

Troubleshooting Overview



This chapter describes the factory-defined boot sequence. It also describes the different types of SPARCstation 5 diagnostic firmware and software tools that are available to you for troubleshooting; the chapter explains how the tools are related and when to use them.

<i>Factory-Defined Boot Mode</i>	<i>page 2-2</i>
<i>After Power Is Switched On</i>	<i>page 2-4</i>
<i>Diagnostic Tools and When to Use Them</i>	<i>page 2-7</i>
<i>Power-On Self-Test</i>	<i>page 2-7</i>
<i>FORTH-Based PROM Diagnostics</i>	<i>page 2-8</i>
<i>FORTH Monitor</i>	<i>page 2-10</i>
<i>SunDiag System Exerciser</i>	<i>page 2-11</i>
<i>SunDiagnostic Executive</i>	<i>page 2-11</i>

2.1 Factory-Defined Boot Mode

The flowcharts in Figure 2-1 and Figure 2-2 outline the roles played by various diagnostics during a *factory-defined boot* operation under the control of the OpenBoot™ PROM (OBP) firmware.

The following sections describe the relationship between the various diagnostic tools, and the role each tool plays during the SPARCstation 5 factory-defined boot sequence. The descriptions in the following sections assume you are using a graphics monitor to view test results.

Figure 2-1 (POST phase) and Figure 2-2 (OBP phase) graphically depict the flow of OBP processing control, after power is switched on. Each figure depicts the possible paths for processing control, and the switch settings for the factory-defined boot sequence. By examining the two flowcharts you can see where in the processing sequence other diagnostic tests are available or are encountered.

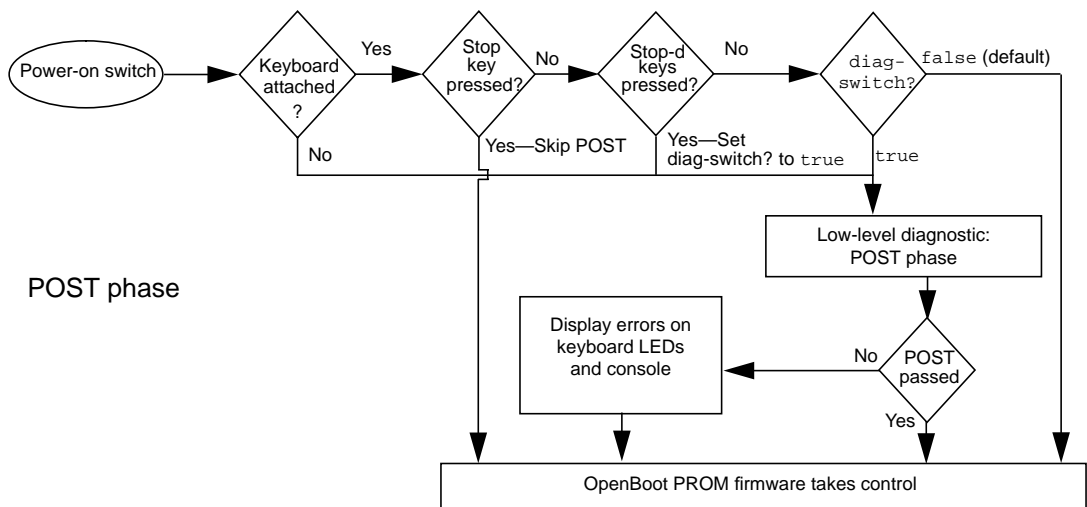


Figure 2-1 Factory-Defined Boot Sequence—POST Phase Settings and Tests

If you need to run extended FORTH Diagnostics to take advantage of more extensive tests, see Appendix D, “FORTH Diagnostics.”

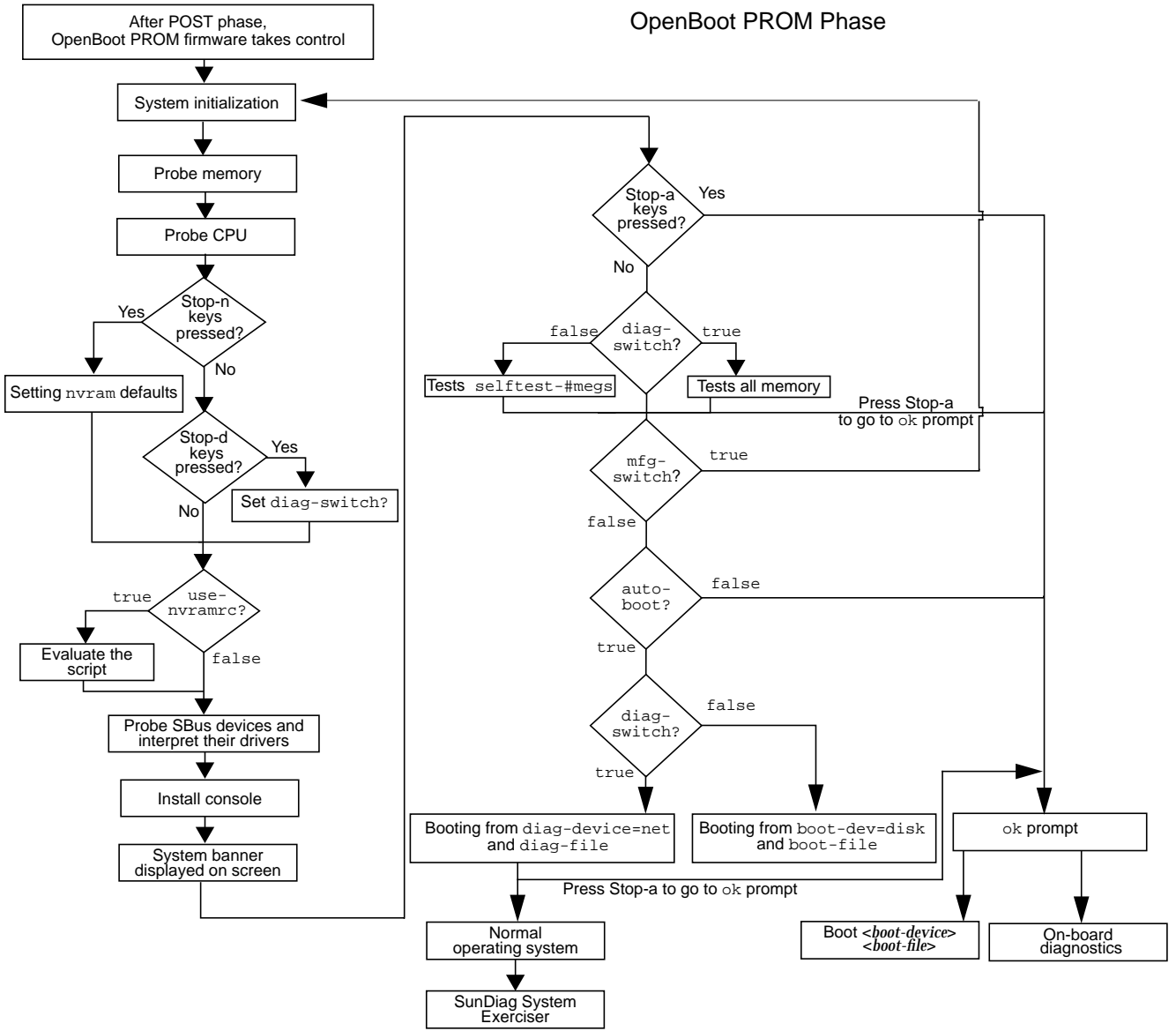


Figure 2-2 Factory-Defined Boot Sequence—OpenBoot PROM Phase Settings and Tests

2.2 After Power Is Switched On

When you turn on the system power, the low-level POST phase is initiated if any of the following circumstances apply:

- `diag-switch?` NVRAM parameter is set to `true`.
- Stop-d keys are held down when you turn on the power.
- Keyboard is disconnected, and `diag-switch?` is set to `false`.

The low-level POST code, which is stored in the boot PROM, is designed to test the most basic functions of the system hardware. The status of the POST is conveyed by four LEDs on the Sun Type-4, Type-5, and Compact 1 keyboards. The Caps Lock LED blinks to indicate that the tests are in progress. If a failure is detected during low-level POST, one of the other three LEDs will light to indicate the nature of the failure. See Chapter 3, “Power-On Self-Test (POST),” for more information.

Note – You can skip the POST phase by turning on the system while holding down the Stop key.

At the successful completion of the low-level POST phase, the OpenBoot PROM firmware takes control and performs the following initialization sequence:

- Initialize system
- Probe memory, then CPU
- Evaluate Script (if `use-nvramrc?` is set to `true`)
- Probe SBus devices and interpret their drivers
- Install the console (see Figure 2-2)

After initialization, a system banner appears on the screen, and the high-level testing begins. When the high-level tests are finished, the system checks parameters stored in the NVRAM to determine the next step. Depending on the following parameter settings, the system will:

- Boot the operating system from a specified location, if `auto-boot?` is set to `true`
- Suppress the boot sequence and enter the FORTH Monitor (`ok` prompt), if `auto-boot?` is set to `false`
- Continually cycle through the OpenBoot PROM sequence, if `mfg-switch?` is set to `true`

Note – If you are in the Sunmon compatibility mode (prompt is `>`) type `n` to return to the OBP monitor (prompt is `ok`).

Table 2-1 contains a list of NVRAM parameters and explains their effect on the power-up sequence. For more detailed information about NVRAM parameters, see the *OpenBoot Command Summary*.

Note – At any point during the high-level OBP execution, you can abort the OBP sequence and access the FORTH Monitor by pressing the Stop and “a” keys simultaneously.

Table 2-1 NVRAM Parameters Used During POST and Boot Sequence

NVRAM Parameter	Description
<code>selftest-#megs</code> Default = 1	This parameter determines how many megabytes of memory to test during high-level OBP testing if <code>diag-switch?</code> is concurrently set to <code>false</code> . The minimum is zero; the maximum is the amount actually installed in the system. The default is a 1-megabyte test.
<code>diag-switch?</code> Default = <code>false</code>	When set to <code>true</code> , this parameter forces the system to test automatically all available memory. It also enables diagnostic message output to serial port A. If a properly configured terminal or “tip window” is connected, diagnostic progress can be monitored through this port. When <code>auto-boot?</code> is set to <code>true</code> and <code>diag-switch?</code> is set to <code>false</code> , <code>diag-switch?</code> forces the system to boot from the device and file specified in <code>boot-dev</code> and <code>boot-file</code> .
<code>auto-boot?</code> Default = <code>true</code>	If <code>auto-boot?</code> is set to <code>true</code> and <code>diag-switch?</code> is set to <code>true</code> , the system boots the operating system from the device and file specified in the <code>diag-device</code> and <code>diag-file</code> NVRAM parameter fields. When set to <code>false</code> , this will suppress the boot sequence. The system halts with the <code>ok</code> prompt.

At the FORTH Monitor prompt, you can direct the system to boot the operating system from a location that you specify, or you can execute a variety of additional FORTH-based tests. See the *OpenBoot Command Reference* for a complete description of the FORTH Monitor.

If the `auto-boot?` parameter is set to `true` (the default), the system boots a standalone program. To determine which program and device to boot from, the system checks the `diag-switch?` NVRAM parameter. Table 2-2 summarizes the effect of the `auto-boot?` and `diag-switch?` parameters.

Table 2-2 Summary of Autoboot and Diagnostic Switch Parameter¹ Settings

<code>auto-boot?</code>	<code>diag-switch?</code>	Result
<code>false</code>	<code>false</code> or <code>true</code>	> or <code>ok</code> prompt
<code>true</code>	<code>false</code>	Boot operating system from device alias "disk" or "net" for SPARCstation 5 system
<code>true</code>	<code>true</code>	Boot operating system from device alias "net"

1. The boot parameters represented here are default settings. The defaults may be changed by following the procedures listed in the *OpenBoot Command Summary*.

Once the operating system is running, you can invoke the SunDiag™ System Exerciser if further diagnostic testing is warranted. Refer to Section 2.7, "SunDiag System Exerciser," for additional information.

Another standalone diagnostic program you can run is the SunDiagnostic Executive. Refer to Section 2.8, "SunDiagnostic Executive," for further information.

To boot user-specified programs, such as the SunDiagnostic Executive, you must be at the > prompt or `ok` prompt. See Appendix D, "FORTH Diagnostics," for a detailed procedure on how to access the > or the `ok` prompt.

2.3 Diagnostic Tools and When to Use Them

Table 2-3 provides a summary of the available diagnostic tools and describes when to use each tool.

Table 2-3 Diagnostic Tools

Diagnostic Tool	When or Why to Use the Tool
Power-On Self-Test (POST)	Executes automatically at power-on when Stop-d keys are pressed or when the <code>diag-switch?</code> parameter is set to <code>true</code> . The POST code resides in the boot PROM and is driven by the POK signal from the power supply. POST tells you if there is a problem with the system board, the NVRAM, or the DSIMMs. See Section 3.1, “Power-On Self-Test (POST).”
FORTH Diagnostics	Tests functions such as the Ethernet and SCSI interfaces, system memory, and the diskette drive controller. You must be at the <code>ok</code> prompt (the FORTH Monitor) to run the FORTH Diagnostics. The FORTH Diagnostics reside in the boot PROM.
FORTH Monitor	Allows input to the system at the boot PROM level. Supports functions such as changing NVRAM parameters, resetting the system, running diagnostic tests, displaying system information, and redirecting input and output. See the <i>OpenBoot Command Reference</i> for more information.
SunDiag System Exerciser	Runs under the operating system. It displays real-time use of the system resources and peripherals. The SunDiag System Exerciser tells you if your system is functioning correctly. If SunDiag fails, run the Power-On Self-Test. If all Power-On Self-Tests pass, then run the SunDiagnostic Executive to identify the problem. See the <i>SunDiag User's Guide</i> for more information.
SunDiagnostic Executive	Runs extensive, configurable subsystem tests that are independent of the operating system. Run the SunDiagnostic Executive if all tests pass when you run the POST. Running the SunDiagnostic Executive allows you to determine which customer replaceable unit needs to be replaced. See the latest version of <i>SunDiagnostic Executive User's Guide for the SPARCstations</i> for more information.

2.4 Power-On Self-Test

For information about the POST, see Chapter 3, “Power-On Self-Test (POST).”

2.5 FORTH-Based PROM Diagnostics

For information about how to run the FORTH Diagnostics, see Appendix D, “FORTH Diagnostics.” Table 2-4 lists specific on-board diagnostic tests for SPARCstation 5 systems.

Table 2-4 Selected FORTH Diagnostic Tests

Type of Test	Description	Preparation	When to Use
test screen	Tests the system video graphics hardware and monitor.	The <code>diag-switch?</code> NVRAM parameter must be set to <code>true</code> .	See description.
test floppy	Tests the floppy drive response to commands.	Insert a formatted diskette into the drive.	See description.
test scsi	Tests the SCSI interface logic on the system board.	The <code>diag-switch?</code> NVRAM parameter must be set to <code>true</code> .	See description.
test net-aur	Performs an internal and an external loopback test on the AUI (Thick) Ethernet interface.	A cable must be connected to the system AUI Ethernet port and to an Ethernet tap or the test will fail the external loopback phase.	See description.
test net-tpe	Performs an internal and an external loopback test on the twisted-pair Ethernet (TPE) interface.	A cable must be connected to the system TPE port and to a TPE hub or the test will fail the external loopback phase. If the <code>tpe-link-test?</code> parameter is <code>false</code> (disabled), the external loopback test will appear to pass even if a cable is not connected.	See description.
test net	Performs an internal and an 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.	See description.
test disk test disk0 test disk1 test disk2 test disk3	Tests internal or external SCSI disks that have a self-diagnostic program contained in the drive controller (disk0 = SCSI address 0, disk1 = SCSI address 1, disk2 = SCSI address 2, disk and disk3 = SCSI address 3).	The drive must be spinning before this test is executed or the test will fail. Enter a <code>boot <disk alias></code> command to cause the drive to spin up.	Disk drive does not function properly.

Table 2-4 Selected FORTH Diagnostic Tests (Continued)

Type of Test	Description	Preparation	When to Use
test cdrom	Performs a self-test diagnostic on the CD-ROM drive.	The CD-ROM must be set to SCSI target 6 and have a CD inserted in the drive or the test will fail.	See description.
test tape test tape0 test tape1	Tests the SCSI tape drive by executing the drive self-test program. <code>tape</code> and <code>tape 0</code> are the first tape drive. <code>tape 1</code> is the second tape drive.	Connect the tape drive to the system and then turn on the power.	See description.
test ttya test ttyb	Outputs an alphanumeric test pattern on the system serial ports (<code>ttya</code> = serial port A, <code>ttyb</code> = serial port B).	Attach a terminal to the serial port to observe the output.	Tests serial ports.
test keyboard	This test executes the keyboard self-test. The four LEDs on the keyboard should flash on once, and the message <code>Keyboard Present</code> is displayed.	Keyboard must be connected.	See description.
test-memory	Tests all of the system main memory if the <code>diag-switch</code> is <code>true</code> . If <code>diag-switch</code> is set to <code>false</code> , it tests the memory according to the number specified in <code>selftest-#megs</code> .	None.	See description.
test-all	Tests all devices in the system (such as SBus cards) that have a built-in test program. Hard disks, tapes, and CD-ROMs are not tested.	Set the <code>diag-switch? NVRAM</code> parameter to <code>true</code> .	When a device driven by an SBus card is not functioning properly.
watch-clock	Displays seconds from the system's Time-of-Day chip.	None.	See description.
watch-net	Monitors broadcast Ethernet packets on the Ethernet cable(s) connected to the system.	Connect the system to the network via the desired Ethernet port.	See description.
watch-aui	Monitors broadcast Ethernet packets (10Base5—Thicknet) on the Ethernet cable(s) connected to the system.	Connect the system to the network via the desired Ethernet port.	See description.

Table 2-4 Selected FORTH Diagnostic Tests (Continued)

Type of Test	Description	Preparation	When to Use
<code>watch-tpe</code>	Monitors broadcast Ethernet packets (10BaseT—Twisted Pair Ethernet) on the Ethernet cable(s) connected to the system.	Connect the system to the network via the desired Ethernet port.	See description.
<code>watch-net-all</code>	Monitors broadcast Ethernet packets on all Ethernet interfaces installed in the system, one at a time.	Connect the system to the network via the desired Ethernet port.	When an SBus card network controller card is installed.
<code>probe-scsi</code>	Returns the SCSI devices (internal and external) and their SCSI targets connected to the built-in SCSI port.	Connect external SCSI devices to the system and turn on their power.	To determine if a SCSI peripheral is talking to the system. To determine the SCSI targets (addresses) of a SCSI device. To determine if more than one SCSI peripheral is assigned the same SCSI address. To determine if the built-in SCSI controller is defective.
<code>probe-scsi-all</code>	Returns to the display the SCSI devices and their SCSI targets connected to all SCSI ports (both the built-in SCSI port and any additional SCSI host adapter cards).	Connect external SCSI devices to the system and turn on their power.	See <code>probe-scsi</code> . To determine if a SCSI host adapter controller is defective.
<code>power-off</code>	Powers off the system.	You must have a Sun Type-5 keyboard in order to use this command.	To power off the system with a Sun Type-5 keyboard.

2.6 FORTH Monitor

The FORTH Monitor is a basic diagnostic utility and system interface. If there is any problem with your operating system, the FORTH Monitor automatically starts, as indicated by the appearance of the `ok` prompt (the Monitor also starts if `auto-boot?` is set to `false`).

You can also choose to access the FORTH Monitor by halting the system. For information on how to access the FORTH Monitor, see Appendix D, “FORTH Diagnostics.” For extensive information about tests you can run from the FORTH Monitor, see *OpenBoot Command Reference*.

2.7 SunDiag System Exerciser

Use the SunDiag System Exerciser to determine real-time use of system resources and peripheral equipment such as Desktop Storage Modules and External Storage Modules. The SunDiag System Exerciser verifies that the system is functioning properly. For information about how to use the SunDiag System Exerciser, see the *SunDiag User's Guide*.

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

2.8 SunDiagnostic Executive

The SunDiagnostic Executive is an independent operating system. It runs exhaustive subsystem tests that are independent of the normal operating system. Run the SunDiagnostic Executive if all POSTs pass, but your system still has a problem. For information about POST, see Section 3.1, “Power-On Self-Test (POST).” The SunDiagnostic Executive is described in the *SunDiagnostic Executive User's Guide for the SPARCstations*.

