

Sun Ultra™ 1 Series Service Manual



THE NETWORK IS THE COMPUTER™

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Contents

Preface xv

Related Documentation xv

Typographic Conventions xvi

Shell Prompts in Command Examples xvi

Cautions xvii

Ordering Sun Documents xviii

Sun Welcomes Your Comments xviii

1. Product Description 1-1

1.1 System Unit 1-1

1.2 System Illustrations 1-1

2. SunVTS Overview 2-1

3. Power-On Self-Test (POST) 3-1

3.1 How to Start POST 3-1

3.2 Max and Min Levels of POST 3-2

3.3 POST Progress and Error Reporting 3-3

3.4 Additional Keyboard Control Commands 3-3

3.5 System and Keyboard LEDs 3-4

3.6 Serial Port A POST Output 3-6

- 3.6.1 Diag-level NVRAM Variable is Set to Max 3-6
- 3.6.2 Diag-level NVRAM Variable is Set to Min 3-12

4. Troubleshooting Procedures 4-1

- 4.1 Power On Fails or No Video 4-1
 - 4.1.1 Symptom 4-1
 - 4.1.2 Action 4-1
 - 4.1.3 Symptom 4-2
 - 4.1.4 Action 4-2
 - 4.1.5 Symptom 4-2
 - 4.1.6 Action 4-2
- 4.2 Power Supply Test 4-3
- 4.3 DSIMM Failures 4-5
- 4.4 Hard Disk or CD-ROM Drive 4-6
 - 4.4.1 Symptoms 4-6
 - 4.4.2 Action 4-6
 - 4.4.3 Symptom 4-6
 - 4.4.4 Action 4-7
- 4.5 OpenBoot On-Board Diagnostics 4-8
 - 4.5.1 watch-clock 4-8
 - 4.5.2 watch-net, watch-aui, watch-tpe, watch-net-all 4-8
 - 4.5.3 test <alias name>, test <device path>, test-all 4-10
- 4.6 Selected On-Board Diagnostic Tests 4-11
- 4.7 The probe-scsi and probe-scsi-all test 4-12
- 4.8 System Board Test 4-13

5. Safety and Tool Requirements 5-1

- 5.1 Safety Requirements 5-1
- 5.2 Symbols 5-1
- 5.3 Safety Precautions 5-2
 - 5.3.1 Modification to Equipment 5-2

- 5.3.2 Placement of a Sun Product 5-2
- 5.3.3 Power Cord Connection 5-2
- 5.3.4 Electrostatic Discharge 5-3
- 5.3.5 Lithium Battery 5-3
- 5.4 Tools Required 5-3

- 6. Power On and Off 6-1**
 - 6.1 Powering Off the System 6-1
 - 6.2 Powering On the System 6-2

- 7. Internal Access 7-1**
 - 7.1 Removing the Cover 7-1
 - 7.2 Attaching the Wrist Strap 7-2
 - 7.3 Replacing the Cover 7-3

- 8. Major Subassemblies 8-1**
 - 8.1 Power Supply 8-1
 - 8.1.1 Removing the Power Supply 8-1
 - 8.1.2 Replacing the Power Supply 8-3
 - 8.2 Fan Assembly 8-4
 - 8.2.1 Removing the Fan Assembly 8-4
 - 8.2.2 Replacing the Fan Assembly 8-6
 - 8.3 Speaker 8-7
 - 8.3.1 Removing the Speaker 8-7
 - 8.3.2 Replacing the Speaker 8-10
 - 8.4 Diskette Cable 8-12
 - 8.4.1 Removing the Diskette Cable 8-12
 - 8.4.2 Replacing the Diskette Cable 8-14
 - 8.5 SCSI Cable/Backplane 8-16
 - 8.5.1 Removing the SCSI Cable/Backplane 8-16
 - 8.5.2 Replacing the SCSI Cable/Backplane 8-18

- 8.6 Peripheral Power Cable 8-20
 - 8.6.1 Removing the Peripheral Power Cable 8-20
 - 8.6.2 Replacing the Peripheral Power Cable 8-22
- 8.7 Speaker/LED Cable 8-24
 - 8.7.1 Removing the Speaker/LED Cable 8-24
 - 8.7.2 Replacing the Speaker/LED Cable 8-29

9. Storage Devices 9-1

- 9.1 Disk Drive 9-1
 - 9.1.1 Removing a Disk Drive 9-1
 - 9.1.2 Replacing a Disk Drive 9-3
- 9.2 CD-ROM/Tape Drive 9-5
 - 9.2.1 Removing the Bracket from the Chassis 9-5
 - 9.2.2 Removing a CD-ROM/Tape Drive 9-8
 - 9.2.3 Replacing a CD-ROM/Tape Drive 9-8
 - 9.2.4 Replacing the Bracket into the Chassis 9-8
- 9.3 Diskette Drive 9-11
 - 9.3.1 Removing a Diskette Drive 9-11
 - 9.3.2 Replacing a Diskette Drive 9-11

10. System Board and Component Replacement 10-1

- 10.1 System Board 10-1
 - 10.1.1 Removing a System Board 10-2
 - 10.1.2 Replacing a System Board 10-5
- 10.2 NVRAM/TOD 10-10
 - 10.2.1 Removing a NVRAM/TOD 10-10
 - 10.2.2 Replacing a NVRAM/TOD 10-10
- 10.3 SBus Card 10-11
 - 10.3.1 Removing an SBus Card 10-11
 - 10.3.2 Replacing an SBus Card 10-13
- 10.4 DSIMM 10-17

10.4.1	Removing a DSIMM	10-18
10.4.2	Replacing a DSIMM	10-20
10.5	System Board Fan	10-21
10.5.1	Removing the System Board Fan	10-21
10.5.2	Replacing the System Board Fan	10-23
11.	Replacement Parts	11-1
11.1	List of Replacement Parts	11-1
A.	Product Specifications	A-1
A.1	Physical Specifications	A-1
A.2	Electrical Specifications	A-2
A.3	Environmental Requirements	A-2
B.	Signal Descriptions	B-1
B.1	Keyboard/Mouse and Serial Port	B-1
B.1.1	Keyboard/Mouse	B-1
B.1.2	Serial Ports A and B (RS-422/RS-232)	B-2
B.2	AUI (Attachment Unit Interface) Connector	B-2
B.3	TPE Connector	B-3
B.4	SCSI	B-4
B.5	Audio Connectors	B-5
B.6	Parallel Port	B-6
C.	Functional Description	C-1
C.1	System Features	C-1
C.2	Sun Ultra 1 Series System Block Diagram	C-1
C.3	System Board Block Diagram	C-2
	Glossary	Glossary-1

Figures

- FIGURE 1-1 Front View of the System 1-1
- FIGURE 1-2 Rear View of the System 1-2
- FIGURE 1-3 Top View of the System with the Cover Removed 1-3
- FIGURE 3-1 Power LED 3-4
- FIGURE 3-2 Arrangement of the Sun Type 5-c Keyboard LEDs 3-5
- FIGURE 4-1 Power Supply Connector J2601 4-3
- FIGURE 4-2 Power Supply Connector J2603 4-4
- FIGURE 6-1 Rear View of the System 6-1
- FIGURE 7-1 Location of Lock Block 7-1
- FIGURE 7-2 Removing the Cover 7-2
- FIGURE 7-3 Attaching the Wrist Strap 7-3
- FIGURE 7-4 Replacing the Cover 7-4
- FIGURE 8-1 Removing the Power Supply 8-2
- FIGURE 8-2 Replacing the Power Supply 8-3
- FIGURE 8-3 Securing and Connecting the Power Supply 8-4
- FIGURE 8-4 Fan and Power Cable Connection 8-5
- FIGURE 8-5 Fan Assembly 8-6
- FIGURE 8-6 Replacing the Fan Assembly 8-7
- FIGURE 8-7 Fan and Speaker Cable Connection 8-8

- FIGURE 8-8 Removing the Fan/Speaker Bracket from the Chassis 8-9
- FIGURE 8-9 Removing the Speaker from the Fan/Speaker Bracket 8-10
- FIGURE 8-10 Replacing the Fan/Speaker Bracket into the Chassis 8-11
- FIGURE 8-11 Removing the Drive Bracket 8-12
- FIGURE 8-12 Diskette Cable 8-13
- FIGURE 8-13 Replacing the Drive Bracket 8-15
- FIGURE 8-14 SCSI/Backplane Cable Connection 8-17
- FIGURE 8-15 Removing the SCSI Backplane 8-18
- FIGURE 8-16 Replacing the SCSI Backplane 8-19
- FIGURE 8-17 Removing the Drive Bracket 8-20
- FIGURE 8-18 Removing the Peripheral Power Cable 8-21
- FIGURE 8-19 Peripheral Power Cable Routing on the SCSI Backplane 8-22
- FIGURE 8-20 Replacing the Peripheral Power Cable 8-23
- FIGURE 8-21 Replacing the Drive Bracket 8-24
- FIGURE 8-22 Removing the Drive Bracket 8-25
- FIGURE 8-23 Placing the Bracket on Top of the Disk Drive 8-26
- FIGURE 8-24 Removing/Replacing the Speaker /LED Cable from the Chassis 8-27
- FIGURE 8-25 Speaker Cable Connection 8-28
- FIGURE 8-26 Speaker Connector on the System Board 8-29
- FIGURE 8-27 Replacing the Bracket to the Chassis 8-30
- FIGURE 9-1 EMI Door 9-2
- FIGURE 9-2 Removing the Disk Drive 9-3
- FIGURE 9-3 Replacing the Disk Drive 9-4
- FIGURE 9-4 Replacing the EMI Door 9-5
- FIGURE 9-5 Drive Bracket 9-6
- FIGURE 9-6 Placing the Drive Bracket on Top of the Disk Drive 9-7
- FIGURE 9-7 Positioning the CD-ROM/Tape Drive 9-8
- FIGURE 9-8 Connecting the Cables from the CD-ROM/Tape and Diskette Drive 9-9

FIGURE 9-9	Positioning the Drive Bracket in the Chassis	9-10
FIGURE 9-10	Positioning the Diskette Drive	9-11
FIGURE 9-11	Positioning the Diskette Drive	9-12
FIGURE 10-1	Disconnecting Connectors from the System Board	10-3
FIGURE 10-2	Speaker/LED Connector on the System Board	10-4
FIGURE 10-3	Captive Screws on the Back Panel	10-4
FIGURE 10-4	Sliding the System Board Out of the Chassis	10-5
FIGURE 10-5	Removing SBus Filler Panels from the Back Panel	10-6
FIGURE 10-6	Sliding the System Board Into The Chassis	10-6
FIGURE 10-7	Location of the Serial Port Jumpers	10-8
FIGURE 10-8	Identifying Jumper Pins	10-9
FIGURE 10-9	NVRAM/TOD	10-10
FIGURE 10-10	SBus Slots Location	10-11
FIGURE 10-11	Removing an SBus Card from Slot 0 or 1	10-12
FIGURE 10-12	Removing an SBus Card from Slot 2	10-13
FIGURE 10-13	Removing the SBus Card Extractor	10-14
FIGURE 10-14	Replacing the SBus Card	10-15
FIGURE 10-15	Lock in the SBus Card Retainers, SBus Slots 0 or 1	10-16
FIGURE 10-16	Lock in the SBus Card Retainer, SBus Slot 2	10-17
FIGURE 10-17	Removing a DSIMM	10-19
FIGURE 10-18	DSIMM Ejection Lever	10-20
FIGURE 10-19	Replacing a DSIMM	10-21
FIGURE 10-20	Plastic Cover for the Board Fan	10-22
FIGURE 10-21	Board Fan	10-23
FIGURE B-1	Keyboard/Mouse Connector	B-1
FIGURE B-2	Serial Ports A and B Con	B-2
FIGURE B-3	AUI Connector	B-3
FIGURE B-4	TPE Connect	B-4

- FIGURE B-5 SCSI Connect B-4
- FIGURE B-6 Audio Ports Connector B-6
- FIGURE B-7 Parallel Port Connector B-6
- FIGURE C-1 Sun Ultra 1 Series System Block Diagram C-2
- FIGURE C-2 Sun Ultra 1 Series System Board Block Diagram C-3

Tables

TABLE P-1	Related Documents	xv
TABLE P-2	Typographic Conventions	xvi
TABLE P-3	Shell Prompts	xvi
TABLE P-4	Ordering Documentation	xviii
TABLE 3-1	The Keyboard LED Patterns	3-5
TABLE 4-1	J2601 Pin Descriptions	4-3
TABLE 4-2	J2603 Pin Descriptions	4-4
TABLE 4-3	DSIMM Physical Memory Address	4-5
TABLE 4-4	Internal Drives Identification	4-6
TABLE 4-5	Selected On-Board Diagnostics Tests	4-11
TABLE 8-1	Peripheral Power Cable Connection	8-21
TABLE 10-1	Serial Port Jumper Settings	10-9
TABLE 10-2	Bank and Socket Locations for DSIMMs	10-18
TABLE 11-1	List of Replacements Parts	11-1
TABLE A-1	Sun Ultra 1 Series Workstation Physical Specifications	A-1
TABLE A-2	AC/DC Power Supply Specifications	A-2
TABLE A-3	Environmental Limits	A-2
TABLE B-1	Keyboard/Mouse Pin Assignments	B-1
TABLE B-2	Serial Ports Pin Assignments	B-2
TABLE B-3	AUI Connector Pinouts	B-3

TABLE B-4	TPE Pin Assignments	B-4
TABLE B-5	SCSI Pin Assignments	B-4
TABLE B-6	Audio Pin Assignments	B-6
TABLE B-7	Parallel Connector Pinouts	B-6

Preface

The *Sun Ultra 1 Series Service Manual* tells how to remove and replace system parts. This document applies to both Sun™ Ultra™ 1 Model 140 and Sun Ultra 1 Model 170. Chapter 11 lists the replacement parts. This document also tells how to troubleshoot system problems by running SunVTS™ programs and system resident diagnostics.

This document is written for Sun field service representatives, original equipment manufacturers (OEMs), value added resellers (VARs), and other customers with self-maintenance contracts.

Related Documentation

The following documents provide additional information for servicing the Sun Ultra 1 Series system. These documents are also available on-line, on the *Sun Ultra 1 Model 140 Hardware AnswerBook* on the Solaris on Sun Hardware AnswerBook set.

TABLE P-1 Related Documents

Application	Title	Part Number
Installation	Sun Ultra 1 Model 140 Installation Guide	802-3825
Configuration	Sun Ultra 1 Model 140 Reference Manual	802-3816
Configuraton	Sun Ultra 1 Internal Storage Device User's Guide	802-3818
Diagnostics	SunVTS User's Guide	801-7271
Diagnostics	SunVTS Test Reference Manual	802-1448
Diagnostics	SunVTS Quick Reference Card	802-3622

Typographic Conventions

The following table describes the typographic changes used in this book.

TABLE P-2 Typographic Conventions

Typeface or Symbol	Meaning	Example
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. machine_name% You have mail.
AaBbCc123	What you type, contrasted with on-screen computer output	machine_name% su Password:
AaBbCc123	Command-line placeholder: replace with a real name or value	To delete a file, type <code>rm filename</code> .
AaBbCc123	Book titles, new words or terms, or words to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be root to do this.

Shell Prompts in Command Examples

The following table shows the default system prompt and superuser prompt for the C shell, Bourne shell, and Korn shell.

TABLE P-3 Shell Prompts

Shell	Prompt
C shell	machine_name%
C shell superuser	machine_name#
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

Cautions



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.

Individuals who remove any outer or open covers to access 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 qualified service-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.



Caution – The surface of the UltraSPARC™ chip may be hot and cause personal injury if touched. Avoid contact.

Note – Before you begin, carefully read each of the procedures in this document. If you have not performed similar operations on comparable equipment, *do not attempt* to perform these procedures.

Ordering Sun Documents

The SunDocs Order Desk is a distribution center for Sun Microsystems technical documentation. It accepts all major credit cards and company purchase orders. You can order documentation in the following ways:

TABLE P-4 Ordering Documentation

In the U.S.A.	Outside the U.S.A.
Call 1-800-247-0250	Call 1-801-342-3450
Fax 1-801-373-6798	Fax 1-801-373-6798
World Wide Web: http://www.sun.com/sundocs/catalog.html	

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You can also email or fax your comments to us. Please include the part number of your document in the subject line of your email or fax message.

- Email: smcc-docs@sun.com
- Fax: SMCC Document Feedback 1-415-786-6443

Product Description

1.1 System Unit

The major components of the Sun Ultra 1 Series workstation are:

- CPU system
- Monitor
- Sun Type-5c keyboard
- Compact 1 mechanical mouse

The following figures illustrate the CPU system:

- FIGURE 1-1 shows the front view of the system.
- FIGURE 1-2 shows the rear view of the system.
- FIGURE 1-3 shows the top view of the system with the cover removed.

1.2 System Illustrations

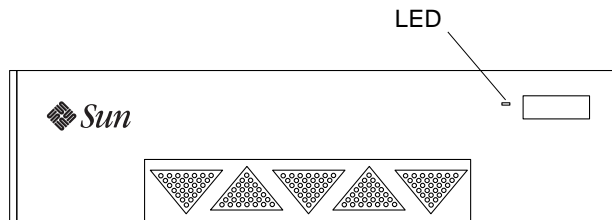


FIGURE 1-1 Front View of the System

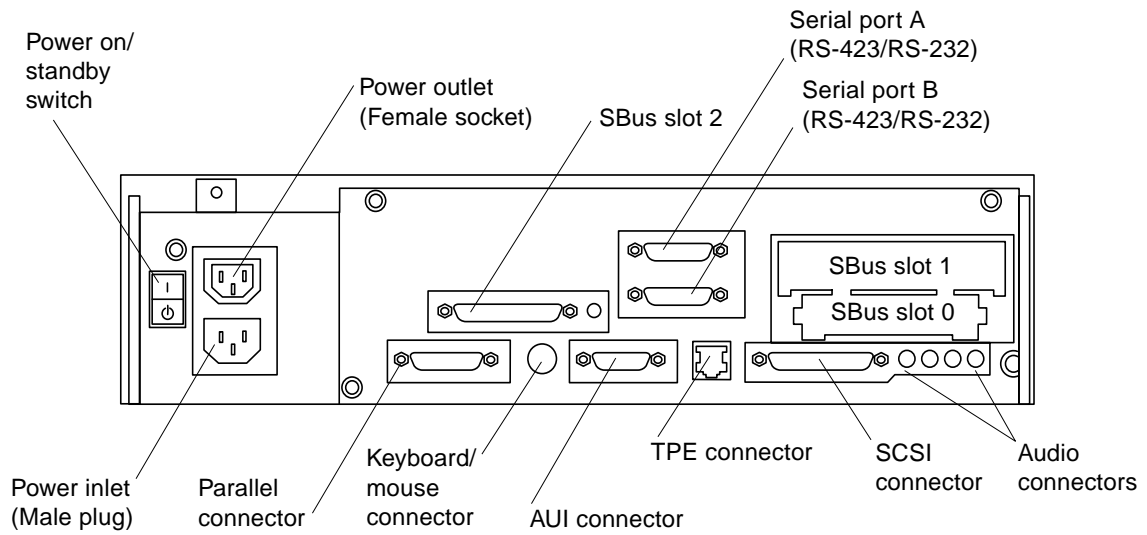


FIGURE 1-2 Rear View of the System

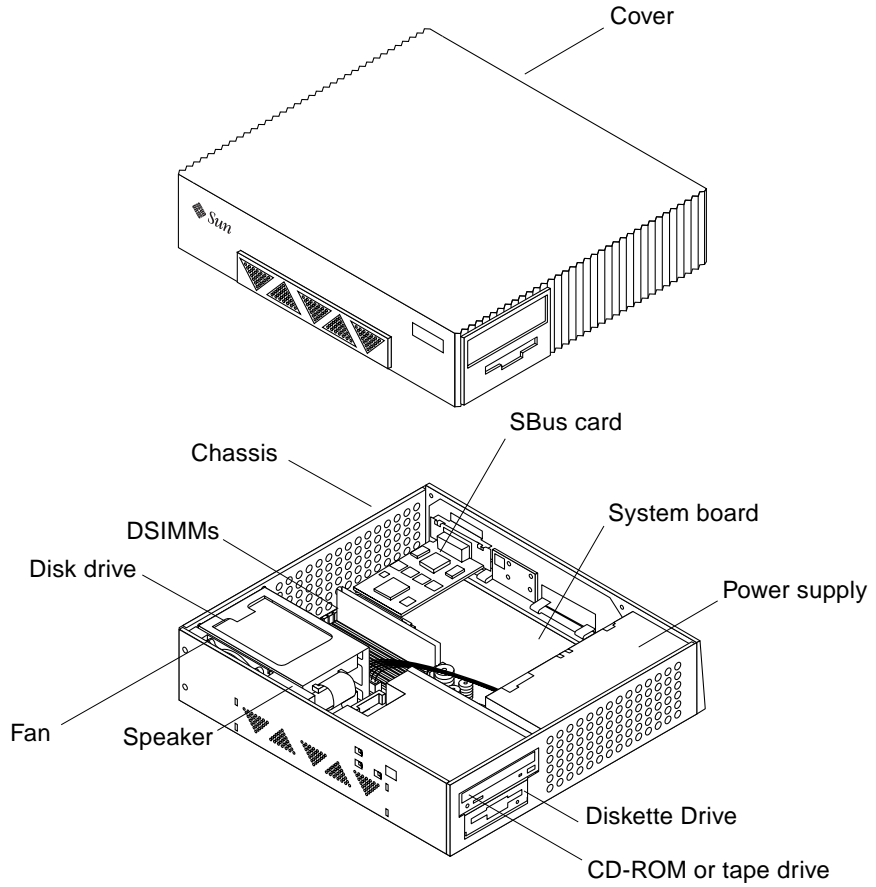


FIGURE 1-3 Top View of the System with the Cover Removed

SunVTS Overview

You can use SunVTS, the Sun Validation and Test Suite, to run individual tests for verifying the configuration and functionality of most hardware controllers and devices.

These are the main features of the SunVTS environment:

- SunVTS kernel (`vtstk`)

The SunVTS kernel controls all aspects of the testing. It stays in the background and is used when needed. Upon starting, it probes the hardware configuration of the system tested, and waits for instructions from the user interface. During testing, it coordinates the running of individual tests, and manages the messages sent by these tests.

- SunVTS OPEN LOOK user interface (`vtstui`)

This interface is designed to run on top of OpenWindows. Through the numerous buttons and windows, users can set options, select tests, read log files, and start or stop testing sessions.

- SunVTS TTY user interface (`vtstty`)

For a Sun system that does not have a monitor, SunVTS has a TTY interface that can be used on a dumb terminal.

- Command line and script interface (`vtstalk` and `vts_cmd`)

Both `vtstalk` and `vts_cmd` allow users to give individual commands and receive messages from the SunVTS kernel without running a user interface. The SunVTS kernel will send any response to the standard input.

- Running individual tests from a command line

Each individual hardware test can be run from a UNIX command line. It is useful to run a single test if you are validating a piece of hardware.

The following documents provide information about SunVTS. They are available on the *Solaris on Sun Hardware AnswerBook*. This AnswerBook is provided on the SMCC Updates CD for the Solaris release you are running.

- *Sun VTS User's Guide (801-7271)*

This document describes the SunVTS environment, including how to start and control the various user interfaces. SunVTS features are described in this document.

- *SunVTS Test Reference Manual (802-1448)*

This document contains descriptions of each test SunVTS runs in the SunVTS environment. Each test description describes the various test options and gives command line arguments.

- *SunVTS Quick Reference Card (802-3622)*

This card gives an overview of the main features of the SunVTS OPEN LOOK interface.

Power-On Self-Test (POST)

The Power On Self Test (POST) diagnostics reside in the system's OpenBoot PROM located on the system board. These diagnostics are useful in determining if a portion of the system has failed and should be replaced. Under normal operating conditions, POST does not run automatically when the system is powered on.

- How to Start POST—page 3-1
- Max and Min Levels of POST—page 3-2
- POST Progress and Error Reporting—page 3-3
- Additional Keyboard Control Commands—page 3-3
- System and Keyboard LEDs—page 3-4
- Serial Port A POST Output—page 3-6

3.1 How to Start POST

POST can be started in two ways. Before powering up the system, press and hold the Stop and D keys on the keyboard. With these keys pressed, turn the system on by pressing the keyboard power on key, or press the power on switch at the rear of the system. This causes the system to start running the POST diagnostics. While POST is running, the Caps Lock key on the keyboard should flash on and off.

The second way to start POST is by setting the `diag-switch?` NVRAM variable to true and then power cycling the system. To set the `diag-switch?` variable to true, type `setenv diag-switch? true` at the system ok prompt.

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

Turn the power off, wait a few seconds, and then press the power on switch. This action causes the system to start running the POST diagnostics. While POST is running, you should see the Caps Lock key on the keyboard flashing on and off.

When you have finished testing the system using POST, set the `diag-switch?` variable back to `false` (the system's default setting).

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

3.2 Max and Min Levels of POST

Two levels of POST are available in the system: `max` (maximum level) and `min` (minimum level). The system runs the selected level of POST based on the setting of the NVRAM variable called `diag-level`.

The default setting for `diag-level` is `max`. In this mode, POST takes about one minute to run and will send progress and error messages to the system serial port A. For an example of max POST output on serial port A, see Section 3.6.1 “Diag-level NVRAM Variable is Set to Max.”

When the `diag-level` variable is set to `min`, POST takes about 30 seconds to run and only an abbreviated set of messages and error information are sent to serial port A. For an example of min POST output on serial port A, see Section 3.6.2 “Diag-level NVRAM Variable is Set to Min.”

To set the `diag-level` variable to `min`, at the system's `ok` prompt type:

```
ok setenv diag-level min
```

To return to the default setting:

```
ok setenv diag-level max
```

To observe POST messages on serial port A, you must connect a terminal to port A or set up a tip connection to another workstation. For information about setting up tip connections, refer to the Solaris software reference manuals.

3.3 POST Progress and Error Reporting

While POST is running, observe the Caps Lock key on the system keyboard. It should flash on and off to indicate that tests are running. Additional POST progress indication is visible when a terminal or tip line is connected to serial port A.

If an error occurs during POST, the Caps Lock key will stop flashing and an error code will be displayed using the lights on the keyboard's Caps Lock, Compose, Scroll Lock, and Num Lock keys.

Note – The error code may only be visible for a few seconds, so it is important to observe the keyboard lights closely while POST is running.

If an error code is present on the keyboard, compare the pattern to TABLE 3-1 for the meaning of the failure. The failure code will indicate a part of the system hardware that was tested by POST to be defective or missing.

In most cases, POST will also attempt to send a failure message to the system monitor. In this case, a message such as this will be displayed:

```
Power On Self Test Failed. Cause: SIMM U0701 or System Board
ok
```

The system will not automatically boot if a POST error occurs. It will halt at the `ok` prompt to alert the user of the failure.

3.4 Additional Keyboard Control Commands

- Stop Key

If the `diag-switch?` variable is set to true but you want to bypass POST when the system is powered on, press and hold the Stop key on the keyboard and turn on the system power. This causes POST to be bypassed.

- Stop and N Keys

If you want to return the system's NVRAM parameters to their original default settings, press and hold the Stop and N keys before powering on the system. Continue to hold the Stop and N keys until the system banner appears on the monitor.

3.5 System and Keyboard LEDs

The power LED at the front of the chassis remains lit when the system is operating normally. FIGURE 3-1 shows the location of the power LED.

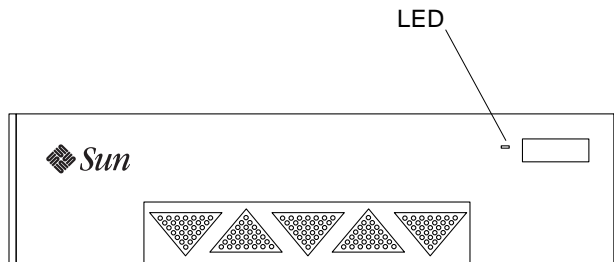


FIGURE 3-1 Power LED

This section describes the keyboard light emitting diode (LED) patterns as a result of POST and their meaning. While POST is running and making progress, the Caps Lock key LED blinks while the rest of the LEDs are off. If POST finds an error, a pattern is encoded in the LEDs to indicate the defective part. If POST completes with no errors, all LEDs will be turned off before returning to the OpenBoot PROM(OBP).

FIGURE 3-2 shows the location of the LED keys on the Sun type 5-c keyboard. TABLE 3-1 lists the meaning of the LED keys.

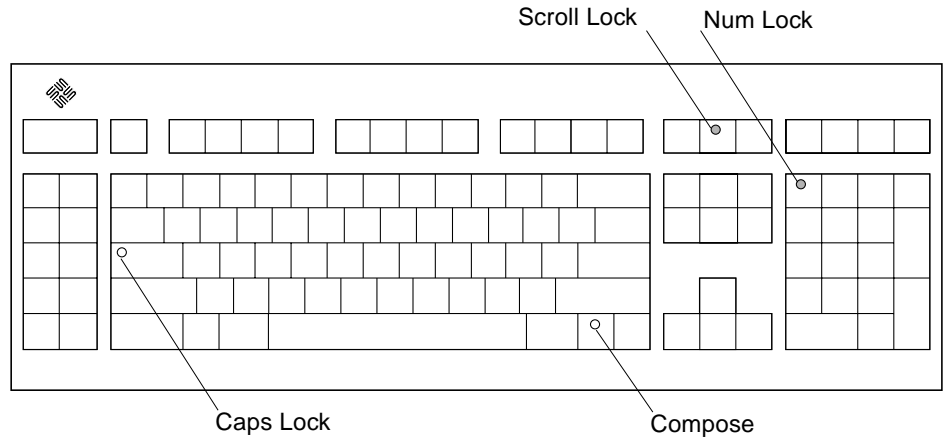


FIGURE 3-2 Arrangement of the Sun Type 5-c Keyboard LEDs

TABLE 3-1 The Keyboard LED Patterns

Caps Lock	Compose	Scroll Lock	Num Lock	Bit Value	Meaning of LED Pattern
Blink	Off	Off	Off	x000	POST in progress
Off	Off	Off	Off	0000	POST successful completion
Off	Off	Off	On	0001	DSIMM in slot U 0601 fail
Off	Off	On	Off	0010	DSIMM in slot U 0701 fail
Off	Off	On	On	0011	DSIMM in slot U 0602 fail
Off	On	Off	Off	0100	DSIMM in slot U 0702 fail
Off	On	Off	On	0101	DSIMM in slot U 0603 fail
Off	On	On	Off	0110	DSIMM in slot U 0703 fail
Off	On	On	On	0111	DSIMM in slot U 0604 fail
On	Off	Off	Off	1000	DSIMM in slot U 0704 fail
On	Off	Off	On	1001	System board fail
On	Off	On	Off	1010	No memory found
On	Off	On	On	1011	Reserved
On	On	Off	Off	1100	Reserved
On	On	Off	On	1101	Reserved
On	On	On	Off	1110	Reserved
On	On	On	On	1111	Reserved

3.6 Serial Port A POST Output

You can observe POST progress if you connect a terminal (or tip line) to the serial port A on the Sun Ultra 1 Series system.

3.6.1 Diag-level NVRAM Variable is Set to Max

Following is an example of serial port A POST output when the diag-level NVRAM variable is set to max.

```

Hardware Power ON
Button Power ON
Button Power ON

@(#) Sun Ultra 1 SBus 3.0 Version 0 created 1995/09/19 13:20
Probing keyboard Done
%o0 = 0000.0000.0000.4001

Executing Power On SelfTest

>
>   RESET SC Control=00000000
>
>   @(#)Sun Ultra 1 SBus POST 2.0.4 9/18/1995 03:59 PM
>Date: 09/20 1995 21:14:24
>Spitfire Version 2.2
>   SC id is 33403000 (UPA Number 3)
>NVRAM Walking 0 and 1 Test
>Probe, Test and Initialize Ecache
>   ECache RAM Size = 00080000
>   ECache TAG Size = 00002000
>Running at Frequency 143 MHZ
>Setting MC_Control1 to 0000026a
>Setting MC_Control0 to 80000f28 (4,0)
>   SIMM Present Field 00000500
>SIMM Pair      Base Addr      Low Size  Hi Size  Pair Status
>  0          00000000.00000000 01000000 01000000    00
>  2          00000000.20000000 02000000 02000000    00
>Running at Frequency 143 MHZ
>Setting MC_Control1 to 0000026a
>Setting MC_Control0 to 80000551 (2,0)>UPA Cacheable Data and
Check bit Bits
>Stack Memory Test
>SelfTest Initializing
>EPROM Path Test
>   PROM Datapath Test
>PROM Datapath Test PASSED
>FPU Register Test
>   FSR Read/Write Test
>FSR Read/Write Test PASSED
>NVRAM Test
>MMU Enable Test

```

```
> DMMU Registers Access Test
>DMMU Registers Access Test PASSED
> DMMU TLB DATA RAM Access Test
>DMMU TLB DATA RAM Access Test PASSED
> DMMU TLB TAGS Access Test
>DMMU TLB TAGS Access Test PASSED
> IMMU Registers Access Test
>IMMU Registers Access Test PASSED
> IMMU TLB DATA RAM Access Test
>IMMU TLB DATA RAM Access Test PASSED
> IMMU TLB TAGS Access Test
>IMMU TLB TAGS Access Test PASSED
> DMMU Init
>DMMU Init Test PASSED
> IMMU Init
>IMMU Init Test PASSED
> I/D MMU TLB Load and Initialize
>I/D MMU TLB Load and Initialize Test PASSED
>Serial Ports Test
> Serial Port Register Test
>Serial Port Register Test PASSED
> Serial Ports Test
>Serial Ports Test PASSED
>Ecache Test
>Basic CPU Test
> Instruction Cache Tag RAM Test
>Instruction Cache Tag RAM Test PASSED
> Instruction Cache Instruction RAM Test
>Instruction Cache Instruction RAM Test PASSED
> Instruction Cache Next Field RAM Test
>Instruction Cache Next Field RAM Test PASSED
> Instruction Cache Pre-decode RAM Test
>Instruction Cache Pre-decode RAM Test PASSED
> Data Cache RAM Test
>Data Cache RAM Test PASSED
> Data Cache Tags Test
>Data Cache Tags Test PASSED
>Memory Test
> Memory Control Register Init
>Running at Frequency 143 MHZ
>Setting MC_Control1 to 0000026a
>Setting MC_Control0 to 80000551 (2,0)
```



```
>Memory Control Register Init Test PASSED
>   Memory Clear Test
>Memory Clear Test PASSED
>   Memory RAM (blk) Test
>Memory RAM (blk) Test PASSED
>   Memory Address Line Test
>   Writing SIMM Pair 0 base address 00000000.00020000
>   Writing SIMM Pair 2 base address 00000000.20000000
>   Reading SIMM Pair 0 base address 00000000.00020000
>   Reading SIMM Pair 2 base address 00000000.20000000
>Memory Address Line Test PASSED
>   Memory Stress Test
>Memory Stress Test PASSED
>FPU Functional Test
>   Floating Single Move Test
>Floating Single Move Test PASSED
>   FPU Basic Operation Test
>FPU Basic Operation Test PASSED
>System Controller Test
>   SC Initialization
>   SC id is 33403000 (UPA Number 3)
>SC Initialization Test PASSED
>Caches and Coherency Test
>   Dcache Init
>Dcache Init Test PASSED
>   Dcache Enable Test
>Dcache Enable Test PASSED
>   Dcache Functionality Test
>Dcache Functionality Test PASSED
>SysIO Registers Test
>   SysIO Register Initialization
>SysIO Register Initialization Test PASSED
>   IOMMU Registers and RAM Test
>IOMMU Registers and RAM Test PASSED
>   Streaming Buffer Registers and RAM Test
>Streaming Buffer Registers and RAM Test PASSED
>   SBus Control and Config Registers Test
>SBus Control and Config Registers Test PASSED
>   SysIO RAM Initialization
>SysIO RAM Initialization Test PASSED
>CPU Functional Test
>   CPU Softint Registers and Interrupts Test
```

```

>CPU Softint Registers and Interrupts Test PASSED
> CPU Tick and Tick Compare Registers Test
>CPU Tick and Tick Compare Registers Test PASSED
> CPU Interrupt Registers and Dispatch Test
>WARNING Test skipped, no alternate CPU
>CPU Interrupt Registers and Dispatch Test PASSED
> CPU Dispatch Control Register Test
>CPU Dispatch Control Register Test PASSED
>SysIO Functional Test
> I/D MMU TLB Load and Initialize Test
>I/D MMU TLB Load and Initialize Test PASSED
> Clear Interrupt Map and State Registers
>Clear Interrupt Map and State Registers Test PASSED
> SysIO Interrupts Test
>SysIO Interrupts Test PASSED
> SysIO Timers/Counters Test
>SysIO Timers/Counters Test PASSED
> IOMMU Virtual Address TLB Tag Compare Test
>IOMMU Virtual Address TLB Tag Compare Test PASSED
> Streaming Buffer Flush Test
>Streaming Buffer Flush Test PASSED
> DMA Merge Buffer Test
>DMA Merge Buffer Test PASSED
>APC Test
> APC Registers Tests Test
>APC Registers Tests Test PASSED
> APC DVMA Test
>APC DVMA Test PASSED
>I/D MMU Functional Test
> I/D MMU TLB Load and Initialize Test
>I/D MMU TLB Load and Initialize Test PASSED
> Access Priviledged Data Page Test
>Access Priviledged Data Page Test PASSED
> Write to Protected Data Page Test
>Write to Protected Data Page Test PASSED
> Read/Write to Invalid Data Page Test
>Read/Write to Invalid Data Page Test PASSED
> Execute from Invalid Instr. Page Test
>Execute from Invalid Instr. Page Test PASSED
>Graphic Instructions Test
>Data Cache Test
> Dcache Init

```

```
>Dcache Init Test PASSED
>  Dcache 256 Bytes Write then load Test
>Dcache 256 Bytes Write then load Test PASSED
>  Dcache Enable Test
>Dcache Enable Test PASSED
>Instruction Cache Test
>  Icache Init
>Icache Init Test PASSED
>  Icache Quick Test
>Icache Quick Test PASSED
>Forcing ECC Faults Test
>  ECC CE Pattern Test
>ECC CE Pattern Test PASSED
>  ECC CE Check bit Test
>ECC CE Check bit Test PASSED
>  ECC UE Pattern Test
>ECC UE Pattern Test PASSED
>  ECC UE Check bit Test
>ECC UE Check bit Test PASSED
>Ecache Stress Test
>  Ecache Stress Test
>Ecache Stress Test PASSED
>Macio Test
>  MACIO Registers/RAM/FIFO Test
>MACIO Registers/RAM/FIFO Test PASSED
>  Ethernet Registers Test
>Ethernet Registers Test PASSED
>  Parallel Port Registers Test
>Parallel Port Registers Test PASSED
>  MACIO SCSI DVMA Test0>MACIO SCSI DVMA Test PASSED
>POST PASSED. Remaining loops 0.
```

Power On Selftest Completed

Status = 0000.0000.0000.0000 ffff.ffff.f006.d268
0e66.0000.0180.1d0d

Software Power ON

@(#) Sun Ultra 1 SBus 3.0 Version 0 created 1995/09/19 13:20
Clearing E\$ Tags Done
Clearing I/D TLBs Done

```
Probing Memory Done
MEM BASE = 0000.0000.2000.0000
MEM SIZE = 0000.0000.0400.0000
MMUs ON
Copy Done
PC = 0000.01ff.f000.1a3c
PC = 0000.0000.0000.1a80
Decompressing into Memory Done
Size = 0000.0000.0006.84a0
ttya initialized
SC Control: EWP:0 IAP:0 FATAL:0 WAKEUP:0 BXIR:0 BPOR:0 SXIR:0
SPOR:1 POR:0
Probing Memory Bank #0 16 + 16 : 32 Megabytes
Probing Memory Bank #1 0 + 0 : 0 Megabytes
Probing Memory Bank #2 32 + 32 : 64 Megabytes
Probing Memory Bank #3 0 + 0 : 0 Megabytes
Probing /sbus@1f,0 at 0,0 Nothing there
Probing /sbus@1f,0 at 1,0 Nothing there
Probing /sbus@1f,0 at 2,0 cgsix
```

3.6.2 Diag-level NVRAM Variable is Set to Min

If you set the `diag-level` NVRAM parameter to `min`, POST runs an abbreviated set of tests. This mode takes approximately 30 seconds to complete. Following is an example of serial port A output when POST runs in this mode.

```
Hardware Power ON
Button Power ON
Button Power ON

@(#) Sun Ultra 1 SBus 3.0 Version 0 created 1995/09/19 13:20
Probing keyboard Done
%o0 = 0000.0000.0000.2001

Executing Power On SelfTest

Power On Selftest Completed
    Status = 0000.0000.0000.0000 ffff.ffff.f006.d268
0e66.0000.0180.1d0d

Software Power ON

@(#) Sun Ultra 1 SBus 3.0 Version 0 created 1995/09/19 13:20
Clearing E$ Tags Done
Clearing I/D TLBs Done
Probing Memory Done
MEM BASE = 0000.0000.2000.0000
MEM SIZE = 0000.0000.0400.0000
MMUs ON
Copy Done
PC = 0000.01ff.f000.1a3c
PC = 0000.0000.0000.1a80
Decompressing into Memory Done
Size = 0000.0000.0006.84a0
ttya initialized
SC Control: EWP:0 IAP:0 FATAL:0 WAKEUP:0 BXIR:0 BPOR:0 SXIR:0
SPOR:1 POR:0
Probing Memory Bank #0 16 + 16 : 32 Megabytes
Probing Memory Bank #1 0 + 0 : 0 Megabytes
Probing Memory Bank #2 32 + 32 : 64 Megabytes
Probing Memory Bank #3 0 + 0 : 0 Megabytes
Probing /sbus@1f,0 at 0,0 Nothing there
Probing /sbus@1f,0 at 1,0 Nothing there
Probing /sbus@1f,0 at 2,0 cgsix
```


Troubleshooting Procedures

This chapter describes how to troubleshoot possible problems and includes the corrective actions you can take.

- Power On Fails or No Video—page 4-1
- Power Supply Test—page 4-3
- DSIMM Failures—page 4-5
- Hard Disk or CD-ROM Drive—page 4-6
- OpenBoot On-Board Diagnostics—page 4-8
- Selected On-Board Diagnostic Tests—page 4-11
- The probe-scsi and probe-scsi-all test—page 4-12
- System Board Test—page 4-13

4.1 Power On Fails or No Video

4.1.1 Symptom

The system does not power up when the power switch on the keyboard is pressed.

4.1.2 Action

Check the AC power cord to be sure that it is properly connected to the system and to the wall outlet. Verify that the wall outlet is supplying AC power to the system.

Press the power switch at the rear of the system. If the system powers on, the keyboard may be defective or the system was unable to accept the keyboard power on signal at that time. Power off the system and press the keyboard power on switch

again. If the system powers on, no further action is required. If the system does not power on, the keyboard may be defective. Connect a different Sun Type 5 or Sun Compact-1 keyboard and press the power key.

Note – The Sun Type 4 keyboard does not have a power on key, and will cause the system to power up as soon as the Type 4 keyboard is connected to the system. The Type 4 keyboard is not supported on the Sun Ultra 1 system.

If you verified that AC power is being supplied to the system and the system does not power up, the system's power supply may be defective. See "Power Supply Test" on page 3.

4.1.3 Symptom

The system attempts to power up, but does not initialize the monitor and does not boot.

4.1.4 Action

Press the power on switch and observe the keyboard. The lights (LEDs) on the keyboard should be lit briefly 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. See "Power Supply Test" below. If you hear a tone and see lights on the keyboard, but the system still fails to initialize, see "System Board Test" on page 13.

4.1.5 Symptom

No video output on the system monitor.

4.1.6 Action

Check the power cord to be sure that it is connected to the monitor and to the wall outlet. Verify that the wall outlet is supplying AC power to the monitor. Check the video cable connection between the monitor and the system's graphics card output port at the rear of the system. If the AC connection to the monitor is correct and the video cable is correctly connected, the system monitor or the system's internal graphics card may be defective. Replace the monitor or the graphics card.

4.2 Power Supply Test

Use a VOM (volt-ohm-milliammeter) to check the power supply output voltages. The power supply connectors J2601 and J2603 must remain connected to the system board.

Place the VOM negative probe on one of the Gnd (ground) pins in the connector, and test the +12v, -12v, +5v, +3.3v and +3.0v power pins individually with the VOM positive probe.

See TABLE 4-1 and TABLE 4-2 for power supply connector pin descriptions.

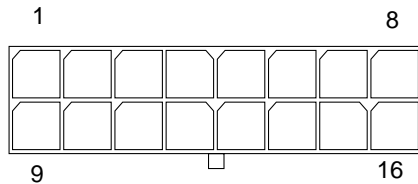


FIGURE 4-1 Power Supply Connector J2601

TABLE 4-1 J2601 Pin Descriptions

Pin	Description	Pin	Description
1	+12V	9	Thermal sensor
2	Gnd	10	-12V
3	Power on	11	Power off
4		12	
5		13	
6	+3V sense	14	Gnd
7	+3V set	15	Thermal sensor
8	+3V ovp	16	Power on reset

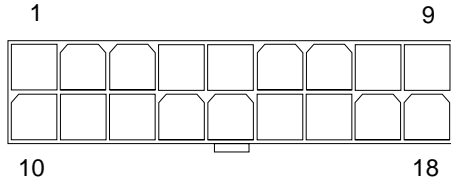


FIGURE 4-2 Power Supply Connector J2603

TABLE 4-2 J2603 Pin Descriptions

Pin	Description	Pin	Description
1	+5V	10	Gnd
2	+5V	11	Gnd
3	+5V	12	Gnd
4	+3.3V	13	Gnd
5	+3.3V	14	Gnd
6	+3.3V	15	Gnd
7	+3.0V	16	Gnd
8	+3.0V	17	Gnd
9	+3.0V	18	Gnd

If any of the voltages are not present with the power supply on and are connected to the system board, replace the power supply.

4.3 DSIMM Failures

At times, the operating system, diagnostic program, or POST may not display a DSIMM location (U number) as part of the memory error message. If you encounter this situation, and the only available information is a physical memory address and failing byte (or bit), use the following table to locate the defective DSIMM.

TABLE 4-3 DSIMM Physical Memory Address

DSIMM Slot Location	Physical Memory Address Start	Physical Memory Address End
Bank 0	0000 0000	0fff ffff
U0701 (byte 00-15, bits 000-127)		
U0601 (byte 16-31, bits 128-255)		
Bank 1	1000 000	1fff ffff
U0702 (byte 00-15, bits 000-127)		
U0602 (byte 16-31, bits 128-255)		
Bank 2	2000 000	2fff ffff
U0703 (byte 00-15, bits 000-127)		
U0603 (byte 16-31, bits 128-255)		
Bank 3	3000 000	3fff ffff
U0704 (byte 00-15, bits 000-127)		
U0604 (byte 16-31, bits 128-255)		

In TABLE 4-3, each bank allows enough address space to accommodate two 16MB, two 32MB, two 64MB, or two 128MB DSIMMs. Unused addresses are mapped out by the memory management hardware. So, regardless of the capacity of the DSIMM installed, the physical memory starting address will always be as shown in the table.

4.4 Hard Disk or CD-ROM Drive

4.4.1 Symptoms

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

CD-ROM drive read or parity errors are reported by the operating system or customer applications.

4.4.2 Action

Replace the drive indicated by the failure messages. The operating system identifies the internal drives as follows:

TABLE 4-4 Internal Drives Identification

Operating System Address	Drive Physical Location and Target
c0t0d0s#	Lower SCSI Disk, target 0
c0t1d0s#	Upper SCSI Disk, target 1
c0t6d0s#	CD-ROM drive, target 6

Note – The # symbol in the examples may be a number between 0 and 7 and represents the slice or partition on the drive.

4.4.3 Symptom

Disk drive or CD-ROM fails to boot or is not responding to commands.

4.4.4 Action

This symptom could be caused by a defective system SCSI controller. First test the drive's response to the `probe-scsi` command. At the system `ok` prompt, type `probe-scsi` and press Return. If the disk drive responds correctly to this command, a message will appear:

```
ok probe-scsi
Target 0
  Unit 0   Disk      SEAGATE ST5660N  SUN1.050638DX168801
                        Copyright (c) 1993 Seagate
                        All rights reserved 0000

Target 1
  Unit 0   Disk      SEAGATE ST5660N  SUN1.050638DX168801
                        Copyright (c) 1993 Seagate
                        All rights reserved 0000

Target 6
  Unit 0   Removable Read Only device      TOSHIBA XM-
5301TASUN4XCD173506/22/95
```

If the drives respond and a message is displayed, the system's SCSI controller has successfully probed the devices. This is an indication that the system's main logic board is working correctly. If one drive does not respond to the probe but the others do, 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 drive. If after replacing the drive the problem still persists, replace the main logic board. If replacing both the disk drive and the main logic board does not correct the problem, replace the internal disk drive cable and SCSI backplane assembly.

4.5 OpenBoot On-Board Diagnostics

4.5.1 watch-clock

This test reads a register in the NVRAM/TOD (Non-Volatile RAM/Time of Day) chip on the main logic board 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.

Example:

```
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 (this counter increments from 0 to 59)
```

4.5.2 watch-net, watch-aui, watch-tpe, 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 such as Framing Error and Cyclic Redundancy Check (CRC) Error are indicated with an X, along with the error description.

Example:

```
ok watch-net
Using AUI Ethernet Interface
Lance register test -- succeeded.
Internal loopback test -- succeeded.
External loopback test -- Lost Carrier (transceiver cable
problem?) send failed.
Using TP Ethernet Interface
Lance register test -- succeeded.
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.
.....
.....
.....
.....
.....Framing error CRC error
X.....
```

The Sun Ultra 1 Series has two types of on-board Ethernet interfaces: 10 BASE-T (also called twisted-pair Ethernet or TPE) and 10 BASE5 (also called thick ethernet or AUI). Only one Ethernet cable is connected to the back of the system. The system automatically selects 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` activates this automatic selection. You may also control the selection of Ethernet interfaces to monitor by using specific commands. Use `watch-tpe` to monitor the 10 BASE-T (Twisted-Pair Ethernet) connection or `watch-aui` to monitor the 10 BASE5 (thicknet) connection. Example:

```
ok watch-tpe
Using TP Ethernet Interface
Lance register test -- succeeded.
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's SBus slots, `watch-net-all` will start by monitoring that card's

Ethernet transmissions. 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.

Example:

```
ok watch-net-all
/sbus@1f,0/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)
/sbus@1f,0/ledma@e,8400010/le@e,8c00000
Using AUI Ethernet Interface
  Lance register test -- succeeded.
  Internal loopback test -- succeeded.
  External loopback test -- Lost Carrier (transceiver cable
problem?)
send failed.
Using TP Ethernet Interface
  Lance register test -- succeeded.
  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.
.....
.....
```

4.5.3 test <alias name>, test <device path>, test-all

The test command, combined with a device's alias or device pathname, will execute that device's selftest program. If a device has no selftest program, this message will be 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 path name.

Example:

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

4.6 Selected On-Board Diagnostic Tests

The on-board diagnostic tests that you can run on the Sun Ultra 1 Series systems are listed in TABLE 4-5.

TABLE 4-5 Selected On-Board Diagnostics Tests

Type of Test	Description	Preparation
test screen	Tests the system's video graphics hardware and monitor	The <code>diag-switch?</code> NVRAM parameter must be set to true for the test to run.
test floppy	Tests the floppy drive's ability to respond to commands	Requires a formatted diskette to be inserted into the drive.
test net-auri	Performs an internal and external loopback test on the AUI (Thick) Ethernet interface	Connect a cable to the system's 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 (Twisted-Pair Ethernet) interface	Connect a cable to the system's TPE port and to a TPE hub or the test will fail the external loopback phase. If the <code>tpe-link-test?</code> parameter 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.

TABLE 4-5 Selected On-Board Diagnostics Tests

Type of Test	Description	Preparation
test ttya test ttyb	This test outputs an alphanumeric test pattern on the system's serial ports (ttya = serial port A, ttyb = serial port B).	You must attach a terminal to the port being tested to observe the output.
test keyboard	This test executes the keyboard's selftest.	The four LEDs on the keyboard should flash on once, and this message is displayed: <i>Keyboard Present</i> .
test-all	This command tests all devices in the system that have a selftest program.	Tests are executed in order using the device tree (viewed with the <i>show-devs</i> command) as reference.

4.7 The probe-scsi and probe-scsi-all test

The `probe-scsi` test sends an inquiry command to internal and external SCSI devices connected to the Sun Ultra 1 Series on-board SCSI interface. If a SCSI device is connected and powered up the target address, unit number, device type, and manufacturer's name is displayed.

Example:

```
ok probe-scsi
Target 0
  Unit 0   Disk           SEAGATE ST31200W SUN1.058724
Target 1
  Unit 0   Disk           SEAGATE ST31200W SUN1.058724
Target 6
  Unit 0   Removable Read Only device   TOSHIBA XM-
5301TASUN4XCD1735
```

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's address in the system's device tree, followed by the SCSI device identification data.

Example:

```
ok probe-scsi-all
/sbus@1f,0/dma@1,81000/esp@1,80000
Target 2
  Unit 0   Disk      SEAGATE ST41600N SUN1.3G00286965
/sbus@1f,0/espdma@e,8400000/esp@e,8800000
Target 0
  Unit 0   Disk      SEAGATE ST31200W SUN1.058724
Target 1
  Unit 0   Disk      SEAGATE ST5660N  SUN05350638
Target 6
  Unit 0   Removable Read Only device  TOSHIBA XM-
5301TASUN4XCD1735
```

4.8 System Board Test

On the keyboard, press and hold the Stop and D keys. While holding the keys down, turn the system's power switch on and watch the lights on the keyboard.

This action puts the system into Power-On Self-Test (POST) mode. The Caps Lock key on the keyboard should flash on and off, indicating that the system is running the built-in tests.

If a failure occurs during POST, one of the other keys on the keyboard may light, indicating a failed system part. See Section 3.5 “System and Keyboard LEDs” on page 3-4” for the meaning of the failure codes. If a failure code appears, replace the defective part indicated by the code.

If the Caps Lock key fails to flash on and off after you have pressed and held the Stop and D keys, POST has failed. The most probable cause of this type of failure is the system board.

However, other optional parts in the system could cause POST to fail in this way. Before replacing the system board, you should remove any optional SBus cards and memory and run the test again. The system only requires two DSIMMs in slot U0701 and U0601, the main logic board, the power supply, and the keyboard to be installed. By removing the other parts and testing the system again, you eliminate the possibility that those parts are causing the failure.

To receive additional POST failure information, you may connect a terminal to serial port A on the system. With the terminal connected, failure messages that give more information about the failure may appear.

Safety and Tool Requirements

Before servicing any part of the Sun Ultra 1 Series system, read the instructions and cautions in this section. This information explains how to work safely when servicing a Sun Microsystems product.

5.1 Safety Requirements

For your protection, observe the following safety precautions when setting up your equipment:

- Follow all cautions, warnings, and instructions marked on the equipment.
- Ensure that the voltages and frequency rating of the power outlet you use match the electrical rating label on the equipment.
- Never push objects of any kind through openings in the equipment. They may touch dangerous voltage points or short out components resulting in fire or electric shock.
- Refer servicing of equipment to qualified personnel.

5.2 Symbols

The following symbols mean:



Caution – Risk of personal injury and equipment damage. Follow the instructions.



Caution – Hazardous voltages are present. To reduce the risk of electric shock and danger to personal health, follow the instructions.



Caution – Hot surfaces. Avoid contact. Surfaces are hot and may cause personal injury if touched.

5.3 Safety Precautions

5.3.1 Modification to Equipment



Caution – Do not make mechanical or electrical modifications to the equipment. Sun Microsystems, Inc. is not responsible for regulatory compliance of a modified Sun product.

5.3.2 Placement of a Sun Product



Caution – To ensure reliable operation of your Sun product and to protect it from overheating, openings in the equipment must not be blocked or covered. A Sun product should never be placed near a radiator or hot air register.

5.3.3 Power Cord Connection



Caution – Not all power cords have the same current ratings. Household extension cords do not have overload protection. Do not use household extension cords with your Sun product.



Caution – The power switch of this product functions as a standby type device only. The power cord serves as the primary disconnect device for the system. Be sure to plug the power cord into a grounded power outlet that is nearby the system and is readily accessible. Do not connect the power cord when the power supply has been removed from the system chassis.

5.3.4 Electrostatic Discharge



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

Do not touch the components themselves or any metal parts. Wear a wrist strap when handling the drive assemblies, boards or cards.

5.3.5 Lithium Battery



Caution – On Sun system boards, a lithium battery is molded into the real-time clock; SDS No. M48T59Y, MK48TXXB-XX, M48T18-XXXPCZ or M48T59W-XXXPCZ. Batteries are not customer replaceable parts. They may explode if mistreated. Do not dispose of the battery in fire. Do not disassemble it or attempt to recharge it.

5.4 Tools Required

- Phillips screwdriver
- Long-nose plier
- Grounding wrist strap
- Volt-ohm-milliammeter (VOM) for checking voltages and continuity
- Antistatic surface

Place static-sensitive parts such as boards, cards, disk drives, and TOD/NVRAM on an antistatic surface. The following items can be used as an antistatic surface:

- The bag used to wrap a Sun replacement part
- The shipping container used to package a Sun replacement part
- The inner side (metal part) of the system unit cover

- Sun ESD mat, P/N 250-1088. You can purchase it through your Sun sales representatives
- Disposable ESD mat, which is shipped with replacement parts or optional system features.

Power On and Off

- Powering Off the System—page 6-1
- Powering On the System—page 6-2

6.1 Powering Off the System

Before turning off system power, shut down the operating system. Failure to shut down the operating system can result in loss of data.

1. **Notify users that the system is going down.**
2. **Back up the system files and data.**
3. **Shut down the system.**
4. **Press the power switch to the stand-by mode at the left rear of the system.**
The LED on the front of the system should not be lit and the fans should not be running.

Power on/
standby switch

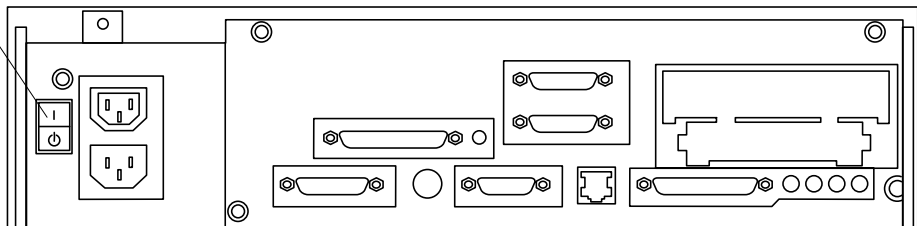


FIGURE 6-1 Rear View of the System



Caution – You must disconnect the AC power cord prior to handling the power supply. When servicing any other system components, the AC power cord should remain connected.

When the system power is in the stand-by position, and the AC power cord remains connected to a power outlet, the hazardous AC voltage is still present in the power supply primary.

5. **Turn off the power to the monitor.**
6. **Disconnect cables to any external units.**

6.2 Powering On the System

1. **Turn the power switch on to all peripherals connected to the system.**
Turn the power on to the attached peripherals first so the system will recognize the peripherals when the system is powered on.
2. **Turn on the power switch to the monitor.**
3. **Turn on the power switch to the system.**

Internal Access

- Removing the Cover—page 7-1
- Attaching the Wrist Strap—page 7-2
- Replacing the Cover—page 7-3

7.1 Removing the Cover

1. Use a Phillips screwdriver to remove the lock block (if installed) on the cover.
See FIGURE 7-1.

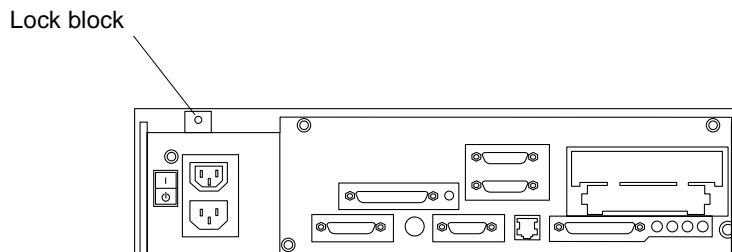


FIGURE 7-1 Location of Lock Block

2. Loosen the captive screws securing the cover.
See FIGURE 7-2.
3. Grasp the sides of the cover and lift up the back of the cover. After the cover clears the back panel, push the cover away from the front panel.

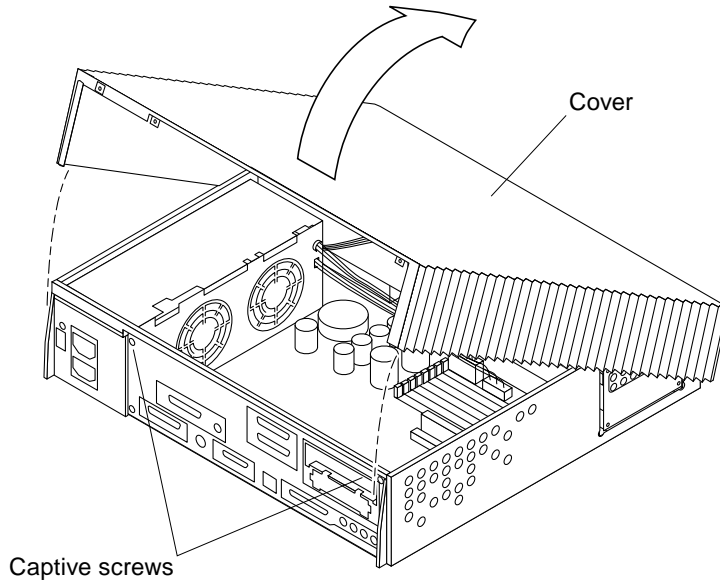


FIGURE 7-2 Removing the Cover

7.2 Attaching the Wrist Strap

- 1. Unwrap the first two folds of the wrist strap and wrap the adhesive side firmly against your wrist.**
See FIGURE 7-3.
- 2. Peel the liner from the copper foil at the opposite end of the wrist strap and attach the copper end of the wrist strap to the top of the power supply.**

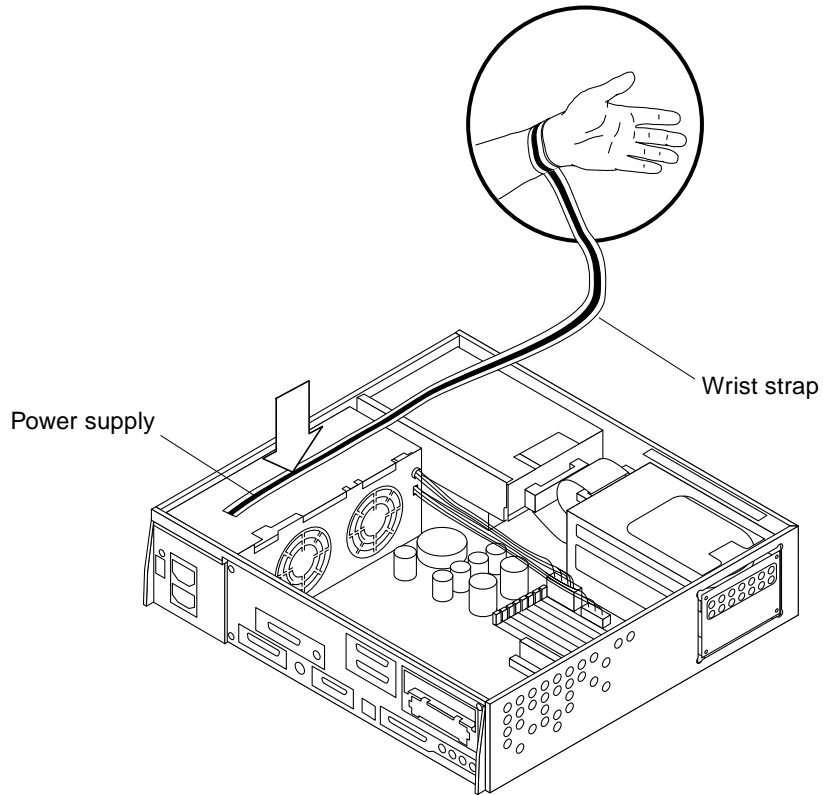


FIGURE 7-3 Attaching the Wrist Strap

7.3 Replacing the Cover

1. Position the cover on the system as shown.

See FIGURE 7-4.

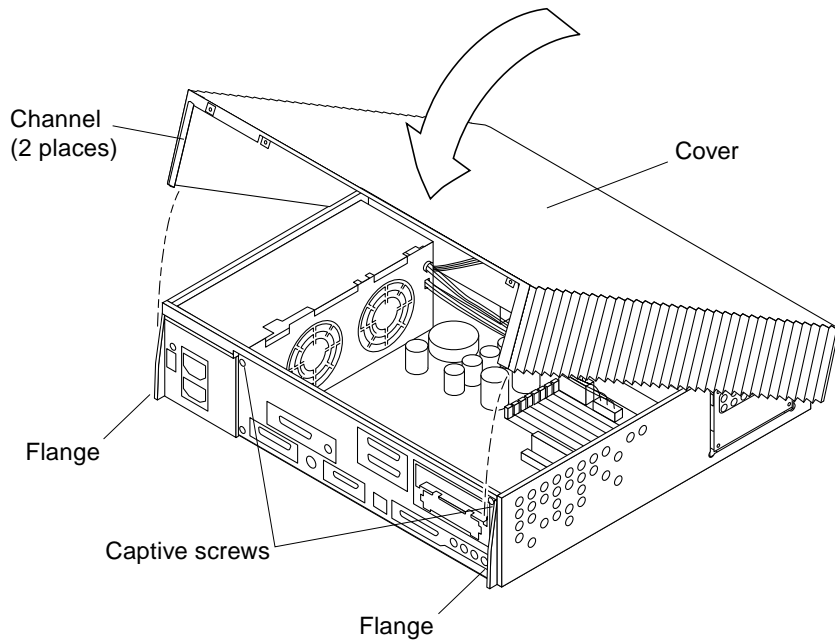


FIGURE 7-4 Replacing the Cover

2. Lower the back side of the cover until the channels on both sides of the cover align with the two flanges on the rear of the system. Press down on both sides of the cover until it is firmly seated.

See FIGURE 7-4.

3. Tighten the captive screws on the back panel.
4. Replace the lock block with a Phillips screwdriver.

See FIGURE 7-1.

Major Subassemblies

This chapter explains how to remove and replace the major subassemblies. Refer to the following *before* you remove any parts:

- Powering Off the System—page 6-1
- Removing the Cover—page 7-1
- Attaching the Wrist Strap—page 7-2

Refer to the following *after* replacing any parts:

- Replacing the Cover—page 7-3
- Powering On the System—page 6-2

The following is the list of the major subassemblies for the Sun Ultra 1 Series system:

- Power Supply—page 8-1
- Fan Assembly—page 8-4
- Speaker—page 8-7
- Diskette Cable—page 8-12
- SCSI Cable/Backplane—page 8-16
- Peripheral Power Cable—page 8-20
- Speaker/LED Cable—page 8-24

8.1 Power Supply

8.1.1 Removing the Power Supply

1. **Disconnect the AC power cable from the system.**
2. **Disconnect the DC connector from the system board at J2603.**

See FIGURE 8-1.

3. Disconnect the DC connector from the system board at J2601.
4. Remove the DC harness from the clip and disconnect the DC connector from the peripheral power cable at P1.

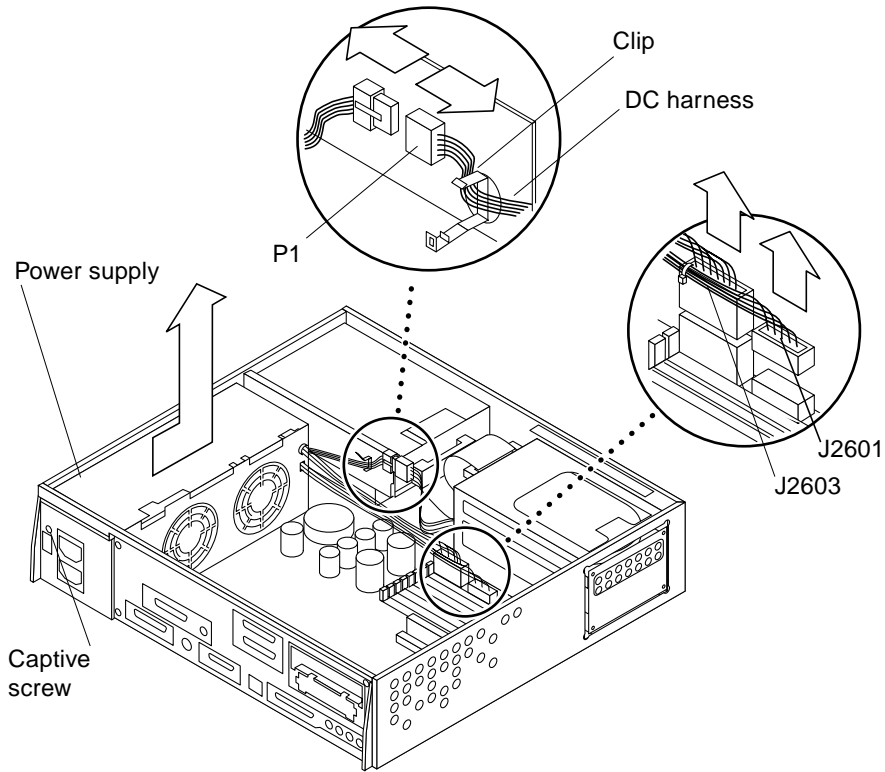


FIGURE 8-1 Removing the Power Supply

5. Loosen the power supply captive screw on the back panel.
See FIGURE 8-1.
6. Push the power supply toward the front side of the chassis to disengage the mounting hooks.
7. Tilt the power supply slightly toward the system board, and lift it out of the chassis.

8.1.2 Replacing the Power Supply

1. Lower the power supply into the chassis and push it all the way toward the back panel. The hooks in the base of the chassis must engage with the cutouts at the bottom of the power supply.

See FIGURE 8-2.

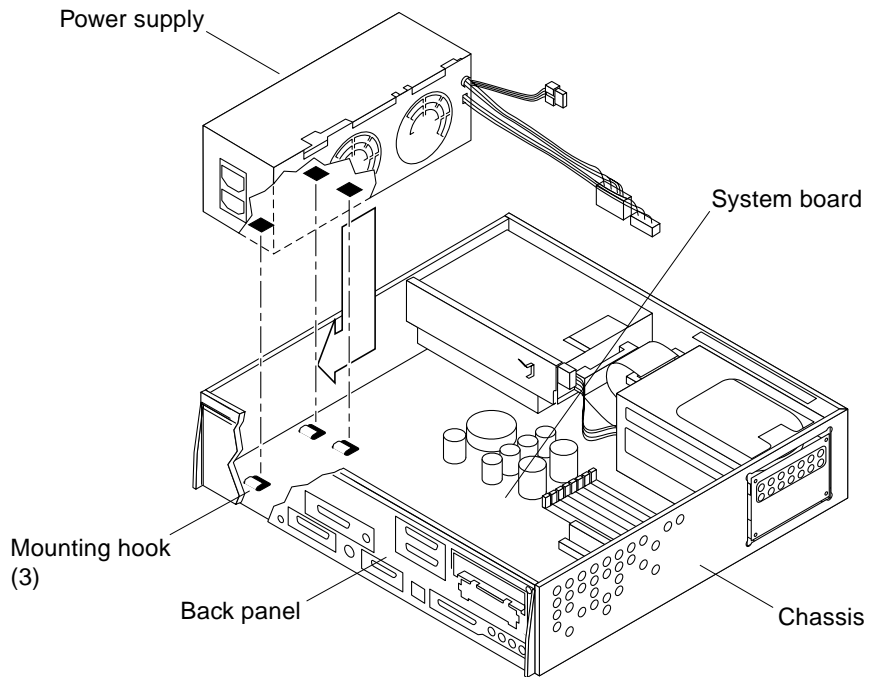


FIGURE 8-2 Replacing the Power Supply

2. Tighten the power supply captive screw on the back panel.

See FIGURE 8-3.

3. Connect the DC connector to the peripheral power cable at P1.
4. Route and insert the DC harness through the clip on the drive bracket.
5. Connect the DC connector on the system board at J2603.
6. Connect the DC connector on the system board at J2601.

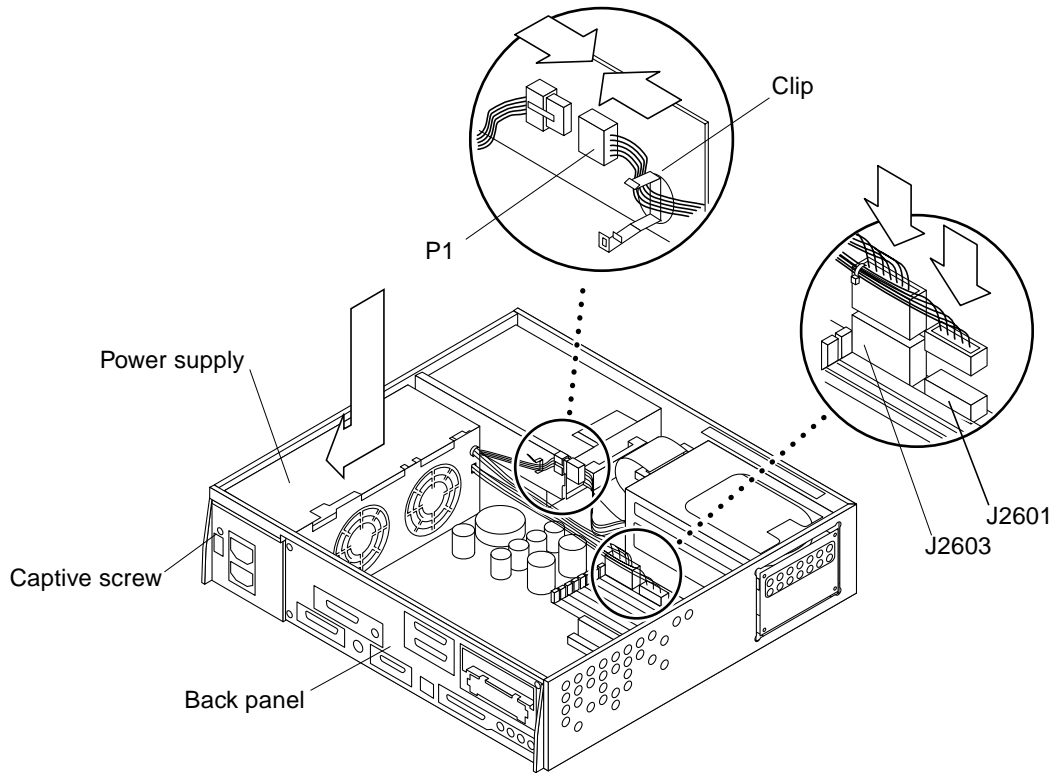


FIGURE 8-3 Securing and Connecting the Power Supply

8.2 Fan Assembly

8.2.1 Removing the Fan Assembly

1. **Disconnect the fan power cable from the fan.**

See FIGURE 8-4.

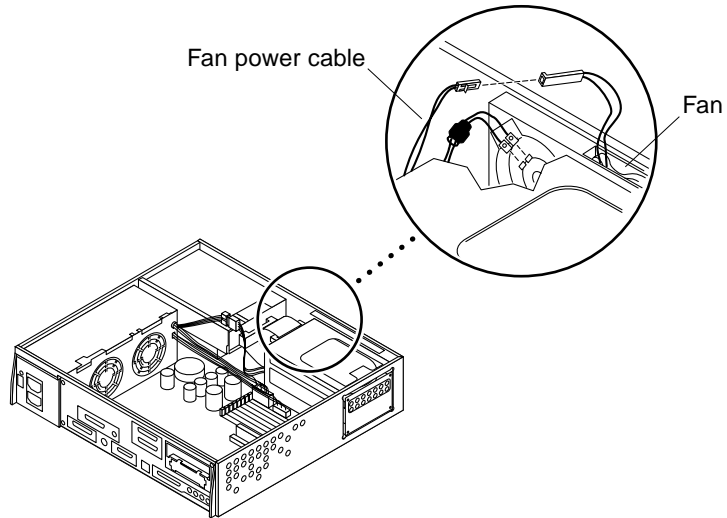


FIGURE 8-4 Fan and Power Cable Connection

- 2. Press the middle tab on the fan/speaker bracket toward the center of the chassis.**
See FIGURE 8-5.
- 3. Grasp the fan and pull it from the fan/speaker bracket in the chassis.**

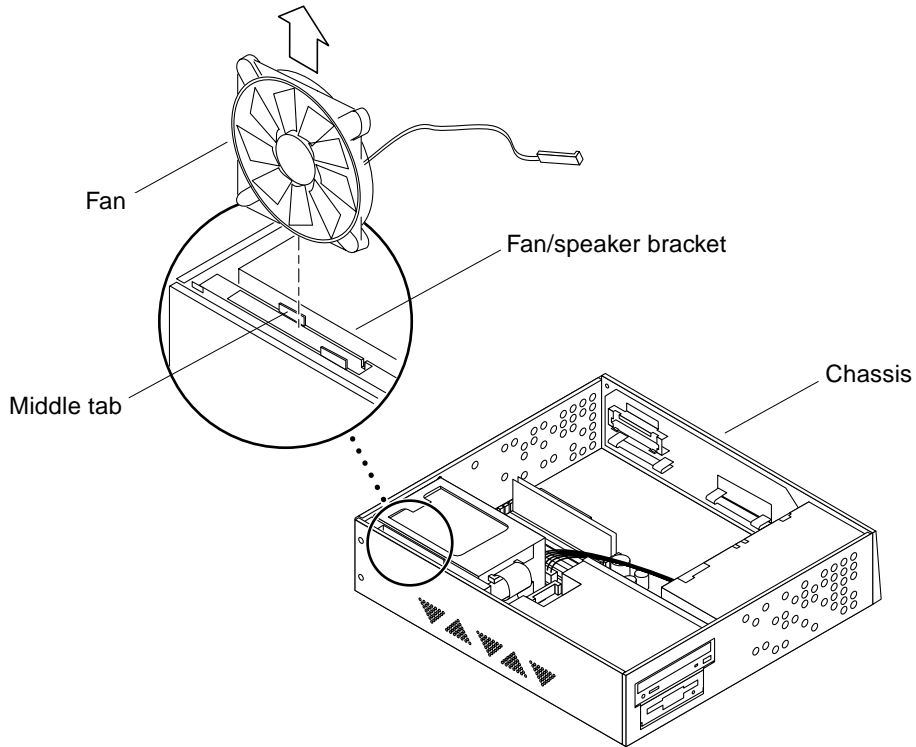


FIGURE 8-5 Fan Assembly

8.2.2 Replacing the Fan Assembly

1. **Position the fan assembly so the arrow on the fan faces the chassis, and the harness faces the power supply.**

See FIGURE 8-6. The arrow on the fan indicates the airflow direction.

2. **Insert the fan assembly into the fan/speaker bracket in the chassis.**

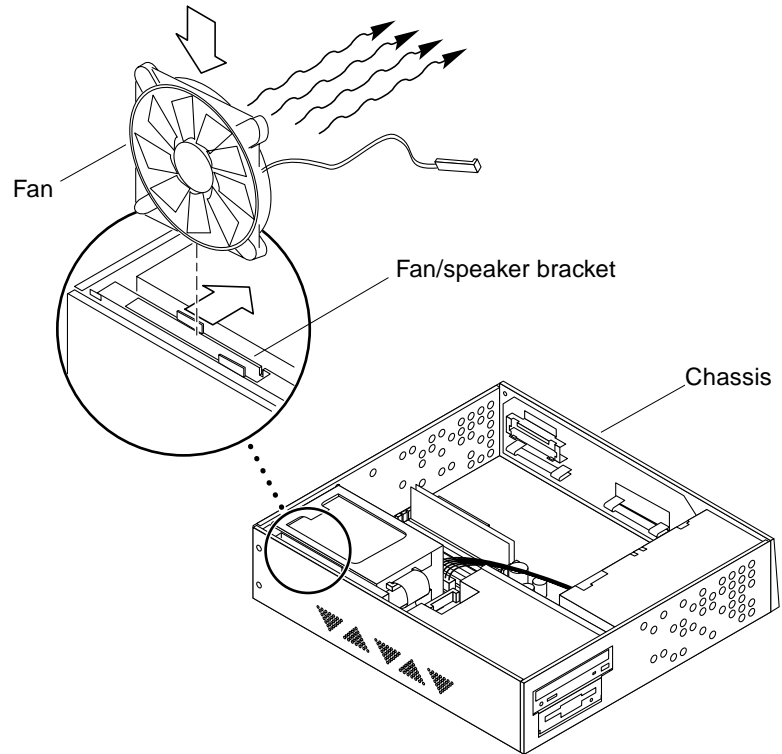


FIGURE 8-6 Replacing the Fan Assembly

3. Connect the fan connector to the fan power cable.

See FIGURE 8-4.

8.3 Speaker

8.3.1 Removing the Speaker

1. Disconnect the fan power cable from the fan.

See FIGURE 8-7.

2. Use a long-nose plier to disconnect the speaker connectors.

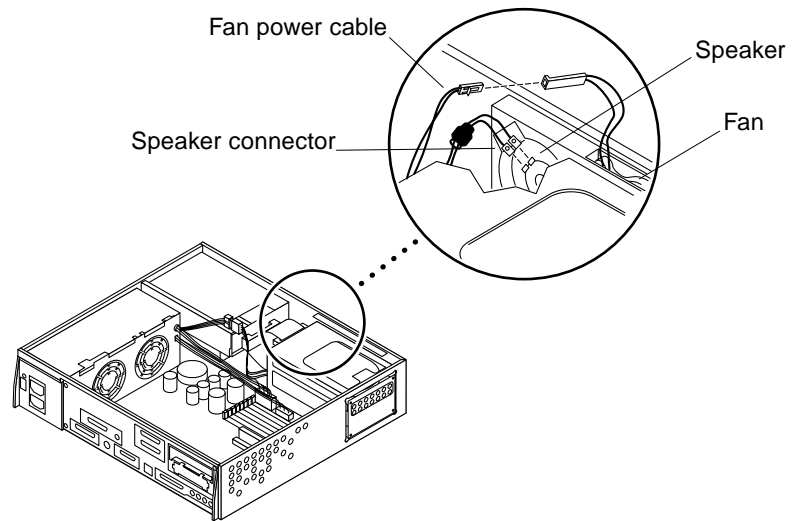


FIGURE 8-7 Fan and Speaker Cable Connection

3. Push in the tabs of the fan/speaker bracket on the chassis.

See FIGURE 8-8.

4. Grasp and remove the fan/speaker bracket from the chassis.

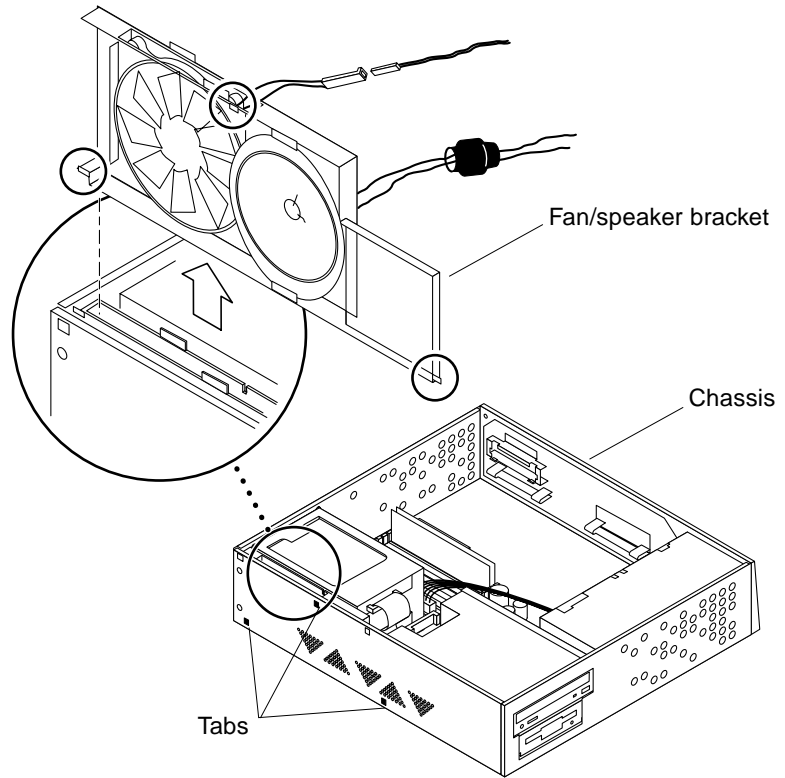


FIGURE 8-8 Removing the Fan/Speaker Bracket from the Chassis

- 5. Release the bottom part of the speaker from the fan/speaker bracket, and remove the speaker.**

See FIGURE 8-9.

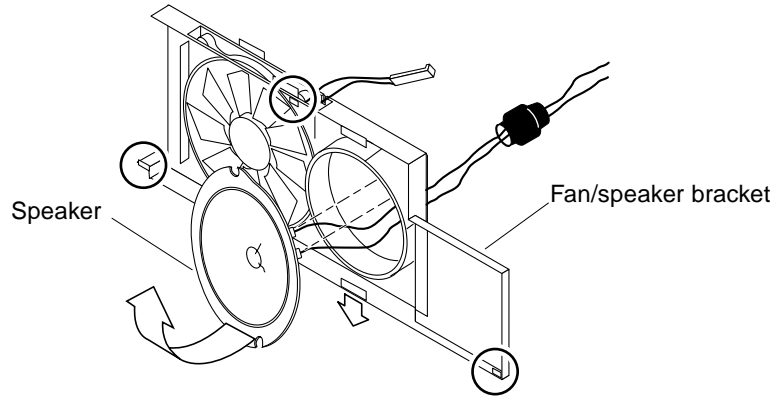


FIGURE 8-9 Removing the Speaker from the Fan/Speaker Bracket

8.3.2 Replacing the Speaker

1. Position the speaker in the fan/speaker bracket.

Make sure the speaker connectors are on the top. See FIGURE 8-10.

2. Insert the fan/speaker bracket into the chassis.

Make sure the tabs are lock into the chassis to ensure proper replacement.

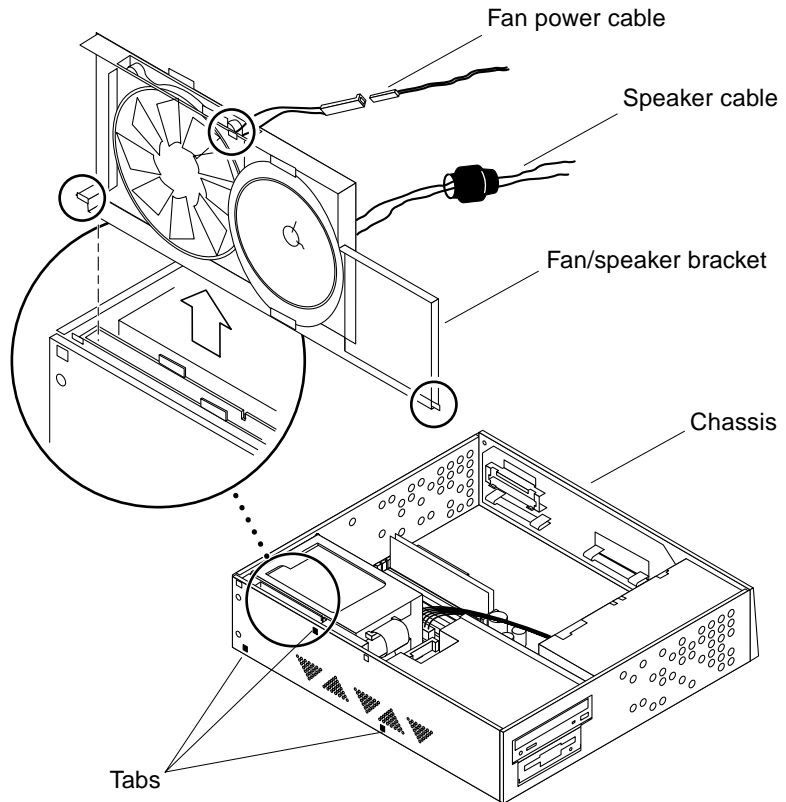


FIGURE 8-10 Replacing the Fan/Speaker Bracket into the Chassis

1. Connect the speaker cable to the speaker connectors with a long-nose plier.

See FIGURE 8-7. The speaker cable has two different connector sizes. These connectors are keyed, to allow the correct connection to the speaker.

2. Connect the fan power cable to the fan.

See FIGURE 8-7.

8.4 Diskette Cable

8.4.1 Removing the Diskette Cable

Note – If a CD-ROM or tape drive is installed in this system, begin at Step 1. If the system does not have a CD-ROM or a tape drive, go directly to Step 4.

1. Remove the two drive mounting screws from the chassis.

See FIGURE 8-11.

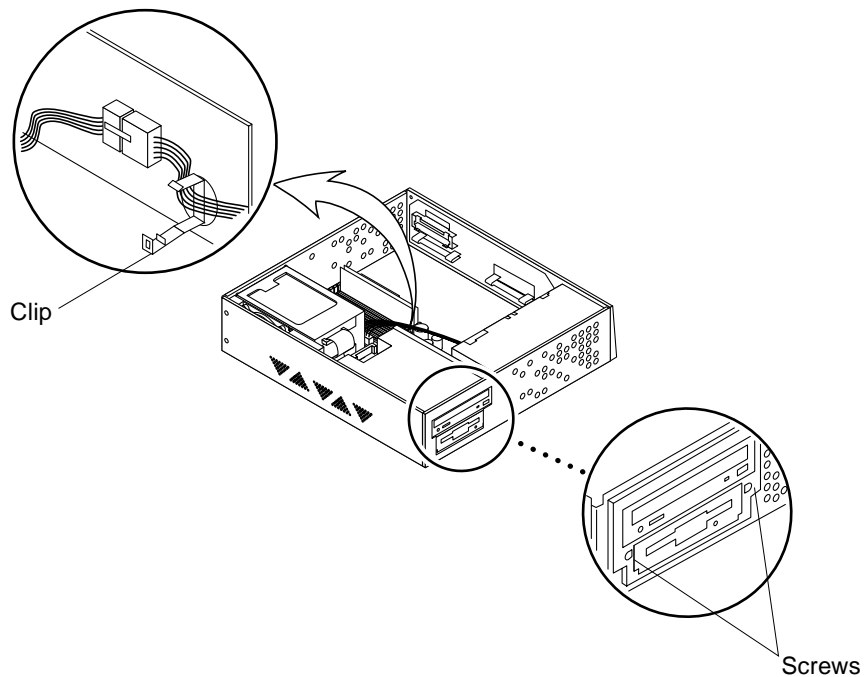


FIGURE 8-11 Removing the Drive Bracket

2. Remove the DC harness from the clip located on the drive bracket.

See FIGURE 8-11.

- 3. Push the drive bracket toward the disk drive bay, and gently flip it over. Place it on top of the disk drive bay.**

See FIGURE 8-12.

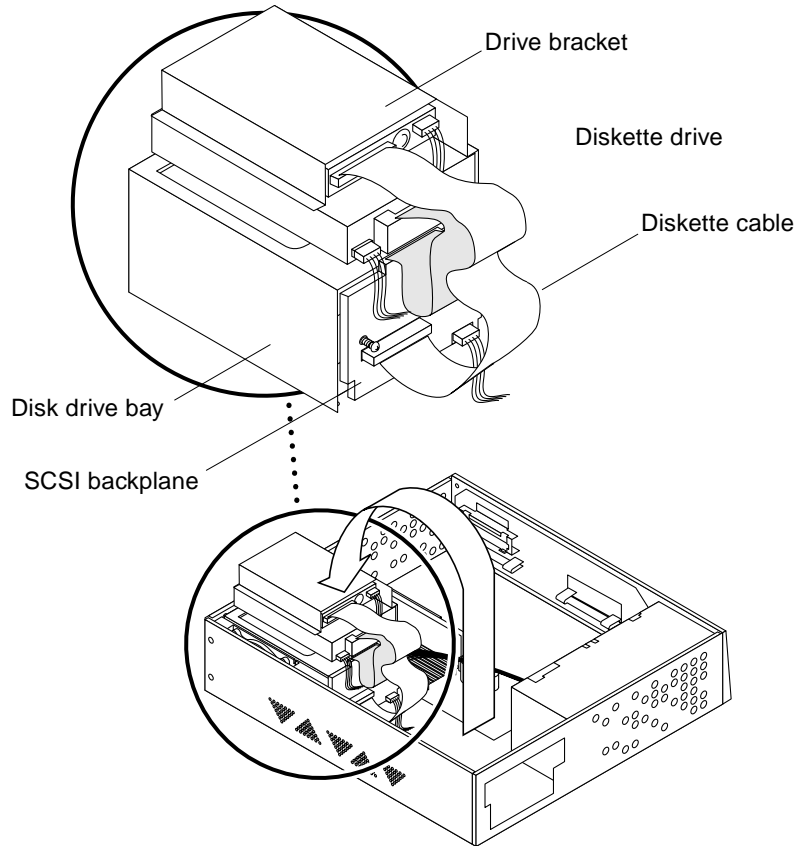


FIGURE 8-12 Diskette Cable

- 4. Disconnect the diskette cable from the diskette drive.**

See FIGURE 8-12.

- 5. Disconnect the diskette cable from the SCSI backplane.**

8.4.2 Replacing the Diskette Cable

1. **Connect the replacement diskette cable to the diskette drive.**

See FIGURE 8-12.

2. **Connect the diskette cable to the socket (marked FLOPPY) on the SCSI backplane.**

Note – If the system does not have a CD-ROM or a tape drive, you are done with replacing the diskette cable. If a CD-ROM or tape drive is installed in this system, continue with Step 3.

3. **Position the drive bracket in the chassis, and slide it toward the openings in the side of the chassis. The hooks in the base of the chassis must lock into the holes in the bottom of the drive bracket.**

See FIGURE 8-13.

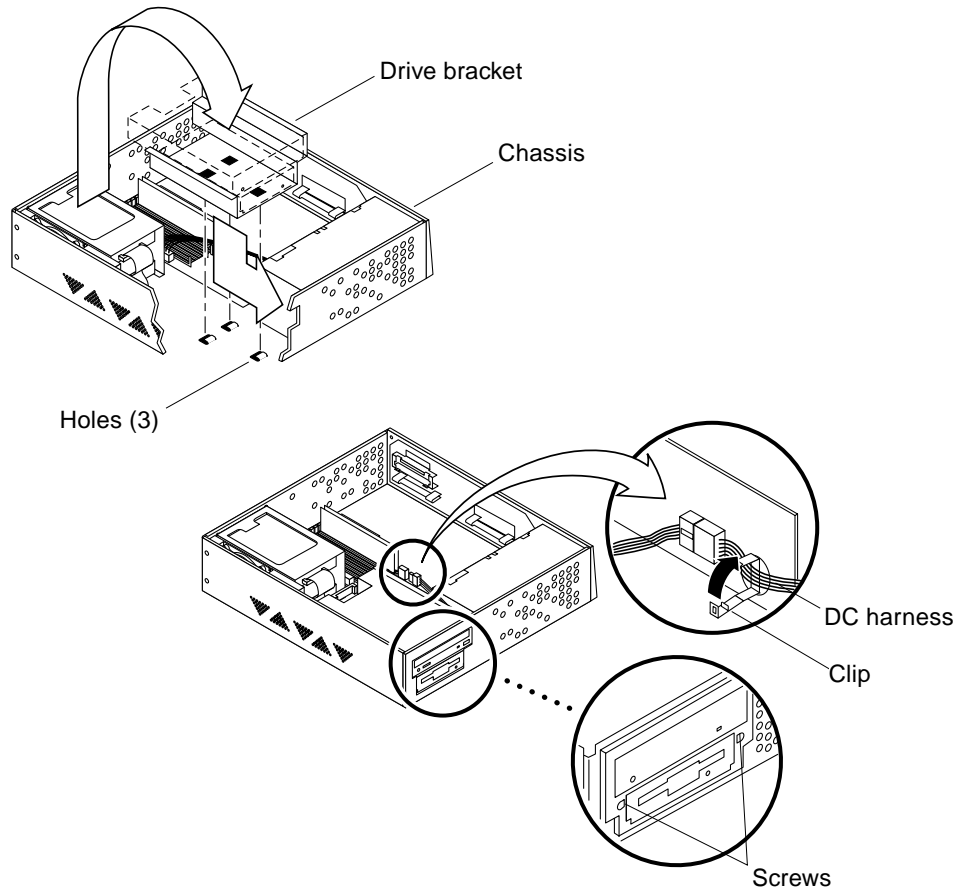


FIGURE 8-13 Replacing the Drive Bracket

- 4. Route the DC harness through the clip on the side of the bracket.**
See FIGURE 8-13.
- 5. Replace the two drive bracket mounting screws on the chassis.**

8.5 SCSI Cable/Backplane

8.5.1 Removing the SCSI Cable/Backplane

1. **Remove the drive bracket from the chassis.**

See Section 9.2.1 “Removing the Bracket from the Chassis.”

2. **Remove the hard disk drive assemblies.**

If there are two hard disk drives in the system, remove both of them.
See Section 9.1.1 “Removing a Disk Drive.”

Note – Make note of the slot each drive was installed into. Each slot has a different SCSI target address (lower slot is target 0, and upper slot is target 1). Installing a drive into the wrong slot could result in the file system problem or system not booting.

3. **Disconnect the peripheral power cable (P4) from the SCSI backplane (marked PWR).**

See FIGURE 8-14.

4. **Disconnect the diskette cable (if present) from the SCSI backplane (marked FLOPPY).**

5. **Remove the two screws from the SCSI backplane.**

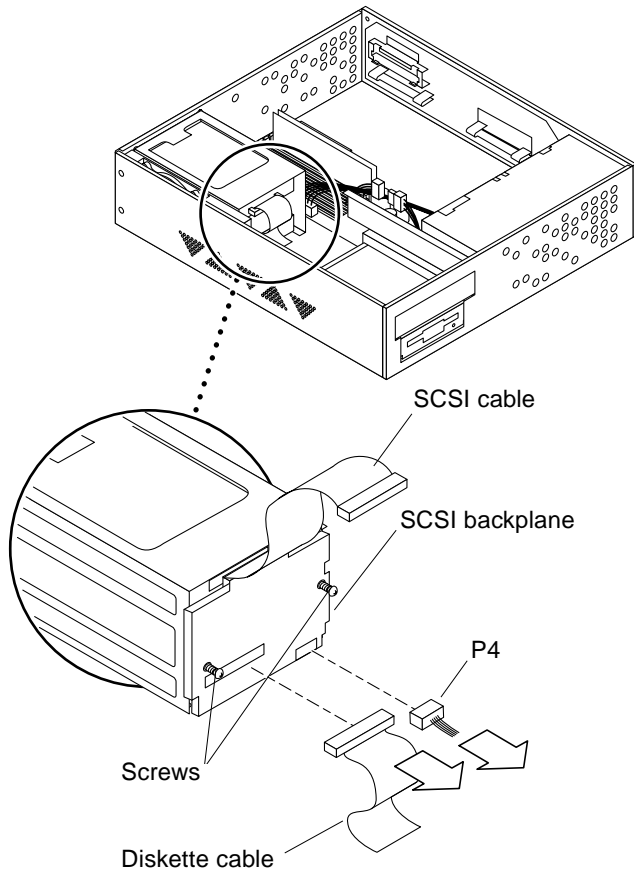


FIGURE 8-14 SCSI/Backplane Cable Connection

- 6. Disconnect the SCSI cable from the system board (J2602).**
See FIGURE 8-14.
- 7. Pull the SCSI cable out through the disk drive bay.**
- 8. Remove the SCSI cable from the three cable clips in the base of the chassis.**

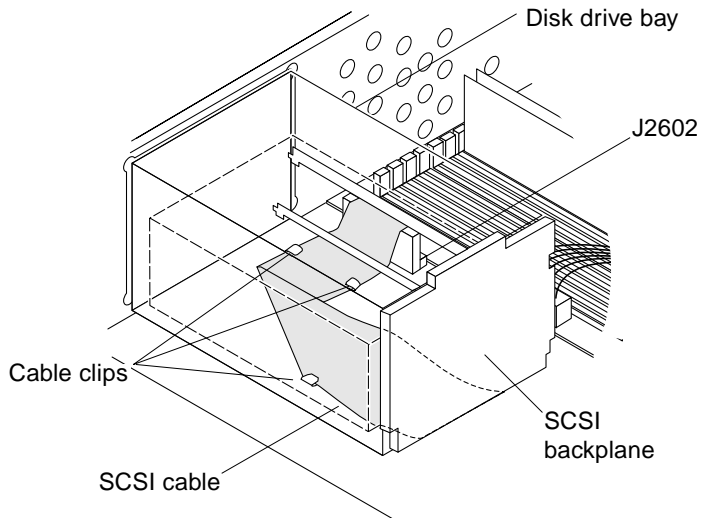


FIGURE 8-15 Removing the SCSI Backplane

9. Remove the SCSI backplane from the bracket.

See FIGURE 8-15.

8.5.2 Replacing the SCSI Cable/Backplane

1. Route the SCSI cable under the three cable clips in the base of the chassis and through the opening near the front edge of the system board.

See FIGURE 8-16.

2. Connect the SCSI cable to the system board at J2602.

3. Position the SCSI backplane on the disk drive bay so the SCSI backplane slots sit on the tabs.

See FIGURE 8-16.

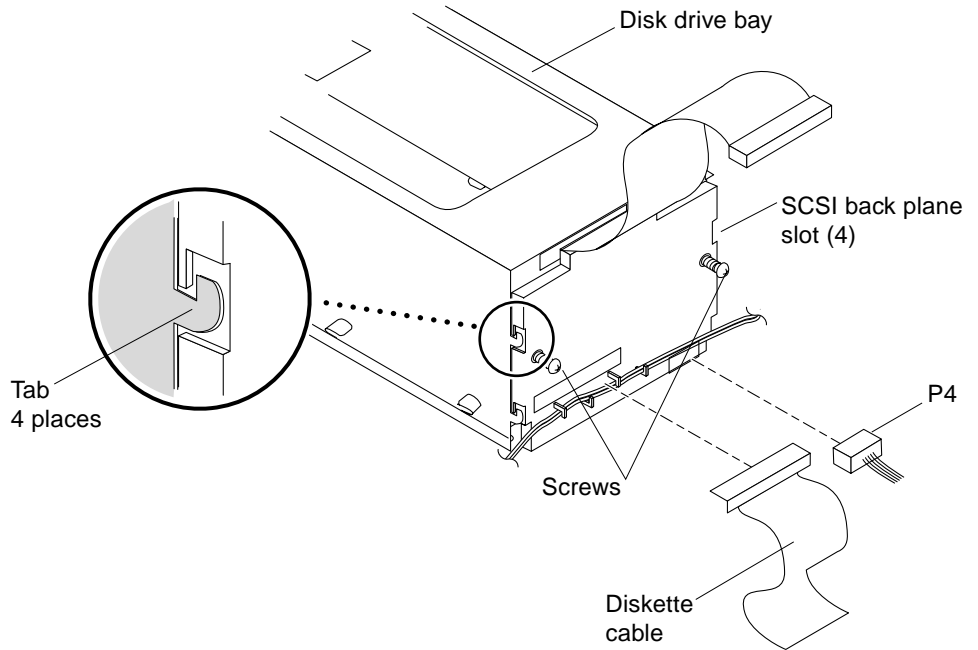


FIGURE 8-16 Replacing the SCSI Backplane

- 4. Replace the two screws to secure the backplane to the bracket.**
- 5. Connect the peripheral power cable (P4) to the SCSI backplane (marked PWR).**
See FIGURE 8-14.
- 6. Connect the diskette cable (if present) to the SCSI backplane (marked FLOPPY on the backplane).**
- 7. Replace the hard disk drive assemblies.**
See Section 9.1.2 “Replacing a Disk Drive.”

Note – If there are two drives, install the drives into their original slots. If this is not done, the system may fail to boot, or file systems may fail to mount.

- 8. Replace the bracket into the chassis.**
See Section 9.2.4 “Replacing the Bracket into the Chassis.”

8.6 Peripheral Power Cable

8.6.1 Removing the Peripheral Power Cable

1. Remove the two screws securing the drive bracket to the chassis.

See FIGURE 8-17.

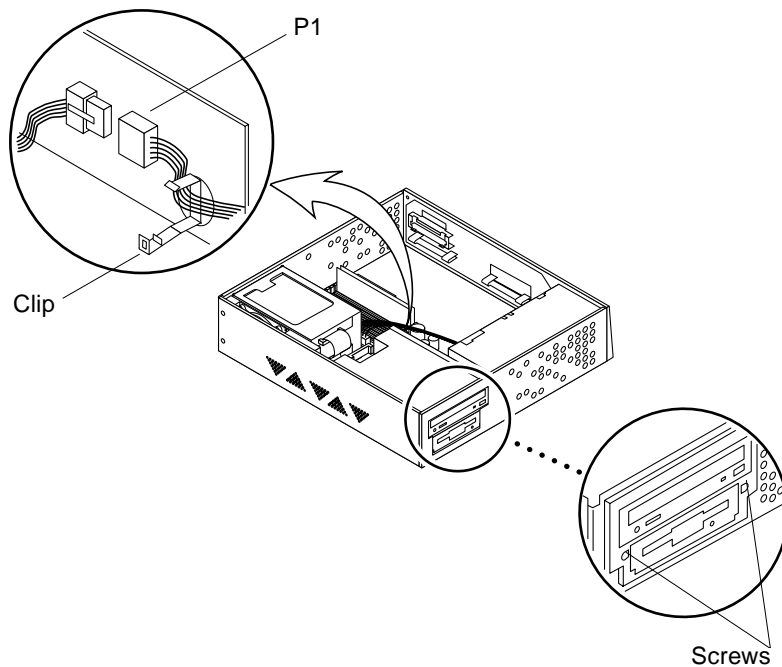


FIGURE 8-17 Removing the Drive Bracket

2. Remove the DC harness from the clip located on the drive bracket.
See FIGURE 8-17.
3. Disconnect the DC harness from the peripheral power cable at P1.
4. Push the drive bracket toward the disk drive bay, and gently flip it over. Place it on top of the disk drive bay.

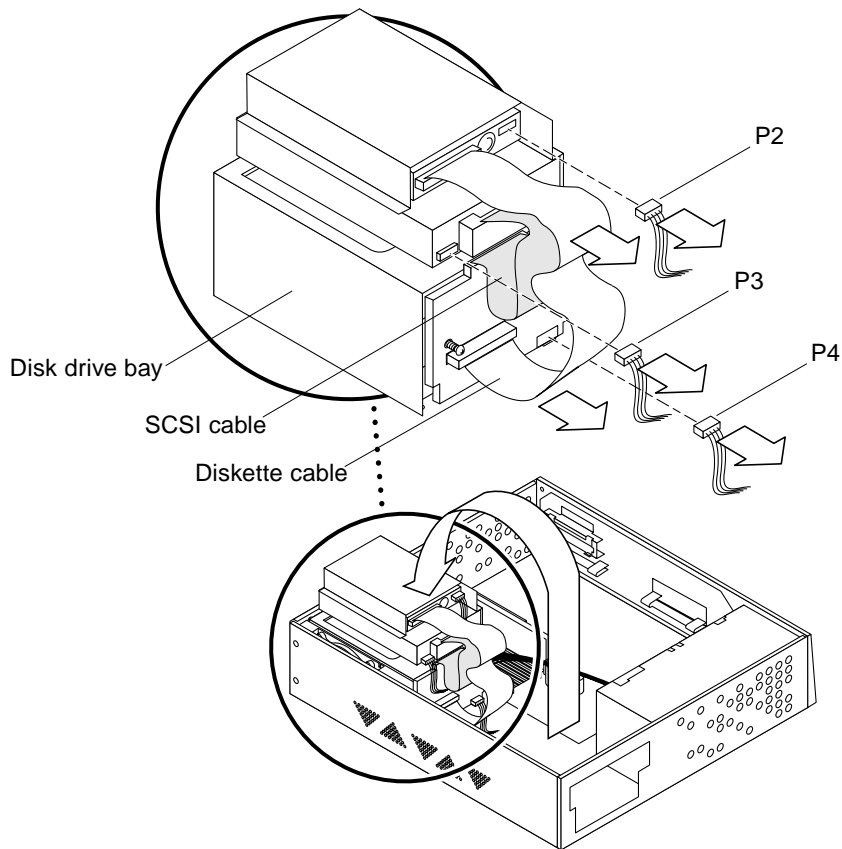


FIGURE 8-18 Removing the Peripheral Power Cable

- 5. Detach the peripheral power cable from the peripherals and the fan. See TABLE 8-1 and FIGURE 8-18.**

TABLE 8-1 Peripheral Power Cable Connection

Connector	Peripheral
P2	Diskette drive
P3	CD-ROM/tape drive
P4	SCSI backplane (PWR)
Fan power connector	Fan

- 6. Remove the peripheral power cable from the cable clips on the SCSI backplane.**

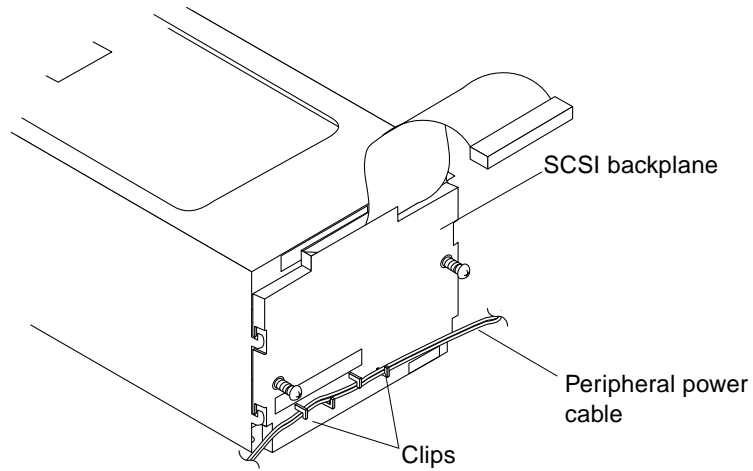


FIGURE 8-19 Peripheral Power Cable Routing on the SCSI Backplane

8.6.2 Replacing the Peripheral Power Cable

- 1. Connect the replacement peripheral power cable to each applicable part.**

See TABLE 8-1 and FIGURE 8-20.

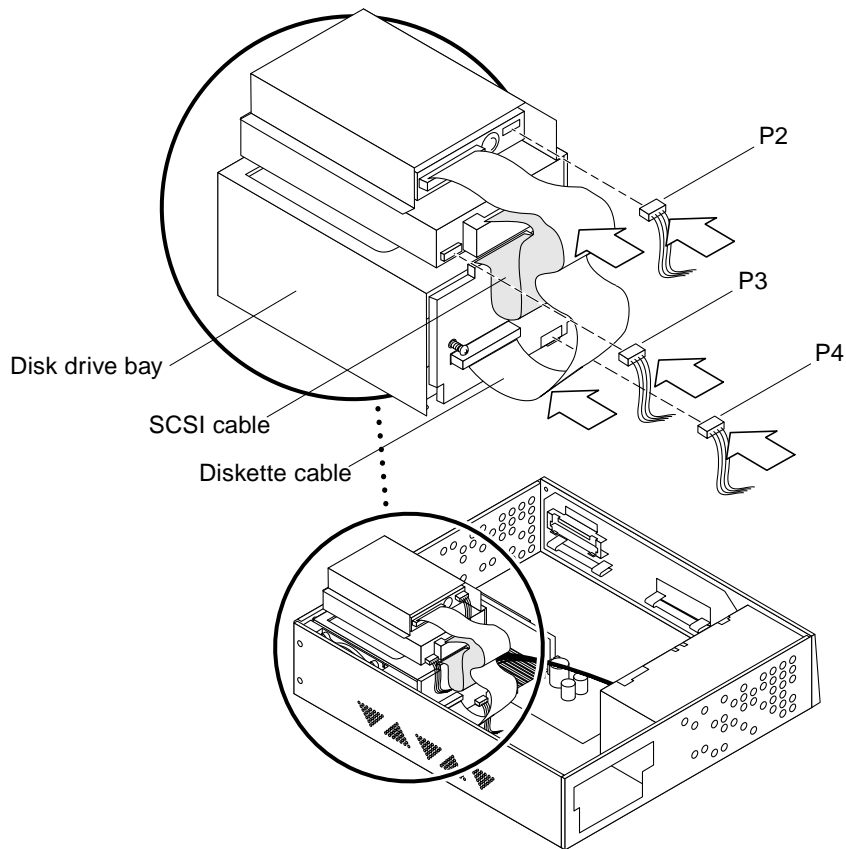


FIGURE 8-20 Replacing the Peripheral Power Cable

- 2. Route the cable through the hooks on the SCSI backplane.**
See FIGURE 8-20.
- 3. Position the bracket in the chassis, and slide it toward the opening in the side of the chassis.**
See FIGURE 8-21.
- 4. Connect the DC harness to the peripheral power cable at P1.**
- 5. Reroute the DC harness through the clip on the bracket.**
- 6. Replace the two screws to secure the drive bracket to the chassis.**

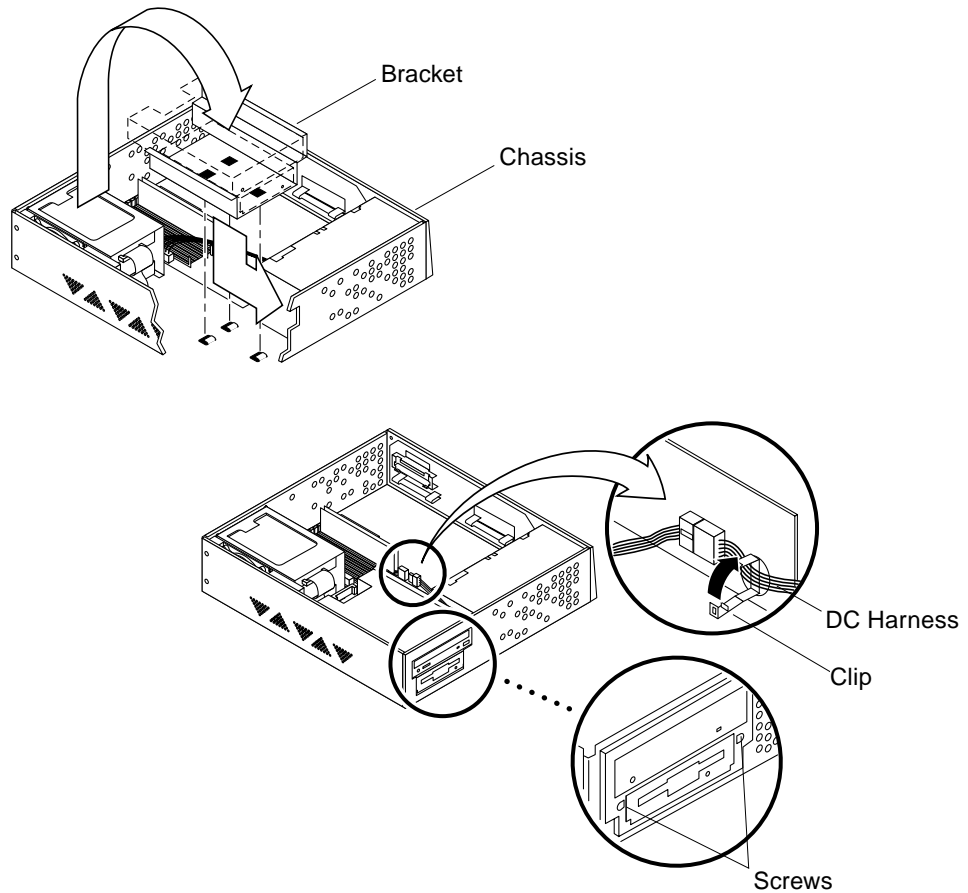


FIGURE 8-21 Replacing the Drive Bracket

8.7 Speaker/LED Cable

8.7.1 Removing the Speaker/LED Cable

Note – If the system does not contain a CD-ROM or a tape drive, go to Step 5.

1. Remove the two screws securing the drive bracket to the chassis.

See FIGURE 8-22.

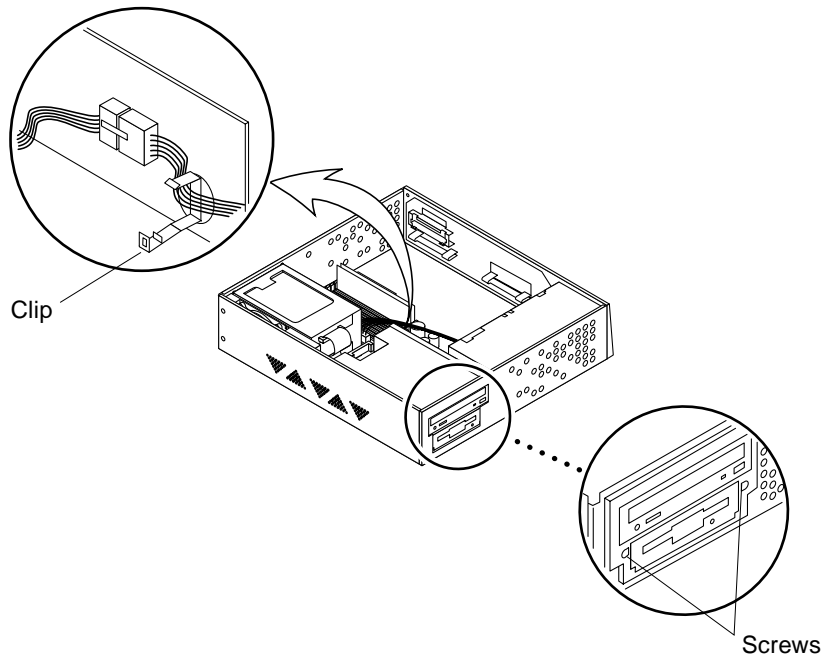


FIGURE 8-22 Removing the Drive Bracket

2. Remove the DC harness from the clip located on the drive bracket.

See FIGURE 8-22.

3. Push the CD-ROM/tape drive bracket toward the disk drive bay, and gently flip it over. Place it on top of the disk drive bay.

See FIGURE 8-23.

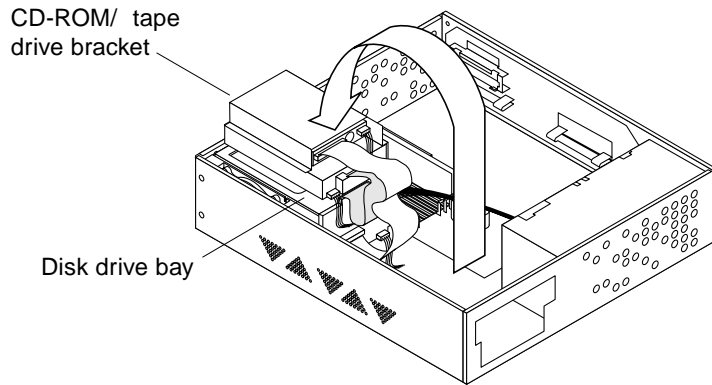


FIGURE 8-23 Placing the Bracket on Top of the Disk Drive

- 4. Slide the LED from the cavity, and remove the speaker/LED cable from the two cable clips.**

See FIGURE 8-24.

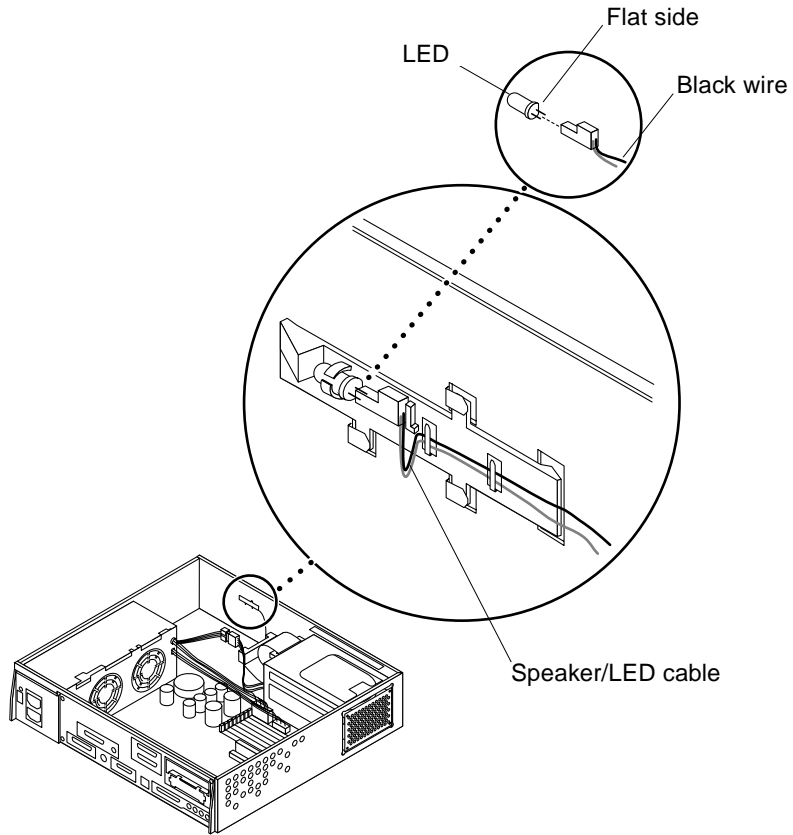


FIGURE 8-24 Removing/Replacing the Speaker /LED Cable from the Chassis

5. Disconnect the cable from the speaker with a long-nose plier.

See FIGURE 8-25.

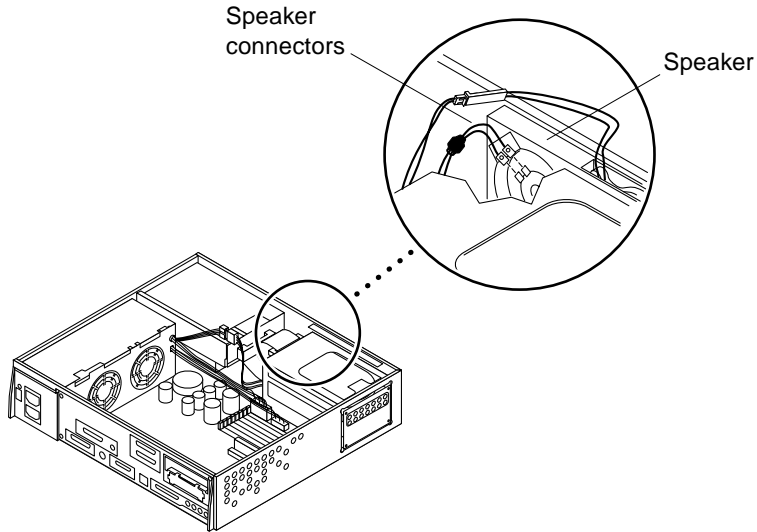


FIGURE 8-25 Speaker Cable Connection

- 6. Remove any SBus card(s) located in slot 0 and/or 1.**
See Section 10.3.1 “Removing an SBus Card.”
- 7. Disconnect the speaker/LED cable from the system board at J2001.**
See FIGURE 8-26.
- 8. Pull the speaker/LED cable from the chassis, removing it from the securing clips on the SCSI backplane.**

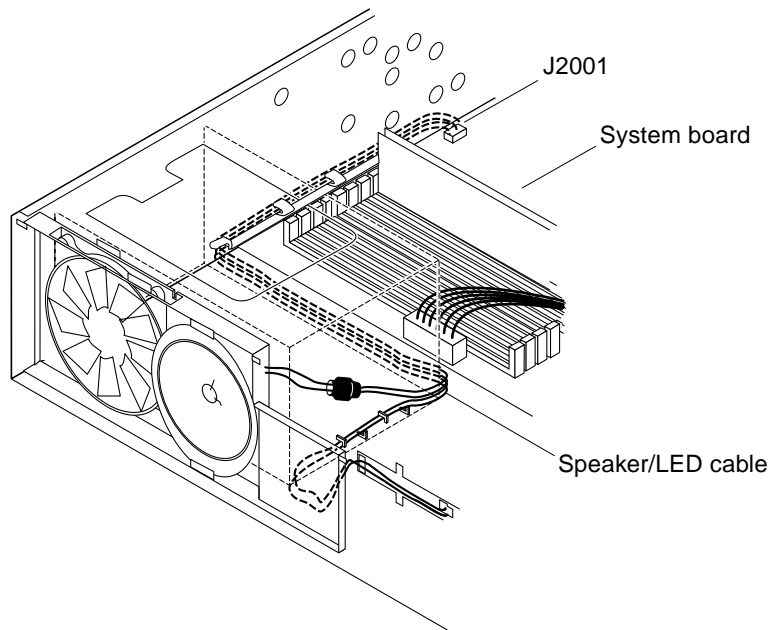


FIGURE 8-26 Speaker Connector on the System Board

8.7.2 Replacing the Speaker/LED Cable

1. **Connect the speaker/LED cable to the system board at J2001, and route the harness as shown. Secure the cable through the clips on the SCSI backplane.**

See FIGURE 8-26.

2. **Replace any SBus card(s) you removed from slot 0 and/or 1.**

See Section 10.3.2 “Replacing an SBus Card.”

3. **Connect the cable to the speaker with a long-nose plier.**

See . The speaker cable has two different connector sizes. These connectors are keyed, to allow the correct connection to the speaker.

4. **Route the speaker/LED cable through the two cable clips, and insert the LED into the cavity.**

If you are replacing the LED itself, make sure the flat side of the LED is lined up with the black wire.

Note – If the system contains a CD-ROM or a tape drive, go to Steps 5 through 8. Otherwise, you are done replacing the fan/speaker cable.

5. Position the bracket assembly into the chassis, and slide it toward the opening in the side of the chassis. The hooks in the base of the chassis must lock into the holes in the bottom of the drive bracket.

See FIGURE 8-27.

6. Connect the DC harness to the peripheral power cable at P1.
7. Reroute the DC power harness through the clip on the bracket.
8. Replace the two screws to secure the drive bracket to the chassis.

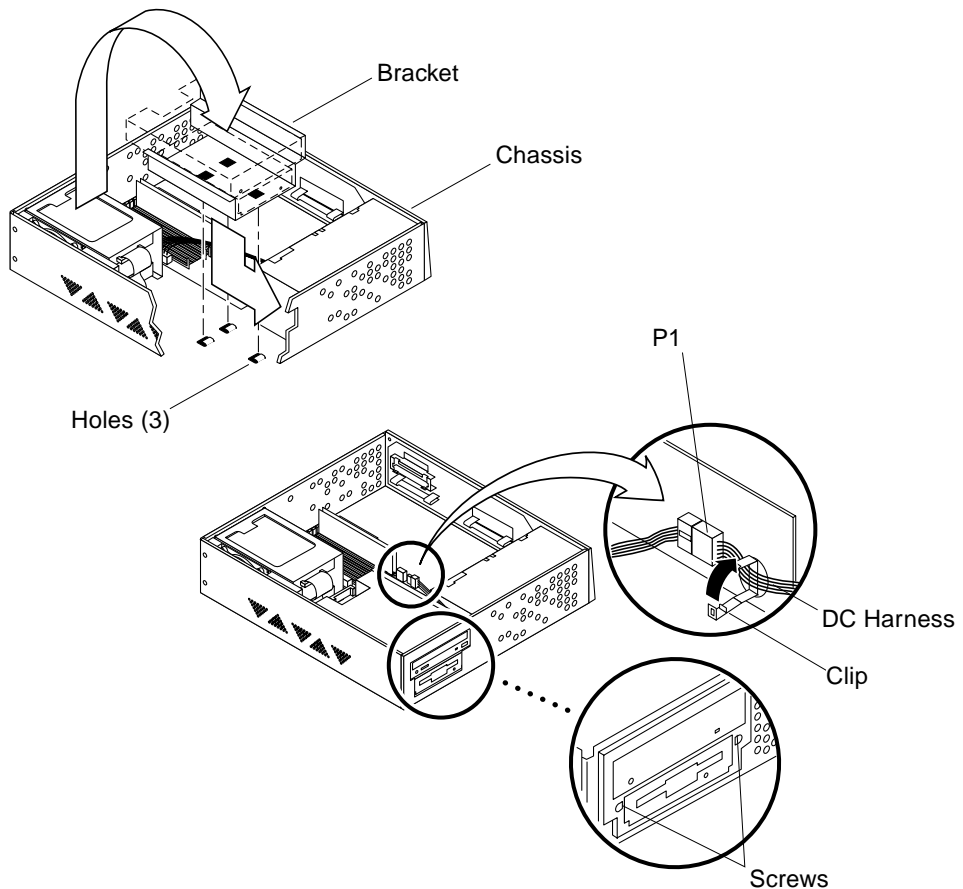


FIGURE 8-27 Replacing the Bracket to the Chassis

Storage Devices

This chapter describes how to remove and replace the storage device units.

Refer to the following *before* you remove any part:

- Powering Off the System—page 6-1
- Removing the Cover—page 7-1
- Attaching the Wrist Strap—page 7-2

Refer to the following *after* replacing any part:

- Replacing the Cover—page 7-3
- Powering On the System—page 6-2

The following is the list of all type of storage devices supported in the Sun Ultra 1 Series system:

- Disk Drive—page 9-1
- CD-ROM/Tape Drive—page 9-5
- Diskette Drive—page 9-11

9.1 Disk Drive

9.1.1 Removing a Disk Drive

1. **Remove the EMI door.**
 - a. **Use a screwdriver to open up the EMI door.**
See FIGURE 9-1.

b. Remove the door from the chassis.

You must replace it after the new drive is installed.

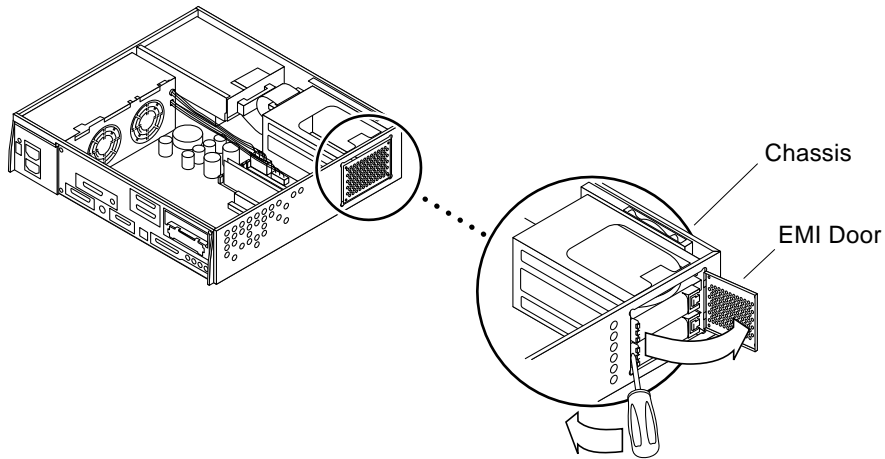


FIGURE 9-1 EMI Door

2. Locate the defective disk drive.

Your system might have more than one disk drive.

Note – If you remove more than one disk drive, take note of the slot each drive was installed into. The SCSI target addresses for the drives are assigned based on the drive's position. The SCSI target address for the lower drive slot is 0, and the upper drive slot is 1.

3. Unlatch the drive handle and swing it open.

See FIGURE 9-2. The connector on the back of the drive will be disconnected once the drive is ejected.

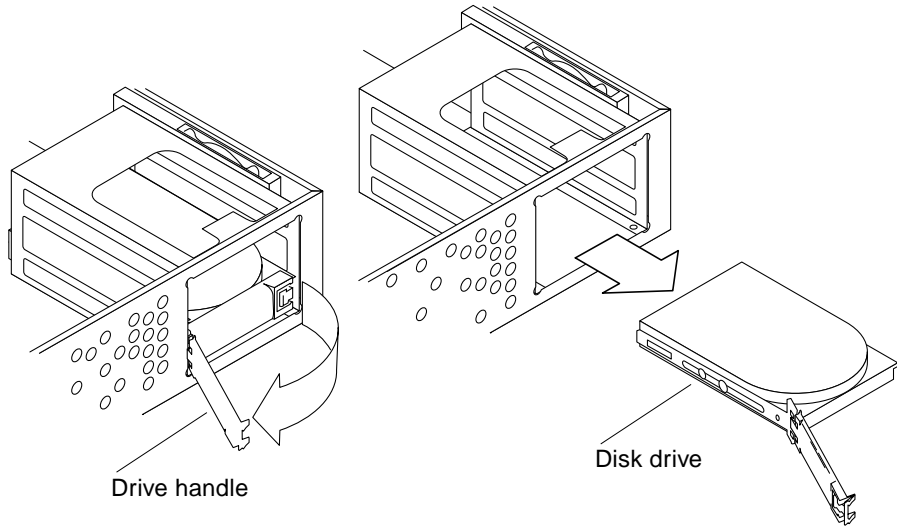


FIGURE 9-2 Removing the Disk Drive

- 4. Hold the drive handle and pull it out to remove the drive from the chassis.**

See FIGURE 9-2.

- 5. Place the drive on an antistatic surface.**

9.1.2 Replacing a Disk Drive

Note – If there are two drives, install the drives into their original slots. If the drives are not installed in their original slots, the system may fail to boot, or file systems may fail to mount.

- 1. With the drive handle open, press on the end of the drive to insert the drive all the way into the chassis and connect it to the SCSI backplane.**

See FIGURE 9-3.

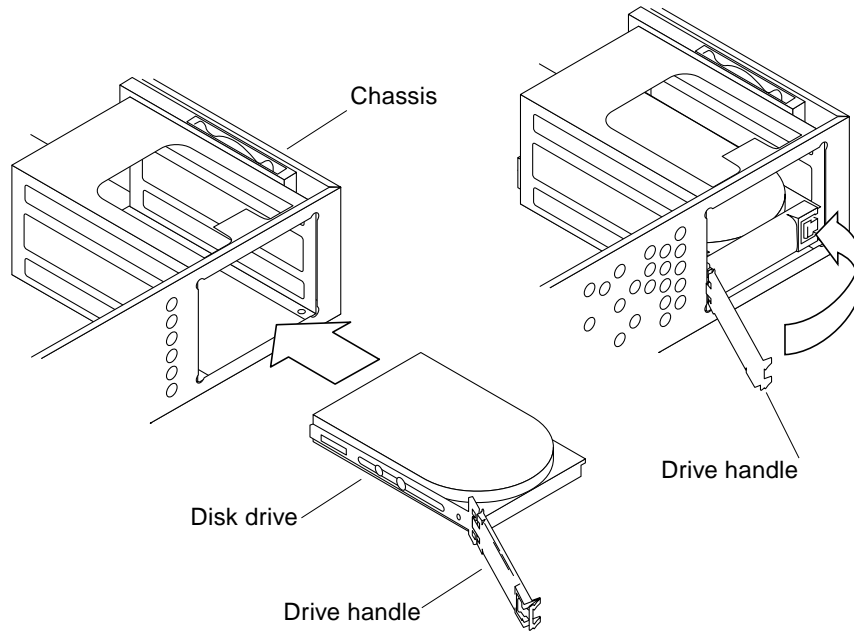


FIGURE 9-3 Replacing the Disk Drive

- 2. Close the drive handle until the release latch clicks and the handle is securely latched to the chassis.**

See FIGURE 9-3.

Note – The drive handle will not latch if the drive is not fully inserted into the slot.

- 3. Replace the EMI door.**

- a. Position the EMI door on the chassis. The two tabs should be hooked into the two slots.**

See FIGURE 9-4.

- b. Push the door in until it is flush with the chassis.**

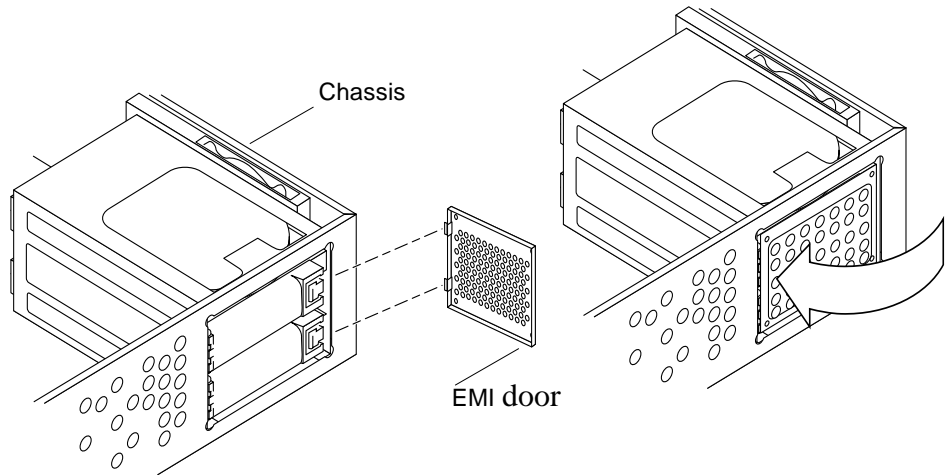


FIGURE 9-4 Replacing the EMI Door

9.2 CD-ROM/Tape Drive

9.2.1 Removing the Bracket from the Chassis

1. Remove the two screws from the chassis that secure the drive bracket.
See FIGURE 9-5.

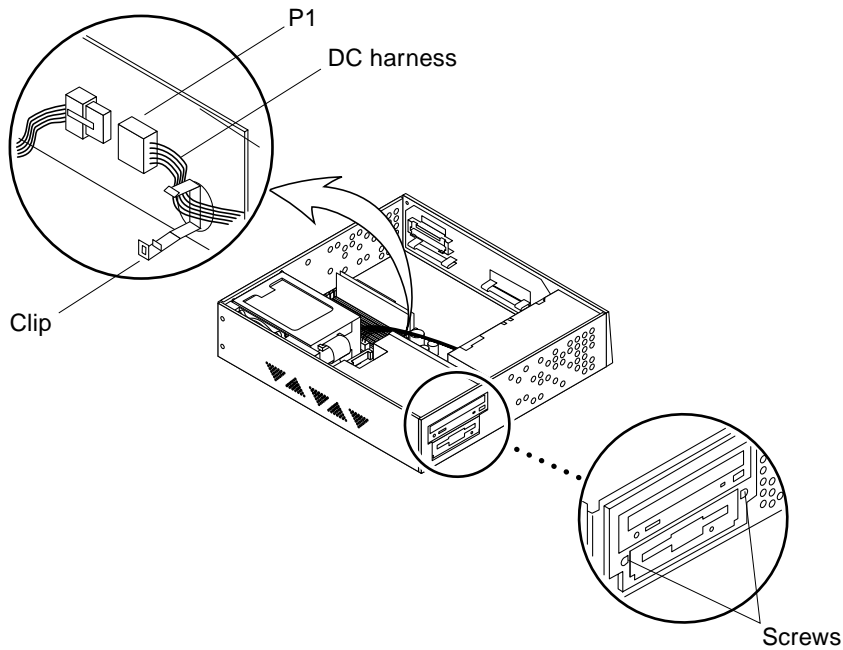


FIGURE 9-5 Drive Bracket

- 2. Remove the DC harness from the clip located on the drive bracket.**
See FIGURE 9-5.
- 3. Disconnect the DC harness from the peripheral power cable at P1.**
- 4. Push the drive bracket toward the disk drive bay, and gently flip it over. Place it on top of the disk drive bay.**
See FIGURE 9-6.

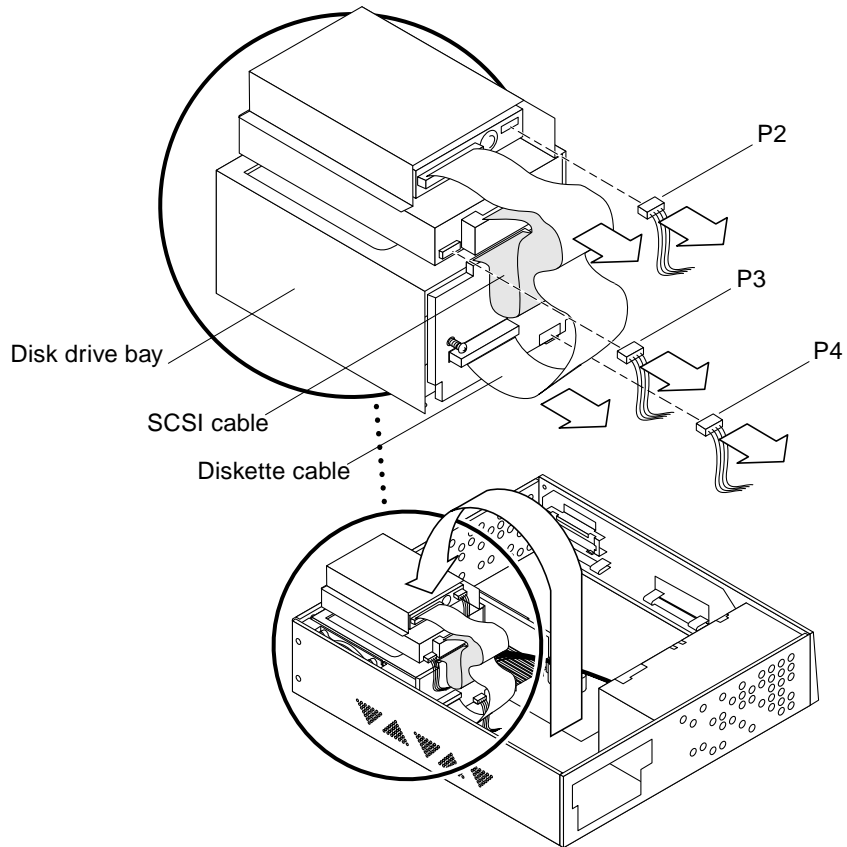


FIGURE 9-6 Placing the Drive Bracket on Top of the Disk Drive

5. **Disconnect the SCSI cable from the CD-ROM/tape drive.**
See FIGURE 9-6.
6. **Disconnect the peripheral power cable from the CD-ROM/tape drive (P3), and from the diskette drive (P2) if any.**
7. **Disconnect the diskette cable from the diskette drive (if any).**
8. **Place the bracket on an antistatic surface.**

9.2.2 Removing a CD-ROM/Tape Drive

1. Position the bracket on top of a flat surface, so that the CD-ROM/tape drive is flat.

See FIGURE 9-7.

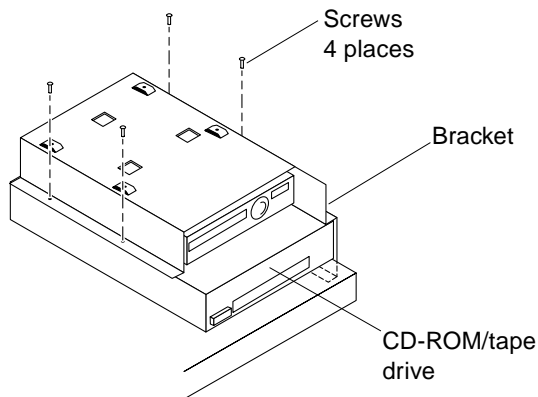


FIGURE 9-7 Positioning the CD-ROM/Tape Drive

2. Remove the four screws securing the CD-ROM/tape drive to the drive bracket.
See FIGURE 9-7.
3. Remove the CD-ROM/tape drive, and place it aside.

9.2.3 Replacing a CD-ROM/Tape Drive

1. Position the CD-ROM/tape drive on an antistatic surface. Align it on the edge of the surface.

See FIGURE 9-7.

2. Position the bracket on top of the CD-ROM/tape drive. If your system has a diskette drive, it is assembled on the bracket.
3. Replace the four screws to secure the CD-ROM/tape drive to the bracket.

9.2.4 Replacing the Bracket into the Chassis

1. Place the drive bracket on top of the disk drive bay.

See FIGURE 9-8.

2. Connect the SCSI cable to the CD-ROM/tape drive (if present).

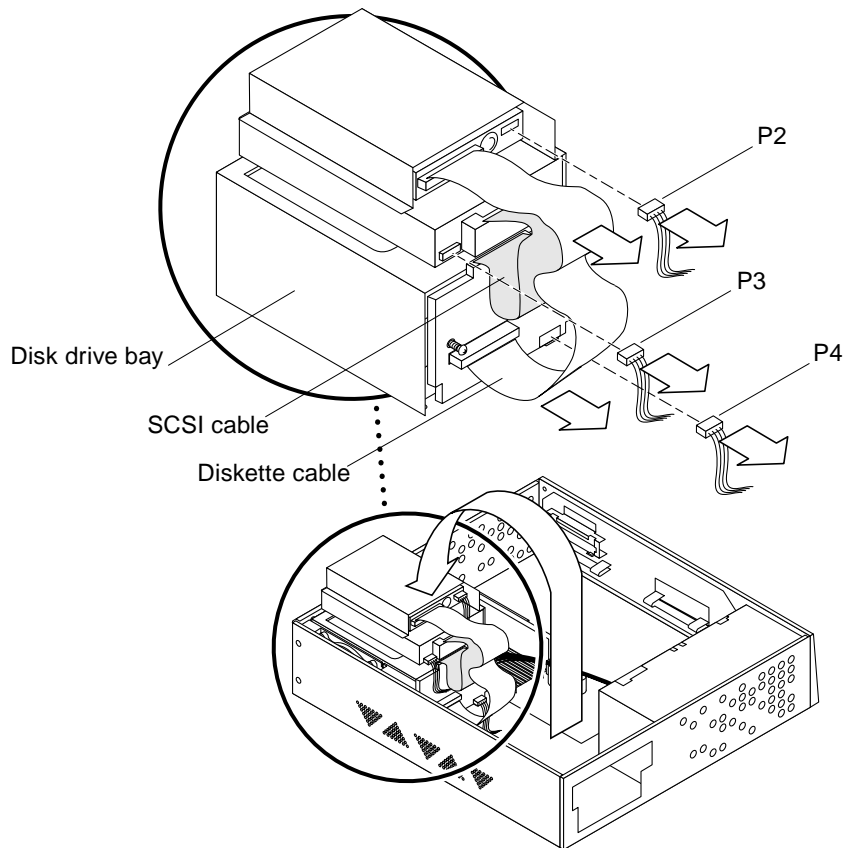


FIGURE 9-8 Connecting the Cables from the CD-ROM/Tape and Diskette Drive

3. Connect the diskette cable to the diskette drive (if any).

See FIGURE 9-8.

4. Connect the peripheral power cable to the CD-ROM/tape drive (P3), and to the diskette drive (P2) if any.

5. Position the bracket in the chassis, and slide it toward the opening in the side of the chassis. The hooks in the base of the chassis must lock into the holes in the bottom of the drive bracket.

See FIGURE 9-9.

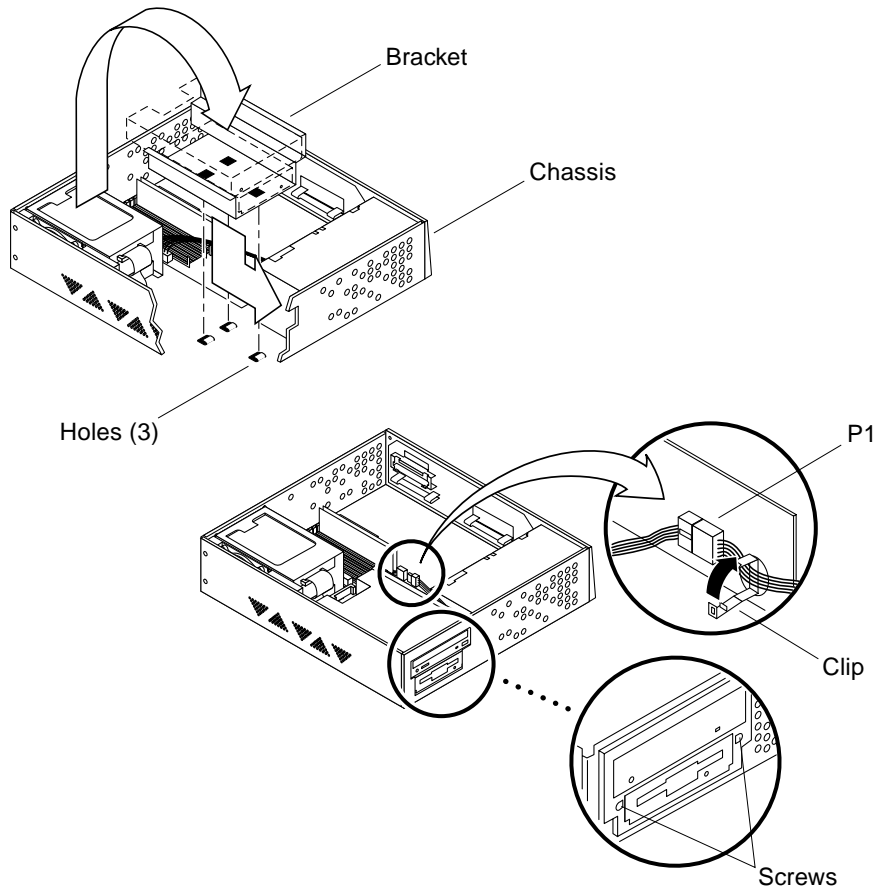


FIGURE 9-9 Positioning the Drive Bracket in the Chassis

6. Connect the DC harness to the peripheral power cable at P1.

See FIGURE 9-9.

7. Route the DC harness through the clip on the bracket.

8. Tighten the two screws on the chassis.

9.3 Diskette Drive

9.3.1 Removing a Diskette Drive

1. Remove the bracket from the chassis.

See Section 9.2.1 “Removing the Bracket from the Chassis” on page 9-5 and Section 9.2.2 “Removing a CD-ROM/Tape Drive” on page 9-8.

2. Position the drive bracket on top of a flat surface as shown.

See FIGURE 9-10.

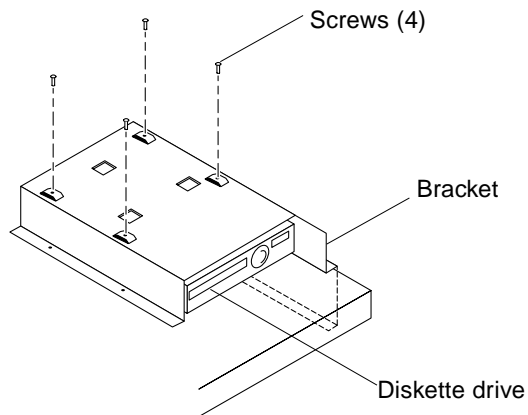


FIGURE 9-10 Positioning the Diskette Drive

3. Remove the four screws securing the diskette drive to the drive bracket.

See FIGURE 9-10.

4. Remove the diskette drive, and place it aside.

9.3.2 Replacing a Diskette Drive

1. Place the diskette drive inside the bracket.

See FIGURE 9-11.

2. Replace the four screws.

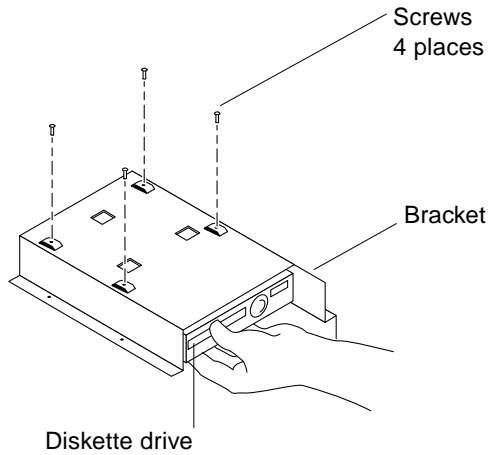


FIGURE 9-11 Positioning the Diskette Drive

3. Replace the bracket into the chassis.

See Section 9.2.3 “Replacing a CD-ROM/Tape Drive” on page 9-8 if applicable, and Section 9.2.4 “Replacing the Bracket into the Chassis” on page 9-8.

System Board and Component Replacement

This chapter provides information on removing and replacing the boards and DSIMMs and a few parts on the system board.

Refer to the following *before* you remove any part:

- Powering Off the System—page 6-1
- Removing the Cover—page 7-1
- Attaching the Wrist Strap—page 7-2

Refer to the following *after* replacing any part:

- Replacing the Cover—page 7-3
- Powering On the System—page 6-2

The following is the list of all replacement parts related to the Sun Ultra 1 Series system board:

- System Board—page 10-1
- NVRAM/TOD—page 10-10
- SBus Card—page 10-11
- DSIMM—page 10-17
- System Board Fan—page 10-21

10.1 System Board



Caution – Use an antistatic mat when working with the system board. An antistatic mat contains the cushioning needed to protect the underside components, to prevent board flexing, and to provide antistatic protection.

Note – Before removing a defective system board, you must remove all DSIMMs and SBus card(s) from the defective board. Note the slots for each of the SBus cards. DSIMMs and SBus card(s) should be replaced on the replacement system board later.

10.1.1 Removing a System Board

Note – The NVRAM/TOD (Non-Volatile Random Access Memory/Time Of Day) clock contains the system's host id and Ethernet address numbers. If you want to use the same numbers on the replacement board, you must remove the NVRAM/TOD from the defective system board, and install it on the replacement system board after it is installed in the system.

1. **Remove each NVRAM/TOD from the defective system board and from the replacement system board.**

See Section 10.2.1 "Removing a NVRAM/TOD" on page 10-10.

2. **Remove all of the SBus card(s) from the defective system board.**

See Section 10.3.1 "Removing an SBus Card" on page 10-11.

3. **Remove all DSIMMs from the system board.**

See Section 10.4 "DSIMM" on page 10-17.

4. **Disconnect the SCSI cable from the system board at J2602.**

See FIGURE 10-1.

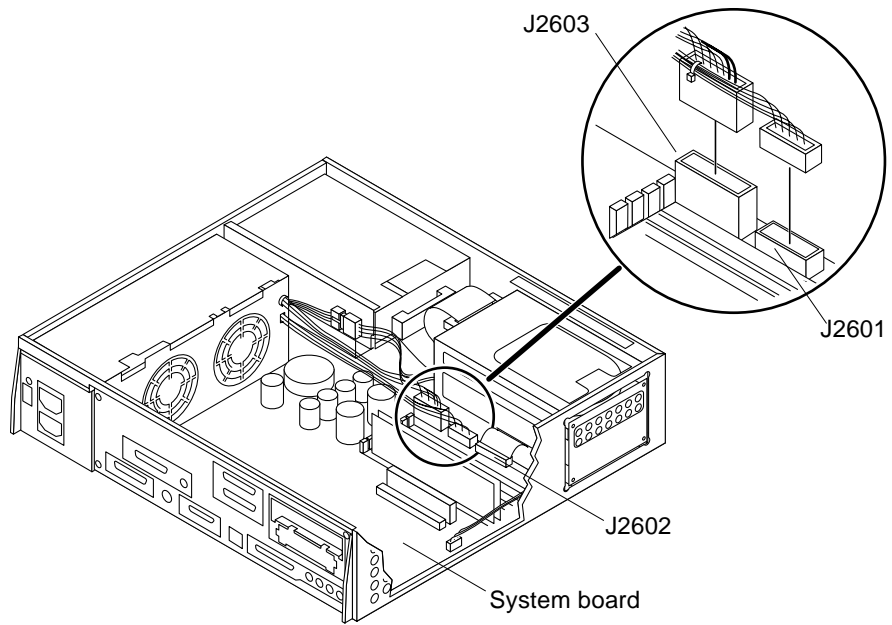


FIGURE 10-1 Disconnecting Connectors from the System Board

- 5. Disconnect the DC power cables from the system board at J2601 and J2603.**
See FIGURE 10-1.
- 6. Disconnect the speaker/LED cable from the system board at J2001.**
See FIGURE 10-2.

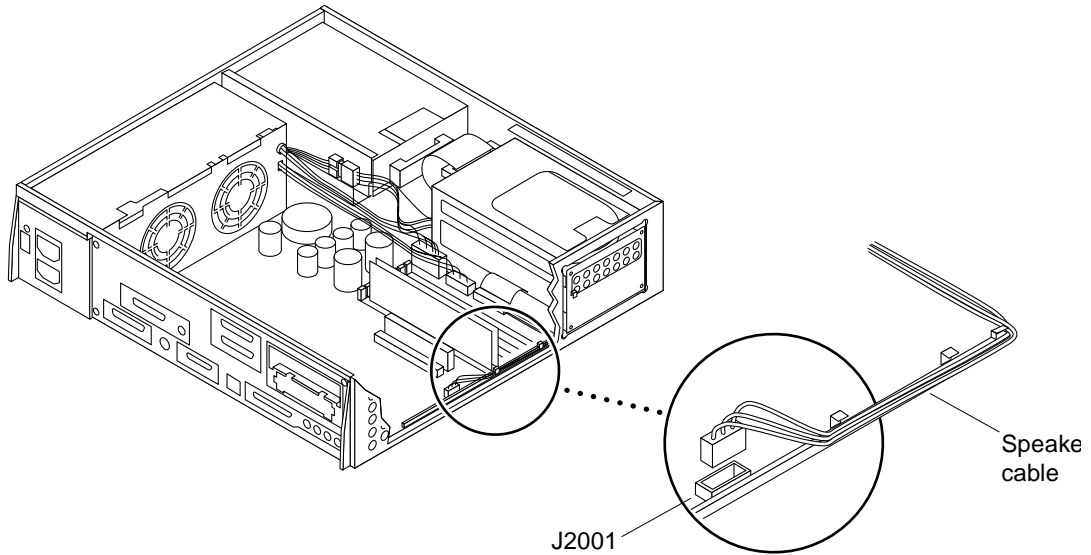


FIGURE 10-2 Speaker/LED Connector on the System Board

7. Loosen both captive screws on the back panel.

See FIGURE 10-3.

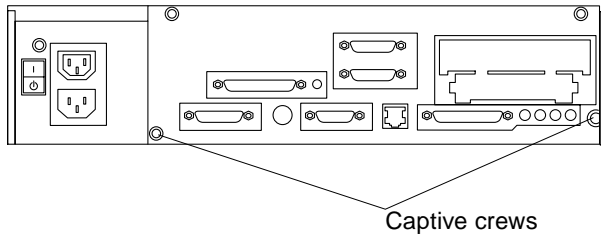


FIGURE 10-3 Captive Screws on the Back Panel

8. Grasp the system board and slide it out of the chassis.

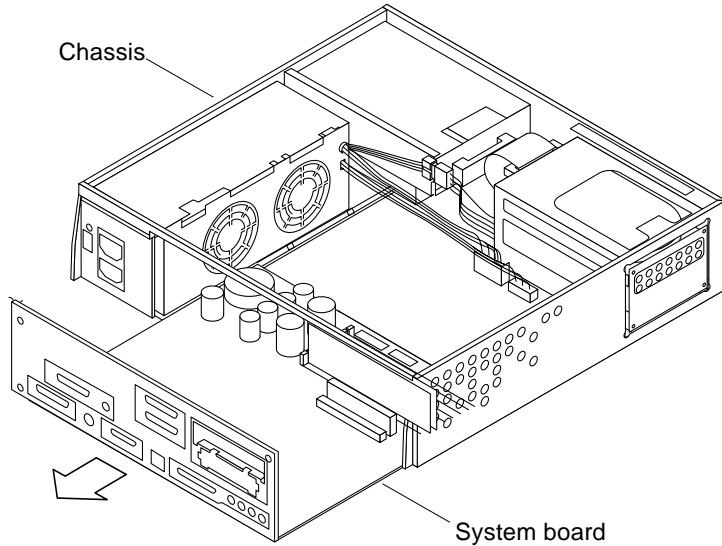


FIGURE 10-4 Sliding the System Board Out of the Chassis

9. Place the system board on an antistatic surface. Handle the system board by the back panel or by the edges only.

10.1.2 Replacing a System Board

1. Remove SBus filler panel(s) from the replacement board so the rear panel of the replacement board and the defective board look the same.
 - a. Squeeze the filler panel bottom locking tabs to unhook them from the back panel.
See FIGURE 10-5.
 - b. Pull the filler panel away from the back panel.

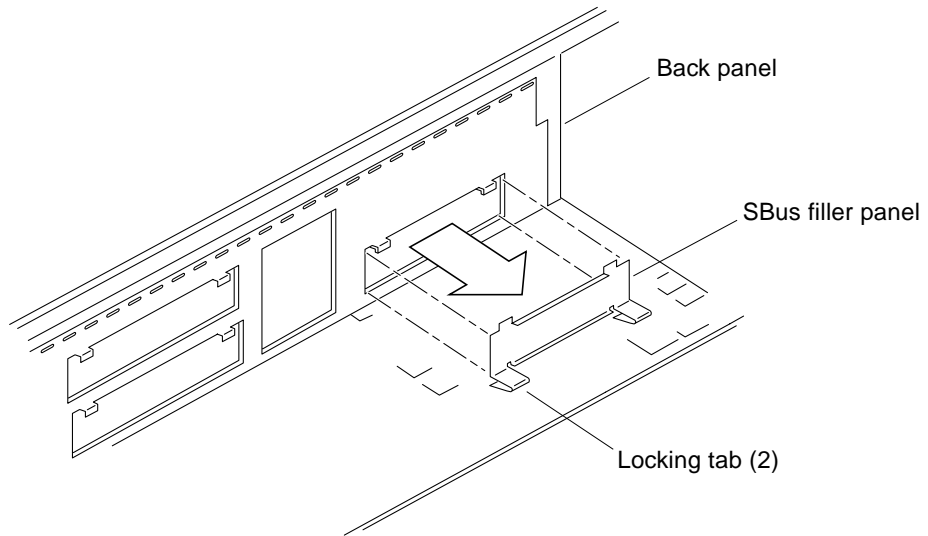


FIGURE 10-5 Removing SBus Filler Panels from the Back Panel

- 2. Slide the board into the rear of the chassis. Both sides of the board must fit into the slots in the plastic board guides in the base of the chassis.**

See FIGURE 10-6.

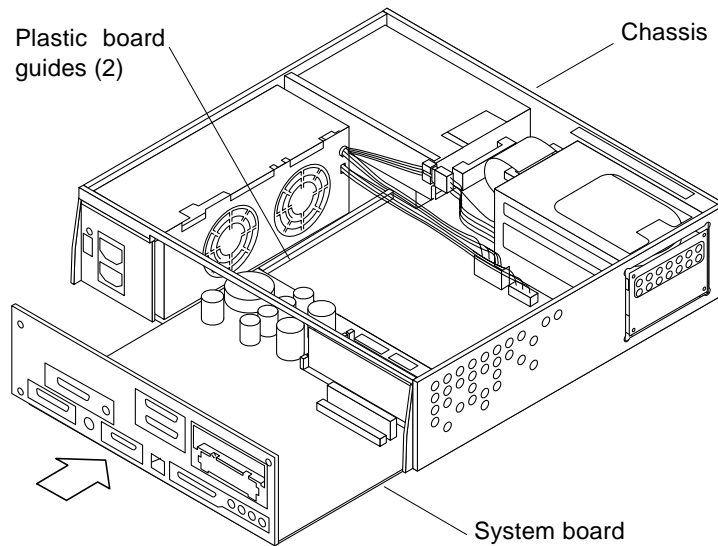


FIGURE 10-6 Sliding the System Board Into The Chassis

3. Tighten the two captive screws on the back panel.

See FIGURE 10-3.

4. Connect the speaker/LED cable to the system board at J2001.

See FIGURE 10-2.

5. Connect the DC power cables to the system board at J2601 and J2603.

See FIGURE 10-1.

6. Connect the SCSI cable to the system board at J2602.

7. Set the serial port jumpers on the replacement system board.

There are two serial port jumpers on the system board, J2104 and J2105.
See FIGURE 10-7.

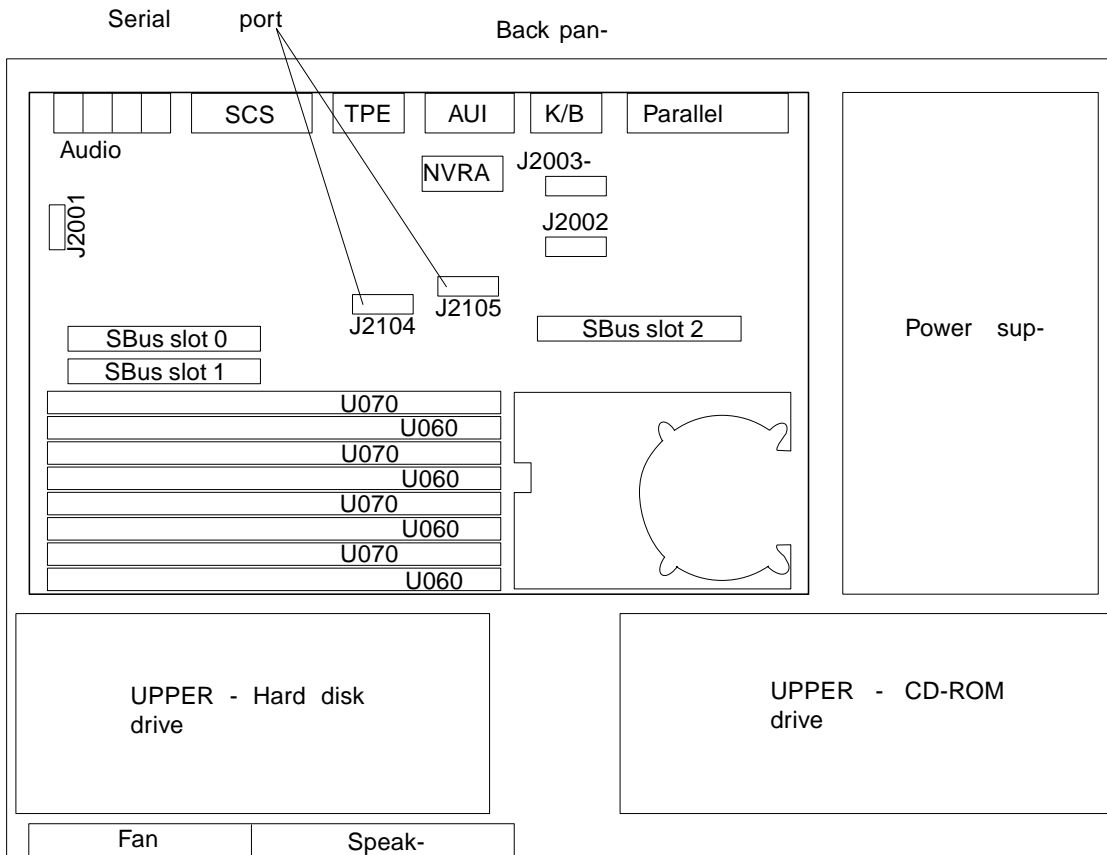


FIGURE 10-7 Location of the Serial Port Jumpers

The jumpers can be set as either RS-423 or RS-232 mode. The jumpers are preset in RS-423 mode, the default standard for North American users.

RS-232 modes are required for digital telecommunication in nations of the European Community.

Jumpers are identified on the system board with silkscreened part numbers. For example, the serial port jumpers are marked J2104 and J2105. Jumper pins are located immediately adjacent to the part number. Pin 1 is marked with an asterisk in any of the positions shown. See FIGURE 10-8.

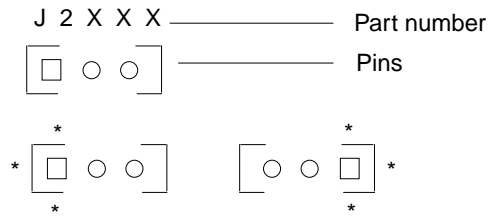


FIGURE 10-8 Identifying Jumper Pins

Be sure the serial port jumpers are set correctly. Use a pair of long-nose pliers to move *both* jumpers to the correct positions. TABLE 10-1 shows the correct setting for the serial port jumpers.

TABLE 10-1 Serial Port Jumper Settings

Jumper	Pins 1 + 2 Select	Pins 2 + 3 Select	Default Shunt on Pins
J2104	RS-232	RS-423	2 + 3
J2105	RS-232	RS-423	2 + 3

1. Replace the old NVRAM/TOD on the replacement system board.

See Section 10.2.2 “Replacing a NVRAM/TOD” on page 10-10.

2. Replace all DSIMMs on the system board.

See Section 10.4 “DSIMM” on page 10-17.

3. Replace all SBus card(s) on the system board.

See Section 10.3 “SBus Card” on page 10-11.

4. Reset the #power-cycles NVRAM variable to zero.

To do this, turn the system power on, and press Stop-A after the system banner appears on the monitor. At the system ok prompt, type:

```
ok setenv #power-cycles 0
```

The #power-cycles variable is incremented each time the system is power cycled. Power management software in the Solaris operating environment uses this variable to control the frequency of automatic system shutdowns if automatic shutdown is enabled.

10.2 NVRAM/TOD

10.2.1 Removing a NVRAM/TOD

1. **Locate the NVRAM/TOD on the system board.**

See FIGURE 10-9.

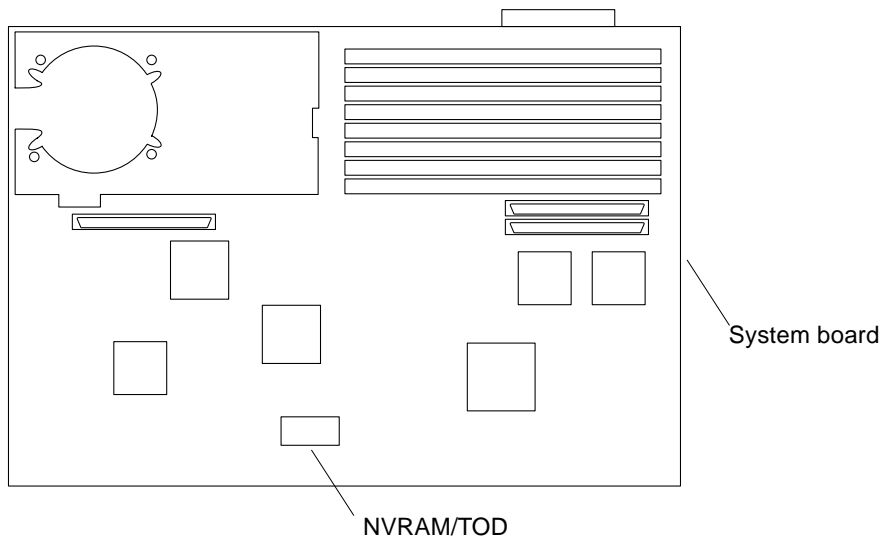


FIGURE 10-9 NVRAM/TOD

2. **Hold the NVRAM/TOD carrier on both ends and lift it straight up.**
Gently wiggle the NVRAM/TOD as necessary.
3. **Place the NVRAM/TOD with its carrier on an antistatic surface.**

10.2.2 Replacing a NVRAM/TOD

1. **Position the replacement NVRAM/TOD on the system board.**

See FIGURE 10-9.

2. Carefully insert the NVRAM/TOD into the socket.

The carrier is keyed so the NVRAM/TOD can be installed only one way.

3. Push the NVRAM/TOD into the carrier until it sits tightly in the socket.

10.3 SBus Card

Sun Ultra 1 Series has three SBus slots. See FIGURE 10-10 for the location of each SBus slot.

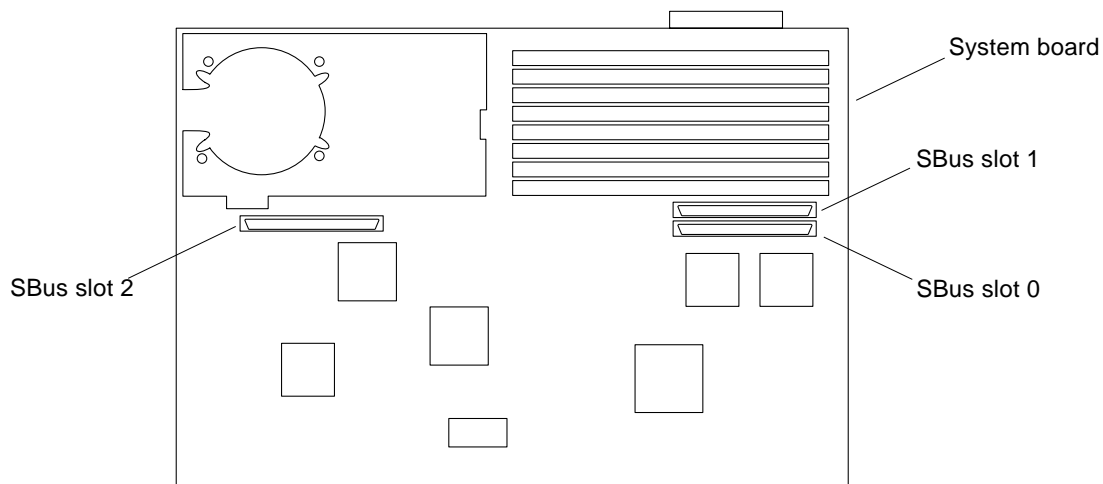


FIGURE 10-10 SBus Slots Location

Note – If the defective SBus card is located in slot 0, *and* there is another SBus card installed in slot 1, you must remove the card from slot 1 before removing the defective card from slot 0.

10.3.1 Removing an SBus Card

1. Unlock the card retainers.

- If the SBus card is located in SBus slot 0 or 1, push the card retainers back from the edge of the SBus card. See FIGURE 10-11.

- If the SBus card is located in SBus slot 2, pull the card retainer up. See FIGURE 10-12. There is only one card retainer for the SBus slot 2.

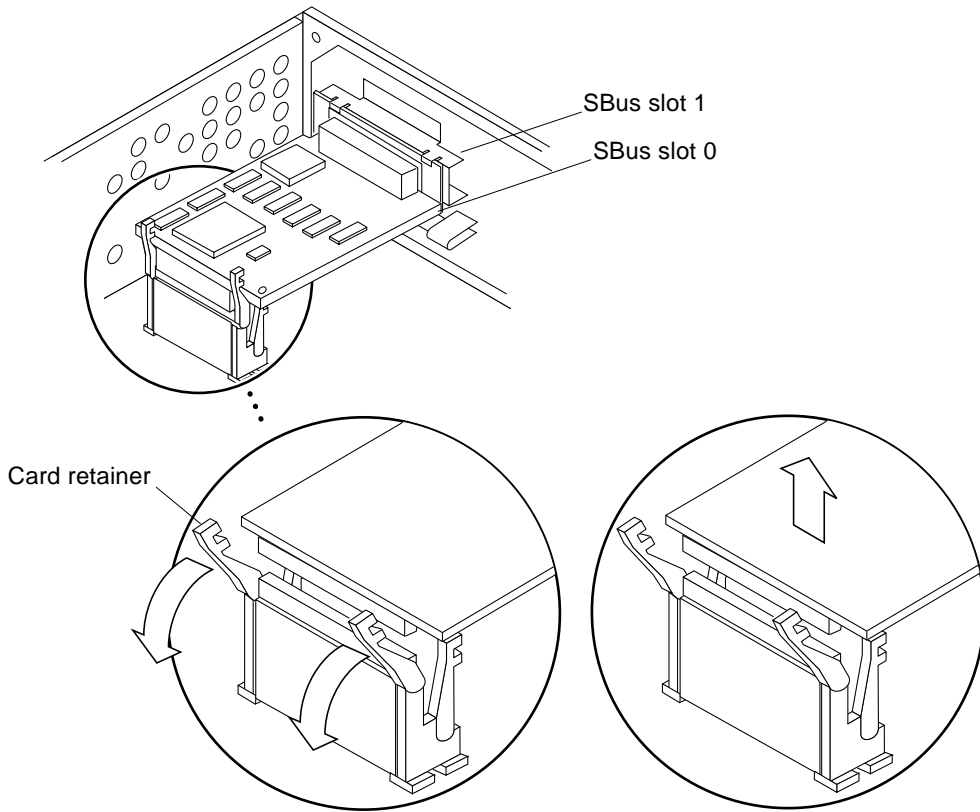


FIGURE 10-11 Removing an SBus Card from Slot 0 or 1

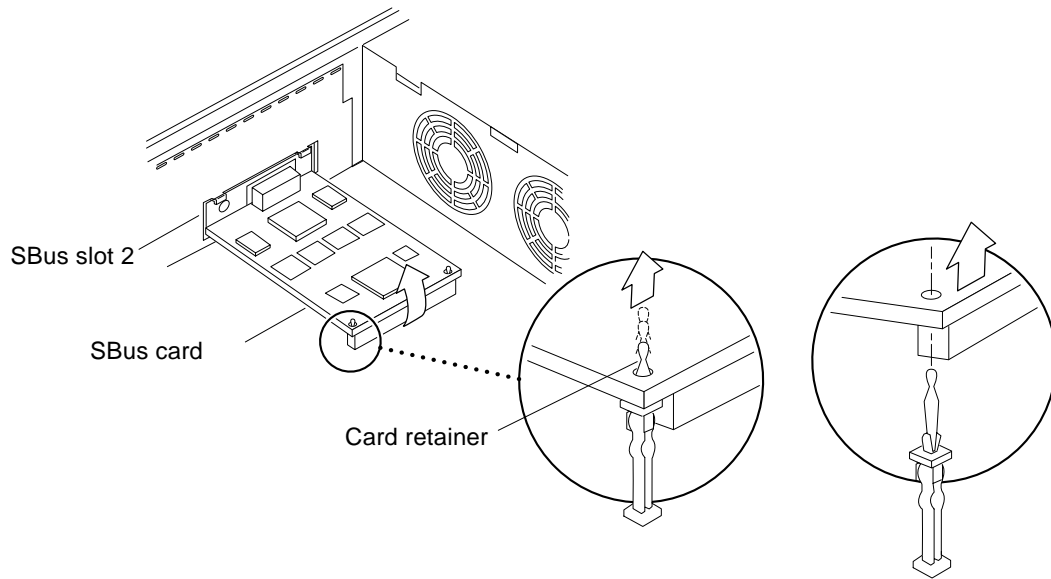


FIGURE 10-12 Removing an SBus Card from Slot 2

2. Grasp the SBus card at both corners, and pull it up to disconnect it from the socket.



Caution – Avoid applying force to one end or one side of the board. It damages the connector pins.

3. Slide the SBus card out of the back panel, and place it on an antistatic surface.

10.3.2 Replacing an SBus Card

1. Place the SBus card on an antistatic surface.
2. If required, set the jumpers or switches on the card.
See your SBus product documentation.
3. Remove the SBus card extractor (if any).

- a. **Bend one leg of the extractor slightly to the outside until the hook clears the hole in the SBus card.**

See FIGURE 10-13.

- b. **Remove the other side of the extractor.**

It should come out easily without being bent.

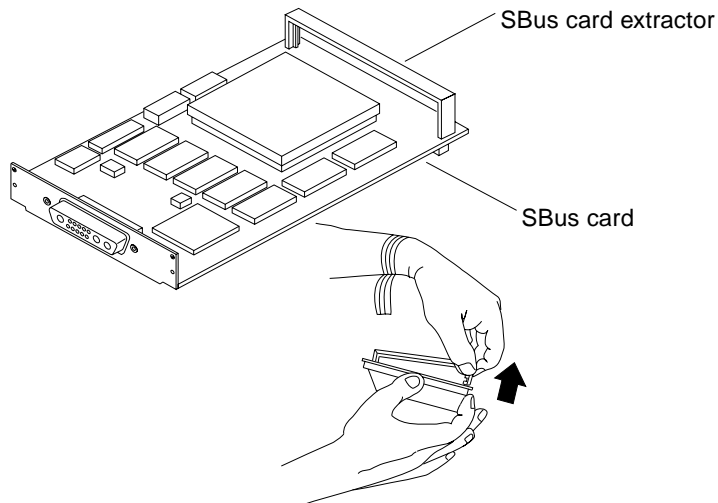


FIGURE 10-13 Removing the SBus Card Extractor

4. **Slide the card at an angle into the system unit by hooking the card backplate under the two tabs on the back panel.**

See FIGURE 10-14. Be sure the card backplate shows through the slot on the back panel.

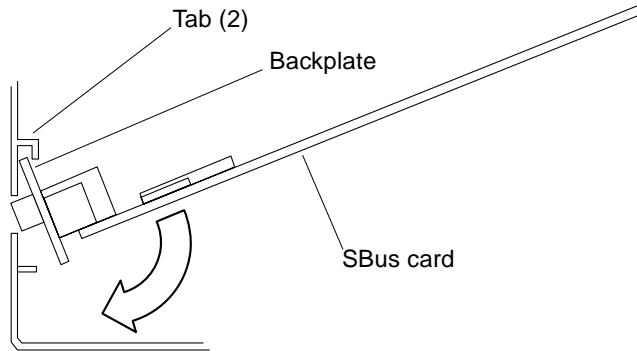


FIGURE 10-14 Replacing the SBus Card

5. Align the connector with the SBus socket. Gently press the corners of the card to push the connector into the socket.

Do not force the card, or you may damage the pins on the card. If the SBus card is located in SBus slot 0 or 1, see FIGURE 10-15. If the SBus card is located in SBus slot 2, see FIGURE 10-16.

6. Lock the card retainers.

- If the SBus card is located in SBus slot 0 or 1, push the rear card retainers forward over the edge of the SBus card. See FIGURE 10-15.
- If the SBus card is located in SBus slot 2, push the card retainer down. See FIGURE 10-16. There is only one card retainer for the SBus slot 2.

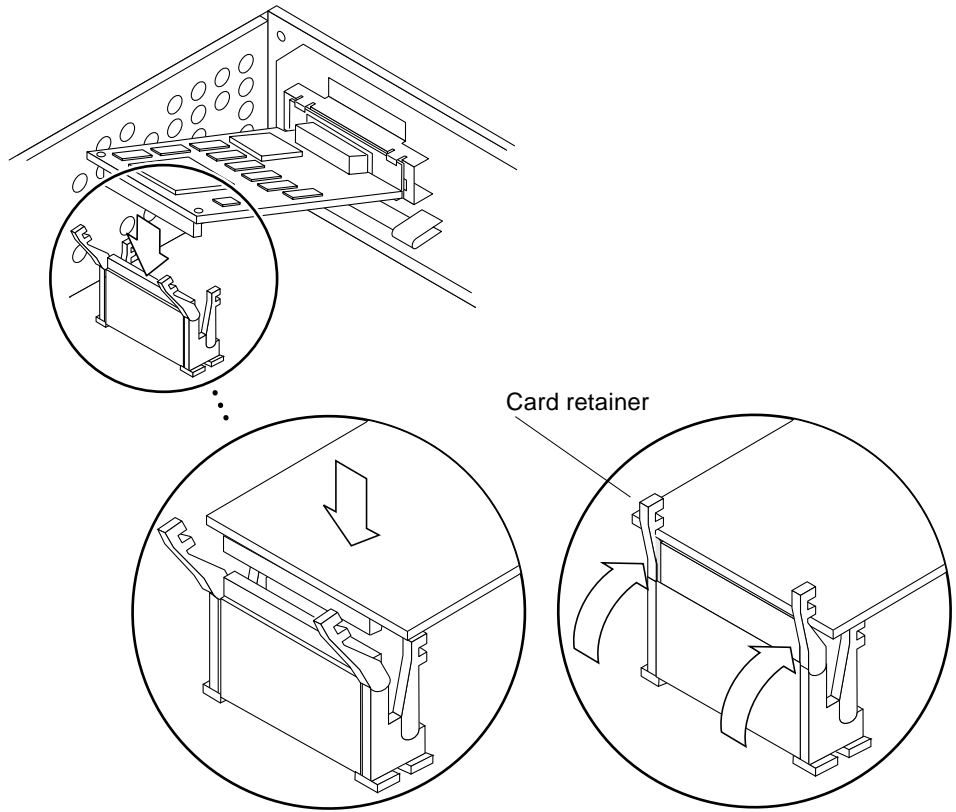


FIGURE 10-15 Lock in the SBus Card Retainers, SBus Slots 0 or 1

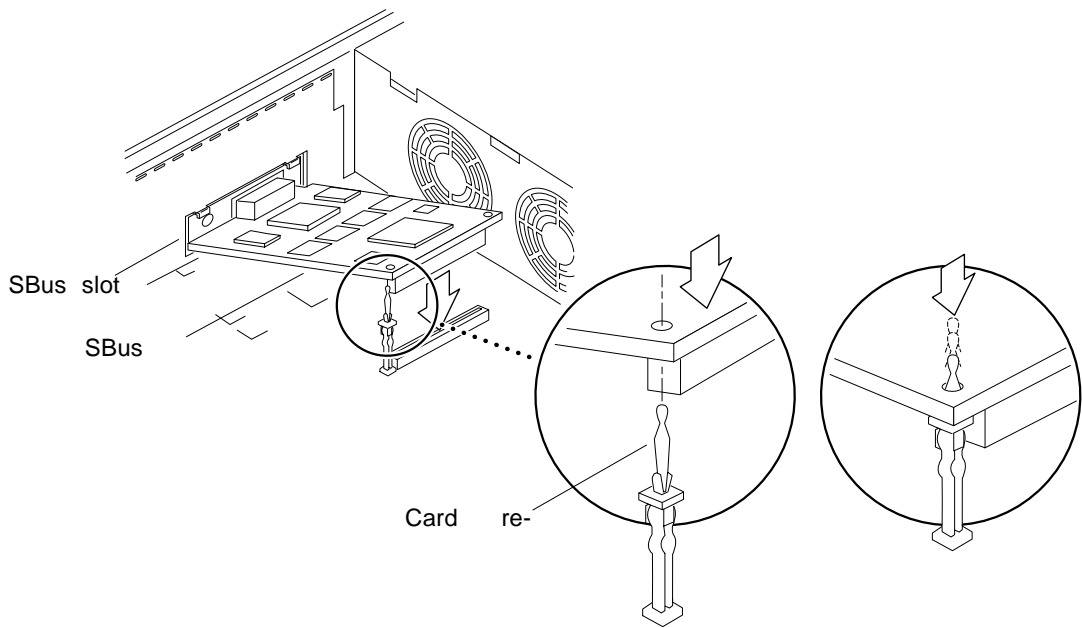


FIGURE 10-16 Lock in the SBus Card Retainer, SBus Slot 2

10.4 DSIMM



Caution – DSIMMs are made of electronic components that are extremely sensitive to static electricity. Ordinary mounts of static from your clothes or work environment can destroy the modules.

Do not remove any DSIMM from the anti-static container until you are ready to install it on the system board. Handle the modules only by the edges. Do not touch the components or any metal parts. Always wear a grounding strap when you handle the modules.

Note – Each DSIMM removed from the system should be replaced with another DSIMM. The replacement DSIMM should have the same capacity as the defective one. It should also be inserted into the same socket as the defective one.

The Sun Ultra 1 Series system *must* have a pair of DSIMMs in bank 0 to be able to boot. Up to eight DSIMMs can be installed in the system. They can be located in the sockets described on TABLE 10-2. However, each bank must contain two DSIMMs of equal density (for example: two 16MB DSIMMs, two 64MB DSIMMs) to function properly. Do not mix DSIMM densities in any bank.

TABLE 10-2 Bank and Socket Locations for DSIMMs

Bank	Socket
0 (Required)	U0701 + U0601
1	U0702 + U0602
2	U0703 + U0603
3	U0704 + U0604

10.4.1 Removing a DSIMM

- 1. Locate the DSIMM you want to remove on the system board.**

See FIGURE 10-17.

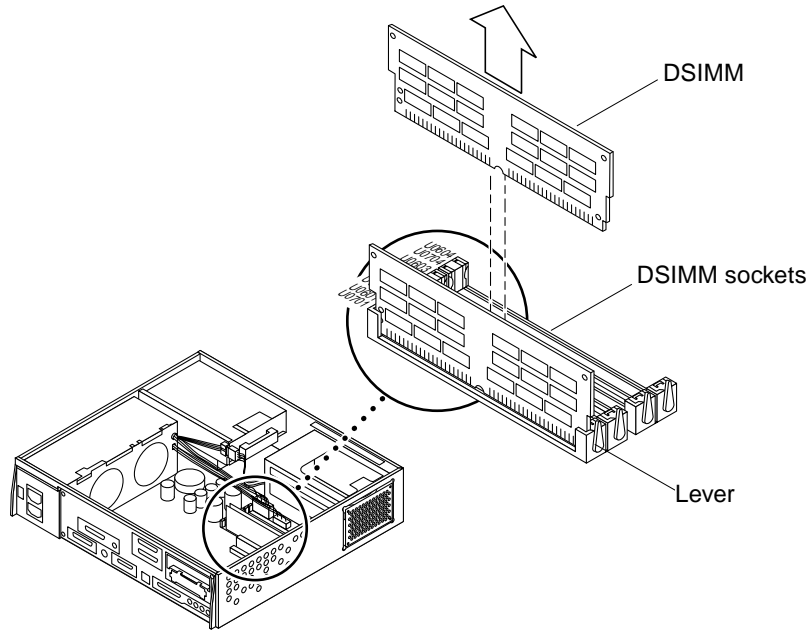


FIGURE 10-17 Removing a DSIMM

2. Push the lever away from the DSIMM.

See FIGURE 10-18.

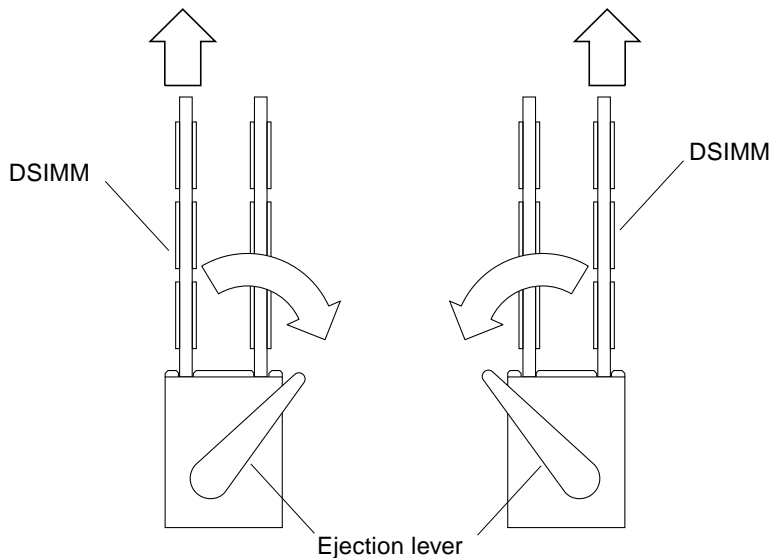


FIGURE 10-18 DSIMM Ejection Lever

3. Pull the DSIMM out of the socket.

10.4.2 Replacing a DSIMM

1. Take the replacement DSIMM from the antistatic container.
2. Position the DSIMM in the socket so the notch is on the same side as the lever.

See FIGURE 10-19.

Note – The replacement DSIMM should have the same capacity as the defective DSIMM.

3. Insert the DSIMM into the socket by pushing it down at both ends until it is fully seated in the socket.

See FIGURE 10-19.

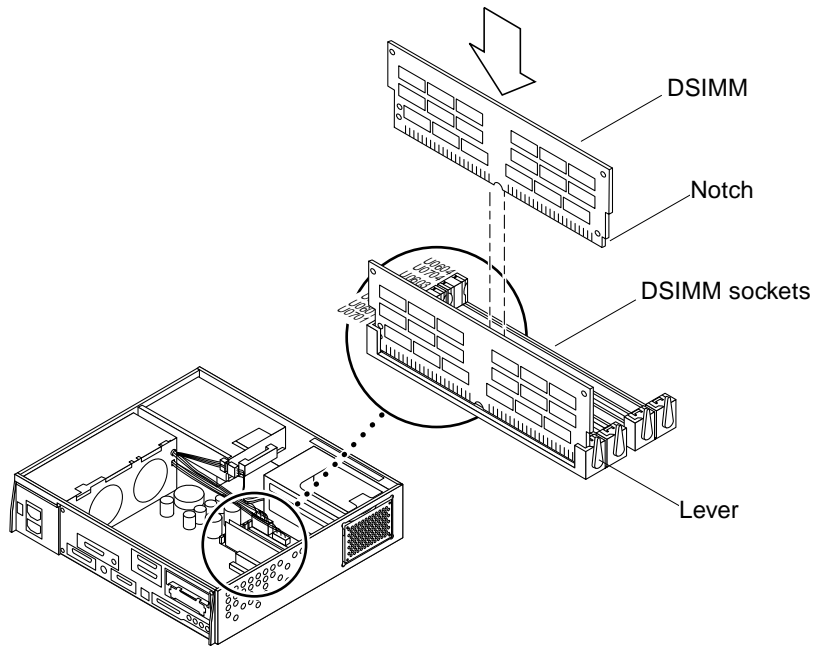


FIGURE 10-19 Replacing a DSIMM

10.5 System Board Fan

10.5.1 Removing the System Board Fan

1. Remove the two screws from the system board fan.

See FIGURE 10-20.

2. Gently push in the middle leg of the plastic cover to unlock it from the board, and pull the plastic cover up to remove it from the system board.

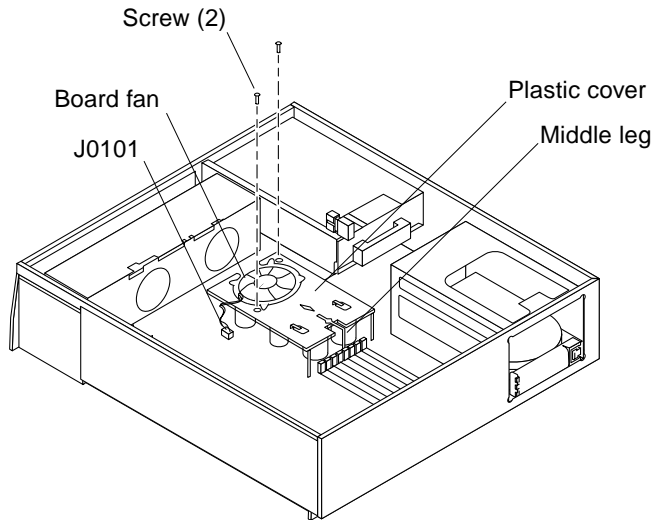


FIGURE 10-20 Plastic Cover for the Board Fan

3. Disconnect the board fan connector from the system board at J0101.

See FIGURE 10-20.

4. Remove the system board fan from the system board.

See FIGURE 10-21.

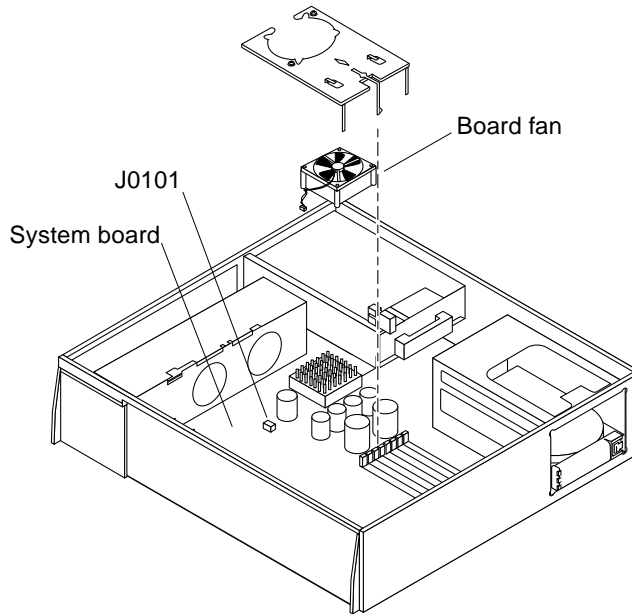


FIGURE 10-21 Board Fan

10.5.2 Replacing the System Board Fan

- 1. Position the replacement system board fan on the system board.**
See FIGURE 10-21.
- 2. Connect the system board fan connector to the system board at J0101.**
- 3. Position the plastic cover on top of the system board fan, and insert the middle leg into the board.**
- 4. Replace the two screws to secure the plastic cover and system board fan to the system board.**

See FIGURE 10-20.

Replacement Parts

This chapter provides the replacement parts list for the Sun Ultra 1 Series system.

11.1 List of Replacement Parts

This section lists part numbers and describes replacement parts for the 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 representatives or service provider to confirm part numbers before you order new or replacement parts.

TABLE 11-1 List of Replacements Parts

Replacement Parts	Part Number	Description
CPU	501-2836	Assy, Sun Ultra 1 Model 140 system board
	501-3082	Assy, Sun Ultra 1 Model 170 system board
TOD/NVRAM	525-1430	TOD/NVRAM
DSIMMs	501-2479	Assy, DSIMM, 16 MB
	501-2622	Assy, DSIMM, 32 MB
	501-2480	Assy, DSIMM, 64 MB
Graphics Card	501-2325 or 501-2922	TGX1 graphics card, 1 MB
	501-2253	TGX+ graphics card, 4 MB
Drives	540-2765	1.05 GB disk drive
	540-2782	2.1 GB disk drive

TABLE 11-1 List of Replacements Parts

Replacement Parts	Part Number	Description
	370-2102	CD-ROM drive 1.6"
	370-2151	Diskette drive
Power Supply	300-1308	180 W power supply
Fan Assembly	540-2761	System board fan
	540-2666	Assy, disk fan (80 mm)
Speaker	370-1579	Speaker
Cable Assembly	530-1871	TPE cable type 5
	530-2153	SCSI cable/backplane assy
	530-2175	Cable, speaker/LED
	530-2176	Cable, peripheral power
	530-2187	Cable, diskette

Product Specifications

A.1 Physical Specifications

TABLE A-1 Sun Ultra 1 Series Workstation Physical Specifications

	U.S.A.	Metric
Height	4.00 inches	10.15 cm
Width	16.44 inches	41.75 cm
Depth	17.44 inches	44.30 cm
Weight range	21.0 to 27.5 lbs	9.55 to 12.50 kg

A.2 Electrical Specifications

TABLE A-2 AC/DC Power Supply Specifications

Parameter	Description	Value
Input	Voltage range	100 to 240 VAC
	Current, maximum	3.1 to 1.5A
	Current frequency range	47 to 63 Hz
Output	1	+5V, 18A
	2	+3.3V, 12 A
	3	+2.5 to 3.6 V, 12 to 8.3 A
	4	+12V, 5.1 A
	5	-12V, 0.3 A
Input Power rating		260 W
Volt-Ampere rating		260 VA
Power factor		>.98

A.3 Environmental Requirements

TABLE A-3 Environmental Limits

	Operating U.S.A	Operating Metric	Non-operating U.S.A	Non-operating Metric
Temperature	41 - 104 °F	5-40 °C	-40 - 140 °F	-40 to 60 °C
Humidity	20 - 80 % Noncondensing @ 104 °F	20 - 80 % Noncondensing @ 40 °C	95 % Noncondensing @ 104 °F	95 % Noncondensing @ 40 °C
Altitude	70.1 KPa	3 Km	19.2 KPa	12 Km
Max Dwells at Extremes	16 hours	16 hours	16 hours	16 hours

Signal Descriptions

B.1 Keyboard/Mouse and Serial Port

B.1.1 Keyboard/Mouse

This connector is located on the system back panel.

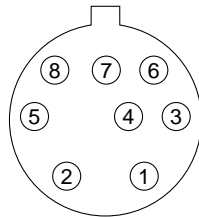


FIGURE B-1 Keyboard/Mouse Connector

TABLE B-1 Keyboard/Mouse Pin Assignments

Pin	Signal Name	Description	Pin	Signal Name	Description
1	GND	Ground	5	kbd-txd	Keyboard transmit data
2	GND	Ground	6	kbd-rxd	Keyboard receive data
3	kbd-pwr	Keyboard power	7	kbd-pwk	Keyboard power key
4	mse-rxd	Mouse receive data	8	kbd-pwr	Keyboard power

B.1.2 Serial Ports A and B (RS-422/RS-232)

These connectors are located on the back panel of system board.

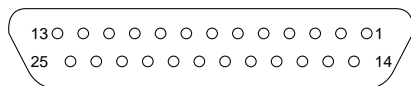


FIGURE B-2 Serial Ports A and B Con

TABLE B-2 Serial Ports Pin Assignments

Pin	Signal Name	Description	Pin	Signal Name	Description
1	Not connected	none	14	Not connected	none
2	Transmit Data	TxD	15	Transmit Clock	TRxC
3	Receive Data	RxD	16	Not connected	none
4	Ready To Send	RTS	17	Receive Clock	RTxC
5	Clear To Send	CTS	18	Not connected	none
6	Data Set Ready	DSR	19	Not connected	none
7	Signal Ground	Gnd	20	Data Terminal Ready	DTR
8	Data Carrier Detect	DCD	21	Not connected	none
9	Not connected	none	22	Not connected	none
10	Not connected	none	23	Not connected	none
11	Not connected	none	24	Transmit Clock	TxC
12	Not connected	none	25	Not connected	none
13	Not connected	none			

B.2 AUI (Attachment Unit Interface) Connector

This connector is located on the back panel of the system board.

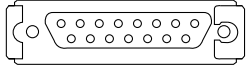


FIGURE B-3 AUI Connector

TABLE B-3 AUI Connector Pinouts

Pin	Function
1	Gnd
2	AUI_CI+
3	AUI_DO+
4	Gnd
5	AUI_DI+
6	Gnd
7	NC
8	Gnd
9	AUI_CI-
10	AUI_DO-
11	Gnd
12	AUI_DI-
13	+12 VDC
14	Gnd
15	NC

B.3 TPE Connector

This connector is located on the back panel of the system board.

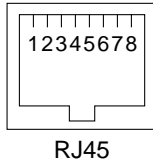


FIGURE B-4 TPE Connect

TABLE B-4 TPE Pin Assignments

Pin	Signal Name	Description	Pin	Signal Name	Description
1	tpe0	Transmit	5	No connect	
2	tpe1	Transmit	6	tpe3	Receive
3	tpe2	Receive	7	No connect	
4	No connect		8	No connect	

B.4 SCSI

This connector is located on the back panel of the system board.

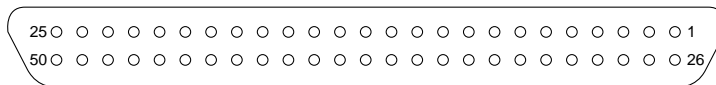


FIGURE B-5 SCSI Connect

TABLE B-5 SCSI Pin Assignments

Pin	Signal Name	Description	Pin	Signal Name	Description
1	gnd	Ground	26	scsi dat 0	SCSI data 0
2	gnd	Ground	27	scsi dat 1	SCSI data 1
3	gnd	Ground	28	scsi dat 2	SCSI data 2
4	gnd	Ground	29	scsi dat 3	SCSI data 3
5	gnd	Ground	30	scsi dat 4	SCSI data 4

TABLE B-5 SCSI Pin Assignments

Pin	Signal Name	Description	Pin	Signal Name	Description
6	gnd	Ground	31	scsi dat 5	SCSI data 5
7	gnd	Ground	32	scsi dat 6	SCSI data 6
8	gnd	Ground	33	scsi dat 7	SCSI data 7
9	gnd	Ground	34	scsi par 0	SCSI parity 0
10	gnd	Ground	35	gnd	Ground
11	gnd	Ground	36	No connect	
12	gnd	Ground	37	gnd	Ground
13	vcc	Vcc	38	Termpower	Termpower
14	gnd	Ground	39	gnd	Ground
15	gnd	Ground	40	gnd	Ground
16	gnd	Ground	41	scsi atn l	SCSI attention
17	gnd	Ground	42	gnd	Ground
18	gnd	Ground	43	scsi bsy l	SCSI busy
19	gnd	Ground	44	scsi ack l	SCSI acknowledge
20	gnd	Ground	45	scsi reset l	SCSI reset
21	gnd	Ground	46	scsi msg l	SCSI message
22	gnd	Ground	47	scsi sel l	SCSI select
23	gnd	Ground	48	scsi cd l	SCSI command
24	gnd	Ground	49	scsi req l	SCSI request
25	gnd	Ground	50	scsi io l	SCSI input/output

B.5 Audio Connectors

The Audio connectors are located on the back panel of the system board.

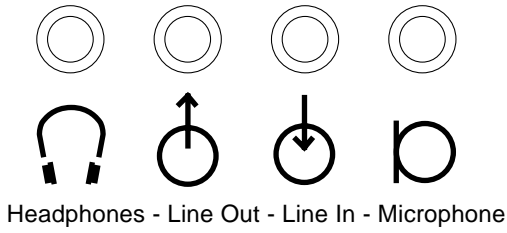


FIGURE B-6 Audio Ports Connector

TABLE B-6 Audio Pin Assignments

	Headphones	Line Out	Line In	Microphone
Tip	Left channel	Left channel	Left channel	Left channel
Ring (center)	Right channel	Right channel	Right channel	Right channel
Shield	Ground	Ground	Ground	Ground

B.6 Parallel Port

This Parallel Port connector is located on the back panel of the system board.

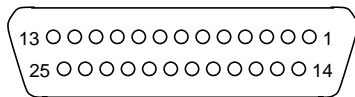


FIGURE B-7 Parallel Port Connector

TABLE B-7 Parallel Connector Pinouts

Pin	Description	Pin	Description
1	nStrobe	14	nAutoFd
2	Data[1]	15	nFault
3	Data[2]	16	nInit
4	Data[3]	17	nSelectIn

TABLE B-7 Parallel Connector Pinouts *(Continued)*

Pin	Description	Pin	Description
5	Data[4]	18	Signal Ground
6	Data[5]	19	Signal Ground
7	Data[6]	20	Signal Ground
8	Data[7]	21	Signal Ground
9	Data[8]	22	Signal Ground
10	nAck	23	Signal Ground
11	Busy	24	Signal Ground
12	PError	25	Signal Ground
13	Select		

Functional Description

C.1 System Features

The Sun Ultra 1 Series system conforms to the Sun4u system architecture. The CPU board contains a single UltraSPARC[™] microprocessor. The system can have up to two 3.5-inch (88.9 mm) hard disk drives, an optional CD-ROM drive or a tape drive, and an optional 3.5-inch (88.9 mm) diskette drive. It has three SBus slots.

Random access memory (RAM) is implemented with dynamic single inline memory modules (DSIMMs). Each system provides eight DSIMM slots, and has a minimum of two DSIMMs installed.

C.2 Sun Ultra 1 Series System Block Diagram

FIGURE C-1 shows a block diagram of the Sun Ultra 1 Series system.

Back pan-

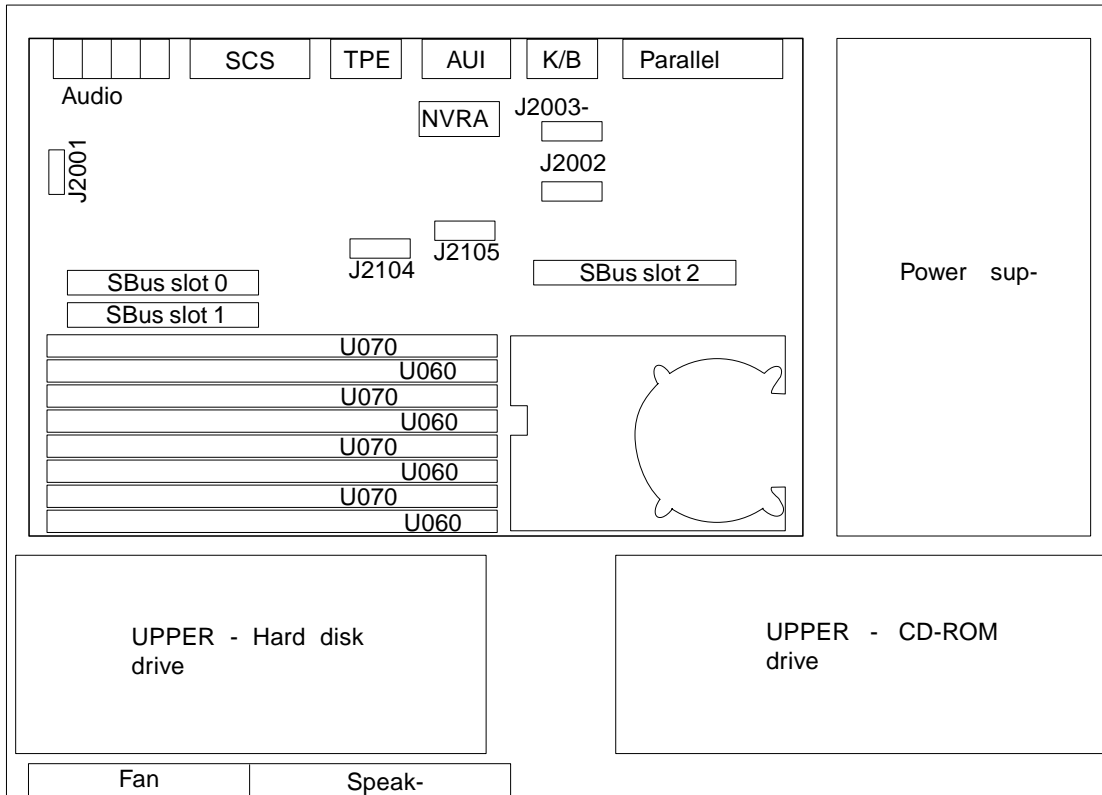


FIGURE C-1 Sun Ultra 1 Series System Block Diagram

C.3 System Board Block Diagram

FIGURE C-2 shows a block diagram of the Sun Ultra 1 Series main logic board.

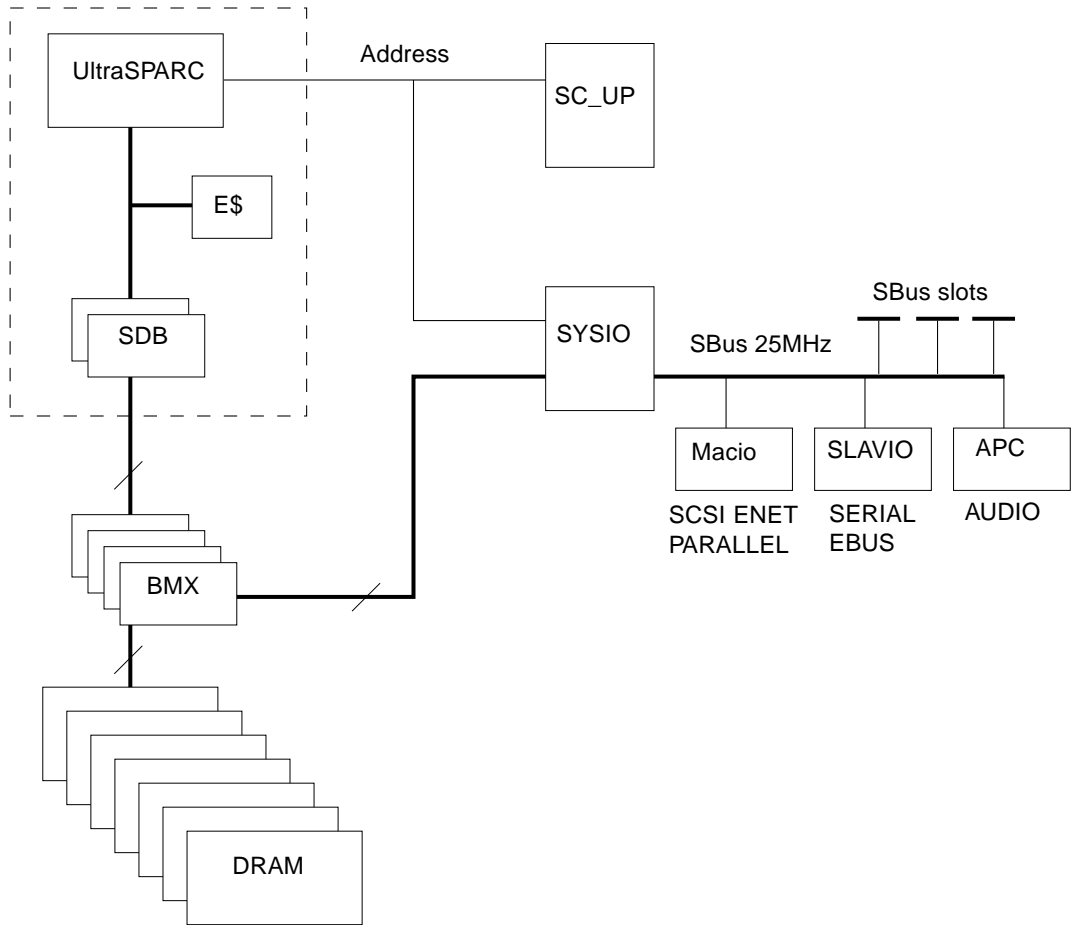


FIGURE C-2 Sun Ultra 1 Series System Board Block Diagram

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.
- BMX** The BMX (Buffered Crossbar Chip) is the hub of all data transfers in the system.
- boot** To load the system software into memory and start it running.
- boot PROM** In Sun workstations, contains the PROM *monitor* program, a command interpreter used for booting, resetting, low-level configuration, and simple test procedures.
- boot PROM diagnostics** The diagnostic firmware contained in the boot PROM. These diagnostics include the Power-On Self Test (POST) and on-board diagnostics.
- default** A preset value that is assumed to be correct unless changed by the user.
- DPS** Is an acronym for Data Path Scheduler. It controls all of the data flow in the machine coordinating the activity of the BMX chips.
- DRAM** Dynamic Random Access Memory.
- DSIMM** DRAM Single Inline Memory Module. A small printed circuit card that contains dynamic random access memory (DRAM) chips.
- EMI** An acronym for Electrostatic Magnetic Interference.
- Ethernet** A type of network hardware that allows communication between systems connected directly together by transceiver taps, transceiver cables, and either a coaxial or twisted-pair cables.
- Macio** It is an IO chip implementing three master devices on the SBus: the Ethernet, SCSI and Parallel Port.

NVRAM An acronym for non-volatile random access memory. The NVRAM is used to store system variables used by the boot PROM. It also contains the system's `hostid` number and Ethernet address.

**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.

POST Power-On Self Test. POST runs when you turn on the system power switch or reboot the system and press and hold the L1-d keys. POST, stored in the boot PROM, is a series of rudimentary tests designed to verify that the major components on the system board and including the processor chip set installed in the system are working properly.

Slavio It is an IO chip implementing three slaves devices on the SBus: the serial, keyboard/mouse and floppy.

SunVTS Sun Validation and Test Suite is a diagnostic tool designed to stress test Sun hardware. Within this environment, a user can run individual tests designed to validate Sun supported piece of hardware. It also allows programmers to develop their own tests and run them on SunVTS interface.

SYSIO Is a bridge chip between UPA and the SBus. It also acts as the IO hub providing features such as the IOMMU and streaming buffers to speed up sequential IO access.

TOD An acronym for Time of Day. This is a special timekeeping chip that keeps track of date and time.

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.

Index

A

audio connector, B-5
AUI connector, B-2

B

bracket
 removing, 9-5
 replacing, 9-8

C

card retainer, 10-15
CD-ROM
 error, 4-6
 removing, 9-8
 replacing, 9-8
connector
 audio, B-5
 AUI, B-2
 keyboard/mouse, B-1
 parallel port, B-6
 SCSI, B-4
 serial port, B-2
 TPE, B-3
cover
 removing, 7-1
 replacing, 7-3

D

diagnostic test
 on-board, 4-11
disk drive
 error, 4-6
 removing, 9-1
 replacing, 9-3
diskette cable, 9-9
 removing, 8-12
 replacing, 8-14
diskette drive
 removing, 9-11
 replacing, 9-11
drive handle, 9-2, 9-4
DSIMM, 4-5
 removing, 10-18
 replacing, 10-20

E

electrical specifications, A-2
EMI door
 removing, 9-1
 replacing, 9-4
environmental requirements, A-2
error
 CD-ROM, 4-6
 disk drive, 4-6
 hard disk drive, 4-6
extractor
 SBus card, 10-14

F

- failures, 4-5
- fan assembly
 - removing, 8-4
 - replacing, 8-6
- fan/speaker bracket, 8-8, 8-10

H

- hard disk drive
 - error, 4-6

K

- keyboard
 - LEDs
 - arrangement, 3-5
- keyboard control command, 3-3
- keyboard/mouse connector, B-1

L

- LED
 - keyboard, 3-4, 3-5
 - power, 3-4
 - status lights, 3-4
 - system, 3-4
- lock block, 7-1

N

- no video output, 4-2
- NVRAM/TOD, 10-2

P

- parallel connector, B-6
- peripheral cable
 - connection, 8-21
 - removing, 8-20
 - replacing, 8-22
- peripheral cable connection, 8-21
- physical specifications, A-1
- POST
 - error reporting, 3-3
 - how to start, 3-1
 - max and min level, 3-2
 - progress, 3-3

- POST output
 - serial port A, 3-6
- power
 - LED, 3-4
- power off, 6-1
- power on, 6-2
 - fails, 4-1
- power supply
 - removing, 8-1
 - replacing, 8-3
 - test, 4-3
- probe-scsi, probe-scsi-all, 4-12

R

- removing
 - bracket, 9-5
 - CD-ROM, 9-8
 - cover, 7-1
 - disk drive, 9-1
 - diskette cable, 8-12
 - diskette drive, 9-11
 - DSIMM, 10-18
 - EMI door, 9-1
 - fan assembly, 8-4
 - lock block, 7-1
 - peripheral cable, 8-20
 - power supply, 8-1
 - SBus card, 10-11
 - SCSI cable/backplane, 8-16
 - speaker, 8-7
 - speaker/LED cable, 8-24
 - system board, 10-2
 - system board fan, 10-21
 - tape drive, 9-8
- replacement parts
 - part
 - replacement, 11-1
- replacing
 - bracket, 9-8
 - CD-ROM, 9-8
 - cover, 7-3
 - disk drive, 9-3
 - diskette cable, 8-14
 - diskette drive, 9-11

- DSIMM, 10-20
- EMI door, 9-4
- fan assembly, 8-6
- peripheral cable, 8-22
- power supply, 8-3
- SBus card, 10-13
- SCSI cable/backplane, 8-18
- speaker, 8-10
- speaker/LED cable, 8-29
- system board, 10-5
- system board fan, 10-23
- tape drive, 9-8
- requirements
 - environmental, A-2

S

- safety requirements, 5-1
- SBus card
 - removing, 10-11
 - replacing, 10-13
- SBus card extractor, 10-14
- SCSI cable/backplane
 - removing, 8-16
 - replacing, 8-18
- SCSI connector, B-4
- serial port A
 - POST output, 3-6
- serial port connector, B-2
- speaker
 - removing, 8-7
 - replacing, 8-10
- speaker/LED cable
 - removing, 8-24
 - replacing, 8-29
- specifications
 - electrical, A-2
 - physical, A-1
- symbols, 5-1
- system board
 - removing, 10-2
 - replacing, 10-5
- system board fan
 - removing, 10-21
 - replacing, 10-23
- system board test, 4-13

T

- tape drive
 - removing, 9-8
 - replacing, 9-8
- test
 - power supply, 4-3
 - system board, 4-13
- test alias name, test device path, test-all, 4-10
- tools required, 5-3
- TPE connector, B-3

W

- watch-clock, 4-8
- watch-net, watch-aui, watch-tpe, watch-net-all, 4-8
- wrist strap, 7-2

