

IBM PC Servers

SY33-0193-00

IBM SerialRAID Adapter for PC Servers

**Hardware Maintenance
Manual Supplement**

October 1998

**Use this supplement with the
Hardware Maintenance Manual for the PC Server**



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Note

Before using this information and the product it supports, be sure to read the general information under "Notices" in the product documentation.

First Edition (October 1998)

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About This Supplement

This book is intended for service representatives who maintain PC servers that use the IBM SerialRAID Adapter.

How This Book Is Organized

"Introducing the IBM SerialRAID Adapter" on page 1 introduces the IBM SerialRAID Adapter.

"Service Request Numbers (SRNs)" on page 3 provides a table of service request numbers (SRNs) that are related to the IBM SerialRAID Adapter.

"Removing and Replacing FRUs" on page 19 describes how to exchange disk drives, DRAMs and the Fast-Write cache.

"Service Aids and Other Utilities" on page 29 describes the SSA service aids.

"Maintenance Tasks" on page 41 describes a number of tasks involving the configurator utilities that are called during the maintenance analysis procedures (MAPs).

"Maintenance Analysis Procedures (MAPs)" on page 49 provides maintenance analysis procedures for the IBM SerialRAID Adapter.

Important

This manual is intended for trained service personnel who are familiar with IBM PC Server products.

Before servicing an IBM product, be sure to review "Safety Information" in the product documentation.

Related Publications

Other manuals that you might find useful are:

- *IBM SerialRAID Adapter: Installation and User's Guide*, S33-3283-00
- *IBM SerialRAID Adapter: Technical Reference*, SA33-3275-01

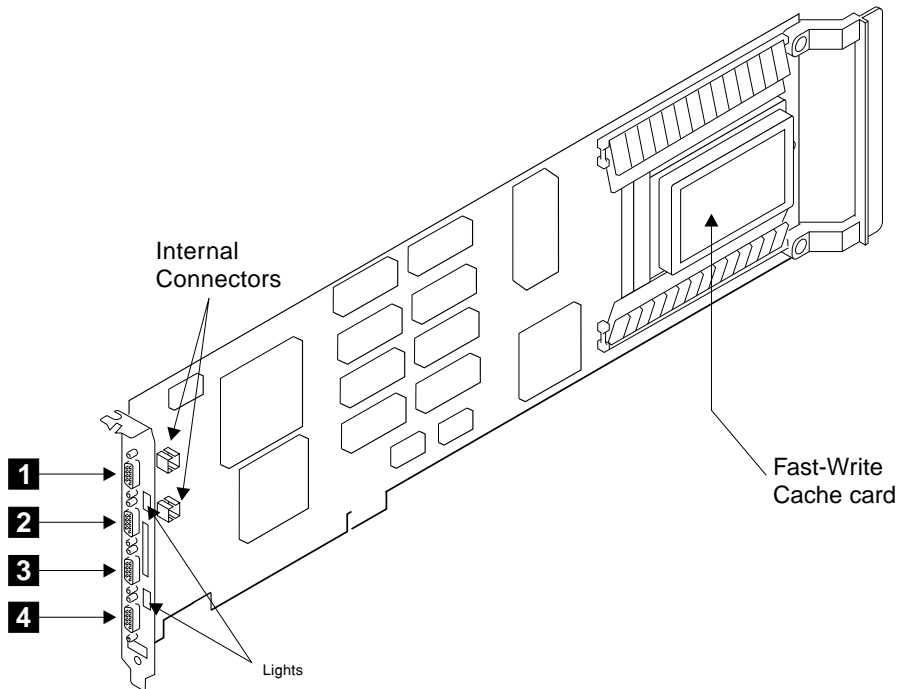
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Introducing the IBM SerialRAID Adapter

The IBM SerialRAID Adapter is a Peripheral Component Interconnect (PCI) adapter that serves as the interface between systems based on PCI architecture and devices that use Serial Storage Architecture (SSA). The adapter has four ports, which can be connected in pairs to drive two SSA loops. Each loop can contain a maximum of 48 disk drives. Two adapters, each one located in a different PC Server, can drive the same SSA loop. This arrangement is referred to as a Cluster Configuration. (See the *IBM SerialRAID Adapter Installation and User's Guide* for more details).

The four SSA ports on the adapter can operate at 20MB/s full-duplex over point-to-point copper cables up to 25 meters long. SSA uses an industry-standard interface based on SCSI-2 commands, queuing model, status and sense bytes.

- | | | | |
|----------|-------------------|----------|-------------------|
| 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 four SSA connectors on the adapter card are arranged in two pairs; connectors A1 and A2 are one pair, B1 and B2 are the other. Next to each pair of connectors is a light that functions as follows:

- **ON continuously:** Power is turned on to the adapter and both ports for that loop are operational; that is, the devices in the loop have power turned on, are connected correctly to the adapter, and are operational.

- **Flashing continuously:** One of the ports is not operational. This condition occurs if the cable to the port is not connected correctly, or if the device in the loop connected next to the adapter is not operational.
- **Off:** Both ports are non-operational.

General Information

For general information regarding the IBM SerialRAID Adapter, RAID technology and SSA loops, see the *IBM SerialRAID Adapter: Installation and User's Guide*.

The IBM SerialRAID Adapter also contains array management software that provides RAID-5 functions to control the arrays of the RAID system. An array can have from 3 to 16 member disk drives and is handled as one large disk drive by the operating system. The array management software translates requests to the single large disk into requests to the individual member disk drives. Configuration software is available that allows the user to define which disk drives in the loop, if any, are to be included in an array.

Up to three adapters can be present in one system unit. For performance reasons it is recommended that they are all placed on the same bus.

A module on the IBM SerialRAID Adapter contains a lithium battery.

CAUTION:

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

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

Dispose of the battery according to local regulations.

Service Request Numbers (SRNs)

Service request numbers (SRNs) are generated by the error logging facility and by the diagnostics. 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.

Displaying SRNs

To see the SRNs run the **Remote Systems Management (RSM) Configurator**. (see the *Installation and User Guide* for details of how to load and start the RSM configurator)

Use the configurator to display the SRNs as follows:

1. On the opening page, select **Event Logger**
2. On the second page, select **Analyse**

The error log is analysed and all errors with a severity level that calls for service intervention are displayed.

The SRN Table

The table in this section lists the SRNs and describes the actions you should take. 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
PAA	P = Adapter port number AA = SSA address (see also "Finding the Device When No Service Aids Are Available" on page 38)
PCI	Peripheral Component Interconnect
POST	Power-On Self-Test

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. Find 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" on page 2410-1 to verify the repair.

SRN	FRU List	Problem
20PAA	Device (45%) ("Exchanging Disk Drives" on page 19). SSA adapter card (45%) External SSA cables (6%) Internal SSA connections (4%) (Hardware Maintenance Manual).	Description: An open SSA link has been detected. Action: Run the Disk service aid to isolate the failure (see "Service Aids and Other Utilities" on page 29). 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" on page 19). SSA adapter card (45%) External SSA cables (6%) Internal SSA connections (4%) (Hardware Maintenance Manual).	Description: An SSA 'Threshold exceeded' link error has been detected. Action: Go to "MAP 2010: START" on page 2010-1.
2A002	Device (50%) ("Exchanging Disk Drives" on page 19). SSA adapter card (50%)	Description: Async code 02 has been received. Probably, a software error has occurred. Action: Go to "Software and Microcode Errors" on page 12 before exchanging any FRUs.
2A003	Device (50%) ("Exchanging Disk Drives" on page 19). SSA adapter card (50%)	Description: Async code 03 has been received. Probably, a software error has occurred. Action: Go to "Software and Microcode Errors" on page 12 before exchanging any FRUs.
2A004	Device (50%) ("Exchanging Disk Drives" on page 19). SSA adapter card (50%)	Description: Async code 04 has been received. Probably, a software error has occurred. Action: Go to "Software and Microcode Errors" on page 12 before exchanging any FRUs.
2FFFF	None	Description: An async code that is not valid has been received. Action: Go to "Software and Microcode Errors" on page 12.
303FF	Device (100%) ("Exchanging Disk Drives" on page 19).	Description: A SCSI status that is not valid has been received. Action: Go to "Software and Microcode Errors" on page 12.
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%) ("Exchanging DRAMs on the IBM SerialRAID Adapter" on page 22).	Description: A 4 MB DRAM in adapter card module 0 has failed. Action: Exchange the FRU for a new FRU.
40008	8 MB DRAM module 0 (100%) ("Exchanging DRAMs on the IBM SerialRAID Adapter" on page 22).	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 IBM SerialRAID Adapter" on page 22).	Description: A 16 MB DRAM in adapter card module 0 has failed. Action: Exchange the FRU for a new FRU.

SRN	FRU List	Problem
40032	32 MB DRAM module 0 (100%) ("Exchanging DRAMs on the IBM SerialRAID Adapter" on page 22).	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 IBM SerialRAID Adapter" on page 22).	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 IBM SerialRAID Adapter" on page 22).	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 IBM SerialRAID Adapter" on page 22).	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 IBM SerialRAID Adapter" on page 22).	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 IBM SerialRAID Adapter" on page 22).	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 IBM SerialRAID Adapter" on page 22).	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 IBM SerialRAID Adapter" on page 22).	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 IBM SerialRAID Adapter" on page 22).	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 IBM SerialRAID Adapter" on page 22).	Description: The SSA adapter has detected that both DRAM modules are failing. Action: <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.
42200	None	Description: Other adapters on the SSA loop are using levels of microcode that are not compatible. Action: Install the latest level of microcode on all other adapters in this SSA loop. First refer to "Software and Microcode Errors" on page 12 and if necessary "Download Microcode Function" on page 37.

SRN	FRU List	Problem
42500	Fast-Write Cache Card (98%) ("Exchanging the Fast-Write Cache Card" on page 23) SSA Adapter Card (2%) (Installation and User Guide)	Description: The Fast-Write Cache Card has failed. Action: <ol style="list-style-type: none"> 1. Exchange the Cache Card for a new one 2. Switch on power to the using system 3. New error codes are produced if the original cache card contained data that was not moved to a disk drive. Run diagnostics on the adapter and if a SRN is produced, do the actions for that SRN.
42510	None	Description: Not enough DRAM available to run the fast-write cache operation. Action: <ol style="list-style-type: none"> 1. Start the using-system service aids. 2. Select Display or Change Configuration or Vital Product Data (VPD). 3. Select Display Vital Product Data. 4. Find the VPD for the SSA adapter that is logging the error. 5. Note the DRAM and cache sizes (Device Specifics Z0 and Z1). 6. For fast-write operations, you must have a 32 MB DRAM. Check that you have the correct size of DRAM.
42515	Fast-write Cache Card (90%) "Exchanging the Fast-Write Cache Card" on page 23) SSA adapter card (10%) (using system <i>Installation and Users Guide</i>)	Description: A fast-write disk is installed, but no Fast-Write Cache Card has been detected. This problem can be caused because: <ul style="list-style-type: none"> • The cache card is not installed correctly. • The Fast-Write feature is not installed on this machine, but a disk drive that is configured for fast-write operations has been added to the subsystem. Action: <ol style="list-style-type: none"> 1. If you have not already done so, run diagnostics on the adapter. If a different SRN is generated solve that problem first. 2. Do the following actions as appropriate: <ul style="list-style-type: none"> • If the cache card is not installed correctly, remove it from the adapter and reinstall it correctly. • If the cache card is installed correctly, it might have failed. Exchange for new FRUs, the FRUs that are shown in the FRU list for this SRN. • If the Fast-Write feature is not installed, and you want to delete the fast-write function for one or more disk drives that have been added to this subsystem: 3. Verify with the customer that the fast-write function can be deleted for the disk drives configured for fast-write. 4. Using the RSM configurator, select the resource in question and select Delete FW. See "Dealing with Fast-Write Problems" on page 12 for more details.

SRN	FRU List	Problem
42520	Fast-Write Cache Card (100%)	<p>Description: A Fast-Write Cache Card has failed. Data has been written to the cache card and cannot be recovered. The location of the lost data is not known. The disk drive is offline.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Ask the customer to determine: <ul style="list-style-type: none"> • Which disk drives are affected by this error • How much data has been lost • Which data recovery procedures can be done 2. Ask the customer to disable the Fast-Write feature for: <ul style="list-style-type: none"> • Each device for which Fast-Write is offline • All other devices that are connected to the failing adapter and have Fast-Write enabled <p>For details of how to disable Fast-Write see "Dealing with Fast-Write Problems" on page 12.</p> 3. Exchange the Fast-Write Cache Card for a new one. 4. Ask the customer to re-enable Fast-Write for the devices that are attached to the new Fast-Write Cache Card.
42521	Fast-Write Cache Card (100%) ("Exchanging the Fast-Write Cache Card" on page 23)	<p>Description: A Fast-Write Cache card has failed. Data has been written to the card and cannot be recovered. The disk drives that have lost data cannot be identified. All unsynchronized fast-write disk drives that are attached to this adapter are off-line.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Ask the customer to determine: <ul style="list-style-type: none"> • Which disk drives are affected by this error • How much data has been lost • Which data recovery procedures can be done 2. Ask the customer to disable Fast-Write for: <ul style="list-style-type: none"> • Each device for which the Fast-Write is offline • All other devices that are connected to the failing adapter and have the Fast-Write enabled <p>For details of how to disable Fast-Write see "Dealing with Fast-Write Problems" on page 12.</p> 3. Exchange the Fast-Write Cache card for a new one. 4. Ask the customer to re-enable Fast-Write for the devices that are attached to the new Fast-Write Cache Card.

SRN	FRU List	Problem
42522	Fast-Write Cache Card (100%) ("Exchanging the Fast-Write Cache Card" on page 23)	<p>Description: A Fast-Write Cache card has failed. Data has been written to the card and cannot be recovered. One or more 4 KB blocks of data for a known disk have been lost and cannot be read.</p> <p>Action:</p> <ol style="list-style-type: none"> 1. Ask the customer to determine: <ul style="list-style-type: none"> • Which disk drives are affected by this error • How much data has been lost • Which data recovery procedures can be done 2. Ask the customer to disable Fast-Write for: <ul style="list-style-type: none"> • Each device for which the Fast-Write is offline • All other devices that are connected to the failing adapter and have the Fast-Write enabled <p style="margin-left: 40px;">For details of how to disable Fast-Write see "Dealing with Fast-Write Problems" on page 12.</p> 3. Exchange the Fast-Write Cache card for a new one. 4. Ask the customer to re-enable Fast-Write for the devices that are attached to the new Fast-Write Cache Card.
42523	None	<p>Description: The Fast-Write Cache Card has a bad version number.</p> <p>Action: Install the correct adapter microcode for this card.</p>
42524	Fast-Write Cache Option Card (100%)	<p>Description: A fast-write disk drive (or drives) that does not contain synchronized data has been detected. The Fast-Write Cache Card, however, cannot be detected. The disk drive (or drives) is offline.</p> <p>Action:</p> <ul style="list-style-type: none"> • If the Fast-Write Cache Card has been removed, reinstall it. • If the Fast-Write Cache card has failed: <ol style="list-style-type: none"> 1. Ask the customer to disable the Fast-Write for: <ul style="list-style-type: none"> – Each device for which the Fast-Write is offline – All other devices that are connected to the failing adapter, and have Fast-Write enabled <p style="margin-left: 40px;">For details of how to disable Fast-Write see "Dealing with Fast-Write Problems" on page 12.</p> 2. Exchange the Fast-Write Cache Card for a new one. 3. Ask the customer to re-enable Fast-Write for the devices that are attached to the new Fast-Write Cache Card.

SRN	FRU List	Problem
42525	None	<p>Description: The wrong Fast-Write Cache Card has been detected by a fast-write disk drive that contains unsynchronized data.</p> <p>Action: The failing disk drive is offline. If the disk drive has just been moved from another adapter, do either of the following actions:</p> <ul style="list-style-type: none"> Return the disk drive to its original adapter. Move the original Fast-Write Cache card to this adapter so that the data can be synchronized. <p>If you cannot do either action, or the data on the disk drive has no value:</p> <ol style="list-style-type: none"> Ask the customer to disable Fast-Write for: <ul style="list-style-type: none"> Each device for which the Fast-Write option is offline All other devices that are connected to the failing adapter, and have Fast-Write enabled. <p>For details of how to disable Fast-Write see "Dealing with Fast-Write Problems" on page 12.</p> Ask the customer to re-enable Fast-Write for the devices that are attached to the new Fast-Write Cache Card.
42526	SSA adapter card (100%) (<i>Installation and User Guide</i>).	<p>Description: This adapter card does not provide support for the Fast-Write Cache.</p> <p>Action: Install the correct SSA adapter (if applicable).</p>
42527	None	<p>Description: A dormant fast-write cache entry exists.</p> <p>Action: The fast-write cache contains unsynchronized data for a disk drive that is no longer available. If possible, reconnect the disk drive to the adapter to enable the data to be synchronized. If you cannot reconnect the disk drive (for example, because the disk drive has failed), the user should delete the dormant fast-write cache entry</p> <p>Although the resource is no longer available, the RSM configurator will show the resource. Go to the Resource View page of the RSM and select Detach or Delete as appropriate.</p>
42528	None	<p>Description: A fast-write disk drive has been detected that was previously unsynchronized, but has since been configured on a different adapter.</p> <p>Action: If this disk drive contains data that should be kept, return the disk drive to the adapter to which it was previously connected.</p> <p>If the disk drive does not contain data that should be kept, ask the user to delete all offline items:</p> <ol style="list-style-type: none"> Open the RSM Configurator and go to the Resource View Select Detach or Delete as appropriate. <p>When the items have been deleted the disk drive becomes free.</p>
43PAA	Device (90%) ("Exchanging Disk Drives" on page 19). 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" on page 2010-1.</p>

SRN	FRU List	Problem
44PAA	Device (100%) ("Exchanging Disk Drives" on page 19).	Description: An SSA device has a 'Failed' status. Action: If the SSA service aids are available, run the Disk service aid (see "Service Aids and Other Utilities" on page 29) 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" on page 38. Exchange the failing FRU for a new FRU.
45PAA	Device (40%) ("Exchanging Disk Drives" on page 19). SSA Adapter card (40%) SSA cables, or other SSA connections in the device enclosure (20%). (Hardware Maintenance Manual).	Description: The SSA adapter has detected an open SSA loop. Action: If the SSA service aids are available, run the Disk service aid (see "Service Aids and Other Utilities" on page 29) to determine which part of the loop is failing. 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" on page 38.
46000	None	Description: An array is in 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" on page 2010-1.
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" on page 2010-1.
47500	None	Description: Part of the array data might have been lost. Action: Go to "MAP 2010: START" on page 2010-1.
48000	None	Description: The SSA adapter has detected a link configuration that is not valid. Action: See "SSA Loop Configurations that Are Not Valid" on page 12.
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: <ul style="list-style-type: none"> • 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" on page 2010-1.
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: <ul style="list-style-type: none"> • 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" on page 2010-1.
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" on page 2010-1.

SRN	FRU List	Problem
49700	None	Description: The parity for the array is not complete. Action: Go to "MAP 2010: START" on page 2010-1.
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" on page 12 before exchanging the FRU.
50006	SSA adapter card (100%)	Description: A channel check has occurred. 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" on page 12 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" on page 12 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. Action: Exchange the FRU for a new FRU.
DFFFF	SSA adapter card (100%)	Note: The description and action for this SRN are valid only if you have run diagnostics to the SSA attachment. If this SRN has occurred because you have run diagnostics on some other device, see the service information for that device. Description: A command or parameter that has been sent or received is not valid. This problem is caused either by the SSA adapter, or by an error in the microcode. Action: Go to "Software and Microcode Errors" on page 12 before exchanging the FRU.

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 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. Refer to the *IBM SerialRAID Adapter: Installation and User's Guide* for details.

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.

Dealing with Fast-Write Problems

Fast-Write problems are indicated by Service Request Numbers (SRNs): in the series 425xx.

The procedure, using the RSM configurator, for removing the Fast-Write function from a resource when advised to do this is as follows:

1. Start the RSM Configurator and select all the resources that have Fast-Write enabled
2. Perform the following actions on each resource in turn:
 - a. Go to the Resource View page for each resource you want to change
 - b. Select **Delete FW**

Note: All Fast-Write resources are identified with the symbol of a lightening flash against them.

SSA Link Errors

SSA link errors can be caused by a number reasons, for example if:

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

Errors might be indicated in various ways, such as:

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

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, 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:

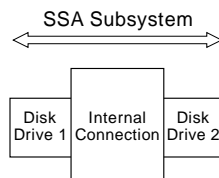
- Disk drive to disk drive
- Adapter to disk drive module
- Adapter to adapter

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.

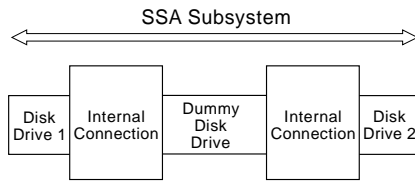
Example 1

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



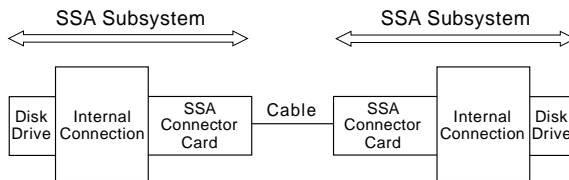
Example 2

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



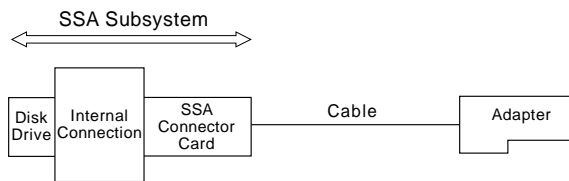
Example 3

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.



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.

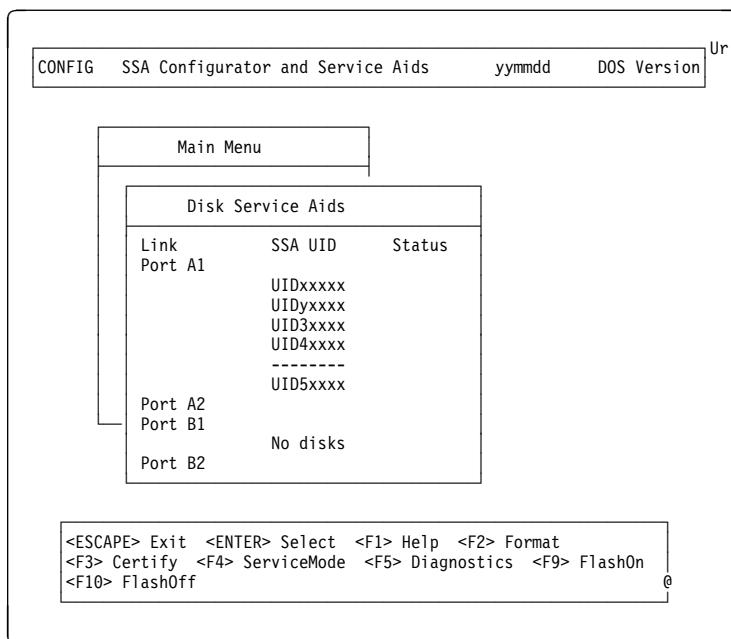
If you need more information about the lights, see:

- For adapter lights, "Introducing the IBM SerialRAID Adapter" on page 1 in this book.
- For other lights, the service information for the device that contains the lights.

Locating a Broken Loop

Using the RSM configurator, go to the Physical View of the selected adapter and look for the symbol **Break**. This indicates a broken SSA loop.

Using the DOS configurator you can access the disk service aids to show the SSA loop that is broken.



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 "Service Aids and Other Utilities" on page 29.

Removing and Replacing FRUs

Exchanging Disk Drives

When a maintenance procedure requires you to replace a faulty disk drive with a new one, first check whether the disk drive to be removed is a member of a RAID array.

- If the disk drive to be changed IS NOT a member of an array, go to “Exchanging an Array Disk” on page 20.
- If the disk drive to be changed IS a member of an array, go to “Exchanging a Non-Array Disk Drive.”

Replacement Disk Drives

There are two points to note about a disk drive you are installing to replace a faulty unit.

- If the replacement disk drive is a new unit from the factory, or one previously used in an AIX machine, it will be placed on the list of New Resources. It must be converted to a Free Resource before it can be used by the PC.
- If the replacement disk was previously formatted as a member of a RAID array in a different system, it will be identified as a Pre-Configured disk. It must be converted to a Free Resource before it can be used in the new system.

Exchanging a Non-Array Disk Drive

The procedure depends on whether you are using the DOS configurator or the RSM configurator.

Using the DOS Configurator

1. From the Main Menu, select **SSA Adapter List**
2. Select the required adapter from the list displayed.
3. From the Adapter Menu, select **Disk Service Aids**.
4. Select the disk drive that you want to change.

If necessary use the Identify function to find the disk drive. Press F9 (FlashOn); the Check light flashes on the selected disk drive; press F10 (FlashOff) to remove the function.

5. Put the disk drive into Service Mode.

Place the cursor on the disk drive entry and press F4.

6. Remove the old drive and replace it with a new one (see the unit *Hardware Maintenance Manual*).
7. Press Esc to exit from the Service Aids window.

This action automatically resets Service Mode on the new disk drive.

8. Repeat the procedure given above for any other disk drive that you are changing.
9. If necessary, convert the newly-installed disk drive into a free resource (see the configurator information in the *IBM SerialRAID Adapter: Installation and User's Guide*).

Using the RSM Configurator

1. Start the RSM configurator and select the appropriate adapter from the Adapter List.
2. On the Adapter View page, select the Physical View.
3. On the Physical View page, select the disk drive you want to change.
4. On the Disk View page, click on the Service Mode button at the bottom of the page to put the disk into service mode.

If necessary use the Identify function to find the actual disk drive. Click FlashOn, the Check light flashes on the selected disk drive; click FlashOff to remove the function.

5. You can now remove the faulty disk drive and insert the replacement.
6. To reset Service Mode on the new disk, move back to the Physical View page and click on the Reset Service Mode button at the base of the page.

If necessary, convert the newly-installed disk drive into a free resource (see the configurator information in the *IBM SerialRAID Adapter: Installation and User's Guide*).

Exchanging an Array Disk

This section describes how a disk is logically removed from an array and replaced by a compatible Free Resource. Such action could be necessary, for example, to check a disk drive that is giving a high level of read/write errors but has not been rejected from the array.

This action is also necessary if an array disk develops a hard fault and there is no hot-spare available. If this happens, at the next write operation the faulty disk is automatically de-configured and moved to the Rejected list. In the array, the faulty disk is replaced by a Blank Reserved. To restore the array to its full operational status you need to replace the Blank Reserved in the array with a suitable Free Resource.

Note: If there was a Hot-Spare available when the array disk became faulty the hot-spare is automatically integrated into the array and the faulty disk moved to the list of Rejected disks. The procedure in this event is to convert the Rejected disk to a Free resource, then change it as described in "Exchanging a Non-Array Disk Drive" on page 19. The new disk can then be reassigned as a Hot-Spare to replace the one that was used.

Exchanging an Array Disk Using the DOS Configurator

1. Start the DOS Configurator.
2. From the Main Menu, select **SSA Adapter List**, then select the required adapter from the list.
3. From the Adapter Menu, select **RAID 5 Resources**.
4. Select the array from which you want to remove a disk drive.
5. Select **View Members**.
6. Select the disk drive that you want to remove.
7. Press F7 (Exchange Members).

This displays a list of Free Resources (disk drives) that are compatible as replacements for the array disk drive.

The list also includes the item **Blank Reserved**. If there are no Free Resources available and you intend to physically remove the array disk, you must exchange the array disk with the Blank Reserved.

8. Select an appropriate Free Resource (or the Blank Reserved).

The selected item replaces the disk drive in the array. The array disk drive is logically removed and returned to the list of Free Resources.
9. If you need to perform maintenance on the disk drive removed from the array:
 - a. Go to the list of Free Resources.
 - b. Select the disk drive that you logically removed from the array.
 - c. Set Service Mode.

You can now physically remove the disk drive for maintenance.

Exchanging an Array Disk Using the RSM Configurator

1. Start the RSM configurator and select the appropriate adapter from the adapter list.
2. On the Adapter View page, select the Logical View.
3. On the Logical View page, select the RAID type.

This opens the Resource list, listing the defined arrays.
4. Select the required array.
5. On the Array View page scroll down to the list of array members.
6. Select the disk drive that you want to remove.

This will take you to the Disk View page for this disk.
7. On the Disk View page, click on the **Comp.Exchange** button.

A list is displayed showing the Free Resource candidates that are suitable as replacements for the array disk drive.

8. Select an appropriate Free Resource.

The array disk drive is logically removed from the array, returned to the list of Free Resources and replaced by the selected Free Resource.

9. If you need to perform maintenance on the disk drive you have logically removed from the array:
 - a. Display the list of Free Resources.
 - b. Select the disk drive that you logically removed from the array.
 - c. Set Service Mode.

You can now physically remove the disk drive for maintenance.

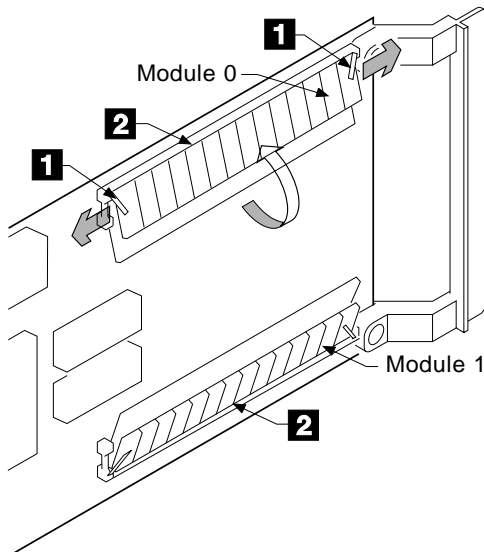
Exchanging DRAMs on the IBM SerialRAID Adapter

Removing a DRAM

Attention

Adapter cards contain parts that are electrostatic-discharge (ESD) sensitive. Use the tools and procedures defined by your organization to protect such parts.

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.



Installing a DRAM

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

Exchanging the Fast-Write Cache Card

The following procedures explain how to remove and replace the Fast-Write Cache card.

Removing the Cache Card

Attention

- Adapter cards contain parts that are electrostatic-discharge (ESD) sensitive. Use the tools and procedures defined by your organization to protect such parts.
- The Fast-Write Cache might contain customer data.

1. Shut down the operating system.
2. Remove power from the system.
3. Remove the adapter from the using system.

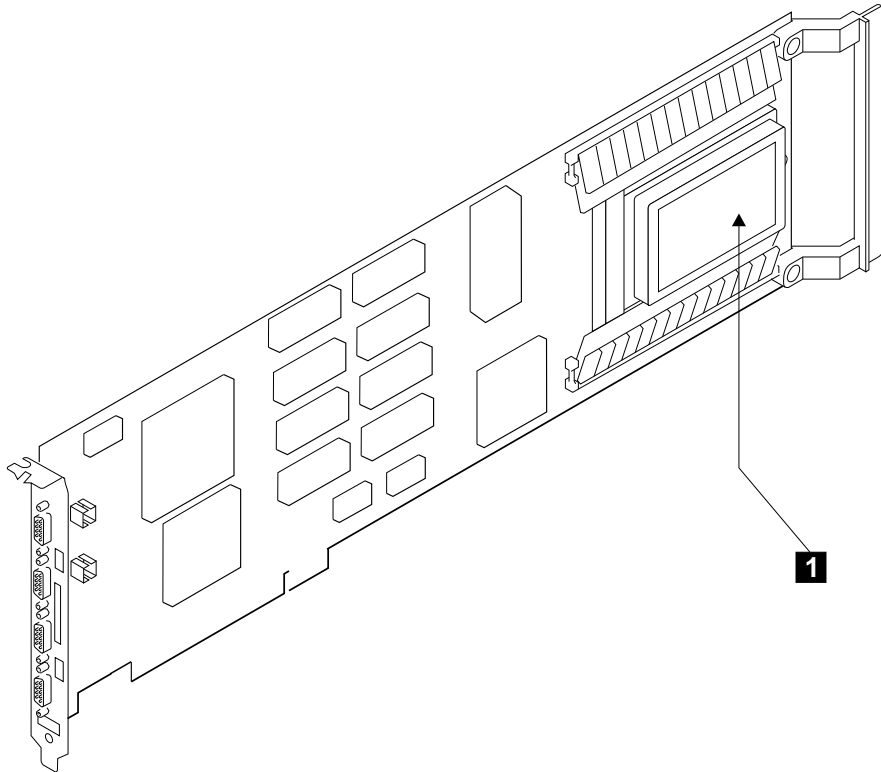


Figure 1. The SSA Fast-Write Card Installed on an IBM SerialRAID Adapter

4. Refer to Figure 2.

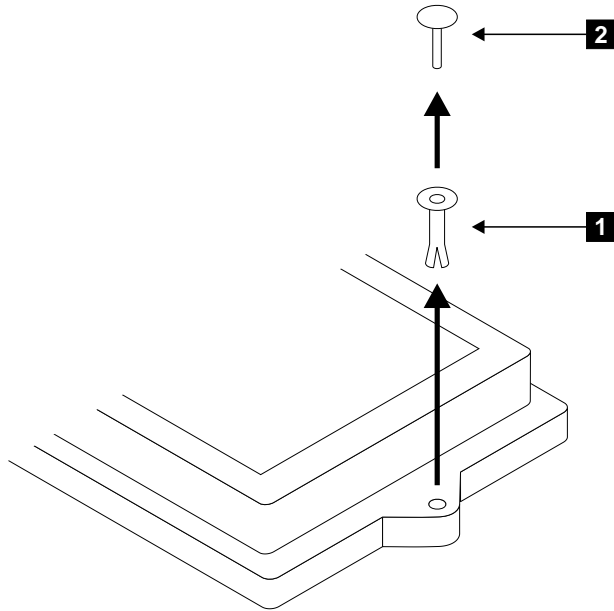


Figure 2. Releasing the Fast-Write Cache Card

5. Remove the pin **2** and the collar **1** from the Fast-Write Cache card.
6. Referring to Figure 3, pull the Fast-Write Cache card **1** in the direction shown by the arrow in the diagram. This action unplugs the card from the connector on the adapter card.

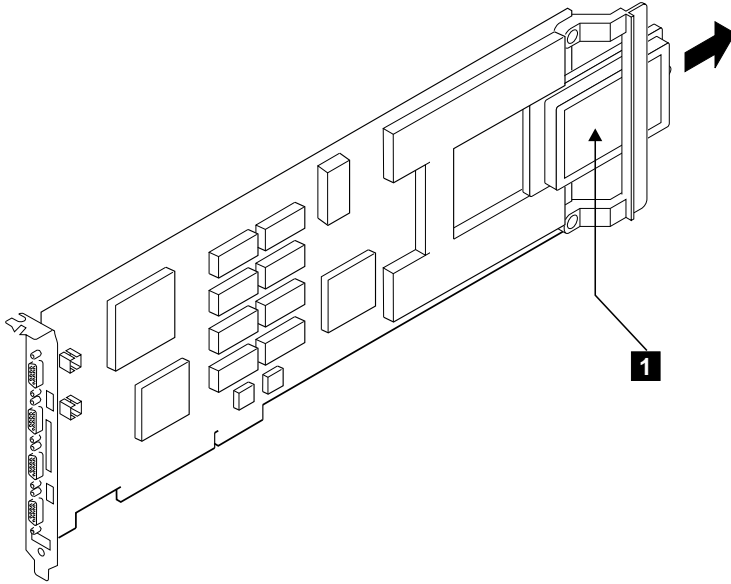


Figure 3. Removing the Fast-Write Cache Card

Installing the Cache Card

Attention

Adapter cards contain parts that are electrostatic-discharge (ESD) sensitive. Use the tools and procedures defined by your organization to protect such parts.

1. Remove the adapter from the using system, if not already removed (see the *Installation and User Guide* for the using system).

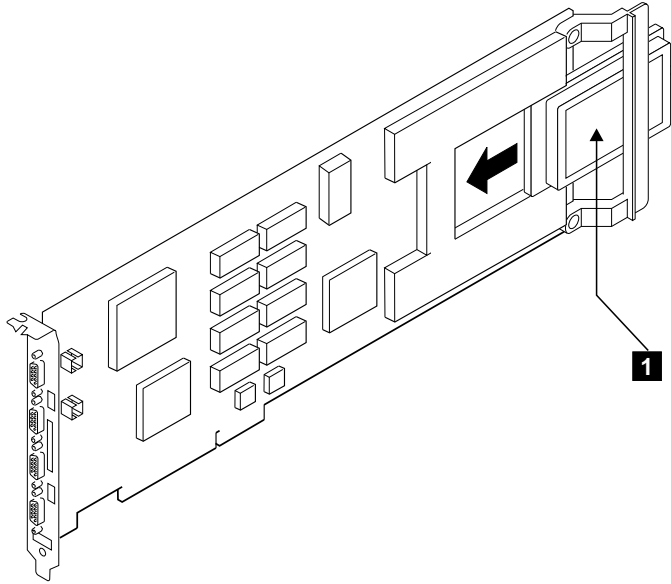


Figure 4. Installing the Fast Write Cache Card onto a IBM SerialRAID Adapter.

2. Orient the Fast-Write Cache card as shown in the diagram, and place it onto the adapter card.
3. Push the card **1** in the direction shown by the arrow in the diagram, and plug it into the connector on the adapter card.
4. Refer to Figure 5 on page 28.

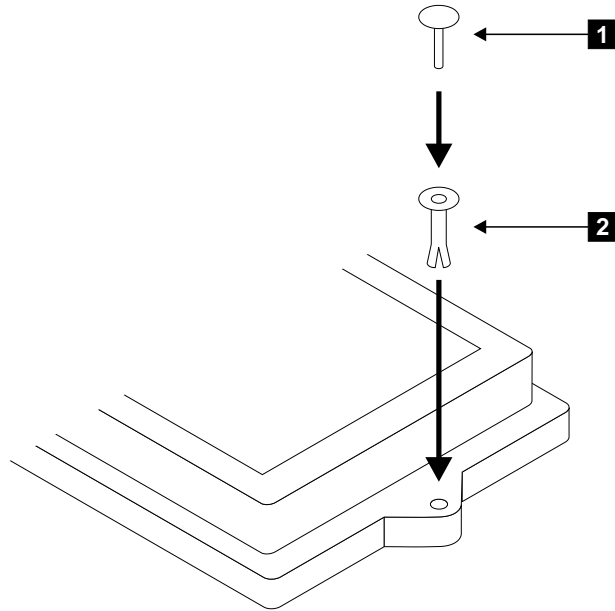


Figure 5. Installing the Collar and Pin of the Fast-Write Cache Card

5. Hold the collar **2** so that its split end is downward.
6. Install the collar into the Fast-Write Cache card so that its split end is downward.
7. Install the pin **1** into the collar, and push it fully home.
8. Reinstall the adapter card into the system unit (see the service information for the system unit).

Service Aids and Other Utilities

A number of service aids and utilities are available with the DOS Configurator to assist in maintenance tasks. These include:

- The Disk Service Aids
- The Identify function
- The Download Microcode function
- How to find the physical location of a device

Similar functions are available through the RSM Configurator, but the RSM also provides access to Event/Error Logging.

Disk Service Aids

The Service Aids allow you to perform general maintenance functions on a selected physical disk drive. They are accessible through the configurator utilities when an adapter is selected. The service aids available are:

- **Service Mode:** (Set and Reset) Service Mode enables you to find a selected disk drive on the SSA loop, and to remove the drive from the loop.
- **Format Disk:** This formats an SSA disk drive.
- **Certify Disk:** This verifies that all the data on a disk drive can be read correctly.
- **Diagnostics:** Concurrent and Nonconcurrent diagnostics are available.

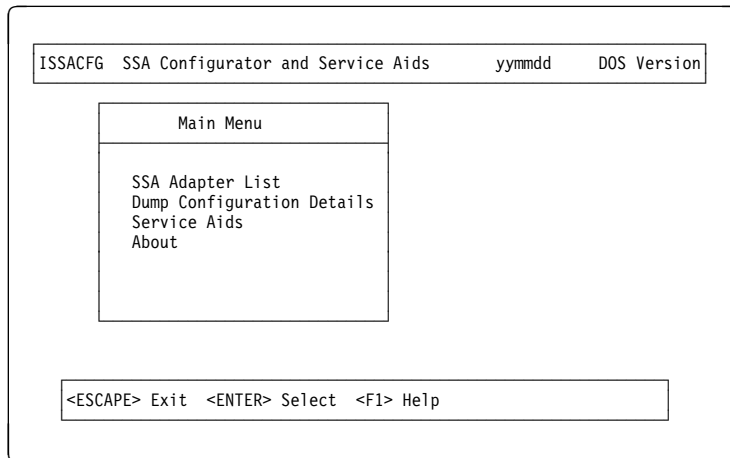
Attention: Do not run the service aids from more than one system at a time, otherwise unexpected results might occur.

Before using the service aids, ensure that you are familiar with the principles of SSA loops. If you are not, first read the introductory information given in the *IBM SerialRAID Adapter: Installation and User's Guide*.

Accessing Service Aids from the DOS Configurator

The service aids provided with the DOS Configurator are accessed from the menu item **Disk Service Aids** on the adapter menu, as follows:

1. Start the DOS Configurator by booting from the diskette.
The Main menu is displayed.



2. From the main menu, select **SSA Adapter List**.
3. Select the appropriate adapter from the list.
4. From the adapter menu, select **Disk Service Aids**.

The Disk Service Aids window is displayed.

Note: The menu item Service Aids on the main menu opens a Help panel that points you to the adapter menu, where the Disk Service Aids are accessed.

Accessing Service Aids from the RSM Configurator

The service aids provided with the RSM configurator are accessed from the **Disk View** page, as follows:

1. Start the RSM Configurator.

Check with the user how access to the RSM is set up, or consult the Readme file provided with the adapter to obtain the URL.
2. The first page to be displayed is the Adapter List. On this page select the adapter you want. This opens the Adapter View page for the selected adapter.
3. On the Adapter View, select the Physical view. The physical view page provides details of the disks connected to this adapter.

Note: selecting the **Enclosure List** also takes you to the service aids, by a slightly different route.
4. On the Physical View page, select the disk you want to work on. This opens the **Disk View** page, on which are the buttons that activate the service aids.

Service Mode

A disk drive must be placed in Service Mode before it can be removed from the SSA loop and maintenance performed on it. When Service Mode is set:

- 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 enclosure that contains the selected disk drive comes on.
- The SSA loop is broken and no communication to the disk is possible.

Only one disk drive at a time can be in Service Mode.

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

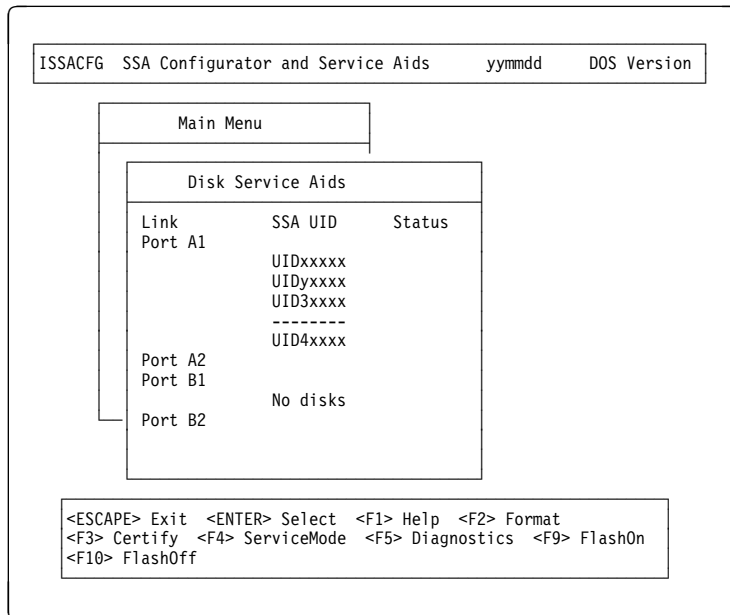
SSA devices can be maintained concurrently; that is, they can be removed, installed, and tested on an SSA loop while the other devices on the loop continue to work normally. If a disk drive has its Check light on, you can remove that disk drive from the SSA loop without taking any special actions.

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.

To Set Service Mode with the DOS Configurator

1. Start the DOS Configurator (see "Accessing Service Aids from the DOS Configurator" on page 29) and select **SSA Adapter List**.
2. Select the required adapter from the list, then from the Adapter Menu select **Disk Service Aids**.

The Disk Service Aids window is displayed.



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

Notes:

- The Link column shows the connectors of the IBM SerialRAID Adapter to which the loop is connected.
- 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.
- The Status column shows the status of the disk drive; for example, "Power" and "Failed".

- Press F4 to set Service Mode. Verification information is displayed.

Notes:

- You can select only one disk drive at time.
- If you set Service Mode and the selected disk drive is not in a closed loop or at the end of a string, the operation fails and an error message is displayed.
- 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" on page 37). If necessary, you can identify the disk drives that are on each side of the one you are trying to find.

5. To reset Service Mode, press Esc (exit from the Disk Service Aids window).

Note: A disk must be in one of the states: Free Resource, New Resource or Rejected, before it can be formatted or put into Service Mode. Array members, System Resources and Hot-Spare disk drives cannot be formatted or put into Service Mode.

To Set Service Mode With the RSM Configurator

1. Start the RSM Configurator (see "Accessing Service Aids from the RSM Configurator" on page 30).
2. On the Adapter List page, select the required adapter.
3. On the Adapter View page, select the Physical View.
4. On the Physical View page, select the required disk drive.
5. On the Disk View page, click on the Service Mode button at the bottom of the page.

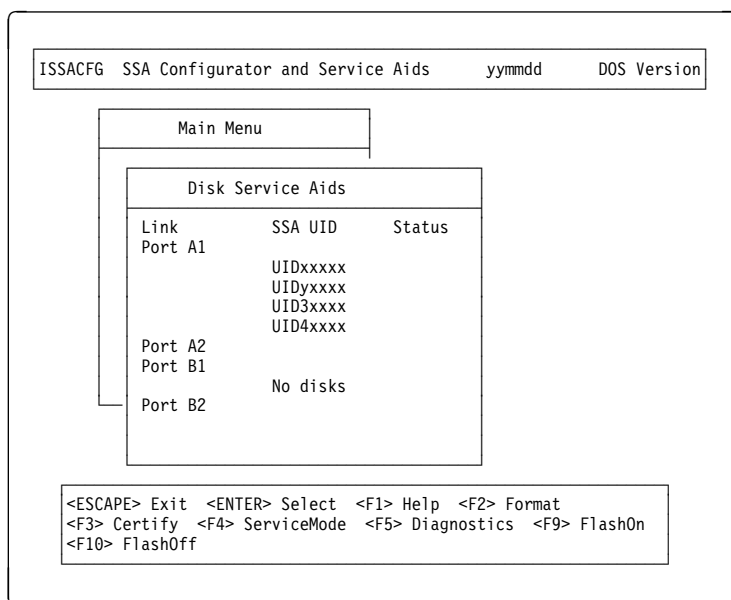
Format Disk

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

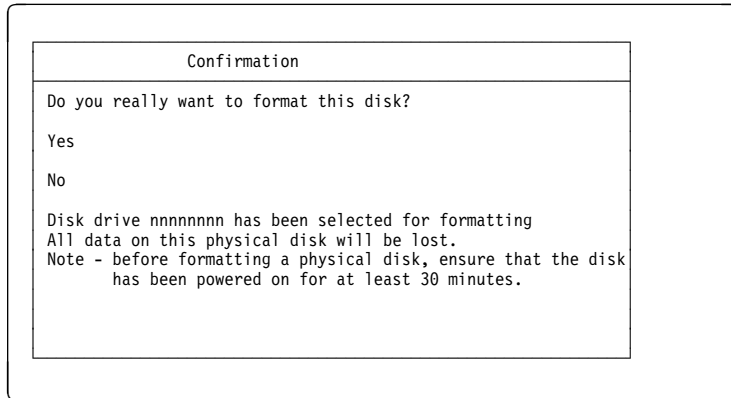
To Format Using the DOS Configurator

1. Start the DOS Configurator (see “Accessing Service Aids from the DOS Configurator” on page 29) and select **SSA Adapter List**.
2. Select the required adapter from the list, then from the Adapter Menu select **Disk Service Aids**.

The Disk Service Aids window is displayed.



3. Select the disk drive that you want to format.
4. If you are not sure of the identification of the drive use the Identify function to get a positive physical identification (see “The Identify Function” on page 37). 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 that displayed on the screen.
5. When you are sure that you have selected the correct disk drive, press F2 (Format). A prompt to confirm this is displayed.



6. Answer the prompt.
7. If you want to find out how the format operation is progressing, look at the resource attributes.

To Format With the RSM Configurator

1. Start the RSM Configurator (see "Accessing Service Aids from the RSM Configurator" on page 30).
2. On the Adapter List page, select the required adapter.
3. On the Adapter View page, select the Physical View.
4. On the Physical View page, select the required disk drive.
5. On the Disk View page, click on the Format button at the bottom of the page.

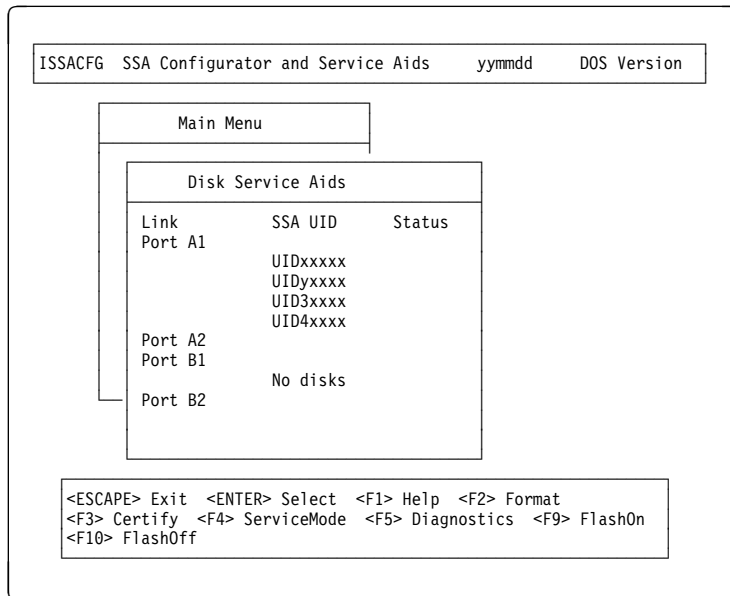
Certify Disk

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

To Certify using the DOS Configurator

1. Start the DOS Configurator (see "Accessing Service Aids from the DOS Configurator" on page 29) and select **SSA Adapter List**.
2. Select the required adapter from the list, then from the Adapter Menu select **Disk Service Aids**.

The Disk Service Aids window is displayed.



3. Select the disk drive that you want to certify.
4. If you are not sure of the identification of the drive use the Identify function to get a positive physical identification (see "The Identify Function" on page 37). 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 that displayed on the screen.
5. When you are sure that you have selected the correct disk drive, press F3 (Certify).
6. If you want to find out how the certify operation is progressing, look at the resource attributes.

To Certify With the RSM Configurator

1. Start the RSM Configurator (see "Accessing Service Aids from the RSM Configurator" on page 30).
2. On the Adapter List page, select the required adapter.
3. On the Adapter View page, select the Physical View.
4. On the Physical View page, select the required disk drive.
5. On the Disk View page, click on the Certify button at the bottom of the page.

The Identify Function

This service aid enables you to determine the position 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 Identify with the DOS Configurator

1. Start the DOS Configurator (see "Accessing Service Aids from the DOS Configurator" on page 29) and select **SSA Adapter List**.
2. Select the required adapter from the list.
Note: From this point, the Identify service aid can be accessed from most of the DOS Configurator displays.
3. To start the Identify function, press F9 (FlashOn). To end the Identify function, press F10 (FlashOff).

To Identify With the RSM Configurator

1. Start the RSM Configurator (see "Accessing Service Aids from the RSM Configurator" on page 30).
2. On the Adapter List page, select the required adapter.
3. On the Adapter View page, select the Physical View.
4. On the Physical View page, select the required disk drive.
5. On the Disk View page, use the Flash On and Flash Off buttons at the bottom of the page as necessary.

Download Microcode Function

At some time on a customer site you might be required to install the latest versions of either the disk or adapter microcode.

To download disk microcode, first obtain the latest SSA PC UCODE package from the SSA Customer Support Homepage located at <http://www.hursley.ibm.com/ssa/pcserver/>

After installing to your disk drive, run the disk downloader tool (issaddld) with each of the drive microcode files (.dl) usually copied to c:\issa\ssaflash.

To install the latest version of the adapter microcode, follow the same instructions as for disk microcode except that the download tool to use is ISSAADLD and file extensions are .lxx, where xx identifies the adapter type (04 is for the IBM SerialRAID Adapter).

Note: To check the latest instructions on how to download microcode, read the README.TEXT file that is on one of the diskettes supplied with the adapter.

Finding the Physical Location of a Device

The physical location of a device (for example, a disk drive or an SSA RAID Adapter) is not reported by the system for all disk subsystems, which means that the SSA Address cannot be used. The address of an SSA device is related to the position of that device on the SSA loop. The address can, therefore, change if the configuration is changed.

Finding the Device When Service Aids Are Available

When the service aids are available, use the Identify function to find the correct disk drive (see "The Identify Function" on page 37). 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 adapter on the SSA link, or use the procedure described in "Finding the Device When No Service Aids Are Available."

Finding the Device When No Service Aids Are Available

When no service aids are available, you can 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.

The Event/Error Logger

The adapter software includes an Event/Error Logger. This is automatically loaded into the system during the installation of the adapter software, and afterward at each power-on operation. The event/error logger collects information about SSA errors and can indicate when service action is required.

Error logging is only accessible using the RSM configurator, on the Adapter List page. Functions available are:

- Analyze SSA Event Log.
- View SSA Event Log.
- Stop SSA Event Logging.
- Obtain a summary of event log entries.
- Modify SSA Event Logger Time Out.

Analyze SSA Event Log

This function checks the event log and displays those entries that require some service activity to be done. Not all entries in the log will require service action to be taken. Some errors may have a severity below the level collected by the Analyze function and are therefore not displayed. In other cases the error might be related to operational procedures that do not call for any service action.

Service Actions are indicated by service request numbers (SRNs): see “Service Request Numbers (SRNs)” on page 3.

Attention: If you need to perform service actions, always go first to “MAP 2010: START” on page 2010-1.

View SSA Event Log

This function displays the complete contents of the Event/Error Log.

Stop SSA Event Logging

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 logger executable file, ISSAELOG.EXE, and run it.

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.

Error Summary

This function is available from the Ctrl File button. It displays a summary of the error types in tabular form.

Maintenance Tasks

This section describes a number of tasks called from the MAPs during maintenance of the IBM SerialRAID Adapter that involve running the configurator utilities. There are two configurator utilities provided with the IBM SerialRAID Adapter, both of which provide access to disk service aids in addition to the procedures for setting the configuration.

- The DOS configurator.

This is on a self-contained bootable diskette provided with the IBM SerialRAID Adapter. It is used to configure an adapter on the local server in situations where the operating system is not loaded or running on the server.

- The Remote Systems Management (RSM) configurator.

This runs through an internet browser interface and allows the IBM SerialRAID Adapter to be configured from either the local server or from a remote server.

For the complete details of how to configure an IBM SerialRAID Adapter you should consult the *IBM SerialRAID Adapter Installation and User's Guide*.

Converting a New Resource to a Free Resource

A new resource is one that has not been used previously by the type of system in which it is now installed. For example, a new disk drive to be installed could have arrived directly from the factory, or have been used previously in an AIX system. In both events the disk itself indicates that it is for AIX usage. This task resets the AIX indication and places the disk in the FREE state so that it can be used by the PC.

Using the DOS Configurator:

1. Start the DOS Configurator.
2. From the main menu select **SSA Adapter List** to display the list of installed adapters.
3. Select the required adapter from the list.
4. From the adapter menu, select **New Resources**.
5. The New Resource list is displayed:
 - a. If there are new resources in the list, go to step 6.
 - b. If there are no new resources in the list, go to step 7.
6. For each new resource that you want to convert to the Free state, put the cursor against its name and press Delete. The resource is converted to the *free* state and its name is removed from the list of new resources.
7. Return to the Main menu by pressing Esc.

Using the RSM Configurator:

1. Start the RSM Configurator.

The opening page to be displayed is the adapter list.

2. From the adapter list, select the appropriate adapter.

This opens the adapter view page.

3. On the adapter view page, select the logical view.

The logical view includes details of new resources if there are any detected by the adapter. These are listed under the heading of **System (AIX)**.

4. Click on the heading **System (AIX)**.

This displays the Resource List page for new resources (described as Non-RAID disks, System (AIX)).

5. Select any one, or all items in the list, and click on the **Delete** button at the bottom of the page.

The items are deleted from the list of New Resources and added to the list of Free Resources (the AIX indicator on the disk is reset).

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.

Using the DOS Configurator:

1. Start the DOS configurator and select **SSA Adapter List** from the main menu.
2. From the adapter list menu, select **System Resources**.
3. Select the resource that you want to remove from the system resource list.

Note: A resource can be a disk drive or an array.

4. Press Delete.

The resource is removed from the System Resource List and returned to the list of free resources.

5. Reboot the system to bring the changes into effect.

Removing a Disk Drive from an Array

This procedure allows you to remove a disk drive from an array so that you can install a replacement disk drive. Use this procedure when you do not have an available online disk drive, or there is no spare slot for a replacement disk drive.

1. Start the DOS Configurator
2. From the Main Menu, select **SSA Adapter List**, then select the required adapter.
3. From the Adapter Menu, select **RAID 5 Resources**.
4. Select the array from which you want to remove a disk drive.
5. Select **View Members**.
6. Select the disk drive that you want to remove. If necessary, 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).
7. Press F7 (Exchange Members).
8. Select **Blank Reserved**.

The selected disk drive is removed from the array and replaced by a blank virtual disk.

9. Physically remove the disk drive (see "Exchanging a Non-Array Disk Drive" on page 19).

Listing or Deleting Records of Old Arrays in the NVRAM

If an array becomes disconnected from the system other than by deleting it, a record of that array remains in the non-volatile 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.

Note: Only 32 NVRAM entries may exist and each RAID 5 array requires an entry. Therefore, to have 32 RAID 5 arrays it may be necessary to delete dormant array entries.

1. Start the DOS Configurator.
2. From the Main Menu select **SSA Adapter List**. then select the required adapter.
3. From the Adapter Menu, select the adapter whose records you are checking.
4. Select **Non-Volatile RAM**. A list of arrays is displayed:
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.

Adding a Disk Drive to an Array

This procedure 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 DOS Configurator.
2. From the Main Menu select **SSA Adapter List**, then select the required adapter.
3. From the Adapter Menu, select **RAID 5 Resources**.
4. Select the array to which you want to add a disk drive.
5. Select **View Members**.
6. Select **Not Present (Blank Slot)**.
7. Press F7 (Exchange Members). A list of candidate disk drives is displayed.
8. Select the disk drive that you want to add to the array.
9. Press Enter. The selected disk drive is added to the array.

Modifying Attributes of Resources

1. Start the DOS Configurator.
2. From the Main menu, select **SSA Adapter List**.
3. Select the required adapter from the list.
4. From the Adapter menu, select **RAID 5 Resources**.
5. Select the array whose attributes you want to change

6. Press F8 (Modify Attributes).

The screen that is displayed 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.

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

Creating an Array

To create an array:

1. Start the DOS Configurator.
2. From the Main menu, select **SSA Adapter List** and from that list select the adapter that is to control the array.
3. Select RAID 5 array. You can scroll the contents of the window by using the arrow keys.

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

4. To add the new array, press Insert.

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

5. Type a Resource Name for the new array.

The default values for the attributes are shown but you can change these values 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.

6. Press Select to set the attributes.

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

To select the disk drives for the array:

1. Press Insert.
2. A list of candidate disk drives is displayed.

Candidates are Free Resources that are suitable for insertion into an array with the given attributes.

3. 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.

4. Repeat steps 1 through 3 for each disk drive that you want to add to the array.

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

The screen that is displayed in step 3 on page 45 reappears showing the new array in the list.

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

6. The array that you have created is in the *free* state. You must now attach the array to your system. Go to “Attaching a Resource to the System” on page 47.

Attaching a Resource to the System

1. Start the DOS Configurator and select **SSA Adapter List** from the main menu.
2. Select the appropriate adapter, then from the Adapter Menu, select **System Resources**.

A list is displayed showing the resources that are attached to the system. The list will be empty if this is the first time the configurator has been run, since no resources have yet been attached. Items in the list can include disks, arrays, and disks or arrays with fast write capabilities.

The resources are listed in the sequence of the resource numbers. 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 resources. The system configures the resources in resource number sequence when the system is booted.

3. If you are attaching the first resource and the list is as yet empty, just press Insert. If there are resources already listed, put the cursor against the name of the resource immediately below where you want the new resource to be added, then 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:

These are the resources that are in the free state.

5. Select the resource that you want to attach.

The name disappears from this list and the System Resources window is re-displayed showing the new resource added with the appropriate resource number assigned.

6. The SSA subsystem is now ready for use with your system.

Maintenance Analysis Procedures (MAPs)

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

Introduction to Using the MAPs

Do not turn off the system unit when servicing an SSA loop, unless the system unit needs to be turned off for some other reason. 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, proceed as follows:

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.

Remember that disk drives are fragile. Handle them with care and keep them well away from strong magnetic fields.

A Note on Configurator Utilities

Text in this section refers to the DOS configurator. If you are using the RSM (Remote System Management) configurator, all event logger functions can be accessed from the **Event Logger** button on the main page. Diagnostic functions are available on each Adapter View page.

The Physical view in the RSM is equivalent to the Disk Service Aids. Individual service actions, such as Format, Certify and Set Service Mode are available on each individual resource menu. Resource Views (Disks and RAID-5 arrays) are accessed from the Logical View page.

Notes

Ruled lines for taking notes.

MAP 2010: START

This MAP is the entry point to the MAPs for the IBM SerialRAID Adapter. If you are not familiar with these MAPs, read "Introduction to Using the MAPs" on page 49 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 a 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 on page 2010-2.

004

(From step 002)

DO YOU HAVE AN SRN?

Yes No

005

- Using the DOS Configurator, select **SSA Adapter List** from the main menu.
- Select the appropriate adapter from the list.
- From the adapter menu, select **Run Concurrent Diagnostics**.

If an SRN is produced, go to "Service Request Numbers (SRNs)" on page 3.
(Step **005** continues)

MAP 2010 (continued)

005 (continued)

If no SRN is produced, go to "MAP 2410: SSA Repair Verification" on page 2410-1.

006

Go to "Service Request Numbers (SRNs)" on page 3.

007

(From step 003)

IS THE SRN 45PAA?

Yes No

008

Go to Step 010.

009

Go to "MAP 2320: SSA Link" on page 2320-1.

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" on page 2323-1.

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.

015

Go to "MAP 2324: SSA RAID" on page 2324-1.

MAP 2320: SSA Link

This MAP helps you to isolate FRUs that are causing an SSA loop problem between a device and the IBM SerialRAID Adapter, or between two devices. If you are not familiar with SSA loops, read the information relating to SSA links, strings, and loops contained in the *IBM SerialRAID Adapter: Installation and User's Guide*.

Attention: It is not necessary to turn off the system unit when servicing the SSA loop, unless you have to turn it off for some other reason. 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” on page 38.

006

Go to “SSA Link Errors” on page 15.

007

(From step 003)

– Using the DOS Configurator, select **SSA Adapter List** from the main menu.

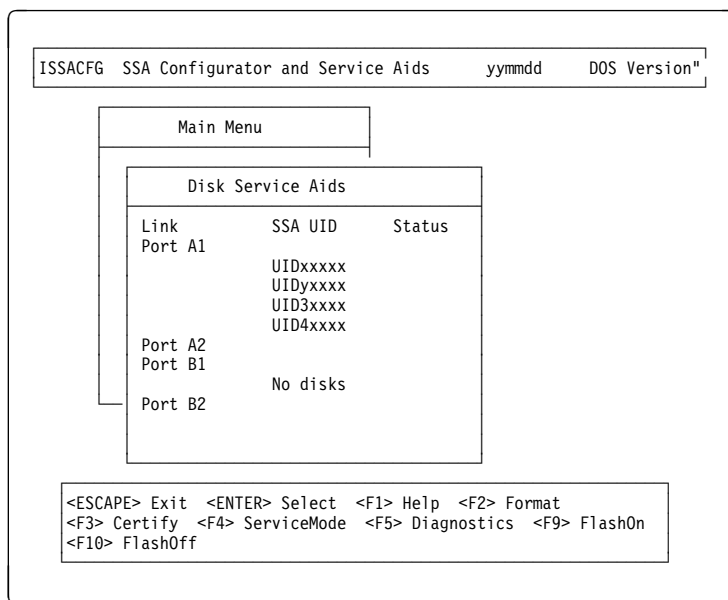
– Select the required adapter from the SSA Adapter List.

(Step **007** continues)

MAP 2320 (continued)

007 (continued)

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



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 IBM SerialRAID 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" on page 2410-1 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 IBM SerialRAID Adapter is failing:
 1. Exchange the adapter for a new one.
 2. Go to "MAP 2410: SSA Repair Verification" on page 2410-1 to verify the repair.

009

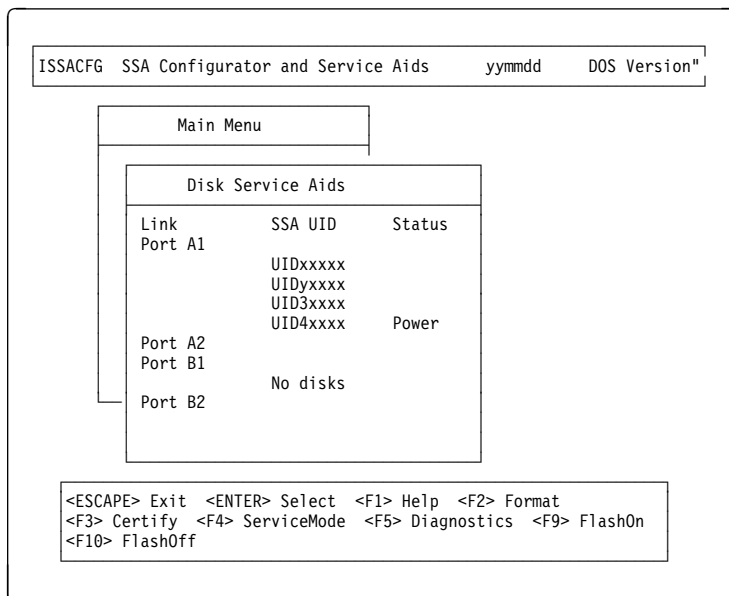
Go to Step 010.

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.

On the RSM configurator this is shown as a red line in the Physical View, with the added text **Break**.



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

Yes No

011

Go to Step 013 on page 2320-4.

012

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

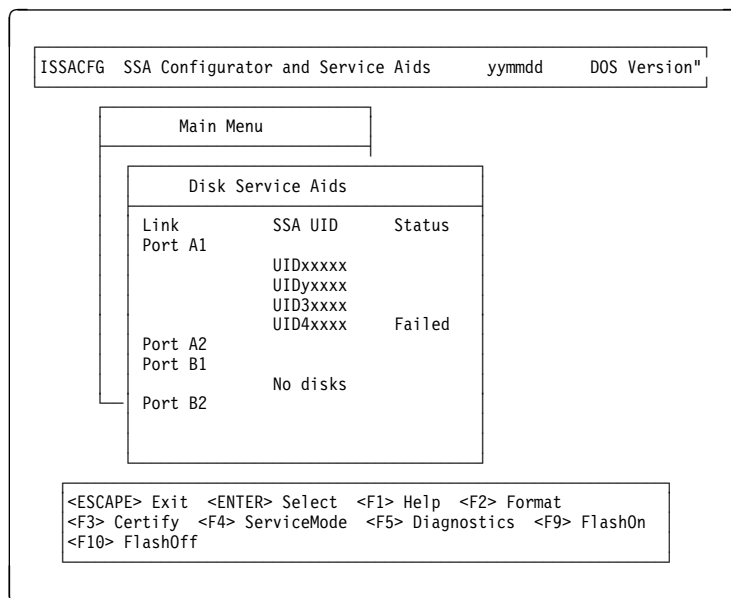
MAP 2320 (continued)

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.

On the RSM configurator this is shown as an icon in the PFA column of the Physical View.



IS ONE OF THE DISK DRIVES FAILING?

Yes No

014

Go to Step 016 on page 2320-5.

015

- Use the Identify function (as instructed on the screen) to find the failing disk drive. See "Finding the Physical Location of a Device" on page 38 if you need more information about finding the disk drive.
 - Exchange the disk drive for a new one (see "Exchanging Disk Drives" on page 19).
- Go to "MAP 2410: SSA Repair Verification" on page 2410-1 to verify the repair.
-

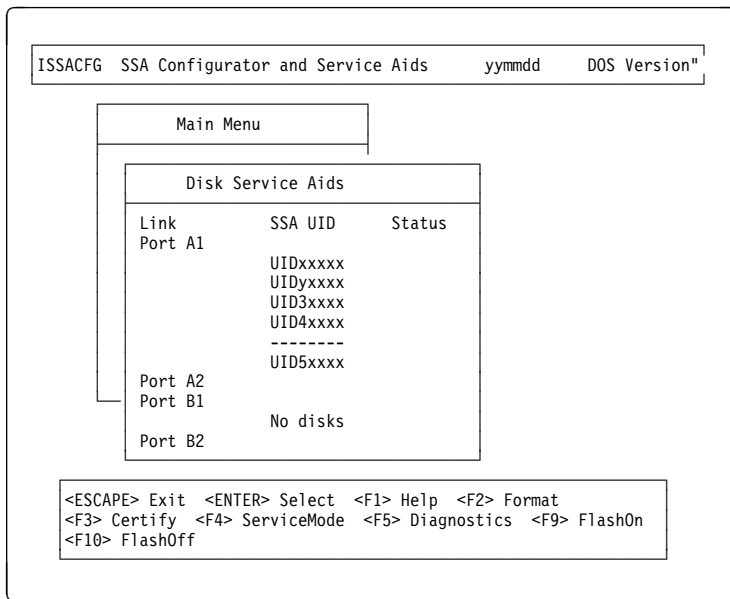
016

(Step 016 continues)

016 (continued)
 (From step 014)

- Observe the list of disk drives on the screen. A dotted line (-----) shows that a link in one of the loops is broken. If two dotted lines are displayed, two links are broken, one in each loop. In the example shown here, a break has occurred between the fourth and the fifth disk drive.

On the RSM configurator this is shown as a red line in the Physical View, with the added text **Break**.



IS A LINK BROKEN BETWEEN TWO DISK DRIVES?

Yes No

017

No trouble found.

018

- Use the Identify function (as instructed on the screen) to find the devices (disk drives or adapters) that are on each side of the broken link. See "Finding the Physical Location of a Device" on page 38 if you need more information about finding the disk drive.

Go to "SSA Link Errors" on page 15. 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.

MAP 2323: SSA Intermittent Link Error

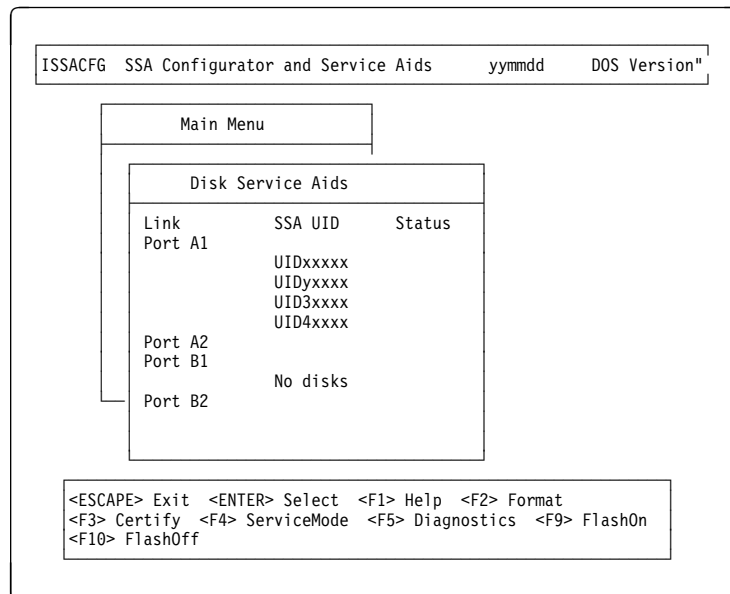
This MAP helps you to isolate FRUs that are causing an intermittent SSA link problem. You are here because you have an SRN from the series 21000 through 29000.

If you are not familiar with SSA loops, read the information relating to SSA links, strings, and loops contained in the *IBM SerialRAID Adapter: Installation and User's Guide*.

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

001

- Start the DOS Configurator.
- 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.



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.

(Step **001** continues)

MAP 2323 (continued)

001 (continued)

- 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).

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.

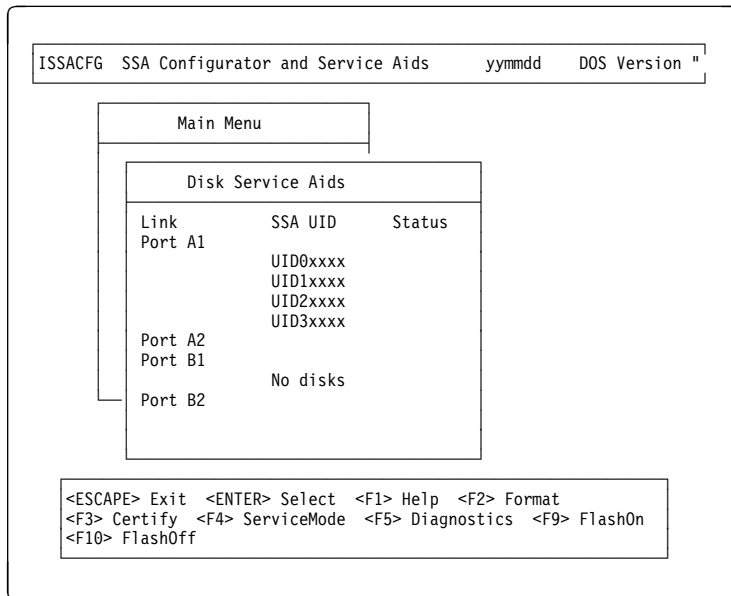
- Observe the screen, and identify the physical device that is represented by PAA in the SRN.

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 on page 2323-3. Otherwise, go directly to Step 003 on page 2323-3.

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.



Example 2

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

003

(From step 002)

The problem is in the SSA link between the device that you identified in Step 002 on page 2323-2 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 on page 2323-2, SRN 24002 identified the SSA address of the third disk drive as 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” on page 2410-1 to verify the repair.

MAP 2323 (continued)

1. One of the two devices that are identified by the SRN (see "Exchanging Disk Drives" on page 19).
 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.
-

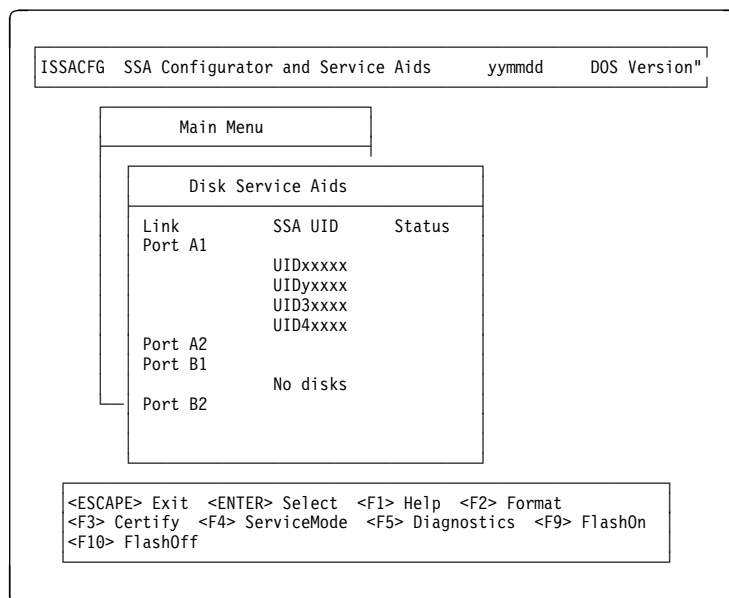
MAP 2324: SSA RAID

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

Attention: It is not necessary to turn off the system unit when servicing and SSA link, unless it needs to be turned off for some other reason. 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. Using the DOS Configurator, select **SSA Adapter List** from the main menu
2. Select the required adapter from the List.
3. Select **Disk Service Aids** from the Adapter menu.



4. Select **Run Concurrent Diagnostics** to identify any disk drive problems that have occurred.
5. Check the Status column to find any power problems, SSA link problems, and SSA disk drives that have a Failed status.
6. 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.

001

(Step **001** continues)

MAP 2324 (continued)

001 (continued)

(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 on the IBM SerialRAID Adapters.

Go to Step 004.

003

No hot-spare disk drives are available. Go to Step 048 on page 2324-10.

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 on page 2324-3.

007

(From step 005)

DID THE DIAGNOSTICS GIVE YOU ANY OTHER SRN?

Yes No

008

Go to Step 069 on page 2324-15.

009

(Step 009 continues)

009 (continued)

- Solve the problems that caused the SRN.

Return to Step 001 on page 2324-2.

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 on page 2324-5.
47500	A partial loss of data has occurred.	Go to Step 019 on page 2324-5.
49000	An array is in the Degraded state.	Go to Step 031 on page 2324-7.
49100	An array is in the Exposed state.	Go to Step 041 on page 2324-9.
49700	The parity on an array is not complete.	Go to Step 051 on page 2324-11.

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 RE-CABLED (not necessarily by you)?

Yes No

012

Go to Step 014 on page 2324-4.

013

You must now restore the original configuration:

- Using the DOS Configurator, select the appropriate adapter, then from the adapter menu select **RAID 5 Resources**.
- Using the RSM configurator, go to the logical view and select either RAID Lists or System (PC) List for JBOD.

(Step **013** continues)

MAP 2324 (continued)

013 (continued)

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

014

(From step 012)

Either more than one disk drive has failed, or an array that is not complete has been connected to the IBM SerialRAID 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" on page 43.
- 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" on page 43, 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)

- Using the DOS Configurator select the appropriate adapter, then from the adapter menu select **Rejected Disks**.
- Using the RSM configurator, go to the Logical View and select **Rejected**.

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.
(Step 017 continues)

017 (continued)

- Run the Certify service aid (see “Certify Disk” on page 35) to all the disk drives that are listed as rejected.

Go to Step 072 on page 2324-15.

018

(From step 010)

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

Go to “Listing or Deleting Records of Old Arrays in the NVRAM” on page 43, 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.

- Using the DOS Configurator, select **SSA Adapter List**, then select the appropriate adapter from the list.
- On the adapter menu, 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” on page 2320-1, and start the problem determination procedure again.

021

- Note the name of the failing array.

Go to Step 022.

022

(From step 021)

(Step **022** continues)

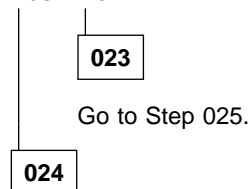
MAP 2324 (continued)

022 (continued)

- Using the DOS Configurator and Service Aids Utility, select the appropriate adapter, then from the adapter menu select **System Resources**.
- Select the failing array, then Select **View Members**.
- Using the RSM configurator, go to the Logical View and select RAIDx, then select the appropriate array to see the members.
- Select the failing disk drive, and note the Resource Names 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.
- 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



- Exchange the failing disk drive for a new one (see “Exchanging Disk Drives” on page 19).

Go to Step 090 on page 2324-18 to add the disk drive to the group of disk drives that are available for use by the RAID manager.

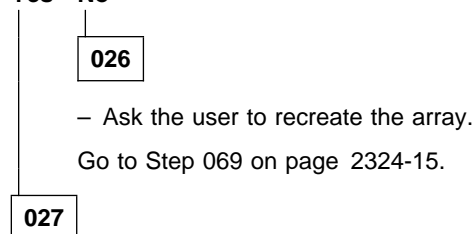
025

(From step 023)

- Run the Certify service aid (see “Certify Disk” on page 35) 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



(Step 027 continues)

027 (continued)

- Run the Format service aid (see “Format Disk” on page 34) 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

- Ask the user to recreate the array.
- Go to Step 069 on page 2324-15.

030

- Exchange the failing disk drive for a new one (see “Exchanging Disk Drives” on page 19).

Go to Step 090 on page 2324-18 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.

- Using the SSA Configurator and Service Aids Utility, select the appropriate adapter, then from the adapter menu select **Rejected Disks**.
- Using the RSM configurator, go to the Logical View and select **Rejected**.

ARE ANY DISK DRIVES LISTED?

Yes No

032

- A disk drive has not been detected by the adapter.
- Go to Step 035 on page 2324-8.

033

(Step **033** continues)

MAP 2324 (continued)

033 (continued)

- Run nonconcurrent diagnostics to all the disk drives that are listed as rejected.
- Run the Certify service aid (see “Certify Disk” on page 35) 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” on page 44.
 - 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)

- Exchange the disk drive for a new one (see “Exchanging Disk Drives” on page 19).

Go to Step 090 on page 2324-18 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” on page 2320-1.

038

(From steps 036 and 046)

(Step 038 continues)

038 (continued)

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” on page 44.
- 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” on page 19).

Go to Step 090 on page 2324-18.

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. Refer to the *IBM SerialRAID Adapter: Installation and User's Guide* for information on array states.

- Using the SSA Configurator and Service Aids Utility, select the appropriate adapter, then from the adapter menu select **Rejected Disks**.
- Using the RSM configurator, go to the Logical View and select **Rejected**.

ARE ANY DISK DRIVES LISTED?

Yes No

042

A disk drive has not been detected by the adapter. Go to Step 045 on page 2324-10.

043

- Run nonconcurrent diagnostics to all the disk drives that are listed as rejected. (Step 043 continues)

MAP 2324 (continued)

043 (continued)

- Run the Certify service aid (see “Certify Disk” on page 35) 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” on page 44.
- 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” on page 19).

Go to Step 090 on page 2324-18 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

(From step 042)

DOES THE DISK SERVICE AID INDICATE AN OPEN LOOP?

Yes No

046

Go to Step 038 on page 2324-8.

047

Go to “MAP 2320: SSA Link” on page 2320-1.

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” on page 19). (Step 048 continues)

048 (continued)

- Using the SSA Configurator and Service Aids Utility, 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” on page 44.
- Change the **Enable Use of Hot Spares** attribute to **No**.
- Using the RSM configurator, select the array in question, then select the **Modify Attributes** button.

050

- Go to “Creating an Array” on page 45, and create a hot-spare disk drive from one of the listed candidate disk drives.

You have solved the problem.

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.

(Step **051** continues)

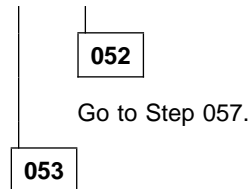
MAP 2324 (continued)

051 (continued)

- Start the DOS Configurator.
- 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



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

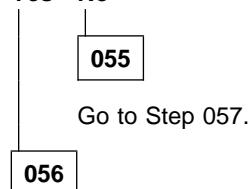
Go to Step 054.

054

(From step 053)

IS THE PROBLEM SOLVED?

Yes No



No further action is needed.

057

(From steps 052 and 055)

- Start the DOS Configurator.
 - Open the adapter list and select the appropriate adapter.
 - Select **System Resources** from the adapter menu.
 - 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.
- (Step **057** continues)

057 (continued)

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)

- Using the DOS Configurator, open the adapter list and select the appropriate adapter.
- select **System Resources** from the adapter menu.
- Select the failing array.
- Select **View Members**.
- Using the RSM configurator, just selecting the array shows all members
- Select the failing disk drive.
- Note all the Resource Nnumbers 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

061

Go to Step 063 on page 2324-14.

062

(Step 062 continues)

MAP 2324 (continued)

062 (continued)

- Exchange the failing disk drive for a new one (see “Exchanging Disk Drives” on page 19).

Go to Step 090 on page 2324-18 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” on page 35) 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 on page 2324-15.

065

- Run the Format service aid (see “Format Disk” on page 34) 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 on page 2324-15.

068

- Exchange the failing disk drive for a new one (see “Exchanging Disk Drives” on page 19).

Go to Step 090 on page 2324-18 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 on page 2410-2)
(From steps 008, 026, 029, 064, and 067)

- Using the DOS Configurator, open the adapter list and select the appropriate adapter.
- From the adapter menu select **Rejected Disks**.
- Using the RSM configurator, go to the Logical View and select **Rejected**.

ARE ANY DISK DRIVES LISTED?

Yes No

070

Go to Step 075 on page 2324-16.

071

- Run nonconcurrent diagnostics to all the disk drives that are listed as rejected.
- Run the Certify service aid (see “Certify Disk” on page 35) 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 on page 2324-16.

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.

074

- Exchange the failing disk drive for a new one (see “Exchanging Disk Drives” on page 19).

(Step **074** continues)

MAP 2324 (continued)

074 (continued)

Go to Step 090 on page 2324-18 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)

- Using the DOS Configurator, open the adapter list and select the appropriate adapter.
- Select RAID 5 Arrays.
- Select each array type in turn.

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

Yes No

076

Go to Step 078.

077

Go to Step 001 on page 2324-2.

078

(From step 076)

- Using the SSA Configurator and Service Aids Utility, open the adapter list and select the appropriate adapter.
- From the adapter menu select **System Resources**.
- Using the RSM configurator, go to the Logical View, then select RAIDx. All the arrays of this type are shown.
- 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

079

Go to Step 081 on page 2324-17.

080

Go to Step 001 on page 2324-2.

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)

(Step **087** continues)

MAP 2324 (continued)

087 (continued)

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

Yes No

088

You have solved all the array problems.

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:

- Using the DOS Configurator, open the adapter list and select the appropriate adapter.
- from the adapter menu select **Rejected Disks**.
- Using the RSM configurator, go to the Logical View and select **Rejected**.
- 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
 - Attached resource
 - Remain as a free resource

092

If you exchanged the disk drive by using the procedure described in “Exchanging Disk Drives” on page 19, the new disk drive is identified as a new resource.
(Step 092 continues)

092 (continued)

- Do the procedure described in “Converting a New Resource to a Free Resource” on page 41.
 - Change the new disk drive to a free resource.
 - Ask the customer to choose how the disk drive is to be configured:
 - Hot-spare
 - Attached resource
 - Remain as a free resource
-

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.

(Step **006** continues)

MAP 2410 (continued)

006 (continued)

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.
- 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 “Displaying SRNs” on page 3).

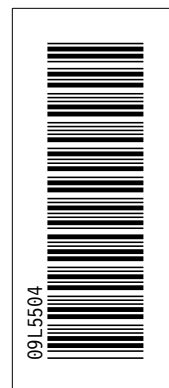
Note: If you do not run this service aid, the diagnostics might create an SRN for a problem that has already been solved.

If you have a RAID array, and the problem remains, go to **RAID Checkout** at MAP 2324 step 069 on page 2324-15.



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