

SSA RAID Adapter Maintenance Information

Abstract

ABSTRACT Abstract

This book is intended for service representatives who service PC servers that use the IBM SSA RAID Adapter for PC Servers.

Subtopics

ABSTRACT.1 How This Book Is Organized

ABSTRACT.2 Related Publications

SSA RAID Adapter Maintenance Information

How This Book Is Organized

ABSTRACT.1 How This Book Is Organized

"Introducing the IBM SSA RAID Adapter for PC Servers, SSA, and RAID" in topic 1.0 describes the adapter, what is provided with it, and the environments in which it works.

"Service Request Numbers (SRNs)" in topic 2.0 provides a table of service request numbers (SRNs) that are related to the SSA RAID Adapter.

"SSA Maintenance Analysis Procedures (MAPs)" in topic 3.0 provides maintenance analysis procedures (MAPs) for the adapter.

"Removing and Replacing FRUs" in topic 5.0 describes how to exchange disk drives, and how to exchange DRAMs on the SSA RAID Adapter.

"Using the SSA Service Aids and Other Service Tools" in topic 6.0 describes the SSA service aids.

"Using the SSA Configurator Functions" in topic 7.0 describes the functions of the array utility programs that are supplied with the adapter.

```
+--- Important -----+
|
| This manual is intended for trained servicers who are familiar with
| IBM PC Server products.
|
| Before servicing an IBM product, be sure to review "Safety
| Information" in your manual.
|
+-----+
```

SSA RAID Adapter Maintenance Information
Related Publications

ABSTRACT.2 Related Publications

Other manuals that you might find useful are:

IBM SSA RAID Adapter for PC Servers: Installation and User's Guide, S32H-3816

IBM SSA RAID Adapter for PC Servers: Technical Reference, SA33-3269

For more information, contact IBM or your IBM Authorized Dealer.

SSA RAID Adapter Maintenance Information
Book Cover

COVER Book Cover

IBM PC Servers

IBM SSA RAID Adapter for PC Servers

**Hardware Maintenance
Manual Supplement**

September 1996

**Use this supplement with the
PS/2 Hardware Maintenance Manual**

Document Number S32H-3817-00

Part Number 32H3817

SSA RAID Adapter Maintenance Information
Notices

NOTICES Notices

```
+--- Note -----+
|
| Before using this information and the product it supports, be sure
| to read the general information under "Notices" in your manual.
|
+-----+
```

SSA RAID Adapter Maintenance Information
Edition Notice

EDITION Edition Notice

First Edition (September 1996)

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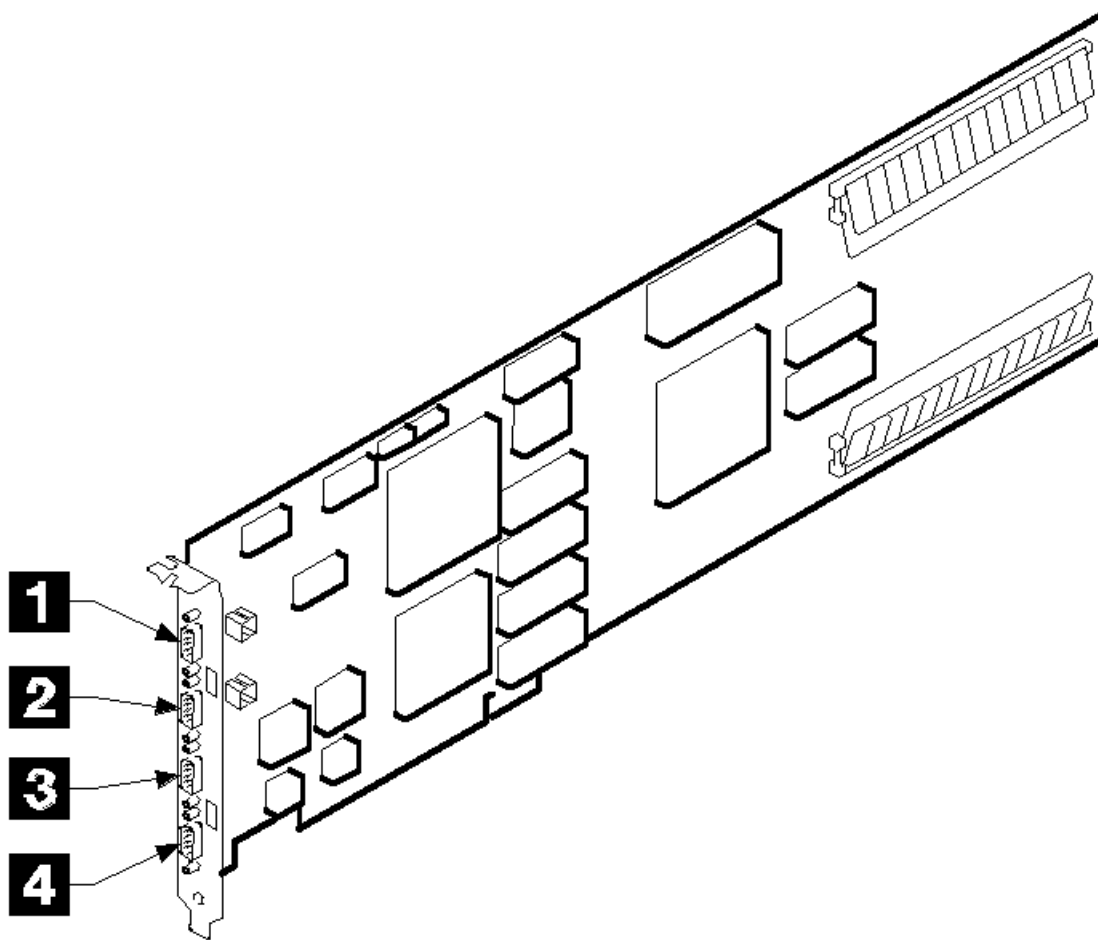
Introducing the IBM SSA RAID Adapter for PC Servers, SSA, and RAID

1.0 Introducing the IBM SSA RAID Adapter for PC Servers, SSA, and RAID

The IBM SSA RAID Adapter for PC Servers is a Peripheral Component Interconnect (PCI) bus-master adapter that is used as the interface between systems that are using the PCI architecture, and devices that are using the Serial Storage Architecture (SSA).

The adapter provides four SSA ports for the attachment of storage devices such as hard disk drives. Each port operates at 20MB/s full-duplex, and uses point-to-point copper cables that can be up to 25 meters long. SSA uses the SCSI-2 commands, queuing model, status, and sense bytes; it is an industry-standard interface.

1 SSA Loop B Port 2	3 SSA Loop A Port 2
2 SSA Loop B Port 1	4 SSA Loop A Port 1



The adapter card has two pairs of SSA connectors, one pair (port 1 and port 2) for each SSA loop. Next to each pair of connectors is a light that functions as follows:

The light is on continuously when power is turned on to the adapter and both ports for that loop are operational; that is, the devices connected next to the adapter in the loop have power turned on to them, are connected correctly to the adapter, and are operational.

The light flashes continuously if one of the ports is not operational. Such a condition occurs if the cable to that port is not connected correctly, or if the device that is connected next to the adapter in the loop is not operational.

The light is off if both ports are not operational

A maximum of two adapters can be present in one system unit.

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 with your system. Use of another battery might present a risk of fire or explosion.

SSA RAID Adapter Maintenance Information
Introducing the IBM SSA RAID Adapter for PC Servers, SSA, and RAID

The battery connector is polarized; do not try to reverse the polarity.

Dispose of the battery according to local regulations.

A module on the SSA RAID Adapter contains a lithium battery.

Subtopics

- 1.1 Operating Systems
- 1.2 Serial Storage Architecture (SSA)
- 1.3 SSA Loops and Links
- 1.4 RAID Functions

SSA RAID Adapter Maintenance Information
Operating Systems

1.1 Operating Systems

The SSA RAID Adapter, its microcode, and the software supplied with it provide attachments of SSA devices to the following operating systems:

OS/2 Warp 3.0, OS/2 2.1.1 SMP, WarpServe

Novell NetWare 3.1.X, 4.

WindowsNT 3.5.1, 4.

SSA RAID Adapter Maintenance Information
Serial Storage Architecture (SSA)

1.2 Serial Storage Architecture (SSA)

Serial Storage Architecture (SSA) is an industry-standard interface that provides high-performance fault-tolerant attachment of I/O storage devices. In SSA subsystems, transmissions to several destinations are multiplexed; the effective bandwidth is further increased by spatial reuse of the individual links. Commands are forwarded automatically from device to device along a loop until the target device is reached. Multiple commands can be travelling around the loop simultaneously. SSA retains the SCSI-2 commands, queuing model, and status and sense bytes.

SSA RAID Adapter Maintenance Information

SSA Loops and Links

1.3 SSA Loops and Links

In the simplest SSA configuration, SSA devices are connected through two or more SSA links to an SSA adapter that is located in the system unit. The devices, 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 devices. The loop continues through the devices, then returns through another link to a second connector on the SSA RAID Adapter.

The maximum permitted length for an external cable that connects two SSA nodes (for example, disk drives) is 25 meters (82 feet).

Details of the rules for configuring SSA loops are given for each SSA RAID Adapter in "Rules for SSA Loops" in topic 1.3.2.

Subtopics

1.3.1 Loops and Data Paths

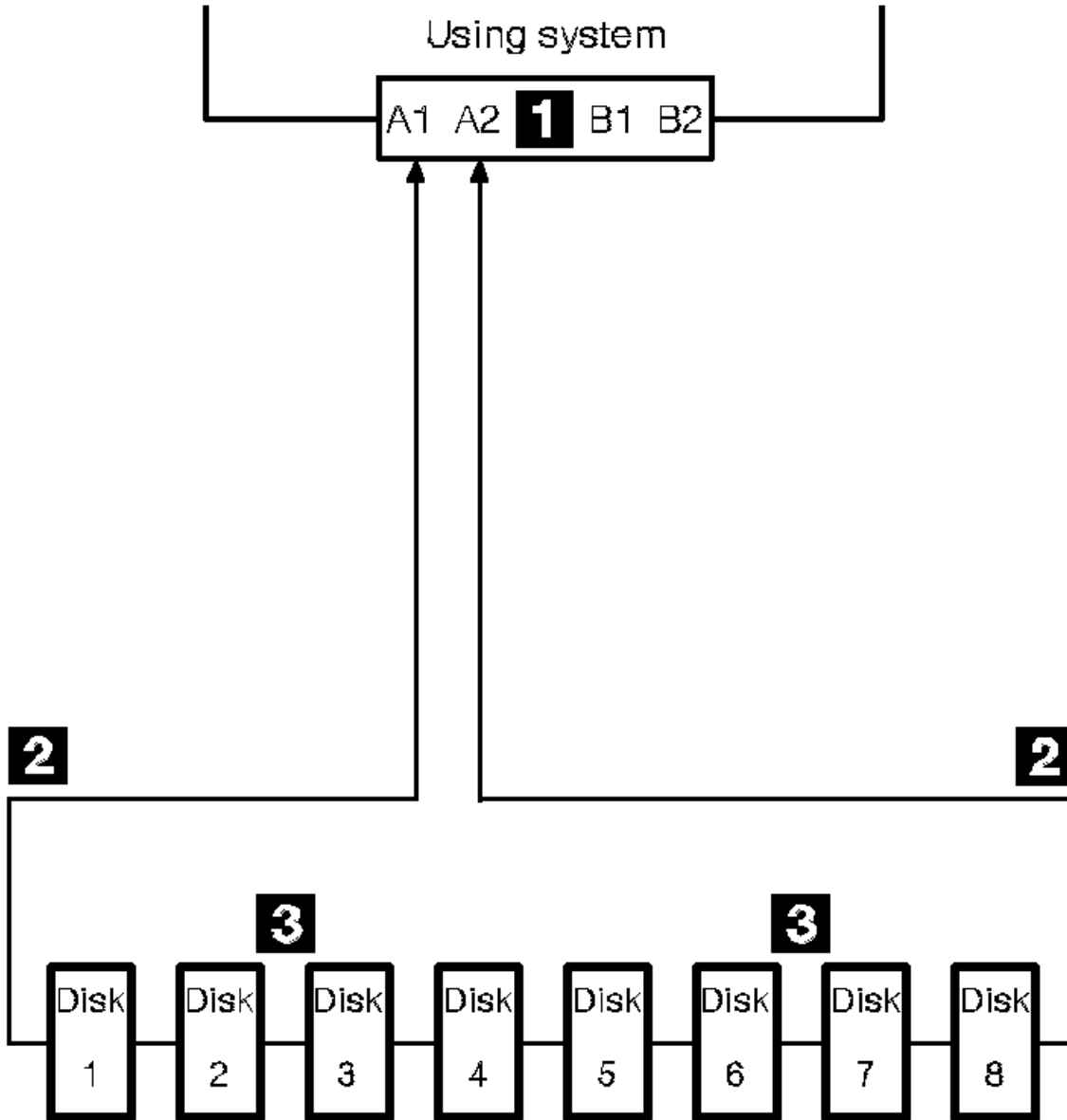
1.3.2 Rules for SSA Loops

SSA RAID Adapter Maintenance Information
Loops and Data Paths

1.3.1 Loops and Data Paths

All devices that are attached to an SSA RAID Adapter card 1 are connected through SSA links 2. 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.

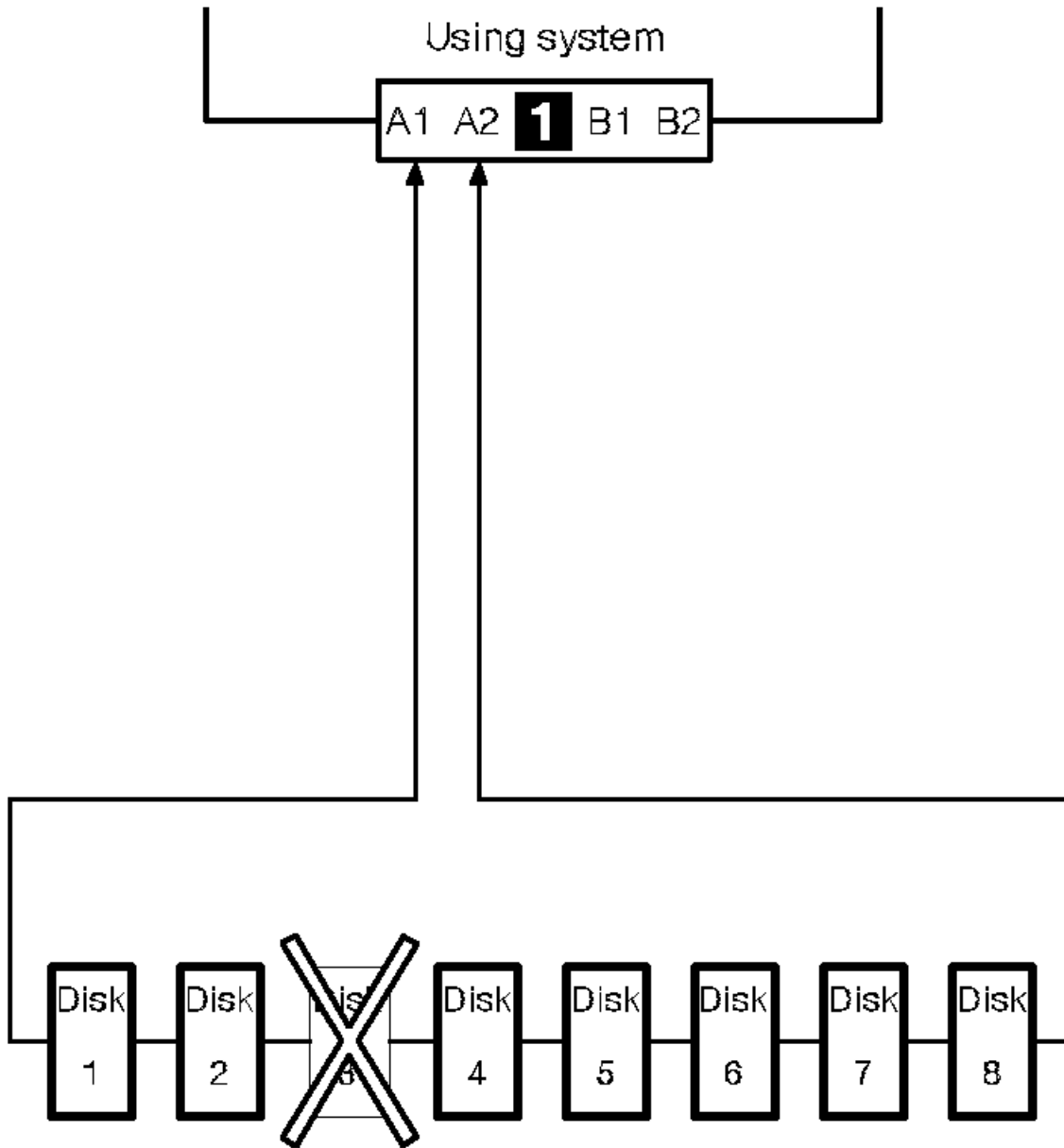
Data can travel in either direction round a loop. The adapter can, therefore, get access to the devices 3 (disk drives in this example) through two data paths. The system cannot detect which data path is being used.



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

In the diagram, disk drive number 3 has failed. Disk drives 1 and 2 can communicate with the system only through connector A1 of the SSA RAID Adapter. Disk drives 4 through 8 can communicate only through connector A2 of the SSA RAID Adapter.

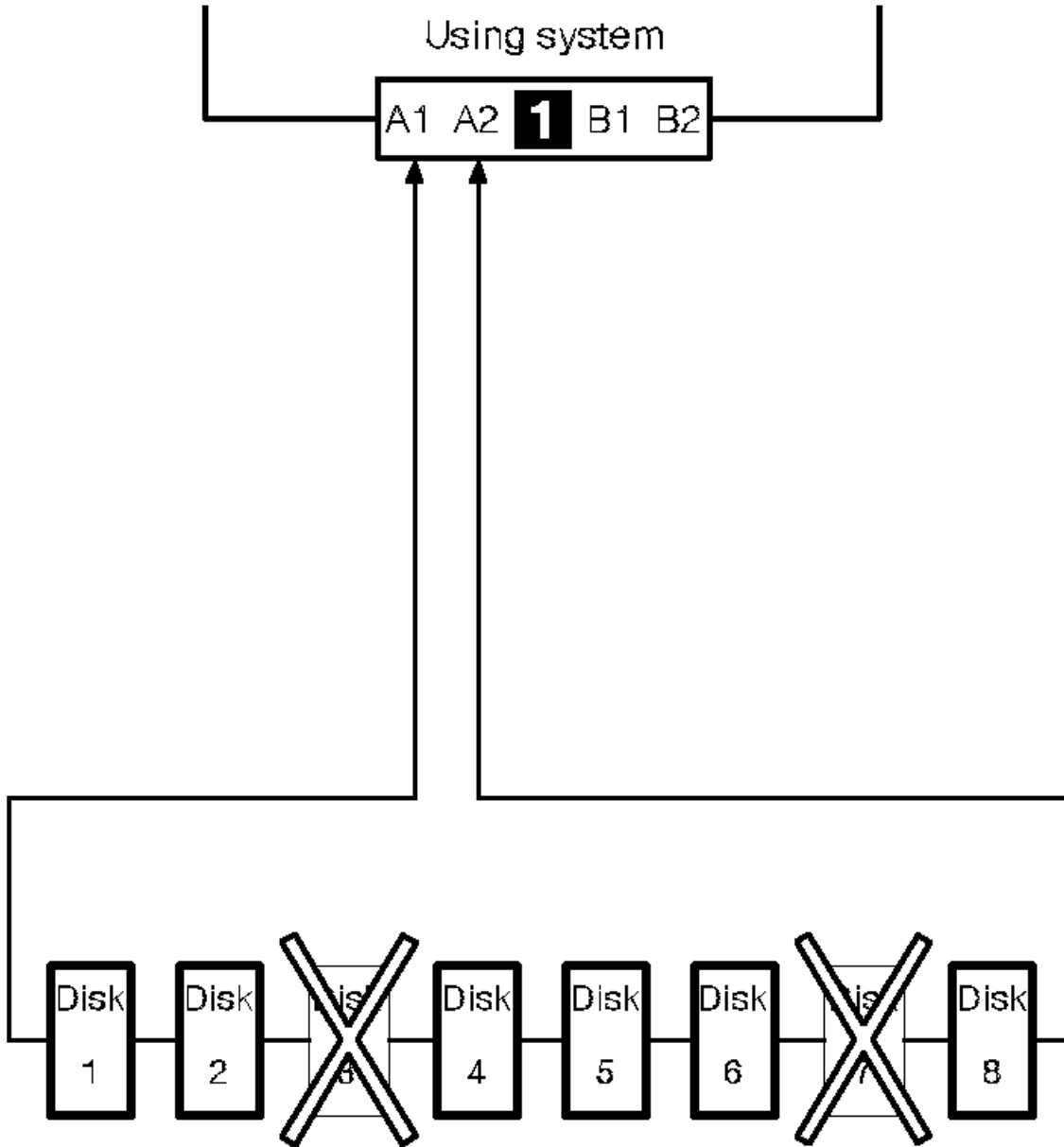
SSA RAID Adapter Maintenance Information
Loops and Data Paths



If two or more disk drives are turned off, fail, or are removed from the loop, some disk drives might become isolated from the SSA RAID Adapter.

In the diagram, disk drives 3 and 7 have been removed. Disk drives 1 and 2 can communicate with the system only through connector A1 of the SSA RAID Adapter. Disk drive number 8 can communicate with the system only through connector A2 of the SSA RAID Adapter. Disk drives 4, 5, and 6 are isolated from the SSA RAID Adapter.

SSA RAID Adapter Maintenance Information
Loops and Data Paths



SSA RAID Adapter Maintenance Information
Rules for SSA Loops

1.3.2 Rules for SSA Loops

For SSA loops that include the SSA RAID Adapter, the following rules apply:

Each SSA loop must be connected to a valid pair of connectors on the SSA adapter (that is, either connectors A1 and A2, or connectors B1 and B2).

A maximum of 48 devices can be connected in a particular SSA loop

Only one pair of adapter connectors can be connected in a particular SSA loop

SSA RAID Adapter Maintenance Information

RAID Functions

1.4 RAID Functions

Redundant Array of Independent Disks (RAID) technology gives you:

- Larger disk capacity
- Immediate availability and recovery of data
- Redundancy of data at a level that you can choose

RAID technology stores data across groups of disk drives that are known as *arrays*. Subject to the level of RAID that you are using, this method of data storage provides the data redundancy that is needed for a secure system, and can allow faster retrieval of data through multiple channel access. Also, if a disk drive fails, you can normally exchange that disk drive without interruption of normal system operation.

The arrays can provide data redundancy that ensures that no data is lost if one disk drive in the array fails. The method that is used to write data to an array is related to the level of RAID that you are using. Arrays are contained in array subsystems. You can configure your subsystem with one or more arrays.

Subtopics

- 1.4.1 Hot Spares
- 1.4.2 RAID-0
- 1.4.3 RAID-1
- 1.4.4 RAID-5

SSA RAID Adapter Maintenance Information

Hot Spares

1.4.1 Hot Spares

A hot-spare disk drive is a disk drive that is defined for automatic use if a disk drive in an array fails. The hot-spare must have a storage capacity that is greater than, or equal to, that of the smallest member of an array. You can define as many hot spares as you want. RAID-1 and RAID-5 arrays can use hot-spare disk drives.

If a disk drive in an array fails, the adapter automatically uses a hot spare instead of the failed disk drive, and rebuilds the data from the failed disk on the hot spare.

SSA RAID Adapter Maintenance Information
RAID-0

1.4.2 RAID-0

RAID-0 is also known as striping, it does not provide redundancy and, therefore, cannot survive the failure of a member. It does provide a single large data space with the operations spread evenly across members. Short operations usually involve only one member, longer transfers use several and can, therefore, give higher data rates.

SSA RAID Adapter Maintenance Information

RAID-1

1.4.3 RAID-1

RAID-1 is also known as mirroring or dual copy. It provides redundancy with better performance than a single disk, but requires real disk capacity of two times the data size.

A RAID-1 array has two disk drive members. If the members have different capacities, the resulting RAID-1 array has the capacity of the smaller member. Each data block of the array is written on each of the two members.

If one member fails, operations continue, to the good member. Performance is degraded for read operations, and improved for write operations, so a mixed workload might not show any change in overall performance. When a member returns or it is replaced (either manually or automatically by the hot-spare mechanism), a rebuild occurs. This rebuild is performed in parallel with any activity to the array.

SSA RAID Adapter Maintenance Information
RAID-5

1.4.4 RAID-5

RAID-5 arrays write strips of data across all but one members of the array. Parity for the other strips is written on the last member. The members of the array are used in rotation for the parity data.

RAID-5 arrays offer both data protection and increased throughput.

SSA RAID Adapter Maintenance Information
Service Request Numbers (SRNs)

2.0 Service Request Numbers (SRNs)

Service request numbers (SRNs) are generated 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.

Subtopics

2.1 The SRN Table

2.2 Using the SRN Table

2.3 Software and Microcode Errors

2.4 SSA Loop Configurations that Are Not Valid

SSA RAID Adapter Maintenance Information
The SRN Table

2.1 The SRN Table

The table in this section lists the SRNs and describes the actions you should do. The table columns are:

SRN	The service reference number.
FRU list	The FRU or FRUs that might be causing the problem, and 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
PAA	P = Adapter port number AA = SSA address (see also "Finding the Device When No Service Aids Are Available" in topic 6.4.2)
PCI	Peripheral Component Interconnect
POST	Power-On Self-Test

SSA RAID Adapter Maintenance Information
Using the SRN Table

2.2 Using the SRN Table

Important: You should have been sent here from either diagnostics or a START MAP. Do not start problem determination from the SRN table; always go to the START MAP for the unit in which the device is installed.

1. Locate the SRN in the table. **If you cannot find the SRN**, refer to the documentation for the subsystem or device. If you still 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 do for the problem. *Do not exchange adapters unless you are instructed to do so.*
3. Normally exchange only one adapter at a time. Always use instructions provided with the system unit when exchanging adapters. After each adapter is exchanged, go to "MAP 2410: SSA Repair Verification" in topic 3.6 to verify the repair.

SRN	FRU List	Problem
20PAA	Device (45%) ("Exchanging Disk Drives" in topic 5.1). SSA adapter card (45%) External SSA cables (6%) Internal SSA connections (4%) (unit <i>Hardware Maintenance Manual</i>).	Description: An open SSA link has been detected. Action: Run the Disk service aid to isolate the failure (see "Using the SSA Service Aids and Other Service Tools" in topic 6.0). If the SSA service aids are not available, go to the service information for the unit in which the device is installed.
21PAA to 29PAA	Device (45%) ("Exchanging Disk Drives" in topic 5.1). SSA adapter card (45%) External SSA cables (6%) Internal SSA connections (4%) (unit <i>Hardware Maintenance Manual</i>).	Description: An SSA 'Threshold exceeded' link error has been detected. Action: Go to "MAP 2010: START" in topic 3.2.
2A002	Device (50%) ("Exchanging Disk Drives" in topic 5.1). SSA adapter card (50%)	Description: Async code 02 has been received. Probably, a software error has occurred. Action: Go to "Software and Microcode Errors" in topic 2.3 before exchanging any FRUs.
2A003	Device (50%) ("Exchanging Disk Drives" in topic 5.1). SSA adapter card (50%)	Description: Async code 03 has been received. Probably, a software error has occurred. Action: Go to "Software and Microcode Errors" in topic 2.3 before exchanging any FRUs.
2A004	Device (50%) ("Exchanging Disk Drives" in topic 5.1). SSA adapter card (50%)	Description: Async code 04 has been received. Probably, a software error has occurred. Action: Go to "Software and Microcode Errors" in topic 2.3 before exchanging any FRUs.
2FFFF	None	Description: An async code that is not valid has been received. Action: Go to "Software and Microcode Errors" in topic 2.3.
40000	SSA adapter card (100%)	Description: The SSA adapter card has failed. Action: Exchange the FRU for a new FRU.
40004	4 MB DRAM module 0 (100%)	Description: A 4 MB DRAM in adapter card module 0 has failed.

SSA RAID Adapter Maintenance Information
Using the SRN Table

	("Exchanging DRAMs on the SSA RAID Adapter" in topic 5.2).	Action: Exchange the FRU for a new FRU.
40008	8 MB DRAM module 0 (100%) ("Exchanging DRAMs on the SSA RAID Adapter" in topic 5.2).	Description: An 8 MB DRAM in adapter card module 0 has failed. Action: Exchange the FRU for a new FRU.
40016	16 MB DRAM module 0 (100%) ("Exchanging DRAMs on the SSA RAID Adapter" in topic 5.2).	Description: A 16 MB DRAM in adapter card module 0 has failed. Action: Exchange the FRU for a new FRU.
40032	32 MB DRAM module 0 (100%) ("Exchanging DRAMs on the SSA RAID Adapter" in topic 5.2).	Description: A 32 MB DRAM in adapter card module 0 has failed. Action: Exchange the FRU for a new FRU.
40064	64 MB DRAM module 0 (100%) ("Exchanging DRAMs on the SSA RAID Adapter" in topic 5.2).	Description: A 64 MB DRAM in adapter card module 0 has failed. Action: Exchange the FRU for a new FRU.
40128	128 MB DRAM module 0 (100%) ("Exchanging DRAMs on the SSA RAID Adapter" in topic 5.2).	Description: A 128 MB DRAM in adapter card module 0 has failed. Action: Exchange the FRU for a new FRU.
41004	4 MB DRAM module 1 (100%) ("Exchanging DRAMs on the SSA RAID Adapter" in topic 5.2).	Description: A 4 MB DRAM in adapter card module 1 has failed. Action: Exchange the FRU for a new FRU.
41008	8 MB DRAM module 1 (100%) ("Exchanging DRAMs on the SSA RAID Adapter" in topic 5.2).	Description: An 8 MB DRAM in adapter card module 1 has failed. Action: Exchange the FRU for a new FRU.
41016	16 MB DRAM module 1 (100%) ("Exchanging DRAMs on the SSA RAID Adapter" in topic 5.2).	Description: A 16 MB DRAM in adapter card module 1 has failed. Action: Exchange the FRU for a new FRU.
41032	32 MB DRAM module 1 (100%) ("Exchanging DRAMs on the SSA RAID Adapter" in topic 5.2).	Description: A 32 MB DRAM in adapter card module 1 has failed. Action: Exchange the FRU for a new FRU.
41064	64 MB DRAM module 1 (100%) ("Exchanging DRAMs on the SSA RAID Adapter" in topic 5.2).	Description: A 64 MB DRAM in adapter card module 1 has failed. Action: Exchange the FRU for a new FRU.
41128	128 MB DRAM module 1 (100%) ("Exchanging DRAMs on the SSA RAID Adapter" in topic 5.2).	Description: A 128 MB DRAM in adapter card module 1 has failed. Action: Exchange the FRU for a new FRU.
42000	SSA adapter card (50%) DRAM modules (50%) ("Exchanging DRAMs on the SSA RAID Adapter"	Description: The SSA adapter has detected that both DRAM modules are failing. Action:

SSA RAID Adapter Maintenance Information
Using the SRN Table

	in topic 5.2).	<ol style="list-style-type: none"> 1. Check whether both DRAM modules are correctly installed on the adapter card. Make any necessary corrections. 2. If this problem has occurred immediately after an upgrade to the adapter card, check whether the correct type of DRAM modules have been installed. Make any necessary corrections. 3. If the problem remains, exchange the adapter card FRU for a new one. <i>Do not exchange any DRAM modules yet.</i> 4. Install the DRAM modules from the original adapter card onto the new adapter card, then install the new adapter card. 5. If the problem remains, exchange the DRAM modules for new modules. 6. Install the new DRAM modules onto the original adapter card. Reinstall the original adapter card.
42500	Write cache card on the SSA adapter card (100%)	<p>Description: The SSA adapter has detected a failure in the write cache.</p> <p>Action: Exchange the FRU for a new FRU.</p>
43PAA	Device (90%) ("Exchanging Disk Drives" in topic 5.1). SSA adapter card (10%)	<p>Description: An SSA device on the link is preventing the completion of the loop configuration.</p> <p>Action: Go to "MAP 2010: START" in topic 3.2.</p>
44PAA	Device (100%) ("Exchanging Disk Drives" in topic 5.1).	<p>Description: An SSA device has a 'Failed' status.</p> <p>Action: If the SSA service aids are available, run the Disk service aid (see "Using the SSA Service Aids and Other Service Tools" in topic 6.0) to find the failing device. If no device is listed as Rejected, use the PAA part of the SRN to determine which device is failing. Before you exchange the failing device, run nonconcurrent diagnostics to that device to determine the cause of the problem. If the SSA service aids are not available, note the value of PAA in this SRN, and go to "Finding the Physical Location of a Device" in topic 6.4. Exchange the failing FRU for a new FRU.</p>
45PAA	Device (40%) ("Exchanging Disk Drives" in topic 5.1). SSA Adapter card (40%) SSA cables, or other SSA connections in the device enclosure (20%). (unit <i>Hardware</i>)	<p>Description: The SSA adapter has detected an open SSA loop.</p> <p>Action: If the SSA service aids are available, run the Disk service aid (see "Using the SSA Service Aids and Other Service Tools" in topic 6.0) to determine which part of the loop is failing. If the SSA service aids are not</p>

SSA RAID Adapter Maintenance Information
Using the SRN Table

	Maintenance Manual).	available, note the value of PAA in this SRN, and go to "Finding the Physical Location of a Device" in topic 6.4.
46000	None	Description: An array is the Offline state because more than one disk drive is not available. At least one member disk drive of the array is present, but more than one member disk drive is missing. Action: Go to "MAP 2010: START" in topic 3.2.
47000	None	Description: An attempt has been made to store in the SSA adapter the details of more than 32 arrays. Action: Go to "MAP 2010: START" in topic 3.2.
47500	None	Description: Part of the array data might have been lost. Action: Go to "MAP 2010: START" in topic 3.2.
48000	None	Description: The SSA adapter has detected a link configuration that is not valid. Action: See "SSA Loop Configurations that Are Not Valid" in topic 2.4.
49000	None	Description: An array is in the Degraded state because a disk drive is not available to the array, and a write command has been sent to that array. Action: A disk drive might not be available for one of the following reasons: The disk drive has failed. The disk drive has been removed from the subsystem. An SSA link has failed. A power failure has occurred. Go to "MAP 2010: START" in topic 3.2.
49100	None	Description: An array is in the Exposed state because a disk drive is not available to the array. Action: A disk drive can become not available for several reasons: The disk drive has failed. The disk drive has been removed from the subsystem. An SSA link has failed. A power failure has occurred. Go to "MAP 2010: START" in topic 3.2.
49500	None	Description: No hot spare disk drives are available for an array that is configured for hot spare disk drives. Action: Go to "MAP 2010: START" in topic 3.2.
49700	None	Description: The parity for the array is not complete.

SSA RAID Adapter Maintenance Information
Using the SRN Table

		Action: Go to "MAP 2010: START" in topic 3.2.
50000	SSA adapter card (100%)	Description: The SSA adapter failed to respond to the device driver. Action: Exchange the FRU for a new FRU.
50001	SSA adapter card (100%)	Description: A data parity error has occurred. Action: Exchange the FRU for a new FRU.
50002	SSA adapter card (100%)	Description: An SSA adapter DMA error has occurred. Action: Exchange the FRU for a new FRU.
50004	SSA adapter card (100%)	Description: Channel check. Action: Exchange the FRU for a new FRU.
50005	SSA adapter card (100%)	Description: A software error has occurred. Action: Go to "Software and Microcode Errors" in topic 2.3 before exchanging the FRU.
50006	SSA adapter card (100%)	Description: A channel check has occurred. Action: Exchange the FRU for a new FRU.
50007	SSA adapter card (100%)	Description: The IOCC detected an internal error. Action: Exchange the FRU for a new FRU.
50008	SSA adapter card (100%)	Description: Unable to read or write the PCI registers. Action: Exchange the FRU for a new FRU.
50010	SSA adapter card (100%)	Description: An SSA adapter or device drive protocol error has occurred. Action: Go to "Software and Microcode Errors" in topic 2.3 before exchanging the FRU.
50012	SSA adapter card (100%)	Description: The SSA adapter microcode has hung. Action: Run nonconcurrent diagnostics to the SSA adapter. If the diagnostics fail, exchange the FRU for a new FRU. If the diagnostics do not fail, go to "Software and Microcode Errors" in topic 2.3 before exchanging the FRU.
D4000	SSA adapter card (100%)	Description: The diagnostics cannot configure the SSA adapter. Action: Exchange the FRU for a new FRU.
D4100	SSA adapter card (100%)	Description: The diagnostics cannot open the SSA adapter. Action: Exchange the FRU for a new FRU.
D4300	SSA adapter card (100%)	Description: The diagnostics have detected an SSA adapter POST failure.

SSA RAID Adapter Maintenance Information
Using the SRN Table

		Action: Exchange the FRU for a new FRU.
DFFFF	SSA adapter card (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" in topic 2.3 before exchanging the FRU.

SSA RAID Adapter Maintenance Information
Software and Microcode Errors

2.3 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, do 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 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 drives.
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.

SSA RAID Adapter Maintenance Information
SSA Loop Configurations that Are Not Valid

2.4 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 maximum numbers allowed depend on the adapter; "Rules for SSA Loops" in topic 1.3.2 describes these details for each adapter.

If the SRN occurred when you, or the customer, turned on the system:

1. Turn off the system.
2. Review the configuration that you are trying to make, and determine why that configuration is not valid.
3. Correct your configuration by reconfiguring the SSA cables or by removing the excess devices or adapters from the loop.
4. Turn on the 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 do these actions*, because they enable the configuration code to reset itself from the effects of the error.

2. Review the configuration that you are trying to make, and determine why that configuration is not valid.
3. Correct your configuration by reconfiguring the SSA cables or by removing the excess devices or adapters from the loop.

SSA RAID Adapter Maintenance Information
SSA Maintenance Analysis Procedures (MAPs)

3.0 SSA Maintenance Analysis Procedures (MAPs)

The maintenance analysis procedures (MAPs) describe how to analyze a failure that has occurred in an SSA loop.

Subtopics

- 3.1 How to Use the MAPs
- 3.2 MAP 2010: START
- 3.3 MAP 2320: SSA Link
- 3.4 MAP 2323: SSA Intermittent Link Error
- 3.5 MAP 2324: SSA RAID
- 3.6 MAP 2410: SSA Repair Verification

SSA RAID Adapter Maintenance Information

How to Use the MAPs

3.1 How to Use the MAPs

Attention: Unless the system unit needs to be turned off for some other reason, *do not turn off the system when servicing an SSA loop*. Unit power cables and external SSA cables that connect the devices to the system can be disconnected while that system is running.

To isolate the FRUs, do the actions and answer the questions given in the MAPs

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.
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. Do the next action indicated by the MAP.

Attention: Disk drives are fragile. Handle them with care, and keep them well away from strong magnetic fields.

SSA RAID Adapter Maintenance Information
MAP 2010: START

3.2 MAP 2010: START

This MAP is the entry point to the MAPs for the SSA RAID Adapter. If you are not familiar with these MAPs, read "How to Use the MAPs" in topic 3.1 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 a disk subsystem or disk drive.

Another MAP sent you here

A customer observed a problem that was not detected by the system problem determination procedures.

Attention: Unless the system unit needs to be turned off for some other reason, *do not turn off the system when servicing the SSA loop.* Unit power cables and external SSA cables that connect the devices to the system can be disconnected while that system is running.

+---+
|001|
+---+

HAVE YOU BEEN SENT HERE FROM THE SRN LIST IN THIS BOOK?

Yes No

| |
| |
| |
| +---+
| |002|
| +---+

| Go to Step 004.

+---+
|003|
+---+

Go to Step 007.

+---+
|004|
+---+

(From step 002)

DO YOU HAVE AN SRN?

Yes No

| |
| |
| +---+
| |005|
| +---+

| - Start the SSA Configurator and Service Aids Utility (see "Selecting the SSA Configurator Functions" in topic 7.2).

| - From the Main menu, select **SSA Adapter List**.

| - Select the adapter from the SSA Adapter List.

| - Select **Run Concurrent Diagnostics**.

| If an SRN is produced, go to "Service Request Numbers (SRNs)" in topic 2.0.

| If no SRN is produced, go to "MAP 2410: SSA Repair Verification" in

| topic 3.6.
|
+---+

| 006 |
+---+

Go to "Service Request Numbers (SRNs)" in topic 2.0.

+---+
| 007 |
+---+

(From step 003)

IS THE SRN 45PAA?

Yes No

| |
| |
+---+

| 008 |
+---+

| Go to Step 010.
|
+---+

| 009 |
+---+

Go to "MAP 2320: SSA Link" in topic 3.3.

+---+
| 010 |
+---+

(From step 008)

IS THE SRN IN THE RANGE 21000 THROUGH 29FFF?

Yes No

| |
| |
+---+

| 011 |
+---+

| Go to Step 013.
|
+---+

| 012 |
+---+

Go to "MAP 2323: SSA Intermittent Link Error" in topic 3.4.

+---+
| 013 |
+---+

(From step 011)

IS THE SRN 46000, 47000, 47500, 49000, 49100, 49500, OR 49700?

Yes No

| |
| |
+---+

| 014 |
+---+

| You are in the wrong book. Go to the correct service information for
| your problem.
|
+---+

SSA RAID Adapter Maintenance Information
MAP 2010: START

| 015 |
+---+

Go to "MAP 2324: SSA RAID" in topic 3.5.

SSA RAID Adapter Maintenance Information
MAP 2320: SSA Link

3.3 MAP 2320: SSA Link

This MAP helps you to isolate FRUs that are causing an SSA loop problem between a device and the SSA RAID Adapter, or between two devices. If you are not familiar with SSA loops, read the section "SSA Loops and Links" in topic 1.3 before using this MAP. "SSA Loops and Links" explains SSA links, strings, and loops.

Attention: Unless the system unit needs to be turned off for some other reason, do not turn off the system when servicing the SSA loop. Unit power cables and external SSA cables that connect the devices to the system can be disconnected while that system is running.

+---+
|001|
+---+

ARE THE SSA SERVICE AIDS AVAILABLE?

Yes No

|
|
|
| +---+
| |002|
| +---+

Go to Step 004.

+---+
|003|
+---+

Go to Step 007.

+---+
|004|
+---+

(From step 002)

ARE ANY LINK STATUS (READY) LIGHTS FLASHING ON THIS SSA LOOP?

Yes No

|
|
| +---+
| |005|
| +---+

- Note the PAA (that is, the last three digits) of the SRN.

Go to "Finding the Physical Location of a Device" in topic 6.4.

+---+
|006|
+---+

Go to "SSA Link Errors" in topic 4.0.

+---+
|007|
+---+

(From step 003)

- Start the SSA Configurator and Service Aids Utility (see "Using the SSA Configurator Functions" in topic 7.0).

- From the Main menu, select **SSA Adapter List**.

- Select the required adapter from the SSA Adapter List.

- Select **Disk Service Aids** from the Adapter menu. The Disk Service Aids window is displayed:

SSA RAID Adapter Maintenance Information
MAP 2320: SSA Link

```

+-----+
|CONFIG  SSA Configurator and Service Aids      Vyyymmdd  XX Version|
+-----+
|
|   +-----+
|   |   Main Menu   |
|   +-----+
|   |   +-----+
|   |   |   Disk Service Aids   |
|   |   +-----+
|   |   | Link          SSA UID      Status |
|   |   | Port A1
|   |   |           UIDxxxxx
|   |   |           UIDyxxxx
|   |   |           UID3xxxx
|   |   |           UID4xxxx
|   |   | Port A2
|   |   | Port B1
|   |   |           No disks
|   |   +-----+
|   |   | Port B2
|   |   +-----+
|   |
|   +-----+
|   | <ESCAPE> Exit  <ENTER> Select  <F1> Help  <F2> Format
|   | <F3> Certify  <F4> ServiceMode  <F5> Diagnostics  <F9> FlashOn
|   | <F10> FlashOff
|   +-----+
|
+-----+

```

ARE ANY DISK DRIVES LISTED FOR THE SELECTED SSA ADAPTER?

Yes **No**

```

+----+
| 008 |
+----+

```

- One of the following conditions exists. Take the action described.

No physical disks are connected to this SSA RAID Adapter:

1. Ensure that the external SSA cables are correctly connected to the units in which the devices are installed and to the SSA RAID Adapter.
2. Go to "MAP 2410: SSA Repair Verification" in topic 3.6 to verify the repair.

All the disk drives are turned off:

Go to the START MAP for the unit in which the SSA devices are installed.

The SSA RAID Adapter is failing:

SSA RAID Adapter Maintenance Information
MAP 2320: SSA Link

1. Exchange the SSA RAID Adapter for a new one.
2. Go to "MAP 2410: SSA Repair Verification" in topic 3.6 to verify the repair.

```
+----+
|009|
+----+
```

Go to Step 010.

```
+----+
|010|
+----+
```

(From step 009)

- Observe the Status column on the screen. If the status of any disk drive is 'Power', that disk drive has detected a loss of redundant power or cooling. In the example shown here, the fourth disk drive has detected such a loss.

```
+-----+
|CONFIG  SSA Configurator and Service Aids      Vvymdd      XX Version|
+-----+
|
|   +-----+
|   |   Main Menu   |
|   +-----+
|   |   +-----+
|   |   |   Disk Service Aids   |
|   |   +-----+
|   |   | Link          SSA UID      Status
|   |   | Port A1
|   |   |             UIDxxxxx
|   |   |             UIDyxxxx
|   |   |             UID3xxxx
|   |   |             UID4xxxx      Power
|   |   | Port A2
|   |   | Port B1
|   |   |             No disks
|   |   +-----+
|   |   | Port B2
|   |   +-----+
|   +-----+
|
|<ESCAPE> Exit <ENTER> Select <F1> Help <F2> Format
|<F3> Certify <F4> ServiceMode <F5> Diagnostics <F9> FlashOn
|<F10> FlashOff
+-----+
```

DO ONE OR MORE DISK DRIVES HAVE A 'POWER' STATUS?

```
Yes  No
|    |
|    |
|    +----+
|    |011|
|    +----+
```


SSA RAID Adapter Maintenance Information
MAP 2320: SSA Link

Go to Step 013.

+---+
|012|
+---+

Go to the START MAP for the unit in which the disk drive is installed.

+---+
|013|
+---+

(From step 011)

- Observe the Status column on the screen. If the status of any disk drive is 'Failed', that disk drive is failing. In the example shown here, the fourth disk drive is failing.

```
+-----+
|CONFIG  SSA Configurator and Service Aids      Vyyymmdd      XX Version|
+-----+
|
|   +-----+
|   | Main Menu
|   +-----+
|   |
|   |   +-----+
|   |   | Disk Service Aids
|   |   +-----+
|   |   | Link          SSA UID      Status
|   |   | Port A1
|   |   |               UIDxxxxx
|   |   |               UIDyxxxxx
|   |   |               UID3xxxxx
|   |   |               UID4xxxxx      Failing
|   |   | Port A2
|   |   | Port B1
|   |   |               No disks
|   |   +-----+
|   | Port B2
|   +-----+
|
| <ESCAPE> Exit  <ENTER> Select  <F1> Help  <F2> Format
| <F3> Certify  <F4> ServiceMode  <F5> Diagnostics  <F9> FlashOn
| <F10> FlashOff
+-----+
```

IS ONE OF THE DISK DRIVES FAILING?

Yes No

+---+
|014|
+---+

Go to Step 016.

+---+
|015|
+---+

- Use the Identify function (as instructed on the screen) to find the failing disk drive. See "Finding the Physical Location of a Device" in

SSA RAID Adapter Maintenance Information

MAP 2320: SSA Link

link. See "Finding the Physical Location of a Device" in topic 6.4 if you need more information about finding the disk drive.

Go to "SSA Link Errors" in topic 4.0. The information that is provided there can help you solve the problem. If necessary, refer to the service information for the unit that contains the device.

SSA RAID Adapter Maintenance Information
MAP 2323: SSA Intermittent Link Error

3.4 MAP 2323: SSA Intermittent Link Error

This MAP helps you to isolate FRUs that are causing an intermittent SSA link problem. You are here because you have an SRN from the series 21000 through 29000.

If you are not familiar with the SSA link, read the section "SSA Loops and Links" in topic 1.3 before using this MAP. "SSA Loops and Links" explains SSA links, strings, and loops.

Attention: Unless the system unit needs to be turned off for some other reason, *do not turn off the system when servicing an SSA loop.* Power cables and external SSA cables can be disconnected while that system is running.

```
+---+
|001|
+---+
```

- Start the SSA Configurator and Service Aids Utility (see "Using the SSA Configurator Functions" in topic 7.0).
- From the Main menu, select **SSA Adapter List**.
- Select the required adapter from the SSA Adapter List.
- Select **Disk Service Aids** from the Adapter menu.

```
+-----+
|-----+-----+-----+-----+
|CONFIG  SSA Configurator and Service Aids      Vyyymmdd      XX Version|
+-----+-----+-----+-----+
|
|  +-----+
|  | Main Menu
|  +-----+
|  |
|  |  +-----+
|  |  | Disk Service Aids
|  |  +-----+
|  |  | Link          SSA UID      Status
|  |  | Port A1
|  |  |                UIDxxxxx
|  |  |                UIDyxxxx
|  |  |                UID3xxxx
|  |  |                UID4xxxx
|  |  | Port A2
|  |  | Port B1
|  |  |                No disks
|  |  +-----+
|  |  | Port B2
|  |  +-----+
|  |
|  +-----+
|  |
|  |<ESCAPE> Exit  <ENTER> Select  <F1> Help  <F2> Format
|  |<F3> Certify  <F4> ServiceMode  <F5> Diagnostics  <F9> FlashOn
|  |<F10> FlashOff
|  +-----+
+-----+
```

Note: On the Disk Service Aids screen, each adapter port is identified by the number of its related connector on the adapter card:

- Adapter port 0 is identified as A1
- Adapter port 1 is identified as A2
- Adapter port 2 is identified as B1
- Adapter port 3 is identified as B2.

SRNs 21000 through 29000 include the adapter port number (0-3).

SSA RAID Adapter Maintenance Information
MAP 2323: SSA Intermittent Link Error

Go to Step 002.

+---+
|002|
+---+

(From step 001)

- Observe the SRN that sent you to this MAP. It is in the series 21PAA through 29PAA (where P is the number of the adapter port, and AA is the SSA address of the device).

Note the value of PAA in the SRN. For example:

If the SRN is 24002, PAA = 002.
If the SRN is 24104, PAA = 104.

- Observe the screen, and identify the physical device that is represented by PAA in the SRN.

Note: If the SSA address (AA) in the SRN is higher than the highest SSA address that is displayed for the adapter port (P), that address is the address of the SSA RAID Adapter.

Read through the following examples if you need help in identifying the device, then go to Step 003. Otherwise, go directly to Step 003.

Example 1

If the SRN is 24002, the device is connected to adapter port 0 (shown as A1 on the screen), and has an SSA address of 02 (shown as 2 on the screen). In the example screen, that device is the third disk drive.

```
+-----+
|CONFIG  SSA Configurator and Service Aids      Vyymmdd      XX Version|
+-----+
|
|   +-----+
|   |   Main Menu   |
|   +-----+
|   |   Disk Service Aids   |
|   +-----+
|   | Link          SSA UID      Status
|   | Port A1
|   |               UID0xxxx
|   |               UID1xxxx
|   |               UID2xxxx
|   |               UID3xxxx
|   | Port A2
|   | Port B1
|   |               No disks
|   +---+ Port B2
|   +-----+
|
| <ESCAPE> Exit  <ENTER> Select  <F1> Help  <F2> Format
| <F3> Certify  <F4> ServiceMode <F5> Diagnostics  <F9> FlashOn
| <F10> FlashOff
|
+-----+
```

Example 2

If the SRN is 24104, the device (in theory) is connected to adapter port 1

SSA RAID Adapter Maintenance Information
MAP 2323: SSA Intermittent Link Error

(shown as A2 on the screen). The device, however, has an SSA address of 04. That address is higher than the highest address that is displayed for adapter port 1. The device is, therefore, the SSA RAID Adapter.

```
+----+
|003|
+----+
(From step 002)
```

The problem is in the SSA link between the device that you identified in Step 002 and the device that is on the same adapter port (P), but whose SSA address has a value of 1 less than AA (AA - 1).

For example, in Step 002, SRN 24002 identified pdisk3. The SSA address of the third disk drive is 02; the address (AA - 1) of the other device on the link is, therefore, 01. SSA address 01 is the address of the second disk drive. SRN 24002 indicates, therefore, that link errors have been detected between the second and third disk drives.

Similarly, SRN 24104 identified the SSA RAID adapter. The SSA address of the adapter is 04. The address of the other device is, therefore, 03. SSA address 03 is the address of the first disk drive. SRN 24104 indicates, therefore, that link errors have been detected between adapter port A2 and the first disk drive.

- Exchange, in the sequence shown, the following FRUs for new FRUs.
Ensure that for *each* FRU exchange, you go to "MAP 2410: SSA Repair Verification" in topic 3.6 to verify the repair.

1. One of the two devices that are identified by the SRN (see "Exchanging Disk Drives" in topic 5.1).
 2. The other of the two devices.
 3. The internal SSA connections of the unit or units in which the devices are installed.
 4. The external SSA cable.
-

SSA RAID Adapter Maintenance Information
MAP 2324: SSA RAID

3.5 MAP 2324: SSA RAID

This MAP helps you to solve problems that have occurred in SSA RAID arrays.

Attention: Unless the system unit needs to be turned off for some other reason, *do not turn off the system when servicing an SSA link or a unit in which SSA devices are installed.* Unit power cables and external SSA cables that connect devices to the system can be disconnected while that system is running.

Before starting this MAP, ensure that all the disk drives are working correctly:

1. Start the SSA Configurator and Service Aids Utility (see "Using the SSA Configurator Functions" in topic 7.0).
2. From the Main menu, select **SSA Adapter List**.
3. Select the required adapter from the SSA Adapter List.
4. Select **Disk Service Aids** from the Adapter menu.

```

+-----+
| CONFIG  SSA Configurator and Service Aids      Vyymmdd      XX Version|
+-----+
|
|   +-----+
|   | Main Menu
|   +-----+
|   |
|   |   +-----+
|   |   | Disk Service Aids
|   |   +-----+
|   |   | Link          SSA UID      Status
|   |   | Port A1
|   |   |                UIDxxxxx
|   |   |                UIDyxxxxx
|   |   |                UID3xxxxx
|   |   |                UID4xxxxx
|   |   | Port A2
|   |   | Port B1
|   |   |                No disks
|   |   +-----+
|   |   | Port B2
|   |   +-----+
|   |
|   +-----+
|   | <ESCAPE> Exit  <ENTER> Select  <F1> Help  <F2> Format
|   | <F3> Certify  <F4> ServiceMode <F5> Diagnostics <F9> FlashOn
|   | <F10> FlashOff
|   +-----+
|
+-----+

```

5. Select **Run Concurrent Diagnostics** to identify any disk drive problems that have occurred.
6. Check the Status column to find any power problems, SSA link problems, and SSA disk drives that have a Failed status.
7. Correct all those problems before you start this procedure.

Attention: Some of the steps in this MAP need you to change the configuration of the array, or to change the use of an SSA disk drive. Do not do those steps unless you have the user's permission.

+----+

SSA RAID Adapter Maintenance Information
MAP 2324: SSA RAID

|001|

+---+

(From steps 009, 077, and 080)

You have been sent to this step either from another step in this MAP, or because you have one of the following Service Request Numbers (SRNs):

46000, 47000, 47500, 49000, 49100, 49500, 49700

DO YOU HAVE SRN 49500?

Yes No

|

|

|

|

|

+---+

|002|

+---+

|

- Run concurrent diagnostics to the SSA RAID Adapters.

|

Go to Step 004.

|

+---+

|003|

+---+

No hot spare disk drives are available. Go to Step 048.

+---+

|004|

+---+

(From step 002)

DID THE DIAGNOSTICS GIVE YOU SRN 46000, 47000, 47500, 49000, 49100, or 49700?

Yes No

|

|

|

|

|

+---+

|005|

+---+

|

Go to Step 007.

|

+---+

|006|

+---+

Go to Step 010.

+---+

|007|

+---+

(From step 005)

DID THE DIAGNOSTICS GIVE YOU ANY OTHER SRN?

Yes No

|

|

|

|

|

+---+

|008|

+---+

|

Go to Step 069.

|

+---+

|009|

+---+

- Solve the problems that caused the SRN.

SSA RAID Adapter Maintenance Information
MAP 2324: SSA RAID

Return to Step 001.

+---+
|010|
+---+

(From step 006)

- Find your SRN in the following table, then do the appropriate actions.

Note: If you still do not have any of these SRNs, you are in the wrong MAP.

SRN	Cause	Action
46000	An array is in the Offline state.	Go to Step 011.
47000	You have more than the maximum number of arrays allowed.	Go to Step 018.
47500	A partial loss of data has occurred.	Go to Step 019.
49000	An array is in the Degraded state.	Go to Step 031.
49100	An array is in the Exposed state.	Go to Step 041.
49700	The parity on an array is not complete.	Go to Step 051.

+---+
|011|
+---+

(From step 010)

An array is in the Offline state if at least one member disk drive of the array is present, but more than one member disk drive is missing. Such a condition can occur if at least two disk drives in the array have failed, or are not available to the array at this time.

ARE ANY DISK DRIVES MISSING OR WITHOUT POWER, OR HAVE ANY DISK DRIVES BEEN RECABLED (not necessarily by you)?

Yes No

|
|
|
| +---+
| |012|
| +---+
|
| Go to Step 014.
|

+---+
|013|
+---+

You must now restore the original configuration:

- Start the SSA Configurator and Service Aids Utility (see "Using the SSA Configurator Functions" in topic 7.0).

- From the Main menu, select **System Resources**.

The status of the array changes to Good when the adapter can find all the member disk drives of the array.

SSA RAID Adapter Maintenance Information
MAP 2324: SSA RAID

+---+
|014|

+---+
(From step 012)

Either more than one disk drive has failed, or an array that is not complete has been connected to the SSA RAID Adapter.

If no disk drives have been added to this system, go to Step 015.

If one or more disk drives have been added to this system, and those disk drives were previously members of an array on this system or on another system, you must do the following:

- Do the actions that are described in "Deleting a Resource from the System Resource List" in topic 7.5.1.

- Select the array that is in the Offline state, and delete it.

That array is now a free resource.

- Do the actions that are described in "Removing a Disk Drive from an Array" in topic 7.7.4, and remove all the disk drives from the array.

You can now use those disk drives as free resources.

- Locate and repair all failed disk drives, and make those disk drives available for the creation of a new array.

Go to Step 015.

+---+
|015|

+---+
(From step 014)

- Start the SSA Configurator and Service Aids Utility (see "Using the SSA Configurator Functions" in topic 7.0).

- From the Main menu, select **SSA Adapter List**.

- Select the adapter from the SSA Adapter List.

- Select **Rejected Disks**.

ARE ANY DISK DRIVES LISTED?

Yes No

| |
| |
| |
| +---+
| |016|
| +---+
| |

- Ask the user to delete and recreate the array that is in the Offline state.

+---+
|017|

+---+

- Run nonconcurrent diagnostics to all the disk drives that are listed as rejected.

- Run the Certify service aid (see "Certify Disk Service Aid" in topic 6.1.4) to all the disk drives that are listed as rejected.

Go to Step 072.

+---+
|018|

SSA RAID Adapter Maintenance Information
MAP 2324: SSA RAID

+----+
(From step 010)

An attempt has been made to create a new array, but the adapter already has the maximum number of arrays defined.

- Start the SSA Configurator and Service Aids Utility (see "Using the SSA Configurator Functions" in topic 7.0).

Go to "Listing or Deleting Records of Old Arrays in the NVRAM" in topic 7.7.7, and delete any array names that are no longer used (dormant).

+----+
|019|
+----+
(From step 010)

Attention: Part of the data that is on the array has been damaged and cannot be recovered. **Before** any other action is taken, the user must recover all the data that is not damaged, and create a backup of that data.

- Start the SSA Configurator and Service Aids Utility (see "Using the SSA Configurator Functions" in topic 7.0).
- Select **System Resources**.
- Select the arrays, one at a time, and check whether any array has one or more invalid data strips.

DOES ANY ARRAY HAVE ONE OR MORE INVALID DATA STRIPS?

Yes No

|
|
|
| +----+
| |020|
| +----+
|

- Review the symptoms.

Go to "MAP 2320: SSA Link" in topic 3.3, and start the problem determination procedure again.

|
+----+
|021|
+----+

- Note the name of the failing array.

Go to Step 022.

+----+
|022|
+----+
(From step 021)

- Start the SSA Configurator and Service Aids Utility (see "Using the SSA Configurator Functions" in topic 7.0).
- Select **System Resources**.
- Select the failing array.
- Select **View Members**.
- Select the failing disk drive, and note the UID numbers of the disk drives that are members of the array.
- Ask the user create a backup of all the data from this array. Some data might not be accessible.

SSA RAID Adapter Maintenance Information
MAP 2324: SSA RAID

- When the backup has been created, ask the user to delete the array.
- Run nonconcurrent diagnostics to each of the disk drives that you noted previously.

DO THE DIAGNOSTICS FAIL WHEN THEY ARE RUN TO A PARTICULAR DISK DRIVE?

Yes No

```
|      |  
|      |  
|      |  
|      |  
+----+  
| 023 |  
+----+
```

Go to Step 025.

```
+----+  
| 024 |  
+----+
```

- Exchange the failing disk drive for a new one (see "Exchanging Disk Drives" in topic 5.1).

Go to Step 090 to add the disk drive to the group of disk drives that are available for use by the RAID manager.

```
+----+  
| 025 |  
+----+
```

(From step 023)

- Run the Certify service aid (see "Certify Disk Service Aid" in topic 6.1.4) to each of the disk drives that you noted previously.

DID THE CERTIFY SERVICE AID FAIL WHEN IT WAS RUN TO A PARTICULAR DISK DRIVE?

Yes No

```
|      |  
|      |  
|      |  
|      |  
+----+  
| 026 |  
+----+
```

- Ask the user to recreate the array.

Go to Step 069.

```
+----+  
| 027 |  
+----+
```

- Run the Format service aid (see "Format Disk Service Aid" in topic 6.1.3) to the disk drive.

- Run the Certify service aid again to the disk drive.

Go to Step 028.

```
+----+  
| 028 |  
+----+
```

(From step 027)

DID THE CERTIFY SERVICE AID FAIL AGAIN?

Yes No

```
|      |  
|      |  
|      |  
|      |  
+----+  
| 029 |  
+----+
```

SSA RAID Adapter Maintenance Information
MAP 2324: SSA RAID

| - Ask the user to recreate the array.

| Go to Step 069.

+----+
|030|
+----+

- Exchange the failing disk drive for a new one (see "Exchanging Disk Drives" in topic 5.1).

Go to Step 090 to add the disk drive to the group of disk drives that are available for use by the RAID manager.

+----+
|031|
+----+

(From step 010)

An array is in the Degraded state if one member disk drive of the array is missing, and a write command has been sent to that array. When an array is in the Degraded state, its data is not protected.

- Start the SSA Configurator and Service Aids Utility (see "Using the SSA Configurator Functions" in topic 7.0).

- From the Main menu, select **SSA Adapter List**.

- Select the adapter from the SSA Adapter List.

- Select **Rejected Disks**.

ARE ANY DISK DRIVES LISTED?

Yes No

| |

| +----+
| |032|
| +----+

| A disk drive has not been detected by the adapter.

| Go to Step 035.

+----+
|033|
+----+

- Run nonconcurrent diagnostics to all the disk drives that are listed as rejected.

- Run the Certify service aid (see "Certify Disk Service Aid" in topic 6.1.4) to all the disk drives that are listed as rejected.

If problems occur on any disk drive, go to Step 034. Otherwise, continue with this procedure.

- Do the actions described in "Adding a Disk Drive to an Array" in topic 7.7.5.

- Referring to the displayed instructions, select a disk from the list of array candidate disk drives, and add that disk drive to the array that is in the Degraded state. The array changes its state to the Good state, and parity is rebuilt.

+----+
|034|
+----+

(From step 033)

SSA RAID Adapter Maintenance Information
MAP 2324: SSA RAID

- Exchange the disk drive for a new one (see "Exchanging Disk Drives" in topic 5.1).

Go to Step 090 to add the disk drives to the group of disk drives that are available for use by the RAID manager.

Note: A disk drive that is listed as rejected is not necessarily failing. For example, the array might have rejected the disk drive because a power problem, or an SSA link problem, caused that drive to become temporarily unavailable. Under such conditions, the disk drive can be reused.

+----+
| 035 |
+----+
(From step 032)

DOES THE DISK SERVICE AID INDICATE AN OPEN LOOP?

Yes	No
	+----+
	036
	+----+
	Go to Step 038.

+----+
| 037 |
+----+

Go to "MAP 2320: SSA Link" in topic 3.3.

+----+
| 038 |
+----+
(From steps 036 and 046)

DOES ANY SSA DISK DRIVE HAVE ITS CHECK LIGHT ON?

Yes	No
	+----+
	039
	+----+
	The disk drive might have been removed from the subsystem.
	- Reinstall the removed drive, or select a new disk drive for addition to the array.
	- Do the actions described in "Adding a Disk Drive to an Array" in topic 7.7.5.
	- Referring to the displayed instructions, select a disk from the list of array candidate disk drives, and add that disk drive to the array that is in the Degraded state.
	The array changes its state to the Good state, and parity is rebuilt.

+----+
| 040 |
+----+

- Exchange the failed disk drive for a new one (see "Exchanging Disk Drives" in topic 5.1).

Go to Step 090.

+----+

|041|

+---+

(From step 010)

An array is in the Exposed state when one member disk drive of the array is not available. When an array is in the Exposed state, its data is not protected. A command line parameter is available to prevent write operations to an array that is in the Exposed state. See "Array States" in topic 7.1 for more information.

- Start the SSA Configurator and Service Aids Utility (see "Using the SSA Configurator Functions" in topic 7.0).
- From the Main menu, select **SSA Adapter List**.
- Select the adapter from the SSA Adapter List.
- Select **Rejected Disks**.

ARE ANY DISK DRIVES LISTED?

Yes No

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+---+

|042|

+---+

A disk drive has not been detected by the adapter. Go to Step 045.

+---+

|043|

+---+

- Run nonconcurrent diagnostics to all the disk drives that are listed as rejected.
 - Run the Certify service aid (see "Certify Disk Service Aid" in topic 6.1.4) to all the disk drives that are listed as rejected.
- If problems occur on any disk drive, go to Step 044. Otherwise, continue with this procedure.

- Do the actions described in "Adding a Disk Drive to an Array" in topic 7.7.5.
- Referring to the displayed instructions, select a disk from the list of array candidate disk drives, and add that disk drive to the array that is in the Exposed state.

The array changes its state from the Exposed state, and parity is rebuilt.

+---+

|044|

+---+

(From step 043)

- Exchange the disk drive for a new drive (see "Exchanging Disk Drives" in topic 5.1).
- Go to Step 090 to add the disk drives to the group of disk drives that are available for use by the RAID manager.

Note: A disk drive that is listed as rejected is not necessarily defective. For example, the array might have rejected the disk drive because a power problem, or an SSA link problem, caused that drive to become temporarily unavailable. Under such conditions, the disk drive can be reused.

+---+

|045|

+---+

SSA RAID Adapter Maintenance Information
MAP 2324: SSA RAID

(From step 042)

DOES THE DISK SERVICE AID INDICATE AN OPEN LOOP?

Yes No

+----+
| 046 |
+----+

Go to Step 038.

+----+
| 047 |
+----+

Go to "MAP 2320: SSA Link" in topic 3.3.

+----+
| 048 |
+----+

(From step 003)

No spare disk drives are available for an array that is configured for hot spare disk drives.

- If the subsystem contains disk drives that have failed, repair those disk drives, or exchange them for new disk drives (see "Exchanging Disk Drives" in topic 5.1).
- Start the SSA Configurator and Service Aids Utility (see "Using the SSA Configurator Functions" in topic 7.0).
- From the Main menu, select **SSA Adapter List**.
- From the SSA Adapter List, select the adapter against which SRN 49500 was logged.
- Select **Spare Disk**. No spare disk drives are listed.
- Using the Insert function, try to make a spare disk drive. (Use the default block size.)

ARE ANY CANDIDATE DISK DRIVES LISTED?

Yes No

+----+
| 049 |
+----+

- Review with the user the requirement for hot spare disk drives. If the customer wants hot spare disk drives, one or more disk drives must have their use changed to **Hot Spare Disk**.

If the customer does not want hot spare disk drives:

- Go to "Modifying Attributes of Resources" in topic 7.7.3.
- Change the **Enable Use of Hot Spares** attribute to **No**.

+----+
| 050 |
+----+

- Go to "Creating an Array or a Hot Spare Disk Drive" in topic 7.4, and create a hot spare disk drive from one of the listed candidate disk drives.

You have solved the problem.

SSA RAID Adapter Maintenance Information
MAP 2324: SSA RAID

Note: Because this problem has occurred, an error log is generated when the system runs the health check program. To verify that the availability of hot spare disk drives has solved the problem:

1. Run concurrent diagnostics to the adapter.
2. Verify that error code 049500 is **not** returned.

+----+
|051|
+----+
(From step 010)

The RAID Manager cannot fully create parity for this array. All read and write operations can complete normally, but the failure of one disk drive can cause the loss of some data.

The problem might be caused by a rebuild operation that is running on a array. You must first check whether a rebuild operation is running. If a rebuild operation is not the cause, the user must delete the array, then recreate it.

- Start the SSA Configurator and Service Aids Utility (see "Using the SSA Configurator Functions" in topic 7.0).
- From the Main menu, select **SSA Adapter List**.
- Select the required adapter from the SSA Adapter List.
- Check whether a rebuild operation is running on any array.

IS A REBUILD OPERATION RUNNING ON ANY ARRAY?

Yes No
| |
| |
| +----+
| |052|
| +----+
| Go to Step 057.
|

+----+
|053|
+----+

- Wait for the rebuild to complete.
- Rerun concurrent diagnostics to the adapter.

Go to Step 054.

+----+
|054|
+----+
(From step 053)

IS THE PROBLEM SOLVED?

Yes No
| |
| |
| +----+
| |055|
| +----+
| Go to Step 057
|

+----+

SSA RAID Adapter Maintenance Information
MAP 2324: SSA RAID

|056|
+----+

No further action is needed.

+----+
|057|
+----+

(From steps 052 and 055)

- Start the SSA Configurator and Service Aids Utility (see "Using the SSA Configurator Functions" in topic 7.0).
- Select **System Resources**.
- Select the arrays, one at a time, and check whether any array has one or more unbuilt parity strides, or one or more unbuilt component strides.

DOES ANY ARRAY HAVE ONE OR MORE UNBUILT PARITY STRIDES, OR ONE OR MORE UNBUILT COMPONENT STRIDES?

Yes No

```
| |  
| |  
| |  
| +----+  
| |058|  
| +----+
```

The error might have occurred because a hot spare drive was being started and rebuilt.

- Check whether any failed disk drives are present in the array.

```
|  
+----+  
|059|  
+----+
```

- Note the array name of the failing array.

Go to Step 060.

```
+----+  
|060|  
+----+
```

(From step 059)

- Start the SSA Configurator and Service Aids Utility (see "Using the SSA Configurator Functions" in topic 7.0).
- Select **System Resources**.
- Select the failing array.
- Select **View Members**.
- Select the failing disk drive.
- Note the all the UID numbers that are in the array.
- Ask the user to create a backup of all the data that is contained in this array. (All the data should be accessible without error.)
- Ask the user to delete the array.
- Run nonconcurrent diagnostics to each of the disk drives that you noted previously.

DO THE DIAGNOSTICS FAIL WHEN RUN TO ANY PARTICULAR DISK DRIVE?

Yes No

```
| |  
| |  
| |  
| +----+
```

SSA RAID Adapter Maintenance Information
MAP 2324: SSA RAID

| 061 |

+----+

Go to Step 063.

+----+

| 062 |

+----+

- Exchange the failing disk drive for a new one (see "Exchanging Disk Drives" in topic 5.1).

Go to Step 090 to add the disk drive to the group of disk drives that are available for use by the RAID manager.

+----+

| 063 |

+----+

(From step 061)

- Run the Certify service aid (see "Certify Disk Service Aid" in topic 6.1.4) to the disk drives that you noted previously.

DID THE CERTIFY SERVICE AID FAIL WHEN RUN TO ANY PARTICULAR DISK DRIVE?

Yes No

|

|

+----+

| 064 |

+----+

- Ask the user to recreate the array.

Go to Step 069.

+----+

| 065 |

+----+

- Run the Format service aid (see "Format Disk Service Aid" in topic 6.1.3) to the disk drive.

- Run the Certify service aid to the disk drive again.

Go to Step 066.

+----+

| 066 |

+----+

(From step 065)

DID THE CERTIFY SERVICE AID FAIL AGAIN?

Yes No

|

|

+----+

| 067 |

+----+

- Ask the user to recreate the array.

Go to Step 069.

+----+

| 068 |

+----+

- Exchange the failing disk drive for a new one (see "Exchanging Disk Drives" in topic 5.1).

SSA RAID Adapter Maintenance Information
MAP 2324: SSA RAID

Go to Step 090 to add the disk drive to the group of disk drives that are available for use by the RAID manager.

```
-----+
+--- RAID Checkout -----+
|
| You are now starting the RAID checkout procedure
|
+-----+
```

```
+---+
|069|
+---+
(From MAP 2410 step 006 in topic 3.6)
(From steps 008, 026, 029, 064, and 067)
```

- Start the SSA Configurator and Service Aids Utility (see "Using the SSA Configurator Functions" in topic 7.0).
- From the Main menu, select **SSA Adapter List**.
- Select the adapter from the SSA Adapter List.
- Select **Rejected Disks**.

ARE ANY DISK DRIVES LISTED?

```
Yes  No
|    |
|    |
|    +---+
|    |070|
|    +---+
|
|    Go to Step 075.
```

```
+---+
|071|
+---+
```

- Run nonconcurrent diagnostics to all the disk drives that are listed as rejected.
- Run the Certify service aid (see "Certify Disk Service Aid" in topic 6.1.4) to all the rejected disk drives.

Go to Step 072.

```
+---+
|072|
+---+
(From steps 017 and 071)
```

IS ANY DISK DRIVE FAILING?

```
Yes  No
|    |
|    |
|    +---+
|    |073|
|    +---+
|
|    Go to Step 075.
```

Note: A disk drive that is listed as rejected is not necessarily failing. For example, the array might have rejected the disk drive because a power problem, or an SSA link problem, caused that drive to become temporarily unavailable. Under such conditions, the disk drive can be reused.

SSA RAID Adapter Maintenance Information
MAP 2324: SSA RAID

|074|
+---+

- Exchange the failing disk drive for a new one (see "Exchanging Disk Drives" in topic 5.1).

Go to Step 090 to add the disk drive to the group of disk drives that are available for use by the RAID manager.

+---+
|075|

+---+
(From steps 070 and 073)

- Start the SSA Configurator and Service Aids Utility (see "Using the SSA Configurator Functions" in topic 7.0).
- From the Main menu, select **SSA Adapter List**.
- Select the adapter from the SSA Adapter List.
- Select each array type in turn.

ARE ANY ARRAYS LISTED WITH A STATUS OTHER THAN GOOD OR REBUILDING?

Yes No

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| |
| |
| |
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| |
| |
| |
| |

Go to Step 078.

+---+
|077|
+---+

Go to Step 001.

+---+
|078|

+---+
(From step 076)

- Start the SSA Configurator and Service Aids Utility (see "Using the SSA Configurator Functions" in topic 7.0).
- Select **System Resources**.
- Select the arrays, one at a time, and check whether any array has one or more invalid data strips, one or more unbuilt parity strides, or one or more unbuilt component strides.

DOES ANY ARRAY HAVE ONE OR MORE INVALID DATA STRIPS, ONE OR MORE UNBUILT PARITY STRIDES, OR ONE OR MORE UNBUILT COMPONENT STRIDES?

Yes No

| |
| |
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| |
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| |

Go to Step 081.

+---+
|080|
+---+

Go to Step 001.

+----+

| 081 |

+----+

(From step 079)

HAVE DISK DRIVES BEEN GOING INTO THE REJECTED STATE WITH NO OTHER FAILURE INDICATIONS?

Yes No

|

|

|

|

+----+

| 082 |

+----+

|

Go to Step 084.

|

+----+

| 083 |

+----+

This problem can occur if an array is accessed before all the member disk drives are available.

- Ensure that the power system turns on power to all the disk drives before, or when, it turns on the power to the system unit.

+----+

| 084 |

+----+

(From step 082)

WAS SRN 46000 LOGGED, BUT NO ERROR FOUND, WHEN CONCURRENT DIAGNOSTICS WERE RUN?

Yes No

|

|

|

|

+----+

| 085 |

+----+

|

Go to Step 087.

|

+----+

| 086 |

+----+

An array was in the Offline state, but is now available.

- Ensure that the power system turns on power to all the disk drives before, or when, it turns on the power to the system unit.

+----+

| 087 |

+----+

(From step 085)

WAS SRN 49100 LOGGED, BUT NO ERROR FOUND, WHEN CONCURRENT DIAGNOSTICS WERE RUN?

Yes No

|

|

|

|

+----+

| 088 |

+----+

|

You have solved all the array problems.

|

+----+

SSA RAID Adapter Maintenance Information
MAP 2324: SSA RAID

|089|
+---+

An array was in the Exposed state, but is now in the Good state.

This problem might have occurred because a disk drive was temporarily removed from the system.

- Ensure that the power system turns on power to all the disk drives before, or when, it turns on the power to the system unit.

+---+
|090|
+---+

(From steps 024, 030, 034, 040, 044, 062, 068, and 074)

HAS A FAILED DISK DRIVE BEEN EXCHANGED FOR A NEW DISK DRIVE?

Yes No

|
|
+---+
|091|
+---+

If you have repaired a power or cabling fault that caused the disk drive to be missing from the system, the drive might now be in a rejected state. You must change that disk drive into a usable disk drive:

- From the Main menu, select **SSA Adapter List**.
- Select the adapter from the SSA Adapter List.
- Select **Rejected Disks**.
- Delete the disk drive that has been restored to the system. This action changes the disk drive to a free resource.
- Ask the customer to choose how the disk drive is to be configured:

Hot spare disk drive
Attached resource
Remain as a free resource.

+---+
|092|
+---+

If you exchanged the disk drive by using the procedure that is described in "Exchanging Disk Drives" in topic 5.1, the new disk drive is configured as a new disk drive.

- Do the procedure described in "Converting a New Disk Drive to a Free Resource" in topic 7.3.
- Change the new disk drive to a free resource.
- Ask the customer to choose how the disk drive is to be configured:

Hot spare disk drive
Attached resource
Remain as a free resource.

SSA RAID Adapter Maintenance Information
MAP 2410: SSA Repair Verification

3.6 MAP 2410: SSA Repair Verification

This MAP helps you to verify a repair after a FRU has been exchanged for a new one.

Attention: Unless the system unit needs to be turned off for some other reason, *do not turn off the system when servicing an SSA link or a unit in which SSA devices are installed.* Unit power cables and external SSA cables that connect devices to the system can be disconnected while that system is running.

+---+
|001|
+---+

Before you arrived at this MAP, you might have exchanged one or more FRUs for new FRUs. Some of those FRUs (for example, disk drives) have Power lights.

- Check whether all those Power lights are on.

DO ALL THE FRUS YOU HAVE EXCHANGED HAVE THEIR POWER LIGHTS ON (WHERE APPLICABLE)?

Yes No

|
|
|
| +---+
| |002|
| +---+

- Exchange, for a new one, the FRU whose Power light is off.

Go to Step 004.

+---+
|003|
+---+

Go to Step 004.

+---+
|004|
+---+

(From steps 002 and 003)

ARE ALL CHECK LIGHTS OFF?

Yes No

|
|
| +---+
| |005|
| +---+

Go to the START MAP for the unit in which the device with its Check light on is installed.

+---+
|006|
+---+

- Run concurrent diagnostics to the device that reported the problem.

Notes:

1. Do not run nonconcurrent diagnostics; otherwise, errors are logged on other systems that share the same loop.
2. If you have just exchanged a disk drive or an SSA RAID Adapter, you must use the configurator to restore the device to the system.

SSA RAID Adapter Maintenance Information
MAP 2410: SSA Repair Verification

- If the original problem was not reported by a device, run diagnostics to each SSA RAID Adapter in the system unit.
- Run the Fix procedure (see "The Event/Error Logger Utility" in topic 6.5).

Note: If you do not run this service aid, the diagnostics might create an SRN for a problem that has already been solved.

If you have a RAID array, and the problem remains, go to **RAID Checkout** at MAP 2324 step 069 in topic 3.5.

SSA RAID Adapter Maintenance Information
SSA Link Errors

4.0 SSA Link Errors

SSA link errors can be caused if:

- Power is removed from an SSA device
- An SSA device is failing
- An SSA device is removed
- A cable is disconnected

Such errors might be indicated by:

- SRN 45PA
- A flashing link status (Ready) light on the SSA device at each end of the failing link
- The indication of an open link by the Disk Service Aid

Subtopics

- 4.1 SSA Link Error Problem Determination
- 4.2 Link Status Lights
- 4.3 Disk Service Aid

SSA RAID Adapter Maintenance Information
SSA Link Error Problem Determination

4.1 SSA Link Error Problem Determination

Instead of using the normal MAPs to solve a link error problem, you can refer directly to the link status lights to isolate the failing FRU. The descriptions given here show you how to do this.

In an SSA loop, SSA devices are connected through two or more SSA links to an SSA RAID Adapter. Each SSA link is the connection between two SSA nodes (devices or adapters); for example:

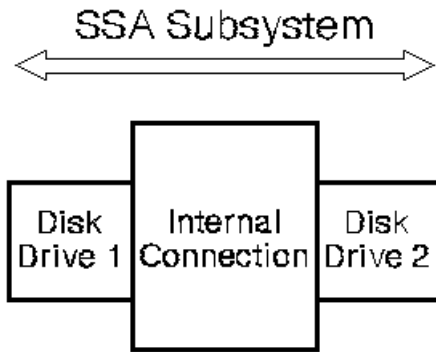
- Disk drive to disk driv
- Adapter to disk drive modul
- Adapter to adapte

An SSA link can contain several parts. When doing problem determination, think of the link and all its parts as one complete item.

Here are some examples of SSA links. Each link contains more than one part.

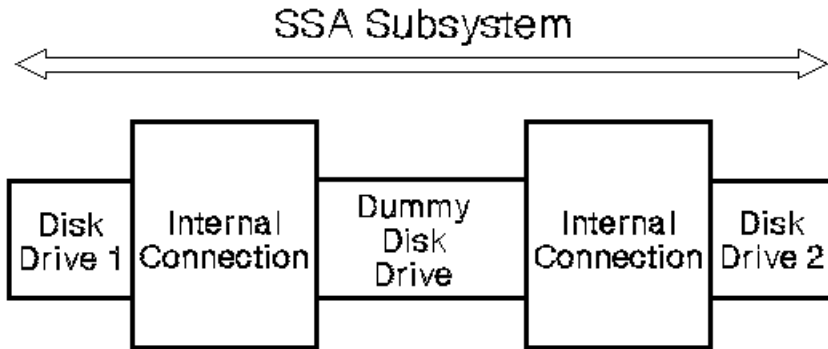
Example 1

This link is between two disk drives that are in the same subsystem. It has three parts.



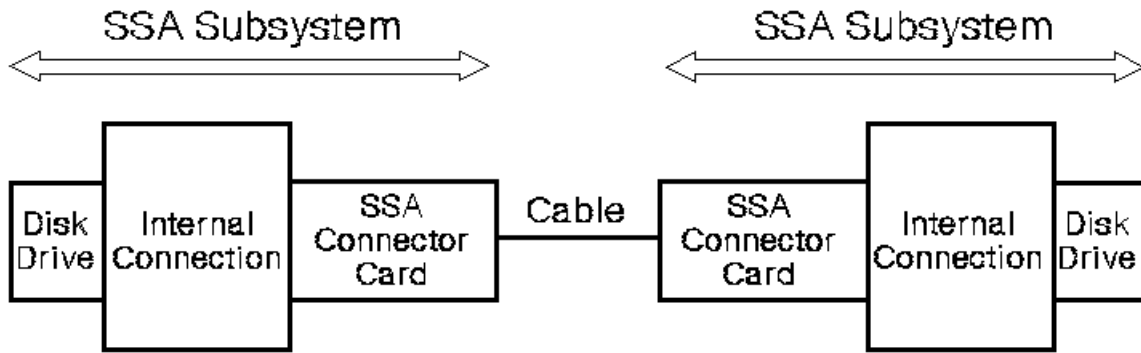
Example 2

This link is between two disk drives that are in the same subsystem. It has five parts.



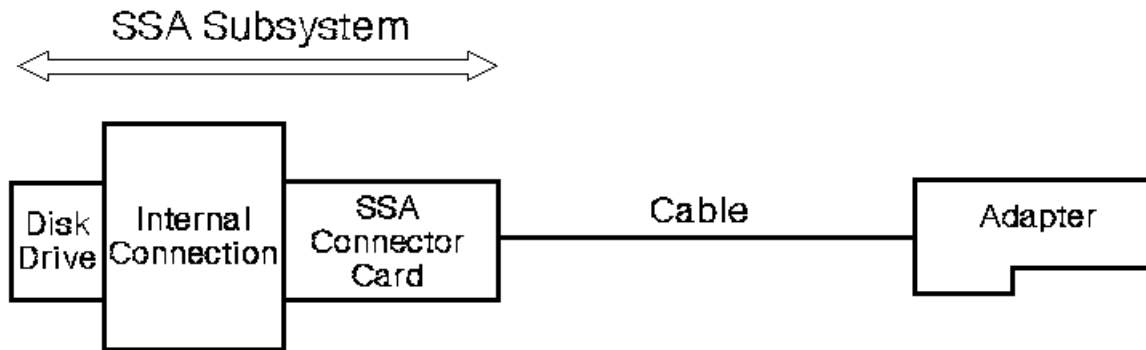
Example 3

This link is between two disk drives that are not in the same subsystem. It has seven parts.



Example 4

This link is between a disk drive and an SSA RAID Adapter. It has five parts.



SSA RAID Adapter Maintenance Information
Link Status Lights

4.2 Link Status Lights

If a fault occurs that prevents the operation of a particular link, the link status lights of the various parts of the complete link show that the error has occurred.

You can find the failing link by looking for the flashing green status light at each end of the affected link. Some configurations might have other indicators along the link (for example, SSA connector cards) to help with FRU isolation.

The meanings of the disk drive and adapter lights are summarized here.

Status of Light	Meaning
Off	Both SSA links are inactive.
Permanently on	Both SSA links are active.
Slow flash (two seconds on, two seconds off)	Only one SSA link is active.

If you need more information about the lights, see:

For adapter lights, "Introducing the IBM SSA RAID Adapter for PC Servers, SSA, and RAID" in topic 1.0 in this book.

For other lights, the service information for the device that contains the lights

SSA RAID Adapter Maintenance Information
Disk Service Aid

4.3 Disk Service Aid

If service aids are available, you can use the Disk service aid to show that the SSA loop is broken.

```
+-----+
|CONFIG  SSA Configurator and Service Aids      Vvymmdd      XX Version|
+-----+
|
|   +-----+
|   | Main Menu
|   +-----+
|   |
|   |   +-----+
|   |   | Disk Service Aids
|   |   +-----+
|   |   | Link          SSA UID      Status
|   |   | Port A1
|   |   |
|   |   |             UIDxxxxx
|   |   |             UIDyxxxx
|   |   |             UID3xxxx
|   |   |             UID4xxxx
|   |   |             -----
|   |   |             UID5xxxx
|   |   | Port A2
|   |   | +-- Port B1
|   |   |             No disks
|   |   | Port B2
|   |   +-----+
|   +-----+
|
| <ESCAPE> Exit  <ENTER> Select  <F1> Help  <F2> Format
| <F3> Certify  <F4> ServiceMode  <F5> Diagnostics  <F9> FlashOn
| <F10> FlashOff
+-----+
```

This example screen shows a break (the dotted line) in the SSA loop between the second and third disk drives. In the condition shown by the display, the Ready lights on the second and third disk drives are both flashing.

To help locate these disk drives, select the disk drive, and press F9 (FlashOn). The Check light on the selected disk drive flashes. This action does not affect the customer's operations.

For more information about the service aids, see "Using the SSA Service Aids and Other Service Tools" in topic 6.0.

SSA RAID Adapter Maintenance Information
Removing and Replacing FRUs

5.0 Removing and Replacing FRUs

Subtopics

5.1 Exchanging Disk Drives

5.2 Exchanging DRAMs on the SSA RAID Adapter

SSA RAID Adapter Maintenance Information
Exchanging Disk Drives

5.1 Exchanging Disk Drives

If you need to exchange a disk drive for a new one, check whether the disk drive that you are going to remove is a member of a RAID array.

If the disk drive is a member of a RAID array, go to "Exchanging Array Disk Drives" in topic 5.1.1.

If the disk drive is **not** a member of a RAID array, go to "Exchanging Non-Array Disk Drives" in topic 5.1.2.

Subtopics

5.1.1 Exchanging Array Disk Drives

5.1.2 Exchanging Non-Array Disk Drives

SSA RAID Adapter Maintenance Information
Exchanging Array Disk Drives

5.1.1 Exchanging Array Disk Drives

1. Start the SSA Configurator and Service Aids Utility (see "Selecting the SSA Configurator Functions" in topic 7.2).
2. From the Main menu, select **System Resources**.
3. Select the array from which you want to remove a disk drive.
4. Select **View Members**.
5. Select the disk drive that you want to remove, and use the Identify function to find the disk drive. To start the Identify function, press F9 (FlashOn); the Check light flashes on the selected disk drive. To end the Identify function, press F10 (FlashOff).
6. Press F7 (Exchange Members).
7. Select **Blank Reserved**.

The selected disk drive has now been removed from the array, and replaced by a blank virtual disk).
8. Physically remove the disk drive (see the unit *Hardware Maintenance Manual*).
9. Physically install the replacement disk drive.
10. Convert the newly-installed disk drive into a free resource (see "Converting a New Disk Drive to a Free Resource" in topic 7.3).
11. From the Main menu, select **System Resources**.
12. Select the array.
13. Select **View Members**.
14. Select the disk drive that you are going to exchange; that is, the hot spare disk drive that was originally exchanged with the rejected disk drive.
15. Press F7 (Exchange Members).
16. A list of candidate disk drives is displayed.
17. Select the disk drive that you want to become the new member of the array.

SSA RAID Adapter Maintenance Information
Exchanging Non-Array Disk Drives

5.1.2 Exchanging Non-Array Disk Drives

1. Start the SSA Configuration and Service Aids Utility (see "Selecting the SSA Configurator Functions" in topic 7.2).
2. From the Main menu, select **SSA Adapter List**.
3. Select an adapter.
4. From the Disk Service Aids menu find the disk drive that you are going to exchange. If the disk drive that you are going to exchange is not listed, select another adapter, and try again.
5. Select the disk drive that you want to remove, and use the Identify function to find the disk drive. To start the Identify function, press F9 (FlashOn); the Check light flashes on the selected disk drive. To end the Identify function, press F10 (FlashOff).
6. Put the cursor on the disk drive that you are going to exchange, and press F4.

This action puts that disk drive into Service Mode. Only one disk can be in Service Mode at a time.

7. Exchange the physical disk drive for a new one (see the unit *Hardware Maintenance Manual*).
8. Press Esc to exit from the Service Aids window. This action automatically resets Service Mode on the new disk drive.
9. Repeat the procedure for any other disk drive that you are exchanging.

SSA RAID Adapter Maintenance Information
Exchanging DRAMs on the SSA RAID Adapter

5.2 Exchanging DRAMs on the SSA RAID Adapter

Subtopics

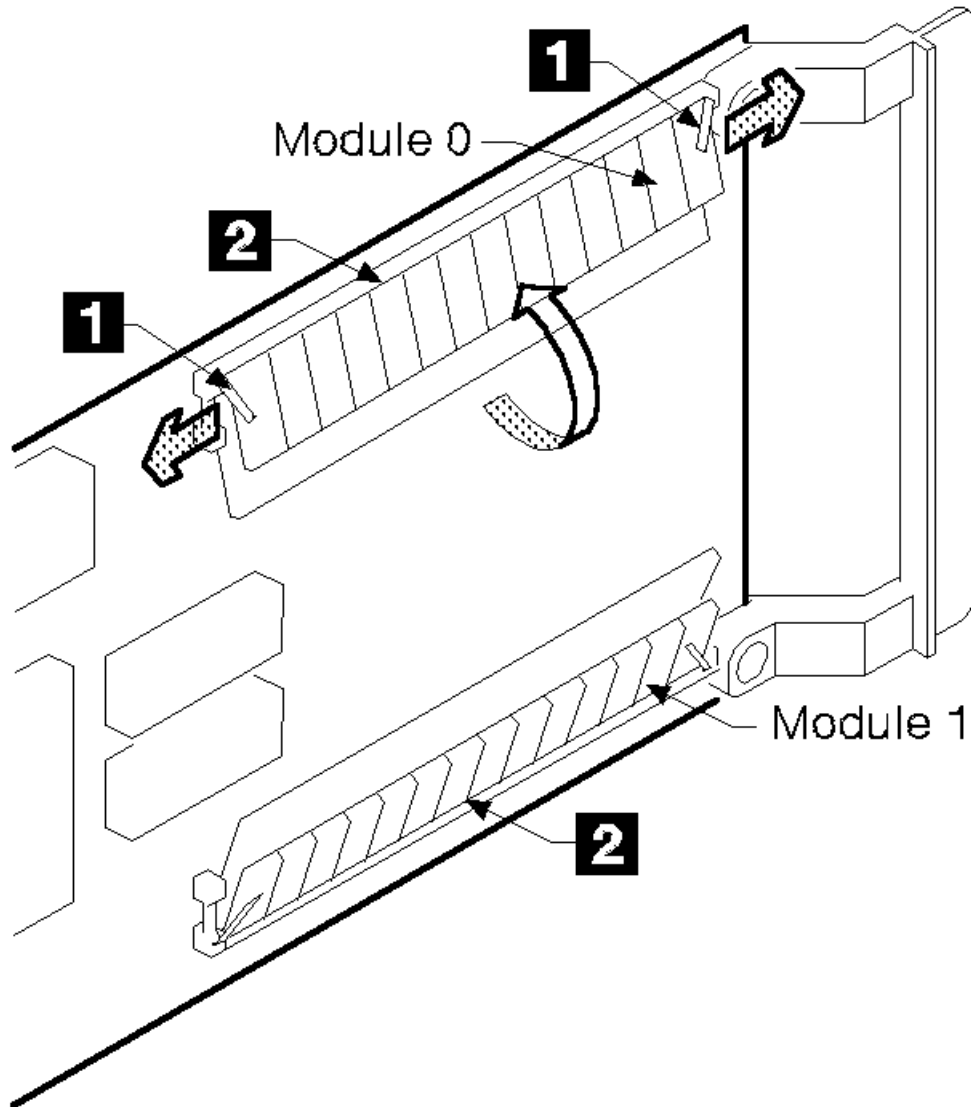
5.2.1 Removing a DRAM

5.2.2 Installing a DRAM

SSA RAID Adapter Maintenance Information
Removing a DRAM

5.2.1 Removing a DRAM

1. Shut down the operating system.
2. Remove power from the system.
3. Remove the adapter from the system unit.
4. Release the clips 1 by carefully pulling them past the ends of the DRAM 2 .
5. Rotate the DRAM away from the adapter card.
6. Pull the DRAM out from the socket.



SSA RAID Adapter Maintenance Information
Installing a DRAM

5.2.2 Installing a DRAM

1. Insert the DRAM into the keyed socket.
2. Press the DRAM into the socket, then rotate the DRAM until the clips 1 click into place.
3. Reinstall the adapter into the system unit (see the service information for the system unit).
4. Turn on the power to the system.
5. Start up the system.

SSA RAID Adapter Maintenance Information
Using the SSA Service Aids and Other Service Tools

6.0 Using the SSA Service Aids and Other Service Tools

The SSA service aids and other tools help you to service SSA systems. This section describes:

- The SSA service aids and how to use the Identify function and how to use it
- The Download Disk Drive Microcode function and how to use it
- How to find the physical location of a device
- The Event/Error Log utility and how to use it

Subtopics

- 6.1 SSA Service Aids
- 6.2 The Identify Function
- 6.3 Download Microcode Function
- 6.4 Finding the Physical Location of a Device
- 6.5 The Event/Error Logger Utility

SSA RAID Adapter Maintenance Information

SSA Service Aids

6.1 SSA Service Aids

SSA service aids are included in the SSA Configurator and Service Aids Utility. The SSA service aids are:

Set Service Mode: This service aid enables you to determine the location of a particular disk drive on the SSA loop, and to remove that disk drive from the loop.

Format Disk: This service aid formats an SSA disk drive.

Certify Disk: This service aid verifies that all the data on a disk drive can be read correctly.

Attention: Do not run the service aids from more than one system at a time; otherwise, unexpected results might occur.

These service aids are available only from the Disk Service Aids menu. To start a service aid, press the appropriate F key. The assignments for the F keys are shown on the screen.

Before you use the service aids, ensure that you are familiar with the principles of SSA loops. If you are not familiar with these principles, first read "SSA Loops and Links" in topic 1.3.

Subtopics

6.1.1 Selecting SSA Service Aids

6.1.2 Set Service Mode Service Aid

6.1.3 Format Disk Service Aid

6.1.4 Certify Disk Service Aid

SSA RAID Adapter Maintenance Information
Selecting SSA Service Aids

6.1.1 Selecting SSA Service Aids

1. Start the SSA Configurator and Service Aids Utility by selecting the icon that was generated when the software was installed, or by running one of the following programs:

For OS/2: **ISSACFG**

For Novell NetWare, issue the following commands:

a. **load CLIB**

b. **load MATHLIB**

c. **load ISSACFG**

For WindowsNT: **ISSACFG**

2. The Main menu is displayed:

```
+-----+
|-----+
|CONFIG  SSA Configurator and Service Aids      Vyyymmdd      XX Version|
|-----+
|
|   +-----+
|   | Main Menu
|   |-----+
|   |
|   | New Disks
|   | Free Resources
|   | System Resources
|   | SSA Adapter List
|   | Event/Error Logger
|   | Service Aids
|   | About
|   |-----+
|
| +-----+
| |<ESCAPE> Exit  <ENTER> Select  <F1> Help
| |-----+
|-----+
+-----+
```

3. From the Main menu, select **SSA Adapter List**.

4. Select the adapter.

5. Select **Service Aids**.

The Disk Service Aids window is displayed:

```
+-----+
|-----+
|CONFIG  SSA Configurator and Service Aids      XX Version|
|-----+
|
|   +-----+
|   | Main Menu
|   |-----+
|   |
|   | +-----+
|   | | Disk Service Aids
|   | |-----+
|   | | Link          SSA UID      Status
|   | | Port A1
|   | |                UIDxxxxx
|   | |                UIDyxxxxx
|   | |                UID3xxxxx
|   | |                -----
|   | |
|   | |-----+
|   |
|   |-----+
|-----+
+-----+
```


SSA RAID Adapter Maintenance Information
Selecting SSA Service Aids

	Port	UID4xxxx
	Port A2	
	Port B1	
+--	Port B2	No disks

+-----+
|<ESCAPE> Exit <ENTER> Select <F1> Help <F2> Format
|<F3> Certify <F4> ServiceMode <F5> Diagnostics <F9> FlashOn
|<F10> FlashOff
+-----+

Notes:

- a. The Link column shows the connectors of the SSA RAID Adapter to which the loop is connected.
- b. The SSA UID column shows the unique identifier of each disk drive.

A dashed line in the SSA UID column shows that the SSA loop is broken. On the screen shown here, the loop is broken between the third and fourth disk drives.

- c. The Status column shows the status of the disk drive; for example, "Power" and "Failed".

SSA RAID Adapter Maintenance Information
Set Service Mode Service Aid

6.1.2 Set Service Mode Service Aid

The Set Service Mode service aid enables you to determine the location of a particular disk drive, and to remove that disk drive from the unit in which it is installed. When the Set Service Mode service aid runs:

The Check light of the disk drive comes on for identification

All SSA loop activity through the disk drive stops

The disk drive motor stops

The Check light (if present) of the unit that contains the selected disk drive comes on

Only one disk drive at a time can be in Service Mode. No communication to the disk drive is possible, and the SSA loop is broken.

Before using this service aid, you must make the selected disk drive unavailable to the system; otherwise, an error occurs.

SSA devices can be maintained concurrently; that is, they can be removed, installed, and tested on an SSA loop while the other devices on the loop continue to work normally. If a disk drive has its Check light on, you can remove that disk drive from the SSA loop without taking any special actions.

If a disk drive does *not* have its Check light on, the SSA loop that passes through it might still be active, although the disk drive itself might not be working. You must put that disk drive into Service Mode before you remove it from the SSA loop.

If you leave the Disk Service Aids window, Service Mode is reset.

To use the Set Service Mode service aid:

1. Start the SSA Configurator and Service Aids Utility, and select **Service Aids** (see "Selecting SSA Service Aids" in topic 6.1.1)

The Disk Service Aids window is displayed.

2. From the Disk Service Aids window, select the disk drive that you want to put into Service Mode.

```
+-----+
|CONFIG  SSA Configurator and Service Aids                               XX Version|
+-----+
|
|   +-----+
|   | Main Menu |
|   +-----+
|   |
|   |   +-----+
|   |   | Disk Service Aids |
|   |   +-----+
|   |   | Link      SSA UID  Status |
|   |   | Port A1          UIDxxxxx |
|   |   |                   UIDyxxxx |
|   |   |                   UID3xxxx |
|   |   |                   ----- |
|   |   |                   UID4xxxx |
|   |   | Port A2          |
|   |   | Port B1          |
|   |   |                   No disks |
|   |   +-----+
|   |   | Port B2          |
|   |   +-----+
|   |
|   +-----+
|   |<ESCAPE> Exit  <ENTER> Select  <F1> Help  <F2> Format |
|   |<F3> Certify  <F4> ServiceMode <F5> Diagnostics <F9> FlashOn |
|   |<F10> FlashOff |
|   +-----+
+-----+
```

SSA RAID Adapter Maintenance Information
Set Service Mode Service Aid

3. If you want to use the Identify function to identify the disk drive, press F9 (FlashOn).
4. Press F4 to set Service Mode. Confirmation information is displayed.

Notes:

- a. You can select only one disk drive at time.
 - b. If you select Service Mode, and the selected disk drive is not in a closed loop or at the end of a string (see "SSA Loops and Links" in topic 1.3), your selection fails and an error message is displayed.
 - c. If the Check light of the disk drive that you have put into Service Mode does not come on, and you are not sure of the location of that disk drive, use the Identify function to help you find it (see "The Identify Function" in topic 6.2). If necessary, you can identify the disk drives that are on each side of the one that you are trying to find.
5. To reset Service Mode, press Esc.

SSA RAID Adapter Maintenance Information
Format Disk Service Aid

6.1.3 Format Disk Service Aid

The Format Disk service aid formats SSA disk drives.

Attention: Formatting a disk drive destroys all the data on that disk drive. Use this procedure only when instructed to do so by the service procedures.

To use the Format Disk service aid:

1. Start the SSA Configurator and Service Aids Utility, and select **Service Aids** (see "Selecting SSA Service Aids" in topic 6.1.1)

The Disk Service Aids window is displayed.

```
+-----+
| CONFIG   SSA Configurator and Service Aids                               XX Version|
+-----+
|
|   +-----+
|   | Main Menu
|   +-----+
|   |
|   |   +-----+
|   |   | Disk Service Aids
|   |   +-----+
|   |   | Link          SSA UID      Status
|   |   | Port A1
|   |   |                UIDxxxxx
|   |   |                UIDyxxxxx
|   |   |                UID3xxxxx
|   |   |                UID4xxxxx
|   |   | Port A2
|   |   | Port B1
|   |   |                No disks
|   |   +-----+
|   |   | Port B2
|   |   +-----+
|   +-----+
|
| <ESCAPE> Exit  <ENTER> Select  <F1> Help  <F2> Format
| <F3> Certify  <F4> ServiceMode <F5> Diagnostics <F9> FlashOn
| <F10> FlashOff
+-----+
```

2. Select the disk drive that you want to format.
3. If you are not sure of the identification of the disk drive that you want to format, use the Identify function to get a positive physical identification of the disk drive (see "The Identify Function" in topic 6.2). You can further ensure that you have selected the correct disk drive by verifying that the serial number on the disk drive 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, press F2 (Format). A prompt for confirmation is displayed:

```
+-----+
|
|   +-----+
|   | Confirmation
|   +-----+
|   | Do you really want to format this disk?
|   |
|   | Yes
|   |
|   | No
|   |
|   | Disk drive nnnnnnnn has been selected for formatting
|   | All data on this physical disk will be lost.
|   | Note - before formatting a physical disk, ensure that the disk|
+-----+
```

SSA RAID Adapter Maintenance Information
Format Disk Service Aid

has been powered on for at least 30 minutes.

5. Answer the prompt.

6. If you want to find out how the format operation is progressing, look at the resource attributes (see "Viewing Resources and Their Attributes" in topic 7.7.2).

SSA RAID Adapter Maintenance Information
Certify Disk Service Aid

6.1.4 Certify Disk Service Aid

The Certify service aid verifies that all the data on a disk drive can be read correctly. Other maintenance procedures tell you when you need to run this service aid.

To use the Certify Disk service aid:

1. Start the SSA Configurator and Service Aids Utility, and select **Service Aids** (see "Selecting SSA Service Aids" in topic 6.1.1)

The Disk Service Aids window is displayed.

```
+-----+
|CONFIG  SSA Configurator and Service Aids                               XX Version|
+-----+
|
|   +-----+
|   | Main Menu |
|   +-----+
|   |
|   |   +-----+
|   |   | Disk Service Aids |
|   |   +-----+
|   |   | Link          SSA UID      Status |
|   |   | Port A1      UIDxxxxx     |
|   |   |              UIDyxxxx     |
|   |   |              UID3xxxx     |
|   |   |              UID4xxxx     |
|   |   | Port A2      |
|   |   | Port B1      |
|   |   |              No disks     |
|   |   | Port B2      |
|   |   +-----+
|   |
|   +-----+
|   | <ESCAPE> Exit  <ENTER> Select  <F1> Help  <F2> Format |
|   | <F3> Certify  <F4> ServiceMode <F5> Diagnostics <F9> FlashOn |
|   | <F10> FlashOff |
|   +-----+
+-----+
```

2. Select the disk drive that you want to certify.
3. If you are not sure of the identification of the disk drive that you want to certify use the Identify function to get a positive physical identification of the disk drive (see "The Identify Function" in topic 6.2). You can further ensure that you have selected the correct disk drive by verifying that the serial number on the front of the disk drive 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, press F3 (Certify).
5. If you want to find out how the certify operation is progressing, look at the resource attributes (see "Viewing Resources and Their Attributes" in topic 7.7.2).

SSA RAID Adapter Maintenance Information
The Identify Function

6.2 The Identify Function

The Identify function can be accessed from most of the SSA Configurator and Service Aids Utility displays.

This function enables you to determine the location of a particular disk drive that you want to identify, but do not want to remove. Identify causes the Check light of the disk drive to flash for identification (two seconds on, two seconds off), but has no effect on the normal operation of the disk drive. It also causes the Check light (if present) of the unit containing the selected disk drive to flash. You can use the Identify function on any number of disk drives at the same time.

Instructions displayed by the service aids tell you when you can select the Identify function.

The service aids display the UIDs of the devices. By checking the UID on the serial-number label on the device, you can verify that the correct device has its Check light flashing.

To start the Identify function, press F9 (FlashOn). To end the Identify function, press F10 (FlashOff).

SSA RAID Adapter Maintenance Information
Download Microcode Function

6.3 Download Microcode Function

Instructions on how to download microcode are contained in a README.TEXT file that is on the diskette supplied with the adapter.

SSA RAID Adapter Maintenance Information

Finding the Physical Location of a Device

6.4 Finding the Physical Location of a Device

The physical location of a device (for example, a disk drive or an SSA RAID Adapter) cannot be reported directly by the 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.

Subtopics

6.4.1 Finding the Device When Service Aids Are Available

6.4.2 Finding the Device When No Service Aids Are Available

SSA RAID Adapter Maintenance Information
Finding the Device When Service Aids Are Available

6.4.1 Finding the Device When Service Aids Are Available

When the service aids are available, use the Identify function to find the correct disk drive (see "The Identify Function" in topic 6.2). If you want to find a device that does not have a Check light (for example, an adapter), you can either use the Identify function to identify devices that are next to the SSA RAID Adapter on the SSA link, or use the procedure described in "Finding the Device When No Service Aids Are Available" in topic 6.4.2.

SSA RAID Adapter Maintenance Information
Finding the Device When No Service Aids Are Available

6.4.2 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 43PAA, 44PAA, and 45PAA.

The port (P) value can be a number 0 through 3. It 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 loop).

Use the port value to locate the relevant connector on the SSA RAID Adapter, then follow the SSA cable to the first *real* device. Include other adapters as real devices if they are in the same SSA link. Do not include dummy devices.

The first device that you reach represents SSA-address count 0. Continue to follow the SSA links from device to device, increasing the SSA-address count by 1 for each device, until you reach the device that is indicated in the SRN.

SSA RAID Adapter Maintenance Information

The Event/Error Logger Utility

6.5 The Event/Error Logger Utility

The adapter software includes an Event/Error Logger utility. This utility is automatically loaded into the system during the installation of the adapter software, and afterward, at each power-on operation. It collects information about SSA errors, and tells you when an error occurs that need a service action.

The format in which the Event/Error Logger reports errors is controlled by the file xxxxxx.yyy in zzzzzz. Details of the settings and how to change them are contained in the header of the control file.

The SSA Configurator and Service Aids Utility provides functions that allow you to use the logged information. These functions are:

- Analyze SSA Event Lo
- Dump SSA Event Lo
- Terminate SSA Event Lo
- Modify SSA Event Logger Time Out

Subtopics

- 6.5.1 Analyze SSA Event Log
- 6.5.2 Dump SSA Event Log
- 6.5.3 Terminate SSA Event Log
- 6.5.4 Modify Event Logger Time Out

SSA RAID Adapter Maintenance Information

Analyze SSA Event Log

6.5.1 Analyze SSA Event Log

This function checks the log information that has been collected over the previous twenty-four hours, and displays information about errors that require service actions to be done.

```
+-----+
| CONFIG   SSA Configurator and Service Aids       Vyyymmdd   XX Version |
+-----+
|
|   +-----+
|   | Main Menu |
|   +-----+
|   |           |
|   |   +-----+
|   |   | Error Log Report |
|   |   +-----+
|   |   | New Di |
|   |   | Free R+
|   |   | System| 1. hh:mm:ss dd-mm-yy  serialnum SRNNN|
|   |   | SSA Ad| 2. hh:mm:ss dd-mm-yy  serialnu2 SRNN2|
|   |   | Event/|
|   |   | Servic|
|   |   | About |
|   |   +-----+
|   |           |
|   +-----+
|
| +-----+
| | <ESCAPE> Exit  <DELETE> Delete  <F1> Help |
| +-----+
+-----+
```

Service Actions are indicated by service request numbers (SRNs): see "Service Request Numbers (SRNs)" in topic 2.0.

Note: The Analyze Log function does not recommend a service action for every log entry. Not all log entries require a service action. In some conditions, some errors might be related to operational procedures. Such errors do not require service actions.

Attention: If you need to do any service actions, always go first to "MAP 2010: START" in topic 3.2.

SSA RAID Adapter Maintenance Information
Dump SSA Event Log

6.5.2 Dump SSA Event Log

This function translates, and writes to a text file, the contents of the Event/Error Log. You can use any text display to look at the text file.

Note: Not all log entries require a service action. In some conditions, some errors might be related to operational procedures. Such errors do not require service actions.

SSA RAID Adapter Maintenance Information
Terminate SSA Event Log

6.5.3 Terminate SSA Event Log

This function ends the operations of the event/error logger.

To restart the logger, either use the icon that is normally in the STARTUP group folder, or go to the directory that contains the ISSAELOG.EXE file.

SSA RAID Adapter Maintenance Information

Modify Event Logger Time Out

6.5.4 Modify Event Logger Time Out

This function enables you to set a longer time for the event logger to perform the analyze and dump functions. A heavily-loaded system might cause a time out to occur if the time setting is too short.

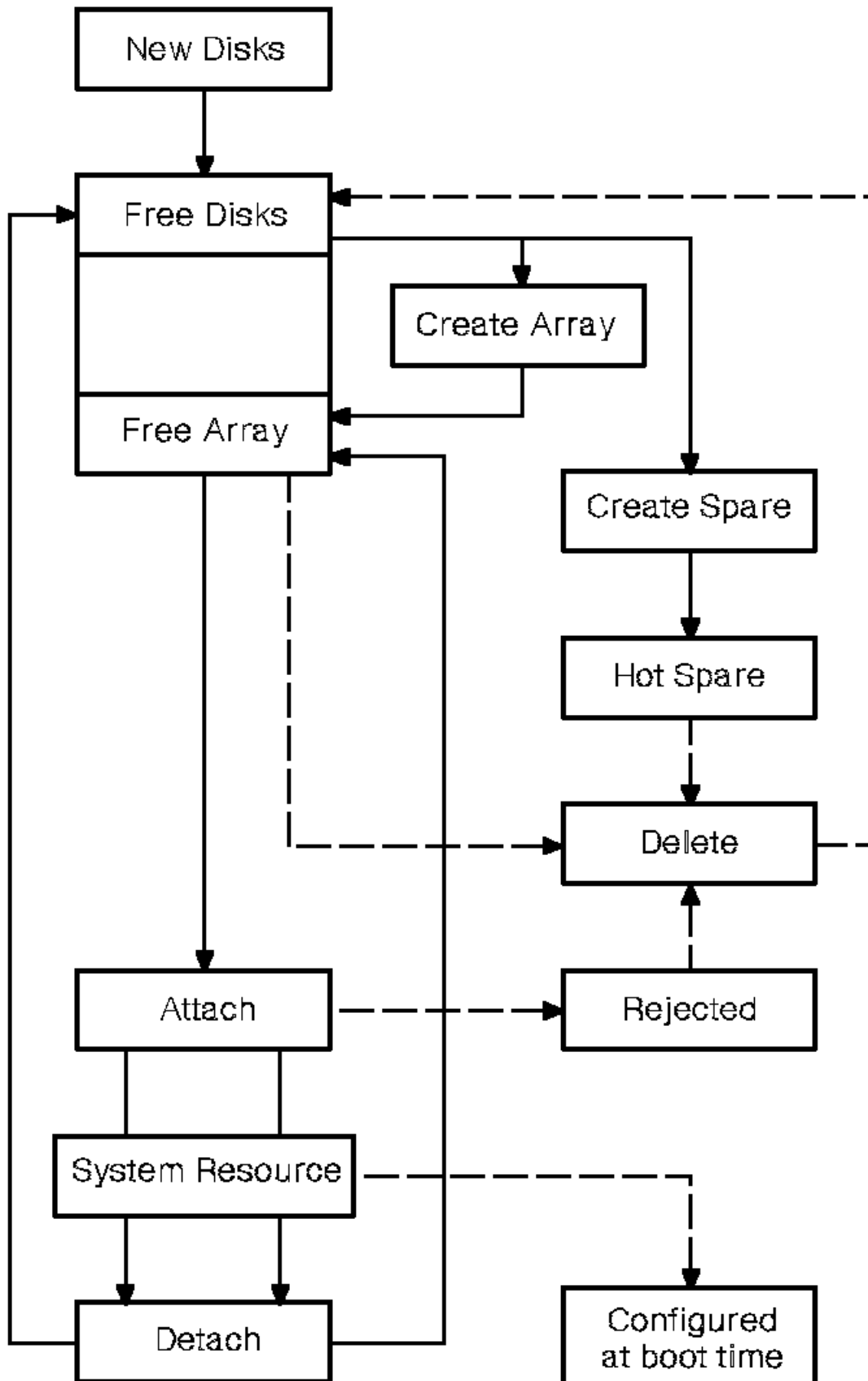
SSA RAID Adapter Maintenance Information

Using the SSA Configurator Functions

7.0 Using the SSA Configurator Functions

The functions of the SSA configurator are included in the SSA Configurator and Service Aids Utility that is provided on the SSA RAID Adapter diskette for your operating system.

The diagram summarizes functions of the SSA configurator.



You must use the SSA configurator to configure and attach SSA disk drives; otherwise, the operating system cannot use those disk drives. You do not need to run this configurator if you are configuring and attaching other types of device.

SSA RAID Adapter Maintenance Information
Using the SSA Configurator Functions

Subtopics

- 7.1 Array States
- 7.2 Selecting the SSA Configurator Functions
- 7.3 Converting a New Disk Drive to a Free Resource
- 7.4 Creating an Array or a Hot Spare Disk Drive
- 7.5 Attaching a Resource to the System
- 7.6 Dealing with RAID Array Problems
- 7.7 Performing Other Array Tasks

SSA RAID Adapter Maintenance Information

Array States

7.1 Array States

An array can be in one of several states. The state of an array is shown in the status column of some of the SSA configurator menus. Those states are described here.

Subtopics

7.1.1 Good State

7.1.2 Exposed State

7.1.3 Degraded State

7.1.4 Rebuilding State

7.1.5 Offline State

SSA RAID Adapter Maintenance Information
Good State

7.1.1 Good State

An array is in the Good state when all the member disk drives of that array are present.

SSA RAID Adapter Maintenance Information

Exposed State

7.1.2 Exposed State

An array enters the Exposed state when a member disk drive becomes missing (logically or physically) from that array. When an array is in the Exposed state, you can reintroduce the missing disk drive, or exchange it for a new one. If necessary, the array management software rebuilds the data that was on the original disk drive before it became missing, then writes that rebuilt data to the reintroduced, or replacement, disk drive. When the data is correct, the array management software returns the array to the Good state.

Subtopics

7.1.2.1 Read Operations while in the Exposed State

7.1.2.2 Write Operations while in the Exposed State

SSA RAID Adapter Maintenance Information

Read Operations while in the Exposed State

7.1.2.1 Read Operations while in the Exposed State

When a read operation is performed on an array that is in the Exposed state, the array management software recreates (rebuilds) the data that was contained on the missing disk drive.

SSA RAID Adapter Maintenance Information

Write Operations while in the Exposed State

7.1.2.2 Write Operations while in the Exposed State

When a write command is sent to an array that is in the Exposed state, the array management software does the following:

If a hot spare disk drive is enabled and available when the write command is sent, the array management software immediately exchanges the missing disk drive for the hot spare disk drive, and returns the disk array to the Good state.

If no hot spare disk drive is enabled and available, the first write operation causes the array to enter the Degraded state. The written data is not protected. If another disk drive in the array fails, or the power fails during a write operation, data might be lost.

SSA RAID Adapter Maintenance Information

Degraded State

7.1.3 Degraded State

An array enters the Degraded state if, while in the Exposed state, it receives a write command. If no hot spare disk drive is available, and a write operation is performed on the array, the array remains in the Degraded state until you take action to return that array to the Good state.

While in Degraded state, an array is not protected. If another disk drive in the array fails, or the power fails during a write operation, data might be lost.

You can return the disk drive to the array, or install another disk drive. The array management software starts a rebuild operation to synchronize the new disk drive with the data that is contained in the other disk drives of the array. This action returns the array to the Good state.

Attention: In this mode of operation, one data check can cause the loss of a large amount of data (more than 64 KB). The array management software must do a complete rebuild of the array to recover the data.

SSA RAID Adapter Maintenance Information

Rebuilding State

7.1.4 Rebuilding State

An array enters Rebuilding state after a missing disk has been replaced. When the array is in this state, all the member disk drives are present, but the data and parity are being rebuilt on the replaced disk drive. The array management software allows read and write operations on a disk drive that is in Rebuilding state. If the power fails before the rebuilding is complete, the array management software restarts the complete rebuilding operation when the power returns.

SSA RAID Adapter Maintenance Information
Offline State

7.1.5 Offline State

An array enters Offline state when two or more disk drives become missing. Read and write operations are not allowed.

SSA RAID Adapter Maintenance Information
Selecting the SSA Configurator Functions

7.2 *Selecting the SSA Configurator Functions*

1. **If the operating system is running**, start the SSA Configurator and Service Aids Utility by selecting the icon that was generated when the software was installed, or by running one of the following programs:

For OS/2: **ISSACFG**

For Novell NetWare, issue the following commands:

a. **load CLIB**

b. **load MATHLIB**

c. **load ISSACFG**

For WindowsNT: **ISSACFG**

If the operating system is not running, run the stand-alone DOS SSA Configuration Utility (ISSACFG).

2. The Main menu is displayed.

Note: Under some adapter error conditions, the configurator is not loaded, and an error message is displayed.

```
+-----+
|+-----+
| |CONFIG  SSA Configurator and Service Aids      Vyyymmdd      XX Version|
|+-----+
|
|   +-----+
|   |           Main Menu           |
|   +-----+
|   |
|   | New Disks                     |
|   | Free Resources                 |
|   | System Resources               |
|   | SSA Adapter List               |
|   | Event/Error Logger             |
|   | Service Aids                   |
|   | About                           |
|   |
|   +-----+
|
|+-----+
| |<ESCAPE> Exit  <ENTER> Select  <F1> Help  |
|+-----+
+-----+
```

SSA RAID Adapter Maintenance Information
 Converting a New Disk Drive to a Free Resource

7.3 *Converting a New Disk Drive to a Free Resource*

A new disk drive is one that has not been used previously by the same type of system as that in which it is now installed. Before a new disk can be attached to the system, it must be in the free state.

1. Start the SSA Configurator and Service Aids Utility (see "Selecting the SSA Configurator Functions" in topic 7.2).
2. From the Main menu, select **New Disks**.
3. If a list of new disk drives is displayed, go to step 4.

If no list is displayed, go to step 5.

```

+-----+
| CONFIG  SSA Configurator and Service Aids      Vyyymmdd      XX Version |
+-----+
|
|   +-----+
|   | Main Menu
|   +-----+
|   |
|   | New D+-----+
|   | Free |           List of New Disks
|   | Syste+-----+
|   | SSA A|SSA UID/Array Name      Status      Adapter
|   | Event|xxxxxxxxx              xxxxxxxx      15
|   | Servi|yyyyyyyyy              yyyyyyy      14
|   | About+-----+
|   |
|   +-----+
|
| +-----+
| |<ESCAPE> Exit  <ENTER> Select  <DELETE> Delete  <F1> Help
| |<F9> Flash On  <F10> Flash Off
| +-----+
|
+-----+
    
```

4. For each disk drive that you want to attach to your system, put the cursor against its name and press Delete. Its name disappears from the list. That disk drive is now in the *free* state.
5. Return to the Main menu by pressing Esc.
6. If you want to display a list of disk drives that are in the free state, Select **Free Resources** from the Main menu. A list of disk drives that are in the free state is displayed.

SSA RAID Adapter Maintenance Information
 Creating an Array or a Hot Spare Disk Drive

7.4 *Creating an Array or a Hot Spare Disk Drive*

To create an array or a hot spare disk drive:

1. Start the SSA Configurator and Service Aids Utility (see "Selecting the SSA Configurator Functions" in topic 7.2).
2. From the Main menu, select **SSA Adapter List**.
3. The SSA Adapter List window opens:

```

+-----+
| CONFIG  SSA Configurator and Service Aids      Vyymmdd      XX Version |
+-----+
|
|   Main Menu
|   +-----+
|   | New Disks
|   | Free Resources
|   | Syst+-----+
|   | SSA |           SSA Adapter List
|   | Even+-----+
|   | Serv| Bus X Device Y Slot Z Adapter  (Q)
|   | Abou| Bus X Device N Slot T Adapter  (S)
|   |
|   +-----+
|
+-----+
| <ESCAPE> Exit  <ENTER> Select  <F1> Help
+-----+
    
```

Select the adapter that is to control the array and hot spare disk drives.

4. The Adapter Menu window opens:

```

+-----+
| CONFIG  SSA Configurator and Service Aids      Vyymmdd      XX Version |
+-----+
|
|   Main M+-----+
|   | Bus X Device Y Slot Z Adapter  (Q)
|   +-----+
|   | New Disks | RAID-0 Arrays
|   | Free Resour| RAID-1 Arrays
|   | Syst+-----+ RAID-5 Arrays
|   | SSA |       | Rejected Disks
|   | Even+-----+ | Non-Volatile RAM
|   | Serv| Bus X | Hot-spare Disks
|   | Abou| Bus X | Run Concurrent Diagnostics
|   |       | Run Non-Concurrent Diagnostics
|   |       | View Adapter VPD
|   |       | Disk Service Aids
|   +-----+
|
+-----+
| <ESCAPE> Exit  <ENTER> Select  <F1> Help
+-----+
    
```

SSA RAID Adapter Maintenance Information
Creating an Array or a Hot Spare Disk Drive

+-----+

Select the type of array or hot spare disk drive that is to be created. You can scroll the contents of the window by using the arrow keys.

5. If you are creating an array, go to "Creating the Array" in topic 7.4.1.

If you are creating a hot spare disk drive, go to "Creating the Hot Spare Disk Drive" in topic 7.4.2.

Subtopics

7.4.1 Creating the Array

7.4.2 Creating the Hot Spare Disk Drive

SSA RAID Adapter Maintenance Information
Creating the Array

7.4.1 Creating the Array

1. A list of the arrays of this type that are already controlled by this adapter appears in a new window:

```

+-----+
| CONFIG  SSA Configurator and Service Aids      Vvymdd      XX Version |
+-----+
|
| Main M+
|-----+
| Bus X  Device Y  Slot Z  Adapter      (Q) |
|-----+
| New Disks | RAID-0 Arrays |
| Free Resour| RAID-1 A+-----+
| Syst+-----| RAID-5 A| List of RAID-X Arrays |
| SSA | | Rejected+-----+
| Even+-----| Non-Vola|Array name      Status | |
| Serv| Bus X| Hot-spar|1. xxxxxxxx      yyyyyyy |
| Abou| Bus X| Run Conc|
| | | Run Non-+-----+
| +-----| View Adapter VPD |
| | | Disk Service Aids |
|-----+
|
+-----+
| <ESCAPE> Exit  <ENTER> Select  <INSERT> Insert  <DELETE> Delete |
| <F1> Help  <F9> FlashOn  <F10> FlashOff  <F8> Modify Attributes |
+-----+

```

To add the new array, press Insert.

2. A window opens showing the attributes for the type of array selected:

```

+-----+
| CONFIG  SSA Configurator and Service Aids      Vvymdd      XX Version |
+-----+
|
| Main M+
|-----+
| Bus X  Device Y  Slot Z  Adapter      (Q) |
|-----+
| New Disks | RAI+-----+
| Free Resour| RAI| Filter Attributes for RAID-X Arrays |
| Syst+-----| RAI+-----+
| SSA | | Rej| SSA UID/Array Name : xxxxxxxx |
| Even+-----| Non| attributel      : xx |
| Serv| Bus X| Hot| attribute2      : yy |
| Abou| Bus X| Run|
| | | Run|
| +-----| Vie|
| | | Dis+-----+
|-----+
|
+-----+
| <ESCAPE> Exit  <ENTER> Select  <F1> Help |
+-----+

```

You must type an Array Name for the new array. The default values for the attributes are shown. You can change these values

SSA RAID Adapter Maintenance Information
Creating the Array

by overtyping them. (The Help screen provides details of the values that are allowed.) Use the arrow keys to scroll the contents of the window, if necessary, to ensure that you check all the attributes. Press Select to set the attributes.

3. When you set the attributes, the list (initially blank) of members of the array appears in a new window:

```

+-----+
| CONFIG  SSA Configurator and Service Aids      Vyyymmdd      XX Version|
+-----+
|
|   Main M+-----+
|   +-----+ Bus X +-----+ (Q)
|   +-----+ Members for RAID-X Arrays  +-----+
|   New Disks | RAI+-----+
|   Free Resour| RAI|
|   Syst+-----+ RAI+---| 1. xxxxxxxx      status  +-----+
|   SSA |      | Rej| S|
|   Even+-----+ Non| a|
|   Serv| Bus X| Hot| a|
|   Abou| Bus X| Run|
|   |      | Run|
|   +-----+ Vi| +-----+
|   |      | Di+-----+
|   +-----+
|
+-----+
| <ESCAPE> Exit  <INSERT> Insert  <DELETE> Delete  <F1> Help
| <F9> FlashOn  <F10> FlashOff
+-----+

```

To select the disk drives for the array:

- a. Press Insert
- b. A list of candidate disk drives is displayed:

```

+-----+
| CONFIG  SSA Configurator and Service Aids      Vyyymmdd      XX Version|
+-----+
|
|   Main M+-----+
|   +-----+ Bus X +-----+ (Q)
|   +-----+ Members for RAID-X Arrays  +-----+
|   New Disks | RAI+-----+
|   Free Resour| RA+-----+
|   Syst+-----+ RA|   Candidates for RAID-X Arrays  +-----+
|   SSA |      | Re+-----+
|   Even+-----+ No| 1.  canUID111      status
|   Serv| Bus X| Ho| 2.  canUID222      status
|   Abou| Bus X| Ru| 3.  canUID333      status
|   |      | Ru| 4.  canUID444      status
|   +-----+ Vi| 5.  canUID555      status
|   |      | Di|
|   +-----+
|
+-----+
| <ESCAPE> Exit  <ENTER> Select  <F1> Help  <F9> FlashOn
| <F10> FlashOff
+-----+

```

SSA RAID Adapter Maintenance Information
Creating the Array

c. Select the disk drive that is to be included in the array.

The previous window reappears now showing the selected disk drive as a member of the array.

d. Repeat steps 3a through 3c for each disk drive that you want to attach.

4. When you have selected all the disk drives required, create the array by pressing Esc and following the prompt to confirm the creation of the array.

The screen that is shown in step 1 reappears showing the new array in the list. If the new array is a RAID-5 array, it is shown with *rebuilding* status while the adapter is initializing the array and its member disk drives.

You can return to the Main menu by repeatedly pressing Esc.

5. The array that you have created is in the *free* state. You must now to attach the array to your system. Go to "Attaching a Resource to the System" in topic 7.5.

SSA RAID Adapter Maintenance Information
 Creating the Hot Spare Disk Drive

7.4.2 Creating the Hot Spare Disk Drive

1. A list of the hot spare disk drives that are controlled by the adapter is displayed.

Note: The list might not contain any hot spare disk drives.

```

+-----+
|CONFIG  SSA Configurator and Service Aids      Vyyymmdd      XX Version|
+-----+
|
|      Main M+-----+
+-----+| Bus X +-----+ (Q)
|      +-----+| Members for RAID-X |-----+
| New Disks | RAI+---+-----+-----+
| Free Resour| RA+---+-----+-----+
| Syst+-----+| RA|      List of Hot-spare Disks |
| SSA |      Re+-----+-----+
| Even+-----+| No|1.  canUID111      status
| Serv| Bus X| Ho|2.  canUID222      status
| Abou| Bus X| Ru|3.  canUID333      status
|      |      Ru|4.  canUID444      status
|      +-----+| Vi|5.  canUID555      status
|      |      Di|
+-----+|
+-----+
|
|<ESCAPE> Exit  <ENTER> Select  <F1> Help  <F9> FlashOn
|<F10> FlashOff
+-----+
    
```

Press Insert to add the new hot spare disk drive.

2. When asked to specify block size, accept the default size.
3. A list of candidate disk drives is displayed:

```

+-----+
|CONFIG  SSA Configurator and Service Aids      Vyyymmdd      XX Version|
+-----+
|
|      Main M+-----+
+-----+| Bus X +-----+ (Q)
|      +-----+| Candidates for Hot-spare Disks|-----+
| New Disks | RAI+---+-----+-----+
| Free Resour| RA+---+-----+-----+
| Syst+-----+| RA|      Hot Spares |
| SSA |      Re+-----+-----+
| Even+-----+| No|1.  canUID111      status
| Serv| Bus X| Ho|2.  canUID222      status
| Abou| Bus X| Ru|3.  canUID333      status
|      |      Ru|4.  canUID444      status
|      +-----+| Vi|5.  canUID555      status
|      |      Di|
+-----+|
+-----+
|
|<ESCAPE> Exit  <ENTER> Select  <F1> Help  <F9> FlashOn
|<F10> FlashOff
+-----+
    
```

SSA RAID Adapter Maintenance Information
Creating the Hot Spare Disk Drive

Select the hot spare disk drive.

The new hot spare disk drive is added to the list.

SSA RAID Adapter Maintenance Information
Attaching a Resource to the System

7.5 Attaching a Resource to the System

1. Start the SSA Configurator and Service Aids Utility (see "Selecting the SSA Configurator Functions" in topic 7.2).
2. From the Main menu, select **System Resources**.

A resource is a device that is to be accessed as a disk drive, a hot-spare disk drive, or an array of disk drives.

A list, initially blank, of the resources that are attached to the system is displayed. The list can contain disk drives, arrays, and hot spare disk drives.

The resources are listed in the sequence of the disk drive addresses. (The configurator assigns disk drive addresses that are directly related to the positions, in the resource list, that you have selected for the attachment of the disk drives.) The system configures the disk drives in drive-address sequence when the system is booted. Only resources that are *attached* can be accessed by the operating system.

```

+-----+
| CONFIG   SSA Configurator and Service Aids           Vyyymmdd       XX Version |
+-----+
|
|   +-----+
|   | Main Menu |
|   +-----+
|   |
|   | New Disks | List of System Resources |
|   | Free Resour+-----+
|   | System Reso| SSA UID/Array Name  Status      Adapter Disk |
|   | SSA Adapter|
|   | Event/Error| 1.xxxx           Online       15        14L |
|   | Service Aid|
|   | About      |
|   +-----+
|
+-----+
|
| <ESCAPE> Exit <ENTER> Select <INSERT> Insert <DELETE> Delete |
| <F1> Help <F9> FlashOn <F10> FlashOff |
+-----+

```

3. For the first resource, just press Insert; otherwise, put the cursor against the name of the resource that is immediately below where you want the new resource to be added. Press Insert.

To add a resource to the end of the list, put the cursor below the current end of the list and press Insert.

4. A list of candidate resources is displayed:

```

+-----+
| CONFIG   SSA Configurator and Service Aids           Vyyymmdd       XX Version |
+-----+
|
|   +-----+
|   | Main Menu |
|   +-----+
|   |
|   | New Disks | List of System Resources |
|   | Free Resour+-----+
|   | System Reso| SSA UID/Array Name  Status      Adapter Disk |
|   | SSA Adapter|
|   | Event/Error| |
|   | Service Aid| Candidates for System Resources |
|   +-----+
|
+-----+

```


SSA RAID Adapter Maintenance Information
Deleting a Resource from the System Resource List

7.5.1 Deleting a Resource from the System Resource List

Note: Only resources that are listed in the system resource list are configured when you next boot the system.

1. Start the SSA Configurator and Service Aids Utility (see "Selecting the SSA Configurator Functions" in topic 7.2).
2. From the Main menu, select **System Resources**.
3. Select the resource that you want to remove from the system resource list.

Notes:

- a. A resource can be a disk drive, an array, or a hot spare disk drive.
 - b. If you are removing a disk drive from an array, you must first remove the array from the system resource list.
4. Press Delete. This action moves the resource to the list of free resources. You have removed the resource from the system resource list. If you are removing a disk drive from an array, continue with the next step.
 5. From the Main menu, select **Free Resources**.
 6. Select the array from which you are removing the disk drive.
 7. Select **View Members**.
 8. Select the disk drive from the list of member disk drives.
 9. Press Delete. The disk drive is removed from the array, and becomes a free disk.
 10. Reboot the system to bring the changes into effect.

SSA RAID Adapter Maintenance Information
Dealing with RAID Array Problems

7.6 Dealing with RAID Array Problems

This part of the book describes how to solve problems that might occur on your arrays.

Subtopics

7.6.1 Identifying and Correcting or Removing Failed Disk Drives

7.6.2 Installing a Replacement Disk Drive (Component Exchange)

SSA RAID Adapter Maintenance Information
Identifying and Correcting or Removing Failed Disk Drives

7.6.1 Identifying and Correcting or Removing Failed Disk Drives

1. Start the SSA Configurator and Service Aids Utility (see "Selecting the SSA Configurator Functions" in topic 7.2).
2. From the Main menu, select **SSA Adapter List**.
3. Select the adapter.
4. Select **Rejected Disk**.
5. A list of rejected disk drives is displayed:

```

+-----+
| CONFIG  SSA Configurator and Service Aids      Vyymmdd      XX Version|
+-----+
|
|      Main M+-----+
+-----+| Bus X  Device Y  Slot Z  Adapter      (Q)
+-----+|-----+
| New Disks | RAID-0 Arrays
| Free Resour| RAID-1 A+-----+
| Syst+-----| RAID-5 A|      List of Rejected Disks
| SSA |      Rejected+-----+
| Even+-----| Non-Vola|SSA UID/Array Name  Status
| Serv| Bus X| Hot-spar|1. xxxxxxxx      yyyyyyy
| Abou| Bus X| Run Conc|
|      |      Run Non+-----+
|      +-----| View Adapter VPD
|      |      Disk Service Aids
+-----+|-----+
+-----+
| <ESCAPE> Exit  <ENTER> Select  <DELETE> Delete  <F1> Help
| <F9> FlashOn <F10> FlashOff
+-----+

```

6. Check the list of rejected disk drives against other error reports to find out why the disk drive was rejected from the array.
7. If you know the physical location of the rejected disk drive, go to step 8. Otherwise, press F9 (FlashOn) to identify the rejected disk drive.
8. If the disk drive was rejected from the array because the disk drive itself has failed, go to "Removing a Disk Drive from an Array" in topic 7.7.4.

When you have removed the disk drive from the array, return here and go to step 9.

If the disk drive was rejected from the array because some other part has failed (for example, a power supply unit, or an SSA cable), correct the problem.

9. If, as a result of the problems described in step 8, the rejected disk drive has been exchanged for a hot spare disk drive, you can do either of the following two procedures:

Let the replacement disk drive be a permanent member disk drive in the array, and convert the rejected disk drive into a hot spare disk drive:

- a. Delete the rejected disk drive from the Rejected list; the disk drive becomes a free resource.
- b. Convert the free resource disk drive into a hot spare disk drive (see "Creating an Array or a Hot Spare Disk Drive" in topic 7.4).

Exchange the rejected disk drive for a replacement disk drive:

SSA RAID Adapter Maintenance Information
Identifying and Correcting or Removing Failed Disk Drives

- a. Delete the rejected disk drive from the Rejected list; the disk drive becomes a free resource.
- b. From the Main menu, select **System Resources**.
- c. Select the array.
- d. Select **View Members**.
- e. Select the disk drive that you are going to exchange; that is, the hot spare disk drive that exchanged with the rejected disk drive.
- f. Press F7 (Exchange Members).
- g. A list of candidate disk drives is displayed.
- h. Select the disk drive that you want to become the new member of the array.

SSA RAID Adapter Maintenance Information
Installing a Replacement Disk Drive (Component Exchange)

7.6.2 Installing a Replacement Disk Drive (Component Exchange)

1. Physically install the replacement disk drive (see the unit *Hardware Maintenance Manual*).
2. Convert the newly-installed disk drive into a free resource (see "Converting a New Disk Drive to a Free Resource" in topic 7.3).
3. From the Main menu, select **System Resources**.
4. Select the array.
5. Select **View Members**.
6. Select the disk drive that you are going to exchange; that is, the hot spare disk drive that was originally exchanged with the rejected disk drive.
7. Press F7 (Exchange Members).
8. A list of candidate disk drives is displayed.
9. Select the disk drive that you want to become the new member of the array.

SSA RAID Adapter Maintenance Information
Performing Other Array Tasks

7.7 Performing Other Array Tasks

This section describes some of the other uses of the SSA Configurator and Service Aids Utility.

All these tasks use the SSA Configurator Utility that is provided on the SSA RAID Adapter diskette for your operating system.

Subtopics

- 7.7.1 Viewing the Physical Configuration
- 7.7.2 Viewing Resources and Their Attributes
- 7.7.3 Modifying Attributes of Resources
- 7.7.4 Removing a Disk Drive from an Array
- 7.7.5 Adding a Disk Drive to an Array
- 7.7.6 Listing the Disk Drives in an Array
- 7.7.7 Listing or Deleting Records of Old Arrays in the NVRAM

SSA RAID Adapter Maintenance Information
Viewing the Physical Configuration

7.7.1 Viewing the Physical Configuration

1. Start the SSA Configurator and Service Aids Utility (see "Selecting the SSA Configurator Functions" in topic 7.2).
2. From the Main menu, select **SSA Adapter List**.
3. Select **Disk Service Aids**. A list of disk drives is displayed:

```
+-----+
|CONFIG  SSA Configurator and Service Aids  Vyyymmdd  XX Version|
+-----+
|
|   +-----+
|   |   Main Menu   |
|   +-----+
|   |   +-----+
|   |   |   Disk Service Aids   |
|   |   +-----+
|   |   | Link          SSA UID   |
|   |   | Port A1      UIDxxxxx  |
|   |   |              UIDyxxxx  |
|   |   |              UID3xxxx  |
|   |   |              UID4xxxx  |
|   |   | Port A2      No disks   |
|   |   | Port B1      No disks   |
|   |   | Port B2      No disks   |
|   |   +-----+
|   |   +-----+
|   |   |<ESCAPE> Exit  <ENTER> Select  <F1> Help  <F2> Format
|   |   |<F3> Certify  <F4> ServiceMode  <F5> Diagnostics  <F9> FlashOn
|   |   |<F10> FlashOff
|   |   +-----+
|   +-----+
+-----+
```

In this example, four disk drives are connected between ports A1 and A2 of the adapter, in a loop, in the order shown. No disk drives are connected to ports B1 and B2.

If a dashed line appears in the list of disk drives, the loop is broken at that point.

SSA RAID Adapter Maintenance Information
 Modifying Attributes of Resources

7.7.3 Modifying Attributes of Resources

1. Start the SSA Configurator and Service Aids Utility (see "Selecting the SSA Configurator Functions" in topic 7.2).
2. From the Main menu, select **System Resources**.
3. Select the array whose attributes you want to change.
4. Press F8 (Modify Attributes).

```

+-----+
| CONFIG   SSA Configurator and Service Aids       Vyymmdd       XX Version |
+-----+
|
|           Main M+-----+
|           +-----+ | Bus X Device Y Slot Z Adapter      (Q) |
|           +-----+ |
|           New Disks | RAID-0 Arrays
|           Free Resour| RAID-1 A+-----+
|           Syst+-----| RAID-5 A|      List of RAID-X Arrays
|           SSA |       | Rejected+-----+
|           Even+-----| Non-Vola|Array name      Status
|           Serv| Bus X | Hot-spar|1. xxxxxxxx      YYYYYYY
|           Abou| Bus X | Run Conc|
|           |       | Run Non+-----+
|           +-----+ | View Adapter VPD
|           |       | Disk Service Aids
|           +-----+ |
|
+-----+
| <ESCAPE> Exit <ENTER> Select <INSERT> Insert <DELETE> Delete |
| <F1> Help <F9> FlashOn <F10> FlashOff <F8> Modify Attributes |
+-----+
    
```

This screen allows you to modify the attributes for the array. When you press Enter, the cursor moves to the next changeable attribute in the list. When you press Enter on the final changeable attribute, a list of components for the array is displayed.

5. If you need information about the attributes, press F1 for a detailed description of each attribute.

SSA RAID Adapter Maintenance Information

Removing a Disk Drive from an Array

7.7.4 Removing a Disk Drive from an Array

This option allows you to remove a disk drive from an array so that you can install a replacement disk drive. Use this option when you do not have either an available online disk drive, or a spare slot for a replacement disk drive.

1. Start the SSA Configurator and Service Aids Utility (see "Selecting the SSA Configurator Functions" in topic 7.2).
2. From the Main menu, select **System Resources**.
3. Select the array from which you want to remove a disk drive.
4. Select **View Members**.
5. Select the disk drive that you want to remove, and use the Identify function to find the disk drive. To start the Identify function, press F9 (FlashOn); the Check light flashes on the selected disk drive. To end the Identify function, press F10 (FlashOff).
6. Press F7 (Exchange Members).
7. Select **Blank Reserved**.

The selected disk drive has now been removed from the array, and replaced by a blank virtual disk).

8. Physically remove the disk drive (see the unit *Hardware Maintenance Manual*).

SSA RAID Adapter Maintenance Information

Adding a Disk Drive to an Array

7.7.5 Adding a Disk Drive to an Array

This option allows you to install a replacement disk drive into an array that is running in the Exposed or Degraded state, because you have removed a disk drive. When you install the replacement disk drive, all the data that was contained on the original disk drive is automatically written to the replacement disk drive.

Note: For instructions on how to *physically* install a disk drive, see the unit *Hardware Maintenance Manual*.

1. Start the SSA Configurator and Service Aids Utility (see "Selecting the SSA Configurator Functions" in topic 7.2).
2. From the Main menu, select **System Resources**.
3. Select the array to which you want to add a disk drive.
4. Select **View Members**.
5. Select **Not Present (Blank Slot)**.
6. Press F7 (Exchange Members). A list of candidate disk drives is displayed.
7. Select the disk drive that you want to add to the array.
8. Press Enter. The selected disk drive is added to the array.

SSA RAID Adapter Maintenance Information

Listing the Disk Drives in an Array

7.7.6 Listing the Disk Drives in an Array

This option allows you to list the disk drives that are contained in a particular array.

1. Start the SSA Configurator and Service Aids Utility (see "Selecting the SSA Configurator Functions" in topic 7.2).
2. From the Main menu, select **System Resources**.
3. Select the array whose disk drives you want to list.
4. Select **View Members**.

Subtopics

7.7.6.1 Listing Hot Spare Disk Drives

SSA RAID Adapter Maintenance Information
Listing Hot Spare Disk Drives

7.7.6.1 Listing Hot Spare Disk Drives

1. Start the SSA Configurator and Service Aids Utility (see "Selecting the SSA Configurator Functions" in topic 7.2).
2. From the Main menu, select **SSA Adapter List**.
3. Select **Spare Disk**. A list of hot spare disk drives is displayed:

```

+-----+
| CONFIG   SSA Configurator and Service Aids      Vyyymmdd      XX Version |
+-----+
|
|           Main M+
| +-----+ | Bus X  Device Y  Slot Z  Adapter      (Q) | | | |
| |         | +-----+ |
| | New Disks | RAID-0 Arrays |
| | Free Resour | RAID-1 A+-----+ |
| | Syst+-----+ | RAID-5 A |           List of Spare Disks |
| | SSA |         | Rejected+-----+ |
| | Even+-----+ | Non-Vola | SSA UID/Array Name  Status |
| | Serv | Bus X | Hot-spar | 1.  xxxxxxxx      yyyyyyy |
| | Abou | Bus X | Run Conc | |
| | |         | Run Non+-----+ |
| | u+-----+ | View Adapter VPD |
| | |         | Disk Service Aids |
| |         | +-----+ |
| +-----+ |
|
| <ESCAPE> Exit  <ENTER> Select  <INSERT> Insert  <DELETE> Delete |
| <F1> Help  <F8> Modify Attributes  <F9> FlashOn  <F10> FlashOff |
+-----+

```

4. To check whether a particular array is enabled for hot spare disk drives:
 - a. From the Main menu, select **System Resources**.
 - b. Select the array.
 - c. The attributes for the array are displayed.

SSA RAID Adapter Maintenance Information
 Listing or Deleting Records of Old Arrays in the NVRAM

7.7.7 Listing or Deleting Records of Old Arrays in the NVRAM

If an array becomes disconnected from a RAID manager by some method other than the method described in "Deleting a Resource from the System Resource List" in topic 7.5.1, a record of that array remains in the nonvolatile random access memory (NVRAM). The record must be deleted manually. This option allows you to list the names of such arrays, and to delete the records of those arrays.

1. Start the SSA Configurator and Service Aids Utility (see "Selecting the SSA Configurator Functions" in topic 7.2).
2. From the Main menu, select **SSA Adapter List**.
3. Select the adapter whose records you are checking.
4. Select **Non-Volatile RAM**. A list of arrays is displayed:

```

+-----+
| CONFIG  SSA Configurator and Service Aids      Vyyymmdd      XX Version|
+-----+
|
|      Main M+-----+
|      +-----+ Bus X Device Y Slot Z Adapter      (Q) |
|      +-----+
|      New Disks | RAID-0 Arrays
|      Free Resour| RAID-1 A+-----+
|      Syst+-----| RAID-5 A|      List of Non-Volatile RAM
|      SSA |      Rejected+-----+
|      Even+-----| Non-Vola|SSA UID/Array Name Status
|      Serv| Bus X| Hot-spar|1. xxxxxxxx      Dormant (0%)
|      Abou| Bus X| Run Conc|
|      |      Run Non+-----+
|      |      View Adapter VPD
|      |      Disk Service Aids
|      +-----+
|
+-----+
| <ESCAPE> Exit  <DELETE> Delete  <F1> Help
+-----+
    
```

5. An array name that has a status of "Dormant", is a record of an array that is no longer present, and is not recognized by the adapter.

Press the Delete key to remove the record from the NVRAM.