SGI™ Video Breakout Box Owner's Guide

007-4243-001

CONTRIBUTORS

Written by Mark Schwenden and Alan Stein

Illustrated by Dan Young

Production by Diane Ciardelli

Engineering contributions by Eric Kunze, Reed Lawson, Joe Kennedy, Aldon Caron, Mike Weesner, Bruce Garrett, Kenji Kokaji, Raul Lopez, Viral Kadakia, Michael Wright, and Ray Mascia.

COPYRIGHT

© 2001 Silicon Graphics, Inc. All rights reserved; provided portions may be copyright in third parties, as indicated elsewhere herein. No permission is granted to copy, distribute, or create derivative works from the contents of this electronic documentation in any manner, in whole or in part, without the prior written permission of Silicon Graphics, Inc.

LIMITED RIGHTS LEGEND

The electronic (software) version of this document was developed at private expense; if acquired under an agreement with the USA government or any contractor thereto, it is acquired as "commercial computer software" subject to the provisions of its applicable license agreement, as specified in (a) 48 CFR 12.212 of the FAR; or, if acquired for Department of Defense units, (b) 48 CFR 227-7202 of the DoD FAR Supplement; or sections succeeding thereto. Contractor/manufacturer is Silicon Graphics, Inc., 1600 Amphitheatre Pkwy 2E, Mountain View, CA 94043-1351.

TRADEMARKS AND ATTRIBUTIONS

Silicon Graphics is a registered trademark, and SGI, the SGI logo, and IRIS InSight are trademarks of Silicon Graphics, Inc. All other third party brands and names mentioned in this document are the property of their respective owners.

Cover Design By Sarah Bolles, Sarah Bolles Design, and Dany Galgani, SGI Technical Publications.

For regulatory and compliance information, see Appendix A.

Record of Revision

Version	Description
001	January 2001 Initial Rev

Contents

Record of Revision iii

Figures vii

Tables ix

About This Guide xi
Product Features xi
Additional Information xiii
Conventions and Terminology xiii
Product Support xiii
Reader Comments xiv

1. VBOB Site Preparation and Specifications 1
Site Preparation 1
Technical Specifications 3

2. Rackmounting and Hardware Overview 5
Mounting VBOB in an SGI 3000 Series Rack 5
Theory of Operation 8
TMDS Interface 8
LVDS Interface 8
Genlock 9

3. VBOB Chassis Connectors and Cabling 11
Chassis Connectors 11
Rear Chassis LEDs 13
Getting Started 14
DG5-2 With TVO Cabling 14
Connecting TVO to VBOB 14
High Definition or Standard Definition Video and Genlock Connections 16

4. HD GVO Software CD 17

A. Regulatory Specifications 19

Manufacturer's Regulatory Declarations 19

CMN Number 19

Class A Compliance 19

Electromagnetic Emissions 21

Japanese Notice 21

Industry Canada Notice (Canada Only) 21

CE Notice 21

Radio and Television Interference 22

Shielded Cables 22

Electrostatic Discharge 23

Index 25

Figures

Figure i	VBOB Front Panel	xii
Figure ii	VBOB Rear Panel	xii
Figure iii	Injury or Death Warning Icon	xiii
Figure 1-1	Chassis Airflow Diagram	2
Figure 2-1	Installing the Mounting Brackets on VBOB	6
Figure 2-2	Installing VBOB in the Rack	7
Figure 2-3	Internal Operation Block Diagram	9
Figure 3-1	VBOB Chassis Rear Panel Connectors	11
Figure 3-2	Rear Chassis LEDs	13
Figure 3-3	Connecting TVO to VBOB	15
Figure 3-4	High Definition/Standard Definition Video and Genlock Connections	16

Tables

Table 1-1 Cooling and Power Requirements 1

Table 1-2 Physical and Environmental Specifications 3

Table 2-1 Rack Installation Hardware for VBOB 5

Table 3-1 Rear Panel Connectors 12

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. It also provides illustrations and procedures for connecting VBOB to a TVO board that is installed in an SGI host system.
- Chapter 4, “HD GVO Software CD,” describes the HD GVO 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
- TMDS digital video input ports
- LVDS input and output ports
- Genlock BNC connectors for High Definition and Standard Definition video
- RS-232 port for upgrades and system maintenance

Figure i shows the VBOB front panel.

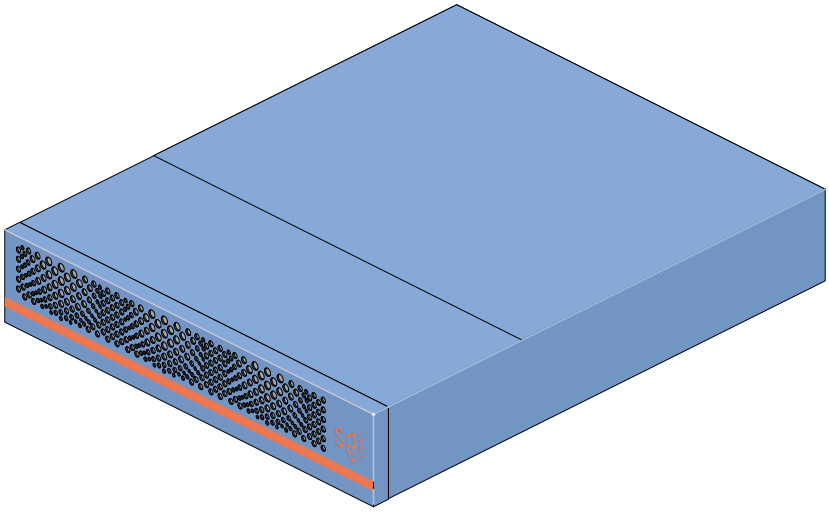

Figure i VBOB Front Panel

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

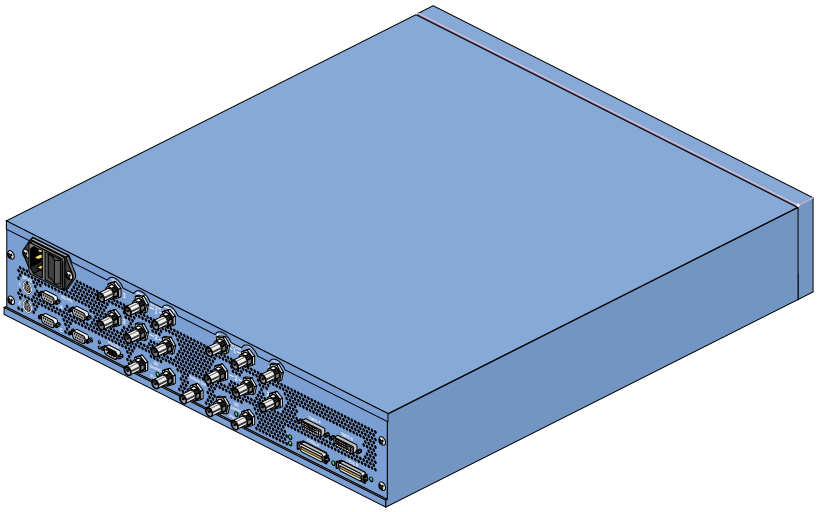

Figure ii VBOB Rear Panel

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.

Reader Comments

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.)

You can contact SGI in any of the following ways:

- Send e-mail to the following address:

  `techpubs@sgi.com`

- Use the Feedback option on the Technical Publications Library World Wide Web page:

  `http://techpubs.sgi.com`

- Contact your customer service representative and ask that an incident be filed in the SGI incident tracking system.
- Send mail to the following address:

  Technical Publications
  SGI
  1600 Amphitheatre Pkwy., M/S 535
  Mountain View, California 94043-1351

- 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 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.

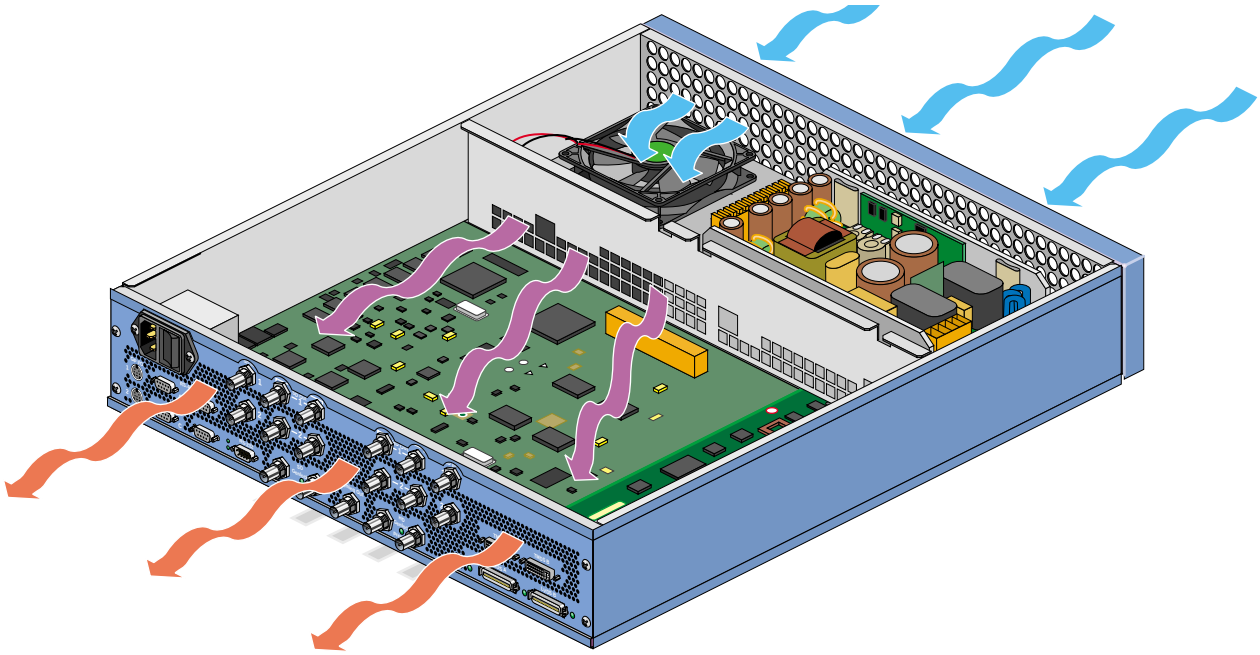

Figure 1-1 Chassis Airflow Diagram

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 2 in. (5.1 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 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.

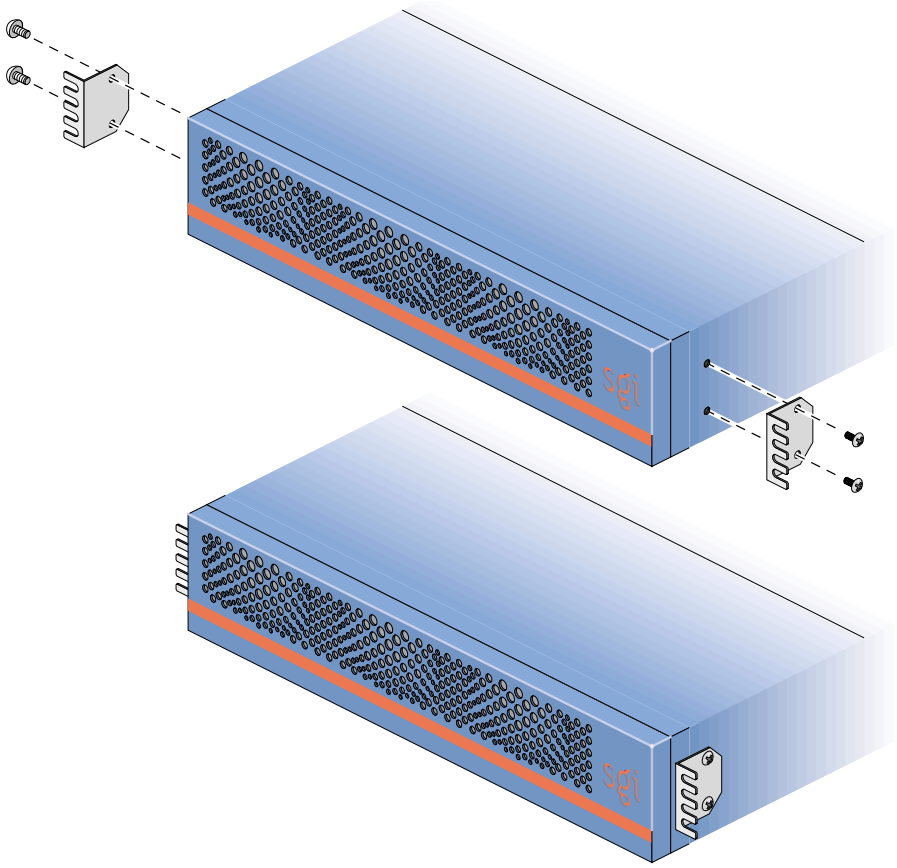

Figure 2-1 Installing the Mounting Brackets on VBOB

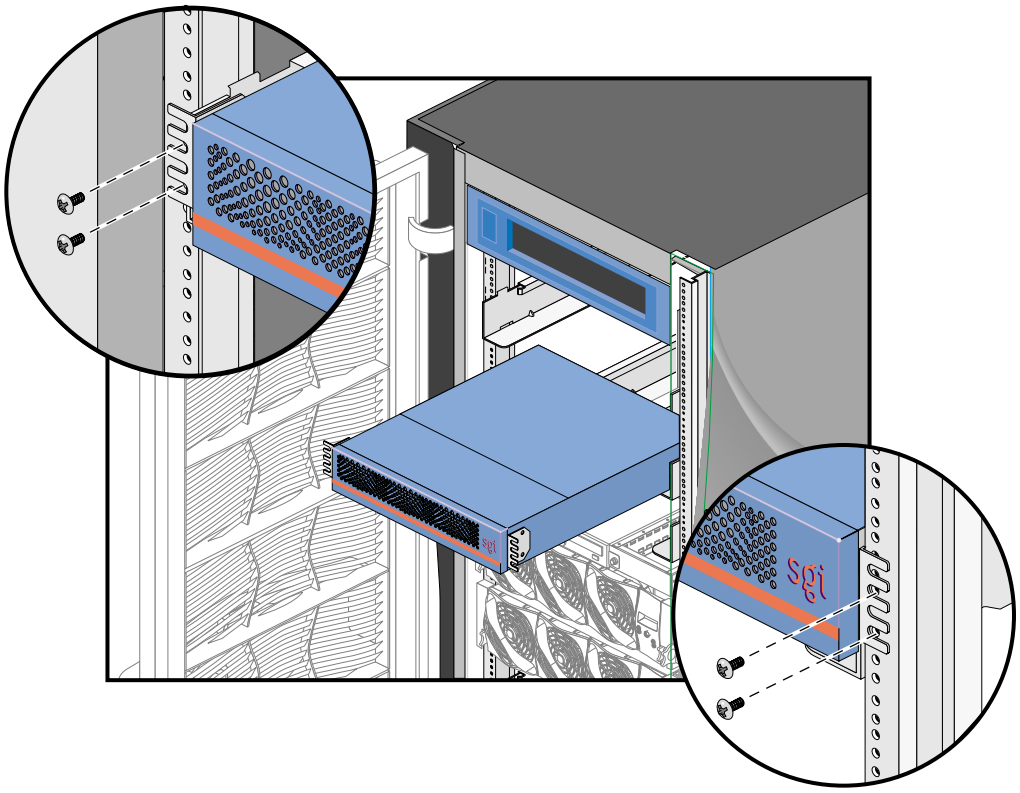

Figure 2-2 Installing VBOB in the Rack

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 a 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.

TMDS Interface

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.

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. Valid sync signals are PAL and NTSC.

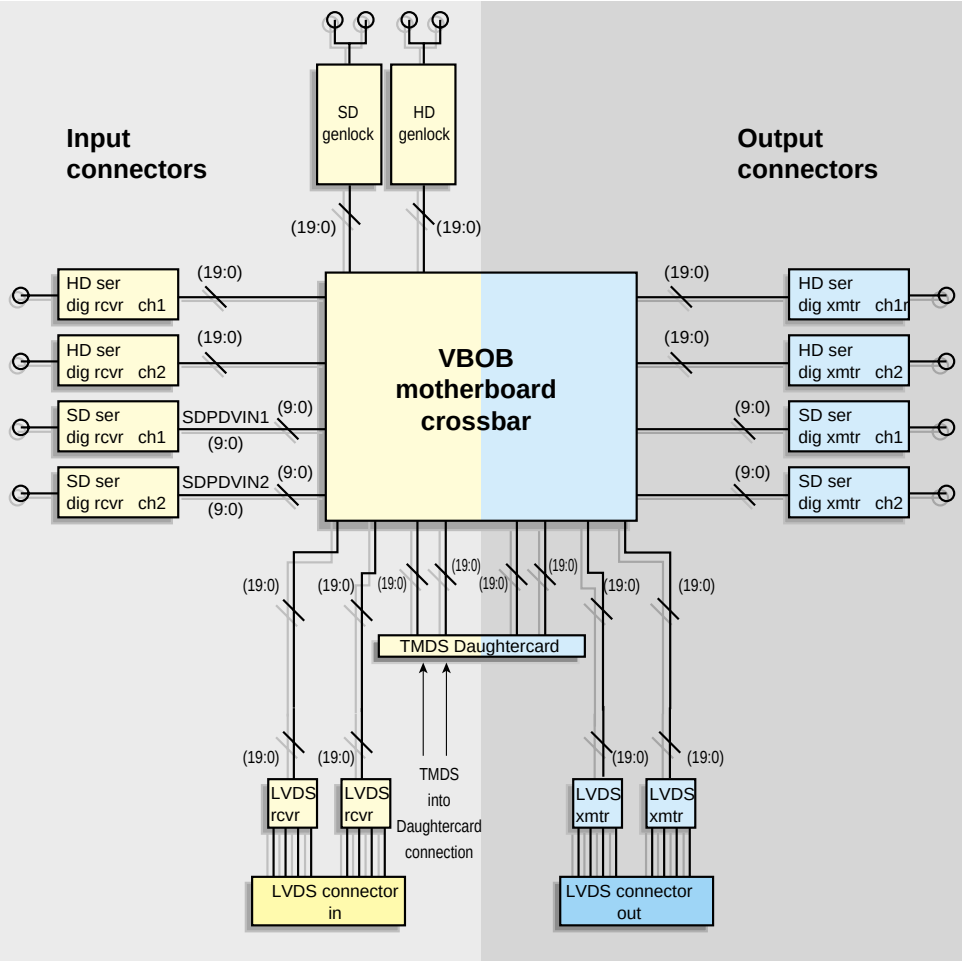

Figure 2-3 Internal Operation Block Diagram

VBOB Chassis Connectors and Cabling

This chapter describes all the connectors and LEDs located on the back of the VBOB chassis. It also provides illustrations and procedures for connecting VBOB to a TVO board that is installed in an SGI host system.

Chassis Connectors

Figure 3-1 shows the rear panel connectors.

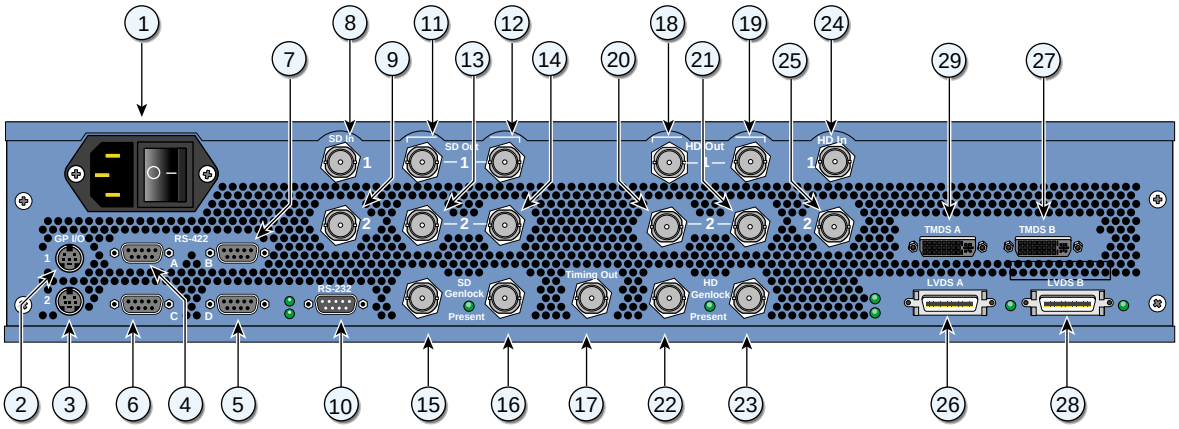

Figure 3-1 VBOB Chassis Rear Panel Connectors

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.	LVDS A	LVDS connector
27.	TMDS B	TMDS graphics connector
28.	LVDS B	LVDS connector
29.	TMDS A	TMDS graphics connector

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)
- **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.

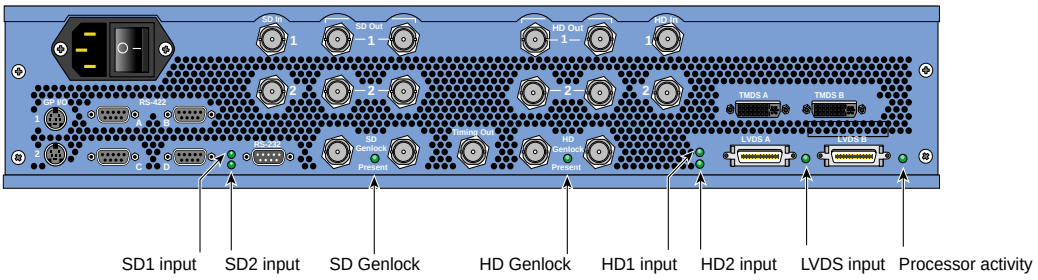

Figure 3-2 Rear Chassis LEDs

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. The next section, "DG5-2 With TVO Cabling" provides some example configurations.

1. Be sure the VBOB power switch at the back of the chassis is in the **Off (-)** 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.

DG5-2 With TVO Cabling

This section provides some example configurations that are applicable to the SGI Onyx2 and Onyx 3000 DG5-2/TVO daughterboard. For a complete description of the TVO daughterboard, see the *SGI HD GVO Owner's Guide* (007-3868-00*x*).

Connecting TVO to VBOB

To display graphics images in High Definition or Standard Definition video, follow these steps:

1. Connect one end of the TMDS A cable (black cable with white connector on each end) to the TVO board's TMDS A connector. Connect the other end of this cable to the VBOB TMDS A connector, as shown in Figure 3-3.
2. Connect one end of the TMDS B cable (black cable with black connector on each end) to TVO board's TMDS B connector. Connect the other end of this cable to the VBOB TMDS B connector.
3. Connect one end of the BNC Timing Reference cable to the VBOB Timing Out connector. Connect the other end of this cable to the TVO board's Genlock in connector.
4. Connect the 75 Ohm terminator to the Genlock loop-through connector on the TVO board.

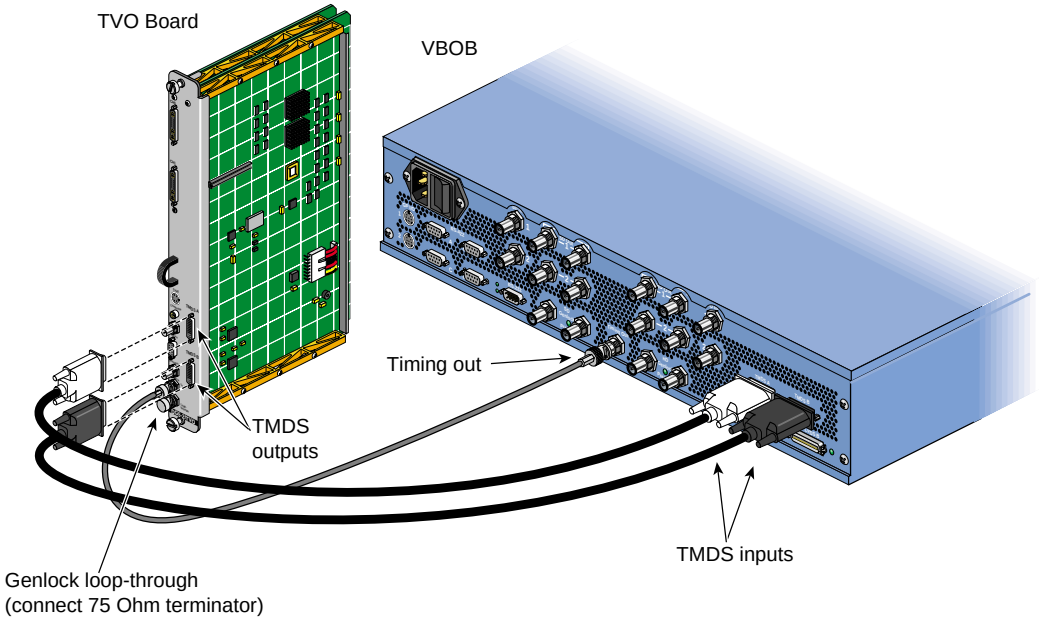

Figure 3-3 Connecting TVO to VBOB

High Definition or Standard Definition Video and Genlock Connections

After you complete the connections in Figure 3-3, you can connect the required cable(s) from the VBOB HD Out or SD Out connector(s) to the desired High Definition or Standard Definition video device(s). If you are genlocking the serial digital output to an external source, connect an analog sync source to the VBOB HD Genlock In or SD Genlock In connector (See Figure 3-4). If you are not using High Definition or Standard Definition Genlock loop-throughs, attach a 75 ohm terminator to the appropriate connectors.

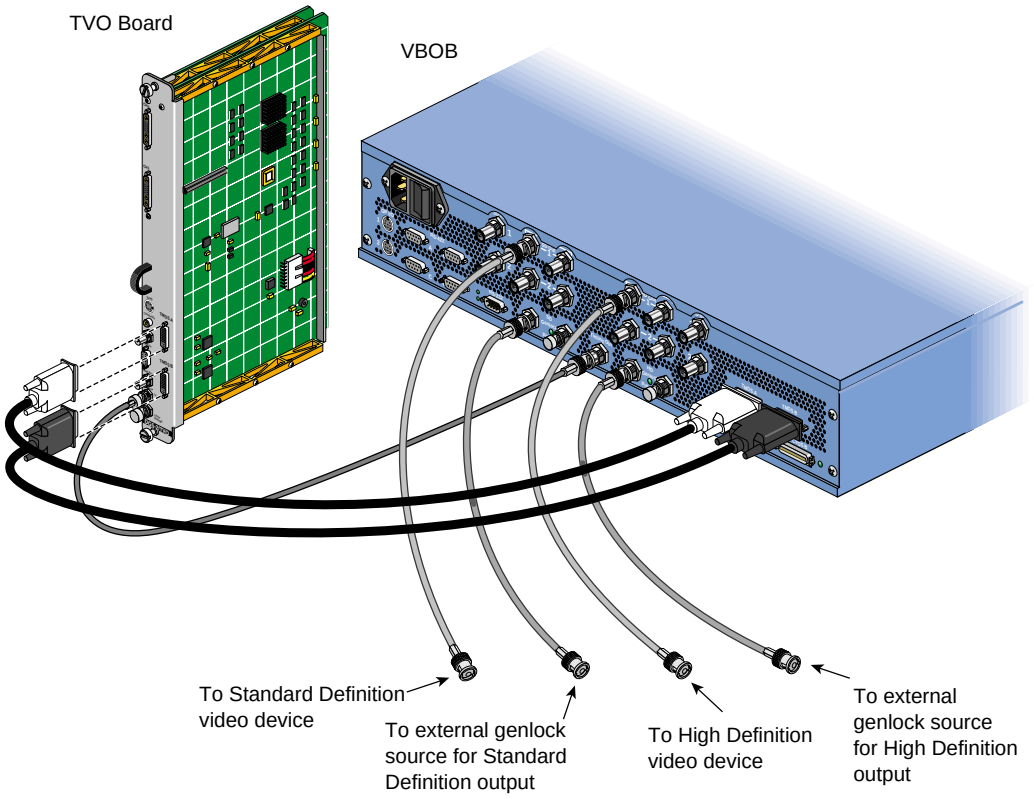

Figure 3-4 High Definition/Standard Definition Video and Genlock Connections

HD GVO Software CD

The VBOB is shipped with HD GVO software version 1.0 or later. You should rarely need to use this CD. VBOB is pre-programmed at the factory and your SGI service representative installs the DG5-2/TVO board. This CD includes the following:

- `vbob_flash`

  A utility for flashing the VBOB PROMs. Without options, this command 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 command, Superuser privileges are required.

  Usage: **`vbob_flash`**

  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.

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 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.

Index

Numbers

8-pin round, 12
9-pin subminiature, 12

A

AC input, 1
acoustic noise, 3
air temperature, 3
alpha signals, 8
altitude, 3

B

back panel
  displayed, xii, 11
back panel connectors, 11-13
BNC connectors
  and High Definition Genlock, 9, 12-13
  and High Definition Video, xi, 8
  and Standard Definition Genlock, 9, 12
  and Standard Definition Video, xi, 8
BNC timing reference cable, 14
booting up, 14
brackets, 6

C

cables
  BNC timing reference, 14
  connecting, 14
  HD Genlock, 16
  HD Video, 16
  SD Genlock, 16
  SD Video, 16
  shielded, 22
  TMDS A, 14
  TMDS B, 14
Canadian regulatory notice, 21
caution
  and rackmounting, 5
CE Notice, 19, 21
chassis
  and airflow, 2
  described, xi
  dimensions, 3
  installing, 5-7
  mounting, 5-7
  site preparation, 1-2
chassis connectors, 11-13
chassis LEDs, 13
chassis rear panel connectors, 11, 13
Class A compliance, 19-20
CMN number, 19
compliance, 19-20
connection
  and cables, 14

TVO to VBOB, 14-15
connectors
described, 8
Genlock loop-through, 14, 15
HD Genlock in, 16
SD Genlock in, 16
timing out, 14
TMDS A, 14
TMDS B, 14
VBOB rear panel, 12
cooling requirements, 1-2
customer service, xiii

D

data interface, 8
DG5-2/TVO board, 14
Digital Visual Interface
and TMDS, 8

E

electromagnetic emissions, 21
electromagnetic interference, 23
electrostatic discharge, 23
environmental specifications, 3
ESD wrist strap, 23
European regulatory notice, 19, 21

F

front panel
displayed, xii

G

Genlock
and HD Video, 16
and SD Video, 16
described, 9
Genlock BNC connectors, xi
Genlock in, 14
Genlock LEDs, 13
Genlock loop-through, 14, 15
graphics images
displaying, 14

H

HD Genlock BNC, 12
HD GVO software, 17
HD in BNC, 13
HD LEDs, 13
HD out BNC, 12
High Definition Genlock in, 12
High Definition Genlock loop-through, 12
High Definition in BNC, 13
High Definition out BNC, 12
High Definition SMPTE-292M, 8
High Definition Video
and Genlock connections, 8, 16
and Video connections, 8

I

icons, xiii
Industry Canada Notice, 21
input connectors
displayed, 9
inrush current, 1

installation
  and brackets, 6
  and mounting brackets, 6
  hardware, 5
  orientation, 3
  requirements, 5
internal operation diagram, 9

J

Japanese regulatory notice, 21

L

LEDs, 13
Low Voltage Differential Signaling. *See* LVDS
LVDS
  described, 8
LVDS A, 13
LVDS B, 13
LVDS connector, 13
  displayed, 9
LVDS interface, 8
LVDS LEDs, 13
LVDS ports, xi

M

Manufacturer's Declaration of Conformity, 19
mechanical shock, 4
mechanical vibration, 4
mounting brackets
  installing, 6

N

nominal current draw, 1
NTSC, 9

O

output connectors
  displayed, 9

P

PAL, 9
physical specifications, 3
power requirements, 1-2
processor activity
  and LEDs, 13
product support, xiii

R

rack
  and product features, xi
  installing VBOB in, 5-7
  warning, 5
rackmounting
  overview, 5-7
  warning, 5
rackmounting rails, 5
radio interference, 22
rails, 5
rear panel
  displayed, xii, 11
  LEDs, 13
rear panel connectors, 11-13
regulatory specifications, 19-23

relative humidity, 3
RS-232 port, xi, 8, 12
RS-422 port, 12

S

SD BNC connectors, 8
SD Genlock BNC, 12
SD in BNC, 12
SD LEDs, 13
SD out BNC, 12
Serial Digital Standard Definition BNC connectors, 8
SGI 3000 series rack. *See* rack
shielded cables, 22
shock, 4
site preparation, 1-2
slide rails, 6
specifications
  cooling, 1
  environmental, 3
  physical, 3
  power, 1
  regulatory, 19-23
Standard Definition Genlock in, 12
Standard Definition Genlock loop-through, 12
Standard Definition in, 12
Standard Definition out, 12
Standard Definition SMPTE-259M, 8
Standard Definition Video
  and Genlock connections, 8, 16
  and Video connections, 8
standards, 8
sync signals, 9
system
  booting, 14

T

technical support, xiii
television interference, 22
theory of operation, 8
thermal gradient, 3
timing out, 12, 15
timing out connector, 14
TMDS, 13
  described, 8
TMDS A cable, 14
TMDS A connector, 13, 14
TMDS B cable, 14
TMDS B connector, 13, 14
TMDS daughtercard
  displayed, 9
TMDS digital video input ports, xi
TMDS graphics connector, 13
TMDS input, 15
TMDS interface, 8
TMDS outputs, 15
TMDS video input ports, 8
Transition Minimized Differential Signaling. *See* TMDS
TVO board
  connecting to VBOB, 14-15

U

UPS volt-amp rating, 1

V

VBOB
  and flashing the PROM, 17
  attaching to rack, 6

configuring, 8
connecting to TVO, 14-15
features, xi
mounting in rack, 5-7
rear panel
displayed, 11
VBOB chassis
and airflow, 2
described, xi
dimensions, 3
installing, 5-7
mounting, 5-7
site preparation, 1-2
VBOB chassis connectors, 11-13
VBOB chassis LEDs, 13
VBOB chassis rear panel connectors, 11, 13
VBOB front panel
displayed, xii
VBOB motherboard crossbar
displayed, 9
VBOB rear panel
displayed, xii
VBOB timing out connector, 14
vbob_flash, 17
vibration, 4

W

warning
and rackmounting, 5
warning icons, xiii