

SPARCstation 10 Service Manual



THE NETWORK IS THE COMPUTER™

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Preface

About This Book

The *SPARCstation 10 Service Manual* describes how to troubleshoot problems and install field replaceable units (FRUs) in the SPARCstation 10 computer system. Technicians, advanced computer system end-users (with experience replacing hardware and troubleshooting), system administrators, and qualified service providers should use this book.

Document Organization

This book is comprised of 17 chapters and 4 appendixes, in addition to a glossary and an index.

- Chapter 1, “System Overview,” describes the major components of the SPARCstation 10 computer system.
- Chapter 2, “Diagnostics Overview,” describes the different types of diagnostic firmware and software, and discusses various tests supported by the SPARCstation 10.
- Chapter 3, “Troubleshooting,” gives pointers for diagnosing a problem or failed component.
- Chapter 4, “Preparing the System,” gives precautions and explains steps you need to perform before you halt the SPARCstation 10, disconnect peripheral devices, or open the system.

- Chapter 5, “Main Logic Board,” describes how to remove and install the main logic board and its main components.
- Chapter 6, “Open Boot PROM,” explains how to remove and install the open boot PROM.
- Chapter 7, “Non-Volatile RAM (NVRAM),” explains how to remove and install an NVRAM.
- Chapter 8, “DSIMMs,” explains how to remove and install a DRAM Single Inline Memory Module (DSIMM).
- Chapter 9, “MBus Modules,” describes how to remove and install MBus modules.
- Chapter 10, “SBus Cards,” describes how to remove and install SBus cards.
- Chapter 11, “Power Supply Assembly,” describes how to remove and install the power supply assembly and fans.
- Chapter 12, “Hard Disk Drives,” tells how to remove and install hard disk drives and their mounting brackets.
- Chapter 13, “Diskette Drive,” explains how to remove and install a diskette (floppy) drive.
- Chapter 14, “DC Power Harness,” tells how to remove and install the SPARCstation 10 DC power harness.
- Chapter 15, “Internal Disk Cable,” explains how to remove and install the internal disk cable.
- Chapter 16, “LED,” explains how to remove and install the light emitting diode (LED) for the SPARCstation 10 system.
- Chapter 17, “Powering On the System,” explains precautions, steps to perform before and after replacing a part, and connecting peripherals to the system.
- Appendix A, “System Specifications,” contains the input power requirements, environmental requirements, physical and packaging dimensions of the system, and regulatory compliance information.
- Appendix B, “Replacement Parts List,” gives part numbers and describes field replaceable units (FRUs) for the SPARCstation 10 system.
- Appendix C, “Positive Temperature Coefficient Devices,” provides general information about positive temperature coefficient (PTC) devices which are located on the main logic board (MLB) in place of fuses.
- Appendix D, “Signal Descriptions,” gives signal descriptions and connector pinouts and assignments.

Warnings, Cautions, and Notes



Caution – This equipment contains lethal voltage. Accidental contact can result in serious injury or death.



Caution – Improper handling by unqualified personnel can cause serious damage to this equipment. Unqualified personnel who tamper with this equipment may be held liable for any resultant damage to the equipment.



Caution – Hot surfaces are present. Use care when opening the system chassis or handling components.

Individuals who service this equipment must observe all safety precautions and ensure compliance with skill level requirements, certification, and all applicable local and national laws.

Procedures contained in this document must be performed by trained maintenance providers. Only people who have been trained by the Sun Microsystems® training facilities (or by Sun Microsystems affiliates) and have been certified as required by local and national laws are considered qualified.

Note – Before you begin, carefully read each of the procedures in this manual. Improper handling by unqualified personnel can cause serious damage to this equipment.

Document Conventions

The following table describes the type changes and symbols used in this book.

TABLE P-1 Document Conventions

Typeface or Symbol	Meaning	Example
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your login file. Use <code>ls -a</code> to list all files. system% You have mail.
AaBbCc123	What you type, contrasted with on-screen computer output This font also indicates a key that you press. When you see two key names, press and hold the first key, then type the second character.	system% su password: Press the Delete key. When you see L1-A , press and hold L1 , while typing A .
<i>AaBbCc123</i>	Command-line placeholder: replace with a real name or value	To delete a file, type <code>rmfilename</code> .
<i>AaBbCc123</i>	Book titles, new words or terms, or words to be emphasized	Read Chapter 6 in <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be root to do this.

Related Books

The following books provide additional information and are referenced in this manual:

- System administration manual for the computer system.
- Operating system documentation for the operating system release the system is running.
- OpenBoot 2.0 Command Reference provides information about booting the operating system, running diagnostics, modifying the system start-up configuration parameters, loading and executing programs and troubleshooting. It also describes the OpenBoot Forth Interpreter commands.

- *SunDiag User's Guide* covers information about Sundiag, a system exerciser that runs under the SunOS[™] Operating System. Sundiag displays real-time use of system resources and peripherals.
- *SunDiagnostic Executive User's Guide for SPARCstations* explains how to run extensive, configurable tests independent of the SunOS operating system. The Sun Diagnostic Executive is the tool of choice when you need thorough diagnostics. With the Sun Diagnostic Executive you can determine which field replaceable unit needs to be replaced.
- *Desktop SPARC Hardware Owner's Guide* provides step-by-step instructions on how to install the system hardware and software.
- *SPARCstation 10 DSIMMs Installation* provides step-by-step information on how to install DSIMMs in the SPARCstation 10 system.
- *424-Mbyte Disk Drive Installation Guide* provides information on how to install 424MB drives in the SPARCstation 10 system.
- *1.05-Gbyte Disk Drive Installation Guide* provides information on how to install 1.05GB drives in the SPARCstation 10 system.
- *Desktop Storage Pack Installation Guide* explains how to install and daisy-chain desktop storage packs.
- *Desktop Storage Module Installation Guide* explains how to install and daisy-chain desktop storage modules.
- *External Storage Module Installation Guide* provides step-by-step information on how to install external storage modules that can be connected to a SPARCstation 10 system.

System Overview

This overview of the SPARCstation 10 system hardware is helpful in servicing and maintaining hardware equipment.

The system major components usually consist of the following:

- System unit
- Video monitor (or a terminal)
- Keyboard
- Mouse
- Speaker box
- External storage modules (optional)

FIGURE 1-1 shows how to connect the system major components with an external drive.

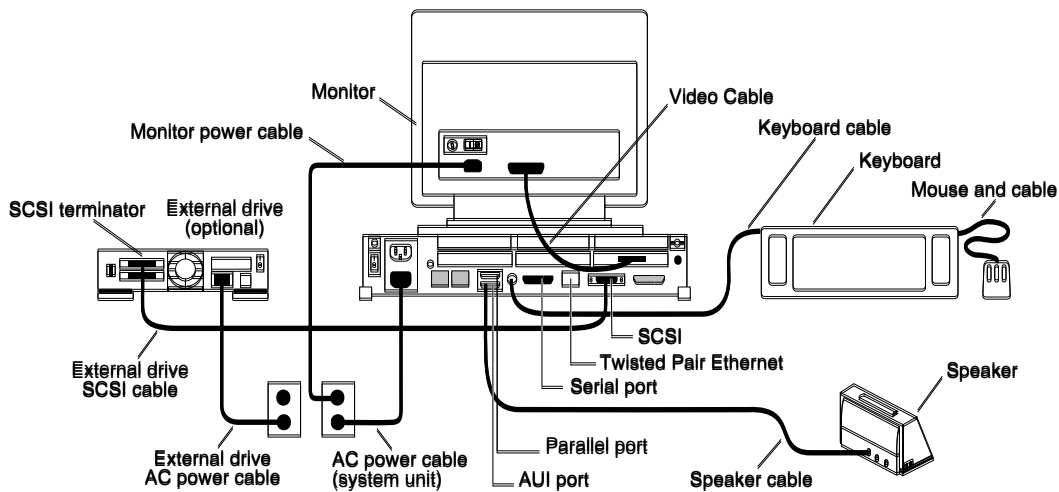


FIGURE 1-1 Connecting the Major Components of the System

1.1 System Unit

The heart of the SPARCstation 10 system is contained in a main chassis or system unit. A SPARCstation 10 system contains:

- Main Logic Board (MLB)
- MBus modules (up to 2 modules)
- DSIMMs (32 to 512 Mbytes)
- SBus cards (up to 4 cards)
- Internal 3 1/2-inch (88.9 mm) hard disk drive units (up to 2 units)
- Internal 3 1/2-inch (88.9 mm) diskette drive unit
- 140W power supply with 3 fans

The following figures and tables illustrate the system unit:

- FIGURE 1-2 shows the front view of a SPARCstation 10 system.
- FIGURE 1-3 shows the rear view of the system.
- FIGURE 1-4 presents the top view of the system with the cover removed, without the cabling.
- FIGURE 1-5 presents the main logic board layout.
- FIGURE 1-6 and FIGURE 1-7 are exploded views of the SPARCstation 10 assembly.
- TABLE 1-1 lists the acronyms used for certain parts, and their full expressions.
- TABLE 1-2 describes video monitors.



FIGURE 1-2 Front View of the System

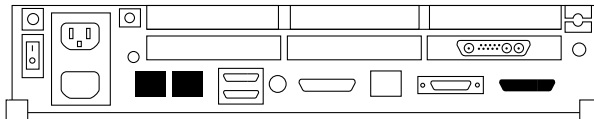


FIGURE 1-3 Rear View of the System

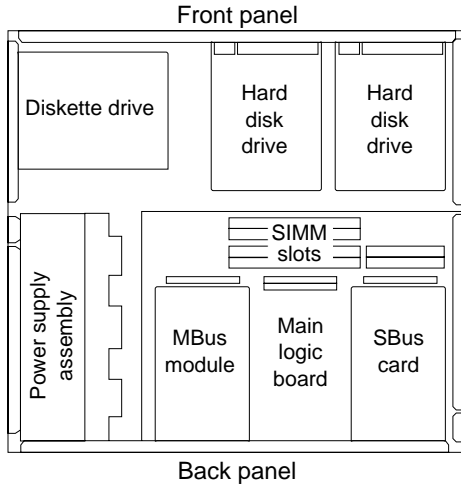


FIGURE 1-4 Top View of the SPARCstation 10 System without Cover

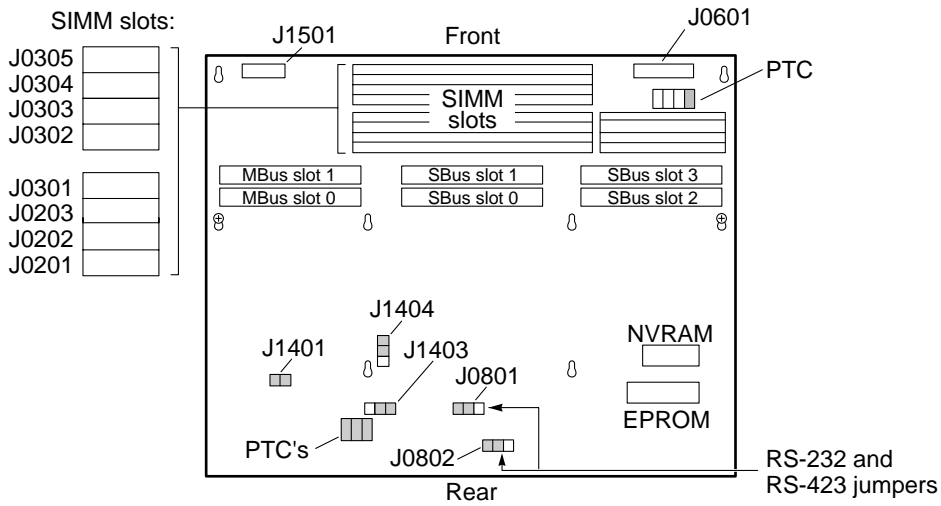


FIGURE 1-5 Main Logic Board

TABLE 1-1 List of Acronyms

Acronyms	Full Expression
NVRAM	Non-volatile Random Access Memory

TABLE 1-1 List of Acronyms

Acronyms	Full Expression
EPROM	Erasable Programmable Read-Only Memory
PTC	Temperature
DSIMM	Single

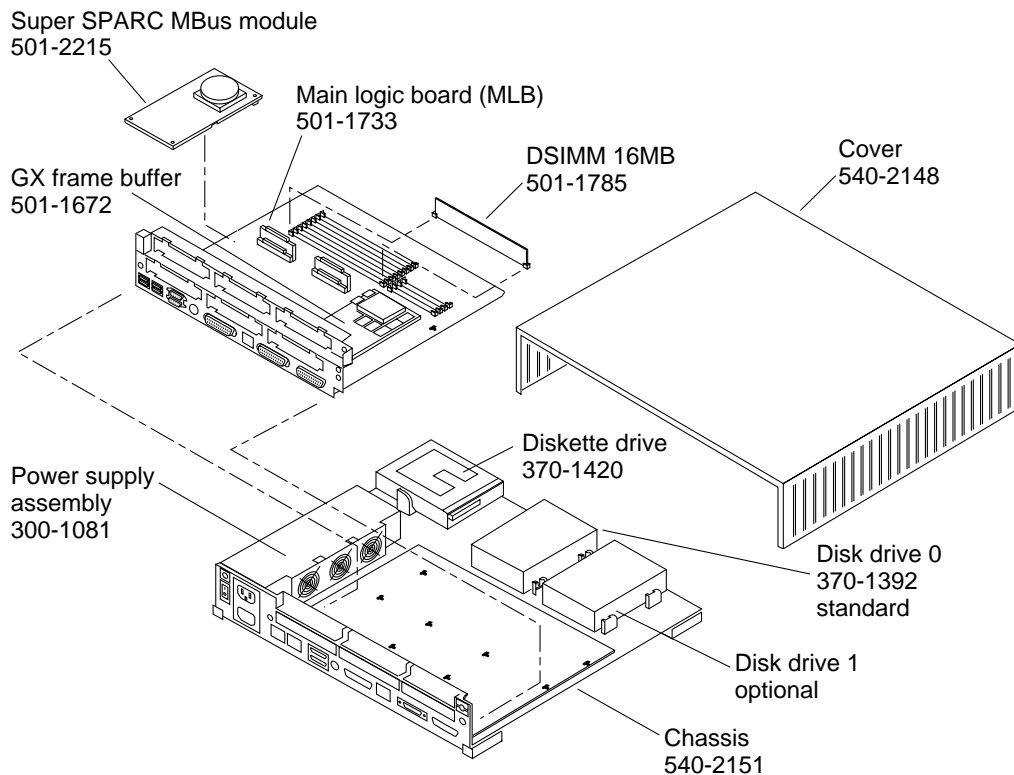


FIGURE 1-6 Exploded View of the SPARCstation 10 System—MLB

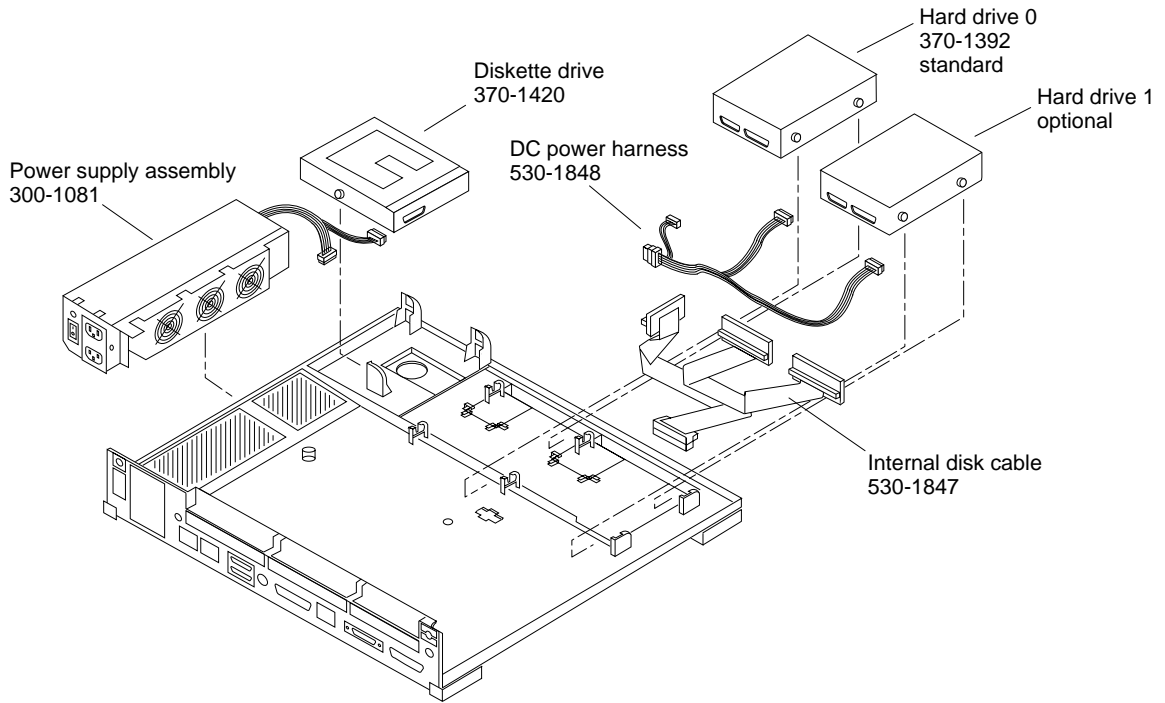


FIGURE 1-7 Exploded View of the SPARCstation 10 System

1.1.1 SBus Cards

You can add various SBus cards to the four SBus slots on the main logic board. FIGURE 1-5 illustrates the SBus slots. See Chapter 10 for information on how to replace SBus cards. Following is a list of some of the Sun SBus cards available for the SPARCstation 10 system.

- GX Graphics Accelerator Card

This card occupies one slot. This card controls the video output from the system unit, and accelerates the generation of graphic images.

- Color Frame Buffer Card

This card occupies one SBus slot. This card controls the video output from the system unit to a color monitor.

- GS Graphics Accelerator Card

This option consists of two cards that are plugged into each other on their component sides. These triple-width SBus cards are installed in the top SBus slot, so you cannot install a second MBus module. This option provides 24-bit color and 3-dimensional graphics capabilities. It also requires a 76 Hz color monitor.

- Video Frame Capture Card

This card occupies one SBus slot. This card takes video input and displays it on color or monochrome monitors.

- SBus Printer Card

This card occupies one SBus slot. This card connects the system to printing, plotting and scanning devices.

- 1-Bit Analog Frame Buffer Card

This card occupies one SBus slot. It controls the video output from the system to a monochrome monitor.

1.2 Monitors, Keyboard, and Mouse

Each system uses a keyboard, an optical mouse, and one of several types of video monitors. TABLE 1-2 lists the monitors supported.

TABLE 1-2 Video Monitor Types

Monitor Type	Voltage
16-inch color monitor (407 mm)	115V
16-inch color monitor (407 mm)	240V
19-inch standard grayscale monitor (483 mm)	90-240V
19-inch high-resolution monochrome monitor (483 mm)	115V
19-inch high-resolution monochrome monitor (483 mm)	240V
17-inch grayscale (432 mm)	90-240V
19-inch color monitor (483 mm)	115V
19-inch color monitor (483 mm)	240V
16-inch color overscan monitor (407 mm)	90-240V
19-inch color overscan monitor (483 mm)	90-240V
17-inch grayscale overscan monitor (432 mm)	90-240V

TABLE 1-2 Video Monitor Types (*Continued*)

Monitor Type	Voltage
19-inch grayscale overscan monitor (483 mm)	90-240V
20-inch grayscale (509 mm)	90-240V
21-inch color monitor (534 mm)	90-240V

1.3 External Storage Modules

You can add expansion modules to increase the system mass storage capacity. The following are some of the external storage modules available:

- Desktop Backup Pack 150 Mbytes tape drive
- Desktop Backup Pack 5.0 Gbytes, 4mm tape drive
- Desktop Disk Pack 207 Mbytes hard disk drive
- Desktop Disk Pack 424 Mbytes hard disk drive
- Desktop Disk Pack 535 Mbytes hard disk drive
- Desktop SunCD Pack compact disc drive
- Desktop SunCD+ compact disc drive
- Desktop Storage Pack 1.05 Gbytes hard disk drive
- Desktop Storage Module 1.3 Gbytes hard disk drive
- Desktop Storage Module 2.3 Gbytes tape drive
- Desktop Storage Module 5.0 Gbytes tape drive
- SCSI Expansion Pedestal w/ 1.3 Gbyte single-ended drives
- SCSI Expansion Pedestal w/ 2.1 Gbyte differential drives

You can daisy-chain these units together.

Diagnostics Overview

This chapter describes the different types of diagnostic firmware and software tools available to you and how they are related. The main categories of diagnostics are:

- Boot PROM diagnostics
- Power-On Self-Test (POST)
- On-Board Diagnostics
- SunDiag System Exerciser
- SunDiagnostic Executive
- Forth Toolkit

FIGURE 2-1 is a flowchart that outlines the roles played by various diagnostics during the default boot mode.

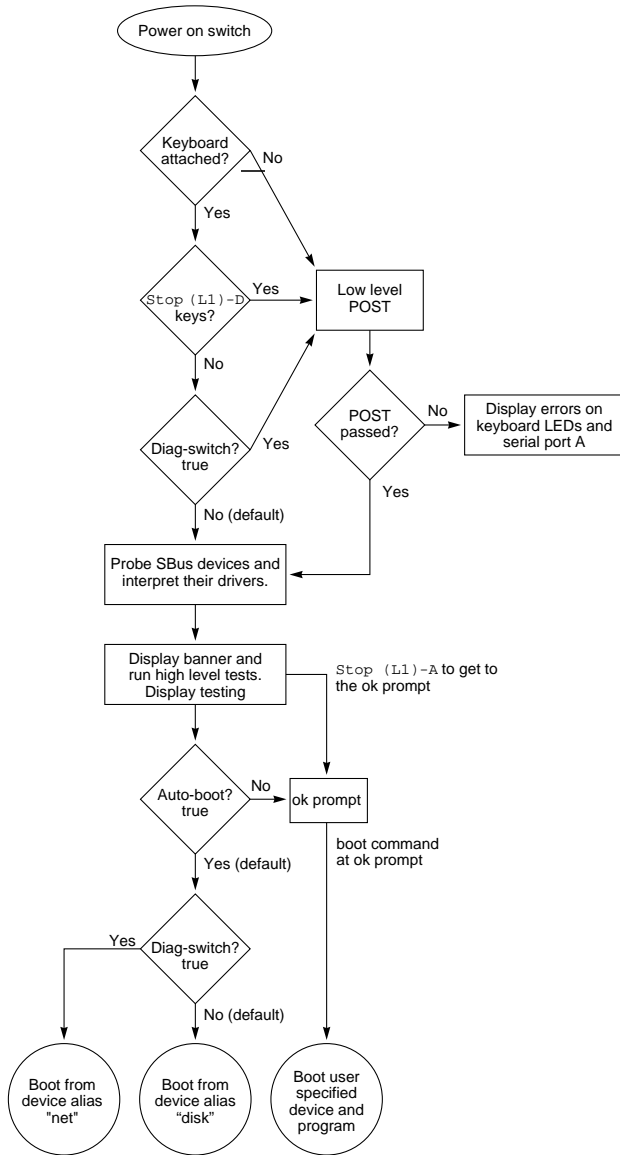


FIGURE 2-1 Default Boot Mode Flowchart

2.1 How It Fits Together

This section describes how the various diagnostic tools work together in the different power-on modes. This description assumes you are using a graphics monitor to view test results. The flowchart in FIGURE 2-1 outlines the roles played by various diagnostics during the default boot mode.

POST runs automatically at power on, if the `stop(L1)-d` keys are pressed and held down after the power-on, or if the `diag-switch?` parameter is set true.

While the low-level POST code executes, the CAPS lock LED on the keyboard flashes to indicate that testing is in progress. If a failure occurs in POST, the failing replaceable unit is encoded on three LEDs located on the Type-5 keyboard. See “Power-On Self Test (POST) later in this chapter for more information.

If POST passes, the system probes for SBus devices and interprets their drivers. Next, high level tests are performed. The word `Testing` displays while the high level tests are running. After `Testing` is displayed, if you want to enter the Forth Toolkit, (indicated by the `ok` prompt), press the `stop(L1)-a` keys simultaneously.

When the autoboot switch parameter is set to false (not the default), the `ok` prompt appears. TABLE 2-1 gives the results of various combinations of the autoboot an diagnostic switch settings. The `ok` prompt is the default prompt. To change to the Monitor prompt (`>`) see the *Open Boot 2.0 Command Reference*.

If the autoboot switch parameter is set to true (default), and the diagnostic switch parameter is set to false (default), SunOS is booted using the device alias “disk.” If the autoboot switch parameter is set to true (default), and the diagnostic switch parameter is set to true (not the default), SunOS is booted using the device alias “net.”

TABLE 2-1 Autoboot and Diagnostic Switch Parameters

Autoboot Switch Parameter	Diagnostic Switch Parameter	Results
False	(Don't care)	<code>ok</code> prompt (Forth Toolkit)
True	False	Boot SunOS (vmunix) from disk
True	True	Boot SunOS (vmunix) from network

To boot user-specified programs, such as the SunDiagnostic Executive, you must be at the `ok` prompt. See “On-Board Diagnostics later in this chapter for a detailed procedure on how to obtain the `ok` prompt.

2.2 When to Use Diagnostics

You should use each type of diagnostic tool in the appropriate circumstances. TABLE 2-2 summarizes the available diagnostic tools and lists when to use each diagnostic tool.

TABLE 2-2 Summary of Available Diagnostic Tools

Diagnostic Tool	When or why to use
Power-On Self Test	Executes at power-on when <code>Stop(L1)-d</code> keys are pressed and held or the <code>diag-switch?</code> parameter is set true. The POST code resides in the boot PROM and is driven by the Pok (Power ok) signal from the power supply. POST tells you if the main logic board (MLB), the DSIMM in slot 0, or the MBus module in slot 0 fails. Described later in this chapter.
On-Board Diagnostics	Tests such as the Ethernet test and the diskette drive controller test are available. You must be at the <code>ok</code> prompt to run on-board diagnostics. The on-board diagnostics reside in the boot PROM. Described later in this chapter.
SunDiag System Exerciser	Runs under SunOS. It displays real-time use of the system resources and peripherals. The SunDiag System Exerciser tells you if your system is functioning correctly or not. If SunDiag fails, run the Power-On Self-Test. If all power-on self-tests pass, then run the SunDiagnostic Executive to identify the problem. See the <i>SunDiag User's Guide</i> for more information.
SunDiagnostic Executive	Runs extensive, configurable subsystem tests independent of SunOS. Run the SunDiagnostic Executive if all tests pass when you run POST. Running the SunDiagnostic Executive allows you to troubleshoot which field replaceable unit needs to be replaced. See the latest version of <i>SunDiagnostic Executive User's Guide for the SPARCstations</i> for more information.
Forth Toolkit	Allows input to the system at the boot PROM level. Supports functions such as changing NVRAM parameters, resetting the system, running diagnostic tests, displaying system information, and redirecting input and output. See the <i>Open Boot 2.0 Command Reference</i> for more information.

2.3 Boot PROM Diagnostics

The diagnostics stored in the boot PROM include the following:

- Power-On Self-Test
- On-Board Diagnostics

If there is system trouble, you may want to run extended on-board diagnostics to take advantage of thorough tests including — but not limited to — Ethernet, memory, and diskette drive tests. TABLE 2-3 shows the keyboard LED diagnostic codes.

The following sections describe the boot PROM diagnostics.

2.3.1 Power-On Self Test (POST)

The Power-On Self-Test (POST) runs when you turn on the system power switch and one of the following conditions apply:

- Press `stop(L1)-d` keys
- The `diag-switch?` NVRAM parameter is set true
- The system keyboard is disconnected

Note – When the keyboard is disconnected, POST is not verbose.

The POST code, which resides in the boot PROM, is executed by the CPU (IU) when the Pok signal is received from the power supply. The POST consists of a sequence of tests designed to test the major hardware components of the MLB in the short time before SunOS is booted. POST does not perform extensive testing on any component of the MLB. Only major failures can be detected by POST.

If a failure occurs in POST, a specific LED pattern is displayed. The LEDs are on the Compose, Scroll Lock, and Num Lock keys. See FIGURE 2-2. The Caps Lock key LED, located just above the left-hand Shift key, is not used as a power-on test failure indicator, but flashes on and off while POST is running. During normal system operation, the LEDs should not be interpreted as diagnostic error indicators.

SunOS is booted automatically following the system successful initialization, unless the NVRAM configuration options specify otherwise.

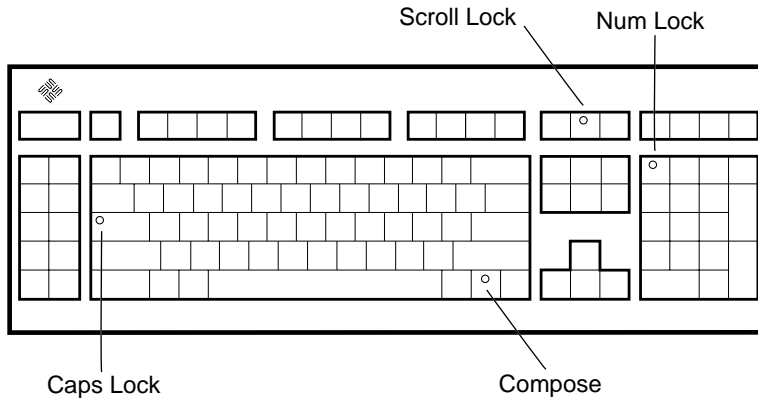


FIGURE 2-2 Arrangement of the Keyboard LEDs

2.3.2 Power-On Self Test Detailed Description

This section describes the keyboard LED states that result from POST and explains the meaning of the various states.

TABLE 2-3 Keyboard LED States

LED State	Description
Caps Lock is flashing	POST is running
Num Lock is ON	MLB fails
Scroll Lock is ON	MBus module in slot 0 fails
Compose is ON	DSIMM in slot J0201 fails

If all POST tests pass, run the SunDiagnostic Executive with the cache disabled. The SunDiagnostic Executive is an independent operating system. It runs exhaustive subsystem tests independent of SunOS. See the latest version of *SunDiagnostic Executive User's Guide for the SPARCstations*.

2.3.3 On-Board Diagnostics

You have access to a number of tests called On-board diagnostics. You must enter the Forth Toolkit to invoke these tests.



Caution – In order to run On-board diagnostics, you must halt the system in an orderly manner. Do not use the `stop(L1)-a` keys to halt the system when the operating system or any other stand-alone program has already booted. Abruptly aborting program execution may cause damage to data files.

To run On-board diagnostics:

1. **Save all your work and quit all applications.**
2. **As `root`, halt the system, depending on your installed operating system:**
 - If your operating system is SunOS 5.x or later, enter

```
/usr/sbin/halt
```

- If your operating system is SunOS 4.x, enter

```
/usr/etc/halt
```

3. **You are presented with the `ok` prompt. The `ok` prompt is the default prompt. If you want to change the default prompt to the `>` prompt, see the *Open Boot 2.0 Command Reference*.**
4. **Enter `help diag` to get a listing of tests comprising on-board diagnostics.**

The following example summarizes the steps you need to take to halt the system, enter the Forth Toolkit, and list the diagnostic tests.

```
hostname# /usr/etc/halt
ok help diag
      Category: Diag (diagnostic routines)
test  device-specifier ( -- ) run selftest method for specified
device
      Examples:
          test /iommu/sbus/ledma@f,400010/le - test net
          test net - test net (device-specifier is an alias)
          test scsi - test scsi (device-specifier is an alias)
          test floppy - test floppy disk drive
watch-clock      (--) - show ticks of real-time clock
watch-net        (--) - monitor broadcast packets using auto-
selected interface
watch-aur        (--) - monitor broadcast packets using AUI
interface
watch-tpe        (--) - monitor broadcast packets using TPE
interface
watch-net-all   (--) - monitor broadcast packets on all net
interfaces
probe-scsi       (--) - show attached SCSI devices
probe-scsi-all  (--) - show attached SCSI devices for all
host adapters
test-all        (--) - execute test for all devices with
selftest method
test-memory      (--) - test all memory if diag-switch? is
true, otherwise test memory
                    specified by selftest-#megs
```

These on-board tests allow you to test the network controller, the diskette drive system, memory, and the system clock.

2.3.3.1 test <alias name> or test <device path>

The `test` command, combined with a device alias or device pathname, executes the selftest program for the specified device. If a device has no selftest program, this message is displayed: `No selftest method for <device name>`. To run the selftest program for a device, type the `test` command followed by the device alias or device pathname. See the following example.

```
ok test floppy
Testing floppy disk system. A formatted disk should be in the
drive.
Test succeeded.
```

The following tests are supported in the SPARCstation 10 system.

TABLE 2-4 Supported Tests

Type of Tests	Description
test screen	Tests the system video graphics hardware and monitor. The <code>diag-switch? NVRAM</code> parameter must be set true for the test to run.
test floppy	Tests the floppy drive ability to respond to commands. Requires a formatted diskette to be inserted into the drive.
test scsi	Tests the SCSI interface logic on the MLB. The <code>diag-switch? NVRAM</code> parameter must be set true for the test to run.
test net-auri	Performs an internal and external loopback test on the AUI (thick) Ethernet interface. A cable must be connected to the system AUI Ethernet port and to an Ethernet Tap or the test will fail the external loopback phase.
test net-tpe	Performs an internal and external loopback test on the TPE interface. A cable must be connected to the system TPE port and to a TPE hub or the test will fail the external loopback phase. If the <code>tpe-link-test? parameter</code> is false (disabled), the external loopback test will appear to pass even if a cable is not connected.
test net	Performs an internal and external loopback test on the auto-selected system Ethernet interface. A cable must be attached to the system and to an Ethernet tap or hub or the external loopback test will fail.
test disk	Tests internal or external SCSI disks which have a self diagnostic program contained in the drive controller. The drive must be spinning before this test is executed or the test will fail. Enter a boot
test disk0	
test disk1	

TABLE 2-4 Supported Tests (Continued)

Type of Tests	Description
test disk2	<disk alias> command to cause the drive to spin up. (disk and disk0 =
test disk3	SCSI target 3, disk1 = SCSI target 1, disk2 = SCSI target 2, disk3 = SCSI target 0.)
test cdrom	Performs a selftest diagnostic on the CDROM drive. The CDROM must be set to SCSI target 6 and have a CD inserted or the test will fail.
test tape	Tests the SCSI tape drive by executing the drive selftest program.
test tape0 test tape1	(tape and tape0 = SCSI target 4, tape 1 = SCSI target 5).
test ttya	Outputs an alphanumeric test pattern on the system serial
test ttyb	ports (ttya = serial port A, ttyb = serial port B). You must attach a terminal to the tested port to observe the output.
test keyboard	Executes the keyboard selftest. The four LEDs on the keyboard should flash on once, and this message is displayed: Keyboard Present.

2.3.3.2 test-all

The `test-all` command tests all devices in the system which have a selftest program. Tests are executed in order using the device tree (viewed with the `show-devs` command) as reference. Disks, tapes, and CDROMs are not tested by `test-all`.

2.3.3.3 watch-clock

The `watch-clock` test reads a register in the NVRAM/TOD (Non-Volatile RAM/Time of Day) chip on the MLB and displays the result as a seconds counter. The counter should count from 0 to 59 repeatedly until you interrupt it by pressing any key on the keyboard. See the example below.

```
ok watch-clock
Watching the 'seconds' register of the real time clock chip.
It should be 'ticking' once a second.
Type any key to stop
41
```


2.3.3.4 watch-net, watch-aui, watch-tpe, and watch-net-all

These tests monitor broadcast Ethernet packets on the Ethernet cable(s) connected to the system. Good packets received by the system are indicated by a period (.) displayed on the screen. Errors are indicated with an x and the error description. See the following example:

```
ok watch-net
  Internal loopback test -- succeeded.
  External loopback test -- Auto-selecting Ethernet cable I/F
Trying AUI
Received packet on AUI
Select cable - AUI
succeeded.
Looking for Ethernet packets.
'.' is a good packet. "X" is a bad packet.
Type any key to stop.
.....
.....
.....Framing error CRC error X.....
```

The SPARCstation 10 system has two types of on-board Ethernet interfaces, 10BaseT (also called twisted-pair Ethernet or TPE) and 10Base5 (also called thick Ethernet or AUI). Only one on-board interface may be connected at a time. The system can automatically select which interface is connected and active.

The AUI port is first tested by transmitting packets and checking for No Carrier or response packets. If the AUI test fails, the TPE port is then tested.

Typing **watch-net** causes this automatic selection to take place. You may see these messages:

```
ok watch-net
  Internal loopback test -- succeeded.
  External loopback test -- Auto-selecting Ethernet cable I/F
Trying AUI
AUI Carrier Loss
Trying TPE
Received packet on TPE
Select cable - TPE
succeeded
```

You may also control the selection of Ethernet interfaces to monitor by using specific commands. Use `watch-tpe` to monitor the 10BaseT (TPE) connection or `watch-aui` to monitor the 10Base5 (thick Ethernet) connection. For example:

```
ok watch-tpe
  Internal loopback test -- succeeded.
  External loopback test -- succeeded.
Looking for Ethernet packets.
'.' is a good packet. 'X' is a bad packet.
Type any key to stop.
.....
```

The `watch-net-all` command monitors Ethernet packets on any Ethernet interface installed in the system. For example, if you have an SBus Ethernet card installed in one of the system SBus slots, `watch-net-all` will start by monitoring Ethernet transmissions detected by that card.

When you interrupt the test on that interface by pressing any key, `watch-net-all` then goes on to test the next Ethernet interface it finds in the system.

For example:

```
ok watch-net-all
/iommu@f,e0000000/sbus@f,e0001000/lebuffer@1,40000/le@1,60000
  Internal loopback test -- succeeded.
  External loopback test -- succeeded.
Looking for Ethernet packets.
'.' is a good packet. 'X' is a bad packet.
Type any key to stop.
.....
.....(keyboard key pressed here)

/iommu@f,e0000000/sbus@f,e0001000/ledma@f,400010/le@f,c00000
  Internal loopback test -- succeeded.
  External loopback test -- succeeded.
Looking for Ethernet packets.
'.' is a good packet. 'X' is a bad packet.
Type any key to stop.
.....
.....
```

2.3.3.5 probe-scsi, probe-scsi-all

The `probe-scsi` test sends an inquiry command to internal and external SCSI devices connected to the SPARCstation 10 on-board SCSI interface. If a SCSI device is connected and powered up, the target address, unit number, device type, and manufacturer name should be displayed. For example:

```
ok probe-scsi
Target 3
  Unit 0 Disk SEAGATE ST1480 SUN04245828 Copyright (c) 1991 Seagate All rights
reserved.
```

The `probe-scsi-all` test sends an inquiry command to all SCSI devices on all the SCSI host adapters installed in the system. The first identifier listed in the display is the SCSI host adapter address in the system device tree, followed by the SCSI device identification data. For example:

```
ok probe-scsi-all
/iommu@f,e0000000/sbus@f,e0001000/dma@1,81000/esp@1,80000
Target 2
  Unit 0 Disk SEAGATE ST41600N SUN1.3G00286965 Copyright (c)1991 Seagate All
rights reserved.

/iommu@f,e0000000/sbus@f,e0001000/espdma@f,400000/esp@f,800000
Target 3
  Unit 0 Disk SEAGATE ST1480 SUN04245828 Copyright (c)1991 Seagate All rights
reserved.
```

2.3.3.6 test-memory

All of the system main memory will be tested if the `diag-switch?` parameter is true. If the `diag-switch?` parameter is false, this test uses the `selftest-#megs` parameter in NVRAM to determine how much memory to test. The default for the `selftest-#megs` parameter is 1, so only 1 megabyte of memory is tested.

To change the amount of memory tested using the `selftest-#megs` parameter, type this command:

```
ok setenv selftest-#megs 16
```

This sets the desired memory test size to 16 megabytes. Any whole number may be used as long as it does not exceed the actual size of memory (in megabytes) installed in the system. When the `test-memory` diagnostic is running, the number of megabytes being tested is displayed and counted down to zero during the test.

2.4 SunDiag System Exerciser

Use the SunDiag System Exerciser, which runs under SunOS, to determine real-time use of system resources and peripheral equipment such as Desktop Storage Packs and External Storage Modules. The SunDiag System Exerciser verifies that the system is functioning properly.

The exerciser is shipped with SunOS and is preinstalled on a SPARCstation 10 system. If selected during the SunInstall (operating system loading) procedure, the exerciser can be run at any time. The SunDiag System Exerciser is in the directory `/usr/diag/sundiag` (for SunOS 4.1.3) or in the directory `/opt/SUNWdiag/bin` (for SunOS 5.1 and later versions). If the SunDiag System Exerciser is not found on the system hard disk or server, you can load it from CD.

For information on how to use the SunDiag System Exerciser, see the *SunDiag User's Guide*. Appendix A, "Loopback Connectors," in the *SunDiag User's Guide* explains how to connect the external loopback connectors required for some options.

If SunDiag passes, the system is operating properly. If SunDiag fails, the error messages should indicate the part of the system which has failed. If the error messages are not descriptive enough, you may need to run POST or the Sun Diagnostic Executive.

2.5 SunDiagnostic Executive

The SunDiagnostic Executive is an independent operating system. It runs exhaustive subsystem tests independent of SunOS. Run the SunDiagnostic Executive if all POST tests pass, in order to determine which field-replaceable unit (FRU) needs to be replaced. For information on POST, see "Power-On Self Test Detailed Description" earlier in this chapter. The SunDiagnostic Executive, which provides you with thorough diagnostics, is described in the *SunDiagnostic Executive User's Guide for the SPARCstations*.

2.6 Forth Toolkit

The Forth Toolkit is a basic diagnostic utility and system interface. If there is any problem with your operating system, the Forth Toolkit automatically starts, and is indicated by the `ok` prompt. You can also choose to enter the Forth Toolkit by halting the system.

To enter the Forth Toolkit:

- 1. Save all your work and quit all applications.**

The following screen summarizes the steps you need to take to halt the system and enter the Forth Toolkit.

```
hostname# /usr/sbin/halt ##(for SunOS 5.x or later versions)
syncing file systems .... done
Halted

ok
```

- 2. As root, enter `/usr/sbin/halt` (for SunOS 5.x or later versions). For SunOS 4.1.3, enter `/usr/etc/halt`**

The system syncs and halts the file systems, and then displays the `ok` prompt.

- 3. The system automatically enters the Forth Toolkit.**

The `ok` prompt shows that you are in the Forth Toolkit.

For extensive information on tests you can run from the Forth Toolkit see *Open Boot 2.0 Command Reference*.

Troubleshooting

This chapter describes how to diagnose a problem with a SPARCstation 10 system. Keep in mind that this chapter does not cover all the symptoms you might experience, nor does it cover all steps which can be done to repair the SPARCstation 10 system. Thorough hardware and software product knowledge is required to troubleshoot and repair a SPARCstation 10 system.

3.1 Power On Does Not Succeed

3.1.1 Symptom

No video output on the system monitor

3.1.2 Actions

1. **Make sure that the power cord is connected to the monitor and to the wall outlet.**
2. **Use a Volt-Ohm Meter (VOM) to verify that the wall outlet is supplying AC power to the monitor.**
3. **Make sure that the video cable connection between the monitor and the system video output port is secure.**
4. **Use a VOM to do continuity test on the video cable.**

If the power cord and video cable connection are good and there is still no video output, the system frame buffer (SBus card) or the monitor is the most likely problem.

3.1.3 Symptom

Power on does not succeed

3.1.4 Actions

1. **Turn the system power switch off.**
2. **Make sure that the system power cord is properly connected to the system rear panel power receptacle and to the wall outlet.**
3. **Verify that the wall outlet is supplying AC power to the system.**
4. **Turn the system power switch on and observe the keyboard.**

The four lights (LED) should briefly illuminate and you should hear a tone from the keyboard.

If you hear no tone or see no lights on the keyboard, the system's power supply may be defective. Refer to the procedure "Power Supply Test later in this chapter.

If you hear a tone and see lights on the keyboard, but the system still fails to initialize, refer to the procedure "MLB Test later in this chapter.

3.2 Power Supply Test

Before you start make sure that the power supply is turned on. You need to remove the system unit cover to be able to test the power supply. Refer to "Removing the System Unit Cover in Chapter 4.

Use a VOM to check the power supply output voltages. The power supply connector (J1501) must remain connected to the MLB. Place the VOM negative probe on one of the logic ground pins in the connector, and test the +12V, -12V, and +5.1V power pins individually with the positive probe. TABLE 3-1 lists the pin assignments on the power supply connector.

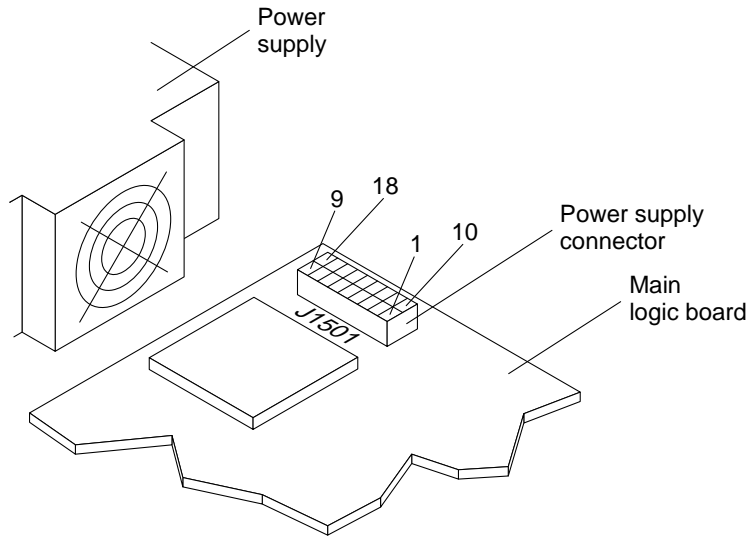


FIGURE 3-1 Power Supply Connector

TABLE 3-1 Power Supply Connector Pin Assignments

Pin #	Assignment	Pin	Assignment
1	+12V	10	Logic Ground
2	-12V	11	Logic Ground
3	+5.1V	12	Logic Ground
4	+5.1V	13	Logic Ground
5	+5.1V	14	Logic Ground
6	+5.1V	15	Logic Ground
7	+5.1V	16	Logic Ground
8	Power On	17	Power OK (reset)
9	Power Off	18	No Connection

Replace the power supply assembly if any of the voltages are not present. Refer to Chapter 11 for instructions to replace the power supply assembly.

3.3 MLB Test

Observe the lights on the keyboard to determine whether the MLB is defective. Press and hold the `STOP(L1)-d` keys. While holding the keys down, turn the system power switch on, and watch the lights on the keyboard. The Caps Lock key on the keyboard should flash on and off, indicating that the system is running the power on self test (POST).

If a failure occurs during POST, one of the keyboard LEDs may be on, indicating a failed system part. TABLE 3-2 lists and defines the keyboard LED states.

TABLE 3-2 Keyboard LED States

LED State	Description
Caps Lock is flashing	POST is running
Num Lock is ON	MLB fails
Scroll Lock is ON	MBus module in slot 0 fails
Compose is ON	DSIMM in slot J0201 fails

If a failure code appears, replace the defective part indicated by the LEDs. The POST failed if the Caps Lock key fails to flash on and off after you have pressed and held the `STOP(L1)-d` keys. The most probable cause of this type of failure is the MBus module. Other optional parts in the system could cause POST to fail this way.

Remove any optional SBus cards and memory and run the test again before replacing the MLB or MBus module. The system requires only that the MBus module 0, DSIMM J0201, the MLB, the power supply assembly, and the keyboard are installed.

Remove the other parts and test the system again to eliminate the possibility that optional parts are causing a failure. To receive additional POST failure information, connect a terminal to serial port A on the SPARCstation 10 system.

3.4 Disk Drive Errors

3.4.1 Symptom

Disk drive read, write, or parity errors are reported by the operating system or customer applications.

3.4.2 Action

Replace the disk drive indicated by the failure messages. The operating system identifies the internal disk drive 0 (SCSI target address 3) as `sd0` or `c0t3d0` and internal disk drive 1 (SCSI target address 1) as `sd1` or `c0t1d0`.

3.4.3 Symptom

A disk drive fails to boot or is not responding to commands.

3.4.4 Action

This symptom could be caused by a defective system SCSI controller, so you should first test the drive response to the `probe-scsi` command.

At the system `ok` prompt, type `probe-scsi` <Return>. If the disk drive responds correctly to this command, a message appears, similar to the following:

```
ok probe-scsi
Target 1
  Unit 0  Disk SEAGATE ST1480  SUN0424  Copyright  (c) 1991

Target 3
  Unit 0  Disk SEAGATE ST1480  SUN0424  Copyright  (c) 1991
```

If the disk drive responds and a message is displayed, the system SCSI controller has successfully probed the devices. This is an indication that the MLB is working correctly. If one disk does not respond to the probe but the other does, replace the unresponsive drive.

If your system has only one internal disk drive and the `probe-scsi` test fails to show the device in the message, replace the disk drive. If the problem is still evident after replacing the drive, replace the MLB. If replacing the disk drive and the MLB does not correct the problem, replace the internal disk drive cable assembly.

3.5 Determining a Failed DSIMM

The operating system, diagnostic program, or POST should display a DSIMM location ("J" number) as part of the memory error message. TABLE 3-3 lists the DSIMM locations and the corresponding physical addresses. If the only available information is a physical memory address, refer to TABLE 3-3 to locate the failed DSIMM.

TABLE 3-3 DSIMM Slot Locations and Physical Addresses

DSIMM Slot Location	Physical Memory Address Start	Physical Memory Address End
J0201 (bank 0)	0000 0000	03ff ffff
J0203 (bank 1)	0400 0000	07ff ffff
J0302 (bank 2)	0800 0000	0bff ffff
J0304 (bank 3)	0c00 0000	0fff ffff
J0202 (bank 4)	1000 0000	13ff ffff
J0301 (bank 5)	1400 0000	17ff ffff
J0303 (bank 6)	1800 0000	1bff ffff
J0305 (bank 7)	1c00 0000	1fff ffff

Note – The physical order of the DSIMM slots on the MLB is not the same as the order of the banks listed in the table. The physical order of the slots is based on an alternating bank pattern: bank 0, bank 4, bank 1, bank 5, bank 2, bank 6, bank 3 and bank 7.

Each bank allows enough address space to accommodate a 64-Mbyte DSIMM. If a 16-Mbyte DSIMM is installed in a bank, the unused addresses are “mapped out” by the memory management hardware. The physical memory starting address of any capacity DSIMM installed will always be as listed in TABLE 3-3.

Preparing the System

This chapter explains steps to perform before removing a replaceable part. Topics covered in this chapter include the following:

- How to halt the system
- Tools needed
- How to disconnect the external SCSI peripherals
- How to remove the system unit's cover
- How to attach a wrist strap

4.1 Halting the System

Before you remove a replaceable part, you must halt the system according to the following procedure.



Caution – When the operating system or any other stand-alone program has already booted, do not use the `stop(L1)-a` keys to halt the system. Using the `stop(L1)-a` keys to abort program execution can cause damage to data files.

1. **Save any files you are presently editing.**
2. **Quit from any applications that will lose information when the system halts.**
See the *Sun System User's Guide* for more information about ending a work session.
3. **Enter `/bin/su` to become superuser.**
Additional information about the superuser command is described in Chapter 2 of the *Sun System & Network Manager's Guide*.
4. **Enter the superuser password.**

5. Enter `/usr/sbin/halt` (for SunOS 5.x or later versions); enter `/usr/etc/halt` (for SunOS 4.1.3).

The system displays system halt messages followed by the prompt `ok`.

```
tutorial% /bin/su
Password:
tutorial# /usr/sbin/halt## (for SunOS 5.x or later versions)
Syncing file systems... done
Halted

ok
```

6. Turn off the power in this order:

- External drive unit(s) (if you have any)
- SPARCstation 10 system unit
- Monitor



Caution – Make sure your system is shut off. The green LED at the front of the system unit should not be lit. Do not disconnect the power cord from the system unit power outlet or the wall socket. This connection provides the ground path necessary to safely remove and install the printed circuit boards and components.

4.2 Halting a System that is Hung

Should your system be hung or unresponsive to commands, perform the following steps:

1. Press `Stop(L1)-a`.

The system displays the `ok` prompt. If the monitor prompt (`>`) is displayed, go to step 2; otherwise, go to step 3.

On some keyboards, L1 appears on the front face of the Stop key. On a system that has a terminal as a console, rather than a Sun keyboard and bitmapped monitor, you must press Break instead of Stop-a to obtain a boot prompt.

2. Enter `n`.
3. Enter `sync`.

The system displays panic and boot messages. The `sync` command helps prevent the system from losing data that was not preserved when the system hung.

4. Wait until the system boots and displays a system login prompt.

5. Turn off the power in this order:

- External drive unit(s) (if you have any)
- SPARCstation 10 system unit
- Monitor

```
(Press Stop(L1)-a)
```

```
Type help for more information
```

```
ok sync
```

```
(System panic and boot messages.)
```

```
tutorial login:
```

For additional information on the halt procedure see Chapter 1 of the *Sun System & Network Manager's Guide* and also the *System & Network Administration* manual.



Caution – Make sure power to your system is shut off. The green LED at the front of the system unit should not be lit. Do not disconnect the power cord from the system unit power outlet or the wall socket. This connection provides the ground path necessary to remove and install the printed circuit boards and components.

4.3 Tools Needed

To remove and install a replaceable part, you need the following tools and materials:

- Phillips screwdriver (size #1)
- Phillips screwdriver (size #2)
- Wrist strap
- Antistatic surface
- Card extractor
- Chip extractor
- Needle nose pliers
- Volt-Ohmmeter (VOM) for checking voltages and continuity

4.4 Antistatic Surface

Place static-sensitive parts such as boards, cards, modules, and SIMMs on an antistatic surface. The replacement procedures notify you when to place a part on an antistatic surface. The following items can be used as an antistatic surface:

- Bag that is used to wrap a Sun replacement part.
- Shipping container that is used to package a Sun replacement part.
- Inner surface of the system unit cover.
- Sun ESD mat with Sun logo. Available for purchase through your Sun sales representative.
- Disposable ESD mat. Available for purchase through your Sun sales representative.

4.5 Disconnecting External SCSI Peripherals

If your system unit has external SCSI peripherals connected to it, disconnect the SCSI connector from the back of the system unit.

1. **Press the finger clips on the SCSI connector.**
2. **Pull the connector to disconnect.**

This action disconnects the SCSI cable from the system unit.

4.6 Removing the System Unit Cover

You need a Phillips screwdriver size #2 to remove the cover from the system unit.



Caution – Hot surfaces are present. Use care when opening the system chassis or handling components.

1. **Make sure that the power to your system unit is turned off, but that the power cord remains plugged into the system unit and to the power source.**

See “Halting the System earlier in this chapter.

2. Use a Phillips screwdriver to fully loosen the captive screw holding the cover to the back panel.

The screw remains attached to the back panel after it is fully loosened from the cover. See FIGURE 4-1.

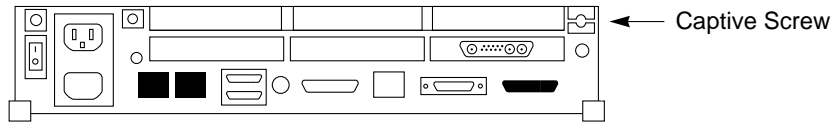


FIGURE 4-1 Rear Panel Captive Screw Location

3. Press the plastic retainer clip with a Phillips screwdriver as you loosen the cover from the back panel with your other hand.

See FIGURE 4-2.

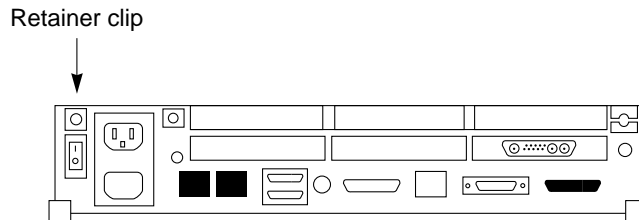


FIGURE 4-2 Plastic Retainer Clip Location

4. Face the back panel. Grasp the sides of the cover from the rear. Lift the cover. Push the cover forward until its hinge tabs are free of the system unit.

See FIGURE 4-2.

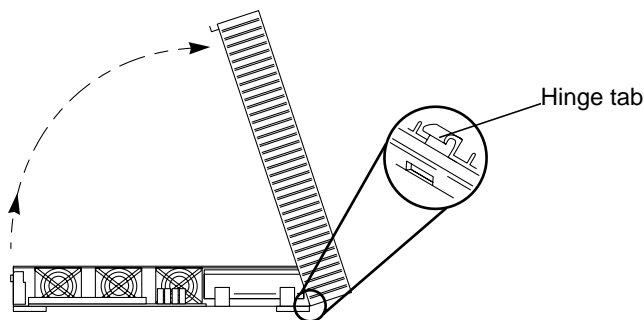


FIGURE 4-3 Removing the System Unit Cover, Side View



Caution – Before powering on your system again, you must replace the cover following the procedure later in this chapter. It is not safe to operate the SPARCstation 10 system without the top cover in place.

4.7 Attaching the Wrist Strap

The wrist strap provides grounding for static electricity between your body and the system unit chassis. Electrical current and voltage do not pass through the wrist strap. Attach one end of the wrist strap to your wrist and the other end to the metal case of the power supply. A wrist strap is shipped with parts that require grounding.



Caution – Boards and modules can be damaged by harmful electrical charges if you do not wear a wrist strap.

1. **Unwrap the first two folds of the wrist strap. Wrap the adhesive side firmly against your wrist.**

See FIGURE 4-4.

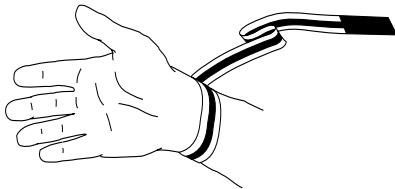


FIGURE 4-4 Wrapping the Wrist Strap Around Your Wrist

2. **Peel the liner from the copper foil at the opposite end of the wrist strap.**
3. **Affix the adhesive copper end of the wrist strap to the top of the metal casing of the power supply.**

See FIGURE 4-5.

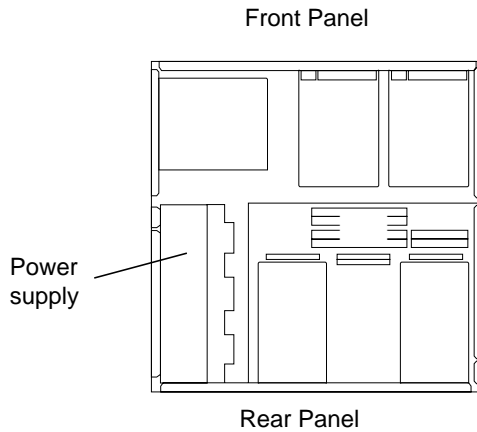


FIGURE 4-5 Power Supply Location

4.8 Replacing the Cover

1. First, remove the wrist strap from your wrist; and then remove it from the power supply.
2. Gently guide the cover hinge tabs into the tab slots on the front of the system unit. Carefully lower the cover onto the system unit.

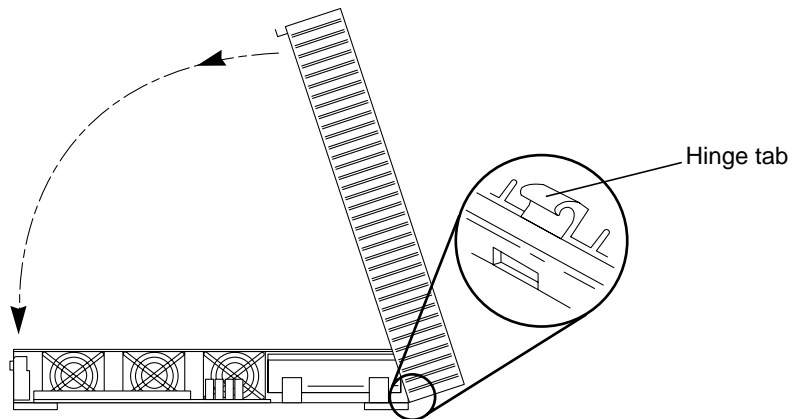


FIGURE 4-6 Lowering the Cover

3. Gently press down on the left and right sides of the cover. Guide the cover so that the retainer clip snaps the cover to the back panel.

See FIGURE 4-7.

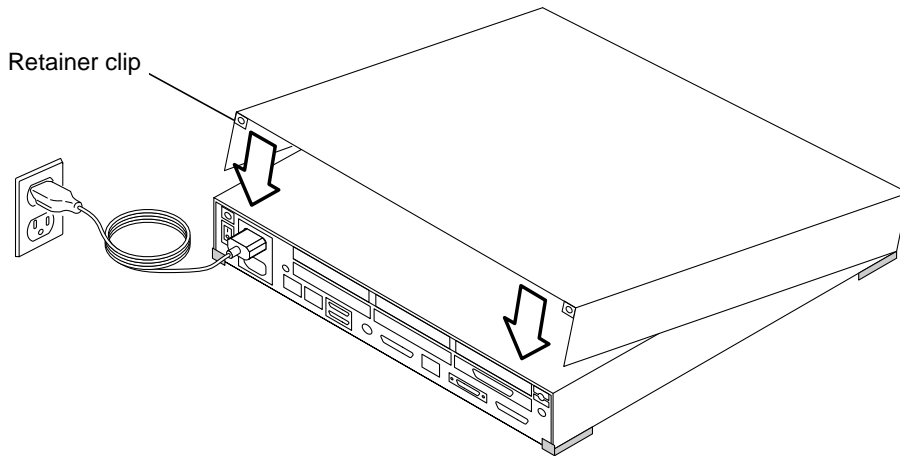


FIGURE 4-7 Closing the Cover

4. Tighten the captive screw at the top right side of the rear panel to the cover using a Phillips screwdriver. Do not over tighten the screw.

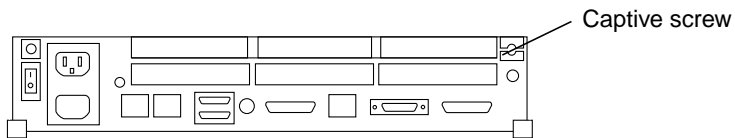


FIGURE 4-8 Tightening the Captive Screw

Main Logic Board

This chapter explains how to remove and install a SPARCstation 10 system main logic board (MLB) and its main components.

5.1 Tools Needed

You will need the following tools and materials to remove and install the MLB, its major cards, and components.

- Phillips screwdriver (size #1)
- Phillips screwdriver (size #2)
- Card extractor
- Needle nose pliers
- Wrist strap
- Antistatic surface

5.2 Preparing Your System

1. Shut down and power off your system.
2. Remove all cables except the power cord from the back of the system. Make sure that the power cord is still connected from the system unit to the wall socket.
3. Remove the system unit cover. See “Removing the System Unit Cover” on page 36.
4. Attach the wrist strap. See “Attaching the Wrist Strap” on page 38.



Caution – Printed circuit boards are made of delicate electronic components that are extremely sensitive to static electricity. Ordinary amounts of static from your clothes or work environment can destroy the boards.

Wear a grounding wrist strap when handling the boards. Attach the wrist strap to the metal casing of the power supply.

Handle boards only by the edges. Do not touch the components or any metal parts.

Do not disconnect the power cord from the system unit power outlet or from the wall socket. This connection provides the ground path necessary to safely remove and install the printed circuit boards and components.

5.3 Removing an SBus Card

1. Note the SBus card slot.

Start with cards mounted on the top slots first. FIGURE 5-1 shows the SBus slot locations on the main logic board (MLB).

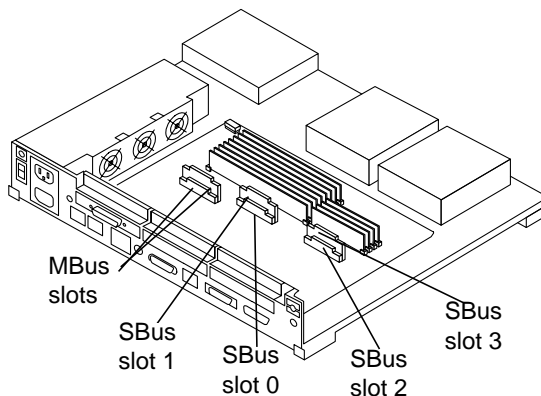


FIGURE 5-1 SBus Slot Locations on the Main Logic Board

2. Remove the screws and washers from the outer rear panel that secure the SBus card(s).

FIGURE 5-2 shows fastening hardware for a single-width SBus card.

Note – Single-width SBus cards have two sets of screws and washers. Double-width SBus cards have four sets of screws and washers. Triple-width SBus cards have six sets of screws and washers. Save the screws and washers for future use.

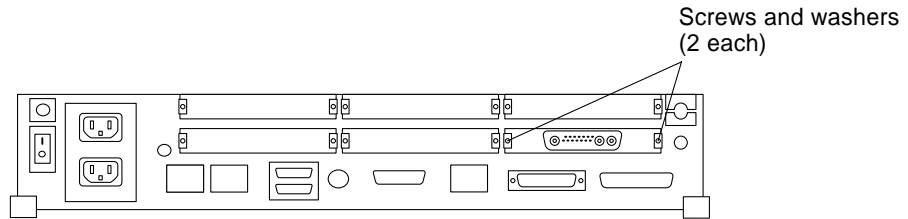


FIGURE 5-2 Rear Panel—Screws and Washers

3. Push back all card retainers holding an SBus card.

See FIGURE 5-3.

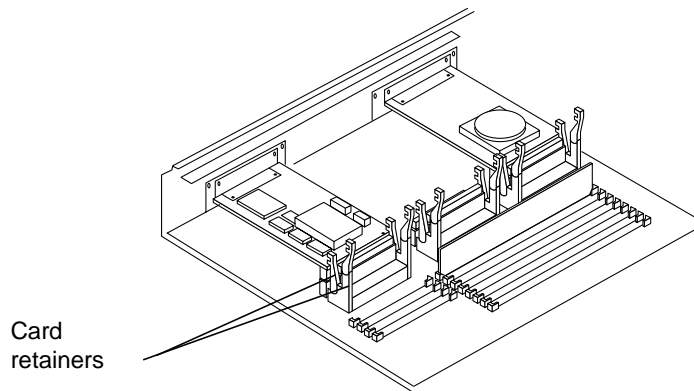


FIGURE 5-3 Card Retainers

4. Install the card extractor on the SBus card.

See FIGURE 5-4. If you are removing a double-width SBus card, install two card extractors on the card instead of one. You do not need card extractors to remove a triple-width SBus card. Place your index fingers or thumbs on the corners of the SBus card near the connectors and pull up on the card. Go to Step 1

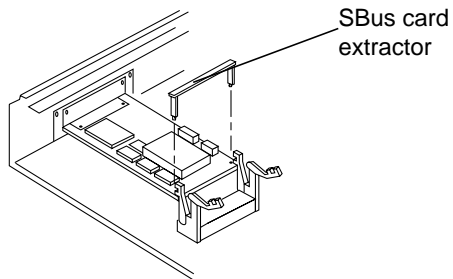


FIGURE 5-4 SBus Card Extractor

5. Hold both ends of the card extractor and pull upwards slowly until the connector is out of the slot. If your system was not shipped with an SBus card extractor, place your index fingers or thumbs on the corners of the SBus card near the SBus connector. Pull up on the card.

FIGURE 5-5 shows a single-width SBus card and FIGURE 5-6 shows a double-width SBus card.

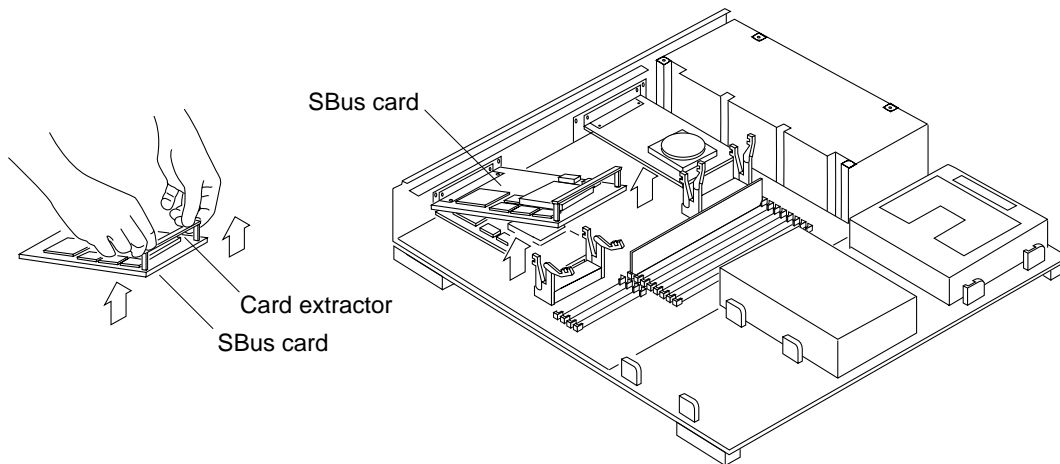


FIGURE 5-5 Removing a Single-width SBus Card

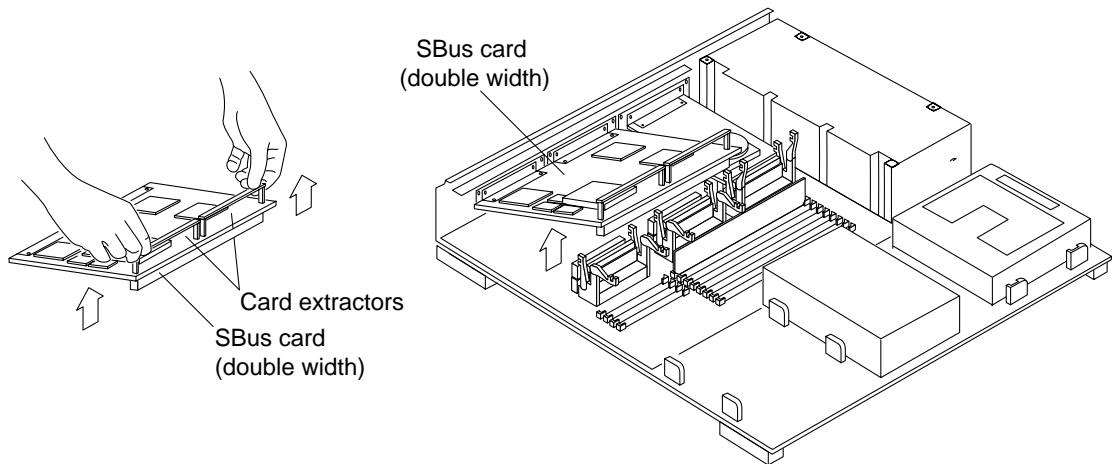


FIGURE 5-6 Removing a Double-width SBus Card

- 6. Remove the card extractor(s) from the SBus card.**
 - a. Bend one leg of the extractor slightly to the outside until the hook clears the hole in the SBus card.**
 - b. Remove the other side of the extractor which should come out easily without bending it.**

Save the card extractor(s) for future use.
- 7. Place the SBus card on an antistatic surface (an antistatic mat or the antistatic bag SBus card was shipped in).**
- 8. Remove the cards from the bottom slots.**

Repeat Step 1 through Step 1 in this section to remove any cards from the bottom slot(s).

5.4 Removing an MBus Module

The Main Logic Board supports one or two MBus modules.



Caution – Hot surfaces are present. Use care when opening the system chassis or handling components.

1. Push back the module retainers for the MBus module.

If the system has two MBus modules (slot 1 on top of slot 0), remove the top module first. See FIGURE 5-7.

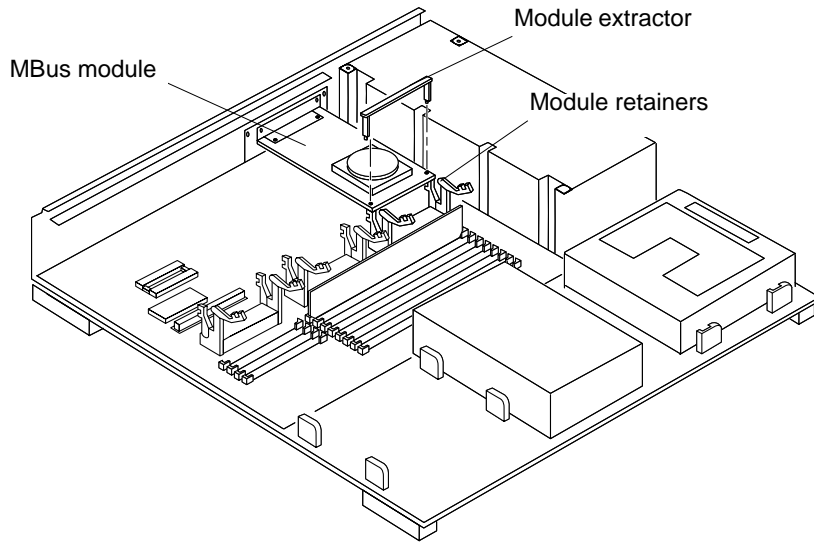


FIGURE 5-7 MBus Module—Retainers and Extractor

2. Install the card extractor on the MBus module.

3. Hold edges of the card extractor and pull upwards slowly until the MBus module is out of the slot.

Note – If your system was not shipped with a card extractor, place your thumb and one finger on the corners of the MBus module near the module connector. Pull up on both corners of the module until the connector is out of the slot.

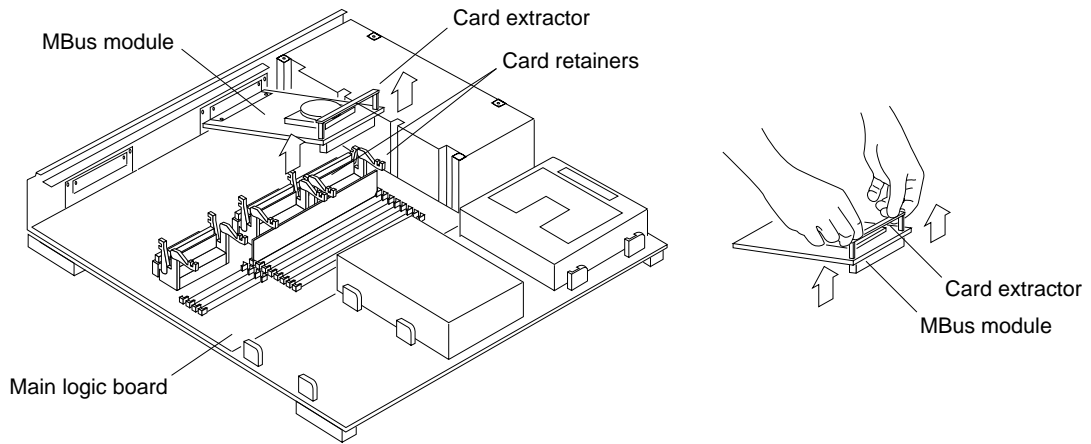


FIGURE 5-8 Removing an MBus Module

- 4. Remove the card extractor from the MBus module.**
Save the card extractor for future use.
- 5. Place the MBus module on the antistatic surface.**
- 6. If your system has another MBus module, remove the module from slot 0.**
Repeat steps 1 through 6.

5.5 Disconnecting the Internal Cables

- 1. Disconnect the internal drive connector (J0101) from the MLB (J0601).**
See FIGURE 5-9.
- 2. Disconnect the DC power connector from the MLB (J1501).**
See FIGURE 5-9.

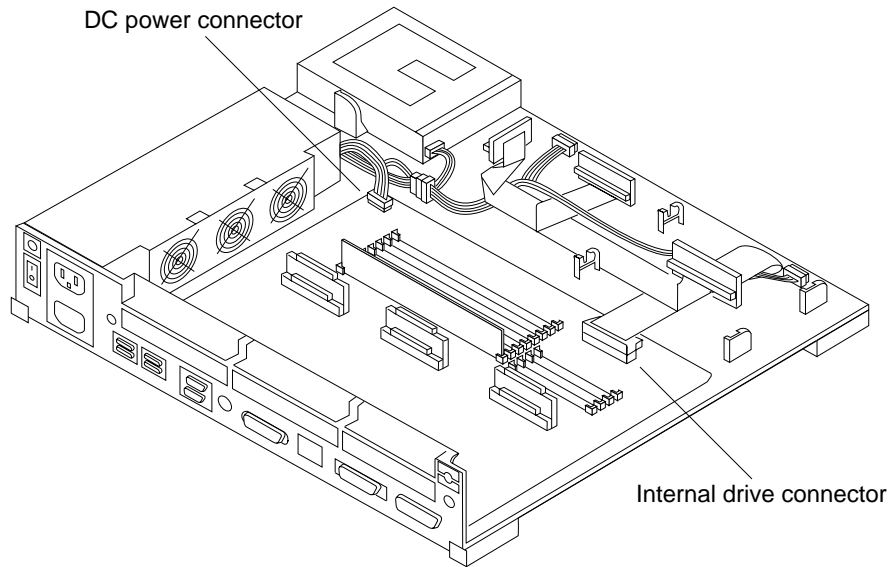


FIGURE 5-9 DC Power Harness and Internal Disk Cable Layout

5.6 Removing the MLB

All SBus cards and MBus modules should be removed at this point. The internal disk connector (J0101) and DC power connector (P1) should be disconnected.

1. Remove the MLB.

- a. **Remove the lock block. Loosen the screw located at the center of the lock block. Save the lock block and screw for use later.**

See FIGURE 5-10.

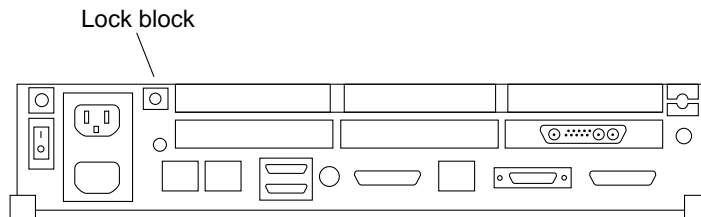


FIGURE 5-10 Lock Block Location

- b. Loosen the two captive retainer screws securing the MLB to the rear of the chassis.

FIGURE 5-11.

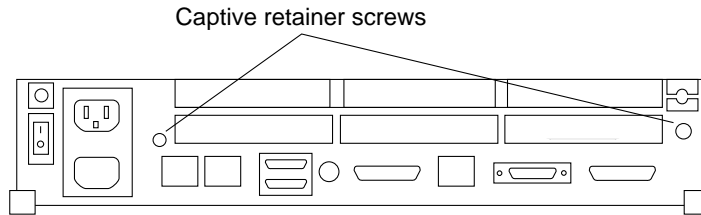


FIGURE 5-11 MLB Retainer Screws at the Rear of the Chassis

- c. Slide the board toward the front of the chassis.

See FIGURE 5-12.

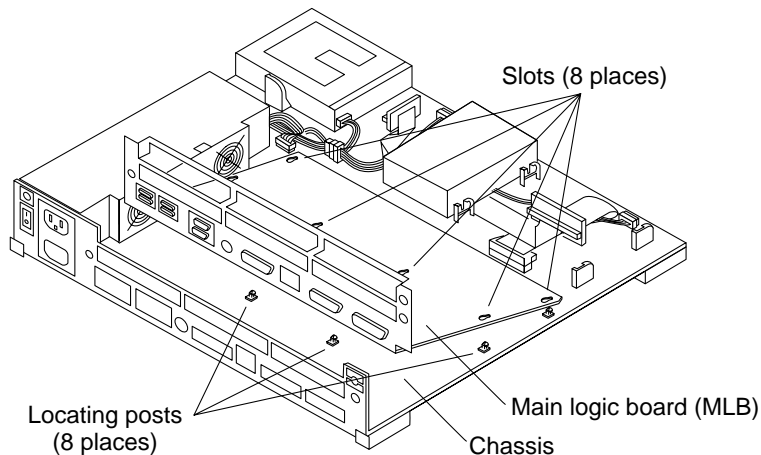


FIGURE 5-12 Removing the MLB

- d. Tilt the rear side of the board and lift it up and over the rear of the chassis.
2. Place the board on an antistatic surface.

5.7 Preparing the MLB

Unpack the replacement MLB. Follow the instructions shipped with the board.

5.8 Removing Filler Panels

1. Remove each filler panel from the replacement MLB so the rear panels of the defective and the new MLB look the same.
 - a. Remove the screws and washers from each filler panel to be removed.

Save the screws and washers for future use. See FIGURE 5-13.

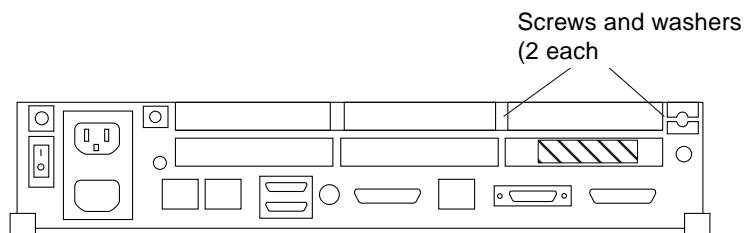


FIGURE 5-13 Filler Panel Fastening Hardware

- b. The filler panel may have two plastic tabs holding it into the rear panel. Push down the two plastic tabs on the filler panel.

Use both hands. See FIGURE 5-14.

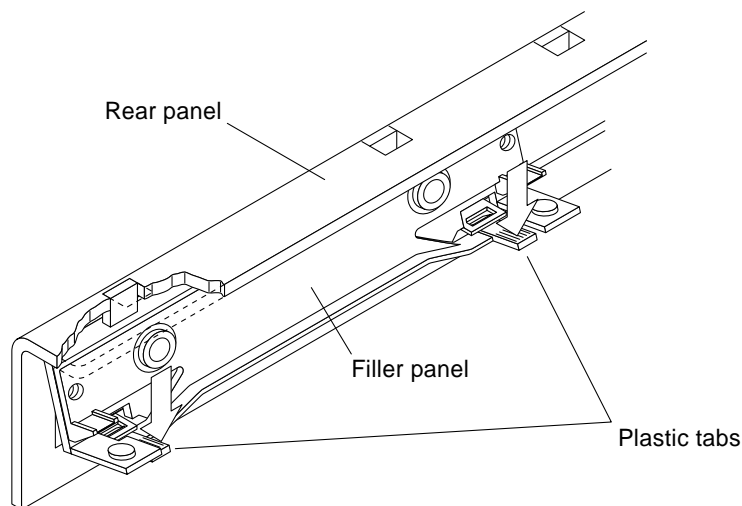


FIGURE 5-14 Removing the Filler Panel

c. Pull the filler panel away from the rear panel.

Use both hands. The panel releases toward the front of the system.

d. Put the filler panel aside.

2. Repeat Step 1.a through Step 1.d for each filler panel that must be removed.

5.9 Setting Jumpers

The Main Logic Board has two types of jumpers. See FIGURE 5-15.

- serial port jumpers
- clock speed jumpers

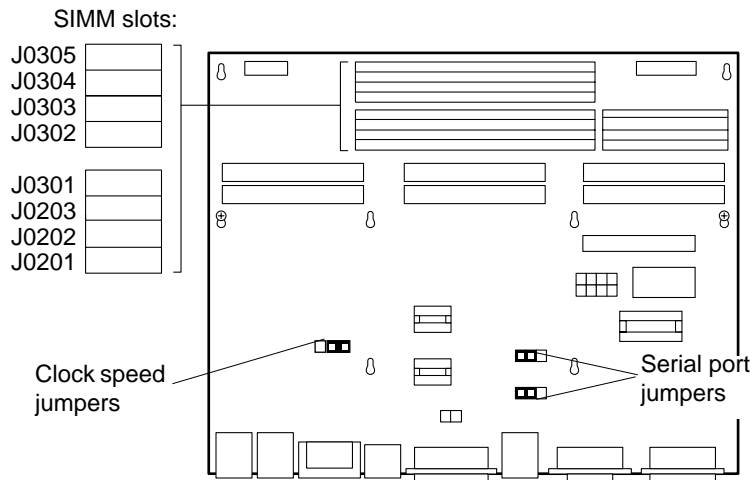


FIGURE 5-15 Jumper Locations on the MLB

5.9.1 Serial Port Jumpers

The serial port jumpers are preset from the factory in RS-423 mode. The ports can be set either as RS-232 mode (for users in the Federal Republic of Germany and Australia) or as RS-423 mode for other users. If you use your SPARCstation 10 system for connection to a public X.25 network in Europe, you must configure the serial ports on your system to operate in the RS232 mode.

Make sure the serial port jumpers are set correctly. FIGURE 5-16 shows the correct setting for the serial port jumpers. If the jumpers need to be changed, use a pair of needle nose pliers to move *both* jumpers to the correct positions.

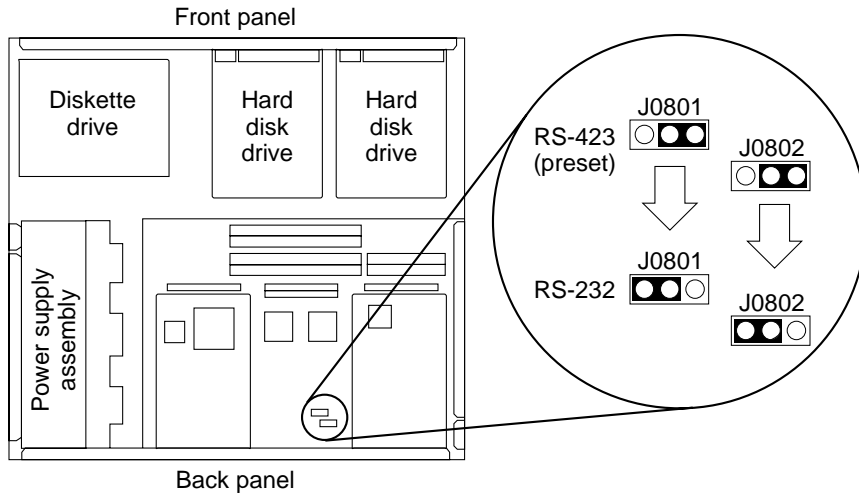


FIGURE 5-16 Serial Port Jumper Settings

5.9.2 Clock Speed Jumpers

You must set the system clock speed jumpers on the Main Logic Board to ensure correct operation of the MBus module. This section describes the jumper settings for two different types of Main Logic Boards.

Use the following tables to determine the correct jumper settings for your system. Both tables give the proper jumper settings. See TABLE 5-1 if you know your system model number; or see TABLE 5-2 to find the jumper settings based on your MBus module numbers.

TABLE 5-1 System Clock Speed Jumper Settings Based on SPARCstation 10 Model Number

SPARCstation 10 Model Number	Jumper Setting	System Clock Speed	MBus Clock Speed
Model 20	B	66 MHz	33 MHz
Model 30	B	72MHz	36 MHz
Model 40	B	80 MHz	40 MHz
Model 402 MP (2 x SM40)	A	80 MHz	40 MHz

TABLE 5-1 System Clock Speed Jumper Settings Based on SPARCstation 10 Model Number *(Continued)*

SPARCstation 10 Model Number	Jumper Setting	System Clock Speed	MBus Clock Speed
Model 41	A	80 MHz	40 MHz
Model 41 MP (2 x SM41)	A	80 MHz	40 MHz
Model 51	A	80 MHz	40 MHz
Model 512 MP (2x SM51)	A	80 MHz	40 MHz

TABLE 5-2 System Clock Speed Jumper Settings Based on MBus Module

MBus Module ¹	Part Number	Jumper Setting	System Clock Speed	MBus Clock Speed
SM20	501-2218	B	66 MHz	33 MHz
SM30	501-2215 501-2239	B	72 MHz	36 MHz
SM40	501-2219 501-2358	B	80 MHz	40 MHz
SM41	501-2258 501-2270 501-2359	A	80 MHz	40 MHz
SM51	501-2352 501-2360	A	80 MHz	40 MHz

1. SM refers to SPARC Module.

5.9.3 Three Clock Speed Jumpers

The first type of board has three jumpers (J1401, J1403, J1404). All three jumpers must be set for either mode A operation (step one), or mode B operation (step two), based on the system model number or MBus modules installed.

1. Set the mode A clock speed jumpers.

Use a pair of needle nose pliers to move the jumpers to the correct positions. See FIGURE 5-17.

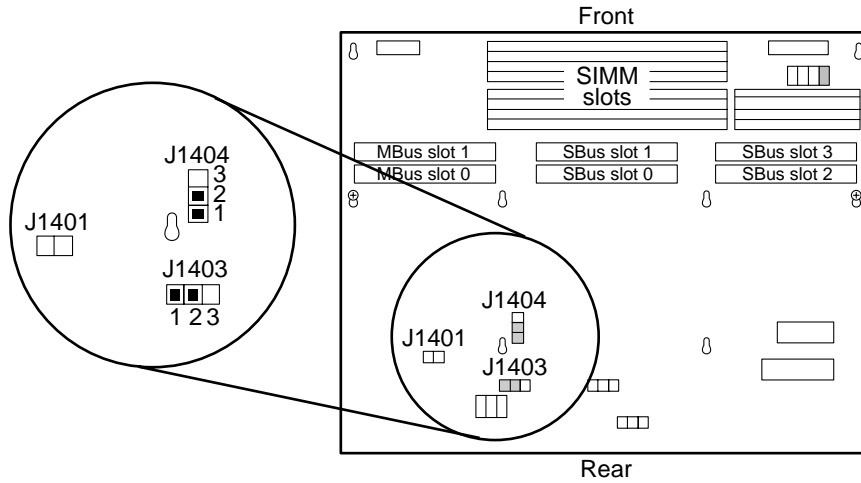


FIGURE 5-17 Mode A Clock Speed Jumper Setting (3-Jumper Board)

2. Set the mode B clock speed jumpers.

Use a pair of needle nose pliers to move the jumpers to the correct positions. See FIGURE 5-18.

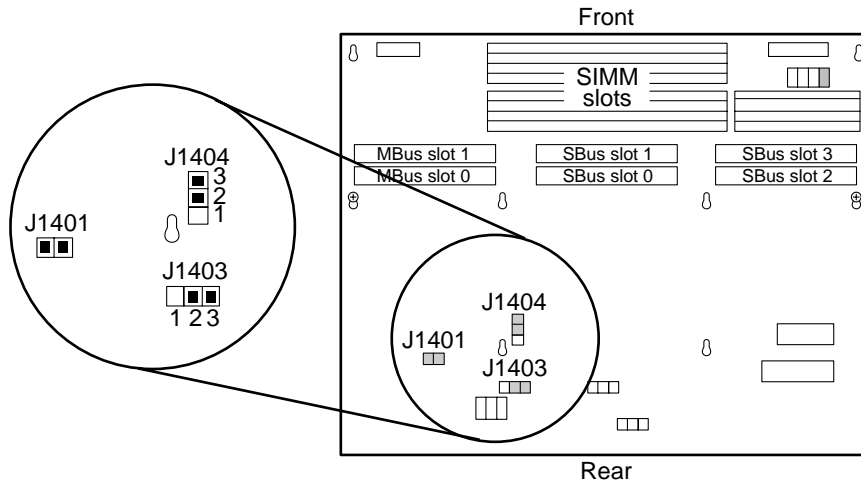


FIGURE 5-18 Mode B Clock Speed Jumper Speed Setting (3-Jumper Board)

5.9.4 Single Clock Speed Jumper

The second type of board has only one jumper (J1401). This jumper must be set for either mode A operation or mode B operation, based on your system model number (TABLE 5-1) or MBus modules installed (TABLE 5-2).

1. Set the mode A clock speed jumper.

Use a pair of needle nose pliers to move the jumper to the correct position. See FIGURE 5-19.

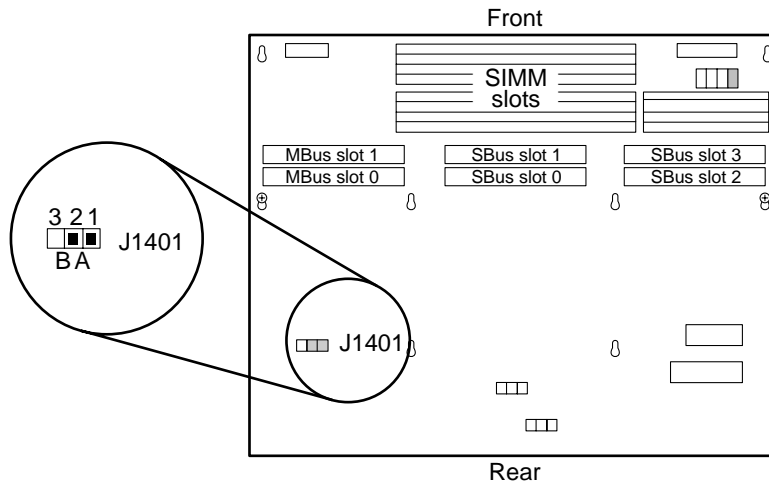


FIGURE 5-19 Mode A Clock Speed Jumper Speed Setting (1-Jumper Board)

2. Set the mode B clock speed jumper.

Use a pair of needle nose pliers to move the jumper to the correct position. See FIGURE 5-20.

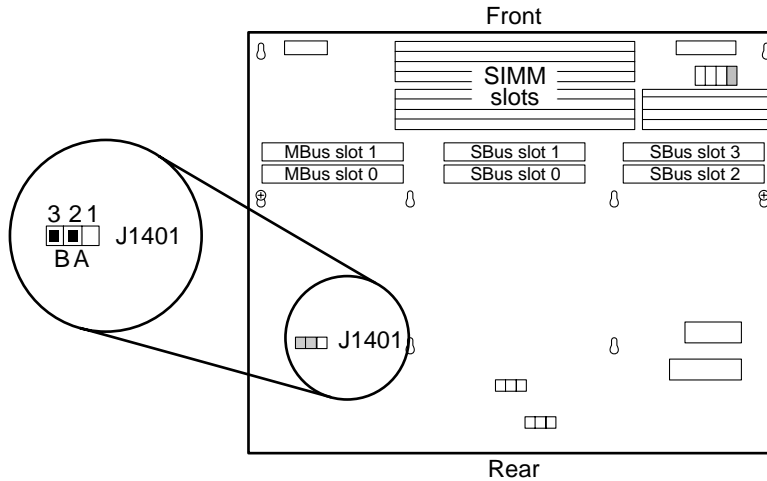


FIGURE 5-20 Mode B Clock Speed Jumper Speed Setting (1-Jumper Board)

5.10 Installing the MLB

1. Set the jumpers on the system board.

- Serial port
- Clock speed

Refer to “Setting Jumpers in this chapter.

2. Orient the board over the chassis so the connectors are facing the rear of the chassis.

3. Tilt the connector side of the board and lower it under the rear of the chassis.

4. Lower the board into the chassis and slide it to the rear of the chassis.

The eight locating posts in the chassis should fit the eight slots on the MLB. See FIGURE 5-21.

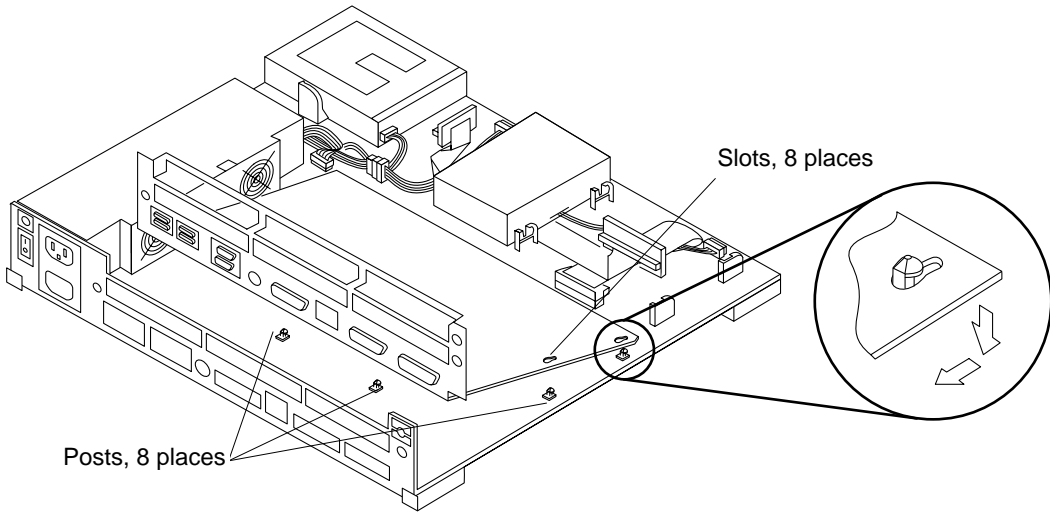


FIGURE 5-21 Lowering the System Board into the Chassis

5. Connect the DC power to the MLB (J1501).

See FIGURE 5-22.

6. Connect the internal drive connector to the MLB (J0601).

See FIGURE 5-22.

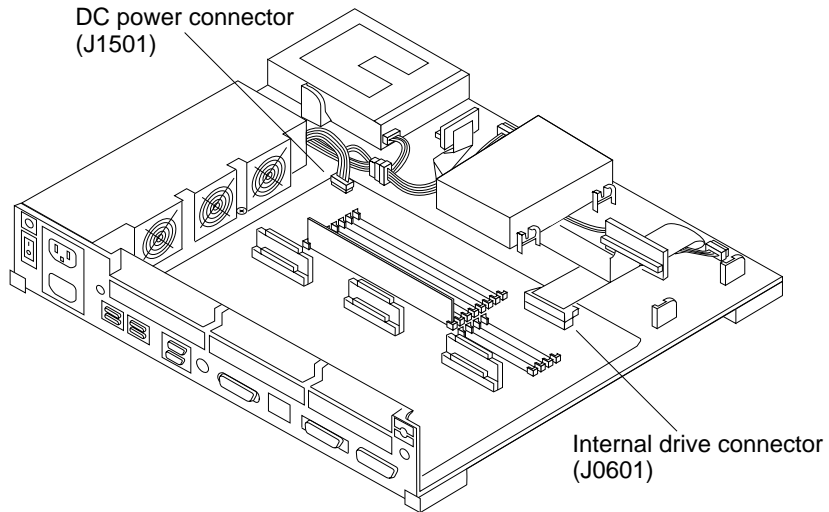


FIGURE 5-22 Connecting the Internal Cables

7. Tighten the captive retainer screws at the rear of the chassis.

See FIGURE 5-23.

Note – Do not overtighten the captive screws or the lock block screw

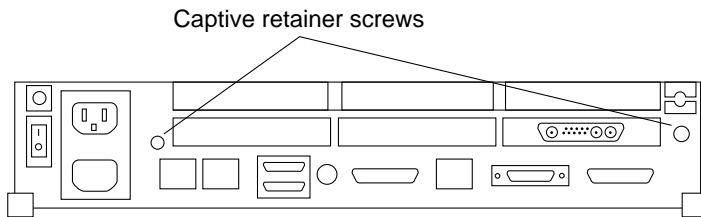


FIGURE 5-23 MLB Retainer Screws at the Rear of the Chassis

8. Install the lock block by inserting the screw through the lock block.

See FIGURE 5-24.

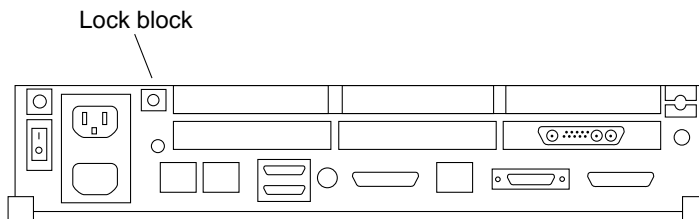


FIGURE 5-24 Lock Block Location

5.11 NVRAM

This section describes how to remove and replace the NVRAM (Non-Volatile Random Access Memory) chip.

5.11.1 Removing the NVRAM Chip

1. Locate the NVRAM chip on the MLB in the chassis.

See FIGURE 5-25.

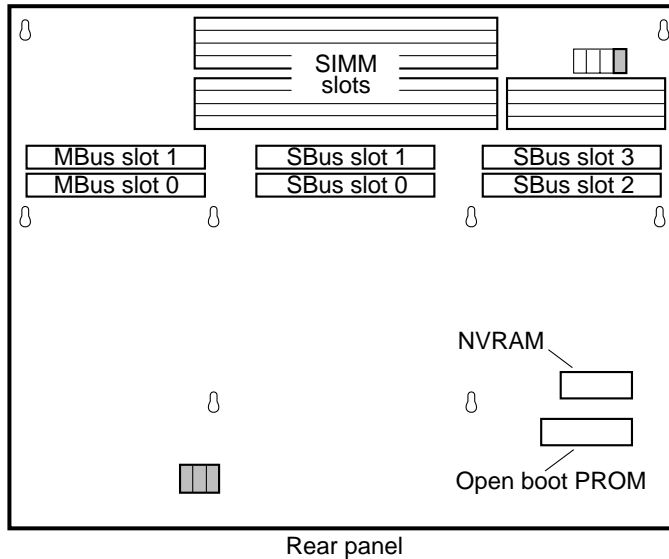


FIGURE 5-25 NVRAM Location

- 2. Hold the NVRAM chip carrier on both ends and lift it straight up.**
Gently wiggle the chip carrier as necessary.
- 3. Put the NVRAM in its chip carrier on an antistatic surface.**
It is to be sent back with the defective system board to Sun.

5.11.2 Installing the NVRAM Chip

- 1. Locate the NVRAM chip and remove it from the defective system board.**
See FIGURE 5-25.
- 2. Carefully align the pins and insert the NVRAM chip into the socket on the MLB in the chassis.**
The carrier is keyed so the NVRAM can be installed only one way.
- 3. Push the NVRAM chip into the carrier until it sits tightly in the socket.**

5.12 Installing MBus Modules

If the system has two MBus modules (slot 1 on the top of slot 0), you must install the first module in slot 0. Then, repeat steps 1 through 4 to install the second module in slot 1.

Note – If there is an MBus module installed in slot 1 (the upper MBus slot), you must remove it before you can install an MBus module in slot 0. Refer to the section “Removing an MBus Module” in this chapter.

1. Push the MBus module retainers back.

See FIGURE 5-26.

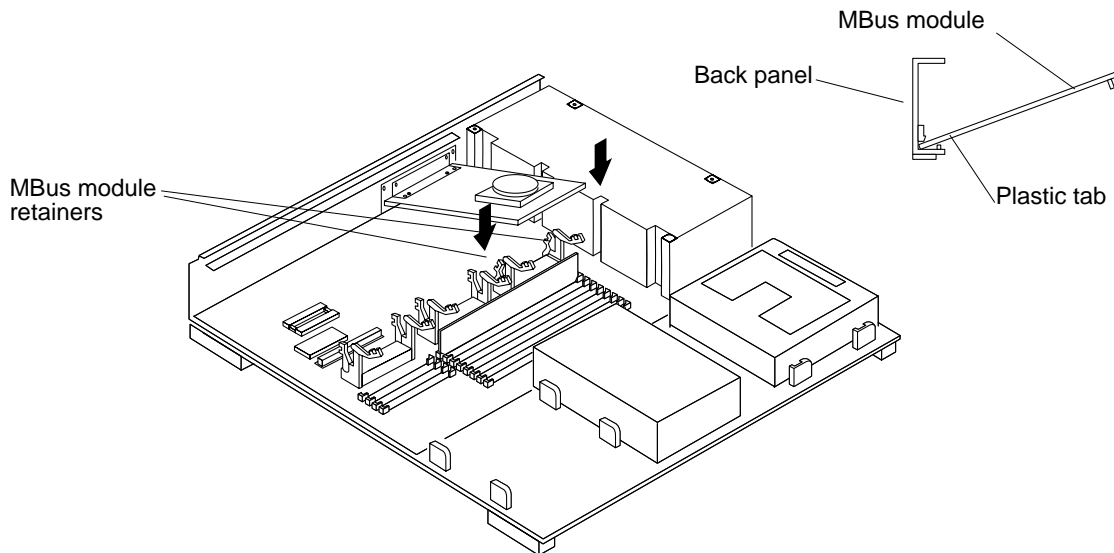


FIGURE 5-26 Installing an MBus Module

2. Insert the first MBus module in the lower slot (MBus slot 0). To insert an MBus module:

Insert the back edge of the module between the metal (lower) and plastic (upper) tabs on the back panel. The MBus module connector should face the appropriate MBus connector on the MLB. See FIGURE 5-26.

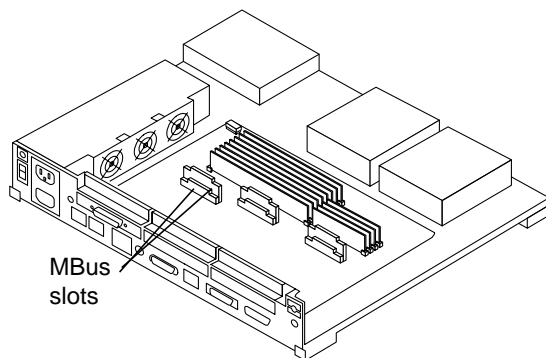


FIGURE 5-27 MBus Slot Locations on the Main Logic Board



Caution – Excessive force may bend or damage the pins.

- 3. Push the MBus module connector down until it is fully seated on the MLB.**
- 4. Lock the module retainers in place by pushing the arms over the edge of the MBus module.**

See FIGURE 5-28.

Note – The MBus module must be properly seated so that the module retainers lock securely over the module edges.

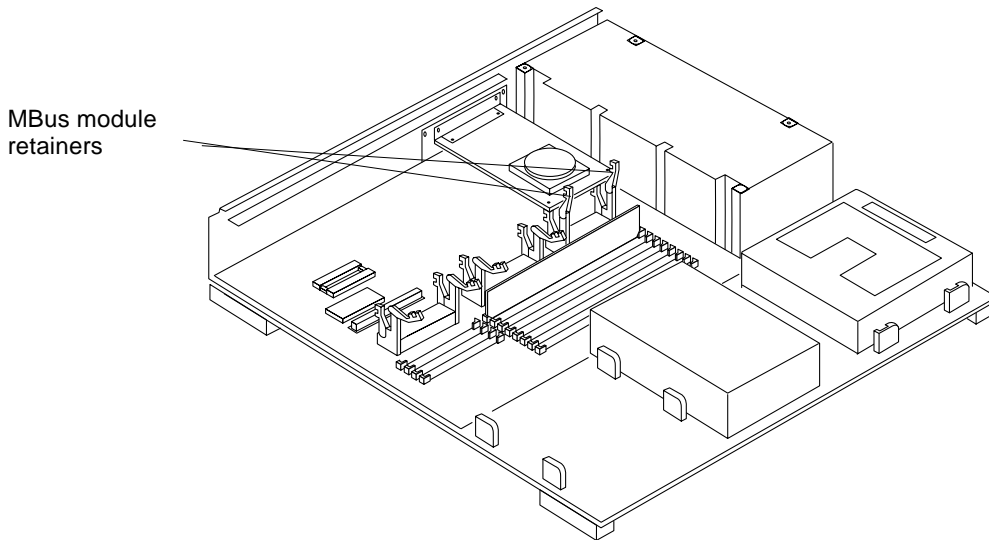


FIGURE 5-28 MBus Module Retainers

5. To replace an MBus module in slot 1, perform steps 1 through 4.

5.13 Installing an SBus Card

1. If required for your card, set the jumpers or switches on the card.
Refer to the guide for your SBus product for the proper settings.
2. Make sure the card retainers for the SBus slot are out of the way.
3. Slide the SBus card at an angle into the back panel of the system unit and push it against the back panel.

Make sure the mounting plate on the SBus card hooks upward into the back panel of the system unit. See FIGURE 5-29.

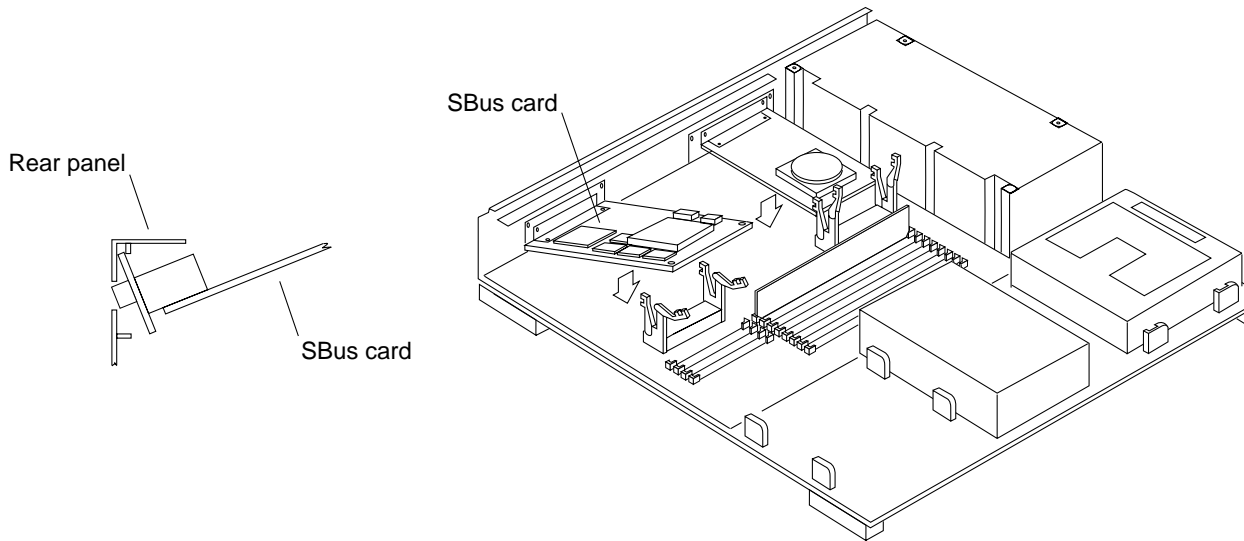


FIGURE 5-29 Installing an SBus Card

Note – The SPARCstation 10 has 4 SBus slots. SBus slot 1 is above SBus slot 0 and SBus slot 3 is above SBus slot 2. Install SBus cards in the lower SBus slots first.

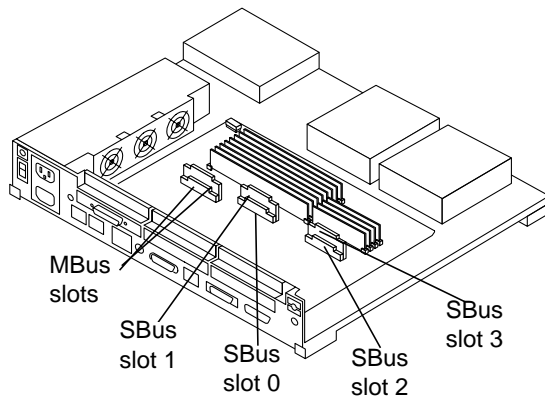


FIGURE 5-30 Location of SBus Slots on Main Logic Board

4. Align the plug with the socket. Press the corners of the card to push the plug into the socket.

See FIGURE 5-31.



Caution – Do not force the card. Using excessive force may bend or damage the pins.

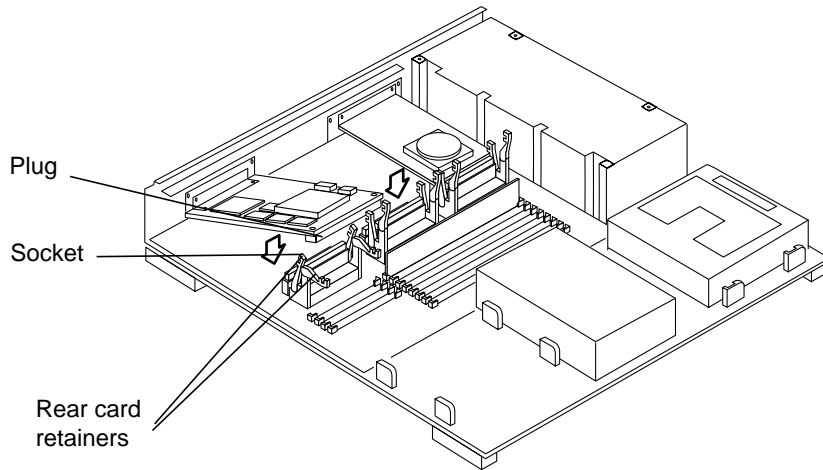


FIGURE 5-31 SBus Card Plug, Socket and Retainers

5. Push the rear card retainers forward over the edge of the SBus card, locking them in place.
6. Install the washers and screws you removed earlier into the screw holes adjacent to the SBus card on the back panel using a Phillips screwdriver. The long side of the washer should be oriented vertically. See FIGURE 5-32.

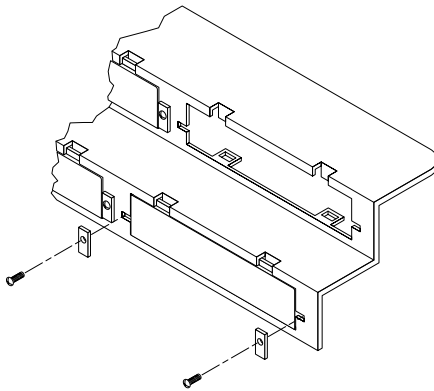


FIGURE 5-32 SBus Card Backpanel Screws and Washers

5.14 Replacing DSIMMs

Remove all of the DSIMMs from the defective MLB and install them in the corresponding slots on the new MLB mounted in the chassis.

FIGURE 5-33 and FIGURE 5-34 show the back and front views of a SPARCstation 10 DSIMM. The surface with the center vertical chip should face the system unit back panel when installed.

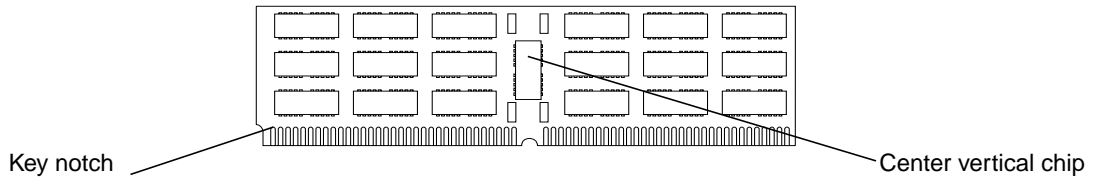


FIGURE 5-33 SPARCstation 10 DSIMM, Back Panel View

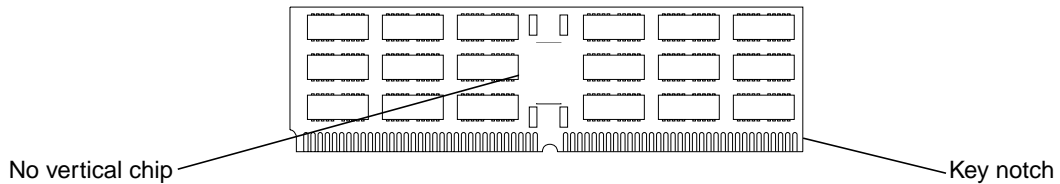


FIGURE 5-34 SPARCstation 10 DSIMM, Front Panel View

To replace a DSIMM:

1. **Locate the DSIMM slots on the main logic board.**

See FIGURE 5-35.

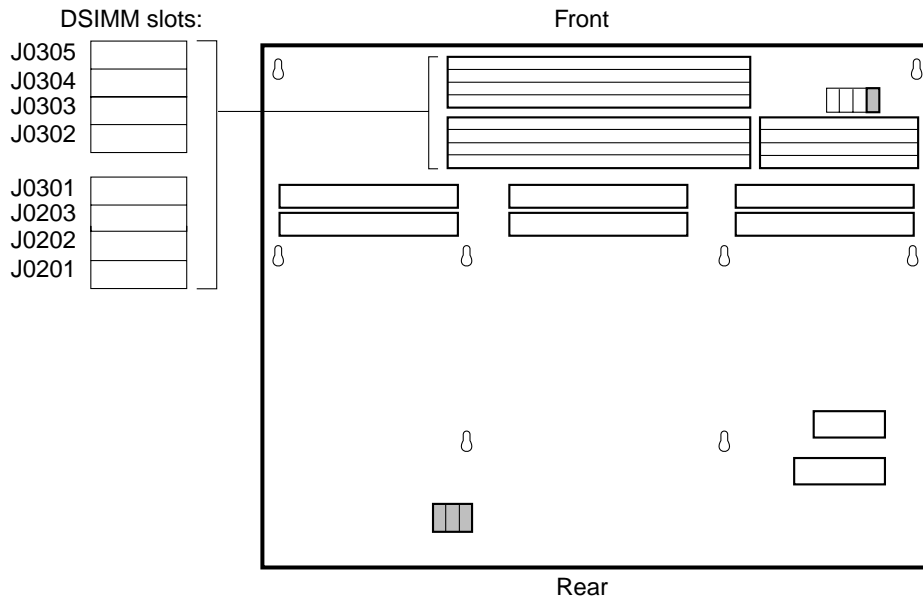


FIGURE 5-35 DSIMM Slot Locations on Main Logic Board

2. See TABLE 5-3 for the proper installation sequence.

Note – Slot J0201 must always have a DSIMM installed in order for the system to function properly. In any SPARCstation 10 system, it is the first slot to be filled with a DSIMM. Each additional DSIMM should be installed in the sequence shown in TABLE 5-3.

TABLE 5-3 DSIMM Installation Sequence

Installation Sequence	Slot
1	J0201
2	J0304
3	J0203
4	J0302
5	J0303
6	J0301
7	J0305
8	J0202

5.14.1 DSIMM Insertion Tool

If your system did not come with a DSIMM Insertion Tool, press the DSIMM into place with your fingers.

1. Identify the insertion tool and its two surfaces.

See FIGURE 5-36 and FIGURE 5-37.

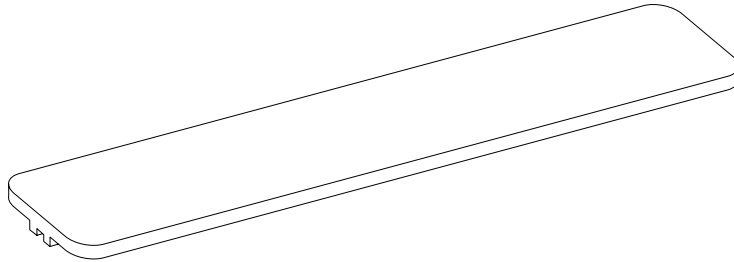


FIGURE 5-36 Insertion Tool, Pushing Surface

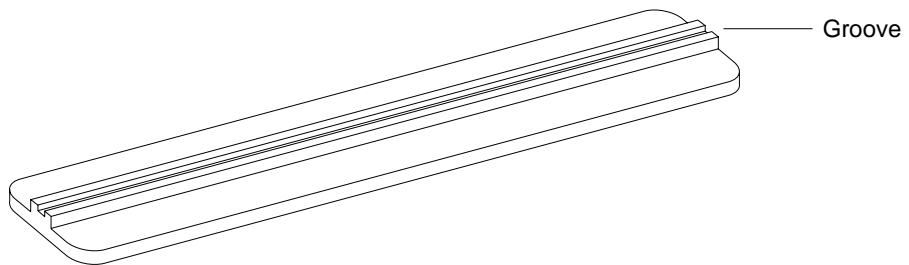


FIGURE 5-37 Insertion Tool, Grooved Surface

2. Holding a DSIMM at its edges, place it into the DSIMM plastic guides.

The surface *without* a center vertical chip must face the system unit front panel. Be sure the center vertical chip is visible and that the key notch. See FIGURE 5-38.

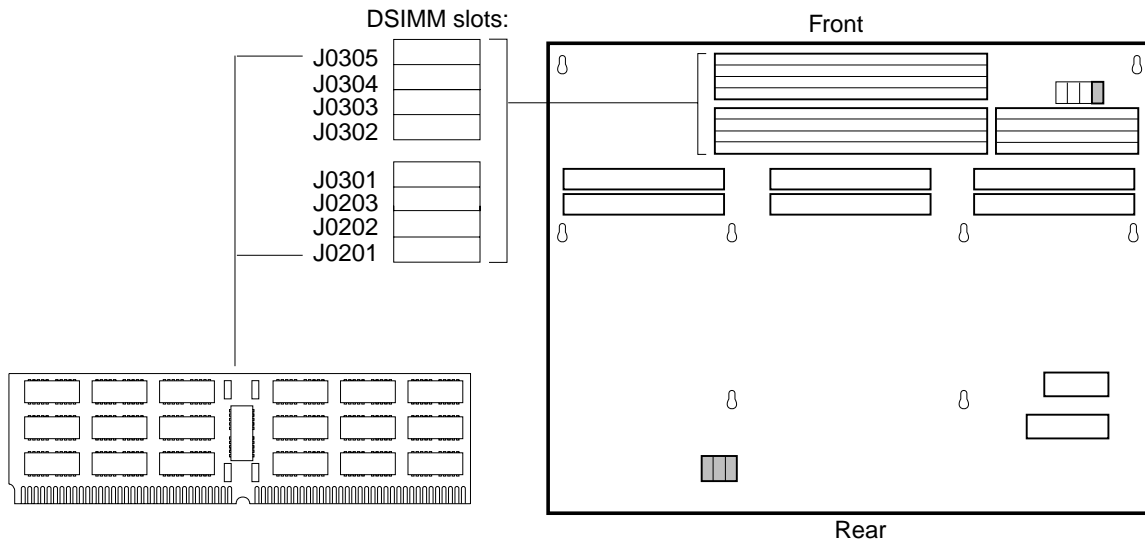


FIGURE 5-38 Inserting a DSIMM, Front Panel View

- 3. Place the insertion tool grooved surface at a 90-degree angle on the DSIMM board upper edge.**
 - 4. Place the heel of each hand on each side of the insertion tool's pushing surface, and press firmly with both hands on the tool until the DSIMM snaps into place.**
- See FIGURE 5-39 and FIGURE 5-40.

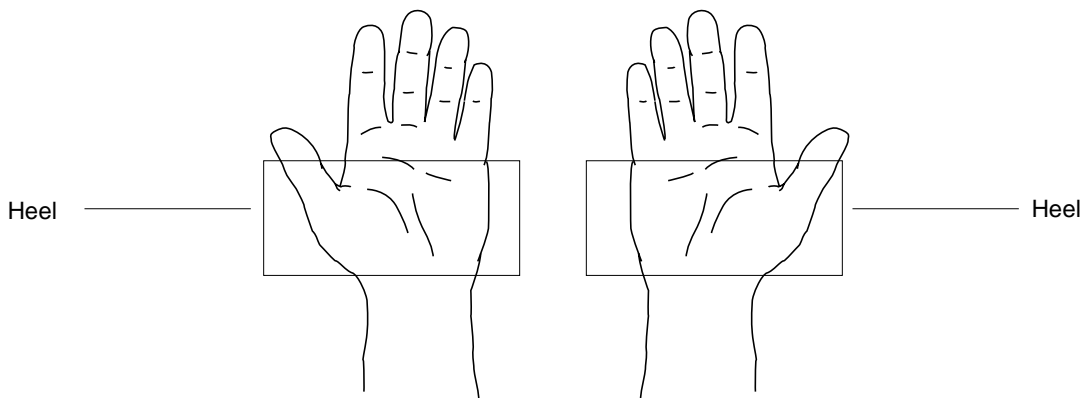


FIGURE 5-39 Heel of Each Hand

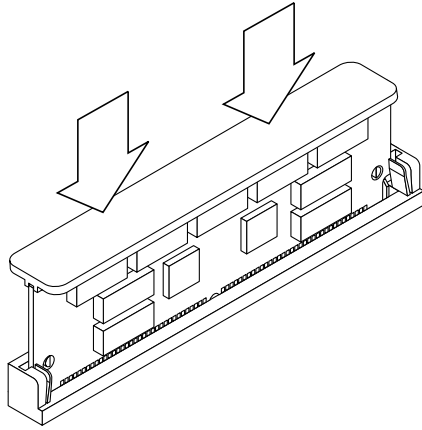


FIGURE 5-40 Using the Insertion Tool

- 5. Put the insertion tool away in a toolbox or other storage place. Do not leave the tool inside the system.**
- 6. Follow the instructions in Chapter 17 to detach the wrist strap, install the cover, connect the expansion unit(s), and power on the system.**

Open Boot PROM

This chapter explains how to remove and install a SPARCstation 10 system Open Boot PROM.

6.1 Tools Needed

To remove and install the open boot PROM you need the following tools and materials:

- Phillips screwdriver (size #1)
- Phillips screwdriver (size #2)
- Wrist strap
- Antistatic surface
- Card extractor
- Chip extractor

6.2 Removing the Open Boot PROM

Power off the system and disconnect the expansion units (refer to Chapter 4).



Caution – Printed circuit boards are made of delicate electronic components that are extremely sensitive to static electricity. Ordinary amounts of static from your clothes or work environment can destroy the boards.

Wear a grounding wrist strap when handling the boards. Attach the wrist strap to the metal casing of the power supply at the rear of the unit top. Handle boards only by the non-conducting edges. Do not touch the components themselves or any metal parts.

1. **Check that the green LED at the front of the chassis is not lit.**
2. **Make sure that the system power cord remains connected to the system and the wall outlet.**

3. **Remove the system unit cover.**

Refer to “Removing the System Unit Cover in Chapter 4.

4. **Attach the wrist strap.**

Refer to “Attaching the Wrist Strap in Chapter 4.

5. **Remove any SBus cards from slot 2 and 3.**

If there is an SBus card in slot 2 or 3, follow steps a through g for each card starting with the top card. Note the SBus card location. Go to step 6 otherwise.

6. **Remove the screws and washers from the outside of the rear panel where the SBus card is.** See FIGURE 6-1.

Single width SBus cards have two screws and washers. Double width SBus cards have four screws and washers. Triple width SBus cards have six screws and washers. Save the screws and washers for future use.

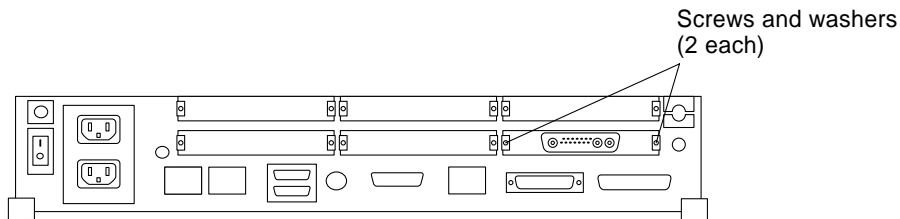


FIGURE 6-1 Rear Panel—Screws and Washers

7. **Push back all card retainers holding an SBus card.**

If the SBus card occupies one or two slots go to step d. Go to the next step if the SBus card occupies three slots.

8. **Hold both corners of the card and pull it out until the connectors are out of the slot.**

You do not need card extractors. Go to step g.

9. **Install the card extractor on the SBus card.** See FIGURE 6-2.

Install two card extractors on an SBus card that occupies two slots.

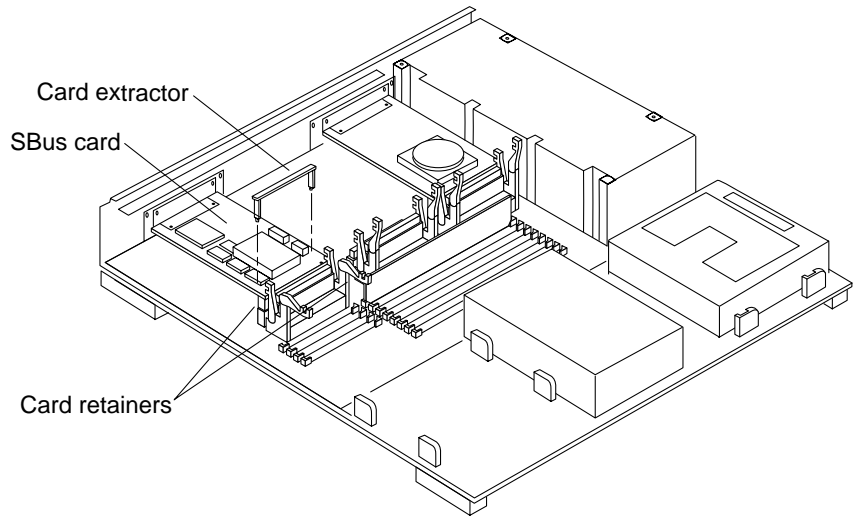


FIGURE 6-2 SBus Card—Card Retainers and Card Extractor

- 10. Hold both ends of the card extractor with your fingers and pull on both corners of the SBus card until the connector is out of the slot.**

See FIGURE 6-3 for a single width SBus card or FIGURE 6-4 for a double width SBus card.

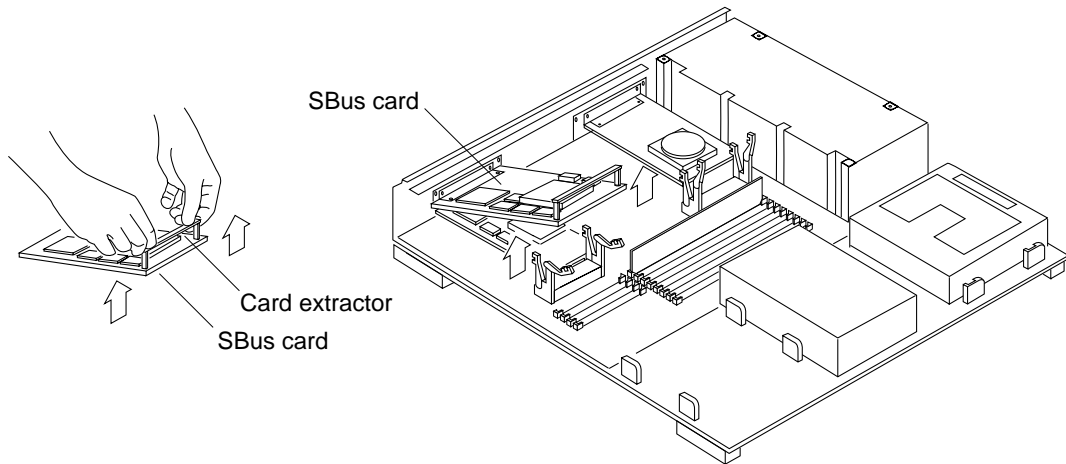


FIGURE 6-3 Removing a Single Width SBus Card

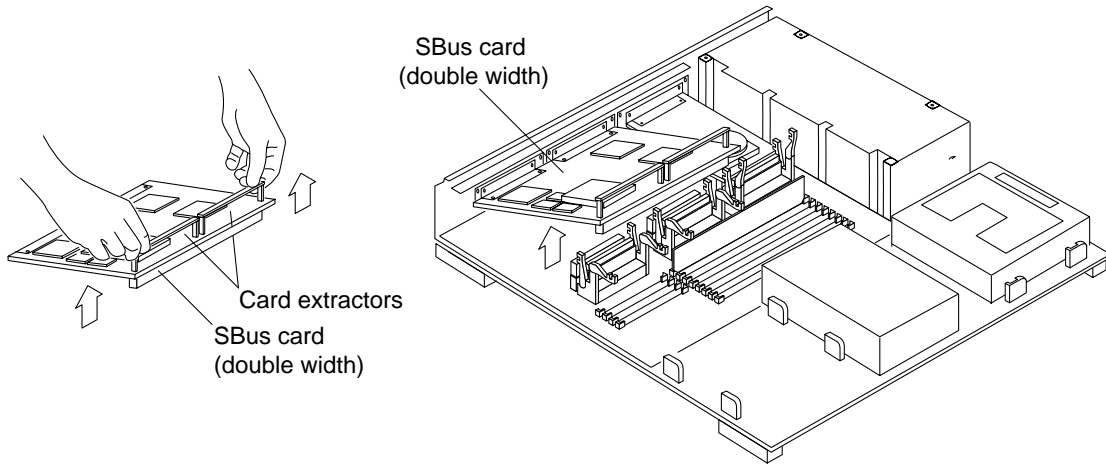


FIGURE 6-4 Removing a Double Width SBus Card

- 11. Remove the card extractor from the SBus card.**
Save the card extractor for future use.
- 12. Place the SBus card on the antistatic surface.**
- 13. Locate the open boot PROM on the MLB.**

See FIGURE 6-5.

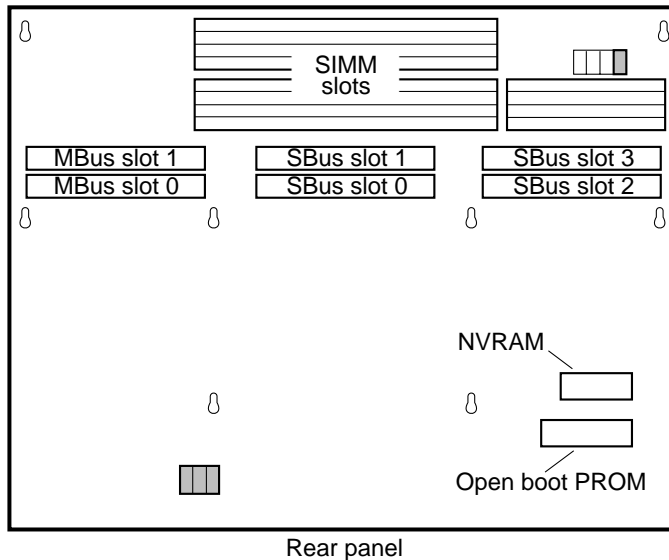


FIGURE 6-5 Location of Open Boot PROM

14. Remove the open boot PROM.

Use an IC extractor or small flat-bladed screwdriver to remove the open boot PROM from its socket. See FIGURE 6-6.

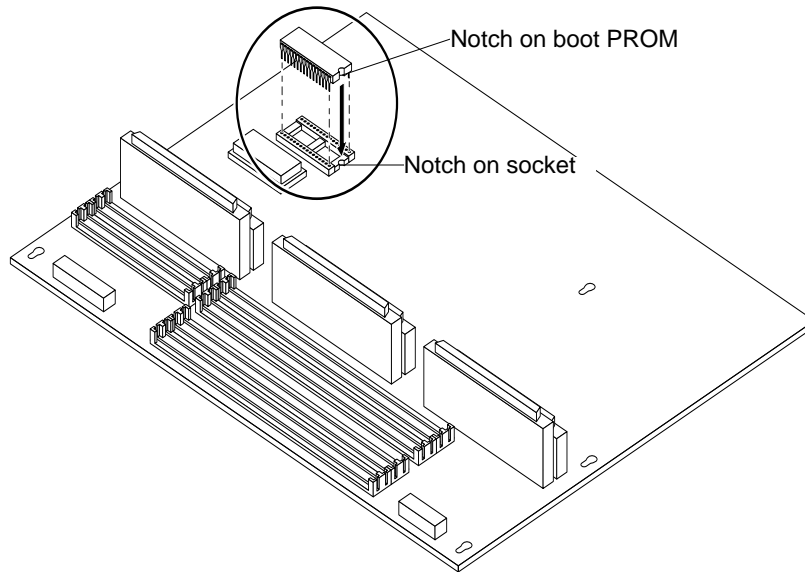


FIGURE 6-6 Proper Orientation of Open Boot PROM

15. Place the open boot PROM on the antistatic surface.

6.3 Installing the Open Boot PROM

1. **Unpack the replacement open boot PROM.**
2. **Hold the PROM by both edges and match the notch on the open boot PROM with the notch on the socket.**

See FIGURE 6-6.

Note – Do not touch the pins.

3. **Align the pins and insert the open boot PROM in the socket.**

Match the pin 1 indicator on the open boot PROM with the indicator on the socket.



Caution – Inserting the PROM backwards will damage the PROM.

4. Install the SBus card in slot 2 or 3 (if you removed them).

Go to step 5 otherwise.

a. Make sure that the card retainers are pushed back.

b. Slide the SBus card at an angle into the back panel of the system unit (See FIGURE 6-7).

Make sure the mounting plate on the SBus card hooks upward into the back panel of the system unit.

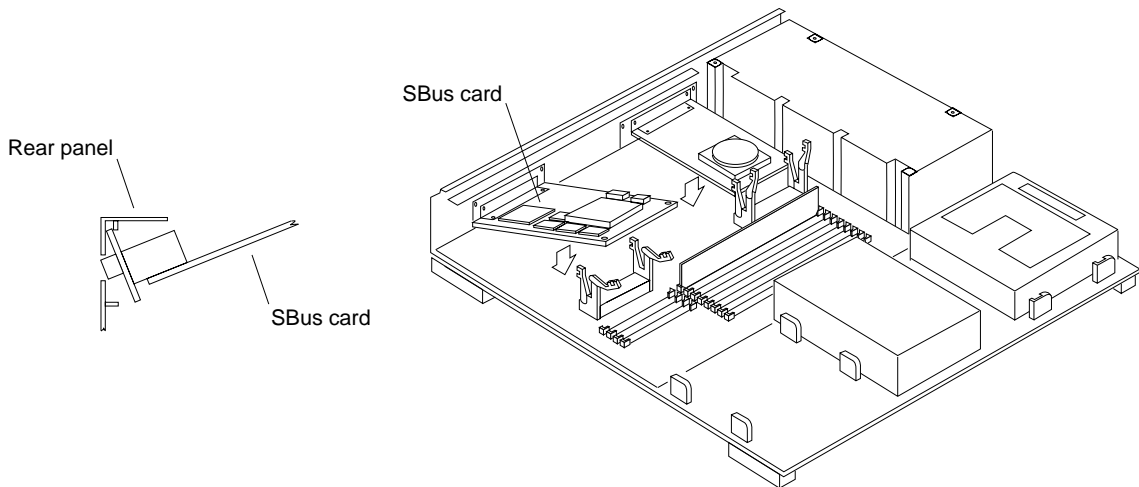


FIGURE 6-7 Installing the SBus Card in Slot 2 or 3

c. Align the plug with the socket of the SBus slot. Insert the plug into the socket by pressing with your fingers on the corners of the SBus card.



Caution – Excessive force may bend or damage the pins.

d. Slide the card retainers over the edge of the card.

e. Install a washer and a screw into the screw hole adjacent to the SBus card on the rear panel each at two places.

Double width SBus cards requires screws and washers in four places. Triple width SBus cards require screws and washers in six places. The long side of the washer should be oriented vertically as shown in FIGURE 6-8.

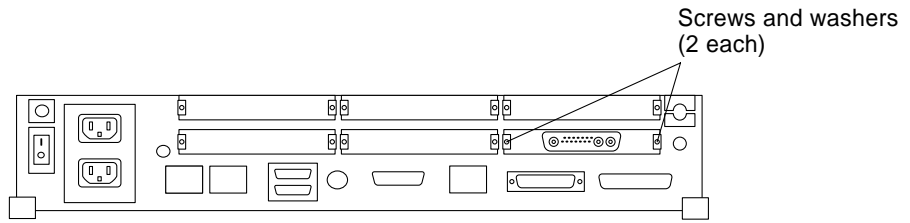


FIGURE 6-8 Rear Panel—Screws and Washers

- 5. Follow the instructions in Chapter 17 to detach the wrist strap, install the cover, connect any of the expansion unit(s) and power on the system.**

Non-Volatile RAM (NVRAM)

This chapter explains how to remove and install a Non-Volatile RAM (NVRAM) from the SPARCstation 10 system.

7.1 Tools Needed

To remove and install the NVRAM, you need the following tools and materials:

- Phillips screwdriver (size #1)
- Phillips screwdriver (size #2)
- Wrist strap
- Antistatic surface
- Card extractor

7.2 Removing the NVRAM

Power off the system and disconnect the expansion units (refer to Chapter 4).



Caution – Printed circuit boards are made of delicate electronic components that are extremely sensitive to static electricity. Ordinary amounts of static from your clothes or work environment can destroy the boards.

Wear a grounding wrist strap when handling the boards. Attach the wrist strap to the metal casing of the power supply at the rear of the unit. Handle boards only by the non-conducting edges. Do not touch the components or any metal parts.

1. Check that the green LED at the front of the chassis is not lit.

2. Check that the system power cord remains connected to the system and the wall outlet.

3. Remove the system unit cover.

Refer to “Removing the System Unit Cover in Chapter 4.

4. Attach the wrist strap.

Refer to “Attaching the Wrist Strap in Chapter 4.

5. Remove SBus card from slot 2 and 3.

If there is an SBus card in slot 2 or 3, follow steps a through g for each card starting with the top card. Note the SBus card location. Go to step 6 otherwise.

a. Remove the screws and washers from the outside of the rear panel where the SBus card is. See FIGURE 7-1.

Single width SBus cards have two screws and washers. Double width SBus cards have four screws and washers. Triple width SBus cards have six screws and washers. Save the screws and washers for future use.

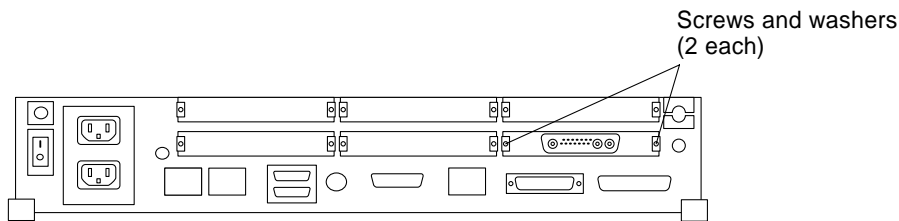


FIGURE 7-1 Rear Panel—Screws and Washers

b. Push back all card retainers holding an SBus card.

If the SBus card occupies one or two slots go to step d. See FIGURE 7-2. Go to the next step if the SBus card occupies three slots.

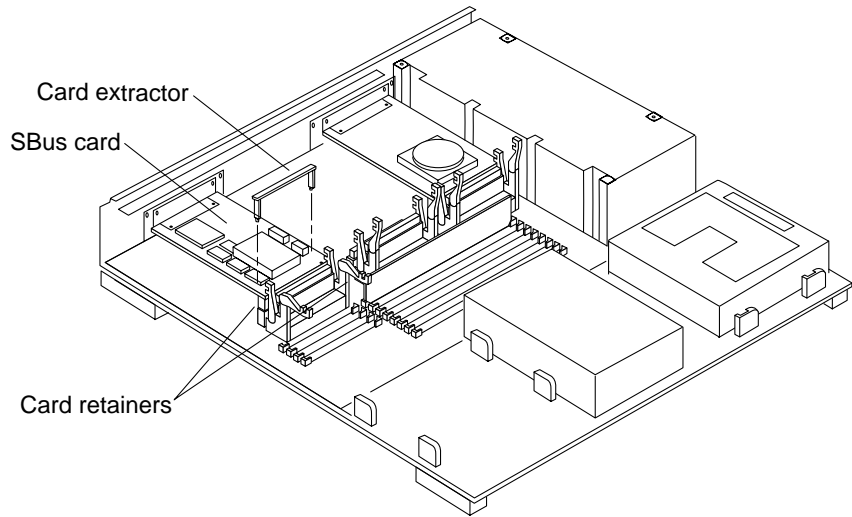


FIGURE 7-2 SBus Card—Card Retainers and Card Extractor

- c. Hold both corners of the card and pull it out until the connectors are out of the slot.**

You do not need card extractors to remove a triple width SBus card. Go to step g.

- d. Install the card extractor on the SBus card.**

If the SBus card occupies two slots, install two card extractors.

- e. Hold both ends of the card extractor with your fingers and pull on both corners of the SBus card on both corners until the connector is out of the slot.**

FIGURE 7-3 shows a single wide SBus card; FIGURE 7-4 shows a double width SBus card.

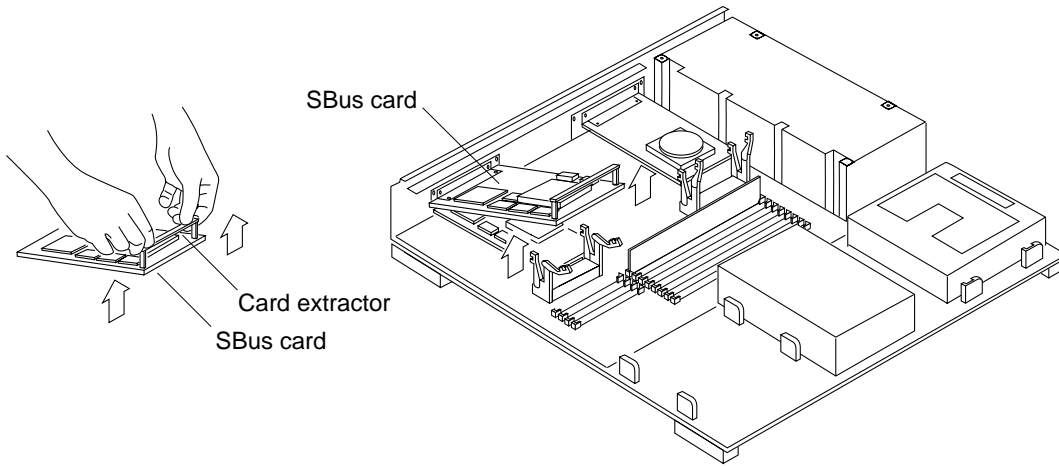


FIGURE 7-3 Removing a Single Width SBus Card

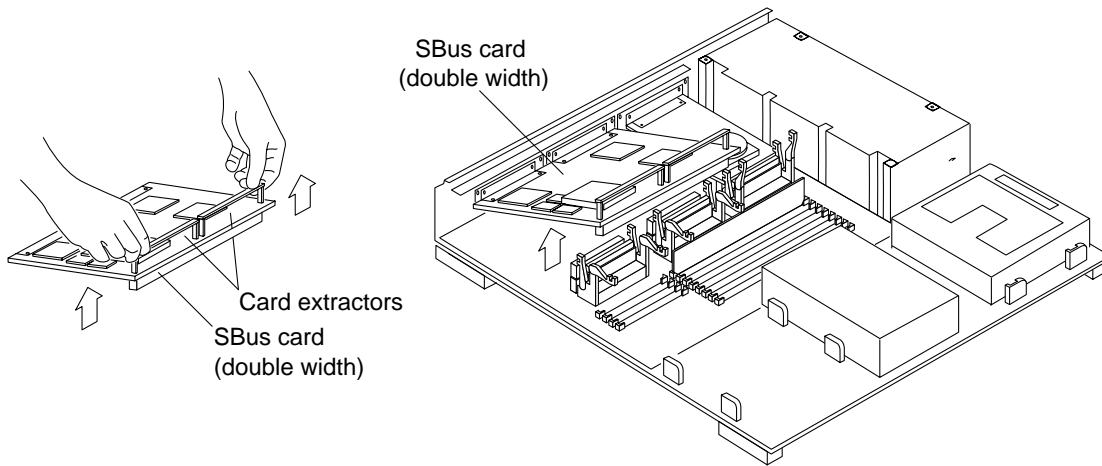


FIGURE 7-4 Removing a Double Width SBus Card

- i. Remove the card extractor from the SBus card.**
Save the card extractor for future use.
 - ii. Place the SBus card on the antistatic surface.**
- 6. Locate the NVRAM chip on the MLB. See FIGURE 7-5.**

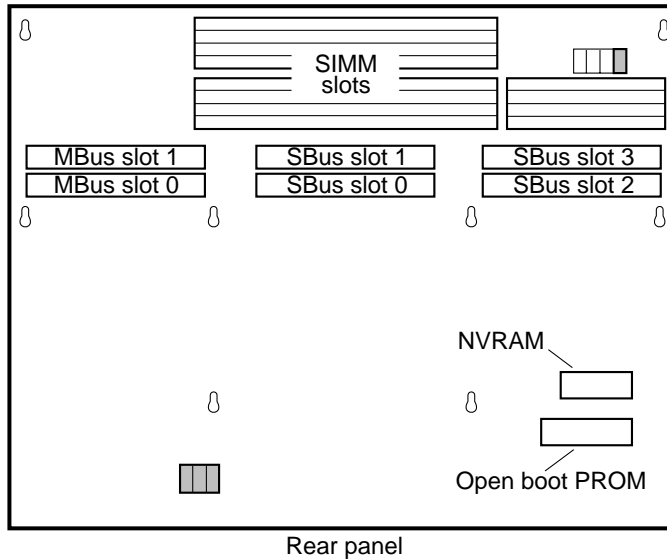


FIGURE 7-5 Location of the NVRAM on the MLB

- 7. Hold the NVRAM chip carrier on both ends and lift it straight up.**
Gently wiggle the carrier as necessary.
- 8. Place it on the antistatic surface.**

7.3 Installing the NVRAM

- 1. Unpack the replacement NVRAM chip. The NVRAM comes with its chip carrier.**
- 2. Hold the NVRAM chip on both sides of the carrier.**
- 3. Carefully align the pins and insert the NVRAM chip in the socket.**
The carrier is keyed so the NVRAM can be installed only one way.
- 4. Push the NVRAM chip into the carrier until it sits tightly in the socket.**
- 5. Install the SBus card in slot 2 or 3 (if you removed one).**
Go to step 11 otherwise.
- 6. Make sure that the card retainers are pushed back.**

7. Slide the SBus card at an angle into the back panel of the system unit. See

FIGURE 7-6.

Make sure the mounting plate on the SBus card hooks upward into the holes at the back panel of the system unit.

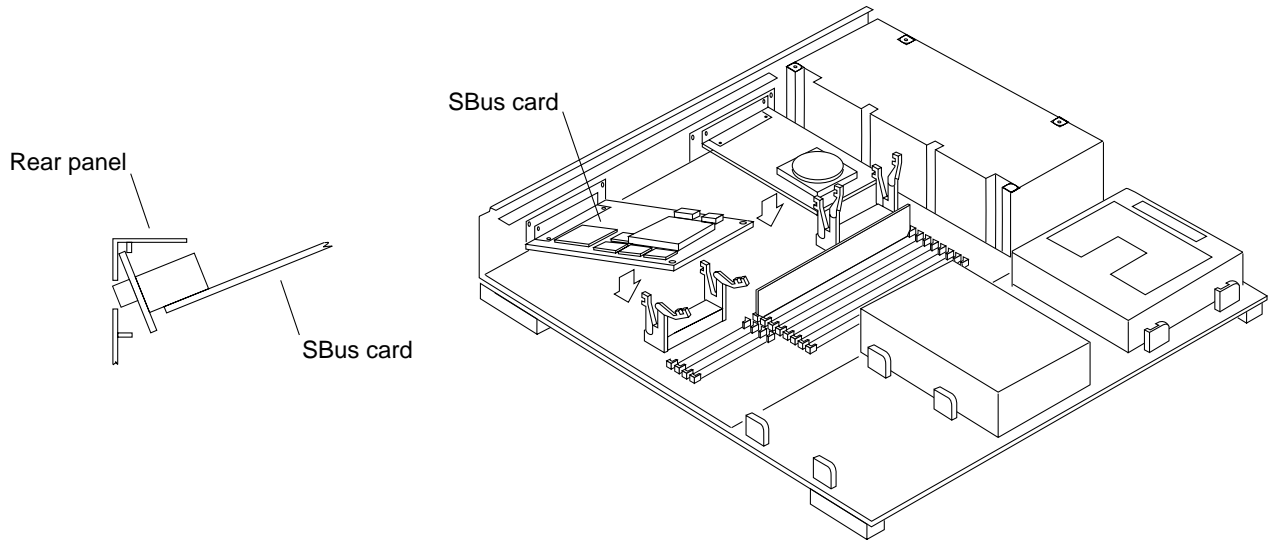


FIGURE 7-6 Installing the SBus Card in Slot 2 or 3

8. Push the SBus card against the back panel.

Align the plug with the socket of the SBus slot and gently press the plug into the socket by pressing with your fingers on the corners of the SBus card.



Caution – Excessive force may bend or damage the pins.

9. Slide the card retainers over the edge of the SBus card.

10. Install a washer and a screw into the screw hole adjacent to the SBus card on the rear panel each at two places.

Double width SBus cards requires screws and washers in four places. Triple width SBus cards require screws and washers in six places. The long side of the washer should be oriented vertically. See FIGURE 7-7.

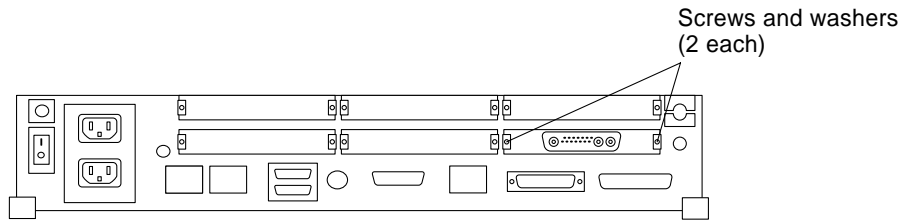


FIGURE 7-7 Rear Panel—Screws and Washers

- 11. Follow the instructions in Chapter 17 to detach the wrist strap, install the cover, connect any expansion unit, and power on the system.**

DSIMMs

This chapter explains how to remove and install a DRAM Single Inline Memory Module (DSIMM) from a SPARCstation 10.

8.1 Tools Needed

To remove and install a DSIMM, you need the following tools and materials:

- Phillips screwdriver (size #2)
- Wrist strap
- Antistatic surface

8.2 Removing a DSIMM

Power off the system and disconnect the expansion units. Refer to Chapter 4.



Caution – A DSIMM is made of delicate electronic components that are extremely sensitive to static electricity. Ordinary amounts of static from your clothes or work environment can destroy a DSIMM. Handle a DSIMM only by the edges. Do not touch the components on the DSIMM or any metal parts. Wear a grounding strap before unpacking and during handling of a DSIMM. *Do not disconnect the power cord from the system unit's power receptacle. The power cord should be left plugged in to a grounded power outlet.* This connection provides the ground path necessary so that you can safely remove and install DSIMMs and other components. Be sure that the system unit power is turned *off* by observing that the green light-emitting diode (LED) at the front of the chassis is not lit.

1. Remove the system unit cover.

Refer to “Removing the System Unit Cover in Chapter 4.

2. Attach the wrist strap.

Refer to “Attaching the Wrist Strap in Chapter 4.

3. Locate the DSIMM slots on the main logic board (MLB). See FIGURE 8-1.

Note the slot location of the DSIMM to be removed.

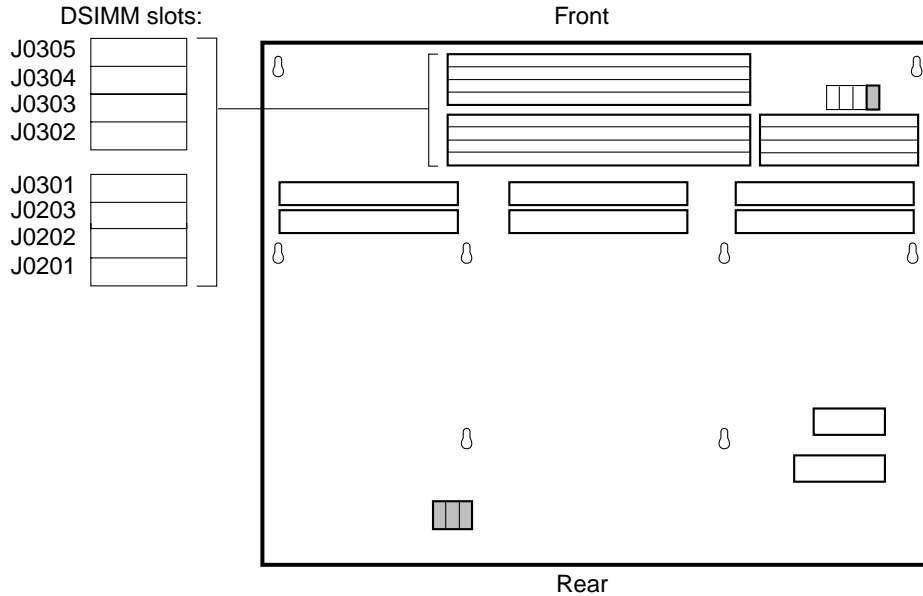


FIGURE 8-1 Location of DSIMMs on the MLB

4. Place an antistatic surface next to the system unit.

5. Pull the ejection lever (A) in the opposite direction of the DSIMM you want to eject. See FIGURE 8-2.

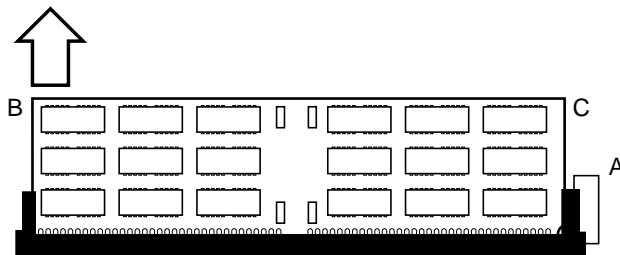


FIGURE 8-2 Pulling the Ejection Lever

6. Pull up on the other side (B) of the DSIMM.
7. Pull up on both corners (B and C) of the DSIMM until the board clears the socket.



Caution – DSIMMs installed in your SPARCstation 10 system must be specifically designed to operate in it. *Do not* remove DSIMMs from a different Sun system and install them in a SPARCstation 10.

8. Place the DSIMM on an antistatic surface.

8.3 Installing the DSIMM

1. Locate the DSIMM slots on the main-logic board.

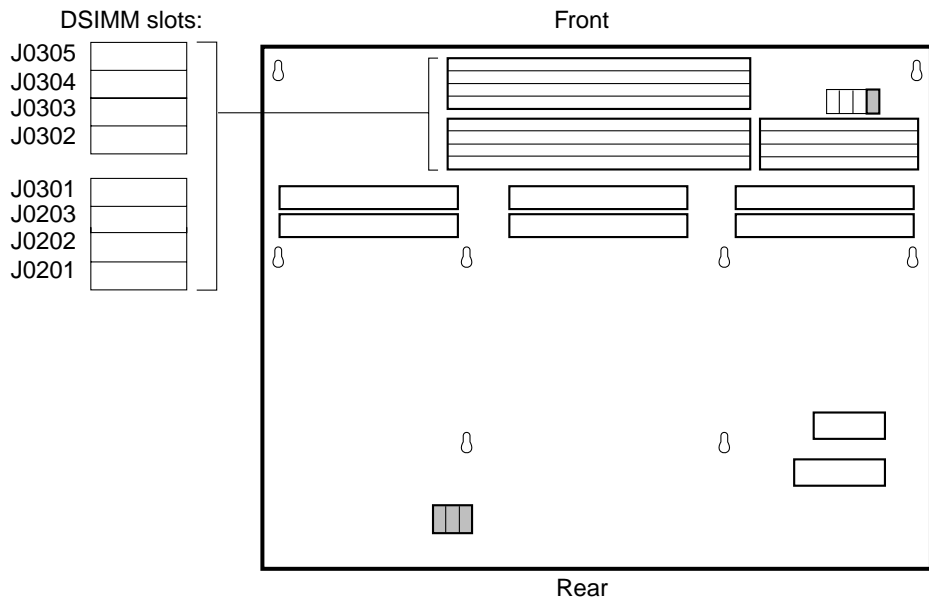


FIGURE 8-3 DSIMM Slot Locations on Main-Logic Board

2. Attach the wrist strap that came with your DSIMM to your wrist and the metal casing of the power supply.
3. Open the protective packaging and take out the DSIMM
4. Place the DSIMM on the static shielding bag

5. See TABLE 8-1 for the proper installation sequence.

Note – Slot J0201 must always have a DSIMM installed in order for your system to function properly. In any SPARCstation 10 system, it is the first slot to be filled with a DSIMM. Each additional DSIMM should be installed in the sequence shown in TABLE 8-1.

TABLE 8-1 DSIMM Installation Sequence

Installation Sequence	Slot
1	J0201
2	J0304
3	J0203
4	J0302
5	J0303
6	J0301
7	J0305
8	J0202

If your system did not come with a DSIMM Insertion Tool, press the DSIMM into place with your fingers. If your system did come with a DSIMM Insertion tool, (see FIGURE 8-4 and FIGURE 8-5), follow the instructions in Steps 1 through 5.

6. Identify the insertion tool and its two surfaces.

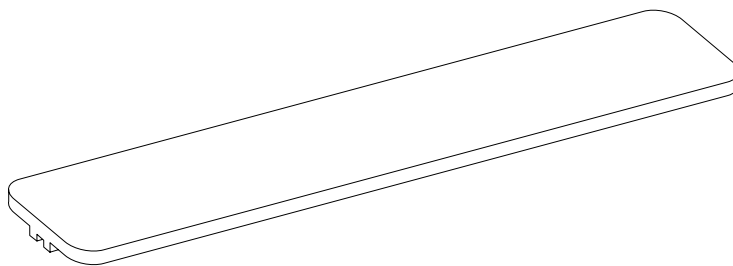


FIGURE 8-4 Insertion Tool, Pushing Surface

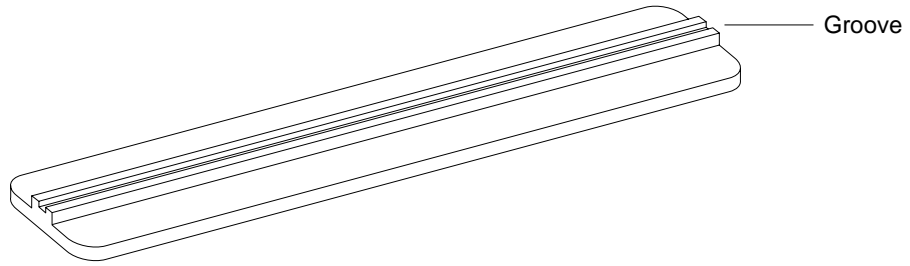


FIGURE 8-5 Installation Tool, Grooved Surface

7. Holding a DSIMM at its edges, place it into the DSIMM plastic guides.

The surface *without* a center vertical chip must face the system unit front panel. Be sure the center vertical chip is visible and that the key notch. See FIGURE 8-6.

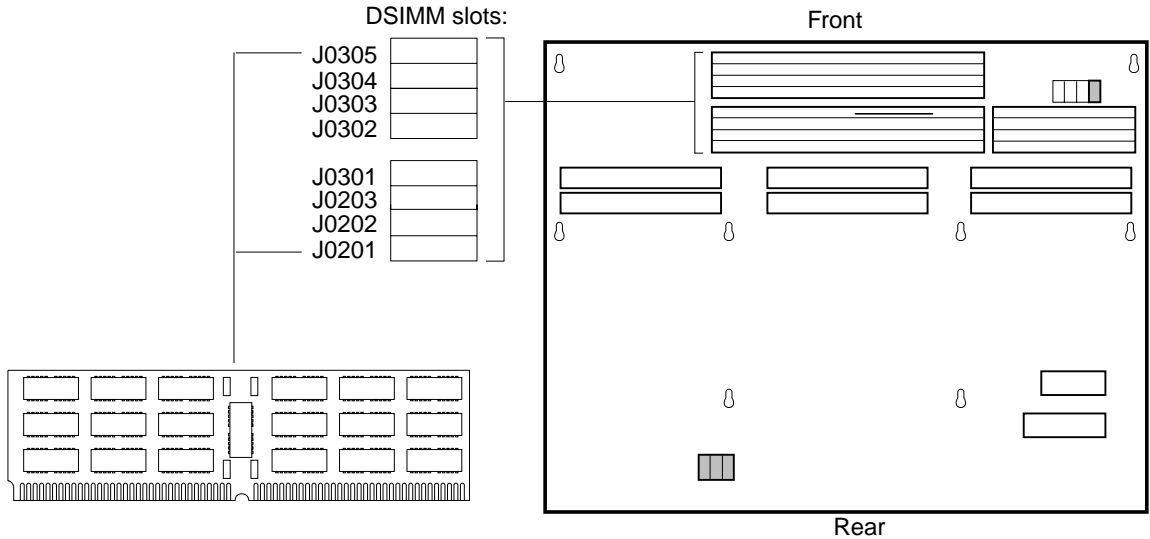


FIGURE 8-6 Inserting a DSIMM, Front Panel View

8. Place the grooved surface of the insertion tool on the upper edge of the DSIMM board. See FIGURE 8-7.

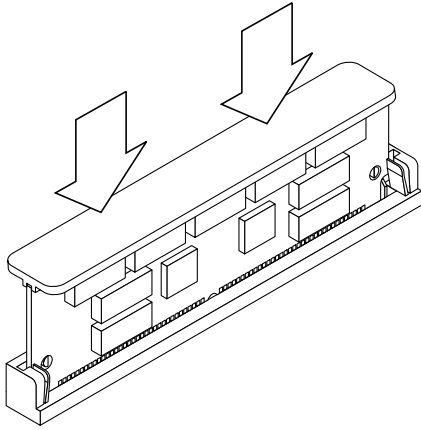


FIGURE 8-7 Using the Insertion Tool

- 9. Place the heel of each hand on each side of the insertion tool's pushing surface, and press the tool down firmly until the DSIMM snaps into place. See FIGURE 8-8.**

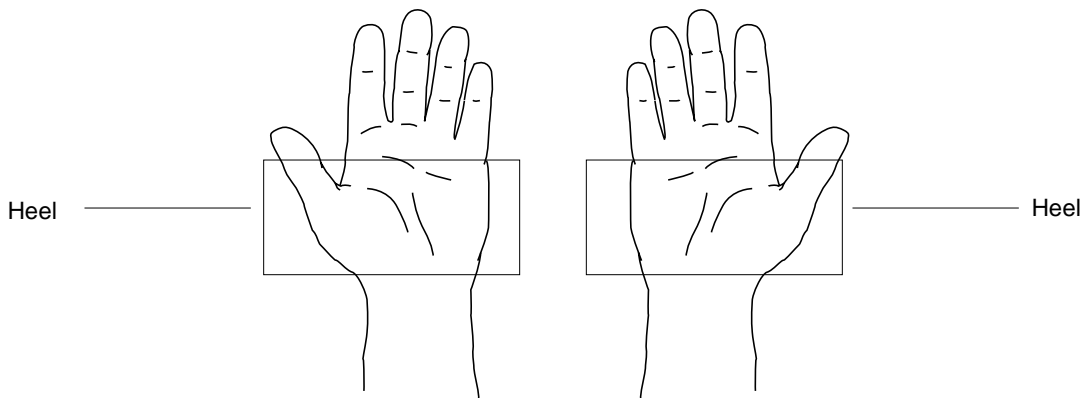


FIGURE 8-8 Heel of Each Hand

- 10. Put the insertion tool in a toolbox or other storage place. Do not leave the tool inside the system.**
- 11. See Chapter 17 to detach the wrist strap, install the cover, connect the expansion unit(s), and power on the system.**

MBus Modules

If you remove a defective MBus module, install the replacement MBus module in the same slot.

9.1 Tools Needed

To remove and install an MBus module you need the following tools and materials:

- Phillips screwdriver (size #2)
- Card extractor
- Wrist strap
- Antistatic surface

9.2 Removing the MBus Module

- **Power off the system and disconnect the expansion units.**

Refer to Chapter 4.



Caution – Printed circuit boards are made of delicate electronic components that are extremely sensitive to static electricity. Ordinary amounts of static from your clothes or work environment can destroy the boards.

Wear a grounding wrist strap when handling the boards. Attach the wrist strap to the metal casing of the power supply at the rear of the unit top. Handle boards only by the edges. Do not touch the components themselves or any metal parts.

Do not disconnect the power cord from the system unit power outlet or from the wall socket. This connection provides the ground path necessary to safely remove and install the printed circuit boards and components. In addition, keep the internal power supply cable connected to the MLB.

Make sure that the system unit power is turned OFF by checking that the green light-emitting diode (LED) at the front of the chassis is not lit and the fan in the power supply is not running.

1. **Check that the green LED at the front of the chassis is not lit.**
2. **Check that the system power cord remains connected to the system and the wall outlet.**
3. **Remove the system unit's cover.**

Refer to "Removing the System Unit Cover in Chapter 4.

4. **Attach the wrist strap.**

Refer to "Attaching the Wrist Strap in Chapter 4.



Caution – Hot surfaces are present. Use care when opening the system chassis or handling components.

5. **Push back both card retainers for the MBus module.**

If the system has two MBus modules (slot 1 on top of slot 0), and slot 0 is the defective module, remove the top module first. See FIGURE 9-1.

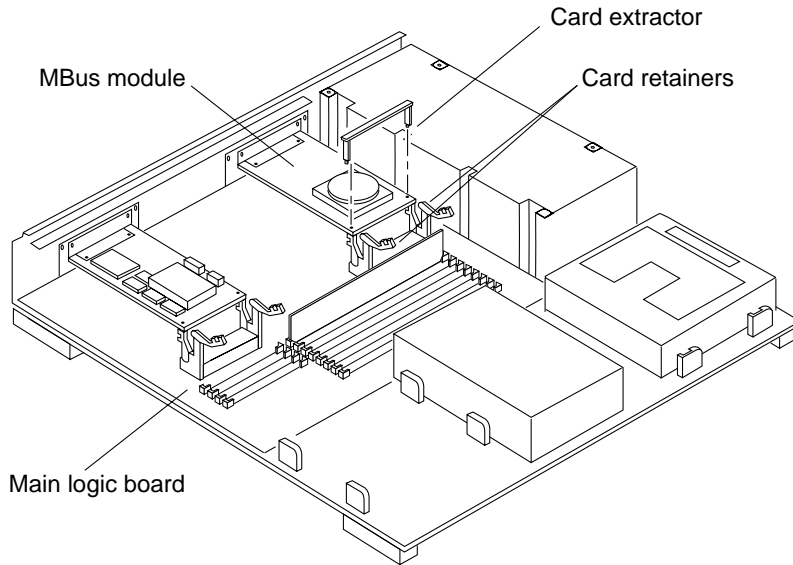


FIGURE 9-1 MBus Module—Card Retainers and Card Extractor

6. Install the card extractor on the MBus module.

See FIGURE 9-2.

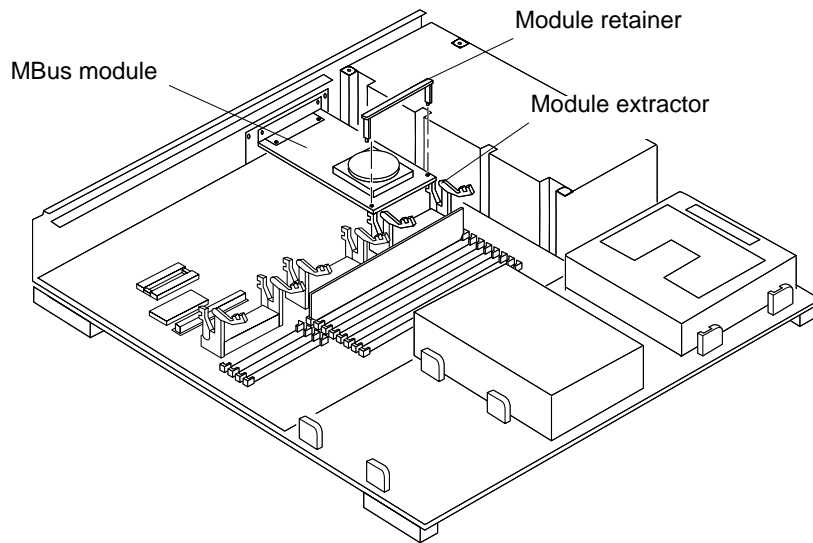


FIGURE 9-2 Installing the Card Extractor

7. Grasp both edges of the card extractor with your fingers and pull up on both corners of the MBus module until the connector is out of the slot.

See FIGURE 9-3.

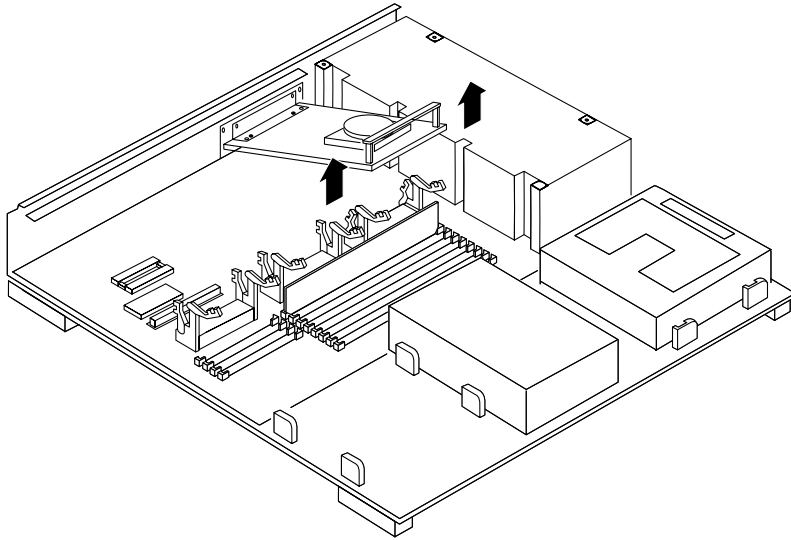


FIGURE 9-3 Removing an MBus Module

8. Remove the card extractor from the MBus module.
Save the card extractor for future use.
9. Place the MBus module on the antistatic surface.
10. Repeat steps 6 through 10 to remove the module from slot 0, if it is to be replaced.

9.3 Installing an MBus Module

1. Open the protective packaging and take out the MBus module.

Note – MBus slot 0 must have a module installed or the system will not work.

- 2. Insert the back edge of the module between the metal (lower) and plastic (upper) tabs on the back panel.**

The connector on the MBus module should be facing the appropriate MBus slot. See FIGURE 9-4.

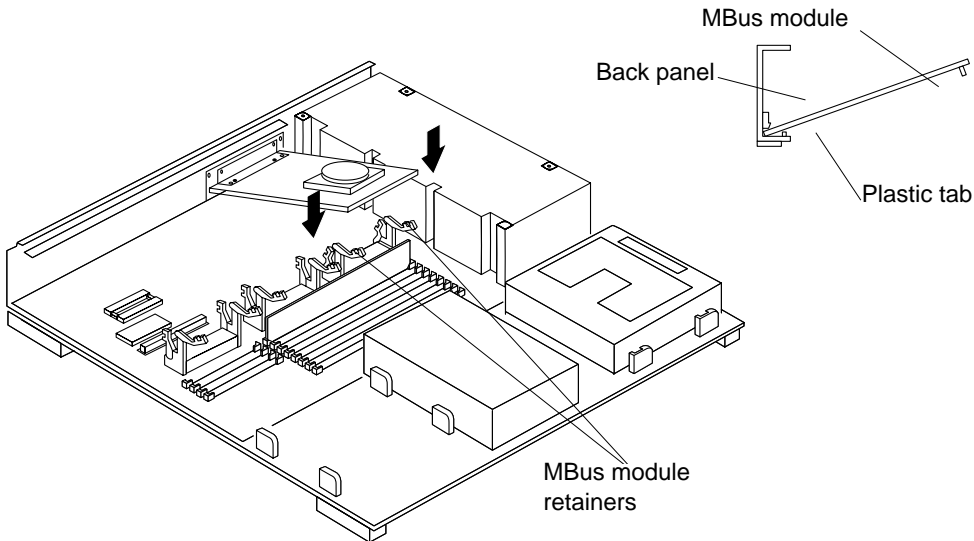


FIGURE 9-4 Installing an MBus Module

- 3. Push the MBus module connector down into the socket.**

See FIGURE 9-5.

- a. Hold the corners of the MBus module connector.**

- b. Press down firmly until the module sits into place.**

Make sure the module is fully inserted into the slot.



Caution – Excessive force may bend or damage the pins.

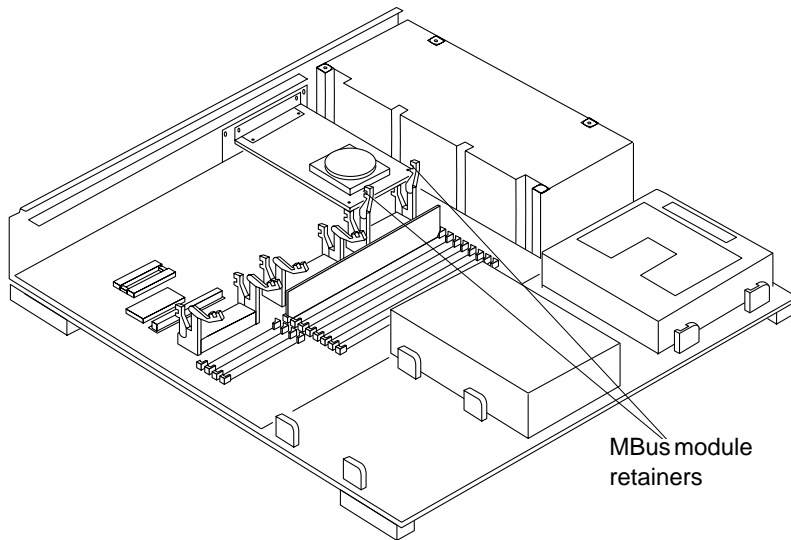


FIGURE 9-5 Locking the MBus Module Retainers

4. Push and lock the retainer arms over the edge of the MBus module.

See FIGURE 9-5. If the system has two MBus modules (slot 1 on top of slot 0), and the defective module is in slot 0, install the module in slot 0 first. Follow steps 2 through 6 to replace module in slot 1.

Note – If the module is not fully inserted into the MBus slot connector, the card retainers may not lock over the module's edge.

5. Detach the wrist strap and replace the cover.

Refer to the procedures in Chapter 17.

6. Reconnect any peripherals to the system.

7. Power on the system.

SBus Cards

If you are removing a defective SBus card, install the replacement card in the same slot. Refer to the documentation shipped with the SBus card for installation information.

10.1 Tools Needed

To remove and install an SBus card you will need the following tools and materials:

- Phillips screwdriver (size #1)
- Phillips screwdriver (size #2)
- Card extractor
- Wrist strap
- Antistatic surface

10.2 Removing an SBus Card

- 1. Power off the system and disconnect the expansion units.**
Refer to “Halting the System in Chapter 4.
- 2. Make sure that the green LED on the front of the chassis is not lit.**
- 3. Leave the power cord connected to the system and to the wall outlet.**
- 4. Remove the system unit cover.**
Refer to “Removing the System Unit Cover in Chapter 4.

5. Attach the wrist strap.

Refer to “Attaching the Wrist Strap in Chapter 4.

6. Note the SBus card location. See FIGURE 10-1.

Start with card(s) mounted in the top slot first.

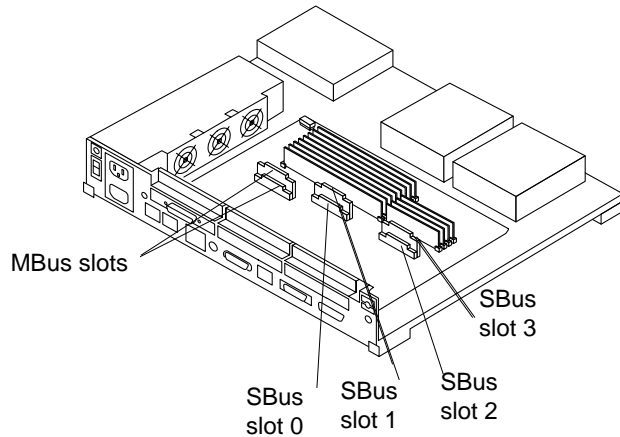


FIGURE 10-1 SBus Slot Locations

7. Remove the screws and washers from the outside of the rear panel where the SBus card is fastened. See FIGURE 10-2.

Single-width SBus cards have two sets of fastening hardware, double-width SBus cards have four sets, and triple-width SBus cards have six sets. Save the screws and washers for future use.

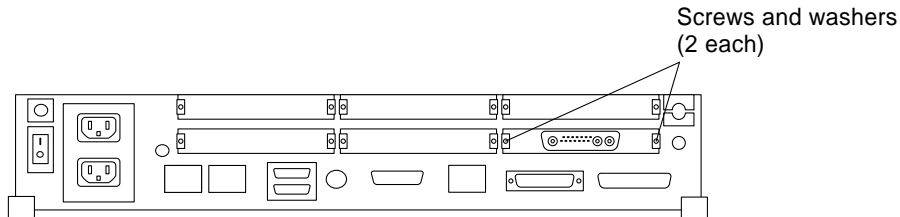


FIGURE 10-2 Rear Panel—Screws and Washers

8. Push the rear card retainers away from the edge of the SBus card. See FIGURE 10-3.

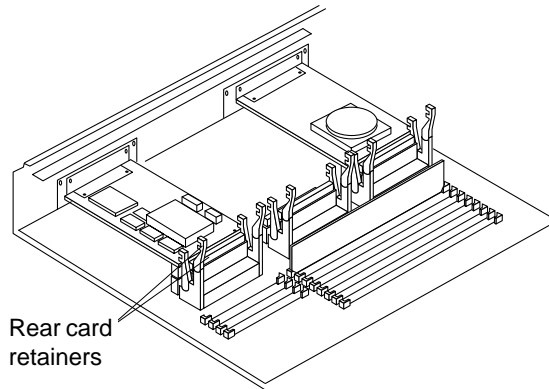


FIGURE 10-3 SBus Rear Card Connectors

- 9. Install the card extractor (shipped with the system) on the SBus card. Insert the legs of the extractor into the holes on either side of the connector. See FIGURE 10-4. Install two card extractors on an SBus card that occupies two slots.**

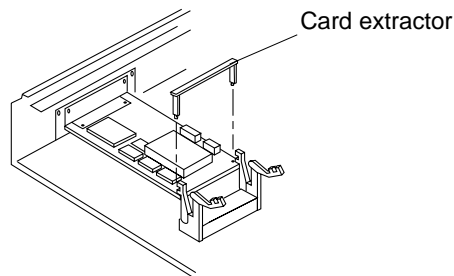


FIGURE 10-4 Installing or Removing the Card Extractor

- 10. Hold both ends of the card extractor and pull upwards slowly until the connector is out of the slot.**
See FIGURE 10-5 and FIGURE 10-6.

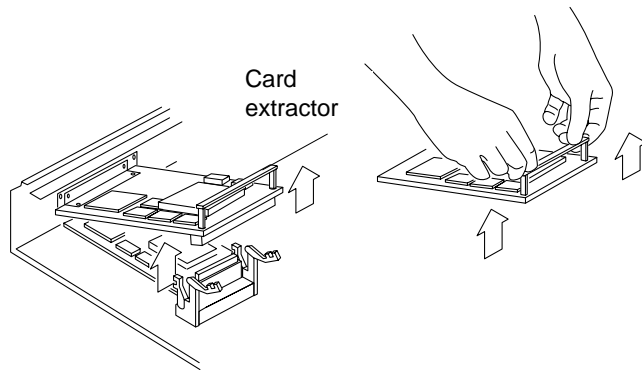


FIGURE 10-5 Removing a Single-Width SBus Card

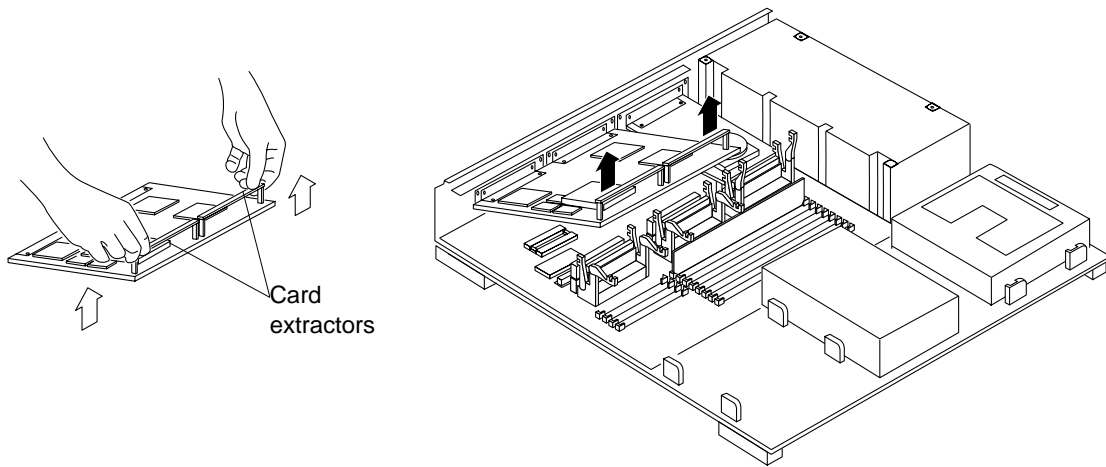


FIGURE 10-6 Removing a Double-Width SBus Card

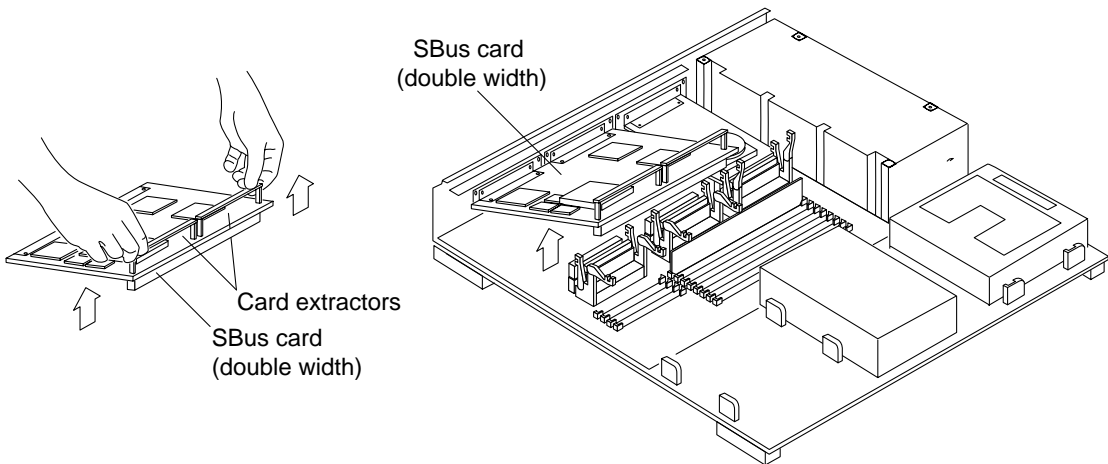


FIGURE 10-7 Removing a Double-width SBus Card

- 11. Remove the card extractor(s) from the SBus card.**
Save the card extractor(s) for future use.
- 12. Place the SBus card on an antistatic surface.**
Save the SBus card for reuse.
- 13. Remove the cards from the bottom slots.**
Repeat steps 6 through 12 to remove the cards from the bottom slot(s) if there are any.

10.3 Installing an SBus Card

- 1. Remove the new card from its antistatic bag. Hold the card by the edges.**
- 2. Place the SBus card on an antistatic surface (either an antistatic mat or the antistatic bag the card was shipped in).**
- 3. If required for your card, set the jumpers or switches on the card.**
Refer to the guide for your SBus product.
- 4. If the card you are installing has tabs on the backplate, remove the adapter bracket.**

a. Remove the two screws attaching the adapter bracket to the backplate.

See FIGURE 10-8.

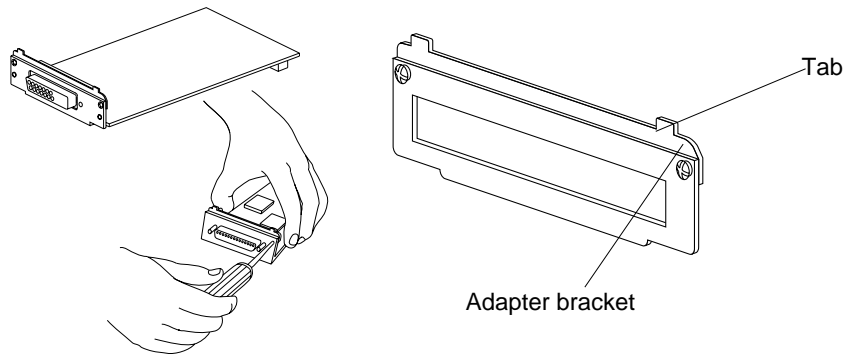


FIGURE 10-8 Removing the Adapter Bracket from the SBus Card

b. Save the adapter bracket and the screws. You might need to use them when installing SBus cards in other systems.

5. If there are filler panels where you are going to install the SBus card, you must remove them.

See FIGURE 10-9.

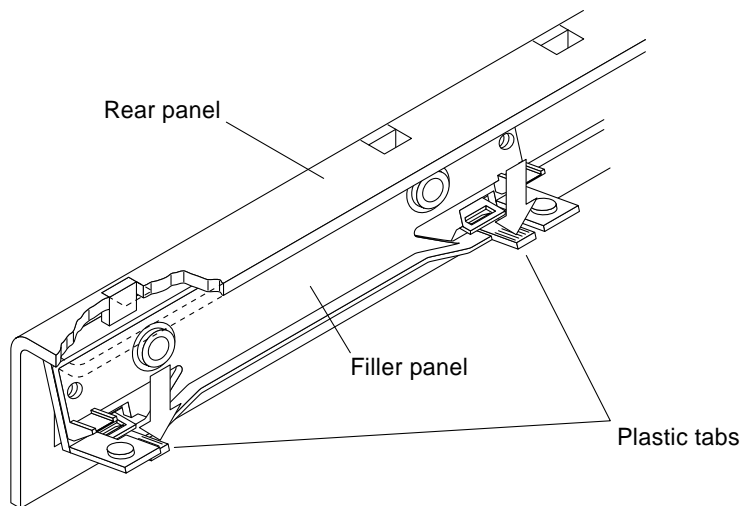


FIGURE 10-9 Removing a Filler Panel

6. Push both rear card retainers back.

See FIGURE 10-10.

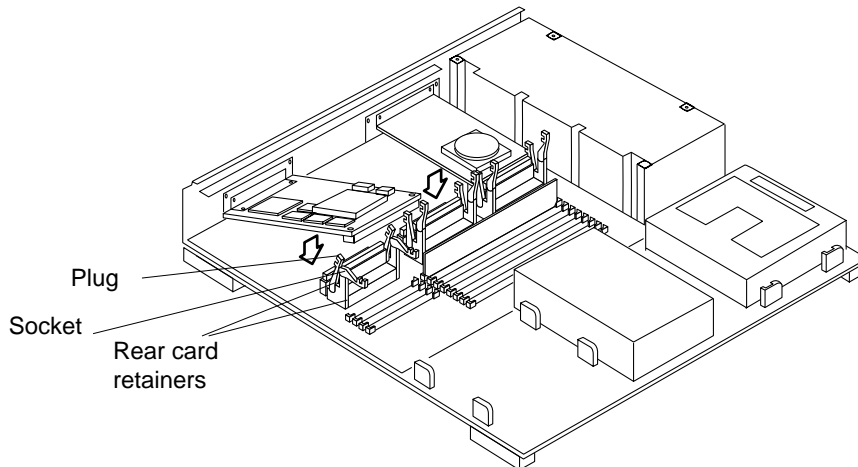


FIGURE 10-10 SBus Card Plug, Socket, and Retainers

7. Remove the card retainer from the SBus card.

See FIGURE 10-11.

- a. Bend one leg of the retainer slightly to the outside until the hook clears the hole in the SBus card.
- b. Remove the other side of the retainer which should come out easily without bending it.

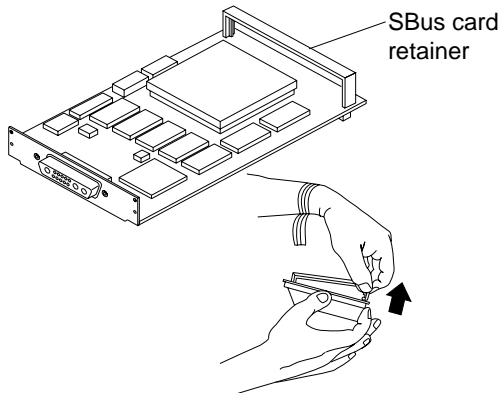


FIGURE 10-11 Removing the SBus Card Retainer

8. **Remove the card extractor from the replacement SBus card if it is installed.**
Save the SBus card extractor for future use.
9. **Slide the card at an angle into the back panel of the system. Hook the card backplate under the lip on the back panel. Be sure the card backplate shows through the slots on the back panel.**

See FIGURE 10-12.

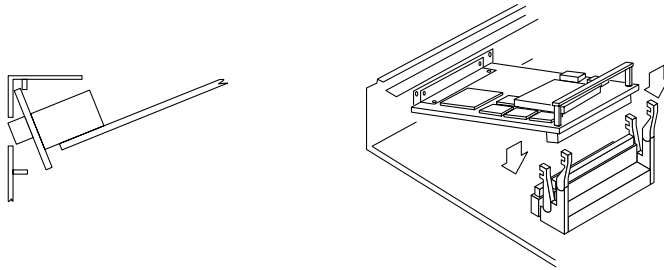


FIGURE 10-12 Inserting the SBus Card

10. **Align the plug with the socket. Gently press the corners of the card to push the plug into the socket. Do not force the card or you may damage the pins on the card.**



Caution – Excessive force may bend or damage the pins.

11. **Press the card retainers forward over the edge of the SBus card.**
See FIGURE 10-10.
12. **Install the fastening hardware you removed earlier into the screw holes adjacent to the SBus card on the back panel using a Phillips screwdriver. The washers must be positioned vertically (narrow side across).**
See FIGURE 10-13.

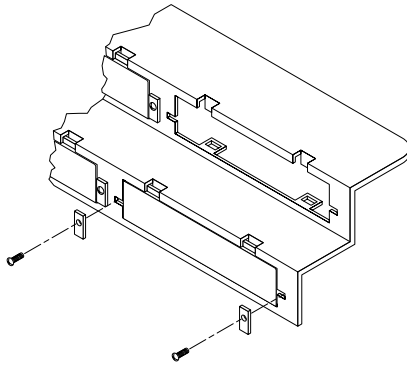


FIGURE 10-13 Inserting Washers and Screws to Secure the SBus Card

- 13. To install top SBus cards, repeat steps 1 through 12.**
- 14. Follow the instructions in Chapter 17 to detach the wrist strap, install the cover, connect the expansion unit(s), and power on the system.**

Power Supply Assembly

This chapter describes how to remove and install the power supply assembly. The power supply assembly also contains fans.

11.1 Tools Needed

To remove and install the power supply assembly you need the following tools and materials:

- Phillips screwdriver (size #2)



Caution – Make sure to disconnect the power cord from the back panel of the system unit before removing the power supply assembly from the system unit.

11.2 Removing the Power Supply Assembly

1. **Power off the system and disconnect the expansion units. Refer to Chapter 4.**
2. **Turn the power switch off (O) position.**
3. **Check that the green LED at the front of the chassis is not lit.**
4. **Remove the power cord from the system unit.**
5. **Remove the system unit cover.**

Refer to “Removing the System Unit Cover in Chapter 4.

- 6. Disconnect the power supply connector from the main logic board (J1501).**
See FIGURE 11-1.
- 7. Disconnect the power supply connector from the DC power harness.**
See FIGURE 11-1.
- 8. Loosen the captive screw that secures the power supply assembly to the chassis.**
See FIGURE 11-1.

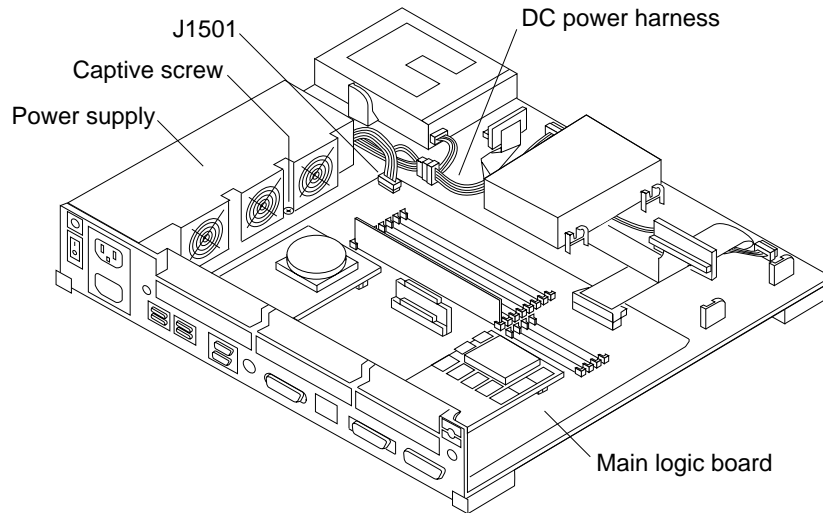


FIGURE 11-1 Disconnecting the Power Supply

- 9. Slide the power supply assembly toward the front of the chassis.**
Sliding the power supply assembly unlocks the power supply from the power supply mounts. See FIGURE 11-2.

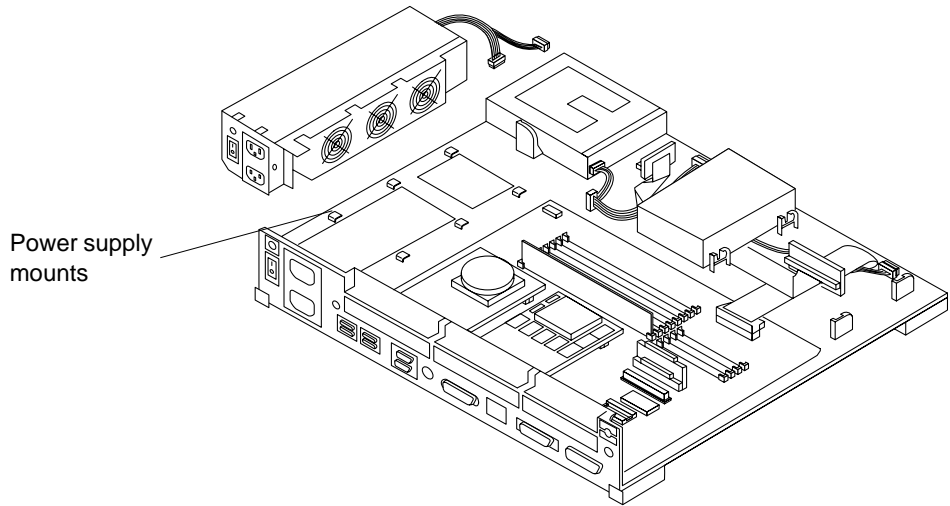


FIGURE 11-2 Power Supply Chassis Mounts

10. Lift the power supply assembly from the chassis.

11.3 Installing the Power Supply Assembly

1. Align the power supply assembly in the chassis.
2. Slide the power supply assembly toward the rear of the chassis until it locks in the power supply mounts.
See FIGURE 11-2.
3. Secure the power supply assembly to the chassis by tightening the captive screw.
See FIGURE 11-3.



Caution – Overtightening the captive screw may damage the chassis.

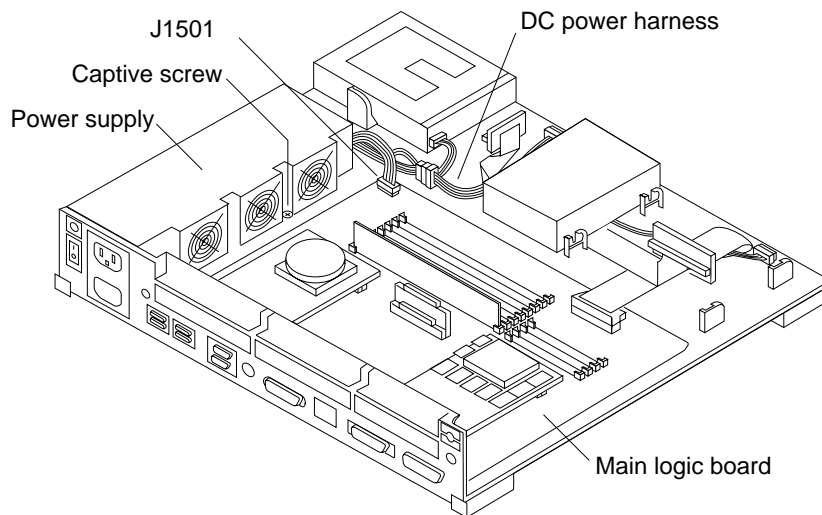


FIGURE 11-3 Connecting the Power Supply

4. Connect the DC power connector to the main logic board (J1501).

The connector is keyed so that the connectors can only be connected one way. See FIGURE 11-3.

5. Connect the DC power connector to the DC power harness.

See FIGURE 11-3.

6. Make sure the power switch on the system unit is in the Off position. Press the side labeled O.

7. Plug in the system unit power cord.

8. Follow the instructions in Chapter 17 to install the cover, connect any expansion unit(s), and power on the system.

Hard Disk Drives

This chapter describes how to remove and install a hard disk drive for a SPARCstation 10 system.

Note – The SPARCstation 10 supports the 424-Mbyte and 1.05-Gbyte hard disk drives, called “fast SCSI” drives. You must inspect and, if necessary, reset the SCSI Device ID jumpers for the type of drive you are installing. When the jumpers are properly set, each drive is automatically assigned a specific and unique SCSI Device ID number.

12.1 Tools Needed

To remove and install the disk drive, you need the following tools and materials:

- Phillips screwdriver (size #2)
- Needlenose pliers
- Wrist strap
- Antistatic surface

12.2 Removing a Disk Drive

Power off the system and disconnect the expansion units. Refer to Chapter 4.



Caution – The hard disk drive contains electronic components that are extremely sensitive to static electricity. Ordinary amounts of static from your clothes or work environment can destroy the components.

Wear a grounding strap when handling the drive. Refer to “Attaching the Wrist Strap in Chapter 4. Do not touch the components or any metal parts.

- 1. Turn the power switch off (O) position.**
- 2. Make sure that the green LED at the front of the chassis is not lit.**
- 3. Make sure that the power cord remains connected to the computer system and to the wall outlet or power strip.**
- 4. Remove the system unit cover.**
Refer to “Removing the System Unit Cover in Chapter 4.



Caution – Hot surfaces are present. Use care when opening the system chassis or handling components.

- 5. Attach the wrist strap.**
Refer to “Attaching the Wrist Strap in Chapter 4.
- 6. Determine which drive you need to remove.**
Drive 0 is mounted toward the center of the chassis, and drive 1 is mounted next to it. If the system has one hard disk drive, it should be mounted toward the center of the chassis (drive 0). See FIGURE 12-1.

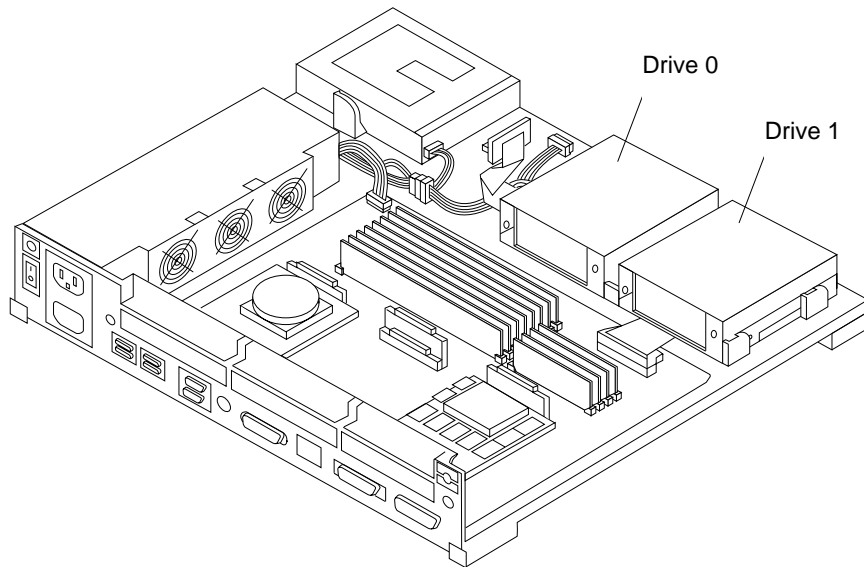


FIGURE 12-1 Hard Disk Drive Locations

- 7. Slide the hard disk drive toward the rear of the chassis to free the grommets from the drive mounts.**

See FIGURE 12-2.

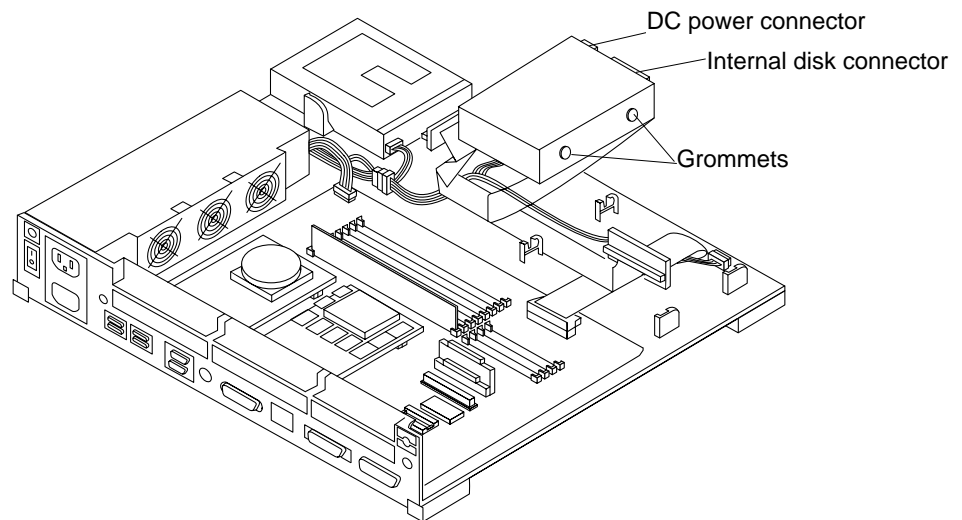


FIGURE 12-2 Removing a Hard Disk Drive

8. Disconnect the DC power connector from the drive.

See FIGURE 12-2.

9. Disconnect the internal disk connector from the drive.

See FIGURE 12-2.

10. Lift the hard disk drive out of the chassis.

Place it on the antistatic surface.

12.3 Installing a Hard Disk Drive

To install a hard disk drive you must do the following:

- Determine the location and type of drive to be installed
- Verify, and if necessary, change the SCSI address jumpers
- Verify that the configuration jumpers are set correctly
- Install the disk drive

12.4 Drive Locations

Find the correct disk drive location. See FIGURE 12-3. Use position 0 if you are installing only one drive.

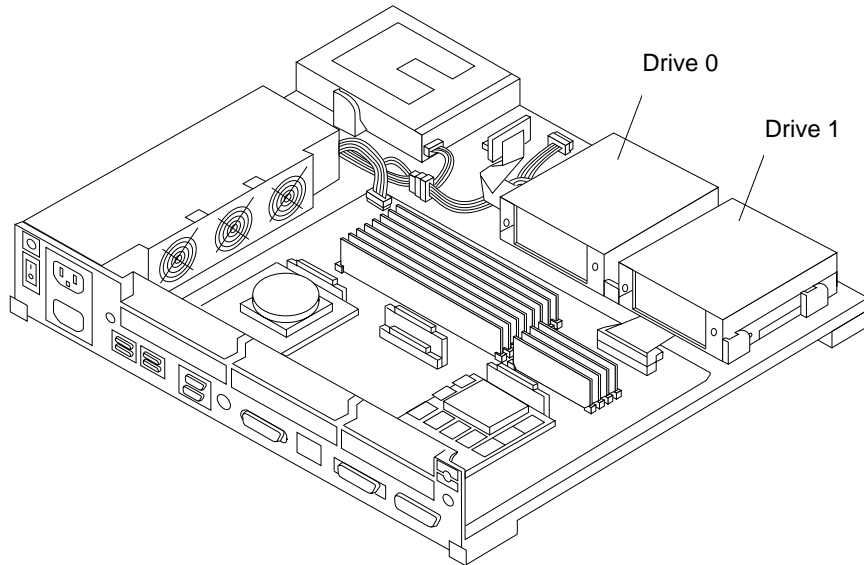


FIGURE 12-3 Hard Disk Drive Locations

12.5 Supported Hard Disk Drives

The following hard disk drives are supported for the SPARCstation 10:

- 424-Mbyte hard disk drive
- 1.05-Gbyte hard disk drive

Depending on the drive, the jumpers are either located near the lower right corner of the drive controller board, or near the lower left corner.

See the figure(s) that correspond to your drive(s) and verify the jumper settings for the appropriate drive position. In the figures, the black jumper spaces indicate a jumper is in that position. The white jumper spaces indicate no jumper for that position. See FIGURE 12-4.

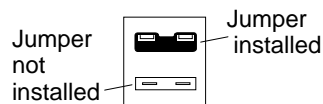


FIGURE 12-4 Jumper Legend in Illustrations

12.6 Checking and Setting SCSI Jumpers

Verify that the SCSI (Small Computer Systems Interface) device ID jumper setting is correct before you install a hard disk drive. Each SCSI device in your system needs a specific and unique SCSI ID number. When you set the SCSI Device ID jumpers, each drive is automatically assigned a SCSI Device ID number. The SCSI device ID jumper of drive 0 must be set at 3. The SCSI device ID jumper of drive 1 must be set at 1. See TABLE 12-1.

TABLE 12-1 SCSI Drive Jumper Settings and Addresses

Drive Location	Target ID Jumper Settings	SCSI Address
Position 0	A0 - Installed	3
	A1 - Installed	
	A2 - Not installed	
Position 1	A0 - Installed	1
	A1 - Not installed	
	A2 - Not installed	

12.6.1 424-Mbyte Jumper Settings

To verify the SCSI ID jumpers:

1. **Make sure that the drive is on an antistatic surface (either an antistatic mat or the antistatic bag the drive was shipped in).**
2. **Compare the SCSI device ID and configuration jumper settings to FIGURE 12-5. Set the jumper settings to match FIGURE 12-5 using needlenose pliers.**

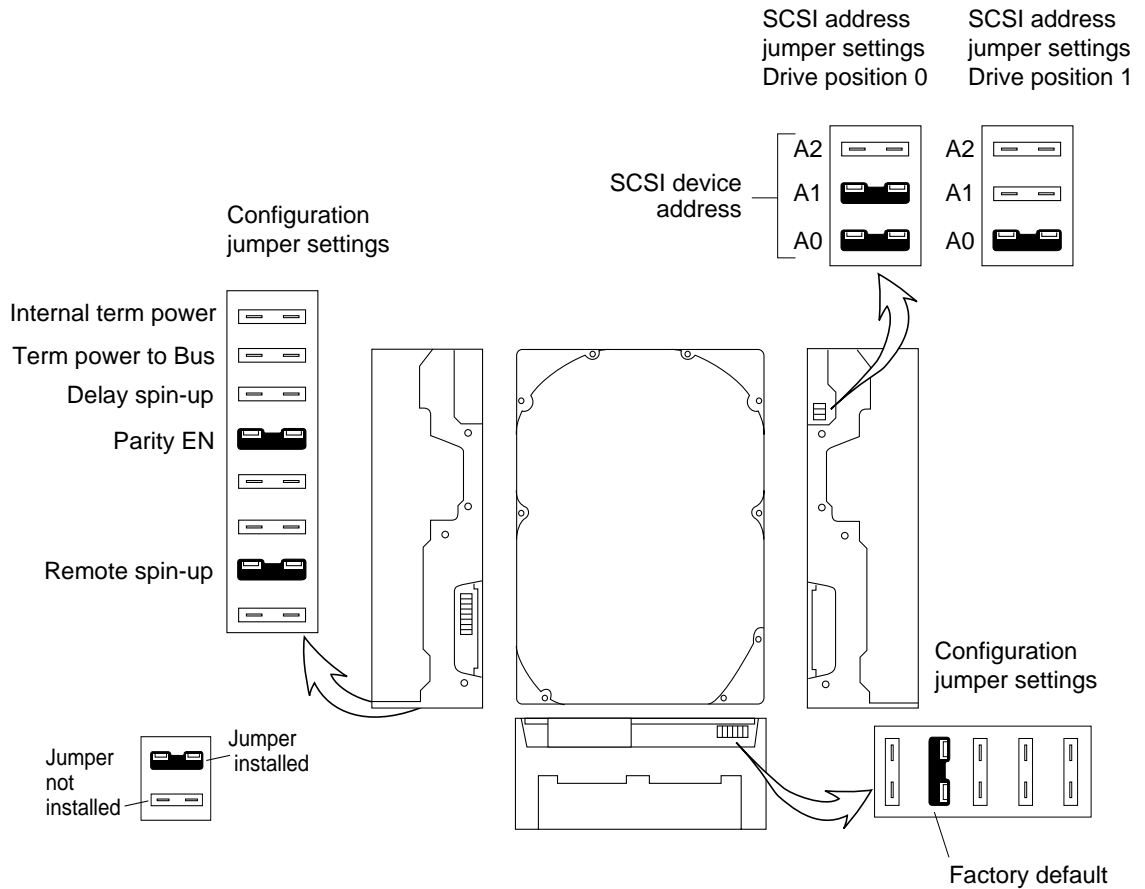


FIGURE 12-5 SCSI Address and Configuration Jumper Settings for 424-Mbyte Drive Position 0 and 1

12.6.2 Installing a 424 Mbyte Drive

1. Complete the procedure for setting drive jumpers. See the “Checking and Setting SCSI Jumpers.”
2. Remove the drive grommets from the defective drive.
3. Set the replacement hard disk drive on an antistatic mat or the antistatic bag the drive was shipped in.
4. Use a Phillips screwdriver to attach four drive grommets to the drive (two on each side).

Refer to FIGURE 12-6.

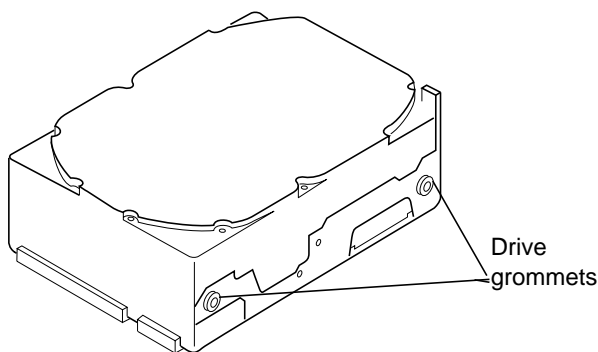


FIGURE 12-6 424 MByte Hard Disk Drive Grommets

- 5. Go to Step 1 of the section “Installing a 1.05 Gbyte Drive to finish installing a 424 Mbyte disk drive.**

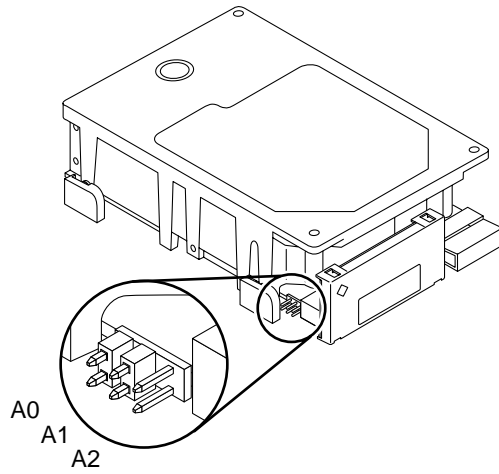
12.6.3 Installing a 1.05 Gbyte Drive

- 1. Put the replacement drive on the antistatic bag the drive was shipped in.**
- 2. Set the SCSI ID jumper settings according to the drive position.**

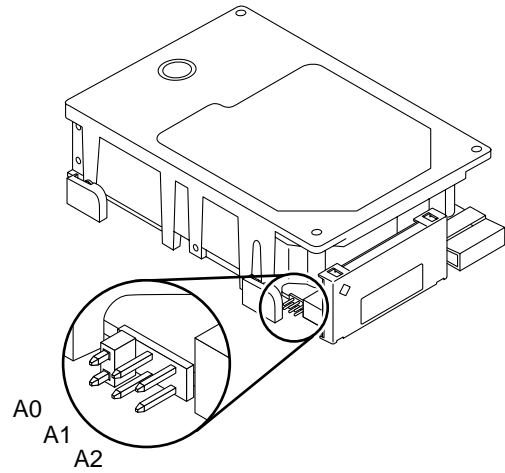
See TABLE 12-2 and FIGURE 12-7.

TABLE 12-2 SCSI Target ID Jumper Settings

Drive Position	Target ID Jumper Settings	SCSI Address
0 (middle of chassis)	A0 installed A1 installed A2 not installed	3
1 (corner of chassis)	A0 installed A1 not installed A2 not installed	1



Drive position 0—Middle of Chassis



Drive position 1—Corner of Chassis

FIGURE 12-7 SCSI Addresses of Both Disk Drives

3. Verify that the configuration jumpers are correctly set. See FIGURE 12-8 and TABLE 12-3.

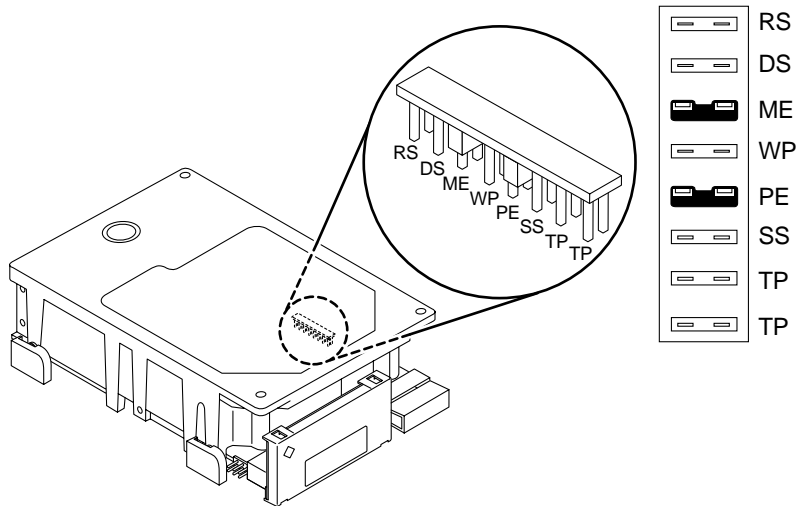


FIGURE 12-8 Configuration Jumper Settings for Both Disk Drives

TABLE 12-3 Configuration Jumper Acronym Definitions

Acronym	Definition
RS	Reserved
DS	Delayed Start
ME	Motor Enable (Remote Spin-up)
WP	Write Protect
PE	Parity Enable
SS	Reserved
TP	Term Power from Drive
TP	Term Power to SCSI Bus

4. Remove the drive grommets from the defective drive.
5. A new mounting bracket must be installed on 1.05 Gbyte drives. Position the drive with the circuit board up so you have access to the drive bottom.
6. Check that the mounting bracket kit contains the following items:
 - Metal mounting bracket
 - Six screws
 - Two slip-on grommets
 - Two screw-in grommets with split washers

Note – If your drive already has four screw-in grommets installed, remove the front two grommets (near the drive connector) and go to Step 1 in this procedure.

- 7. If not already installed, insert two one-piece screw-in drive grommets and split washers on each side of the replacement drive rear (away from the drive connector). Use a Phillips screwdriver. These grommets and the two front slip-on grommets slide into the drive mounts during installation.**

See FIGURE 12-9.

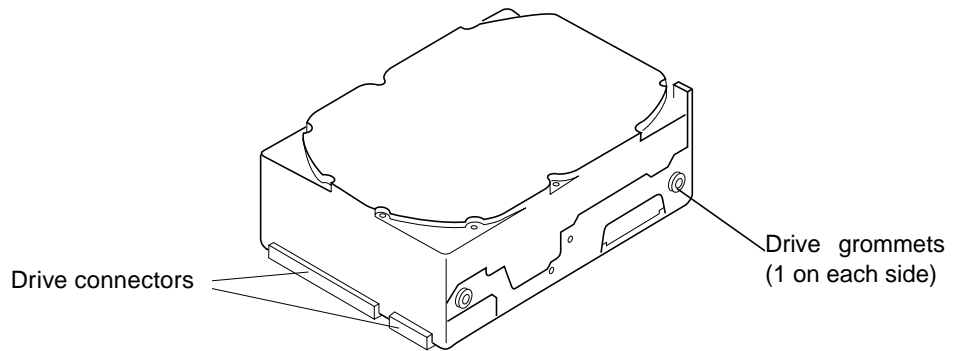


FIGURE 12-9 1.05 Gbyte Hard Disk Drive — Screw-In Grommets

- 8. Press the two plain rubber slip-on grommets (without screws) into place over the metal bracket side tabs.**

See FIGURE 12-10.

Note – When fastening the new mounting bracket to the drive base, you must use the six screws supplied with the mounting bracket (four screws on the base, two on the sides).

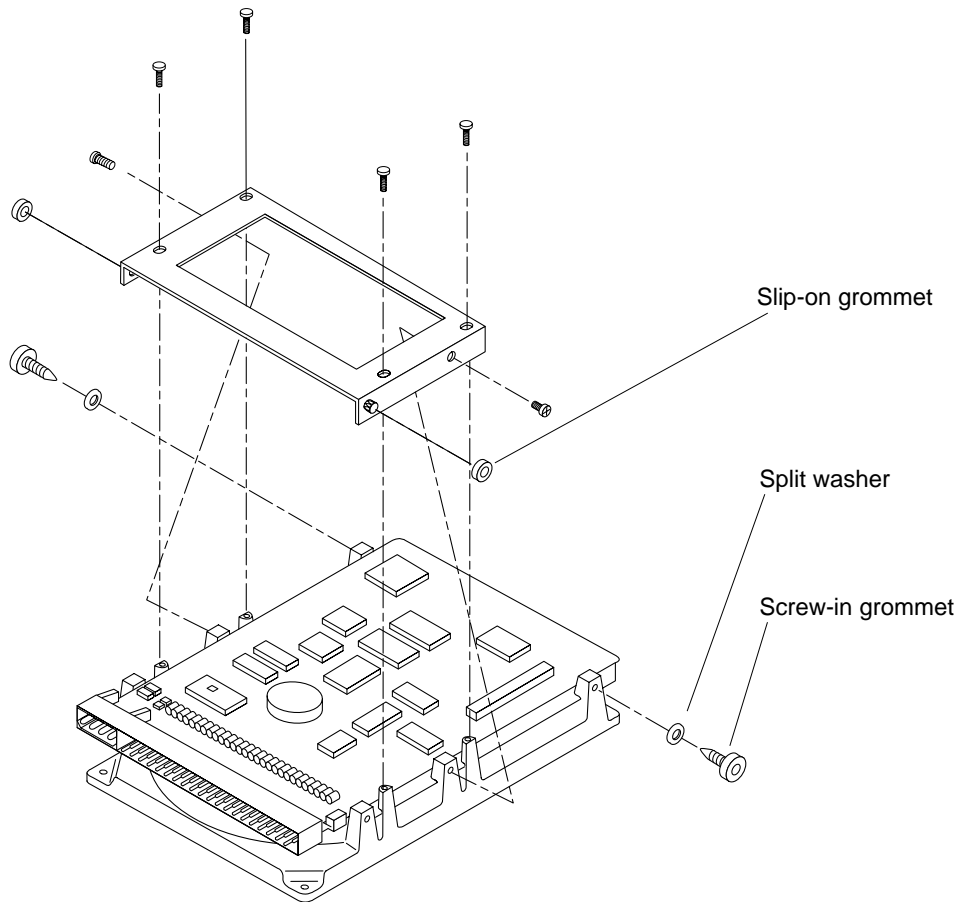


FIGURE 12-10 Positioning the Mounting Bracket over the Drive

- 9. Position the bracket over the drive and align the screw slots over the drive circuit board.**
- 10. Insert one screw on each side of the bracket to fasten the bracket sides to the drive sides.**
- 11. Secure the bracket base to the drive bottom (board side) with four screws.**
- 12. Route the drive power harness and the internal disk data cable to lie flat under the disk drive.**

Fold the internal disk cable and power cable out toward the front of the chassis so they will be in position for connecting to the drive. See FIGURE 12-11.

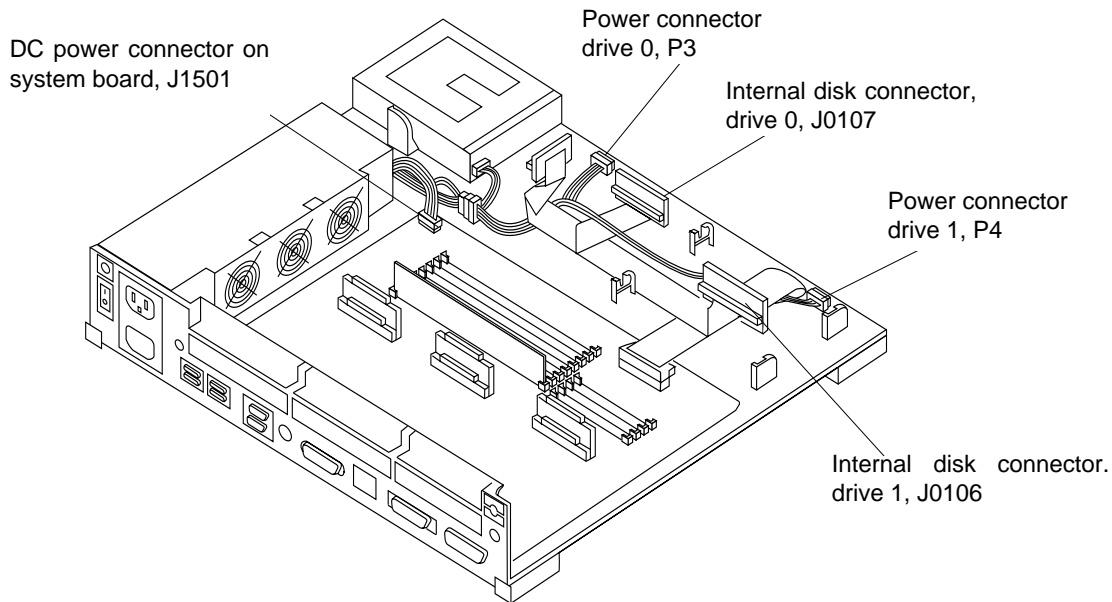


FIGURE 12-11 DC Power Harness and Internal Cable Routing and Connectors

- 13. Hold the drive in one hand and attach the internal disk cable connector and the power harness connector to the drive with your other hand.**
- 14. Lower the drive into the chassis. Align the four grommets on the drive mounts.**
See FIGURE 12-12.

Note – Do not seat the grommets in the drive mounts yet.

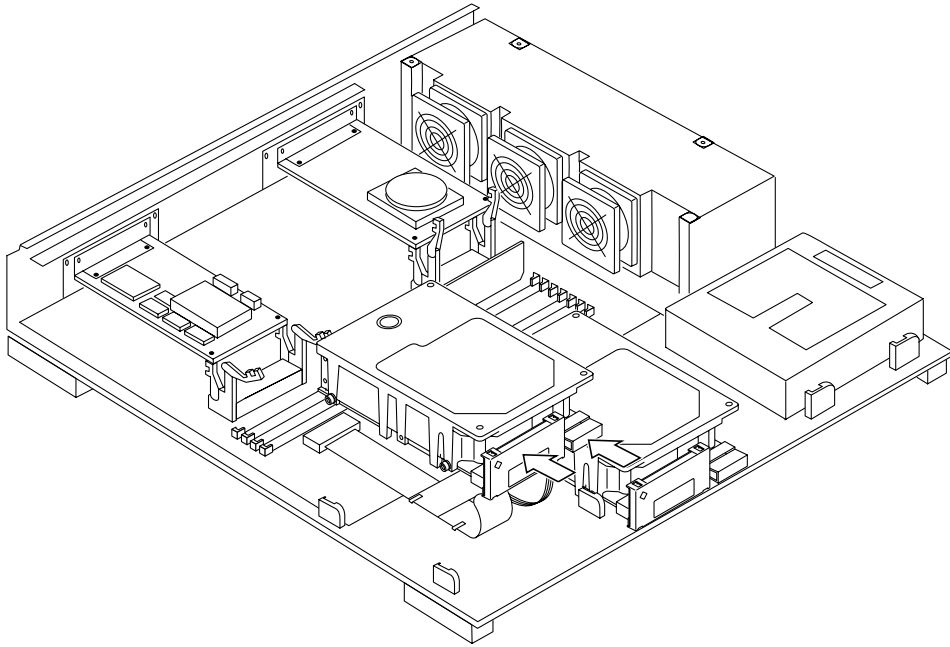


FIGURE 12-12 Lowering the Drive Into the Chassis

15. Connect the DC power connector to the disk drive.

The connectors are keyed so you can only connect them one way. See FIGURE 12-11.

- a. To connect drive 0, attach the connector labeled P3 on the power harness to the drive.
- b. To connect drive 1, attach the connector labeled P4 on the power harness to the drive.

16. Connect the internal disk data connector to the disk drive.

The connectors are keyed so you can only connect them one way. See FIGURE 12-11.

- a. To connect drive 0, attach the internal disk data connector labeled J0107 on the system board to the drive.
- b. To connect drive 1, attach the internal disk data connector labeled J0106 on the system board to the drive.

See FIGURE 12-13.

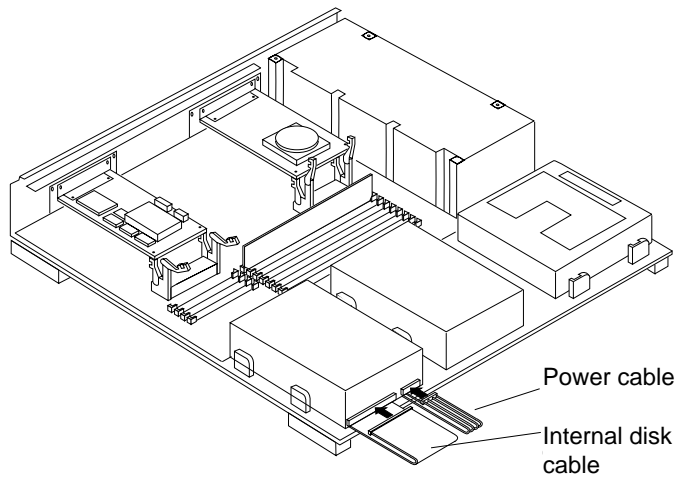


FIGURE 12-13 Connecting the Internal Disk and Power Cables to Drive 1

- 17. Lower the drive into the chassis, press the four drive grommets into the drive mounts. Firmly seat the grommets by moving the drive forward toward the front of the chassis until the grommets sit tightly in the drive mounts.**

See FIGURE 12-14.

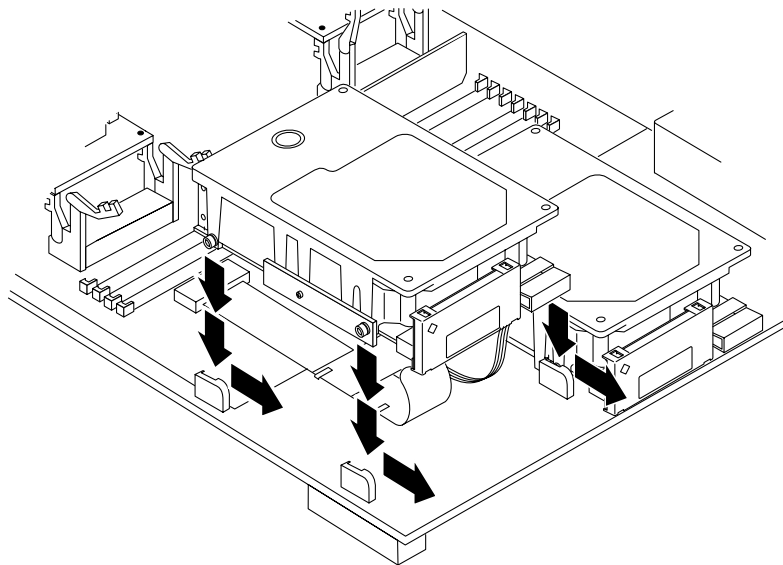


FIGURE 12-14 Seating the Disk Drive Grommets into the Drive Mounts

18. Detach the wrist strap and replace the top cover.

Perform the steps in the section "Installing the System Unit Cover in Chapter 17.

Note – The cover will not close if the disk drive is not fully forward in the disk drive mounts.

19. Connect any expansion units you previously removed to the system.

20. Power on the system.

Perform the steps in the section "Turn On the Power in Chapter 17.

Diskette Drive

This chapter explains how to remove and install a diskette drive for the SPARCstation 10 system.



Caution – The diskette drive contains electronic components that are extremely sensitive to static electricity. Ordinary amounts of static from your clothes or work environment can destroy the components.

Wear a grounding strap when handling the drive. Refer to “Attaching the Wrist Strap in Chapter 4. Do not touch the components or any metal parts.

13.1 Tools Needed

To remove and install the diskette drive, you will need the following tools and materials:

- Phillips screwdriver (size #2)
- Wrist strap
- Antistatic surface

13.2 Removing the Diskette Drive

Follow Chapter 4 to power off the system and disconnect the expansion units.

To remove the diskette drive from the system:

1. **Check that the green LED at the front of the chassis is not lit.**

2. **Check that the system power cord remains connected to the system and the wall outlet.**
3. **Remove the system unit cover.**
Refer to “Removing the System Unit Cover in Chapter 4.
4. **Attach the wrist strap.**
Refer to “Attaching the Wrist Strap in Chapter 4.
5. **Remove both clips from the diskette drive mounts before you remove the diskette drive. Keep the clips for future use.**
See FIGURE 13-1.

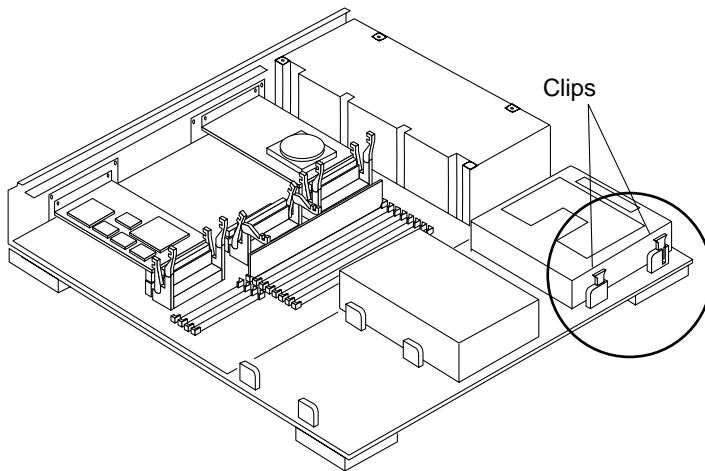


FIGURE 13-1 Removing Diskette Drive Clips

6. **Slide the diskette drive toward the outer side of the chassis to free the grommets from the drive mounts.**
See FIGURE 13-2.

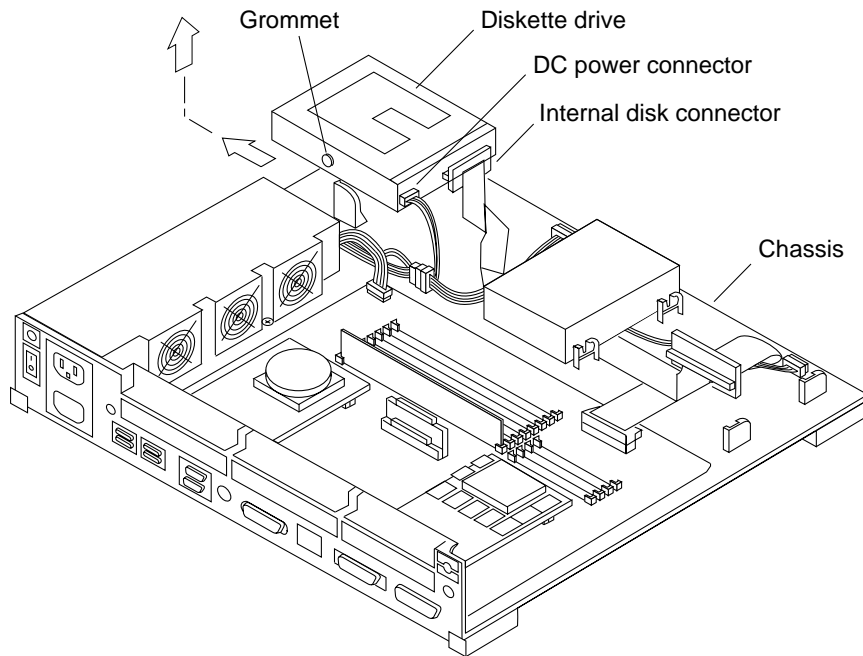


FIGURE 13-2 Removing a Diskette Drive

7. Disconnect the DC power connector and the internal disk connector from the diskette drive.

See FIGURE 13-2.

8. Lift the diskette drive out of the chassis and put it on an antistatic surface.

13.3 Preparing the Diskette Drive

Before installing a diskette drive, you must check the diskette drive switch setting and make sure that the switch is set correctly, as shown in FIGURE 13-3.

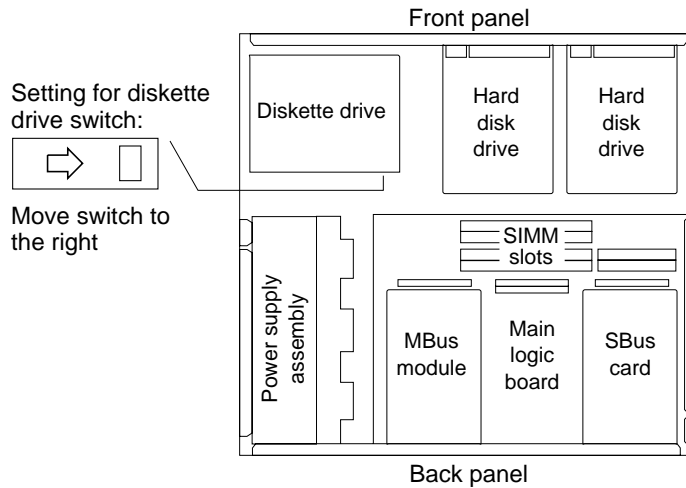


FIGURE 13-3 Diskette Drive Switch Setting

13.4 Installing the Diskette Drive

To install the diskette drive in the system:

1. **Position the drive unit so that its data and power cables are facing the inner part of the chassis.**

See FIGURE 13-4.

2. **Lower the drive into the chassis and align the three grommets into the drive mounts.**

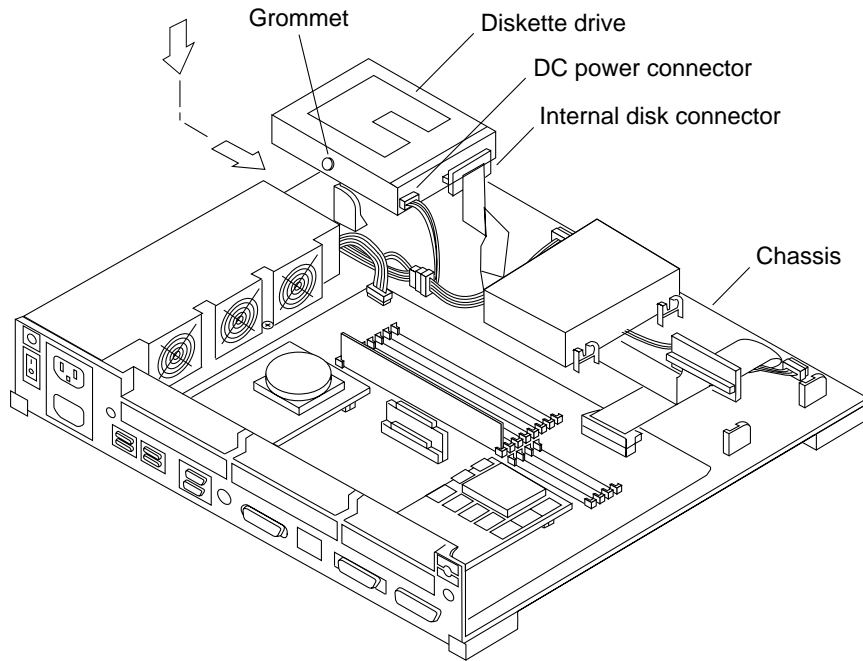


FIGURE 13-4 Installing a Diskette Drive

- 3. Connect the DC power connector to the diskette drive and the internal disk connector to the diskette drive.**

The connectors are keyed so that it will fit only one way. See FIGURE 13-4.

- 4. Slide the diskette drive toward the center of the chassis until the three grommets sit tightly in the drive mounts.**
- 5. Insert the diskette drive clips into the drive mounts in their designated positions.**
See FIGURE 13-5.

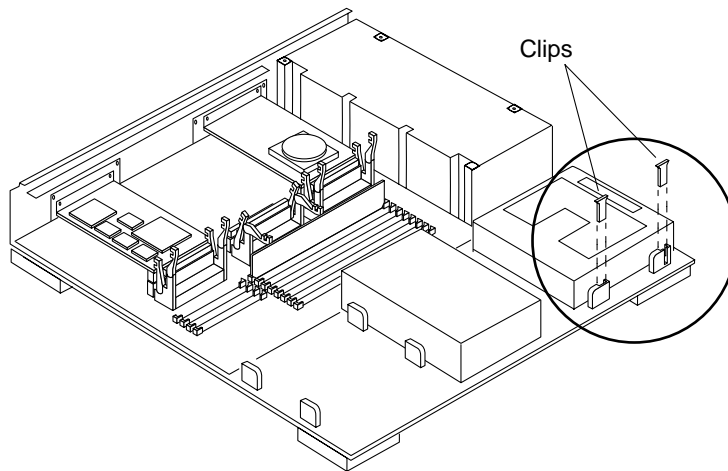


FIGURE 13-5 Installing Clips Into the Diskette Drive Mounts

Note – The system cover may not close, if the diskette drive is not seated correctly in the drive mounts.

- 6. Follow the instructions in Chapter 17 to detach the wrist strap, install the cover, connect the expansion unit(s), and power on the system.**

DC Power Harness

This chapter explains how to remove and install the DC power harness for a SPARCstation 10 system.

14.1 Tools Needed

To remove and install the DC power harness you will need the following tools and materials:

- Phillips screwdriver (size #2)
- Wrist strap
- Antistatic surface

14.2 Removing the DC Power Harness

Power off the system and disconnect the expansion units. Refer to Chapter 4.



Caution – The hard disk drive contains electronic components that are extremely sensitive to static electricity. Ordinary amounts of static from your clothes or work environment can destroy the components.

Wear a grounding strap when handling the drive. Refer to “Attaching the Wrist Strap in Chapter 4. Do not touch the components themselves or any metal parts.

To remove the DC power harness:

1. **Remove the disk drive from the system unit.**

- a. Check that the green LED at the front of the chassis is not lit.
- b. Check that the system power cord remains connected to the system and the wall outlet.
- c. Remove the system unit cover.
Refer to “Removing the System Unit Cover in Chapter 4.
- d. Attach the wrist strap.
Refer to “Attaching the Wrist Strap in Chapter 4.
- e. Slide the disk drive toward the rear of the chassis to free the grommets from the drive mounts.
See FIGURE 14-1.

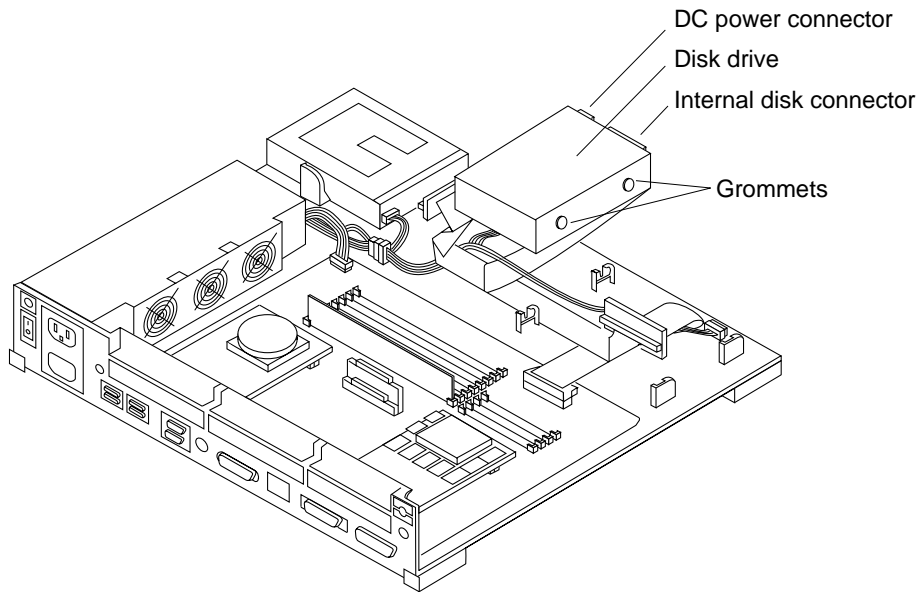


FIGURE 14-1 Removing a Disk Drive

- f. Disconnect the DC power connector from the disk drive.
See FIGURE 14-1.
- g. Disconnect the internal disk connector from the disk drive.
See FIGURE 14-1.
- h. Lift the hard disk drive out of the chassis and put it on an antistatic surface for future use.
- i. Note the drive location.

- j. Repeat steps e to i if a second drive is installed.
2. **Disconnect the DC power connector from the power supply.**
See FIGURE 14-2.
3. **Disconnect the DC power connector from the diskette drive.**
See FIGURE 14-2.
4. **Slide the DC power harness out of the cable clips in the base of the system and remove the DC power harness from the chassis.**

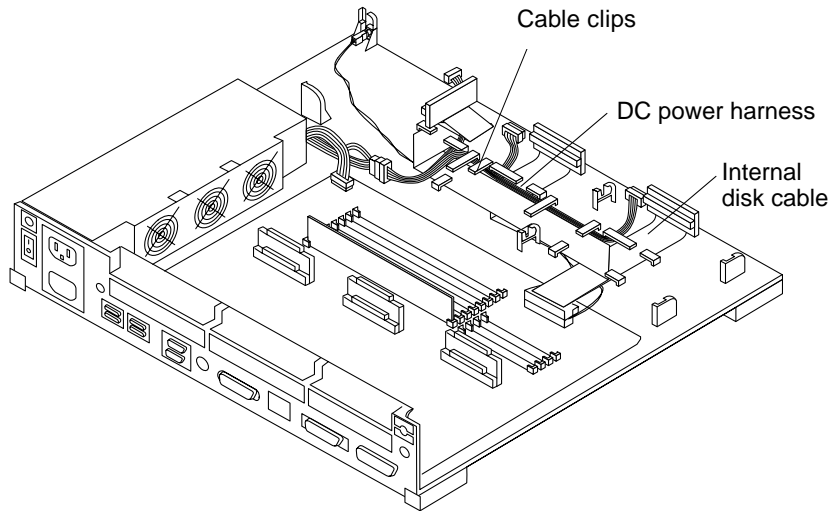


FIGURE 14-2 DC Power Harness and Internal Disk Cable Layout

14.3 Installing the DC Power Harness

Follow these steps to install the DC power harness:

1. **Connect the DC power connector to the power supply.**
See FIGURE 14-3.

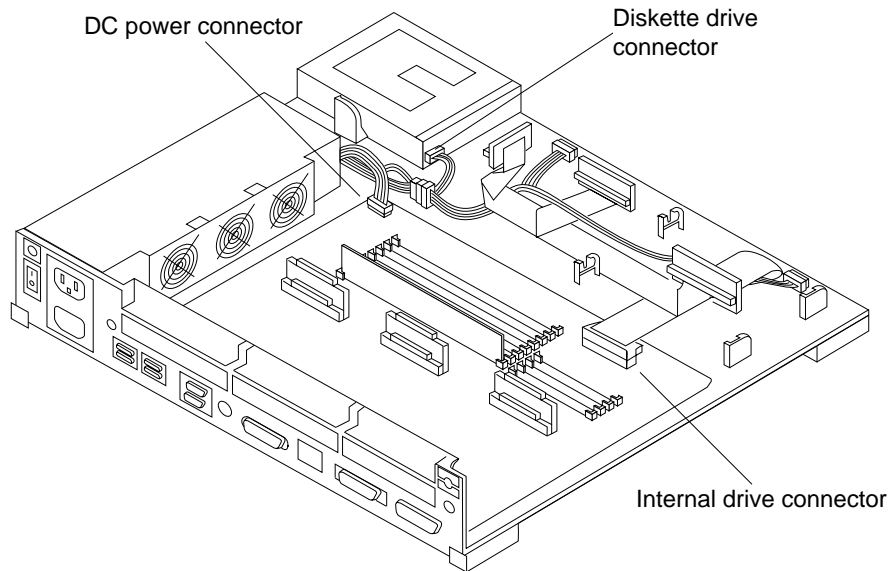


FIGURE 14-3 DC Power Harness and Drive Connectors

2. Connect the DC power connector to the diskette drive.

See FIGURE 14-3.

3. Route the DC power harness through the cable clips.

See FIGURE 14-2.

Note – Make sure that the DC power harness and the internal drive cable lay flat.

4. Verify that the jumper setting is correct for the drive location.

FIGURE 14-4 shows the proper jumper settings for drive 0 and drive 1.

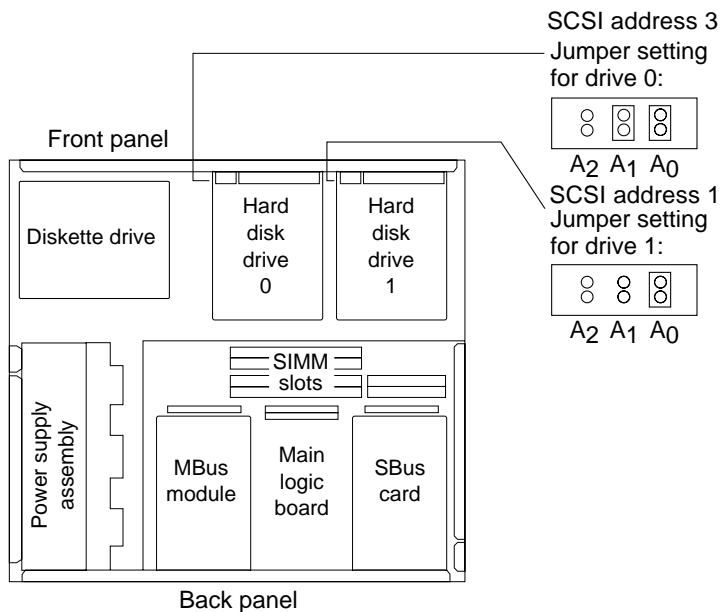


FIGURE 14-4 Jumper Settings for Drive 0 and 1

5. Position the drive connectors toward the front of the chassis.

See FIGURE 14-5.

6. Lower the drive into the chassis and align the grommets on the drive mounts.

See FIGURE 14-5.

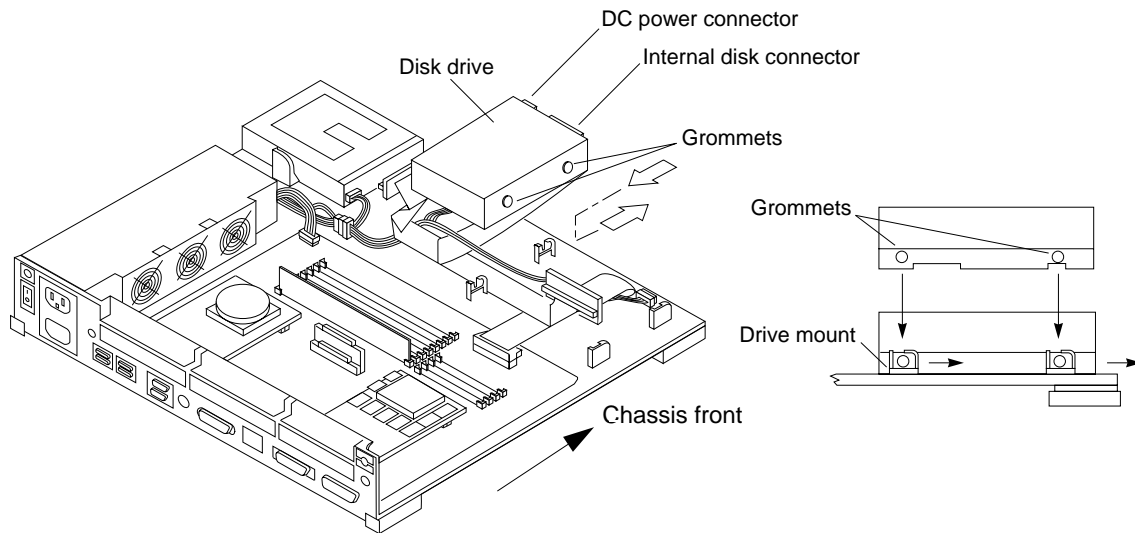


FIGURE 14-5 Installing the Disk Drive

- 7. Connect the internal disk connector to the disk drive.**
The connector is keyed so it will fit only one way.
- 8. Connect the DC power connector to the disk drive.**
The connector is keyed so it will fit only one way.
- 9. Lower the drive and slide it forward toward the front of the chassis until the grommets sit tightly in the drive mounts.**
- 10. Follow steps 4 through 9 if a second drive is to be installed.**

Note – The system cover may not close correctly, if the drive is not pushed forward far enough.

- 11. Follow the instructions in Chapter 17 to detach the wrist strap, install the cover, connect the expansion unit(s), and power on the system.**

Internal Disk Cable

This chapter explains how to remove and install the internal disk cable in a SPARCstation 10 system.

15.1 Tools Needed

To remove and install the internal disk cable, you will need the following tools and materials:

- Phillips screwdriver (size #2)
- Wrist strap
- Antistatic surface

15.2 Removing the Internal Disk Cable

Follow the instructions in Chapter 4 to power off the system and disconnect the expansion units.



Caution – The hard disk drive contains electronic components that are extremely sensitive to static electricity. Ordinary amounts of static from your clothes or work environment can destroy the components.

Wear a grounding strap when handling the drive. Refer to “Attaching the Wrist Strap in Chapter 4. Do not touch the components themselves or any metal parts.

To remove the internal disk cable, follow these steps:

1. **Remove the disk drive(s) from the system unit.**
 - a. **Check that the green LED at the front of the chassis is not lit.**
 - b. **Check that the system power cord remains connected to the system and the wall outlet.**
 - c. **Remove the system unit cover.**
Refer to “Removing the System Unit Cover in Chapter 4.
 - d. **Attach the wrist strap.**
Refer to “Attaching the Wrist Strap in Chapter 4.
 - e. **Slide the disk drive toward the rear of the chassis to free the grommets from the drive mounts and lift the drive.**
See FIGURE 15-1.

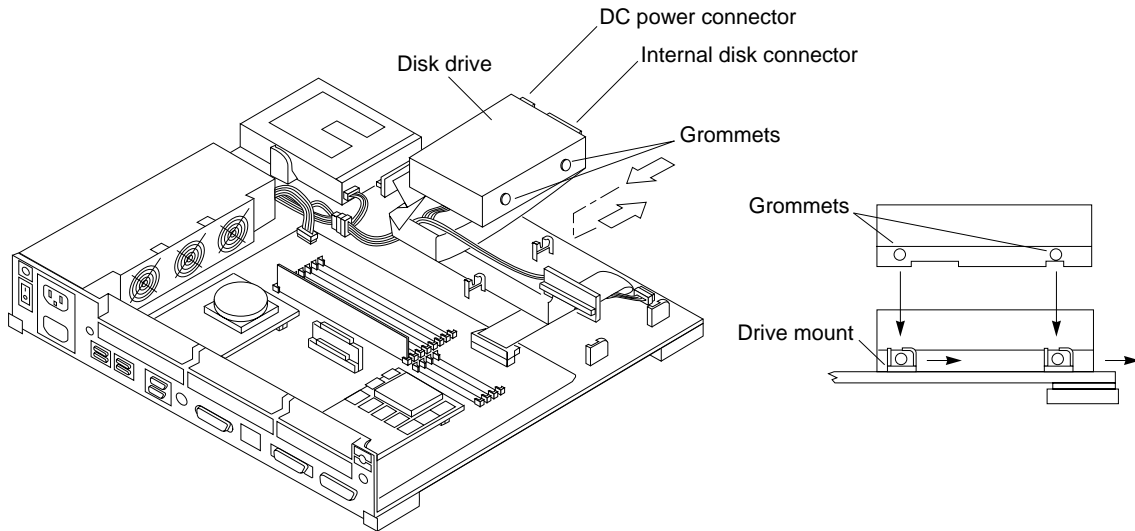


FIGURE 15-1 Removing the Disk Drive

- f. **Disconnect the DC power connector from the disk drive.**
See FIGURE 15-1.
- g. **Disconnect the internal disk connector from the disk drive.**
See FIGURE 15-1.
- h. **Lift the hard disk drive out of the chassis.**
Put it aside on an antistatic surface for future use.
- i. **Note the disk drive location.**

- j. Follow steps e through i if a second drive is installed.**
- 2. Remove the diskette drive from the system unit.**
 - a. Slide the diskette drive toward the outer side of the chassis to free the grommets from the drive mounts.**
See FIGURE 15-2.

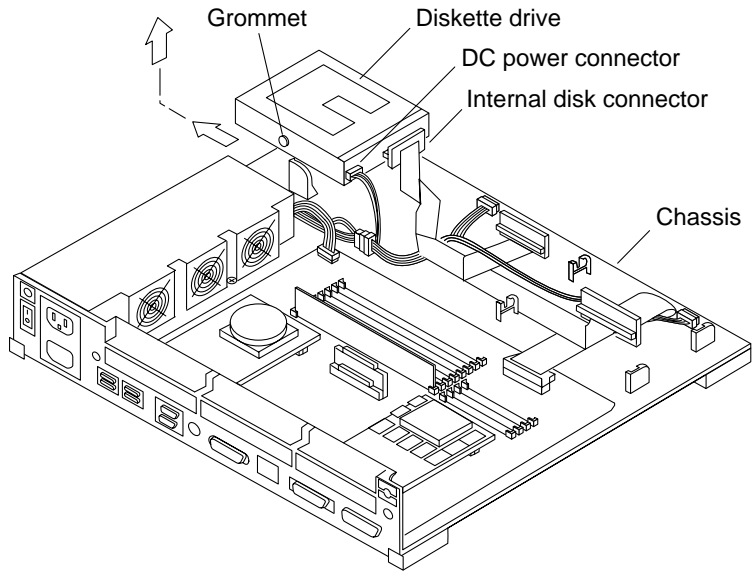


FIGURE 15-2 Removing a Diskette Drive

- b. Disconnect the DC power connector from the diskette drive.**
See FIGURE 15-2.
 - c. Disconnect the internal disk connector from the diskette drive.**
See FIGURE 15-2.
 - d. Lift the diskette drive out of the chassis and put it aside on an antistatic surface.**
- 3. Remove the DC power harness from the system unit.**
 - a. Disconnect the DC power connector from the power supply.**
See FIGURE 15-3.

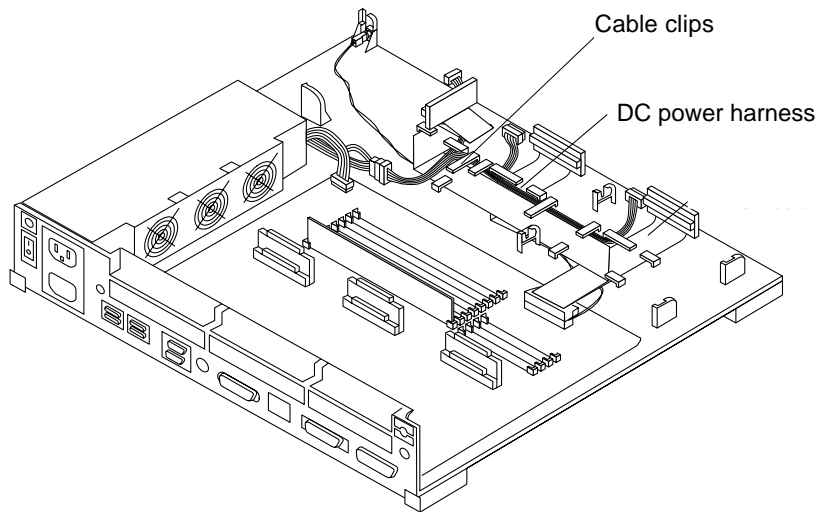


FIGURE 15-3 DC Power Harness and Internal Disk Cable Layout

- b. Slide the DC power harness out of the cable clips in the base of the system and remove the DC power harness from the chassis.**

See FIGURE 15-3.

- 4. Disconnect the LED connector from the LED.**

See FIGURE 15-4.

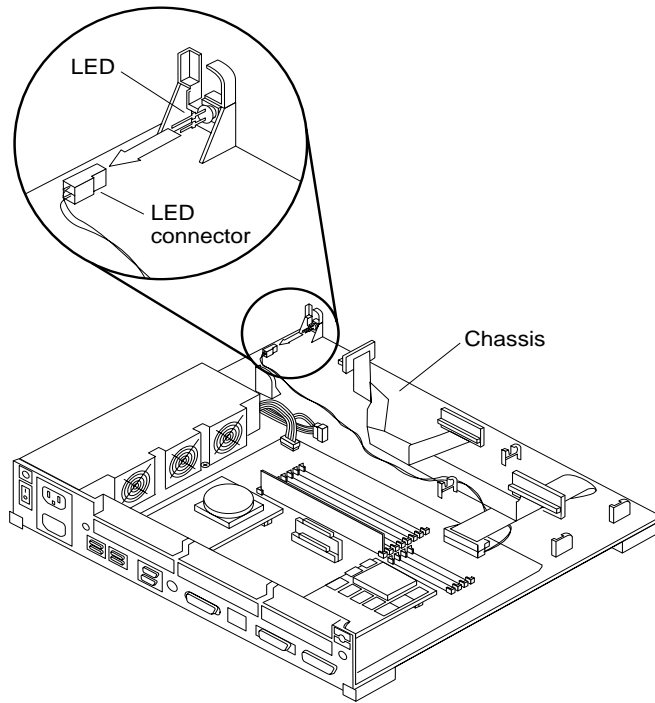


FIGURE 15-4 Disconnecting the LED Connector from the LED

5. Disconnect the internal disk connector from the MLB.

See FIGURE 15-5.

6. Slide the internal disk cable out of the cable clips in the system base and remove it from the chassis.

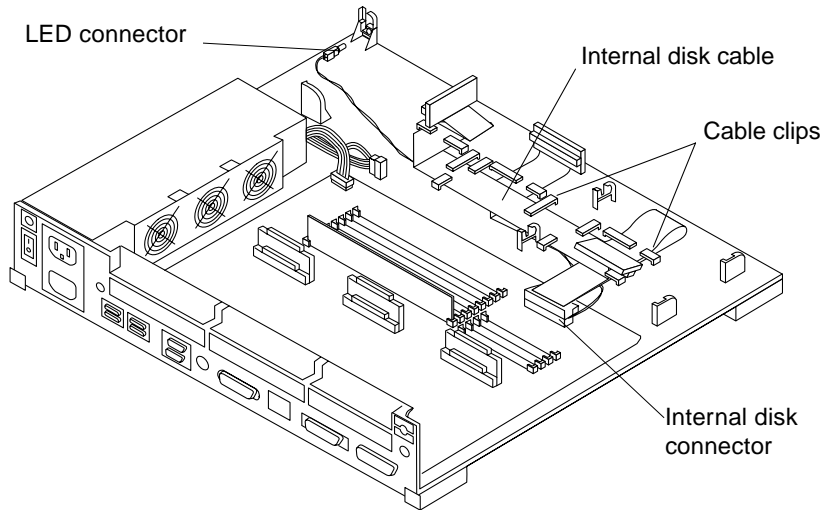


FIGURE 15-5 Internal Disk Cable

15.3 Installing the Internal Disk Cable

1. Lay out the internal disk cable on the chassis and slide it under the cable clips.
See FIGURE 15-6.

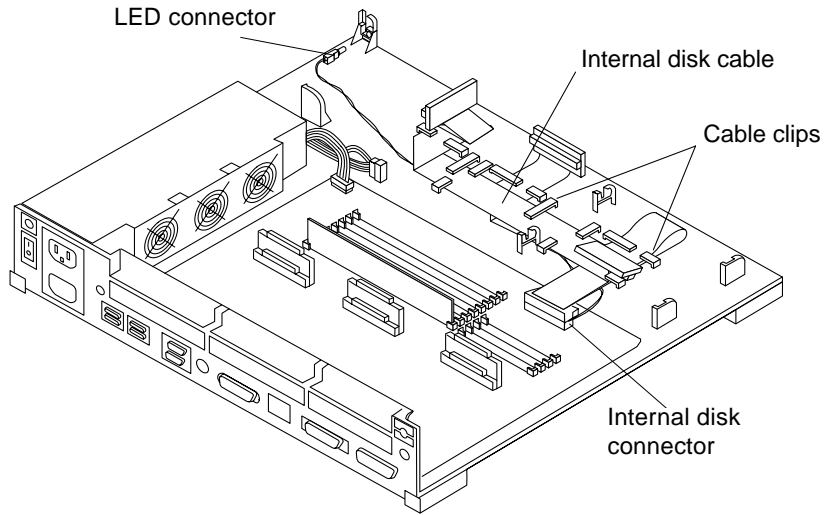


FIGURE 15-6 Internal Disk Cable Layout

- 2. Connect the internal disk connector to the MLB.**
- 3. Insert the LED into the LED connector.**

The longer LED pin should be inserted into the LED connector with the red wire. See FIGURE 15-7.

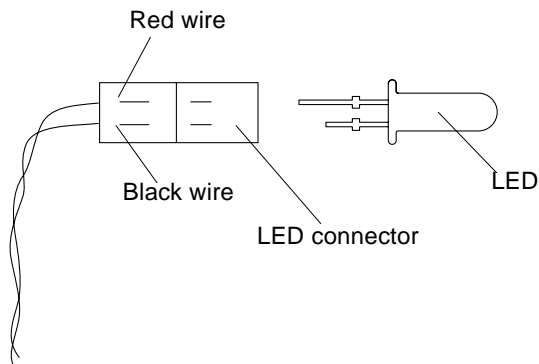


FIGURE 15-7 Inserting the LED into the LED Connector

- 4. Slide the LED into the LED cavity on the chassis. Push it into the cavity until it comes in contact with the locating stop.**

See FIGURE 15-8.

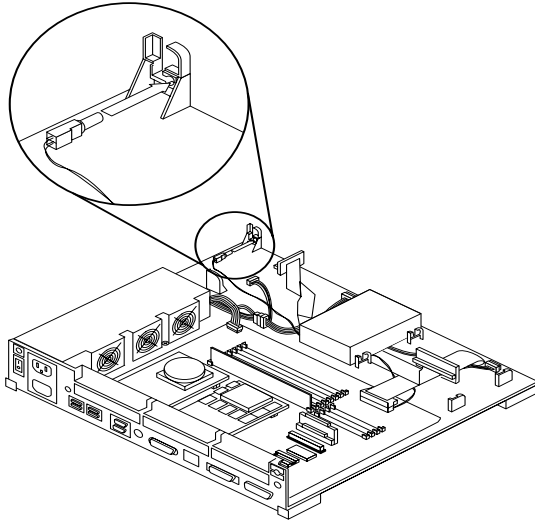


FIGURE 15-8 Connecting the LED Connector to the LED

5. Lay out the DC power harness in the chassis.

See FIGURE 15-9.

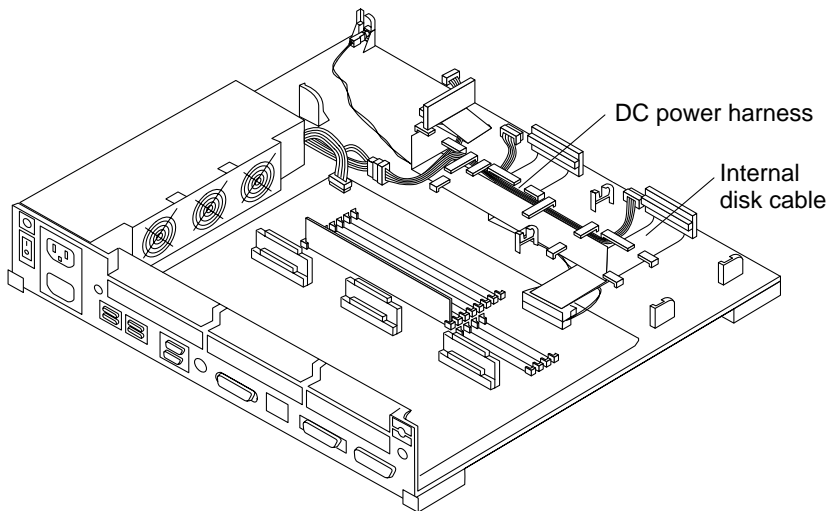


FIGURE 15-9 DC Power Harness Layout

6. Install the diskette drive.

a. Connect the DC power connector to the power supply.

See FIGURE 15-9.

b. Position the drive unit so the data and power cables face the inside of the chassis.

c. Lower the drive into the chassis and align the three grommets into the drive mounts.

See FIGURE 15-10.

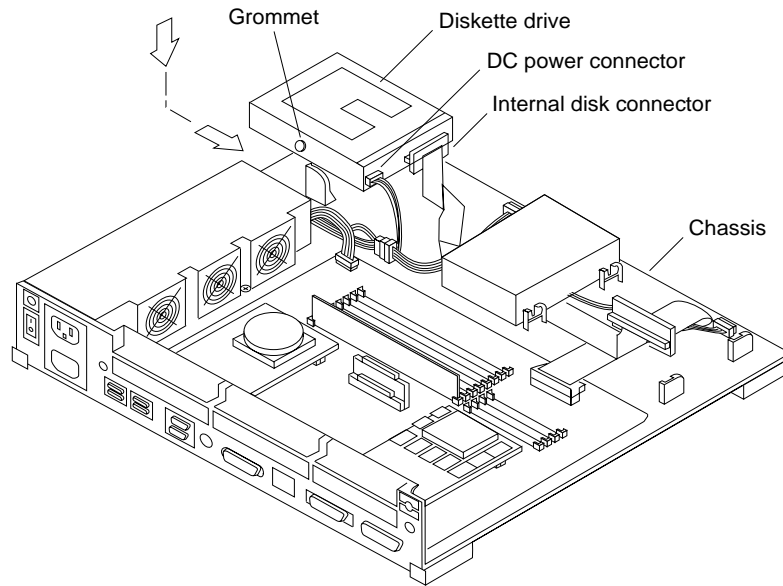


FIGURE 15-10 Installing the Diskette Drive

d. Connect the DC power connector to the diskette drive.

See FIGURE 15-10.

e. Connect the internal disk connector to the diskette drive.

The connector is keyed so that it will fit only one way. See FIGURE 15-10.

f. Slide the diskette drive toward the center of the chassis until the three grommets sit tightly in the drive mounts.

Note – The system cover may not close, if the diskette drive is not seated correctly in the drive mounts.

- g. Insert a clip into the diskette drive mounts at two places after installing the diskette drive.**

See FIGURE 15-11.

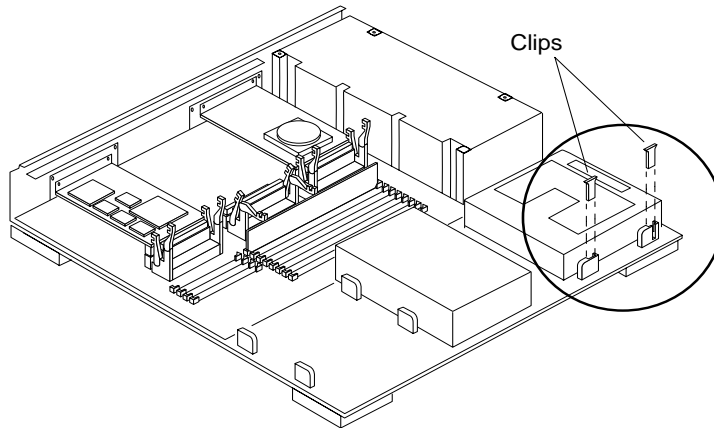


FIGURE 15-11 Installing Diskette Drive Clips

7. Install the hard disk drive.

- a. Verify that the jumper setting is correct for the drive location.**

FIGURE 15-12 shows the proper jumper settings for drive 0 and drive 1.

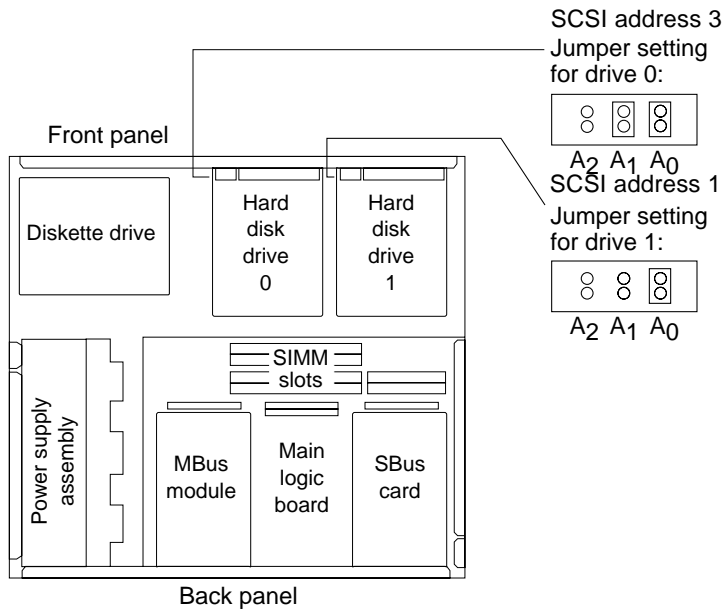


FIGURE 15-12 Jumper Settings for Hard Disk Drive 0 and 1

b. Lower the drive into the chassis. The connector side of the drive should be facing the front of the chassis.

See FIGURE 15-13.

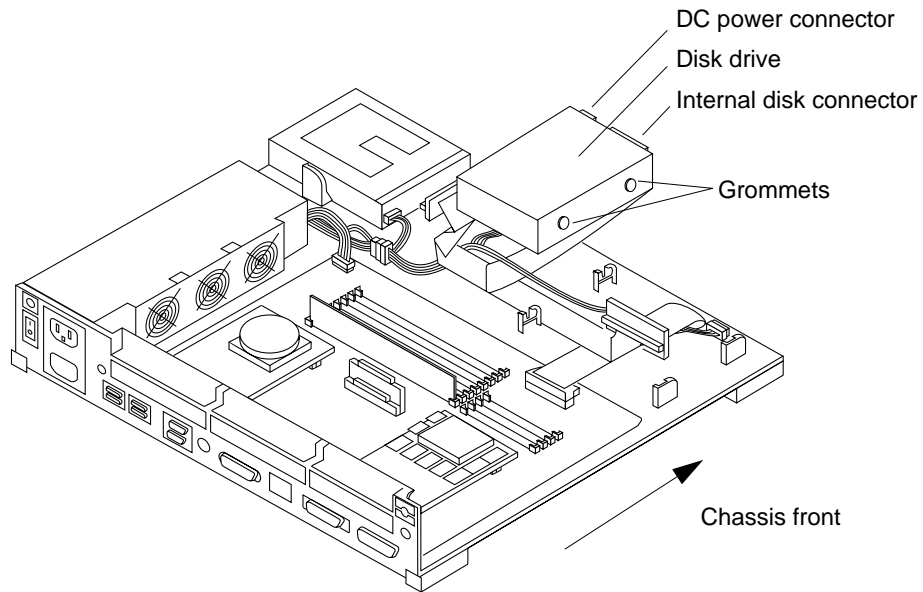


FIGURE 15-13 Reconnecting the Disk Drive

c. Connect the internal disk connector to the disk drive.

The connector is keyed so it fits only one way.

d. Connect the DC power connector to the disk drive.

The connector is keyed so it will fit only one way.

e. Lower the drive and slide it forward toward the front of the chassis until the grommets sit tightly in the drive mounts.

See FIGURE 15-14.

Note – If the drive is not pushed forward far enough and seated properly, the system cover may not close correctly.

f. Repeat steps a through e if a second disk drive is present.

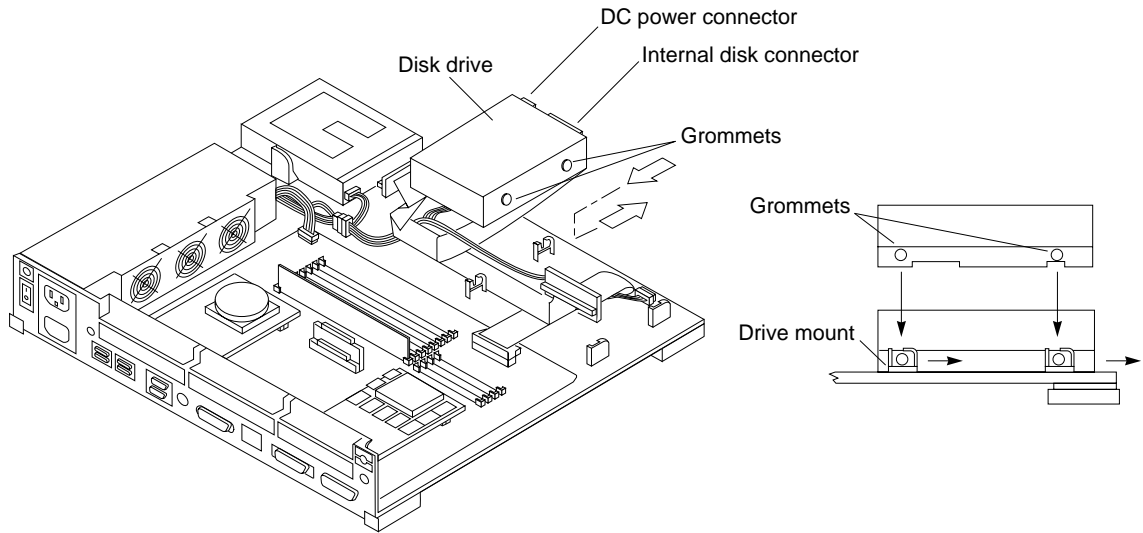


FIGURE 15-14 Installing the Disk Drive

8. Follow the instructions in Chapter 17 to detach the wrist strap, install the cover, connect the expansion unit(s), and power on the system.

Light-Emitting Diode

This chapter explains how to remove and install the light-emitting diode (LED).

16.1 Tools Needed

To remove and install the LED you will need the following tools and materials:

- Phillips screwdriver (size #2)
- Wrist strap
- Antistatic surface

16.2 Removing the LED

Follow the instructions in Chapter 4 to power off the system and disconnect the expansion units.



Caution – The hard disk drive contains electronic components that are extremely sensitive to static electricity. Ordinary amounts of static from your clothes or work environment can destroy the components.

Wear a grounding strap when handling the drive. Refer to “Attaching the Wrist Strap in Chapter 4. Do not touch the components or any metal parts.

To remove the LED:

1. **Check that the system power cord remains connected to the system and the wall outlet.**

2. Remove the system unit cover.

Refer to “Removing the System Unit Cover in Chapter 4.

3. Attach the wrist strap.

Refer to “Attaching the Wrist Strap in Chapter 4.

4. Remove the diskette drive from the system.

a. Slide the diskette drive toward the outer side of the chassis to free the grommets from the drive mounts.

See FIGURE 16-1.

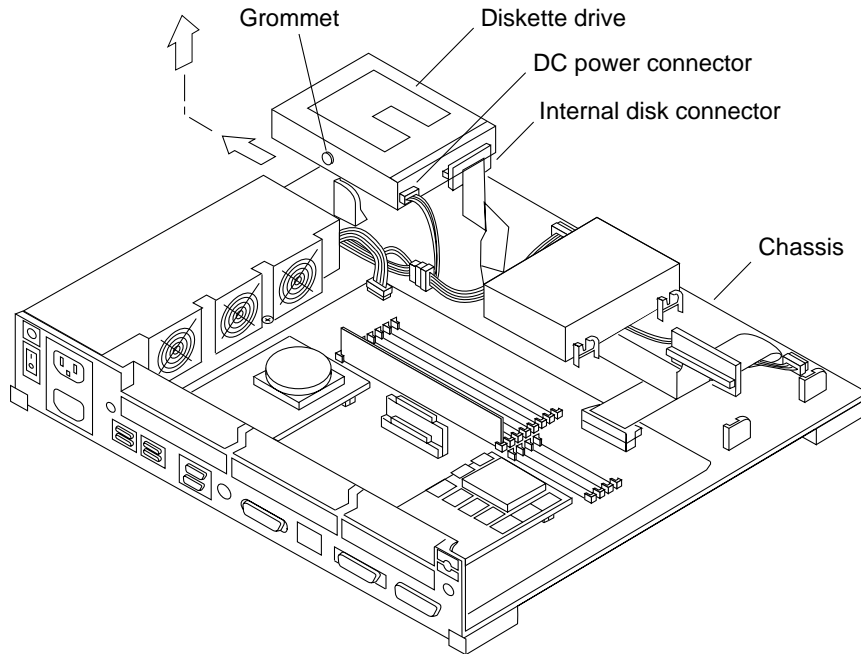


FIGURE 16-1 Removing a Diskette Drive

b. Disconnect the DC power connector from the diskette drive.

See FIGURE 16-1.

c. Disconnect the internal disk connector from the diskette drive.

See FIGURE 16-1.

d. Lift the diskette drive out of the chassis and place it on an antistatic surface.

5. Disconnect the LED connector from the LED.

See FIGURE 16-2.

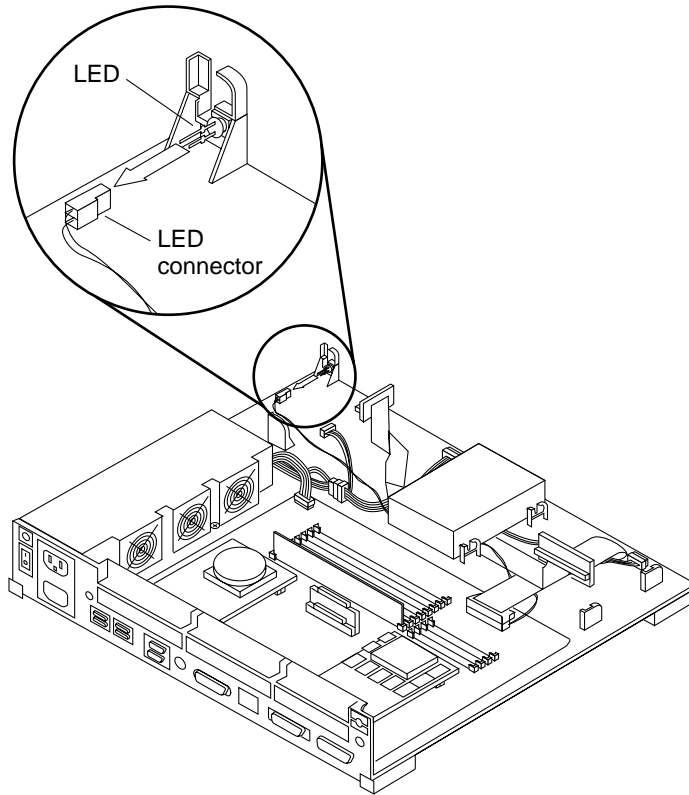


FIGURE 16-2 Disconnecting the LED from the LED Connector

6. Push the LED in by using the tip of a Phillips screwdriver.

See FIGURE 16-3.

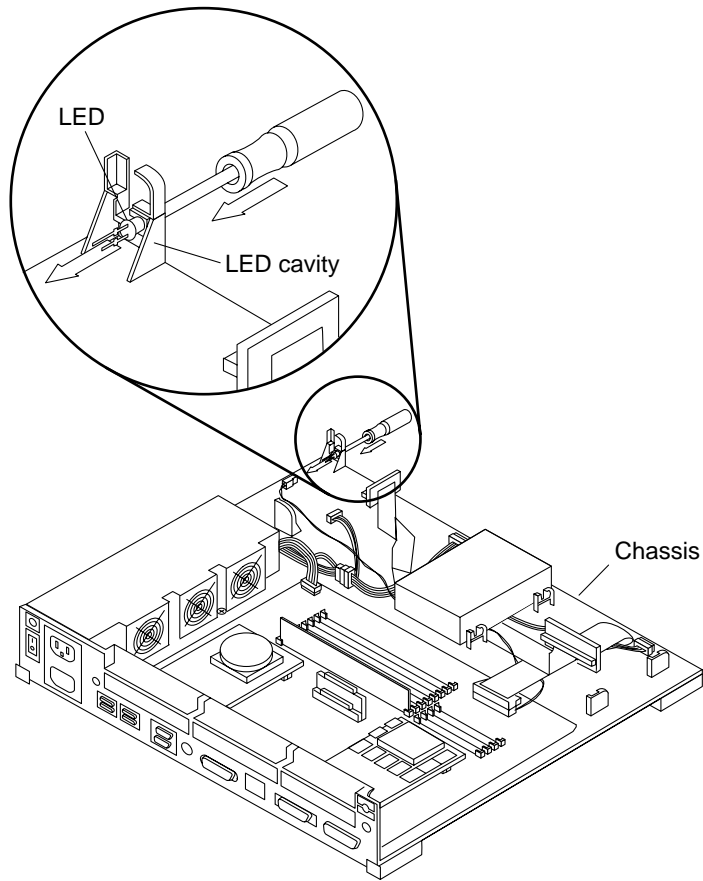


FIGURE 16-3 Removing the LED from the Chassis

7. Slide the LED out of the chassis.

16.3 Installing the LED

To install the LED:

1. Insert the longer LED pin into the LED connector with the red wire.
2. Connect the LED to the LED connector.

See FIGURE 16-4.

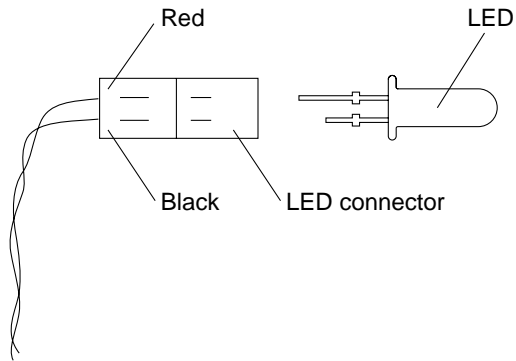


FIGURE 16-4 Connecting the LED to the LED Connector

- 3. Slide the LED into the LED cavity. Push it into the cavity until it comes in contact with the locating stop.**

See FIGURE 16-5.

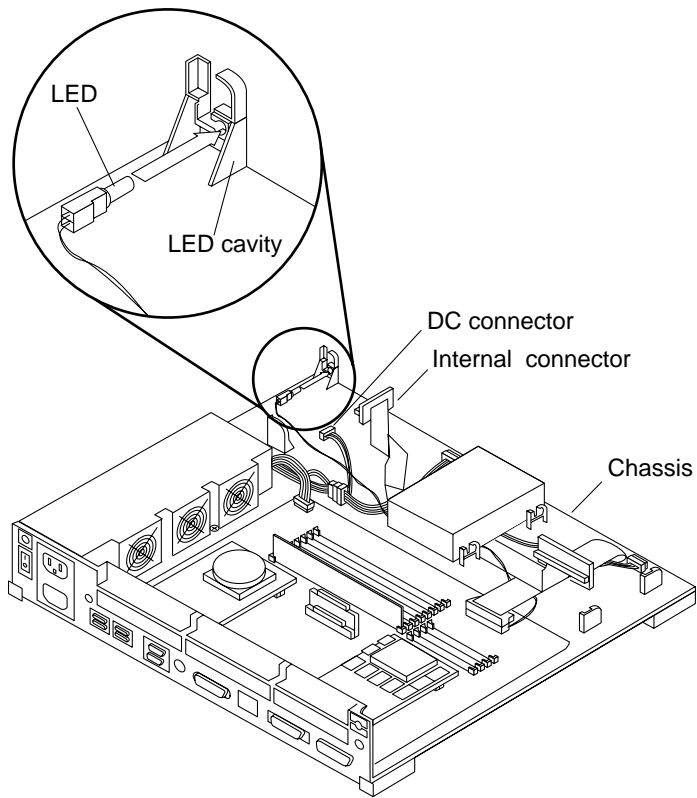


FIGURE 16-5 Installing the LED into the Chassis

4. Install the diskette drive.

See FIGURE 16-6.

- a. Position the drive unit so the data and power cables face the inside of the chassis.
- b. Lower the drive into the chassis and align the three grommets into the drive mounts.

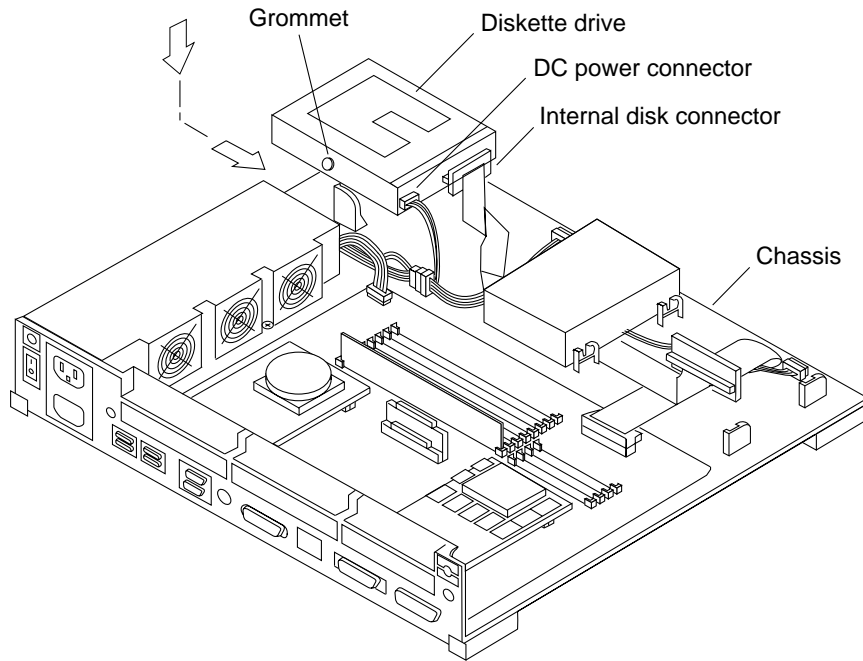


FIGURE 16-6 Installing the Diskette Drive

c. Connect the DC power harness to the diskette drive.

The connector is keyed so that it will fit only one way.

d. Connect the internal disk connector to the diskette drive.

The connector is keyed so that it will fit only one way.

e. Slide the diskette drive toward the center of the chassis until the three grommets sit tightly in the drive mounts.

Note – The system cover may not close, if the diskette drive is not seated correctly in the drive mounts.

f. Insert clips into the diskette drive mounts at two places after installing the diskette drive.

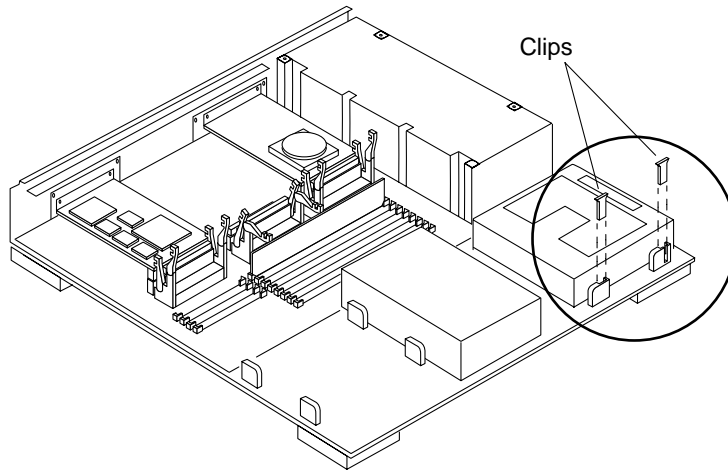


FIGURE 16-7 Installing Diskette Drive Clips

- 5. Follow the instructions in Chapter 17 to detach the wrist strap, install the cover, connect the expansion unit(s), and power on the system.**

Powering On the System

This chapter explains the steps to perform before and after replacing a part. Unwrap the wrist strap from your wrist and detach the adhesive copper strip from the power supply. Topics covered in this chapter include the following:

- Installing the system unit cover
- Connecting peripheral(s) to the system
- Turning the power on

17.1 Installing the System Unit Cover

Note – The card retainers on the MBus module should be pushed down over the edge of the module. You will not be able to close the system unit cover properly otherwise.

To install the system unit cover:

1. **Hold the cover at an angle, approximately as shown, and gently guide the hinge tabs on the cover into the tab slots on the front of the system unit. Continue to hold onto the cover.**

See FIGURE 17-1.

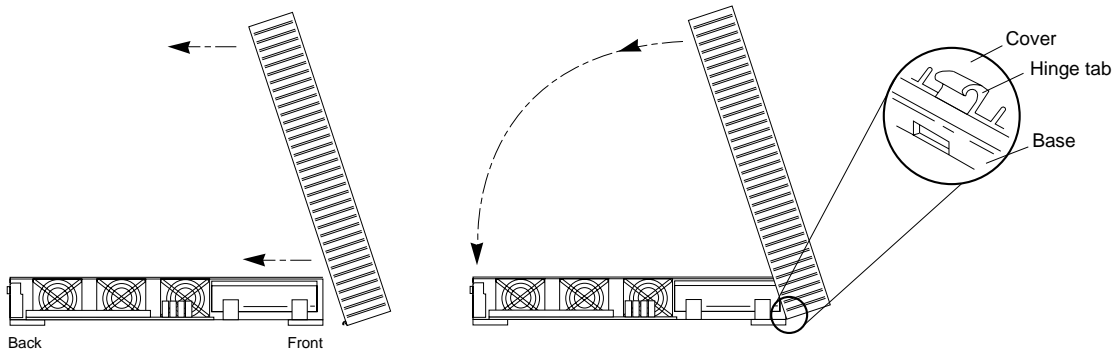


FIGURE 17-1 Installing the System Unit Cover

- 2. Slowly lower the cover onto the system unit.**
- 3. Place your hands on the top rear of the cover. Push down on both sides of the cover.**

See FIGURE 17-2.

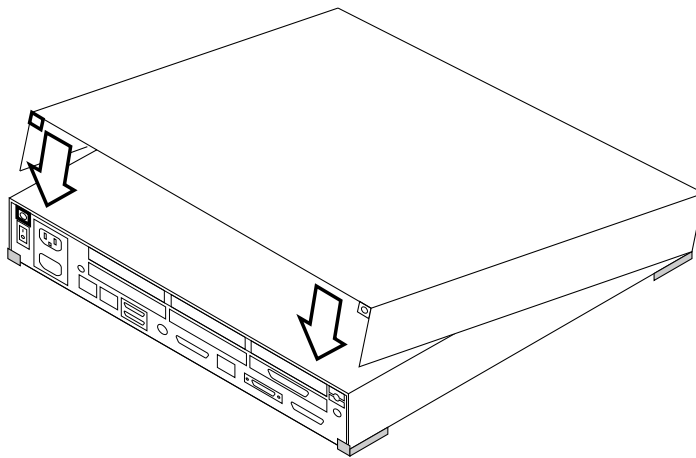


FIGURE 17-2 Pushing Down on the Rear Cover Edges

- 4. Guide the cover down so that the plastic retainer clip snaps the cover to the rear panel.**

See FIGURE 17-2.

- 5. Use a Phillips screwdriver to tighten the captive screw on the rear panel. Do not over tighten the screw.**

See FIGURE 17-3.

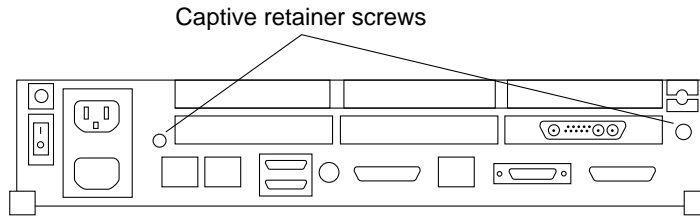


FIGURE 17-3 Rear Panel Captive Retainer Screws

17.2 Connecting a Desktop Storage Pack

To connect a Desktop Storage Pack (DSP) to the system unit:

1. **Connect the connector on the SCSI cable to the SCSI port on the system unit's back panel.**
2. **See the *Desktop Storage Pack Installation Guide* for additional installation information.**

17.3 Connecting an External Storage Module

To connect the External Storage Module (ESM) to the system unit:

1. **Connect the SCSI connector on the SCSI adapter cable to the SCSI port on the system unit back panel.**
2. **See the *Sun External Storage Module* for additional installation instructions.**

17.4 Connecting a Video Monitor

There are several different types of monitors and cabling. The color and grayscale monitors use cables with 13W3 connectors. See Appendix C of the *SPARCstation 10 Installation Guide* for more specific information on monitors.

17.5 Connecting a Mouse

The optical mouse connects to one of two jacks in the back of the keyboard. The mouse can be connected on either the left or right side to accommodate either left-handed or right-handed users. Connect the mouse to the keyboard before you connect the keyboard to the system unit.

17.6 Connecting a Keyboard

A cable connects the keyboard to the system unit. The keyboard port is located at the left rear of the system unit (when viewed from the front). Connect the keyboard cable on either the left or right side of the keyboard, then to the port on the back of the system unit.

17.7 Turn On the Power

After turning off the power to replace a part, turning the power on again is relatively simple.



Caution – This device is equipped with a three-wire grounded power cord. To reduce the risk of electrical shock, always plug the power cord into a properly grounded power outlet.



Caution – Before powering on your system, be sure to install the cover. It is not safe to operate the SPARCstation 10 system without the top cover in place.



Caution – Always allow 10 seconds between turning off the power and turning it back on again. This pause prevents possible damage to power supply components in your system unit.



Caution – Hot surfaces are present. Use care when opening the system chassis or handling components.

Turn the power switches on in this order:

- Monitor
- External drive unit(s) if you have one
- System unit

After a minute or so, you should see the login prompt.

```
system messages
system messages
system messages
system messages
system messages
system messages

hostname login:
```

When you see the login screen, you can log in to your system. For more information on logging in, see Chapter 2 of the *Sun System User's Guide*.

System Specifications

This appendix contains the input power requirements, environmental requirements, physical dimensions, packaging dimensions, and regulatory compliance information.

A.1 Power Input Requirements

TABLE A-1 lists the power input requirements for the system unit. The maximum power dissipated is less than, or equal to, 187 watts. The power supply automatically selects the correct AC voltage range.

TABLE A-1 Power Input Requirements and Power Dissipation for the System Unit

Operating Voltage Range	Maximum Input Current	Maximum Input Power	Maximum Input Volt-Amperes	Thermal Dissipation	Operating Frequency Range
100 – 240 Vac	6A	187W	200W	406 BTU	47 – 63 Hz

A.2 Environmental Requirements

TABLE A-2 lists the environmental requirements for the operating environment and the non-operating environment.

TABLE A-2 Environmental Requirements

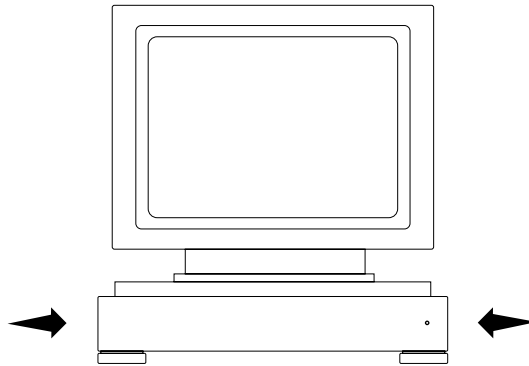
Operating Environment	
Temperature	between 0 to 40 degrees C (32 and 104 degrees F)
Humidity	5 to 95% relative humidity
Altitude	70.1 kPa (3 km or 9,843 ft equivalent))
Vibration	0.25G peak all axes, 1 sweep at 1 octave/min., 5-500-5 Hz 10 minute dwell at a maximum of 4 resonant frequencies
Shock	5G half sine 11 msec, 10 impacts each on all 6 surfaces, 0.343 m/sec velocity change
Acoustic noise	5.1 bels (<28 degrees C or 82.4 degrees F environment)
Idle Acoustic Noise	5.0 bels (<28 degrees C or 82.4 degrees F environment (per declared noise emissions in accordance with ISO 9296)
Non-Operating Environment:	
Temperature	between -40 to 75 degrees C or -40 to 167 degrees F)
Humidity	95% relative humidity
Altitude	19.3 kPa (12 km or 39,370 ft)
Vibration	1.0G peak all axes, 12 mm peak-peak, 1 sweep at 1 octave/min. 5-500-5 Hz 10m minute dwell at a maximum of 4 resonant frequencies
Shock	3.5 m/sec velocity change, 3 msec max. pulse duration, 3 impacts each on all 6 surfaces
Handling drops	1 rotational flat drop each edge, 1 rotational edge drop each edge 80 mm drop height, 40 mm block height
Mechanical Connections	100 inserts per connector, 100 opening/closing of top cover, 100 on/off operations of each switch

A.3 System Placement Requirement

The SPARCstation 10 system unit has vents on its left and right panels for ventilation and a slot on its right panel for diskettes. When you place the unit on a desktop, make sure that objects do not block the vents on either side of the unit.



Caution – Do not block the vents on the side of the system unit.



Allow *at least* 3 inches (76 millimeters) of unobstructed space on either side of the system unit.

A.4 Physical Dimensions

TABLE A-3 lists the physical specifications for the system unit, the keyboard, and the optical mouse.

TABLE A-3 Physical Specifications

Component	Height	Width	Depth	Net Weight
System Unit	2.8 in (71 mm)	16 in (409 mm)	16.0 in (409 mm)	25 lb (11 kg)
Keyboard, Type 5	1.7 in (44 mm)	20.1 in (510 mm)	7.2 in (182 mm)	3.5 lb (1.6 kg)
Mouse	2.0 in (50 mm)	4.0 in (100 mm)	3.0 in (80 mm)	3 lb (14 kg)

A.5 Packaging Dimensions

TABLE A-4 shows the outer dimensions of the packaging.

TABLE A-4 Packaging Dimensions

Component	Length	Width	Depth
System Unit	22.0 in (559 mm)	24.0 in (610 mm)	10.0 in (254 mm)

A.6 Regulatory Compliance

TABLE A-5 lists regulatory compliance information.

TABLE A-5 Regulatory Compliance Information

Product Safety	EMI	Ergonomics	X-Ray Emissions
UL 1950	FCC Class B	German Federal	DHHS, PTB
CSA C22.2 No. 950	VDE Class B	Republic ZH 1/618	
IEC 380	DOC Class B		
EN 60950	VCCI Class 2		

Replacement Parts List

This appendix lists part numbers and describes replacement parts for the SPARCstation 10 system.

Although these part numbers are correct as of the publication date of this document, they are subject to change. Consult your authorized Sun sales representative or service provider to confirm part numbers before you order new or replacement parts.

TABLE B-1 lists the replacement parts and their part numbers.

TABLE B-1 Replacement Parts List

Replacement Parts	Part Number	Description
Main Logic Board	501-2274	Main Logic Board (Model 20)
	501-1733	Main Logic Board (Model 30 and 41)
	501-2259	Main Logic Board (Model 30 and 41)
	501-2365	Main Logic Board, BAPT Labeled (Model 30, 40, and 41)
MBus Module	501-2218	Super SPARC Module, 33MHz (Model 20)
	501-2239	Super SPARC Module, 36MHz (Model 30)
	501-2219	Super SPARC Module, 40MHz (Model 40)
	501-2358	Super SPARC Module, 40MHz (Model 40 and 402)
	501-2258	Super SPARC/Super Cache Module (Model 41)
	501-2270	Super SPARC/Super Cache Module (Model 41)
	501-2359	Super SPARC/Super Cache Module (Model 41)
	501-2352	Super SPARC/Super Cache Module (Model 51 and 512)
DSIMM	501-2273	16 Mbytes DSIMM
	501-1930	64 Mbytes DSIMM

TABLE B-1 Replacement Parts List *(Continued)*

Replacement Parts	Part Number	Description
NVRAM/TOD	525-1184	NVRAM (Battery)/ Time of Day Clock
EPROM	525-1183	EPROM (Boot PROM)
Frame Buffer	501-1996	GX Frame Buffer
	501-2018	GX+ Frame Buffer
	370-1407	GS Frame Buffer
Power Supply Assembly	300-1081	Power Supply, 140W
Speakerbox	540-2220	Speakerbox
Hard Disk Drive	370-1392	424-MByte SCSI Disk Drive
	370-1546	1.05-GByte SCSI Disk Drive
Diskette Drive	370-1420	Triple Density Floppy Drive
Drive Mounting Grommet	330-1390	Drive Mounting Grommet
Drive Securing Clip	330-1448	Floppy Drive Securing Clip
Speaker Assembly	501-1943	Speaker Box
LED	150-1891	Light, Pipe, LED (Light Emitting Diode)
Internal Cables	530-1848	DC Power Harness
	530-1847	Internal Disk Cable
External Cables	530-1898	Video, 4.5m
	530-1856	AUI/Audio Adapter
	530-1857	Centronics Parallel Printer, 5.0m
	530-1861	IBM Parallel Printer, 5.0m
	530-1869	Serial Port "Y" Breakout Cable, 0.5m
	530-1871	ISDN Interface RJ45, 4.0m
Antistatic Mat	250-1088	Sun ESD Mat with Sun Logo
	330-1145	Disposable ESD Mat

Positive Temperature Coefficient Devices

This appendix provides general information about positive temperature coefficient (PTC) devices which are located on the main logic board (MLB) in place of fuses. These devices are self healing; they reset after a fault occurs and do not require replacement. There are four PTCs on the MLB.

TABLE C-1 Positive Temperature Coefficient Devices

Location on MLB	For
1	F0601 Keyboard and Mouse
2	F1301 Thick Ethernet
3	F1302 Thick Ethernet
4	F1502 SCSI Termination

FIGURE C-1 shows the location of these PTCs on the MLB.

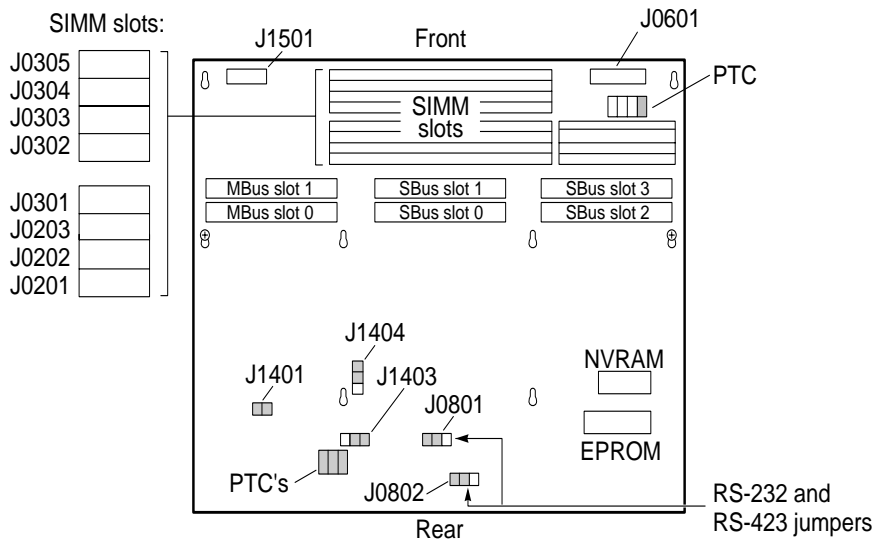


FIGURE C-1 PTCs on the Main Logic Board

C.1 Keyboard and Mouse PTC

The keyboard and mouse PTC protects the keyboard and mouse from short circuits or overcurrent. If you power on the system and any of the following occurs, the keyboard and mouse PTC may be open.

- The keyboard speaker does not beep.
- The four LEDs on the keyboard do not flash when power is turned on to the system unit.
- A message is displayed on the system monitor:

No keyboard connected.

C.2 Ethernet PTC

The Ethernet PTC protects the Ethernet transceiver from short circuits or overcurrent. If you plug the Ethernet cable into the MLB and the Ethernet transceiver LED does not light, the Ethernet PTC may be open.

Note – The Ethernet transceiver is not a part of the workstation. It is connected to the main Ethernet network cable.

If the Ethernet transceiver LED does not light:

- The transceiver may be bad.
- The connection on the Ethernet cable may be bad.
- The Ethernet cable or transceiver may have a problem such as a bad connection, shorted center conductor to the shield, or a broken cable segment.

C.3 SCSI Termination PTC

The SCSI termination PTC protects an external SCSI device from short circuits or overcurrent. To determine if the SCSI termination PTC is bad, use a VOM and test the PTC using an open test for lack of continuity.

Signal Descriptions

D.1 Stacked Micro High Density Connectors

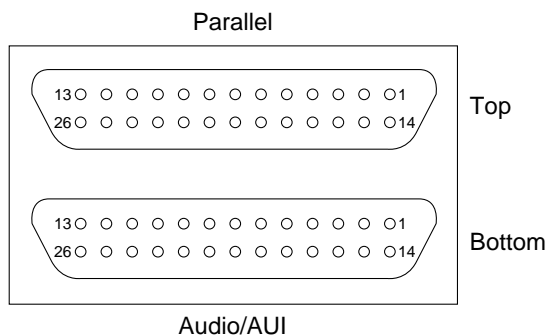


FIGURE D-1 Parallel and Audio/AUI Connectors

TABLE D-1 Parallel Connector Pin Assignments

Pin	Function	I/O	Level	Pin	Function	I/O	Level
1	DataStrobe*	I/O	24 ma OC	14	AutoFeed*	O	24 ma TTL
2	Data Bit 0	I/O	24 ma OC	15	Error*	I	TTL
3	Data Bit 1	I/O	24 ma OC	16	Reset*	O	24 ma TTL
4	Data Bit 2	I/O	24 ma OC	17	SlctIn*	O	24 ma TTL
5	Data Bit 3	I/O	24 ma OC	18	Shield		GND
6	Data Bit 4	I/O	24 ma OC	19	Shield		GND

TABLE D-1 Parallel Connector Pin Assignments (*Continued*)

Pin	Function	I/O	Level	Pin	Function	I/O	Level
7	Data Bit 5	I/O	24 ma OC	20	Shield		GND
8	Data Bit 6	I/O	24 ma OC	21	Shield		GND
9	Data Bit 7	I/O	24 ma OC	22	Shield		GND
10	Ack*	I	TTL	23	Shield		GND
11	Busy	I	TTL	24	Shield		GND
12	PE	I	TTL	25	Shield		GND
13	Select	I	TTL	26	Shield		GND

TABLE D-2 Audio/AUI Connector Pin Assignments

Pin	Function	I/O	Level	Pin	Function	I/O	Level
1	AUI_DO-	O	Analog	14	AUI_DO+	O	Analog
2	AUI_DI+	I	Analog	15	AUI_DI-	I	Analog
3	AUI_CI-	I	Analog	16	AUI_CI+	I	Analog
4	+12 VDC	O	DC	17	Ground		GND
5	EMCTL	I&O	TTL	18	CHI_ResetS	I&O	TTL
6	CHI_DX	I&O	TTL	19	CHI_DR	I&O	TTL
7	CHI_CLK	I&O	TTL	20	CHI_FS	I&O	TTL
8	CHI_DFSYNC	I&O	TTL	21	D/C	I&O	TTL
9	N.C.			22	N.C.		
10	+5 VDC	O	DC	23	Ground		GND
11	+5VDC	O	DC	24	Ground	O	GND
12	ExtPwrDn	I	TTL	25	N.C.		
13	+5 VDC	O	DC	26	Ground		GND

D.1.1 Stacked Micro High Density Connectors-Signal Descriptions

TABLE D-3 Parallel and Audio/AUI Signal Description

Signal	Descriptions
Parallel	
DataStrobe*	Data valid Strobe
DataBit<0-7>	Data Bits
Ack*	Data Acknowledge
Busy	Busy
PE	Paper Error
Select	Select
AutoFeed*	AutoFeed
Error*	Error
Reset*	Initialize
SlctIn*	Select In
Audio/AUI	
AUI_DO+/-	Data Out Positive/Negative
AUI_DI+/-	Data In Positive/Negative
AUI_CI+/-	AUI Collision Positive/Negative
CHI_DX	Digital Audio Data Transmit
CHI_CLK	Digital Audio Clock
CHI_FS	Digital Audio Frame Select
CHI_DFSYNC	Digital Audio Frame Sync
CHI_RESET	Digital Audio Reset
CHI_DR	Digital Audio Data Receive
EMCTL	External Mode Control
D/C	Data/Control Select

D.2 Keyboard/Mouse and Serial Ports A&B

D.2.1 Keyboard/Mouse

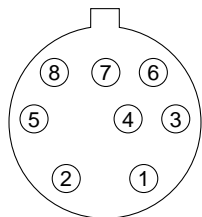


FIGURE D-2 Keyboard/Mouse Connector

TABLE D-4 Keyboard/Mouse Connector Pin Assignments

Pin	Function	I/O	Level	Pin	Function	I/O	Level
1	Ground	O	GND	5	KeyBd Out	O	TTL
2	Shield		Shield	6	KeyBd In	I	TTL
3	+5 VDC	O	VCC	7	PowerOn*	I	TTL
4	Mouse In	I	TTL	8	+5VDC	O	VCC

D.2.2 Serial Ports A&B

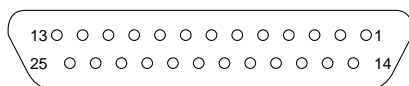


FIGURE D-3 Serial Port A & B Connectors

TABLE D-5 Serial Port A&B Pin Assignments

Pin	Function	I/O	Level	Pin	Function	I/O	Level
1	N.C.			14	Xmit Data B	O	RS232/423
2	Xmit Data A	O	RS232/423	15	TRxC A	I	RS232/423
3	Rec Data A	I	RS232/423	16	Rec Data B	I	RS232/423
4	RTS A	O	RS232/423	17	RTxC A	I	RS232/423
5	CTS A	I	RS232/423	18	TRxC B	I	RS232/423
6	DSR A	I	RS232/423	19	RTS B	O	RS232/423
7	Ground		GND	20	DTR A	O	RS232/423

TABLE D-5 Serial Port A&B Pin Assignments

Pin	Function	I/O	Level	Pin	Function	I/O	Level
8	DCD A	I/O	RS232/423	21	N.C.		
9	N.C.			22	N.C.		
10	N.C.			23	N.C.		
11	DTR B	I	RS232/423	24	TxC A	O	RS232/423
12	DCD B	I	RS232/423	25	TxC B	O	RS232/423
13	CTS B	I	RS232/423				

D.2.3 Keyboard/Mouse and Serial Ports A&B-Signal Descriptions

TABLE D-6 Keyboard/Mouse and Serial Ports A&B Signal Descriptions

Signal	Descriptions
Mouse In	Input From Mouse
KeyBoardOut	Output to Keyboard
KeyBoardIn	Input From Keyboard
XmitDataA	Transmit Data Port A
RecDataA	Receive Data Port A
RTS A	Request to Send Port A
CTS A	Clear to Send Port A
DSR A	Data Set Ready Port A
DCD A	Data Carrier Detect Port A
DTR B	Data Terminal Ready Port B
DCD B	Data Carrier Detect Port B
CTS B	Clear To Send Port B
XmitData B	Transmit Data Port B
TRxC A	Transmit Clock (Receive) Port A
RecData B	Receive Data Port B
RTxC A	Secondary/Transmit Clock (Receive) Port A
TRxC B	Receive/Transmit Clock Port B (Pullup)
RTS B	Request to Send Port B
DTR A	Data Terminal Ready Port A
TxC A	Transmit Clock Port A
TxC B	Transmit Clock Port B

Note – TRxC A and TxC A are connected to the same pin, since that pin is bidirectional.

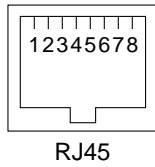


FIGURE D-4 Twisted Pair Ethernet

TABLE D-7 Twisted Pair Ethernet Connector

Pin	Function	I/O	Level	Pin	Function	I/O	Level
1	TPO+	O	Analog	5	N.C.		
2	TPO-	O	Analog	6	TPI-	I	Analog
3	TPI+	I	Analog	7	N.C.		
4	N.C.			8	N.C.		

D.3 Twisted Pair Ethernet

D.3.1 Twisted Pair Ethernet-Signal Description

TABLE D-8 Twisted Pair Ethernet Signal Description

Signal	Descriptions
TPO+/-	Differential Twisted Pair Transmit Data
TPI+/-	Differential Twisted Pair Receive Data

D.4 SCSI

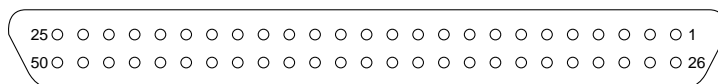


FIGURE D-5 SCSI Connector

TABLE D-9 SCSI Pin Assignments

Pin	Function	I/O	Level	Pin	Function	I/O	Level
1	Ground		GND	26	sd0*	I&O	TTL
2	Ground		GND	27	sd1*	I&O	TTL
3	Ground		GND	28	sd2*	I&O	TTL
4	Ground		GND	29	sd3*	I&O	TTL
5	Ground		GND	30	sd4*	I&O	TTL
6	Ground		GND	31	sd5*	I&O	TTL
7	Ground		GND	32	sd6*	I&O	TTL
8	Ground		GND	33	sd7*	I&O	TTL
9	Ground		GND	34	sdp*	I&O	TTL
10	Ground		GND	35	Ground		GND

TABLE D-9 SCSI Pin Assignments (*Continued*)

Pin	Function	I/O	Level	Pin	Function	I/O	Level
11	Ground		GND	36	Ground		GND
12	Ground		GND	37	Ground		GND
13	Ground		GND	38	Termpower	I&O	TTL
14	Ground		GND	39	Ground		GND
15	Ground		GND	40	Ground		GND
16	Ground		GND	41	atn*	O	TTL
17	Ground		GND	42	Ground		GND
18	Ground		GND	43	bsy*	O	TTL
19	Ground		GND	44	ack*	O	TTL
20	Ground		GND	45	rst*	O	TTL
21	Ground		GND	46	msg*	O	TTL
22	Ground		GND	47	sel*	O	TTL
23	Ground		GND	48	cd*	O	TTL
24	Ground		GND	49	req*	O	TTL
25	Ground		GND	50	io*	O	TTL

D.4.1 SCSI-Signal Description

TABLE D-10 SCSI Signal Descriptions

Signal	Descriptions
sd<0-7>*	SCSI Data Bits 0 to 7
sdp*	SCSI Data Parity
atn*	Attention
bsy*	Busy
ack*	Acknowledge
rst*	Reset
msg*	Message
sel*	Select
cd*	Control/Data

TABLE D-10 SCSI Signal Descriptions

Signal	Descriptions
req*	Request
io*	Input/Output
Termpower	Termination Voltage

Glossary

- address** Refers to a location within a computer system memory. The word *location* is a synonym. Reference is usually made to an *address* for the purpose of retrieving or storing information.
- A RMS** Amperes root mean square. RMS is often used in power measurements for electronic equipment.
- attachment unit interface (AUI) port** The port on the SPARCstation 10 system unit where the AUI adapter cable is connected.
- board** See *printed circuit board*.
- boot** To load the system software into memory and start the system running.
- boot PROM** Refers to a specific PROM chip on the MLB. This chip contains boot code and a Forth Monitor program. The boot PROM is connected to the I/O data bus.
- boot PROM diagnostics** The diagnostic firmware contained in the boot PROM. These diagnostics include the Power-On Self-Test (POST) and on-board diagnostics.
- buffer** The auxiliary data-storage device which holds data temporarily, and which may also perform other functions in conjunction with various I/O machines.
- cables** Wires or bundles of wires configured with connectors at each end and used to connect two or more hardware devices.
- cache** A mechanism for accelerating a microprocessor performance. A cache is a small, fast memory between the microprocessor and main memory. It quickens a microprocessor access time to main memory. It also stores the most recently used information (data, instructions, etc.), and provides such information again to the microprocessor more rapidly than could main memory.
- card** See *printed circuit board*.
- CPU** Central processing unit.

CRU	Customer Replaceable Unit.
Desktop Backup Pack	An external unit containing a tape drive that can be connected to a SPARCstation 10 system.
Desktop Disk Pack	An external unit containing a disk drive that can be connected to a SPARCstation 10 system.
Desktop Storage Module	An external data storage that contains a disk drive or a tape drive.
Desktop Storage Pack (DSP)	A generic name for an external unit containing a tape drive, disk drive, or a CD-ROM drive that can be connected to a SPARCstation 10. The external unit containing the tape drive is referred to as the Desktop Backup Pack. The external unit containing a disk drive is specifically referred to as the Desktop Disk Pack. The external unit containing a compact disc drive is specifically referred to as the Desktop SunCD Pack.
Desktop SunCD Pack	An external unit containing a compact disc drive.
Diagnostic Executive	See <i>SunDiagnostic Executive</i> .
DMA	Direct Memory Access.
DRAM	Dynamic Random Access Memory.
DSIMM	DRAM Single Inline Memory Module. A small printed circuit card that contains dynamic random access memory (DRAM) chips.
Ecache	External cache is a cache that is located external to the microprocessor. See <i>cache</i> .
ESM	External Storage Module. An external unit that contains disk and/or tape drive(s) that can be connected to a SPARCstation 10.
Forth	A high-level programming language. A major feature of Forth is that user-defined operators can be used as if they are primitives.
Forth Toolkit	An interactive command interpreter based on the Forth programming language. While in the Toolkit, you will see the <code>ok</code> prompt. The Toolkit gives you access to an extensive set of functions for performing fault isolation and debugging.
frame buffer board	A printed circuit board installed in an SBus slot of the system unit that controls a video display.
IC	Integrated Circuit.
ID	Identification.

I/O	Input/Output. A device that inputs data to a computer CPU and receives data from a computer CPU. Examples of I/O devices include keyboards, mice, monitors and peripheral devices.
IU	Integer Unit.
LANCE	Local Area Network Controller for Ethernet.
LED	Light Emitting Diode.
Location	See <i>address</i> .
MLB	Main logic board.
MBus module	A printed circuit board installed in an MBus slot of the system unit that contained the CPU circuitry and components.
Monitor 1)	Indicated by the > prompt. From the > prompt, you can boot the system, continue the execution of a halted program, or enter the Forth Toolkit. If disaster happened to your operating system, the Monitor automatically starts.
Monitor 2)	A video display unit that is part of the SPARCstation 10 system. It is not the same thing as a terminal.
MMU	Memory Management Unit.
NVRAM	Non-Volatile RAM.
On-Board Diagnostics	A test that allows you to test the control registers, the network controller, the diskette drive system, memory, the cache, the system clock, and watch the network for valid packets.
Pok	Power ok is a signal from the power supply, which is activated after DC voltages have risen.
POST	Power-On Self-Test. The POST runs automatically when you turn on the system power switch or reboot the system. The POST, stored in the boot PROM, is a series of rudimentary tests designed to verify that a viable boot path exists for loading more extensive diagnostic software, such as the Diagnostic Executive.
PTC	Positive Temperature Coefficient. A self healing device that replaces a fuse. After an error occurs, the PTC resets.
printed circuit board	Any board with electronic wiring etched on it.
PROM	Programmable Read Only Memory.
RAM	Random Access Memory.
ROM	Read Only Memory.
SBus card	A printed circuit board installed in an SBus slot of the system unit.

SCC Serial Communications Controller.

SCSI Small Computer System Interface; pronounced “scuzzy.”

SIA Serial Interface Adapter.

SunDiagnostic

Executive An independent operating system running exhaustive subsystem tests independent of SunOS. Use the SunDiagnostic Executive after you have run POST and need to troubleshoot which part needs to be replaced.

Sundiag System

Exerciser Diagnostic software that runs under SunOS system software; displays real-time use of system resources and peripheral equipment such as Desktop Storage Packs and External Storage Modules.

system Monitor See *Monitor 1) or 2)*.

terminal A device that consists of a video display and keyboard that is used to type and display information. A terminal may be connected to either of the RS-423/RS-232 serial interface ports on the back panel of the SPARCstation 10 system. It is not the same thing as a monitor.

TOD Time of Day clock.

TPE Twisted-pair Ethernet.

UART Universal Asynchronous Receiver/Transmitter.

VRAM Virtual Random Access Memory.

wrist strap A device that provides grounding for static electricity between your body and the system unit chassis. Electric current and voltage do not pass through the wrist strap.

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