AM-4
Audio Monitor

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AM-4

4 channel
Analog, AES3 Digital, SDI Embedded Digital
Audio Monitor
User Manual

Introduction

The AM-4 is a DSP based digital audio signal monitoring unit, with facilities for monitoring two Stereo Analog, two AES3 Stereo Digital, and two SDI Embedded stereo signal sources.

The four (two stereo channel) audio level meters display VU and PPM values simultaneously, with dBu and dBFS scales.

Two stereo audio signals (Analog, AES3 digital, SDI embedded digital) may be monitored at a time using the level meters. Only one of the two selected stereo sources can be monitored via the built-in speakers, or with headphones.

The AM-4 supports four monitoring modes: Stereo, Left channel only, Right channel only, and Left and Right summed mono.

A front panel volume control is provided, for use with speaker and headphone monitoring only. The VU/PPM meters and Line output levels are not affected by the volume control.

The Analog inputs support either XLR or 1/4“ TRS connections. Analog input sensitivity is adjustable for each individual input to either +4 dBm or –10 dBV nominal levels, by using the internal jumpers provided on each analog input. AES3 Digital inputs are XLR-3F balanced, and the SDI input is a BNC connection.

Two Analog outputs, two digital stereo line outputs, and a parallel GPI remote connection are provided for convenience.

The Out-of-Phase LED will illuminate when phase reversal occurs on one of the stereo channels. Note that this condition can occur not only for actual accidental phase errors, but may also appear during segments where signal processing has been applied for sound imaging purposes.
A feature to test for an out-of-phase condition is provided. Pressing and holding down either A or B pushbutton will reverse the phase of the right channel of the signal while it is being listened to. This function is very useful to determine whether a stereo signal source is out-of-phase or not.

The Silence LED will illuminate when the signal level falls below the set threshold level, and stays below the threshold for more than either 5 or 10 seconds in any one of the four channels currently being monitored. The duration of silence and threshold level to activate this warning is determined by the user-preset DIP switches.

In the SDI embedded digital audio signal, the carrier is divided into four groups, and each group can contain up to two stereo digital audio signals. The AM-4 allows selection of one specific audio group, and retrieval of one or both of the embedded stereo digital audio signals in that group.

Note: The AES3 digital and SDI Embedded digital audio interfaces are optional plug-in boards.

1. Functionality

1-1. Input Selection

Two stereo sources may be monitored simultaneously, one on the monitor A meters, and one on the monitor B meters. The input source for each is selected using the Monitor Select and INPUT pushbuttons. As an example, to monitor Analog input channel A, press the A pushbutton, then select the Analog input source by pressing the INPUT pushbutton. When the INPUT pushbutton is pressed, the input source selection will cycle through Analog, Digital AES3, and SDI digital, then back to Analog. To assign a source to monitor B**,** use same process as described for A using the B pushbutton.

Only input sources Analog-A, AES3 Digital-A and SDI channel 1 and 2 may be assigned to monitor channel A. Only input sources Analog-B, AES3 Digital-B and SDI channel 3 and 4 may be assigned to monitor channel B.

Monitored input sources are automatically routed to both the Analog and AES3 Digital line outputs.

Selecting one of four SDI groups is accomplished with the **SDI** pushbutton. Each SDI group contains up to four (two stereo) digital audio channels.

The currently selected signal sources for monitor channels A and B are indicated by the LEDs located above each VU meter pair.

The nominal sensitivity of all Analog line inputs is adjustable to either +4 dBm or –10 dBv by jumper settings on the main circuit board.

1-2. Monitor source and Monitor Mode selection

Either monitor channel A or B can be selected and routed to built-in speakers by pressing the **A** or **B** pushbutton.

Each depression of the monitor mode [LEFT/RIGHT] button selects one of 5 monitoring modes, in sequence: (1) Stereo, (2) Left channel only, (3) Right channel only, (4) Monaural (5) Right channel phase reversal (out of phase), then back to (1).

The LEFT and RIGHT LEDs indicate the current monitor mode:

(1) Stereo ……. both LEFT and RIGHT LED are on.
(2) Left channel only ….. only LEFT LED is on
(3) Right channel only … only RIGHT LED is on
(4) Monaural ……. both LEFT and RIGHT LEDs flash once
(5) Right channel phase reversal … both LEFT and RIGHT LEDs flash twice.

Note that an Out-of-Phase condition listening test can be easily performed using mode 5.
The phase of the right channel will be reversed, allowing a comparative listening test to be performed. This function is very useful when trying to determine whether a stereo signal source is out-of-phase or not.

Speaker and/or headphone monitoring can be changed from normal Stereo mode to Left channel only, Right channel only, or Left and Right summed mono mode by using the **LR** (Left Right) pushbutton. Mono monitoring mode is indicated when both the L and R LEDs are flashing. Stereo monitoring mode is indicated when both the L and R LEDs are continuously on.

1. Functionality (cont'd.)

1-3. VU / PPM Meter

The VU/PPM meters are 3 color LED bar displays, with 53 segments per channel.
By using a core DSP processor, all of the monitoring for the four (two stereo) signal channels are processed in the digital domain for both RMS and PPM and calculated in real-time.
The VU and PPM values are then displayed in the range from –34 dBu (-53 dBFS) to +18 dBu (0 dBFS) in 1 dB increments. All Analog signals are converted to the digital domain before being processed by the DSP.

1-4. Out-of-Phase and Silence Monitoring

Out-of-Phase and Continuous Silence conditions for the selected audio sources are indicated by the PHASE and A or B switch LEDs respectively. When an Out-of-Phase condition occurs on monitor source A, the PHASE LED illuminates and the A switch flashes for the duration of the condition.
A period of silence on a selected channel will illuminate the SILENCE LED for the duration of the condition. The time period required to constitute a silence condition is selectable using the user-preset DIP switches to be either 5 or 10 seconds. The Sensitivity threshold is adjustable to either –36 dBFS or –48 dBFS.

1-5. Line output

Two stereo Analog line outputs, and optionally, two AES3 Digital outputs are provided. Digital line outputs are mirror images of the Analog line outputs. The stereo source signals for the VU/PPM meters are routed to these line outputs.

1-6. User presets

The internal user-preset DIP switch is located at the left-hand side near the power supply circuitry on the main circuit board, and is designated as SW600. The eight switches provided for user-presets are to define Silence duration, Silence threshold level, and Test tone mode.

Test tones with 0 VU (-18 dBFS) levels and frequencies of 400 Hz and 1 kHz can be generated and routed to both the A and B line outputs when the TEST-TONE user preset switch is turned on.

The Silence duration and threshold level are both adjustable with the user preset switch for convenience.

USER PRESET SWITCHES

1 ~ 5 Undefined

6 Test Tone
- Off No test tone
- On -18 dBFS , 400 Hz test tone routed to both A and B left output channels, and 1 kHz test tone routed to both A and B right output channels.

7 Silence threshold level
- On -36 dBFS
- Off -48 dBFS

8 Silence duration
- Off 10 seconds
- On 5 seconds

1. Functionality (cont'd.)

1-7. Monitor channel A & B independent Gain Control

The signal levels of the AM4 were originally designed with unity gain between any input and any output. The signal levels for channel A & B can be increased or decreased up to +30/–20 dB in 1 dB increments.

Increase or decrease gain

To increase / decrease gain, use combination of front panel control button [A] or [B], and [INPUT] or [SDI] buttons. Button [A] or [B] selects the intended channel to change. The [INPUT] button increases the gain and the [SDI] button decreases the gain.

For instance, to increase the gain of channel A, press and hold the [A] button, then press [INPUT] until the desired signal level is reached.

[A] or [B] to select channel …. A or B
[INPUT] gain increase. …… UP
[SDI] gain decrease. ……. DOWN

Gain display

Internal gains can be displayed on the VU meters. To see the current gain, press and hold the [A] or [B] button for approximately a one-half second. The left channel VU meter shows the amount of gain applied, relative to the right channel meter. The right channel meter indicates the relative reference for unity gain. Each LED bar is equivalent to 1 dB. (The reference level shown on the right channel VU is always at –30 dBFS. This –30 dBFS reference was chosen for convenience only, in order to accommodate and display the gain range of –20 to +30 dB.)

For instance when channel B's gain is increased by +20 dB, the left channel gain display shows the bar at –10 dBFS (-30 + 20 = -10). The right channel's VU bar is always at the relative unity gain reference level, placed at -30 dBFS.

The factory default gain is 0 dB.

AM-4 Specifications

Power Requirements	115 VAC, 60 Hz or 230 VAC, 50 Hz, 50 W
Analog Audio Inputs	
Input Impedance	20 kohms balanced, 10 kohms unbalanced
Nominal Input Level	-10 dBV, or +4 dBu
Maximum Input Level	+24 dBu
Input Connectors	XLR-3F and 1/4"TRS, x 4
Common Mode Rejection	-60 dB typical @ 60 Hz
Analog Audio Outputs	
Output Impedance	100 ohms balanced
Output Signal Level	+4 dBu nominal, +22 dBu maximum
Output Connectors	XLR-3M, x 2
Digital Audio Inputs	
AES3	XLR-3F x 2
SDI	BNC
SDI Outputs	BNC x 2, Active loop
VU/PPM Meters	3 Color, 53 Segment LED bar x 4
Attack Time	20.8 usec (PPM)
Speakers	20 W, 8 ohms
Power Amplifier Outputs	15 W RMS, 8 Ohms
Frequency Response	From 20 Hz to 20 kHz +/- 1 dB
THD + Noise	0.01% or less
Remote Control	DB-9F; Parallel Remote (pull down to ground)
Physical Dimensions (Inches)	19 W x 3.5 H x 13 D, EIA rack mounting

Warranty

Videoquip Research Limited (VRL) warrants the AM-4 for a period of 2 (two) years from the date of shipment from the factory, to be free of defects in workmanship and material under normal use and service. This warranty is void if failure is due to abnormal use or modification, or if serial numbers have been tampered with. VRL's liability is limited to the repair or replacement of this unit, or to a sales credit, and the warranty action taken is at the sole discretion of VRL. Any warranty claims must be received in writing by VRL before the expiration of the two year period. Warranty coverage does not include shipping costs. This warranty is in lieu of all other warranties, expressed or implied, and all other obligations or liabilities of Videoquip Research Limited.