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TurboGX/TurboGXplus Hardware Installation Guide



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Preface

This *TurboGX/TurboGXplus Installation Guide* provides general instructions for installing the TurboGX/TurboGXplus card into different Sun™ SPARCstation™ platforms and servers. The TurboGX/TurboGXplus card is a single-wide, 8-bit color and/or grayscale graphics accelerator cards. Also described are servicing and ordering procedures, configuration options, troubleshooting procedures, and specifications.

Note – The generic term SPARCsystem is used in this guide to describe SPARCsystem™ 630MP, SPARCsystem™ 670MP, SPARCserver™ 690MP, and the generic term SPARCcenter is used to describe the SPARCcenter ™ 1000, and SPARCcenter™ 2000 machines.

Who Should Use This Book

This *TurboGX/TurboGXplus Installation Guide* is for those of you who will physically install the TurboGX/TurboGXplus card into a SPARCstation, SPARCsystem, or SPARCcenter. You should be somewhat familiar with working on computers, but by no means do you need to be a computer expert to use this guide. *However, the installation of a TurboGX/TurboGXplus card into a SPARCsystem 600MP series, and SPARCcenter system should only be attempted by a qualified service provider.*

When You Need Help with UNIX

This manual does not include specific software commands or procedures. Instead, software tasks are named and you can refer to the operating system documentation that was shipped with your system when you need help with commands or procedures such as:

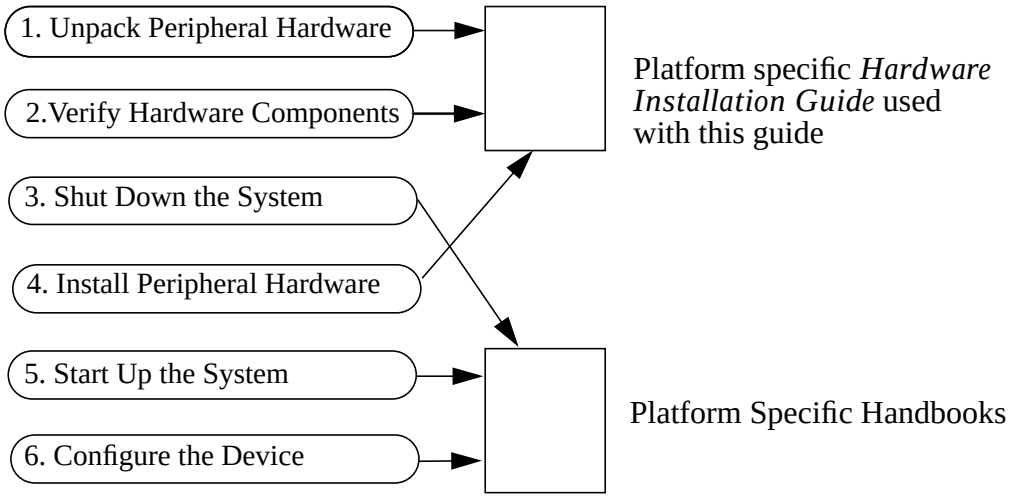
- Shutting down the system
- Configuring devices
- Other software procedures

Depending on the operating system you are using, you can find descriptions of commands and procedures for installing peripherals in the following documents:

- *Solaris 1.x (SunOS 4.x) Handbook for SMCC Peripherals*
- *Solaris 2.x Handbook for SMCC Peripherals*
- On-line *AnswerBook* documentation that comes with Solaris
- Other software documentation you received with your system

Task Map for Getting Your System Running

The diagram below outlines the tasks you can perform to successfully install a new peripheral. Each numbered item in the diagram represents a procedure and the arrows point to manuals in which these procedures are detailed.



After you perform these tasks, you will be ready to use the TurboGX/TurboGXplus card with your system.

Before You Read This Book

If you are installing a TurboGX/TurboGXplus card into a SPARCstation or SPARCserver, you should read the *Installation Guide* that came with your system for additional information.

If you are installing a TurboGX/TurboGXplus card into a SPARCsystem 600MP series system, you should read the following manuals for additional information:

- *600MP System Board and Expansion Memory Installation and Service Manual* (Part Number 800-5318)
- *SBus Card Installation Guide for Deskside and Data Center Cabinet SPARCsystems* (Part Number 800-6366*)*
- The Service Manual that came with your SPARCsystem hardware.

How This Book Is Organized

Chapter 1 and Chapter 2 contain some important information that applies to all systems. The installation instructions apply to more than one system. Appendices are provided with detailed reference information for servicing, ordering, configuring and troubleshooting the TurboGX/TurboGXplus card.

Pay particular attention to all notes, cautions, and warnings.

Summary of Contents

The contents of this guide are summarized below.

Preface describes how this manual is organized.

Chapter 1 contains an overview of the installation procedure.

Chapter 2 describes general installation instructions. It also describes the necessary tools and software.

Appendix A contains servicing and ordering information.

Appendix B describes how to configure your system using the TurboGX/TurboGXplus card and explains how to attach multiple monitors. In addition, it contains a list of monitors supported by the TurboGX/TurboGXplus card.

Appendix C describes monitor cable signals.

Appendix D describes the troubleshooting procedures.

Appendix E contains TurboGX/TurboGXplus card specifications.

Appendix F contains SBus card bracket and handle installation instructions.

Relevant Documents

Documents that contain information applicable to or which have been referred to in this document are listed below.

Part Number	Description
800-5*772*	*SPARCstation IPX Installation Guide.* Describes how to install the SPARCstation IPX workstation.
800-*5035*	*SPARCstation 2 Installation Guide.* Describes how to install the SPARCstation 2 workstation.
801-2175	*Desktop SPARC Hardware Owner's Guide.* It is a combined manual that describes how to install the SPARCstation LX, SPARCclassic, and SPARCstation 10 workstations.
800-3272	*5-Slot Office Pedestal Service Manual.* Describes how to service the SPARCsystem 630MP system.
800-3255	*12-Slot Office Pedestal Service Manual.* Describes how to service the SPARCsystem 670MP system.
800-3259	*56" Data Center Cabinet Service Manual.* Describes how to service the SPARCserver 690MP system.
800-5318	*600MP System Board and Expansion Memory Installation and Service Manual.* Describes how to install and power up a SPARCsystem 600 MP. In addition, it describes how to open and close the system unit and install monitors, and cables.

800-6366	*SBus Card Installation Guide for Deskside and Data Center Cabinet SPARCsystems*. Describes how to install an SBus card in a SPARCsystem.
800-6313	*SPARCstation 10 Installation Guide.* Describes how to install and power up a SPARCstation 10 workstation. In addition, it describes how to open and close the system unit and install monitors, and cables. It also includes a brief description of the operating system software that comes with the SPARCstation 10 workstation.
800-4251	*Open Boot 2.0 Toolkit User's Guide*. Describes how to use your system's open boot PROM. This guide is for system administrators, software or hardware developers, and advanced users.
800-5674	*Introduction to Open Boot 2.0*. Describes how to use your system's 2.0 open boot PROM. This guide is for system administrators, software or hardware developers, and advanced users.
800-4826	*Sun Family Users's Guide*. Describes how to use your Sun workstation. The guide also includes a brief description of the operating system software that comes with the workstations.

In addition, refer to the following manuals:

Sun System & Network Manager's Guide. This is a generic guide shipped as part of each Desktop SPARC® Owner's Set. It describes the system and network management tasks for maintaining a single Sun Workstation® or a network of several Sun Workstations.

Sun System User's Guide. This is a generic guide shipped as part of each Desktop SPARC Owner's Set. It describes the basics of using the Sun system.

What Typographical Changes and Symbols Mean

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

Table P-1 Typographic Conventions

Typeface or Symbol	Meaning	Example
`AaBbCc123`	The names of commands, files, and directories; on-screen computer output	Edit your `.login` file. Use `ls -a` to list all files. system% `You have mail.`
`AaBbCc123`	What you type, contrasted with on-screen computer output	system% **`su`** `password:`
AaBbCc123	Command-line placeholder: replace with a real name or value	To delete file, type `rm` *junk_mail*
AaBbCc123	Book titles, new words or terms, or words to be emphasized	Read Chapter 2 in *TurboGX/TurboGXplus Installation Guide.* These are called *class* options. You must be *root* to do this.
Return	A capitalized letter within text indicates a key that you press.	Press Return.
Control-c	Press and hold down the Control key, and then press the lowercase c.	Press Control-c to cancel a command.
Code samples are included in boxes and may display the following:		
%	UNIX C shell prompt	`system%`
$	UNIX Bourne shell prompt	`system$`
#	Superuser prompt, either shell	`system#`

Notes, Cautions, and Warnings

Observe all warning, cautions, and notes in this manual and in related manuals. The following warning, caution, and note are specifically related to all SPARCsystem 600MP series (630MP, 670MP, and 690MP), and SPARCcenter (1000 and 2000) hardware.



Warning – 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 panels 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 (related to SPARCsystem machines) must be performed by qualified service providers.

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

TurboGX/TurboGXplus Introduction 1

The TurboGX and TurboGXplus graphics accelerators are single-wide, SBus slot cards, which can be installed in several SBus-based SPARCstations, SPARCservers, SPARCsystem 600MP series machines, and SPARCcenter 1000 and 2000 machines. This guide contains general installation instructions for both the TurboGX and TurboGXplus card.

1.1 TurboGX/TurboGXplus Specifications

Table 1-1 lists the technical specifications for the TurboGX and TurboGXplus cards.

Table 1-1 TurboGX/TurboGXplus Specifications

Description	**TurboGX**	**TurboGXplus**
SBus Slots	1	1
Clock Rate	30 MHz	46 MHz
On-board Memory	1 MB	4 MB
Double Buffer Support	No	Yes
Resolutions Supported	1024 x 768 1152 x 900	1024 x 768 1152 x 900 1280 x 1024 1600 x 1280

1.2 Systems Covered

The installation procedures described in this guide cover the following Sun systems:

- SPARCstation 1 and 1+
- SPARCstation IPC
- SPARCstation IPX
- SPARCstation 2
- SPARCstation 10 and SPARCserver 10
- SPARCclassic
- SPARCstation LX
- SPARCsystem 630MP
- SPARCsystem 670MP
- SPARCserver 690MP
- SPARCcenter 1000
- SPARCcenter 2000

Refer to Section 2.4 for System Requirements.

1.3 Installing an ESD Kit

The ESD (electrostatic discharge) kit includes the following:

- ESD kit which consists of an antistatic mat and a wrist strap. The wrist strap is a disposable one piece design which attaches by adhesive to electrical ground and the installer.

1.4 Installation Cautions

Carefully read and follow the cautions below before beginning the installation procedure. Failure to comply may result in damage to the equipment.



Caution – Do not open the antistatic envelope containing the TurboGX/TurboGXplus card until instructed to do so.



Caution – Circuit board components are vulnerable to damage by electrostatic discharge (ESD). An electrostatic charge can build up on the human body and then be discharged when you touch a board. Before handling any board, wear an antistatic device (wrist strap) to discharge the static electricity present in your body.

To minimize risk of ESD damage, do the following:

- Handle boards by the edges only.
- Store boards in the antistatic envelope provided.
- Use a wrist strap and antistatic envelope whenever you work on a board. (Instructions are included in the ESD kit.)

General Installation Instructions 2

This chapter describes general instructions for installing the TurboGX/TurboGXplus card into different SPARCstations, SPARCsystems, and SPARCcenter series machines.

We recommend that you read the *Installation Guide* and the *Software Administration Guide for Peripherals* that came with your system for detailed information.

You should allow about 30 to 60 minutes to complete the installation.

Please refer to the Preface of this guide for a list of appropriate documents that describe detailed TurboGX/TurboGXplus installation instructions.

Note – Only qualified Sun Microsystems® service-trained maintenance providers should install a TurboGX/TurboGXplus card in a SPARCsystem and SPARCcenter series machine.

2.1 Tools Needed

The TurboGX/TurboGXplus installation procedure for the SPARCstation does not require any special tools. You only need the following tools:

1. Medium size Phillips screwdriver #2
2. Medium size flat screwdriver #2

3. ESD (electrostatic discharge) kit (provided)

Refer to *600MP System Board and Expansion Memory Installation and Service Manual* for a list of tools and equipment that are needed to install a TurboGX/TurboGXplus card into a particular SPARCsystem.

Refer to *SPARCcenter 1000 and 2000 System Board and Expansion Memory Installation and Service Manual* for a list of tools and equipment that are needed to install a TurboGX/TurboGXplus card into a particular SPARCcenter.

2.2 Software Requirements

The TurboGX requires SunOS 4.0.3, the TurboGXplus requires SunOS 4.1.1 or higher or Solaris 1.x or higher to run a single TurboGX/TurboGXplus configuration. To run multiple TurboGX/TurboGXplus configurations, you need SunOS 4.1.1 or higher, or Solaris 2.0. If you need to run Sundiag in a multiple TurboGX/TurboGXplus configuration, you need 4.1.1–GFX Rev 2 or higher or Solaris 2.0. If you do not have the appropriate operating system revision, contact your local Sun Sales Representative to obtain the necessary software upgrade.

Note – You need 4.1.1–GFX Rev 2 only if you need to run Sundiag in a multiple TurboGX/TurboGXplus configuration mode. It is not required to bring up your TurboGX/TurboGXplus or run any applications.

2.3 Running Direct Xlib

Direct Xlib is Sun Microsystems new software product that transparently enhances graphics rendering performed for graphics-intensive Xlib applications. Source code changes are not necessary because Direct Xlib present the standard Xlib interface as presented in OpenWindows™. Dynamically linked applications can use Direct Xlib without recompiling or relinking. Statically linked applications will only have to be relinked with the static Direct Xlib library prior to use.

Direct Xlib provides enhanced performance for Xlib applications when run locally using the OpenWindows™ server. It accelerates those operations which cause changes to pixels on the screen by using Direct Graphics Access ™(DGA) technology to bypass the server and perform the operations directly on the graphics hardware device. The performance improvement comes from the

elimination of the overhead involved in copying X11 commands and data into the Xlib request buffer and the elimination of the interprocess communication (IPC) between the client and server in transferring the request buffer. The greatest increase is achieved for large number of short vectors, filled rectangles, short text strings, and small scrolls or blit operations where the overhead can be a significant percentage of the processing.

Performance improvement is dependent upon an application's use and mix of graphics primitives. Programs that are not graphics-intensive may see little overall performance gain. The applications most likely to benefit are those in the following industry segments: mechanical design, electronic design, drafting, mapping, and scientific visualization.

Direct Xlib 1.0 is unbundled and compatible with Solaris 1.x, OpenWindows 3.0 and is available at no additional charge. Contact your local Sun Sales Representative to get your copy. Direct Xlib 2.0 is compatible with Solaris 2.1 or later and OpenWindows 3.1 or later, and is bundled on the Solaris 2.2 CD. Users running Xlib applications will notice a higher level of performance running Solaris 2.0 with DXlib 2.0.

If you need help with software or problems related to the TurboGX/TurboGXplus installation, call Sun Microsystems at 1-800-USA-4SUN.

2.4 System Requirements for TurboGX

Note – SPARCstation 1, SPARCstation 1+, and SPARCstation IPC systems were shipped with boot PROM version 1.x. If you require a boot PROM upgrade kit call 1-800-USA-4SUN.

- SPARCstation 1 (boot PROM version 2.0 or higher)
- SPARCstation 1+ (boot PROM version 2.0 or higher)
- SPARCstation 2 (boot PROM version 2.4 or higher)
- SPARCstation 10 (boot PROM version 2.6 or higher)
- SPARCclassic (boot PROM version 2.0 or higher)
- SPARCstation IPC (boot PROM version 2.x or higher)
- SPARCstation IPX (boot PROM version 2.0 or higher)

- SPARCstation LX (boot PROM version 2.6 or higher)
- SPARCsystem 630MP (boot PROM version 2.5 or higher)
- SPARCsystem 670MP (boot PROM version 2.5 or higher)
- SPARCserver 690MP (boot PROM version 2.5 or higher)
- SPARCcenter 1000 (boot PROM version 2.0 or higher)
- SPARCcenter 2000 (boot PROM version 2.0 or higher)

2.5 System Requirements for TurboGXplus

- SPARCstation 2 (boot PROM version 2.4 or higher)
- SPARCstation 10 (boot PROM version 2.6 or higher)
- SPARCclassic (boot PROM version 2.0 or higher)
- SPARCstation IPX (boot PROM version 2.0 or higher)
- SPARCstation LX (boot PROM version 2.6 or higher)
- SPARCsystem 630MP (boot PROM version 2.5 or higher)
- SPARCsystem 670MP (boot PROM version 2.5 or higher)
- SPARCserver 690MP (boot PROM version 2.5 or higher)
- SPARCcenter 1000 (boot PROM version 2.0 or higher)
- SPARCcenter 2000 (boot PROM version 2.0 or higher)

2.6 Identifying the UNIX Version of Your System

Execute the command that identifies the operating system and its version number, as appropriate for your system. See the *Preface*, "When You Need Help with UNIX," for help with this command. This command is typically:

```
cat etc/motd
```

2.7 Refresh Rate for Monitors

The TurboGX/TurboGXplus card supports the following monitor resolutions and refresh rates:

Table 2-1 Supported Monitor Resolutions

Resolution/Refresh Rate Supported	TurboGX Buffering	TurboGXplus Buffering
1024 x 768 @ 60 Hz	**single**	**double**
1024 x 768 @ 70Hz	**single**	**double**
1024 x 768 @ 77 Hz	**single**	**double**
1152 x 900 @ 66 Hz	**single**	**double**
1152 x 900 @ 76 Hz	**single**	**double**
1280 x 1024 @ 67 Hz	**single**	**double**
1280 x 1024 @ 76 Hz	**single**	**double**

The TurboGX/TurboGXplus card uses the sense code bus to identify the monitor resolution and refresh rate for the monitor connected (see Table C-3 for a detailed description.) The sense code bus exists on the monitor cable and is driven by the monitor.

While most monitors and refresh rate combinations are supported by the sense bus, the following monitors are not supported.

1024 x 768 @ 70 Hz (TurboGXplus)

1280 x 1024 @ 67 Hz (TurboGXplus)

These resolutions and refresh rates are defined using the `setenv` command.

If you currently have a monitor that supports one of these resolutions and wish to use it, read the following section for instructions on how to change the resolution and refresh rate.

If you are upgrading a GXplus card with a TurboGXplus card, please follow the instructions in the following section.

The GXplus card ignored the sense code and defaulted to 1280 x 1024 @ 67 Hz as the resolution and refresh rate.

Since the TurboGXplus card does use the sense code, your monitor will first boot up at 1152 x 900 @ 76 Hz. To set your monitor to boot at 1280 x 1024 @ 67 Hz as the default, refer to the next section for detailed instructions.

2.8 Changing the Refresh Rate for Monitors

The TurboGX/TurboGXplus card supports a variety of monitors and refresh rates. In most cases, the user simply connects the monitor to the TurboGX/TurboGXplus card and the card automatically identifies the resolution and refresh rate for the monitor. There are two cases where you may wish to override the sense code bus:

1. If you wish to use one the following resolution and refresh rates; 1024 x 768 @ 70 Hz, or 1280 x 1024 @ 67 Hz, you need to override the sense code bus. The sense code bus identifies only six of the eight supported resolution and refresh rate combinations.

Note – You will need to override the sense code bus when upgrading from a GXplus to a TurboGXplus card.

---

2. If you do not want to use the resolution and refresh rate combination identified by the sense code (this may occur when using a non-Sun monitor or a cable adapter.)

Note – Ensure that the monitor attached does support the resolution and refresh rate that you have selected.

2.9 Overriding the Sense Code Bus using the `setenv` command

To change the resolution on the console. pass the resolution as an argument along with the device name, using the `setenv` command with a resolution from the list of supported parameters in Table 2-1

The following procedure is an example of how to use the `setenv` command to change the monitor refresh rate and resolution.

This sets the resolution to 1280 x 1024 at 67 Hz.

```
ok setenv output-device  screen:r1280x1024x67
```

This is the default condition, resolution is set by the monitor (sense bus)

```
ok setenv output-device screen <cr>
ok reset <cr>
```

Servicing and Ordering Information A

A.1 Field Replaceable Units

The TurboGX/TurboGXplus card does not have any field replaceable components; rather the card assembly is a field replaceable unit (FRU). If the TurboGX/TurboGXplus card is defective, it should be replaced with a new one.

If a unit is defective and under warranty, call 1-800-USA-4SUN if you are within the USA. Also call that number (within the USA), if you want the unit to be repaired.

A.2 Ordering the TurboGX Card

If you need a new unit, call Sun Express at 1-800-USE-SUNX. Table A-2 shows the description and part numbers of the FRUs.

Table A-1 TurboGX Field Replaceable Units

Description	FRU Number
TurboGX Card	F501-2325-04

A.3 Ordering the TurboGXplus Card

If you need a new unit, call your local Sun service provider for a replacement. Table A-2 shows the description and part numbers of the FRUs.

Table A-2 Field Replaceable Units

Description	FRU Number
TurboGXplus Card	F501-2253

A.4 Getting Help

Sun Microsystems has service providers throughout the world. If you have a question about Sun software or hardware, contact your local service provider. When you call, please have your system's model number, serial number, and operating system release number ready for the service provider.

You can also send questions by electronic mail to **sun!hotline@sun.com**. Be sure your mail message includes your name, company, and phone number, along with the information listed above. If you have questions about Sun's support services or your shipment, call your sales representative.

Configuration Options B

This appendix describes how you can configure your system using a TurboGX/TurboGXplus card to suit your specific video/graphics requirements.

B.1 Systems Supported

- SPARCstation1, 1+ (TurboGX only)
- SPARCstation 2
- SPARCstation 10
- SPARCclassic
- SPARCstation IPC (TurboGX only)
- SPARCstation IPX
- SPARCstation LX
- SPARCsystem 630MP
- SPARCsystem 670MP
- SPARCserver 690MP
- SPARCcenter 1000
- SPARCcenter 2000

B.2 TurboGX/TurboGXplus Supported Monitors

Table B-1 shows the list of monitors supported by the TurboGX/TurboGXplus card.

Table B-1 Monitors Supported

TGX	TGX+	Model	Sun Part Number	Type/Size/FCC	Resolution/Frequency
X	X	GDM-1604A15	365-1079	Color 16” FCCA	1152 x 900 x 66 Hz US
X	X	GDM-1604B15	365-1092	Color 16” FCCB	1152 x 900 x 66 Hz US
X	X	GDM-1662B	365-1113 or 365-1130	Color 16” FCCB	1152 x 900 x 76 Hz US 1152 x 900 x 76 Hz OS
X	X	GDM-1955A15	365-1081	Color 19” FCCA	1152 x 900 x 66 Hz US
X	X	GDM-1962	365-1095	Color 19” FCCA	1152 x 900 x 76 Hz US 1152 x 900 x 76 Hz OS
1152x 900 Only	X	GDM-1962B	365-1112 or 365-1153	Color 19” FCCB	1152 x 900 x 76 Hz US 1152 x 900 x 76 Hz OS 1152 x 900 x 66 Hz 1280 x 1024 x 67 Hz
X	X	17SMM4 A	365-1100	Gray 17” FCCA	1152 x 900 x 76 Hz US 1152 x 900 x 76 Hz OS
X	X	M20P110	365-1099 or 365-1140	Gray 19” FCCB	1152 x 900 x 76 Hz US 1152 x 900 x 76 Hz OS
	X	CPD-1790	365-1151	Color 16” FCCB	1024 x 768 x 66 Hz 1024 x 768 x 77 Hz
	X	NEC 4FG		SVGA 16” FCCB	1024 x 768 x 60 Hz
	X	GoldStar 1620 VGA		SVGA 14” FCCB	1024 x 768 x 60 Hz
	X	16“Mid Range Color	365-1165-01	Color 16” FCCB	1024 x 768 x 60 Hz
	X	14“Color	365-1286-01	Color 14” FCCB	1024 x 768 x 60 Hz
1152x 900 Only	X	20” Premium Color(P4)	365-1167-01	Color 20” FCCB	1152 x 900 x 66 Hz 1152 x 900 x 76 Hz 1280 x 1024 x 67 Hz 1280 x 1024 x 76 Hz

Switch on back of monitor: US (–) = Underscan, OS (+) = Overscan. (When the monitor is in underscan mode, the video image is totally inside a dark border. When the monitor is in overscan mode, no dark border is visible on the screen and the video is scanned beyond the edge of the monitor bezel.) * Requires a special cable.

Note – The monitors listed in Table B-1 are subject to change as Sun Microsystems announces new monitors. Contact your local Sun representative for a listing of supported monitors.

B.3 Changing the Probing Order

This section provides information about the SBus probing 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 it.

B.3.1 SBus Addresses

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

The SPARCstation1/1+, and SPARCstation 2 SBus slots 1, 2, and 3 are used for customer- installable SBus cards, slot 0 is reserved for the CPU.

The SPARCstation LX has SBus addresses 0 and 1. Slot 3 is reserved for the onboard frame buffer, slot 2 is reserved for the audio chip.

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

B.3.2 Probing Order

The probing order is determined by the `sbus-probe-list` parameter in the system’s open boot PROM. The first display is defined as the console. You have the option to define which display will be the console by changing the probing order. For SPARCstation 10, you must begin with f. This parameter is set up to probe 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 a SPARCclassic, SPARCstation IPX, and SPARCstation LX configuration, 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 probing 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 probing order.

B.3.3 Changing sbus-probe-list

The following procedure describes how to change `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 *eeprom* command described below will change the system configuration.

---

1. **Become superuser.**

2. **At the superuser prompt, type** *`eeprom sbus-probe-list=0xyz`* **or** *fwxyz* **(for 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# eeprom sbus-probe-list=0312
```

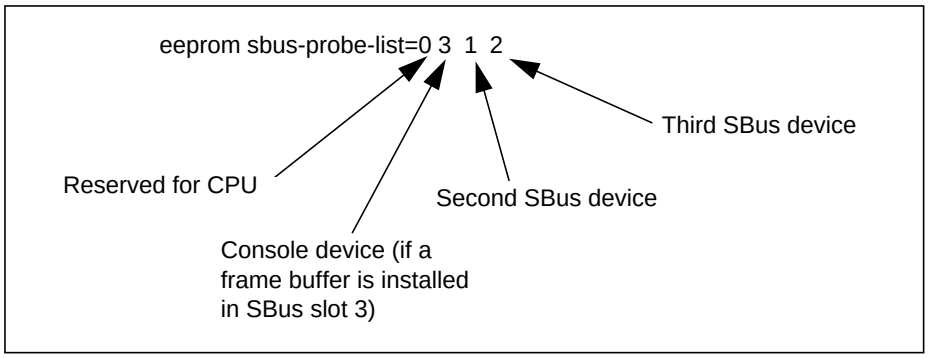


Figure B-1 SBus Probe List Explanation

The leftmost character, except 0, in eeprom `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 system, the leftmost character in `sbus-probe-list` will be f (not 0) which is reserved for the CPU.

---

3. **Make sure a monitor is connected to the frame buffer identified as the "new console".**

4. **Reboot the system for the changes to take effect.**

B.4 Running Multiple Monitors

This section describes how to use multiple monitors while running the SunView software, or SunView software in conjunction with the OpenWindows Version 2 or OpenWindows Version 3 software. This procedure requires some knowledge of UNIX®. You should be familiar with UNIX and basic editing tools such as vi or emacs.

When setting up multiple monitors, you need to:

1. Make sure that your system will support a multiple head configuration
2. Install the cards and monitors
3. Configure OpenWindows for multiple monitors

4. If you need to override the sense code, follow the instructions provided in section B.6, *Programming Multiple Monitor Configurations*.

Skip this section if you are not interested in running multiple monitors.

Note – Sun Microsystems currently recommends upgrading to Version 3 of Open Windows running on Solaris 2.x to optimize the TurboGX/TurboGXplus card performance.

You can run multiple monitors in the following modes:

- SunView
- OpenWindows Version 2
- OpenWindows Version 3
- SunView and OpenWindows Version 2
- SunView and OpenWindows Version 3

Note – This information is subject to change with future software releases. Refer to future software release documents with respect to multiple monitor support.

For additional information, refer to the following documents:

- *OpenWindows Version 2 Installation and Start-Up Guide* (800-4899)
- *OpenWindows Version 3 Installation and Start-Up Guide* (800-6029)
- SunView man pages (Enter `man sunview` in a shell.)

B.5 Multiple Monitor Configuration

Multiple monitor configurations are supported only on SPARCstation 2, SPARCstation IPX, SPARCstation 10, 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.

The SPARCstation 1, SPARCstation 1+, and SPARCstation IPC require boot PROM version 2.x to support multiple monitors. To upgrade your boot PROM call 1-800-USA-4SUN to order your upgrade kit.

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

For the SPARCstation 10 system, 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
        .
        .
```

B.6 Programming Multiple Monitor Configurations

Follow the steps in this section if you are configuring a multiple monitor environment, and you need to override the sense codes.

Note – Skip this section if you do not need to override the sense codes.

Configuring multiple monitors on a single workstation provides an additional desktop environment without any additional hardware.

Nvramrc is prom script memory that is nonvolatile. When the prom reaches the device probing stage, it checks the variable use-nvramrc?, if it is true, executes the forth code which resides in `nvramrc`, otherwise it calls `probe-sbus`, `install-console` and `banner`.

The following code places resolution initialization between the probe-sbus stage and the install-console and banner stages. First probe-sbus is called to probe all devices, so that the device tree is created, and the devices are initialized.

The next line defines a forth word called vsetup which contains the monitor video setup values. The following string of values (defined in Table B-2) are the specifications for a video setup:

" 117000000,71691,67,16,112,224,1280,2,8,33,1024,COLOR,0OFFSET"

Table B-2 Video Setup Specifications

Value	Description
117000000	Pixel frequency or dot clock in Hz
71691	Horizontal frequency in Hz
67	Vertical frequency in Hz
16	Horizontal Front Porch (in pixels)
112	Horizontal Sync Width (in pixels)
224	Horizontal Back Porch (in Pixels)
1280	Horizontal Displayed pixels (in pixels)
2	Vertical Front Porch (in lines)
8	Vertical Sync Width (in lines)
33	Vertical Back Porch (in lines)
1024	Vertical Displayed lines (in lines)
COLOR	Color monitor flag
0OFFSET	No sync pedestal flag

The line, vsetup 4, basically pushes the video string on the stack, the number 4 defines the sense code of the monitor we want to change the resolution on. See Table B-3 for supported monitor codes.

The next line, pushes the string `/sbus/cgsix@1` onto the forth stack, the path for the device where the resolution is to be changed.

The following example changes the cgsix framebuffer on Sbus slot 1. The string `"override"` is the actual entry point in the cgsix Fcode prom which reconfigures the resolution from the data present on the forth stack. execute-device-method actually calls override and returns a pass/fail flag which is ignored by the drop command which follows.

The remaining two lines install-console and banner, installs a terminal driver on the display device, then prints the banner at reset time or reboot time.

B.6.1 Configuring Monitors using a UNIX script

The following is an example of a UNIX script used to configure a 1280x1024x67 resolution:

```
#!/bin/sh
eeprom fcode-debug\?=true
eeprom use-nvramrc\?=true
eeprom nvramrc='probe-sbus
: vsetup " 117000000,71691,67,16,112,224,1280,2,8,33,1024,COLOR,0OFFSET" ;
vsetup 4
" /sbus/cgsix@1" " override" execute-device-method drop
install-console
banner
'
```

B.6.2 Configuring Monitors using the PROM method

The following example uses the Prom method to configure a 1280x1024x67 resolution:

```
ok nvedit
0: probe-sbus
1: : vsetup “ 117000000,71691,67,16,112,224,1280,2,8,33,1024,COLOR,0OFFSET”;
2: vsetup 4
3: “ /sbus/cgsix@1” “ override” execute-device-method drop
4: install-console
5: banner
6: ^C
ok nvstore
ok setenv use-nvramrc? true
ok setenv fcode-debug? true
```

The following table contains codes for TurboGX/TurboGXplus supported resolutions:

Table B-3 TurboGX/TurboGXplus Resolution Codes

Resolution	Code
r1024x768x60	“ 64125000,48286,60,16,128,160,1024,2,6,29,768,COLOR”
r1024x768x70	“ 74250000,56593,70,16,136,136,1024,2,6,32,768,COLOR”
r1024x768x77	“ 84375000,62040,77,32,128,176,1024,2,4,31,768,COLOR”
r1152x900x66	“ 94500000,61845,66,40,128,208,1152,2,4,31,900,COLOR”
r1152x900x76	“ 108000000,71808,76,32,128,192,1152,2,4,31,900,COLOR,0OFFSET”
r1280x1024x67	“ 117000000,71691,67,16,112,224,1280,2,8,33,1024,COLOR,0OFFSET”
r1280x1024x76	“ 135000000,81128,76,32,64,288,1280,2,8,32,1024,COLOR,0OFFSET”
r1600x1280x76	“ 216000000,101890,76,24,216,280,1600,2,8,50,1280,COLOR,0OFFSET”

B.6.3 Setting up Multiple Monitors using a UNIX Script

The following screen shows a UNIX script which sets up the TurboGX/TurboGXplus cards in slot 1 at 1152x900x76, and another r1600x1280x76

TurboGX/TurboGXplus card in slot 3 at 1280x1024x67 using two 19” monitors.

```
#!/bin/sh
eeprom fcode-debug\?=true
eeprom nvramrc='probe-sbus
: vsetup1 " 108000000,71808,76,32,128,192,1152,2,4,31,900,COLOR,0OFFSET ;
vsetup1 4
" /sbus/cgsix@1" " override" execute-device-method drop
: vsetup2 " 117000000,71691,67,16,112,224,1280,2,8,33,1024,COLOR,0OFFSET" ;
vsetup2 4
" /sbus/cgsix@3" " override" execute-device-method drop
install-console
banner
'
eeprom use-nvramrc\?=true
```

B.6.4 Setting up a single Monitor using the PROM method

The following is an example of how to set up a TurboGX/TurboGXplus card in slot 2 to a 1024x768x60 resolution using a 16" monitor.

```
ok nvedit
   0: probe-sbus
   1: : vsetup " 64125000,48286,60,16,128,160,1024,2,6,29,768,COLOR" ;
   2: vsetup 6
   3: " /sbus/cgsix@2" " override" execute-device-method drop
   4: install-console
   5: banner
   6: ^C
ok nvstore
ok setenv use-nvramrc? true
ok setenv fcode-debug? true
```

B.6.5 Setting up a single Monitor using a UNIX Script

The following example is a UNIX script which sets a 1024x768x60 resolution for the TurboGX/TurboGXplus card in slot 2.

```
#!/bin/sh
eeprom fcode-debug\?=true
eeprom nvramrc='probe-sbus
: vsetup " 64125000,48286,60,16,128,160,1024,2,6,29,768,COLOR" ;
vsetup 6
"/sbus/cgsix@2" " override" execute-device-method drop
install-console
banner
'
eeprom use-nvramrc\?=true
```

B.7 Device File Names

If you are using OpenWindows or SunView 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 and SunView software require that UNIX device file names for frame buffers be supplied on the command line when either is started.

The UNIX boot messages identifies 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/cgthree0` depending on the type of the 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 TurboGX/TurboGXplus card is added to the system that already has a GX product,
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 TurboGX/TurboGXplus cards. The TurboGX/TurboGXplus card in slot 2 will be known as `/dev/fb` and `/dev/cgsix0`; the TurboGX/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.

B.7.1 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 the following command:

```
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` (for color frame buffers) and `bw` (for black and white frame buffers).

Note – The execution of the aforementioned 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.

```
Oct 22 10:53
4SunOS Release 4.1.1-GFX-Rev2 (GENERIC_SMALL) #1: Sat Jul 6
16:23:04 PDT 1991
Copyright (c) 1983-1990, Sun Microsystems, Inc.
mem=1684k (ox100000)
 .
 .
cgsix0 at SBus slot 2 0x0 pri 7
cgsix0: screen 1152x900, single buffered, 1M mappable, rev 6
cgsix1 at SBus slot 3 0x0 pri 7
 .
 .
```

B.8 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
```

B.9 Running OpenWindows Version 2 with Multiple Monitors

Before you start multiple monitors (maximum of four supported), you need to put instructions in your `.xinitrc` file to start extra copies of the `olwm` window manager, one for each monitor. The OpenWindows Version 2 should already be installed. To run multiple monitors:

1. Edit the `.xinitrc` file under your home directory.

```
example% vi ~/.xinitrc
```

Note – ~ indicates user's home directory.

2. Edit these lines of your `.xinitrc` **file if you wish to use two monitors:**

```
replace these lines:

eval ‘svenv -env‘                # Sunview binary compatibility
olwm -3 &                        # OpenLook Window Manager

with these lines:

eval ‘svenv -display :0.0  -env‘# SunView binary compatibility
olwm -display :0.0 -3 &          # OpenLook Window Manager
eval ‘svenv -display :0.1 -env‘ # SunView binary compatibility
olwm -display :0.1 -3 &          # OpenLook Window Manager
```

3. Save the changes and exit your editor.

4. Type the following command to verify that a device file already exists for the desired frame buffer:

```
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 message, skip steps 5, 6, and 7 and go to step 8. If the system responds with the "not found" message, continue with step 5.

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

5. **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.)**

   See the *Preface*, "When You Need Help with UNIX," for references to documentation that contains the procedure on how to become a superuser.

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

This creates a device file for the second frame buffer.

6. **Verify the newly created file by typing:**

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

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

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

7. **Exit the superuser mode.**

8. **Start the system using the** `-dev` **command-line option to** `openwin` **to specify the frame buffers for your monitors. For example:**

```
example% 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.

If you are running multiple screens, you should create a `.openwin-init` file in the home directory to specify the screen on which each tool is to be displayed. For example, you might put this into the `.openwin-init` file to specify a Shell Tool window on each screen:

```
export DISPLAY
DISPLAY=:0.0
shelltool -Wp 0 177 -Ws 594 692 -WP 56 9 +Wi &
DISPLAY=:0.1
shelltool -Wp 544 216 -Ws 593 461 -WP 165 7 +Wi &
```

B.10 Running OpenWindows Version 3 with Multiple Monitors

If you have been running, OpenWindows Version 2, and want to switch to, OpenWindows Version 3 (maximum of four monitors supported), refer to the Open Windows installation procedure for detailed instructions. When Open Windows Version 3 is installed you need to remove some of the "`.`" files. These files are:`.xinitrc`,`.openwin_init`, and `.openwin_menu`.

To remove these "`.`" files:

```
example% rm ~/.xinitrc ~/.openwin-init ~/.openwin-menu
```

Running multiple monitors with OpenWindows Version 3 is fairly easy and simple. The OpenWindows Version 3 should already be installed.

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. **Enter the following command to verify that a device file already exists for the desired frame buffer:**

```
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 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 message 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.

B.11 Running OpenWindows and SunView Environments with Multiple Monitors

Note – Skip this procedure if you are using SPARCstation LX or running an earlier version of Solaris (2.x for example) as SunView is not supported in those specific environments.

This procedure is valid for running multiple monitors in the SunView environment in conjunction with the OpenWindows version 2 or OpenWindows version 3 software.

If you have a system with two frame buffers, you can run the OpenWindows environment on one frame buffer and the SunView environment on the other. Note that the names of the XView and SunView versions of the DeskSet tools you will be running are the same.

You must make sure your `$path` is set up correctly to run the SunView versions of the program on the SunView screen and the XView versions of the programs on the OpenWindows screen. The SunView programs are located in /usr/bin; that path must appear first in your path to run the SunView tools. The XView programs are located in $OPENWINHOME/bin/xview; that path must appear first in your path to run the XView tools. (The openwin command automatically sets up your path when you start the system.)

Note – Steps 1 and 2 below are needed only if the OpenWindows environment is invoked first.

The OpenWindows and SunView environments use different keyboard encodings. Before you try to run the OpenWindows and SunView environments at the same time, you should add an item to your SunView root `/usr/lib/.r`menu so that you can reset the keyboard encoding, if you need to, using the `kbd_mode` command. If the `.rootmenu` file is owned by the user, the file should be located under the user's home directory. If the `.rootmenu` is the default file, please copy the `.root` menu file to the users home directory and edit the `/usr/lib/.rootmenu` file.

1. **Add the following line to your `.rootmenu` file:**

```
"Reset Keyboard"    $OPENWINHOME/bin/kbd_mode -e
```

   Now even if you cannot enter characters properly when you start up your SunView environment, you will be able to reset the keyboard through the root menu.

2. **Save the file and exit your editor.**

3. **To start the OpenWindows environment on one frame buffer, execute the `openwin` command and specify the chosen frame buffer with the -dev option. For example:**

```
example% openwin -dev /dev/fb
```

4. **Reset your path so that the path for the SunView versions of the DeskSet tools appears before the path for the XView versions. For example, if you are using the C shell, use the following command:**

```
example% set path=(/usr/bin $path)
```

If you are using the Bourne shell, use the following command:

```
example$ PATH=/usr/bin:$PATH; export PATH
```

5. **Enter the following command to verify if that device file already exists for the desired frame buffer:**

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

If the device file already exists, you will see a message that will be similar to the one shown below. If you see such a message, skip steps 6, 7, and 8 and go to step 9. If the system responds with the "not found" message, continue with step 6.

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

6. **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.

7. **Verify the newly created file by typing:**

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

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

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

8. **Exit the superuser mode.**

9. **Start the SunView environment using the `sunview` command and specify the second frame buffer with the `-d` command-line option. For example:**

```
example% sunview -d /dev/cgsix1 &
```

10. **Run the** `adjacentscreens` **command to provide alternating access to the two displays. For example, if the** `cgsix1` **screen is to the left of the** `fb` **screen, type:**

```
example% adjacentscreens /dev/fb -l /dev/cgsix1
```

11. **Check to make sure you can enter characters properly on the screen running the SunView environment. If not, select the "Reset Keyboard" item from the root menu.**

Note – The `-l` parameter indicates that the cursor will exit the screen to the left. This may be changed to `-r` to enable the cursor to exit the screen to the right.

B.12 Running Multiple Monitors in the SunView Environment

The `sunview` program runs on either a monochrome or color screen. Each monitor on a machine with multiple monitors may have a separate SunView environment running. The keyboard and mouse input devices can be shared between the screens. Using `adjacentscreens` command, you can set up the pointer to slide from one screen to another.

Two monitors are assumed to be attached to the system. To set up the SunView environment on two monitors:

1. **Invoke** `sunview` **on the first display as you normally would. This starts an instance of the SunView environment on the default frame buffer** (`/dev/fb`)**. For Example:**

2. **Enter the following command to verify that a device file already exists for the desired frame buffer:**

```
example% sunview
```

```
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 as described earlier. 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 one shown below indicating that the devicefile has been successfully created:

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

5. **Exit the superuser mode.**

6. **To start the SunView environment on the second device, open a Shell Tool window and enter this command:**

```
example% sunview -d /dev/cgsix1 &
```

This starts the SunView environment on another device. In this example, the device name of `/dev/cgsix1` was used. The name of your frame buffer may be different.

7. **In the same Shell Tool, enter this command:**

```
example% adjacentscreens /dev/fb -r /dev/cgsix1
```

Note – The `-r` parameter indicates that the cursor will exit the screen to the right. This may be changed to `-l` to enable the cursor to exit the screen to the left.

For more information, consult the `sunview` man page (`man sunview`).

Video Cable and Interface Signals

C

This appendix describes the video cable and SBus interface signals.

C.1 Video Cable Signals

The Sun Class B monitor connector (13W3) is a D-type subminiature socket housing with coax cavities. Table C-1 describes the connectors.

Table C-1 Monitor Connector Cable

Parameter	**Description**
Shell size	B
Arrangement	13W3
Number of contacts	10
Contact size	#20
Coax or HV cavities	3

Figure C-1 shows the Sun Class B monitor connector. The monitor side pinout is described in Table C-2.

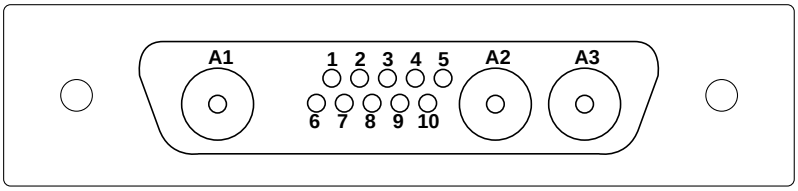


Figure C-1 Sun Class B Monitor Connector (13W3)

Table C-2 Monitor Side Pinout

Pin	Function	Sun Usage
A1	Red	Coaxial receptacle 75 Ohm
A2	Green	Coaxial receptacle 75 Ohm (grayscale video)
A3	Blue	Coaxial receptacle 75 Ohm
2	Reserved	N/C
6	Reserved	N/C
5	CSYNC	Combined H/V Sync
3	S2	See Table C-3
8	S1	See Table C-3
9	S0	See Table C-3
4	GND *	Pin reference to frame buffer ground only
1	Reserved	N/C
7	Reserved	N/C
10	Cgnd	

GND * = Logic ground, Pin 4

N/C = Not Connected

Table C-3 shows the sense pin allocation.

Table C-3 Sense Pin Allocation

Code	Scan Rate	Pin 3 Sense 2	Pin 8 Sense 1	Pin 9 Sense 0
7No Monitor	1152 x 900 66 Hz	N/C	N/C	N/C
6	1152 x 900 76 Hz	N/C	N/C	GND *
5	1024 x 768 60 Hz	N/C	GND *	N/C
4	1152 x 900 76 Hz	N/C	GND *	GND *
3	1152 x 900 66 Hz	GND *	N/C	N/C
2	1280 x 1024 76Hz	GND *	N/C	GND *
1	1600 x 1280 76Hz	GND *	GND *	N/C
0	1024 x 768 77 Hz	GND *	GND *	GND *

N/C = Not Connected

GND * = Frame buffer ground, Pin 4

Troubleshooting D

This appendix describes the troubleshooting procedure. Some procedures are simple; others are complex and should be performed only by an experienced user of Sun hardware.

D.1 Checking the `fcode-debug` *Parameter*

Skip this information if you have not changed the `fcode-debug` parameter.

Note – The fcode-debug parameter is set to false at the factory and does not need to be changed. If you have changed it to true for CPU PROMs older than version 2.0, the system will not boot.

Refer to the following documents for details:

800-4251	*Open Boot PROM Toolkit User's Guide* describes how to use your system's open boot PROM. This guide is for system administrators, software or hardware developers, and advanced users. Use this guide if your system boot PROM version is older than 2.0.
800-5674	*Introduction to Open Boot 2.0* describes how to use your system's 2.0 open boot PROM. This guide is for system administrators, software or hardware developers, and advanced users. Use this guide if your system boot PROM version is 2.0 or later.

D.2 No Video Display

If you do not see a video display after booting up the system, do the following in sequence:

1. **Make sure the power cord is attached, the power is on, and the SPARCstation LED and the monitor LED are lit.**
2. **Make sure the TurboGX/TurboGXplus card is installed properly and the cable is properly attached to the card and the monitor.**
   You may need to open the system unit.
3. **Verify that you have the correct monitor and the monitor cable.**
   A 13W3 D-type monitor cable is required. Replace the monitor or the cable if necessary. Refer to Appendix B for a list of supported monitors.
4. **Verify that you have reconfigured your system by executing** `touch /reconfigure` **(before shutdown) or** `boot -r` **(upon power up) command for a Solaris 2.x system.**
5. **Verify that you have the proper boot prom revision level for your system type.**

For additional troubleshooting tips, refer to the *Installation Guide* that came with your system.

D.3 No Dark Border on the Screen

Check to see that the switch at the rear of the monitor is at Underscan (–) position. If it is at Overscan (+) position, change its position to Underscan (–).

D.4 Partly Hidden or Shifted Icons

Check to see that the switch at the rear of the monitor is at Underscan (–) position. If it is at Overscan (+) position, change its position to Underscan (–).

D.5 Resolution Problem

This problem may occur if

- No monitor was attached to the system when the power was turned on

- Improper monitor is attached to the system
- The monitor cable is either defective or not installed properly
- The monitor is defective
- The TurboGX/TurboGXplus card is defective
- If the `setenv` command was used, it may have been used improperly. Refer to Section 2.7, *Changing the Refresh Rate for Monitors* to check the settings.

To solve this problem:

1. **Make sure that you are using the right monitor, and that the monitor cable is installed properly.**
2. **Attach the proper monitor to the system and turn the CPU power off and on.**
3. **If it does not resolve the problem, replace the monitor cable.**

If the problem still exists, call **1-800-USA-4SUN** (within the USA) or contact your Sun Sales Representative. If you are outside the USA, contact your nearest Sun service provider.

D.6 Checking the System Fuses

Note – This procedure should be performed only if the system fails to boot up after performing the procedure described in section D2

The TurboGX/TurboGXplus card does not have a fuse or a circuit breaker; it gets its power from the CPU board. If the system fails to boot and the system LED is not lit, this does not necessarily mean that the TurboGX/TurboGXplus card is defective; a system fuse may be blown, or a circuit breaker may be turned off. These fuses or circuit breakers should be checked. The following section describes how to check them.

D.6.1 SPARCstation 1, 1+, 2, SPARCstation IPC, IPX, LX, and SPARCclassic System Circuit Breakers

The SPARCstation 2, SPARCstation IPC, IPX, LX, and SPARCclassic systems do not use conventional fuses. Instead, they use self-healing thermal devices (which normally never need to be replaced). This type of circuit breaker is turned off when it gets too hot. This condition is usually caused by a short. It requires removal of the object that caused the short. After the short condition is removed, the system needs a cool-off period.



Warning – Before performing this procedure, make sure the system power is turned off. Failure to comply may result in physical injury.

Do the following in sequence:

1. **If the short condition is outside the system unit, remove it.**
2. **Wait about ten minutes and reboot the system.**

If the previous procedure does not solve the problem, a short condition may exist inside the system unit. Do the following in sequence:

1. **Remove the system unit cover.**
   Follow all the safety cautions and warnings.
2. **Visually inspect and remove any foreign matter or metal pieces that might have been introduced in the TurboGX/TurboGXplus installation process.**
3. **Close the system unit.**
4. **Wait for about 10 minutes and reboot the system.**

If the problem still exists, contact Sun Microsystems at **1-800-USA-4SUN** (within the USA) or contact your Sun Sales Representative.

D.7 Running Sundiag

The Sundiag tool is available to every user under the SunOS or Solaris operating system.

Note – SunView is not supported under Solaris 2.x.

Refer to the *Sundiag User's Guide* for details.

Specifications



This appendix describes the TurboGX/TurboGXplus card specifications.

E.1 TurboGXplus Specifications Summary

E.1.1 Physical Specifications

Length: 146.70 mm (5.78 inches)

Width: 83.82 mm (3.3 inches)

Weight: 189.95 grams (6.7 Oz.)

E.1.2 Electrical Input Requirements

Current: 2 amps (maximum)

Power Requirements: +5 volts ±5%

Heat dissipation: 10 watts

Load Condition: Running special code designed for exercising the frame buffer to the maximum power.

E.1.3 Environmental Specifications

Temperature range: Between 32 and 104 degrees Fahrenheit (0 and 40 degrees Celsius)

Humidity: Between 5% and 80% (relative noncondensing)

Altitude: Between 0 and 10,000 feet (0 and 3048 meters)

E.2 TurboGX Specifications Summary

E.2.1 Physical Specifications

Length: 146.70 mm (5.78 inches)

Width: 83.82 mm (3.3 inches)

Weight: 189.95 grams (6.7 Oz.)

E.2.2 Electrical Input Requirements

Current: 960 Milliampere (maximum)

Power Requirements: +5 volts $\pm$5%

Heat dissipation: 5 watts

Load Condition: Running special code designed for exercising the frame buffer to the maximum power.

E.2.3 Environmental Specifications

Temperature range: Between 32 and 104 degrees Fahrenheit (0 and 40 degrees Celsius)

Humidity: Between 5% and 80% (relative noncondensing)

Altitude: Between 0 and 10,000 feet (0 and 3048 meters)

E.2.4 Interface Requirements

Connector type: SBus (single slot)

E.2.5 Agency Certification

- FCC Class B
- DOC Class B
- VCCI Class 2
- VDE Class B (vfg243/1991)
- UL
- CSA
- TUV (EN60950/ISO9241-3)

The FCC and VCCI approvals are board level approvals. All of the other approvals are system level; that is, the approvals apply to the Sun system in which the board is installed.

E.2.6 Compatibility

SBus compatible.

Installing an SBus Card Bracket Adapter and Handle

F

This appendix provides installation instructions on how to install the bracket adapter, and card handle before installing the SBus card into the following systems:

- SPARCstation 1 and 1+
- SPARCstation 2
- SPARCstation IPC
- SPARCstation IPX
- SPARCstation LX
- SPARCclassic
- SPARCclassic X
- SBus Expansion Subsystem

Note – Before the SBus card can be installed, the system needs to be powered down. If powering down this system affects other users or clients, the system administrator should warn them that the system is about to be powered down. For details refer to the system software documentation.

F.1 Handling Internal Components

Keep in mind that many of the internal components of the system unit are delicate and sensitive to electrostatic discharge. The antistatic wrist strap should be attached to your wrist and to a bare metal portion of the system unit chassis, such as the power supply, before handling the boards or internal components. Failure to comply may result in permanent damage to a board.



Caution – Handle the card only by the non-conductive edges. To avoid damage to the card, do not touch the components on the card or any metal parts. Make sure the system power is turned off and the power switch is in the off position. Also make sure that the green light-emitting diode (LED) at the front of the system is not lit.

F.2 Removing an SBus Card

If the SBus card is replacing an existing card, remove the card as shown in Figure F-1.

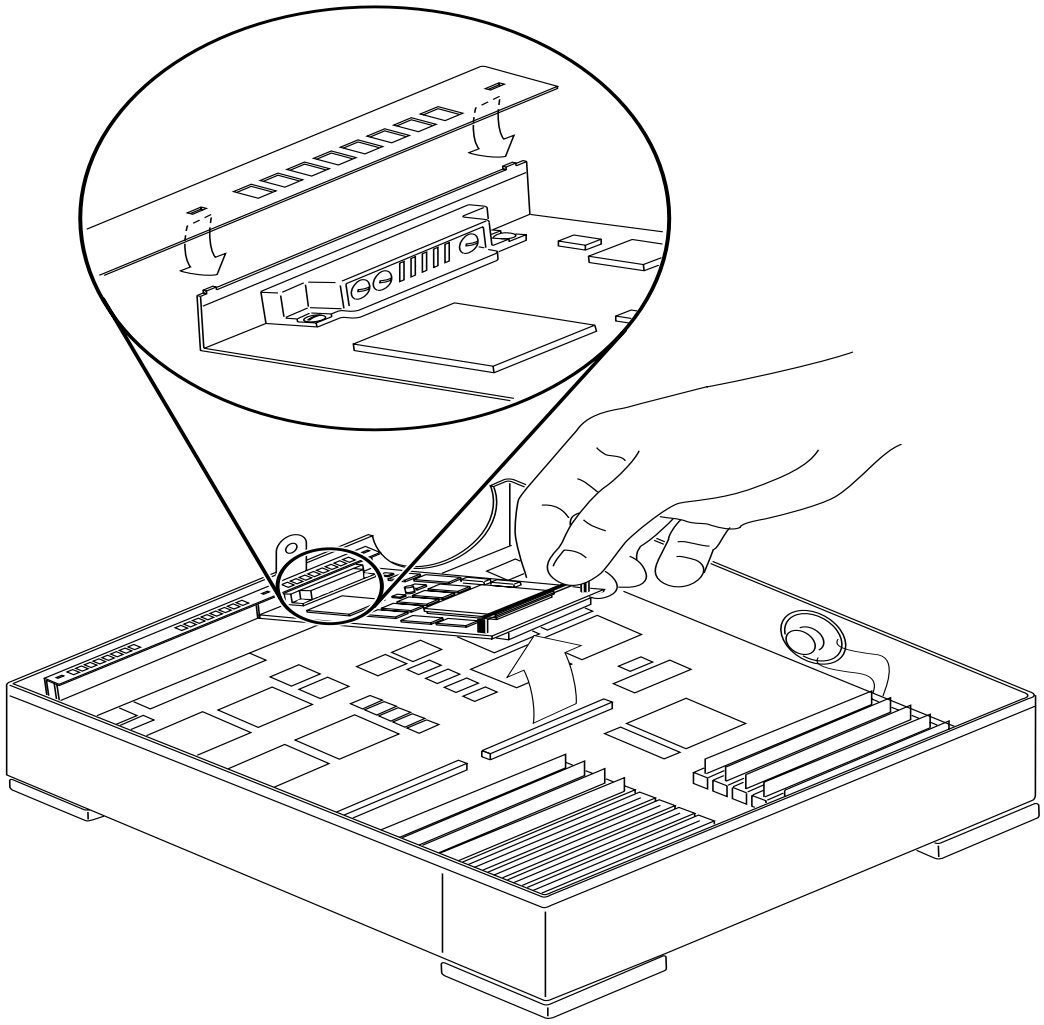


Figure F-1 Removing an SBus Card

F.3 Removing a Double-Wide SBus Card

To remove a double-wide SBus card, grasp the card by the edge closest to the SBus connectors, and gently pull the card upward. When the card is free, disengage the tab from the back panel as shown in Figure F-2.

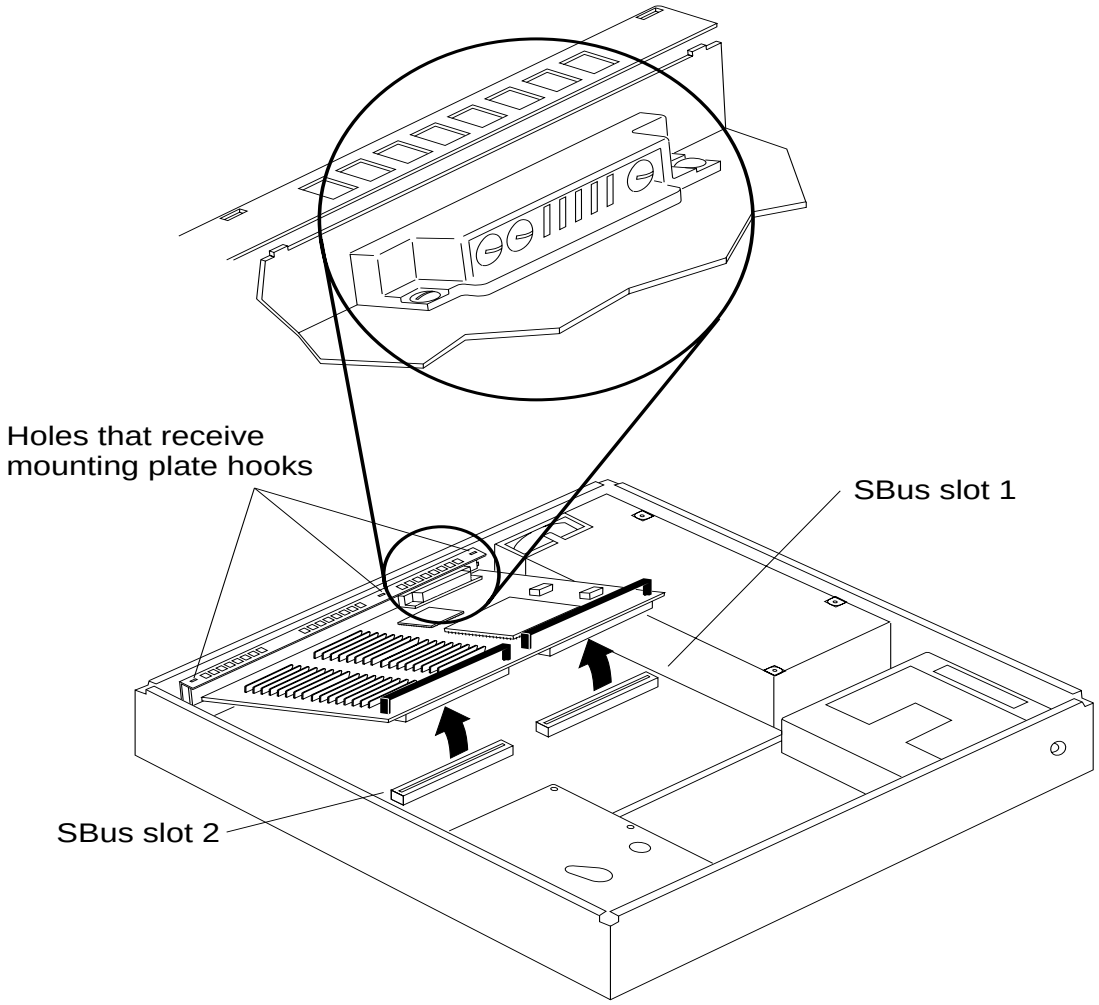


Figure F-2 Removing a double-wide SBus card

F.4 Installing the Card Handle

Install the card handle on the card as shown in Figure F-3

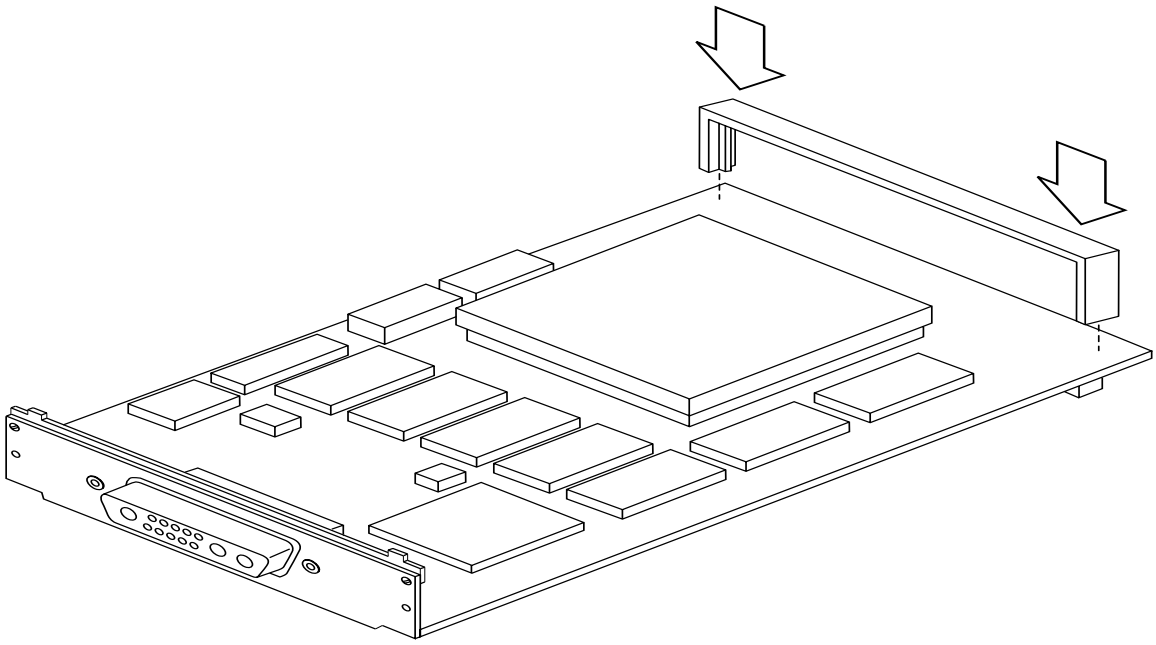


Figure F-3 Installing the Card Handle

F.5 Installing the Bracket Adapter

Install the bracket adapter assembly on the SBus card as shown in Figure F-4

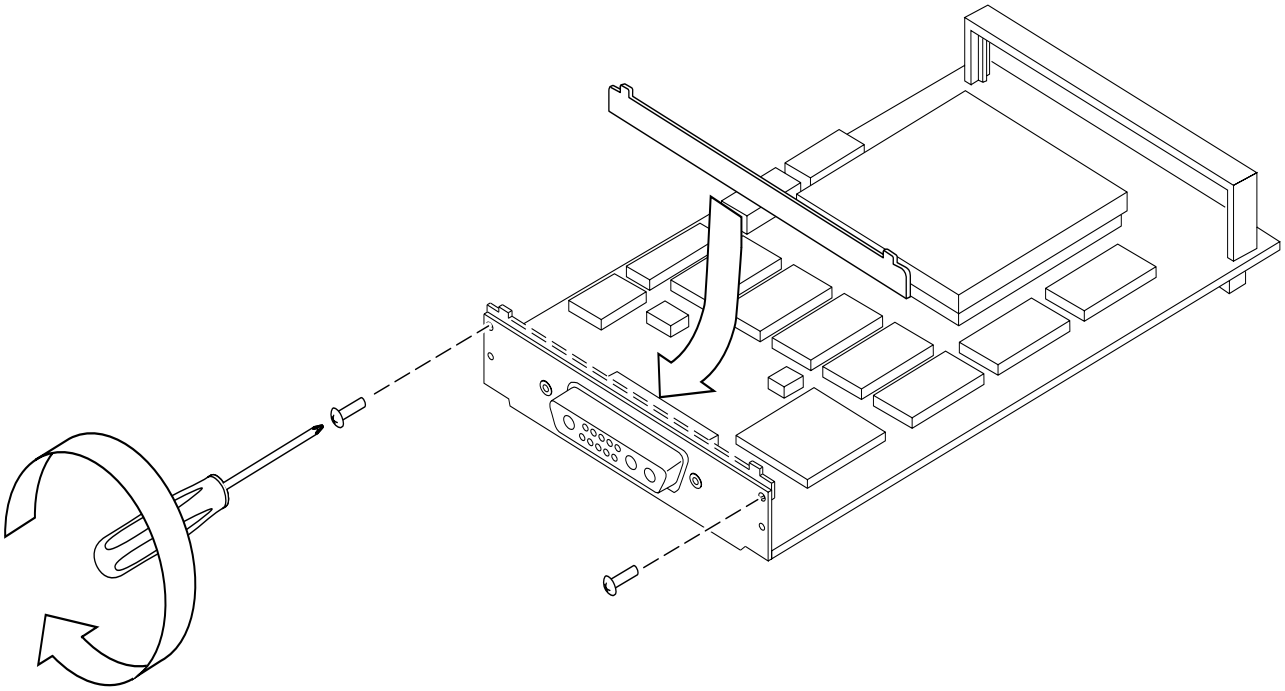


Figure F-4 Installing the Bracket Adapter

F.6 Installing an SBus Card

When the SBus card is configured properly, install the card in the slot as shown in Figure F-5.

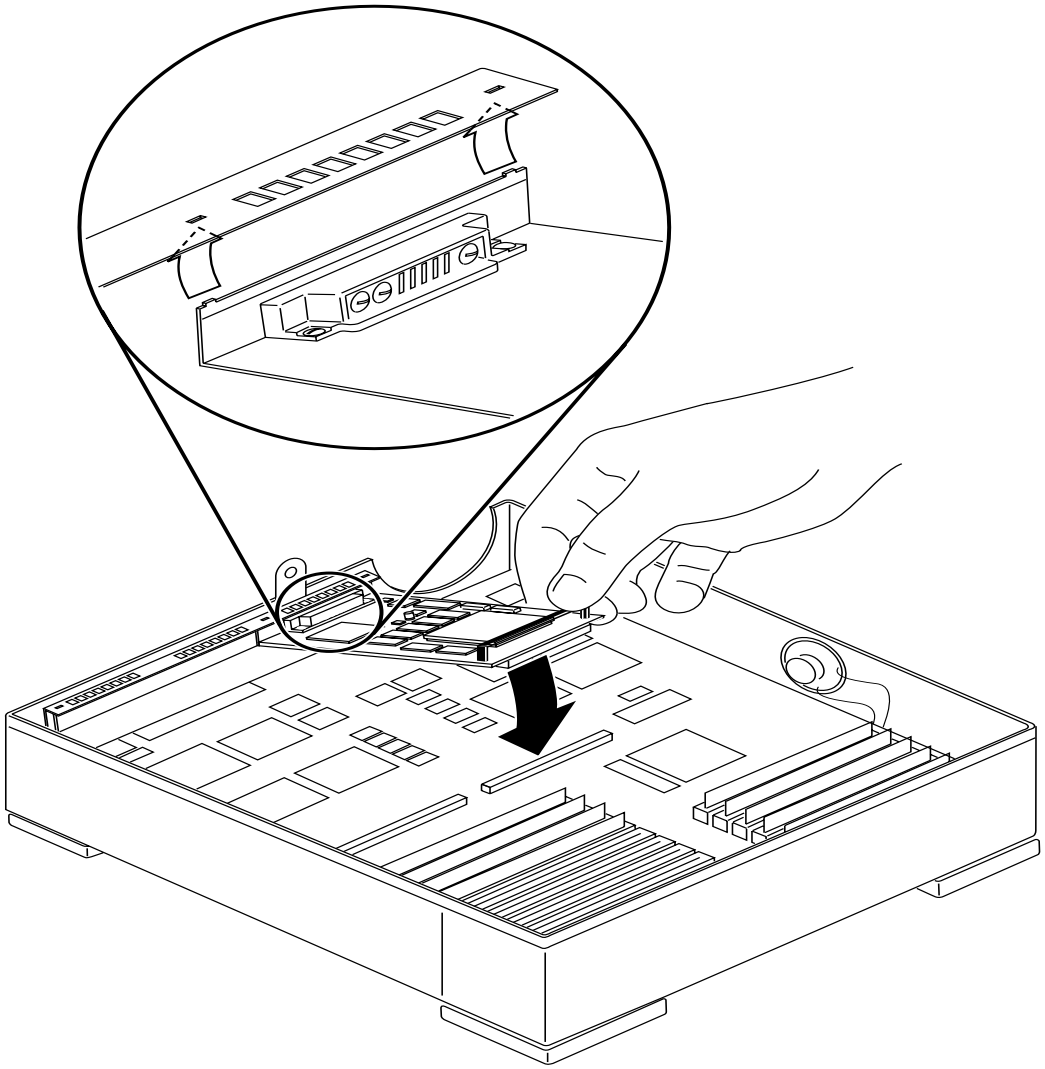


Figure F-5 Installing an SBus Card

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