Imagine COMMUNICATIONS

Installation and Operation Manual

Videotek® VSG-401

SDI Video Signal Generator

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Edition D

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Delivering the Moment

imaginecommunications.com

Publication Information

This publication is designed to assist in the use of the product as it exists on the date of publication of this manual, and may not reflect the product at the current time or an unknown time in the future. This publication does not in any way warrant description accuracy or guarantee the use for the product to which it refers. Imagine Communications reserves the right, without notice to make such changes in equipment, design, specifications, components, or documentation as progress may warrant to improve the performance of the product.

Trademarks

Contact Information

Imagine Communications has office locations around the world. For locations and contact information see: **http://www.imaginecommunications.com/contact-us/**

Support Contact Information

For support contact information see:
Support Contacts: http://www.imaginecommunications.com/services/technical-support/

eCustomer Portal: http://support.imaginecommunications.com

Contents

About This Manual

This manual details the features, installation procedures, operational procedures, and specifications of the VSG-401 SDI video signal generator.

About This Manual provides an overview of this installation and operation manual, describes manual conventions, and tells you where to look for specific information. This section also gives you important information on unpacking and shipping your product.

Intended Audience

This manual is written for engineers, technicians, and operators responsible for the installation, setup, and/or operation of the VSG-401 SDI video signal generator.

Finding Specific Information

Table P-1 shows the location of specific information in this manual.

Table P-1 Finding Specific Information in this Guide

If you are looking for	Go to
Back panel information	Page 16
Browser interface	Page 43
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If you are looking for	Go to
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Manual Information

This section provides information about the revision history of the manual, writing conventions used for ease of understanding as well as for navigation throughout the document, and information about obtaining other product manuals.

Revision History

Table P-2 Manual Revision History

Edition	Date	Revision History
A	March 2011	Initial release
B	August 2011	Addition of TC Insertion menu and functionality
C	June 2012	Minor correction to specifications
D	July 2014	Rebranding; minor corrections to contents

Writing Conventions

To enhance your understanding, the authors of this manual have adhered to the following text conventions:

Table P-3 Manual Style and Writing Conventions

Term or Convention	Description
Bold	Indicates dialog boxes, property sheets, fields, buttons, check boxes, list boxes, combo boxes, menus, submenus, windows, lists, and selection names
Italics	Indicates email addresses, the names of books or publications, and the first instances of new terms and specialized words that need emphasis
CAPS	Indicates a specific key on the keyboard, such as ENTER, TAB, CTRL, ALT, or DELETE
`Code`	Indicates variables or command-line entries, such as a DOS entry or something you type into a field
> or →	Indicates the direction of navigation through a hierarchy of menus and windows

Table P-3 Manual Style and Writing Conventions *(Continued)*

Term or Convention	Description
hyperlink	Indicates a jump to another location within the electronic document or elsewhere
Internet address	Indicates a jump to a website or URL
	Indicates important information that helps to avoid and troubleshoot problems
To perform a procedure	Indicates the introduction to a procedure or series of procedural steps

Obtaining Documents

The installation and operation manuals for most Imagine Communications products are included on your VSG & VSX Products Operator's Handbook CD as individual Adobe Acrobat PDF files. Most of the software applications contained on the CD include Online Help (electronic documents integrated into their respective software applications). While working in the application, you can open the Online Help and print out individual topics. The most up-to-date documentation and software is always available on our website.

Unpacking/Shipping Information

This product was carefully inspected, tested, and calibrated before shipment to ensure years of stable and trouble free service.

Unpacking a Product

1. Check equipment for any visible damage that may have occurred during transit.
2. Confirm that you have received all items listed on the packing list.
3. Contact your dealer if any item on the packing list is missing.
4. Contact the carrier if any item is damaged.
5. Remove all packaging material from the product and its associated components before you install the unit.

Product Servicing

The VSG-401 SDI video signal generator is not designed for field servicing. All hardware upgrades, modifications, or repairs require you to return the VSG-401 to the Customer Service center. For more information see ***VSG-401 Service and Support*** on page 12.

Returning a Product

In the unlikely event that your product fails to operate properly, please contact Customer Service to obtain a Return Authorization (RA) number, and then send the unit back for servicing.

Keep at least one set of original packaging, in the event that you need to return a product for servicing. If the original packaging is not available, you can purchase replacement packaging at a modest cost or supply your own packaging as long as it meets the following criteria:

- Withstands the weight of the product
- Holds the product rigid within the packaging
- Leaves at least two inches of space between the product and the container
- Protects the corners of the product

Ship products back to us for servicing prepaid and, if possible, in the original packaging material. If the product is still within the warranty period, we will return the product prepaid after servicing. For more information see ***VSG-401 Service and Support*** on page 12.

Operator's Safety Summary

WARNING: These instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform this installation or any servicing unless you are qualified to do so. Refer all servicing to qualified service personnel.

Ensuring Safety

- If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- The unit should not be exposed to dripping or splashing, and no objects filled with liquids, such as vases, shall be placed on the unit.
- When the unit is to be permanently cabled, connect the protective ground conductor before making any other connections.
- Operate built in units only when they are properly fitted into the system.
- For permanently cabled units without built in fuses, automatic switches, or similar protective facilities, the AC supply line must be fitted with fuses rated to the units.
- Before switching on the unit, ensure that the operating voltage set at the unit matches the line voltage, if appropriate. If a different operating voltage is to be set, use a fuse with the appropriate rating. Refer to the Installation Instructions.
- Units of Protection Class I with an AC supply cable and plug that can be disconnected must be operated only from a power socket with protective ground contact:
  - Do not use an extension cable–it can render the protective ground connection ineffective.
  - Do not intentionally interrupt the protective ground conductor.
  - Do not break the protective ground conductor inside or outside the unit or loosen the protective ground connection; such actions can cause the unit to become electrically hazardous.
- Before opening the unit, isolate it from the AC supply. Then, ensure that
  - Adjustments, part replacements, maintenance, and repairs are carried out by qualified personnel only.
  - Safety regulations and rules are observed to prevent accidents.

- Only original parts are used to replace parts relevant to safety (for example, the power on/off switches, power transformers, and fuses).

- Replaceable fuses can be hazardous when live. Before replacing a fuse, disconnect the AC power source.
- Use caution when cleaning the equipment; isopropyl alcohol or similar solvents can damage or remove the labels.
- Observe any additional safety instructions specified in this manual.

Explanation of Symbols

These symbols may appear on Imagine Communications equipment:

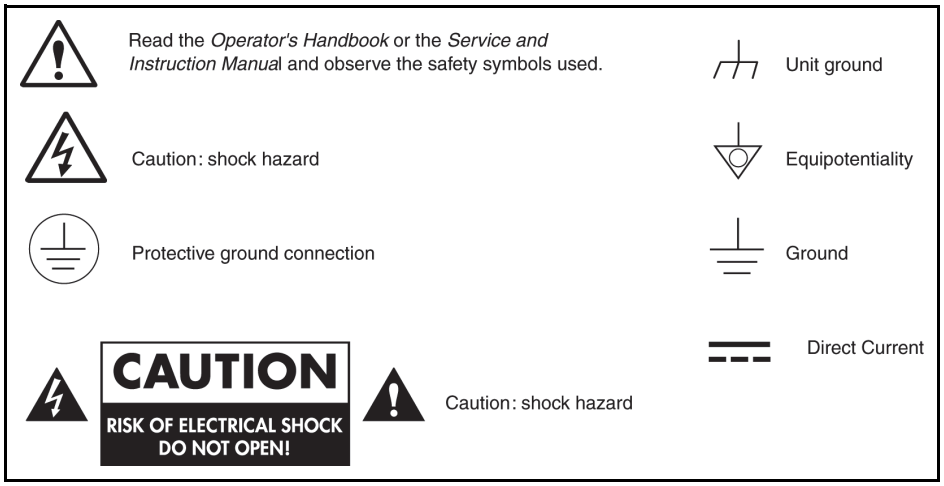


Figure P-1 Safety Symbols Appearing on Imagine Communications Equipment

This product manual uses the following safety terms and symbols to identify certain conditions or practices.

Table P-4 Safety Terms and Symbols Appearing in the Product Manual

Symbol	Description
	**WARNING: Identifies conditions or practices that can result in personal injury or loss of life — high voltage is present. Uninsulated dangerous voltage within the product's enclosure may be sufficient to constitute a risk of electric shock to persons.**
	**CAUTION: Identifies conditions or practices that can result in damage to the equipment or other property. Important operating and maintenance (servicing) instructions are included in the literature accompanying the product.**

Certification Labels and Symbol Locations

On Imagine Communications equipment, certification labels and symbols are located on the back panel, rear chassis sides, or bottom rear of the chassis. On smaller space-restricted units, most labels and symbols can be found on the bottom rear of the chassis.

Directives and Compliances

This section provides information concerning Imagine Communications compliance with EU Directive 2002/95/EC and EU Directive 2002/96/EC.

Restriction on Hazardous Substances (RoHS) Directive

Directive 2002/95/EC — commonly known as the *European Union (EU) Restriction on Hazardous Substances (RoHS)* — sets limits on the use of certain substances found in electrical and electronic equipment. The intent of this legislation is to reduce the amount of hazardous chemicals that may leach out of landfill sites or otherwise contaminate the environment during end-of-life recycling. The Directive, which took effect on July 1, 2006, refers to the following hazardous substances:

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent Chromium (Cr-V1)
- Polybrominated Biphenyls (PBB)
- Polybrominated Diphenyl Ethers (PBDE)

In accordance with this EU Directive, products sold in the European Union will be fully RoHS-compliant and "lead-free." Spare parts supplied for the repair and upgrade of equipment sold before July 1, 2006 are exempt from the legislation. Equipment that complies with the EU directive will be marked with a RoHS-compliant symbol, as shown in **Figure P-2**.

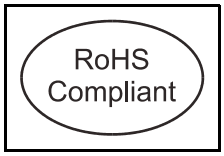


Figure P-2 RoHS Compliance Symbol

Waste from Electrical and Electronic Equipment (WEEE) Directive

The *European Union (EU) Directive 2002/96/EC on Waste from Electrical and Electronic Equipment (WEEE)* deals with the collection, treatment, recovery, and recycling of electrical and electronic waste products. The objective of the WEEE Directive is to assign the responsibility for the disposal of associated hazardous waste to either the producers or users of these products. As of August 13, 2005, producers or users are required to recycle electrical and electronic equipment at end of its useful life, and must not dispose of the equipment in landfills or by using other unapproved methods. (Some EU member states may have different deadlines.)

In accordance with this EU Directive, companies selling electric or electronic devices in the EU will affix labels indicating that such products must be properly recycled. Contact your local Sales representative for information on returning these products for recycling. Equipment that complies with the EU directive will be marked with a WEEE-compliant symbol, as shown in **Figure P-3**.

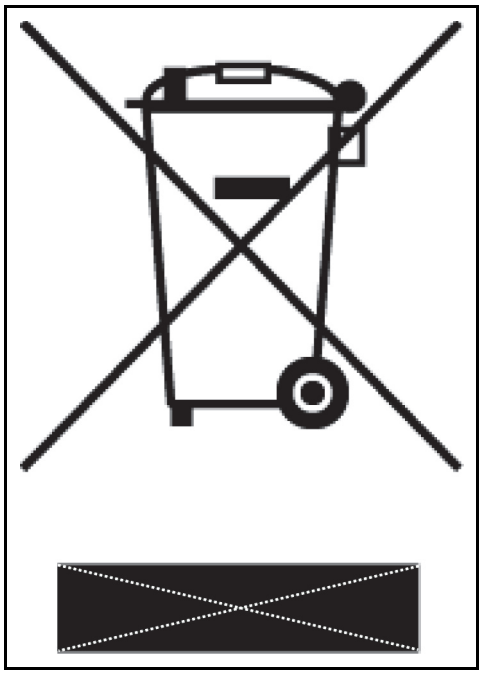


Figure P-3 WEEE Compliance Symbol

1 Introduction

The Videotek® VSG-401 is a 1 RU, half rack wide, single channel SDI test generator with single link and dual link operation modes. Select either four outputs for single link SDI 3 Gb/s, single link SDI 1.5 Gb/s or single link SDI 270 Mb/s or two outputs of dual link SDI (2 x 1.5 Gb/s). Part of the Videotek Compact Monitor Series, the unit is small in size and light in weight, making it a perfect fit for all broadcast television and post production environments

The VSG-401 can be externally referenced to color black (black burst) or tri-level sync and selectable video format, frame rate and signal type on the test generator. It has up to 16 channels of embedded audio, with group enabled settings and global settings for amplitude and frequency. There are two AES outputs, with one output selectable as word clock or digital audio reference signal (DARS).

The test signal outputs on the VSG-401 allow source ID selection up to 19 characters. Users can add continuous motion of a bouncing block to any test pattern except check field.

The VSG-401 is simple to operate, with an Ethernet port facilitating software updates and Web browser control. A 110/220 universal AC adapter provides DC voltage power input.

Product Features

The VSG-401 includes the following standard and optional features.

Standard Features

- External reference input (looping) with color black (black burst) or tri-level sync
- Single channel test generator with four outputs (two outputs for dual link)
  - Single link SDI supports 3 Gb/s, 1.5 Gb/s or 270 Mb/s
  - Dual link SDI supports 2 x 1.5 Gb/s
- 19 character source ID can be added to test signal output
- Single channel of selectable color black (black burst) or tri-level sync reference output (2 outputs)
- Two AES/EBU outputs (one selectable as word clock or DARS)
- Up to 16 channels of embedded audio test signals with Selectable audio level and frequency
- Front panel control with external reference input status LED
- Ethernet port for updates and built-in Web interface

Optional Features

Table 1-1 VSG-401 Part Numbers and Descriptions

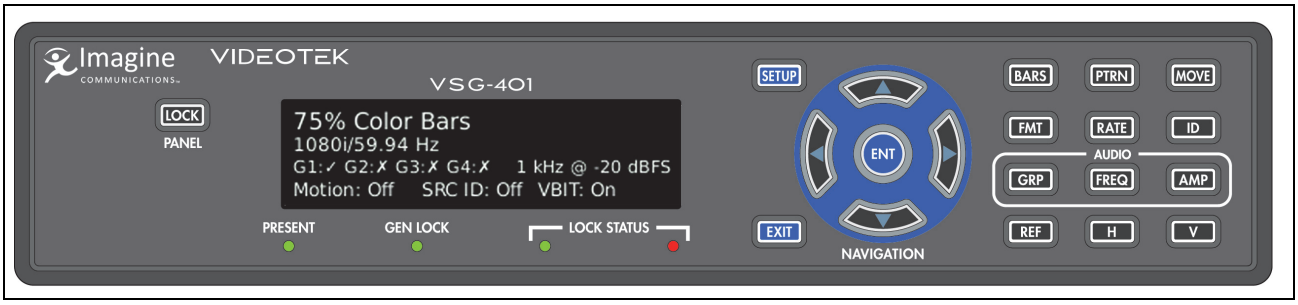
Option	Description
VSG-401	Video Signal Generator (single channel), half-RU wide, with Genlock and 3G/HD/SD Video and Embedded/AES Audio Outputs, optional rack mount (DRT-4A) and blank panel (BLK-5)
DRT-4A	Dual Rackmount Tray for CMN-41, CMN-MV, LLM-1770, or VSG-401. Use BLK-5 to fill unused space, if needed
BLK-5	Blank panel for left or right side of DRT-4A or DRT-5

Applicable Standards

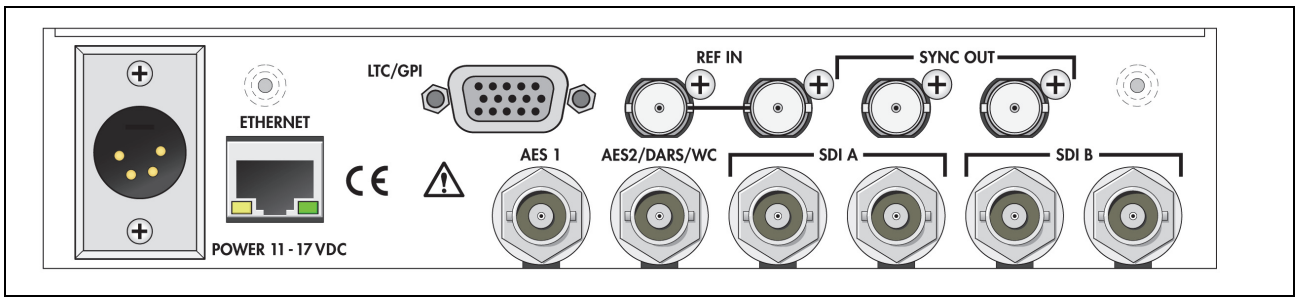
- **SMPTE 125M-1995**: Component Video Signal 4:2:2—Bit-Parallel Digital Interface
- **SMPTE 259M-1997**: SDTV Digital Signal/Data—Serial Digital Interface
- **SMPTE 274M-2005**: 1920×1080 Image Sample Structure, Digital Representation and Digital Timing Reference Sequences for Multiple Picture Rates
- **SMPTE 276M**: Transmission of AES/EBU Digital Audio Signals Over Coaxial Cable
- **SMPTE 292M-1998**: 1.5 Gb/s Signal/Data Serial Interface
- **SMPTE 296M-2001**: 1280×720 Progressive Image Sample Structure—Analog and Digital Representation and Analog Interface
- **SMPTE 299M -2004**: Mapping of 24-bit AES digital audio data and associated control information into the ancillary data space of a serial digital video
- **SMPTE 372M-2002**: Dual Link 292M Interface for 1920×1080 Picture Raster
- **SMPTE 424M-2006**: 3 Gb/s Signal/Data Serial Interface
- **SMPTE 425M-2006**: 3 Gb/s Signal/Data Serial Interface—Source Image Format Mapping

Front Panel and Back Panel Views

Figure 1-1 shows the front and back panel views of the VSG-401. See **Table 3-1** on page 20 for descriptions of the front panel components. See **Table 2-2** on page 16 for descriptions of the back panel components.



Front Panel



Back Panel

Figure 1-1 VSG-401 Front and Back Panels

Safety

See the ***Operator's Safety Summary*** on page 4 for a list of important safety instructions.

Carefully observe all safety alert symbols for dangers, warnings, and cautions. They alert installers and operators of possible dangers or important information contained in this manual.

Keep in mind, though, that warnings alone do not eliminate hazards, nor are they a substitute for safe operating techniques and proper accident prevention measures.

VSG-401 Service and Support

For service and support, telephone the Imagine Communications Customer Service Department at **1-888-534-8246**. If the problem cannot be resolved over the telephone and the instrument must be shipped to Imagine Communications for service or repair:

- Obtain a Return Authorization (RA) number from the Imagine Communications Customer Service Department.
- Attach a tag to the unit with the following information:
  - Your company name, address, and telephone number
  - The name of the contact person at your company
  - The RA number
  - The unit serial number
  - An explanation of the problem
- To prevent shipping damage, pack the unit the same way Imagine Communications had packed it. If possible, use the original packing materials in the original shipping container.
- Ship the unit to Imagine Communications
  Videotek Test and Measurement
  Attn: RA *xxxx* (where *xxxx* is the RA number)

  Email: BCDService@imaginecommunications.com

2 Installation

Installation Procedures

Inspecting the Shipment

Before installing the VSG-401, inspect the box and the contents. Report any damage to the shipper, and then telephone the Imagine Communications Customer Service Department (see ***VSG-401 Service and Support*** on page 12).

Refer to the enclosed packing sheet for the latest list of items that are supplied with the unit.

The box contains the following:

- One VSG-401
- One ***VSG-401 Installation and Operation Manual*** on CD
- One detachable power cord
- One power supply assembly
- One breakout connector (for LTC/GPI)

Save the box and packing material for any future shipping requirements.

Rack Mounting the VSG-401

When selecting the permanent mounting location for the VSG-401, make sure that the flow of air to the ventilation holes on the top and sides of the chassis is not obstructed.

Rack mounting the VSG-401 is illustrated in **Figure 2-1** for the DRT-4 rack mount case. **Table 2-1** lists the parts required to rack mount the VSG-401 into the DRT-4 rack mount case.

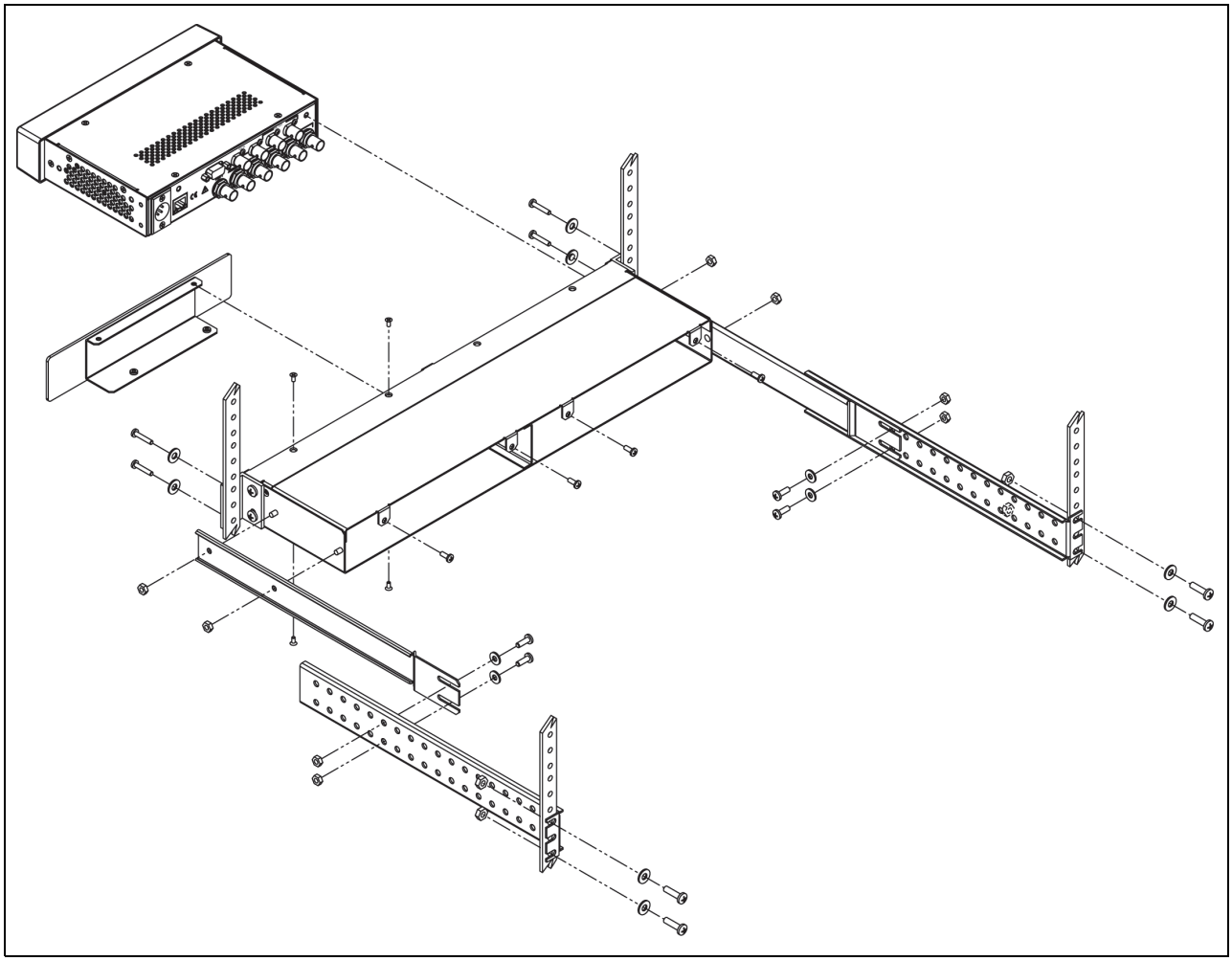


Figure 2-1 Mounting the VSG-401 in a Rack Using the DRT-4

*Although only one VSG-401 unit is shown in **Figure 2-1**, two VSG-401 units may be mounted into a DRT 4 rack case.*

Table 2-1 Parts for Rack Mounting the VSG-401 Using the DRT-4

Key	Item Number	Qty	Description
1	-	A/R	VSG-401 unit
2	866080	1	DRT-4 rack tray
3	832072	2	Metal extension mount
4	832070	2	Metal extension bracket
5	831030	8	#10-32×¾-in. Phillips head screws

Table 2-1 Parts for Rack Mounting the VSG-401 Using the DRT-4 *(Continued)*

Key	Item Number	Qty	Description
6	831019	4	Nylon washer, rack mount
7	831119	8	#8-32 kep nuts
8	831131	4	#8-32×3/8-in. Phillips head screws (CMN mtg)
9	831064	4	#8-32×½-in. Phillips head screws
10	831118	8	#10 flat washers
11	831030	4	#10-32×¾-in. Phillips head screws
	866073		FP BLK-5 (optional cover plate)
12	832131	1	DRT-4 metal blank panel
13	831136	4	#4-40×¼ self-tapping Phillips head screws

1. Install the extension bracket mounts (ITEM 3) to both sides of the chassis (ITEM 2) using four #8-32 kep nuts (ITEM 7)
2. Install the assembled unit in a rack using #10-32×¾-in Phillips head screws (ITEM 5) and washers (ITEM 6) through the chassis front mounting ears, as shown.
3. Hold the extension bracket (ITEM 4) in place on each side of the chassis, and loosely install #8-32×½-in. Phillips head screws (ITEM 9), #10 flat washers (ITEM 10), and #8-32 kep nuts (ITEM 7) into the holes that align with the slots in the metal extension mount (ITEM 3).
4. Install the #10-32×¾-in. Phillips head screws (ITEM 5), #10 flat washers (ITEM 10), and #10-32×¾-in. Phillips head screws (ITEM 11) through the rack rails and the appropriate slots in the back of the metal extension bracket (ITEM 4), and then tighten them.
5. Tighten the remaining hardware that joins the bracket pairs (ITEM 3 and ITEM 4).
6. Using 3/8-in. Phillips head screws (ITEM 8), secure the VSG-401 unit to the back of the DRT-4 rack case.
7. If desired, install the optional BLK-5 cover plate:
   - Slide the metal cover plate (ITEM 12) into the desired side of the DRT-4 rack.
   - Using 4 self tapping screws (ITEM 13), secure the cover plate into the DRC-3 rack.
8. The installation is complete.

Connecting the VSG-401

The back panel connectors are illustrated in **Figure 2-2**, and the function of each connector is described in **Figure 2-2**.

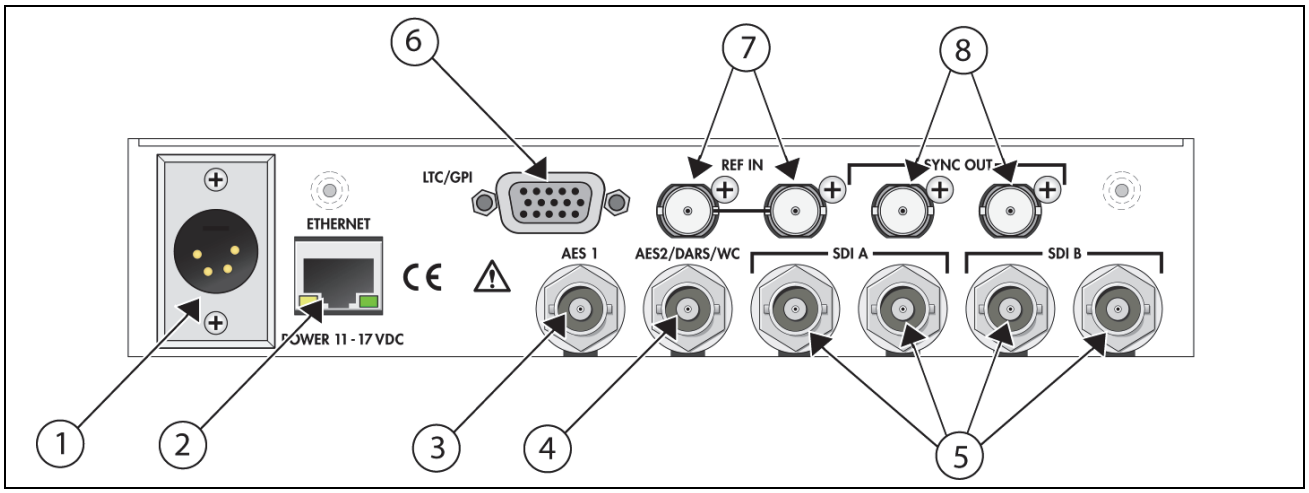


Figure 2-2 VSG-401 Back Panel Connectors

Table 2-2 Description of Back Panel Connectors

Key	Label	Description
1	PWR 11-17VDC	Power connector[1]
2	ETHERNET	RJ45, female, 10/100Base-T Ethernet connector[1]
3	AES1	AES 1 A dedicated AES Output BNC connector
4	AES2/DARS/WC	User-seletable AES, DARS or Word Clock output connector
5	SDI A and SDI B	Output BNC connectors for SDI A and B
6	LTC/GPI	15-pin, high-density female D-sub connector for LTC/GPI input/output[1]
7	REF IN	Reference Input BNCs
8	SYNC OUT	Sync Output BNCs

[1] See ***VSG-401 Pinouts*** on page 57 for the connections.

Ethernet Setup

The Ethernet default settings for the VSG-401 are as follows:
IP: 192.168.0.100
Subnet Mask: 255.255.255.0
Gateway: 0.0.0.0

1 Prior to performing the VSG-401 network configuration, obtain TCP/IP addresses from the system administrator or the Internet service provider (ISP). These addresses are a static IP address (unless using Dynamic Host Configuration Protocol [DHCP]), a subnet mask, and an optional gateway IP.

Be sure to record all addresses in the spaces provided below. The gateway address is not needed unless the VSG-401 is routed to an outside network.

VSG-401 interface static IP address	
VSG-401 interface subnet mask	
Gateway IP address	

2 Identify a host PC to configure and test the VSG-401.

3 Choose a dedicated PC connection or network connection method:

- For a dedicated PC connection, connect the host PC with a network card to the "ENET" connector on the back panel of the VSG-401, using a CAT5 network cable (not included). See **Figure 2-3**.

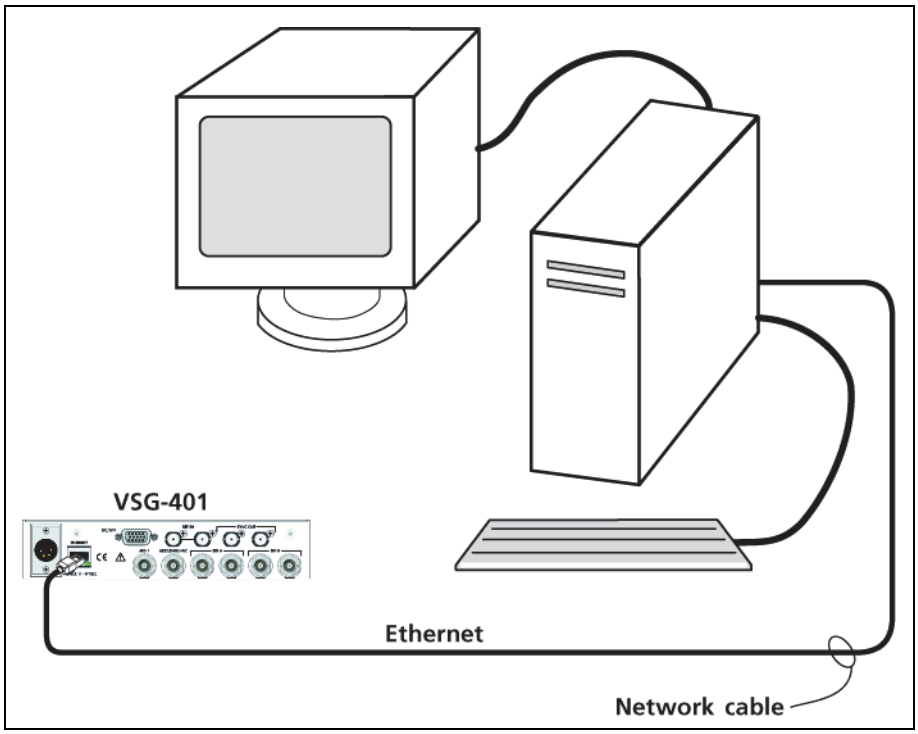


Figure 2-3 VSG-401 Dedicated PC Connection

- For a network connection, connect the network hub to the back panel of the VSG-401 using a CAT5 network cable (not included). See **Figure 2-4**.

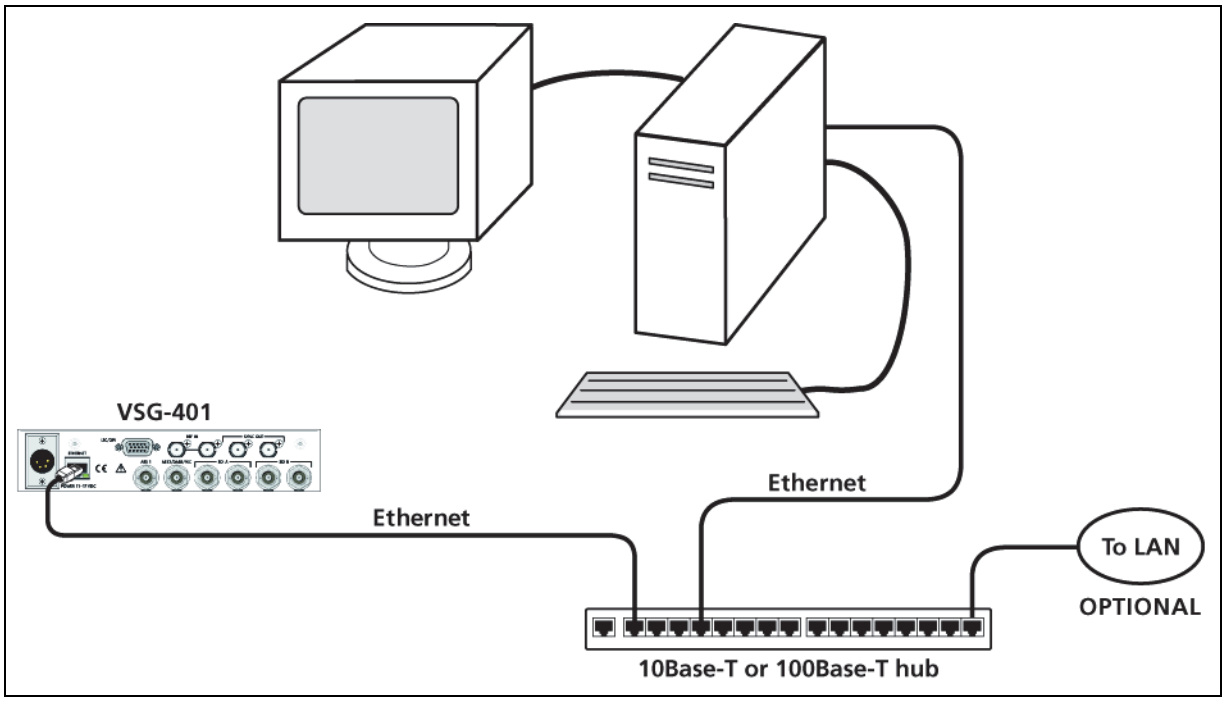


Figure 2-4 VSG-401 Network PC Connection

4 Set up an Ethernet configuration for the VSG-401 as follows:

a Press the **SETUP** button on the VSG-401 front panel.

b Press the Up/Down arrow button to scroll to the Unit Configuration Setup menu, and then press the **ENT** button to enter the submenu.

c Press the Up/Down arrow button until the **IP** selection option is shown.

d Press the **ENT** button or Left/Right arrow button to enter the Ethernet Config selection option.

e Select **DHCP Control**, and then press the **ENT** button, or use the right arrow to scroll to the next selection. (Use the Up/Down arrows to change the selection.)

f Once enabled, the obtained DHCP address can be viewed through **IP** → **IP Address**

g If using DHCP:

- Press the Left/Right arrow button to select **DHCP**.
- Press the Up/Down arrow button to toggle the state to **ON**.
- Press the **ENT** button.

The IP Address is retrieved from the DHCP server and placed under the appropriate submenu.

h If not using DHCP:

- Press the Left/Right arrow button to select **IP ADDRESS**.
- Press the Up/Down arrow button to change the value selected, and then press the Left/Right arrow button to select the next value.
- Repeat for the remainder of the IP address, subnet mask, and gateway. To avoid conflicts, the static IP address, subnet mask, and gateway should be obtained from the system administrator.
- Press the **ENT** button to accept the entered values.

i Press the **EXIT** button to exit the submenu.

3 Operation

Controlling the VSG-401

*Pressing and holding certain buttons will activate menus for additional functionality. See **Table 3-1** for more information.*

The VSG-401 is controlled in these ways:

- **Quick Controls**: Controls on the front panel that adjust parameters that are frequently used. See ***Front Panel Controls*** on page 19 for more information about front panel controls.
- **Menu Settings**: Shortcut menus within a function that are used to control the parameters for the individual function.
- **Global Setup Menu Settings**: Setup menu parameters that affect the entire unit (not function-specific). The Setup menu is accessed by pressing the **SETUP** button.
- **Web Interface Control**: A PC, using a web browser, connects to the VSG-401 using the Ethernet IP address.

Front Panel Controls

The front panel controls and web-based controls are illustrated in **Figure 3-1**.

See **Chapter 5, *External Control*** on page 43 for information on how to access the web-based controls.

Web-based controls are accessible from a computer that has Java™ Standard Edition Version 6, Update 17 or later installed. (Java can be downloaded at www.java.com.)

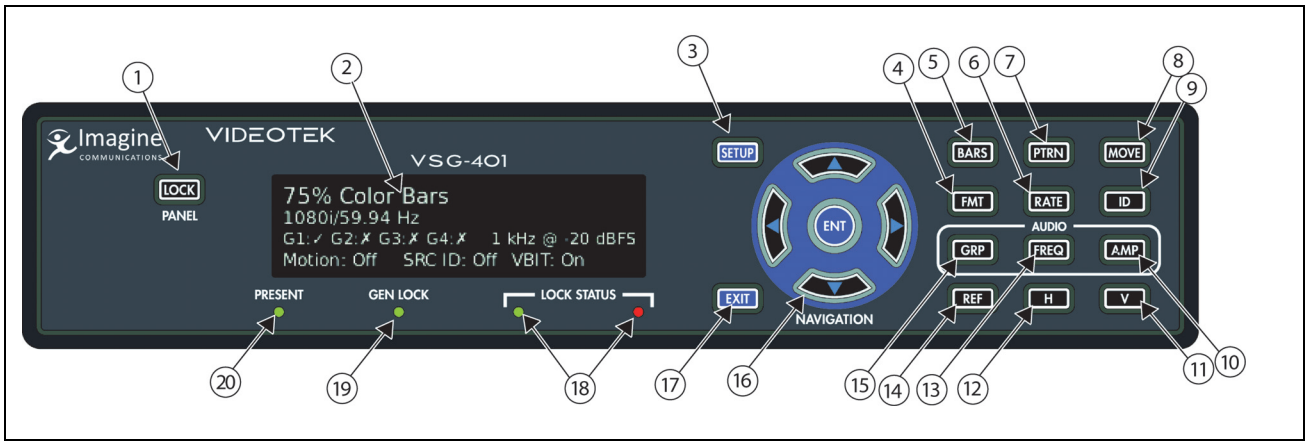


Figure 3-1 VSG-401 Front Panel Controls

Most buttons and text are in a low-tally (low illumination) state; under certain conditions, however, some buttons and text reach a high-tally (high illumination) state, as described in **Table 3-1**. The high and low tally illumination levels can be set in the High Tally and Low Tally selection options of the Unit Configuration Front Panel setup menu selection option (see page 39).

Multiple buttons may be high tally at the same time. The last control selected is the active control.

Table 3-1 VSG-401 Front Panel Controls

Key	Label	Description
1	LOCK	Lock button; press and hold to lock or unlock the front panel
2	—	Display window
3	SETUP	■ Setup button; press and release to access Setup mode ■ Press and release to exit the displayed Setup menu
4	FMT	This button is used to select the video format
5	BARS	This button is used to enable and configure the colorbar output signals
6	RATE	This button is used to select the frame rate associated with the active video
7	PTRN	This button is used to enable and configure the non-colorbar output signals
8	MOVE	This button is used to toggle through the test signal motion selection
9	ID	This button is used to toggle source ID on or off
10	AMP	This button is used to select the audio output amplitude
11	V	This button is used to adjust the vertical output timing
12	H	This button is used to adjust the horizontal output timing
13	FREQ	This button is used to select the output audio frequency
14	REF	Toggles between Internal and GenLock operational modes

Table 3-1 VSG-401 Front Panel Controls *(Continued)*

Key	Label	Description
15	GRP	This button is used to enable the embedded audio groups
16	Navigation	Use to navigate menus and select selection options (see page 31 for an explanation of how to operate the navigation items)
17	EXIT	Exit selection button; press and release to leave menu function selections
18	LOCK STATUS (Red)	Indicates that a Genlock error has occurred
	LOCK STATUS (Green)	Indicates that the unit has locked to the reference input
19	GEN LOCK	Indicates that the unit is in external Genlock mode
20	PRESENT	Indicates that an external reference signal has been detected

Front Panel Selections

The VSG-401 unit shows data on the display screen. It displays the current output selections for the test generator.

An illustration of the display is shown in **Figure 3-1**. The display varies, depending on the choice of display mode.

Selecting a Function

To directly select specific functions for the display

Press the appropriate function button. For this product, the twelve buttons on the right of the unit can be used to hot key into the menus.

When a button is pressed that cannot be used with a selected function, the message FUNCTION NOT ALLOWED briefly appears over the center of the display.

To lock or unlock a front panel

Press and hold the **Lock** button.

Status Display

This is the main display of the unit, which is used to indicate the current configuration of the VSG-401.

Status information is displayed as shown in **Figure 3-2** and **Figure 3-3**. Use the Down arrow to access the second status page. Use the Up arrow to access the first status page.

To view status

Status information will be displayed as the default display shown in **Figure 3-2**. Use the **Down** arrow to access the second status page. Use the **Up** arrow to access the first status page from the second status page.

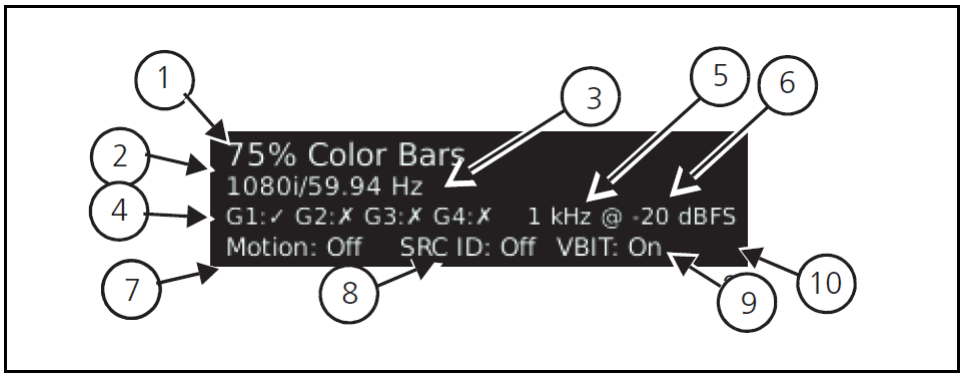


Figure 3-2 Page 1 of Status Display

Table 3-2 Status Display Page 1 Information Descriptions

Key	**Description**
1	The output test pattern
2	The output video format
3	The output video frame rate
4	Audio Group enables ■ A check mark indicates the audio group is enabled ■ An X mark indicates that the audio group is disabled
5	The selected audio frequency
6	The selected audio amplitude
7	The state of the motion function
8	The state of the source ID function
9	The state of the VBIT function
10	The text "V2A" will appear indicating that the V2A timing mode is enabled

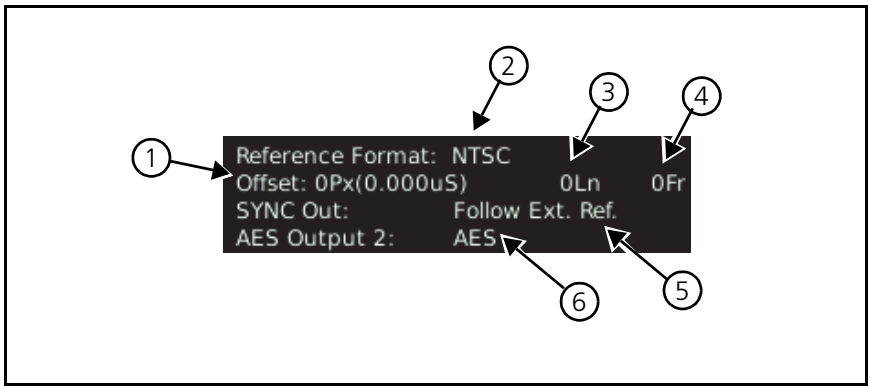


Figure 3-3 Page 2 of Status Display

Table 3-3 Status Display Page 2 Information Descriptions

Key	Description
1	The current timing pixel offset (The conversion to microseconds follows the pixel indication) *
2	The current reference format*
3	The current timing line offset*
4	The current timing frame offset*
5	The sync out user selection
6	The AES output 2 configuration

* Note - These values are only valid when the unit is in Genlock mode and the unit is locked

Quick Start

Table 3-4 lists various common tasks you will want to do with your VSG-401.

Table 3-4 VSG-401 Quick Start List

Task	Action
Output Color Bars	Press and release the BARS button.
Output a non-Color Bar Pattern	Press and release the PTRN button.
Enable pattern motion	Press and release the MOVE button.
Change the output video format	1. Press and hold the FMT button. 2. Choose a format from the list. 3. Press ENT to save your change.
Change the output video frame rate	1. Press and hold the RATE button. 2. Choose a frame rate from the list. 3. Press ENT to save your change.
Turn on the source identifier overlay	Press and release the ID button.
Enable or disable audio groups	1. Press and hold the GRP button. 2. Choose an audio group from the list. 3. Press ENT to save your change.
Change the audio frequency	1. Press and hold the FREQ button. 2. Choose an audio frequency from the list. 3. Press ENT to save your change.
Change the audio amplitude	1. Press and hold the AMP button. 2. Choose an amplitude from the list. 3. Press ENT to save your change.
Enable external reference	Press and release the REF button.
Change the reference timing	1. Press and hold either the H or V buttons. 2. Choose a timing standard from the list. 3. Press ENT to save your change.
Configure the VSG-401	Press and release the SETUP button.
Exit setup mode	Press and release the EXIT button.

Accessing and Navigating the Setup Menu

To access the global Setup menu

Press the **SETUP** button.

The Setup menu selections are displayed as shown in **Figure 3-4**.

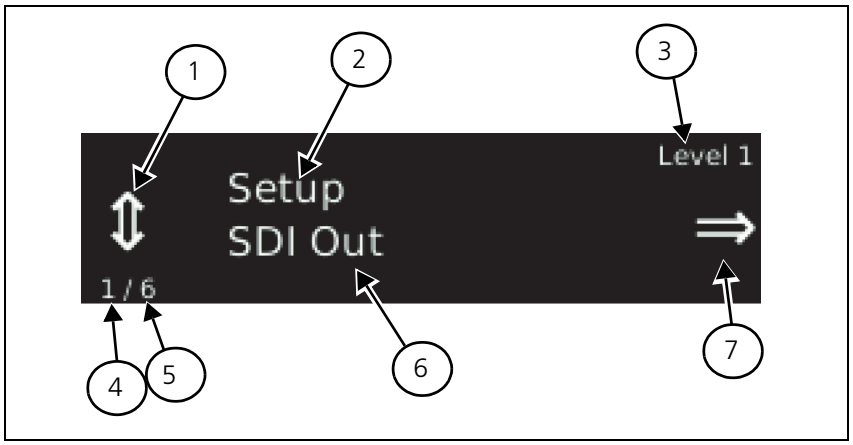


Figure 3-4 Setup Display

Table 3-5 Setup Menu Details

Key	Description
1	Up/Down directional marker (Shows the possible navigation selection using the NAVIGATION buttons)
2	Main menu name
3	Submenu level number
4	Submenu number
5	Number of submenus under main menu item
6	Submenu name
7	Left/Right directional marker (Shows the possible navigation selection using the NAVIGATION buttons)

To directly access specific function setup menus

Press and hold the corresponding function button.

To display the pertinent Setup menu

Press and hold the function button or press the **Setup** button and then navigate through the menu selections.

To navigate the Setup menu

Use the navigation buttons. The navigation buttons are described in **Table 4-1** on page 31.

For more information on the global Setup menu, see **Chapter 4, *Setup Menu Functions***.

Genlocking the Unit

The front panel REF button toggles internal and external Genlock modes. External Genlock is indicated through the High Tally REF button and illuminated front panel GEN LOCK indicator.

If the VSG-401 is to be Genlocked, a stable reference should be connected to the REF IN back panel BNC connector and terminated. The VSG-401 will automatically detect the video standard of the applied reference. If a valid reference signal is detected, the front panel PRESENT indicator will illuminate.

When the unit is genlocked, both the SYNC Outputs and SDI outputs remain in time relative to the REF IN. This is indicated by the green LED in the front panel LOCK STATUS group illuminating. When locked, timing adjustments can be applied using the Timing Offset Setup menu. Timing adjustments are determined from the REF IN video characteristics and retained separately for each reference video standard.

The red LOCK STATUS LED illuminates to indicate an invalid lock combination.

Table 3-6 Supported Genlock Combinations 1080 Reference Inputs
• = Supported

	External Reference Format															
SDI Output Format	**1080p60**	**1080p59.94**	**1080p50**	**1080p30**	**1080p29.97**	**1080p25**	**1080p24**	**1080p23.98**	**1080p30sf**	**1080p29.97sf**	**1080p25sf**	**1080p24sf**	**1080p23.98sf**	**1080i60**	**1080i59.94**	**1080i50**
1080p60	•			•			•		•					•		
1080p59.94		•			•			•		•					•	
1080p50			•			•					•					•
DL 1080p60	•			•					•					•		
DL 1080p59.94		•			•					•					•	
DL 1080p50			•			•					•					•
1080p30	•			•			•		•					•		
1080p29.97		•			•			•		•					•	
1080p25			•			•					•					•
1080p24							•					•				
1080p23.98								•					•			
1080p30sf	•			•			•		•					•		
1080p29.97sf		•			•			•		•					•	
1080p25sf			•			•					•					•
1080p24sf							•					•				
1080p23.98sf								•					•			

Table 3-6 Supported Genlock Combinations 1080 Reference Inputs *(Continued)*
• = Supported

SDI Output Format	External Reference Format															
	1080p60	1080p59.94	1080p50	1080p30	1080p29.97	1080p25	1080p24	1080p23.98	1080p30sf	1080p29.97sf	1080p25sf	1080p24sf	1080p23.98sf	1080i60	1080i59.94	1080i50
1080i60	•			•			•		•					•		
1080i59.94		•			•			•		•					•	
1080i50			•			•					•					•
720p60	•			•			•		•					•		
720p59.94		•			•			•		•					•	
720p50			•			•					•					•
720p30	•			•			•		•					•		
720p29.97		•			•			•		•					•	
720p25						•					•					•
720p24							•					•				
720p23.98								•					•			
625/50			•			•					•					•
525/59.94		•			•					•					•	

Table 3-7 Supported Genlock Combinations 720/PAL/NTSC Reference Inputs
• = Supported

SDI Output Format	External Reference Format									
	720p60	720p59.94	720p50	720p30	720p29.97	720p25	720p24	720p23.98	NTSC	PAL
1080p60	•			•						
1080p59.94		•			•				•	
1080p50			•			•				•
DL 1080p60	•			•						
DL 1080p59.94		•			•				•	
DL 1080p50			•			•				•
1080p30	•			•						
1080p29.97		•			•				•	

Table 3-7 Supported Genlock Combinations 720/PAL/NTSC Reference Inputs *(Continued)*
• = Supported

	External Reference Format									
SDI Output Format	**720p60**	**720p59.94**	**720p50**	**720p30**	**720p29.97**	**720p25**	**720p24**	**720p23.98**	**NTSC**	**PAL**
1080p25			•			•				•
1080p24							•			
1080p23.98								•		
1080p30sf	•			•						
1080p29.97sf		•			•				•	
1080p25sf			•			•				•
1080p24sf							•			
1080p23.98sf								•		
1080i60	•			•						
1080i59.94		•			•				•	
1080i50			•			•				•
720p60	•			•						
720p59.94		•			•				•	
720p50			•			•				•
720p30	•			•						
720p29.97		•			•				•	
720p25			•			•				
720p24							•			
720p23.98								•		
625/50			•			•				•
525/59.94		•			•				•	

V2A Timing Mode

The V2A Timing Mode enables the VSG-401 to generate video and audio test signals that can be used to detect any time propagation difference that might occur in the video and audio paths. The analyzer tool can be the Videotek™ TVM & VTM series with V2A and audio options, X75HD, X85 or similar product.

To use the V2A Timing Test Tool, configure the VSG-401 so that it outputs the **V2A Timing** test pattern.

When the VSG-401 is in V2A Timing Mode, the characteristics of the unit are fixed as follows:

- The output test pattern will be 75% color bars
- The Audio output frequency will be set to 2000 Hz with a gain of -9 dBFS
- Audio output Group 1 will be forced on
- The OSD will be forced on and will display **V2A Timing Enabled**
- **V2A** will appear on the last line of the primary status display

Configuring the VSG-401 for V2A Timing mode:

1. Press the **SETUP** button on the VSG-401 front panel.
2. Press the **Right arrow** button to enter the **SDI OUT Setup** menu.
3. Press the **Down arrow** button until the **Pattern** menu is shown, and then press the **ENT** button to enter the submenu.
4. Press the **Up/Down arrow** button until the V2A Timing selection option is shown.
5. Press the **ENT** button to select the option.
6. Press the **EXIT** button to exit all menus.
7. Press the **PTRN** button to use the selected pattern.

4 Setup Menu Functions

The setup position navigation buttons are described in **Table 4-1**. See **Figure 3-1** on page 20 for the location of these buttons.

To access the global Setup menu

Press the **SETUP** button.

To navigate the Setup menu

Use the **SETUP**, **UP**, **DOWN**, **LEFT**, **RIGHT**, **ENT**, and **EXIT** buttons. The available button selection will be indicated by a high talley navigation button.

Table 4-1 Setup Button Functions

Button	Function
	Press to exit the Setup menu.
	Press to enter or exit the Setup menu.
	Press to select a menu item, or open a menu or submenu.
	Press to move up in a menu or submenu tree.
	Press to move right to the next submenu.
	Press to move out of a submenu.
	Press to move down in a menu or submenu.

Setup Menus and Alarm Tables

The following tables make up the global setup menu. An asterisk (*) is shown next to the default menu selections. The Setup menu items are listed in **Table 4-2** with their corresponding Table and Description location pages.

Table 4-2 Setup Menu Tables

Selection	Page
SDI Out	Page 32
Audio Out	Page 35
Sync Out	Page 36
Timing Offset	Page 36
TC Insertion	Page 38
Unit Configuration	Page 39
About	Page 40

SDI Out Setup Menu

Menu Selections

Table 4-3 SDI Out Setup Menu Selections

Selection Option	Selection Option	Selection Option
Color Bars	100% Color Bars	
	75% Color Bars *	
	RP-219 with +I	
	RP-219 with -I	
	RP-219 100% White	
	RP-219 75% White	
	SMPTE Bars	
Patterns	Check Field *	
	4:3 in 16: 9	
	Circle	
	Co-Sited Pulse	
	Cross Hatch	
	Flat Field 0%	
	Flat Field 50%	
	Flat Field 100%	
	Red Field	
	Visible Field	

Table 4-3 SDI Out Setup Menu Selections *(Continued)*

Selection Option	Selection Option	Selection Option
	Line Sweep 100%	
	Multiburst	
	Multiburst Y only	
	Pulse Bar	
	Limit Ramp	
	Shallow Ramp	
	Ramp Y only	
	5 Step Y only	
	Zone Plate	
	V2A Timing	
Video Format	3 Gbps	
	DL 1080p	
	1080p	
	1080psf	
	1080i *	
	720p	
	625	
	525	
Frame Rate	3 Gbps	60
		59.94 *
		50
	DL 1080p	60
		59.94 *
		50
	1080p	30 *
		29.97
		25
		24
		23.98
	1080psf	30sF
		29.97sF *
		25sF
		24sF
		23.98sF

Table 4-3 SDI Out Setup Menu Selections *(Continued)*

Selection Option	Selection Option	Selection Option
	1080i *	60
		59.94 *
		50
	720p	60
		59.94 *
		50
		30
		29.97
		24
		23.98
	625	50
	525	59.94
Pattern Movement	Slow	
	Med *	
	Fast	
Source ID	Dialog to Enter Src ID (default --Harris VSG-401	

Menu Selection Descriptions

- **Color Bars**: Used to select the color bar output pattern. Selections include 100% Color Bars, 75% Color Bars (default), RP-219 with +1, RP-219 with -1, RP-219 100% White, RP-219 75% White, and SMPTE Bars.
- **Patterns**: Used to select which non-color bar pattern to output; options include Check Field (which is the default), 4:3 in 16: 9, Circle 16x9, Circle 4X3, Co-Sited Pulse, Cross Hatch, Flat Field 0%, Flat Field 50%, Flat Field 100%, Red Field, Visible Field, Line Sweep 100%, Multiburst 100%, Multiburst Y Only, Pulse Bar, Limit Ramp, Shallow Ramp, Ramp Y Only, 5 Step Y Only, Zone Plate, and V2A Timing.

*NOTE: When V2A is enabled, the source ID is forced on and **V2A ENABLED** is displayed.*

- **Video Format**: Many of these formats have subsequent output video frame rate options.
  - **3 Gbps**: Options include 60, 59.94 *, and 50.
  - **DL 1080p**: Options include 60, 59.94 *, and 50.
  - **1080p**: Options include 30*, 29.97, 25, 24, and 23.98.
  - **1080psf**: Options include 30sF, 29.97sF*, 25sF, 24sF, and 23.98sF.
  - **1080i**: Options include 60, 59.94 *, and 50.
  - **720p**: Options include 60, 59.94 *, 50, 30, 29.97, 24, and 23.98 (with sub-option 3Gbps).
  - **625**: The only option is 50.

- **525**: The only option is 59.94.

Note: Pattern and Bars selections are stored and recalled by format and selected changes in the format may change the selected pattern or bar output.

- **Pattern Movement**: Used to set the speed associated with the pattern movement feature. Enabling or disabling pattern movement is done directly from the front panel MOVE button. Selections include Slow, Medium, and Fast.
- **Source ID**: This selection opens a dialog where you can enter the Source ID.

Audio Out Setup Menu

Menu Selections

Table 4-4 Audio Out Setup Menu

Selection Option	Selection Option	Selection Option
Group	Audio Group 1	Off
		On *
	Audio Group 2	Off *
		On
	Audio Group 3	Off *
		On
	Audio Group 4	Off *
		On
Frequency	400 Hz	
	1 kHz *	
	10 kHz	
Amplitude	0 dBFS	
	-9 dBFS	
	-12 dBFS	
	-18 dBFS	
	-20 dBFS *	
	Silence	
AES Output 2	AES *	
	DARS	
	Word Clock	
VBIT	Off	
	On *	

Menu Selection Descriptions

- **Group**: Turns on and off each of the four audio groups. All audio groups are on by default.
- **Frequency**: Used to select the audio output frequency. Selections are 400 Hz, 1 kHz *, and 10 kHz.
- **Amplitude**: Used to select the audio output amplitude. Measured in dBFS, options are 0, -9, -12, -18, -20, and silence.
- **AES Output 2**: Used to configure the function of the second AES output. Selections are AES *, DARS, and Word Clock.
- **VBIT**: Used to enable or disable the AES validity bit. This can be set to Off or On *.

Sync Out Setup Menu

This selection is used to configure the sync output video format.

Menu Selections

Table 4-5 Sync Out Setup Menu Selections

Selection Option	Selection Option	Selection Option
Follow SDI Output		
Follow Ext. Ref *		
Black Burst PAL		
Black Burst NTSC		

Menu Selection Descriptions

- **Follow SDI Output**: The sync outputs will follow the selected video output format.

*NOTE: When **Follow SDI output** is enabled, selecting HD formats will select Tri level Sync on the sync outputs, and selecting SD formats will select Black Burst on the sync outputs.*

- **Follow Ext. Ref ***: The sync outputs will follow the external reference format
- **Black Burst PAL**: The sync output will set to 625 Black Burst.
- **Black Burst NTSC**: The sync output will be set to 525 black burst.

Timing Offset Setup Menu

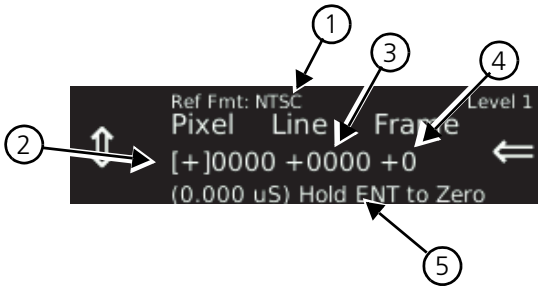


Figure 4-1 Offset Setup Menu Display

Table 4-6 Status Display Page 2 Information Descriptions

Key	Description
1	Reference format
2	The horizontal pixel offset is 0 plus or minus the available range for the reference format. (The conversion to microseconds appears directly below the offset.)
3	The vertical line offset is 0 to the available range for the reference format.
4	The frame offset is dependent on the input reference format. NTSC is +/- 1, PAL is +/- 2 frames.
5	Hold ENT to set all offsets to 0.

Note: *The Timing Offset Setup menu is available only when a valid format is detected by the EXT REF input.*

TC Insertion Setup Menu

The TC Insertion menu allows you to configure timecode insertion. The timecode source is from the LTC/GPI D-Sub connector (see appendix A).

Menu Selections

Table 4-7 TC Insertion Menu Selections

Selection Option	Selection Option	Selection Option
VITC (SYNC) Enable	Enable	
	Disable*	
ANC (SD/HD) Enable	Enable	
	Disable*	
DVITC (SD) Enable	Enable	
	Disable*	
NTSC/525 Line 1	10-30, 14*	
NTSC/525 Line 2	10-30, 16*	
PAL/625 Line 1	6-30, 14*	
PAL/625 Line 2	6-30, 16*	

Menu Selection Descriptions

- **VITC (SYNC) Enable**: This selection enables VITC timecode insertion to the SYNC OUT. To change this selection, press the front panel ENT button. The default is disabled.
- **ANC (SD/HD) Enable**: This selection enables ANC timecode insertion to the SDI A/B. To change this selection, press the front panel ENT button. The default is disabled.
- **DVITC (SD) Enable**: This selection enables DVITC timecode insertion in SD formats to the SDI A/B. To change this selection, press the front panel ENT button. The default is disabled.
- **NTSC/525 Line 1**: This selects the NTSC line for the line 1 timecode insertion. This value is used for both VITC and DVITC. The range of NTSC/525 Line 1 is 10 to 30. The default is 14.
- **NTSC/525 Line 2**: This selects the NTSC line for the line 2 timecode insertion. This value is used for both VITC and DVITC. The range of NTSC/525 Line 2 is 10 to 30. The default is 16.
- **PAL/625 Line 1**: This selects the PAL line for the line 1 timecode insertion. This value is used for both VITC and DVITC. The range of PAL/625 is 6 to 30. The default is 14.
- **PAL/625 Line 2**: This selects the PAL line for the line 2 timecode insertion. This value is used for both VITC and DVITC. The range of PAL/625 is 6 to 30. The default is 16.

Unit Configuration Setup Menu

Menu Selections

Table 4-8 Unit Configuration Setup Menu Selections

Selection Option	Selection Option	Selection Option
Front Panel	High Tally	35% to 100% (80%*)
	Low Tally	5% to 10% (5%*)
GPIO	Input 1	No Action
		Select Color Bar output*
	Input 2	No Action
		Select Pattern output*
	Input 3	No Action
		Genlock Int/Ext*
	Input 4	No Action
		Source ID On/Off*
IP	DHCP Control	Off *
		On
	IP Address	
	Subnet Mask	
	Gateway Addresses	
Front Panel Lock	Off*	
	On	
System Time	YYYY/MM/DD HH:MM	

Menu Selection Descriptions

- **Front Panel**: This selection is used to raise or lower the brightness levels of the front panel function buttons.
  - **High Tally**: This selection is used to set the brightness of the High Tally state. The range of button contrast is 35% to 100%. The default selection is 80%.
  - **Low Tally**: This selection allows for setting the brightness of the buttons in a low tally state. The range of brightness is 0% to 10%. The default selection is 5%.
- **GPIO**: This selection is used to enable general purpose inputs/outputs.
  - **Input 1**: This selection enables the use of GPIO input 1. Selections include No action or Select Color Bar output.
  - **Input 2**: This selection enables the use of GPIO input 2. Selections include No action or Select Pattern output.
  - **Input 3**: This selection enables the use of GPIO input 3. Selections include No action or select Genlock Internal/External.
  - **Input 4**: This selection enables the use of GPIO input 4. Selections include No action or select Source ID On/Off.

- **IP**: This selection is used to configure the VSG-401 for Ethernet communication. The Ethernet interface provides a high-speed communication link to the third party applications (such as web browser) over standard LAN and Internet networks. The interface conforms to industry Ethernet standards:
  - Connection via a standard RJ45 socket
  - Automatic detection and switching between 10Base-T and 100Base-T
  - TCP/IP stack is fully compliant with RFC2500, "Internet Official Protocol Standards"
  - Fully compliant with IEEE 802.3 Ethernet standard

  The interface can accept a static IP address, or it can obtain an IP address dynamically from a DHCP server. The IP Address, Subnet Mask, Gateway Address, DHCP enable, and Port are programmable from the unit's Ethernet Setup menu. The settings are performed in the IP Configuration screen.
  - **DHCP Control**: The Dynamic Host Configuration Protocol (DHCP) function is used to have the VSG-401 automatically configure an IP Address, Subnet Mask, and Gateway every time the unit is powered on. The IP Address is dynamic and could change each time the VSG-401 is powered on. DHCP Enable is set to OFF by default.
  - **IP Address**: The IP Address is used to select a static IP address (unless DHCP will be used). The IP address must not be the same address as another instrument or PC on the network. Network conflicts will occur if two devices have the same IP address. See the System Administrator to determine a static IP address that will avoid conflicts.
  - **Subnet Mask**: The Subnet Mask is used to configure the Subnet Mask on a network if DHCP is not enabled. If DHCP is not used to automatically detect the Subnet Mask on a network, the Subnet Mask must be manually configured. Unlike the IP address, the Subnet Mask must be the same Subnet Mask as the network Subnet Mask. See the System Administrator to determine the Subnet Mask.
  - **Gateway**: The Gateway is the network address that provides access to an outside network. Use the Gateway submenu to configure the Gateway on a network if DHCP is not enabled. If DHCP is not used to automatically detect the Gateway on a network, the Gateway must be manually configured. Unlike the IP address, the Gateway must be the same Gateway address as the network Gateway address. See the System Administrator to determine the Gateway address.
- **Front Panel Lock**: This selection is used to enable the front panel auto lock function. If enabled, the front panel will automatically lock after 30 seconds of no front panel activity.
- **System Time**: This selection allows the setup of the clock display's date and time.

About Menu

This selection allows the display of the About screen (see **Figure 4-2**).

Menu Selections

Table 4-9 About Menu

Selection Option
Model Number
Serial Number

Table 4-9 About Menu *(Continued)*

Selection Option
Options
Front Panel Rev.
Firmware Rev.
FPGA Rev.
CPLD Rev.
PCB Rev.
Qt Rev.
File System Rev.
OS Rev.
Boot Rev.
MAC Address
IP Address

Menu Selection Descriptions

The About screen contains information specific to the VSG-401, such as model, serial number, options, revision levels, IP address, and MAC address.

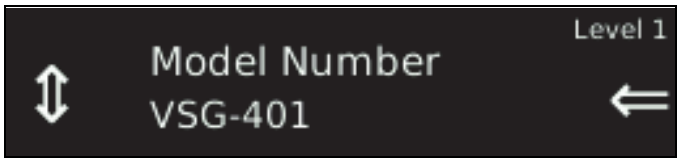


Figure 4-2 About Display Screen

To enter the About Menu selection display

1 Press **Setup**, and then press the **Up** or **Down** navigation button until About is displayed.
2 Press **ENT**.

Figure 4-3 Setup → About Display

To navigate the About menu selection information

Press the **Up** or **Down** navigation button.

To exit the About display screen

Press the **Setup** or the **Exit** button.

5 External Control

Microsoft® Internet Explorer version 6 or later is the recommended browser.

Browser Interface

The website for each unit is accessed by pointing the web browser at the VSG-401 IP address. Before the default web screen appears, a user ID and password must be entered.

- User ID: **admin**
- Password: **Harris**

*The user ID **admin** is the default user ID and **Harris** is the default password. These are set at the factory but can be changed by the user via the Accounts web page. Keep in mind, though that once the user ID and password have been changed, the only way to reset the unit to the default user ID and its default password is to send the unit back to the factory for repairs.*

Once the user ID and password have been entered, the web page appears, showing a list of captures that have been stored in the VSG-401's internal memory. Use the web page to view the files or save them to disk. A sample web page is shown in **Figure 5-1**.

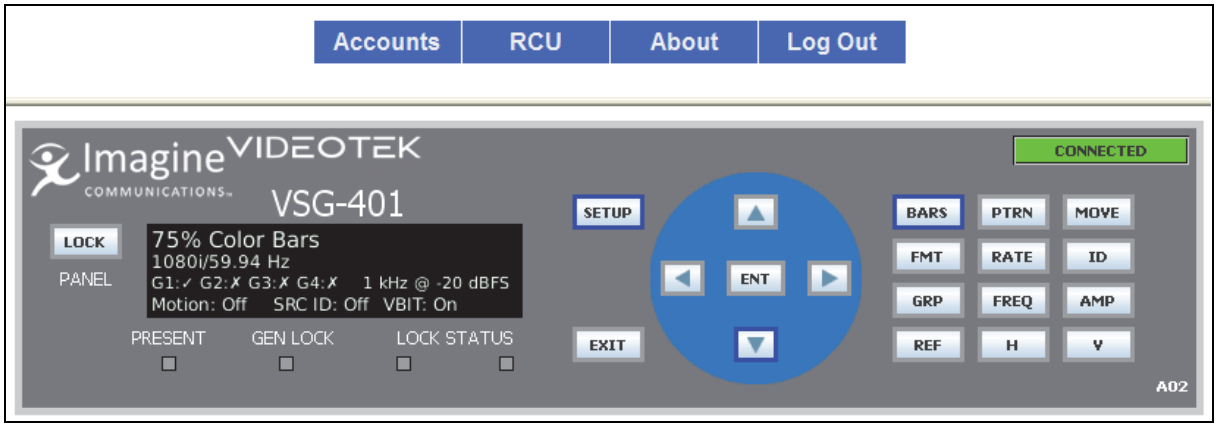


Figure 5-1 Sample Web Remote Display

Across the top of the display is a series of buttons that allow access to the various external control functions available to a user.

*The **Accounts**, **RCU**, **About**, and **Log Out** control buttons are displayed across the top of each display. The user can click on one of these buttons to access the appropriate display or function.*

- The **Accounts** button accesses the user account management display. See page 47 for an explanation of this display.
- The **RCU** button accesses the web-based control panel display. See page 44 for an explanation of this display.
- The **About** button accesses information specific to the VSG-401, such as model, serial number, options, revision levels, IP address, and MAC address. It also allows a user to download current VSG-401 firmware and/or unlock VSG-401 options. See page 47 for an explanation of this display.
- The **Log Out** button allows a user to exit the external control function.

Accessing the Web-Based Control Panel

RCU

Access the web browser as described on page 43. When the remote display page opens, click the **RCU** button to access the web-based control panel.

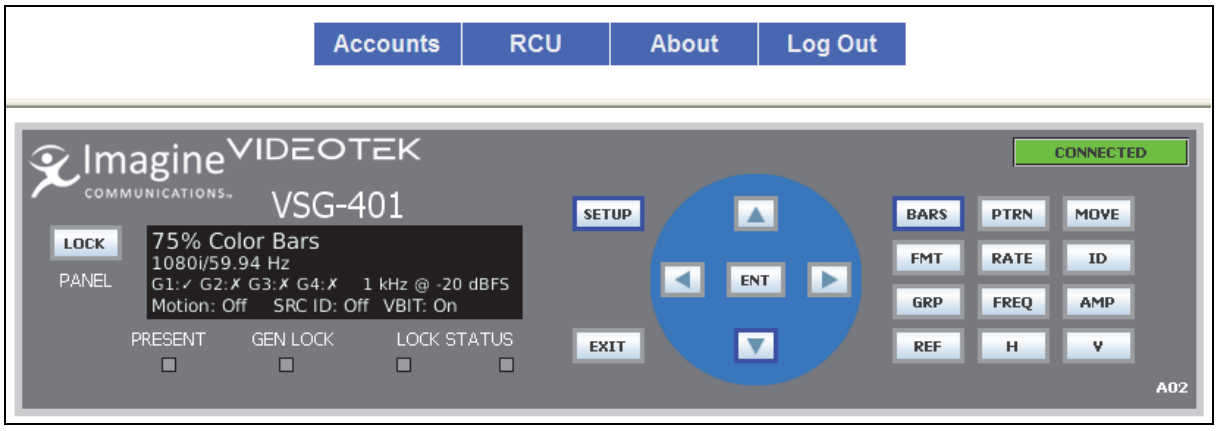


Figure 5-2 Web-Based Control Panel

The VSG-401 unit allows access to one controller at a time. If the unit receives a request for another Web RCU session while previously established control session exists, the request will be granted after the previously established session is terminated. A Web RCU session that was terminated due to conflict with another control session can be re-established by repeating the logon procedure.

The web-based VSG-401 control panel operates identically to a physical VSG-401 control panel. Refer to **Chapter 3, *Operation*** for more information about panel operation.

Managing User Accounts

Accounts

The VSG-401 allows user accounts to be added or edited at the User, System, or Administrator levels. Both User and System level accounts are allowed general control of the unit.

Only Accounts at the Administrator level can manage accounts.

Adding Accounts

To add a new user account

1 Click the **Accounts** button on the web-based control panel.
The Accounts Display page opens.

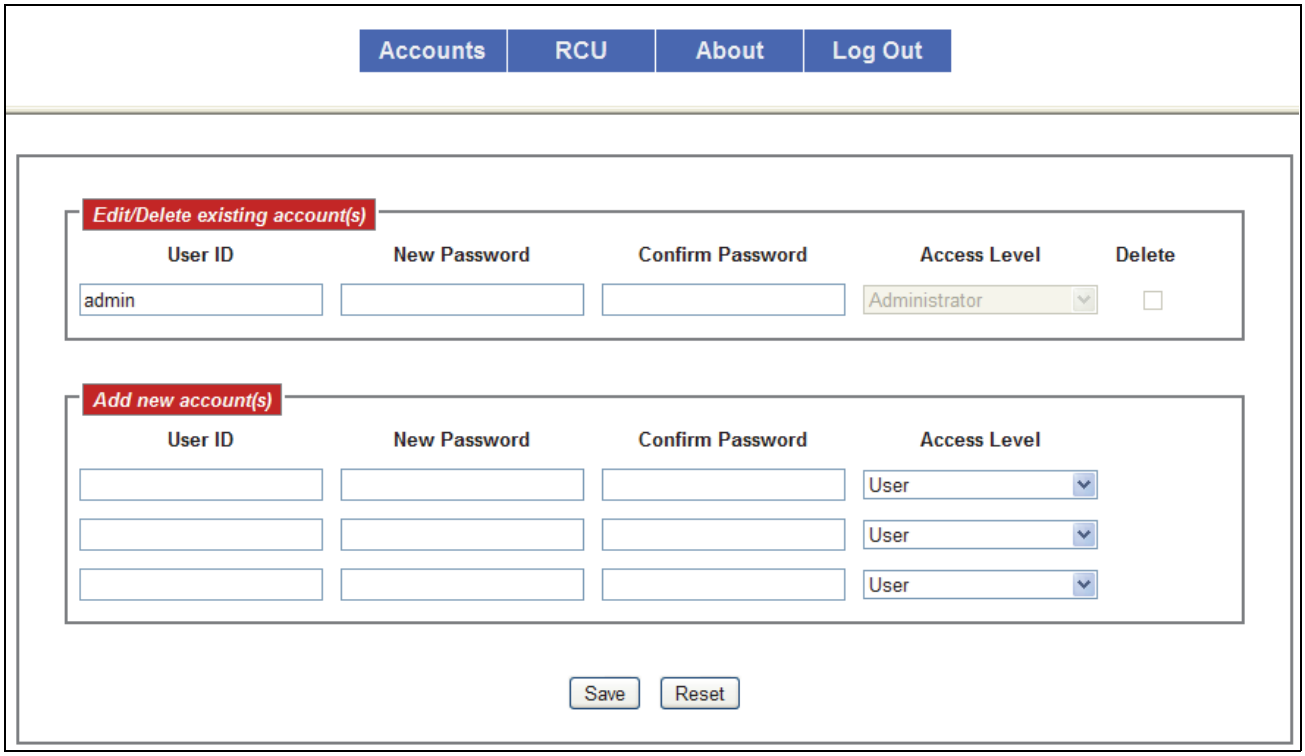


Figure 5-3 Accounts Display Page

2 In the **Add new account(s)** box, enter the following information:
- A unique identifier for the new account in the User ID text box.
- A password for the new account (confirm the password by entering it again in the **Confirm Password** text box).
- An access level of User, System, or Administrator from the **Access Level** drop-down list box.

3 Click **Save** to accept the new account, or click **Reset** to clear the previously entered information and start again.

Editing Accounts

To edit password and access level information

1. Click the **Accounts** button on the web-based control panel.

   The Accounts Display page opens.
2. In the **Edit/Delete existing account(s)** box, locate the unique identifier in the User ID text box for the account to be edited.
3. Change one or more of the following fields as appropriate:
   - Change a password for the existing account by entering a new password in the **New Password** text box.

     Confirm the password by entering it again in the **Confirm Password** text box.
   - Change the user access level by making a different selection at the **Access Level** drop-down list box.
4. Click **Save** to accept the account changes, or click **Reset** to restore the original information and start again.

Deleting Accounts

To delete a user account

1. Click the **Accounts** button on the web-based control panel.

   The Accounts Display page opens.
2. In the **Edit/Delete existing account(s)** box, locate the unique identifier in the User ID text box for the account to be deleted.
3. Click the **Delete** check box to the right of the account to be deleted.
4. Click **Save**.

   The account is deleted.

Accessing the About Page

The About screen contains information specific to the VSG-401, such as model, serial number, options, revision levels, IP address, and MAC address.

Click the **About** button on the web-based control panel to access the web page containing the device's data.

The About display page opens.

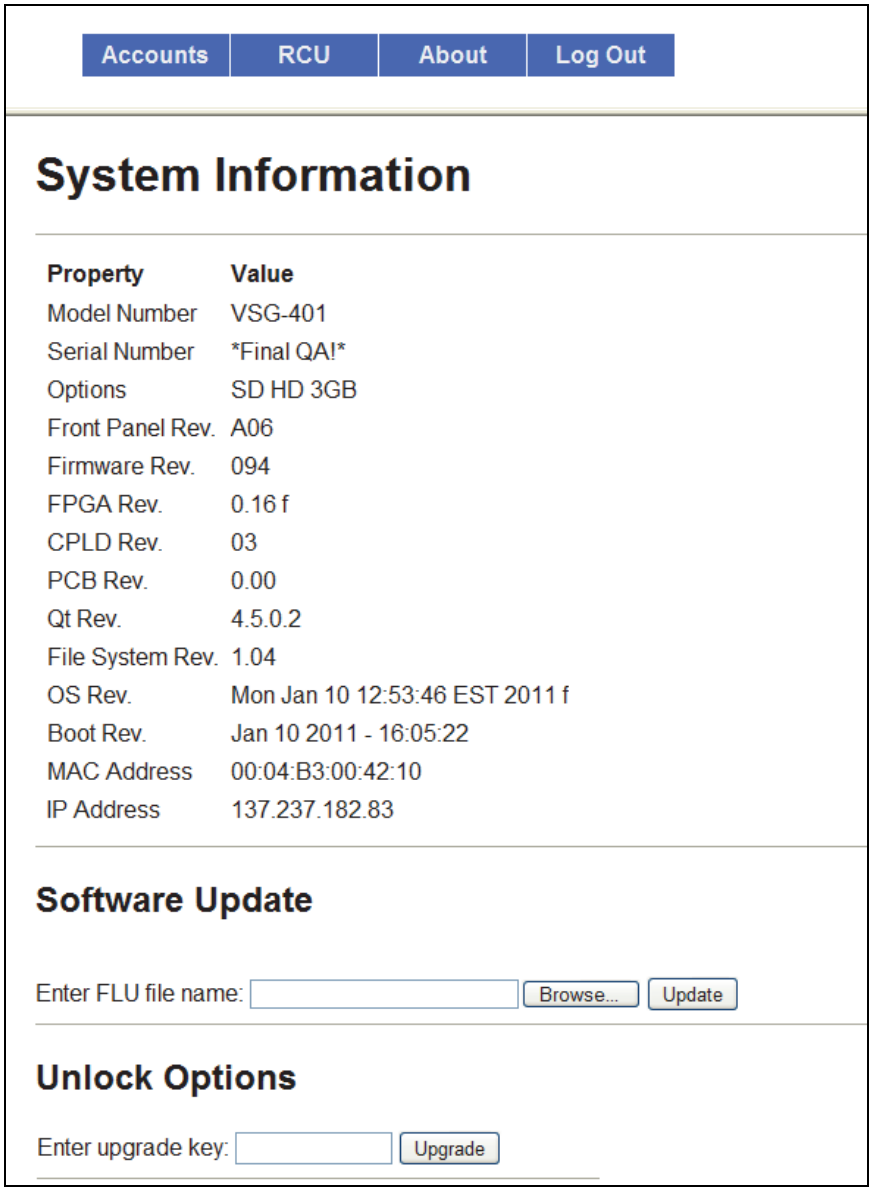


Figure 5-4 About Display Page

To update the VSG-401 firmware

1 Download the latest firmware from the Imagine Communications Customer Support website (http://support.imaginecommunications.com/)

2 Navigate to the download location of the VSG-401_rXXXX.flu FLU file.

3 Once the file has been selected, click the **Update** button to begin the update.

4 When the update is complete, the unit will automatically power off or restart.

After the update has completed, a flash update log file can be retrieved through the web interface.

5 Verify that the firmware revision level retrieved from the **About** menu matches the downloaded firmware revision.

To unlock an option

NOTE: at the time of this printing no options were available for the VSG-401.

1 Enter the supplied 9-digit number in the Enter Upgrade Key field in the Unlock Options box.

2 Press the **Upgrade** button to start the feature upgrade.

A message on the Unit display indicates the upgrade status.

3 Once the update is complete, the unit will automatically power off.

4 Press the power button and wait for the unit to power-up.

5 Verify that the option now appears in the **About** menu.

6 Attach the supplied serial number to the Unit.

6 Troubleshooting

CAUTION: These instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform this installation or any servicing unless you are qualified to do so. Refer all servicing to qualified service personnel.

Initial Checks

If the VSG-401 is not functioning properly, first verify the following:

- The VSG-401 is connected to a power source (11-17 VDC).
- All cables are correctly connected (see ***Connecting the VSG-401*** on page 16).

Initial difficulties with operation or display can be due to improper setup. Review the Setup menus (see ***Setup Menu Functions*** on page 31) to ensure that the proper adjustments have been made for the signal requirements.

Restarting

If a problem persists after the cables are correctly connected and the unit is set up, restart the unit by doing the following:

1. Push and hold the **SETUP** and **V** buttons for a minimum of five seconds until the SYSTEM RESET message appears on the display.
2. Press and hold the **ENT** button to reset the unit's configuration. All front panel and Setup menu selections will be reset to the factory default settings.

Problems, Causes, and Solutions

Table 6-1 VSG-401: Problems, Causes, and Solutions

Problem/Symptom	Solution or Explanation
There are no communications on the Ethernet port.	Verify the network settings through the Setup menu.
No audio is present on the AES outputs.	The audio output groups may be muted.
Upon power-up the output characteristics are different from what they were when the unit powered-down.	The unit saves all output settings 30 seconds after the last user change.
The test pattern output changes when the Video Format is changed.	Pattern and Bars selections are stored and recalled by Video Format.

If the problem still exists after troubleshooting the VSG-401, see ***VSG-401 Service and Support*** on page 12 for further instructions.

7 Specifications

Specifications are subject to change without notice.

Genlock Input

Table 7-1 Genlock Input Specifications

Item	Specification
Input Type	1 input, passive looping
Input Connector Type	Electrical, single-ended, unbalanced, mechanical, BNC
Input Impedance	Hi-Z
Blackburst Input Amplitude	NTSC: sync and burst 286 mV, nominal PAL: sync and burst 300 mV, nominal
Blackburst Input Amplitude Tolerance	±6 dB
Return Loss	≤ –40 dB to 10 MHz
Lock Range	±6 ppm (NTSC Fsc ±21 Hz, PAL Fsc ±26 Hz)
Black Burst Subcarrier Jitter	<1 ns (pk-pk) over one horizontal line
Tri-Level Sync Amplitude	600 mV pk-pk nominal
Tri-Level Sync Amplitude Tolerance	±3 dB

Outputs

Table 7-2 Blackburst/Tri-Level Sync (TLS) Specifications

Item	Specification
Number/Connector Type	2 BNC, female
Load Impedance	75 Ω nominal
Return Loss	≤–40 dB (100 kHz to 10 MHz)
Blackburst Signal Level	NTSC: sync and burst 286 mV, nominal PAL: sync and burst 300 mV, nominal
Blackburst Subcarrier Jitter	<1 ns (pk-pk) over one horizontal line

Table 7-2 Blackburst/Tri-Level Sync (TLS) Specifications

Item	Specification
Tri-Level Signal Level	600 mV pk-pk
DC Offset	0 V ±.5 V
SC/H Phase	0^{o} ±10^{o}
Reference to Output Timing	±100 ns

Table 7-3 General SD I Output Characteristics

Item	Specification
Number of Outputs	4
Output Connector Type	BNC, female
Output Impedance	75 Ω nominal

Table 7-4 3G/HD/SD -SD I Output Characteristics

Item	Specification
Output Return Loss	(5 MHz to 1.485 GHz) ≤-15 dB
	(1.485 to 3 GHz) ≤-10 dB
Output Signal Level	800 mV ±10%
Output DC Offset	0 V ±0.5 V
Output Rise and Fall Time	■ (@ 2.97 GHz) <135 ps (20 to 80% amplitude), not differing by more than 50 ps ■ (@ 1.484 GHz) <270 ps (20 to 80% amplitude), not differing by more than 100 ps ■ (@ 270Mhz) 400 to 700 ps (20 to 80% amplitude), not differing by more than 500 ps
Jitter (Only meaningful with a High Pass frequency stated)	■ (@ 2.97 GHz): <0.3UI ■ (@1.484 GHz): <0.2 UI ■ (@270MHz): <0.2 UI

Table 7-5 Video Output Specifications

Item	Specification
Output Formats	3G/HD/SD/DL, selectable
Supported Formats	1080i/60, 1080i/59.94, 1080i/50; 1080p/30, 1080p/29.97, 1080p/25, 1080p/24, 1080p/23.98; 720p/60, 720p/59.94, 720p/50, 720p/30, 720p/29.97, 720p/25, 720p/24, 720p/23.98

Table 7-5 Video Output Specifications *(Continued)*

Item	Specification
Segmented Frame	1080p/30sF, 1080p/29.97sF, 1080p/25sF, 1080p/24sF, 1080p/23.98sF
Dual Link (per SMPTE 372M)	4:2:2 (YCBCR) 10-bit, 1080p/60, 1080p/59.94, 1080p/50
3G-SDI	1080p: 60 Hz, 59.94 Hz, 50 Hz (4:2:2 Y'Cb'Cr/10-bit)
SD-SDI	525 at 59.94 Hz 625 at 50 Hz

Audio

Table 7-6 Audio Specifications

Item	Specification
Audio Formats	AES or DARS, unbalanced
Sample Rate	48 kHz
Output Impedance	75 Ω
Output Connector	2 BNC
AES Output Return Loss	≤ -25 dB -0.1 to 6 MHz
Output Signal Level	1 V pk-pk (75 Ω terminated)
AES Jitter	≤ 0.25 UI

Table 7-7 Word Clock Output Characteristics

Item	Specification
Output Connector	1 BNC, female, shared with AES/DARS
Output Impedance	75 Ω nominal
Output Level	5 V TTL levels with 75 Ω load

Embedded Audio

Table 7-8 Embedded Audio Specifications

Item	Specification
Output Sample Rate	AES, 48 kHz
Output Level	0, -9, -12, -20 dBFS and silence, user-selectable
Output Frequency	Fixed selections of 400 Hz, 1 kHz, and 10 kHz

Display

Table 7-9 Display Specifications

Item	Specification
General	256×64 OLED display for device configuration and output selections

Communication Interfaces

Table 7-10 Communication Interfaces

Item	Specification
Ethernet	1 Ethernet port RJ-45 10/100 Base-T connector
LTC/GPIO	1 LTC/GPIO connector 15 female pin D-sub

LTC Input

Table 7-11 LTC Input

Item	Specification
Nominal Input Amplitude	2.0 volts pk-pk
Min. Input Amplitude	0.5 volts pk-pk
Max. Input Amplitude	4.5 volts pk-pk

Ethernet

Table 7-12 Ethernet Specifications

Item	Specification
Standard	10/100 Base-T conforms to IEEE802.3
Connector	RJ-45
Performance metric	Transfer a downloaded file to a PC in 30 seconds, dedicated LAN

Power Requirements

Table 7-13 Power Requirements

Item	Specification
Power connector	15 VDC nominal 11 VDC minimum, 18 VDC maximum
Power consumption	10 W nominal
Over-voltage protection	+50 VDC nominal
Non-resetting fuse	2A, 72 VDC
AC Adapter	Included

Mechanical

Table 7-14 Mechanical Specifications

Item	Specification
Height	1.75 in. (4.45 cm)
Width	8.5 in. (21.59 cm)
Depth	6.60 in. (16.76 cm)
Weight	1.66 lbs (0.753 kg)

Environmental

Table 7-15 Environmental Specifications

Item	Specification
Operating Temperature	32° to 122° F (0° to 50° C)
Storage Temperature	-22° to 149° F (-30° to 65° C)
Humidity (non-condensing)	■ Operating: 20% to 80% ■ Non-operating: 5% to 90%
Altitude	Operating: 6562 ft (2000 m)
Transportation	24.00 in. (60.96 cm) impact drop survivable in original factory packaging
Pollution degree	Pollution degree 2

Applicable Standards

SMPTE RP 184-2004, SMPTE RP 165-1994, SMPTE RP 219, SMPTE 259M, SMPTE 272M, SMPTE 274M-2005, SMPTE 291M, SMPTE 292M-2006, SMPTE 295M, SMPTE 296M, SMPTE 299M, SMPTE 318M, SMPTE 352M, SMPTE 372M, SMPTE 424M, SMPTE 425M AB, SMPTE RP 184-2004, SMPTE RP 165-1994, SMPTE RP 219, SMPTE 318M, AES3.2003, AES11.2003

Standard and Optional Accessories

Table 7-16 Standard Accessories

Item	Specification
Standard accessories	■ ***VSG-401 Installation and Operation Manual*** on CD ■ Hardware Kit, GPI Dsub ■ One power cord ■ One power supply assembly

Table 7-17 Optional Accessories

Item	Specification
BLK-5	Blank panel for left or right side of DRT-4A or DRT-5
DRT-4A	Dual Rackmount Tray for CMN-41, CMN-MV, LLM-1770, or VSG-401. Use BLK-5 to fill unused space, if needed

A VSG-401 Pinouts

LTC/GPI D-Sub Connector

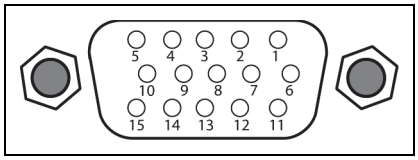


Figure A-1 LTC/GPI 15-Pin, Female, D-Sub Connector

Table A-1 Pinouts for LTC/GPI Connector

Pinout	Signal
1	ERROR SUM
2	GPI IN 1
3	GPI IN 2
4	GPI IN 3
5	GPI IN 4
6	ERROR SUM RETURN
7	GND
8	GND

Pinout	Signal
9	LTC GND
10	LTC+
11	LTC-
12	N/C
13	GND
14	N/C
15	GND

Ethernet RJ45 Connector

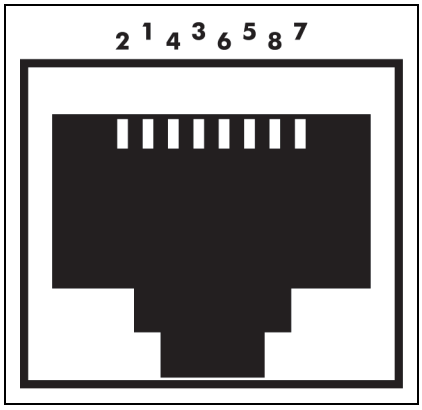


Figure A-2 Ethernet RJ45 Connector

Table A-2 Ethernet RJ45 Connector Pinouts

Pinout	Signal	Pinout	Signal
1	TX+	5	N.C.
2	TX-	6	RX-
3	RX+	7	N.C.
4	N.C.	8	N.C.

Power Connector

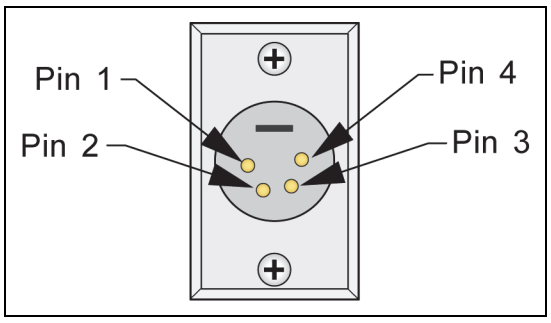


Figure A-3 Power Connector

Table A-3 Power Connector Pinouts

Pinout	Signal	Pinout	Signal
1	GND	3	N.C.
2	N.C.	4	Power

B Glossary

601. An international standard (ITU-R BT.601) for component digital television. It defines the sampling systems, matrix values, and filter characteristics for digital television.

8 VSB. Vestigial sideband modulation with 8 discrete amplitude levels.

16 VSB. Vestigial sideband modulation with 16 discrete amplitude levels.

Advanced Television Systems Committee (ATSC). The parent organization that developed, tested and described the form and function of the US digital television formats.

AES/EBU. A digital audio standard established jointly by the Audio Engineering Society (AES) and the European Broadcasting Union (EBU).

Anchor Element. The perceptual loudness reference point or element around which other elements are balanced in producing the final mix of the content, or that a reasonable viewer would focus on when setting the volume control.

Artifacts. Unwanted visible effects in the picture created by disturbances in the transmission or image processing, such as edge crawl or "hanging dots" in analog pictures, or "pixilation" in digital pictures.

Aspect Ratio. The ratio of horizontal to vertical dimensions. A square has an aspect of 1:1 since the horizontal and vertical measurements are always equal. Current television screen aspect ratios are 4:3 and 16:9.

Asynchronous Serial Interface (ASI). A transmission method adopted by the DVB, and called DVB-ASI. The transmission method allows for the transport of varying data payloads in a constant data stream. The DVB-ASI transport stream rate is 270 Mb/s.

Audio Breakaway. Routing video and accompanying audio in separate signal paths.

Audio-Follow. Routing video and accompanying audio together in the same signal path.

Auto Trans. Automatic transition; the execution of a single wipe or fade from current picture to another picture by way of an automatic device.

Bandwidth. The range of frequencies used to transmit information such as picture and sound.

Baseband Video. An unmodulated video signal.

Black. Also color black, blackburst. A composite color video signal that has the composite sync, reference burst, and a black video signal.

Blanking Processor. A circuit which removes sync, burst and blanking from the program video and then replaces it with sync, burst and blanking from the reference input. The process ensures constant sync and burst levels on program video.

Border. An electronically-generated picture member which is used in wipes to separate the two video sources used in the wipe. It is of even thickness and has color produced by the matte generator.

Broadcast Legal. Encoding video signal parameters to conform to prescribed limits for broadcast. Encoding rules vary by NTSC, PAL, country and broadcast facility.

BTSC. Broadcast Television Standards Committee. A US standard for stereo audio encoding in NTSC broadcast television.

CAV. Component Analog Video

CDP. Caption Distribution Packet

CES. Consecutive Errored Samples

Composite Video. A single video signal that includes all color video and timing information. A composite signal includes luminance, chrominance, blanking pulses, sync pulses and color burst information.

Chrominance. The color portion of a video signal that represents the saturation and hue. Black, gray and white have no chrominance; color signals have both chrominance and luminance.

CH. Chroma

Chrominance/Luminance Delay. A measurement that indicates the amount to which chrominance and luminance are aligned with respect to each other. A low C/L delay figure can minimize the effects of ghosts or color offset on the received picture.

C/L Delay. Chrominance/Luminance Delay

Clipping. The electronic process of shearing off the peaks of either the white or black excursions of a video signal for limiting purposes. Clipping is often performed prior to modulation to limit the signal.

CMRR. Common Mode Rejection Ratio

Color Burst. The portion of a color video signal which contains a short sample of the color subcarrier. It is used as a color synchronization signal to establish a reference for the color information following it and is used by a color monitor to decode the color portion of a video signal. The color burst acts as both amplitude and phase reference for color hue and intensity. The color oscillator of a color television receiver is phase locked to the color burst.

Composite Sync. A signal consisting of horizontal sync pulses, vertical sync pulses and equalizing pulses only.

CRC. Cyclical Redundancy Check

Crosspoint. An electronic switch, usually controlled by a button on the panel. Control logic will allow for only one crosspoint, for each bus, to be switched "ON" on at a time.

D/A. Conversion of digital to analog signals.

DA. Distribution Amplifier

dBTP. Decibels relative to nominal 100%, true-peak

Data Element. An item of data as represented before encoding and after decoding.

Decoded Stream. The decoded reconstruction of a compressed bit stream.

Decibel (dB). A logarithmic measure of the ratio between two powers, voltages, currents, sound intensities, etc. Signal-to-noise ratios are expressed in decibels.

Default. A factory preset value or condition.

Demodulator. A receiver, such as for television broadcast, cable, and closed circuit applications. A TV demodulator receives and processes off-air or cable RF signals and provides baseband video and audio outputs.

DHCP. Dynamic Host Configuration Protocol.

Dialnorm. An AC-3 metadata parameter, numerically equal to the absolute value of the Dialog Level, carried in the AC-3 bit stream.

Dialog Level. The loudness, in LKFS units, of the Anchor Element.

Differential Gain. A measurement that specifies how much the chrominance gain is affected by the luminance level. Expressed as a percentage showing the largest amplitude change between any two levels, it indicates how much color saturation variance occurs when the luminance level changes.

Differential Phase. A peak-to-peak measurement that specifies the extent to which the chrominance phase is affected by the luminance level. Expressed in degrees of subcarrier phase, it indicates how much hue shift occurs with luminance level changes.

Digital Video Broadcasting (DVB). A specific project office of the European Broadcast Union. This group has produced a set of digital broadcasting standards.

DSK. Down Stream Key, a keyer which is electronically located after (or down stream from) all other functions of a switcher. The key resulting will appear to be on top of all other pictures from the switcher.

Duration. Duration is used to determine how long an error must persist before it is reported. Setting the duration to 0 causes an error to be displayed as soon as the CES value is met.

DVITC, D-VITC. Digital Vertical Interval Time Code. Timecode information stored on specific lines in the vertical blanking interval of a television signal.

EAV. End of Active Video in component digital systems.

EBU. European Broadcasting Union

Editor. A device or system which controls video tape recorders, video switchers, and other related devices in order to electronically splice segments of recorded video into a finished production.

EDH. Error Detection and Handling. A recommended practice defined in SMPTE RP 165. A system to generate and then detect video data errors in serial digital video systems.

Effects Keyer. A keyer which is electronically located in the mix/wipe generator portion of a switcher. The resulting key would appear under the down stream key.

EIA Rack Space or Unit. A specific size as designated by the Electronics Industry Association. The rack unit is 19 inches wide, and is 1.75 inches tall. A device which requires 3 EIA rack units is 19 inches wide and 5.25 inches (3x1.75 = 5.25) tall.

Elementary Stream (ES). A generic term for one of the coded video, audio or other variable length bit streams which are packetized to form MPEG-2 transport streams. Consists of compressed data from a single source (audio, video, data, etc.). One elementary stream is carried in a sequence of PES packets with one and only one stream ID.

Embedded Audio. Digital audio information multiplexed onto a serial digital data stream. Up to sixteen channels can be multiplexed on a single stream of 601 video, minimizing cabling and routing requirement.

ENG. Electronic News Gathering

Encoded Clip Softness. In the encoded legalization process, "softness," as applied to encoded clips, refers to the processing of the video at the point of the clip. The clips are applied in YCbCr color space. The clip point is either an immediate limit (no softness) or will have a range of values leading to the clip point, all reduced to smooth the clip point to a less immediate limit (softness).

Encoded Legalization. Limiting of the luminance and color difference signals such that, once encoded into a composite video signal, the resultant encoded video does not violate the maximum or minimum signal levels as defined by the specific encoding rules. NTSC and PAL video plus various users of these types of video have many varied rules for maximum and minimum encoding limits. Encoded legalization usually calculates first the encoded luminance value and then the corresponding chroma value to make legalization judgements.

Encoded Video. A combined single video signal that is constructed from either separate GRB or luminance and two color difference video signals. NTSC, PAL, and SECAM are all examples of encoded video.

Envelope Detection. An RF signal detection technique that does not respond to phase variations in the carrier signal, enabling measurement of a transmitter's incidental phase. When used together with synchronous detection, envelope detection helps isolate either video and/or RF as the causes of phase distortion.

External Key Input. This is an alternate source for key cut. This is usually a separate external input to a switcher

Fade-thru-Black. A production technique which is a two step process. The first step will fade the program video to black. The second step will fade from black to the video selected on the preview bus. This is usually used in major scene transitions.

Fade-to-Black. A production technique which simply fades the program video to black and program audio to silent. This is used to end programs and to escape from embarrassing pictures or sounds.

Field. A picture or picture portion which is produced within one cycle of vertical synchronization. In interlaced systems, a full picture or frame requires two consecutive fields.

FM Trap. A circuit designed to minimize potential interference from strong FM signals in receiving equipment, such as a TV demodulator. For example, an FM trap can attenuate signals between 88-108 MHz to reduce interference on NTSC television channel 6.

Frame. A single full resolution picture as viewed in either a video or film system. In the case of interlaced video, two consecutive fields provide all of the information of one frame. In non-interlaced systems, one cycle of vertical synchronization produces a frame. A 60 Hz interlaced system, produces 30 frames of video in one second. A 60 Hz progressive (or non-interlaced) system, produces 60 frames of video in one second. Common frame rates are 24 (film) 25, 29.97, 30, 50, 59.94 and 60.

Frame Synchronizer. An electronic device that synchronizes two or more video signals. Using one input as a reference, it locks a second signal to the reference.

Frame Store. An electronic method of capturing and storing a single frame of video.

Gamma. This term applies to the linearity of the change from black to white. Gamma controls adjust the gray or 50% point of the video either up or down, with the effect of changing the gray level of the video.

Gamut. The whole or total of whatever is being addressed. In color space, gamut refers to all colors which are included in a particularly defined color group, such as 601 gamut.

Genlock (Generator Lock). A method of synchronization involving the generation of a video signal that is time and phase locked with another signal.

GPI. General Purpose Interface

Headend. In a cable TV system, the facilities where program sources (satellite, terrestrial, VTR, local) are received and remodulated for distribution through a cable plant.

High Definition Television (HDTV). High definition television has a resolution of approximately twice that of conventional television in both the horizontal (H) and vertical (V) dimensions and a picture aspect ratio (H to V) of 16:9.

High Level. A range of allowed picture parameters defined by the MPEG-2 video coding specification which corresponds to high definition television.

HRC. Harmonically-Related Carrier

Hue. Color tint

ICPM. Incidental Carrier Phase Modulation. A measurement of picture carrier phase distortion (affected by the video signal level) that occurs in the transmitter.

Installation Categories. Categories of measurements that occur on circuits attached or not attached to a live electrical supply outlet. Installation Categories are as follows:

- Category I is for measurements that occur on circuits not attached to a live electrical supply outlet (115/230 VAC). The voltages come from secondary power sources. The secondary power source includes circuits energized by low-voltage sources and electronics such as batteries.

- Category II is for measurements that occur on circuits attached to a live electrical supply outlet (115/230 VAC).
- Category III is for measurements that occur on equipment permanently connected to the building. The distribution level equipment are usually fixed installations and circuit breakers.
- Category IV is for measurements that occur at the main electrical power supply.

IP. Internet Protocol

IRC. Incrementally-Related Carrier

I.R.E. Refers to the Institute of Radio Engineers, and is used as a unit of measurement. In NTSC television, 1 volt of signal equals 140 IRE units.

ISP. Internet Service Provider

Jitter. A deformation of a signal affected by poor synchronization.

Key. An effect in television where a selected portion of background video is removed and replaced with another video.

Key Cut. In a key effect, this is the video which designates the portion of background video which is removed.

Key Fill. In a key effect, this is the video which is used to replace the portion of background video which was removed. This may be the same video as the Key Cut video.

Key Invert. In a key effect, this is an electronic action which reverses the polarity of the key cut signal. It makes black appear as white, and white appear as black.

Key Mask. In a key effect, it uses a wipe pattern from the wipe pattern generator to restrict the key cut from removing video in a portion of the screen. This requires the use of the wipe pattern generator and the Mask/Preset Size controls.

Key Source. Another term which is the same as key cut.

Legalization. The modification of serial digital video to conform to analog color space rules, as required by users.

LCD. Liquid Crystal Display

LED. Light-Emitting Diode

LFE. Low Frequency Effects

Lissajous. A display of the amplitude and phase relationships between two input signals.

LKFS. Loudness, K weighted, relative to nominal full scale. The LKFS unit is equivalent to a decibel in that an increase in the level of a signal by 1 dB will cause the loudness reading to increase by 1LKFS. A unit of LKFS is equivalent to a decibel.

If a 0 dB full-scale 1 kHz sine wave is input applied to the left, centre, or right channel input, the indicated loudness will equal -3.01 LKFS. The weighting coefficients are different for each channel.

LS. Left Surround

LTC. Longitudinal Time Code, A SMPTE timecode standard usually recorded onto the linear audio track of a VTR.

LU. Loudness Unit. The loudness unit is the scale unit of the loudness meter. The value of the program in loudness units represents the loss or gain (dB) that is required to bring the program to 0 LU, e.g. a program that reads -10 LU will require 10 dB of gain to bring that program up to a reading of 0 LU. (From BS.1771)

LUFS. Loudness unit, referenced to Full Scale. (This is the EBU recommended unit; equivalent to LKFS.)

Luminance. The degree of brightness (black and white portion of the video signal) at any given point in the video image. A video signal is comprised of luminance, chrominance and sync. If luminance is high, the picture is bright and if low the picture is dark. Changing the chrominance does not affect the brightness of the picture.

Main Level. A range of allowed picture parameters defined by the MPEG-2 video coding specification with maximum resolution equivalent to standard definition television.

Main Profile. A subset of the syntax of the MPEG-2 video coding specification that is supported over a large range of applications. Applications include, MP@HL (Main profile at high level) and MP@ML (Main profile at main level).

Mask/Preset Size. Uses the wipe pattern generator in the keyer portion of the effects generator. This is used to adjust the size of a preset pattern or for adjusting the size of a mask to block a portion of the key cut (source) from use in the keyer.

Matte Generator. An internal generator which can make any color, is used for border color and may be used for key fill. It is identical to the Color Background Generator, but simply used in other areas of the switcher.

Mbps. Megabits Per Second

mV. Millivolts

M/E. Mix/Effects System

MP@HL. Main profile at high level

MP@ML. Main profile at main level

MPEG. Refers to standards developed by the ISO/IEC JTC1/SC29 WG11, Moving Picture Experts Group.

MPEG-2. Refers to ISO/IEC standards 13818-1 (Systems), 13818-2 (Video), 13818-3 (Audio), and 13818-4 (Compliance).

Multi-Level Effects. Applies to any effects generator which can do more than one effect at a time. Typically, a multi level switcher can produce a Key and a Background transition in the same effects generator at one time.

NTSC. National Television Systems Committee, the color television system used in the United States, Canada, Mexico and Japan.

NVRAM. Nonvolatile RAM

OLED. Organic light-emitting diode; a graphical color display for use as television screens, computer displays, portable system screens, and in advertising and information board applications

Packet Identifier (PID). A unique integer value used to associate elementary streams of a program in a single or multi-program transport stream.

Packet. A packet consists of a header followed by a number of contiguous bytes from an elementary data stream. It is a layer in the system coding syntax.

Packetized Elementary Stream (PES). The data structure used to carry elementary stream data. The packets consist of a header followed by payload data, and a stream is a series of packets which form an elementary stream and have a single stream identification.

PAL. Phase Alternation Line; the standard color television system in many European and other countries.

Passive Looping. Video and audio signals routed through components, even if power is removed. Signals are not amplified or processed, maintaining transparency.

Pedestal Level. An offset used in a video system to separate the active video from the blanking level by maintaining the black level above the blanking level by a small amount.

Pixel. A Picture cell or Picture element representing one sample of picture information, such as an individual sample of R, G, B, luminance or chrominance.

Pollution Degree. A measurement of the foreign materials such as conductive dust, gas, and moisture between the internal areas of the product and the outside environment. Pollution Degrees are 1,2 3, and 4.

- Pollution Degree 1 describes conditions where no pollution occurs or only dry, nonconductive pollution occurs. This is normal for equipment located in clean rooms. The pollution classified under Pollution Degree 1 has no environmental influence.
- Pollution Degree 2 describes conditions where dry, nonconductive pollution occurs. This is normal in an office environment. Temporary conductivity caused by condensation may occur when the unit is not in service.
- Pollution Degree 3 describes conditions where conductive pollution occurs, or dry, nonconductive pollution occurs due to condensation. Rooms that cannot maintain the moisture or temperature fall into this category. The location can only protect from outside weather conditions such as direct sunlight, rain, snow, and wind. Industrial areas can fall under Pollution Degree 3.
- Pollution Degree 4 describes pollution that generates persistent conductivity through conductive dust, rain, or snow. Pollution Degree 4 is for outdoor locations.

Preset. Refers to establishing any condition prior to use on the Program output. This term is used in reference to wipe patterns and is often interchanged with Preview.

Preview. The video output channel used to view the intended Program results prior to the execution of the next transition.

PRO Audio. A transmitted audio channel for talent cueing via Interrupt Foldback (IFB) to ENG vans and remote applications. Some demodulators support PRO audio monitoring.

Program. A transport stream combination of a video stream and one or more audio and data streams associated with that video stream. In analog terms, "Program" refers to the Base Band video and audio produced by the final output of a switcher.

Program Association Table (PAT). A list of all programs that are in the ATSC data stream.

Program Map Table (PMT). A listing of all elementary streams that comprise a complete (television) program.

Program Clock Reference (PCR). This is a time reference signal that is placed in MPEG streams for the purpose of time coordinating various data streams.

Program and System Information Protocol (PSIP). Information sent out as part of an ATSC transport stream which lists all of the video, audio, data and program information contained in the stream. This is the "TV guide" for a given stream.

Progressive Scanning. Also non-interlaced. A system of video scanning where lines of a picture are transmitted consecutively, such as with VGA monitor displays.

Push-push Toggle Switch. An electro-mechanical device which, when pushed, alternates the condition of the switch. Push once, it's off, push again, it's on.

Quadrature Output. An output in a television demodulator used for measuring Incidental Carrier Phase Modulation (ICPM) in a transmitter.

QPSK. Quadrature Phase Shift Keying, typically used by satellite downlinks.

QAM. Quadrature Amplitude Modulation, the technique used by cable TV systems (64-QAM and 256-QAM) to remodulate signals for distribution in a cable plant.

GRB Legalization. Limiting of luminance and color difference video signals such that, once transcoded into GRB component video signals, the resultant video does not violate the maximum or minimum signal levels as defined by component video level rules. Typically, the maximum value for R, G, or B is 700 mV, and the absolute minimum value for any of these signals is 0 mV.

Reclocking. The process of regenerating digital data with a clock recovered from the input data.

Resolution. A measure of the finest detail that can be seen, or resolved, in a reproduced image.

RS. Right Surround

RS-422. Recommended Standard number 422, an E.I.A. standard which describes a type of data interchange. Television products use this standard as its communication format between the electronics frame and editors, control panel and computers. An RS-422 line may be extended up to 1,000 feet (304m).

Sampling. Process by which an analog signal is sampled to convert the analog signal to digital.

SAP. Secondary Audio Program, used in television broadcast for second language broadcasting, simulcasting, and separate audio programming.

Saturation. Color intensity

SAW Filter. Surface Acoustic Wave filter

Segment Error Rate (SER). A calculated average of uncorrected transport stream packets vs. total packets as accumulated over a designated period of time.

Sensitivity. Sensitivity is set by Consecutive Errored Samples (CES). When setting amplitude limits, a noise spike can exceed the limit while the video amplitude can be within the limit. With the CES set to a low number, a spike is detected and an alarm is displayed. Set the CES to a higher number to ignore the fast spike. Each CES occurs at 37ns intervals for SD and 13.5ns for HD. Use this as a guideline to select the appropriate CES value.

Not all alarms have CES associated with them; in such cases, use the duration to increase or decrease the general sensitivity.

Signal to Noise Ratio -Analog (SNR). A measurement of the noise level in a signal expressed in dB (decibels) as a ratio of between the audio or video signal's maximum peak-to-peak signal voltage and the measured voltage of noise present when the signal is removed. Higher SNR figures indicate that any noise introduced by system components will not be perceived in the picture and sound output signals.

Signal to Noise Ratio-8VSB (SNR). As applies to 8VSB transmissions, this is a calculated average power of the ideal signal divided by the actual demodulated signal power.

SMPTE. Society of Motion Picture and Television Engineers

Standard Definition Television (SDTV). This term is used to signify a digital television system in which the quality is approximately equivalent to that of NTSC. This equivalent quality may be achieved from pictures originated at the 4:2:2 level of ITU-R BT.601 and subjected to processing as part of the bit rate compression. The results should be such that when judged across a representative sample of program material, subjective equivalence with NTSC is achieved. The displayed picture may be either the traditional 4:3 or the wide-screen 16:9 aspect ratio.

STL. Studio Transmitter Link

Synchronous Detection. A common detection technique used in television demodulators that removes quadrature distortion, enabling comparison of transmitter output with video input signal.

S-Video. Also Y/C. Transmits luminance and color portions separately via multiple wires, thus avoiding the color encoding process and resulting loss of picture quality.

Tally. A system used to light lamps and indicate usage. Most production switchers have an internal tally system to indicate selected functions, and which selected functions are currently involved with Program.

TCP. Transmission Control Protocol

Telecine. A device used to convert film to video; movie film is digitally sampled and converted to video frame by frame in real-time.

TCXO. Temperature Compensated Crystal Oscillator

THD. Total Harmonic Distortion

TPL. True Peak Level

Transport Stream-ATSC (TS). Consists of the following: (1) Packets: 188 bytes - fixed length with descriptive data, (2) Carries several programs, (3) has a PID which identifies the type of TS packet (video, audio, other), and (4) carries descriptive information about the program.

True Peak Level. The maximum value of an audio signal waveform in the continuous time domain.

UHF. Ultra High Frequency

Unity Gain. An electronic term indicating that a signal will be neither amplified or attenuated. One volt of signal level in results in one volt of signal level out.

Vector. A measure that has two individual properties: magnitude and direction.

Vector Clip. A special encoded clip version that limits only the Cb and Cr input video signals and does not affect (nor is it affected by) the luminance component. This color-only clip limits the maximum vector excursions as viewed in an encoded state and is intended for users who wish to prevent encoded vectors from ever exceeding the perimeter circle of an encoded vector display.

VHF. Very High Frequency

VITC. Vertical Interval Time Code, a method for recording on to video tape the timecode address for each video frame inserted in the vertical interval.

Waveform. A visual representation of a signal in the shape of a wave that plots amplitude versus time.

White Level. The brightest part of a video signal, corresponding to approximately 1.0 Volt.

White Balance. An electronic process used to calibrate the picture for accurate color display in different lighting conditions.

Wipe. A special effect in which two pictures from different video sources are displayed on one screen. Production switchers and special effects generators provide numerous wipe patterns varying from simple horizontal and vertical wipes to multi-shaped, multi-colored arrangements.

XGA. High resolution 1024×768 non-interlaced (progressive) display monitor

XVGA. Extended Video Graphics Adapter

YPbPr. CAV format composed of luminance (Y) and two color difference signals (Pb and Pr)

Y/C. Also S-video. Describes the separation of video signal luminance and chrominance components.

Zero Carrier Pulse (chopper). In a TV demodulator, removes the carrier in the vertical interval for a short period, enabling depth of field measurement.

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Version 2.1, February 1999

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