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742F Service Manual

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Section: **Page:**

NOTE: When replacing parts, make sure to handle the parts carefully. It is necessary to use anti-static hand gloves or a wrist strap when handling sensitive parts, such as circuit boards or PCBA.

Make sure that somebody is around to provide help when needed, such as when moving the whole enclosure.

Place the screws in a proper place, so they won't be lost or mixed up during servicing.

When servicing, some parts need to be replaced in power-off state. Please see table below.

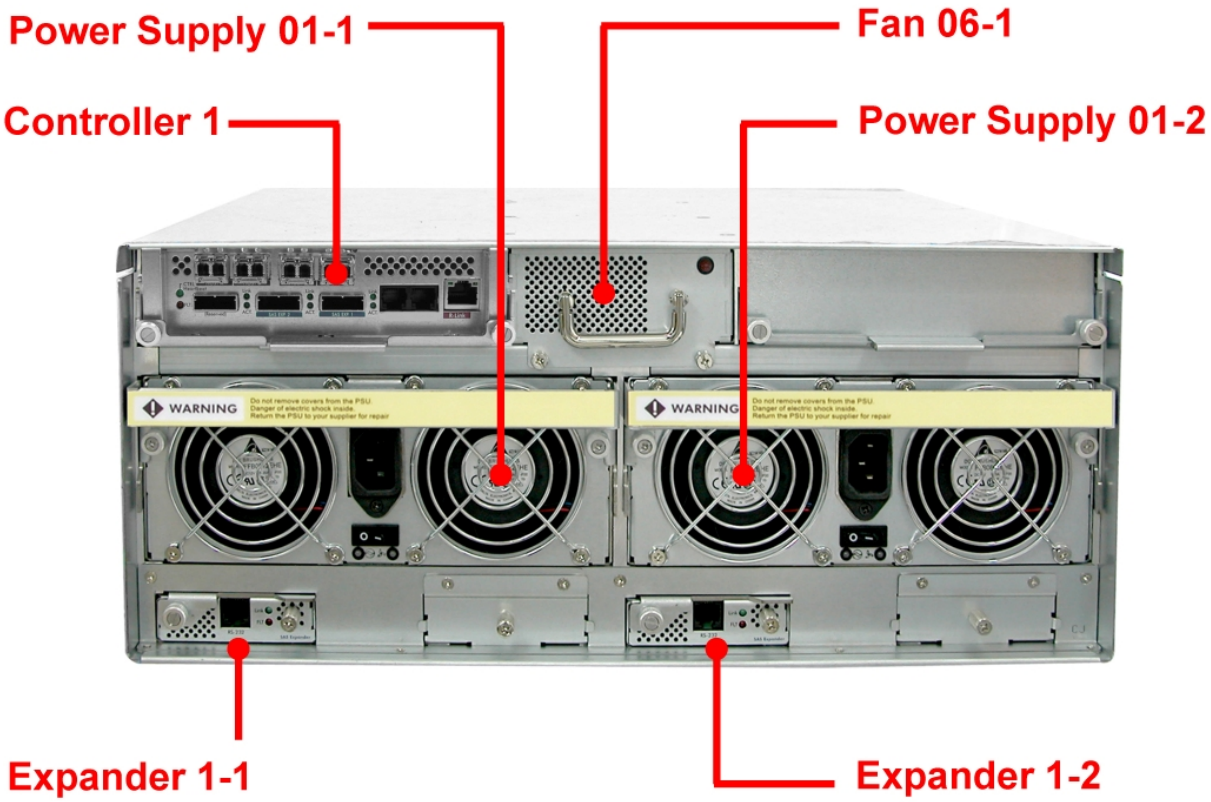
Hot-Swappable Parts (Can be replaced while online)	Not Hot-Swappable Parts (Need to power off RAID subsystem)
Disk Drives/Disk Trays	LCD Front Panel Module
Power Supply - replacing one of the failed Power Supply Module	Cache Memory Module - upgrading memory module in both RAID controllers
Turbo Fan (Fan 06-1)	FC Daughter Board (single controller mode)
	Expander Modules (single or dual controller)
	Bottom Boards
	Middle Backplane Board

IMPORTANT:

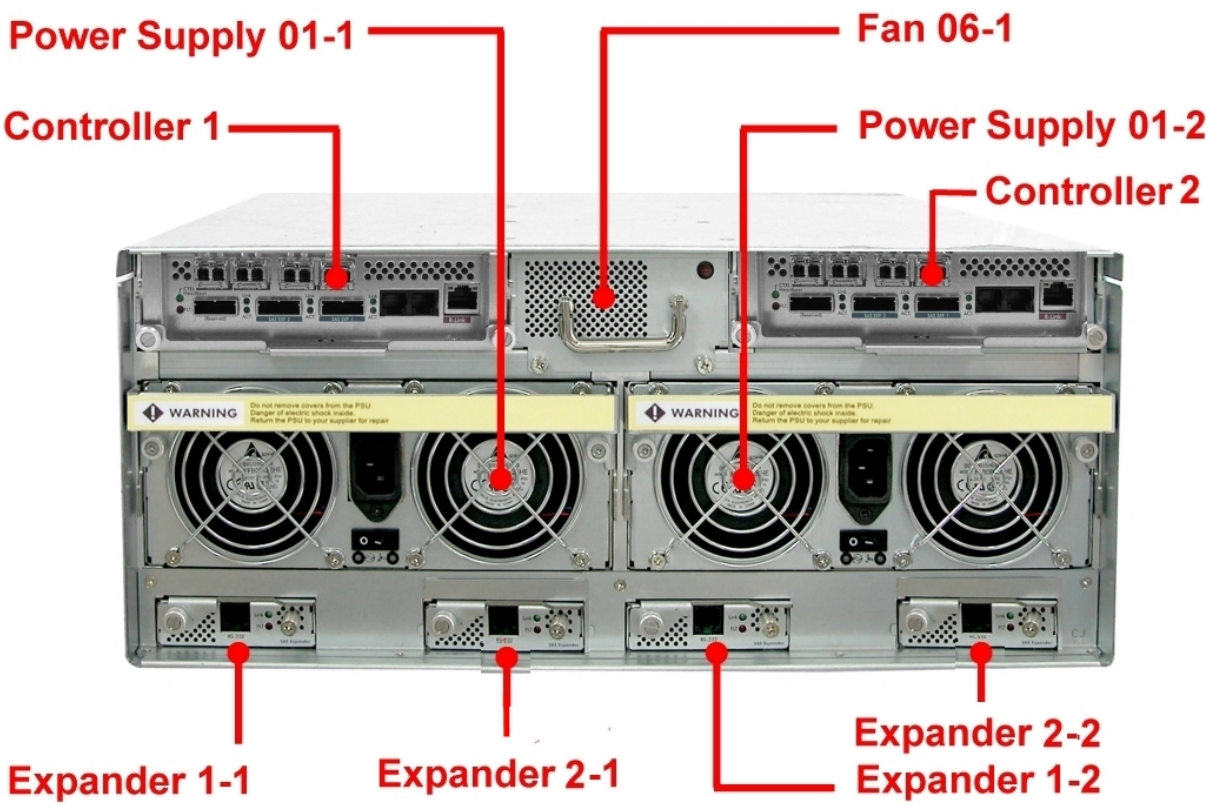
(1.) When the subsystem is online and a Power Supply fails, and the replacement Power Supply module is not yet available, don't remove or disconnect the failed Power Supply module. This is to maintain proper airflow within the enclosure, since the fans will still be working.

(2.) When the subsystem (redundant controller mode) is online and a component, such as RAID Controller module or Expander module, fails and the replacement is not yet available, in order to maintain proper airflow within the enclosure, the failed module can be disconnected just about an inch but not entirely removed from the slot. Another option is to use a cover plate to temporarily cover the slot of the removed module. This is needed to maintain proper airflow within the enclosure.

(3.) When replacing a failed component online, it is not recommended to remove the failed component for a long period of time; proper air flow within the enclosure might fail causing high controller / disk drive temperature.



Single Controller RAID Subsystem



Dual Controller RAID Subsystem

NOTE: Each Power Supply Fan Module has 1 Power Supply and 5 Fans.
For the purpose of hardware monitoring, the RAID enclosure is logically divided into two enclosures.

The functions of the Expander Modules are as follows:

Module:	Function / Description:
Expander Module 1-1 (for Controller 1)	Monitors Enclosure 1 (Disk slots 1 to 21, Power Supply 01-1, Fans 01-1, 02-1, 03-1, 04-1, and 05-1, and Turbo Fan 06-1). Note: "-1" means enclosure 1.
Expander Module 2-1 (for Controller 2)	Same function as Expander 1-1
Expander Module 1-2 (for Controller 1)	Monitors Enclosure 2 (Disk slots 22 to 42, Power Supply 01-2, Fans 01-2, 02-2, 03-2, 04-2, and 05-2. Note: "-2" means enclosure 2.
Expander Module 2-2 (for Controller 2)	Same function as Expander 1-2

Before servicing the RAID subsystem, please see the following table for additional information about specific problem and what to replace.

Problem	What to do / What to Replace
The LCD Display Panel does not show any character. No light in LCD Display Panel.	1. Check first if the LCD cable is properly connected to the LED front panel module and LCD display module. Refer to Section 2 step F and J. 2. Try to replace the LCD cable. Refer to Section 2 Step J. 3. If the LCD cable is properly connected or already replaced but the problem still exists, replace the LCD display module. Refer to Section 2.
The LCD Display Panel has blue background light but does not show any character.	1. Check first if the RAID controller(s) can start-up normally (not hang). If controller(s) cannot boot-up normally, check the RAID controller(s) or expander module(s). 2. If the RAID controller(s) can start-up normally, check if the LCD cable is properly connected to the LED front panel module and LCD display module. Refer to Section 2 step F and J. 3. Try to replace the LCD cable. Refer to Section 2 Step J. 4. If there is still problem after checking or replacing the LCD cable, replace the LCD display module (PRO-275-G). Refer to Section 2.

Problem	What to do / What to Replace
Some or all HDD LEDs (Activity LEDs and Power On/Fail LED) on front panel do not light up after power on.	1. Check first if the RAID controller(s) can start-up normally (not hang). If controller(s) cannot boot-up normally, check the RAID controller(s). 2. Make sure all expander modules are working fine. If there is a failed expander module, check or replace it first. Refer to Section 10. 3. If the RAID controller(s) can start-up normally, check if the switch cable and LCD cable are properly connected to the LED front panel module. Refer to Section 1 step E and F. 4. Check if there disk drive in the particular slot in which HDD LED does not light up. Try to move the disk drive in another slot and see if the HDD LED will light up. And try another disk drive in the particular slot with HDD LED not working. 5. If the disk drive is detected in RAID Manager GUI in the particular slot, but the HDD LED still has problem, replace the LED front panel module. Refer to Section 1.

Problem	What to do / What to Replace
The RAID subsystem does not start up properly. Both RAID controllers are in Faulty state (Fault LED is blinking red).	1. Check the cable of Switch Mechanism in both RAID controllers, if cable is properly connected. Refer to Section 4 Step D. 2. To verify if the 2 RAID controllers are working fine, power off the enclosure, disconnect the cable of Switch Mechanism in both RAID controllers, and then power on the enclosure. If both controllers are working fine, then the problem is in the Switch Mechanism. Refer to Section 6 on how to replace the switch mechanism. 3. Make sure none of the 4 expander modules are failed (when Fault LED is red). If so, check or replace the failed expander module. Refer to Section 10. 4. If all 4 expander modules are good, verify if each individual RAID controller is working fine. Power off the enclosure, remove one RAID controller and the corresponding 2 expander modules, power on, and check if the single RAID controller can work fine. Then repeat the test to check the other RAID controller in single controller mode. If both RAID controllers can work in single controller mode, then the problem could be with the switch mechanism. Check or replace the switch mechanism. Refer to Section 6. 5. If switch mechanism has been replaced but controller still fails, remove and reinsert the RAM module, or try to replace with a new one. Refer to Section 5. 6. If the cable of switch mechanism are disconnected in both RAID controllers, all 4 expander modules are good, and one or both RAID controllers fail, replace the failed RAID controller(s). Refer to Section 4.

Problem	What to do / What to Replace
One RAID controller does not start up properly. The FLT LED is blinking red.	1. Check the cable of Switch Mechanism in the faulty RAID controller, if cable is properly connected to the RAID controller. Refer to Section 4 Step D. 2. Remove and reinsert the RAM module (cache memory) in the faulty RAID controller. Refer to Section 5 how to remove and reinsert the RAM module. 3. Make sure none of the 4 expander modules are failed (when Fault LED is red). If so, check or replace the failed expander module. Refer to Section 10. 4. If problem still exist, replace the faulty RAID controller. Refer to Section 4.

Problem	What to do / What to Replace
The Volume Sets (LUNs) are not detected in one Fibre port or both Fibre ports (host channels).	1. Make sure that the Fibre cable(s) is/are properly connected to the Fibre HBA and to the Fibre host port(s). 2. Make sure the Fibre HBA and SFP module(s) are working fine. 3. Verify Fibre Channel Config in Raid Manager GUI -> System Controls, if Channel 0 (or 1) Speed – Current Speed shows “Unknown”, and Channel 0 (or 1) Topology – Current Topology shows “None”, then there is no Fibre connectivity on that particular Fibre host port or channel. Try to change both the FC Speed and Topology settings to “Auto”, and then verify if it helps. 4. Make sure that the LUN host channel mapping on Fibre port is correct. Verify this in Volume Set Information -> Fibre Ch/Lun. Fibre Ch 0 means channel 0. 5. If channel mapping is correct but the problem still exists, try mapping the LUN to the other Fibre port (example: from Fibre Ch 0 to Fibre Ch 1). If one Fibre port works, while the other does not, replace the daughter board. Refer to Section 7. 6. If both Fibre ports do not work, replace the daughter board. Refer to Section 7.

Problem	What to do / What to Replace
When the main Power Switch is turned on, the enclosure does not power on.	1. Make sure that the power cords are connected to the 2 PSFM (Power Supply fan Module), and that the power on switch of the 2 PSFM are turned on. Verify that the Power Status LED becomes red when the power cable is inserted in the AC input power socket. 2. If the power cords have power from power source and are properly connected, but the PSFM Power On/Fail LED shows red after turning on the main Power Switch, try to swap the PSFM with the other PSFM. 3. If both the Power On/Fail LEDs of 2 PSFM shows red when power cords are connected, but the enclosure still does not power on, check the main power switch cable if properly connected. Refer to Section 3 step E. 4. If the main power switch cable if properly connected but enclosure still does not power on, replace the main power switch. Refer to Section 3.
One Power Supply failed. The alarm beeper sounds, the controller log shows “Ex Power 01-x Failed”, and the Hardware Monitor shows “Power 01-x Failed”. The Power Status LED on the PSFM is red.	1. Make sure that the power cord connected to the PSFM is good. Check that there is power from power source (where power cord gets its power). Verify that the Power Status LED becomes red when the power cord is inserted in the AC input power socket. 2. Try to remove and reinsert the PSFM (wait for several seconds before reinserting). 3. If the power supply on the PSFM still fails, replace the PSFM. Refer to Section 8.
One fan in the PSFM is not working. The alarm beeper sounds, the Hardware Monitor shows the Fan RPM is 0 (zero). The Fan Fail LED on the PSFM is red.	1. Check which PSFM the Fan Fail LED is red, or check which “Enclosure” the failed fan is located. Then replace the PSFM where the failed fan is located. Refer to Section 8.

Problem	What to do / What to Replace
One or more disk drives is/are not detected on one or more slots.	1. Make sure the disk drive (SATA or SAS) is good. Verify that the Power On/Fail LED is green (good). If LED is red, try the disk drive in another disk slot. 2. If disk drive is SATA and RAID subsystem is in dual controller mode, check or replace the dongle board connected to the SATA disk drive. Make sure the dongle board is working fine. Swap with another dongle board, if possible, and try again the disk drive in another slot. 3. Make sure the firmware version of Expander modules and RAID controller expander are all the same. If not, upgrade each expander to the same (common) version. 4. Try to replace the suspected Expander module (see Section 10) or RAID controller (see Section 4). 5. If the disk drive is good, the dongle board is good, and Expander firmware are all same, and Expander module and RAID controller have been checked/replaced, but a disk drive is always not detected on the same slot but works in another slot, replace the bottom board. Refer to Section 9. And take note which disk slot have problem and replace the corresponding bottom board. See the second picture in Section 9 step G.

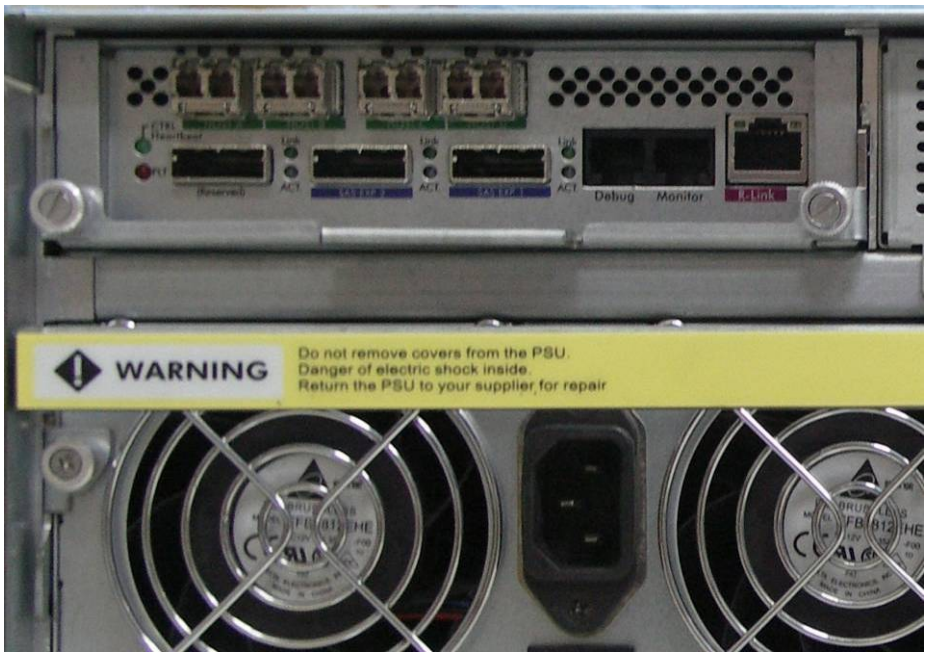
Problem	What to do / What to Replace
The Turbo Fan (Fan 06-1) is failed. The Hardware Monitor shows the Fan RPM is 0 (zero). The Turbo Fan Status LED is red.	1. Check fan cable inside the Turbo Fan, if properly connected. Refer to Section 11 step C. 2. Try to replace the Fan Board, or replace the Turbo Fan. Refer to Section 11 step C. 3. If a replacement Turbo Fan module is available, replace the Turbo Fan module. Refer to Section 11.
One or both RAID controllers and one or both power supply modules are not detected in the controller slot or power supply slot.	1. Make sure the RAID controller(s) or power supply module(s) are good. Try the controller or power supply in another enclosure. 2. If the controller and power supply are good but cannot be detected in same controller or power supply slot, replace the middle backplane board. See Section 12.

1. How to Replace the RAID Controller (ARC8006)

A. When a RAID controller fails, the FLT LED will be blinking red indicating controller failure Shutdown the Raid System. Loosen the thumbscrews on the sides of the failed RAID controller.

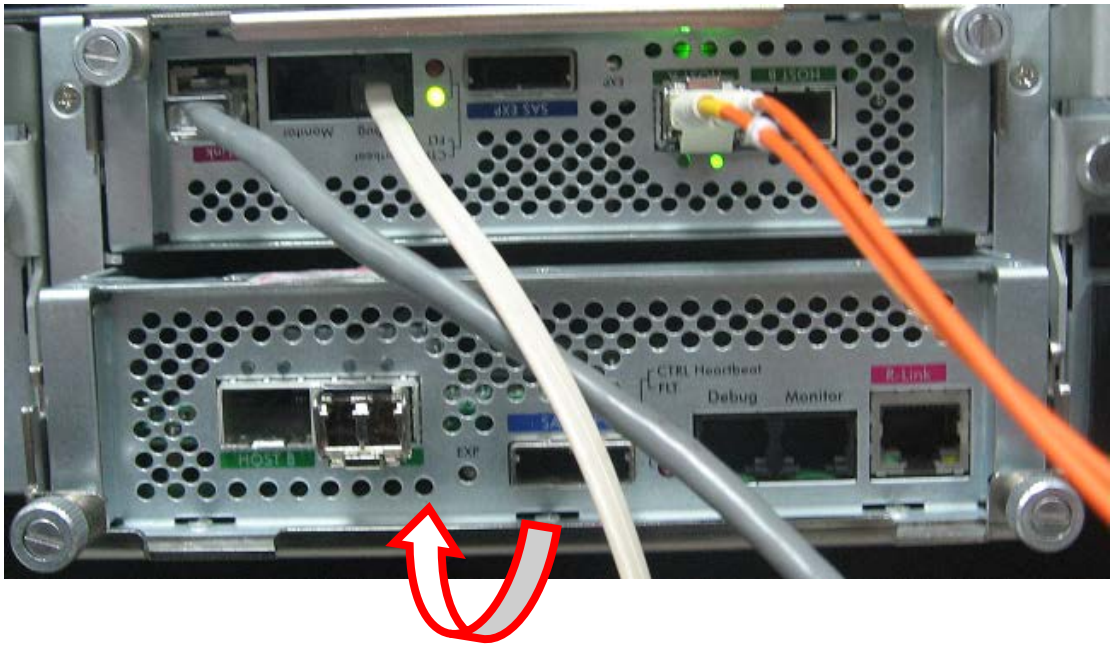
Loosen the 2 thumbscrews on both sides of the failed controller.

B. Remove all cables from the panel of the failed RAID controller.



The cables from the Failed Controller are removed.

C. Pull the handle bar of the controller drawer about 90°, and then remove the controller drawer from the slot.



(NOTE: The picture is not from actual machine model but from similar RAID series)

S. Insert the controller drawer into the controller slot. The **FLT LED** will still be **blinking red**. **NOTE: Don't tighten yet the 2 thumbscrews**.

The replacement Controller is inserted

(NOTE: The picture is not from actual machine model but from similar RAID series)

T. Reconnect all cables.

All cables on the replacement Controller are reconnected / reinserted.

(NOTE: The picture is not from actual machine model but from similar RAID series)

U. Press the handle bar towards the side of the controller drawer and make sure the handle bar is well attached to the controller drawer side. And then properly tighten the 2 thumbscrews.

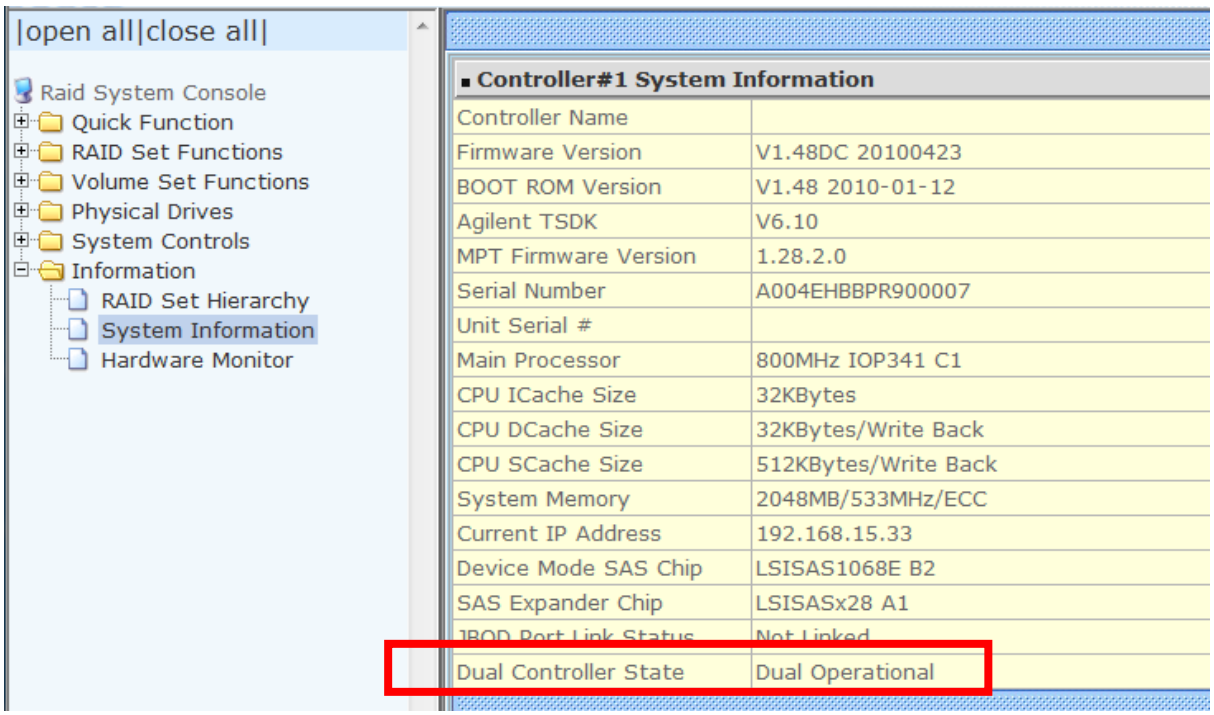
NOTE: When the thumbscrews are tightened, the FLT LED will be off and one short beep will be heard. This means the controller status is OK.

An alarm will still sound. In this time, the new/replacement controller will take over the original IO jobs of the failed controller.

IMPORTANT: The thumbscrews must be properly tightened so that the FLT LED will be off and the controller status will become OK.

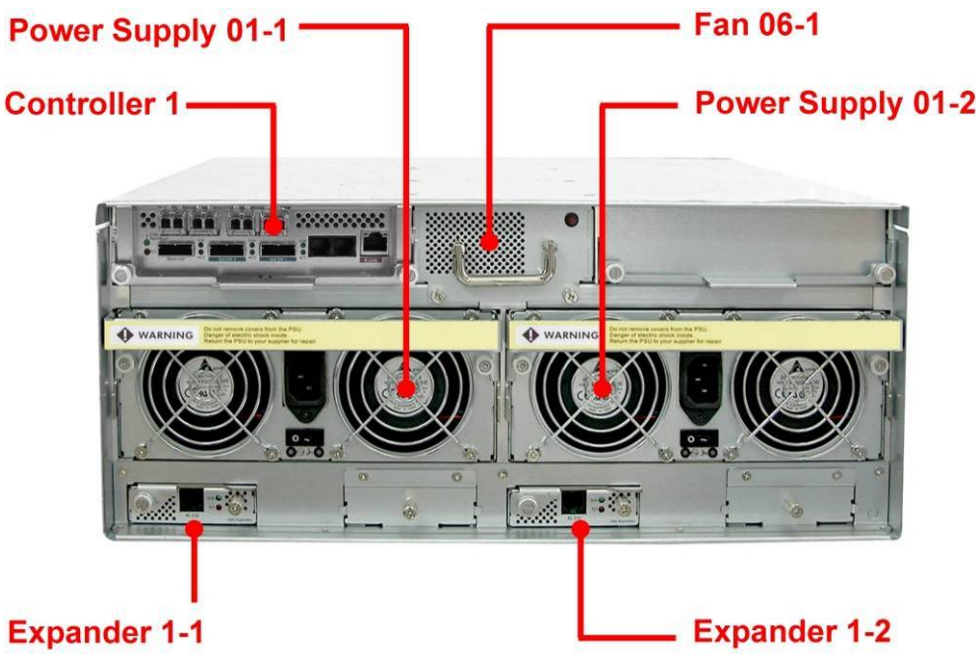
V. **After the inserted controller has taken over the original IO jobs of the failed controller**, the **alarm** sound will be **off**. B controllers will be back to normal operational mode.

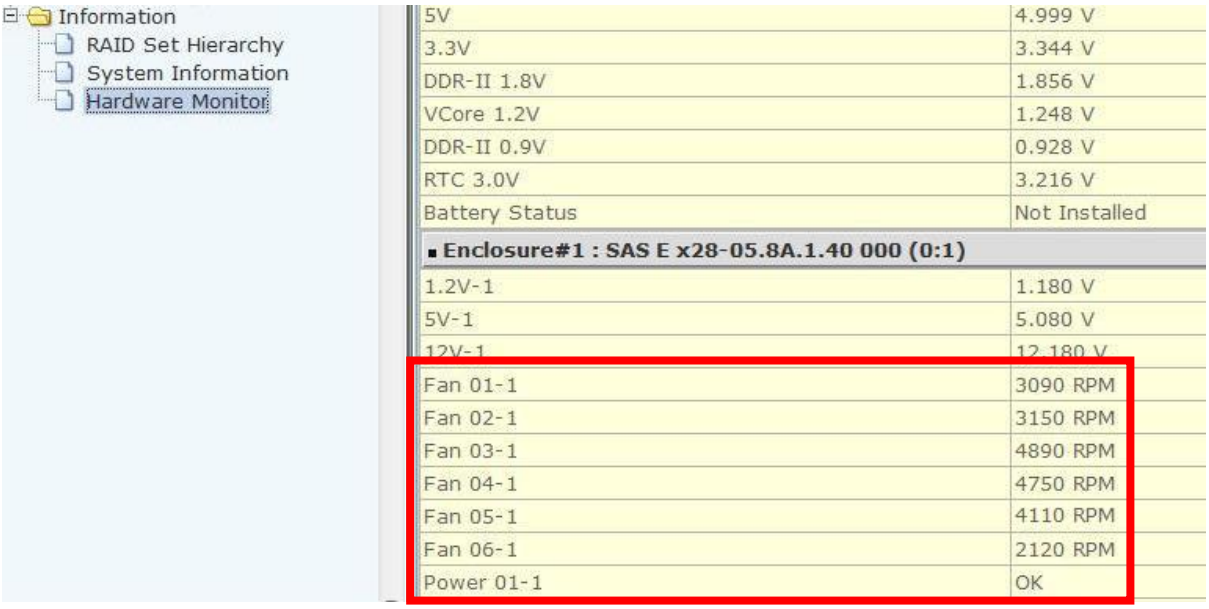
NOTE: To verify the status of the 2 RAID controllers, login to the Raid Manager GUI on one of the RAID controller and check in System Information the Dual Controller State; it should be "Dual Operational".



2. How to Replace the Power Supply Fan Module (PSFM)

NOTE: Each Power Supply Fan Module (PSFM) has one Power Supply and five Fans. **PSFM 1 has Power 01-1, Fan 01-1, Fan 02-1, Fan 03-1, Fan 04-1, and Fan 05-1,** and **PSFM 2 has Power 01-2, Fan 01-2, Fan 02-2, Fan 03-2, Fan 04-2, and Fan 05-2**.



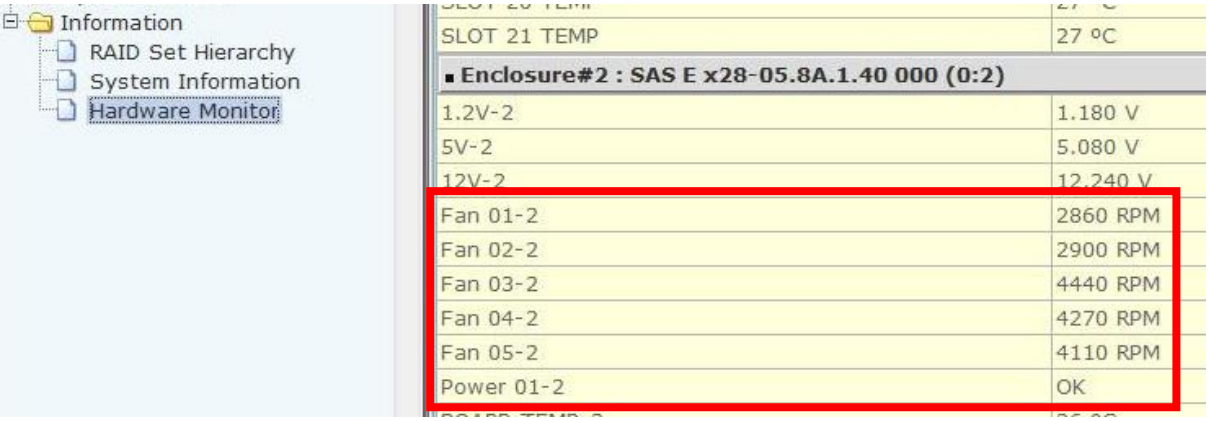


- Information
  - RAID Set Hierarchy
  - System Information
  - Hardware Monitor

5V	4.999 V
3.3V	3.344 V
DDR-II 1.8V	1.856 V
VCore 1.2V	1.248 V
DDR-II 0.9V	0.928 V
RTC 3.0V	3.216 V
Battery Status	Not Installed
Enclosure#1 : SAS E x28-05.8A.1.40 000 (0:1)	
1.2V-1	1.180 V
5V-1	5.080 V
12V-1	12.180 V
Fan 01-1	3090 RPM
Fan 02-1	3150 RPM
Fan 03-1	4890 RPM
Fan 04-1	4750 RPM
Fan 05-1	4110 RPM
Fan 06-1	2120 RPM
Power 01-1	OK

Power 01-1 and Fan 01-1 to 05-1

NOTE: Fan 06-1 is included in fans being monitored in Enclosure #1



Power 01-2 and Fan 01-2 to 05-2

IMPORTANT:

When the Power Supply of a PSFM fails, the PSFM need not be removed from the slot if replacement is not yet available. The fans will still work and provide necessary airflow inside the enclosure.

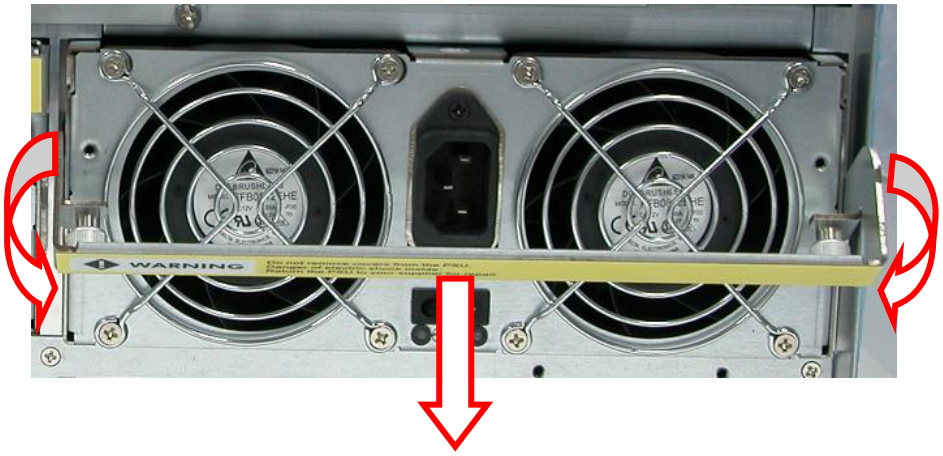
After replacing the Power Supply Fan Module and turning on the Power On/Off Switch of the PSFM, the Power Supply will not power on immediately. The Fans in the PSFM will spin-up until the RPM becomes stable. When Fan RPM is already stable, the RAID controller will then power on the Power Supply. This process takes more or less 30 seconds. This safety measure helps prevent possible Power Supply overheating when the Fans cannot work.

NOTE: If a Fan fails, the whole PSFM module can be replaced. The PSFM, with failed Fan, can be checked or repaired via RMA.

NOTE: Before replacing a PSFM, turn off the PSFM switch and disconnect the power cable from the AC Power Input Socket.

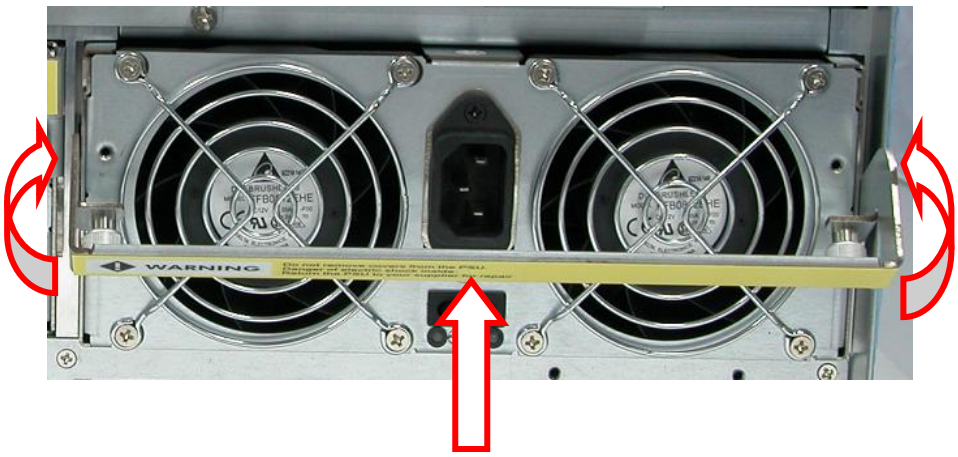
A. Loosen the thumbscrews of the Power Supply Fan Module.

B. Pull the handle of the Power Supply Fan Module. The Power Supply Fan Module will move out from the slot.



C. Prepare the new Power Supply Fan Module.

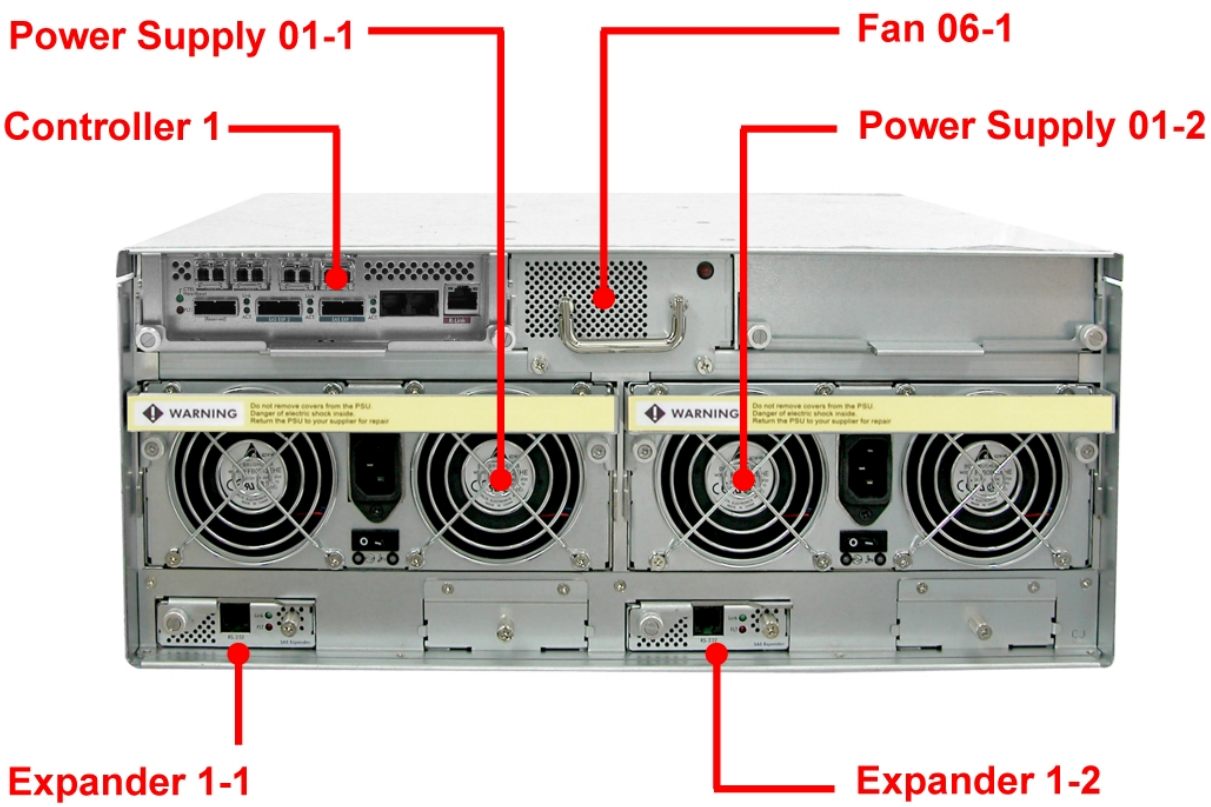
D. Insert the replacement Power Supply Fan Module and push inwards. With the handle in open position, close the handle until the lock is engaged.

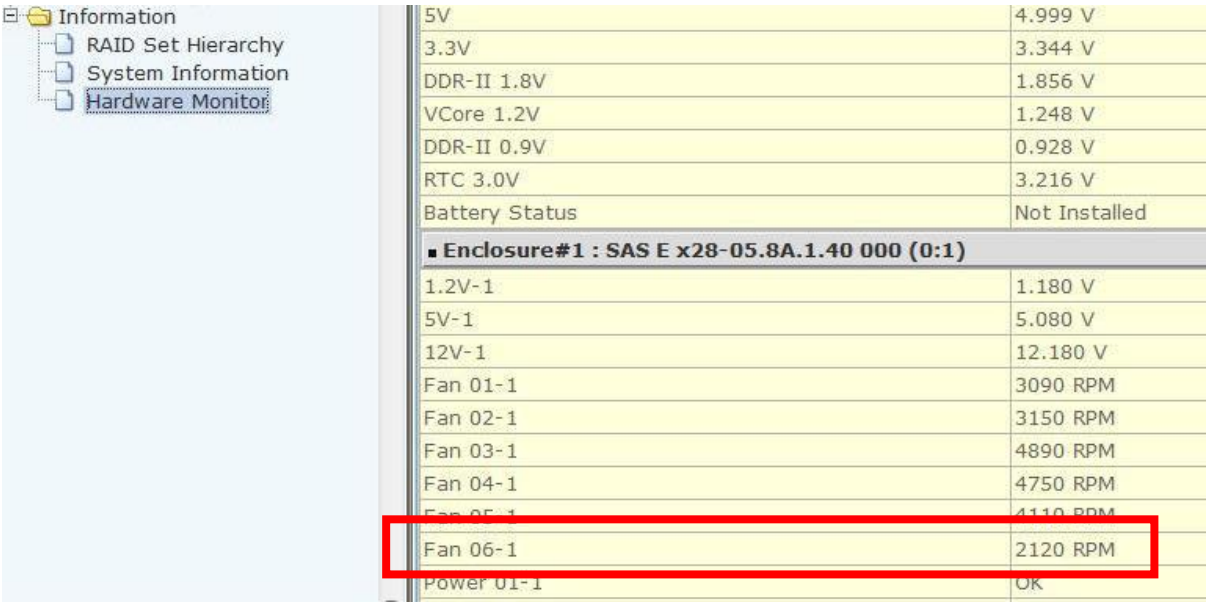


E. Tighten the 2 thumbscrews of the PSFM.

F. Reconnect the power cable. Turn on the PSFM power switch.

3. How to Replace the Turbo Fan (Fan 06-1)

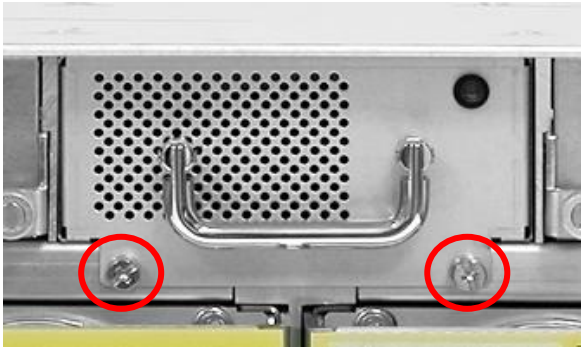




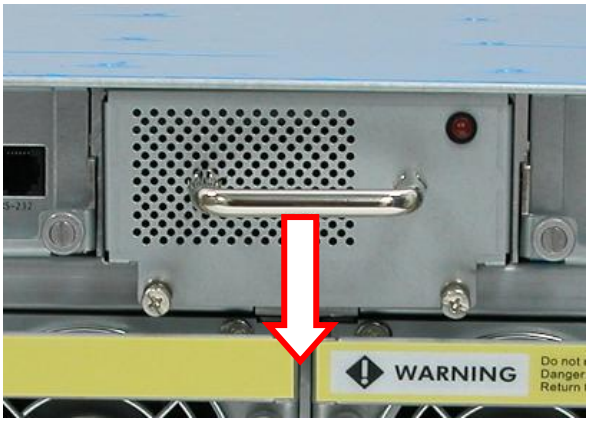
- Information
  - RAID Set Hierarchy
  - System Information
  - Hardware Monitor

5V	4.999 V
3.3V	3.344 V
DDR-II 1.8V	1.856 V
VCore 1.2V	1.248 V
DDR-II 0.9V	0.928 V
RTC 3.0V	3.216 V
Battery Status	Not Installed
Enclosure#1 : SAS E x28-05.8A.1.40 000 (0:1)	
1.2V-1	1.180 V
5V-1	5.080 V
12V-1	12.180 V
Fan 01-1	3090 RPM
Fan 02-1	3150 RPM
Fan 03-1	4890 RPM
Fan 04-1	4750 RPM
Fan 05-1	4110 RPM
Fan 06-1	2120 RPM
Power 01-1	OK

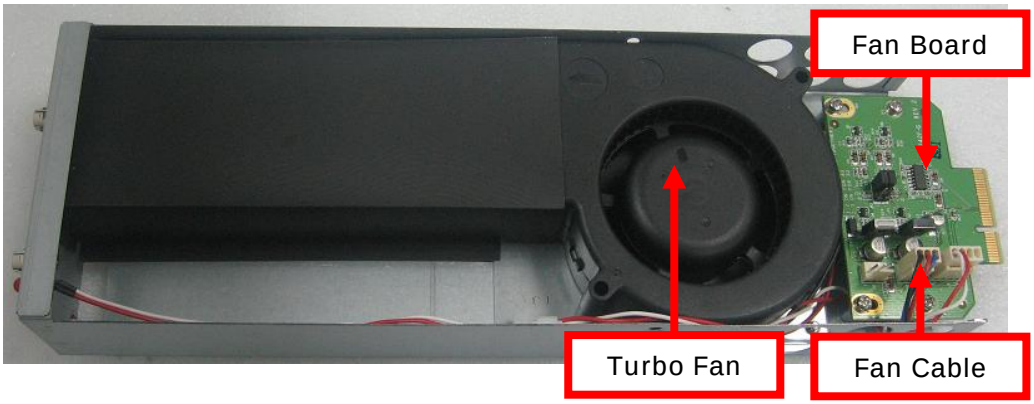
A. Loosen the 2 screws of the Turbo Fan module.



B. Pull the handle to remove the Turbo Fan module from the slot.

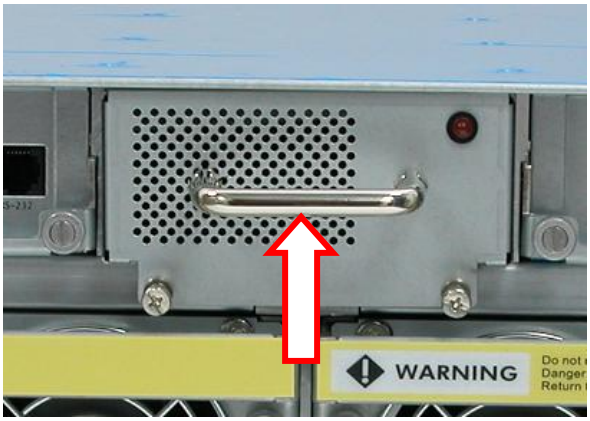


C. Insert the replacement Turbo Fan module.

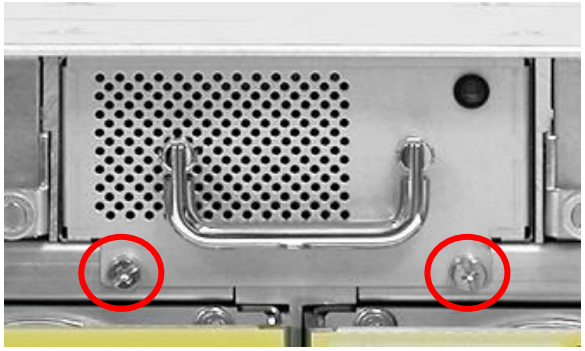


NOTE: If only the fan board will be replaced, disconnect first the fan cable, loosen the screws on the fan board, and replace the fan board.

D. Insert and push the Turbo Fan module until it is fully inserted.



E. Tighten the 2 screws of the Turbo Fan module.



2.6 Disk Tray

The Disk Tray houses a 3.5 inch hard disk drive. It is designed for maximum airflow and incorporates a carrier locking mechanism to prevent unauthorized access to the HDD.

Disk Tray Lock

Unlocked

Locked

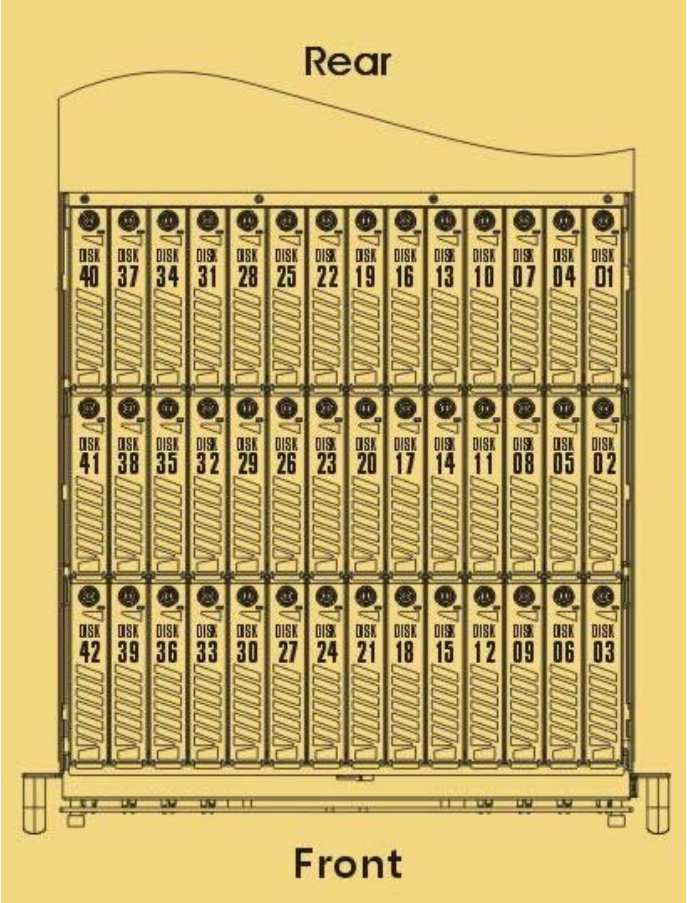
Key for Disk Tray Lock

2.6.1 Disk Drive Installation

This section describes the physical locations of the hard drives supported by the subsystem and give instructions on installing a hard drive. The subsystem supports hot-swapping allowing you to install or replace a hard drive while the subsystem is running.

NOTE: When the RAID subsystem is shipped, the disk trays are not placed in the disk slots. If all disk trays will be used to install all 42 disk drives, for quicker and easier installation of disk drives in the RAID subsystem, it is recommended to install first each disk drive in a disk tray. After installing the disk drives, insert 14 disk trays into one row of 14 slots at a time and lock them one by one. Do the same for the next row until the last row.

Disk Slots



NOTE: When the subsystem is already in operational mode, it is not recommended to open the top cover for a long period of time; proper air flow within the enclosure might fail causing high disk drive temperature.

IMPORTANT: In dual controller mode, the installation of SATA disk drive in a disk tray is done differently. In single controller mode, the installation of SATA disk in a disk tray is the same with SAS disk.

HDD	Single Controller	Dual Controller
SATA	No need dongle board	Need dongle board
SAS	No need dongle board	No need dongle board

NOTE: In this model, it is recommended to use 6Gb hard drive disks.

To install a SATA disk drive (Dual Controller Mode) in a disk tray:

1. Use the Key for Disk Tray Lock to unlock a disk tray.

2. Prepare the dongle board with metal bracket.

3. Connect the dongle board into the SATA disk drive.

4. Place the SATA disk drive into the disk tray, then turn the disk tray upside down. To secure the disk drive into the disk tray, tighten 4 screws on the holes of the disk tray. Note in the picture below where the screws should be placed in the disk tray holes.

4 screws **#6-32 UNC L=5.0mm**

5. Tighten 2 screws of the dongle board metal bracket.

To install a SAS disk drive (Single or Dual Controller Mode) or SATA disk drive (Single Controller Mode) in a disk tray:

1. Use the Key for Disk Tray Lock to unlock a disk tray.

2. Place the disk drive into the disk tray.

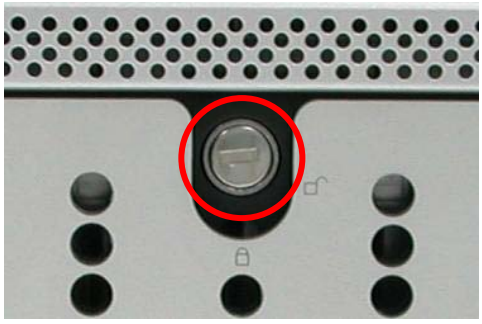
3. Turn the disk tray upside down. To secure the disk drive into the disk tray, tighten 4 screws on the holes of the disk tray. Note in the picture below where the screws should be placed in the disk tray holes.

4 screws  **#6-32 UNC L=5.0mm**

To install the disk trays into the disk slots:

a. Loosen two screws on both sides of the top cover on the front panel side.

b. Use the Top Cover Key to unlock the key lock on the front panel side.

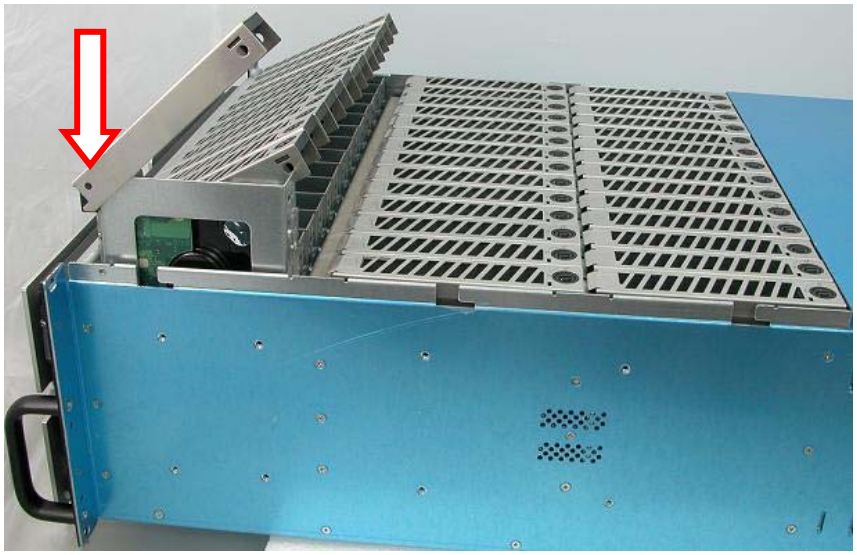


c. Hold the front part of the top cover and slide the top cover about half an inch towards the front side then pull upwards to remove it.

d. Insert each disk tray with disk drive one by one, 14 disk trays or one row first, and then lock each disk tray. Then do the same for the next 14 disk trays or row.

To install the disk tray into the disk slot, insert it first in the slot.

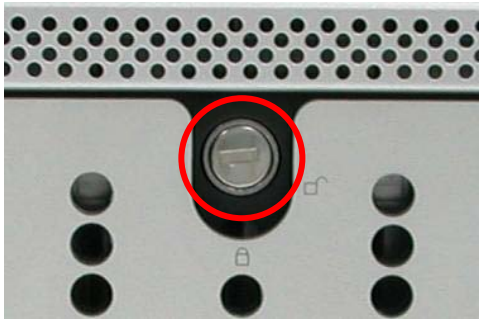
Then push down the latch part of disk tray as indicated in the picture below until it reached a full stop.



Close the lever handle then use the Key for Disk Tray Lock and turn the disk tray lock into "locked" position.

e. When all disk trays have been installed and locked, put the top cover back and place it about half an inch away. Then push the top cover towards the rear.

f. Use the Top Cover Key to lock the key lock on the front panel side.



g. To secure the top cover, tighten two screws on both sides of the top cover on the front panel side.