voyager IIi

TADPOLE RDI

Part Number: 431107402
Rev. A

User Guide

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This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult your supplier or an experienced radio or television technician for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from your supplier. Tadpole-RDI is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications to the equipment could void the authority granted by the FCC to operate the equipment.

Declaration of Conformity

We, Tadpole-RDI,
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Declare under our sole responsibility that the product

VoyagerIIi Portable Server

complies with Part 15 of FCC Rules. Operation is subject to the following two conditions: 1) this device may not cause harmful interference, and 2) this device must accept any interference received, including interference that may cause undesired operation.

Electrical Safety Notice

WARNING! To reduce risk of electric shock, do not open unit. No user serviceable parts inside. Refer all servicing to qualified personnel only.

AVERTISSEMENT! Ne pas ouvrir. Risque de décharge électrique. Ne content pas de pièces à entretenir. Maintenance par personnel compétent uniquement.

ACHTUNG! Um stromstösse zu vermeiden, darf die Einheit nicht geöffnet werden. Das Gerät enthält keine vorn Endibenutzer zu wartenden teile. Die Wartung darf nur durch den Fachmann ausgeführt werden.

¡AVISO! Para reducir el riesgo de descarga eléctrica, no abran la unidad. No contiene piezas servibles. Para cambiar la lámpara, enviar el equipo a personal competente.

To Connect Your Computer

1. Turn your computer and peripherals OFF.
2. Connect the peripherals to your computer.
3. Connect any other system cables; for example, display cable or network cable.
4. Connect the power cord to the outlet.
5. Turn the peripherals ON first and then your computer.

To Disconnect Your Computer

1. Turn everything OFF.
2. Disconnect the power cord.
3. Disconnect all system cables.
4. Disconnect all peripheral cables.

WARNING! To reduce risk of electric shock, do not open unit. No user serviceable parts inside. Refer all servicing to qualified personnel only.

Fuses

The unit has two fuses located and accessed at the bottom of the power socket. Replace the fuses only with the correct replacement part.

CAUTION: For continued protection against risk of fire, replace only with the same rating of fuse.

Either obtain a replacement fuse from an approved supplier or obtain a 2 Amp anti-surge 20*5 fuse with the following approvals:

In the USA: UL recognized fuse: Bussman S505/2A Anti-surge.

In Europe: Compliant with IEC EN60127.

Contents

Preface

Welcome to the *VoyagerIIi User Guide*. This manual contains valuable information about using your new VoyagerIIi.

Conventions in This User Guide

The following conventions are used in this Guide:

Procedures

Procedures are numbered.

Example:

1. Turn on your workstation.

Notes

Notes precede information that requires special attention.

Example:

For your convenience, you can use either a Sun or PC-compatible keyboard.

Warnings and Cautions

Information of a hazardous nature is shown as indented and preceded by warning/caution icon.

Example:

CAUTION: To avoid damage to the product, do not subject it to excessive shock.

Example:

WARNING! To reduce risk of electric shock, do not open unit. No user serviceable parts inside. Refer all servicing to qualified personnel only.

Warnings highlight conditions of potential personal injury. Cautions point out possible equipment damage.

Keyboard Conventions

Keyboard keys are shown in inital upper-case type.

1. Type Search and press the Enter key to have the system search for bootable devices.

Screen Messages

Screen messages appear in `Courier` type within a box.

Example:

After the VoyagerIIi passes its self-test, the following initial message appears:

```
VoyagerIIi
ROM Rev. x.xx, xx, Serial #xxxxxxx
xxMB memory installed, Keyboard Present
Ethernet address x:x:xx:x:x:xx, Host ID: xxxxxxxx
```

Variables

Variables appear as a lower-case x. For example, the x's in the screen on the previous page are variables because the values shown for ROM Rev., serial number, Ethernet address, and host ID will vary from system to system.

Notes

Overview

1

Welcome to your new VoyagerIIi from Tadpole-RDI.

The Voyager IIi packages all the power and functionality of the Sun Ultra 10 into a robust, mobile package. The unit includes user-exchangeable disk packs with two disk drives per pack and a maximum of two disk packs per system. Support for Solaris operating environments allow the VoyagerIIi to run all major SPARC/Solaris applications.

The VoyagerIIi is designed for Mobile Technical Professionals who need to develop, demonstrate, or deploy Solaris applications at more than one location. The VoyagerIIi is a robust, portable, 100% SPARC-compliant, full-powered UltraSPARC-IIi® server or desktop platform. It provides the user with the ability to run any of the 10,000-plus Solaris applications at home, office, or other locations.

The VoyagerIIi can be configured with an UltraSPARC-IIi processor, up to 1GB DRAM, and a wide variety of hard disk drive capacities, allowing the user to deploy and not just demonstrate any Server or Desktop application without compromise. The user-exchangeable disk packs also make field distribution of binaries, demonstrations, or pre-built applications a straightforward, error-free task. Also, the exchangeable disk packs enable the user to switch between demonstration, training, or testing environments in minutes.

Features

The VoyagerIIi has been designed as an alternative to Sun Server and Sun Desktop computers in mobile application areas. The Sun SPARC/Solaris environment has the following features:

- Powerful—fast processing of high-end applications.
- Scalable—can be expanded to meet increasing demands.
- Network Ready—easy interchange of data between multiple systems.
- Reliability—high availability and integrity.

The two main types of system are described as Server and Desktop products. Both systems have the above features, but the essential differences are:

- Servers handle high capacity, remote storage, processing and communications needs of one or many users typically running large, centralized applications. Servers are tailored to specific applications by configuring the amount of processing, storage, and I/O.
- Desktops handle local processing and the graphics needs of a single user typically running a dedicated application. Desktops are tailored to specific applications by configuring the amount of processing, graphics capability, and memory.

The VoyagerIIi can be configured to meet all these requirements. In order to support mobile applications, the VoyagerIIi also has the following additional features:

- Compact/lightweight—for easy transportation, even as hand luggage on flights.
- Robust—ability to cope with demanding environmental conditions such as shock, vibration, temperature extremes, and fluctuations.
- Ease of deployment—for rapid set-up and shut-down between different operating locations.
- Removable disks—allowing the software environment to be easily changed and consequently providing high levels of security.

Applications

Table 1-1 shows some further application areas in which the VoyagerIIi could be used because of its compact size, ruggedness, reliability, processing capability, and ease of set-up and shut-down:

Table 1-1: Uses of VoyagerIIi

Potential Application Areas	Example Industry Sectors
Demonstrations and Presentations	Software Sales, Education, Exhibitions
Geological Survey, Exploration	Mining, Oil
Mapping and Analysis	GIS, Biomedical, Astronomical Research
Field Technical Support	Technical, Commercial
Mobile Command Posts	Communication, Command and Control Centers
Engineering	Integrated Circuit Design, Automotive
Software Development	Client-Server Applications
Disaster Support and Recovery	Banking, Call Center, Natural Disasters

Expanding the VoyagerIIi's Capabilities

The VoyagerIIi can be expanded by adding more memory and additional disk drives. Its capability can also be increased using devices such as a tape unit, CD drive, high-capacity floppy disk, PCI cards, PCMCIA modem, and network cards.

Summary

This chapter has provided a high level overview of the VoyagerIIi. The next chapter will help you familiarize yourself with the VoyagerIIi controls, interfaces, and indicators.

Notes

2

Getting to Know VoyagerIIi

The Tadpole-RDI VoyagerIIi is designed to meet the demands of high-end mobile computing needs, including client-server applications. You can use your VoyagerIIi as a desktop computer by attaching a keyboard, mouse, and display. You can also connect it to a network and other external devices. Alternatively, you can use VoyagerIIi as a server system and operate it over a network. You can easily suspend VoyagerIIi's operations and resume them whenever needed, minimizing set up and shut down time.

This chapter explains the purpose of your VoyagerIIi's indicators, switches, and connectors.

This chapter covers the following topics:

Familiarizing Yourself with the System

The VoyagerIIi combines a Sun Microsystem UltraSPARC-IIi processor, Solaris Operating System, large memory and disk capacities, I/O interfaces, and a wide range of configuration and upgrade options within a compact and robust package.

The front panel contains system status indicator lamps, a recessed reset switch, and access to the disk drive packs. The rear panel contains switches, interfaces, and power connectors. The vented side panels provide an air inlet and exhaust for system cooling. The VoyagerIIi is designed to be operated horizontally. With a suitable stand to enable venting, it may also be operated vertically.

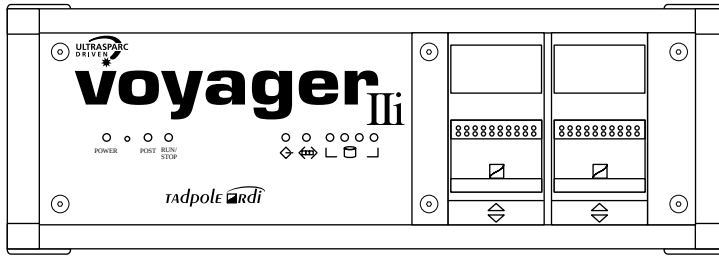
The dimensions of the VoyagerIIi are:

- WxDxH = 335 x 266 x 116mm (13.2 x 10.5 x 4.5in) plus rubber feet and disk packs.

Weight:

- 4.5kg (10lb)

Figure 2-1: The VoyagerIIi Portable Server



The Front Panel

The front panel contains a row of indicators, a recessed reset switch, and the removable disk packs.

Figure 2-2: The Front Panel

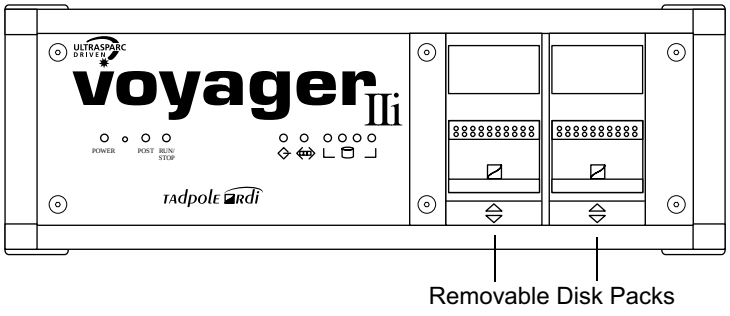
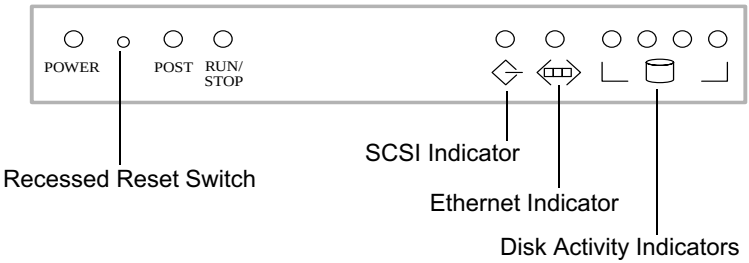


Figure 2-3: Front Panel Indicators



Indicators

Power Indicator

This lights up when the system is connected to the AC outlet and the Power On/Off Switch on the rear panel is turned ON.

POST Indicator

The POST (Power On Self Test) Indicator lights up when you turn on the power to the system and remains lit while the system runs its internal system test and diagnostic program. Test duration depends on the system configuration. When the test is completed successfully, the POST indicator turns off; if it does not, refer to Chapter 17, “Troubleshooting” for more information.

Run/Stop Indicator

This indicator lights up to indicate that the Solaris operating system is running.

After the Power On Self Test completes successfully, the system prepares itself to run the Solaris operating system. If the Run/Stop Switch on the rear of the unit (see Figure 2-4:) is set to ***Run***, Solaris starts or resumes automatically and the Run/Stop Indicator lights up. If the Run/Stop Switch is set to ***Stop***, the system does not boot and the indicator remains dark.

When the Run/Stop Indicator is ***on***, Solaris is running and must be shut down properly before turning off the system. When the Run/Stop Indicator is ***off***, it is safe to turn off the main power switch.

SCSI Indicator

This indicator lights up when the SCSI expansion bus transfers data.

Ethernet Indicator

This indicator light flashes when the system detects Ethernet activity.

The activity detected may have nothing to do with your system. Depending upon the network topology, the lamp may indicate other activity on the network. The lamp always flashes when your system is active on the network.

Disk Drive Indicators

The four indicator lights in this group light up to indicate disk drive activity on the drive corresponding to each light.

Controls

Reset Switch

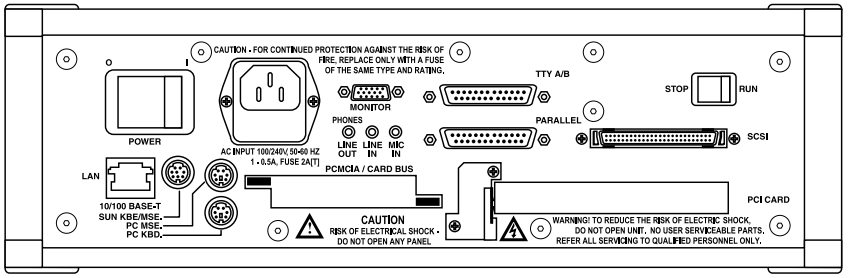
The Reset Switch is located between the Power Indicator and the POST Indicator.

CAUTION: Do not use the Reset Switch unless the system is completely locked up. Any unsaved application data will be lost.

To reset your system, insert a small object, such as the tip of a pen, into the opening. Pushing the Reset Switch stops the operating system and any applications immediately and restarts OpenBoot.

The Rear Panel

Figure 2-4: Switches and Connectors on The Rear Panel



Switches

Power On/Off Switch

The Power On/Off Switch controls power to the system.

CAUTION: Do not turn off the power to the system unless the Run/Stop Indicator is off, showing the operating system has been shut down properly or suspended. Turning off the power while the operating system and applications are running will cause data loss.

The Run/Stop Switch

The Run/Stop Switch is a manual control for the operating system. You can turn the operating system On or Off even without a console connected to the unit. You can determine the operating system status by checking the Run/Stop Indicator on the front panel, discussed in this chapter on page 4.

To start the operating system automatically when you turn the unit On, set the Run/Stop Switch to ***Run*** while power to the unit is turned Off. To prevent the operating system from starting automatically, set the switch to ***Stop*** while power to the unit is turned Off.

To start the operating system manually if the unit is running but the Run/Stop Indicator is Off, set the Run/Stop Switch to ***Run*** while the system is turned On. To shut down the operating system manually, set the Run/Stop Switch to ***Stop*** while the unit is turned On.

Interface Connectors

This section provides a brief description of the connectors on the VoyagerIIi. In-depth information for connecting peripherals and details on the interfaces appears in Chapter 14, “Serial, Parallel, and Audio I/O.”

AC Supply Inlet Socket

The AC supply inlet is a standard IEC 950-compliant three pin grounded socket. The socket has a plug-in fuse rated at 2A. See “Fuses” on page viii at the beginning of this User Guide for more information.

Operate the system from a grounded AC supply between 100-240 VAC and 50-60 Hz. The power supply adjusts automatically to any AC voltage in this range.

Current consumption is 1A max at 100 VAC and less than 0.5A at 240 VAC.

The power cord provided with the system has a fused AC plug of the appropriate type for the country where purchased. Contact your sales representative for different cords.

Ethernet

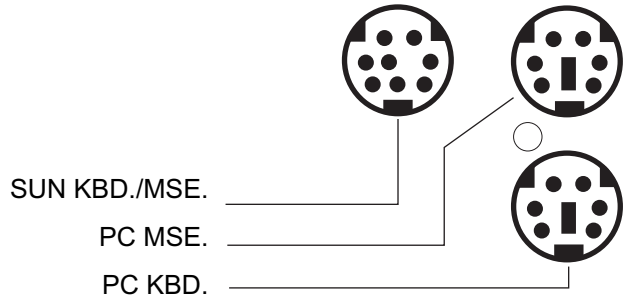
You can connect the VoyagerIIi to a 10/100 base-TX interface, using the auto-sensing RJ45 socket provided.

Keyboard and Mouse

You can connect a Sun standard keyboard or a mouse to the "SUN KBD./MSE" socket. Connect the mouse to the keyboard (as in other Sun systems).

A PS/2 style keyboard and PS/2 mouse may also be connected to the system via the PC sockets shown in the figure.

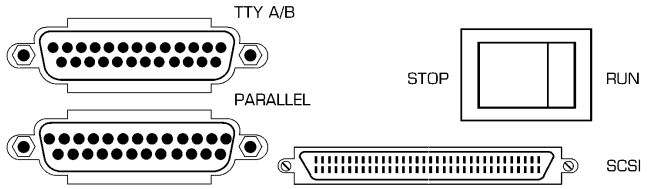
Figure 2-5: Keyboard and Mouse Connectors



Parallel Port

You can connect a printer to the VoyagerIIi using the standard IEEE P1284 Centronics interface.

Figure 2-6: Serial, Parallel, and SCSI Connectors



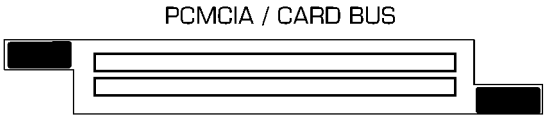
PCI Card Interface

Your VoyagerIIi has a PCI expansion slot to install a PCI option card.

PCMCIA Card Slots

Your VoyagerIIi has two Personal Computer Memory Card Interface Association (PCMCIA) expansion slots. See Chapter 13, “PCMCIA Interface.”

Figure 2-7: PCMCIA Card Slots



SCSI

You can connect up to 15 daisy-chained SCSI devices to the VoyagerIIi’s SCSI port. See Chapter 12, “Using SCSI Devices,”

Serial Ports

Your VoyagerIIi supports two RS232 serial ports via the TTY A/B socket. You can connect a UNIX-supported character-based console terminal to the system via this port.

Use the same standard serial port cables as Sun’s Ultra workstations.

Audio and Video Connectors

Your VoyagerIIi supports external audio and video connections.

The Line In connector is a standard 1/8" miniature audio jack for providing stereo input signals to the system from an external source.

The Line Out/Headphones connector is a standard 1/8" miniature audio jack for providing stereo output signals to an external amplifier, amplified speakers, or headphones.

The Microphone connector is a standard 1/8" miniature audio jack for connecting an external mono microphone to the system.

The Monitor connector is a standard DB15 connector for connecting the system to a VGA monitor (or other peripheral that requires VGA video output).

Cooling System

The VoyagerIIi is cooled by air from the vents in its left side panel through the right side vents. Keep the vents clear to ensure adequate cooling.

CAUTION: Restricting the unit's air circulation may cause the system to overheat. Temperature sensors MAY then close the system down.

You can operate the system on its side if you install it with a stand-off unit to ensure airflow clearance.

Speaker

A speaker inside the unit provides sound for audible alerts.

Notes

Getting Started

3

This chapter describes how to operate your VoyagerIIi. It describes how to connect your system to an AC supply, how to start the system, how to properly shut it down, and how to save and resume.

This chapter contains the following topics:

Caring for Your VoyagerIIi

Your VoyagerIIi is a robust mobile computer system but you still need to observe the following precautions:

- Do not place heavy objects, such as a monitor, on top of your VoyagerIIi.
- Keep your VoyagerIIi away from electrical appliances that generate strong magnetic fields, such as motors, televisions, refrigerators, or unshielded audio speakers.
- Do not dismantle your VoyagerIIi.
- Do not move your VoyagerIIi while it is operating.
- Do not obstruct the airflow through the VoyagerIIi.

Cleaning

To clean your VoyagerIIi:

- Remove the AC cord.

WARNING! To reduce risk of electric shock, do not open unit. No user serviceable parts inside. Refer all servicing to qualified personnel only.

- Wipe the exterior with a soft cloth moistened with mild detergent and water.

Connecting to an AC Supply

Your VoyagerIIi operates at any AC voltage in the range of 100 to 240 Volts at 50 or 60Hz with the appropriate AC power cord.

Connect the AC power cord to your VoyagerIIi as follows:

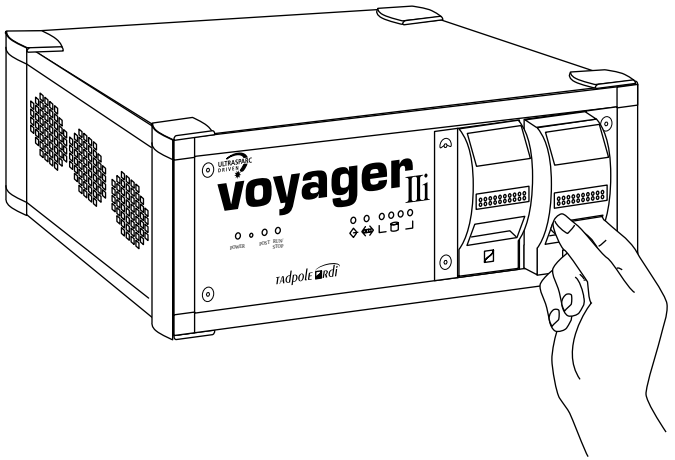
- Connect the socket of the AC power cord into the power input socket on the rear panel of your VoyagerIIi. Connect the plug of the power cord into a suitable AC supply.

Using Removable Disk Packs

Each removable disk pack contains a pair of disk drives. Install Disk Packs by inserting them into the system and secure with the integral latch mechanism. Remove Disk Packs by pushing the latch upward, then gently pulling the units forward.

Handle Disk Packs carefully to avoid data loss. For more info see Chapter 11, “Caring for Removable Disk Packs.”

Figure 3-1: Removing a Disk Pack



CAUTION: Do not install or remove Disk Packs while the Power On Indicator is lit.

Powering On for the First Time

Before powering up the system, connect

- A keyboard and mouse (either Sun or PC-compatable)
- A monitor (either a suitable display using the PCI graphics card option or an ASCII terminal using the serial port)

You cannot use a PC keyboard and mouse to install the Solaris operating system.

1. Ensure that the Run/Stop Switch is set in the 'Run' position.
2. Press the Power On Switch.

The Power On Indicator lights. Next, the POST (Power On Self Test) Indicator lights while an internal system test and diagnostic program runs. The light turns off at the end of the system test. If it stays on or flashes, this indicates the presence of a potential fault. The duration of this test depends on your system configuration.

If the lamp remains on, refer to "Troubleshooting" on page 17-1 for more information. If all is well, the POST lamp goes out. The system starts to run the operating system. After several seconds, the operating system will have booted, the Run/Stop Indicator lights and operating system messages appear on the console.

3. Configure the system as described in Chapter 4, "Initial System Configuration."

POST may take up to five minutes, depending on the amount of DRAM installed.

Powering Off

Your VoyagerIIi provides you with two methods of shutting down and powering off:

- Conventional system shutdown
- Save or Suspend

Powering Off Using a System Shutdown

To shut down your VoyagerIIi:

1. Log in as root
2. Enter the command:

```
# init 0
```

This takes the system down to the OpenBoot prompt and a safe state for power-off.

3. Switch the Power On/Off Switch to the Off position.

The next time you power on, your VoyagerIIi carries out a full system startup.

Alternatively:

1. Log in as root
2. Enter the command:

```
# shutdown now
```

This takes the system down to the OpenBoot prompt and a safe state for power-off.

The Run/Stop light goes out when it is safe to power off the unit.

Powering Off Using Save

The Save or Suspend facility allows you to power off quickly without waiting for a lengthy shutdown process. To power off with Save:

Press the STOP switch on the rear panel.

Depending upon which applications are running, and the amount of memory installed in the unit, the Save operation should take about 15 seconds to complete. When finished saving, the system displays a message indicating that is safe to switch the power off.

During the power off sequence, the Run/Stop lamp flashes and will eventually go out, indicating that it is safe to turn off the unit.

Suspend and Resume

The Suspend and Resume feature makes it easy to start and stop your VoyagerIIi without performing the lengthy system run time procedures of a conventional UNIX system. The system's complete operational state is saved in a specially assigned file on the hard disk and is restored when you next power on again. You do not have to close applications before performing a Suspend because they are completely unaffected by Suspend and Resume, allowing you to take up exactly where you left off.

Use Suspend and Resume only if your VoyagerIIi is going to be used in the same way when you next power on. Use a full system shutdown and reboot if you intend to change or remove disks, change displays, or change the system's network environment while it is powered off. Your VoyagerIIi provides several ways to initiate a Suspend operation. These are described in Chapter 10, "Suspend and Resume."

Using Full System Startup

You can boot your VoyagerIIi in the same way as any conventional desktop ULTRA workstation running Solaris.

- Use a full system startup if you have reconfigured your system's hardware in any way while it has been powered off. (Suspend and Resume may fail in cases where the system hardware has been reconfigured.)
- Use a full system restart if, for any reason, you do not wish to use the Suspend and Resume facility.

If you have previously used Suspend in conjunction with power off or if Resume fails, you can carry out a full system startup as follows:

1. Press the Power On switch. Or, if your system already has power but is failing to Resume, press the recessed Reset switch.
2. When the OpenBoot startup screen is displayed, press **Stop-A** on a Sun keyboard or **Break** on a PC keyboard or serial console.
3. At the OpenBoot prompt, type in the following commands:

```
ok create no-resume?
ok boot
```

If you need further help, refer to your Solaris Documentation.

Using Different Screen Environments

Different types of screens may be connected:

- a Sun or PC video monitor may be connected to the video connector
- an ASCII terminal console may be connected to the serial port
- an XWindows terminal may be connected via the network.

When your system starts up, the Solaris login window allows you to select the display mode from the **Option** menu.

Session Allows you to select between the CDE or the OpenWindows desktop environments, both of which operate in XWindows mode.

Command Line Login
Allows you to select the terminal mode. In this mode, your display operates as a simple ASCII terminal and displays the Solaris command line.

If your VoyagerIIi starts at the command prompt, you can enter OpenWindows by typing the command: `/usr/openwin/bin/openwin`.

Using a Keyboard and Mouse

If you wish to use your VoyagerIIi as a desktop machine, you may use either a Sun-compatible keyboard and mouse or a PC-compatible keyboard and mouse.

The Sun external keyboard and mouse interface is combined, and can be used to connect a Type 4 or 5 Sun keyboard and mouse.

Notes

4

Initial System Configuration

This chapter describes how to carry out the initial system configuration of your VoyagerIIi system, including how to create your own user account, how to configure an Internet Protocol (IP) address and host name, and how to set the time zone.

Your VoyagerIIi system arrives with the Solaris operating system already installed for you on the removable hard disk pack. However, before using your system for the first time, configure the operating system following the instructions in this chapter.

This chapter covers the following topics:

What System Configuration Entails

Basic configuration of your system involves the following steps:

- Assigning a host name and Internet Protocol (IP) address to your system
- Setting your time zone
- Setting a password for the superuser (root) account
- Setting up user accounts

The remainder of this chapter provides you with a worked example.

The initial configuration process may differ slightly between Solaris versions so that the order in which steps are carried out may differ from the worked example below. As a general rule, you should carry out any steps following any instructions displayed on the screen.

For full details of how to configure Solaris, refer to the Solaris documentation.

Initial Configuration – Worked Example

Collecting the Required System Information

Before configuring your system, obtain the following information:

Table 4-1: Important System Information

Category	Worked Example	Your Configuration
Host Name	chianti	
IP Address	195.5.2.15	
Subnet Mask	255.255.255.0	
Name Service	None	
Name Server Host Name	None	
Time Zone	PST	
User Name	Liz Turner	

Network Information

Host Name

The host name of your system is the name by which it is known to other computers connected to the network. For example:

```
Host name: chianti
```

The host name must be unique to your system as duplicated names will disrupt the operation of the network.

Internet Address

The IP address of your system consists of four groups of decimal numbers separated by periods. For example:

```
Internet (IP) Address: 195.5.2.15
```

The IP address must be unique to your system because duplicated addresses will disrupt the network. If you are uncertain about the IP address, contact your network administrator or system administrator.

If your system will be connected to other networks, it is possible to change the IP address later to match the IP addresses used by the network to which you are connecting.

Name Service

After you have entered your system's host name and IP address, you are prompted to select the name service you require.

If your system will be used as a mobile computer, you may wish to select `None` from this screen and configure your system later to use the Domain Name Service (DNS). See Chapter 9, "Using the Network Interface."

Using NIS and NIS+ can cause startup problems if you later try to use your system without a network connection.

Subnets

The screen prompts you to specify whether or not your system will be attached to a subnet. Larger corporate networks are often divided into smaller segments called subnets. If your system is going to be used as a stand-alone system, enter `No`.

If your system will be connected to a large network, you will need to consult your system administrator for the correct choice for this screen.

Time Zone

Enter your time zone information when prompted.

If your time zone does not correspond with any of those listed, you can set a time zone relative to Greenwich Mean Time (GMT), also known as Coordinated Universal Time (CUT), or specify a time zone file to use.

Setting a Superuser Password

Enter a password for the superuser (or root) account. The superuser account has special privileges and is used for system administration tasks. Inadvertent or unauthorized use of some of the commands available to superuser can damage the operating system and render your system unusable. For this reason you should set a password for the superuser account.

The superuser password can be between zero and eight characters long. However, to increase security, the password should consist of a minimum of six characters. You can use both alphanumeric and punctuation characters.

After you enter your root password, Solaris displays the Solaris login prompt. You are ready to create a user account as described in the next section.

Moving Between User and Root Accounts

Many of the operations described in this guide require you to log in as root to have the privileges required to carry out system administration tasks such as disk maintenance. However, using the root account for day-to-day purposes is very risky as you can easily cause damage to the operating system.

As a rule, you should log in to your normal user account for everyday purposes. Then, when you need to carry out a particular task as root, enter the `su` command and the root password to log in to the root account:

```
% su -
Password:
#
```

The hash prompt (#) indicates that you have root privileges. When you have completed the task requiring root privilege, close the root session by pressing **Ctrl-D** on the keyboard.

Setting Up a User Account (UNIX Command Line)

Creating Users using a UNIX Command Line

If you are unable to set up a user account by using the Graphical User Interface (GUI) administrative interface `admintool`, you can use the Useradd utility. You must be logged in as root to use Useradd

1. Type the following command line, using the appropriate login name in place of the words in *italics*:

```
# useradd -d /export/home/username -m -g 10
-s /bin/ksh username
6 blocks
#
```

2. Once the login identity has been created, assign a password using the passwd command:

```
# passwd username
New password
Re-enter new password:
passwd (SYSTEM): passwd successfully
changed for username
#
```

Solaris will ask users to change their passwords when they first login. This maintains security on the system, as each user is the only one who knows their password.

Setting Up a User Account (CDE Graphical Environment)

Starting the User Account Manager

For day-to-day use, you should set up a user account by using the Graphical User Interface (GUI) administrative interface, `admintool`. This provides an easy-to-use way to create a user account. This administrative interface can only be invoked in the Common Desktop Environment (CDE) or OpenWindows graphical environments. To open an admintool window in CDE, carry out the following steps:

1. At the CDE Login Screen, log in as root and enter the root password when prompted.

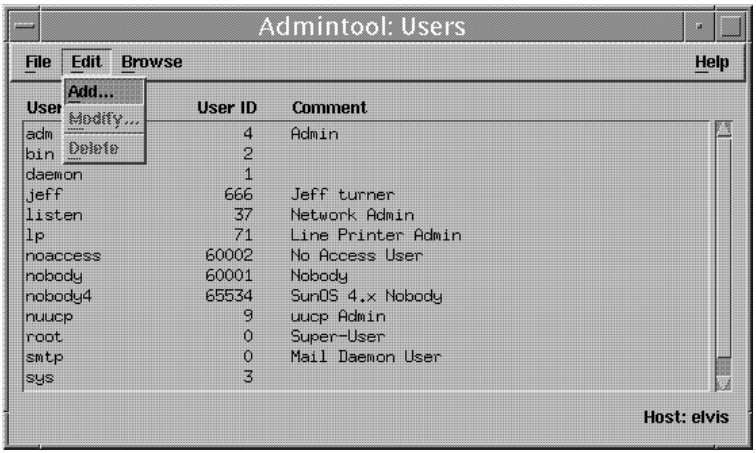
   The CDE workspace screen is displayed.

2. Invoke a Terminal Display Window from the applications pull-up menu. (*This is usually situated on the pull-up menu above the icon that shows paper and pencil*)

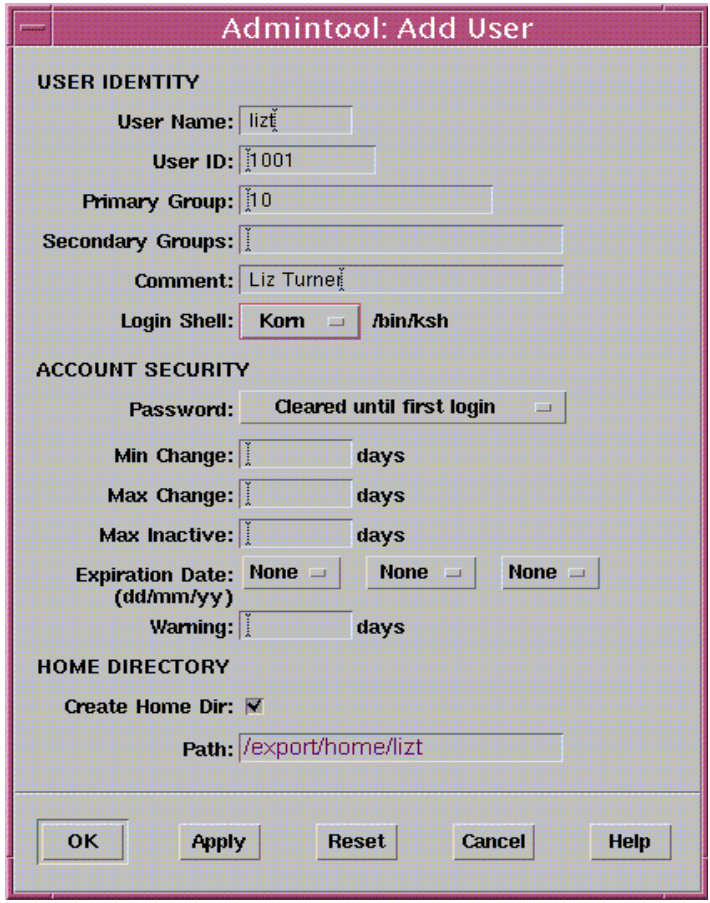
3. In the terminal window, enter the command:

   ```
   # admintool &
   ```

4. The **Admintool** window displays. If necessary, select **User** from the **Browse** menu to display a list of users. The names of the users are always displayed in ascending order.



5. A scroll bar at the right edge of the window allows you to scroll up and down through the available list of user login IDs.
6. From the **Edit** menu, select **Add**. The **Add User** window is displayed.



User Name

This is the login name of the user. This is often an abbreviation or the user's initials. For example, for the user Liz Turner you might use `lizt`. The comment field is commonly used to enter the user's full name Liz Turner.

User ID

The user ID is a unique number by which the network identifies a user account. Numbers 1 through 99 are reserved. You should consult the network administrator for your site for a valid number. The default user ID number, in the **Add User** window, will always be displayed as 1001. If you are using your system as a stand-alone unit, use 1001 for the first account, 1002 for the next, and so on.

Group ID or Primary Group

The group ID is a number that identifies the user's default workgroup. To create new groups or list available groups, you should select the **Browse Groups** option in the admintool window. The default group used by Solaris is group ID number 10 (*staff*).

Account Security

This section is used to specify password administration for the account. Use this section to specify the required change frequency, expiration date, and number of password change warnings that are issued.

Home Directory

This section creates a home directory for your new user account. You must enter a directory path in the text field. User accounts are normally located in `/export/home`. In this example, for the user Liz Turner you would enter the path `/export/home/lizt`.

After you have entered your account details, click OK and Solaris creates a user account based on your specifications.

Setting Up a User Account (OpenWindows Environment)

Starting the User Account Manager

For day-to-day use, you should set up a user account by using the Graphical User Interface (GUI) administrative interface, `admintool`. This provides an easy-to-use way to create a user account. This administrative interface can only be invoked in the Common Desktop Environment (CDE) or OpenWindows graphical environments. To open an admintool window carry out the following steps:

1. At the Solaris prompt, log in as root and then start OpenWindows with the following commands:

   ```
   login: root
   password:
   # /usr/openwin/bin/openwin
   ```

   The OpenWindows desktop is displayed.

2. Move the cursor to a clear area of the desktop background and press and hold the menu (center) mouse button. The OpenWindows desktop menu is displayed.

3. From the menu, select **Programs** and then **Command Tool**. A cmdtool window is displayed.

4. In the command tool window, enter the command:
   `# admintool &`

5. The **Admintool** window is displayed. If necessary, select the **User** from the **Browse** menu to display a list of users.

6. The steps to add a user are as shown from step 4 onward as described in the following CDE Environment information.

Restarting the System After Configuration

When you have completed system configuration, carry out a complete system reboot:

1. Enter the command:

```
# init 0
```

This takes the system down to the OpenBoot prompt and a safe state for power off without using the Save and Resume feature.

2. When the Run/Stop light is off and has stopped flashing, power off by switching the power switch to the OFF position.
3. Power on again by turning the power switch to the ON position.

Using the Root Login ID

One of the security controls of the Solaris OS is that root log in is restricted to the console terminal device by default. If you are not operating the VoyagerIIi with a console device, you may need to remove this restriction.

To allow root to log in from any terminal:

1. Power down the system.
2. Connect a character terminal device to Serial Port A of your system.

Your serial port will fail to respond if a keyboard is connected or a video card is installed.

3. Power on your system. By default, it uses the terminal device on Port A as the console device if no other keyboard is connected.
4. At the Solaris prompt, log in as the root user, as shown below:

```
login: root
password:
```

The UNIX prompt, #, is displayed.

5. Edit the `/etc/default/login` file, using an editor such as the *vi* editor:

```
# vi /etc/default/login
#ident"@(#)login.dfl1.896/10/18 SMI"/*
SVr4.0 1.1.1.1*/

......

# If CONSOLE is set,root can only login on
that device.
```

```
# Comment this line out to allow remote
login by root.

#

CONSOLE=/dev/console
```

6. Insert a hash (#) character at the start of the line that reads:

   CONSOLE=/dev/console

7. When the line looks like the example, shown below, you should save and exit from the file using the command**:**

```
# wq!

# If CONSOLE is set, root can only login
on that device

# Comment this line out to allow remote
login by root.

#

# CONSOLE=/dev/console
```

8. Once the file has been saved, the root user will be able to log in from any connected terminal or network connected system.

Notes

5

Installing and Using Applications

This chapter provides details about running third-party applications, and outlines any limitations that may apply.

This chapter covers the following topics:

Third-Party Application Support

Because it uses a standard SPARC processor architecture and the Solaris operating system, the VoyagerIIi runs any applications that meet the SPARC Compliance Definition (SCD).

In general, all third-party XWindows or OpenWindows applications written for SPARCstation and compatible workstations will run on the VoyagerIIi with very few limitations as follows:

- Applications must use either XWindows as their graphics system or be written for OpenWindows. The operating system uses XWindows Release 4 and OpenWindows Version 3, but you can run earlier XWindows, OpenWindows, or MOTIF applications directly on the VoyagerIIi. Older SunView applications are not supported.
- Applications that require the existence of Sun-specific hardware, such as attached SBus hardware, or that make direct calls into undocumented device driver interfaces in the Sun kernel, will not run on the VoyagerIIi.
- Applications that use Sun or other vendor-specific hardware may not run on the VoyagerIIi.

Methods of Installing Applications

You can install software on the VoyagerIIi in a conventional manner, either to run locally or on a network server. However, since it is likely you will use VoyagerIIi in a mobile environment without a network connection from time to time, it is advisable to install applications onto your VoyagerIIi's own hard disk and run them locally.

You can install applications from a locally connected drive, from a network server, or from a remote Web site.

For specific information about installing SPARC applications onto VoyagerIIi, refer to the documentation supplied with the application and to the Solaris documentation.

Applications and Graphics Interfaces

The VoyagerIIi is not shipped with a display monitor.

A video monitor can be connected to the VoyagerIIi to produce a graphics display. The system graphics can be configured to a variety of display resolutions. The choice of monitor should reflect the display resolution required to support a particular application.

For more information refer to Chapter 15, "Video and Audio Subsystem."

Legibility of Text on a Small Screen

At higher display resolutions, text elements within windows and menus appear very small. Both OpenWindows and CDE allow you to increase the text size used in windows, menus, and alert messages.

Changing Text Size in OpenWindows

To change the font size used in OpenWindows, select **Workspace Properties** from the Workspace menu and then select **Fonts** from the Category menu. Within the fonts category window, select the required font style and size.

Changing Text Size in CDE

To change the font size used in CDE, select the **Style Manager** icon from the Front Panel and then select the **Font** icon from the Style Manager window. In the **Font** window, select the required font size and then click **OK**.

The change takes effect immediately for applications launched after the change is made. However, to make the change take effect for CDE itself, you must exit and then re-enter CDE.

Customizing the Operating System

The VoyagerIIi preload of Solaris is a standard Sun Developer installation with additional packages specific to the VoyagerIIi system. Many of the facilities available on the complete Solaris operating system CD-ROM are not required by every user or are only occasionally needed.

This section explains how to add facilities to your system by installing packages from the Tadpole-RDI distribution CD supplied with your VoyagerIIi or from the Solaris CD. The instructions should be read in conjunction with your Solaris documentation.

Installing Packages

The basic procedure for adding packages is as follows:

1. Connecting the CD-ROM
   Connect the CD-ROM to your VoyagerIIi's SCSI port with a target SCSI ID of 6. See Chapter 12, "Using SCSI Devices."
2. Create the Device Files – Boot Time
   To create the special device files at boot time, follow these steps:
   a. Ensure that the system had previously been fully shut down, (not just saved) then power on all peripherals and the system unit.
   b. Interrupt the boot process at the appropriate time to issue commands at the PROM monitor command line.

   ok

The device name of c1t6d0s0 is used as an example. The first two characters denote the disk controller number (*in this instance, controller 1*). The number of the SCSI disk controller may vary from this example dependent on the number of IDE disk controllers that have been installed in your system. All examples in this chapter use controller 1 to represent the SCSI disk controller.

3. Enter the following commands:

```
ok boot -r
```

The **-r** option prompts the VoyagerIIi to reconfigure hardware.
In this example, the VoyagerIIi detects the external CD-ROM at target ID 6 and creates the necessary special file **/dev/dsk/c1t6d0s0** to allow the CD-ROM's filesystem(s) to be accessed.
Wait for the system to complete booting.

4. Mount your CD-ROM

a. If the Volume Manager process (vold) is running on your system, the /cdrom file system will be mounted automatically a few seconds after the CD is inserted. You may skip substep b.

b. If vold is not running, log in as root and enter the following commands:

```
# cd /
# mkdir /cdrom
# mount -F hsfs -o ro /dev/dsk/c1t6d0s0 /cdrom
```

5. Installing the Packages

   a. Use the **pkgadd** command to install the required packages. For example, to add a package to a Solaris release, type:

   ```
   # pkgadd -d /cdrom/cdrom0 packageA
   ```

   b. Follow the displayed instructions to complete the installation procedure.

   c. You can add several packages at one time by specifying the required package names separated with a space. For example:

   ```
   # pkgadd -d /cdrom/cdrom0 packageA packageB
   ```

The name of the directory `cdrom0` may differ between versions of the operating system. To determine the correct name, list the contents of the CD-ROM using the command: `# ls /cdrom`.

Displaying Package Information

To display information about all packages installed on your VoyagerIIi, type:

```
# pkginfo
```

Information about the installed packages displays on your screen. Alternatively, to display information about specific packages, you can pipe the output of `pkginfo` into a `grep` command. For example, you can use the following command to display the Tadpole-RDI packages installed on your VoyagerIIi:

```
# pkginfo | grep TAD
```

Removing Packages

To remove packages, use the `pkgrm` command. For example:

```
# pkgrm packageA
```

You can remove several packages at one time by specifying the package names separated with spaces. For example:

```
# pkgrm packageA packageB packageC
```

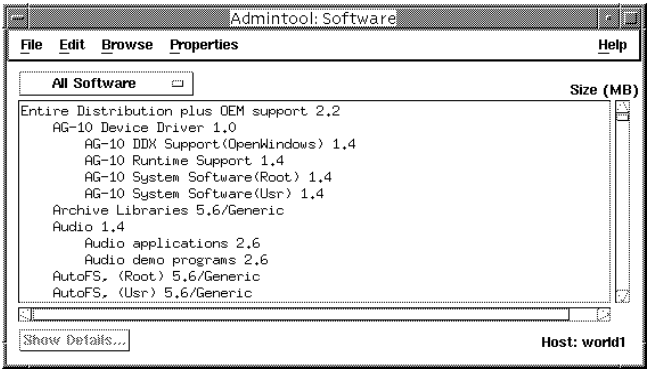
Admintool Software

The Admintool administrative GUI provides a set of software management facilities.

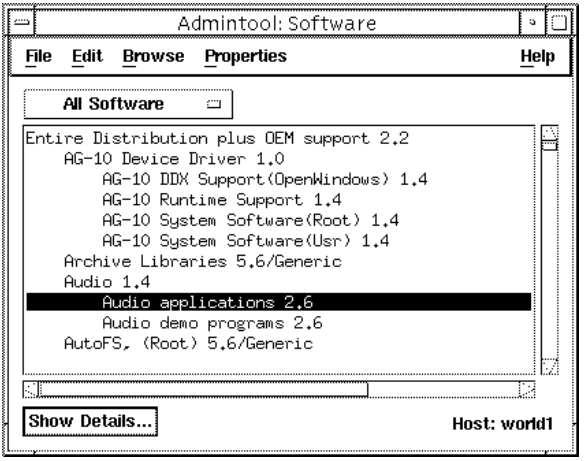
You can add software, list details, or remove software using the Admintool Graphical User Interface.

Examples of the Admintool Software windows are provided on the following pages:

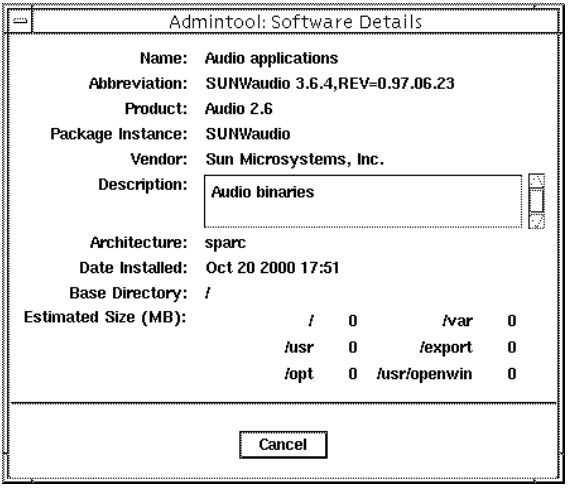
- Below is the main window.



- You can highlight to select a software package from the list.



- You can click Show Details to display details about the selected software package.



Memory Usage and Swap Space

The Solaris operating system uses *virtual memory* to allow several applications to run simultaneously when they would otherwise require more memory than is physically present in the system. To support this feature, one of the disk partitions on the boot disk is assigned to provide your VoyagerIIi with swap space.

The `swap` partition created by the "factory install" on your VoyagerIIi's removable hard disk drive is sufficient to use a reasonable number of tools and applications to be used simultaneously. The table below shows the sizes used for the `swap` partition for the different memory capacities.

Table 5-1: Memory Usage

Memory (MB)	Swap Size (MB)
256	256
512	512
1024	1024

Using Swap Space Efficiently

All applications require a certain amount of memory to be available before they will start. You can use up your VoyagerIIi's memory quickly if you start many applications and leave them all running on the OpenWindows or CDE workspace.

Some helpful hints to minimize your memory and swap usage include:

- Minimize the number of DeskSet tools in use. The tools use large amounts of memory. For example, if you only use the Calendar Manager occasionally, call it up from the Workspace menu when you need it rather than leaving it as an icon on your workspace.
- Avoid using tools that use memory continuously or often. For example, the performance meter tool runs every second. Similarly, if you enable the second hand on the clock, the clock program must run every second.
- Keep your mail in mail files if you have more than a few messages. Each message that appears when you open your mail file takes memory.
- Keep tools iconified if you are not using them, but do not want to quit them. For example, the performance meter and the File Manager tools are suspended when they are iconified, freeing up memory (but not swap space) for other processes.
- Arrange tools on the screen so they do not overlap. This reduces repainting by the Window Manager.
- If you are using the multi-browser in the Calendar Manager, quit it when you are finished rather than iconizing it. It is almost as quick to restart it from the Calendar Manager as it is to open it from the icon.
- Avoid using a background image for the main background; plain backgrounds use less memory.

- Avoid using PostScript applications at the same time as OpenLook applications.
- Do not run too many applications at once. You may have to reduce the number of applications active or on the desktop if you want to run a new large application.

Checking Swap Space Usage

You can find out how much swap space you are using at any time by using the following command:

```
% swap -l
```

This displays the amount of swap space available and in use.

Increasing Swap Space

You can increase your swap space without reformatting the disk. For example, the following steps create a 16Mbyte file for use as extra swap space. (You will need to be superuser or logged in as root to do this.)

1. Create a 16Mbyte swap file using the following commands:

```
# mkdir /swap
# cd /swap
# mkfile 16m SWAPFILE
```

2. Add the swap file to the system by editing. You should add lines such as the following to the file `/etc/vfstab`:

```
/swap/SWAPFILE - - swap - no - no -
```

3. Restart your VoyagerIIi using a full system startup

Notes

6

Disks and Filesystems

This chapter provides an overview of how you can configure the hard disk drives of the VoyagerIIi using the Solstice DiskSuite software. Also presented in this chapter is a guide to using the Network File System (NFS) as an extension of the VoyagerIIi's local disk file systems.

This chapter covers the following topics:

Using Disk Devices

The VoyagerIIi is designed to allow up to four internal hard disk drive units to be installed. In addition, external SCSI disk drives can also be attached to extend the disk storage capacity of the system.

There are no restrictions regarding the storage capacity of the external SCSI disk drive unit.

By combining the internal disk drive units and external SCSI disk units, you may increase the disk storage capacity of VoyagerIIi. This volume of data storage requires special disk management techniques to be applied in order to reduce the risk of data loss.

The Solaris operating system is supplied with a software package called Solstice DiskSuite. This software package provides facilities for managing very large disk capacity.

Each disk device will have an associated logical device name file. For example, the device name `/dev/dsk/c1t3d0s0` refers to a disk drive that is:

- a SCSI disk on controller number 1 (`c1`)
- that has a target address of 3 (`t3`)
- that is a stand alone disk drive (`d0`) and not part of a RAID drive and partition, or slice, 0 on the drive (`s0`).

Solstice DiskSuite

Solstice DiskSuite is a graphical administrative tool to manage multiple hard disk drives. DiskSuite allows the creation of virtual disks that are called *metadevices* and converts all the Input/Output requests that are targeted at a metadevice into the appropriate physical disk read/write requests.

A metadevice is a combination of two or more disk slices (partitions). These could be on the same disk drive or be a combination of slices from two or more disk drives.

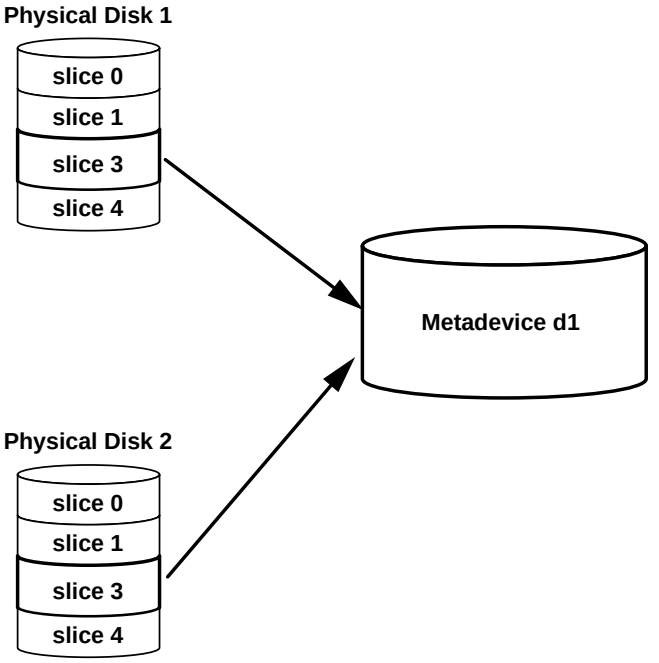
Metadevices can contain *mirrors* (duplicate copies) of the data areas on disk. DiskSuite can also *stripe* information over two or more disk drives to help increase disk I/O data throughput.

The VoyagerIIi is designed to be a transportable system. Mirroring and striping should only be applied to the internal disk drives. If external disk drives are considered to be part of the mirror or stripe area for the metadevice, those external disks will not be available if the VoyagerIIi is moved off site.

Metadevice Configuration

The diagram below shows how a number of disk slices can be combined to form a *metadevice*.

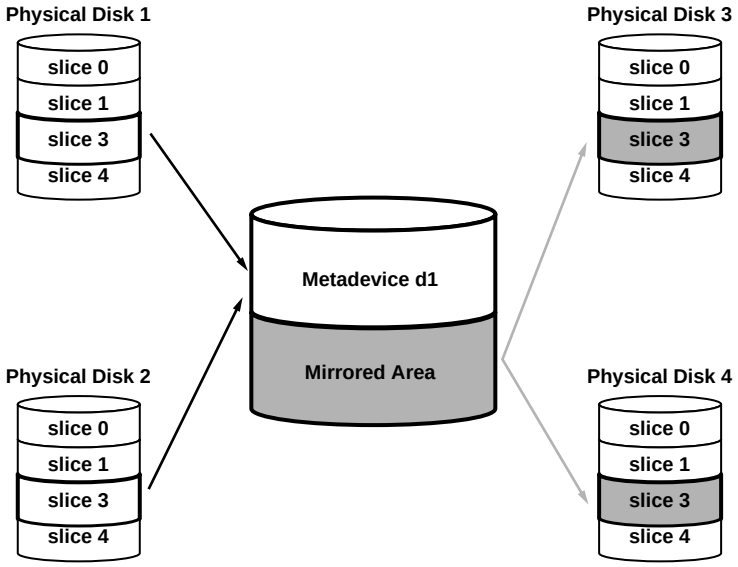
Figure 6-1: Setting up a Metadevice



Metadevice Mirror Configuration

A disk mirror is a duplicate region of disk space physically identical to the disk space it mirrors that acts as a backup storage region. All data writes to a disk are also written to the mirror of that disk. The diagram below shows how you may configure a mirror:

Figure 6-2: Disk Mirroring



Not only does the mirror provide greater resilience for the storage of data, it also provides an alternative data source for disk read operations. Disk mirroring can, therefore, improve the speed of disk input.

The mirror disk area is still considered to be part of the metadevice. When adding disk space to a mirrored metadevice, you should remember to add an equivalent amount of mirror disk space.

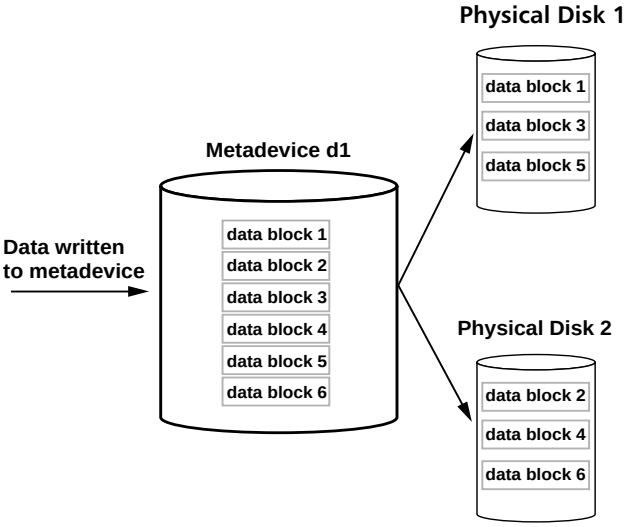
DiskSuite can work with stand alone disk drives, such as the internal disk drives, or with RAID (*Redundant Array of Inexpensive Disks*) storage units.

Metadevice Data Striping

Data striping is a method of spreading the write operations across two or more slices or disk drives.

When DiskSuite writes data to the *metadevice*, it alternately writes the blocks of data to each physical disk.

Figure 6-3: Data Striping



As shown in the diagram above, DiskSuite writes the first block of data to physical disk 1 and the second block of data to physical disk 2. DiskSuite writes data blocks 3 and 4 in the same manner. This operation continues for all data blocks it writes to the *metadevice*.

The advantage of striping is that DiskSuite can write to two or more disk drives simultaneously. Striping therefore, increases the speed of data output.

Network File Systems (NFS)

Sun has developed the Network File System (NFS), which allows directories to be shared across the network.

The Solaris operating system includes the NFS software and any Solaris system can automatically act as an NFS client when connected to a network. The NFS client daemon processes are started at boot time by a run-time control script called `/etc/init.d/nfs.client`.

A server can make one or more directories available to NFS clients in the network. By running appropriate daemon processes, you can start these processes manually by running the `/etc/init.d/nfs.server` script.

For the script to work, there must be an entry in the `/etc/dfs/dfstab` file. An example is shown below:

```
earth # cat /etc/dfs/dfstab

#Place   share(1M)   commands   here   for
automatic execution
#on entering init state 3.
#
#Issue             the             command
'/etc/init.d/nfs.server start' to ...
#daemon processes and the share commands,
after ...
#first entry to this file.
#
#share  [-F  fstype]  [-o  options]  [-d
"<text>"] ...
#.e.g,
#share -F nfs -o rw=engineering -d ...

share -F nfs -o rw=earth -d "man pages"
/usr/share/man
earth #
```

The nfs.server script on the host `earth` will read the `/etc/dfs/dfstab` file and share the `/usr/share/man` directory to other hosts in the network. Only the host, `earth`, will be able to read and write to this directory. All other hosts will have read-only access to files in the `/usr/share/man` directory.

Mounting an NFS Shared Directory

If you connect the VoyagerIIi system to a network, you can mount NFS shared directories at boot time using entries in the `/etc/vfstab` file, or you can mount them manually by the root user using the **`mount`** command.

```
# grep earth /etc/vfstab

earth:/usr/share/man - /usr/man nfs - yes
-ro,nosuid

# mount -o ro,nosuid earth:/usr/share/man
/usr/man
```

If you use the VoyagerIIi as a mobile system, it is easier to use the NFS Automounter facility described in the next section.

The NFS Automounter

You can use a daemon process called `automountd` to automatically mount and unmount NFS shared directories. The automounter mounts when a shared directory is required and unmounts that directory after a period of inactivity.

Automounter Special Directory

The `automounter` process uses the `/net` directory to allow access to shared directories without having to use the mount command. You can control the use of this directory by information stored in the `/etc/auto_master` file.

```
# cat /etc/auto_master
# Master map for automounter
#
+auto_master
/net      -hosts   -nosuid,nobrowse
/home     auto_home  -nobrowse
/xfn      -xfn
```

The automounter automatically mounts remote, shared directories whenever a path name is used that starts with `/net/server_host_name`.

Before the automounter performs a mount operation, the `/net` directory appears as an empty directory. Once an appropriate path name is used, the automounter creates the necessary sub-directories of `/net` to allow access to the shared directory files.

Shown below is an example of how the /net directory is used:

1. The NFS server host must exist in the host's database.

```
# grep earth /etc/hosts
130.1.46.101        earth
#
```

2. The NFS server host must be available on the network. The easiest way to test the network connection to the server is to use the `ping` command.

```
# ping earth
earth is alive
#
```

3. The NFS server must share one or more directories to other hosts in the network. The easiest way to test that the server is sharing directories is to use the `dfshares` command.

```
# dfshares earth
RESOURCE                 SERVER ACCESS TRANSPORT
 earth:/usr/share/man     earth    -       -
#
```

4. Initially, the `/net` directory appears to be an empty directory.

```
# ls -l /net
total 0
```

5. When a path name is used that starts with `/net/`*`server_name`*, the automounter automatically mounts all shared directories from that server to the appropriate sub-directories of `/net/`*`server_name`*.

```
# cd /net/earth/usr/share
# ls
man
# pwd
/net/earth/usr/share
#
```

After a default time-period (*usually five minutes*) of inactivity, the automounter unmounts the sub-directories that were mounted below the `/net` directory and the `/net` directory once again appears to be an empty directory.

If you wish to start or stop the automounter process, you can use the run-control script as shown below:

```
# /etc/init.d/autofs stop
<< stop the automounter
# /etc/init.d/autofs start
<<start the automounter
```

If applications refer to directories by path names that do not start with `/net`, these directories cannot be NFS mounted with the automounter. You must use the mount command as a root user or mount the NFS shared directories at boot time. Refer to Chapter 6, "Mounting an NFS Shared Directory."

Metadevices

7

This chapter provides an overview of the Solstice DiskSuite software and the use of Metadevices.

This chapter covers the following topics:

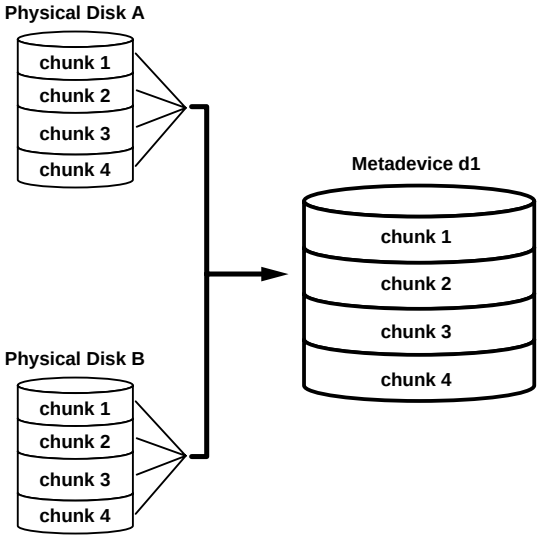
Overview of Metadevices

The VoyagerIIi can have up to four large-capacity internal disk drives, plus any number of external SCSI disk drives. Each disk drive can have a maximum of seven partitions.

The Solaris 2.6 or newer operating system (server version) is supplied with a package called Solstice DiskSuite. (Consult the appropriate Solaris Licence Agreement regarding the licensing of this package.) This package allows the user to create metadevices.

A *Metadevice* is a combination of two or more partitions from one or more physical disk drives that are treated as one logical disk drive unit. Unlike the physical limitation of seven partitions, per disk drive, up to 1027 metadevices can be created, allowing up to 1027 logical partitions to exist on your system.

Figure 7-1: The Metadevice Concept



A further advantage of the metadevice approach is that logical partitions, or entire physical disk drives, can be mirrored to other drives and data can be "striped" across a series of disk drives to improve read/write performance.

A mirror partition or disk must have exactly the same characteristics and size as the partition or disk it mirrors.

Using Metadevices

As with physical disk drives, the metadevice has special device files associated with each logical drive.

The device names of metadevices are stored in the subdirectories `/dev/md/dsk` (*block metadevices*) and `/dev/md/rdsk` (*raw metadevices*).

Each metadisk can be recognized by its name. For example, in the preceding diagram, partitions (*referred to as chunks*) from the two physical disk drives were being treated as a single, logical metadisk. The metadisk had the name ***d1***. The block device name for this metadisk would therefore be `/dev/md/dsk/d1`.

The information that is used by the system to manage the metadevices must be stored in a raw disk partition. This information is called the State Database because it contains details of the state of the metadevice and its contents.

To avoid loss of that data, it is recommended that the State Database be backed up and stored in a minimum of three raw partitions. These partitions should not be used as swap space or for filesystems. If an error occurs, which corrupts a State Database, the system will seek out the backup State Databases and rebuild its information using the most up-to-date and correct data from all of the State Databases for the metadevice.

Solstice DiskSuite

Although there are several commands available to create and manage metadevices and State Databases, Solaris provides a Graphical Administration Interface called DiskSuite.

The DiskSuite program is a Solstice product and is started from the Solstice Launcher window.

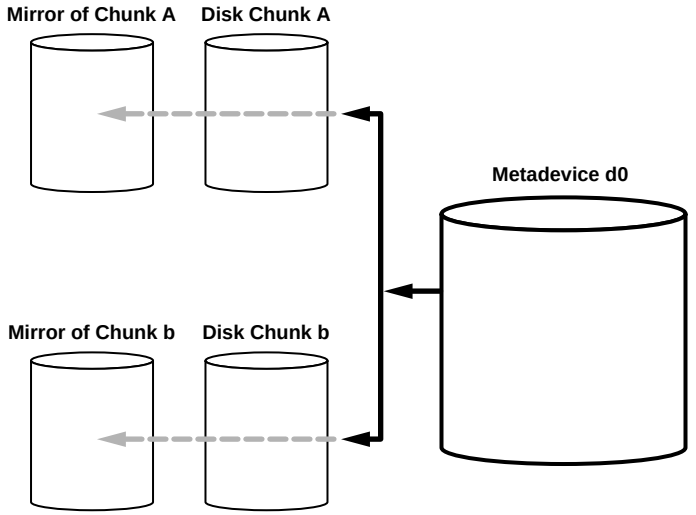
For further details, refer to the Solstice DiskSuite Reference Guide.

How Metadevices Can Improve Performance

When the system makes simultaneous read/write requests to the disk, the read/write heads waste time moving between the multiple track areas involved. If the data is spread across a number of disk drives, the different drives can work in parallel, particularly for random data access.

Using metadevices to stripe and mirror data across multiple physical disk drives substantially increases data throughput.

Figure 7-2: Mirrored Metadisks



If the data is striped across the metadevice, each physical drive can read the metadevice data simultaneously. If the metadevice is mirrored, the physical drives have a second source of data when the first metadevice a drive accesses is busy, instead of waiting. If metadisks are mirrored, then for each read request, a second source of data is available. The read request could be passed to the normal metadisk or to its mirror, depending on which metadisk is busy.

8

Backup and Restore

This chapter describes the backup and restore facilities provided as part of Solaris 2.6 or newer operating system. In particular it provides an example of how to use `ufsdump` and `ufsrestore` to backup and restore filesystems.

This chapter covers the following topics:

Overview

System hang-ups and hard disk problems are hazards even with the most reliable computer systems and there is always a risk that valuable data may be lost. In the case of the VoyagerIIi, hard disks are removeable and can be lost or damaged while they are removed from the system. Therefore, it is vital to maintain regular backups of your work and of essential system configuration files.

Backup Strategies

Usage and filesystem structures vary widely from system to system so you must customize your backup strategy for your individual needs. The following observations may help in devising your strategy:

- Your system runs the standard Solaris operating system with backup capabilities identical to those of a conventional desktop system, including `tar`, `cpio` and `ufsdump`.
- The preloaded operating system may be supplied on a CD-ROM and you can re-install it very easily.
- Consider any portability factors of different media that may be applicable in your situation. The Tadpole-RDI removable disk packs provide lightweight options powered from the system's internal power supplies.

Further Information

The Solaris operating system contains many facilities for automated backup in a large networked environment. This guide can only describe very basic backup and restore facilities. For a complete description of the backup and restore capabilities of Solaris, refer to the included documentation.

File Backup Facilities

For most purposes, `tar` and `cpio` are adequate for saving important files to tape or floppy disk. They are sufficient to save small amounts of data and have the advantage of allowing you to back up both local and remote filesystems mounted via NFS.

Tar Command

For example, the `tar` command could be used to make a backup of your `/export/home` directory to tape as follows:

```
$ tar cvf /dev/rmt/0 /export/home
```

As another example, to save the file `mywork` to a formatted floppy disk using a SCSI floppy disk drive, the command would be as follows.

```
$ tar cf /dev/diskette mywork
```

To list the contents of the archive on the floppy in the form displayed by `ls -l`, the command would be:

```
$ tar tvf /dev/diskette
```

To extract the archive from the floppy the command would be:

```
$ tar xvf /dev/rdiskette mywork
```

For further information about `tar` and `cpio`, please consult the Solaris documentation.

Backing Up Filesystems

To backup a complete filesystem (or single disk partition), you can use the `ufsdump` command. The general syntax for the command is as follows:

```
# ufsdump options arguments filesystem
```

Where `options` is a list of options to be used for this backup and `arguments` is a list of arguments that correspond to the list of options in the *same order*.

CAUTION: Supply the arguments in the same order as their corresponding options. For example:

```
ufsdump 0sd s-arguments d-arguments
filesystems
```

If you enter the commands in the wrong order, you could completely destroy the filesystem you are attempting to backup.

For example, to create a backup of a disk partition on a 5.0 Gbyte tape unit 0, the following command would be used:

```
# ufsdump 0fu /dev/rmt/0 /dev/dsk/c0t0d0sn
```

`0fu`	is a list of options. `0` specifies the backup level, in this case a full backup; `f` specifies that the dump is to be directed to something other than the default device; and `u` specifies that the `/etc/dumpdates` file should be updated with a record of this backup.
`/dev/rmt/0`	is the device to which the archive is to be directed. This argument corresponds to the `f` option.
`/dev/dsk/c0t0d0sn`	is the block disk device being backed up where `n` is the disk slice.

Backing Up Partitions to Tape

To backup the individual disk partitions on your removable hard disk drive, you can use the following sequence of commands, one for each partition to be backed up:

```
# ufsdump 0cfb /dev/rmt/0n 64 /(slice 0)
# ufsdump 0cfb /dev/rmt/0n 64 /var(slice 3)
# ufsdump 0cfb /dev/rmt/0n 64 /opt(slice 5)
# ufsdump 0cfb /dev/rmt/0n 64 /usr(slice 6)
```

The options used in these examples specify a level `0` or full backup, using a cartridge tape at `/dev/rmt/0n`, where `n` specifies the “no rewind”. The no rewind is most important for this type of backup scenario to prevent each subsequent dump from overwriting the last one. In this case, the argument `/dev/rmt/0n` corresponds with the `f` option, and the `64` argument corresponds with the `b` (block size) option.

CAUTION: Restore the partitions in the same order they were backed up.

Making a Complete Tape Backup – Worked Example

This example creates a tape backup of the backup partition of your removable hard disk drive. This is a special partition that spans the whole drive to make it more convenient to backup the entire contents of the removable hard disk drive.

1. Ensure that the system was previously shut down, not just suspended.
2. Connect a tape drive to your system with a SCSI Target ID of 4.
3. Power on the external drives and your system.
4. When the OpenBoot greeting is displayed, press **Stop-A** on the keyboard. The OpenBoot `ok` prompt is displayed.
5. Boot the system with the following command:

   ```
   ok boot -r
   ```

6. Log in as root.
7. At the Solaris command prompt, type the appropriate `ufsdump` command. For example, to create a backup of the root partition `c0t0d0s0` on a 5.0 Gbyte tape unit 0:

```
# ufsdump 0cfb/dev/rmt/0n 64 /dev/dsk/c0t0d0s0
```

Backing Up Onto an External Hard Disk

You can backup disk partitions to another locally connected disk drive with the `ufsdump` command. For example, to backup each partition in turn to an external hard disk, the commands would have the following syntax:

```
# ufsdump 0f /external/usr_arch_ddmmyy /usr
```

Where:

`/usr_arch_ddmmyy`
: is the name of the dump file. The `arch` element used in this example is an arbitrary reminder to the user at a future date that this is an archive, and `ddmmyy` provides an arbitrary date stamp.

Restoring Filesystems

You can restore filesystems from a `ufsdump` archive using the `ufsrestore` command.

CAUTION: It is important to restore the partitions in the same order they were backed up. See the example in "Backing Up Filesystems" on page 8-4.

Carry out the restore procedure as follows:

1. Connect the backup drive to your system. A tape drive should be connected at SCSI ID 4 or an external hard disk drive at SCSI ID 0, 1 or 2.
2. Power on your system and external drive.
3. Connect the CD-ROM drive to your system at SCSI ID 6.
4. If you are using a tape device, ensure that the backup tape is rewound by logging in as root and entering the following command at the Solaris prompt (assuming that the backup device used was `/dev/rmt/0n`):

   ```
   # mt -f /dev/rmt/0n rewind
   ```

5. Reset your system by entering the following commands:

   ```
   # sync
   # init 5
   ```

6. Power up your system and external drive and when the OpenBoot greeting is displayed, press **Stop-A** on the keyboard. The OpenBoot `ok` prompt is displayed.

7. Place the Solaris operating system CD in the CD-ROM drive and boot the system with the following command:

   ```
   ok boot cdrom -s
   ```

8. You will be logged in as root, in a Bourne shell, and at the Solaris prompt, restore each partition in turn with the following sequence of commands:

This example restores the partitions in the order they were backed up. See the example in "Backing Up Filesystems" on page 8-4.

To restore the `root` filesystem to your hard disk:

```
# cd /
# mount /dev/dsk/c0t0d0s0 /a
# cd /a
# ufsrestore -rf /dev/rmt/0n
# rm restoresymtable
```

Change the directory to the one acting as the mount-point directory for the partition that is being restored (in this instance, the **`/a`** directory). The **`ufsrestore`** command restores files starting with the current directory. Failure to observe this rule may cause you to restore files into the wrong partition.

9. After restoring the files into the root partition (disk slice 0) you must recreate the Solaris Operating System Bootblock so the disk can be used as a bootable disk.

10. To install the bootblock on the disk, use the following commands:

```
# cd /usr/platform/‘uname -i‘/lib/fs/ufs
# installboot bootblk /dev/rdsk/c0t0d0s0
```

11. To restore the remaining partitions, you would give the following commands:

    a. To restore the `var` filesystem to your hard disk.

```
# cd /
# umount /a
# mount /dev/dsk/c0td0s3 /a
# cd /a
# ufsrestore -rf /dev/rmt/0n
# rm restoresymtable
```

    b. To restore the `opt` filesystem to your hard disk.

```
# cd /
# umount /a
# mount /dev/dsk/c0t0d0s5 /a
# cd /a
# ufsrestore -rf /dev/rmt/0n
# rm restoresymtable
```

    c. To restore the `usr` filesystem to your hard disk.

```
# cd /
# umount /a
# mount /dev/dsk/c0t0d0s6 /a
# cd /a
# ufsrestore -rf /dev/rmt/0n
# rm restoresymtable
```

12. At the Solaris prompt, enter the command:

```
# cd /
# umount /a
```

13. Reboot the system by entering the command:

```
# reboot -- -r
```

The examples above all end with the command “rm restoresymtable”. Do not remove this file until after a complete restore has been performed. The **`restoresymtable`** file contains details of restored files and is not required once the restore operation (of a level 0 backup) has been completed.

Re-installing the Operating System from CD-ROM

The Solaris operating system can be re-installed on your hard disk from a CD-ROM. Typically, this is only necessary to configure a new hard disk drive, to recover from a serious operating system problem, or following a memory upgrade.

When you install Solaris from a CD-ROM you can follow the default option or customize the hard disk's partition map. The table below shows an example of a partition map for a hard disk installed from the CD using the default options except for the `var` partition that was explicitly selected. The resulting partition map differs from the factory installed partition map.

Table 8-1: Example Partition Map

System Partitions	Tag	Approximate Size (MB)
/dev/dsk/c0t0d0s0	/	256
/dev/dsk/c0t0d0s1	swap	128
/dev/dsk/c0t0d0s2	overlap	(Entire) Disk size
/dev/dsk/c0t0d0s3	var (if selected)	256
/dev/dsk/c0t0d0s5	/opt	600
/dev/dsk/c0t0d0s6	/usr	850
/dev/dsk/c0t0d0s7	/export/home	Remainder of disk

Restoring the complete factory installation from CD-ROM involves the following steps:

- Loading a version of the Solaris operating system from a CD-ROM.
- Rebooting your system.

CAUTION: The Solaris install program will destroy all of the data on your hard disk. Before installing Solaris onto a previously used disk, make backups of all filesystems so you can recover your data afterward. See Chapter 8, "Backing Up Filesystems."

Loading Solaris

1. Connect the CD-ROM drive to your system at SCSI ID 6.
2. Power up your system and external drive.
3. When the OpenBoot greeting displays, press **Stop-A** on the keyboard. The OpenBoot `ok` prompt appears.
4. Boot the system with the following command:

   ```
   ok boot cdrom
   ```

5. After a delay, the Solaris installer window is displayed. Follow the displayed instructions to install Solaris.
6. When the Solaris installation is complete, use backups created before the install was started to restore your data and configuration files into the newly created filesystems. Alternatively, you can configure a new hard disk for your system as described in "Initial Configuration – Worked Example" on page 4-3.

9

Using the Network Interface

This chapter provides an introduction to networking concepts, with particular regard to mobile computing and describes how to connect your system to a network and configure the network interface.

This chapter covers the following topics:

Network Terminology

Some of the terms used in this chapter are explained below:

Client — A network *client* machine is a system that uses the services provided by a server machine for disk storage space, printer access, or some other network-wide service.

Domain — The name assigned to a group of machines within an organization on a site is a *domain*.

DNS — Domain Name Service (DNS). A service that allows systems on a network to obtain the IP Addresses of other systems on a network from a server.

Host Name — The name given to a computer so other users can refer to it easily from the network.

Internet — The name given to a wide area network (WAN) that spans the world. Many servers are connected to this network, providing clients access to the Internet.

IP Address — A unique number assigned to each machine on the network. Each system address has a corresponding system name, or hostname.

NFS The Network File System (NFS) allows you to use directories or files on a remote machine as if they were actually on your own computer.

NIC Network Information Center (NIC). Internet addresses are allocated and administered globally by an International Network Information Center.

NIS Network Information Service (NIS). A service that allows systems on a network to obtain the host names and IP addresses of other systems on a network from a server. Using NIS is not recommended for systems that are frequently operated away from the network.

RJ45 The type of connector used to connect the system to a network via an Ethernet cable system.

Server A machine that provides services to other machines on the network, such as providing network-wide disk, backup, or printing services.

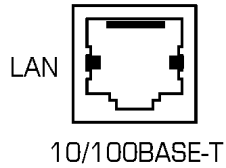
TCP/IP Transmission Control Protocol/Internet Protocol (TCP/IP) is a family of protocols that determine how data is transferred across a network.

Connecting Your System to a Network

Your system can be connected to a network via the built-in network interface or via suitable PCMCIA adapter card.

There are several different types of physical media you can connect to a system's Ethernet interface. The VoyagerIIi supports a direct 10/100Base-T connection to a hub or another network device. Your system provides an RJ45 connector located on the I/O panel, as illustrated below.

Figure 9-1: RJ45 Connector



Before you can operate your system on a network, it must be configured correctly, as described in "Configuring Your System for a TCP/IP Network" on page 9-10.

An Overview of TCP/IP Networking and the Internet

All computers connected to an Ethernet network, either directly or via a telephone line, can potentially access computers all over the world via the Internet. For this to be possible, every computer needs a unique identity so that data and messages can be sent and received anywhere in the world.

Although an in-depth study of networking is beyond the scope of this manual, this section provides a useful overview of how the Internet uses a system of network domains and internet protocol (IP) addresses to make data communications possible over the Internet.

Internet Addresses

Every device connected to a network must have a unique address and must know the address of every other machine on the network that it is going to communicate with. Internet Protocol (IP) addresses are used to uniquely identify each machine on the Internet throughout the world. IP address allocation is normally managed by a single person at a particular site, often called the system administrator, who is responsible for the reliable operation and security of an organization's network.

If you do not belong to an organization with its own internal network, you may gain access to the Internet via modem through a local Internet Service Provider (ISP).

Classes of Address

IP addresses consist of 32 bits and are normally written as four decimal numbers each in the range 0-255 and separated by periods. IP addresses have the following form:

```
a.b.c.d
```

For example, a typical IP address for a computer might be:

```
192.3.4.56
```

Any leading zeros are discarded.

The address functions in two parts. The first part is used to identify a particular network. The second is used to identify an individual computer, normally called a *host*, attached to that network. The proportion of the address used for each function depends upon the class of the network. There are three network classes, as summarized in the table below.

Table 9-1: ID Address Name Structure

Class	Range	Network Portion	Host Portion	Likely Usage
A	1-126	a	b.c.d	Only the largest networks are assigned Class A addresses.
B	128-191	a.b	c.d	Large organizations and groups of subnetworks sometimes have a Class B address.
C	192-224	a.b.c	d	Networks for the majority of companies are Class C networks.

The majority of smaller organizations use class C addresses, which provide 254 possible host addresses on their network. By convention, host address 0 is used to represent the network itself and 255 is used as a broadcast address. A message sent as a broadcast on a network is received by every other host attached to that network.

In addition, address 127.0.0.1 is used as a *loopback address*; data sent to this address is transmitted back to the same host for testing. This address is usually given the hostname *localhost* in the `/etc/hosts` file (described later in this chapter).

Addresses Used by Systems Not Connected to the Internet

By convention, sites that are not connected to the Internet often use 192 or 193 as part a of their network address. However, even if you do not intend to access the Internet immediately, you are advised to obtain an official Internet address for your site.

Network Names

The global Internet is organized into a hierarchical structure of *domains* that follow the network's organizational and geographical structure. At the top level, or *root domain,* the Internet is organized into a number of domains that reflect the type of organizations or geographical territories within them. For example, `.com` identifies a *domain* used by commercial organizations most often in the United States. There also exist codes for individual countries such as `.uk` for the United Kingdom or `.fr` for France.

Commercial companies, educational establishments, and government departments can access the Internet within these domains either directly or through an access provider.

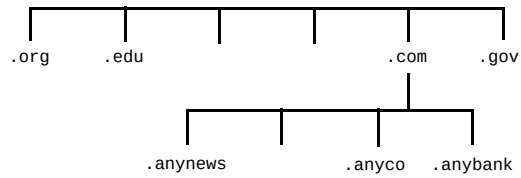
The Internet address for an organization consists of a name that is unique to that organization.

For example, a company attached to the .com domain could have the address:

```
anyco.com
```

The diagram in Figure 9.2 shows three fictitious commercial organizations attached to the `.com` domain. An individual computer called `medoc` attached to a LAN segment within the company called anyco would have the address: `medoc.anyco.com`

Figure 9-2: Domain Structure



Individual users can be addressed using this scheme. For example, a user called Liz Turner who uses `medoc` at `anyco`, might have the address:

```
liz_turner@medoc.anyco.com
```

Simpler e-mail addresses may be recognized by a mail server that uses database files to recognize the intended destination from Liz Turner's e-mail address of:

```
liz_turner@anyco.com
```

Accessing the Internet

To allow access to computers attached to other networks or to the Internet, a router or gateway is normally required. The router or gateway functions are performed by computers with multiple network connections that provide the necessary link between the Internet and an organization's internal LAN segments. They ensure that messages in the form of data packets are routed according to destination. A gateway may also be used to provide security against unauthorized intrusion.

Figure 9-3: Example Diagram of a Local Area Network

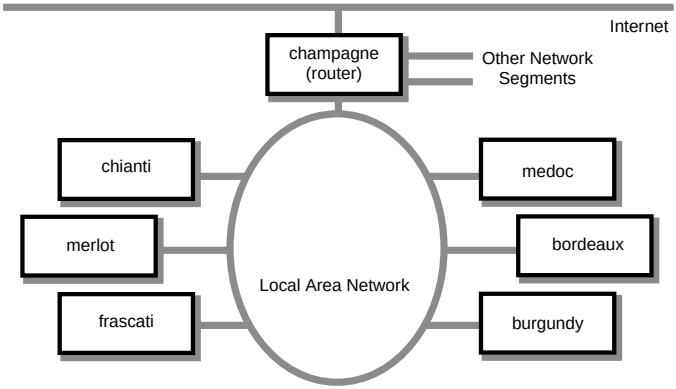


Figure 9-3 shows a LAN within the organization anyco. Each computer has a unique IP address and host name that allow messages to be routed correctly between them and the outside world. Subject to access privileges, the various computers are able to share applications and files. In this case, champagne functions as a router and controls data movement between this segment and any others within the same organization and provides access to the Internet.

Configuring Your System for a TCP/IP Network

The steps required to configure your system for a TCP/IP network are as follows:

- Configure a host name and IP address
- Configure your system to use DNS (optional)
- Configure your system to use a router (optional)
- Reboot and test the system.

Assigning a Host Name and IP address

Although you may have already assigned a host name and IP address to your system during initial system configuration (see Chapter 4, "Initial System Configuration") you may need to change these details occasionally if your system is mobile. In this case, consult the network administrators responsible for these networks.

Simple Configuration Using ifconfig

Use the `ifconfig` command to set the basic characteristics of the network interface, the most important of which is to associate an IP address with the interface. For example:

```
ifconfig    le0    195.5.2.15    netmask
255.255.255.0 broadcast 195.5.2.255
```

Configuring Your System By Editing the Hosts Files

The `/etc/inet/hosts` file contains the name-to-address mapping for every host on the network, including the local host itself. On a Solaris system, the `/etc/inet/hosts` file name is symbolically linked to the file name `/etc/hosts`. Either of these file names can be referred to as the `hosts table`.

Whenever a new machine is added to the network, you must update the `hosts table` on each host already connected to the network to allow them to communicate.

The initial configuration you carried out when you first powered your system on will have created an `/etc/inet/hosts` file similar to the following:

```
#
# Internet host table
#
127.0.0.1 localhost
195.5.2.15 chianti loghost
```

The address and hostname used here are examples only. Substitute your system's address and hostname.

You must add an additional line for each machine that you need to communicate with on your network. To edit the `/etc/inet/hosts` file, you must be logged in as root. You can edit the file using a text editor or with `vi` at the Solaris command prompt.

Each line contains the following information:

```
ip-number hostname #comments
```

For example, the following might be the host file for the network of machines illustrated in Figure 9-3 on page 9:

```
#
# Internet host table
#
127.0.0.1 localhost
195.5.2.15 chianti loghost # my system
#
195.5.2.10 champagne# internet router
195.5.2.54 burgundy
195.5.2.55 bordeaux
195.5.2.57 frascati
195.5.2.58 merlot
```

Configuring Your System to Use a Name Server

You are strongly advised not to use NIS or NIS+ with your system if you intend to use your system as a mobile computer. Using NIS or NIS+ may prevent your system from starting up properly if it is not connected to a network and cannot communicate with the NIS name server.

You can configure the system as a *Domain Name Service* (DNS) client by creating the configuration file `/etc/resolv.conf`. This file lists the local domain name and location of name servers for the local network. For example, in the case of the network illustrated in Figure 9-3 where champagne is the name server, `/etc/resolv.conf` would be similar to the following:

```
#
# Name Server Lookup
domain anyco.com
nameserver 195.5.2.10
```

The file could contain a list of several name servers, if required.

The `/etc/inet/hosts` file is much simpler for the DNS client and need only contain the hostname and IP address of your own system and the name server. For example, the `/etc/inet/hosts` file for a machine attached to the network in Figure 9-3 would be similar to the following:

```
#
# Internet host table
#
127.0.0.1 localhost
195.5.2.15 chianti loghost # my system
#
195.5.2.10 champagne# internet router
```

Setting Up a Default Router

Configure your system to use a default router by creating a default router file, `/etc/defaultrouter`, containing the IP address of the specified router. For example, the `/etc/defaultrouter` file for a machine attached to the network in Figure 9-3, with the router champagne, would be:

```
# defaultrouter
192.5.2.10
```

Testing Your Network Connection

Reboot your system after all the necessary configuration files have been created and correctly edited. This will activate the changes and you can test the network connection.

The most basic test of a network connection is the `ping` command. If `ping` works, your connection is working and the basic configuration is correct. The command syntax for `ping` is:

```
# ping hostname
```

You must be logged in as root to use `ping`. For example, to test communications with a machine connected to the local network in Figure 9-3, you would use this command:

```
# ping burgundy
burgundy is alive
```

Use the `-s` option with the command to obtain more detailed output.

To test the Internet connection to a company called `otherco`, you would use this command:

```
# ping otherco.com
otherco.com is alive
```

If using hostname does not work, try using the IP address:

```
# ping 195.5.5.1
195.5.5.1 is alive
```

Problems using the `ping` command may be caused by an incorrect setting in the `/etc/nsswitch.conf` file, which controls access to Naming Service information. Refer to the Solaris manual pages on `nsswitch.conf` for additional information about this file.

Sharing Filesystems

The Sun Network File System (NFS) allows you to set up distributed filesystems enabling files and applications on one host to be shared across the network by other hosts. This section provides a brief overview of how to set up a distributed filesystem using NFS.

File Sharing and Suspend and Resume

Many problems associated with Save/Suspend and Resume arise when file sharing is being used. This is particularly true if you are running applications located on a server machine. The scenario is frequently as follows: you power off with a Save; remove your system from the network; and then attempt a Resume with no network connection. The server machine cannot be reached and the Resume cannot complete because your system cannot Resume the same operational state.

To prevent this situation from arising, you should always observe the following precaution before powering off with a Save and removing your system from the network.

Always unmount shared directories. Comment out any lines in the `/etc/vfstab` file that automount an NFS filesystem by placing a # at the start of the line.

For more information refer to Chapter 10, “Suspend and Resume”.

Sharing Local Filesystems

To allow others to access parts of the filesystem on your system, you must *share* the filesystems you wish to make available. To make the whole filesystem available, you can specify the root directory, but normally you would only allow access to specific files or directories.

Configuring the /etc/dfs/dfstab File

The `/etc/dfs/dfstab` file controls access by other hosts to the local filesystem and consists of a number of lines containing the mount point followed by one or more hostnames, identifying the hosts that may access the exported filesystem. This file will not exist if you have not previously used NFS to export files, but can be created and edited with a text editor such as `vi`.

Each line has the following syntax:

```
share -F nfs -d "text" pathname -option,option…
```

Where:

`share`	is the command used to share directories
`-F nfs`	designates that the directory is to be shared using NFS
`-d "text"`	is the descriptive text that will be displayed by certain NFS-related commands
`pathname`	is the file or directory to be exported
`option`	specifies the type of access to be given, such as `ro` for read-only or `rw` for read-write access.

For example, the `/etc/dfs/dfstab` file on `merlot` attached to the network shown in Figure 9-3 might have the following lines:

```
#Place share(1M) commands here for
automatic execution
#on entering init state 3.
#
#Issue the command
'/etc/init.d/nfs.server start' to ...
#daemon processes and the share commands,
after adding ...
#first entry to this file.
#
#share [-F fstype] [-o options] [-d
"<text>"] ...
#.e.g,
#share -F nfs -o rw=engineering -d "home
dirs" ...
/usr/anywork -rw=medoc,
access=chianti:burgundy, \     anon=-1
/usr/anybrowse -ro
```

In this example, `medoc` has read-write access to the directory `/usr/anywork`; `chianti` and `burgundy` have read-only access; and the `anon=-1` entry prevents any anonymous accesses. The second entry allows anonymous read-only access to `/usr/anybrowse`.

Enabling File Sharing

To allow these directories to be shared, you can either reboot the operating system (but not with Save and Resume) or use the following commands:

```
# /etc/init.d/nfs.server start
start the NFS server daemons
# shareall
share the specified directories
(listed in the dfstab file)
# dfshare
list the directories that are being shared
```

If you have added directories to an already existing `/etc/dfs/dfstab` file, the NFS daemons will already be running. You may only need to enter the `shareall` command.

Disabling File Sharing

Before disabling file sharing, check to see if any files are being shared with the `dfshares` command without arguments. This produces a list of shared directories. You can unshare directories at any time by using the `unshare` or `unshareall` commands. For example:

```
# unshare /usr/anywork
halt NFS access to /anywork
# unshareall
halt NFS access to all directories
# dfshares
list the directories that are being shared
(the list should be empty)
```

Mounting Filesystems

Use the `mount` command to use a directory that has been made available for sharing. This allows you to attach remote filesystems to your own filesystem tree and access them as a normal part of your own filesystem. You may need to create a directory as a mount point and then mount the remote filesystem. For example, Liz Turner on the machine `medoc` wishes to mount the directory `/usr/anywork`, which resides on the machine `merlot`, and access it within her home directory `/export/home/lizt` in a subdirectory called `mywork`. The steps required would be as follows:

1. Create the new directory

```
$ mkdir /export/home/lizt/mywork
```

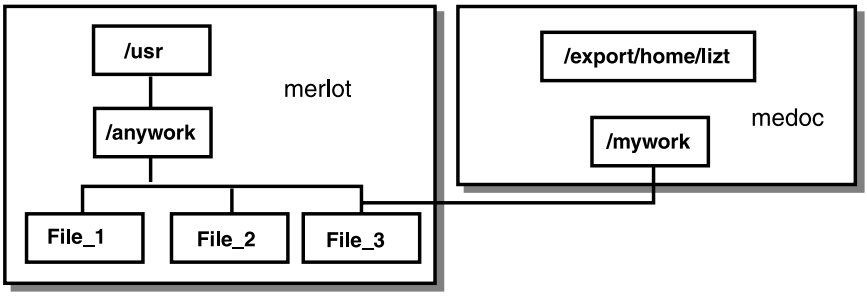
This step is only required if the directory does not already exist. However, using an existing directory as a mount point will prevent you from accessing files already in that directory while the remote filesystem is mounted.

2. Mount the remote directory

The `mount` command can only be executed by the superuser. The command to mount the directory must, therefore, be executed as root.

```
# mount merlot:/usr/anywork
/export/home/lizt/mywork
```

Figure 9-4: Mounting a Remote Directory



The figure above illustrates the effect of mounting the remote directory on the local directory tree. Note that although this directory has the name `/usr/anywork` on `merlot`, access to the directory from the local host (`medoc`) uses the name of the mount point `/export/home/lizt/mywork`. For example:

```
$ pwd
/export/home/lizt
$ ls mywork
File_1 File_2 File_3
```

Automatic File Mounting

You can mount a remote directory automatically at boot time. To set this up, you need to log in as root and add a line to the `/etc/vfstab` file using a text editor, such as vi.

For example, to mount `/usr/anywork` on a machine called merlot, at boot time, as `/export/home/lizt/mywork` on a machine called medoc (as in the previous example), the following line would be added to the `/etc/vfstab` file on medoc:

```
merlot:/usr/anywork - /export/home/lizt/mywork nfs -
yes rw,hard,intr
```

Where the fields are assigned as follows:

`device to mount`
: This is the device name for a local file system or `host:pathname` for a remote directory.

`device to fsck`
: This specifies the raw device to `fsck`. In the case of an NFS filesystem, a dash (–) should be used.

`mount point`
: This is the directory where you will mount the remote filesystem. The directory must exist for the mount to succeed.

`FS type`
: This is the type of filesystem. Normally `ufs` for a local filesystem or `nfs` for a network filesystem.

`fsck pass` This is the number of times to carry out a filesystem check. In this case a dash (–) means none. This is normally 1 for the root filesystem, 2 for all other local filesystems or 0 for remotely mounted filesystems.

`mount at boot`
This specifies whether or not to mount the filesystem automatically at boot time.

`mount options`
This field specifies mount options, such as read-only (`ro`), read-write (`rw`) and no superuser privileges (`nosuid`). Other useful options for remotely mounted filesystems are `hard` and `intr`, which together enable the local user to interrupt (with **Ctrl-C**) or to kill hung processes that may occur if the network link is disrupted.

Unmounting a Remote Filesystem

You can only unmount remote files while logged in as root. Use the `umount` command. For example:

```
# umount /export/home/lizt/mywork
```

Unmounting is recommended whenever you intend to use your system away from the current network. Always unmount remote filesystems before a Save if the filesystem is not going to be available when you Resume.

Executing Remote Commands

A number of TCP/IP commands are provided that can be executed remotely on other machines on the network, subject to permissions. The most important of these commands are as follows:

`rcp`	Copies files over the network between UNIX hosts.
`rlogin`	Logs you in to remote UNIX hosts over the network if you have an account. Supply a password if required by the remote system.
`rsh`	Execute a single command on a remote UNIX host.
`ftp`	Copies files over the network between hosts using file transfer protocol.
`telnet`	Logs you in to any reachable remote system where you have an account.
`finger`	Finds out information about users on remote systems.

Copying Files

The syntax for copying files with `rcp` is as follows:

```
$     rcp     [-r]     [fromsys:]filename
[tosys:]filename
```

For example, to copy the file `swdemo` from the current directory on the local machine into the `/tmp` directory on the machine called burgundy, you would use the following command:

```
$ rcp swdemo burgundy:/tmp/swdemo
```

Note that you do not need to specify the name of the local host in the command.

Remote Program Execution

You can execute a single command on a remote machine without logging in if you have the necessary privileges. The command syntax is as follows:

```
$ rsh sysname command
```

For example, to list the files in `/home` on the machine called burgundy you would type the following:

```
$ rsh burgundy ls /home
```

Notes

10

Suspend and Resume

This chapter discusses the use of the Suspend and Resume feature. This provides an easy way to start and stop your VoyagerIIi without having to perform lengthy shutdown and startup procedures.

This chapter covers the following topics:

How Suspend and Resume Functions

The operation of Suspend and Resume can be summarized as follows:

Suspend

- When you use the suspend function, your VoyagerIIi copies the contents of the system's memory and system operating parameters into the `.CPR` file on a specified partition and sets the save state as valid in the `.cpr.default` file.

Resume

- When the system attempts to boot, the **ufs** boot program looks for a valid **cpr** dump file. Provided the OpenBoot variable `noresume` does not exist and it finds valid save data, the system resumes to exactly the same state as when the save was initiated *for that disk*. If there is no valid save data available, your VoyagerIIi carries out a conventional Solaris system startup.

CAUTION: Unexpected operations may occur if you try to resume with a disk saved on a VoyagerIIi that has a different hardware configuration, such as a larger main memory.

Powering Off Using Suspend

You can initiate a Suspend in several ways:

- Select **Suspend** from the OpenWindows desktop Utilities menu.
- Type the appropriate commands at the Solaris root prompt.

You do not have to close applications because they remain completely unaffected by Suspend and Resume, allowing you to take up work exactly where you left off.

How To Ensure Suspend and Resume Operates Successfully

Your VoyagerIIi resumes most reliably if the hardware facilities are the same before and after Suspend is performed.

Do not make hardware configuration changes while your system is powered off, particularly with hard disks, tape drives, CD-ROMs, and PCMCIA memory cards that are mounted as part of your file system, and to network connections that may change.

Your VoyagerIIi cannot resume successfully to a file tree that is no longer there. To prevent problems, observe the following precautions:

- Always unmount file systems on drives that are likely to be disconnected before you power on again.
- Always unmount network file systems if your VoyagerIIi's network connection is likely to change before you power on again.

What To Do If Resume Fails

If your system fails to Resume, carry out a full system reboot with the following procedure:

1. Power off again.
2. Wait a few moments and restore power.
3. When the OpenBoot greeting is displayed, press **Stop-a**. The OpenBoot `ok` prompt is displayed.
4. Enter the following commands:

```
ok create no-resume?
ok boot disk
```

Your VoyagerIIi carries out a full system boot.

Suspend and Resume and Security

If a user was logged on to a machine prior to a Suspend operation, the system will resume but prevent access by requiring the user to re-enter his or her password. However, if the user does not have a password configured, the system is instantly accessible to anyone.

One way to further protect your VoyagerIIi against unauthorized use is to remove the hard disk while the power is off. Replace it again when you next wish to use your VoyagerIIi, before you power on.

If you are not satisfied with this level of protection, you have the following options:

- Power off using a conventional Solaris system shutdown. To do this, log in as root and enter the `init 0` command.

  This takes the system down to the OpenBoot prompt and a safe state for power off. The next time you power on, your VoyagerIIi carries out a full system startup and not a Resume.

- Disable Suspend and Resume altogether, as described below.

If either of these issues poses a serious problem, the Suspend and Resume facility can be disabled. Comment out the “statefile” entry in the `/etc/power.conf` file.

Notes

11

Removable Disk Packs

This chapter discusses how to use your VoyagerIIi's removable hard disk packs. It describes how to fit and remove the disk packs, how to use additional disk packs, and how to ensure a basic level of security.

This chapter covers the following topics:

Overview

You can easily remove your VoyagerIIi's disk packs when your system is not in use and store or carry them separately. Removable hard disks provide effective data security for your VoyagerIIi when it is not in use and allow you to upgrade your hard disks very easily as larger capacity disk drives become available.

It is possible for you to have several boot disks for several different projects, or for different people who share a VoyagerIIi system to each have their own boot disk pack.

Using the Suspend and Resume feature, each disk can store a different machine state that your VoyagerIIi resumes when you next power on. This means, for example, that when you power on with your training disk installed, your VoyagerIIi resumes to the state saved on your training disk.

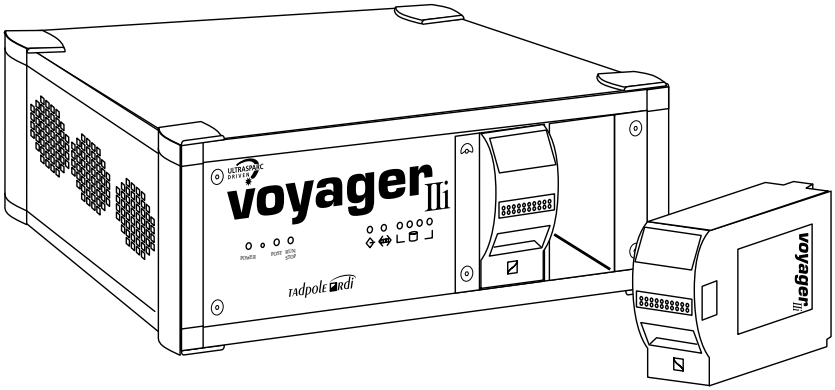
Installing and Removing the Hard Disk

Your VoyagerIIi is shipped from the factory with disk packs already installed and ready for you to use. These disk packs can be removed as follows:

CAUTION: Ensure that your VoyagerIIi is powered OFF before removing a disk pack. Removing a disk pack while your system is running may damage the disk and destroy important data.

1. Place your VoyagerIIi on a firm surface, such as a desk.
2. Lift the disk pack's catch, as shown in Figure 11-1.
3. Pull on the catch to remove the disk from your VoyagerIIi.

Figure 11-1: Removing the Disk Packs



Caring for Removable Disk Packs

The removable hard disk packs are robust, but should be handled with care. Follow these precautions:

- ***Physical shock and vibration***: Protect the disk pack from jarring and excessive vibration.
- ***Power***: You should never remove the hard disk while power is on; always power off first.
- ***Condensation***: If your disk packs are carried separately from your VoyagerIIi and are subjected to much lower temperatures, bringing them into a warm room may cause condensation. This may cause damage, so you should allow time for your disk packs to acclimatize before use.
- ***Static electricity***: Do not touch the electrical contacts on the disk pack to prevent damage by static discharge (ESD).

Boot Disk Partitions

The hard disk pack supplied with your VoyagerIIi is preloaded with a Solaris operating system; the version is dependent upon availability and customer order. The removable disk is preconfigured as a boot disk and is "factory" partitioned.

The `swap` partition is used by the operating system to store applications that are running in the background. Its size, therefore, is affected by the size of the main memory of your VoyagerIIi.

Using Additional Removable Hard Disks

You can obtain additional removable hard disk packs from your supplier. These are supplied blank for use as additional data storage. You must configure each new disk pack for your VoyagerIIi when it is first used.

Removable Hard Disk Security

The disk packs provide your system with a basic level of security because you can remove them from your VoyagerIIi when it is not in use. However, it is equally possible for an unauthorized person to remove the disk pack. The disk pack can be installed into a similarly configured VoyagerIIi, allowing your files and applications to be accessed.

Notes

12

Using SCSI Devices

This chapter describes how to connect and use external SCSI devices. It describes how to set the SCSI ID and termination correctly and provides an example of how to connect and configure an external SCSI hard disk.

This chapter covers the following topics:

Overview

The system provides a single-ended Ultra-Wide Small Computer System Interface (SCSI) port located on the rear panel. An industry-standard 68-pin high density Ultra-Wide SCSI connector is provided.

How to Ensure Reliable SCSI Operation

To ensure reliable operation of SCSI devices, always follow these hints:

- Connect SCSI devices to the bus in a "daisy-chain" configuration, using a single cable to join each device to the one before it.
- Install an active SCSI terminator on the device at the far end of the bus from the system. Your VoyagerIIi has a built-in active terminator for its end of the SCSI bus.
- Allocate a unique ID for each SCSI device according to its user documentation. The default SCSI ID for the VoyagerIIi is 7. (See "Configuring an External Hard Disk" on page 12-8 for instructions on how to reconfigure the SCSI ID using OpenBoot.)

- Operate only the appropriate number of SCSI devices and total allowable cable lengths for the applicable SCSI bus mode. Consult the user documentation for your devices to find the SCSI type of each one. The slowest device determines the applicable SCSI bus mode. For your reference, the maximum number of devices and cable lengths for the different SCSI modes are as follows:

Table 12-1: SCSI Device Assignments and Device File Names

SCSI Type	Number of Devices	Cable Length
Ultra SCSI (20 MHz)	4 devices	3 meters
"	8 devices	1.5 meters
Fast SCSI (10 MHz)	8 or 16 devices	3 meters
SCSI-1 (5 MHz)	8 devices	6 meters

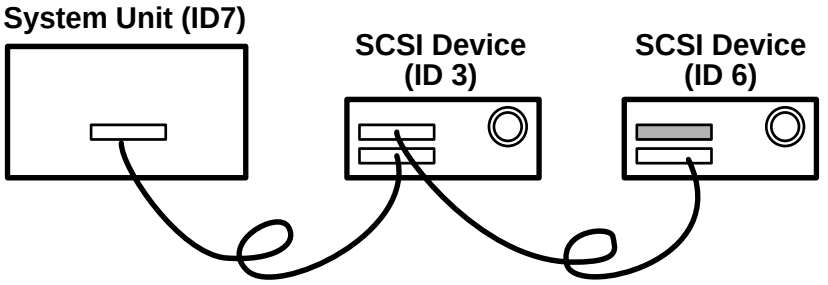
SCSI Terminators

To ensure reliable operation of your system and external SCSI devices, you must use an active terminator at the end of the SCSI chain. The system unit contains permanently fixed terminators and should, therefore, be positioned at the beginning of the SCSI chain while the device at the end of the SCSI chain will need terminators fitted or enabled.

Connecting SCSI Devices

Connect SCSI devices to the system in a *daisy-chain* arrangement as illustrated below.

Figure 12-1: A SCSI Daisy Chain Cable System



Maximum Number of Devices Supported

A SCSI chain supports up to sixteen devices including the SCSI interface within the system. The SCSI interface's target ID is ID 7. This number is set in the eeprom NVRAM settings. The eeprom parameter that holds this number is called the `scsi-initiator-id`.

To verify the eeprom setting, give the following command:

```
# eeprom scsi-initiator-id
scsi-initiator-id=7
#
```

SCSI IDs

To allow data on individual drives to be accessed, each device connected to the chain must have a unique address, or SCSI target ID. A device's target ID is not related to its physical position within the daisy chain. IDs are usually assigned in keeping with operating system conventions for devices according to type. For example, under Solaris 2.6 or above, a CD-ROM is assigned to SCSI ID 6 and the system is assigned to ID 7.

The boot disks in the system are IDE disk drives and are not relevant to SCSI ID assignment.

Every drive has one or more special files associated with it, according to its function. For example, a hard disk has a block data file and a raw data file associated with each partition in the form:

`/dev/dsk/c1t2d0s`*n*-block special device file

`/dev/rdsk/c1t2d0s`*n*-raw (*character*) special device file

The structure of the file name provides clues to the nature of the disk drive unit.

`c1` Controller 1 (SCSI controller on the internal system bus)

`t2` The target ID number of the device

`d0` The number of the disk in the disk drive unit (see note on next page)

`s0` The ***slice*** (*partition*) number on that disk device.

Partitions are numbered 0 through 7.

If a RAID disk drive unit is attached to the SCSI daisy chain, that unit may contain more than one physical disk unit. The number of the disk device would increment, by a value of 1, for each drive found in the RAID unit. For example, in a RAID drive unit that has a target ID of 2 and contains three disk drives, the device names would be the following:

`/dev/dsk/c1t2d0s0`	Slice 0 (zero) on the first disk drive in the RAID unit
`/dev/dsk/c1t2d1s0`	Slice 0 (zero) on the second disk drive in the RAID unit
`/dev/dsk/c1t2d2s0`	Slice 0 (zero) on the third disk drive in the RAID unit

On a SCSI disk, slice 2 represents the entire disk. Only slices 0, 1, and 3 through 7 should be used as partitions in which data may be saved.

The following table shows the convention for SCSI target IDs used by the Solaris 2.6 (or above) operating system. Device file names are also listed in this table.

Table 12-2: SCSI Device Assignments and Device File Names

SCSI ID	Special (Device) Files	Function
0	/dev/[r]dsk/c1t0d0s[0-7]	External Hard Disk Drive
1	/dev/[r]dsk/c1t1d0s[0-7]	External Hard Disk Drive
2	/dev/[r]dsk/c1t2d0s[0-7]	External Hard Disk Drive
3	/dev/[r]dsk/c1t3d0s[0-7]	External Hard Disk Drive
4	/dev/rmt/0[bchlmn]	External Tape Drive
5	/dev/rmt/1[bchlmn]	External Tape Drive
6	/dev/dsk/c1t6d0s[0-7]	First CD-ROM Drive
7	-	System Unit
F	/dev/dsk/c0t15d0s[0-7]	Wide Hard Disk Drive

The disk controller number has a value between 0 and 5, making a total of six possible controllers. These example device pathnames may, therefore, appear different to your system's device names. The SCSI target numbers, however, are conventional and should be the same as the examples.

Configuring an External Hard Disk

The basic procedure for connecting an external hard disk drive to the SCSI daisy chain is as follows:

- Power down the system (Do not use Suspend)
- Connect the drive and set termination and SCSI ID.
- Power up the system and enter a command to create the necessary device files.
- Format the disk if necessary and partition it.
- Create and check a file system in each disk partition that is to be used to store data in files.
- Create a mount-point directory and mount the file system(s).

Each of these steps is described in this worked example.

1. Log in as root and shut down the system using the command:

   ```
   # init 0
   ```

2. When safe to do so, power off the system.
3. Connect the new hard disk drive using the appropriate SCSI cable(s).

This example assumes that the SCSI target ID has been set to 3 on the new disk drive.)

4. Power on all peripherals. Switch the Run/Stop switch to Stop then power on the system unit. This interrupts the boot process and causes the Boot PROM monitor prompt to be displayed (see Chapter 10, "Suspend and Resume" for more information.) Switch the Run/Stop Switch to Run.

5. At the PROM ok prompt, give the following command:

```
ok boot -r
```

This command creates the necessary device files for the new disk drive unit.

6. When the system has booted, login as *root* and issue the `format` command, shown below:

```
# format
```

7. Select the appropriate disk from the list of available disks. In this worked example, we have only one disk to select from. The number selected is 0 (zero). An example is shown below:

```
AVAILABLE DISK SELECTIONS:
0. c1t3d0 <QUANTUM-FIREBALL_TM2110S-300X cyl 6483 ..
/pci@1f,0/pci@1/ide@4/dad@0,0
Specify disk (enter its number): 0
selecting c1t3d0
[disk formatted]
```

8. A menu of options is displayed. You must select the partition option by typing sufficient letters to signify this choice. As this is the only choice on the menu that begins with the letter p, you can type the letter p, then press Return. Alternatively, you can type the full word, associated with the menu choice, then press Return.

```
FORMAT MENU:
 disk - select a disk
 type - select (define) a disk type
 partition - select (define) a partition table
 current - describe the current disk
 format - format and analyze the disk
 repair - repair a defective sector
 label - write label to the disk
 analyze - surface analysis
 defect - defect list management
 backup - search for backup labels
 verify - read and display labels
 save - save new disk/partition definitions
 inquiry - show vendor, product and revision
 volname - set 8-character volume name
 !<cmd> - execute <cmd>, then return
 quit
format> partition
```

9. A list of the available partitions will then be displayed, along with more menu choices.

```
PARTITION MENU:
0 - change ‘0’ partition
1 - change ‘1’ partition
2 - change ‘2’ partition
3 - change ‘3’ partition
4 - change ‘4’ partition
5 - change ‘5’ partition
6 - change ‘6’ partition
7 - change ‘7’ partition
select - select a predefined table
modify - modify a predefined partition table
name - name the current table
print - display the current table
label - write partition map and label to the
disk
 !<cmd> - execute <cmd>, then return
 quit
partition> print
```

10. The format command now displays a list of the current partition settings.

Slice (partition) 2 represents the entire disk and should not be changed.

```
Current partition table (unnamed):
Total disk cylinders available: 6483 + 2 (reserved ...)

Part  Tag    Flag  Cylinders      Size         Blocks
 0 unassigned wm  0                0      (0/0/0) 0
 1 unassigned wm  0                0      (0/0/0) 0
 2 backup wm  0 - 6482 1.97GB (6483/0/0) 4123188
 3 unassigned wm  0                0      (0/0/0) 0
 4 unassigned wm  0                0      (0/0/0) 0
 5 unassigned wm  0                0      (0/0/0) 0
 7 unassigned wm  0                0      (0/0/0) 0
```

11. To alter the settings of any partition, you must select the number, appropriate for the partition, then enter four values. These values are the ID Tag for the partition, whether the partition is writable and mountable (or unmountable), the starting cylinder for the partition, and the size of the partition.

The size of the partition can be entered as a number of disk blocks (each 512 bytes in size), number of cylinders, Megabytes or Gigabytes.

```
partition> 0
Part Tag     Flag Cylinders Size     Blocks
 0 unassigned wm  0           0      (0/0/0) 0

Enter partition id tag[unassigned]: root
Enter partition permission flags[wm]: wm
Enter new starting cyl[0]: 0
Enter partition size[0b, 0c, 0.00mb, 0.00gb]: 4557c
```

There are only six reserved tag names that can be assigned to a partition. If you attempt to use a word that is not in the list of six reserved words, the assignment of the tag will fail. If you are unsure how the partition will be used, it is probably safer to leave the tag as unassigned.

12. The process can now be repeated for all remaining partitions that will be used as filesystem or "raw" disk space.

```
partition> print
Current partition table (unnamed):
Total disk cylinders available: 6483 + 2 (reserved cylinders)

Part  Tag    Flag   Cylinders     Size        Blocks
 0 root       wm  0 - 4556       1.38GB      (4557/0/0) 2898252
 1 unassigned wm  0              0           (0/0/0) 0
 2 backup     wm  0 - 6482       1.97GB      (6483/0/0) 4123188
 3 unassigned wm  0              0           (0/0/0) 0
 4 unassigned wm  0              0           (0/0/0) 0
 5 unassigned wm  0              0           (0/0/0) 0
 7 unassigned wm  0              0           (0/0/0) 0


partition> 1
Part  Tag    Flag  Cylinders      Size         Blocks
 1 unassigned wm  4557 - 4878  100.00MB  (322/0/0) 204792

Enter partition id tag[unassigned]: var
Enter partition permission flags[wm]: wm
Enter new starting cyl[0]: 4557
Enter partition size[204792b, 322c, 100.00mb, 0.10gb]: 323c
partition> 3
Part  Tag    Flag  Cylinders      Size         Blocks
 3 unassigned wm  4880 - 5031    47.20MB  (152/0/0) 96672

Enter partition id tag[unassigned]: swap
Enter partition permission flags[wm]: wu
```

```
Enter new starting cyl[0]: 4880
Enter partition size[96672b, 152c, 47.20mb, 0.05gb]: 153c
partition> print
Current partition table (unnamed):
Total disk cylinders available: 6483 + 2 (reserved cylinders)

Part  Tag    Flag  Cylinders      Size         Blocks
 0 root       wm 0 - 4556        1.38GB (4557/0/0) 2898252
 1 var        wm 4557 - 4879   100.31MB  (323/0/0) 205428
 2 backup     wm 0 - 6482        1.97GB (6483/0/0) 4123188
 3 swap       wu 4880 - 5032    47.51MB  (153/0/0) 97308
 4 unassigned wm 0                  0      (0/0/0) 0
 5 unassigned wm 0                  0      (0/0/0) 0
 6 unassigned wm 0                  0      (0/0/0) 0
 7 unassigned wm 0                  0      (0/0/0) 0


partition> 7
Part Tag Flag Cylinders Size Blocks
 7 unassigned wm 0 0 (0/0/0) 0

Enter partition id tag[unassigned]: home
Enter partition permission flags[wm]: wm
Enter new starting cyl[0]: 5033
Enter partition size[0b, 0c, 0.00mb, 0.00gb]: 1450c
partition> print
Current partition table (original):
Total disk cylinders available: 6483 + 2 (reserved cylinders)

Part  Tag    Flag  Cylinders      Size         Blocks
 0 root       wm 0 - 4556        1.38GB (4557/0/0) 2898252
 1 var        wm 4557 - 4879   100.31MB  (323/0/0) 205428
 2 backup     wm 0 - 6482        1.97GB (6483/0/0) 4123188
 3 swap       wu 4880 - 5032    47.51MB  (153/0/0) 97308
 4 unassigned wm 0                  0      (0/0/0) 0
 5 unassigned wm 0                  0      (0/0/0) 0
 6 unassigned wm 0                  0      (0/0/0) 0
 7 home       wm 5033 - 6482   450.29MB (1450/0/0) 922200
```

13. Once all required partitions have been designated, the disk label must be updated. The disk label holds details of the starting slice of each partition and the number of (disk) cylinders within that partition.

To label the disk, you must select the following menu option:

```
partition>label
Ready to label disk, continue? yes
```

14. Once the label has been written to the disk, you may select the quit option twice in succession to quit from the format command.

```
partition> quit
FORMAT MENU:
 disk - select a disk
 type - select (define) a disk type
 partition - select (define) a partition table
 current - describe the current disk
 format - format and analyze the disk
 repair - repair a defective sector
 label - write label to the disk
 analyze - surface analysis
 defect - defect list management
 backup - search for backup labels
 verify - read and display labels
 save - save new disk/partition definitions
 inquiry - show vendor, product, and revision
 volname - set 8-character volume name
 !<cmd> - execute <cmd>, then return
 quit
format> quit

#
```

15. Having created a series of partitions on the disk, if a partition is to be used to store files, a new filesystem must be created in that partition.

a. To create a new filesystem, you must use the `newfs` command, as shown below: (for brevity, the output of this command is not shown)

```
# newfs /dev/rdsk/c1t3d0s0
...
# newfs /dev/rdsk/c1t3d0s1
...
# newfs /dev/rdsk/c1t3d0s7
...
#
```

b. The filesystems in the new partitions will be mounted to directories in the *root* filesystem. Once these directories have been created, the filesystems can be mounted to the mount-point directories.

These steps are shown below:

```
# mkdir /spareroot /var2 /export/home2
#
# mount /dev/dsk/c1t3d0s0 /spareroot
# mount /dev/dsk/c1t3d0s1 /var2
# mount /dev/dsk/c1t3d0s7 /export/home2
```

c. If a partition is to be used as swap space, it can be added to swap as shown below.

```
# swap -a /dev/rdsk/c1t3d0s3
# swap -l
swapfile dev swaplo blocks free
/dev/dsk/c1t3d0s3 32,27 8 97296 95064
#
```

d. In addition to using the format command, the `prtvtoc` command can also be used to display the partitions that are, actually, in use on that disk drive. It is important that the raw-disk device name is used with the `prtvtoc` command. Also, you must use Slice 2 as the partition device name (which corresponds to the entire disk drive).

```
# prtvtoc /dev/rdsk/c0t3d0s2
* /dev/rdsk/c1t3d0s2 partition map
*
* Dimensions:
* 512 bytes/sector
* 159 sectors/track
* 4 tracks/cylinder
* 636 sectors/cylinder
* 6485 cylinders
* 6483 accessible cylinders
*
* Flags:
* 1: unmountable
* 10: read-only
*
* First Sector Last
* Partition Tag Flags Sector Count Sector Mount Directory
   0         2  00     0   2898252 2898251 /spareroot
   1         7  00 2898252  205428 3103679 /var2
   2         5  00     0   4123188 4123187
   3         3  01 3103680   97308 3200987
   7         8  00 3200988  922200 4123187 /export/home2
#
```

e. If a partition's file system is to be automatically mounted at boot time, or a partition must be added to the swap space at boot time, entries must be made in the `/etc/vfstab` file, as shown in the following example:

```
/dev/dsk/c0t3d0s3  -  -  swap  -  no  -
/dev/dsk/c0t3d0s0  /dev/rdsk/c0t3d0s0  /s
pareroot  ufs  1  no  -
/dev/dsk/c0t3d0s1  /dev/rdsk/c0t3d0s1  /v
ar2       ufs  1  no  -
/dev/dsk/c0t3d0s7 /dev/rdsk/c0t3d0s7 /exp
ort/home2 ufs  2 yes  -
```

Notes

13

PCMCIA Interface

This chapter discusses how to use the PCMCIA interface to add memory, I/O, and/or communications facilities to your VoyagerIIi system using industry-standard credit card-sized PCMCIA cards (also known as PC Cards).

This chapter covers the following topics:

Introduction to PCMCIA

The PCMCIA (Personal Computer Memory Card International Association) standard defines the physical dimensions, electrical interface characteristics, and software architecture of cards and slots that conform to the standard.

The PCMCIA standard defines cards of three thicknesses; each is about the same size as a credit card, uses a similar 68-pin connector and has a 3.3 mm thickness around its edge. The three types differ in the thickness of the center section. The center section of a Type I card is 3.3 mm thick; Type II cards are 5 mm thick; and Type III cards are 10.5 mm thick. The PCMCIA port in your VoyagerIIi can accommodate two Type I or II cards or one Type III card.

Some of the devices available on PCMCIA cards are:

- ***Memory cards***: These include FLASH, SRAM, and combined FLASH and SRAM cards. PCMCIA memory cards cannot be used to expand the main memory of your VoyagerIIi, but should be seen as a form of solid state hard disk. You can access the data on a PCMCIA memory card by mounting the card on your file system.
- ***Modem and Fax/Modem cards***: These include a range of cards that can be used to equip a VoyagerIIi with a modem.
- ***Interface cards***: These include network interface, scanner interface, and frame grabber cards.

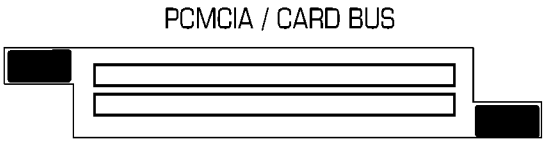
- ***Hard disk drives***: These include a range of different capacity products suitable for filesystem use that can be formatted and mounted like a conventional drive. These are an alternative to the removable hard disk packs for rapid system configuration or for software distribution.

Many PCMCIA cards are supplied with software and instructions for use with a PC-compatible computer, but do not apply to VoyagerIIi. Use only device drivers for approved PCMCIA cards from your Tadpole-RDI supplier.

The PCMCIA Port

Your VoyagerIIi has two PCMCIA slots, arranged one above the other on the rear panel. The PCMCIA port is illustrated below.

Figure 13-1: The PCMCIA Slots



Installing a PCMCIA Card

To install a PCMCIA card, proceed as follows:

1. Insert your PCMCIA card into the slot with the connector end in first, taking care to align it correctly in the card guides.
2. Push on the PCMCIA card firmly until it clicks into position.

If your PCMCIA card fails to fit or connect, remove it and check that you are inserting it the right way up.

Your VoyagerIIi automatically detects when you insert a PCMCIA card, and may in some cases automatically configure it.

Removing a PCMCIA Card

Before removing a PCMCIA card from your system, you should disable it as advised in the associated documentation.

To remove a PCMCIA card, press the eject button for the PCMCIA card you wish to remove.

Using PCMCIA Cards

Your VoyagerIIi has a software driver for a Hayes-compatible modem card, and may later support Ethernet cards, memory cards, and hard disks. Some less commonly used cards may require specific software driver support for Solaris.

PCMCIA Ethernet cards can be used with your VoyagerIIi in addition to the built-in interface or with the built-in interface disabled.

Notes

14

Serial, Parallel, and Audio I/O

This chapter describes how to use the serial and parallel interfaces. The audio speaker is also described.

This chapter covers the following topics:

Using Serial Devices

You can connect a variety of serial devices such as terminals, modems, and scanners to your VoyagerIIi via the serial port slot located on the I/O panel.

The serial port slot cable has two 25-pin D-type connectors. See Appendix B, “Connector Reference” for pinout information on the serial port.

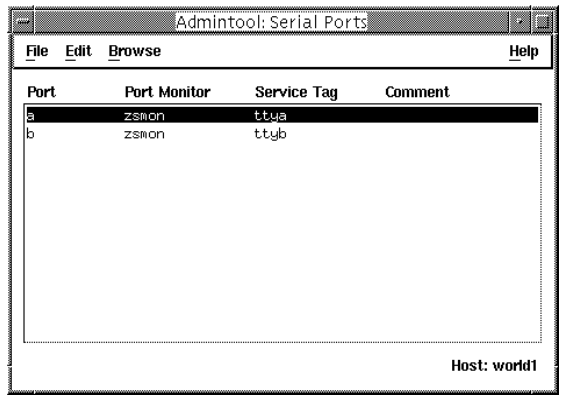
To configure a serial port for a terminal or modem from within the OpenWindows or CDE desktops, login as root and use **admintool** as follows:

1. Launch **admintool** from within a **cmdtool** window with the following command:

   ```
   # admintool
   ```

2. From the **Browse** menu, select **Serial Ports**. The Serial Ports menu opens:

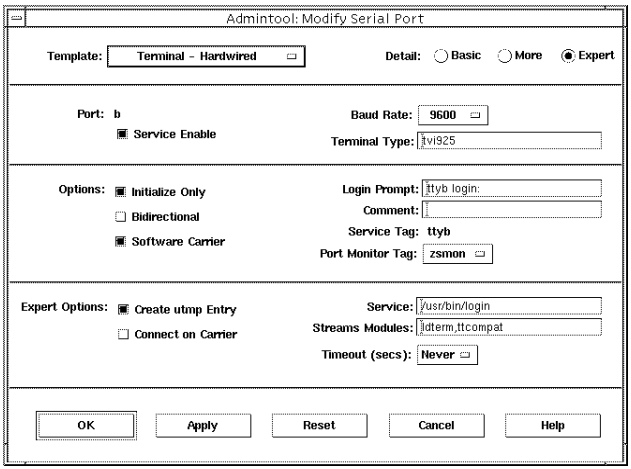
Figure 14-1: Admin tool - Serial Ports



Ports **a** and **b** are the serial ports on the I/O panel of your VoyagerIIi that can be used for terminal or modem connections.

3. To edit a port's configuration, double-click the associated entry's line. The Modify Serial Port window opens.

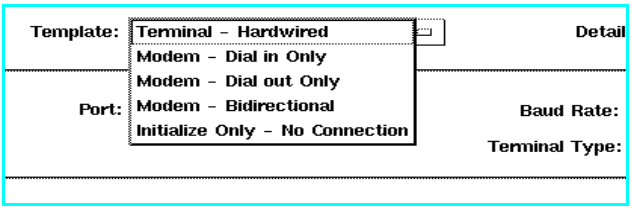
Figure 14-2: Modify Serial Port Window



You should always select the template for the terminal port.

4. Select a template from the list to configure the serial port for either terminal or modem use.

Figure 14-3: List of Modem Types



5. Edit the parameters in the Modify Serial Port window such as baud rate and terminal type, to suit your external device and application. Click on **Apply** to save the changes. Consult the documentation for your serial device for its specific serial interface requirements.

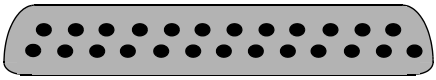
The Modify Serial Port window has three display settings: Basic, More, and Advanced. You are recommended to select the Advanced setting to see all of the characteristics that are being configured for the serial port.

For more details on configuring serial devices, see the Solaris documentation.

Using Parallel Devices

You can connect a range of devices to the parallel port on the rear of your VoyagerIIi, including printers and scanners. The parallel port has a standard Centronics style, 25-pin, D-type connector.

Figure 14-4: Parallel Port Connector



Configuring Parallel Devices

For information about configuring parallel devices, refer to your Solaris documentation.

The device name of the parallel device is `/dev/ecpp0`.

Audio Speaker

The VoyagerIIi has a system speaker that beeps as an audible alert. You may also use the speaker to listen to modem activity while a connection is being established.

Notes

15

Video and Audio Subsystem

This chapter describes how to use the video and audio interfaces.

It covers the following topics:

Video Subsystem

You can connect a Sun- or PC-compatible video monitor to your VoyagerIIi via the standard monitor connector (DB15) on the rear panel.

The VoyagerIIi includes an integrated video controller with a high-performance PCI Permedia-2 graphics processor that supports balanced 3D and multimedia acceleration.

The video subsystem supports applications requiring fast X-windowing performance and simultaneous display of true- and pseudo-color graphics at full speed. With 8 MB of high-speed synchronous graphics memory (SGRAM), the frame buffer can support simultaneous 8- and 24-bit true color up to a resolution of 1280 x 1024 and a resolution of 1600 x 1280 in 8-bit color mode.

You can run both legacy 8-bit color applications and the latest 24-bit applications without color map flashing problems because the simultaneous 8- and 24-bit capability supports both true-color and pseudo-color applications on the same system.

If you connect a plug-n-play monitor, the video controller will select the correct display resolution by reading its timing information using a VESA Display Data Channel (DDC2B) interface.

Table 15-1: Video Display Resolutions Supported

Display Resolution	Color Mode	Double Buffering	Vertical Refresh Rate (Hz)
640 x 480	8-bit, 24-bit, 8+24-bit	Yes	60/72/75/85
800 x 600	8-bit, 24-bit, 8+24-bit	Yes	60/72/75/85
1024 x 768	8-bit, 24-bit, 8+24-bit	Yes	60/72/75/77/85
1024 x 800	8-bit, 24-bit, 8+24-bit	Yes	85
1152 x 900	8-bit, 24-bit, 8+24-bit	Yes	60/66/70/75/76
1152 x 900	8-bit	Yes	60/66/70/75/76/85
1280 x 800	8-bit, 8+24-bit	Single only	76
1280 x 1024	8-bit	Yes	60/66/70/75/76/85
1280 x 1024	8-bit, 8+24-bit	Single only	60/67/75/76
1600 x 1000	8-bit	Yes	66/76
1600 x 1200	8-bit	Yes	60/65/66/70/75/76/80

You can change bit modes and resolutions with the `GFXconfig` utility located in `/usr/bin`.

Audio Subsystem

You can use the audio subsystem for both audio recording (line in and microphone) and playback (line out/headphones).

The VoyagerIIi includes a Sound Blaster PCI audio accelerator and a Stereo AC'97 Codec to provide high fidelity audio compatible with your legacy applications.

The PCI audio accelerator consists of four interactive components:

- PCI bus master
- DMA controller
- Legacy functions
- AC'97 Codec interface controller

The PCI bus master controls the memory accesses to keep the audio cache buffer full, and empties the A/D Converter buffer to main memory as required.

Table 15-2: Digital Audio Specifications

Function	Modes	Rates
Record/Playback	Mono/stereo Full duplex	16-bit 48 kHz maximum
Analog/Digital Converter	A/D D/A	16-bit
Frequency Response	Full range	20 Hz – 20 kHz
Lowest Noise		SNR > 95 dB typical

16

Upgrading Your System

This chapter discusses how to upgrade your VoyagerIIi system.

This chapter covers the following topics:

Changes to the Main System Configuration

Only an approved Service Center can make changes to the main system configuration. The main upgrade items are critical to the performance of the product, these ***must*** be purchased through an approved Tadpole-RDI channel.

Processor Module/Memory Upgrades

The processor module (which has a specified processor speed and cache size), can be upgraded only by an approved Service Center.

The unit's DRAM can be upgraded to a maximum of 1GB by an approved Service Center.

PCI Cards

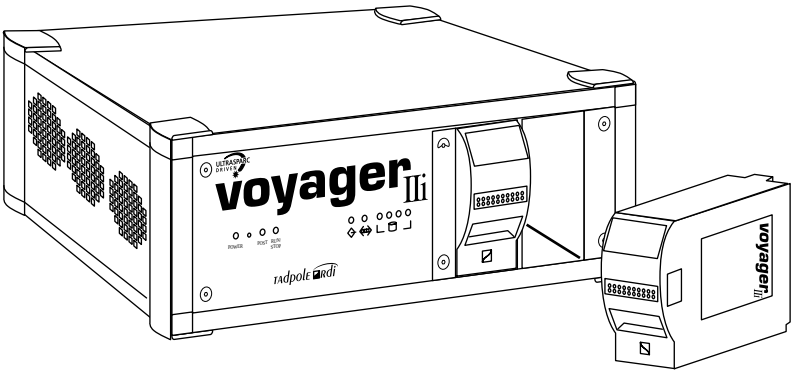
PCI cards can be upgraded by qualified service personnel only. Refer to Appendix D, "Service Guide for PCI Installation."

WARNING! To reduce risk of electric shock, do not open unit. No user serviceable parts inside. Refer all servicing to qualified personnel only.

Disk Upgrades

You can add new removable disk packs. The raw disk drives within the disk packs can be upgraded by an approved Service Center.

Figure 16-1: Disk Pack Removed from VoyagerIIi



Notes

Troubleshooting

17

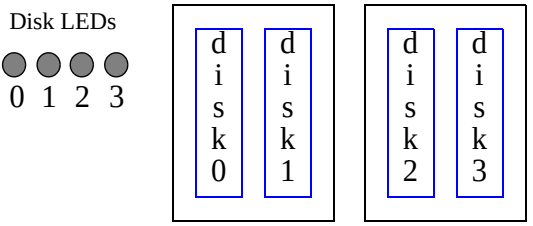
This chapter provides possible solutions to problems that may arise. It describes how to obtain technical assistance, provides a problem-solving checklist, and describes how to solve some common software problems.

This chapter covers the following topics:

Troubleshooting Checklists

Startup Problems

Table 17-1: Startup Problems

Possible Cause	What to Check or Action to Take
Problem: No startup beep, LED indicators do not light up.	
Power is not being delivered to the unit.	Ensure that the power cord is connected to an AC supply and that the Power On Switch is turned on.
Problem: System fails to boot operating system.	
Boot hard disk drive is not discovered at boot time.	Check that the removable hard disk drive unit is installed correctly. The LED display should show which IDE disk drive units have been found during the boot sequence. Disk 0 is the first IDE disk slot, Disk 1 the second IDE disk slot, and so on.  The disk drive in Slot 0 should be the boot disk. The disk pack with the boot disk should be installed in the left-hand disk pack bay.

Possible Cause	What to Check or Action to Take
SCSI Target ID conflict	Check that all external SCSI devices have unique Target ID settings.
The system can't find a SCSI boot device.	If you are trying to boot from a SCSI CD-ROM device, ensure that the target ID of the CD-ROM drive is 6. If you are trying to boot from an external SCSI disk drive, check the OBP settings to see which device is designated as the boot disk (see OpenBoot PROM Command Reference17–20).
You have configured your system to use NIS or NIS+ but the system has been disconnected from the network. Your system is looking for a name server but cannot find an appropriate NIS or NIS+ server.	1) Reset and restart your system. 2) As the system is booting, interrupt the boot process by pressing Stop-A. The OpenBoot `ok` prompt displays. 3) At the `ok` prompt, enter the following command: ok ***create no-resume?*** ok ***boot -s*** This will allow you to boot the system into a "single-user" state. While in this state, you are working as the superuser (root). You can now change the boot controls that make the system search for an NIS or NIS+ server. See Chapter 9, page 12, "Configuring Your System to Use a Name Server" for further details regarding working with NIS and NIS+.

Possible Cause	What to Check or Action to Take
A boot disk is not installed.	Check that the disk drives, installed in Slots 0/1 or connected to the SCSI connector, are valid boot disks.
OpenBoot PROM settings have been changed.	1) Reset and restart the system. 2) As the system is booting, interrupt the boot process so that you see the OBP ok prompt. 3) At the ok prompt, enter the following command: **`ok printenv`** The value for "boot-device" should contain the word: disk 4) At the ok prompt, enter the following command: **`ok devalias`** The alias names of devices is displayed. 5) Check that the device pathname for the "`disk`" device is the correct pathname.

Suspend and Resume Problems

Table 17-2: Suspend and Resume Problems

Possible Cause	What to Check or Action to Take
Problem: The system fails to Resume.	
The removable hard disk drive does not contain usable Resume data.	Carry out a full system startup. See Chapter 3, page 9, "Using Full System Startup" procedure.
Removable hard disk drive is not inserted.	Check that the removable hard disk drive is inserted. If not: 1) Power down the system. 2) Insert the removable hard disk drive. 3) Power on the system.
SCSI Target ID conflict.	Check that all external SCSI devices have unique Target ID settings.
There has been a hardware change since the last Save or Suspend.	Your system could be attempting to Resume to a file system on a disk drive that is no longer present. Check that all the appropriate disk drives are available and connected. Reboot the system.

System Suspend Login Problems

Table 17-3: System Suspend Login Problems

Possible Cause	What to Check or Action to Take
Problem: You cannot login after the system has been Suspended.	
You are attempting to login as a different user than the user who Suspended the system.	Log in as the user who `Suspended` the system.If you do not know which user used the Suspend facility, you must use the Full System Startup procedure.

Keyboard and Mouse Problems

Table 17-4: Keyboard and Mouse Problems

Possible Cause	What to Check or Action to Take
Problem: The keyboard or mouse does not work correctly.	
A PS2 keyboard may be plugged into the PS2 mouse port.	Ensure that the PS2 keyboard cable is connected to the lower of the two PS2 ports. The upper port is for the PS2 mouse. The lower port is for the PS2 keyboard.
A PS2 mouse may be plugged in to the PS2 keyboard port.	See above.
The Sun keyboard does not work.	If you have installed both a Sun keyboard and a PS2 keyboard, the PS2 keyboard becomes the system's active keyboard. If you wish to use the Sun keyboard as your system keyboard, you will have to reboot your system. Before the system starts its boot operations, you will have to disconnect the PS2 keyboard.

Table 17-4: Keyboard and Mouse Problems

Possible Cause	What to Check or Action to Take
The Sun mouse does not work.	Check that your Sun mouse is properly connected to the Sun keyboard. If you have a PS2 mouse connected to the PS2 mouse port and a Sun mouse connected to your Sun keyboard's mouse socket, you will have to reboot the system and disconnect the PS2 mouse before the system starts its boot operations.
'Interrupt Level 9' Message	You have connected a PS2 keyboard but no PS2 mouse. Connect a PS2 mouse to use the PS2 keyboard.

Network Problems

Table 17-5: Network Problems

Possible Cause	What to Check or Action to Take
Problem: You are unable to communicate over the network.	

Faulty transceiver or transceiver cable.
 	
Bad network connection.
 	
Entry for remote system is not in the local `/etc/hosts` file or entry for the local host is not in the remote system's `/etc/hosts` file.
 	
Cannot find name server or name service configuration files or they contain incorrect information.
 	
Internet addresses incorrect or duplicated.
 	
No write permission to requested remote resources.
	Check basic Ethernet communication using the `ping` command. For example:
	`# ping remotehost`
	
	If the communications path is open between the local host and the remote host, a message should be displayed saying:
	`remotehost is alive`
	
	If there is a hardware or a configuration problem, there will be no response. The command will time out after a while, but you may terminate it with the ***Ctrl-C*** interrupt command. If `ping` fails, there may be a basic hardware or software configuration problem and you should check the hardware interfaces and basic software setup.
	
	Consult the local network administrator about specific configuration requirements for your location.
	
	See Chapter 9, page 10, "Configuring Your System for a TCP/IP Network."
	
	Also see Chapter 9, page 12, "Configuring Your System to Use a Name Server."

Root Login Problems

Table 17-6: Root Login Problems

Possible Cause	What to Check or Action to Take
Problem: You are unable to login as the root user.	
Your system only allows the root user to login on the console terminal.	This is the default setting in Solaris for security purposes. Check the contents of the /etc/default/login file. If the following line is not commented out with a # character, then root can only login from the console terminal: CONSOLE=/dev/console
You have forgotten the root password.	You must boot from CD-ROM into single-user mode and remove the root password from the `/etc/shadow` file using the following procedure: 1) Interrupt the boot procedure, using Stop-A (Sun keyboard) or Break key (Ctrl-Pause on a PS2 keyboard). 2) At the OBP ok prompt, give the command: **`ok boot cdrom -s`** 3) Once you have booted into single-user mode, you must mount the boot disk's root partition, using the following command: **`# mount /dev/dsk/c0t0d0s0 /a`** (Remember to use the correct device name for the root partition) 4) Edit the /etc/shadow file, using the 'vi' editor, and remove the encrypted password from the 2nd field of the root user's entry. Save and exit from the file. 5) Reboot the system. 6) As soon as the system has booted, log in as the root user (which should have no password) and assign a new password for the root user.

Other Hardware Problems

Table 17-7: Other Hardware Problems

Possible Cause	What to Check or Action to Take
Problem: Display Problems	
Display is blank.	Check that the display unit is properly connected. The display may have a *timeout blank control* set. Try pressing a key on the keyboard or moving the mouse to see if the display is still functional.
SCSI devices are not responding.	Check to see that the devices are powered on. Check the SCSI cable connections. Remember that the SCSI devices should be connected to the system and powered on ***before*** the system is booted.

A printer is not printing.	Check that the Line Printing Scheduler (**lpsched**) process is running using the command:
	`# lpstat -t`
	
	If the scheduler is not running, use the run-control script to start the scheduler, as shown below:
	`# /etc/init.d/lp start`

Using OpenBoot Diagnostics

OpenBoot is an industry-standard (IEEE1275) ROM-based firmware implementation that controls your system between the time it is powered on and the Solaris operating system takes control. During this time, OpenBoot carries out hardware testing and initialization before booting the operating system.

OpenBoot also provides a user interface and programming language, based on the Forth programming language, which can be used to perform certain diagnostics and change user-configurable options stored in NVRAM.

Displaying the OpenBoot User Interface

Display the OpenBoot user interface as follows:

1. Power on the system.
2. When the OpenBoot start up screen is displayed, press ***Stop-A*** (if using a Sun keyboard) or ***Ctrl-Pause*** (if using a PS2 keyboard) or ***Break*** key, if available. The OpenBoot `ok` prompt will then be displayed.

   To see details of your system, give the command:

   ```
   ok banner
   ```

Checking SCSI Devices

To ascertain which SCSI devices the system found connected during the system startup, enter the following command:

```
ok probe-scsi
```

This command should output a list of the attached SCSI devices.

If no SCSI devices are listed, but you have SCSI devices connected and powered on, you can test the SCSI connection using the following OBP command sequence:

```
ok setenv diag-switch? true
ok test scsi
```

If the SCSI chip is working successfully, you should see no messages.

```
ok
```

Once this test has been run, you should disable diagnostics using the following command:

```
ok setenv diag-switch? false
```

Checking the Network Interface

As a check to see whether your system's Ethernet hardware and twisted-pair connection to the network are functioning correctly, enter the following command:

```
ok watch-net
Internal loopback test -- succeeded
Transceiver check -- passed
'.' is a good packet. 'X' is a bad packet.
Type any key to stop.
...........
```

A series of periods (`. . .`) should print rapidly across the screen if the internal hardware and Ethernet connection are functioning correctly. If you are still having network problems, you should check your operating system network configuration. See "Network Problems" on page 17-8.

Software Problems

This section provides some information on common software problems and gives brief suggestions regarding possible remedies in each case. This section is not comprehensive; situations may arise where you should contact your systems administrator or Tadpole-RDI Customer Support. See "Customer Service and Support" on page 17-21.

Stopping Processes

If you are running interactive commands on a command line, you can stop the current command process using the interrupt character, ***Ctrl-C***. This normally closes a program. However, not all programs are run interactively and you may need to terminate using alternative methods as described in the next section.

Killing a Program

Before killing (terminating) a program, you must know its process ID number (PID) and whether that program is part of a set of programs that constitute a complete system task. To display a summary of the current system processes, use the following command:

 # ps -ef

You can see whether a process is an isolated process or part of a set of related processes by studying the output of the `ps` command:

```
# ps -ef
     UID   PID  PPID  C  STIME TTY   TIME  CMD
    root    0    0    0   Apr 30 ?    0:03 sched
    root    1    0    0   Apr 30 ?    0:14 /etc/init -
    root    2    0    0   Apr 30 ?    0:00 pageout
    root    3    0    1   Apr 30 ?   37:46 fsflush
    root   307  304   0   Apr 30 ?   0:01  /usr/lib/...
    root    180   1   0   Apr 30 ?   0:06  /usr/sbin/cron
    ....
    root   1279  1266   0  09:48:25 pts/3 0:02  /bin/ksh
```

System processes will have a '`tty`' column entry of "?" because those processes are being run internally as opposed to by a user at a terminal. The last process in the example listing is being run by the root user in a pseudo-terminal window.

Also in this example, there are two processes (PID 2 and 3) that are related to the FileSystem and Memory Management operations of the system.

You can terminate processes individually, using the `kill` command. The kill command has values that determine whether the process is terminated cleanly or "quick and dirty." The option `-15` represents a "clean" kill and the option `-9` represents a "dirty" kill.

 # kill -15 180
 # kill -9 1279

Killing Processes Using Run-control Scripts

When a process is one of a related group of processes, it may be better to use the run-control scripts to terminate the entire group of processes. For example, if you wish to stop all processes that relate to the system being a NFS client, you could invoke the appropriate run-control script.

 # /etc/init.d/nfs.client stop

The `/etc/init.d` directory contains all of the system's master run-control scripts. To restart the NFS client processes, the same script could be used:

 # /etc/init.d/nfs.client start

Operating System Panic

If the operating system encounters a problem so serious it cannot continue to run the machine, the system may panic. If this happens, a message is printed on the screen with as much information as the operating system is able to gather about the cause. Record the information for subsequent use by Customer Support. See "Customer Service and Support" on page 17-21.

If the system does not reboot automatically, you will need to reset it.

Failing Program

Programs can fail to run for a variety of reasons, some of which are as follows:

- Corrupt program
- Corrupt media
- ***Shared Library Inconsistency:***
  The program was compiled with a shared library that is incompatible with the system. Use the `ldd` utility to determine what libraries the program is loading. You can only resolve this problem by relinking the application with the shared libraries.
- ***Program Error:***
  A programming fault can cause a segmentation violation if a program attempts to write to an illegal or protected address.
- ***Out of Swap Space or Memory Space***:
  A message may appear on the console if either of these conditions occur. Running processes may suddenly and abnormally terminate.
- ***Memory Failure***:
  There has been a memory error (hardware) during program execution.

The Solaris operating system includes the `trace` utility that allows you to monitor a process' system calls. An experienced UNIX programmer can track down the cause of a problem. In addition, experienced UNIX programmers may be able to use the `crash`, `adb`, or `dbx` debugger utilities provided to determine the cause of a "core dump."

System Messages

The Solaris operating system displays system information messages and warnings.

These system messages are generally displayed on the console terminal display but may also appear in a console window or application window.

Some messages indicate that the system has run out of resources and requires attention. For example, a program may fail to start and may print a message such as:

```
out of swap space
```
or
```
out of memory
```
or
```
FS full on /dev/c0t0d0s6
```

Write down these messages for later use in troubleshooting or in case you must call Customer Support.

As a general rule, you should exit the offending program. It may also be prudent to reboot the system after such an event because applications and the operating system do not always recover gracefully from system failure.

If you run out of disk space, you must either move files to a different filesystem, or to a networked server, or you must remove them.

Resetting the System

If the operating system panics, or the keyboard locks up and all other remedies have failed, you may need to reset the system.

Use reset as a last resort because the operating system will have open files and unflushed buffers that must be repaired when the system is rebooted.

To reset the system, press ***Stop-A*** (on a Sun keyboard) or ***Break*** (***Ctrl-Pause*** on a PS2 keyboard).

This will take you to the OBP `ok` prompt. Once at the OBP command level, you can boot the system using the following command:

ok ***boot***

When the system starts to boot, the Solaris operating system will run the automatic filesystem check program, `fsck`. After completing the `fsck`, the system will continue to boot automatically.

OpenBoot PROM Command Reference

Some of the most useful OBP commands are listed below. OBP commands should only be used by experienced system administrators or under the direction of a member of Customer Support.

Table 17-8: OpenBoot Commands

OBP Command	Description
boot -s	Boot the system into single-user mode.
boot -r	Perform a reconfiguration boot.
boot cdrom	Boot from the SCSI CD-ROM device.
boot net	Boot from a network server.
banner	Display the hardware (system) banner information.
devalias	List the device hardware pathnames and their associated alias names.
printenv	Display a list of the OBP parameters and their current values.
reset-all	Resets the system unit and re-initializes the system with new parameters.
setenv parameter value	Set the OBP parameter to hold the data "`value`."
sync	Synchronize data in the buffer cache to disk.

Customer Service and Support

If the troubleshooting information in this chapter does not resolve the problem, you may contact Tadpole-RDI's Customer Service and Support staff.

North America
7:00 AM to 6:00 PM PST
Phone: (800) 734-7030
Fax: (760) 930-0762
E-mail: support@tadpolerdi.com

Europe
9:00 AM to 5:00 PM GMT
Tel: +44 1223 428200
Fax: +44 1223 428201
E-mail: support@tadpolerdi.com

Before you call, have the VoyagerIIi serial number nearby. This number appears on the bottom of the VoyagerIIi.

If you received an error message, it will also help if you write down the following information:

1. The serial number of your system.
2. The exact description of the problem.
3. The task you were performing when you encountered the problem.
4. The command you typed when the error occurred. You may want to check the command line to make sure you did not make a mistake.
5. The directory you were in. You can use "`pwd`" to obtain this information.

6. The account you were using. You can use "`whoami`" to obtain this information.
7. The version of the operating system you are using. You can use one or both of the two following commands to obtain different types of version information.
    - Use `uname -a` to obtain release information including the exact patch.

```
SunOS xxxxxxx x.x Generic_xxxxxx-xx sun4u SUNW,Ultra-x_x
```

    - Use `more /etc/release` to obtain release information including the release date on the install CD.

```
             Solaris 7 x/xx xxxxx_xx_xxxxx_xx SPARC
 Copyright xxxx Sun Microsystems, Inc.  All Rights Reserved.
                    Assembled xx xxxxx xxxx
```

A

Technical Specifications

This appendix provides detailed technical specifications for the VoyagerIIi.

Specifications are subject to change without notice.

Table A-1: Technical Specifications

Feature	Model
VoyagerIIi	
CPU	
Processor	UltraSPARC-IIi Module
Clock Speed	440MHz or 360 MHz
Level 2 Cache	2MB
Memory	
DRAM	256MB up to 1GB
Storage	
Hard Disk Drive	4 x Ultra-DMA IDE disk channels (simultaneous activity) 2 x removable disk packs each with 2 disk drives per pack. Contact your Tadpole-RDI sales representative for current options.
Indicators	
Status Indicators	Power On LED POST (Power On Self Test) LED Run/Stop LED Ethernet Activity LED SCSI Activity LED Disk Activity x 4 LEDs
I/O	
Buses	66MHz 32-bit PCI I/O bus 2 x 33MHz 32-bit PCI buses (simultaneous activity)

Table A-1: Technical Specifications

Feature	Model
Interfaces	
Ethernet	10/100 Base TX interface (auto-sensing)
SCSI	Ultra-Wide SCSI (40MB/s) on a 68-way socket
PCMCIA/CardBus	Two Type I/II cards or one Type III card
Parallel	Parallel IEEE P1284 compatible Centronics interface
Serial Ports	2 x RS232 serial interfaces (synchronous or asynchronous operation)
Keyboard/Mouse	Sun and PC (PS2-type)
Graphics	SVGA 15-pin D-shell connector (DB15)
PCI	PCI expansion slot available for one specialist 3/4-sized (maximum 9.25 inches or 235 mm) or shorter PCI card
Mouse/Keyboard	Combined keyboard and mouse port 6-pin mini-DIN connector Supports Sun Type 4 or Type 5 compatible keyboards and mouse
Audio	Simultaneous record/playback, Mono: Microphone Stereo: Line in, Line out/Headphones Speaker: PCMCIA audio support (modem call progression, system status beeps)
Power	
Internal Mains PSU	World standard; AC power inlet, switch, fuse
Software	
Operating System	Desktop or server: Solaris 2.5.1, 2.6, or 7. OpenBoot 3.x, Self-Test and Diagnostics

Table A-1: Technical Specifications

Feature	Model
Configuration	US/English for North American and International markets
Size and Weight	
Dimensions	12.7 x 10.2 x 4.0 inches 323 x 259 x 101 mm
Weight	10.0 lb (4.5 kg)
Environmental	
Temperature	Operational: 5 to 45°C Non-operational: –20 to 50°C
Humidity	Operational: 8-80% non-condensing Non-operational: 5-95% non-condensing
Standards/Approvals	
Approvals	N. America: UL (Safety) FCC Part 15 Class B (EMC) Europe: CE98 includes EN60950 (Safety) EN55022 (Emissions), EN55024 (Immunity)

Connector Reference

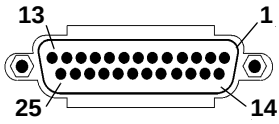
B

This appendix describes the pin assignments for the VoyagerIIi connectors listed below.

This appendix describes the following connectors:

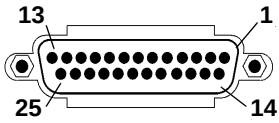
Parallel Port Connector

Table B-1: Parallel Port Connections

Connector	Pin	Signal	Pin	Signal
	1	/STROBE	14	/AUTOFEED
	2	DATA (0)	15	/ERROR
	3	DATA(1)	16	/INIT
	4	DATA(2)	17	/SELECT_IN
	5	DATA(3)	18	Signal Ground
	6	DATA(4)	19	Signal Ground
	7	DATA(5)	20	Signal Ground
	8	DATA(6)	21	Signal Ground
	9	DATA(7)	22	Signal Ground
	10	/ACK	23	Signal Ground
	11	BUSY	24	Signal Ground
	12	PE	25	Signal Ground
	13	SLCT		

Serial Port Connector

Table B-2: Serial Port Connections

Connector	Pin	Signal	Pin	Signal
	1	NO CONNECTION	14	B_TXD
	2	A_TXD	15	A_TRXC
	3	A_RXD	16	B_RXD
	4	A_RTS	17	A_RXC
	5	A_CTS	18	B_TRXC
	6	A_SYNC	19	B_RTS
	7	Signal Ground	20	A_DTR
	8	A_DCD	21	NO CONNECTION
	9	B_SYNC	22	NO CONNECTION
	10	B_RXC	23	NO CONNECTION
	11	B_DTR	24	A_TXC
	12	B_DCD	25	B_TXC
	13	B_CTS		

SCSI Connector

Table B-3: SCSI Connections

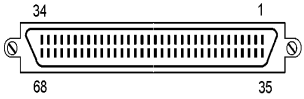
Connector	Pin	Signal	Pin	Signal
	1	SIGNAL GROUND	35	DB12
	2	SIGNAL GROUND	36	DB13
	3	SIGNAL GROUND	37	DB14
	4	SIGNAL GROUND	38	DB15
	5	SIGNAL GROUND	39	PARITY1
	6	SIGNAL GROUND	40	DB0
	7	SIGNAL GROUND	41	DB1
	8	SIGNAL GROUND	42	DB2
	9	SIGNAL GROUND	43	DB3
	10	SIGNAL GROUND	44	DB4
	11	SIGNAL GROUND	45	DB5
	12	SIGNAL GROUND	46	DB6
	13	SIGNAL GROUND	47	DB7

Table B-3: SCSI Connections

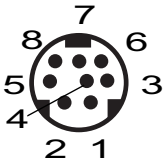
Connector	Pin	Signal	Pin	Signal
	14	SIGNAL GROUND	48	PARITY0
	15	SIGNAL GROUND	49	SIGNAL GROUND
	16	SIGNAL GROUND	50	SIGNAL GROUND
	17	TERMPWR	51	TERMPWR
	18	TERMPWR	52	TERMPWR
	19	SIGNAL GROUND	53	SIGNAL GROUND
	20	SIGNAL GROUND	54	SIGNAL GROUND
	21	SIGNAL GROUND	55	/ATN
	22	SIGNAL GROUND	56	SIGNAL GROUND
	23	SIGNAL GROUND	57	/BSY
	24	SIGNAL GROUND	58	/ACK
	25	SIGNAL GROUND	59	/RST
	26	SIGNAL GROUND	60	/MSG
	27	SIGNAL GROUND	61	/SEL
	28	SIGNAL GROUND	62	C/D
	29	SIGNAL GROUND	63	/REQ
	30	SIGNAL GROUND	64	I/O

Table B-3: SCSI Connections

Connector	Pin	Signal	Pin	Signal
	31	SIGNAL GROUND	65	DB8
	32	SIGNAL GROUND	66	DB9
	33	SIGNAL GROUND	67	DB10
	34	SIGNAL GROUND	68	DB11

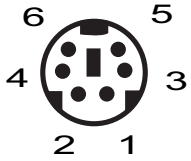
Sun Keyboard/Mouse Connector

Table B-4: Sun Keyboard/Mouse Connections

Connector	Pin	Signal	Pin	Signal
	1	GROUND	5	SUN KBD OUT
	2	GROUND	6	SUN KBD IN
	3	+5V	7	NO CONNECTION
	4	SUN MSE IN	8	+5V

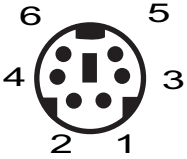
PS2 Keyboard Connector

Table B-5: PS2 Keyboard Connections

Connector	Pin	Signal	Pin	Signal
	1	KBDATA	5	KBCLK
	2	NO CONNECTION	6	NO CONNECTION
	3	GROUND		
	4	+5V		

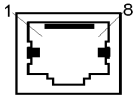
PS2 Mouse Connector

Table B-6: PS2 Mouse Connections

Connector	Pin	Signal	Pin	Signal
	1	MSE DATA	5	MSE CLOCK
	2	NO CONNECTION	6	NO CONNECTION
	3	GROUND		
	4	+5V		

Ethernet RJ45 Connector

Table B-7: Ethernet Connections

Connector	Pin	Signal
	1	TP _TX+
	2	TP _TX–
	3	TP _RX+
	4	BI _D3+
	5	BI _D3–
	6	TP _RX–
	7	BI _D4+
	8	BI _D4–

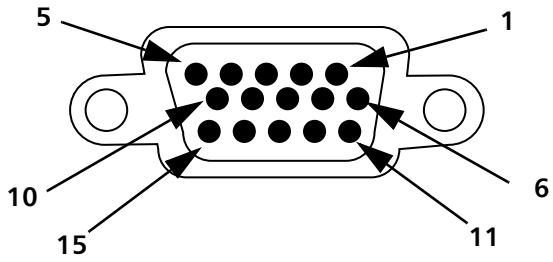
Monitor Connector

The Monitor Connector is a female, 15-pin DB15 connector. The following table lists the pin assignments for this connector. Figure B-1:shows the Monitor Connector.

Table B-8: Monitor Connections

Pin	Signal	Pin	Signal
1	RED	9	+5V
2	GREEN	10	GND
3	BLUE	11	NC
4	NC	12	DDC DATA
5	GND	13	HSYNC
6	GND	14	VSYNC
7	GND	15	DDC CLK
8	GND		

Figure B-1: Monitor Connector



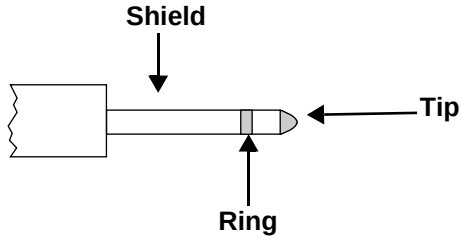
Line In Connector

The Line In Connector is a standard female, 1/8”, audio miniature jack. The following table lists the pin assignments for this connector. For illustration purposes, Figure B-2: shows the male 1/8” connector.

Table B-9: Line In Connections

Pin	Signal
Tip	LEFT CHANNEL
Ring	RIGHT CHANNEL
Shield	GND

Figure B-2: Line In Mating Connector



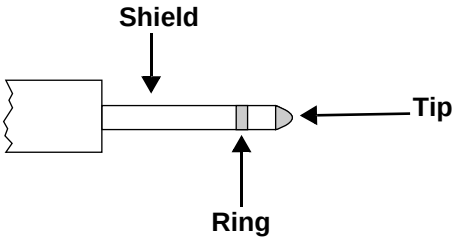
Line Out/Headphones Connector

The Line Out/Headphones Connector is a standard female, 1/8", audio miniature jack. The following table lists the pin assignments for this connector. For illustration purposes, Figure B-3: shows the male 1/8" connector.

Table B-10: Line Out/Headphone Connections

Pin	Signal
Tip	LEFT CHANNEL
Ring	RIGHT CHANNEL
Shield	GND

Figure B-3: Line Out/Headphones Mating Connector



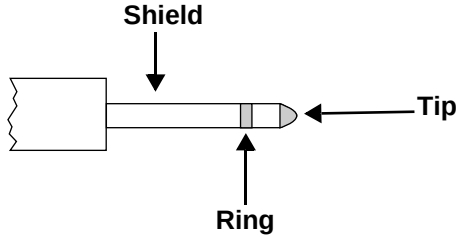
Microphone Connector

The Microphone Connector is a standard female, 1/8", audio miniature jack. The following table lists the pin assignments for this connector. For illustration purposes, Figure B-4: shows the male 1/8" connector.

Table B-11: Microphone Connections

Pin	Signal
Tip	+5V
Ring	MIC
Shield	GND

Figure B-4: Microphone Mating Connector



Configuring the Serial Port for Laptop Display

C

This chapter describes how to configure the VoyagerIIi serial port to accept a laptop display.

This appendix covers the following topic:

Configuration Procedure

To perform this configuration, obtain the Serial Splitter Cable

- Tadpole-RDI part #: ***V-SERCBL***
- Sun part #: ***530-1869***
- SunEX catalogue #: ***X985A***

This cable allows you to have two serial connections to the one serial port.

The single DB25 male connector only work with current Voyagers.

On early systems, with a male serial port, you need a gender-bender that breaks out into two serial ports, A and B, which are accessed in the usual Solaris manner. Port B supports asynchronous communications only. Port A supports both sync and async. You should be able to connect a Sun single-ended DB25 serial cable to this port and get port A signals; Port B is then unavailable.

CAUTION: Before using a non-Sun cable, check the pinout.

Setup Procedure

1. Connect the split end of the cable to the serial port of the VoyagerIIi.
2. Connect the “A” end of the serial cable to your Notebook. (Leave the “B” end loose.)

Your Notebook may have a 9-pin Serial connection. If this is the case, you need a DB25 to DB9 cable adapter (the following pins must be linked: 2 to 2, 3 to 3, and 7 to 5).

3. Verify that no keyboard or mouse is plugged into the Voyager IIi and the Run/Stop switch on the back of the VoyagerIIi is in the Stop position.

Configuring the Laptop

1. On the laptop, choose ***Programs>Accessories>Hyper Terminal*** from the ***Start*** button.
2. From Hyper Terminal, double-click on the Hypertrm icon in the New Connection window.
3. Type the name: **`Voyager Console`**.
4. Click ***OK***. A Phone Number window appears.
5. Click on the ***Down Arrow*** near ***Connect Using*** Window and highlight ***Direct to Com1***. A Properties window appears.
6. Verify/enter the following settings:
   - Bits per second=9600
   - Data Bits=8
   - Parity=None
   - Stop Bits=1
   - Flow Control=Xon/Xoff

7. Click OK.
8. From the Hyper Terminal window, click the ***File*** menu and choose ***Properties***.
9. Choose ***Settings***.
10. Change ***Emulation*** to VT100.
11. Click ***OK***.
12. Click the ***File*** menu and choose ***Save***.
13. Power On the VoyagerIIi. The Voyager banner and OK prompt appears on the Laptop Display when the POST LED goes out on the front of the VoyagerIIi.

Service Guide for PCI Installation

D

This appendix covers the installation of a PCI card into the VoyagerIIi.

All service and upgrades to the VoyagerIIi server must be performed by a trained technician only.

NOTE: The Tadpole-RDI VoyagerIIi system is compatible with all ¾-sized (maximum length of 9.25 inches or 235 mm) or smaller PCI cards that are on Sun's Web site and work with the SME AXi motherboard.

Sun Web site :
(http://www.sun.com/pci/pci.cards.ihv.html)

Tadpole-RDI Warranty Coverage and Limitations

Tadpole-RDI does not warrant any product not distributed by Tadpole-RDI or an authorized Tadpole-RDI partner.

Tadpole-RDI warranty excludes the repair, maintenance, and adjustment of Tadpole-RDI product required due to, but not limited to, damage caused by internal and/or external peripherals and options not supplied by Tadpole-RDI.

Tadpole-RDI shall have no liability or responsibility to the end-user or any other person or entity with respect to any liability for damage to other property, including software, caused by any defects in the product, damages based upon inconvenience, loss of use of the product, loss in time, loss of data, loss of business, commercial loss, or any other damages, whether incidental, consequential, or otherwise.

All other terms and conditions of the Tadpole-RDI Warranty Policy apply.

Installation Steps

WARNING! To reduce risk of electric shock, do not open unit. No user serviceable parts inside. Refer all servicing to qualified personnel only.

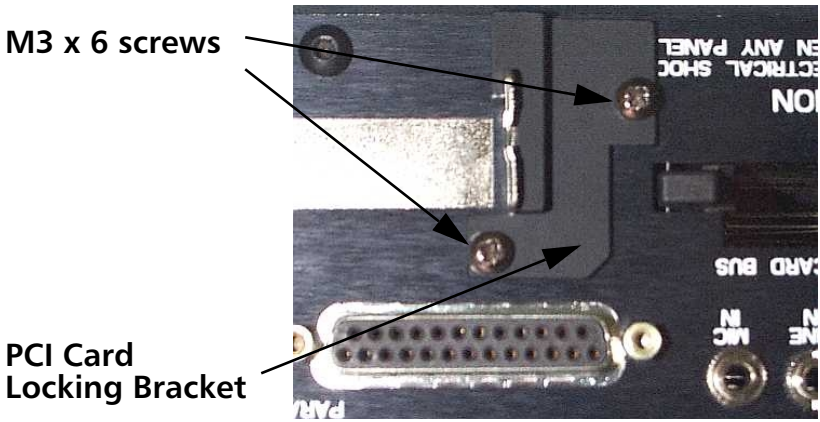
CAUTION: To prevent fire or damage to the equipment, do not expose the interior of the VoyagerIIi server to rain or heavy moisture during operation. Do not immerse the server in water. If water or other liquids have entered the server cabinet, do not use the server until it has been inspected by a Tadpole-RDI qualified service tecnnician.

1. Turn OFF the VoyagerIIi system. Disconnect the AC power cord. Disconnect all system cables. Disconnect all peripheral cables.
2. Turn the system over with the rear I/O panel facing you.

Disassembly

3. Locate the bracket next to the large PCI card opening as shown in Figure D-1 and remove two M3 x 6 screws.

Figure D-1: Removing Screws on Bracket



4. Remove the PCI Card Locking Bracket from the rear I/O panel. Keep the bracket and screws in a safe place for access when it is time to reassemble.

5. Rotate the system with the front panel facing you.

CAUTION: Electric Static Discharge protection is required prior to handling Electric Static Sensitive components. Use an anti-static grounding mat with an anti-static harness and wrist strap while handling these components.

6. Slide the foot covers to gain access to screws for removing bottom panel.

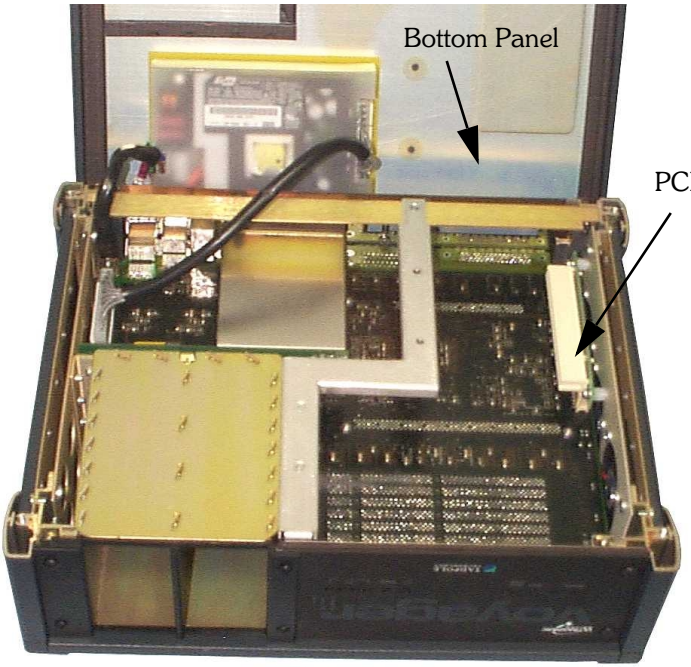
7. Remove two screws from the center section as shown in Figure D-2, and four screws from the corner plastic feet. Move screws and plastic feet to a location that will be easily found when it is time to reinstall the panel.

Figure D-2: Removing Screws

8. Lift the panel gently. Note the position of cable harnesses and ground wiring so that you can turn the panel over without pinching or straining the harnesses attached to the power supply or the panel.

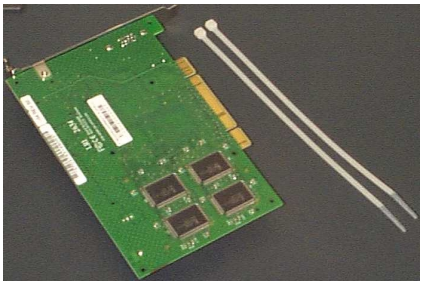
9. Lower the panel and allow it to rest as shown in Figure D-3.

Figure D-3: Removing Bottom Panel



A PCI card sample and two cable ties are shown below in Figure D-4.

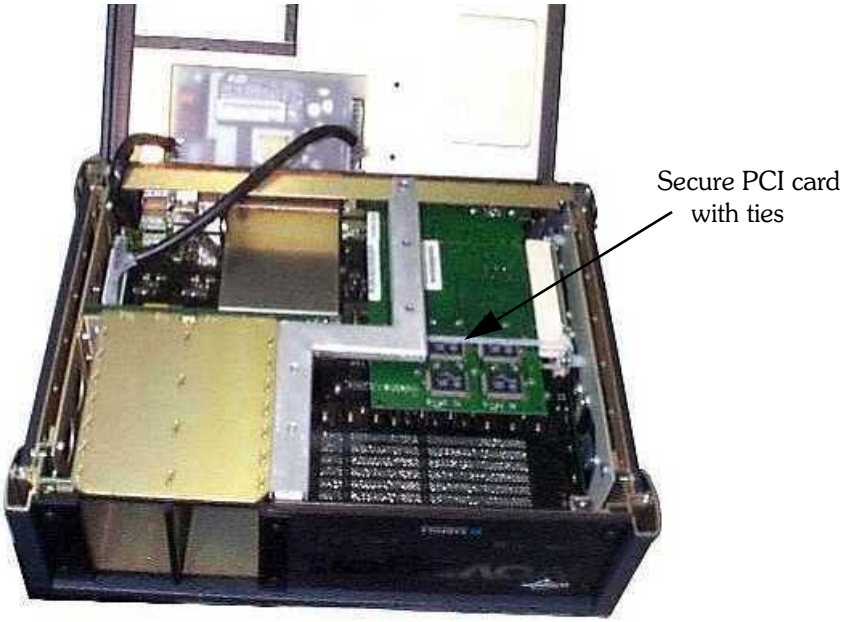
Figure D-4: Card and ties



10. While guiding the PCI card plate through the opening of the rear I/O panel, plug the PCI card securely into the PCI connector slot.

11. Secure the PCI card with two (200 x2.5mm) cable ties provided. To do this, join the ties together and route them as shown in Figure D-5. Trim excess ties.

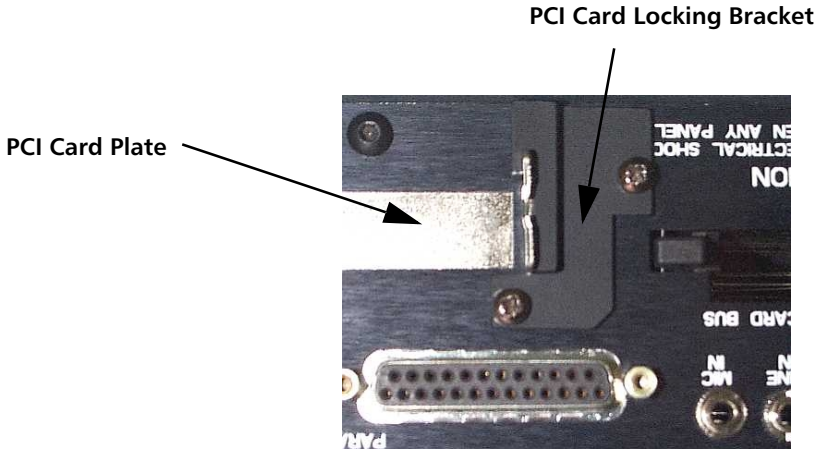
Figure D-5: Securing ties



Reassembly

1. Lift and turn over the panel and place it back onto the system. Ensure that no cables or harness are crimped or pinched and that all edges of the panel are properly aligned for installation of feet.
2. Rotate the system so that the rear I/O panel faces you.
3. Slide the edge of the PCI card locking bracket over the PCI card plate, securing it from movement as shown in Figure D-6.

Figure D-6: Securing the PCI card

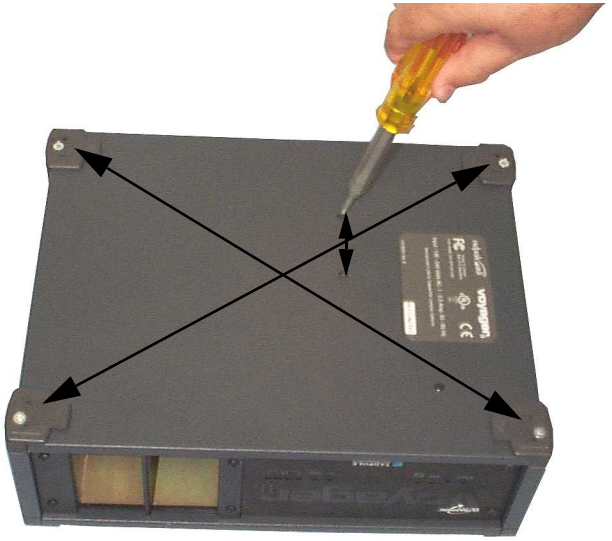


4. Align the mounting holes and secure the locking bracket with two M3 x 6 screws.

5. Install the plastic feet in their appropriate locations (Use provided plastic feet if necessary).

6. Install screws with a slight pressure to get screw started. Once all screws are started, rotate from screw to screw as shown in Figure D-7 to tighten while ensuring that the panel seats completely.

Figure D-7: Screw Locations



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