

Multiple Monitors on a System



This chapter describes how to use multiple monitors on a SPARCstation system. Skip this chapter if you are not interested in running multiple monitors on your system.

This procedure requires some knowledge of UNIX[®]. You should be familiar with UNIX and basic editing tools such as vi or emacs.

For a list of the frame buffers supported by each workstation model, see the *SMCC SPARC Hardware Platform Guide Solaris 2.4 Hardware:11/94*.

Multiple Monitor Configuration

Multiple monitor configuration is supported only on SPARCstation 2, SPARCstation IPX[™], SPARCstation 10, SPARCstation 20, and SPARCstation LX machines. If you are using one of these systems, you can install multiple frame buffers in a system and attach more than one monitor if additional SBus slots are available.

When the system is booted, it looks for the `sbus-probe-list` which determines the order in which the SBus devices are addressed.

For the SPARCstation 10, SBus address `f` is reserved for the CPU and should always be the first address in the `sbus-probe-list`.

The addressing numbers are 0, 1, 2, and 3. However, 0 is reserved for the CPU and should always be the first address in the `sbus-probe-list` for all SPARCstation systems except the SPARCstation 10 system.

To find out the system information and `sbus-probe-list` type:

```
nevada% eeprom
.
.
.
sbus-probe-list=0123
.
.
```

The following system information and `sbus-probe-list` (starting with `f`) will display if you have a SPARCstation 10 system:

```
nevada% eeprom
.
.
.
sbus-probe-list=f0123
.
.
```

Device File Names

If you are using OpenWindows software on multiple monitors, you should be familiar with the way frame buffer devices are assigned to UNIX device file names. Multiple frame buffers used with OpenWindows software require that UNIX device file names for frame buffers be supplied on the command line when either is started.

The UNIX boot messages identify the frame buffer as `/dev/fb` (where `fb` is the type of frame buffer). The `/dev/fb` usually has another device file name such as `/dev/cgsix0`, `/dev/bwtwo0`, or `/dev/leo0` depending on the type of frame buffer. When a second frame buffer is added, the system decides which is `/dev/fb` based on the SBus slot number of each frame buffer and an EEPROM variable known as `sbus-probe-list`. The `/dev/fb` is the frame buffer in the first SBus slot defined in the `sbus-probe-list`.

If a TurboGXplus card is added to the system that already has a GX frame buffer, the `sbus-probe-list` also determines which one is `/dev/cgsix0` and which one is `/dev/cgsix1`.

Example: Assume that the `sbus-probe-list` on a SPARCstation 10 system has the default value of `f0123` and SBus slots 2 and 3 contain TurboGXplus cards. The TurboGXplus card in slot 2 will be known as `/dev/fb` and `/dev/cgsix0`; the TurboGXplus card in slot 3 will be known as `/dev/cgsix1`.

The command line examples shown in this document use possible device file names to refer to frame buffers. Remember to substitute the device file name appropriate for your system.

Checking the Available Frame Buffers

If you do not know the names of the frame buffer devices present in your system, you can check them by entering:

```
example% /etc/dmesg | more
```

This will display the system configuration including the types of available frame buffers in your system and the slots they occupy. The list of messages might be very long. Look for the lines that start with `cg` or `leo` (for color frame buffers) and `bw` (for black and white frame buffers).

```
Dec 5 11:16
SunOS Release 5.3 Version Generic [UNIX(R) System V Release 4.0]
Copyright (c) 1983-1993, Sun Microsystems, Inc.
mem=49152K (0x3000000)
.
.
cgsix0 at SBus0: SBus slot 1 0x0 SBus level 5 sparc ipl 7
cgsix0 is /sbus@1,f8000000/chsix@1,0
cgsix0: screen 1152x900, single buffered, 1M mappable, rev1
.
.
```

Note - The execution of the `dmesg` command may show too many other messages; you may not even see the appropriate system configuration messages shown below. If that is the case, you need to reboot your system. After rebooting, repeat the command shown above.

Starting OpenWindows from the Console

The following is an example of a `.login` file configured to start OpenWindows from the console.

```
#
# if possible, start the windows system. Give user a chance to bail out
#
if ( `tty` == "/dev/console" && $TERM == "sun" ) then
  if ( ${?OPENWINHOME} == 0 ) then
    setenv OPENWINHOME /usr/openwin
  endif
  echo ""
  echo -n "Starting OpenWindows in 5 seconds (type Control-C to
interrupt)"
  sleep 5
  echo ""
  $OPENWINHOME/bin/openwin
  clear # get rid of annoying cursor rectangle
  logout # logout after leaving windows system
```

Running OpenWindows on Multiple Monitors

Running multiple monitors with OpenWindows Version 3 is fairly easy:

1. **Set up the OpenWindows Version 3 environment by typing the following command (substitute for `/usr/local` variable tag the actual pathname where OpenWindows Version 3 software is located):**

Example:

```
example% setenv OPENWINHOME /usr/local/openwin
```

- 2. To verify that a device file already exists for the desired frame buffer, enter:**

```
example# ls -l /dev/cgsix1
```

If the device file already exists, a message will display similar to the one shown below. If you see such a message, skip steps 3, 4, and 5 and go to step 6. If the system responds with the "not found" message, continue with step 3.

```
crw-rw-rw- 1 root      67,   0 Jan 10 1991 /dev/cgsix1
```

- 3. Become superuser. Create a device file for your second frame buffer as shown in the following example. (The second frame buffer is assumed to be cgsix1.)**

```
example# cd /dev
example# MAKEDEV cgsix1
```

This creates a device file for the second frame buffer.

- 4. Verify the newly created file by typing:**

```
example# ls -l /dev/cgsix1
```

The system will display a message similar to the following indicating that the device file has been successfully created:

```
crw-rw-rw- 1 root      67,   0 Jan 10 1991 /dev/cgsix1
```

- 5. Exit the superuser mode.**

6. Specify the screens that you wish to run by typing:

```
example% $OPENWINHOME/bin/openwin -dev /dev/fb -dev /dev/cgsix1
```

Note – The order of the devices is important. The first device corresponds to the left screen. The second device corresponds to the right screen. The names of your devices (for example, `/dev/cgsix1`) may differ. Remember to use the device file name that is appropriate for your system.

Changing the Polling Order

This section provides information about the SBus polling order and how to change it. Skip this information if you know the order in which the SBus devices are addressed, or you are not interested in changing the order.

SBus Addresses

The two-slot SPARCstation systems, such as SPARCstation IPX and LX, have four SBus addresses: 0, 1, 2, and 3. SBus address 0 is located on the main logic board and is reserved for system use. SBus slots (SBus addresses) 1 and 2 are for customer-installable SBus cards. SBus slots 1 and 2 are the only physical slots. SBus address 3 is the frame buffer on the main logic board.

The SPARCstation 2 machine has no on-board frame buffer. Slots 1, 2, and 3 in this system are used to install SBus cards.

There is no on-board frame buffer on the SPARCstation 10 and SPARCstation 20 systems either. SBus address `f` is reserved for the CPU and should always be the first address in the `sbus-probe-list`. In the SPARCstation 10 and 20 systems, SBus address lines 0, 1, 2, and 3 are used for customer-installable SBus cards.

Polling Order

The polling order is determined by the `sbus-probe-list` parameter in the system's OpenBoot™ PROM. For the SPARCstation 10 and 20, you must begin with `f`. This parameter is set up to poll the slots in order from 0 to 3. You can change the order of slots 1, 2, and 3, but you must begin with slot 0.

For example, in SPARCclassic™, SPARCstation IPX, and SPARCstation LX configurations, if you install a frame buffer card into an SBus slot, the system automatically looks first for the frame buffer at the SBus slot rather than on the on-board frame buffer. If it finds a frame buffer at an SBus slot, the system establishes the video connection at that slot and looks no further. If you want the system to look first at the on-board frame buffer, you have to change the polling order to 0, 3, 1, 2.

Note – If you change `sbus-probe-list` in a SPARCstation IPX or LX system and select 3 as the console device, make sure a monitor is attached to the on-board frame buffer. Otherwise, the system will not recognize any other monitors regardless of their polling order.

Changing the sbus-probe-list

The following procedure describes how to change the `sbus-probe-list`.



Caution – The procedure described below is for experienced SunOS™ software users only. Ignore this procedure if you have only one monitor or you do not need to change the probe list. Any changes made to the system information displayed after typing the `eeeprom` command described below will change the system configuration.

1. As superuser, type `eeeprom sbus-probe-list=0xyz` or `fwxyz` (for a SPARCstation 10 system), where `xyz` or `wxyz` is the order of SBus slots to be probed.

For example, in a SPARCclassic, SPARCstation IPX, and SPARCstation LX configuration, 0321 would cause SBus slot 3 (on-board frame buffer) to be probed first. After slot 3 is probed, SBus slots 1 and 2 will be probed, respectively.

```
nevada# eeeprom sbus-probe-list=0312
```

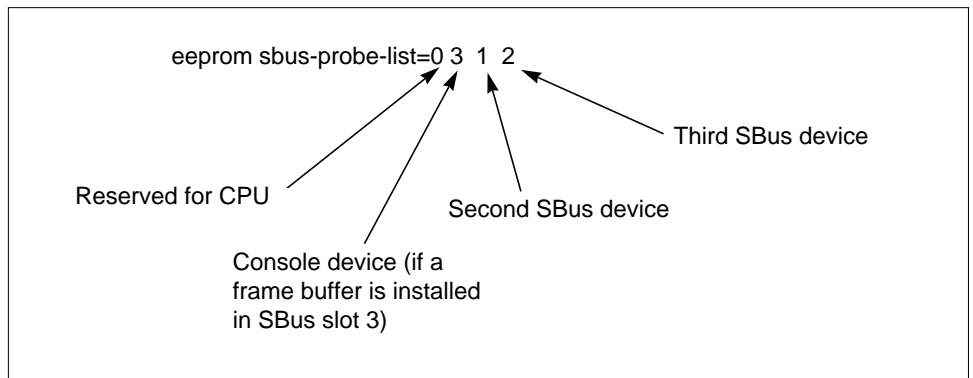


Figure 8-1 SBus Probe List Explanation

The leftmost character, except 0, in `eeeprom sbus-probe-list` indicates the device that will be probed first. This will be the console device regardless of its physical location.

Note – If you are using a SPARCstation 10 or 20 system, the leftmost character in `sbus-probe-list` will be `f` (not 0) which is reserved for the CPU.

2. Make sure a monitor is connected to the frame buffer identified as the “new console”.
3. Reboot the system for the changes to take effect.