Imagine COMMUNICATIONS™

Installation and Operation Manual

Videotek® VSG-4CSD

Master Timing Generator

Videotek® VSG-4MTG

Clock System Driver

Edition E

P061-0028

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-4MTG/VSG-4CSD Signal Generators.

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-4MTG/VSG-4CSD Signal Generators.

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
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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	May 2012	Initial release
B	August 2012	Additional feature, minor updates to content, SNMP appendix
C	February 2013	Minor updates for UL compliance
D	July 2013	Addition of VSX change options
E	January 2014	Update to GPI labels

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

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

Term or Convention	Description
> or →	Indicates the direction of navigation through a hierarchy of menus and windows
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 Documentation and Product Resources DVD as individual Adobe Acrobat PDF files. Most of the software applications contained on the DVD 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.

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.

Important Safety Instructions

- Read these instructions.
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water.
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade (or the third prong) is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer.

  Norway and Sweden
  "Utrustning som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medföra risk för brand. För att undvika detta skall vid anslutning av utrustningen till kabel-TV nät galvanisk isolator finnas mellan utrustningen och kabel-TV nätet."
- Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/ apparatus combination to avoid injury from tip-over.

Figure P-1 Portable Cart Warning

- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
- The device's IEC power connector shall remain readily accessible.

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.
- Imagine Communications does not recommend internal battery replacement by the user.
- Dispose of used batteries according to the battery's disposal instructions.

CAUTION: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type.

- 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:

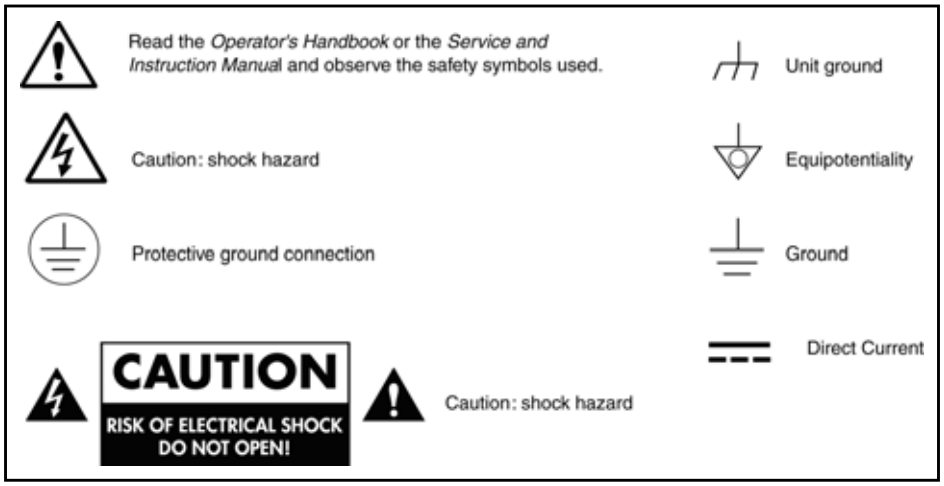

Figure P-2 Safety Symbols Appearing on Imagine Communications Equipment

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-3**.

Figure P-3 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-4**.

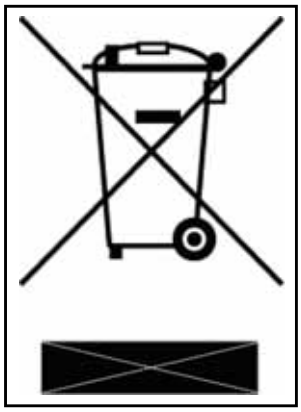

Figure P-4 WEEE Compliance Symbol

1 Introduction

The VSG-4MTG/VSG-4CSD master timing generators input time information from various sources, including Linear Time Code (LTC), Vertical Interval Time Code (VITC), Global Positioning Systems (GPS), and Network Time Protocol (NTP) servers. The module's internal timing engine processes the incoming reference information, makes appropriate conversions to different time bases, and maintains a consistent time base which is used to drive the module's outputs.

Using a combination of parameters such as leap second information, DST rules, and offset values, the VSG-4MTG/VSG-4CSD can be configured to convert incoming International Atomic Time (TAI) to other time bases. This time is then distributed to the module's outputs as time and date information, and black burst video reference signals.

Product Features

The VSG-4MTG/VSG-4CSD include the following standard and optional features.

Standard Features

Inputs

- Genlock to standard color black (NTSC - SMPTE 170M and PAL - ITU-R BT. 470-5)
- Genlock to Tri-level sync (SMPTE 240M/274M/296M)
- Support for various time code formats and time code user bit formats, including SMPTE/EBU drop frame or non-drop time code format
- GPS support via 10 MHz and RS-232 interface
- NTP support and PTP support via a network connection
- VITC support from black burst inputs
- LTC support
- GPI I/O
- Redundant external power supplies
- HD26 DSUB with hood (for customer-supplied cable to connect to the GPI I/O connector)

Outputs

- 1-5 Sync Outputs, configurable as black burst or Tri-Level Sync (TLS)
- VITC support on black burst
- Two LTC outputs
- Support for digital audio reference signal (DARS) or word clock on a shared BNC

Processing Features

- Configurable Daylight Savings Time and Leap Second change auto detection for some input sources
- User-definable scheduled call outs to time reference sources, such as GPS receivers
- User-programmable delays for input and output, offsets, time code offsets, output phasing, and input and output jam syncs
- Display of current local time and date on a menu-driven front panel interface

Options

Table 1-1 VSG-4MTG/VSG-4CSD Optional Features and Descriptions

Option	Description
TM-WRTY-1YR	Test & Measurement one-year warranty extension: excludes LCDS, CRTS, and batteries
TM-WRTY-3YR	Test & Measurement three-year warranty extension: excludes LCDS, CRTS, and batteries
BLK-4	Blank panel for DRT-5
DRT-ADP-1	Adaptor plate option to install CMN-41, VSG-401, or LLM-1770 series units
DRT-5	Dual Rack Tray for Rack mounting the equipment
VSG-4-BRK-1	Breakout panel and 5 ft cable with HD26 pin DSUB Male to Female connectors for the VSG-4 Series

Applicable Standards

ST 125M:1995	Component Video Signal 4:2:2-Bit-Parallel Digital Interface
ST 259M:1997	SDTV Digital Signal/Data-Serial Digital Interface
ST 274M:2005	1920×1080 Image Sample Structure, Digital Representation and Digital Timing Reference Sequences for Multiple Picture Rates
ST 276M	Transmission of AES/EBU Digital Audio Signals Over Coaxial Cable
ST 292M:1998	1.5 Gb/s Signal/Data Serial Interface

ST 296M:2001	1280×720 Progressive Image Sample Structure-Analog and Digital Representation and Analog Interface
ST 299M :2004	Mapping of 24-bit AES digital audio data and associated control information into the ancillary data space of a serial digital video
ST 372M:2002	Dual Link 292M Interface for 1920×1080 Picture Raste
ST 424M:2006	3 Gb/s Signal/Data Serial Interface
ST 425M:2006	3 Gb/s Signal/Data Serial Interface-Source Image Format Mapping
ISO 8601: 2004	Data elements and interchange formats -- Information interchange -- Representation of dates and times

This product provides support for IEEE1588:2008 PTP networks, and is being released in advance of ratification of SMPTE standardization work in this area. The product is fully software upgradeable, and will be able to be upgraded to provide full compliance with the SMPTE standard once ratified and published, ensuring interoperability with other compliant equipment.

Safety

See the ***Operator's Safety Summary*** on page 3 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-4MTG/VSG-4CSD Service and Support

The VSG-4MTG/VSG-4CSD master timing converters are not designed for field servicing. All hardware upgrades, modifications, or repairs require you to return the VSG-4MTG/VSG-4CSD to the Customer Service center.

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:

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.

- 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
  (Address to be provided by Imagine Communications Customer Service Department)
  Attn: RA *xxxx* (where *xxxx* is the RA number)

  Email: BCDService@imaginecommunications.com

2 Installation

Installation Procedures

Inspecting the Shipment

Before installing the VSG-4MTG/VSG-4CSD, inspect the box and the contents. Report any damage to the shipper, and then telephone the Imagine Communications Customer Service Department (see ***VSG-4MTG/VSG-4CSD Service and Support*** on page 11).

Note: 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-4MTG/VSG-4CSD
- One ***VSG-4MTG/VSG-4CSD Installation and Operation Manual*** on CD
- Two detachable power cords
- Two power supplies in shipping box
- Warranty statements
- BNC terminator
- One hardware kit: AUX I/O HD26 with hood

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

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 Imagine Communications representative 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.

Rack Mounting the VSG-4MTG/VSG-4CSD

When selecting the permanent mounting location for the VSG-4MTG/VSG-4CSD, make sure that the flow of air to the ventilation holes on the sides of the chassis is not obstructed.

Rack mounting the VSG-4MTG/VSG-4CSD is illustrated in **Figure 2-1** for the DRT-5 rack mount case. **Table 2-1** lists the parts required to rack mount the VSG-4MTG/VSG-4CSD into the DRT-5 rack mount case.

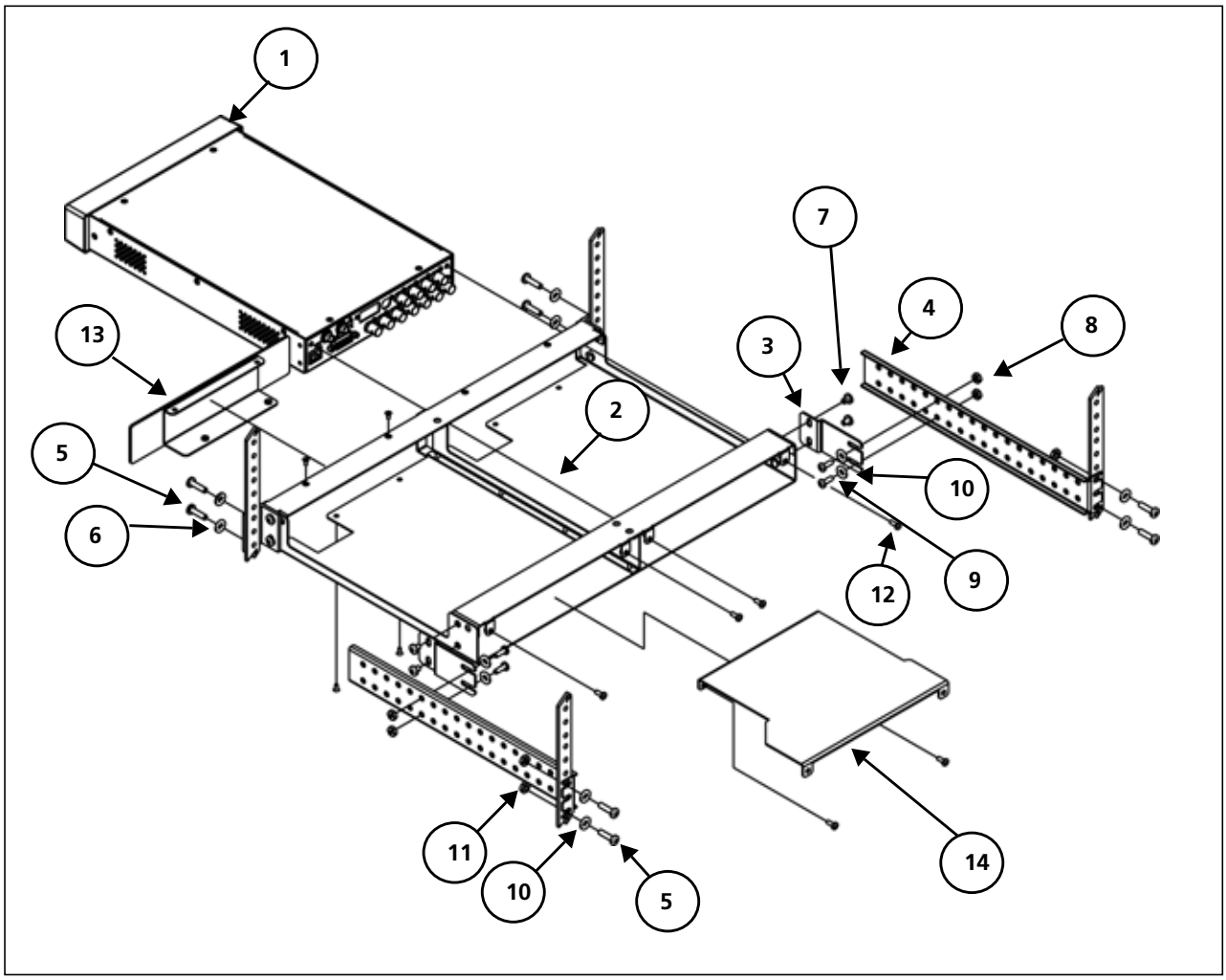

Figure 2-1 Mounting the VSG-4MTG/VSG-4CSD in a Rack Using the DRT-5

*Although only one VSG-4MTG/VSG-4CSD unit is shown in **Figure 2-1**, two VSG-4MTG/VSG-4CSD units may be mounted into a DRT-5 rack case.*

Table 2-1 Parts for Rack Mounting the VSG-4MTG/VSG-4CSD Using the DRT-5

Key	Item Number	Qty	Description
1	-	A/R	VSG-4MTG/VSG-4CSD unit
2	P832-0090	1	DRT-5 rack tray (optional)

Table 2-1 Parts for Rack Mounting the VSG-4MTG/VSG-4CSD Using the DRT-5 *(Continued)*

Key	Item Number	Qty	Description
3	831061	2	Metal extension mount
4	832070	2	Metal extension bracket
5	831030	8	#10-32×¾-in. Black phillips head screws
6	831019	4	Nylon washer, rack mount
7	P831-0026	4	#10-32×¼-in. Phillips head screw
8	831119	4	#8-32 kep nuts
9	831064	4	#8-32×½-in. Phillips head screws
10	831118	8	#10 flat washers
11	831060	4	#10-32 kep nuts
12	831131	4	#6-32×3/8-in. Phillips head screws (CMN mtg)
13	BLK-4	n/a	Metal blank panel assembly (separately purchased option, not included in this kit)
14	DRT-ADP-1	n/a	Adapter plate to install CMN-41, VSG-401, or LLM1770 series units (separately purchased option, not included in this kit)

1 Install the extension bracket mounts (ITEM 3) to both sides of the chassis (ITEM 2) using four #10-32 screws (ITEM 7) as shown.

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 #10-32 kep nuts (ITEM 11) into the holes that align with the slots in the metal extension mount (ITEM 3).

4 Install the remaining #10-32×¾-in. Phillips head screws (ITEM 5), #10 flat washers (ITEM 10), and #10-32 kep nuts s (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 6-32 x 3/8-in. Phillips head screws (ITEM 12), secure the VSG-4MTG/VSG-4CSD unit to the back of the DRT-5 rack case.

7 If desired, install the optional BLK-4 cover plate:

- Slide the metal cover plate (ITEM 13) into the desired side of the DRT-5 rack.
- Using 4 self tapping screws (ITEM 13), secure the cover plate into the DRT-5 rack.

The installation is complete.

Connecting the VSG-4MTG/VSG-4CSD

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

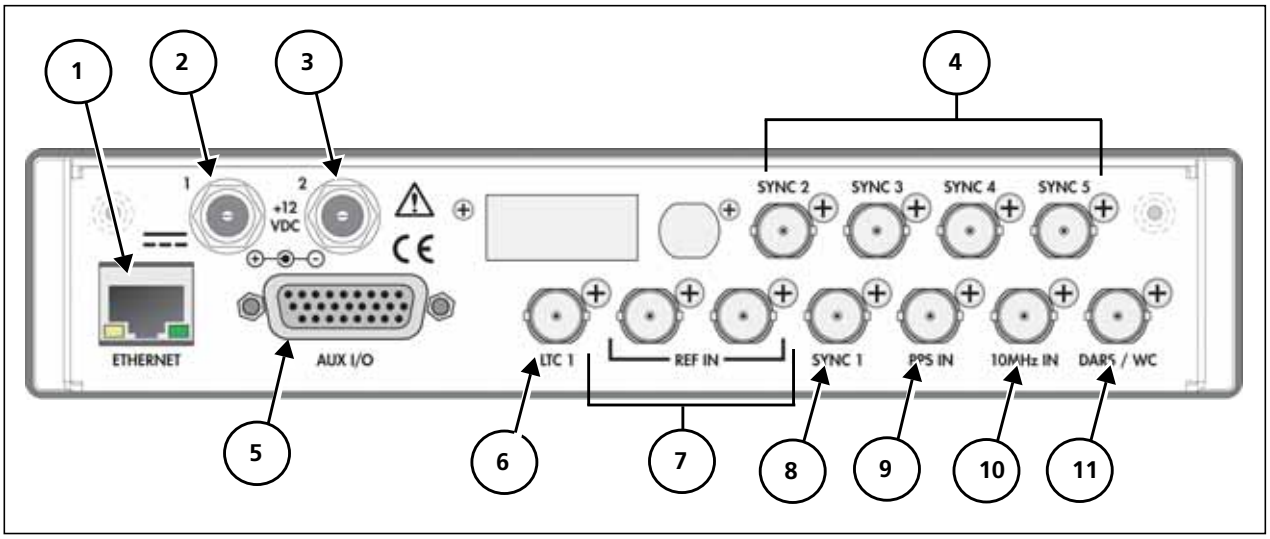

Figure 2-2 VSG-4MTG/VSG-4CSD Back Panel Connectors

Table 2-2 Description of Back Panel Connectors

Key	Label	Description
1	ETHERNET	RJ45, female, 10/100Base-T Ethernet connector[1]
2	PWR 12VDC	Primary Power connector
3	PWR 12VDC	Redundant Power connector
4	SYNC 2-5 (OUT)	Female BNC connector that outputs a color black burst (NTSC,PAL-B) or Tri-Level Sync video reference signal. VSG-4MTG model only
5	AUX I/O	26 pin, high-density, female, D sub connector for installation of the Breakout Module [2]
6	LTC 1	LTC 1 Time code output
7	REF IN	Reference passive looping BNC for BB & Tri-level sync
8	SYNC 1 (OUT)	Female BNC connector that outputs a color black burst (NTSC,PAL-B) or Tri-Level Sync video reference signal
9	PPS IN	Female BNC connector that accepts a pulse-per-second (PPS) input tyically from a GPS receiver
10	10MHz IN	Female BNC connector that accepts a 10 MHz reference signal typically from a GPS receiver
11	DARS/WC	DARS or Word Clock Output

[1] *See **Appendix A, *Pinouts*** on page 101 for the connections.
[2] See ***Optional Breakout Module with Five Foot Cable*** on page 17.

Optional Breakout Module with Five Foot Cable

The optional VSG-4-BRK-1 Breakout module connects to the AUX I/O connector (connector 5 on **Figure 2-2** on page 16) either directly or through the 5 ft extension cable in the option kit (cable not shown).

The breakout module further divides the signals available on the DB-26 pin connector into nine function-specific groups and connectors. The breakout board is illustrated in **Figure 2-3** on page 17.

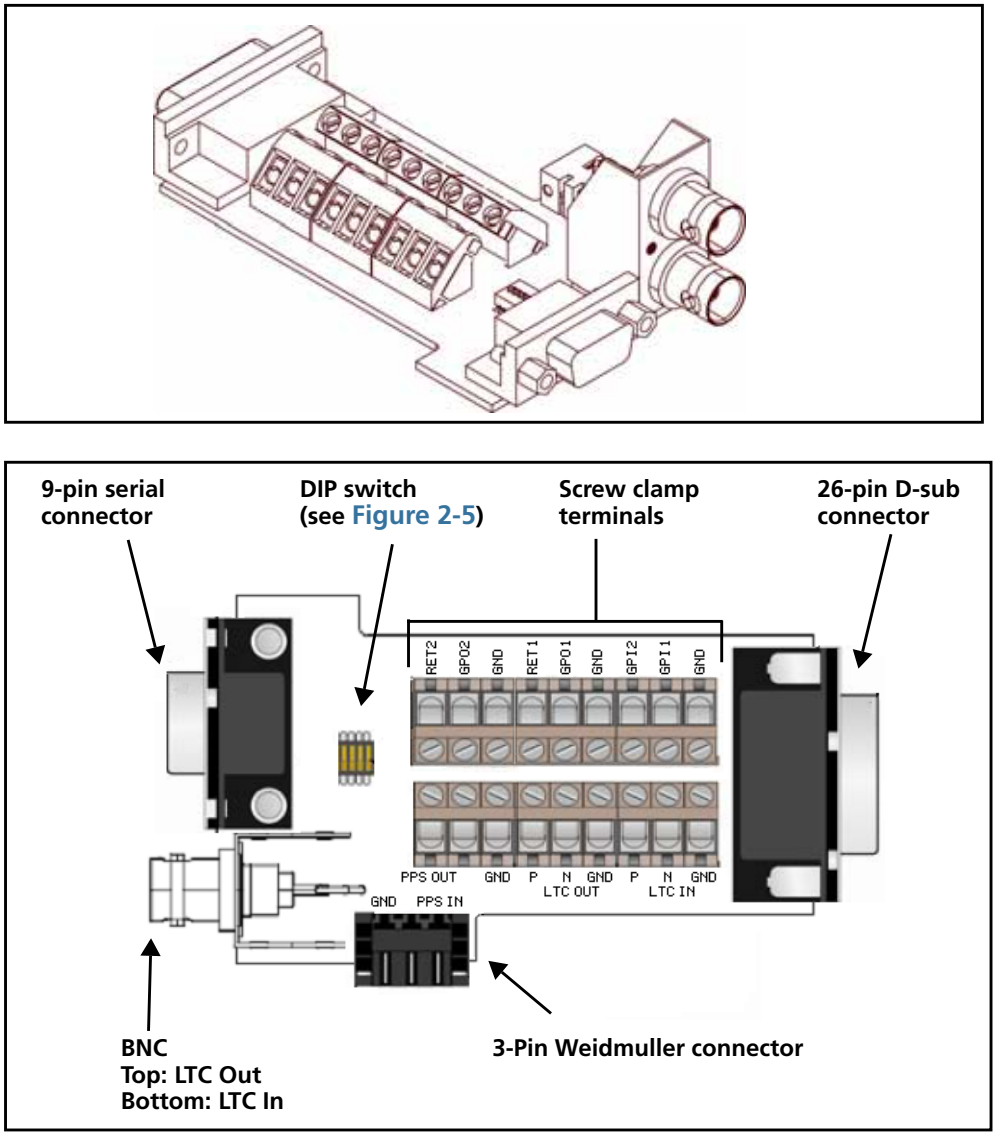

Figure 2-3 VSG-4-BRK-1 Breakout Board

Table 2-3 Breakout Module Connections

Connector	Function
9-pin Male serial (D-sub) connector	RS-232. See ***TIA/EIA-574 (RS-232) 9-Pin Serial Connector*** on page 21.
DIP switch	Configures termination on the LTC timecode. See ***DIP Switch*** on page 20.

Table 2-3 Breakout Module Connections *(Continued)*

Connector	Function
Screw clamp terminals	These connectors provide LTC in and out, PPS out, and GPI in and out. See ***Screw Clamp Terminals*** on page 19.
26-Pin D-sub connector	The 26-pin male, D-Sub connector is used to connect the breakout module to the back panel of the VSG-4MTG/VSG-4CSD. For pinout information, see **Appendix A, *Pinouts*** on page 101.
3-Pin Weidmuller connector	Provides PPS In. See ***PPS IN*** on page 18.
BNC (upper)	Provides LTC2 OUT
BNC (lower)	Provides LTC input

TIA/EIA-574 (RS-232) 9-Pin Serial Connector

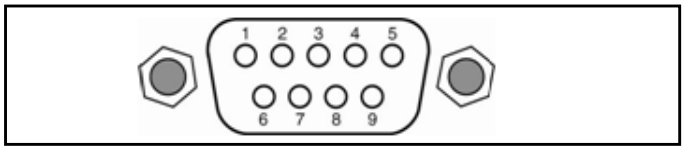

Figure 2-4 RS-232 9-Pin, Male, D-Sub Connector

Table 2-4 Serial Port (Single)

Pin	Description
1	NC
2	Received Data (RD)
3	Transmitted Data (TD)
4	NC
5	Ground
6	NC
7	NC
8	NC
9	NC

3-Pin Weidmuller Connector (PPS In)

For the location of this connector, see **Figure 2-3** on page 17.

The PPS IN provides connectivity to a pulse-per-second (PPS) signal from the GPS 3904 or GPS-3903 receiver.

Table 2-5 HZ Pin Layouts

Pin	Description
1	Ground
2	Unused
3	PPS IN

Screw Clamp Terminals

For the location of these connectors, see **Figure 2-3** on page 17.

PPS Output

The PPS Output provides a 5V TTL square-wave signal at the 1 Hertz frequency.

Table 2-6 HZ Pin Layouts

Pin	Description
1	Ground
2	Unused
3	PPS OUT

Linear Time Code Output (LTC2 OUT)

These connectors are used to output time code. The time code output impedance is settable via a DIP switch. See ***DIP Switch*** on page 20 for more information on adjusting the impedance.

Some devices bridge high-impedance output. Therefore, a large number of clocks may be connected parallel to this output. For the purposes of fault isolation, it is recommended that some form of distribution be used when connecting more than 20 clocks to the system.

Table 2-7 LTC2 OUT Pin Layouts

Pin	Description
+	LTC Out Positive
-	LTC Out Negative
GND	Ground

This output, LTC2, is independent of the LTC1 BNC connector on the back panel. Its output matches the breakout board LTC BNC Out.

Linear Time Code Input (LTC INPUT)

These connectors on the screw clamp terminals in **Figure 2-3** on page 17 are used to input time code. The time code input impedance is settable via a DIP switch. See ***DIP Switch*** on page 20 for more information on adjusting the impedance.

Table 2-8 TC Input Pin Layouts

Pin	Description
+	TC In Positive
-	TC In Negative
GND	Ground

General Purpose Interface (GPI) Inputs and Outputs

The various VSG-4MTG/VSG-4CSD interfaces have different labels for GPI inputs and outputs. **Table 2-9** describes the labels and pinouts for each GPI.

Table 2-9 GPI General Purpose Interface Input and Output Labels

Web Server User Interface and Local Control Panel Label	VSG-4-BRK-1 Breakout Label		PCB Designation
	Pin	Description	
GPI Output 1	RET1 *	Return 1	
	GPO1	GPI Output 1	GPO2
	GND	Ground	GND
GPI Output 2	RET2 *	Return 2	
	GPO2	GPI Output 2	GPO3
	GND	Ground	GND
* The GPI outputs are optically isolated. For the default operation, it is open between GPO and RET when there are no alarms and closed between GPO and RET when there is an alarm. The user can configure the GPI outputs to be closed between GPO and RET when there is no alarm and open between GPO and RET when there is an alarm.			
GPI Input 1	GPI1	Input 1	GPI0
GPI Input 2	GPI2	Input 2	GPI1
	GND	Ground	GND

DIP Switch

For the location of the DIP switch, see **Figure 2-3** on page 17.

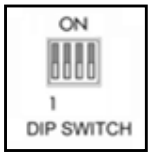

Figure 2-5 DIP Switch on Breakout Module

DIP Switch positions 1 and 2 on the breakout module configure termination on the LTC2 OUT, as described in **Table 2-10**.

Table 2-10 DIP Switch SW1 Positions 1 and 2

Switch Positions	Description
Position 1 ON Position 2 ON	LTC2 output Low-Z
Position 1 OFF Position 2 OFF	LTC2 output 600Ω terminated

DIP Switch positions 3 and 4 on the breakout module configures termination on the LTC input, as described in **Table 2-11**.

Table 2-11 DIP Switch SW1 Positions 3 and 4

Switch Positions	Description
Position 3 OFF	LTC input High-Z
Position 3 ON	LTC input 600Ω terminated
Position 4 OFF	LTC terminal input
Position 4 ON	LTC BNC input

TIA/EIA-574 (RS-232) 9-Pin Serial Connector

The 9-pin male connector is a standard serial interface connector compliant with TIA/EIA-574. The signaling on this connector is compatible with RS-232 levels. The pin layout when using the RS-232 port as one serial port is shown in ***26-Pin D-Sub Connector*** on page 101.

System Connections

The following sections describe how to connect the VSG-4MTG/VSG-4CSD to other devices, such as GPS receivers.

Connecting the GPS Antenna and Receiver

This section describes how to mount a GPS antenna, and how to connect the VSG-4MTG/VSG-4CSD to a GPS 3904/3903 receiver.

Mounting the GPS Antenna

To mount a GPS antenna outside:

Attach a short length of ¾-in. standard plumbing pipe (not supplied) to an outside surface or wall where it will not be disturbed, as shown in **Figure 2-6**.

NOTE: The thread on the end of the pipe must be ¾-in. NPT to properly screw into the bottom of the antenna. It is not necessary to mount the GPS antenna in a sheltered or protected area. However, it should be located where it is unobstructed by surrounding buildings.

1. Thread one end of the 75-ft. (22.86 m) RG-59 cable through the pipe.
2. Attach the female F-type or TNC connector on the RG-59 cable to the male connection under the antenna dome.
3. Connect the remainder of the RG-59 cable to the antenna lightning suppressor (impulse suppressor) included in the GPS receiver / antenna kit.
4. Ground the attached suppressor according to the manufacturer's instructions and the local electrical codes.
5. Connect the other side of the lightning suppressor to an RG-59 cable and thread the cable through an exterior wall and into the building.

NOTE: To ensure the safety of personnel and the protection of equipment from lightning strikes, it is recommended that the approved ground wire is attached to the RG-59 cable. Follow the provisions of the local electrical code.

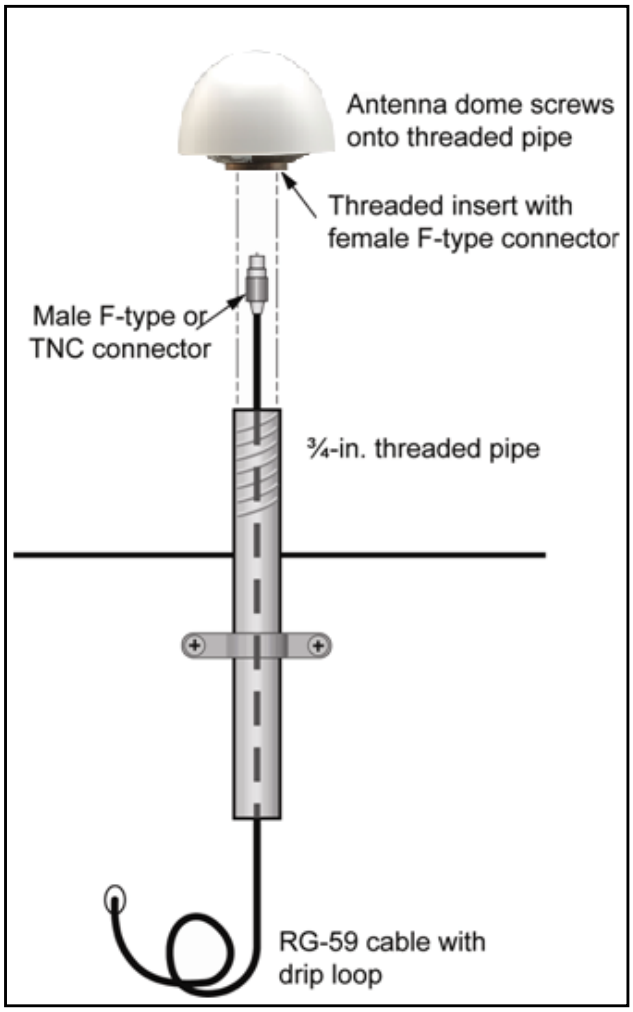

Figure 2-6 Typical Outdoor Installation of a GPS Antenna

Connecting the GPS Antenna to the Receiver

After the antenna has been installed and connected, the other end of the RG-59 cable must be connected to the 8 in. (20 cm) Type-F or TNC adapter cable. The other end of the adapter cable is then plugged into the ANT port of the GPS 3904/3903 receiver.

Connecting the VSG-4MTG/VSG-4CSD to a GPS 3903 Receiver

NOTE: To connect the VSG-4MTG/VSG-4CSD system to a GPS 3903 receiver, use a CAB-CSD-GPS3901 cable.

Follow these steps to connect the VSG-4MTG/VSG-4CSD to the GPS 3903 receiver. **Figure 2-7** illustrates the required connections.

Ensure the GPS 3903 antenna is mounted outside the building and connected to the receiver.

1 Connect the breakout module to the 26-pin connector on the back of the VSG-4MTG/VSG-4CSD.

2 If the system did not come with a CAB-CSD-GPS3901 cable, create a custom cable to connect the VSG-4MTG/VSG-4CSD to the GPS 3903 receiver. Attach the 9 pin male RS-232 connector to PORT 2 on the GPS 3903 receiver.

3 Attach the 9-pin female RS-232 of the cable to the 9-pin male RS-232 connector on the breakout board, as shown in **Figure 2-7**.

4 Attach the cable's Weidmuller 3-pin female connector to the 3-pin male connector labeled PSS IN on the breakout board.

When making this connection, ensure that the screw heads on the Weidmuller 3-pin female connector are facing up.

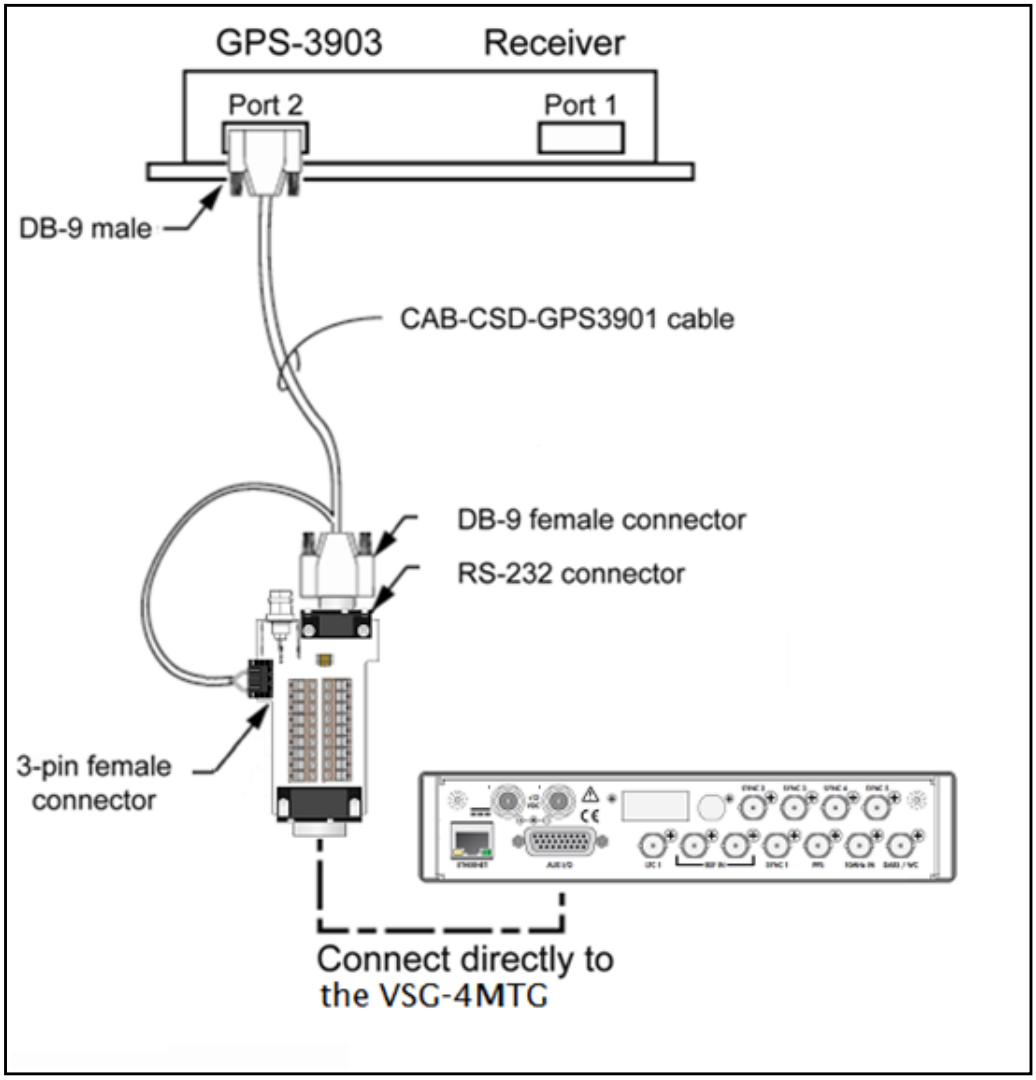

Figure 2-7 VSG-4MTG/VSG-4CSD to GPS 3903 Receiver Connections

For information on configuring the VSG-4MTG/VSG-4CSD for GPS operation, see ***GPIO*** on page 73.

Connecting the VSG-4MTG/VSG-4CSD to a GPS 3904 Receiver

Follow these steps to connect the VSG-4MTG/VSG-4CSD to a GPS 3904 receiver:

Using a standard BNC cable, connect the 1 PPS OUTPUT BNC connector on the GPS 3904 receiver to the PPS BNC connector on the VSG-4MTG/VSG-4CSD, as shown in **Figure 2-8**.

1. Using a standard BNC cable, connect the 10MHz OUTPUT BNC connector on the GPS 3904 receiver to the 10 MHZ connector on the VSG-4MTG/VSG-4CSD.
2. Connect the breakout module to the 26-pin connector on the back of the VSG-4MTG/VSG-4CSD.
3. Attach the 9-pin male connector on the RS-232 serial cable to the 9-pin female RS-232 connector on the back of the GPS 3904 receiver.
4. Attach the 9-pin female connector on the RS-232 serial cable to the 9-pin male RS-232 connector on the VSG-4MTG/VSG-4CSD breakout module.

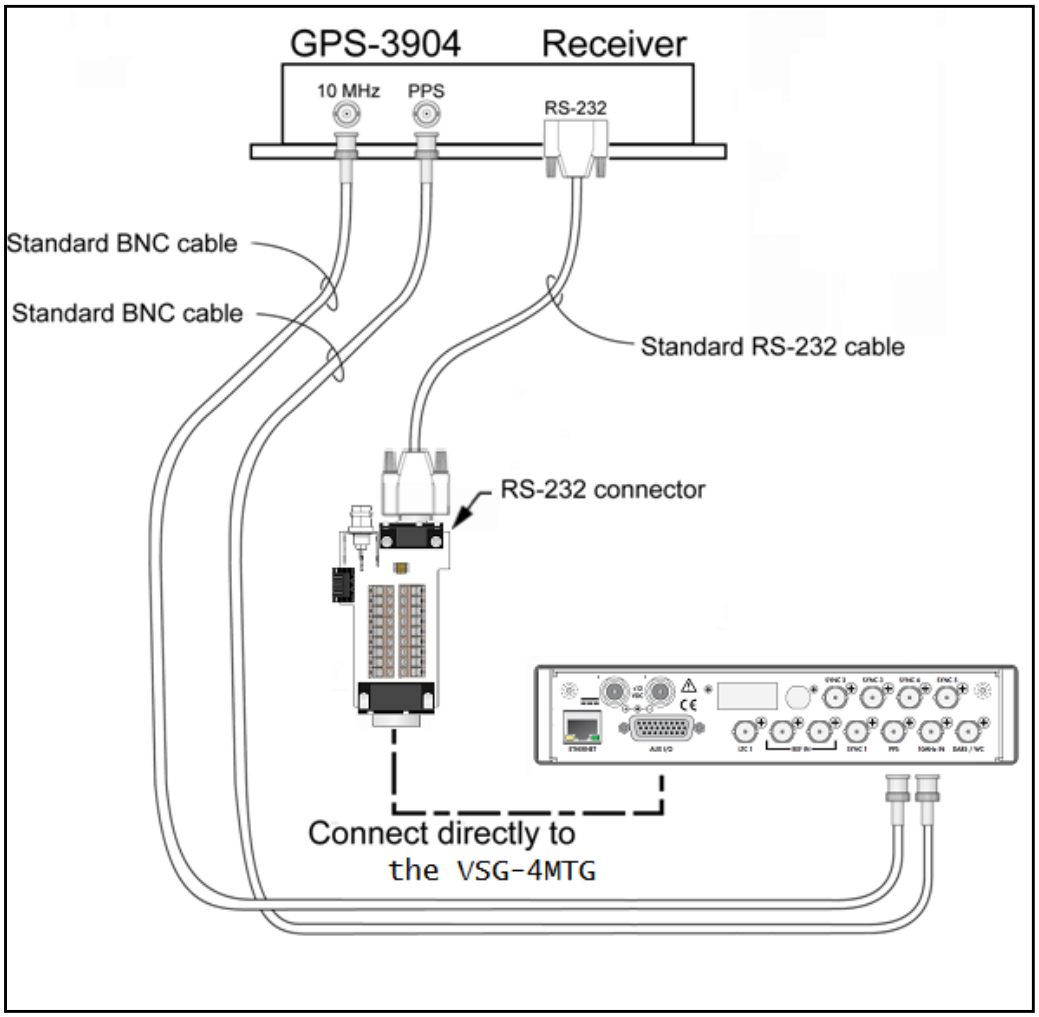

Figure 2-8 VSG-4MTG/VSG-4CSD to GPS 3904 Receiver Connections

For information on configuring the VSG-4MTG/VSG-4CSD for GPS operation, see ***GPIO*** on page 73.

Ethernet Setup

The Ethernet default settings for the VSG-4MTG/VSG-4CSD 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-4MTG/VSG-4CSD 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-4MTG/VSG-4CSD is routed to an outside network.

VSG-4MTG/VSG-4CSD interface static IP address	
VSG-4MTG/VSG-4CSD interface subnet mask	
Gateway IP address	

2 Identify a host PC to configure and test the VSG-4MTG/VSG-4CSD.

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-4MTG/VSG-4CSD, using a CAT5 network cable (not included). See **Figure 2-9**.

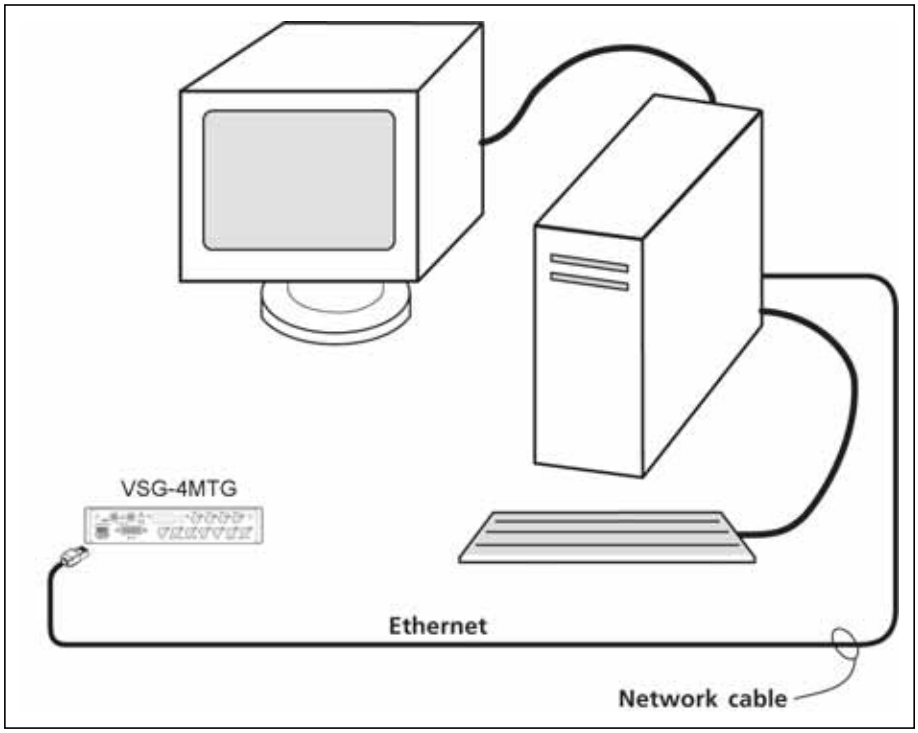

Figure 2-9 VSG-4MTG/VSG-4CSD Dedicated PC Connection

- For a network connection, connect the network hub to the back panel of the VSG-4MTG/VSG-4CSD using a CAT5 network cable (not included). See **Figure 2-10**.

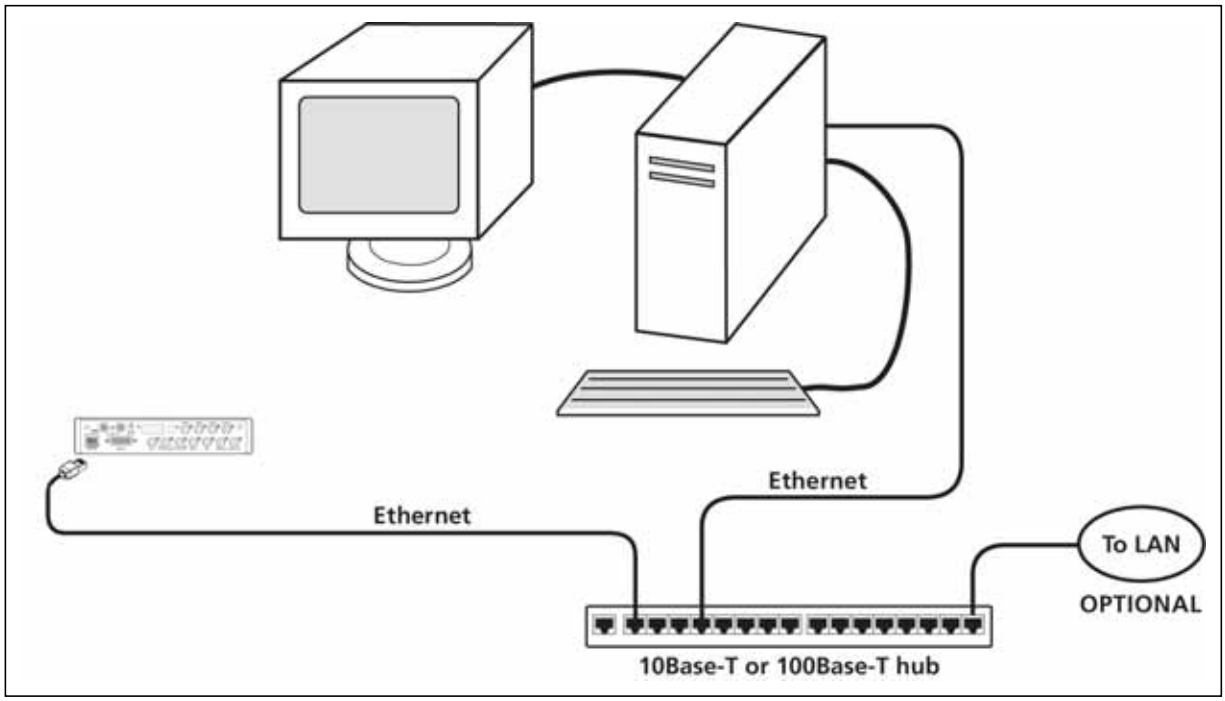

Figure 2-10 VSG-4MTG/VSG-4CSD Network PC Connection

4 Set up an Ethernet configuration for the VSG-4MTG/VSG-4CSD as follows:

a Press the **SETUP** button on the VSG-4MTG/VSG-4CSD 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

Terms

The following terms are used in this section:

- **ACO —** Automatic Change Over
- **ATR** — Absolute Timing Reference
- **BG** — Binary Group. LTC designated bit groups for extended time information such as date, time zone, offset, as well as other user information
- **CSD** — Master Clock Driver
- **DCF**— German Based radio based timing signal
- **DUT1** — The predicted difference UT1-UTC. DUT1 has a range of -0.8s to +0.8s in 0.1s increments.
- **France Inter —** French public radio
- **GPS —**Global Positioning System
- **GPS TIME —** Global Positioning System time, is the atomic time scale implemented by the atomic clocks in the GPS ground control stations and the GPS satellites themselves. GPS time was zero at 0h 6-Jan-1980. It is not perturbed by leap seconds.
- **Leap seconds —** A leap second is a positive or negative one-second adjustment to the Coordinated Universal Time (UTC) time scale that keeps it close to mean solar time.
- **Local time —** Time is the date/time reported by your PC (as seen by your web browser). If your PC clock is accurate to a second then the other time scales displayed above will also be accurate to within one second.
- **Loran-C —** Long Range Navigation time, is an atomic time scale implemented by the atomic clocks in Loran-C chain transmitter sites. Loran time was zero at 0h 1-Jan-1958. It is not perturbed by leap seconds.
- **LTC —** Linear Time code
- **MJD —** The MJD is defined as the JD minus 2400000.5. It should be noted that JD increments at noon while MJD increments at midnight. MJD is thus a continuous count of the number of days that have elapsed since 17 November 1858.
- **MSL —** United Kingdom radio national time reference
- **MTG —** Master Time Generator
- **NTP —** Network Time Protocol
- **PPS —** Pulse-Per-Second
- **PTP —** Precision Time Protocol
- **TAI —** International Atomic Time (TAI, from the French name Temps Atomique International) is a high-precision atomic coordinate time standard based on the notional passage of proper time on Earth's geoid. TAI was synchronized with Universal Time at the beginning of 1958. It is a Non leap second compensated "continuous" time.
- **TSG —** Test Signal Generator

- **VITC** — Vertical Interval Time code
- **UT1 —** Time scale based on the observation of the Earth's rotation. The magnitude of UT1-UTC is always less than 0.9s. This is accomplished through the use of leap seconds.
- **UTC —** Coordinated Universal Time is a time standard based on International Atomic Time (TAI) with leap seconds added at irregular intervals to compensate for the Earth's slowing rotation.[2] Leap seconds are used to allow UTC to closely track UT1, which is mean solar time at the Royal Observatory, Greenwich.

Controlling the VSG-4MTG/VSG-4CSD

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

The VSG-4MTG/VSG-4CSD is controlled in these ways:

- **Quick Controls**: Controls on the front panel that adjust parameters that are frequently used. See ***Panel Controls*** on page 31 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-4MTG/VSG-4CSD using the Ethernet IP address.

To directly select specific function(s)

Press the appropriate function button.

To access the function specific setup menus

Press and hold the function button; or press the SETUP button, and then use the navigation buttons to scroll through the menu selections.

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

Pressing and holding certain buttons will activate menus for additional functionality.

To leave the setup menu

Press the SETUP or EXIT button.

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.

Panel Controls

The front panel controls and web-based controls are illustrated in **Figure 3-1**. A virtual front panel is recreated when controlling the unit through web-controls.

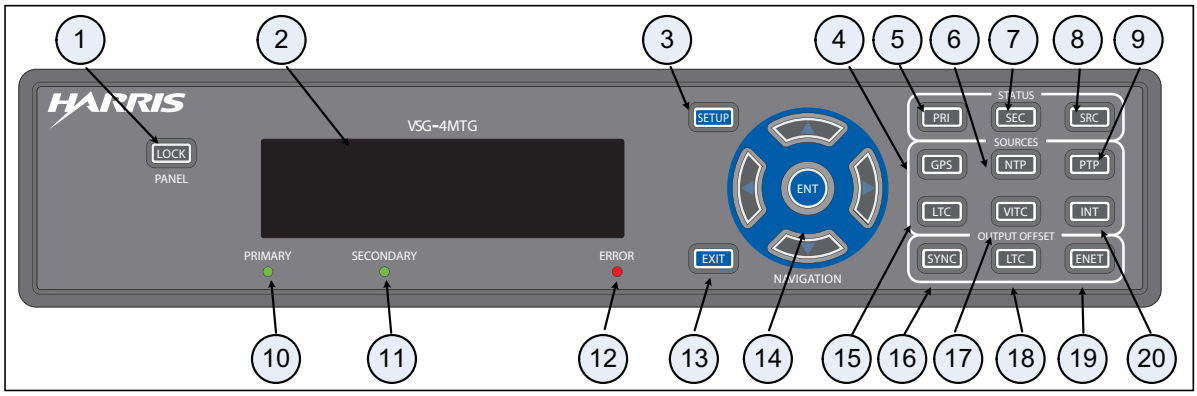

Figure 3-1 VSG-4MTG/VSG-4CSD Front Panel Controls

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 78).

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

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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.)

Table 3-1 VSG-4MTG/VSG-4CSD 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	GPS	Used to setup or check the status of the GPS input
5	PRI	Used to view and setup the primary input
6	NTP	Used to setup or check the status of the NTP operation
7	SEC	Used to view and setup the secondary input
8	SRC	Input source check function; used to check the status of the inputs
9	PTP	Used to setup or check the status of the PTP operation
10	PRIMARY (Green)	When lit, indicates that the primary time source is the currently active source used by the system
11	SECONDARY (Green)	When lit, indicates that the secondary time source is the currently active source used by the system

Table 3-1 VSG-4MTG/VSG-4CSD Front Panel Controls

Key	Label	Description
12	ERROR (Red)	When lit, indicates that an error has been detected; error details can be viewed on the Error Status display line
13	EXIT	Exit selection button; press and release to leave menu function selections
14	Navigation	Use to navigate menus and select selections options (see page 58 for an explanation of how to operate the navigation items)
15	LTC	Used to setup or check the status of the LTC input
16	SYNC	Used to setup or check the status of the SYNC output
17	VITC	Used to setup or check the status of the VITC input
18	LTC	Used to setup or check the status of the LTC output
19	ENET	Used to setup or check the status of the Ethernet outputs
20	INT	Used to setup or check the status of the Internal input

Time Display (Default Display)

This is the main display of the unit; representing time of the MTG.

The time that is being displayed (Input or Output) is menu configurable.

This display will automatically be displayed after 20 seconds of front panel inactivity.

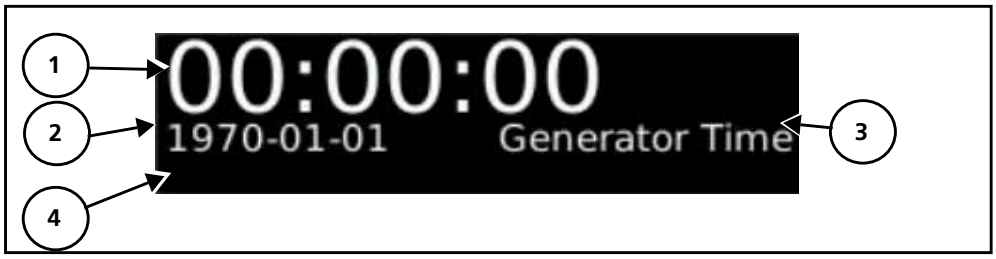


Figure 3-2 Main Status Display

Table 3-2 Main Status Display Information Descriptions

Key	Description
1	Menu selectable output time formatted as follows: ■ PTP OUT - hh:mm:ss ■ NTP OUT - hh:mm:ss ■ SYNC (1-5) - hh:mm:ss ■ LTC (1-2) - hh:mm:ss ■ Local Time - hh:mm:ss Menu selectable source time formatted as follows: ■ GPS IN - hh:mm:ss ■ PTP IN - hh:mm:ss ■ NTP IN - hh:mm:ss ■ VITC IN - hh:mm:ss ■ LTC IN - hh:mm:ss ■ Local Time - hh:mm:ss where: ■ hh is the number of complete hours that have passed since midnight ■ mm is the number of complete minutes since the start of the hour ■ ss is the number of complete seconds since the start of the minute
2	The associated date selection represented as YYYY-MM-DD where: ■ YYYY is the year ■ MM is the month ■ DD is the day of the week
3	A text string indicating which output or source time is being displayed ■ Local Time ■ GPS IN ■ NTP IN ■ PTP IN ■ LTC IN ■ VITC IN ■ PTP OUT ■ NTP OUT ■ LTC (1-2) ■ SYNC (1-5)
4	Displays the most recent error. This line is blank if no errors are detected

Operational Flow of the MTG

Control of the MTG is broken down into three groups: STATUS, INPUT SOURCES, and OUTPUT OFFSETS.

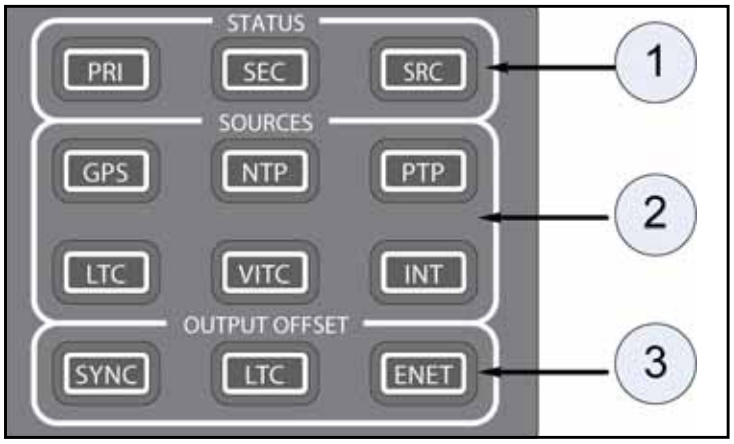


Figure 3-3 Control Button Groups

Table 3-3 Control Button Groups

Key	Description
1	Status buttons ; see ***Status Group*** on page 36
2	Sources buttons; see ***Input Sources Group*** on page 38
3	Output offset buttons; see ***Output Offset Group*** on page 44

STATUS group

Items in the Status group, when pressed, display the status of the primary sources, secondary sources, input sources, and power supplies in the front panel display window.

Table 3-4 Status Group Actions

Status Group Action	Front Panel Tally LEDs	Main Display
PRI button pressed and released	The PRI button will light at high tally	The main display will detail the primary input source status
SEC button pressed and released	The SEC button will light at high tally	The main display will detail the secondary input source status
SRC button pressed and released	The SRC button will light at high tally	An input status overview screen will be displayed

Individual displays are detailed later in this manual

SOURCES Group

The items in the Sources group are pressed, they display the state of any of the input sources in the front panel display window. Input Sources with more than one page of information can be viewed using the UP/DOWN navigation buttons.

Table 3-5 Input Sources Group

Status Group Action	Front Panel LEDs	Main Display
Press any ISG button to check the individual input status	One ISG button will be lit	The display will detail the status associated with the selected input

OUTPUT OFFSET Group

When the Output Offset group is pressed, the status of the output is displayed in the front panel display window. Outputs with more than one page of information can be viewed using the UP/DOWN navigation buttons.

Table 3-6 Output Offsets Group

Status Group Action	Front Panel LEDs	Main Display
SYNC button pressed and released	The SYNC button will light at high tally	Displays the Sync output status
LTC button pressed and released	The LTC button will light at high tally	Displays the LTC output status
ENET button pressed and released	The ENET button will light at high tally	Displays the Ethernet output status

Lock Button

The front panel lock feature is provided to secure operation of the unit, preventing accidental changes.

An auto lock feature can be enabled through the menu system invoking this feature after 30 seconds of front panel inactivity.

To Lock the VSG-4MTG/VSG-4CSD

Press the LOCK button

To Unlock the VSG-4MTG/VSG-4CSD

Press and hold the LOCK button

Status Group

Primary Input Display

The primary input display is used to indicate which input source is currently selected. When this button is pressed, the main display (as in **Figure 3-4**) will then detail information associated with this selected source.

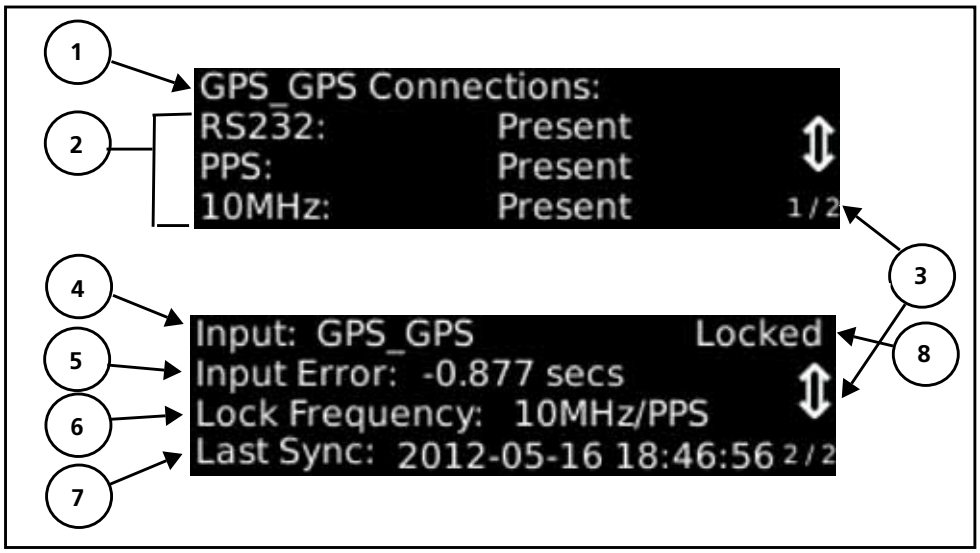


Figure 3-4 Primary Input Display With GPS_GPS Source Selected

Table 3-7 Primary Input Display Information Descriptions

Key	Description
1	Current source selection
2	List of input sources required for proper operation of the selected source
3	Page indicator (X/Y indicates current page is X of a total of Y. Up/Down arrows indicate that the Up/Down front panel navigation buttons can be used to change the current page.)
4	Current source selection
5	The internal error drift

Table 3-7 Primary Input Display Information Descriptions *(Continued)*

Key	Description
6	The lock frequency which can be one of the following: ■ Unknown ■ None ■ GPS ■ InputVideo ■ 10MHz ■ 10MHz/PPS
7	The last time the input source was synchronized
8	The lock status of the source, which can be one of the following: ■ Locked ■ Present ■ Invalid

Secondary Input Display

The secondary input display is used to indicate which input source is currently selected as the backup to the primary source. When this button is pressed, the main display (as in **Figure 3-5**) will then detail information associated with this selected source.

The secondary input display is shown in **Figure 3-5**.

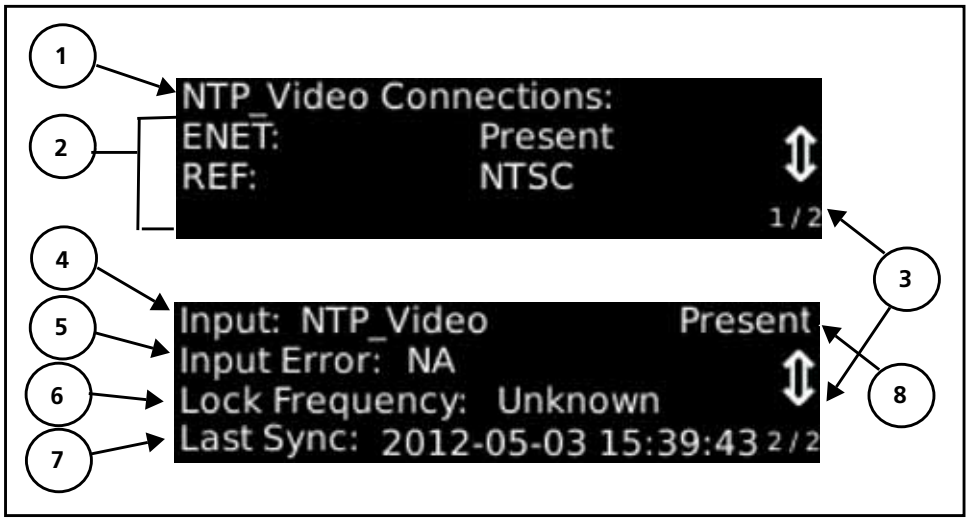


Figure 3-5 Secondary Input Display With NTP_Video Source Selected

Table 3-8 Secondary Input Display Information Descriptions

Key	Description
1	Current source selection
2	List of input sources required for proper operation of the selected source
3	Page indicator (X/Y indicates current page is X of a total of Y. Up/Down arrows indicate that the Up/Down front panel navigation buttons can be used to change the current page.)
4	Current source selection

Table 3-8 Secondary Input Display Information Descriptions *(Continued)*

Key	Description
5	The internal error drift
6	The lock frequency, which can be one of the following: ■ Unknown ■ None ■ GPS ■ InputVideo ■ 10MHz ■ 10MHz/PPS
7	The last time that the input source was synchronized
8	The lock status of the source, which can be one of the following: ■ Locked ■ Present ■ Invalid

Source Status Display

The source input function is used to check the status of all sources. Initially when this button is pressed all tally indications found in the SOURCES group will switch off. The main display will indicate a status summary screen for all inputs; selectively the user can show detailed input status by pressing any button in the ISG.

Figure 3-6 Input Source Summary Display

Directly following the name of the input source, text indicates the status of the various inputs, which can have the following options: **Present** or **Missing**. Status is also provided for the two power supplies, PS1 and PS2. A check ✓ next to the supply name indicates that the supply is good. An 'X' next to the supply name indicates the supply is either bad or not connected.

Pressing any button from the Sources group will then detail the selected input. Associated Sources Group display details can be found in later sections of this manual.

Input Sources Group

GPS Input

This button is used to detail the status of the GPS input source.

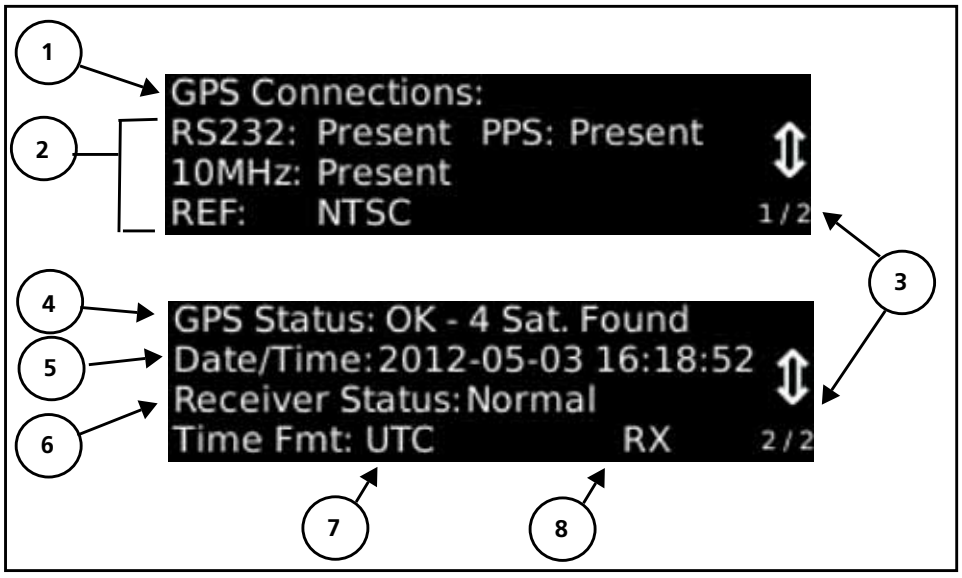


Figure 3-7 GPS Input Display

Table 3-9 GPS Input Display Information Descriptions

Key	Description
1	Title
2	List of input sources needed for selected source
3	Page indicator (X/Y indicates current page is X of a total of Y. Up/Down arrows indicates that the Up/Down front panel navigation buttons can be used to change the current page.)
4	GPS receiver status includes: ■ **OK** ■ **No GPS Time** ■ **PDOP Too High** - position dilution of precision (PDOP) is too high ■ **No Satelites** ■ **No Usable Sats.** - no usable satelites ■ **TRAIM Rejected Fix** - Timing receiver autonomous integrity monitoring (TRAIM) will disregard the satellite with the highest residual range rate
5	The received GPS date and time
6	Extended receiver status includes: ■ No Signal ■ GPS Malfunction ■ Normal ■ Power Up ■ Auto Holdover ■ Manual Holdover ■ Recovery ■ Fast Recovery ■ Discp. Disabled (disciplining mode disabled) ■ Antenna Fault

Table 3-9 GPS Input Display Information Descriptions *(Continued)*

Key	Description
7	GPS time format: ■ GPS ■ UTC
8	GPS receiver communication indicators ■ RX (indicates data is being received) ■ TX (indicates data is being transmitted)

***Note**: the receiver status for keys 4 and 6 above are part of the Trimble Standard Interface Protocol (TSIP). Contact the vendor at www.trimble.com for more information.*

NTP Input

This button is used to detail the status of the NTP input source.

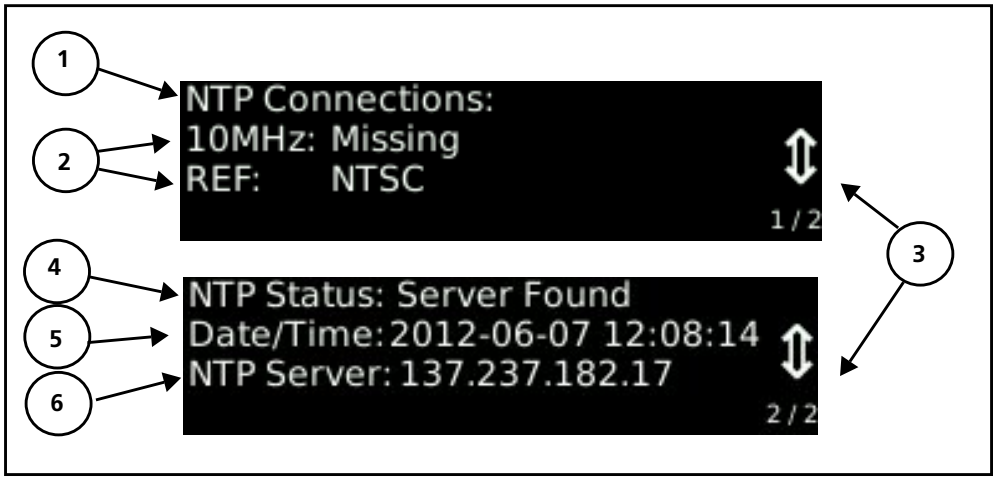


Figure 3-8 NTP Input Display

Table 3-10 NTP Input Display Information Descriptions

Key	Description
1	Title
2	List of input sources for selected source
3	Page indicator (X/Y indicates current page is X of a total of Y. Up/Down arrows indicate that the Up/Down front panel navigation buttons can be used to change the current page)
4	General NTP status indicator
5	The received NTP date and time
6	The IP address of the NTP server

PTP Input

This button is used to detail the status of the PTP input source.

Figure 3-9 PTP Input Display

Table 3-11 PTP Input Display Information Descriptions

Key	Description
1	Displays the current PTP protocol port state, which can be any of the following: ■ **Initializing**—The protocol is initializing ■ **Faulty**—The protocol is in a fault condition ■ **Disabled**—The protocol is currently disabled ■ **Listening**—The protocol is listening for other PTP devices ■ **Pre Master**—The protocol is preparing to act as a PTP Master ■ **Master**—The protocol is behaving as a PTP Master ■ **Grand Master**—The protocol is behaving as a PTP Grand Master ■ **Passive**—The protocol is currently in an idle state ■ **Uncalibrated**—The protocol is attempting to synchronize with a detected PTP Master ■ **Slave**—The protocol is synchronous with the selected PTP Master
2	The current PTP date and time

LTC Input

This button is used to detail the status of the LTC input source.

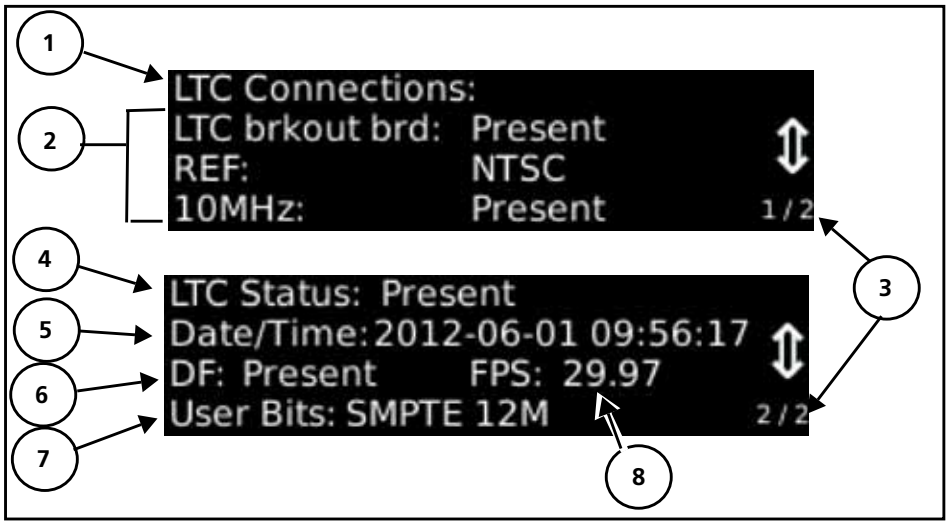


Figure 3-10 LTC Input Display

Table 3-12 LTC Input Display Information Descriptions

Key	Description
1	Title
2	List of input sources needed for selected source
3	Page indicator (X/Y indicates current page is X of a total of Y. Up/Down arrows indicates that the Up/Down front panel navigation buttons can be used to change the current page.)
4	LTC receive status indicator
5	The received LTC date and time
6	Drop Frame indicator
7	Extracted LTC user bits ■ SMPTE 12M - No date or time zone detected in source ■ SMPTE 309M - Date or time zone detected in source and date is encoded as YYMMDD ■ MJD 309M - Date and time zone detected in source and date is encoded as a modified Julian date
8	The extracted LTC frames per second

VITC Input

This button is used to detail the status of the VITC input source.

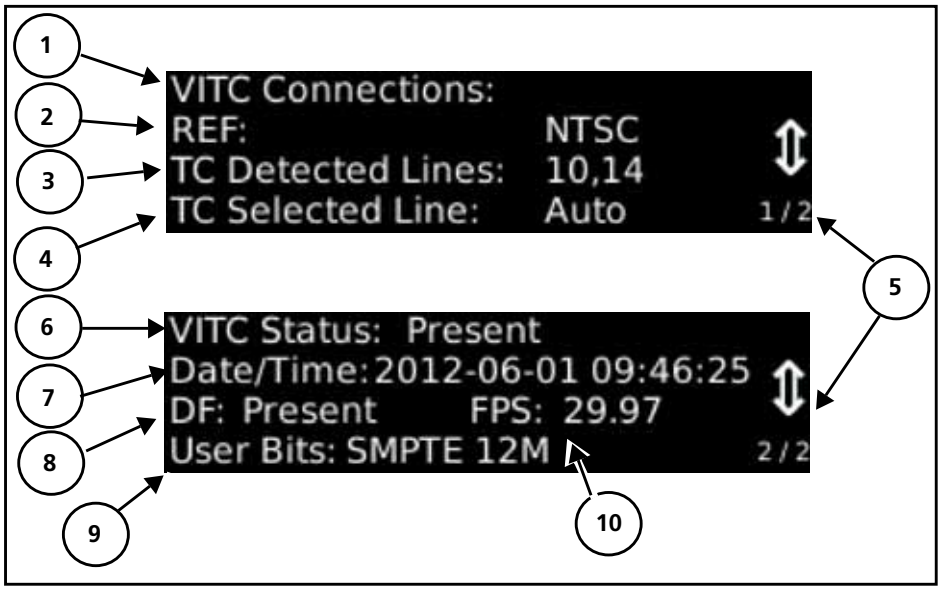


Figure 3-11 VITC Input Display

Table 3-13 VITC Input Display Information Descriptions

Key	Description
1	Title
2	REF IN detected format
3	Lines where VITC is detected
4	Timecode line selector mode
5	Page indicator (X/Y indicates current page is X of a total of Y. Up/Down arrows indicates that the Up/Down front panel navigation buttons can be used to change the current page.)
6	VITC input source status
7	Extracted VITC date and time
8	Drop Frame indicator
9	Extracted VITC user bits ■ SMPTE 12M - No date or time zone detected in source ■ SMPTE 309M - Date or time zone detected in source and date is encoded as YYMMDD ■ MJD 309M - Date and time zone detected in source and date is encoded as a modified Julian date
10	Frames per second

INT Input

This button is used to detail the status of the Internal input source.

Figure 3-12 INT Input Display

Table 3-14 INT Input Display Information Descriptions

Key	Description
1	Type of time indicated
2	The internal date and time
3	The internal time zone
4	Daylight savings time indicator

Output Offset Group

Sync Output

This button is used to detail the status of the Sync output.

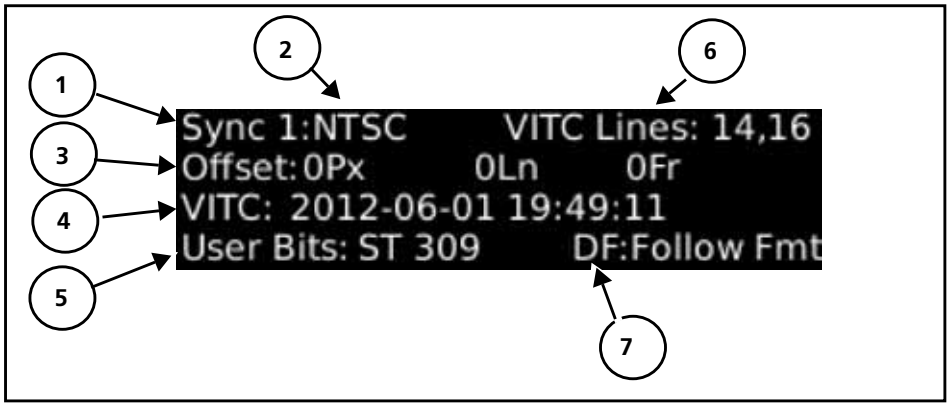


Figure 3-13 Sync Output Display

Table 3-15 Sync Output Display Information Descriptions

Key	Description
1	Sync Output number indicator (VSG-4CSD 1, VSG-4MTG 1-5)
2	Video format and frame rate

Table 3-15 Sync Output Display Information Descriptions *(Continued)*

Key	Description
3	Offset timing adjustment in pixels (Px), lines (Ln), and frames (Fr)
4	Extracted date and time
5	User bits configuration ■ ST 309 - Encode date as YYMMDD ■ ST 390_MJD - Encode date as modified Julian date ■ Source ID - Encode up to four ASCII characters in the user bit groups See **Outputs** > **Sync x** >**Time Code** > **User Bits** > **Format** where x is the sync number (VSG-4CSD 1, VSG-4MTG 1 to 5) in the ***Sync Output Timing Offset Setup Menu*** on page 66.
6	Lines where VITC is inserted
7	Drop frame configuration; options include: ■ Follow Fmt ■ Forced On ■ Forced Off See **Outputs** > **Sync x** >**Time Code** > **Drop Frame** where x is the sync number (VSG-4CSD 1, VSG-4MTG 1 to 5) in the ***Sync Output Timing Offset Setup Menu*** on page 66.

LTC Output

This button is used to detail the status of the LTC output.

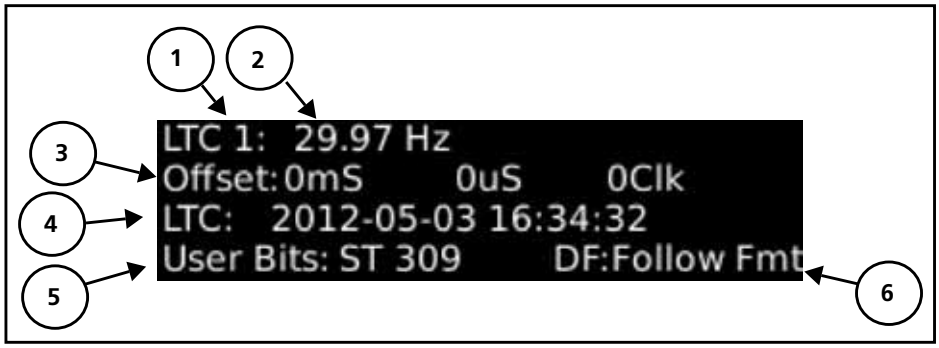


Figure 3-14 LTC Output Display

Table 3-16 LTC Output Display Information Descriptions

Key	Description
1	LTC output (1 or 2) indicator
2	Frame rate
3	Timing offset in mS, uS, and clocks

Table 3-16 LTC Output Display Information Descriptions *(Continued)*

Key	Description
4	Date and time
5	User bits configuration ■ ST 309 - Encode date as YYMMDD ■ ST 390_MJD - Encode date as modified Julian date ■ Source ID - Encode up to four ASCII characters in the user bit groups See **Outputs** > **LTC 1** (or **2**) > **Time Code** > **User Bits** > **Format** in the ***LTC Output Timing Offset Setup Menu*** on page 71.
6	Drop frame configuration; options include: ■ Follow Fmt ■ Forced On ■ Forced Off See **Outputs** > **LTC 1** (or **2**) > **Time Code** > **Drop Frame** in the ***LTC Output Timing Offset Setup Menu*** on page 71.

ENET Output

This button is used to detail the status of the Ethernet output.

Figure 3-15 Ethernet Output Display

Table 3-17 Ethernet Output Display Information Descriptions

Key	Description
1	Active state the of NTP server
2	Active state of the PTP master
3	Current output NTP/PTP time
4	IP Address of the NTP server

Theory of Operation

Time/Date and Time Base information received from an active source is translated into an internal time keeping engine (ITKE). Synchronization of multiple outputs is then achieved by converting data contained within the internal time keeping engine into various customizable output time formats. **Figure 3-16** illustrates a simplified system flow.

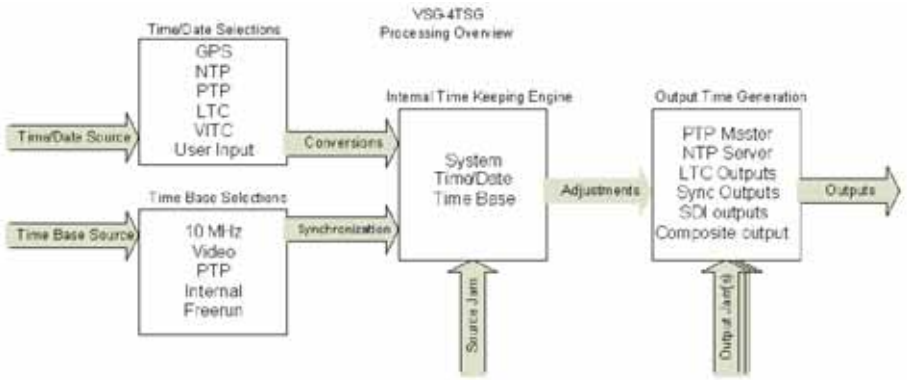


Figure 3-16 VSG-4MTG/VSG-4CSD Time Generator Inputs and Outputs Flow

Time Base Definitions

It is important to understand the relationship of the different types of time bases. These concepts will aid in the successful operation of the unit.

- **TAI Time**—International Atomic Time (TAI, from the French name Temps Atomique International) is a high-precision atomic coordinate time standard based on the notional passage of proper time on Earth's geoid. TAI was synchronized with Universal Time at the beginning of 1958. It is a Non leap second compensated "continuous" time.
- **UTC Time**—Coordinated Universal Time (UTC), formerly known as Greenwich Mean Time (GMT), is the sum of TAI time minus an integer number of leap seconds. A leap second is a positive or negative one-second adjustment to the UTC designed so that UTC remains close to mean solar time.The International Earth Rotation and Reference Systems Service (IERS) periodically announces the insertion of a leap second approximately every six months. Historical leap second adjustments can be obtained from the following url: http://maia.usno.navy.mil/ser7/tai-utc.dat.
- **GPS Time**—Global Positioning System time, is the atomic time scale implemented by the atomic clocks in the GPS ground control stations and the GPS satellites themselves. GPS time was zeroed with UTC at 0h 6-Jan-1980. It is not perturbed by leap seconds.
- **Local Time**—Local time correlates to the time and date relative to the physical unit.

VSG-4MTG/VSG-4CSD Time Inputs

The VSG-4MTG/VSG-4CSD accepts two independent types of inputs: one that provides **time and date** information and another that provides time base information.

The device can obtain time and date information from any of these input sources:

- GPS
- NTP
- PTP
- LTC
- VITC
- User Input

The device obtains time base synchronization through any of these **time base** input sources:

- 10 MHz

- Video
- PTP
- Freerun

Some of the aforementioned combinations produce erroneous results, therefore menu restrictions will be applied based upon invalid combinations. Supported combinations of time/date and time base sources are listed in **Table 3-18**.

Table 3-18 Supported Combinations of Time/Date and Time Base Source

Source		
Time Date	**Time Base**	**Configuration Notes**
GPS	10 MHz	GPS synchronous to the 10 MHz source
GPS	Video	GPS synchronous to the REF Video
GPS	Freerun	
NTP	10 MHz	NTP synchronous to the 10 MHz source
NTP	Video	NTP synchronous to the REF Video
NTP	Freerun	
PTP	PTP	Connectivity to a PTP Master device
LTC	10 MHz	LTC synchronous to the 10MHz source
LTC	Video	LTC synchronous to the REF Video
LTC	Freerun	
VITC	Video	VITC matches REF format
User Input	10 MHz	
User Input	Video	
User Input	PTP	Connectivity to a PTP Master device
User Input	Freerun	

Additionally, each reference source can be configured with an offset parameter. This offset compensates for any time zone differences between the current input and current local time.

Table 3-19 describes the format of the incoming source with offset ranges.

Table 3-19 Offset Ranges for Incoming Sources

Time / Date Source	**Possible Formats**	**Offset Available**
GPS	UTC,GPS	+/- HH:MM:SS*
NTP	UTC	+/- HH:MM:SS*
PTP	UTC	+/- HH:MM:SS*
LTC	UTC plus (Date, Timezone, DST)	+/- HH:MM:SS*
VITC	UTC plus (Date, Timezone, DST)	+/- HH:MM:SS*
User Input	UTC plus (Timezone, DST)	--

*The maximum configurable offset is +/- 23:59:59

User Configurable Local Time

If there are no valid sources connected to the device, the VSG-4MTG/VSG-4CSD will internally generate a time/date and time base.

This is the default mode of operation for the product. If defaulted or for first time use; the initial time and date will be January 1st 1970 GMT.

Through menu selections, provisions for setting the local time of the unit are provided. With no input source, local time follows the following formula:

```
Local Time = Time/Date Menu Selections + Local Time Zone Time
+ Local DST Adjustment
```

If a valid external source is in use by the system, then local time becomes:

```
Local Time = Adjusted External Source Time/Date + Local Time
Zone Time + Local DST Adjustment
```

Source Detection and Failover

Periodic communications will occur between the VSG-4MTG/VSG-4CSD and all potential source devices. The rate at which this exchange occurs, will vary based upon the capabilities of the individual device. Individual device status can be viewed at anytime through front panel button sequences. If the device is assigned as either the primary or secondary source, then it's data will propagate through the system as determined through the configuration menus. A failover condition from the locked source will occur based upon the following rules:

Table 3-20 Failover conditions From Locked Sources

Failover Sense	System Reaction	Notes
Time Base Loss	Failover to backup source after 1 second of signal interruption	Potential output glitch will occur
Time or Date Loss	Failover @ scheduled source jam time	

If the time, date, or time base reference source is missing from the primary input source, the VSG-4MTG/VSG-4CSD switches to the secondary input source. If the secondary source also fails, the VSG-4MTG/VSG-4CSD will failover to the Freerun source.

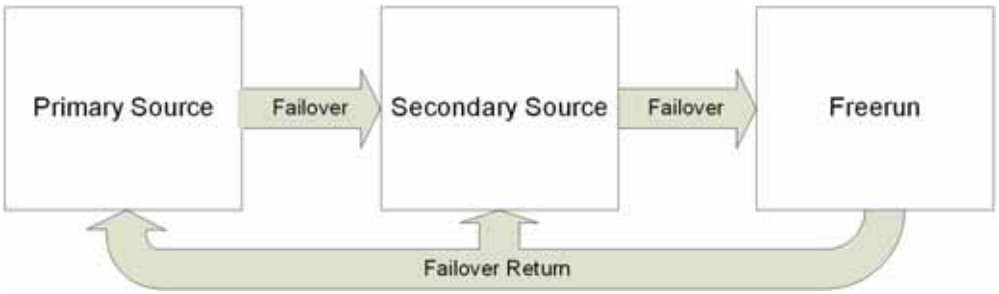


Figure 3-17 Failover Sequence of Events

Note: Any change in the VSG-4MTG/VSG-4CSD time may cause a disruption in the output time.

Failover Return

When reference is recovered from the failed source, the VSG-4MTG/VSG-4CSD automatically switches back to the highest available input source. This feature can be disabled through the menu system in which case the user must manually force the switch.

Source-To-Internal Time Keeping Engine Synchronization

Table 3-21 details the conditions when the ITKE is updated:

Table 3-21 Conditions when Source-To-Internal TimeKeeping is Updated

Source Jam Conditions	Notes	Outputs Affected
Power-up	On power up, the system is synchronized	Yes
Now	User forces synchronization	Depends on output menu*
Schedule		
Daily	Force update once a day	Depends on output menu*
Weekly	Force update once a week	Depends on output menu*
Monthly	Force update once a month	Depends on output menu*
User changes local time	Internal time in use as the source and then the user changes data	Yes
Input Failover	Reaction is based upon the Jam Schedule	Per Schedule

* A menu selection is provided to Jam the outputs after a source Jam occurs this is the default configuration of the unit.

Internal Time Keeping

The VSG-4MTG/VSG-4CSD maintains International Atomic Time (TAI) as the principal time base. Since input time sources can have different time bases, including local time and Coordinated Universal Time (UTC), the VSG-4MTG/VSG-4CSD must convert the incoming time information into TAI time.

On loss of external time base the unit will internally generate the time base.

VSG-4MTG/VSG-4CSD Time Outputs

Once the internal time base has been established, the VSG-4MTG/VSG-4CSD converts this time information to a corresponding UTC or local time and sends it to the outputs. These outputs include the following:

- PTP Master
- NTP Server
- Two Linear Time Code (LTC) outputs
- Black burst video outputs can be configured to include Vertical Interval Time Code (VITC)

Separate times are maintained for each output. This time is periodically synchronized with the ITKE. Variations between the ITKE time and the output times are managed this way to limit disruptions in continuous LTC outputs or black burst video output signals.

Table 3-22 details the conditions when the outputs are updated:

Table 3-22 Conditions when Outputs are Updated

Output(s) Jam Conditions	Notes
Power-up	On power up, the system is synchronized
Now or Follow Source Jam	User forces output synchronization
Schedule	
Daily	Force update once a day
Weekly	Force update once a week
Monthly	Force update once a month
Menu Modifications	
Time Change (DST, Offsets)	Applied at based upon Jam Schedule
Video Format (DF,Frame Rate)	Immediately
Video Delays (Line, Pixel/Sub Pixel, Frame)	Immediately

Output Rules

1. Timebase and timedate management is independent. Changing one will not cause an output change to the other. Jam will be timedate only.
2. Output will experience a disruption when timebase changes are made. This includes:
   - Source Offsets
   - Output Timing Offsets
   - Timebase changes
   - Output Format Change

Table 3-23 describes the format of the outputs with offset ranges.

Table 3-23 Outputs with Associated Offset Ranges

Time / Date Source	Possible Formats	Offset Available
Local Time	IKTE plus (Timezone, DST)	--
NTP	IKTE converted to UTC (GMT)	--
PTP	IKTE converted to UTC (GMT)	--
LTC	IKTE plus (Date, Timezone, DST)	+/- HH:MM:SS*
VITC	IKTE plus (Date, Timezone, DST)	+/- HH:MM:SS*

*The maximum configurable offset is +/- 23:59:59.

Local Time Display

The following formula is used in generating local time:

```
Local Time = ITKE + ITKE Global Offset + Local Time Zone Time
+ Local DST Adjustment
```

Configuring NTP Output Time

The following formula is used to calculate the output time:

```
NTP Output time = ITKE + ITKE Global Offset - Converted to UTC
(GMT)
```

Configuring PTP Output Time

The following formula is used to calculate the output time:

```
PTP Output time = ITKE + ITKE Global Offset - Converted to UTC
(GMT)
```

Configuring LTC Output Time

The following formula is used to calculate the output time:

```
LTC Output time = ITKE + ITKE Global Offset + LTC Time Zone +
LTC Output Offset + LTC DST Adjustment
```

Menu selections exist to control the content of the LTC packet. See **Table 4-7** on page 62.

Configuring VITC Output Time

The following formula is used to calculate the output time:

```
VITC Output time = ITKE + ITKE Global Offset + VITC Time Zone
+ VITC Output Offset + VITC DST Adjustment
```

Menu selections exist to control the content of the VITC packet. See **Table 4-7** on page 62.

4 Setup Menu Functions

The setup position navigation buttons are described in **Table 4-2**. See **Figure 3-1** on page 31 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.

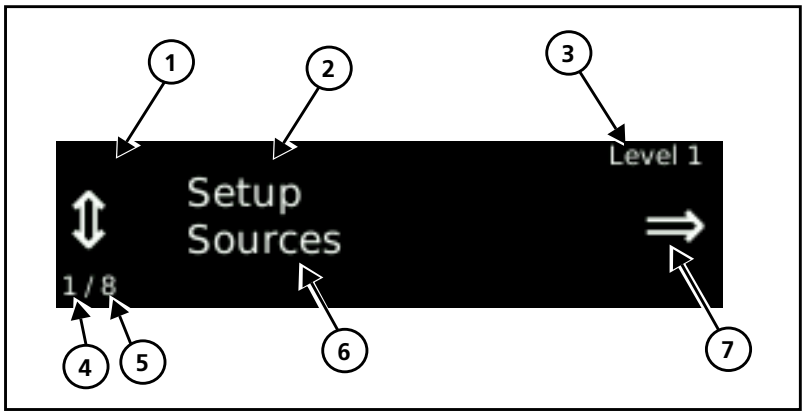


Figure 4-1 Setup Display

Table 4-1 Setup Menu Details

Key	Description
1	Up/Down directional marker ? (controlled by the Up/ Down 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 (controlled by the Left/ Right navigation buttons)

Table 4-2 Setup Button Functions

Button	Function
	Press to move up one menu level. Exit can also be used to exit some menus without making any changes.
	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 4-3** with their corresponding Table and Description location pages.

Table 4-3 Setup Menu Tables

Selection	Page
Sources	Page 55
Default Time display	Page 59
Time Processing	Page 60
Outputs	Page 62
GPIO	Page 73
Alarms	Page 75

Table 4-3 Setup Menu Tables *(Continued)*

Selection	Page
Unit Configuration	Page 78
About	Page 82
Timing Offset Setup Menu	Page 64

Sources

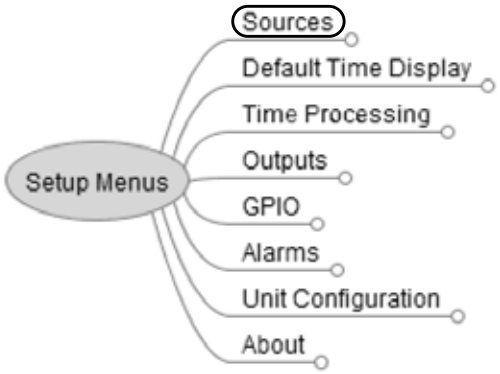


Table 4-4 Sources Setup Menu Parameters

Parameter Name	Description	Selection
Primary Source **Note:** PTP cannot be selected if the the unit is configured to a PTP Master. See page 62.	Selects the primary source; see ***Source Detection and Failover*** on page 49 for details.	■ UserInput_Freerun * ■ UserInput_PTP ■ UserInput_Video ■ UserInput_10 MHz ■ VITC_Video ■ LTC_Freerun ■ LTC_Video ■ LTC_10 MHz ■ PTP_PTP ■ NTP_Freerun ■ NTP_Video ■ NTP_10 MHz ■ GPS_Freerun ■ GPS_Video ■ GPS_GPS
Secondary Source **Note:** PTP cannot be selected if the the unit is configured to a PTP Master. See page 62.	Selects the secondary source; see ***Source Detection and Failover*** on page 49 for details.	■ UserInput_Freerun * ■ UserInput_PTP ■ UserInput_Video ■ UserInput_10 MHz ■ VITC_Video ■ LTC_Freerun ■ LTC_Video ■ LTC_10 MHz ■ PTP_PTP ■ NTP_Freerun ■ NTP_Video ■ NTP_10 MHz ■ GPS_Freerun ■ GPS_Video ■ GPS_GPS

Table 4-4 Sources Setup Menu Parameters *(Continued)*

Parameter Name	Description	Selection
Phase Offsets		
Phase Offsets		
Primary		
Video Timebase	Provides an offset for video timebase of the primary source	Menu Dialog ■ Pixels ■ Lines ■ Frames
Other Timebase	Provides an offset for non-video timebases of the primary source	Menu Dialog (uS)
Secondary		
Video Timebase	Provides an offset for video timebase of the secondary source	Menu Dialog ■ Pixels ■ Lines ■ Frames
Other Timebase	Provides an offset for non-video timebases of the secondary source	Menu Dialog (uS)
Failover Return	Determines whether the source failover will switch back to the original source if it becomes available after failing over; see ***Source Detection and Failover*** on page 49 for details	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is enabled.
Source Jam		
Schedule Select	The repetition rate that the Jam occurs	■ Daily Schedule ■ Weekly Schedule ■ Monthly Schedule *
Schedule Setup	Repeats the jam once per cycle (once per day, week, or month)	■ Daily Schedule (HH:MM:SS) ■ Weekly Schedule [Week Day] HH:MM:SS ■ Monthly Schedule [Day of Month] HH:MM:SS
Apply Now	Forces the system to immediately sync to the input source	When this menu is opened, a warning if given indicating that if ENT is pressed, the change is applied immediately. Default is disabled.
GPS Config		
Device	The selected GPS device	■ GPS-3903 ■ GPS-3904*

Table 4-4 Sources Setup Menu Parameters *(Continued)*

Parameter Name	Description	Selection
Offset	The offset applied to the received GPS date and time	+/-HH:MM:SS
Offset Enable	Enables the GPS offset feature	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is disabled.
NTP Client Config		
IP Address	The IP address of the primary NTP server	[X]XX.XXX.XXX.XXX The up/down navigation keys increase or decrease the digit in brackets. The left/right navigation keys move the brackets one digit to the left or right.
Alternate IP Address	An alternate address of the NTP server	[X]XX.XXX.XXX.XXX The up/down navigation keys increase or decrease the digit in brackets. The left/right navigation keys move the brackets one digit to the left or right.
Offset	The offset applied to the received NTP date and time	+/-HH:MM:SS
Offset Enable	Enables the NTP offset feature	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is disabled.
PTP		
Offset	The offset applied to the received PTP date and time	+/-HH:MM:SS
Offset Enable	Enables the PTP offset feature	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is disabled.
LTC Config		
Offset	The offset applied to the received LTC date and time	+/-HH:MM:SS
Offset Enable	Enables the LTC offset feature	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is disabled.
LTC Read Date	Determines if the date should be read from the LTC data	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is disabled.
LTC Read Timezone	Determines if the time zone information should be read from the LTC data	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is disabled.

Table 4-4 Sources Setup Menu Parameters *(Continued)*

Parameter Name	Description	Selection
VITC Config		
Offset	The offset applied to the received VITC date and time	+/-HH:MM:SS
Offset Enable	Enables the VITC offset feature	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is disabled.
VITC Line Position	Determines which video horizontal line from which to extract VITC data.	6 - 40 Auto* (automatically determines the first horizontal video line in which VITC is detected)
VITC Read Date	Determines if the date should be read from the VITC data	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is disabled.
VITC Read Timezone	Determines if the time zone information should be read from the VITC data	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is disabled.

Default Time Display

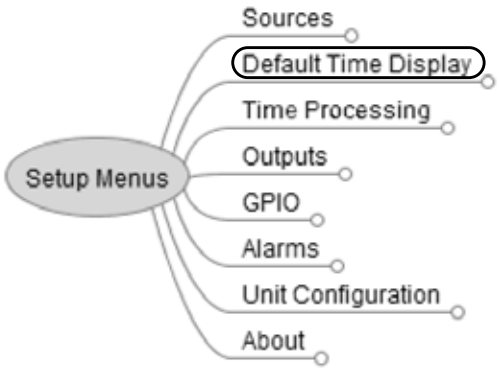


Table 4-5 Default Time Display Setup Menu Parameters

Parameter Name	Description	Selection
Default Time Display	Determines the time/ date source displayed by the main time display.	■ SYNC_5 (VSG-4MTG only) ■ SYNC_4 (VSG-4MTG only) ■ SYNC_3 (VSG-4MTG only) ■ SYNC_2 (VSG-4MTG only) ■ SYNC_1 ■ LTC_2 ■ LTC_1 ■ NTP OUT ■ PTP OUT ■ VITC IN ■ LTC IN ■ PTP IN ■ NTP IN ■ GPS IN ■ Local Time*

Time Processing

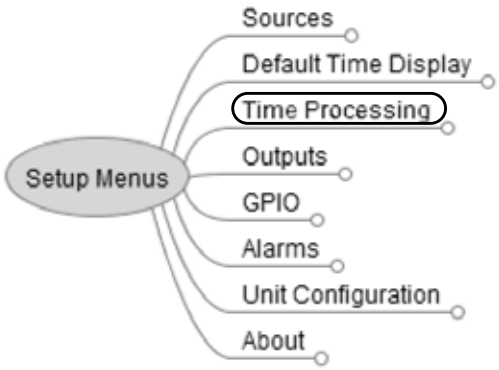


Table 4-6 Default Time Display Setup Menu Parameters

Parameter Name	Description	Selection
Leap Second Control	See ***Leap Second Control*** on page 60 for more information.	■ Add Leap Sec ■ Delete Leap Sec
Internal Control		
Internal Offset	Determines by how much to offset the internal time. See ***Source-To-Internal Time Keeping Engine Synchronization*** on page 50 for more details	+/-HH:MM:SS
Apply Now	Immediately applies the Internal Offset to the local time	When this menu is opened, a warning indicates that if ENT is pressed, the change is applied immediately.

Leap Second Control

A leap second entry consists of three selectable fields: YYYY, MMMDD, and sD. YYYY is the year, MMMDD is the month and day of the month (only four selections are available: Mar31, Jun30, Sep30, and Dec31), and sD is the sign (- or +) and delta (0 or 1) of the leap second to be added.

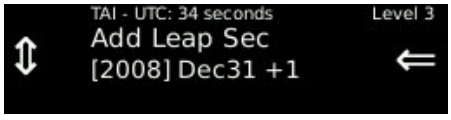


Figure 4-2 Add Leap Second When First Opened

Use the right and left Navigation buttons to select the field to be changed. The selected field is shown with brackets around it. Use the up and down Navigation buttons to change the value of the selected field. Press the ENT button to save the displayed leap second.

The entry shown when first opening the Add Leap Sec menu is the last entry added or, if no entries have been added, the last entry of the factory supplied entries. Only dates greater than the most recent entry can be added.

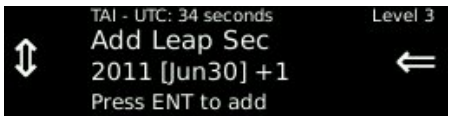


Figure 4-3 Add Leap Sec menu After Changes Have Been Made

Delete Leap Sec displays the most recent leap second added in YYYY MMMDD sD format (see Add Leap Sec) or, if no entries have been added, "NO USER ENTRIES" is displayed.

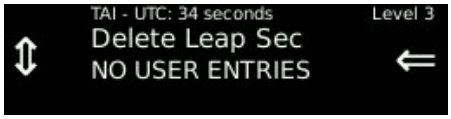


Figure 4-4 Delete Leap Sec Menu with no User Entries

Only the most recent leap second can be deleted. Once deleted, the next most recent leap second is displayed.

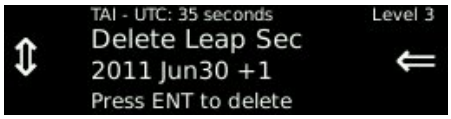


Figure 4-5 Delete Leap Second with one or more Entries

For reference, the top line of the opened menu the total number of offset seconds (TAI -UTC) for the currently selected entry.

Outputs

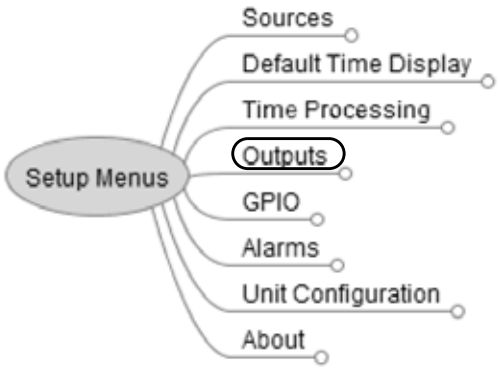


Table 4-7 Output Parameters

Parameter Name	Description	Selection
PTP Master **Note:** If either the Primary or Secondary Source is configured for PTP, PTP Master will be disallowed.	Configures the unit to act as a PTP master device	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is disabled.
NTP Server	Configures the unit to act as a NTP server @ the IP address of the unit	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is disabled.
Global / Sync 1 Config	Sync 1 output configuration menus. On the VSG-4MTG only, can also be used as a global control of the the SYNC 2 through 5 settings when **Apply To Syncs 1-5** is enabled.	
Apply To Syncs 1-5	When enabled, all sync outputs will use the Sync 1 setup parameters (VSG-4MTG only)	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is disabled.
Format	Video output format selections	Follow Ext. Ref (Default)
Video Format	The selected output Video Format	■ 1080p ■ 1080psF ■ 1080i* ■ 720p ■ PAL ■ NTSC

Table 4-7 Output Parameters *(Continued)*

Parameter Name				Description	Selection
		Frame Rate		Video Frame rate selections	
			1080p	1080p frame rate selections	■ 60 ■ 59.94* ■ 50 ■ 30 ■ 29.97 ■ 25 ■ 24 ■ 23.98.
			1080psF	1080psF frame rate selections	■ 30sF ■ 29.97sF* ■ 25sF ■ 24sF ■ 23.98sF
			1080i	1080i frame rate selections	■ 60 ■ 59.94 * ■ 50
			720p	720p frame rate selections	■ 60 ■ 59.94 * ■ 50 ■ 30 ■ 29.97 ■ 24 ■ 23.98
			PAL	PAL frame rate	■ 50* ■ 24 ■ 23.98
			NTSC	NTSC frame rate	The only option is 59.94.
		Follow Ext. Ref		The sync outputs will follow the external reference format	
	Timing Offset			Timing adjustment dialog	See ***Sync Output Timing Offset Setup Menu*** on page 64 for details.

Sync Output Timing Offset Setup Menu

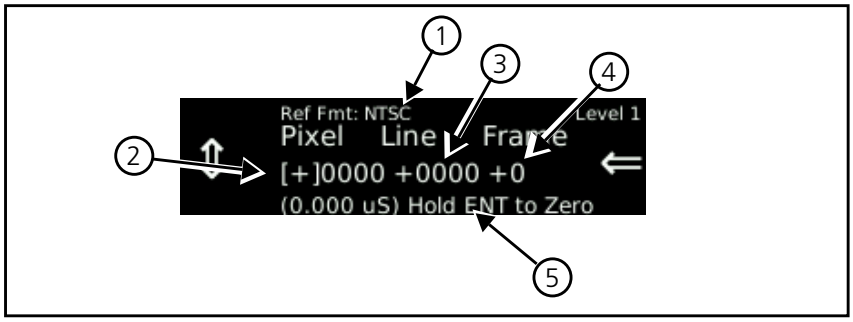


Figure 4-6 Sync Output Timing Offset Setup Menu Display

Table 4-8 Sync Output Timing Offset Setup Menu 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.*

Table 4-7 Output Parameters *(Continued)*

Parameter Name			Description	Selection
	Jam Sync		The time when the output and internal times or the unit are re-aligned	
		Enable	The enable for Jam Sync feature	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled.
		Follow Source Jam	Causes the LTC output to Jam when a source Jam occurs.	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled.
		Schedule Select	The repetition rate that the Jam occurs	■ Daily Schedule ■ Weekly Schedule ■ Monthly Schedule*

Table 4-7 Output Parameters *(Continued)*

Parameter Name			Description	Selection
		Schedule Setup	Repeats the jam once per cycle (once per day, week, or month)	■ Daily Schedule (HH:MM:SS) ■ Weekly Schedule [Week Day] HH:MM:SS ■ Monthly Schedule [Day of Month] HH:MM:SS
		Apply Now	Forces the system to immediately Jam the output time code	When this menu is opened, a warning is given indicating that if the ENT key is pressed, the change is applied immediately.
	Time Zone		Determines the time zone to be applied to the SYNC output. This is the offset in hours and minutes (hh:mm) from UTC (Coordinated Universal Time).	■ Follow Local * (applies the local time zone selection, see the Local Time Zone parameter under Unit Configuration, Local Time) ■ UTC ■ UTC -00:30 ■ UTC -01:00 ■ UTC -01:30 ■ UTC -02:00 ■ UTC -02:30 ■ UTC -03:00 ■ UTC -03:30 ■ UTC -04:00 ■ UTC -04:30 ■ UTC -05:00 ■ UTC -05:30 ■ UTC -06:00 ■ UTC -06:30 ■ UTC -07:00 ■ UTC -07:30 ■ UTC -08:00 ■ UTC -08:30 ■ UTC -09:00 ■ UTC -09:30 ■ UTC -10:00 ■ UTC -10:30 ■ UTC -11:00 ■ UTC -11:30 ■ UTC -12:00 ■ UTC +13:00 ■ UTC +12:45 ■ UTC +12:00 ■ UTC +11:30 ■ UTC +11:00 ■ UTC +10:30 ■ UTC +10:00 ■ UTC +09:30 ■ UTC +09:00 ■ UTC +08:30 ■ UTC +08:00 ■ UTC +07:30 ■ UTC +07:00 ■ UTC +06:30 ■ UTC +06:00 ■ UTC +05:30 ■ UTC +05:00 ■ UTC +04:30 ■ UTC +04:00 ■ UTC +03:30 ■ UTC +03:00 ■ UTC +02:30 ■ UTC +02:00 ■ UTC +01:30 ■ UTC +01:00 ■ UTC +00:30

Table 4-7 Output Parameters *(Continued)*

Parameter Name	Description	Selection
Time Offset		
Offset	Applies a fixed offset to the VITC time code output	+/-HH:MM:SS
Offset Enable	Enables the VITC "offset" feature	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled.
Apply Now	Forces the system to immediately apply the time offset	When this menu is opened, a warning is given indicating that if the ENT key is pressed, the change is applied immediately.
Time Code		
Drop Frame	For NTSC only, determines whether the drop frame flag is present in the time code output.	■ Force Off ■ Force On ■ Follow Format (Uses the REF IN format to determine if the drop frame bit is set in the embedded VITC of the SYNC output. Drop frame is set to ON if the REF IN format is NTSC.)
User Bits	Determines the content of the output time code User Bits (also known as User Binary Groups).	
Format		■ ST 309 (SMPTE 309 YYMMDD format) ■ ST 309_MJD (SMPTE 309 modified Julian date format) ■ Source ID (4 ASCII characters)
Source ID		4 ASCII characters (default is "USER"). The four characters are encoded into the user binary groups 1 through 8. Each ASCII character represents two user groups where the first character (left most) are binary groups 1 and 2 and the fourth character (right most) are binary groups 7 and 8.
VITC Enable	When enabled, causes VITC to be encoded into the assocated SYNC output.	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled.
VITC Line 1	When VITC is enabled, determines the line 1 horizontal video position VITC will be encoded into in the associated SYNC output.	6 - 30 (Default is 14) If the SYNC output format is NTSC, 10 will be the lowest value applied even though the parameter can go lower.

Table 4-7 Output Parameters *(Continued)*

Parameter Name	Description	Selection
VITC Line 2	When VITC is enabled, determines the line 2 horizontal video position VITC will be encoded into in the associated SYNC output.	6 - 30 (Default is 16) If the SYNC output format is NTSC, 10 will be the lowest value applied even though the parameter can go lower.
DST Control		
DST Enabled	When enabled, determines whether the Day Light Savings time offset is applied to the embedded VITC time code as specified in the On/Off time rules.	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled.
DST On Time/Rule	Determines the start of Day Light Savings time.	[1st] Mon Jan 00:00:00* Use the left/right navigation keys to move the brackets one field to the left or right. Use the up/down navigation keys to increment or decrement the field in brackets. Use the ENT key to save the current settings. Use the EXIT key to close the menu without making any changes.
DST Off Time/Rule	Determines the end of Day Light Savings time.	[1st] Mon Jan 00:00:00* Use the left/right navigation keys to move the brackets one field to the left or right. Use the up/down navigation keys to increment or decrement the field in brackets. Use the ENT key to save the current settings. Use the EXIT key to close the menu without making any changes.
10 Field Enable	Causes 10 field to be encoded in the output at line 15	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled.
Sync 2 Config	Sync 2 Config (VSG-4MTG only)	See "Global/Sync 1 Config" for details
Sync 3 Config	Sync 3 Config (VSG-4MTG only)	See "Global/Sync 1 Config" for details
Sync 4 Config	Sync 4 Config (VSG-4MTG only)	See "Global/Sync 1 Config" for details

Table 4-7 Output Parameters *(Continued)*

Parameter Name		Description	Selection
Sync 5 Config		Sync 5 Config (VSG-4MTG only)	See "Global/Sync 1 Config" for details
LTC 1			
	Apply to LTC 2	If enabled, LTC 1 settings will be applied to LTC 2.	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled.
	Frame Rate	Determines the LTC output frame rate. Use the "Lock to Sync" selections to set the LTC frame rate to that of the SYNC output.	■ Lock to Sync 5 (VSG-4MTG only) ■ Lock to Sync 4 (VSG-4MTG only) ■ Lock to Sync 3 (VSG-4MTG only) ■ Lock to Sync 2 (VSG-4MTG only) ■ Lock to Sync 1* ■ 30 Hz ■ 29.97 Hz ■ 25 Hz ■ 24 Hz ■ 23.98 Hz
	Timing Offset	Determines the offset to apply to the LTC output.	See ***LTC Output Timing Offset Setup Menu*** on page 68 for details.

LTC Output Timing Offset Setup Menu

The LTC output timing offset setting consists of four fields that are combined into the timing offset applied to the LTC output: sign, millisecond, microsecond, and clocks (based on the internal hardware).

Use the left/right navigation keys to move the brackets to the desired field.

Use the up/down navigation keys to increment or decrement the bracketed field.

Press and release the ENT key to apply the timing offset. Press and hold the ENT key to set the timing offset to 0.

To apply a negative offset, the sign field must be changed to a "-", selecting a digit and trying to go below 0 will not work.

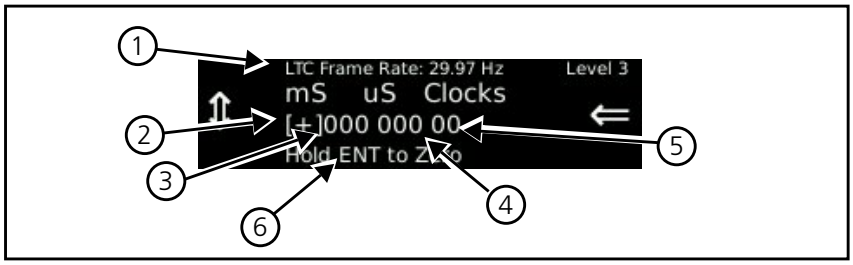


Figure 4-7 LTC Output Timing Offset Setup Menu Display

Table 4-9 LTC Output Timing Offset Setup Menu Information Descriptions

Key	Description
1	Indicates the curent LTC output frame rate
2	Sign field, + or -. Determines the sign of offset.
3	Determines the millisecond component of the offset. Range 0 to 999.
4	Determines the microsecond component of the offset. Range 0 to 999.
5	Determines the number of clock ticks component of the offset. Range 0 to 26.
6	Hold ENT to set offset value to 0.

Table 4-7 Output Parameters *(Continued)*

Parameter Name			Description	Selection
	Jam Sync			
		Enable	When enabled, causes an output Jam to occur based on the other Jam Sync settings.	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled.
		Follow Source Jam	Causes the LTC output to Jam when a source Jam occurs.	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled.
		Schedule Select	Determines the type of schedule	■ Daily Schedule ■ Weekly Schedule ■ Monthly Schedule *
		Schedule Setup	Repeats the jam once per cycle (once per day, week, or month)	■ Daily Schedule (HH:MM:SS) ■ Weekly Schedule [Week Day] HH:MM:SS ■ Monthly Schedule [Day of Month] HH:MM:SS
		Apply Now	Forces the system to immediately sync to the input source	When this menu is opened, a warning is given indicating that if the ENT key is pressed, the change is applied immediately.

Table 4-7 Output Parameters *(Continued)*

Parameter Name	Description	Selection
Time Offset		
Offset	The offset applied to the LTC output date and time	+/-HH:MM:SS
Offset Enable	Enables the LTC output "offset" feature	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is disabled.
Apply Now	Forces the system to immediately apply the time offset to the SYNC output.	When this menu is opened, a warning is given indicating that if the ENT key is pressed, the change is applied immediately.
Time Zone	Determines the time zone applied to the LTC output. This is the offset in hours and minutes (hh:mm) from UTC (Coordinated Universal Time).	■ Follow Local * Uses the time zone offset set for the local time. ■ UTC ■ UTC -00:30 ■ UTC -01:00 ■ UTC -01:30 ■ UTC -02:00 ■ UTC -02:30 ■ UTC -03:00 ■ UTC -03:30 ■ UTC -04:00 ■ UTC -04:30 ■ UTC -05:00 ■ UTC -05:30 ■ UTC -06:00 ■ UTC -06:30 ■ UTC -07:00 ■ UTC -07:30 ■ UTC -08:00 ■ UTC -08:30 ■ UTC -09:00 ■ UTC -09:30 ■ UTC -10:00 ■ UTC -10:30 ■ UTC -11:00 ■ UTC -11:30 ■ UTC -12:00 ■ UTC +13:00 ■ UTC +12:45 ■ UTC +12:00 ■ UTC +11:30 ■ UTC +11:00 ■ UTC +10:30 ■ UTC +10:00 ■ UTC +09:30 ■ UTC +09:00 ■ UTC +08:30 ■ UTC +08:00 ■ UTC +07:30 ■ UTC +07:00 ■ UTC +06:30 ■ UTC +06:00 ■ UTC +05:30 ■ UTC +05:00 ■ UTC +04:30 ■ UTC +04:00 ■ UTC +03:30 ■ UTC +03:00 ■ UTC +02:30 ■ UTC +02:00 ■ UTC +01:30 ■ UTC +01:00 ■ UTC +00:30

Table 4-7 Output Parameters *(Continued)*

Parameter Name	Description	Selection
Time Code		
Drop Frame	For NTSC only, determines whether the drop frame flag is present in the time code output.	■ Force Off ■ Force On ■ Follow Fmt* (Uses the REF IN format to determine if the drop frame bit is set in the embedded VITC of the SYNC output. Drop frame is set if REF IN format is NTSC.)
User Bits		
Format	Determines the content of the output time code User Bits (also known as User Binary Groups).	■ ST 309 (SMPTE 309 YYMMDD format ■ ST 309_MJD (SMPTE 309 modified Julian date format) ■ Source ID (use the Source ID menu below to enter the ASCII characters)
Source ID	4 ASCII characters (default is "USER"). The four characters are encoded into the user binary groups 1 through 8. Each ASCII character represents two user groups where the first character (left most) are binary groups 1 and 2 and the fourth character (right most) are binary groups 7 and 8.	ASCII 4 characters
Color Frame		Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is disabled.
DST Control		
DST Enabled	When enabled, determines whether the Day Light Savings time offset is applied to the LTC output time as specified in the On/Off time rules.	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is disabled.

Table 4-7 Output Parameters *(Continued)*

Parameter Name			Description	Selection
		DST On Time/Rule	Determines the start of Day Light Savings time.	[1st] Mon Jan 00:00:00* Use the left/right navigation keys to move the brackets one field to the left or right. Use the up/down navigation keys to increment or decrement the field in brackets. Use the ENT key to save the current settings. Use the EXIT key to close the menu without making any changes.
		DST Off Time/Rule	Determines the end of Day Light Savings time.	[1st] Mon Jan 00:00:00* Use the left/right navigation keys to move the brackets one field to the left or right. Use the up/down navigation keys to increment or decrement the field in brackets. Use the ENT key to save the current settings. Use the EXIT key to close the menu without making any changes.
LTC 2			LTC 2 Config	See LTC 1 for details
Dars Enable			Enables the Dars output capabilities of the unit instead of the word clock	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is disabled.

GPIO

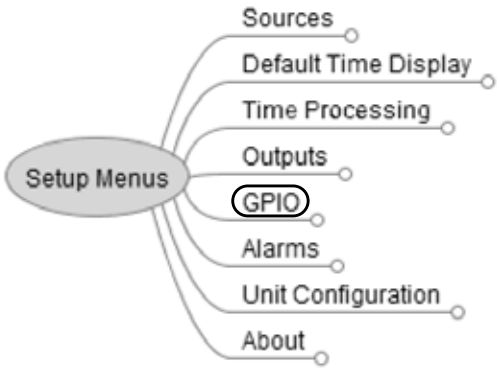


Table 4-10 GPIO Setup Menu Parameters

Parameter Name	Description	Selection
GPI 1	Configuration for the channel 1 GPI	■ VSX Change ■ Source Jam Now ■ No Action*
GPI 2	Configuration for the channel 2 GPI	■ VSX Change ■ Source Jam Now ■ No Action*

Table 4-10 GPIO Setup Menu Parameters

Parameter Name	Description	Selection	
GPO 1	Configuration for the channel 1 GPO	■ Off ■ VSX Reset ■ Enabled Alarms ■ Loss of PS2 ■ Loss of PS1 ■ VITC Frozen ■ VITC Line Mismatch ■ Loss of VITC ■ LTC Frozen ■ Loss of LTC	■ Loss of ENET ■ Loss of PTP ■ Loss of NTP ■ Loss of GPS ■ Loss of Reference ■ Source Freq Lock ■ Source Time Lock ■ Loss of Secondary Source ■ Loss of Primary Source *
GPO 2	Configuration for the channel 2 GPO	■ Off ■ VSX Reset ■ Enabled Alarms ■ Loss of PS2 ■ Loss of PS1 ■ VITC Frozen ■ VITC Line Mismatch ■ Loss of VITC ■ LTC Frozen ■ Loss of LTC	■ Loss of ENET ■ Loss of PTP ■ Loss of NTP ■ Loss of GPS ■ Loss of Reference ■ Source Freq Lock ■ Source Time Lock ■ Loss of Secondary Source ■ Loss of Primary Source *
Output Polarity	Configures the polarity of the GPO contact	■ Normally Closed ■ Normally Open*	

Alarms

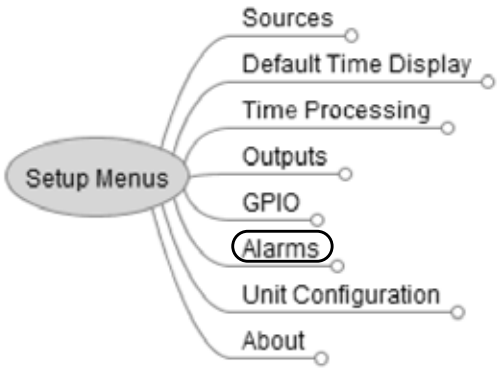


Table 4-11 Alarms List

Parameter Name	Description	Selection	Option Description	Option Settings
Loss of Primary Source	Indicates that the system is no longer receiving data from the primary source	Enable	Alarm enable	■ Unchecked(Off) ■ Checked (On)
		Duration	Period of time that the alarm condition must exist prior to the system indicating the alarm	0 to 60 seconds (2 seconds*)
Loss of Secondary Source	Indicates that the system is no longer receiving data from the secondary source	Enable	Alarm enable	■ Unchecked(Off) ■ Checked (On)
		Duration	Period of time that the alarm condition must exist prior to the system indicating the alarm	0 to 60 seconds (2 seconds*)
Source Time Lock	Indicates that the system is no longer time locked with the active source	Enable	Alarm enable	■ Unchecked(Off) ■ Checked (On)
		Duration	Period of time that the alarm condition must exist prior to the system indicating the alarm	0 to 60 seconds (2 seconds*)
Source Freq Lock	Indicates that the system is no longer frequency locked with the active source	Enable	Alarm enable	■ Unchecked(Off) ■ Checked (On)
		Duration	Period of time that the alarm condition must exist prior to the system indicating the alarm	0 to 60 seconds (2 seconds*)

Table 4-11 Alarms List *(Continued)*

Parameter Name	Description	Selection	Option Description	Option Settings
Loss of Reference	Indicates that the system is no longer detecting reference	Enable	Alarm enable	■ Unchecked(Off) ■ Checked (On)
		Duration	Period of time that the alarm condition must exist prior to the system indicating the alarm	0 to 60 seconds (2 seconds*)
Loss of GPS	Indicates that the system is no longer detecting the GPS source	Enable	Alarm enable	■ Unchecked(Off) ■ Checked (On)
		Duration	Period of time that the alarm condition must exist prior to the system indicating the alarm	0 to 60 seconds (2 seconds*)
Loss of NTP	Indicates that the system is no longer detecting the NTP source	Enable	Alarm enable	■ Unchecked(Off) ■ Checked (On)
		Duration	Period of time that the alarm condition must exist prior to the system indicating the alarm	0 to 60 seconds (2 seconds*)
Loss of PTP	Indicates that the system is no longer detecting the PTP source	Enable	Alarm enable	■ Unchecked(Off) ■ Checked (On)
		Duration	Period of time that the alarm condition must exist prior to the system indicating the alarm	0 to 60 seconds (2 seconds*)
Loss of ENET	Indicates that the system is no longer detecting the Ethernet link	Enable	Alarm enable	■ Unchecked(Off) ■ Checked (On)
		Duration	Period of time that the alarm condition must exist prior to the system indicating the alarm	0 to 60 seconds (2 seconds*)
Loss of LTC	Indicates that the system is no longer detecting the LTC source	Enable	Alarm enable	■ Unchecked(Off) ■ Checked (On)
		Duration	Period of time that the alarm condition must exist prior to the system indicating the alarm	0 to 60 seconds (2 seconds*)
LTC Frozen	Indicates that the system is no longer detecting a changing time in the LTC source . This alarm will only occur if the LTC source is present.	Enable	Alarm enable	■ Unchecked(Off) ■ Checked (On)
		Duration	Period of time that the alarm condition must exist prior to the system indicating the alarm	0 to 60 seconds (2 seconds*)

Table 4-11 Alarms List *(Continued)*

Parameter Name	Description	Selection	Option Description	Option Settings
Loss of VITC	Indicates that the system is no longer detecting the VITC source	Enable	Alarm enable	■ Unchecked(Off) ■ Checked (On)
		Duration	Period of time that the alarm condition must exist prior to the system indicating the alarm	0 to 60 seconds (2 seconds*)
VITC Line Mismatch	Indicates that the system is is detecting a difference between the detected VITC line in the source and the selected VITC line in the VITC Config menu. This alarm will only occur if the VITC source is present and that the VITC source is either the primary or secondary source.	Enable	Alarm enable	■ Unchecked(Off) ■ Checked (On)
		Duration	Period of time that the alarm condition must exist prior to the system indicating the alarm	0 to 60 seconds (2 seconds*)
VITC Frozen	Indicates that the system is no longer detecting a changing time in the VITC source. This alarm will only occur is the VITC source is present.	Enable	Alarm enable	■ Unchecked(Off) ■ Checked (On)
		Duration	Period of time that the alarm condition must exist prior to the system indicating the alarm	0 to 60 seconds (2 seconds*)
Loss of PS1	Indicates that the system is no longer detecting power supply 1	Enable	Alarm enable	■ Unchecked(Off) ■ Checked (On)
		Duration	Period of time that the alarm condition must exist prior to the system indicating the alarm	0 to 60 seconds (2 seconds*)
Loss of PS2	Indicates that the system is no longer detecting power supply 2	Enable	Alarm enable	■ Unchecked(Off) ■ Checked (On)
		Duration	Period of time that the alarm condition must exist prior to the system indicating the alarm	0 to 60 seconds (2 seconds*)
VSX Change Over	Indicates that the Changeover has switched to the alternate source	Enable	Alarm enable	■ Unchecked(Off) ■ Checked (On)
		Duration	Period of time that the alarm condition must exist prior to the system indicating the alarm	0 to 60 seconds (2 seconds*)

Unit Configuration

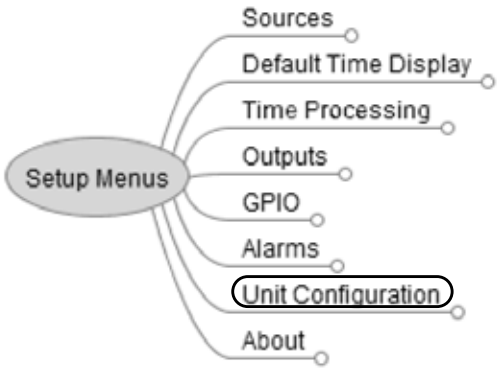


Table 4-12 Unit Configuration Parameters

Parameter Name	Description	Selection
Local Time		
Set Date/Time	Date and time when the unit will attempt to sync the output source	2011-07-01 to 2031-12-31 (Date) 00:00:00* to 23:59:59(Time)
Local Time Zone	Determines the time zone applied to the Local Time. This is the offset in hours and minutes (hh:mm) from UTC (Coordinated Universal Time).	■ UTC* ■ UTC -00:30 ■ UTC -01:00 ■ UTC -01:30 ■ UTC -02:00 ■ UTC -02:30 ■ UTC -03:00 ■ UTC -03:30 ■ UTC -04:00 ■ UTC -04:30 ■ UTC -05:00 ■ UTC -05:30 ■ UTC -06:00 ■ UTC -06:30 ■ UTC -07:00 ■ UTC -07:30 ■ UTC -08:00 ■ UTC -08:30 ■ UTC -09:00 ■ UTC -09:30 ■ UTC -10:00 ■ UTC -10:30 ■ UTC -11:00 ■ UTC -11:30 ■ UTC -12:00 ■ UTC +13:00 ■ UTC +12:45 ■ UTC +12:00 ■ UTC +11:30 ■ UTC +11:00 ■ UTC +10:30 ■ UTC +10:00 ■ UTC +09:30 ■ UTC +09:00 ■ UTC +08:30 ■ UTC +08:00 ■ UTC +07:30 ■ UTC +07:00 ■ UTC +06:30 ■ UTC +06:00 ■ UTC +05:30 ■ UTC +05:00 ■ UTC +04:30 ■ UTC +04:00 ■ UTC +03:30 ■ UTC +03:00 ■ UTC +02:30 ■ UTC +02:00 ■ UTC +01:30 ■ UTC +01:00 ■ UTC +00:30
DST Control	Daylight savings time controls	
DST Enabled	When enabled, determines whether the Day Light Savings time offset is applied to the the local time as specified in the On/Off time rules.	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is disabled.

Table 4-12 Unit Configuration Parameters

Parameter Name			Description	Selection
		DST On Time/Rule	The rule for when DST will start (+1 hour will added to the local unit time)	[1st] Mon Jan 00:00:00* Use the left/right navigation keys to move the brackets one field to the left or right. Use the up/down navigation keys to increment or decrement the field in brackets. Use the ENT key to save the current settings. Use the EXIT key to close the menu without making any changes.
		DST Off Time/Rule	The rule for when the DST adjustment will stop being applied	[1st] Mon Jan 00:00:00* Use the left/right navigation keys to move the brackets one field to the left or right. Use the up/down navigation keys to increment or decrement the field in brackets. Use the ENT key to save the current settings. Use the EXIT key to close the menu without making any changes.
Front Panel			Raises or lowers the brightness levels of the front panel function buttons.	
	High Tally		Sets the front panel high tally brightness level.	35% to 100% (80%*)
	Low Tally		Sets the front panel low tally brightness level.	0% to 10% (5%*)
IP			Configures Ethernet communication	
	DHCP Control		Enables the DHCP capabilities of the device	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is disabled.
	IP Address		Sets up a static IP Address of the device or shows the IP address assigned by the DHCP server. *See the System Administrator to determine a static IP address that will avoid conflicts.*	192.0.0.100*
	Subnet Mask		Configures the Subnet Mask off the device or shows the Subnet Mask assigned by the DHCP server. *See the System Administrator to determine the Subnet Mask.*	255.255.255.0*
	Gateway Address		Manually configures the Gateway address of the device or shows the Gateway address assigned by the DHCP server. *See the System Administrator to determine the Gateway address.*	0.0.0.0*

Table 4-12 Unit Configuration Parameters

Parameter Name		Description	Selection
Logs			
	Naming Convention	Determines how the log files are named.	■ Use Serial Number * ■ Use Custom String
	Custom String	When "Use Custom String" is selected in Naming Convention above, this string is used in the log names.	Maximum 9 characters ('A-Z', 'a-z', '0-9', '_'). Default is "UseCustom".
Auto Front Panel Lock		Enables the front panel auto lock function. If enabled, the front panel will automatically lock after 30 seconds of no front panel activity.	Press ENT to toggle the enable state. A check mark will appear to the left of the menu when enabled. Default is enabled.

About

Information in the About menu is read-only; you cannot change information in this menu.

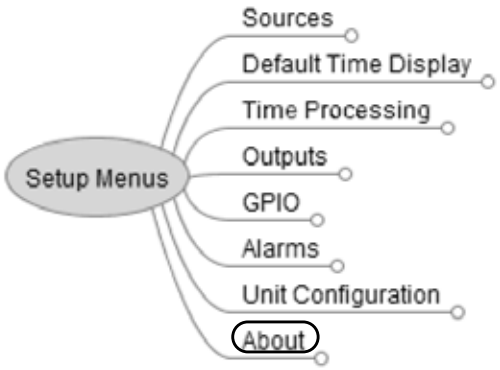


Table 4-13 About Menu Items (Read-Only)

Parameter Name	Description
Model Number	The model number of the unit
Serial Number	The serial number of the unit
Firmware Rev.	The build revision of the application firmware
FPGA Rev.	The build revision of the FPGA
MTG FPGA Rev.	The build revision of the MTG board's FPGA (VSG-4MTG only)
Front Panel Rev.	The build revision of the front panel firmware
CPLD Rev.	The build revision of the CPLD
PCB Rev.	The printed circuit board revision
File System Rev.	The file system revision
OS Rev.	The date and time that the operating system software was created
Boot Rev.	The date and time that that boot software was created
MAC Address	The MAC address of the unit
IP Address	The network address of the unit

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-4MTG/VSG-4CSD 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. A sample web page is shown in **Figure 5-1**.

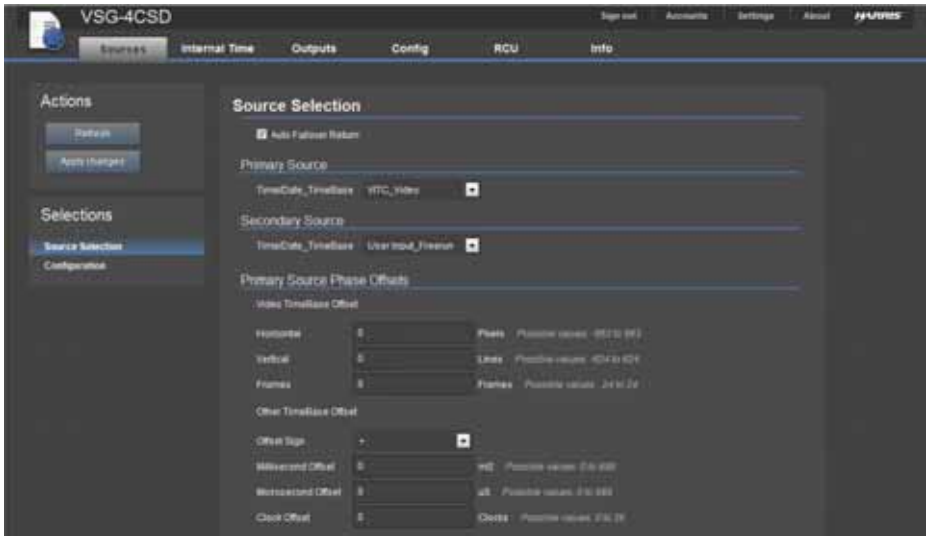


Figure 5-1 Sample Web Remote Display

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

The **Sign out**, **Accounts**, **Settings**, and **About** buttons along the top right edge of the page allow you to perform functions or access information about the device.

- **Sign out** logs out of the current browser session and opens the sign-in page. Fields are provided for user name and password which can be entered to start a new session.
- **Accounts** opens the user management page. See ***Managing User Accounts*** on page 87 for more details.
- **Settings** opens the applications settings page. This allows the firmware to be updated, unlocks optional features, and provides a link to download the SNMP MIB file for the device. See ***Settings*** on page 89 for more details.
- **About** opens the about page. Version information is displayed for various components of the device.

The **Sources**, **Internal Time**, **Outputs**, **Config**, **RCU**, and **Info** tabs provide access to pages that allow you to configure the device.

- **Sources** configures the primary and secondary sources. Also configures the various source types.
- **Internal Time** configures which input source or output is shown on the main time display. An offset can also be applied to the local time.
- **Outputs** configures NTP, PTP, LTC, and SYNC outputs.
- **Config** configures GPIO, Alarms, local time, day light savings time, Ethernet properties, and front panel LED tally levels.
- **RCU** provides a virtual front panel that allows remote control of the device through a web browser. See ***Accessing the Web-Based Control Panel*** on page 85 for more details.
- **Info** provides a list of log file links for downloading from the device through a web browser. These log files include jam times and alarms.

A collection of controls is provided on the left side of the page that stays in place as the page is vertically scrolled.

Figure 5-2 Static Controls on the Web Interface

- **Actions** - two buttons are provided that control the tab's data. **Refresh** causes the data to be reloaded from the device. **Apply changes** causes the data for the tab to be sent to the device.
- **Selections** - the items listed under Selections will vary for each of the tabs. These items break a tab's data into smaller collections to help reduce vertical scrolling. Clicking on an item will display the data for the selection.

Accessing the Web-Based Control Panel

Access the web browser as described on page 83. When the remote display page opens, click the **RCU** button to access the web-based control panel.

Figure 5-3 Web-Based Control Panel

The VSG-4MTG/VSG-4CSD 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. The communication status for the current session can be found in the lower left corner of the virtual front panel. The status will show a green "Connected" or a red "Disconnected" depending on the status of the current session.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-4MTG/VSG-4CSD control panel operates identically to a physical VSG-4MTG/VSG-4CSD control panel. Refer to **Chapter 3, *Operation*** for more information about panel operation.

Accessing the Log Files

Click the **Info** tab and then select **Logs** from **Selections** to display the list of available log files for downloading.

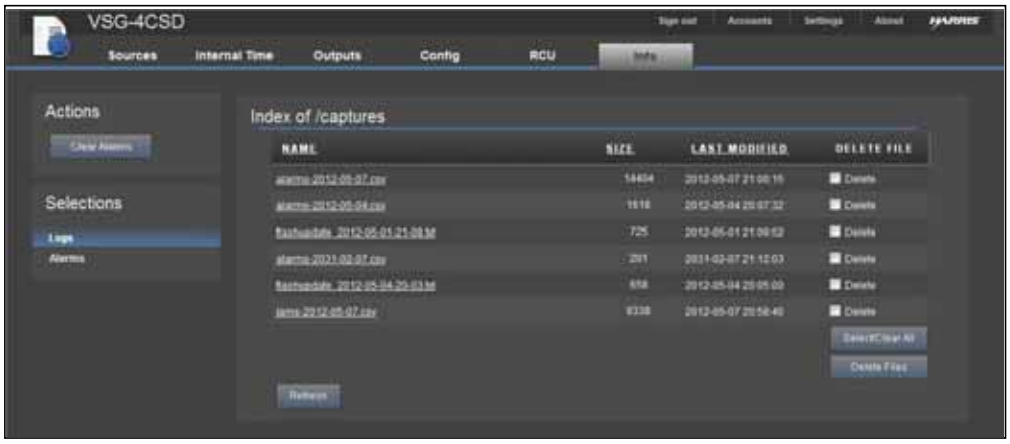


Figure 5-4 Index of Captures Display

To open a file

Click the file name, and then follow the on-screen instructions.

The VSG-4MTG/VSG-4CSD has two types of log files: jam files and alarm files.

To display an updated list of log files

Click the **Refresh** button.

The log file list does not refresh automatically. To update the list, click the Refresh button located below the file list.

To save a file

Click the file name, and then follow the on-screen instructions.

To delete a single file

Click the **Delete** check box to the right of the file name, and then click the **Delete Files** button.

To delete multiple files

1. Click the **Select/Clear All** button.

   The **Delete** check box to the right of each file capture is automatically selected. (Click the individual check mark to deselect files as desired.)

2. Click the **Delete Files** button.

   The files are removed from the list and deleted from the device.

Managing User Accounts

Accounts

The VSG-4MTG/VSG-4CSD 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.

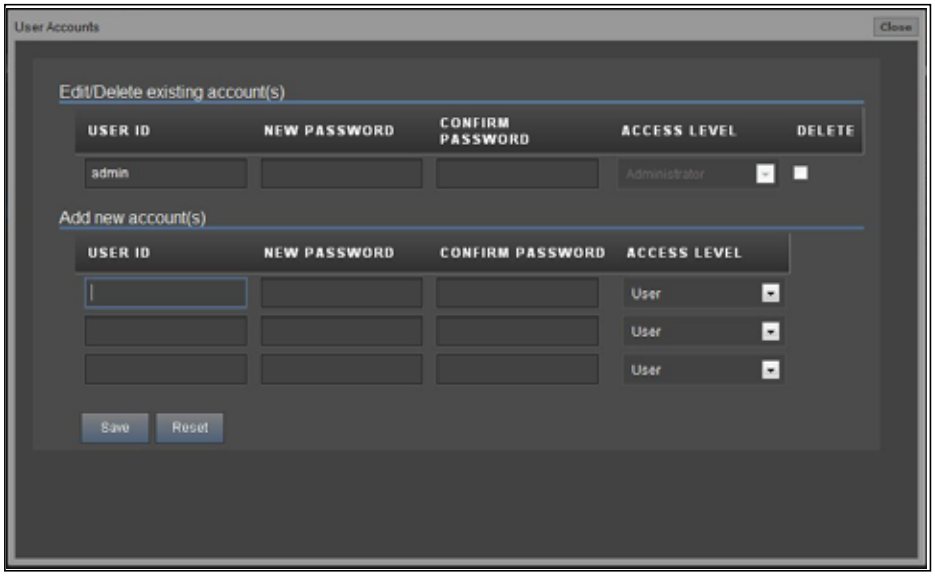


Figure 5-5 Accounts Display Page

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). A password is a minimum of 6 characters.
- 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

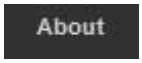
1. Click the **Accounts** button on the web-based control panel.

   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-4MTG/VSG-4CSD, 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.

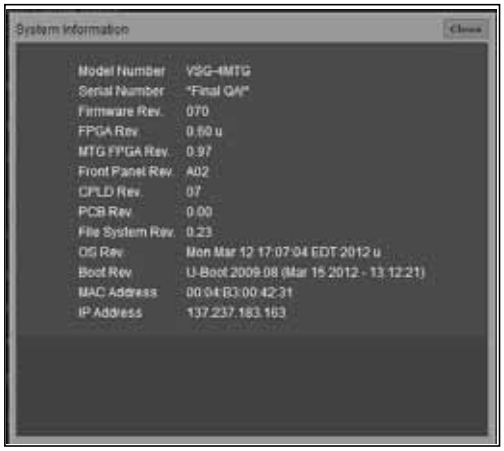


Figure 5-6 About Display Page

Settings

The Settings screen contains tools for upgrading the VSG-4MTG/VSG-4CSD firmware and adding optional license keys.

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

The Application Settings display page opens.

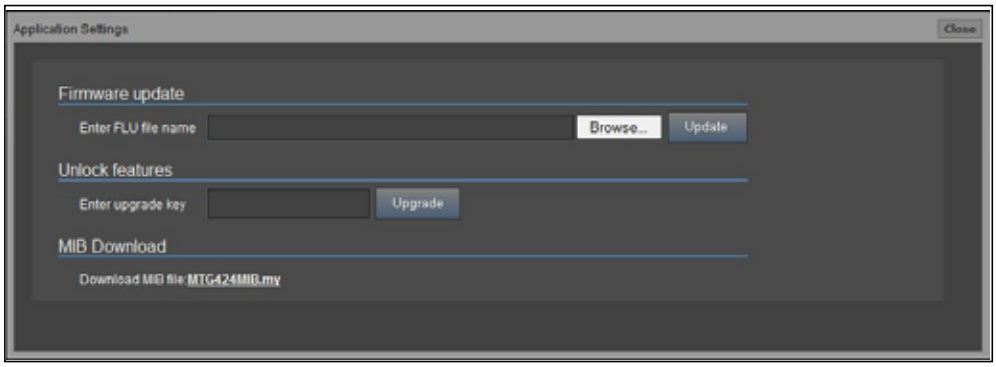


Figure 5-7 Application Settings Display Page

To update the VSG-4MTG/VSG-4CSD firmware

1. Download the latest firmware from the Imagine Communications Customer Support website (http://support.imaginecommunications.com/)
2. Press **Browse** and navigate to the download location of the VSG-4MTG/VSG-4CSD_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 a Feature

1. Contact your Imagine Communications sales representative to obtain the procedure for purchasing an unlockable feature. A code will then be provided for use in the next step.
2. Enter the code provided by your Imagine Communications sales representative and click "Upgrade".
3. See updated operator's handbook for details of the unlocked feature.

Note: As of this writing, no unlockable features are available for the VSG-4MTG/VSG-4CSD.

To Download the MIB file

1. Click on the link provided (the .my file name).
2. Select where to save the file.

   Once saved, the MIB file can be used in a MIB browser or an SNMP based Network Manager System (NMS) to control the VSG-4MTG/VSG-4CSD. See **Appendix C, *SNMP Agent and MIBs*** on page 107 for more information on SNMP support.

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.

When power is applied to the unit, the display shows the startup screen for about 45 seconds.

Initial Checks

If the VSG-4MTG/VSG-4CSD is not functioning properly, first verify the following:

- The VSG-4MTG/VSG-4CSD is connected to a power source (12 VDC).
- All cables are correctly connected (see ***Connecting the VSG-4MTG/VSG-4CSD*** 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 53) 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 **ENET** 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-4MTG/VSG-4CSD: Problems, Causes, and Solutions

Problem/Symptom	Solution or Explanation
The configured day-light-savings time (DST) rules are not applied to the time as expected.	DST is applied to three areas of the VSG-4CSD/ VSG-4MTG: local time, sync outputs, and LTC outputs. For local time, changes made to the DST rules are immediate if DST is enabled and are only applied to the local time of the unit. For sync and LTC outputs, the DST rules are applied on the next output jam. Also note, that the start rules must be older than the end rule or no DST offset will be applied.
Local time zone was not jammed to the VITC/LTC source even though the VITC/LTC Read Time Zone menu was enabled.	Local time zone is not jammed with the source. Use the Unit Configuration/Local Time/Local Time Zone menu to change the local time zone.
There are no communications on the Ethernet port	Verify the network settings through the Setup menu.
Magellan™ CCS Navigator fails to discover the VSG-4MTG/ VSG-4CSD. The message **Failure finding CCS-P host (xxx.xxx.xxx.xxx): Timeout** appears in the **Status** window after running a discovery	Navigator must be configured to connect to the VSG-4MTG/VSG-4CSD. To configure Navigator, follow these steps: 1. From the Navigator main menu, select **File** > **Operational Mode** > **Build**. 2. Ensure that the Discovery view is enabled with **Tools** > **Discovery**. 3. From the **Discovery** view, click **Options**. 4. On the **Hosts** tab, click **Add**. 5. Enter the IP address of the VSG-4MTG/VSG-4CSD in the **Add a host IP** field. 6. Click **Options**... for the **X50,X75, X85, NEO, 6800+, MULTIVIEWER, NUCLEUS, Platinum, EDGE-DPS575, Legalizer, RCP-CCS-1U.** 7. Change **Communication Type** to **Point-to-Point**. The default is **Broadcast** and will not work with the VSG-4MTG/VSG-4CSD. 8. Click **OK** to close the **Add Host** dialog. 9. Click **OK** to close the **Discovery Options** dialog. 10.Click **Start** on the **Discovery** view. If discovered, the VSG-4MTG/VSG-4CSD will appear in the Status pane as **Found System (xxx.xxx.xxx.xxx)** and **Found Frame 0 (VSG-4MTG)** or **Found Frame 0 (VSG-4CSD)** depending on the device model.

Table 6-1 VSG-4MTG/VSG-4CSD: Problems, Causes, and Solutions *(Continued)*

Problem/Symptom	Solution or Explanation
An SNMP client is denied accessed to the VSG-4MTG/ VSG-4CSD SNMP data.	SNMP clients need to be given the community strings for SNMP access. These strings can be found in the MIB file available for download from the device's Web Page. See ***Range and Community Levels*** on page 107 for details.
The unit will not allow PTP to be selected as a Primary or Secondary Source.	Check to see if PTP Master mode is enabled in the Unit's output configuration. The unit does not support simultaneous operation of PTP Master and Slave Modes.
PTP Master mode cannot be enabled.	Check to see either the Primary or Secondary source has PTP selected. The unit does not support simultaneous operation of PTP Master and Slave Modes.

If the problem still exists after troubleshooting the VSG-4MTG/VSG-4CSD, see ***VSG-4MTG/ VSG-4CSD Service and Support*** on page 11 for further instructions.

7 Specifications

Specifications are subject to change without notice.

Inputs

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	less then or equal to -40 dB to 10 MHz
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

10 MHz Input

Table 7-2 10 MHz Input Specifications

Item	Specification
Input type	1 input
Input connector type	Electrical, single-ended, unbalanced, mechanical, BNC

Table 7-2 10 MHz Input Specifications *(Continued)*

Item	Specification
Input impedance	75 ohm
Level	2Vp-p ±3dB

PPS Input

Table 7-3 PPS Input Specification

Item	Specification
Input type	1 input
Input connector type	Electrical, single-ended, unbalanced, mechanical, BNC
Input impedance	75 ohm
Level	TTL; Vih=2.0 V min, Vil=0.8V max
Edge transition	20ns max

LTC Input

Table 7-4 LTC Input Differential

Item	Specification
Input type	1 Differential balanced
Input connector type	Electrical, single-ended, unbalanced, mechanical, BNC
Input impedance	Hi-Z (>20 kΩ) or 600 Ω , selectable with switches
Nominal input amplitude	2.0 volts pk-pk
Min. input amplitude	0.5 volts pk-pk
Max. input amplitude	4.5 volts pk-pk

Table 7-5 LTC Input Unbalanced

Item	Specification
Input type	1 Unbalanced
Input connector type	Electrical, single-ended, unbalanced, mechanical, BNC
Input impedance	Hi-Z (>20k Ω)
Nominal input amplitude	2.0 volts pk-pk
Min. input amplitude	0.5 volts pk-pk
Max. input amplitude	4.5 volts pk-pk

Outputs

Table 7-6 Blackburst/Tri-Level Sync (TLS) Specifications

Item	Specification
Number/connector type	1 or 5 BNC, female
Load impedance	75 ohm nominal
Return loss	Less then or equal to -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
Tri-Level signal level	600 mV pk-pk
DC offset	0 V ±.5 V
SC/H phase	0 ±10 degree
Reference to output timing	±100 ns

Table 7-7 LTC Output 1

Item	Specification
Output connector	1 BNC, female
Interface	Unbalanced
Impedance	Low-Z (< 25Ω)
Level	2.0 Vp-p nominal into 1kΩ (Low-Z output)
Transition time	40us ± 4us measured at 10% and 90% amplitude

Table 7-8 LTC Output 2

Item	Specification
Interface	**Differential balanced**
Impedance	Low-Z (< 25Ω per side) or 600Ω, selectable with switches on break-out board
Level	■ 3.9Vp-p nominal into 1kΩ (Low-Z output) ■ 2.5Vp-p nominal into 1kΩ (600Ω output)
Transition Time	40us ± 4us measured at 10% and 90% amplitude
Interface	**Unbalanced**
Impedance	Low-Z (< 25Ω)
Level	2.0Vp-p nominal into 1kΩ
Transition Time	40us ± 4us measured at 10% and 90% amplitude

Audio

DARS

Table 7-9 Audio Specifications DARS

Item	Specification
Output connector	1 BNC, female, shared with WC
Output impedance	75Ω
Audio formats	DARS, unbalanced
Sample rate	48 kHz
AES output return loss	Less then or equal to -25 dB -0.1 to 6 MHz
Output signal level	1 V pk-pk (75 ohm terminated)
AES jjitter	Less then or equal to 0.25 UI

Word Clock

Table 7-10 Word Clock Output Characteristics

Item	Specification
Output connector	1 BNC, female, shared with AES/DARS
Output impedance	75Ω nominal
Output level	5 V TTL levels

OLED Display

Table 7-11 Display Specifications

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

Communication Interfaces

Table 7-12 Communication Interfaces

Item	Specification
Ethernet	1 Ethernet port RJ-45 10/100 Base-T connector
LTC/GPIO	1 LTC/GPIO connector 26 female pin D-sub

Ethernet

Table 7-13 Ethernet Specifications

Item	Specification
Standard	10/100 Base-T conforms to IEEE802.3
Connector	RJ-45

Power Requirements

Table 7-14 Power Requirements

Item	Specification
Power connector	2 barrel connectors with screw lock
Power input	12 VDC nominal 10.8 VDC minimum, 13.2 VDC maximum
Power consumption	less then 20 W nominal
Non-resetting fuse	2.5A, 16 VDC
AC Adapter	Included

Mechanical

Table 7-15 Mechanical Specifications

Item	Specification
Height	1.74 in. (4.42 cm)
Width	8.46 in. (21.49 cm)
Depth	13.12 in. (33.32 cm)
Weight	VSG-4CSD = 2.65 lb (1.20 kg) VSG-4MTG = 3.05 lb (1.38 kg)

Environmental

Table 7-16 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%

Table 7-16 Environmental Specifications *(Continued)*

Item	Specification
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

Standard and Optional Accessories

Table 7-17 Standard Accessories

Item	Specification
Standard accessories	■ ***VSG-4MTG/VSG-4CSD Installation and Operation Manual*** on CD ■ Breakout board kit assembly, separately ordered option (not supplied) ■ Two power cords ■ Two power supplies
HD26 DSUB with hood	For customer-supplied cable to connect to GPI I/O connector

Table 7-18 Optional Accessories

Item	Specification
TM-WRTY-1YR	Test & Measurement one-year warranty extension: excludes LCDS, CRTS, and batteries
TM-WRTY-3YR	Test & Measurement three-year warranty extension: excludes LCDS, CRTS, and batteries
BLK-4	Blank front filler plate
DRT-5	Double rack tray
DRT-ADP-1	Adaptor plate
VSG-4-BRK-1	Breakout panel and 5 ft cable with HD26 pin DSUB Male to Female connectors for the VSG-4 Series

A Pinouts

26-Pin D-Sub Connector

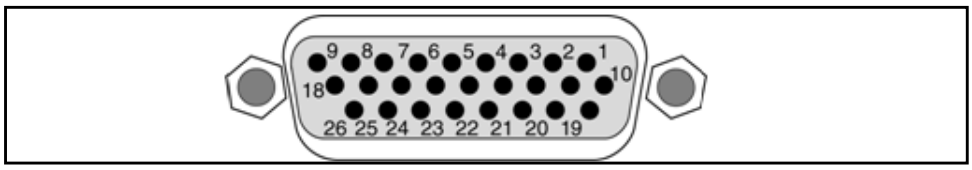


Figure A-1 26-Pin D-Sub Connector

The 26-pin female, D-Sub connector is used to connect to the back panel of the VSG-4MTG and VSG-4CSD.

Table A-1 Pinouts for AUX IO Connector

Pinout	Signal
1	GND
2	PPS IN
3	PPS OUT
4	GPI2
5	GPO1 RETURN
6	GPO1
7	GPI1
8	GPO2 RETURN
9	GPO2
10	NC
11	RS232 RX
12	RS232 TX
13	NC

Pinout	Signal
14	GND
15	NC
16	NC
17	NC
18	NC
19	GND
20	LTC OUT P
21	LTC OUT N
22	NC
23	NC
24	LTC IN P
25	LTC IN N
26	GND

Ethernet RJ45 Connector

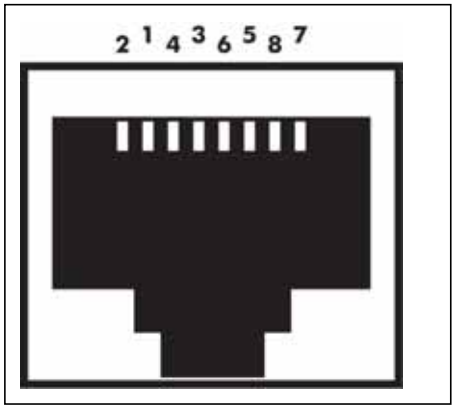


Figure A-2 Ethernet RJ45 Connector

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

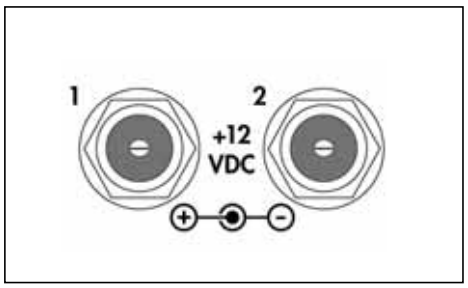


Figure A-3 Power Connector

Table A-3 Power Connector Pinouts

Connector 1		Connector 2	
Pinout	**Signal**	**Pinout**	**Signal**
Pin (Center)	12 vdc	Pin (Center)	12 vdc
Sleeve	Ground	Sleeve	Ground

B Log File Contents

The VSG-4MTG/VSG-4CSD has two types of capture files: jam files and alarm files.

- A jam file represents the source and output jams performed by the device for a given day.
- An alarm file represents an entire day's worth of alarm events. Alarm events are written to the log as they occur. Menu options control how the box operates if the number of alarms exceeds the storage capabilities of the device.

A new log file is created when the system time rolls over to the next day.

Naming Conventions

<device model>_<field string>_<type>_<date>_.csv where:

<device model> is either VSG-4CSD or VSG-4MTG.

<field string> is either the serial number of the unit or a 9 char custom string

<type> is either "alarms" or "summary jams"

<date> is the date that the file was created in the format of "YYYY-MM-DD"

The names of these files are determined in the Setup menu and use the serial number of the unit or a custom string and the date.

Alarm File Contents

Table B-1 Alarm File Contents

Column Header	Description
Start Time	Associated system time that the alarm was triggered
Alarm Name	The name of the alarm
Start Time Code	Associated time code that the alarm was triggered
Duration	The total duration that the alarm occurred  *The duration is filled in after the alarm clears. The duration will be "--:--:--" until it clears.*
Peak Value	Reported Peak Value (RPV) If available, this will represent the peak value that caused the alarm to trigger If no RPV value is associated with the alarm, **NO RPV** is indicated
Event	Either **Triggered** or **Cleared**: ■ Triggered indicates the leading edge of the alarm. ■ Cleared indicates the trailing edge of the alarm.

Sample Alarm File

Table B-2 Sample Alarm File

Start Time	Alarm Name	Start Time Code	Duration	Peak Value	Event
2012-06-02-00:12:51	Loss of Primary Source	00:00:00:00	--:--:--	NO RPV	Triggered
2012-06-02-00:12:51	Loss of Secondary Source	00:00:00:00	--:--:--	NO RPV	Triggered
2012-06-02-00:12:55	Loss of Primary Source	00:00:00:00	00:00:04	NO RPV	Clear
2012-06-02-00:12:55	Loss of Secondary Source	00:00:00:00	00:00:04	NO RPV	Clear
2012-06-02-21:34:21	Loss of REF	00:00:00:00	--:--:--	NO RPV	Triggered

Jam Log Contents

Table B-3 Jam Log Contents

Column Header	Description
Event Time	The associated date and time the jam occurred
Active Source	The source that was active when the jam occurred: ■ Primary ■ Secondary ■ Freerun
Primary Source	The primary source selection at the time the jam occurred. See the selection options listed for the Primary Source under the Sources menu.
Secondary Source	The secondary source selection at the time the jam occurred. See the selection options listed for the Secondary Source under the Sources menu.
Source Jam Type	The type of source jam that occurred for this event: ■ Failover ■ Timebase ■ Menu ■ Force ■ Scheduled
Sync 1 Jam Type	The type of output jam that occurred for this event for sync 1: ■ Follow Src ■ Failover ■ Timebase ■ Menu ■ Force ■ Scheduled These are listed in order of priority. If a jam occurs for multiple reasons, only the highest priority reason will be listed.
Sync 2 Jam Type (VSG-4MTG only)	The type of output jam that occurred for this event for sync 2: ■ Failover ■ Timebase ■ Menu ■ Force ■ Scheduled These are listed in order of priority. If a jam occurs for multiple reasons, only the highest priority reason will be listed.
Sync 3 Jam Type (VSG-4MTG only)	The type of output jam that occurred for this event for sync 3: ■ Failover ■ Timebase ■ Menu ■ Force ■ Scheduled These are listed in order of priority. If a jam occurs for multiple reasons, only the highest priority reason will be listed.

Table B-3 Jam Log Contents *(Continued)*

Column Header	Description
Sync 4 Jam Type (VSG-4MTG only)	The type of output jam that occurred for this event for sync 4: ■ Failover ■ Timebase ■ Menu ■ Force ■ Scheduled These are listed in order of priority. If a jam occurs for multiple reasons, only the highest priority reason will be listed.
Sync 5 Jam Type (VSG-4MTG only)	The type of output jam that occurred for this event for sync 5: ■ Failover ■ Timebase ■ Menu ■ Force ■ Scheduled These are listed in order of priority. If a jam occurs for multiple reasons, only the highest priority reason will be listed.
LTC 1 Jam Type	The type of output jam that occurred for this event for LTC 1: ■ Failover ■ Timebase ■ Menu ■ Force ■ Scheduled
LTC 2 Jam Type	The type of output jam that occurred for this event for LTC 2: ■ Failover ■ Timebase ■ Menu ■ Force ■ Scheduled

Sample Jam Log

Table B-4 Sample Jam Log

Event Time	Active Source	Primary Source	Secondary Source	Source Jam Type	SYNC 1 Jam Type	SYNC 2 Jam Type	SYNC 3 Jam Type	SYNC 4 Jam Type	SYNC 5 Jam Type	LTC 1 Jam Type	LTC 2 Jam Type
2012-07-02-08:30:01	Primary	User Input_ Freerun	User Input_ Freerun	Failover	Follow Src	Follow Src	Follow Src	Follow Src	Follow Src	Follow Src	Follow Src
2012-07-02-08:35:23	Primary	VITC_Video	User Input_ Freerun		Menu	Menu	Menu	Menu	Menu	Menu	Menu
2012-07-02-09:55:26	Primary	VITC_Video	User Input_ Freerun	Timebase	Follow Src	Follow Src	Follow Src	Follow Src	Follow Src	Follow Src	Follow Src
2012-07-02-12:18:10	Freerun	User Input_ Freerun	User Input_ Freerun	Force	Menu	Menu	Menu	Menu	Menu	Menu	Menu

C SNMP Agent and MIBs

The SNMP Agent

The agent is an implementation of the snmpd daemon that is part of the NET-SNMP 5.x distribution.

SNMP Agent Formats

There are two formats.

SNMPv1 supports the following SNMP commands:

- Get
- Getnext
- Set
- Trap

SNMPv2c supports the following SNMP commands:

- Get
- Getnext
- Getbulk
- Set
- Notification

Range and Community Levels

There are three supported community levels: Administration, System, and User. To access SNMP data from an SNMP client, a community string is required. Each community level has an associated string. These strings can be found in the MIB file that can be downloaded from the Web server of the VSG-4MTG/VSG-4CSD. See ***To Download the MIB file*** on page 90 for details.

The community strings can be found as comments at the top of the MIB file. The community strings are case-sensitive. Note that these strings are fixed in the system and cannot be changed by the user.

Administration Level

Read/write access to all objects in the following branches:

- 1.3.6.1.2
- 1.3.6.1.4
- 1.3.6.1.6
- 1.3.6.1.4.1.10039 (Videotek enterprise ID)

System Level

Read/write access to all objects in the following branches:

- 1.3.6.1.2.1.1 (system)
- 1.3.6.1.2.1.2 (interfaces)
- 1.3.6.1.2.1.4 (ip)
- 1.3.6.1.2.1.6 (tcp)
- 1.3.6.1.6.3 (snmpModules)
- 1.3.6.1.4.1.10039.1.320 (vtVsg4MtgCsdSeries)

User Level

Read/write access to all objects in the following branches:

- 1.3.6.1.2.1.1 (system)
- 1.3.6.1.4.1.10039.1.320 (vtVsg4MtgCsdSeries)

Behavior

Conforms to RFC1157 (SNMPv1) and RFC1902 (SNMPv2c).

SNMP Configuration Save

Setting OID "versionSavePersistent" = 1 (1.3.6.1.4.1.2021.100.13.0) of the UCD-SNMP-MIB saves the current SNMP configuration to nonvolatile storage. The saved SNMP configuration is loaded at reset.

Traps and Notifications

Conforms to RFC1157 (Traps) and RFC1902 (Notifications).

MIB

The MIB is a description of the OIDs supported by the VSG-4MTG/VSG-4CSD SNMP agent and is available as a file download from the device. See ***To Download the MIB file*** on page 90 for details.

Format SMIv2 subset of ASN.1; RFC1902, RFC1903, and RFC1904.

Range

SNMP Enterprise ID

The Videotek Enterprise ID is 10039. The full MIB tree is:

iso(1).org(3).dod(6).internet(1).private(4).enterprises(1).10039

The VSG-4MTG/VSG-4CSD MIB branch will be called **vtVsg4MtgCsdSeries** and will be at **1.3.6.1.4.1.10039.1.320**.

VSG-4MTG/VSG-4CSD MIB

The VSG-4MTG/VSG-4CSD MIB table will be added to the "**vtRelease**" table, as:

```
vtRelease                          OBJECT IDENTIFIER ::= { videotekMIB 1 }
vtVsg4MtgCsdSeries                 OBJECT IDENTIFIER ::= { vtRelease 320 }
vtVsg4MtgCsdSeriesv1               OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSeries 1 }
vtVsg4MtgCsdMain                   OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSeriesv1 1 }
vtVsg4MtgCsdAlarmStatus            OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSeriesv1 2 }
vtVsg4MtgCsdSeriesSWIPS            OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSeriesv1 4 }

vtVsg4MtgCsdSources                OBJECT IDENTIFIER ::= { vtVsg4MtgCsdMain 1 }
vtVsg4MtgCsdDefaultTimeDisplay     OBJECT IDENTIFIER ::= { vtVsg4MtgCsdMain 2 }
vtVsg4MtgCsdTimeProcessing         OBJECT IDENTIFIER ::= { vtVsg4MtgCsdMain 3 }
vtVsg4MtgCsdOutputs                OBJECT IDENTIFIER ::= { vtVsg4MtgCsdMain 4 }
vtVsg4MtgCsdGPIO                   OBJECT IDENTIFIER ::= { vtVsg4MtgCsdMain 5 }
vtVsg4MtgCsdAlarms                 OBJECT IDENTIFIER ::= { vtVsg4MtgCsdMain 6 }
vtVsg4MtgCsdUnitConfiguration      OBJECT IDENTIFIER ::= { vtVsg4MtgCsdMain 7 }

vtVsg4MtgCsdPhaseOffsetsVideo      OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSources 1 }
vtVsg4MtgCsdPhaseOffsetsOther      OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSources 2 }
vtVsg4MtgCsdSourcesConfig          OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSources 3 }
vtVsg4MtgCsdSourcesJamSync         OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSources 4 }
vtVsg4MtgCsdSourcesGPSConfig       OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSources 5 }
vtVsg4MtgCsdSourcesNTPConfig       OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSources 6 }
vtVsg4MtgCsdSourcesPTPConfig       OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSources 7 }
vtVsg4MtgCsdSourcesLTCConfig       OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSources 8 }
vtVsg4MtgCsdSourcesVITCConfig      OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSources 9 }

vtVsg4MtgCsdRefTimingHorz          OBJECT IDENTIFIER ::= { vtVsg4MtgCsdPhaseOffsetsVideo 1 }
vtVsg4MtgCsdRefTimingVert          OBJECT IDENTIFIER ::= { vtVsg4MtgCsdPhaseOffsetsVideo 2 }
vtVsg4MtgCsdRefTimingFrame         OBJECT IDENTIFIER ::= { vtVsg4MtgCsdPhaseOffsetsVideo 3 }

vtVsg4MtgCsdRefHorz1080i           OBJECT IDENTIFIER ::= { vtVsg4MtgCsdRefTimingHorz 1 }
vtVsg4MtgCsdRefHorz1080p           OBJECT IDENTIFIER ::= { vtVsg4MtgCsdRefTimingHorz 2 }
vtVsg4MtgCsdRefHorz1080psf         OBJECT IDENTIFIER ::= { vtVsg4MtgCsdRefTimingHorz 3 }
vtVsg4MtgCsdRefHorz720p            OBJECT IDENTIFIER ::= { vtVsg4MtgCsdRefTimingHorz 4 }
vtVsg4MtgCsdRefHorz525             OBJECT IDENTIFIER ::= { vtVsg4MtgCsdRefTimingHorz 5 }
```

```
vtVsg4MtgCsdRefHorz625             OBJECT IDENTIFIER ::= { vtVsg4MtgCsdRefTimingHorz 6 }

vtVsg4MtgCsdRefVert1080i           OBJECT IDENTIFIER ::= { vtVsg4MtgCsdRefTimingVert 1 }
vtVsg4MtgCsdRefVert1080p           OBJECT IDENTIFIER ::= { vtVsg4MtgCsdRefTimingVert 2 }
vtVsg4MtgCsdRefVert1080psf         OBJECT IDENTIFIER ::= { vtVsg4MtgCsdRefTimingVert 3 }
vtVsg4MtgCsdRefVert720p            OBJECT IDENTIFIER ::= { vtVsg4MtgCsdRefTimingVert 4 }
vtVsg4MtgCsdRefVert525             OBJECT IDENTIFIER ::= { vtVsg4MtgCsdRefTimingVert 5 }
vtVsg4MtgCsdRefVert625             OBJECT IDENTIFIER ::= { vtVsg4MtgCsdRefTimingVert 6 }

vtVsg4MtgCsdRefFrame1080i          OBJECT IDENTIFIER ::= { vtVsg4MtgCsdRefTimingFrame 1 }
vtVsg4MtgCsdRefFrame1080p          OBJECT IDENTIFIER ::= { vtVsg4MtgCsdRefTimingFrame 2 }
vtVsg4MtgCsdRefFrame1080psf        OBJECT IDENTIFIER ::= { vtVsg4MtgCsdRefTimingFrame 3 }
vtVsg4MtgCsdRefFrame720p           OBJECT IDENTIFIER ::= { vtVsg4MtgCsdRefTimingFrame 4 }
vtVsg4MtgCsdRefFrame525            OBJECT IDENTIFIER ::= { vtVsg4MtgCsdRefTimingFrame 5 }
vtVsg4MtgCsdRefFrame625            OBJECT IDENTIFIER ::= { vtVsg4MtgCsdRefTimingFrame 6 }

vtVsg4MtgCsdLTCOutputs             OBJECT IDENTIFIER ::= { vtVsg4MtgCsdOutputs 2 }
vtVsg4MtgCsdPTPConfig              OBJECT IDENTIFIER ::= { vtVsg4MtgCsdOutputs 3 }
vtVsg4MtgCsdNTPConfig              OBJECT IDENTIFIER ::= { vtVsg4MtgCsdOutputs 4 }
vtVsg4MtgCsdDARSConfig             OBJECT IDENTIFIER ::= { vtVsg4MtgCsdOutputs 5 }
vtVsg4MtgCsdSyncOutputs            OBJECT IDENTIFIER ::= { vtVsg4MtgCsdOutputs 6 }

vtVsg4MtgCsdSyncOutputVideo        OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncOutputs 1 }
vtVsg4MtgCsdSyncConfig             OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncOutputs 2 }
vtVsg4MtgCsdSyncTC                 OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncOutputs 3 }
vtVsg4MtgCsdSyncDTS                OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncOutputs 4 }
vtVsg4MtgCsdSyncJam                OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncOutputs 5 }
vtVsg4MtgCsdSyncTimingOffsets      OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncOutputs 6 }

vtVsg4MtgCsdSyncTimingOffsetsHorz  OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsets 1 }
vtVsg4MtgCsdSyncTimingOffsetsVert  OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsets 2 }
vtVsg4MtgCsdSyncTimingOffsetsFrame OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsets 3 }

vtVsg4MtgCsdHorz1080i              OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsetsHorz 1 }
vtVsg4MtgCsdHorz1080p              OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsetsHorz 2 }
vtVsg4MtgCsdHorz1080psf            OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsetsHorz 3 }
vtVsg4MtgCsdHorz720p               OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsetsHorz 4 }
vtVsg4MtgCsdHorz525                OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsetsHorz 5 }
vtVsg4MtgCsdHorz625                OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsetsHorz 6 }

vtVsg4MtgCsdVert1080i              OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsetsVert 1 }
vtVsg4MtgCsdVert1080p              OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsetsVert 2 }
vtVsg4MtgCsdVert1080psf            OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsetsVert 3 }
vtVsg4MtgCsdVert720p               OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsetsVert 4 }
vtVsg4MtgCsdVert525                OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsetsVert 5 }
vtVsg4MtgCsdVert625                OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsetsVert 6 }

vtVsg4MtgCsdFrame1080i             OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsetsFrame 1 }
```

```
vtVsg4MtgCsdFrame1080p              OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsetsFrame 2 }
vtVsg4MtgCsdFrame1080psf            OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsetsFrame 3 }
vtVsg4MtgCsdFrame720p               OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsetsFrame 4 }
vtVsg4MtgCsdFrame525                OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsetsFrame 5 }
vtVsg4MtgCsdFrame625                OBJECT IDENTIFIER ::= { vtVsg4MtgCsdSyncTimingOffsetsFrame 6 }

vtVsg4MtgCsdLTCOutConfig            OBJECT IDENTIFIER ::= { vtVsg4MtgCsdLTCOutputs 1 }
vtVsg4MtgCsdLTCOutTC                OBJECT IDENTIFIER ::= { vtVsg4MtgCsdLTCOutputs 2 }
vtVsg4MtgCsdLTCOutDST               OBJECT IDENTIFIER ::= { vtVsg4MtgCsdLTCOutputs 3 }
vtVsg4MtgCsdLTCOutJamSync           OBJECT IDENTIFIER ::= { vtVsg4MtgCsdLTCOutputs 4 }
vtVsg4MtgCsdLTCOutTimingOffsets     OBJECT IDENTIFIER ::= { vtVsg4MtgCsdLTCOutputs 5 }
```

Behavior Conforms to SNMPv1 and SNMPv2c as supported by NET-SNMP 5.x.

SNMP Trapset Utility

The Trapset utility found on the SNMP Support CD is not used for the VSG-4MTG/ VSG-4CSD. Instead, use the procedure found in ***Detailed SNMP Trap Configuration***.

Detailed SNMP Trap Configuration

Adding a New Trap Target

This section details how to configure traps without using Trapset. The SNMP client must have administrator privileges to create, delete, or change trap target characteristics. Entries must be created in two tables to set up a new trap target address:

1. Create a new row in the snmpTargetAddrTable by sending a createAndWait command (5) to a new instance (index) of snmpTargetAddrRowStatus (1.3.6.1.6.3.12.1.2.1.9).
2. Fill in the following fields in table snmpTargetAddrTable (1.3.6.1.6.3.12.1.2):
   - snmpTargetAddrTDomain (1.3.6.1.6.3.12.1.2.1.2.index) is set to snmpUDPDomain or 1.3.6.1.6.1
   - snmpTargetAddrTAddress (1.3.6.1.6.3.12.1.2.1.3.index) is target IP address (including port, normally 00)
   - snmpTargetAddrTimeout (1.3.6.1.6.3.12.1.2.1.4.index) is set to 1500
   - snmpTargetAddrRetryCount (1.3.6.1.6.3.12.1.2.1.5.index) is set to 3
   - snmpTargetAddrTagList (1.3.6.1.6.3.12.1.2.1.6.index) is set to "vsg4mtgcsdTrap"
   - snmpTargetAddrParams (1.3.6.1.6.3.12.1.2.1.7.index) is set to "v1Vsg4MtgCsdSystemParams" or "v2cVsg4MtgCsdSystemParams"
   - snmpTargetAddrStorageType (1.3.6.1.6.3.12.1.2.1.8.index) is set to nonVolatile or 3
   - snmpTargetAddrRowStatus (1.3.6.1.6.3.12.1.2.1.9.index) is set to active or 1
3. Set versionSavePersistentData.0 (1.3.6.1.4.1.2021.100.13.0) to a 1 to save the target address entry.

   versionSavePersistentData is a one-shot in that it returns to 0 as soon as the save is completed. This is located in UCD-SNMP-MIB.my. If this step is not performed, the target address changes will not be retained between power cycles.

Changing an Existing Trap Target

1. Set the desired field at the desired index in the above tables.

   The change will overwrite the existing value at the specified index.

2. Set versionSavePersistentData.0 (1.3.6.1.4.1.2021.100.13.0) to a 1 to save the target address entry.

   versionSavePersistentData is a one-shot in that it returns to 0 as soon as the save is completed. This is located in UCD-SNMP-MIB.my. If this step is not performed, the target address changes will not be retained between power cycles.

Disabling Trap Targets

1. snmpTargetAddrRowStatus (1.3.6.1.6.3.12.1.2.1.9.index) - set to notInService or 2. To reactivate, change back to active or 1.
2. Set versionSavePersistentData.0 (1.3.6.1.4.1.2021.100.13.0) to a 1 to save the target address entry.

   versionSavePersistentData is a one-shot in that it returns to 0 as soon as the save is completed. This is located in UCD-SNMP-MIB.my. If this step is not performed, the target address changes will not be retained between power cycles.

Deleting Trap Targets

1. snmpTargetAddrRowStatus (1.3.6.1.6.3.12.1.2.1.9.index) - set to destroy or 6.

   The instance will be permanently removed from both the snmpTargetAddrRowStatus.

2. Set versionSavePersistentData.0 (1.3.6.1.4.1.2021.100.13.0) to a 1 to save the target address entry.

   versionSavePersistentData is a one-shot in that it returns to 0 as soon as the save is completed. This is located in UCD-SNMP-MIB.my. If this step is not performed, the target address changes will not be retained between power cycles.

VSG-4MTG/VSG-4CSD Alarm Status Table

This table implements a circular read-only buffer of 1000 alarms generated by the device. An NMS can use this table to collect alarms that may have not been received as traps. It is the responsibility of the NMS to keep track of already collected alarms. This generally requires collecting the entire alarm table and ignoring entries that previously collected or received as traps. The astSequence column is useful for determining whether a row has already been collected or received since it is unique to each alarm instance. This table can be ignored if alarms will be handled only as traps.

NOTE: *The VSG-4MTG/VSG-4CSD does not use Reported Peak Value related fields. These fields are only supplied to maintain a consistent format across certain Imagine Communications products.*

An alarm consists of the following columns:

Table C-1 VSG-4MTG/VSG-4CSD Alarm Status

OID Name	Type	Description
astAlarmID	Integer 0..99	The row index of the table. See **Table C-2**.
astAlarmIndex	Gauge32	Alarm description index. See ***Alarm Description***.
astStartDate	Octet String (size 4)	Alarm trigger date. See **Table C-3**.
astStartTime	Octet String (size 4)	Alarm trigger time. See **Table C-4**.
astTimeCode	Octet String (size 4)	Timecode, if present, at which the alarm was triggered. See **Table C-5**.
astDuration	Gauge32	Number of seconds the alarm was triggered. This is only useful on the trailing edge (clearing) of the alarm (astHappening = 1).
astHappening	Gauge32	Indicates alarm edge. Leading (triggering) is 0 and trailing (clearing) is 1.
astTriggered	Gauge32	Not used.
astCaptured	Gauge32	Contains the display freeze sequence number for this alarm. Zero if the alarm is not configured for alarm capture.
astPeakValue	Octet String (size 4)	Whole numeric part of the reported peak value. See astPeakIndex for more information. See **Table C-6**.
astPeakIndex	Octet String (size 4)	Decimal part of the reported peak value. Also contains the description index. See **Table C-7**.
astSequence	Gauge32	Device unique ID of this entry.
astInput	Gauge32	Indicates the source input (A, B) on which the alarm occurred. See **Table C-10**.

Alarm Description

Table C-2 lists the alarm descriptions for the indexes found in the alarm's astAlarmIndex column.

Table C-2 Alarm IDs

Index	Description
0	Loss of Primary Source
1	Loss of Secondary Source
2	Source Time Lock
3	Source Frequency Lock
4	Loss of REF
5	Loss of GPS
6	Loss of NTP
7	Loss of PTP

Table C-2 Alarm IDs *(Continued)*

Index	Description
8	Loss of ENET
9	Loss of LTC
10	Loss of VITC
11	VITC Line mismatch
12	VITC frozen
13	LTC frozen
14	Loss of PS1
15	Loss of PS2

Alarm Date (astStartDate)

The alarm date column (astAlarmDate) of an alarm is decoded as follows:

Table C-3 Alarm Date (astStartDate)

Byte	Contents	Range
4-3	Year	0..9999
2	Month	1..12
1 (least significant)	Day	1..31

Alarm Time (astStartTime)

The alarm time column (astAlarmTime) is decoded as follows:

Table C-4 Alarm Time (astStartTime)

Byte	Format Change Dig	0
4	Seconds	0..59
3	Minutes	0..59
2	Hours	0..23
1 (least significant)	Unused	NA

Time Code

The time code column (astTimeCode) is decoded as follows:

Table C-5 Time Code

Byte	Contents	Range
4	Hours	0..23
3	Minutes	0..59
2	Seconds	0..59
1 (least significant)	Frames	0..29 NTSC/525 0..24 PAL/625

Reported Peak Value

Use astPeakValue and astPeakIndex to decode the reported peak value. The digits for the left side of the decimal are found in the astPeakValue. For values that have a decimal part, append the fractional part found in astPeakIndex byte 2.

NOTE: *The VSG-4MTG/VSG-4CSD does not use Reported Peak Value related fields. These fields are only supplied to maintain a consistent format across certain Imagine Communications products.*

Table C-6 astPeakValue

Byte	Contents	Range
4	Digit 4	0..9
3	Digit 3	0..9
2	Digit 2	0..9
1 (least significant)	Digit 1	0..9

Table C-7 astPeakIndex

Byte	Contents	Range
4	0 NO RPV 1 mV 2 UNITS 3 IRE 4 dB 5 dBu 6 dBFS 7 deg 8 uS 9 mV or IRE 10 Lines 11 uS	0..8
3	0 PAL 1 NTSC	0..1
2	Digits for decimal part	0..99
1 (least significant)	UNUSED	NA

Notes:

- If astPeakIndex (byte 4) = 0, there is no reported peak value. Ignore all other fields in astPeakIndex and astPeakValue.
- If astPeakIndex (byte 4) = 11, append a decimal point to the digits in astPeakValue and append astPeakIndex (byte 2). This forms a peak value of type float.
- If astPeakIndex (byte 4) = 9, the description string depends on astPeakIndex (byte 3). If astPeakIndex (byte 3) = 0, the description = "mV", if astPeakIndex (byte 3) = 1, the description = "IRE".

For example, the following astPeakIndex and astPeakValue OIDs decode into "23.3 IRE".

Table C-8 Example astPeakValue

Byte 4	Byte 3	Byte 2	Byte 1
0x00	0x00	0x00	0x17

Table C-9 Example astPeakIndex

Byte 4	Byte 3	Byte 2	Byte 1
0x03	0x01	0x03	0x00

Source Input

The device's source input column is decoded as follows:

Table C-10 Device Source Input Column

Index	Input Description
0	Indicates source input A
1	Indicates source input B

Trap and Notifications

In addition to the alarm status table, the agent also supports SNMPv1 traps. This can be configured as defined in RFC1157 (Traps) using "vsg4MtgCsdTrap" for snmpTargetAddrTagList and "v2cVsg4MtgCsdSystemParams" for snmpTargetAddrParams

Alarm Status Table Management

An OID is available to assist in the management of the Alarm Status Table, astAlarmIDStart. Since the Alarm Status Table is a circular queue, it is possible that Alarm IDs can wrap around when the table has completely filled, placing newer alarms at the top of the table, When reading alarm status starting from row 0 under this scenario, more recent alarms will be read before older alarms. To assist in the location of the oldest alarms (at the "head" of the circular queue), astAlarmIDStart will always contain the ID of the oldest alarm.

Table C-11 Alarm Status Table

OID name	Type	R/W	Values/Range	Unit	Default
astAlarmIDStart	Integer	R	Min: 0 Max: 999	---	0

MIB Definition File

The MIB file is located on the VSG-4MTG/VSG-4CSD web server. Through a web browser, log into the VSG-4MTG/VSG-4CSD and select the Settings button in the top right corner of the page. Click the **Download MIB file** link and save the file to your local disk. It can then be loaded into most network manager systems or SNMP browsers. See ***To Download the MIB file*** on page 90 for details.

D 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 (BB). 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.

PDOP. Position dilution of precision (GPS related term).

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

SNMP. Simple Network Management Protocol is an Internet-standard protocol for managing devices on IP networks.

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

TRAIM. Timing receiver autonomous integrity monitoring (GPS related term).

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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