

# SGI® Video BreakOut Box User's Guide

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For regulatory and compliance information, see Appendix A.

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## Record of Revision

Version	Description
001	January 2001 Initial Revision
002	April 2001 Second Revision
003	May 2002 Third Revision



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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:

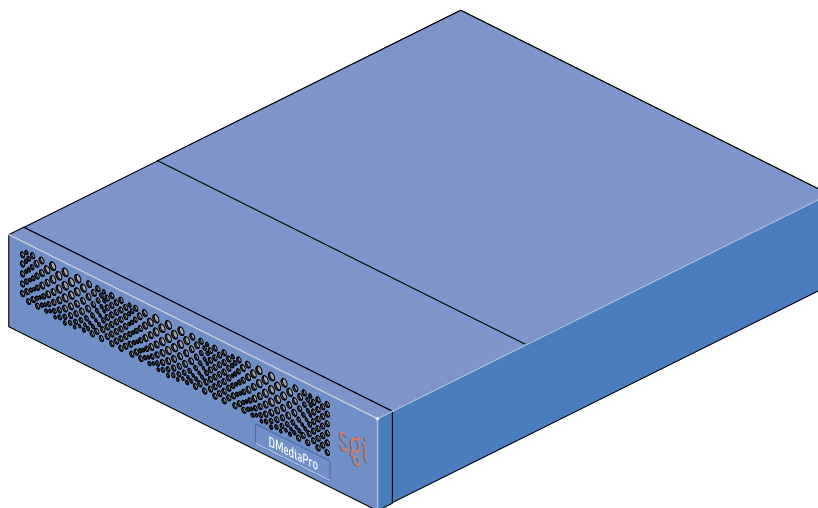
- Chapter 1, “VBOB Site Preparation and Specifications,” provides environmental and technical information needed to properly set up and configure the VBOB enclosure.
- Chapter 2, “Rackmounting and Hardware Overview,” explains how to mount the VBOB in a rack and provides a technical overview of the system 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 Software,” 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 the following:

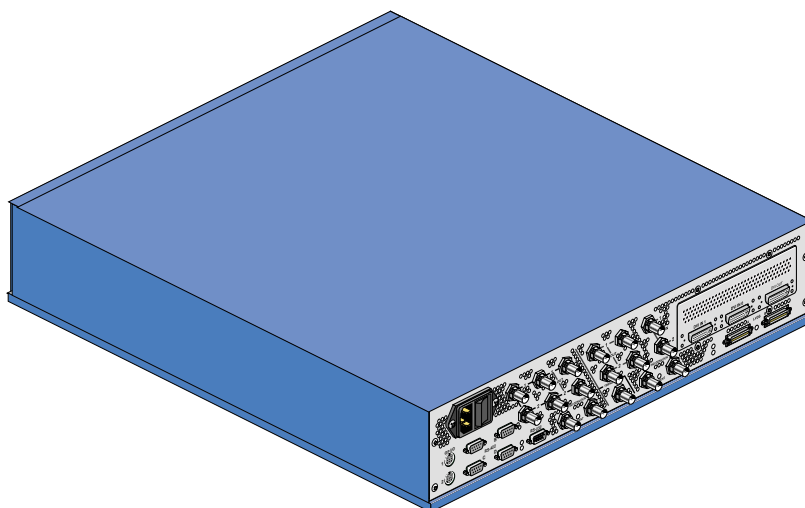
- BNC input and output ports for high-definition (HD) and standard-definition (SD) video
- LVDS input and output ports
- Optional DVI input and output ports
- Genlock BNC connectors for high-definition (HD) and standard-definition (SD) video
- RS-232 port for upgrades and system maintenance

Figure i shows the VBOB front panel.



**Figure i** VBOB Front Panel

Figure ii shows the VBOB rear panel. To see the labeling of the rear panel connectors, see “Chassis Connectors” in Chapter 3.



**Figure ii** VBOB Rear Panel

## Additional Information

SGI manuals are available in various formats on the 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.

## 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.

## Reader Comments

If you have comments about the technical accuracy, content, or organization of this document, please contact SGI. 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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- Send a fax to the attention of “Technical Publications” at +1 650 932 0801.

SGI values your comments and will respond to them promptly.

# VBOB Site Preparation and Specifications

The VBOB is shipped as a table-top unit but it can also be rackmounted.

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

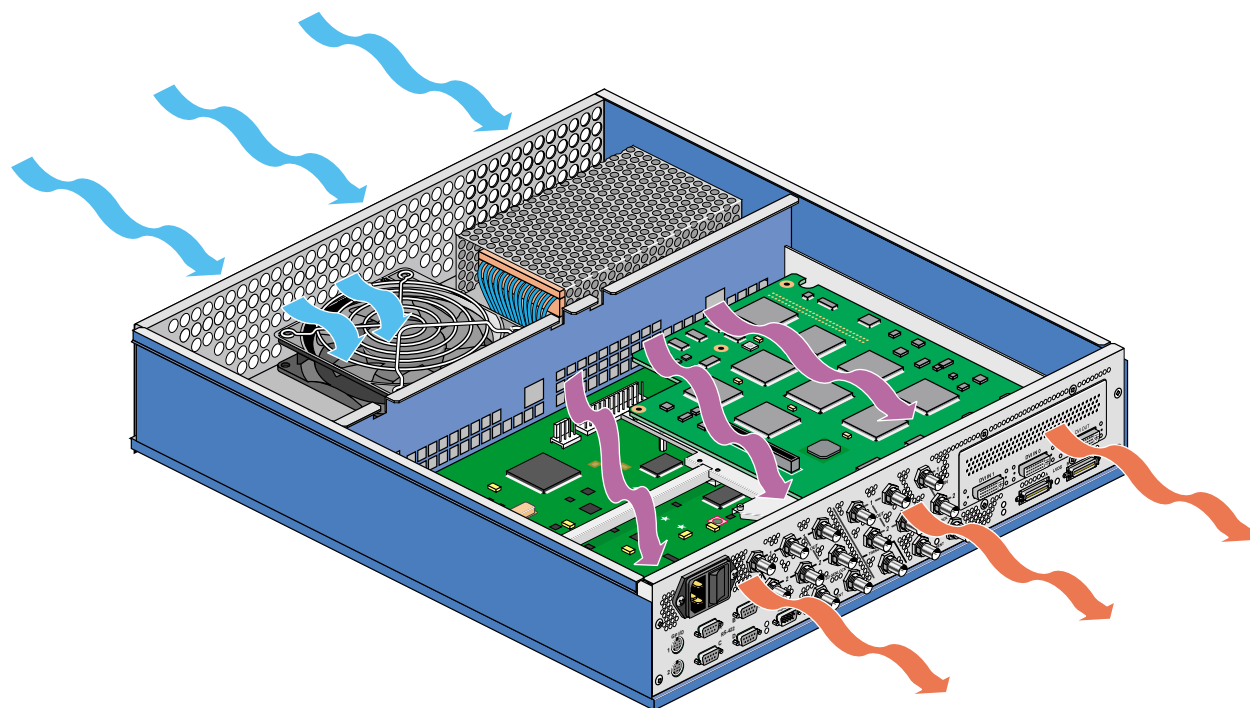
Specification	Value Per Server
Cooling requirements	256 Btu/hour
Power consumption	75 W maximum
AC input to power supply	100-120/200-240 VAC at 50-60 Hz, 2/1A (autoranging)
Inrush current	35 A maximum
Nominal current draw	1.1 A @ 100-120 VAC, 0.6 A @ 200-240 VAC
UPS volt-amp rating	250 VA

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 of 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.

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**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 21.0 in. length (8.9 cm height [2U] x 44.4 cm width x 53.3 cm length) [Length includes rear BNCs]
Weight (installed)	20 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 altitude
Non-operating	-40 to +149 °F (-40 to +65 °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), derated 1 °C per 1,000 ft above 5,000 ft altitude (i.e. 30 °C temp at 10,000 ft)
Non-operating	40,000 ft (12,192 m) MSL (maximum)
Relative humidity	
Operating	10% to 85%, noncondensing
Non-operating	5% to 95%, noncondensing
Mechanical shock	
Operating	15 G, 3 ms (horizontal and vertical, half-sine wave)
Non-operating	30 G, 10 ms (horizontal and vertical, trapezoidal wave)
Mechanical vibration	
Operating	0.25 G, 5-500 Hz, @ 1 oct/min
Non-operating	0.5 G, 3-300 Hz, @ 1 oct/min



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## 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 the 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.



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**Warning:** Personnel could be seriously injured and equipment could be damaged if the rack topples over. Install all equipment in the rack from the lowest available position. Also, be 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.

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

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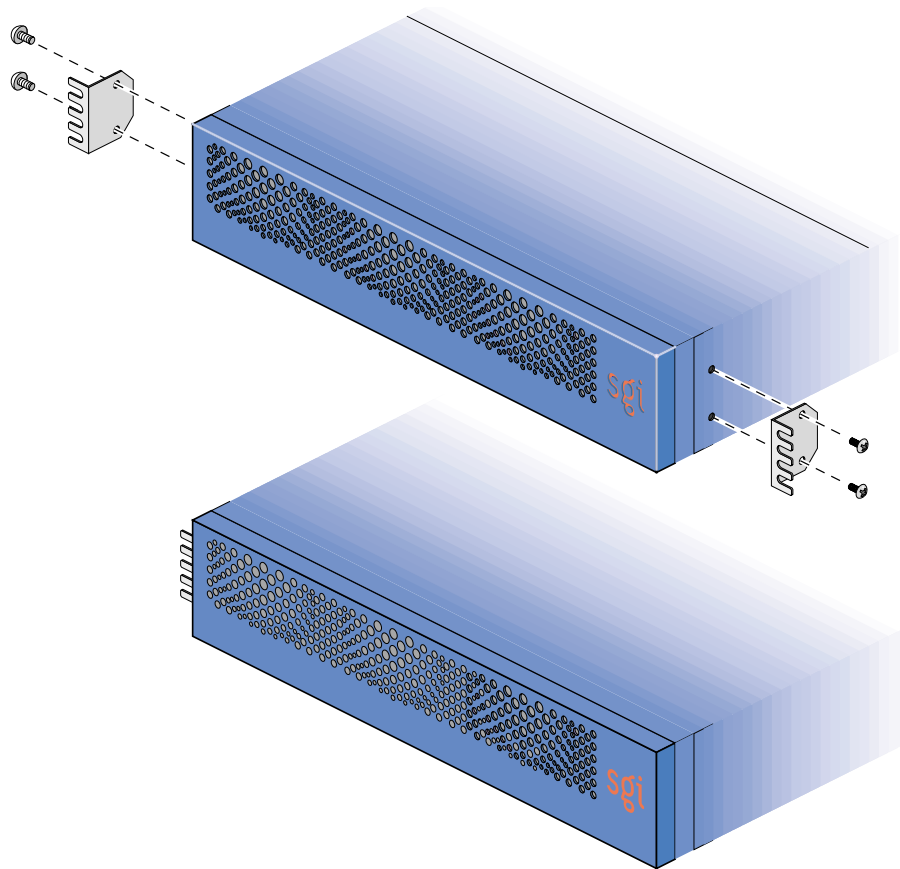
This procedure presumes that internal rackmounting rails are already installed and that a vertical space of 3.5 in. (8.9 cm) is available.

**Table 2-1** Rack Installation Hardware for VBOB

Part Description	Quantity
8-32 x 3/8 in. flathead screws	4
Front mounting brackets	1 pair
M5 x 12mm	4

To install the VBOB in a rack, follow these steps:

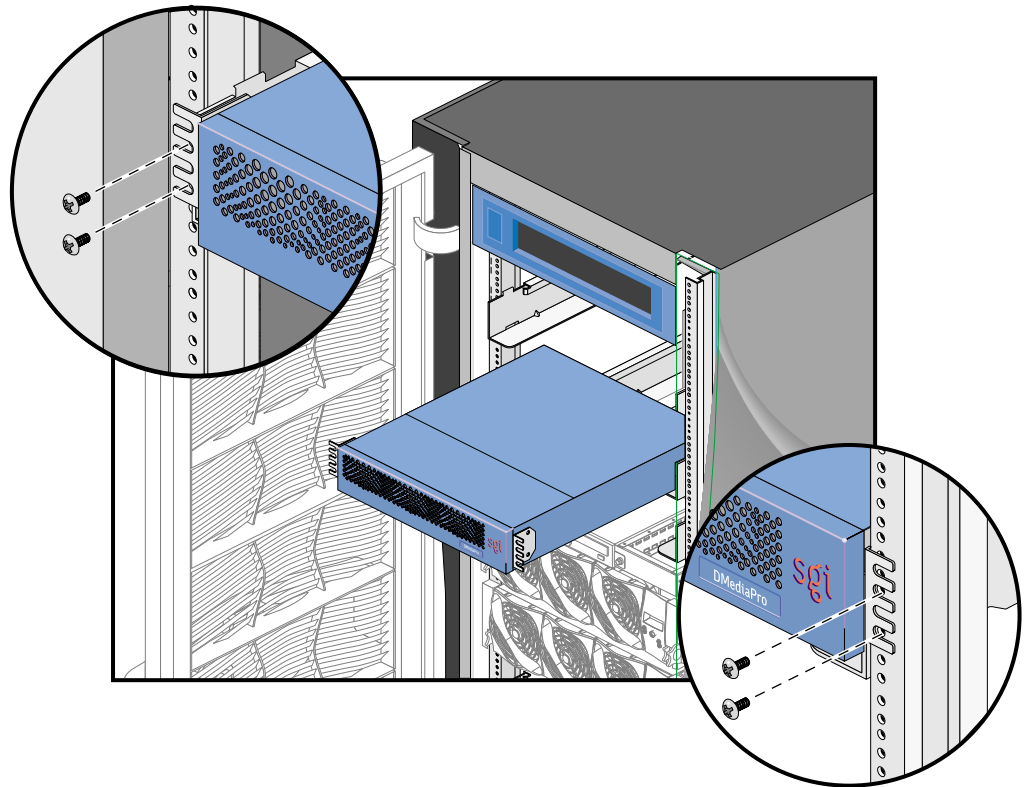
1. Remove the four rubber feet mounted on the bottom of the VBOB.
2. Find the two front mounting brackets and the four 8-32 x 3/8 in. screws in the shipping container.
3. Place the VBOB on a flat surface and attach the front mounting brackets, as shown in Figure 2-1.



**Figure 2-1** Installing the Mounting Brackets on VBOB

4. With one person holding each side, place the VBOB on the desired slide rails, and then slide it inside the rack.
5. Attach the VBOB to the rack, as shown in Figure 2-2, using M5 screws for the rack.

The VBOB chassis is now securely attached to the rack.



**Figure 2-2** Installing the VBOB in the Rack

## Theory of Operation

The VBOB is a digital video switcher that routes video inputs from different sources to various output formats. The 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. The VBOB outputs include dual-link serial digital SD and HD BNC connectors, which you can use with applications in which alpha signals accompany the YUV video. In addition, the VBOB includes an LVDS video output connector, generator locking device (genlock) input and loop-throughs for both SD video and HD video, and an RS-232 port for system upgrading and maintenance.

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

- High-definition SMPTE-292M
- Standard-definition SMPTE-259M

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

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## 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 350 mV) 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 the 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. The VBOB has two BNC connectors for SD genlock and two BNC connectors for HD genlock. You can use either of these connectors as an input or a loop-through.

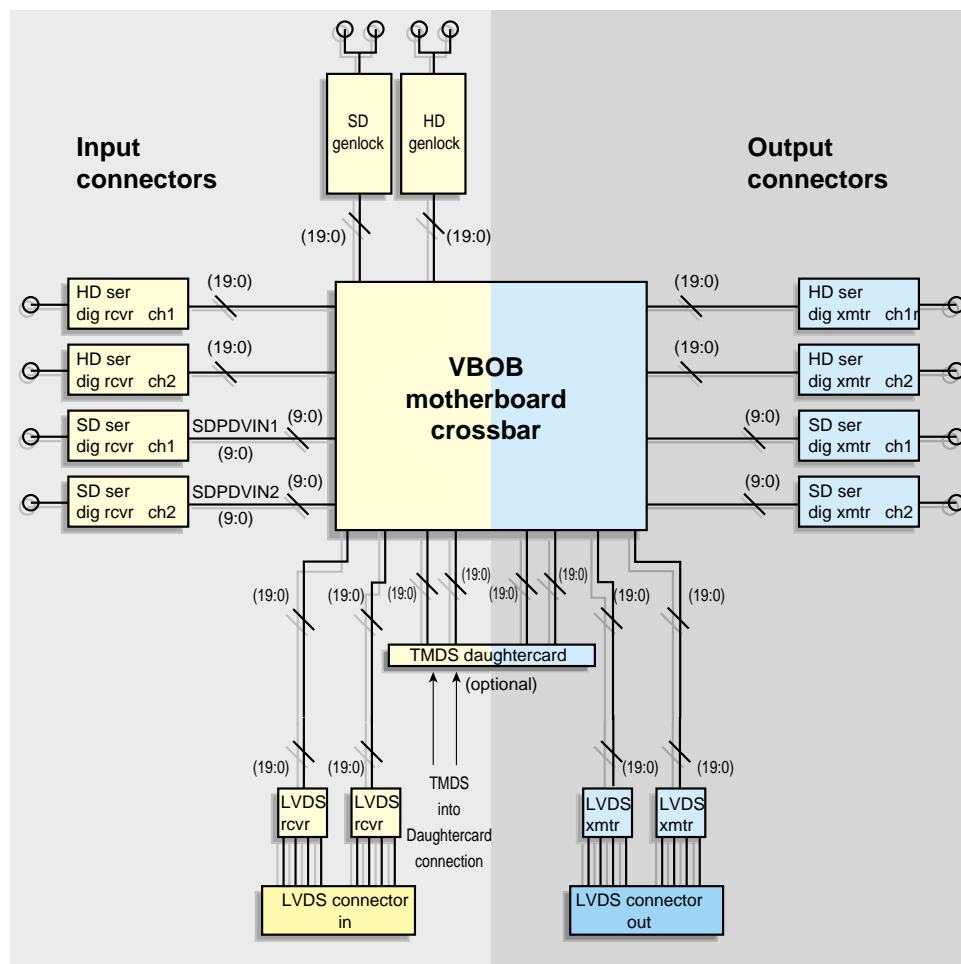
## DVI Standard (Optional)

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

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**Note:** The DVI standard is optional. It is sometimes included as standard equipment when the VBOB is purchased with DVI-related products, such as HD GVO or DMediaPro DM5.

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**Figure 2-3** Internal Operation Block Diagram

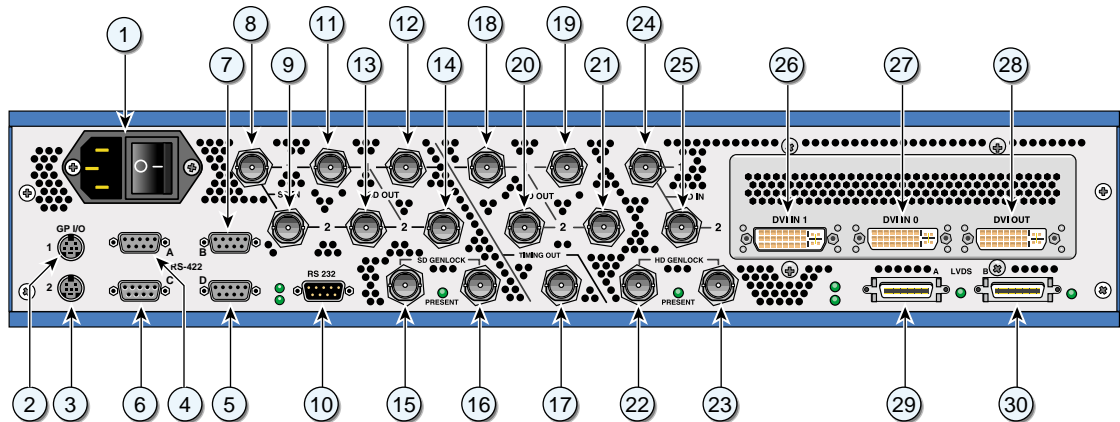


## VBOB Chassis Connectors and Cabling

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 with an optional DMediaPro DM5 installed.



**Figure 3-1** VBOB Chassis Rear Panel Connectors

Table 3-1 lists the VBOB rear panel 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 mini-DIN	General purpose I/O connector #1 (reserved for future use)
3.	8-pin mini-DIN	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** Rear Panel Connectors (**continued**)

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.	DVI IN 1	Digital Visual Interface (DVI) in connector #2
27.	DVI IN 0	Digital Visual Interface (DVI) in connector #1
28.	DVI OUT	Digital Visual Interface (DVI) out connector #1
29.	LVDS A	LVDS connector
30.	LVDS B	LVDS connector

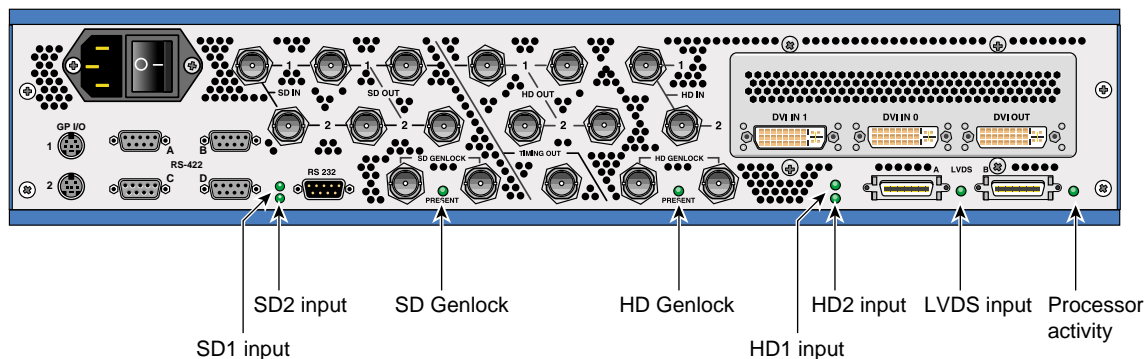
**Note:** The VBOB has two BNC connectors for each external HD and SD genlock source. You can use either of these connectors as an input or a loop-through.

## 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.

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

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## VBOB Software

The VBOB is shipped with CD software version 1.3 or later. The 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 the VBOB is connected to your system. If the VBOB is not connected, a message appears that reminds you to connect the 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.

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

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## 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



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**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.

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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:

- 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.

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If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are 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.



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**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.

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## 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

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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 prescrites dans le Règlement sur les interférences 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, Inc., 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 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 Silicon Graphics, Inc., 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, Inc., be sure they are shielded. Telephone cables do not need to be shielded.

## Electrostatic Discharge

Silicon Graphics, Inc., 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.

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**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.

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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:
  - When 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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