

SunSAI/P User's Guide



THE NETWORK IS THE COMPUTER™

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- Federal Communications Commission (FCC) — USA
- Department of Communications (DOC) — Canada
- Voluntary Control Council for Interference (VCCI) — Japan

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Note: 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 the dealer or an experienced radio/television technician for help.

Shielded Cables: Connections between the workstation and peripherals must be made using shielded cables in order to maintain compliance with FCC radio frequency emission limits. Networking connections can be made using unshielded twisted pair (UTP) cables.

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Compliance ID: DIGI-70000414

Product Name: SunSAI/P Adapter

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Operation is subject to the following two conditions:

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2. This equipment must accept any interference that may cause undesired operation.

EMC

This equipment complies with the following requirements of the EMC Directive 89/336/EEC:

EN55022 / CISPR22 (1985)		Class B
EN50082-1	IEC801-2 (1991)	4 kV (Direct), 8 kV (Air)
	IEC801-3 (1984)	3 V/m
	IEC801-4 (1988)	1.0 kV Power Lines, 0.5 kV Signal Lines
EN61000-3-2/IEC1000-3-2(1994)		Pass (Class D)

Supplementary Information

This product was tested and complies with all the requirements for the CE Mark when connected to a Sun workstation or server.

/ S /

Dennis P. Symanski DATE

Manager, Product Compliance

/ S /

John Shades DATE

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Introduction

The *SunSAI/P User's Guide* covers the installation and configuration of the SunSAI/P intelligent serial communications boards in Sun™ Microsystems™ PCI workstations running the Solaris™ 2.5.1 Hardware: 4/97, 8/97, 11/97, Solaris 2.6, and Solaris 7 operating environments.

In addition to the adapter itself, you will also need to install device driver software for your operating system, so that programs can communicate with the board. Device driver installation instructions are included in this manual, after the hardware installation instructions.

Components

The carton in which your SunSAI/P board was shipped should contain the following items:

- SunSAI/P board
- *SunSAI/P User's Guide* (this book)
- One or more software packets containing device driver CD-ROM
- Connector assembly

Features

- Serial asynchronous board with eight ports
- Maximum speed 115K bps per port
- Meets PCI local bus specification rev. 2.1
- PCI card: 32 bit data width, short length with 33 MHz operating frequency and 5.0 or 3.3 volts I/O signalling (universal card)

Board Operation

The SunSAI/P board is a multi channel intelligent Serial Asynchronous Interface board for computers incorporating the PCI bus standard.

The heart of the SunSAI/P board is a 32-bit RISC processor. The board has 128 KB of dual-ported high-speed RAM used for program code and data buffering. The SunSAI/P board supports “preset” throughput speeds of up to 115K bps for each asynchronous port.

The processor and dual ported RAM relieves your computer of the burden of managing the serial ports. The computer can transfer large blocks of data directly to the memory on the board, then move on to other tasks while the board sends the data out the serial ports one character at a time. Similarly, the board receives input data and stores it in buffers in its dual ported RAM, so the computer only needs to check periodically to see if data is available.

The dual ported RAM is memory which is accessible for read and write operations by both the board and the computer. To the computer, the dual ported RAM looks exactly like its own memory, and can be accessed by the same high speed memory referencing commands it uses for its internal memory. This means that a block of data that may take a number of seconds for the SunSAI/P board to receive or transmit to the outside world can be transferred between the board and the computer in mere microseconds.

The SunSAI/P board’s dual ported RAM is mapped into a 4 Megabyte unused area in the host computer’s memory address space.

Customer Assistance

Be sure to read the Release Notes that may be included with this software. The Release Notes contain information not available at this manual’s press time.

For assistance in the United States, please call 1-800-USA-4SUN.

For information on how to get the latest patches and patch revision, please visit the SunSolvesm website at <http://sunsolve.sun.com>, or contact your local Sun Service provider. For additional information, access Sun on the World Wide Web at <http://www.sun.com> and select Sales and Service.

Installing SunSAI/P Boards

Before You Install the Board

Write down the serial number of the board. You will need it if you have to contact Sun regarding the board.

There are no switches or jumpers on the SunSAI/P board.

SunSAI/P boards contain static-sensitive components. Always touch a grounded surface to discharge static electricity before handling the circuit board.

▼ Installing the Board

Now you are ready to install the SunSAI/P board in your computer. Follow these steps:

Note – Refer to your system installation or service manual for detailed instructions for the following steps.

1. **Power off your system, using the standard shut down procedures described in the *Solaris Handbook for Sun Peripherals* or your system service manual.**

The *Solaris Handbook for Sun Peripherals* is shipped with the Solaris operating environment software and is available on the <http://docs.sun.com> website.

2. **Locate an available PCI slot in your computer and remove the slot plate.**
3. **Install the SunSAI/P board according to the instructions in the platform service or installation manual.**

4. **Install the connector box assembly on the SunSAI/P board by connecting the male 78-pin plug on the assembly to the female 78-pin connector on the end of the SunSAI/P board. Be sure that the plug is completely installed—it may be a snug fit.**

Note – If you have difficulty connecting the DB-78 connector, try loosening the screw in the endplate (the connector may not be exactly centered in the slot in the back of the computer). Be sure to re-tighten the endplate screw once the DB-78 connector is securely attached.

5. **Screw the connector into the board's endplate. Do not over-tighten the screws. If the screws don't go in several turns, or if they don't reach the nuts in the endplate, the 78-pin connectors are probably not completely mated.**
6. **Replace your computer's cover.**
7. **Power on your system, using the procedures described in the *Solaris Handbook for Sun Peripherals* or your system service manual.**

Memory Window Size and Starting Address

The memory starting address is determined by the system. No switches or jumpers are required to change these parameters.

The SunSAI/P board requires 4 Mbytes of unused PCI memory address space in your computer.

EIA-232 Connectors and Cables

Connectors

SunSAI/P boards are shipped with a connector box which provides eight female DB-25 EIA-232 connectors wired for data terminal equipment (DTE) operation.

TABLE 3-1 DB-25 Connector Pin Assignments

Signal	Description	DTE Use	Pin #
GND	Chassis Ground	N/A	Shell
TxD	Transmitted Data	Output	2
RxD	Received Data	Input	3
RTS	Request To Send	Output	4
CTS	Clear To Send	Input	5
DSR	Data Set Ready	Input	6
SG	Signal Ground	<i>reference</i>	7
DCD	Data Carrier Detect	Input	8
DTR	Data Terminal Ready	Output	20
RI	Ring Indicator	Input	22

The pin assignments for the DB-25 connectors follow the usual conventions for EIA-232 wiring.

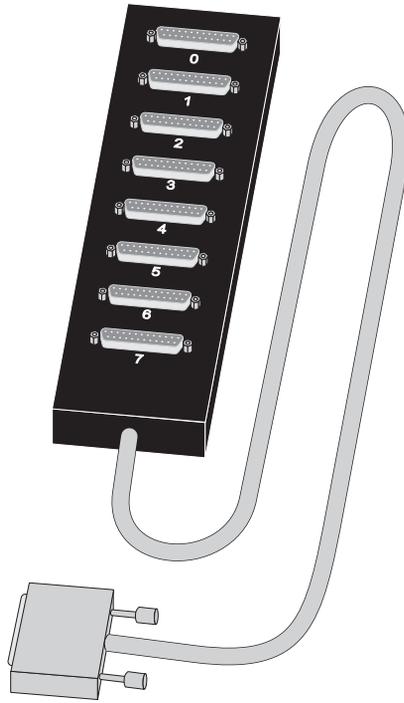


FIGURE 3-1 Eight-Port Connector Box

Cables

EIA-232 serial interface cables should be shielded, low capacitance cables, ideally designed specifically for serial data transmission.

Grounding

The shield should be grounded at both ends of the cable. Chassis Ground, available on the shell of the DB-25 connectors, is ideal for this purpose.

Environment

While good shielding provides reasonable protection against “noise” (Electro-Magnetic Interference, or EMI), cables should still be routed away from noise sources wherever possible. Avoid laying cables in close proximity to transformers, generators, motors, fluorescent lights, etc.

Capacitance vs. Length of Run

The total capacitance of a cable affects the integrity of transmitted data. As a rule of thumb, the total capacitance of a cable (including the connectors) should not exceed 2500 pF for baud rates of up to 57,600 (1200pF for 115K baud and 600 pF for 230K baud). Serial interface cable is usually rated in pico Farads per foot. Therefore, if a cable has a capacitance of 50 pF/ft, and the connectors are 100 pF each, the maximum recommended cable length is 46 feet for baud rates of up to 57,600. If the cable is rated at 12.5 pF/ft, the maximum recommended cable length is 184 feet, and 5 pF/ft cable can be run up to 460 feet.

In situations where low-capacitance cable is unavailable, or very long cable runs are required, “short-haul” modems, available from suppliers such as Black Box, can be used to increase the effective range of the EIA-232 interface. Short-haul modems are similar to standard modems, except that they are connected directly to each other via a cable instead of going through a telephone circuit.

Note – Use only externally-powered short-haul modems with the SunSAI/P adapter.

Connecting Peripherals

This section discusses various methods of connecting peripheral devices to the SunSAI/P adapter.

Sample cable diagrams are provided to aid in constructing the correct cable for your application.

Note – The cables shown in this section are for information only and are not supplied by Sun Microsystems.

Connecting to a Modem

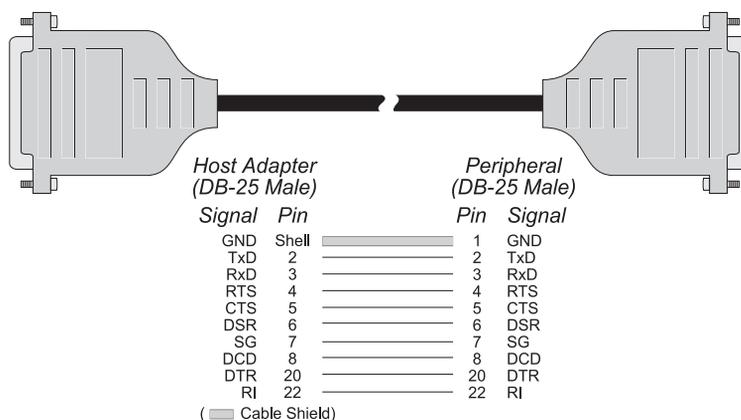


FIGURE 4-1 Modem Cable

To connect the SunSAI/P board to a modem, use a standard “straight-through” cable (FIGURE 4-1) to connect the modem to one of the DB-25 connectors on the connector box.

Note – Shielded cable must be used to remain in compliance with Part 15 of FCC rules.

Connecting to a DTE Device

A DTE device is a terminal, serial printer, another computer's serial port, etc. To connect the SunSAI/P board (which is also a DTE device) to another DTE device, you need a null modem cable or adapter.

Software Handshaking (XON/XOFF)

In most cases, serial terminals and printers need only a “three-wire” connection to the SunSAI/P board. The Solaris device driver supports XON/XOFF (software) handshaking, so the only signal lines necessary are Transmitted Data (TxD), Received Data (RxD) and Signal Ground (SG). Cables must be shielded to remain in compliance with FCC certification requirements, and the shield should be connected to Chassis Ground (GND) at both ends of the cable run.

A simple cable for connecting a terminal or a printer to a DB-25 equipped SunSAI/P board is shown below.

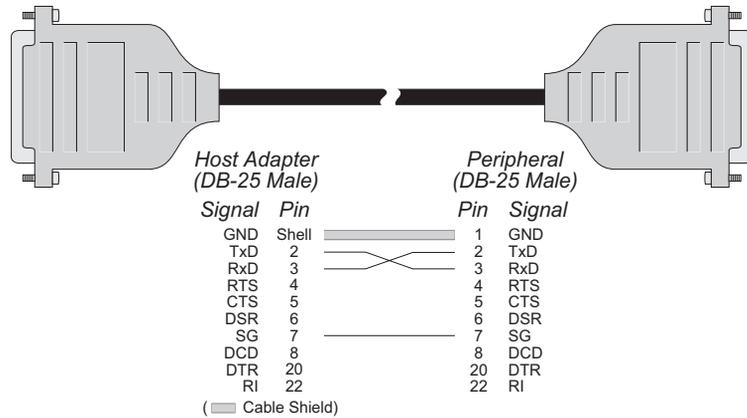


FIGURE 4-2 Simple Terminal/Printer Cable

Note – Shielded cable must be used to remain in compliance with Part 15 of FCC rules.

The cable shown in FIGURE 4-2 is a three-wire null modem cable—that is, Transmitted Data on one end of the cable is connected to Received Data at the other end, and vice versa.

The male DB-25 end can be plugged directly into most serial terminals and printers without any adapters. The female DB-25 end plugs directly into one of the DB-25 connectors on the connector box assembly.

Hardware Handshaking (Ready/Busy)

Most terminals and printers use Data Terminal Ready (DTR) for Ready/Busy hardware handshaking. The cable shown below supports this method.

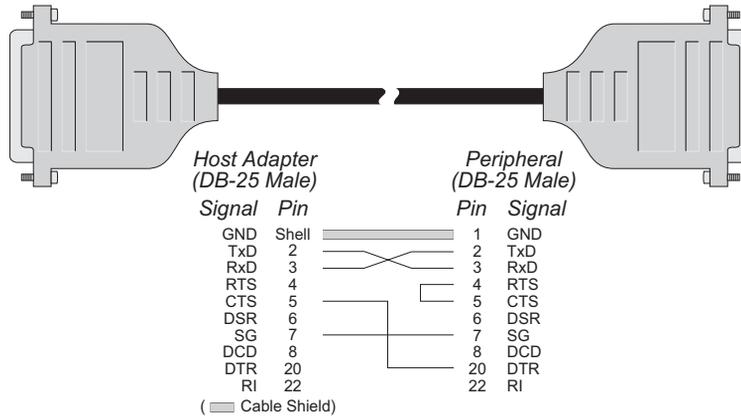


FIGURE 4-3 Terminal/Printer Cable with DTR Handshaking

Note – Shielded cable must be used to remain in compliance with Part 15 of FCC rules.

Note – Some Okidata printers use a control signal on pin 11, called Supervisory Send Data (SSD) instead of DTR. In this case, simply connect CTS on the female DB-25 side to pin 11 of the male DB-25, instead of pin 20. Other printer manufacturers may use different methods of flow control. Consult your printer's documentation for specific wiring requirements.

Device Driver Installation

Note – Software changes more rapidly than printed documentation can keep up. For this reason, some of the screens or prompts may not appear exactly as shown.

Removing Previous Versions of the Driver Software

Before installing the SunSAI/P driver software, you must first remove any previous version of the SunSAI/P software that may be present on your system. If you attempt to add the software packages over existing SunSAI/P packages, the installation will fail.

1. **Become superuser (root).**
2. **Check for any SunSAI/P software packages by using the `pkginfo` command:**

```
# /usr/bin/pkginfo | grep SUNWsaip
```

If you find any SunSAI/P packages, you must remove them.

3. **Remove any existing SunSAI/P software packages by using the `pkgrm` command:**

```
# /usr/sbin/pkgrm SUNWsaip SUNWsaipu
```

Installing the Driver Software Using pkgadd

1. **Log onto your system console as superuser (root).**
2. **Insert the SunSAI/P CD into your system's CD-ROM drive.**
The Solaris volume management software will mount the CD to the /cdrom/sunsaip_2_0 directory.
3. **To start the software installation, type:**

```
# pkgadd -d /cdrom/sunsaip_2_0/Product SUNWsaip SUNWsaipu
```

Note – For more information about the pkgadd utility, refer to the pkgadd(1m) man page or the Solaris documentation.

You will see the following, or similar, output:

```
Processing package instance <SUNWsaip> from </cdrom/sunsaip_2_0/Product>
Serial Asynchronous Interface Driver (PCI)
(sparc) 2.0,REV=year.month.day
Copyright 1998 Sun Microsystems, Inc. All rights reserved.

Automatically installing the default configuration.
To reconfigure or add new adapters, use the saipconfig utility.

The following has been automatically configured for adapter 1:
Adapter Type: 8-port PCI Async Intelligent Adapter.

Module  Port Names
-----
1       term/a000 - term/a007 -- also /dev/cua/axxx
Using </> as the package base directory.
## Processing package information.
## Processing system information.
    6 package pathnames are already properly installed.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.
```

4. Answer yes (y) when asked to allow scripts to be run as superuser on your system.

```
This package contains scripts which will be executed with super-user
permission during the process of installing this package.
```

```
Do you want to continue with the installation of <SUNWsaip> [y,n,?] y
```

After several status messages, you will see the following, or similar, output:

```
Installation of <SUNWsaip> was successful.
```

```
Processing package instance <SUNWsaipu> from </cdrom/sunsaip_2_0/Product>
```

```
Serial Asynchronous Interface Utilities (PCI)
```

```
(sparc) 2.0,REV=year.month.day
```

```
Copyright 1998 Sun Microsystems, Inc. All rights reserved.
```

```
Using </opt> as the package base directory.
```

5. Answer yes (y) when asked to allow scripts to be run as superuser on your system.

```
This package contains scripts which will be executed with super-user
permission during the process of installing this package.
```

```
Do you want to continue with the installation of <SUNWsaipu> [y,n,?] y
```

The driver installation will continue automatically. When you will see the following message, the driver software will have been successfully installed on your system.

```
Installation of <SUNWsaipu> was successful.
```

6. Unmount and eject the SunSAI/P CD.

Directory Structure

FIGURE 5-1 and FIGURE 5-2 shows the directory structure of the SunSAI/P software after it has been installed on your system.

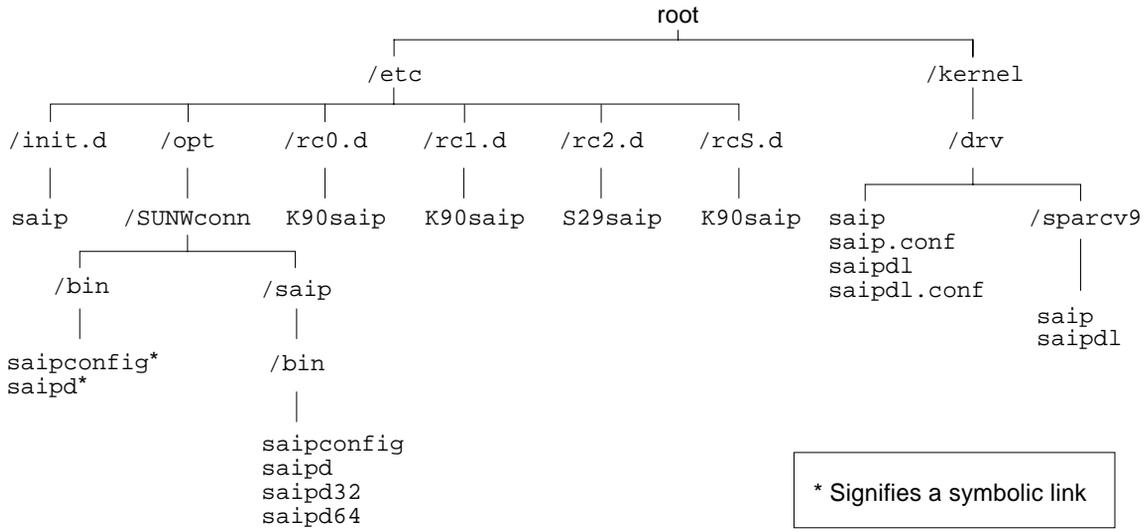


FIGURE 5-1 SunSAI/P Software Directory Structure (/etc and /kernel Directories)

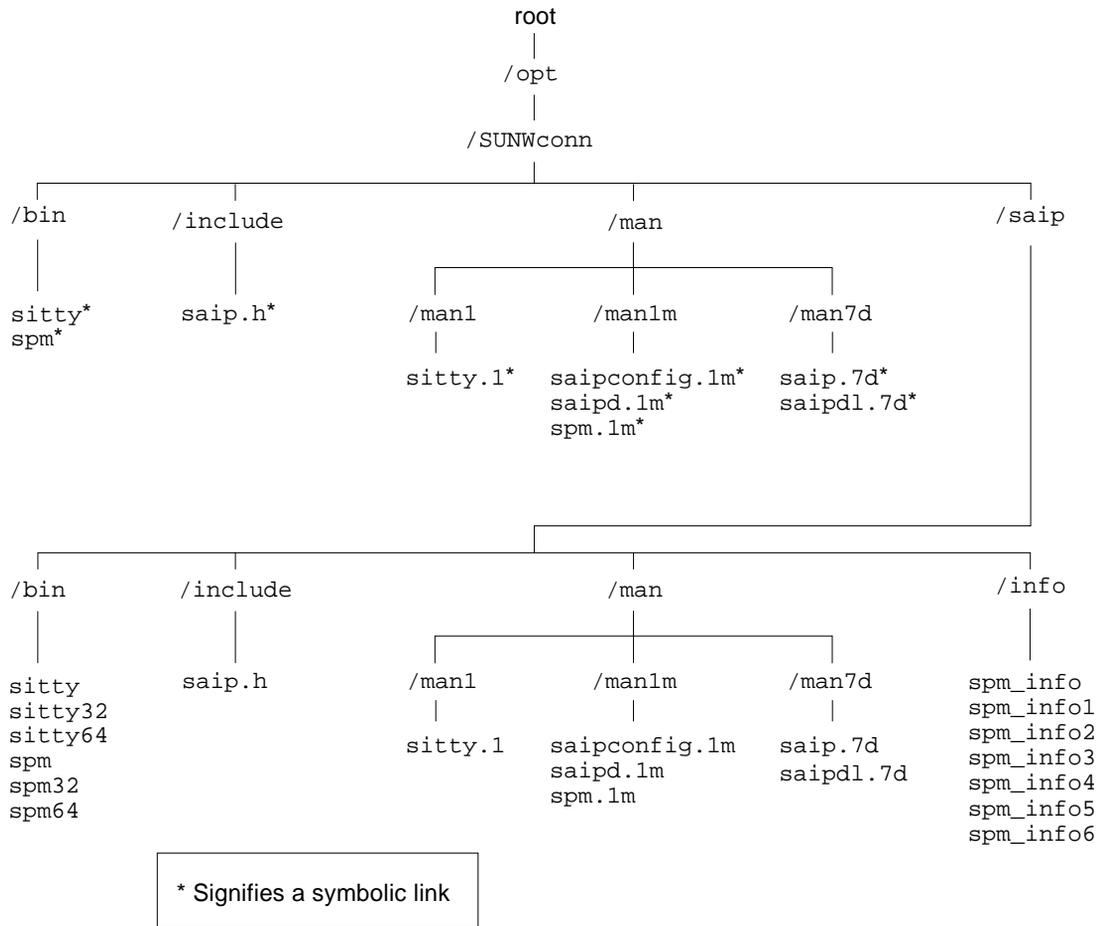


FIGURE 5-2 SunSAI/P Software Directory Structure (/opt Directory)

Loading the Driver

When the driver loads, you will see the following (or similar) message:

```
SUNWsaip  port:0x00000000  mem=0x00400000  ports=8  SunSAI/P V x.x.x
```

If there is a problem with the board or the driver configuration, you may see error messages after this screen—see Appendix A for explanations of the error messages that may occur.

sitty options set from a run control (rc) script must be set after the download program has run, and must wait for the board to boot before running.

sitty options should be added to the end of `/etc/rc2.d`. This can be done by giving it a name such as “S99saip” or “S99sittystuff”, where the “S” must be a capital letter, and the greater the number, the later the script is run.

Using saipconfig to Configure the Driver Software

In some circumstances, you may want to configure the SunSAI/P device driver manually. For example, you may want to use more adapters than are currently loaded in the system, or you may need to change the default configuration. After you have installed the driver software, use the `saipconfig` utility to configure the driver software.

Rebooting the System

If you have installed additional boards since you have installed the driver software, perform a reconfiguration boot before using the `saipconfig` utility.

1. **Shut down your system and display the OpenBoot prompt (`ok`) using the procedures described in the *Solaris Handbook for Sun Peripherals* or your system service manual.**

For example, you can shut down the system using the `shutdown` command:

```
# /usr/sbin/shutdown -y -g10 -i0
```

Refer to the `shutdown(1m)` man page for more information.

2. **Perform a reconfiguration book by typing the following at the OpenBoot prompt:**

```
ok boot -r
```

Automatic Configuration

Follow this procedure to use the `saipconfig` utility to configure the SunSAI/P interfaces on your system automatically.

1. **Log onto to your system console as superuser (`root`).**
2. **To start the `saipconfig` utility, type:**

```
# /etc/opt/SUNWconn/bin/saipconfig
```

3. **Answer yes (`y`) to accept the default configuration.**

```
The installation has detected 1 SunSAI/P serial adapter.
```

```
Would you like to automatically install the default configuration? y
```

At this point, the `saipconfig` utility will configure the SunSAI/P interfaces automatically. When `saipconfig` has finished configuring the interfaces, you will see this message:

```
Configuration Completed.
```

Manual Configuration

Use the `saipconfig` utility to configure the SunSAI/P adapters on your system manually. The utility will ask you a series of questions about how you want to customize the adapters. After you have answered these questions, the utility will reconfigure the driver software.

1. **Log onto to your system console as superuser (root).**
2. **To start the `saipconfig` utility, type:**

```
# /etc/opt/SUNWconn/bin/saipconfig
```

3. **To configure the adapters manually, answer no (n) to this question:**

```
The installation has detected 1 SunSAI/P serial adapter.  
Would you like to automatically install the default configuration? n
```

The `saipconfig` utility will ask you questions about how you want to configure the SunSAI/P interfaces.

```
This script installs the Sun PCI Serial Asynchronous Interface  
driver :
```

```
This script also installs the information needed by Solaris to use  
the additional ports available through this driver. Depending upon  
your system, the driver may support up to 12 Host Adapters.
```

```
Press <CR> to proceed or "Q" to quit:
```

4. **Press the Return key to configure your driver software.**

5. Type the number of SunSAI/P adapters you want to configure on your system:

```
How many adapters do you wish to install (1-12)?
```

For each adapter that you specified in Step 5, you will be asked the questions shown in Step 6 and Step 7.

6. Decide if you want to enable interrupts on the SunSAI/P adapter.

Type “y” to disable interrupts (the default value), or type “n” to enable interrupts, on the adapter.

Note – We recommend that you use the default setting of disabled interrupts.

```
Configuring adapter 1.
```

```
Adapter type is 8-port PCI Async Intelligent Adapter.
```

```
8-port adapter:
```

```
In order to reduce response time to small packets (latency), it
may be helpful to enable interrupts on the adapter. However,
doing this will significantly increase driver CPU usage on your
Solaris system. By default, interrupts are disabled.
To enable interrupts, answer no.
```

```
Do you want to keep interrupts disabled on the adapter? (y/n)?
```

7. Type “y” if you are satisfied with this adapter’s configuration.

```
You have selected the following configuration for adapter 1:
```

```
Adapter Type: 8-port PCI Async Intelligent Adapter.
```

```
Module  Port Names
```

```
-----
```

```
1          term/a000 - term/a007 -- also /dev/cua/axxx
```

```
Interrupts disabled.
```

```
Is this configuration acceptable (y or n)?
```

Type “n” if you are not satisfied with the configuration.

```
Is this configuration acceptable (y or n)? n
```

```
Hit <CR> to re-configure adapter #1:
```

Press the Return key to return to Step 6.

After answering these questions for all of the SunSAI/P adapters on your system, `saipconfig` will configure the interfaces automatically. When `saipconfig` has finished configuring the interfaces, you will see this message:

```
Configuration Completed.
```

Creating New Devices

Devices have been created in `/dev`, giving the operating system the information to use the additional ports.

The device driver will support up to 12 SunSAI/P adapters, depending upon your system.

The devices are named according to the following convention:

TABLE 5-1 Format Used For Port Names

Format	Description
<code>/dev/term/</code>	Directory path for dial-in devices.
<code>/dev/cua/</code>	Directory path for dial-out devices.
<code>a - z, A - Z</code>	Module letter ID.
<code>000 - 007</code>	Port Number. For example, for the first board, the module letter and port numbers will be <code>a000 - a007</code> . For the second board, they will be <code>b000 - b007</code> .

Note – See Chapter 6 for more information about TTY device names.

Enabling the New Ports

Please refer to your Solaris *System Administration Guide*, under the Peripherals Setup section, for the details on how to enable serial ports.

Note – The *System Administration Guide* is shipped with the Solaris operating environment, and it is available on the <http://docs.sun.com/> website.

The following example shows how to set up serial ports for use with terminals:

1. **Connect terminals to the ports (using a null modem, if necessary) and test the connections to each terminal by entering the following command for each port added:**

```
# date > /dev/cua/a000
```

(Assuming the terminal is connected to a000.)

Please note that in the step above, the `date` command is used as a simple test, to provide text output that can be redirected; there is no other significance to `date` in this test.

- If the `date` appears on the terminal screen, the device is properly connected.
- If the `date` does not appear on the terminal screen, then that terminal is not receiving data; check the power, cables, connections, and so on.
- If nonsense characters are printed on the terminal screen, check the baud rates, data bits, stop bits, and parity setting on your terminal.

Once you can redirect output to a terminal with the test above, perform the following steps to enable that port:

2. **Log onto the console as super-user (root).**
3. **Type (on a single command line):**

```
# pmadm -a -p zsmon -s a000 -fu -i root -v `ttyadm -V` \  
-m "`ttyadm -d /dev/cua/a000 -l 9600 -s /usr/bin/login`"
```

This will enable the port suitably for a terminal.

Note – Ports may also be enabled through the Solaris `admintool` program. Refer to the *System Administration Guide* for more information.

Viewing the Man Pages

The SunSAI/P man pages are installed in the `/opt/SUNWconn/man/` directory. Before you can view the man pages, you will need to add this directory to your `MANPATH` environment variable. The location of the `MANPATH` variable will depend on which UNIX shell you are using.

Editing the C Shell Environment

1. **Examine your `$HOME/.login` and `$HOME/.cshrc` files to locate the `MANPATH` variable.**
2. **Using a text editor, add this line to the end of the file that contained the `MANPATH` variable.**

```
setenv MANPATH "/opt/SUNWconn/man/:$MANPATH"
```

If neither of these files contain this variable, add this line to the end of one of the files, or contact your system administrator for assistance.

```
setenv MANPATH "/opt/SUNWconn/man/"
```

3. **Use the `source` command on the file you edited to make the changes effective in your current window.**

For example, if you added the `MANPATH` line to the `.login` file, you would type:

```
% source $HOME/.login
```

Note – If you log out and then back into to your system, you will update the `MANPATH` variable in all command windows and shells.

Editing the Bourne or Korn Shell Environments

1. Using a text editor, add these two lines to the end of the `$HOME/.profile` file.

```
MANPATH=/opt/SUNWconn/man:$MANPATH
export MANPATH
```

If this file did not already contain this variable, add these lines to the end of the file, or contact your system administrator for assistance.

```
MANPATH=/opt/SUNWconn/man
export MANPATH
```

2. Make the changes effective in your current window.

```
$ . $HOME/.profile
```

Note – If you log out and then back into to your system, you will update the `MANPATH` variable in all command windows and shells.

Viewing the Man Pages

Once you have added the `/opt/SUNWconn/man/` directory to your `MANPATH` variable, you can use the `/usr/man` command to view these SunSAI/P man pages:

- `saip(7d)`
- `saipconfig(1m)`
- `saipd(1m)`
- `saipdl(7d)`
- `sitty(1)`
- `spm(1m)`

Un-Installing the Device Driver

Enter the following commands to un-install the device driver software:

1. **Log onto the console as super-user (root).**
2. **Enter the following command:**

```
# /usr/sbin/pkgrm SUNWsaip SUNWsaipu
```

3. **You will see:**

```
This package contains scripts which will be executed with super-user  
permission during the process of removing this package.
```

```
Do you want to continue with the removal of this package [y,n,?,q] y
```

Answer “y”. The packages containing the driver and associated utilities will now be removed from the system. In the event that some of the ports were open when `pkgrm` was initiated, the unloading of the driver will fail. In this case it will be necessary to reboot to complete the driver removal.

TTY Devices

This device driver supports two different device types on each line. On line “a000”, where “a” refers to the first SunSAI/P board, and “000” refers to first line (port) on that board, there are two devices:

`/dev/term/a000`

Dial-in TTY device, used for terminals, modems, printers, laboratory equipment, etc.

This device is a traditional UNIX port with modem control. It requires Data Carrier Detect (DCD) to be high before it will operate.

When used with a modem, the port will wait for carrier before sending out the `login:` prompt, so the user is greeted properly upon making a connection.

When used with a terminal or other device, it is usually wise to wire the SunSAI/P DCD signal to the terminal's DTR (Data Terminal Ready) line. When the terminal is turned on, the system outputs a `login:` prompt. When the terminal is turned off, any associated jobs are killed, and the user is logged out.

`/dev/cua/a000`

Dial-out TTY device. This is the same as `/dev/term/a000` with the exception that Data Carrier Detect need not be present to open the device. Once a connection is established and DCD becomes active, standard devices behave in the same way as modem devices-subsequent loss of the Data Carrier Detect signal will cause the jobs to be killed and the user will be automatically logged off.

Setting Terminal Options with the `sitty` Utility

`sitty` is a utility program that sets and displays the terminal options for the SunSAI/P.

The `sitty` command must be run each time the machine is booted if non default settings are required for certain ports. Usually, the best way to do this is by adding `sitty` commands to your system initialization file (you can put them in a text file in the `/etc/rc2.d` directory, and give the file a name such as `/etc/rc2.d/S99saip` or `/etc/rc2.d/S99sittystuff`; refer to the *Solaris System Administration Guide* for details). Alternatively, you may include the `sitty` command sequence in your `.login` or `.profile` files. Your system administrator can help you edit these files. The full pathname for the command is `/opt/SUNWconn/bin/sitty`.

The format is:

```
sitty [-a] [option(s)] [< ttyname]
```

With no options, `sitty` displays all SunSAI/P special driver settings, modem signals, and all standard parameters for the TTY device referenced by standard input.

Command options are provided to change flow control settings, force modem control lines, and display all TTY settings (see TABLE 7-1). Any unrecognized options are passed to `stty(1)` for interpretation.

TABLE 7-1 `sitty` Options

Option	Description
<code>-a</code>	Display all of the unique SunSAI/P option settings, as well as all of the standard TTY settings reported by <code>stty -a</code> .
<code>ttyname</code>	Set and display options for the given TTY device, instead of standard input. <code>ttyname</code> is the full pathname (e.g. <code>/dev/term/a000</code>) of the device.
The following options specify transient actions to be performed immediately.	
<code>break</code>	Send a 250 MS break signal out on the TTY line.
<code>flush</code>	Immediately flush (discard) TTY input and output.
<code>flushin</code>	Flush TTY input only.
<code>flushout</code>	Flush TTY output only.
The following options are “sticky”, which means that the effects continue until the system is rebooted or until the options are changed.	
<code>[-]fastbaud</code>	Alter the baud rate tables, so that the following baud rate changes take place: 50=56700, 75=76800, 110=115200, 200=230000, 300=76800, 600=115200, 1200=230000, and 1800=28800. For example, 50 baud becomes 57,600 baud, 75 baud becomes 76,800 baud, and so on.
<code>[-]forcedcd</code>	Disable [re-enable] carrier sense, so the TTY may be opened and used even when carrier is not present.
<code>[-]altpin</code>	Switches the function of the DSR and the DCD inputs on the modular connector, so that DCD is available when using an 8-pin RJ-11 connector instead of the 10-pin RJ-45 connector.
<code>edelay n</code>	Sets the number (<i>n</i>) of milliseconds of delay between the time the first character arrives after a period of no characters and notification of its arrival to the host. This delay is also referred to as the wakeup rate between the host adapter software (FEPOS) and the host device driver. This has the advantage of reducing host overhead by allowing the host to process larger blocks of incoming data. Larger <code>edelay</code> values result in more characters being sent in a given time period. This will reduce host processor overhead and increase overall system throughput. Smaller <code>edelay</code> values result in fewer characters being sent in a given time period. This will increase character response time and increase host processor overhead.

TABLE 7-1 `sitty` Options (*Continued*)

Option	Description
	The default value for <code>edelay</code> is 100. This is a good value for normal TTY activity like typing. For some applications like <code>uucp</code> , decreasing the <code>edelay</code> value may increase character throughput, but will result in increased system overhead. For applications receiving continuous input at high speeds, increasing <code>edelay</code> will result in lowering host overhead and increasing overall system throughput. A value of 250 is reasonable.
The following options specify actions which are not “sticky”, meaning that the changes are reset when the device is closed, and that the device will use the default values the next time it is opened.	
<code>stopout</code>	Stop output exactly as if an <code>xoff</code> character was received.
<code>startout</code>	Restart stopped output exactly as if an <code>xon</code> character was received.
<code>stopin</code>	Activate flow control to stop input.
<code>startin</code>	Release flow control to resume stopped input.
<code>[-]dtr</code>	Raise [drop] the DTR modem control line, unless DTR hardware flow control is selected.
<code>[-]rts</code>	Raise [drop] the RTS modem control line, unless RTS hardware flow control is selected.
<code>[-]rtSPACE</code>	Enable [disable] RTS hardware input flow control, so RTS drops to pause remote transmission.
<code>[-]ctSPACE</code>	Enable [disable] CTS hardware output flow control, so local transmission pauses when CTS drops.
<code>[-]dsrSPACE</code>	Enable [disable] DSR hardware output flow control, so local transmission pauses when DSR drops.
<code>[-]dcdSPACE</code>	Enable [disable] DCD hardware output flow control, so local transmission pauses when DCD drops.
<code>[-]dtrSPACE</code>	Enable [disable] DTR hardware input flow control, so DTR drops to pause remote transmission.

For more information, refer to the `sitty(1)`, `stty(1)`, `ioctl(2)`, `termio(7i)`, and `terminfo(4)` man pages.

Sun Port Manager

Sun Port Manager (SPM) is a software tool which provides a means to monitor the status of the Front End Processor/Operating System (FEP/OS), which is the on-board software run by the SunSAI/P.

SPM also shows the status of the individual ports on a module by displaying a simulated modem status register. Each of the eight supported EIA-232 signals is displayed, along with input and output flow control status.

SPM is installed automatically when you install this device driver, and can be run from any terminal on the system.

Using SPM

To run the Sun Port Manager, enter the following command from any terminal, or the system console:

```
spm [-l logfile]
```

The `-l logfile` option specifies the file path for screen dumps. If this option is not specified, the default log file path is `/tmp/spmllog`. The Sun Port Manager is fully documented in context-sensitive help screens.

Error Messages

The following error messages are generated by the device driver:

WARNING: PCI SAI/8 memory allocation error. <2>

What it means: The operating system would not allocate memory to the driver.

Action to take: Adjust kernel resources. Reboot.

WARNING: PCI SAI/8 not resetting. <3>

What it means: The board doesn't respond to reset.

Action to take: Make sure the board is fully seated in the slot. Potential hardware problem.

WARNING: PCI SAI/8: No memory at 0xXX <4>.

What it means: The driver cannot read the board's dual ported memory.

Action to take: Make sure the board is fully seated in the slot. Potential hardware problem.

WARNING: PCI SAI/8: port X failed diagnostics <5>.

What it means: The driver encountered an error executing on-board BIOS.

Action to take: Potential software problem.

WARNING: PCI SAI/8 FEPOS not functioning. <7>

What it means: The driver encountered an error executing on-board FEPOS.

Action to take: Potential software problem. Potential hardware problem.

```
WARNING: saip_driver attach(0): Can't get config info for PCI
saip8 (#0)
```

What it means: The driver found a board in the system that had not been configured.

Action to take: De-install driver with `pkgrm`. Install driver with `pkgadd`. Either use the auto-install option or select the appropriate number of boards.

Specifications

Power Requirements

- +5 VDC 5%:960 mA typical
- +12 VDC 5%:80 mA typical
- -12 VDC 5%:80 mA typical
- +3.3 VDC 5%:20 mA maximum

Board Dimensions

- Length: 6.875 inches
- Width: 0.5 inches
- Height: 4.2 inches
- Weight: 6.1 ounces

Operating Environment

- Ambient temperature: 10° C to 55° C
- Relative humidity: 5% to 90%
- Air movement: 30 CFM forced
- Altitude: 0 to 12,000 feet

Serial Interface Surge Suppression

- Threshold Voltage (TxD & RxD): 12 Volts
- Threshold Voltage (Control Lines): 12 Volts
- Response Time: Less than 10 nS

SunVTS Diagnostic Testing

The SunVTS™ software executes multiple diagnostic hardware tests from a single user interface and is used to verify the configuration and the functionality of most hardware controllers and devices. The SunVTS software primarily operates from a user interface that allows you to control all aspects of the diagnostic test operation.

The `saiptest` diagnostic, which is shipped with the SunVTS software, checks the functionality of SunSAI/P adapters. This diagnostic can be run from the SunVTS user interface, or it can be run from the command line. Refer to the *SunVTS Test Reference Manual* for more information about the `saiptest` test.

Refer to the SunVTS documents for detailed information about the SunVTS software. These documents are available on the Solaris on Sun Hardware AnswerBook, which can viewed on the Sun Documentation website (<http://docs.sun.com/>).

TABLE C-1 SunVTS Documentation

Title	Description
<i>SunVTS User's Guide</i>	Describes the SunVTS environment; starting and controlling the various user interfaces.
<i>SunVTS Test Reference Manual</i>	Describes each SunVTS test; provides various test options and command-line arguments.
<i>SunVTS Quick Reference Card</i>	Provides an overview of <code>vtsui</code> interface features.

The main features of the SunVTS environment include:

- SunVTS kernel

The SunVTS kernel (`vtsk`) controls all facets of the SunVTS environment. When activated, `vtsk` probes the hardware configuration of the system being tested and responds to commands from `vtsui` and `vtstty`. `vtsk` coordinates the operation of individual tests and manages the messages sent by these tests.

- SunVTS user interface

The SunVTS graphical user interface (`vtsui`) operates on the windowing system. `vtsui` controls `vtsk` and allows you to set user options, start and stop tests, and read log files.

- SunVTS TTY interface

The `vtstty` TTY user interface controls `vtsk` from either a command shell or a terminal attached to a serial port. Most options available in `vtsui` have equivalent options in `vtstty`.

Note – Some of the `saiptest` tests require a EIA-232 loopback plug, which can be ordered through Sun (part number: 540-1558).

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