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SGI® Scalable Graphics Compositor User's Guide

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For regulatory and compliance information, see Appendix A.

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About This Guide

This guide explains how to cable and configure the Scalable Graphics Compositor (the compositor). It also provides important regulatory specifications.

The compositor is a graphics compositor that is capable of receiving two, three, or four DVI digital video inputs from pipes in a single system, and then combining them into a single video output to increase graphics performance. The video output can display out to digital or analog monitors at the same time.

This guide is written for owners, system administrators, and users of the compositor. General knowledge of computers and computer operation is presumed.

Important Information



Warning: Before installing, operating, or servicing any part of this product, read "Safety Instructions" on page 63.

Chapter Descriptions

The following topics are covered in this guide:

- Chapter 1, "Product Description and Specifications," provides environmental and technical information needed to properly set up and configure the scalable graphics compositor enclosure.
- Chapter 2, "Cabling the Scalable Graphics Compositor to Onyx4 Graphics Systems," describes all the connectors and LEDs on the back of the compositor chassis and example connections to an Onyx4 UlitimateVision graphics system.
- Chapter 3, "Cabling the Scalable Graphics Compositor to InfinitePerformance Graphics Systems," describes all the connectors and LEDs on the back of the

compositor chassis and provides example connections to InfinitePerformance visualization systems; including the Onyx 350 and Onyx 3000 systems.

- Chapter 4, “Configuring the Scalable Graphics Compositor,”describes how to use the Sgcombine utility to configure the compositor.
- Appendix A, “Regulatory Specifications,” lists all regulatory information related to use of the scalable graphics compositor in the United States and other countries.

Related Publications

When installing and configuring the Scalable Graphics Compositor, you may want to consult the following additional manuals:

- *Silicon Graphics Onyx4 UltimateVision User’s Guide* (007-4634-00*x*)
- *Silicon Graphics Onyx4 UltimateVision Start Here Guide* (007-4667-00*x*)
- *SGI Onyx 350 Graphics System User’s Guide* (007-4632-00*x*)
- *SGI Onyx 3000 Series Graphics System Hardware Owner’s Guide* (007-4264-00*x*)

You can obtain SGI documentation, release notes, or man pages in the following ways:

- See the SGI Technical Publications Library at http://docs.sgi.com. Various formats are available. This library contains the most recent and most comprehensive set of online books, release notes, man pages, and other information.
- If it is installed on your SGI system, you can use InfoSearch, an online tool that provides a more limited set of online books, release notes, and man pages. With an IRIX system, select **Help** from the Toolchest, and then select **InfoSearch**. Or you can type **`infosearch`** on a command line.

Conventions

The following conventions are used throughout this document:

Convention	Meaning
`Command`	This fixed-space font denotes literal items such as commands, files, routines, path names, signals, messages, and programming language structures.
variable	The italic typeface denotes variable entries and words or concepts being defined. Italic typeface also is used for book titles.
`user input`	This fixed-space font denotes literal items that the user enters in interactive sessions. Output is shown in nonbold, fixed-space font.
[ ]	Brackets enclose optional portions of a command or directive line.
...	Ellipses indicate that a preceding element can be repeated.
`man page`(*x*)	Man page section identifiers appear in parentheses after man page names.
GUI element	This font denotes the names of graphical user interface (GUI) elements such as windows, screens, dialog boxes, menus, toolbars, icons, buttons, boxes, fields, and lists.

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Product Description and Specifications

This chapter describes the Scalable Graphics Compositor (the compositor) and provides product specifications in the following sections:

- "Product Description" on page 1
- "Cooling and Power Specifications" on page 5
- "Physical and Environmental Specifications" on page 7

Product Description

The compositor is a hardware graphics compositor that can receive two, three, or four DVI digital video inputs, and then combine them into a single video output to increase graphics performance. Each input is from one Silicon Graphics Onyx4 UltimateVision or Onyx InfinitePerformance graphics pipe (VPro V12 board), residing in an SGI graphics device such as a, G2/G2N brick, SGI Onyx 350 compute/graphics module, or an SGI 3000 series V-brick. The video output can display on digital and analog monitors at the same time.

Each SGI graphics pipe provides the data for an area of the video output. Figure 1-1 provides an example of the inputs of four InfinitePerformance graphics pipes contributing to the video output on a monitor. You can configure the area of the screen sent by each graphics pipe with the Sgcombine utility described in Chapter 4, "Configuring the Scalable Graphics Compositor."

Note: If you are a software developer, you can also configure the compositor with programs accessed through the GLX_SGIX_Hyperpipe GLX extension. Enter **`man hyperpipe`** at your system console for more information on GLX_SGIX_Hyperpipe.

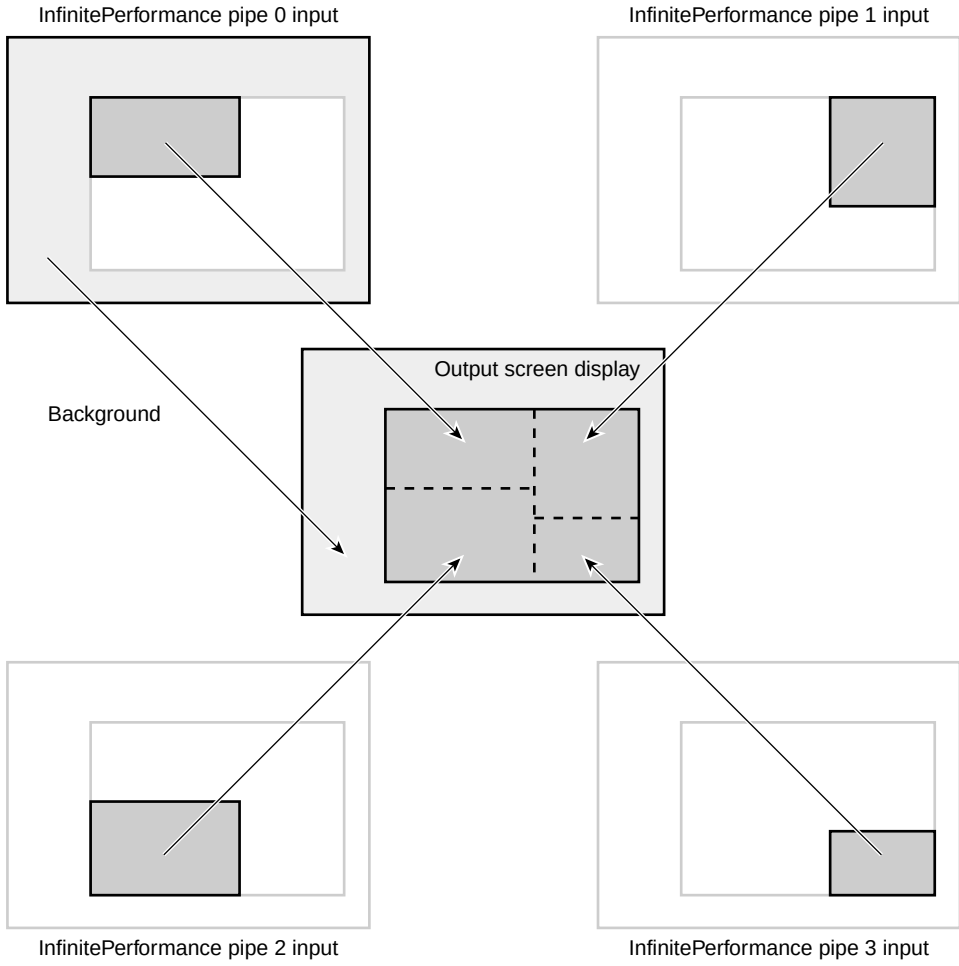


Figure 1-1 Example of InfinitePerformance Input Combinations

The compositor is a 2U-sized unit that comes rackmounted or is rackmounted for you by an SGI system support engineer (SSE).

The compositor features include the following:

- Four DVI single-link digital video inputs with up to 165-MHz pixel clock per input can combine into one digital video output that allows up to 165 MHz of output.
  - A selectable pixel averaging feature (antialiasing) combines the inputs from up to four graphics pipes into the compositor and averages these inputs to smooth jagged edges on displayed images.
  - A spatial composition/tiling feature enables each pipe connected to the compositor to render a pre-defined portion of the display.
- One analog video output supports up to 200-MHz pixel clock video output.
- DB9 stereo sync port connector connects to an emitter to provide stereo effect for LCD shutter glasses. This stereo function has one pipe providing images for the left and right eyes in alternating frame buffers. You can also select a **Stereo** mode through the **Initial Tiling Mode** field so that one graphics pipe provides 24-bit images for the left eye and another pipe provides images for the right eye in alternating frames to enhance viewing performance.
- One advanced csync connector and a GENLOCK 1 connector connect with the genlock connectors on the graphics pipes to synchronize the video refresh of the compositor output with the graphics pipes. These connections enable the compositor to receive an external sync signal, which locks the timing of the output video picture.
- One swap-ready port connector synchronizes the compositor buffer swaps to the graphics pipe buffer swaps.
- With InfinitePerformance graphics there are four swap-ready port connectors labeled **IP SWAP READY 0**, **1**, **2**, and **3** connect to the corresponding swap-ready connector on the InfinitePerformance pipes 0, 1, 2, and 3. These connections synchronize the compositor buffer swaps to the InfinitePerformance graphics pipe buffer swaps.
- One USB (type B) up connector connects the compositor to an Onyx host system upstream from the compositor.
- Four USB (type A) down connectors connect the compositor to other compositors downstream.

Figure 1-2 shows the front panel of the compositor.

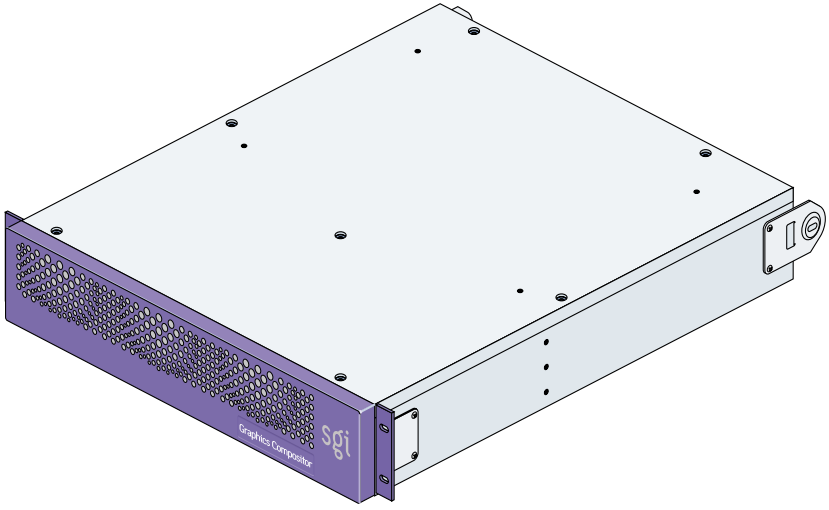


Figure 1-2 Front Panel of the Compositor

Figure 1-3 shows the rear panel of the compositor. For instructions for cabling the compositor using these rear panel connectors, see Chapter 2, “Cabling the Scalable Graphics Compositor to Onyx4 Graphics Systems,” or Chapter 3, “Cabling the Scalable Graphics Compositor to InfinitePerformance Graphics Systems.”

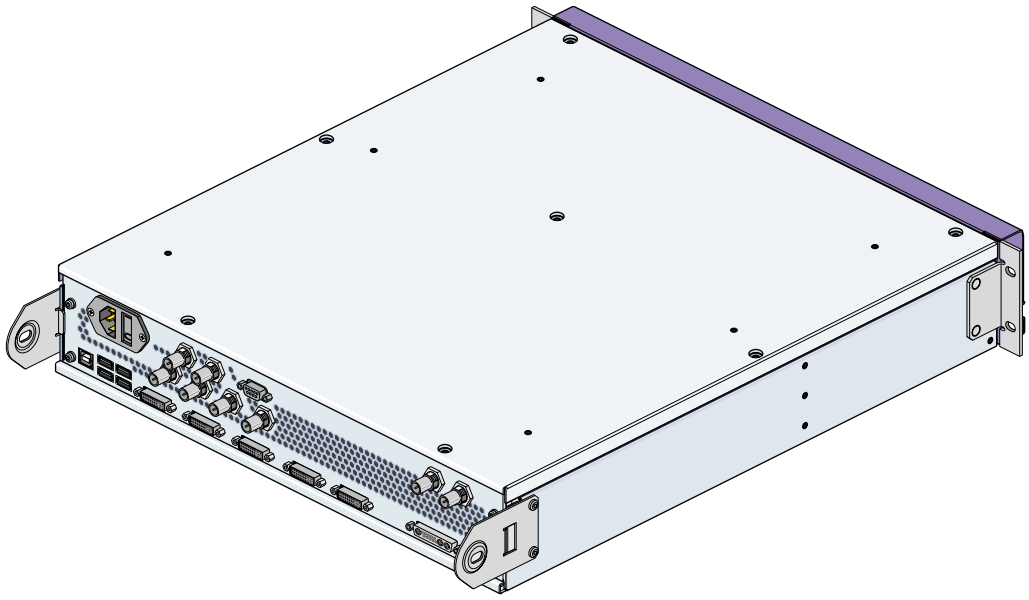


Figure 1-3 Rear Panel of the Scalable Graphics Compositor

Cooling and Power Specifications

Table 1-1 provides cooling and power specifications for a single compositor chassis.

Table 1-1 Cooling and Power Specifications

Specification	Value per Server
Cooling requirements	256 Btu/hour
Power consumption	125 W maximum
AC input to power supply	100-120/200-240 VAC at 50-60 Hz, 1.25A maximum (autoranging)

Table 1-1 Cooling and Power Specifications **(continued)**

Specification	Value per Server
Inrush current	5 A maximum
Nominal current draw	0.8 A @ 100-120 VAC, 0.4 A @ 200 -240 VAC
UPS volt-amp rating	250 VA

As shown in Figure 1-4, the airflow in the compositor chassis flows through the mesh grill at the front of the chassis, through the power supply enclosure, and over the motherboard. The hot air exhausts out the back of the chassis.

Caution: Always keep at least 4 inches (10.2 cm) of clearance at the back of the chassis for cooling.

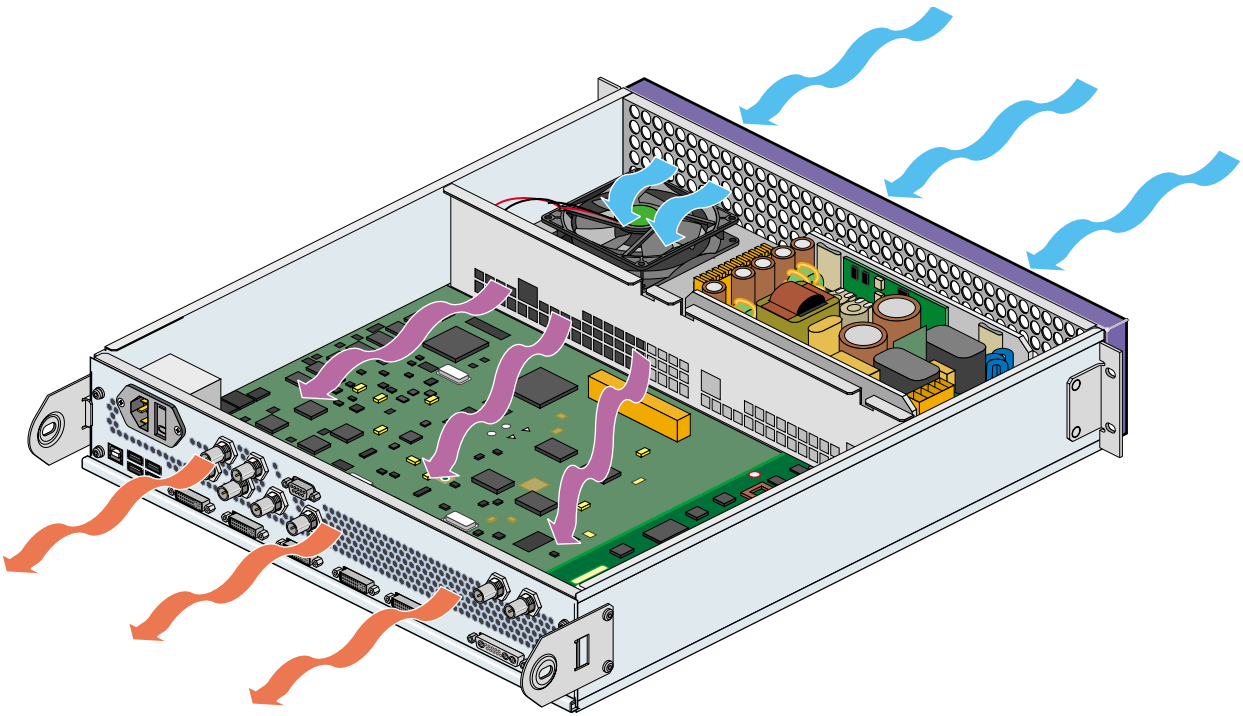


Figure 1-4 Chassis Airflow Diagram

Physical and Environmental Specifications

Table 1-2 lists the physical and environmental specifications for the compositor.

Table 1-2 Physical and Environmental Specifications

Specification	Value per compositor
Chassis dimensions	3.5 in. height (2U) x 17.5 in. width x 21 in. length (8.9 cm height [2U] x 44.4 cm width x 52 cm length). Length includes rear BNCs.
Weight (installed)	36 lb (16.4 kg) maximum
Installation orientation	Any, with 4 in. (10.2 cm) clearance at back
Acoustic noise	43 dBA approximate
Air temperature	
Operating	+41 to +95 °F (+5 to +35 °C) up to 5,000 ft. +41 to +86 °F (+5 to +30 °C) up to 10,000 ft.
Non-operating	-40 to +140 °F (-40 to +60 °C)
Thermal gradient	
Operating	18 °F (10 °C) per hour (maximum)
Non-operating	108 °F (60 °C) per hour (maximum)
Altitude	
Operating	10,000 ft (3,048 m) MSL (maximum)
Non-operating	40,000 ft (12,192 m) MSL (maximum)
Relative humidity	
Operating	10% to 95%, noncondensing
Non-operating	10% to 95%, noncondensing
Mechanical shock	
Operating	30 G, 3 ms (vertical) 15 G, 3 ms (horizontal)
Non-operating	Critical velocity 200 in/s, critical acceleration 50 G, 11 ms (trapezoidal)
Mechanical vibration	
Operating	0.25 G, 5-500-5 Hz, @ 1 oct/ min.
Non-operating	0.5 G, 3-200-3 Hz, @ 1 oct/min.

Cabling the Scalable Graphics Compositor to Onyx4 Graphics Systems

This chapter describes how to cable the Scalable Graphics Compositor (the compositor) connectors to the SGI Onyx4 graphics boards and display devices. This chapter includes:

- "Compositor Power Switch and Rear Panel Connectors" on page 9
- "Cabling the Scalable Graphics Compositor to the SGI Onyx4 Graphics Modules" on page 12.



Warning: Before installing, operating, or servicing any part of this product, read the following section: "Safety Instructions" on page 63.



Caution: Before installing and cabling the Scalable Graphics Compositor, see the cooling, power, physical, and environmental specifications in Chapter 1, "Product Description and Specifications."

Compositor Power Switch and Rear Panel Connectors

Figure 2-1 shows the power switch and connectors on the rear panel of the compositor chassis.

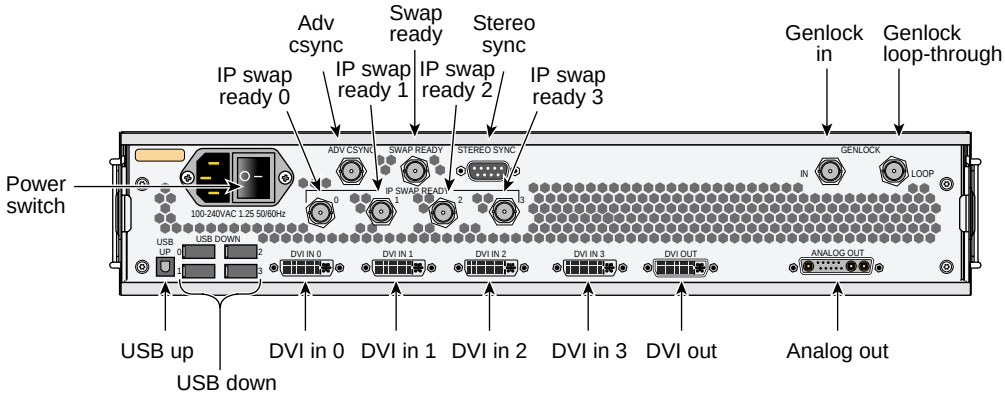


Figure 2-1 Power Switch and Connectors on Rear Panel

Table 2-1 details the functions of the power switch and connectors on the rear panel of the compositor.

Table 2-1 Power Switch and Connectors on Rear Panel

Name	Function
100-240 VAC 1.25 50/60 HZ	This connector is used to connect the compositor to a power source.
Power switch	Press the power switch to the ON (**I**) position to power on the compositor, and press the power switch to the OFF (**O**) position to power off the compositor. (The SGI logo on the compositor front panel lights blue when the compositor is powered on and is not lit when the compositor is powered off.)
ADV CSYNC	Reserved for Future Use.
SWAP READY	This connector is used to daisy-chain the swap-ready connectors of additional compositors to the compositor. 75-ohm BNC cables and BNC L connectors are used to make the connections. The swap-ready is used to synchronize the swap buffers between compositors.
STEREO SYNC	This connector is used to connect stereo glasses to the compositor. (Stereo glasses can also connect to the stereo sync connectors on the InfinitePerformance pipes.) You can also select **Stereo** through the **Initial Tiling Mode** field to divide the inputs into the stereo glasses between two InfinitePerformance pipes to enhance viewing performance.

Table 2-1 Power Switch and Connectors on Rear Panel **(continued)**

Name	Function
GENLOCK IN	This connector is used to daisy-chain the genlock connectors of all the InfinitePerformance pipes to the compositor. 75-ohm BNC cables, BNC L connectors, and a BNC terminator are used to make the connections. The genlock connections are used to synchronize multiple InfinitePerformance pipes with each other.
GENLOCK LOOP	This connector is used to daisy-chain the genlock function to other compositors. This connector is terminated when its daisy-chaining function is not used.
IP SWAP READY (0, 1, 2, and 3)	These connectors are used to connect the swap-ready connectors of all the InfinitePerformance pipes to the compositor. 75-ohm BNC cables and are used to make the connections. The swap-ready connections are used to synchronize the swap buffers in order to synchronize the InfinitePerformance pipes.
USB UP	This USB (type B) UP connector is used to connect an Onyx4 graphics system located upstream to the compositor.
USB DOWN	These four USB (type A) DOWN connectors are used to connect the compositor to other compositors downstream.
DVI IN 0	This Digital Video Interface (DVI) connector is used to connect to the leftmost DVI connector of the graphics pipe 0.
DVI IN 1	This Digital Video Interface (DVI) connector is used to connect to the leftmost DVI connector of the graphics pipe 1.
DVI IN 2	This Digital Video Interface (DVI) connector is used to connect with the leftmost DVI connector of the graphics pipe 2.
DVI IN 3	This Digital Video Interface (DVI) connector is used to connect with the leftmost DVI connector of the graphics pipe 3.
DVI OUT	This Digital Video Interface (DVI) OUT connector is used to cable a digital monitor to the compositor.
ANALOG OUT	This connector is used to cable an analog monitor to the compositor.

Cabling the Scalable Graphics Compositor to the SGI Onyx4 Graphics Modules

This section provides an example of how to cable the SGI Onyx4 graphics pipes, which reside in the G2/G2N module(s) to the compositor.

Figure 2-2 shows an Onyx4 graphics module with pipes 0 and 1. Refer back to Figure 2-1 and Table 2-1 for the locations and functional descriptions of the rear panel connectors as needed when cabling the compositor.

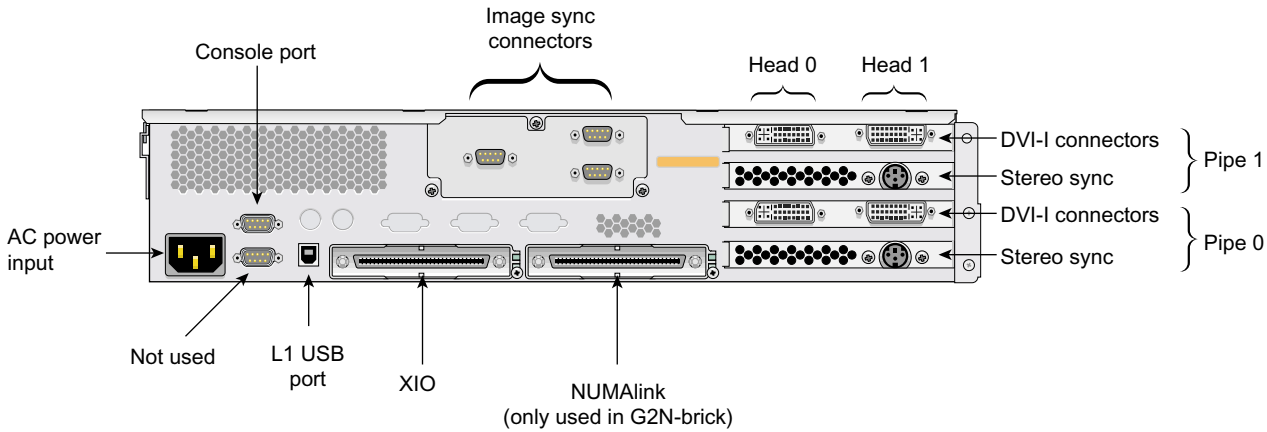


Figure 2-2 SGI Onyx4 Graphics Pipes

The rear panel of the SGI Onyx4 G2-brick or G2N-brick has the following connectors:

- AC power input. This connector connects the graphics brick to an AC power outlet.
- Console port. This DB-9 serial port (console and diagnostic port) enables you to connect a system console to the L1 controller on the graphics brick.
- L1 port (USB type B). This universal serial bus (USB) type B connector connects the graphics brick L1 controller to an L2 controller.
- XIO connector. This Crosstown2 connector connects the G2-brick to a host system compute brick. This connection is made with a NUMAlink cable.
- XIO connector LEDs. The XIO connector has a yellow LED and a green LED. The yellow LED indicates that both the graphics brick and the host system brick to which it is connected are powered on. The green

- LED indicates that the host system has established a link to the graphics brick.
- Image Sync connectors. These connectors are used in conjunction with an (image sync) card.
- NUMAlink connector (only used in G2N-bricks). This NUMAlink connector connects the G2N-brick to the host system. This connection is made with a NUMAlink cable.
- NUMAlink LED. The NUMAlink connector has a yellow LED and a green LED (located to the right of the NUMAlink connector). The yellow LED indicate that both the graphics brick and the host system brick to which it is connected are powered on. The green LED indicates that the host system has established a link to the graphics brick.
- DVI-I display connectors. These connectors are used to attach one or more external displays.
- Stereo Sync connectors. Stereo Sync is supported only with specific releases and configurations.

To install the compositor, follow these steps:

1. Be sure that the compositor power switch on the rear panel is in the OFF **(O)** position and that it is not connected to a power source.
2. Gather the following cables and other cabling items, most of which are shown in Figure 2-3:
   - Three DVI single-link cables
   - One DVI-I splitter cable with 75-ohm BNC cable attachment.
   - One 75-ohm BNC terminator
   - One USB cable
   - One digital monitor cable (not shown)
   - One analog monitor cable (not shown)
   - One power cable for the compositor (appropriate for local power source)

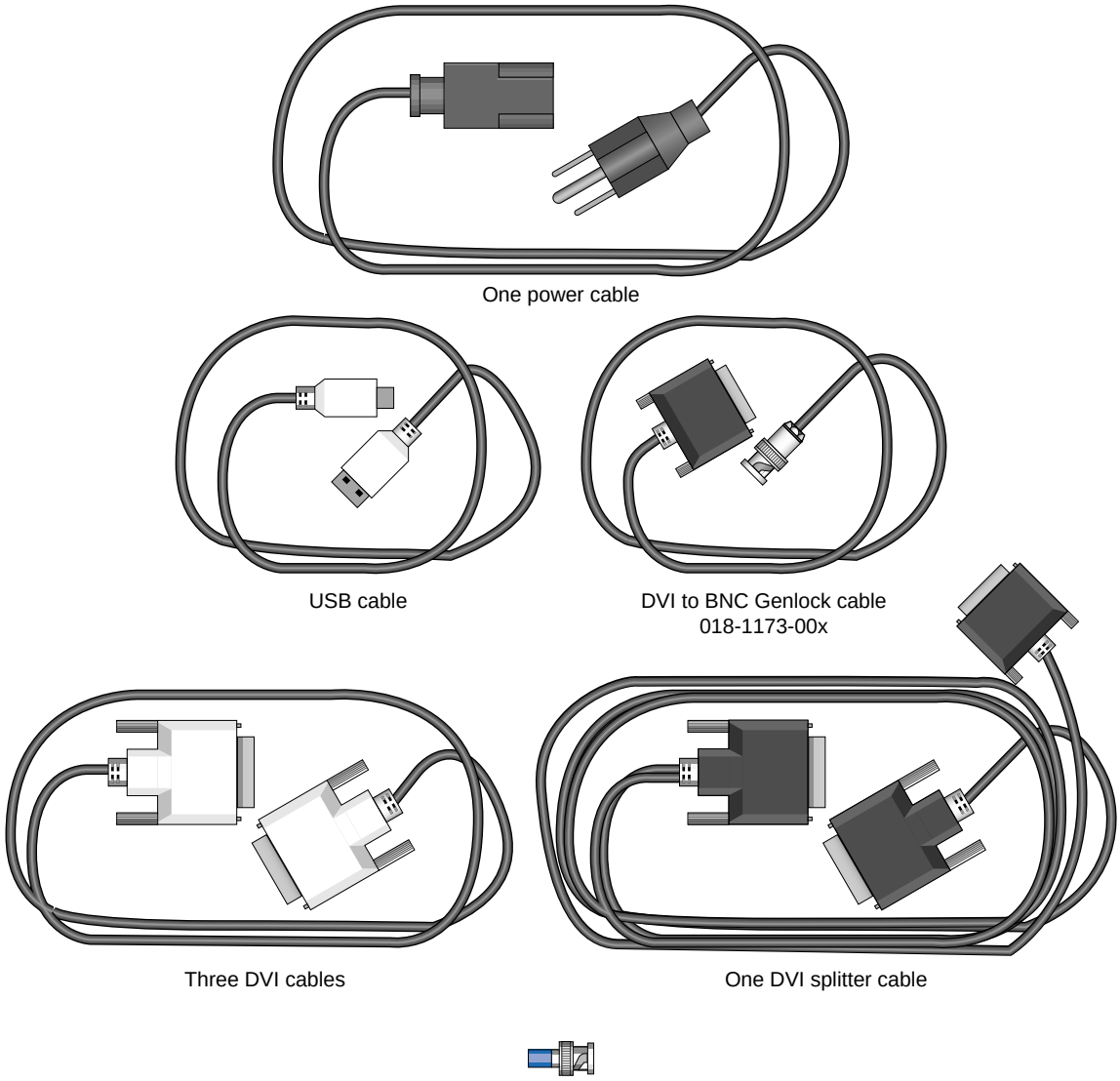


Figure 2-3 Cables and Other Cabling Items Needed for Installation

3. Using a USB cable, connect the **USB UP** port on the compositor to a USB connector port on the USB PCI option card installed in the Onyx4 compute module (as shown in Figure 2-4):

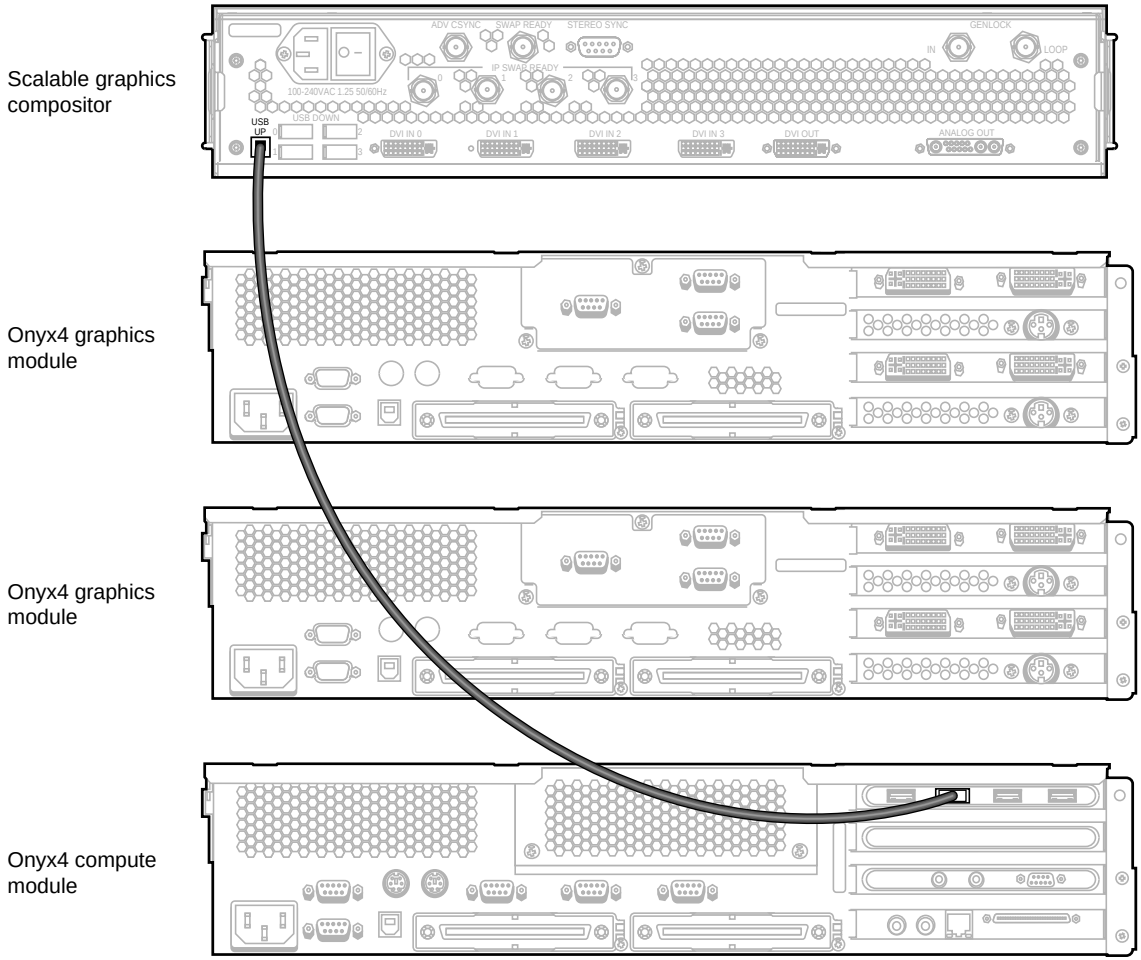


Figure 2-4 Onyx4 USB Connection Example

4. Using the DVI splitter cable and DVI single-link cables, connect the DVI connectors on the Onyx4 pipes to the compositor DVI connectors in the following order (as shown in Figure 2-5):

   a. Connect the DVI splitter cable to the DVI connector on pipe 0 of the Onyx4 graphics card. Then connect the digital side of the DVI splitter cable to the leftmost DVI IN 0 connector on the compositor. The DVI to BNC splitter cable connects to the Genlock-in connection on the upper right section of the compositor. Make sure the Genlock Loop through connector next to the splitter input is terminated with the 75-Ohm BNC terminator.

   b. Connect the DVI connector on the Onyx4 graphics pipe 1 to the compositor DVI IN 1 connector.

   c. Connect the DVI connector on the Onyx4 pipe 2 to the compositor DVI IN 2 connector.

   d. Connect the DVI connector on the Onyx4 pipe 3 to the compositor DVI IN 3 connector.

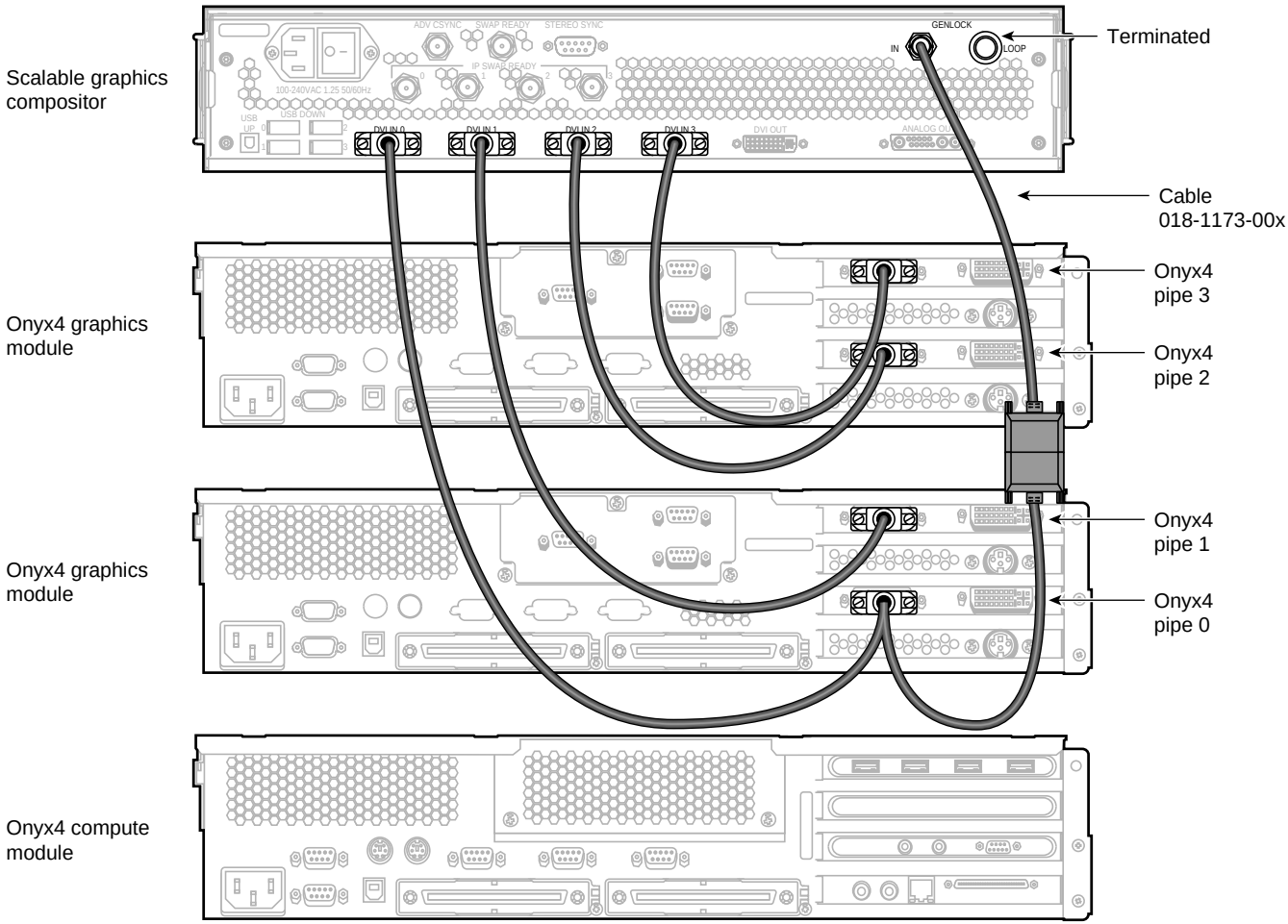


Figure 2-5 Connecting the DVI and Genlock In Connectors

5. Connect the 75-ohm BNC cable to the swap-ready connector on the compute module PCI card (leftmost connector), then connect the cable to the **Swap Ready** connector on the compositor as shown in Figure 2-6.
6. Connect the first image sync cable from the compute module PCI card (rightmost connector) to the image sync **Input 1** connector on the nearest G2/G2N module.

7. Connect an additional image sync cable from the **Repeat** connector to the image sync **Input 1** connector on the next G2/G2N module.

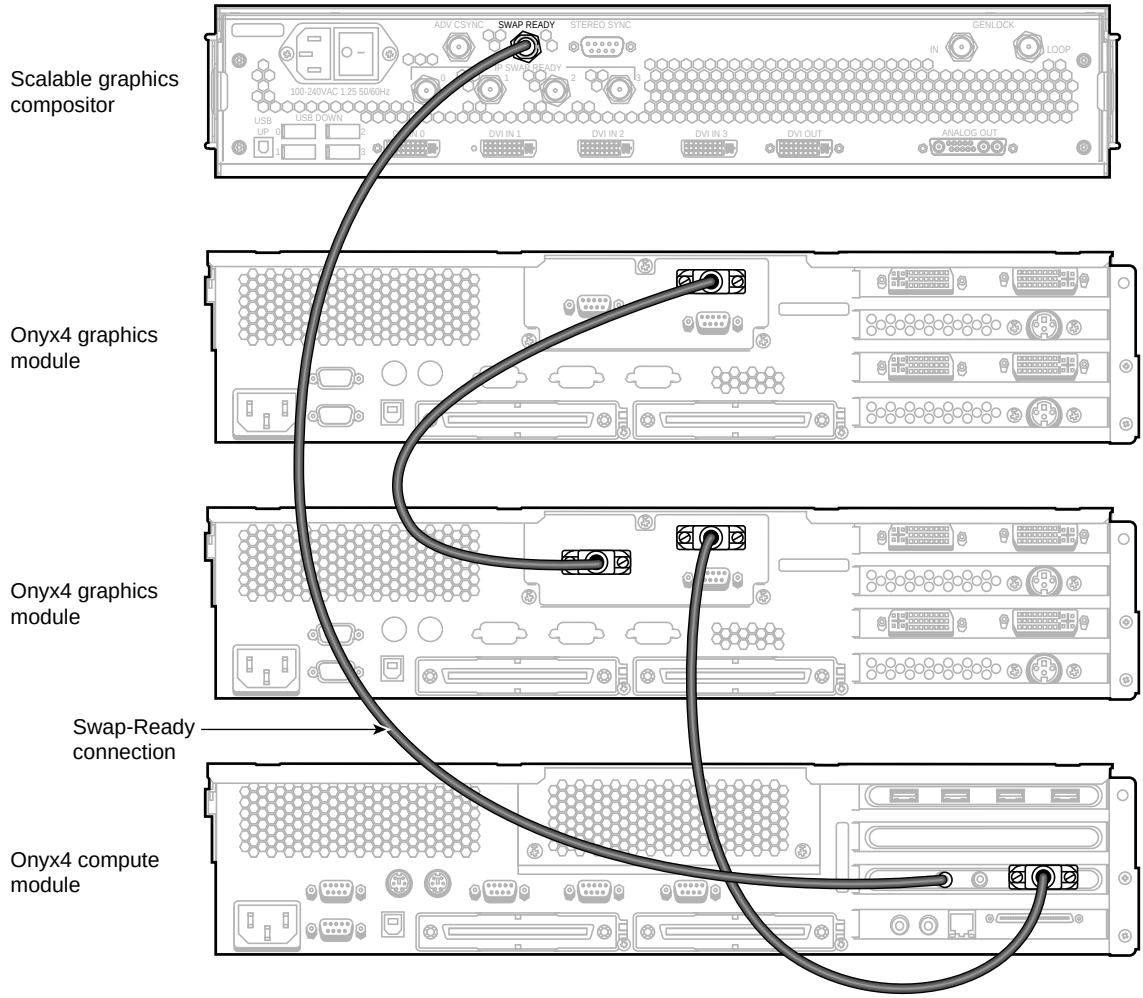


Figure 2-6 Onyx4 Image-Sync and Swap-Ready Connection Example

8. As is applicable to your cabling installation, connect the following items to the compositor (as shown in Figure 2-7):
   a. If you are connecting to a digital monitor, first make sure that your digital monitor is powered off and not connected to a power source. Then connect the DVI OUT connector on the compositor to your digital monitor.
   b. If you are connecting to an analog monitor, first make sure that your analog monitor is powered off and not connected to a power source. Then connect the ANALOG OUT connector on the compositor to an analog monitor.
   c. If you are connecting stereo glasses to the compositor, connect the glasses to the STEREO SYNC connector on the compositor. ???**Onyx4 Applicable???**
9. Connect one end of the power cord to the compositor power plug and the other end of the cord to your AC power source.
10. Connect your monitor(s) to a power source as described in your monitor installation guides.
11. Press the compositor power switch to the ON **(I)** position.
12. Power on your monitors as described in your monitor user guides.
13. Boot the SGI host system.
14. Proceed to Chapter 4, “Configuring the Scalable Graphics Compositor” for overview information on how to configure the compositor.

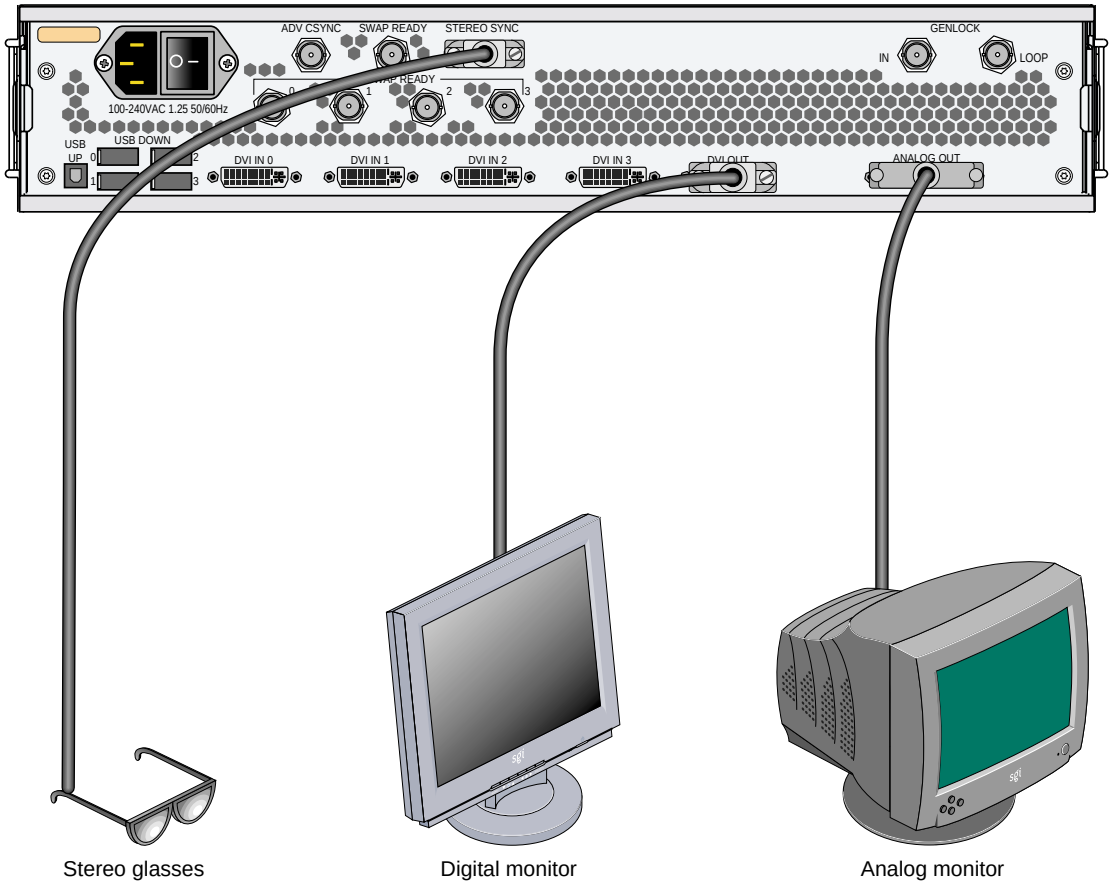


Figure 2-7 Example Connections to Digital and Analog Display Devices

Cabling the Scalable Graphics Compositor to InfinitePerformance Graphics Systems

This chapter describes how to cable the Scalable Graphics Compositor (the compositor) connectors to the SGI InfinitePerformance pipes (VPro V12 boards) and display monitors. This chapter includes:

- "Power Switch and Connectors on Rear Panel" on page 21
- "Cabling the Scalable Graphics Compositor Hardware to the SGI Onyx 350 Compute/Graphics Module" on page 24
- "Cabling the Scalable Graphics Compositor Hardware to an SGI Onyx 3000 System with InfinitePerformance Graphics" on page 36



Warning: Before installing, operating, or servicing any part of this product, read the following section: "Safety Instructions" on page 63.



Caution: Before installing and cabling the compositor, see the cooling, power, physical, and environmental specifications in Chapter 1, "Product Description and Specifications."

Power Switch and Connectors on Rear Panel

Figure 3-1 shows the power switch and connectors on the rear panel of the compositor chassis.

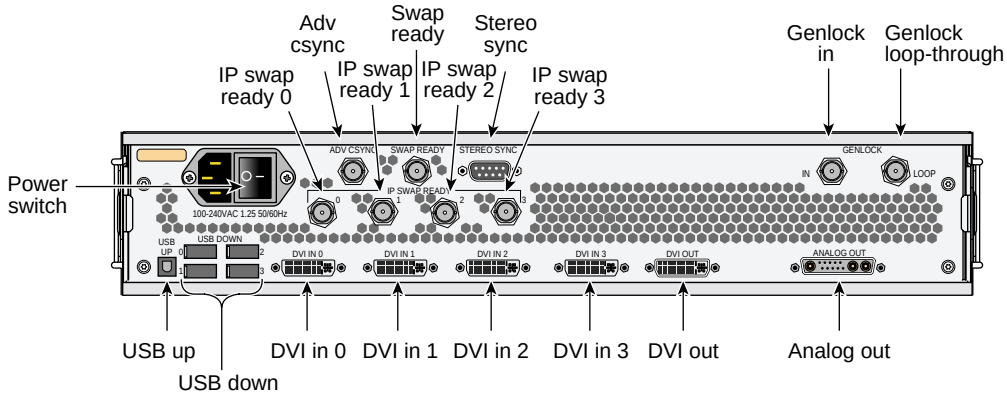


Figure 3-1 Power Switch and Connectors on Rear Panel

Table 3-1 details the functions of the power switch and connectors on the rear panel of the compositor.

Table 3-1 Power Switch and Connectors on Rear Panel

Name	Function
100-240 VAC 1.25 50/60 HZ	This connector is used to connect the compositor to a power source.
Power switch	Press the power switch to the ON (**I**) position to power on the compositor, and press the power switch to the OFF (**O**) position to power off the compositor. (The SGI logo on the compositor front panel lights blue when the compositor is powered on and is not lit when the compositor is powered off.)
ADV CSYNC	Reserved for Future Use.
SWAP READY	This connector is used to daisy-chain the swap-ready connectors of additional compositors to the compositor. 75-ohm BNC cables and BNC L connectors are used to make the connections. The swap-ready is used to synchronize the swap buffers between compositors.
STEREO SYNC	This connector is used to connect stereo glasses to the compositor. (Stereo glasses can also connect to the stereo sync connectors on the InfinitePerformance pipes.) You can also select **Stereo** through the **Initial Tiling Mode** field to divide the inputs into the stereo glasses between two InfinitePerformance pipes to enhance viewing performance.

Table 3-1 Power Switch and Connectors on Rear Panel **(continued)**

Name	Function
GENLOCK IN	This connector is used to daisy-chain the genlock connectors of all the InfinitePerformance pipes to the compositor. 75-ohm BNC cables, BNC L connectors, and a BNC terminator are used to make the connections. The genlock connections are used to synchronize multiple InfinitePerformance pipes with each other.
GENLOCK LOOP	This connector is used to daisy-chain the genlock function to other compositors. This connector is terminated when its daisy-chaining function is not used.
IP SWAP READY (0, 1, 2, and 3)	These connectors are used to connect the swap-ready connectors of all the InfinitePerformance pipes to the compositor. 75-ohm BNC cables and are used to make the connections. The swap-ready connections are used to synchronize the swap buffers in order to synchronize the InfinitePerformance pipes.
USB UP	This USB (type B) UP connector is used to connect an Onyx 300 system, Onyx 350 graphics/compute module, Onyx 3000 system (I-brick or IX-brick), or Onyx 3900 system, located upstream to the compositor.
USB DOWN	These four USB (type A) DOWN connectors are used to connect the compositor to other compositors downstream.
DVI IN 0	This Digital Video Interface (DVI) connector is used to connect to the leftmost DVI connector of the InfinitePerformance pipe 0.
DVI IN 1	This Digital Video Interface (DVI) connector is used to connect to the leftmost DVI connector of the InfinitePerformance pipe 1.
DVI IN 2	This Digital Video Interface (DVI) connector is used to connect with the leftmost DVI connector of the InfinitePerformance pipe 2.
DVI IN 3	This Digital Video Interface (DVI) connector is used to connect with the leftmost DVI connector of the InfinitePerformance pipe 3.
DVI OUT	This Digital Video Interface (DVI) OUT connector is used to cable a digital monitor to the compositor.
ANALOG OUT	This connector is used to cable an analog monitor to the compositor.

Cabling the Scalable Graphics Compositor Hardware to the SGI Onyx 350 Compute/Graphics Module

This section describes how to cable the SGI InfinitePerformance pipes, which reside in the Onyx 350 compute/graphics module(s) to the compositor.

Figure 3-2 shows an Onyx 350 compute/graphics module with one InfinitePerformance pipe. The USB PCI card and IO9 card are standard on the first system module but optional on expansion modules. See Figure 3-1 and Table 3-1 for the locations and functional descriptions of the rear panel connectors when cabling the compositor.

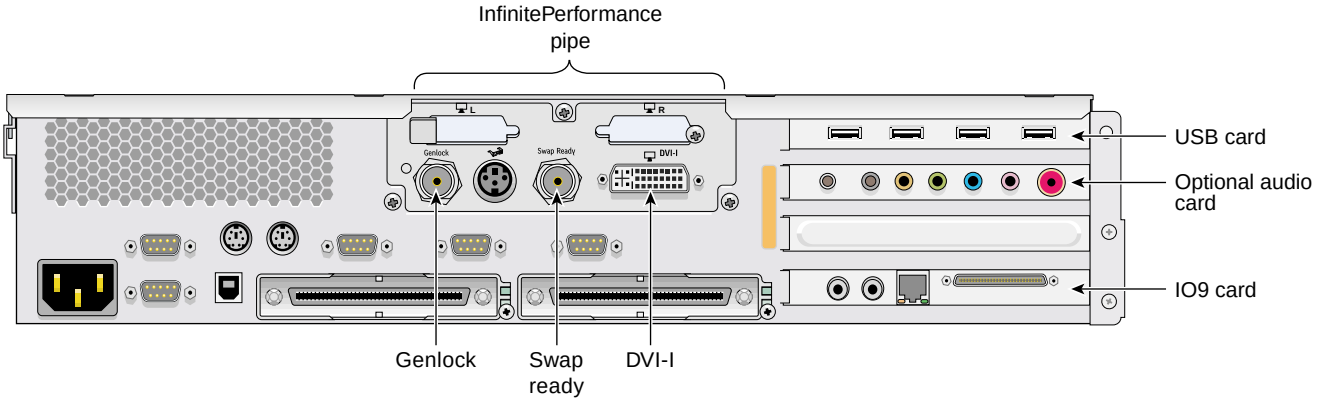


Figure 3-2 SGI Onyx 350 Compute/Graphics Module with One Infinite Performance Pipe

To install the compositor, follow these steps. Although you can connect fewer pipes, it is assumed that you are connecting four InfinitePerformance pipes to the compositor.

1. Be sure that the compositor power switch on the rear panel is in the OFF **(O)** position and that it is not connected to a power source.
2. Gather the following cables and other cabling items, most of which are shown in Figure 3-3:
   - Three DVI single-link cables
   - One DVI-I splitter cable
   - Eight 75-ohm BNC cables
   - Three BNC L connectors

- One 75-ohm BNC terminator
- One USB cable
- Up to four additional USB cables, depending on how many compositors will be connected together
- One digital monitor cable (not shown)
- One analog monitor cable (not shown)
- One power cable for the compositor (appropriate for local power source)

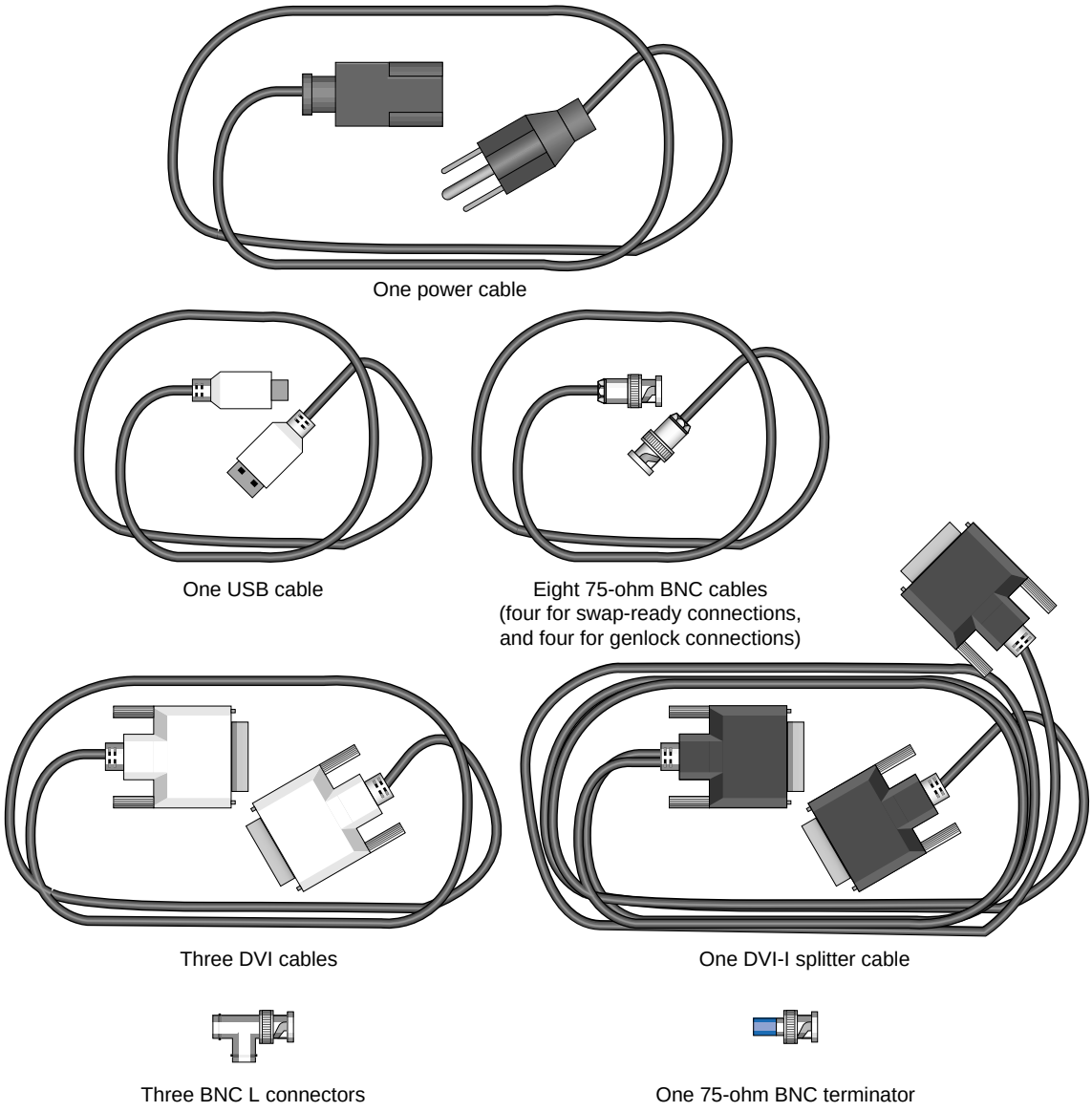


Figure 3-3 Cables and Other Cabling Items Needed for Installation

3. Using a USB cable, connect the USB UP port on the compositor to a USB DOWN port on the Onyx 350 graphics system which contains pipe 0 (as shown in Figure 3-4):

Note: You may connect additional compositors to the compositor shown in Figure 3-4 with USB cables by connecting the UP port(s) of the additional compositor(s) to the DOWN port(s) of the compositor shown.

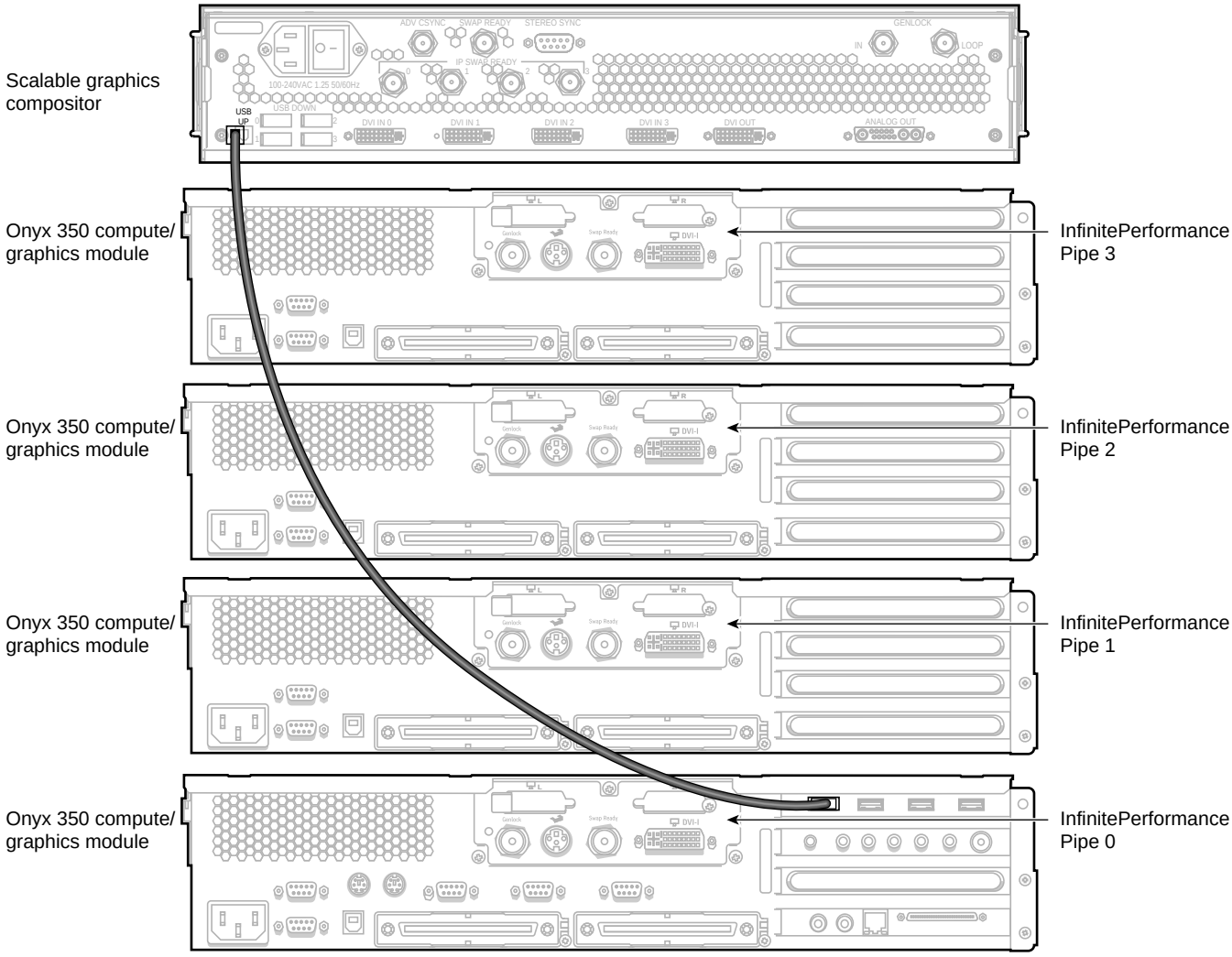


Figure 3-4 Connecting the USB Connectors

4. Using the DVI-I splitter cable and DVI single-link cables, connect the DVI connectors of the InfinitePerformance pipes to the compositor DVI connectors in the following order (as shown in Figure 3-5):

    a. Connect the DVI-I splitter cable to the DVI connector on the InfinitePerformance pipe 0. Then connect the digital side of the DVI-I splitter cable to the leftmost DVI IN 0 connector on the compositor. The analog side of the DVI-I splitter cable is used to connect a monitor to pipe 0. See step 8 for details on how to connect the monitor.

    b. Connect the DVI connector on the InfinitePerformance pipe 1 to the compositor DVI IN 1 connector.

    c. Connect the DVI connector on the InfinitePerformance pipe 2 to the compositor DVI IN 2 connector.

    d. Connect the DVI connector on the InfinitePerformance pipe 3 to the compositor DVI IN 3 connector.

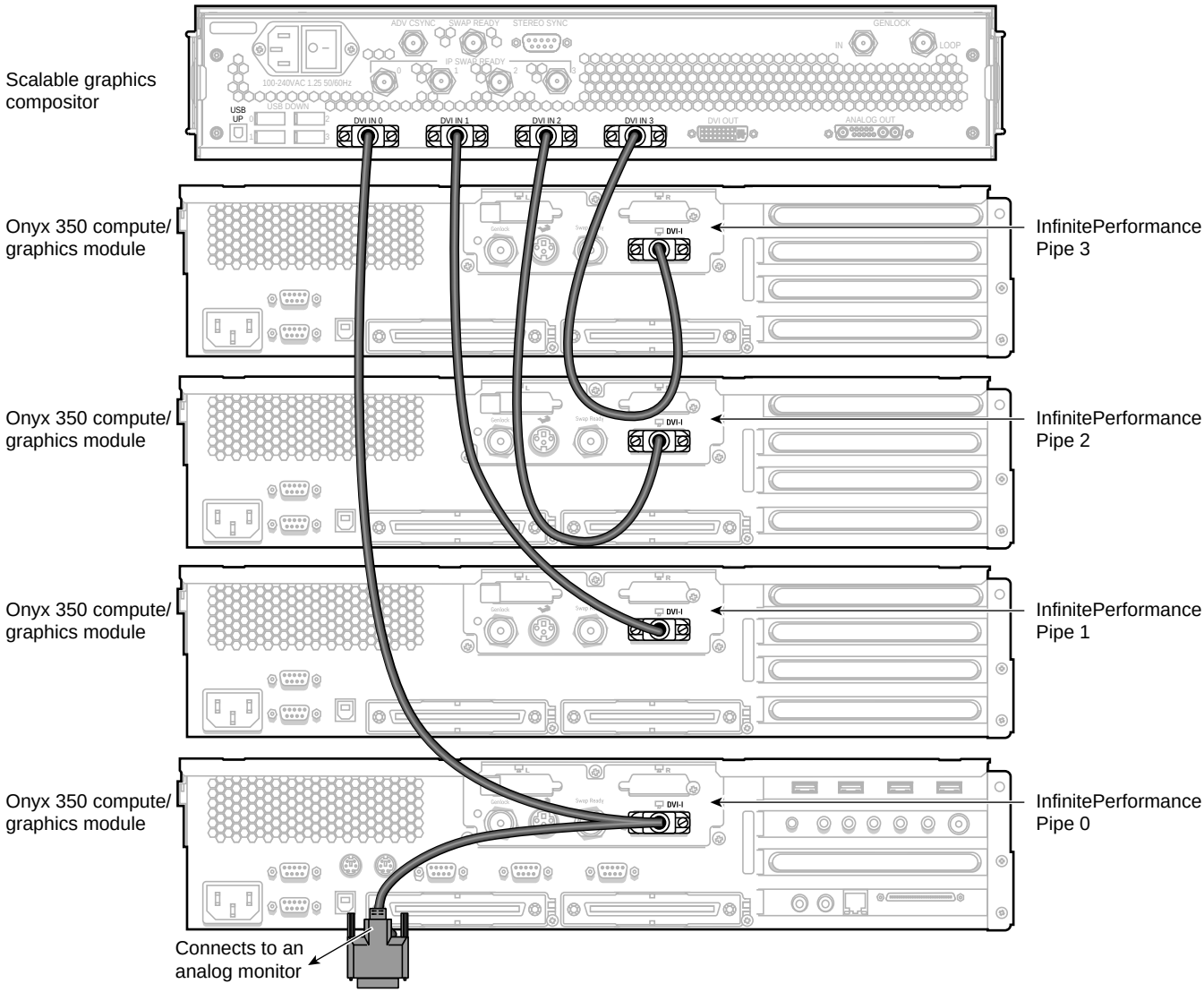


Figure 3-5 Connecting the DVI Connectors

5. Using the 75-ohm BNC cables, connect the swap-ready connectors of the InfinitePerformance pipes to the swap-ready connectors on the compositor in the following order (as shown in Figure 3-6): pipe 0 to IP SWAP READY 0, pipe 1 to IP SWAP READY 1, pipe 2 to IP SWAP READY 2, and pipe 3 to IP SWAP READY 3.

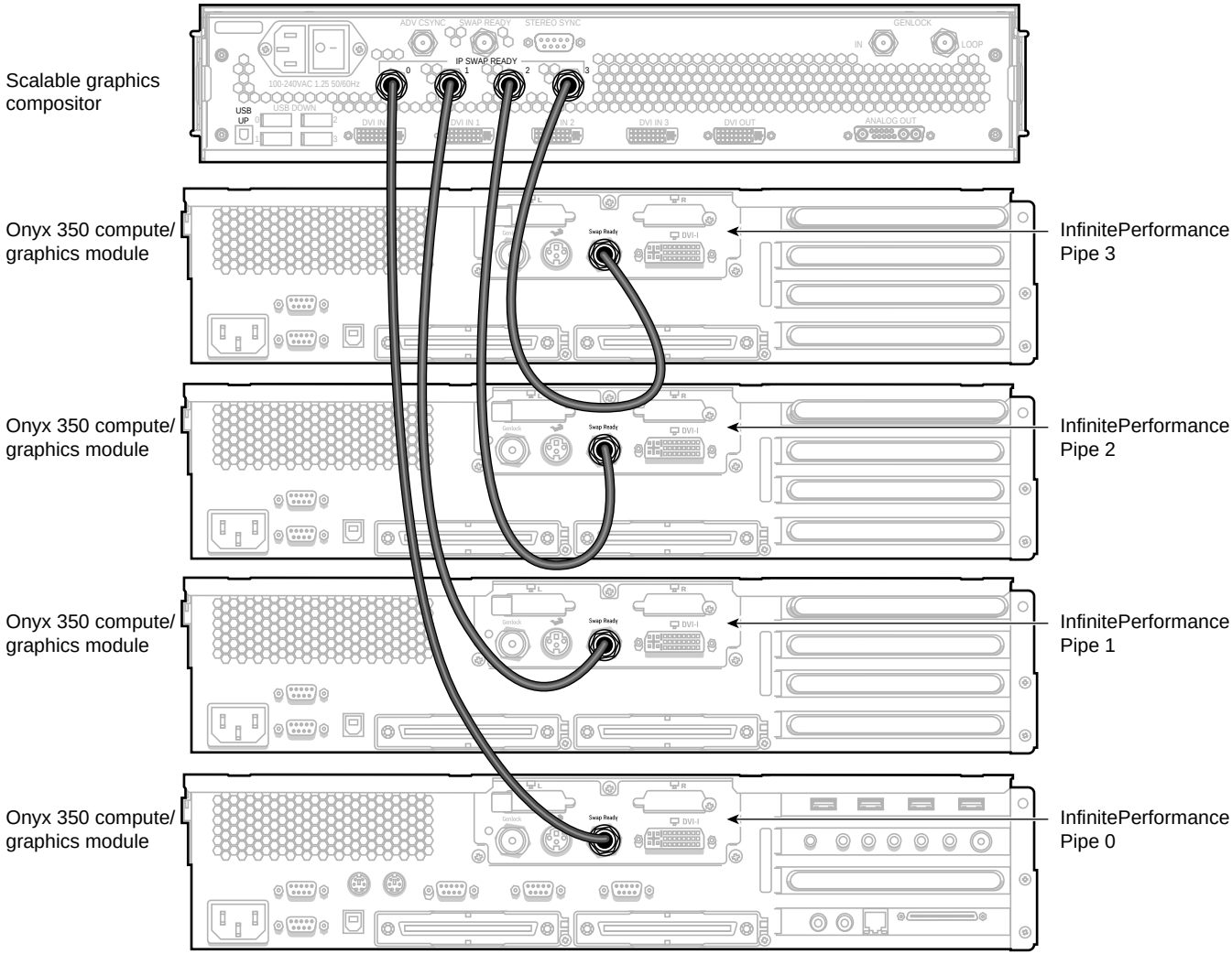


Figure 3-6 Connecting the Swap-Ready Connectors

6. Using the 75-ohm BNC cables and the BNC L connectors, daisy-chain the InfinitePerformance genlock connectors to each other, and then connect the last genlock connector to the genlock-in connector on the compositor in the following order (as shown in Figure 3-7): pipe 0 to pipe 1, pipe1 to pipe 2, pipe 2 to pipe 3, and pipe 3 to the genlock-in connector on the compositor.
7. Connect the 75-ohm BNC terminator to the genlock-loop connector shown in Figure 3-7.

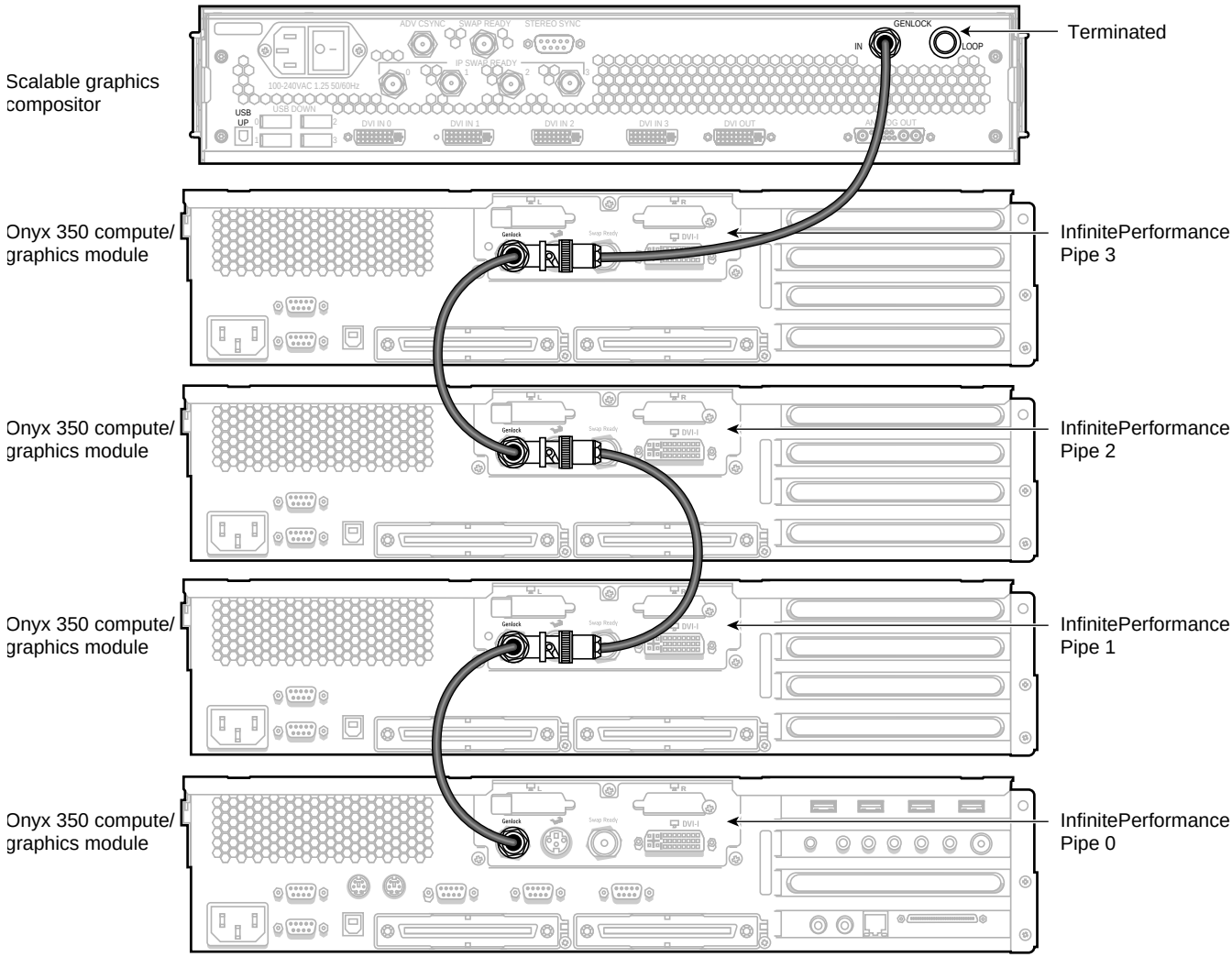


Figure 3-7 Connecting the Genlock Connectors

8. As is applicable to your cabling installation, connect the following items to the compositor (as shown in Figure 3-8):
    a. If you are connecting to a digital monitor, first make sure that your digital monitor is powered off and not connected to a power source. Then connect the DVI OUT connector on the compositor to your digital monitor.
    b. If you are connecting to an analog monitor, first make sure that your analog monitor is powered off and not connected to a power source. Then connect the ANALOG OUT connector on the compositor to an analog monitor. You can also connect the ANALOG OUT side of the DVI-I splitter cable, from the InfinitePerformance pipe, to an analog monitor (see Figure 3-5).
    c. If you are connecting stereo glasses to the compositor, connect the glasses to the STEREO SYNC connector on the compositor.
9. Connect one end of the power cord to the compositor power plug and the other end of the cord to your AC power source.
10. Connect your monitor(s) to a power source as described in your monitor installation guides.
11. Press the compositor power switch to the ON **(I)** position.
12. Power on your monitors as described in your monitor user guides.
13. Boot the SGI host system.
14. Proceed to Chapter 4, “Configuring the Scalable Graphics Compositor” for an overview on how to configure the compositor.

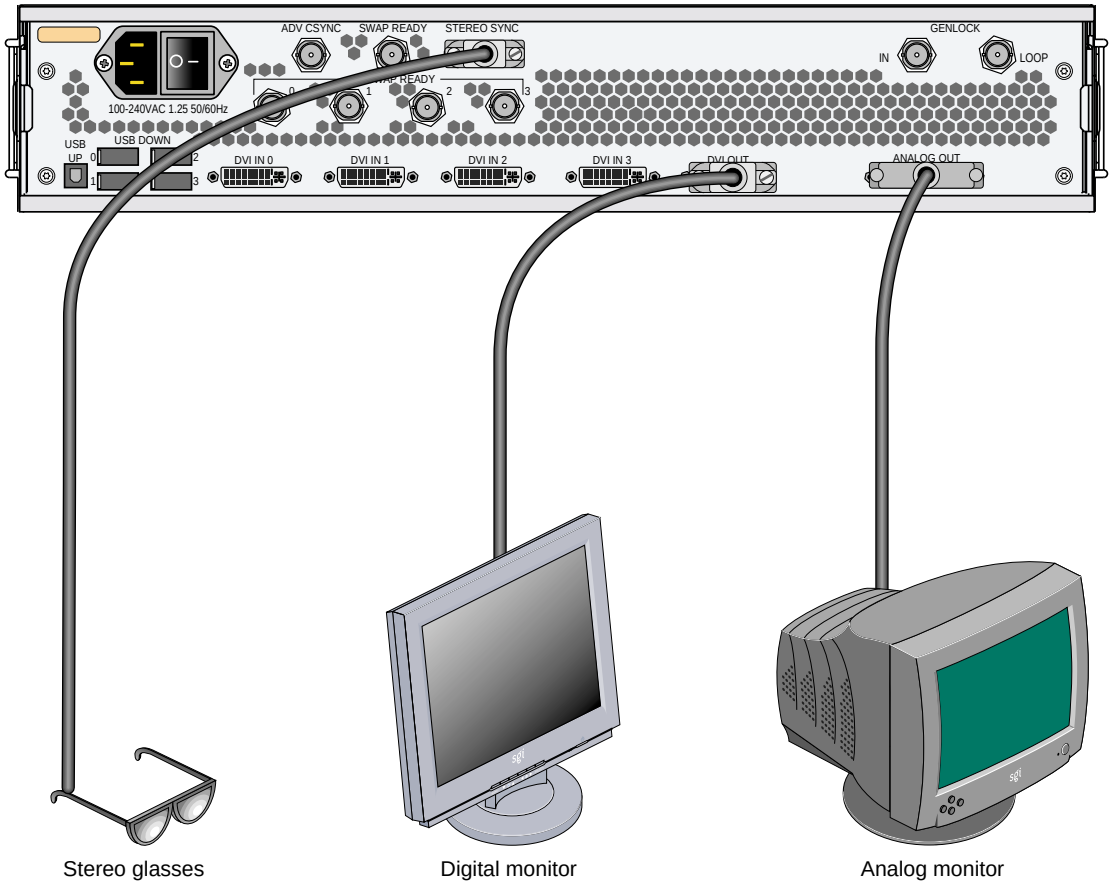


Figure 3-8 Connecting to Digital and Analog Monitors

Cabling the Scalable Graphics Compositor Hardware to an SGI Onyx 3000 System with InfinitePerformance Graphics

This section describes how to cable the SGI InfinitePerformance pipes, which reside in the SGI Onyx 3000 system(s) to the compositor connectors. In an SGI Onyx 3000 system, the InfinitePerformance pipes are installed in the V-brick(s).

Figure 3-9 shows a V-brick with two InfinitePerformance pipes. See Figure 3-1 and Table 3-1 for the locations and functional descriptions of the rear panel connectors when cabling the compositor.

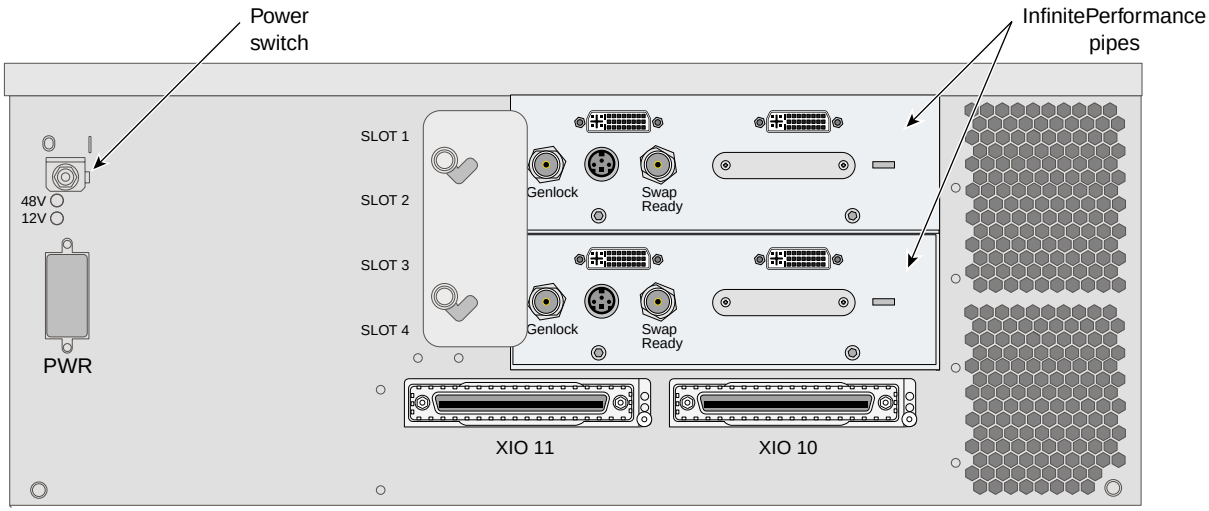


Figure 3-9 V-brick with Two InfinitePerformance Pipes

To install the compositor, follow these steps. Although you can connect fewer pipes, it is assumed that you are connecting four InfinitePerformance pipes to the compositor.

1. Be sure that the compositor power switch on the rear panel is in the OFF **(O)** position and that it is not connected to a power source.
2. Gather the following cables and other cabling items, most of which are shown in Figure 3-10:
   - Four DVI single-link cables
   - Eight 75-ohm BNC cables
   - Three BNC L connectors
   - Two 75-ohm BNC terminators
   - Up to four USB cables, depending on how many compositors will be connected together
   - One digital monitor cable (not shown)
   - One analog monitor cable (not shown)
   - One power cable for the compositor (appropriate for local power source)

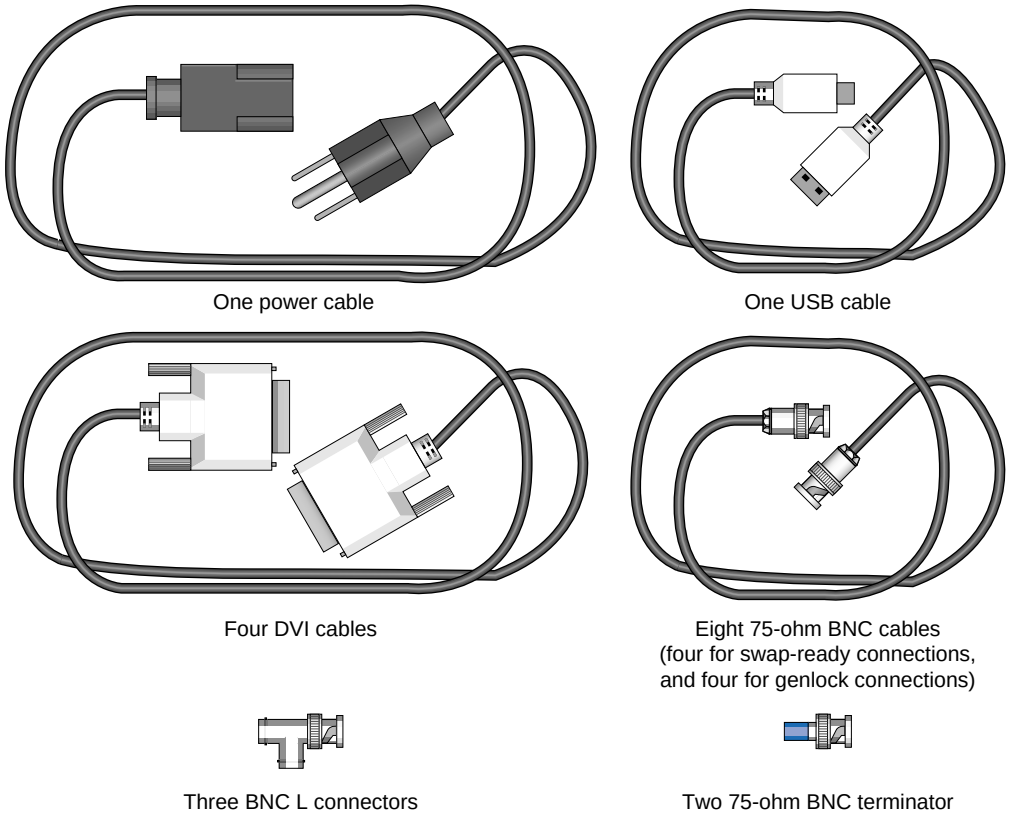


Figure 3-10 Cables and Other Cabling Items Needed for Installation

3. If you are connecting multiple compositors together, connect the USB UP port of one compositor to the USB DOWN port of another. You may connect up to four compositors together.
4. Using DVI single-link cables, connect the leftmost DVI connectors of the InfinitePerformance pipes to the compositor DVI connectors in the following order (as shown in Figure 3-11):
   a. Connect the leftmost DVI connector on the InfinitePerformance pipe 0 to the leftmost DVI IN 0 connector on the compositor.
   b. Connect the leftmost DVI connector on the InfinitePerformance pipe 1 to the compositor DVI IN 1 connector.

c. Connect the leftmost DVI connector on the InfinitePerformance pipe 2 to the compositor DVI IN 2 connector.

d. Connect the leftmost DVI connector on the InfinitePerformance pipe 3 to the compositor DVI IN 3 connector.

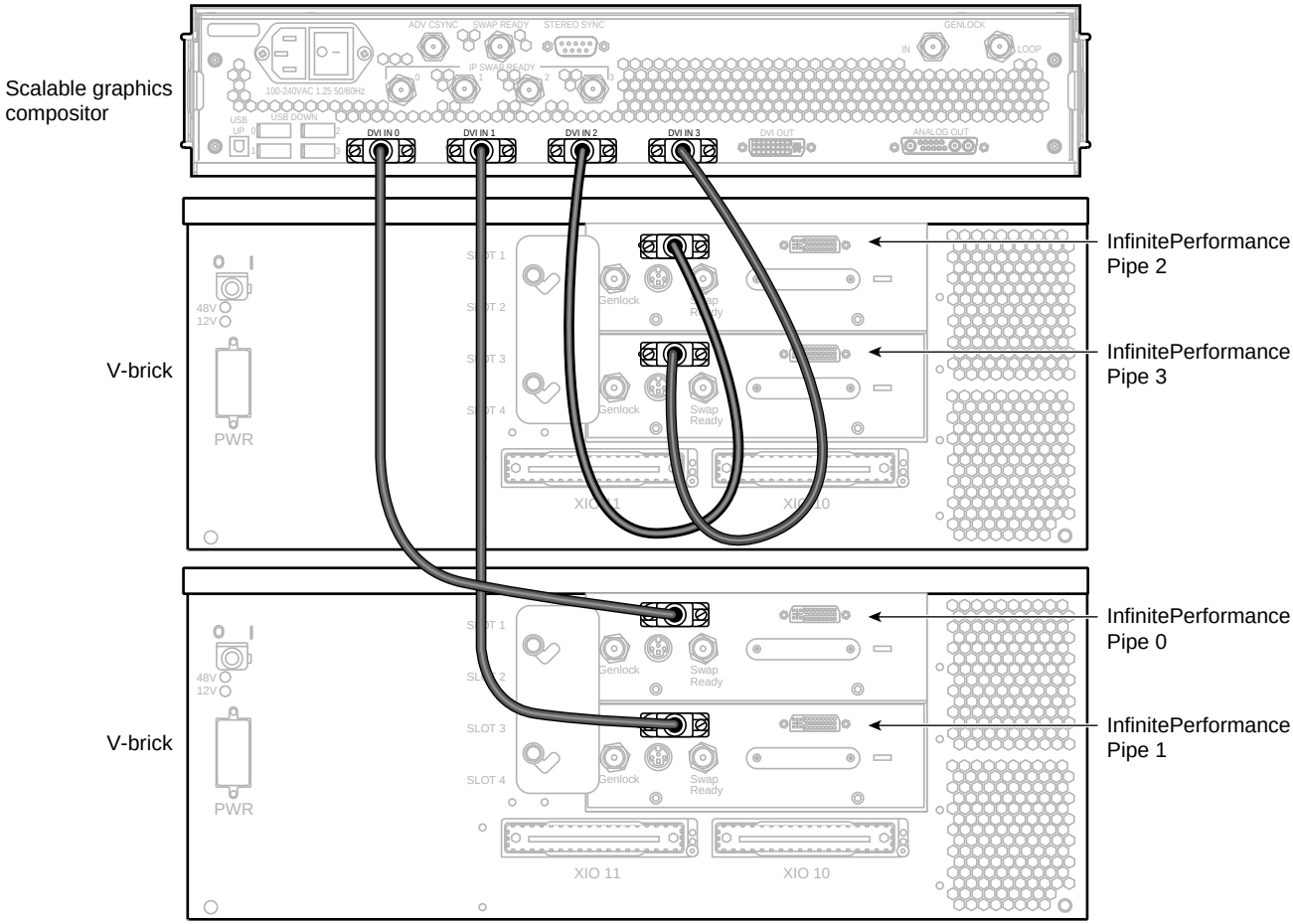


Figure 3-11 Connecting the DVI Connectors

5. Using the 75-ohm BNC cables, connect the InfinitePerformance swap-ready connectors to the swap-ready connectors on the compositor in the following order (as shown in Figure 3-12): pipe 0 to IP SWAP READY 0, pipe 1 to IP SWAP READY 1, pipe 2 to IP SWAP-READY 2, and pipe 3 to IP SWAP-READY 3.

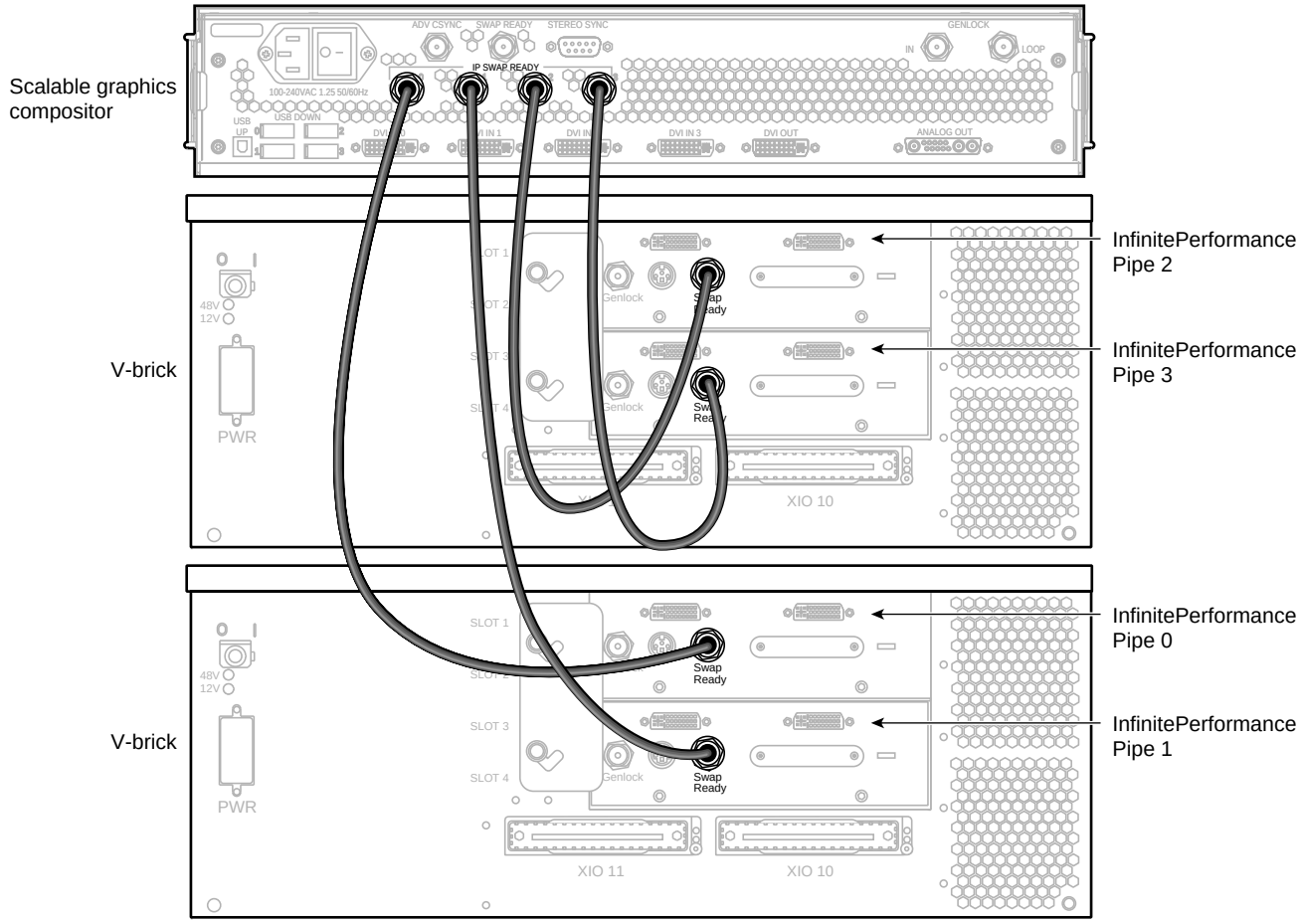


Figure 3-12 Connecting the Swap-Ready Connectors

6. Using the 75-ohm BNC cables and BNC L connectors, daisy-chain the InfinitePerformance genlock connectors to each other in the following order (as shown in Figure 3-13): pipe 0 to pipe 1, pipe 1 to pipe 2, pipe 2 to pipe 3, and pipe 3 to GENLOCK IN.
7. If you are not going to connect to other compositors, use a 75-ohm BNC terminator to terminate the GENLOCK LOOP connector on the compositor.

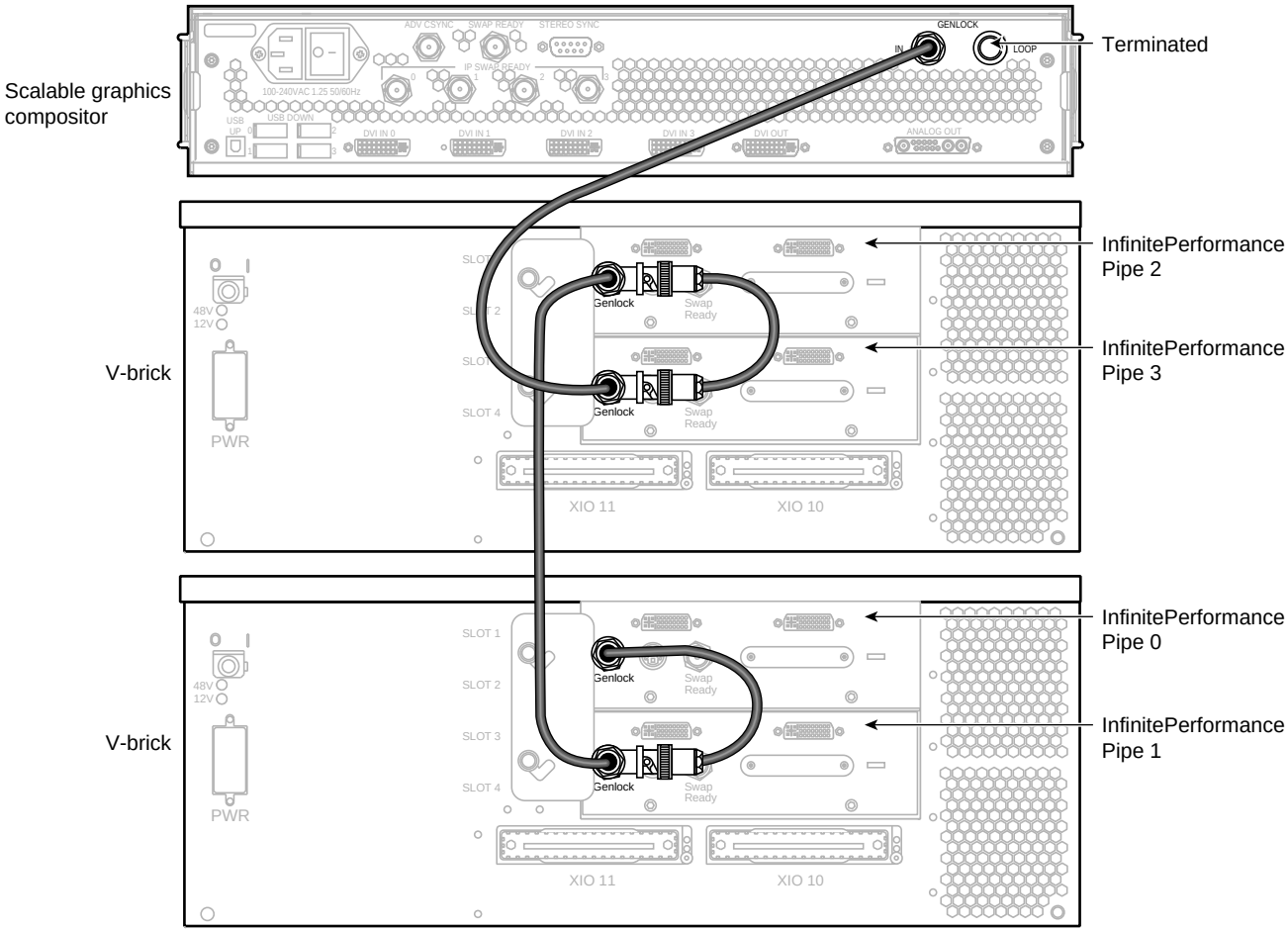


Figure 3-13 Connecting the Genlock Connectors

8. As is applicable to your cabling installation, connect the following items to the compositor (as shown in Figure 3-14):
    a. If you are connecting to a digital monitor, first make sure that your digital monitor is powered off and not connected to a power source. Then connect the DVI OUT connector on the compositor to your digital monitor.
    b. If you are connecting to an analog monitor, first make sure that your analog monitor is powered off and not connected to a power source. Then connect the ANALOG OUT connector on the compositor to your analog monitor.
    c. If you are connecting stereo glasses to the compositor, connect the glasses to the STEREO SYNC connector on the compositor.
9. Connect one end of the power cord to the compositor power plug and the other end of the cord to your AC power source.
10. Connect your monitor(s) to a power source as described in your monitor installation guides.
11. Press the compositor power switch to the ON **(I)** position.
12. Boot the SGI host system.
13. Power on your monitors as described in your monitor user guides.
14. Proceed to Chapter 4, “Configuring the Scalable Graphics Compositor” for overview information on how to configure the compositor.

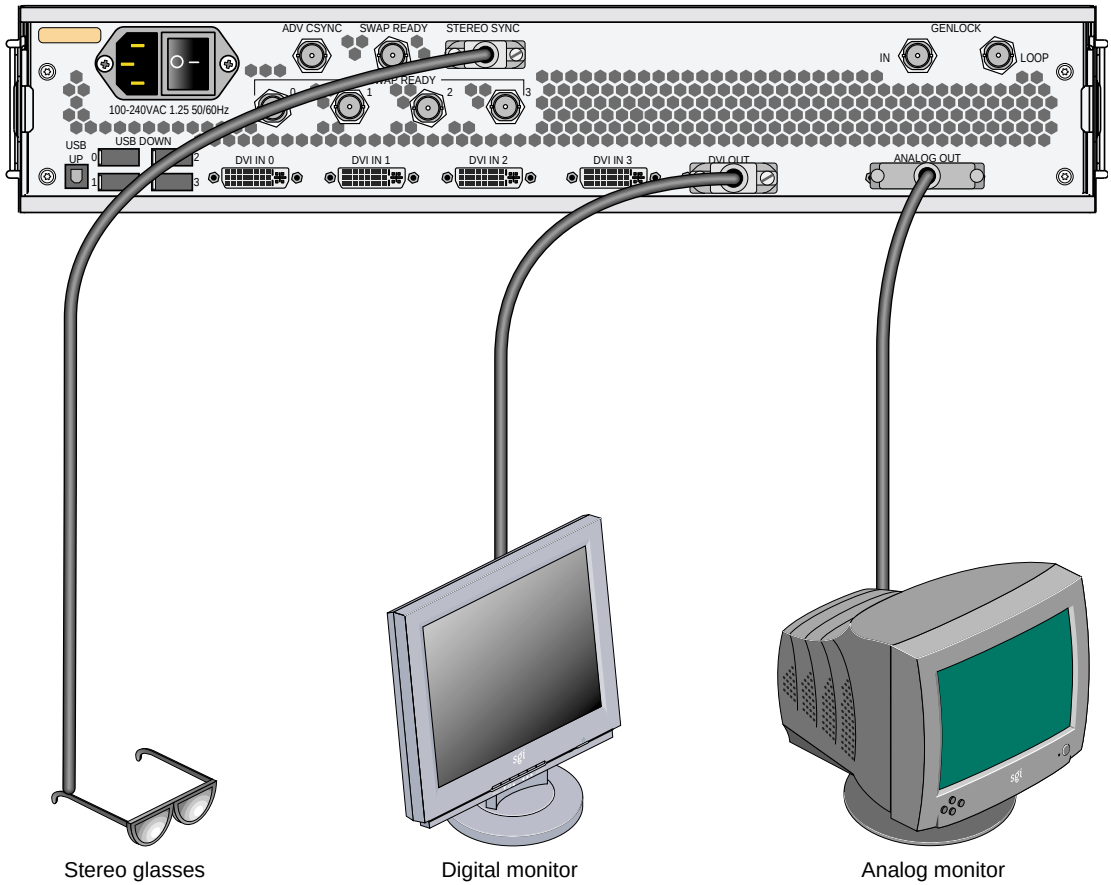


Figure 3-14 Connecting to Digital and Analog Monitors

Configuring the Scalable Graphics Compositor

You can use the Sgcombine utility to configure the Scalable Graphics Compositor (the compositor). You can also use the Sgcombine utility to set up all the SGI graphics pipes connected to the compositor and to set up the compositor video output.

Note: If you are a software developer, you can also configure the compositor with programs accessed through the GLX_SGIX_Hyperpipe GLX extension. Enter **`man hyperpipe`** at your system console for more information on GLX_SGIX_Hyperpipe.

To use the Sgcombine utility, enter **`/usr/gfx/sgcombine`** at the IRIX user prompt. Figure 4-1 shows the main window of the Sgcombine utility.

The **Sgcombine** main window displays the combined output area from the various inputs from the graphics pipes connected to the compositor. From the main window, you can do the following:

- Select the video format of the display combined by the compositor. The format options appear as follows: 1280x1024_60.vfo. The first number identifies the width of the display, the second number identifies the height, and the third number indicates how many times per second the display will refresh itself. The format selected must be compatible with the monitor you will be connecting to the compositor.
- Select initial tiling settings to determine how you want to combine the graphics pipe display inputs to the combined output display on the monitor.

Note: Dynamic load balancing provides updates to graphics compositor tiling while an application is running. You use the glXHyperpipeAttribSGIX (3G) function call. Type **`man glXHyperpipeAttribSGIX(3G)`** to view the man page data. SGI OpenGL Performer version 3.0 adds support for dynamic tiling. See *OpenGL Performer Getting Started Guide* (P/N 007-3560-00*x*) and *Programmer's Guide* (P/N 007-1680-0*xx*) for more information on this function. The OpenGL multipipe software development kit (MPSDK) version 2.1 also provides this enhanced tiling functionality for the compositor. See the *SGI OpenGL Multipipe SDK User's Guide* (P/N 007-4239-00*x*) for more information.

- Select the device (graphics pipe or external device) that generates the master sync signal. The other devices must synchronize with this signal.
- Select video properties for your compositor configuration that meet the requirements of the video monitor you will be using.

The following is a sample configuration procedure that details all the possible configuration selections. When you perform the actual configuration, you can select **Download** at any time during the configuration procedure after you have selected the video format. This downloads the configuration to your hardware. The configuration settings take effect only after the configuration is downloaded.

Note: The example window shown in Figure 4-1 shows "Vpro" as the video format. In the case of Onyx4 graphics it would show "SG2" as the video format.

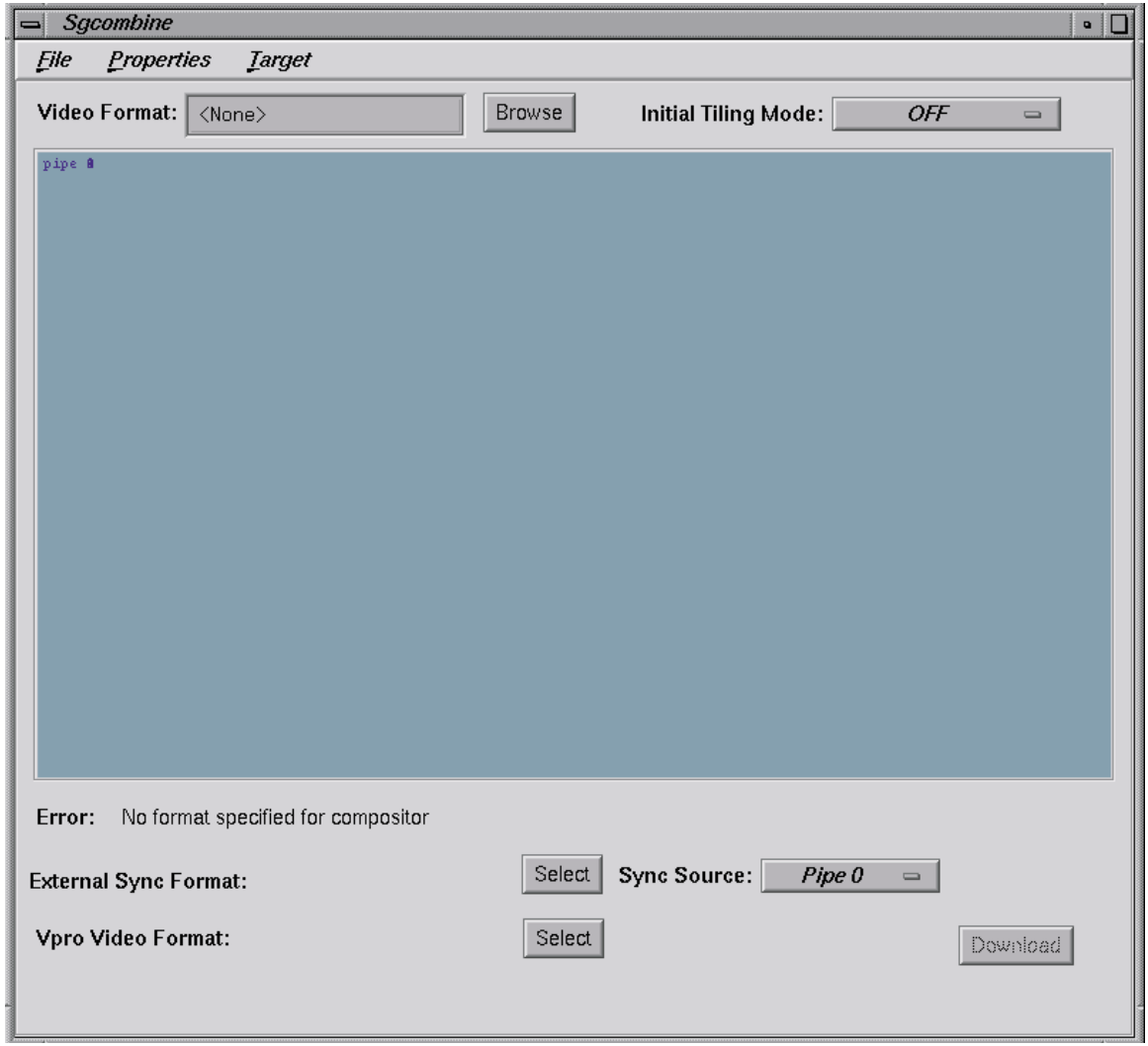


Figure 4-1 Sgcombine Main Window Example

To configure the compositor, follow these steps. (Follow steps 1 through 3 for a simple configuration, or follow all the steps for a more detailed configuration.)

1. Select **Browse** from the main window to see the **Select Format** window shown in Figure 4-2. Select a video format for the compositor by following these steps:

   a. Select a video format from the **Files** field. The options appear as follows: 1280x1024_60.vfo. The first number identifies the width of the display, the second number identifies the height, and the third number indicates how many times per second the display will refresh itself. This third number appears as **Frame Rate** and **Swap Rate** in the dialog box. **Frame Rate** is how many times the screen will be scanned per second, and the **Swap Rate** is how many times per second the displayed graphics will change.

   Note: New video formats for the compositor may be compiled through the Video Format Compiler. See the *Video Format Compiler Programmer's Guide (007-3402-00x)* for more information.

   ---

   b. After you have highlighted the format you want, click **OK.** Once you click **OK**, the format selected appears on the **External Sync Format** field and on the **Vpro Video Format** field on the main window. Note that external sync is not supported in Onyx4 graphics systems.

      In the **External Sync Format** field, you can select a video format from an external sync device different from the compositor video format. However, you must select a video format with the same frame rate and the same number of total video lines as the compositor video format.

      In the **Video Format** field, you can select a video format for the VPro or SG2 graphics board that is different from the compositor video format. You must select a video format with the same frame rate and the same number of total video lines as the compositor video format.

      Note: You will see an error message in the **Error** field if the video format selected for the **External Sync Format** or the **Vpro/SG2 Video Format** is not compatible with the compositor video format.

Note: The **Error** field indicates any error with the current format configuration selected. If there is no error with the selection, the **Error** field displays **None**. A common error occurs when the frame rates selected do not match. This indicates that the format selected for the graphics board does not work with the video format selected for the compositor. These two formats must be similar.

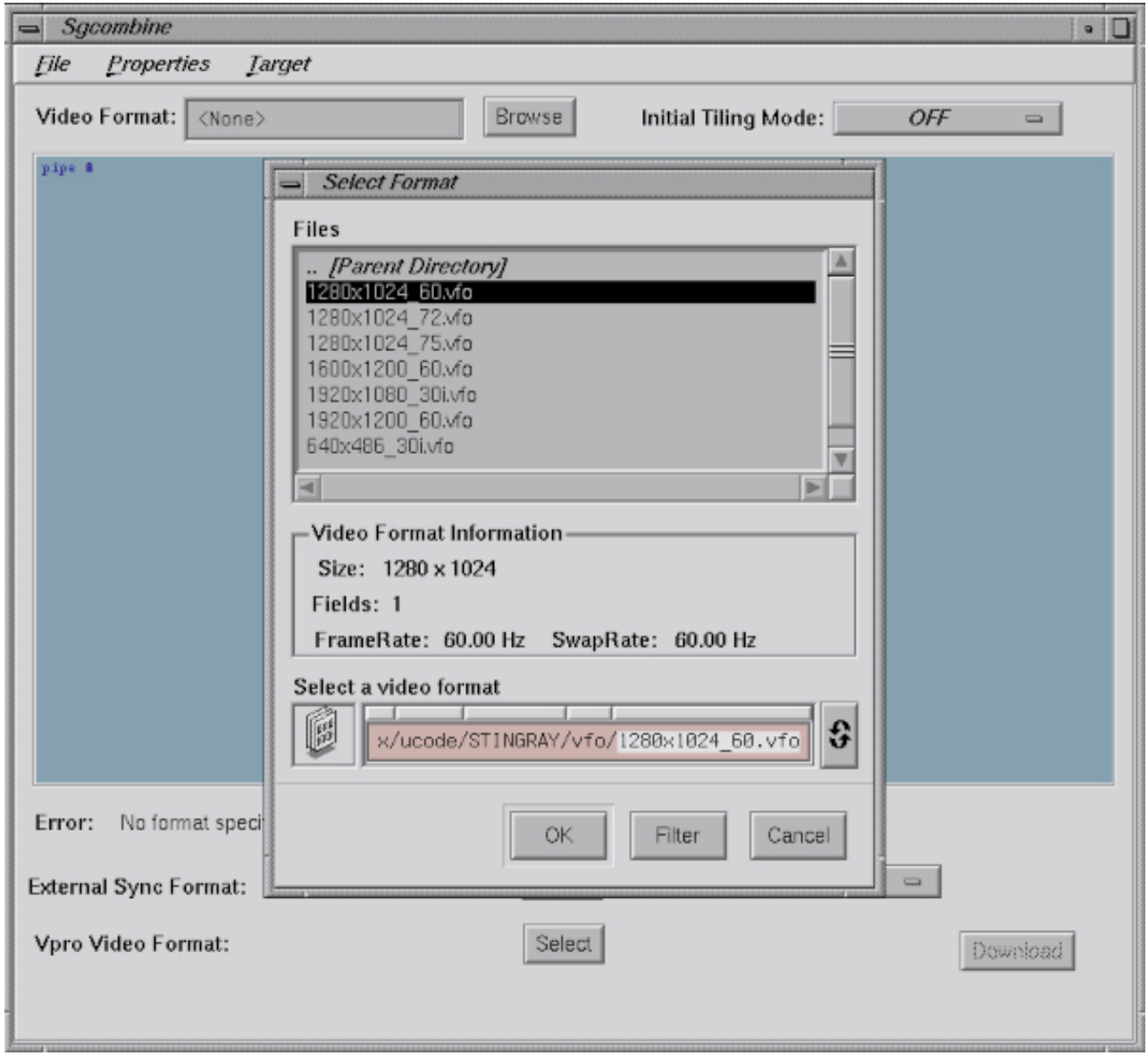


Figure 4-2 Select Format Window Example

2. In the **Initial Tiling Mode** field, select how you want to divide the composite display screen area, as follows:

   - **Quadrants**: This selection divides the screen into four display areas. (This selection works only if you have inputs from four graphics pipes.) Each graphics pipe controls one quadrant of visual space that contributes to the whole display surface. Figure 4-3 shows an example of how the screen display can be divided with the **Quadrants** selection. Note that VPro graphics are being used in the example. Onyx4 (SG2) video format is adjusted in the same manner.
   - **Horizontal Stripe**: This selection divides the display area into two horizontal areas if you have inputs from two graphics pipes. If you have inputs from four graphics pipes, this selection divides the display area into four horizontal areas.
   - **Vertical Stripe**: This selection divides the display area into two vertical areas if you have inputs from two graphics pipes. If you have inputs from four graphics pipes, this selection divides the display area into four vertical areas.
   - **Pixel Average**: This selection combines the inputs from the graphics pipes connected to the compositor and displays an average of those inputs. (This selection works only if you have inputs from four graphics pipes.) You can use this selection for anti-aliasing (smoothing jagged edges on items on a display).
   - **Stereo**: This selection splits the data source inputs into stereo glasses so that one pipe provides the data for the right eye (input 0) and another pipe provides the data for the left eye (input 1). (This selection works only if you have inputs from two graphics pipes.) This stereo function increases viewing performance by alternating between the two inputs to enhance the viewing output. You must connect stereo glasses to the **STEREO SYNC** connector on the rear panel of the compositor to use this function.

     Note: You can also select **Stereo** mode by using the glXHyperpipeAttribSGIX **(3)** function. You can also select **Stereo** mode by using OpenGL multipipe software development kit (MPSDK) version 2.1.

3. After you have selected the initial tiling mode, you can use the default configuration settings or proceed to the next steps to configure more of the settings for the compositor. If you want to stop your configuration at this point, select the **Download** button from the **Sgcombine** main window to download your configuration to the hardware.

Note: The configuration settings take effect only after the configuration is downloaded.

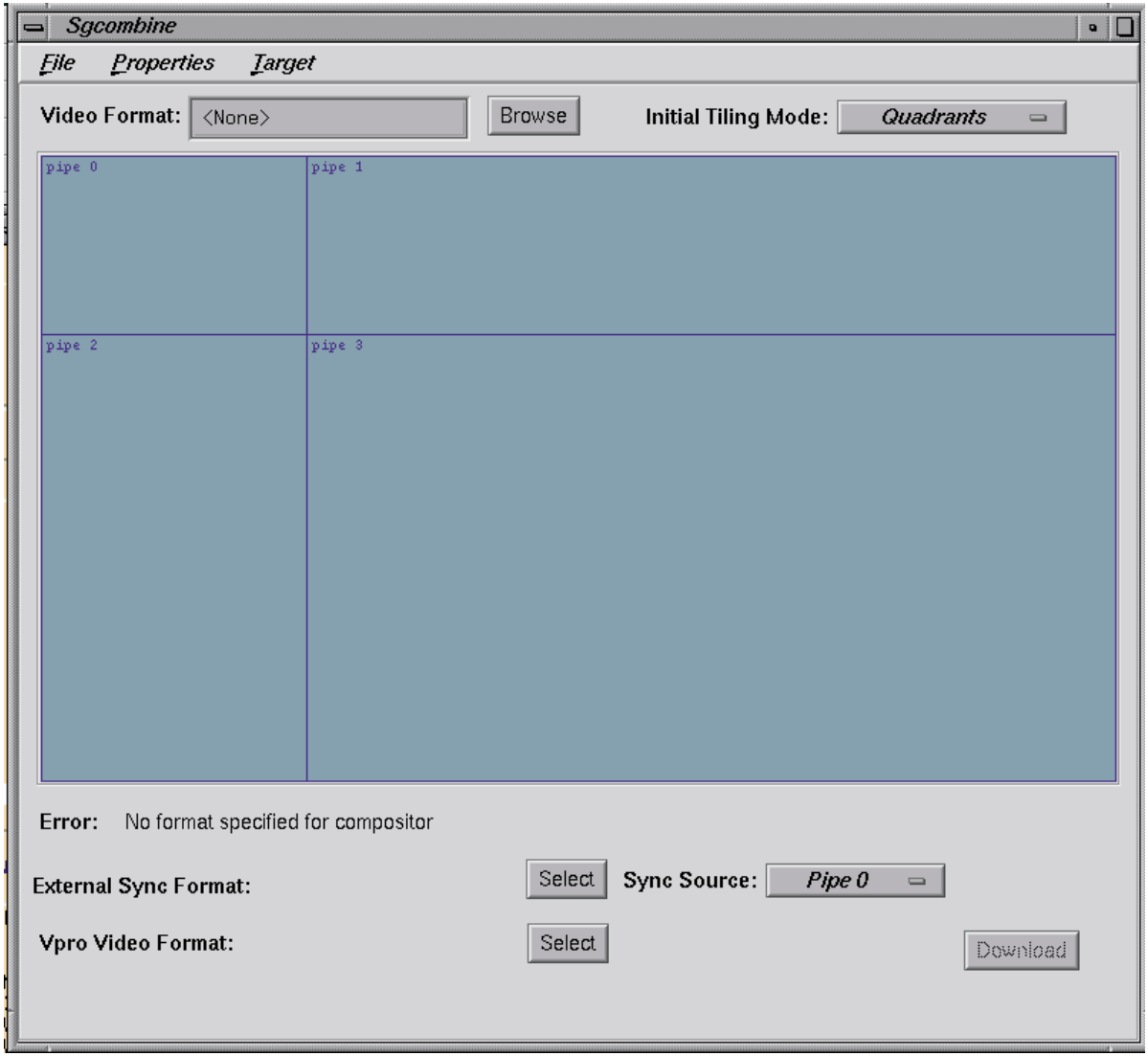


Figure 4-3 Example of Initial Tiling Mode (Quadrant)

4. In the **Sync Source** field, you can select the device (graphics pipe or other device) that generates the master sync signal. The other devices must synchronize with this signal. (For this release, only graphics pipes connect to the compositor. Therefore, a graphics pipe provides the master sync signal; graphics pipe 0 is the default.)
5. From the **Sgcombine** main window, select **Properties**, and then select **Tiling Properties,** to see the **Tiling Properties** window shown in Figure 4-4. Select options as follows:

   a. In the **Initial Tiling Mode** field, you can select the initial tiling mode as you did in the **Initial Tiling Mode** field on the **Sgcombine** main window. Your most recent entry on either of these two fields overrides the previous entry.

   b. In the **Number of Pipes** field, you can select how many graphics pipes you want to contribute to the final composite screen display.

   c. In the **Size** and **Origin** fields, you can set the width and height for the visual contribution of each pipe.

   Note: You can also use your mouse on the tiled configuration window to move your area selections for each pipe.

   After you have finished your configuration selections, select **Close** to close the **Tiling Properties** window.

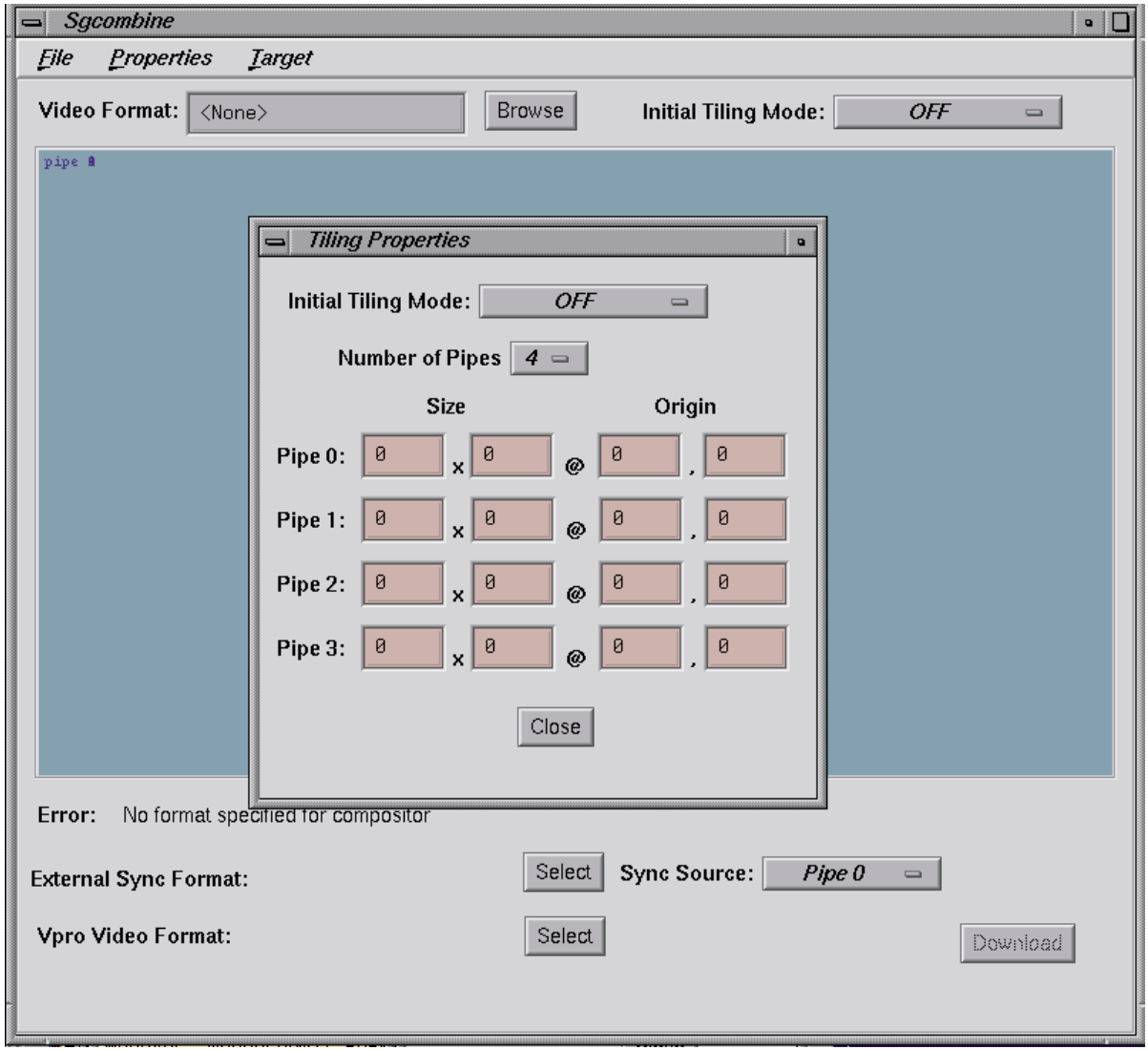


Figure 4-4 Tiling Properties Window Example

6. From the **Sgcombine** main window, select **Properties**, and then select **Video Properties**, to see the **Video Properties** window shown in Figure 4-5. From this window, you can configure the output video so that it is compatible with your video monitor, as follows:

   a. In the **Format** field, you can select the video format for the compositor as you did with the **Video Format** field on the **Sgcombine** main window. Your most recent video format entry on either of these two fields overrides the previous entry.

   b. In the **Sync Component** field, you can select if you want composite sync (information that tells the display where to put the graphics) to run on the **R** (red), **G** (green), or **B** (blue) wire.

   c. In the **Sync Output** field, you can set the display output to either **Horizontal** or **Composite**. If your monitor device requires separate horizontal and vertical set signals, select **Horizontal**. If your monitor device requires combined horizontal and vertical signals, select **Composite**.

   d. In the **H/C Sync Polarity** (horizontal/composite polarity) field, you can set the horizontal/composite sync signals to **Positive** or **Negative**. Select **Positive** if you want the video data to be present when the signals are low. Select **Negative** if you want the video data to be present when the signals are high.

   e. In the **VSync Polarity** (vertical sync polarity) field, you can set the vertical sync signals to **Positive** or **Negative**. Select **Positive** if you want the video data to be present when the signals are low. Select **Negative** if you want the video data to be present when the signals are high.

7. After you have finished all your compositor configuration selections, select **Download** from the **Sgcombine** main window to download the configurations to the hardware.

Note: The configuration settings take effect only after the download is complete.

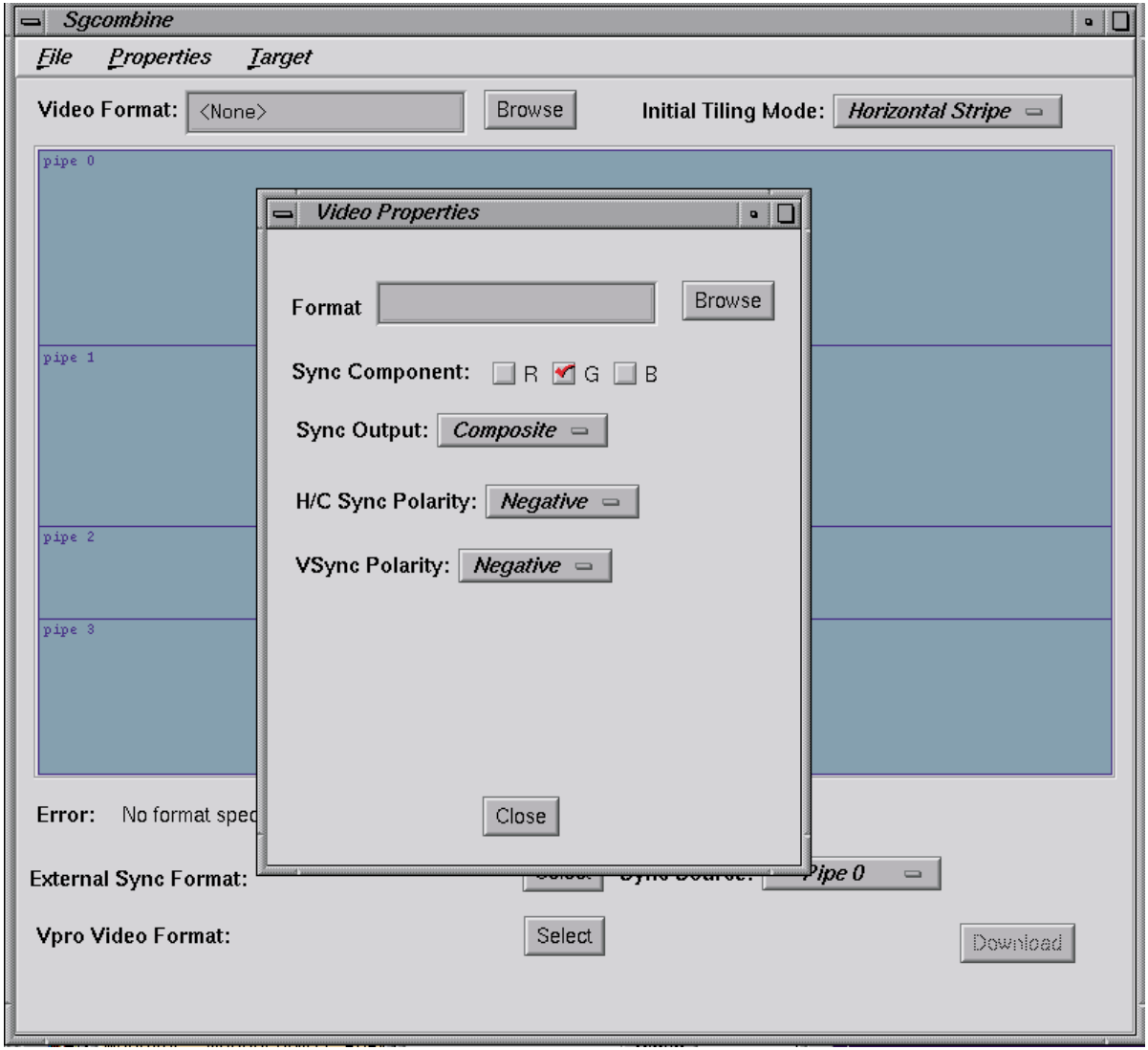


Figure 4-5 Video Properties Window Example

Regulatory Specifications

This appendix provides regulatory and safety information related to the use of the Scalable Graphics Compositor (the compositor) in the United States and other countries.

Manufacturer's Regulatory Declarations



Caution: This device has several governmental and third-party approvals, licenses, and permits. Do not modify this product in any way that is not expressly approved by SGI. If you do, you may lose these approvals and your governmental agency authority to operate this device.

The device conforms to several national and international specifications and European Directives listed on the Manufacturer's Declaration of Conformity. The CE insignia displayed on each device is an indication of conformity to the European requirements.

CMN Number

The compositor model number, or CMN number, is on the system label on the chassis.

To obtain the Manufacturer's Declaration of Conformity from SGI, you must either provide the CMN number to your local SGI sales representative, or contact the Technical Assistance Center at 1 800 800 4SGI.

Class A Compliance

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



Caution: Changes or modifications to the equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Electromagnetic Emissions

This device complies with the Class A limits of Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Also, this device complies with Class A electromagnetic emissions limits of C.I.S.P.R. Publication 22, Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment.

Japanese Notice

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に
基づくクラスA情報技術装置です。この装置を家庭環境で使用すると
電波妨害を引き起こすことがあります。この場合には使用者が適切な
対策を講ずるよう要求されることがあります。

Industry Canada Notice (Canada Only)

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique német pas de perturbations radioélectriques dépassant les normes applicables aux appareils numériques de Classe A préscrites dans le Règlement sur les interferences radioélectriques établi par le Ministère des Communications du Canada.

CE Notice

Marking by the "CE" symbol indicates compliance of the device to directives of the European Community. A "Declaration of Conformity" in accordance with the standards has been made and is available from SGI upon request.

Radio and Television Interference

The equipment described in this guide generates and uses radio frequency energy. If it is not installed and used in accordance with the instructions in this guide, it can cause radio and television interference.

This equipment has been tested and it complies with the limits for a Class A computing device in accordance with the specifications in Part 15 of FCC rules. These specifications are designed to provide reasonable protection against such interference in an industrial or office installation. However, there is no guarantee that the interference will not occur in a particular installation. This system is not certified for home use.

You can determine whether your system is causing interference by turning it off. If the interference stops, it was probably caused by the workstation or one of the peripherals. To tell if the interference is caused by one of the peripherals, try disconnecting one peripheral at a time to see if the interference stops. If it does, that peripheral is the cause of the interference.

If your workstation does cause interference to radio or television reception, try to correct the interference by following one or more of these suggestions:

- Turn the television or radio antenna until the interference stops.
- Move the workstation to one side or the other of the radio or television.
- Move the workstation farther away from the radio or television.
- Plug the workstation into an outlet that is on a different circuit from the radio or television. (That is, make certain the workstation and the radio or television are on circuits controlled by different circuit breakers or fuses.)
- For additional information, see the FCC website at: http://www.fcc.gov/cib/Publications/tvibook.html

Shielded Cables

The device is FCC-compliant under test conditions that include the use of shielded cables between the workstation and its peripherals. Your workstation and any peripherals you purchase from SGI have shielded cables. Shielded cables reduce the possibility of interference with radio, television, and other devices. If you use any cables that are not from SGI, be sure they are shielded. Telephone cables do not need to be shielded.

Electrostatic Discharge

SGI designs and tests its products to be immune to the effects of electrostatic discharge (ESD). ESD is a source of electromagnetic interference and can cause problems ranging from data errors and lockups to permanent component damage.

Note: While operating your workstation, keep all covers and doors, including the plastics, in place. The shielded cables included with the workstation and its peripherals should be installed correctly, with all thumbscrews fastened securely.

An ESD wrist strap is included with some products, such as memory and graphics upgrades. The wrist strap is used when installing these upgrades to prevent the flow of static electricity, and it should protect your system from ESD damage.

Safety Instructions

Read these instructions carefully:

1. Follow all warnings and instructions marked on the product and noted in this and other documentation included with the product.
2. Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
3. Do not use this product near water.
4. Do not place this product or components of this product on an unstable cart, stand, or table. This product may fall, causing serious damage to the product.
5. Slots and openings on the cabinets and components of the product are provided for ventilation, reliable operation, and protection from overheating of the product. These slots and openings must not be blocked or covered. This product should never be placed near or over a radiator or heat register, or in a built-in installation unless proper ventilation is provided.
6. This product should be operated from the type of power indicated on the marking label. If you are not sure of the type of power available, consult your dealer or local power company.
7. Do not allow anything to rest on the power cord. Do not locate this product where people may walk on the cord.

8. Do not use extension cords with your SGI system.
9. Never push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.
10. Do not attempt to service this product yourself except as noted in this guide. Opening or removing covers of internal components may expose you to dangerous voltage points or other risks. Refer all servicing to qualified service personnel.
11. Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
    - If the power cord or plug is damaged or frayed.
    - If liquid has been spilled into the product.
    - If the product has been exposed to rain or water.
    - If the product does not operate normally when the operating instructions are followed. Adjust only those controls that are covered by the operating instructions, because improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal condition.
    - If the product has been dropped or the cabinet has been damaged.
    - If the product exhibits a distinct change in performance, indicating a need for service.
12. Use only the proper type of power supply cord set (provided with the system) for this unit.

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