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Serial Parallel Controller User's Guide



Sun Microsystems, Inc.
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Mountain View, CA 94043
U.S.A.

Part No: 800-6573-12
Revision A, February 1993

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1. This device may not cause harmful interference, and
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 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 a power 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.

Modifications

Modifications to this device, not approved by Sun Microsystems, Inc. may void the authority granted to the end user by the FCC to operate the equipment.

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This digital apparatus does not exceed Class B limits for radio noise emission for a digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

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Preface

This *Serial Parallel Controller User's Guide* explains how to:

- Select the slots in your SPARCsystem where you can install the card.
- Set jumpers on the card.
- Install the loadable device driver from the release media to your system, depending on which operating system you have installed on your system: Solaris 2.1 or 2.2 (SunOS™ 5.1 or 5.2), or Solaris 1.*x* (SunOS 4.*x*).
- Use Sundiag to test your card and device driver for correct operation.
- Connect peripheral devices to your system using the Serial Parallel Controller.

Installing the card is covered in the accompanying installation guides:

- *Installing SBus Cards in Desktop SPARCstations*
- *Installing SBus Cards in Deskside and Data Center Cabinets*

Typographic Conventions

This book uses the following typographic conventions:

- *This font* is used for: emphasis; a command argument for which you must replace the argument name; or the title of a book. For example:
  - *SPARCstation 2 Installation Guide*
- `This font` indicates text the system displays on your screen. For example:
  - `Syncing file systems... done`

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It also indicates characters and words you type as illustrated in the following text:

Enter `passwd`

- **`This font`** indicates what you type, as illustrated in screen examples:

```
% whoami
```

Related Information

The following books and online documentation contain more information on topics covered in this book:

- *Installing SBus Cards in Desktop SPARCstations*
- *Installing SBus Cards in Deskside and Data Center Cabinets*
- *Solaris 1.x (SunOS 4.x) Handbook for SMCC Peripherals.* (Contains Solaris 1.*x* [SunOS 4.*x*] software commands.)
- *Solaris 2.x Handbook for SMCC Peripherals.* (Contains Solaris 2.*x* software commands.)
- *SunOS 5.1 Adding and Maintaining Devices and Drivers*
- *Sun System & Network Manager's Guide*
- *System & Network Administration*
- *Sundiag User's Guide*
- Serial Parallel Controller Man Page (`spc`)

Note – The term *SPARCsystem* is used throughout this User's Guide to refer to Desktop SPARCstations, Desktop SPARCservers, Deskside SPARCcenters and Deskside SPARCservers.

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Introducing the Serial Parallel Controller 1

The Serial Parallel Controller lets you increase the number of serial ports to add terminals, modems, printers, and other peripheral devices to your SBus-based SPARC-based system. The card provides eight full-duplex serial ports, as well as one unidirectional Centronics-compatible printer port.

After installing the card in an SBus-based SPARC system, you can connect eight additional serial devices and one parallel device, per card. You can use the Serial Parallel Controller with your system to meet your need for low-end, multi-user applications such as data entry and process control. You can install additional Serial Parallel Controller cards or other SBus cards into available SBus slots in your system.

Depending on the number of available SBus slots in your system, you can use the Serial Parallel Controller with your SBus-based:

- SPARC system as a host for 8 (1 card) to 16 (2 cards) serial devices, plus 1 parallel port per card.
- SPARC system as a server for 8 (1 card) to 24 (3 cards) serial devices, plus 1 parallel port per card.

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Features

The Serial Parallel Controller offers the following features:

- Single-width SBus card requiring one SBus slot.
- Eight serial ports (RS-423 or RS-232 compliant, selectable by jumper blocks on your card).
- One unidirectional Centronics-compatible printer port.
- Support for SBus-based Desktop and Deskside SPARCsystems.
- Device driver installation and configuration scripts.
- Independently programmable baud rates and port configuration.
- SBus programmed input/output interface.
- Baud rate of 50 to 38.4 k baud.
- Less than 0.01% error rate across all baud rates.
- 135 k baud total throughput, using flow control.
- Clear-to-Send/Request-to-Send (CTS/RTS), Data-Terminal-Ready (DTR), Data-Carrier-Detect (DCD), and Data-Set-Ready (DSR) modem controls on all serial ports.
- Support for Hayes-compatible modems.
- FCC Class B compliancy, for home use.

Note – Serial Parallel Controller does not support Ring Indicator (RI). RI is a defined EIA RS-232 input signal.

Release Information

- This manual assumes operation under Solaris 2.1 (SunOS 5.1) or Solaris 2.2.. Information regarding operation under Solaris 1.x (SunOS 4.x) is included in case you happen to be using that operating system release.
- Release 1.0 of the Serial Parallel Controller card hardware (P/N F501-1511) will work with release 1.0 or greater of the Serial Parallel Controller card software.
- Release 1.1 or greater of the Serial Parallel Controller card hardware (P/N F501-1931) must be used with release 1.1 or greater of the Serial Parallel Controller card software.

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Enhancements Since the Last Release

An ASCII file of enhancements to this software version is included with the Solaris 1.x release. To read this information, see the following file:

```
/usr/sys/unbundled/stC/enhancements.doc
```

Getting Help

If you have a problem or need more information, check the manual thoroughly and read the man page for the Serial Parallel Controller. To access the man page, type: `man spc`. If you still need additional help, contact your local service provider.

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Installing the Serial Parallel Controller 2

This chapter covers:

- Unpacking the Serial Parallel Controller
- Special Instructions
- Installing the card

For step-by-step installation instructions, refer to *Installing SBus Cards in Desktop SPARCstations* or *Installing SBus Cards in Deskside and Data Center Cabinets.*

Unpacking the Serial Parallel Controller

Remove the components from the packing box. Leave the card in its antistatic bag. Store your packing box and packing materials for future use.

You should have the following items:

- *Installing SBus Cards in Desktop SPARCstations*
- *Installing SBus Cards in Deskside and Data Center Cabinets*
- *Solaris 1.x Handbook for SMCC Peripherals.*
- *Solaris 2.x Handbook for SMCC Peripherals.*
- Serial Parallel Controller card
- Patch panel
- 9.84-feet (3 m) 96-pin shielded cable
- CD-ROM (device driver installation and configuration scripts, SPC/S Sundiag test files, and insert which includes CD mounting instructions)
- Rack and wall mounting brackets

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- Nylon grommet for rack mounting brackets
- Four 10-32 Phillips screws and lock washers (not shown)
- 96-pin loopback plug (not shown)
- 25-pin serial loopback plug (not shown)
- Anti-static wrist strap (not shown)

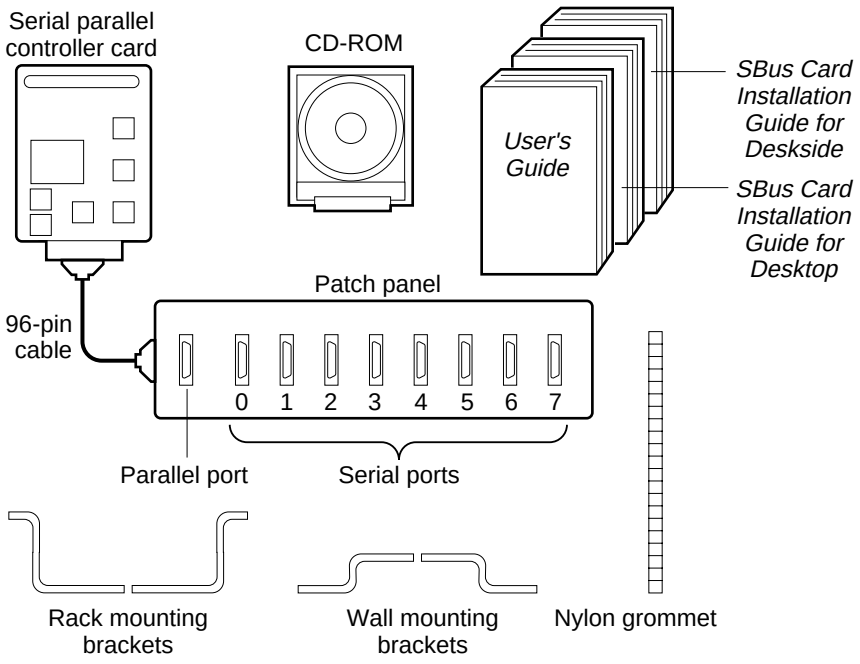


Figure 2-1 Serial Parallel Controller Parts

Special Instructions

The following special instructions explain how to select an SBus card slot in your SPARCsystem, what tools are required, how to choose a protocol, and how to proceed with the card installation.

Selecting an SBus Slot

Install your Serial Parallel Controller card in any slot.

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Tools Required

Before you begin, make sure you have the following:

- #1 Phillips screwdriver
- Needlenose pliers
- Installing SBus Cards in Desktop SPARCstations
- Installing SBus Cards in Deskside and Data Center Cabinets

Choosing a Protocol

Before installing the card, you must choose one of two protocols for controlling data communication between your computer system and other systems, RS-423 or RS-232. Your peripheral devices must also operate in the protocol you choose. Refer to the documentation of the devices you intend to connect to the SPC/S card for the correct protocol.

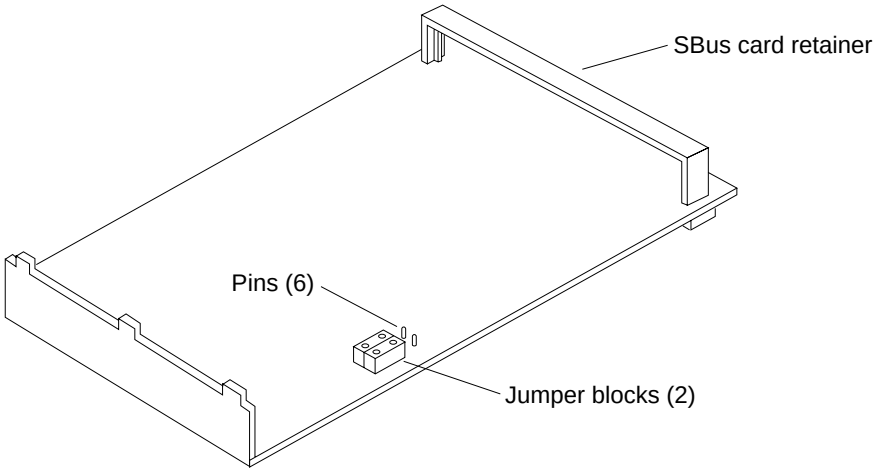


Figure 2-2 Location of Jumper Blocks

You will set the jumpers, if necessary, during card installation. For now, simply identify the protocol you want to use.

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RS-423

This is the default RS-423 protocol setting. No changes to the jumpers are required.

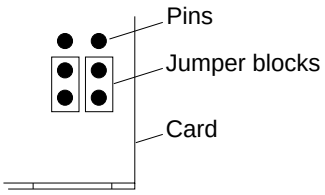


Figure 2-3 Default RS-423 Jumper Settings

RS-232

At the designated step in the card installation procedures, use a pair of needlenose pliers to move the jumper blocks on your card from the RS-423 position to the RS-232 position, as shown in the following figure.

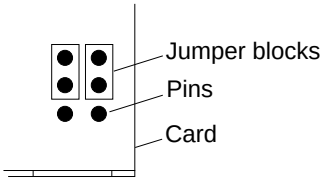


Figure 2-4 RS-232 Jumper Settings

Installing the Card

Go to *Installing SBus Cards in Desktop SPARCstations* or *Installing SBus Cards in Deskside and Data Center Cabinets* to install the card. When you have finished installing the card, return to this manual.

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Installing the Patch Panel 3

After installing the Serial Parallel Controller card, install the patch panel. The patch panel connects peripheral devices, such as terminals, printers, or modems to the Serial Parallel Controller card.

Installing the patch panel requires the following steps:

- Mounting the patch panel
- Connecting the patch panel and card
- Validating patch panel pinouts

You will need a #1 Phillips screwdriver.

Mounting the Patch Panel

You can mount the patch panel on a desktop, rack, or wall. If you want to create a service area to stack several Serial Parallel Controller patch panels on a rack or wall, you can use the rack or wall mounting brackets.

Desktop Mounting

To mount the patch panel on your desktop, simply choose a clear, unobstructed area on your desktop and position your patch panel on it.

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Rack Mounting

To rack mount the patch panel, complete these steps.

1. **Use a #1 Phillips screwdriver to detach the rubber feet from the bottom of the patch panel.**

2. **Attach the rack mounting brackets to the bottom of the patch panel on each end, using the rubber feet and screws.**

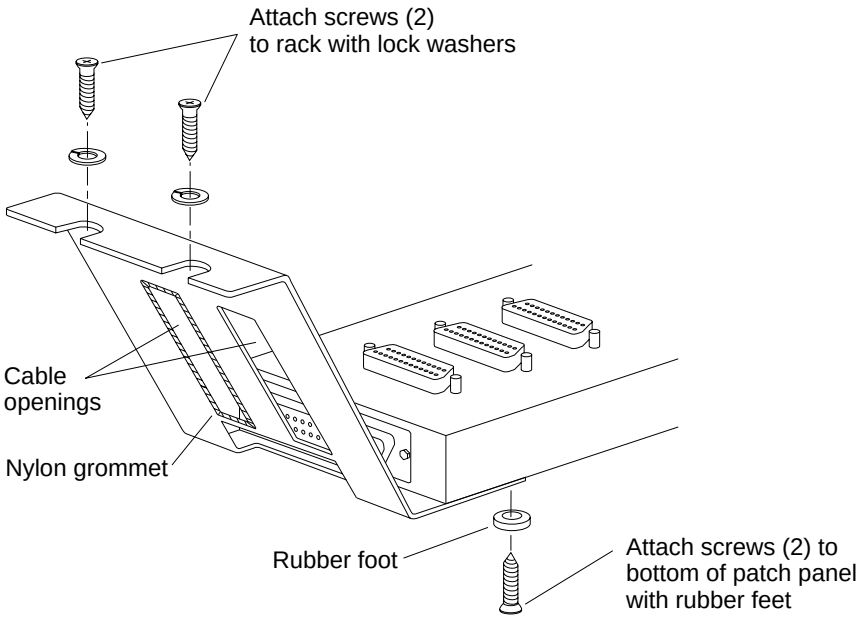


Figure 3-1 Rack Mounting Brackets (2)

3. **Attach the brackets to the rack, using the four Sun-supplied 10-32 Phillips screws with lock washers.**

4. **Cut the Sun-supplied nylon grommet into four equal pieces and press them into the bracket's cable openings.**
   This prevents the cables from chafing against the metal edges of the brackets.

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Wall Mounting

To wall mount the patch panel, follow this procedure.

1. **Use a #1 Phillips screwdriver to detach the rubber feet from the bottom of the patch panel.**
2. **Attach the wall mounting brackets to the bottom of the patch panel on each end, using the rubber feet and screws.**
3. **Attach the brackets to the wall, using 3/8-inch to #10 Pan head screws.**

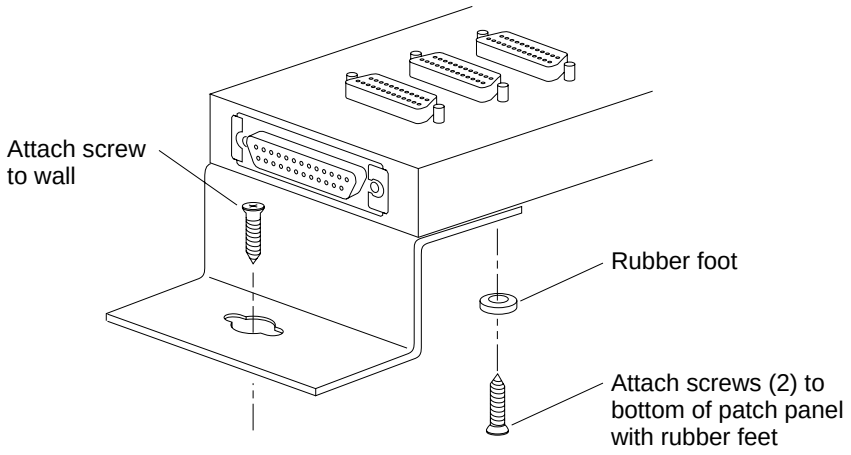


Figure 3-2 Wall Mounting Brackets (2)

Patch Panel Pinouts

The following figures show the pinouts for the serial and parallel ports on your patch panel. For more information about your device driver, see the Serial Parallel Controller man page, located in `/usr/man/man4/spc.4s` on most systems. To view the man page, type `man spc` and press Return.

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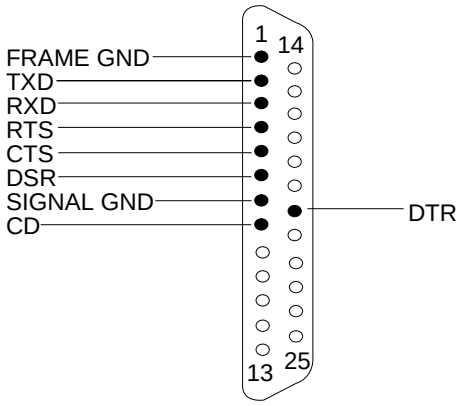


Figure 3-3 Serial Port (Active Pins Highlighted)

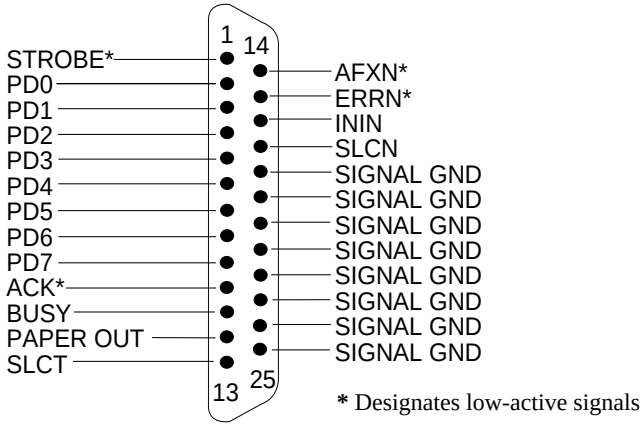


Figure 3-4 Parallel Port (Active Pins Highlighted)

Connecting the Patch Panel and Card

After mounting the patch panel, use the 96-pin shielded cable to connect the patch panel to the Serial Parallel Controller card.

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To connect the patch panel to the card:

1. **Connect one end of the 96-pin cable to the patch panel.**
2. **Connect the other end of the cable to the 96-pin connector on the card.**

Note – Make sure the locking mechanism of the connector on each end of the cable clicks into place.

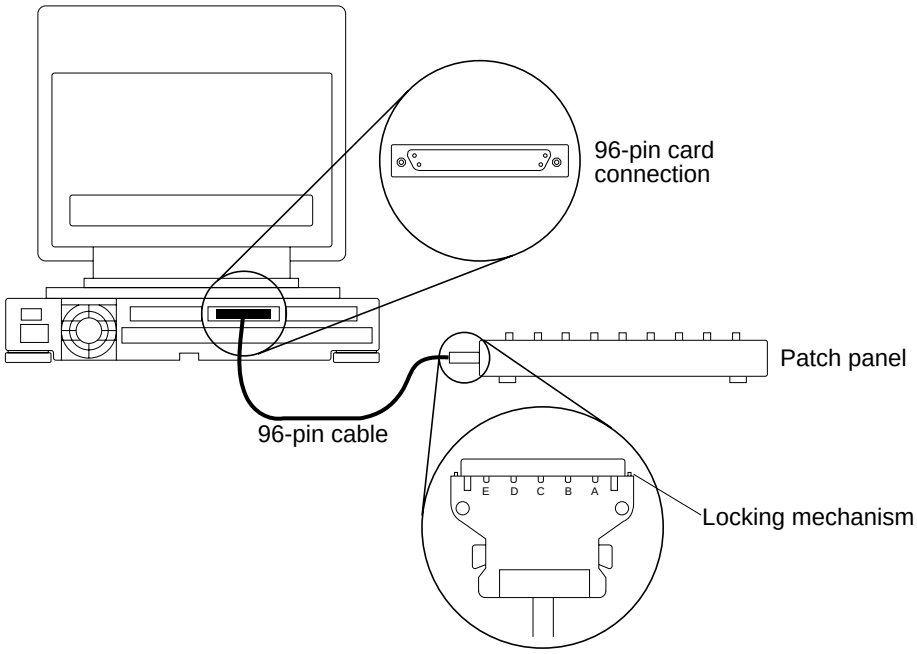


Figure 3-5 Connecting the Patch Panel and Card

The 9.84-feet (3 m) 96-pin shielded cable supplied by Sun conforms to engineering and safety standards. It is long enough to meet the needs of most users. If you have special cable length requirements for your installation, ask your Sun sales representative about alternative cables. The cable length cannot exceed 25-feet (7.6 m).

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Installing the Device Driver 4

After installing the Serial Parallel Controller card and patch panel, install the device driver. The device driver is software that interacts with the operating system to control up to three Serial Parallel Controller cards and the peripheral devices connected to them.

Installation instructions in this chapter assume that you are operating under Solaris 2.1or 2.2 (SunOS 5.1 or 5.2).

Note – If you are installing the Serial Parallel Controller on a system running the Solaris 1.x (SunOS 4.x) operating system, refer to Appendix A for instructions on installing the device driver under that software.

Note – The Serial Parallel Controller device driver that operates under Solaris 2.1 will not work with some older revisions of the Serial Parallel Controller. If you are upgrading an already-installed Serial Parallel Controller, you must replace the older version of the Serial Parallel Controller (part number 501-1511) with the current version (part number 501-1931).

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Installation With Software Mannager Tool (swmtool)

Follow these steps to start the Software Manager Tool on your local system.

First, mount the CD-ROM that contains the device driver software for the Serial Parallel Controller

1. Become superuser on your system.

```
% su
Password:
#
```

2. Put the disc into a caddy and insert it into the CD player.

3. Create a directory for the CD and mount the CD.

```
% /usr/sbin/su
Password:  Type superuser password
# /usr/bin/mkdir /cdrom
# /usr/sbin/mount -r /dev/sr0 /cdrom
```

4. Run the Software Manager Tool application.

```
# /usr/sbin/swmtool -d /cdrom
```

If you choose Install Software..., the Load window will appear and you will be asked to specify where the software you wish to install exists. See Step 3 of “Installing the Device Driver" for an illustration of the Load window.

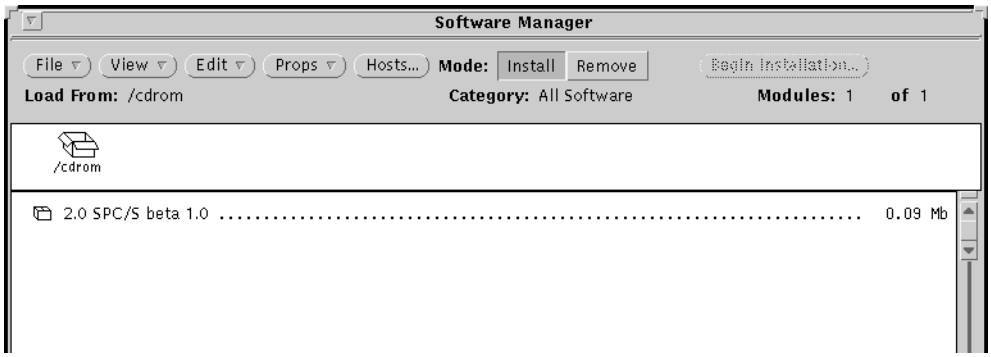
If you choose Remove Software..., the Software Manager Tool scans your local system and displays all the installed software packages.

Installing the Device Driver

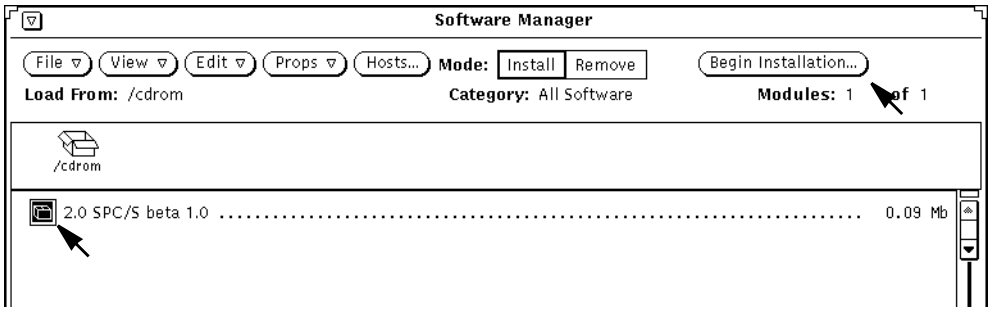
Follow these steps to install software on your local system. (The example that follows shows swmtool installating version 2.0 SPC/S beta 1.0 software. The software you will be installing is different, but the procedure is the same.)

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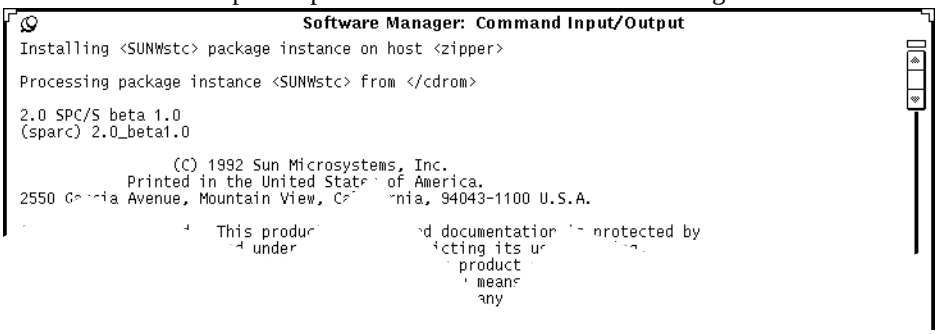
1. **Choose the Install mode of the Software Manager Tool if you are not already in this mode..**



2. **Choose to install the 2.0 SPC.S driver by clicking on its icon, and then press the Begin Installation... button.**



Notice that swmtool puts up a screen similar to the following:



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3. **Answer the question at the bottom of the displayed screen "Do you want to continue with the installation of this package [y,n?]" with "y" to install the Serial Parallel Controller device driver..**

```
                                ..mation.
                        ...es are already            stalled.
## Ve.          .ok space requirements.
## Check...g for conflicts with package.    eady installed.
## Checking for setuid/setgid programs.

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 this package [y,n,?] y

Installing 2.0 SPC/S beta 1.0 as <SUNWstc>

## Installing part 1 of 1.

/var/sadm/pkg/SUNWstc/install/i.comm: 2.0 SPC/S beta file install started on [/opt/SUNWstc]
/var/sadm/pkg/SUNWstc/install/i.comm: 2.0 SPC/S beta file install finished on [/opt/SUNWstc]

[ verifying class <comm> ]

Installation of <SUNWstc> was successful.
▲
```

As the installation proceeds, you will see text displayed following the progress of the installation. This should end with a line indicating that installation of `SUNWstc` was successful.

If the installation is not successful, you will see one or more messages describing the reason for the failure. For more information about the meaning of those messages, see "Messages"

Removing Software

Follow these steps to remove the device driver from your local machine with the Software Manager Tool.

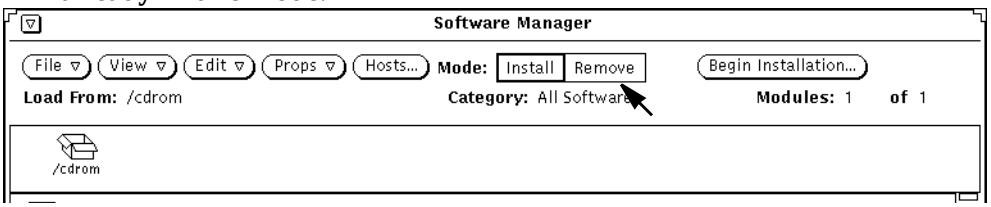
1. **Run the Software Manager Tool application.**

```
# /usr/sbin/swmtool
```

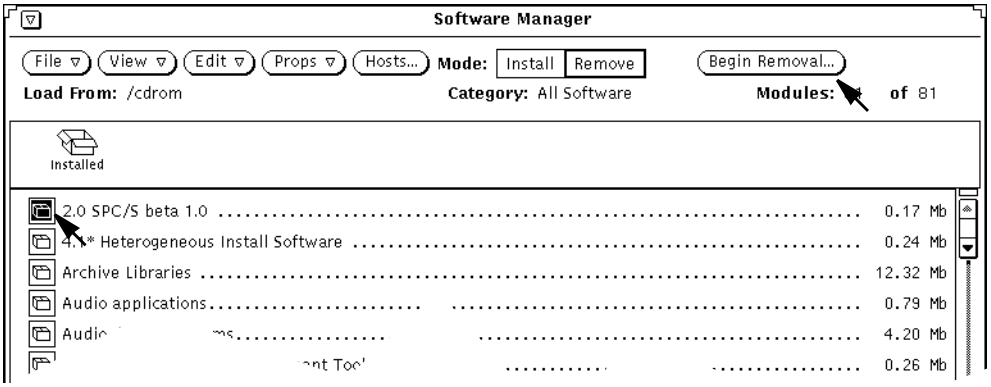
Note – You don't need to mount the SPC/S CD-ROM remove a device driver with swmtool.

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2. **Choose the Remove mode of the Software Manager Tool if you are not already in this mode.**

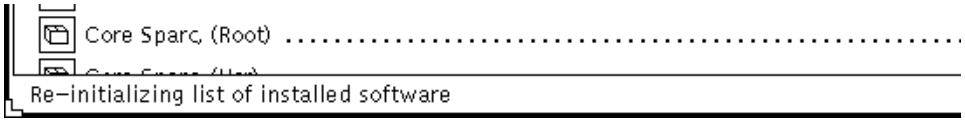


3. **Select the Serial Parallel Controller device driver and press the Begin Removal... button.**



Updating the List of Installed Software

Once the installation or removal of software is complete, you will see this message in the lower left corner of the main swmtool window footer.



The complete list of installed software will then be updated to reflect the changes you made.

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4

Installation With Software Manager (swm)

The Software Manager (`swm`(1)) provides a character user interface for installing and removing packages under Solaris 2.1 and 2.2.

The Software Manager must be invoked from a cursor-addressable terminal or window-based terminal emulator such as `xterm`(1) or `shelltool`(1). If you are using a window-based emulation, the window must be at least 24 characters deep and 80 characters wide. Use `stty`(1) to determine if your window is large enough. You must run `swm` as super user.

The `swm` program uses a "hot-key" interface. Thus, you do not need to press `Return` after entering a menu choice character. You only type `Return` to exit the menu or when asked for confirmation.

Use the following command to invoke `swm`.

```
# /usr/sbin/swm -d /cdrom
```

After `swm` determines the software that is installed on your system, the Software Manager Main Menu appears:

1. **Select option a to choose the device driver. An asterisk is displayed to show that the driver has been chosen.**

```
 Software Available for Installation:                          Page 1 of 1
  [a] P 2.0 SPC/S beta
1.0.........................................10.00 Mb


 Legend: * = selected for installation
   + or ^ = installed (same or other version)
   P = package, C = cluster, 4 = 4.x product

                                        +------------------------------+
                                         |       (required)    (free)  |
 Type  [a] to select/de-select software     | /        12.80 Mb  12.54 Mb |
  or ?[a] to view/edit software properties  | /usr    161.67 Mb  75.02 Mb |
  or  [Return] to complete selecting.       | /opt     32.62 Mb   5.39 Mb |
 Select an option:                      +------------------------------+
```


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2. **Return to the swm main menu by pressing Return, and select option e “Install selected software products”.**

```
              *** Software Manager Main Menu ***

Choose a function:
   [a] Edit configuration properties
   [b] Select target hosts for software installation/removal

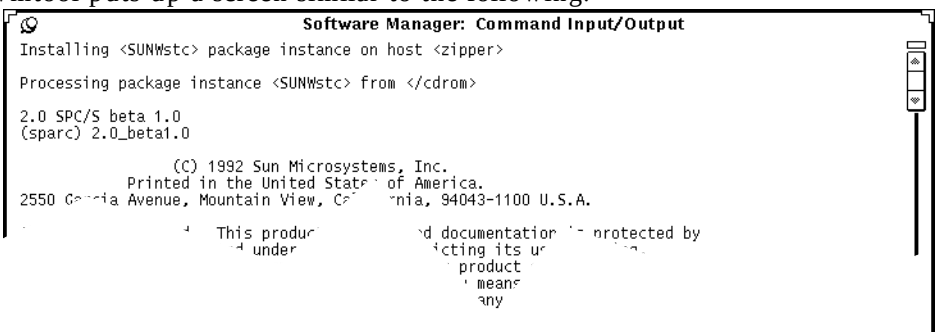
   [c] Load software distribution media
   [d] Select software products for installation
   [e] Install selected software products

   [f] Select software products for removal
   [g] Remove selected software products

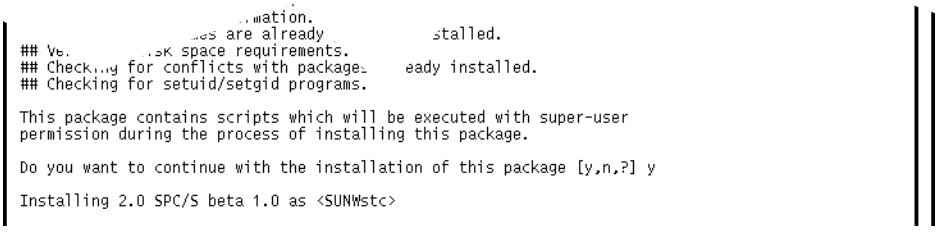
   [q] Exit swm

Type any bracketed letter to select that function:
```

swmtool puts up a screen similar to the following:



3. **Answer the question at the bottom of the displayed screen “Do you want to continue with the installation of this package [y,n?]” with “y” to install the Serial Parallel Controller device driver..**



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When using `swm` to install or remove software, you can get some information about the device driver and other packages at both the "`[d] Select software products for installation`" and "`[f] Select software products for removal`" options at the `swm` main menu.

1. **Select "[d] Select software products for installation" from the main menu, to see a screen similar to this:**

```
Software Available for Installation:                              Page 1 of 1
 [a] P 2.0 SPC/S beta 1.0.........................................10.00 Mb


Legend: * = selected for installation
  + or ^ = installed (same or other version)
  P = package, C = cluster, 4 = 4.x product

                                          +------------------------------+
                                          |        (required)    (free)  |
Type  [a] to select/de-select software    | /         12.80 Mb  12.54 Mb |
  or ?[a] to view/edit software properties | /usr     161.67 Mb  75.02 Mb |
  or  [Return] to complete selecting.     | /opt      32.62 Mb   5.39 Mb |
Select an option:                         +------------------------------+
```


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2. Select ?a to see an information screen similar to the following:

```
           Product Name:   SPC/S
         Component Name:   2.0 SPC/S beta 1.0

  Component Abbreviation:  SUNWstc
         Component Type:   Package
                 Vendor:   Sun Microsystems, Inc.
                Version:   2.0_beta1.0
            Description:   SPC/S SBus serial/parallel card software

   Target Base Directory:  /opt/SUNWstc
 Estimated Size (Mbytes):  /          8.00     /usr       0.00
                           /opt       4.00     /var       0.00
                           /export    0.00     /openwin   0.00
 Architectures Supported:  sparc
   Descriptive Text File:  <available>
   Demonstration Program:  <unavailable>
                  Status:  Available for installation


       Type [a] to change the location where this product will be installed
         or [b] to read more about this software
         or [Return] to return to software selection menu.

       Select an option:
```

3. If you want more information, select option b:

```
This is the Beta release of 2.0 SPC/S.  If you are using swm/swmtool to
install this package, non-interactive install doesn't work yet and will
generate an error if you try it.  The default installation mode is
interactive.

When you install or remove this package, you will see a message similar to
the following:

    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 this package [y,n,?]

Answer with a 'y' and press <RETURN>.
```


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The resulting screen asks “Do you want to continue with the installation of this package [y,n?]”.

4. Select option y to install the device driver

```
Using </opt/SUNWstc> as the package base directory.
## Processing package information.
## Processing system information.
   3 package pathnames are already properly installed.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.

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 this package [y,n,?] y

Installing 2.0 SPC/S beta 1.0 as <SUNWstc>

## Installing part 1 of 1.

/var/sadm/pkg/SUNWstc/install/i.comm: 2.0 SPC/S beta file install started on [/opt/SUNWstc]
/var/sadm/pkg/SUNWstc/install/i.comm: 2.0 SPC/S beta file install finished on [/opt/SUNWstc]

[ verifying class <comm> ]

Installation of <SUNWstc> was successful.
Re-initializing list of installed software
```

5. After swm returns to the main menu, and select option q to leave swm.

```
             *** Software Manager Main Menu ***

Choose a function:
   [a] Edit configuration properties
   [b] Select target hosts for software installation/removal

   [c] Load software distribution media
   [d] Select software products for installation
   [e] Install selected software products

   [f] Select software products for removal
   [g] Remove selected software products

   [q] Exit swm

Type any bracketed letter to select that function:
```


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Removing the Driver With swm

You can use swm to remove the Serial Parallel Control device driver. Follow these steps to remove the Serial Parallel Controller's device driver with swm:

1. Run the Software Manager application.

```
# /usr/sbin/swm
```

Note – You don't need to mount the SPC/S CD-ROM remove a device driver with swm.

2. Select option f from the Software Manager Main Menu.

```
             *** Software Manager Main Menu ***

Choose a function:
   [a] Edit configuration properties
   [b] Select target hosts for software installation/removal

   [c] Load software distribution media
   [d] Select software products for installation
   [e] Install selected software products

   [f] Select software products for removal
   [g] Remove selected software products

   [q] Exit swm

Type any bracketed letter to select that function: f
```

3. A menu similar to the following appears. Select option a to choose the device driver to remove

Packages selected to be removed have an asterisk (*) displayed before the selection character.

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If the number of installed packages exceeds the size of the screen, you can page forward through the additional packages by pressing the space bar or Control-n. The number of pages and the current page number are shown in the upper right corner of the menu..

```
 Software Available for Removal                                  Page 1 of 2
  [a] P 2.0 SPC/S beta 1.0.....................................12.00 Mb
  [b] P 4.1* Heterogeneous Install Software....................0.24 Mb
  [c] P Archive Libraries......................................12.32 Mb
...and a bunch of other packages that we'll ignore...
  [Q] P OpenWindows online handbooks...........................3.79 Mb
 Legend: * = selected for removal
   P = package, C = product cluster

                                          +------------------------------+
                                          |        (required)    (free)  |
 Type  [a] to select/de-select software   | /         12.80 Mb  12.54 Mb |
   or ?[a] to view/edit software properties | /usr     161.67 Mb  75.02 Mb |
   or  [Return] to complete selecting.    | /opt      32.62 Mb   5.39 Mb |
 Select an option:                        +------------------------------+
```

4. Press Return to return to the main menu, and select option g to remove the device driver.

```
             *** Software Manager Main Menu ***

Choose a function:
   [a] Edit configuration properties
   [b] Select target hosts for software installation/removal

   [c] Load software distribution media
   [d] Select software products for installation
   [e] Install selected software products

   [f] Select software products for removal
   [g] Remove selected software products

   [q] Exit swm

Type any bracketed letter to select that function: f
```


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5. Enter y to remove the device driver.

```
Removing <SUNWstc> package instance from host <zipper>

The following package is currently installed:
   SUNWstc          2.0 SPC/S beta 1.0
                    (sparc) 2.0_beta1.0

Do you want to remove this package [y,n,?,q] y
```

6. Enter y yet again at the next menu displayed.

```
## Removing installed package instance <SUNWstc>

This package contains scripts which will be executed with superuser
permission during the process of removing this package.

Do you want to continue with the removal of this package [y,n,?,q] y
                                                                   ^
(Note: user presses 'y'<RETURN> here)______________________________|
```

7. After the device driver is removed, press Return to go back to the swm main menu and select q to leave swm.

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Connecting Peripheral Devices 5

The following sections describe how to connect peripheral devices to the Serial Parallel Controller card, by way of the patch panel:

- Connecting terminals
- Connecting modems
- Connecting printers

Consult the manual for your particular terminal, modem, or printer for information about its capabilities and how to use it. Please have the manual for your peripheral device available for reference.

The procedures in the remaining sections of this chapter assume you have correctly installed the Serial Parallel Controller card and device driver.

Note – The discussion of software in this chapter refers to operation under Solaris 1.x (SunOS 4.x). If you are using the Serial Parallel Controller under Solaris 2.1, you will need to read *SunOS 5.1 Adding and Maintaining Devices and Drivers* for information about connecting and configuring peripheral devices.

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Connecting Terminals

The Serial Parallel Controller supports SBus-based SPARCsystems, as well as most popular ASCII-based terminals, such as Wyse-compatible terminals.

To connect a terminal:

1. **Set up your terminal for operation.**
2. **Set the power switch on your terminal to the *Off* position.**
3. **Connect one end of the null modem cable to the serial port on the terminal.**
   The serial port on a Wyse-compatible terminal requires a male connector. For more information about null modem cables, see Appendix C.
4. **Connect the other end of the null modem cable to one of the eight serial ports on the patch panel.**

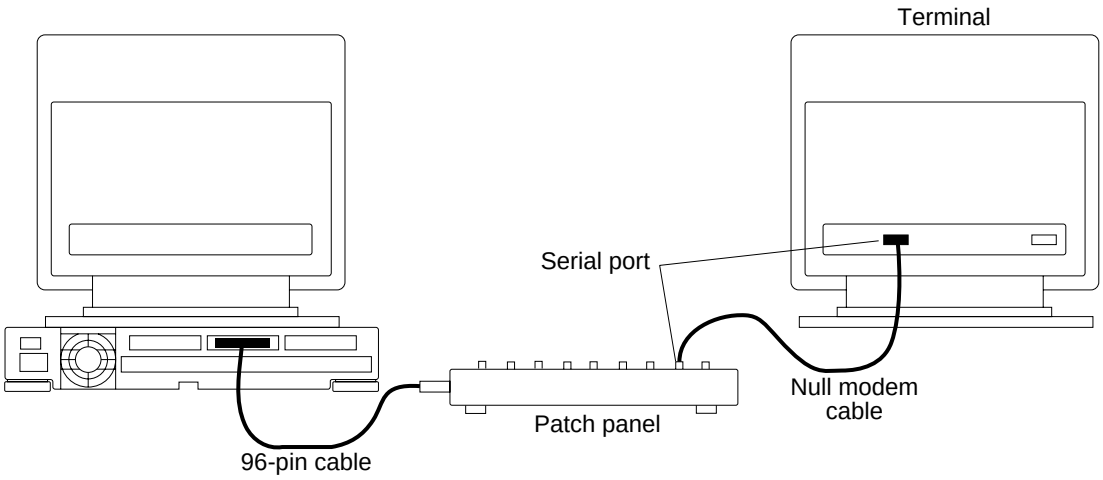


Figure 5-1 Connecting a Terminal

5. **Plug the power cord of your terminal into an AC outlet, and turn the power switch to the *On* position.**

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6. **Configure your terminal.**
   Wyse-compatible terminals have a setup menu that allows you to control how your terminal operates. The setup options require only one adjustment. See your terminal manual to learn how to access the setup menu.

   After accessing the setup menu, set the following options:
   - Wyse WY-50 — set to tvi925 emulation mode.
   - 8 data bits per character.
   - 1 stop bit.
   - No parity.
   - 9600 baud.
   - X ON/X OFF enabled.

Note – If you are using the Serial Parallel Controller under Solaris 2.1 or later, refer to *SunOS 5.1 Adding and Maintaining Devices and Drivers* about configuring terminal devices. The following discussion relates only to operation under Solaris 1.*x*.

---

7. **Define the terminal to your system.**
   After connecting, powering up, and configuring your terminal, you must inform your system about the new device. The device driver needs to know where to send the data that you want to display on the terminal, and where to look for the data that you type from the terminal keyboard.

   a. **To set up the `tty` ports for the device driver, become superuser and edit `/etc/ttytab`. To edit this file, you must be** *superuser***. Add the following lines to the file:**

Turn input on *for each port you wish to log into.*

```
ttyy00  "/usr/etc/getty  std.9600"   tvi925  on   local
ttyy01  "/usr/etc/getty  std.9600"   tvi925  off  local
ttyy02  "/usr/etc/getty  std.9600"   tvi925  off  local
ttyy03  "/usr/etc/getty  std.9600"   tvi925  off  local
ttyy04  "/usr/etc/getty  std.9600"   tvi925  off  local
ttyy05  "/usr/etc/getty  std.9600"   tvi925  off  local
ttyy06  "/usr/etc/getty  std.9600"   tvi925  off  local
ttyy07  "/usr/etc/getty  std.9600"   tvi925  off  local
```


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The lines `ttyy`*nn* specify the serial I/O incoming port(s) provided on the Serial Parallel Controller card. Note that the Serial Parallel Controller uses `ttyy` instead of `tty`. For more information on `ttyy`, consult man page on the Serial Parallel Controller. To access the man page, type `man spc`.

b. To choose the port you wish to connect your terminal to, edit the `/usr/etc/stc/stc_defaults` file. For each port, determine the device name for the port and change the default line to `ttyz`*n*`:dtr_assert:soft_carrier:` where *n* is the number of the port, as shown in the following example.

Note – Both the `dtr_assert` and `soft_carrier` settings must be *on* for terminals.

For n type the number of the port, in the range 00-17.

```
ttyzn:dtr_assert:soft_carrier:
```

You can change the terminal default settings in this file by configuring serial and parallel ports. The line for `ttyz`*n* specifies the serial I/O outgoing port(s) provided on the Serial Parallel Controller cards.

Note – For information about choosing ports and device names, see AppendixB. This appendix also explains how to configure ports for the terminal.

---

c. After editing the `stc_defaults` file, type `/usr/etc/stc/stc_defs` and press `Return`. This command applies the new settings you specify in the `stc_defaults` file to the serial and parallel ports controlled by the device driver. To enable login to the ports you configured, type `kill -1 1` and press `Return`.

```
tutorial# /usr/etc/stc/stc_defs
tutorial# kill -1 1
```

For more information about connecting terminals to your system, see the system administration manual for your system.

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For more information about the stc_defaults file, see the file stc_defaults.doc.

On a system running Solaris 2.1 or later, the file will be found in `/opt/SUNWstc/`, while on systems running Solaris 1.x, the file will be found in `/usr/sys/unbundled/stc/`.

Connecting Modems

Note – If you are using the Serial Parallel Controller under Solaris 2.1 or later, refer to *SunOS 5.1 Adding and Maintaining Devices and Drivers* about installing and configuring modems. The following discussion relates only to installation and configuration under Solaris 1.*x*.

The Serial Parallel Controller supports Hayes-compatible modems. These modems respond to a special set of commands from the keyboard.

To connect a Hayes-compatible modem to the Serial Parallel Controller:

1. **Set up your modem for operation.**

2. **Set the power switch on your modem to the *Off* position.**
   The default switch settings for Hayes-compatible modems are compatible with SPARCsystems. If you have a Hayes-compatible modem, the switches might not correspond exactly to the switches on the Hayes modem. You can emulate the Hayes standards on Hayes-compatible modems by using the following standard switch settings:

   - Baud rate is the speed at which data is transmitted. The baud rate can sometimes be set using the modem switches, but it is also specified when using your terminal's software (see the previous section). The baud rate for your modem must be the same as the baud rate for any other modem(s) with which it communicates.
   - DTR: OFF. SPARCsystems use X ON/X OFF to control data flow, instead of Data-Terminal-Ready (DTR).
   - Numeric result codes: ON.
   - Suppress result codes: OFF.
   - Echo off-line commands: OFF.
   - Auto answer-on ring: OFF (unless you are using the modem to answer incoming calls from other computers).
   - Normal carrier detect: OFF.
   - Single phone connection: OFF.

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- Normal AT command set: ON. This enables you to break the phone connection by typing three plus (+) signs.

3. **Plug the male end of the modem cable into the serial port of your modem.** For information about modem cables, see Appendix C.

4. **Connect the other end of the modem cable to one of the eight serial ports on the patch panel.**

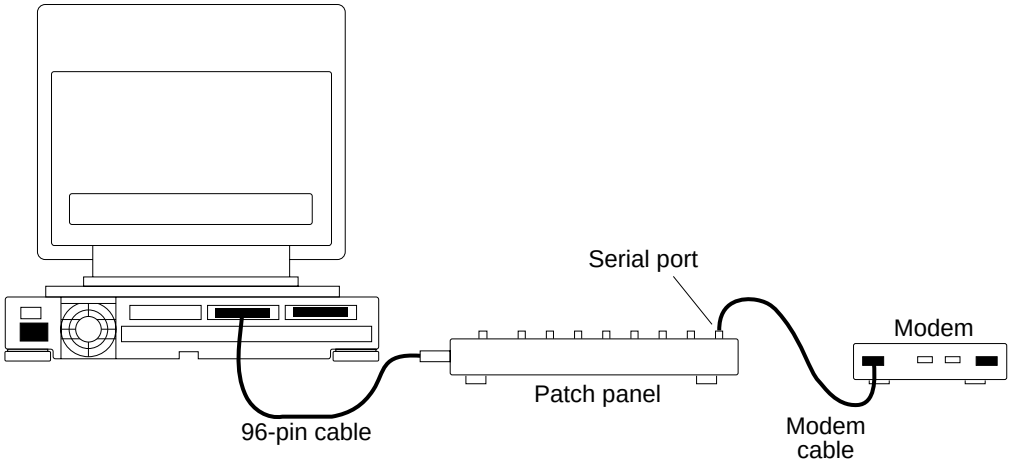


Figure 5-2 Connecting a Modem

5. **Plug the power cord of the modem into an AC outlet, and turn the power switch to the *On* position.**

6. **Define the modem to your system.**
   After connecting and powering up the modem, you must inform your system about the new device. The device driver needs to know where to send the data that travels over the telephone lines.

   To do so, add an entry for the new modem to the `/etc/remote` file. This file contains an entry for each system with which you wish to communicate using your modem.

You must also edit several other files which define the modem to your system. To edit these files, you must be *superuser.*

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To choose ports to connect the modem to, edit the `/usr/etc/stc/stc_defaults` file. For each port, determine the device name for the port and change the default line to `ttyz`*n*`:dtr_assert:` where *n* is the number of the port, as in the following example:

```
    For n type the number of the port, in the range 00-17.
    ↓
ttyzn:dtr_assert:
```

You can change the modem default settings in this file by configuring serial and parallel ports.

Note – For information about choosing ports and device names, see Appendix B. This appendix also explains how to configure ports for the modem.

After editing your `stc_defaults` file, type `/usr/etc/stc/stc_defs` and press `Return`. This command applies the new settings you specify in the `stc_defaults` file to the serial and parallel ports controlled by the device driver. To enable login to the ports you configured, type `kill -1 1` and press `Return`.

```
tutorial# /usr/etc/stc/stc_defs
tutorial# kill -1 1
```

Add a line describing your modem to the `/etc/remote` file. The following example shows an entry for a 2400 baud modem on port 0 of the first Serial Parallel Controller card in your system:

```
ttyz00:\
    :dv=/dev/ttyz00:br#2400:
```

Now set up a `tip` connection to determine whether your modem is connected. Type `tip ttyz`*n* (where *n* is the number of the port you wish to test) and press `Return`. If your modem is connected, your system displays the `connected` message:

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```
tutorial% tip ttyzn      <-- n is the number of the port to test.
connected
```

After you see the `connected` message, set up your modem by typing commands in the `tip` window. For information about which commands to type, refer to your *System & Network Administration* manual. After setting up your modem, type `~.` and press `Return` to exit the `tip` window.

```
tutorial# ~.
tutorial#
```

You need to edit additional files to set up the `tty` ports for the device driver, to enable logins on your modem(s).

Add the following line(s) to the `/etc/ttytab` file:

Note – Add lines to this file only if they connect a modem that answers the telephone to provide a login.

Turn input on *for each port you wish to log into.*

```
ttyy00  "/usr/etc/getty  D2400"   dialup  on   remote
ttyy01  "/usr/etc/getty  D2400"   dialup  off  remote
ttyy02  "/usr/etc/getty  D2400"   dialup  off  remote
ttyy03  "/usr/etc/getty  D2400"   dialup  off  remote
ttyy04  "/usr/etc/getty  D2400"   dialup  off  remote
ttyy05  "/usr/etc/getty  D2400"   dialup  off  remote
ttyy06  "/usr/etc/getty  D2400"   dialup  off  remote
ttyy07  "/usr/etc/getty  D2400"   dialup  off  remote
```

You also need to edit files to set up the UNIX to UNIX File Copy (UUCP) package installed on your system. UUCP allows your system to communicate with other systems using the modem. Refer to *the system administration manual for your system* for information about setting up UUCP files for the modem.

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Connecting Printers

Note – If you are using the Serial Parallel Controller under Solaris 2.1 or later, refer to *SunOS 5.1 Adding and Maintaining Devices and Drivers* about configuring printers. The following discussion relates only to installation and configuration under Solaris 1.*x*.

The Serial Parallel Controller supports a variety of laser printers, such as the Apple LaserWriter™ and the HP LaserJet™. Connecting non-PostScript™ printers to the Serial Parallel Controller is different from connecting PostScript printers. Follow the instructions for your type of printer.

To connect a PostScript printer:

1. **Set up your printer for operation.**
2. **Set the power switch on your printer to the *Off* position.**
3. **Plug the male end of the null modem cable into the serial port on the printer.**
   For information about null modem cables, see Appendix C.
4. **Connect the other end of the null modem cable to one of the eight serial ports on the patch panel.**

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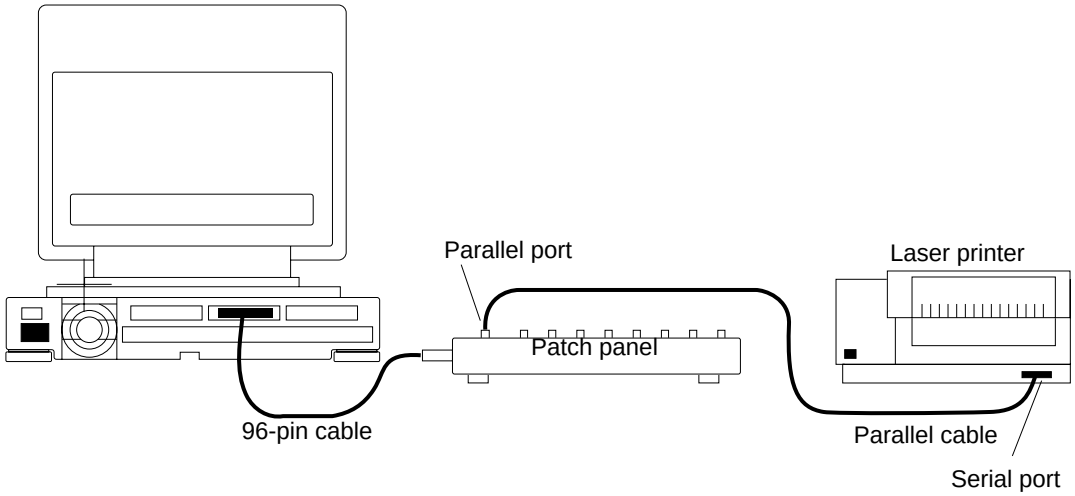


Figure 5-3 Connecting a PostScript Printer

5. **Plug the power cord of your printer into an AC outlet, and turn the power switch to the *On* position.**

6. **Configure your printer.**
   See the manual for your printer for information about setting options. Set the switch settings on your printer to the following parameters:

   - DTE: ON.
   - Modem control signals disabled. If your printer requires Clear-To-Send (CTS) and Data-Set-Ready (DSR), loop back the following lines on the printer: connect line 4 to line 5, and line 6 to line 20.
   - Baud rate: 9600.
   - X ON/X OFF enabled.

7. **Define the printer to your system.**
   After connecting, powering up, and configuring your printer, you must inform your system about the new device. The device driver needs to know where to send data that you want to output on the printer. For information about defining a PostScript-compatible printer to the device driver, refer to the system administration manual for your system.

To connect a non-PostScript printer:

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Note – Use a Centronics-compatible cable to connect your non-PostScript printer to the Serial Parallel Controller.

1. **Set up your printer for operation.**
2. **Turn the power switch on the printer to the *Off* position.**
3. **Plug the Centronics end of the cable into the parallel port on the printer.**
4. **Connect the other end of the parallel cable to the parallel port on the patch panel.**

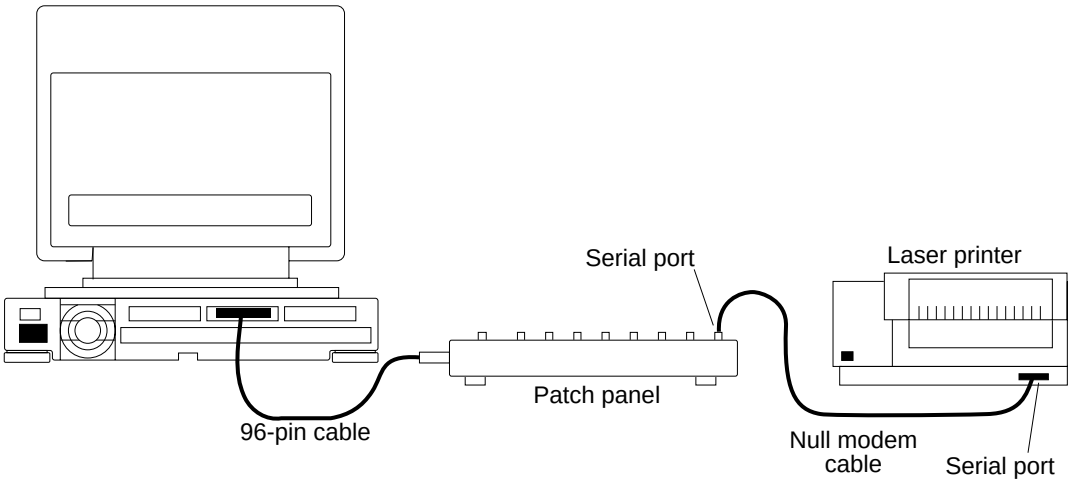


Figure 5-4 Connecting a Non-PostScript Printer

5. **Plug the power cord of your printer into an AC outlet, and turn the power switch to the *On* position.**
6. **Define the printer to your system.**
   After connecting and powering up your printer, you must inform your system about the new device. The device driver needs to know where to send data that you want to output on the printer.

   Become superuser, and add an entry for your new printer to the `/etc/printcap` file. This file contains an entry for each printer connected to your system.

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The following examples show common `printcap` entries for printers connected to a serial port and a parallel port.

This example shows a `printcap` entry for a printer connected to a serial port.

```
# SPC/S line printer on serial port /dev/ttyz00 with <NL> to <CR><NL> translation and
# XON/XOFF handshaking
lp|spcxs|Printer on SPC/S serial port:\
    :lp=/dev/ttyz00:br#9600:tr=\f:if=/usr/lib/lpf:lf=/usr/adm/lpd-errs:\
    :ms=ixon,-ixany:onlcr:

# SPC/S line printer on serial port /dev/ttyz00 for raw work
# (using RTS/CTS)
rspcs|HP Desk Jet PLUS on SPC/S serial port:\
    :lp=/dev/ttyz00:br#9600:fo:tr=\f:lf=/usr/adm/lpd-errs:\
    :fc#0177777:xc#0177777:ms=raw,crtscts:

# SPC/S line printer on serial port /dev/ttyz00 with <NL> to <CR><NL> translation and
# XON/XOFF handshaking
lp1|spcxs|Printer on SPC/S serial port:\
    :lp=/dev/ttyz00:br#9600:tr=\f:if=/usr/lib/lpf:lf=/usr/adm/lpd-errs:\
    :ms=ixon, -ixany, onlcr:
```

This example shows a `printcap` entry for a printer connected to a parallel port.

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```
# SPC/S line printer on parallel port with <NL> to <CR><NL> translation
# This printcap entry always prints an extra blank page
lp|spcs|HP Desk Jet PLUS on SPC/S parallel port:\
    :lp=/dev/stclp0:br#9600:tr=\f:if=/usr/lib/lpf:lf=/usr/adm/lpd-errs:\
    :ms=ocrnl:

# SPC/S line printer on parallel port for graphics only
rspcs|HP Desk Jet PLUS on SPC/S parallel port:\
    :lp=/dev/stclp0:br#9600:fo:tr=\f:lf=/usr/adm/lpd-errs:\
    :fc#0177777:xc#0177777:ms=raw:
```

For more information about the `printcap` file and connecting printers to your system, refer to the system administration manual for your system.

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Troubleshooting 6

This chapter explains how to troubleshoot the Serial Parallel Controller card. If your system is displaying messages, see Appendix F for an explanation. You can use these messages to determine which of the following problems is most likely affecting the card:

- System initialization problems
- Serial port problems
- Parallel port problems
- Serial Parallel Controller card problems
- Patch panel and cable problems
- Software installation problems

Follow the instructions for correcting the appropriate problem. Problems are organized according to when you are most likely to experience them during installation.

System Initialization Problems

If the system cannot recognize that the Serial Parallel Controller card has been installed into your system, you will see a message on your console similar to the following example:

```
stc_config:  can't load this module:  No such device or address
stc_config:  error loading stc driver – modload error number n
```

n is the error number.

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The problem might be a faulty card or corrupted device driver. To determine which is the cause of the problem:

1. **Remove the card and install it again in the same SBus slot.**
   After powering on the system, observe the boot messages. If you see the preceding message again, your card is most likely faulty and must be replaced. Otherwise, proceed to the next step.

2. **Install the device driver again.**
   The device driver might have become corrupted. If the software is not corrupted, installing the device driver again will initialize your card correctly.

Serial Port Problems

If the Serial Parallel Controller card initializes correctly, but peripherals or modems connected to the patch panel do not operate correctly, or SunOS displays device error messages, you most likely have serial port problems. You can use the `spiftest` program installed with your device driver to determine which port(s) is responsible for the problem.

To use the `spiftest` program:

1. **Quit processes on the particular card you wish to test.**
   Processes using the serial and parallel ports might interfere with the `spiftest` program.

2. **If a specific serial port is responsible for the problem, disconnect the serial cable of the peripheral or modem from the port.**
   Install a 25-pin loopback connector on the port you wish to test.

3. **Type** `cd /usr/diag/sundiag` **and press Return.**

4. **Type** `spiftest D=/dev/ttyz`*n* `T=8` **and press Return.**
   For *n* type the number of the peripheral or modem you wish to test. This command runs a data loopback to the port to test the path from the card to the 25-pin serial port connector on your patch panel.

   If the test is successful, the problem is most likely a faulty peripheral, modem, or serial cable. Otherwise, the problem might be a faulty patch panel, 96-pin cable, or card. To determine whether the problem is a faulty patch panel or cable, follow the instructions for troubleshooting patch panel and cable problems later in this chapter.

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Parallel Port Problems

If the printer connected to the parallel port does not print, follow these instructions.

1. **Quit processes using the parallel port.**
   Processes using the parallel port might interfere with the diagnostic programs that test the parallel port for correct operation.

2. **If the parallel printer has a test print diagnostic, run the test to determine whether the basic electronics and print mechanism of the printer are working correctly.**

3. **Make sure the parallel cable is connected properly to the printer and to the parallel port on the patch panel.**
   Disconnect the cable and inspect the connector contacts at both ends. They must be clean and free of obstructions.

4. **If you have another parallel cable, connect one end to the printer and the other end to the parallel port on the patch panel.**

5. **Test the printer again using the new cable.**
   To test the new cable:

   a. **Type** `cd /usr/diag/sundiag` **and press Return.**

   b. **Type** `spiftest D=/dev/stclp`*n* `T=2` **and press Return.**
   For *n*, type the number of the Serial Parallel Controller card you wish to test. For example, if the printer is connected to the first or second card, use `D=/dev/stclp0` or `D=/dev/stclp1`, respectively.

   If the test is successful, your printer prints the ASCII character set.

6. **If the printer prints under the control of the `spiftest` print program, but does not print under the control of SunOS or an application program, the most likely cause is a software or setup problem.**

7. **If the printer does not appear to receive data from your system, test the parallel port on the Serial Parallel Controller card for correct operation.**
   To test the parallel port on your card:

   a. **Disconnect the 96-pin cable from the rear panel connector of the card.**

   b. **Connect the 96-pin loopback connector to the rear panel connector of the card.**

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c. **Type** `cd /usr/diag/sundiag` **and press Return.**

d. **Type** `spiftest D=sb`*n* `T=4` **and press Return.**
For *n*, type the number of the Serial Parallel Controller card you wish to test. For example, if the printer is connected to the first or second card, use `D=sb1` or `D=sb2`, respectively.

This command runs a data loopback test of the parallel port on the card, and reports any errors.

8. **If the card passes the loopback test, but the printer does not print under the control of the** `spiftest` **print program, the most likely cause is a faulty 96-pin cable, patch panel, or both.**

Serial Parallel Controller Card Problems

If you suspect that the problem concerns any or all of the ports on the card, determine whether the problem is the electronics or the connector on the card.

To determine whether the electronics on the card is the problem:

1. **Disconnect the 96-pin cable from the rear panel connector of the card.**
2. **Type** `cd /usr/diag/sundiag` **and press Return.**
3. **Type** `spiftest D=sb`*n* `T=1` **and press Return.**
For *n*, type the number of the Serial Parallel Controller card you wish to test. For example, if the problem is with the first or second card, use `D=sb1` or `D=sb2`, respectively.

   This command runs an internal test of the electronics on the card. If the test reports any errors, the card is faulty and you must replace it. If the test is successful, test the connector on the card.

To determine whether the connector on the card is the problem:

1. **Connect the 96-pin loopback connector to the rear panel connector of the card.**
2. **Type** `cd /usr/diag/sundiag` **and press Return.**

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3. **Type** `spiftest D=sb`*n* `T=4` **and press Return.**
   For *n*, type the number of the Serial Parallel Controller card you wish to test. For example, if the problem is with the first or second card, use `D=sb1` or `D=sb2`, respectively.

   This command runs a data loopback test on all ports on the card. If the test reports any errors, the most likely cause is faulty components on the card (data drivers or receivers). You must replace the card.

Patch Panel and Cable Problems

If you suspect that the problem concerns the 96-pin cable or patch panel, determine whether the problem is the cable or patch panel.

To determine which is the problem:

1. **Quit processes using the ports.**
   Processes using the ports might interfere with the diagnostic programs that test the ports for correct operation.
2. **Disconnect the terminal or printer cable from the patch panel.**
3. **If all ports cannot communicate with terminals or printers, determine whether the card is the problem.**
   See “Serial Parallel Controller Card Problems” earlier in this chapter.
4. **If the card passes both tests in that section, the problem might be a faulty 96-pin cable or patch panel.**
5. **Replace the 96-pin cable.**
6. **If the problem continues, replace the patch panel.**

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Software Installation Problems

If these error messages appear while you are installing your software, refer to the explanations which follow.

```
install_unbundled:  software not loaded correctly!!
Would you like to retry this installation (Y) or not (N)? [yes]
```

1. **Confirm that your equipment is properly connected and plugged into the outlet.**
2. **Verify that you have adequate space on your hard disk to run the installation.**

```
install_unbundled: error creating <DESTDIR>, please choose another
```

Verify that you have the correct permissions to create the directory where you want to install the software.

```
install_unbundled: unable to create unbundled directory /usr/tmp/unbundled
```

Verify that your disk space and file/directory permissions include /usr/tmp.

```
install_unbundled: remote installation using CD-ROM is not supported
```

Make certain that the CD-ROM drive is local to your machine (not on a server located elsewhere).

Verify that you have read/write/root access to the specified number of directories listed at the beginning of the *Installing the Device Driver* (Chapter 4) section of this manual.

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```
install_unbundled:  error extracting files from <DEVICE> into <DESTDIR>
The errors encountered have been saved in a log file.
Would you like to see the errors and save this log file?
(If you answer NO, the log file will be removed) [yes]
```

```
Would you like to try to extract the files again (E) retry the
installation (R) or quit (Q) right now? [E]
```

Decide whether you wish to try the same installation method again (E), try another type of installation method (R), or quit (Q).

```
install_unbundled: configuration script stc_config not executed
this shouldn't have happened - I recommend that you retry
your installation from scratch
```

Try running your installation again. (The configuration script was either installed incorrectly or damaged.)

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Installing the Device Driver Under Solaris 1.x (SunOS 4.x)

A

After installing the Serial Parallel Controller card and patch panel, install the device driver. The device driver is software that interacts with the operating system to control up to three Serial Parallel Controller cards and the peripheral devices connected to them.

Note – The instructions in this appendix cover installing the device driver under Solaris 1.x or SunOS 4.x. If you are installing the Serial Parallel Controller on a system running Solaris 2.1 or 2.2, refer to Chapter 4, “Installing the Device Driver" for correct installation instructions for Solaris 2.1 or 2.2.

This chapter includes:

- Before Installing the Software
- Installing from CD-ROM
- Removing the Device Driver

Note – If you need assistance, please ask your system administrator or other technical support personnel for help.

Before Installing the Software

This section tells you what directories you need, what release media is provided, and what installation script options are available to run your installation.

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Upgrading to a New Software Release

If you presently have the Serial Parallel Controller card device driver installed and want to upgrade to a later software release, you must remove your existing device driver before upgrading to the new software release. Refer to the section “Removing the Device Driver” of this chapter.

Directories

If you decide to install the software in the default location (`/usr`), you must have read, write, and root access to all of the following directories before starting the installation:

- `/usr`
- `/usr/sys`
- `/usr/include`
- `/usr/etc`
- `/usr/man`
- `/usr/diag/sundiag`
- `/usr/tmp`
- `/etc`
- `/dev`
- `/tmp`

If any of these directories are linked to other directories, you must also have read, write, and root access to them. If you do not have proper access to all the necessary directories, the installation of your device driver will be unreliable.

Release Media

The installation script, configuration script, device driver, and a file containing enhancements of this release are contained on the CD-ROM release media.

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Installation Script Options

The CD-ROM has three installation script options:

- **Quick** allows you to load the software in the `/usr` default directory. It installs the Serial Parallel Controller card software on a system running SunOS 4.1 (or later) and uses the current machine architecture. *Most users should select this installation method.*
- **Custom** allows you to select the directory in which you want to load the software and to specify the SunOS release. It uses the current machine architecture.
- **Server** allows you to select the directory in which you want to load the software, the SunOS release, and the machine architecture.

You must have, as a minimum, the following amount of the disk space:

- 3 Mbyte in `/tmp`
- 3 Mbyte in `/usr/tmp`
- 2 Mbyte in `/usr` (or whatever installation directory you select)

The script automatically installs the Sundiag diagnostic tests specific to the Serial Parallel Controller on your system. Use the Sundiag diagnostic to test your Serial Parallel Controller card and device driver for correct operation. For a list of files stored on your system by the installation script, see Appendix G.

Note – You can quit the installation at any time by pressing Control-c.

Installing from CD-ROM

Two programs available for accessing data on the CD-ROM: `CDmanager` or `CDm`. `CDmanager` is a window-based application and `CDm` is a text-based application.

Regardless of the program you use, you need to know how to mount and eject the CD. This section includes:

- Mounting the CD
- Running CDmanager
- Running CDm
- Ejecting the CD

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Mounting the CD

Before you begin the installation, you must mount the CD. Follow these steps:

1. **Put the disc into a caddy and insert the caddy into the CD player.**
2. **As superuser, create a directory for the CD and mount it. For example:**

```
% /usr/bin/su
Password: Type superuser passwrd
# /usr/bin/mkdir/cdrom
# /usr/etc/mount -r /dev/sr0 /cdrom
```

Choosing Install Options

Note – You must be running OpenWindows to use CDmanager.

To start CDmanager:

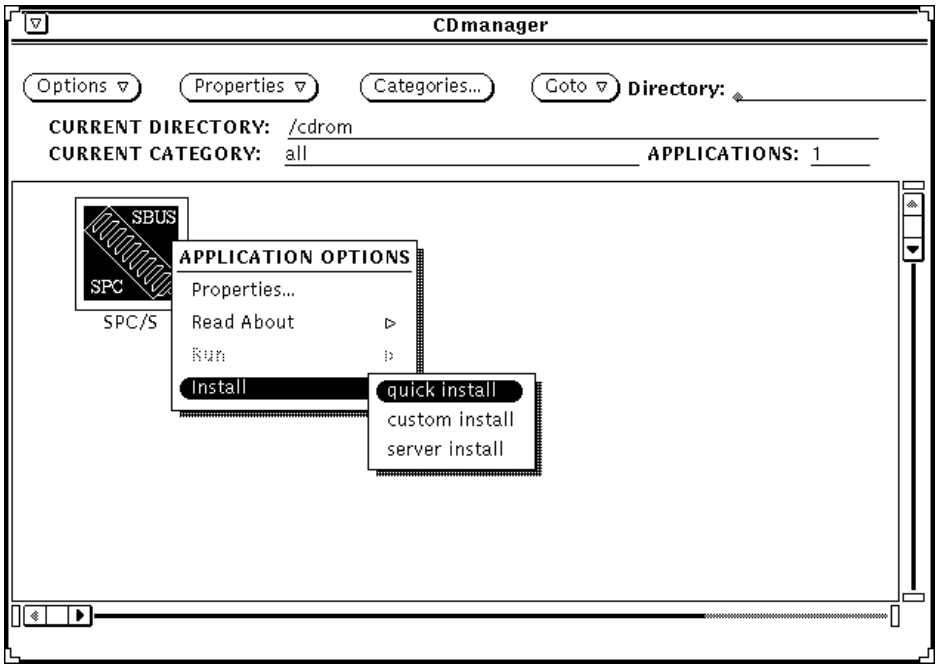
1. **Change to the directory where you mounted the CD and type** `cdmanager`. **For example:**

```
# cd /cdrom
# cdmanager
```

2. **The CDmanager window opens and an SPC/S icon appears. Position the cursor over the icon, press down on the right mouse button** *and continuing to hold it down*:
   - Slide the mouse to the right (the *Application Options* menu appears)
   - Slide to the bottom of the menu and highlight the *Read About* selection

   Release the mouse button

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3. **Review the information about the three install options to identify the option that is appropriate for your system.**

Quick

The quick install is the default installation which quickly installs the device driver and Sundiag into the `/usr` directory.

1. **Go to the CDmanager window. Position the cursor over the SPC/S icon and press down on the right mouse button**. *Continuing to hold it down*:
   - Slide the mouse to the right (the *Application Options* menu appears)
   - Slide to the bottom of the menu and highlight the *Install* selection
   - Slide to the right to choose the quick install option.

   Release the mouse button.

The following screen appears.

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```
*****APPLICATION INSTALLATION*****
                                                          n represents a value.
quick install from /cdrom/STC/bin into /usr

extracting files from CD-ROM directory [/cdrom/STC/bin] to [/usr]
<please wait...>

software successfully installed from /cdrom/STC/bin into /usr
running SPC/S configuration script /usr/sys/unbundled/stc/stc_config

stc_config: unloaded SPC/S driver, id n
stc_config: module loaded; id = n
stc_config: SPC/S driver successfully loaded from stc.o
stc_config: SPC/S driver files created in /dev directory
stc_config: removing device nodes for all SPC/S boards
stc_config: making device nodes for n SPC/S boards
stc_config: added SPC/S driver autoload commands to /etc/loadable
stc_config: SPC/S driver configured to autoload on next bootup

Done analyzing installation results [y/n]?
```

2. **Press** `y` **when you are finished reviewing the screen.**
   Your system is ready for operation (you do not need to reboot).

Custom

To install the Serial Parallel Controller software from the Custom menu, do the following:

1. **Go to the CDmanager window. Position the cursor over the SPC/S icon and press down on the right mouse button**. *Continuing to hold it down*:
   - Slide the mouse to the right (the *Application Options* menu appears)
   - Slide to the bottom of the menu and highlight the *Install* selection
   - Slide to the right to choose the custom install option.

   Release the mouse button.

   The following screen appears.

2. **Select an installation directory.**
   - **To use the** `/usr` **default directory, type** `yes` **and press** `Return`**.**

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```
*****APPLICATION INSTALLATION*****

The software requires 1400 kbytes of space on your disk.
The default installation directory is recommended to be: /usr
There are 68154 kbytes available in this directory.
Do you want to use the default (highly recommended)? [yes]
```

- **To change the installation directory, type** `no` **and press** `Return`**. Type the new installation directory information. (If the directory you specify does not exist, the installation script will create it.) When you have finished selecting a new directory, press** `Return` **to start the custom installation.**

Your directory location appears on the screen

```
The installation directory is: /xxx
Press <RETURN> to continue the installation or type Q to quit now:
```

3. **Press** `Return` **to continue (or** `q` **to quit).**

   A message appears, confirming that your files have been installed.

```
extracting files from CD-ROM directory [/cdrom/STC/bin] to [/xxx]
<please wait...>


software successfully installed from /cdrom/STC/bin into /xxx
```

The following message also appears.

```
The default configuration is for a SunOS 4.1 system.
While there is software in this release that will run on a
SunOS 4.0.3c system, this software is NOT OFFICIALLY SUPPORTED.
Would you like to configure for a SunOS 4.0.3c system? [no]
```

4. **Select a SunOS.**

   - **To configure for SunOS 4.1 or later, type** `no` **and press Return.**

   Your selection is displayed.

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```
Configuration is for SunOS 4.x

Would you like to run the configuration script?  If you answer Yes
then the software will automatically be configured to allow you to
use your new SPC/S right away.  If you answer No, you will have to
manually run the configuration script at some time in the future.
Run the configuration script? [yes]
```

5. **Decide whether to proceed with the configuration at this time.**
   - **To run the configuration script now, type** `yes` **and press Return.**
   - **To run the configuration script manually at a later time, type no. (Your software will be installed, but not configured.) Press** `Return`.

   The following messages appear.

```
running SPC/S configuration script /usr/sys/unbundled/stc/stc_config
                                                    n represents a value
stc_config: unloaded SPC/S driver, id n
stc_config: module loaded; id = n
stc_config: SPC/S driver successfully loaded from stc.o
stc_config: SPC/S driver files created in /dev directory
stc_config: removing device nodes for all SPC/S boards
stc_config: making device nodes for n SPC/S boards
stc_config: added SPC/S driver autoload commands to /etc/loadable
stc_config: SPC/S driver configured to autoload on next bootup

Done analyzing installation results [y/n]?
```

6. **When you are finished reviewing the menu, type** `y` **and press** `Return`**.** Your system is ready for operation (you do not need to reboot).

Server

To install the Serial Parallel Controller software from the Custom menu, do the following:

1. **Go to the CDmanager window. Position the cursor over the SPC/S icon and press down on the right mouse button**. *Continuing to hold it down*:
   - Slide the mouse to the right (the *Application Options* menu appears)

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- Slide to the bottom of the menu and highlight the *Install* selection
- Slide to the right to choose the server install option.

Release the mouse button.

The following screen appears.

```
*****APPLICATION INSTALLATION*****


The software requires 1400 kbytes of space on your disk.
The default installation directory is recommended to be: /usr
There are 68154 kbytes available in this directory.
Do you want to use the default (highly recommended)? [yes]
```

2. Select an installation directory.

- To use the /usr default directory, type yes and press Return.
- To change the installation directory, type no **and press** Return. Type the new installation directory information. (If the directory you specify does not exist, the installation script will create it.) When you have finished selecting a new directory, press Return to start the server installation.

Your directory location appears on the screen.

```
The installation directory is: /xxx
Press <RETURN> to continue the installation or type Q to quit now:
```

3. Press Return to continue (or Q to quit).

A message appears, confirming that your files have been installed.

.

```
extracting files from CD-ROM directory [/cdrom/STC/bin] to [/xxx]
<please wait...>


software successfully installed from /cdrom/STC/bin into /xxx
```

The following message also appears.

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```
Which ONE of the following would you like to install:

             arch    SunOS version
          1. sun4c / SunOS 4.1, 4.1.1, or 4.1.2
          2. sun4m / SunOS 4.1.1_PSR, 4.1.2
          3. sun4c / SunOS 4.0.3c

Note for SunOS 4.0.3c installation:
    While there is software in this release that will run on a
    SunOS 4.0.3c system, this software is NOT OFFICIALLY SUPPORTED.

Enter either 1, 2 or 3 [1]:
```

4. **Type the number of the OS version that you need to install, then Press `Return`.**

- Select `1` if you have a single-processor desktop system running SunOS 4.1 or later.
- Select `2` if you have a multiprocessor system.
  Your selection is displayed.

```
Configuration is for sun4c / SunOS 4.x

Would you like to run the configuration script?  If you answer Yes
then the software will automatically be configured to allow you to
use your new SPC/S right away.  If you answer No, you will have to
manually run the configuration script at some time in the future.
Run the configuration script? [yes]
```

5. **Decide whether to proceed with configuration at this time.**
   - **To run the configuration script now, type `yes` and press `Return`.**
   - **To run the configuration script manually at a later time, type `no`. (Your software will be installed, but not configured. Press `Return`.**

   The following messages appear.

6. **When you are finished reviewing the menu, type `y` and press `Return`.**
   Your system is ready for operation (you do not need to reboot).

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```
running SPC/S configuration script /usr/sys/unbundled/stc/stc_config

stc_config: unloaded SPC/S driver, id n                    n represents a value
stc_config: module loaded; id = n
stc_config: SPC/S driver successfully loaded from stc.o
stc_config: SPC/S driver files created in /dev directory
stc_config: removing device nodes for all SPC/S boards
stc_config: making device nodes for n SPC/S boards
stc_config: added SPC/S driver autoload commands to /etc/loadable
stc_config: SPC/S driver configured to autoload on next bootup

Done analyzing installation results [y/n]?
```

Running CDm

Note – CDm can be executed from any command window in any window system (OpenWindows or SunView) or from an attached terminal.

To start CDm:

1. **Change to the directory where you mounted the CD and type** cdm.
   For example:

```
# cd /cdrom
# cdm
```

   The following information appears.

2. **Type** 1 **to choose** *Select Application* **from the CDm menu. Press** Return**.**

```
Applications available:

        1.  SPC/S

Please enter a number or q for the main menu:
```


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```
cdm Initializing Done

Current program environment:

        Application: none
        Category:    all
        Directory:   /cdrom

----->>>>> CDM <<<<<-----

        1.  Select Application
        2.  Show Current Application
        3.  Install Application
        4.  Display Application Text File
        5.  Print Application Text File
        6.  List Applications
        7.  List Categories
        8.  Change Current Category
        9.  Change Current Directory
        10. Show Program Environment

Please enter a number or q to quit:
```

3. Type `1` to select the *SPC/S* application. Press `Return`.

4. Type `3` to select *Install Application*. Press `Return`.

When you select *Install Application*, this menu appears. Follow the instructions for the type of installation you want to do.

```
Installation files available for this application

        1.  quick install
        2.  custom install
        3.  server install

Please enter a number or q for the main menu:
```


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```
"SPC/S" selected as new application.


----->>>>> CDM <<<<<-----

        1.  Select Application
        2.  Show Current Application
        3.  Install Application
        4.  Display Application Text File
        5.  Print Application Text File
        6.  List Applications
        7.  List Categories
        8.  Change Current Category
        9.  Change Current Directory
        10. Show Program Environment

Please enter a number or q to quit:
```

Quick

The quick install is the default installation which quickly installs the device driver and Sundiag into the `/usr` directory.

1. **Type `1` to select quick install. Press `Return`.**
   The following message appears.

```
Begin installation now? (y/n):
```

2. **Type `y` and press `Return` to begin the installation process.**
   The following message appears.

   Your system is ready for operation (you do not need to reboot).

Custom

1. The custom installation allows you to specify a SunOS version and an installation directory. **Type `2` to select custom install. Press `Return`.**
   The following message appears.

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```
Begin installation now? (y/n):
```

2. **Type** `y` **to begin your installation. Press** `Return`**.**
   The following message appears.

```
Executing installation file ..

The software requires 1400 kbytes of space on your disk.
The default installation directory is recommended to be: /usr
There are 69611 kbytes available in this directory.
Do you want to use the default (highly recommended)? [yes]
```

3. **Select an installation directory.**
   - **To use the** `/usr` **default directory, type** `yes` **and press** `Return`**.**
   - **To change the installation directory, type** `no` **and press** `Return`**. Type the new installation directory information. (If the directory you specify does not exist, the installation script will create it.) When you have finished selecting a new directory, press** `Return` **to start the custom installation.**

   Your directory location appears on the screen.

```
The installation directory is: /xxx
Press <RETURN> to continue the installation or type Q to quit now:
```

4. **Press** `Return` **to continue (or** `Q` **to quit).**
   A message appears, confirming that your files have been installed.

5. **Select a SunOS (refer to the above screen).**
   - **To configure for SunOS 4.1 or greater, type** `no` **and press Return.**
   - **Press Return.**

   Your selection is displayed.

6. **Decide whether to proceed with the configuration at this time.**

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```
extracting files from CD-ROM directory [/cdrom/STC/bin] to [/xxx]
<please wait...>

software successfully installed from /cdrom/STC/bin into /xxx

The default configuration is for a SunOS 4.1 system.
While there is software in this release that will run on a
SunOS 4.0.3c system, this software is NOT OFFICIALLY SUPPORTED.
Would you like to configure for a SunOS 4.0.3c system? [no]
```

```
Configuration is for SunOS 4.x

Would you like to run the configuration script?  If you answer Yes
then the software will automatically be configured to allow you to
use your new SPC/S right away.  If you answer No, you will have to
manually run the configuration script at some time in the future.
Run the configuration script? [yes]
```

- **To run the configuration script now, type** `yes` **and press Return.**
- **To run the configuration script manually at a later time, type no. (Your software will be installed, but not configured.) Press** `Return`.

The following messages appear.

```
running SPC/S configuration script /usr/sys/unbundled/stc/stc_config
                                                    n represents a value
stc_config: unloaded SPC/S driver, id n
stc_config: module loaded; id = n
stc_config: SPC/S driver successfully loaded from stc.o
stc_config: SPC/S driver files created in /dev directory
stc_config: removing device nodes for all SPC/S boards
stc_config: making device nodes for n SPC/S boards
stc_config: added SPC/S driver autoload commands to /etc/loadable
stc_config: SPC/S driver configured to autoload on next bootup
```

Your system is ready for operation (you do not need to reboot).

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Server

The server install option allows you to install the device driver and Sundiag onto a server. When you select Install Application, this screen appears.

1. **Type** `3` **to select server install. Press** `Return`**.**
   The following message appears.

```
Begin installation now? (y/n):
```

2. **Type** `y` **to immediately begin your installation. Press** `Return`**.**
   The following message appears.

```
Executing installation file ..

The software requires 1400 kbytes of space on your disk.
The default installation directory is recommended to be: /usr
There are 69611 kbytes available in this directory.
Do you want to use the default (highly recommended)? [yes]
```

3. **Select an installation directory.**
   - To use the /usr default directory, type yes and press Return.
   - To change the installation directory, type no **and press** `Return`. Type the new installation directory information. (If the directory you specify does not exist, the installation script will create it.) When you have finished selecting a new directory, press Return to start the server installation.

   Your directory location appears on the screen.

```
The installation directory is: /xxx
Press <RETURN> to continue the installation or type Q to quit now:
```

4. **Press** `Return` **to continue (or** `Q` **to quit).**
   A message appears, confirming that your files have been installed.

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5. **Type the number that corresponds to the SunOS version that you need to install. Press** `Return`**.**
   Your selection is displayed.

6. **Decide whether to proceed with the configuration at this time.**
   - **To run the configuration script now, type** `yes` **and press** `Return`**.**
   - **To run the configuration script manually at a later time, type** `no`**. (Your software will be installed, but not configured. Press** `Return`**.**

   The following messages appear.

```
running SPC/S configuration script /usr/sys/unbundled/stc/stc_config

stc_config: unloaded SPC/S driver, id 5
stc_config: module loaded; id = 6
stc_config: SPC/S driver successfully loaded from stc.o
stc_config: SPC/S driver files created in /dev directory
stc_config: removing device nodes for all SPC/S boards
stc_config: making device nodes for n SPC/S boards
stc_config: added SPC/S driver autoload commands to /etc/loadable
stc_config: SPC/S driver configured to autoload on next bootup

Installation files available for this application

        1.  quick install
        2.  custom install
        3.  server install

Please enter a number or q for the main menu:
```

n is the number of installed SPC/S cards.

7. **Type** `q` **to go to the main menu. Press** `Return`**.**

8. **Type** `q` **to quit. Press** `Return`**.**
   Your system is ready for operation (you do not need to reboot).

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Ejecting the CD

When you are finished with the installation, unmount and eject the CD.

1. **As superuser, type:**

```
# cd /
# /etc/umount /cdrom
# /usr/bin/eject cdrom
```

Removing the Device Driver

If you are upgrading to a new release of the Serial Parallel Controller device driver or no longer wish to use it, you can remove the driver from your system by following the instructions in this section.

Note – If you ran the configuration script to load the device driver into your system, follow the instructions in this section. If you added the device driver to your system kernel, see "Restoring the Old Kernel" in Appendix B to remove the driver from your system.

To remove the device driver from your system:

1. **Type** `su` **to become superuser and press** `Return`**. Type your superuser password and press** `Return`**.**
2. **Type** `cd /usr/sys/unbundled/stc` **and press** `Return`**.**
3. **Type** `./stc_config -c` **and press** `Return`**.**
   This command removes the device driver and the devices created in the `/dev` directory by the installation script.

```
tutorial% su
Password: (Type your superuser password)
tutorial# cd /usr/sys/unbundled/stc
tutorial# ./stc_config -c
```


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The installation script displays messages to confirm that the device driver has been removed from your system.

```
stc_config: unloaded SPC/S driver, id n
stc_config: removing device nodes for all SPC/S boards
stc_config: automatic loading of SPC/S device driver on bootup is disabled
```

n is the id number for your device driver.

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Kernel Reconfiguration under Solaris 1.x



This appendix explains how to add the Serial Parallel Controller device driver to the system kernel under Solaris 1.x (SunOS 4.x). This method of configuring your device driver is an alternative to loading the device driver as explained in Appendix A, "Installing the Device Driver Under Solaris 1.x (SunOS 4.x)". Before reconfiguring the kernel, run the Custom or Server installation script in Appendix G to install the device driver on your system. At the question `Run the configuration script? [yes]` type `n` and press the `Return` key. Follow the instructions given here.

Note – Kernel reconfiguration is not necessary under Solaris 2.x.



Caution – Incorrectly reconfiguring your system kernel can make your system inoperable. Only a trained system administrator or other technical personnel with kernel reconfiguration experience should follow these instructions.

This chapter includes:

- The system kernel
- Creating a new kernel configuration file
- Adding a configuration file
- Building the new system kernel
- Installing the new system kernel
- Creating device files
- Restoring the old kernel

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B

The System Kernel

The system kernel is the heart of your Sun Operating System (SunOS), and is configured to meet the needs of most users. You can reconfigure the system kernel to make your device driver part of the kernel. This procedure assumes that your system has a kernel on its local disk. For information about reconfiguring other types of kernels, see your *System & Network Administration* manual.

Creating a New Configuration File

The first step in reconfiguring your system kernel is to create a new kernel configuration file to provide the system software support you require. Since it is easier to use an existing kernel configuration file than to create a new file, you can:

1. **Locate your current or generic kernel configuration file.**
2. **Copy this existing file.**
3. **Change the copied file.**
4. **Change your kernel files.**

To locate your current kernel configuration file, type `arch -k` to determine the kernel architecture name.

```
tutorial% arch -k
sun4c
tutorial%
```

Since the kernel architecture name is `sun4c`, the kernel configuration file is stored in the `/usr/share/sys/sun4c/conf` directory.

If you do not know which kernel configuration file was used to build your current kernel, look for the *generic* kernel configuration file appropriate to the kernel architecture of your system. The name of the generic kernel configuration file is `GENERIC`.

For example, `/usr/share/sys/sun4c/conf/GENERIC` is the generic kernel configuration file for Desktop SPARCsystems.

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To copy your current kernel configuration file:

1. **Type** `su` **to become superuser and press** `Return`**. Type your superuser password and press** `Return`**.**
2. **Type** `cd`**, a space, the name of the directory where the kernel configuration file is located, and press** `Return`**.**
3. **Copy the existing kernel configuration file to a new file name. Type** `cp`**, a space, and the following arguments, separated by spaces:**
   - The name of the old kernel configuration file.
   - The name for your new kernel configuration file.

   Press `Return`.

   The old kernel configuration file can be the `GENERIC` kernel configuration file shipped with your system. Or, if you have renamed the kernel configuration file, use that kernel configuration file name.

   For example:

```
tutorial% su
Password: (Type your superuser password)
tutorial# cd /usr/share/sys/sun4c/conf
tutorial# cp GENERIC MYKERNEL
tutorial#
```

To change your new kernel configuration file:

1. **Add the device driver information to the new kernel configuration file.** The information you need to add is listed in the following example. To add a comment to the kernel configuration file, type a pound character (#) at the beginning of the line containing the comment.

   The following example creates a new kernel configuration file named `/usr/share/sys/sun4c/conf/MYKERNEL` based on the `/usr/share/sys/sun4c/conf/GENERIC` generic kernel configuration file, and adds an entry for the device driver.
2. **Save the file and quit the editor.**

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```
tutorial# vi MYKERNEL
(Add the following line to the end of the file)
device-driver    stc       # driver for SPC/S board
:wq (Save the file and quit the editor)
tutorial#
```

Adding the Driver to the New Configuration File

Your Serial Parallel Controller device driver, like all new device drivers, requires an entry in the following kernel files:

- /usr/share/sys/sun4c/conf/files
- /sys/sun/conf.c

To change your kernel files:

1. **As superuser, type** `cd /usr/share/sys/sun4c/conf` **and press** `Return`**.**
2. **Using a text editor, such as vi, edit the** `files` **file.**

```
tutorial# cd /usr/share/sys/sun4c/conf
tutorial# vi files
```

3. **Add the line** `sbusdev/stc.c optional stc device-driver` **to the** `files` **file.**
4. **Save the file and quit the editor.**

```
(Add the following line to the file)
sbusdev/stc.c optional stc device-driver
:wq (Save the file and quit the editor)
tutorial#
```

5. **Type** `chmod +w /sys/sun/conf.c` **and press** `Return`.
6. **Type** `vi /sys/sun/conf.c` **and press** `Return`**.**

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```
tutorial# chmod +w /sys/sun/conf.c
tutorial# vi /sys/sun/conf.c
```

7. **Add the following lines to the** `/sys/sun/conf.c` **file:**

```
...
#include "stc.h"
#if NSTC > 0
extern struct streamtab stc_stab;
#define stcstab &stc_stab
#else
#define stcstab NULL
#endif
...
```

8. **Determine the major number for the new device by finding the major number of the last entry in the** `cdevsw` **table and using the next number.** In the following example, the last number used is 103; so 104 is used as the major number for the new card. Your major number might be different.

Note – Remember the major number and to which device it is assigned. You will need this information to create the device files later in this chapter.

---

9. **Add the following lines to the end of the** `struct cdevsw` **definition to define the new** `cdevsw` **elements:**

Note – You do not need separate entries for each card installed in your system. Only one entry is needed for *n* cards, where *n* is the number of cards you install into your system.

---

10. **Save the file and quit the editor.**

Building the New System Kernel

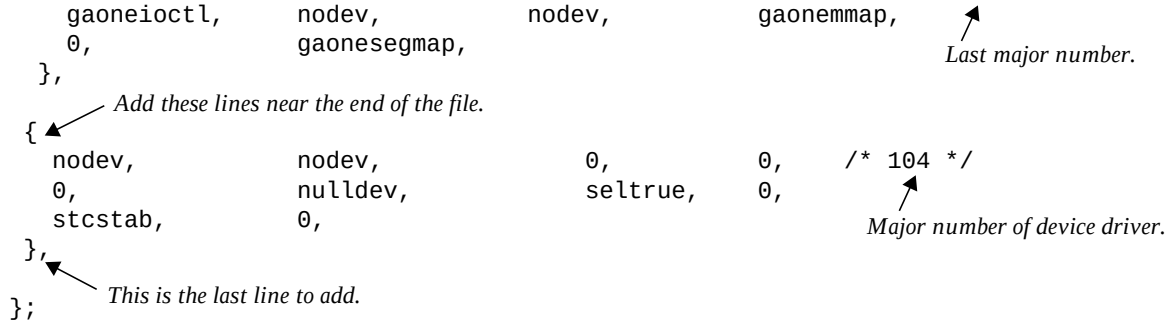
After copying and modifying the kernel, build a new kernel from your new kernel configuration file.

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```
struct cdevsw   cdevsw[] =
{
  {
    cnopen,         cnclose,        cnread,         cnwrite,    /*0*/
    cnioctl,        nulldev,        cnselect,       0,
    0,              0,
  },
... (other entries)
  {
    gaoneopen,      gaoneclose,     nodev,          nodev,      /*103*/
    gaoneioctl,     nodev,          nodev,          gaonemmap,
    0,              gaonesegmap,
  },
 {
   nodev,           nodev,              0,          0,     /* 104 */
   0,               nulldev,            seltrue,    0,
   stcstab,         0,
 },
};

int     nchrdev = sizeof (cdevsw) / sizeof (cdevsw[0]);

int     mem_no = 3;     /* major device number of memory special file */
int     dump_no = 41;   /* major device number of dump special file */
:wq (Save the file and quit the editor)
tutorial#
```



To build a system kernel from the new kernel configuration file:

1. **As superuser, type** `cd /usr/share/sys/sun4c/conf`**.**
2. **Type** `config` **and the name of your new kernel configuration file, and press** `Return`**.**
   The system displays the message:

   Doing a "make depend"
3. **Type** `cp /usr/sys/unbundled/stc/stc.o`**, a space,** `/sys/sun4c/OBJ/stc.o` **and press** `Return`**.**
4. **Type** `cd ../`**, no space, the name of the new kernel configuration file you specified as an argument to the** `config` **command, and press** `Return`**.**

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5. **Type** `make` **and press** `Return`.
   The system displays kernel build messages.

   This example builds a kernel on a Desktop SPARCsystem, using a new kernel configuration file named `/usr/share/sys/sun4c/conf/MYKERNEL`:

```
tutorial# cd /usr/share/sys/sun4c/conf
tutorial# config MYKERNEL
Doing a "make depend"
tutorial# cp /usr/sys/unbundled/stc/stc.o /sys/sun4c/OBJ
tutorial# cd ../MYKERNEL
tutorial# make
(Kernel build messages appear)
tutorial#
```



Caution – If you receive error messages, resolve the errors and repeat the foregoing instructions. Do not use a faulty kernel to run your system.

Installing the New System Kernel

This section explains how to install your new kernel, so that your system will use it when you boot.



Caution – Before moving your new kernel, save a copy of the old kernel. You can run your system using the old kernel if your new kernel does not work correctly.

To install your new system kernel:

1. **As superuser, type** `cd /usr/sys/unbundled/stc` **and press** `Return`.
2. **Type** `./stc_config -c` **and press** `Return`.
   This removes old Serial Parallel Controller device driver files and device entries, if present.

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```
tutorial# cd /usr/sys/unbundled/stc
tutorial# ./stc_config -c
```

3. **Type** `mv /vmunix /vmunix.old` **and press** `Return`**.**
   This saves a copy of the current kernel file.

4. **Type** `cp`**, a space,** `/usr/share/sys/sun4c/`*`MYKERNEL`*`/vmunix`**, a space,** `/vmunix`**, and press** `Return`**. Replace** ***`MYKERNEL`*** **with the actual name of the new kernel configuration file.**

5. **Type** `halt` **and press** `Return`**.**

6. **Type** `b` **and press** `Return`**.**
   The system boots using the new kernel. For more information about booting your system, see your *Sun System & Network Manager's Guide*.

This example installs and boots a kernel named `/usr/share/sys/sun4c/MYKERNEL/vmunix`:

```
tutorial% su
Password: (Type your superuser password)
tutorial# mv /vmunix /vmunix.old
tutorial# cp /usr/share/sys/sun4c/MYKERNEL/vmunix /vmunix
tutorial# halt
Syncing file systems... done
Halted

> b
(System boot messages appear)
...
spif0 at SBus slot 1 0x0 stc_pri 9, ppc_pri 5
(More messages appear)
...
login:
```

Creating Device Files

This section explains how to create device files.

1. **As superuser, type** `cd /usr/sys/unbundled/stc` **and press** `Return`**.**

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2. **Type** `./stc_config -M`*n* `-m` **and press** `Return`**.**
   Replace *n* with the major number of your Serial Parallel Controller device driver, determined earlier in this appendix. For example, if the major number of your device driver is 104, type `./stc_config -M104 -m` and press Return.

```
tutorial# cd /usr/sys/unbundled/stc
tutorial# ./stc_config -Mn -m      <-- n is the id number for your device driver.
```

Restoring the Old Kernel

If your system does not boot correctly with the new kernel, you can restore your old kernel by following the instructions in this section. If you are upgrading to a new release of the Serial Parallel Controller card or no longer wish to use it, you can also follow these instructions to remove your Serial Parallel Controller device driver from your system.

To restore your old kernel, you must be *superuser*. As superuser, boot the old kernel in single-user mode, move the old kernel back to `/vmunix`, and reboot your system. The system should now function as it did before you reconfigured your kernel. The following example boots with the old kernel, moves the old kernel back to `/vmunix`, and reboots the system:

```
tutorial% su
Password: (Type your superuser password)
tutorial# b vmunix.old -s
(System boot messages appear)
tutorial# cd /
tutorial# mv /vmunix.old /vmunix
tutorial# reboot
Syncing file systems... done
Rebooting
(System boot messages appear)
login:
```


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After rebooting your system with the old kernel and logging in, remove the Serial Parallel Controller device driver files and device entries from your system.

To remove the device driver from your system:

1. **As superuser, type** `cd /usr/sys/unbundled/stc` **and press** `Return`**.**
2. **Type** `./stc_config -c` **and press** `Return`**.**
   This removes the Serial Parallel Controller device driver from your system.

```
tutorial# cd /usr/sys/unbundled/stc
tutorial# ./stc_config -c
```

3. **Undo changes made to any system files to reflect the removal of your device driver.**

For more information about reconfiguring your kernel, see the *SunOS Reference Manual* or the `config`(8) man page. Also see your *Sun System & Network Manager's Guide.*

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Device Names and Device Default Settings

C

This appendix describes the device names for the serial and parallel ports and explains how to change the default settings for the ports contained in `stc_defaults`. The Serial Parallel Controller device driver lets you specify various default settings to configure the serial and parallel ports. Additional information is contained in the file `stc_defaults.doc`.

These files are found in Solaris 2.1 and later systems in `/opt/SUNWstc/`. In Solaris 1.*x* systems, look for `stc_defaults` in `/usr/stc/stc`, and look for `stc_defaults.doc` in `/usr/sys/unbundled/stc/` .

Before supporting interactive login sessions with your device driver, become familiar with the functions in the following files.

- Under Solaris 2.1 and later:
  - `/etc/ttymon`
  - `/etc/pmadm`
  - `/etc/sacadm`
- Under Solaris 1.*x*:
  - `/etc/ttytab(5)`
  - `/etc/gettytab(5)`

Set the baud rate of the serial ports at an appropriate speed for the device(s) you connect to your SBus-based SPARCsystem. You can set the baud rate up to 38.4 k baud, but do not exceed the 135 k baud total throughput for all eight serial ports, unless you are using flow control. If you do not use flow control, you will lose data.

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The `stc_defaults` file allows you to specify various default operating settings for the ports on your device driver. You can configure serial and parallel ports by specifying settings in this file. These settings are explained in this appendix.

Card Addresses

The following table shows you how to address the Serial Parallel Controller cards in your system.

Table C-1 How Your Cards are Addressed

Card	Addresses		
stc0	ttyy00 - ttyy07,	ttyz00 - ttyz07,	stclp0
stc1	ttyy08 - ttyy0f,	ttyz08 - ttyz0f,	stclp1
stc2	ttyy10 - ttyy17,	ttyz10 - ttyz17,	stclp2

Device Names

The following tables show device names and how they correspond to serial and parallel ports on your card. This information also applies to `ttyy` ports.

Table C-2 Device Names (Cards 0,1, and 2)

Device Name	Card Number	Port
ttyz00	0	serial 0
ttyz01	0	serial 1
ttyz02	0	serial 2
ttyz03	0	serial 3
ttyz04	0	serial 4
ttyz05	0	serial 5
ttyz06	0	serial 6
ttyz07	0	serial 7
stclp0	0	parallel
ttyz08	1	serial 0

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Device Name	Card Number	Port
ttyz09	1	serial 1
ttyz0a	1	serial 2
ttyz0b	1	serial 3
ttyz0c	1	serial 4
ttyz0d	1	serial 5
ttyz0e	1	serial 6
ttyz0f	1	serial 7
stclp1	1	parallel
ttyz10	2	serial 0
ttyz11	2	serial 1
ttyz12	2	serial 2
ttyz13	2	serial 3
ttyz14	2	serial 4
ttyz15	2	serial 5
ttyz16	2	serial 6
ttyz17	2	serial 7
stclp2	2	parallel

Serial Ports

You must include a line in the `stc_defaults` file for each serial port you use. The line contains two fields. The format is:

```
device:flag:...:
```

`Device` is the device name of the peripheral device you connect to your system. The syntax for device names is `ttyz`*n*, where *n* is the number of the port. See the table earlier in this appendix which shows device names supported by your device driver, and how they correspond to serial and parallel ports on your card.

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Flag is a setting you can specify. Typing one or more of the following flag names after the device name in the line for the serial port turns the setting(s) *on*. You can type the flag names in any order. Deleting a flag name from the line turns a setting *off*.

- *soft_carrier* enables soft carrier on the specified line. If this setting is *on*, transitions on the CD line are ignored.
- *dtr_assert* asserts DTR on the next open of the line.

The flag `display` displays the current settings for a particular line in the `stc_defaults` file. You can use this option to verify your modem settings for one or more serial ports. Typing `display` at the end of the line displays the settings for the line each time you run the `stc_defs` program.

Example of configuring serial port 2 to ignore CD and assert DTR on open():

```
ttyz02:dtr_assert:soft_carrier:display:
```

Parallel Port

Include a line in the `stc_defaults` file for each parallel port you use. The line can contain four fields. The first field is required; the others are optional. You can specify one or more settings within each field, but all settings specified for all fields must be on the same line. You cannot use a line continuation character (\). The format is:

```
device:flag1:...:flag2:...:variable=value:...:
```

Device is the device name of the peripheral device you connect to your system. The syntax for the device name is `stclp`*n*, where *n* is the number of the card containing the parallel port you wish to configure. See the table earlier in this appendix, which shows device names supported by your device driver, and how they correspond to serial and parallel ports on your card.

Flag1 is a setting you can specify. This setting controls how the parallel interface responds to certain control/status signals coming from the peripheral device. Typing one or more of the following flag names after the device name in the line for the parallel port turns the setting(s) *on*. You can type the flag names in any order. Turning the setting *on* enables the Serial Parallel

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Controller card to monitor the appropriate signal from the peripheral device. Deleting a flag name from the line turns a setting *off*. The card then ignores the signal.

- *paper_out* monitors PAPER OUT signals.
- *error* monitors ERROR signals.
- *busy* monitors BUSY signals.
- *select* monitors SELECT or ON LINE signals.

`Flag2` is another setting you can specify. This setting controls how exceptional conditions on the parallel interface are handled. `Flag1` modifies the behavior of `flag2`. Typing one or more of the following flag names after *flag1* in the line for the parallel port turns the setting(s) *on*. You can type the flag names in any order. Deleting a flag name from the line turns a setting *off*.

- *pp_message* displays a message on your console every 60 seconds for a condition until the condition is cleared. If this setting is not turned *on*, you will still receive a message on your console when the condition is detected and another one when the condition has cleared.
- *pp_signal* sends a PP_SIGTYPE signal if an exceptional printer condition (which has not been masked off) is detected. The value of PP_SIGTYPE is defined in the header file located in `/usr/include/sbusdev/stcio.h`.

`Variable` is one more setting you can specify. You can assign an integer value to the variable to control various aspects of the parallel port's error handling and data transfer parameters. For the values you can use, see the file `/usr/include/sys/stcio.h` (under Solaris 1.*x*, see `/usr/include/sbusdev/stcio.h`). If a value is not specified, the device driver will use the current value for the first three values. If timeout is exceeded, the device driver returns an error to the parallel port's controlling process (and optionally posts a signal).

Typing one or more of the following variable names after `flag2` in the line for the parallel port turns the setting(s) *on*. You can type the variable names in any order. Deleting a variable name and its integer value from the line turns a setting *off*.

- *ack_timeout* specifies the amount of time (in seconds) to wait for the ACK signal from the peripheral device after asserting the STROBE signal and transferring a byte of data.
- *error_timeout* specifies the amount of time (in seconds) to wait for the ERROR signal to clear.

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- *busy_timeout* specifies the amount of time (in seconds) to wait for the BUSY signal to clear.
- *data_setup* specifies the amount of time (in µS) between placing data on the parallel lines and asserting the STROBE signal.
- *strobe_width* specifies the width (in µS) of the STROBE signal pulse.

The flag `display` displays the current settings for a particular line in the `stc_defaults` file. You can use this option to verify your settings for the parallel port on one or more cards. Typing `display` at the end of the line displays the settings for the line each time you run the `stc_defs` program.

Example of configuring the parallel port on card 2:

```
stclp2:paper_out:error:busy:strobe_width=6:ack_timeout=120:display:
```

For more examples of configuring serial and parallel ports, see the following files:

- Under Solaris 2.1 or later:
  - `/opt/SUNWstc/stc_defaults`
  - `/opt/SUNWstc/stc/stc_defaults.doc`
- Under Solaris 1.*x* :
  - `/usr/etc/stc/stc_defaults`
  - `/usr/sys/unbundled/stc/stc_defaults.doc`

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Serial Cables



This appendix provides information about serial cables, which connect peripheral devices to the serial ports on the Serial Parallel Controller patch panel. You can purchase ready-made cables or make them yourself.

Serial Cable Types

Two types of serial cables are described in this appendix:

- Modem cables
- Null modem cables

This appendix also provides information about unrecognized cables.

Modem Cables

If you are connecting a Hayes-compatible modem to your system using the Serial Parallel Controller, you must obtain a modem cable with a male connector for the modem end and a male connector for the patch panel end. You can connect the modem cable to any of the eight serial ports on your patch panel. You can obtain the correct cable from most computer dealers or computer supplies stores.

In a serial modem cable, the pins in the connectors are wired *straight through*. This means that the pins function identically on the two connectors at both ends of the cable.

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Data Terminal Equipment (DTE) typically includes terminals, personal computers, and workstations. Modems are a good example of Data Communications Equipment (DCE).

A modem cable connects a modem to your patch panel. Since DTE and DCE devices send and receive through different pins, their signals will not *collide*.

The following figure shows the wiring of a serial modem cable that enables the Serial Parallel Controller card to communicate with a Hayes-compatible modem. If you obtain a serial cable wired like the one shown, it will properly connect your patch panel and a Hayes-compatible modem. For the signal names of the pins, see "Patch Panel Pinouts" in Chapter 3.

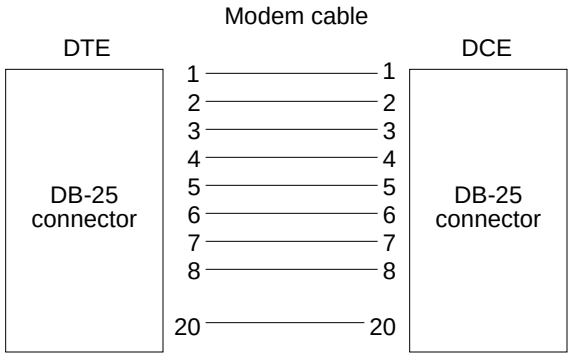


Figure D-1 DTE to DCE

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Null Modem Cables

Null modem cables are another type of serial cable. However, these cable wires are not attached to the pins in the connectors in the same way as a modem cable. Terminals and printers use a null modem cable.

If you cannot purchase a ready-made null modem cable, you can make one by connecting a *null modem converter* to a modem cable, as the following figure shows. The end that connects to your patch panel must be male. The gender of the connector at the other end of the cable depends on the peripheral device you are connecting to your patch panel.

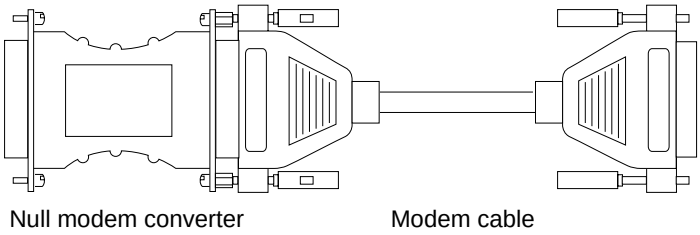


Figure D-2 An Assembled Null Modem Cable

The serial null modem cable is designed for devices that send and receive data on the same pins. Terminals and printers are DTE devices — both expect to send data on pin 2 and receive it on pin 3. Because both devices are trying to send and receive on the same wire, these wires must be *crossed*.

If you are making your own null modem cable, you must connect the wire from pin 2 on the system unit end of the cable to pin 3 on the device end, and connect the wire from pin 3 on the system unit end of the cable to pin 2 on the device end. See the following figure for wiring your cable.

A null modem cable also disables certain features of a peripheral device by *jumpering* wire(s) from one pin to another pin on the same connector. The following figure shows pins 5 and 6 jumpered, and then connected to pin 20. Also, pins 4 and 8 are wired to each other. A cable wired like the one in this figure will connect your patch panel and a Wyse-compatible terminal.

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If you have some other type of device, you will have to consult the manual for the device to determine whether jumpering is necessary and which pins are involved. For the signal names of the pins, see “Patch Panel Pinouts” in Chapter 3.

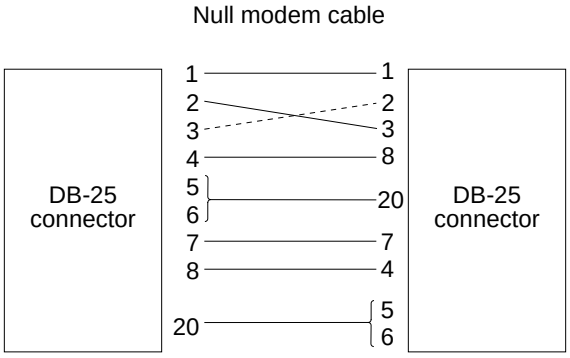


Figure D-3 Null Modem Cable

Unrecognized Cables

If the Serial Parallel Controller device driver recognizes a peripheral device, you can define it to your system. For the Serial Parallel Controller card to communicate with devices not supported by the Serial Parallel Controller device driver, you must inform your system about them by using the methods described in “Printer, Terminal, and Modem Software” in your *Sun System & Network Manager’s Guide.*

But first, you must select a serial cable that enables your card and the peripheral device to communicate. Because each device is different, there is no general rule for selecting or creating a serial cable. To obtain the correct cable, you will need to know which serial port pins are active. The manual for your terminal, modem, or printer should specify the active pins and what type of signal is sent or received on each pin. It should also specify what type of cable is required.

Also see “Patch Panel Pinouts” in Chapter 3, which identifies the active pins on the serial ports of your patch panel. Active pins are highlighted and the type of signal for each active pin is labeled.

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To cable an unrecognized device:

1. **Make sure the device is a serial device.**
   Peripheral devices are cabled to the serial ports on your patch panel. This applies only to serial devices.

2. **Determine whether the device is DCE or DTE.**
   The manual or your dealer should have this information. Modems are generally DCE devices; most terminals and printers are DTE devices.

3. **If the device is DCE, use a modem cable.**
   Begin by trying the cables with the pin configuration specified earlier in this appendix. These cables work with most devices.

4. **If the device is DTE, use a null modem cable.**
   Begin by trying the cables with the pin configuration specified earlier in this appendix. These cables work with most devices.

If these typical cable specifications do not work, see the manual for your peripheral device to determine which pins are active. Also see “Patch Panel Pinouts” in Chapter 3 to determine which pins are active for the serial ports on your patch panel.

You must wire the cable connectors according to the needs of both the peripheral device and the serial port on your patch panel. You might have to experiment to find a successful compromise.

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Sundiag E

This appendix explains how to use Sundiag with Solaris 1.x (SunOS 4.x) to test the functionality of the Serial Parallel Controller card within the SunOS operating environment. Sundiag uses the Serial Parallel Controller device driver to access the card components such as the cd-180 and ppc2 chips, and the serial and parallel ports.

Note – To install and use Sundiag with SunOS 4.1.2 or later, refer to the *Sundiag User's Guide*.

Hardware Requirements

The following is the minimum hardware configuration required to successfully run the (user0) Serial Parallel Controller card Internal Test:

- SBus-based SPARCsystem with up to three available SBus slots.
- Serial Parallel Controller card, installed in one of the SBus slots.

The following hardware *is also* required to successfully run the other Sundiag Serial Parallel Controller tests:

- Patch panel
- One to three 96-pin loopback plugs
- One to twenty-four 25-pin serial loopback plugs
- One to three serial cables
- One to twenty-four `tty` terminals

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Sundiag Files

Solaris 2.1 Location

Under Solaris 2.x, all Sundiag files are automatically stored in the `/opt/SUNWdiag/bin` directory when the device driver is installed from the CD-ROM to your system.

The two Sundiag files are:

- spiftest
- .usertest

Solaris 1.x Location

Under Solaris 1.x, all Sundiag files are automatically stored in the `/usr/diag/sundiag` directory when the device driver is installed from the release media to your system.

The two Sundiag files are:

- spiftest
- .usertest

Starting Sundiag

When you are ready to run Sundiag, type:

```
myhost% su
passwd: (Type your superuser password)
myhost# cd  /usr/diag/sundiag
myhost# sundiag
```

You should see the `Probing` Message, and then the Sundiag window should appear on your screen.

Note – The Sundiag tests for the Serial Parallel Controller appear under "USER TESTS" in the control panel.

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Sundiag Tests

The Sundiag tests consist of the following ten tests:

- (user0) Serial Parallel Controller card Internal Test

  This test performs a quick internal check of the Serial Parallel Controller card(s) installed in SBus slots. You do not need to attach anything to the card(s) to perform this test. *This is a stand-alone test designed to run alone, not with any other tests.*

- (user1) Serial Parallel Controller card 25-pin Loop Back (LB) on `ttyz00`

  This test provides full-duplex transmission and full-modem loopback testing on the port designated `/dev/ttyz00`. You *must attach* a 25-pin Loopback plug to serial port `/dev/ttyz00` on the patch panel. (This port is labeled *0* on the patch panel connected to the first installed card.)

- (user2) Serial Parallel Controller card Echo `tty` on `ttyz00`

  This test checks the proper operation of the serial ports by echoing any character typed on a `tty` terminal keyboard to the `tty` terminal screen. This test is terminated by typing Ctrl-C from the terminal keyboard. After a short delay, the Status Window updates the Pass Count.

Note – If no terminal keyboard input is received within two minutes, a time-out occurs and a failure is posted to the Status Window.

  To run the default test, you *must connect* a `tty` terminal to `/dev/ttyz00` (labeled *0* on the patch panel connected to the first installed card). (You can test other serial ports by altering the `.usertest` file. See the `.usertest` section at the end of this appendix.) Observe the terminal screen to validate the test.

- (user3) Serial Parallel Controller card Printer Test on `stclp0`

  This test sends the entire ASCII character set to a Centronics-compatible parallel printer. You must attach a parallel printer to the parallel port (`/dev/stclp0`) on the Serial Parallel Controller patch panel. Observe the printer output to validate the test.

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Note – For the user4 - user9 tests, when you connect the 96-pin Loopback plug, make sure the locking mechanism on the 96-pin loopback plug clicks to insure a secure connection.

- (user4) Serial Parallel Controller card 96-pin LB on card 1

  This test provides data transmission, full-modem loopback, and parallel port loopback testing on the first installed card. You *must attach* a 96-pin loopback plug to the card before running this test.

- (user5) Serial Parallel Controller card 96-pin LB on card 2

  This test provides data transmission, full-modem loopback, and parallel port loopback testing on the second installed card. You *must attach* a 96-pin loopback plug to the card, if present, before running this test.

- (user6) Serial Parallel Controller card 96-pin LB on card 3

  This test provides data transmission, full-modem loopback, and parallel port loopback testing on the third installed card. You *must attach* a 96-pin loopback plug to the card, if present, before running this test.

- (user7) Serial Parallel Controller card 25-pin LB on card 1

  This test provides data transmission and full-modem loopback testing on the first installed card. It also tests the cable between the card and the patch panel, and the patch panel itself. You *must attach* eight 25-pin loopback plugs to the serial ports on the patch panel before you perform this test.

- (user8) Serial Parallel Controller card 25-pin LB on card 2

  This test provides data transmission and full-modem loopback testing on the second installed card. It also tests the cable between the card and the patch panel, and the patch panel itself. You *must attach* eight 25-pin loopback plugs to the serial ports on the patch panel before you perform this test.

- (user9) Serial Parallel Controller card 25-pin LB on card 3

  This test provides data transmission and full-modem loopback testing on the third installed card. It also tests the cable between the card and the patch panel, and the patch panel itself. You *must attach* eight 25-pin loopback plugs to the serial ports on the patch panel before you perform this test.

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The Serial Parallel Controller tests appear under "USER TESTS" in the Sundiag control panel. To run a test, with the mouse, *click* on the box next to one of the ten tests listed above. Then *click* on the Sundiag start button.

Test Options

The Sundiag Serial Parallel Controller tests, except the Printer test, allow you to change test options. The test options are shown in the following table.

Note – If you are running pre-2.0 Sundiag, do not enable the options in the Options Window. If you do so, Sundiag will either fail or not recognize the enabled option(s).

Table E-1 Test Options

Options	Default	Values	Description
D	any	See footnote[1]	Specifies the device name.
T	1	See footnote[2]	Specifies the subtest name.
B	9600	110 - 38400[3]	Specifies the baud rate.
C	8	5 - 8	Specifies the character length.
S	1	1, 2[4]	Specifies the number of stop bits.
P	0	0 - 2[5]	Specifies parity.
F	rtscts	See footnote[6]	Specifies the flow control protocol.
I	A	5, A, r[7]	Specifies the data for the loopback tests.

1. Your options are *sb1* (`/dev/ttyz00 - 07`), *sb2* (`/dev/ttyz08 - 0F`), *sb3* (`/dev/ttyz10 - 17`), and *any* (`/dev/ttyz00 - 17`). For example, the *sb1* option enables the eight serial ports on the first installed card and the *any* (default) option enables the eight serial ports on any cards installed in SBus slots.
2. Your options are *1* for Internal Loopback test, *2* for Printer test, *4* for 96-pin Loopback test, *8* for DB-25 Loopback test, *16* for Echo `tty` test, or the *sum* of any combination.
3. The selectable baud rates are *110*, *300*, *600*, *1200*, *2400*, *4800*, *9600*, *19200*, and *38400*.
4. Your options are *1* for 1 stop bit and *2* for 2 stop bits.
5. Your options are *none* for no parity, *even* for even parity, and *odd* for odd parity.

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6. Your options are *xonoff* for Xon / Xoff, *rtscts* for hardware flow control, and *both* for xonoff and rtscts.
7. The selectable patterns are *Hex. 5* for a 5 pattern, *Hex. a* for an A pattern, and *r* for a random pattern.

The test options are changed by modifying the `.usertest` file. To change the test options:

1. **As superuser, type** `cd /usr/diag/sundiag` **and press Return.**
2. **Use** `vi` **or another editor of your choice to change the** `.usertest` **file in the** `/usr/diag/sundiag` **directory.**
   Each line in the `.usertest` file is in the following format:

   sundiag test label, test name, command-line arguments

You can replace *sundiag test label* with whatever you want to be displayed on the Sundiag control panel. Use `spiftest` for the test name. Refer to the table earlier in this appendix and the *Sundiag User's Guide* for all the available command line arguments.

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The following example shows the `.usertest` file. The # symbol before a line in the `.usertest` file means that the line is commented out. If you want to test another serial port (`/dev/ttyz01 - 07`), you can use a text editor and remove the # symbol on the line corresponding to the serial port(s) you want to test.

Note – If you do alter the `.usertest` file so that you can test more than /dev/ttyz00, *you must* use a 25-pin loopback plug for each enabled serial port.

```
# @(#).usertest Rev   MM/DD/YY Copyright 1990 Sun Microsystems.

Serial Parallel Controller card Internal Test,spiftest,s D=any
T=1
Serial Parallel Controller card 25-pin LB on ttyz00,spiftest,s
D=/dev/ttyz00 T=8
#Serial Parallel Controller card 25-pin LB on ttyz01,spiftest,s
D=/dev/ttyz01 T=8
#Serial Parallel Controller card 25-pin LB on ttyz02,spiftest,s
D=/dev/ttyz02 T=8
#Serial Parallel Controller card 25-pin LB on ttyz03,spiftest,s
D=/dev/ttyz03 T=8
#Serial Parallel Controller card 25-pin LB on ttyz04,spiftest,s
D=/dev/ttyz04 T=8
#Serial Parallel Controller card 25-pin LB on ttyz05,spiftest,s
D=/dev/ttyz05 T=8
#Serial Parallel Controller card 25-pin LB on ttyz06,spiftest,s
D=/dev/ttyz06 T=8
#Serial Parallel Controller card 25-pin LB on ttyz07,spiftest,s
```


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Error Messages

Sundiag error messages appear in the sundiag console window. The error messages are generated as a result of the Sundiag Serial Parallel Controller discovering fatal errors. Sundiag saves these error messages in the Sundiag error log file. The error messages appear in the following format:

MM/DD/YY HH:MM:SS <device name> spiftest ERROR: error message

SunOS error messages (if any) appear in your system console window and are not listed here. This section identifies possible causes for the card or test failure and identifies the Field Replaceable Unit (FRU), if possible. The three FRUs are as follows:

- Serial Parallel Controller card.
- 96-pin shielded cable.
- Patch panel.

This section also provides suggestions if an error is not hardware related.

Error message: No Serial Parallel Controller card found or device driver not installed

Possible causes: An incorrect slot number was specified, or a non-Serial Parallel Controller card card was found, or the device driver was not installed.

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Error messages:

Ioctl STC_DCONTROL(STC_REGIOW-COR2) error on <device name>, or

Ioctl STC_DCONTROL(STC_REGIOR-CCR) error on <device name>, or

Ioctl STC_DCONTROL(STC_REGIOW-CCR) error on <device name>, or

Ioctl STC_DCONTROL(STC_PPCREGW-PDATA) error on <device name>, or

Ioctl STC_DCONTROL(STC_PPCREGR-PDATA) error on <device name>, or

Ioctl TCSETS failed on <device name>, or

Ioclt TIOCMGET error on <device name>, or

Ioclt TIOCMSET error on <device name>, or

Ioctl STC_GPPC error on device <device name>

Ioctl STC_SDEFAULTS error on <device name>

Ioctl STC_DCONTROL error on <device name>

Possible cause: The device driver was not installed correctly, or the card is not working (see system console for messages). You may need to reinstall the device driver.

Error message: Expected DSR set, observed clear
Parallel port loopback test failed on <device name>

Possible causes: The modem lines DSR are not stable, or the parallel port is not sending the correct data, or the 96-pin loopback plug either is wired incorrectly or not making proper contact.

Error message: Expected <pattern>
Observed <pattern>
Modem loopback test failed on <device name>

Possible causes: The modem lines are not stable. If the modem loopback test passed on the 96-pin loopback test and failed on the 25-pin loopback test, then it is possible that either the patch panel or the cable is not functional. Also, make sure the loopback plug is making proper contact.

Error message: Can’t open <device name> with file descriptor <number>

Possible causes: This is an internal error. Phone Sun for technical assistance.

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Error message: Device <device name> already open

Possible causes: Two tests are trying to access the same device at the same time or the device is already busy running another process.

Error messages:

Open error on <device name>, or

Read error on <device name>, or

Write error on <device name>

Possible causes: Another application is currently using this device or the device driver is not installed properly.

Error messages:

Paper out error on device <device name>, or

Off-line error on device <device name>, or

Busy error on device <device name>, or

Error on device <device name>

Possible causes: The parallel printer is either out of paper, off-line, busy printing data, or some other error condition exists. Check the printer status.

Error message:

Expected <number> bytes, observed <number> bytes
Internal test failed on <device name>

Possible cause: Data transmission failed because you're running the internal loopback with another test. The Serial Parallel Controller card must be replaced.

Expected = <pattern>, observed = <pattern>
Internal test failed on <device name>

Possible cause: Data transmission failed, the card must be replaced.

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Expected = <pattern>, observed = <pattern>
Data loopback failed on <device name>

Possible causes: Data transmission failed because you are running the internal loopback with another test, or the loopback connector is not making proper contact, or the card failed. Re-insert the connector and make sure it makes proper contact. If the test still fails and if you are running the 25-pin loopback test, you can try to run the 96-pin loopback test to isolate the problem. If both tests fail for the same port, then it is possible that the card is not functional. If the 96-pin test passes, and the 25-pin doesn't, try the test with a different cable.

Error message: Timeout error on <device name>

Possible causes: The test requires a loopback plug, a `tty` terminal, or a printer connected to the device under test and found none.

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Serial Parallel Controller Parts

F

- Serial Parallel Controller card (Rev. 1.1) F501-1931
- Patch panel F540-2007
- 96-pin shielded cable F530-1685
- 96-pin loopback plug 370-1366
- 25-pin serial loopback plug 540-1558

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Messages G

This appendix explains messages displayed by the Serial Parallel Controller device driver and configuration script. These messages inform you about the status of the installation of the device driver. They also help you troubleshoot problems with the device driver and card.

Note – Some messages described in this appendix apply only to installation under Solaris 1.x. These messages are marked with an asterisk (*).

Conventions

Note – The term *board* is used instead of *card* in this appendix.

There are three types of messages:

- *Advisory* messages indicate that the device driver or configuration script has detected a condition which you might find of interest. They are provided for your information, and *do not* require any response from you.
- *Error* messages indicate that a condition has been detected which disrupts the normal operation of your device driver, board, or both. You might lose data as a result of these messages. They *do* require a response from you.
- *Fatal* messages indicate that the device driver was not configured into your system correctly and, consequently, the Serial Parallel Controller card is inaccessible to your system. They *also require* a response from you.

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Messages are organized into seven groups:

- Configuration script messages
- Loading and removing driver messages
- Initialization messages
- Serial port messages
- Serial port control messages
- Parallel port messages
- STREAMS processing messages

Each group relates to the installation, configuration, or operation of the device driver. Messages in each group appear in order of severity, from *Advisory* to *Fatal*.

Configuration Script Messages

stc_config: invalid number of boards in configuration file, configuring 3

Advisory. The `/dev/stc.AUTOLOAD` file has a number outside the range of 1 to 8. The maximum number of boards which the configuration script can support (which is 8) is configured. Make sure the file does not contain any bogus characters inadvertently written to the file.

stc_config: invalid number of boards; between 1 and 8 can be configured

Advisory. The maximum number of boards which the configuration script can support (which is 8) is configured. You cannot configure more than 8 boards into your system.

stc_config: unloaded SPC/S driver, id *number*

Advisory. The device driver, which has an id number, is successfully unloaded (removed) from your system. You cannot operate any peripheral devices controlled by Serial Parallel Controller until the Serial Parallel Controller device driver is installed and configured into your system again.

stc_config: SPC/S driver successfully loaded from *file*

Advisory. The device driver was successfully loaded into your system from the specified file.

stc_config: SPC/S driver files created in /dev directory

Advisory. The files for your device driver have been created in the `/dev` directory.

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stc_config: removing device nodes for all SPC/S boards

Advisory. The device nodes for your device driver are being removed from the `/dev` directory. This message appears as a result of booting your system or using the `-c` command line option with the configuration script.

stc_config: making device nodes for *number* **SPC/S boards**

Advisory. The configuration script is creating device nodes for your device driver in the `/dev` directory for the specified number of boards installed in your system.

stc_config: SPC/S driver will be automatically loaded on the next bootup

Advisory. The device driver will be loaded into the system the next time you boot your system. This message is the result of using the `-s` (status) command line option with the configuration script.

stc_config: added call to /etc/loadable in /etc/rc.local

Advisory. The configuration script added a call to the script that loads your device driver in the `/etc/rc.local` file.

stc_config: created /etc/loadable where none existed before

Advisory. The configuration script created the `/etc/loadable` file. This file contains the commands to load the device driver into the system the next time you boot your system.

stc_config: added SPC/S driver autoload commands to /etc/loadable

Advisory. The configuration script added the commands to load your device driver into your system to the `/etc/loadable` file.

stc_config: SPC/S driver configured to autoload on next bootup

Advisory. The device driver will be loaded into the system the next time you boot your system. This message is the result of following the instructions for running the installation script explained in this book.

stc_config: automatic loading of SPC/S device driver on bootup is disabled

Advisory. The device driver will not be loaded into the system the next time you boot your system. This message appears as a result of using the `-c` (clean) or `-n` (disable autoload) command line options with the configuration script.

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stc_config: can't execute defaults setup program /usr/etc/stc/stc_defs

Error. The configuration script could not run the program that applies the modem control and printer settings in the `/usr/etc/stc/stc_defaults` file to the serial and parallel ports. Make sure that these files are installed correctly. This message also appears if you have installed your software in a directory other than the `/usr` directory.

stc_config: must have root privileges to run this command

Fatal. You must be root or superuser to execute one or more of the command line options you specified.

stc_config: can't find driver object file in: stc.o /dev/stc.o

Fatal. The configuration script looks for the device driver in several places. If it cannot locate the device driver on your system, this message is displayed. Make sure that the device driver is installed correctly on your system. You must run the `stc_config` command from either the `/dev` directory or the directory where the `stc.o` file is located on your system.

stc_config: invalid device major number specified *number*

Fatal. You cannot specify a major number outside the range of 1 to 255 in the `-M#` command-line option.

stc_config: error unloading SPC/S driver - modunload error number

Fatal. The device driver cannot be removed from your system. See the `modload` man page for information about the error number. Make sure your board does not have any open devices. Check your console for any indication of which device(s) might be open.

stc_config: error loading SPC/S driver - modload error number *number*

Fatal. The device driver cannot be configured into your system. See the `modunload` man page for information about the error number. Make sure that at least one Serial Parallel Controller board is installed in your system. Also make sure the `vd` (virtual device) driver is configured into your system kernel.

stc_config: driver must be unloaded before devices can be removed, use -u

Fatal. You attempted to remove device nodes from the `/dev` directory before unloading your device driver. Unload (remove) your device driver using the `-u` command-line option. Then use the `-r` command-line option to remove the device nodes for your device driver from the `/dev` directory.

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stc_config: driver must be loaded before devices can be made, use -l

Fatal. You attempted to create device nodes for your device driver in the `/dev` directory before loading your device driver. Load your device driver using the `-l` command-line option. Then use the `-m` command-line option to create device nodes for your device driver in the `/dev` directory.

usage: stc_config [-c|-l|-b#|-u|-m|-M#|-r|-s|-p|-n|-a|-d]

Fatal. You attempted to use an incorrect command-line option with the configuration script. If no command-line option is used with the `stc_config` command, the device driver and configuration script are installed in the `/dev` directory, device nodes are created in the `/dev` directory, and a call to the configuration script is added to the `/etc/loadable` file. You can use the following command-line options with the `stc_config` command.

`-c` This option (`clean`) unloads your device driver, removes device nodes from the `/dev` directory, and removes the device driver and configuration script from the `/dev` directory.

`-l` This option (`load`) loads your device driver into your system.

`-b#` This option allows you to specify the number # of boards to configure into your system.

`-u` This option removes (unloads) the device driver from your system.

`-m` This option creates device nodes for the device driver in the `/dev` directory.

`-M#` This option allows you to specify the major number # of your device driver. This is required if device nodes must be created for a driver which is added to the system kernel as opposed to loaded into the system.

`-r` This option removes device nodes for your device driver from the `/dev` directory.

`-R` This option removes device nodes for your device driver from the `/dev` directory, but does not check whether the device driver is loaded.

`-s` This option (`status`) displays the status of device drivers which have been loaded into the system.

`-p` This option (`put`) copies the configuration script and the executable object file for the device driver to the `/dev` directory.

`-n` This option disables automatic loading of the device driver the next time you boot your system.

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`-a` This option enables automatic loading of the device driver the next time you boot your system. This option also creates the `/etc/loadable` file if not present, and adds a call to it to the `/etc/rc.local` file.

`-d` This option checks for and runs the `/usr/etc/stc/stc_defs` set up program to apply the default settings you specify in the `/usr/etc/stc/stc_defaults` file.

`-BOOT` This option is used only if it is called from the `/etc/loadable` directory while your system is booting.

Loading and Removing Driver Messages

stc_vdcmd: unit *board number* **cd-180 firmware revision:** *revision*

Advisory. This message displays the firmware revision level of the cd-180 chip when the device driver is first loaded.

stc_vdcmd: unit *board number* **line** *number* **is open**

Advisory. The serial line on the enumerated board is open (in use by a process).

stc_vdcmd: unit *board number* **ppc is open**

Advisory. The parallel port on the enumerated board is open (in use by a process).

stc_vdcmd: unit *board number* **control line is open**

Advisory. The control line on the enumerated board is open (in use by a process).

stc_vdcmd: can't unload stc driver, some device(s) are still open

Error. The device driver could not be removed because one or more of the devices controlled by the driver are open (in use by a process). Type the `/dev/stc_config -s(status)` command to determine which device(s) are still open.

stc_vdcmd: unknown command: *command*

Error. The virtual device handler of the device driver attempted to execute an unrecognized command. Phone your Sun sales representative if you receive this message.

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Initialization Messages

*** stc_attach: unit** *board number* **weird oscillator revision (***revision***), assuming 10Mhz**

Advisory. The FCode Programmable Read-Only Memory (PROM) on the board returned an unexpected baud rate oscillator value. The device driver assumes that a 10Mhz oscillator is installed. This message appears only if you changed the FCode Programmable Read-Only Memory (PROM) on the Serial Parallel Controller board.

stc_attach: can't allocate memory for unit structs

Fatal. The (`kmem_zalloc`) function did not allocate memory for the data structures used by the device driver. This message indicates a problem with your system. Try to reinstall the device driver again.

*** stc_attach: unit** *board number* **board revision undeterminable!!**

Fatal. The device driver could not obtain a hardware revision level from the FCode Programmable Read-Only Memory (PROM) on the board. Make sure your board is installed properly in its SBus slot. Otherwise, the problem might be a faulty FCode PROM on your board or a faulty board. In both cases, you must replace your board.

stc_attach: unit *board number* **board revision** *revision* **not supported by driver**

Fatal. The device driver does not support this revision of the board. You might be using an older version of the Serial Parallel Controller board or the Programmable Read-Only Memory (PROM) on the board might be faulty.

stc_attach: unit *board number* **oscillator revision undeterminable!!**

Fatal. The device driver could not obtain an oscillator revision level from the FCode Programmable Read-Only Memory (PROM) on the board. Make sure your board is installed properly in its SBus slot. Otherwise, the problem might be a faulty FCode PROM on your board or a faulty board. In both cases, you must replace your board.

*** stc_attach: error initializing stc** *board number*

Fatal. An error occurred while initializing the board. A memory access could have failed. This message indicates a faulty component on your Serial Parallel Controller board. If this message appears frequently, replace your board.

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*** stc_attach: unit** *board number* **bad number of interrupts:** *number*

Fatal. An incorrect number of interrupts was read from the FCode Programmable Read-Only Memory (PROM) on the board. Make sure your board is installed properly in its SBus slot. Otherwise, the problem might be a faulty FCode PROM on your board or a faulty board. In both cases, you must replace your board.

*** stc_attach: unit** *board number* **bad number of register sets:** *number*

Fatal. An incorrect number of register sets was read from the FCode Programmable Read-Only Memory (PROM) on the board. Make sure your board is installed properly in its SBus slot. Otherwise, the problem might be a faulty FCode PROM on your board or a faulty board. In both cases, you must replace your board.

*** stc_init: unit** *board number* **GIVR was not 0x0ff, was:** *hexadecimal number*

Fatal. The 8-channel UART (universal asynchronous receiver transmitter) of the cd-180 chip could not initialize, or a memory fault occurred in attempting to access the chip. If this message appears frequently, replace your board.

*** cd180_init: unit** *board number* **GIVR was not 0x0ff, was:** *hexadecimal number*

Fatal. The 8-channel UART of the cd-180 chip could not initialize, or a memory fault occurred in attempting to access the chip. If this message appears frequently, replace your board.

Serial Port Messages

*** stc_modem: unit** *board number* **line** *number* **interesting modem control: MCR:** *hex num***, MSVR:** *hex num*

Advisory. The cd-180 chip posted a modem control line change interrupt to the device driver, but the driver did not detect a change since its last scan. If this problem occurs frequently, your data cables are either too long or picking up noise. *Hex num* stands for hexadecimal number.

*** SET_CCR: CCR *timeout***

Error. The CCR register of the cd-180 chip did not return a nonzero value within the timeout period after receiving a command. This message indicates a faulty cd-180 chip or board.

*** PUTSILO: unit** *board number* **line** *number* **soft silo overflow**

Error. The internal receive data silo of the device driver overflowed for the enunciated line, because the system has not yet written the data in the silo. All data in the silo is flushed as a result of this condition. Make sure you are using the correct flow control.

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*** stc_rcvex: unit** *board number* **line** *number* **receiver overrun, char:** *hexadecimal character*
Error. The device driver could not service the cd-180 receive data interrupt before the receive data FIFO (queue) of the chip filled up. Make sure you are using the correct flow control.

*** stc_drainsilo: unit** *board number* **line** *number* **can't allocate streams buffer**
Error. The device driver could not obtain a STREAMS message buffer from the `bufcall`() function. All data in the receive data silo of the device driver is flushed as a result of this condition.

*** stc_drainsilo: unit** *board number* **line** *number* **punting put retries**
Error. The device driver could not send data down the stream to the application because the path was blocked. All data in the receive data silo of the device driver is flushed as a result of this condition.

Serial Port Control Messages

*** stc_restart: unit** *board number* **line** *number* **BREAK BIT off (*ERROR*)**
Advisory. The BREAK control bit for the enumerated line was set instead of clear. Your cd-180 chip might be faulty, or your device driver might be faulty.

*** stc_ioctl: unit** *board number* **line** *number* **can't allocate streams buffer for ioctl**
Error. The device driver could not obtain a STREAMS message buffer from the `bufcall()` function for the requested `ioctl`. The `ioctl` will not execute as a result of this condition.

*** stc_ioctl: unit** *board number* **line** *number* **can't allocate STC_DCONTROL block**
Error. The device driver could not allocate a data block from the `allocb()` function for the STC_DCONTROL return value. The `ioctl` will not execute as a result of this condition.

*** stc_ioctl: unit** *board number* **line** *number* **can't allocate STC_GDEFAULTS block**
Error. The device driver could not allocate a data block from the `allocb()` function for the STC_GDEFAULTS return value. The `ioctl` will not execute as a result of this condition.

*** stc_ioctl: unit** *board number* **line** *number* **can't allocate STC_GPPC block**
Error. The device driver could not allocate a data block from the `allocb()` function for the STC_GPPC return value. The `ioctl` will not execute as a result of this condition.

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*** stc_ioctl: unit** *board number* **line** *number* **can't allocate TIOCMGET block**
Error. The device driver could not allocate a data block from the `allocb()` function for the TIOCMGET return value. The `ioctl` will not execute as a result of this condition.

Parallel Port Messages

*** ppc_stat: unit** *board number* **PAPER OUT**
Advisory. The peripheral device connected to the parallel port on your enumerated board is out of paper. The PAPER OUT line was asserted as a result.

*** ppc_stat: unit** *board number* **PAPER OUT condition cleared**
Advisory. The peripheral device connected to the parallel port on your enumerated board has cleared the PAPER OUT condition. The PAPER OUT line was deasserted as a result.

*** ppc_stat: unit** *board number* **OFFLINE**
Advisory. The peripheral device connected to the parallel port on your enumerated board is off-line. The SLCT line was deasserted as a result.

*** ppc_stat: unit** *board number* **OFFLINE condition cleared**
Advisory. The peripheral device connected to the parallel port on your enumerated board has cleared the OFFLINE condition. The SLCT line was asserted as a result.

*** ppc_stat: unit** *board number* **ERROR**
Advisory. The peripheral device connected to the parallel port on your enumerated board has detected some error. The ERROR line was asserted as a result.

*** ppc_stat: unit** *board number* **ERROR condition cleared**
Advisory. The peripheral device connected to the parallel port on your enumerated board has cleared the ERROR condition. The ERROR line was deasserted as a result.

*** ppc_xwait: unit** *board number* **interrupted sleep**
Advisory. The device driver received a signal while waiting for the queued output from the previous STREAMS module to be sent to the parallel port. The device driver returns from the `sleep()` call prematurely as a result.

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*** ppc_int: unit** *board number* **stray interrupt**
Advisory. The parallel port controller (ppc) chip generated an unexpected interrupt while the peripheral device was closed. If this problem occurs frequently, your parallel cable might be picking up noise, causing the ppc to generate an unwanted interrupt; or the ppc might have an internal problem.

*** ppc_acktimeout: unit** *board number* **ACK timeout**
Error. The ACK line of the peripheral device connected to the parallel port on your enumerated board did not assert itself within the configurable timeout. Make sure your peripheral device is connected properly and is powered on.

*** ppc_acktimeout: unit** *board number* **BUSY timeout**
Error. The BUSY line of the peripheral device connected to the parallel port on your enumerated board did not deassert itself within the configurable timeout. Make sure your peripheral device is connected properly and is powered on.

*** ppc_acktimeout: unit** *board number* **can't get pointer to read q**
Error. The data structure for the parallel port controller (ppc) of the device driver is faulty.

*** ppc_acktimeout: unit** *board number* **can't send M_ERROR message**
Error. The device driver cannot send an M_ERROR STREAMS message to the application.

*** ppc_signal: unit** *board number* **can't get pointer to read q**
Error. The data structure for the parallel port controller (ppc) of the device driver is faulty.

*** ppc_signal: unit** *board number* **can't send M_PCSIG (PP_SIGTYPE** *hexadecimal number***) message**
Error. The device driver cannot send an M_PCSIG STREAMS message to the application (which could post a signal).

STREAMS Processing Messages

*** stc_wput: unit** *board number* **trying to M_STARTI on ppc or control device**
Advisory. An M_STARTI STREAMS message was sent to the parallel port or the board control device. This should occur only if an application sends this message.

*** stc_wput: unit** *board number* **line** *number* **unknown message:** *hexadecimal number*
Advisory. The device driver received an unknown STREAMS message from the application. Check your application coding.

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*** stc_start: unit** *board number* **line** *number* **unknown message:** *hexadecimal number*

Advisory. The device driver received an unknown STREAMS message from the application. Check your application coding.

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Manual: *Serial Parallel Controller User's Guide*

Writer: Steve Hix Revision: A of (date) February, 1993

Part Number: 800-6573-12 Spot Color? __ Yes x No Total Page Count: 132

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