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HD-SDI Generator

USER MANUAL

www.gefen.com

ASKING FOR ASSISTANCE

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INTRODUCTION

The HD-SDI Generator offers a long list of advanced features. It provides still and moving test patterns in SD and HD formats. The HD-SDI Generator outputs audio tone and time code. It even features dual-link 2k resolution video output. The HD-SDI Generator is portable. It can fit on the palm of your hand!

The HD-SDI Generator provides four buttons to operate the menu on its LCD screen. This cost-effective tool will allow video professionals to calibrate and test video equipment and displays.

FEATURES

- 4 channels of embedded audio
- Ancillary Timecode (LTC and VITC)
- Moving objects or the whole image can move (Motion)
- Scrolling text message (Title)
- Timecode burn in window (BIW)
- VANC counter.

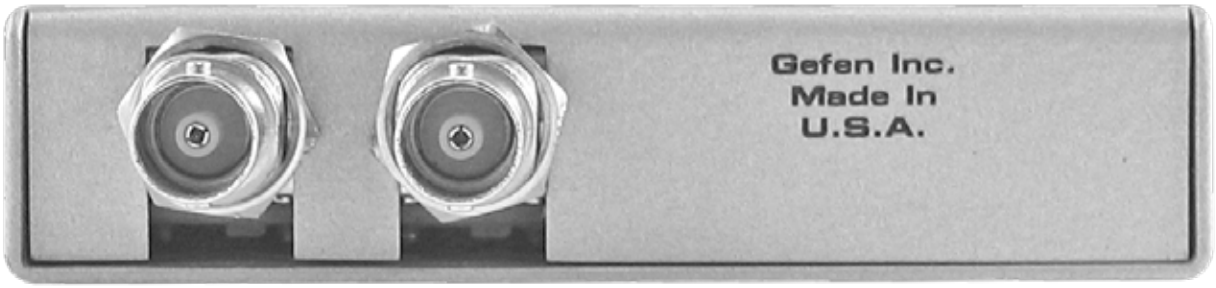
CONTENTS

The HD-SDI Generator consists of:

(1) HD-SDI Generator
(1) 5VDC Power Supply
(1) User's Manual







HD-SDI A

HD-SDI B

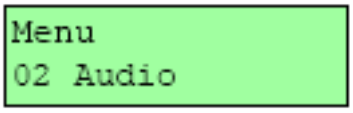
MENU AND NAVIGATION

The HDSDI Generator has a new user interface. Menu selections are no longer active as soon as you change them, you must press ENTER to make the change.

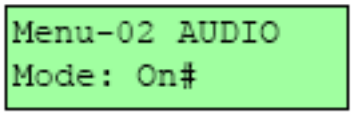
The HDSDI Generator has two modes: Menu mode and Display mode.
· In Menu mode the user can change the HDSDI Generator parameters
· In Display mode, the HDSDI Generator will show information about the output signal and gen

In Menu mode, the HDSDI Generator has 3 levels:

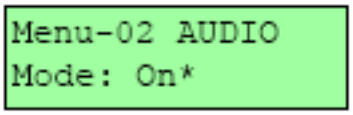
· Main: Selects the Main menu that has the parameter to change.



· Sub: Selects the parameter to change. The “#” sign at the end of the second line can be used to identify level 2



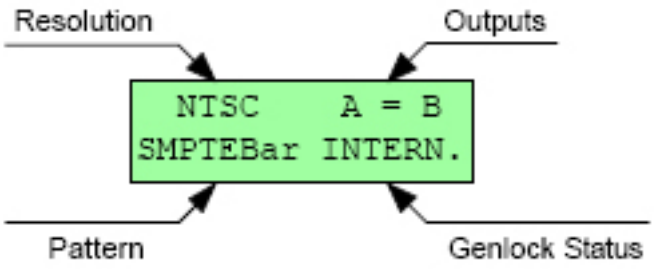
· Selection: Make the change. The “*” sign shows the current value. When you hit the UP or DOWN arrows, the “*” will go away until you hit ENTER.



The HDSDI Generator powers up in Display mode. To go to Menu mode, press the MENU button. UP and DOWN buttons will browse all available selection at that level. ENTER will make the selection and every time you press MENU it will go back one level until you get to Display mode.

Display Mode

In Display Mode, the HDSDI Generator shows information about the output of the the output resolution, outputs mode, pattern and genlock status. The picture display after a factory reset.



When Quick Access in the SYSTEM menu is ON, pressing the UP and Mode will navigate through the available test patterns.

Menu Mode

Refer to the next paragraphs on how to change any parameter; in this paragraph would be how to change the output resolution to 1080i:

1. Hit MENU to go in Menu Mode
2. Use the UP or DOWN buttons to get to “00 FORMAT”, then hit ENTER
3. Use the UP or DOWN buttons to get to “Resolution”, then hit ENTER
4. Use the Up or DOWN buttons to find 1080i, then hit ENTER
5. Hit MENU several times until you exit to Display Mode.

MENU MAP


00 FORMAT
Resolution
Frame Rate
Outputs
NTSC, PAL, 720p, 1080i, 1080p, 2K sf, 2K p
23.98, 24, 25, 29.97, 30
A=B, Dual YPbPr, Dual RGB
01 VIDEO
Pattern
Title
TC BlW
Filter
Look for the test patterns list later in this manual
Off, On-White, On-Black
Off, On-W/B, On-B/W
Off, On
02 AUDIO
Mode
Group
Level
Mask
Off, On
01, 02, 03, 04
-48,-42,-36,-30,-24,-20,-18,-12,-6, random (values in db)
1, 2, 3, 4, 1+2, 3+4, 1234
03 MOTION
Mode
Speed
No Motion, Sq1, Sq2, 2 Sqs, Sqs Inv, Full Motion, Snow
1, 2, 3, 4, 5, 6, 7
04 GENLOCK
Mode
Input
H Trig
V Trig
Off, On
Displays the Genlock Input Format
Changes in pixels
Changes in lines
05 ANC DATA
CC
TC
VANC
Inv Fields
Closed Caption: Off, On
Off, On/Non Drop, On/Drop
Off, On/1, On/12, On/123, On/1234
Off, On
06 SYSTEM
Version
S/N
Save
Reset
Quick Acess
Displays the current version
Displays the serial number
Save settings to flash
Reset factory settings
Off, On

Format Menu

The FORMAT menu allows you to change the video format parameters:

· Resolution: NTSC, PAL, 720p, 1080i, 1080p, 2K sf, 2K p. 2K resolutions are 2048x1080 at 23.98 or 24 FPS. “sf” and “p” designate segmented frame and progressive respectively.

· Frame Rate: 23.98, 24, 25, 29.97, 30 (50, 59.94, 60 for 720p formats)

· Outputs: The unit can output either the same signal on both output connectors, or a dual link YPbPr or RGB signal. The 4:4:4 dual link signal is compliant with the SMPTE 372 and SMPTE 352 standards.

System Menu

The SYSTEM menu can be used to show the current firmware version, save current settings to flash, reset factory defaults, etc.

· Version: Displays the current version number
· SN: Displays the serial number of the unit.
· Save Settings: Save the current settings to flash.
· Factory Reset: Reset the flash to factory defaults. ALL SAVED SETTINGS WILL BE LOST.
· Quick Access: Set to ON if you want to change the test pattern in Display Mode using the UP and DOWN buttons.

Video Menu

The VIDEO menu is for actual video output settings: Test pattern, burn in window, title, etc.

· Pattern: Select between the many test patterns available.

Pattern Label	Pattern Description
SMPTEBar	SMPTE color bars
100%Bars	100% color bars
Chkfield	The Checkfield pattern can be used to test the SDI clock recovery because it maximizes the DC component on the SDI signal.
Cross H.	Cross Hatch is a white cross hatch on a black background
Brd line	Border Lines can be used to find if a device is displaying all lines and pixels. It has 8 colors, 2 pixels (or 2 lines) each to make a total of 16 pixels (or 16 lines) on every side of the image.
Gradient	Gradient is a 10 bit gradient, from black to white
Gray lev	Gray Levels has 16 bars of gray, from black to white
Grn lev	Green Levels has 16 bars of green, from black to green
Blu lev	Blue Levels has 16 bars of blue, from black to blue
Red lev	Red Levels has 16 bars of red, from black to red
100% Whit	100% White is 100% IRE white pattern
100% Red	100% Red is 100% IRE red pattern
100% Grn	100% Green is 100% IRE green pattern
100%Blue	100% Blue is 100% IRE blue pattern
25% Gray	25% Gray is 25% IRE gray pattern
15% Gray	15% Gray is 15% IRE gray pattern
Black	Black is 100% IRE black pattern
Noise	White Noise can be used to test video compression
Circle	Circle is also known as Moire pattern
Target	Target has a perfect circle in the center for aspect ratio testing
V lines	Vertical Lines. Black and white alternate every pixel to make straight black and white vertical lines
H lines	Horizontal Lines. Black and white alternate every line to make straight black and white horizontal lines (1 field white, 1 field black in interlaced mode)
Random	Random cycles through all patterns. Each pattern stays for about 2 seconds.

· Title: Hide or show the scrolling text message called “Title”. The Title moves from bottom to top at 2 pixels per frame. **Note: The Title text can be changed to reflect your company’s name or any other message for a one-time fee.

· TC BIW: Hide or show the burn in window timecode display

· Filter: Set the filter ON for smoother transitions between colors.

  o Filter OFF: Color transitions are sharp, they occur on the next pixel.

  o Filter ON: Color transitions are smooth; it takes few pixels until the change of color occurs.

Audio Menu

Using the AUDIO menu, you can select the embedded audio group (1-4), the 1K-tone volume level in db, etc.

- Mode: Set audio on or off.
- Group: Set the embedded audio Group to 1, 2, 3 or 4. Group 1 designates audio channels 1-4, Group 2 is 5-8, Group 3 is 9-12 and Group 4 is 13-16.
- Level: Set the 1K Tone level from –48 to –6 db. There is also a “random” selection that can be used for video to audio delay testing. The audio level changes every time Square 1 touches any of the sides.
- Mask: In a group, the audio can be present on channel 1, channel 2, channel 3, channel 4, pair 1&2, pair 3&4 or on all 4 channels.

Motion Menu

Motion can be added to the video output. Moving square(s), Snow, Full Motion, etc can be selected. Motion is field based in interlaced formats and frame based in progressive formats.

- Mode: No Motion, Square 1, Square 2, 2 Squares, 2 Squares Inverted, Full Motion and Snow.
  - Square 1 keeps changing size as it moves and it changes color when it hits any of the sides. Possible colors are: white, yellow, cyan, green, magenta, red, blue and black. Square 1 moves faster than square 2
  - Square 2 is always blue and does not change size. It is slower than Square 1.
  - 2 Squares Shows both Square 1 and Square 2
  - 2 Squares Inv shows both squares in inverted mode with a black back ground color. The pattern can be seen inside the squares.
  - Full Motion moves the whole pattern. Motion differs between patterns
  - Snow adds white noise to the video outputs.
- Speed: 1 is slowest, 7 is fastest.

Genlock Menu

Genlock is a software option that can be purchased through your dealer. A utility is provided that can be used with an authorization code to enable Genlock support. If Genlock is enabled on your unit you will have access to:

- Mode: On or Off
- Input: This is a display only selection that shows the Sync Input video format.
- H Trig: Sets the horizontal trigger value. Holding down the UP or DOWN buttons will cause the value to change faster and faster. The number is a pixel indication and can be moved from – half line to + half line. You don't need to hit ENTER for this value to change.
- V Trig: Sets the vertical trigger value on lines.
- Inv Fields: On or Off. This parameter can be used to invert the field polarity of the output.

The genlock input can accept any of the following signals:

- NTSC: For NTSC and all 29.97 and 59.94 FPS HD formats
- PAL: For PAL and all 25 and 50 FPS HD formats
- 1080i-29.97: For NTSC and all 29.97 and 59.94 FPS HD formats
- 1080i-25: For PAL and all 25 and 50 FPS HD formats
- 1080i-23.98: For 2K and all 23.98 FPS HD formats
- 1080i-30: For all 30 and 60 FPS HD formats
- 1080i-24: For 2K and all 24 FPS HD formats

ANC Data Menu

Ancillary data can be used to embed metadata in the HD-SDI stream. Audio, Timecode, etc. are all embedded in the ancillary data space.

- TC: Enables timecode on the ancillary data. For NTSC, 720p-59.94, 1080i-29.97 and 1080p-29.97, you can also decide if the timecode is drop or non-drop. For HD formats embedded LTC is compliant with SMPTE Standard RP-188. Timecode starts at 0 every time you change this selection or when it reaches 24 hours. The HDSDI Generator outputs LTC and VITC.
- VANC: Enables the VANC counter that adds 1, 2, 3 or 4 packets to the ancillary data. For more information on the packet content, refer to the VANC Counter Appendix at the end of this manual.

Circle and Target patterns

The Target pattern is based on a square pixel ratio for high definition formats, 11/10 pixel ratio in NTSC and 54/59 pixel ratio in PAL
The Circle pattern is based on a square pixel ratio for all formats. Since NTSC and PAL do not have a square pixel ratio, the circles will look like ellipses on standard definition CRT monitors.

Crosshatch

Crosshatch pattern are usually made with 2 consecutive lines, one on each field. On the HDG product line we intentionally made the crosshatch with lines showing only on Field-1 so it can be used to identify problems related to field inversion.

Border Lines

Border Lines can be used to find if a device is displaying all lines and pixels. It has 8 colors, 2 pixels (or 2 lines) each to make a total of 16 pixels (or 16 lines) on every side of the image.

Burn In Window

The Burn In Window shows the timecode in 00:00:00:00 format. The character separating the seconds from the frames can be used to identify Field-1 from Field 2 for interlaced formats. It can also be used to identify drop and non-drop formats. Example:

- 00:00:01.04 indicates a non drop timecode for Field-1 interlaced
- 00:00:01:04 indicates a non drop timecode for Field-2 interlaced
- 00:00:01,04 indicates a drop frame timecode for Field-1 interlaced
- 00:00:01;04 indicates a drop frame timecode for Field-2 interlaced

Genlock parameters

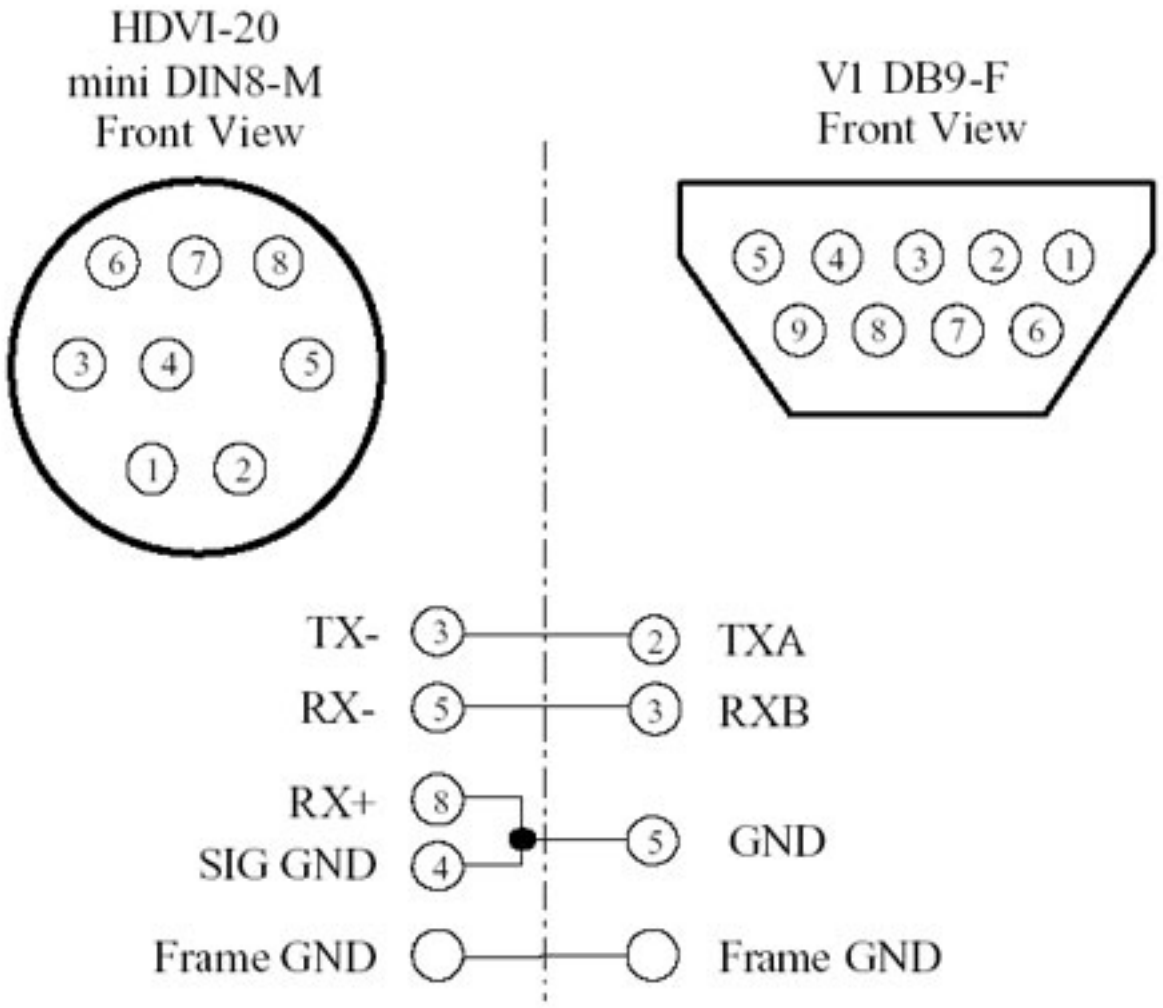
Each video format has its own set of HTRIG, VTRIG and Inv Fields values. They are saved to flash using the 06 SYSTEM > Save Settings sub-menu. If you use a bi-level sync source and keep switching between NTSC and 1080i for example, you don’t need to keep adjusting the H and V settings every time you change the output. You would adjust each format, with that same input, once, and save the settings to flash.
Changing the Sync input signal format will require re-adjusting the H and V values.

WIRING OF THE RS422-RS232 CABLE

The HD-SDI Generator has an RS422 port that can be used to view the current settings of the unit. To connect the RS422 port to a PC you need a special RS422-RS232 cable that can be purchased from Gefen by contacting support@gefen.com You can also make the cable using the wiring diagram shown at the end of this document.

• Connect COM1 of the PC to the HD-SDI Generator using the RS422-RS232 cable
• Run HyperTerminal on your PC and make a direct connection on COM1
• Connection Properties should be set to: 38400 Bauds, 8 Data Bits, Odd Parity, 1 Stop Bit, and None Flow Control.

When you power up the HD-SDI Generator, plug or unplug the HD-SDI outputs. Messages will be displayed in the HyperTerminal window indicating the input and output formats as well as the native monitor resolution reported by the EDID message.



Note: For a true RS422 connection, you can use an adapter made by KK Systems (Part Number K422-99). This adapter connects to the RS232 port on the PC and provides an RS422 connection on the other side. To connect the K422-99 to the HD-SDI to DVI Conversion Box, use a standard RS422 cable (Male DB9 to Male DB9 pin to pin). A true RS422 connection allows for a better connection and longer cables.

FIRMWARE UPDATE PROCEDURE

To upgrade the firmware on your HD-SDI Generator, you would need to get the new firmware package that would be named HDG_206.zip or a similar name. In this package you should find 4 different files:

1. HDG20_220.bin: The new firmware
2. hdg.exe: The command prompt flash utility (do not double click or run, use the batch file instead)
3. HDG_update.bat: A batch file with the proper commands to upgrade the HD-SDI Generator

Place all 4 files in the default command prompt folder. This is the folder that Windows goes to when you run the Command Prompt application and:

- Recycle power on your HDSDI Generator
- Enter HDG_update.bat
- You will be prompted to enter the COM port number connected to the HDSDI Generator device, Enter 1 for COM-1 or 2 for COM-2
- Enter the firmware filename, i.e. HDG20_220.bin

Time Code

Ancillary Timecode (ATC) is similar to linear time code (LTC). ATC is incremented each frame and is reset to 0 after 24 hours. LTC is on Line-10 Field-1 and VITC is on Line-9 Field-1 and on Line-571 Field-2

LTC is transmitted on Line-10 Field-1 for all formats except for PAL where it's transmitted on line 6. (SMPTE RP188) VITC is transmitted on Line-9 Field-1 and Line-571 Field-2

Audio

In SD (PAL or NTSC), 2 pairs are embedded on the SDI stream with 6 or 8 packets per line (SMPTE 272M).

In HD, 2 pairs are embedded on the HDSDI stream (SMPTE 299M).

SMPTE Standards

Video Output: SMPTE 125M, SMPTE 296M, SMPTE 274M, SMPTE 372M, SMPTE 352M
Time Code (LTC) SMPTE RP 188
Audio (embedded on SDI / HD-SDI)
SMPTE 272M SMPTE 299M

Note: In 2K, ancillary data is output only on Link A to match SMPTE 372M specifications.

Formats Supported

- NTSC & PAL
- 720p - 60, 59.94, 50Hz
- 1080i / 1080p - 30, 29.97, 25, 24, 23.98Hz
- 2048x1080p & sf - 24, 23.98Hz
- Standards: SMPTE 125M, 274M, 296M, 372M
- Bit Rate: 1.485 Gb/s, 1.4835 Gb/s, 270Mb/s
- Resolution: 10bit

Interface

- Two line LCD with menu controls
- Save settings to memory option

General

- 5 volts (screw-on connector)
- External Adapter: 100-240VAC 50-60Hz
- 5.4" x 3.7" x .8" (138mm x 93mm x 22mm)
- Shipping Weight: 5 Lbs.

VANC Counter

For 1080i-59.94 formats, when VANC is enabled, the HDG-20 can embed up to 4 data packets on each of the following lines:

- Field-1: Lines 9 to 20
- Field-2: Lines 572 to 583

All packets are identical except for UWD0, UWD1 and UWD255 that are used to indicate the line number, packet number / field identifier and the checksum. The packet is structured as follows:

ADF1= 0x00
ADF2= 0xFF
ADF3= 0xFF
DID= 0x5F
SDID= 0xFA
DC= 0xFF
UWD0= LSB byte of the line number
UWD1= Packet Number and Field Identifier, 0x30 for packet-3 field-1 or 0x2F for packet-2 field-2
UWD2 .. UWD254= Hex value of a counter that starts at 0x00 and ends 0xFC
UWD255= Checksum

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