SGI™ Video Breakout Box Owner's Guide

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For regulatory and compliance information, see Appendix A.

Record of Revision

Version	Description
001	January 2001 Initial Rev
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About This Guide

This guide shows you how to install your SGI Video Breakout Box (VBOB).

The following topics are covered in this guide:

- Chapter 1, “VBOB Site Preparation and Specifications,” provides environmental and technical information needed to properly set up and configure the VBOB enclosure.
- Chapter 2, “Rackmounting and Hardware Overview,” explains how to mount the VBOB into a rack and provides a technical overview of the system components.
- Chapter 3, “VBOB Chassis Connectors and Cabling,” describes all the connectors and LEDs located on the back of the VBOB chassis.
- Chapter 4, “VBOB CD,” describes the VBOB software.
- Appendix A, “Regulatory Specifications,” lists all regulatory information related to use of the VBOB in the United States and other countries.

Product Features

The VBOB is shipped for rackmounting in an SGI 3000 series rack or a user-supplied rack. It can also be used as a table-top unit. The chassis is built in a 2U form factor. Some of the VBOB’s features include:

- BNC input and output ports for High Definition and Standard Definition video
- LVDS input and output ports
- Genlock BNC connectors for High Definition and Standard Definition video
- RS-232 port for upgrades and system maintenance
- Optional TMDS digital video input ports

Figure i shows the VBOB front panel.

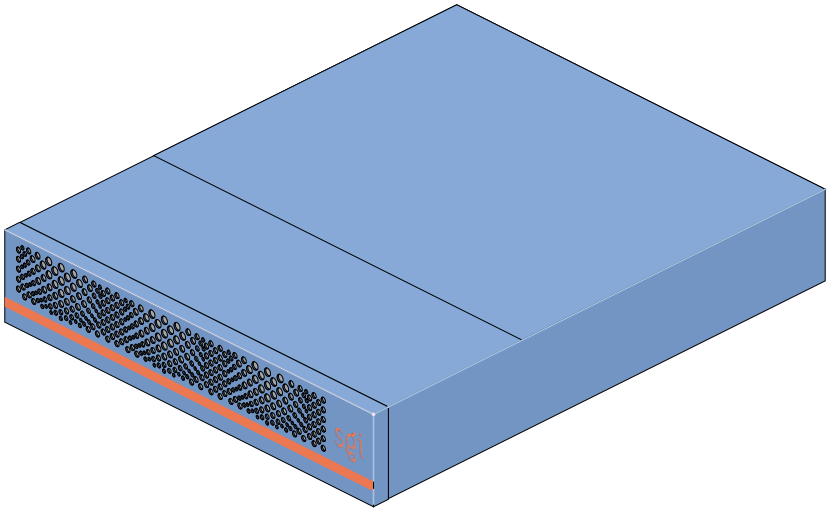

Figure i VBOB Front Panel

Figure ii shows the VBOB rear panel. For labeling of the rear panel connectors, see Chapter 3.

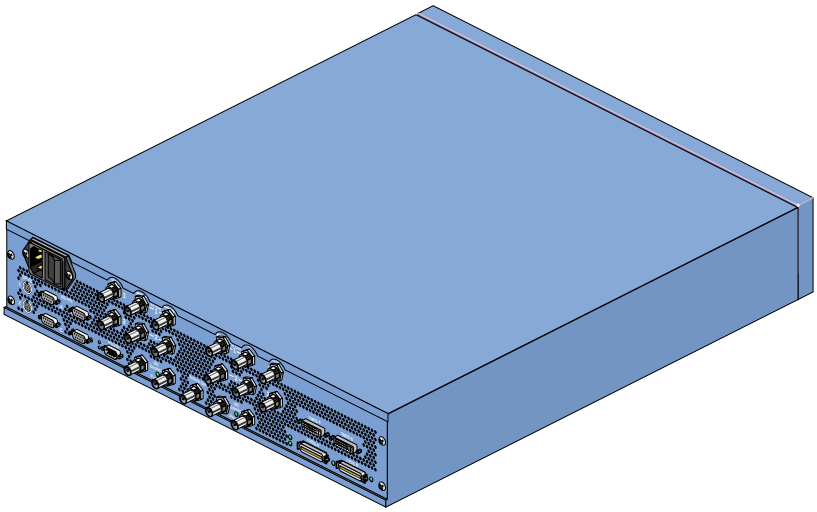

Figure ii VBOB Rear Panel

Additional Information

Manuals are available in various formats on the World Wide Web at:

`http://techpubs.sgi.com/library`

Enter a keyword search, or search by title to find the information or manual you need.

Conventions and Terminology

This guide uses the following conventions:

- Document titles are in *italics*.
- Names of files appear in `Courier`.
- References to chapters and sections within this guide are in quotation marks.
- Characters that you type on your keyboard are in **`Courier bold.`**
- Procedures are explained in numbered steps. When necessary, an explanation follows the step.
- Warnings that describe conditions that could cause injury or death are highlighted with the lightening bolt icon, as shown in Figure iii.

Figure iii Injury or Death Warning Icon

Product Support

SGI provides a comprehensive product support and maintenance program for its products. If you are in North America, contact the Technical Assistance Center at 1-800-800-4SGI or your authorized service provider. If you are outside North America, contact the SGI subsidiary or authorized distributor in your country.

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If you have comments about the technical accuracy, content, or organization of this document, please tell us. Be sure to include the title and document number of the manual with your comments. (Online, the document number is located in the front matter of the manual. In printed manuals, the document number is located at the bottom of each page.)

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SGI values your comments and will respond to them promptly.

VBOB Site Preparation and Specifications

The VBOB is shipped ready for rackmounting or it can be used as a table-top unit.

See Chapter 2, "Rackmounting and Hardware Overview" for information on mounting a VBOB chassis in an SGI 3000 series rack.

Site Preparation

Table 1-1 provides site preparation information for a single VBOB chassis.

Table 1-1 Cooling and Power Requirements

Specification	Value Per Server
Cooling requirements	256 Btu/hour
Power consumption	128 watts maximum
AC input to power supply	100-120/200-240 Vac at 50-60 Hz, 4/2A (autoranging)
Inrush current	5 amps maximum
Nominal current draw	0.8 amps @ 100-120 Vac, 0.4 amps @ 200 -240 Vac
UPS volt-amp rating	250 VA

As shown in Figure 1-1, the airflow in the 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.

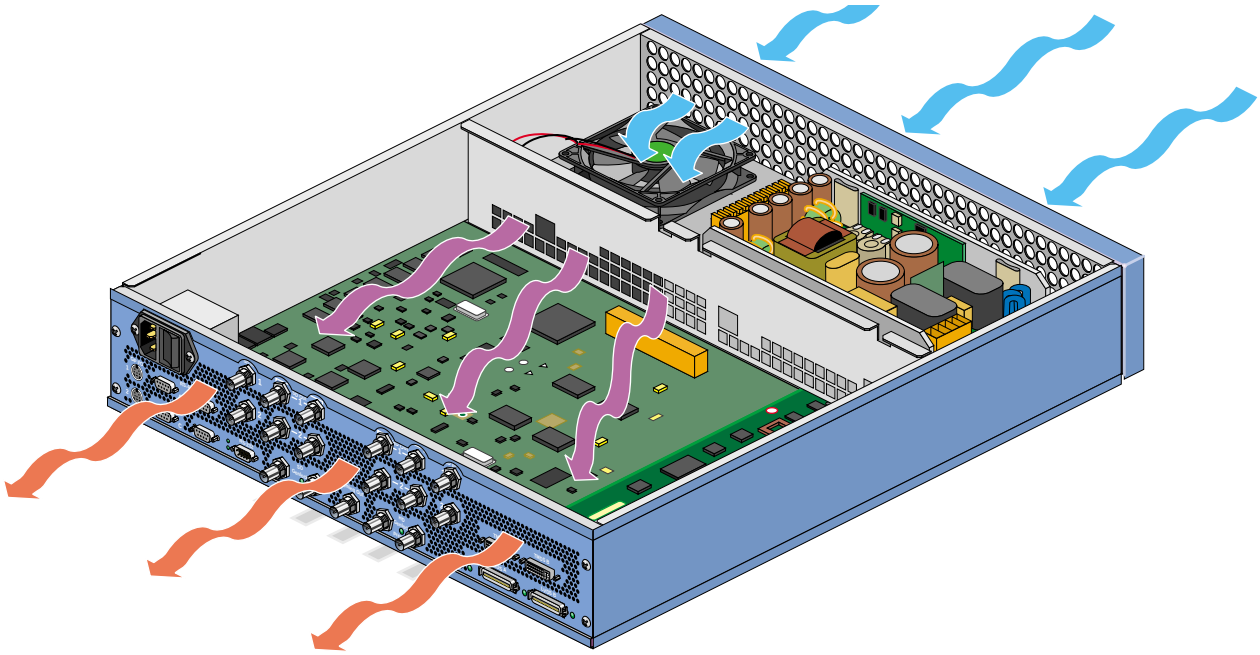

Figure 1-1 Chassis Airflow Diagram

Technical Specifications

Table 1-2 lists physical and environmental specifications.

Table 1-2 Physical and Environmental Specifications

Specification	Value Per VBOB
Chassis Dimensions	3.5″ in height (2U) x 17.5″ in width x 20.5″ 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	50 dBA approximate
Air temperature Operating Non-operating	 +41 to +95 °F (+5 to +35 °C) -40 to +149 °F (-40 to +65 °C)
Thermal gradient Operating Non-operating	 18 °F (10 °C) per hour (maximum) 108 °F (60 °C) per hour (maximum)
Altitude Operating Non-operating	 10,000 ft (3,048 m) MSL (maximum) 40,000 ft (12,192 m) MSL (maximum)
Relative humidity Operating Non-operating	 10% to 85%, noncondensing 5% to 95%, noncondensing

Table 1-2 (continued) Physical and Environmental Specifications

Specification	Value Per VBOB
Mechanical shock Operating Non-operating	 30G, 3ms (vertical) 15G, 3ms (horizontal) critical velocity 200 in/s, critical acceleration 50G, 11ms (trapezoidal)
Mechanical vibration Operating Non-operating	 0.25G, 5-500-5Hz, @1 oct/min 0.5G, 3-200-3Hz, @1 oct/min

Rackmounting and Hardware Overview

This chapter describes the VBOB hardware. The first section shows you how to mount the VBOB unit in a rack, and the following sections explain the theory of operation.

Mounting VBOB in an SGI 3000 Series Rack

You can install the VBOB chassis as a free-standing table-top unit, or mount it in a rack. This section explains how to install the VBOB chassis in an SGI 3000 series rack. Before you begin, make sure that you have the hardware listed in Table 2-1.

Warning: Personnel could be seriously injured and equipment could be damaged if the rack topples over. Install all equipment into the rack from the lowest available position. Also, make certain that the rack has sufficient power for the VBOB's needs. Check with the appropriate facilities authorities before installing this unit in a rack.

Note: This installation requires two people and a #2 Phillips screwdriver.

This procedure presumes that internal rackmounting rails are already installed and that a vertical space of 3.5 in. (8.9 cm) is available.

Table 2-1 Rack Installation Hardware for VBOB

Part Description	Quantity
10-32 x 1/4 in. screws	4
Front mounting brackets	1 pair

1. Find the two front mounting brackets and the four 10-32 x 1/4 in. screws in the shipping container.
2. Place the VBOB on a flat surface and attach the front mounting brackets, as shown in Figure 2-1.
3. With one person holding each side, place the VBOB on the desired slide rails, then slide it inside the rack.
4. Attach the VBOB to the rack, as shown in Figure 2-2, using appropriate screws for your rack.

   The VBOB chassis is now securely attached to the rack.

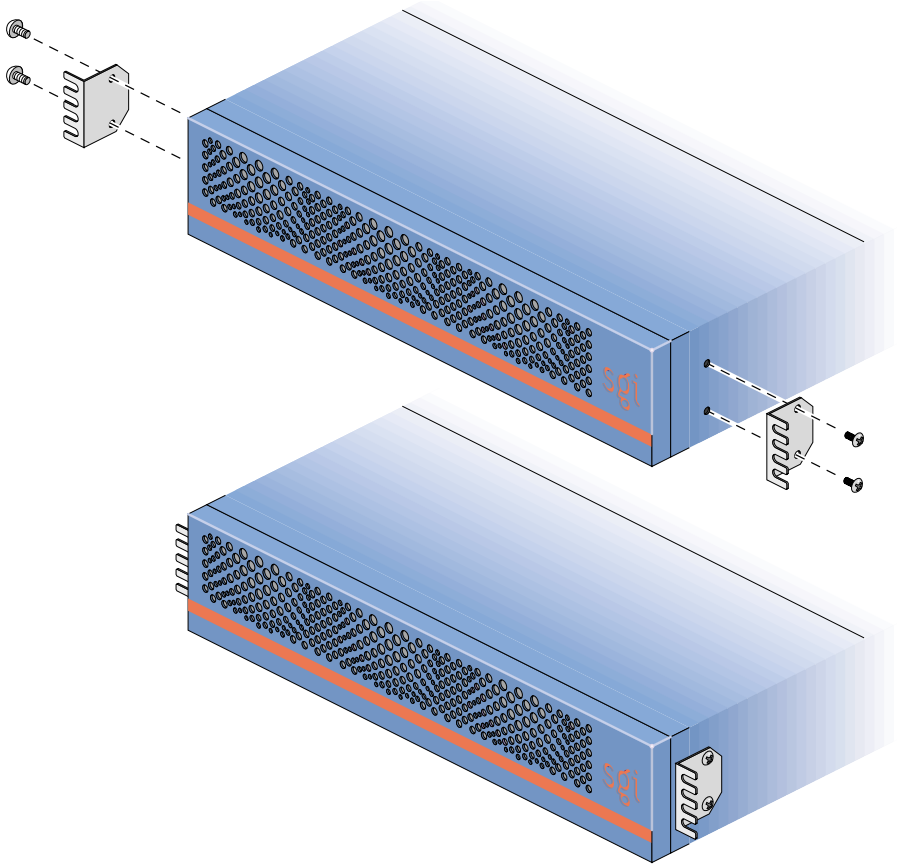

Figure 2-1 Installing the Mounting Brackets on VBOB

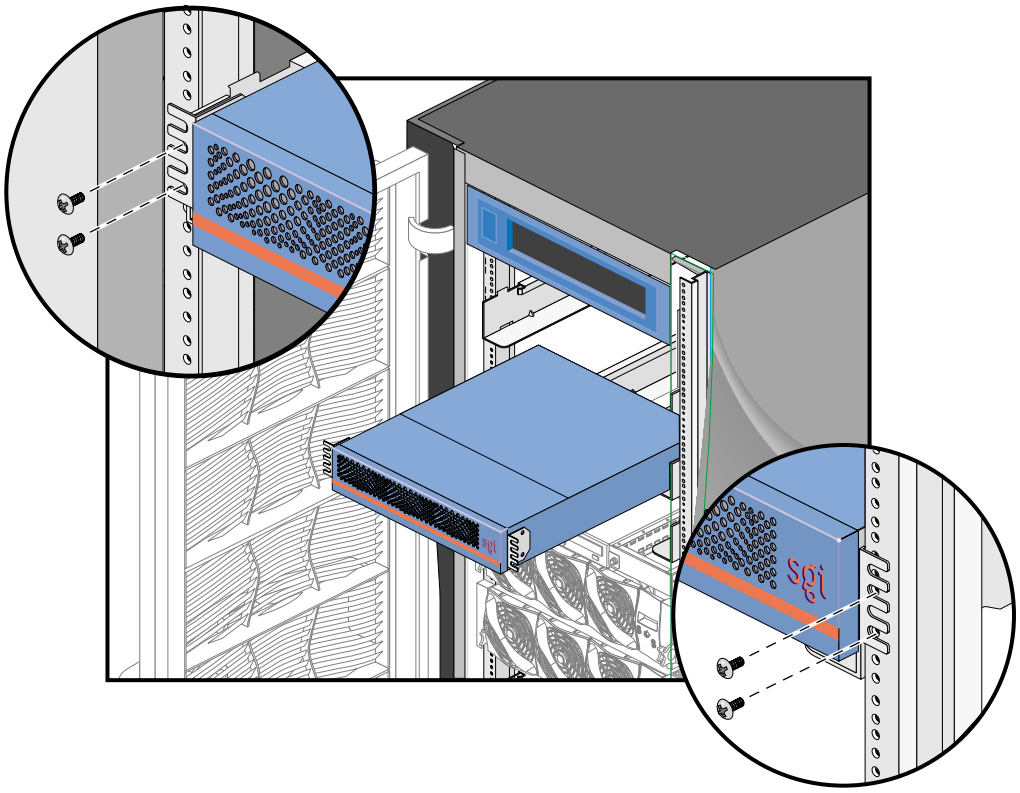

Figure 2-2 Installing VBOB in the Rack

Theory of Operation

VBOB is a digital video switcher that routes video inputs from different sources to various output formats. VBOB inputs include Serial Digital Standard Definition (SD) and High Definition (HD) BNC connectors, a Low Voltage Differential Signaling (LVDS) video input connector, and an optional dual-link Transition Minimized Differential Signaling (TMDS) input. VBOB outputs include dual-link Serial Digital Standard Definition and High Definition BNC connectors, which you can use with applications where Alpha signals accompany the YUV video. In addition, VBOB includes an LVDS video output connector. Generator Locking Device (Genlock) input and loop-throughs for both Standard Definition Video and High Definition Video, and a RS-232 port for system upgrading and maintenance are also included.

Utilizing a highly advanced 80-bit parallel video crossbar, you can configure VBOB for various I/O applications. VBOB complies with the following standards:

- High Definition SMPTE-292M
- Standard Definition SMPTE-259M

Note: HD and SD have separate connections, which allows you to switch between operational domains without switching cables.

LVDS Interface

LVDS is a new data interface standard that is defined in the TIA/EIA-644 and the IEEE 1596.3 standards. It transmits data at a high speed using a very low voltage swing (approximately 350mV) over two differential circuit board traces or a balanced cable. The LVDS drivers are current mode, so a termination resistor is required to complete the current loop and limit reflections due to the sub-nanosecond transition times over the transmission line.

Genlock

Genlock is a device that enables VBOB to receive an external sync signal, which locks the timing of the output video picture. This allows you to maintain a common timing across multiple video devices, which enables smooth dissolves, wipes, and other effects commonly used on broadcast TV. VBOB has two BNC connectors for Standard Definition genlock and two BNC connectors for High Definition genlock. You can use either of these connectors as an input or a loop-through.

TMDS Interface (optional)

TMDS is the basis of the Digital Visual Interface (DVI) standard, which transmits data using a differential interface with the data transitions minimized over a balanced cable.

Note: The TMDS Interface is optional. It is sometimes included as standard equipment when VBOB is purchased with TMDS-related products, such as HD GVO.

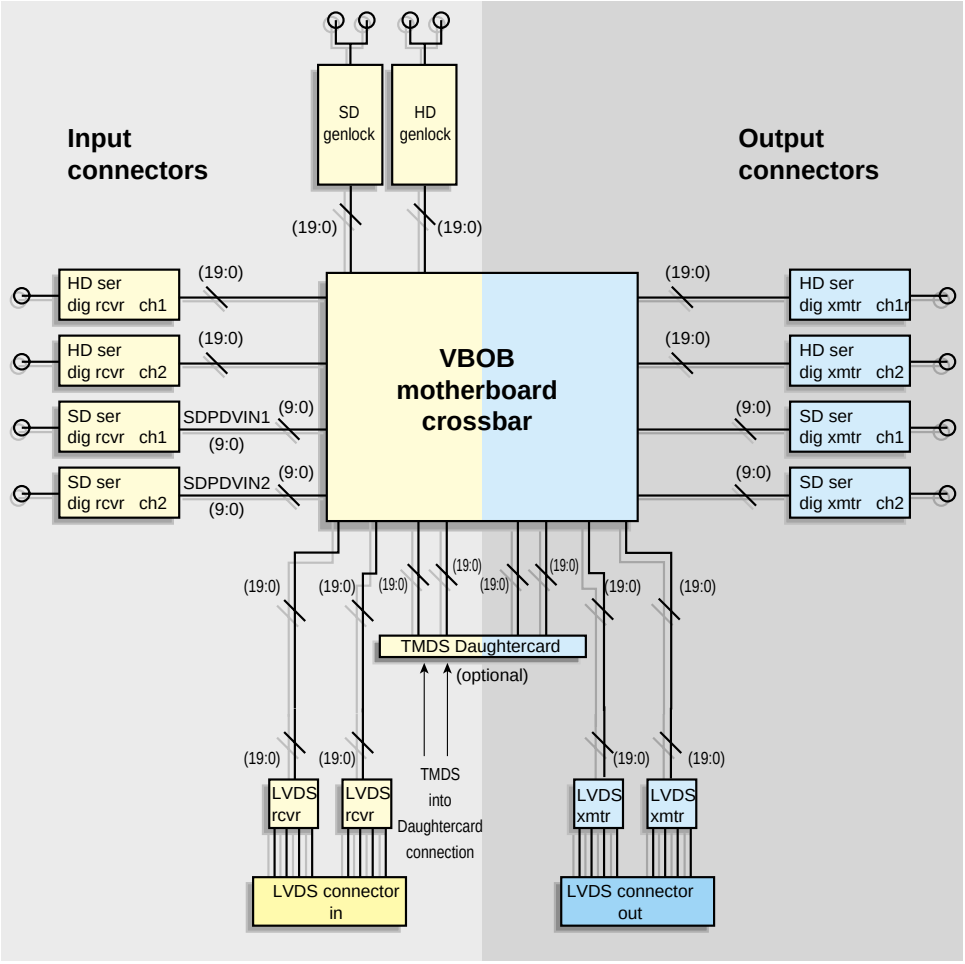

Figure 2-3 Internal Operation Block Diagram

VBOB Chassis Connectors and Cabling

This chapter describes all the connectors and LEDs located on the back of the VBOB chassis.

Chassis Connectors

Figure 3-1 shows the rear panel connectors.

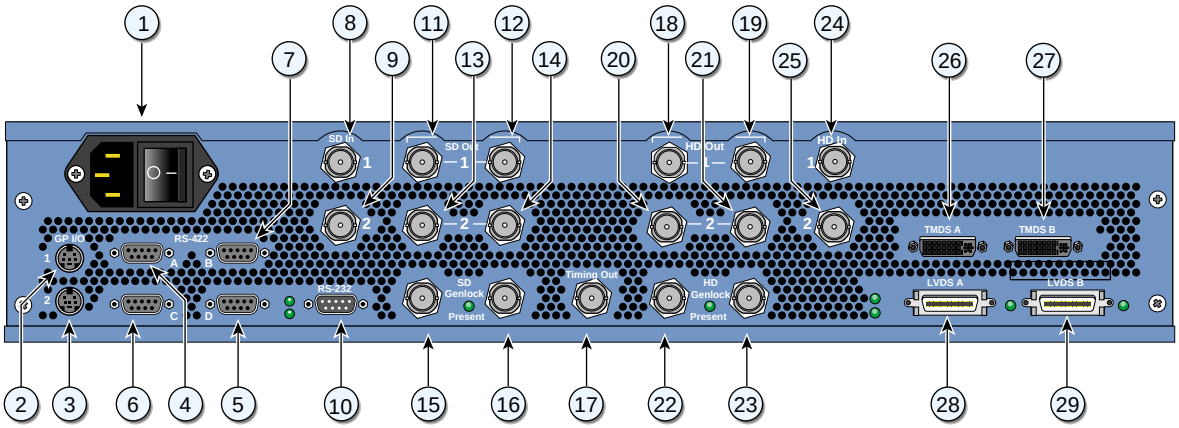

Figure 3-1 VBOB Chassis Rear Panel Connectors

Table 3-1 lists the VBOB connectors and their functions.

Table 3-1 Rear Panel Connectors

ID #	Connector Name	Connector Function
1.	AC plug and switch	AC power connection from chassis to power source
2.	8-pin round	General purpose I/O connector #1 (reserved for future use)
3.	8-pin round	General purpose I/O connector #2 (reserved for future use)
4.	9-pin subminiature D	RS-422 serial port A (reserved for future use)
5.	9-pin subminiature D	RS-422 serial port D (reserved for future use)
6.	9-pin subminiature D	RS-422 serial port C (reserved for future use)
7.	9-pin subminiature D	RS-422 serial port B (reserved for future use)
8.	SD in BNC #1	Standard Definition in #1 (link A)
9.	SD in BNC #2	Standard Definition in #2 (link B)
10.	9-pin subminiature D	RS-232 service port
11.	SD out BNC #1	Standard Definition out #1 (link A)
12.	SD out BNC #1	Standard Definition out #1 (link A)
13.	SD out BNC #2	Standard Definition out #2 (link B)
14.	SD out BNC #2	Standard Definition out #2 (link B)
15.	SD Genlock BNC	Standard Definition Genlock in BNC
16.	SD Genlock BNC	Standard Definition Genlock loop-through
17.	Timing BNC	Timing Out (to Genlock in on DG5-2 with TVO)
18.	HD out BNC #1	High Definition out BNC #1 (link A)
19.	HD out BNC #1	High Definition out BNC #1 (link A)
20.	HD out BNC #2	High Definition out BNC #2 (link B)
21.	HD out BNC #2	High Definition out BNC #2 (link B)
22.	HD Genlock BNC	High Definition Genlock in BNC
23.	HD Genlock BNC	High Definition Genlock loop-through

Table 3-1 (continued) Rear Panel Connectors

ID #	Connector Name	Connector Function
24.	HD in #1 BNC	High Definition in BNC #1 (link A)
25.	HD in #2 BNC	High Definition in BNC #2 (link B)
26.	TMDS A	TMDS digital video in connector (optional)
27.	TMDS B	TMDS digital video in connector (optional)
28.	LVDS A	LVDS connector
29.	LVDS B	LVDS connector

Note: VBOB has two BNC connectors for each external HD and SD genlock source. You can use either of these connectors as an input or a loop-through.

Rear Chassis LEDs

There are eight LEDs on the rear of the VBOB chassis, as shown in Figure 3-2.

The SD, HD, Genlock, and LVDS LEDs indicate the following:

- **SOLID** - Signal present and valid
- **FLASHING** - Signal present but unrecognizable (invalid, such as wrong video format)
- **OFF** - No signal present

The last LED on the right indicates the processor activity. This LED should flash at a rate of about 1 Hz.

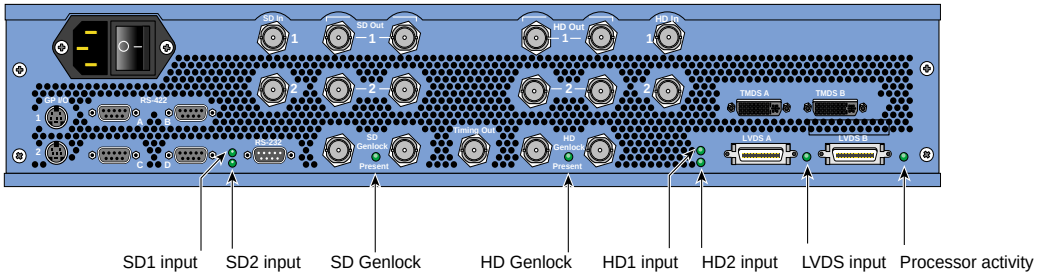

Figure 3-2 Rear Chassis LEDs

Getting Started

Follow these steps to connect the cables and boot the host system. See Figure 3-1 and Table 3-1 for the location and functional descriptions of the rear panel connectors.

1. Be sure the VBOB power switch at the back of the chassis is in the **Off (o)** position.
2. Connect one end of the power cord to the VBOB power plug and the other end of the cord to your AC power source.
3. Connect all other cables as applicable.
4. Turn the VBOB power switch to the **On (-)** position.
5. Boot the SGI host system.

Note: You can find cabling instructions for a specific configuration in the owner's guide provided with your VBOB-related product.

VBOB CD

The VBOB is shipped with software 1.0 or later. VBOB is pre-programmed at the factory, and you should rarely need to use this CD. The following components are included on this CD:

- `vbob_flash`

  A utility for flashing the VBOB PROMs. Without options, this utility flashes the VBOB hardware with VBOB PROM images that are located in `/usr/dmedia/ucode/vbob`. If you want to use `inst` to automatically update the firmware, make sure VBOB is connected to your system. If VBOB is not connected, a message appears that reminds you to connect VBOB to the system. To execute this utility, enter **`vbob_flash`**. Superuser privileges are required.

  For detailed instructions on using this utility, see the vbob_flash man page.

- Micro Code

  The micro code used in the VBOB hardware, including the `.MCS` files for FPGA components and the `.BIN` binary images of the operating code and bootloader.

Note: Electronic documentation in IRIS InSight format may also be included.

Regulatory Specifications

This appendix provides regulatory information related to the use of the VBOB 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 Silicon Graphics. 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 VBOB 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: (1) This device may not cause harmful interference, and (2) 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, the user is encouraged to 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: Users should note that 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.

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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 Silicon Graphics 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 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 Web site 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 Silicon Graphics 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 Silicon Graphics, be sure they are shielded. Telephone cables do not need to be shielded.

Electrostatic Discharge

Silicon Graphics 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.

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