

Power-On Self-Test (POST)



This chapter describes the Power-On Self-Test (POST) for Normal, Full, and Abbreviated modes, available with your SPARCstation 5 system.

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The Power-On Self-Test (POST) diagnostics reside in the OpenBoot PROM located on the system board. There are two POST modes: Normal and Diagnostic.

3.1 Power-On Self-Test (POST)

The Power-On Self-Test (POST) runs when you turn on the system unit power switch and any of the following conditions 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 POST comprises a sequence of tests designed to evaluate the major hardware components of the main logic board in the short time before the OpenBoot PROM firmware takes control. The POST does not perform extensive testing on any component of the main logic board. Only major failures can be detected by the POST.

Four different LEDs on the keyboards are used to indicate the progress and results of the POST. These LEDs are on the Caps Lock, Compose, Scroll Lock, and Num Lock keys, as shown in Figure 3-1, Figure 3-2, and Figure 3-3. To indicate the beginning of the POSTs, the four LEDs briefly light all at once. The monitor screen remains blank, and the Caps Lock LED blinks for the duration of the POST.

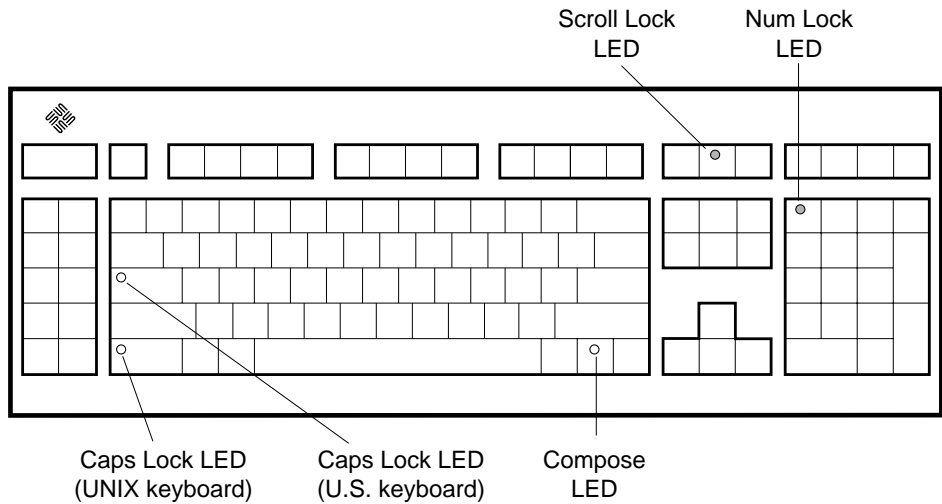


Figure 3-1 Arrangement of Sun Type-5 Keyboard Diagnostic LEDs

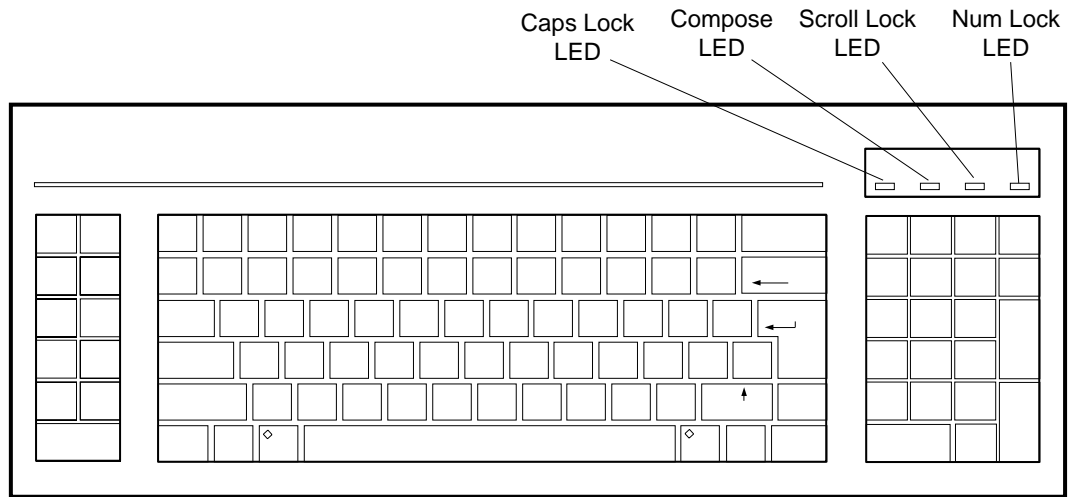


Figure 3-2 Sun Type-4 Keyboard

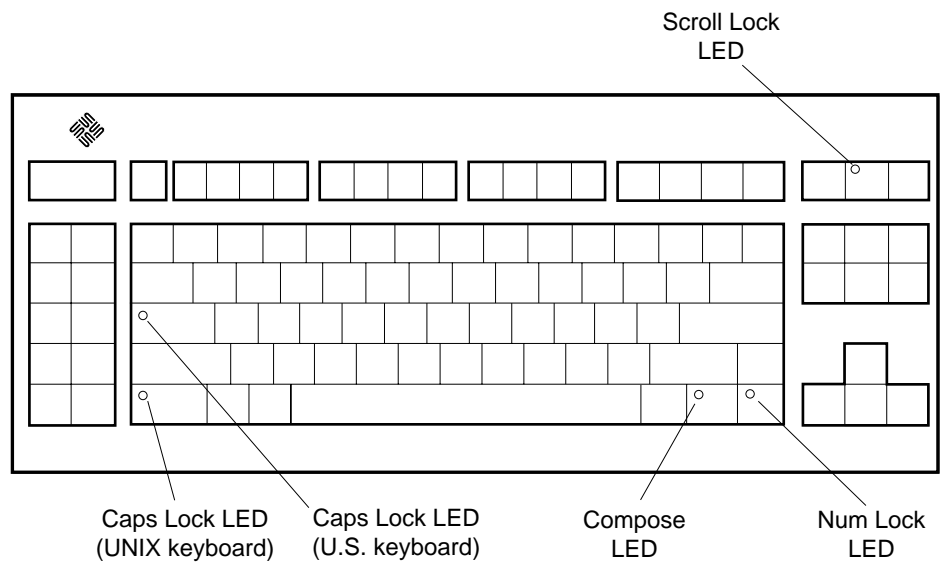


Figure 3-3 Sun Compact 1 Keyboard

If the system fails any POST, one of the LEDs will light to indicate the nature of the problem. The LED may be lit continuously, or for just a few seconds. Table 3-1 provides the meaning of each diagnostic LED.

Table 3-1 Interpreting the Keyboard Diagnostic LEDs

| Diagnostic LED | Failed Part |
|-------------------------|--|
| Num Lock LED is lit. | Main logic board |
| Scroll Lock LED is lit. | NVRAM |
| Compose LED is lit | DSIMMs (see Section 4.4, "Determining Faulty DSIMM Locations") |

Note – The Caps Lock LED is *not* used as a failure indicator; it blinks on and off to indicate that the POSTs are running.

The keyboard LED diagnostics feature described here applies only to a SPARCstation 5 system with a Sun Type-4, Type-5, or Compact 1 keyboard connected to its keyboard port. The LED diagnostics do not apply if a different Sun-supported keyboard is connected to the keyboard port, or if a terminal and its keyboard are used as a main console instead of a monitor and a Type-4, Type-5, or Compact 1 keyboard.

If the system passes all the POSTs, all four LEDs light again and then go off. Next, the OBP firmware performs its initialization sequence and the system banner appears on the screen. A generic SPARCstation banner is shown as an example. From this point on, the keyboard LEDs assume their normal functions (that is, you should no longer interpret the LEDs as diagnostic error indicators).

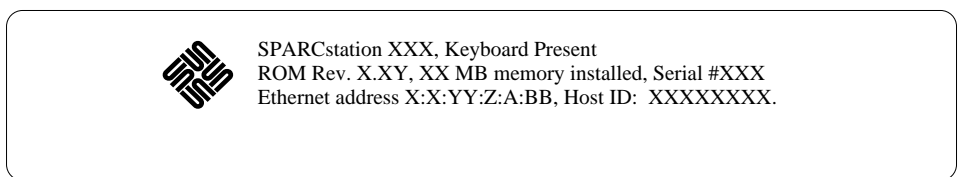


Figure 3-4 SPARCstation System Banner

Following the system’s successful initialization, the operating system is booted automatically—unless the NVRAM configuration options specify otherwise.

You can retrieve more detailed POST failure information by connecting a terminal to the `ttys` serial port. If you connect a terminal, you must set the NVRAM parameter `diag-switch?` to `true`. For more information about the NVRAM parameters, see Table 2-1. Test failure messages are displayed on the system monitor or console, whether or not the system is in Diagnostic Mode. However, it may be easier to understand the failure message output when it is accompanied by more detailed POST progress messages available via the `ttys` serial port.

3.2 Normal Mode

Under Normal Mode, when the system is turned on, control is sent to the OpenBoot PROM. Depending on the options set in the OpenBoot PROM, for example if `auto-boot?` is enabled (set to `true`), the operating system will load. Diagnostic testing is *not* run.

3.3 Full Diagnostic Mode

Full Diagnostic Mode tests the major hardware system board components and, if the POST is successful, control is transferred to the OBP firmware that probes the installed SBus modules. Full Diagnostic Mode runs if one of these conditions is met:

- You press and hold the Stop-d keys while you turn on the power.
- You set the `diag-switch?` NVRAM parameter to `true` in the OpenBoot PROM.
- You disconnect the keyboard and you set the `diag-switch?` NVRAM parameter to `true` in the OpenBoot PROM.

Note – POST does not perform extensive testing on any system board component. POST detects only major failures.

To view error messages returned by POST, connect a terminal to serial port A or use a `tip` connection to another workstation.

If you do not connect a terminal to serial port A or use a `tip` connection, the screen will be blank during the POST diagnostics. In this case, use the keyboard LEDs to display error conditions. See Section 3.7, “Status Lights (LEDs) and Indicators.”

3.4 Abbreviated Diagnostic Mode

A silent Power-On Self-Test (POST) is run if you disconnect the keyboard and you set the `diag-switch?` NVRAM parameter to `false` in the OpenBoot PROM. This Power-On Self-Test is silent (no progressive test messages are printed out). If an error or errors occur during the abbreviated Power-On Self-Test, all error messages are displayed on the TTY or `tip` window.

3.4.1 Setting Up a `tip` Connection to Another System

You can use the serial port on your SPARCstation 5 system to connect to another Sun workstation (either the same type of SPARC® system or a different type of Sun workstation or server system). This connection lets you use a shell window on the Sun workstation as a terminal to the SPARCstation 5 being tested.

The `tip` method is recommended, because it lets you use SunOS™ windowing and operating system features to help you work with the boot PROM.

To make a `tip` connection, follow these steps:

1. **Connect the system's serial port (`ttya`) to another Sun workstation `ttya` serial port using a serial connection cable. This connection is made with a 3-wire null modem cable. Connect wires 3-2, 2-3, and 7-7.**
2. **At the other Sun workstation, add the following lines to the file `/etc/remote`:**

```
hardwire:\
:dv=/dev/ttys:br#9600:el=^C^S^Q^U^D:ie=%$:oe=^D:
```

3. **In a Shell Tool window on the Sun workstation, type `tip hardwire`. (Some commands will not work properly in a Command Tool window.)**

The system will reply connected.

```
hostname% tip hardwire
connected
```

The Shell Tool window is now a `tip` window directed to the Sun workstation serial port.

- 4. When you are finished running POST and want to disconnect the `tip` window, either type `~.` (tilde period) in the `tip` window, or type `kill -9` and the process ID number of the `tip` hardware process.**

```
hostname% ~.  
or  
hostname% kill -9 PID# of tip hardware process
```

3.5 Tests the POST Runs

Following is a sample listing of the Full Diagnostic Mode tests completed by POST.

```
MMU Context Table Reg Test  
MMU Context Register Test  
MMU TLB Replace Ctrl Reg Tst  
MMU Sync Fault Stat Reg Test  
MMU Sync Fault Addr Reg Test  
MMU TLB RAM NTA Pattern Test  
MMU TLB CAM NTA Pattern Test  
MMU TLB LCAM NTA Pattern Test  
IOMMU SBUS Config Regs Test  
IOMMU Control Reg Test  
IOMMU Base Address Reg Test  
IOMMU TLB Flush Entry Test  
IOMMU TLB Flush All Test  
SBus Read Time-out Test  
EBus Read Time-out Test  
D-Cache RAM NTA Test  
D-Cache TAG NTA Test  
I-Cache RAM NTA Test  
I-Cache TAG NTA Test  
Memory Address Pattern Test  
FPU Register File Test
```

```
FPU Misaligned Reg Pair Test
FPU Single-precision Tests
FPU Double-precision Tests
FPU SP Invalid CEXC Test
FPU SP Overflow CEXC Test
FPU SP Divide-by-0 CEXC Test
FPU SP Inexact CEXC Test
FPU SP Trap Priority > Test
FPU SP Trap Priority < Test
FPU DP Invalid CEXC Test
FPU DP Overflow CEXC Test
FPU DP Divide-by-0 CEXC Test
FPU DP Inexact CEXC Test
FPU DP Trap Priority > Test
FPU DP Trap Priority < Test
PROC0 Interrupt Regs Tests
Soft Interrupts OFF Test
Soft Interrupts ON Test
PROC0 User Timer Test
PROC0 Counter/Timer Test
DMA2 E_CSR Register Test
LANCE Address Port Tests
LANCE Data Port Tests
DMA2 D_CSR Register Test
DMA2 D_ADDR Register Test
DMA2 D_BCNT Register Test
DMA2 D_NADDR Register Test
ESP Registers Tests
DMA2 P_CSR Register Test
DMA2 P_ADDR Register Test
DMA2 P_BCNT Register Test
PPORT Registers Tests
NVRAM Access Test
TOD Registers Test
```

3.6 POST Error Messages

The POST error messages returned to the terminal are self-explanatory. For example, if no DSIMM is installed in the system, the POST will tell you that no DSIMM is installed and will indicate the slot number of the DSIMM slot. Use the error messages returned by POST to troubleshoot the system.

3.7 Status Lights (LEDs) and Indicators

The LED at the front of the chassis lights when the system is operating normally. Figure 3-5 shows the location of the system LED. Chapter 4, “Troubleshooting Procedures,” shows flow diagrams of actions to take when the system LED is not lit.

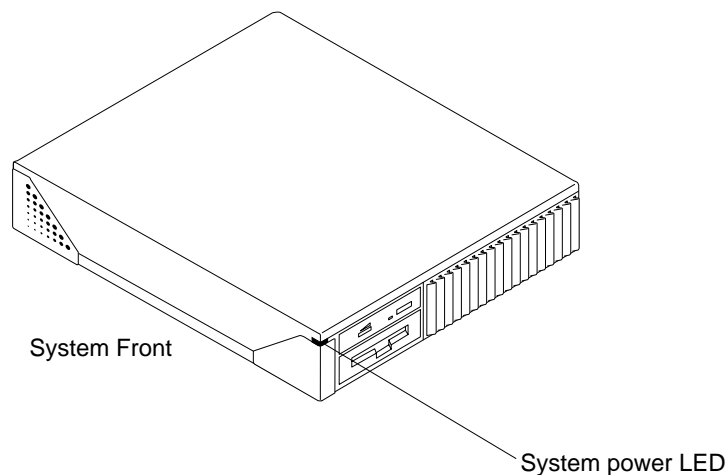


Figure 3-5 Location of System Power LED

Section 3.1, “Power-On Self-Test (POST),” describes the keyboard LED sequences displayed at power up when POST fails. If a failure occurs in POST, the keyboard displays a specific LED pattern. See Figure 3-1 through Figure 3-3 and Table 3-1. During normal system operation, the LEDs should not be interpreted as diagnostic error indicators.

Following the system initialization, the operating system boots automatically, unless the NVRAM configuration options specify not to do so.

Note – The Caps Lock key LED on some U.S. keyboards, located just above the left-hand Shift key, is not used as a POST failure indicator, but blinks on and off while POST is running.

If the Caps Lock key fails to flash on and off after you have pressed and held the Stop-d keys when you power on the system, POST failed. See Section 4.2.2, “System Board Test,” for troubleshooting information.