Virtual Tape Library

VTL Value User Maintenance Guide

Sun Microsystems, Inc.
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Revision History

Short Name	Part Number	Dash	Date	Comments
VTL Value User Maintenance Guide	316196301	A	Oct 2007	

Contents

About this book

This book describes the user-performed maintenance and repair processes specific to the Sun StorageTek VTL Value appliance. In VTL Value deployments, it supersedes the *Sun Fire™ X4500 Server Service Manual* (819-4359-11). While the VTL Value appliance hardware is almost identical to the VTL Value, it has been specially preconfigured to host Virtual Tape Library software on the Solaris operating system.

Using this book

This book leads you through the process of diagnosing VTL Value equipment problems and replacing customer-replaceable components. Wherever possible, each task is described from beginning to end, with all the needed information immediately to hand and the alternatives clearly indicated. Each chapter and section begins with a list of the tasks it contains. Tasks are presented in order, and the steps in each process are numbered, in the sequence in which they are to be performed. Conditional steps (steps that you perform only in specified circumstances) begin with the condition ("If *A* ...") and end with the corresponding action ("... do *B*"); if the condition does not apply, you simply skip the step. Each task ends with a reference to the next task in the sequence:

Next task: "Installing slide-rail assemblies" on page 3.

When the setup process branches, the tasks ends with conditional alternatives:

Next task:

- If the customer does not plan to run the management console from a host on the local area network (LAN), press `Skip`, and go to the next task.
- Otherwise, carry out the procedure "Configuring the Ethernet management interface" on page 57.

To minimize the time you spend switching between publications or major sections of the document, we have made an effort to avoid cross references to external information wherever possible. If you need to have a figure, a table, or a procedure, it should always be, at worst, on a neighboring page.

The chapters are organized to reflect top-level tasks. The first chapter details the physical installation of the appliance hardware, including rack mounting, cabling, and power up procedures. The second chapter explains the initial configuration of the operating system software and network and some basic checks that should be run on a newly installed system.

Appendices provide additional information that, while not essential to a normal installation, may prove useful in special circumstances. These list the private network addresses used when installing the VTL Value appliance, provide instructions for serially connecting to the VTL Value Integrated Lights Out Manager (ILOM) service processor, and summarize commands that can be entered at the ILOM commandline interface (CLI).

Taking advantage of this book's hypertext features

If you choose to view this book online, rather than in printed form, you can jump quickly to any part of the book by clicking on the corresponding entry under the `Bookmarks` tab on the left side of the Adobe Acrobat interface. In addition, clicking on entries in the table of contents, cross references, or references to subsequent tasks will take you directly to the indicated part of the document. You can then use the back arrow on the Adobe Acrobat Reader to return, if desired, to the point you left. In addition, clicking on most Uniform Resource Locators (URLs) and on most references to online resources will open your default web browser to the corresponding web page, so that you can, if necessary, obtain a required download immediately (be aware, however, the URL to specific pages change frequently and may not always be accurate).

Understanding the conventions used in this book

The table below illustrates the conventions that represent literal and variable values, commands, and property names in this book.

Convention	Meaning	Examples
`AaBbCc123`	Fixed-width text is used for literal values, including names of commands, files, directories, literal computer inputs/outputs, and Uniform Resource Locators (URLs)	Edit your `.login` file. Use `ls -a` to list files. `% You have mail.`
AaBbCc123	Oblique text is used for variables that stand for real names or values and for book titles.	To delete a file, type: `rm` *filename*.
ABCD	Bold, san-serif text indicates callouts in illustrations.	Click `Submit` (**A** below).
1.	Numbered paragraphs indicate steps in a process that should be executed in sequential order.	
■	Bulleted paragraphs indicate lists of alternatives or components.	

Using the Sun StorageTek CRC

The Sun StorageTek Customer Resource Center (CRC) at <`www.support.storagetek.com`> stores the latest documentation, software updates, and licensing resources for VTL Value solutions. Always check the CRC for updates to this document before proceeding. Documents distributed on CDROM may not reflect the latest changes to VTL hardware, software, and services.

You must have an account to use the CRC. If you do not currently have access, click the `Request a CRC Password` link at the URL shown above.

Commenting on this book

Sun welcomes your comments and suggestions for improving this book. Contact us at `glsfs@sun.com`. Please include the title, part number, issue date, and revision: *VTL Value User Maintenance Guide* , part number 316196301 (Oct 2007 revision A).

CHAPTER 1

Servicing VTL Value appliances

This chapter provides an overview of the customer self-service operations that are possible with the Sun StorageTek VTL Value appliance. The chapter first discusses the serviceability features that let you handle common maintenance and repair operations yourself: Customer Replaceable Units (CRUs) and the Integrated Lights Out Manager (ILOM) service processor. It then provides an overview of the tools, personnel, and general precautions that you should follow whenever servicing storage equipment.

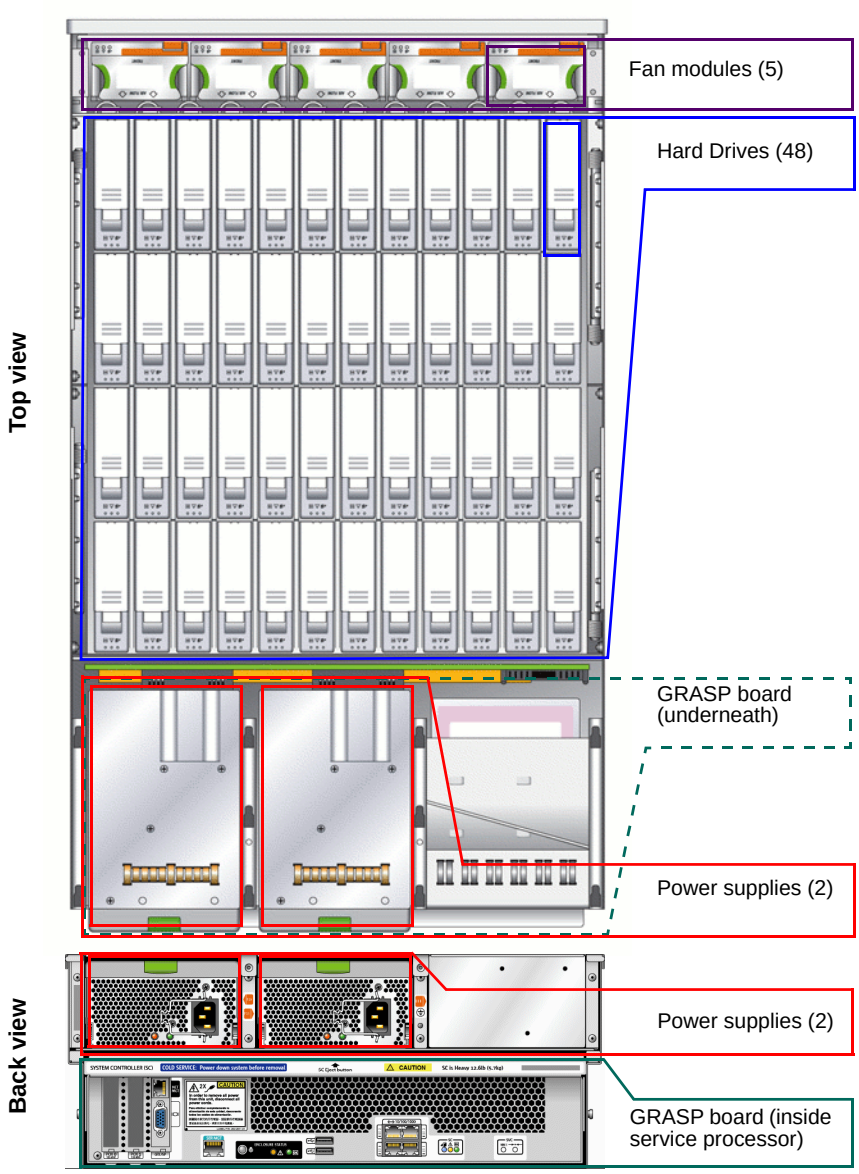
Customer Replaceable Units (CRUs)

Key VTL Value components have been designed as customer-replaceable units (CRUs), so that you can return your appliance to its full capacity in minimum time, without arranging for a service call. The table below lists the VTL Value CRUs:

Component	Number	Part Number
Power Supply	2	300-1787
Fan Module	5	541-0458
500-GB 7200-RPM SATA 3.5-in disk drive assembly	48	541-1467
250-GB 7200-RPM SATA 3.5-in disk drive assembly	48	541-1468
2-GB Registered ECC Memory, in DIMMs	2	541-1903
GRASP board (includes SP board and video board)	1	541-0597

Any problem that can be rectified by replacing one or more of the above CRUs can be addressed by customers, using the diagnostics and procedures contained in subsequent chapters of this book.

CRUs are readily accessible through the top cover of the appliance or via the rear panel. The figure below shows the locations and appearance of the major VTL Value appliance components, once the covers have been removed.



The Integrated Lights Out Manager (ILOM) service processor

The Sun Integrated Lights Out Manager (ILOM) is a dedicated processor that supports operating system-independent management interfaces and applications for the Sun StorageTek VTL Value appliance. This section introduces the Graphics Redirect and Service Processor (GRASP) hardware and the functions it supports. The section concludes with instructions for accessing the ILOM interface and the VTL Value appliance Solaris operating system.

The core of the system is the GRASP hardware. The GRASP monitors the status and configuration of customer-replaceable VTL Value components, including fans, disk drives, and power supplies. It also provides the physical, serial and Ethernet management interfaces to the VTL Value system.

GRASP firmware provides a suite of management applications that run independent of the operating system and CPU:

- A server-side Secure Shell (ssh) implementation supports encrypted remote login.
- A commandline interface (CLI) supports serial access to the system.
- A Simple Network Management Protocol (SNMP) interface supports network management using SNMP versions 1, 2c, or 3.
- A web server supports Remote Console operations.

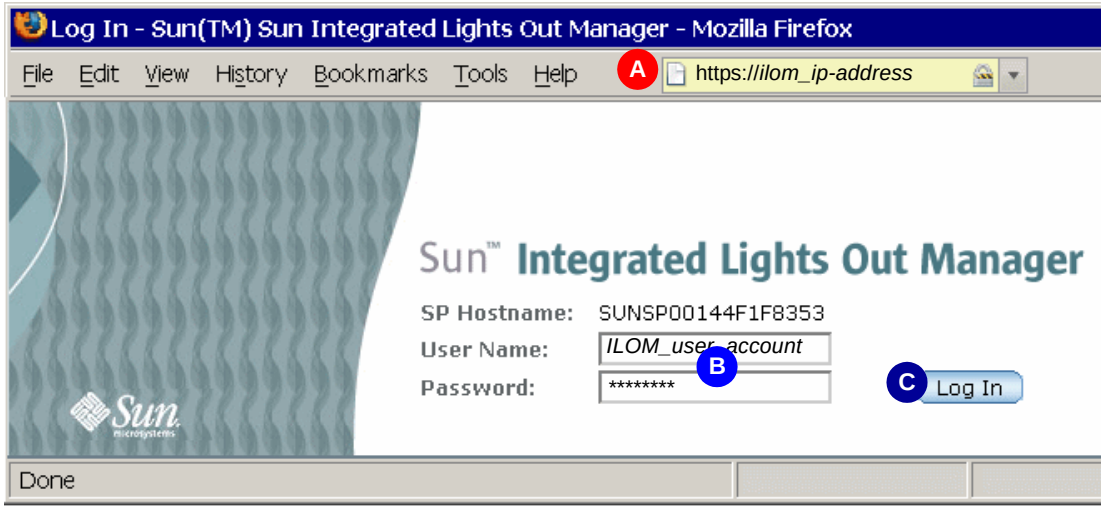
  The web server publishes a browser-accessible ILOM graphical user interface (GUI) that supports remote system monitoring and redirection of the Solaris operating system GUI to a remote terminal. By downloading a Java application from the ILOM web interface, users can access the Solaris desktop remotely, just as if they were using a local keyboard, monitor, and mouse.

You can carry out many system monitoring and maintenance tasks using the ILOM interface. For now, we will focus on the basic operations that give you access to this functionality:

- "Logging in to the ILOM" on page 4
- "Accessing the Solaris operating system via the ILOM" on page 4.

▼ Logging in to the ILOM

1. **Open a web browser to the IP address of the VTL appliance (A below).**



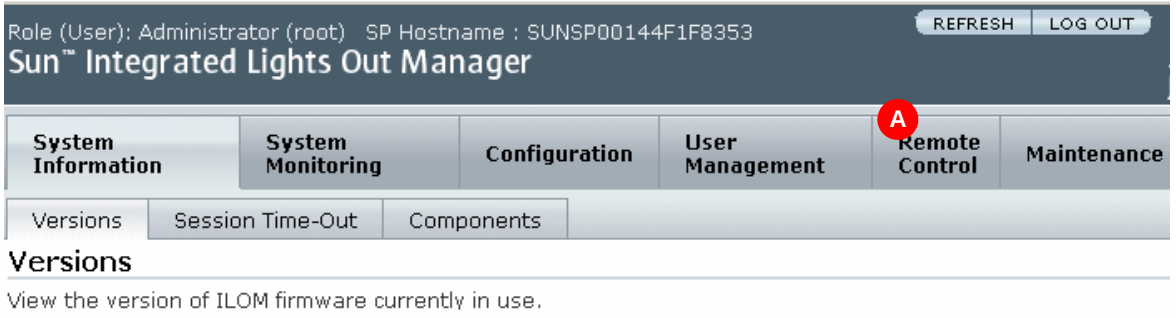
2. **When the login page appears, enter your administrative user account name and password (B above).**

   The default account name is `root`, with a password chosen by your system administrator. Other accounts may have been created by your system administrator.

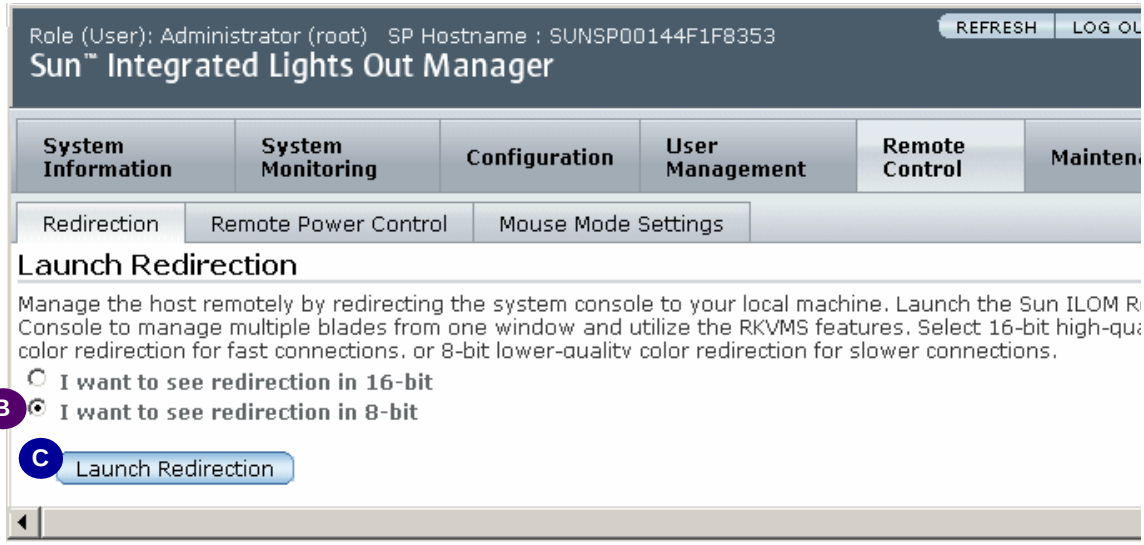
3. **Press `Log In` (C above).**

▼ Accessing the Solaris operating system via the ILOM

1. **On the `Integrated Lights Out Manager` (ILOM) page, press the `Remote Control` button (A below).**

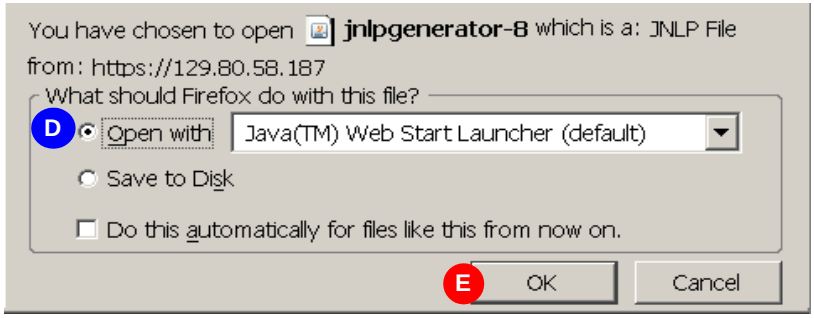


2. **On the** `Launch Redirection` **panel, click the radio button for 8- or 16-bit resolution (B below), and press** `Launch Redirection` **(C).**



Java starts, downloads files, and launches the Java console.

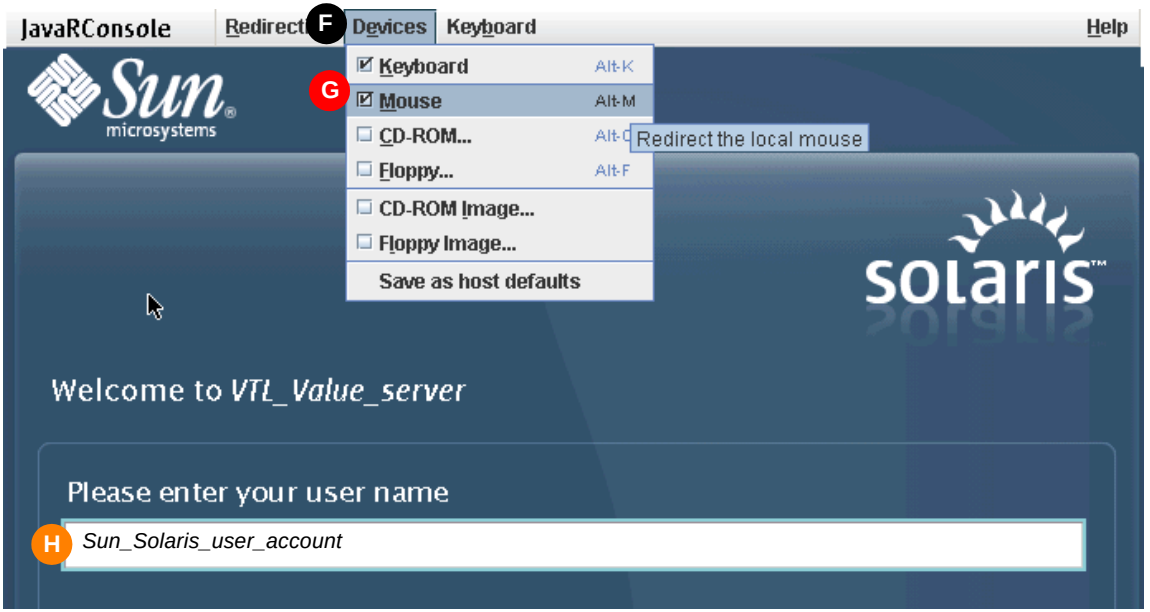
3. **When the download dialog appears, click the** `Open with` **radio button, and select** `Java(TM) Web Start Launcher` **from the list (D below). Then press** `OK` **(E).**



The `jnlp` file launches the `Sun ILOM Remote Console` application and displays the Solaris login screen for the VTL Value server.

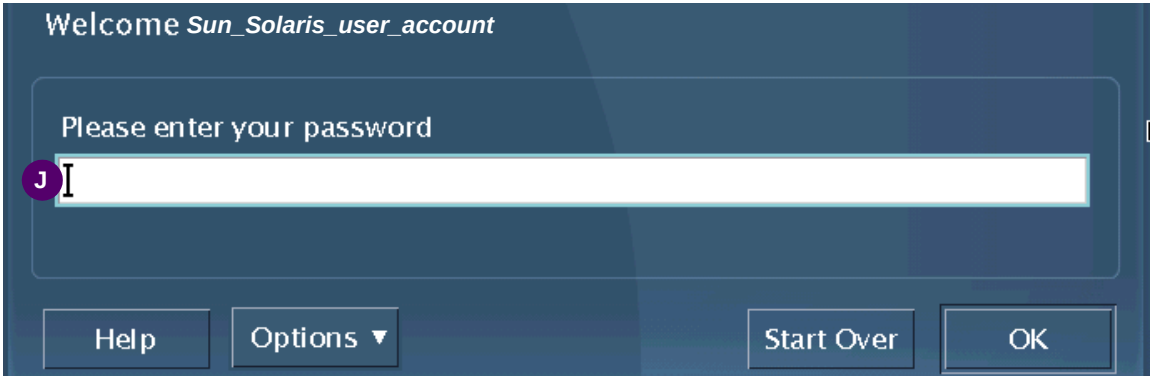
4. **When the** `Sun ILOM Remote Console` **application interface appears, select** `Devices` **from the main menu (F below), and check the** `Mouse` **check box in the submenu (G).**

   You check the `Mouse` check box to enable mouse support inside the Remote Console environment.



5. **In the** `Please enter your user name` **field (H above) of the Solaris login page, enter the name of your Solaris administrative user account.**

6. **When the** `Welcome` *`Sun_Solaris_user_account`* **appears, enter the password for your Solaris administrative user account in the** `Please enter your password` **field (J below).**



When you enter your password, the Solaris desktop appears within the `Sun ILOM Remote Console` application.

Addressing general requirements

This section describes a few basic requirements that you be aware of whenever you are going to service a VTL Value appliance:

- "Gathering the required tools" on page 7,
- "Assembling the required personnel" on page 7,
- "Taking the required precautions" on page 8.

Gathering the required tools

Each CRU service procedure has been designed to require a minimum number of commonly available tools. All operations in this document can be carried out using only the following items:

- a 10-inch, No. 2 Phillips screwdriver (preferably with a magnetic tip)
- an antistatic wrist strap
- a stylus, ball-point pen barrel, or other pointed object (for pressing recessed power and system controller-release buttons)

If the VTL appliance has to be removed from a rack mount, however, Sun also strongly recommends that you use a mechanical lift that can support the weight of the appliance.

Caution – The VTL Value appliance weighs 160 pounds (72.7 kg) when fully loaded with components. To prevent injury to personnel or damage to the equipment, Sun strongly recommends using a mechanical lift when installing the server in a rack.

Assembling the required personnel

While replacing a CRU does not in itself require more than a single person in most cases, you may need more people to access the CRU, particularly if the appliance has been mounted in an equipment rack. Safely removing a rack-mounted appliance from its rack require 3-4 people, at a minimum. To determine the number required, proceed as follows.

▼ Assessing the number of required personnel

1. **If a mechanical lift is available, make sure that at least three people are on hand to remove the server and, later, to reinstall it in the rack.**

   It takes two people to operate the lift and manipulate the server and one additional person to insure that the rails are correctly engaged/disengaged.

2. **If a mechanical lift is not available, make sure that at least four trained people are available to remove the server.**

3. **If the minimum number of people are not available, reduce the weight of the server by removing both power supplies and the system controller. Then label the hard disk drives in slots 2 to 46 and remove them (you will reinstall the drives in their original slots using the labels as a guide).**

   Do not uninstall the fan trays or the bootable drives in slots 0 and 1.

Taking the required precautions

Any time you service storage equipment, be careful to avoid situations that can lead to personal injury or damage to equipment. This section covers general precautions for handling rack stability, temperature control, and system power. Before you proceed further in this book, make sure you understand the material in this section:

- "Maintaining the stability of rack-mounting systems" on page 8
- "Insuring adequate system cooling" on page 9
- "Insuring that systems are powered off correctly" on page 9
- "Taking static-discharge precautions" on page 14.

Maintaining the stability of rack-mounting systems

VTL Value appliances contain a large number of disk-storage devices and are therefore heavier than ordinary file servers. If the appliance is mounted in a rack that is not designed for storage devices or if the appliance is mounted too high in the rack, the rack could tip, injuring personnel and/or damaging equipment. So, before proceeding with any service procedure that requires moving the appliance from its normal, fully installed position, assess the stability of the rack system and take appropriate precautions when necessary.

▼ Assessing the stability of rack mountings prior to removing VTL Value appliances for service

1. **If an anti-tipping bar is available, deploy it.**

   Anti-tipping bars increase the stability of a heavily loaded rack system. Sun StorageTek has racks available that incorporate anti-tipping bars.

2. **Note the position of the VTL Value appliance in the rack: moving a low-mounted VTL Value appliance does not affect the stability of the rack as much as moving one higher in the rack.**

   Sun recommends installing VTL Value appliances as low in the rack as possible.

3. **If the VTL Value appliance is mounted in the upper two-thirds of the rack, use a mechanical lift and be exceptionally cautious. Consult the rack and lift documentation and seek vendor advice as necessary.**

   Make sure that you reinstall the appliance safely, lower in the rack, if at all possible.

Insuring adequate system cooling

Always operate the VTL Value appliance with all covers, baffles, and heat sinks in place. Covers and baffles direct airflow through the interior of the appliance, minimizing restrictions and insuring that critical components receive enough cooling air. Heat sinks transfer heat away from critical components and dissipate heat to the air. For this reason, never run the appliance for more than 60 seconds at a time with covers, baffles, or heat sinks removed. Plan service actions in advance, so that you can act quickly once the cover is off, or power down the appliance prior to proceeding.

Make sure that the air inlets at the front of the case are free of obstructions at all times and that all cooling fans are in place and functioning properly.

If the server is operated with baffles or covers removed or with missing, inoperative, or obstructed cooling fans, the VTL Value appliance may overheat and components may be damaged. When the service processor detects the over-temperature condition, it will try to shut the system down as a protective measure.

Insuring that systems are powered off correctly

When you must power off a VTL Value appliance prior to service, always follow the procedures below. If you do not, you may corrupt system software or file systems and could expose yourself or a coworker to electrical shock.

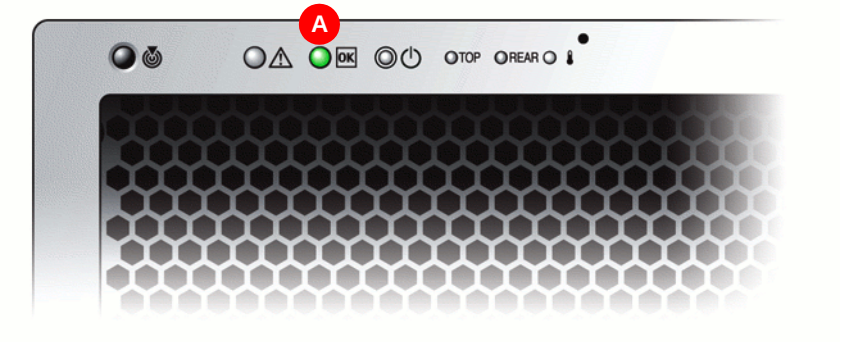
VTL Value appliances use a two-stage power system, with main and standby power. Powering off the main power button turns off the main power that supplies the VTL Value host computer and storage devices. But it does NOT turn off the standby power or insure that all internal components are de-energized. So always follow the procedures below when you must turn off the appliance power prior to performing service tasks:

- "Identifying the power state of a VTL Value appliance" on page 10
- "Powering down" on page 12.

Caution – Pressing the `Power` button does NOT cut off power to the appliance. The GRASP service processor board and power supply fans continue to draw power after the button has been pressed. To completely power off the appliance, you must disconnect the AC power cords from the power supplies on the back panel of the appliance. See below for detailed procedures.

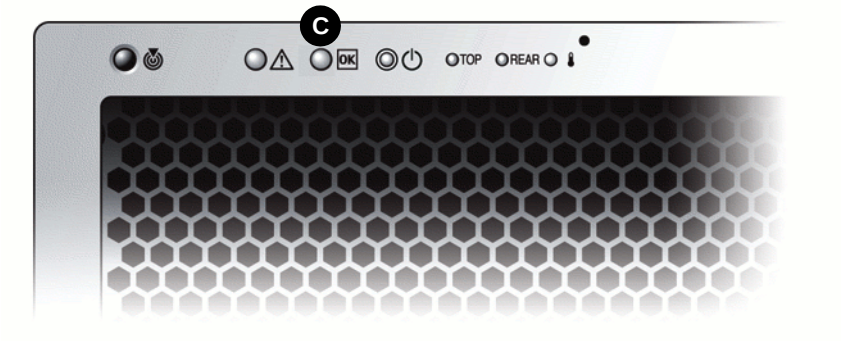
▼ Identifying the power state of a VTL Value appliance

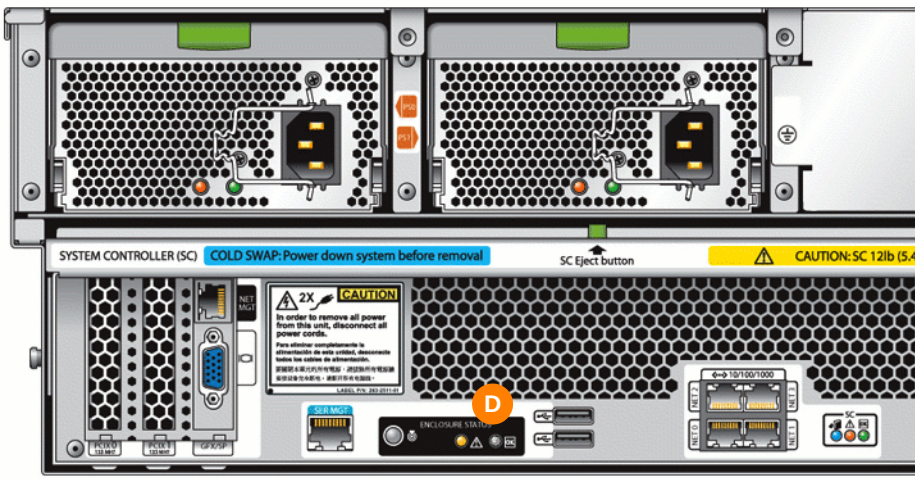
1. **If the `OK` LED on the upper left corner of the VTL Value front panel (A below) glows steadily, main power is `ON`. The appliance's host computer has power.**



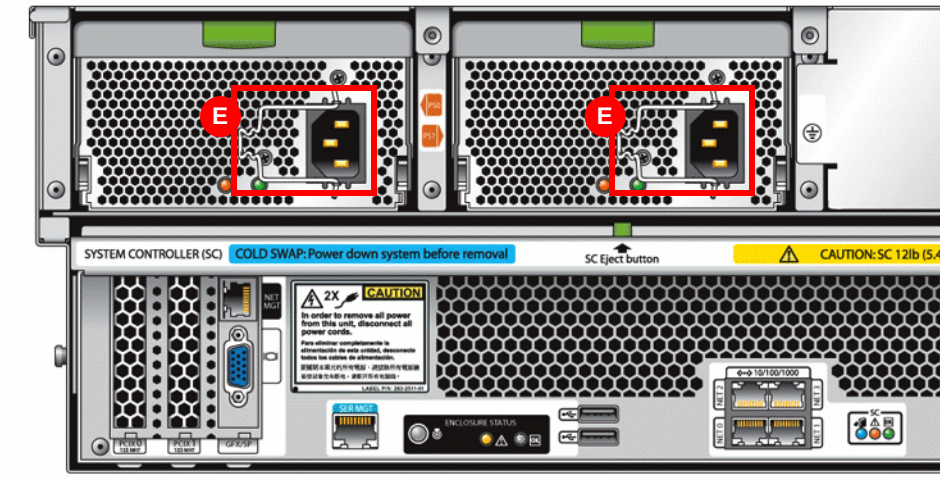
2. **If the `OK` LED on the front panel (A above) and the `Enclosure Status OK` LED on back panel (B) are blinking, standby power is `ON`. The Integrated Lights Out Management (ILOM) service processor has power.**

3. **If the `OK` LED on the front panel (C below) and the `Enclosure Status OK` LED on the back panel (D) are both dark, main and system power are `OFF`. However, components may still be energized.**





4. **If the power cables have been unplugged from both the power supplies (E below), all power is** `OFF`**.**



▼ Powering down

Whenever possible, you want to power off a running VTL Value appliance *gracefully*, so that the operating system has time to shut down running processes and write unsaved data out to disk. The preferred method is to shutdown using the Integrated Lights Out Manager (ILOM) service processor, using either the ILOM interface itself or a redirected Solaris operating system terminal window. Proceed as follows.

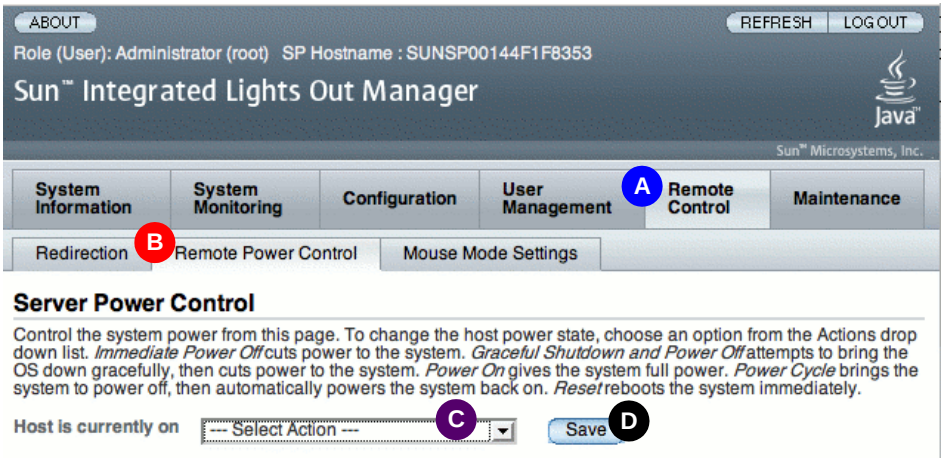
1. **If you are already logged into a redirected Solaris console session, open a Solaris terminal window and, at the shell prompt, enter the** `init 5` **command:**

```
% init 5
```

The `init 5` command shuts the system down gracefully before turning off main power.

When the `init 5` command completes, main power is OFF, and standby power is ON. The `OK` LED on the appliance front panel is blinking.

2. **If you are not logged into a redirected, remote Solaris console session, power down directly using the ILOM interface. From the** `Remote Control` **tab (A below), select the** `Remote Power Control` **tab (B), select** `Graceful Shutdown and Power Off` **from the drop list (C), and press** `Save` **(D).**



   Like the `init 5` command, the ILOM command shuts the system down gracefully before turning off main power.

   When the remote server shutdown process completes, main power is OFF, and standby power is still ON. The `OK` LED on the appliance front panel is blinking.

3. **If you cannot use the operating system to shut off main power, use a stylus to quickly press and immediately release the power button on the front panel.**

Caution – Do not hold the button down! if you inadvertently hold down the button too long (or if it sticks), you will initiate an ungraceful, emergency shut down.

Pressing and releasing the power button causes the Advanced Configuration and Power Interface (ACPI) to stop the operating system in an orderly fashion before shutting main power off (this can take some time). The process is essentially equivalent to issuing an `init 5` command from the Solaris commandline. But, if you inadvertently hold down the button too long (or if it sticks), you will initiate an ungraceful, emergency shut down.

Main power is now OFF. Standby power is ON. The `OK` LED on the front panel is blinking.

4. **If the main power did not shut off or if you cannot wait for a graceful shutdown, use a stylus to press and hold the power button for four seconds.**

   Pressing and holding the power button shuts off the main power immediately, placing the system in standby power mode. The OK LED on the front panel is blinking.

   Main power is now OFF. Standby power is ON. The OK LED on the front panel is blinking.

5. **If you need to power off the appliance completely, so that neither the server nor the service processor draws power, unplug the AC power cords from the power supplies at the rear of the server.**

   Main power is now OFF. Standby power is OFF. The OK LED on the front panel is not lighted.

Taking static-discharge precautions

Caution – Before handling components, attach an electrostatic discharge (ESD) wrist strap to bare metal on the chassis. The system's printed circuit boards and hard disk drives contain components that are extremely sensitive to static electricity.

CHAPTER 2

Using the Integrated Lights Out Manager (ILOM) service processor

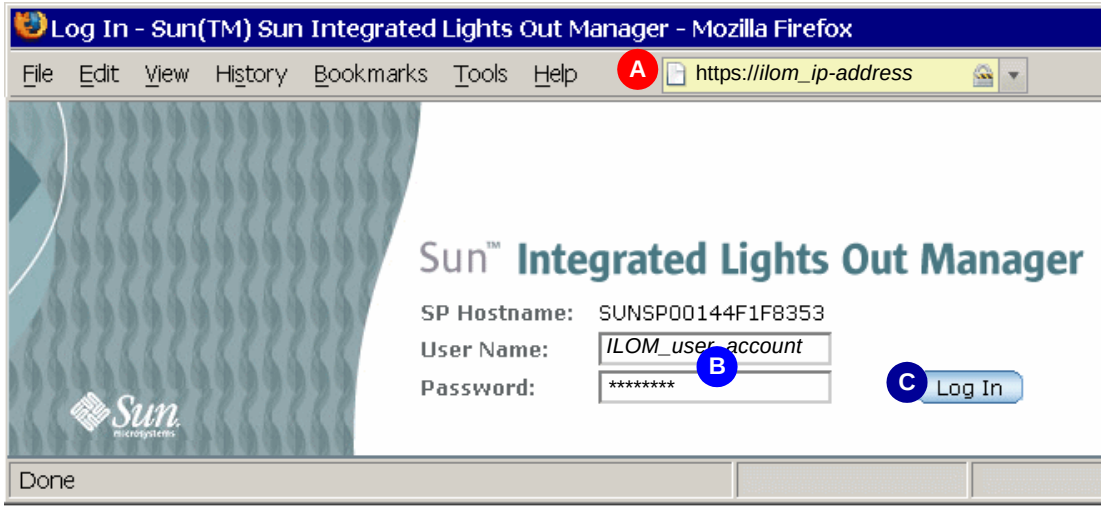
The Sun Integrated Lights Out Manager (ILOM) is a dedicated processor that supports operating system-independent management interfaces and applications for the Sun StorageTek VTL Value appliance. This chapter describes common ILOM-related tasks, including:

Logging in to the service processor

To login to the ILOM interface, proceed as follows:

▼ Logging in to the ILOM

1. **Open a web browser to the IP address of the VTL appliance (A below).**



2. **When the login page appears, enter your administrative user account name and password (B above).**

   The default account name is `root`, with a password chosen by your system administrator. Other accounts may have been created by your system administrator.

3. **Press `Log In` (C above).**

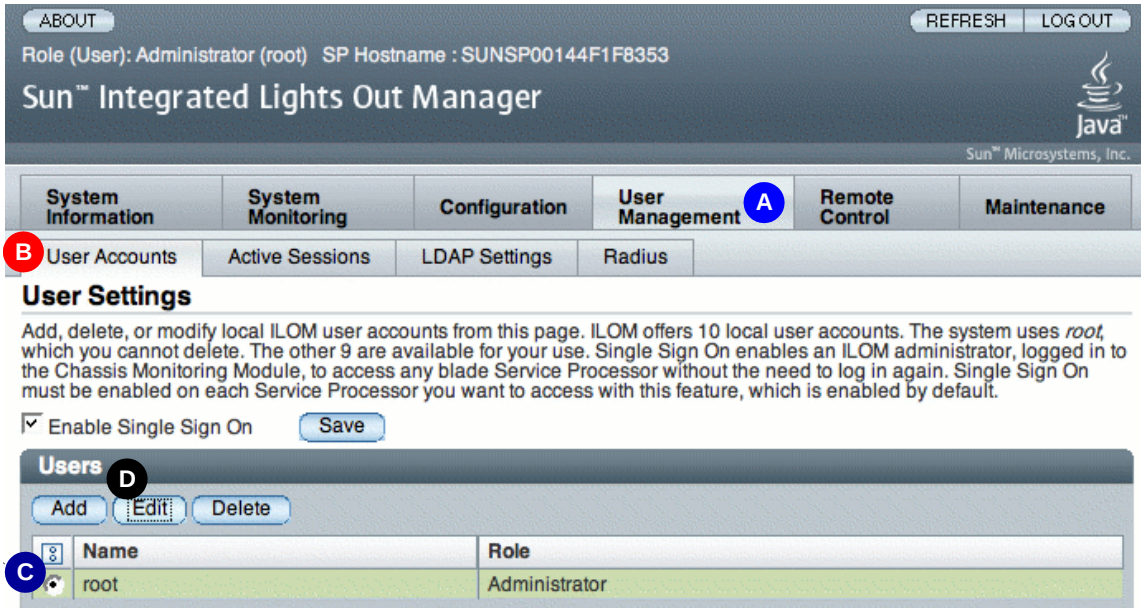
Changing the ILOM password

You should change the ILOM password periodically and after reverting to the default password (`changeme`). Proceed as follows.

▼ Changing passwords

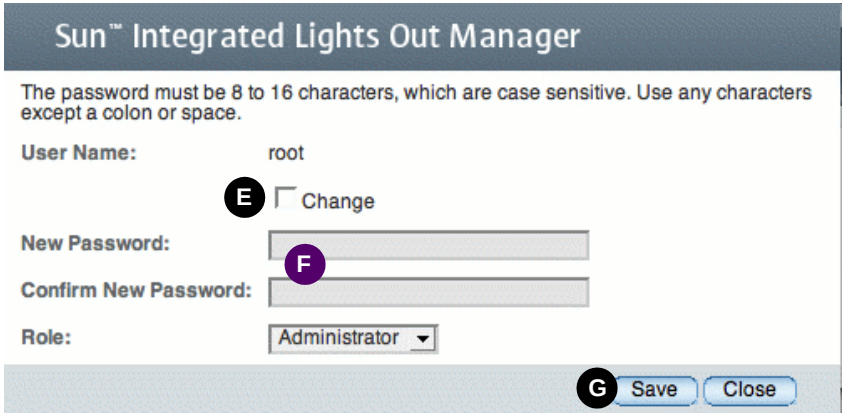
1. **Open a web browser and log in to the ILOM user interface.**
2. **Select the `User Management` tab (A below).**

3. **Select the** `User Accounts` **sub-tab (B below).**



4. **Click the radio button beside the user account that you want to modify (C above), and press** `Edit` **(D).**

5. **When the ILOM password maintenance dialog appears, check the** `Change` **check box (E below).**



6. **Enter and confirm the new password in the text boxes provided (F above).**

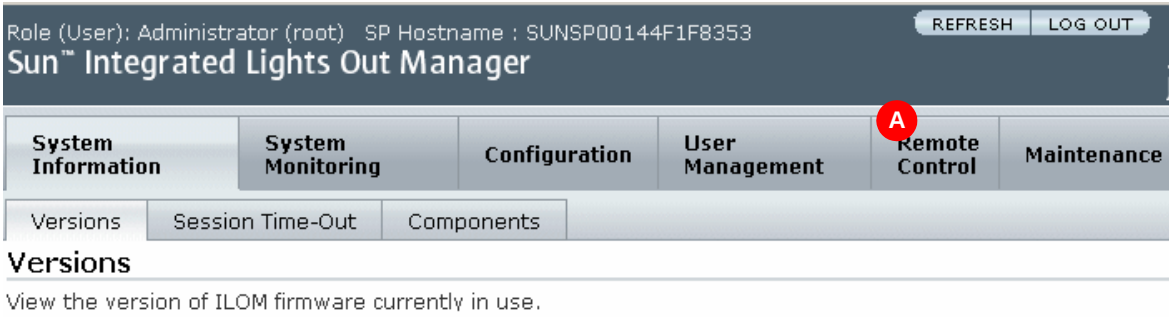
7. **Press** `Save` **(G above).**

Logging in to Solaris

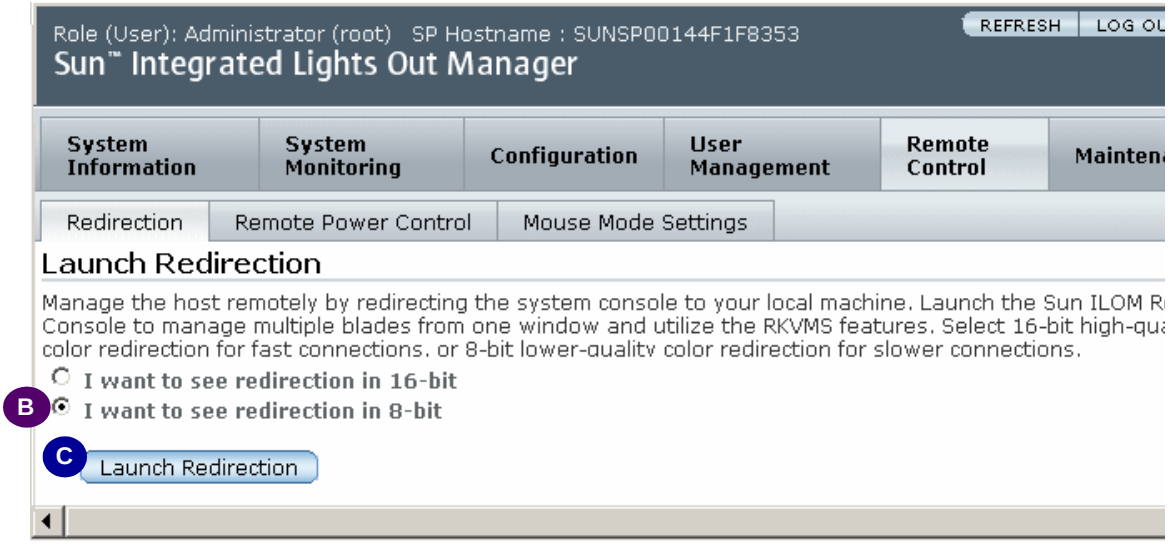
The ILOM interface includes a Remote Console Java application that gives you remote access to the Solaris console. This section describes launching and using this application.

▼ Accessing the Solaris operating system via the ILOM

1. **On the** `Integrated Lights Out Manager` **(ILOM) page, press the** `Remote Control` **button (A below).**

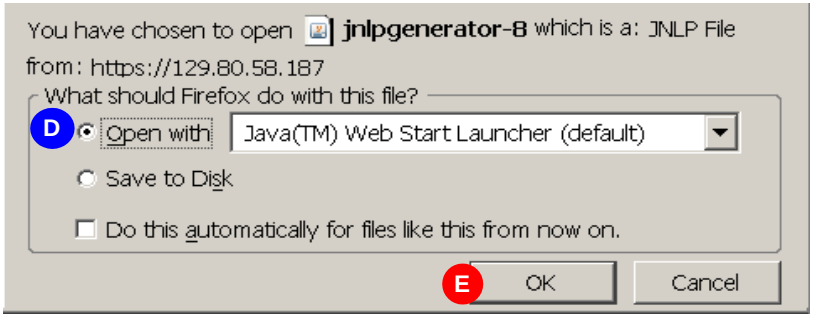


2. **On the** `Launch Redirection` **panel, click the radio button for 8- or 16-bit resolution (B below), and press** `Launch Redirection` **(C).**



Java starts, downloads files, and launches the Java console.

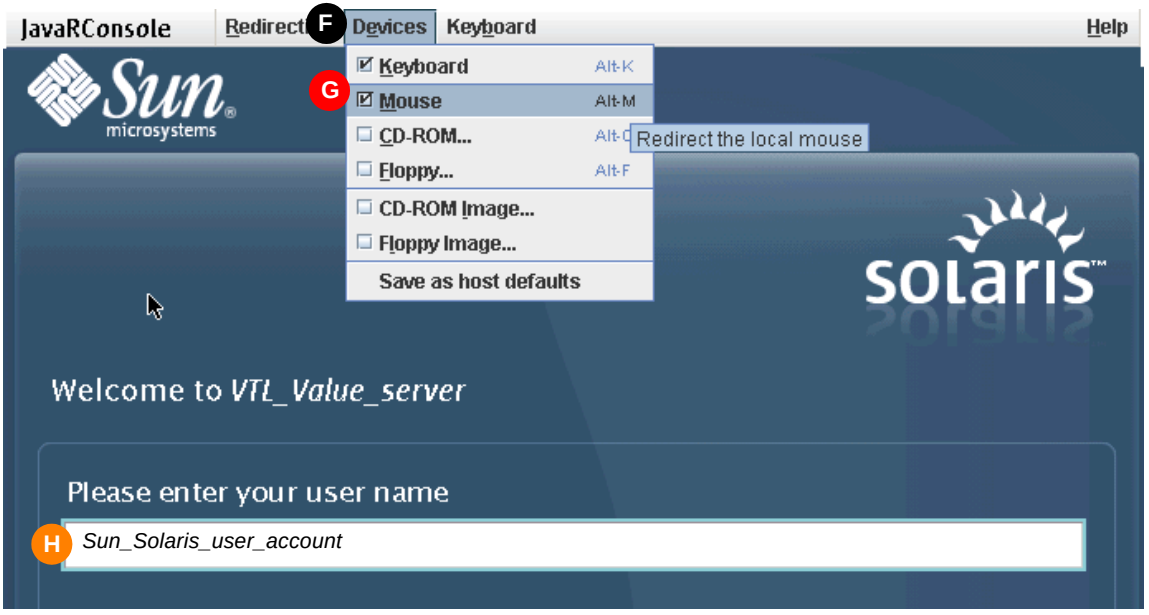
3. **When the download dialog appears, click the** `Open with` **radio button, and select** `Java(TM) Web Start Launcher` **from the list (D below). Then press** `OK` **(E).**



The `jnlp` file launches the `Sun ILOM Remote Console` application and displays the Solaris login screen for the VTL Value server.

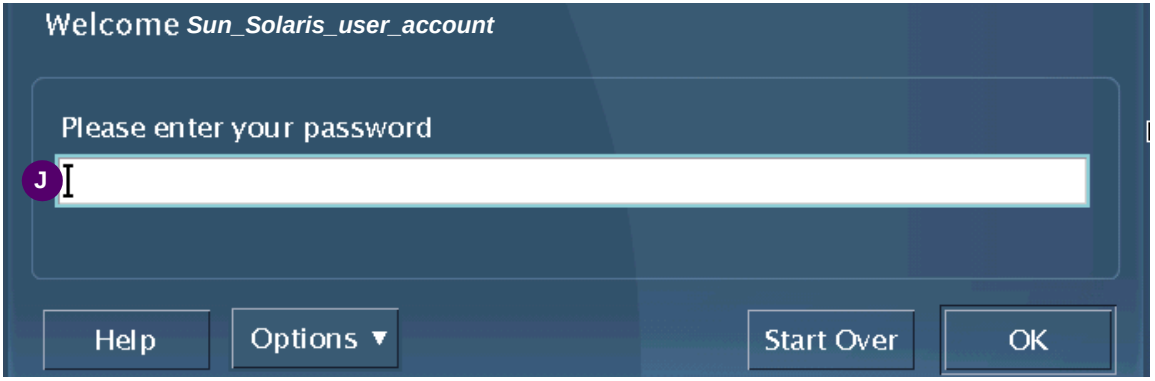
4. **When the** `Sun ILOM Remote Console` **application interface appears, select** `Devices` **from the main menu (F below), and check the** `Mouse` **check box in the submenu (G).**

You check the `Mouse` check box to enable mouse support inside the Remote Console environment.



5. **In the** `Please enter your user name` **field (H above) of the Solaris login page, enter the name of your Solaris administrative account.**

6. **When the** `Welcome` *`Sun_Solaris_user_account`* **appears, enter the password for the Solaris** `root` **account in the** `Please enter your password` **field (J below).**



When you enter your password, the Solaris desktop appears within the `Sun ILOM Remote Console` application.

Power cycling and rebooting

You can remotely power cycle or reboot VTL Value appliances via the ILOM. There are two options:

- "Remotely booting or power cycling the server from an ILOM Remote Console Solaris session" on page 20
- "Remotely booting or power cycling the server from the ILOM user interface" on page 21

Remember that both methods apply to the server and system main power. Standby power to the platform and the ILOM hardware are unaffected.

▼ Remotely booting or power cycling the server from an ILOM Remote Console Solaris session

If you already have an ILOM Remote Console session open, proceed as follows.

1. **Open a Solaris terminal window on the VTL desk top.**
2. **If you wish to reboot, enter the init 6 command:**

```
# init 6
```

3. **If you wish to power the server down, enter the init 5 command:**

```
# init 5
```

The VTL server is powered off, but the ILOM and system platform continue to operate on standby power.

▼ Remotely booting or power cycling the server from the ILOM user interface

1. **Start by "Logging in to the ILOM" on page 16**
2. **From the** `Remote Control` **tab (A below), select the** `Remote Power Control` **tab (B).**
3. **From the drop list (C below), select the desired operation:**
   - `Reset`
   - `Immediate Power Off`
   - `Graceful Shutdown and Power Off`
   - `Power On` (greyed out if power is currently on)
   - `Power cycle`
4. **Press** `Save` **(D).**

Restoring ILOM root and BIOS passwords to the factory defaults

You can easily change known passwords using the ILOM user interface. But, if you forget the `root` password for the ILOM service processor or the optional BIOS password (if set), you need to reset both to the factory defaults. Carry out the following tasks:

- "Changing passwords" on page 16.

▼ Powering down

Caution – Pressing the `Power` button does NOT cut off power to the appliance. The GRASP service processor board and power supply fans continue to draw power after the button has been pressed. To completely power off the appliance, you must disconnect the AC power cords from the power supplies on the back panel of the appliance. See below for detailed procedures.

1. **Shut down the appliance to standby power using one of the following procedures:**
   - "Remotely booting or power cycling the server from an ILOM Remote Console Solaris session" on page 20
   - "Remotely booting or power cycling the server from the ILOM user interface" on page 21.

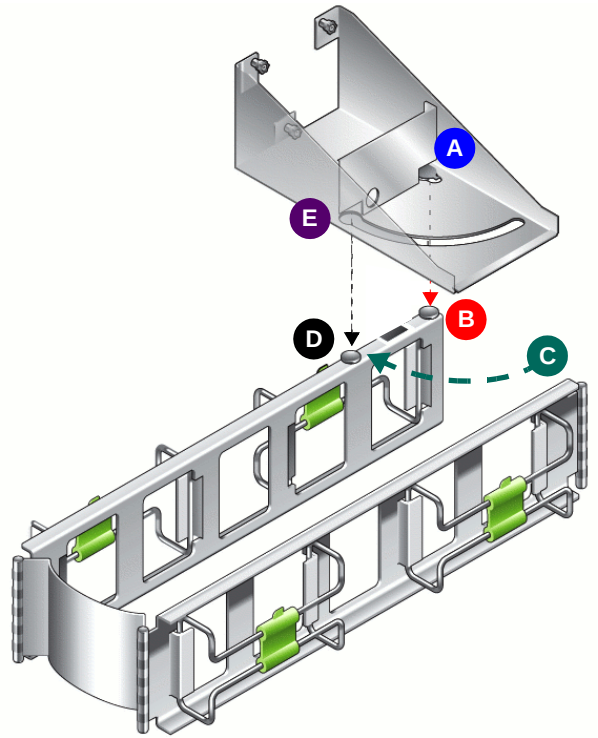
   While you can also shut down gracefully by pressing and releasing the `Power` button on the server, inadvertently holding the button too long can precipitate an immediate shutdown. Using one of the software methods is thus safer.
2. **Disconnect the AC power cords from the appliance.**

Next task: "Removing the cable management arm" on page 22.

▼ Removing the cable management arm

If you need to access the system controller (SC), remove the cable management arm (CMA) using the following procedure.

1. **Lift the small tab (A below) on the CMA-to-chassis bracket to release the right pinhead (B).**



2. **Push the CMA toward the chassis (C above), so that the second pinhead (D) aligns with the keyhole (E), freeing the CMA to drop away from the bracket.**

3. **Pull the CMA away from the rear of the chassis, and remove the CMA from the slide-rail extension.**

Next task: "Removing the system controller" on page 23.

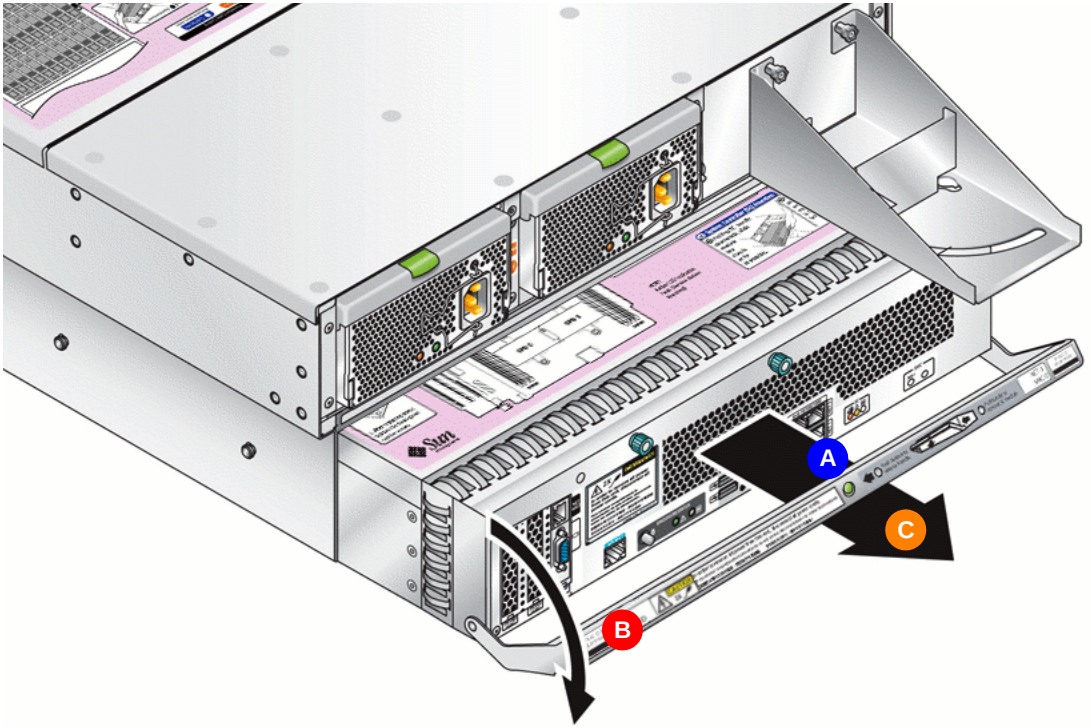
▼ Removing the system controller

The system controller is a sub-enclosure that can be removed from the back of the main system enclosure. The system controller contains the CPUs, memory, the Graphics Redirect and Service Processor (GRASP) board, and optional PCI cards.

Caution – To prevent electrostatic discharge (ESD) damage to the components on the system controller, connect a ground strap between yourself and the chassis ground before proceeding. Shut down the power from the front panel and then unplug both power supply cords.

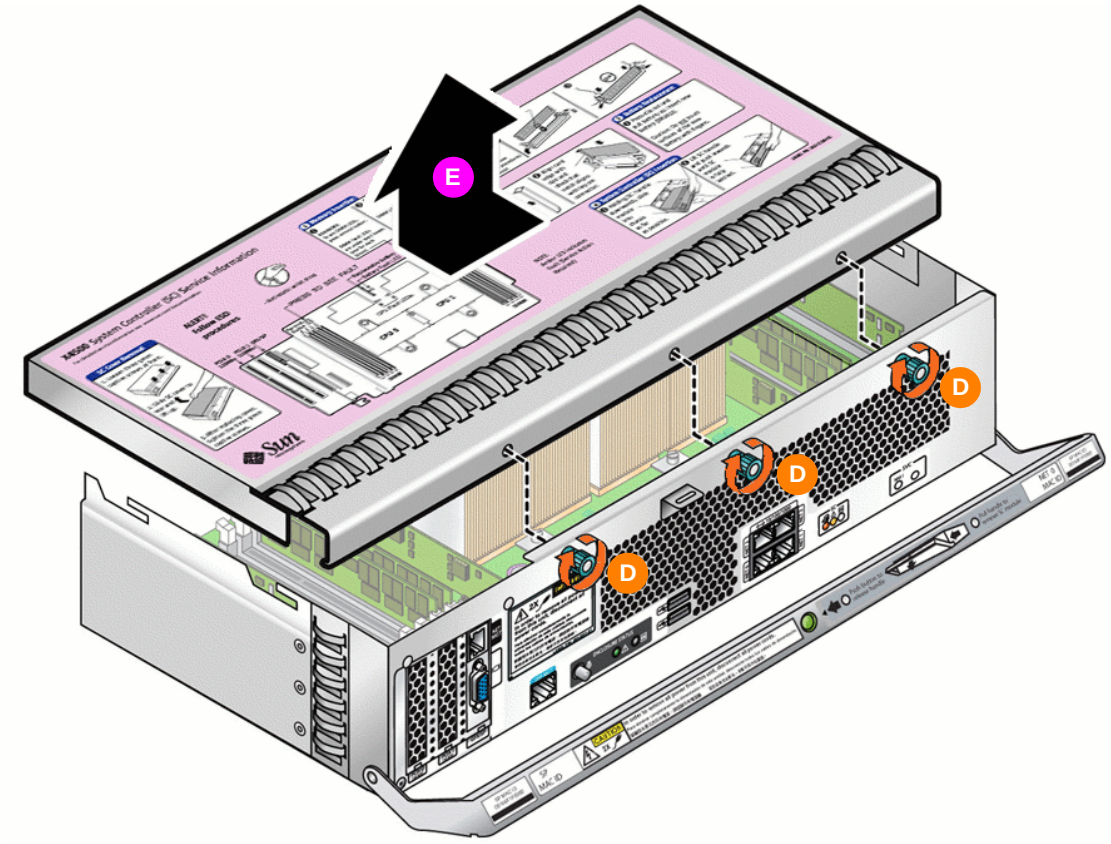
Caution – Although both power supplies should turn off then when you remove the system controller, voltage could be present on the chassis connectors if either power supply did not shut down as expected. Thus, you must pull the power cords from the power supplies to avoid any risk from inadvertent contact with those connectors.

1. **Using a stylus, ballpoint pen, or similar pointed device, hold down the system controller eject button (A below).**
2. **Rotate the system controller handle toward you (B below).**



3. **Grasping the system controller handle (B above) with one hand and supporting the weight of the system controller with the other, pull the system controller from the chassis and slide it out (C).**

4. **Loosen the three green-capped captive screws (D below) under the system controller handle.**



5. **Push the system controller cover toward the rear of the chassis and lift it off (E above).**

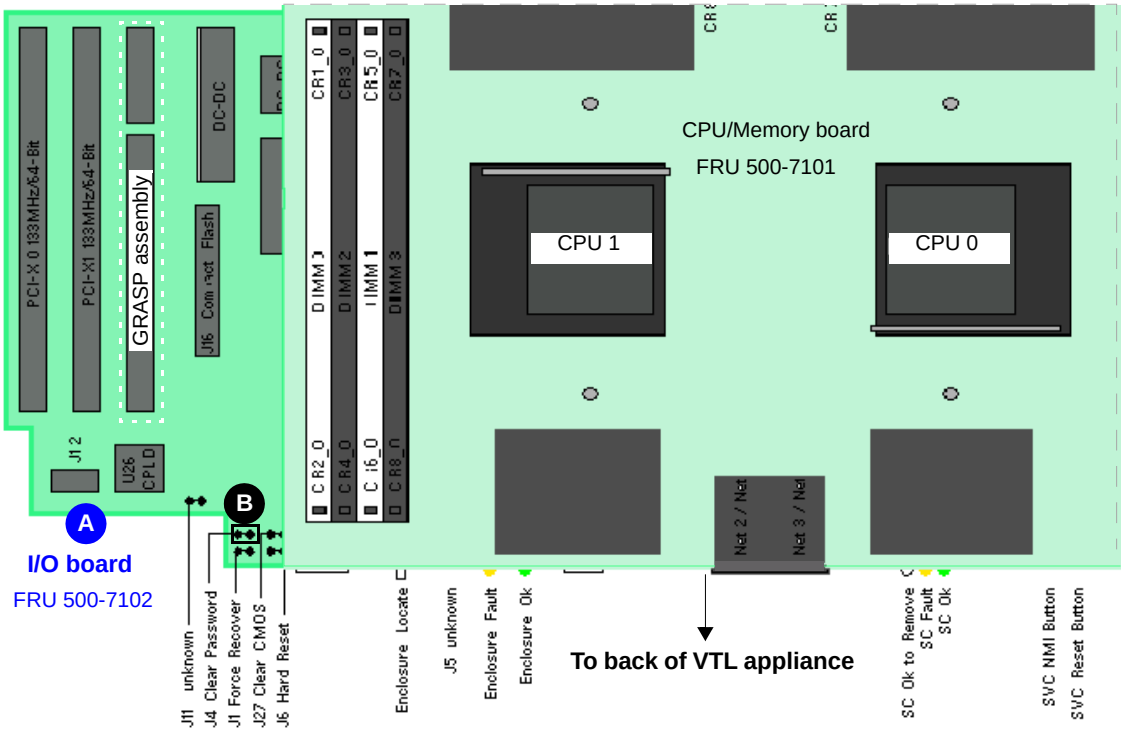
Next task: "Clearing the passwords" on page 25.

▼ Clearing the passwords

You clear the passwords and restore the defaults by connecting the J4 jumper pins at the rear left corner of the system I/O board. Use the procedure below to identify the I/O board, locate the J4 pins, and install jumper blocks.

1. **Locate the system I/O board (A below) inside the system controller enclosure.**

   The I/O board protrudes from under the left rear corner of the system CPU/Memory board.



2. **Connect the J4 Clear Password jumper pins with a jumper block (B above).**

   The jumper pins are labeled `passwd clr` and are located at the rear of the I/O board between the GRASP assembly and the edge of the CPU/Memory board.

Next task: "Returning the system controller to the chassis" on page 26.

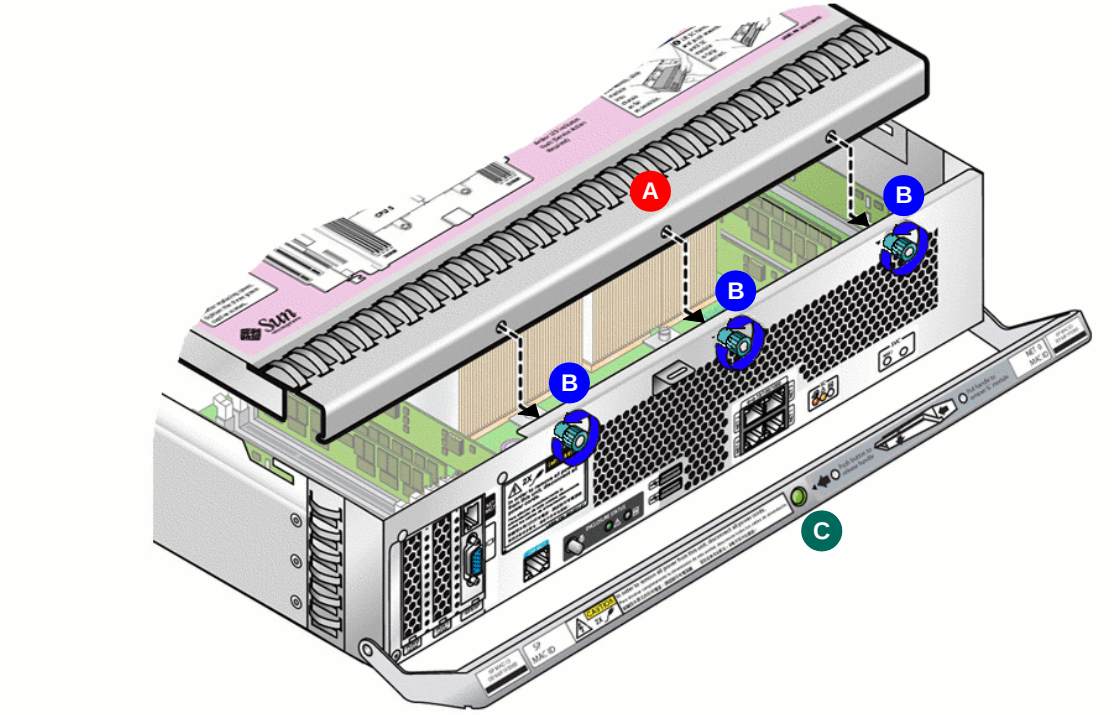
▼ Returning the system controller to the chassis

1. **Place the system controller cover (A below) in position on the enclosure, and slide it forward to engage the captive screws (B).**

Caution – Do not reinstall the system controller without the cover. If you operate the system without the cover in place, the system may overheat and damage system components, and service processor may report an over temperature event at `proc.p1.t_core`.

---

2. **Secure the cover by tightening the three plastic-capped captive screws (B below).**

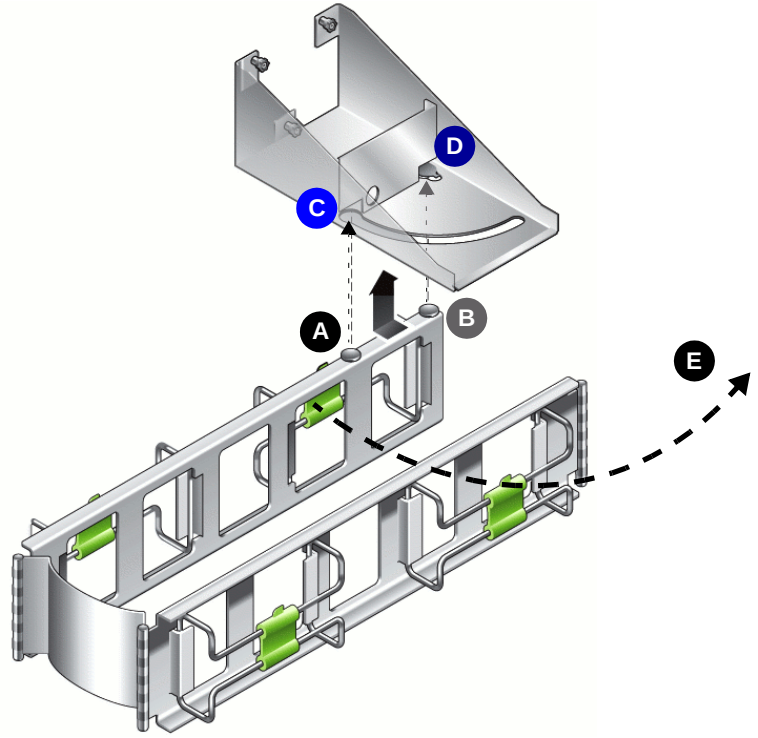


3. **Align the system controller with the empty bay in the appliance chassis.**
4. **Push the system controller into the bay until it firmly engages the connector on the power distribution board.**
5. **Push the system controller further until it is seated firmly.**
6. **Lift the system controller handle (C above) until the latch clicks into place.**

Next task: "Replacing the cable management arm" on page 27.

▼ Replacing the cable management arm

1. **Placing your hand under the CMA for support, fit the two pins (A, B below) into the keyholes in the CMA-to-chassis bracket (C, D).**



2. **Rotate CMA towards you until it seats with an audible snap (E above).**

▼ Restoring main power and starting the server

1. **Reconnect AC power cords to the appliance power supplies.**

   The appliance enters standby power mode. The `Power/OK` LED on the front panel flashes.

2. **Return the appliance to main power mode by using a ballpoint pen or other stylus to press and release the recessed `Power` button on the front panel.**

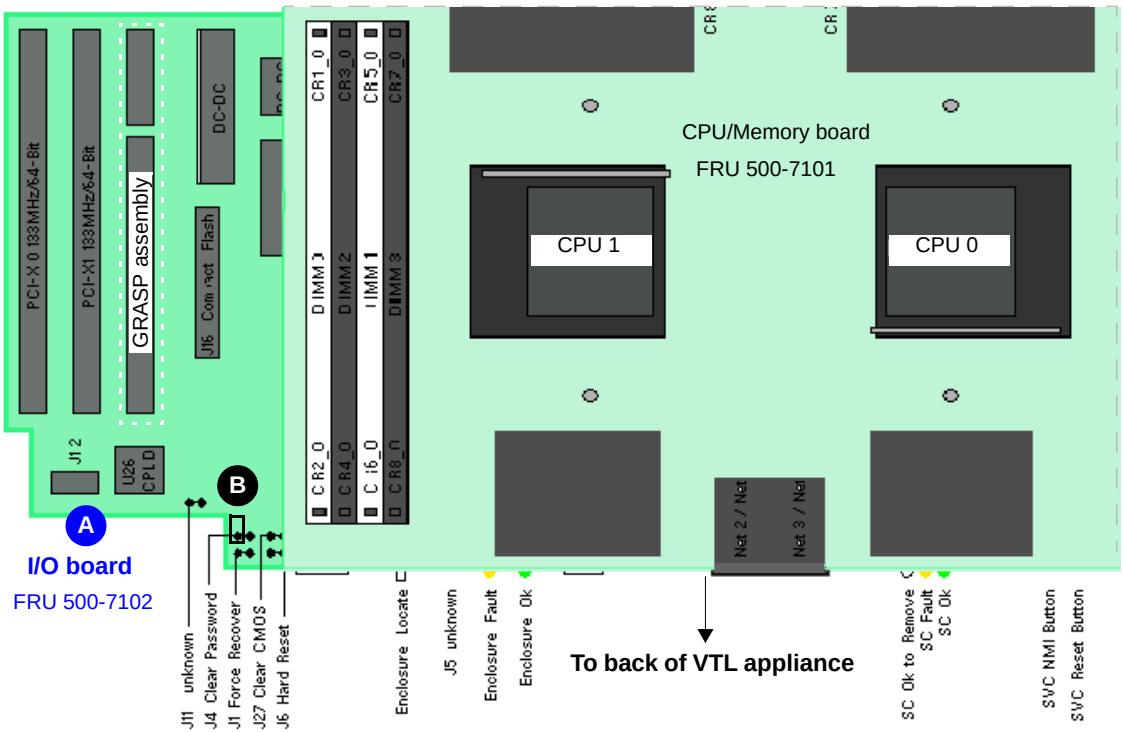
   When both the service processor and the server reboot, the CPU detects the state of the `passwd clr` jumper. Shortly after the end of the Power On Self Test (POST), the CPU sends the message `CMOS password cleared by jumper`. The ILOM service processor password reverts to the default, `changeme`. The BIOS password (if any) is removed.

Next task: ."Setting a new root password" on page 29.

▼ Setting a new root password

Finally, you need to replace the default password with something more secure and remove the jumper block that resets the passwords at boot. Proceed as follows.

1. **Using the procedure for "Changing the ILOM password" on page 16, change the default password to something more secure.**
2. **Use the procedures for "Removing the cable management arm" on page 22 and "Removing the system controller" on page 23 to open the system controller.**
3. **On the I/O board (A below), locate the jumper block that you installed when restoring the default password (B).**



4. **Remove the jumper block or reposition it so that it no longer connects the jumper pins (B above).**

   If you do not remove the jumper block from the `passwd clr` pins, the ILOM service processor and BIOS passwords will return to the defaults every time you power-cycle the appliance.

5. **To finish up, carry out the procedures in "Returning the system controller to the chassis" on page 26 and "Replacing the cable management arm" on page 27.**

CHAPTER 3

BIOS and BIOS parameters

The Basic Input/Output System (BIOS) is the initialization program that runs when power is applied to an x86 platform. At startup, the CPU loads the BIOS from an erasable programmable read-only memory (EPROM) chip. BIOS then runs a Power On Self Test (POST), locates, checks, and configures devices, and loads the operating system into memory. The VTL Value BIOS includes 128 KB of read-only memory (ROM), of which approximately 86 KB are used by the VGA controller, the Marvell controller, and the on-board network interface card (NIC). This leaves about 42KB of BIOS Option ROM for PCI devices (For advice on handling boot problems that result from inadequate BIOS Option ROM, see "Coping with BIOS Option ROM Exhaustion" on page 54).

When the system boots, BIOS detects devices in the order determined by the hexadecimal address at which the device appears on the system bus. The table below list devices (including PCI slots) by bus address:

Bus Hex Address	Device
0x1	Marvell 0
0x2	Marvell 1
0x3	USB 1.1
0x3	VGA
0x3	USB 2
0x5	Marvell 2
0x6	Marvell 3
0x7	ON NIC
0x8	ON NIC
0xA	Marvell 4

Bus Hex Address	Device
0xB	Marvell 5
0xD	PCI SLOT 0
0xE	PCI SLOT 1

For information about BIOS POST testing, POST codes, POST code checkpoints, and console redirection, see Appendix F.

Updating BIOS and firmware

Caution – The default BIOS configuration is set at the factory and should never be modified without express instructions from a Sun support representative. Incorrect BIOS, incorrect BIOS settings, or incorrect firmware can render the VTL Value appliance inoperable.

In particular, the AMD PowerNow! feature shown on the `Advanced` menu of the BIOS Setup utility has been deliberately disabled.

The VTL Value BIOS is tightly coupled with the Integrated Lights Out Manager (ILOM) firmware, so the two are always updated together. This section describes the normal upgrade process and procedures for handling post-update problems. See the following subsections:

- "Reflashing BIOS and ILOM firmware" on page 32
- "Recovering system hangs following BIOS updates" on page 35.

Reflashing BIOS and ILOM firmware

To upgrade the VTL Value BIOS and the service processor firmware, perform the following tasks:

- "Initial checks and preparations for a BIOS and firmware upgrade" on page 33
- "Running the BIOS and firmware update" on page 34

▼ Initial checks and preparations for a BIOS and firmware upgrade

Caution – Never upgrade VTL Value BIOS and firmware unless directed to do so by a Sun technical support representative! Installing incorrect BIOS and firmware can disable the VTL Value appliance.

1. **Make sure that you will have reliable power for the duration of the upgrade. Make sure that power cords cannot be inadvertently unplugged.**

   If system standby power were to fail during the firmware update procedure, the ILOM could become unbootable.

2. **Power the server down using one of the methods listed:**

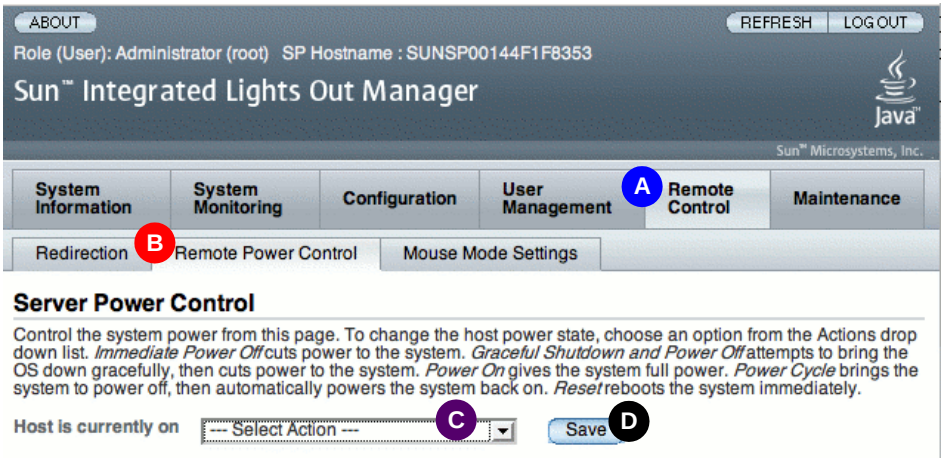
   - If you are logged in to a redirected Solaris console session, open a terminal window, and shut down using the `init 5` command:

     ```
     # init 5
     ```

     The `init 5` command shuts the system down gracefully before turning off main power.

     When the `init 5` command completes, main power is OFF, and the appliance is in standby power mode. The `OK` LED on the appliance front panel is blinking.

   - Otherwise, log in to the ILOM web interface. From the `Remote Control` tab (**A** below), select the `Remote Power Control` tab (**B**). Then select `Graceful Shutdown and Power Off` from the drop list (**C**), and press `Save` (**D**).



When the remote server shutdown process completes, main power is OFF, and standby power is still ON. The `OK` LED on the appliance front panel is blinking.

- If you cannot use the operating system or ILOM interface to shut off main power, use a stylus to quickly press and immediately release the power button on the front panel. Do not hold the button down.

  Pressing and releasing the power button causes the Advanced Configuration and Power Interface (ACPI) to stop the operating system in an orderly fashion before shutting main power off (this can take some time). The process is essentially equivalent to issuing an `init 5` command from the Solaris commandline. But, if you inadvertently hold the button down for too long (or if it sticks), you will initiate an ungraceful, emergency shut down.

  After you press the button, main power is OFF, and standby power is still ON. The `OK` LED on the front panel is blinking.

Next task: "Running the BIOS and firmware update" on page 34.

▼ Running the BIOS and firmware update

Perform the actual upgrade using the procedure documented below. The upgrade takes about five minutes. During this time, no other tasks can be performed in the ILOM.

1. **On a host machine that has network access to the service processor, open an X terminal and log in to the service processor using secure shell (`ssh`):**

```
# ssh root@ILOMhostname
Password:

Sun(TM) Integrated Lights Out Manager

Version 1.1.1

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Use is subject to license terms.

->
```

   In the above example, the variable *`ILOMhostname`* represents the network hostname and domain name or the IP address of the ILOM service processor.

   Sun recommends that you update BIOS and firmware from the service processor's ILOM commandline interface (CLI) in order to conserve bandwidth and improve the responsiveness of the process.

2. **At the service processor commandline prompt, `->`, enter the command `load -source tftp://`*URI*:**

```
-> load -source tftp://URI
```

where *URI* is the Uniform Resource Indicator that points to the network location where the update files are stored. Note that TFTP is the only protocol supported, so the URI must begin with `tftp://`.

3. **When prompted to confirm the URI, check what you have typed and, if it is correct, enter** `y`**.**

```
-> load -source tftp://URI
Are you sure you want to load the specified file (y/n)? y
File upload is complete.
Firmware image verification is complete.
```

4. **When prompted, enter** `y` **to preserve the configuration,** `n` **to restore the defaults:**

```
Do you want to preserve the configuration (y/n)? n
Updating firmware in flash RAM:
.
Firmware update is complete
```

The update takes about 5-10 minutes.

5. **If the network times out during the file upload, the ILOM reboots using the prior version of the ILOM firmware. Repeat the update process.**
6. **If the service processor hangs on reboot, go to "Recovering system hangs following BIOS updates" on page 35.**
7. **Otherwise, you are finished. Stop here.**

Recovering system hangs following BIOS updates

Occasionally, the system hangs during a reboot following an ILOM SP firmware/BIOS update. If this occurs, force the appliance to look for the new BIOS by performing the following tasks:

▼ Powering off

1. **Shut off main power. Use a stylus to press and hold the power button on the front panel.**

   After you press the button, main power is OFF, and standby power is still ON. The OK LED on the front panel is blinking.

2. **Unplug the AC power cords from the power supplies at the rear of the server.**

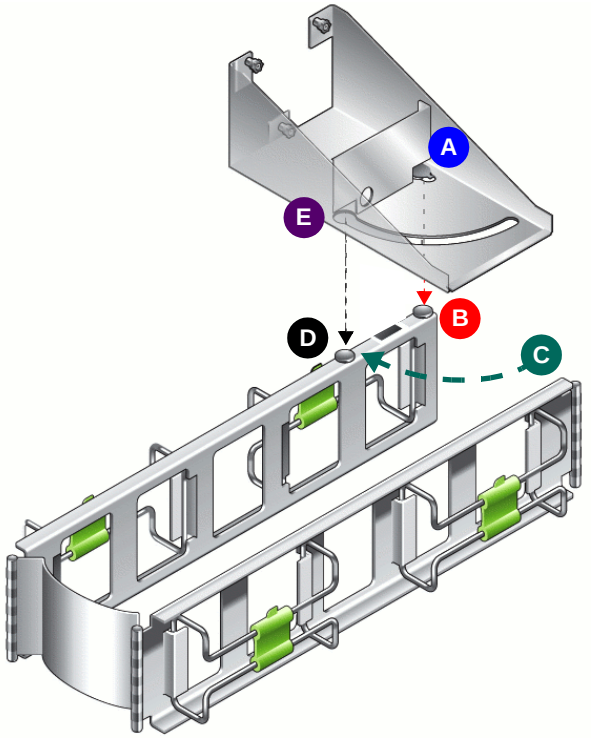
   Power is now OFF. The OK LED on the front panel is not lighted.

Next task: "Removing the cable management arm" on page 36.

▼ Removing the cable management arm

If you need to access the system controller (SC), remove the cable management arm (CMA) using the following procedure.

1. **Lift the small tab (A below) on the CMA-to-chassis bracket to release the right pinhead (B).**



2. **Push the CMA toward the chassis (C above), so that the second pinhead (D) aligns with the keyhole (E), freeing the CMA to drop away from the bracket.**

3. **Pull the CMA away from the rear of the chassis, and remove the CMA from the slide-rail extension.**

Next task: "Removing the system controller" on page 37.

▼ Removing the system controller

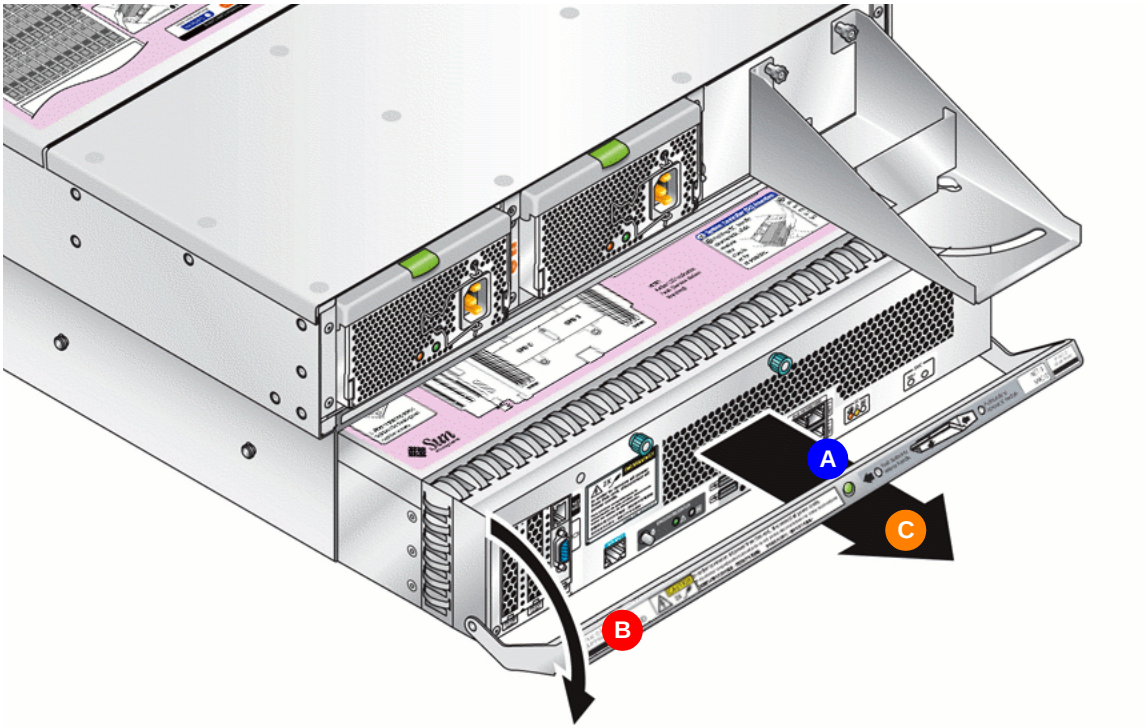
The system controller is a sub-enclosure that can be removed from the back of the main system enclosure. The system controller contains the CPUs, memory, the Graphics Redirect and Service Processor (GRASP) board, and optional PCI cards.

Caution – To prevent electrostatic discharge (ESD) damage to the components on the system controller, connect a ground strap between yourself and the chassis ground before proceeding. Shut down the power from the front panel and then unplug both power supply cords.

Caution – Although both power supplies should turn off then when you remove the system controller, voltage could be present on the chassis connectors if either power supply did not shut down as expected. Thus, you must pull the power cords from the power supplies to avoid any risk from inadvertent contact with those connectors.

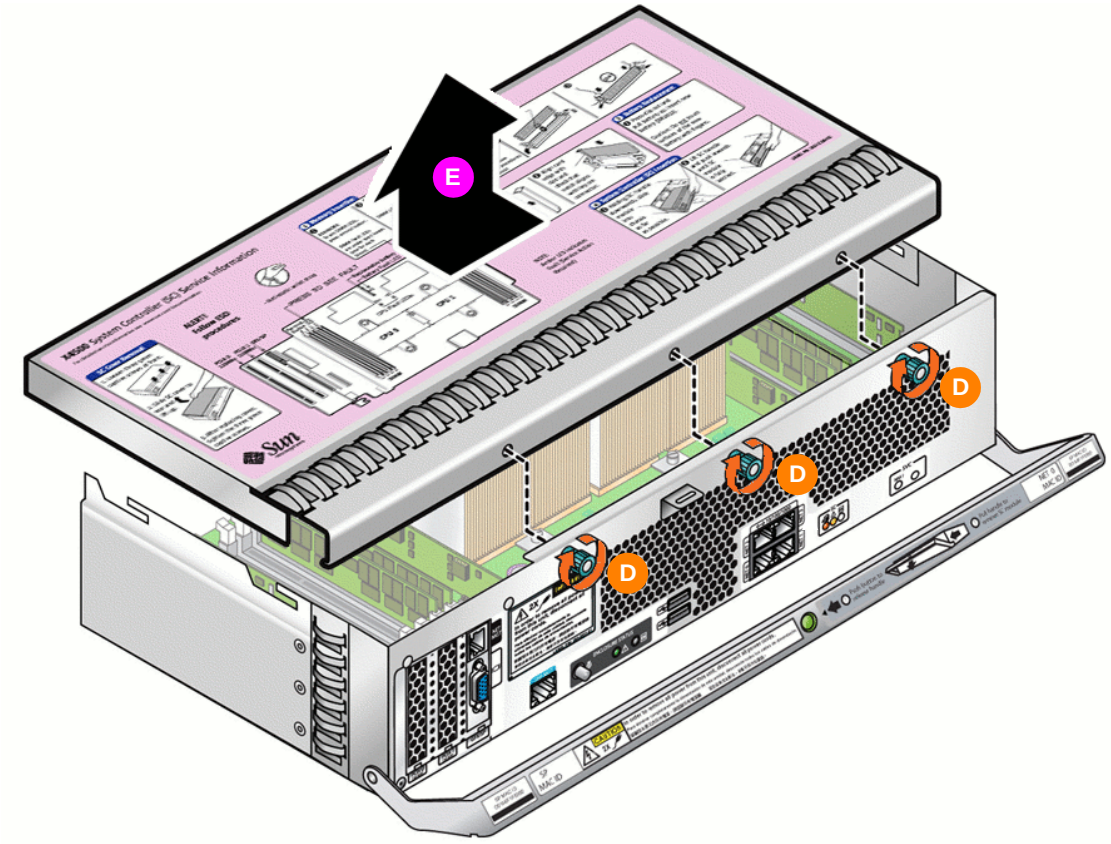
1. **Using a stylus, ballpoint pen, or similar pointed device, hold down the system controller eject button (A below).**

2. **Rotate the system controller handle toward you (B below).**



3. **Grasping the system controller handle (B above) with one hand and supporting the weight of the system controller with the other, pull the system controller from the chassis and slide it out (C).**

4. **Loosen the three green-capped captive screws (D below) under the system controller handle.**



5. **Push the system controller cover toward the rear of the chassis and lift it off (E above).**

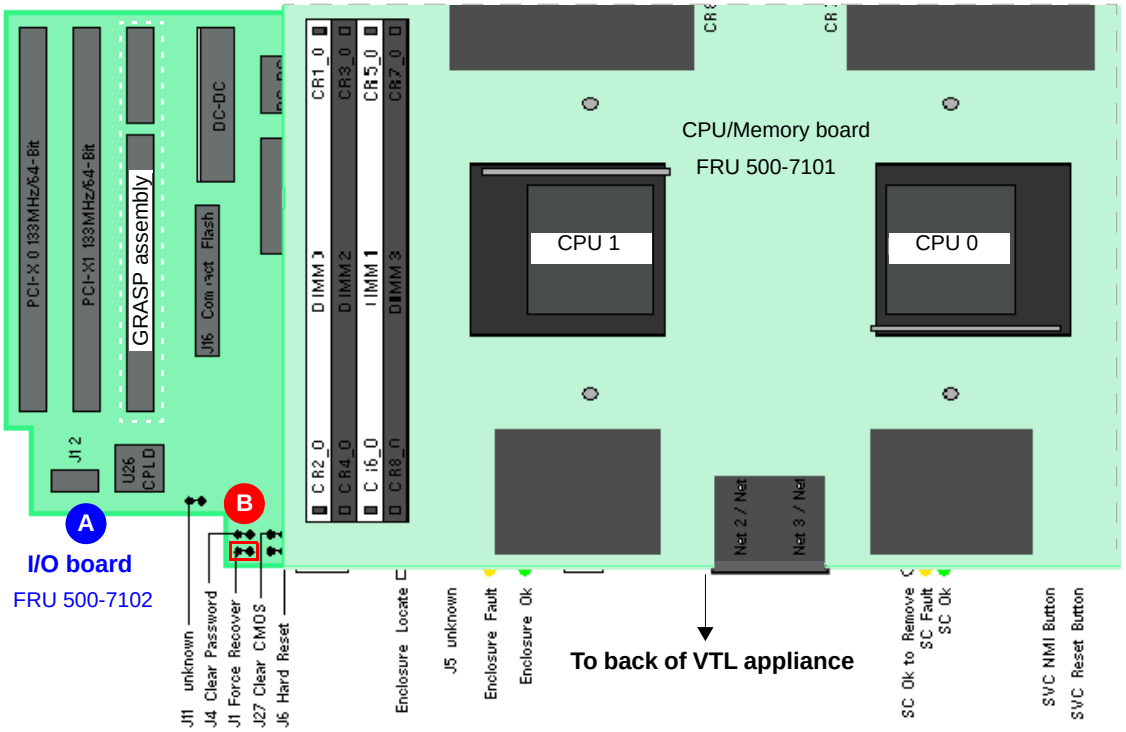
Next task: "Using the Force-Recovery jumper" on page 39.

▼ Using the Force-Recovery jumper

You force the system to look for new BIOS by connecting the J1 jumper pins at the rear left corner of the system I/O board. Use the procedure below to identify the I/O board, locate the J1 pins, and install jumper blocks.

1. **Locate the system I/O board (A below) inside the system controller enclosure.**

   The I/O board protrudes from under the left rear corner of the system CPU/Memory board.



2. **Connect the J1 Force Recover jumper pins with a jumper block (B above).**

   The jumper pins are labeled `Force Rcvr` and are located at the rear of the I/O board between the GRASP assembly and the edge of the CPU/Memory board.

Next task: "Returning the system controller to the chassis" on page 40.

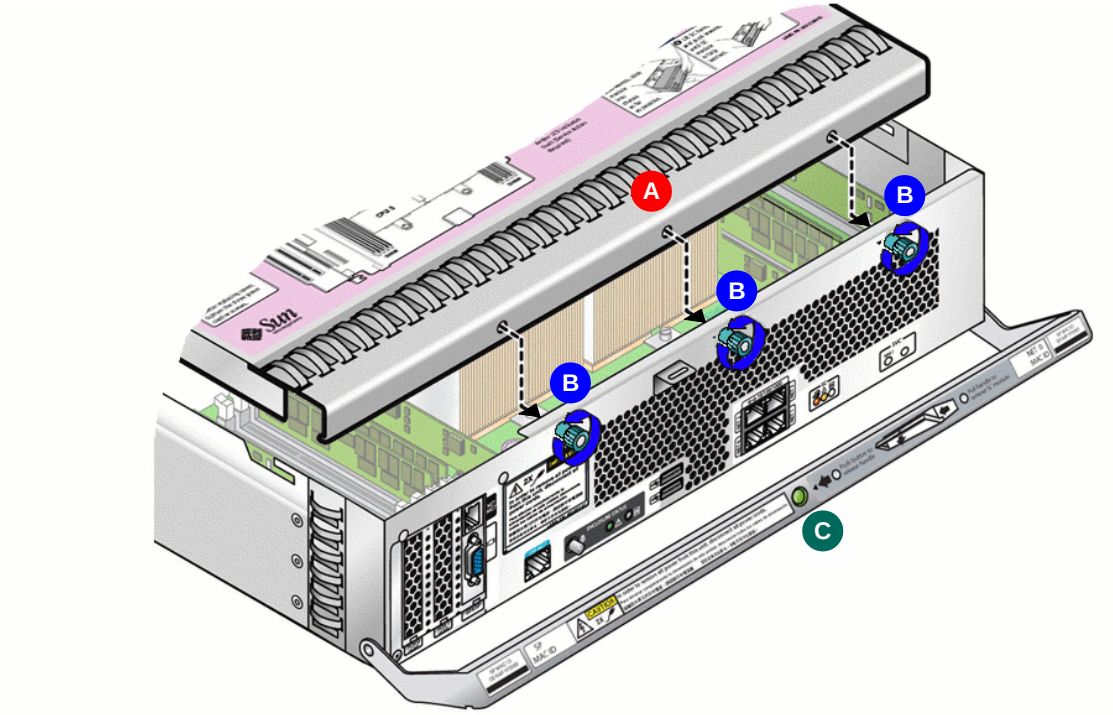
▼ Returning the system controller to the chassis

1. **Place the system controller cover (A below) in position on the enclosure, and slide it forward to engage the captive screws (B).**

Caution – Do not reinstall the system controller without the cover. If you operate the system without the cover in place, the system may overheat and damage system components, and service processor may report an over temperature event at `proc.p1.t_core`.

---

2. **Secure the cover by tightening the three plastic-capped captive screws (B below).**

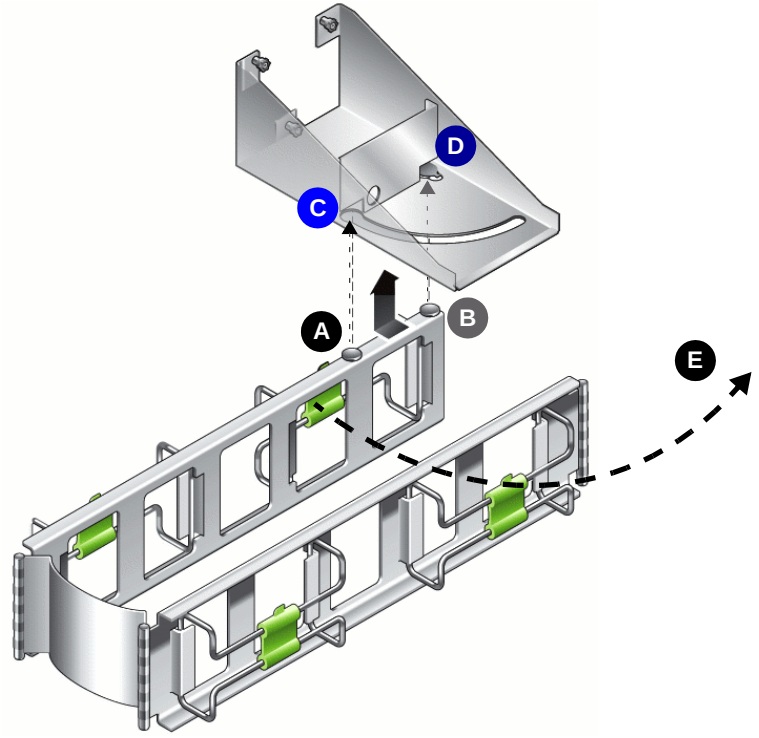


3. **Align the system controller with the empty bay in the appliance chassis.**
4. **Push the system controller into the bay until it firmly engages the connector on the power distribution board.**
5. **Push the system controller further until it is seated firmly.**
6. **Lift the system controller handle (C above) until the latch clicks into place.**

Next task: "Reinstalling the cable-management arm" on page 42.

▼ Reinstalling the cable-management arm

1. **Placing your hand under the CMA for support, fit the two pins (A, B below) into the keyholes in the CMA-to-chassis bracket (C, D).**



2. **Rotate CMA towards you until it seats with an audible snap (E above).**

Next task: "Restoring main power and starting the server" on page 42.

▼ Restoring main power and starting the server

1. **Reconnect AC power cords to the appliance power supplies.**

   The appliance enters standby power mode. The `Power/OK` LED on the front panel flashes.

2. **Return the appliance to main power mode by using a ballpoint pen or other stylus to press and release the recessed `Power` button on the front panel.**

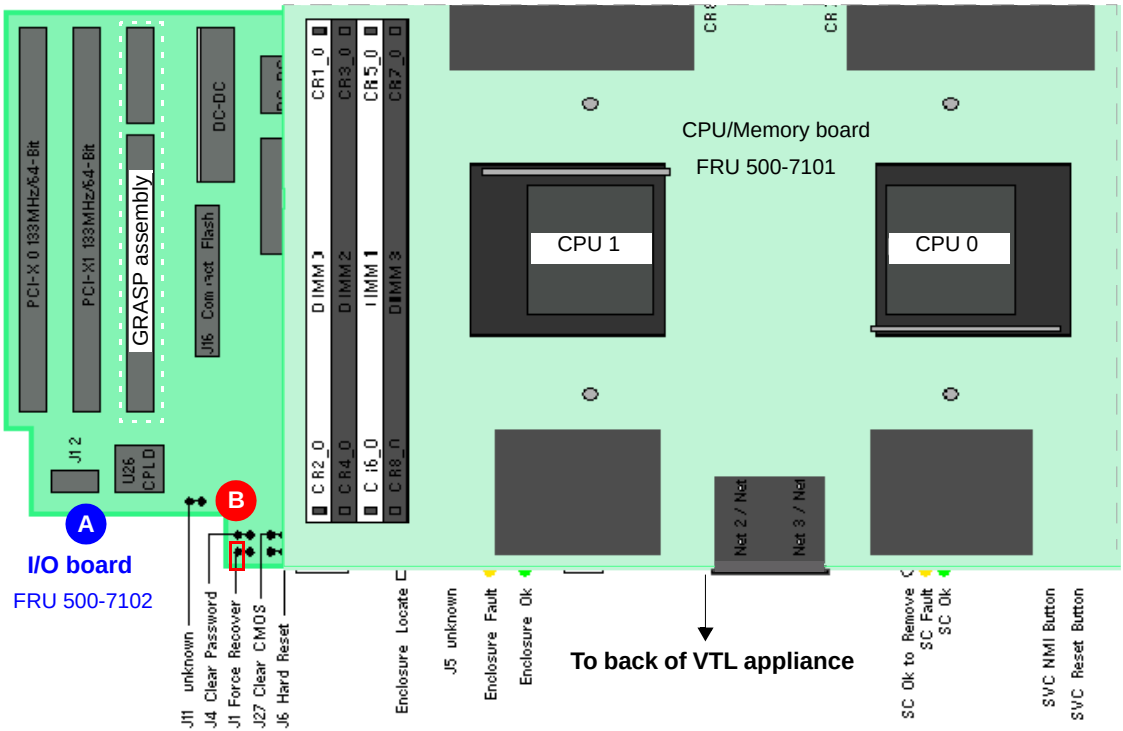
   When both the service processor and the server reboot, the CPU detects the state of the Force Recover jumper and looks for new BIOS.

Next task: "Removing the Force Recover jumper block" on page 43.

▼ Removing the Force Recover jumper block

Finally, you need to remove the jumper block that forces the system to look for new BIOS every time the system boots. Proceed as follows.

1. **Use the procedures for "Removing the cable management arm" on page 36 and "Removing the system controller" on page 37 to open the system controller.**
2. **On the I/O board (A below), locate the jumper block that you installed when forcing recovery (B).**



3. **Remove the jumper block or reposition it so that it no longer connects the jumper pins (B above).**

   If you do not remove the jumper block from the `Force Rcvr` pins, the system will do a forced recovery and look for new BIOS every time you power-cycle the appliance.

4. **Carry out the procedures in "Returning the system controller to the chassis" on page 40 and "Reinstalling the cable-management arm" on page 42.**
5. **Finish up by powering up the appliance.**

Accessing BIOS settings

Caution – This section describes viewing and/or modifying the BIOS settings. Never alter VTL Value BIOS settings unless directed to do so by a Sun technical support representative. Improperly modified BIOS values may disable the VTL Value appliance.

The Basic Input/Output System (BIOS) includes a Setup utility stored in the BIOS flash memory. The Setup utility reports system information and can be used to configure the BIOS settings. The configured data is provided with context-sensitive Help and is stored in the system's battery-backed CMOS RAM. If the configuration stored in the CMOS RAM is invalid, the BIOS settings default to the original state specified at the factory.

You can examine and, in some instances, modify BIOS settings using the VTL Value BIOS Setup utility. This section explains how you start the utility, navigate through the various menus, and edit values. For sample Setup utility screens, see Appendix E.

▼ Launching the BIOS utility

1. **Start an ILOM Remote Console session and redirect console output to your local workstation.**

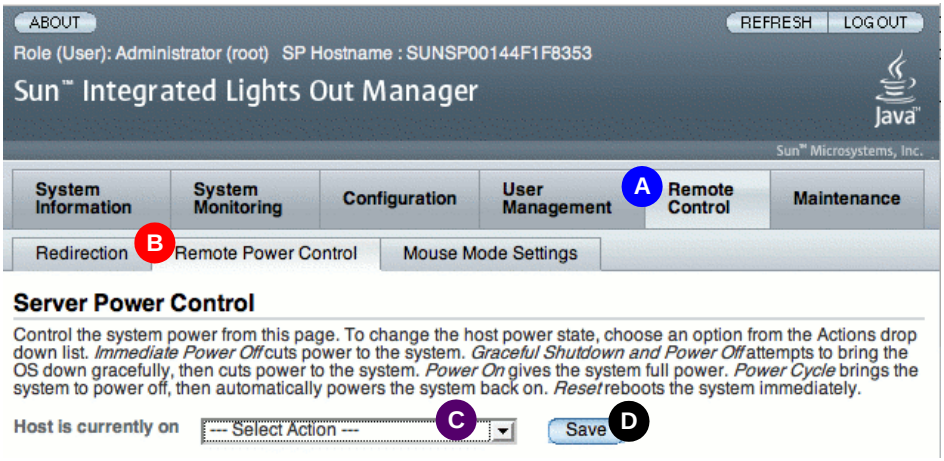
2. **Reboot the server.**

   - If the server is currently powered up, log in to Solaris as `root`, open a terminal window, and restart using the `init 6` command:

     ```
     # init 6
     ```

     Alternatively, you can reset the power directly from the ILOM interface. From the `Remote Control` tab (**A** below), select the `Remote Power Control` tab (**B**), select `Graceful Shutdown and Power Off` from the drop list (**C**), and press `Save` (**D**). Then power up as described below.

- If the server is currently powered down, power it up from the ILOM. From the `Remote Control` tab (**A** below), select the `Remote Power Control` tab (**B**), select `Power On` from the drop list (**C**), and press `Save` (**D**).



3. **As the server restarts, press the `F2` key while the system is performing the power-on self-test (POST).**

   The BIOS Setup utility starts.

▼ Navigating through the BIOS menus

The BIOS Setup utility contains seven menu screens, displayed in the following order:

1. `Main`
2. `Advanced`
3. `PCI/PnP`
4. `Boot`
5. `Security`
6. `Chipset`
7. `Exit`

Navigation is straightforward. You page through the menus using the left and right arrow keys. The left arrow steps you back through the menus. The right arrow steps you forward. Within a menu, you scroll between fields using the up and down arrow keys and jump between columns using the `Tab` key.

For facsimiles of the menu screens, see Appendix E.

▼ Editing BIOS parameters

For each parameter that you need modify, proceed as follows:

Caution – Never alter BIOS settings unless directed to do so by a Sun technical support representative! Improperly modified BIOS values may disable the VTL Value appliance.

---

1. **Using the left and right arrow keys, page through the menus until you locate the page that contains the value you need to modify.**
2. **Using the right and left arrow keys and the `Tab` key, move the cursor to the field that you need to modify.**

   Note that editable fields are displayed in color.
3. **Press `Enter` to select the field.**

   A dialog box lists the legal values for the BIOS parameter that you have selected.
4. **Enter a value and close the screen.**
5. **Repeat the above steps for each BIOS parameter that you need to change.**
6. **When you have made all of the required edits, press and release the right arrow key until the `Exit` menu appears.**
7. **Following the instructions in the `Exit` menu, save your changes and exit the BIOS Setup utility.**

Recovering from a BIOS misconfiguration

If the BIOS has been so badly misconfigured that the system will not boot, you can recover by restoring CMOS to the factory-default settings. Factory defaults are restored by installing a jumper block across pins on the system board. Proceed as follows.

▼ Powering off

1. **Shut off main power. Use a stylus to press and hold the power button on the front panel.**

After you press the button, main power is OFF, and standby power is still ON. The OK LED on the front panel is blinking.

2. **Unplug the AC power cords from the power supplies at the rear of the server.**

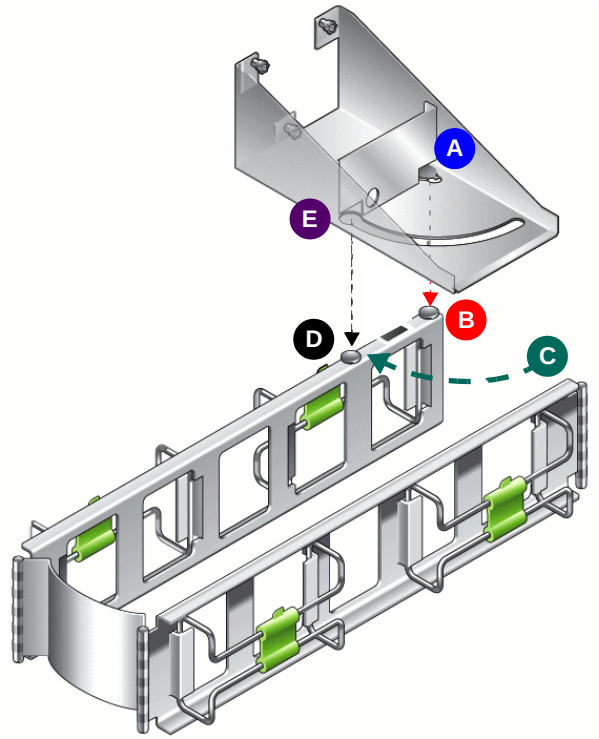
   Power is now OFF. The OK LED on the front panel is not lighted.

Next task: "Removing the cable management arm" on page 47.

▼ Removing the cable management arm

If you need to access the system controller (SC), remove the cable management arm (CMA) using the following procedure.

1. **Lift the small tab (A below) on the CMA-to-chassis bracket to release the right pinhead (B).**



2. **Push the CMA toward the chassis (C above), so that the second pinhead (D) aligns with the keyhole (E), freeing the CMA to drop away from the bracket.**
3. **Pull the CMA away from the rear of the chassis, and remove the CMA from the slide-rail extension.**

Next task: "Removing the system controller" on page 48.

▼ Removing the system controller

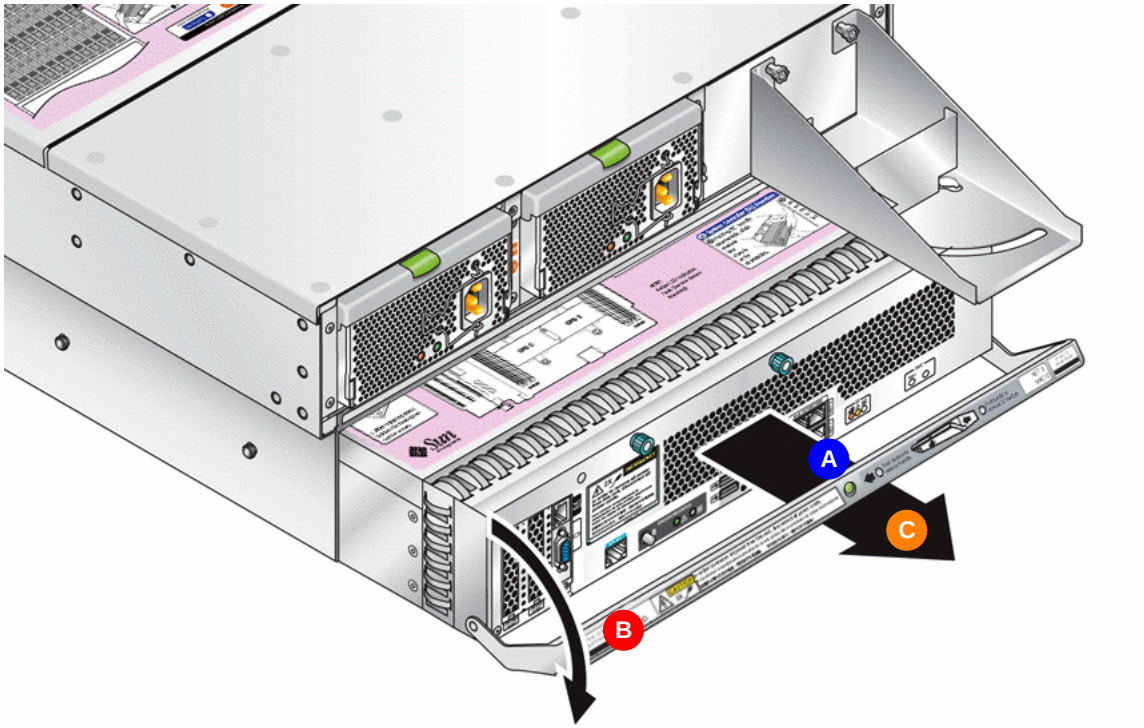
The system controller is a sub-enclosure that can be removed from the back of the main system enclosure. The system controller contains the CPUs, memory, the Graphics Redirect and Service Processor (GRASP) board, and optional PCI cards.

Caution – To prevent electrostatic discharge (ESD) damage to the components on the system controller, connect a ground strap between yourself and the chassis ground before proceeding. Shut down the power from the front panel and then unplug both power supply cords.

Caution – Although both power supplies should turn off then when you remove the system controller, voltage could be present on the chassis connectors if either power supply did not shut down as expected. Thus, you must pull the power cords from the power supplies to avoid any risk from inadvertent contact with those connectors.

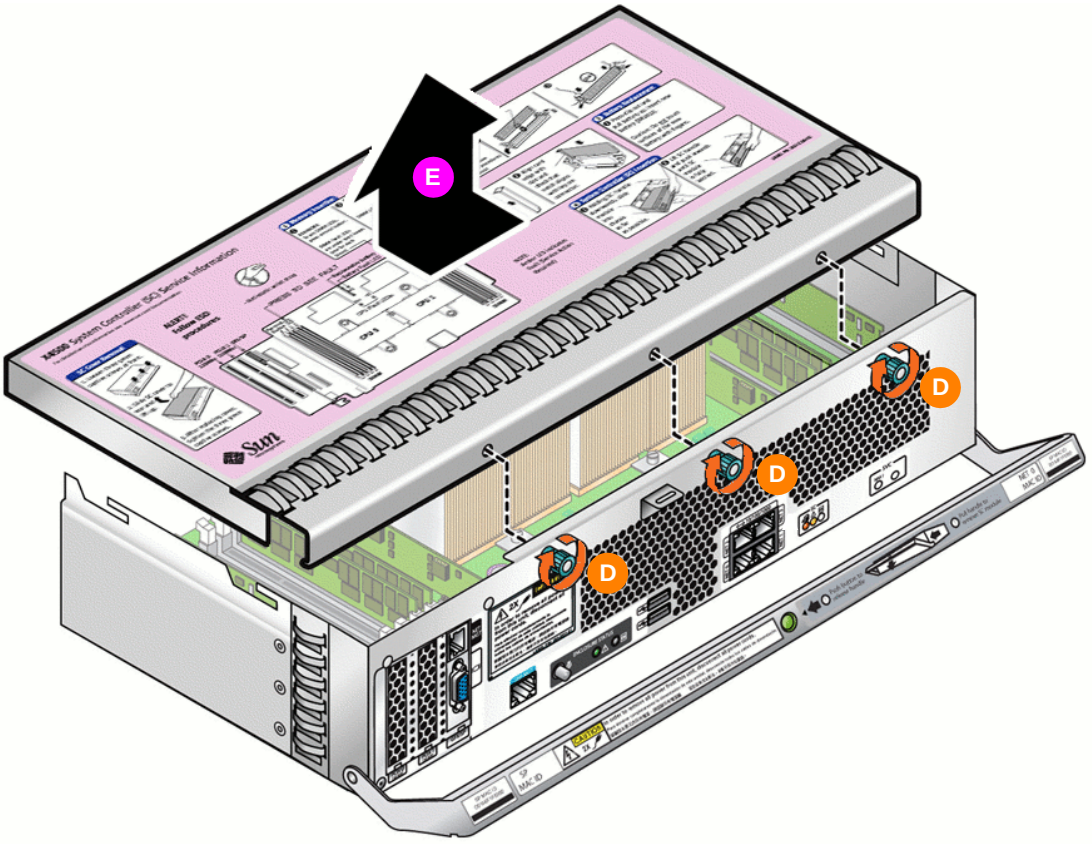
1. **Using a stylus, ballpoint pen, or similar pointed device, hold down the system controller eject button (A below).**

2. Rotate the system controller handle toward you (B below).



3. Grasping the system controller handle (B above) with one hand and supporting the weight of the system controller with the other, pull the system controller from the chassis and slide it out (C).

4. **Loosen the three green-capped captive screws (D below) under the system controller handle.**



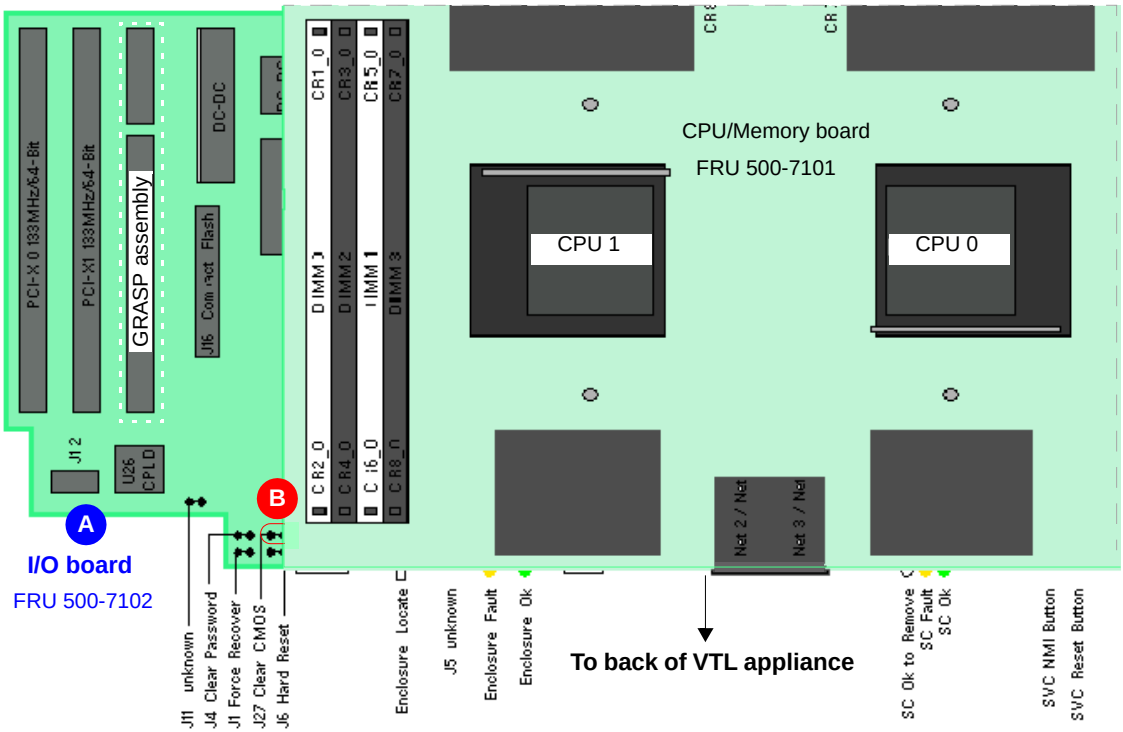
5. **Push the system controller cover toward the rear of the chassis and lift it off (E above).**

Next task: "Using the Clear CMOS Jumper" on page 51

▼ Using the Clear CMOS Jumper

1. **Locate the system I/O board (A below) inside the system controller enclosure.**

   The I/O board protrudes from under the left rear corner of the system CPU/Memory board.



2. **Connect the J27 Clear CMOS jumper pins with a jumper block (B above).**

   The jumper pins are labeled `Clear CMOS` and are located at the rear of the I/O board partly underneath the edge of the CPU/Memory board.

3. **Wait 10 seconds, then remove the jumper.**

   The jumper cuts battery power to the chipset where the CMOS settings are stored, clearing the CMOS memory.

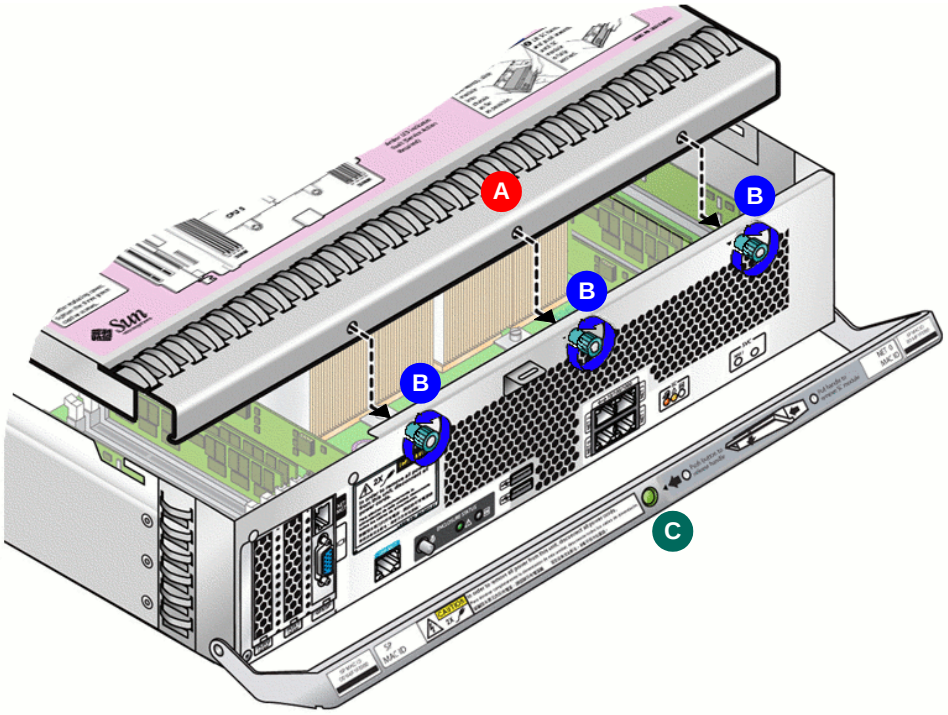
Next task: "Returning the system controller to the chassis" on page 51.

▼ Returning the system controller to the chassis

1. **Place the system controller cover (A below) in position on the enclosure, and slide it forward to engage the captive screws (B).**

Caution – Do not reinstall the system controller without the cover. If you operate the system without the cover in place, the system may overheat and damage system components, and service processor may report an over temperature event at `proc.p1.t_core`.

2. **Secure the cover by tightening the three plastic-capped captive screws (B below).**

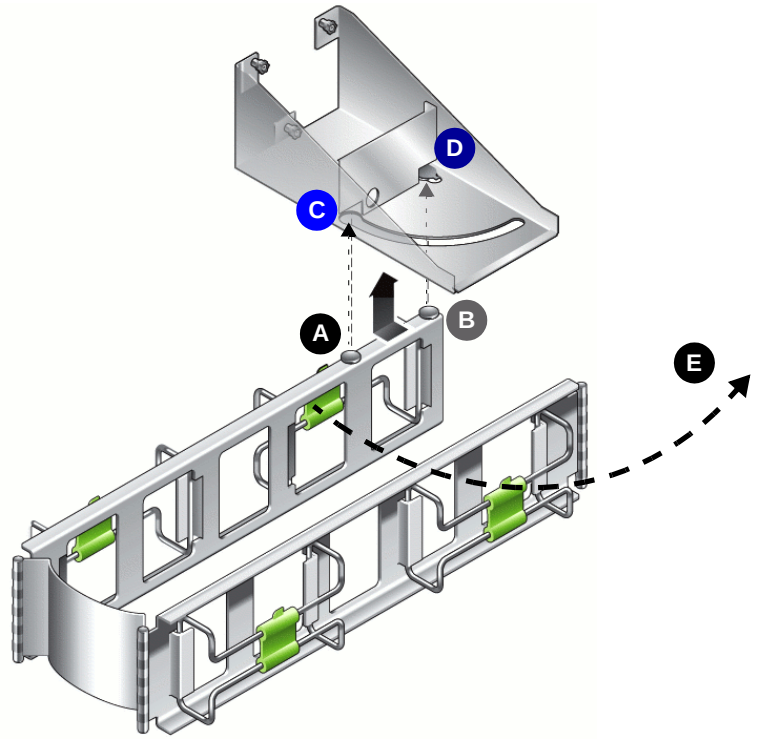


3. **Align the system controller with the empty bay in the appliance chassis.**
4. **Push the system controller into the bay until it firmly engages the connector on the power distribution board.**
5. **Push the system controller further until it is seated firmly.**
6. **Lift the system controller handle (C above) until the latch clicks into place.**

Next task: "Replacing the cable management arm (CMA)" on page 52.

▼ Replacing the cable management arm (CMA)

1. **Placing your hand under the CMA for support, fit the two pins (A, B below) into the keyholes in the CMA-to-chassis bracket (C, D).**



2. **Rotate CMA towards you until it seats with an audible snap (E above).**

Next task: "Restoring main power and starting the server" on page 53.

▼ Restoring main power and starting the server

1. **Reconnect AC power cords to the appliance power supplies.**

   The appliance enters standby power mode. The `Power/OK` LED on the front panel flashes.

2. **Return the appliance to main power mode by using a ballpoint pen or other stylus to press and release the recessed `Power` button on the front panel.**

   When both the service processor and the server reboot, the CPU detects the state of the Force Recover jumper and looks for new BIOS.

Coping with BIOS Option ROM Exhaustion

Note – You should not see the condition described below in a VTL appliance. Before taking any action on BIOS option ROM, consult Sun support.

Of the 128 KB of BIOS Option ROM provided by the VTL Value BIOS, 86 KB are used by the VGA controller, the Marvell controller, and the on-board Network Interface Card (NIC), leaving about 42 KB for other option ROMs. At boot, the order in which devices are scanned causes the option ROM space to be used up before all cards are scanned and makes some slots unbootable. With multiple PCI cards installed and option ROM enabled on all cards, you may see boot up errors of the following form:

```
Not enough space to copy PCI option ROM.
Option ROM memory space exhausted.
```

If you press `F12` to PXE boot from the network using the on-board NICs, the following error message appears:

```
PXE-ECI: Base code ROM-ID structure was not found.
Exiting Intel Boot Agent
```

To boot devices without exhausting all the option ROM, you have two options:

- You can leave slots `0` and `1` empty.
- You can use the BIOS `PCI/PnP` menu to disable OPROM scanning for PCIX slots `0` and `1` or for all PCI slots, if you need to enable PXE booting.

To disable OPROM scanning, proceed as follows.

▼ Disabling OPROM scanning to conserve BIOS Option ROM

1. **Enter the BIOS Setup utility by pressing the `F2` key while the system is booting up and performing POST.**
2. **On the BIOS Main Menu screen, select the `PCIPnP` tab to open the `PCI/PnP Settings` screen.**
3. **If you are not using PXE booting, change the lines for `Scanning OPROM on PCIX slots 0 and 1` to `Disabled`.**
4. **If you are not using PXE booting, disable OPROM scanning for all PCI slots.**

5. **Press and release the right arrow key until the `Exit` menu screen appears.**
6. **Follow the instructions on the `Exit` menu screen to save your changes and exit the Setup utility.**

CHAPTER 4

Maintaining VTL Value appliances

The VTL Value appliance has been designed to require little or no regular maintenance in normal use. You simply need to ensure adequate cooling:

- Make sure that chassis openings are free of external obstructions.
- Check periodically for dust and contaminant build-up.

  Sun recommends that you open the appliance at least every 6 months (more often in dusty environments). Inspect the heatsinks, fan modules, air passages, and external openings for dust buildup. If necessary, remove accumulated dust using a gentle brush, compressed air, or a vacuum cleaner.

Caution – Before handling components, attach an ESD wrist strap to bare metal on the chassis. The system's printed circuit boards and hard disk drives contain components that are extremely sensitive to static electricity.

CHAPTER 5

Repairing the VTL Value appliance

The VTL Value appliance has been designed to require little regular maintenance so that customers can rectify many of the most likely problems quickly and easily, with little or no system down time. In most cases, you can simply swap out complete components using a minimal number of tools. This chapter provides step-by-step instructions that guide you through the following maintenance tasks:

- "Locating MAC addresses" on page 60
- "Removing a VTL appliance from a rack" on page 60
- "Replacing hard disk drives" on page 61
- "Replacing chassis components" on page 86
- "Replacing system controller components" on page 91.

Note – This chapter covers all VTL Value customer-replaceable units (CRUs). All other components are field-replaceable units (FRUs) that can only be serviced by trained technicians. Contact your Sun Service representative for assistance if you need to replace any component that is not covered below.

Before proceeding

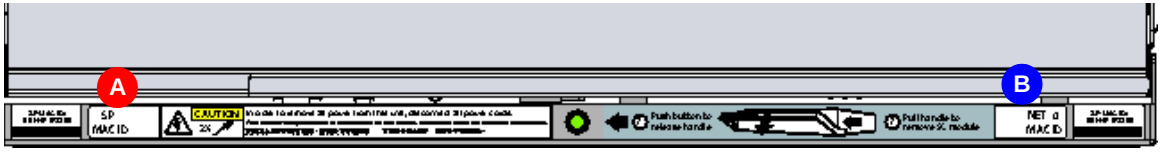
Before you proceed with any of the tasks detailed in this section of the document, carefully review "Addressing general requirements" on page 7, including:

- "Gathering the required tools" on page 7
- "Assembling the required personnel" on page 7
- "Taking the required precautions" on page 8.

Locating MAC addresses

The I/O board and service processor MAC addresses are printed on the system controller handle:

- The service processor MAC address is on the left side of the handle and labeled `SP MAC ID` (**A** below).
- The I/O board MAC address is on the right side of the handle and labeled `Net 0 MAC ID` (**B** below).



Removing a VTL appliance from a rack

This procedure assumes you have turned off the server, removed the cable management arm, and removed any cables or cords that would restrict the movement of the server.

▼ Removing the appliance from the rack

1. **Have a mechanical lift on hand, if at all possible.**

Caution – The VTL Value appliance weighs 160 pounds (72.7 kg) when fully loaded with components. To prevent injury to personnel or damage to the equipment, Sun strongly recommends using a mechanical lift when installing the server in a rack.

---

2. **If a mechanical lift is not available, make sure that at least four trained people are available to remove the server and/or reduce the weight of the server by removing components:**
   - Remove both power supplies.
   - Remove the system controller.
   - Label the hard disk drives in slots 2 to 46 and then remove them (you will reinstall the drives in their original slots using the labels as a guide).

   Do not uninstall the fan trays or the bootable drives in slots `0` and `1`.

3. **If a mechanical lift is available, make sure that at least three trained people are available to install the server in the rack.**

   It takes two people to operate the lift and install the server and one additional person to insure that the rails are engaged correctly.

4. **From the front of the rack, squeeze the slide-rail locks (with green plastic handles) to release the lock and pull the server about 1.5 inches from the rack.**

5. **Push the green plastic tabs on the middle slide rails to release the first stop.**

6. **Push the green plastic tabs on the middle slide rails to release the second stop and pull the server out about 36 inches from the rack.**

7. **Slide the server completely out of the slide rails and place on a clean, stable surface.**

Note – If you are removing the server in a data center with narrow aisles (under 44 inches or approximately 1.12 meters wide), you can order a narrow aisle removal kit from Sun Service.

Replacing hard disk drives

The VTL Value appliance uses SATA disk drive modules (500-GB, part number 541-1467 at the time of publication, but, for the most current list, consult the Sun System Handbook <`http://sunsolve.sun.com/handbook_pub/Systems/`>). This section covers the following tasks:

Removing and reinstalling the disk access cover

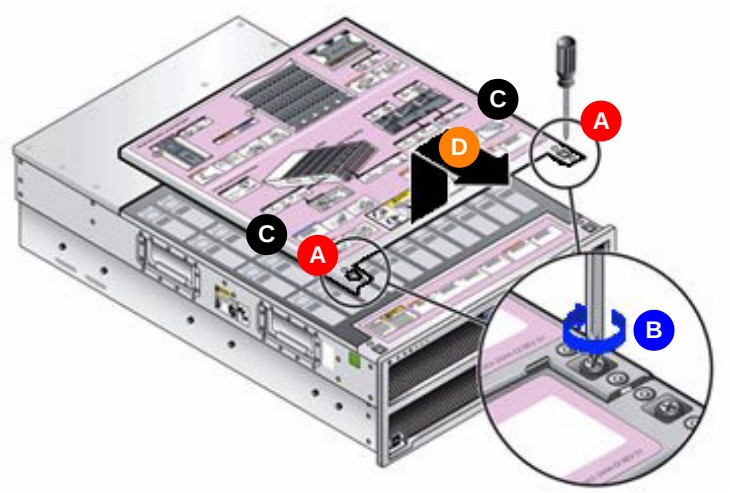
The cover is secured to the chassis by a metal lip that slides under the top of the chassis at the rear of the disk access opening and by a pair of captive screws at the front. To remove of replace the access cover, see the procedures below.

Caution – If you must remove the cover while the appliance is on, plan your activities carefully and then work quickly. The disk access cover is part of the system of ducts that direct cooling air through the appliance. To avoid overheating and possible component damage, you must replace the cover within 60 seconds whenever the appliance is on.

▼ Removing the disk drive access cover

The hard disk drive access cover protects the 48 hard disks in the appliance and ensures proper cooling to the drives and the system controller.

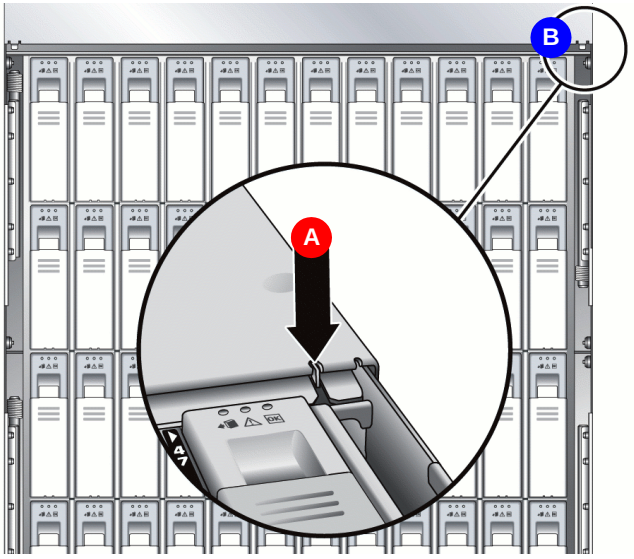
1. **Loosen the left and right captive screws (A below) using a No. 2 Phillips screwdriver (B).**
2. **Grasp the cover by its edges (C below), lift the front up from the chassis, and pull it forward (D).**



▼ Replacing the hard disk access cover

1. **Set the cover on the chassis**

2. **Being careful to avoid damaging the hard disk light pipes at the rear and the disk access cover intrusion switch (A below) at the rear right corner of the opening (B), slide the metal lip at the rear of the cover under the chassis.**



3. **Lower the cover and push it toward the rear until the front end drops into place.**
4. **Using a No. 2 Phillips screwdriver, turn the left and right captive screws on the cover until they are hand-tight.**

Replacing a failed boot drive

The VTL Value appliance boots from a mirrored boot volume that incorporates drives `0` and `1`. To replace a failed boot drive and return the appliance to normal operation, you must thus complete the following tasks:

- “Recovering a system that will not boot due to an insufficient metadevice database replicas error” on page 64
- “Identifying the failed boot drive” on page 66
- “Unconfiguring the bad boot drive” on page 68
- “Replacing the bad boot drive ” on page 70
- “Checking and correcting the logical boot disk configuration” on page 71
- “Rebuilding the boot mirror” on page 72
- “Checking the health of the rebuilt mirror ” on page 75.

Note – If you encounter problems at any point during the boot-disk repair operation, consult Sun support for assistance.

▼ Recovering a system that will not boot due to an insufficient metadevice database replicas error

If, for any reason, the VTL Value appliance restarts following the failure of a mirrored boot disk, normal booting fails with the message `Insufficient metadevice database replicas located`. The system enters single-user mode.

To boot in multiuser mode, the system must have a *state database replica quorum*. At least four of the six replicated database copies that store configuration and state information for the metadevices (logical disks) must be completely consistent with each other. After a disk has failed, this condition cannot be met: some of the replicas are *stale* and no longer reflect the current state of the metadevices.

Before proceeding further, you must refresh the metadata and restore the system's ability to boot into multiuser mode. Proceed as follows.

1. **Using a web browser, log in to the ILOM service processor, and redirect the Solaris system console. Then, using the ILOM remote console application, log in to Solaris as `root`, and open a Solaris terminal window.**

   If you do not have access to a web browser, you can connect to the appliance session via `ssh` and then become root using `su -`:

```
[laptop]user:# ssh -l vtladmin appliance_host-name_or_IP-address
Password:
[VTL_Value]vtladmin:# su -
Password:
[VTL_Value]root:#
```

   As a security precaution, remote `root` login is disabled by default. So you must use the `vtladmin` account.

2. **If the VTL Value appliance has not rebooted into single-user mode, stop here. Go to the next task noted at the end of this procedure.**

3. **If the VTL Value appliance has rebooted into single-user mode, the system displays the message shown beow:**

```
Insufficient metadevice database replicas located.

Use metadb to delete databases which are broken.
Ignore any "Read-only file system" error messages.
Reboot the system when finished to reload the metadevice database.
After reboot, repair any broken database replicas which were deleted.

Type control-d to proceed with normal startup
(or give root password for system maintenance):
```

4. **Enter the `root` password to enter maintenance mode.**

```
Type control-d to proceed with normal startup
(or give root password for system maintenance):

single-user privilege assigned to /dev/console.
Entering System Maintenance Mode
```

5. **Identify the stale databases. At the command prompt, enter the `metadb -i` command, and note any error flags.**

```
# metadb -i
        flags           first blk       block count
     a m  p  luo        16              8192            /dev/dsk/cXtYdNsP
     a    p  luo        8208            8192            /dev/dsk/cXtYdNsP
     a    p  luo        16400           8192            /dev/dsk/cXtYdNsP
    M     p             16              unknown         /dev/dsk/cXtZdNsP
    M     p             8208            unknown         /dev/dsk/cXtZdNsP
    M     p             16400           unknown         /dev/dsk/cXtZdNsP
```

The capitalized status flags are error flags:

- The `W` flag indicates that the replica has device write errors.
- The `M` flag indicates that the replica has problem with master blocks.
- The `D` flag indicates that the replica has problem with data blocks.
- The `F` flag indicates that the replica has format problems.
- The `R` flag indicates that the replica has device read errors.

6. **Using the command `metadb -d` *`disk-slice`*, delete each database that is flagged with an error in the metadb output.**

```
# metadb -d cXtZdNsP
```

7. **Make sure that the stale databases have been deleted:**

```
# metadb
        flags           first blk       block count
     a m  p  luo        16              8192            /dev/dsk/cXtYdNsP
     a    p  luo        8208            8192            /dev/dsk/cXtYdNsP
     a    p  luo        16400           8192            /dev/dsk/cXtYdNsP
```

8. **Reboot.**

```
# reboot
```

Next task: "Identifying the failed boot drive" on page 66.

▼ Identifying the failed boot drive

Boot drives are installed at the left front of the VTL Value chassis, in slots `0` and `1`. First, you must determine which of the two drives has failed. Proceed as follows.

1. **Using a web browser, log in to the ILOM service processor, and redirect the Solaris system console. Then, using the ILOM remote console application, log in to Solaris as `root`, and open a Solaris terminal window.**

   If you do not have access to a web browser, you can connect to the appliance session via `ssh` and then become root using `su -`:

```
[laptop]user:# ssh -l vtladmin appliance_host-name_or_IP-address
Password:
[VTL_Value]vtladmin:# su -
Password:
[VTL_Value]root:#
```

   As a security precaution, remote `root` login is disabled by default. So you must use the `vtladmin` account.

2. **Run the `hd` utility to identify the bad drive. On the Solaris command line, enter the command `hd -c`:**

```
[VTL_Value]root:# hd -c
```

The output of the `hd` command looks something like the example below:

```
[VTL_Value]root:# hd -c
---------------------SunFireX4500------Rear-----------------------------
 36:   37:   38:   39:   40:   41:   42:   43:   44:   45:   46:   47:
c6t3  c6t7  c5t3  c5t7  c8t3  c8t7  c7t3  c7t7  c1t3  c1t7  c0t3  c0t7
^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +
 24:   25:   26:   27:   28:   29:   30:   31:   32:   33:   34:   35:
c6t2  c6t6  c5t2  c5t6  c8t2  c8t6  c7t2  c7t6  c1t2  c1t6  c0t2  c0t6
^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +
 12:   13:   14:   15:   16:   17:   18:   19:   20:   21:   22:   23:
c6t1  c6t5  c5t1  c5t5  c8t1  c8t5  c7t1  c7t5  c1t1  c1t5  c0t1  c0t5
^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +
  0:    1:    2:    3:    4:    5:    6:    7:    8:    9:   10:   11:
c6t0  c6t4  c5t0  c5t4  c8t0  c8t4  c7t0  c7t4  c1t0  c1t4  c0t0  c0t4
^ b +  ^ b -  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +
--------*-----------*--SunFireX4500------Front-----*-----------*--------
[VTL_Value]root:#
```

3. **At lower left corner of the `hd` output, locate the blue flags and `b` labels that designate the boot drives.**

   The drives in slots 0 and 1 are the boot volumes. In our example, `c6t0` and `c6t4` are the boot drives.

Caution – the disk identifiers `c6t0` and `c6t4` are examples only. Your controller and target numbers may be different. Be sure to use the correct identiers

---

4. **Make a note of the controller and target numbers of the disk that has red flags and a `-` (minus) symbol under the drive name**

   In the example above, the drive in slot `1`, `c6t4` (controller `6` target `4`), is the failed drive.

5. **At the Solaris command prompt, display all of the SATA drives by piping the output of the** `cfgadm -l` **command to the** `grep sata` **command.**

   The output looks something like the following:

```
[VTL_Value]root:# cfgadm -l | grep sata
sata0/0::dsk/c0t0d0       disk       connected    configured     ok
sata0/1::dsk/c0t1d0       disk       connected    configured     ok
sata0/2::dsk/c0t2d0       disk       connected    configured     ok
sata0/3::dsk/c0t3d0       disk       connected    configured     ok
sata0/4::dsk/c0t4d0       disk       connected    configured     ok
sata0/5::dsk/c0t5d0       disk       connected    configured     ok
sata0/6::dsk/c0t6d0       disk       connected    configured     ok
sata0/7::dsk/c0t7d0       disk       connected    configured     ok
sata1/0::dsk/c1t0d0       disk       connected    configured     ok
sata1/1::dsk/c1t1d0       disk       connected    configured     ok
...
sata4/0::dsk/c6t0d0       disk       connected    configured     ok
sata4/1::dsk/c6t1d0       disk       connected    configured     ok
sata4/2::dsk/c6t2d0       disk       connected    configured     ok
sata4/3::dsk/c6t3d0       disk       connected    configured     ok
sata4/4::dsk/c6t4d0       disk       connected    configured     unknown
sata4/5::dsk/c6t5d0       disk       connected    configured     ok
sata4/6::dsk/c6t6d0       disk       connected    configured     ok
sata4/7::dsk/c6t7d0       disk       connected    configured     ok
[VTL_Value]root:#
```

   The output contains five columns: `Ap_Id`, `Type`, `Receptacle`, `Occupant`, and `Condition` (use of the grep command shortens the output list but cuts off the headings).

6. **Find the bad drive in the list and note the device name of the disk (found in the first column,** `Ap_Id`**).**

   In the example above, the full device name is `sata4/4::dsk/c6t4d0`. If the drive were not recognized, only the first part of the full device name would be displayed: `sata4/4`.

Next task: "Unconfiguring the bad boot drive" on page 68.

▼ Unconfiguring the bad boot drive

VTL Value drive modules are hot-pluggable. You do not need to power down the machine to replace one. But, before physically removing a drive, you must make sure that the drive is no longer part of the system's logical configuration. Otherwise, the operating system could crash and permanently damage the remaining boot drive in the mirror. Proceed as follows.

1. **In output of the** `cfgadm -l | grep SATA` **command, check the logical state of the bad disk in relation to the system (found in the fourth column,** `Occupant`**).**

   The `Receptacle` and `Occupant` fields of the `cfgadm -l` output jointly define the attachment point of the disk device. The attachment point consists of a slot and a slot occupant. In the example above, the `Occupant` field of the entry for `sata4/4::dsk/c6t4d0` (the bad disk) is logically `configured`.

2. **If the bad disk is logically** `unconfigured`**, stop here, and go to the next task referenced at the end of this procedure:**

   ```
   sataX/Y::/dsk/cxtydz      disk       connected      unconfigured   ok
   ```

   where `sataX/Y::/dsk/cxtydz` is the full device name of the bad disk (in our example, `sata4/4::dsk/c6t4d0`).

3. **If the bad disk is logically** `configured`**, enter the** `cfgadm -c unconfigure` **command, and, when prompted, enter** `yes` **to continue, as shown below:**

   ```
   sataX/Y::/dsk/cxtydz      disk       connected      configured     ok
   [VTL_Value]root:# cfgadm -c unconfigure sataX/Y::/dsk/cxtydz
   Unconfigure the device at: /devices/device_address
   This operation will suspend activity on the SATA device
   Continue (yes/no)? yes
   ```

   where `sataX/Y::/dsk/cxtydz` is the full device name of the bad disk (in our example, `sata4/4::dsk/c6t4d0`).

4. **Make sure that the drive has been successfully unconfigured. At the command prompt, enter the** `cfgadm -l | grep sataX/Y` **command and check the fourth column (the** `Occupant` **field) of the output:**

   ```
   [VTL_Value]root:# cfgadm -l | grep sataX/Y
   sataX/Y::/dsk/cxtydz      disk       connected      unconfigured   ok
   ```

   where `sataX/Y::/dsk/cxtydz` is the full device name of the bad disk (in our example, `sata4/4::dsk/c6t4d0`).

5. **If the fourth column (the** `Occupant` **field) of the** `cfgadm -l` **command reads** `unconfigured`**, the bad disk has been successfully unconfigured. Stop here, and go to the next task referenced at the end of this procedure.**

6. **Otherwise, if the fourth column (the** `Occupant` **field) of the** `cfgadm -l` **command still reads** `configured`**, repeat steps 3-6 until you can unconfigure the bad drive.**

Next task: "Replacing the bad boot drive " on page 70.

▼ Replacing the bad boot drive

Caution – Cooling airflow is impeded whenever the drive bay cover is not installed on a running VTL appliance. To avoid over-temperature warnings and potential component damage, you must complete all service activities and reinstall the cover in under 60 seconds.

Read the instructions below BEFORE proceeding with disk replacement. You must know the process well enough to work quickly once you open the disk drive bay.

1. **Have a replacement disk at hand.**

   The replacement disk must be the same type and capacity as the unit it replaces.

2. **Make sure that the VTL Value cables have enough play to allow you to slide the appliance forward in the rack and make sure that the rack will not tip. Deploy any anti-tilt bars installed on the rack.**

3. **If the cables have enough play in them, slide the appliance out on its rails far enough to allow you to remove the cover of the disk drive bay and access the disk drives.**

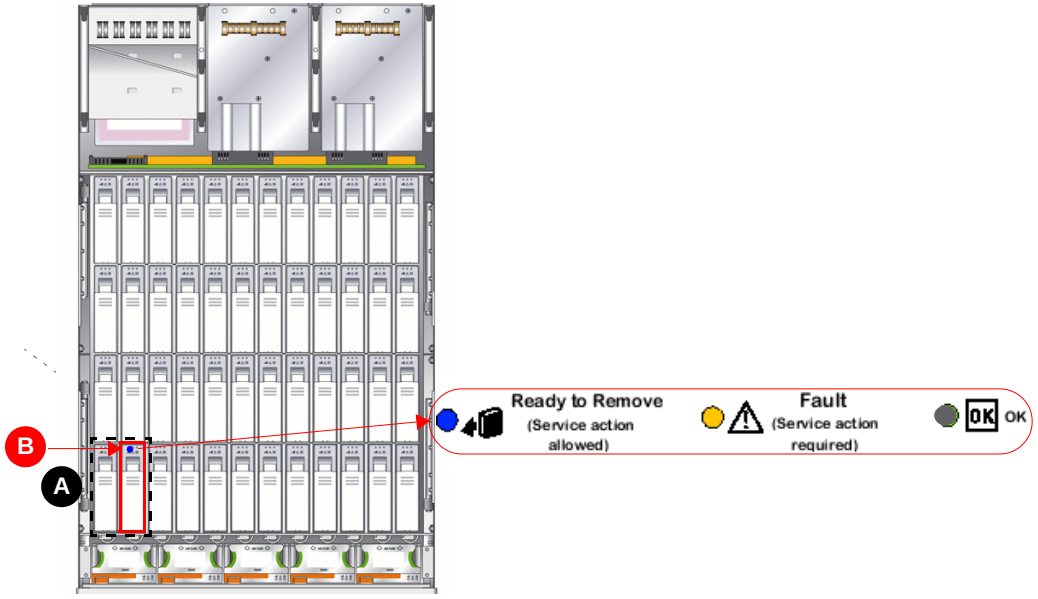
4. **Otherwise, if the cables will not let you slide the appliance out far enough or if the rack is not steady enough, unrack the appliance using the procedure outlined in "Removing the appliance from the rack" on page 60.**

5. **Open the drive bay cover, as described in "Removing the disk drive access cover" on page 62.**

Caution – Cooling airflow is now interrupted! You have at most 60 seconds to complete the remainder of this procedure!

6. **Working quickly, locate the boot drives (A below). Look for the yellow status LED that identifies the failed drive and the blue LED that shows that the drive is unconfigured and ready to remove (B).**

   The blue LED indicates that the drive is unconfigured and may be safely removed. In the example below, the failed drive is boot drive `1`.



7. **Quickly lift the metal latch that secures the failed drive, and remove the drive.**

   The service label illustrates the operation of the latch.

8. **Push the replacement disk drive into connector on the backplane of the slot, and seat the metal handle securely.**

9. **Replace the drive bay access cover, as described in "Replacing the hard disk access cover" on page 62.**

Next task: "Checking and correcting the logical boot disk configuration" on page 71.

▼ Checking and correcting the logical boot disk configuration

Verify that the drive is connected and configured within the operating system.

1. **Wait at least one minute after the drive has been replaced to let the drive connect to the system.**

2. **Check the configuration. At the Solaris command prompt, pipe the output of the `cfgadm -l` command into the `grep sataX/Y` command:**

```
[VTL_Value]root:# cfgadm -l | grep sataX/Y
```

where `sataX/Y::/dsk/cxtydz` is the full device name of the bad disk (in our example, `sata4/4::dsk/c6t4d0`).

3. **If the fourth column (the `Occupant` field) of the `cfgadm -l` command reads `configured`, stop here, and go to the next task referenced at the end of this procedure:**

```
[VTL_Value]root:# cfgadm -l | grep sataX/Y
sataX/Y::/dsk/cxtydz      disk       connected      configured      ok
```

If you wish to double check the state of the disk and are willing to open the disk bay access door again, you should see that the blue LED on the replacement is now OFF. Just remember that opening the case interferes with the flow of cooling air, so the case should remain open for no more than 60 seconds.

4. **If the fourth column (the `Occupant` field) of the `cfgadm -l` command reads `unconfigured`, enter the `cfgadm -c configure` command as shown below:**

```
[VTL_Value]root:# cfgadm -l | grep sataX/Y
sataX/Y::/dsk/cxtydz      disk       connected      unconfigured    ok
[VTL_Value]root:# cfgadm -c configure sataX/Y::/dsk/cxtydz
```

where `sataX/Y::/dsk/cxtydz` is the full device name of the bad disk (in our example, `sata4/4::dsk/c6t4d0`).

5. **Recheck the configuration of the replacement disk: go to step 2.**

Next task: "Rebuilding the boot mirror" on page 72.

▼ Rebuilding the boot mirror

A boot mirror recovery script, `repair_mirror`, is included with the VTL Value software. The script automates most of the process of rebuilding and resynching a mirrored boot pair, including:

- creating new partitions on the replacement drive
- clearing old mirror and replica database references
- creating new meta database replicas
- creating new submirrors on the replacement drive.
- attaching new submirrors to the mirrors
- forcing a resync of each submirror.

Proceed as follows.

1. **Identify the damaged mirror. Run** `metadb` **and look for** `W` **flags:**

```
[VTL_Value]root:# metadb
     flags       first blk   block count
a   m  p   luo   16          8192          /dev/dsk/c6t0d0s6
a      p   luo   8208        8192          /dev/dsk/c6t0d0s6
    W           16          8192          /dev/dsk/c6t4d0s6
    W           8208        8192          /dev/dsk/c6t4d0s6
[VTL_Value]root:#
```

The `W` flag shows that the metadevice database has write errors. In the example above, the databases for the replacement disk, `c6t4d0`, show write errors.

2. **Identify submirrors that need maintenance. Run** `metastat` **and examine the output.**

   In the example below, all of the submirrors on the secondary boot drive—boot drive `1`, `c6t4d0`—need maintenance:

```
[VTL_Value]root:# metastat
d40: Mirror
     Submirror 0: d41
       State: Okay
     Submirror 1: d42
       State: Needs maintenance
     Pass: 1
     Read option: roundrobin (default)
     Write option: parallel (default)
     Size: 204812685 blocks (97 GB)
d41: Submirror of d40
     State: Okay
     Size: 204812685 blocks (97 GB)
     Stripe 0:
       Device    Start   Block   DBase          State   Reloc   Hot Spare
       c6t0d0s3          0       No              Okay     Yes
d42: Submirror of d40
     State: Needs maintenance
     Invoke: metasync d40
     Size: 204812685 blocks (97 GB)
     Stripe 0:
       Device    Start   Block   DBase          State   Reloc   Hot Spare
       c6t4d0s3          0       No       Maintenance     Yes
d50: Mirror
     Submirror 0: d51
       State: Okay
     Submirror 1: d52
       State: Needs maintenance
     Pass: 1
     Read option: roundrobin (default)
     Write option: parallel (default)
     Size: 20482875 blocks (9.8 GB)
d51: Submirror of d50
     State: Okay
     Size: 20482875 blocks (9.8 GB)
     Stripe 0:
       Device    Start   Block   DBase          State   Reloc   Hot Spare
       c6t0d0s0          0       No              Okay     Yes
d52: Submirror of d50
     State: Needs maintenance
     Invoke: metasync d50
     Size: 20482875 blocks (9.8 GB)
```

```
     Stripe 0:
       Device    Start   Block   DBase         State  Reloc   Hot Spare
       c6t4d0s0          0       No       Maintenance    Yes
Device Relocation Information:
Device Reloc    Device ID
c6t4d0 Yes      idl,sd@SATA_____HITACHI_HDS7250S_____KRVN65ZAKHTM2F
c6t0d0 Yes      idl,sd@SATA_____HITACHI_HDS7250S_____KRVN65ZAKHXKEH
[VTL_Value]root:#
```

3. **Run the** `repair_mirror` **script as shown below:**

```
[VTL_Value]root:# path/repair_mirror -t replacement_disk
```

where *replacement_disk* is the replacement for the failed member of the mirrored pair, either mirror disk `0` or mirror disk `1`. In our example, the replacement is mirror disk `1`.

For script usage information, enter the following:

```
[VTL_Value]root:# path/repair_mirror -?
```

Caution – You will be asked to confirm which drive you want to rebuild. Look carefully to see if that you have chosen the correct drive. Choosing the wrong drive will result in the deleting the partition of the only working boot drive.

4. **When you are prompted to confirm the identity of the replacement disk, consider carefully and then, if you are sure, enter** `yes`**.**

The mirrored boot drive is rebuilt on the replacement disk that you have specified. This will take 24 hours or more.

Next task: "Checking the health of the rebuilt mirror " on page 75.

▼ Checking the health of the rebuilt mirror

To verify that the meta database replicas and the submirrors have been rebuilt, proceed as follows.

1. **Check the status of the rebuilt mirrors. Run** `metadb` **and make sure that the output looks normal:**

```
[VTL_Value]root:# metadb
     flags       first blk   block count
a   m  p   luo   16          8192          /dev/dsk/c6t0d0s6
a      p   luo   8208        8192          /dev/dsk/c6t0d0s6
a   m  p   luo   16          8192          /dev/dsk/c6t4d0s6
a      p   luo   8208        8192          /dev/dsk/c6t4d0s6
[VTL_Value]root:#
```

2. **Rerun** `metastat`**, and make sure that none of the devices need maintenance.**

   Note that the metadb output in the example has been abbreviated to save space:

```
[VTL_Value]root:# metastat
d40: Mirror
      Submirror 0: d41
        State: Okay
      Submirror 1: d42
        State: Okay
      Pass: 1
      Read option: roundrobin (default)
      Write option: parallel (default)
      Size: 204812685 blocks (97 GB)
d41: Submirror of d40
      State: Okay
...
d52: Submirror of d50
      State: Okay
      Invoke: metasync d50
      Size: 20482875 blocks (9.8 GB)
      Stripe 0:
        Device    Start    Block    DBase          State
        c6t4d0s0           0        No           Okay
Device Relocation Information:
Device  Reloc     Device ID
c6t4d0  Yes       idl,sd@SATA_____HITACHI_HDS7250S_____KRVN65ZAKHTM2F
c6t0d0  Yes       idl,sd@SATA_____HITACHI_HDS7250S_____KRVN65ZAKHXKEH
[VTL_Value]root:#
```

3. **If the** `metadb` **or** `metastat` **commands reveal problems, contact Sun technical support for assistance.**

4. **If the** `metadb` **or** `metastat` **commands do not reveal any problems, stop here.**

   The mirror has been reestablished. Note that the resync process may take 24 hours or more to complete.

Replacing a failed data drive

To replace a failed, non-bootable data drive and return the appliance to normal operation, you must thus complete the following tasks:

- “Identifying the failed data drive” on page 77
- “Unconfiguring the bad data drive” on page 79
- “Replacing the bad data drive ” on page 81

- "Checking and correcting the logical data disk configuration" on page 83

▼ Identifying the failed data drive

1. **Using a web browser, log in to the ILOM service processor, and redirect the Solaris system console. Then, using the ILOM remote console application, log in to Solaris as `root`, and open a Solaris terminal window.**

   If you do not have access to a web browser, you can connect to the appliance session via `ssh` and then become root using `su`:

```
[laptop]user:# ssh -l vtladmin appliance_host-name_or_IP-address
Password:
[VTL_Value]vtladmin:# su
Password:
[VTL_Value]root:#
```

   As a security precaution, remote `root` login is disabled by default. So you must use the `vtladmin` account.

2. **Run the `hd` utility to identify the bad drive. On the Solaris command line, enter the command `hd -c`:**

```
[VTL_Value]root:# hd -c
```

   The output looks something like that shown below:

```
[VTL_Value]root:# hd -c
---------------------SunFireX4500------Rear----------------------------
 36:   37:   38:   39:   40:   41:   42:   43:   44:   45:   46:   47:
c6t3  c6t7  c5t3  c5t7  c8t3  c8t7  c7t3  c7t7  c1t3  c1t7  c0t3  c0t7
^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +
 24:   25:   26:   27:   28:   29:   30:   31:   32:   33:   34:   35:
c6t2  c6t6  c5t2  c5t6  c8t2  c8t6  c7t2  c7t6  c1t2  c1t6  c0t2  c0t6
^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +
 12:   13:   14:   15:   16:   17:   18:   19:   20:   21:   22:   23:
c6t1  c6t5  c5t1  c5t5  c8t1  c8t5  c7t1  c7t5  c1t1  c1t5  c0t1  c0t5
^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ - -  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +
  0:    1:    2:    3:    4:    5:    6:    7:    8:    9:   10:   11:
c6t0  c6t4  c5t0  c5t4  c8t0  c8t4  c7t0  c7t4  c1t0  c1t4  c0t0  c0t4
^ b +  ^ b +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +  ^ + +
--------*-----------*--SunFireX4500------Front-----*-----------*--------
[VTL_Value]root:#
```

3. **Make a note of the controller and target numbers of the disk that has red flags and - (minus) symbols under the drive name**

   In the example above, the drive in slot `17`, `c8t5` (controller `8` target `5`), is the failed drive.

4. **At the Solaris command prompt, enter the** `zpool status -xv` **command.**

   The output for our example looks something like the following:

```
[VTL_Value]root:# zpool status -xv
  pool: pool8
 state: DEGRADED
status: One or more devices could not be opened. Sufficient replicas exist for
        the pool to continue functioning in a degraded state.
action: Attach the missing device and online it using 'zpool online'.
   see: http://www.sun.com/msg/ZFS-8000-D3
 scrub: resilver completed with 0 errors on Tue Jun 19 12:15:47 2007
config:
        NAME          STATE     READ    WRITE   CKSUM
        pool8         DEGRADED     0        0       0
          raidz1      DEGRADED     0        0       0
            c8t0d0    ONLINE       0        0       0
            c8t1d0    ONLINE       0        0       0
            c8t2d0    ONLINE       0        0       0
            c8t3d0    ONLINE       0        0       0
            c8t4d0    ONLINE       0        0       0
            spare     DEGRADED     0        0       0
              c8t5d0  UNAVAIL      0        0       0  cannot open
              c0t7d0  ONLINE       0        0       0
            c8t6d0    ONLINE       0        0       0
        spares
          c0t7d0      INUSE     currently in use
          c5t7d0      AVAIL
          c7t7d0      AVAIL
          c8t7d0      AVAIL

errors: No known data errors
[VTL_Value]root:#
```

5. **Check the** `zpool status` **output for ZFS errors, and note the device name and pool number.**

   In the example above, the faulty disk, device `c8t5d0`, is unavailable (`UNAVAIL`). The ZFS pool that contains the disk, `pool8`, is therefore operating in a `DEGRADED` state using spare disk `c0t7d0`.

6. **Now find the full device name of the failed drive. At the Solaris command prompt, display all of the SATA drives by piping the output of the** `cfgadm -l` **command to the** `grep sata` **command.**

   The output looks something like the following:

```
[VTL_Value]root:# cfgadm -l | grep sata
sata0/0::dsk/c0t0d0       disk       connected    configured     ok
sata0/1::dsk/c0t1d0       disk       connected    configured     ok
sata0/2::dsk/c0t2d0       disk       connected    configured     ok
sata0/3::dsk/c0t3d0       disk       connected    configured     ok
sata0/4::dsk/c0t4d0       disk       connected    configured     ok
sata0/5::dsk/c0t5d0       disk       connected    configured     ok
sata0/6::dsk/c0t6d0       disk       connected    configured     ok
sata0/7::dsk/c0t7d0       disk       connected    configured     ok
sata1/0::dsk/c1t0d0       disk       connected    configured     ok
sata1/1::dsk/c1t1d0       disk       connected    configured     ok
...
sata5/0::dsk/c8t0d0       disk       connected    configured     ok
sata5/1::dsk/c8t1d0       disk       connected    configured     ok
sata5/2::dsk/c8t2d0       disk       connected    configured     ok
sata5/3::dsk/c8t3d0       disk       connected    configured     ok
sata5/4::dsk/c8t4d0       disk       connected    configured     ok
sata5/5::dsk/c8t5d0       disk       connected    configured     unknown
sata5/6::dsk/c8t6d0       disk       connected    configured     ok
sata5/7::dsk/c8t7d0       disk       connected    configured     ok
[VTL_Value]root:#
```

   The output contains five columns: `Ap_Id`, `Type`, `Receptacle`, `Occupant`, and `Condition` (use of the grep command shortens the output list but cuts off the headings).

7. **Find the bad drive in the list and note the full device name of the disk (found in the first column,** `Ap_Id`**).**

   In the example above, the full device name is `sata5/5::dsk/c8t5d0`. If the drive were not recognized, only the first part of the full device name would be displayed: `sata5/5`.

Next task: "Unconfiguring the bad data drive" on page 79.

▼ Unconfiguring the bad data drive

VTL Value drive modules are hot-pluggable. You do not need to power down the machine to replace one. But, before physically removing a drive, you must make sure that the drive is no longer part of the system's logical configuration. Otherwise, the operating system could crash and permanently damage the remaining boot drive in the mirror. Proceed as follows.

1. **In output of the** `cfgadm -l | grep SATA` **command, check the logical state of the bad disk in relation to the system (found in the fourth column,** `Occupant`**).**

   The `Receptacle` and `Occupant` fields of the `cfgadm -l` output jointly define the attachment point of the disk device. The attachment point consists of a slot and a slot occupant. In the example above, the `Occupant` field of the entry for `sata5/5::dsk/c8t5d0` (the bad disk) is logically `configured`.

2. **If the bad disk is logically** `unconfigured`**, stop here, and go to the next task referenced at the end of this procedure:**

```
sataX/Y::/dsk/cxtydz  disk        connected       unconfigured   ok
```

   `sataX/Y::/dsk/cxtydz` is the full device name of the bad disk (in our example, `sata5/5::dsk/c8t5d0`).

3. **If the bad disk is logically** `configured`**, enter the** `cfgadm -c unconfigure` **command, and, when prompted, enter** `yes` **to continue, as shown below:**

```
sataX/Y::/dsk/cxtydz  disk        connected       configured     ok
[VTL_Value]root:# cfgadm -c unconfigure sataX/Y::/dsk/cxtydz
Unconfigure the device at: /devices/device_address
This operation will suspend activity on the SATA device
Continue (yes/no)?
yes
```

   `sataX/Y::/dsk/cxtydz` is the full device name of the bad disk (in our example, `sata5/5::dsk/c8t5d0`).

4. **If the** `cfgadm -c unconfigure` **command fails, as shown below, take the disk offline from the ZFS pool. At the command prompt, enter the command** `zpool offline` `poolN cxtydz`**:**

```
[VTL_Value]root:# cfgadm -c unconfigure sataX/Y::/dsk/cxtydz
Unconfigure the device at: /devices/device_address
This operation will suspend activity on the SATA device
Continue (yes/no)? yes
cfgadm: Hardware specific failure: Failed to unconfig device at ap_id:
/devices/device_address
[VTL_Value]root:# zpool offline poolN cxtydz
```

   `sataX/Y::/dsk/cxtydz` is the full device name of the bad disk (in our example, `sata5/5::dsk/c8t5d0`).

   poolN is the ZFS pool number that contains the bad disk, and `cxtydz` is the device name of the bad disk (`pool8` and `c8t5d0` in our example).

5. **If you had to take the bad disk offline from the ZFS pool due to a failure of the** `cfgadm -c unconfigure` **command, retry the** `cfgadm -c unconfigure` **command:**

```
[VTL_Value]root:# cfgadm -c unconfigure sataX/Y::/dsk/cxtydz
Unconfigure the device at: /devices/device_address
This operation will suspend activity on the SATA device
Continue (yes/no)? yes
[VTL_Value]root:# zpool online poolN cxtydz
```

   `sataX/Y::/dsk/cxtydz` is the full device name of the bad disk (in our example, `sata5/5::dsk/c8t5d0`).

   poolN is the ZFS pool number that contains the bad disk, and `cxtydz` is the device name of the bad disk (`pool8` and `c8t5d0` in our example).

6. **Make sure that the drive has been successfully unconfigured. At the command prompt, enter the** `cfgadm -l | grep sataX/Y` **command and check the fourth column (the** `Occupant` **field) of the output:**

```
[VTL_Value]root:# cfgadm -l | grep sataX/Y
sataX/Y::/dsk/cxtydz     disk       connected      unconfigured   ok
```

   `sataX/Y::/dsk/cxtydz` is the full device name of the bad disk (in our example, `sata5/5::dsk/c8t5d0`).

7. **If the fourth column (the** `Occupant` **field) of the** `cfgadm -l` **command reads** `unconfigured`**, the bad disk has been successfully unconfigured. Stop here, and go to the next task referenced at the end of this procedure.**

8. **Otherwise, if the fourth column (the** `Occupant` **field) of the** `cfgadm -l` **command still reads** `configured`**, repeat steps 3-6 until you can unconfigure the bad drive.**

Next task: "Replacing the bad data drive " on page 81.

▼ Replacing the bad data drive

Caution – Cooling airflow is impeded whenever the drive bay cover is not installed on a running VTL appliance. To avoid over-temperature warnings and potential component damage, you must complete all service activities and reinstall the cover in under 60 seconds.

Read the instructions below BEFORE proceeding with disk replacement. You must know the process well enough to work quickly once you open the disk drive bay.

1. **Have a replacement disk at hand.**

   The replacement disk must be the same type and capacity as the unit it replaces.

2. **Make sure that the VTL Value cables have enough play to allow you to slide the appliance forward in the rack and make sure that the rack will not tip. Deploy any anti-tilt bars installed on the rack.**

3. **If the cables have enough play in them, slide the appliance out on its rails far enough to allow you to remove the cover of the disk drive bay and access the disk drives.**

4. **Otherwise, if the cables will not let you slide the appliance out far enough or if the rack is not steady enough, unrack the appliance using the procedure outlined in "Removing the appliance from the rack" on page 60.**

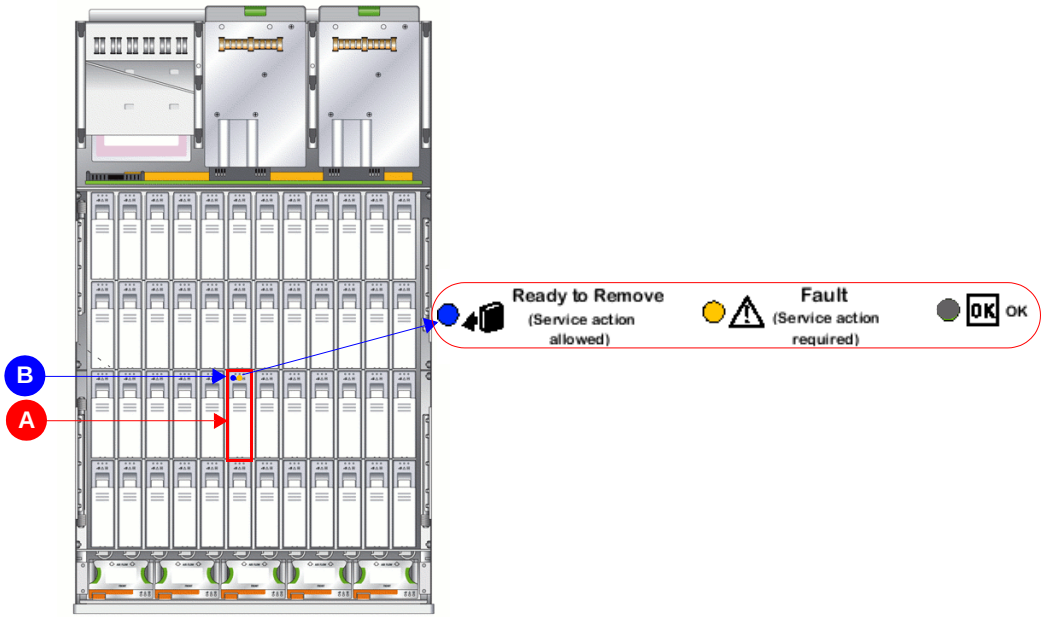
5. **Open the drive bay cover as described in "Removing the disk drive access cover" on page 62.**

Caution – Cooling airflow is now interrupted! You have at most 60 seconds to complete the remainder of this procedure!

---

6. **Working quickly, locate the failed drive (A below). Look for the yellow status LED that identifies the failed drive and the blue LED that shows that the drive is unconfigured and ready to remove (B).**

   The blue LED indicates that the drive is unconfigured and may be safely removed. In the example below, the failed drive is boot drive `1`.



7. **Quickly lift the metal latch that secures the failed drive, and remove the drive.**

   The service label illustrates the operation of the latch.

8. **Push the replacement disk drive into connector on the backplane of the slot, and seat the metal handle securely.**

9. **Replace the drive bay access cover, as described in "Replacing the hard disk access cover" on page 62.**

Next task: "Checking and correcting the logical data disk configuration" on page 83.

▼ Checking and correcting the logical data disk configuration

Verify that the drive is connected and configured within the operating system.

1. **Wait at least one minute after the drive has been replaced to let the drive connect to the system.**

2. **Check the configuration. At the Solaris command prompt, pipe the output of the** `cfgadm -l` **command into the** `grep sataX/Y` **command:**

```
[VTL_Value]root:# cfgadm -l | grep sataX/Y
```

   where `sataX/Y::/dsk/cxtydz` is the full device name of the replacement disk (in our example, `sata5/5::dsk/c8t5d0`).

3. **If the fourth column (the** `Occupant` **field) of the** `cfgadm -l` **command reads** `configured`**, stop here, and go to the next task referenced at the end of this procedure:**

```
[VTL_Value]root:# cfgadm -l | grep sataX/Y
sataX/Y::/dsk/cxtydz      disk       connected      configured   ok
```

   If you wish to double check the state of the disk and are willing to open the disk bay access door again, you should see that the blue LED on the replacement is now OFF. Just remember that opening the case interferes with the flow of cooling air, so the case should remain open for no more than 60 seconds.

4. **If the fourth column (the** `Occupant` **field) of the** `cfgadm -l` **command reads** `unconfigured`**, enter the** `cfgadm -c configure` **command as shown below:**

```
[VTL_Value]root:# cfgadm -l | grep sataX/Y
sataX/Y::/dsk/cxtydz      disk       connected      unconfigured ok
[VTL_Value]root:# cfgadm -c configure sataX/Y::/dsk/cxtydz
```

   where `sataX/Y::/dsk/cxtydz` is the full device name of the replacement disk (in our example, `sata5/5::dsk/c8t5d0`).

5. **Recheck the configuration of the replacement disk: go to step 2.**

Next task: "Adding the new drive to the ZFS Pool and freeing the spare" on page 84.

▼ Adding the new drive to the ZFS Pool and freeing the spare

Once the replacement disk drive is physically installed, you need to add it to the ZFS pool in place of the spare drive that took over for the failed unit. Proceed as follows.

1. **At the Solaris command prompt, enter the** `zpool replace -f` **command, as shown below:**

```
[VTL_Value]root:# zpool replace -f poolN replacement spare
```

poolN is the ZFS pool number (*pool8* in our example).

replacement is the newly installed disk that replaced the failed unit (`c8t5d0` in our example).

spare is hot spare disk drive that temporarily replaced the failed disk in the ZFS pool (`c0t7d0` in our example).

The `zpool replace` command joins the replacement drive to the ZFS pool and returns the spare to the spares pool.

2. **If the** `zpool replace` **command fails with an** `invalid vdev specification` **error, manually join the replacement disk to the pool by entering the** `zpool online` **command and manually detach the spare from the pool by entering the** `zpool detach` **command. See below:**

```
[VTL_Value]root:# zpool replace -f poolN replacement spare
invalid vdev specification
the following errors must be manually repaired:
/dev/dsk/c5t7d0s0 is part of active ZFS pool pool8. Please see zpool(1M).
[VTL_Value]root:# zpool online poolN  cxtydz
Bringing device cxtydz online
[VTL_Value]root:# zpool detach poolN  cntpdq
```

poolN is the ZFS pool number (`pool8` in our example), *cxtydz* is the device name of the replacement disk (`c8t5d0` in our example), and *cntpdq* is the device name of the spare disk (`c0t7d0` in our example).

3. **Check the results. At the Solaris command prompt, enter the** `zpool status` **command, and check the output.**

   The output for our example looks something like the following:

```
[VTL_Value]root:# zpool status pool8
  pool: pool8
 state: ONLINE
 scrub: resilver completed with 0 errors on Tue Jun 19 12:15:47 2007
config:
        NAME          STATE     READ    WRITE   CKSUM
        pool8         ONLINE       0        0       0
          raidz1      ONLINE       0        0       0
            c8t0d0    ONLINE       0        0       0
            c8t1d0    ONLINE       0        0       0
            c8t2d0    ONLINE       0        0       0
            c8t3d0    ONLINE       0        0       0
            c8t5d0    ONLINE       0        0       0
            c8t6d0    ONLINE       0        0       0
        spares
          c0t7d0      AVAIL
          c5t7d0      AVAIL
          c7t7d0      AVAIL
          c8t7d0      AVAIL

errors: No known data errors
[VTL_Value]root:#
```

4. **If the replacement drive is not online (**`ONLINE`**), try to manually join the replacement disk to the pool by entering the** `zpool online` **command:**

```
[VTL_Value]root:# zpool online poolN  cxtydz
Bringing device cxtydz online
```

   poolN is the ZFS pool number (`pool8` in our example), and `cxtydz` is the device name of the replacement disk (`c8t5d0` in our example).

5. **If the spare is not back in the global spares pool (**`AVAIL`**), try to manually detach the spare from the pool by entering the** `zpool detach` **command. See below:**

```
[VTL_Value]root:# zpool detach poolN  cntpdq
```

   poolN is the ZFS pool number (`pool8` in our example), and `cntpdq` is the device name of the spare disk (`c0t7d0` in our example).

6. **If the replacement drive is online (**`ONLINE`**) and the spare is back in the global spares pool (**`AVAIL`**), the data disk has been successfully replaced. Stop here.**

7. **Otherwise, if the replacement drive is not online (`ONLINE`) or the spare is not back in the global spares pool (`AVAIL`), contact Sun technical support for assistance.**

Replacing chassis components

This section outlines replacement procedures for customer-replaceable units (CRUs) that are located on the system chassis.

This section contains procedures for replacing the following components:

- "Replacing hot-swappable fan modules" on page 86 (CRU)
- "Replacing hot-swappable power supplies" on page 89 (CRU)
- "Accessing system controller components" on page 92
- "Replacing the system battery" on page 96 (CRU)
- "Replacing Graphics Redirect And Service Processor" on page 98 (CRU)
- "Replacing dual inline memory modules (DIMMs)" on page 102 (CRU)
- "Replacing host bus adapters (HBAs)" on page 104 (CRU)

Caution – Before handling components, attach an ESD wrist strap to bare metal on the chassis. The system's printed circuit boards and hard disk drives contain components that are extremely sensitive to static electricity.

Replacing hot-swappable fan modules

Caution – Cooling airflow is impeded whenever the fan tray access cover is not installed on a running VTL appliance. To avoid over-temperature warnings and potential component damage, you must complete all service activities and reinstall the cover in under 60 seconds—so read the instructions below BEFORE you start. You must know the process well enough to work quickly once you open the fan tray access cover.

Five hot-swappable fan modules cool the VTL Value appliance. Each module holds two fans, supplied and replaced as a unit (part number 541-0458 at the time of publication, but, for the latest part numbers, see the Sun System Handbook

<http://sunsolve.sun.com/handbook_pub/Systems/>). Fans are labeled FT0 (fan tray 0) to FT4 (fan tray 4). Green and amber light-emitting diodes (LEDs) indicate the condition of each module:

- When the green LED is lit, the fan module is fully operational (both fans are running).
- When the amber LED is lit, the fan module has failed (neither fan is operational).
- When both the green and amber LEDs are lit, the fan module is degraded (one of the two fans in the fan module has failed).

Note that some VTL Value drive modules may include a blue LED. Fan modules are always ready to remove, so a blue LED (if present) can be safely ignored.

To replace one or more modules, carry out the following tasks:

- "Accessing the fan-module bay" on page 87
- "Changing a fan module" on page 87.

▼ Accessing the fan-module bay

1. **Make sure that the VTL Value cables have enough play to allow you to slide the appliance forward in the rack and make sure that the rack will not tip. Deploy any anti-tilt bars installed on the rack.**
2. **If the cables have enough play in them, slide the appliance out on its rails far enough to allow you to remove the fan tray access cover and replace the fan module.**
3. **Otherwise, if the cables will not let you slide the appliance out far enough or if the rack is not steady enough, unrack the appliance using the procedure outlined in "Removing the appliance from the rack" on page 60.**

Next task: "Changing a fan module" on page 87.

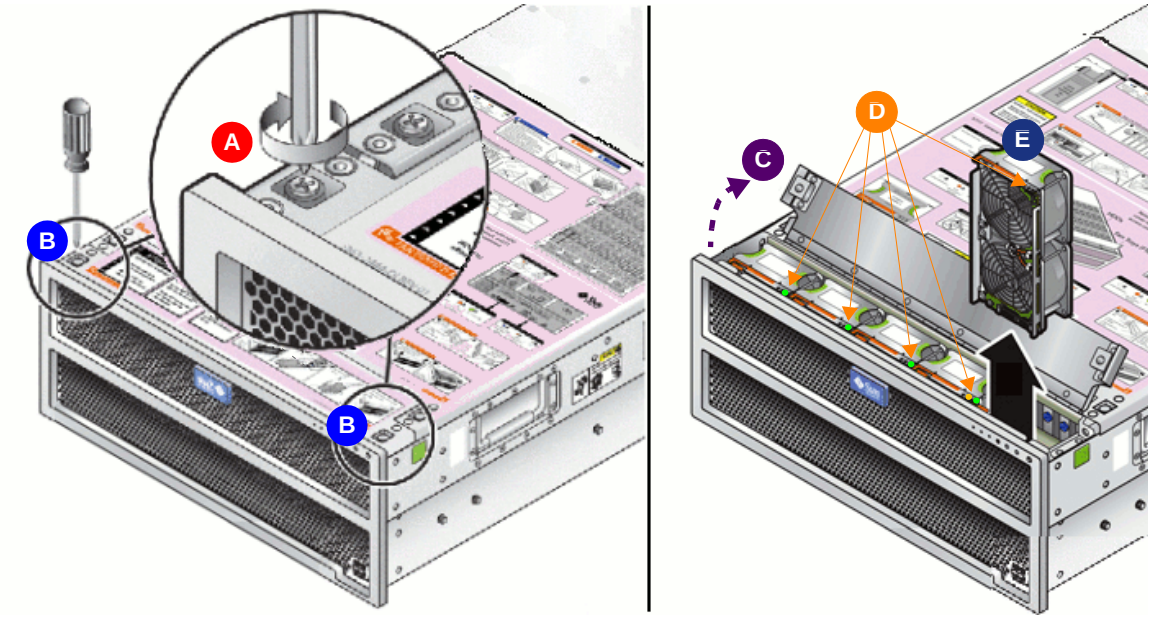
▼ Changing a fan module

To keep the appliance as cool as possible, replace modules one at a time, closing the cover between replacements and allowing the temperature to stabilize. Replace failed modules first. Then replace degraded modules.

For each faulty fan module, proceed as follows

1. **Have the replacement fan module close at hand.**

2. **Open the fan tray access cover. Using a No. 2 Phillips screwdriver (A below), loosen the two captive screws on the left and right sides (B), and swing the cover open (C).**



Caution – Cooling airflow is interrupted! You have 60 seconds to complete this procedure!

---

3. **Quickly examine the fan-module LEDs (D above), and identify the module that you need to replace.**

   Remember:

   - When the amber LED is lit, the fan module has failed (neither fan is operational).
   - When both the green and amber LEDs are lit, the fan module is degraded (one of the two fans in the fan module has failed).

4. **Grasp the handle of the fan module (E above) and, without damaging the gaskets, carefully lift the unit straight up and out of the system chassis.**

5. **Lower the replacement fan module into the vacant chassis bay until it contacts the connector on the fan board. Push down gently until the connector is fully engaged.**

   Once the connector is fully engaged, the amber (middle) LED lights up momentarily.

6. **Close the fan cover.**

7. **If you have finished replacing fan modules, resecure the screws on the left and right sides of the cover, and stop here.**
8. **If you still need to replace more fan modules, wait until the temperature of the appliance stabilizes. Then repeat this procedure.**

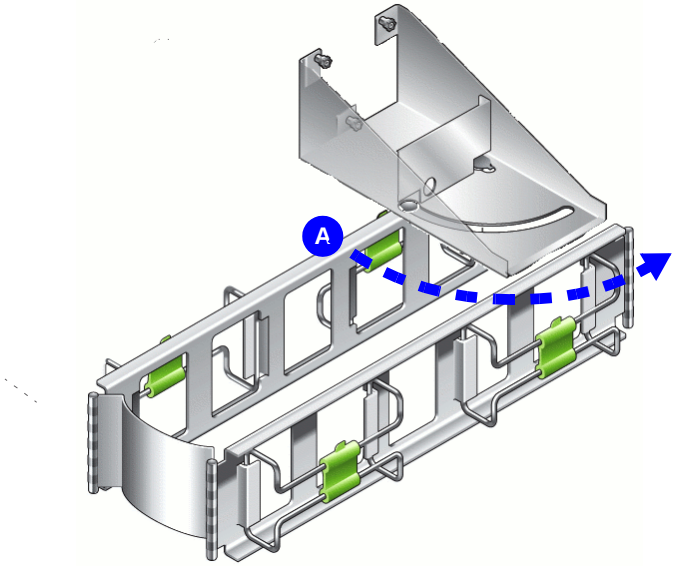
Replacing hot-swappable power supplies

The VTL Value appliance contains two fully redundant, hot-swappable, 220-VAC, type A205 power supplies (part number 300-1787 at the time of publication, but, for the most current list of part numbers, consult the Sun System Handbook <http://sunsolve.sun.com/handbook_pub/Systems/>). The service label displays the system designations of the power supplies.

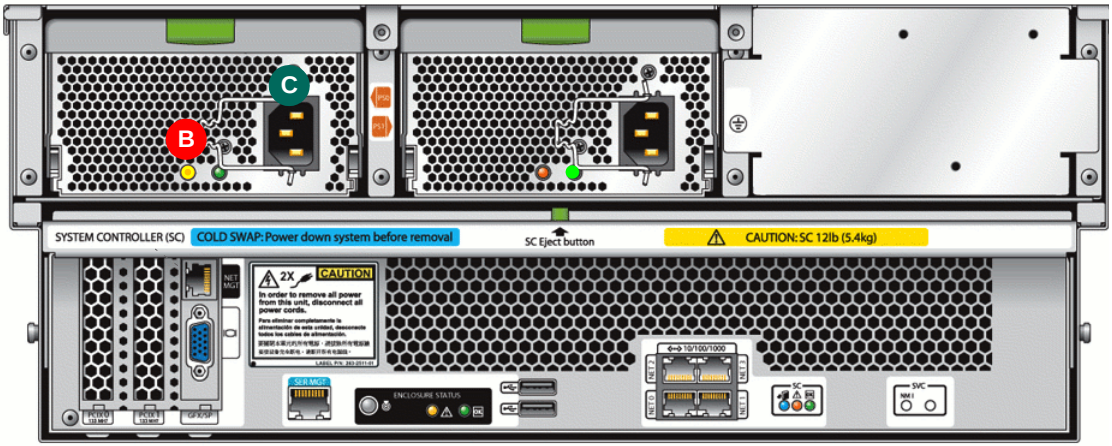
▼ Replacing a Power Supply

To replace a power supply, proceed as follows.

1. **If the appliance is in a rack with a cable management arm attached, swing the arm out of the way so that you can see the power supplies (A below).**

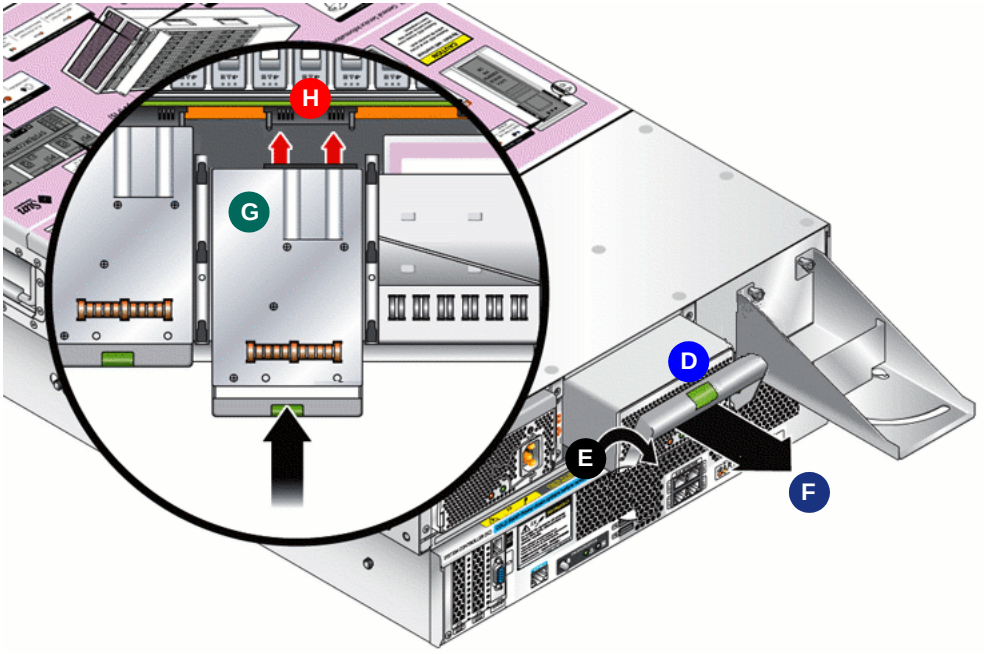


2. Locate the faulty power supply by checking the power-supply status LEDs. When the amber LED is lit (B below), the power supply is faulty.



3. Disconnect the AC power cord (C above) from the faulty power supply.

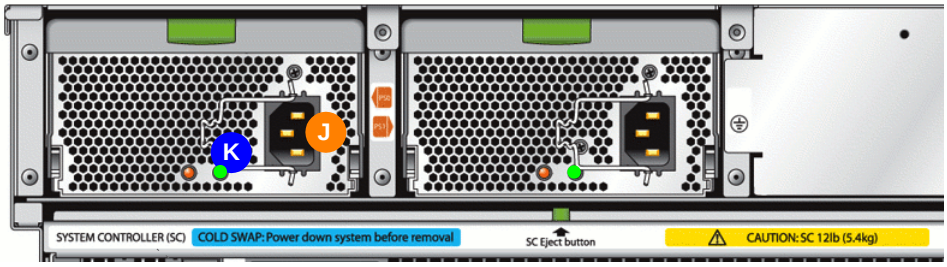
4. Remove the power supply. With one hand, hold down on the thumb latch at the center of the power supply (D below), rotate the handle outward (E), and pull the power supply clear of the chassis the chassis (F). Support the weight of the power supply with the other hand.



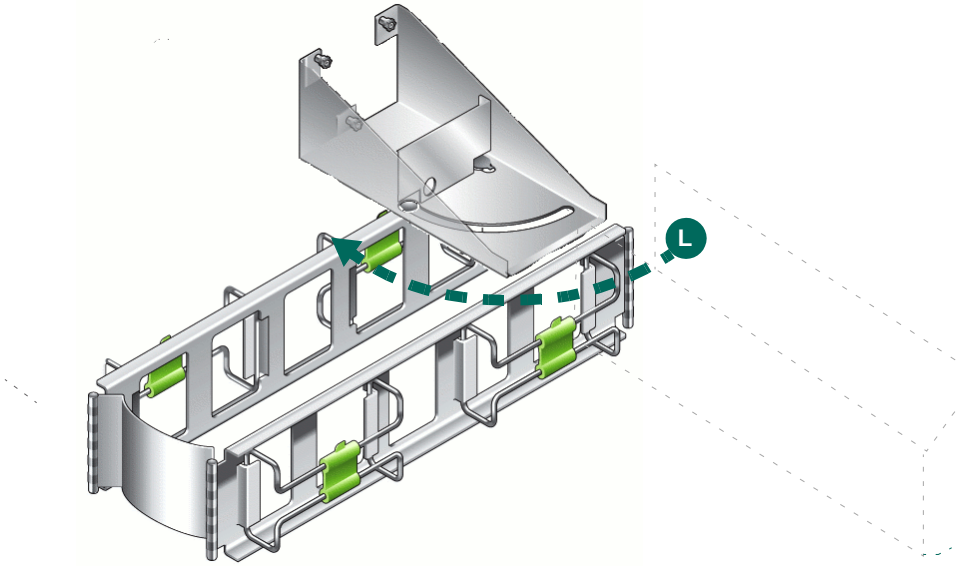
5. **Align the replacement power supply (G above) with the empty bay and push it back until it firmly engages the connector on the power distribution board (H).**

   The thumb latch clicks into place.

6. **Connect the AC power cord to the replacement power supply (J below), and secure the cord with the retaining clip (K).**



7. **Swing the cable management arm back into the closed position, and stop here.**



Replacing system controller components

The following customer replaceable components are located on the system controller:

- CMOS memory battery

- Graphics Redirect and Service Processor (GRASP) board
- Dual Inline Memory Modules (DIMMs)

To replace any one of these components, start by "Accessing system controller components", below.

Accessing system controller components

To access the components located on the system controller assembly, you must carry out the following tasks:

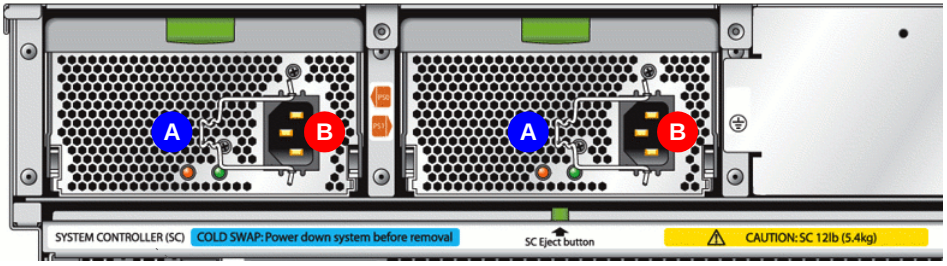
- "Powering down" on page 92
- "Removing the cable management arm" on page 92
- "Removing the system controller" on page 93.

▼ Powering down

1. **Power off system power gracefully, if possible using the Solaris init 5 command from the command line or the ILOM remote power controls (see "Powering down" on page 12 for detailed instructions).**

   The appliance is now running on standby power.

2. **Release the power cord-retaining clips (A below) and unplug both power cords (B).**



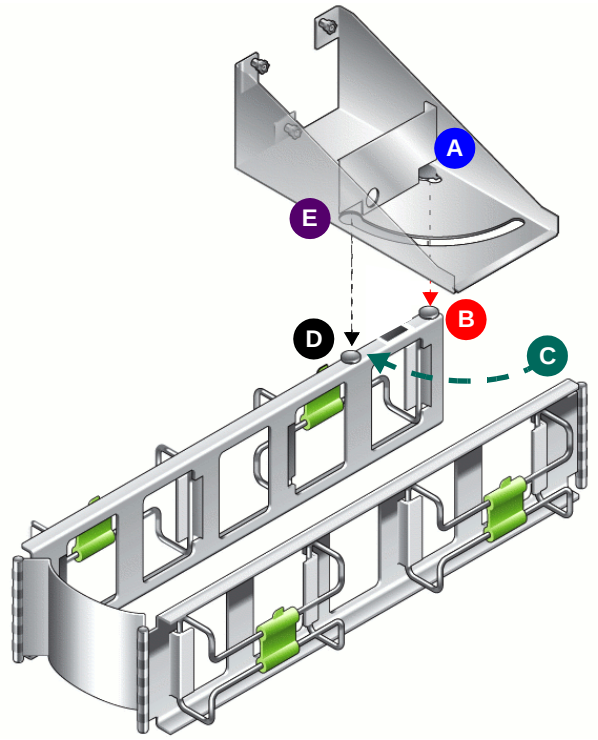
   Power is now OFF, and it is safe to proceed.

Next task: "Removing the cable management arm" on page 92.

▼ Removing the cable management arm

If you need to access the system controller (SC), remove the cable management arm (CMA) using the following procedure.

1. **Lift the small tab (A below) on the CMA-to-chassis bracket to release the right pinhead (B).**



2. **Push the CMA toward the chassis (C above), so that the second pinhead (D) aligns with the keyhole (E), freeing the CMA to drop away from the bracket.**
3. **Pull the CMA away from the rear of the chassis, and remove the CMA from the slide-rail extension.**

Next task: "Removing the system controller" on page 93.

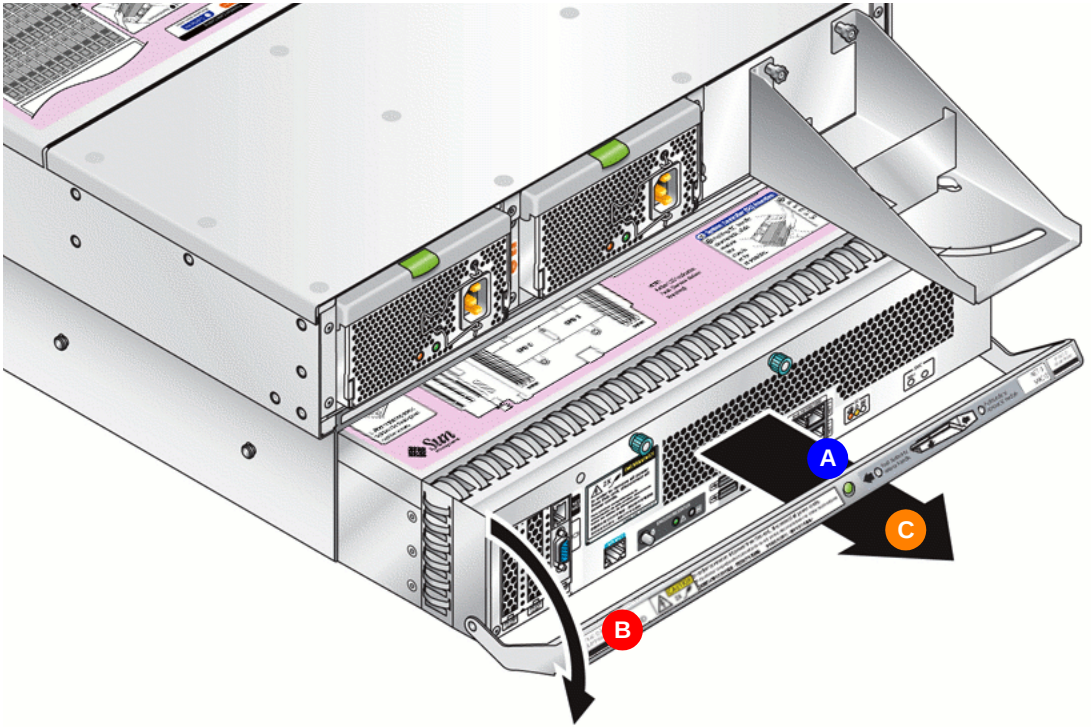
▼ Removing the system controller

The system controller is a sub-enclosure that can be removed from the back of the main system enclosure. The system controller contains the CPUs, memory, the Graphics Redirect and Service Processor (GRASP) board, and optional PCI cards.

Caution – To prevent electrostatic discharge (ESD) damage to the components on the system controller, connect a ground strap between yourself and the chassis ground before proceeding. Shut down the power from the front panel and then unplug both power supply cords.

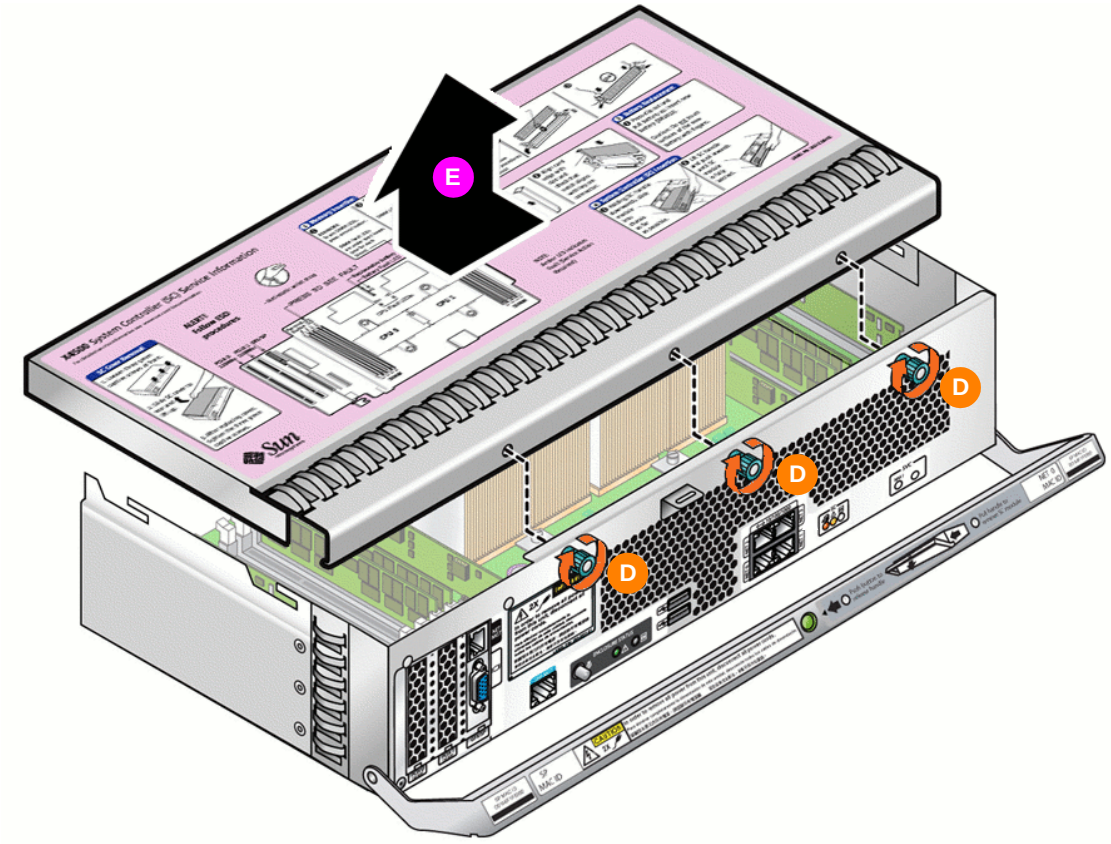
Caution – Although both power supplies should turn off then when you remove the system controller, voltage could be present on the chassis connectors if either power supply did not shut down as expected. Thus, you must pull the power cords from the power supplies to avoid any risk from inadvertent contact with those connectors.

1. **Using a stylus, ballpoint pen, or similar pointed device, hold down the system controller eject button (A below).**
2. **Rotate the system controller handle toward you (B below).**



3. **Grasping the system controller handle (B above) with one hand and supporting the weight of the system controller with the other, pull the system controller from the chassis and slide it out (C).**

4. **Loosen the three green-capped captive screws (D below) under the system controller handle.**



5. **Push the system controller cover toward the rear of the chassis and lift it off (E above).**

Next task: With the service processor open, you can perform any of the following tasks:

- "Replacing the system battery" on page 96
- "Replacing Graphics Redirect And Service Processor" on page 98
- "Replacing dual inline memory modules (DIMMs)" on page 102
- "Replacing host bus adapters (HBAs)" on page 104.

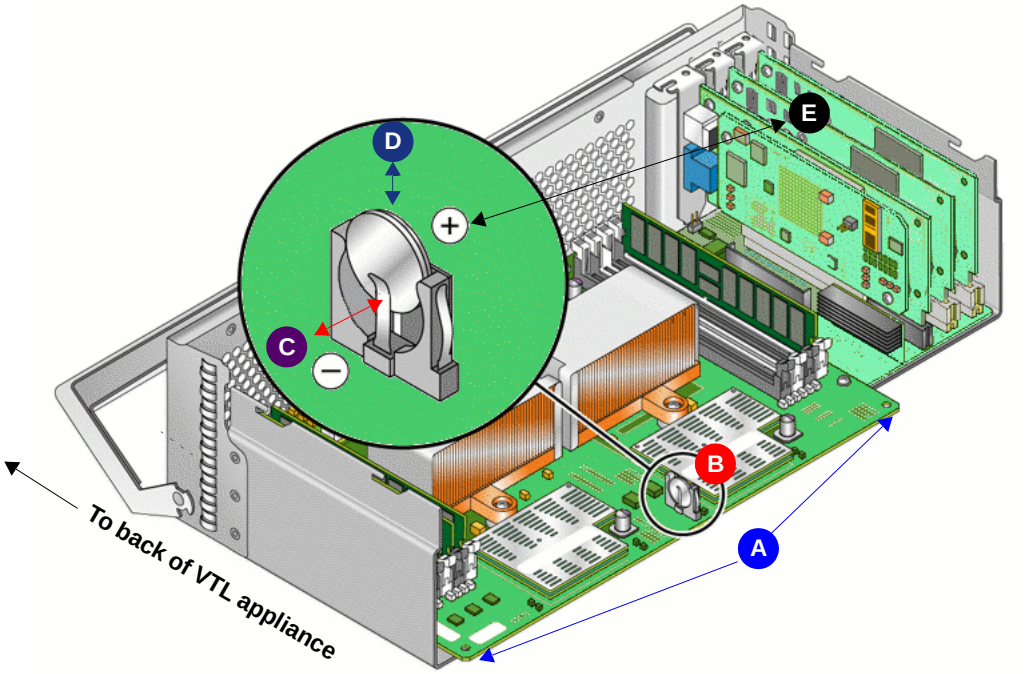
Replacing the system battery

The VTL Value appliance stores date, time, and other basic system configuration information in a CMOS memory chip powered by a small battery (part number 150-3993at the time of publication, but, for the latest part numbers, see the Sun System Handbook <http://sunsolve.sun.com/handbook_pub/Systems/>).

If you have not already done so, complete the tasks outlined in "Accessing system controller components" on page 92. Then proceed as follows.

▼ Replacing the CMOS memory battery

1. **Near the center of the front edge of the CPU/Memory board (A below), locate the CMOS memory battery (B).**



2. **Gently pull the clip away from the battery face (C above) and lift the battery straight up (D).**
3. **Orient the replacement battery so that the + symbol on the battery faces the GRASP board and host bus adapters (E above).**
4. **Gently pull the clip away (C above), and push the battery straight down and into position (D).**

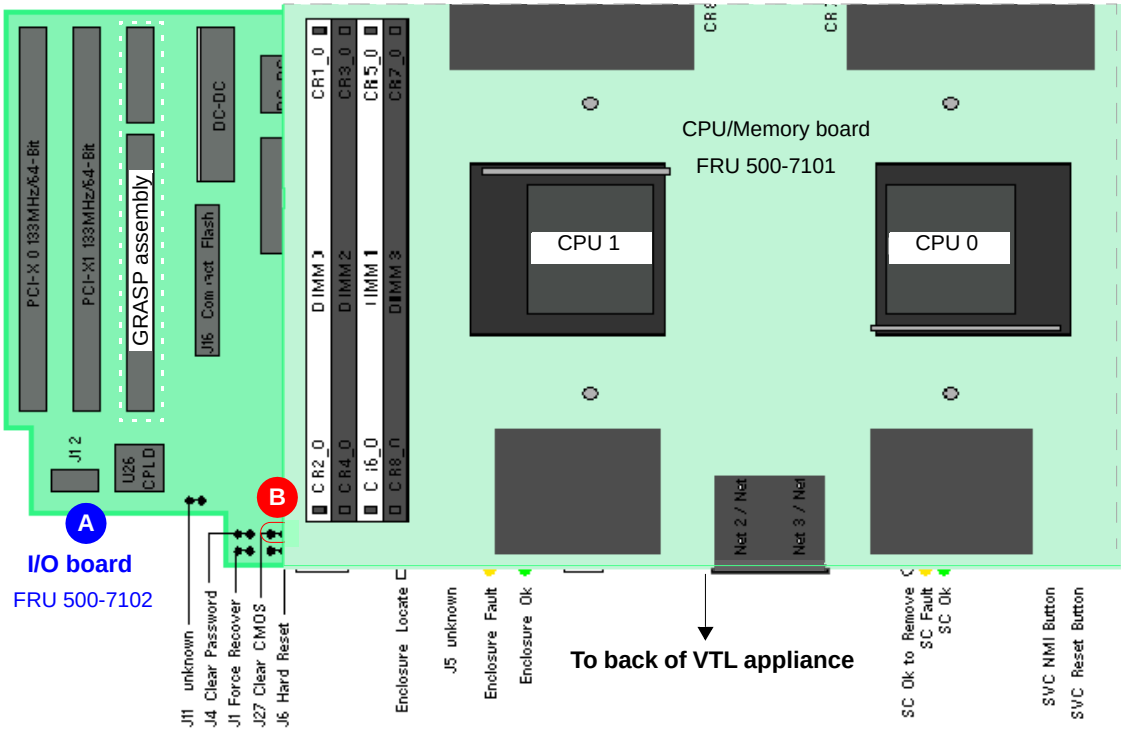
Next task: If you need to do so, go to "Resetting CMOS memory to factory default values" on page 97. Otherwise, go to "Replacing the system controller and restarting" on page 108.

▼ Resetting CMOS memory to factory default values

In some cases for the battery to work, you *might* need to reset the CMOS on the I/O controller board. To reset the CMOS, proceed as follows.

1. **On the I/O controller board (A below), locate jumper J27 (B).**

   Jumper J27 is near the serial connection to the service processor (labeled SER MGT) on the back of the appliance.



2. **Using a screwdriver, short the pins on jumper J27 for one to two seconds.**

Next task: "Replacing the system controller and restarting" on page 108.

Replacing Graphics Redirect And Service Processor

On VTL Value systems, local and remote management console services are provided by a Graphics Redirect and Service Processor (GRASP) assembly (part number 541-0597 at the time of publication, but, for the latest part numbers, see the Sun System Handbook <`http://sunsolve.sun.com/handbook_pub/Systems/`>). Replacing the GRASP assembly is a straightforward process. Proceed as follows.

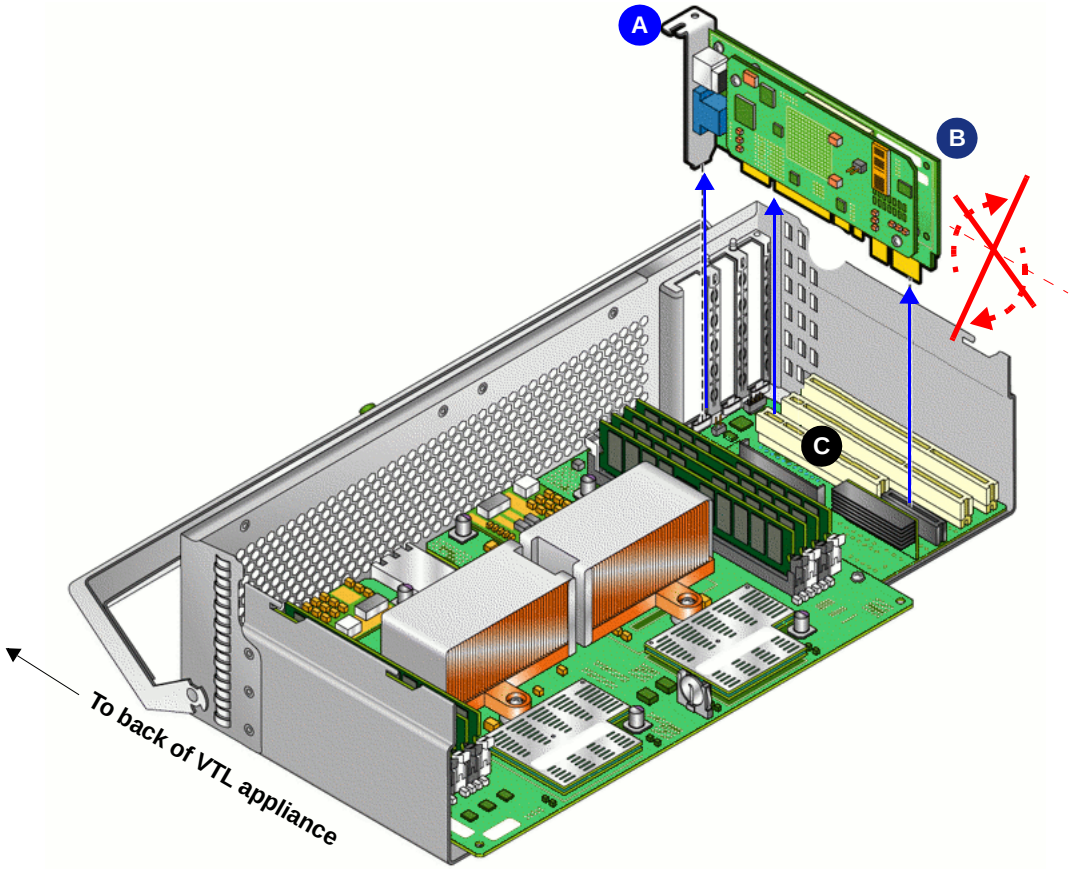
▼ Replacing the GRASP Board

1. **If you have not already done so, carry out the tasks outlined in "Accessing system controller components" on page 92.**
2. **Note the MAC address of the replacement GRASP board. Then create a new label for the system controller handle, and paste the new label over the old one.**
3. **Double check and make sure that the green standby power-status LED on the GRASP board (CR1) is OFF (not lit).**

   The GRASP board is *not* hot-swappable! Do not remove it if the LED is lit.

4. **Remove the screw that secures the GRASP assembly mounting bracket (A below) to the service processor enclosure, and set it aside.**

   Note that, for clarity, the host bust adapters are not shown.



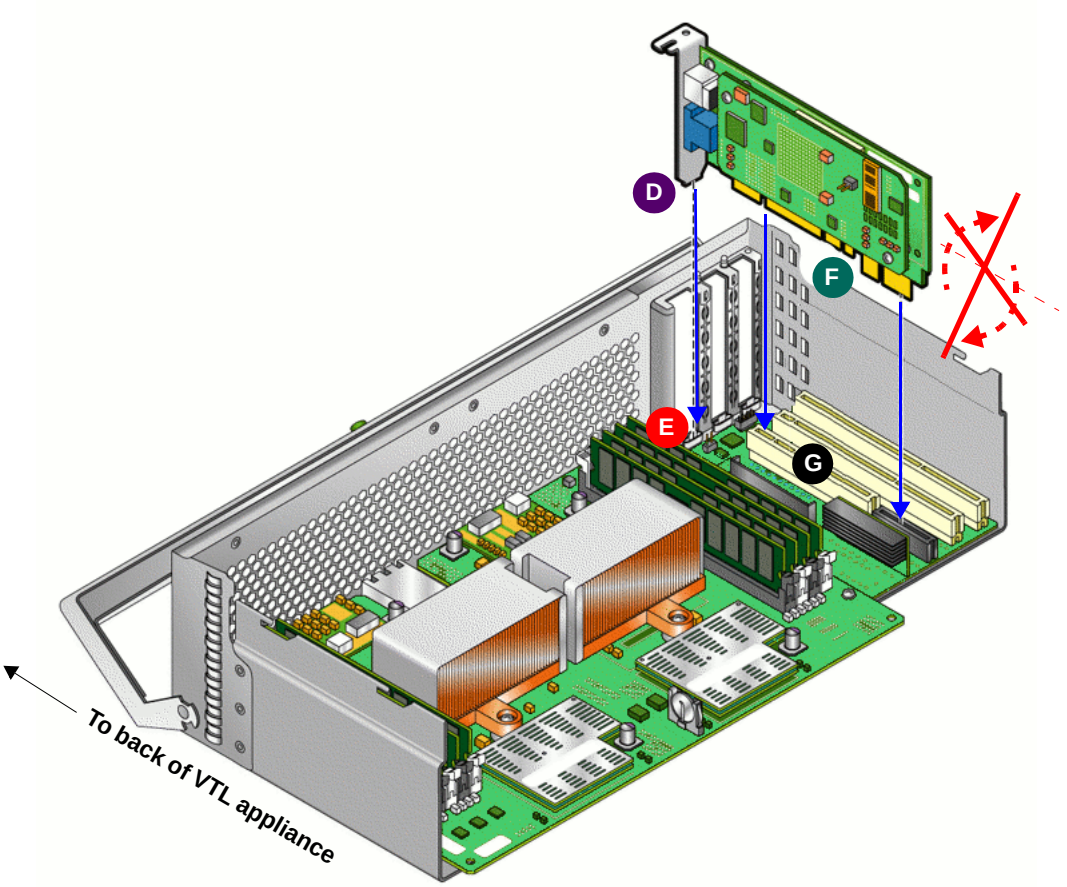
5. **Carefully grip the GRASP assembly by the metal bracket (A above) and, if necessary, the edges of the circuit board that carries the male connectors (B).**

6. **Carefully pull the GRASP assembly straight up, detaching it from the female connectors on the I/O board (C above).**

   Do not bend or twist the GRASP assembly when removing it.

7. **Position the replacement GRASP assembly in the service processor enclosure: align the tab on the metal mounting bracket (D below) with the slot in the enclosure (E), and align the male connectors on the GRASP assembly (F) with the female connectors on the I/O board (G).**

   Note that, for clarity, the host bust adapters are not shown.



8. **Carefully press straight down on the metal bracket (D above) and the top edge of the GRASP assembly, firmly seating the male connectors on the assembly (F above) within the female connectors on the I/O board (G).**

   Do not bend or twist the GRASP assembly when inserting it.

9. **Secure the mounting bracket (D above) to the chassis using the screw that you set aside at the start of this procedure.**

Next task: "Replacing the system controller and restarting" on page 108.

▼ Updating system service records with Servicetool

Caution – The `sunservice` account is for the use of Sun service representatives only. Do not use the sunservice account unless you are instructed to do so in a procedure developed by Sun Microsystems.

1. **Using `ssh`, log in to the `sunservice` account. The default password is `changeme`.**

```
[laptop]user:# ssh sunservice@SP-IP-address
password:
[VTL_Value] sunservice:#
```

2. **At the prompt, enter the `servicetool --board_replaced` command:**

```
[VTL_Value] sunservice:# servicetool --board_replaced=service_processor
```

3. **When `servicetool` prompts you, enter `y` to confirm that you wish to continue and that the service processor is installed:**

```
[VTL_Value] sunservice:# servicetool --board_replaced=service_processor
Servicetool is going to collect system information for the service
processor for future part swaps.
    * The new service processor must be installed.
Do you want to continue (y|n)? y
The following preconditions must be true for this to work:
    * The new service processor must be installed.
Do you want to continue (y|n)? y
```

4. **When `servicetool` prompts you, enter `y` to confirm that you wish to reboot the service processor:**

```
Service processor FRU information ready to be collected.
You MUST reboot the service processor for to complete
this process.  Allow the service processor to fully boot.
DO NOT UNPLUG THE SYSTEM WHILE THE SERVICE PROCESSOR IS BOOTING!
Would you like to reboot the service processor now (y|n)? y
The system is going down NOW !!
Sending SIGTERM to all processes.
```

5. **Stop here.**

Next task: "Replacing the system controller and restarting" on page 108.

Replacing dual inline memory modules (DIMMs)

VTL Value appliances use 2-GB, PC3200 ECC Registered DIMMs (part number 541-1903, X-option X4231A-Z at the time of publication, but see the Sun System Handbook <http://sunsolve.sun.com/handbook_pub/Systems/> for the latest part numbers). Each CPU supports two pairs of DIMMs, for a total of 8-GB of RAM per appliance.

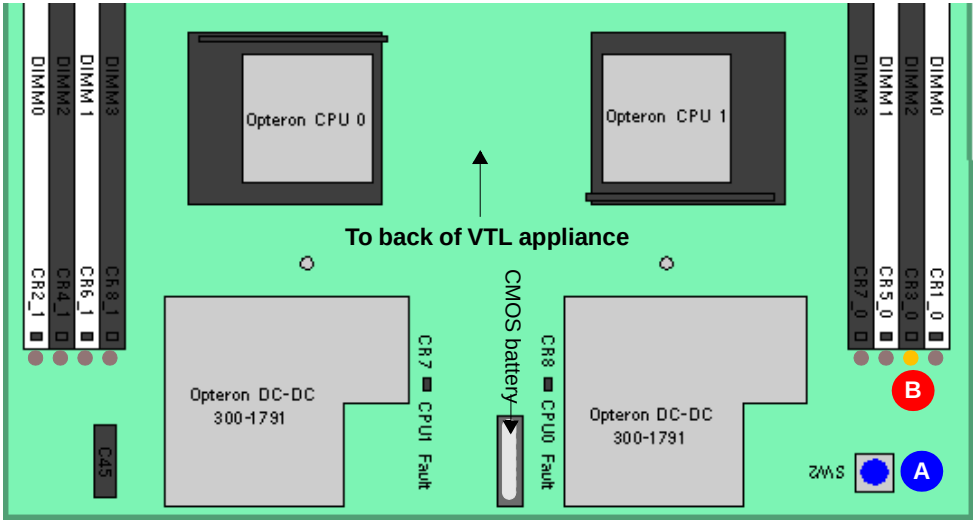
You detect a failed DIMM by pressing a button on the system board. This button triggers a capacitor that lights up an amber LED on any DIMM slot that contains a failed memory module. The capacitor stores enough power to light these LEDs for up to one minute. To detect and replace a failed DIMM, proceed as follows.

▼ Replacing DIMMs

Caution – DIMMs are extremely sensitive to electrostatic discharge (ESD). To avoid damage, always take antistatic precautions.

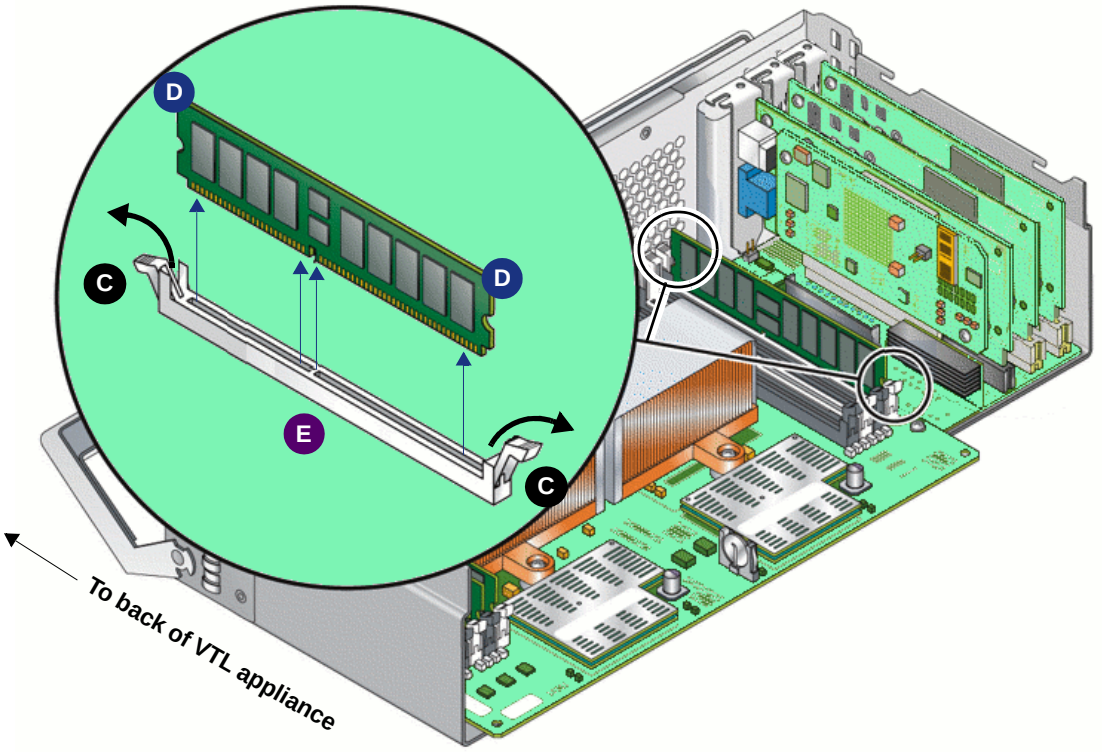
---

1. **If you have not already done so, carry out the tasks outlined in "Accessing system controller components" on page 92.**
2. **Take anti-static precautions. Put on an anti-static ground strap, and lay out the replacement DIMM(s) on an antistatic mat.**
3. **Press the blue show-fault button (A below), and look for the amber LED(s) that indicate a failed DIMM (B).**



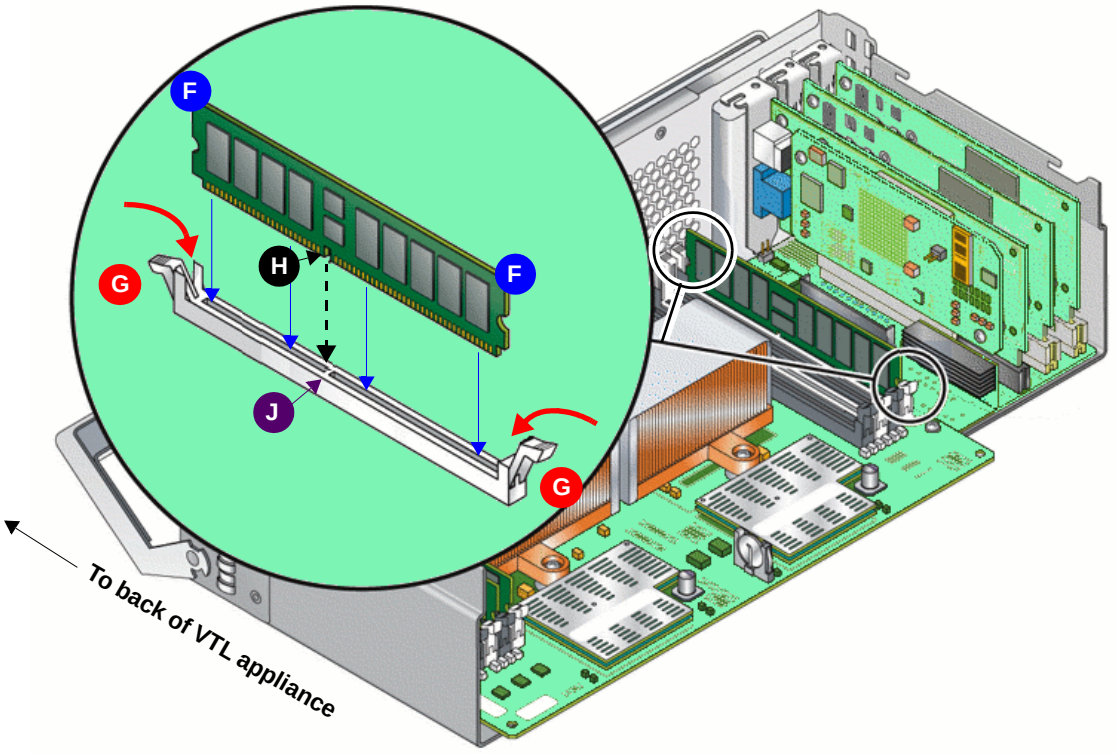
4. **Partially eject the failed DIMM from its socket by simultaneously rotating the two ejector levers (C below) outward as far as they will go.**

   Note that, for clarity, only one of the four DIMMs is shown in the illustration below.



5. **Carefully grasp the DIMM by its edges (D above), and lift it straight up out of the socket.**
6. **Carefully pick up the replacement DIMM by its edges (F below).**
7. **Make sure that the DIMM ejector levers at each end of the memory socket are still fully open (G below).**
8. **Align the notch in the bottom edge of the DIMM (H below) with the key in the DIMM socket (J).**

9. **Press down evenly on both top corners of the DIMM (F below) until the ejector levers (G) snap closed over the cutouts in the left and right edges of the DIMM.**



Next task: "Replacing the system controller and restarting" on page 108.

Replacing host bus adapters (HBAs)

The VTL appliance comes with two host-facing, 2-Gb, dual-port, Fibre Channel host bus adapters (Sun/QLogic QLA2342, part number 375-3363 at the time of publication, but, for the latest part numbers, see the Sun System Handbook <`http://sunsolve.sun.com/handbook_pub/Systems/`>). The HBAs occupy the two PCI-X slots on the I/O board inside the system controller.

To replace an HBA, carry out the following tasks:

- "Installing the optional low-profile bracket on the HBA" on page 105
- "Installing the replacement HBA in its PCI-X slot" on page 105.

▼ Installing the optional low-profile bracket on the HBA

The Sun Fibre Channel HBA installation kit includes a low-profile mounting bracket for compatibility with the VTL Value appliance. Install it as follows.

1. **Put on a properly grounded antistatic strap.**
2. **Using a #2 cross-head screwdrive, remove the two screws that secure the high-profile bracket to the HBA . Save the screws.**
3. **Replace the high-profile bracket with the low-profile bracket, taking care to align the screw holes on the bracket with the corresponding holes on the circuit board.**
4. **Insert the mounting screws and tighten them enough to secure the circuit board (do not overtighten screws).**

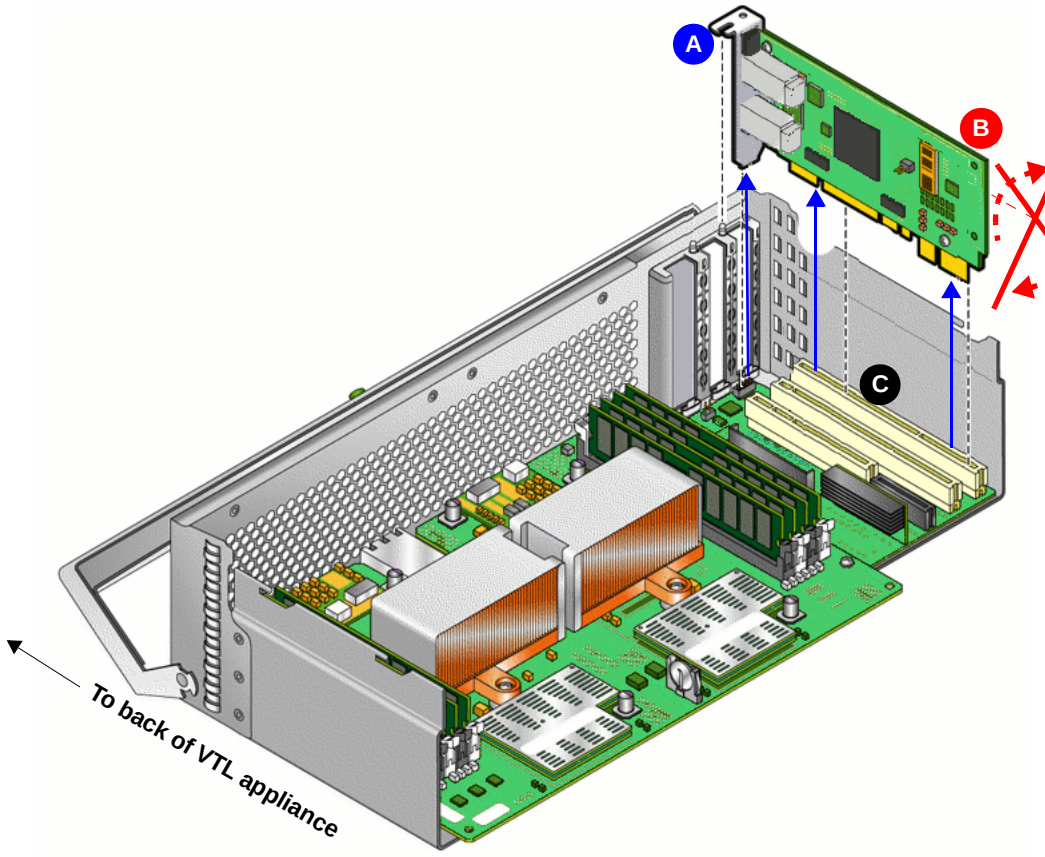
Next task: "Replacing host bus adapters (HBAs)" on page 104.

▼ Installing the replacement HBA in its PCI-X slot

1. **If you have not already done so, carry out the tasks outlined in "Accessing system controller components" on page 92.**
2. **Disconnect external Fibre Channel cables from the HBA.**
3. **Remove the screw that secures the faulty HBA to the service processor enclosure (A below) and set it aside.**

   The second host bus adapter and the GRASP assembly are not shown.

4. **Carefully grip the HBA by the metal bracket (A below) and, if necessary, the edges of the circuit board that carries the male connectors (B).**

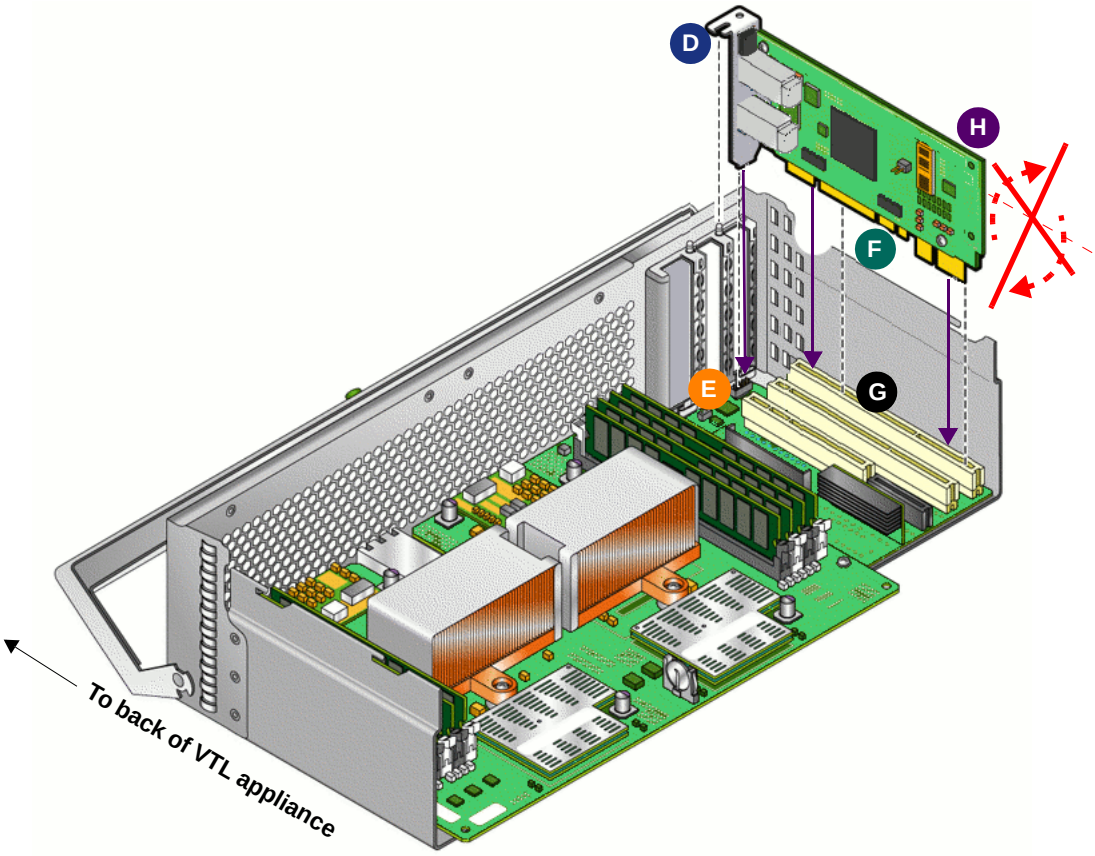


5. **Carefully pull the HBA straight up, detaching it from the PCI-X socket on the I/O board (C above).**

   Do not bend or twist the HBA assembly when removing it.

6. **Position the replacement HBA in the service processor enclosure: align the tab on the metal mounting bracket (D below) with the slot in the enclosure (E), and align the male connectors on the GRASP assembly (F) with the PCI-X socket on the I/O board (G).**

   Note that, for clarity, the second host bus adapter and the GRASP assembly are not shown.



7. **Carefully press straight down on the metal bracket (D above) and the top edge of the HBA (H), firmly seating the male connectors on the HBA (F above) within the PCI-X socket on the I/O board (G).**

   Do not bend or twist the GRASP assembly when inserting it.

8. **Secure the mounting bracket (D above) to the chassis using the screw that you set aside at the start of this procedure.**

Next task: "Replacing the system controller and restarting" on page 108.

Replacing the system controller and restarting

Once you have finished servicing system controller components, carry out the following tasks:

- "Returning the system controller to the chassis" on page 108
- "Reinstalling the cable management arm (CMA)" on page 109
- "Restarting the VTL Value appliance" on page 110.

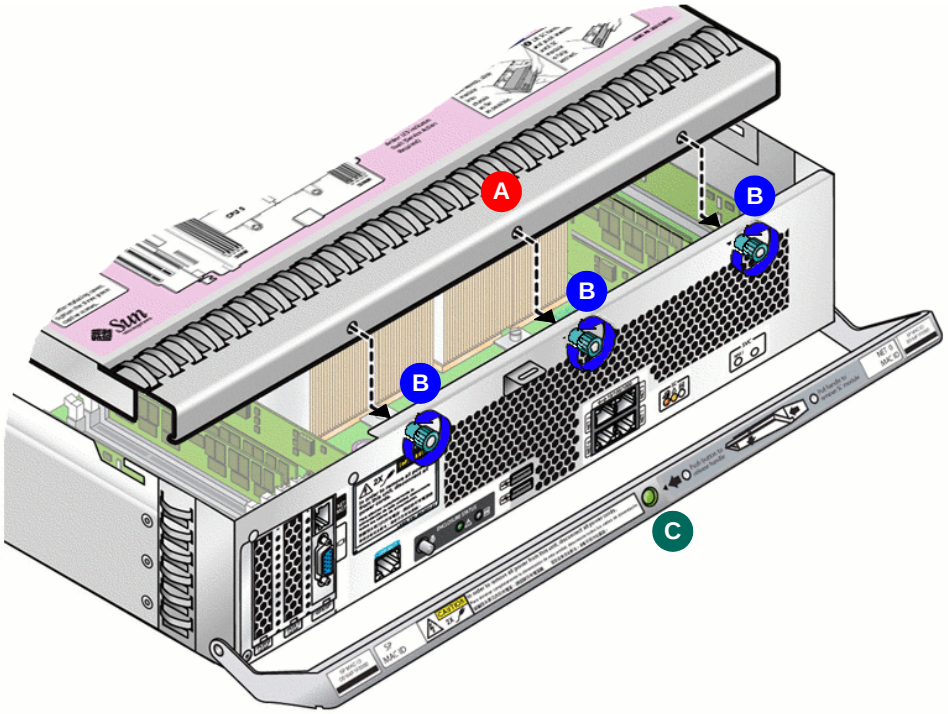
▼ Returning the system controller to the chassis

1. **Place the system controller cover (A below) in position on the enclosure, and slide it forward to engage the captive screws (B).**

Caution – Do not reinstall the system controller without the cover. If you operate the system without the cover in place, the system may overheat and damage system components, and service processor may report an over temperature event at `proc.p1.t_core`.

---

2. **Secure the cover by tightening the three plastic-capped captive screws (B below).**



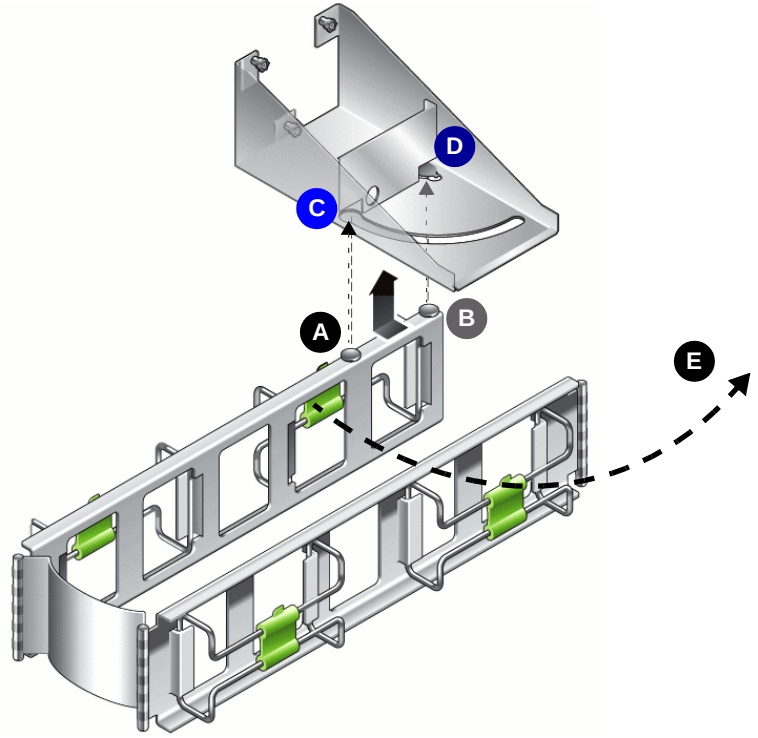
3. **Align the system controller with the empty bay in the appliance chassis.**

4. **Push the system controller into the bay until it firmly engages the connector on the power distribution board.**
5. **Push the system controller further until it is seated firmly.**
6. **Lift the system controller handle (C above) until the latch clicks into place.**

Next task: "Reinstalling the cable management arm (CMA)" on page 109.

▼ Reinstalling the cable management arm (CMA)

1. **Placing your hand under the CMA for support, fit the two pins (A, B below) into the keyholes in the CMA-to-chassis bracket (C, D).**

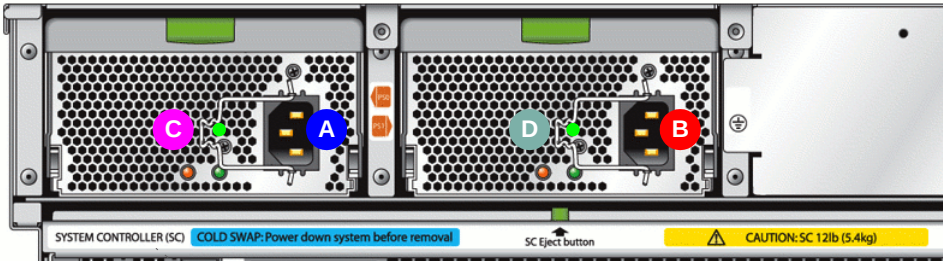


2. **Rotate CMA towards you until it seats with an audible snap (E above).**

Next task: "Restarting the VTL Value appliance" on page 110.

▼ Restarting the VTL Value appliance

1. **Connect the AC power cords to the connectors on the power supplies (A and B below). Secure the cords with the retaining clips (C and D).**



2. **Go around to the front of the appliance. Using a stylus or ballpoint pen, press the power button (F below), and start the appliance.**

3. **Stop here.**

APPENDIX **A**

System Specifications

This appendix contains physical, power, environmental, and acoustic noise emission specifications for the VTL Value appliance.

VTL Value physical specifications		
Weight	160 pounds (472 Kg) max	
Width	17.3 inches (444 mm)	
Height	6.8 inches (175 mm)	
Depth	**overall (including cable management arm)**	38 inches (966 mm)
	overall (not including cable management arm)	32.5 inches (827 mm)
	enclosure only	29.5 inches (750 mm)
	cables only	3 inches (77 mm)

VTL Value power specifications	
Universal AC Input	200–240 VAC, 50/60 Hz
Heat output	5800 BTU/hr
Input power	200–240 VAC
Maximum input power	1700 WAC

VTL Value environmental specifications	
Operating temperature	5° to 35° C (41° to 95° F) up to 93% relative humidity, noncondensing, 27º C max wet bulb
Storage temperature	-40 °C to 65 °C (-40 °F to 149 °F) up to 93% relative humidity, noncondensing, 38 ºC max wet bulb
Operating altitude	Up to 3048 meters, maximum ambient temperature is derated by 1º C per 500 meters above 500 meters
Nonoperating altitude	Up to 4000 meters

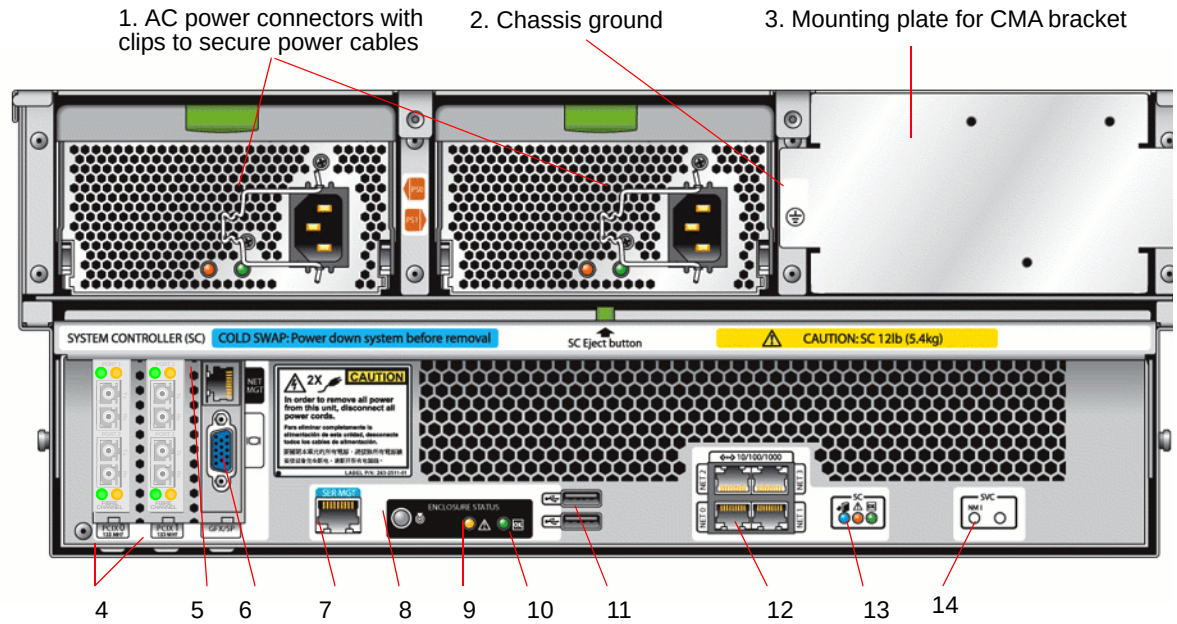
VTL Value acoustic noise emission specifications*

	28C and below	Above 28C
Acoustic noise	Less than 83 dB at ambient temperature of up to 24º C	
LwAd operating and idle	8.0 B	8.5 B
LpAm	70 dB	75 dB

*per ISO 9296

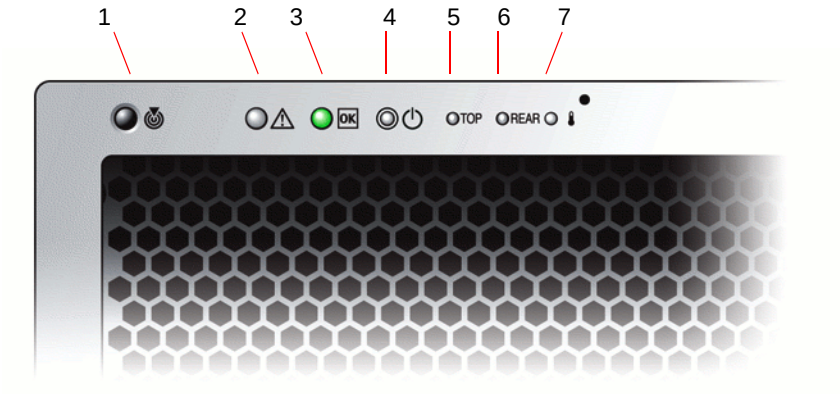
APPENDIX **B**

Front and rear overviews of the VTL Value server



4. PCIX-0 and PCIX-1
5. NET MGT (SP)
6. Video connector
7. SER MGT (serial connection to SP)
8. Locate button/LED
9. Chassis fault LED
10. System OK/On Standby
11. USB connectors (2)
12. 10/100/1000 Gigabit Ethernet ports
13. System Controller status lights: Blue = Ready to remove; Amber = Fault; Green = OK
14. Service only: NMI and Reset

1. Locate button/LED
2. System Fault LED
3. Power/OK LED (system power)
4. Power button
5. Top (hard disk drive or fan fault)
6. Rear (power supply or system controller fault)
7. System over temperature warning



APPENDIX **C**

ILOM command reference

The following table summarizes Integrated Lights Out Manager (ILOM) commandline interface (CLI).

Description	Command
User Commands	
Add a local user.	`create /SP/users/user1 password=password role=administrator|operator`
Delete a local user.	`delete /SP/users/user1`
Change a local user's properties.	`set /SP/users/user1 role=operator`
Display information about all local users.	`show -display [targets|properties|all] -level [value|all] /SP/users`
Display information about LDAP settings.	show /SP/clients/ldap
Change LDAP settings.	`set /SP/clients/ldap binddn=proxyuser bindpw=proxyuserpassword defaultrole=administrator|operator ipaddress=ipaddress`
Network and Serial Port Setting Commands	
Display network configuration information.	`show /SP/network`
Change network properties for the ILOM. Changing certain network properties, like the IP address, disconnects your active session.	`set /SP/network pendingipaddress=ipaddress pendingipdiscovery=dchp|static pendingipgateway=ipgateway pendingipnetmask=ipnetmask commitpending=true`
Display information about the external serial port.	show /SP/serial/external
Change the external serial port configuration.	`set /SP/serial/external pendingspeed=integer commitpending=true`

Description	Command
Display information about the serial connection to the host.	`show /SP/serial/host`
Change the host serial port configuration. Note: This speed setting must match the speed setting for serial port 0, COM1 or /dev/ttyS0 on the host operating system.	`set /SP/serial/host pendingspeed=`*`integer`* `commitpending=true`
Alert Commands	
Display information about PET alerts. You can configure up to 15 alerts.	`show /SP/alert/rules/1...15`
Change alert configuration.	`set /SP/alert/rules/1...15 destination=`*`ipaddress`* `level=down|critical|major|minor`
System Management Access Commands	
Display information about HTTP settings.	`show /SP/services/http`
Change HTTP settings, such as enabling automatic redirection to HTTPS.	`set /SP/services/http port=`*`portnumber`* `secureredirect enabled|disabled` servicestate=enabled|disabled
Display information about HTTPS access.	`show /SP/services/https`
Change HTTPS settings.	`set /SP/services/https port=`*`portnumber`* `servicestate=enabled|disabled`
Display SSH DSA key settings.	`show /SP/services/ssh/keys/dsa`
Display SSH RSA key settings.	`show /SP/services/ssh/keys/rsa`
SNMP Commands	

Display information about SNMP settings. By default, the SNMP port is 161 and v3 is enabled.	`show /SP/services/snmp engineid=`*`snmpengineid`*
	`port=`*`snmpportnumber`* `sets=enabled|disabled`
	`v1=enabled|disabled v2c=enabled|disabled`
	`v3=enabled|disabled`

Display SNMP users.	show /SP/services/snmp/users

Add an SNMP user.	`create /SP/services/snmp/users/`*`snmpusername`*
	`authenticationpassword=`*`password`*
	`authenticationprotocol=MD5|SHA`
	`permissions=rw|ro privacypassword=`*`password`*
	`privacyprotocol=none|DES`

Delete an SNMP user.	`delete /SP/services/snmp/users/`*`snmpusername`*
Display information about SNMP public (read-only) communities.	`show /SP/services/snmp/communities/public`
Add this device to an SNMP public community.	`create /SP/services/snmp/communities/` `public/`*`comm1`*

Description	Command
Delete this device from an SNMP public community.	`delete /SP/services/snmp/communities/public/`*`comm1`*
Display information about SNMP private (read-write) communities.	`show /SP/services/snmp/communities/private`
Add this device to an SNMP private community.	`create /SP/services/snmp/communities/private/`*`comm2`*
Host System Commands	
Delete this device from an SNMP private community.	`delete /SP/services/snmp/communities/private/`*`comm2`*
Start the host system.	`start /SYS`
Stop the host system.	`stop /SYS`
Reset the host system.	`reset /SYS`
Start a session to connect to the host console.	`start /SP/console`
Stop the session connected to the host console.	`stop /SP/console`
Clock Settings	
Set the ILOM clock to synchronize with a primary NTP server.	`set /SP/clients/ntp/server/1 address=`*`ntpIPaddress`*
Set the ILOM clock to synchronize with a secondary NTP server.	`set /SP/clients/ntp/server/2 address=`*`ntpIPaddress2`*

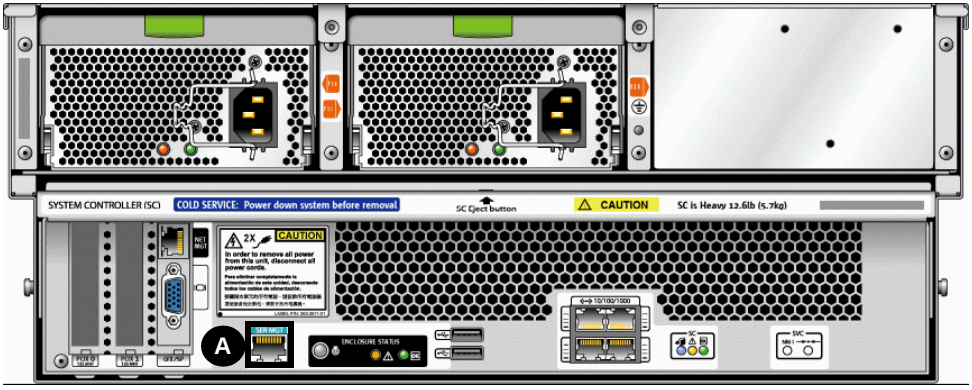
APPENDIX **D**

Connecting to ILOM via a serial port

Normally, you access the Integrated Lights Out Manager (ILOM) service processor of a VTL Value appliance via the preconfigured Ethernet management port (`NETMGT`) and the ILOM graphical user interface (GUI). However, if network services are not available, you can still access the ILOM commandline interface (CLI) by connecting a terminal or a computer running terminal emulation software to the RJ-45 serial port on the back panel of the VTL Value appliance.

1. **Configure the terminal device or the terminal emulation software for**
   - eight data bits, no parity, one stop bit
   - 9600 baud
   - no hardware flow control (CTS/RTS)
   - no software flow control (XON/XOFF)

2. **Connect an RJ-45 serial cable from the terminal device to the `SER MGT` port on the back panel of the VTL appliance (A below).**



3. **Press `Enter` on the terminal device.**

   This establishes the connection between the terminal device and the ILOM.

Note – If you connect a terminal or emulator to the serial port before it has been powered up or during its power-up sequence, you will see bootup messages.

When the system has booted, the ILOM displays its login prompt:

```
SUNSPnnnnnnnnnn login:
```

The first string in the prompt is the default host name. It consists of the prefix `SUNSP` and the ILOM's MAC address.

4. **Log in to the CLI as `root` and enter the root password.**

   When you have successfully logged in, the SP displays the ILOM default command prompt:

   ```
   ->
   ```

   The ILOM is now accessing the CLI. You can now run CLI commands.

   For example, to display status information about the motherboard in your server, type the following command:

   ```
   -> show /SYS/MB
   ```

   Use the ILOM commands to configure the server's user accounts, network settings, access lists, alerts, and so on. For detailed instructions on CLI commands, see the *Integrated Lights Out Manager (ILOM) Administration Guide*, 819-1160.

5. **To go to the host serial console (host COM0), type the following commands:**

   ```
   cd /SP/console
   -> start
   ```

Note – After you have returned to the serial console, to switch back to the CLI, enter the **`Escape`** and left parenthesis [( ] key in rapid succession.

APPENDIX **E**

BIOS utility screen reference

Caution – This section describes viewing and/or modifying the BIOS settings. Never alter VTL Value BIOS settings unless directed to do so by a Sun technical support representative. Unsupported BIOS option settings may disable the appliance.

This appendix contains facsimiles of the user interface screens for the VTL Value BIOS Setup utility. Please note that the screens shown are examples. The version numbers, screen items, and selections shown are subject to change over the life of the product.

The BIOS Setup utility presents seven top level menus:

- "Main menu" on page 122 lists general system information.
- "Advanced Menu" on page 122 contains twelve submenus that list configuration options for the CPUs, IDE, SuperIO, ACPI, Event Log, HyperTransport, IPMI, MPS, PCI Express, Remote Access, and USB.
- "PCI/PnP Menu" on page 133 displays options for configuring Plug-and-Play (PnP) devices using BIOS (the default) or the operating system (if applicable).
- "Boot Menu" on page 134 assigns priority to the boot devices (hard disk drives and the ATAPI DVD-ROM drive).
- "Security Settings Menu" on page 138 lets you install or change user and supervisor passwords.
- "Chipset Menu" on page 138 contains six submenus that display configuration options for the NorthBridge, SouthBridge, and PCI-X devices.
- "Exit Options Menu" on page 142 let you save or discard changes made using the other menus.

Main menu

```
Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit
*************************************************************************************
* System Overview                                    ** Use [ENTER], [TAB]     *
* ************************************************** or [SHIFT-TAB] to      *
* AMIBIOS                                            ** select a field.        *
* Version   : 08.00.10                               **                        *
* Build Date: 04/12/06                               ** Use [+] or [-] to      *
* ID        : 0ABIG014                               ** configure system Time. *
*                                                    **                        *
* Product Name          : Sun Fire X4500             **                        *
* System Serial Number  : Not Available              **                        *
* BMC Firmware Revision : 1.00                       **                        *
*                                                    **                        *
* Processor                                          **                        *
* Dual Core AMD Opteron(tm) Processor 285            ** **    Select Screen    *
* Speed :2.6 GHz                                     ** **    Select Item      *
* Count :4                                           ** +-    Change Field     *
*                                                    ** Tab   Select Field     *
* System Memory                                      ** F1    General Help     *
* Size      : 15.9 GB                                ** F10   Save and Exit    *
*                                                    ** ESC   Exit             *
* System Time                 [16:59:00]             **                        *
* System Date                 [Thu 07/20/2006]       **                        *
*************************************************************************************
```

Advanced Menu

```
Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit
*************************************************************************************
* Advanced Settings                                  * Options for CPU         *
* ************************************************** *                         *
* WARNING: Setting wrong values in below sections    *                         *
*          may cause system to malfunction.          *                         *
*                                                    *                         *
* * CPU Configuration                                *                         *
* * IDE Configuration                                *                         *
* * SuperIO Configuration                            *                         *
```

```
* * ACPI Configuration                                  *                        *
* * Event Log Configuration                             *                        *
* * Hyper Transport Configuration                       *                        *
* * IPMI 2.0 Configuration                              *                        *
* * MPS Configuration                                   * **    Select Screen    *
* * Remote Access Configuration                         * **    Select Item      *
* * Trusted Computing                                   * Enter Go to Sub Screen *
* * USB Configuration                                   * F1    General Help     *
*                                                       * F10   Save and Exit    *
*                                                       * ESC   Exit             *
*                                                       *                        *
*                                                       *                        *
*************************************************************************************
```

Advanced Menu > CPU Configuration

```
Advanced
*************************************************************************************
* CPU Configuration                                     * This option should     *
* Module Version: 14.09                                 * remain disabled for    *
* Physical Count: 2                                     * the normal operation.  *
* Logical Count : 4                                     * The driver developer   *
* ************************************************** * may enable it for      *
* Dual Core AMD Opteron(tm) Processor 285               * testing purpose.       *
* Revision: E6                                          *                        *
* Cache L1: 256KB                                       *                        *
* Cache L2: 2048KB                                      *                        *
* Speed   : 2600MHz                                     *                        *
* Current FSB Multiplier: 13x                           *                        *
* Maximum FSB Multiplier: 13x                           *                        *
* Able to Change Freq.  : Yes                           * **    Select Screen    *
* uCode Patch Level     : 0x0                           * **    Select Item      *
*                                                       * +-    Change Option    *
* GART Error Reporting           [Disabled]             * F1    General Help     *
* MTRR Mapping                   [Continuous]           * F10   Save and Exit    *
* Speculative TLB Reload         [Enabled]              * ESC   Exit             *
*                                                       *                        *
*************************************************************************************
```

Advanced Menu > IDE Configuration

```
Advanced
*******************************************************************************
* IDE Configuration                                  * DISABLED: disables the *
* ************************************************** * integrated IDE         *
* OnBoard PCI IDE Controller     [Primary]           * Controller.            *
*                                                    * PRIMARY: enables only  *
* * Primary IDE Master              : [Not Detected]  * the Primary IDE        *
* * Primary IDE Slave               : [Not Detected]  * Controller.            *
* * Secondary IDE Master            : [Not Detected]  * SECONDARY: enables     *
* * Secondary IDE Slave             : [Not Detected]  * only the Secondary IDE *
*                                                    * Controller.            *
* Hard Disk Write Protect        [Disabled]          * BOTH: enables both IDE *
* IDE Detect Time Out (Sec)      [5]                 * Controllers.           *
*                                                    *                        *
*                                                    * **    Select Screen    *
*                                                    * **    Select Item      *
*                                                    * +-    Change Option    *
*                                                    * F1    General Help     *
*                                                    * F10   Save and Exit    *
*                                                    * ESC   Exit             *
*                                                    *                        *
*                                                    *                        *
*******************************************************************************
```

Advanced Menu > SuperIO Chipset Configuration

```
          Advanced
*******************************************************************************
* Configure Smc27X Super IO Chipset                  * Allows BIOS to Select  *
* ************************************************** * Serial Port1 Base      *
* Serial Port1 Address           [3F8/IRQ4]          * Addresses.             *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    * **    Select Screen    *
```

```
*                                                    * **    Select Item      *
*                                                    * +-    Change Option    *
*                                                    * F1    General Help     *
*                                                    * F10   Save and Exit    *
*                                                    * ESC   Exit             *
*                                                    *                        *
*                                                    *                        *
*******************************************************************************
```

Advanced Menu > ACPI Configuration

```
Advanced
*******************************************************************************
* ACPI Settings                                     * Enable / Disable       *
* ************************************************ * ACPI support for       *
* ACPI Aware O/S                 [Yes]              * Operating System.      *
*                                                   *                        *
* * Advanced ACPI Configuration                     * ENABLE: If OS          *
*                                                   * supports ACPI.         *
*                                                   *                        *
*                                                   * DISABLE: If OS         *
*                                                   * does not support       *
*                                                   * ACPI.                   *
*                                                   *                        *
*                                                   *                        *
*                                                   * **    Select Screen    *
*                                                   * **    Select Item      *
*                                                   * +-    Change Option    *
*                                                   * F1    General Help     *
*                                                   * F10   Save and Exit    *
*                                                   * ESC   Exit             *
*                                                   *                        *
*                                                   *                        *
*******************************************************************************
```

Advanced Menu > Advanced ACPI Configuration

```
Advanced
*******************************************************************************
* Advanced ACPI Configuration                       * Enable RSDP pointers   *
* ************************************************ * to 64-bit Fixed System *
```

```
* ACPI 2.0 Features               [Yes]                 * Description Tables.    *
* ACPI APIC support               [Enabled]             *                        *
* ACPI SRAT Table                 [Enabled]             *                        *
* AMI OEMB table                  [Enabled]             *                        *
* Headless mode                   [Enabled]             *                        *
* Remote Access                   [Enabled]             *                        *
*                                                       * **    Select Screen    *
*                                                       * **    Select Item      *
*                                                       * +-    Change Option    *
*                                                       * F1    General Help     *
*                                                       * F10   Save and Exit    *
*                                                       * ESC   Exit             *
*                                                       *                        *
*                                                       *                        *
*************************************************************************************
```

Advanced Menu > Event Logging Details

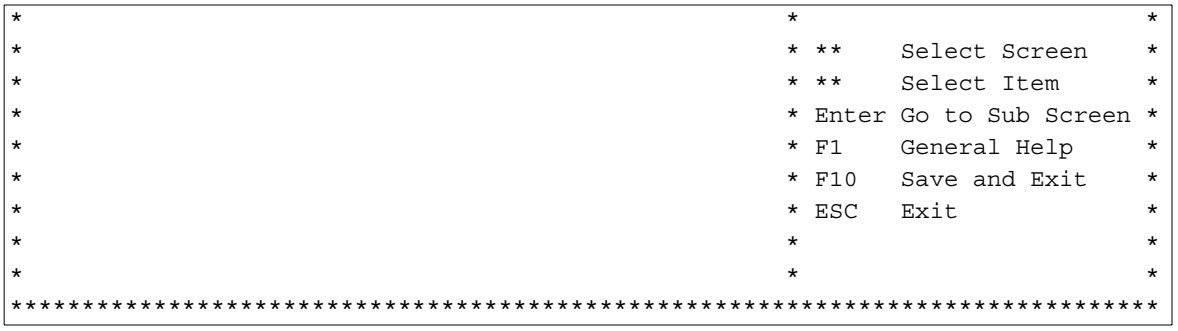
```
          Advanced
*************************************************************************************
* Event Logging details                                 * View all unread events *
* ************************************************** * on the Event Log.      *
* View Event Log                                        *                        *
* Mark all events as read                               *                        *
* Clear Event Log                                       *                        *
*                                                       *                        *
*                                                       *                        *
*                                                       *                        *
*                                                       *                        *
*                                                       *                        *
*                                                       *                        *
*                                                       *                        *
*                                                       * **    Select Screen    *
*                                                       * **    Select Item      *
*                                                       * Enter Go to Sub Screen *
*                                                       * F1    General Help     *
*                                                       * F10   Save and Exit    *
*                                                       * ESC   Exit             *
*                                                       *                        *
*                                                       *                        *
*************************************************************************************
```

Advanced Menu > HyperTransport Configuration

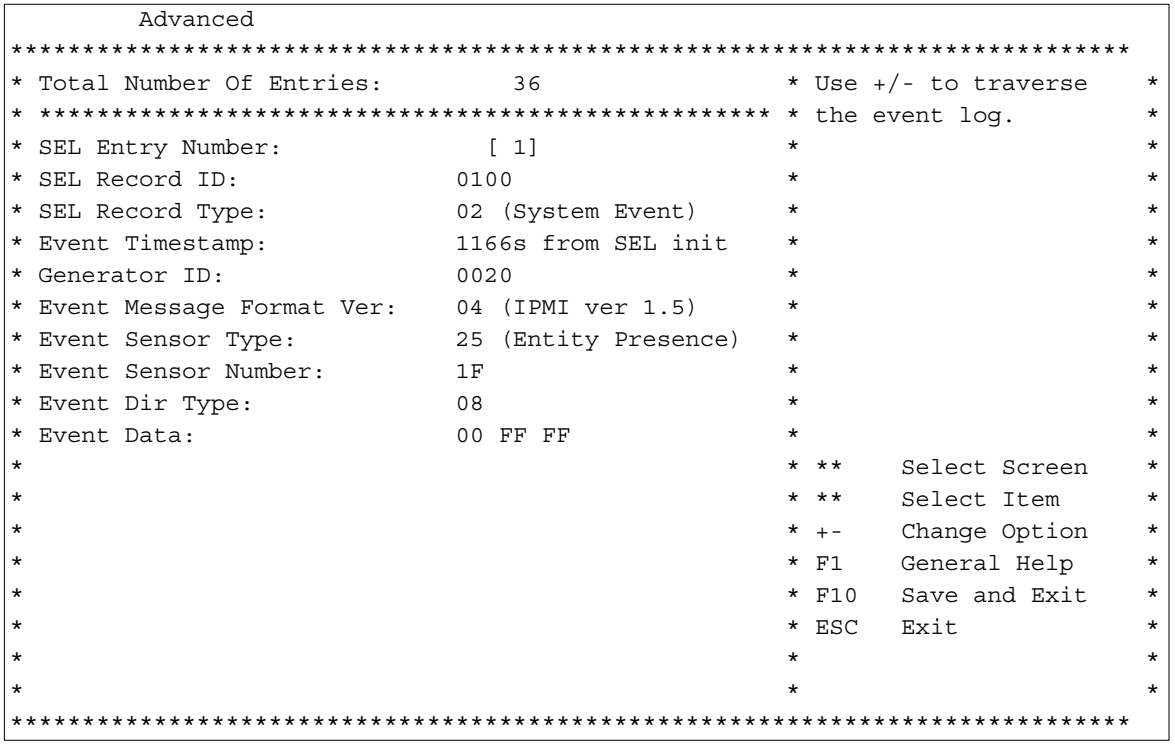
```
Advanced
*********************************************************************************
* Hyper Transport Configuration                        * The HyperTransport     *
* ************************************************** * link will run at this  *
*                                                      * speed if it is slower  *
* CPU0:CPU1 HT Link Speed        [Auto]                * than or equal to the   *
* CPU0:CPU1 HT Link Width        [Auto]                * system clock and the   *
*                                                      * board is capable.      *
* CPU0:PCI-X0 HT Link Speed      [Auto]                *                         *
* CPU0:PCI-X0 HT Link Width      [Auto]                *                         *
*                                                      *                         *
* CPU0:PCI-X1 HT Link Speed      [Auto]                *                         *
* CPU0:PCI-X1 HT Link Width      [Auto]                *                         *
*                                                      *                         *
* PCI-X1:PCI-X2 HT Link Speed    [Auto]                * **    Select Screen    *
* PCI-X1:PCI-X2 HT Link Width    [Auto]                * **    Select Item      *
*                                                      * +-    Change Option    *
* CPU1:PCI-X3 HT Link Speed      [Auto]                * F1    General Help     *
* CPU1:PCI-X3 HT Link Width      [Auto]                * F10   Save and Exit    *
*                                                      * ESC   Exit             *
* CPU1:PCI-X4 HT Link Speed      [Auto]                *                         *
* CPU1:PCI-X4 HT Link Width      [Auto]                *                         *
*                                                      *                         *
*                                                      *                         *
*********************************************************************************
```

Advanced Menu > IPMI 2.0 Configuration

```
Advanced
*********************************************************************************
* IPMI 2.0 Configuration                               * View all events in the *
* ************************************************** * BMC Event Log.         *
* Status Of BMC                   Not Working          * It will take a max. of *
* * View BMC System Event Log                         * 15 seconds to read all *
* Clear BMC System Event Log                           * BMC SEL records.       *
* * Set LAN Configuration                             *                         *
* * Set PEF Configuration                             *                         *
* BMC Watch Dog Timer Action     [Disabled]            *                         *
*                                                      *                         *
*                                                      *                         *
*                                                      *                         *
```



Advanced Menu > IPMI 2.0 > View BMC Event Log



Advanced Menu > IPMI 2.0 > LAN Configuration

```
Advanced
*******************************************************************************
* LAN Configuration.                                 * Enter channel number   *
* ************************************************** * for LAN Configuration  *
* Channel Number                [01]                 * Command.                *
* Channel Number Status:        Channel number is OK *                         *
*                                                    * Proper value below 16. *
*                                                    *                        *
* IP Assignment                 [DHCP]               *                        *
*                                                    *                        *
* Current IP address in BMC:     010.006.042.175     *                        *
* Current MAC address in BMC:    00.03.BA.F2.09.66   *                        *
* Current Subnet Mask in BMC:    255.255.255.000     *                        *
* Current Gateway in BMC:        010.006.042.001     *                        *
*                                                    * **    Select Screen    *
* Refresh                                            * **    Select Item      *
*                                                    * Enter Update           *
* IP Address                     010.006.042.174     * F1    General Help     *
* Subnet Mask                    255.255.255.000     * F10   Save and Exit    *
* Default Gateway                010.006.042.001     * ESC   Exit             *
*                                                    *                        *
* Commit                                             *                        *
*******************************************************************************
*
```

Advanced Menu > IPMI 2.0 > PEF Configuration

```
          Advanced
*******************************************************************************
* Set PEF Configuration Parameters Command.          * Enable or Disable PEF  *
* ************************************************** * Support.               *
* PEF SUPPORT                   [Enabled]            * Refer Table 24.6 of    *
* * PEF Action Global Control                        * IPMI Specification 1.5 *
* Alert Startup Delay           [Disabled]           *                        *
* Startup Delay                 [Disabled]           *                        *
* Event Message For PEF Action  [Disabled]           *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
```

```
*                                                    * **    Select Screen    *
*                                                    * **    Select Item      *
*                                                    * +-    Change Option    *
*                                                    * F1    General Help     *
*                                                    * F10   Save and Exit    *
*                                                    * ESC   Exit             *
*                                                    *                        *
*                                                    *                        *
*******************************************************************************
```

Advanced Menu > MPS Configuration

```
          Advanced
*******************************************************************************
* MPS Configuration                                  * MPS Revision           *
* ************************************************ *                        *
* MPS Revision                  [1.4]                *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    * **    Select Screen    *
*                                                    * **    Select Item      *
*                                                    * +-    Change Option    *
*                                                    * F1    General Help     *
*                                                    * F10   Save and Exit    *
*                                                    * ESC   Exit             *
*                                                    *                        *
*                                                    *                        *
*******************************************************************************
```

Advanced Menu > AMD PowerNow Configuration

Note – The AMD PowerNow! feature is disabled by default on VTL Value appliances. Some problems have been observed when using this feature on certain operating systems. If you want to enable this feature, first check the *VTL Value appliance Product Notes* (819-4364) for any currently known issues for your operating system.

```
*************************************************************************************
* AMD PowerNow Configuration                          * Enabled/Disabled            *
* ************************************************** * PowerNow                     *
* PowerNow                        [Disabled]          *                             *
*                                                     *                             *
*                                                     *                             *
*                                                     *                             *
*                                                     *                             *
*                                                     *                             *
*                                                     *                             *
*                                                     *                             *
*                                                     *                             *
*                                                     *                             *
*                                                     * **    Select Screen         *
*                                                     * **    Select Item           *
*                                                     * +-    Change Option         *
*                                                     * F1    General Help          *
*                                                     * F10   Save and Exit         *
*                                                     * ESC   Exit                  *
*                                                     *                             *
*                                                     *                             *
*************************************************************************************
```

Advanced Menu > Remote Access Configuration

```
Advanced
*************************************************************************************
* Configure Remote Access type and parameters         * Select Remote Access       *
* ************************************************** * type.                       *
* Remote Access                   [Enabled]           *                             *
*                                                     *                             *
* Serial port number              [COM1]              *                             *
```

```
*      Base Address, IRQ          [3F8h, 4]            *                          *
* Serial Port Mode                [09600 8,n,1]        *                          *
* Flow Control                    [None]               *                          *
* Redirection After BIOS POST     [Always]             *                          *
* Terminal Type                   [ANSI]               *                          *
* VT-UTF8 Combo Key Support       [Enabled]            *                          *
* Sredir Memory Display Delay     [No Delay]           *                          *
*                                                      * **    Select Screen     *
*                                                      * **    Select Item       *
*                                                      * +-    Change Option     *
*                                                      * F1    General Help      *
*                                                      * F10   Save and Exit     *
*                                                      * ESC   Exit              *
*                                                      *                         *
*                                                      *                         *
*******************************************************************************
```

Advanced Menu > USB Configuration

```
           Advanced
*******************************************************************************
* USB Configuration                                  * Enables support for    *
* ************************************************ * legacy USB. AUTO       *
* Module Version - 2.24.0-11.4                       * option disables        *
*                                                    * legacy support if      *
* USB Devices Enabled :                              * no USB devices are     *
*   2 Keyboards, 2 Mice, 1 Hub, 2 Drives             * connected.              *
*                                                    *                         *
* Legacy USB Support              [Enabled]          *                         *
* USB 2.0 Controller Mode         [FullSpeed]        *                         *
* BIOS EHCI Hand-Off              [Enabled]          *                         *
* Hotplug USB FDD Support         [Auto]             *                         *
* Hotplug USB CDROM Support       [Auto]             *                         *
*                                                    * **    Select Screen    *
* * USB Mass Storage Device Configuration            * **    Select Item      *
*                                                    * +-    Change Option    *
*                                                    * F1    General Help     *
*                                                    * F10   Save and Exit    *
*                                                    * ESC   Exit             *
*                                                    *                        *
*                                                    *                        *
*******************************************************************************
```

PCI/PnP Menu

```
Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit
*******************************************************************************
* Advanced PCI/PnP Settings                          ** NO: lets the BIOS      *
* ************************************************** configure all the      *
* WARNING: Setting wrong values in below sections    ** devices in the system. *
*          may cause system to malfunction.          ** YES: lets the          *
*                                                    ** operating system       *
* Plug & Play O/S                [No]                ** configure Plug and     *
* PCI Latency Timer              [64]                ** Play (PnP) devices not *
* Allocate IRQ to PCI VGA        [Yes]               ** required for boot if   *
* Palette Snooping               [Disabled]          ** your system has a Plug *
* PCI IDE BusMaster              [Disabled]          ** and Play operating     *
* OffBoard PCI/ISA IDE Card      [Auto]              ** system.                 *
* Scanning onboard Marvell ROM   [Enabled]           **                        *
* Scanning onboard NIC-0 OPROM   [Enabled]           ** **    Select Screen    *
* Scanning onboard NIC-1 OPROM   [Enabled]           ** **    Select Item      *
* Scanning onboard NIC-2 OPROM   [Enabled]           ** +-    Change Option    *
* Scanning onboard NIC-3 OPROM   [Enabled]           ** Available: Specified   *
* Scanning OPROM on PCIX SLOT0   [Enabled]          ** DMA is available to be *
* Scanning OPROM on PCIX SLOT1   [Enabled]           ** used by PCI/PnP        *
* Onboard PCI NIC MAC Address                        ** devices.               *
*   GE NIC 1 : 00 14 4F 20 DA FC                     ** Reserved: Specified    *
*   GE NIC 2 : 00 14 4F 20 DA FD                     ** DMA is reserved for    *
*   GE NIC 3 : 00 14 4F 20 DA FE                     ** use by legacy ISA      *
*   GE NIC 4 : 00 14 4F 20 DA FF                     ** devices.               *
*                                                    **                        *
* IRQ3                           [Available]         **                        *
* IRQ4                           [Reserved]          **                        *
* IRQ5                           [Available]         **                        *
* IRQ7                           [Available]         ** **    Select Screen    *
* IRQ9                           [Available]         ** **    Select Item      *
* IRQ10                          [Available]         ** +-    Change Option    *
* IRQ11                          [Available]         ** F1    General Help     *
* IRQ14                          [Available]         ** F10   Save and Exit    *
* IRQ15                          [Available]         ** ESC   Exit             *
*                                                    **                        *
* DMA Channel 0                  [Available]         ** **    Select Screen    *
* DMA Channel 1                  [Available]         ** **    Select Item      *
* DMA Channel 3                  [Available]         ** +-    Change Option    *
* DMA Channel 5                  [Available]         ** F1    General Help     *
```

```
* DMA Channel 6                  [Available]          ** F10   Save and Exit    *
* DMA Channel 7                  [Available]          ** ESC   Exit             *
*                                                     **                        *
* Reserved Memory Size           [Disabled]           **                        *
*****************************************************************************
```

Boot Menu

```
Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit
*****************************************************************************
* Boot Settings                                    * Configure Settings     *
* ************************************************ * during System Boot.    *
* * Boot Settings Configuration                    *                         *
*                                                  *                         *
* * Boot Device Priority                           *                         *
* * Hard Disk Drives                               *                         *
* * Removable Drives                               *                         *
* * ATAPI CDROM Drives                             *                         *
*                                                  *                         *
*                                                  *                         *
*                                                  *                         *
*                                                  *                         *
*                                                  * **    Select Screen    *
*                                                  * **    Select Item      *
*                                                  * Enter Go to Sub Screen *
*                                                  * F1    General Help     *
*                                                  * F10   Save and Exit    *
*                                                  * ESC   Exit             *
*                                                  *                         *
*                                                  *                         *
*****************************************************************************
```

Boot Menu > Boot Settings Configuration

```
                              Boot
*****************************************************************************
* Boot Settings Configuration                      * Allows BIOS to skip    *
* ************************************************ * certain tests while    *
```

```
* Quick Boot                       [Disabled]          * interrupt 19           *
* System Configuration Display     [Disabled]          *                        *
* Quiet Boot                       [Disabled]          * messages.              *
* AddOn ROM Display Mode           [Force BIOS]        *                        *
* Bootup Num-Lock                  [On]                *                        *
* Wait For 'F1' If Error           [Disabled]          *                        *
* Interrupt 19 Capture             [Disabled]          *                        *
*                                                      *                        *
*                                                      *                        *
*                                                      *                        *
*                                                      * **    Select Screen    *
*                                                      * **    Select Item      *
*                                                      * +-    Change Option    *
*                                                      * F1    General Help     *
*                                                      * F10   Save and Exit    *
*                                                      * ESC   Exit             *
*                                                      *                        *
*                                                      *                        *
*************************************************************************************
```

Boot Menu > Boot Device Priority

```
                                  Boot
*************************************************************************************
* Boot Device Priority                                 * Specifies the boot     *
* ************************************************** * sequence from the      *
*                                                      * available devices.     *
* 1st Boot Device                  [ATAPI CDROM]       *                        *
* 2nd Boot Device                  [Removable Dev.]    * A device enclosed in   *
* 3rd Boot Device                  [Hard Drive]        * parenthesis has been   *
* 4th Boot Device                  [IBA GE Slot 0708 v] * disabled in the       *
* 5th Boot Device                  [IBA GE Slot 0709 v] * corresponding type    *
* 6th Boot Device                  [IBA GE Slot 0808 v] * menu.                 *
* 7th Boot Device                  [IBA GE Slot 0809 v] *                       *
*                                                      *                        *
*                                                      *                        *
*                                                      * **    Select Screen    *
*                                                      * **    Select Item      *
*                                                      * +-    Change Option    *
*                                                      * F1    General Help     *
*                                                      * F10   Save and Exit    *
*                                                      * ESC   Exit             *
```

```
*                                                          *                          *
*                                                          *                          *
*****************************************************************************************
```

Boot Menu > Hard Disk Drives

```
                                Boot
*****************************************************************************************
* Hard Disk Drives                                        * Specifies the boot      *
* ******************************************************* * sequence from the       *
* 1st Drive                        [SATA 06C0 S00]        * available devices.      *
* 2nd Drive                        [SATA 06C4 S01]        *                          *
*                                                         *                          *
*                                                         *                          *
*                                                         *                          *
*                                                         *                          *
*                                                         *                          *
*                                                         *                          *
*                                                         *                          *
*                                                         *                          *
*                                                         * **    Select Screen      *
*                                                         * **    Select Item        *
*                                                         * +-    Change Option      *
*                                                         * F1    General Help       *
*                                                         * F10   Save and Exit      *
*                                                         * ESC   Exit               *
*                                                         *                          *
*****************************************************************************************
```

Boot Menu > Removable Drives

```
Boot
*****************************************************************************************
* Removable Drives                                        * Specifies the boot      *
* ******************************************************* * sequence from the       *
* 1st Drive                        [AMI Virtual Floppy]   * available devices.      *
*                                                         *                          *
*                                                         *                          *
*                                                         *                          *
*                                                         *                          *
*                                                         *                          *
```

```
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    * **    Select Screen    *
*                                                    * **    Select Item      *
*                                                    * +-    Change Option    *
*                                                    * F1    General Help     *
*                                                    * F10   Save and Exit    *
*                                                    * ESC   Exit             *
*                                                    *                        *
*                                                    *                        *
*********************************************************************************
```

Boot Menu > CD/DVD Drives

```
Boot
*********************************************************************************
* ATAPI CDROM Drives                                 * Specifies the boot    *
* ************************************************** * sequence from the     *
* 1st Drive                      [IOMEGA CDRW64892EX] * available devices.    *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    *                        *
*                                                    * **    Select Screen   *
*                                                    * **    Select Item     *
*                                                    * +-    Change Option   *
*                                                    * F1    General Help    *
*                                                    * F10   Save and Exit   *
*                                                    * ESC   Exit            *
*                                                    *                        *
*                                                    *                        *
*********************************************************************************
```

Security Settings Menu

```
Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit
*************************************************************************
* Security Settings                                * Install or Change the  *
* ************************************************ * password.              *
* Supervisor Password :Not Installed               *                        *
* User Password       :Not Installed               *                        *
*                                                  *                        *
* Change Supervisor Password                       *                        *
* Change User Password                             *                        *
* Clear User Password                              *                        *
*                                                  *                        *
* Boot Sector Virus Protection   [Disabled]        *                        *
*                                                  *                        *
*                                                  *                        *
*                                                  * **    Select Screen    *
*                                                  * **    Select Item      *
*                                                  * Enter Change           *
*                                                  * F1    General Help     *
*                                                  * F10   Save and Exit    *
*                                                  * ESC   Exit             *
*                                                  *                        *
*                                                  *                        *
*************************************************************************
```

Chipset Menu

Note – The Memory Chipkill option is enabled by default. Enabling Chipkill improves system reliability but degrades system performance under specific applications.

```
Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit
*************************************************************************
*                                                * Options for NB         *
```

```
* * NorthBridge Configuration                          *                          *
* * SouthBridge Configuration                          *                          *
*                                                      *                          *
*                                                      *                          *
*                                                      *                          *
*                                                      *                          *
*                                                      *                          *
*                                                      *                          *
*                                                      *                          *
*                                                      * **    Select Screen      *
*                                                      * **    Select Item        *
*                                                      * Enter Go to Sub Screen   *
*                                                      * F1    General Help       *
*                                                      * F10   Save and Exit      *
*                                                      * ESC   Exit               *
*                                                      *                          *
*                                                      *                          *
*******************************************************************************
```

Chipset Menu > NorthBridge Configuration

```
Chipset
*******************************************************************************
* NorthBridge Chipset Configuration                  *                         *
*****************************************************                          *
* * Memory Configuration                             *                         *
* * ECC Configuration                                 *                         *
* * IOMMU Option Menu                                 *                         *
* Power Down Control             [Auto]              *                         *
* ************************************************** *                         *
* Memory Timing Parameters       [CPU Node 0]        *                         *
*   Memory CLK             :200 MHz                  *                         *
*   CAS Latency(Tcl)       :3.0                      *                         *
*   RAS/CAS Delay(Trcd)    :3 CLK                    *                         *
*   Min Active RAS(Tras)   :8 CLK                    *                         *
*   Row Precharge Time(Trp):3 CLK                    * **    Select Screen      *
*   RAS/RAS Delay(Trrd)    :2 CLK                    * **    Select Item        *
*   Row Cycle (Trc)        :11 CLK                   * Enter Go to Sub Screen   *
*   Row Refresh Cycle(Trfc):13 CLK                   * F1    General Help       *
*   Read Write Delay(Trwt) :3 CLK                    * F10   Save and Exit      *
*   Read Preamble          :7.0 ns                   * ESC   Exit               *
```

```
*   Asynchronous Latency   :8 ns                          *                          *
*                                                         *                          *
*************************************************************************************
```

Chipset Menu > NorthBridge Memory Configuration

```
Chipset
*************************************************************************************
* Memory Configuration                                   * MEMCLK can be set       *
* ************************************************** * by the code using       *
* Memclock Mode                  [Auto]                  * AUTO, or if you use     *
* MCT Timing Mode                [Auto]                  * LIMIT, you can set      *
* User Config Mode               [Auto]                  * one of the standard     *
* Bank Interleaving              [Auto]                  * values.                 *
* Burst Length                   [4 Beats]               *                         *
* Enable Clock to All DIMMs      [Disabled]              *                         *
* SoftWare Memory Hole           [Disabled]              *                         *
* HardWare Memory Hole           [Disabled]              *                         *
* Node Interleaving              [Disabled]              *                         *
*                                                        *                         *
*                                                        * **    Select Screen    *
*                                                        * **    Select Item      *
*                                                        * +-    Change Option    *
*                                                        * F1    General Help     *
*                                                        * F10   Save and Exit    *
*                                                        * ESC   Exit             *
*                                                        *                         *
*                                                        *                         *
*************************************************************************************
```

Chipset Menu > NorthBridge ECC Configuration

```
                                                      Chipset
*************************************************************************************
* ECC Configuration                                     * DRAM ECC allows         *
* ************************************************** * hardware to report      *
* DRAM ECC Enable                [Enabled]               * and correct memory      *
*   MCA DRAM ECC Logging         [Enabled]               * errors automatically    *
*   ECC Chip Kill                [Enabled]               * maintaining system      *
*   DRAM SCRUB REDIRECT          [Disabled]              * integrity.              *
```

```
*   DRAM BG Scrub                [327.7us]          *                        *
* L2 Cache BG Scrub              [ 10.2us]          *                        *
* Data Cache BG Scrub            [ 5.12us]          *                        *
*                                                   *                        *
*                                                   *                        *
*                                                   *                        *
*                                                   * **    Select Screen    *
*                                                   * **    Select Item      *
*                                                   * +-    Change Option    *
*                                                   * F1    General Help     *
*                                                   * F10   Save and Exit    *
*                                                   * ESC   Exit             *
*                                                   *                        *
*                                                   *                        *
*****************************************************************************
```

Chipset Menu > NorthBridge IOMMU Configuration

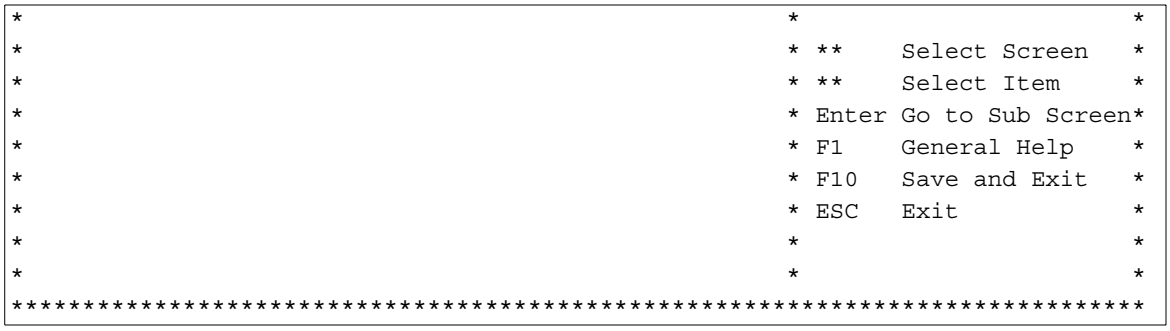
```
                                                  Chipset
*****************************************************************************
* IOMMU MODE          [AGP Present]                 * Set GART size in,      *
*                                                   * systems without AGP,   *
*                                                   * or disable altogether. *
*                                                   * Some OSes require      *
*                                                   * valid GART for proper  *
*                                                   * operation.  If AGP is  *
*                                                   * present, select        *
*                                                   * appropriate option to  *
*                                                   * ensure proper AGP      *
*                                                   * operation.             *
*                                                   *                        *
*                                                   *                        *
*                                                   * **    Select Screen    *
*                                                   * **    Select Item      *
*                                                   * +-    Change Option    *
*                                                   * F1    General Help     *
*                                                   * F10   Save and Exit    *
*                                                   * ESC   Exit             *
*                                                   *                        *
*                                                   *                        *
*****************************************************************************
```

Chipset Menu > SouthBridge Configuration

```
                                                    Chipset
*******************************************************************************
* South Bridge Chipset Configuration                * Enable/disable         *
* ********************************************** * SMBUS 2.0 Controller   *
* 2.0 SM Bus Controller          [Enabled]          * in South Bridge        *
* Restore on AC/Power Loss       [Last State]       *                        *
* Power Button Behavior          [Instant Off]      *                        *
*                                                   *                        *
* HT Link 0 P-Comp Mode          [Auto]             *                        *
* HT Link 0 N-Comp Mode          [Auto]             *                        *
* HT Link 0 RZ-Comp Mode         [Auto]             *                        *
*                                                   *                        *
*                                                   *                        *
*                                                   *                        *
*                                                   * **    Select Screen    *
*                                                   * **    Select Item      *
*                                                   * +-    Change Option    *
*                                                   * F1    General Help     *
*                                                   * F10   Save and Exit    *
*                                                   * ESC   Exit             *
*                                                   *                        *
*                                                   *                        *
*******************************************************************************
```

Exit Options Menu

```
  Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit
*******************************************************************************
* Exit Options                                      * Exit system setup     *
* ********************************************** * after saving the      *
* Save Changes and Exit                             * changes.               *
* Discard Changes and Exit                          *                        *
* Discard Changes                                   * F10 key can be used    *
*                                                   * for this operation.    *
* Load Optimal Defaults                             *                        *
* Load Failsafe Defaults                            *                        *
*                                                   *                        *
*                                                   *                        *
*                                                   *                        *
```


** Select Screen
** Select Item
Enter Go to Sub Screen
F1 General Help
F10 Save and Exit
ESC Exit

APPENDIX **F**

BIOS POST codes

This appendix describes the BIOS Power-On Self-Test (POST) codes. It contains the following sections:

Introduction to POST

The system BIOS provides a rudimentary power-on self-test. The basic devices required for the appliance to operate are checked, memory is tested, the Marvell disk controller and attached disks in slot 0 and slot 1 are probed and enumerated, and the two Intel Gigabit Ethernet controllers are initialized.

During the memory test, the first megabyte of DRAM is tested by the BIOS before the BIOS code is shadowed (that is, copied from ROM to DRAM). Once executing out of DRAM, the BIOS performs a simple memory test (a write/read of every location with the pattern `55aa55aa`). The BIOS polls the memory controllers for both correctable and uncorrectable memory errors and logs those errors into the service processor. Memory tests can take several minutes (you can abort the memory test and continue with POST by pressing any key).

The progress of the self-test is indicated by a series of POST codes. These codes are displayed at the lower-right hand corner of the system's VGA screen (once the self-test has progressed far enough to initialize the video monitor). However, the codes

are displayed as the self-test runs and scroll off the screen too quickly to be read. An alternate method of displaying the POST codes is to redirect the output of the console to a serial port (see "Redirecting console output" on page 146).

The message `BMC Responding` is displayed at the end of POST.

Note – This memory test is performed only if Quick Boot is *not* enabled from the Boot Settings Configuration screen. Enabling Quick Boot causes the BIOS to skip the memory test. See "Changing POST options" on page 147 for more information.

Viewing POST output

To view BIOS POST output, you must redirect system console output to the ILOM service processor. VTL Value appliances ship with console output redirected. But, if necessary, you can redirect it yourself using the procedure below.

▼ Redirecting console output

1. **Initialize the BIOS Setup utility by pressing the `F2` key while the system is performing the power-on self-test (POST).**

   The BIOS Main Menu screen appears.

2. **Select `Advanced`.**

   The `Advanced Settings` screen appears.

3. **Select `IPMI 2.0 Configuration`.**

   The `IPMI 2.0 Configuration` screen appears.

4. **Select the `LAN Configuration` menu item.**

5. **Select the `IP Assignment` option that you want to use (`DHCP` or `Static`).**

6. **If you chose `DHCP`, the appliance's IP address is retrieved from your network's DHCP appliance and displayed in following format:**

   `Current IP address in BMC : xxx.xxx.xxx.xxx`

7. **If you choose `Static`, type the IP address in the `IP Address` field, enter the subnet mask and default gateway settings in their respective fields, select `Commit`, and press `Return` to make the changes.**

   Select `Refresh` and press `Return` to see your new settings displayed in the `Current IP address in BMC` field.

8. **To view BIOS POST output, log in to an ILOM remote console session and restart the appliance. For instructions, see the following:**
   - "Logging in to the ILOM" on page 4
   - "Accessing the Solaris operating system via the ILOM" on page 4.

Changing POST options

These instructions are optional, but you can use them to change the operations that the appliance performs during POST testing.

1. **Initialize the BIOS Setup utility by pressing the** `F2` **key while the system is performing the POST.**

   The `BIOS Main Menu` screen appears.

2. **Select the** `Boot` **menu.**

3. **From the** `Boot Settings` **screen, select** `Boot Settings Configuration`**.**

   The `Boot Settings Configuration screen` appears.

4. **Select one or more of the following options:**

Option	Description
`Quick Boot`	This option causes the system to boot faster by skipping certain tests, such as the extensive memory test.
`System Configuration Display`	This option causes the system to display the system configuration screen before booting begins.
`Quiet Boot`	This option causes the system to display the Sun Microsystems logo instead of POST codes.
`Language`	This option is reserved for future use. Do not change.
`Add On ROM Display Mode`	When Quiet Boot is enabled, this option controls whether output from the Option ROM is displayed: • Force BIOS (default): Remove the Sun logo and display Option ROM output • Keep Current: Display the Sun logo and do not display Option ROM output.
`Boot Num-Lock`	This option controls how the system sets the keyboard Num-Lock during boot. Turn this option On to set the Num-Lock On (default) or Off to turn the Num-Lock Off.

Option	Description
Wait for F1 if Error	Enabling this option causes the system to pause the POST if it encounters an error, and wait for an operator to press the F1 key before resuming. The default of Off.
Interrupt 19 Capture	This option is reserved for future use. Do not change.
Default Boot Order	The letters in the brackets represent the boot devices. To see the letters defined, position your cursor over the field and read the definition on the right side of the screen.

POST codes

The table below lists the POST codes in the order in which they are generated. Each four-digit code combines two digits from secondary I/O port 81 followed by two digits from primary I/O port 80.

Code	Description
00d0	Coming out of POR, PCI configuration space initialization, enabling 8111's SMBus.
00d1	Keyboard controller BAT, waking up from PM, saving power-on CPUID in scratch CMOS.
00d2	Disable cache, full memory sizing, and verify that flat mode is enabled.
00d3	Memory detections and sizing in boot block, cache disabled, IO APIC enabled.
01d4	Test base 512 KB memory. Adjust policies and cache first 8MB.
01d5	Boot block code is copied from ROM to lower RAM. BIOS is now executing out of RAM.
01d6	Key sequence and OEM specific method is checked to determine if BIOS recovery is forced. If next code is E0, BIOS recovery is being executed. Main BIOS checksum is tested.
01d7	Restoring CPUID; moving boot block-runtime interface module to RAM; determine whether to execute serial flash.
01d8	Decompressing runtime module into RAM. Storing CPUID information in memory.
01d9	Copying main BIOS into memory.
01da	Giving control to BIOS POST.
0004	Check CMOS diagnostic byte to determine if battery power is OK and CMOS checksum is OK. If the CMOS checksum is bad, update CMOS with power-on default values.

Code	Description
00c2	Set up boot strap processor for POST. This includes frequency calculation, loading BSP microcode, and applying user requested value for GART Error Reporting setup question.
00c3	Errata workarounds applied to the BSP (#78 & #110).
00c5	Enumerate and set up application processors. This includes microcode loading, and workarounds for errata (#78, #110, #106, #107, #69, #63).
00c6	Re-enable cache for boot strap processor, and apply workarounds in the BSP for errata #106, #107, #69, and #63 if appropriate.
00c7	HT sets link frequencies and widths to their final values.
000a	Initializing the 8042 compatible Keyboard Controller.
000c	Detecting the presence of keyboard in KBC port.
000e	Testing and initialization of input devices. Traps the INT09h vector, so that the POST INT09h handler gets control for IRQ1.
8600	Preparing CPU for booting to OS by copying all the context of the BSP to all application processors present. NOTE: APs are left in the CLI HLT state.
de00	Preparing CPU for booting to OS by copying all the context of the BSP to all application processors present. NOTE: APs are left in the CLI HLT state.
8613	Initialize PM regs and PM PCI regs at Early-POST. Initialize multi-host bridge, if system supports it. Setup ECC options before memory clearing. Enable PCI-X clock lines in the 8131.
0024	Decompress and initialize any platform specific BIOS modules.
862a	BBS ROM initialization.
002a	Generic Device Initialization Manager (DIM) - Disable all devices.
042a	ISA PnP devices - Disable all devices.
052a	PCI devices - Disable all devices.
122a	ISA devices - Static device initialization.
152a	PCI devices - Static device initialization.
252a	PCI devices - Output device initialization.
202c	Initializing devices. Detecting and initializing the video adapter installed in the system that have optional ROMs.
002e	Initializing all the output devices.
0033	Initializing the silent boot module. Set the window for displaying text information.
0037	Displaying sign-on message, CPU information, setup key message, and any OEM-specific information.

Code	Description
4538	PCI devices - IPL device initialization.
5538	PCI devices - General device initialization.
8600	Preparing CPU for booting to OS by copying all the context of the BSP to all application processors present. NOTE: APs are left in the CLI HLT state.

POST code checkpoints

The table below lists POST code checkpoints during the POST portion of the BIOS. These two-digit checkpoints are the output of primary I/O port 80.

Checkpoint	Description
03	Disable NMI, Parity, video for EGA, and DMA controllers. At this point, POST code is still executing out of BIOS ROM.
04	Check CMOS diagnostic byte to determine if battery power is OK and CMOS checksum is OK. Verify CMOS checksum manually by reading storage area. If the CMOS checksum is bad, update CMOS with power-on default values and clear passwords. Initialize status register A. Initializes data variables that are based on CMOS setup questions. Initializes both the 8259 compatible PICs in the system.
05	Initializes the interrupt controlling hardware (generally PIC) and interrupt vector table.
06	Do R/W test to CH-2 count register. Initialize CH-0 as system timer. Install the POSTINT1Ch handler. Enable IRQ-0 in PIC for system timer interrupt. Traps INT1Ch vector to POSTINT1ChHandlerBlock.
C0	Early CPU Init Start-Disable Cache-Init Local APIC.
C1	Set up boot strap processor information.
C2	Set up boot strap processor for POST. This includes calculating the frequency, loading BSP microcode, and applying user-requested value for GART Error Reporting setup question.
C3	Errata workarounds applied to the BSP (#78 & #110).
C5	Enumerate and set up application processors. This includes microcode loading, and workarounds for errata (#78, #110, #106, #107, #69, #63).
C6	Re-enable cache for boot strap processor, and apply workarounds in the BSP for errata #106, #107, #69, and #63 if appropriate. In case of mixed CPU steppings, errors are sought and logged, and an appropriate frequency for all CPUs is found and applied. NOTE: APs are left in the CLI HLT state.

Checkpoint	Description
C7	The HT sets link frequencies and widths to their final values. This routine gets called after CPU frequency has been calculated to prevent bad programming.
0A	Initializes the 8042 compatible keyboard controller.
0B	Detects the presence of PS/2 mouse.
0C	Detects the presence of keyboard in KBC port.
0E	Testing and initialization of input devices. Also, update the kernel variables. Traps the INT09h vector, so that the POST INT09h handler gets control for IRQ1. Decompress all available language, BIOS logo, and Silent logo modules.
13	Initialize PM regs and PM PCI regs at Early-POST. Initialize multi-host bridge, if system supports it. Set up ECC options before clearing memory. REDIRECTION causes corrected data to written to RAM immediately. CHIPKILL provides 4-bit error det/corr of x4 type memory. Enable PCI-X clock lines in the 8131.
20	Relocate all the CPUs to a unique SMBASE address. The BSP will be set to have its entry point at A000:0. If fewer than five CPU sockets are present on a board, subsequent CPUs entry points are separated by 8000h bytes. If more than four CPU sockets are present, entry points are separated by 200h bytes. CPU module is responsible for the relocation of the CPU to correct address. NOTE: APs are left in the INIT state.
24	Decompress and initialize any platform-specific BIOS modules.
30	Initialize System Management Interrupt.
2A	Initializes various devices through DIM.
2C	Initializes various devices. For all devices, assigns resources and initializes option ROM if required.
2E	Initializes all the output devices.
31	Allocate memory for ADM module and decompress it. Give control to ADM module for initialization. Initialize language and font modules for ADM. Activate ADM module.
33	Initializes the silent boot module. Set the window for displaying text information.
37	Displaying sign-on message, CPU information, setup key message, and any OEM-specific information.
38	Initializes various devices through DIM.
39	Initializes DMAC-1 and DMAC-2.
3A	Initialize RTC date/time.
3B	Test for total memory installed in the system. Also, check for DEL or ESC keys to limit memory test. Display total memory in the system.

Checkpoint	Description
3C	By this point, RAM read/write test and the memory controller programming are complete.
40	Detect various devices (parallel ports, serial ports, and coprocessor in CPU, etc.) successfully installed in the system and update the BDA, EBDA, etc.
50	Programming the memory hole or any kind of implementation that needs an adjustment in system RAM size if necessary.
52	Updates CMOS memory size from memory found in memory test. Allocates memory for Extended BIOS Data Area from base memory.
60	Initializes NUM-LOCK status and programs the keyboard.
75	Initialize Int-13 and prepare for IPL detection.
78	Initializes IPL devices controlled by BIOS and option ROMs.
7A	Initializes remaining option ROMs.
7C	Generate and write contents of ESCD in NVRam.
84	Log errors encountered during POST.
85	Display errors to the user and receives the user responses.
87	Execute BIOS setup if needed/requested.
8C	After all device initialization is done, programmed any user-selectable parameters relating to NB/SB, such as timing parameters, noncacheable regions and the shadow RAM cacheability, and do any other NB/SB/PCIX/OEM-specific programming necessary during late-POST. Background scrubbing for DRAM, and L1 and L2 caches are set up based on setup questions. Get the DRAM scrub limits from each node. Workaround for erratum #101 is applied here.
8D	Build ACPI tables (if ACPI is supported).
8E	Program the peripheral parameters. Enable/Disable NMI as selected.
90	Late POST initialization of system management interrupt.
A0	Check boot password if installed.
A1	Clean-up work required before booting to OS.
A2	Takes care of runtime image preparation for various BIOS modules. Fill the free area in F000h segment with 0FFh. Initializes the Microsoft IRQ Routing Table. Prepares the runtime language module. Disables the system configuration display if required.
A4	Initialize runtime language module.
A7	Displays the system configuration screen if enabled. Initialize the CPUs before boot, which includes the programming of the MTRRs.
A8	Prepare CPU for OS boot including final MTRR values.

Checkpoint	Description
A9	Wait for user input at config display if required.
AA	Uninstall POST INT1Ch vector and INT09h vector. Deinitializes the ADM module.
AB	Prepare BBS for Int 19 boot.
AC	Any kind of chipset (NB/SB)-specific programming required during end-POST, just before giving control to runtime code booting to OS. Programmed the system BIOS (0F0000h shadow RAM) cacheability. Ported to handle any OEM specific programming required during end-POST. Copy OEM-specific data from POST_DSEG to RUN_CSEG.
B1	Save system context for ACPI.
00	Prepares CPU for booting to OS by copying all of the context of the BSP to all application processors present. NOTE: APs are left in the CLIHLT state.
61-70	OEM POST Error. This range is reserved for chipset vendors and system manufacturers. The error associated with this value may be different from one platform to the next.

APPENDIX **G**

Status Indicator LEDs

This appendix describes the status and fault LEDs on the appliance. The information is organized to describe external LEDs that can be viewed on the outside of the appliance, and internal LEDs that can be viewed only with the main cover removed.

This appendix contains the following sections:

External LEDs

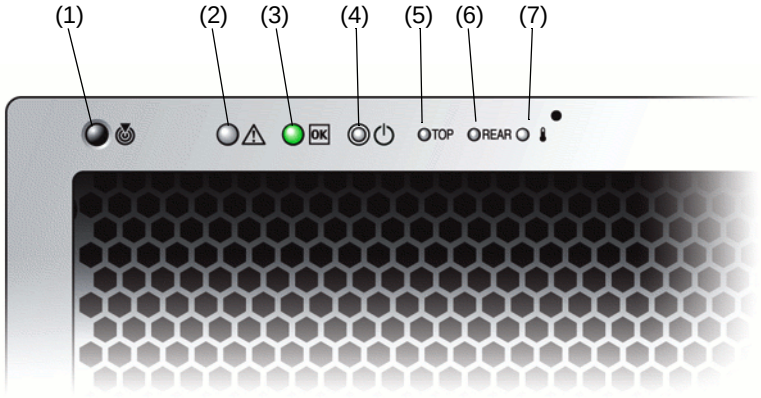
The table below lists the external LEDs that are located on the front and rear panels of the appliance.

Name	Color	Function
Enclosure Status - Front and rear panels		
Locate (LED and switch)	White	Operators can turn this LED ON remotely to help them locate the appliance in a crowded appliance room. Press to turn on or off. Pressing the Locate LED/Switch for five seconds turns all indicators on for 15 seconds.
Fault	Amber	Alert/Service action is required.
Power	Green	Steady = Power is on. Blink = Standby power is on but main power is off. Off = Power is off.
Supplemental Enclosure Status - Front panel only		
Top Failure	Amber	On = HDD or fan fault.

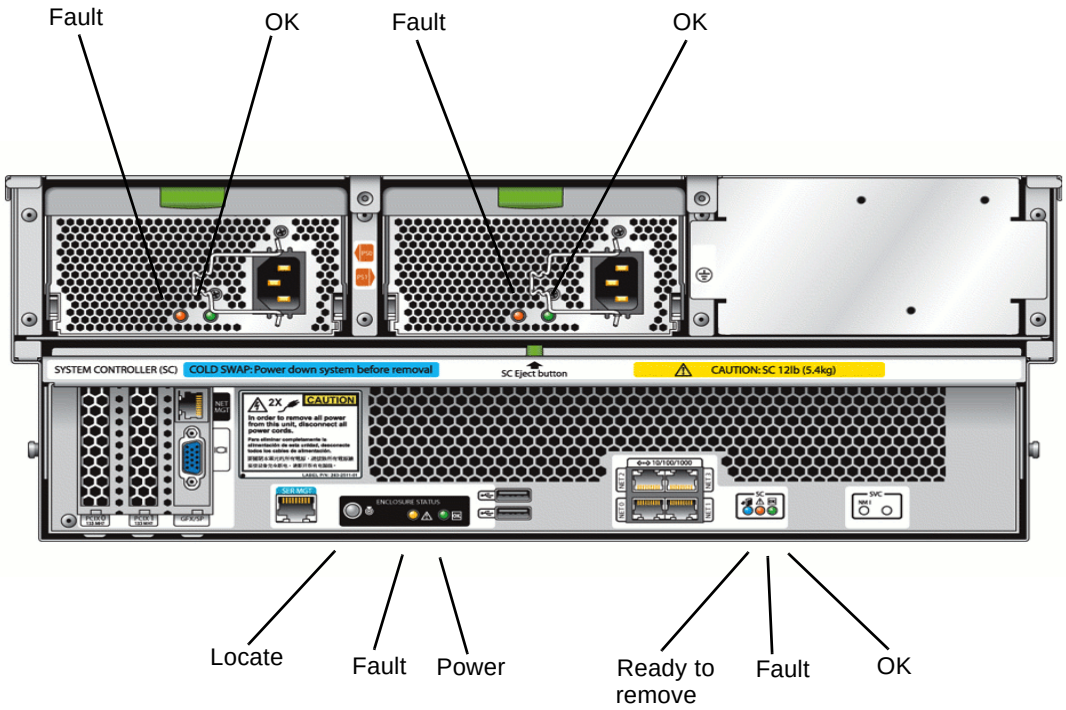
Name	Color	Function
Rear Failure	Amber	On = Power supply, or system controller fault (service is required).
System Over Temperature	Amber	System over temperature.
SC Status - Rear panel		
Ready to Remove	Blue	Service action allowed.
Fault	Amber	Service action required.
OK	Green	Operational. No action required.
Power Supply Status - Rear panel. One set per power supply		
Fault	Amber	Service action required.
OK	Green	Solid = AC and DC OK. Slow blink = AC OK.

The figure below depicts the appliance front panel:

(1) Locate button/LED
(2) System failure LED
(3) Power/OK LED (system power)
(4) System power On/Off button
(5) Top failure LED (hard disk drive or fan fault)
(6) Rear (Power supply or system controller fault)
(7) System over temperature



The rear panel is shown below:



Internal LEDs

The table below lists the internal LEDs that display the status of disk drives, fan trays, and PCI slots.

Component	LED color	Component status	Explanation
Disk drive	green	OK	The disk drive is operating normally.
	amber	Faulty	The disk drive has to be replaced.
	blue	Ready to remove	The hot-pluggable disk drive has been unconfigured and can be removed safely.

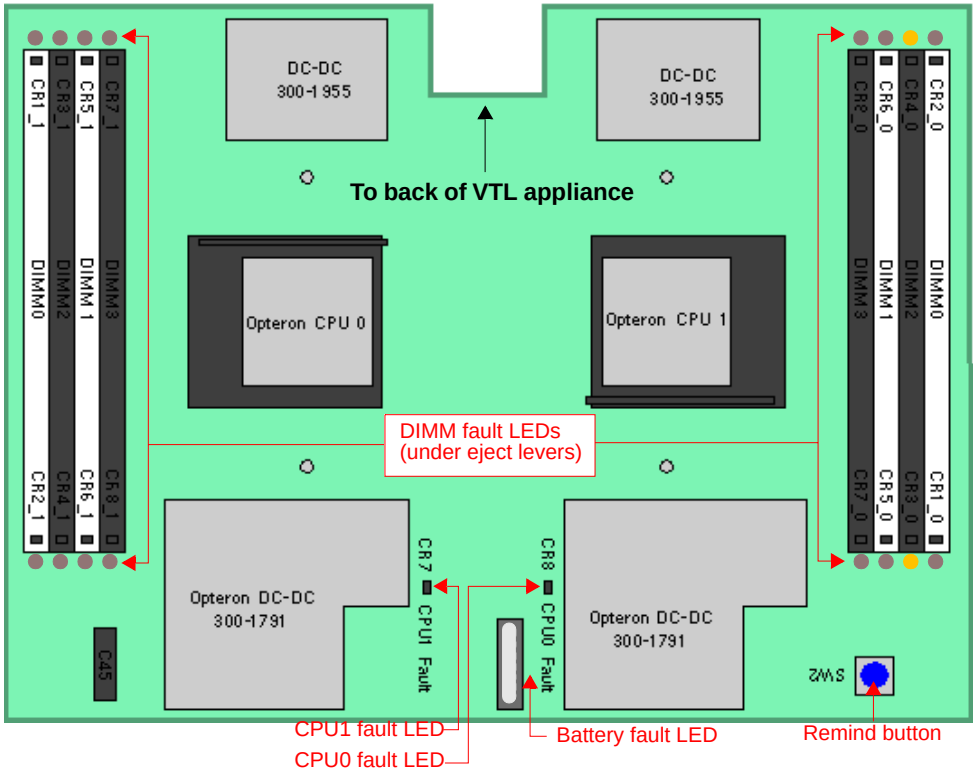
*These capacitor-powered LEDs are activated by pushing a button on the system board.

Component	LED color	Component status	Explanation
Fan module	green	OK	Both of the fans in the fan module are operating normally.
	amber	Faulty	Fault (Service action required)
	amber + green	Degraded	One of the two fans in the module has failed.
	blue (if present)	OK	Not significant. Hot-swappable fan modules can always be removed.
DIMM*	amber/blinking	Faulty	The system has detected a memory module fault. Restart the system to clear the indicator.
CPU*	amber/blinking	Faulty	The system has detected a CPU fault. Restart the system to clear the indicator.
Battery*	amber/blinking	Faulty	The system has detected a battery problem. Restart service processor to clear the indicator.

*These capacitor-powered LEDs are activated by pushing a button on the system board.

CPU Board LEDs

The CPU LEDs are active only when the Remind button is depressed. They blink to indicate a failure; otherwise they are OFF. The figure below illustrates the locations of the LEDs and the activation (remind) button.



GRASP assembly power indicator LED

The GRASP board has one power indicator LED:

LED color	Status	Explanation
green	ON	3.3-V standby power is reaching the GRASP board.
green	OFF	3.3-V standby power is disconnected.

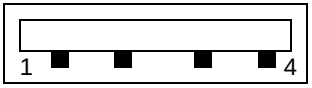
APPENDIX **H**

Connector pinouts

This appendix contains pinout information for the following connectors:

USB connector

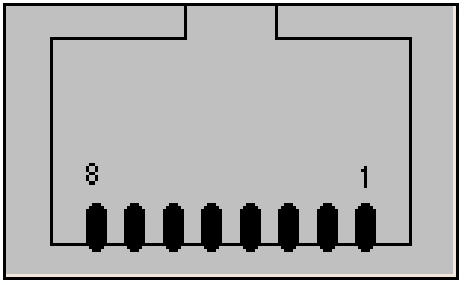
The USB connector pins and their corresponding descriptions are shown in the figure and table in this section.



Pin	Pin Name	Description
1	+5V	+5V supply
2	Data-	Negative side of differential for data
3	Data+	Positive side of differential for data
4	Gnd	Ground

Serial connector

The RJ-45 serial connector pins and their corresponding descriptions are shown in the figure and table in this section.

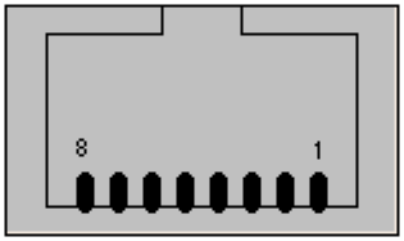


Pin	Pin Name	Description
1	RTS	Ready to send
2	DTR	Data terminal ready
3	TXD	Transmit data
4	GND	Ground
5	GND	Ground

Pin	Pin Name	Description
6	RXD	Receive data
7	DCD/DSR	Data set ready
8	CTS	Clear to send

10/100BASE-T connector

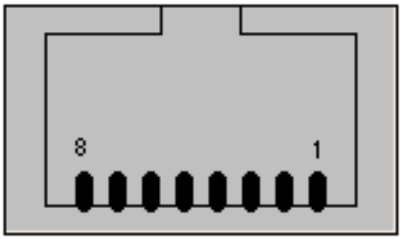
The RJ-45 10/100BASE-T connector pins and their corresponding descriptions are shown in the figure and table in this section.



Pin	Pin Name	Description
1	TX+	Positive side of transmit data
2	TX-	Negative side of transmit data
3	RX+	Positive side of receive data
4	NC	No connect
5	NC	No connect
6	RX-	Negative side of receive data
7	NC	No connect
8	NC	No connect

10/100/1000BASE-T connector

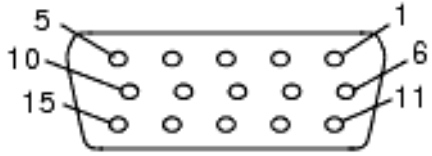
The RJ45 10/100/1000BASE-T connector pins and their corresponding descriptions are shown in the figure and table in this section.



Pin	Pin Name	Description
1	TP0+	Positive side of data pair 0
2	TP0-	Negative side of data pair 0
3	TP1+	Positive side of data pair 1
4	TP2+	Positive side of data pair 2
5	TP2-	Negative side of data pair 2
6	TP1-	Negative side of data pair 1
7	TP3+	Positive side of data pair 3
8	TP3-	Negative side of data pair 3

VGA video connector

The VGA video connector pins and their corresponding descriptions are shown in the figure and table in this section.



Pin	Pin Name	Description
1	RED	Red video
2	GRN	Green video
3	BLU	Blue video
4	ID2	ID2 (ground)
5	GND	Ground
6	R_GND	Red video return (ground)
7	G_GND	Green video return (ground)
8	B_GND	Blue video return (ground)
9	KEY	No pin
10	S_GND	Sync return (ground)
11	ID0	ID0 (ground)
12	ID1/SDA	ID1 (no connect)
13	HSYNC	Horizontal sync
14	VSYNC	Vertical sync
15	ID3/SCL	ID3 (no connect)

I/O-to-disk backplane connectors

There are three connectors between the I/O and disk backplane:

- Power Blade Connector, J23 to J50.
- High-Speed Dock Connector, J24 to J49
- High-Speed Dock Connector, J25 to J51.

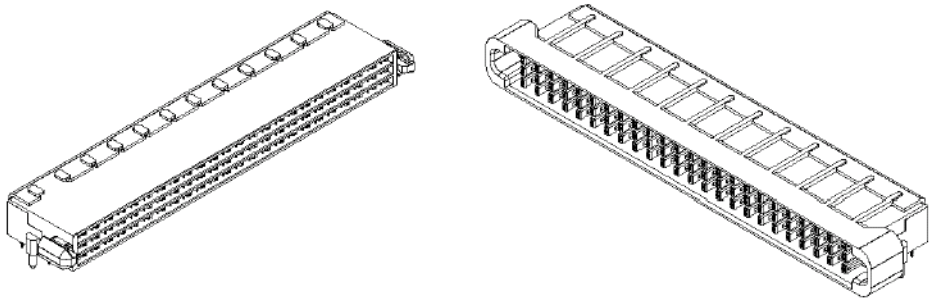
Power Blade Connector

This connector has ten blades and 20 signal pins, with a 30-A limit per blade.

Pin	Pin Name	Pin	Pin Name	Pin	Pin Name	Pin	Pin Name
A1	FAN4_CTL0	B1	FAN4_CTL0	C1	FAN4_CTL1	D1	FAN4_CTL1
A2	FAN3_CTL0	B2	FAN3_CTL0	C2	FAN3_CTL1	D2	FAN3_CTL1
A3	FAN2_CTL0	B3	FAN2_CTL0	C3	FAN2_CTL1	D3	FAN2_CTL1
A4	FAN1_CTL0	B4	FAN1_CTL0	C4	FAN1_CTL1	D4	FAN1_CTL1
A5	FAN0_CTL0	B5	FAN0_CTL0	C5	FAN0_CTL1	D5	FAN0_CTL1
Blade 1							5V_DISK
Blade 2							5V_DISK
Blade 3							GND
Blade 4							GND
Blade 5							GND
Blade 6							+12V
Blade 7							GND
Blade 8							+12V
Blade 9							Gnd
Blade 10							+12V

High-Speed Dock Connector, J24 to J49

The figure and table below describe the high-speed dock connector J24 to J49.

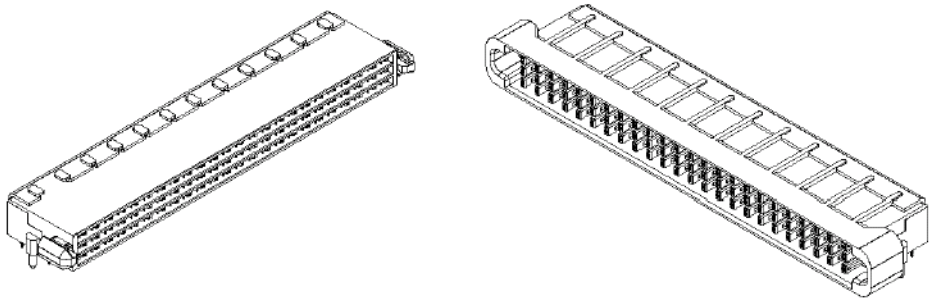


Pin	Pin Name	Pin	Pin Name	Pin	Pin Name
A1	FRONT_USB_P	B1	SHORT_PIN1	C1	POWER_BUTTON_L
A2	FRONT_USB_N	B2	P3_3V	C2	LOCATE_BUTTON_L
A3	5V_AUX	B3	5V_AUX	C3	P5V
A4	PS2_BATT_L	B4	GND	C4	GND
A5	DISK36_TX_P	B5	DISK36_RX_N	C5	DISK24_TX_P
A6	DISK36_TX_N	B6	DISK36_RX_P	C6	DISK24_TX_N
A7	DISK24_RX_N	B7	DISK12_TX_P	C7	DISK12_RX_N
A8	DISK24_RX_P	B8	DISK12_TX_N	C8	DISK12_RX_P
A9	DISK36_ACT_LED_L	B9	DISK24_ACT_LED_L	C9	DISK12_ACT_LED_L
A10	DISK13_ACT_LED_L	B10	DISK1_ACT_LED_L	C10	DISK0_ACT_LED_L
A11	DISK0_TX_P	B11	DISK0_RX_N	C11	DISK1_RX_P
A12	DISK0_TX_N	B12	DISK0_RX_P	C12	DISK1_RX_N
A13	DISK1_TX_N	B13	DISK13_RX_P	C13	DISK13_TX_N
A14	DISK1_TX_P	B14	DISK13_RX_N	C14	DISK13_TX_P
A15	DISK25_RX_P	B15	DISK25_TX_N	C15	DISK37_RX_P
A16	DISK25_RX_N	B16	DISK25_TX_P	C16	DISK37_RX_N
A17	DISK37_TX_N	B17	DISK2_RX_P	C17	DISK2_TX_N
A18	DISK37_TX_P	B18	DISK2_RX_N	C18	DISK2_TX_P
A19	DISK25_ACT_LED_L	B19	DISK37_ACT_LED_L	C19	DISK2_ACT_LED_L
A20	DISK38_ACT_LED_L	B20	DISK26_ACT_LED_L	C20	DISK14_ACT_LED_L
A21	DISK14_RX_P	B21	DISK14_TX_N	C21	DISK26_RX_P

Pin	Pin Name	Pin	Pin Name	Pin	Pin Name
A22	DISK14_RX_N	B22	DISK14_TX_P	C22	DISK26_RX_N
A23	DISK26_TX_N	B23	DISK38_RX_P	C23	DISK38_TX_N
A24	DISK26_TX_P	B24	DISK38_RX_N	C24	DISK38_TX_P
A25	DISK3_RX_P	B25	DISK3_TX_N	C25	DISK15_RX_P
A26	DISK3_RX_N	B26	DISK3_TX_P	C26	DISK15_RX_N
A27	DISK15_TX_N	B27	DISK27_RX_P	C27	DISK27_TX_N
A28	DISK15_TX_P	B28	DISK27_RX_N	C28	DISK27_TX_P
A29	DISK3_ACT_LED_L	B29	DISK15_ACT_LED_L	C29	DISK27_ACT_LED_L
A30	DISK16_ACT_LED_L	B30	DISK4_ACT_LED_L	C30	DISK39_ACT_LED_L
A31	DISK39_RX_P	B31	DISK39_TX_N	C31	DISK4_RX_P
A32	DISK39_RX_N	B32	DISK39_TX_P	C32	DISK4_RX_N
A33	DISK4_TX_N	B33	DISK16_RX_P	C33	DISK16_TX_N
A34	DISK4_TX_P	B34	DISK16_RX_N	C34	DISK16_TX_P
A35	DISK28_RX_P	B35	DISK28_TX_N	C35	DISK40_RX_P
A36	DISK28_RX_N	B36	DISK28_TX_P	C36	DISK40_RX_N
A37	DISK40_TX_N	B37	DISK5_RX_P	C37	DISK5_TX_N
A38	DISK40_TX_P	B38	DISK5_RX_N	C38	DISK5_TX_P
A39	DISK28_ACT_LED_L	B39	DISK40_ACT_LED_L	C39	DISK5_ACT_LED_L
A40	DISK41_ACT_LED_L	B40	DISK29_ACT_LED_L	C40	DISK17_ACT_LED_L
A41	DISK17_RX_P	B41	DISK17_TX_N	C41	DISK29_RX_P
A42	DISK17_RX_N	B42	DISK17_TX_P	C42	DISK29_RX_N
A43	DISK29_TX_N	B43	DISK41_RX_P	C43	DISK41_TX_N
A44	DISK29_TX_P	B44	DISK41_RX_N	C44	DISK41_TX_P
A45	3_3AUX_IN	B45	3_3AUX_IN	C45	3_3AUX_IN
A46	GND	B46	5V_DISK_SENSE_N	C46	GND
A47	3_3_AUX_SENSE_P	B47	5V_DISK_SENSE_P	C47	SP_I2C_CLK
A48	3_3_AUX_SENSE_N	B48	MAMMOTH_INT_L	C48	SP_I2C_DAT

High-Speed Dock Connector, J25 to J51

The figure and table below describe the high-speed dock connector J25 to J51.



Pin	Pin Name	Pin	Pin Name	Pin	Pin Name
A1	12V_SENSE_P	B1	3_3AUX_POWERGOOD	C1	VDD_RTC
A2	12V_SENSE_N	B2	PS1_ENABLE_L	C2	PS0_ENABLE_L
A3	DISK6_RX_P	B3	DISK6_TX_N	C3	DISK18_RX_P
A4	DISK6_RX_N	B4	DISK6_TX_P	C4	DISK18_RX_N
A5	DISK18_TX_N	B5	DISK30_RX_P	C5	DISK30_TX_N
A6	DISK18_TX_P	B6	DISK30_RX_N	C6	DISK30_TX_P
A7	DISK6_ACT_LED_L	B7	DISK18_ACT_LED_L	C7	DISK30_ACT_LED_L
A8	DISK19_ACT_LED_L	B8	DISK7_ACT_LED_L	C8	DISK42_ACT_LED_L
A9	DISK42_RX_P	B9	DISK42_TX_N	C9	DISK7_RX_P
A10	DISK42_RX_N	B10	DISK42_TX_P	C10	DISK7_RX_N
A11	DISK7_TX_N	B11	DISK19_RX_P	C11	DISK19_TX_N
A12	DISK7_TX_P	B12	DISK19_RX_N	C12	DISK19_TX_P
A13	DISK31_RX_P	B13	DISK31_TX_N	C13	DISK43_RX_P
A14	DISK31_RX_N	B14	DISK31_TX_P	C14	DISK43_RX_N
A15	DISK43_TX_N	B15	DISK8_RX_P	C15	DISK8_TX_N
A16	DISK43_TX_P	B16	DISK8_RX_N	C16	DISK8_TX_P
A17	DISK31_ACT_LED_L	B17	DISK43_ACT_LED_L	C17	DISK8_ACT_LED_L
A18	DISK44_ACT_LED_L	B18	DISK32_ACT_LED_L	C18	DISK20_ACT_LED_L
A19	DISK20_RX_P	B19	DISK20_TX_N	C19	DISK32_RX_P
A20	DISK20_RX_N	B20	DISK20_TX_P	C20	DISK32_RX_N
A21	DISK32_TX_N	B21	DISK44_RX_P	C21	DISK44_TX_N

Pin	Pin Name	Pin	Pin Name	Pin	Pin Name
A22	DISK32_TX_P	B22	DISK44_RX_N	C22	DISK44_TX_P
A23	DISK9_RX_P	B23	DISK9_TX_N	C23	DISK21_RX_P
A24	DISK9_RX_N	B24	DISK9_TX_P	C24	DISK21_RX_N
A25	DISK21_TX_N	B25	DISK33_RX_P	C25	DISK33_TX_N
A26	DISK21_TX_P	B26	DISK33_RX_N	C26	DISK33_TX_P
A27	DISK9_ACT_LED_L	B27	DISK21_ACT_LED_L	C27	DISK33_ACT_LED_L
A28	DISK22_ACT_LED_L	B28	DISK10_ACT_LED_L	C28	DISK45_ACT_LED_L
A29	DISK45_RX_P	B29	DISK45_TX_N	C29	DISK10_RX_P
A30	DISK45_RX_N	B30	DISK45_TX_P	C30	DISK10_RX_N
A31	DISK10_TX_N	B31	DISK22_RX_P	C31	DISK22_TX_N
A32	DISK10_TX_P	B32	DISK22_RX_N	C32	DISK22_TX_P
A33	DISK34_RX_P	B33	DISK34_TX_N	C33	DISK46_RX_P
A34	DISK34_RX_N	B34	DISK34_TX_P	C34	DISK46_RX_N
A35	DISK46_TX_N	B35	DISK11_RX_P	C35	DISK11_TX_N
A36	DISK46_TX_P	B36	DISK11_RX_N	C36	DISK11_TX_P
A37	DISK34_ACT_LED_L	B37	DISK46_ACT_LED_L	C37	DISK11_ACT_LED_L
A38	DISK47_ACT_LED_L	B38	DISK35_ACT_LED_L	C38	DISK23_ACT_LED_L
A39	DISK23_RX_P	B39	DISK23_TX_N	C39	DISK35_RX_P
A40	DISK23_RX_N	B40	DISK23_TX_P	C40	DISK35_RX_N
A41	DISK35_TX_N	B41	DISK47_RX_P	C41	DISK47_TX_N
A42	DISK35_TX_P	B42	DISK47_RX_N	C42	DISK47_TX_P
A43	PS0_FAN_FAIL_L	B43	PS0_POWEROK	C43	PS1_POWEROK
A44	PS1_FAN_FAIL_L	B44	PS0_PRESENT_L	C44	PS2_POWEROK
A45	PS2_FAN_FAIL_L	B45	PS1_PRESENT_L	C45	PS0_FAIL
A46	PS0_VIN_GOOD_L	B46	PS2_PRESENT_L	C46	PS1_FAIL
A47	PS1_VIN_GOOD_L	B47	PS2_VIN_GOOD_L	C47	PS2_FAIL
A48	PS2_ENABLE_L	B48	SHORT_PIN4	C48	INTRUSION_SW

Power supply connector

The signal pins and power blades of the power supply connector are listed in the table below.

X,Y	1	2	3	4	5	6	7
D	3.3AUX	GND	12LS	Spare	SCL	A0	3.3 Vsb RS+
C	3.3AUX	GND	AC OK	+12V RS+	+12V RS-	A1	3.3 Vsb RS-
B	3.3AUX	GND	PSON	PSKILL	SDA	A2	Fan fail
A	3.3AUX	GND	PRESENT	PWOK	FAIL	ACL	Reserved

The power blades of the power supply connector are listed in the following table.

Pin	Function
P1	12VDC
P2	12VDC Return
P3	12VDC
P4	12VDC Return
P5	12VDC
P6	12VDC Return
P7	12VDC
P8	12VDC Return

Disk backplane to front indicator connector

The table below lists the pins for the 10-wire flex cable that connects the disk backplane to the indicator board.

Disk Backplane Pin	Pin Name	Front Indicator Board Pin
1	LOCATE_LED	10
2	LOCATE_BUTTON_L	9
3	ALERT_LED	8
4	POWER_LED	7
5	POWER_BUTTON_L	6
6	FAN_FAIL_LED	5
7	PS_FAIL_LED	4
8	OVERTEMP_LED	3
9	PRESENT_L (GND on front indicator board)	2
10	GND	1

Backplane To Disk Backplane Connector

The backplane to disk backplane connector has eight blades that support 30 amps each. It also has 30 signal pins. The tables below list for the signal pins.

Pin	Function
Blade 1	+12V
Blade 2	GND
Blade 3	+12V
Blade 4	GND
Blade 5	+12V

Pin	Function
Blade 6	GND
Blade 7	GND
Blade 8	GND

Pin	Pin Name	Pin	Pin Name
A1	3.3V AUX	C1	.3V AUX
A2	GND	C2	GND
A3	VDD_RTC	C3	SP_I2C_CLK
A4	INTRUSION_SW	C4	SP_I2C_DAT
A5	PS2_ENABLE_L	C5	PS2_BATT_L
A6	PS2_VIN_GOOD_L	C6	PS0_POWEROK
A7	PS2_POWEROK	C7	PS1_FAN_FAIL_L
A8	PS2_FAIL	C8	PS1_POWEROK
A9	PS2_FAN_FAIL_L	C9	PS1_PRESENT_L
B1	3.3V AUX	D1	3.3V AUX
B2	GND	D2	GND
B3	PS0_FAN_FAIL_L	D3	3_3_AUX_SENSE_P
B4	NC	D4	3_3_AUX_SENSE_N
B5	PS2_PRESENT_L	D5	PS0_FAIL
B6	PS0_PRESENT_L	D6	PS0_VIN_GOOD_L
B7	PS1_FAIL	D7	PS0_ENABLE_L
B8	PS1_VIN_GOOD_L	D8	12V_SENSE_P
B9	PS1_ENABLE_L	D9	12V_SENSE_N

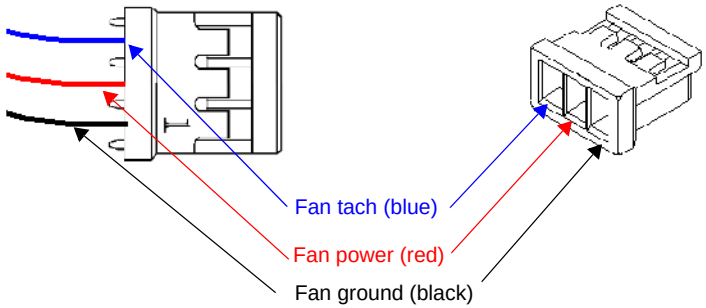
Fan Tray Connectors

The fan tray uses the SATA hard drive connector for the interface to the disk backplane. The pins have been designed so that no damage occurs if a fan tray is accidentally inserted into a hard drive slot or vice versa.

Pin	Name
S1	GND
S2	REMOVE_LED_L
S3	FAIL_LED_L
S4	PRESENT_L
S5	FAN_TACH0
S6	FAN_TACH1
S7	GND
P1	FAN_CTL0
P2	FAN_CTL0
P3	No Connect
P4	GND
P5	GND
P6	GND
P7	3.3AUX
P8	5VAUX
P9	No Connect
P10	GND
P11	OK_LED_L
P12	GND
P13	No Connect
P14	FAN_CTL1
P15	FAN_CTL1

Fan Connectors

The figure and table below describe the three-pin fan connectors.



Pin	Name	Color
1	Ground	Black
2	Power	Red
3	Tach	Blue

APPENDIX

Power reset and initialization sequences

This appendix describes the power-on and power-off reset sequences:

Power-on reset sequence

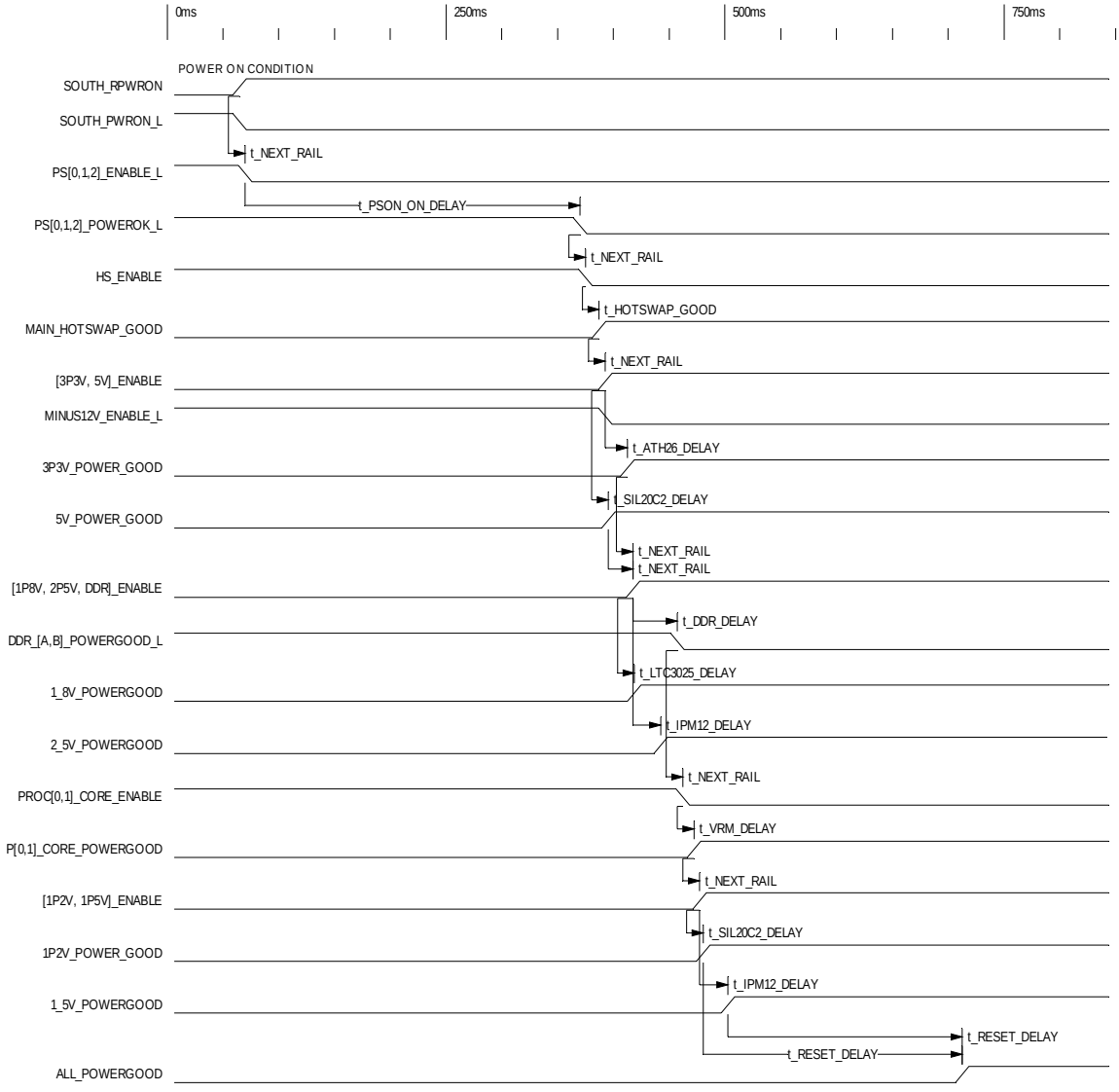
The power-on sequence is initiated as soon as power is applied or when the power button is pushed, depending on the BIOS settings.

When the sequence is initiated, the main power supplies are enabled, then the hot-swap circuit for the main 12V rail is enabled. When 12V is up, the supplies are sequenced as follows:

- 1.5V, 3.3V, and -12V
- 1.8V, 2.5V, and 1.25V
- Processor core voltage
- 1.2V and 1.5V

When all of the rails are within 5%, the voltage monitor chip waits for 210 mS then asserts `ALL_POWERGOOD`, which starts the boot sequence.

The diagram below shows the power-on sequence. The accompanying table defines the symbols used in the diagram and describes the power-on sequence timing parameters.



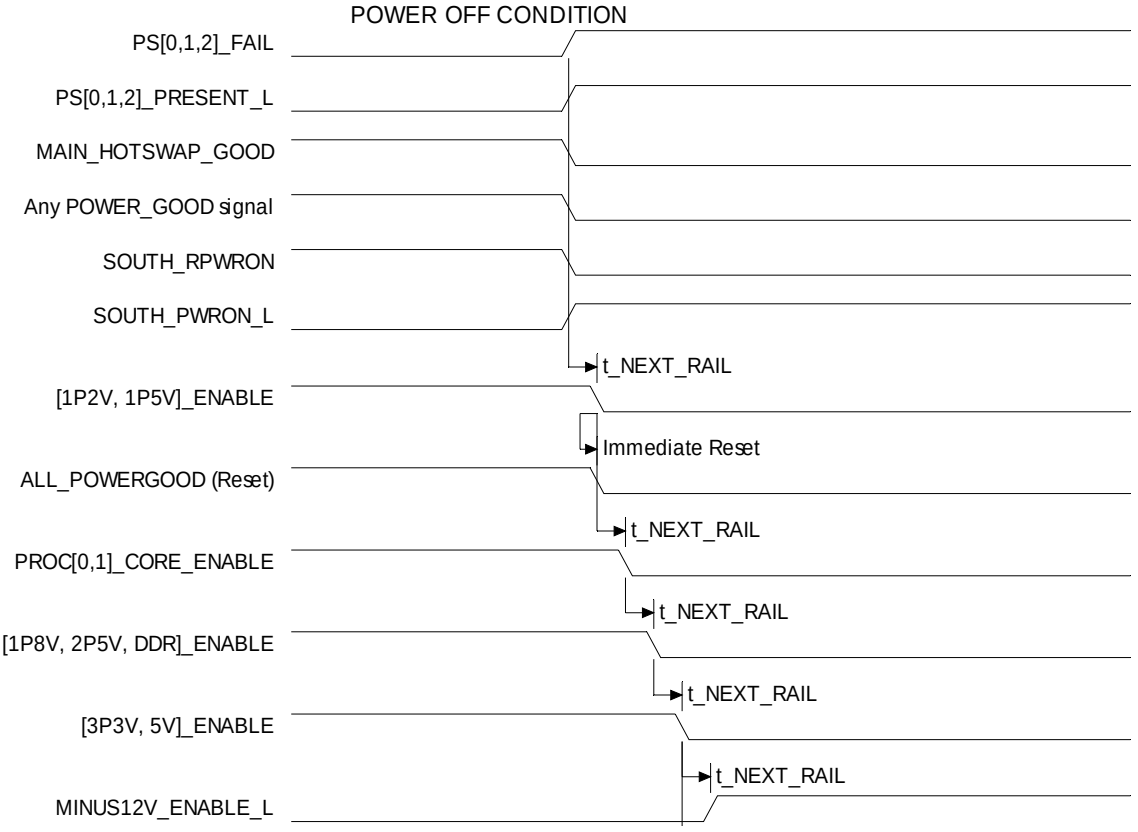
Parameter	Description	Value	Units
t_NEXT_RAIL	Delay from one rail, Power Good to next rail, Enable	1	mS
t_PSON_ON_DELAY	Soft-start delay for LTC3733	300	mS
t_HOTSWAP_GOOD	Delay from Hotswap Enable to Hotswap Good	12.4	mS
t_ATH26_DELAY	ATH26 Module Turn-on time + Power Good delay	20	mS
t_SIL20C2_DELAY	SIL20C2 Module Turn-on time + Power Good delay	3	mS

Parameter	Description	Value	Units
t_DDR_DELAY	DDR Module Turn-on time + Power Good delay	40	mS
t_LTC3025_DELAY	LTC3025 Turn-on time + Power Good delay	1	mS
t_IPM12_DELAY	IPM12 Module Turn-on time + Power Good delay	25	mS
t_VRM_DELAY	SIL06 Module Turn-on time + Power Good delay	10	mS
t_RESET_DELAY	LTC2902 delay from voltage in spec to release of reset line	210	mS

Power-off sequence

A power-off sequence is initiated by a request from the SP board management controller, an OS-level shutdown, a power button press, or a fault condition. A power supply fault (main or voltage converter) or a thermal event (THERMTRIP) can trigger a hardware-level shutdown.

The diagram below shows the power-off sequence. The accompanying table defines the symbols used in the diagram and the power-off sequence timing parameters.



Symbol	Parameter	Value (in ms)
t_NEXT_RAIL (fault condition)	Delay from one rail Enable deassertion to next rail Enable deassertion after a fault condition.	1 ms
t_ NEXT_RAIL (normal power-down)	Delay from one rail Enable deassertion to next rail Enable deassertion after a power-down initiated by the Host/SP.	20 ms

APPENDIX **J**

I²E bus devices

This appendix describes the I²E bus devices.

Power-on reset sequence

The Inter-IC Communication bus (I2C) is a simple 2-pin serial bus used to control some of the basic chassis management features. These include existing EEPROMs, fan controllers, and power supply monitors that are used to monitor the health and status of the chassis. In some instances, such as temperature, a separate interrupt immediately alerts the processors when it detects a problem.

I²E bus address table

The table below shows the addresses of the devices on the bus.

Description	Part #	Location	Address (Hex)
Fan controller 0	VSC055-01	Disk backplane	0x1000000 (40/80)
Fan controller 1	VSC055-01	Disk backplane	0x1000001 (41/82)
System monitor	ADM1026	Front of I/O controller	0x0101100 (2C/58)
Processor inlet temp sensor	LM75	Rear of CPU board	0x1001001 (49/92)
PCI card area temp sensor	LM75	Between PCI slots of I/O controller	0x1001010 (4A/94)
IO controller ID PROM	AT24C64B	I/O controller	0x1010010 (52/A4)
Power supply 0 ID PROM	AT24C02A	Power Supply	0x1010100 (54/A8)

Description	Part #	Location	Address (Hex)
Power supply 1 ID PROM	AT24C02A	Power Supply	0x1010101 (55/AA)
Power supply 2 ID PROM	AT24C02A	Power Supply	0x1010110 (56/AC)
Backplane temperature sensor	LM75	Front of Disk backplane	0x1001000 (48/90)
Backplane ID PROM	AT24C64B	Disk backplane	0x1010000 (50/A0)
Proc card ID PROM	AT24C64B	CPU board	0x1010001 (51/A2)
Service processor ID PROM	AT24C64B	GRASP	0x1010011 (53/A6)
IO expander (for Front LEDs)	PCA9556	Disk backplane	0x0011000 (18/30)
IO Expander (for Fan Enables)	PCA9556	I/O controller	0x0011001 (19/32)
IO expander (for DIMM LEDs)	PCA9556	CPU board	0x0011100 (1C/38)
IO expander (for PROC LEDs)	PCA9556	CPU board	0x0011101 (1D/3A)
Proc card system monitor	ADM1026	Front of CPU board	0x0101101 (2D/5A)
Clock generator	CDC960	I/O controller	0x1101001 (69/D2)
8-port switch (for DIMMS, PCI slots)	PCA9548	I/O controller	0x1110000 (70/E0)
DIMM0 serial presence detect	EEPROM	DIMM	0x1010000 (50/A0)
DIMM1 Serial Presence Detect	EEPROM	DIMM	0x1010001 (51/A2)
DIMM2 serial presence detect	EEPROM	DIMM	0x1010010 (52/A4)
DIMM3serial presence detect	EEPROM	DIMM	0x1010011 (53/A6)