SunSAI/P User's Guide

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Your Sun product is marked to indicate its compliance class:

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

Please read the appropriate section that corresponds to the marking on your Sun product before attempting to install the product.

FCC Class B Notice

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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DOC Class B Notice - Avis DOC, Classe B

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

VCCI 基準について

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![Sun logo] **Sun**

Sun Microsystems Computer Company
A Sun Microsystems, Inc. Business

Declaration of Conformity

Compliance ID: DIGI-70000414

Product Name: SunSAI/P Adapter

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

In addition this equipment complies with the following requirements of the EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC;

EMC:	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.

<table>
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Introduction 1 ☰

This Installation Guide covers the installation and configuration of the SunSAI/P intelligent serial communications boards in Sun Microsystems PCI workstations running Solaris 2.5.1 Hardware: 4/97 and future releases.

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

- Installation Guide (this book)

- One or more software packets containing device driver CD-ROM and manuals

- Connector assembly

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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.

Installing SunSAI/P Boards 2 ≡

Before you plug in 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.

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Plugging in the Board

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

1. **Turn off your computer's power and remove the cover (refer to your computer's manual for instructions on cover removal and option board installation and cautions).**

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 User's Guide 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.**

   HINT: if you have difficulty plugging in 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.**

Software Installation Considerations

Memory Window Size and Starting Address

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

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

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EIA-232 Cables and Connectors 3 ≡

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.

Connectors

SunSAI/P boards are shipped with a connector box which provides eight female DB-25 EIA-232 connectors wired for 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	*reference*	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

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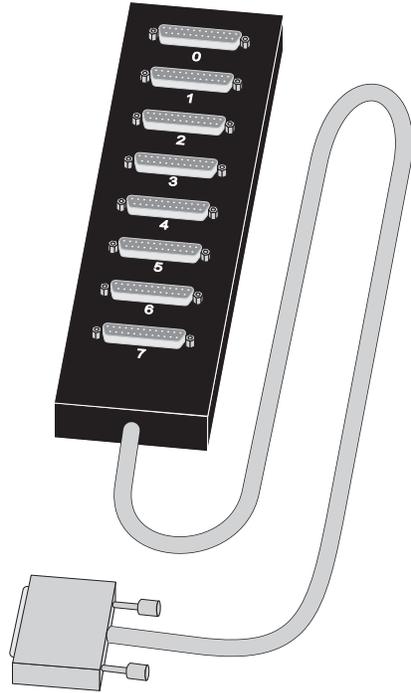
Connecting Peripherals 4

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 through Sun Microsystems.

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Connecting to a Modem

Figure 4-1   Modem Cable
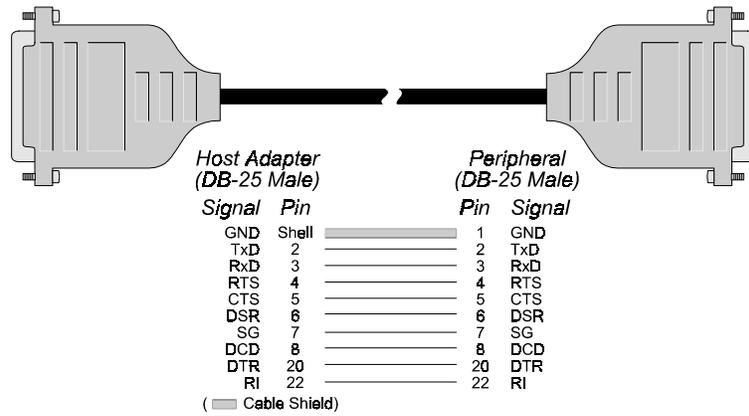
To connect the SunSAI/P board to a modem, use a standard "straight-through" cable (shown above) to connect the modem to one of the DB-25 connectors on the connector box.

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). It may be necessary to disable DCD (Data Carrier Detect) sensing by using the `sitty forcedcd` command (see *Setting Terminal Options with sitty*, on page 29). 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
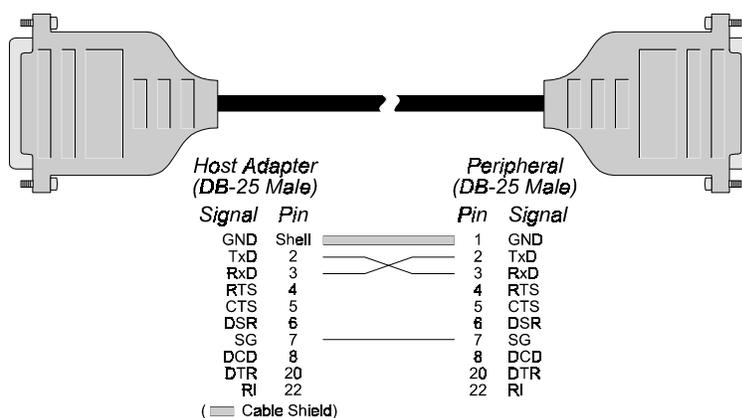
Note – Shielded cable must be used to remain in compliance with Part 15 of FCC rules.

The cable shown on the previous page 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
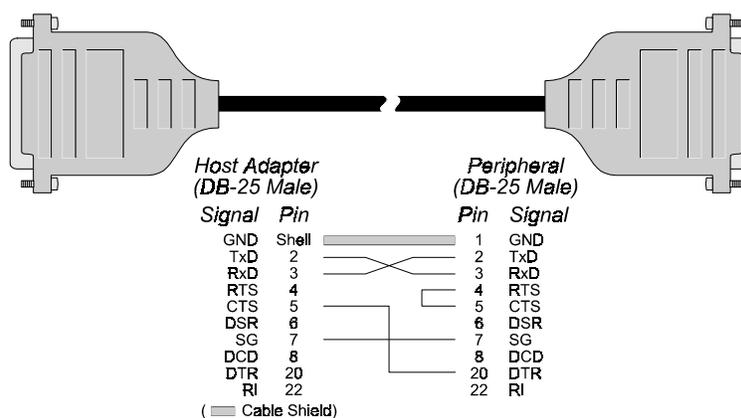
Note – Shielded cable must be used to remain in compliance with Part 15 of FCC rules.

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.

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Device Driver Installation 5 ≣

> **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.

Installing the Driver Package

The SunSAI/P device driver for Solaris (SPARC) is fully automatic. The procedure follows. If you wish to use non-default options, the driver can be configured manually. The manual installation procedure begins on page 20.

Automatic Installation

1. **Log onto the console as super-user (root).**

2. **To begin the installation, insert the CD-ROM containing the device driver software and enter the commands:**

   ```
   # cd /cdrom/sun_saip_1_0/Product
   # pkgadd -d . SUNWsaip SUNWsaipu
   ```

This will run the System Administration program designed to assist in Add On Package installation.

Refer to the Operations/System Administrator's Guide for more information on pkgadd.

You will see the following (or something similar):

```
Processing package instance <SUNWsaip> from </cdrom/sun_saip_1_0/Product>
Sun Serial Asynchronous Interface (PCI)
(sparc) 1.0.0
Copyright 1997 Sun Microsystems, Inc. All rights reserved.

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

Answer "y". The system then displays:

```
The following has been automatically configured for board 1:
8-port PCI Async Intelligent Board.

        Module  Port Names
       --------------------------
        1       term/a000 - term/a007 -- also /dev/cua/axxx

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

3. Files will be loaded and processed, and you will be asked:

```
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,?]
```

Answer "y".

The installation procedure from this point is automatic. You will see several status messages, and finally:

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

4. You will see:

```
Processing package instance <SUNWsaipu> from </cdrom/sunsaip_1_0/Product>
Serial Asynchronous Interface Utilities (PCI)
(sparc) 1.0.0
Copyright 1997 Sun Microsystems, Inc. All rights reserved.
Using </opt> as the package base directory.
```

5. Files will be loaded and processed, and you will be asked:

```
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,?]
```

Answer "y".

The installation procedure from this point is automatic. You will see several status messages, and finally:

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

Manual Installation

In some circumstances it may be desirable to configure the device driver manually (for example, if you want to use device names of your own choosing). The procedure for manual installation follows.

1. Log onto the console as super-user (root).

2. To begin the installation, insert the CD-ROM containing the device driver software and enter the commands:

```
# cd /cdrom/sunsaip_1_0/Product
# pkgadd -d . SUNWsaip SUNWsaipu
```

This will run the System Administration program designed to assist in Add On Package installation.

Refer to the Operations/System Administrator's Guide for more information on pkgadd.

You will see the following (or something similar):

```
Processing package instance <SUNWsaip> from </cdrom/sunsaip_1_0/Product>
Serial Asynchronous Interface Driver (PCI)
(sparc) 1.0.0
Copyright 1997 Sun Microsystems, Inc. All rights reserved.
The installation has detected 1 SunSAI/P serial board.
Would you like to automatically install the default configuration?
```

3. Answer "n".
You will now see the following (or a similar) screen:

```
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.  This driver
supports up to 12 Host Adapter boards.

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

Press <Enter>.

4. The system displays:

```
The port names in the /dev directory will look like:
/dev/term/a000 (wait for CD)
/dev/cua/a000  (do not wait for CD)

Systems with a large number of ports may need to use some letters more
than once.  When this occurs, the first box to use an ID letter will
get port numbers 000-007, the second box to use that letter will get
port numbers 008-015, and so on.

You can have the install script pick ID letters for you, assigning
letters consecutively (a, b, c, d...) and starting over from the
beginning when it runs out of letters; or you can choose them manually.

Manual ID selection is sometimes desirable for larger systems, where it
can be used to help keep port names more organized.

Do you want ID letters picked for you (y or n)?
```

If you answer "y", ID letters will be automatically picked. If you answer "n", you will be asked (later in the procedure) to specify an ID letter for each module.

Answer "y".

5. The system asks:

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

Enter the number of SunSAI/P boards you have installed.

6. You will see (for each board specified in Step 5):

```
Configuring board 1.

 Board type is 8-port PCI Async Intelligent Board.

8-port board:
You have selected the following configuration for board 1:
Board Type: 8-port PCI Async Intelligent Board.

        Module  Port Names
      --------------------------
        1       term/a000 - term/a007 -- also /dev/cua/axxx
Using </> as the package base directory.
```

7. You will see several status messages as the installation proceeds, then you will be asked:

```
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,?]
```

Answer "y" to proceed.

8. You will see several more status messages as the installation continues; upon completion you will see:

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

The driver is now ready for use. A reboot is not necessary before beginning to use the SunSAI/P adapter; however, a reboot is recommended to guarantee consistency in the system configuration.

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.

The devices are named according to the following conventions:

<table>
<tr><td colspan="2" align="center">Format used for port names</td></tr>
<tr><td>/dev/term/</td><td>Directory path for dial-in devices.</td></tr>
<tr><td>/dev/cua/</td><td>Directory path for dial-out devices.</td></tr>
<tr><td>a-z</td><td>Module letter ID. Legal letters are a-z.</td></tr>
<tr><td>000-095</td><td>Port number.</td></tr>
</table>

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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 page 35 for explanations of the error messages that may occur.

`sitty` options set from an 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.

Enabling the New Ports

Please refer to your Solaris System Administrator's Guide, under the Peripherals Setup section, for the details on how to enable serial ports. 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 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's screen, the device is properly connected.
   - If the date does not appear on the terminal's screen, then that terminal is not receiving data; check the power, cables, connections, etc.
   - If nonsense characters are printed on the terminal's 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. **Enter (on a single command line):**

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

   where `ttymonx` is the port monitor tag. This will enable the port suitably for a terminal. For more information, see `ttymon` and `ttyadm` in the Answer Book.

Ports may also be enabled via the Solaris `Admintool` program.

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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:

```
# 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]
```

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 6 ≡

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 Carrier Detect 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 sitty 7 ≡

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 etc/rc system initialization file (put them in a text file in the directory /etc/rc2.d; see your System Administrators 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 pathname for sitty is /usr/bin/sitty.

The format is:

sitty [-a] [-n *ttyname*] [*option(s)*] [*ttyname*]

With no options, sitty displays all SunSAI/P special driver settings, modem signals, and all standard parameters displayed by stty(1) 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. Any unrecognized options are passed to stty(1) for interpretation.

The options are:

-a   Display all of the unique SunSAI/P option settings, as well as all of the standard tty settings reported by stty -a.

-n *ttyname*	Set and display options for the given tty device, instead of standard input. This option may be specified multiple times to perform the same operation on multiple devices.
ttyname	Set and display options for the given tty device, instead of standard input. ttyname can be the full pathname (e.g. /dev/dty/a001s), or a simplified pathname where the reference to /dev is implied (e.g. dty/a001s). This option may be used on a modem control line when no carrier is present.

The following options specify transient actions to be performed immediately:

break	Send a 250 MS break signal out on the tty line.
flush	Immediately flush (discard) tty input and output.
flushin	Flush tty input only.
flushout	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.

[-]fastbaud	Alter the baud rate tables, so 50 baud becomes 57,600 baud, 75 baud becomes 76,800 baud and 110 baud becomes 115,200 baud.
[-]forcedcd	Disable [re-enable] carrier sense, so the tty may be opened and used even when carrier is not present.

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.

stopout	Stop output exactly as if an xoff character was received.
startout	Restart stopped output exactly as if an xon character was received.
stopin	Activate flow control to stop input.
startin	Release flow control to resume stopped input.
[-]dtr	Raise [drop] the DTR modem control line, unless DTR hardware flow control is selected.
[-]rts	Raise [drop] the RTS modem control line, unless RTS hardware flow control is selected.

[-]rtspace   Enable [disable] RTS hardware input flow control, so RTS drops to pause remote transmission.

[-]ctspace   Enable [disable] CTS hardware output flow control, so local transmission pauses when CTS drops.

[-]dsrpace   Enable [disable] DSR hardware output flow control, so local transmission pauses when DSR drops.

[-]dcdspace   Enable [disable] DCD hardware output flow control, so local transmission pauses when DCD drops.

[-]dtrpace   Enable [disable] DTR hardware input flow control, so DTR drops to pause remote transmission.

Also see `stty(1)`, `ioctl(2)`, `termio(7)`, and `termcap(5)`.

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Sun Port Manager 8 ≡

Introduction

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.

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.

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/spmlog`.

Sun Port Manager is fully documented in context-sensitive help screens.

☰ *8*

Error Messages A≡

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 B≡

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

☰ B

Serial Interface Surge Suppression

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