SG4410
AES/EBU Digital Audio Sync Generator
User Guide

The AES/EBU SG4410 Sync Generator module produces reference quality digital tone and silence at selectable 44.1, 48, 88.2, or 96 kHz sample rates and an SDIF-2 Word Clock at 44.1 or 48 kHz. These reference signals, phase aligned with the inputs, are used for source synchronization in a digital audio environment.

The SG4410 locks to composite video (NTSC or PAL), Tri-level HD Sync, AES/EBU, or SDIF-2 Word Clock. It automatically senses the input signal format (NTSC, PAL, AES/EBU, SDIF-2). Video and AES/EBU inputs may be looped through or terminated at the module. On-board jumpers provide termination options.

The module allows video input termination of either 75Ω or Hi-Z (loop-thru, termination downstream). It also allows AES/EBU input termination of either 110Ω (balanced I/O), 75Ω (unbalanced I/O), or Hi-Z (loop-thru, termination downstream). User-selectable analog HDTV video may also be used with line and frequency selection of 1125/750, 60/59.94. The priority for the input reference (locking) signal is as follows:

1 Video
2 AES/EBU
3 SDIF-2 Word Clock

The AES outputs are in phase with the input reference signal. If video is the input reference, the output is synchronized to Field 1, Line 1. If none of the above signals are present, the SG4410 enters a free-running state and continues to provide a stable reference.

The SG4410 module consists of a Processing Card and an I/O card. The Processing Card, installed at the front of the 4000 Series frame and connected to the motherboard, occupies one slot. This card receives ±15VDC through the motherboard and generates the ±12 and +5 VDC power for the module.

Installed at the 4000 Series frame rear panel, the I/O card occupies the slot opposite the slot for the Processing Card and connects to the motherboard. Two configurations of I/O cards are available to provide for either an AES balanced or unbalanced interface.

Processing Card Panel Description

Figure 1 illustrates the SG4410 Processing Card front panel. Front panel LEDs, visible when the 4000 Series frame door is open, indicate power, reference signal presence, and the current output sample rate. Switches on the front panel allow user configuration control. Keyed to Figure 1, switches and LEDs are described below.

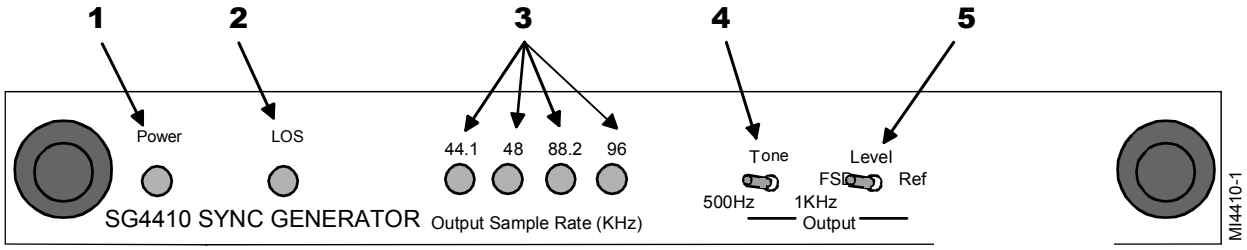


Figure 1. SG4410 Processing Card Panel Indicators and Switches

1 - This green Power LED is normally On to indicate that the module is receiving power from the NV4001/2 frame power supply through the motherboard. On-board supplies then generate the ±12VDC and +5VDC required by the module.

2 - This red LOS LED is normally Off. If lighted, the SG4410 is not receiving any of the three input reference signals.

3 - One of these green LEDs is On during normal operation to indicate the currently selected output sample rate (in kHz). See *Configuration* for additional details about selecting the sample rate.

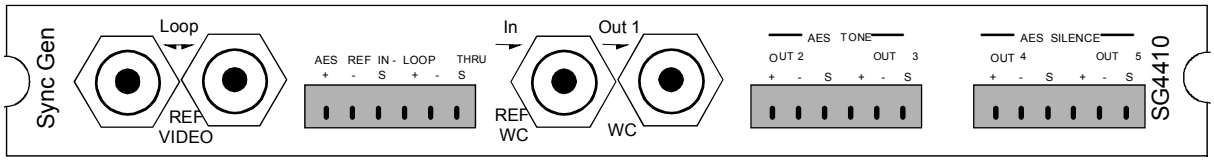
4 - This switch allows the user to select the frequency for the AES output Tone signal. See *Configuration* for additional details about use of this switch.

5 - This switch allows the user to select either FSD (Full Scale Digital) or Reference as the signal amplitude for the output Tone signal. See *Configuration* for additional details about use of this switch.

I/O Panel Descriptions

I/O cards are designed to support balanced (twisted pairs) or unbalanced (coaxial) AES input and outputs. This selection, made at the time the SG4410 is ordered, depends on the requirements of your facility. The Reference Video input and the Reference Word Clock input and output are coaxial. Figure 2 illustrates the balanced and unbalanced SG4410 I/O panels.

Balanced I/O Card



Unbalanced I/O Card

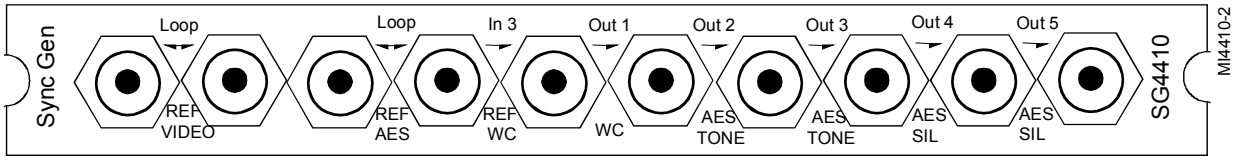


Figure 2. SG4410 I/O Card Panels

The balanced I/O Card provides:

- BNC connectors for the video (with loop-thru) input and SDIF-2 Word Clock input.
- A Phoenix connector for an AES Ref (with loop-thru) input.
- A BNC connector for Word Clock output.
- Two Phoenix connectors for AES outputs (one with two Tone outputs and one with two Silence outputs).

The unbalanced I/O Card consists of BNC connectors only with:

- A Video (with loop-thru) input, an AES (with loop-thru) input, and a Word Clock input.
- A Word Clock output, two AES Tone outputs, and two AES Silence outputs.

Note: Arrows on the I/O panels beside the BNC connectors point to the connector appropriate for the legend above the arrow.

SPECIFICATIONS.

Table 1. SG4410 SYNC GENERATOR SPECIFICATIONS

TYPE	PARAMETER
General	
Power	±15VDC input from 4000 Series frame, ±12 and +5 VDC onboard
Power Consumption	4.2 Watts
Size	Processing Card: 0.563” (14.3mm) H x 6.125” (155.6mm) W x 12.375” (314.3mm) D I/O Card: 0.563” (14.3mm) H x 6.125” (155.6mm) W x 2.938” (76.6mm) D
Weight	1.25 lbs (0.6kg) max.
Inputs	
1 Video Sync	Input Impedance - 75Ω/Hi-Z Input Level - 1 Vpp, Nominal Signal Format - NTSC per SMPTE 170M, PAL, and HD Sync per SMPTE 274M
AND	
1 SDIF-2 Word Clock	Input Impedance - Hi-Z Min/Max Input Signal - 2V/5V
AND EITHER	
1 AES3 Ref Loop-thru	Input Impedance - 110Ω, ±20%, 0.1MHz to 6.0MHz Min/Max Input Signal - 200mVpp/10Vpp
OR	
1 AES-3ID Ref Loop-thru	Input Impedance - 75Ω Min/Max Input Signal - 320mVpp/1Vpp, ±20% Return Loss - >15dB, 0.1MHz to 6.0MHz
Outputs	
1 SDIF-2 Word Clock	Output Signal - Drives CMOS Levels into 75Ω.
AND EITHER	
4 AES3 (2 Tone, 2 Silence)	Output Impedance - 110Ω, ±20%, 0.1MHz to 6.0MHz Output Voltage - 2.0 to 7.0 Vpp into 110Ω Rise/Fall Time - 5 to 30 ns (10% to 90%) Jitter - ≤ ±20ns
OR	
4 AES-3ID (2 Tone, 2 Silence)	Output Impedance - 75Ω, ±20%, 0.1MHz to 6.0MHz Output Voltage - 1.0Vpp into 75Ω DC Offset - <50mV Jitter - ≤ ±20ns Return Loss - >15dB, 0.1MHz to 6.0MHz

CONFIGURATION

Configuring the SG4410 entails switch settings and jumper placements. Figure 4410-3 shows the Processing card with configuration switches highlighted and Figure 4410-4 shows the card with configuration jumpers highlighted.

Switches

Configuration switches consist of two panel toggle switches and an 8 position DIP switch. Keyed to Figure 3, configuration switches are:

1 Use switch S1 to set output Tone frequency to either 500Hz or 1kHz per your facility requirements.

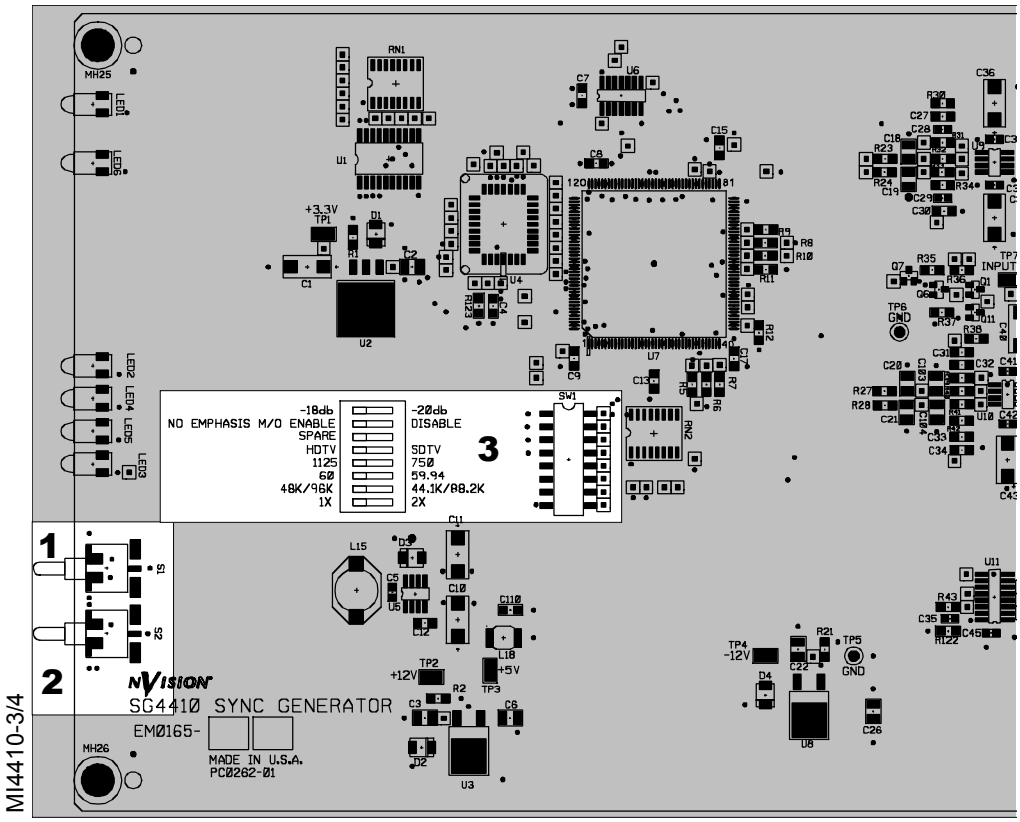


Figure 3. SG4410 Configuration Switches

2 Switch S2 allows you to set the Tone output level to 0dB, -18dB, or -20dB. Set to FSD (Full Scale Digital), selects 0dB (and disables SW1-1); set to Ref allows you to select -18dB or -20dB with SW1-1.

3 The 8 position DIP switch, SW1, provides the following functions:

SW1-1: With S2 (see **2** above) in Ref position, use SW1-1 to set Tone output level appropriate for your facility. Set as follows:

Off -18dB
On -20dB

SW1-2: Use this switch to control Channel Status No Emphasis Manual Override. If receiving an Emphasis error downstream, change this switch to the opposite setting per the following:

Off Enable
On Disable

SW1-3: Spare (not used)

SW1-4: Use this switch to select High Definition TV (HDTV) or Standard Definition TV (SDTV) for the Video Ref input per the following:

Off HDTV
On SDTV

Note that selection of SDTV disables SW1-5 and SW1-6.

SW1-5/6: With SW1-4 set to HDTV, use these switches to select the lines and frame rate for the HDTV video ref input. Set per the following:

5	6	
Off	Off	1125 lines, 60Hz
Off	On	1125 lines, 59.94Hz
On	Off	750 lines, 60Hz
On	On	750 lines, 59.94Hz

SW1-7/8: Use these switches to select the output sample rate appropriate for your use. Set as follows:

7	8	
Off	Off	48kHz
Off	On	96kHz
On	Off	44.1kHz
On	On	88.2kHz

Jumpers

Jumpers J1 and J2 on the SG4410 Processing Card select termination impedance for AES/EBU and video inputs. Figure 4 shows the jumper locations. Set J1 and J2 as follows:

Note: To properly set the jumpers for your facility, you must know if you are using a Balanced or Unbalanced SG4410 I/O Card and if you want loop-thru reference inputs.

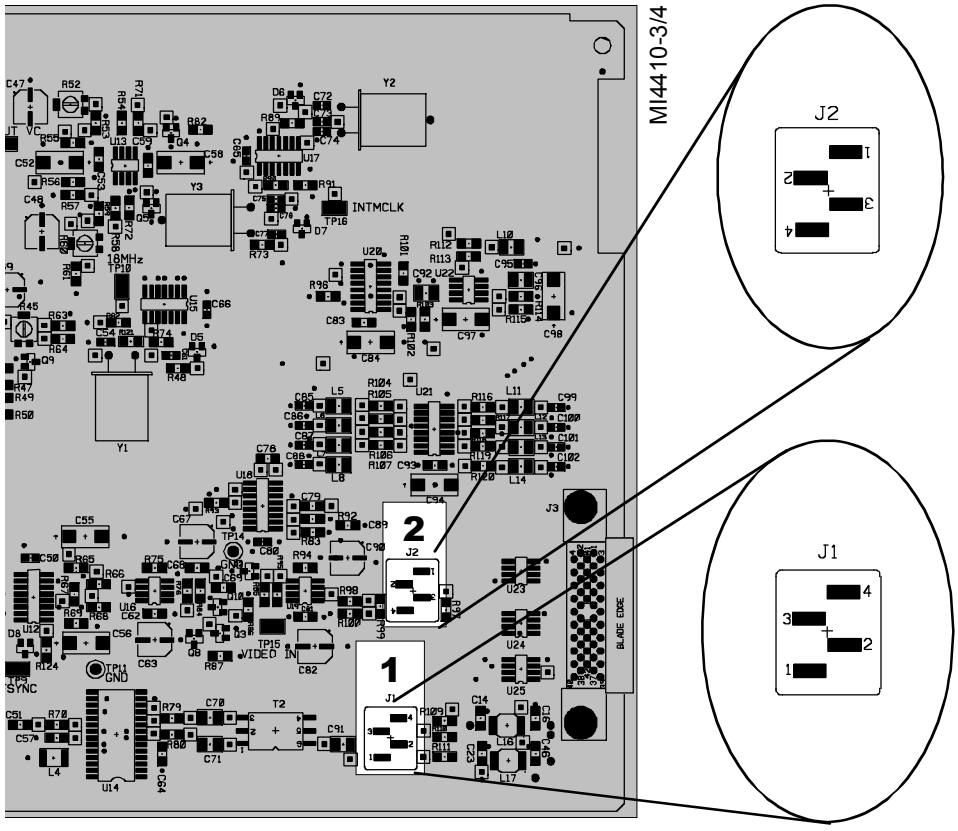


Figure 4. SG4410 Configuration Jumpers

1 A jumper on J1 selects AES/EBU termination where (from the bottom):

Jumper PinsTerminationUse

1-2 110ΩNo Loop-thru, Balanced I/O Card
2-3 75ΩNo Loop-thru, Unbalanced I/O Card
3-4 Hi-ZLoop-thru, termination downstream

2 A jumper on J2 selects video termination where (from the top):

Jumper PinsTerminationUse

1-2 75ΩNo Loop-thru
2-3 Hi-ZLoop-thru, termination downstream
3-4 Hi-ZLoop-thru, termination downstream

INSTALLATION

The module can be installed (by qualified personnel only) with frame power on. Installation entails inserting the processing module into an available front slot of the 4000 frame and inserting the I/O module in the rear slot directly behind the processing module.

TROUBLESHOOTING & MAINTENANCE

The module requires no routine maintenance.

If the LOS LED remains on, the reference source is out of specification or not present, or the SG4410 is bad. If the signal exhibits problems, check signal sources, cables, terminations, and switch/jumper settings.

If the module does not appear to operate correctly, reseat the module in the frame to ensure good internal connections and then check that the Power indicator on the front of the module is lit. For additional information, please refer to the 4000 Series Processing Frames and Power Supply User Guide. For technical assistance, call 530-265-1000 or send email to *nvsupport@nvision1.com*.