# Rx Audio Integration Application Notes

Overview

With digital audio coming in different flavours over different interfaces it is essential that the PHABRIX Rx system is configured correctly to that the audio can be analysed.

The sophisticated architecture of the PHABRIX Rx system also allow the integration of the unit into environments that uses native AES audio, AES audio embedded in the SDI data stream as well and Dolby E, Dolby D and Dolby D+ audio encoded in AES and embedded in SDI.

The Rx instruments use a module-wide, high speed data bus to transfer video, audio and control data between the installed modules and the CPU module. The bidirectional audio data bus allows audio data (originating as SDI embedded audio or AES audio) to be processed by the system. This bus also allows the routing of audio data to output as embedded SDI audio, AES audio and HDMI audio.
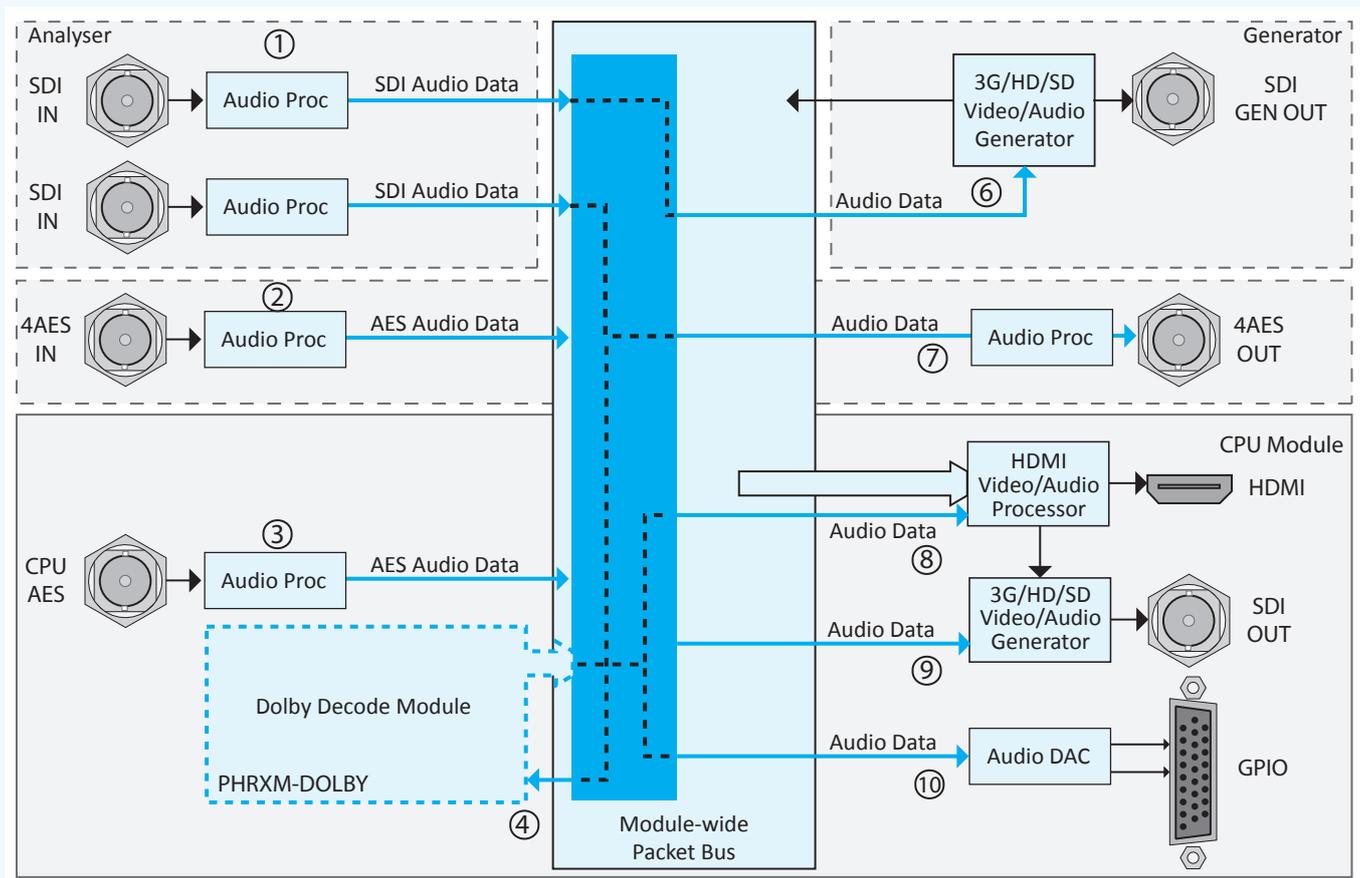
Simplified audio block diagram of the Rx instrument

Audio channel selection for analysis

Embedded Audio Input

The Analyser module to which the SDI signal is connected will predetermine which instruments that can have access to the embedded audio channels of the SDI signal. Audio channel selection is made on each instrument ①

The levels of the embedded audio channels for the selected input can be viewed using the Audio Meters for that specific Analyser module. The Meters window can displays the levels all 16 embedded audio channels at the same time. The actual channel pairs to be displayed can be selected using the Setup menu.

The Lissajous display allows the phase relationship of a selected stereo audio pair from the embedded audio channels to be seen.

The loudness levels of the embedded audio channels can be monitored and logged using the Loudness window. The Loudness window allows a stereo pair or 5.1 channel group to be selected. (the individual audio channels for the 5.1 group being defined in the Surround Meters Setup window).

The Audio Status and Dolby Meta-Data (Dolby Metadata Analysis option) windows allow the selection of an individual stereo pair from the embedded audio for analysis.
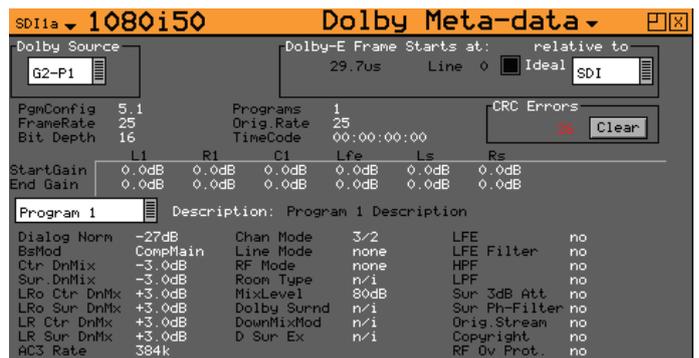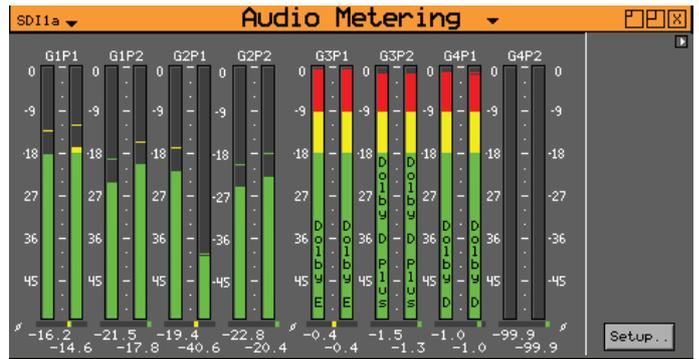

AES Audio Input

The 4AES module provides audio-only analysis tools and audio-only generation tools.

The 4AES module provides 4 configurable input (analyser) /output (generator) pairs.

The Generator - Output Audio window of the 4AES module is used to assign the connectors as inputs or outputs. The inputs (A In, B In, C In and D In) can be monitored using the instruments available with the module. See ② on block diagram

The Audio Meters display allows the levels of the AES audio channels to be viewed. The Meters window can display a maximum of 8 AES audio channels at the same time. The actual channel pairs to be displayed can be selected using the Setup menu.

The Lissajous display allows the phase relationship of a selected stereo AES audio pair (A In, B In, C In or D In) to be seen.
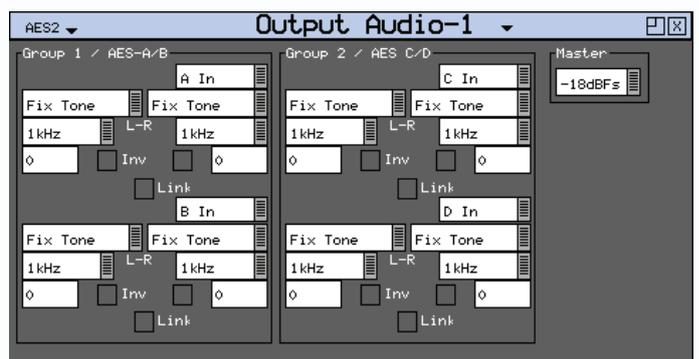
The loudness levels of the selected AES audio pair (A In, B In, C In or D In) can be monitored and logged using the Loudness window.

The Audio Status and Dolby Meta-Data (Dolby Metadata Analysis option) windows allow the selection of an individual AES audio pair for analysis.
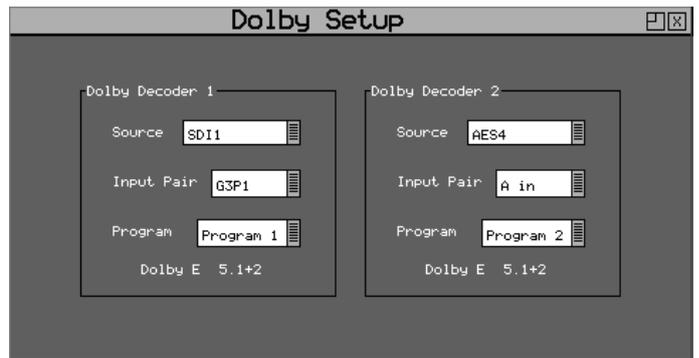
Decoded Dolby Audio (Dolby Decoder module)

The Dolby audio source to be decoded into baseband audio channels can be selected from a pair of audio channels from an Analyser module SDI input, from the AES input on the CPU module or from a pair of AES audio channels from the 4AES module.

The selection of which audio pair that is decoded is made in the System - Dolby Decoder Setup window. The Source drop down allows the selection of either Analyser (ie Analyser module) or AES In (CPU module). See ④ on block diagram.

The Analyser Source allows the selection of the SDI input holding the Dolby audio data or the 4AES module. The discrete audio pair can then be selected from the drop-down list (for example G1P1 for SDI input or A In for AES input). Where the Dolby digital audio contains more than one program, the require one can be selected.

ⓘ *To ensure that the Dolby audio is decoded correctly, the System Reference locking frame rate must be the same as the SDI input video being decoded.*

The levels of the decoded Dolby audio channels can be viewed using the Audio Meters of the corresponding Analyser module. The Meters window can displays the levels all 8 of the decoded audio channels at the same time. The actual channel pairs to be displayed can be selected using the Setup menu.

The Lissajous display allows the phase relationship of a selected stereo audio pair from the decoded Dolby audio channels to be viewed on the corresponding Analyser module.
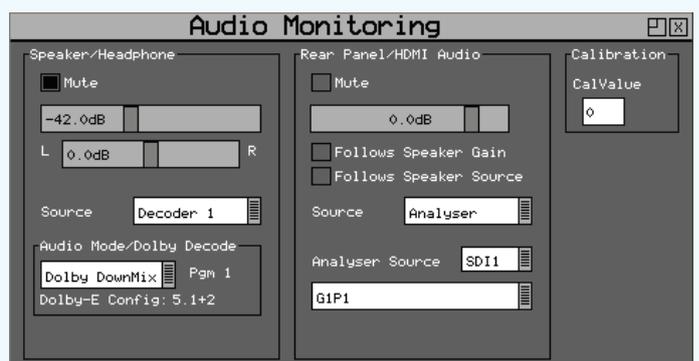
Audio Monitoring

The System - Audio Monitoring window allows the selection of any Analyser input any audio group and any audio pair from the selected embedded audio group.

The Audio Monitoring window allows the selection of the headphone/speaker audio and the separate selection of the rear connection audio. The audio level and source for the rear panel can be made to follow the headphone/speaker source. See ⑩ on block diagram

The Source drop down list allows the selection of the audio channels from an Analyser module or the CPU AES In audio stereo pair. See ③ on block diagram.

If the Dolby Decoder module is installed, the embedded Dolby audio pair to be decoded is also selected as the Source. See ④ on block diagram.

The Audio Mode/Dolby Decode section controls whether PCM audio or a Dolby Down mix is output. Where the Dolby audio contains multiple programs, the specific program to be decoded can be selected here.

Speaker / Headphone Audio monitoring

The Rx range provides a headphone socket on the front panel. In addition to this the Rx 2000 provides front panel loudspeakers.

The audio to be monitored on the Speakers/Headphones is controlled by the Speaker/Headphone section of the Audio Monitoring window.

Rear Panel monitoring

The Rx range provides an unbalance audio pair on the CPU module GPIO connector. This can be used to monitor the pair of audio channels selected in the "Rear Panel Audio" section of the Audio Monitoring window.

The Source drop down list allows the selection of either Analyser (ie Analyser module) or AES In (CPU module). The Analyser Source allows the selection of the SDI input holding the Dolby audio data or the 4AES module. See ⑩ on block diagram

The discrete audio pair can then be selected from the drop-down list (for example G1P1 for SDI input or A In for AES input).

HDMI output monitoring

The currently selected Rear Panel Audio pair in the "Speaker/Headphone" section of the Audio Monitoring window is routed via the HDMI output when the "DVI Monitor" check box is disabled. See ⑧ on block diagram

This is done using the HDMI/CPU SDI Setup window.

The audio level on the HDMI output is controlled by the Speaker/Headphone level in the Audio Monitoring window.
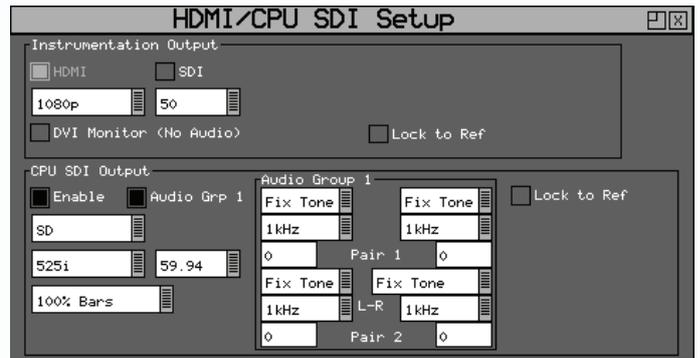
HDMI over SDI monitoring

If the HDMI Monitor output is routed via the CPU SDI output then the currently selected Speaker/Headphone audio pair is output as Group 1, Pair 1 of the embedded SDI audio.

This is done using the HDMI/CPU SDI Setup window. See ⑨ on block diagram

Note that the audio level of the SDI audio output is the same level as the currently selected audio pair in the Audio Monitoring window.
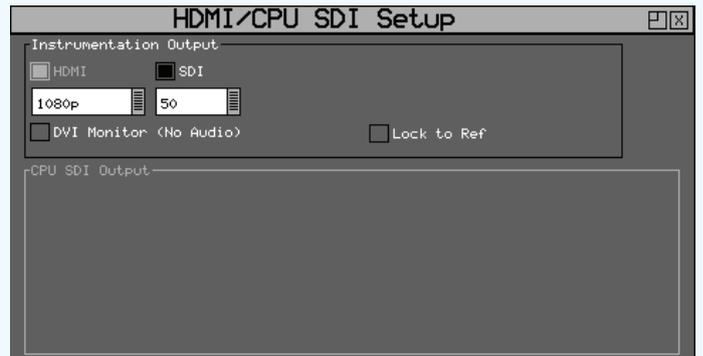
Audio Routing

The Rx system allows SDI embedded audio and AES audio to be routed from input connection to output connection.

AES Audio Output

Individual embedded audio channels from and SDI Analyser input can be output as AES audio via the 4AES module (option) using the Output Audio window.

This can be setup in the Output Audio window for the 4AES module. See ⑦ on block diagram

ⓘ *To ensure that the SDI audio is synchronous with the AES output, the System reference locking frame rate must be the same as the SDI output video being generated. This can be done from the "Ref" menu on the HDMI task bar.*
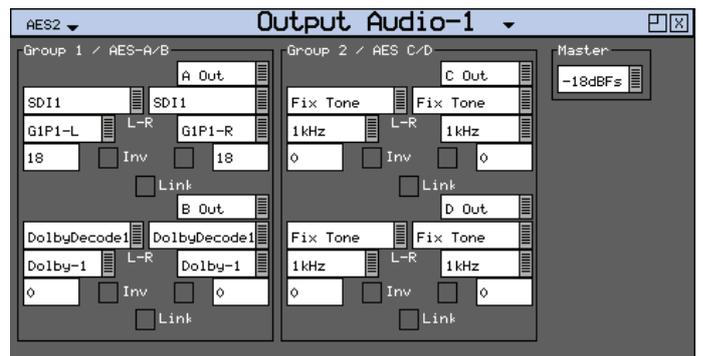
When outputting SDI as AES audio it may be necessary to adjust the levels. This can be done using the individual channel levels.

Generator SDI Audio Output

Discrete AES audio channels, from the CPU AES input or 4AES module input, can be embedded into the Generator SDI output signal instead of audio test tones. This is done using the Generator Audio Output window. See ⑥ on block diagram

When embedding AES sourced audio into the SDI signal it may be necessary to adjust the levels. This can be done using the Master level or the individual channel levels.

If the Dolby Decoder module is installed Decoded Dolby audio channels can also be embedded into the Generator SDI output signal.