Alnico Series RAID Subsystem Hardware Installation Guide

Ver. 1.7

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Regulatory information

For Europe

This drive is in conformity with the EMC directive.

Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

Those limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antennas.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circlet different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

Warning:

A shielded-type power cord is required in order to meet FCC emission limits and also to prevent interference to the nearby radio and television reception. It is essential that only the supplied power cord be used.

Use only shielded cables to connect I/O devices to this equipment.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

About This Hardware Installation Guide

Welcome to Hardware Installation Guide. This guide is designed to be used as step-by-step instructions for installation of your subsystem, and covers everything you need to know in learning how to operation, troubleshooting and future upgrades. For the detail about how to configure your subsystem, please refer to the Software Operation manual.

Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.

Caution

This icon indicates that failure to follow directions could result in personal injury, damage to your equipment or loss of information.

Note

This icon presents commentary, sidelights, or interesting points of information. .

Important terms, commands and programs are put in **Boldface** font.

Screen text is given in **`screen`** font.

Contents

Chapter 1. INTRODUCTION

This chapter introduces the features and capabilities of Alnico series RAID subsystems.

You will find:

- ⇨ **A full introduction to your Alnico RAID subsystem.**
- ⇨ **Details of key features and supplied accessories.**

Model Variations

There are nine available models in Alnico RAID storage subsystem series, three of them utilize Ultra320 SCSI as Host interface, each with 8,12 or16 device bays. Another three models support 4Gb FC via SFP connector, then rest of three models provide SAS for Host connecting :

Model Name	*Host Interface*	*Device bays*
AL-6080S	2 x Ultra320 SCSI	8 bays
AL-6080FA	2 x 4Gbps FC	8 bays
AL-6080SA	2 x MiniSAS Connectors (2 x 3Gb Links per connector)	8 bays
AL-6120S	2 x Ultra320 SCSI	12 bays
AL-6120FA	2 x 4Gbps FC	12 bays
AL-6120SA	2 x MiniSAS Connectors (2 x 3Gb Links per controller)	12 bays
AL-6160S	2 x Ultra320 SCSI	16 bays
AL-6160FA	2 x 4Gbps FC	16 bays
AL-6160SA	2 x MiniSAS Connectors (2 x 3Gb Links per controller)	16 bays

Features

The Alnico series is a high performance, external RAID subsystem using new generation of Serial ATA 2.0 channels for disk drives and either Ultra320 SCSI or 4Gbps Fibre channel I/O standard to connect services to Host computer. Target usage ranges are set from small business to departmental and corporate server needs. The Alnico RAID is designed for easy integration, smooth data expansion and server migration.

When properly configured, the Alnico RAID can provide non-stop service with a high degree of fault tolerance through the use of RAID technology and advanced array management features.

The Alnico series supports the following features:

- High performance super scalar Intel Xscale 80321 IO processor.
- Superior Array Management Firmware supports RAID levels 0, 1 (0+1), 3, 5, 6 and JBOD RAID configurations.
- Advanced 100MHz/64-bit PCI-X bus architecture
- Cache memory utilizes the Fastest 64-bit 200Mhz ECC DDR SDRAM and cache memory size up to 1 gigabytes.
- New generation Serial ATA 2.0 Drive Interface supported.

  AL-6160 → Up to 16 SATA drives via two 8 channels SATA interface.

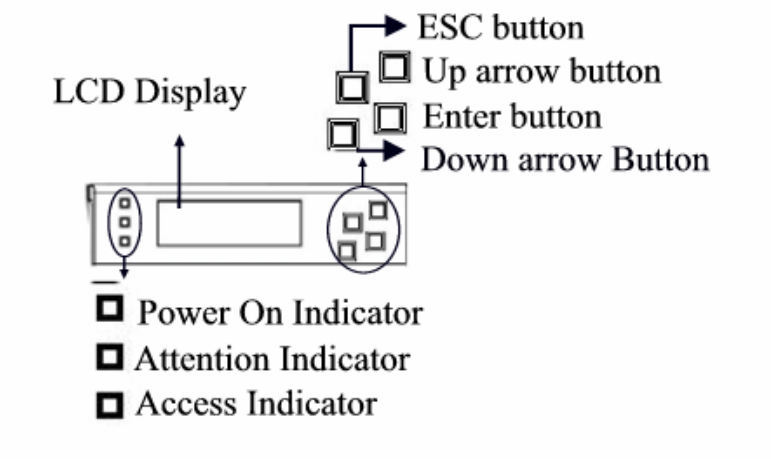
  AL-6120 → Up to 12 SATA drives via two 8 channels SATA interface.

  AL-6080 →Up to 8 SATA drives via single 8 channels SATA interface.
- Redundant and Hot Swappable Fan, Power and Drives.
- Hot Swap, Hot Spare and Automatic Drive Rebuild Supported.
- Configuration and environmental information is accessible either via the control panel or Serial Port or 10/100 Ethernet LAN port.
- E-mail event notification.
- Load sharing hot swappable redundant power system with PFC function.
- Host System independent.
- Operating System independent.

Understanding the Alnico RAID subsystem

Front Panel Overview

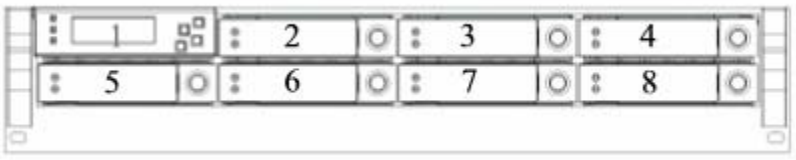
LCD Module



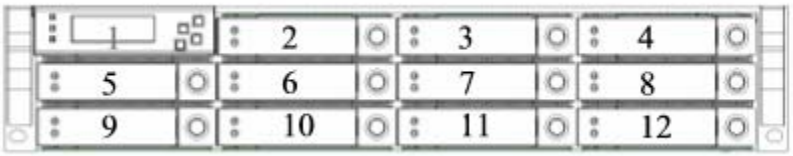
Driver Bay numbering convention

The enclosure bay numbering convention is shown in following figure. A bay is designed to house a single 1.0-inch high, 3,5-inch hard disk drive in his carrier module.

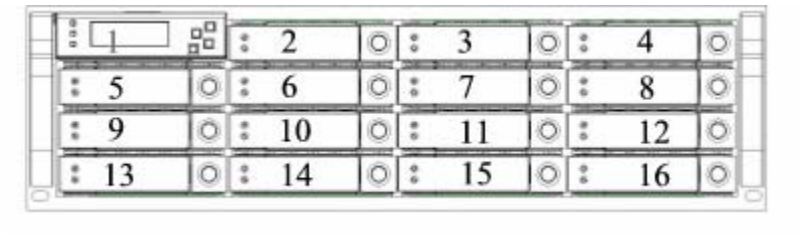
AL-6080



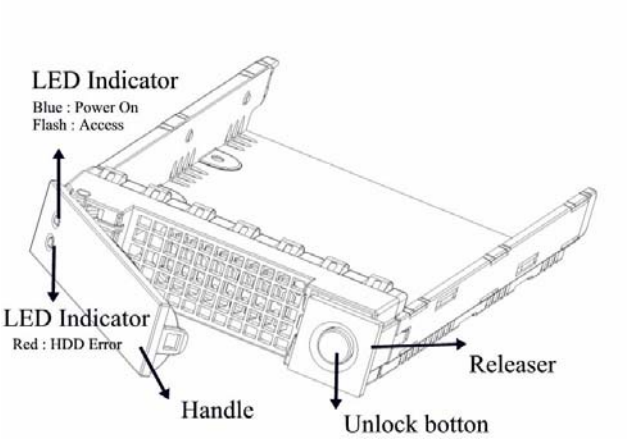
AL-6120



AL-6160

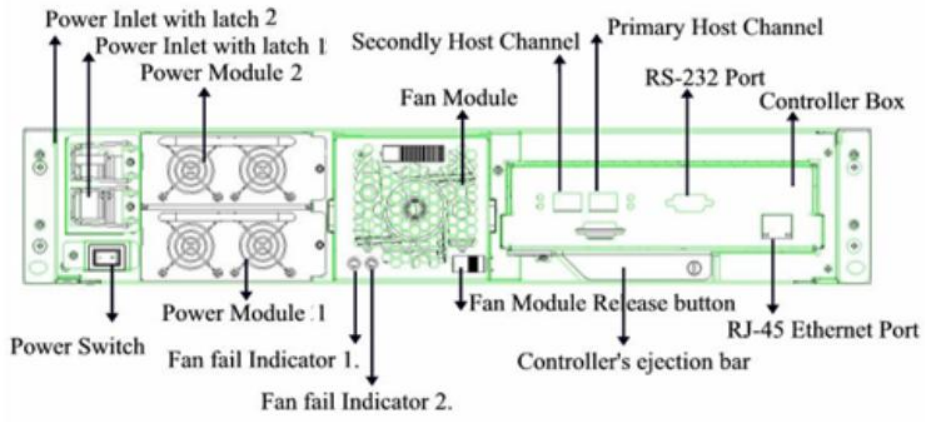


Drive Bay

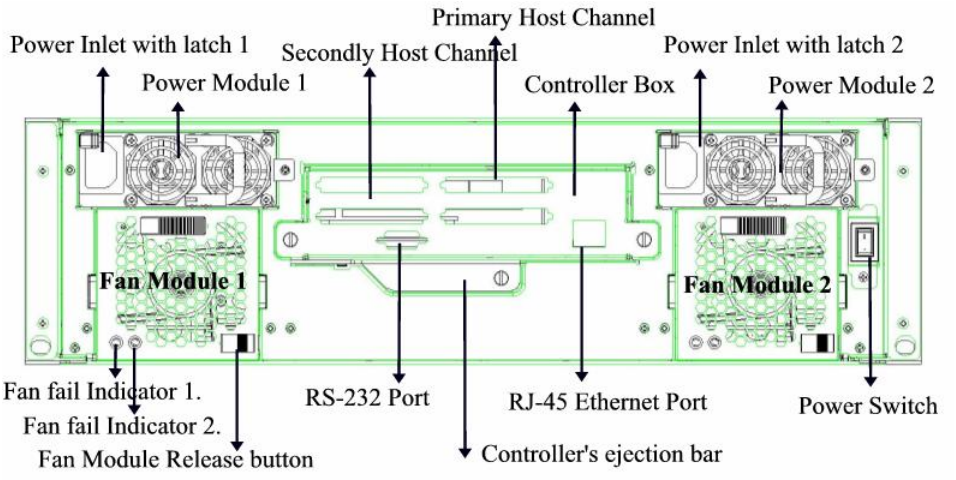


Rear Panel Overview

AL-6120 & AL-6080



AL-6160


Primary Host Channel
Power Inlet with latch 1
Secondly Host Channel
Power Inlet with latch 2
Power Module 1
Controller Box
Power Module 2
Fan Module 1
Fan Module 2
Fan fail Indicator 1.
Fan fail Indicator 2.
Fan Module Release button
RS-232 Port
RJ-45 Ethernet Port
Power Switch
Controller's ejection bar

Chapter 2. INSTALLATION

This chapter presents:

- ⇨ **Instructions on unpacking & checking the equipment**
- ⇨ **Instructions on how to install Hard disk drive**
- ⇨ **Instructions on how to install Alnico RAID in a Rack.**
- ⇨ **Instructions on how to connect Alnico RAID.**

Unpacking & checking the Equipment

Before unpacking the Alnico RAID subsystem, prepare a clean, stable surface to put on the contents of Alnico RAID shipping container. Altogether, you should find following items in the package :

Alnico SCSI to SATA Subsystem

- Alnico RAID subsystem x1
- CD-ROM x 1 (Includes Hardware Installation Guide, Software operation Manual & HTTP Proxy Server utility for Web browser-based Configuration).
- Ultra320 SCSI Cable x1
- Null cable x1
- Ultra320 SCSI Active Terminator x1
- Power Cord x 2
- Spare Fan x 1
- Spare Drive Bay x 1
- Rails for Rack
- Mounting screws (bag) ×1

Alnico Fibre to SATA Subsystem

- Alnico RAID subsystem x1
- CD-ROM x 1 (Includes Hardware Installation Guide, Software operation Manual & HTTP Proxy Server utility for Web browser-based

Configuration).

- Null cable x1
- Power Cord x 2
- Spare Fan x 1
- Spare Drive Bay x 1
- Rails for Rack
- Mounting screws (bag) ×1

Alnico SAS to SATA Subsystem

- Alnico RAID subsystem x1
- CD-ROM x 1 (Includes Hardware Installation Guide, Software operation Manual & HTTP Proxy Server utility for Web browser-based Configuration).
- SAS cable(8088) x1
- Null cable x1
- Power Cord x 2
- Spare Fan x 1
- Spare Drive Bay x 1
- Rails for Rack
- Mounting screws (bag) ×1

To avoid the unmatched connector type between the Fibre HBA in the Host computer and Alnico RAID, Alnico RAID doesn't include the Fibre cable with the standard shipping.

What else you need

- Hard disk drives (different RAID levels requires different numbers of HDDs. Refer to Software Operation manual for more detail information.
- Host computer with SCSI, Fibre or SAS interface.
- Dedicated terminal or PC with third party communication software that supports ANSI terminal emulation (required for viewing Monitor Utility)

ESD Precaution

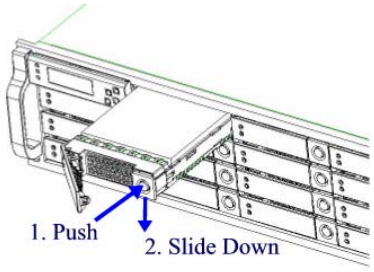
Use a suitable anti-static wrist or ankle strap and observe all conventional ESD precaution when handle Alnico RAID's modules and components. Avoid contact with backplane components and module connectors.

Installing hard disks

The Alnico RAID series includes 8/12/16 (depends on models) hot swappable drive bays. The following sections describe how to install disks into Alnico RAID subsystems.

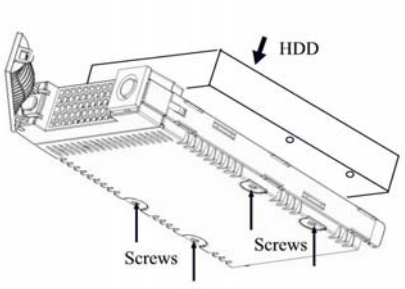
Remove the empty hot swappable driver bays

1. Push the unlock botton then slide down the Releaser on drive bays .
2. Left the handle to disengage the drive bay from the slot.



Loading Hard Disk to the drive bay.

1. Put HDD into the bay.
2. Fasten all 4 screws to mount HDD in the bay and make sure the HDD is properly tightened.



Place drive bays back into the system

1. Slide in drive bay, make sure the handle is open fully.
2. Close the handle to engage the drive bay into the slot.

The hard drives in a RAID array should match in size and speed. All drives in any array should be identical models with the same firmware versions. RAID arrays can use any size drive, however the smallest drive will determine the size of the array.

1. *Only use the screws offered with Alnico RAID subsystem. Longer screws might cause the drive damage.*

2. *All the drive bays (with or without hard drive) must be placed in the Alnico subsystem. Alnico's cooling system is designed with full of drive bays. Missing drive bays might cause the subsystem damage.*

Install The Alnico subsystem in a Rack

You are shipped one rackmounting kit for each Alnico subsystem that you intend to rackmount. Alnico subsystem is designed for installation into a industry-standard 19-inch rackmount cabinet. Following the use of this section for installing the Alnico subsystem into a Rack

Install the Slide Rails

1. Combine Left slide rail and rear slide rail.
2. Measure the depth of the rack enclosure, then fasten 4 of P4*8M screws into M4 Locking nuts to fix the length.
3. Use T5*8M screws and PW14 washer to install the left slide on Front and rear Posts of Rack as Figure 1.
4. repeat procedure 1 ~ 3 to install the right Slide into the Rack.

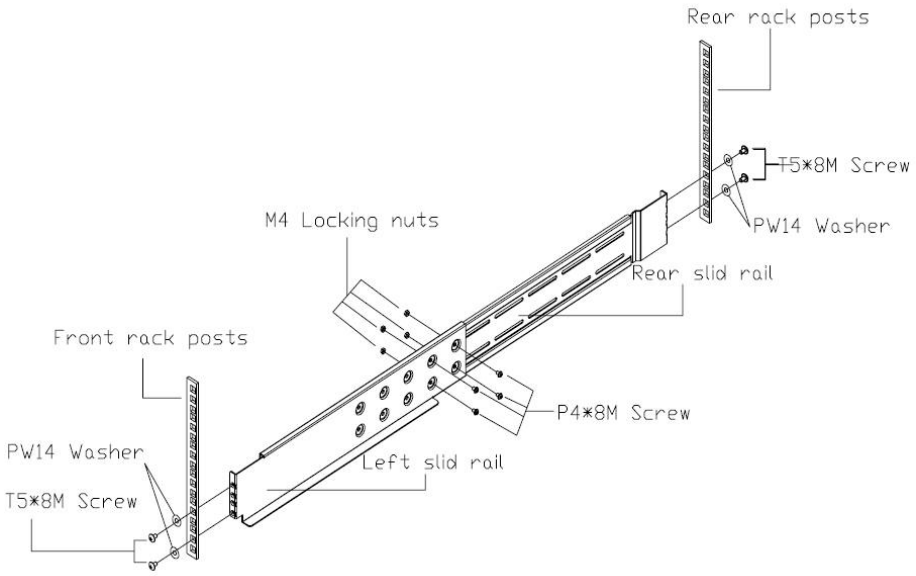


Figure 1.

Place the Alnico Subsystem into the rack

1. Lift the subsystem enclosure and slide it slowly and gently along the slide rail into the rack as Figure 2.

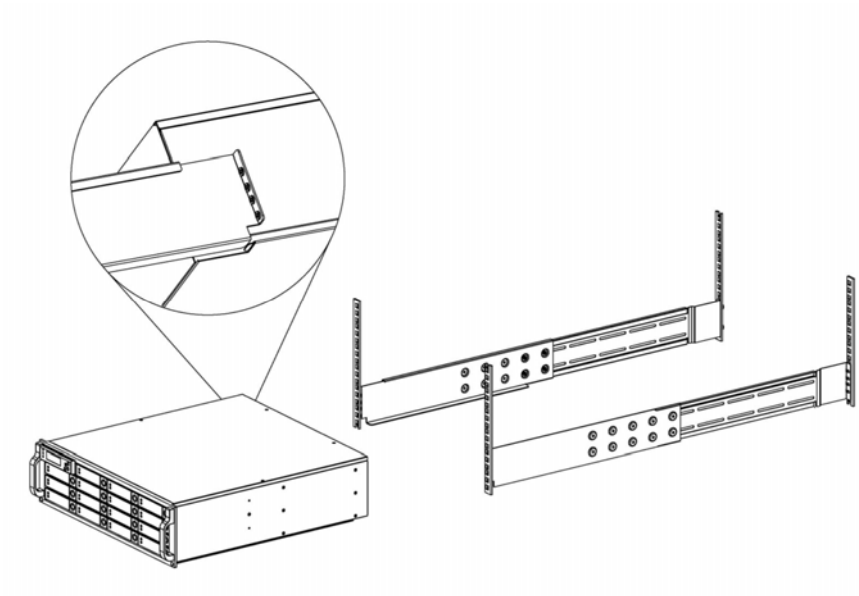


Figure 2.

2. Fasten two M5 screws through the chassis ears in the front side of the chassis to secure the Alnico subsystem in the rack as Figure 3.

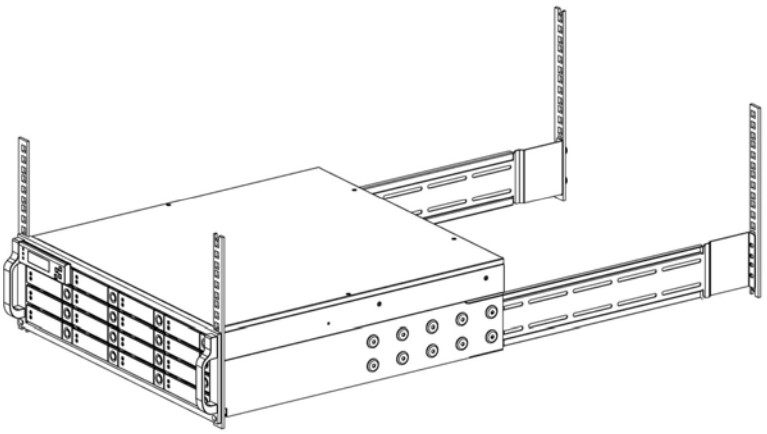


Figure 3.

The Alnico subsystem is heavy, two person are required to move the system in the procedure.

System Connection

Connect all cables and power cord as shown below :

Cable	Alnico RAID	Device	Purpose
Null Cable	RS-232 Port	ANSI Terminal or a PC with Terminal emulator.	Configuration Utility
SCSI cable / Fibre cable	Primary SCSI/ FC-AL Secondly SCSI/ FC-AL	HBA of Host computer	Host interface between RAID and Host computer
Power Cord	Power inlet	A/C power outlet	A/C power input
RJ 45 Cable	Ethernet Port	Switch or HUB	Connect to Internet .

Alnico RAID subsystem do not require the installation of different drivers for use with different operating systems. Alnico RAID is independent and transparent to the host operating system.

Chapter 3. TROUBLE SHOOTING

This chapter contains trouble shooting procedures and suggestions to minimize their impact on the Alnico RAID operation :

- ⇨ **Instructions on how to replace the components of Alnico RAID subsystem.**

If the fault LED on the front panel and LCD of Alnico RAID lights red and LCD displays a error message , or if Alnico RAID's Internet manager indicates a fault, determine the reason for this alert immediately. Examine the component LEDs to see if any indicates a fault, then replace it as soon as possible.

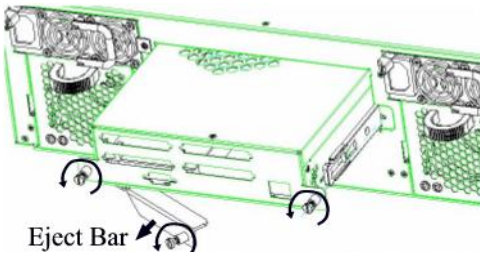
Replace the Controller

Read the replacing notices earlier in this chapter before proceeding with replacement.

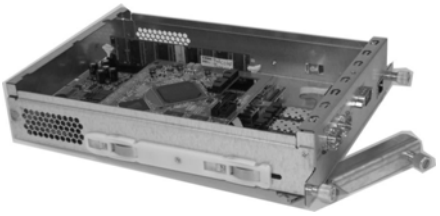
This section provides instructions for the removal and installation of the RAID controller components indicated in the figure below. This section is for the reference of engineers. End users should not need to replace or remove components.

Removing the controller from Alnico RAID :

In order to access controller box, turn anti-clock wise to release three thumb screws, then use the eject bar to remove controller box.



Disconnect all cables, then unscrew four fasteners on controller and upward to remove it.



Installing the controller into Alnico RAID:

Reverse the procedure of **"removing the controller"** to install the controller into Alnico RAID.

Then according to "Appendix C. Configuration table" on "Soft Operation Manual" to reconfigure your RAID

Replacing / Upgrading DIMM

Alnico RAID are normally supplied with 128MB cache memory installed.

NOTE

There's no set formula to determine how much cache memory to use, but as a general rule, a workstation, with mostly very large files, such as for audio or video editing and playback, graphics or CAD files, can benefit from a large cache. File servers, with multiple random access of varying file size, generally have little or no performance improvement with additional cache.

Specifications:

Type	◆ 184-pin DDR DIMM module (DDR-266) ◆ ECC, without Register and Unbuffered.
Parity (ECC)	◆ With parity for data security.
Size	◆ From 64MB, 128MB, 256MB, 512MB to 1GB

Architecture of supported DIMM:

Size	Architecture
64 MB	◆ 9 (8M bit x 8)
128 MB	◆ 9 (16M bit x8)
256 MB	◆ 9 (32M bit x 8) ◆ 18(16M bit x8)
512 MB	◆ 9 (64M bit x 8) ◆ 18 (32M bit x 8)
1 GB	◆ 9 (128M bit x 8) ◆ 18 (64M bit x 8)

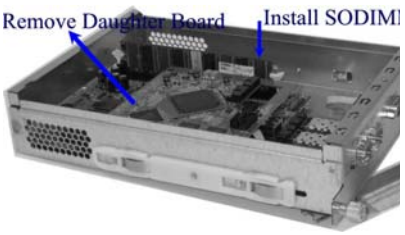
NOTE

If you have plan to install a Battery Back up module with Alnico RAID subsystem, we will strongly recommend you to choice the memory module which uses the low power consumption memory chips. Only this type of memory can meet the spec. of maximum memory back up duration. Especially, for memory sizes are 512MB and 1GB.

Installing DIMM

To install a DIMM, ensure the system power is off and disconnected. Then:

1. Turn anti- lock wise to release three thumb screws, then use the eject bar to remove controller box.
2. Remove the daughter board.
3. Insert a memory card at a 45-degree angle into the memory card socket so that the gold teeth of the card are no longer visible.
4. Press the card down firmly until the latches lock it into place.



1. *Before starting any kind of hardware installation, please ensure that all power switches have been turned off and all power cords disconnected to prevent personal injury and damage to the hardware.*

2. *Use screws provided with Alnico system only. Longer or shorter screws may cause electric shorting or un-proper installed.*

3. *Static electricity can damage electronic components. To guard against such damage:*

   Work in a static-free environment

   Wear a grounded anti-static wrist strap

   Store uninstalled components in anti-static bags

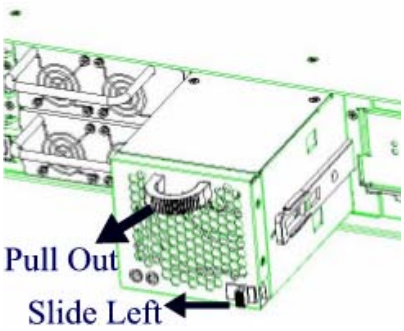
   Handle PCBs by their edges and avoid touching chips and connectors.

Hot Swapping to replace the Fan Module

This section provides instructions for the removal and installation of the Fan Module indicated in the figure below.

Removing the Fan Module from Alnico :

Remove the Fan modules by slide the release button left and pull the module out of system.



Installing the Fan module into Alnico :

Insert a Fan module.

Replace the Fan in Fan module

1. There are two failure LEDs on the rear of Fan module. Check which LED lights to yellow.
2. Remove the Cover of Fan modules by anti-clock wise to release the thumb screw then slide it back and lifting off.

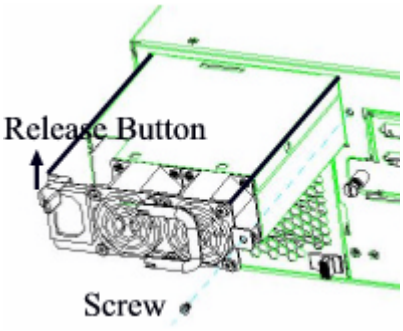
3. Pull up the defect fan.
4. Insert the spare Fan.
5. Put back the cover and fasten the thumb screw.

Hot Swapping to replace the Power Module

This section provides instructions for the removal and installation of the Power Module indicated in the figure below.

Removing the Power Module from Alnico AL-6160 :

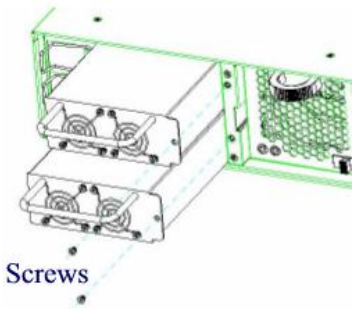
Unscrew the fastener, then push right the release button, slide it back and lifting off.



Removing the Power Module from

Alnico Al-6120 & AL-6080 :

Unscrew the fastener, then slide it back and lifting off.



Installing the Power module into Alnico:

Insert a Power module then fasten the screw.

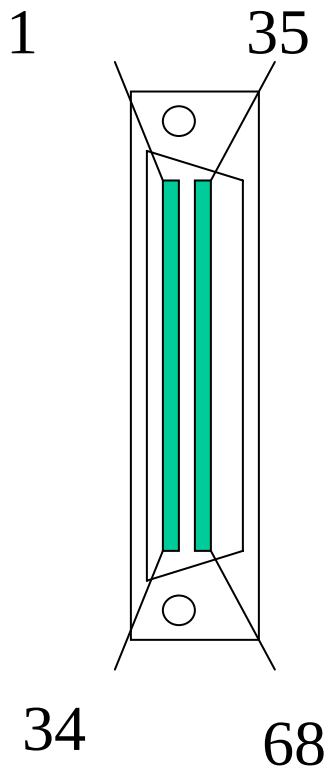
NOTE

The Power indicator will turn bright "Green" to indicate it has powered on

Appendix A

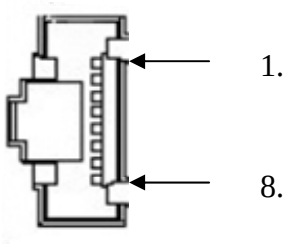
Connectors

SCSI Connector



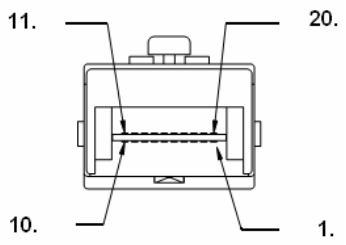
Pin#	Signal Name	Pin#	Signal Name
1	SCSI_AC_DAT<12>+	35	SCSI_AC_DAT<12>-
2	SCSI_AC_DAT<13>+	36	SCSI_AC_DAT<13>-
3	SCSI_AC_DAT<14>+	37	SCSI_AC_DAT<14>-
4	SCSI_AC_DAT<15>+	38	SCSI_AC_DAT<15>-
5	SCSI_AC_PAR<1>+	39	SCSI_AC_PAR<1>-
6	SCSI_AC_DAT<0>+	40	SCSI_AC_DAT<0>-
7	SCSI_AC_DAT<1>+	41	SCSI_AC_DAT<1>-
8	SCSI_AC_DAT<2>+	42	SCSI_AC_DAT<2>-
9	SCSI_AC_DAT<3>+	43	SCSI_AC_DAT<3>-
10	SCSI_AC_DAT<4>+	44	SCSI_AC_DAT<4>-
11	SCSI_AC_DAT<5>+	45	SCSI_AC_DAT<5>-
12	SCSI_AC_DAT<6>+	46	SCSI_AC_DAT<6>-
13	SCSI_AC_DAT<7>+	47	SCSI_AC_DAT<7>-
14	SCSI_AC_PAR<0>+	48	SCSI_AC_PAR<0>-
15	GND	49	GND
16	GND	50	GND
17	TERMPWRA	51	TERMPWRA
18	TERMPWRA	52	TERMPWRA
19	GND	53	GND
20	GND	54	GND
21	SCSI_AC_ATN_L+	55	SCSI_AC_ATN_L-
22	GND	56	GND
23	SCSI_AC_BSY_L+	57	SCSI_AC_BSY_L-
24	SCSI_AC_ACK_L+	58	SCSI_AC_ACK_L-
25	SCSI_AC_RST_L+	59	SCSI_AC_RST_L-
26	SCSI_AC_MSG_L+	60	SCSI_AC_MSG_L-
27	SCSI_AC_SEL_L+	61	SCSI_AC_SEL_L-
28	SCSI_AC_CD_L+	62	SCSI_AC_CD_L-
29	SCSI_AC_REQ_L+	63	SCSI_AC_REQ_L-
30	SCSI_AC_IO_L+	64	SCSI_AC_IO_L-
31	SCSI_AC_DAT<0>+	65	SCSI_AC_DAT<0>-
32	SCSI_AC_DAT<9>+	66	SCSI_AC_DAT<9>-
33	SCSI_AC_DAT<10>+	67	SCSI_AC_DAT<10>-
34	SCSI_AC_DAT<11>+	68	SCSI_AC_DAT<11>-

Ethernet RJ-45 Connector



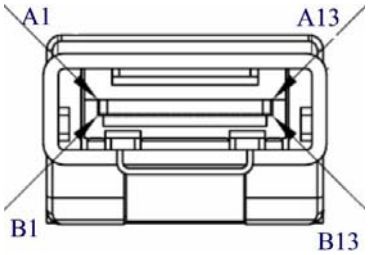
Pin#	Signal Name
1	TX+
2	TX-
3	RX+
4	NC
5	NC
6	RX-
7	NC
8	NC

Fibre SFP



Pin#	Signal Name
1	VEFT
2	TFAULT
3	TDIS
4	MOD_DEF(2)
5	MOD_DEF(1)
6	MOD_DEF(0)
7	Rate Select
8	LOS
9	VEER
10	VEER
11	VEER
12	RD-
13	RD+
14	VEER
15	VCCR
16	VCCT
17	VEET
18	TD+
19	TD-
20	VEET

miniSAS (SFF-8088)

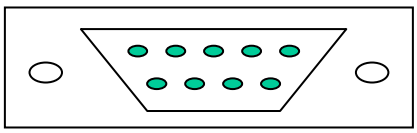


Pin#	Signal	Pin#	Signal
A1	GND	B1	GND
A2	RX0+	B2	TX0-
A3	RX0-	B3	TX0+
A4	GND	B4	GND
A5	RX1+	B5	TX1-
A6	RX1-	B6	TX1+
A7	GND	B7	GND
A8	RX2+	B8	TX2-
A9	RX2-	B9	TX2+
A10	GND	B10	GND
A11	RX3+	B11	TX3-
A12	RX3-	B12	TX3+
A13	GND	B13	GND

NOTE

Only 2 of 4 SAS ports have physical connecting with HBA.

RS-232 & Modem Male Connector



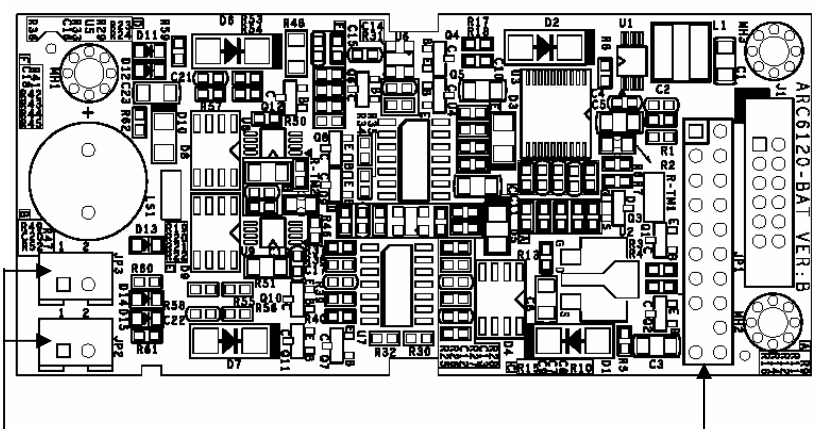
Pin#	Signal	Pin#	Signal
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	TXC
5	GND		

Appendix B

Battery Backup Module (BBM)

The external RAID controller operates using cache memory .The battery Backup Module is an add-on module that provides power to the external RAID controller cache memory in the event of a power failure. The Battery Backup Module monitors the write back cache on the external RAID controller, and provides power to the cache memory if it contains data not yet written to the hard drives when power failure occurs.

BBM Components



BBM Specifications

Mechanical

Module Dimension (W x H x D) : 148 x 128 x 244 mm

BBM Connector

2 * 10 box header

Input Voltage

+3.6VDC

On Board Battery Capacity

2000MAH (2*1000MAH)

Installation

- Make sure all power to the system is disconnected.
- Connector J5 is available for the optional battery backup module. Connect the BBU cable to the 12-pin battery connector on the controller
- Integrators may provide pre-drilled holes in their cabinet for securing the BBM using its three mounting positions.

Battery Backup Capacity

Battery backup capacity is defined as the maximum duration of a power failure for which data in the cache memory can be maintained by the battery. The BBM's backup capacity varied with the memory chips that installed on the external RAID controller..

Capacity	Memory Type	Battery Backup duration (Hours)
256MB DDR	Normal (27mA)	74
256MB DDR	Low Power (18mA)	111

Operation

- Battery conditioning is automatic. There are no manual procedures for battery conditioning or preconditioning to be performed by the user.
- Battery bad a tendency to “remember” its capacity. In order to make sure of all the capacity of your battery cells, allow the battery cell to be fully charged when installed for the first time. The first time charge of battery cells takes about 24 hours to complete.

Removing the Battery Backup Module

The battery module will need to be removed for one of the following reason:

- Disconnect battery module if there is a long storage period before deployment
- The LI-ION battery will no longer accept a charge properly.

Appendix C. Specifications

Specifications

RAID Architecture		
Intel Xscale 80321 I/O processor		
Proprietary ASIC to support extreme performance RAID 6 function.		
Up to 1GB 200MHz DDR SDRAM on one DIMM socket with ECC protection		
Marvell 8 channels SATA-II controller (88SX5080)		
RAID Features		
RAID Levels : 0, 1, 3, 5, 0+1, 6 & JBOD		
Multiple RAID selection		
Online RAID level/stripe size migration		
Online Array roaming		
Online capacity expansion and RAID level migration simultaneously		
Instant availability and background initialization		
Automatic drive insertion / removal detection and rebuilding		
Host Interface		
AL-6080S/AL-6120S/ AL-6160S	AL-6080FA/AL-6120FA/ AL-6160FA	AL-6080SA/AL-6120SA/ AL-6160SA
Two Ultra320 SCSI Channels - 320MB/sec per channel	Two 4Gbps Fibre Channels	Two MiniSAS connectors 3Gb x 2Links per Connector
Drive Interface		
AL-6080	AL-6120	AL-6160
8 SATA-II channel -3Gbps	12 SATA-II channel -3Gbps	16 SATA-II channel-3Gbps
Monitors/Indicators		
LCD Control Panel for setup, alarm mute and configuration		
System status indication through LCD, LED and alarm buzzer		
All system events can be sent to multiple user alerts to be via ‘ Plain English’ e-mails.		
RAID Management		

Field-upgradeable firmware in flash ROM.		
Firmware-embedded manager via RS-232 port.		
Firmware-embedded SMTP manager – Monitor all system events and user can select either single or multiple user alerts to be sent via ‘ Plain English’ e-mails.		
Firmware-embedded Web Browser-based RAID manager via 10/100 Ethernet port		
Operating System		
OS independent and transparent.		
Environmental /Physical		
Cooling System	Hot swappable and redundant Cooling Fan modules.	
Power System	AL6080 & AL 6120	AL-6160
	Redundant by Dual 375W Power modules with PFC feature, Load Sharing type and cableless design.	Redundant by Dual 460W Power modules with PFC feature, Load Sharing type and cableless design.
Electrical	AC Voltage 100-240 VAC Ac Frequency 50-60Hz	
Temperature	Operating Temperature : 10 to 35 degree C.	
Relative Humidity	20% to 80% non-condensing	
Dimensions	AL-6080 & 6120	446mm(W) x 480mm(D) x 88.8mm (H)
	AL-6160	446mm(W) x 470mm(D) x 133mm (H)
Weight	AL-6080	13.5Kg(W/O HDD)
	AL-6120	13Kg (W/O HDD)
	AL-6160	18Kg (W/O HDD)

Specifications subject to change without notice.