IBM® Serial Storage Architecture

Remote Systems Management
User's Guide
v1.51

March 8 2000

Preface

This document contains the IBM SSA Remote Systems Management (RSM) GUI specification. It is intended for users of RSM and is published only on the SSA Customer Support website.

Online access

This document was up-to-date on the day of publication.

The latest version is stored on the IBM Storage website at :

http://www.storage.ibm.com/hardsoft/products/ssa/

Select the *Documents* link.

Change History

The publication dates for this document are :

Version	Date	Explanation
1.51	8th March 2000	First Edition relating to RSM versions 1.51

Table 1:   Change history

Part 1 - RSM Basics

1 Introduction

The Remote Systems Management (RSM) configurator is a web-based configuration tool for use with IBM Serial Storage Architecture RAID Adapters. Chapter 2 provides a list of supported adapters and corresponding operating systems.

Serial Storage Architecture (SSA) is an open standard. It defines a high-performance serial interface for storage devices which retains the SCSI-2 commands, queuing model, status and sense bytes.

RSM provides a configuration interface to all SSA adapters, disk drives and enclosures. The interface can be accessed with any supported HTML browser. It provides, therefore, true *remote* systems management.

On the PC Server platforms the web service is included in the RSM software. On these platforms, the RSM also provides an interface to the dedicated SSA Event Logger and to the related Security Manager.

All versions of RSM allow you to use an Internet connected browser to check the level of all your SSA Host Software and microcode.

This book describes the supported systems, using-system prerequisites, and the user interface.

RSM Tutorial

RSM is provided with a set of tutorial HTML documents. These documents are intened for new users. They provide the basic information that new users need to use the RSM. The tutorial documents are described below.

Filename	Description
tutorial.htm	**Tutorial index page:** Provides links to the four tutorials.
ssa-tut1.htm	**RSM Overview:** Describes: • Description of the RSM • Useful SSA terminology • Principles of user interface design • Local and remote configuration • Help and check levels
ssa-tut2.htm	**Using the RSM:** Describes: • The main views within RSM • Explorer • Adapter List and View • Logical View • Resource Lists and Views • Physical View • Enclosure View • System View • PC Server Security and Event Logger.
ssa-tut3.htm	**Configuration Examples:** Describes how to: • Creating a RAID-5 resource and attach it to the using system • Change the RAID-5 resource into a fast-write RAID-5 resource • Attach a non-RAID enclosure to the using system • Create a hot-spare disk drive
ssa-tut4.htm	**RAID-10 and the Hot-spare Manager:** Describes how to: • Create a hot-spare pool • Add hot-spare disks to the pool • Create a RAID-10 array with multiple domains • Add or change the hot-spare pool assignments

Table 2: RSM Tutorial HTML Files

2 Supported Systems

This information was correct at the time of publication, in reference to release v1.51.

Client Pre-requisites:

The Client is the system used to access RSM.

- TCP/IP network access to the Server.

- Supported browser as stated below.

RSM is supported with the following browsers :

Browser	Version	Recommend
Microsoft Internet Explorer	4.01 SP2 *	4.01 SP2 *
Microsoft Internet Explorer	5.0x	5.00.23x+
Netscape Navigator	4.0x	4.07+
Netscape Navigator	4.5x to 4.7x	4.71+

Table 3. Supported Browsers

* Also known as Version 4.72

IBM AIX 4.3.2 and 4.3.3

Server prerequisites

- One of the following PCI IBM SSA Adapters:
    - IBM SSA Enhanced RAID Adapter
    - IBM Advanced SerialRAID (Plus) Adapter
- The latest adapter, disk and enclosure microcode[1]
- The latest AIX device driver (Host Software) installed and running[1]
- Lotus Go, or IBM Apache web service installed
- AIX 4.3.2 or AIX 4.3.3
- TCP/IP Networking

1. As guided by 'Check Levels' or the SSA Customer Support Website :

Microsoft Windows NT Server 4.0

Server prerequisites

The Server is the system that RSM is installed on.

- One of the following IBM SSA RAID Adapters :
  - IBM SSA RAID Adapter
  - IBM SSA RAID Cluster Adapter
  - IBM SerialRAID Adapter
  - IBM Advanced SerialRAID/X Adapter
- The latest adapter, disk and enclosure microcode[1]
- The latest Windows NT device driver installed and running[1]
- The latest Windows NT SSA Event Logger installed and running[1](at least v1.30)
- Windows NT Server 4.0 (Standard or Enterprise Edition) at Service Pack 3, or above

Additional Stand-Alone version prerequisites

- Windows NT Networking with TCP/IP protocol

Additional Netfinity version prerequisites

- Version 5.2 of Netfinity SM Manager software installed on the using system
- Windows NT Networking with either TCP/IP or NetBIOS protocols

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1. As guided by 'Check Levels' or the SSA Customer Support Website :

Novell NetWare 4.2 and 5.0

Server prerequisites

- One of the following IBM SSA RAID Adapters :
    - IBM SSA RAID Adapter
    - IBM Advanced SerialRAID/X Adapter
- The latest adapter, disk and enclosure microcode[1]
- The latest NetWare device driver installed and running[1]
- The latest NetWare SSA Injector installed and running[1]
- The latest NetWare SSA Event Logger installed and running[1]
- Novell NetWare 4.2 or 5.0
- NetWare TCP/IP protocol operational between the client and server

1. As guided by 'Check Levels' or the SSA Customer Support Website :

3 Interface Layout

The interface layout is the same in all versions of RSM.
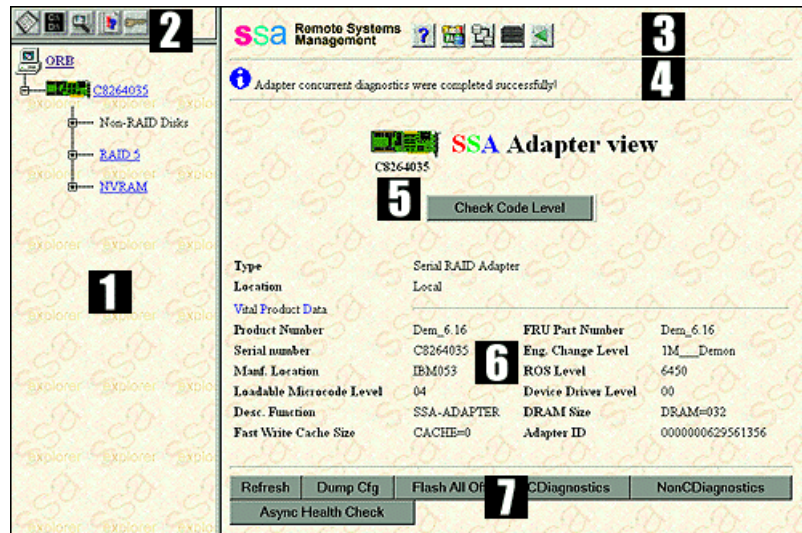
1. The **Explorer Frame,** contains an expandable tree of SSA adapters and their respective resources. The resources are grouped by their type.

2. The **Common Navigation Frame**, above the explorer frame contains links to the RSM functions that are available from every RSM page.

The right hand **Configuration Frame** contains several subareas. The style of each subarea is constant throughout RSM.

3. The **Navigation Area** contains links to the main RSM Resource Views; **Adapter List, Logical View**, **Physical View,** and **Enclosure View**. It also contains a *logically back* icon and the **RSM Help** icon.

   The icons are grey when you are on the Adapter List page, or are performing an action. From the Adapter List, select an adapter; the icons become active.

   Note: *Logically back* steps back one logical step. For example, if you select a Disk View from the Physical View, you are returned to the Physical View, rather than to Logical View as is normal. Be careful when you use the browser navigation icons as you may inadvertantly attempt to repeat an action. Use the RSM navigation aids, such as the Explorer Frame for navigation.

4. The **Information Area** contains reports of user errors, warnings, and, after some actions, important information. ***These messages appear only once.*** For example, if you are in a Resource View, and select to start the indicator light flashing on the resource, a message appears to notify you that the action was successful. When you move elsewhere the message disappears. It does not reappear, although the resource might still be flashing.

5. The **Title Area** contains links to other views and check levels as appropriate. The page title contains the name of the resource that you are configuring or observing; for example, an adapter or disk drive serial number.

6. The **Configuration Area** contains the details that relate to the resource that you are observing. When an action requires user input, the configeration areas also contains user input forms.

7. The **Actions Area** contains the actions that you can preform on, or with the resource that you are observing.

Common Navigation Frame

- The Common Navigation Frame, which is above the Explorer Frame, provides links to the RSM features that are available from every page. From left to right, they are: the SSA Tools Menu icon, the System View icon, the Check Level Discovery icon, the Event Logger icon, and the Security icon.

- The **SSA Tools Menu** icon provides links to the SSA Tools Menu, which contains more information about SSA subsystems. The menu provides information to help you use the other SSA utility programs. It also contains links to HTML versions of all SSA readme files relevant to the operating system on which RSM is running. This menu provides important user information, see Chapter 1 on page 35.

- The **System View** icon links to the list of 'System' resources. On PC Server systems, these resources are listed in **Resource Number** sequence, lowest first. On all platforms, the system view shows the sequence in which the SSA resources in this server are presented to the operating system. See pages 37 and 154.

  Note: The System View shows the 'System' resources that are presented by ALL the SSA adapters in this server.

  The 'System' resources that are presented first are those that are available via the adapter that has the lowest node number. The next resources to be presented are those that are available via the adapter that has the next-to-lowest node number and so on.

  The using system assigns the node number . This number isgenerally determined by the using-system PCI bus and slot priority.

- The **Check Level Discovery** icon starts the discovery process on the using system. See page 41

- The **Event Logger** icon provides a link to the SSA Event Logger that the PC server version of the RSM provide. See page 43.

- The **Security Icon** provides a link to the RSM Security features provided by the PC Server versions of the RSM provide. These features allow you to manage the RSM access user names on the existing using system. This icon is visible only on the PC Server versions. Stand-alone users must have Admin permission. In the Netfinity versions, the security icon links to the Netfinity Security Manager. See page 51.

Explorer Frame

The **Explorer Frame** displays a list of the SSA adapters that are installed in the using system.
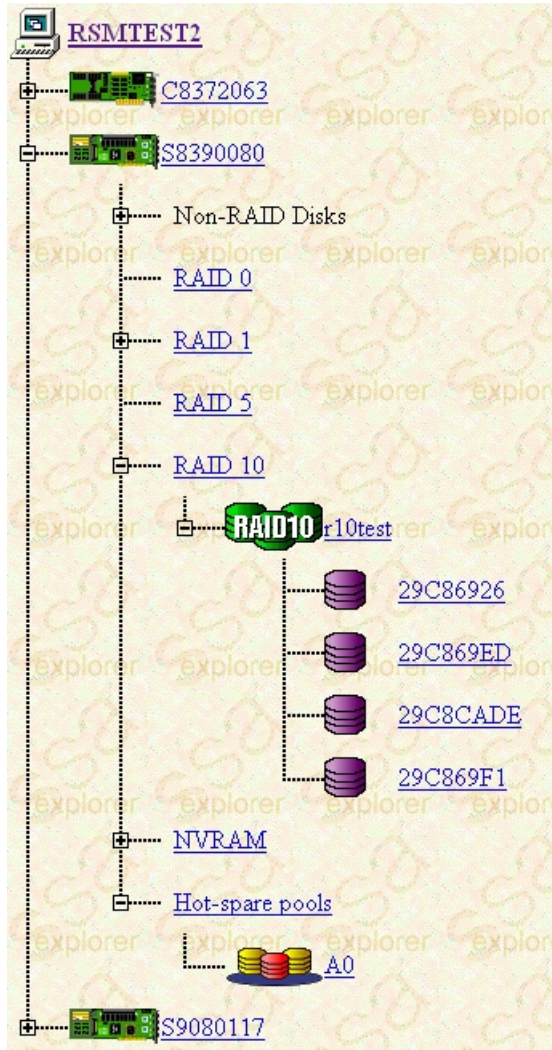
Select the **Computer** Icon to refresh the Explorer Frame.

Select any **Adapter** icon to display, in a JavaScript Popup window, details that relate to the chosen adapter. (See figure on the next page.)

Select any **Expand** icon to expand the chosen Explorer branch.

Select any **Hide** icon to close the chosen Explorer branch.

Note: If neither the Hide nor the Expand icon is visible next to the Resource Title, you have no resources of that type.

Select any **Resource** icon to display, in a JavaScript Popup window, details that relate to the resource. (See figure on the next page.) Each Image contains a Tool Tip, if your browser supports. The same information is always displayed in the browser status bar.
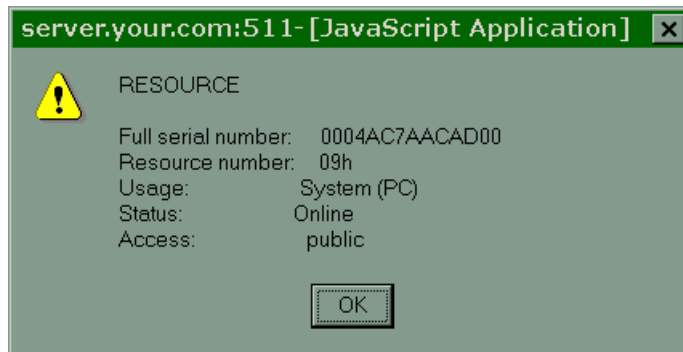
Each **Serial Number** links the Configuration Frame to the relevant Disk, Pool, NVRAM or Array View.

Adapter JavaScript Window:
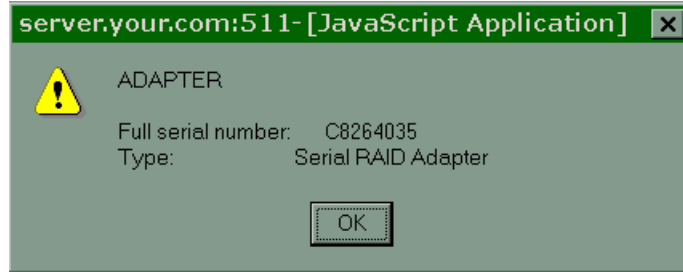
Resource JavaScript Window :

Configuration Frame

The data in this area is page specific. Each page displays the necessary data to allow you to select the action or navigation that you need for your configuration job.

Navigation Area

You can access the Logical, Physical and Enclosure Views only after you have selected an adapter from the adapter list, or Explorer Frame. If you have not selected an adapter the icon will appear grey - as shown below.

Before selecting an adapter (Stand Alone versions):

After selecting an adapter from the Adapter List or Explorer Frame (Stand Alone versions):
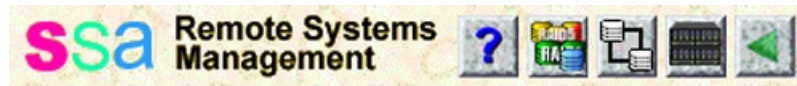
After selecting an adapter from the Adapter List or Explorer Frame (Netfinity versions):
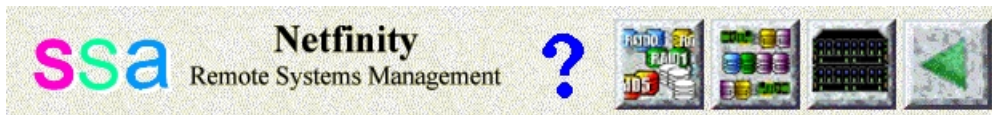
- The **SSA Remote Systems Management** title is a link back to the Adapter List page. If you are already on the Adapter List page, the icon refreshes the page.

- The **Help** icon opens a new browser window which contains context-sensitive help information. The Help icon is shown if the correct help file is accessible; that is, it is in the required location.

- The **Logical View** icon links to a logical view of the SSA subsystem. The current SSA resources, as seen by the selected adapter, are grouped by array type and disk usage. Any resource types that are visible to, but not supported by, the selected adapter, can be grouped under the "Unsupported" or "Pre-configured" types.

  You can access the Logical View only after you have selected an adapter from the adapter list. If you have not selected an adapter, the icon appears grey, as shown above. Select the appropriate adapter serial number from the Explorer Frame or Adapter List.

- The **Physical View** icon provides a link to a physical view of the SSA subsystem. The Physical View shows how the disk drives and, if a cluster configeration, the other adapters are connected to the adapter.

  You can access the Physical View only after you have selected an adapter from the Adapter List. If you have not selected an adapter; the icon appears grey, as shown above. Select the appropriate adapter serial number from the Explorer Frame or Adapter List.

- The **Enclosure View** icon, in the navigation area, links to a list of enclosures connected to the selected adapter. The enclosures must support SCSI Enclosure Services (SES), for example the IBM 7133 Serial Disk Storage Enclosures Models D40 and T40.

 You can access the Enclosure View only after you have selected an adapter from the Adapter List. If you have not selected an adapter the icon will appear grey - as shown above. Select the appropriate adapter serial number from the Explorer Frame or Adapter List.

- The **Logical Back** icon links to the previous page in the RSM page hierarchy. This page might not always be the page which you observed before the existing page. For example, when the existing page is the Resource List, the previous page is the Logical View.

Information Area

All error, warning and information messages are displayed in the Information Area. The type of information are identified by the icons :

! Error Icon   Warning Icon   Information Icon

The information is displayed only once. It is not display again if you select any other action, including Refresh. Multiple error, warning, or information messages are displayed in sequence.

Configuration Area

This section contains all the information that relates to the SSA subsystem resource that you have selected.

When you have selected an action, this area might contain a form. The fields of the form are related to the information that is required before you can perform the action.

The title area displays the page title and, under it, the adapter serial number under it. On the Adapter List this is the Hostname. On the Disk and Array Views, the resource name or serial number is also shown.

Actions Area

This section contains the actions that you can be perform from the exsisting page; that is, the actions that are suitable for the selected resource.

Note: Some service actions are available only when the Resource View has been accessed through the Physical View.

Some actions display a form in the Configuration Area, some perform the action immediately, while others provide a confirmation window.

RSM Child Windows

Several RSM actions display their results in child browser windows. Child windows are opened only when an action takes you to a completely different area within RSM; for example, to the Check Level functions.

You can observe these windows while you are observing the main RSM Configuration window. This is a useful function if, for example, you have requested a help page.

The following RSM actions create (or refresh) a child browser window.

> **Note:** Netscape Navigator and Communicator do not auto-raise existing child windows, although the contents are refreshed.

- *Selecting the Help icon in the Navigation area:* The Help window is opened or refreshed.

- *Selecting an SRN link from the Event Log Analysis page, or after running a diagnostic action:* The SRN window opens or is refreshed. This window automatically searches for the closest match to the SRN the you have requested.

- *Selecting a Check Level action:* The Check Level window opens. This window requests the level check from the SSA Customer Support Website[1]

  > **Note:** The Check Level Discovery process opens another browser window that is the same size as the main RSM window.
  >
  > The Individual Check Level processes open a smaller fixed size window.

- *Selecting the SSA Tools Menu icon from the Common Navigation Frame:* The SSA Tools window opens. This page provides a Javascript function. The function ensures that no more than one window containing RSM is opened simultaneously. For example, if, when using the RSM, you select the SSA Tools Menu icon, then select the RSM link from the menu, the Javascript function returns you to the existing RSM window.

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1. http://www.storage.ibm.com/hardsoft/products/ssa/

RSM Logical Flow

The figure below shows the logical flow path and available actions provided by RSM :
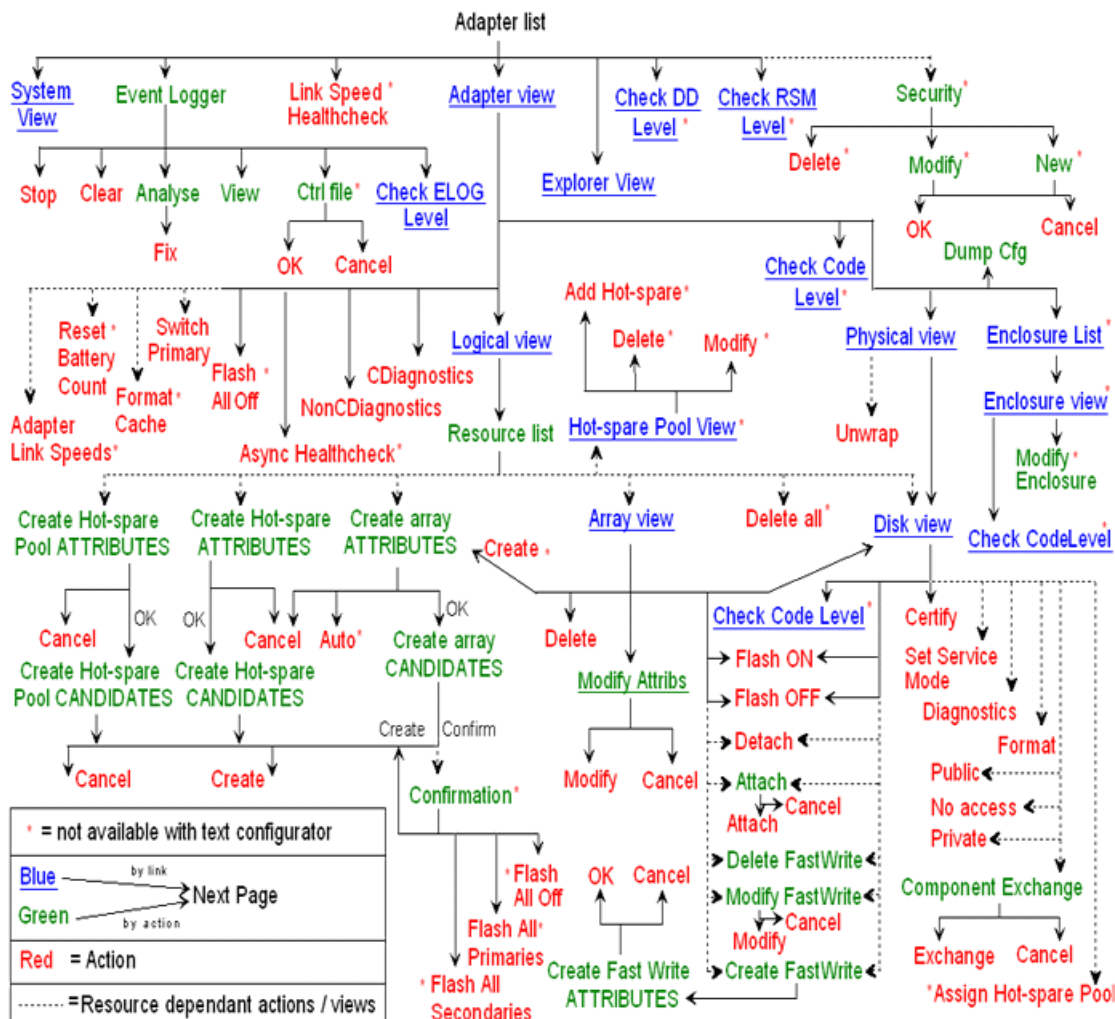
4 Context Sensitive Help

The Help icon in the RSM Navigation Area provides help that relates to the exsisting page. This help is displayed in the help browser window that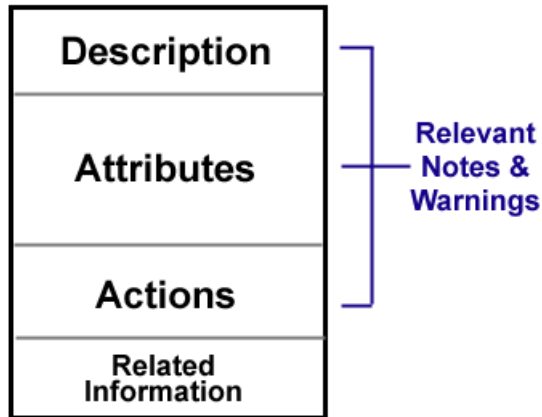 the RSM creates when help if first time requested. Each following request for help is displayed in the same browser window, if it is still open.

> **Note:** Netscape Navigator and Communicator do not auto-raise existing child windows, although the contents are refreshed.

The help pages follow the same basic design as shown below :

Some help pages describe a range of resource usages and types. For example, the Array View page, provides help for RAID arrays, Fast Write RAID arrays, and all array usage classes.

Under these conditions, RSM uses an anchor in the help page to display the help that is relevant to the resource that you are observing in the RSM Configuration Frame. You might, however, need to select your adapter type.
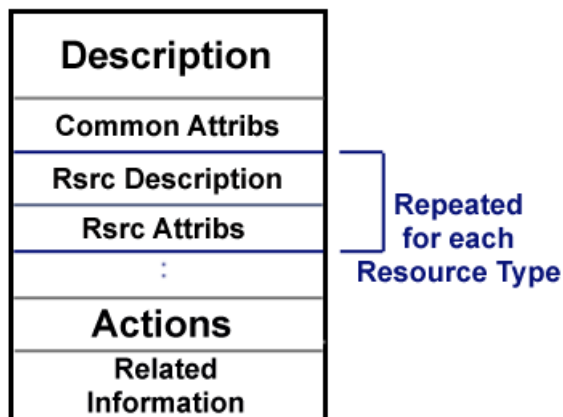
Example Basic Help Browser Window :
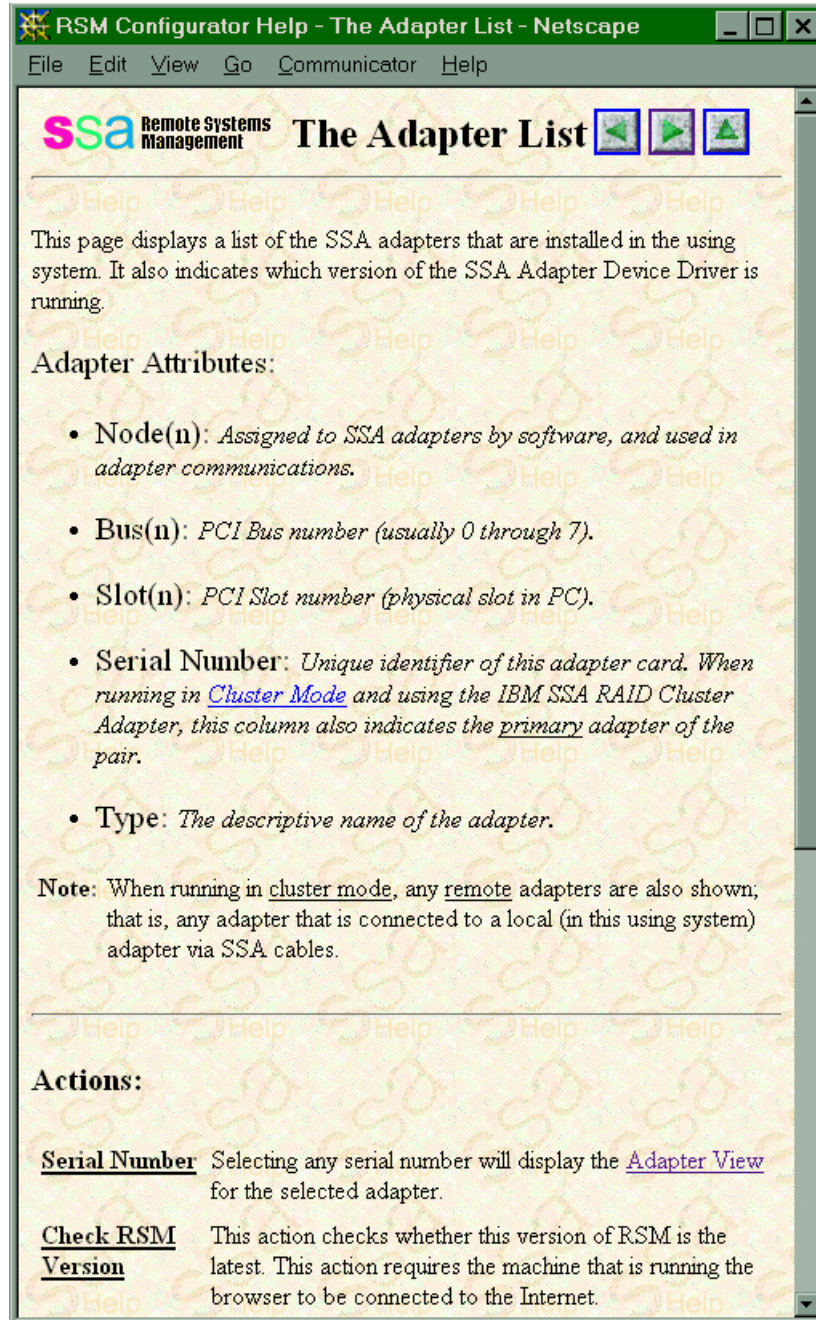
Example Multiple Resource Type Help Browser Window :

Part 2 - RSM Interface

1 SSA Tools Menu

The SSA Tools Menu is supplied with all versions of RSM. During installation of the Windows NT version, a short path is added to the existing user Start Menu. This short path provides a link directly to the page that is shown above. From that page, you can access RSM, the Tutorial, the Help and the SSA SRN list.

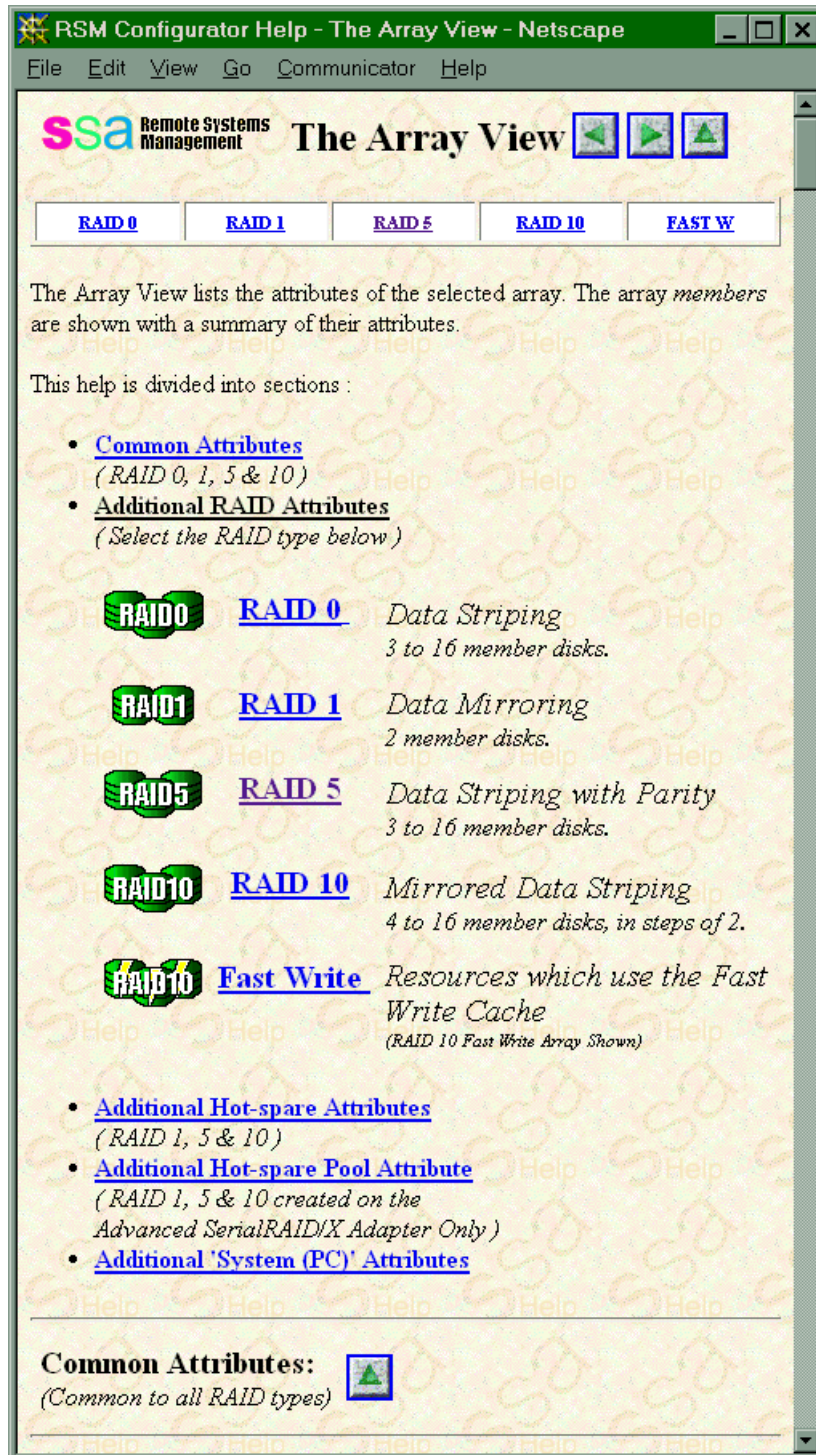You can also start the SSA Tools Menu if you select the SSA Tools Menu icon from the Common Navigation Frame. This action opens the SSA Tools Menu window, which provides a Javascript function. This function ensures that only one browser window opens when you select the RSM link from the SSA Tools Menu. For example, if, when using the RSM, you select the SSA Tools Menu icon, then select the RSM link from the menu, the JavaScript funtion returns you to the existing RSM window.

The SSA Tools Menu can also be started by the appropriate URL :

`http://127.0.0.1:nnn/help/ssaindex.htm`

where *nnn* is the appropriate port number, and `127.0.0.1` is the TCP/IP loopback address for the local machine. If you are running the browser on the machine that is running the RSM, you can use this loopback address. Otherwise, you must use the correct TCP/IP domain name for the server that is running the RSM.

Also provided are HTML versions of the related SSA readme files, and information about the updating of SSA software and microcode. That information explains the Check Level function and provides a link to the SSA Customer Support Website.

2 System View

System Usages

It is important to remember that "System (PC)" and "System (AIX)" have different meanings on the PC Server and AIX operating systems.

On a PC Server systems:

- **System PC:** Resources are available, and have been attached to the operating system. These resources are true *System* Resources.

  Resource color = green

- **System (AIX):** Resources are either new from the factory; that is, they have not been initialized, or they have been:

  - Low-level formatted, or

  - Attached with a resource number that is already in use, or

  - Previously attached to an AIX system.

  These resources are *New* Resources. They might still contain valid AIX data.

  Resource color = white

On AIX systems:

- **System (PC):** Resources have been previously attached to a PC Server system. These resources are *New* Resources. They might still contain valid PC Server data.

  Resource color = white

- **System (AIX):** Resources are available to the AIX system; that is, hdisks are assigned to these resources when configuration is run. These resources are true *System* resources.

  Resource color = green

PC Server version

This page displays a list of System (PC) resources in increasing <u>Resource Number</u> sequence (see page 154). This is the sequence in which the SSA resources in this server are presented to the operating system.

The System (PC) resources that are presented first are those that are available via the adapter that has the lowest node number. The next resources to be presented are those that are available via the adapter that has the next-to-lowest node number and so on. The node number is assigned by the using system. This is generally dictated by PCI bus and slot priority.

If you have created a partition on an SSA resource since the using system was last rebooted, you might need a reboot to update the drive letter information. The drive letter might not be interpreted correctly if you do the following actions:

1. Attach resources whose resource numbers are lower than those of existing resources.

2. Use the Windows NT Disk Administrator to change (modify) the disk drive letter assignments.

Try to assign resource numbers in the sequence in which the RSM displays them. Attach resources in the sequence in which you want the operating system to observe them.
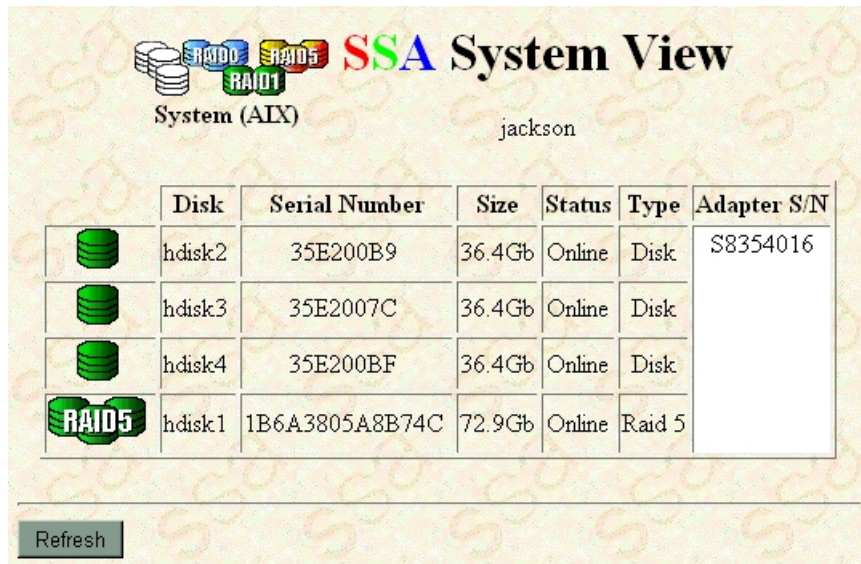
System View Attributes:

- **Resource Icon:** The color indicates the current usage of the resource. Here, the icon is green to indicate System (PC).

- **Drive Letters:** The exsisting drive letters that the Windows NT Disk Administrator has assigned to the resource. If you have multiple partitions on the resource, each drive letter that is in the list represents one partition. The list is displayed in the sequence in which the partitions were created on the resource.

- **Resource Number:** (second sequence) This number determines the sequence in which the System (PC) resources are presented to the operating system.

- **Serial Number:** The unique name or identifier of the disk or array.

- **Size:** The capacity of the item, in gigabytes.

- **Status:** The resource status, see Appendix A.

- **Type:** Disk drive, RAID array, component, and so on.

- **Adapter S/N:** The serial number of the adapter to which the resource is attached.

Actions:

- **Resource Icons:** Select any resource icon to display information that relates to the resource.
- **Refresh:** This action updates the exsisting page.

AIX version

This page displays the list of System (AIX) resources that are available to the operating system.

System View Attributes:

- **Resource Icon:** The color indicates the exsisting usage of the resource. Here the usage is System (AIX).
- **Disk:** The current hdisk name that the AIX **cfgmgr** command gives to the resource.
- **Serial Number:** The unique name or identifier of the disk or array.
- **Size:** The capacity of the item, in gigabytes.
- **Status:** The resource status (see the status list for a list of valid states).
- **Type:** Disk drive, RAID array, component, and so on.
- **Adapter S/N:** The serial number of the adapter to which the resource is attached.

Actions:

- **Resource Icons:** Select any resource icon to display information that relates to the resource.
- **Refresh:** This action updates the existing page.

3 Check Levels

RSM provides functions that allow you to check the levels of the Host Software and microcode on the using system. For these functions the client browser must be connected to the Internet.

The two styles of Check Level are:

- **Individual component Check Level**: This action can be performed individually on the components listed below:

Component	Windows NT	NetWare	AIX
SSA Device Driver	Yes	Yes	
SSA Host Software (inc Device Driver)			Yes
SSA RSM Software	Yes	Yes	Yes
SSA Event Logger Software	Yes	Yes	
Adapter Microcode	Yes	Yes	Yes
Disk Microcode	Yes	Yes	Yes
Enclosure Microcode	Yes	Yes	Yes

Table 4:   Check Level Components

- **Check Level Discovery:** This action scouts the using system for all available component information, as applicable to the operating system. A single HTML page is returned with the results for each component.

After selecting a Check Level action RSM will open a new browser window that will display the results of the level check. If the component is downlevel an HTML link will be provided that allows you to download the latest code level to the client (browser) machine.

Example Individual Check Level (Adapter):

Example Check Level Discovery:

4 SSA Event Logger (PC Server versions)
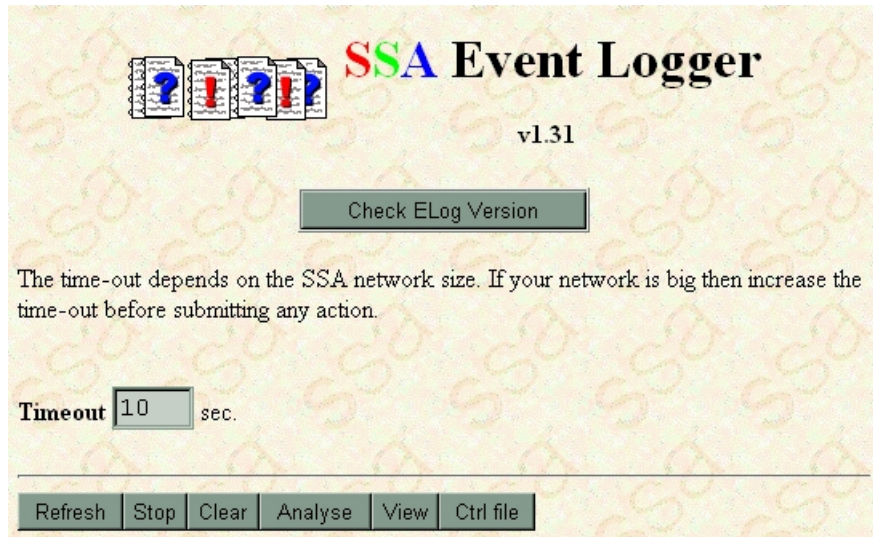
Event Logger Interface

These pages provide an interface to the SSA Event Logger that is running on the using system. PC Server platform use an event logger that is specifically for SSA errors and events. The System Logging List determines which error templates are used to log errors in the event log. The Event Logger gives you a method for observing or analyzing the log for important SSA events.

The PC Server SSA Event Logger should be started when your system starts. The logger detects and logs events that occur in your SSA subsystem and, depending on the type or frequency of the event, provides an indication that corrective action might be needed.

Timeout Value:

The Timeout value sets the number of seconds that the configuration tools wait for a response from SSA Event Logger. In a heavily loaded system, you might want to allow more time for the Event Logger to respond. To do this, enter a new value in the text box provided. (The default is 15 seconds.)

The new timeout value is set when you select any of the actions, as described below.
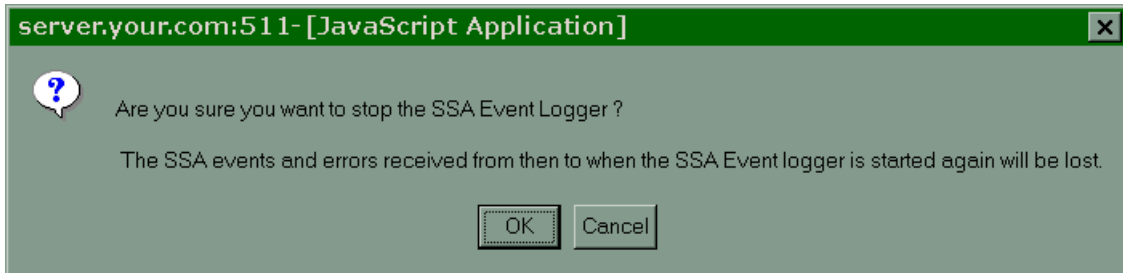
Actions:

- **Check Event Logger Version:** This action checks whether this version of the Event Logger is the latest. This action requires the machine that is running the browser to be connected to the Internet.

- **Refresh:** This action updates the current page. The selection of this action causes a new timeout to be submitted, as described above.

- **Start:** his action starts the SSA Event Logger. It might take a long time to complete, depending on the workload of the using system. The selecting of this action cause a new timeout to be submitted, as described above.
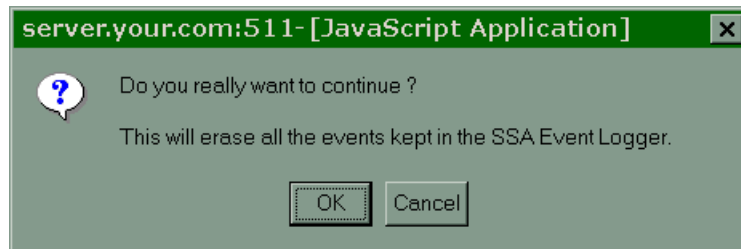
  Note: The start action becomes available if RSM failed to make contact with the SSA Event Logger.

- **Stop:** This action stops the SSA Event Logger if you have varified that you want it stopped. The selection of this action causes a new timeout to be submitted, as described above.
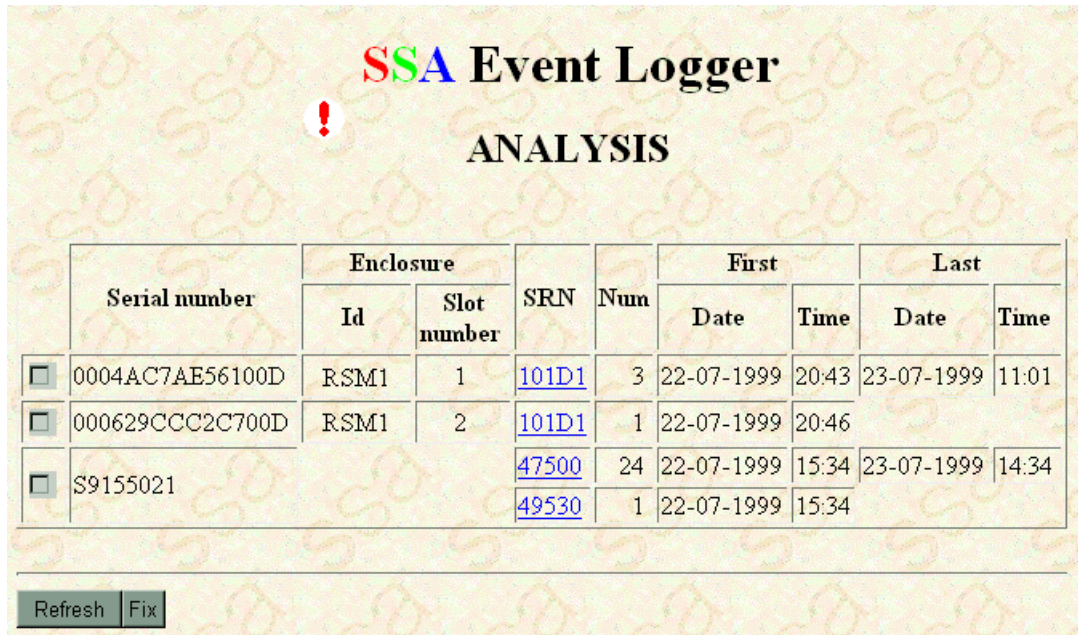
  Note: The stop action will be available if RSM has successfully made contact with the SSA Event Logger.

- **Analyze:** This action searches the SSA Event Log for any events that might have occurred. If any events are found as a result of the analysis, they are displayed on the SSA Event Log Analysis page. Otherwise, you are returned to the existing page. The selection of this action causes a new timeout to be submitted, as described above.

- **View:** This action displays all the events that are stored in the SSA Event Log. All recent events are displayed on the SSA Event Log View page. The selection of this action causes a new timeout to be submitted, as described above. **Note:** The Event Logger collects all events produced by the SSA subsystem. To decide which events indicate a problem, the user must use the Analyze action.

- **Ctrl File:** This action displays and allows you to modify the contents of the SSA Event Logger Control File. The file is also used to enable SSA event forwarding to other System Mananagement Tools. The selection of this action causes a new timeout to be submitted, as described above.

- **Clear:** This action clears the SSA Event Log. The selection of this action causes a new timeout to be submitted, as described above.

Event Log Analysis

When you submit an Analysis action, the Event Logger searches for any SSA Event that might have occurred and, depending on the nature or frequency of the occurrence, indicates whether corrective action is required.

Such events are sorted by the adapter serial number and service request numbers (SRN), and are presented in a table.

Each entry in the analysis table contains:

- The serial number of the adapter or disk drive that logged the event
- The enclosure ID and the slot number, if a drive error has occurred and the disk drive is in a 7133 Model D40 or T40
- The SRN that is associated with the event
- The number of occurrences of the event.
- The date and time at which the event first occurred
- The data and time at which the event last occurred

Notes:

1. The date is represented in the format, dd-mm-yyyy; for example, 07-05-1998 is the 7th May 1998.

2. You can change the format by editing the evnlog.nls file. Information is provided in the file. Open it with any text editor. You must restart the SSA Event Logger to update the format

3. The SRN number links to the relevant section of the SRN Table

4. Some SRNs are dynamic. A dynamic SRN provides a link to the first SRN whose most-significant digit is the same as that of the synamic SRN.

5. You can search for specific SRN if you access the SRN list and select the Find SRN function. If the SRN is dynamic, it finds the closest match. You require at least Netscape 4.0 or Internet Explorer 4.01 SP2 to use this JavaScript function.

6. For information about dynamic SRNs, see the notes that are at the top of the table.

Actions:

- **Check Box:** A check box is provided in the first column of each row in the SRN table. This box selects an SRN that is to be fixed. You must select the SRN before you select the Fix action.

- **Refresh:** This action updates the exsisting page.

- **Fix:** This action marks the chosen events as "fixed". These events are not reported by further Analysis actions. To fix an SRN, you must select a radio button, as described above. You can select more than one SRN.

   Note: If you are using the Stand Alone version, you must be logged in with Config access to perform this action.

SSA SRN List

Service Request Numbers (SRNs)

Find SRN

SRN	FRU List	Problem
10104	None	Description: Format in progress. Action: Wait for the formatting operation to end, then run concurrent diagnostics to ensure that no more problems exist.
...	...	...
SSAXX	None	Description: Service aid error code. Action: See the user or maintenance information for your using-system SSA attachment for details. Note: In this SRN, an X represents a digit 0 through F.

Find SRN

The columns in the SRN table are:

- **SRN**: Service Request Number.

  Note: To skip quickly to a particular SRN, enter the URL of the Event Data Table HTML page, then do one of the following actions:

  - Add #SRNNO, where SRNNO is the SRN that you want to see.
  - Add #MSD, where MSD is the most-significant digit of the SRN. For example, #4 skips to the SRNs that are in the 40000 range.
  - Use the Find function.

  Note: An X represents a digit 0 through F. PAA represents the Port and Address of the device.

- **FRU List**: The field-replaceable unit (FRU) or FRUs that might be causing the problem, and that might need to be exchanged for a new one.
- **Problem**: A short description of the problem and the actions that are needed to solve that problem.

Actions:

- **Find SRN:** You can use the Find action to search for a specific SRN if it that SRN which contains a PAA reference, or has a generic reference. If the Find action cannot find an approximation for the SRN, an error is returned.

  The help page, `ssasrn.htm` uses JavaScript to find SRNs. The script searches for the SRN as an anchor in the file. If it is not found, the script then looks for the same string, with the least significant digit removed, and so on, until it finds an approximation, or fails. This function canfind almost all SRNs, including those that contain the port and address (PAA) of the failing resource.
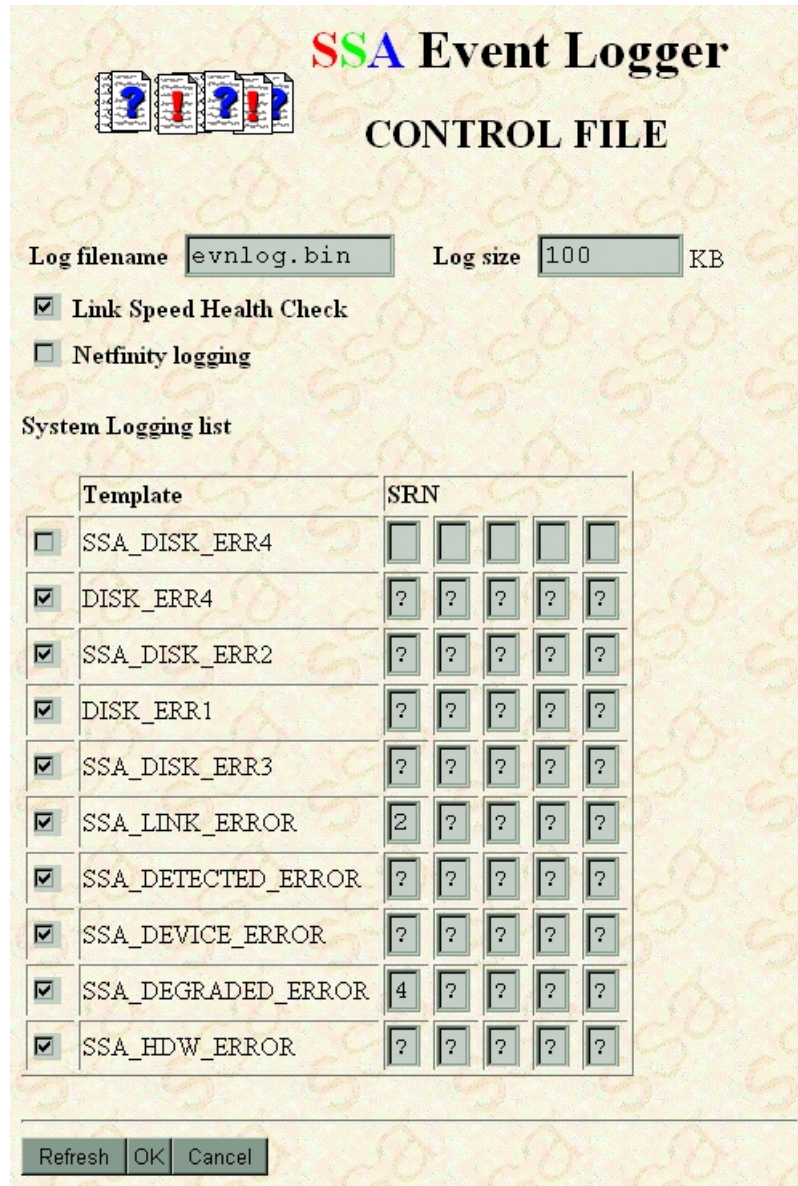
Event Log View
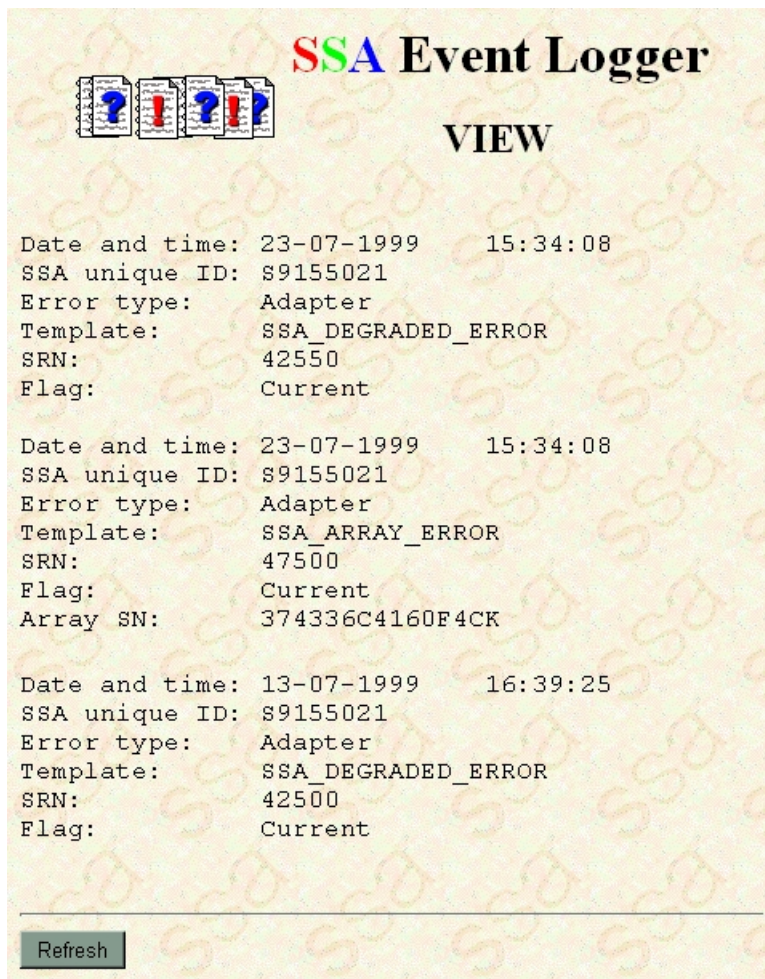
The SSA Event Logger View gets all the events from the SSA Event Log File. Each displayed event has the following attributes:

- **Date and time:** The date and time of this view.

- **SSA unique ID:** The unique SSA ID of the FRU.

- **Error type:** The failing item; that is, adapter, disk drive , or enclosure.

- **Template:** Internal Error type.

- **SRN:** The service request number.

- **Flag:** Either Current or Fixed.

- **Array SN:** The serial number of the array. This field is displayed only for adapter-type events.

- **Dump of the sense data:** This field is displaced only for disk-type events. (SCSI - sense data.)

Actions:

- **Refresh:** This action updates the exsisting page.

Event Control File

This page displays the exsisting SSA Event Logger settings. The check boxes and text fields allow you to modify each setting. The Event Control File must reside in the directory that contains the SSA Event Logger.

Control File Settings:

- **Log Filename**: The name of the SSA Event Log. All SSA Events are logged to this file, which is in the directory that contains the Event Logger (usually c:\issa).

- **Log Size**: The maximum size for the SSA Event Log (in kilobytes). When the log reaches this size, it starts wrapping.

- **Link Speed Healthcheck**: Enables or disables the automatic Link Speed Healthcheck, which normally runs once every 24 hours.

- **Netfinity Logging**: Enables or disables the sending of SSA Events to the Netfinity Alert Manager.

- **System Logging List**: The list of SSA Event Templates. When any of these fields is set, the event is logged in the Windows NT System Event Log and, if enabled, the Netfinity Alert Manager. Each template has 5 bits, into which a hexadecimal bit can be entered to specify a particular SRN or range of SRNs.

  Note: You can use the ? character to represent any other character. For example 4???? reports all errors having the selected template and an SRN with a 4 as its most-significant digit.
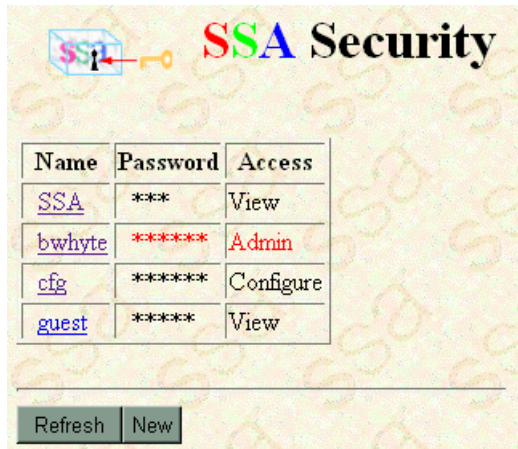
Actions:

- **Refresh:** This action updates the existing page. Any changes that you have made are lost.

- **OK:** This action updates the control file with the changes that you have made. This actions causes the SSA Event Logger to reinitialize with the new settings.

  Note: If you are using the Stand-Alone Version you must be logged in with Admin access to perform this action.

- **Cancel:** This action cancels the changes that you have made. It returns you to the SSA Event Logger Page.

5 Security (PC Server Stand Alone versions)

This page displays a list of the security records that exist on the using system. These records control access to the Stand-Alone Version of the RSM running on this using system.

Security Record Attributes:

- **Name:** A string (not containing spaces) of up to ten characters. Each character can be one of: a through z, A through Z, or 0 through 9. The name is a link to the Security Record View. See Section on page 53.

  Note: The user under which you are logged on is shown in red.

- **Password:** A string (not containing spaces) of up to ten characters. Each character can be one of: a through z, A through Z, or 0 through 9.
- **Access:** The types of access tht you are permitted:
  - **View:** You are permitted to observe the configuration of the SSA subsystem, but you can perform only the Refresh action.
  - **Configure:** You are permitted to configure the SSA Subsystem and perform actions, but you cannot observe or change the security records.
  - **Admin:** You are permitted to manage the security records and configure the SSA subsystem.

Actions:

- **Refresh:** This action updates the existing page.
- **New:** This action creates a New Security Record.

Notes :

1. If you want to delete the Admin user that you have used to log on, ensure that you create another Admin user before you delete.
2. Delete the default SSA user immediately after you have created a new Admin user.
3. The name and password are case sensitive.
4. If you change the password or the name of the Admin user that you have used to log on, your browser asks you to log on again when you update the record. Use the new details that you have just entered..
5. If you enter the wrong password three times or more times inside one hour, and you are using IP address security; the user name will be locked for an hour. That is, you cannot use that user name to log on from that client until an hour has elapsed. See Section on page 53.

New Security Record
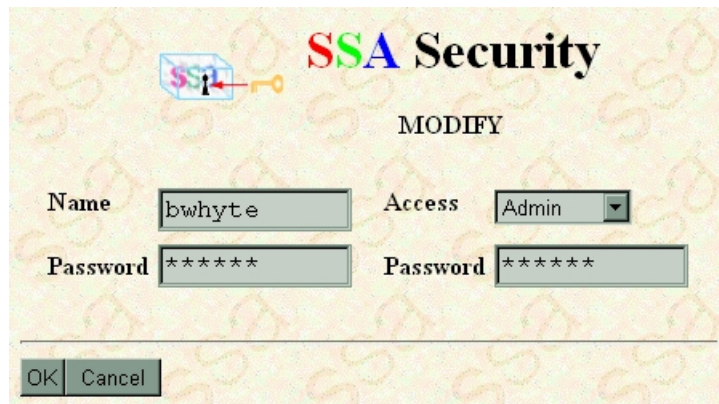
Complete as appropriate to create a new record and select OK.

Actions:

- **OK:** This action completes the creation or modification and returns you to the Security page.
- **Cancel:** This action stops the creation or modification of the existing record, and returns you to the security page.

Modify Security Record

If you are changing an exisiting record, the fields contain the existing user name and password. Modify as appropriate and select OK to update the security record.

Actions:

- **OK:** This action completes the creation or modification and returns you to the Security page.
- **Cancel:** This action stops the creation or changing of the existing record, and returns you to the security page.

Security Record View

RSM provides various levels of security as described in the previous sections. In addition to the permissions for access, versions later than 1.50 also provide IP-based security. To limit which machines can be used to access RSM, you can add a list of IP addresses to the security record. This becomes the list of client machines that are specifically permitted to use theselected user name to access the RSM. If you do not want use the IP address to limit access (that is, you want to be able to access the RSM with the selected user name from any client machine), do not add any IP addresses to the security record.

The Security Record View displays the attributes that are associated with selected user name. From here, you can change the security record. This action takes you to the Modify Record page, as described in the previous sections. You can also delete the complete security record, or add or delete an IP address to or from the access list.

RSM releases post 1.50 also provide limited retries, although Netscape continuously reenters passwords until you select Cancel. If any password request is failed three times or more times, **and** the security record is set to use IP based security, the appropriate username is locked for a period of one hour. An Admin user can reset this at any time by checking the locked IP address check box and selecting the "Reset IP Address" action. IP addresses that are locked are shown in red - as above. If a check box is not selected, all locked IP addresses are reset.

If you are observing the security record that you have used to log on, a related message is displayed in the information area, as shown above. This message reminds you of the risks that can occur if you change or delete the existing security record. See also the notes in the previous section.

- **Check Box:** (A Check box is displayed in the first column of each row in the table.) This box selects an IP address to be reset or deleted.

    Note: If you do not select an IP address before you select the Reset IP Address action, all locked IP addresses (shown in red) are reset.

- **Refresh:** This action updates the existing page.
- **Delete:** This action deletes existing security record.
- **Modify:** This action changes the existing security record.
- **Add IP Address:** This action prompts for an IP address, which must be provided in dotted decimal format.
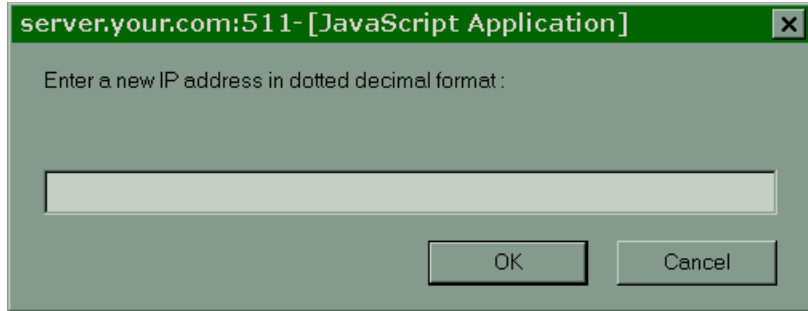
- **Delete IP Address:** This action deletes the selected IP address.

    Note: You must select the appropriate check box before you select the Delete IP Address action.

- **Reset IP Address:** This action unlocks the selected IP address.

    Note: You must select the appropriate check box before you select the Reset IP Address action. If you do not, all locked IP addresses (shown in red) are reset.

6 Adapter List

This page displays a list of the SSA adapters that are installed in the using system. It also indicates which version of the SSA adapter device driver is running.

PC Server versions

Adapter Attributes:

- **Node(n)**: Assigned to SSA adapters by software, and used in adapter communications.

- **Bus(n)**: PCI Bus number (usually 0 through 7).

- **Slot(n)**: PCI Slot number (physical slot in PC).

- **Serial Number**: Unique identifier of this adapter card. When the system is running in Cluster Mode and is using a IBM SSA RAID Cluster Adapter, this serial-number column also indicates the primary adapter of the pair.

- **Type**: The descriptive name of the adapter.

  Note: When the system is running in Cluster mode, any remote adapters are also shown; that is, any adapter that is connected to a local (in this using system) adapter via SSA cables.

Actions:

- **Serial Number:** The selection of any serial number causes the Adapter View for the selected adapter to be displayed.
- **Check RSM Version:** This action checks whether this version of RSM is the latest. For this action, the machine that is running the browser must be connected to the Internet.
- **Check DD Version:** This action checks whether this installed version of the SSA Adapter device driver is the latest. This action requires the machine that is running the browser to be connected to the Internet.
- **Refresh:** This action updates the current page.
- **Link Speed Health Check:** This action starts the Link Speed Health Check. This check looks for pairs of resources that are connected by 40-megabytes-per-second type links that are actually running at 20 megabytes per second. The SSA Event Logger runs this operation.
- **Adapter Icon:** Select any adapter icon to display concise details relating to the chosen adapter in a JavaScript Popup window.

AIX version

Adapter Attributes:

- **Node** : Assigned to SSA adapters by software, and used in adapter communications.
- **Bus** : PCI Bus number (usually 0 through 7).
- **Slot** : PCI Slot number (physical slot in RS/6000 as assigned by configuration methods).
- **Device** : The logical device name as assigned by the SSA configuration methods.
- **Serial Number**: Unique identifier of this adapter card.
- **Type**: The descriptive name of the adapter.

   Note: In cluster mode, any remote adapters are also shown; that is, any adapter that is connected to a local (in this using system) adapter via SSA cables.

Actions:

- **Serial Number:** The selection of any serial number causes the Adapter View for the selected adapter to be displayed.

- **Check RSM Version:** This action checks whether this version of RSM is the latest. This action requires the machine that is running the browser to be connected to the Internet.

- **Check DD Version:** This action checks whether this installed version of the SSA Adapter device driver is the latest. For this action, the machine that is running the browser must be connected to the Internet.

- **Refresh:** This action updates the current page.

- **View Cfg:** This action is presented when an exisiting Dump file is available. It displays the existing dump. To refresh the dump information, you must resubmit the Dump Cfg action.

- **Dump Cfg:** This action reads the existing adapter and resource configuration details, and outputs the information on the Adapter Dump page. This action runs the AIX **snap** command.

  Note: In large configurations, this operation might take some time to complete when the using system is under heavy load. If your browser times out, before the action completes, increase the timeout value.

- **Adapter Icon:** Select any adapter icon to display details that relate to the chosen adapter in a JavaScript Popup window.

7 Adapter View
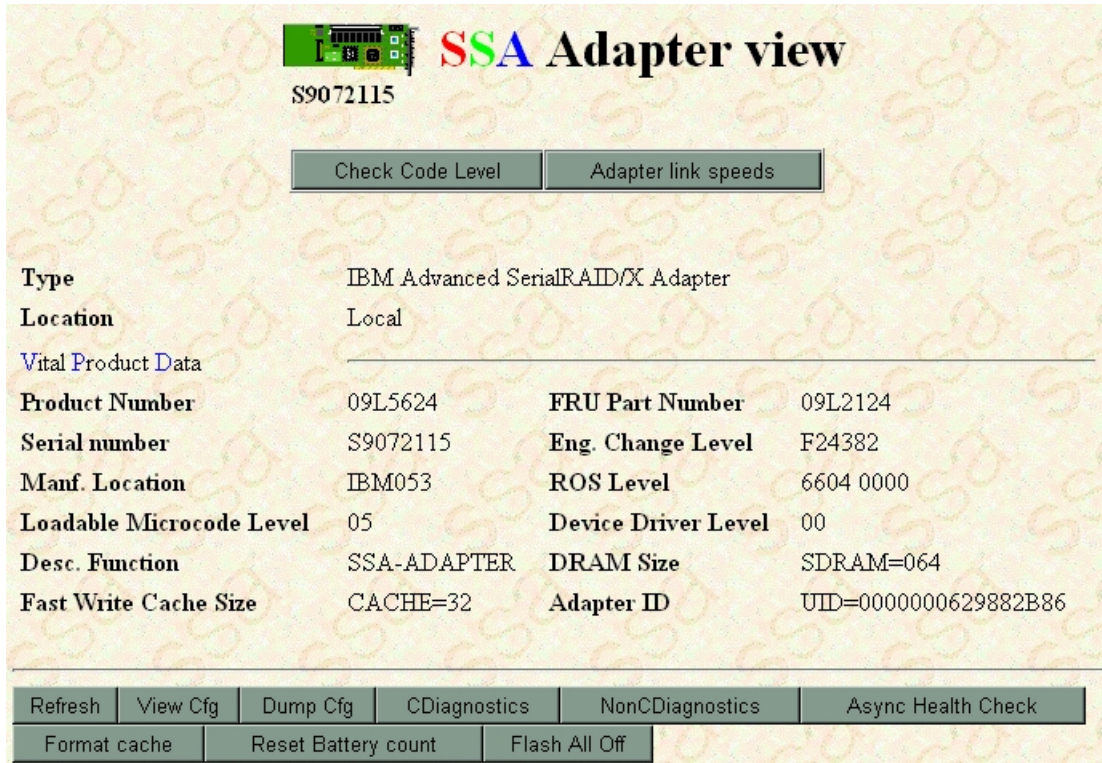
When you have selected an adapter, you can view the attached SSA resources from a selection of logical and physical views. All these views lead to single resource views that provide the actions to configure and maintain your SSA resources.

The Adapter View displays the VPD of the selected adapter and provides the actions that are available to you.

>   **Note:**   The displayed actions are related to the actions that are available for the given adapter. For example, the screen shown here provides various actions that are related to Fast-Write feature (Format Cache and Reset Battery count). These actions are not available if the adapter does not have the Fast-Write feature installed.

The Check Code Level action provides a method to check the level (ROS) of adapter microcode running on the selected adapter. See page 59, Chapter 5.

PC Server Adapter View (with Fast Write Cache feature)

AIX Adapter View (without Fast Write Cache feature)

Adapter Vital Product Data (VPD) Attributes:

- **Product Number:** Eight-character part number of the adapter.

- **FRU Part Number:** Eight-character part number of the field-replaceable unit.

- **Serial Number:** Unique serial number identifier of this adapter.

- **Eng. Change level:** Character identifier of adapter release version.

- **Manf Location:** Six-character field that identifies the IBM plant of manufacture.

- **ROS Level:** Eight-character field that identifies the existing level of the adapter microcode. You can update this information to show the latest level by using the Check Level action that is described below.

- **Loadable Microcode Level:** Two-digit field that identifies the type of adapter microcode that you must download to the adapter. Use the supplied download utilities to do this action. The Loadable Microcode Level field is also known as the LL field.

- **Device Driver Level:** Two-digit field that describes the type of device driver that is required for this adapter.

- **Desc. Function:** Identifier for the adapter feature level.

- **DRAM Size:** DRAM=XXX shows the size, in megabytes, of the data RAM that is installed on the adapter.

- **Fast-Write Cache Size:** CACHE=XXX shows the size, in megabytes, of the fast-write cache memory that is installed on the adapter.

Actions:

- **Check Code Level:** This action checks whether the level of adapter microcode on your adapter is the latest. For this action, the machine requires the browser to be connected to the Internet.

- **Refresh:** This action updates the existing page.

- **Flash All Off:** This action stops the flashing indicator light on all disk disks that are attached to the selected adapter.

PC Server versions :

> **Note:** The AIX Dump Configuration actions are performed on the whole system; that is, they are not performed on a particular adapter as they are with the PC Server versions. The equivalent AIX actions are therefore available on the AIX Adapter List page.

- **Adapter Link Speeds:** This action displays the actual running speed of links that can run at 40 megabytes per second. See also Link Speed Health Check.

  > **Note:** This action will be displayed if it is possible to get the data from the adapter.

- **Async Health Check:** This action starts the Asynchronous Health Check in the adapter. This health check causes any degraded errors to be logged in the SSA Event Log.

- **View Cfg:** This action reads an existing dump file (created with the **Dump Cfg** action) and displays the information on the Configuration Dump page.

- **Dump Cfg:** This action reads the existing adapter, enclosure, and resource configuration details and outputs the information on the Configuration Dump page.

  > **Note:** In large configurations it might take a long time to complete when the using system is under heavy load. If your browser times out, before the action completes, increase the timeout value.

- **CDiagnostics:** This action starts the Current Diagnostic funtion on the adapter. Concurrent diagnostics provide a level of diagnostics that enables the SSA subsystem to function without a decrease in performance. If the diagnostics find an error, an event is raised in the SSA Event Log and the diagnostics stops. The error is also displayed in the Information Area, which is below the Navigation Area. Follow the instructions to solve the problem, as described under the relevant SRN information, and resubmit the Diagnostic to ensure no other errors exist.
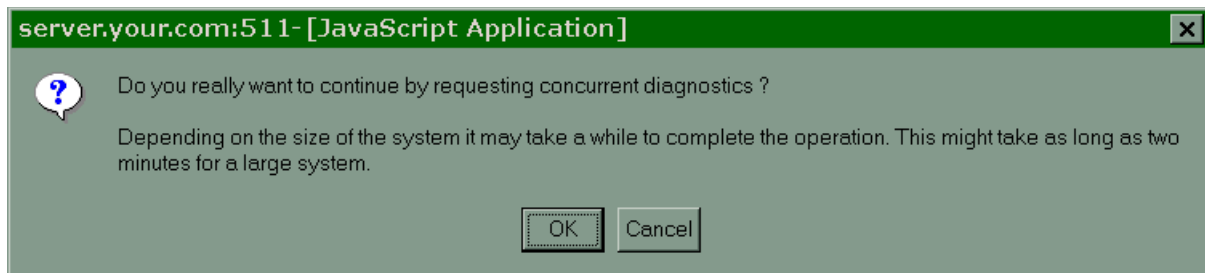
- **NonCDiagnostics:** This action starts the nonconcurrent diagnostics functions on the adapter. Nonconcurrent diagnostics are more-detailed than concurrent diagnostics. Before you run nonconcurrent diagnostics, therefore, you must stop all I/O to the SSA disk drives. You must then verify that you have a quiescent system before youcontinue with this option.
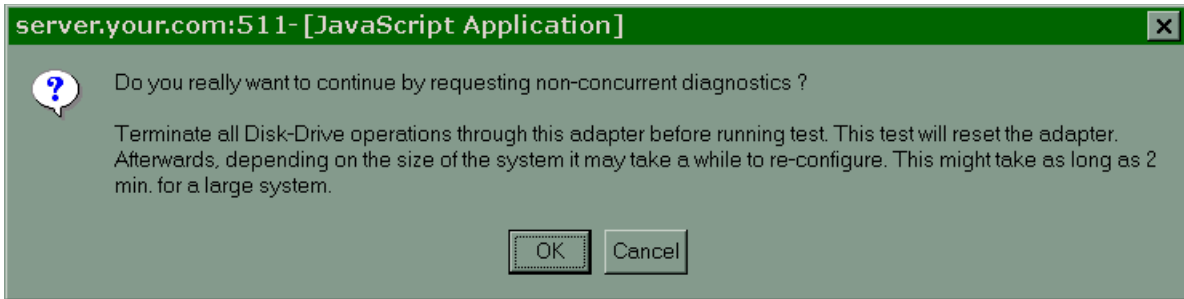
SSA RAID Cluster Adapter :

- **Switch Primary** - This action causes the primary cluster adapter to become the secondary cluster adapter.

    Note: All read and write transactions to RAID1 Cluster arrays are sent through the primary adapter. Remember that fact when you set the primary adapter and balance the load between the using systems.

Fast Write enabled Adapters :

- **Format cache** - This action clears all entries in a stale (obsolete) fast-write cache.
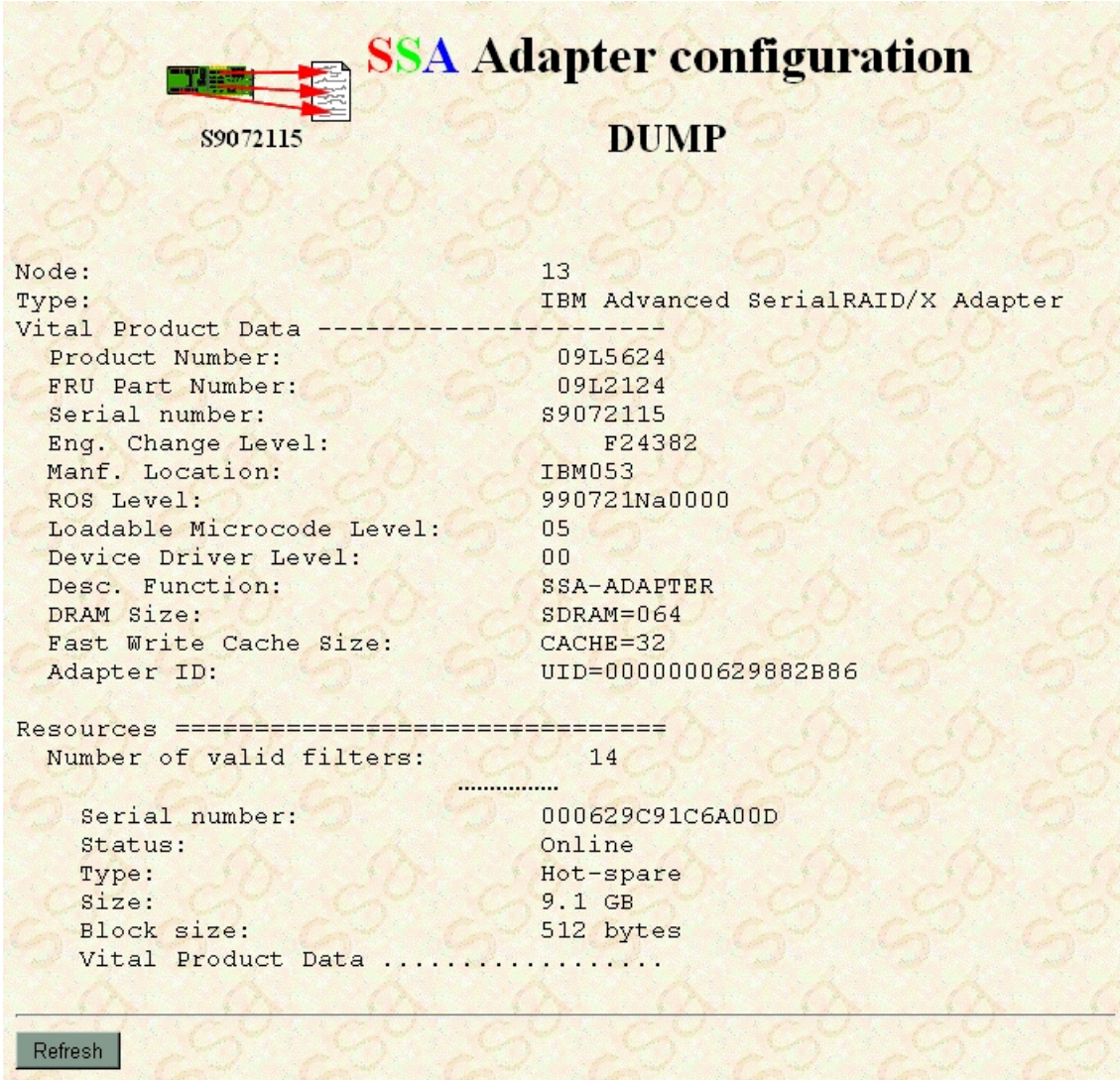
Attention Use the Format Cache action only when an SRN or a service representative
: instructs you to do so. Incorrect usage of this action might cause the loss of important data that might be residing on the cache. If you are using the stand-alone version, you nee Config access.

- **Reset Battery count** - This action resets the battery counter in the Fast-Write Cache feature.

Attention Use the Format Cache action only when an SRN or a service representative
: instructs you to do so. Incorrect usage of this action might cause the loss of important data that might be residing on the cache. If you are using the stand-alone version, you nee Config access.
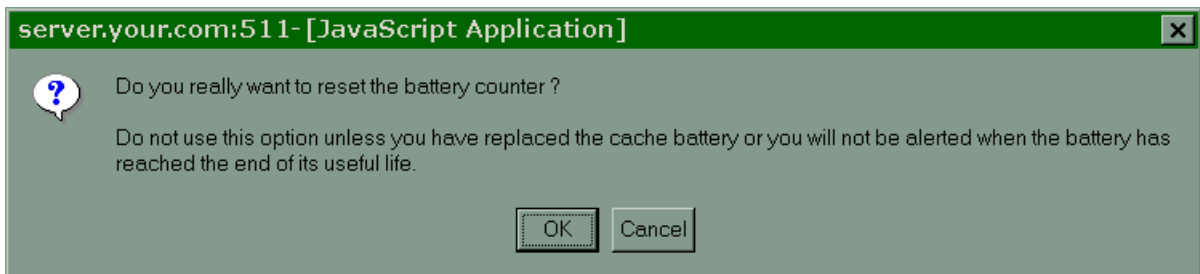
PC Server Configuration Dump

This page displays the SSA subsystem resource information that is visible to the selected adapter. All SSA logical and physical resources connected to the adapter are listed with their attributes, configuration, usage, and state. These resources include adapters, disk drivess, arrays, and enclosures.

Actions:

- **Refresh:** This action updates the current page.

AIX Configuration Dump


```
                    SSA Adapter configuration

                              DUMP

Thu Oct 14 17:13:30 BST 1999

.....
.....     Operating System Level
.....

4.3.2.0

Disk hdisk1

pvid            none            Physical volume identifier  False
queue_depth     24              Queue depth                 True
write_queue_mod 0               Write queue depth modifier  True
adapter_a       ssa0            Adapter connection          False
adapter_b       none            Adapter connection          False
primary_adapter adapter_a       Primary adapter             True
reserve_lock    yes             RESERVE device on open      True
connwhere_shad  1B6A3805A8B74CK SSA Connection Location     False
max_coalesce    0x20000         Maximum coalesced operation True
size_in_mb      72891           Size in Megabytes           False
location                        Location Label              True


.....
.....     lsdev of all pdisks
.....

pdisk0  Available 10-90-PUE1-11-P SSA160 Physical Disk Drive
pdisk1  Available 10-90-PUE1-05-P SSA160 Physical Disk Drive
pdisk2  Available 10-90-PUE1-15-P SSA160 Physical Disk Drive
pdisk3  Available 10-90-PUE1-06-P SSA160 Physical Disk Drive
pdisk4  Available 10-90-PUE1-13-P SSA160 Physical Disk Drive
.....
.....     lscfg for all pdisks
.....

  DEVICE            LOCATION            DESCRIPTION

  pdisk0            10-90-PUE1-11-P    SSA160 Physical Disk Drive (36400
```

This page displays the SSA subsystem resource information that is visible to the using system; that is, all SSA resources that are connected to all the SSA adapters in this using system. Each SSA logical and physical resource is listed with its configuration, usage, and state.

This page is displayed when either the Dump Cfg or the View Cfg are selected. Before you can use the View Cfg action, you must use the Dump Cfg action to store the configuration details.

Actions:

- **Refresh:** This action updates the current page.

8 Logical View

The Logical View displays the SSA resources thatcan be accessed by the selected adapter. The resources are split into two types: arrays and disk drives.

Array Resources

The Logical View displays a Logical Group header for each RAID type that the selected adapter supports. Array resources are listed under their related Logical Group header. The list contains all arrays of that RAID type, whatever their usage. The color of the resource icon indicates the existing usage of the resource.

If your adapter supports RAID-1 arrays, and you have created two such arrays, one array is a Free resource; the other is a System (PC) resource. Both arrays are listed under the RAID-1 Logical Group.

The name of a particular array is the unique identifier of that array. Each array has a unique identifier, which is assign when the array is created.

The Logical Group name provides a link to the related Resource List. From this list, you can observe existing arrays and create new resources of that RAID type.

> **Note:** If an array is connected to an adapter which does not support the array type, the array members might be listed under the 'Pre-configured' Logical Group.
>
> If an array is connected to an adapter that is running in cluster mode, but the adapter does not support that array type when it is running in cluster mode, the array might be listed with a status of offline. To solve this problem recable the adapter in a noncluster mode, and delete the resource if necessary.

Non-RAID Disk Resources

Note: In this section, the term "disk" means a non-RAID disk drive.

The Logical View displays a Logical Group header for each drive type that the selected adapter supports. Disk drive resources are listed under their related Logical Group header. The list contains drives that are in the given usage group. The color of the resource icon indicates the existing usage of the resource, which is the same as the Logical Group.

The serial number of a particular disk drive is the unique identifier of that disk drive.

The Logical Group name provides a link to the related Resource List. From this list, you can observe disk drives that are in that usage type. If you select a particular disk drive, you can change the usage of that disk drive.

> **Note:** When a disk drive is supplied from the manufacturing plant, or has been low-level formatted via the RSM, it is first grouped under the System (AIX) usage. To make the disk drive into a Free disk drive, select the System (AIX) resource list, and delete the disk drive from this group.
>
> If a resource is "Unsupported", it cannot be seen in the Logical View. Select the Physical View, then select the resource. From the Disk View , select Format. This action normally returns the disk drive to System (AIX) usage. If the disk drive cannot be formatted, ask your service representative for a replacement disk drive.

Actions:

- **Logical Group:** Select any Logical Group header to view the Resource List for the selected group.

- **Resource Icons:** Select any Resource Icon to display details relating of the resource.

- **Refresh:** This action updates the existing page.

9 Resource Lists

A Resource List displays the resources that are now available via the local adapter. RSM provides the following Resource Lists.

Note: Most of the screen shots are from the PC Server version of the RSM.

Usage Classes	Array Types	Other
Free	RAID-0	NVRAM
Pre-configured	RAID-1	Offline
Hot-spare Disk	RAID-5	Offine Fast Write
Hot-spare Pool	RAID-10	
Rejected		
System (AIX)		
System (PC)		

Non-Cluster Mode (1-Way)

Only one adapter is connected to the SSA resources. Each loop starts and ends on the same adapter. No other adapters are connected in the loop.

Cluster Mode (2-Way)

Two adapters are connected to shared SSA resources. That is, the loop starts and ends on the same adapter, but other adapters are connected in the loop.

The table below lists the resource types, that are supported by each SSA adapter.

	Noncluster Mode (1-way)	Cluster Mode (2-way)
IBM SSA RAID Adapter (LL03 and LL11)	RAID-0 arrays RAID-1 arrays RAID-5 arrays disk resources	Not supported
IBM SSA RAID Cluster Adapter (LL10)	RAID-1 arrays disk resources	RAID-1 arrays disk resources
IBM SerialRAID Adapter(PC) **IBM SSA Enhanced RAID Adapter(AIX)** **(LL04)**	RAID-5 arrays disk resources "fast-write" resources	RAID-5 arrays disk resources
IBM Advanced SerialRAID Adapter (LL05)	RAID-0 arrays RAID-5 arrays disk resources "fast-write" resources	RAID-5 arrays disk resources

| IBM Advanced SerialRAID Adapter (LL05) *(Upgraded firmware > 7000)* | RAID-0 arrays
RAID1 arrays
RAID-5 arrays
RAID-10 arrays
disk resources
"fast-write" resources
hot-spare pools | RAID-1 arrays
RAID-5 arrays
RAID-10 arrays
disk resources
"fast-write" resources
hot-spare pools |

Free Resources

This page displays the resources that have an existing usage of Free. These resources are disk drives that have been configured, and are candidates for attachment to the system.

Resource Attributes:

- **Resource Icon:** The color of the icon indicates the existing usage of the resource.
- **Serial Number:** The unique name or identifier of the disk.
- **Disk (AIX Only):** The pdisk or hdisk name.
- **Size:** The capacity of the resource, in gigabytes.
- **Status**: The resource status, see Appendix .
- **Type:** Disk; that is, a single physical disk drive (non-RAID).

Actions:

- **Resource Name:** Select a Resource Name to observe the required Disk or Array View.
- **Run CFGMGR (AIX Only):** This action is available on all AIX Resource Lists. It runs the AIX `cfgmgr` command utility to configure only SSA resources. The syntax of the command is cfgmgr -l ssar
- **Refresh:** This action updates the existing page.

Pre-configured Resources

This page displays the resources with a current usage of 'Pre-configured'. These are disks which have been previously configured for a function that is not supported by this adapter.

Resource Attributes:

- **Resource Icon:** The color of the icon indicates the existing usage of the resource.

- **Serial Number:** The unique name or identifier of the disk.

- **Disk (AIX Only):** The pdisk or hdisk name.

- **Size:** The capacity of the resource, in gigabytes.

- **Status**: The resource status, see Appendix .

- **Type:** Disk; that is, a single physical disk drive (non-RAID).

Actions:

- **Resource Name:** Select a Resource Name to observe the required Disk or Array View.

- **Delete All:** This action changes the use of all the selected resource from Preconfigured to Free. The resource is then available to create arrays, or can be made available to the operating system.

- **Run CFGMGR (AIX Only):** This action is available on all AIX Resource Lists. It runs the AIX `cfgmgr` command utility to configure only SSA resources. The syntax of the command is cfgmgr -l ssar

- **Refresh:** This action updates existing page.

Rejected Resources

This page displays the resources that have an existing usage of Rejected. These resources are disk drives that have been rejected from arrays. If the array was configured to use hot-spare resources, it is in the Offline state (nondegraded). If the array was not configured to use hot-spare resources, you might need to Exchange the failed resource for a 'Free' disk to recover the array.

Resource Attributes:

- **Resource Icon:** The color of the icon indicates the existing usage of the resource.
- **Serial Number:** The unique name or identifier of the disk.
- **Disk (AIX Only):** The pdisk or hdisk name.
- **Size:** The capacity of the resource, in gigabytes.
- **Status**: The resource status, see Appendix .
- **Type:** Disk; that is, a single physical disk drive (non-RAID).

Actions:

- **Resource Name:** Select a Resource Name to observe the required Disk or Array View.
- **Delete All:** This action changes the use of all the selected resource from Preconfigured to Free. The resource is then available to create arrays, or can be made available to the operating system.
- **Run CFGMGR (AIX Only):** This action is available on all AIX Resource Lists. It runs the AIX **cfgmgr** command utility to configure only SSA resources. The syntax of the command is cfgmgr -l ssar
- **Refresh:** This action updates existing page.

Offline Resources

A resource can enter the Offline state for several reasons:

- **A RAID Array**: An arrays is in the offline state if two or more of its member resources are unavailable, or if a member resource is unavailable while another member is rebuilding. Arrays can enter the offline state also if they are in an unsupported configuration.

- **Fast-write resource**: This type of resource enters the Offline state if you have a fast-write configuration that is not valid. For example, if you have attempted to use a fast-write resource in a two-way configuration where the adapter does not support two-way fast-write resources.

NVRAM Entries

Each RAID-1, RAID-5, and RAID-10 array has an entry in the adapters nonvolatile random access memory (NVRAM). If an array is not destroyed correctly, you might have dormant NVRAM entries. If the NVRAM entry name is a link, it is a dormant entry. Select the link and delete the resource on the NVRAM View.

Actions :

- **Resource Name:** Select a Resource Name to view the required NVRAM View. The view appears only with dormant entries.
- **Refresh:** This action updates the existing page.
- **Delete All Dormant:** This action deletes all dormant NVRAM entries.

Deleting Dormant Entries
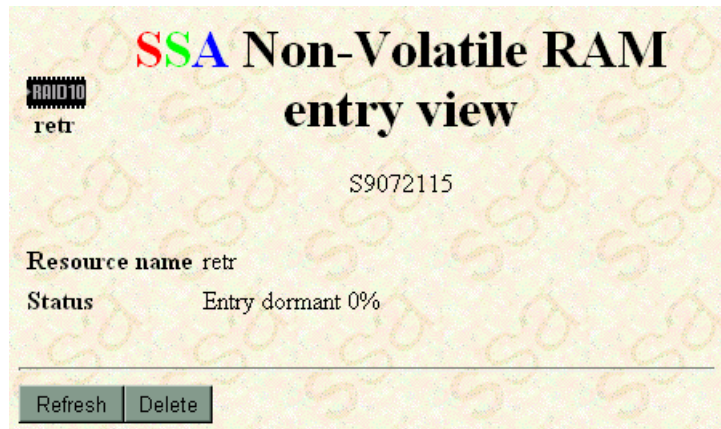
After selecting a dormant NVRAM entry, you can delete it by selecting the Delete action.

Unknown Resources

An array resource might be unknown when more than the critical number of component disks are missing.
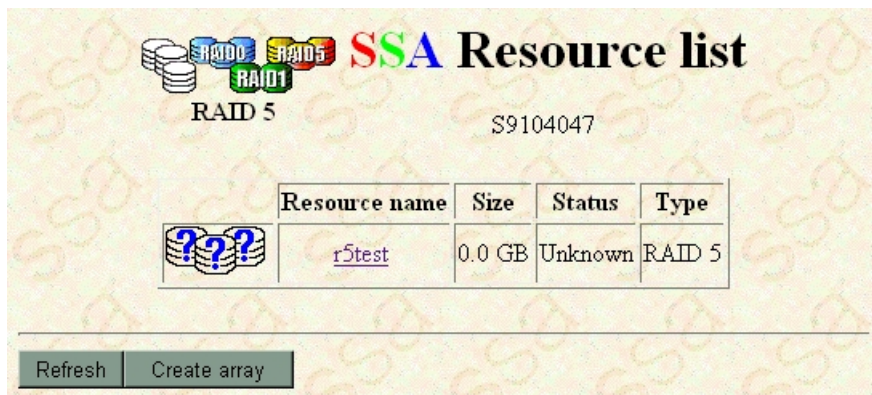
System Resources

System resources rely on the operating system that is being used.

Note: Most of the screens that are shown in this section are from the PC Server versions of RSM. The difference the PC Server version and AIX version is the color of the resource icons. That is, green and white are swapped between PC Server and AIX versions.

System Usages

It is important to remember that the meanings of the terms "System (PC)" and "System(AIX)" differ between PC Server operating systems and AIX operating systems.

On a PC Server systems:

- **System (PC):** Resources are available, have been attached to the operating system. These resources are true *System* Resources.

  Resource color = green

- **System (AIX):** Resources are either new from the factory, that is, have not been initialized, or they have been:

  - Low level formatted, or

  - Attached with a resource number that is already in use, or

  - Previously attached to an AIX system.

  These resources are *New* Resources. They might still contain valid AIX data.

  Resource color = white

On AIX systems:

- **System (PC):** Resources have been previously attached to a PC Server system. These resources are *New* Resources. They might still contain valid PC Server data.

  Resource color = white

- **System (AIX):** Resources are available to the AIX system; that is, hdisks are assigned to these resources when configuration is run. These resources are true *System* Resources.

  Resource color = green

PC Server Versions

System (AIX) Resources

This page displays the resources that have an existing usage of System (AIX). These resources are disk drives that have been initialized by this adapter. These resources are disk drives that have been previously configured, but are in a format that is not supported by this adapter.

> **Note:** When a disk drive has been formatted, it returns to the System (AIX) usage.

Resource Attributes:
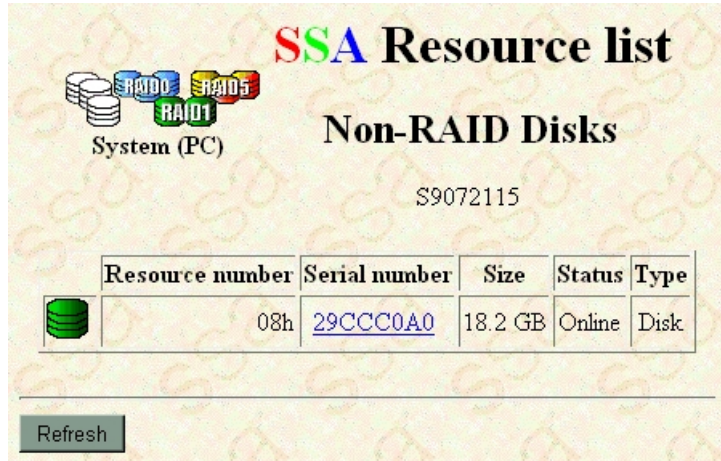
- **Resource Icon:** The color of the icon indicates the existing usage of the resource.
- **Serial Number:** The unique name or identifier of the disk.
- **Size:** The capacity of the resource, in gigabytes.
- **Status**: The resource status, see Appendix .
- **Type:** Disk; that is, a a single physical disk drive (non-RAID).

Actions:

- **Resource Name:** Select a Resource Name to observe the required Disk or Array View.
- **Delete All:** This action changes the use of all the listed resource from System (AIX) to Free. The resource is then available to create arrays, or it can be made available to the operating system.
- **Refresh:** This action updates the existing page.

System (PC) Resources

This page displays the resources that have an existing usage of System (PC). Theseresources are disk drives that have been configured, and that are now available to the system.

Resource Attributes:

- **Resource Icon:** The color of the icon indicates the existing usage of the resource.
- **Resource Number:** The logical disk mapping number. See Section on page 154.
- **Serial Number:** The unique name or identifier of the disk.
- **Size:** The capacity of the resource, in gigabytes.
- **Status**: The resource status, see Appendix .
- **Type:** Disk; that is, a a single physical disk drive (non-RAID).

Actions:

- **Resource Name:** Select a Resource Name to observe the required Disk or Array View.
- **Refresh:** This action updates the existing page.

AIX Version

System (AIX) Resources

This page displays the resources that have a current usage of System (AIX). These resources can be disk drives that have been configured, and are now available to the system.

Resource Attributes:

- **Resource Icon:** The color of the icon indicates the existing usage of the resource.
- **Serial Number:** The unique name or identifier of the disk.
- **Disk:** The hdisk name.
- **Size:** The capacity of the resource, in gigabytes.
- **Status**: The resource status, see Appendix .
- **Type:** Disk; that is, a a single physical disk drive (non-RAID).

Actions:

- **Resource Name:** Select a Resource Name to observe the required Disk or Array View.
- **Run CFGMGR:** This action is available on all AIX Resource Lists. It runs the AIX `cfgmgr` command utility to configure only SSA resources. The syntax of the command is `cfgmgr -l ssar`
- **Refresh:** This action updates the existing page.

System (PC) Resources

This page displays the resources that have an existing usage of System (PC). These resources are disk drives that have been initialized and possibly used by a PC Server system. Take care if you delete such resources; they might still contain valuable data.

Resource Attributes:

- **Resource Icon:** The color of the icon indicates the existing usage of the resource.
- **Serial Number:** The unique name or identifier of the disk.
- **Disk:** The pdisk name.
- **Size:** The capacity of the resource, in gigabytes.
- **Status**: The resource status, see Appendix .
- **Type:** Disk; that is, a a single physical disk drive (non-RAID).

Actions:

- **Resource Name:** Select a Resource Name to observe the required Disk or Array View.
- **Delete All:** This action changes the use of the selected resource from System (PC) to Free. The resource is then available to create arrays, or it can be made available to the operating system.
- **Run CFGMGR:** This action is available on all AIX Resource Lists. It runs the AIX **cfgmgr** command utility to configure only SSA resources. The syntax of the command is cfgmgr -l ssar
- **Refresh:** This action updates the existing page.

Hot-spare Resources

Hot-spare Disk Resources

All SSA Adapters (Advanced SerialRAID Adapter *with* ROS < 5000)

This page displays the resources that have a existing usage of Hot-spare (hot-spare pools are not included here).

Resource Attributes:

- **Resource Icon:** The color of the icon indicates the existing usage of the resource.
- **Serial Number:** The unique name or identifier of the disk or array.
- **Size:** The capacity of the resource, in gigabytes.
- **Status**: The resource status, see Appendix .
- **Type:** Disk; that is, a a single physical disk drive (non-RAID).
- **Network ID:** The SSA Loop that this hot-spare disk is protecting.

Actions:

- **Resource Name:** Select a Resource Name to observe the required Disk or Array View.
- **Refresh:** This action updates the existing page.
- **Create Hot-spare:** This action displays the Create Hot-spare disk attributes page.

Create Hot-spare Disk

You must complete the following two steps to create a new hot-spares disk drive.

1. Define the hot-spare attributes. For information about attributes, see "Create Hot-Spare Disk - Attributes".

2. Select the resources that enable you to create the hot-spare disk drive. Candidate disk drives are free disk drives that have the required attributes that you defined in step 1. For information about candidates, see "Create Hot-Spare Disk - Candidates".

Create Hot-spare Disk - Attributes

This section is related to step 1.
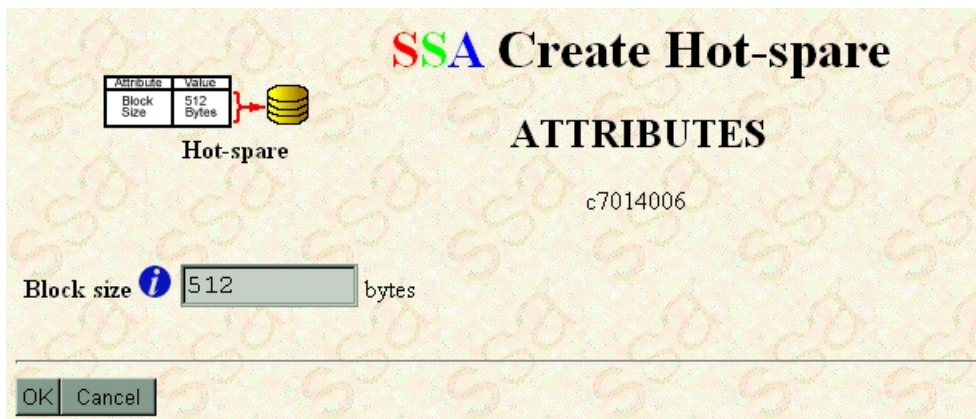
- **Block Size:** The physical block size of records on the disk drive. The block size must be 512. (Support of 524 is for a specialized application.) If you select the information icon, a suitable JavaScript popup
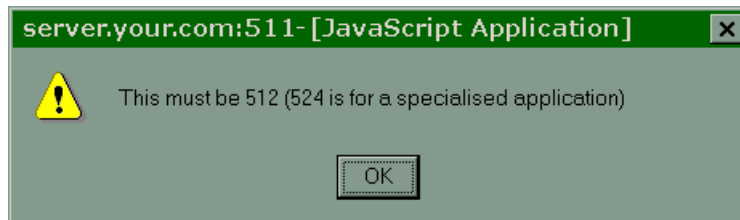
is displayed.

Actions:

- **OK:** This action sends the attributes and displays the candidate list.
- **Cancel:** This action cancels the creation of the hot-spares disk drive, and returns to the related Resource List.

Create Hot-spare Disk - Candidates

This section is related to step 2. The screen shows the attributes that you chose in step 1 and a list of suitable candidate disk drives.
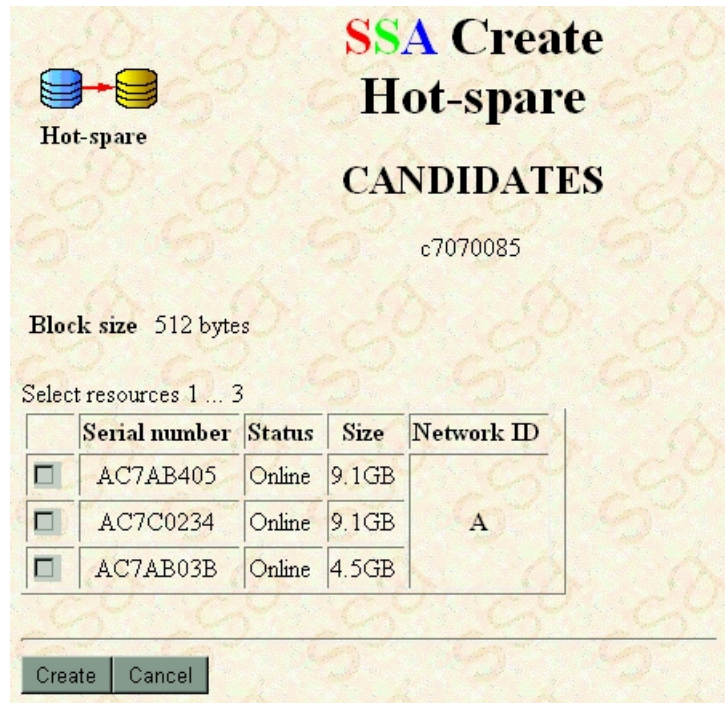
Candidate Attributes:

- **Check Box:** The button that is displayed in the first column of each row in the table. Use these buttons to select the free disk drive that is to become a hot-spare disk drive.
- **Serial Number:** The unique identifier of the disk.
- **Status:** The resource status, see Appendix .
- **Size:** The capacity of the disk, in gigabytes.
- **Network ID:** Identified the SSA Loop to which each candidate drive belongs.

Actions:

- **Check Box:** The button that is displayed in the first column of each row in the table. Use these buttons to select the hot-spare resources.
- **Create:** This action sends the chosen candidates and attributes to allow the adapter to complete the Hot-spare creation. If any error occurs, a suitable message is displayed in the Information Area.
- **Cancel:** This action cancels the Hot-spare creation and returns you to the Resource List

Hot-spare Pool Resources

Advanced SerialRAID Adapter *with* ROS > 5000

This page displays the hot-spare pools that are available for use by the RAID-1, RAID-5, and RAID-10 array resources that are attached to the selected adapter.

Hot-spare Pools can protect only arrays on the same SSA loop or network. The pool id contains the Network ID and the pool number.

You can assign a single array member to use hot-spare pools. To do this, select **Assign Hot-spare Pool** on the related Disk View .

If an array member is not assigned to a pool, is subsequently rejected from the array, and the Hot-Spare Enabled array attribute is set to On, the array can use the global hot-spare pool that is on the related network. These pools are named A0 and B0.

> **Note:** Hot-spare resources created on adapters other than the IBM Advanced SerialRAID Adapter/X will be assigned to their network's global pool if they are subsequently attached to an IBM Advanced SerialRAID/X Adapter.

Pool Icon (Good): This icon shows the existing state of the pool. Here, the pool is healthy. When you select this icon, information that relates to the pool is displayed when this in a JavaScript popup window.

Pool Icon (Fault): This icon is displayed if a fault is detected in the pool. This icon is an animation; that is, the red disk drive cycles through all three hot-spare disk drives. A thousand combinations are possible. When you select this icon, information that relates to the pool is displayed in a JavaScript popup window.

Hot-spare Pool Attributes:

- **Pool ID:** The pool identifier. Select this attribute to see the required Hot-Spare Pool View.
- **Status:** The pool status, see Appendix .

- **Network ID:** The SSA loop that this pool protects.

Actions:

- **Refresh:** This action updates the existing page.
- **Create Hot-spare Pool:** This action allows you to create a new hot-spare pool via the Create Hot-spare Pool page.

Create Hot-spare Pool

You must complete the following two steps to create a new hot-spares disk drive.

1. Define the hot-spare attributes. For information about attributes, see "Create Hot-Spare Disk - Attributes".

2. Select the resources that enable you to create the hot-spare disk drive. Candidate disk drives are free disk drives that have the required attributes that you defined in step 1.

> **Note:** When you are creating a hot-spare pool, candidate disk drives can also be hot-spare disk drives that belong to the global pool of the related SSA loop.

Create Hot-spare Pool - Attributes

This section is related to step 1.

Pool Attributes :

- **Block Size:** The physical block size of records on the disk drive. The block size must be 512. (Support of 524 is for a specialized application.)

- **Network ID:** The SSA loop that this pool protects.

  Note: A list is displayed of the candidates that are available on the chosen SSA loop.

- **Hot Spare Pool Number:** The pool number that is to be given to this new pool.
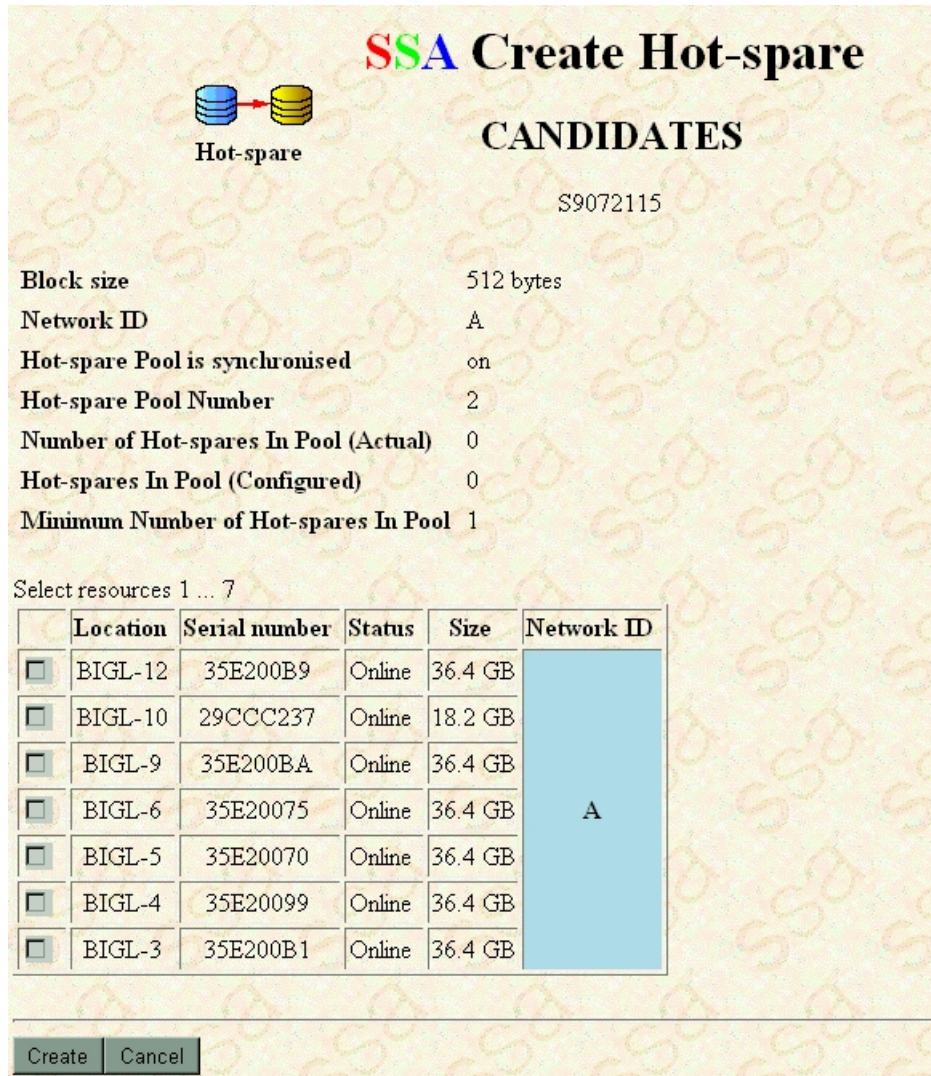
  Note: The default value is the next available pool number on the selected SSA loop.

- **Minimum Number of Hot Spares in Pool:** The minimum number of hot spare disks that can be available in the pool before an error is raised.

Actions:

- **OK:** This action sends the attributes and displays the candidate list.
- **Cancel:** This action cancels the creation of the hot-spares disk drive, and returns to the related Hot-spare pool list.

Create Hot-spare Pool - Candidates

Candidate Attributes:

- **Check Box:** The button that is displayed in the first column of each row in the table. Use these buttons to select the hot-spare resources.

- **Location:** The enclosure name and the disk slot number (if available).

- **Serial Number:** The unique identifier of the disk.

- **Status:** The resource status, see Appendix .

- **Size:** The capacity of the disk, in gigabytes.

- **Network ID:** Identifies the SSA Loop of which this candidate is a member.

Actions:

- **Create** - This action sends the chosen candidates to complete the creation of the hot-spare pool.

- **Cancel** - This action cancels the creation of the hot-spare pool, and returns you to the resource list

Hot-spare Pool View

This page displays the selected Hot-spare Pool attributes. The Hot-spare disk resources and the array components that are protected by this pool are shown. Select a serial number to display the Disk View.

Hot-spare pool Attributes:

- **Network ID:** This is the SSA loop that this pool can protect.

- **Hot-spare pool is synchronized:** The hot-spare pool contains the same hot-spare disk drives that it contained when it was previously updated.

- **Hot-spare Pool Number:** The pool number on this loop.

- **Number of hot-spares in pool (actual):** The actual number of hot-spare disk drivess that are now available for use by arrays that are configured for this pool.

- **Hot-spares in pool (configured):** The number of hot-spare disk drives that were in the pool when it was created or changed. That is, the number of hot-spare disk drives required for the pool to be full.

- **Minimum number of hot-spares in pool:** The minimum number of hot-spare disk drivess that can exist in a pool before error condition is lost. If this number is greater than the Actual number, the pool will logs an error.

Hot-spare Disk Member Attributes:

- **Resource Icon:** The colour depicts the current usage of the disk. In this case yellow for Hot-spare. Concise information relating to the resource is displayed when you select the icon. JavaScript Popup

- **Serial Number:** The unique identifier of this disk.

- **Size:** The capacity of the resource, in gigabytes.

- **Status:** The disk status, see Appendix . This column may also contain further information regarding the validity of the component, for example if there is no Hot-spare disk large enough to protect this component, this column will notify you that there is a problem.

Array Components Protected by this Pool:

- **Resource Icon:** The color of the icon indicates the current usage of the disk drive. In this case purple for Component. Yellow is used for hot-spare disk drives. When you select this icon, information that isrelated to the resource is displayed in a JavaScript popup window.

- **Serial Number:** The unique identifier of this disk.

- **Status:** The disk status, see Appendix . This column might also contain information about the validity of the component. For example, if no hot-spare disk drive is large enough toprotect this component, this column tells you that a problem exists.

- **Type:** The type of the array that contains this resource.

- **RAID:** The name of the array that contains this resource.

Actions:

- **Refresh:** This action updates the existing page.

- **Add hot-spare:** This action allows you to add another Hot-spare disk to this pool. A list of candidate disk drives is shown. The list contains the disk drives that are no free and those that are in the global pool.

- **Modify Attributes:** This action allows you to modify the attributes of this pool. That is, you can change the Minimum Number of Hot-Spares in a Pool attribute.

- **Delete:** This action allows you to delete a Hot-spare Pool and return all the hot-spare disk resources to the required global pool.

Modify Hot-spare Pool Attributes
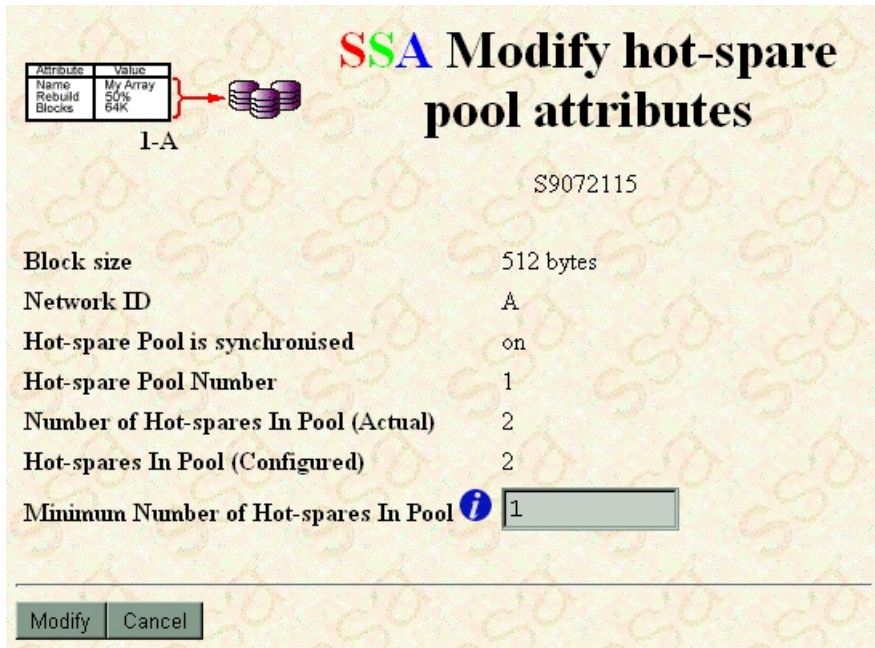
- Minimum Number of Hot Spares in Pool:

  ```
  Supports: 0 to 48
  ```

  The minimum number of hot-spare disks that can be available in this pool before an error is raised.

Fast Write Resources
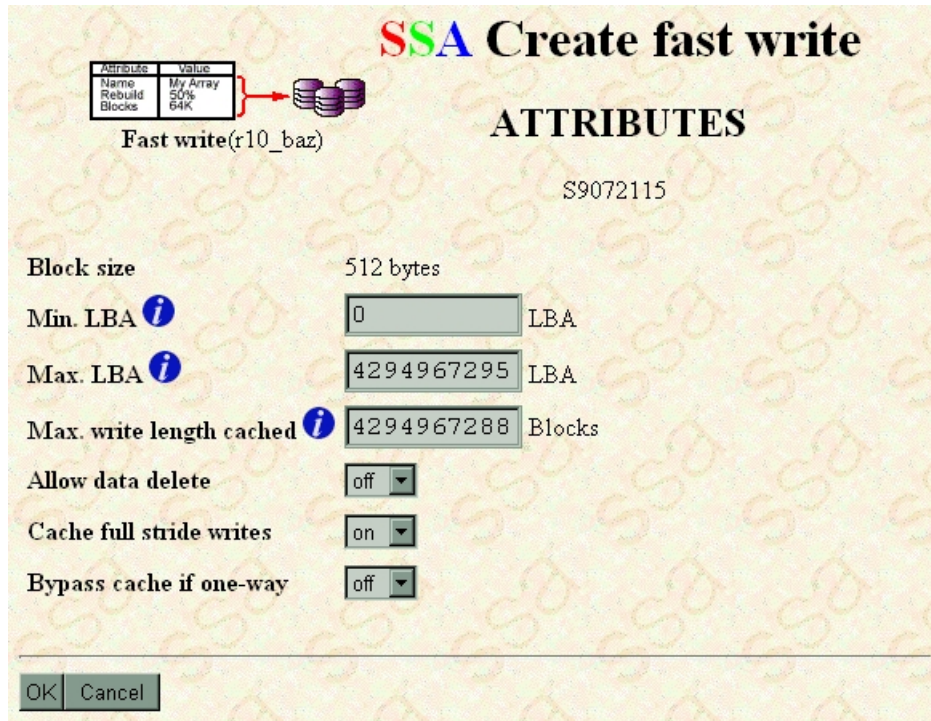
Resources which use the fast-write feature have these additional attributes :

- **Minimum LBA:** The Minimum Logical Block Address (LBA) is the address of the lowest block of the array or disk that should be saved in the fast write cache.

- **Maximum LBA:** The Maximum Logical Block Address (LBA) is the address of the highest block of the array or disk that should be saved in the fast write cache.

- **Maximum Write Length Cached:** Data is held in the fast-write cache is for transmission to other destinations. The length of this data can be up to the length that is set in the Maximum Write Length Cached attribute.

  If the length of the data is greater than the set length, the transmission of that data is handled as an operation in which data is written to the destination disk drive and saved, but no requirement exists for that data to read back soon afterward. It is recommended that you do not use the fast-write cache for such operations. If you do, you gain little value from reduced response times for future read operations, and you reduce the available bandwidth.

- **Allow Data Delete:**

  Default: Off

  Supports: On, Off

  When this attribute is set to Off, a disk drive that is configured for fast-write operations cannot be deleted if any data for that disk drive is held in the fast-write cache and cannot be destaged to the disk drive. When the attribute is set to On, the disk drive can be deleted whether or not the fast-write cache contains data for the disk drive and the data cannot be destaged.

- **Snoop Data into Battery Backed SRAM:**

  Default: On

  Supports: On, Off

  Never change this attribute from its default value (On). If the attribute is set to Off, fast-write data is not held in the nonvolatile cache and can be lost if the power fails.

- **Cache Full Stride Writes:**

  Default: On

  Supports: On, Off

  When this attribute is set to Off, data is not cached in the fast-write cache if the length of the write is equal to, or greater than, the size of the stride. This condition causes improved performance of the write operation. Usually, data that is written with full stride write operations is not read back soon afterward, so you gain little value if you cache the data.
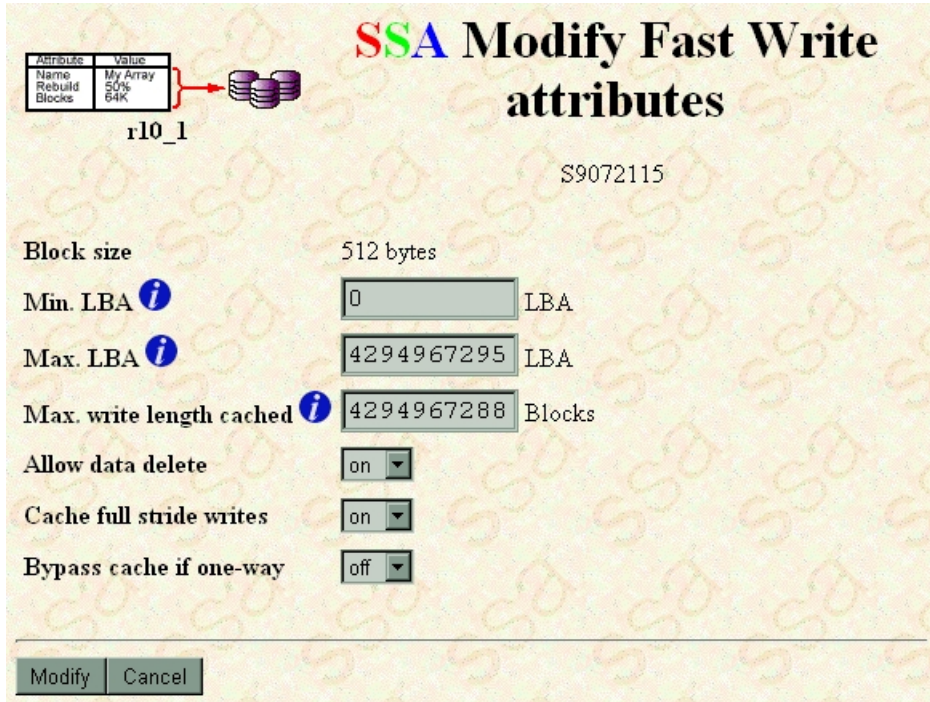
- **Bypass cache if One-Way:**

  Default: Off

  Supports: On, Off

  When this attribute is set to Off, caching is still used when one adapter is missing from a cluster configuration. If you want to maintain the protection of data and avoid possible loss due to a second failure when one adapter is missing, set the attribute to On. When the attribute is set to On, caching is disabled, the performance gain that the fast-write cache provides does not occur.

Modify Fast Write Attributes

Offline Fast-Write Resources
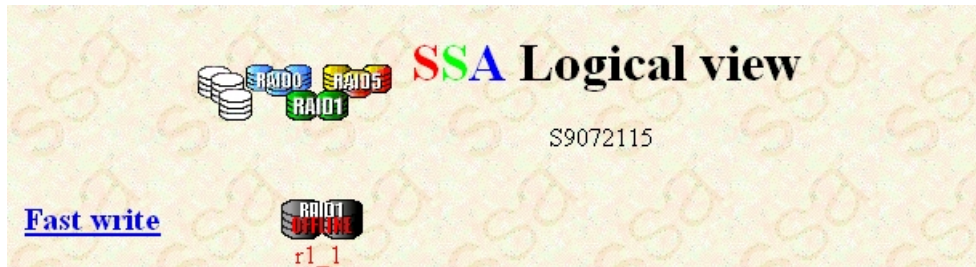
Fast-write Resources are not normally listed in the Logical View because they are always in another usage or RAID class. Think of fast-write as an attribute of a resource.

This Resource List will be visible if stale or dormant fast-write cache data exists. Such data can occur if you use a method other than the Delete FW action to remove a fast-write resource from the subsystem. By using a method other than the Delete FW action, you leave unsynchronized data in the cache. Under these conditions, reinstall the fast-write resource to let the cache synchronize the data. If the fast-write resource no longer exists, delete the stale data from the cache. To do this, select the resource name that provides a link to the required resource view. Then select the Delete FW action as shown here:

RAID-0 Resources

This page displays all the RAID-0 resources as the selected adapter sees them, if that adapter supports RAID-0. RAID-0 arrays use data striping. Data striping relates several disk drives with one another and presents them to the operating system as a single disk resource.

Resource Attributes:

- **Resource Icon**: The color of the icon indicates the existing usage of the resource.
- **Name:** The unique name or identifier of the array.
- **Size:** The capacity of the resource, in gigabytes.
- **Status:** The resource status, see Appendix
- **Type:** Array Type.

Actions:

- **Array Name:** Select an array name to observe the RAID-0 Array View.
- **Refresh:** This action updates the existing page.
- **Create Array:** This action takes you to the RAID-0 Create Array page.

RAID-1 Resources

This page displays all the RAID-1 resources as as the selected adapter sees them, if that adapter supportsRAID-1. RAID-1 arrays use data mirroring. Data mirroring relates two physical disk drives with one another and writes a copy of the data onto both disk drives. This redundancy allows a failing disk drive to be exchanged without interruption of system access to the data. RAID-1 arrays are presented to the operating system as a single disk resource.

SSA Resource list

RAID 1   S9072115

	Resource name	Size	Status	Type
RAID1	r1_1	18.2 GB	Online (non-degraded)	RAID 1
RAID1	r1_2	18.2 GB	Online (non-degraded)	RAID 1

Refresh   Create array

Resource Attributes:

- **Resource Icon**: The color of the icon indicates the existing usage of the resource.
- **Name:** The unique name or identifier of the array.
- **Size:** The capacity of the resource, in gigabytes.
- **Status:** The resource status, see Appendix and Appendix .
- **Type:** Array Type.

Actions:

- **Array Name:** Select an array name to observe the RAID-1 Array View.
- **Refresh:** This action updates the existing page.
- **Create Array:** This action takes you to the RAID-1 Create Array page.

RAID-5 Resources

This page displays all the RAID-5 resources as as the selected adapter sees them, if that adapter supports RAID-5. RAID-5 arrays use data striping with parity. Data striping with parity relates several physical disk drives with one another and presents them to the operating system as a single disk resource.

RAID-5 combines a number of physical disk drives in an arrangement which allows the array to continue operation if one physical disk drive is removed. This redundancy allows a failing disk drive to be exchanged without interruption of system access to the data.

Resource Attributes:

- **Resource Icon**: The color of the icon indicates the existing usage of the resource.
- **Name:** The unique name or identifier of the array.
- **Size:** The capacity of the resource, in gigabytes.
- **Status:** The resource status, see Appendix .
- **Type:** Array Type.

Actions:

- **Array Name:** Select an array name to observe the RAID-5 Array View.
- **Refresh:** This action updates the existing page.
- **Create Array:** This action takes you to the RAID-5 Create Array page.

RAID-10 Resources

This page displays all the RAID-10 resources as as the selected adapter sees them, if that adapter supports RAID-10. RAID-10 arrays use mirrored striping. Mirrored striping relates several mirrored pairs of disk drives with one another and presents them to the operating system as a single disk resource.

RAID-10 combines a number of physical disk drivess in an arrangement that allows the array to continue operation if half or less of the physical disk drives are missing. This redundancy allows a failing disk drive to be exchanged without interruption of system access to the data.

SSA Resource list

RAID 10   S9072115

	Resource name	Size	Status	Type
RAID10	r10_1	18.0 GB	Online (non-degraded)	RAID 10
RAID10	r10_2	72.9 GB	Online (non-degraded)	RAID 10
RAID10	r10_3	72.9 GB	Online (non-degraded)	RAID 10
RAID10	r10_4	18.2 GB	Online (non-degraded)	RAID 10

Refresh   Create array

Resource Attributes:

- **Resource Icon**: The color of the icon indicates the existing usage of the resource.
- **Name:** The unique name or identifier of the array.
- **Size:** The capacity of the resource, in gigabytes.
- **Status:** The resource status, see Appendix .
- **Type:** Array Type.

Actions:

- **Array Name:** Select an array name to observe the RAID-10 Array View.
- **Refresh:** This action updates the existing page.
- **Create Array:** This action takes you to the RAID-10 Create Array page.

10 Array Creation and Modification

Please Note

Most screen shots are taken from the PC Server versions of RSM. AIX versions of RSM will not appear exactly as shown. Some AIX RAID adapters accept different ranges of RAID attributes to those shown. Select the RAID attribute "Information Icons" for further information.

Noncluster Mode (1-way):

Only one adapter is connected to the SSA resources. Each loop starts and ends on the same adapter. No other adapters are connected in the loop.
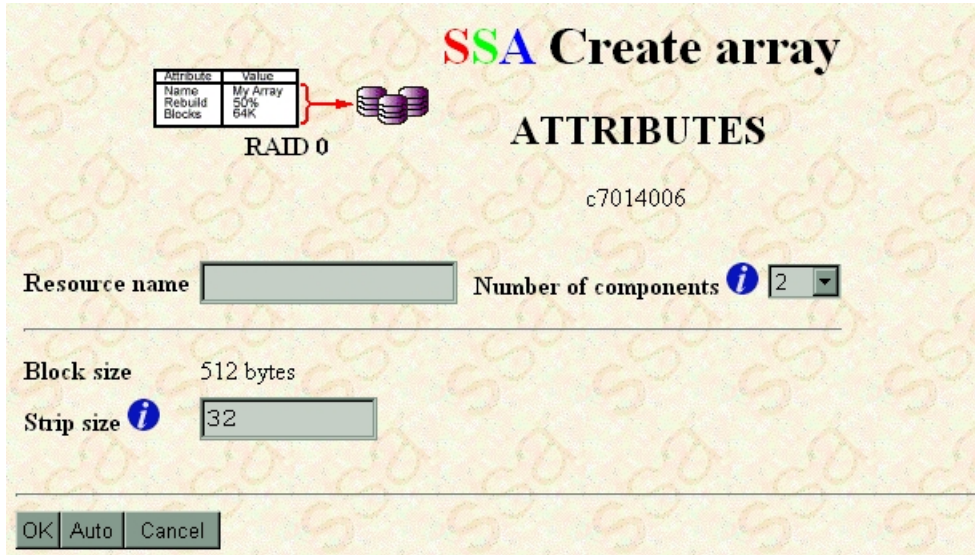
Cluster Mode (2-way):

Two adapters are connected to shared SSA resources. The loop starts and ends on the same adapter, but other adapters are connected in the loop.

The table below lists the resource types supported by each SSA adapter.

	Non-Cluster Mode (1-way)	Cluster Mode (2-way)
IBM SSA RAID Adapter (LL03 and LL11)	RAID-0 Arrays RAID-1 Arrays RAID-5 Arrays Disk Resources	Not supported
IBM SSA RAID Cluster Adapter (LL10)	RAID-1 Arrays Disk Resources	RAID-1 Arrays Disk Resources
IBM SerialRAID Adapter(PC) **IBM SSA Enhanced RAID Adapter(AIX)** **(LL04)**	RAID-5 Arrays Disk Resources Fast Write Resources	RAID-5 Arrays Disk Resources
IBM Advanced SerialRAID Adapter (LL05)	RAID-0 Arrays RAID-5 Arrays Disk Resources Fast Write Resources	RAID-5 Arrays Disk Resources
IBM Advanced SerialRAID Adapter (LL05) *(Upgraded microcode > 7000)*	RAID-0 Arrays RAID1 Arrays RAID-5 Arrays RAID-10 Arrays Disk Resources Fast Write Resources Hot-spare Pools	RAID-1 Arrays RAID-5 Arrays RAID-10 Arrays Disk Resources Fast Write Resources Hot-spare Pools

SSA RAID Adapter (PC Server Only)

Create RAID-0 Attributes

- **Resource Name:** Enter a unique name for the new array.

- **Number of Components:** The number of physical disks components, or members, in the array.

- **Block Size:** The physical block size of the records in the array. Do not change this from 512. The size of 524 if for a specialized application program.

- **Strip Size:** This attribute defines the number of contiguous blocks that can be held on a disk drive before the write operation switches to the next disk drive. Higher values can decrease the performance of long send operations because the data might be striped across fewer disk drives. Lower values can decrease the performance of write operations.

  This information is displayed when you select the information icon which is next to the attribute:

Actions:

- **OK:** This action sends the attributes and displays a list of suitable candidate disk drives.
- **Auto:** This action creates an array that has the chosen attributes. You are not asked to select the components from the candidate list. The first *n* suitable free disk drives are chosen automatically (where *n* is the number of components in the array). If possible, all the disk drives are the same size..
- **Cancel:** This action cancels the array creation, and returns to the relevant Resource List.

Create RAID-1 Attributes

- **Resource Name:** Enter a unique name for the new array.
- **Number of Components:** The number of physical disks components, or members, in the array.
- **Block Size:** The physical block size of the records in the array. Do not change this from 512. The size of 524 if for a specialized application program.

- **Hot-Spare Enabled:**

```
Default: On
```

```
Supports: On, Off
```

Set this attribute to On to enable the use of hot-spare disk drives. If you set the attribute to Off, the array cannot use any available hot-spare disk drives if it needs them. Under this condition, the array enters the Degraded state.

- **Hot-Spare Exact Size:**

```
Default: Off
```

```
Supports: On, Off
```

When this attribute is set to On, only hot-spare disk drives of exactly the same size as the failing disk drive are used. When the attribute is set to Off, the hot-spare disk drive that is used can be of a greater size than the failing diskdrive that it is replacing.

- **Initial Rebuild:**

```
Default: Off
```

```
Supports: On, Off
```

When this attribute is set to On and you create an array, the array runs a rebuilding operation and copies data from the first component to the second. When the attribute is set to Off and you create an array, the array starts with undefined data and immediately becomes nondegraded.

You can set this attribute only at creation time; you cannot change it later.

With the attribute is set to On and no user data has been written to the array, the same data will be returned by whichever member disk is read. If the attribute is Off, it is not guaranteed to always return the same data for the same block before that block contains user data.

  Note: It is recommended that the Initial Rebuild attribute is set to 'On', to avoid the
         possible problems if applications depend on the same data being returned before
         data is written. Note that this will cause some performance overhead while the
         array is being rebuilt.

- **Data Scrub Enabled:**

```
Default: Off
```

```
Supports: On, Off
```

When this attribute is set to On, the array, when it is nondegraded, verifies in the background that all the data on the array member disk drives can be read correctly If an error is detected during this verification, the failing data block on the disk drive is rewritten from the data that is contained on the mirrored array member disk drive.

- **Data Scrub Rate:**

```
Default: 24 (hours)
```

```
Supports: 6 to 48 (hours) in steps of 1
```

This attribute sets the period, in hours, that is to elapse between each single pass of data scrub on the array. The default period is 24 hours. A shorter period causes more interference with the processing of requests, but detects latent failures earlier.

- **Rebuild Priority:**

  `Default: 50%`

  `Supports: 1% to 100%`

  This attribute sets the rate for rebuilding operations. A higher value for the attribute gives a faster array rebuilding operation, but can decrease the performance of programs that run during that operation. A lower value gives a slower array rebuilding operation, but can increase in the performance of programs that run during that operation.

Actions:

- **OK:** This action sends the attributes and displays a list of suitable candidate disk drives.
- **Auto:** This action creates an array that has the chosen attributes. You are not asked to select the components from the candidate list. The first *n* suitable free disk drives are chosen automatically (where *n* is the number of components in the array). If possible, all the disk drives are the same size.
- **Cancel** - This action cancels the array creation, and returns to the relevant Resource List.

Modify Attributes :

Create RAID-5 Attributes

- **Resource Name:** Enter a unique name for the new array.

- **Number of Components:** The number of physical disks components, or members, in the array.

- **Block Size:** The physical block size of the records in the array. Do not change this from 512. The size of 524 if for a specialized application program.

- **Hot-Spare Enabled:**

  ```
  Default: On
  ```

  ```
  Supports: On, Off
  ```

  Set this attribute to On to enable the use of hot-spare disk drives. If you set the attribute to Off, the array cannot use any available hot-spare disk drives if it needs them. Under this condition, the array enters the Degraded state.

- **Hot-Spare Exact Size:**

  ```
  Default: Off
  ```

  ```
  Supports: On, Off
  ```

  When this attribute is set to On, only hot-spare disk drives of exactly the same size as the failing disk drive are used. When the attribute is set to Off, the hot-spare disk drive that is used can be of a greater size than the failing diskdrive that it is replacing.

- **Strip Size:**

  ```
  Default: 128
  ```

  ```
  Supports: 128 Only
  ```

  This attribute defines the number of contiguous blocks that can be held on a disk drive before the write operation switches to the next disk drive. Higher values can decrease the performance of long send operations because the data might be striped across fewer disk drives. Lower values can decrease the performance of write operations and rebuilding operations.

- **Stretch Size:**

  ```
  Default: 4
  ```

  ```
  Supports: 1 to 9999 in steps of 1.
  ```

  This attribute defines the number of strips that are to be written before the disk drive that holds the parity data is changed. The default value is 4. You cannot increase performance by setting a different value.

- **Rebuild Priority:**

  ```
  Default: 50%
  ```

  ```
  Supports: 1% to 100%
  ```

  This attribute sets the rate for rebuilding operations. A higher value for the attribute gives a faster array rebuilding operation, but can decrease the performance of programs that run during that operation. A lower value gives a slower array rebuilding operation, but can increase in the performance of programs that run during that operation.

Actions:

- **OK:** This action sends the attributes and displays a list of suitable candidate disk drives.
- **Auto:** This action creates an array that has the chosen attributes. You are not asked to select the components from the candidate list. The first *n* suitable free disk drives are chosen automatically (where *n* is the number of components in the array). If possible, all the disk drives are the same size.
- **Cancel:** This action cancels the array creation, and returns to the relevant Resource List.

Modify Attributes :

SSA Modify array attributes

Attribute	Value
Name	My Array
Rebuild	50%
Blocks	64K

r5_lg1

c7014006

Block size	512 bytes
Strip size	128
Stretch size	4
Hot-spare enabled ⓘ	on ▼
Hot-spare exact size ⓘ	off ▼
Rebuild priority ⓘ	50 %
Unbuilt parity strips	32769
Unbuilt data strips	0
Invalid data strips	0

Modify   Cancel

SSA RAID Cluster Adapter (PC Server Only)

Create RAID-1 Attributes

The SSA RAID Cluster Adapter uses the same RAID-1 attributes as the SSA RAID Adapter; see Section 10.1. An additional attribute is provided:

- **Split Confirm:**

  Default: Off

  Supports: On, Off

  When this attribute is set to On, it protects against errors that can occur if you split a mirrored pair of disk drives between two systems. The errors occur if, while the other disk drive of the pair is still being used on the original system, you try to use the disk drive that has been moved. When the attribute is set to On, the array that has only one member disk drive (the disk dcrive that you moved) is not made online, and an SSA event is generated.

SerialRAID Adapter / SSA Enhanced RAID Adapter

Note: On PC Systems this adapter is known as the *SerialRAID Adapter*. On AIX systems this adapter is known as the *SSA Enhanced RAID Adapter*.
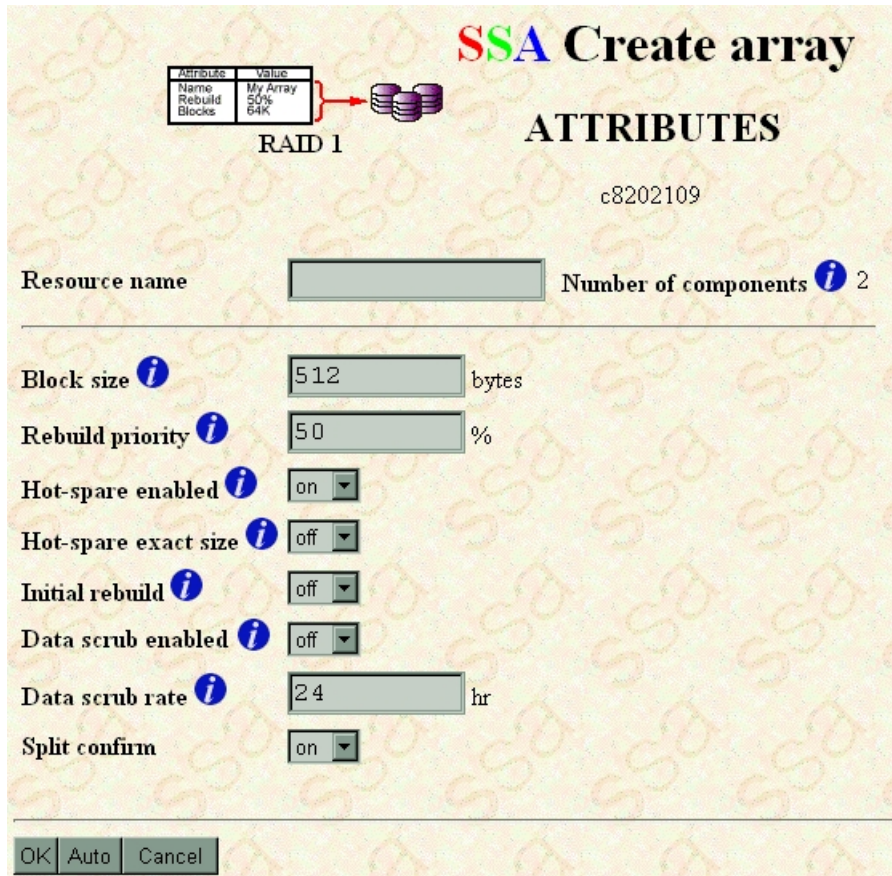
Create RAID-5 Attributes

- **Resource Name:** Enter a unique name for the new array.
- **Number of Components:** The number of physical disks components, or members, in the array.
- **Block Size:** The physical block size of the records in the array. Do not change this from 512. The size of 524 if for a specialized application program.
- **Network ID:** This identifies which SSA loop is being used.

  Note: Array members must all be on the same SSA loop.

- **Hot-Spare Enabled:**

  `Default: On`

  `Supports: On, Off`

  Set this attribute to On to enable the use of hot-spare disk drives. If you set the attribute to Off, the array cannot use any available hot-spare disk drives if it needs them. Under this condition, the array enters the Degraded state.

- **Hot-Spare Exact Size:**

  `Default: Off`

  `Supports: On, Off`

  When this attribute is set to On, only hot-spare disk drives of exactly the same size as the failing disk drive are used. When the attribute is set to Off, the hot-spare disk drive that is used can be of a greater size than the failing diskdrive that it is replacing.

- **Hot-spare Preferred:**

  `Default: Off`

  `Supports: On, Off`

  When this attribute is set to On, only a hot-spare disk drive from the preferred hot-spare pool can be used to replace a failing disk drive. Hot-spare disk drives that are in global pool 0 are not used. When the attribute is set to Off, a suitable hot-spare disk drive from a hot-spare pool other than the preferred pool can be used to replace a failing disk if the preferred Hot-spare pool is empty. Pool 0 will be tried first. Then, any other available pools are tried.

  If Hot-spare preferred is On, Hot-spare disks in the global pool 0 will not be used.

  When assigning a hot-spare pool to protect an array, ensure the pool contains disks whose capacites are the same, or greater than, the capacities of the array member disk drives.

- **Strip Size:**

  `Default: 128`

  `Supports: 128 Only`

  This attribute defines the number of contiguous blocks that can be held on a disk drive before the write operation switches to the next disk drive. Higher values can decrease the performance of long send operations because the data might be striped across fewer disk drives. Lower values can decrease the performance of write operations and rebuilding operations.

- **Stretch Size:**

  `Default: 4`

  `Supports: 1 to 9999 in steps of 1.`

  This attribute defines the number of strips that are to be written before the disk drive that holds the parity data is changed. The default value is 4. You cannot increase performance by setting a different value.

- **Rebuild Priority:**

```
Default: 50%
```

```
Supports: 1% to 100%
```

This attribute sets the rate for rebuilding operations. A higher value for the attribute gives a faster array rebuilding operation, but can decrease the performance of programs that run during that operation. A lower value gives a slower array rebuilding operation, but can increase in the performance of programs that run during that operation.

Actions:

- **OK:** This action sends the attributes and displays a list of suitable candidate disk drives.
- **Auto:** This action creates an array that has the chosen attributes. You are not asked to select the components from the candidate list. The first *n* suitable free disk drives are chosen automatically (where *n* is the number of components in the array). If possible, all the disk drives are the same size.
- **Cancel:** This action cancels the array creation, and returns to the relevant Resource List.

Modify Attributes :

Advanced SerialRAID Adapter

Note: On PC Systems this adapter is known as the *Advanced SerialRAID/X Adapter*. On AIX systems this adapter is known as the *Advanced SerialRAID Adapter.*

Create RAID-0 Attributes

- **Resource Name:** Enter a unique name for the new array.
- **Number of Components:** The number of physical disks components, or members, in the array.
- **Block Size:** The physical block size of the records in the array. Do not change this from 512. .
- **Strip Size:**

  ```
  Default: 32 (Blocks)
  ```

  ```
  Supports: Min 8, Max 512 in steps of 8
  ```

  This attribute defines the number of contiguous blocks that can be held on a disk drive before the write operation switches to the next disk drive. Higher values can decrease the performance of long send operations because the data might be striped across fewer disk drives. Lower values can decrease the performance of write operations and rebuilding operations.
- **Network ID:** This identifies which SSA loop is being used.

     Note: Array members must all be on the same SSA loop.

Actions:

- **OK:** This action sends the attributes and displays a list of suitable candidate disk drives.

- **Auto:** This action creates an array that has the chosen attributes. You are not asked to select the components from the candidate list. The first *n* suitable free disk drives are chosen automatically (where *n* is the number of components in the array). If possible, all the disk drives are the same size.

- **Cancel:** This action cancels the array creation, and returns to the relevant Resource List.

Create RAID-5 Attributes

The Advanced SerialRAID Adapter uses the same RAID-5 filter as does the SerialRAID Adapter, see Section on page 107.

Advanced SerialRAID Adapter *with* ROS > 7000

Note: On PC Systems this adapter is known as the Advanced *SerialRAID/X Adapter*. On AIX systems this adapter is known as the *Advanced SerialRAID Plus Adapter*. These adapters have had a firmware update (>7000) which provides these additional features :

Create RAID-1 Attributes

- **Resource Name:** Enter a unique name for the new array.

- **Number of Components:** The number of physical disks components, or members, in the array.

- **Block Size:** The physical block size of the records in the array. Do not change this from 512. The size of 524 if for a specialized application program.

- **Network ID:** This identifies which SSA loop is being used.

  Note: Array members must all be on the same SSA loop.

- **Hot-Spare Enabled:**

  `Default: On`

  `Supports: On, Off`

  Set this attribute to On to enable the use of hot-spare disk drives. If you set the attribute to Off, the array cannot use any available hot-spare disk drives if it needs them. Under this condition, the array enters the Degraded state.

- **Hot-Spare Exact Size:**

  `Default: Off`

  `Supports: On, Off`

  When this attribute is set to On, only hot-spare disk drives of exactly the same size as the failing disk drive are used. When the attribute is set to Off, the hot-spare disk drive that is used can be of a greater size than the failing diskdrive that it is replacing.

- **Hot-spare Preferred:**

  `Default: Off`

  `Supports: On, Off`

  When this attribute is set to On, only a hot-spare disk drive from the preferred hot-spare pool can be used to replace a failing disk drive. Hot-spare disk drives that are in global pool 0 are not used. When the attribute is set to Off, a suitable hot-spare disk drive from a hot-spare pool other than the preferred pool can be used to replace a failing disk if the preferred Hot-spare pool is empty. Pool 0 will be tried first. Then, any other available pools are tried.

  If Hot-spare preferred is On, Hot-spare disks in the global pool 0 will not be used.

  When assigning a hot-spare pool to protect an array, ensure that the pool contains disks whose capacites are the same, or greater than, the capacities of the array member disk drives.

- **Hot-spare Splits:**

  `Default: Off`

  `Supports: On, Off`

  When this attribute is set to On and the RAID-1 array is split, hot-spare disk drives are used from the selected or available pools to replace the missing drive. When the attribute is set to Off, no hot-spare disk drives are used if only one RAID-1 domain is available.

- **Split Array Resolution:**

```
Default: Primary
```

```
Supports: Primary, Secondary
```

This attribute is normally set to Primary. If it is set to Secondary, the using system needs access to only the secondary domain to continue operation if it has lost access to the other using system and the primary domain. Set this attribute to Secondary only when you are sure that the other using system has lost access to, and is not using, the primary domain. If the fault has occurred in the SSA loop, for example multiple cabling faults, and the other using system is still using the primary domain, both systems will be able to access the two domains independently. This condition causes unsynchronized data. This will only occur when you are running in cluster mode.

- **Rebuild Priority:**

```
Default: 50%
```

```
Supports: 1% to 100%
```

This attribute sets the rate for rebuilding operations. A higher value for the attribute gives a faster array rebuilding operation, but can decrease the performance of programs that run during that operation. A lower value gives a slower array rebuilding operation, but can increase in the performance of programs that run during that operation.

- **Initial Rebuild:**

```
Default: Off
```

```
Supports: On, Off
```

When this attribute is set to On and you create an array, the array runs a rebuilding operation and copies data from the first component to the second. When the attribute is set to Off and you create an array, the array starts with undefined data and immediately becomes nondegraded.

You can set this attribute only at creation time; you cannot change it later.

With the the attribute is set to On and user data has yet to be written to the array, the same data will be returned by whichever member disk is read. If the attribute is Off, it is not guaranteed to always return the same data for the same block before that block contains user data.

  Note: It is recommended that the Initial Rebuild attribute is set to 'On', to avoid the possible problems if applications depend on the same data being returned before data is written. Note that this will cause some performance overhead while the array is being rebuilt.

Actions:

- **OK:** This action sends the attributes and displays a list of suitable candidate disk drives.
- **Auto:** This action creates an array that has the chosen attributes. You are not asked to select the components from the candidate list. The first *n* suitable free disk drives are chosen automatically (where *n* is the number of components in the array). If possible, all the disk drives are the same size.

  When Auto is selected on an Advanced Serial RAID Adapter, the array is assigned to the global hot-spare pool on the given SSA loop (that is, pool A0 or pool B0). If this does not exist, the global pool is created and the array is assigned to use this pool.

- **Cancel:** This action cancels the array creation, and returns to the relevant Resource List.

Modify Attributes :

Create RAID-1 Array Candidates

Advanced SerialRAID Adapter *with* **ROS > 7000**

In addition to the above attributes and actions, the Component Order can be selected. This allows users to select which disk is the Primary, and which is the Secondary. See Section on page 118.

Create RAID-10 Attributes

- **Resource Name:** Enter a unique name for the new array.
- **Number of Components:** The number of physical disks components, or members, in the array.
- **Block Size:** The physical block size of the records in the array. Do not change from 512. The size of 524 is for a specialized application program.
- **Network ID:** This identifies which SSA loop is being used.

   Note: Array members must all be on the same SSA loop.

- **Hot-Spare Enabled:**

   `Default: On`

   `Supports: On, Off`

   Set this attribute to On to enable the use of hot-spare disk drives. If you set the attribute to Off, the array cannot use any available hot-spare disk drives if it needs them. Under this condition, the array enters the Degraded state.

- **Hot-Spare Exact Size:**

  Default: Off

  Supports: On, Off

  When this attribute is set to On, only hot-spare disk drives of exactly the same size as the failing disk drive are used. When the attribute is set to Off, the hot-spare disk drive that is used can be of a greater size than the failing diskdrive that it is replacing.

- **Hot-spare Preferred:**

  Default: Off

  Supports: On, Off

  When Hot-spare Preferred is set to On, only a hot-spare from the preferred Hot-spare pool will be used to replace a failing disk. When Hot-spare preferred is Off, a suitable Hot-spare from a Hot-spare pool other than the preferred pool may be used to replace a failing disk if the preferred Hot-spare pool is empty. Pool 0 will be tried first, then any other available pools.

  If Hot-spare preferred is On, Hot-spare disks in the global pool 0 will not be used.

  When assigning a Hot-spare Pool to protect an array, please ensure the pool contains the correct capacity of resources as the array. i.e. the pool contains resources with the same or greater capacity as the array member resources.

- **Hot-spare Splits:**

  Default: Off

  Supports: On, Off

  When this attribute is set to On and the RAID-1 array is split, hot-spare disk drives are used from the selected or available pools to replace the missing drive. When the attribute is set to Off, no hot-spare disk drives are used if only one RAID-1 domain is available.

- **Split Array Resolution:**

  Default: Primary

  Supports: Primary, Secondary

  This attribute is normally set to Primary. If it is set to Secondary, the using system needs access to only the secondary domain to continue operation if it has lost access to the other using system and the primary domain. Set this attribute to Secondary only when you are sure that the other using system has lost access to, and is not using, the primary domain. If the fault has occurred in the SSA loop, for example multiple cable faults, and the other using system is still using the primary domain, both systems will be able to access the two domains independently. This condition causes unsynchronized data. This will only occur when you are running in cluster mode.

- **Strip Size:**

  Default: 32

  Supports: 32, 64, 128

  This attribute defines the number of contiguous blocks that can be held on a disk drive before the write operation switches to the next disk drive. Higher values can decrease the performance of long send operations because the data might be striped across fewer disk drives. Lower values can decrease the performance of write operations and rebuilding operations.

- **Initial Rebuild:**

```
Default: Off
```

```
Supports: On, Off
```

When this attribute is set to On and you create an array, the array runs a rebuilding operation and copies data from the first component to the second. When the attribute is set to Off and you create an array, the array starts with undefined data and immediately becomes nondegraded.

You can set this attribute only at creation time; you cannot change it later.

With the the attribute is set to On and user data has yet to be written to the array, the same data will be returned by whichever member disk is read. If the attribute is Off, it is not guaranteed to always return the same data for the same block before that block contains user data.

Note: It is recommended that the Initial Rebuild attribute is set to 'On', to avoid the possible problems if applications depend on the same data being returned before data is written. Note that this will incur some performance overhead while the array is being rebuilt.

- **Rebuild Priority:**

```
Default: 50%
```

```
Supports: 1% to 100%
```

This attribute sets the rate for rebuilding operations. A higher value for the attribute gives a faster array rebuilding operation, but can decrease the performance of programs that run during that operation. A lower value gives a slower array rebuilding operation, but can increase in the performance of programs that run during that operation.
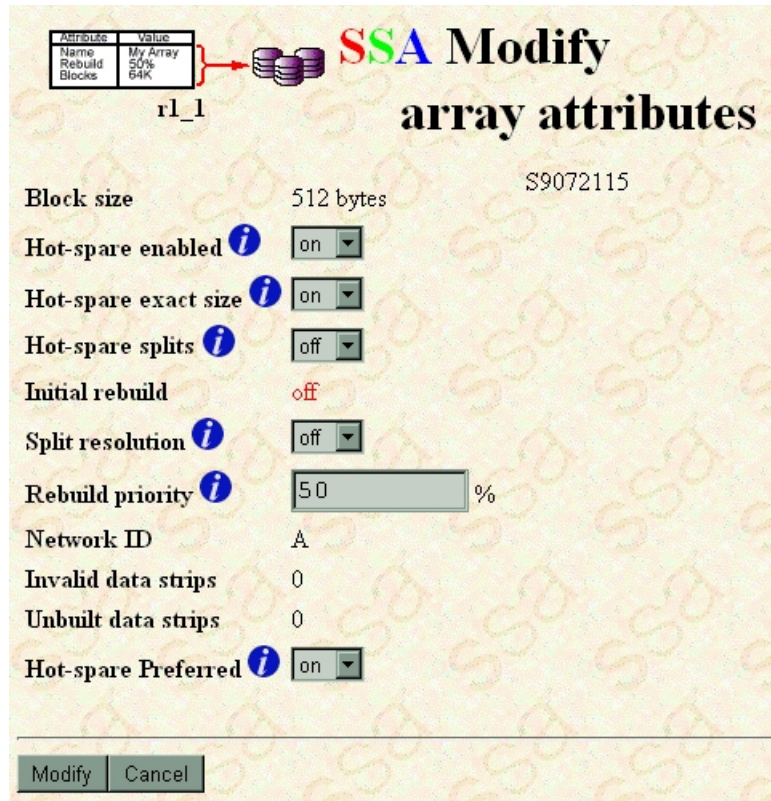
Actions:

- **OK:** This action sends the attributes and displays a list of suitable candidate disk drives.
- **Auto:** This action creates an array that has the chosen attributes. You are not asked to select the components from the candidate list. The first *n* suitable free disk drives are chosen automatically (where *n* is the number of components in the array). If possible, all the disk drives are the same size.

  When Auto is selected on an Advanced Serial RAID Adapter, the array is assigned to the global hot-spare pool on the given SSA loop (that is, pool A0 or pool B0).If this does not exist, the global pool is created and the array is assigned to use this pool.

- **Cancel:** This action cancels the array creation, and returns to the relevant Resource List.

Component Order and Domains

When you are creating a RAID-10 array, you can also assign the Component Order. This allows you to control which candidates become mirrored pairs in the array.

RAID-10 uses mirrored stripe sets, where the data is striped across a set of drives (the stripe set). At the same time, the stripe set is mirrored to another set of disk drives. This method of redundancy allows multiple domains to be created within one array.

The RSM configurator provides component ordering to allow you to create two domains in an array that has an even number of component disks, or members. Each domain contains a copy of the entire stripe set. One domain is assigned as the primary, the other as secondary. While the primary domain is accessible, the array can continue to process read and write requests, whether or not the secondary domain has been lost.

When you are assigning the array component order, decide whether multiple domains are to be used. You can physically separate domains, for example, between different enclosures or between different buildings. Therefore, a power failure in one enclosure or building does not put the array into the Offline state.

> **Note:** The secondary domain is prevented from continuing if it loses communication with the primary domain and the Split Resolution attribute is set to Off.
>
> If you do not want to use multiple domains, let the component order remain as default.

Assigning Component Ordering

RSM component ordering allows you to pick the candidates that will become members of each domain if the following rule is followed :

The data that is written to the disk 'X (Primary)' is always mirrored on 'X (Secondary)'
where X is any value between 1 and 8.

Create RAID-10 Candidates

Actions:

- **Pool ID:** Each of these drop-down boxes contains a list of the available hot-spare pools that are on the selected SSA loop. Select the pool that you want to use to protect each of the array members.

- **Component Order** - These drop down boxes contain a list of the valid component ordering for the selected number of array components. Select the ordering as explained above, if you wish to use multiple domains, otherwise leave them as 'default'.

- **Check Box:** The button that is displayed in the first column of each row in the table. Use these buttons to select the array members. You must select the correct number before you do the Create action.

- **Create:** This action sends the chosen candidates and attributes for the adapter to complete the array creation. If any error occurs, a suitable message is displayed in the Information Area.

- **Confirm:** This action displays the RAID-10 Confirmation page. If you have chosen to create your RAID-10 array by using multiple domains, this page allows you to check whether you have assigned the resources to the correct domain. As part of this confirmation, you can flash the indication lights on either half of the array. This action is only valid if you have specified the component order, rather than leave it as the default order.

- **Cancel:** This action cancels the array creation and returns you to the Resource List.

RAID-10 Confirmation

This page is displayed if you have selected to use the Component Order values to create a RAID-10 array that uses multiple domains. This page allows you to verify that the selected components are assigned to the correct domains. It also allows you to modify the Component Order values if you have made a mistake.

If you modify the Component Order, the page automatically updates so that no two components have the same Component Order value. Each write action is striped across the primary resources, then the mirrored copy is striped across the related secondary resources.

Actions:

- **Create:** This action sends the create request with the component order, as now defined on the confirmation page.

- **Cancel:** This action cancels the creation of the RAID-10 array and returns to the Resource List.

- **Flash All Primaries:** This action causes the identifier lights to flash on all the disk drives that are now assigned, via the Component Order, as primary resources. You can use this action to verify that the domains will be created correctly.

- **Flash All Secondaries:** This action causes the identifier lights to flash on all the disks currently assigned, via the Component Order, as secondary resources. You can use this action to verify that the domains will be created correctly.

- **Flash All Off:** This action stops the identifier lights flashing on *all* disk drives, including any other disks that are in the same loop.

- **Refresh:** This action updates the existing page.

Modify Attributes :

Create Array Candidates

There are two steps which must be completed when creating a new array.

1. Define the array attributes - attributes are adapter and array specific. All attributes are explained below.

2. Selecting the array members - the candidate disks are 'Free' disks which possess the relevant attributes as defined in step 1.

All SSA Adapters

All SSA Adapters (Advanced SerialRAID Adapter *with* ROS < 7000)

Step 2 in creating an array is to select the 'Free' resources which will become the array members, or components. The attributes chosen in Step 1 are shown, along with a list of suitable candidate disks.

> **Note:** Candidates are all 'Free' disks which are in the chosen SSA loop. (The Network ID selected in Step 1).

Candidate Attributes:

- **Check Box:** The button that is displayed in the first column of each row in the table. Use these buttons to select the array members. You must select the correct number before you do the Create action.

- **Serial Number:** The unique identifier for this disk.

- **Location:** The enclosure name and disk slot number (if available).

- **Size:** The capacity of the disk, in gigabytes.

- **Status:** The resource status (see the status list for a list of valid states).

- **Network ID:** The SSA Loop that contains the candidate disk drives.

Actions:

- **Check Box:** The button that is displayed in the first column of each row in the table. Use these buttons to select the array members. You must select the correct number before you do the Create action.

- **Create:** This action sends the chosen candidates and attributes for the adapter to complete the array creation. If any error occurs, a suitable message is displayed in the Information Area.

- **Cancel:** This action cancels the array creation and returns you to the Resource List.

Advanced SerialRAID Adapter *with* ROS > 7000

In addition to the attributes and actions that are described in section 10.6.1, you can also select the hot-spare pool that is to contain your selected candidate disk drive.

Actions:

- **Pool ID** - Each of these drop-down boxes contains a list of the available hot-spare pools that are on the selected SSA loop. Select the pool that you want to use to protect each of the array members. (The default is the global pool that is on the selected loop.)

11 Array View

System Usages

It is important to remember that System (PC) and System (AIX) have different meanings on the PC Server and AIX operating systems.

On a PC Server systems:

- **System (PC):** Resources are available, and have been attached to the operating system. These resources are true *System* Resources.

  Resource color = green

- **System (AIX):** Resources are either new from the factory; that is, they have not been initialised, or they have been:

  - Low-level formatted, or

  - Attached with a resource number that is already in use, or

  - Previously attached to an AIX system.

  These resources are *New* Resources. They might still contain valid AIX data.

  Resource color = white

On AIX systems:

- **System (PC):** Resources have been previously attached to a PC Server system. These resources are *New* Resources. They might still contain valid PC Server data.

  Resource color = white

- **System (AIX):** Resources are available to the AIX system; that is, hdisks are assigned to these resources when configuration is run. These resources are true *System* Resources.

  Resource color = green

Array Attributes

Array attributes are described in Section 10: Array Creation and Modification. This section provides examples of each RAID type (adapters might vary).

Additional System (PC) Attributes (PC Server):

- **Access:** When running in Cluster Mode, arrays and disks can be made private to one adapter. That is, only one adapter can access the resource. Access can be set only when the resource is in the usage class 'System (PC)'. Cluster Mode Only.

  The access can be set to any one of three types:

  - **No Access:** The resource is not presented to the operating system on any using system.
  - **Public:** All adapters connected to the SSA network can access the resource. The resource will be presented to the operating systems on all using systems.
  - **Private:** Only the adapter that set the privacy presents the resource to the operating system. That is, only the using system that contains the adapter that set the privacy can access the resource. This type of access is useful if an SSA resource contains the operating system for the using system, and you do not want other using systems to have access to the boot resource.

- **Resource Number:** The resource number as assigned when the resource was attached to the system. The number determines the sequence in which the System (PC) resources are presented to the operating system.

Additional Attributes (AIX):

- **Location:** The location that the ODM provides.
- **Disk:** The pdisk and or hdisk names (as appropriate).

Array Actions:

- **Serial Number:** Select any serial number to display the relevant Disk View.
- **Refresh:** This action updates the existing page.
- **Flash On:** This action starts the light indicator flashing on all the array components. A message indicating that the resource is flashing is displayed in the information area. This message appears only once. You must remember to Flash Off the resource. Otherwise, the light continues to flash. To clear all indicators, use the Flash All Off button on the Adapter View to Flash Off the indicator lights on all disk drives that are attached to the selected adapter.
- **Flash Off:** This action stops the light indicator flashing on all the array components.
- **Delete:** This action destroys the array and returns its component disks to the free usage type.
- **Create:** This action takes you to the Create Array page. The default attributes are set to the same values as those of the existing array.
- **Modify Attributes:** This action takes you to the Modify Array page where you can change the array attributes.

Free Resources :

- **Attach:** This action changes the use of an array from free to system (PC). The array is then available to the operating system. This action links to the Attach page, where you can select a resource number. This number determines the sequence in which resources are presented to the operating system.

Free Resources Attached to Fast-Write-Enabled Adapters:

- **Create FW:** This action takes you to the Create Fast-Write Array page. When you select OK, the array will now be configured to use the fast-write cache for data write operations.

- **Modify FW:** This action takes you to the Modify Fast-Write Array page where you can modify some of the current array attributes.

- **Delete FW:** This action stops the array from using the Fast-Write Cache feature for data write operations.

System (PC) Resources : (PC Server Systems)

- **Detach:** This action changes the use of an array from System (PC) to Free. The resource is no longer available to the operating system.

- **No Access:** The resource is not presented to the operating system on any using system.

- **Public:** All adapters connected to the SSA network can access the resource. The resource will be presented to the operating systems on all using systems.

- **Private:** Only the adapter that set the privacy presents the resource to the operating system. That is, only the using system that contains the adapter that set the privacy can access the resource. This type of access is useful if an SSA resource contains the operating system for the using system, and you do not want other using systems to have access to the boot resource.

Arrays created with Advanced SerialRAID Adapter:

- **Assign Hot-spare Pool:** This action allows you to change the hot-spare pool that will protect *all* the array components. A JavaScript text entry pop-up is displayed. Enter the new Pool number.
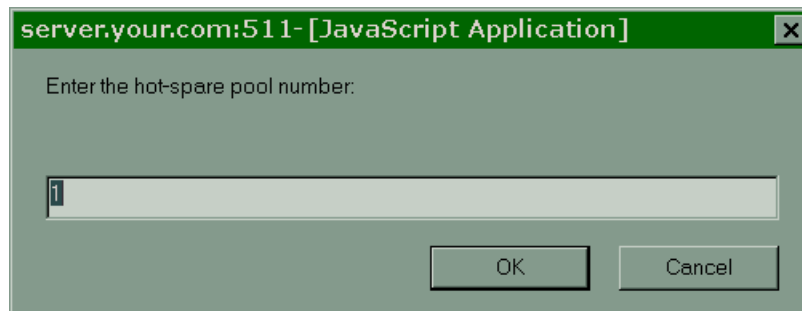
RAID-0 Array View - SSA RAID Adapter

RAID-1 Array View - Advanced SerialRAID Adapter

This figure shows a Fast Write Array :

RAID1 SSA Array view
r1_1
S9072115

Usage	System (PC)		
Status	Online (non-degraded)	Number of components	2
Size	9.1 GB	Access	public
Resource number	0Ch		

RAID Attributes

Block size	512 bytes	Hot-spare enabled	on
Hot-spare exact size	on	Hot-spare splits	off
Initial rebuild	off	Split resolution	off
Rebuild priority	50 %	Network ID	A
Invalid data strips	0	Unbuilt data strips	0
Hot-spare Preferred	on		

FW Attributes

Block size	512 bytes	Min. LBA	0 LBA
Max. LBA	4294967295 LBA	Max. write length cached	4294967288 LBA
Allow data delete	on	Cache full stride writes	on
Bypass cache if one-way	off		

Serial number	Size	Status	Pool ID
AC7AD188	9.1 GB	Present	0
AC7AD18F	9.1 GB	Present	

Refresh	Flash on	Flash off	Detach	Delete	Create	Private	NoAccess

Modify Attribs	Delete FW	Modify FW Attr	Assign hot-spare pool

RAID-5 Array View - SSA RAID Adapter

RAID-5 Array View - Advanced SerialRAID Adapter

AIX version :

RAID-10 Array View - Advanced SerialRAID Adapter

12 Disk View

System Usages

It is important to remember that "System (PC)" and "System (AIX)" have different meanings on the PC Server and AIX operating systems.

On PC Server systems:

- **System (PC):** Resources are available, and have been attached to the operating system. These resources are true *System* Resources.

  Resource color = green

- **System (AIX):** Resources are either new from the factory; that is, they have not been initialized, or they have been:

  - Low-level formatted, or

  - Attached with a resource number that is already in use, or

  - Previously attached to an AIX system.

  These resources are *New* Resources. They might still contain valid AIX data.

  Resource color = white

On AIX systems:

- **System (PC):** Resources have been previously attached to a PC Server system. These resources are *New* Resources. They might still contain valid PC Server data.

  Resource color = white

- **System (AIX):** Resources are available to the AIX system; that is, hdisks are assigned to these resources when configuration is run. These resources are true *System* Resources.

  Resource color = green

This figure shows a Fast Write disk :

Disk Attributes:

- **Usage:** The usage of an SSA resource determines how you can use the resource. All possible usage classes are explained in the Resource List help.

- **Status:** The status of this disk resource.

- **Size:** The capacity of the disk drive, in gigabytes.

- **Vendor ID:** The disk drive manufacturer.

- **Product ID:** The disk drive type. The first four characters detail the type of microcode that is required by this disk. See SSA Tool Help for more information.

- **Model Number:** The disk drive model (usually the same as the second part of the Product ID).

- **ROS Revision:** The level of ROS microcode.

- **RAM Revision:** The level of RAM microcode.

> **Note:** The combination of the ROS and RAM gives you the existing level of information and the product ID to check whether you have the latest drive microcode on this disk. Some disk drives combine these two fields as the **level**.

- **Manufacture Date:** The date the disk was manufactured (yy plus day of year).

- **Servo Microcode:** The level of servo microcode.

- **HDE Serial Number:** The Head Disk Enclosure serial number of this disk.

Additional 'System (PC)' Attributes

On PC Servers:

- **Access:** When running in Cluster Mode, arrays and disks can be made private to one adapter. That is, only one adapter can access the resource. Access can be set only when the resource is in the usage class 'System (PC)'. Cluster Mode Only.

  The access is set to one of three types:

  - **No Access:** The resource is not presented to the operating system on any using system.

  - **Public:** All adapters connected to the SSA network can access the resource. The resource will be presented to the operating systems on all using systems.

  - **Private:** Only the adapter that set the privacy presents the resource to the operating system. That is, only the using system that contains the adapter that set the privacy can access the resource. This type of access is useful if an SSA resource contains the operating system for the using system, and you do not want other using systems to have access to the boot resource.

- **Resource Number:** The resource number as assigned when the resource was attached to the system. This number determines the order in which the System (PC) resources are presented to the operating system.

Additional Array component Attribute

Advanced SerialRAID Adapter *with* ROS > 5000:

- **Pool Id:** The hot-spare pool that contains the resource.

Disk Actions:

- **Check Code Level:** This action checks whether the disk drive contains the latest level of microcode. This action requires the machine that is running the browser to be connected to the Internet

- **Refresh:** This action updates the existing page.

- **Flash On:** This action starts the light flashing on the disk drive. A message indicating that the resource is flashing will be displayed in the information area. This message appears only once. You must remember to Flash Off the resource. Otherwise, the light continues to flash. To clear all indicators, use the Flash All Off button on the Adapter View to Flash Off the indicator lights on all disk drives that are attached to the selected adapter.

- **Flash Off:** This action stops the light indicator flashing on the disk.

- **Diagnostics:** After verification, this action starts the disk drive diagnostic funtion.

```
server.your.com:511-[JavaScript Application]      ✕

  (?)   Do you really want to continue ?

        Terminate all disk drive operations before running this test.

              [ OK ]   [ Cancel ]
```
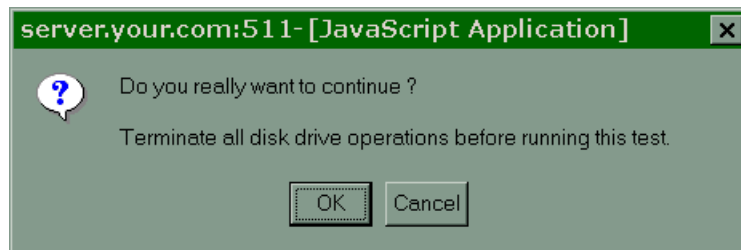
Free Resources

- **Attach:** This action changes the use of a disk drive from Free to System (PC). The disk drive is then available to the operating system. This action links to the Attach page, where a resource number is selected. This number determines the sequence in which resources are presented to the operating system.

Free Resources attached to Fast Write Enabled Adapters

- **Create FW:** This action takes you to the Create Fast-Write Array page. When you select OK, the array will now be configured to use the fast-write cache for data write operations.

- **Modify FW:** This action takes you to the Modify Fast-Write Array page where you can modify some of the current array attributes.

- **Delete FW:** This action stops the array from using the Fast-Write Cache feature for data write operations.

System (PC) Resources

On PC servers:

- **Detach:** This action changes the use of a disk from System (PC) to Free. The resource is no longer available to the operating system.

- **No Access:** The resource is not presented to the operating system on any using system.

- **Public:** All adapters connected to the SSA network can access the resource. The resource will be presented to the operating systems on all using systems.

- **Private:** Only the adapter that set the privacy presents the resource to the operating system. That is, only the using system that contains the adapter that set the privacy can access the resource. This type of access is useful if an SSA resource contains the operating system for the using system, and you do not want other using systems to have access to the boot resource.

System (AIX), System (PC), Rejected and Hot-spare Disk Resources

- **Delete:** This action changes the use of a disk from xxx to Free.

Array Components

- **Component Exchange:** This action allows you to exchange an array member for another disk drive. This action appears if you have accessed the Disk view from the relevant Array view.

Array components attached to the Advanced SerialRAID Adapter *with* ROS > 5000

- **Assign Hot-spare Pool:** This action allows you to change the hot-spare pool that contains this disk drive. A JavaScript text entry pop-up is displayed. Enter the new Pool number problem.
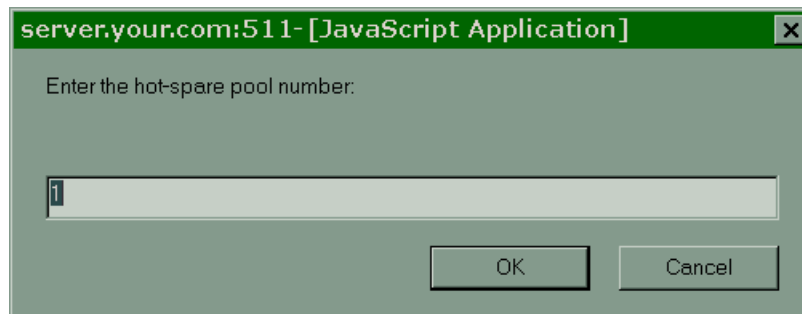
Additional Service Actions (Physical View)

When a disk view has been accessed through the Physical View, rather than through the Logical View, the following additional actions are available :

- **Format:** This action performs a format operation on the disk. If the operation is successful, the disk drive becomes a member of the usage class System (AIX).

  Note: Low-level formatting of a resource destroys all data, including SSA configuration data. Ensure that you do want to destroy the data before you proceed.

  You can run the format action only if you have selected the required disk drive from the Physical View. If you select a disk drive from any other view, the Certify option is not available.

- **Certify** - This action starts the certification operation on the disk. This performs read/write actions to all data areas on the disk.

  Note: Certify can be performed only when the relevant disk view has been selected from the Physical View - Selecting a disk from any other view will result in the Certify option not being available.

- **Service Mode:** Use this action when removing any disks from an active SSA loop. Service mode attempts to stop the disk drive motor, prevent link errors, and start the indicator light flashing. See Section 15 on page 149.

  Note: 1. Only these types of disk drive can be put into service mode:

  - System (AIX) on PC servers
  - System (PC) on AIX systems
  - Free
  - Rejected

  2. Only failed disks can be set in Service Mode.

  3. Fast-Write resources cannot be put in Service Mode no matter, whatever their usage.

  4. You can set service mode can only if you have selected the required disk drive from the Physical View. If you select a disk drive from any other view, the Set Service Mode option is not available.

Disk View (AIX version)

The actions that the AIX Disk View provides are the same as those that the PC Server versions provide, but this additional information is also displayed:

- **Location:** The location information that the ODM provides.
- **Disk:** The pdisk and or hdisk names (as appropriate).

13 Enclosure List

This page displays a list of the enclosures that are connected to the selected adapter. Only enclosures that have SCSI Enclosure Services (SES) controller cards are listed. These SES enclosures are the 7133 Models D40 and T40 Serial Disk Systems. The 7133 Models 010, 020, 500, and 600 are not included because they do not have controller cards. If you do not have any SES enclosures, the following message is displayed:

SSA Enclosure list

C8264035

No SES Enclosures detected. (SES = SCSI Enclosure Services)

[Refresh]
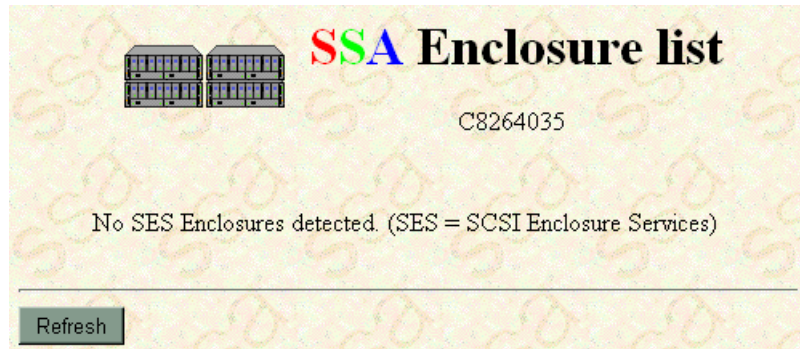
Each suitable enclosure that is connected to the selected adapter, via the SSA network, is listed. The enclosures are listed in the physical sequence in which they are attached to the adapter.

SSA Enclosure list

S9072115

Enclosure ID	Power		Fan			Temperature
	1	2	1	2	3	
MAK8	Populated	Populated	low	low	low	22°C
RSM1	Populated	Populated	low	low	low	21°C
TFXX	Populated	Populated	low	low	low	21°C

[Refresh]

Enclosure Attributes:

- **Enclosure ID:** The name of the enclosure, as shown in the four-character display panel on the front of the Enclosure. The name links the relevant Enclosure View .

  Note: If the background of this, or any other table cell is red, a fault has occurred in the enclosure. Select the Enclosure ID link to access the relevant Enclosure View where you should again see a table cell with a red background. This is the Enclosure component which is reporting the fault.

- **Power:** The status of the two power-supply assemblies: installed, missing, or failed.
- **Fan:** The speed of the three cooling fans: low or high. The speed is determined by the existing enclosure temperature.
- **Temperature:** The enclosure detected temperature, in ^{o}C.

 Note: When the RSM configurator builds the Enclosure list and the Enclosure View, it collects the information directly from the SES controller that is in the enclosure. The RSM configurator communicates with the Controller through any one of the available disks drives that are in the enclosure. This page can take a long time to complete if the disk drives are busy with I/O.

Actions:

- **Enclosure ID:** Select any of the Enclosure ID links to access the relevant Enclosure View.
- **Refresh:** This action updates the existing page.

14 Enclosure View

This page displays the Enclosure components:

7133 Model D40 :
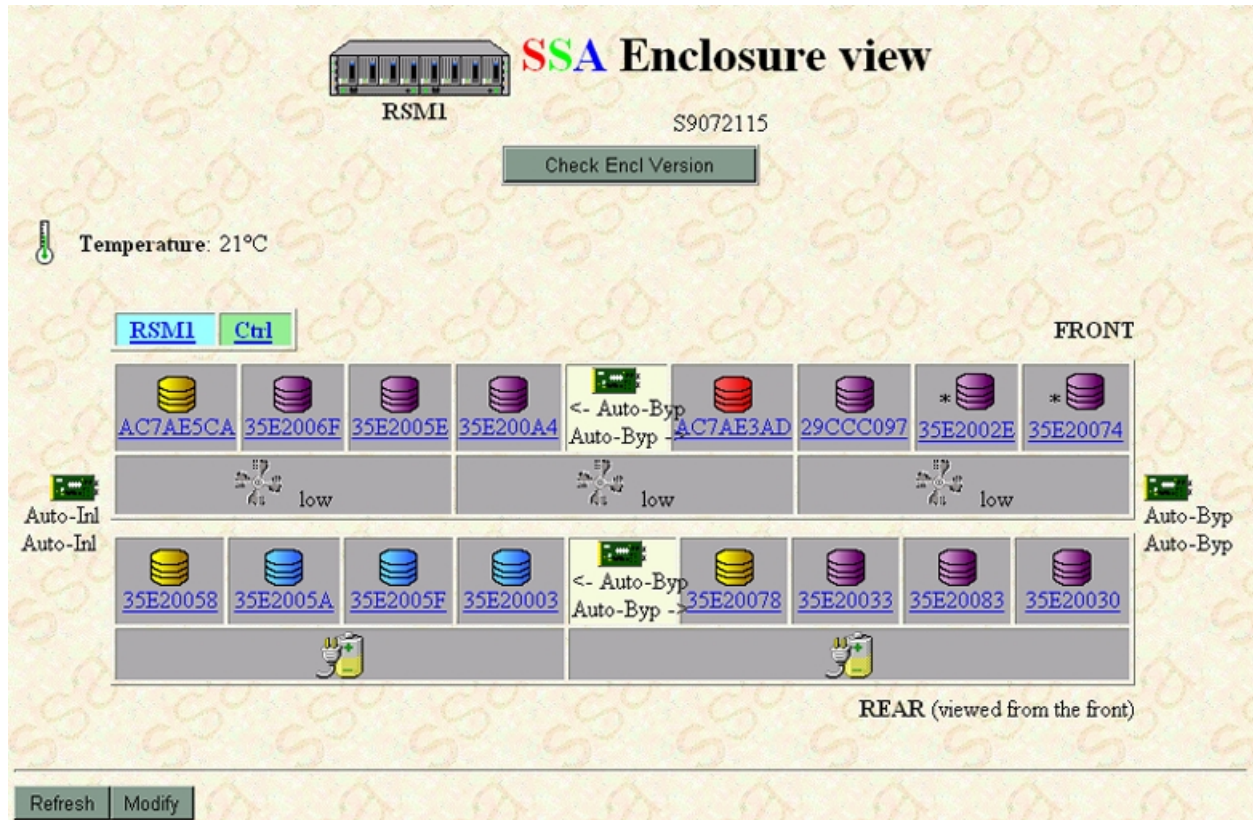
- **Temperature Sensor:** This sensor monitors the temperature of the enclosure and changes the fan speeds when necessary.

- **Display Panel:** This panel is on teh fron of the enclosure. It display the four character enclosure name.

- **Enclosure Controller:** The controller that controls and monitors the Enclosure components.

- **Bypass Card:** Each of the four bypass cards controls two of the SSA ports that are on the enclosure. Normally, these cards remain in Auto mode, but they might need to be modified when special configurations are required.

- **Cooling Fans:** The three cooling fans are controlled by the enclosure controller. The speed changes when the Controller detects that a temperature threshold has been reached.

- **Power supply assemblies:** The two power supply assemblies provide dc power to the enclosure.

- **Disk drives modules:** The enclosure can support from one to sixteen disk drives. When a disk drive is connected to the selected adapter, it is represented on the screen by an icon that shows the existing usage. The serial numbers link to the related DiskView.

7133 Model T40:

Note: Some enclosure ports might be connected to a different adapter, in a different SSA network. That is the disks in the Enclosure are shared between multiple adapters, but the adapters are not connected in the same SSA network. Disks drives that are connected to the another adapter will appear as ghost disks, a grey disk icon. The adapter that is now selected cannot communicate with these disks . Select the adapter to which they are connected, and select the required Enclosure View.

When a disk drive slot is empty, the word "Empty" is displayed instead of a disk icon.

When a disk drive slot contains a dummy SSA disk (an empty SSA disk carrier), the word "Dummy" is displayed instead of a disk icon.

Resource Actions:

Select any of the icons on this page to display information about the selected component.

Note: When an icon is flashing red, or the table cell background is red, the enclosure controller has detected a fault with this enclosure component.

The Enclosure Icon, when selected, displays information about the enclosure. The information comes from the Enclosure Vital Product Data (VPD), and is displayed as a JavaScript Popup.

The Temperature icon is displayed when the temperature is inside the threshold. When this icon is selected, it displays information about the enclosure temperature and the existing temperature thresholds. The information comes from the controller, and is displayed as a JavaScript Popup.

The Warning Temperature icon is displayed when the temperature is greater than the existing critical threshold. When this icon is selected, it displays information about the enclosure temperature and the existing temperature thresholds. The information comes from the controller, and is displayed as a JavaScript Popup. The icon is animated.

The Critical Temperature icon is displayed when the temperature is greater than the existing warning threshold. When this icon is selected, it displays information about the enclosure temperature and the existing temperature thresholds. The information comes from the controller, and is displayed as a JavaScript Popup. The icon is animated.

When this icon has a blue background, it indicates that the display panel is working correctly. Select the Enclosure ID link to see information about the display panel. In the example icon (shown to the left of this text), XXXX represents the Enclosure Link ID. The information comes from the display panel Vital Product Data (VPD), and is displayed as a JavaScript Popup.

If the controller detects a fault with the display panel, the background changes from blue to red.
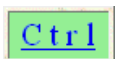
The Enclosure Controller is working correctly. Select the 'Ctrl' link to view concise information relating to the Controller. This information is taken from the Controller Vital Product Data (VPD). JavaScript Popup.

	If the controller detects a fault with itself, the background will change from blue to red.
	When this icon has a blue background, it indicates that the bypass card is working correctly. When the icon is selected, information about the operation of the bypass card is displayed, including mode of bypass, cable type, and serial number.
	If the controller detects a fault with a bypass card, the icon flashes in red. The icon is animated.
	When this icon has a blue background, it indicates that the cooling fan is working correctly. When the icon is selected, information about the operation of the fan is displayed.
	If the controller detects a fault with a fan, the icon flashs in red. The icon is animated. **Note:** The rotation of the icon is not related to the physical speed of the fan. The icon stops rotating after 1000 revolutions.
	When this icon has a blue background, it indicates that the power supply assembly is working correctly. When the icon is selected, information about the power supply assembly is displayed.
	If the controller detects a fault with a power supply assembly, the icon flashes in red. The icon is animated.

Other Actions:

- **Check Version:** This action checks whether your controller has the latest level of enclosure microcode. For this action, the machine that is running the browser must be connected to the Internet.
- **Serial Number:** Select any of the disk serial numbers to display the required Disk View.
- **Refresh:** This action updates the existing page.
- **Modify:** This action allows you to change the enclosure settings.

Modify Enclosure

The Modify Enclosure page is similar to the Enclosure View. The input field on this page allow you to change the enclosure settings.

Modifications:

- **Bypass Card:** Use the drop-down boxes that are next to each bypass card, to change the mode of operation for the selected bypass card. It is possible to set the bypass cards into a mode where all disks are bypassed. RSM requires the disks to communicate with the Controller. To be able to communicate with the controller, the RSM configurator need disk drives to be available. If no disk drive is available, the RSM configurator cannot communicate with the controller.

- **FInl:** The bypass card is forced to run in Inline Mode.

- **FByp:** The bypass card is forced to run in Bypass Mode.

- **FOpe:** The bypass card is forced open.

- **Auto:** The bypass card is automatically reconfigured as is suitable for the cables that are attached to it. More information is given in the Enclosure View under:

  - **Auto-Byp:** Automatic, running in Bypass Mode.

  - **Auto-Inl:** Automatic, running in Inline Mode.

- **Display Panel:** Enter a new name (enclosure ID) in the text field provided. This name is displayed in the four-character display panel on the front of the enclosure.

- **Temperature Threshold:** Enter new values for the high and low temperature limits for the Warning threshold. The information icon displays the minimum and maximum values as shown in the table.

- **Swap Bit:** If any rnclosure components have been removed and replaced, the swap bit is set for the component. To reset the swap bit, select the checkbox that is next to the Reset icon.

Warning Thresholds	The **minimum** value for the **low** warning threshold is 10°C
	The **maximum** value for the **low** warning threshold is 24°C
	The **minimum** value for the **high** warning threshold is 25°C
	The **maximum** value for the **high** warning threshold is 50°C
Critical Thresholds	The **value** for the **low** critical threshold is 0°C
	The **value** for the **high** critical threshold is 55°C
	The critical values cannot be modified.

Table 5:   Coral Temperature Thresholds
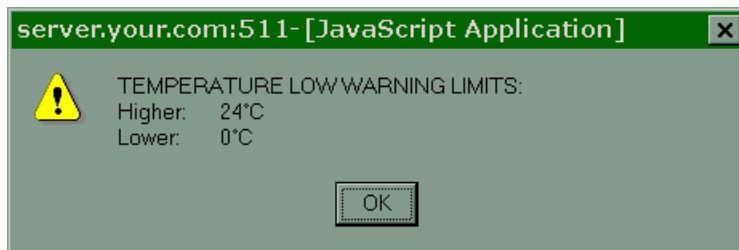
Actions:

- **Cancel:** This action cancels all changes that have been made, and returns you to the Enclosure View.

- **OK:** This action sends the changes to the controller, and returns you to the Enclosure View. If the SSA network is under load, it might take several seconds for the controller to process the changes. Refresh the Enclosure View after a short time.

- **Reset:** This action clears any changes and redisplays the existing page.

15 Physical View

The Physical View displays the physical network of SSA disk drives that is connected to this adapter. Any other SSA adapters that are connected in the same SSA networks are also shown. Such configerations occur only in Cluster mode.
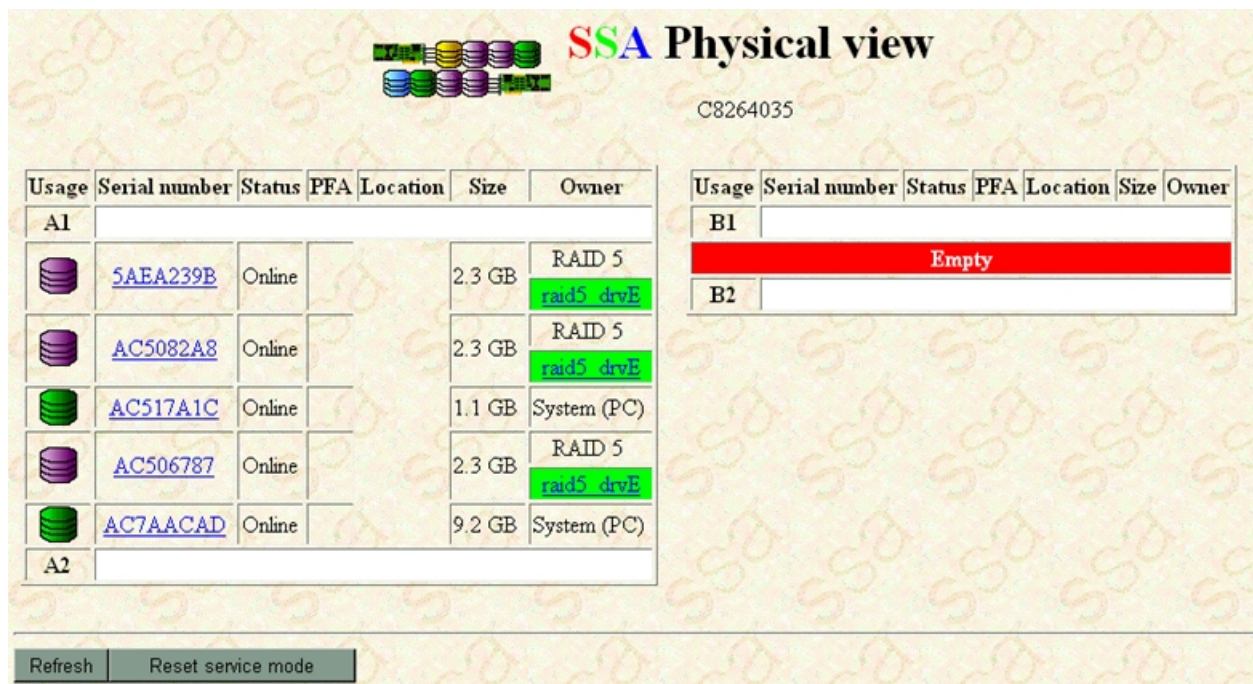
The resource are display in the same sequence as that in which the adapter sees them. Each disk drive has a value that is known as a *hop coun*t. The SSA adapters use these hop counts to communicate with each disk drive that is in the SSA network.

IBM SSA Adapters have two networks, or loops: A and B. Each network has two ports. The four ports (A1, A2, B1 and B2) and the hop count from one of these ports determines the position of a disk drive on the SSA loop. Some service request numbers (SRN) contain the PAA address of a disk drive, where P is the port number, and AA is the hop count or address. See also the information about SRNs that is given in the adapter and enclosure publications.

The Physical View shows the network connections from port A1 to A2 and from B1 to B2. Each entry describes either an adapter, or a disk drive.

If the SSA network breaks, the Physical View shows a red table row that contains the word "Break". You must solve the problem as quickly as possible. Go to the event logger and analyze the log to find the problem.

When the RSM configurator is building the Physical View, it needs to collect much information from the adapter, disk drives, and any SES enclosures that can be found in the SSA networks. If the using system is under heavy load, or the SSA network is busy, it might take some time to load.

Disk Resource Attributes:

- **Disk icon:** The color of this icon indicates the existing usage of the disk drive. If the icon is purple, the disk drive is a member of an array.

- **Serial Number:** The unique identifier of the disk.

- **Status:** The disk status. (See the status list for a list of valid states.)

- **Size:** The capacity of the disk, in gigabytes.

- **PFA:** Predictive failure analysis (PFA). All IBM disks have a predictive failure mechanism. This mechanism allows the disk drive to predict failures some time before they occur. If a disk drive to predict failures, some time before they occur. If a disk has logged a PFA event, the PFA column contains the PFA Icon. Contact your service representative if this occurs.

- **Owner:** The existing usage of the disk drive. If the disk drive is a member of an array, the usage column lists the type of array and the array name. The background color shows the existing usage of the array. The array name links to the required Array View.

- **Location:** If available, the location information provided by SES aware enclosures. (Older models of 7133 do not provide location information) On AIX the location information is obtained from the ODM.

Adapter Resource Attributes:

- **Adapter Icon:** In Cluster Mode only, this icon shows the position of other SSA adapters in the SSA network. The adapter icon has an overlay (in Roman numerals). This is the adapter port number that is connected to that part of the loop.

- **Serial Number:** The unique identifier of this adapter.

Service Mode

A disk drive must be in service mode before it is removed from the SSA loop to be serviced. 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 drive 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 a free resource.

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

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

If you are not sure of the identification of the disk drive that you want to format, use the Identify function (Flash) to get a positive physical identification of the disk drive. You can further ensure that you have selected the correct disk drive by verifying that the serial number on the disk drive is the same as the serial number that is displayed on the screen.

To set service mode, select the disk drive serial number from the Physical View. Then select **Set Service Mode** from the Disk View. This action removes the disk drive from the SSA network. The network is now running on two strings, one from each port of the adapter. The open-loop events that are normally logged when the loop is broken are not logged while the disk drive is in service mode.

To reset service mode on the new disk drive, return to the **Physical View** page, and click on the **Reset Service Mode** button at the bottom of the page. If necessary, use the RSM configurator to convert the newly-installed disk drive into a free resource.

Notes:

- You can set service mode only when you have reached the required Disk View through the Physical View. In the Physical View, select the disk drive serial number to see the required Disk View. You cannot set service mode if you reached the required Disk View through either the Logical View, or the Enclosure View.

- Only System (AIX) on PC server systems, System (PC) on AIX systems, Free or Rejected disk resources can be put into service mode.

- Fast Write resources cannot be put in Service Mode, whatever their existing usage.

- When a disk drive is in service mode, the Physical View shows a red table row that contains a message. That message tells you that the disk drive is in service mode.

Actions:

- **Serial Number:** Select any of the disk serial numbers to display the requiredDisk View

- **Resource Icons:** When selected, all resource icons display a JavaScript Popup that contains details about the resource.

- **Refresh:** This action updates the existing page.

- **Reset Service Mode:** This action resets any service mode settings.
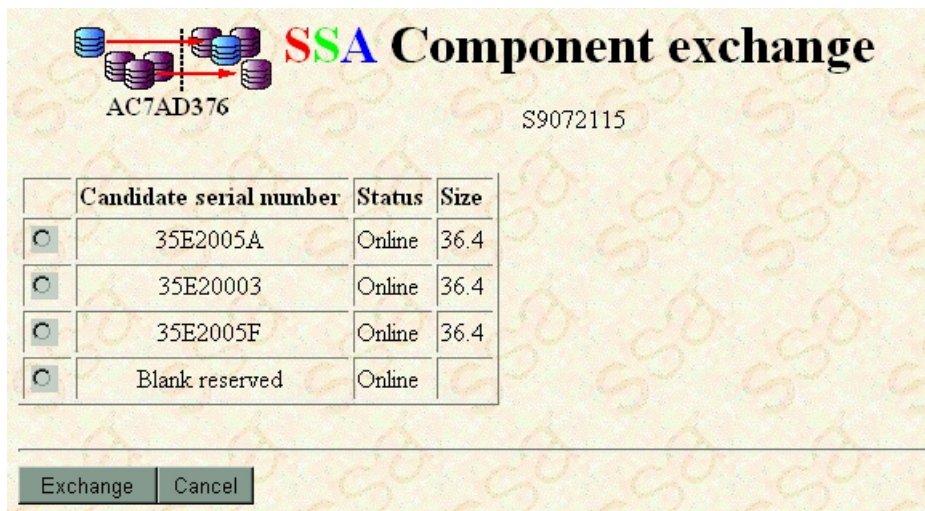
16 Miscellaneous Actions

Component Exchange

An array might contain a virtual resource called a blank reserved disk if it has rejected one of its member disk drives and either no suitable hot-spare resources are available, or the array is not configured to use hot-spare resources. The blank reserved disk is shown to allow the missing member to be exchanged with a suitable free resource.

Use Component Exchange when an array member needs to be exchanged for another resource.

This page lists the suitable candidate free disk drives that can be exchanged into the array. Select the disk drive that you want to become a member of the array. If no candidates are available you can use the virtual *Blank Reserved* disk as a temporary measure. You should replace the exchanged disk drive and perform a subsequent component exchange to exchange the *Blank Reserved* disk for the new one. **Note** that while the *Blank Reserved* disk is a member of the array, the array is **not protected** against subsequent drive failures.

Component Exchange Attributes :

- **Check Box:** Use this column to select the disk drive that you want to exchange into the array.
- **Serial Number:** The unique identifier of the disk.
- **Size:** The capacity of the resource, in gigabytes.
- **Status:** The resource status. See the status list for a list of valid states.

Actions:

- **Radio Button:** Select the radio button beside the disk you wish to exchange into the array. You can only select one radio button.
- **Cancel:** This action returns you to the exchange and returns to the disk view.
- **Exchange:** This action sends the exchange request to the adapter and returns to the disk view.

Attach

AIX version

When you attach an SSA resource, you make the resource available to the operating system; that is, you change its use from free to system (AIX). Therefore, the next time that the AIX cfgmgr command is run, these resources are assigned hdisk names and are available for operating-system use.

PC Server versions

When you attach an SSA resource, you make the resource available to the operating system; that is, change its use from free to System (PC). You must supply a resource number. This number determines the sequence in which the SSA resources are presented to the operating system, lowest number first.

Resource numbers are similar to the SCSI ID settings on SCSI disk drives. The system software uses the numbers to map the disk drives to a logical bus, target, and LUN ID.The logical bus number to which a system resource is mapped:

Resource number divided by 32

where 32 is the number of targets on each bus. Therefore, a resource number that is lower than 32 is in logical bus 0. The target address is the remainder that results from dividing the disk number by 32. The Logical Unit Number (LUN) is always set to 0.

The table below, shows an example.

Resource Number	Mapping
2	Logical Bus 0 Target 2
32	Logical Bus 1 Target 0
37	Logical Bus 1 Target 5
65	Logical Bus 2 Target 1

Table 6:   Resource Numbers and Mappings

The Attach page allows you to enter the resource number with which to attach the selected resource. The number is in hexadecimal format and can be any value within the range 01H through FFh. The resource number must be unique. The RSM configurator does not attach a resource if the resource number selected is already in use on this using system. If two resources are attached with the same number, only one appears in the system (PC) resource list. The other appears in the System (AIX) resource list.

Notes:

- The supplied default value is the next available resource number on this using system.

- Be careful when you attach resources. If the resource that you attach has a resource number that is lower than that of a resource that is already attached, the drive letter assignments might change.

- Be careful when you assign resource numbers to shared resources; that is, when the system is running in cluster mode. The resource number must be available on both using systems.

- If the adapter card CBIOS Extension is turned on and the SSA adapter is in a higher priority PCI slot than that of the adapter that controls the current boot device, your operating system might not boot. Turn the CBIOS Extension off during the next bootup.

- For compatibility with Microsoft Cluster Services (MSCS), the boot device (if it is an SSA resource) must be on a different logical bus from that used by any shared disk drives.
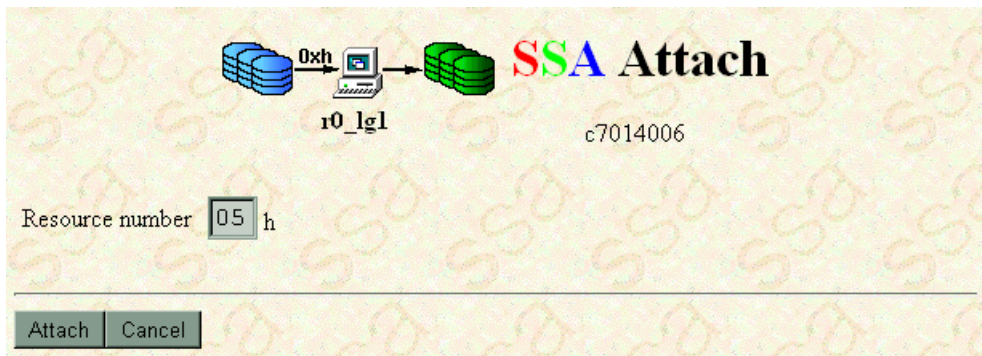
Actions:

- **Attach:** This action attaches the resource with its assigned resource number to the operating system with the assigned resource number. This resource is now available for use by the operating system (when it has been initialized and partitions have been assigned as required by your operating system).

- **Delete MBR and Attach:** This action attaches the resource as described under the OK action. In addition, an old master boot record (MBR) that existed on the resource is removed.

- **Cancel:** This action cancels the attachment and returns you to the Resource List.

Confirmation
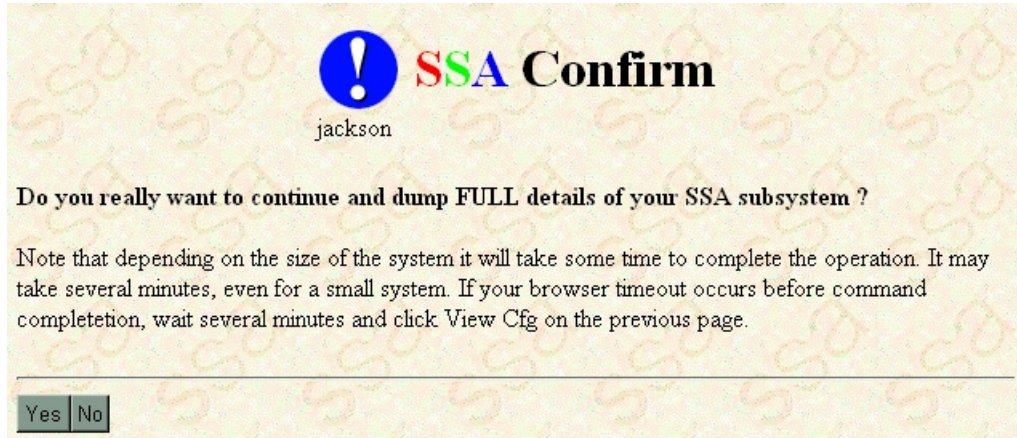
If the client browser does not support JavaScript, the RSM configurator displays all confirmation messages as a new page. The figure above shows an example of the confirmation page.

Glossary

This glossary explains terms and abbreviations that are used in this specification. The glossary contains terms and definitions from the *IBM Dictionary of Computing,* ZC20-1699.

If you do not find the term or abbreviation for which you are looking, refer to the *IBM Dictionary of Computing*.

http://www.networking.ibm.com/nsg/nsgmain.htm

A

action. A process that performs a configuration task, started by RSM.

adapter. A PCI or MCA storage controller for connecting loops of disk drives.

actions area. See Part1 Chapter 3.

AIX system disk. aka **System (AIX).** A *resource* that is owned by AIX; that is, it is not accessible to a PC server.

anchor. An HTML markup tag used to define a section of an HTML document.

array. A collection of individual disk drives which are combined and presented as one single disk drive, usually with added redundancy.

attach. To make a resource available to the using system. See also *resource number*.

attribute. A named property of an entity; for example, the attributes of a RAID *array* include *state*, current *use*, and size of *array*.

B

blank reserved. See *virtual disk.*

boot. To prepare a computer system for operation by loading an operating system.

broken array. An *array* that has more than the critical number of components missing.

browser. Client tool used to view RSM.

buffer. A routine or storage that is used to compensate for a difference in rate of flow of data, or time of occurrence of events, when transferring data from one device to the other.

bus. A facility for transferring data between several devices located between two end points, only one device being able to transmit at a given moment.

bypass card. An *enclosure* component that operates the connection of disks to cables, in an attempt to maintain loop topology.

C

candidate disk. Disk drives that are available for use in an array.

check level. RSM process that facilitates the update of *microcode* and software via the Internet.

check level discovery. *check level* process that facilitates the update of **all** *microcode* and software components via the Internet.

clashing resource. A *resource* that has been *attached* with a *resource number* that is already in use.

client. The system used to view RSM.

cluster. Two or more *using systems* which are sharing common storage devices.

cluster mode. Two or more SSA *adapters* connected by means of SSA cables to provide *clustered* storage.

configurator. A tool for creating and maintaining *resources* (in this case disk and *array resources*).

common navigation frame. See Part1 Chapter 3.

component. An *array member* disk.

component exchange. The action of swapping a failed array *component* for a new *candidate disk.*

configuration area. See Part 1 Chapter 3.

configuration dump. Textual representation of all *adapter*, disk, *array* and *enclosure* entities

configuration frame. See Part1 Chapter 3.

controller. See *enclosure (controller).*

D

degraded state. The state that a RAID *array* enters if, while in the *Exposed state*, it receives a write command. See also *Exposed state*.

detach. An action that returns a *System(PC) resource* to the *Free* resource list. This means the operating system will no longer be able to access the *resource*.

device driver. (1) A file that contains the code needed to use an attached device. (2) A program that enables a computer to communicate with a specific peripheral device. (3) A collection of subroutines that control the interface between I/O device adapters and the processor.

dialog. An interface entity used during installation to ask the user for input.

disk array. See *array.*

display panel. Logic containing the four character display on 7133 model 40 *enclosures*.

domain. One half of a RAID-1 or RAID-10 array containing an entire copy of the array data. The *primary domain* is the odd numbered *components*, the *secondary domain* is the even numbered *components*. If a *domain* becomes *split,* only one half may continue to operate in order to protect from *unsynchronised data.*(In some cases both sides may stop operating to protect from *unsynchronised data.*)

E

enclosure. A hardware box that contains disk drives, *bypass cards*, power and cooling, and possibly an *enclosure (controller)*.

enclosure (controller). Logic that controls the operation of the *enclosure.*

event logger. A *service* that listens for asynchronous alerts from the *subsystem*.

explorer frame. See Part1 Chapter 3.

exposed state. The state that a RAID *array* enters if a *member* disk drive becomes missing (logically or physically) from that *array*.

F

failed status. The disk drive is not working.

fast write cache (feature). An area of memory on the *adapter* that can be used to store writes and return completion before writing has occurred to the relevant *resource*.

filter. A type of *resource*, for example RAID-1.

firewall. A mechanism for limiting access to a network subdomain.

free resource. A *resource* that is available to be added to an *array*, or *attached* to the system

G

GB. gigabyte.

gigabyte (GB). 1000000000 bytes.

good state. The state of a RAID *array* when all its *member* disk drives are present.

H

healthcheck. A process that runs automatically to check the *subsystem* for errors.

hop count. The position of an SSA disk from a given *adapter port*.

host. See *using system*.

hot-spare disk drive. A spare disk drive that is automatically added to a RAID *array* to logically replace a *member* disk drive that has failed.

hot-spare pool. A logical *resource* containing multiple *hot-spare disk drives* and any number of array *components* that are protected by the *pool* of *hot-spare disk drives.*

I

information area. See Part1 Chapter 3.

InstallShield. Industry standard Windows setup media IDE.

interface. Hardware, software, or both, that links systems, programs, or devices.

J

Javascript. Language for embedding function in an HTML document. Aids the generation of dynamic HTML.

K

KB. kilobyte.

kilobyte (KB). 1000 bytes.

L

link. Point to point connection between disks or adapters.

link speed. The speed at which any particular *link* is running.

local adapter. In *cluster* configurations; the *adapter* that the *resources* are being viewed through.

logical group. An *array* RAID type, or a disk *usage* class.

M

MB. megabyte.

megabyte (MB). 1000000 bytes.

member disk. See *component.*

microcode. One or more microinstructions used in a product as an alternative to hard-wired circuitry to implement functions of a processor or other system component.

migration. The process of moving an *array* from one type of SSA *adapter* to another - under supported conditions.

multiple domain. An *array* that has been configured using *Primary* and *Secondary domains*.

N

navigation area. See Part1 Chapter 3

Netfinity SM. The Netfinity Systems Management software.

new resource. See *AIX System Disk.*

no-access. *Privacy* option (PC Server Only) - setting a *resource* to *no-access* results in no *using system* having access the *resource*.

node. (1) A machine running the Netfinity SM services software. (2) In a network, a point at which one or more functional units connect channels or data circuits. For example, in an SSA *subsystem*, a disk drive or an *adapter*.

O

offline state. The state that a RAID *array* enters when a critical number of *member* disk drives become missing.

operator panel. See *display panel.*

P

parameter. A variable that is given a constant value for a specified application.

partition. A logical drive (or volume) created on a logical unit (LUN).

PC Server. A using system that contains an Intel based processor, running either Windows NT, NetWare, DOS, or OS2.

physical disk. The actual hardware disk drive.

port (TCP/IP). A software address to which a TCP/IP *service* can bind.

primary adapter. See *switch primary*.

primary domain. See *domain*.

privacy. The access restrictions applied to a *resource*.

private. *Privacy* option (PC Server Only) - setting a resource to *private* results in only the *local using system* having access the *resource*.

protocol. A language used for communication over a computer interface.

proxy. A server that filters requests external to a *firewall.*

public. *Privacy* option (PC Server Only) - setting a *resource* to *public* results in all *using systems (local and remote)* having access the *resource*.

R

RAID array. See *array.*

RAID manager. The software that manages the logical units of an *array*.

rebuilding state. The state that a RAID *array* enters after a missing *member* disk drive has been returned to the array or *exchanged* for a replacement disk drive. While the *array* is in this state, the data and parity are rebuilt on the returned or replacement disk drive.

registry (NT). Information repository consisting of a hierarchy of *keys* and *values.*

registry key (NT). A node in the NT *registry.*

registry value (NT). The variable assigned to a leaf *key* in the NT *registry.*

rejected disk. A failing disk drive that the array management software has removed from a RAID array.

remote adapter. In *cluster* configurations; an *adapter* that is connected in the same loop, but is not being used to view the *resources* through.

request. A browser transaction.

resource. An SSA disk or array.

resource number (NT). The number assigned to a *System(PC) resource* when it is *attached* to the *using system*. This dictates the order in which *resources* are presented to the operating system.

S

secondary adapter. See *switch primary*.

secondary domain. See *domain*.

serial number. See SSA unique ID.

service (NT). A process that is started when the system *boots,* that is before any user has logged in.

service aid. A process that helps to perform a service action.

service mode. A mode in which an SSA disk drive may be removed, meanwhile the *subsystem* will withold link errors.

server. See *using system*.

split domain. See *domain*.

SSA unique ID. The unique serial number used to reference an SSA *resource.*

state. The current condition of a *resource*, that is *offline, good, exposed* etc

status. The current percentage through an operation.

subsystem. A secondary or subordinate system, usually capable of operating independently of, or asynchronously with, a controlling system.

swap bit. A register that is set when an *enclosure* component is replaced.

switch primary (LG2). An action that swaps which *adapter* is controlling the RAID-1 *arrays*.

system (AIX). See *AIX System disk.*

system(PC). A *resource* that is available for use by a *PC Server* system.

T

title area. See Part1 Chapter 3.

U

unrecoverable error. An error for which recovery is impossible without the use of recovery methods that are outside the normal computer programs.

unsynchronised data. The two *domains* within a *muliple domain* array contain different data. The *array* has been *split* and write operations have continued to both *domains* independantly.

usage. The current availability of a *resource*, that is *Free, Hot-spare, Rejected, System(PC)* etc

using system. The system unit that contains the SSA *adapter*.

V

virtual disk. A disk drive that does not physically exist. This is the case if an *array* has rejected a *component*, and no *hot-spare disk drive* was available, a *blank reserved* virtual disk will be shown in place of the *rejected resource*.

W

web service. A *service* that binds to a TCP/IP *port*, listening for HTTP requests.

Acronyms

AIX	Advanced Interactive eXecutive
BIOS	Basic Input Output System
CBIOS	Conventional Basic Input Output System
CGI	Common Gateway Interface
DLL	Dynamic Linked Library
FRU	Field Replaceable Unit
GIF	Graphics Information File
GUI	Graphical User Interface
HTML	Hyper-Text Markup Language
HTTP	Hyper-Text Transport Protocol
JBOD	Just a Bunch Of Disks - i.e. not RAID
LL	Loadable Microcode Level
LUN	Logical Unit
MAP	Maintenace Analysis Procedure
MCA	Micro-Channel Architecture
MSCS	Microsoft Cluster Services
NETBIOS	Network Basic Input Ouput System
NLS	National Language Support
NVRAM	Non Volatile Random Access Memory
ODM	Object Data Manager
PCI	Peripheral Component Interconnect
RAID	Redundant Array of Inexpensive Disks
RAM	Random Access Memory
RDV	Resource Dependant Value
ROS	Read Only Store
RSM	Remote Systems Management
SAN	Storage Area Network or System Area Network
SCSI	Small Computer System Interface
SES	SCSI Enclosure Services
SM	System Manager
SRN	Service Request Number
SSA	Serial Storage Architecture
TCP/IP	Transport Control Protocol / Internet Protocol
URL	Uniform Resource Locator
VPD	Vital Product Data

Appendix A: SSA Resource States

RAID-0 - SSA RAID and Advanced SerialRAID Adapters

- **Good (Online - Non-degraded)** - A RAID-0 array is in the Good state when all the component disk drives of that array are present.
- **Offline** - A RAID-0 array enters the Offline state when one or more component disk drives become missing. Read and write operations are not allowed.

RAID-1 - SSA RAID and SSA RAID Cluster Adapters

- **Good (Online - Non-degraded)** - A RAID-1 array is in the Good state when:
  - All the member disk drives of that array are present.
  - No member disk drive is deconfigured.
  - Read and write operations can be done on the array.
  - No rebuilding operations need to be done.

  The array is fully protected from the loss of one disk drive. Some unsynchronised records may still be under repair.
- **Exposed** - A RAID-1 array is in the Exposed state when one member disk drive is missing but still configured. Read and write operations can be performed on the array, although write operations put the array into the Degraded state. When the missing member disk drive is reintroduced, the array returns to the Good state.
- **Degraded** - A RAID-1 array is in the Degraded state when one member disk drive is missing or deconfigured, and a write operation has occurred. Read and write operations can be performed on the array. The missing member disk drive is deconfigured so that it is permanently excluded from the array. If it becomes available again, it can be introduced only as a new member.
- **Rebuilding** - A RAID-1 array is in the Rebuilding state when a rebuilding operation is running on one of the member disk drives. Read and write operations can be performed on the array.

  When an arrray is created, it enters the Rebuilding state to synchronise the member disk drives. When the rebuilding operation is complete, the array returns to the Good state.
- **Offline** - A RAID-1 array is in the Offline state if both member disks are missing.

RAID-1 and RAID-10 - Advanced SerialRAID Adapter *with* ROS > 5000

- **Good (Online - Non-degraded)** - A RAID-1 or RAID-10 array is in the Good state when:

  - All the member disk drives of that array are present.

  - No member disk drive is deconfigured.

  - Read and write operations can be done on the array.

  - No rebuilding operations need to be done.

  The RAID-10 array is fully protected from the loss of multiple disk drives if one copy of the mirrored data is still available. The RAID-1 array is protected from the loss of one member disk. Some unsynchronised records may still be under repair.

- **Exposed** - A RAID-1 or RAID-10 array is in the Exposed state when member disk drives (one in the case of RAID-1) are missing but still configured. Read and write operations can be performed on the array, although write operations put the array into the Degraded state. When the missing member disk drives are reintroduced, the array returns to the Good state.

- **Degraded** - A RAID-1 or RAID-10 array is in the Degraded state when one or more member disk drives (one in the case of RAID-1) are missing or deconfigured, and a write operation has occurred. Read and write operations can be performed on the array. The missing member disk drives are deconfigured so that they are permanently excluded from the array. If they become available again, they can be introduced only as new members.

  A RAID-1 or RAID-10 array is in the Degraded state also if the secondary domain operates while the primary domain is deconfigured. Under this condition, the secondary domain holds information about the members of the primary domain to track recovery.

- **Rebuilding** - A RAID-1 or RAID-10 array is in the Rebuilding state when a rebuilding operation is running on one or more member disk drives. Read and write operations can be performed on the array.

  When an arrray is created, it enters the Rebuilding state to synchronise the member disk drives. When the rebuilding operation is complete, the array returns to the Good state.

  If the medium-error table fills during a rebuilding operation, the array remains in the Rebuilding state until space becomes available in the table.

- **Unknown** - A RAID-10 array is in the Unknown state when not enough array members are present for the array configuration to be determined; that is, fewer than two of the first three members are present. Unless the Split Array Resolution flag is set to Primary, the array enters the Offline state.Change the flag to "Secondary" to allow the secondary domain to operate if:

  - The member disk drive that holds the configuration sector in the secondary domain of the array is available (the secondary disk of the first mirrored pair).

  and

  - Neither of the member disk drives that hold configuration sectors in the primary domain of the array is available (the primary disks of the first and second mirrored pairs).

- **Offline** - A RAID-10 array can be in the Offline state for any of the following reasons :
  - No NVRAM is available to operate the array.
  - The array is split across SSA loops.
  - *All* these three conditions exist :
    - In the secondary domain, the member disk drive that contains the configuration sector is present.
    - In the primary domain, no members that hold configuration sectors are present.
    - The Split Array Resolution flag is set to Primary.
  - *All* these three conditions exist :
    - In the primary domain, the disk drive members that hold the configuration sectors are present.
    - In the secondary domain, the member disk drive that contains the configuration sector is not present.
    - The Split Array Resolution Flag is set to Secondary.
  - In the primary and secondary domains, member disk drives that hold the configuration sectors are present, and the Split Array Resolution flag is set to Secondary. The array, however, was not initialised correctly.
  - Two failures in a configuration update (configuration sectors, fence sector, label sector, medium-error table, or unsync table).
  - Both member disk drives of a mirrored pair are missing, deconfigured, or rebuilding.

RAID-5 - SSA RAID, SSA Enhanced RAID, SerialRAID and Advanced SerialRAID Adapters.

- **Good (Online - non-degraded)** - A RAID-5 array is in the Good state when all the component disk drives of that array are present.

- **Exposed** - A RAID-5 array enters the Exposed state when a component disk drive becomes missing (logically or physically) from that array. When an array is in the Exposed state, you can reintroduce the missing disk drive, or exchange it for a new one. If the missing disk drive is reintroduced, the array returns to the Good state. The array management software does not need to rebuild the data. If a new disk drive is exchanged for the missing disk drive, the array management software rebuilds the data that was on the original disk drive before it became missing, then writes that rebuilt data to the replacement disk drive. When the data is correct, the array management software returns the array to the Good state.

Read Operations while in the Exposed State

When a read operation is performed on an array that is in the Exposed state, the array management software recreates the data that was contained on the missing disk drive. On some adapters, the array management software immediately exchanges a hot-spare disks drive for the missing disk drive, if a hot-spare disk drive is enabled and available when the read command is sent.

Write Operations while in the Exposed State

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

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

- If no hot-spare disk drive is enabled and available, the first write operation causes the array to enter the Degraded state. The written data is not protected. If the power fails during a write operation, data might be lost (64KB) unless the array is configured to allow read-only operations in the Exposed state. Most application programs, however, cannot be run when write operations are not allowed.

- **Degraded** - A RAID-5 array enters the Degraded state if, while in the Exposed state, it receives a write command. If a suitable hot-spare disk drive is available, the array management software immediately exchanges the hot-spare disk drive for the missing disk drive, and returns the array to the Rebuilding state. If no hot-spare disk drive is available, and a write operation is performed on the array, the array remains in the Degraded state until you take action to return that array to the Good state.

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

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

- **Rebuilding** - A RAID-5 array enters the Rebuilding state when:

  - That array is first created

  - A component disk drive is replaced

  - An adapter is replaced, but a correct shutdown has not been performed

Initial Rebuild Operation

When an array is first created, it enters the Rebuilding state while parity is rebuilt. If a disk drive fails during the initial rebuild operation, no hot-spare disk drive is exchanged for the failing disk drive.

Disk Drive Replacement

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

Adapter Replacement

If, for any reason, an adapter is exchanged for a replacement adapter, and a correct shutdown has not been performed, the parity is rebuilt on *all* the associated arrays when the replacement adapter powers on.

- **Offline** - A RAID-5 array enters the Offline state when two or more component disk drives become missing. Read and write operations are not allowed.

Hot-spare Pools - **Advanced SerialRAID Adapter** *with* **ROS > 5000**

- **Full** - The number of Hot-spare disk drives that are in the pool equals the number of Hot-spare disk drives that are configured for the pool.

- **Empty** - The pool contains no Hot-spares disk drives, or the Hot-spare disk drives that are in the pool are not suitable as member disk drives of the pool.

- **Reduced** - The number of Hot-spare disk drives that are in the pool is less than the number of Hot-spare disk drives that were originally configured, but greater than the minimum number.

- **Critical** - The number of Hot-spare disk drives that are in the pool is less than the specified minimum number of Hot-spare disk drives for that pool.

- **Inconsistent** - Configuration data for the Hot-spare pool is saved on all Hot-spare disk drives. The Hot-spare disk drives that are in the pool, however, do not contain the same configuration data. Two or more of the Hot-spare Pools have conflicting information. That is, possibly one of the Hot-spare Disks has been assigned, or exchanged into the wrong pool.

- **Inadequate** - One or more array components that are members of this pool are larger than the largest available Hot-spare Disk. Assign a new Hot-spare Disk into the pool which is larger, or the same size as the largest array component that is protected by this pool.

- **Mixed** - An array in this pool has used a Hot-spare disk drive that is from another pool.

- **Unused** - Hot-spare disks exist in the pool, but they are not protecting any array components.

JBOD - All Adapters

(X is an integer from 0 to 100.)

- **Online** - The disk drive is working
- **Online(Power)** - The disk drive is working but is reporting a loss of redundant power or cooling. You should analyse the Event Log for the cause of the problem.
- **Offline** - The disk drive is present but the disk is not online.
- **Out of sync** - The disk drive does not contain valid data.
- **Formatting X%** - A low level format is in progress. X% has been completed.
- **Format failed at X%** - A low level format failed at X%. The disk drive has failed.
- **Certifying X%** - A certify operation is in progress. X% has been completed.
- **Certifying failed at X%** - A certify operation failed at X%. This disk drive has failed.
- **In service mode** - The disk drive is in service mode.

Array Components - All Adapters

- **Not present** - The disk drive cannot be detected. It has been removed or it has failed.
- **Not present** *(de-configured)* - The disk drive is not present. It has been removed by the adapter as it has failed.
- **Not present** *(blank slot)* - The disk drive is not present. It has been removed or has failed but no Hot-spare disk drive was taken by the array. A virtual blank reserved resource is in its place.
- **Present** - The disk drive is working.
- **Present** *(being rebuilt)* - The disk drive is working and data is being reconstructed on this disk drive.
- **Present** *(needs rebuilding)* - The disk drive is working but does not contain valid data. The disk drive requires a rebuild operation to reconstruct the data on this disk drive.
- **Unknown** ?
- **Present** *(illegal network)* - The disk drive is working but the current loop configuration does not support resources of this type.

Appendix B: SSA Unique IDs

Each SSA device has a specific identifier that is not used by any other SSA device in the whole world. This identifier is called the IEEE SSA Unique ID (UID) of the device. It is written into the device during manufacture.

The full UID consists of 16 characters. The label on the side of the disk drive shows the serial number of the disk drive. The serial number is actually part of the UID. Also part of the UID, the Connection Address consists of the LUN name and the device-type identifier. The software uses this information to access the device.

Note: RSM displays the disk serial number rather than the UID.

```
Full UID                        0000XXXXXXNNNNNN
Disk drive serial number            XXNNNNNN
Connection address              XXXXXXNNNNNN LLD
```

where:

    `XXXXXX` IEEE Organisation Identifier (manufacturer)

    `NNNNNN` Product / ID (assigned unique number)

        `LL` LUN (always 00 for a LUN device)

         `D` **Device type :**
           (D for an SSA Physical disk drive)
           (E for a fast-write logical disk)
           (F for a RAID-0 array)
           (G for a RAID-1 array)
           (K for a RAID-5 array)
           (O for a RAID-10 array)
           (Y for a Hot-spare disk drive)
           (X for an NVRAM entry)

Appendix C: Servutil.exe

This utility can be used for the following purposes. Example usage is given in each case. (It is assumed the host software has been installed into **c:\issa** in all examples)

Running servutil with no command line parameters, or with -? or -h will display the usage instructions.

Running servutil with the additional -d command line switch will display debug output as appropriate.

Service Installation

Servutil can be used to install :

• The IBM SSA Windows NT Event Logger Service

  Usage to install event logger :

  ```
  servutil -i elog <path to elog> <path to pfa log>
  ```

  Example :

  ```
  c:\issa\servutil -i elog c:\issa c:\issa\pfa\pfalog.dat
  ```

• The IBM SSA Remote Systems Management (Stand Alone) Service.

  Usage to install RSM (Stand Alone Version) :

  ```
  servutil -i rsm <path to rsm> <port number>
  ```

  Example :

  ```
  c:\issa\servutil -i rsm c:\issa\web 511
  ```

• The IBM SSA Remote Systems Management (Netfinity Plugin) Service. This actually merges the ssa.ini file with the Netfinity svcmgr.ini file, making a backup copy, svcmgr.old, of the original the first time the service is installed. Each subsequent install, if the backup file exists it is not overwritten.

  Usage to install RSM (Netfinity Version) :

  ```
  servutil -i nf <path to netfinity>
  ```

  Example :

  ```
  c:\issa\servutil -i nf c:\wnetfin
  ```

Starting and Stopping Services

Servutil can also be used to start and stop all three services, the Event Logger, RSM and Netfinity.

- Usage to start `<servicename>` :

  `servutil -b <servicename>`

  where `<servicename>` is either `nf,` `rsm,` or `elog`

  Example to start the Netfinity Services :

  `c:\issa\servutil -b nf`

- Usage to stop `<servicename>` :

  `servutil -e <servicename>`

  where `<servicename>` is either `nf,` `rsm,` or `elog`

  Example to stop the RSM service :

  `c:\issa\servutil -e rsm`

(For RSM, you can use "`net start SSARSM`" or "`net stop SSARSM`" from the command line to perform the same action.)

Removing Services

Servutil can also be used to remove either the Event Logger or RSM services.

- Usage to remove `<servicename>` :

  `servutil -rm <servicename>`

  where `<servicename>` is either `nf,` `rsm,` or `elog`

  Example to remove the Event Logger service :

  `c:\issa\servutil -rm elog`

Appendix D: Setup Error Messages

These message are displayed when the Windows NT InstallShield setup program encounters a problem.

Device Driver

1. "Setup did not find the IBM SSA Adapter device driver. This device driver must be installed and running before setup can continue..."

   Follow the instructions displayed when you click OK and re-run setup when you have installed the appropriate device driver.

Windows NT Registry

1. "Couldn't set registry root to HKEY_LOCAL_MACHINE"

   Setup failed to contact your System Registry.

2. "Could not create registry Key : xxx"

   Setup failed to create the registry key xxx, try creating the specified key with regedt32.exe and re-run setup.

3. "Could not create registry value : xxx"

   Setup failed to create the registry value xxx, try creating the specified value with regedt32.exe and re-run setup.

4. "Could not retrieve registry value : xxx"

   A value (xxx) required by setup could not be found. If setup aborted, you may not have one of the pre-requisite software components or services.

5. "Could not delete registry old Registry key... xxx"

   Setup removes old registry software keys after upgrading and recreates the keys with the new settings. Delete the key specified and re-run setup.

Application Launch

1. "Failed to launch application cmdxxx paramsyyy"

   Setup failed to run the specified application. This generally relates to the RSM or Event Logger Service utility - servutil.exe. Try running the command before setup to stop services if setup fails to copy files, or run the command after setup if setup fails to restart / start a service.

   For usage see : servutil -h

   For all commands add -d for debug output.

   Note : If setup fails to launch notepad, simply view the readme file later.

Event Logger

1. Not currently used.

RSM

1. "Setup detected an old version of RSM which is not in the default location. This old version has been stopped, uninstalled and replaced by ..."

You should delete the files in the old location as specified by the error message. These files have been replaced by those in the default c:\issa\web directory.

2. "Setup could not find the Microsoft TCP/IP Network Service on this machine..."

The Stand Alone NT Service version of RSM requires TCP/IP Networking to function. Install the TCP/IP Network protocol and re-run setup.

3. "Setup could not find a version of Netfinity compatible with RSM. You must install the Stand Alone NT Service."

RSM is compatible with Netfinity Manager Versions 5.2 and setup failed to find the install location. Install the Stand Alone version.

4. "RSM no longer supports Netfinity SM Versions 5.0 and 5.1. You should upgrade Netfinity SM to Version 5.2 or install the RSM Stand Alone version"

Setup has detected that you previously installed the Netfinity SM 5.0 / 5.1 version of RSM. This is not longer supported. You can continue to use the previous version, but you should install Netfinity SM 5.2 and re-run setup.

5. "The version of Netfinity you have installed is not compatible with the version of RSM you selected..."

Re-select the appropriate version of RSM, or select the Stand Alone version.

6. "Could not find a default browser in your registry..."

Setup couldn't find one of the supported browsers, see pre-reqs. Setup will not have created a link to the SSA Tools Menu, but RSM may still function with your browser, try running it manually.

General

1. "This Software is for Windows NT Server 4.0 Only."

   Setup detected an operating system other than Windows NT. SSA Adapters are only supported on Intel Windows NT servers.

2. "An unknown error has occurred."

   Setup suffered an unrecoverable error. Please contact your service representative / supplier.

3. "An error occurred during the move data process: -nnn"

   If you have a previous version of the either RSM or the SSA Event Logger services running. You must ensure these are stopped before re-installing, setup tries to stop the service but may have failed. Use servutil.exe to stop both services manually, or use the Control Panel, services window to stop both

   "PC's SSA Event Logger" and

   "SSA Remote Systems Management"

4. "The SSA Device Driver requires Windows Service Pack 3 or later. Please install Service Pack 3 or later and re-run setup."

   Setup detected an unsupported level of Windows NT. Install Service Pack 5 and re-run setup.