



The Synchronization Experts.



## SETUP GUIDE

### IMS-VSG181H

#### Hot-Plug Module

March 2, 2022

Meinberg Funkuhren GmbH & Co. KG



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# 1 Imprint

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Date: February 23, 2022

Manual  
Version: 1.1

## 2 Change Log

Version	Date	Revision Notes
1.0	10/29/2021	Initial version
1.01	12/16/2021	Addition of change log & troubleshooting chapter, minor corrections
1.1	2/23/2022	Corrections to frame rate support via LTC output, adjustments to Web Interface following firmware updates, new screenshots, clarification of information regarding LEDs, on-board oscillator and time zone setting

## 3 Introduction

This Setup Guide is a systematically structured guideline to assist you with the set-up of your Meinberg product.

The IMS-VSG181H is used to provide a reference video or audio signal for studio equipment, with generated signals output through two BNC outputs and a 15-pin D-Sub output. The "Black Out" BNC output is used to deliver bi-level ("black & burst") and tri-level sync signals, while the "DARS Out" BNC output provides an unbalanced Digital Audio Receiver Signal (DARS). The D-Sub connector serves as a multi-output solution for several signal types, specifically balanced and unbalanced LTC signals, balanced DARS signals, and word clock signals.

To ensure that the output signals remain highly precise even when switching between clocks using the RSC module (in IMS systems with receiver redundancy), the IMS-VSG181H may be fitted with a dedicated oscillator.

### Functionality

The IMS-VSG181H is synchronized against an external reference frequency (10 MHz), a pulse-per-second signal (PPS), and a time string from an upstream clock. These synchronization signals are essential to maintaining the precision of the output signals. The Web Interface provides a wide range of adjustment and customization options for all output signal types. The signal outputs are phase-matched with the PPS signal.

Please refer to the LANTIME Firmware Manual for a more detailed description of all of the status monitoring configuration options and features available for your Meinberg product.

LTOS7 Firmware Manual Download:

<http://www.mbg.link/docg-fw-ltos>

### Compatibility

The IMS-VSG181H is an IMS module that is compatible with the following systems in the IMS product family and can be used in the following slots:

#### System Compatibility - IMS VSG181H

IMS System	M500	M1000	M1000 S	M2000 S	M3000	M3000 S	M4000
Compatible	✓	✓	✓	✓	✓	✓	✓

#### Slot Compatibility - IMS VSG181H

IMS Slot	PWR	CLK	CPU	MRI	ESI	I/O
Compatible	✗	✗	✗	✓	✓	✓

To eliminate any risk of compatibility problems, your IMS system should have at least LANTIME OS Version 7.04 installed.

## 4 Important Safety Information



Please ensure that IMS modules designed for "hot-plugging" (modules that are removable and insertable while a system is in operation) are always handled with the utmost care.

**Before performing any maintenance work on the system:**

- We recommend making a backup of any stored configurations (e.g. using a USB flash drive or from the Web UI)
- Take note of the chapter "Prevention of ESD Damage".
- Take note of the chapter "Power Supply".

### 4.1 Additional Safety Information



This manual contains important safety information regarding the installation and use of the device. Please read it through fully before setting up the device for use.

This device may only be used for the purpose described in this manual. In particular, the specified operating limits of the device must be heeded. The person setting up the device is responsible for safety matters in relation to any larger system in which the device is installed!

Failure to observe these instructions may have an adverse impact on device safety!

Please keep this manual in a safe and accessible place.

#### **Target Readership**

This manual is only intended to be used by qualified electricians, or by persons who have been appropriately instructed by qualified electricians and who are familiar with applicable national standards and safety rules & regulations, especially in relation to the installation of low-voltage (< 1000 V) installations.

## 4.2 Prevention of ESD Damage



### ATTENTION!

An ESDS device (electrostatic discharge-sensitive device) is any device at risk of damage or malfunction due to electrostatic discharges (ESD) and thus requires special measures to prevent such damage or malfunction. Systems and modules with ESDS devices usually bear the following symbol:



### Symbol Indicating Devices with ESDS Components

The following measures will help to protect ESDS components from damage and malfunction.

#### When preparing to dismantle or install devices:

Ground your body (for example, by touching a grounded object) before touching sensitive devices.

Ensure that you wear a grounding strap on your wrist when handling such devices. These straps must in turn be attached to an uncoated, non-conductive metal part of the system.

Use only tools and devices that are free of static electricity.

#### When transporting devices:

Devices must only be touched or held by the edges. Never touch any pins or conductors on the device.

#### When dismantling or installing devices:

Avoid coming into contact with persons who are not grounded. Such contact may compromise your connection with the earth conductor and thus also compromise the device's protection from any static charges you may be carrying.

#### When storing devices:

Always store devices in ESD-proof ("antistatic") bags. These bags must not be damaged in any way. ESD-proof bags that are crumpled or have holes cannot provide effective protection against electrostatic discharges.

ESD-proof bags must have a sufficient electrical resistance and must not be made of conductive metals if the device has a lithium battery fitted on it.



## 4.3 Power Supply



### WARNING!

The IMS system in which the module is used is operated at a dangerous voltage. Please refer to your IMS Manual for more information about safety.

When removing a hot-pluggable power supply unit, always disconnect its power cable before removing it from the IMS system.

Never open a power supply unit—there may still be hazardous residual voltages present even after disconnection from the mains supply. In the event that a power supply unit is no longer working (e.g. defective), please return it to Meinberg for repair.

Failure to observe these safety instructions may result in serious injury and/or property damage. The IMS system must only be installed, set up, and operated by qualified personnel.

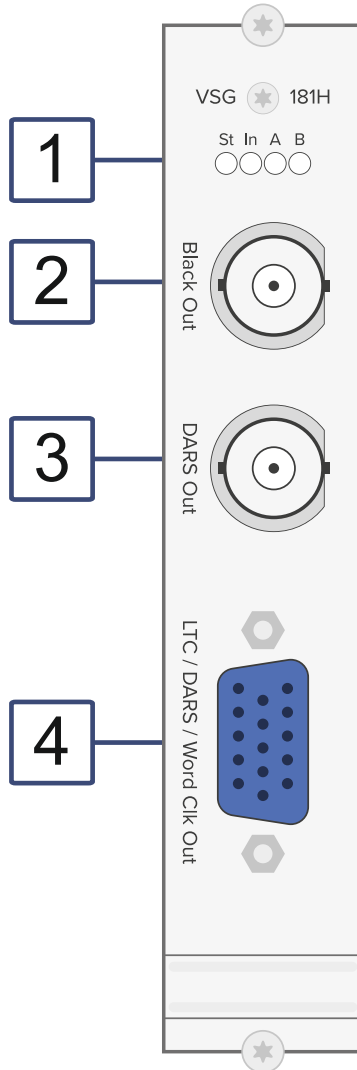
## 4.4 Cabling



### WARNING!

Danger of death from electric shock! Never work on the system while the power is live! Always disconnect the cables from the devices at **both** ends before working on the plugs and terminals of connected cables!

## 5 IMS-VSG181H Module Connectors and Indicators

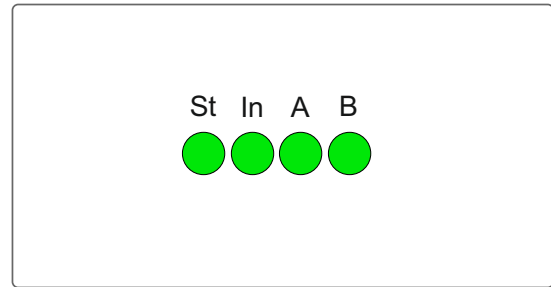


The numbering in the drawing above relates to the relevant subsection in this chapter.

## 5.1 Status LEDs

### Statusanzeige

LED "St":	Status of IMS-VSG181H in operating system
LED "In":	Status of synchronization against reference signal
LED "A":	Status of "Black Out" output
LED "B":	Status of "LTC" output



The status LEDs "A" and "B" only provide information about whether the outputs have been enabled and properly configured in the LANTIME Web Interface. They do **not** provide any information about the output of the signal itself.

The LEDs show the following colors and patterns to indicate the following states:

#### "St" LED: System Status

Blue	Internal operating system is initializing IMS-VSG181H
Green	Internal operating system has initialized IMS-VSG181H

---

#### "In" LED: Reference Signal Status

Reports status after initialization by operating system

Green, not flashing	IMS-VSG181H is synchronized (accurate to $\leq 200$ ns against reference)
Green, flashing	IMS-VSG181H is synchronized against reference signal, but module oscillator is not yet warmed up
Yellow	IMS-VSG181H is not yet synchronized against the reference signal, but a signal has been found
Red	IMS-VSG181H cannot find a stable reference signal and therefore cannot be synchronized

---

#### "A" LED: *Black Out* Output Status

This LED will usually display the following color pattern when the IMS system is booted:  
1 second red -> 1 second yellow -> 1 second green -> 1 second off

Off	Black Out signal is disabled or has not been configured
Green, flashing	Adjusting timing pattern of Black Out signal
Yellow, flashing	Adjusting timing pattern of Black Out signal, module oscillator is not yet warmed up
Green, not flashing	Output enabled, module oscillator is warmed up (timing is being fine-tuned)
Yellow, not flashing	Output enabled, but module oscillator is not yet warmed up (timing is homing in to approximate levels)

---

#### "B" LED: *LTC Out* Output Status

This LED will usually display the following color pattern when the IMS system is booted:  
1 second red -> 1 second yellow -> 1 second green -> 1 second off

Off	LTC signal is disabled or has not been configured
Green, flashing	Adjusting timing pattern of LTC signal
Yellow, flashing	Adjusting timing pattern of LTC signal, module oscillator is not yet warmed up
Green, not flashing	Output enabled, module oscillator is warmed up (timing is being fine-tuned)
Yellow, not flashing	Output enabled, but module oscillator is not yet warmed up (timing is homing in to approximate levels)



The status of the DARS and word clock outputs are not indicated by the status LEDs. Please refer to the LANTIME Web Interface for more information on the status of these signal outputs.

Please refer to the chapter "Configuration and Setup via Web Interface" for more information.

## 5.2 Black Out Output

**Output Signal:** NTSC (525i @ 59.94 Hz)  
"Black & Burst" ITU-R BT.1700/  
SMPTE 170M

PAL (625i @ 50 Hz)  
"Black & Burst", ITU-R BT.1700

720p @ 50 Hz  
Tri-Level Sync, SMPTE 296M

1080i @ 50 Hz  
Tri-Level Sync, SMPTE 274M

720p @ 59.94 Hz  
Tri-Level Sync, SMPTE 296M

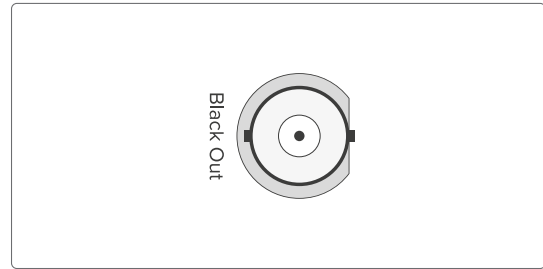
1080i @ 59.94 Hz  
Tri-Level-Sync, SMPTE 274M

PAL & NTSC signals can include embedded VITC  
SMPTE 12M-1/SMPTE 309M

**Signal Level:** 300 mV<sub>pp</sub>,  
75 Ω termination (unbalanced)

**Connector Type:** BNC Connector, Female

**Cable:** Coaxial Cable, Shielded



## 5.3 DARS Output (Unbalanced)

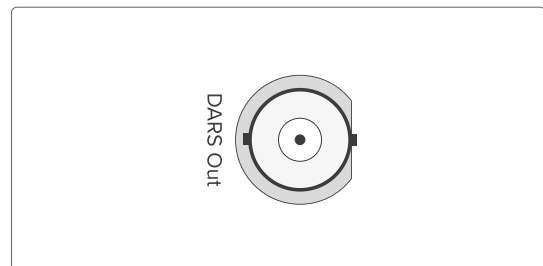
**Output Signal:** DARS (Unbalanced)

**Signal Level:** TTL, 2.5 V<sub>pp</sub>,  
75 Ω termination

**Signal Type:** Digital audio with sample rate of  
44.1 kHz or 48 kHz

**Connector Type:** BNC Connector, Female

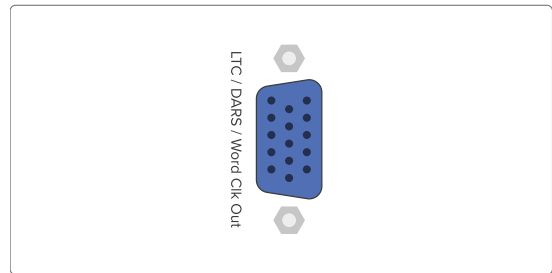
**Cable:** Coaxial Cable, Shielded



## 5.4 D-Sub 15-Pin Multi-Output

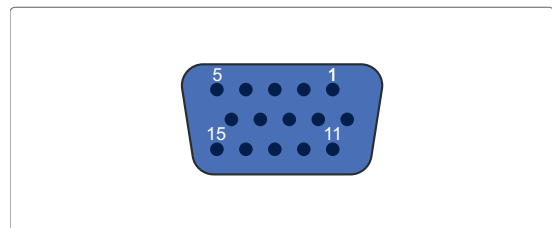
The 15-pin D-Sub connector is used to output a variety of balanced signal types:

- LTC (Linear Time Code), Balanced
- DARS (Digital Audio Reference Signal), Balanced
- Word Clock Output



### Pin Layout

Pin No.	Function
Pin 1	LTC +
Pin 2	LTC -
Pin 3	Not connected
Pin 4	Not connected
Pin 5	Not connected
Pin 6	GND
Pin 7	GND
Pin 8	GND
Pin 9	GND
Pin 10	GND
Pin 11	DARS +
Pin 12	DARS -
Pin 13	Word Clock (2.5 V @ 75 Ω)
Pin 14	Not connected
Pin 15	LTC (2.5 V @ 75 Ω)



Note: The pin numbering relates to the connector on the module itself.



Please refer to the chapter "Data and Signal Cables" for further information on supported data and signal cables and cable wiring.

### 5.4.1 LTC Output

Output Signal: LTC

Signal Level: *Balanced Signal*  
TTL, 2.5 V<sub>pp</sub> (MARK/SPACE),  
600 Ω termination, pin 1 (+) and 2 (-)

*Unbalanced Signal*  
TTL, 2.5 V<sub>pp</sub> (MARK/SPACE),  
75 Ω termination, pin 15

Formats: 24 fps (23.976 Hz and 24 Hz)  
25 fps  
30 fps (with or without drop frame  
support for adapting 30 fps time code  
to 29.97 fps content)

### 5.4.2 DARS Output (Balanced)

Output Signal: DARS (Balanced)

Signal Level: TTL, 2.5 V<sub>pp</sub>,  
110 Ω termination, pin 11 (+) and 12 (-)

Signal Type: Sample frequencies: 44.1 kHz and 48 kHz

### 5.4.3 Word Clock Output

Output Signal: Word Clock

Signal Level: TTL, 2.5 V<sub>pp</sub>,  
75 Ω termination, pin 13

Frequency Range: 24 Hz – 12.288 MHz

Sample Rates: 44.1 kHz and 48 kHz

Scale Factors: At sample frequency 44.1 kHz  
- 1/32, 1/16, 1/8, 1/4, 1/2, 1, 2, 4, 8, 16, 32  
- Frequency range: 1.378125 kHz to 1.4112 MHz

At sample frequency 48 kHz  
- 1/32, 1/16, 1/8, 1/4, 1/2, 1, 2, 4, 8, 16, 32  
- Frequency range: 1.5 kHz to 1.536 MHz

## 6 Before You Start

### 6.1 Contents of Delivery

Unpack the IMS-VSG181H carefully and check the contents of the delivery against the enclosed packing list to ensure that no parts are missing. If any of the listed items are missing, please contact our sales department: [sales@meinberg.de](mailto:sales@meinberg.de)

Check that the product has not been damaged in transit. If the product is damaged or fails to operate upon installation, please contact Meinberg immediately. Only the recipient (the person or company receiving the system) may file claims or complaints against the forwarder for damage caused in transit.

Meinberg recommends that you keep the original packaging materials in case the product needs to be shipped or transported again at a later date.

### 6.2 Disposal of Packaging Materials



The packaging materials we use are fully recyclable:

Material	Use for	Disposal
Cardboard	Shipping, packaging of accessories	Paper recycling
Plastic Wrapping	Shipping, packaging of accessories	Household waste or recycling depot



## 7 System Installation

### 7.1 Important Information Regarding Hot-Pluggable IMS Modules

The following information should be strictly observed when replacing IMS modules during operation. Not all IMS modules are fully hot-pluggable. For example, it is naturally not possible to replace a power supply unit in a system without PSU redundancy without first having installed a second power supply unit while the system is in operation.

The following rules apply for the individual IMS slots:

**PWR Slot:** "Hot-Swappable" If you operate your system with only one power supply unit, a second power supply unit must be installed before removing or replacing it in order to keep your system on.

**I/O, ESI and MRI Slots:** "Hot-Pluggable".

**CLK1/CLK2 Slots:** "Hot-Pluggable" When a clock module is replaced or installed, it is important to rescan the reference clocks ("Rescan Refclocks") in the "System" menu of the Web Interface.

**RSC/SPT Slots:** "Hot-Pluggable" It will not be possible for your IMS system to switch between signal generators while the RSC/SPT is not installed.

**CPU Slot:** "Not Hot-Pluggable" Before the CPU is removed, the IMS system must be powered down.  
Please note that after powering on and rebooting the LANTIME Operating System, the configuration of some IMS modules may be reset to factory defaults!



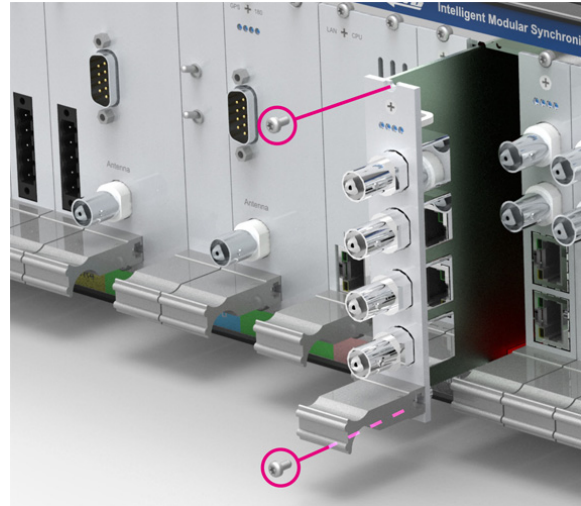
The NTP service and access to the web interface will be unavailable while the CPU is not installed. Management and monitoring functions will also be disabled.

## 7.2 Installation of Hot-Pluggable IMS Modules.

If the system is supplied with an antenna and antenna cable, it is advisable to first mount the antenna in a suitable location (refer to the chapter "Mounting the Antenna" in your IMS system manual) and to lay the antenna cable.

Please use a Torx screwdriver (T8 x 60) to remove and install IMS modules.

1. Follow the safety instructions at the beginning of this manual!
2. Remove the two marked Torx screws from the module holder plate or the cover plate of the empty slot.
3. **Please note when removing modules:**  
The module must be pulled **carefully** out of the guide rail. Note that the module will be securely seated in the connector block inside the chassis—a certain amount of force must be applied to release the module. Once the module has been detached from the connector block in the system backplane, the module can be easily pulled out.
4. **Please note when installing modules:**  
Ensure that the module is correctly inserted into the two guide rails of the system chassis. Failure to do so may result in damage to the module and chassis. Ensure that the module is securely seated in the connector block inside the chassis before you fasten the two screws.
5. The installed module is now ready for use.



*Locations of fixture screws in a 1RU IMS system*

## 7.3 Data and Signal Cables

### Coaxial Cable

The IMS-VSG181H module provides one BNC connector for outputting an analog bi-level or tri-level sync signal, and one BNC connector for outputting a digital DARS signal.

The signal outputs should be connected to your receiver device using coaxial cable with the proper characteristic impedance and adequate shielding.

A mismatched cable impedance will result in signal distortion, while poor shielding can cause signal interference.

### D-Sub 15-Pin cable

The balanced and unbalanced LTC, DARS and word clock signals can be read from the device via the 15-pin D-Sub connector, for which a suitable cable must be specifically assembled. The cable should be fitted with a 15-pin D-Sub plug at one end—ideally with a shielded plug case—while the other end should be fitted with a connector compatible with your signal receiver.

Shielded, twisted-pair, multiconductor cable should be used for the balanced signals. Coaxial cable can be used for the unbalanced signals.

Ideally, the cable shielding should be connected with the metallic case of the D-Sub connector.

Please refer to the chapter "D-Sub 15-Pin Multi-Output" for further information on wiring.

## 8 Configuration and Setup via Web Interface

This chapter describes the initial setup of a IMS-VSG181H using the Web Interface.

The IMS-VSG181H is configured by selecting the menu *I/O Config* → *Output Configuration* in the Web Interface.

The configuration options addressed in this chapter represent a IMS-VSG181H with Firmware Version V1.11 running under LANTIME OS Version 7.04.

## 8.1 Output 1: Black Out

**VSG - Video Signal Generator 2 [Chassis 0, Slot MRI1]**

Output 1 | Output 2 | Output 3 | Output 4 | Output 5 | Output 6 | Misc

**Output Type**  
Video Out

**Epoch**  
TAI D1970-01-01 T00:00:00

**Format**  
NTSC (525i)

**Vertical Offset**  
0 Lines

**Horizontal Offset**  
0 ns

**Timecode**  
None

**First Time Code Line**  
19

**Second Time Code Line**  
21

**Daily Jam Time**  
00 Hours 00 minutes

Use local time offset from PTP TLV if running in PTP Slave Mode

**Label**  
[Empty text box]

**Format dropdown options:**  
 OFF  
 NTSC (525i)  
 PAL (625i)  
 720p 50 Hz  
 1080i 50 Hz  
 720p 59.94 Hz  
 1080i 59.94 Hz

**Timecode dropdown options:**  
 None  
 VITC  
 VITC w. daily jam  
 VITC w. daily jam and drop frame

Output Type: "Video Out" (*Analog Bi-Level-Sync ("Black & Burst") or Tri-Level-Sync Video Signal*)

Epoch: Video signal timestamp epoch  
TAI D1970-01-01 T00:00:00

Format: "OFF"  
 "NTSC (525i)" (*59.94 Hz, "Black & Burst", ITU-R BT.1700/SMPTE ST 170:2004*)  
 "PAL (625i)" (*50 Hz, "Black & Burst", ITU-R BT.1700*)  
 "720p 50 Hz" (*Tri-Level Sync, SMPTE ST 296*)  
 "1080i 50 Hz" (*Tri-Level Sync, SMPTE ST 274*)  
 "720p 59.94 Hz" (*Tri-Level Sync, SMPTE ST 296*)  
 "1080i 59.94 Hz" (*Tri-Level Sync, SMPTE ST 274*)

Vertical Offset: Approximate configuration of phase offset in lines

Horizontal Offset: Fine adjustment of phase offset in 10 ns increments

Timecode:	"VITC" "VITC w. daily jam" ( <i>NTSC only</i> ) "VITC w. daily jam and drop frame" ( <i>NTSC only</i> )
First Time Code Line:	Select the first line in which the timecode is to be integrated. (6-22)
Second Time Code Line:	Select the second line in which the timecode is to be integrated. (6-22)
Daily Jam Time:	Define a time for the daily jam event.
Use Local Time Offset from PTP TLV if Running in PTP Slave Mode:	If the IMS LANTIME server is being operated as a PTP slave, enabling this option will cause the IMS-VSG181H to incorporate any local time offset information included in TLVs from the master clock for generating the signal and time codes.
Label:	You can use this field to define a custom label for the output, or you can leave the field blank.

---

## 8.2 Output 2 & 4: DARS

VSG - Video Signal Generator 2 [Chassis 0, Slot MRI1]

Output 1 Output 2 Output 3 Output 4 Output 5 Output 6 Misc

Output Type  
Digital Audio Out

Signal Type  
OFF

Label

Output Type: "Digital Audio Out" (*Digital Audio Reference Signal [DARS]*)

Signal Type: "OFF"  
"DARS 48 kHz"  
"DARS 44.1 kHz"

Label: You can use this field to define a custom label for the output, or you can leave the field blank.

**Please note:** Output 4 is a "follower" port whose output is solely controlled by the configuration for Output 2 above.

VSG - Video Signal Generator 2 [Chassis 0, Slot MRI1]

Output 1 Output 2 Output 3 Output 4 Output 5 Output 6 Misc

Output Type  
Digital Audio Out

Signal Type  
OFF

Label

## 8.3 Output 3 & 6: LTC

VSG - Video Signal Generator 2 [Chassis 0, Slot MRI1]

Output 1 Output 2 Output 3 Output 4 Output 5 Output 6 Misc

Output Type  
LTC Out

Type  
OFF

Phase Offset  
0 ns

Daily Jam Time  
00 Hours 00 minutes

Date encoding according to ITU-R BR.1353  Disable Parity Encoding

Label

Output Type:	"LTC Out" ( <i>Linear Time Code in Audio Signal</i> )
Type:	"OFF" "LTC 24 fps / 23.976 Hz" "LTC 24 fps" "LTC 25 fps" "LTC 30 fps" "LTC 30 fps Drop Frame" ( <i>for NTSC content with a frame rate of 29.97 fps</i> )
Phase Offset:	You can define a phase offset here to compensate for runtime delays.
Daily Jam Time:	This is used to set a time for the daily jam event.
Date Encoding According to ITU-R BR.1353:	If this option is enabled, the module will format the date information integrated into the LTC data in accordance with the format specified in the ITU recommendation BR.1353. If it is disabled, the data will be formatted in accordance with SMPTE ST 309. A specific setting may be necessary here for compatibility reasons.
Disable Parity Encoding:	If this option is enabled, the parity bits will not be integrated into the LTC data. This may be necessary for compatibility reasons.
Label:	You can use this field to define a custom label for the output, or you can leave the field blank.



**Please note:** Output 6 is a "follower" port whose output is solely controlled by the configuration for Output 3 above.

## 8.4 Output 5: Word Clock

Output Type: "Studio Clock Out" (Word Clock)

State: "Disabled"  
"Enabled"

Base Frequency: "44.1 kHz"  
"48 kHz"

Scale: Used to set the factor by which the base frequency (sampling rate) will be multiplied by. The frequency of the output signal is thus calculated as:

$$\text{Base Sampling Rate} * \text{Scale} = \text{Output Frequency}$$

Label: You can use this field to define a custom label for the output, or you can leave the field blank.

## 8.5 Misc



The screenshot shows a web interface for the 'VSG - Video Signal Generator 2 [Chassis 0, Slot MRI1]'. At the top, there are seven tabs: 'Output 1', 'Output 2', 'Output 3', 'Output 4', 'Output 5', 'Output 6', and 'Misc'. The 'Misc' tab is currently selected. Below the tabs, there is a 'Time Zone' label and a dropdown menu showing '(UTC) - UTC' with a small downward arrow on the right side.

---

Time Zone: This can be used to set the time zone of the IMS-VSG181H module.

---

## 9 Troubleshooting

Our Technical Support team will be pleased to help you with any problems that you may be having with your Meinberg IMS-VSG181H. However, before you contact our Technical Support team, it is advisable to read this chapter through first to see if your problem might be more quickly resolved with one of the solutions below.

Problem	Possible Causes	Possible Solutions
The module is not detected by the base IMS unit.	The module may not have been properly inserted into the slot.	Ensure that the module is properly aligned with the guide rails inside the IMS unit; the module must lock securely into the socket at the back. The metal plate of the module should be perfectly flush with the metal plates of the other slots and the screws should be straight.
	Your IMS device's firmware may not be up to date.	Using the instructions in the chapter "Firmware Updates" in your IMS device manual, check whether the latest version of LANTIME OS is installed, and install the latest version if necessary.
The "In" LED is red and there is no synchronization signal from the outputs.	The reference clock of the IMS device cannot find a synchronization signal required to operate the IMS-VSG181H.	Check your antenna and cables as appropriate. Refer to the main IMS manual for further information.
It takes a long time for the "Black Out" output to be enabled after power-up.	The IMS-VSG181H has a dedicated oscillator that must be synchronized with the reference clock of your IMS unit. When this module has only just been installed, this process can take up to two hours.	Let your IMS unit run for a while with the IMS-VSG181H installed and the reference clock synchronized so that this process can be properly completed.

## 10 Your Opinion Matters to Us

This user manual is intended to assist you in the preparation, use, and care of your Meinberg product, and provides important information for configuration and status monitoring.

Be a part of the ongoing improvement of the information contained in this manual. Please contact our Technical Support team if you have any suggestions for improvements or technical questions that are relevant to the manual.

### **Meinberg – Technical Support**

Phone: +49 (0) 5281 – 9309- 888

Email: [techsupport@meinberg.de](mailto:techsupport@meinberg.de)

# 11 RoHS and WEEE

## Compliance with EU Directive 2011/65/EU (RoHS)

We hereby declare that this product is compliant with the European Union Directive 2011/65/EU and its delegated directive 2015/863/EU "Restrictions of Hazardous Substances in Electrical and Electronic Equipment". We ensure that electrical and electronic products sold in the EU do not contain lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls (PBBs), polybrominated diphenyl ethers (PBDEs), bis(2-ethylhexyl)phthalat (DEHP), benzyl butyl phthalate (BBP), dibutyl phthalate (DBP), or diisobutyl phthalate (DIBP) above the legal limits.



## WEEE status of the product

This product is handled as a B2B (Business to Business) category product. To ensure that the product is disposed of in a WEEE-compliant fashion, it must be returned to the manufacturer. Any transportation expenses for returning this product (at end-of-life) must be covered by the end user, while Meinberg will bear the costs for the waste disposal itself.



## 12 List of Abbreviations

BNC	Bayonet Neill–Concelman connector
CPU	Central Processing Unit
DARS	Digital Audio Reference Signal
D-Sub	D-Subminiature
ESD	Electrostatic Discharge
ESDS	Electrostatic Discharge Sensitivity/Sensitive
GND	Ground
HD	High-definition
LTC	Linear Time Code (alternately: Longitudinal Time Code)
LTOS	LANTIME Operating System
NTSC	National Television Standard Committee
NTP	Network Time Protocol
PAL	Phase Alternating Line
RSC	Redundant Switch Control unit
PPS	Pulse per Second
SMPTE	Society of Motion Picture and Television Engineers
TTL	Transistor–Transistor Logic
VITC	Vertical Interval TimeCode
Web-UI	Web User Interface