RS/6000 7026 H Series CPU Drawer

# Installation and Service Guide

SA38-0535-01

**Second Edition (June 1997)**

# 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 documentation.

### 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

### 電波障害自主規制　届出装置の記述

この装置は，第一種情報装置（商工業地域において使用されるべき情報装置）で商工業地域での電波障害防止を目的とした情報処理装置等電波障害自主規制協議会（VCCI）基準に適合しております。
従って，住宅地域またはその隣接した地域で使用すると，ラジオ，テレビジョン受信機等に受信障害を与えることがあります。
取扱説明書に従って正しい取り扱いをしてください。

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 0.14 milliwatts at 765 to 815 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.

## About This Book

This book provides maintenance information that is specific to the system unit, adapters, and devices that do not have their own service information. It also contains Manintenance Analysis Procedures (MAPs) that are not common to other systems.

MAPs that are common to all systems are contained in the *Diagnostic Information for Multiple Bus Systems*.

This book is used by the service technician to repair system failures. This book assumes that the service technician has had training on the system unit.

### ISO 9000

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

### Related Publications

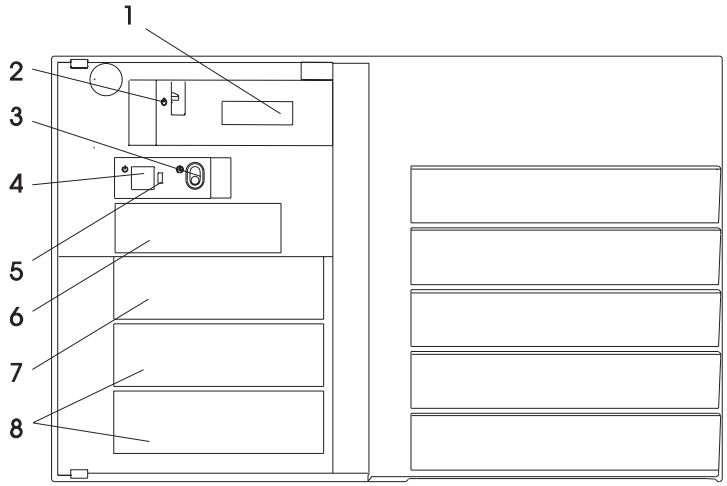
The following publications are available for purchase:

- The *User's Guide* contains information to help users set up, install options, configure, modify, and solve minor problems.
- The *Diagnostic Information for Multiple Bus Systems* contains common diagnostic procedures, error codes, service request numbers, and failing function codes. This manual is intended for trained service technicians.
- The *RS/6000 Adapters, Devices, and Cable Information for Multiple Bus Systems* contains information about adapters, external devices, and cabling. This manual is intended to supplement information found in the *Diagnostic Information for Multiple Bus Systems*.
- The *Site and Hardware Planning Information* contains information to help you plan your installation.

# Chapter 1. Reference Information

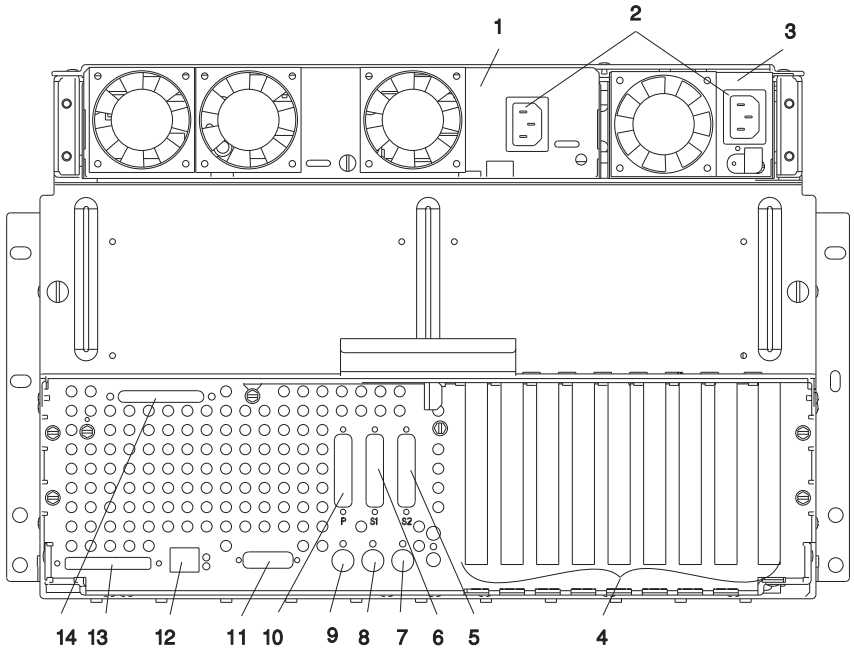
## System Unit Locations

### Front View with Bezel Door Off



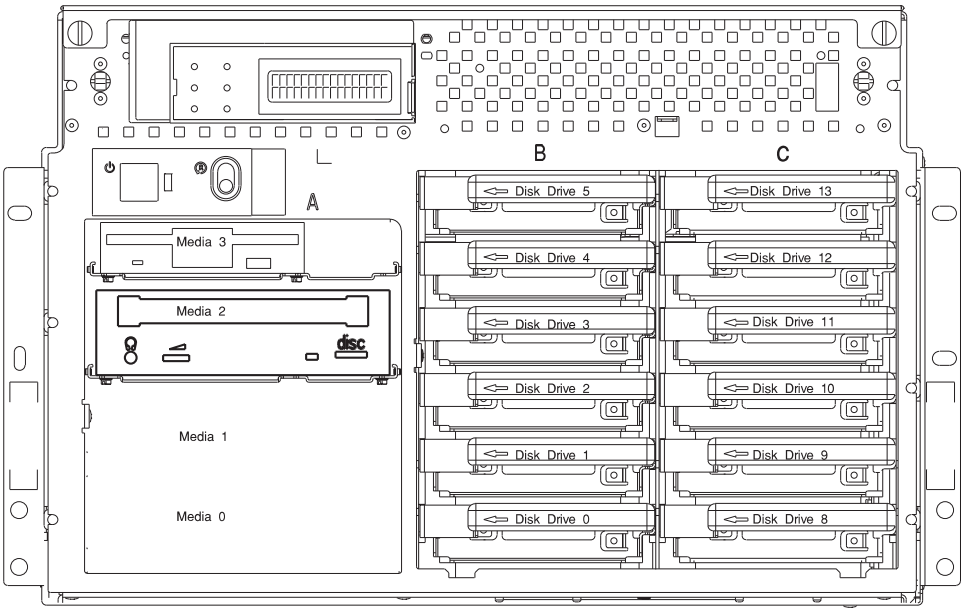

1. Operator Panel Display
2. Power On LED
3. Reset Button
4. Power Button
5. Power On LED
6. Diskette Drive
7. CD-ROM
8. Media Devices (optional)

## Rear View

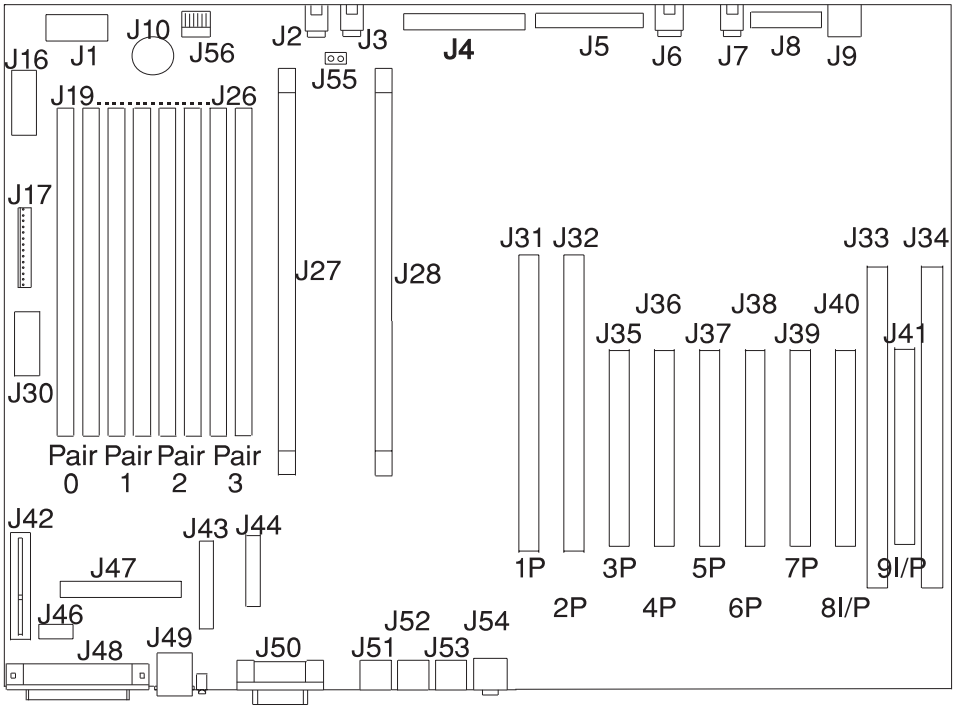



1. Base Power Supply
2. Power Cord Connectors
3. Auxiliary Power Supply
4. Adapter Slots
5. Serial Connector
6. Serial Connector
7. Mouse Connector
8. Keyboard Connector
9. Tablet Connector
10. Parallel Connector
11. Ethernet Connector (thick)
12. Ethernet Connector (twisted pair)
13. External SCSI Connector
14. External SSA Connector

## SCSI IDs and Bay Locations



## System Board Locations




| | |
|---|---|
| **J1** | Power connector (3.3V) |
| **J2** | Fan #1 |
| **J3** | Fan #2 |
| **J4** | Internal SCSI connector |
| **J5** | Diskette drive connector |
| **J6** | Fan #3 |
| **J7** | Fan #4 |
| **J8** | Operator panel connector |
| **J9** | Operator panel audio connector |
| **J10** | Battery |
| **J16** | Power connector (3.3V) |
| **J17** | Power connector |
| **J19, J20, J21, J22** | Memory module connectors (Pairs 0 and 1 or sockets 1, 2, 3, 4) |

| | |
|---|---|
| **J23, J24, J25, J26** | Memory module connectors (Pairs 2 and 3 or sockets 5, 6, 7, 8) |
| **J27** | CPU #0 connector |
| **J28** | CPU #1 connector |
| **J30** | Power connector (5.0V) |
| **J31, J32** | 64-bit PCI connectors |
| **J33, J34** | ISA connectors |
| **J35, J36, J37, J38** | 32-bit PCI connectors |
| **J39, J40, J41** | 32-bit PCI connectors |
| **J42** | Service processor connector |
| **J43** | Parallel connector |
| **J44** | Serial connector |
| **J46** | SCSI security jumpers |
| **J47** | Internal SCSI connector |
| **J48** | External SCSI connector |
| **J49** | Ethernet connector (twisted pair) |
| **J50** | Ethernet connector (thick) |
| **J51** | Tablet connector |
| **J52** | Keyboard connector |
| **J53** | Mouse connector |
| **J54** | Not Used |
| **J55** | Fan Jumper |
| **J56** | Redundant Power Connector |

## Specifications

The mechanical packaging, cooling, power supply, and environmental requirements for the server is shown in the following:

| | | |
|---|---|---|
| **Dimensions** | | |
| Height | 306.2 mm 12.1 in. | |
| Width | 442.4 mm 17.4 in. | |
| Depth | 748.2 mm 29.5 in. | |
| **Weight** | | |
| Minimum configuration | 42 kg 92 lbs. | |
| Maximum configuration | 57 kg 126 lbs. | |
| **Electrical** | | |
| Power source loading typical in kVA | 0.41 | |
| Power source loading maximum in kVA | 0.56 | |
| Voltage range (V ac) | 200 to 240 | |
| Frequency (hertz) | 50 or 60 | |
| Thermal output (typical) | 683 BTU/hr | |
| Thermal output (maximum) | 1365 BTU/hr | |
| Power requirements (typical) | 200 watts | |
| Power requirements (maximum) | 400 watts | |
| Power factor | 0.8 - 0.96 | |
| Inrush current[3] | 60 amps at 240 V ac | |
| Maximum altitude | 2135 m (7000 ft.) | |
| **Temperature Requirements** | **Operating** 10 to 40°C (50 to 104°F) | **Non-Operating** 10 to 52°C (50 to 125.6°F) |
| **Humidity (Noncondensing)** | **Operating** | **Non-Operating** 8 to 80% |
| Without tape drive | 8 to 80% 20 to 80% | 20 to 80% 27°C (80°F) |
| With tape drive **Wet Bulb** | 27°C (80°F) 23°C (73°F) | 27°C (80°F) |
| **Requirements** | | |
| Without tape drive | | |
| With tape drive | | |
| **Noise Emissions**[1,2] $L_{WAd}$ $L_{pAm}$ $<L_{pA}>_m$ | **Operating** 5.9 bels | **Idle** 5.8 bels |
| Impulsive or prominent discrete tones | NA 39 dBA<br>No | NA 38 dBA<br>No |
| **Clearances** | Maintenance of a proper service clearance should allow proper air flow. (See service clearances for the 7015 System Rack R00) | |

1. See “Noise Emission Notes” on page 1-7 for definitions of noise emissions positions.
2. Noise emmissions data for the Model H10 CPU Drawer is based on the CPU Drawer mounted in a 7015 System Rack R00.
3. Inrush currents occur only at initial application of power, no inrush occurs during normal power off-on cycle.

## Noise Emission Notes

1. $L_{WAd}$ is the declared sound power emission level for a production series of machines.
2. $L_{pAm}$ is the mean value of the sound pressure emission levels at the operator position (if any) for a production series of machines.
3. $<L_{pA}>_m$ is the mean value of the space-averaged sound pressure emission levels at the one-meter positions for a production series of machines.
4. N/A = Not Applicable (no operator position).
5. All measurements are made in accordance with ISO DIS 779 and reported in conformance with ISO DIS 7574/4.

## Power Cables

To avoid electrical shock, a power cable with a grounded attachment plug is provided. Use only properly grounded outlets.

Power cables used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA). These power cords consist of:

- Electrical cables, Type SVT or SJT.
- Attachment plugs complying with National Electrical Manufacturers Association (NEMA) 5-15P. That is:

  "For 115 V operation, use a UL listed cable set consisting of a minimum 18 AWG, Type SVT or SJT three-conductor cord a maximum of 15 feet in length and a parallel blade, grounding type attachment plug rated at 15 A, 125 V."

  "For 230 V operation in the United States use a UL listed cable set consisting of a minimum 18 AWG, Type SVT or SJT three-conductor cable a maximum of 15 feet in length, and a tandem blade, grounding type attachment plug rated at 15 A, 250 V."
- Appliance couplers complying with International Electrotechnical Commission (IEC) Standard 320, Sheet C13.

Power cables used in other countries consist of the following:

- Electrical cables, Type HD21.
- Attachment plugs approved by the appropriate testing organization for the specific countries where they are used.

  "For units set at 230 V (outside of U.S.): use a cable set consisting of a minimum 18 AWG cable and grounding type attachment plug rated 15 A, 250 V. The cable set should have the appropriate safety approvals for the country in which the equipment will be installed and should be marked HAR'."

Refer to Chapter 7 on page 7-1 to find the power cables that are available.

## Service Inspection Guide

Perform a service inspection on the system when:

- The system is inspected for a maintenance agreement.
- Service is requested and service has not recently been performed.
- An alterations and attachments review is performed.
- Changes have been made to the equipment that may affect the safe operation of the equipment.
- External devices with their own power cables have those cables attached.

If the inspection indicates an unacceptable safety condition, the condition must be corrected before anyone can service the machine.

**Note:** The correction of any unsafe condition is the responsibility of the owner of the system.

Perform the following checks:

1. Check the covers for sharp edges and for damage or alterations that expose the internal parts of the system unit.
2. Check the covers for proper fit to the system unit. They should be in place and secure.
3. Gently rock the system unit from side to side to determine if it is steady.
4. Set the power switch of the system unit to Off.
5. Remove the covers.
6. Check for alterations or attachments. If there are any, check for obvious safety hazards such as broken wires, sharp edges, or broken insulation.
7. Check the internal cables for damage.
8. Check for dirt, water, and any other contamination within the system unit.
9. Check the voltage label on the back of the system unit to ensure that it matches the voltage at the outlet.
10. Check the external power cable for damage.
11. With the external power cable connected to the system unit, check for 0.1 ohm or less resistance between the ground lug on the external power cable plug and the metal frame.
12. Perform the following checks on each device that has its own power cables:
    a. Check for damage to the power cord.

b. Check for the correct grounded power cable.

c. With the external power cable connected to the device, check for 0.1 ohm or less resistance between the ground lug on the external power cable the metal frame of the device.

13. Install the covers.

# Chapter 2. System Unit Maintenance Analysis Procedures (MAPs)

## Entry MAP

Use the following table to determine your starting point.

**Notes:**

1. If more than eight digits are displayed in the operator panel, use only the first eight digits to find the error in the tables. The digits that display beyond the first eight digits are location codes that can assist you in diagnosing the problem. See "Firmware Location Codes" on page 3-25.
2. Licensed programs frequently rely on network configuration, and system information stored on the VPD on the operator panel control assembly. If the MAPs indicate that the Operator Panel Control Assembly should be replaced, swap the VPD from the old operator panel control assembly to the new one. If the old VPD module has to be replaced call technical support for recovery instructions. If recovery is not possible, notify the system owner that new keys for licensed programs may be required.
3. If a network adapter or the system board is replaced, the network administrator must be notified so that the client IP addresses used by the server can be changed. In addition, the operating system configuration of the network controller may need to be changed in order to enable system startup.

| Symptom | Action |
|---|---|
| **Service Actions** | |
| You have parts to exchange or a corrective action to perform. | 1. Go to the *Removal and Replacement Procedures*.<br>2. Go to the *Repair Checkout Procedure* in the *Diagnostic Information for Multiple Bus Systems*. |
| You need to verify that a part exchange or corrective action corrected the problem. | Go to the *Repair Checkout Procedure* in the *Diagnostic Information for Multiple Bus Systems*. |
| You need to verify correct system operation. | Go to the *System Checkout Procedure* in the *Diagnostic Information for Multiple Bus Systems*. |
| **Symptom Analysis** | |
| You do not have a determined symptom. | Go to "MAP 1020: Problem Determination" on page 2-5. |
| You have an 8-digit error code displayed. | Record the error code. Go to Chapter 3 on page 3-1. |

| Symptom | Action |
|---|---|
| You have an SRN. | Go to the Fast Path MAP in the *Diagnostic Information for Multiple Bus Systems*. |
| The system POST indicators are displayed on the system console, the system pauses and then restarts. The term "POST indicators" refer to the icons (graphic display) or device mnemonics (ASCII terminal) that appear during the power-on self-test (POST). | Go to “Fxx Code Boot Problems” on page 3-22. |
| The system stops and POST indicators are displayed on the system console. The term "POST indicators" refer to the icons (graphic display) or device mnemonics (ASCII terminal) that appear during the power-on self-test (POST). | 1. Use MAP 1540 to isolate the problem. |
| The system stops and the message "STARTING SOFTWARE PLEASE WAIT..." is displayed on ASCII terminal, the boot indicator (  ) is displayed on a graphics terminal. | Go to “Firmware Checkpoints” on page 3-19. |
| The system will not respond to the password being entered or the system login prompt is displayed when booting in service mode. | Verify that the password is being entered from the ASCII terminal or keyboard defined as the system console. If so, then the keyboard or its controller may be faulty.<br>1. If entering the password from the keyboard which is attached to the system, replace the keyboard. If replacing the keyboard does not fix the problem, replace the system board. (See notes on 2-1.)<br>2. If entering the password from a keyboard which is attached to a ASCII terminal, suspect the ASCII terminal. Use the Problem Determination Procedures for the terminal. Replace the system board if these procedures do not reveal a problem. |
| Nothing is displayed on the system console, and the operator panel is blank. | 1. If using a graphic display, go to the *Problem Determination Procedures* for the display.<br>2. If you do not find a problem then replace the display adapter.<br>3. Go to “MAP 1540: Minimum Configuration” on page 2-14. |

| Symptom | Action |
|---|---|
| All display problems. | 1. If using a graphics display, go to the *Problem Determination Procedures* for the display.<br>2. If you do not find a problem then replace the display adapter.<br>3. If the problem is with the ASCII terminal:<br>a. Make sure that the ASCII terminal is connected to S1.<br>b. If problems persist, go to the *Problem Determination Procedures* for the terminal.<br>4. If you do not find a problem then suspect the system board. Go to “MAP 1540: Minimum Configuration” on page 2-14. |
| A flashing 888 is displayed in the control panel followed by a additional error codes. | Go to the Fast Path MAP in the *Diagnostic Information for Multiple Bus Systems*. |
| The system stops and a 3-digit number is displayed in the operator panel display. | If the number displayed begins with the character "A" or "F" then go to “Firmware Checkpoints” on page 3-19.<br>For all other numbers record SRN 101-xxx, where **xxx** is the three-digit number displayed in the operator panel, then go to the Fast Path MAP in the *Diagnostic Information for Multiple Bus Systems*. |
| The power light does not come on, or stay on. | Go to “MAP 1520: Power” on page 2-9. |
| No codes are displayed on the operator panel within a few seconds of turning on the system. | Reseat the operator panel cable.<br>If problem not resolved, replace in order:<br>1. Operator panel display.<br>2. Operator panel control assembly.<br>3. System board (See notes on 2-1.) |

| Symptom | Action |
|---|---|
| The SMS configuration list or Boot sequence selection menu shows more SCSI devices attached to a controller/adapter than are actually attached. | A device may be set to use the same SCSI bus ID as the control adapter. Note the ID being used by the controller/adapter (this can be checked and/or changed via an SMS utility), and verify that no device attached to the controller is set to use that ID.<br>If settings do not appear to be in conflict:<br>1. Replace the SCSI cable.<br>2. Replace the device.<br>3. Replace the SCSI adapter (or system board if connected to the integra SCSI controller on the system board).<br>**Note:** In a "Twin-tailed" configuration where there is more than one initiator device (normally another system) attached to the SCSI bus, it may be necessary to change the ID of the SCSI controller or adapter with the System Management Services. |
| You cannot load diagnostics. | Go to “MAP 1020: Problem Determination” on page 2-5. |
| You have a problem that does not prevent the system from booting. | Go to the Fast Path MAP in the *Diagnostic Information for Multiple Bus Systems*. |
| You suspect a cable problem. | See the *RS/6000 Adapters, Devices, and Cable Information for Multiple Bus Systems*. |
| **You Cannot Find the Symptom in this Table** | |
| All other problems. | Go to “MAP 1020: Problem Determination” on page 2-5. |

## MAP 1020: Problem Determination

### Purpose of This MAP

Use this MAP to get an error code if you were not provided one by the customer or you are unable to load diagnostics. If you are able to load the diagnostics, go to MAP 0020 in the *Diagnostic Information for Multiple Bus Systems*.

Be prepared to record code numbers and use those numbers in the course of analyzing a problem. Go to "Step 1020-1."

### Step 1020-1

The following steps analyze a failure to load the diagnostic programs.

**Note:** You are asked questions regarding the operator panel display You are also asked to perform certain actions based on displayed POST indicators. Please be observant of these conditions.

1. Insert the diagnostic CD-ROM disc into the CD-ROM drive.
2. Turn the power off.
3. Turn the power on.
4. If the keyboard indicator is displayed (the word **keyboard** on an ASCII terminal or the keyboard and hand icon on a graphical display), press the F5 key on the directly-attached keyboard or the number 5 key on an ASCII terminal.

5. Enter any requested passwords.
6. Wait until the diagnostics are loaded or the system appears to stop.
7. Find your symptom in the following table; then follow the instructions given in the Action column.

| Symptom | Action |
|---|---|
| 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. See “Firmware Recovery” on page 5-23. |
| The system stops with a prompt to enter a password. | Enter the password. You are not allowed to continue until a correct password has been entered. When you have entered a valid password go to the beginning of this table and wait for one of the other conditions to occur. |
| The diagnostics loaded. | Go to MAP 0020 in the *Diagnostic Information for Multiple Bus Systems*. |
| 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 IPL of the diagnostic programs. If this was the case start over at the beginning of this Step.<br>**Note:** Perform the systems shutdown procedure before turning off the system.<br>If you are sure you pressed the correct key in a timely manner, go to “Step 1020-2” on page 2-7. |
| The system does not respond when the password is entered. | Go to “Step 1020-2” on page 2-7. |
| The system stopped and a POST indicator is displayed on the system console and an eight-digit error code is not displayed. | If the POST indicator represents:<br>• memory, record error code M0MEM002.<br>• keyboard, record error code M0KBD000.<br>• SCSI, record error code M0CON000.<br>• network, record error code M0NET000.<br>• speaker (audio), record error code M0BT0000.<br>Go to “Step 1020-3” on page 2-7. |
| All other symptoms. | If you were directed here from the Entry MAP, go to “MAP 1540: Minimum Configuration” on page 2-14. Otherwise, find the symptom in the “Entry MAP” on page 2-1. |

## Step 1020-2

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 |
|---|---|
| Type 101 keyboard (U.S.). Identify by the size of the Enter key. The Enter key is in only one horizontal row of keys. | Record error code M0KBD001; then go to "Step 1020-3." |
| Type 102 keyboard (W.T.). Identify by the size of the Enter key. The Enter key extends into two horizontal rows. | Record error code M0KBD002; then go to "Step 1020-3." |
| Type 106 keyboard. (Identify by the Japanese characters.) | Record error code M0KBD003; then go to "Step 1020-3." |
| ASCII terminal keyboard | Go to the documentation for this type of ASCII terminal and continue problem determination. |

## Step 1020-3

Take the following actions:

1. Find the eight-digit error code in Chapter 3 on page 3-1.

   **Note:** If the eight-digit error code is not listed in Chapter 3, look for it in the following:

   - Any supplemental service manual for the device
   - The diagnostic problem report screen for additional information
   - The Service Hints service aid
   - The CEREADME file (by using the Service Hints service aid).

2. Perform the action listed.

### Step 1020-4

1. Turn off, then turn on the system unit.
2. When the keyboard indicator appears, press the F1 key on a directly attached keyboard or the 1 key on an ASCII terminal. If the keyboard indicator does not appear, go to “MAP 1540: Minimum Configuration” on page 2-14.
3. When the System Management Services appear, check the error log for any errors.
   - Choose Utilities
   - Choose Error Log
   - If an error is logged, check the time stamp.
   - If the error was logged during the current boot attempt, record it.
   - Look up the error in the Chapter 3 on page 3-1 and do the listed action.
   - If no recent error is logged in the error log, go to “MAP 1540: Minimum Configuration” on page 2-14.

## MAP 1520: Power

**Note:** This is not a start of call MAP. Use this Power MAP only if you have been directed here from a MAP step in the *Diagnostic Information for Multiple Bus Systems*.

This procedure is used to locate power problems in system units. If a problem is detected, this procedure helps you isolate the problem to a failing unit.

Observe the following safety notice during service procedures.

**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 on 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.**

## Step 1520-1

You may be directed to this MAP for several reasons:

1. There is no indication of activity when the start/stop switch is pressed. None of the LEDs light and none of the fans, including the fan in the power supply, start to turn.

   Go to “Step 1520-2.”

2. When the start/stop switch is pressed, the system begins to power on, but the power LED does not stay on.

   Go to “Step 1520-3” on page 2-11.

## Step 1520-2

1. Turn the power off.
2. Check that the external power cable to the system unit has continuity.
3. Check that the power outlet has been wired correctly with the correct voltage.
4. Check that the external power cable is plugged into both the system unit and the power outlet.

**Did you find a problem?**

**NO** Go to “Step 1520-3” on page 2-11.

**YES** Correct the problem. Go to "Map 0410: Repair Checkout" in the *Diagnostic Information for Multiple Bus Systems*.

### Step 1520-3

**Note:** Either the cooling fans, the power supply or the system board is defective.

To test each FRU, exchange the FRUs that have not already been exchanged in the following order.

- Verify that the fan jumper is connected to connector J55.
- Exchange the fan assembly.
- Power supply
- System board

1. Turn the power off.
2. Unplug the system unit power cable from the wall outlet.
3. Exchange one of the FRUs in the list.
4. Connect the system unit power cable to the wall outlet.
5. Turn the power on.

**Does the fan in the power supply turn on and the power LED come on and stay on?**

**NO** Reinstall the original FRU.

Repeat this step until the defective FRU is identified or all the FRUs have been exchanged.

If the symptom did not change and all the FRUs have been exchanged, go to “Step 1520-4” on page 2-12.

**YES** Go to "Map 0410: Repair Checkout" in the *Diagnostic Information for Multiple Bus Systems*.

### Step 1520-4

1. Turn the power off.
2. Unplug the system unit power cable from the wall outlet.
3. Record the slot numbers of all the ISA and PCI adapters. Label and record the location of any cables attached to the adapters. Remove all the adapters.
4. Remove all pairs of the memory modules.
5. Remove the CPU card(s).
6. Unplug the power cables from all the SCSI devices.
7. Unplug all the fans, except the fan in the power supply.
8. Connect the system unit power cable to the wall outlet.
9. Turn the power on.

**Does the fan in the power supply turn on and the power LED come on and stay on?**

**NO** Replace the system board. Go to "Map 0410: Repair Checkout" in the *Diagnostic Information for Multiple Bus Systems*

**YES** Go to “Step 1520-5” on page 2-13.

### Step 1520-5

One of the parts that was removed or unplugged is causing the problem. Install or connect the parts in the following order.

1. CPU card.
2. Memory modules (Install in pairs).
3. SCSI devices, lowest bay to highest bay.
4. PCI cards, lowest slot to highest slot.
5. ISA cards, lowest slot to highest slot.
6. Fans.

Turn the power on after each part is installed or connected. If the system does not power on or the power LED does not stay on, the most recently installed or connected part is causing the failure.

1. Turn the power off.
2. Unplug the system unit power cable from the wall outlet.
3. Install or connect one of the parts in the list.
4. Connect the system unit power cable to the wall outlet.
5. Turn the power on.

**Does the fan in the power supply turn on and the power LED come on and stay on?**

**NO** Replace the last part you installed.

Repeat these steps until all the parts have been installed.

If the symptom did not change and all the parts have been replaced, call your service support person for assistance.

If the symptom has changed, check for loose cards, cables, and obvious problems. If you do not find a problem, return to “Step 1520-1” on page 2-10 in this MAP and follow the instructions for the new symptom.

**YES** Go to "Map 0410: Repair Checkout" in the *Diagnostic Information for Multiple Bus Systems*.

## MAP 1540: Minimum Configuration

**Notes:**

1. This MAP assumes that a CD-ROM drive is installed and connected to the integrated SCSI adapter, and a Diagnostics CD-ROM disc is available.
2. If a power-on password or privileged–access password is installed, you are prompted to enter the password before the diagnostic CD-ROM can load.
3. The term "POST indicators" refer to the icons (graphic display) or device mnemonics (ASCII terminal) that appear during the power-on self-test (POST).

### Purpose of this MAP

This MAP is used to locate defective FRUs not found by normal diagnostics. For this procedure, diagnostics are run on a minimally-configured system. If a failure is detected on the minimally-configured system, the remaining FRUs are exchanged one at a time until the failing FRU is identified. If a failure is not detected, FRUs are added back until the failure occurs. The failure is then isolated to the failing FRU.

### Step 1540-1

1. Ensure that the diagnostics and the operating system are shut down.
2. Insert the diagnostic CD-ROM into the CD-ROM drive.
3. Turn the power off.
4. Turn the power on.
5. When the keyboard indicator is displayed (the word **keyboard** on an ASCII terminal or the keyboard and hand icon on a graphical display), press the F5 key on the directly-attached keyboard or the number 5 key on an ASCII terminal.
6. If the Console Selection screen is displayed, choose the system console.
7. Enter the appropriate password when prompted to do so.

**Is the "Please define the System Console" screen displayed?**

**NO** Go to “Step 1540-2” on page 2-15.

**YES** Go to “Step 1540-12” on page 2-26.

### Step 1540-2

1. Turn the power off.
2. Disconnect all external cables.
3. Remove the top cover.
4. Record the slot numbers of the ISA and PCI adapters. Label and record the location of any cables attached to the adapters. Remove all the adapters.
5. Remove the second processor card.
6. Record the slot numbers of the memory modules, and then remove all but the memory modules in the slots of Pair 0 (sockets 1 and 2).
7. Disconnect the SCSI cable from the SCSI connectors on the system board.
8. Disconnect the diskette drive cable from the diskette drive connector on the system board.
9. Disconnect the internal serial, Ethernet, and tablet port cables.
10. Turn the power on.

**Does the operator panel stabilize with code FDC, FF2, FF3, or F4D displayed, or is one of these codes displayed immediately before the system unit attempts to restart?**

**NO** Go to “Step 1540-3” on page 2-16.

**YES** Go to “Step 1540-4” on page 2-17.

### Step 1540-3

One of the FRUs remaining in the system unit is defective.

If the following steps call for a system board to be replaced, see notes on page 2-1.

1. If F24 is displayed in the operator panel, turn the power off and exchange the following FRUs in order:
   a. Memory modules (pair)
   b. System board (see notes on page 2-1.)
2. If F24 is NOT displayed in the operator panel, turn the power off and exchange the following FRUs in order:
   a. Processor cards
   b. Memory modules (pair)
   c. System board (see notes on page 2-1.)

**Does the operator panel stabilize with code FDC, FF2, FF3, or F4D displayed, or is one of these codes displayed immediately before the system unit attempts to restart?**

**NO** Reinstall the original FRU.

Repeat the FRU replacement steps until the defective FRU is identified or all the FRUs have been exchanged.

If the symptom did not change and all the FRUs have been exchanged, call your service support person for assistance.

If the symptom has changed, check for loose cards, cables, and obvious problems. If you do not find a problem, return to “Step 1540-1” on page 2-14 in this MAP and follow the instructions for the new symptom.

**YES** Go to "Map 0410: Repair Checkout" in the *Diagnostic Information for Multiple Bus Systems*.

### Step 1540-4

No failure was detected with this configuration.

1. Turn the power off.
2. Install a pair of memory modules.
3. Turn the power on.

**Does the operator panel stabilize with code FDC, FF2, FF3, or F4D displayed, or is one of these codes displayed immediately before the system unit attempts to restart?**

**NO** Go to “Step 1540-5.”

**YES** Repeat this step until all the memory modules are installed and tested.

After all the memory modules are installed and tested, turn the power to off.

Go to “Step 1540-7” on page 2-19.

### Step 1540-5

The failure may be caused by the last pair of memory modules installed. To isolate the failing FRU, do the following:

1. Turn the power off.
2. Exchange the last memory module pair installed.
3. Turn the power on.

**Does the operator panel stabilize with code FDC, FF2, FF3, or F4D displayed, or is one of these codes displayed immediately before the system unit attempts to restart?**

**NO** Go to “Step 1540-6” on page 2-18.

**YES** Go to "Map 0410: Repair Checkout" in the *Diagnostic Information for Multiple Bus Systems*.

### Step 1540-6

One of the FRUs remaining in the system unit is defective.

1. Turn the power off.
2. Exchange the following FRUs the order listed.
   a. System board (See notes on 2-1.)
   b. Power supply.
3. Turn the power on.

**Does the operator panel stabilize with code FDC, FF2, FF3, or F4D displayed, or is one of these codes displayed immediately before the system unit attempts to restart?**

**NO** Reinstall the original FRU.

Repeat this step until the defective FRU is identified or all the FRUs have been exchanged.

If the symptom did not change and all the FRUs have been exchanged, call your service support person for assistance.

If the symptom has changed, check for loose cards, cables, and obvious problems. If you do not find a problem, return to “Step 1540-1” on page 2-14 in this MAP, and follow the instructions for the new symptom.

**YES** Go to "Map 0410: Repair Checkout" in the *Diagnostic Information for Multiple Bus Systems*.

### Step 1540-7

1. Turn the power off.
2. Reconnect the system console.

   **Notes:**

   a. If an ASCII terminal has been defined as the system console, attach the ASCII terminal cable to the to the S1 connector on the rear of the system unit. Also connect the internal serial and Ethernet cables to the system board.

   b. If a display attached to a display adapter has been defined as the system console, install the display adapter and connect the display to it. Plug the keyboard into the keyboard connector on the rear of the system unit.
3. Turn the power on.
4. If the ASCII terminal or graphics display (including display adapter) are connected differently than before, the Console Selection screen appears and requires that a new console be selected.
5. When the keyboard indicator is displayed, press the F1 key on the directly attached keyboard or the number 1 key on an ASCII terminal. This triggers the SMS.
6. Enter the appropriate password when prompted to do so.
7. Wait until the SMS screen is displayed or the system appears to stop.

**Is the SMS screen displayed?**

**NO** One of the FRUs remaining in the system unit is defective.

In the following order, exchange the FRUs that have not been exchanged:

1. Go to the Problem Determination Procedures (test procedures) for the device attached to the S1 serial port or the display attached to the graphics adapter, and test those devices. If a problem is found, follow the procedures for correcting the problem on that device.
2. Graphics adapter (if installed).
3. Cable (async or graphics, including internal async cable).
4. System board. (see notes on page 2-1.)

Repeat this step until the defective FRU is identified or all the FRUs have been exchanged.

If the symptom did not change and all the FRUs have been exchanged, call your service support person for assistance.

If the symptom changed, check for loose cards and obvious problems. If you do not find a problem, return to “Step 1540-1” on page 2-14 and follow the instructions for the new symptom.

**YES** Go to “Step 1540-8” on page 2-21.

### Step 1540-8

1. Make sure the diagnostic CD-ROM is inserted into the CD-ROM drive.
2. Turn the power off.
3. Plug the internal SCSI cable into the SCSI connector on the system board.
4. Disconnect the signal and power connectors from all the SCSI devices except the CD-ROM drive.
5. Turn the power on.
6. After the keyboard indicator is displayed, press the F5 key on the directly-attached keyboard or the number 5 key on an ASCII terminal keyboard.
7. Enter the appropriate password when prompted to do so.

**Is the "Please define the System Console" screen displayed?**

**NO** One of the FRUs remaining in the system unit is defective.

In the following order, exchange the FRUs that have not been exchanged:

1. SCSI cable
2. Last SCSI device connected (CD-ROM drive, tape drive, etc.)
3. The graphics adapter, if the system console is defined as a graphical display.
4. System board (see notes on page 2-1.)
5. Processor card
6. Power Supply.

Repeat this step until the defective FRU is identified or all the FRUs have been exchanged.

If the symptom did not change and all the FRUs have been exchanged call your service support person for assistance.

If the symptom has changed, check for loose cards, cables, and obvious problems. If you do not find a problem, return to “Step 1540-1” on page 2-14 in this MAP and follow the instructions for the new symptom.

**YES** Repeat this step, adding one SCSI device at a time, until all the SCSI devices that were attached to the integrated SCSI adapter are connected and tested.

Go to “Step 1540-9” on page 2-23.

## Step 1540-9

The system is working correctly with this configuration. One of the FRUs (adapters) that you removed is probably defective.

1. Make sure the diagnostic CD-ROM disc is inserted into the CD-ROM drive.
2. Turn the power off.
3. Plug the diskette drive cable into the diskette drive connector on the system board.
4. Turn the power on.
5. After the keyboard indicator is displayed, press the F5 key on the directly-attached keyboard or the number 5 key on an ASCII terminal keyboard.
6. Enter the appropriate password when prompted to do so.

**Is the "Please define the System Console" screen displayed?**

**NO** One of the FRUs remaining in the system is defective.

In the following order, exchange the FRUs that have not been exchanged.

1. Diskette drive
2. Diskette drive cable
3. System board (see notes on page 2-1).
4. Power supply

Repeat this step until the defective FRU is identified or all the FRUs have been exchanged.

If the symptom did not change and all the FRUs have been exchanged, call your service support person for assistance.

If the symptom has changed check for loose cards, cables, and obvious problems. If you do not find a problem return to “Step 1540-1” on page 2-14 in this MAP and follow the instructions for the new symptom.

**YES** Go to “Step 1540-10” on page 2-24.

### Step 1540-10

The system is working correctly with this configuration. One of the FRUs (adapters) that you removed is probably defective,

1. Turn the power off.
2. Install the second CPU card if one was removed. If a second CPU card was not removed, or has already been reinstalled and verified, install a FRU (adapter) and connect any cables and devices that were attached to it.
3. Turn the power on.
4. If the Console Selection screen displays, choose the system console.
5. After the keyboard indicator displayeds, press the F5 key on the directly-attached keyboard or the number 5 key on an ASCII terminal keyboard.
6. Enter the appropriate password when prompted to do so.

**Is the "Please define the System Console" screen displayed?**

**NO** Go to “Step 1540-11” on page 2-25.

**YES** Repeat this step until all of the FRUs (adapters) are installed, then go to the *Repair Checkout Procedure* in the *Diagnostic Information for Multiple Bus Systems*.

## Step 1540-11

The last FRU installed or one of its attached devices is probably defective.

1. Make sure the diagnostic CD-ROM disc is inserted into the CD-ROM drive.
2. Turn the power off.
3. Starting with the last installed adapter, disconnect one attached device and cable.
4. Turn the power on.
5. If the Console Selection screen is displayed, choose the system console.
6. After the keyboard indicator appears, press the F5 key on the directly-attached keyboard or the number 5 key on an ASCII terminal keyboard.
7. Enter the appropriate password when prompted to do so.

**Is the "Please define the System Console" screen displayed?**

**NO** Repeat this step until the defective device or cable is identified or all the devices and cables have been disconnected.

If all the devices and cables have been removed, then one of the FRUs remaining in the system unit is defective.

To test each FRU, exchange the FRUs in the following order:

1. Adapter (last one installed)
2. System board

   If the system board or a network adapter is replaced, see notes on page 2-1.
3. Power supply.

If the symptom did not change and all the FRUs have been exchanged, call your service support person for assistance.

If the symptom has changed check for loose cards, cables, and obvious problems. If you do not find a problem return to “Step 1540-1” on page 2-14 in this MAP and follow the instructions for the new symptom.

**YES** The last device or cable that you disconnected is defective.

Exchange the defective device or cable.

Go to "Map 0410: Repair Checkout" in the *Diagnostic Information for Multiple Bus Systems*.

### Step 1540-12

1. Follow the instructions on the screen to select the system console.
2. When the DIAGNOSTIC OPERATING INSTRUCTIONS screen is displayed, press Enter.
3. If the terminal type has not been defined, you must use the Initial Terminal option on the FUNCTION SELECTION menu to initialize the AIX operating system environment before you can continue with the diagnostics. This is a separate and different operation than selecting the console display.
4. Select Advanced Diagnostic Routines.
5. When the DIAGNOSTIC MODE SELECTION menu displays, select System Verification.
6. Start with the first item on the list and test all the adapters and devices.

**Did you get an SRN?**

**NO** Go to “Step 1540-14” on page 2-27.

**YES** Go to “Step 1540-13.”

---

### Step 1540-13

Look at the FRU part numbers associated with the SRN.

**Have you exchanged all the FRUs that correspond to the failing function codes?**

**NO** Exchange the FRU with the highest failure percentage that has not been changed.

Repeat this step until all the FRUs associated with the SRN have been exchanged or diagnostics run with no trouble found. Run diagnostics after each FRU is exchanged.

If the system board or a network adapter is replaced, see notes on page 2-1.

Go to "Map 0410: Repair Checkout" in the *Diagnostic Information for Multiple Bus Systems*.

**YES** If the symptom did not change and all the FRUs have been exchanged, call your service support person for assistance.

### Step 1540-14

Consult the ISA and PCI adapter configuration documentation for your operating system to verify that all installed adapters are configured correctly.

Go to "MAP 0410: Repair Checkout" in the *Diagnostic Information for Multiple Bus Systems*.

If the symptom did not change and all the FRUs have been exchanged, call your service support person for assistance.

## SSA Maintenance Analysis Procedures (MAPs)

These maintenance analysis procedures (MAPs) describe how to analyze a continuous failure that has occurred in a system that contains two or more disk drive modules. Failing field-replaceable units (FRUs) of the system unit can be isolated with these MAPs.

### How to Use These MAPs

**Attention:** Switching off the power to an SSA Hot-Swap Disk Drive can cause a system fault unless you first make the SSA Hot-Swap Disk Drive modules unavailable to the system unit. To do this:

1. Use the system-management task menus to make the disk drive modules unavailable.
2. If the system unit has more than one SSA adapter, make the SSA Hot-Swap Disk Drive modules unavailable to the system for each of the paths to the SSA Hot-Swap Disk Drive.

**Attention:** Unless the system unit needs to be switched off for some other reason, do not switch off the power to the system unit when servicing an SSA Hot-Swap Disk Drive or the external SSA cable.

- To isolate the FRUs associated with in the failing SSA Hot-Swap Disk Drive, perform the actions and answer the questions given in this MAP.
- When instructed to exchange two or more FRUs in sequence:
    1. Exchange the first FRU in the list for a new one.
    2. Verify that the problem is solved. For some problems, verification means running the diagnostic programs (see the using-system service procedures).

3. If the problem remains:
    a. Reinstall the original FRU.
    b. Exchange the next FRU in the list for a new one.
4. Repeat steps 2 and 3 until either the problem is solved, or all the related FRUs have been exchanged.
5. Perform the next action indicated by the MAP.

- See 4e1 on page 6-29 for locations and descriptions of the lights and switches.

## MAP 2010: SSA Hot-Swap Disk Drive–Start

This MAP is the entry point to the MAPs for the SSA Hot-Swap Disk Drive. If you are not familiar with these MAPs, read “How to Use These MAPs” on page 2-27 first.

You might have been sent here because:

- The system problem determination procedures sent you here.
- Action from an SRN list sent you here.
- A problem occurred during the installation of an SSA Hot-Swap Disk Drive module.
- Another MAP sent you here.
- A customer observed a problem that was not detected by the system problem determination procedures.

### Step 2010-1

Have you been sent to this MAP from the Configuration Verification service aid?

**Yes** Go to “Step 2010-2” on page 2-30.

**No** Go to “Step 2010-3” on page 2-31.

### Step 2010-2

One of the following conditions exist. Take the action described.

1. You have an hdisk that has no associated pdisk.
   a. Issue the system **cfgmgr** command.
   b. Retry the Configuration Verification service aid.
   c. If the problem remains, a software error has probably occurred. Call your support center for assistance.
2. You have a pdisk that has no associated hdisk.
   a. Run diagnostics (using system verification mode) to the pdisk.
   b. If you get an SRN, go to Table B-1 on page B-3 and follow the actions described.

      If you do not get an SRN, the disk formatting may be incompatible with the system (the disk was formatted on a different type of using system, that is, not an RS 6000).

      1. Format the pdisk.
      2. Issue the system **cfgmgr** command
      3. Retry the Configuration Verification service aid.
3. If the problem remains, a software error has probably occurred. Call your support center for assistance.

### Step 2010-3

Have the system diagnostics or problem determination procedures given you an SRN for the SSA Hot-Swap Disk Drive?

**No** Go to "Step 2010-4."

**Yes** Go to "Service Request Numbers (SRNs)" on page B-1.

### Step 2010-4

If the system diagnostics are available, go to "Step 2010-5."

If the stand-alone diagnostics are available, but the system diagnostics are not available, run them, then go to "Step 2010-5."

If the system diagnostics and stand-alone diagnostics are not available, go to "Step 2010-1" on page 2-29.

### Step 2010-5

Run the diagnostics in the problem determination mode.

**Note:** Do not run the advanced diagnostics, because errors are logged on other using systems that share the same loop.

Did the diagnostics give you an SRN for the SSA Hot-Swap Disk Drive?

**No** Go to "Step 2010-6" on page 2-32.

**Yes** Go to "Service Request Numbers (SRNs)" on page B-1.

### Step 2010-6

Are all LED's on the drives in a 6 pack off?

**Yes** Go to “Step 2010-7.”

**No** Go to step “Step 2010-9.”

### Step 2010-7

Are any power cables loose or in need of replacement?

**No** Go to “Step 2010-8.”

**Yes** Fix or replace the power cables as required. Go to "MAP 410: Repair Checkout" in *Diagnostic Information for Multiple Bus Systems* to verify the repair.

### Step 2010-8

Replace the backplane. Go to "MAP 410: Repair Checkout" in *Diagnostic Information for Multiple Bus Systems* to verify the repair.

### Step 2010-9

Is there only one drive with no LED's on?

**No** Go to step “Step 2010-10” on page 2-33.

**Yes** Replace the the following FRU's:

1. Backplane
2. Disk drive assembly

Go to "MAP 410: Repair Checkout" in *Diagnostic Information for Multiple Bus Systems* to verify the repair.

### Step 2010-10

Is the middle LED on one or more disk drives on a backplane off?

**No** Go to step “Step 2010-11.”

**Yes** Replace the the following FRU's:

1. Backplane
2. EPOW cable

Go to "MAP 410: Repair Checkout" in *Diagnostic Information for Multiple Bus Systems* to verify the repair..

### Step 2010-11

Is middle LED in the drive at the end of the backplane flashing?

**No** Go to step “Step 2010-8” on page 2-32.

**Yes** Go to step “Step 2010-12.”

### Step 2010-12

Replace the SSA link cable closest to the flashing LED. Did the LED stop flashing?

**No** Go to step “Step 2010-13.”

**Yes** Go to "MAP 410: Repair Checkout" in *Diagnostic Information for Multiple Bus Systems* to verify the repair.

### Step 2010-13

Replace the following:

1. Backplane
2. Disk drive with the second LED flashing

Go to "MAP 410: Repair Checkout" in *Diagnostic Information for Multiple Bus Systems* to verify the repair.

# Chapter 3. Error Code to FRU Index

The Error Code to FRU Index lists error symptoms and possible causes. The most likely cause is listed first. Use this index to help you decide which FRUs to replace when servicing the system.

If the codes in the following tables indicate a device which is present more than once in the system unit, a location code is needed to specify which device generated the error. Go to “Step 1020-4” on page 2-8 to display the System Management Services error log and obtain a location code. Location code descriptions can be found under “Firmware Location Codes” on page 3-25.

If more than eight digits are displayed in the operator panel, use only the first eight digits to find the error in the tables. The digits that display beyond the first eight digits are location codes that can assist you in diagnosing the problem. See “Firmware Location Codes” on page 3-25.

**Notes:**

1. Licensed programs frequently rely on network configuration or system board information to authorize program use. If the following tables indicate that the system board or network adapter should be replaced, notify the system owner that new keys for licensed programs may be required.
2. If a network adapter or the system board is replaced, the network administrator must be notified so that the client IP addresses used by the server can be changed. In addition, the operating system configuration of the network controller may need to be changed in order to enable system startup.

If you replace FRUs and the problem is still not corrected, go to MAP 0030 in the *Diagnostic Information for Multiple Bus Systems* unless otherwise indicated in the tables.

## POST Error Codes

| Error Code | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| M0BT0000 | Speaker (audio) error | Record the code displayed on the operator panel. If the code is listed in "Firmware Checkpoints" on page 3-19 then perform the indicated action. If the code is not listed, go to "MAP 1540: Minimum Configuration" on page 2-14. |
| M0CON000 | The system hung during POST. | Go to "MAP 1540: Minimum Configuration" on page 2-14. |
| M0CPU000 | The CPU POST failed. | 1. CPU Card<br>2. System Board. (See notes on page 2-1.) |
| M0CPU001 | Checkstop occurred. | 1. CPU card<br>2. System board. (See notes on page 2-1.) |
| M0FD0000 | The system hung during diskette POST. | 1. System board. (See notes on page 2-1.)<br>2. Diskette drive. |
| M0GA0000 | Graphics adapter POST failed. | Graphics adapter |
| M0HD0000 | The system hung during boot POST. | Go to "MAP 1540: Minimum Configuration" on page 2-14. |
| M0KBD000 | The system hung during keyboard POST. | 1. System board. (See notes on page 2-1.)<br>2. Keyboard |
| M0KBD001 | The system did not respond to a keyboard entry. | Type 101 keyboard |
| M0KBD002 | The system did not respond to a keyboard entry. | Type 102 keyboard |
| M0KBD003 | The system did not respond to a keyboard entry. | Type 106 keyboard |
| M0MC0001 | A machine check occurred. | Go to "MAP 1540: Minimum Configuration" on page 2-14. |
| M0MEM000 | No good memory could be found. | 1. Memory<br>2. System board. (See notes on page 2-1.)<br>Note: If only one memory module is installed, replace it. If there are multiple memory modules installed, go to "MAP 1540: Minimum Configuration" on page 2-14. |

| Error Code | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| M0MEM001 | No good memory could be found. | 1. Memory<br>2. System board. (See notes on page 2-1.) |
| M0MEM002 | The system hung during memory POST. | Go to “MAP 1540: Minimum Configuration” on page 2-14. |
| M0NET000 | Network error | Record the code displayed on the operator panel. If the code is listed in “Firmware Checkpoints” on page 3-19, then perform the indicated action. If the code is not listed, go to “MAP 1540: Minimum Configuration” on page 2-14. |
| M0PS0000 | Power failure. | Go to “MAP 1520: Power” on page 2-9. |
| M0SCSI00 | Unable to load diagnostics. | Go to “MAP 1540: Minimum Configuration” on page 2-14. |
| M0SCSI01 | Unable to load diagnostics. | Go to “MAP 1540: Minimum Configuration” on page 2-14. |
| M0SPK000 | A continuous beep is heard from the system. | System board. (See notes on page 2-1.) |
| M0SPK001 | The system does not beep. | 1. Speaker<br>2. System board. (See notes on page 2-1.) |

## Firmware Error Codes

If you replace FRUs and the problem is still not corrected, go to MAP 0030 in the *Diagnostic Information for Multiple Bus Systems* unless otherwise indicated in the tables.

| Error Code | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| 20100xxx | Power Supply | |
| 20A80000 | Insufficient information to boot. | Verify the IP address. |
| 20A80001 | Client IP address is already in use by other network device | Change IP address. |
| 20A80002 | Cannot get gateway IP address | Refer to “Firmware Checkpoints” on page 3-19 table using code **F74**. |
| 20A80003 | Cannot get server hardware address | Refer to “Firmware Checkpoints” on page 3-19 table using code **F74**. |
| 20A80004 | Bootp failed | Refer to “Firmware Checkpoints” on page 3-19 table using code **F75**. |
| 20A80005 | File transmission (TFTP) failed. | Check network connection, try again. |
| 20D0000F | Selftest failed on device, no SRN/location code information available | Check the System Management Services error log entry (if present) for the location code of the failing device. The error log is described in “Step 1020-4” on page 2-8. |
| 20D00010 | Selftest failed on device, can't locate package | Contact you service support representative for assistance. |
| 20E00000 | Power on Password entry error. | The password has been entered incorrectly.<br>Retry installing the password. |
| 20E00001 | Privileged-access password entry error. | The password has been entered incorrectly.<br>Retry installing the password. |
| 20E00002 | Privileged-access password jumper not enabled. | The privileged-access password jumper is not in the correct position for password initial entry.<br>Consult the system's User's Guide for jumper location and position. |
| 20E00003 | Power on Password must be set for Unattended mode | Unattended mode requires the setting of the Power On password before it is enabled. |
| 20E00004 | Battery drained or needs replacement | 1. Replace battery.<br>2. Replace system board. (See notes on page 2-1.) |

| Error Code | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| 20E00005 | EEPROM locked | 1. Turn off, then turn on system unit.<br>2. Replace the system board. (See notes on page 2-1.) |
| 20E00008 | CMOS corrupted or tampering evident, CMOS initialized | Check your machine for evidence of tampering.<br>If no tampering evident:<br>1. Replace battery, restore NVRAM data (passwords, startup data).<br>2. Replace system board. (See notes on page 2-1.) |
| 20E00009 | Invalid password entered - system locked | The password has been entered incorrectly 3 times.<br>Turn off, then turn on the system unit, then enter the password correctly. |
| 20E0000A | EEPROM lock problem | If for privileged-access password install, is jumper in correct position?<br>Consult the system's User's Guide for jumper location and position.<br>1. Turn off, turn on system unit.<br>2. Replace system board. (See notes on page 2-1.) |
| 20E0000B | EEPROM write problem | 1. Turn off, turn on system unit.<br>2. Replace system board. (See notes on page 2-1.) |
| 20E0000C | EEPROM read problem | 1. Turn off, turn on system unit.<br>2. Replace system board. (See notes on page 2-1.) |
| 20E00017 | Cold boot needed for password entry | Turn off, turn on system unit. |
| 20EE0003 | IP parameter requires 3 dots "." | Enter valid IP parameter.<br>Example: 000.000.000.000 |
| 20EE0004 | Invalid IP parameter | Enter valid IP parameter.<br>Example: 000.000.000.000 |
| 20EE0005 | Invalid IP parameter (>255) | Enter valid IP parameter.<br>Example: 255.192.002.000 |
| 20EE0006 | No SCSI controllers present | The system board should always have (at least) an integrated PCI SCSI controller; replace system board. (See notes on page 2-1.) |
| 20EE0007 | Keyboard not found | 1. Plug in keyboard<br>2. Replace system board. (See notes on page 2-1.) |

| Error Code | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| 20EE0008 | No configurable adapters found in the system | This warning occurs when the selected SMS function cannot locate any devices/adapters supported by the function. If a supported device is installed:<br>1. Replace the device or adapter<br>2. Replace riser card<br>3. Replace system board (See notes on page 2-1.) |
| 21A00xxx | SCSI disk drive | **Notes:**<br>1. Before replacing any system components:<br>a. Ensure that the controller and each device on the SCSI bus is assigned a unique SCSI ID.<br>b. Ensure SCSI bus is properly terminated: SCSI cable plugged into system board internal SCSI port.<br>c. Ensure SCSI signal and power cables are securely connected and not damaged.<br>2. The location code information is required to identify the ID of SCSI device failures as well as to indicate the location of the controller to which the device is attached. |
| xxx = 001 | Test Unit Ready Failed - hardware error | 1. SCSI device<br>2. SCSI cable<br>3. SCSI controller |
| xxx = 002 | Test Unit Ready Failed - sense data available | 1. Media (Removable media devices)<br>2. SCSI device |
| xxx = 003 | Send Diagnostic Failed | SCSI device |
| xxx = 004 | Send Diagnostic Failed - DevOfl cmd | SCSI device |
| 21E00xxx | SCSI Tape | Refer to 21A00xxx (SCSI disk drive) for xxx definitions. |
| 21ED0xxx | SCSI Changer | Refer to 21A00xxx (SCSI disk drive) for xxx definitions. |
| 21EE0xxx | Other SCSI device type | Refer to 21A00xxx (SCSI disk drive) for xxx definitions. |

| Error Code | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| 21F00xxx | SCSI CDROM | Refer to 21A00xxx (SCSI disk drive) for xxx definitions. |
| 21F20xxx | SCSI Read/Write Optical | Refer to 21A00xxx (SCSI disk drive) for xxx definitions. |
| 25010xxx | Flash | |
| xxx = 000 | No diskette in drive | Insert diskette containing firmware image. |
| xxx = 001 | Diskette seek error | 1. Retry function.<br>2. Replace diskette drive.<br>3. Replace diskette cable.<br>4. Replace system board. (See notes on page 2-1.) |
| xxx = 002 | Diskette in drive does not contain an *.IMG file. | Insert diskette with firmware update file. |
| xxx = 003 | Cannot open OPENPROM package | Replace system board. (See notes on page 2-1.) |
| xxx = 004 | Cannot find OPENPROM node | Replace system board. (See notes on page 2-1.) |
| xxx = 006 | System id does not match image system id | Make sure correct firmware update diskette is being used with this system. |
| xxx = 007 | Image has bad CRC | Replace firmware updated diskette. |
| xxx = 008 | Flash is write protected, update cancelled | 1. Turn off, turn on system unit and retry.<br>2. Replace system board. (See notes on page 2-1.) |
| xxx = 009 | Flash module is unsupported or not recognized | Make sure correct firmware update diskette is being used with this system. |
| xxx = 00A | Flash write protected. | 1. Turn off, turn on system unit, retry.<br>2. Replace system board. (See notes on page 2-1.) |
| 25A0xxy0 | Cache L2 controller failure | Refer to Error code 2B2xxyrr for a description of the “xx” and “y” values.<br>1. CPU card<br>2. System board.(See notes on page 2-1.) |

| Error Code | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| 25A1xxy0 | Cache L2 SRAM failure | Refer to Error code 2B2xxyrr for a description of the “xx” and “y” values.<br>1. CPU card<br>2. System board. (See notes on page 2-1.) |
| 25A80xxx | NVRAM | **Note:** Errors reported against NVRAM can be caused by low Battery voltage and (more rarely) power outages that occur during normal system usage. With the exception of the 25A80000 error, these errors are warnings that the NVRAM data content had to be re-established and do not require any FRU replacement unless the error is persistent. When one of these errors occurs, any system customization (eg. boot device list) information has been lost, the system may need to be re-configured.<br>If the error is persistent, replace the battery.<br>If the error is persistent after battery replacement, or the error code is 25A80000, replace the system board. (See notes on page 2-1.) |
| xxx = 000 | Initialization failed, device test failed | |
| xxx = 001 | Init-nvram invoked, all of NVRAM initialized | |
| xxx = 002 | Init-nvram invoked, GE area preserved, remaining areas initialized | |
| xxx = 011 | Data corruption detected, ALL of NVRAM initialized | |
| xxx = 012 | Data corruption detected, GE area preserved, remaining areas initialized | |
| xxx = 100 | NVRAM data validation check failed. | Turn off, turn on system unit and retry the operation. |

| Error Code | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| 25AA0xxx | EEPROM | **Note:** Ensure that the EEPROM Security jumper is in the correct position if doing a privileged-access password install.<br>Consult the system's User's Guide for jumper location and position.<br>Retry the operation.<br>If retries do not solve the problem, replace the system board. (See notes on page 2-1.) |
| xxx=000 | Unable to unlock EEPROM | |
| xxx=001 | Read-Recv error | |
| xxx=002 | Read-Trans error | |
| xxx=003 | Write-enable error | |
| xxx=004 | Write-recv error | |
| xxx=005 | Write-disable error | |
| xxx=006 | Write-Trans error | |
| xxx=007 | Unable to lock EEPROM | |

| Error Code | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| 25Cyycsr | Memory | See “Memory PD Bits” on page 3-18 for definition of "yy".<br><br>c = Memory card number (Always 0 for DIMM sockets on system planar.)<br><br>s = DIMM socket number (hex 0 through F). |
| r = 1 | DIMM fails memory test. | For more information:<br><br>1. Use the location code obtained from the SMS Error Log utility (described in “Step 1020-4” on page 2-8) to identify which DIMM is defective.<br>2. The "yy" values specify type of memory causing error. See “Memory PD Bits” on page 3-18 for definition of "yy."<br><br>**Note:** There may be 2 DIMM related memory errors reported to indicate a DIMM pair. One of the 2 indicated DIMMs may be good, when replacing memory on this system replace 1 DIMM at a time, not both. |
| r = 2 | DIMM is not supported. | 1. Remove unsupported DIMM.<br>2. The "yy" values specify type of memory causing error. See “Memory PD Bits” on page 3-18 for definition of "yy."<br><br>**Note:** Memory DIMMs must be installed/removed in pairs. |

| Error Code | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| 28030xxx | RTC | **Note:** Errors reported against the Real Time Clock can be caused by low Battery voltage and (more rarely) power outages that occur during normal system usage. These errors are warnings that the Real Time Clock data content needs to be re-established and do not require any FRU replacement unless the error is persistent. When one of these errors occurs, the Power On Password and Time and Date information has been lost.<br>• To set/restore a Power On Password, use the SMS utility.<br>• To set/restore the Time and Date, use the Operating System facility.<br>If the error is persistent, replace the battery.<br>If the error is persistent after battery replacement, replace the system board. (See notes on page 2-1.) |
| xxx = 001 | RTC not updating | RTC initialization required |
| xxx = 002 | Bad time/date values - Set Time/Date | Set Time/Date |
| 29000002 | Keyboard/Mouse controller failed self-test | System Board. (See notes on page 2-1.) |
| 29A00003 | Keyboard not present/detected | 1. Keyboard<br>2. System Board. (See notes on page 2-1.) |
| 29a00004 | Keyboard stuck key test failed | 1. Keyboard<br>2. I/O board |
| 29B00004 | Mouse not present/detected | 1. Mouse<br>2. System Board. (See notes on page 2-1.) |
| 2B200042 | Unknown processor type | Contact your service support representative. |

| Error Code | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| 2B2xxyrr | Bad Processor/CPU | **Note:** Processor and Cache type combinations are identified by the **xx** and **y** fields as follows:<br>**xx** Processor type/speed<br>**21** 166 Mhz 604+<br>**22** 200 Mhz 604+<br>**31** 233 Mhz 604++<br>**y** Cache information<br>**0** Integrated cache or cache information unavailable<br>**5** 512KB<br>**6** 1MB<br>**7** 256KB<br>**D** ICBM 1MB |
| rr = 22 | | 1. Processor (card)<br>**Note:** Go to the System Management Services error log (described in "Step 1020-4" on page 2-8) and use the location code for this error.<br>2. System board. (See notes on page 2-1.) |
| rr = 31 | | 1. Processor (card)<br>**Note:** Go to the System Management Services error log (described in "Step 1020-4" on page 2-8) and use the location code for this error.<br>2. System board. (See notes on page 2-1.) |
| 2BA00000 | Service processor POST failure | 1. Service processor, if present<br>2. System board. (See notes on page 2-1.) |

| Error Code | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| 2BA00001 | CPU card or power supply failure | 1. CPU card<br>2. Power supply |
| 2BA00006 | Service processor incorrectly reports slow or stuck fan | 1. Fans<br>2. Service processor, if present<br>3. System board. (See notes on page 2-1.) |
| 2BA00007 | Service processor reports over temperature | 1. Check for cool air flow obstructions to the system<br>2. System board if the problem persists. (See notes on page 2-1.) |
| 2BA00008 | Service processor system board over temperature | 1. Check for cool air flow obstructions to the system<br>2. System board if the problem persists. (See notes on page 2-1.) |
| 2BA00009 | CPU card over temperature | 1. Check for cool air flow obstructions to the system<br>2. Replace CPU card if problem persists<br>3. System board. (See notes on page 2-1.) |
| 2BA00010 | Service processor reports fast shutdown condition pending | 1. Power supply<br>2. System board. (See notes on page 2-1.) |
| 2BA00011 | Service processor reports power supply or CPU failure | 1. Power supply<br>2. System board. (See notes on page 2-1.) |
| 2BA00012 | Service processor reports self test failure | 1. Service processor; if present<br>2. System board. (See notes on page 2-1.) |
| 2BA00013 | Service processor reports bad NVRAM CRC | 1. If problem persists, replace battery<br>2. System board. (See notes on page 2-1.) |
| 2BA00014 | Service processor reports bad service processor firmware. | Use service processor firmware diskette to re-program firmware. |
| 2BA00015 | Service processor reports bad service processor VPD. | 1. Service processor; if present<br>2. System board. (See notes on page 2-1.) |
| 2BA00016 | Service processor reports firmware failure. | 1. Retry service processor firmware update<br>2. Service processor; if present |
| 2BA00017 | Service processor reports bad or low battery. | 1. Battery<br>2. Service processor; if present<br>3. System board. (See notes on page 2-1.) |

| Error Code | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| 2BA00018 | EPOW test failure. | 1. Service processor; if present<br>2. System board. (See notes on page 2-1.) |
| 2BA00019 | IRQ13 test failure. | 1. System board. (See notes on page 2-1.)<br>2. Service processor; if present |
| 2BA00020 | Service processor reports VPD access failure. | 1. Service Processor.<br>2. System board. (See notes on page 2-1.)<br>3. If problem persists, swap new VPD module onto operator panel control assembly (also see step 4).<br>4. If customer has protected licensed software installed, advise customer to contact all protected software suppliers for a licensed update. |
| 2BA00022 | Service processor reports bad CRC error-CMOS/NVRAM | System board. (See notes on page 2-1.) |
| 2BA00023 | Error occurred during the processor test. | CPU card |
| 2BA00100 | Service processor firmware recovery information could not be written to diskette. | 1. Check diskette media write protect tab<br>2. Diskette drive |
| 2BA00101 | Service processor is not installed, update cancelled. | 1. Install the service processor<br>2. Retry operation |
| 2BA00102 | No service processor diskette in drive. | Insert the diskette |
| 2BA00103 | Service processor firmware update file is corrupted, update cancelled. | 1. Obtain new firmware file<br>2. Retry operation |
| 2BA00104 | Service processor firmware update file is the same level as the service processor firmware, update cancelled. | 1. Obtain new level of firmware<br>2. Retry operation |
| 2BA00200 | Service processor firmware update error occurred, update not completed. | Error occurred during service processor flash write operation.<br>Service processor firmware update recovery procedure:<br>1. Turn the system Off<br>2. Unplug power cable and then plug power cable back in<br>3. Turn the system On<br>4. Retry operation. If problem persists, replace optional service processor. |

| Error Code | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| 2BA00201 | Service processor firmware update error occurred, update not completed. | Error occurred while reading service processor CRC<br>See error code 2BA00200 for recovery procedure. |
| 2BA00202 | Service processor firmware update error occurred, update not completed. | Error occurred while verifying service processor CRC<br>See error code 2BA00200 for recovery procedure. |
| 2BA00203 | Service processor firmware update error occurred, update not completed. | Error occurred while reading service processor CRC after updating service processor firmware<br>See error code 2BA00200 for recovery procedure. |
| 2BA00204 | Service processor firmware update error occurred, update not completed. | Error occurred while calculate CRC write<br>See error code 2BA00200 for recovery procedure. |
| 40100005 | A loss of system power detected. | Possible main power loss. If not, replace power supply. |
| 40111002 | An unknown power problem detected. | 1. Power supply<br>2. System board. (See notes on page 2-1.)<br>3. Service processor, if present |
| 40111022 | A high 5.0 voltage reading detected. | 1. Power supply<br>2. CPU card |
| 40111032 | A high 3.3 voltage reading detected. | 1. CPU card<br>2. Power supply |
| 40111042 | A high 2.5 voltage reading detected. | 1. CPU card<br>2. Power supply |
| 40111052 | A high +12 voltage reading detected. | 1. Power supply<br>2. System board. (See notes on page 2-1.) |
| 40111062 | A high –12 voltage reading detected. | 1. Power supply<br>2. System board. (See notes on page 2-1.) |
| 40111082 | A low 5.0 voltage reading detected. | 1. Power supply<br>2. CPU card |
| 40111092 | A low 3.3 voltage reading detected. | 1. CPU card<br>2. Power supply |
| 401110A2 | A low 2.5 voltage reading detected. | 1. CPU card<br>2. Power supply |

| Error Code | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| 401110B2 | A low +12 voltage reading detected. | 1. Power supply<br>2. System board. (See notes on page 2-1.) |
| 401110C2 | A low –12 voltage reading detected. | 1. Power supply<br>2. System board. (See notes on page 2-1.) |
| 40200001 | An unknown cooling problem detected. | Cooling problem; check system fans. |
| 40200021 | A CPU temperature warning detected. | Over temperature on CPU card. |
| 40200023 | A critical CPU temperature condition detected. | Critical temperature on CPU card. |
| 40200031 | An I/O planar temperature warning detected. | Over temperature on system board. |
| 40200033 | A critical I/O planar temperature condition detected. | Critical temperature on system board. |
| 40200041 | A memory temperature warning detected. | Over temperature on system board. |
| 40200043 | A critical memory temperature condition detected. | Critical temperature on system board. |
| 40210011 | A slow fan detected. | Check:<br>1. Room operating temperature<br>2. System fans |
| 40210014 | A stopped fan detected. | Failing fan. |
| 40A00000 | System firmware IPL failure. | 1. Surveillance mode control is from the Service Processor (SP) Menus.<br>2. Go to “MAP 1540: Minimum Configuration” on page 2-14.<br>3. If the problem persists, call the support center for assistance. |
| 40B00000 | The operating system surveillance interval exceeded. | 1. Surveillance mode control is from the Service Processor(SP) Menus.<br>2. Verify that the Operating System (OS) Heartbeat Utility is installed and has been activated.<br>3. Check for errors or unusual conditions that might prevent the OS from reporting Heartbeat messages; such as system dump, machine check or checkstop error. Review the error log.<br>4. System board. (See notes on page 2-1.)<br>5. Service processor<br>6. If the problem persists, call the support center for assistance. |

| Error Code | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| 40D00003 | An unknown slow shutdown commanded. | Critical cooling problem. |
| 40D00004 | An unknown fast shutdown commanded. | Locked fan failure detected. |
| 4B201000 | Checkstop. | 1. CPU<br>2. System board (See notes on page 2-1.)<br>3. Adapter (PCI)<br>4. Software problem<br>5. Firmware problem<br>6. If the problem persists, call the support center for assistance. |
| 4B201010 | Machine check. | 1. CPU<br>2. System board (See notes on page 2-1.)<br>3. Software problem<br>4. Firmware problem<br>5. If the problem persists, call the support center for assistance. |
| 4B201020 | TEA (transfer error acknowledge). | 1. CPU<br>2. System board (See notes on page 2-1.)<br>3. Software problem<br>4. Firmware problem<br>5. If the problem persists, call the support center for assistance. |

## Memory PD Bits

The following table expands the firmware error code **25Cyyxxx** on page 3-10, where **yy** is the PD values in the table below. Use these values to identify the type of memory that generated the error.

If you replace FRUs and the problem is still not corrected, go to MAP 0030 in the *Diagnostic Information for Multiple Bus Systems* unless otherwise indicated in the tables.

| PD value | Size | Speed (nsecs) | Parity/ ECC | Single/ Dual |
|---|---|---|---|---|
| 64 | 8MB | 60 | ECC | Single |
| 69 | 16MB | 60 | ECC | Single |
| 6B | 32MB | 60 | ECC | Single |
| 6D | 64MB | 60 | ECC | Single |
| 6F | 128MB | 60 | ECC | Single |

## Firmware Checkpoints

The following Fxx code checkpoints occur during system startup, and can be used for diagnostic purposes.

If you replace FRUs and the problem is still not corrected, go to MAP 0030 in the *Diagnostic Information for Multiple Bus Systems* unless otherwise indicated in the tables.

| Checkpoint | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| A11 | CPU reset failure | Replace in the following order:<br>1. CPU card<br>2. Service Processor<br>3. System board. (See notes on page 2-1.) |
| F05 | Transfer control to Operating System (normal boot). | See “Fxx Code Boot Problems” on page 3-22. |
| F22 | No memory detected (system lockup) Note: Disk drive light is on continuously. | 1. Memory modules<br>2. System board. (See page 2-1.) |
| F4D | Loading boot image | See “Fxx Code Boot Problems” on page 3-22. |
| F4F | NVRAM initialization | Refer to error code 25A80xxx in “Firmware Error Codes” on page 3-4. |
| F51 | Probing primary PCI bus | 1. PCI Adapters<br>2. System board.<br>If a network adapter or system board is replaced, see page 2-1. |
| F52 | Probing for adapter FCODE, evaluate if present | 1. PCI Adapters<br>2. System board.<br>If a network adapter or system board is replaced, see page 2-1. |
| F55 | Probing PCI bridge secondary bus | 1. PCI Adapters<br>2. System board.<br>If a network adapter or system board is replaced, see page 2-1. |
| F5B | Transferring control to Operating System (service mode boot) | See “Fxx Code Boot Problems” on page 3-22. |

| Checkpoint | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| F5F | Probing for adapter FCODE, evaluate if present | 1. PCI Adapters<br>2. System board.<br>If a network adapter or system board is replaced, see page 2-1. |
| F74 | Establishing host connection | Refer to “Fxx Code Boot Problems” on page 3-22 for general considerations. |
| F75 | BootP request | Refer to “Fxx Code Boot Problems” on page 3-22 for general considerations.<br>1. Turn off then on, and retry the boot operation.<br>2. Verify the network connection (network could be down).<br>3. Have network administrator verify the server configuration for this client. |
| F9E | Real time clock (RTC) initialization | Refer to error code 28030xxx in “Firmware Error Codes” on page 3-4. |
| FDC | Dynamic console selection. | Refer to “Fxx Code Console Problems” on page 3-24. |
| FDD | Processor exception | System board (See notes on page 2-1.) |
| FDE | Alternating pattern of FDE and FAD indicates a processor exception has been detected. | System board (See notes on page 2-1.) |
| FEA | Firmware flash corrupted, load from diskette. | Ensure that the diskette installed contains recovery image appropriate for this system unit.<br>The System Management Services recovery procedure for the flash EEPROM should be executed. See “Update” on page 5-22.<br>If the diskette is installed with the correct recovery image, then suspect:<br>1. Diskette<br>2. Diskette drive<br>3. Diskette cable<br>4. System board. (See notes on page 2-1.) |

| Checkpoint | Description | Action/<br>Possible Failing FRU |
|---|---|---|
| FEB | Firmware flash corrupted, load from diskette. | Ensure that the diskette installed contains recovery image appropriate for this system unit.<br><br>The System Management Services recovery procedure for the flash EEPROM should be executed. See “Update” on page 5-22.<br><br>If the diskette is installed with the correct recovery image, then suspect:<br><br>1. Diskette<br>2. Diskette drive<br>3. Diskette cable<br>4. System board. (See notes on page 2-1.) |
| FF2 | Power-On Password prompt. | If a console is attached but nothing is displayed on it, go to the “Entry MAP” on page 2-1 with the symptom "All display problems." |
| FF3 | Privileged-Access Password prompt | If a console is attached but nothing is displayed on it, go to the “Entry MAP” on page 2-1 with the symptom "All display problems." |
| FFD | The operator panel alternates between the code FFD and another Fxx code, where Fxx is the point at which the error occurred. | If the Fxx is not listed in this table, go to “MAP 1540: Minimum Configuration” on page 2-14. |
| Fxx | Problem not listed here | Go to “MAP 1540: Minimum Configuration” on page 2-14. |

**Fxx Code Boot Problems:** Depending on the boot device, a checkpoint may be displayed on the operator panel for an extended period of time while the boot image is retrieved from the device. This is particularly true for Tape and Network boot attempts. If the checkpoint/code is displayed for an extended time there may be a problem loading the boot image from the device. If booting from CDROM or Tape, watch for “activity” on the drive's LED indicator. A blinking LED means that the loading of either the boot image or additional information required by the operating system being booted is still in progress.

For network boot attempts, if the system is not connected to an active network or if the target server is inaccessible (this can also result from incorrect IP parameters being supplied), the system still attempts to boot and because time-out durations are necessarily long to accommodate retries, the system may appear to be hung.

1. Restart the system and get to the Firmware SMS utilities. In the utilities check:
   - Is the intended boot device correctly specified in the boot sequence?
   - For network boot attempts:
     – Are the IP parameters correct?
     – Attempt to “Ping” the target server using the SMS “Ping” utility.
2. If the checkpoint F05 or F5B is displayed for an extended time, there may be a problem with the integrity of the boot image.
   - Try to boot and run standalone diagnostics against the system, particularly against the intended boot device. If the diagnostics are successful, it may be necessary to perform an operating system specific recovery process, or reinstall the operating system.
3. If attempting to boot from a disk drive, CDROM, or tape drive:
   a. Try a different CD/Tape (unless booting from disk drive)
   b. Verify proper SCSI bus termination
   c. Replace SCSI cable
   d. It is possible that another attached SCSI device is causing the problem.

      Disconnect any other SCSI devices attached to the same controller as the one the boot device is attached to and retry the boot operation. If this is successful, one of the devices removed is causing the problem, re-attach devices one by one and retry the boot operation until the problem recurs and replace the device that caused the problem.
   e. Replace SCSI adapter (if drive is attached to a card rather than the system board)
   f. Replace SCSI drive
   g. It is possible that another installed adapter is causing the problem.

      Remove all installed adapters except the one the boot device is attached to, try to boot the standalone diagnostics from a CDROM drive attached to the SCSI controller on the system board, and run the diagnostics against the system.

If this is successful, re-install adapters (and attached devices as applicable) that were removed, one at a time, and run the standalone diagnostics against the system. If problem recurs, replace the last installed device or adapter.

h. Replace system board

4. If attempting to boot from a Network controller:
   a. Turn power Off then On and retry the boot operation
   b. Verify the network connection (network could be down)
   c. Verify that IP parameters are correct
   d. Try to “Ping” the target server
   e. Have network administrator verify the server configuration for this client
   f. Replace network cable
   g. Replace network adapter (unless trying to boot using the ethernet controller on the system board)
   h. It is possible that another installed adapter is causing the problem.

      Remove all installed adapters except the one you are trying to boot, and try to boot the standalone diagnostics from a CDROM drive attached to the SCSI controller on the system board. If this is successful, run the diagnostics against the system, particularly against the target network boot controller/adapter.

      If this is successful, re-install adapters (and attached devices as applicable) that were removed, one at a time, and run the diagnostics against the system. If problem recurs, replace the last installed device or adapter.

   i. Replace system board (if not replaced in previous step)
5. If you replaced the indicated FRUs and the problem is still not corrected, or the above descriptions did not address your particular situation, go to "MAP 1540: Minimum Configuration".

**Fxx Code Console Problems:** If a console is attached but nothing is displayed on it, follow the steps associated with “All display problems” in the “Entry MAP” on page 2-1. If the console selection screens can be seen on the terminals but there is no response to attempts to select the console:

1. If selecting the console with a keyboard attached to the system, replace the keyboard. If replacing the keyboard does not fix the problem, replace the system board. (See notes on page 2-1.)
2. If selecting the console with an ASCII terminal, suspect the ASCII terminal. Use the Problem Determination Procedures for the terminal. Replace the system board (See notes on page 2-1.) if these procedures do not reveal a problem.

   **Note:** Terminal settings should be set to:
   - 9600 Baud
   - No Parity
   - 8 Data bits
   - 1 Stop bit

## Firmware Location Codes

These codes can be found in the System Management Services error log as described in “Step 1020-4” on page 2-8.

Location codes vary in length depending on the device being referenced. In general, if a location code is referring to an adapter or controller, the location code is 4 digits (eg. 04-01 identifies the device/controller /adapter on the PCI bus, in physical slot 1). If a device is optional and plugs into an adapter/controller, it is normally 8 digits (eg. 01-C0-00-00 is identifying the first diskette drive).

### Location Code format

The basic format of the location code is:

- For non-SCSI devices/drives
  AB-CD-EF-GH
- For SCSI devices/drives (not controllers/adapters)
  AB-CD-EF-G,H

  “G” is the SCSI bus ID (PUN) of the device and “H” is the Logical Unit Number (LUN).

The “AB” value identifies the bus type as follows:

| | |
|---|---|
| 00 | Processor bus |
| 01 | ISA bus |
| 04 | PCI bus |
| 05 | PCMCIA bus |

The “CD” value depends on whether the device is integrated or a plug in adapter. For plug in adapters, the value is a decimal number in the range of 01 to 99 that identifies the system slot. For integrated devices (eg. the integrated PCI Ethernet controller), the value of “G” is an uppercase alphabetic character in the range from A to Z and is generated based on the device “discovery” order as specified in the Open Firmware 1275 specification for the “probe” process which translates into “Device Tree” order.

The “EF” value, as generated by the firmware, is always 00.

The “GH” value (except for SCSI devices) is a subsystem dependent “index” value indicating subordinate devices of the parent identified by the “AB-CD-EF” value.

Examples:

**Note:** The values used in the examples are representative of the format and relationships described above.

| | |
|---|---|
| 00-00 | System board |
| 00-00-00-00 | Memory SIMM/DIMM in socket 1 |
| 01-A0 | ISA bus Diskette Controller |
| 01-A0-00-01 | 2nd ISA bus Diskette drive |
| 00-00 | 2nd ISA bus Serial Port (Error code differentiates between 1st and 2nd) |
| 04-01 | PCI Adapter in system slot 1 |
| 04-01-00-13,0 | SCSI device at SCSI bus ID 13 (decimal) attached to the PCI SCSI controller in system slot 1 |
| 04-D0 | Integrated PCI Ethernet controller |
| 04-E0 | 1st Integrated PCI SCSI controller |
| 04-C0-00-13,0 | SCSI device at SCSI bus ID 13 (decimal) attached to the first PCI SCSI controller integrated on the system board. |
| 00-00 | 1st Processor (Proc 0) |
| 00-01 | 2nd Processor (Proc 1) |
| 04-F0 | 2nd Integrated PCI SCSI controller |

# Chapter 4. Loading the System Diagnostics

The system unit can be booted either from the default boot list or from the custom boot list. (See Chapter 5 on page 5-1 for instructions on defining the custom boot list.)

To load **Standalone** diagnostics from the default boot list, perform the following procedure:

1. Verify with the system administrator and users that all programs may be stopped, then do so.
2. Turn off the system.
3. Wait 30 seconds, and turn on the system.
4. Immediately insert the diagnostic CD-ROM into the CD-ROM drive.
5. When or after the diskette indicator appears during startup, press the F5 key on a directly-attached keyboard (or the number 5 key on an ASCII terminal).
6. Enter any requested passwords.

**Online** diagnostics can be loaded by booting from the custom boot list by pressing the F6 key (on a directly-attached keyboard) or the number 6 key on an ASCII terminal.

The procedure for booting from the devices listed in the custom boot list (Online diagnostics) is the following:

1. Verify with the system administrator and users that all programs may be stopped, then do so.
2. Turn off the system.
3. Wait 30 seconds, and turn on the system.
4. When or after the diskette indicator appears during startup, press the F6 key on a directly-attached keyboard (or the number 6 key on an ASCII terminal).
5. Enter any requested passwords.

After any requested passwords have been entered, the system attempts to boot from the first device of each type found on the list. If no bootable image is found on the first device of each type on the list, the system does not search through the other devices of that type for a bootable image; instead, it polls the first device of the next type.

If all types of devices in the boot list have been polled without finding a bootable image, the system starts the System Management Services.

### Custom Boot List and Default Boot List

The default boot list is:

1. Diskette
2. CD-ROM
3. Hard File
4. Tape Drive
5. Network
    - Token-Ring
    - Ethernet

Pressing the F5 key on a directly-attached keyboard (or the number 5 key on an ASCII terminal) causes the system to boot in service mode from this list.

Pressing the F6 key on a directly-attached keyboard (or number 6 key on an ASCII terminal) selects a service mode boot from the custom boot list, which is the boot list defined using the System Management Services described in Chapter 5 on page 5-1. Like the default boot list, the custom boot list can contain four entries. The F6 or 6 keys work like the F5 or 5 keys, with the following exceptions:

- The system searchs for a boot record according to the custom boot list.
- If the custom boot list is discovered by a cyclical redundancy check to be corrupted, the system rebuilds the custom boot list according to the default boot list. (The default boot list contains four entries, and for each matching device type found in the system unit, the system makes an entry in the custom boot list.)
- If no custom boot list is present, the system enters "none" in the corresponding location within the custom boot list.

# Chapter 5. 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 5-24.

## 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.

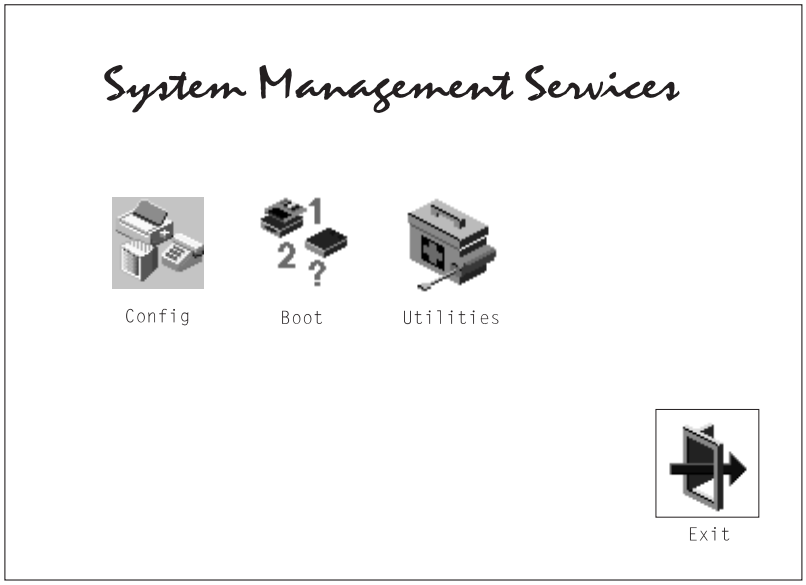
If you press the **F8** key, the Open Firmware command line (an "OK" prompt) appears after the initialization and power-on self test (POST) are complete.

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.

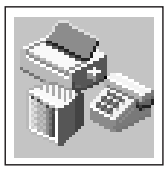
To enter the graphical System Management Services instead of the Open Firmware command line, you must press the **F1** key *after the keyboard icon appears* during startup.  and prior to the audible tone.

**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.

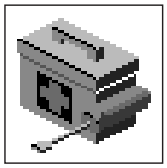


The System Management Services screen contains the following choices.

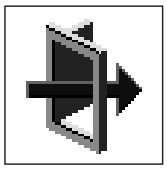


**Config**: Enables you to view your system configuration.


**Boot**: Allows you to set the sequence in which devices are searched for operating system startup code.



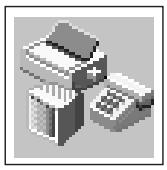
**Utilities**: Enables you to set and remove passwords, control the playing of system tones, enable the unattended start mode, set and view the addresses of your system's SCSI controllers, select the active console, and view or clear the error log.



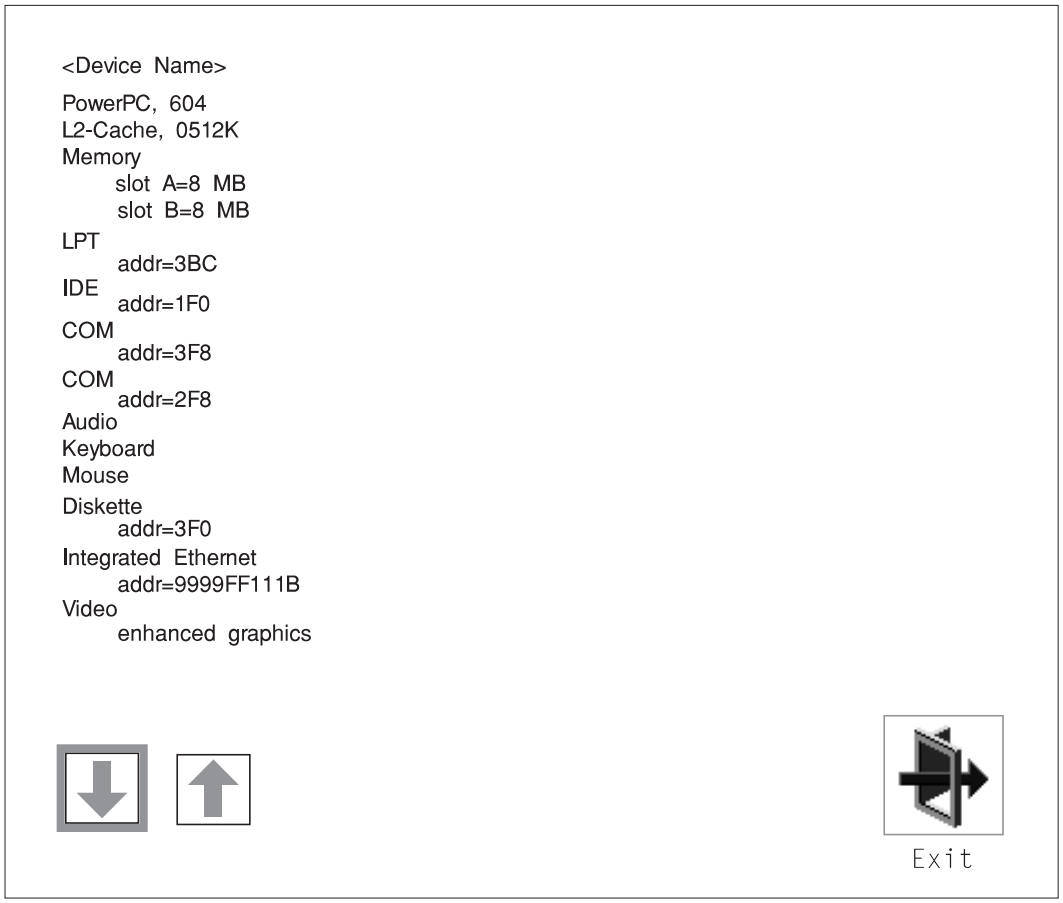
**Exit**: Returns you to the previous screen.

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

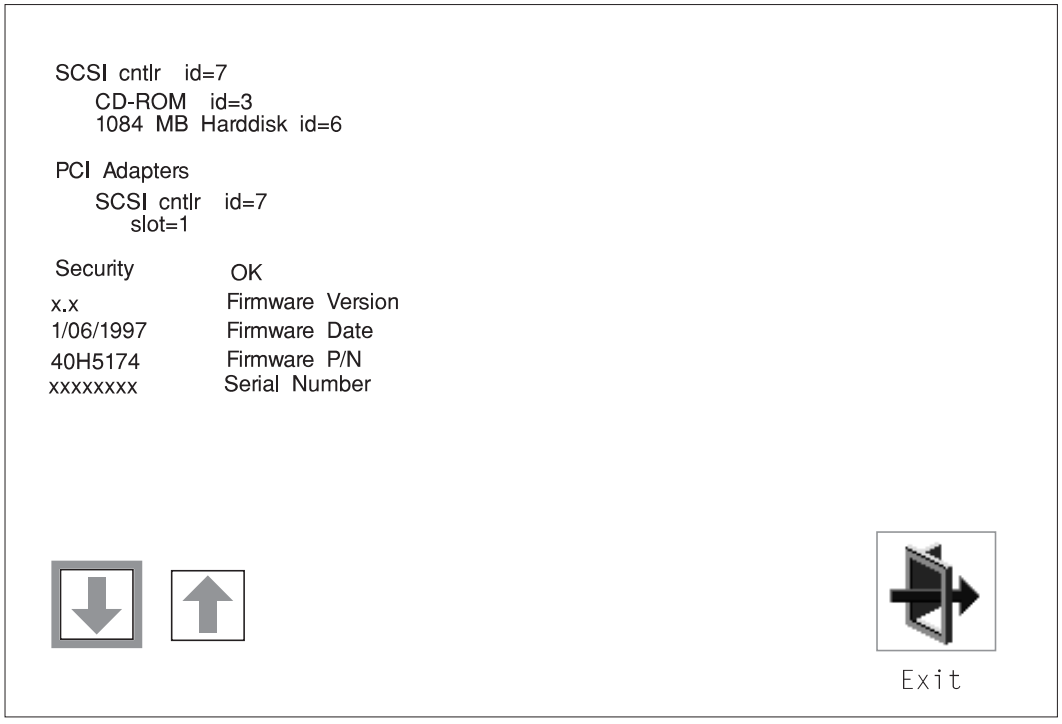


Selecting this icon makes it possible for you to view information about the setup of your system unit. A list similar to the following appears when you select the **Config** icon.



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.



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>

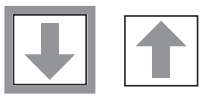
| | |
|---|---|
| x.x | Firmware Version |
| 1/06/1997 | Firmware Date |
| 40H5174 | Firmware P/N |
| xxxxxxxx | Serial Number |

<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.

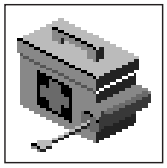
The default boot sequence is:

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

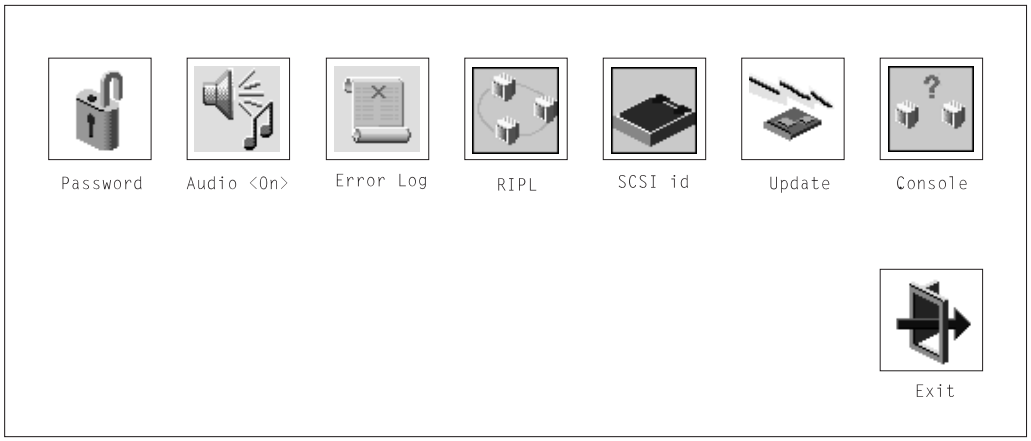
To change the custom boot list, enter a new order in the **New** column, then select **Save**. The List of Boot Devices is updated to reflect the order you have chosen.

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.)

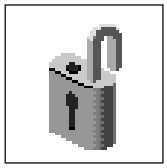
## Utilities



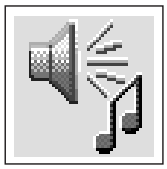
Selecting this icon enables you to perform various tasks and view additional information about your computer.



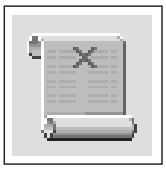

The following describes the choices available on this screen.



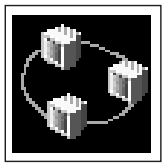
**Password**: Enables you to set password protection for turning on the computer and for using system administration tools.



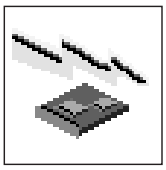
**Audio**: Enables you to turn on or off the system tones heard when the system is turned on.



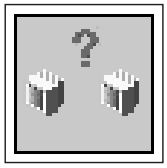
**Error Log**: Enables you to view and clear error log information for your computer.



**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.

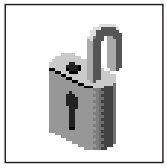


**Update**: Allows you to update the firmware programs on your computer.

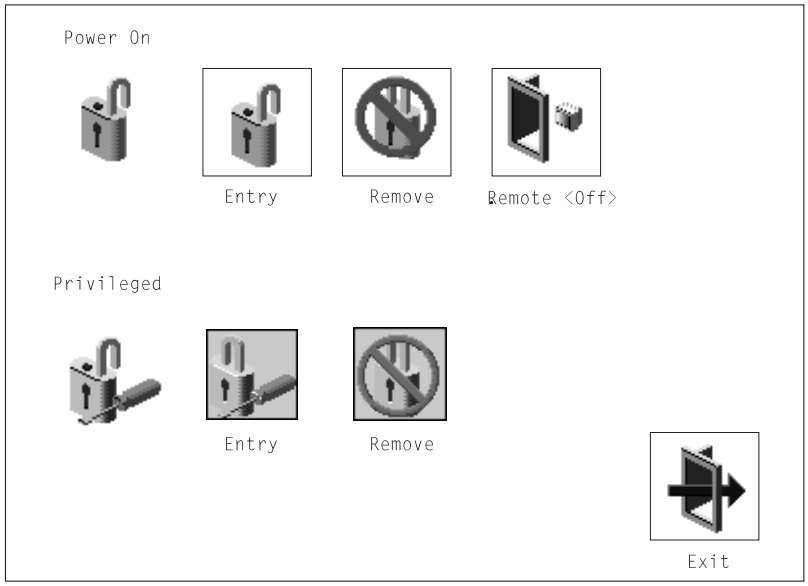


**Console**: If you have more than one keyboard and display attached to your system unit, or if you have an ASCII terminal attached to your system unit in addition to a keyboard and display, this tool allows you to define which one is active.

## Password

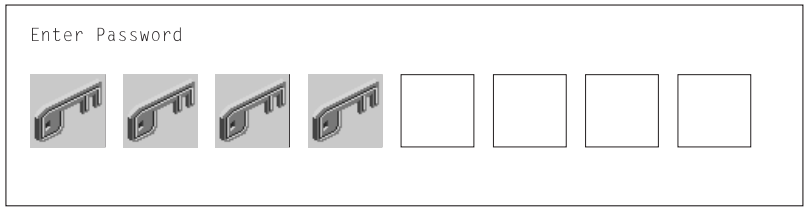


When you select this icon, the following screen is displayed.

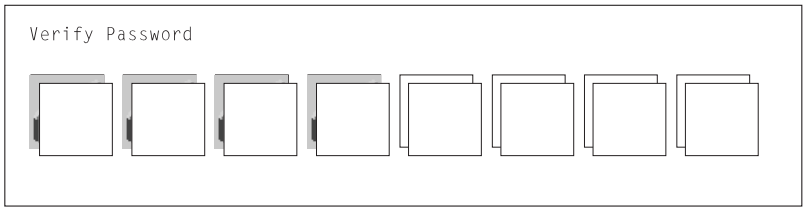



**Power-On Password**: Setting a power-on password helps protect information stored in your computer. If a power-on password is set for your computer, the Power On icon is shown in the locked position; if a power-on password is not set, then the Power On icon is shown in the unlocked position (as in 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.



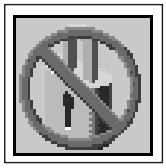
Press **Enter** when you are finished; you are required to type the password again for verification.




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

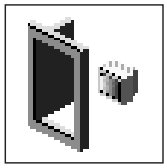
After you have entered and verified the password, the power-on password icon flashes and changes to the locked position to indicate that the power-on password is set.

If you previously had set a power-on password and want to remove it, select the Remove icon.



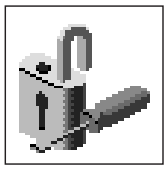
**Note:** If you *forget* the power-on password, you must remove the battery for at least 30 seconds to disable this password. See “Battery” on page 6-46 for details.

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



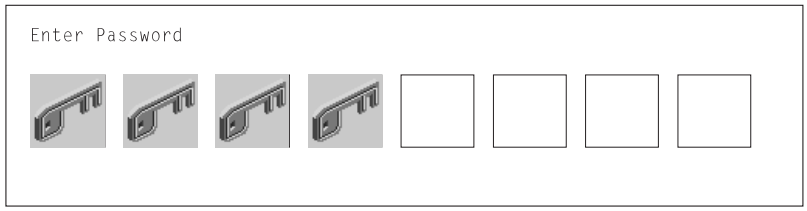
**Remote Mode**: The remote mode, when enabled, allows the system to start from the defined boot device. This mode is ideal for network servers and other computers that operate unattended. You *must* set a power-on password before you can enable the remote mode. When the remote mode is set, the icon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

If you remove the power-on password, the remote mode is automatically reset, and the icon returns to **Remote <Off>**.

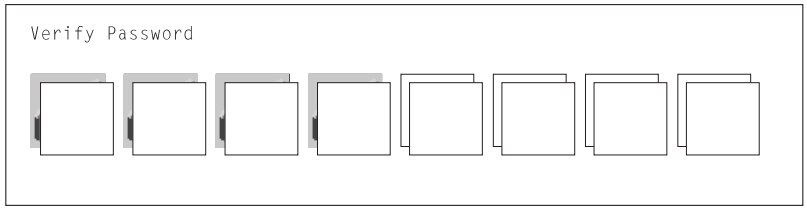


**Privileged-Access Password**: The privileged–access password protects against the unauthorized starting of the system programs.

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.

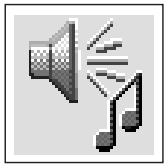



If you make a mistake, press the **Esc** key and start again.

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.

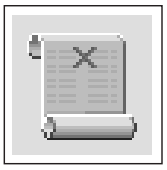
**Note:** If you *forget* the privileged–access password, you must remove the battery for at least 30 seconds to disable this password. See “Battery” on page 6-46 for details.

## Audio

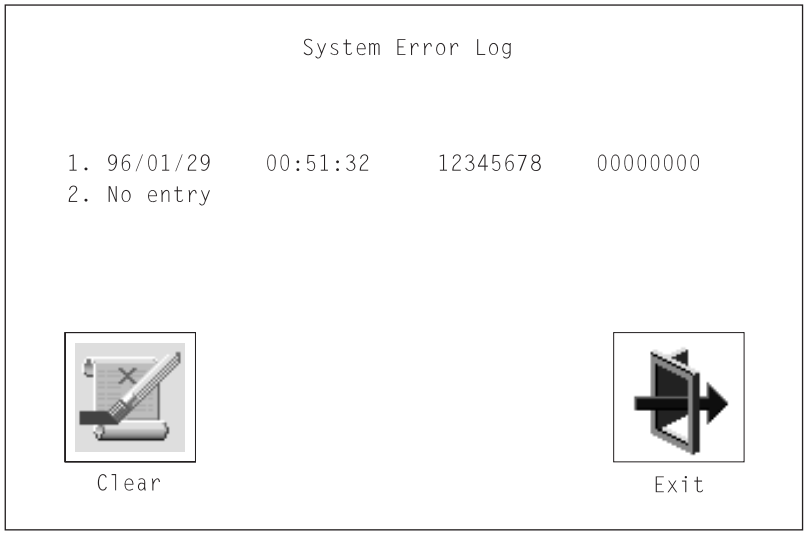


This icon enables you to turn on or off the system tones heard at power-on time. To change the audio status, use the arrow keys to highlight the audio icon, then press the Enter key.

## Error Log

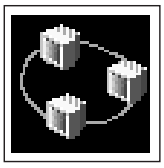


Selecting this icon displays the log of the first and the last errors your computer has encountered during operations.

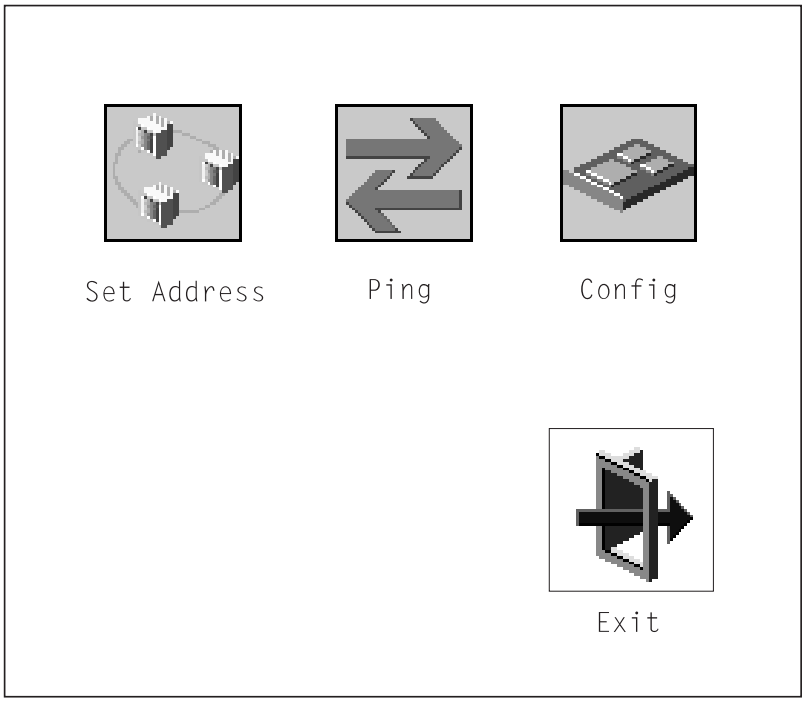


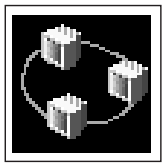

Selecting the Clear icon erases the entries in this log.

## RIPL

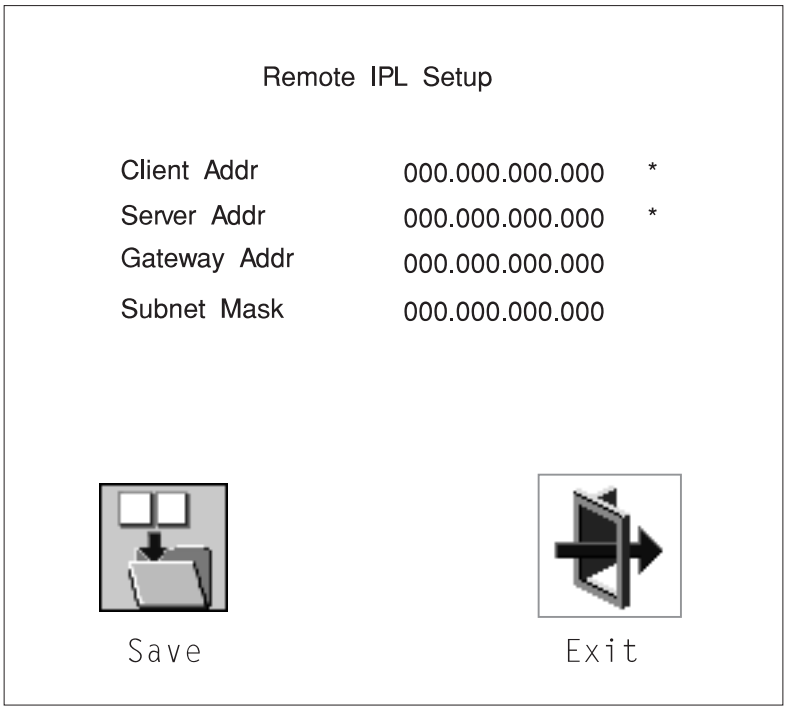


Selecting the Remote Initial Program Load (RIPL) icon above gives you access to the following selections.





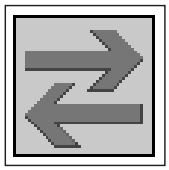
The Set Address icon allows you to define addresses from which your computer can receive RIPL code.




**Notes:**

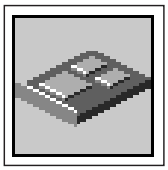
1. Those addresses indicated with an (*) are required.
2. Some applications may require that IP addresses contain leading zeroes for numbers less than 100. For example, 129.132.4.20 may need to be entered as 123.132.004.020. If you are using the NIM application, do not specify leading zeroes in the IP 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.

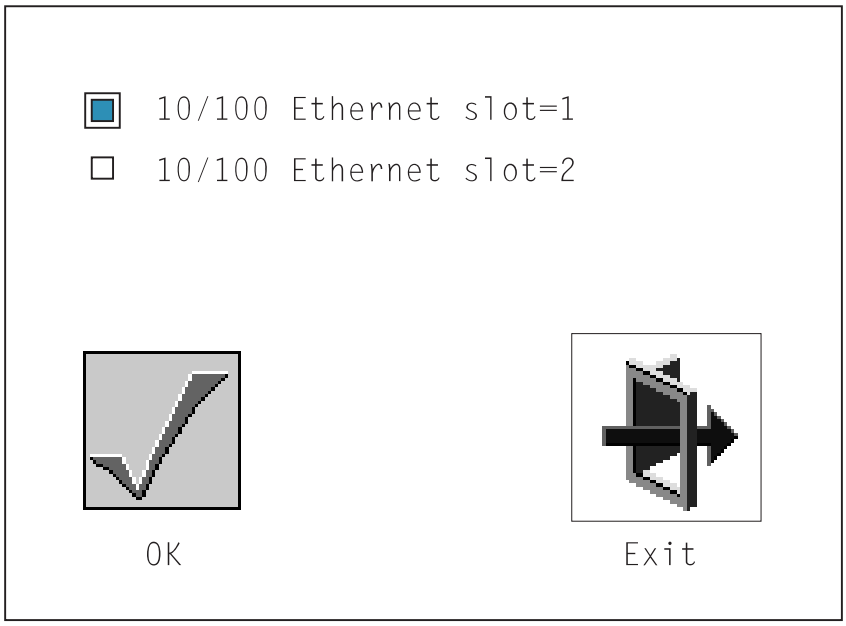


The Ping icon allows you to confirm that a specified address is valid by sending a test transmission to that address.

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.



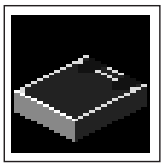
The Config icon allows you to configure network adapters which require setup. Selecting the Config icon presents a list of the adapters requiring configuration. Use the arrow keys to highlight an adapter, press the spacebar to select the adapter, then highlight the OK icon and press the Enter key.




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.

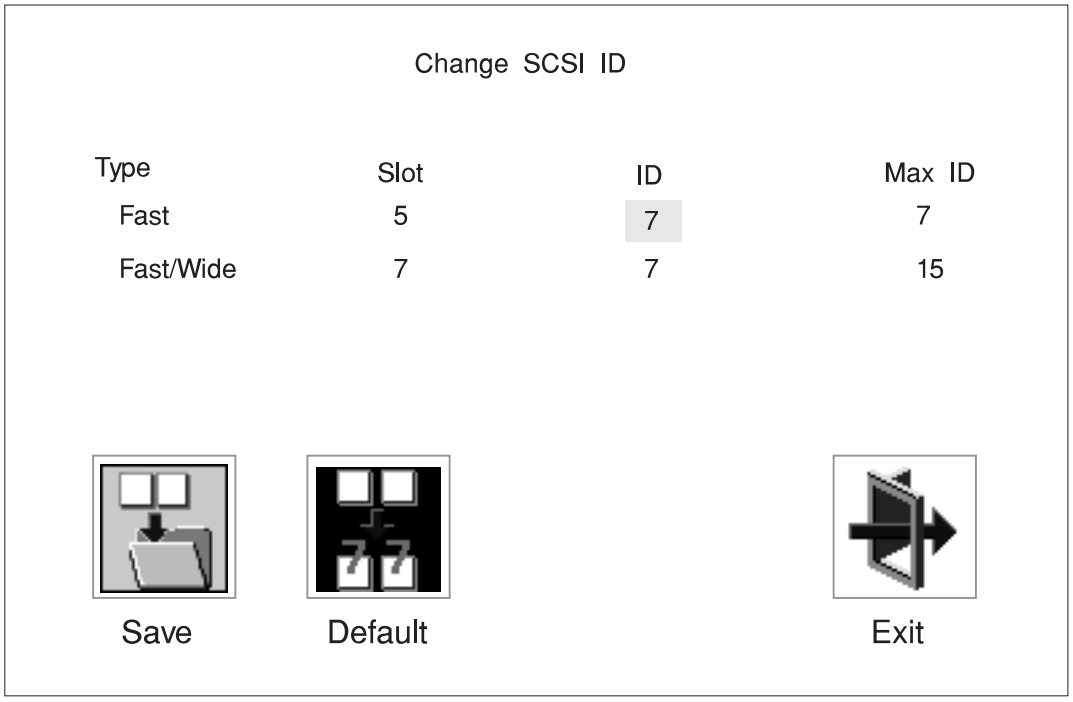
After choosing the adapter to configure, you can select the communications mode of the chosen adapter (or allow the system to select the communications mode automatically). As on the previous screen, use the arrow keys or mouse to highlight, then press the spacebar to select. When you have selected the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

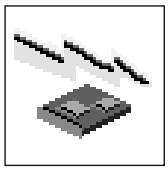
At any time in this process, you can select the Default icon to change the SCSI IDs to the default values.

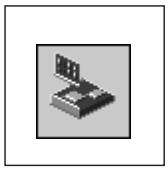


## Update

### 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 5-22.

## 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.

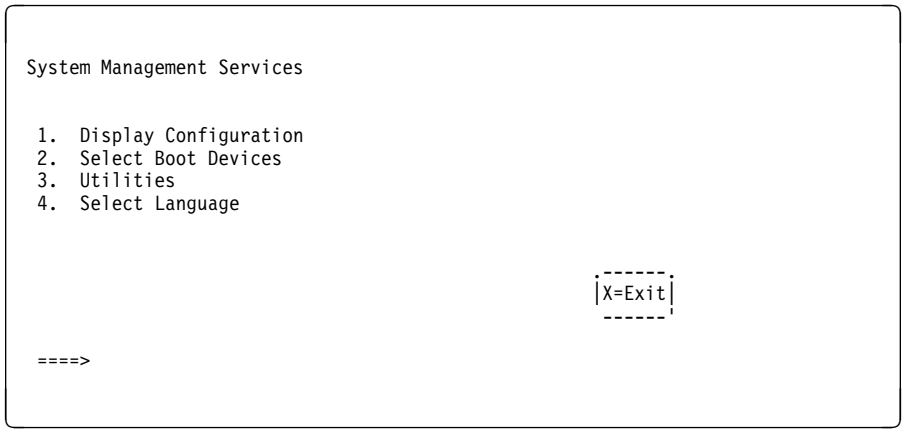
If you have pressed the **8** key, the Open Firmware command line (an "OK" prompt) appears after the initialization and power-on self tests (POST) are complete.

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.)

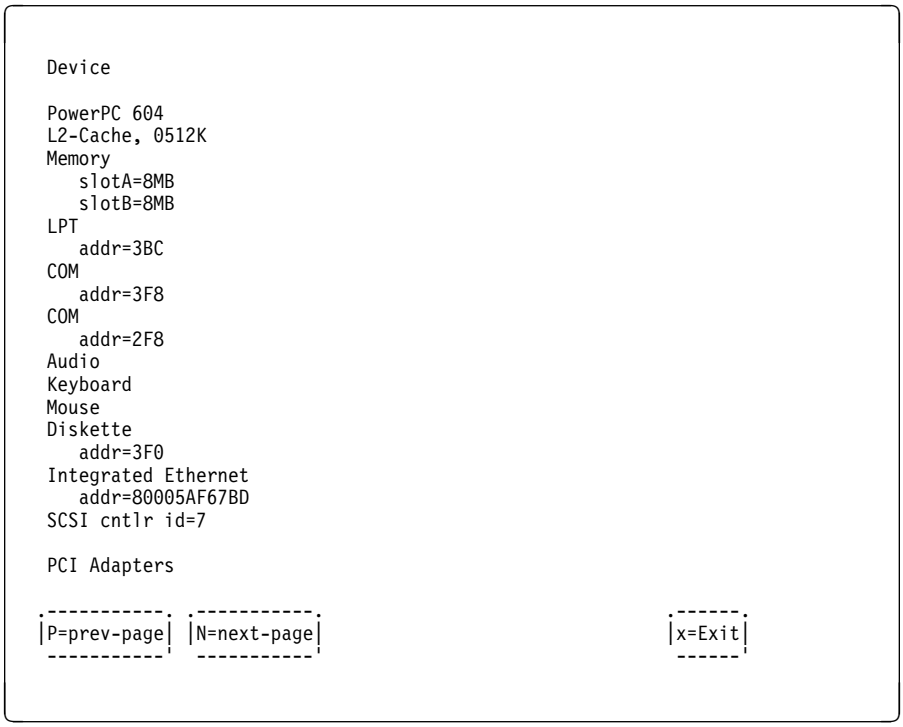



Selecting the numbered options provide capabilities described on the following pages.

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

## Display Configuration

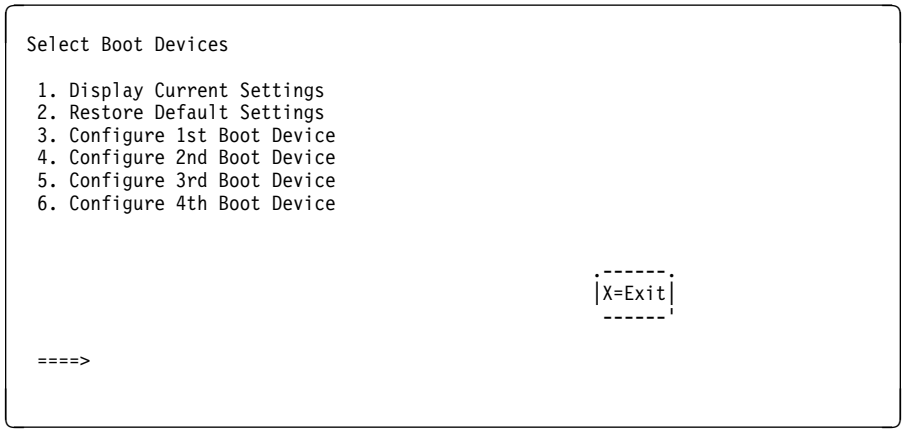
This option provides information about the setup of your computer. A screen similar to the following displays:



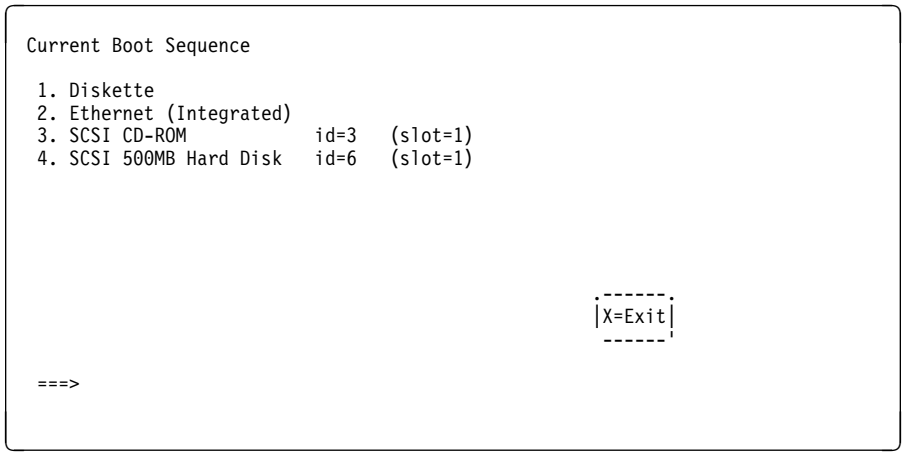

Note that this configuration information does not include ISA adapters installed in the system unit.

## Select Boot Devices

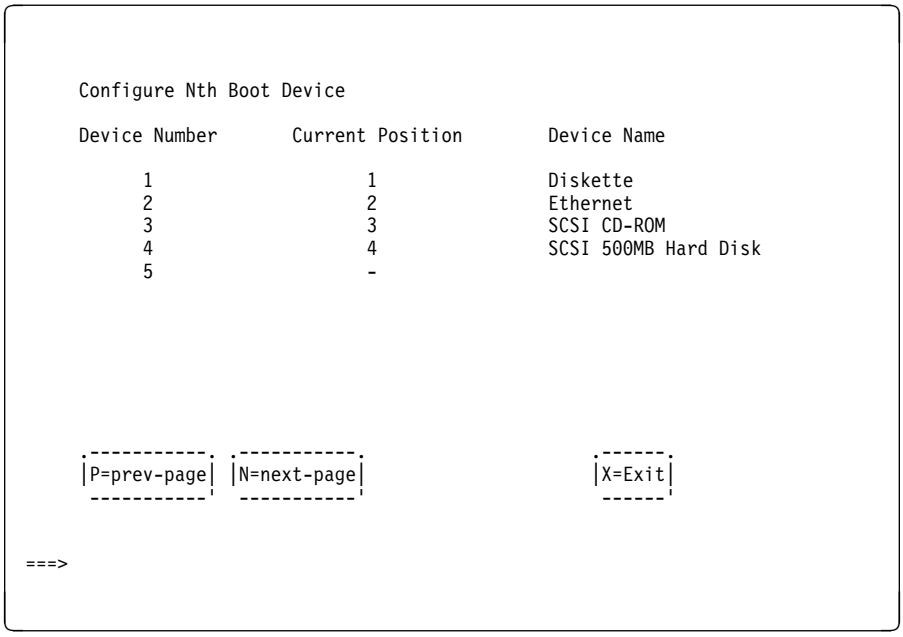
This selection enables you to view and change the custom boot list, which is the sequence of devices read at startup time.




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.



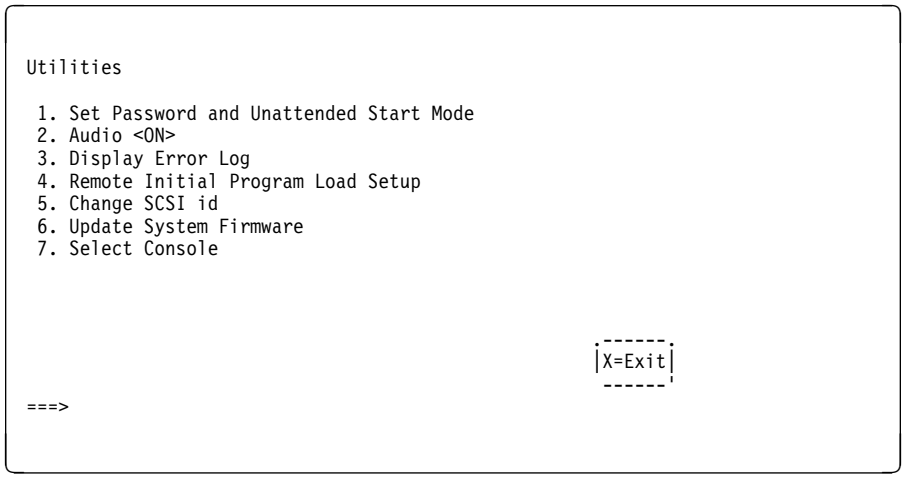
Selecting any of the Configure Boot Device options displays the following screen:



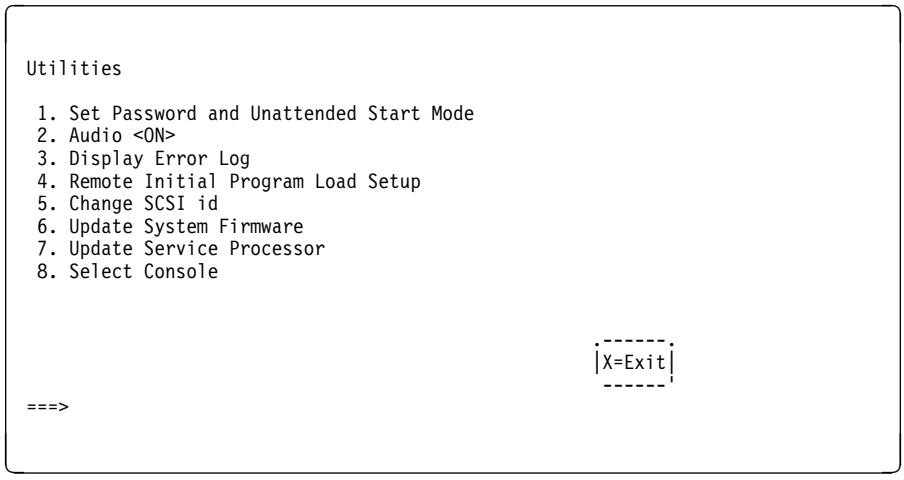
## Utilities

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

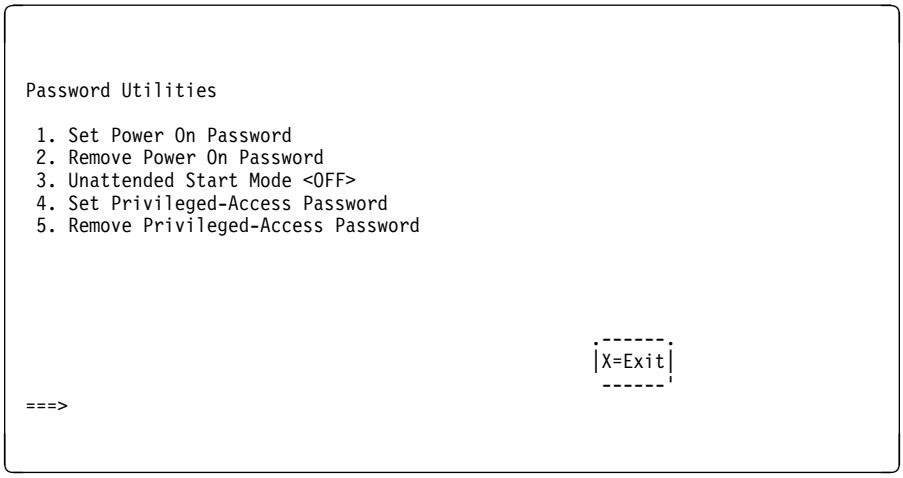
The following screen appears if you DO NOT have a service processor installed in your system:




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



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




**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 “Battery” on page 6-46 for details.

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

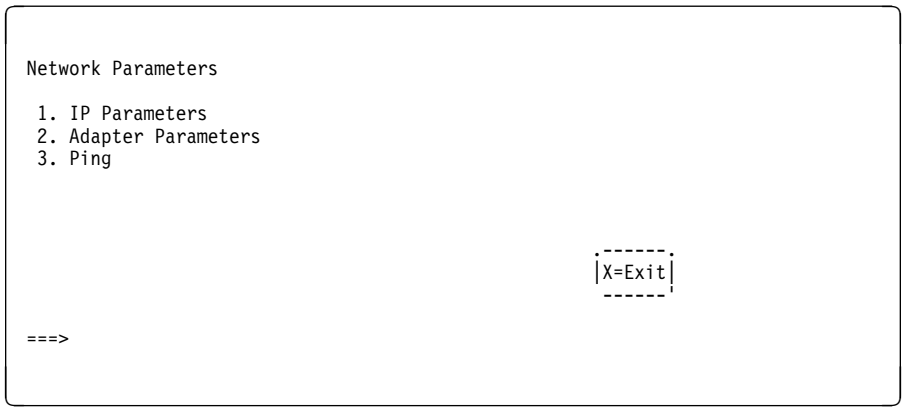
**Set Privileged-Access Password**: The privileged–access password protects against the unauthorized starting of the system programs.

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 “Battery” on page 6-46 for details.

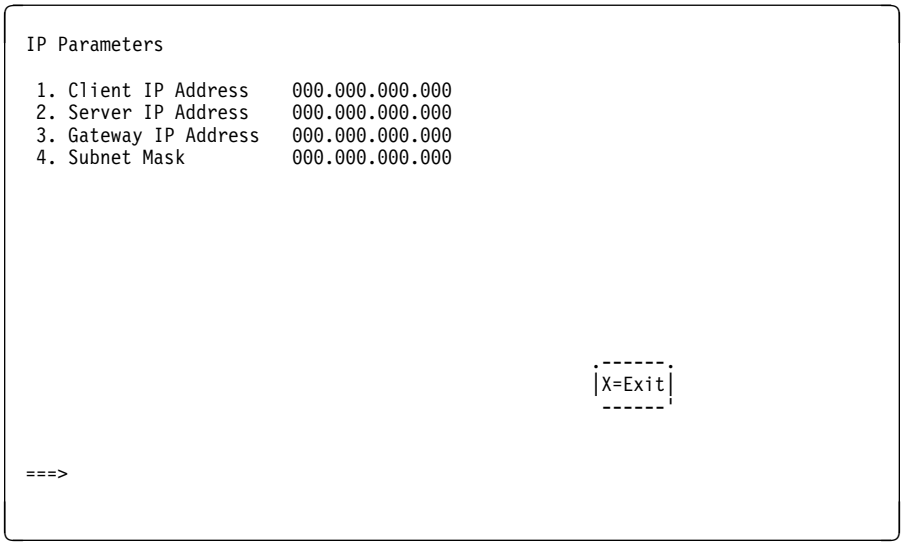
**Audio:** Selecting this utility turns on or off the system tones heard at power-on time.

**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.

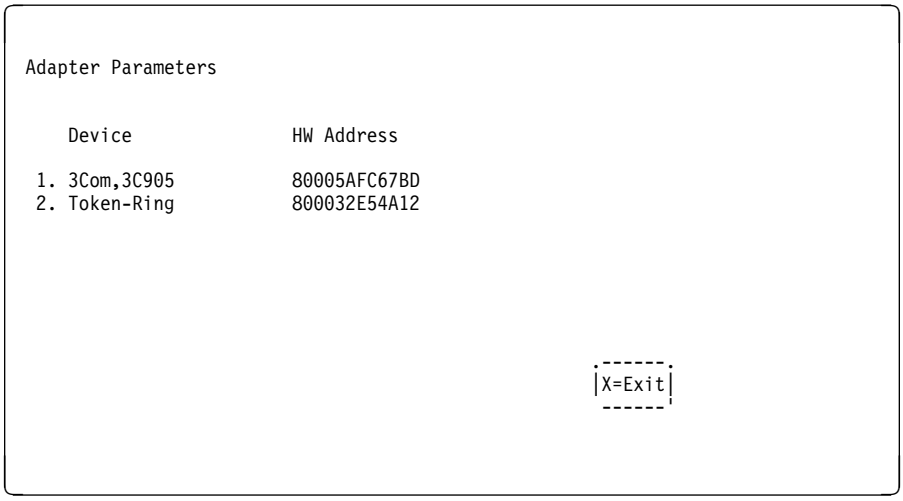



**Note:** Some applications may require that IP addresses contain leading zeroes for numbers less than 100. For example, 129.132.4.20 may need to be entered as 123.132.004.020.

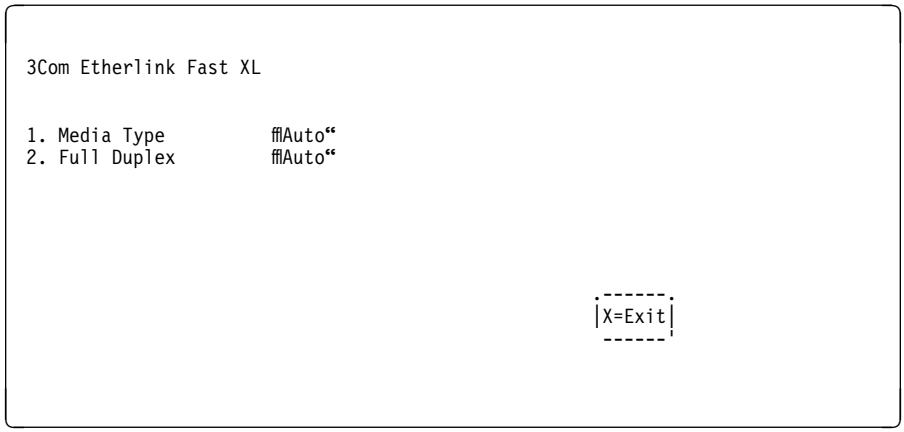
Selecting the IP Parameters option displays the following screen.



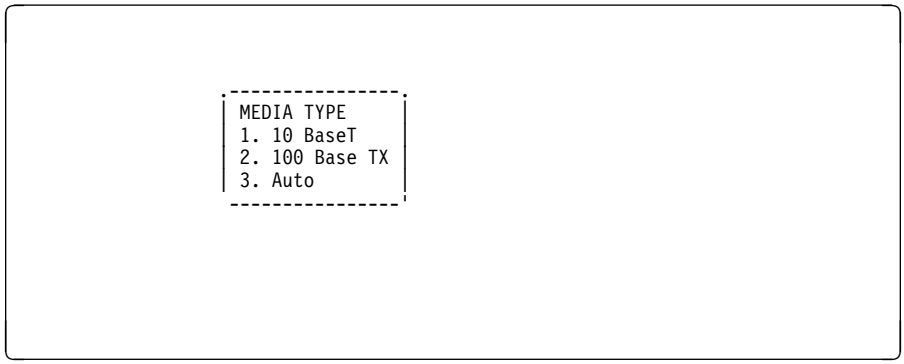

Selecting the Adapter Parameters option allows you to view an adapter's hardware address as well as configure network adapters that require setup.



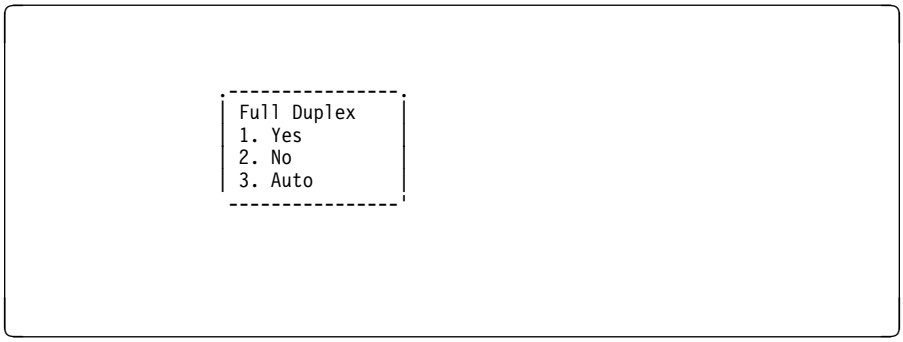
Selecting option 1 (3Com,3C905) displays the following 100Mb Ethernet configuration menus:



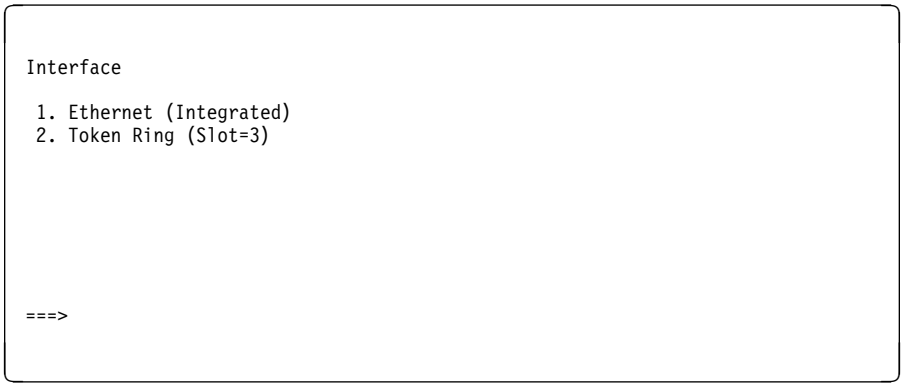

Selecting the Media Type option allows you the change the media employed by the Ethernet adapter:



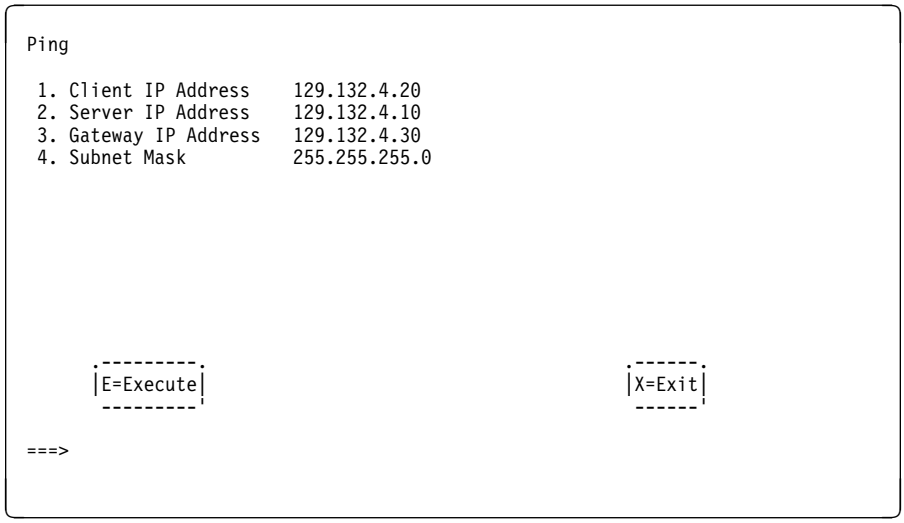
Selecting the Full Duplex option allows you to change how the Ethernet adapter communicates with the network:



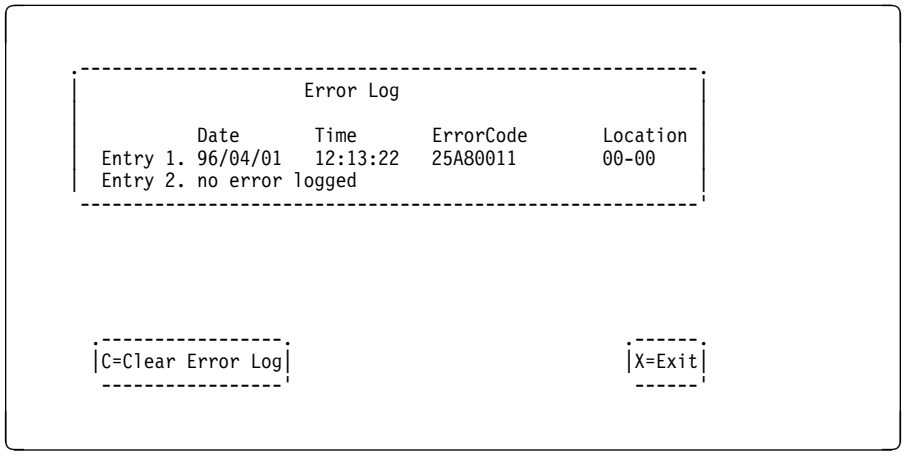

Ping, the last option available from the Network Parameters menu, allows you to test a connection to a remote system unit. After selecting the Ping option, you must choose which adapter communicates with the remote system.



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




**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.



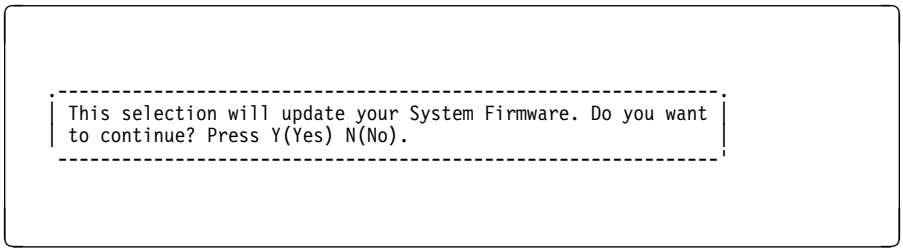

**Change SCSI ID:** This option allows you to view and change the addresses of the SCSI controllers attached to you computer.

**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.




**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:


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

# Chapter 6. Removal and Replacement Procedures

Before performing any of the removal or replacement procedures in this chapter, read the following notices.

**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 3-wire power cable and plug for the user's safety. Use this power cable in conjunction with a properly grounded electrical outlet to avoid electrical shock.**

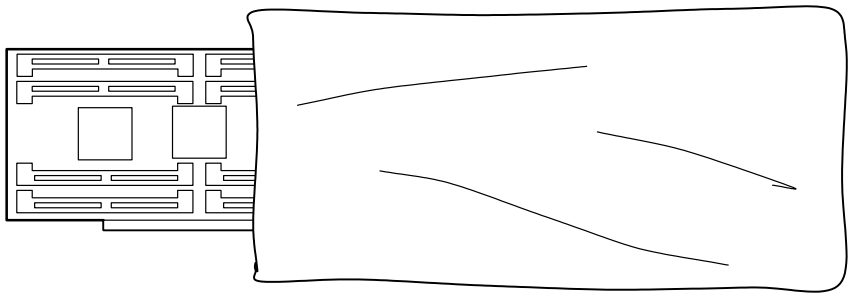
**CAUTION:**
**This unit has more than one power supply cord. To reduce the risk of electrical shock, disconnect two power supply cords before servicing.**

## Handling Static-Sensitive Devices

**Attention:** Disk drives, tape drives and CD-ROM drives are sensitive to static electricity discharge. These devices are wrapped in antistatic bags to prevent damage caused by electrostatic discharge.

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.



## Installing the 7026 CPU Drawer Into A Rack Unit

### Install the Rails and Mounting Hardware for the CPU Drawer

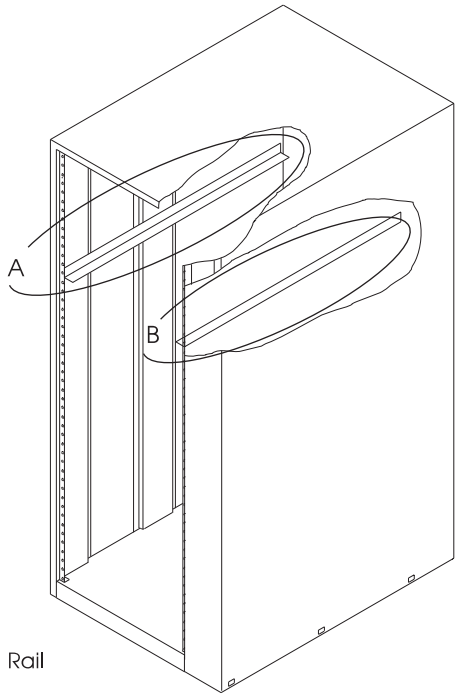
**CAUTION:**
**The stabilizer must be firmly attached to the bottom front of the rack to prevent the rack from turning over when the drawers are pulled out of the rack. Do not pull out or install any drawer or feature if the stabilizer is not attached to the rack.**

**Note:** Racks have EIA numbers visible from the rear that go from 1 (at the bottom) to 32 (at the top). The lowest EIA number completely occupied by a drawer is said to be that drawer's EIA position. Therefore, the rail surface that a drawer sets upon is approximately in line with the lower edge of the EIA position for that drawer. An EIA number is also used in identifying cables attached to that drawer.

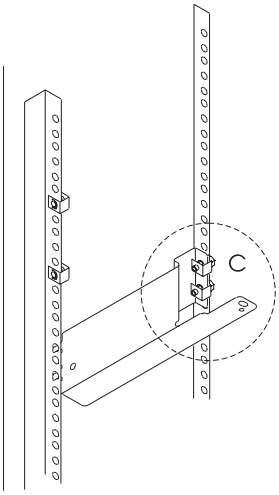
1. The 7026 CPU Drawer occupies 7 EIA units. Install the new rails at the bottom of the lowest EIA number. Refer to the *Rack Installation and Service Guide*, *Rails (Rack with CPU Drawer)* if more details on rail installation are needed.
2. Install one (1) nut clip on the fifth hole above the upper guide pins for each rail at the front of the rack.
3. Install one (1) more nut clip on the tenth hole above the upper guide pins for each rail at the front of the rack.
4. At the rear of each rail, install two (2) nut clips.
5. Install the rails to the rack, using four M5x14 hex head screws that are supplied with this unit.

## Typical Rail Installation

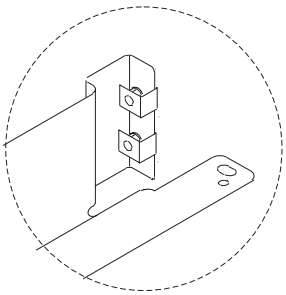
Mounting Hardware for Rack Drawer



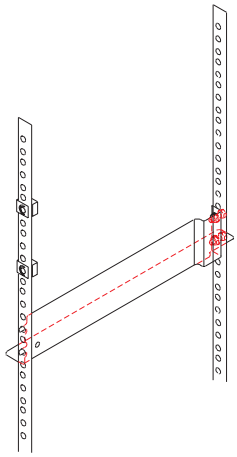

Detail A - Left Side Rail




Detail C - Rail With Nut Clip



Detail B - Right Side Rail



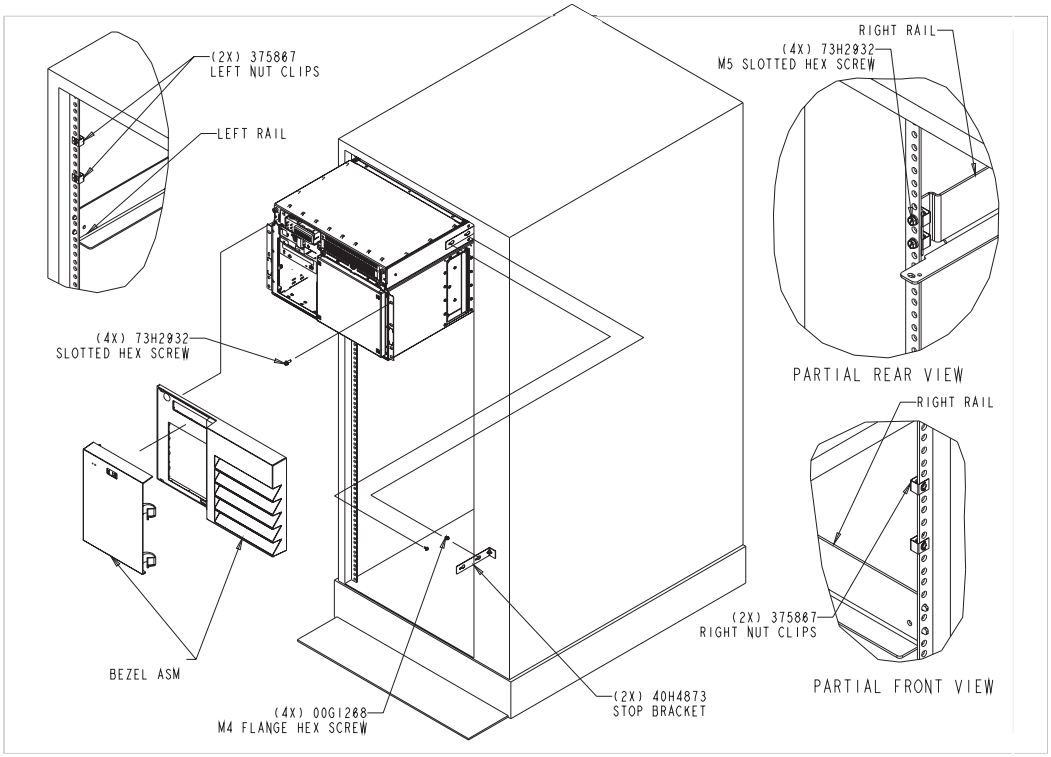
## Install the Disk Drive Drawer

**CAUTION:**
**This unit weighs between 32 kg (70.5 pounds) and 55 kg (121.2 pounds). Three persons are required to safely move it. Using less than three persons to move it can result in injury.**

When fully configured:

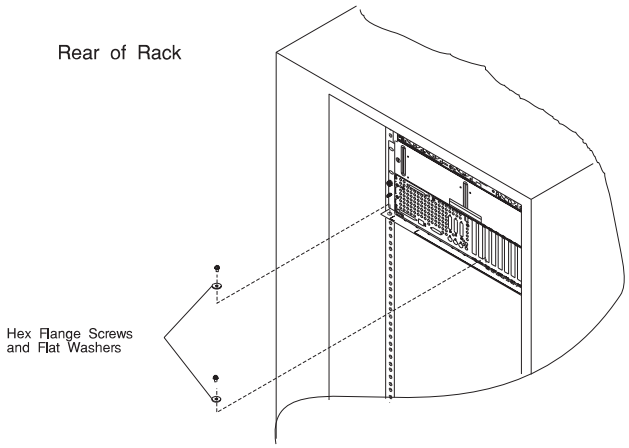
**CAUTION:**
**This unit weighs more than 55 kg (121.2 pounds). Material handling systems such as levers, slings, or lifts are required to safely move it. When this is not possible, specially trained persons or services (such as riggers or movers) must be used.**

1. Slide the shipping box containing the CPU Drawer in front of the rack.
2. Install two M4 hexhead flange screws to each side of the CPU Drawer Do not completely tighten these screws.



3. Lift the disk drive drawer onto the support rails, and slide it **slowly** into the rack until the first hexhead flange screw. Slip the angled end of each chassis stop bracket behind the rack frame and position the slotted clearance holes over the hexhead flange screws. Tighten the hexhead flange screws securely.
4. Continue sliding the drawer into the rack until the front of the CPU Drawer rests against the nut clips on the rack.

   **Attention:** Do not lift the disk drive drawer by its bezel.
5. Attach the rear of the CPU Drawer to the rack rails with the two (2) M4 screws and the two (2) M4 washers provided with the CPU Drawer. This secures the drawer to the rack.



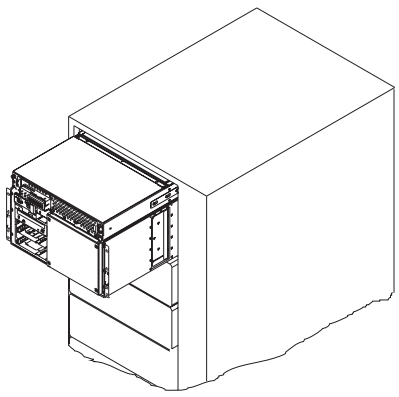

6. Remove the bezel from the drawer by pulling it toward you.
7. Using four (4) M5 x 14 hex head screws supplied with this unit, attach the disk drive drawer to the nut clips in the front of the rack at the sides.
8. Replace the bezel by lining up the velcro hook and loop pads and pushing it toward the drawer.

## Service Position

**CAUTION:**
**The stabilizer must be firmly attached to the bottom front of the rack to prevent the rack from turning over when the drawers are pulled out of the rack. Do not pull out or install any drawer or feature if the stabilizer is not attached to the rack.**

To gain access to the front of the drawer, follow these steps:

1. Do the steps in the power off procedure as detailed in "Stopping the System Unit" in chapter 2 of *7026 H Series CPU Drawer User's Guide*.
2. Remove the power cords from the rear of the drawer.
3. Remove other cables as required from the rear of the drawer.
4. Remove the bezel by pulling it toward you.
5. Remove the four screws that attach the drawer to the rack.
6. Remove the two screws that attach the drawer to the rear of the rails in the rack.
7. Pull the drawer out until it stops (about 12 inches).
8. Return to the procedure that directed you to place the drawer into the front service position.



## Operating Position

To place the drawer into the operating position, follow these steps:

1. Slide the drawer into the rack. If the drawer does not slide all the way in, go to the rear of the rack and realign the drawer, and then slide it in the rest of the way.
2. Replace the two screws that attach the drawer to the rear of the rails in the rack.
3. Replace the four retainer screws to the front of the drawer.
4. Replace the bezel by pushing it toward the machine.
5. Plug the power cords into the rear of the drawer.
6. Do the steps in the power on procedure as detailed in "Starting the System Unit" in chapter 2 of *7026 H Series CPU Drawer User's Guide*.

## Rear Access Cover

### Removal

To gain access to the rear of the drawer, follow these steps:

1. Do the steps in the shutdown procedure as detailed in "Stopping the System Unit" in chapter 2 of *7026 H Series CPU Drawer User's Guide*.
2. Open the rear door of the rack unit.
3. Remove the power cords from the rear of the drawer.
4. If you have a modem or fax machine attached to the server, disconnect the telephone line from the wall outlet and the server.
5. Unplug all power cords (cables) from electrical outlets.
6. Note the locations of the following; then, disconnect them from the back of the CPU Drawer:
   - Power cord
   - Display cable
   - Keyboard cable
   - Any other cables and cords
7. Remove the rear access cover by loosening the two retained screws (one on each side).

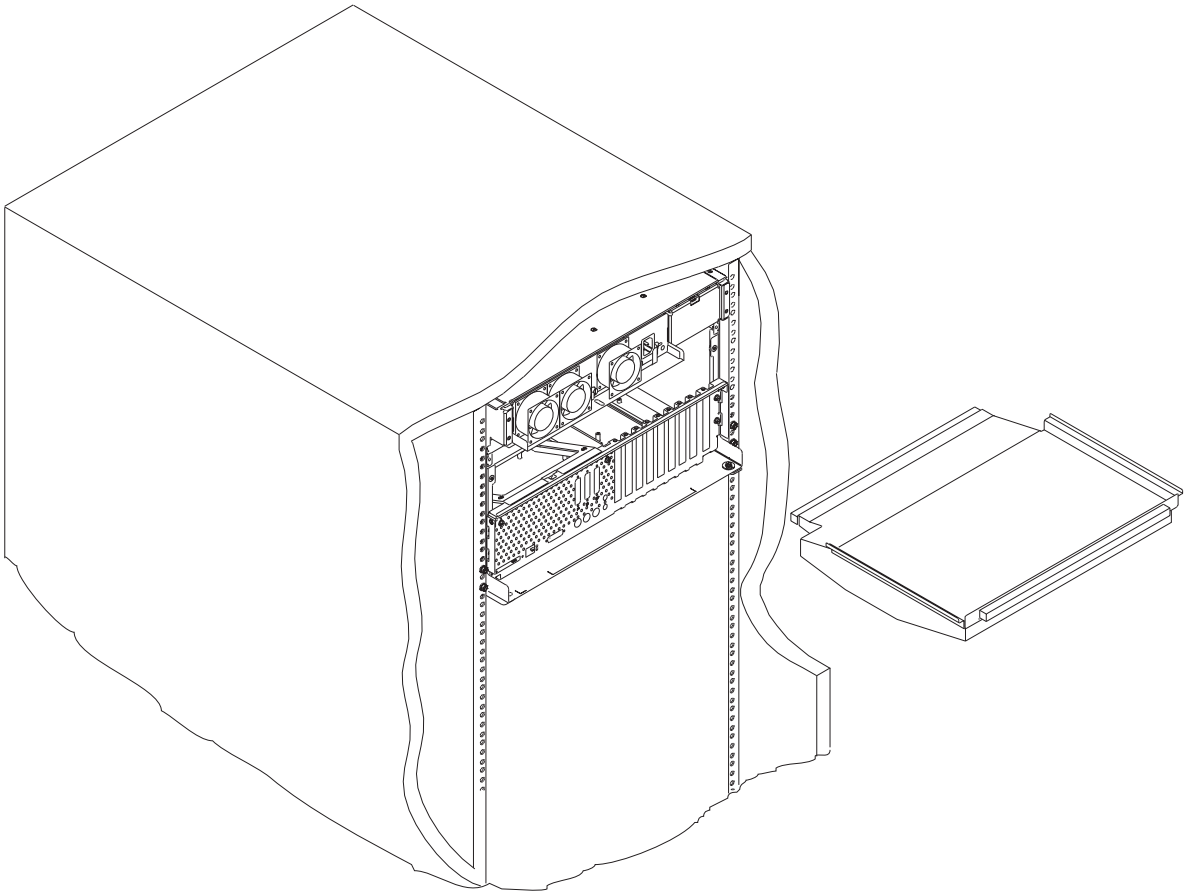
### Replacement

To replace the rear access cover, perform the removal steps in the reverse order.

## Accoustic Baffle

### Removal

1. Follow the removal steps in “Rear Access Cover” on page 6-9.
2. Slide the accoustic baffle out.
3. If you need more room to reach your hands inside to remove cards or other components, remove the power supplies as described in “Removing Power Supplies” on page 6-14.



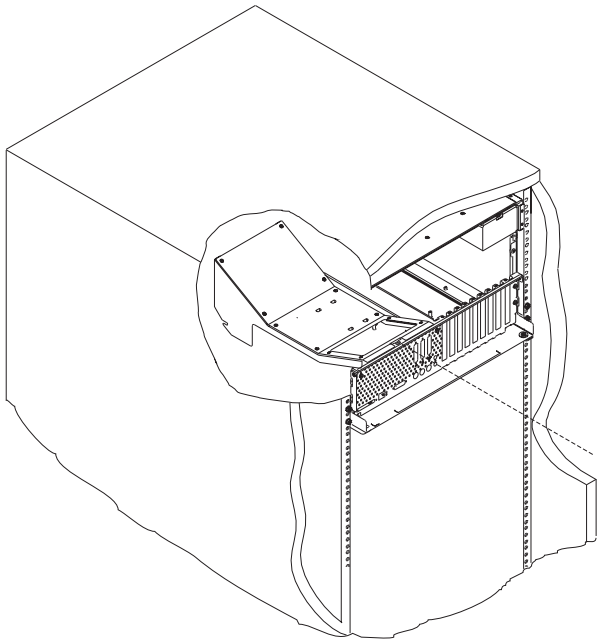
### Replacement

To replace the accoustic baffle, perform the removal steps in the reverse order.

## Air Flow Duct

### Removal

1. Follow the removal steps in “Rear Access Cover” on page 6-9.
2. Slide the accoustic baffle out, as described in “Accoustic Baffle” on page 6-10.
3. Remove the base power supply as described starting with step 7 on page 6-17.
4. Remove the screw that attaches the duct to the chassis.
5. Tilt the duct up and carefully pull it toward the rear of the drawer.



### Replacement

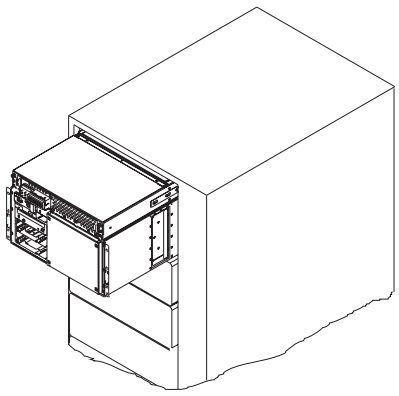
To replace the air flow duct, perform the removal steps in the reverse order.

**Attention:**Use extreme care when replacing the air flow duct into the rear of the CPU Drawer, as there is very little clearance between the cables and the side of the drawer and the air flow duct.

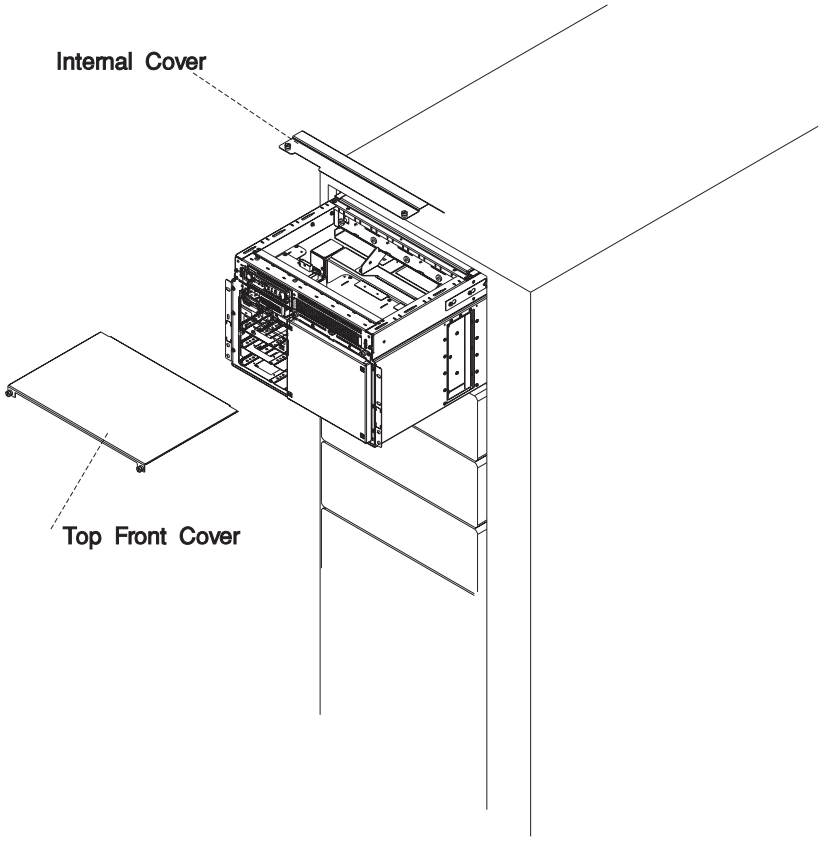
## Front Chassis Cover

### Removal

1. Remove all media (CDs, optical discs, or tapes) from drives; then turn the power off to the drawer.
2. Place the drawer in the service position as described in “Service Position” on page 6-7.



3. Remove the cover by loosening the two retained screws at the top front of the drawer. Slide the cover forward and then up to remove it. Store it in a safe place.




4. Remove the internal cover by loosening the two thumbscrews.
5. Return to the procedure that directed you to remove the front, top cover.

## Replacement

1. Replace the internal cover by tightening the two thumbscrews.
2. Align the tabs on the bottom edges of the top cover with the slots in the top edges of the drawer and slide the cover back until it stops.
3. Tighten the two retained screws at the front of the cover.
4. Place the drawer in the operating position as described in “Operating Position” on page 6-8.
5. Return to the procedure that directed you to replace the front, top cover.

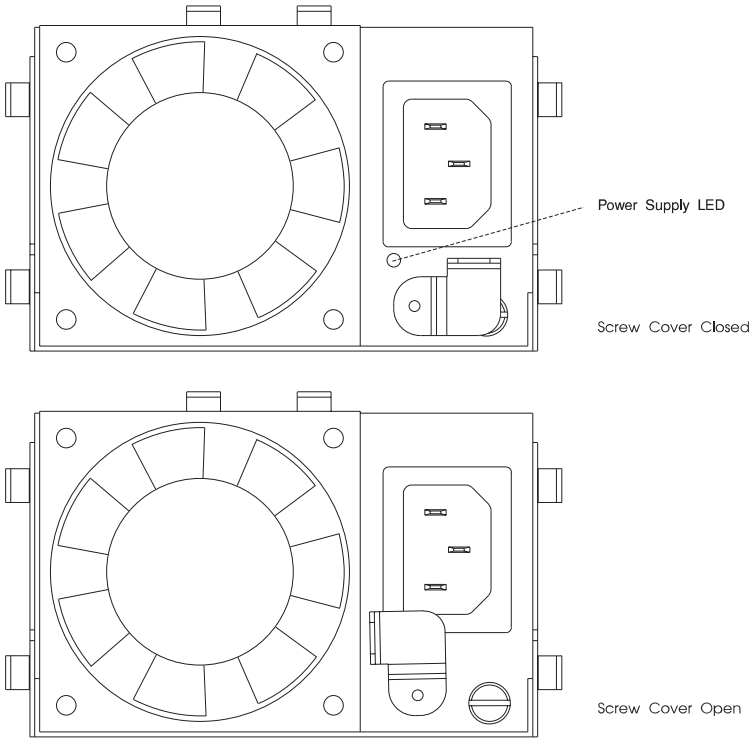
## Removing Power Supplies

**DANGER**

> **Do not attempt to open the covers of the power supply. Power supplies are not serviceable and are to be replaced as a unit.**

**Note:** The CPU Drawer can hold up to two power supplies. You can replace each supply separately.

1. If you have not already done so, open the rear door of the rack unit and locate the drawer you need to work on.
2. If a power supply needs to be removed, the green LED is off.

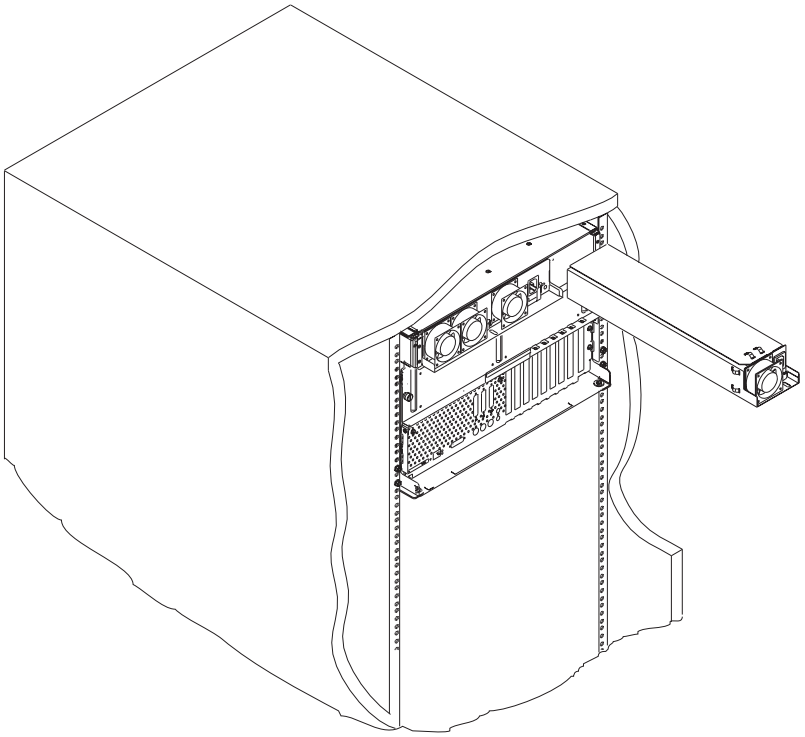


**Notes:**

a. If you are removing the base power supply go to step 7 on page 6-17.

b. If you are removing the auxiliary power supply go to step 4 on page 6-15.

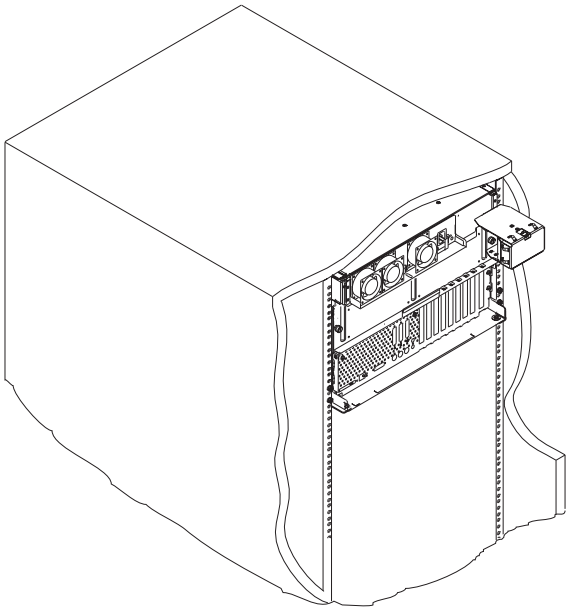
3. Unplug the power cord from the power supply.
4. Pivot the screw cover counterclockwise to the open position to access the power supply screw.
5. Loosen the screw until the power supply can be pulled out.
6. Slide the power supply out.



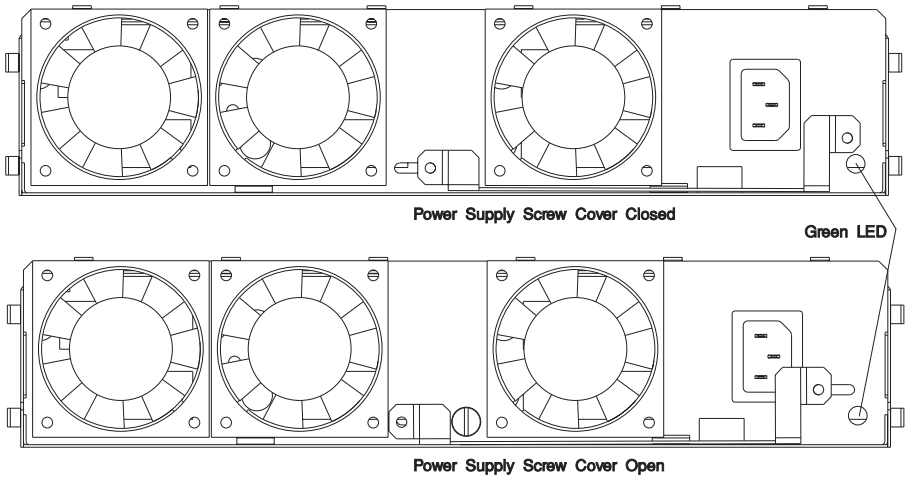
**Notes:**

a. If you do not plan to replace the auxiliary power supply, install the power supply blank into the auxiliary power supply position.

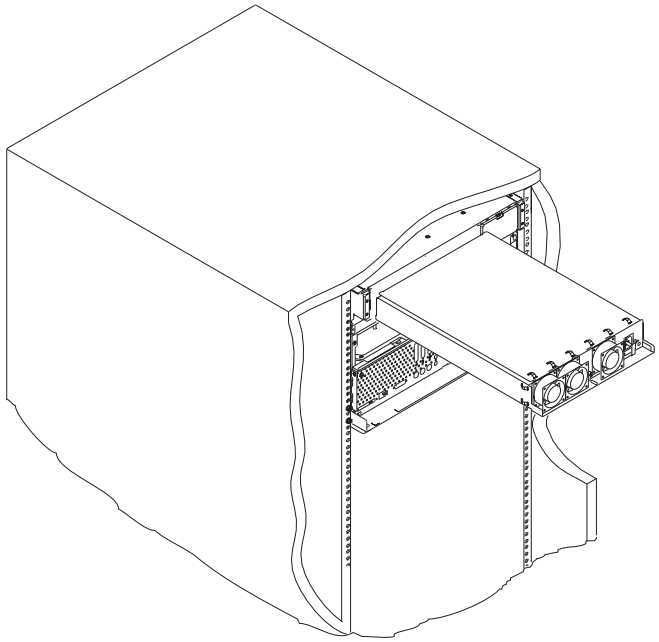
b. To remove the power supply blank, use a flathead screw driver to press the detent and pull it out.



7. To remove the base power supply, slide the screw cover to the left to the open position to access the power supply screw.




8. Loosen the screw until the power supply can be pulled out.
9. Slide the power supply out.



## Installing Power Supplies

**DANGER**

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

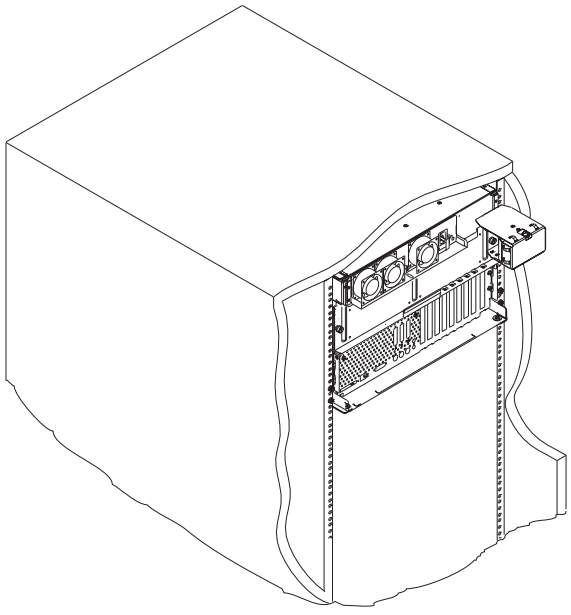
1. If you have not already done so, open the rear door of the rack unit and locate the drawer you need to work on.

   **Notes:**

   a. If you are installing the base power supply, go to step 10 on page 6-21.

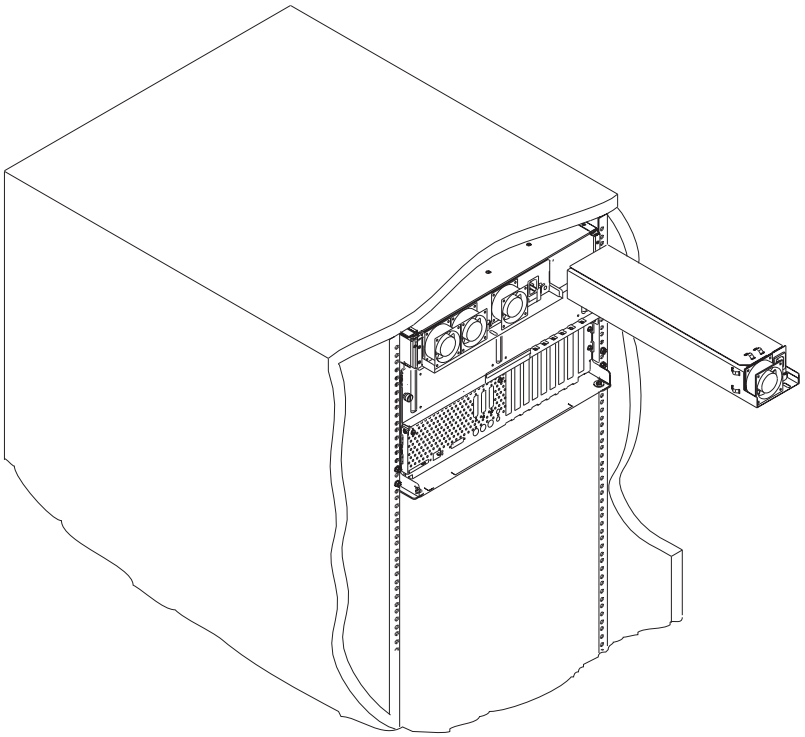
   b. If you are installing the auxiliary power supply, go to step 2.

2. Remove the power supply blank from the previously unused power supply position.
3. To remove the power supply blank, use a flathead screw driver to press the detent and pull it out.



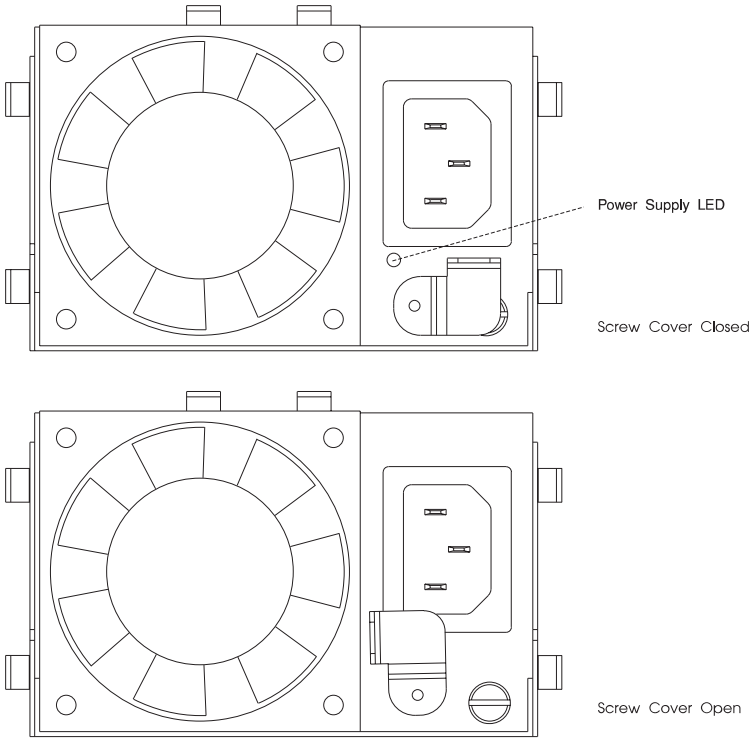
4. If you need to replace the blank, push it back in to the opening.

5. Slide the auxiliary power supply in.



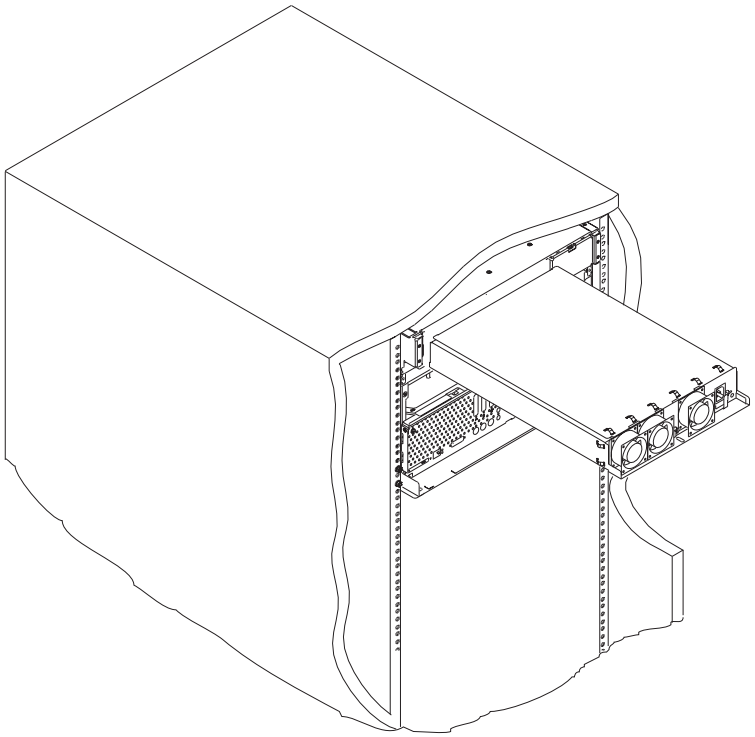
6. Tighten the screw until the power supply is drawn in tight.

7. Pivot the screw cover clockwise over the screw.



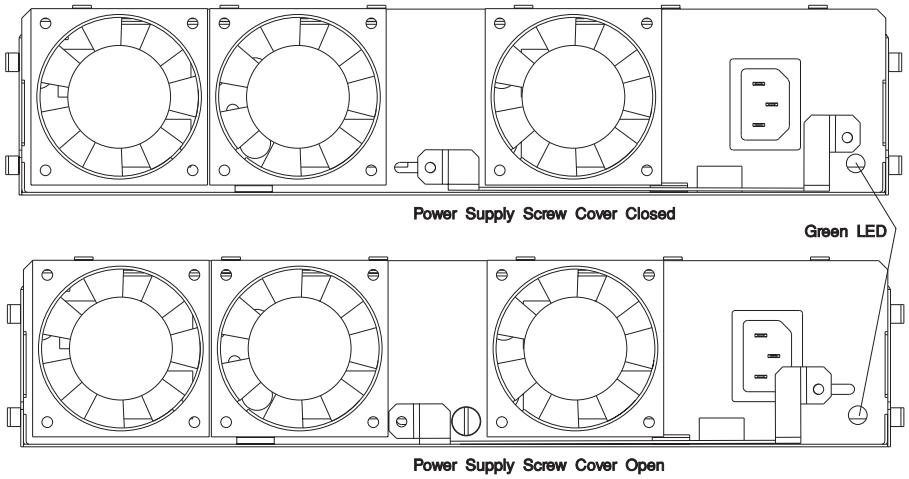

8. Plug the power cord into the power supply.
9. Plug the other end of the power cord into the rack power distribution unit.

10. To install the base power supply, slide it into position.



11. Tighten the screw until the power supply is drawn in tight.

12. Slide the screw cover to the right to cover the screw.




13. Plug the power cord into the power supply.
14. Plug the other end of the power cord into the rack power distribution unit.
15. Close the door at the rear of the rack unit.

## Hot Swap Disk Drives

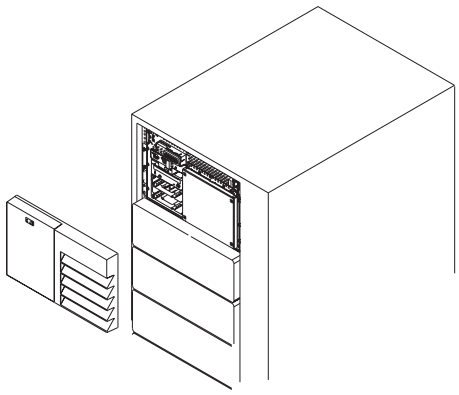
### Removal

This procedure describes how to remove hot swap disk drives from a hot swap bay while the CPU Drawer is powered on.

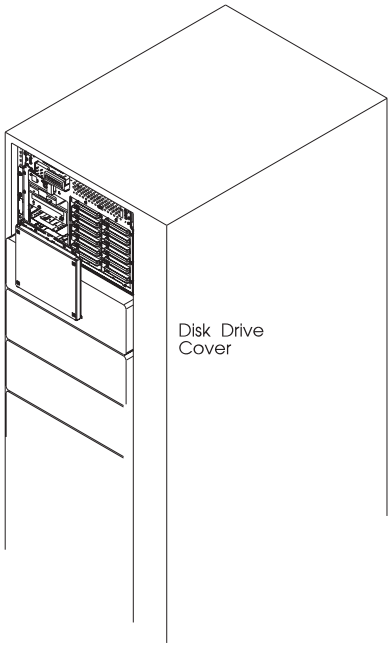
If you remove a hot swap disk drive when the CPU Drawer power is off, steps 4 and 5 do not apply.

**Attention:** Follow all procedures for ESD-sensitive parts while performing these procedures. For ESD information, see “Handling Static-Sensitive Devices” on page 6-2.

1. To remove a hot swap disk drive from CPU Drawer, remove the bezel by grasping each side and gently pulling the bezel towards you.



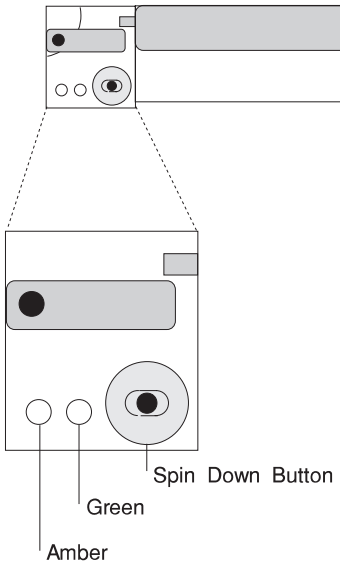
2. Loosen the screws that hold the disk drive cover to the drawer and remove the the disk drive cover from the drawer, storing it in a safe place.



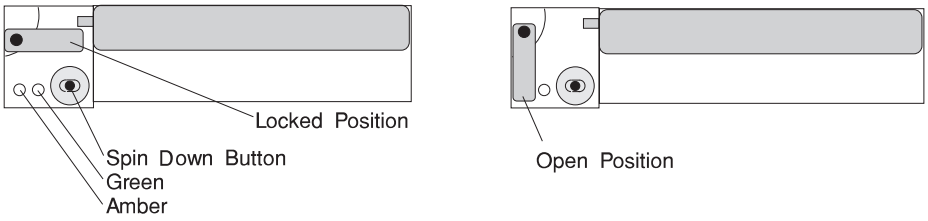

**Attention:** Physically removing a hot swap drive from the CPU Drawer before it has been removed from the system configuration, may cause unrecoverable data corruption.

3. Verify that the device has been removed from the system configuration; the yellow LED on the hot swap disk drive should be off.

4. Press the spin down button on the hot swap disk drive; observe the green flashing LED.




5. Rotate the carrier latch to the open position.




6. Pull the hot swap disk drive out of the hot swap bay, keeping it straight to prevent damage.
7. Place the hot swap disk drive in an antistatic bag.
8. Replace the front or rear disk drive cover.
9. Reinstall the bezel.

## Replacement

This procedure describes how to add an additional hot swap disk drive or install a new hot swap disk drive in a hot swap bay while the CPU Drawer is powered on.

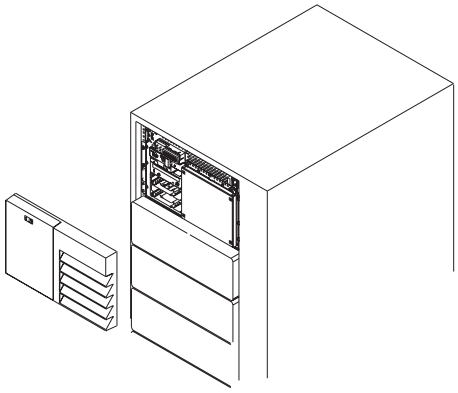
**Attention:** Do not open the drive; no user adjustments or serviceable parts are inside.

**Notes:**

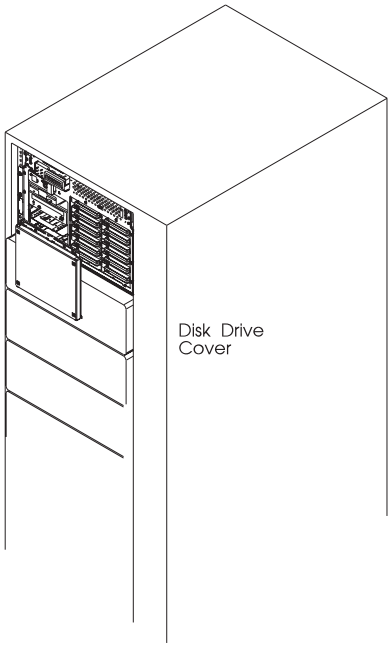
1. This procedure is the same for any hot swap disk drive that is supported by this drawer.
2. For additional information regarding the operation of the hot swap disk drives, see the installation and users guide that came with the drives.

This section gives the instructions for installing hot swap disk drives in banks B and C.

1. Remove the bezel by grasping each side and gently pulling the bezel toward you.



2. Remove the screws that hold the disk drive cover to the drawer and remove the the disk drive cover from the drawer, storing it in a safe place.




3. Each hot swap disk drive you plan to replace must have the hot swap SCSI disk drive carrier attached.

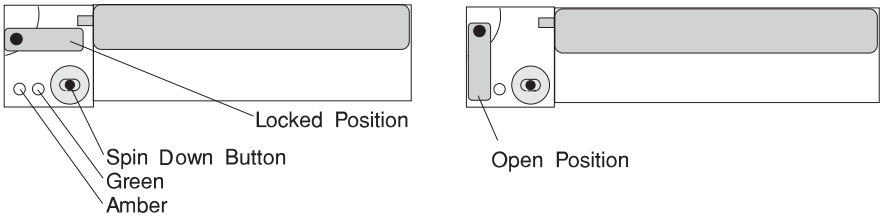
   **Attention:** Handle the hot swap disk drive with care as it is very fragile and can be easily damaged if exposed to shock, electrostatic discharge, or rough handling.

4. It is recommended that you install the hot swap disk drive in the next unused position of bank B first, and then bank C.

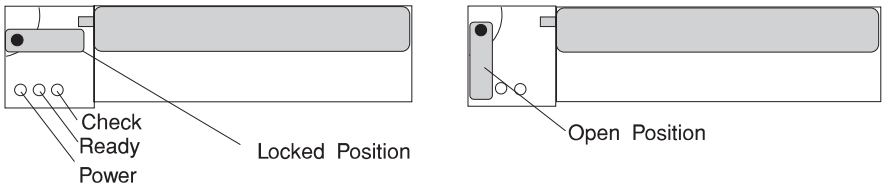
   **Attention:** Attaching SCSI address jumpers on the hot swap disk drive rather than using the automatic ID furnished by the backplane is not advised. Attaching jumpers can cause service problems, multiple drives at the same address, or confusion locating the correct drive.

a. Rotate the carrier latch to the open position.

1. SCSI Disk Drive.



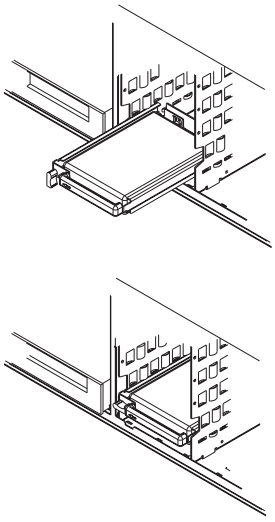

2. SSA Disk Drive.




b. Position the drive carrier assembly horizontally, with the connector facing into the bay.

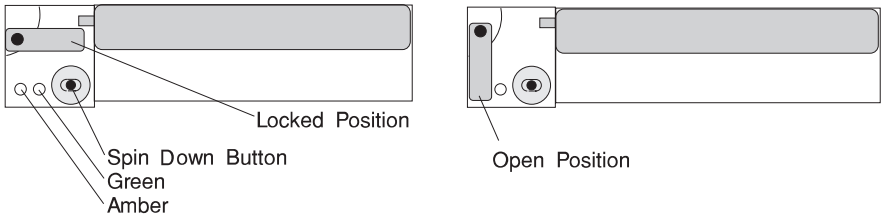
c. Align the side of the carrier with the raised guides on the left of the bay.

d. Slide the carrier into the bay gently to keep from damaging the hot swap disk drive. Slide the carrier to the rear of the bay until it is seated into the connector.



e. Move the carrier latch to the locked position. If the carrier does 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 is illuminated.

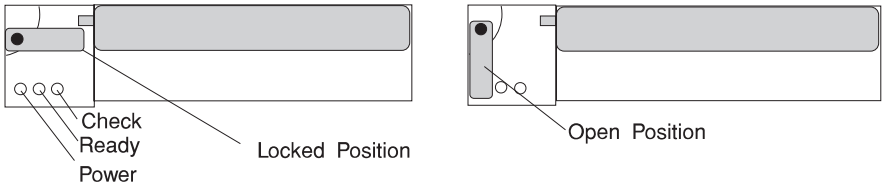
   1. SCSI Disk Drive.




The following table explains the meaning of the green and amber status lights and spin down button on a SCSI disk drive.

| SCSI Disk Drive Status Lights | | |
|---|---|---|
| **Light 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 |

2. SSA Disk Drive.




The following table explains the meaning of the Power, Ready and Check status LEDs on a SSA disk drive.

| SSA 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 |

5. Go to 'Installed Device Records' in *7026 H Series CPU Drawer User's Guide* to record the drive location and the SCSI ID assigned to the drive; then return here to determine your next step.
6. If you have other hot swap disk drives to install, go to page 6-27.
7. If you have other devices to install, refer to “Media Devices (CD-ROM Drive, Tape Drive, Diskette Drive)” on page 6-32.
8. If you do not have any other procedures to perform, replace the cover that you removed in step 2 on page 6-27.
9. Reinstall the bezel.

## Media Devices (CD-ROM Drive, Tape Drive, Diskette Drive)

**CAUTION:**
**Do not open the drive; no user adjustments or serviceable parts are inside.**

**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.**

**Notes:**

1. This procedure is the same for any media device that is supported by this drawer.
2. For additional information regarding the operation of the media drives see the installation and users guide that came with the drives.

### Removal

1. Remove the top cover as described in “Front Chassis Cover” on page 6-12.
2. Note which cables are connected to each device. Label them to ensure that each cable is returned to the correct device when replacing them.
3. If necessary, remove any devices that impede access to the device that you are removing.
4. Disconnect the power and signal cables to the drive you are removing.
5. Slide the drive forward to remove.

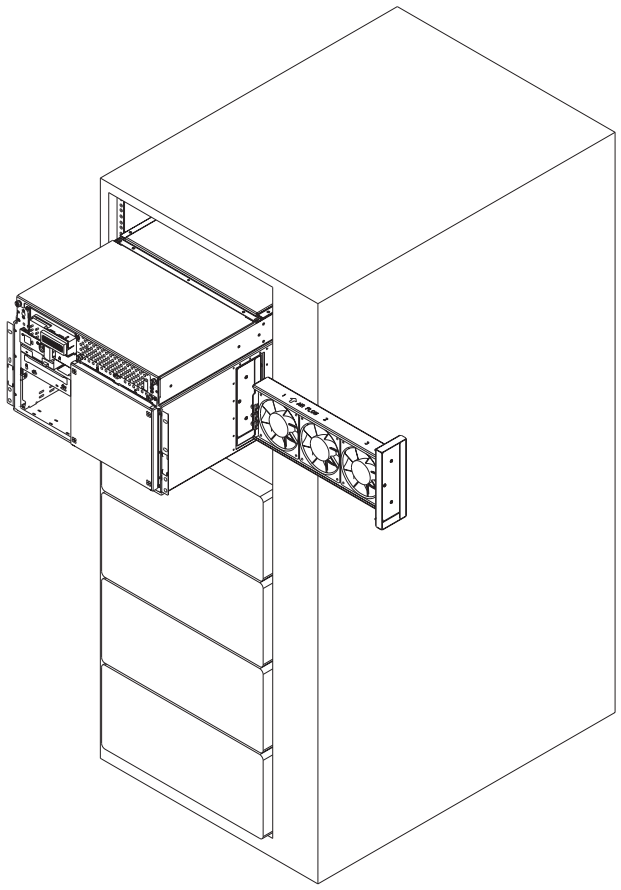
### Replacement

1. If there is an interposer, remove it from the device.
2. Remove the metal plate from the device you just removed.
3. Attach the metal plate to the replacement device.
4. Attach the interposer that you removed earlier to the replacement device.
5. Slide the device into the proper media bay.
6. Connect the power and signal cables to the device you are installing, making sure that the correct cables are connected to each device .
7. Replace and connect any devices that you removed to access this device.
8. Replace the top cover as described in “Front Chassis Cover” on page 6-12.

## Fan Assembly

### Removal

1. Place the drawer in the service position, as described in “Service Position” on page 6-7.
2. Loosen the two retained screws holding the fan assembly in position.
3. Remove the fan assembly by pulling it out.



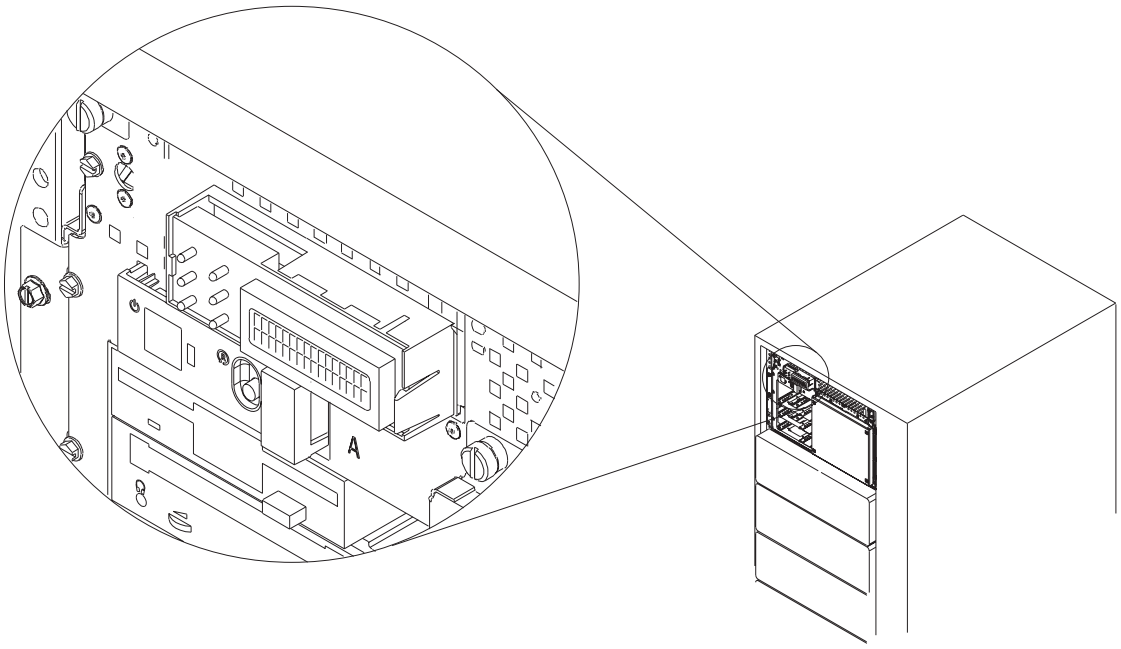
### Replacement

Replace in reverse order. Ensure that the retained screws are properly engaged, as they draw the fan assembly into the fan connectors.

## Operator Panel Control Assembly Bezel

### Removal

1. If you have not already done so, place the drawer in the front service position and remove the front top cover as described in “Front Chassis Cover” on page 6-12.
2. Press the snap in detent on the right side of the operator panel card mounting bracket, next to the letter A on the chassis, to release the bezel.
3. Rotate the bezel forward and out of the mounting bracket.




### Replacement

Replace in reverse order.

## Operator Panel Control Assembly

**Attention:** The system ID is stored in the VPD, which is located on the Operator Control panel assembly. Contact the system administrator if you replace the Operator Control panel assembly.

### Removal

1. Do the removal procedure as described in “Operator Panel Control Assembly Bezel” on page 6-34.
2. Remove the diskette drive, as described in “Media Devices (CD-ROM Drive, Tape Drive, Diskette Drive)” on page 6-32.
3. Note the locations of the cables that attach to the card.
4. Disconnect all cables from the operator panel control assembly.
5. Release the the assembly by compressing the spring clip at each side of the assembly.
6. Remove the card by pushing it to the rear and pulling it up.

### Replacement

Replace in reverse order.

## Power Distribution Assembly

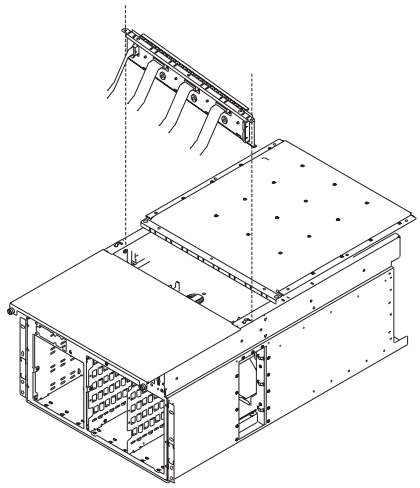
**Attention:** The Power Distribution Assembly cannot be removed unless you remove the entire drawer from the rack. Be sure to observe all the safety precautions that are listed on page 6-1.

### Removal

**Attention:** Note the bay locations of all disk drives in each bank before you attempt to remove them from the drawer.

1. To reduce the weight and enable easier handling of the drawer, remove the hot swap drives from the CPU Drawer. See “Removal” on page 6-23.
2. Remove all power supplies, as described in “Removing Power Supplies” on page 6-14.
3. Follow in reverse order the procedure in “Install the Disk Drive Drawer” on page 6-5, placing the drawer on sturdy work surface.
4. Remove the front chassis cover, as described in “Front Chassis Cover” on page 6-12.
5. Remove the rear chassis cover. Remove the nine screws that attach it to the drawer, and lift the cover off.
6. Note the locations of the cables that attach to the power distribution card.
7. Disconnect the cables that attach to the power distribution assembly.
8. Remove the two screws that hold the power distribution assembly bracket in place.

9. Remove the power distribution assembly and its bracket by pulling it up and out.



10. Remove the five screws that connect the power distribution assembly to its bracket.

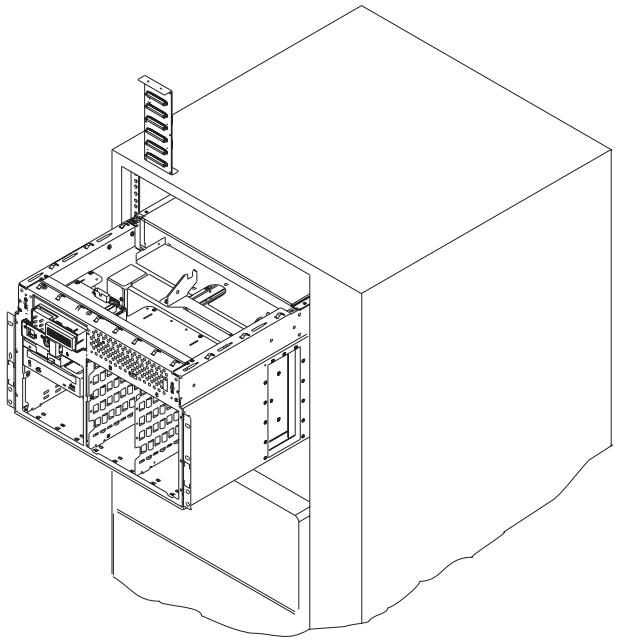
## Replacement

Attach the new power distribution assembly to the bracket, and replace in reverse order.

## SCSI or SSA Backplane

### Removal

1. Do the front cover removal procedure as described in “Front Chassis Cover” on page 6-12.
2. Remove the disk drive cover from the front of the drawer.
3. Disconnect the disk drive carriers from the backplane and slide them out just enough that they clear the backplane connectors.
4. Remove the screw that holds the backplane card in place.
5. Note the locations of the cables that attach to the backplane card.
6. Disconnect the cables that attach to the backplane card.
7. Remove the card by pulling it up and out.



### Replacement

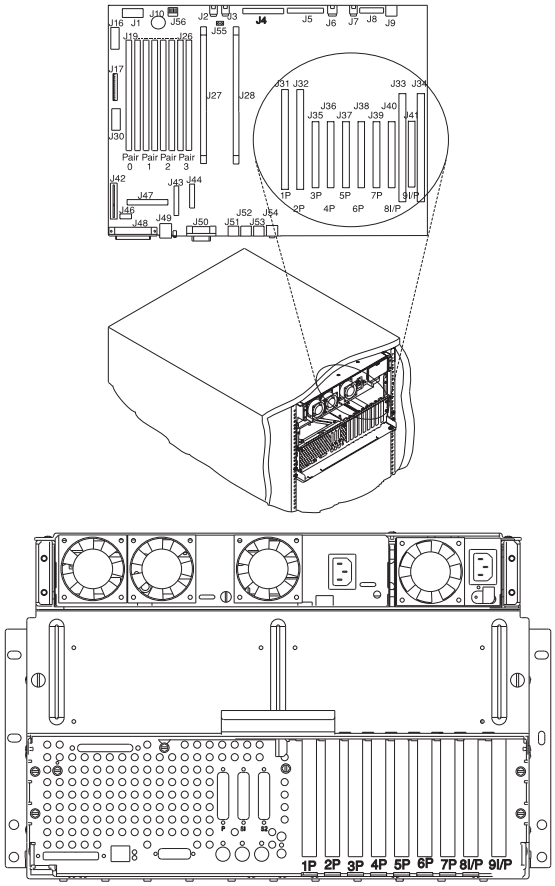
Replace in reverse order.

If you installed an SSA backplane, be sure to connect the internal SSA cable between the backplane and the internal connectors on the external SSA connector.

## Adapters

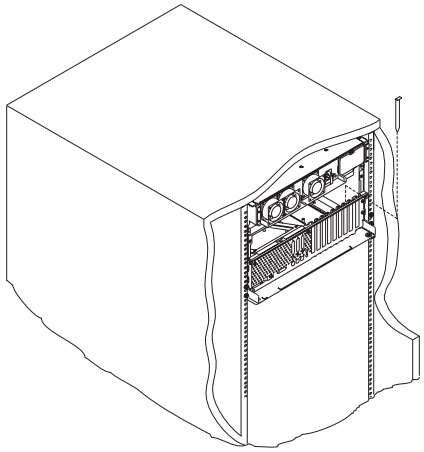
### Removal

1. Remove the accoustic baffle in the rear of the CPU Drawer, as described in “Accoustic Baffle” on page 6-10.
2. Note the slot number of the adapter you are removing.




3. If there are any external cables attached to the adapter, disconnect them.
4. Loosen and remove the screw on top of the adapter's bracket.
5. If there are any internal cables attached to the adapter, disconnect them.
6. Carefully pull the adapter out of the slot.
7. If you are installing another adapter in this expansion slot, follow the instructions given under “Replacement” on page 6-40 below.

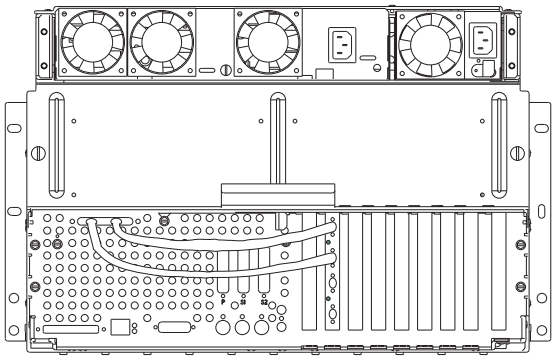
8. If you are not installing another adapter in this expansion slot, replace the expansion-slot cover:
   a. Slide the cover over the open expansion slot.
   b. Tighten the expansion-slot screw on the top of the expansion-slot cover.



## Replacement

To replace an adapter, perform the removal steps in the reverse order.

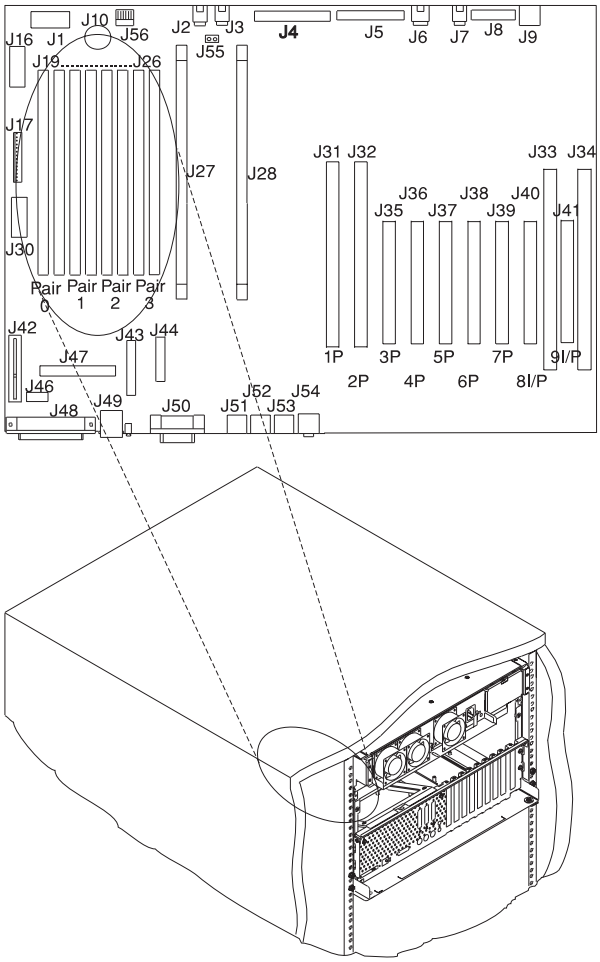
If you replaced an SSA adapter card, be sure to connect the external SSA cable from the external SSA connector to connectors B1 and B2 on the SSA adapter card.



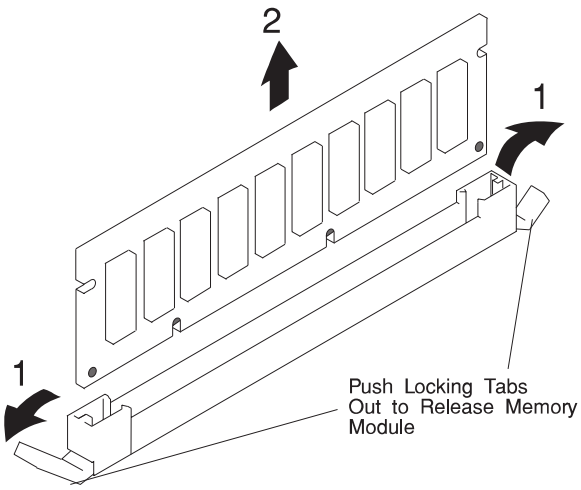
## Memory Modules

### Removal

1. Remove the air flow duct from the rear of the CPU Drawer, as described in “Air Flow Duct” on page 6-11.
2. Locate the memory-module kit connectors and determine which memory-module kits you want to remove.

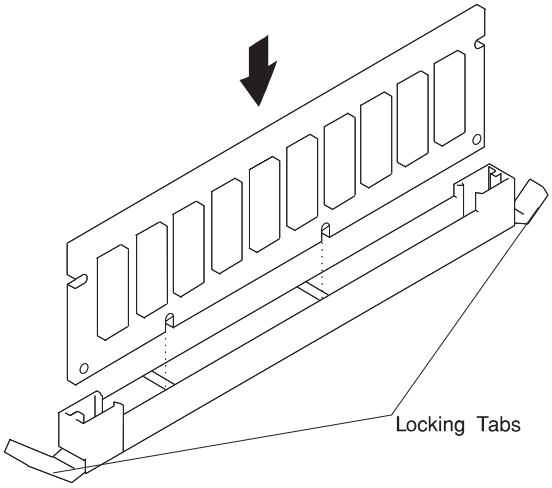


3. Remove the memory module by pushing the tabs out on the memory connectors.




## Replacement

1. With one hand, touch any metal surface of the chassis to minimize static electrical charges, and then pick up a memory module.
2. Locate the memory module connector location on the system board.
3. Install the new memory module by pushing down on the memory-module kit until the latch tabs lock the memory-module kit into the connector. (Do not attempt to move the latch tabs yourself. They lock automatically when you have fully inserted the memory-module kit.)



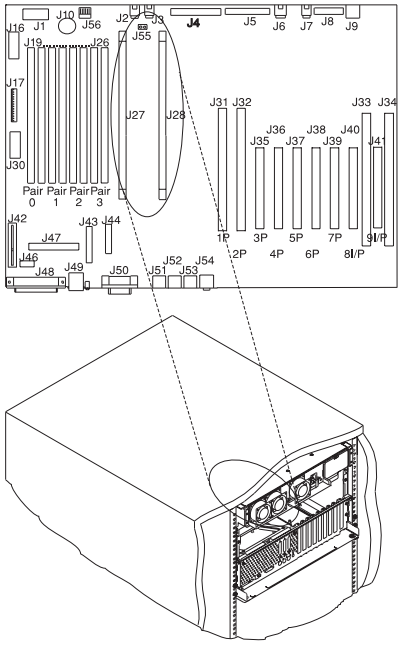
**Attention:** Inserting the memory-module kit diagonally may damage the memory-module kit.

4. Store any memory-module kits you are no longer using in a static-protective package. Make a note of the kit size and speed for future reference.
5. If you have no more removal and replacement procedures to perform, replace the air flow duct, as described in “Air Flow Duct” on page 6-11.

## CPU Card

### Removal

1. Remove the air flow duct from the rear of the CPU Drawer, as described in “Air Flow Duct” on page 6-11.
2. Locate the CPU card that needs to be replaced.
3. Remove the CPU card, following the same procedure as described in the memory module removal procedure, step 3 on page 6-42.



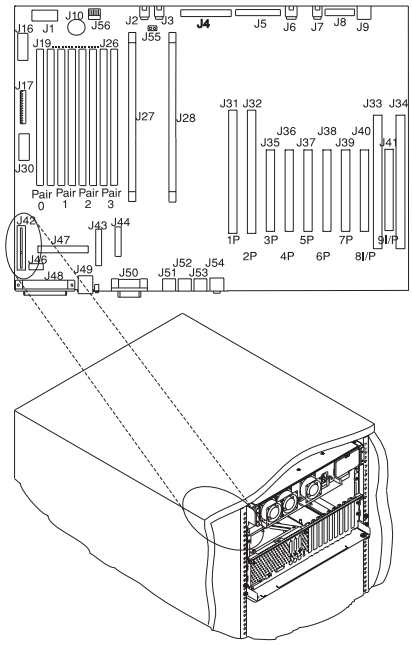

### Replacement

To replace the CPU Card, perform the removal steps in the reverse order.

## Service Processor Card

### Removal

1. Remove the air flow duct from the rear of the CPU Drawer, as described in “Air Flow Duct” on page 6-11.
2. Remove the screw that secures the service processor card bracket to the system chassis, then remove the service processor card bracket.
3. Remove the service processor card.




### Replacement

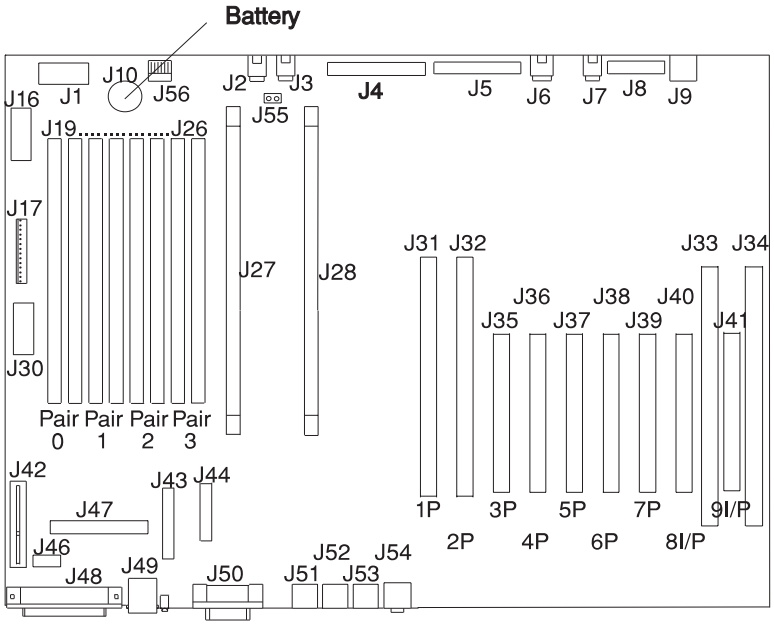
To replace the service processor card, perform the removal steps in the reverse order.

## Battery

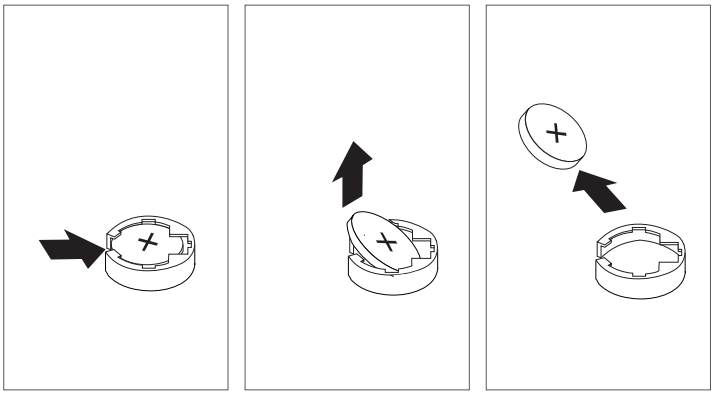
**CAUTION:**
**A lithium battery can cause fire, explosion, or a severe burn. Do not recharge, disassemble, heat above 100°C (212°F), solder directly to the cell, incinerate, or expose cell contents to water. Keep away from children. Replace only with the part number specified for your system. Use of another battery may present a risk of fire or explosion.**

## Removal

1. Remove the air flow duct in the rear of the CPU Drawer, as described in “Air Flow Duct” on page 6-11.
2. Locate the battery on the system board.

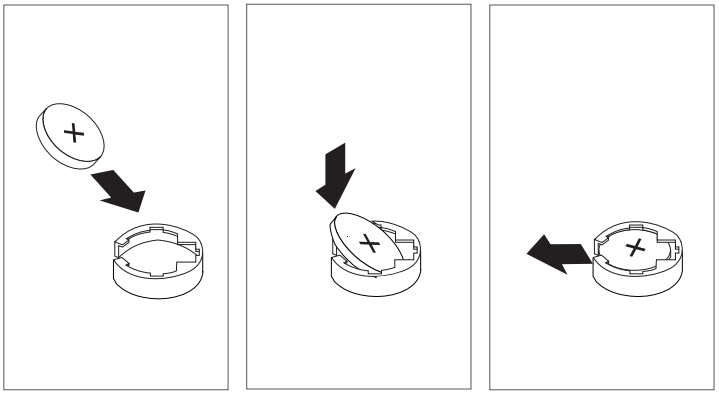


3. Use one finger to slightly slide the battery toward the front of the server. (The spring mechanism behind the battery will push it out toward you as you slide it forward.) Use your thumb and index finger to hold the battery as it pushes out of the socket.



## Replacement

Tilt the battery so that you can insert it into the front of the socket. As you slide the battery toward the front of the server, push it down into the socket.



**Notes:**

1. Be sure to tell the customer that the time and date need to be reset.
2. Ensure that the battery polarity is correct; place the battery in the holder with the positive side facing up.

## Serial Cable

### Removal

1. Remove the air flow duct from the rear of the CPU Drawer, as described in “Air Flow Duct” on page 6-11.
2. Remove the serial cable from the system board connector J44.
3. Remove the four screws from the S1 and S2 connectors on the rear of the system.

### Replacement

Replace in reverse order.

Connect the serial cables as follows:

| | |
|---|---|
| P1 | J44 (system board) |
| P2 | S1 connector |
| P3 | S2 connector |

## Parallel Cable

### Removal

1. Remove the air flow duct from the rear of the CPU Drawer, as described in “Air Flow Duct” on page 6-11.
2. Remove the parallel cable from the system board connector J43.
3. Remove the two screws from the parallel connector on the rear of the system.

### Replacement

Replace in reverse order.

## System Board

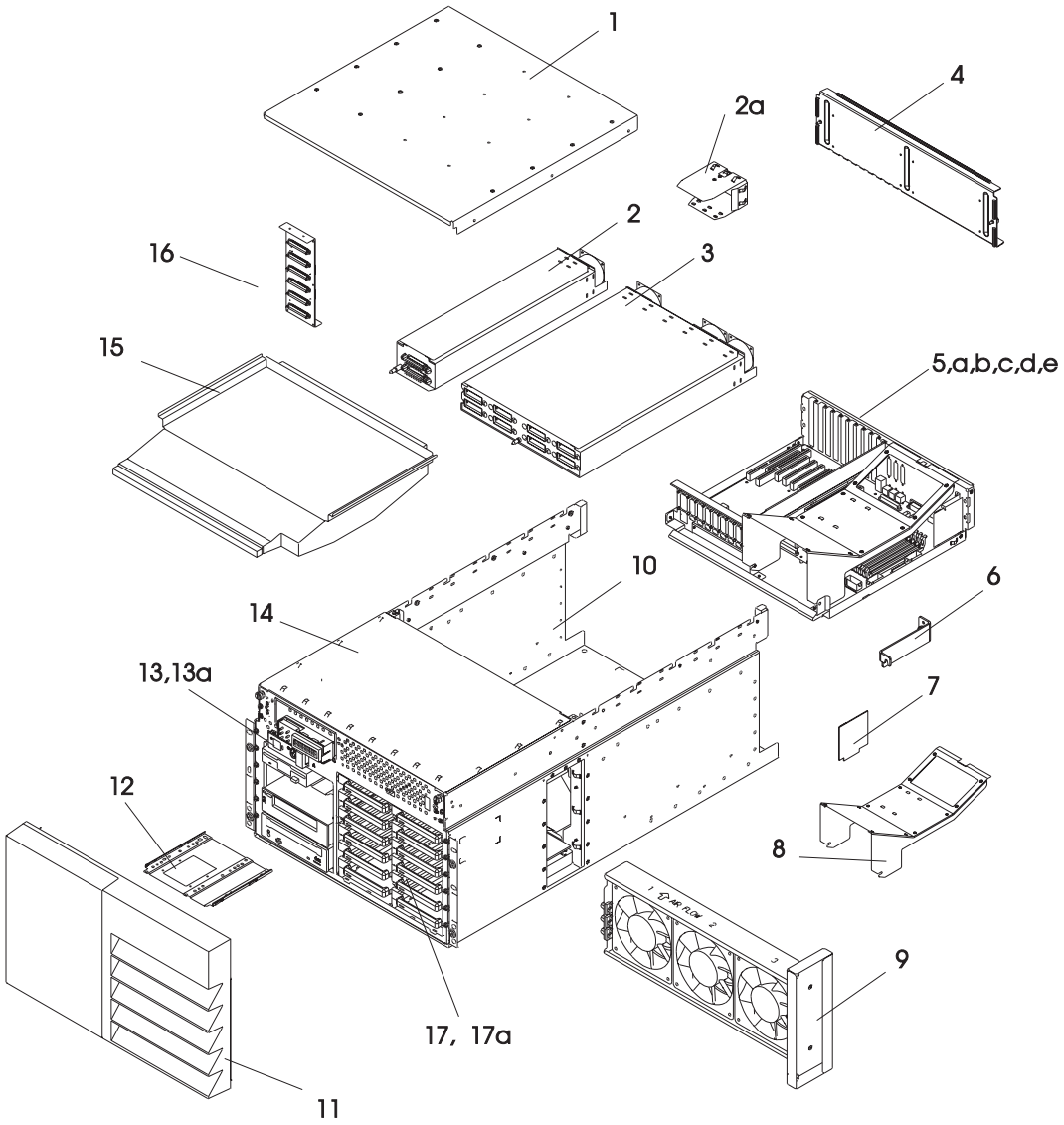
### Removal

1. Remove the air flow duct from the rear of the CPU Drawer, as described in “Air Flow Duct” on page 6-11.
2. Do the removal procedure in “Adapters” on page 6-39.
3. Do the removal procedure in “CPU Card” on page 6-44.
4. Do the removal procedure in “Memory Modules” on page 6-41.
5. Do the removal procedure in “Service Processor Card” on page 6-45.
6. Note the locations of all cables that are connected to the system board and then disconnect them all from the system planar.
7. Remove the screws that attach the system planar to the system unit frame.
8. Slide the system planar toward the front of the system unit, tilt the rear of the system planar upward, and remove the system planar.

### Replacement

To replace the system planar, do the removal steps in the reverse order.

# Chapter 7. Parts Information



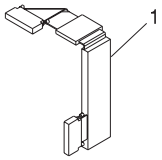

| Index | FRU Part Number | Units Per | Description |
|---|---|---|---|
| 1 | None | 1 | Chassis cover, rear |
| 2 | 40H4840 | 1 | Auxiliary power supply |
| 2a | 40H4913 | 1 | Auxiliary power supply blank |
| 3 | 40H4837 | 1 | Base power supply |
| 4 | 93H4235 | 1 | Rear access cover |
| 5 | None | 1 | CEC Housing |
| 5a | 40H3098 | 1 | System board |
| 5b | 33F8354 | 1 | Battery |

| Index | FRU Part Number | Units Per | Description |
|---|---|---|---|
| 5c | See note | 2 to 8 | 16MB memory module |
| | See note | 2 to 8 | 32MB memory module |
| | See note | 2 to 8 | 64MB memory module |
| | See note | 2 to 8 | 128MB memory module |
| 5d | See note | Up to 10 | Adapter card |
| 5e | See note | 1 to 2 | CPU card |
| 6 | None | 1 | Service processor bracket |
| 7 | 93H4226 | 1 | Service processor |
| 8 | None | 1 | Air flow duct |
| 9 | 40H4878 | 1 | Triple fan |
| 10 | See note | 2 to 4 | Media device (diskette drive, CD-ROM or tape drive) |
| 11 | 93H1326 | 1 | Bezel |
| 11a | 11H3143 | 2 | Bezel blank |
| 12 | 06H2792 | 1 | Media mounting tray |
| 13 | | 1 | Operator panel assembly |
| 13a | 93H1332 | 1 | Operator panel assembly bezel |
| 14 | None | 1 | Chassis front cover |
| 15 | None | 1 | Air baffle |
| 16 | 40H0114 | 1 | SCSI backplane |
| 17 | See note | Up to 12 | Disk drive |
| 17a | See note | Up to 12 | Disk drive carrier assembly |

**Note:** See *Diagnostic Information for Multiple Bus Systems* for part numbers.


| Index Number | FRU Part Number | Units Per Assy | Description |
|---|---|---|---|
| 1 | 82G3278 | 1 | Keyboard, United States English |
| | 1391402 | 1 | Keyboard, French |
| | 1393395 | 1 | Keyboard, Italian |
| | 1391403 | 1 | Keyboard, German/Austrian |
| | 1391406 | 1 | Keyboard, United Kingdom English |
| | 1391405 | 1 | Keyboard, Spanish |
| | 79F0167 | 1 | Keyboard, Japanese |
| | 64F7707 | 1 | Keyboard, Brazilian Portuguese |
| | 82G3279 | 1 | Keyboard, Canadian French |
| | 1391526 | 1 | Keyboard, Belgian French/Dutch |
| | 1391411 | 1 | Keyboard, Swedish/Finnish |
| | 1391407 | 1 | Keyboard, Danish |
| | 1399583 | 1 | Keyboard, Bulgarian |
| | 1395881 | 1 | Keyboard, Swiss French |
| | 1385882 | 2 | Keyboard, Swiss German |
| | 1391409 | 1 | Keyboard, Norwegian |
| | 1391511 | 1 | Keyboard, Dutch |
| | 1391410 | 1 | Keyboard, Portuguese |
| | 1399046 | 1 | Keyboard, Greek |
| | 1391408 | 1 | Keyboard, Hebrew |
| | 1399581 | 1 | Keyboard, Hungarian |
| | 1391407 | 1 | Keyboard, Icelandic |
| | 1399580 | 1 | Keyboard, Polish |
| | 1399582 | 1 | Keyboard, Romanian |
| | 1399571 | 1 | Keyboard, Slovakian |
| | 1399570 | 1 | Keyboard, Czechoslovakian |
| | 1393286 | 1 | Keyboard, Turkish (ID 179) |
| | 8125409 | 1 | Keyboard, Turkish (ID 440) |
| | 1391490 | 1 | Keyboard, Arabic |
| | 52G9658 | 1 | Keyboard, Korean |
| | 1393990 | 1 | Keyboard, Chinese |
| | 06H3048 | 1 | Keyboard, United States (OEM) |
| 2 | 76H5084 | 1 | Three Button Mouse |
| | 11H4879 | 1 | Three Button Mouse (OEM) |

## Cables




| Index | FRU Part Number | Units Per | Description |
|---|---|---|---|
| 1 | 06H6660 | Up to 3 | Cable, SCSI (backplane to adapter) |
| | 93H4339 | 1 | Cable, SSA (backplane to bulkhead) |
| | 93H4340 | 2 | Cable, SSA 0.6m link (bulkhead to adapter) |
| | 73H1894 | 1 | Cable (diskette) |
| | 73H3596 | 1 | Cable (SCSI 4-drop) |
| | 93H1816 | 1 | Cable (LCD to operator panel) |
| | 93H1349 | 1 | Power cable, fan |
| | 93H1350 | 1 | Power Cable Assembly |
| | 8185219 | 1 | Cable (Parallel) |
| | 92F1294 | A/R | screw (3.5 x 6) |
| | 89X2629 | 1 | Power cable (bifurcated) |

# Appendix A. SSA Problem Determination Procedures

Problem determination procedures are provided by power-on self-tests (POSTs), service request numbers (SRNs), and maintenance analysis procedures (MAPs). Some of these procedures use the using system service aids that are described in “SSA Service Aids” on page B-19.

## Disk Drive Module Power-On Self-Tests (POSTs)

**Attention:** Disk drive modules are fragile. Handle them with care. Follow all ESD-sensitive (electro-static discharge) parts procedures when handling disk drive modules. For ESD information, see “Handling Static-Sensitive Devices” on page 6-2.

The disk drive module POSTs start each time the module is switched on or when a **Send Diagnostic** command is received from the SSA adapter. They check whether the disk drive module is working correctly. The POSTs also help verify a repair after a FRU has been exchanged.

There are two power-on self-tests: POST-1 and POST-2.

POST-1 runs immediately after the ‘power-on reset’ line goes inactive, and before the disk drive module motor starts. POST-1 includes tests of the:

- Microprocessor
- ROM
- Safety circuits

If POST-1 completes successfully, POST-2 is enabled.

If POST-1 fails, the disk drive module check light stays on, and the disk drive module is not configured into the SSA network.

POST-2 runs after the disk drive module motor has started. POST-2 includes tests of:

- Motor control
- Servo control
- Read and write on the diagnostic cylinder (repeated for all heads)
- Error checking and correction (ECC)

If POST-2 completes successfully, the disk drive module is ready for use by the using system.

## Adapter Power-On Self-Tests (POSTs)

Two power-on self-tests (POSTs) are resident in the SSA adapter. The tests are POST-1 and POST-2.

POST-1 tests all the functions that are necessary to enable the adapter to communicate with the Micro Channel. POST-1 can fail for either of two reasons:

- A hardware error has been detected. In such instances, the POST code enters a tight loop, and does not put the identification of the SSA adapter into the programmable option select (POS) registers. If this error occurs, the SSA adapter must be exchanged for a new one.
- The flash erasable programmable read-only memory (EPROM) has a check sum that is not valid. This error can be caused if the power fails while microcode is being downloaded. In such instances, the POST checks all the hardware that is needed to download the microcode. If all the hardware is correct, the POST sets the ROS level to zero, puts the identification of the SSA adapter into POS 0-1, and puts error data into the adapter status register.

  To recover from this type of error, microcode must be downloaded to the SSA adapter. If the using system can have an initial program load (IPL) without the adapter, the configuration code detects the down-level ROS code and downloads the latest level of code. The configuration code then uses control register bit 7 to reset the adapter and restart POST-1.

If no error is detected during POST-1, the identification of the SSA adapter is put into the POS registers, and POST-2 is started.

POST-2 tests the remaining hardware on the SSA adapter card and tests the other FRUs that are attached to the adapter. If this test fails, an error code is saved and sent to the using-system error log when the error logger becomes available. An internal health check continues to send the error code at regular intervals.

# Appendix B. SSA Software and Microcode Errors

## Service Request Numbers (SRNs)

Service request numbers (SRNs) are generated for the SSA Hot-Swap Disk Drive by the system error-log analysis, system configuration code, diagnostics, and customer problem-determination procedures. SRNs help you to identify the cause of a problem, the failing field-replaceable units (FRUs), and the service actions that might be needed to solve the problem.

### The SRN Table

Table B-1 on page B-3 lists the SRNs and describes the actions you should perform. The table columns are:

**SRN** The service reference number

**FRU list** The FRU or FRUs that might be causing the problem (see also "FRU Names Used in the SRN Table" on page B-2)

**%** How likely it is (by percentage) that the FRU is causing the problem

**Problem** A description of the problem and the action you must take

Abbreviations used in the table are:

**DMA** Direct memory access

**FRU** Field-replaceable unit

**IOCC** Input/output channel controller

**POS** Programmable option select (POS registers)

**POST** Power-on self-test

**PAA** P = adapter port number
AA = SSA address

### Using the SRN Table

**Important:** You should have been sent here from "SSA Maintenance Analysis Procedures (MAPs)." Do not start problem determination from the SRN table; always go to "SSA Maintenance Analysis Procedures (MAPs)" on page 2-27 first.

1. Locate the SRN in the table. If you cannot find the SRN, you have a problem with the diagnostics, the microcode, or the documentation. Call your support center for assistance.

2. Read carefully the “Action” you must perform for the problem. *Do not exchange FRUs unless you are instructed to do so*.
3. Normally exchange only one FRU at a time, starting from the top of the FRU list for that SRN. Always use instructions given in the page reference when exchanging FRUs. After each FRU is exchanged, go to "MAP 410: Repair Checkout" in *Diagnostic Information for Multiple Bus Systems* to verify the repair.

### Software and Microcode Errors

Some SRNs indicate that a problem might have been caused by a software error or by a microcode error. If you have one of these SRNs, perform the following actions:

1. Make a note of the contents of the error log for the device that has the problem.
2. Go to the using-system service aids and select Display Vital Product Data to display the VPD of the failing system. Make a note of the VPD for all the SSA adapters and disk drive modules.
3. Report the problem to your support center. The center can tell you whether you have a known problem and can, if necessary, provide you with a correction for the software or microcode.

### FRU Names Used in the SRN Table

This section provides a glossary of the FRU names used.

| ***FRU Name in Table*** | ***Definition*** |
|---|---|
| **Backplane assembly** | The disk drive modules, blank disk drive modules, and internal SSA cables, are connected to the backplane assembly. |
| **Disk drive module** | A disk drive assembly to a carrier that plugs into the backplane in the system unit. |
| **Blank Disk drive module** | This module must be installed in a slot that does not contain a disk drive module. This completes the SSA loop through the system unit. |
| **External SSA cable** | A cable that connects the bulkhead to the SSA adapter or to an SSA subsystem. |
| **Internal SSA cable** | Attaches the backplane to the SSA adapter card. |
| **SSA adapter card** | The SSA adapter card, which is located in the using system. |

*Table B-1 (Page 1 of 9). Service Request Numbers*

| SRN | FRU List | % | Problem |
|---|---|---|---|
| 10101 | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.) | 100 | **Description:** Disk drive motor stopped. The disk drive module is bad.<br>**Action:** If this SRN was received by one disk drive module only, then exchange that disk drive module. |
| 10112 | None | – | **Description:** Format degraded. A format operation has been ended before it has completed.<br>**Action:** Use the Format service aid to format the disk drive module. |
| 1*xxxx* | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.) | 100 | **Description:** Disk drive module error.<br>**Action:** Exchange the FRU for a new FRU.<br>**Note:** In this SRN, an *x* represents a digit from 0 to F. |
| 20PAA | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.)<br>**SSA adapter card** (See the installation and service guide for the using system.)<br>**External SSA Cables**<br>**Backplane assembly** (See "SCSI or SSA Backplane" on page 6-38.)<br>**Internal SSA Cable** | 45<br>45<br>6<br>2<br>2 | **Description:** An open SSA link has been detected.<br>**Action:** Run the Link Verification Service Aid to isolate the failure. If the SSA service aids are not available:<br>• When the failing device is an SSA Hot-Swap Disk Drive, go to "SSA Maintenance Analysis Procedures (MAPs)" on page 2-27.<br>• When the failing device is not an SSA Hot-Swap Disk Drive, go to the service information for that device. |
| 21PAA to 29PAA | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.)<br>**SSA adapter card** (See the installation and service guide for the using system.)<br>**External SSA Cables Backplane assembly** (See "SCSI or SSA Backplane" on page 6-38.)<br>**Internal SSA Cable** | 45<br>45<br>6<br>2<br>2 | **Description:** An SSA threshold-exceeded-link error has been detected.<br>**Action:** Run the Link Verification Service Aid to isolate the failure. If the SSA service aids are not available:<br>• When the failing device is an SSA Hot-Swap Disk Drive, go to "SSA Maintenance Analysis Procedures (MAPs)" on page 2-27.<br>• When the failing device is not an SSA Hot-Swap Disk Drive, go to the service information for that device. |
| 2A002 | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.)<br>**SSA adapter card** (See the installation and service guide for the using system.) | 50<br>50 | **Description:** Async code 02 has been received. A software error has probably occurred.<br>**Action:** Go to "Software and Microcode Errors" on page B-2 before exchanging any FRUs. |

*Table B-1 (Page 2 of 9). Service Request Numbers*

| SRN | FRU List | % | Problem |
|---|---|---|---|
| 2A003 | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.)<br>**SSA adapter card** (See the installation and service guide for the using system.) | 50<br>50 | **Description:** Async code 03 has been received. A software error has probably occurred.<br>**Action:** Go to "Software and Microcode Errors" on page B-2 before exchanging any FRUs. |
| 2A004 | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.)<br>**SSA adapter card** (See the installation and service guide for the using system.) | 50<br>50 | **Description:** Async code 04 has been received. A software error has probably occurred.<br>**Action:** Go to "Software and Microcode Errors" on page B-2 before exchanging any FRUs. |
| 2A005 | **Backplane** (See "SCSI or SSA Backplane" on page 6-38.) | – | **Description:** Async code 05 has been received. This code indicates that a disk drive module has detected a loss of power.<br>**Action:** Use the Link Verification Service Aid to determine if any devices are missing from the SSA link.<br>• If a device is missing, go to "SSA Maintenance Analysis Procedures (MAPs)" on page 2-27 to isolate the problem.<br>• If no device is missing, the problem might have been caused by a temporary, or partial, loss of power to the SSA Hot-Swap Disk Drive. |
| 2A006 | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.)<br>**Backplane** (See "SCSI or SSA Backplane" on page 6-38.) | 70<br>30 | **Description:** Async code 06 has been received. This code indicates that a disk drive module has detected the loss of one of its power inputs.<br>**Action:**<br>• If the failing device is an SSA Hot-Swap Disk Drive, go to "SSA Maintenance Analysis Procedures (MAPs)" on page 2-27, exchange the disk drive module.<br>• If the failing device is not an SSA Hot-Swap Disk Drive, go to the service information for that device. |

*Table B-1 (Page 3 of 9). Service Request Numbers*

| SRN | FRU List | % | Problem |
|---|---|---|---|
| 2A106 | **Backplane assembly** (See "SCSI or SSA Backplane" on page 6-38.) | 100 | **Description:** Async code 06 has been received. This code indicates that multiple disk drive modules have detected the loss of one of its their power inputs.<br>**Action:**<br>• If the failing devices are SSA Hot-Swap Disk Drives, exchange the backplane.<br>• If the failing devices are not SSA Hot-Swap Disk Drives, go to the service information for those devices. |
| 2A206 | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.) | 100 | **Description:** A disk drive module has detected that one of its SSA links has failed the POSTs.<br>**Action:**<br>1. Use the Link Verification Service Aid to determine where the SSA link is broken.<br>2. Run diagnostics in the system verification mode to the two disk drive modules that are nearest to, and on each side of, the place where the link is broken. The diagnostics show which disk drive module detected the problem. |
| 2FFFF | None | – | **Description:** An async code that is not valid has been received.<br>**Action:** Go to "Software and Microcode Errors" on page B-2. |
| 300C0 | **Backplane** (See "SCSI or SSA Backplane" on page 6-38.) | 100 | **Description:** A disk drive module has detected the loss of one of its power inputs.<br>**Action:**<br>• If the failing device is an SSA Hot-Swap Disk Drive, exchange the backplane.<br>• If the failing device is not an SSA Hot-Swap Disk Drive, go to the service information for that device. |

*Table B-1 (Page 4 of 9). Service Request Numbers*

| SRN | FRU List | % | Problem |
|---|---|---|---|
| 301C0 | **Backplane assembly** (See "SCSI or SSA Backplane" on page 6-38.) | 100 | **Description:** Multiple disk drive modules have detected the loss of one of their power inputs.<br>**Action:**<br>• If the failing devices are SSA Hot-Swap Disk Drives, exchange the backplane.<br>• If the failing devices are not SSA Hot-Swap Disk Drives, go to the service information for those devices. |
| 303FF | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.) | 100 | **Description:** A SCSI status that is not valid has been received.<br>**Action:** Go to "Software and Microcode Errors" on page B-2 before exchanging any FRUs. |
| 40000 | **SSA adapter card** (See the installation and service guide for the using system.) | 100 | **Description:** The SSA adapter card has failed.<br>**Action:** Exchange the FRU for a new FRU. |
| 43PAA | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.)<br>**SSA adapter card** (See the installation and service guide for the using system.) | 90<br>10 | **Description:** An SSA device on the link is preventing the completion of the link configuration.<br>**Action:** If the SSA service aids are available, run the Link Verification Service Aid to determine which device is preventing configuration. (That device is the one beyond the last-configured device on an open SSA link.) |
| 44PAA | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.) | 100 | **Description:** A disk drive module has failed.<br>**Action:** If the SSA service aids are available, run the Link Verification Service Aid to find the failing disk drive module. Before you exchange the failing disk drive module, run diagnostics in the system verification mode to the module to determine the cause of the problem. |

*Table B-1 (Page 5 of 9). Service Request Numbers*

| SRN | FRU List | % | Problem |
|---|---|---|---|
| 45PAA | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.)<br>**External SSA Cables**<br>**Backplane assembly** (See "SCSI or SSA Backplane" on page 6-38.) | 40<br>40<br>20 | **Description:** The SSA adapter has detected an open SSA link. This problem is caused either by a disk drive module that is failing, or by a disk drive module that has been switched off from another using system on the same SSA link. (That using system has itself been switched off.)<br>**Action:** If the SSA service aids are available, run the Link Verification Service Aid to determine which device is preventing configuration. (That device is the one beyond the last-configured device on an open SSA link.) |
| 48000 | None | – | **Description:** The SSA adapter has detected a link configuration resource that is not valid.<br>**Action:** See "SSA Loop Configurations That Are Not Valid" on page B-12. |
| 50000 | **SSA adapter card** (See the installation and service guide for the using system.) | 100 | **Description:** The SSA adapter failed to respond to the device driver.<br>**Action:** Exchange the FRU for a new FRU. |
| 50001 | **SSA adapter card** (See the installation and service guide for the using system.) | 100 | **Description:** A data parity error has occurred.<br>**Action:** Exchange the FRU for a new FRU. |
| 50002 | **SSA adapter card** (See the installation and service guide for the using system.) | 100 | **Description:** An SSA adapter direct memory access (DMA) error has occurred.<br>**Action:** Exchange the FRU for a new FRU. |
| 50004 | **SSA adapter card** (See the installation and service guide for the using system.) | 100 | **Description:** A channel check has occurred.<br>**Action:** Exchange the FRU for a new FRU. |
| 50005 | **SSA adapter card** (See the installation and service guide for the using system.) | 100 | **Description:** A software error has occurred.<br>**Action:** Go to "Software and Microcode Errors" on page B-2 before exchanging the FRU. |
| 50006 | **SSA adapter card** (See the installation and service guide for the using system.) | 100 | **Description:** A channel check has occurred.<br>**Action:** Exchange the FRU for a new FRU. |

*Table B-1 (Page 6 of 9). Service Request Numbers*

| SRN | FRU List | % | Problem |
|---|---|---|---|
| 50007 | **SSA adapter card** (See the installation and service guide for the using system.) | 100 | **Description:** The input/output channel controller (IOCC) detected an internal error.<br>**Action:** Exchange the FRU for a new FRU. |
| 50008 | **SSA adapter card** (See the installation and service guide for the using system.) | 100 | **Description:** Unable to read or write the POS registers.<br>**Action:** Exchange the FRU for a new FRU. |
| 50010 | **SSA adapter card** (See the installation and service guide for the using system.) | 100 | **Description:** An SSA adapter or device drive protocol error has occurred.<br>**Action:** Go to "Software and Microcode Errors" on page B-2 before exchanging the FRU. |
| 50012 | **SSA adapter card** (See the installation and service guide for the using system.) | 100 | **Description:** The SSA adapter microcode is in a suspended state.<br>**Action:** Run diagnostics in System Verification mode to the SSA adapter.<br>• If the diagnostics fail, exchange the FRU for a new FRU.<br>• If the diagnostics do not fail, go to "Software and Microcode Errors" on page B-2 before exchanging the FRU. |
| 50100 | None | – | **Description:** An attempt was made to log an error against a pdisk that is not available to the using system.<br>**Action:** This problem has occurred for one of the following reasons:<br>• A user has deleted a pdisk from the system configuration. In such an instance, the hdisk that is related to the pdisk continues to operate normally. If the disk drive module tries to log an error, however, this SRN (50100) is produced. Enter the **cfgmgr** command to return the pdisk to the system configuration.<br>• A disk drive module has tried to log an error during system configuration. To find the failing disk drive module, run diagnostics to the disk drive modules that are connected to this SSA adapter. |

*Table B-1 (Page 7 of 9). Service Request Numbers*

| SRN | FRU List | % | Problem |
|---|---|---|---|
| 60000 | **SSA adapter card** (See the installation and service guide for the using system.) | 100 | **Description:** The SSA adapter is missing from the expected configuration.<br>**Action:** Verify that the SSA adapter card is installed in the expected slot of the using-system.<br>• If it is in the expected slot, exchange the FRU for a new FRU.<br>• If it is not in the expected slot, enter the **diag -a** command, and answer the questions that are displayed. |
| 7*xxxx* | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.)<br>**Backplane assembly** (See "SCSI or SSA Backplane" on page 6-38.) | 80<br>20 | **Description:** An SSA Hot-Swap Disk Drive module is missing from the expected configuration of the SSA loop.<br>**Action:** Replace the FRUs one at a time. Go to "MAP 410: Repair Checkout" in *Diagnostic Information for Multiple Bus Systems* to verify each repair. |
| D0000 | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.) | 100 | **Description:** The using system cannot configure the disk drive module. This is probably a software problem.<br>**Action:**<br>1. Try again to configure the disk drive module.<br>2. If the problem remains, go to "Software and Microcode Errors" on page B-2 before exchanging the FRU. |
| D0100 | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.) | 100 | **Description:** Unable to clear a disk drive module reservation.<br>**Action:** Exchange the FRU for a new FRU. |
| D0101 | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.) | 100 | **Description:** The disk drive module has been reserved since the diagnostics started. The disk drive module is in use.<br>**Action:** Release the disk drive module, and run the diagnostics again. |
| D0200 | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.) | 100 | **Description:** The disk drive module timed out while the diagnostics were running.<br>**Action:** Rerun the diagnostics. If the problem remains, exchange the FRU for a new FRU. |
| D0300 | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.) | 100 | **Description:** The disk drive module failed the diagnostic test.<br>**Action:** Exchange the FRU for a new FRU. |

*Table B-1 (Page 8 of 9). Service Request Numbers*

| SRN | FRU List | % | Problem |
|---|---|---|---|
| D0400 | **Disk drive module** (See "Hot Swap Disk Drives" on page 6-23.) | 100 | **Description:** The disk drive module is not ready while the diagnostics are running. **Action:** Rerun the diagnostics. If the problem remains, exchange the FRU for a new FRU. |
| D0450 | None | – | **Description:** A format operation is in progress. The format operation that was started on this disk drive module has not yet finished. A format operation can take up to 30 minutes to run. **Action:** Wait for the format operation to finish before you run the diagnostics again. You can observe the progress of the format operation by running the format service aid again on this disk drive module. |
| D0460 | None | – | **Description:** A format operation has been degraded. The format operation that was started on this disk drive module did not finish. Possibly, the disk drive module was switched off while the format operation was running. **Action:** Run the format service aid to format this disk drive module. |
| D4000 | **SSA adapter card** (See the installation and service guide for the using system.). | 100 | **Description:** The diagnostics cannot configure the SSA adapter. **Action:** Exchange the FRU for a new FRU. |
| D4100 | **SSA adapter card** (See the installation and service guide for the using system.) | 100 | **Description:** The diagnostics cannot open the SSA adapter. **Action:** Exchange the FRU for a new FRU. |
| D4300 | **SSA adapter card** (See the installation and service guide for the using system.) | 100 | **Description:** The diagnostics have detected an SSA adapter POST failure. **Action:** Exchange the FRU for a new FRU. |
| D44xx | **SSA adapter card** (See the installation and service guide for the using system.) | 100 | **Description:** The diagnostics have detected that the SSA adapter has corrupted the microcode, but cannot download a new version of the microcode. **Action:** Exchange the FRU for a new FRU.<br>**Note:** In this SRN, an x represents a digit 0 through F. |

*Table B-1 (Page 9 of 9). Service Request Numbers*

| SRN | FRU List | % | Problem |
|---|---|---|---|
| DFFFF | **SSA adapter card** (See the installation and service guide for the using system.) | 100 | **Description:** A command or parameter that has been sent or received is not valid. This problem is caused either by the SSA adapter or by an error in the microcode. **Action:** Go to “Software and Microcode Errors” on page B-2 before exchanging the FRU. |

## SSA Loop Configurations That Are Not Valid

**Note:** This section is related to SRN 48000.

SRN 48000 shows that the SSA loop contains more devices or adapters than are allowed. The following condition exist: the loop contains more than 48 devices.

If the SRN occurred when either you or the customer switched on the using system:

1. Switch off the using system.
2. Review the configuration that you are trying to make, and determine why that configuration is not valid.
3. Review “Rules for SSA Loops” on page B-16.
4. Correct your configuration by reconfiguring the SSA cables or by removing the excess devices or adapters from the loop.
5. Switch on the using system.

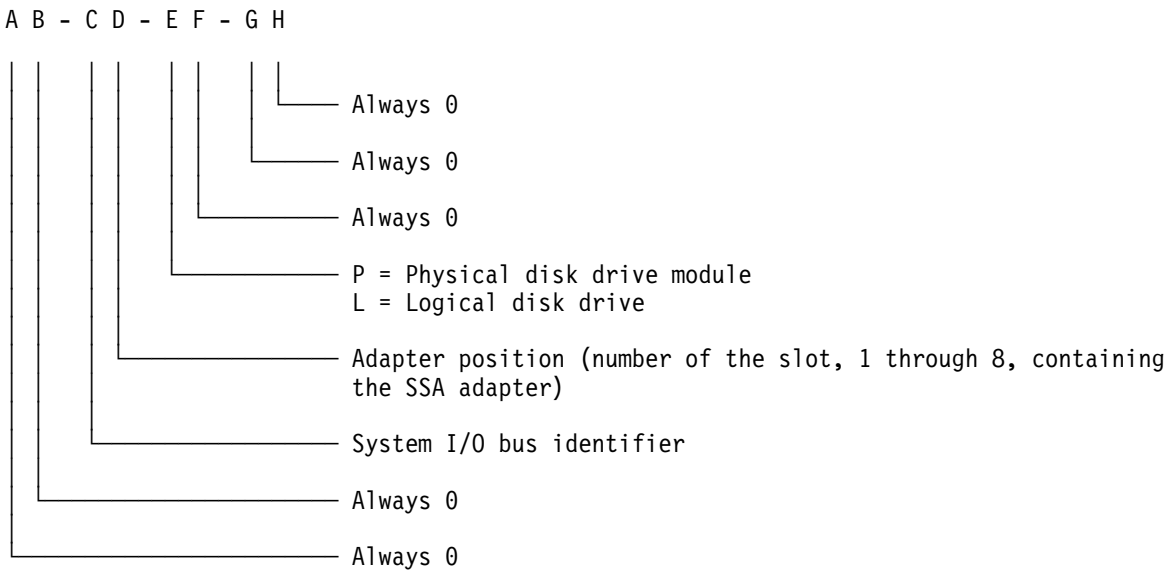
If the SRN occurred because additional devices or adapters were added to a working SSA loop:

1. Remove the additional devices or adapters that are causing the problem, and put the loop back into its original, working configuration.

   **Note:** It is important that you perform these actions, because they enable the configuration code to reset itself from the effects of the error.
2. Review “Rules for SSA Loops” on page B-16.
3. Review the configuration that you are trying to make, and determine why that configuration is not valid.
4. Correct your system to a valid configuration.

## 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.



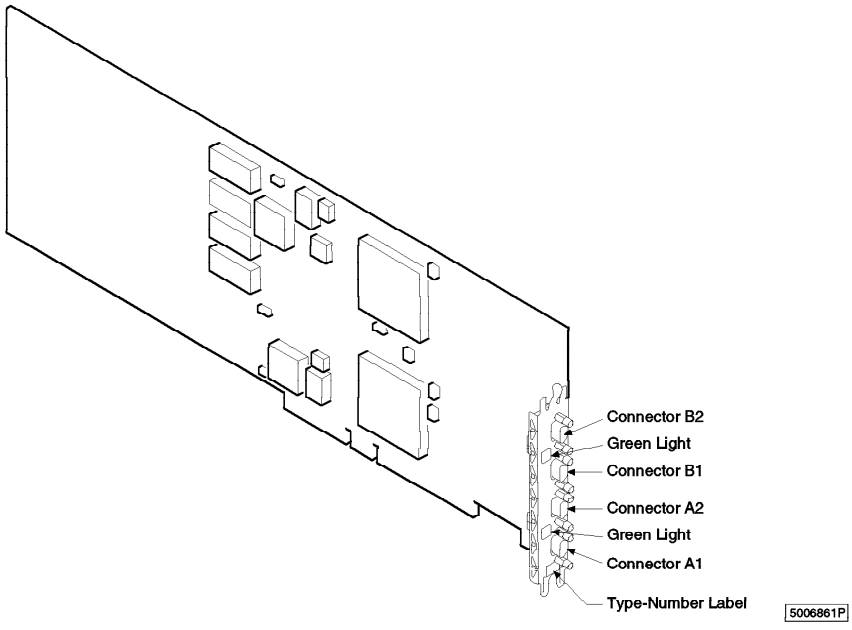

The location code shows only the position of the SSA adapter in the using system and the type of device that is attached. Use a service aid to find the location of the device (disk drive module). For more information, see “SSA Service Aids” on page B-19.

## 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.



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.

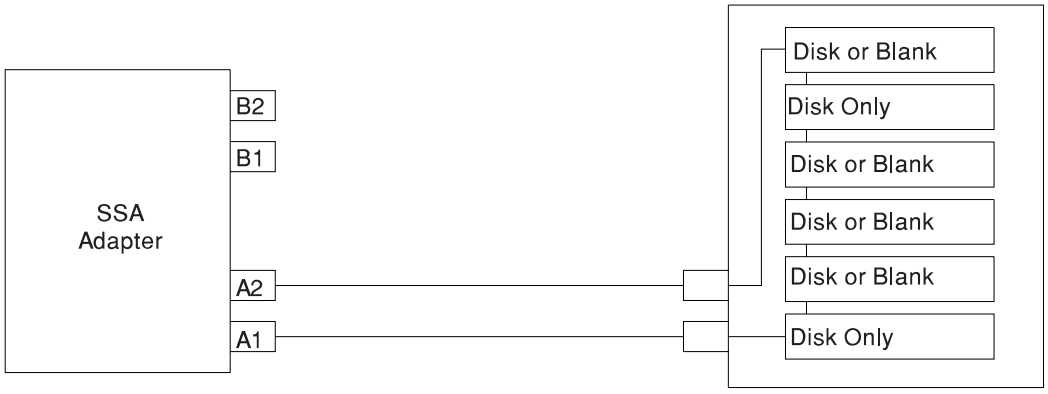
Each pair of connectors has a green light that indicates the operational status of its related loop:

| 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 following 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.

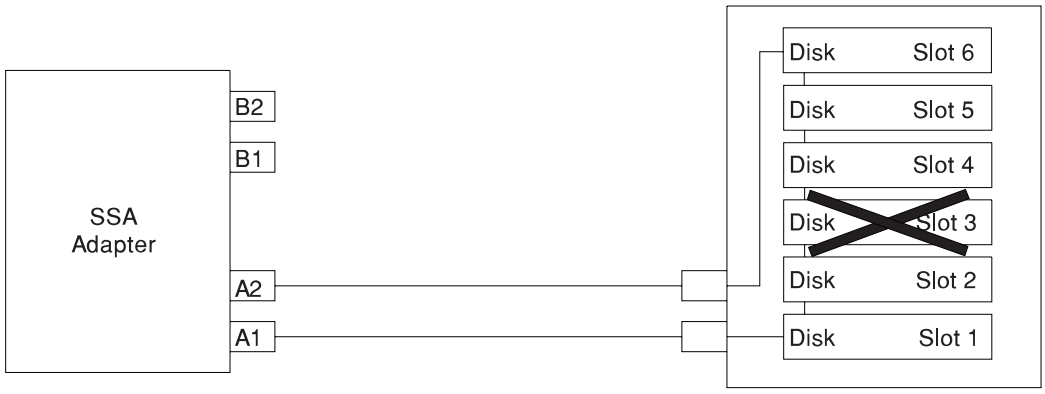
## Loops and Data Paths

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.

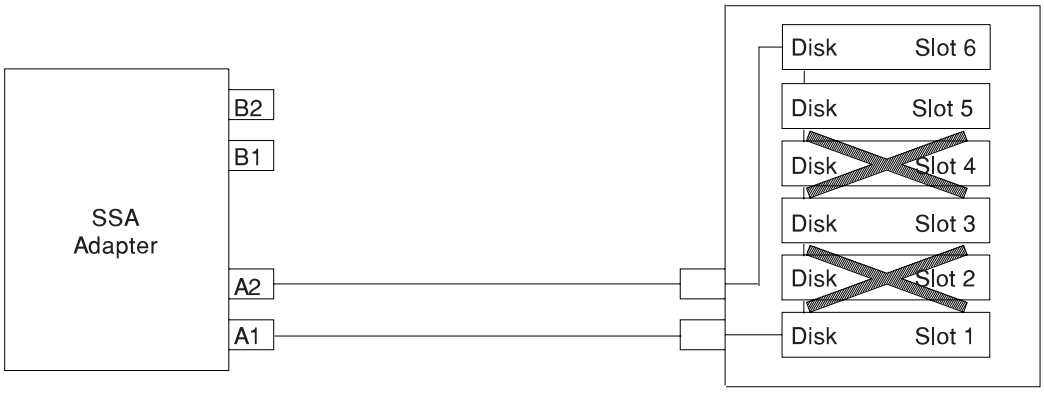
If a disk drive module fails, or is turned off, the loop is broken, and one of the data paths to a particular module is no longer available. The disk drive modules on the loop continue to work, but an error is reported to the using system.

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 the 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 SSA Hot-Swap Disk Drive. 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 B-14.

## 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 B-22

"Link Verification Service Aid" on page B-28

"Configuration Verification Service Aid" on page B-31

"Format Disk Service Aid" on page B-33

"Certify Disk Service Aid" on page B-35

### 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 B-20). 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 B-13. |
| **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 B-14), 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 B-20).

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 B-20). 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 B-14).

**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 B-20).

**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 B-20).

```
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.

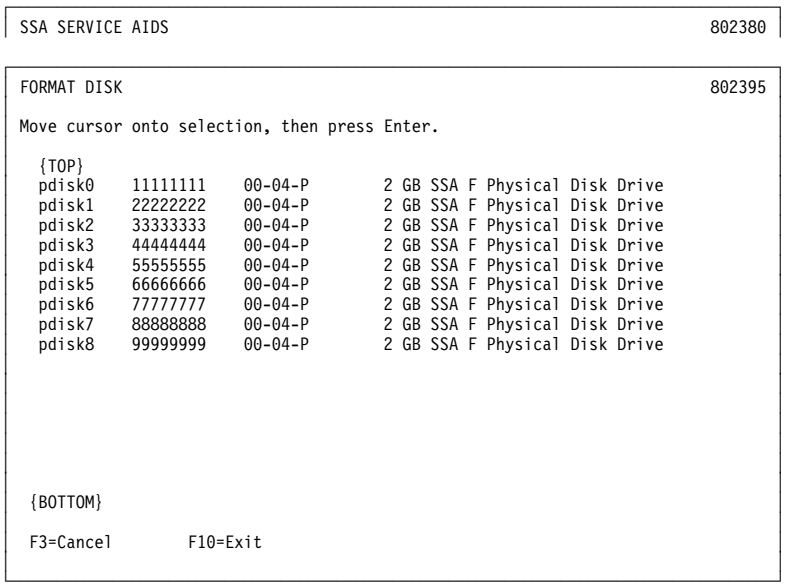
## Format Disk Service Aid

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 B-20). A list of pdisks is displayed:



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 B-20). 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 B-20). 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 B-20). 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.

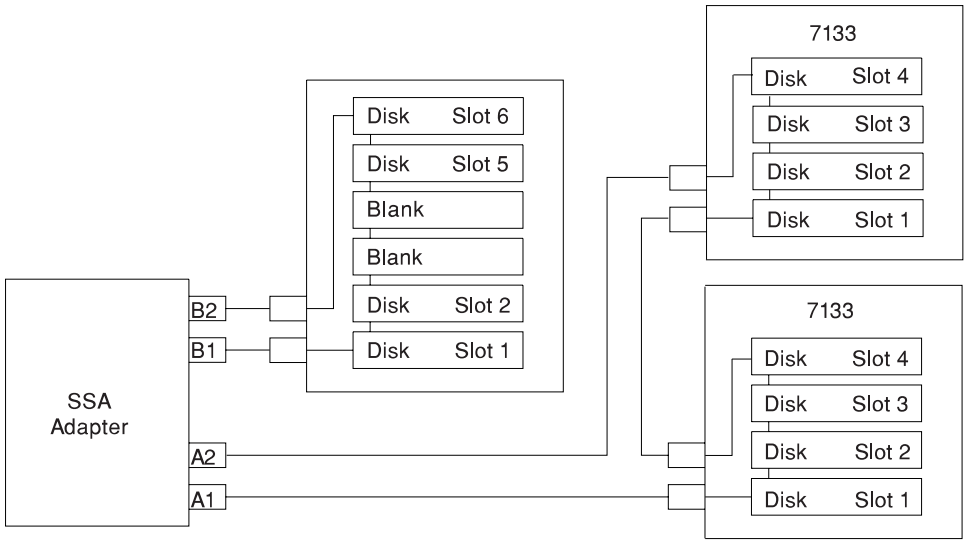
**SSA03** The service aid was unable to open an hdisk. This problem might have occurred because a disk drive module has failed or has been removed from the system. Take the actions described here:

1. Use the Configuration Verification service aid (see "Configuration Verification Service Aid" on page B-31) 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 B-28) to the SSA adapter.
3. If a link failure is indicated by the service aid, go to "SSA Maintenance Analysis Procedures (MAPS)" in *7026 H Series CPU Drawer Installation and Service Guide*.
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 B-28). 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:

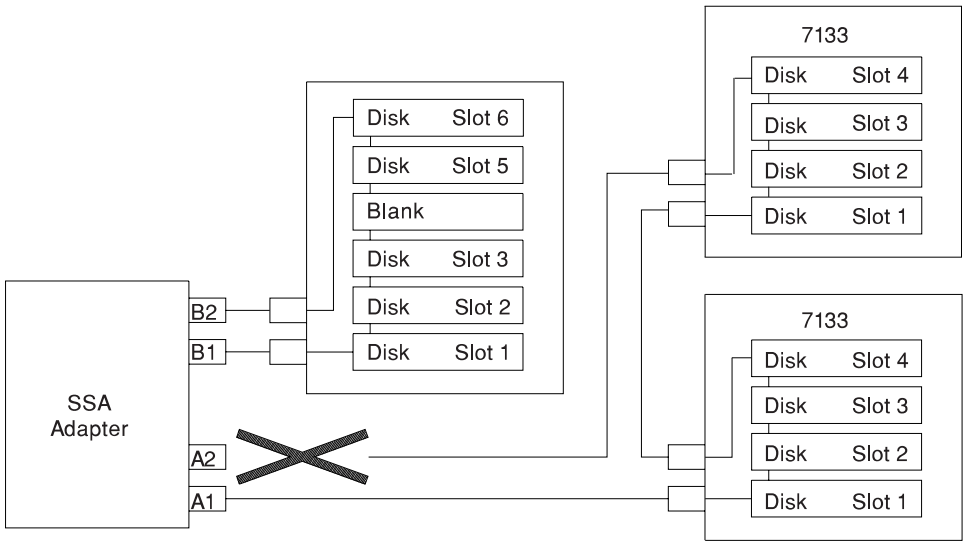
```
LINK VERIFICATION                                                    802386

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).



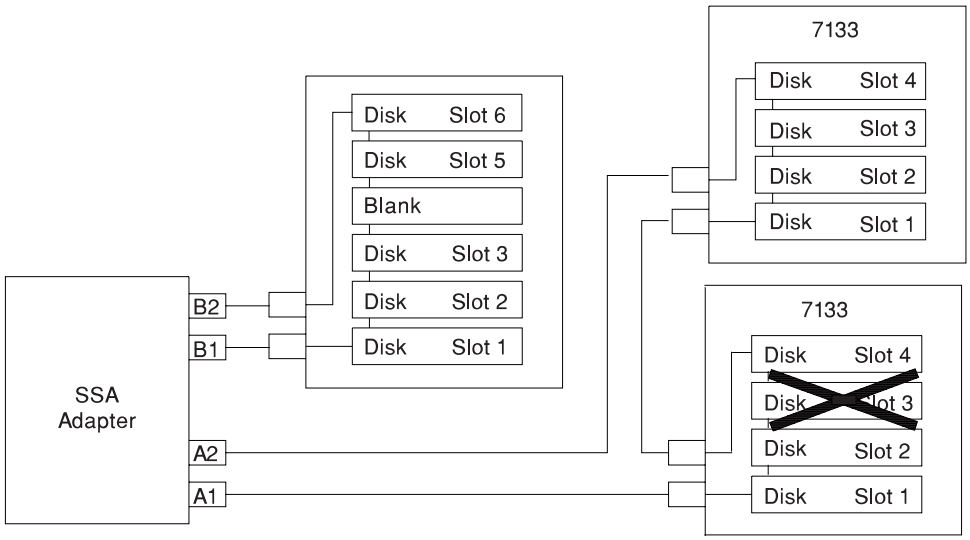
For this example, the Link Verification service aid displays the following information:

```
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 B-19.

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 |

# Index

## Numerics



## A



## B



## C

## D



## E



## F

## G



## H



## I



## L

## R

# S



# T

## U



## V

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