

SECTION OUTLINE for DS14 Shelf Module Replacement/Reseat or Power Cycle

STOP	Read the "README FIRST" below the Table of Contents	VII.	Shelf Identification - Method 3 (disk_list)
I.	DS14 Shelf Orientation and Dispatch Information	VIII.	Shelf Identification - Method 4 (Autosupport Data)
II.	DS14 Shelf Design and Cabling Notes	IX.	Shelf Identification - Method 5 (storage show disk -p)
III.	Node State Checks	X.	Module Replacement, Reseat or Shelf Power Cycle
IV.	Shelf Identification Methods Overview	XI.	Disk Verification and Module Firmware Checks
V.	Shelf Identification - Method 1 (Power Supply S/N)	XII.	Dispatch Completion and Part Return
VI.	Shelf Identification - Method 2 (LINK LED)		

README FIRST

This Action Plan requires NGS support where noted - But first read and follow this README FIRST Section.

TERMS: "Module" refers to a LRC, ESH(x) or AT-FCX Shelf Module. "target node" is the node connected to the shelf module.

NOTE This Action Plan covers replacements, reseat and shelf power cycle

FOLLOW THESE IMPORTANT NOTES

- TPM:**
- a. After following this README FIRST, continue with Sections I and II calling into NGS when noted to do so.
 - b. Do not attempt to trace the FC cable from the node to the shelf loop- this is discouraged - follow this plan.
 - c. There are five Methods to identify the "shelf" that holds the module to be replaced, resealed or power cycled in this action plan. Section IV, the "Shelf Identification Overview" lists the five Methods. Methods 1 and 2 are non-invasive to the system. Methods 3-5 require console commands to be run and interacting with NGS.
 - d. **Method 1: PREFERRED** - Requires NGS to provide a serial number of a Power Supply 1 (Left) or 2 (Right) in the "target" shelf. The power supply s/n confirmation is a mandatory step in Section X. An overview of Method 1 is in Section IV. If a PS serial number was not provided, call NGS now and request it.
 - e. **Method 2: ALTERNATE** - Use only for a node that is *halted* or *waiting for giveback*. This is also a non-invasive procedure to identify the shelf loop. An overview of Method 2 is in Section IV.
 - f. Section III is the node state check. It must be followed in all Methods (Method 1,3-5), except Method 2.
 - f. If Method 1 or 2 cannot locate the "target" shelf, Review alternate methods 3,4,5 in Section IV, then contact NGS and request which Method, (3,4,5) should be used to locate the target shelf.
- NGS:**
- a. There are five Shelf Identification Methods (1-5) detailed in Sections V thru IX to visually identify the "target" shelf based on node/HA state. Method 1 at the minimum is required. It is non-invasive and identifies/confirms the target shelf using a serial number of a Power Supply in the shelf. Method 2 can be used if the node is down and is also non-invasive. The TPM disconnects the FC cable on the target FC Adapter at the node and looks for loss of LINK on the modules. Section IV provides an "Overview" of the methods and their applicability to node/HA state.
 - b. If not already sent in the dispatch, determine a power supply serial number, PS-1 (left) or PS-2 (right), installed in the "target" shelf and provide to the TPM. This is a mandatory "Confirmation" step in Section X.
 - c. If the TPM cannot locate the "target" shelf using Method 1 or 2, NGS is required to provide the TPM a recommendation and guided hands using an alternate Method, 3, 4 or 5.
 - d. **In all cases NGS is required for the FW and system integrity check in Section XI.**

I. DS14 Shelf Orientation and Dispatch Information

1 Note the shelf types, grey and charcoal models in the text boxes and the Shelf ID LED in Fig 1.

DS14 Shelf Family
 Grey colored Shelf Models: DS14, DS14Mk2, DS14Mk4
 Charcoal colored Shelf Model: DS14mk2-AT

LRC and ESH(x) modules are used in a Grey colored Shelf

AT-FCX modules are used in a Charcoal colored Shelf

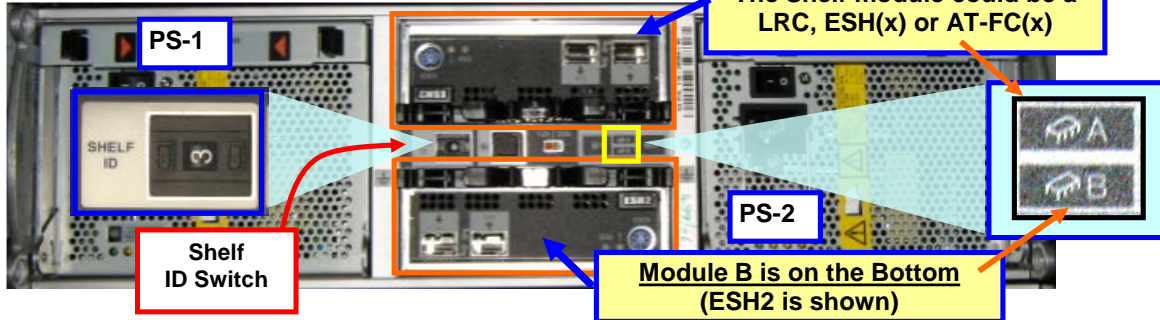
All Amber Disk LEDs are shown "ON" to illustrate the *led_on_all <HA>* command.

2 Continue with Section I on next page.

I. DS14 Shelf Orientation Required Dispatch Information (Cont.)

3 Fig 2 shows the rear of the DS14 Shelf. Note the location of the shelf ID switch and module identification.

Fig 2 (DS14 Family Rear View)



4 Always capture the node's console output to a text file, "NetApp-dispatch-num.txt", even if using the end-user's computer. To review the Job Aid on how to connect to console (IOIO) port and serial emulator options, click >> [Console Attach Aid](#)

5 The dispatch has to include these 5 items: If not all 5 items are provided, call NGS and get the missing data.

- i. The System (aka: Filer/head/Node/Controller) Serial Number.
- ii. The FC Host Adapter number (The FC Adapter on the system driving the loop to the shelf module)
- iii. The Shelf Number where the module is installed, typically numbered 1-6.
- iv. Which Shelf Module, A (top) or B (bottom) to replace or reseat
- v. Shelf Power supply serial number PS-1 or PS-2 installed in the "target" shelf

II. DS14 Shelf Design and Cabling Notes

WARNING for High Availability Controller Configurations

If the failure has caused a controller failover you may have been dispatched on the surviving (partner) node's serial number, not the failed (target) node. Capture console output for this procedure even if end-user is doing it.

- 1 The DS14 shelf has two independent FC paths to it. One FC path is through the "A" module (top) and the other FC path is through the "B" module (bottom). Multipath adds another data path to the "A" and "B" shelf loop.
- 2 Do not disturb the other FC path as the disks in the shelf loop are being accessed through it.
- 3 If the **target** shelf cannot be found using Method 1 or 2, there are alternate Methods, 3-5, summarized in Section IV. These will require live NGS support.

NOTE In a HA configuration each system connects to the disk shelves. Therefore each node sees the disk serial numbers. Methods 3-5 use a disk serial number lookup to determine the two FC paths to the shelf.

III. Node State Checks

NOTE These steps must be followed if using Methods 3-5. If Method 1 or 2 being used, skip to next section.

1 **Which shelf module type are you replacing or reseating?** If replacing - open the RMA box to see what it looks like.

NOTE If reseating a module, a document showing the types of shelf modules used in the DS14 disk shelf is >> [here](#).

2 **Is this node HA configured?** Yes/No How do I tell?

LCD Panel?

YES: The LCD panel provides node and HA (controller failover) state. Ex. of LCD messages [here](#).

NO: Look at the node's "A, B" activity () LEDs. Which one is blinking or flashing?

Both A & B: This is a HA configured system and both nodes are online. The serial number in the dispatch is correct. The system may be cabled for Multipath-HA or not failed over yet.

A multipage Job-Aid for a physical cabling check for Multipath-HA is [here](#)

A or B Activity LED is Flashing

Are 2 controllers installed in the Chassis? Picture of dual controllers [here](#).

YES: One node is UP, the other is down – Confirm the node with no activity is "halted" or "Waiting for giveback" by console response..

Confirming the console response is a required step.

NO: Only one controller is installed. NGS will determine if the node needs to be halted (not dual looped shelves) for the maintenance procedure.

3 After determining the node state, engage NGS for "guided hands" to step through the detailed Method they instructed to be followed - Section IV has the Overview Summary and references to the Method detail for each.

IV. Shelf Identification Methods Overview

STOP Attempt Method 1 first, as it is a required "Confirmation" step in Section X. of this action plan.

Method	Node State*	Hi-Level Summary	Advantages	Challenge/Alternative Methods
1. (see STOP above)	UP or DOWN (Single or HA Node)	NGS provides one of the power supply serial numbers in the <i>target</i> shelf using AutoSupport "environment" data. A picture of Shelf power supply serial numbers and the shelf ID is > here . (Section V.)	Pinpoints the <i>target</i> shelf where the module resides based on shelf PS serial number. Non-Invasive. (Node State Check, in Sec III Required)	When shelves are not in the same or adjacent cabinet as the node, reading power supply serial numbers with many racks is difficult. NGS to advise on which alternate method should be used.
2.	DOWN (Single or HA Node)	The cable attached to the <i>target</i> FC host adapter specified in the dispatch is removed. All shelves with the ID switch set to "1" are scanned to see if the "IN" Link LED for the Module (A or B) in the dispatch turns "OFF". (Section VI.)	Non-Invasive.	When shelves are not in the same or adjacent cabinet as the node, this process may not be possible. Use Method 3 or 4.
3.	DOWN (HA Node)	The ' <i>disk_list</i> ' command from maintenance mode is used to locate a disk s/n on the target FC adapter. From the <i>partner</i> node, the FC adapter # for this s/n is used to illuminate the shelf loop. (Section VII.)	Visually locates the proper shelf loop using the Amber Disk LEDs.	Console login required to run commands. If the ' <i>disk_list</i> ' output does not list any disks on the specified FC adapter number, use Method 4.
4.	DOWN (HA Node)	Use if Method 3 fails to list any disks on the <i>target</i> FC adapter in Maintenance mode. NGS uses Autosupport data to find the partner's FC adapter and the <i>partner</i> node is used to illuminate the shelf loop. (Section VIII.)	Visually locates the proper shelf loop using the Amber Disk LEDs.	NGS provides all the information from autosupport in this discovery process. Console login is required.
5.	UP (Single or HA Node)	<p>For single node, single FC path to shelf: The target Adapter is used to illuminate the shelf loop.</p> <p>For a single-attach HA - no Multipath-HA: The <i>partner</i> node is used to illuminate the shelf loop.</p> <p>For a Multipath-HA node_or a Single node with dual-pathed shelves: The output of '<i>storage show disk -p</i>' provides both FC paths to the disks. Reference - Multipath-HA cabling here. Single node cabling here. (Section IX.)</p>	Visually locates the proper shelf loop using the Amber Disk LEDs.	NGS is required to confirm system cabling scheme. Console login is required to issue commands. If the target FC adapter is not listed in the ' <i>storage show disk -p</i> ', output, NGS is required to provide the <i>alternate</i> FC path from an autosupport.

*** Node State**

"UP" : Node is online/serving data. LCD if equipped toggles hostname of node and "Activity" LED is flashing
 "DOWN" : LCD displays *halted* or "*waiting for (MB) giveback*" or if no LCD, the activity LED for that node is "OFF". The Console is prompt is the PROM, (ok, CFE>, LOADER) prompt or "*waiting for user input*."

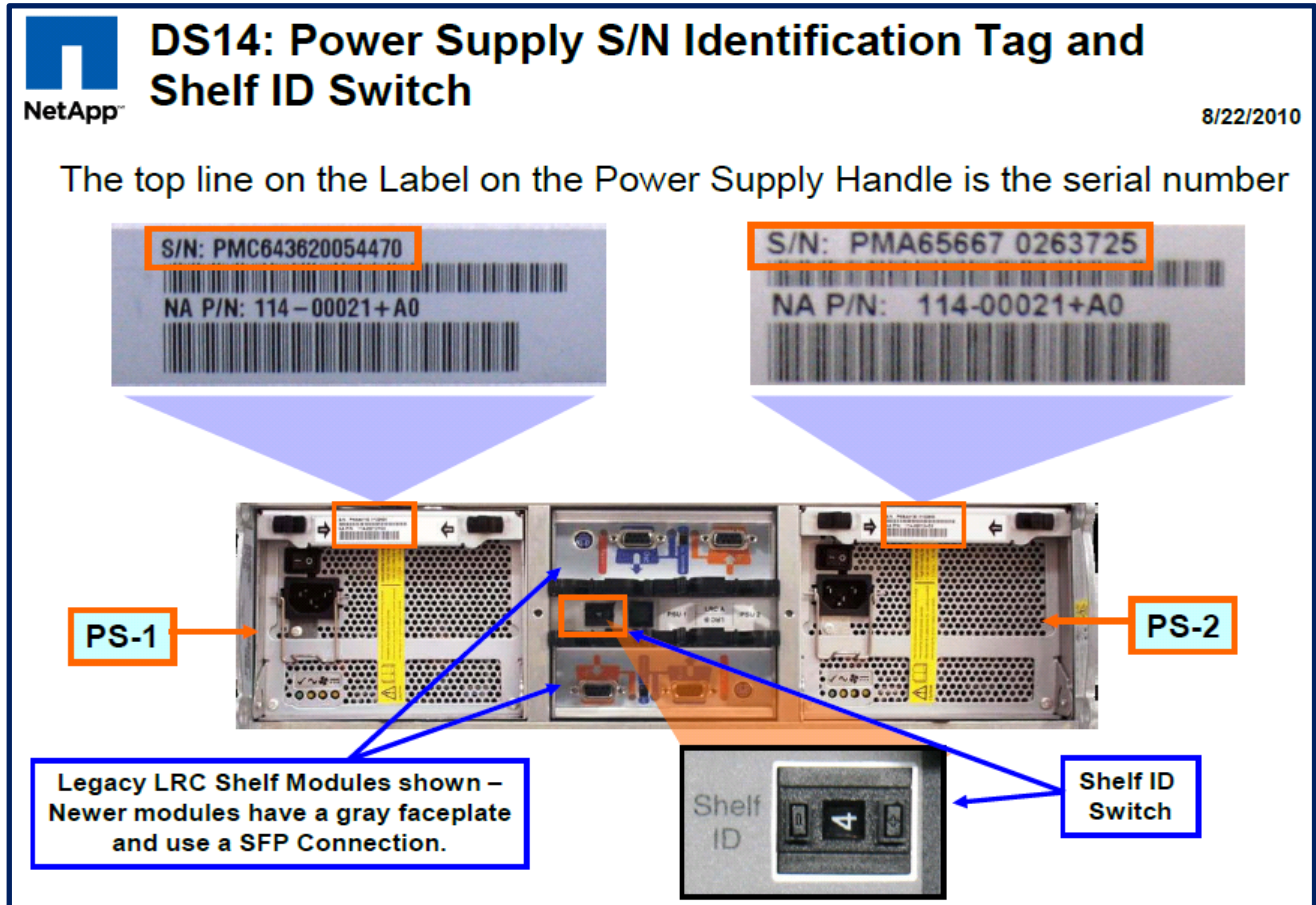
V. Shelf Identification - Method 1 (Find Shelf by Using a Shelf Power Supply S/N)

This is a non-invasive procedure - This procedure is a required confirmation step in Section X.

- ◆ Entering commands for shelf identification is not required.
- ◆ NGS provides the serial number of the power supply (PS-1 or PS-2) located in the target shelf number specified in the dispatch using the "environment" section of the Autosupport data.

1 A Power Supply serial number in the target shelf is required. PS-1 (on left side) or PS-2 (on right side) installed in the target shelf number. This method works best if the shelf is in the same or adjacent rack to the node.
Fig 3 is a picture of the rear of a DS14 shelf showing Shelf ID, power supply numbering and location of their serial numbers.

Fig 3



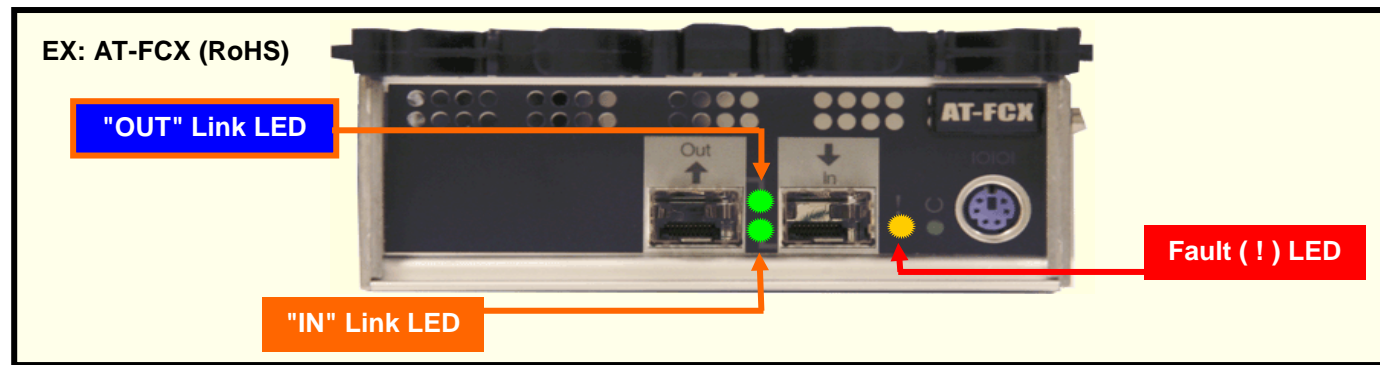
- 2 Using a flash light, look for shelves numbered the same one specified in the dispatch, then match the PS-1 or PS-2 serial number provided by NGS.
- 3 If you cannot locate the power supply serial number provided by NGS and the node is UP and online use Method 5. If the node is down or was taken over by it partner, attempt Method 2. If the shelf loop still cannot be found, use Method 3 or 4 with NGS and end-user support.
- 4 If the correct shelf is found, go to Section X, "Module Replacement or Reset"

VI. Shelf Identification - Method 2 (LINK LED)

This non-invasive procedure is for a "single" or "HA configured" node that is: *halted* or "waiting for giveback"

- ◆ Entering commands for shelf identification is not required.
- ◆ Use this method to locate the shelf loop by unplugging the FC Adapter cable at the node causing the Link LED on Shelf module in Shelf #1 (or the first shelf in the loop) to turn off.

1	Confirm the node's LCD displays ' <i>halted</i> ' or ' <i>waiting for giveback</i> ', or the console prompt is: "ok", "CFE>", "LOADER" or "LOADER-A/B". If the node is still UP, check with NGS to make sure you are working on the correct node as this is the wrong procedure if the node is UP.
2	If the console response is: ' <i>waiting for giveback</i> ', skip to step 4.
3	If the node is ' <i>halted</i> ', boot into Maintenance Mode and follow steps 3a-3d to turn on the FC transmitters: <div style="background-color: #ffffcc; padding: 5px; margin-top: 5px;"> <p>a) At the "ok", "CFE>", "LOADER>", or "LOADER-A B" prompt enter '<i>bye</i>'</p> <p>b) When the message "Enter CTRL-C for special Boot Menu" is displayed, hit ^C (Ctrl-C).</p> <p>c) After the 5 point menu is displayed, enter '<i>5</i>'</p> <p>d) If this message is displayed, "Continue with boot? y/n" Enter '<i>y</i>' Prompt changes to <i>*></i></p> </div>
4	On the back of the node that is DOWN, confirm the FC Adapter Link LED specified in your dispatch is "ON" (green). Then unplug the optical cable in the FC adapter.. <div style="background-color: #ffffcc; padding: 5px; margin-top: 5px;"> <p>a) Look for the missing green LINK led on shelves configured as ID 1. Check this rack, or adjacent racks. See picture below of LINK LEDs for a AT-FCX module. All modules can be seen >> here.</p> <p>b) If you think you have found the missing green LINK LED, reconnect the cable to confirm it goes back "ON".</p> <p>c) When confirmed, locate the shelf number in the dispatch. If not shelf #1 it is daisy chained from shelf #1.</p> </div>
5	If you cannot find the shelf loop, engage end-user if readily available and ask if any shelves are not local to this node and use Method 3 with end-user. If end-user not available, skip to Section VIII, Method 4 and engage NGS.
6	If the correct shelf is found, go to Section X, "Module Replacement or Reset"



VII. Shelf Identification - Method 3 (disk_list)

This procedure is for a HA configured node that is: **halted** or **"waiting for giveback"**

STOP End-User is required - Engage NGS for verification.

- ◆ This method may not work if the shelf module is "wedged" (causing the FC loop to be non-responsive).
- ◆ Login to Partner node is required where **partner** is indicated.

- 1 On the target node if the console response is 'waiting for giveback': Press CTRL-C when this message is displayed: "Do you wish to halt this node rather than wait [y/n]?" enter 'y'. Go to step 2.
- 2 If the target node is 'halted' (LCD displays halted), or the console prompt is: "ok", "CFE>", "LOADER" or "LOADER-A/B", boot into Maintenance Mode and follow steps 2a-2d to turn on the FC transmitters:
 - a) At the "ok", "CFE>", "LOADER>", or "LOADER-A|B" prompt enter 'bye'
 - b) When the message "Enter CTRL-C for special Boot Menu" is displayed, hit ^C (Ctrl-C).
 - c) After the 5 point menu is displayed, enter '5'
 - d) If this message is displayed, "Continue with boot? y/n" Enter 'y' Prompt changes to *>
- 3 Enter 'disk_list' at the maintenance mode '*>' prompt. This will list all the disks the node detects. See "disk_list" output Example 1 below
- 4 From this output, locate the specified FC adapter (HA) and record one of the disk serial numbers attached to it. If no disks are listed for the FC target adapter, this method cannot be used. Proceed with Method 4 in Section VIII.
- 5 Capture a disk serial number on the target FC <HA>. (In Example 1: Target FC is '0c'. Record a specific ID (0c.29) and the disk **serial number** attached to it).
- 6 On the **partner** node, the end-user issues the 'sysconfig -d' command. From the output locate the same serial number and note the FC adapter number. See Example 2 for sample output of the highlighted disk serial number in Example 1.
- 7 With the partner's FC HA adapter number determined, the end-user needs to issue these two commands from the partner (UP) node to illuminate the Amber disk LEDs in the shelves on the FC loop. (LEDs Fig 1 Sec I)


```
partner-node> priv set advanced
partner-node*> led_on_all <HA> (HA is the partner's FC Adapter # discovered in step 6)
```
- 8 From the front of the rack, locate the set of shelves with all the Amber Disk LEDs ON and the shelf number specified in the dispatch. Move to the back of the cabinet and locate the target shelf based on the shelf ID switch setting on the center rear.
- 9 When the correct shelf is identified, go to Section X, "Module Replacement or Reseat"

Example 1 (run on target node in maintenance mode)

```
*> disk_list
DISK      CHAN  VENDOR  PRODUCT ID      REV  SERIAL#          HW (BLOCKS  BPS) DQ
-----
0c.29    FC:A  NETAPP  X235_HJURD073F10 NA09  303V3157         ff  142410400  520  N
0c.28    FC:A  NETAPP  X235_HJURD073F10 NA09  303N8847         ff  142410400  520  N
0c.27    FC:A  NETAPP  X235_HJURD073F10 NA09  303R9444         ff  142410400  520  N
0c.26    FC:A  NETAPP  X235_HJURD073F10 NA09  303R7712         ff  142410400  520  N
0c.25    FC:A  NETAPP  X235_HJURD073F10 NA09  303S2243         ff  142410400  520  N
0c.18    FC:A  NETAPP  X272_SCHT6073F10 NA08  3HZ1F7SB00007349WA2V ff  140395092  520  N
0c.17    FC:A  NETAPP  X235_HJURD073F10 NA09  303S3616         ff  142410400  520  N
0a.21    FC:B  NETAPP  X235_HJURD073F10 NA09  303S2237         ff  142410400  520  N
...
...

```

← Lines deleted to trim output

Example 2 (run on the partner node)

```
partner-filer> sysconfig -d
Device    HA    SHELF  BAY  CHAN  Disk Vital Product Information
-----
0b.16    0b    1      0    FC:A  3KT58FJZ00009706R5UN
0b.17    0b    1      1    FC:A  3KT58FXC00009706RPQR
0b.18    0b    1      2    FC:A  3KT58H7R00009706QCK9
...
0d.29    0b    1      13   FC:B  303V3157 ← is the Serial Number
0d.28    0d    1      12   FC:B  303N8847
0d.27    0d    1      11   FC:B  303R9444
0d.26    0d    1      10   FC:B  303R7712
...

```

NOTE
The Partner node uses FC Adapter HA '0d' to connect to disk serial number 303V3157

VIII. Shelf Identification - Method 4 (Autosupport Data)

This procedure is used when Method 3 fails (No disks are listed in maintenance mode on the target adapter)

STOP Engage NGS for live support for this procedure Step 1a.

- ◆ AutoSupport data is used to retrieve the *partner's* FC adapter number for the target shelf.
- ◆ Login to Partner node is required where *partner* is indicated.

1 NGS can lookup a disk drive serial number using this process:

- a) NGS opens up an Autosupport on the "*target*" node and references the '**sysconfig -d**' listing to locate a disk serial number on the *target* FC Adapter. Example 1: '**sysconfig -d**' in the Autosupport lists the disk data for the **Target Node**. Capture a disk s/n on the target FC adapter. Example: FC adapter '**0a**' and disk s/n of **3KT58FJZ00009706R5UN**.
- b) On the *partner* node the end-user can issue the command '**sysconfig -d**' to find the disk's serial number to obtain the partner's FC adapter number or NGS can retrieve this data from an Autosupport. In Example 2 on the *partner node*, one could first scan each disk ID ".16" and then locate disk serial number **3KT58FJZ00009706R5UN**. When found, we see the partner is using FC Adapter (HA) '**0b**' to drive this disk.

Example 1 (target node output)

```
target-filer> sysconfig -d
```

Device	HA	SHELF	BAY	CHAN	Disk	Product Info
0a.16	0a	1	0	FC:A	3KT58FJZ00009706R5UN	
0a.17	0a	1	1	FC:A	3KT58FXC00009706RPQR	
0a.18	0a	1	2	FC:A	3KT58H7R00009706QCK9	
0a.19	0a	1	3	FC:A	3KT56BSL00007703B086	
0a.20	0a	1	4	FC:A	3KT568V100007703B08B	
0a.21	0a	1	5	FC:A	3KT58FA200009706RP6Q	
0a.22	0a	1	6	FC:A	3KT58GBB00009706P5CV	
0a.23	0a	1	7	FC:A	3KT568V900007703AZXU	
0a.24	0a	1	8	FC:A	3KT58G3N00007701YEPO	
0a.25	0a	1	9	FC:A	3KT58GTC00009706RNJA	
0a.26	0a	1	10	FC:A	3KT568W600007703DVDT	
0a.27	0a	1	11	FC:A	3KT5AM1G00009706QBFJ	
0a.28	0a	1	12	FC:A	3KT5AN5F00009706L4AJ	
0a.29	0a	1	13	FC:A	3KT58FCC00009706R6BA	
0c.16	0c	1	0	FC:A	3KT581ZZ00007704GSDD	
0c.17	0c	1	1	FC:A	3KT5809S00007704GQN4	
0c.18	0c	1	2	FC:A	3KT573VQ000077046AVH	
0c.19	0c	1	3	FC:A	3KT580DF00007704VQEG	
0c.20	0c	1	4	FC:A	3KT585KY00007704VQVN	
0c.21	0c	1	5	FC:A	3KT582SD00007704GT78	
0c.22	0c	1	6	FC:A	3KT586H400007704TLZ3	
0c.23	0c	1	7	FC:A	3KT5858C00007704GSOF	
0c.24	0c	1	8	FC:A	3KT580QA000077042GGH	
0c.25	0c	1	9	FC:A	3KT577T300007703HTYS	
0c.26	0c	1	10	FC:A	3KT5AQK00009705JUTE	
0c.27	0c	1	11	FC:A	3KT582T000007704VQA5	
0c.28	0c	1	12	FC:A	3KT582SM00007704GRBW	
0c.29	0c	1	13	FC:A	3KT54W170000770469EW	

Example 2 (partner node output)

```
partner-filer> sysconfig -d
```

Device	HA	SHELF	BAY	CHAN	Disk	Product Info
0d.16	0d	1	0	FC:A	3KT581ZZ00007704GSDD	
0d.17	0d	1	1	FC:A	3KT5809S00007704GQN4	
0d.18	0d	1	2	FC:A	3KT573VQ000077046AVH	
0d.19	0d	1	3	FC:A	3KT580DF00007704VQEG	
0d.20	0d	1	4	FC:A	3KT585KY00007704VQVN	
0d.21	0d	1	5	FC:A	3KT582SD00007704GT78	
0d.22	0d	1	6	FC:A	3KT586H400007704TLZ3	
0d.23	0d	1	7	FC:A	3KT5858C00007704GSOF	
0d.24	0d	1	8	FC:A	3KT580QA000077042GGH	
0d.25	0d	1	9	FC:A	3KT577T300007703HTYS	
0d.26	0d	1	10	FC:A	3KT5AQK00009705JUTE	
0d.27	0d	1	11	FC:A	3KT582T000007704VQA5	
0d.28	0d	1	12	FC:A	3KT582SM00007704GRBW	
0d.29	0d	1	13	FC:A	3KT54W170000770469EW	
0b.16	0b	1	0	FC:A	3KT58FJZ00009706R5UN	
0b.17	0b	1	1	FC:A	3KT58FXC00009706RPQR	
0b.18	0b	1	2	FC:A	3KT58H7R00009706QCK9	
0b.19	0b	1	3	FC:A	3KT56BSL00007703B086	
0b.20	0b	1	4	FC:A	3KT568V100007703B08B	
0b.21	0b	1	5	FC:A	3KT58FA200009706RP6Q	
0b.22	0b	1	6	FC:A	3KT58GBB00009706P5CV	
0b.23	0b	1	7	FC:A	3KT568V900007703AZXU	
0b.24	0b	1	8	FC:A	3KT58G3N00007701YEPO	
0b.25	0b	1	9	FC:A	3KT58GTC00009706RNJA	
0b.26	0b	1	10	FC:A	3KT568W600007703DVDT	
0b.27	0b	1	11	FC:A	3KT5AM1G00009706QBFJ	
0b.28	0b	1	12	FC:A	3KT5AN5F00009706L4AJ	
0b.29	0b	1	13	FC:A	3KT58FCC00009706R6BA	

2 With the partner's FC HA adapter number determined, the end-user needs to issue these two commands from the partner (UP) node to illuminate the Amber disk LEDs in the shelves on the FC loop. (LEDs Fig 1 Sec I)

```
partner-node> priv set advanced
partner-node*> led_on_all <HA> (The FC HA specified by NGS. In our example above it would be HA 0b)
```

3 From the front of the rack, locate the set of shelves with all the Amber Disk LEDs ON and the shelf number specified in the dispatch. Move to the back of the cabinet and locate the target shelf based on the shelf ID switch setting on the center rear.

4 When the correct shelf is identified, go to Section X, "Module Replacement or Reseat"

IX. Shelf Identification - Method 5 (storage show disk -p)

This procedure is for a "single" or "HA" node that is: [UP \(online\)](#)

- ◆ This method is used for any of the four following node states and system configurations:
 - i. A **single** node that only has a single FC connection to the disk shelves: (Method A) Node cabling [here](#).
 - ii. **Single-Attach HA node**: (Method B) The target FC path is the "standby" (partner) path. Both nodes remain up but controller-failover has typically been disabled by the failure.
 - iii. A **single** node that has **dual connections to the disk shelves**: (Method C) Dual path shelf cabling > [here](#).
 - iv. **Multipath-HA nodes**: (Method C) See multipage page cabling example [here](#).

STOP Engage NGS to confirm node/HA cabling configuration and for live support for this procedure.

Method A : For Single nodes with single FC path to the shelf: (NGS to verify this is a single node with single FC looped shelves)

- A1) `target-node> priv set advanced`
- A2) `target-node*> led_on_all <HA>` (Specify the **target FC HA Adapter** specified in the dispatch).
- A3) Go to Step C3

Method B : For Single-Attach HA node: (Use the partner node and the partner's FC Adapter to illuminate the shelf loop)

- B1) `partner-node > priv set advanced`
- B2) `partner-node*> led_on_all <HA>` (The target FC path is suspect and may be open. It is best to use the partner's FC Adapter as specified by NGS using the disk s/n match technique from autosupports)
- B3) Go to Step C3

Method C : For Multipath-HA nodes or Single Nodes with Dual-looped Disk Shelves: (Request NGS to confirm)

C1 From the target node, the output of the '`storage show disk -p`' command will list the primary and secondary FC adapters for disks. In Example 1 below, the target FC adapter is '0c'. If a secondary FC path is shown as in this case '0a', continue with step C2. But if the **target** FC adapter in a HA-config is not seen as in Example 2, use the partner Method B above.

The listings below are examples of a Multipath-HA Node or of a Single Node with Dual FC Path to the shelves. Each would show a "PRIMARY" and "SECONDARY" path to the disks. See links in (iii) and (iv) above for the cabling scheme.

EXAMPLE 1 (Listing from Target node s/n)

NOTE - Multipath: '0c' and '0a' are shown

```
target-node> storage show disk -p
```

PRIMARY PORT	SECONDARY PORT	SHELF	BAY
0c.16	0a.16	A	1
0a.17	0c.17	B	1
0a.18	0c.18	B	1
0a.19	0c.19	B	1
0a.20	0c.20	B	1
...
0e.23	0b.23	A	1
0b.24	0e.24	B	1
0e.27	0b.27	A	1
0b.28	0e.28	B	1
0b.29	0e.29	B	1

target-node>

EXAMPLE 2 (Listing from Target node s/n)

NOTE - The '0c' FC path is missing

```
target-node> storage show disk -p
```

PRIMARY PORT	SECONDARY PORT	SHELF	BAY
0a.16		A	1
0a.17		A	1
0a.18		A	1
0a.19		A	1
0a.20		A	1
...
0e.23	0b.23	A	1
0b.24	0e.24	B	1
0e.27	0b.27	A	1
0b.28	0e.28	B	1
0b.29	0e.29	B	1

target-node>

FC HA '0c' is missing from the list

- a) `target-node> priv set advanced`
- b) `target-node*> led_on_all <HA>` (Because the target FC path is suspect and may be open, specify the alternate FC HA Adapter discovered in the step 1 or specified by NGS).

C3 From the front of the rack, locate the set of shelves with all the Amber Disk LEDs ON and the shelf number specified in the dispatch. Move to the back of the cabinet and locate the target shelf based on the shelf ID switch setting on the center rear.

C4 When the correct shelf is identified, go to Section X, "Module Replacement or Reseat" on next page.

X. Module Replacement or Reseat or Shelf Power Cycle

NOTE	If this dispatch includes a Shelf Power cycle, NGS will have to determine if this node is part of a HA-config and if the partner node needs to be halted .
1	If RMA part(s) were sent, verify the Order Reference 8xxxxxxx number on the RMA packing slip is the same as the Part Request (PREQ) number listed in your dispatch notes.
2	Verify the shelf ID # specified in the dispatch by examining the shelf switch on the rear center of shelf, see Fig 3 Sec 1.
STOP	TARGET SHELF Confirmation Step: Re-confirm the " target " shelf by shelf power supply serial number provided by NGS: PS-1 (left) or PS-2 (right). A picture showing the Shelf PS serial numbers is in Sec V. Fig 1 or link >> here . If the dispatch or NGS did not provide a serial number for a PS in the target shelf, CALL and request it.
3	Does the module specified in the dispatch, "A" (top) or "B" (bottom) have a FAULT (!) LED on? Or is either the " IN " or " OUT " LINK LED OFF? If a LINK LED is OFF or the Fault (!) LED is ON, report this to NGS. See pictures of all the shelf modules showing the " IN ", " OUT " LINK LEDs and the Fault (!) LED here > shelf-modules
NOTE	If this is a single node with a single FC loop to the disk shelves as verified by NGS, this node will have to be halted before proceeding with the replacement, reseat or shelf power cycle.
4	If this dispatch includes a Shelf Power Cycle: See Note above and confirm with NGS that the node or nodes are ready for a shelf power cycle. If power cycle is confirmed by NGS, follow steps 4a-4b, otherwise skip to step 6. a) To power cycle the shelf, turn "OFF" both the left and right PSU switches at the same time. Figure: here . b) Proceed with the next steps - The shelf will be powered ON later.
5	If the action plan is to just " reseat " a shelf module, skip to step 10 otherwise continue with next step.
6	On the shelf module "A" (top) or "B" (bottom) as specified in the dispatch, label the shelf cables: " L " for Left cable and " R " for the Right cable.
NOTE	Careful! Do not to disturb the FC connections on the other shelf module because data is being served through it.
7	Remove the cables and simultaneously pinch both pairs of tabs to open the levers and extract the shelf module. Fig A.
8	If a SFP (Optical-Cu) GBIC module was shipped, Fig C: Remove it from the shipping bag and install it into the same connector as the original module.
9	If no SFP module was shipped and there is an existing SFP installed, Fig C, remove it and firmly insert it into the same connector in the replacement module. The SFP is keyed!
NOTE	If replacing a LRC or ESH module: There is a " Term " switch on the module that needs to be set to the same position as the original module.
10	Open the levers as shown in Fig A/B and insert the replacement module, or reseat the original module, CONFIRM both levers engage with the shelf.
11	Push both levers closed which will properly seat the module into the shelf backplane.
STOP	Confirm the lever "ears" are correctly engaged with both sides of the shelf - Fig A.
12	Firmly re-install the cables to their proper connector.
STOP	Confirm proper seating of the cables by grasping the connector and pulling on them to confirm they are properly latched.
13	If the shelf power was powered OFF, turn ON both power supply switches simultaneously.
14	If the node is halted , the FC transmitters are OFF. If the node is in maintenance mode (*>), " waiting for giveback " or the node is UP (online), the " IN " LINK LED to all shelves should be "ON". If this module is cabled to another shelf or node, the " OUT " LINK LED should also be "ON" - VERIFY! See Step 3 above for a link to pictures of the LINK and FAULT LEDs for each module type.
S T O P	Confirm the IN & OUT Link LEDs on this module, the partner module in the same shelf and the modules in shelves above and below this one, if present, are all "ON" and that no Fault (!) LEDs are "ON".. Module LEDS shown: here If a LINK LED is "OFF" on any port and there is a SFP in the that port, it is suspect. Also re-check the cables that feed and exit this module <u>at each end to confirm they are firmly seated by pulling on them</u> . Report any issues and Amber Fault (!) LEDs to NGS.
15	Go to Section XI, "Disk Verification and Module Firmware Checks" on next page.



Fig A

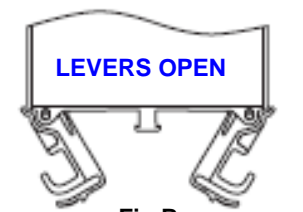


Fig B



Fig C

XI. Disk Verification and Module Firmware Checks

STOP Engage NGS to confirm the disk list, module firmware verification and for system integrity check

1 If the LINK LEDs are correct and the `led_on_all <HA>` command was used to turn ON the AMBER disk LEDs, turn them OFF with this command `led_off_all <HA>`. The HA # is the adapter number that was used to turn them ON.

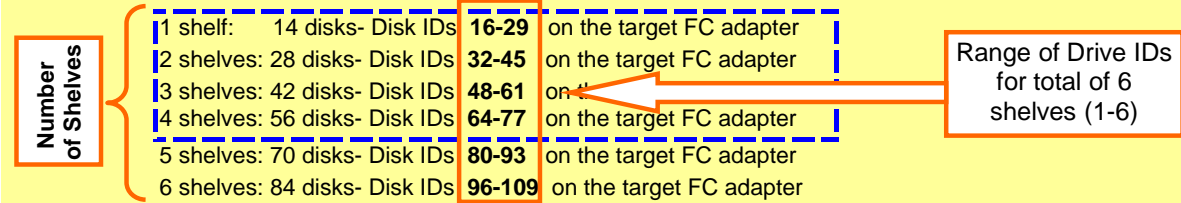
NOTE Skip to Section A if the node is in maintenance mode (*) or skip to Section B if the node is UP (online).

Section A : (Execute these steps if the node is in maintenance mode)

- A1** Enter 'disk_list' at the maintenance mode ' * ' prompt. This will list all local and partner disks seen by this node.
- A2** How many shelves are connected to this shelf loop or were illuminated with the led_on_all command? (1, 2, 3, 4, 5, or 6)
- A3** Examine the disk_list output. Verify the disks are seen on every shelf on the loop on the FC HA specified in the dispatch.

Example :

If a loop has just 4 shelves (typically numbered starting from ID 1) on FC HA **0d**, the Disk IDs should range from **0d.16 to 0d.77** shown inside the blue dashed box.



A4 Confirm with NGS all the disks are seen and the dispatch is complete. If some shelves/disks are not discovered more troubleshooting is required - **Confirm shelf module is latched on both sides and the FC cables are fully seated!**

! If all the disks are still missing after the module replacement, the FC Adapter or SFP at the system controller and the cable to the first shelf are all suspects. Engage NGS and FC troubleshooting aid >> [here](#).

Section B : (Execute these steps if the node is online)

B1 Verify all shelf numbers are discovered on the target FC adapter using the "storage show disk -p" command. Example 1, consolidated shows a single FC path node and we see all 4 shelves represented on FC adapter ' 0d'. Example 2 show a Multipart-HA node or a single node with dual FC connections to the shelf.

NOTE The target FC adapter could be listed in the secondary column as in Example 2. Also the disks are typically displayed in random order.

EXAMPLE 1
Only one (Primary) Path to disks (shelf)

```
target-node> storage show disk -p
```

PRIMARY PORT	SECONDARY PORT	SHELF	BAY
0d.16	A	1	0
0d.17	A	1	1
0d.18	A	1	2
...			
0d.32	A	2	0
0d.33	A	2	1
0d.37	A	2	5
...			
0d.61	A	3	13
0d.59	A	3	11
0d.48	A	3	0
...			
0d.73	A	4	9
0d.75	A	4	11
0d.76	A	4	12
0d.74	A	4	10
0d.77	A	4	13

target-node>

No Secondary Path . All 4 shelves only seen on FC HA 0d

EXAMPLE 2
Primary and Secondary Paths to disks (shelf)

```
target-node> storage show disk -p
```

PRIMARY PORT	SECONDARY PORT	SHELF	BAY
0d.16	A	0a.16	B 1 0
0d.17	A	0a.17	B 1 1
0d.18	A	0a.18	B 1 2
...			
0d.32	A	0a.32	B 2 0
0d.33	A	0a.33	B
0d.37	A	0a.37	B
...			
0d.61	A	0a.61	B
0d.59	A	0a.59	B
0d.48	A	0a.48	B
...			
0d.73	A	0a.73	B 4 9
0d.75	A	0a.75	B 4 11
0d.76	A	0a.76	B 4 12
0d.74	A	0a.74	B 4 10
0d.77	A	0a.77	B 4 13

target-node>

Multi-Path All 4 shelves seen on FC HA 0d and HA 0a

2 Continue with Section XI on next page.

XI. Disk Verification and Module Firmware Checks (Cont.)

REAME **Shelf Module Firmware Check**
All DS14 Shelf modules have field upgradeable firmware. Depending upon the shelf module model and the system configuration, some firmware upgrades are automatic and some are manual. In all cases, the firmware version of the replacement module needs to be checked against the other shelf modules in the system. If not the same, NGS in conjunction with the end-user, will decide if and when to change the firmware. A shelf firmware change is done under Data Ontap, so the system must be up and it cannot be done if the node is in a **“takeover”** state as part of a controller failover. However, shelf module’s firmware revision can still be checked from the partner node.

- 1 If the node is **"UP"** in which the shelf module was replaced, skip to Step 5.
- 2 If node is still in Maintenance Mode (>*) exit it by entering **'halt'**. (Wait a few seconds)
- 3 At the prom prompt: **ok>**, **CFE>** or **LOADER>**, **LOADER-A/B>** enter **'bye'** to start the autoboot process.
- 4 During the boot process, if this node was taken over by its partner the console will report **“this node was taken over”**, etc. Hitting **<enter>**, the console will respond with **“Waiting for giveback”** or the node will boot up online.
- 5 **Firmware Check for a Node that is UP (online)**. If node is **“waiting for giveback”** skip to step 6.
 - a) Issue **'sysconfig -a <HA-Slot>** command (Adding the HA-Slot parameter limits the output) (HA-Slot is “0” for FC adapters 0a-0h, “1” for FC adapter 1a-1d, “2” for FC adapter 2a-2d, etc.)
 - b) Go to step 7
- 6 **Firmware Check for a Node that is “waiting for (MB) giveback” because the giveback can’t be done now**.
 - a) The replacement module’s firmware needs to be checked from the partner node. Issue the command from there.
 - b) Issue **'sysconfig -a <HA-Slot>** command (Adding the HA-Slot parameter limits the output) (HA-Slot is “0” for FC adapters 0a-0h, “1” for FC adapter 1a-1d, “2” for FC adapter 2a-2d, etc.)
 - c) Continue with step 7
- 7 Locate the target FC Adapter in the output and view the shelf module FW under the disks. Example : [here](#).
- 8 The firmware for the A and B shelf module in each shelf is listed after the disks. Engage NGS to confirm.

NOTE Shelf Module firmware update procedures vary depending on model and system configuration. See GUIDELINES:

FIRMWARE UPDATE GUIDELINES :

- a) **ESH, ESH2, ESH4** Models: FW changes on these modules are **non-disruptive** to client access.
- b) **AT-FC, AT-FC2** Models: FW updates on these model are **disruptive** to client access and must be scheduled for a service window.
- c) **AT-FCX** Model:
 - i. FW revision of the replaced AT-FCX module is 37 or higher
 - ii. **and** the node is running Data Ontap 7.3.1 or higher
 - iii. **and** the AT-FCX shelves are dual looped if single controller or cabled Multipath-HA.

If any of the above conditions are not met, the FW update is disruptive to client access and must be scheduled for a service window.

- 9 The command to upgrade the shelf firmware to be executed only under direction of NGS is: (Otherwise skip)

Target-node> **storage download shelf <HA>** (HA is the target FC Adapter in the dispatch)

XII. Dispatch Completion and Part Return

Step	Action Description
1	If the target system is UP, request end-user to send NetApp an Autosupport so the configuration setup can be verified by NGS. Use the following command: filer> options autosupport.doit <enter NetApp FSO/case # here> . Without the < > brackets (The FSO number is 7 digits and begins with 5xxxxxx. Case numbers are ten digits and begin with 2xxxxxxx)
2	Email the console log with the NetApp Reference Number in the Subject Line to xdl-tpm-console-logs@netapp.com
3	Place the defective part in antistatic bag and seal the box.
4	Follow the return shipping instructions on the box to ship the part(s) back to NetApp’s RMA processing center. If the shipping label is missing see process to obtain a shipping label here > Missing Shipping Label?
5	Verify with customer that the system is OK and ask NGS to be released from the dispatch .
6	Call NGS Partner IVR and close out dispatch per Rules of Engagement.