the system board cover.

2. Latch the cover and tighten the three screws.

Latches
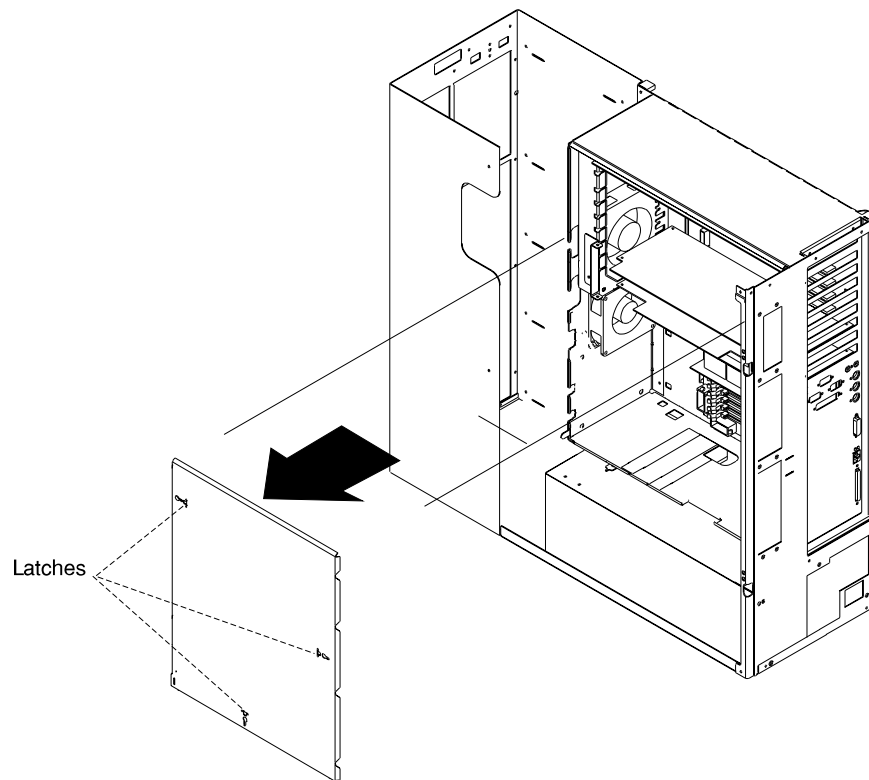
Chapter 5. Using the Standalone and Online Diagnostics

Sources for the Diagnostic Programs

The diagnostics consist of Standalone Diagnostics and Online Diagnostics. Standalone Diagnostics are resident on removable media. They must be booted or mounted before they can be run. If booted, they have no access to the AIX Error Log or the AIX Configuration Data. However, if mounted, they have access to the AIX Error Log and the AIX Configuration Data.

Online Diagnostics, when installed, are resident with AIX on the disk or server. They can be booted in single user mode (referred to as service mode), run in maintenance mode (referred to as maintenance mode), or run concurrently (referred to as concurrent mode) with other applications. They have access to the AIX Error Log and the AIX Configuration Data.

Standalone and Online Diagnostics Operating Considerations

The following items identify some things to consider before using the diagnostics.

- Run Online Diagnostics in Service Mode when possible, unless otherwise directed. The Online Diagnostics perform additional functions, compared to Standalone Diagnostics.

- When running Online Diagnostics, device support for some devices may not have been installed. If this is the case, that device will not appear in the resource list.

- When running Standalone Diagnostics, device support for some devices may be contained on supplemental diagnostic media. If this is the case, the device will not appear in the resource list when running diagnostic unless the supplemental media has been processed.

- Support for some tty terminals is optionally installed. If you attach a tty terminal to a system to run diagnostics beware that it may not work properly since the AIX support for the terminal may not be installed.

Selecting a Console Display

When you run Standalone Diagnostics and under some conditions Online Diagnostics, you need to select the console display. The diagnostics display instructions on any graphics display and the terminal attached to the S1 port.

Identifying the Terminal Type to the Diagnostics Programs

Note: This is a different function than selecting a console display.

When you run diagnostics, the diagnostics must know what type of terminal you are using. If the terminal type is not known when the FUNCTION SELECTION menu is displayed, the diagnostics do not allow you to continue until a terminal is selected from the DEFINE TERMINAL option menu. Select lft for adapter-attached displays.

Undefined Terminal Types

If an undefined terminal type from the DEFINE TERMINAL option menu is entered, the menu will prompt the user to enter a valid terminal type, and the menu will be redisplayed until either a valid type is entered or the user exits the DEFINE TERMINAL option.

Resetting the Terminal: If the user enters a terminal type that is valid (according to the DEFINE TERMINAL option menu) but is not the correct type for the ASCII terminal being used, difficulty may be encountered in reading the screen, using the function keys or the Enter key. These difficulties can be bypassed by pressing Ctrl-C to reset the terminal. The screen display which results from this resetting action varies with the mode in which the system is being run:

- Online Normal or Maintenance Mode - The command prompt appears.

- Standalone Mode or Online Service Mode -The terminal type will be reset to "dumb", the Diagnostic Operating Instruction panel will be displayed, and the user will be required to go through the DEFINE TERMINAL process again.

Running Standalone Diagnostics

Consider the following when you run Standalone Diagnostics:

- The diagnostic disc must remain in the CD-ROM drive for the entire time that diagnostics are executing.

- The diagnostic CD-ROM disc cannot be ejected from the CD-ROM drive once the diagnostic programs have loaded. The disc can only be ejected after the system has been powered-Off and then powered-On (Standalone mode) or after the diagnostics program has terminated (Online concurrent mode). The disc must be ejected prior to the system attempting to load the diagnostic programs again.

- The CD-ROM drive from which diagnostics were loaded cannot be tested.

- The SCSI adapter (or circuitry) controlling the CD-ROM drive from which diagnostics were loaded cannot be tested.

Running Online Diagnostics

Consider the following when you run the Online Diagnostics from a server or a disk:

- The diagnostics cannot be loaded and run from a disk until the AIX operating system has been installed and configured. After the installation of the AIX operating system, all three modes of operation are available.

- The diagnostics cannot be loaded on a system (client) from a server if that system is not set up to IPL from a server over a network, or the server has not been setup to send a service mode IPL of the diagnostics. When the system is set up to IPL from a server, the diagnostics are executed in the same manner as they are from disk.

- If the diagnostics were loaded from disk or a server, you must shutdown the AIX operating system before powering the system unit off to prevent possible damage to disk data. This is done in one of two ways:

  - If the diagnostic programs were loaded in Standalone mode, press the F3 key until DIAGNOSTIC OPERATING INSTRUCTIONS displays; then follow the displayed instructions to shutdown the AIX operating system.

  - If the diagnostic programs were loaded in maintenance or concurrent mode, enter the shutdown -F command.

- Under some conditions the system may stop, with instructions displayed on attached displays and terminals. Follow the instructions to select a console display.

Running the Diagnostics from a tty terminal

Consider the following when you run diagnostics using a tty-type terminal as the console display:

- See the operator manual for your type of tty terminal to find the key sequences you need to respond to the diagnostics. For the 3151, refer to the 3151 ASCII Display Station Guide to Operations, form number GA18-2633. For the 3164, refer to the 3164 ASCII Color Display Station Description, form number GA18-2617.

- When the diagnostics present display information through the S1 port, certain attributes are used. These attributes are set as if the diagnostics were using a 3161 display terminal. The following tables list attributes for the 3161 ASCII Display Terminal and for two other ASCII display terminals commonly used with the system.

- If you have a tty terminal other than a 3151, 3161 or 3164 attached to the S1 port, your terminal may have different names for the attributes. Use the attribute descriptions in the following tables to determine the settings for your terminal.

General Attributes Always Required

The following general attributes are the default settings for the diagnostics. Be sure your terminal is set to these attributes.

Note: These attributes should be set before the diagnostics are loaded.

Refer to the following table.

General Setup Attributes	3151 /11/31 /41 Settings	3151 /51/61 Settings	3161 /3164 Settings	Description
Machine mode	3151	3151	3161 or 3164	The diagnostics are set to emulate use of the 3161 ASCII Display Terminal. If your terminal can emulate a 5085, 3161 or 3164 terminal, use the following attribute settings. Otherwise, refer to your operator's manual, compare the following attribute descriptions with those of your terminal, and set your attributes accordingly.
Generated Code Set		ASCII		
Screen	Normal	Normal		Uses the EIA-232 interface protocol.
Row and column	24 x 80	24 x 80		Uses the EIA-232 interface protocol.
Scroll	Jump	Jump	Jump	When the last character on the bottom line is entered, the screen moves down one line.
Auto LF	Off	Off	Off	For the "On" setting, pressing the Return key moves the cursor to the first character position of the next line. For the "Off" setting, pressing the Return key moves the cursor to the first character position of the current line. The CR and LF characters are generated by the New line setting.

General Setup Attributes	3151 /11/31 /41 Settings	3151 /51/61 Settings	3161 /3164 Settings	Description
CRT saver	Off	Off	10	The "10" setting causes the display screen to go blank if there is no activity for 10 minutes. When the system unit sends data or a key is pressed, the display screen contents are displayed again.
Line wrap	On	On	On	The cursor moves to the first character position of the next line in the page after it reaches the last character position of the current line in the page.
Forcing insert	Off	Off		
Tab	Field	Field	Field	The column tab stops are ignored, and the tab operation depends on the field attribute character positions.
Trace			All	Both inbound data (data to the system unit) and outbound data (data from the system unit) to and from the main port can be transferred to the auxiliary port without disturbing communications with the system unit when the Trace key is pressed.

Additional Communication Attributes

The following communication attributes are for the 3151, 3161, and 3164 terminals.

Communication Setup Attributes	3151 /11/31 /41 Settings	3151 /51/61 Settings	3161 /3164 Settings	Description
Operating mode	Echo	Echo	Echo	Data entered from the keyboard on the terminal is sent to the system unit for translation and then sent back to the display screen. Sometimes called conversational mode.
Line speed	9600 bps	9600 bps	9600 bps	Uses the 9600 bps (bits per second) line speed to communicate with the system unit.
Word length (bits)	8	8	8	Selects eight bits as a data word length (byte).
Parity	No	No	No	Does not add a parity bit, and is used together with the word length attribute to form the 8-bit data word (byte).
Stop bit	1	1	1	Places a bit after a data word (byte).
Turnaround character	CR	CR	CR	Selects the carriage return (CR) character as the line turnaround character.
Interface	EIA-232	EIA-232	EIA-232	Uses the EIA-232 interface protocol.
Line control	IPRTS	IPRTS	IPRTS	Uses the permanent request to send' (IPRTS) signal to communicate with system unit.
Break signal (ms)	500	500	500	The terminal sends a break signal' to the system unit within 500 ms after the Break key is pressed.
Send null suppress	On	On		Trailing null characters are not sent to the system unit.

Communication Setup Attributes	3151 /11/31 /41 Settings	3151 /51/61 Settings	3161 /3164 Settings	Description
Send null			On	Trailing null characters are sent to the system unit.
Response delay (ms)	100	100	100	The terminal waits for 100ms for the system unit to respond.

Additional Keyboard Attributes

The following keyboard attributes are for the keyboard attached to the 3151, 3161, and 3164 terminals.

Keyboard Setup Attributes	3151/11/ 31/41 Settings	3151 /51/61 Settings	3161 /3164 Settings	Description
Enter	Return	Return	Return	The Enter key functions as the Return key.
Return	New line	New line	New line	The cursor moves to the next line when the Return key is pressed.
New line	CR	CR	CR	The Return key generates the carriage return (CR) and the line feed (LF) characters. The line turnaround occurs after the CR and LF characters are generated.
Send	Page	Page	Page	The contents of the current page are sent to the system unit when the Send key is pressed.
Insert character	Space	Space	Space	A blank character is inserted when the Insert key is pressed.

Additional Printer Attributes

The following printer attributes are for a printer attached to the 3151, 3161, and 3164 terminals.

Printer Setup Attributes	3151/11/ 31/41 Settings	3151 /51/61 Settings	3161 /3164 Settings	Description
Line speed	9600	9600	9600	Uses 19200 or 9600 bps (bits per second) line speed to communicate with the system unit.
Word length (bits)	8	8	8	Selects eight bits as a data word length (byte).
Parity	Even	Even	No	
Stop bit	1	1	1	Places a bit after a data word (byte).
Characters	ALL	ALL		
Line end			CR-LF	
Print			Viewport	
Print EOL			Off	
Print null			Off	

Online Diagnostics Mode of Operation

The Online diagnostics can be run in three modes:

- Service Mode allows checking of most system resources.
- Concurrent Mode allows the normal system functions to continue while selected resources are being checked.
- Maintenance Mode allows checking of most system resources

Service Mode

Service mode provides the most complete checkout of the system resources. This mode also requires that no other programs be running on the system. All system resources except the SCSI adapter, and the disk drives used for paging can be tested. However, note that system memory and the processor are only tested during POST.

Error log analysis is done in service mode when you select *the* Problem
Determination option on the DIAGNOSTIC MODE SELECTION menu.

Running the Online Diagnostics in Service Mode (Service Mode IPL)

To run Online diagnostics in service mode, take the following steps:

 1. Stop all programs including the AIX operating system (get help if needed).

 2. Remove all tapes, diskettes, and CD-ROM discs.

 3. Turn the system unit's power off.

 4. Turn the system unit's power on.

 5. After the first POST indicator appears on the system unit's console, press F6 on
    the direct attached keyboard or 6 on the tty keyboard to indicate that diagnostics
    are to be loaded.

    Note: The term "POST indicator" refers to the ICONS (graphic display) or
    device mnemonics (ASCII terminal) that are displayed while the POST are
    executing.

 6. Enter any requested password.

 7. Follow any instructions to select a console.

 8. After the diagnostic controller loads, DIAGNOSTIC OPERATING
    INSTRUCTIONS appear on the console display.

 9. Follow the displayed instructions to checkout the desired resources.

10. When testing is complete; use the F3 key to return to the DIAGNOSTIC
    OPERATING INSTRUCTIONS.

11. Press the F3 key (from a defined terminal) or press 99 (for an undefined
    terminal) to shutdown the diagnostics before turning off the system unit.

Note: Pressing the F3 key (from a defined terminal) produces a "Confirm Exit"
        popup menu which offers two options: continuing with the shutdown by
        pressing F3; or returning to diagnostics by pressing Enter.

        For undefined terminals, pressing 99 will produce a full screen menu which
        offers two options: continuing with the shutdown by pressing 99 and then
        Enter; or returning to diagnostics by pressing Enter.

Concurrent Mode

Concurrent mode provides a way to run Online diagnostics on some of the system
resources while the system is running normal system activity.

Because the system is running in normal operation, some of the resources cannot be tested in concurrent mode. The following resources cannot be tested in concurrent mode:

- SCSI adapters connected to paging devices
- The disk drive used for paging
- Some display adapters
- Memory
- Processor.

There are three levels of testing in concurrent mode:

- The **share-test level** tests a resource while the resource is being shared by programs running in the normal operation. This testing is mostly limited to normal commands that test for the presence of a device or adapter.

- The **sub-test level** tests a portion of a resource while the remaining part of the resource is being used in normal operation. For example, this test could test one port of a multiport device while the other ports are being used in normal operation.

- The **full-test level** requires the device not be assigned to or used by any other operation. This level of testing on a disk drive may require the use of the **varyoff** command. The diagnostics display menus to allow you to vary off the needed resource.

Error log analysis is done in concurrent mode when you select *the* Problem Determination option on the DIAGNOSTIC MODE SELECTION menu.

To run the Online diagnostics in concurrent mode you must be logged onto the AIX operating system and have proper authority to issue the commands (if needed, get help).

The **diag** command loads the diagnostic controller and displays the Online diagnostic menus.

Running the Online Diagnostics in Concurrent Mode

To run Online diagnostics in concurrent mode, take the following steps:

- Log on to the AIX operating system as root or superuser.
- Enter the diag command.
- When the DIAGNOSTIC OPERATING INSTRUCTIONS are displayed, follow the instructions to check out the desired resources.

- When testing is complete; use the F3 key to return to the DIAGNOSTIC OPERATING INSTRUCTIONS. Then press the F3 key again to return to the AIX operating system prompt. Be sure to vary on any resource you had varied to off.

- Press the Ctrl-D key sequence to log off from root or superuser.

Maintenance Mode

Maintenance mode runs the Online diagnostics using the customer's version of the AIX operating system. This mode requires that all activity on the AIX operating system be stopped so the Online diagnostics have most of the resources available to check. All of the system resources except the SCSI adapters, memory, processor, and the disk drive used for paging can be checked.

Error log analysis is done in maintenance mode when you select *the Problem Determination* option on the *DIAGNOSTIC MODE SELECTION* menu.

The **shutdown -m** command is used to stop all activity on the AIX operating system and put the AIX operating system into maintenance mode. Then the **diag** command is used to invoke the diagnostic controller so you can run the diagnostics. After the diagnostic controller is loaded, follow the normal diagnostic instructions.

Running the Online Diagnostics in Maintenance Mode

To run the Online diagnostics in maintenance mode you must be logged on to the customer's version of the AIX operating system as *root* or *superuser* and use the **shutdown -m** and **diag** commands. Use the following steps to run the Online diagnostics in maintenance mode:

1. Stop all programs except the AIX operating system (get help if needed).

2. Log onto the AIX operating system as *root* or *superuser*.

3. Enter the **shutdown -m** command.

4. When a message indicates the system is in maintenance mode, enter the **diag** command.

   Note: It may be necessary to set *TERM* type again.

5. When *DIAGNOSTIC OPERATING INSTRUCTIONS* is displayed, follow the displayed instructions to checkout the desired resources.

6. When testing is complete; use the F3 key to return to *DIAGNOSTIC OPERATING INSTRUCTIONS.* Then press the F3 key again to return to the AIX operating system prompt.

7. Press Ctrl-D to log off from *root* or *superuser*.

Standalone Diagnostic Operation

Standalone Diagnostics provide a method to test the system when the Online Diagnostics are not installed and a method of testing the disk drives and other resources that can not be tested by the Online Diagnostics.

Error Log Analysis is not done by the Standalone Diagnostics.

If running from CD-ROM, the CD-ROM drive and the SCSI controller that controls it cannot be tested by the Standalone Diagnostics.

Running the Standalone Diagnostics

To run Standalone Diagnostics in service mode, take the following steps:

1. Stop all programs including the AIX operating system (get help if needed).

2. Remove all tapes, diskettes, and CD-ROMs.

3. Turn the system unit's power off.

4. Set the key mode switch to the service position.

5. Turn the system unit's power on.

6. Insert the diagnostic media drive.

7. When the keyboard POST indicator appears, press the F5 key on the direct attached keyboard, or the number 5 key on the tty keyboard.

8. Enter any requested passwords.

9. Follow any instruction to select the console.

10. After the diagnostic controller loads, DIAGNOSTIC OPERATING INSTRUCTIONS appear on the console display.

11. Follow the displayed instructions to checkout the desired resources.

12. When testing is complete; use the F3 key to return to the DIAGNOSTIC OPERATING INSTRUCTIONS.

General Information About Multiple Systems

This chapter presents guideline information for anyone needing to run the diagnostic programs on a system unit that is attached to another system. These guidelines are intended for both the operator of the system and the service representative.

This guideline is presented by adapter type or by system configuration type.

These considerations and actions are not detailed step-by-step instructions, but are used to ensure that you have considered the attached system before you run diagnostics on this system unit.

You are directed to the detailed procedures for the various activities as needed.

These guidelines generally present considerations for the following:

- Starting and stopping the communications with the other system.
- Considerations before running diagnostics on the system.
- Analyzing the error log information.
- Using the wrap plugs with the diagnostics.

When this system unit is attached to another system, be sure you isolate this system unit before stopping the operating system or running diagnostic programs. Some system cabling changes (such as installing wrap plugs or removing a device from the configuration) may require action by the operator of the attached system before making the cabling changes on this system.

High-Availability SCSI

A high-availability SCSI configuration consists of two system units or CPU drawers connected to a common set of SCSI devices. The configuration provides high-availability because either system unit or CPU drawer can continue to access the common devices while the other system is unavailable.

The actions needed to isolate a particular system unit or device from the configuration depends on the software controlling the systems and devices. Therefore, be sure you use the documentation with the software to prepare the configuration before turning a system unit or device off.

High-Availability Cabling

Refer to *RS/6000 Adapter, Device, and Cable Information for Multiple Bus Systems*.

Diagnostic Summary

Memory and Processor Testing

- Memory and Fixed-Point Processors are only tested during POST.

- A complete memory test is run during POST.

- The POST will only halt and report problems that prevent the system from booting.

- All other problems are logged into Residual Data and are only analyzed and reported if the Base System or Memory Diagnostic is run.

- The Base System Diagnostic also tests the Floating Point Processor.

Residual Data Analysis

Residual Data is only analyzed if the Base System or Memory Diagnostic is run.

- Residual Data Analysis report problems that are logged by ROS (firmware) during boot.

Error Log Analysis

- Error Log Analysis is analysis of the AIX Error Log.

- Error Log Analysis is part of the diagnostic applications and is invoked by selecting a device form the DIAGNOSTIC SELECTION menu, by using the **diag** command, or selecting the Run Error Log Analysis task.

- Error Log Analysis is only preformed when running online diagnostics.

- Error Log Analysis is NOT preformed when running from removable media except for mounted CD-ROM.

- Error Log Analysis will only report problems if the errors have reached defined thresholds. Thresholds can be from 1 to 100 depending upon the error.

- Permanent errors do not necessarily mean a part should be replaced.

- Automatic Error Log Analysis (diagela) provides the capability to do error log analysis whenever a permanent hardware error is logged.

Diagnostic Modes: The Diagnostic Modes consist of Problem Determination Mode and System Verification Mode. The only difference between the two modes is one performs ELA and the other does not.

- Problem Determination Mode will run all tests unless the resource is being used. If a problem is not found, then Error Log Analysis is performed.

- In Problem Determination Mode, Error Log Analysis is performed even if a resource is being used.

- A screen will always appear informing the user that the resource needs to be freed if a resource is being used.

- System Verification Mode does not do ELA. This mode should be run when doing a repair verification.

- Residual Data Analysis is done in either mode.

4.2 Diagnostic Changes

Tasks are operations that can be performed on a resource. Running Diagnostics, Displaying VPD, or Formatting a Device, are examples of tasks. Service Aid functionality should also be considered a task.

Resources are devices used by the system unit. Diskette Drive, and CD ROM Drive are examples of resources.

The FUNCTION SELECTION menu was enhanced with two new selections allowing either all resources, or all tasks to be displayed. When Task Selection is made and a task has been selected a list of supporting resources will be displayed. Alternatively, when Resource Selection is made, and a resource or group of resources are selected, a list of supporting common tasks are displayed. Also, to aid with backward compatibility the FUNCTION SELECTION menu contains 'Diagnostic' and Advanced Diagnostic'.

The 'Display or Change Diagnostic Run Time Options' task can be used to set advanced mode diagnostics, looping capability, and ELA mode when running diagnostics from the Task Selection menu.

The following sections describe the 4.2 Diagnostic Subsystem.

diag Command Line Options:

```
COMMAND LINE OPTIONS:

        diag Command line flags are as follows:

        -a      Perform missing device analysis.
        -c      Machine is unattended.  No prompts should be displayed.
        -d resource  Test the named resource.
                The "resource" parameter is the /dev entry.
        -e      Error Log Analysis.
                Checks the error log for device specified in "resource"
                of the -d option.
        -s      Test the system.
        -A      Advanced Diagnostics
        -B      Base system test
        -S      Test the Test Suite Group
        -v      System Verification mode.
                        1 - Base system
                        2 - I/O Devices
                        3 - Async Devices
                        4 - Graphics Devices
                        5 - SCSI Devices
                        6 - Storage Devices
                        7 - Commo Devices
                        8 - Multimedia Devices

        Entering diag -h from the command line prints out an
        appropriate usage statement.

        Default execution mode is non-advanced mode.
```

Location Codes

The basic format of the system unit's location code is:

```
AB-CD-EF-GH     non-SCSI
        G,H   SCSI
```

For planars, cards, and non-SCSI devices the location code is defined as:

```
AB-CD-EF-GH
 |  |  |  |
 |  |  |  Device/FRU/Port ID
 |  |  Connector ID
 |  Slot or Adapter Number
 Bus Type
```

AB identifies a bus type, CD identifies a slot or adapter number, EF a connector identifier, and GH is a port identifier, address, memory module, device, or FRU. Adapters/cards are identified with just AB-CD.

The possible values for AB are as follows:

```
00      for processor bus
01      for ISA buses
04      for PCI buses
05      for PCMCIA buses (not supported)
```

The possible values for CD depend on the adapter or card. For pluggable adapters/cards this is a two digit slot number in the range from 01 to 99. However, in the case of ISA cards these numbers do not actually correspond to the physical slot numbers. They are simply based on the order the ISA cards are defined/configured either by SMIT or the ISA Adapter Configuration Service Aid.

For integrated adapters the first character in CD is a letter in the range from A to Z. This letter is based on the order that the integrated adapters are defined in residual data and ensures unique location codes for the integrated adapters. The D is set to 0.

EF is the Connector ID. It is used to identify the adapter connector that a resource is attached too.

GH is a port identifier, address, memory module, device, or FRU. It identifies a port, device, or a FRU. GH has several meanings depending upon the resource type. They are:

- For memory cards GH defines a memory module. Values for GH are 1 through 16.

  For systems that have memory modules that plug directly into the system planar the location code is 00-00-00-GH where GH is the memory module slot. For system that have memory cards with memory modules, the location code is 00-CD-EF-GH where CD is the card slot and GH is the memory module slot.

- For caches GH defines the cache. Values for GH are 01 through 16.

- For PCMIAs GH defines the PCMIA. Values for GH are 01 through 16.

- For async devices GH defines the port on the fanout box. Values are 00 to 15.

- For a diskette drive H defines which diskette drive 1 or 2. G is always 0.

- For all other devices GH is equal to 00.

For integrated adapters, EF-GH will be the same as the definition for a pluggable adapter. For example, the location code for a diskette drive will be 01-A0-00-00.

For SCSI the Location Code is defined as:

```
AB-CD-EF-G,H
 |  |  | | |
 |  |  | | Logical Unit Address of SCSI Device
 |  |  | Control Unit Address of SCSI Device
 |  |  Connector ID
 |   Slot or Adapter Number
 Bus Type
```
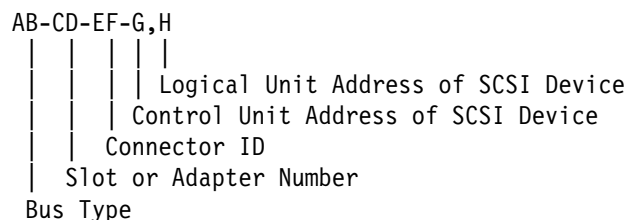
Where AB-CD-EF are the same as non-SCSI devices.

G defines the control unit address of the device. Values of 0 to 15 are valid.

H defines the logical unit address of the device. Values of 0 to 255 are valid.

Examples:

```
Processor-PCI bus
  00-00              PCI bus

Memory module in system planar
  00-00-00-01

Memory module in card
  00-0A-00-01

Integrated PCI adapters for
  04-A0              ISA bus (Integrated PCI-ISA bridge)
  04-B0              Secondary PCI bus (Integrated PCI-PCI bridge)
  04-C0              Integrated PCI SCSI controller

Non-integrated PCI adapters
  04-01              Any PCI card in slot 1
  04-02              Any PCI card in slot 2

Integrated ISA adapters
  01-A0              Diskette adapter
  01-B0              Parallel port adapter
  01-C0              Serial port 1 adapter
  01-D0              Serial port 2 adapter
  01-E0              Keyboard adapter
  01-F0              Mouse adapter

Non-integrated ISA adapters
  01-01              First ISA card defined/configured
  01-02              Second ISA card defined/configured
  01-03              Third ISA card defined/configured
  01-04              Fourth ISA card defined/configured

Device attached to SCSI controller
  04-C0-01-4,0       Device attached to Integrated PCI SCSI controller
```

Chapter 6. Introduction to Tasks and Service Aids

The AIX Diagnostic Package contains programs that are referred to as either Tasks or Service Aids. These programs are accessed differently depending on the level of AIX diagnostics installed. If you are running AIX Diagnostics version 4.2 or later, the programs are called Tasks. Tasks perform a given function; while service aids act as a subset of the chosen task.

To perform a Task, use the following from the Function Selection Menu:

- Task Selection (Diagnostics, Advanced Diagnostics, Service Aids, etc).

  This selection will list the tasks supported by these procedures. Once a task is selected, a resource menu may be presented showing all resources supported by the task.

If you are running AIX Diagnostics prior to and including version 4.1.x, the programs are called Service Aids.

To perform a Service Aid, use the following from the Function Selection Menu:

- Service Aids

  This selection will look at the machine configuration, exercise external interfaces, format media, look at past diagnostic results, control what resources are tested, check out media, etc.

Tasks

Service Aids are invoked via a task selection from the following list:

Note:

- Add or Delete Drawer Configuration
- Add Resource to Resource List
- AIX Shell Prompt
- Backup and Restore Media
- Change Hardware Vital Product Data
- Check Spare Sectors Service
- Configure Dials and LPFKeys
- Configure ISA Adapters
- Configure Ring Indicate Power On

- Configure Service Processor
- Create Customized Diagnostic Configuration Diskette
- Delete Resource from Resource List
- Disk Maintenance
- Disk Media
- Display/Alter Bootlist
- Display Configuration and Resource List
- Display Hardware Error Report
- Display Hardware Vital Product Data
- Display Machine Check Error Log
- Display or Change Diagnostic Run Time Options
- Display Previous Diagnostic Results
- Display Resource Attributes
- Display Service Hints
- Display Software Product Data
- Display Test Patterns
- Generic Microcode Download
- Local Area Network Analyzer
- Microcode Download
- Periodic Diagnostics
- PCI RAID Physical Disk Identify
- Process Supplemental Media
- Run Diagnostics
- Run Error Log Analysis
- SCSI Bus Analyzer
- SCSI Device Identification and Removal=
- SCSI Tape Utility
- SSA Service Aid
- Update Disk Based Diagnostics
- 7135 RAIDiant Array Service Aids

- 7318 Serial Communication Network Server

aids which are provided.

AIX Shell Prompt Service Aid

This service aid allows access to the AIX command line. In order to use this service aid the user must know the root password (when a root password has been established).

Backup/Restore Media Service Aid

This service aid allows verification of backup media and devices. It presents a menu of tape and diskette devices available for testing and prompts for selection of the desired device. It then presents a menu of available backup formats and prompts for selection of the desired format. The supported formats are tar, backup, and cpio. After the device and format are selected, the service aid backups a known file to the selected device, restores that file to /tmp, and compares the original file to the restored file. The restored file is also left in /tmp to allow for visual comparison. All errors are reported.

Configure Ring Indicate Power On Service Aid

This service aid allows the user to display and change the NVRAM settings for the Ring Indicate Power On capability of the service processor.

The settings allows the user to:

- Enable/Disable power on from Ring Indicate
- Read/Set the number of rings before power on

Configure Service Processor Service Aid

This service aid allows you to display and change the NVRAM settings for the service processor.

Enter one of the following service aids:

- Surveillance Setup
- Modem Configuration
- Call In/Call Out Setup
- Site Specific Call In/Call Out Setup

Surveillance Setup Service Aid

This service aid allows you to display and change the NVRAM settings for the surveillance capability of the service processor.

The settings allow you to:

- Enable/disable surveillance
- Set the surveillance time interval, in minutes
- Set the surveillance delay, in minutes

The current settings are read from NVRAM and displayed on the screen. Any changes made to the data shown are written to NVRAM.

Modem Configuration Service Aid

Use this service aid when setting the NVRAM for a modem attached to any of the Service Processor's serial ports. The user inputs the file name of a modem configuration file and the serial port number. The formatted modem configuration file is read, converted for NVRAM than loaded into NVRAM. Refer to the "Service Processor Installation and User's Guide" for more information.

Call In/Out Setup Support Service Aid

This service aid allows the user to display and change the NVRAM settings for the Call In/Call Out capability of the service processor.

The settings allows the user to:

- Enable/Disable call in on either serial port.
- Enable/Disable call out on either serial port.
- Set the line speed on either serial port.

Site Specific Call In/Out Setup Support Service Aid

This service aid allows you to display and change the NVRAM settings that are site specific for the call in/call out capability of the service processor.

The site specific NVRAM settings allow you to:

- Set the phone number for the service center
- Set the phone number for the customer administration center
- Set the phone number for a digital pager

- Set the phone number for the customer system to call in
- Set the phone number for the customer voice phone
- Set the customer account number
- Set the call out policy
- Set the customer RETAIN id
- Set the customer RETAIN password
- Set the remote timeout value
- Set the remote latency value
- Set the number of retries while busy
- Set the system name

The current settings are read from NVRAM and displayed on the screen. Any changes made to the data shown are written to NVRAM.

Create Customized Diagnostic Configuration Diskette

This service aid provides a means of creating a diagnostic diskette from the diagnostics on the disk. This service aid is only supported on version 2.x.

Diagnostic Package Utility Service Aid

The Diagnostic Package Utility Service Aid allows the user to perform the following actions:

- Format a 1, 2, or 4MB diskette

  This function was moved to the Format Media Task at version 4.2.

- Create a Standalone Diagnostic Package Configuration Diskette

  The Standalone Diagnostic Package Configuration Diskette allows the following to be changed from the console:

  – Default refresh rate for a LFT

    The refresh rate used by the standalone diagnostic package is 60Hz. If the display's refresh rate is 77Hz, then set the refresh rate to 77.

  – Different async terminal console

    A console configuration file that allows a terminal attached to any RS232 or RS422 adapter to be selected as a console device can be created using this

service aid. The default device is a RS232 tty attached to the first standard
serial port (S1).

Dials and LPFK Configuration Service Aid

This service aid provides a tool for configuring and removing dials/LPFKs to the
standard serial ports.

Since version 4.1.3 a tty must be defined on the async port before the Dials and
LPFKs can be configured on the port. Before version 4.2 the Dials and LPFKs could
only be configured on the standard serial ports. At version 4.2 the Dials and LPFKs
can be configured on any async port.

Dials and LPFKs Configuration Service Aid Before version 4.2

The Dials and LPFKs Configuration Service Aid provides a tool for configuring and
removing dials/LPFKs to the standard serial ports.

Configure Dials and LPFKs Task Version 4.2+

The Dials and LPFKs can be configured on any async port. A tty must be in the
available state on the async port before the Dials and LPFKs can be configured on
the port. The task allows an async adapter to be configured, then a tty port defined
on the adapter, and then Dials and LPFKs can be defined on the port.

Disk Based Diagnostic Update Service Aid and Update Disk Based Diagnostic Task

This service aid allows fixes (APARs) to be applied.

Disk Based Diagnostic Update Service Aid Before Version 4.2

Prior to version 4.2 this service aid is used to update the diagnostics on the disk
drive. The updates may be new diagnostics or an update to the existing diagnostics.
It uses the **installp** command to do this.

Update Disk Based Diagnostic Task Version 4.2

Beginning with version 4.2 this service aid is replaced by the Update Disk Based
Diagnostics task. The task invokes the SMIT Update Software by Fix (APAR) task.
The task allows the input device and APARs to be selected. Any APAR can be
installed using this task.

Disk Media Service Aids

This service aid consists of a Format, Certify, and Erase service aid for each type of hard disk supported, and Optical Disk service aid for supported optical disks.

- Certify

  Certify reads all of the ID and data fields. It checks for bad data and counts all errors encountered. If more than 10 hard data errors or more than 1 hard equipment error is found, the user is prompted to replace the drive. One or less recovered data errors per megabyte is normal. More than one recoverable data error per megabyte indicates that the disk should be formatted and certified. Disk errors are not logged during certify.

- Format

  Format writes all the disk. The pattern put on the disk is device dependent, i.e. some drives may put all 0s, while some may put hexadecimal number 5F. No bad block reassignment occurs

- Format and Certify

  Format and Certify does the same as format does. After the Format is completed, Certify is run. This Certify will reassign all bad blocks encountered.

- Erase Disk

  This option can be used to overwrite (remove) all data currently stored in user-accessible blocks of the disk. The Erase Disk option writes one or more patterns to the disk. An additional option allows data in a selectable block to be read and displayed on the system console.

  To use the Erase Disk option, specify the number (0-3) of patterns to be written. Select the patterns to be written; the patterns are written serially. That is, the first pattern is written to all blocks. Then the next pattern is written to all blocks, overlaying the previous pattern. A random pattern is written by selecting the "Write random pattern?" option.

  The Erase Disk service aid has not been certified as meeting the Department of Defense or any other organizations security guidelines. The following steps should be followed if the data on the drive is to be overwritten:

  1. Run the "Erase Disk" Service Aid to overwrite the data on the drive.

  2. Do a format without certify.

  3. Run a second pass of the erase service aid.

  For a newly installed drive, you can insure that all blocks on the drive will be overwritten with your pattern if you use the following procedure:

1. Format the drive.

2. Check the defect map by running the Erase Disk Service Aid.

   Note: If you use the "Format and Certify" option, there may be some blocks which get placed into the grown defect map.

3. If there are bad blocks in the defect map, record the information presented and ensure that this information is kept with the drive. This data is used later when the drive is to be overwritten.

4. Use the drive as you would normally.

5. When the drive is no longer needed and is to be erased, run the same version of the Erase Disk Service Aid which was used in step 2.

   Note: Using the same version of the service aid is only critical if there were any bad blocks found in step 3.

6. Compare the bad blocks which were recorded with the drive in step 3 with those which now appear in the grown defect map.

   Note: If there are differences between the saved data and the newly obtained data, then all of the sectors on this drive cannot be overwritten. The new bad blocks will not be overwritten.

7. If the bad block list is the same, continue running the service aid to overwrite the disk with the chosen pattern(s).

Before version 4.2 the Disk Media Service Aid is entered via the Disk Media selection from the Service Aid Selection Menu. At version 4.2+ the Disk Media service aid is entered via the Format Media or Certify Media options from the Task Selection Menu.

Optical Disk Service Aids

The Optical Disk Service Aids consist of Initialize, Format and Certify, and Spare Sector Availability service aids.

- Initialize

  This service aid is used to format the optical disk without certifying it. This option does not reassign the defective sectors; however, it is a quick way of formatting after cleaning the disk.

- Format and Certify

  This service aid is used to format the optical disk and certify it. The certification process is drive specific and performs the surface analysis of all user data and spare sectors. The defective sectors are reassigned.

- Spare Sector Availability

  This service aid checks the number of spare sectors available on the optical disk. The spare sectors are used to reassign when defective sectors are encountered during normal usage or during a format and certify operation. Low availability of spare sectors indicates that the disk needs to be backed up and replaced. Formatting the disk will not improve the availability of spare sectors.

Disk Maintenance Service Aid

- Disk to Disk Copy Service Aid
- Display/Alter Sector Service Aid

Disk to Disk Copy Service Aid

The service aid allows you to recover data from an old drive when replacing it with a new drive. The service aid only supports copying from a drive to another drive of similar size. This service aid cannot be used to update to a different size drive. The **migratepv** command should be used when updating drives. The service aid recovers all LVM software reassigned blocks. To prevent corrupted data from being copied to the new drive, the service aid aborts if an unrecoverable read error is detected. To help prevent possible problems with the new drive, the service aid aborts if the number of bad blocks being reassigned reaches a threshold.

The procedure for using this service aid requires that both the old and new disks be installed in or attached to the system with unique SCSI addresses. This requires that the new disk drive SCSI address must be set to an address that is not currently in used and the drive be installed in an empty location. If there are no empty locations, then one of the other drives has to be removed. Once the copy is complete, only one drive may remain installed. Either remove the target drive to return to the original configuration, or perform the following procedure to complete the replacement of the old drive with the new drive.

1. Remove both drives.
2. Set the SCSI address of the new drive to the SCSI address of the old drive.
3. Install the new drive in the old drive's location.
4. Install any other drives that were removed into their original location.

To prevent problems that may occur when running this service aid from disk, it is suggested that this service aid be run from the diagnostics that are loaded from removable media when possible.

Display/Alter Sector Service Aid

This service aid allows the user to display and alter information on a disk sector. Care must be used when using this service aid because inappropriate modification to some disk sectors may result in total loss of all data on the disk. Sectors are addressed by their decimal sector number. Data is displayed both in hex and in ASCII. To prevent corrupted data from being incorrectly corrected, the service aid will not display information that cannot be read correctly.

Diskette Media Service Aid

This service aid provides a way to verify the data written on a diskette. When this service aid is selected, a menu asks you to select the type of diskette being verified. The program then reads all of the ID and data fields on the diskette one time and displays the total number of bad sectors found. Diskette format support was added in version 4.2.

Prior to version 4.2 the Diskette Media Service Aid was entered via the Diskette Media selection from the Service Aid Selection Menu. At version 4.2 and later the Diskette Media Service Aid is entered via the Format Media or Certify Media options from the Task Selection Menu.

Display/Alter Bootlist Service Aid

This service aid allows the bootlists to be displayed, altered, or erased.

The system will attempt to perform an IPL from the first device in the list. If the device is not a valid IPL device or if the IPL fails, the system will proceed in turn to the other devices in the list to attempt an IPL.

Display or Change Configuration or Vital Product Data (VPD) Service Aid

This service aid allows the user to display, change configuration, data and vital product data (VPD).

Prior to version 4.2 this service aid was entered via the Service Aid Selection Menu. From version 4.2 on, this service aid is entered via the Task Selection Menu.

The following are the task selections which appear on the Task Selection Menu:

- Display Configuration and Resource List
- Display Hardware Vital Product Data
- Change Hardware Vital Product Data
- Add or Delete Drawer configuration

Display Vital Product Data (VPD) Service Aid and Display Hardware Vital Product Data Task

This service aid will display all installed resources along with any VPD for those resources. Use this service aid when you want to look at the VPD for a specific resource.

Display Software Product Data Prior to Version 4.2

This service aid displays information about the installed software.

Display Software Product Data beginning with Version 4.2

This service aid displays information about the installed software and provides the following functions:

- List Installed Software
- List Applied but Not Committed Software Updates
- Show Software Installation History
- Show Fix (APAR) Installation Status
- List Fileset Requisites
- List Fileset Dependents
- List Files Included in a Fileset
- List File Owner by Fileset

Display Configuration Service Aid and Display Configuration and Resource List Task

This service aid will display the item header only for all installed resources. Use this service aid when there is no need of seeing the VPD. (No VPD will be displayed.)

Change Hardware Vital Product Data Task

Use this service aid to display the Display/Alter VPD Selection Menu. The menu will list all resources installed on the system. When a resource is selected a menu is displayed that lists all the VPD for that resource.

Note: The user cannot alter the VPD for a specific resource unless it is not machine readable.

Add Resource to Resource List Task

Use this task to add resources back to the resource list.

Delete Resource from Resource List Task

Use this task to delete resources from the resource list.

Change Configuration Service Aid and Add or Delete Drawer Configuration Task

Use this service aid to add or delete features to the system configuration.

Note: Drawers are the only features that can be added or deleted.

Add or Delete Drawer Configuration Task

This task provides the following options:

- List all Drawers
- Add a Drawer
- Remove a Drawer

The supported drawer types are:

- Media SCSI Device Drawer
- DASD SCSI DASD Drawer

Display and Change Diagnostic Test List Service Aid

Note: Beginning with version 4.2 this service aid is no longer supported. The Display Configuration and Resource List, Add Resource to Resource List, and Delete Resource from Resource List Tasks have replaced it.

This service aid provides a way to:

* Display the Diagnostic Test List

  This selection lists all of the resources tested by the diagnostics.

* Add a resource to the Diagnostic Test List

  This selection allows resources to be added back to the Diagnostic Test List. The Diagnostic Test List Menu lists all resources that can be added back to the Diagnostic Test List.

  Note: Only resources that were previously detected by the diagnostics and deleted from the Diagnostic Test List is listed. If no resources are available to be added, then none are listed.

* Delete a resource from the Diagnostic Test List

  This selection allows resources to be deleted from the Diagnostic Test List. The Diagnostic Test List Menu lists all resources that can be deleted from the Diagnostic Test List.

  Note: Only resources that were previously detected by the diagnostics and have not been deleted from the Diagnostic Test List are listed. If no resources are available to be deleted, then none are listed.

Display Machine Check Error Log Service Aid

Note: The Machine Check Error Log Service Aid is available only on Standalone Diagnostics.

When a machine check occurs, information is collected and logged in a NVRAM error log before the system unit shuts down. This information is logged in the AIX error log and cleared from NVRAM when the system is rebooted from either hard disk or LAN. The information is not cleared when booting from Standalone Diagnostics. When booting from Standalone Diagnostics, this service aid can take the logged information and turn it into a readable format that can be used to isolate the problem. When booting from the hard disk or LAN, the information can be viewed from the AIX error log using the Hardware Error Report Service Aid. In either case the information is analyzed when running the `sysplanar0` diagnostics in Problem Determination Mode.

Display Previous Diagnostic Results Service Aid

Note: This service aid is not available when you load the diagnostics from a source other than a disk drive or from a network.

Each time the diagnostics produce a service request number (SRN) to report a problem, information about that problem is logged. The service representative can look at this log to see which SRNs are recorded. This log also records the results of diagnostic tests that are run in loop mode.

When this service aid is selected, information on the last problem logged is displayed. The Page Down and Page Up keys can be used to look at information about previous problems.

This information is *not* from the error log maintained by the AIX operating system. This information is stored in the **/etc/lpp/diagnostics/data/*.dat** file.

Display Resource Attributes

This task will display the Customized Device Attributes associated with a selected resource. This task is similar to running the **lsattr -E -l resource** command.

Display or Change Diagnostic Run Time Options Task

The Display or Change Diagnostic Run Time Options task allows the diagnostic run time options to be set.

Note: The run time options are used only when running the Run Diagnostic task.

The run time options are:

- Display Diagnostic Mode Selection Menus

  This option allows the user to select whether the DIAGNOSTIC MODE SELECTION MENU is displayed or not (the default is yes).

- Include Advanced Diagnostics

  This option allows the user to select if the Advanced Diagnostics should be included or not (the default is no).

- Include Error Log Analysis

  This option allows the user to select if the Error Log Analysis (ELA) should be included or not (the default is no).

- Run Tests Multiple Times

This option allows the user to select if the diagnostic should be run in loop mode or not (the default is no).

Note: This option is only displayed when running Online Diagnostics in Service Mode.

Display Test Patterns Service Aid

This service aid provides a means of making adjustments to system display units by providing displayable test patterns. Through a series of menus the user selects the display type and test pattern. After the selections are made the test pattern is displayed.

Generic Microcode Download Service Aid

This service aid provides a means of restoring a diskette (or other media) and executing a restored program. This program will do whatever is required to download the microcode onto the adapter or device.

This service aid is supported in both concurrent and standalone modes from disk, LAN, or loadable media.

When entered, this service aid displays information about what it does. It then asks for a microcode diskette to be inserted into the diskette drive. The diskette is in backup format. The service aid then restores the diskette to the **/tmp** directory and execute a program called **diagucode**. Once diagucode has completed, you are then returned to the service aid.

Hardware Error Report Service Aid and Display Hardware Error Log Task

This service aid provides a tool for viewing the hardware error log. It uses the **errpt** command.

The Display Error Summary and Display Error Detail selection provide the same type of report as the **errpt** command. The Display Error Analysis Summary and Display Error Analysis Detail selection provide additional analysis. The Error Analysis and Error Analysis Detail options were removed at version 4.1.3.

ISA Adapter Configuration Service Aid

The ISA Adapter Configuration Service Aid allows the identification and configuration of ISA adapters on systems that have an ISA bus and adapters.

This service aid also displays all ISA adapters supported by diagnostics. Diagnostic support for ISA adapters not shown in the list may be supported from a Supplemental Diskette. ISA adapter support can be added from a Supplemental Diskette with this service aid.

Whenever an ISA adapter is installed, this Service Aid must be run and the adapter configured before the adapter can be tested. This Service Aid must also be run (and the adapter removed) whenever an ISA adapter is physically removed from the system.

If diagnostics are run on an ISA adapter that has been removed from the system,the diagnostics fail.

This service aid is only supported by the Standalone Diagnostics. SMIT should be used to configure ISA adapters for AIX.

ISA adapters cannot be detected by the system.

Note: When using this service aid choose the option that places the adapter in the "Defined State". Do not select the option that places the device in the "Available State.

Local Area Network Service Aid and Local Area Network Analyzer Task

This service aid and task are used to exercise the LAN communications adapters (Token-Ring, Ethernet, and Fiber Distributed Data Interface (FDDI). The following services are available:

- Connectivity testing between two network stations. Data is transferred between the two stations. This requires the user to input the Internet Addresses of both stations.

- Monitoring ring (Token-Ring only). The ring is monitored for a period of time. Soft and hard errors are analyzed.

  Additional information about this service aid can be found in the Local Area Network Service Aids CIS.

  Prior to version 4.2 this service aid was accessed via the Local Area Network Service Aids selection of the Service Aid Selection Menu. Beginning with version 4.2 this service aid is accessed via the Local Area Network Analyzer options from the Task Selection Menu.

Microcode Download Service Aid

This service aid provides a way to copy device microcode to a device. It is used to update the microcode on a device. It presents a list of devices that use microcode. The device on which the microcode is to be installed is selected. The service aid instructs the user on its use.

PCI RAID Physical Disk Identify

This selection will identify physical disks connected to a PCI SCSI-2 F/W RAID adapter.

Periodic Diagnostics Service Aid

This service aid provides a tool for configuring periodic diagnostics and automatic error log analysis. A hardware resource can be chosen to be tested once a day, at a user specified time. If the resource cannot be tested because it is busy, error log analysis is performed. Hardware errors logged against a resource can also be monitored by enabling Automatic Error Log Analysis. This allows error log analysis to be performed every time a hardware error is put into the error log. If a problem is detected, a message is posted to the system console and a mail message sent to the user(s) belonging to the system group with information about the failure such as Service Request Number.

The service aid provides the following functions:

- Add or delete a resource to the periodic test list
- Modify the time to test a resource
- Display the periodic test list
- Modify the error notification mailing list
- Disable Automatic Error Log Analysis

Process Supplemental Media Task

Notes:

- This task is supported in Standalone Diagnostics only.
- Process and test one resource at a time.
- Do not process multiple supplements at a time.

Diagnostic Supplemental Media contain all the diagnostic programs and files required to test a resource. Supplemental media is normally released and shipped with the resource.

When prompted, insert the supplemental media. Then press Enter. After processing has completed, go to the resource selection list to find the resource to test.

This prompts for either diskette or tape media, reads in media using cpio, and executes **diagstart** shell script.

Run Diagnostics Task

The Run Diagnostics task invokes the Resource Selection List menu. When the commit key is pressed, Diagnostics are run on all selected resources.

The procedures for running the diagnostics depends on the states of the Diagnostics Run Time Options. The run time options are:

- Display Diagnostic Mode Selection Menus

  If this option is on, the Diagnostic Mode Selection Menu will be displayed when the commit key is pressed.

- Include Advanced Diagnostics

  If this option is on, Advanced Diagnostics will be included.

- Include Error Log Analysis

  If this option is on, Error Log Analysis will be included.

- Run Tests Multiple Times

  If this option is on, diagnostic are run in loop mode. This option is only valid when running Online Diagnostics in Service Mode.

Run Error Log Analysis Task

The Run Error Log Analysis task invokes the Resource Selection List menu. When the commit key is pressed, Error Log Analysis will be run on all selected resources.

SCSI Bus Service Aid and SCSI Bus Analyzer Task

This service aid provides a means to diagnose a SCSI Bus problem in a free-lance mode.

Prior to version 4.2 the SCSI Bus Service Aid was accessed via the SCSI Bus selection from the Service Aid Selection Menu. Beginning with version 4.2 the SCSI Bus Service Aid is accessed via the SCSI Bus Analyzer option from the Task Selection Menu.

To use this service aid, the user should have an understanding of how a SCSI Bus works. This service aid should be used when the diagnostics cannot communicate with anything on the SCSI Bus and cannot isolate the problem. Normally the procedure for finding a problem on the SCSI Bus with this service aid is to start with a single device attached, ensure that it is working, then start adding additional

devices and cables to the bus ensuring that each one works. This service aid will work with any valid SCSI Bus configuration.

The SCSI Bus Service Aid transmits a SCSI Inquiry command to a selectable SCSI Address. The service aid then waits for a response. If no response is received within a defined amount of time, the service aid will display a timeout message. If an error occurs or a response is received, the service aid will then display one of the following messages:

- The service aid transmitted a SCSI Inquiry Command and received a valid response back without any errors being detected.

- The service aid transmitted a SCSI Inquiry Command and did not receive any response or error status back.

- The service aid transmitted a SCSI Inquiry Command and the adapter indicated a SCSI bus error.

- The service aid transmitted a SCSI Inquiry Command and an adapter error occurred.

- The service aid transmitted a SCSI Inquiry Command and a check condition occur.

When the SCSI Bus Service Aid is entered a description of the service aid is displayed.

Pressing the Enter key will display the Adapter Selection menu. This menu allows the user to enter which address to transmit the SCSI Inquiry Command.

When the adapter is selected the SCSI Bus Address Selection menu is displayed. This menu allows the user to enter which address to transmit the SCSI Inquiry Command.

Once the address is selected the SCSI Bus Test Run menu is displayed. This menus allows the user to transmit the SCSI Inquiry Command by pressing the Enter key. The Service Aid will then indicate the status of the transmission. When the transmission is completed, the results of the transmission is displayed.

Notes:

- A Check Condition can be returned when there is nothing wrong with the bus or device.

- AIX does not allow the command to be sent if the device is in use by another process.

SCSI Device Identification and Removal

This service aid allows the user to choose a SCSI device or location from a menu and to identify a device, located in the system unit.

The service aid also does the following:

- Generate a menu which displays all SCSI devices.
- Lists the device and all of it's sibling devices.
- List all SCSI adapters and their ports.
- List all SCSI devices on a port.

SCSI Tape Utilities Service Aid

This service aid provides a means to obtain the status or maintenance information from a SCSI tape drive. Only some models of SCSI tape drive are supported.

The service aid provides the following options:

- Display time since a tape drive was last cleaned.

  The time since the drive was last cleaned is displayed onto the screen. In addition, a message whether the drive is recommended to be cleaned will also be displayed.

- Copy a tape drive's trace table.
- The trace table of the tape drive is written to diskettes.

  The required diskettes must be formatted for DOS. Writing the trace table may require several diskettes. The actual number of required diskettes will be determined by the service aid based on the size of the trace table. The names of the data files is of the following format:

  'TRACE<X>.DAT' where 'X' is the a sequential diskette number. The complete trace table consists of the sequential concatenation of all the diskette data files.

- Display or copy a tape drive's log sense information.

  The service aid will provides options to display the log sense information to screen, to copy it to a DOS formatted diskette or to copy it to a file. The file name "LOGSENSE.DAT" is used when the log sense data is written on the diskette. The service aid prompts for a file name when the log sense data is chosen to be copied to a file.

Service Hints Service Aid

This service aid reads and displays the information in the CEREADME file from the diagnostics source (diskettes, disk, or CD-ROM). This file contains information that is not in the publications for this version of the diagnostics. It also contains information about using this particular version of diagnostics.

Use the Enter key to page forward through the information or the - (dash) and Enter keys to page backward through the file.

SSA Service Aids

This service aid provides tools for diagnosing and resolving problems on SSA attached devices. The following tools are provided:

* Set Service Mode

* Link Verification

* Configuration Verification

* Format and Certify Disk

7135 RAIDiant Array Service Aid

The 7135 RAIDiant Array service aids contain the following functions:

* Certify LUN

  This selection reads and checks each block of data in the LUN. If excessive errors are encountered the user will be notified.

* Certify Spare Physical Disk

  This selection allows the user to certify (check the integrity of the data) on drives designated as spares.

* Format Physical Disk

  This selection is used to format a selected disk drive.

* Array Controller Microcode Download

  This selection allows the microcode on the 7135 controller to be updated when required.

* Physical Disk Microcode Download

  This selection is used to update the microcode on any of the disk drives in the array.

- Update EEPROM

  This selection is used to update the contents of the EEPROM on a selected controller.

- Replace Controller

  Use this selection when it is necessary to replace a controller in the array.

7318 Serial Communications Network Server Service Aid

This service aid provides a tool for diagnosing terminal server problems.

SSA Location Code Format

Location codes identify the locations of adapters and devices in the using system and their attached subsystems and devices. These codes are displayed when the diagnostic programs isolate a problem. For information about the location codes that are used by the using system, see the operator guide for the using system.

```
A B - C D - E F - G H
                      └──── Always 0

                    └────── Always 0

                 └───────── Always 0

               └─────────── P = Physical disk drive module
                            L = Logical disk drive

            └────────────── Adapter position (number of the slot, 1 through 8, containing
                            the SSA adapter)

         └───────────────── System I/O bus identifier

      └──────────────────── Always 0

   └─────────────────────── Always 0
```
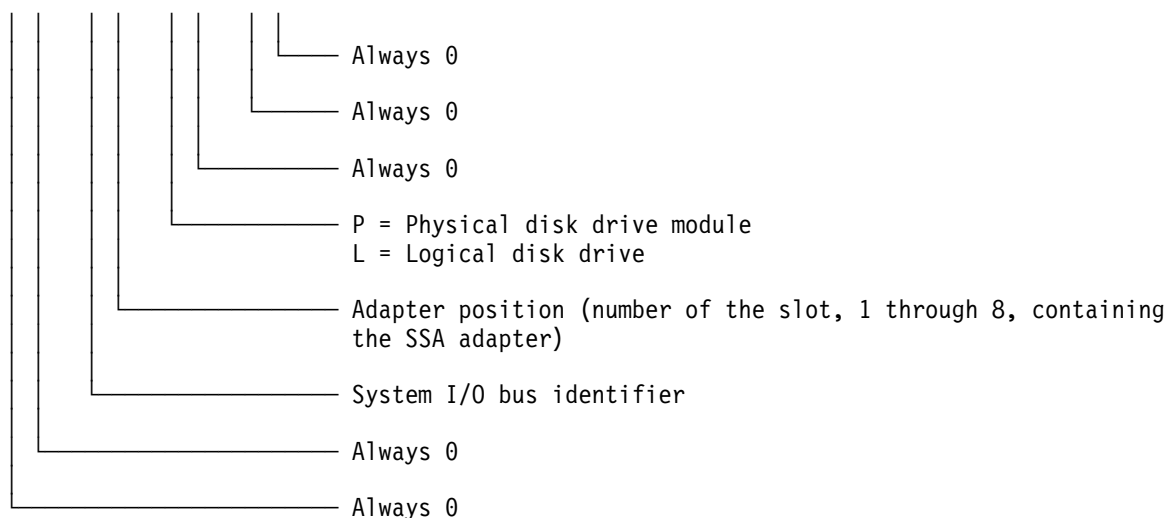
The location code shows only the position of the SSA adapter in the using system and the type of device that is attached. Use a service aid to find the location of the device (disk drive module). For more information, see "SSA Service Aids" on page 6-30.

SSA Loops and Links

The disk drive modules of the system unit are connected through two SSA links to
an SSA adapter that is located in the using system. The disk drive modules, SSA
links, and SSA adapter are configured in loops. Each loop provides a data path that
starts at one connector of the SSA adapter and passes through a link (SSA cable) to
the disk drive modules. The path continues through the disk drive modules, then
returns through another link to a second connector on the SSA adapter.

The SSA Adapter

The system unit can be attached to an SSA adapter. The adapter card has four
SSA connectors that are arranged in two pairs. Connectors A1 and A2 are one pair;
connectors B1 and B2 are the other pair. Connectors B1 and B2 are not used
externally on 7025 Model F20.
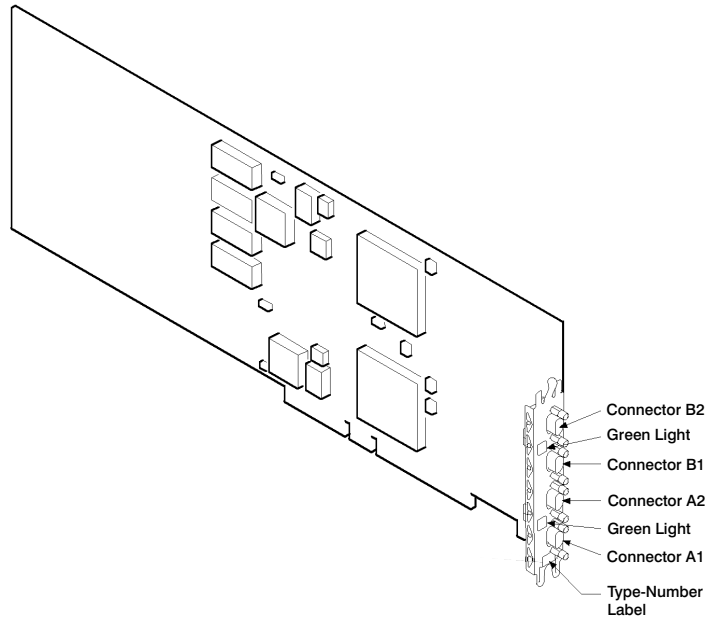
The SSA links must be configured as loops. The loop is connected to the internal connectors at the SSA adapter card. These connectors *must* be a valid pair (that is, A1 and A2, or B1 and B2); otherwise, the disk drive modules on the loop are not fully configured, and the diagnostics fail. Operations to all the disk drive modules on a particular loop can continue if that loop breaks at any one point.

Each pair of connectors has a green light that indicates the operational status of its related loop:

Status of Light	Meaning
Off	Both SSA connectors are inactive. If disk drive modules are connected to these connectors, either those modules are failing, or their SSA links have not been enabled.
Permanently on	Both SSA links are active (normal operating condition).
Slow Flash	Only one SSA link is active.

Disk Drive Module Strings

In the system unit, the disk drive modules are arranged in a string of 2 to 6 disk drive modules. This string has its own two SSA connectors. This string is connected through an internal SSA cable to a pair of connectors on the SSA adapter to make an SSA loop. (The SSA cables provide the SSA links.)

The next diagram shows the relationships between the SSA connectors and the disk drive module string in a system unit.
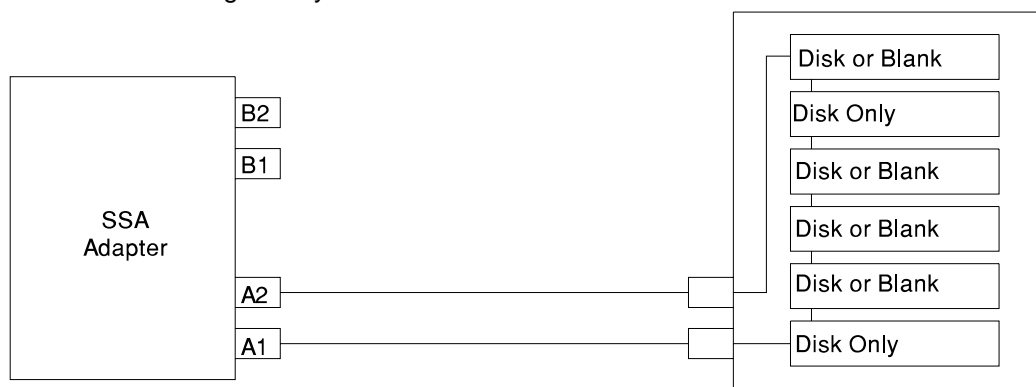
Pdisks, Hdisks, and Disk Drive Module Identification

The *physical disk drives* (**pdisks**) in an SSA subsystem can be configured as logical units (LUNs). A LUN is also known as an **hdisk**, and can consist of one or more physical disk drives. An hdisk in an SSA subsystem might, therefore, consist of one pdisk or several pdisks.

The configuration software also allocates an identification (hdisk and pdisk number) to each disk drive module during the configuration of the SSA link. The disk drive modules do not have fixed physical addresses.

The configuration software first recognizes the disk drive module by the machine-readable serial number that is written on the disk. Then, it assigns an identification that is related to the position of the disk drive-module in the SSA string. After configuration, the disk drive module always has the same identification. It can be moved to any position on the SSA link, but can always be found by the software.

Service actions are always related to physical disk drives. For this reason, errors that occur on SSA disk drives are always logged against the physical disk drive (pdisk).

The numeric identifier of pdisks, hdisks, and disk drive module slots of the system unit are not related to each other. For example, pdisk1 is not necessarily installed in slot 1 of the 6-pack.

The disk drive module serial number, on the label on the front of the carrier, is also displayed by the service aids. It is the last eight digits of the drives IEEE SSA unique ID, which is stored on the drives electronics card.

Rules for SSA Loops

The following are rules for SSA loops.

- The SSA loop must be connected to the internal pair of connectors on the SSA adapter.

- Only one pair of adapter connectors can be connected to a particular SSA loop.

- A maximum of 18 disk drive modules can be connected in a particular SSA loop.

- A maximum of three dummy disk drive modules can be connected next to each other in a particular SSA loop.

Loops and Data Paths

All devices that are attached to an SSA adapter card are connected through SSA links. The SSA links are configured as loops. Data and commands to a particular device pass through all other devices on the link between the adapter and the target device.

Data can travel in either direction around a loop. The adapter can, therefore, access the disk drive modules through two data paths. The using system cannot detect which data path is being used.

If a disk drive module fails, or is turned off, the loop is broken, and one of the data paths to a particular module is no longer available. The disk drive modules on the loop continue to work, but an error is reported to the using system.

The following diagram shows that the disk drive module in slot 3 has failed. The disk drive modules in slots 1 and 2 can communicate with the using system only through connector A1 of the SSA adapter. The disk drive modules in slots 4, 5, and 6 can communicate only through connector A2 of the SSA adapter.
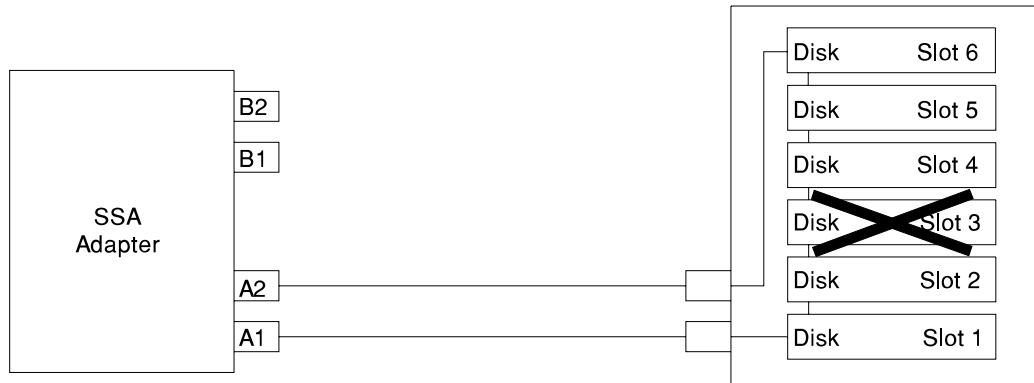
If two or more disk drive modules are turned off, fail, or are removed from the loop, some modules might become isolated from the SSA adapter.

The following diagram shows that disk drive modules in slots 2 and 4 have failed. The disk drive module in slot 1 can communicate with the using system only through connector A1 of the SSA adapter. The disk drive module in slots 5 and 6 can communicate with the using system only through connector A2 of the SSA adapter. The disk drive module in slot 3 is isolated from the SSA adapter.
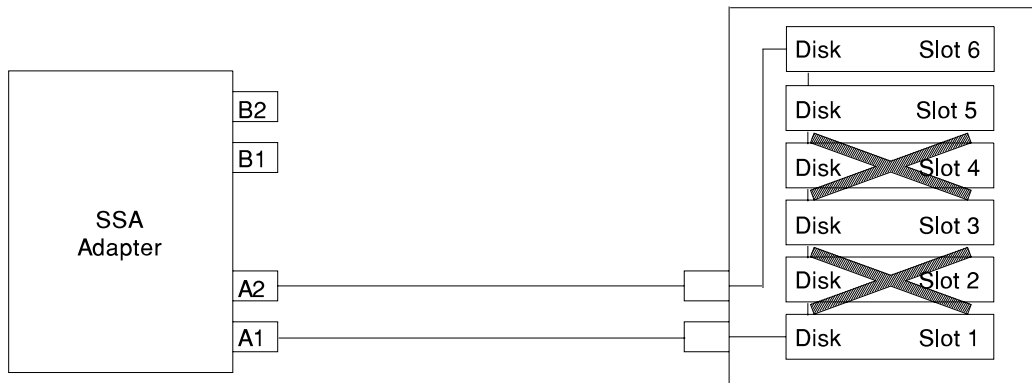
SSA Service Aids

SSA service aids help you service the Service Processor. This section describes those service aids, and tells how to use them.

Attention: Do not run the service aids from more than one using system at a time; otherwise, unexpected results might occur.

The SSA service aids are:

Set Service Mode This service aid enables you to determine the location of a particular disk drive module on the SSA link and to remove that module from the link.

Link Verification This service aid tells you the operational status of an SSA link.

Configuration Verification This service aid lets you determine the relationship between physical and logical disk drives.

Format Disk This service aid formats an SSA disk drive module.

Certify Disk This service aid verifies that all the data on a disk drive can be read correctly.

Before you use the service aids, ensure that you are familiar with the principles of SSA links and physical disk drives (pdisks). If you are not familiar with these principles, first read "SSA Loops and Links" on page 6-25.

The Identify Function

The identify function can be accessed from any of the service aids.

This function enables you to determine the location of a particular disk drive module that you want to identify but do not want to remove from the system unit. The identify function causes the check light of the disk drive module to flash for identification (1 second on, 1 second off), but has no effect on the normal operation of the disk drive module. You can use the identify function on any number of disk drive modules at the same time.

Instructions displayed by the service aids tell you when you can select the identify function.

Note: You cannot use the identify function on a device that is in reserved status.

Starting the SSA Service Aids

To start the SSA service aids:

1. Start the using-system diagnostics (see the *Common Diagnostics Information Manual*), and go to DIAGNOSTIC OPERATING INSTRUCTIONS.

2. Follow the instructions to select FUNCTION SELECTION.

3. Select SERVICE AIDS from the Function Select menu.

4. Select SSA SERVICE AIDS from the Service Aids menu.

   The SSA Service Aids menu is displayed.

```
 SSA SERVICE AIDS                                               802380

 Move cursor onto selection, then press Enter.


         Set Service Mode
         Link Verification
         Configuration Verification
         Format Disk
         Certify Disk














    F3=Cancel        F10=Exit

```

Note: In some configurations of the using-system console:

      Esc and **0** = Exit
      Esc and **3** = Cancel

      In such configurations, however, the displayed instructions for the function keys remain the same as those shown in the screen above.

5. Select the service aid that you require, then go to the relevant instructions in this chapter:

    "Set Service Mode Service Aid" on page 6-33

    "Link Verification Service Aid" on page 6-39

    "Configuration Verification Service Aid" on page 6-43

    "Format Disk Service Aid" on page 6-45

    "Certify Disk Service Aid" on page 6-47

Set Service Mode Service Aid

The Set Service Mode service aid enables you to determine the location of a particular disk drive module and to remove that module from the system unit. It causes the check light of that disk drive module to come on for identification, and it stops all SSA link activity through the module. Only one disk drive module at a time can be in the service mode.

Before using this service aid, you must make the selected disk drive module unavailable to the using system; otherwise, an error occurs.

SSA disk drive modules can be maintained concurrently; that is, they can be removed, installed, and tested on an SSA link while the other modules on the link continue to work normally. If a disk drive module has its check light on, you can remove that module from the SSA link without taking any special actions.

If a disk drive module does *not* have its check light on, the SSA link that passes through it might still be active, even though the disk drive module itself might not be working. You must put that module into the service mode before you remove it from the SSA link.

If you leave the Set Service Mode service aid, the service mode is reset.

To use the Set Service Mode service aid:

1. Select SET SERVICE MODE from the SSA Service Aids menu (see "Starting the SSA Service Aids" on page 6-31). A list of physical disk drives (pdisks) is displayed:

```
 SSA SERVICE AIDS                                                  802380

  SET SERVICE MODE                                                 802381

  Move cursor onto selection, then press Enter.

     {TOP}

     pdisk0    11111111    00-04-P       2 GB SSA F Physical Disk Drive
     pdisk1    22222222    00-04-P       2 GB SSA F Physical Disk Drive
     pdisk2    33333333    00-04-P       2 GB SSA F Physical Disk Drive
     pdisk3    44444444    00-04-P       2 GB SSA F Physical Disk Drive
     pdisk4    55555555    00-04-P       2 GB SSA F Physical Disk Drive
     pdisk5    66666666    00-04-P       2 GB SSA F Physical Disk Drive
     pdisk6    77777777    00-04-P       2 GB SSA F Physical Disk Drive
     pdisk7    88888888    00-04-P       2 GB SSA F Physical Disk Drive
     pdisk8    99999999    00-04-P       2 GB SSA F Physical Disk Drive


     {BOTTOM}

   F3=Cancel        F10=Exit
```

The columns of information displayed on the screen have the following meanings:

pdisk0 through pdisk8   Physical disk drive resource identifiers.

11111111 through 99999999   Serial numbers of the physical disk drive modules. The actual serial number of a disk drive module is shown on the front of the disk drive module.

00-04-P   See "SSA Location Code Format" on page 6-24.

2 GB SSA F Physical Disk Drive   Descriptions of the disk drive modules.

2. Select the pdisk that you want to identify or put into Service Mode (for example, pdisk3). The following display appears with details of the disk drive module that you have just selected.

```
 SSA SERVICE AIDS                                                 802380

 SET SERVICE MODE                                                 802381

 SET SERVICE MODE                                                 802382

 pdisk3    44444444    00-04-P        2 GB SSA F Physical Disk Drive

 Move cursor onto selection, then press Enter.

 + Set or Reset Identify.
     Select this option to set or reset the Identify indicator
     on the disk drive.
 > Set or Reset Service Mode.
     Select this option to set or reset Service Mode
     on the disk drive.




  F3=Cancel        F10=Exit
```

3. Select either the service mode or the identify function. (For this example, assume that you have selected the service mode function.) The list of pdisks is displayed again, and the disk drive module that you selected is marked by a >, which shows that the module is in the service mode.

```
 SSA SERVICE AIDS                                          802380

 SET SERVICE MODE                                          802381

 SET SERVICE MODE                                          802382

 SET SERVICE MODE                                          802381

 Move cursor onto selection, then press Enter.

    {TOP}

    pdisk0   11111111   00-04-P      2 GB SSA F Physical Disk Drive
    pdisk1   22222222   00-04-P      2 GB SSA F Physical Disk Drive
    pdisk2   33333333   00-04-P      2 GB SSA F Physical Disk Drive
 >  pdisk3   44444444   00-04-P      2 GB SSA F Physical Disk Drive
    pdisk4   55555555   00-04-P      2 GB SSA F Physical Disk Drive
    pdisk5   66666666   00-04-P      2 GB SSA F Physical Disk Drive
    pdisk6   77777777   00-04-P      2 GB SSA F Physical Disk Drive
    pdisk7   88888888   00-04-P      2 GB SSA F Physical Disk Drive
    pdisk8   99999999   00-04-P      2 GB SSA F Physical Disk Drive



    {BOTTOM}

  F3=Cancel        F10=Exit
```

Notes:

   a. You can select only one disk drive module at a time.

   b. If you select the service mode function, and the selected disk drive module is not in a closed loop (see "SSA Loops and Links" on page 6-25), your selection fails and an error message is displayed. Use the Link Verification service aid to identify any open-link problems before trying to reselect the service mode function.

   c. If you select the service mode function, and a file system is mounted on the selected disk drive module, your selection fails. Use the Configuration Verification service aid to determine which hdisk must have its file system unmounted before you can select the service mode function.

   d. If the check light of the disk drive module that you have put into the service mode does not come on, and if you are not sure of the location of that module, use the identify function to help you find the disk drive module (see "The Identify Function" on page 6-31).

4. Select a second disk drive module, if required (for example, pdisk5). The
   following display appears:

```
┌──────────────────────────────────────────────────────────────────────┐
│ SSA SERVICE AIDS                                            802380     │
│─────────────────────────────────────────────────────────────────────  │
│ SET SERVICE MODE                                           802381      │
│──────────────────────────────────────────────────────────────────     │
│ SET SERVICE MODE                                          802382       │
│─────────────────────────────────────────────────────────────────      │
│ SET SERVICE MODE                                         802381        │
│────────────────────────────────────────────────────────────────       │
│ SET SERVICE MODE                                        802382         │
│                                                                        │
│ > pdisk5    66666666    00-04-P    2 GB SSA F Physical Disk Drive      │
│                                                                        │
│                                                                        │
│ Move cursor onto selection, then press Enter.                          │
│                                                                        │
│ + Set or Reset Identify.                                               │
│     Select this option to set or reset the Identify indicator          │
│     on the disk drive.                                                  │
│ > Set or Reset Service Mode.                                           │
│     Select this option to set or reset Service Mode                    │
│     on the disk drive.                                                  │
│                                                                        │
│                                                                        │
│  F3=Cancel        F10=Exit                                             │
│                                                                        │
└──────────────────────────────────────────────────────────────────────┘
```

5. Select either the service mode or the identify function. If the original disk drive module is to remain in service mode, you can select only the identify function now. (Only one disk drive module at a time can be in the service mode.) The list of pdisks appears again. The pdisk that is in identify mode is identified by a +.

```
SSA SERVICE AIDS                                                802380
```

```
SET SERVICE MODE                                                802381
```

```
SET SERVICE MODE                                                802382
```

```
SET SERVICE MODE                                                802381
```

```
SET SERVICE MODE                                                802382
```

```
SET SERVICE MODE                                                802381

Move cursor onto selection, then press Enter.

   {TOP}

   pdisk0    11111111    00-04-P    2 GB SSA F Physical Disk Drive
   pdisk1    22222222    00-04-P    2 GB SSA F Physical Disk Drive
   pdisk2    33333333    00-04-P    2 GB SSA F Physical Disk Drive
 > pdisk3    44444444    00-04-P    2 GB SSA F Physical Disk Drive
   pdisk4    55555555    00-04-P    2 GB SSA F Physical Disk Drive
 + pdisk5    66666666    00-04-P    2 GB SSA F Physical Disk Drive
   pdisk6    77777777    00-04-P    2 GB SSA F Physical Disk Drive
   pdisk7    88888888    00-04-P    2 GB SSA F Physical Disk Drive
   pdisk8    99999999    00-04-P    2 GB SSA F Physical Disk Drive




   {BOTTOM}

 F3=Cancel         F10=Exit
```

6. Identify other disk drive modules in the same way, if required.

Link Verification Service Aid

The Link Verification service aid helps you determine:

- Where an SSA link has been broken

- The status of the disk drive modules on that SSA link

- The location of a power fault that has been detected by the disk drive modules on that SSA link

To use the Link Verification service aid:

1. Select Link Verification from the SSA Service Aids menu (see "Starting the SSA Service Aids" on page 6-31). The Link Verification adapter menu is displayed:

```
┌─────────────────────────────────────────────────────────────────┐
│ SSA SERVICE AIDS                                         802380 │
│                                                                 │
│ ┌─────────────────────────────────────────────────────────────┐ │
│ │ LINK VERIFICATION                                    802385 │ │
│ │                                                             │ │
│ │ Move cursor onto selection, then press Enter.               │ │
│ │                                                             │ │
│ │   ssa0    00-03    SSA Adapter                              │ │
│ │   ssa1    00-05    SSA Adapter                              │ │
│ │   ssa2    00-06    SSA Adapter                              │ │
│ │   ssa3    00-07    SSA Adapter                              │ │
│ │                                                             │ │
│ │                                                             │ │
│ │                                                             │ │
│ │                                                             │ │
│ │                                                             │ │
│ │                                                             │ │
│ │                                                             │ │
│ │                                                             │ │
│ │                                                             │ │
│ │                                                             │ │
│ │                                                             │ │
│ │   F3=Cancel        F10=Exit                                 │ │
│ └─────────────────────────────────────────────────────────────┘ │
└─────────────────────────────────────────────────────────────────┘
```

2. Select the adapter that you want to test.

   The columns of information displayed on the screen have the following meanings:

   ssa0 through ssa3   Adapter resource identifiers.

   00-03 through 00-07   Adapter location codes. These codes specify the location of the SSA adapter in the using system.

   SSA Adapter   Descriptions of the adapters.

3. When you have selected an adapter, a list is displayed showing the status of all
   the disk drive modules that are attached to the adapter:

```
┌─────────────────────────────────────────────────────────────────────────┐
│ SSA SERVICE AIDS                                                  802380 │
└─────────────────────────────────────────────────────────────────────────┘
┌─────────────────────────────────────────────────────────────────────────┐
│ LINK VERIFICATION                                                 802385 │
└─────────────────────────────────────────────────────────────────────────┘
┌─────────────────────────────────────────────────────────────────────────┐
│ LINK VERIFICATION                                                 802386 │
│                                                                           │
│ SSA Link Verification for:                                                │
│   ssa1    00-05    SSA Adapter                                            │
│                                                                           │
│ To set or reset Identify, move cursor onto selection, then press Enter.   │
│                                                                           │
│   Physical    Serial#       Adapter Port                                  │
│                                                                           │
│                           A1  A2  B1  B2                Status            │
│   {TOP}                                                                   │
│   pdisk0    11111111       0   7                        Good              │
│   pdisk1    22222222       1   6                        Good              │
│   pdisk2    33333333       2   5                        Good              │
│   pdisk3    44444444       3   4                        Good              │
│   pdisk4    55555555       4   3                        Good              │
│   pdisk5    66666666       5   2                        Good              │
│   pdisk6    77777777       6   1                        Good              │
│   pdisk7    88888888       7   0                        Good              │
│   pdisk8    99999999              0  10                 Good              │
│   pdisk9    nnnnnnnn              1   9                 Good              │
│   {MORE}                                                                  │
│                                                                           │
│   F3=Cancel       F10=Exit                                                │
│                                                                           │
└─────────────────────────────────────────────────────────────────────────┘
```

The columns of information displayed on the screen have the following
meanings:

pdisk0 through pdisk9   Physical disk drive resource identifiers.

11111111 through 99999999   Serial numbers of the physical disk drive modules. The
actual serial number of a disk drive module is shown on
the front of the disk drive module.

A1 A2 B1 B2   Adapter connector number (see "The SSA Adapter" on
page 6-25).

Status   Statuses are:

                                            Good   The disk drive module is working
correctly.

                                            Failed   The disk drive module has failed.

                                            Power   The disk drive module has detected a
loss of power.

                                            Reserved The disk drive module is used by another
using system.

An SSA link must be configured in a loop around which data can travel in either
direction. The loop is broken if a cable fails or is removed, or if a disk drive
module fails. Because each disk drive module on the loop can be accessed

from either direction, the broken loop does not prevent access to any data, unless that data is on the failed disk drive module. If the loop is broken between two disk drive modules, the ready lights on those modules flash to show that only one SSA path is active. Also, the Link Verification service aid shows that only one path is available to each disk drive module on the broken loop.

You can find the physical location of any disk drive module on the link by using the identify function (see "The Identify Function" on page 6-31).

Notes:

a. In the lists of physical disk drives (pdisks) that are displayed by the service aids, you might see:

????? Question marks show where an SSA loop is broken. No information is available about any devices that are beyond this point.

Asterisks indicate an unconfigured device. That device might be:

- Another SSA adapter that is in the same using system or in a different using system.

- An SSA device that is in the SSA network, but whose type is not known. Such a condition can occur if, for example, devices are added to the network, but the **cfgmgr** command is not run to configure those devices into the using system.

For example:

```
LINK VERIFICATION                                                    802386

SSA Link Verification for:
  ssa1    00-05    SSA ADAPTER

To set or reset Identify, move cursor onto selection, then press Enter.

  Physical    Serial#      Adapter Port

                           A1  A2  B1  B2                Status
  {TOP}
  pdisk0   11111111        0                             Good
  pdisk1   22222222        1                             Good
  ?????
  pdisk3   44444444            4                         Good
  pdisk4   55555555            3                         Good
  pdisk5   66666666            2                         Good
  pdisk6   77777777            1                         Good
  pdisk7   88888888            0                         Good
  pdisk8   99999999                0   3                 Good
  pdisk9   10000000                1   2                 Good
  {MORE}

  F3=Cancel        F10=Exit
```

Note that the missing disk drive module (pdisk2) is represented by a line of question marks.

b. If you have just made changes to or have just turned on the system unit, you might need to wait up to 30 seconds before detailed information about the SSA network becomes available to the service aids.

4. When you have solved a problem, press **F3** (**Esc** and **3** on some consoles) to leave the display; then press Enter to reselect it. The display shows the new status of the SSA links.

Configuration Verification Service Aid

The Configuration Verification service aid enables you to determine the relationship between SSA logical units (hdisks) and SSA physical disk drives (pdisks). It also displays the connection information and operational status of the disk drives.

Note: User applications communicate with the hdisks; error data is logged against the pdisks.

To use the Configuration Verification service aid:

1. Select Configuration Verification from the SSA Service Aids menu to display a list of pdisks and hdisks (see "Starting the SSA Service Aids" on page 6-31).

```
 SSA SERVICE AIDS                                                   802380

 CONFIGURATION VERIFICATION                                         802390

 Move cursor onto selection, then press Enter.

   {TOP}
   pdisk0    22222222    00-03-P      2 GB SSA F Physical Disk Drive
   pdisk1    33333333    00-05-P      2 GB SSA F Physical Disk Drive
   pdisk2    44444444    00-07-P      2 GB SSA F Physical Disk Drive
   hdisk3    22222222    00-03-L      SSA Logical Disk Drive
   hdisk4    33333333    00-05-L      SSA Logical Disk Drive
   hdisk5    44444444    00-07-L      SSA Logical Disk Drive




   {BOTTOM}

   F3=Cancel        F10=Exit
```

2. Select the hdisk or pdisk that you want to test.

3. If you select an hdisk, a list of pdisks is displayed:

```
┌─────────────────────────────────────────────────────────────────────────┐
│  SSA SERVICE AIDS                                               802380   │
│ ┌───────────────────────────────────────────────────────────────────────┤
│ │ CONFIGURATION VERIFICATION                                    802390   │
│ │ ┌─────────────────────────────────────────────────────────────────────┤
│ │ │ CONFIGURATION VERIFICATION                                  802391   │
│ │ │                                                                      │
│ │ │   hdisk3    22222222   00-03-L    SSA Logical Disk Drive             │
│ │ │                                                                      │
│ │ │ To set or reset Identify, move cursor onto selection, then press enter.│
│ │ │                                                                      │
│ │ │   Physical     Serial#    Adapter    Port    SSA_Addr    Status      │
│ │ │                                                                      │
│ │ │   {TOP}                                                              │
│ │ │   pdisk0       22222222    00-02     A1         5         Good       │
│ │ │                           00-02     A2         5         Good        │
│ │ │                           00-03     A1        10         Good        │
│ │ │                           00-03     A2         0         Good        │
│ │ │                                                                      │
│ │ │                                                                      │
│ │ │                                                                      │
│ │ │                                                                      │
│ │ │                                                                      │
│ │ │   {BOTTOM}                                                           │
│ │ │  F3=Cancel       F10=Exit                                            │
│ │ └─────────────────────────────────────────────────────────────────────┘
```

If you select a pdisk, a list of hdisks is displayed:

```
┌─────────────────────────────────────────────────────────────────────────┐
│  SSA SERVICE AIDS                                               802380   │
│ ┌───────────────────────────────────────────────────────────────────────┤
│ │ CONFIGURATION VERIFICATION                                    802390   │
│ │ ┌─────────────────────────────────────────────────────────────────────┤
│ │ │ CONFIGURATION VERIFICATION                                  802392   │
│ │ │                                                                      │
│ │ │   pdisk0    22222222   00-03-P    2 GB SSA F Physical Disk Drive     │
│ │ │                                                                      │
│ │ │ Move cursor onto selection, then press Enter.                        │
│ │ │                                                                      │
│ │ │   hdisk3    22222222   00-03-L    SSA Logical Disk Drive             │
│ │ │                                                                      │
│ │ │                                                                      │
│ │ │   {BOTTOM}                                                           │
│ │ │  F3=Cancel       F10=Exit                                            │
│ │ └─────────────────────────────────────────────────────────────────────┘
```

Note: If you select the hdisk from this screen, the hdisk configuration is displayed.

Format Disk Service Aid

The Format Disk service aid formats SSA disk drive modules.

Attention: Formatting a disk drive module destroys all the data on that module. Use this procedure only when instructed to do so by the service procedures.

To use the Format Disk service aid:

1. Select Format Disk from the SSA Service Aids menu (see "Starting the SSA Service Aids" on page 6-31). A list of pdisks is displayed:

```
 SSA SERVICE AIDS                                                      802380

 ┌─────────────────────────────────────────────────────────────────────────┐
 │ FORMAT DISK                                                      802395   │
 │                                                                           │
 │ Move cursor onto selection, then press Enter.                             │
 │                                                                           │
 │   {TOP}                                                                   │
 │   pdisk0    11111111    00-04-P       2 GB SSA F Physical Disk Drive       │
 │   pdisk1    22222222    00-04-P       2 GB SSA F Physical Disk Drive       │
 │   pdisk2    33333333    00-04-P       2 GB SSA F Physical Disk Drive       │
 │   pdisk3    44444444    00-04-P       2 GB SSA F Physical Disk Drive       │
 │   pdisk4    55555555    00-04-P       2 GB SSA F Physical Disk Drive       │
 │   pdisk5    66666666    00-04-P       2 GB SSA F Physical Disk Drive       │
 │   pdisk6    77777777    00-04-P       2 GB SSA F Physical Disk Drive       │
 │   pdisk7    88888888    00-04-P       2 GB SSA F Physical Disk Drive       │
 │   pdisk8    99999999    00-04-P       2 GB SSA F Physical Disk Drive       │
 │                                                                           │
 │                                                                           │
 │                                                                           │
 │                                                                           │
 │   {BOTTOM}                                                                │
 │                                                                           │
 │   F3=Cancel        F10=Exit                                               │
 │                                                                           │
 └─────────────────────────────────────────────────────────────────────────┘
```

2. Select the pdisk that you want to format. The following instructions are
   displayed:

```
┌─────────────────────────────────────────────────────────────────────┐
│ SSA SERVICE AIDS                                          802380      │
└─────────────────────────────────────────────────────────────────────┘
┌─────────────────────────────────────────────────────────────────────┐
│ FORMAT DISK                                              802395       │
└─────────────────────────────────────────────────────────────────────┘
┌─────────────────────────────────────────────────────────────────────┐
│ FORMAT DISK                                              802396       │
│                                                                       │
│   pdisk1    22222222    00-04-P        2 GB SSA F Physical Disk Drive │
│                                                                       │
│   Set or Reset Identify.                                              │
│       Select this option to set or reset the Identify indicator       │
│       on the disk drive.                                              │
│   Format.                                                             │
│       Select this option only if you are sure that you have selected  │
│       the correct disk drive.                                         │
│       FORMATTING DESTROYS ALL DATA ON THE DISK DRIVE.                 │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│   F3=Cancel        F10=Exit                                           │
│                                                                       │
└─────────────────────────────────────────────────────────────────────┘
```

3. If you are not sure of the identification (pdisk number) of the disk drive module
   that you want to format, use the identify function to get a positive physical
   identification of the module (see "The Identify Function" on page 6-31). You can
   further ensure that you have selected the correct disk drive module by verifying
   that the serial number on the front of the disk drive module is the same as the
   serial number that is displayed on the screen.

4. When you are sure that you have selected the correct disk drive module, select
   Format.

Certify Disk Service Aid

The Certify Disk service aid verifies that all the data on a disk drive module can be read correctly. Instruction given elsewhere in this book tell you when you need to run this service aid.

To use the Certify Disk service aid:

1. Select Certify Disk from the SSA Service Aids menu (see "Starting the SSA Service Aids" on page 6-31). A list of pdisks is displayed:

```
┌─────────────────────────────────────────────────────────────────────┐
│ SSA SERVICE AIDS                                              802380 │
├─────────────────────────────────────────────────────────────────────┤
│  ┌──────────────────────────────────────────────────────────────┐   │
│  │ CERTIFY DISK                                          802404   │   │
│  │                                                                │   │
│  │ Move cursor onto selection, then press Enter.                  │   │
│  │                                                                │   │
│  │    {TOP}                                                       │   │
│  │    pdisk0    11111111    00-04-P        2 GB SSA F Physical Disk Drive │
│  │    pdisk1    22222222    00-04-P        2 GB SSA F Physical Disk Drive │
│  │    pdisk2    33333333    00-04-P        2 GB SSA F Physical Disk Drive │
│  │    pdisk3    44444444    00-04-P        2 GB SSA F Physical Disk Drive │
│  │    pdisk4    55555555    00-04-P        2 GB SSA F Physical Disk Drive │
│  │    pdisk5    66666666    00-04-P        2 GB SSA F Physical Disk Drive │
│  │    pdisk6    77777777    00-04-P        2 GB SSA F Physical Disk Drive │
│  │    pdisk7    88888888    00-04-P        2 GB SSA F Physical Disk Drive │
│  │    pdisk8    99999999    00-04-P        2 GB SSA F Physical Disk Drive │
│  │                                                                │   │
│  │                                                                │   │
│  │                                                                │   │
│  │                                                                │   │
│  │    {BOTTOM}                                                    │   │
│  │                                                                │   │
│  │  F3=Cancel      F10=Exit                                       │   │
│  │                                                                │   │
│  └──────────────────────────────────────────────────────────────┘   │
└─────────────────────────────────────────────────────────────────────┘
```

2. Select the pdisk that you want to certify. The following instructions are displayed:

```
┌──────────────────────────────────────────────────────────────────────┐
│ SSA SERVICE AIDS                                              802380   │
└──────────────────────────────────────────────────────────────────────┘
┌──────────────────────────────────────────────────────────────────────┐
│ CERTIFY DISK                                                 802404    │
└──────────────────────────────────────────────────────────────────────┘
┌──────────────────────────────────────────────────────────────────────┐
│ CERTIFY DISK                                                 802405    │
│                                                                        │
│   pdisk1    22222222    00-04-P        2 GB SSA F Physical Disk Drive  │
│                                                                        │
│ Move cursor onto selection, then press Enter.                          │
│                                                                        │
│  Set or Reset Identify.                                                │
│      Select this option to set or reset the Identify indicator         │
│      on the disk drive.                                                │
│  Certify.                                                              │
│      Select this option to start the Certify operation.                │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│     F3=Cancel        F10=Exit                                          │
│                                                                        │
└──────────────────────────────────────────────────────────────────────┘
```

3. If you are not sure of the identification (pdisk number) of the disk drive module that you want to format, use the identify function to get a positive physical identification of the module (see "The Identify Function" on page 6-31). You can further ensure that you have selected the correct disk drive module by verifying that the serial number on the front of the disk drive module is the same as the serial number that is displayed on the screen.

4. When you are sure that you have selected the correct disk drive module, select Certify

Service Aid Error Codes

If the SSA service aids detect an unrecoverable error and are unable to continue, one of the following error codes might occur.

SSA01   Not enough using-system memory is available for this service aid to continue. Take one of the actions described here:

- This problem might be caused by a failed application program. Ask the user to end any failed application program, then try to run the service aid again.
- Run diagnostics in the problem determination mode on the system unit. If you find any problems, solve them; then try to run the service aid again.
- Close down and reboot the using system; then try to run the service aid again.
- Run diagnostics from diskette or CD-ROM to isolate the problem. If you do not find a problem, the operating system might have failed.

SSA02   An unknown error has occurred. Take one of the actions described here:

- Run diagnostics in the problem determination mode to the system unit. If you find any problems, solve them; then try to run the service aid again.
- If diagnostics fail or if the same problem occurs when you try the service aid again, run the diagnostics from diskette or CD-ROM to isolate the problem. If you do not find a problem, the operating system might have failed.

SSA03   The service aid was unable to open an hdisk. This problem might have occurred because a disk drive module has failed or has been removed from the system. Take the actions described here:

1. Use the Configuration Verification service aid (see "Configuration Verification Service Aid" on page 6-43) to determine the location code of the SSA adapter to which the hdisk is attached. (For example, if the location code of the hdisk is 00-03-L, the location code of the SSA adapter is 00-03.)
2. Run the Link Verification service aid (see "Link Verification Service Aid" on page 6-39) to the SSA adapter.
3. If a link failure is indicated by the service aid, go to "SSA Maintenance Analysis Procedures (MAPS)" in &sgtitle..
4. If no link failures are indicated, run the diagnostics in the system verification mode to each pdisk that is attached to the SSA adapter.

Using the Service Aids for SSA-Link Problem Determination

If you have a problem with an SSA link, use the Link Verification service aid (see
"Link Verification Service Aid" on page 6-39). The following examples show various
loops and the associated information that is displayed by the Link Verification service
aid.

Example 1. Normal Loops In the following diagram, eight disk drive modules are
connected to connectors A1 and A2 of the SSA adapter. Five disk drive modules
are connected to connectors B1 and B2 of the same SSA adapter.

For this example, the Link Verification service aid displays the following information:

```
LINK VERIFICATION                                                         802386

SSA Link Verification for:
  ssa1    00-05    SSA ADAPTER

To set or reset Identify, move cursor onto selection, then press Enter.

  Physical    Serial#       Adapter Port

                          A1  A2  B1  B2               Status
  {TOP}
  pdisk0    nnnnnnnn       0   7                       Good
  pdisk1    nnnnnnnn       1   6                       Good
  pdisk2    nnnnnnnn       2   5                       Good
  pdisk3    nnnnnnnn       3   4                       Good
  pdisk4    nnnnnnnn       4   3                       Good
  pdisk5    nnnnnnnn       5   2                       Good
  pdisk6    nnnnnnnn       6   1                       Good
  pdisk7    nnnnnnnn       7   0                       Good
  pdisk8    nnnnnnnn               0   3               Good
  pdisk9    nnnnnnnn               1   2               Good
  {MORE}

  F3=Cancel        F10=Exit
```

Note: Scroll the display to see all the connected disk drive modules.

Example 2. Broken Loop (Cable Removed): Each disk drive module normally communicates with the adapter through one data path. Because data can pass around the loop in either direction, however, the adapter automatically reconfigures the loop to enable communication to continue to each disk drive if the loop becomes broken.

In the following diagram, eight disk drive modules should be connected to connectors A1 and A2 of the SSA adapter. However, the loop is broken because the SSA cable has been disconnected from connector A2. Four disk drive modules are connected to connectors B1 and B2 of the same SSA adapter.

Although the broken loop is reported as an error, all the disk drive modules can still communicate with the using system. The eight disk drive modules can communicate through connector A1 of the SSA adapter . The five disk drive modules can communicate through connectors B1 and B2 of the same SSA adapter (normal loop).
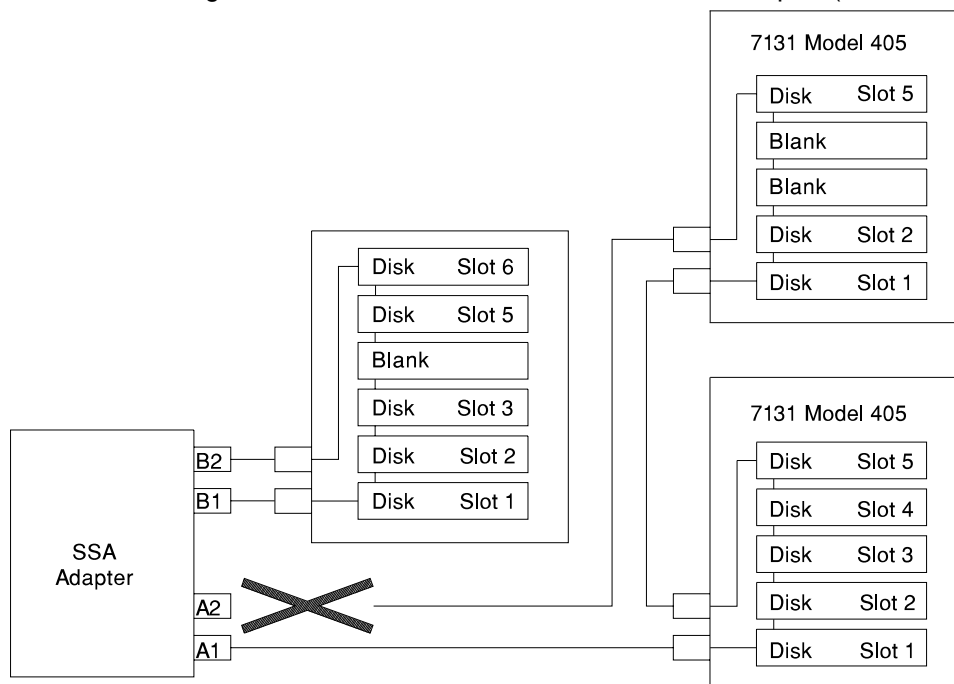
For this example, the Link Verification service aid displays the following information:

```
LINK VERIFICATION                                                   802386

SSA Link Verification for:
  ssa1    00-05    SSA ADAPTER

To set or reset Identify, move cursor onto selection, then press Enter.

  Physical    Serial#        Adapter Port

                          A1  A2  B1  B2                  Status
  {TOP}
  pdisk0    nnnnnnnn        0                             Good
  pdisk1    nnnnnnnn        1                             Good
  pdisk2    nnnnnnnn        2                             Good
  pdisk3    nnnnnnnn        3                             Good
  pdisk4    nnnnnnnn        4                             Good
  pdisk5    nnnnnnnn        5                             Good
  pdisk6    nnnnnnnn        6                             Good
  pdisk7    nnnnnnnn        7                             Good
  pdisk8    nnnnnnnn               0   3                  Good
  pdisk9    nnnnnnnn               1   2                  Good
  {MORE}

  F3=Cancel        F10=Exit
```

Note that the column for adapter connector A2 shows no connections.

Example 3. Broken Loop (Disk Drive Module Removed): The following diagram shows eight disk drive modules connected to connectors A1 and A2 of the SSA adapter, but the loop is broken because disk drive module in slot 3 has been removed. Four disk drive modules are connected to connectors B1 and B2 of the same SSA adapter.

Although the missing disk drive module is reported as an error, all the remaining disk drive modules can still communicate with the using system. Two disk drive modules can communicate through connector A1 of the SSA adapter. Five disk drive modules can communicate through connector A2 of the SSA adapter. Five disk drive modules can communicate through connectors B1 and B2 of the same SSA adapter (normal loop).
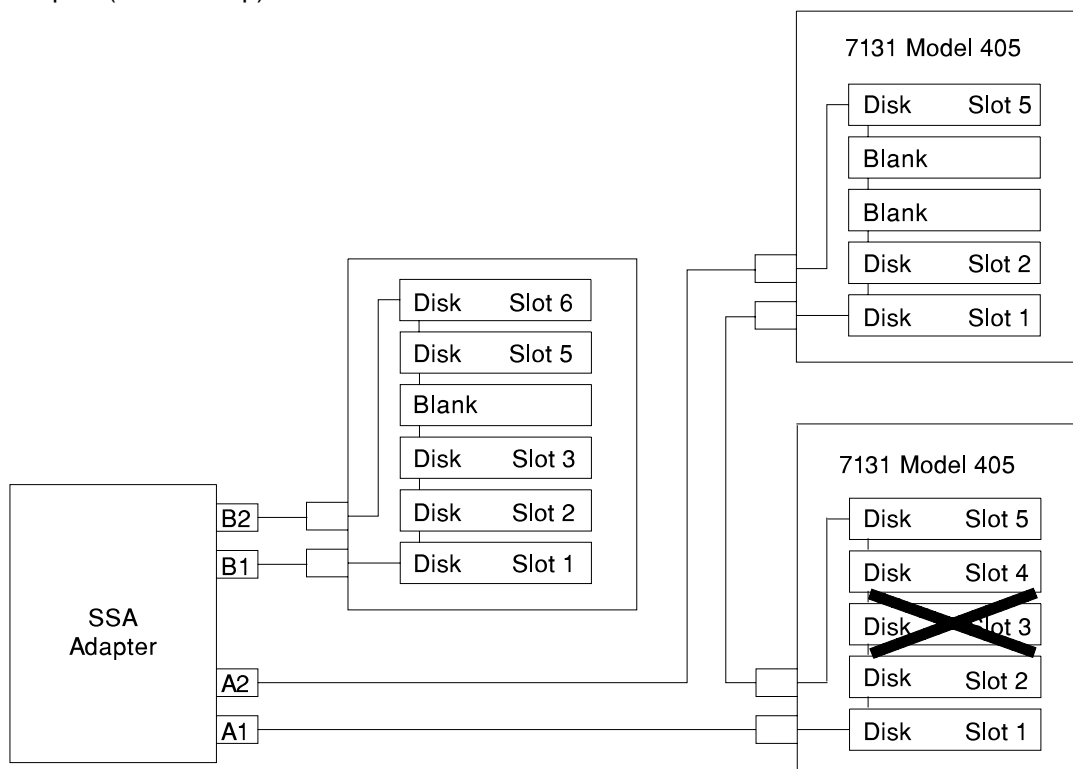
For this example, the Link Verification service aid displays the following information:

```
LINK VERIFICATION                                                  802386

SSA Link Verification for:
  ssa1    00-05    SSA ADAPTER

To set or reset Identify, move cursor onto selection, then press Enter.

   Physical   Serial#      Adapter Port

                        A1  A2  B1  B2                 Status
   {TOP}
   pdisk0   nnnnnnnn      0                            Good
   pdisk1   nnnnnnnn      1                            Good
   ?????
   pdisk3   nnnnnnnn          4                        Good
   pdisk4   nnnnnnnn          3                        Good
   pdisk5   nnnnnnnn          2                        Good
   pdisk6   nnnnnnnn          1                        Good
   pdisk7   nnnnnnnn          0                        Good
   pdisk8   nnnnnnnn              0   3                Good
   pdisk9   nnnnnnnn              1   2                Good
   {MORE}

  F3=Cancel        F10=Exit
```

Note that the missing disk drive module (pdisk2) is represented by a line of question marks.

Finding the Physical Location of a Device

The physical location of a device (for example, a disk drive module or an SSA adapter) cannot be reported directly by the using system because of the way in which the SSA interface works. The address of an SSA device is related to the position of that device on the SSA loop. The address can, therefore, change if the configuration is changed.

Finding the Device When Service Aids Are Available

To help you to find the correct physical disk drive, the SSA service aids include an identify function. This function, when selected, causes the check light of the selected disk drive module to flash. For more details, see "SSA Service Aids" on page 6-30.

Some devices (for example, adapters) do not have check lights. To find such a device, you can either use the identify function to identify devices that are next to the SSA adapter on the SSA link, or use the procedure described in "Finding the Device When No Service Aids Are Available."

Finding the Device When No Service Aids Are Available

When no service aids are available, you must find the device by using the port (P) and SSA-address (AA) values that are provided by some service request numbers (SRNs). Examples of these SRNs are 43nnn, 44nnn, and 45nnn, where nnn represents the PAA values.

The port (P) value can be a number from 0 to 3, which indicates the port connector on the SSA adapter:

    0 = Connector A1
    1 = Connector A2
    2 = Connector B1
    3 = Connector B2

The AA value is the decimal SSA-address value. It indicates the position of the device that you are trying to find (counted *along* the SSA link).

Use the port value to locate the relevant connector on the SSA adapter, then follow the SSA cable to the first disk drive module or adapter in the same SSA loop. Do not include dummy disk drive modules.

The first disk drive module or adapter that you reach represents SSA-address count 0. Continue to follow the SSA link from disk drive module or adapter, increasing the

SSA-address count by 1 for each device, until you reach the disk drive module or adapter that is indicated in the SRN.

Microcode Maintenance

Updates to the microcode are loaded into the using system from diskettes. If the level of the microcode that is stored in the using system is higher than the level of the microcode that is installed on the SSA adapter or the disk drive modules, the higher-level microcode is automatically downloaded to the adapter and disk drive modules when the using system runs the device configuration method.

For some problems, the service request number (SRN) might ask you to check the microcode package ID before you exchange any field-replaceable units (FRUs). You can determine the package ID for the adapter in either of the following two ways:

- On the command line, type the following command and press Enter:

    lsattr -E -l <adapter> **-a ucode**

    where *adapter* is the ID of the adapter that you want to check; for example, ssa0.

    The response to this command is:

    ucode 8F97.00.nn **Name of adapter download False**

    where *nn* is the adapter code package ID.
- Use the Display or Change Configuration or Vital Product Data (VPD) service aid to display the VPD for the adapter. The first two characters of the ROS Level field contain the adapter code package ID.

To determine the ID of the microcode package that is being used on a disk drive module, use the Display or Change Configuration or Vital Product Data (VPD) service aid to display the VPD for the disk drive module. The first two characters of the ROS Level field contain the ID of the microcode package for the disk drive module.

Note: During the configuration of the complete system, all the VPD files in the system are updated *before* any microcode is downloaded from the using system to the 6-pack. If the using system later downloads a new level of microcode to the subsystem, the VPD for the adapter or disk drive module will not show the ID of the new microcode package until the next time the configuration manager command (**cfgmgr**) is run.

Vital Product Data (VPD)

The vital product data (VPD) for the system unit and for the SSA adapter can be displayed by using the using-system service aids. This section shows the types of information that are contained in the VPD.

Abbreviations used in this section are:

DRAM   Dynamic random-access memory

FRU   Field-replaceable unit

RAM   Random-access memory

ROM   Read-only memory

ROS   Read-only storage

SSA   Serial storage architecture

4.5 GB, and 9.1 GB SSA Disk Drives

Part number   Disk drive module part number

EC level   Disk enclosure engineering change level

Serial number   Disk enclosure serial number

Machine type and model   Type and model

Manufacturer   Manufacturer and plant code

ROS level and ID   ROM and RAM code revision levels

Device specific Z2   RAM code load part number

Device specific Z3   Electronics card assembly part number

Device specific Z4   Disk enclosure date of manufacture

SSA Adapter

Part number   Adapter card FRU part number

Serial number   Adapter card serial number

Engineering change level Adapter card engineering change level

Manufacturing location   Manufacturer and plant code

ROS level and ID   Version of ROS code loaded on the adapter

Loadable microcode level Version of loadable code needed for the satisfactory operation of this card

Device driver level	Minimum level of device driver needed for this level of card
Description of function	SSA adapter
Device specific (Z0)	If the adapter contains additional DRAM modules, Z0 indicates the total DRAM size in megabytes
Device specific (Z1)	If the adapter contains a pluggable fast-write cache module, Z1 indicates the cache size in megabytes

Chapter 7. Using the System Verification Procedure

The system verification procedure is used to check the system for correct operation.

When you are analyzing a hardware problem, you should use Chapter 8, "Hardware Problem Determination" on page 8-1.

Step 1. Considerations before Running This Procedure

Notes:

1. If this system unit is directly attached to another system unit or attached to a network, be sure communications with the other system unit is stopped.

2. This procedure requires use of all of the system resources. No other activity can be running on the system while you are doing this procedure.

- This procedure requires a display connected to the video port or an ASCII terminal attached to the S1 port.

- Before starting this procedure, you should stop all programs and the operating system.

- This procedure runs the Online Diagnostics in Service mode or Standalone Diagnostics. If the Online Diagnostics are installed, they should be run. See the operator manual for your type of ASCII terminal to find the key sequences you need in order to respond to the diagnostics.

- If you need more information about diagnostics see Chapter 5, "Using the Standalone and Online Diagnostics" on page 5-1.

- If a console display is not selected, the diagnostics stop. The instructions for selecting a console display are displayed on all of the graphic displays and any terminal attached to the S1 port. Follow the displayed instructions to select a console display.

- ISA adapters cannot be detected by the system. The ISA adapter Configuration Service Aid allows the identification and configuration of ISA adapters when running standalone diagnostics.

- Go to Step 2.

Step 2. Loading the Diagnostics

1. Stop all application programs running on the operating system.

2. Stop the operating system.

3. Turn the power off.

4. If you are loading the Standalone Diagnostics and running them from an ASCII terminal:

    - The attributes for the terminal must be set to match the defaults of the diagnostics.

    - If you need to change any settings, record the normal settings, and be sure the terminal attributes are set to work with the diagnostics. If needed, see "Running the Diagnostics from a tty terminal" on page 5-3.

    - Return to substep 5 when you finish checking the attributes.

5. Turn the power on.

    a. When the keyboard indicator appears, press F5 on the direct attached keyboard (5 on the ASCII keyboard) to load the Standalone Diagnostics or F6 on the directly-attached keyboard (6 on the ASCII terminal keyboard) to load the Online Diagnostics.

    b. Enter any requested passwords.

    c. Follow any instructions to select a console.

6. When the Diagnostic Operating Instructions display, go to Step 3. If you are unable to load the diagnostics, go to "Problem Determination When Unable to Load Diagnostics" on page 8-10.

Step 3. Running System Verification

The Diagnostic Operating Instructions should be displayed.

1. Press the Enter key.

2. If the terminal type has not been defined, you must use the `Initialize Terminal` option on the Function Selection menu to initialize the operating system environment before you can continue with the diagnostics.

3. If you want to do a general checkout without much operator action, Select the `Diagnostic Routines` option on the Function Selection menu.

   If you want to do a more complete checkout including the use of wrap plugs, select the `Advanced Diagnostics` option on the Function Selection menu. The advanced diagnostics are primarily for the service representative; they may instruct you to install wrap plugs to better isolate a problem.

4. Select the `System Verification` option on the Diagnostic Mode Selection menu.

5. If you want to run a general checkout of all installed resources, Select the `System Checkout` (if displayed) option on the Diagnostic Selection menu.

   If you want to check one particular resource, select that resource on the Diagnostic Selection menu.

6. Go to Step 4.

Step 4. Additional System Verification

The checkout programs end with either the Testing Complete menu and a message stating `No trouble was found` or the A Problem Was Detected On (Time Stamp) menu with an SRN.

1. Press Enter to return to the Diagnostic Selection menu.

2. If you want to check other resources, select the resource. When you have checked all of the resources you need to check, go to Step 5.

Step 5. Stopping the Diagnostics

1. If running Online diagnostics, the system first should be shut down using the following procedure:

    a. Press F3 repeatedly until you get to the Diagnostic Operating Instructions, then follow the displayed instructions.

    b. Press F3 once, and then follow the displayed instructions to shut down system.

2. If you changed any attributes on your ASCII terminal to run the diagnostics, change the settings back to normal.

3. This completes the system verification. Report the SRN to the service organization if you received one. To do a normal boot, turn off the system unit and wait 30 seconds, and then set the power switch of the system unit to On.

Chapter 8. Hardware Problem Determination

Problem Determination Using the Standalone or Online Diagnostics

Use this procedure to obtain a service request number (SRN) when you are able to load the Standalone or Online Diagnostics. If you are unable to load the Standalone or Online Diagnostics, go to "Problem Determination When Unable to Load Diagnostics" on page 8-10. The service organization uses the SRN to determine which field replaceable units (FRUs) are needed to restore the system to correct operation.

Step 1. Considerations before Running This Procedure

Note: See the operator manual for your ASCII terminal to find the key sequences you need to respond to the diagnostic programs.

- The diagnostics can use a display connected to the video port or a ASCII terminal attached to a serial port.

- This procedure asks you to select the type of diagnostics you want to run. If you need more information about the types, see "Standalone and Online Diagnostics Operating Considerations" on page 5-1.

- ISA adapters cannot be detected by the system. The ISA adapter Configuration Service Aid allows the identification and configuration of ISA adapters for Standalone Diagnostics. ISA adapters must be identified and configured before they can be tested.

- Go to "Step 2."

Step 2

Are the Online Diagnostics installed on this system?

NO   Go to "Step 15."

YES   Go to "Step 3."

Step 3

Determine if the operating system is accepting commands.

Is the operating system accepting commands?

NO   The system must be turned off in order to run diagnostics.

        1. Verify with the system administration and users that the system may be turned off. If so, then turn off the system unit and go to "Step 6."

YES   Go to "Step 4."

Step 4

Diagnostic tests can be run on many resources while the operating system is running. However, more extensive problem isolation is obtained by running Online diagnostics in Service mode.

Do you want to run the Online diagnostics in Service mode?

NO   Go to "Step 5."

YES   Do the following to shut down your system:

        1. At the system prompt, stop the operating system using the proper command for your operating system.

        2. After the operating system is stopped, power off the system unit.

        3. Go to "Step 6."

Step 5

This step invokes the Online Diagnostics in concurrent mode.

1. Log on as root or as superuser.

2. Enter the diag command.

3. Wait until the Diagnostic Operating Instructions are displayed, or wait for three minutes.

Are the Diagnostic Operating Instructions displayed without any obvious console display problems?

NO   Do the following to shut down your system:

        1. At the system prompt, stop the operating system using the proper command for your operating system.

        2. After the operating system is stopped, power off the system unit.

        3. Go to "Step 6."

YES   Go to "Step 9."

Step 6

This step loads Online diagnostics in service mode. If you are unable to load the diagnostics, go to "Step 7."

1. Turn the power on.

2. When the keyboard indicator (icon or text) appears, press F6 on the directly-attached keyboard or 6 on the ASCII terminal keyboard to indicate that diagnostics are to be loaded.

3. Enter any requested passwords.

4. Follow any instructions to select a console.

Did the Diagnostics Operating Instructions display without any obvious display problem?

NO   Go to "Step 7."

YES   Go to "Step 9."

Step 7

Starting at the top of the following table, find your symptom and follow the instructions given in the Action column.

Symptom	Action
Display problem.	Go to "Step 8."
All other symptoms.	Go to "Problem Determination When Unable to Load Diagnostics" on page 8-10

Step 8

The following steps analyze a console display problem.

Find your type of console display in the following table, then follow the instructions given in the Action column.

Console Display	Action
Display Device	Go to the display documentation for problem determination.
ASCII terminal	Go to the documentation for problem determination for this type of terminal.

Step 9

The diagnostics loaded correctly.

Press the Enter key.

Is the Function Selection menu displayed?

NO   Go to "Step 10."

YES   Go to "Step 11."

Step 10

There is a problem with the keyboard.

Find the type of keyboard you are using in the following table, then follow the instructions given in the Action column.

| Keyboard Type	Action
101–key keyboard. Identify by the type of Enter key used. The Enter key is within one horizontal row of keys.	Record error code M0KBD001 and report the problem to the service organization.
102–key keyboard. Identify by the type of Enter key used. The Enter key extends into two horizontal rows of keys.	Record error code M0KBD002 and report the problem to the service organization.
Kanji keyboard. Identify by the Japanese characters.	Record error code M0KBD003 and report the problem to the service organization.
ASCII–terminal keyboard. This applies to all attached terminals.	Go to the documentation for problem determination for this type terminal.

Step 11

1. If the terminal type has not been defined, you must use the `Initialize Terminal` option on the Function Selection menu to initialize the operating system environment before you can continue with the diagnostics. This is a separate and different operation than selecting the console display.

2. Select `Diagnostic` Routines.

3. Press the Enter key.

4. In the following table, find the menu or system response you received when you selected `Diagnostics`. Follow the instructions given in the Action column.

System Response	Action
The Diagnostic Mode Selection menu is displayed.	Select Problem Determination and go to "Step 12."
The Missing Resource menu is displayed.	Follow the displayed instructions until either the Diagnostic Mode Selection menu or an SRN is displayed. If the Diagnostic Mode Selection menu is displayed, select Problem Determination and go to "Step 12." If you get an SRN, record it, and go to "Step 14."
The New Resource menu is displayed.	Follow the displayed instructions. Note: Devices attached to serial ports S1 or S2 will not appear on the New Resource menu. Also, ISA adapters do not appear unless they have been identified and configured. If the Diagnostic Mode Selection menu is displayed, select Problem Determination and go to "Step 12." If you get an SRN, record it, and go to "Step 14." If you do not get an SRN, go to "Step 17."
The system does not respond to selecting `diagnostics`	Go to "Step 10."

Step 12

Did the Diagnostic Selection Menu display?

NO   If `Problem Determination` was selected from the Diagnostic Mode
         Selection menu, and if a recent error has been logged in the error log, the
         diagnostics automatically begin testing the resource.

         Follow the displayed instructions.

         If the No Trouble Found screen is displayed, press Enter.

         If another resource is tested, repeat this step.

         If the Diagnostic Selection menu is displayed, go to "Step 13."

         If an SRN is displayed, record it, and go to "Step 14."

YES   Go to "Step 13."

Step 13

The system checkout option checks most of the configured adapters and devices.

Notes:

1. System checkout is only supported in Online Diagnostics in Service Mode.

2. ISA adapters cannot be detected by the system. The ISA adapter Configuration
   Service Aid allows the identification and configuration of ISA adapters for
   Standalone Diagnostics. ISA adapters must be identified and configured before
   they can be tested.

Select and run the diagnostic tests on the resources you are having problems with or
run system checkout to check all of the configured resources. Find the response in
the following table and take the Action for it.

Diagnostic Response	Action
An SRN is displayed.	Go to "Step 14."
The system hangs.	Report SRN 109-200.
The Testing Complete menu and the No trouble was found message is displayed, and you have not tested all of the resources.	Press Enter and continue with the testing.
The Testing Complete menu and the No trouble was found message displayed and you have tested all of the resources.	Go to "Step 17."

Step 14

The diagnostics produced an SRN for this problem.

1. Record the SRN and other numbers read out.

2. Report the SRN to the service organization.

3. **STOP.** You have completed these procedures.

Step 15

When you are loading the Standalone Diagnostics, the attributes for the terminal must be set to match the defaults of the diagnostic programs. The ASCII terminal must be attached to serial port 1 on the system unit.

Are you going to load Standalone Diagnostics and run them from a ASCII terminal?

NO   Go to "Step 16."

YES   Go to "Running the Diagnostics from a tty terminal" on page 5-3 and be sure your terminal attributes are set to work with the diagnostic programs.

Return to "Step 16" when you finish checking the attributes. Record any settings that are changed.

Step 16

This step loads the Standalone Diagnostics. If you are unable to load the diagnostics, go to "Step 7."

1. Turn the power on.

2. Insert the diagnostic CD-ROM into the CD-ROM drive.

3. When the keyboard indicator appears, press F5 on the direct attached keyboard or 5 on the ASCII keyboard to indicate that diagnostics are to be loaded.

4. Enter any requested passwords.

5. Follow any instructions to select a console.

Did the Diagnostics Operating Instructions display without any obvious display problem?

NO　　　Go to "Step 7."

YES　　Go to "Step 9."

Step 17

The diagnostics did not find a hardware problem. If you still have a problem, contact your software support center.

Problem Determination When Unable to Load Diagnostics

Use this procedure to obtain an error code. The service organization uses the error code to determine which field replaceable units (FRUs) are needed to restore the system to correct operation.

Step 1. Considerations before Running This Procedure

- The diagnostics can use a display connected to the video port or a ASCII terminal attached to a serial port.

- Go to "Step 2."

Step 2

Are the Online Diagnostics installed on this system?

NO   Go to "Step 4."

YES   Go to "Step 3."

Step 3

This step attempts to load Online diagnostics in service mode.

1. Turn the power to off.

2. Turn the power on.

3. If the keyboard indicator appears, press F6 on the direct attached keyboard or 6 on the ASCII keyboard to indicate that diagnostics are to be loaded.

4. Enter any requested passwords.

5. Follow any instructions to select a console.

6. Wait until the diagnostics load or the system appears to stop.

Did the diagnostics load?

NO   Go to "Step 5."

YES   Go to "Step 6."

Step 4

This step attempts to load the Standalone diagnostics.

1. Turn the power to off.

2. Turn the power to on.

3. Insert the diagnostic CD-ROM into the CD-ROM drive.

4. If the keyboard indicator appears, press F5 on the direct attached keyboard or 5 on the ASCII keyboard to indicate that diagnostics are to be loaded.

5. Enter any requested passwords.

6. Follow any instructions to select a console.

7. Wait until the diagnostics load or the system appears to stop.

Did the diagnostics load?

NO   Go to "Step 5."

YES   Go to "Step 6."

Step 5

Starting at the top of the following table, find your symptom and follow the instructions given in the Action column.

Symptom	Action
The power LED does not come on, or comes on and does not stay on.	Check the power cable to the outlet. Check the circuit breakers and check for power at the outlet. Assure the room temperature is within 60 - 90°F. If you do not find a problem, record error code M0PS0000 and report the problem to the service organization.
The system appears to be stopped and NO beep was heard from the system unit.	Processor POST failure. Report error code M0CPU000.
The system appears to be stopped and NO beep was heard from the system unit. F22, F23, or F24 is displayed on the operator panel display.	No good memory could be found. Report error code M0MEM000.
The system appears to be stopped a beep WAS heard from the system unit.	No good memory could be found. Report error code M0MEM001.
The diagnostics are loaded and there was NO beep heard from the system unit during the IPL sequence.	Record error code M0SPK001.
The system stops with the Diagnostic Operating Instructions displayed.	Go to "Step 6."
The diskette LED is blinking rapidly, or FEA or FEB is displayed on the operator panel.	The flash EPROM data is corrupted. The recovery procedure for the flash EPROM should be executed.
The system stops with a prompt to enter a password.	Enter the password. You are not be allowed to continue until a correct password has been entered. When you have entered a valid password, wait for one of the other conditions to occur.
The system stops with an eight-digit error code(s) displayed on the console.	Record the error code(s) and report the problem to the service organization.
The system login prompt is displayed.	You may not have pressed the correct key or you may not have pressed the key soon enough when you were to indicate a Service Mode boot of diagnostic programs. If this was the case, start over at the beginning of this step. If you are sure you pressed the correct key in a timely manner go to Step 7.

Symptom	Action
The system does not respond when the password is entered.	Go to Step 7.
The system stopped and an indicator is displayed on the system console and an eight-digit error code is not displayed.	If the indicator (text or icon) represents: • a keyboard, record error code M0KBD000 and report the problem to the service organization. • memory, record error code M0MEM002 and report the problem to the service organization. • SCSI, record error code M0CON000 and report the problem to the service organization. • Network, record error code M0NET000 and report the problem to the service organization. • Speaker/Audio, record error code M0BT0000 and report the problem to the service organization.

The System Management Services menu is displayed.	The device or media you are attempting to boot from may be faulty.
	
	1. Check the SMS error log for any errors. To check the error log:
	
	  • Choose tools
	
	  • Choose error log
	
	  • If an error is logged, check the time stamp.
	
	  • If the error was logged during the current boot attempt, record it and report it to your service person.
	
	  • If no recent error is logged in the error log, continue to the next step below.
	
	2. If you are attempting to load the Online Diagnostics, try loading the Standalone Diagnostics. Otherwise, record error code M0SCSI01 and report to the service organization.

The system appears to be stopped, the disk activity light is on continuously, and a beep was heard from the system unit.	Record error code M0MEM001 and report the problem to the service organization.
The system stops and the message "STARTING SOFTWARE PLEASE WAIT ..." is displayed.	Report error code M0BT0000.
The message "The system will now continue the boot process" is displayed continuously on the system unit's console.	Report error code M0SCSI01.

Step 6

The diagnostics loaded correctly.

Go to "Problem Determination Using the Standalone or Online Diagnostics" on page 8-1.

Step 7

There is a problem with the keyboard.

Find the type of keyboard you are using in the following table, then follow the instructions given in the Action column.

Keyboard Type	Action
101–key keyboard. Identify by the type of Enter key used. The Enter key is within one horizontal row of keys.	Record error code M0KBD001 and report the problem to the service organization.
102–key keyboard. Identify by the type of Enter key used. The Enter key extends into two horizontal rows of keys.	Record error code M0KBD002 and report the problem to the service organization.
Kanji keyboard. Identify by the Japanese characters.	Record error code M0KBD003 and report the problem to the service organization.
ASCII–terminal keyboard. This applies to all attached terminals.	Go to the documentation for problem determination for this type terminal.

Appendix A. System Records

Record the Identification Numbers

Record and retain the following information.

Product Name   RS/6000 7025 F40 Series

CPU Type/Speed   _____

Serial Number   _____

Key Serial Number   _____

The server's identification numbers are located on the front cover and on the rear of the server.

Serial Number

Serial Number
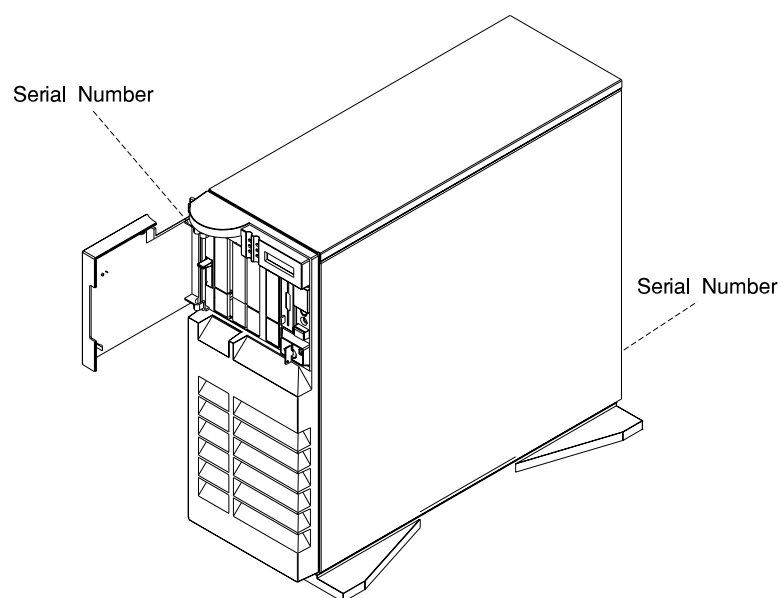
Device Records

Use the following tables to keep a record of the options installed in or attached to your system. This information can be helpful when you install additional options in your server or if you ever need to have your server serviced.

Table A-1. Internal and External Options	
Location	**Option Description**
Memory (J26)	16MB □ 32MB □ 64MB □ 128MB □
Memory (J25)	16MB □ 32MB □ 64MB □ 128MB □
Memory (J24)	16MB □ 32MB □ 64MB □ 128MB □
Memory (J23)	16MB □ 32MB □ 64MB □ 128MB □
Memory (J22)	16MB □ 32MB □ 64MB □ 128MB □
Memory (J21)	16MB □ 32MB □ 64MB □ 128MB □
Memory (J20)	16MB □ 32MB □ 64MB □ 128MB □
Memory (J19)	16MB □ 32MB □ 64MB □ 128MB □
Mouse Connector	Mouse □ Other:_____
Keyboard Connector	Space Saving □ Enhanced □ Other:_____
Expansion Slot 9	_____
Expansion Slot 8	_____
Expansion Slot 7	_____
Expansion Slot 6	_____
Expansion Slot 5	_____
Expansion Slot 4	_____
Expansion Slot 3	_____
Expansion Slot 2	_____
Expansion Slot 1	_____
Parallel Port	_____
Serial Port 1	_____
Serial Port 2	_____

Refer to the following diagram of your server's bays when completing Table A-2 on page A-4.

Bank C
Bays: 1-6
SCSI IDs:
  0-5 or 8-13

Bank D
Bays: 1-6
SCSI IDs:
  0-5 or 8-13

Bank E
Bays: 1-6
SCSI IDs:
  0-5 or 8-13

B1 B2 A1 A2

| C1. | C2. | C3. | C4. | C5. | C6. |
| ID: 1 or 8 | ID: 2 or 9 | ID: 3 or 10 | ID: 4 or 11 | ID: 5 or 12 | ID: 6 or 13 |

| D1. | D2. | D3. | D4. | D5. | D6. |
| ID: 1 or 8 | ID: 2 or 9 | ID: 3 or 10 | ID: 4 or 11 | ID: 5 or 12 | ID: 6 or 13 |

| E1. | E2. | E3. | E4. | E5. | E6. |
| ID: 1 or 8 | ID: 2 or 9 | ID: 3 or 10 | ID: 4 or 11 | ID: 5 or 12 | ID: 6 or 13 |

Bank Labels
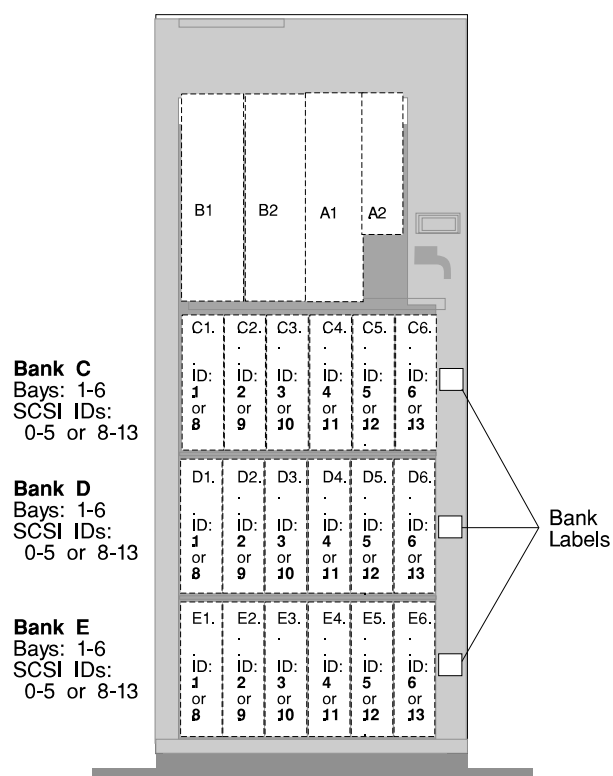
Notes:

- If you attach a drive or other device to an adapter, record the expansion-slot number for that adapter in the *adapter* field of table A-2.
- Your model might have more preinstalled drives than shown in this table.

Table A-2. Internal Files and Devices			
Adapter	**Location**	**SCSI ID**	**Drive Description**
Integrated	Bay A1	4	CD-ROM Drive
Integrated	Bay A2	Non-SCSI	3.5-Inch 1.44MB Diskette Drive
Integrated	Bay B1	6	_____
Integrated	Bay B2	5	_____
_____	Bank C Bay 1	8 or 0	_____
	Bank C Bay 2	9 or 1	_____
	Bank C Bay 3	10 or 2	_____
	Bank C Bay 4	11 or 3	_____
	Bank C Bay 5	12 or 4	_____
	Bank C Bay 6	13 or 5	_____
_____	Bank D Bay 1	8 or 0	_____
	Bank D Bay 2	9 or 1	_____
	Bank D Bay 3	10 or 2	_____
	Bank D Bay 4	11 or 3	_____
	Bank D Bay 5	12 or 4	_____
	Bank D Bay 6	13 or 5	_____
_____	Bank E Bay 1	8 or 0	_____
	Bank E Bay 2	9 or 1	_____
	Bank E Bay 3	10 or 2	_____
	Bank E Bay 4	11 or 3	_____
	Bank E Bay 5	12 or 4	_____
	Bank E Bay 6	13 or 5	_____
_____	_____	_____	_____
_____	_____	_____	_____

Appendix B. Replacing the Battery

The manufacturer has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, be sure to adhere to the following instructions.

CAUTION:
A lithium battery can cause fire, explosion, or severe burn. Do not recharge, disassemble, heat above 100°C (212°F), solder directly to the cell, incinerate, or expose cell contents to water. Keep away from children. Replace only with the part number specified for your system. Use of another battery may present a risk of fire or explosion.

The battery connector is polarized; do not attempt to reverse polarity.

Dispose of the battery according to local regulations.

Note: After you replace the battery, you must reconfigure your system (bootlist, IP parameters, etc.) and reset the system date and time.

1. If you have not already done so, remove the covers as described in "Removing Both the Front and Side Covers" on page 4-10.

2. If a POWER GXT1000 is installed, go to "Removing the POWER GXT1000 Enclosure" on page C-5 for instructions on how to remove it.

3. Remove the system board cover as described in "Removing the System Board Cover" on page 4-16.

4. Locate the battery on the system board.
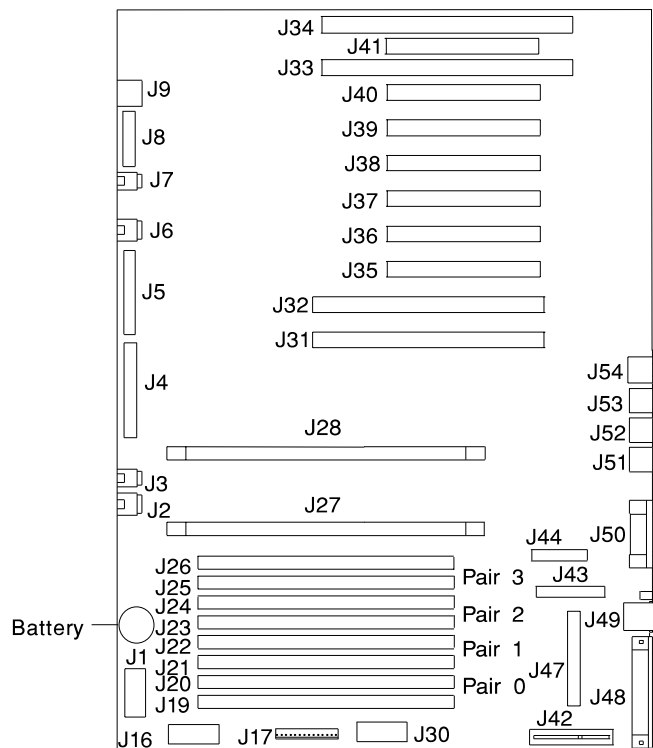
5. Remove the battery:

   a. Use one finger to slightly slide the battery toward the front of the server. (The spring mechanism behind the battery pushes it out toward you as you slide it forward.)

   b. Use your thumb and index finger to hold the battery as it pushes out of the socket.
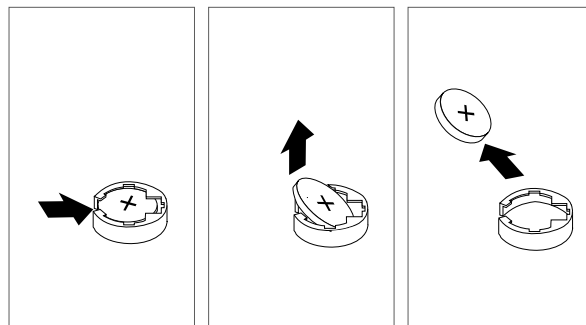
6. Insert the new battery:

   a. Tilt the battery so that you can insert it into the front of the socket.

   b. As you slide it toward the front of the server, push it down into the socket.
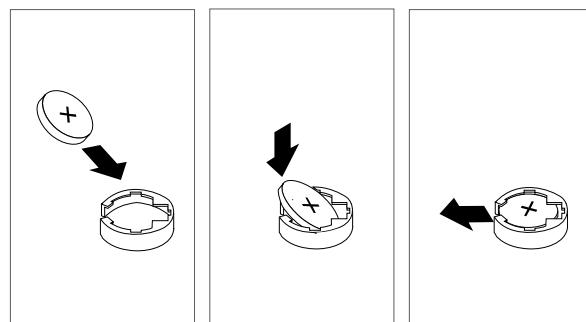
7. Reconfigure your system and reset the system date and time.

8. Replace the covers as described in "Replacing Both the Front and Side Covers" on page 4-96.

Appendix C. POWER GXT1000 Internal Graphics Accelerator

Overview

The POWER GXT1000 Graphics Accelerator is an internally attached graphics subsystem that emphasizes both high function and upper to high mid-range performance. It provides hardware acceleration for 3D modeling and rendering, and addresses a diverse set of applications including design automation, architectural design, geophysical analysis, molecular modeling, scientific visualization, and animation. The POWER GXT1000 supports the following application programming interface (API) versions:

- AIXwindows 1.2.5 (X11R5)
- OpenGL 1.0
- PEXlib 5.1
- graPHIGS
- IBM GL 3.2

POWER GXT1000 contains two subsystems that comprise a Geometry Processing Subsystem (GPSS) and a Rasterizer Subsystem (RSS) and has four parallel graphics processor nodes designed for high speed floating point operations, and a five-way rasterizer for fast rendering performance.

POWER GXT1000 contains a standard base hardware frame buffer and can be expanded with the Advanced Graphics feature. The frame buffer is made up of a number of configurations, each containing a unique combination of double-buffers, auxiliary buffers, Z-buffers, stencil planes, and texture options. Each of the configurations is referred to as a visual.

The visuals are further grouped into a visual set that is predetermined by the standard base hardware frame buffer or Advanced Graphics feature.

Texture map configurations are also determined by the hardware frame buffer. The maximum texture map configuration is obtained if the POWER GXT1000 with Advanced Graphics is installed. The maximum size texture map supported is a 1024x1024x32-bit texture map. The POWER GXT1000 texture buffers are further enhanced by allowing small texture buffers to be used in place of large accumulation buffers. See "Defining Texture Map Configurations" on page C-21 for more information on texture maps, and "Understanding POWER GXT1000 Visuals" on page C-30 for texture map sizes.

The RS/6000 system unit Attachment Adapter feature allows connection of the system unit to the POWER GXT1000. With the POWER GXT1000 and the

appropriate operating system level, your system supports graphic applications on a 1280x1024 high-resolution display.

The Video Output Option (VOO) feature is a small printed circuit board that allows you to display or record images generated on a high-resolution (1280x1024) screen to a video cassette recorder (VCR) or standard television monitor. With the Video Output Option installed, this system complies with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. This option supports National Television System Committee (NTSC) or Phase Alternate Lock (PAL) outputs with the ability to genlock to an external video source. See "Understanding Video" for more information on VOO.

The POWER GXT1000 is a video stereo-ready graphics system that supports a method to add stereo 3D viewing (depth perception) to an image rendered on the 2D surface of a display. A stereo connector that provides the sync signal and +12 V DC power is available on the back panel. It allows attachment of an infrared transmitter that controls the image seen through liquid crystal lenses. This, along with a display that supports stereo mode, gives the effect of stereo 3D viewing. The displays that support stereo are:

- 6091-19i

- POWERdisplay 17

- POWERdisplay 19

- POWERdisplay 20

See "Understanding Video" for more information on stereo 3D viewing.

POWER GXT1000 Locations

Rear View
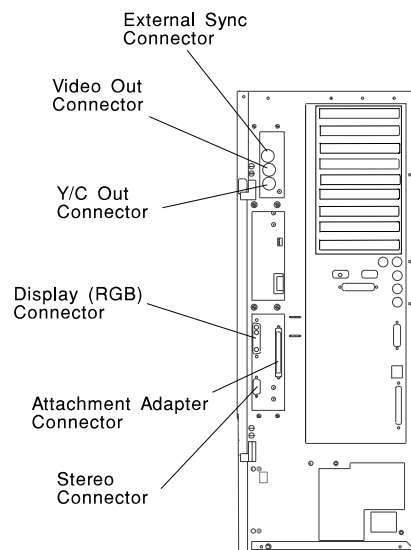
Display Connector is used to attach the display to the POWER GXT1000 via a
display attachment cable (RGB).

> **Note:** The cable and display must match. for a list of the supported
> displays and associated cables.

External Sync accepts a video sync signal for synchronization of the POWER
GXT1000 graphics image with an external sync source (genlock). This
connector supports NTSC and PAL standards.

> **Note:** The cable that attaches to this connector is not supplied with the
> POWER GXT1000 and will have to be purchased through a local supplier.

Attachment Adapter Connector is used to attach the attachment adapter cable to
the system unit. This cable transfers instructions and data between the
POWER GXT1000 and the system unit.

Stereo Connector is an external sync output signal and 12 VDC power for control of
stereo 3D viewing. This connector allows attachment of an infrared
transmitter and liquid crystal lenses that are required for stereo 3D
viewing. The infrared transmitter, liquid crystal lenses, and cable are
available through StereoGraphics Corporation.

Video Out Connector is a composite video signal (CVBS) that allows the transfer of the POWER GXT1000 graphics image to a standard television monitor or video tape recorder. This connector supports NTSC and PAL standards.

> **Note:** The cable that attaches to this connector is not supplied with the POWER GXT1000 and will have to be purchased through a local supplier.

Y/C Out Connector is a luminance video signal (Y) and chrominance video signal (C) that allows the transfer of the POWER GXT1000 graphics image to a standard television monitor or video tape recorder that accepts a Y/C connector. This connector supports NTSC and PAL standards.

> **Note:** This cable is not supplied with the POWER GXT1000 and will have to be purchased through a local supplier.

POWER GXT1000 Removal and Replacement

The sections provides information on how to remove and replace the POWER GXT1000 enclosure from your system. If you have not already done so, review "Safety Considerations" on page 4-1 and remove the covers as described in "Removing Both the Front and Side Covers" on page 4-10.

Attention: Your POWER GXT1000 enclosure is very sensitive. Handle it very carefully.

Removing the POWER GXT1000 Enclosure
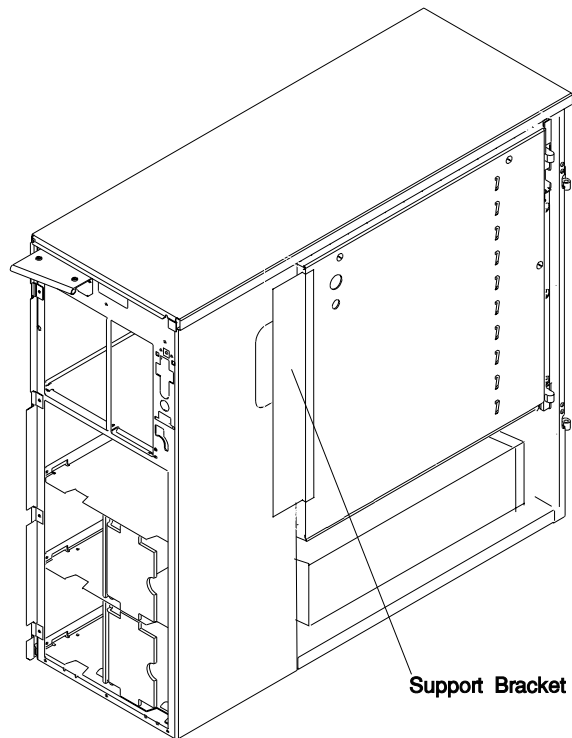
1. Unplug the external cables attached.
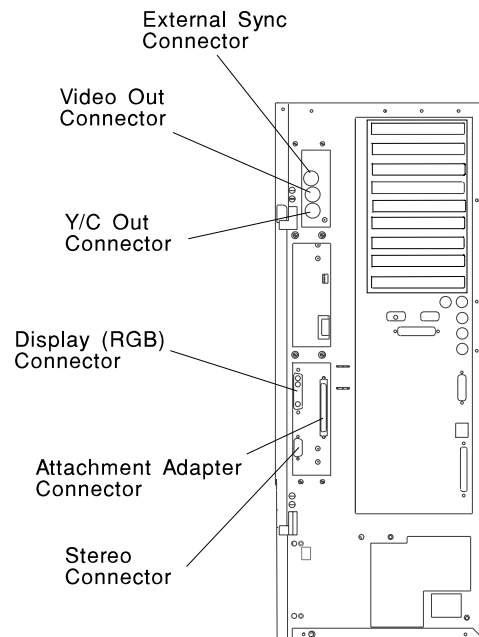
2. Remove the four POWER GXT1000 mounting screws from the rear of the
   system. Place the screws in a safe place, you need them when you reinstall the
   enclosure.

Mounting
Screws
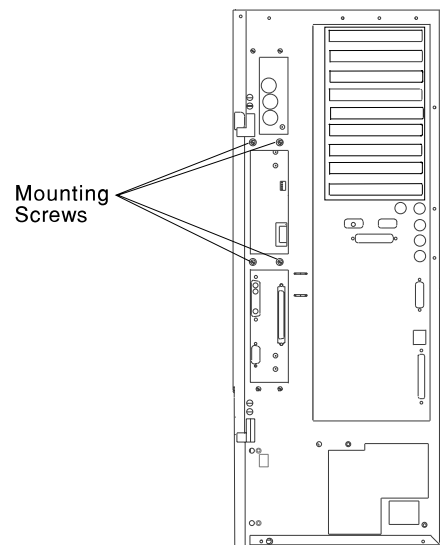
3. Remove the three screws that hold the support bracket to the POWER GXT1000 and the system unit.

Support Bracket

4. There are two fasteners that hold the enclosure inside the system. The upper fastener is accessed through the enclosure cover. The lower fastener is attached to a tab beneath the enclosure. Insert a screw driver, as shown, and loosen the enclosure fasteners.
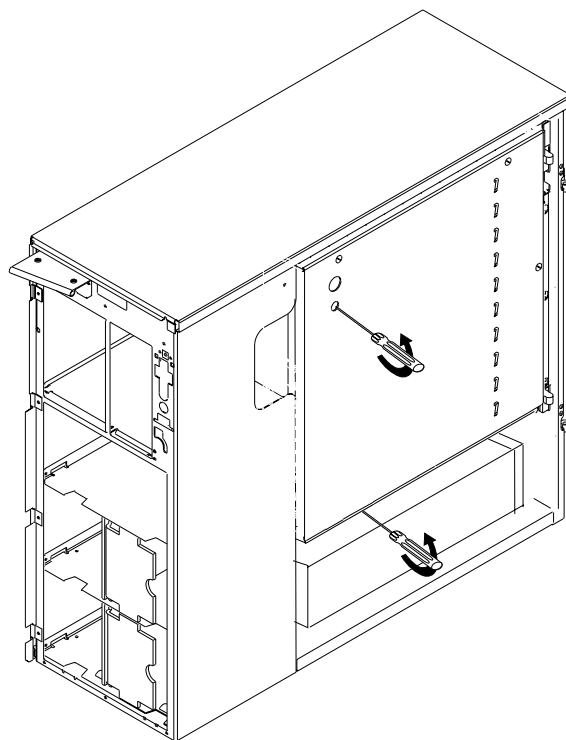
Attention: Make sure all of the external cables are disconnected before you pivot the enclosure.

5. Pivot the enclosure 90 degree away from the system.
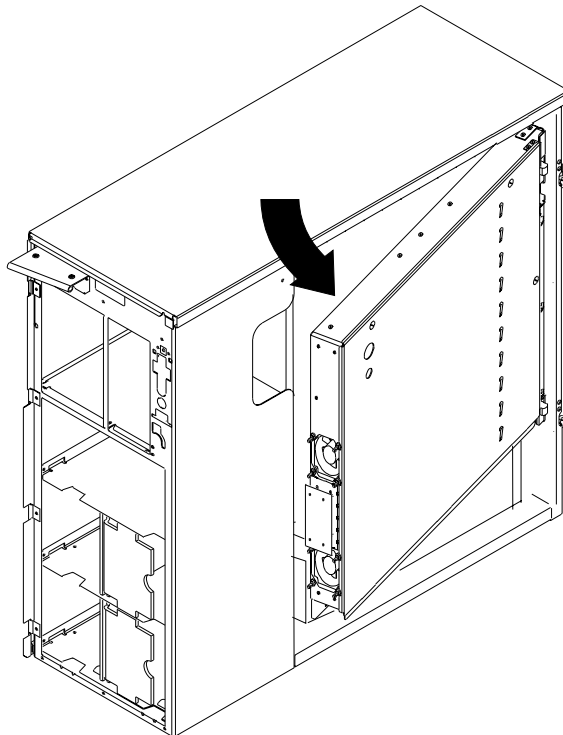
6. Disconnect cables that are attached to the bottom on the enclosure:

   a. Disconnect the 2 fan cables.

   b. Disconnect the 2 power cables.

   Disconnect the 2 power supply cables and the 2 fan cables.

Fan Cable

Power Supply
Cable
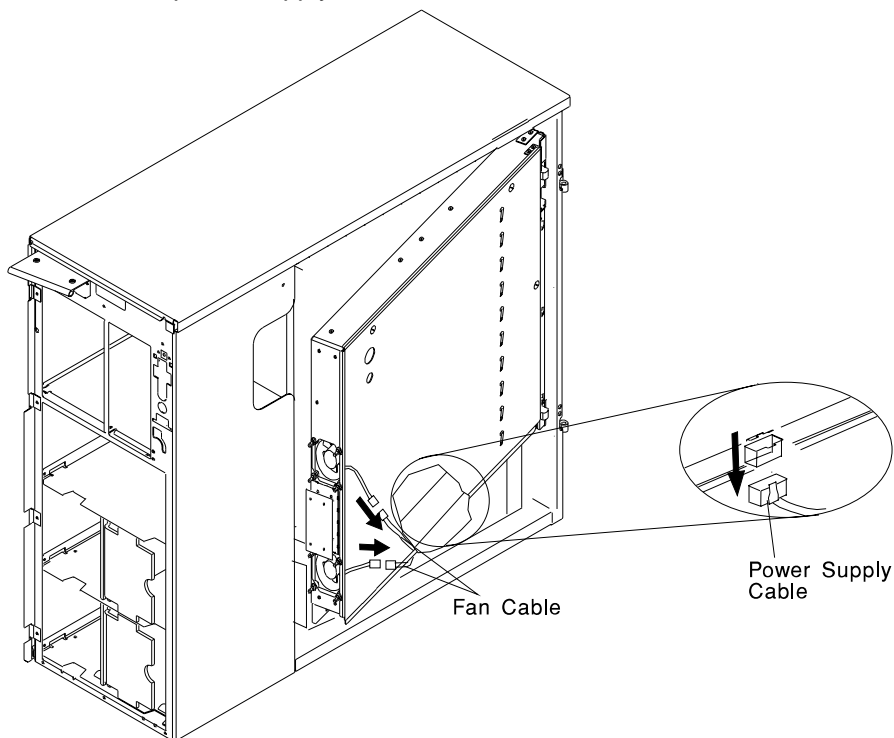
7. Carefully lift the POWER GXT1000 enclosure up and out of the system. Store the enclosure in a safe place.
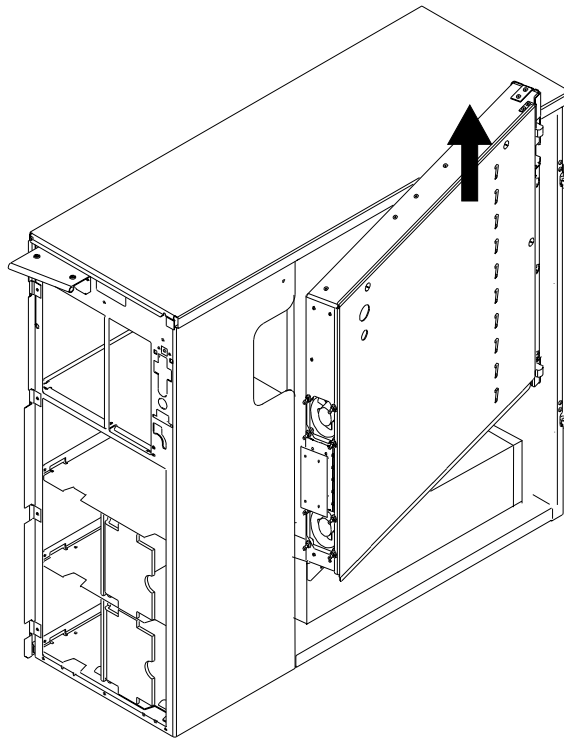
Reinstalling the POWER GXT1000 Enclosure

Attention: Your POWER GXT1000 enclosure is very sensitive. Handle it very carefully.

1. Align the hinges on the rear of the enclosure with the two pins on the rear of the system.
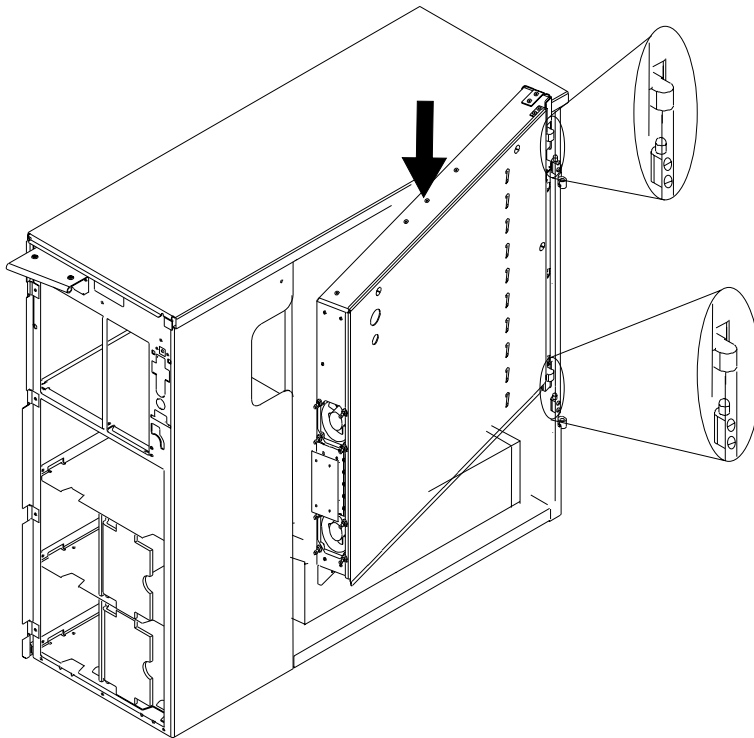
2. Slide the enclosure down on the pins.

3. Reconnect the power supply cables and the fan cables on the bottom of of the enclosure.

Fan Cable

Power Supply Cable
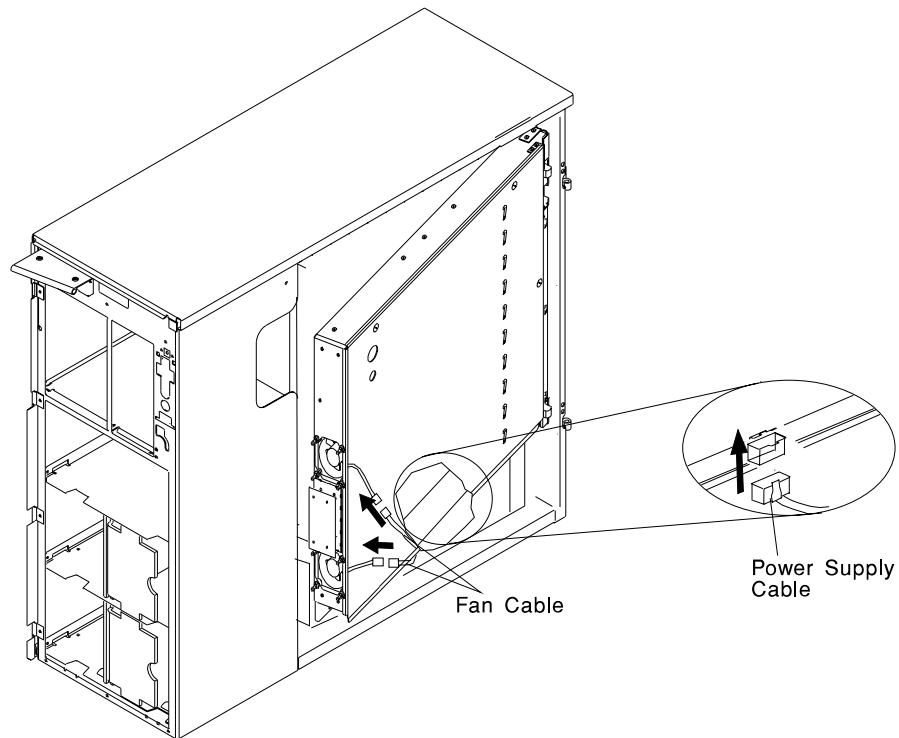
4. Carefully push the enclosure into the system.
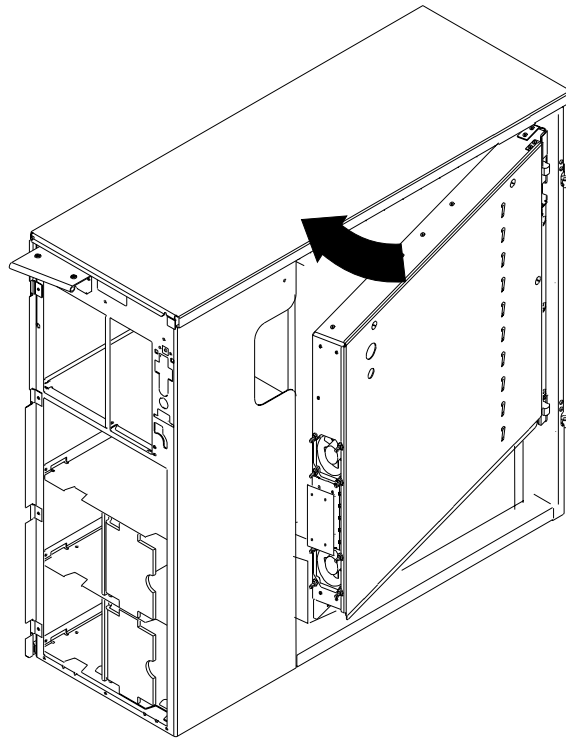
5. Insert and tighten the three screws that hold the support bracket to the POWER GXT1000 and the system unit.

Support Bracket

6. Tighten the 2 screws inside the system that secure the enclosure.
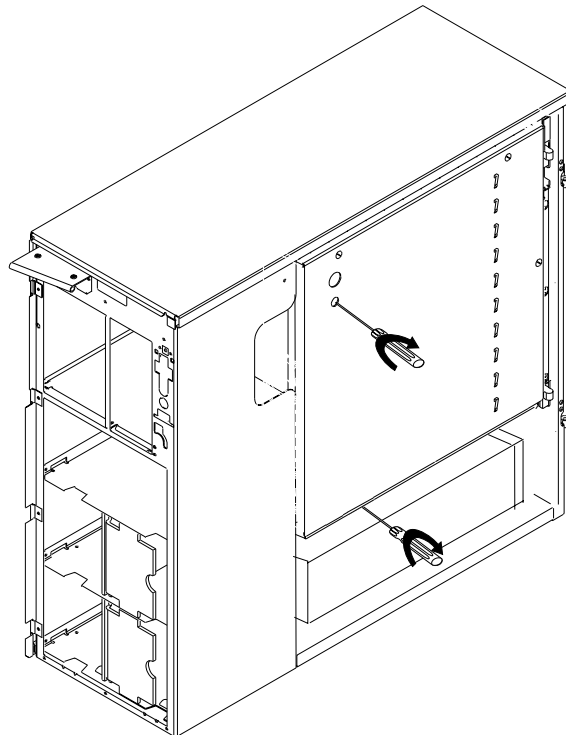
7. Install the four mounting screws on the rear of the system.

Mounting
Screws
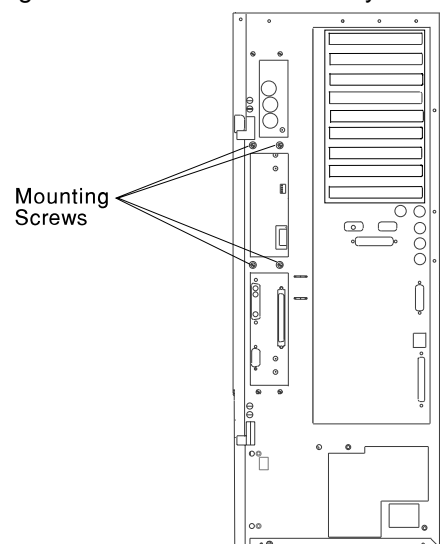
8. Reconnect the external cables that you removed in Step 1 on page C-5.

External Sync
Connector

Video Out
Connector

Y/C Out
Connector

Display (RGB)
Connector

Attachment Adapter
Connector

Stereo
Connector
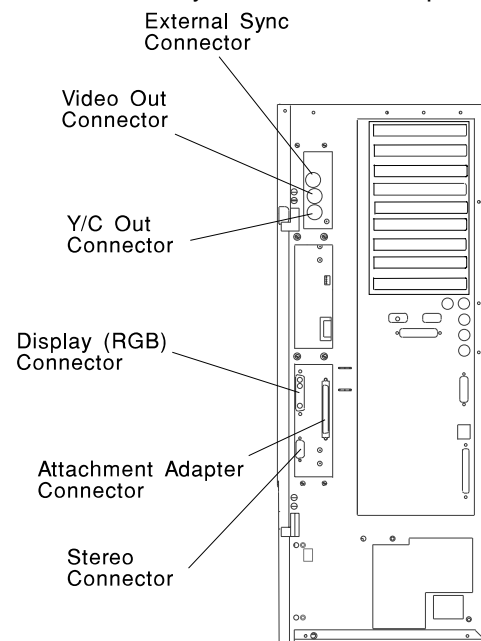
POWER GXT1000 System Considerations

This section describes operating system tasks that are associated with the POWER GXT1000

Virtual Terminal Restrictions (Hot Key)

Accessing virtual terminals (multiple display access from one physical display) is restricted when using the POWER GXT1000 This restriction applies when the AIXwindows X server is running on a POWER GXT1000 display. As a result, all other virtual terminals on the POWER GXT1000 display become inaccessible through hot keying (Alt/Ctrl). If the `open` command is used to create a new virtual terminal on the POWER GXT1000 that virtual terminal will also become inaccessible.

This restriction does not affect virtual terminals on other display adapters. However, an existing virtual terminal on another display cannot be switched to the POWER GXT1000 with the `chdisp` command.

The virtual terminals will remain inaccessible until the X server is closed with the Ctrl-Alt-Backspace key sequence. See *Getting Started: Using RISC System/6000* for additional information on working with virtual terminals.

Defining Overlay and Color Plane Visuals

The POWER GXT1000 allows the X server to create windows in a separate set of frame buffer planes called overlays. The X server supports this by defining distinct visuals for the overlay and color planes. During X server initialization a default visual is used to create the root window, and this visual becomes the default for all child windows of the root. The X server runs by default in the overlays, meaning the root window and all windows created with the default visual will reside in the overlay planes.

A new parameter (-layer n) for **xinit** provides the ability to select what hardware frame buffer planes the X server runs in. A value of:

    0 indicates the color plane

    1 indicates the overlay plane (default)

These are the only valid choices. All other choices will default to layer 1.

Example 1: Starting the X server in the color planes

    xinit -- -layer 0 *<other flags>*

Example 2: Starting the X server in the overlay planes

```
xinit --  -layer 1 <other flags>
or
xinit -- <other flags>
```

Starting the X server for the 3D API's

The **xinit** command options have been expanded, as required by the 3D application programming interfaces (APIs), to take advantage of the hardware capabilities of the POWER GXT1000. The following procedures describe how to start the X server using the new options. Additional information on the **xinit** command can be found in *AIX Commands Reference* or on InfoExplorer.

When starting the X server for all 3D API's (OpenGL, PEX, graPHIGS, and GL), you must specify `-x mbx` and `-x abx` as parameters to **xinit**. For example:

```
xinit -- -x mbx -x abx <other flags>
```

Starting the X server for the PEX API

Starting the X server for the PEX API requires an additional parameter `-x pex`. For example:

```
xinit -- -x mbx -x abx -x pex <other flags>
```

Starting the X server for the OpenGL API

Starting the X server for the OpenGL API requires an additional parameter `-x GLX`. For example:

```
xinit -- -x mbx -x abx -x GLX <other flags>
```

Starting the X server for the graPHIGS API

Using the visual associated with the window, graPHIGS supports creating gP windows as 8-bit Indexed, 24-bit TrueColor, or 24-bit DirectColor. Additionally, the gP window **must** be created in the color planes and for the best performance, it is recommended that the X window (root window when the X server is started) be created in the overlay planes. In support of echoes, graPHIGS on behalf of the application will create a child window in the overlay planes.

The gP window may be created as follows:

- By the application, who then passes the window id to graPHIGS via the **XWINDID** procopt

- By graPHIGS on behalf of the application when the workstation is created.

The visual associated with the gP window when it is created is selected as follows:

- A visual may be specifically selected by the application from the supported visuals for the color planes via the **XGetVisualInfo** function and then passed to the **XCreateWindow** function to create the gP window in the color planes.

  In this case, start the X server in the overlay planes as follows:

  ```
  xinit -- -x mbx -x abx
  ```

  and within your application, select the desired visual and pass it to the **XCreateWindow** function.

  This method allows you the best performance, It allows you to start the X server in the overlay planes while gP is running in the color planes. Windows in different planes do not cause expose events to each other, forcing redraws. If your application is not currently written to select a visual, this will require a change to your application.

  A sample program, **windsamp**, and a **README** are available to show how an application selects the desired visual and creates a gP window. They are located in the **/usr/lpp/graPHIGS/samples/windsamp** directory.

- It may default to using the visual associated with the root window (the window created when the X server was started) by not passing a selected visual to the **XCreateWindow** function.

  In this case, you start the X server in the color planes and select one of the three graPHIGS supported visuals for the root window:

  Select the 8-bit visual:
  ```
  xinit -- -x mbx -x abx -layer 0
  ```

  Select the 24-bit DirectColor visual:
  ```
  xinit -- -x mbx -x abx -layer 0 -d 24 -cc DirectColor
  ```

  Select the 24-bit TrueColor visual:
  ```
  xinit -- -x mbx -x abx -layer 0 -d 24 -cc TrueColor
  ```

  This method requires no change to your application but it does not give you the best performance. Since the X server and graPHIGS are both running in the color planes, graPHIGS will have to handle exposure events from manipulating the X windows forcing more graPHIGS redraws.

  If the application chooses to create its own window and it is not the top level window, then a Window Manager Install property must be added when creating the window. This property allows a color map to be installed for the graPHIGS child window in the overlays, which is created to support echoes.

Defining Texture Map Configurations

Texture map visual configurations are determined by the frame buffer and the Advanced Graphics feature. By default the X server is initialized to provide the largest texture maps possible for a given POWER GXT1000 configuration:

*   POWER GXT1000 Base (without the Advanced Graphics feature)

    One 256x256 32-bit texture buffer

*   POWER GXT1000 with the Advanced Graphics feature.

    Four 512x512 32-bit texture buffer (one 1024x1024 texture image)

Based on the requirements of the 3D applications you are using, it may be necessary to initialize the X server for smaller texture maps on the POWER GXT1000. By reducing the size of the texture maps, memory may be set aside for alternate uses such as auxiliary buffers or deeper accumulation buffers.

This will only be useful if your application does not require the maximum available texture configuration and you want to free the resources for OpenGL accumulation buffers or auxiliary buffers. Because the GL 3.2, PEX 5.1, and graPHIGS APIs do not support these functions, you never need to change your texture map configuration from its default value.

To initialize the X server for smaller texture maps on the POWER GXT1000, use the **HW_TEXTURE_CFG** environment variable prior to starting the X server.

Bourne Shell Syntax

```
HW_TEXTURE_CFG ="[tmconfg:dspid] ..."
export HW_TEXTURE_CFG
```

Options

tmconfg	TX8	One 512x512 32-bit texture buffer on the POWER GXT1000 one 256x256 32-bit texture buffer on the POWER GXT1000 with Advanced Graphics Feature
		Note: These are the defaults for the POWER GXT1000 frame buffer configurations.
	TX96	Three 512x512 32-bit texture buffers
	TX128	Four 512x512 32-bit texture buffers
		Note: This is the default for the POWER GXT1000 with the Advanced Graphics feature.
dspid		The display number or name as determined by the **lsdisp** command.

> **Note:**   TX96 and TX128 are only available if the POWER GXT1000 with Advanced Graphics Feature installed.

Description

The purpose of the **HW_TEXTURE_CFG** environment variable is to configure the texture map for each POWER GXT1000. The X server can support more than one POWER GXT1000 and associated display on a RS/6000 system. If the environment variable is not used each POWER GXT1000 will default to its maximum texture map configuration. This may preclude the use of some visual configurations, so it is important to make sure that the environment variable is set correctly. The environment variable must be set prior to starting the X server.

The texture map configuration can be set independently for each POWER GXT1000 by specifying a display identifier in the environment variable assignment. The display identifier must match the device number or name as determined by executing the **lsdisp** command. Note that the **lsdisp** command can run only from an HFT. If no display identifier is specified then the texture map configuration will apply to all of the attached POWER GXT1000s.

Example 1: Setting texture map configurations

The following is an example of setting the texture map configurations for a RISC System/6000 with two attached POWER GXT1000 graphics subsystems.

First, list all displays on the RISC System/6000 by entering: **lsdisp**. A list similar to the following is displayed:

	NAME	DESCRIPTION	
1	colorgda:1		Color Graphics Display Adapter
2	GXT1000 :1		POWER GXT1000 POWER GXT1000 Graphics Accelerator
3	GXT1000 :2		POWER GXT1000 POWER GXT1000 Graphics Accelerator with Advanced Graphics Feature.

Second, use the adapter sequence numbers from the first column in the **lsdisp** list and set the texture map configurations for each POWER GXT1000 by entering:

```
HW_TEXTURE_CFG ="TX8:2 TX96:3"
export HW_TEXTURE_CFG
```

Third, start the X server specifying a multi-head configuration using both POWER GXT1000s, by entering:

```
xinit --  -P11 2 -P12 3 -x mbx -x abx <other flags>
```

Example 2: Texture buffer arrangement for using TX8

```
HW_TEXTURE_CFG='TX8'
export HW_TEXTURE_CFG
```

One 512x512 32-bit texture buffer on the POWER GXT1000

One 256x256 32-bit texture buffer on the POWER GXT1000 with
Advanced Graphics Feature
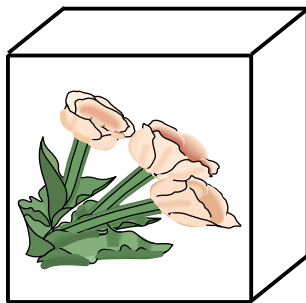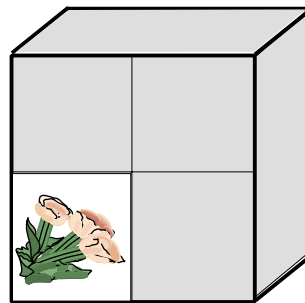
7250 Model 001   7250 Model 002

Example 3: Texture buffer arrangement for using TX96

```
HW_TEXTURE_CFG='TX96'
export HW_TEXTURE_CFG
```

Three 512x512 32-bit texture buffers
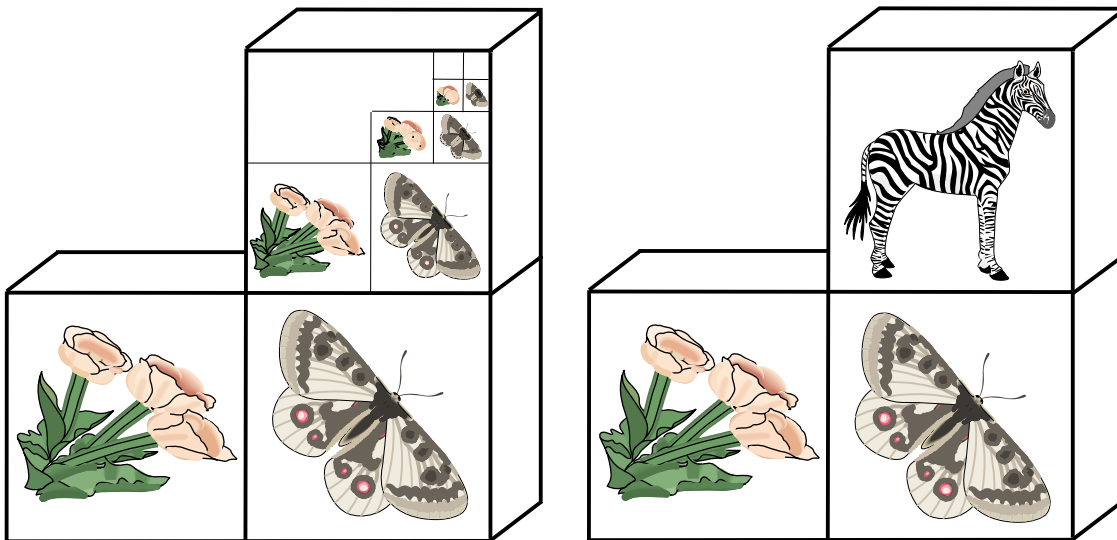
Example 4: Texture buffer arrangement for using TX128

```
HW_TEXTURE_CFG='TX128'
export HW_TEXTURE_CFG
```

Four 512x512 32-bit texture buffers (one 1024x1024 texture image)
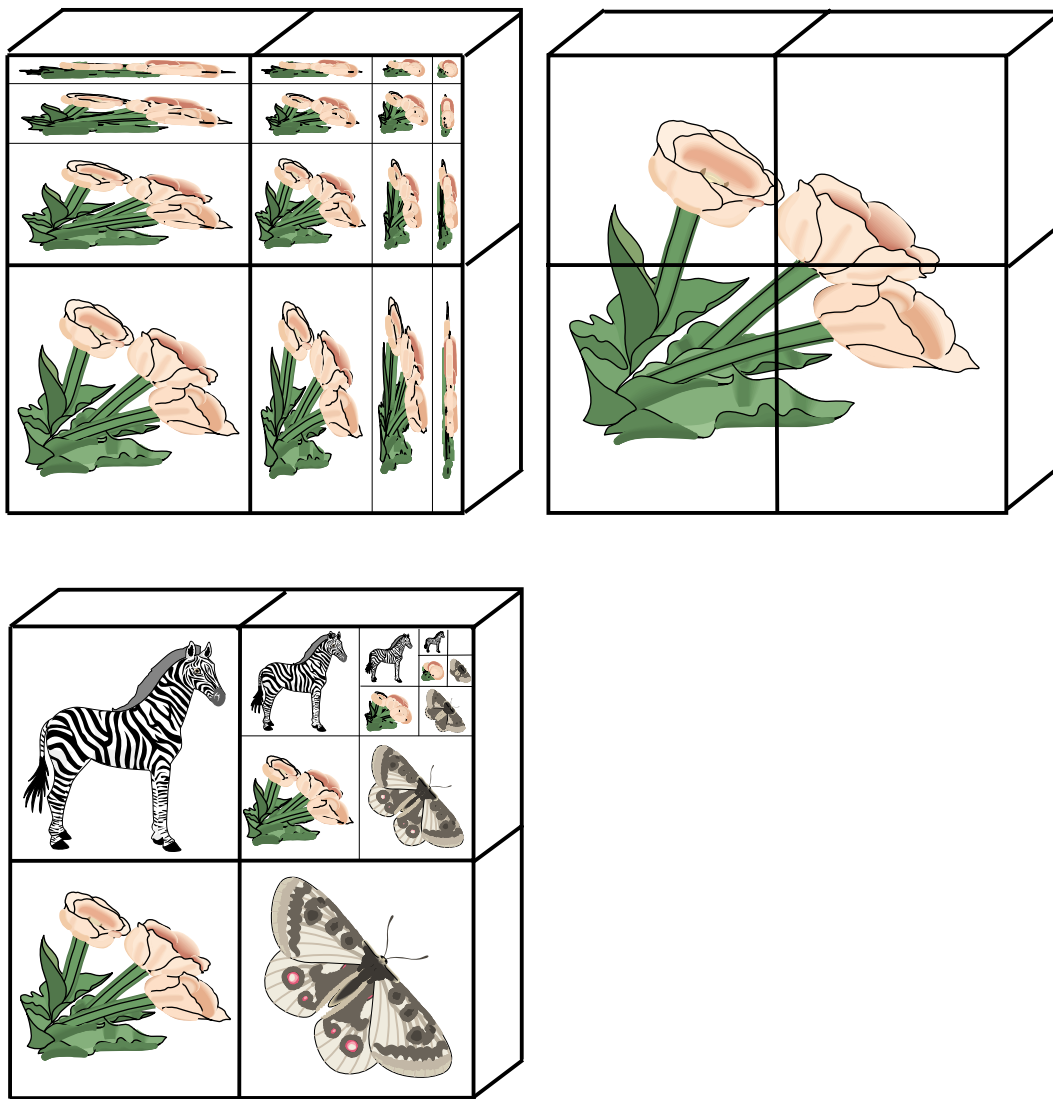
Gamma Correction

The POWER GXT1000 gamma correction function creates consistent "true color". This is necessary because displays have a varying range of phosphor color quality. An accurate display color is achieved through the use of a loadable gamma lookup table.

Some applications modify the lookup table values and do not restore the initial values when the application is terminated. This may result in an inaccurate color reproduction for the display, when used by successive applications. The following utility program is provided to allow the user to restore the gamma lookup table to the initialized values. It is located in the directory **/usr/lpp/x11/bin**.

Notes:

1. The environment variable **DISPLAY** must be set and exported prior to using the **setgamma** command.

2. When the POWER GXT1000 is powered on the default gamma loaded will be the identity table (i.e., no gamma correction).

Usage

```
setgamma
```

```
setgamma -f <input file>
```

```
setgamma [ -o <output file> ] -gamma <red_gammavalue>
            [<green_gammavalue> <blue_gammavalue>]
```

Exit codes

    0   gammaramps are supported, gammaramp was modified as specified.

    255   gammaramp not supported.

Examples

```
setgamma -h
```
        display **setgamma** help information.

```
setgamma
```
        print gammaramp capability of this screen.

```
setgamma -f special.gamma
```
        specify a gammaramp stored in a file.

```
setgamma -o xxx.gamma -gamma 2.7
```
        set and save the gamma table to a file.

        Note: The file format consists of 256 rows, each containing

three floating point numbers (red, green, and blue) that are formatted as follows:

```
0.0  0.0  0.0
0.1  0.1  0.1
......
1.0  1.0  1.0
```

`setgamma -gamma 1.0`
generate and load a linear gammaramp.

`setgamma -gamma 2.7`
use the built in exponential function to generate and load the gammaramp.

`setgamma -gamma 2.7 2.5 2.4`
Use the built in exponential function to generate and load different gammaramps for each component. These are the recommended values for the supported displays.

Determining the POWER GXT1000 Hardware Configuration

The **lsdev** command displays information about the POWER GXT1000 with the Advanced Graphics feature, and the Video Output Option (VOO) feature. You need to know the installed features when defining texture map configurations, in understanding what visual set applies to your POWER GXT1000, or if you plan to use VOO to display or record your graphics on an external device.

The following examples show some of the possible configurations that are available.

```
lsdev -C | grep rby
```

POWER GXT1000 without the Advanced Graphics and VOO features

```
rby0      Available    00-03        POWER
                                    GXT1000
                                    POWER
                                    GXT1000
                                    Graphics
                                    Accelerator
                                    with
                                    Advanced
                                    Graphics
                                    Feature
rbygpss0 Defined       00-03-01     Graphics
                                    Processor
                                    Subsystem
rbyrss0   Defined      00-03-02     Raster
                                    Subsystem
```

Example 3: POWER GXT1000 with the Advanced Graphics and VOO features

rby0	Available	00-03	POWER GXT1000 POWER GXT1000 Graphics Accelerator with Advanced Graphics Feature
rbygpss0	Defined	00-03-01	Graphics Processor Subsystem
rbyrss0	Defined	00-03-02	Raster Subsystem with Advanced Graphics Feature
rbyvoo0	Defined	00-03-03	Video Output Option

POWER GXT1000 Performance When Rendering to a Double Buffer Visual

The performance of the POWER GXT1000 may be improved when rendering to a double buffer visual. This can be accomplished by synchronizing frame buffer swaps with the display horizontal retrace. However, running in this mode may introduce minor visual effects. The default is to synchronize on vertical retrace.

The following procedures allow the POWER GXT1000 to synchronize frame buffer swaps on horizontal or vertical retrace. For these changes to take effect, you must reboot the target machine. On each subsequent reboot the POWER GXT1000 will maintain the last synchronization request.

Enabling the POWER GXT1000 to synchronize the frame buffer swaps on horizontal retraces

```
su root (Enter the root password)
echo "80FFFFFF" >/etc/microcode/8fbcmask.00.00
```

Enabling the POWER GXT1000 to synchronize the frame buffer swaps on vertical retraces (default)

```
su root (Enter the root password)
rm /etc/microcode/8fbcmask.00.00
```

Understanding POWER GXT1000 Visuals

This section contains tables that describe the POWER GXT1000 visual sets and visuals, and the relationship between visuals and texture options. In addition, it contains a list of the X visuals classes.

Understanding Visuals

POWER GXT1000 is available with a standard base hardware frame buffer and can be expanded with the Advanced Graphics feature. The frame buffer is made up of a number of configurations, each containing a unique combination of double-buffers, auxiliary buffers, Z-buffers, stencil planes, and texture options. Each of the configurations is referred to as a visual.

The visuals are further grouped into a visual set that is predetermined by the standard base hardware frame buffer or Advanced Graphics feature.

Your application and application programming interface (for example, graPHIGS, OpenGL, GL, or PEX) determines the visual set that meets your needs.

Base Visual Configuration

The Texture Option columns contain the value specified when using the
HW_TEXTURE_CFG environment variable. The only valid texture option for this
hardware configuration is TX8. This is the default.

Table C-1. base visual configuration - graPHIGS and PEX					
Buffer Type	Color	Alpha Buffer (bits)	Z Buffer (bits)	Support	Texture Options
8-bit double buffer overlay	Indexed	0	0	Yes[3]	N/A[2]
8-bit double buffer	Indexed	0	24	Yes	TX8
12-bit double buffer	Indexed	0	24	No	—
24-bit single buffer	RGB	0	24	Yes	TX8
24-bit double buffer	RGB	0	24	Yes (default)	TX8
[1] = Not applicable [2] = Texture/data mapping is not available in PEX when using the overlay plane visual [3] = Not supported by a graPHIGS XDirectWindowAccess (XDWA) workstation					

Table C-2. base visual configuration - OpenGL							
Buffer Type	Color	Alpha Buffer (bits)	Z Buffer (bits)	Accumu- lation Buffer (bits)	Auxiliary Buffers	Stencil Planes (bits)	Texture Options
8-bit double buffer overlay	Indexed	0	0	0	0	0	N/A[1]
8-bit double buffer	Indexed	0	24	0	4	2	N/A[1]
12-bit double buffer	Indexed	0	24	0	2	2	N/A[1]
24-bit single buffer	RGB	0	24	24	0	2	TX8
24-bit double buffer	RGB	0	24	0	0	2	TX8
[1] = Not applicable [2] = Texture/data mapping is not available in PEX when using the overlay plane visual [3] = Not supported by a graPHIGS XDirectWindowAccess (XDWA) workstation							

Advanced Graphics Visual Configuration

The Texture Option columns contain the value specified when using the
HW_TEXTURE_CFG environment variable. The only valid texture options for this
hardware configuration are TX96 and TX128 (TX128 is the default)

Table C-3. advanced visual configuration - graPHIGS and PEX					
Buffer Type	Color	Alpha Buffer (bits)	Z Buffer (bits)	Support	Texture Options
8-bit double buffer overlay	Indexed	0	0	Yes[3]	N/A[2]
8-bit double buffer	Indexed	0	24	Yes	TX128
12-bit double buffer	Indexed	0	24	No	__
24-bit single buffer	RGB	8	24	Yes	TX128
24-bit double buffer	RGB	8	24	Yes (default)	TX128
24-bit double buffer	RGB	8	24	Yes (default)	TX96
[1] = Not applicable [2] = Texture/data mapping is not available in PEX when using the overlay plane visual [3] = Not supported by a graPHIGS XDirectWindowAccess (XDWA) workstation					

Table C-4. base visual configuration - OpenGL							
Buffer Type	Color	Alpha Buffer (bits)	Z Buffer (bits)	Accumu- lation Buffer (bits)	Auxiliary Buffers	Stencil Planes (bits)	Texture Options
8-bit double buffer overlay	Indexed	0	0	0	0	0	N/A[1]
8-bit double buffer	Indexed	0	24	0	4	8	N/A[1]
12-bit double buffer	Indexed	0	24	0	4	8	N/A[1]
24-bit single buffer	RGB	8	24	64	0	4	TX128
24-bit double buffer	RGB	8	24	0	1	4	TX128
24-bit double buffer	RGB	8	24	64	0	4	TX96
24-bit double buffer	RGB	8	24	0	2	4	TX96
[1] = Not applicable [2] = Texture/data mapping is not available in PEX when using the overlay plane visual [3] = Not supported by a graPHIGS XDirectWindowAccess (XDWA) workstation							

X Visual Classes

The 7250 frame buffer configurations are accessible through AIXwindows as X Visuals. The following table defines the X-Visual classes, buffer depth, and method of color display. Use the color column in this table to relate the X Visuals to the 7250 visuals on pages C-31 and C-32.

Additional information on visuals under AIXwindows can be found in *AIX User Interface Programming Concepts for RISC System/6000*. And information on opaque and transparent overlay planes and their access can be found in InfoExplorer.

Table C-5. 7250 X visual classes		
Class	**Depth**	**Color**
PseudoColor overlay (opaque)	8-bit	Indexed[1]
PseudoColor overlay (transparent)	8-bit	Indexed[1]
Grayscale overlay	8-bit	Indexed[1]
PseudoColor	8-bit	Indexed
PseudoColor	12-bit	Indexed
Grayscale	8-bit	Indexed
StaticColor	8-bit	Indexed
StaticGray	8-bit	Indexed
DirectColor	24-bit	RGB
TrueColor	24-bit	RGB

[1] = Overlay buffer type.

Understanding Video

This chapter describes how you can use the video output option (VOO) and stereo. It also contains a procedure that allows you to use VOO and a description of the VOO and stereo options, library calls, header files, and error handling that are useful if you plan to program these functions yourself.

VOO Overview

The function of video output option (VOO) is to translate the 640x480 top left pixels of the operating system root window from high-resolution RGB to either NTSC or PAL outputs for the purpose of transferring the image to a VCR or a standard TV monitor.

The following are necessary for using VOO:

- The video output option feature is installed on your POWER GXT1000.
- A video output device is attached to the VOO card, plugged in and turned on.
- AIXwindows is running.

    Note: To determine whether VOO is available, use the **VidQueryMode** function. If VOO mode is not available, **VidQueryMode** will return the value `VID_VOO_NOT_INSTALLED`.

Using VOO Options with VOO Library Calls

This section describes the VOO options under the application control, refers to the library calls, header files, and error handling, and discusses considerations for managing VOO. .

You have several responsibilities when running VOO. First, since only the top left 640x480 pixels are captured while in VOO mode, the application must arrange the windows to be captured into that top left corner. This may require moving and resizing windows. Second, the application must provide a mechanism for controlling the time duration of each mode and interrupting the process if exiting before the specified time has expired. The **sleep** system call can be used to set a time duration. There are several ways to interrupt before the specified time has expired. These include:

- Pressing a user-defined interrupt key while in the active VOO sample window. This is feasible only if the VOO sample window remains the active window.

- Adding a line to the window manager **rc** file that lists a **Stop VOO** action on the root menu. When the cursor is moved to the visible (for example, upper left 640x480 pixels) area, the application can bring up the root menu (that is, via mouse button) and choose the **Stop VOO** action. This action should be written

to find the VOO process and issue a signal (for example, SIGUSR1) to it. It is the user's responsibility to set up a signal handler routine for unmasked signals.

Stopping VOO via the Root Menu: One way to stop VOO is to send it an unmasked signal. By customizing the root menu, this can be accomplished with the click of the mouse.

The root menu can be customized by making a copy of the system-wide configuration file in your home directory, and then adding one entry. The procedure, using **mwm** as the window manager in this example, is as follows:

```
cd
cp /usr/lib/X11/system.mwmrc .mwmrc
chmod +w .mwmrc
```

Use an editor to add the following line to the "Menu RootMenu" section of the configuration file:

```
Stop VOO" f.exec "kill -USR1 $(ps -e | grep voo | awk '{print $1}')
```

On the next invocation of **mwm**, **Stop VOO** will appear as a menu item on the root menu.

Stereo Overview

Stereo mode puts the POWER GXT1000 into a stereoscopic image environment for the purpose of viewing 3D images. This stereo type has 1280x496 resolution spaced across the full screen. It uses stored left and right images from the upper and lower halves of the frame buffer, respectively, which results in an aspect ratio of 5:2. The application must make the appropriate API calls to adjust the frame buffer contents in preparation for entering stereo mode.

To achieve the correct visual results, the stereo application must be run in a full screen window. The application should enforce this by enlarging (and positioning) the window as necessary before making any stereo calls.

Video Library and Header File Locations

The library called **libvoo.a**, which is in the **/usr/lib** directory, contains all the video routines for VOO and Stereo. Additionally, there are two header files in the **/usr/include/sys** directory. They contain the structures and defines necessary when calling the video library routines.

Interface Description

The following table lists the VOO and Stereo options under application control, the default settings for those options, and related interface functions. In addition, **VidGetVooOptions** and **VidSetVooOptions** can be used to get and set all options.

Table C-6. VOO and Stereo Options and Related Interface Functions		
Option	**Default Setting**	**Related Function(s)**
Genlock mode	genlock mode	VidSetVooGenlock
CLUT bypass	no bypass	VidSetVooCLUTBypass
Specific CLUT	system-defined	VidGetVooCLUT VidSetVooCLUT
Color mode	color	VidSetVooColor
Chrominance	standard chrominance	VidSetVooChrominance
Encoding format	NTSC-M, 60Hz, SQP (12.27 MHz)	VidSetVooFormat
Phase adjustment	64x1.40625 degrees	VidSetVooPhase
Frequency adjustment	0 frequency adjustment	VidSetVooFrequency
Set VOO or Stereo Mode	N/A	VidMode
Query VOO or Stereo Mode	N/A	VidQueryMode

Video Library Error Handling

If an error occurs during the execution of a video library routine, an error return code is passed back to the application. See the **#define** values in the video header files to determine the cause of the error.

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