Correction Information for "SSA Adapters User's Guide and Maintenance Information" SA-3272-02

This procedure replaces MAP 2324 on page 13-30

MAP 2324: SSA RAID

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

Attention: Unless the using system needs to be switched off for some other reason, do not switch off the using system when servicing an SSA link or an enclosure in which SSA devices are installed. Enclosure power cables and external SSA cables that connect devices to the using system can be disconnected while that system is running. Before starting this MAP, ensure that all the disk drives are working correctly:

1. Run diagnostics in Problem Determination mode to identify any disk drive problems that have occurred.
2. Run the Link Verification service aid (see "Link Verification Service Aid" on page 12-10) to find all power problems, SSA link problems, and SSA disk drives that have a Failed status.
3. Correct all those problems before you start this procedure.

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

1. (from steps 3, 30, and 31)
   You have been sent to this step either from another step in this MAP, or because you have one of the following Service Request Numbers (SRNs): 46000, 47000, 47500, 49000, 49100, 49500, 49700

   Do you have SRN 49500?

   NO

   Run diagnostics in System Verification mode to the SSA adapters.
   Go to step 2.

   YES No hot spare disk drives are available.
   Go to step 21.

2. (from step 1)
   Did the diagnostics produce SRN 46000, 47000, 47500, 49000, 49100, or 49700?

   NO Go to step 3.

YES Go to step 4.

3.   (from step 2)
     Do you have any other SRN?

     NO Go to step 28.

     YES Solve the problems that caused the SRN.
     Return to step 1

4.   (from step 2)
     Find your SRN in the following table, then do the appropriate actions.
     Note: If you still do not have any of these SRNs, you are in the wrong MAP.

SRN	Cause	Action
46000	An array is in the Offline state.	Go to step 5.
47000	You have more than the maximum number of arrays allowed.	Go to step 8.
47500	A partial loss of data has occurred.	Go to step 9.
49000	An array is in the Degraded state.	Go to step 13.
49100	An array is in the Exposed state.	Go to step17.
49700	The parity on an array is not complete.	Go to step 22.

5.   (from step 4)
     An array is in the Offline state if it contains at least one member disk drive, but does not contain
     enough member disk drives to maintain data availability. When a RAID-0 array is in the Offline
     state, at least one member disk drive is missing. When a RAID-5 array is in the Offline state, at
     least two member disk drives are missing. Such a condition can occur if at least two disk drives in
     the array have failed, or are not available to the array at this time.
     Are any disk drives missing or without power, or have any disk drives been recabled (not
     necessarily by you)?

     NO Go to step 6.

     YES Restore the original configuration:
          •   Type smitty ssaraid and press Enter.
          •   Select List All SSA RAID Arrays Connected to a RAID Manager.
          •   The status of the array changes to Good when the adapter can find all the member disk
               drives of the array.
          •   Go to "MAP 2410: SSA Repair Verification" on page 13-49 to verify the repair.

6.   (from step 4)
     An array is in the Offline state if it contains at least one member disk drive, but does not contain
     enough member disk drives to maintain data availability. When a RAID-0 array is in the Offline
     state, at least one member disk drive is missing. When a RAID-5 array is in the Offline state, at
     least two member disk drives are missing. Such a condition can occur if at least two disk drives in
     the array have failed, or are not available to the array at this time.

     Are any disk drives missing or without power, or have any disk drives been recabled (not
     necessarily by you)?

     NO Go to step 6.

     YES Restore the original configuration:

- Type smitty ssaraid and press Enter.
- Select List All SSA RAID Arrays Connected to a RAID Manager.
- The status of the array changes to Good when the adapter can find all the member disk drives of the array.
- Go to "MAP 2410: SSA Repair Verification" on page 13-49 to verify the repair.

7. (from step 5)
   Either one or more disk drives have failed, or an array that is not complete has been connected to the SSA adapter.
   If one or more disk drives have been added to this system, and those disk drives were previously members of an array on this system or on another system, do the following:
   - Type smitty ssaraid and press Enter.
   - Select Delete an SSA RAID Array.
   - Select the array that is in the Offline state, and delete it. All data that is on that RAID array is now lost.
   - You must now locate and repair any failed disk drives, and make those disk drives available for the creation of a new array. Go to step 7.

   If no disk drives have been added to this system, go to step 7.

8. (from step 6)
   - Type smitty ssaraid and press Enter.
   - Select Change/Show Use of an SSA Physical Disk.

   Are any disk drives listed as "SSA physical disks that are rejected"?

   NO Ask the user to delete and recreate the array that is in the Offline state.

   YES
   - Run diagnostics in System Verification mode to all the disk drives that are listed as rejected.
   - Run the Certify service aid (see"Certify Disk Service Aid" on page 12-18) to all the disk drives that are listed as rejected.
   - If any problems occur, exchange the failed disk drives for new disk drives (see "Exchanging Disk Drives" on page 10-1).
   - Go to step 36 to add the disk drive to the group of disk drives that are available for use by the RAID manager.
   - Note: A disk drive that is listed as rejected is not necessarily failing. For example, the array might have rejected the disk drive because a power problem, or an SSA link problem, caused that drive to become temporarily unavailable. Under such conditions, the disk drive can be reused.
   - If you think that a disk drive has been rejected because it is failing, check the error log history for that disk drive. For example, if you suspect pdisk3, type on the command line:

     ```
     ssa_ela -l pdisk3 -h 5
     ```

   - This command causes the error log for pdisk3 to be analyzed for the previous five days. If a problem is detected, an SRN is generated.

9. (from step 4)
   An attempt has been made to create a new array, but the adapter already has the maximum number of arrays defined.

   - Type smitty ssaraid and press Enter.
   - Select List/Delete Old RAID Arrays in an SSA RAID Manager.
   - Delete any array names that are no longer used.

10. (from step 4)
Attention: Part of the data that is on the array has been damaged and cannot be recovered. *Before* any other action is taken, the user must recover all the data that is not damaged, and create a backup of that data.

- Type smitty ssaraid and press Enter.
- Select List Status Of All Defined SSA RAID Arrays.

Are any arrays listed as having an invalid data strip (as shown in the following screen)?

```
+---------------------------------------------------+
| COMMAND STATUS                              |
|                               |
| Command: OK   stdout: yes     stderr: no    |
|                               |
|Before command completion, additional        |
|            instructionsmay appear below |
|                               |
|    Unsynced Parity Strips Unbuilt Data Strips |
| hdisk3    0                0  Invalid |
|                         data strip|
| hdisk4    0                0        |
|                               |
|                               |
|                               |
|                               |
|                               |
|                               |
|                               |
|                               |
| F1=Help   F2=Refresh  F3=Cancel  F6=Command  |
| F8=Image  F9=Shell   F10=Exit  /=Find      |
| n=Find Next                        |
+---------------------------------------------------+
```

NO Review the symptoms, then go to "MAP 2320: SSA Link" on page 13-22, and start the problem determination procedure again.

YES
- Note the hdisk number of the failing array.
- Go to step 10.

11. (from step 9)
- Type smitty ssaraid and press Enter.
- Select List/Identify SSA Physical Disks.
- Select List Disks in an SSA RAID Array.
- Select the failing disk drive, and note the pdisk numbers of the disk drives that are members of the array.
- Ask the user to create a backup of all the data from this array. Some data might not be accessible.
- When the backup has been created, ask the user to delete the array.
- Run diagnostics in System Verification mode to each of the pdisks that you noted previously.

Do the diagnostics fail when they are run to a particular disk drive?

NO Go to step 11.

YES

- Exchange the failing disk drive for a new one (see "Exchanging Disk Drives" on page 10-1).
- Go to step 36 to add the disk drive to the group of disk drives that are available for use by the RAID manager.

12. (from step 10)
    Run the Certify service aid (see "Certify Disk Service Aid" on page 12-18) to each of the pdisks that you noted previously.

    Did the Certify service aid fail when it was run to a particular disk drive?
    NO
    - Ask the user to recreate the array.
    - Go to step 28.

        YES
    - Run the Format service aid (see "Format Disk Service Aid" on page 12-16) to the disk drive.
    - Run the Certify service aid again to the disk drive.
    - Go to step 12.

13. (from step 11)
    Did the Certify service aid fail again?
    -

        NO
        Ask the user to recreate the array.
    - Go to step 28.

        YES
    - Exchange the failing disk drive for a new one (see "Exchanging Disk Drives" on page 10-1).
    - Go to step 36 to add the disk drive to the group of disk drives that are available for use by the RAID manager.

14. (from step 4)
    An array is in the Degraded state if one member disk drive of the array is missing, and a write command has been sent to that array. When an array is in the Degraded state, its data is not protected.

    - Type smitty ssaraid and press Enter.
    - Select Change/Show Use of an SSA Physical Disk.

        Are any disk drives listed as "SSA physical disks that are rejected"?

        NO A disk drive has not been detected by the adapter. Go to step 15.

        YES
    - Run diagnostics in System Verification mode to all the disk drives that are listed as rejected.
    - Run the Certify service aid (see "Certify Disk Service Aid" on page 12-18) to all the disk drives that are listed as rejected.
    - If problems occur on any disk drive, go to step 14. Otherwise, continue with this procedure.
    - A disk drive that is listed as rejected is not necessarily failing. For example, the array might have rejected the disk drive because a power problem, or an SSA link problem, caused that drive to become temporarily unavailable. Under such conditions, the disk drive can be reused.
    - If you think that a disk drive has been rejected because it is failing, check the error log history for that disk drive. For example, if you suspect pdisk3, type on the command line:

```
ssa_ela -l pdisk3 -h 5
```

- This command causes the error log for pdisk3 to be analyzed for the previous five days. If a problem is detected, an SRN is generated.
- If errors are detected, go to step 14. Otherwise, continue with this procedure.
- Type smitty ssaraid and press Enter.
- Select Change/Show Use of an SSA Physical Disk and, for all disks that you have tested or exchanged, change the Current Useto Array Candidate Disk.
- Select Change Member Disks in an SSA RAID Array.
- Select Add a Disk to an SSA RAID Array.
- Referring to the displayed instructions, select a disk from the list of array candidate disk drives, and add that disk drive to the array that is in the Degraded state. The array changes its state to the Good state, and parity is rebuilt.
- Note: The array can be used during the rebuilding operation. Inform the user, however, that while the rebuilding operation is running, the data is not protected against another disk drive failure. The rebuilding operation runs more slowly if the array is being used. When the rebuilding operation is complete, ask the user to run diagnostics in System Verification mode to the SSA adapters, to ensure that the rebuilding operation has not found any more problems.

15. (from step 13)
    Exchange the disk drive for a new drive (see "Exchanging Disk Drives" on page 10-1).
    - Type smitty ssaraid and press Enter.
    - Select Change/Show Use of an SSA Physical Disk. The pdisk that has beeeen exchanged is listed under SSA Physical Disks that are system disks.
    - Select the pdisk from the list and change the Current Use parameter to Array Candidate Disk.
    - Select Change Member Disks in an SSA RAID Array.
    - Select Add a Disk to an SSA RAID Array and add to the array the disk that you have just exchanged.
    - Note: The array can be used during the rebuilding operation. Inform the user, however, that while the rebuilding operation is running, the data is not protected against another disk drive failure. The rebuilding operation runs more slowly if the array is being used. When the rebuilding operation is complete, ask the user to run diagnostics in System Verification mode to the SSA adapters, to ensure that the rebuilding operation has not found any more problems.

16. (from step 13)
    Does the Link Verification service aid indicate an open loop?

    NO Go to step 16.
    YES Go to "MAP 2320: SSA Link" on page 13-22.

17. (from step 15)
    Does any SSA disk drive have its Check light on?

    NO The disk drive might have been removed from the subsystem.
    - Reinstall the removed drive, or select a new disk drive for addition to the array.
    - Type smitty ssaraid and press Enter.
    - Select Change Member Disks in an SSA RAID Array.
    - Select Add a Disk to an SSA RAID Array.
    - Referring to the displayed instructions, select a disk from the list of array candidate disk drives, and add that disk drive to the array that is in the Degraded state. The array changes its state to the Good state, and parity is rebuilt.

      YES
    - Exchange the failed disk drive for a new one (see "Exchanging Disk Drives" on page 10-1).

- Go to step 36.

18. (from step 4)
An array is in the Exposed state when one member disk drive of the array is not available. If data is written to an array that is in the Exposed state, that data is not protected (see "RAID-5 Array States" on page 3-2 for more information). Command line parameters are available that allow you to prevent such write operations.

- Type smitty ssaraid and press Enter.
- Select Change/Show Use of an SSA Physical Disk.
- The status of the disk drives that are connected to the using system is displayed.

    Are any disk drives listed as "SSA physical disks that are rejected"?

    NO A disk drive has not been detected by the adapter. Go to step 19.

    YES
- Run diagnostics in System Verification mode to all the disk drives that are listed as rejected.
- Run the Certify service aid (see "Certify Disk Service Aid" on page 12-18) to all the disk drives that are listed as rejected.
- If problems occur on any disk drive, go to step 18. Otherwise, continue with this procedure.
- Type smitty ssaraid.
- Select Change Member Disks in an SSA RAID Array.
- Select Add a Disk to an SSA RAID Array.
- Referring to the displayed instructions, select a disk from the list of array candidate disk drives, and add that disk drive to the array that is in the Exposed state. The array changes its state from the Exposed state, and parity is rebuilt.

19. (from step 17)
Exchange the disk drive for a new drive (see "Exchanging Disk Drives" on page 10-1).
- Go to step 36 to add the disk drives to the group of disk drives that are available for use by the RAID manager.
- Note: A disk drive that is listed as rejected is not necessarily defective. For example, the array might have rejected the disk drive because a power problem, or an SSA link problem, caused that drive to become temporarily unavailable. Under such conditions, the disk drive can be reused.
- If you think that a disk drive has been rejected because it is failing, check the error log history for that disk drive. For example, if you suspect pdisk3, type on the command line:

    ```
    ssa_ela -l pdisk3 -h 5This command causes the error log for
    pdisk3 to be analyzed for the previous five days. If a
    problem is detected, an SRN is generated.
    ```

20. (from step 17)
Does the Link Verification service aid indicate an open loop?

NO Go to step 20.

YES Go to "MAP 2320: SSA Link" on page 13-22.

21. (from step 19)
Does any SSA Disk drive have its Check light on?
-
    NO The disk drive might have been removed from the subsystem.
- Reinstall the removed drive, or select a new disk drive for addition to the array.
- Type smitty ssaraid and press Enter.

- Select Change Member Disks in an SSA RAID Array.
- Select Add a Disk to an SSA RAID Array.
- Referring to the displayed instructions, select a disk from the list of array candidate disk drives, and add that disk drive to the array that is in the Exposed state. The array changes its state from the Exposed state, and parity is rebuilt.

    YES
- Exchange the failed disk drive for a new one (see "Exchanging Disk Drives" on page 10-1).
- Go to step 36.

22. (from step 1)
No spare disk drives are available for an array that is configured for hot spare disk drives.
- If the subsystem contains disk drives that have failed, repair those disk drives, or exchange them for new disk drives (see "Exchanging Disk Drives" on page 10-1).
- Type smitty ssaraid and press Enter.
- Select Change/Show Use of an SSA Physical Disk.

    Are any disks listed as "SSA Physical disks that are hot spares"?

    NO Review with the user the requirement for hot spare disk drives. If the customer wants hot spare disk drives, one or more disk drives must have their use changed to Hot Spare Disk.

    If the customer does not want hot spare disk drives:

- Return to the SSA RAID Arrays menu.
- Select Change/Show Attributes of an SSA RAID Array.
- Change the Enable Use of Hot Spares attribute to No.

    YES The following conditions must be met to make a hot spare disk drive available for use by an array:

- The hot spare disk drive and the array must be on the same SSA loop (see "Creating a Hot Spare Disk Drive" on page 4-8).
- If the spare_exact parameter is set to true, the size of the hot spare disk drive must be the same as the size of the smallest member disk drive in the array. (See "Changing or Showing the Attributes of an SSA RAID Array" on page 4-52 to determine how the hot spare attribute is set; see "Listing the Disk Drives in an SSA RAID Array" on page 4-27 to determine the sizes of the disk drives that are in the array.)
- If the spare_exact parameter is set to false, the size of the hot spare disk drive must be at least that of the smallest member disk in the array.

    Ensure that these conditions have are met.

23. (from step 4)
The RAID Manager has detected an array that does not have complete parity. All read and write operations can complete normally, but the failure of one disk drive can cause the loss of some data.

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

- Type smitty ssaraid and press Enter.
- Select List All SSA RAID Arrays Connected to a RAID Manager.
- Select the adapter that you are testing. A list of hdisks is displayed.
- Check whether a rebuilding operation is running on any array.

    Is a rebuilding operation running on any RAID array?

NO Go to step 24.

YES
- Wait for the rebuilding operation to complete.
- Rerun diagnostics in System Verification mode to the adapter.
- Go to step 23.

24. (from step 22)
Is the problem solved?

NO Go to step 24.

YES No further action is needed.

25. (from steps 22 and 23)
- Type smitty ssaraid and press Enter.
- Select List Status Of All Defined SSA RAID Arrays.

    Do any arrays have a number other than zero listed under "Unsynced Parity Strips" or "Unbuilt Data Strips"?

    NO The error might have occurred because a hot spare drive was being started and rebuilt. Check whether any failed disk drives are present in the array.

    YES
- Note the hdisk number of the failing array.
- Go to step 25.

26. (from step 24)
Type smitty ssaraid and press Enter.
- Select List/Identify SSA Physical Disks.
- Select List Disks in an SSA RAID Array.
- Select the failing array.
- Note all the pdisk numbers that are in the array.
- Ask the user to create a backup of all the data that is contained in this array. (All the data should be accessible without error.)
- Ask the user to delete the array.
- Run diagnostics in System Verification mode to each of the pdisks that you noted previously.

    Do the diagnostics fail when run to any particular disk drive?

    NO Go to step 26.

    YES
- Exchange the failing disk drive for a new one (see "Exchanging Disk Drives" on page 10-1).
- Go to step 36 to add the disk drive to the group of disk drives that are available for use by the RAID manager.

27. (from step 25)
Run the Certify service aid (see "Certify Disk Service Aid" on page 12-18) to the pdisks that you noted previously.
Did the Certify service aid fail when run to any particular disk drive?

NO   Ask the user to recreate the array.
      Go to step 28.

YES

- Run the Format service aid (see "Format Disk Service Aid" on page 12-16) to the disk drive.
- Run the Certify service aid to the disk drive again.
- Go to step 27.

28. (from step 26)

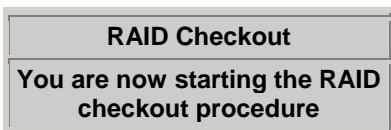Did the Certify service aid fail again?
NO
- Ask the user to recreate the array.
- Go to step 28.

    YES
- Exchange the failing disk drive for a new one (see "Exchanging Disk Drives" on page 10-1).
- Go to step 36 to add the disk drive to the group of disk drives that are available for use by the RAID manager.

29. (from step 2 in MAP 2410: SSA Repair Verification, and from steps 3, 11, 12, 26, and 27 in this MAP)

RAID Checkout
You are now starting the RAID checkout procedure

- Type smitty ssaraid and press Enter.
  Select Change/Show Use of an SSA Physical Disk from the SSA RAID Arrays menu.

  Are any disks listed as "SSA physical disks that are rejected"?

  NO Go to step 30.

  YES
- Run diagnostics in System Verification mode to all the disk drives that are listed as rejected.
- Run the Certify service aid (see "Certify Disk Service Aid" on page 12-18) to all the rejected disk drives.
- Go to step 29.
-

29. (from step 25)
Is any disk drive failing?

NO Go to step 30.

YES

- Exchange the failing disk drive for a new one (see "Exchanging Disk Drives" on page 10-1).
- Go to step 36 to add the disk drive to the group of disk drives that are available for use by the RAID manager.

30. (from steps 28 and 29)

- Type smitty ssaraid and press Enter.

- Select List All SSA RAID Arrays Connected to a RAID Manager.
- List the arrays that are connected to each SSA Adapter.
  Are any arrays listed with a status other than Good or Rebuilding?

  NO Go to step 31.

  YES Go to step 1.

31. (from step 30)

- Type smitty ssaraid and press Enter.
- Select List Status Of All Defined SSA RAID Arrays.

  Do any listed arrays have Invalid Data Strips?

  NO Go to step 32.

  YES Go to step 1.

32. (from step 31)
 Do any listed arrays have Unsynced Parity Strips or Unbuilt Data Strips?

  NO Go to step 33.

  YES The rebuilding operation is running or has stopped before completion.

- Note the number of unsynced parity strips and unbuilt data strips.
- Press the Cancel key to leave the status display.
- Wait for a few moments, then reselect the status display.
- Again note the number of unsynced parity strips and unbuilt data strips. If the numbers are lower than those that you noted earlier, the rebuilding operation is running. Wait for the rebuilding operation to complete before you continue. If the numbers have not changed, the rebuilding operation has stopped.
- If this is the first time you have been through this step while solving this particular problem, return to step 1. Otherwise:
  - Delete the array (see "Deleting an SSA RAID Array" on page 4-6).
  - Run the Certify service aid (see "Certify Disk Service Aid" on page 12-18) to each member disk drive.
  - Recreate the array (see "Adding an SSA RAID Array" on page 4-3).

33. (from step 32)
 Have disk drives been going into the rejected state with no other failure indications?

  NO Go to step 34.

  YES This problem can occur if an array is accessed before all the member disk drives are available. Ensure that the power system switches on power to all the disk drives before, or when, it switches on the power to the using system.

34. (from step 33)
 Was SRN 46000 logged, but no error found, when diagnostics were run in System Verification mode?

  NO Go to step 35.

YES An array was in the Offline state, but is now available.
Ensure that the power system switches on power to all the disk drives before, or when, it switches on the power to the using system.

35. (from step 34)
Was SRN 49100 logged, but no error found, when diagnostics were run in System Verification mode?

NO You have solved all the array problems.
If you have previously created a data backup, reload that data now.

YES An array was in the Exposed state, but is now in the Good state.
This problem might have occurred because a disk drive was temporarily removed from the system.

Ensure that the power system switches on power to all the disk drives before, or when, it switches on the power to the using system.

36. (from steps 7, 10, 12, 14, 16, 18, 20, 25, 27, and 29)
Has a failed disk drive been exchanged for a new disk drive?

- NO If you have repaired a power or cabling fault that caused the disk drive to be missing from the system, the drive might now be in a rejected state. You must change that disk drive into a usable disk drive:

    - Type smitty ssaraid and press Enter.
    - Select Change/Show Use of an SSA Physical Disk.
    - The disk drive that has been restored to the system is listed under SSA Physical Disks that are rejected.
    - Select the disk drive that has been restored to the system.
    - Change the Current Use parameter to Hot Spare Disk or to Array Candidate Disk.
    - Note: It is the user who should make the choice of Current Use parameter. That choice should be:
        - Hot Spare Disk if the use of hot spares is enabled for the arrays on the subsystem
        - Array Candidate Disk if the use of hot spares is disabled for the arrays on the subsystem

- YES When a new disk drive has been added to the system, it is configured as an AIX disk drive. If the disk drive replacement procedure that you used has not already instructed you to do so, change the Current Use parameter of the disk drive to Hot Spare Disk or to Array Candidate Disk.
    - Type smitty ssaraid and press Enter.
    - Select Change/Show Use of an SSA Physical Disk.
    - The pdisk that has been exchanged is listed under SSA Physical Disks that are system disks.
    - Select the pdisk from the list.
    - Change the Current Use parameter to Hot Spare Disk or to Array Candidate Disk
    - Note: It is the user who should make the choice of Current Use parameter. That choice should be:
        - Hot Spare Disk if the use of hot spares is enabled for the arrays on the subsystem
        - Array Candidate Disk if the use of hot spares is disabled for the arrays on the subsystem