

DENSITÉ series

AMX-1901 3G/HD/SD 8 Analog Audio & Metadata Embedder Guide to Installation and Operation

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Electromagnetic Compatibility



This equipment has been tested for verification of compliance with FCC Part 15, Subpart B requirements for Class A digital devices.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



This equipment has been tested and found to comply with the requirements of the EMC directive 2004/108/CE:

- EN 55022 Class A radiated and conducted emissions
- ENV 50204 Radiated EMF Immunity – RF 900 MHz Pulsed
- EN 61000-3-2 Harmonic current emission limits
- EN 61000-3-3 Voltage fluctuations and flicker limitations
- EN 61000-4-2 Electrostatic discharge immunity
- EN 61000-4-3 Radiated electromagnetic field immunity – radio frequencies
- EN 61000-4-4 Electrical fast transient immunity
- EN 61000-4-5 Surge transient immunity
- EN 61000-4-11 Voltage-dips, short-interruption and voltage variation immunity

Table of Contents

1	AMX-1901 3Gbps/HD/SD 8 Analog Audio & Metadata Embedder	1
1.1	Introduction	1
1.2	Features	1
1.3	Functional Block Diagram	2
1.4	Front Card-edge Interface	2
2	Installation	3
2.1	Installation of Rear Connector Panels	3
2.2	AMX-1901 Card Installation	4
2.3	Installation of the Optical Interface (option)	4
2.4	Rear Panels and Connectors	5
2.4.1	Images of Rear Panel Connectors	5
2.4.2	Summary of rear panel connections	5
2.4.3	Details of rear panel connections	6
3	User Interface	8
3.1	Control options	8
3.2	Card-Edge Status LED	8
4	Local control using the Densité frame control panel	9
4.1	Overview	9
4.2	Menu for local control	10
5	Remote control using iControl	11
5.1	The iControl graphic interface window	11
5.2	Video Input/Output panel	14
5.2.1	Video Input/Output panel (no fiber support)	14
5.2.2	Video Input/Output panel with fiber support	14
5.3	Metadata panel	15
5.3.1	TC-GPI tab	15
5.3.2	AFD tab	16
5.3.3	Audio tab	19
5.4	Audio Inputs panel	21
5.4.1	Analog 1-4, 5-8 tabs	21
5.4.2	The Config tab:	21
5.5	Audio Output panel	22
5.5.1	CH 1-2, CH 3-4, ... CH 7-8 tabs	22
5.5.2	Config tab	23
5.6	Dynamic Processing panel	23
5.7	Audio Programs panel	26
5.8	ALC panel	27
5.8.1	Config tab	28
5.8.2	PGM1-8 tabs	28
5.9	Loudness Panel	30
5.9.1	Loudness Config panel	31
5.9.2	Loudness PGM panel	31
5.10	Alarms panel	33
5.10.1	Alarms – Video panel	33

GUIDE TO INSTALLATION AND OPERATION

5.10.2 Alarms – Metadata panel.....	34
5.10.3 Alarms – Audio panel.....	36
5.11 Reference panel.....	39
5.12 Monitoring panel.....	39
5.12.1 RALM Connections tab	39
5.12.2 Meter Ballistics Config tab	40
5.13 Test panel.....	41
5.14 Factory/Presets panel.....	42
5.14.1 <i>Factory/Presets tab</i>	42
5.15 Options panel	44
5.15.1 Dynamic Processing option:.....	45
5.15.2 ALC option	45
5.16 Alarm Config panel	46
5.17 Info panel.....	49
6 Specifications	51
7 Grass Valley Technical Support	53
ANNEX 1 – AMX-1901 Local User Interface	54
ANNEX 2 – Installing the Optical Interface	55
ANNEX 3 – AFD Flags	57
ANNEX 4 - Loudness Logging and the Miranda Audio Loudness Analyzer	59

1 AMX-1901 3Gbps/HD/SD 8 Analog Audio & Metadata Embedder

1.1 Introduction

The AMX-1901 is an advanced, high quality 24-bit 48 kHz analog audio embedder designed to insert up to eight analog audio signals into a 3G/HD/SD video signal. The AMX-1901 can process the eight audio input channels with functions including level, channel shuffling and mixing.

Options include Automatic Loudness Control and dynamic processing (limiter, compressor, and expander). The loudness measurement features allows the measurement and logging of up to eight audio programs with iControl Loudness Monitoring software to analyze and report compliance with respect to various loudness legislation around the world. Furthermore, a delay of up to 2.7s can be programmed independently per audio input channel.

In the absence of an input video signal, an internally generated black or color bar signal is used, thus sustaining audio embedding even with a loss of input.

The AMX-1901 can embed longitudinal timecode (LTC) as ancillary timecode (ATC) in 3G/HD and DVITC in SD. Up to two GPI inputs can be used to embed GPI events to the timecode user bits in transport applications. Audio metadata insertion in the VANC is possible from an embedded VANC stream or an external RS-422 link.

A fiber input/output SFP cartridge is offered as an option on some rear modules. Once the cartridge is installed, the inputs or outputs are selectable through the control interface.

1.2 Features

Audio

- 8 analog audio inputs with input shuffling
- Individually adjustable input level
- Audio delay adjustments of up to 2.7s to compensate for lip sync issues
- Audio dynamic processor option (compressor/limiter/expander)
- Optional 8 channels, up to 8 programs Automatic Loudness Control with Wideband processing
- Loudness measurement of up to 8 audio programs and logging with iControl Loudness Monitoring software
- Loudness compliant to EBU R128, ATSC A/85:2013 and ARIB TR-B32 (ITU-R BS.1770-3)
- Built-in test pattern generator (audio + video)
- Monitoring and reporting of audio input Overload, Max/Min Loudness, Silence and Phase

Video

- 3G/HD/SD input
- Supports 3G level A (mapping 1) and level B Dual Link
- Internal black or color bar generator in case of input signal absence or loss
- Flexible HD/SD/URS reference input, used only when input signal is absent
- Optional optical fiber SFP cartridge
- Black Detection monitoring

Metadata

- AFD (SMPTE-2016), VLI (RP-186) and WSS insertion
- Longitudinal timecode (LTC input) embedding into DVITC (SD) or ATC (3G/HD)
- Audio metadata insertion (SMPTE 2020-A) from RS-422 serial data input
- 2 GPI inputs that can be inserted in the timecode user bits

1.3 Functional Block Diagram

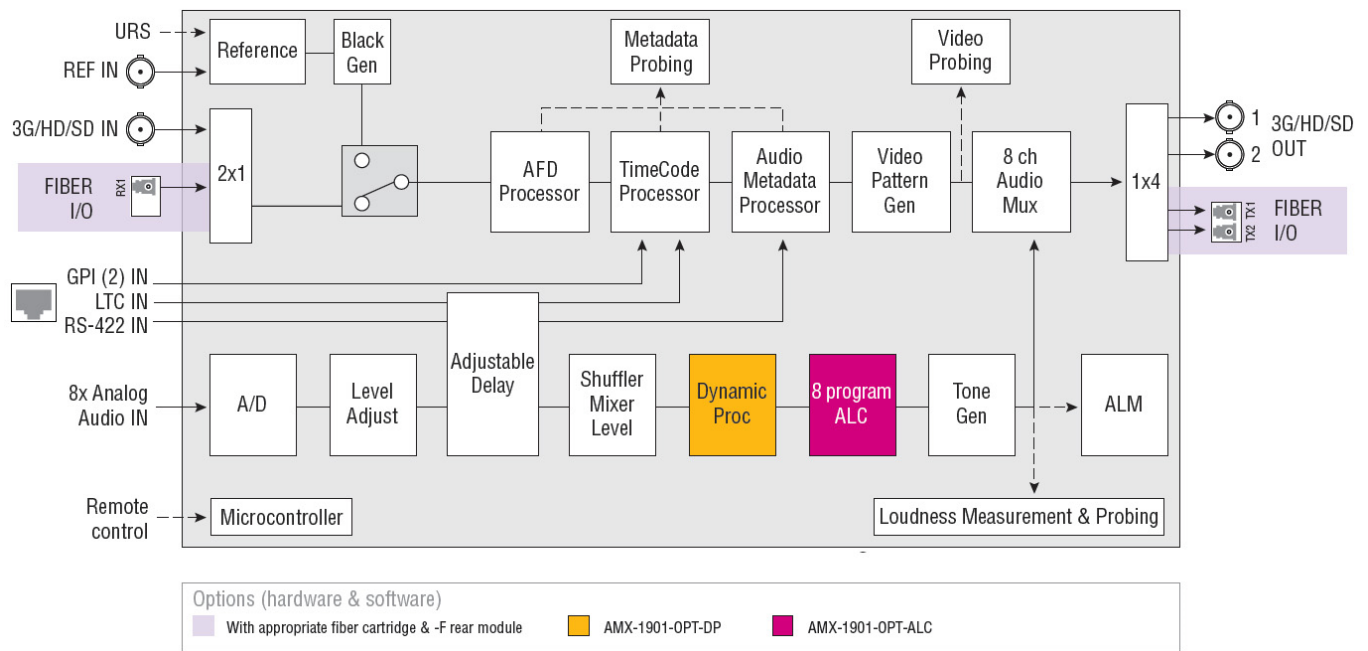


Figure 1.1 AMX-1901 Functional Block Diagram

1.4 Front Card-edge Interface

The front card-edge of the AMX-1901 incorporates two elements:

- [Status LED](#) (see section 3.2)
- [Select Button](#) (see section 4)

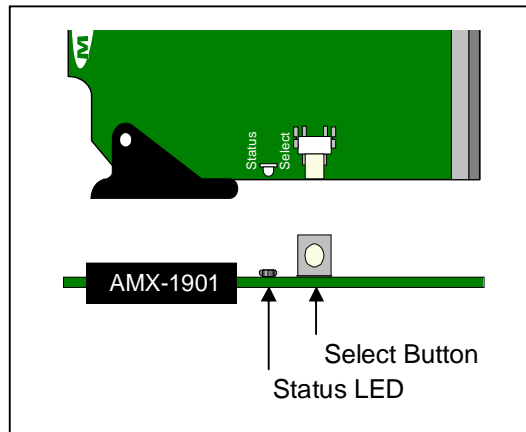


Figure 1.2 Front card-edge layout

2 Installation

2.1 Installation of Rear Connector Panels

Miranda Densité-series cards are each associated with a rear connector panel, which must be installed in the Densité frame before the card can be inserted.

The AMX-1901 card is designed to fit into Miranda's Densité-2 frame. Two different rear connector panels are available for this configuration. Due to connector space requirements, a double-slot-width rear panel is necessary:

- AMX-1901-DRP Double-slot-width panel for Densité-2
- AMX-1901-DRP-F Double-slot-width panel for Densité-2 with fiber I/O

With a factory-installed adapter mounted on the AMX-1901 card, it can be installed in a Densité-3 frame. In this case, only a single-slot-width panel is required. Two rear panels are available:

- AMX-1901-3SRP Single-slot-width panel for Densité-3
- AMX-1901-3SRP-F Single-slot-width panel for Densité-3 with fiber I/O

See [section 2.4](#) for details of the signal connections available on each of these panel types.

All cards and rear panels can be installed with the frame power on. The card has connectors which plug into a mid-frame mother board for distribution of power and for connection to the controller card, and a second connector which plugs directly into the rear connector panel for input and output.

The rear connector panel must be installed with the card out of the frame.

- To remove an existing card from the slot, tilt up the swivel handle on the front of the card to lever the connectors apart, then use the handle to pull the card straight out of the slot.

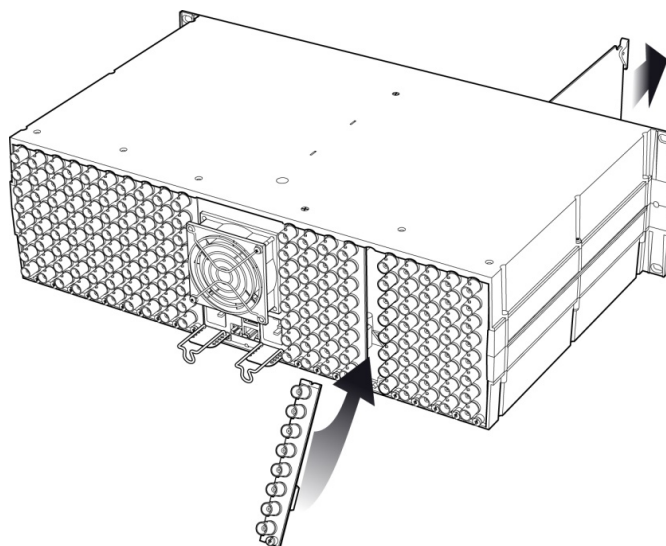


Figure 2.1 Densité-3 frame – rear panel installation

To install the connector panel:

Note – the procedure is the same for both Densité-2 and Densité-3 frames.

1. If a card is installed in the slot whose rear panel is being changed, remove it as described above.
2. Remove the existing panel (either blank or belonging to an existing card that is being changed) by releasing the captive screw(s) at the bottom.
3. Position the new panel and secure it in place with the captive screw(s) at the bottom.

2.2 AMX-1901 Card Installation

Note – The card itself (AMX-1901) is designed to fit the Densité-2 frame. If it was ordered for the Densité-3 frame (AMX-1901-3RU), it will be delivered with an installed adapter that allows it to fit into the taller frame. The adapter can be ordered separately and user-installed if required.

Once a matching rear connector panel is in place, install the AMX-1901 card as follows:

1. Open the front panel of the frame.
2. Slide the AMX-1901 card into the slot and push gently on the handle to seat the connectors.

When using the double-slot-width rear panel in a Densité-2 frame, the card should be inserted into the right-most of the two slots. Inserting the card into the wrong slot will not damage the card, and will be flagged by the on-card status LED flashing red to indicate that there is no connection to the rear panel.

3. Close the front panel of the frame.

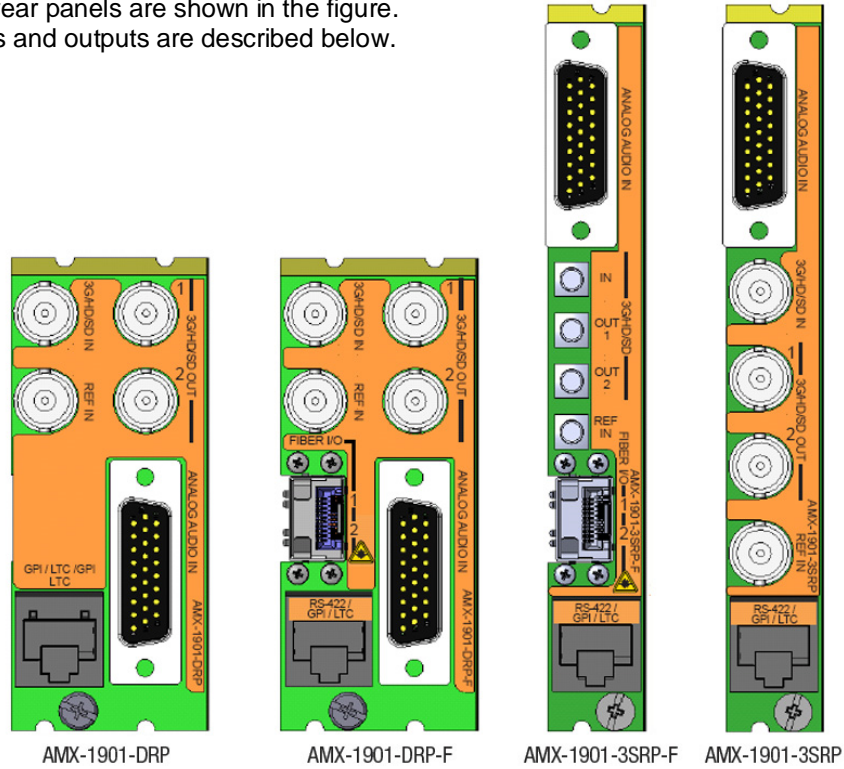
2.3 Installation of the Optical Interface (option)

Refer to [ANNEX 2](#).

2.4 Rear Panels and Connectors

2.4.1 Images of Rear Panel Connectors

The four available rear panels are shown in the figure. Details of the inputs and outputs are described below.



2.4.2 Summary of rear panel connections

AMX-1901-3SRP				
AMX-1901-3SRP-F				
AMX-1901-DRP				
AMX-1901-DRP-F				
CONNECTORS				
Single-slot-width panel			◆	◆
Double-slot-width panel	◆	◆		
3G/HD/SD IN	1	1	1*	1
3G/HD/SD OUT	2	2	2*	2
REF IN	1	1	1*	1
Analog Audio IN on D-SUB	8	8	8	8
2 GPI IN, LTC IN and RS-422 IN on RJ45	yes	yes	yes	yes
Fiber I/O module	yes		yes	

* DIN1.0/2.3 connectors on AMX-1901-3SRP-F panel; BNC connectors on all other panels.

2.4.3 Details of rear panel connections

3G/HD/SD IN – Serial digital 3G/HD/SD input

Connect a serial digital video signal, conforming to the SMPTE 425M standard for 3G input signals, SMPTE 292M standard for HD input signals or SMPTE 259M standard for SD input signals, to the BNC labeled **3G/HD/SD IN**. The AMX-1901 will automatically switch to the detected line/frame rate format.

3G/HD/SD OUT – Serial digital video outputs

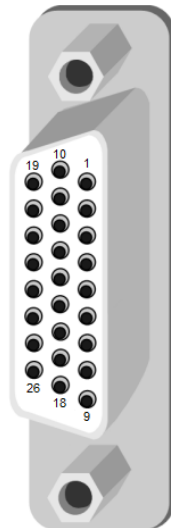
The AMX-1901 provides two 3G/HD/SD SDI video outputs on BNC connectors, labeled **3G/HD/SD OUT 1 and 2**. The SDI video signal conforms to the input standard. When there is no signal connected to the input, the selected recovery signal is used. The same signal is carried on both outputs.

REF IN – External reference input

Connect either Black Burst per SMPTE 170M / SMPTE 318M / ITU 624-4, or Tri-Level sync per SMPTE 274M / SMPTE 296M.

ANALOG AUDIO IN – Analog audio inputs (8)

The eight analog audio inputs are high-impedance balanced inputs, via a 26-pin D-SUB connector. Pinout for the connector is shown in the table.



Signal	Pin #
AUDIO IN 1 (Hi)	1
AUDIO IN 1 (Lo)	10
AUDIO IN 2 (Hi)	2
AUDIO IN 2 (Lo)	11
AUDIO IN 3 (Hi)	3
AUDIO IN 3 (Lo)	12
AUDIO IN 4 (Hi)	4
AUDIO IN 4 (Lo)	13
AUDIO IN 5 (Hi)	5
AUDIO IN 5 (Lo)	14
AUDIO IN 6 (Hi)	6
AUDIO IN 6 (Lo)	15
AUDIO IN 7 (Hi)	7
AUDIO IN 7 (Lo)	16
AUDIO IN 8 (Hi)	8
AUDIO IN 8 (Lo)	17
GND	9, 18 to 26

Fiber I/O – Fiber-optic inputs and outputs

Rear panels whose part number ends in –F incorporate a fiber optic interface. The interface consists of two parts:

- A socket on the rear panel into which an SFP interface module is plugged
- An SFP (Small Form-factor Pluggable) module into which the optical fibers are plugged, and which incorporates the optical/electrical interface

The optical fibers must be terminated in an LC/PC connector.

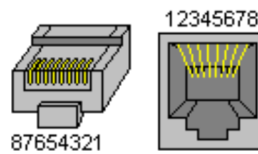
See [ANNEX 2](#) for instructions on installing and removing the SFP interface module, and for plugging and unplugging the LC-terminated fibers.

The SFP modules supported by the AMX-1901 are:

SFP Modules	Description
SFP-T-S13-LC	Single fiber Tx (output) module at 1310 nm with LC/PC connector
SFP-TT-S13S13-LC	Dual fiber Tx (output) module at 1310 nm with LC/PC connector
SFP-RT-S13-LC	Dual fiber Rx (input) and Tx (output) module at 1310 nm with LC/PC connectors
SFP-R-LC	Single fiber Rx (input) module with LC/PC connector
SFP-RT-W13-LC	Single fiber Rx/Tx module at 1310 nm with WDM, LC/PC connector
SFP-RT-W15-LC	Single fiber Rx/Tx module at 1550 nm with WDM, LC/PC connector

RS-422 / GPI / LTC – Metadata Input, GPI Inputs and Timecode Input

RS-422, GPI and LTC signals are carried on an RJ-45 connector, with the pinout as shown in the table:



Function	Pin #
RS422-RX-1	1
RS422-RX-0	2
NC	3
LTC INPUT	4
GPIO USER2 INPUT	5
NC	6
GPIO USER1 INPUT	7
GND	8

Note: A GPI is inactive when its input is left unconnected, and active when connected to ground.

3 User Interface

3.1 Control options

The AMX-1901 can be controlled in three different ways:

- The local control panel and its push-buttons can be used to move through a menu of parameters and to adjust parameter values (see [section 4](#)).
- Miranda's iControl system can be used to access the card's operating parameters from a remote computer, using a convenient graphical user interface (GUI) (see [section 5](#)).
- Miranda's RCP-200 panel (check for availability).

3.2 Card-Edge Status LED

The status monitor LED is located on the front card-edge of the AMX-1901, and is visible through the front access door of the DENSITÉ frame. This multi-color LED indicates the status of the AMX-1901 by color, and by flashing/steady illumination.

The chart shows how the various error conditions that can be flagged on the AMX-1901 affect the LED status.

- If a cell is gray, the error condition cannot cause the LED to assume that status
- If more than one LED status is possible for a particular error condition, the status is configurable. See [section 5.16](#) for details.
- The factory default status is shown by a ✪

The LED will always show the most severe detected error status that it is configured to display, and in the chart error severity increases from left to right, with green representing no error/disabled, and flashing red the most severe error.

If the LED is Flashing Yellow, it means that the card is selected for local control using the Densité frame's control panel. See [section 4.1](#) for details.

Error Condition	LED Status			
	Green	Yellow	Red	Flashing Red
Hardware failure				✪
No Rear				✪
Reference missing	✪			
SFP – missing	✪			
SFP – mismatch	✪			
SFP – temperature			✪	
SFP – voltage			✪	
SFP – input power			✪	
SFP – out A power			✪	
SFP – out B power			✪	
Video – no lock			✪	
Video – black	✪			
Video – DB MTDT absent	✪			
Ext – DB MTDT absent	✪			
AFD absent	✪			
ATC absent	✪			
LTC absent	✪			
Audio – clip 1 • • • Audio – clip 8			✪	

Audio – group absent 1 ⋮ Audio – group absent 4	✱			
Audio – overload 1 ⋮ Audio – overload 8		✱		
Audio – NSD 1 ⋮ Audio – NSD 8	✱			
Audio – min loudness 1 ⋮ Audio – min loudness 8	✱			
Audio – max loudness 1 ⋮ Audio – max loudness 8	✱			
Audio – phase error 1 ⋮ Audio – phase error 4	✱			
Audio – mute 1 ⋮ Audio – mute 8		✱		
Audio - tone		✱		

4 Local control using the Densité frame control panel

4.1 Overview

Push the SELECT button on the AMX-1901 card edge (see section 1.4) to assign the local control panel to operate the AMX-1901. Use the control panel buttons to navigate through the menu, as described below.

All of the cards installed in a Densité frame are connected to the frame’s controller card, which handles all interaction between the cards and the outside world. There are no operating controls located on the cards themselves. The controller supports remote operation via its Ethernet ports, and local operation using its integrated control panel.

The local control panel is fastened to the front of the CPU-ETH2 controller card, and when installed is located in the front center of the frame, positioned in front of the power supplies. The panel consists of a display unit capable of displaying two lines of text, each 16 characters in length, and five pushbuttons.

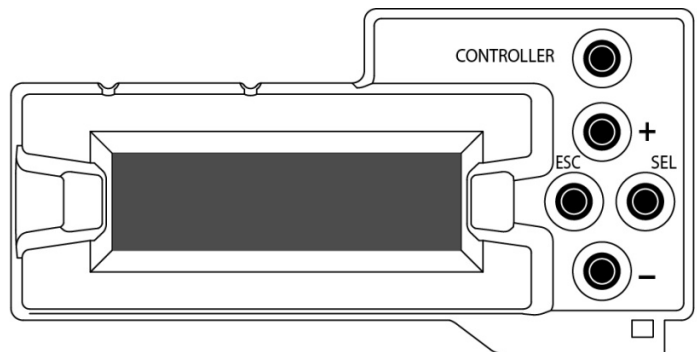


Figure 4.1 Densité Frame local control panel

GUIDE TO INSTALLATION AND OPERATION

The panel is assigned to operate any card in the frame by pushing the SELECT button on the front edge of that card.

- Pushing the CONTROLLER button on the control panel selects the Controller card itself.
- The STATUS LED on the selected card flashes yellow.

The local control panel displays a menu that can be navigated using the four pushbuttons located beside the display. The functionality of the pushbuttons is as follows:

[+] [-] Used for menu navigation and value modification

[SELECT] Gives access to the next menu level. When a parameter value is shown, pushing this button once enables modification of the value using the [+] and [-] buttons; a second push confirms the new value

[ESC] Cancels the effect of parameter value changes that have not been confirmed; pushing [ESC] causes the parameter to revert to its former value.

Pushing [ESC] moves the user back up to the previous menu level. At the main menu, [ESC] does *not* exit the menu system. To exit, re-push the [SELECT] button for the card being controlled.

If no controls are operated for 30 seconds, the controller reverts to its normal standby status, and the selected card's STATUS LED reverts to its normal operating mode.

4.2 Menu for local control

The AMX-1901 has operating parameters which may be adjusted locally at the controller card interface.

- Press the SELECT button on the AMX-1901 front card edge to assign the Densité frame's local control panel to the AMX-1901
- Use the keys on the local control panel to step through the displayed menu to configure and adjust the AMX-1901.

The complete menu structure is shown in [ANNEX 1](#) to this document, beginning on page 54.

5 Remote control using iControl

The operation of the AMX-1901 may be controlled using Miranda's iControl system.

- This manual describes the control panels associated with the AMX-1901 and their use.
- Please consult the iControl User's Guide for information about setting up and operating iControl.

In iControl Navigator or iControl Websites, double-click on the AMX-1901 icon to open the control panel.

5.1 The iControl graphic interface window

The basic window structure for the AMX-1901 is shown in figure 5.1. The window identification line gives the card type (*AMX-1901*) and the slot number where the card is installed in its Densité frame.

There are four main sections in the window itself, as identified in the figure:

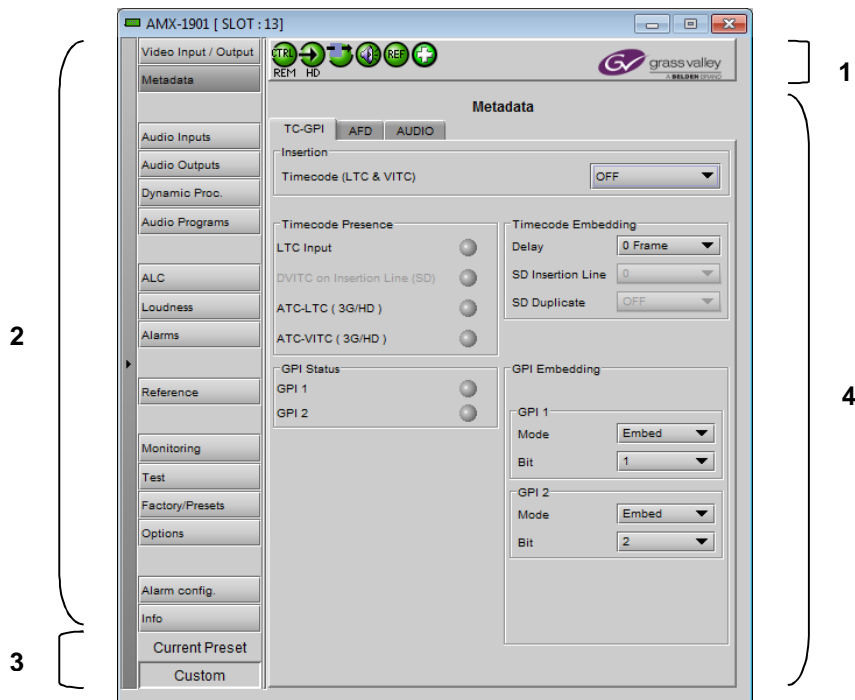


Figure 5.1 AMX-1901 iControl graphic interface window

Section 1. The top section displays six icons on the left. These icons report different statuses such as card communication status, input signal and reference signal format and statuses. In some instances, they relate to conditions defined through parameters settings.



Icon # 1 2 3 4 5 6

Move the mouse over an icon and a status message appears below the icon providing additional information.








If there is an error, the error status message appears in the message area without mouse-over.







- If there are multiple errors, the error messages cycle so all can be seen
- The icon whose status or error message is shown is highlighted with a mauve background

The table below describes the various status icons that can appear, and how they are to be interpreted.

- In cases where there is more than one possible interpretation, read the error message in the iControl window to see which applies.

Table –iControl Status Icon interpretation

Icon #1 – Manual Card Configuration	
	Remote card control activated. The iControl interface can be used to operate the card
	Local card control active, The card is being controlled using the Densité frame control panel, as described in section 4 . Any changes made using the iControl interface will have no effect on the card.
Icon #2 – Input status	
	Signal detected and valid. <ul style="list-style-type: none"> • Beneath the icon, the format will be indicated as 3G, HD or SD, and the specific format details will be listed if the cursor is moved over the icon.
	No rear Video not locked
	Video input alarm disabled
Icon #3 – Operation Mode	
	Operation mode: process – normal processing of the input signal
	Operation mode: TEST – color bar and audio test tones enabled (see section 5.16)

Icon #4 – Analog Audio Input / Output Status	
 (green)	Audio OK
 (yellow)	Yellow alarm condition detected on 1 or more channels
 (red)	Red alarm condition detected on 1 or more channels
Icon #5 – Reference	
 (green)	Reference OK. Mouse over to see the source of the reference, and its format, e.g. External, NTSC
 (red)	Video Input signal is invalid, and external and URS references are missing.
 (gray)	A valid video input signal is present, the Reference signal is not used – displays recovery format.
Icon #6 – Operation Mode	
 (green)	Hardware OK
 (red)	Hardware Health Monitoring (Hardware fault detected, SFP errors) If this icon appears flashing red, return the card to Grass Valley and specify the error code.

Section 2. The left portion of the window contains all the parameter groups, which become highlighted when they are selected; the main panel (4) then displays the group's set of parameters. Each of the groups is described in detail below.

Section 3. The lower left corner of the window identifies the Preset currently in use or "Custom" if none is applicable.

Section 4. The main panel contains all the parameters specific to the group selected. It may contain several tabs to help manage the different parameters.

Each of the panels associated with the groups accessed from the buttons in Section 2, and shown in Section 4, is described individually in the following sections.

5.2 Video Input/Output panel

This panel allows input selection and determination of the output in the event of loss of input signal.

The panel appearance is different for installations supporting a fiber input (i.e. using a –F rear panel) and those without fiber support.

5.2.1 Video Input/Output panel (no fiber support)

Timing

Select the Minimum Delay checkbox to configure the card for minimum video delay – less than ¼ line. This allows cascading of AMX-1901 cards if an operation requires the embedding of more than 8 channels.

Entering this mode disables certain metadata processing in the card in order to achieve such a small delay:

- AFD and audio metadata modes Pass, Insert, Auto and Blank modes are disabled
- Add mode is forced.

A warning message is displayed, requiring user confirmation before the minimum delay mode is triggered.

Recovery

If there is no signal on the electrical video, the card uses the reference signal to generate an output video signal in which to embed the audio. Use the two pull-downs in this section to specify the output signal format:

- Format: select the video standard. An OFF selection allows killing the outputs in the absence of a valid video input.
- Signal: select the output signal (black or color bar)

Output Status

The data box reports the actual output video format. If there is neither reference nor input video signal, the card enters a free-run mode, flagged by the “Free-Run” icon.

5.2.2 Video Input/Output panel with fiber support

With fiber support, the following sections are added or activated:

Input Select: use the pulldown list to select between the copper input (BNC) and the fiber optic input (only when a receiver SFP module is installed).



Figure 5.2 Video Input/Output panel (without fiber)



Figure 5.3 Video Input/Output panel (with fiber)

Fiber Output Config: This control is only available when a transmitter SFP module is installed. The fiber out 2 selector is only available when a dual-transmitter SFP is installed.

SFP Info: Displays information about the type and status of the installed SFP module. The two columns showing status data are labeled to reflect the type of SFP module:

- Transceiver SFP: RX-A TX-B
- Single transmitter SFP: TX-A (N/A)
- Dual transmitter SFP: TX-A TX-B

The following identifying information about the SFP module is displayed:

- Vendor name
- Type
- Part Number
- Serial Number
- Date Code

Additionally, some parameters are measured and their values displayed here:

- Temperature
- Voltage (V)
- Optical Power (dBm)
- Wavelength (nm)

5.3 Metadata panel

This panel contains three tabs that give access to metadata processing on the AMX-1901 card:

- TC-GPI
- AFD
- AUDIO

5.3.1 TC-GPI tab

This tab controls timecode and GPI embedding into the output SDI data stream.

Insertion – Timecode (DVITC) or Timecode (LTC & VITC):

- 3G/HD signals – select BOTH to insert both LTC and VITC; select OFF to disable insertion and pass incoming signals through unchanged.
- SD signals – select ON to insert DVITC into the output, incoming TC present on the insertion line will be deleted; select OFF to disable insertion and pass incoming signals through unchanged

Timecode presence:

The Status icons indicate the presence of different time code formats – those that do not apply to the current input format are grayed-out:

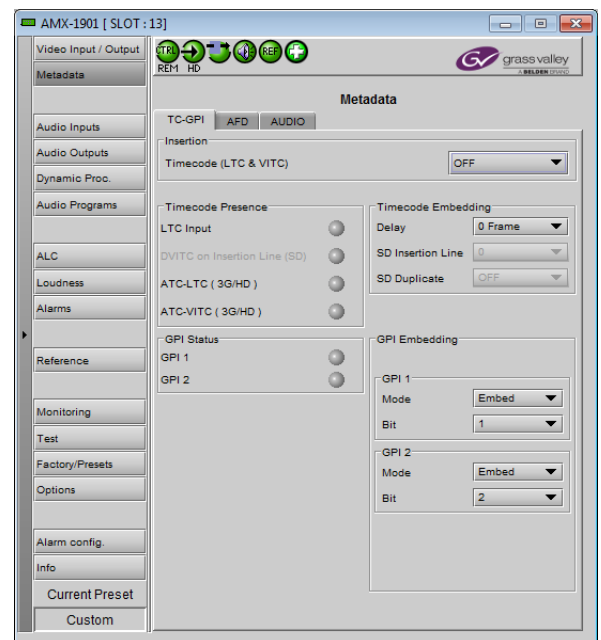


Figure 5.4 Metadata Panel – TC-GPI tab

GUIDE TO INSTALLATION AND OPERATION

- LTC input (on the rear panel)
- DVITC (SD) embedded in the SDI input on the same line that has been selected in this panel for embedding
- ATC-LTC (3G/HD) embedded in the SDI input
- ATC-VITC (3G/HD) embedded in the SDI input

The *Timecode Embedding* section provides resources to configure the embedding process.

Delay: Adjust the timecode value to compensate for a 1-to-50 frame offset between the video and the LTC.
Value: [0, 1, 2, ..., 50 frames]

SD Insertion Line: Select the line in which to embed LTC in the SD-SDI output signal. Available only when SD is detected at the input.

[Range is 10-20 for 525; 7-22 for 625]

SD Duplicate: Embed a duplicate LTC in the SD-SDI output signal on the “SD Insertion Line” + 2. Available only when SD is detected.

GPI Status: The icons show the status of the two GPI inputs on the rear panel.

GPI Embedding: Set up the embedding of GPI data in the output data streams. For each of the two GPIs:

Mode: Use the pulldown list to select the operating mode for this GPI:

- OFF – the GPI state is not embedded
- Embed – the data placed on the rear-panel GPI port is embedded to a pre-defined user bit within timecode in the outgoing data stream.
 - When Embed is selected, use the Bit pulldown list to set which of the user bits (1-16) will be used to carry the GPI data. The default is: GPI 1 on bit 1; GPI 2 on bit 2. If the same bit is selected for both GPIs, GPI 1 is embedded.

5.3.2 AFD tab

The Active Format Descriptor (AFD) flag is used to identify the aspect ratio and protected areas of a video signal. The AMX-1901 manages the transfer of the AFD flag between its input and output, but does not use the AFD flag to perform any picture manipulation. The AFD flag is implemented differently in HD and SD:

- In HD, the AFD flag (SMPTE 2016) is sent as an ancillary packet, normally found on line 11 in the vertical ancillary space.
- In SD, the AFD flag is sent as a Video Line Index (VLI) signal (RP 186), as an AFD packet (SMPTE 2016), and, for 625 only, as a Wide Screen Signaling (WSS) signal (ITU-R BT.1119-2).

Note: The term AFD is used to represent all three types of flags – SMPTE 2016 ancillary packet, VLI, and WSS.

The two graphics at the top of the panel show representations of the input and output AFDs and indicate the status (e.g. detected, inserted) and the AFD code. If no AFD is present, the “screen” will be gray. See [ANNEX 3 – AFD Flags](#) on page 57 for information about AFD flags and terminology.

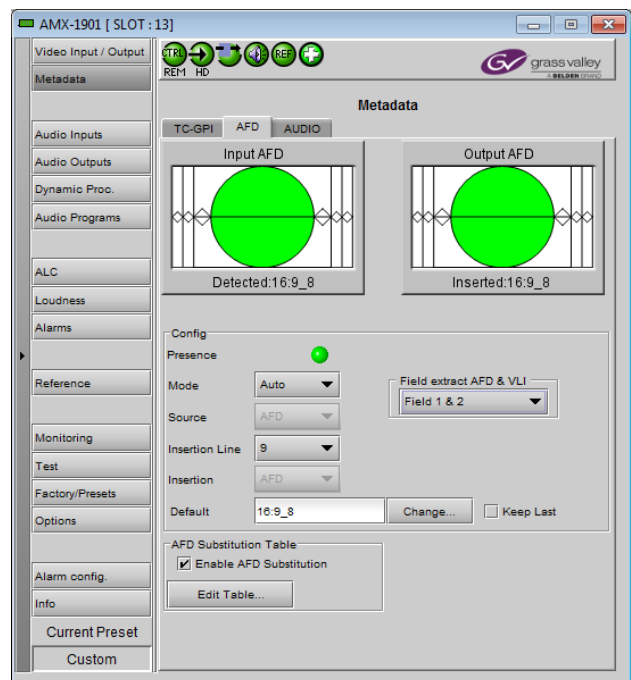


Figure 5.5 Metadata - AFD tab

If the input AFD is passed, the output AFD status will be specified as N/A, since nothing was inserted.

5.3.2.1 Config section

Presence: The status indicator turns Green when AFD is detected on the input signal. On an SD input, the status indicator will indicate the presence of AFD flags carried as selected by the Source and Insertion Line pull-downs below, i.e. AFD, VLI or WSS (for 625 sources only)

Mode: use the pull-down list to specify how AFD information will be handled. Available choices are:

- Pass – pass the incoming AFD flag through without change
- Insert – insert the “Default” AFD flag into the output, overwriting any incoming flags
- Auto – if incoming flags are detected, pass them through, otherwise, insert the “Default” flag
- Blank – ensure that no AFD flags are embedded in the output stream.

Source: Selects the source of AFD information – options are AFD (SMPTE 2016), VLI (SD only) or WSS (for 625 sources only).

Insertion Line: The Insertion line is used to select on which line in the VANC the AFD packet (SMPTE 2016) will be inserted. It is not necessary to specify the detection line since the card will automatically detect the incoming packet. This parameter is active only for AFD; it is grayed-out for VLI and WSS.

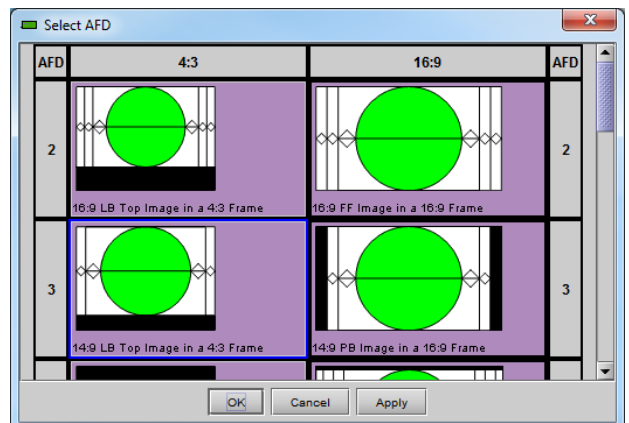
Insertion: The Insertion pull-down menu is used to enable or disable the insertion of AFD on the output. This feature makes possible AFD conversion (SMPTE 2016 to VLI, VLI to WSS, VLI to SMPTE 2016, etc ...) by allowing the user to select the type of AFD flag to insert regardless of the programmed AFD source type:

- During HD operation, the Ancillary Aspect Ratio packet (SMPTE 2016) may be inserted. There is no AFD conversion during HD.
- During SD operation, the Ancillary Aspect Ratio packet (SMPTE 2016), VLI, or WSS for 625 may be inserted

Default/Forced: this text box is labeled according to the mode selected in the Mode pull-down above

- In AUTO mode, it is labeled DEFAULT and shows the current default AFD code to be used if no valid AFD code is detected at the input.
- In INSERT mode, it is labeled FORCED, and shows the code that is forced onto the output regardless of the actual input code or if one is present

Change: Click the Change button to open the *Select AFD* panel showing the available AFD codes that could be used as the default code/forced AFD flag during AUTO/INSERT modes. Click on one to select it, then click *Apply* or *OK* at the bottom of the panel.



Keep Last: Select this checkbox to use the last AFD code detected at the input as the default code to be used in the *Auto* mode when no AFD flag is detected. This box is disabled in the *Insert* mode.

Field Extract AFD & VLI: Use the pull-down to select Field 1, Field 2 or Field 1 & 2

5.3.2.2 AFD Substitution Table

In the AFD mode, it is possible to set up a systematic AFD substitution scheme, where incoming AFD flags can always be replaced by different flags, according to the AFD Substitution table.

- Select the Enable AFD Substitution checkbox to use this feature. The checkbox is only available in Auto mode

Click the *Edit Table...* button to open the AFD Substitution Table

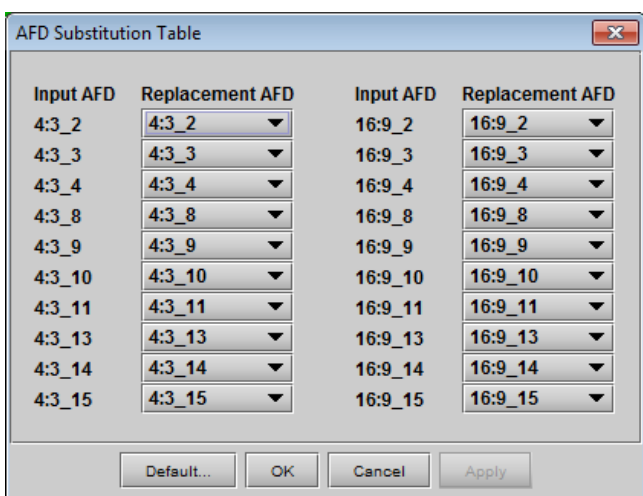


Figure 5.6 AFD Substitution table

- The table lists all possible Input AFD flags, and beside each is a *Replacement AFD* pulldown list that also lists all possible AFD flags.
- If the Replacement AFD does not match the Input AFD, the Replacement AFD name is colored, so that it is immediately obvious which AFDs will be substituted.



Note: AFD substitution is ignored when no source flag is detected at the input. In this case, the Default flag is used.

These controls are located at the bottom of the tab:

- Default – restore the table to default mode, where the replacement AFD always matches the Input AFD.
- OK – make any proposed changes and close the table.
- Cancel – close the table without making any of the proposed changes.
- Apply – make any proposed changes, and leave the table open.

5.3.2.3 Error and Warning Messages (SD only)

During SD operation, situations may arise when a conflict has occurred or may occur due to the enabling of certain metadata parameters such as time code insertion, SMPTE 2016/VLI insertion, or Dolby Metadata insertion.

- A warning message will appear at the bottom of the Metadata / AFD panel.
- See for an example.

Here is a list of all possible messages that may be displayed and a description of the error or potential conflict.

“Dolby Metadata/VLI line insertion conflict. Refer to the user manual.” [Error in red]

This error occurs when the AMX-1901 has been programmed to generate Dolby Metadata and VLI on the same line. The VLI signal is placed on line 14 for 525 and line 11 for 625. Make sure to select a different line number for Dolby Metadata insertion.

“AFD insertion may overwrite incoming TC on insertion line. Refer to the user manual.” [Warning in blue]

Incoming DVITC time code may unknowingly be replaced by the insertion of SMPTE 2016 AFD flag. In order to avoid any problems, make sure the line number of any incoming time code is known.

“Dolby Metadata insertion may overwrite incoming TC/VLI on insertion line. Refer to the user manual.” [Warning in blue]

Incoming DVITC time code or VLI signal may unknowingly be corrupted by the insertion of Dolby Metadata. In order to avoid any problems, make sure the line number of any incoming time code is known. If Dolby Metadata is inserted on line 14 in 525 or line 11 in 625, make sure no time code or VLI is present in the input video signal.

“Dolby Metadata insertion may overwrite incoming TC on insertion line. Refer to the user manual.” [Warning in blue]

Incoming DVITC time code may unknowingly be corrupted by the insertion of Dolby Metadata. In order to avoid any problems, make sure the line number of any incoming time code is known.

“Dolby Metadata/AFD insertion may overwrite incoming TC on insertion line. Refer to the user manual.” [Warning in blue]

Incoming DVITC time code may unknowingly be replaced by the insertion of Dolby Metadata or the SMPTE 2016 AFD flag. In order to avoid any problems, make sure the line number of any incoming time code is known.

“VLI insertion may overwrite incoming Dolby Metadata on insertion line. Refer to the user manual.” [Warning in blue]

Incoming Dolby Metadata may unknowingly be corrupted by the insertion of the VLI flag. In order to avoid any problems, make sure no Dolby Metadata is present on line 14 in 525 or line 11 in 625 when VLI is inserted.

5.3.3 Audio tab

This tab provides resources to configure the input and output selections and processing of metadata for the AMX-1901 card.

VANC Metadata Extractor

The card can extract a Dolby metadata stream from the VANC interval according to the specified SDID (range = 01 to 09). The presence of the stream is reported in the interface, but NB only if the metadata is located on the line specified in the VANC Metadata Inserter section in this panel.

Dolby-E Metadata

The icon is green if Dolby-E metadata is detected on the RS-422 input on the rear panel.

Use the two sliders – coarse (ms), and fine (samples) – to adjust the delay of the Dolby-E metadata by up to 2.7 seconds to account for video/audio timing differences.

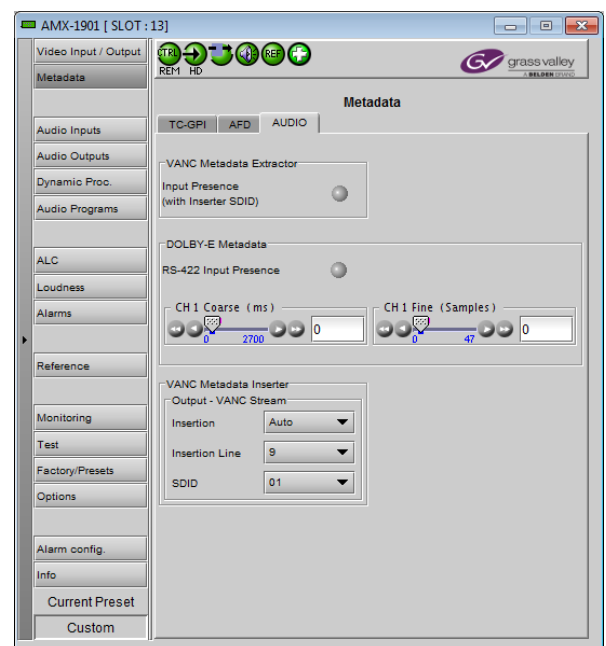


Figure 5.7 Metadata – Audio tab

VANC Metadata Inserter

The card can insert a metadata stream in the VANC interval of the output. Use the pulldown lists to configure the metadata insertion.

Insertion: Enable metadata insertion

- Pass – pass the incoming Dolby metadata through without change. Insertion Line and SDID selections are disabled.
- Insert – insert Dolby metadata from the RS422 interface into the output, overwriting any incoming metadata. Insertion Line and SDID selections are active
- Auto – if metadata is detected on the RS422 interface, insert it into the output; otherwise, pass any incoming metadata through.
- Blank – blanks all lines in the selected SDID; the line selection is inactive.

Insertion Line: Select the VANC line in which the metadata will be inserted. The range depends on the output format:

- 3G/HD: lines 9 to 20, default is 10
- SD (525) lines 12 to 19, default is 12
- SD (625) lines 8 to 22, default is 8

SDID: Select the VANC metadata packet SDID to be inserted. The SDID is used to specify the relationship between the VANC metadata stream and the first channel of its associated audio program.

SDID	Associated channel pair
01	No association, or only one audio program (default value)
02	Channel pair 1&2
03	Channel pair 3&4
04	Channel pair 5&6
05	Channel pair 7&8
06	Channel pair 9&10
07	Channel pair 11&12
08	Channel pair 13&14
09	Channel pair 15&16

5.4 Audio Inputs panel

The presence icons across the top of the panel indicate:

Embedded Audio Group Detected – a green icon shows the presence of any embedded audio groups detected in the incoming SDI signal.

Discrete Audio Inputs – indicated the presence and condition of the analog inputs to the AMX-1901

- Green – audio present
- Red – audio present, but clipped (i.e. level too high)
- Gray – audio not present

5.4.1 Analog 1-4, 5-8 tabs

These two tabs each provide individual phase and delay controls for four of the eight input analog audio channels.

Phase invert – select the checkbox to invert the phase of the channel at the input to the signal processing chain.

Fixed delay – add delay to the channel, using the two, or by typing directly into the data box:

- Coarse delay (range = 0 to 2700 msec)
- Fine delay (range = 0 to 47 samples)

5.4.2 The Config tab:

Use the pulldown to select the analog audio input level that will correspond to digital full scale after analog-to-digital conversion.

[Range: 1,2,3,4,...,23, 24 dBu]



Figure 5.8 Audio Inputs panel – Analog 1-4 tab

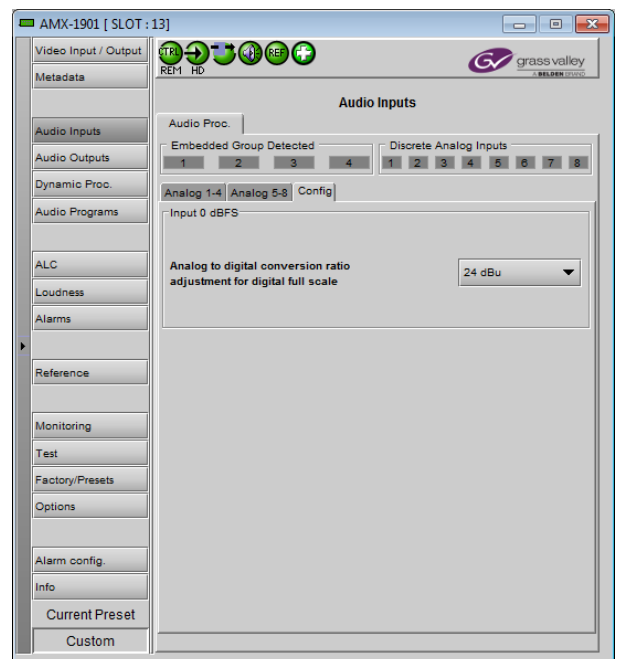


Figure 5.9 Audio Input panel - Config

5.5 Audio Output panel

This panel provides additional audio processing for the eight audio channels embedded in the 3G/HD/SD output:

- audio channel shuffling
- level adjustment
- mixing
- audio embedding mode.

5.5.1 CH 1-2, CH 3-4, ... CH 7-8 tabs

Each of these tabs provides all necessary controls for the output mixers. The example shown is for the Embedded Output, CH 1-2, but all panels have the same controls.

Operation Mode (Off, A, SUM(A+B), Mix): This menu allows the source(s) of each output channel to be selected – a single channel, the sum of two channels, or a mix of two channels.

Off: The output channel is muted.

A: The output channel is the source selected in sub-menu SOURCE A.

SUM (A+B): The output channel is the sum of the two source channels selected in sub-menus SOURCE A and SOURCE B.

- If you select this option, the SUM (A+B) Level pull-down is activated, allowing you to reduce the level of the summed output (0dB, -3dB or -6dB).

Mix: The output channel is a mono mix of source channels selected in sub-menus SOURCE A and SOURCE B.

Mute: Mute the audio channel by checking this box.

Clipping: indicates a very high level at the input of the analog-to-digital converter, about -0.1 dB of the maximum input level.

Source A & Source B: These sub-sections allow the source channels (A and B) to be selected for each output channel.

Channel: ANLG 1, ..., ANLG 8: selects the analog source to be used for this channel.

Level (dB): Sets the audio gain of the analog source from -96 to +12 dB in 0.5 dB steps

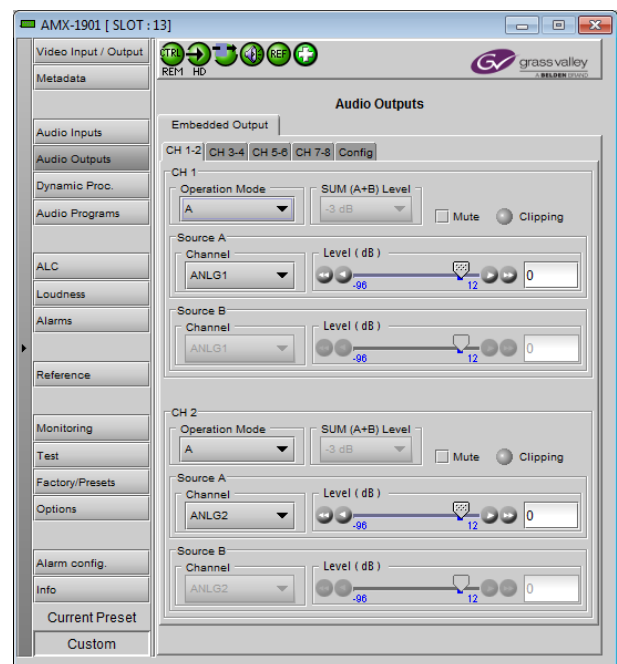


Figure 5.10 Audio Output panel – Ch 1-2 tab

5.5.2 Config tab

The tab contains only four Audio Insert pull-downs, allowing selection of the audio to be inserted in the outgoing audio embedded groups.

The choices in each pulldown are:

- Ch 1-4 – select input channels 1-4
- Ch 5-8 – select input channels 5-8
- Pass – pass any incoming embedded audio through untouched
- Blank – delete any incoming embedded

Audio Word Length: this 20/24 bits length selection is active only for an SD signal. It is forced to 24 bits for a HD or 3G signal.



Figure 5.11 Audio Output - Config tab

5.6 Dynamic Processing panel

This panel provides controls for dynamic processing of the audio channels derived from the analog inputs of the AMX-1901

- The [Dynamic Processing Option](#) (AMX-1901-OPT-DP) must be activated to access this functionality. See page 44.

Individual and independent controls are provided for each of the 8 channels.

These parameters affect the output audio channels.

Note that only one (1) dynamic processing configuration is saved by the card, regardless of the input format (3G/HD or SD).

- Access the individual channel controls through 8 sub-tabs

The functionality of these controls is identical for each channel, and is explained here.

The upper right-hand corner of each tab contains a graphic depicting the transfer characteristic of the channel as configured by the current dynamic processing settings. Images will be shown below to illustrate the effect of the various controls

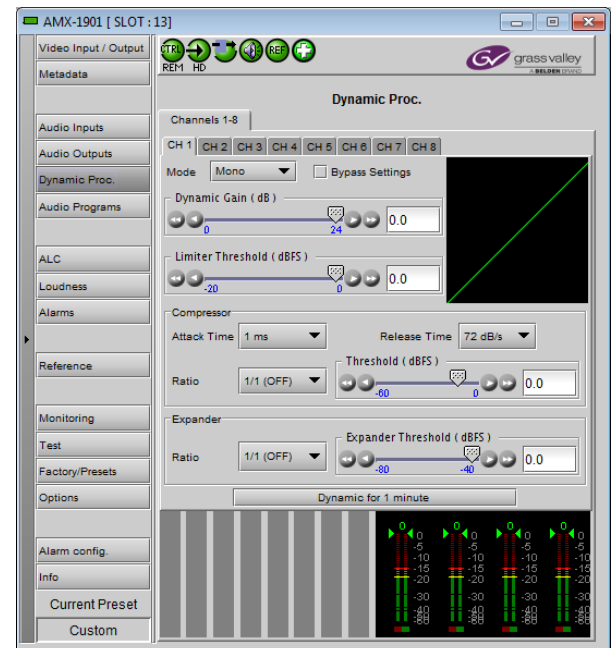


Figure 5.12 Dynamic Processing panel

Mode

Use the pull-down to select the operating mode for this channel, from among these options:

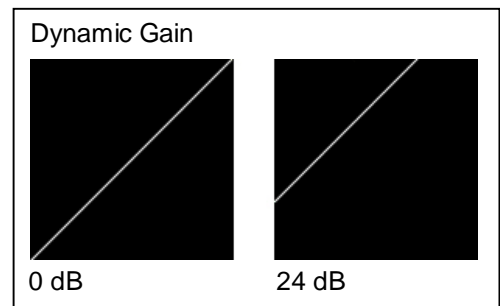
- Mono: applies the dynamics processing settings only to the selected channel
- Stereo: applies the dynamics processing settings to the channel pair (e.g. 1 & 2, 7 & 8, etc.)
- Group 1: applies the dynamics processing settings only to the channel assigned to Group 1
- Group 2: applies the dynamics processing settings only to the channel assigned to Group 2

Applying the same dynamic processing to a pair of channels will retain the coherence of a stereo or multi-channel image.

Click the *Bypass Settings* checkbox to bypass all the dynamics processing settings set up in this panel for this channel. This is useful for a quick Dynamics ON-OFF comparison.

Dynamic Gain

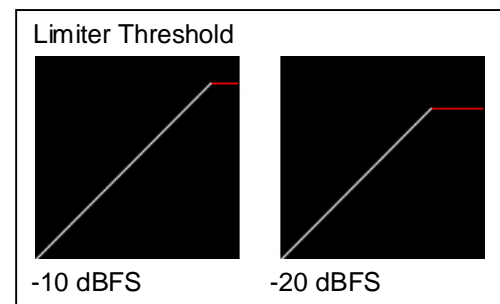
Sets the audio dynamic gain from 0 to 24 dB (in 1 dB steps) applied to the selected channel. The dynamic gain is applied at the end of the dynamics processing chain, and allows compensation for the loudness attenuation that follows compression.



Limiter Threshold

A *limiter* is a type of compressor designed for a specific purpose, to limit the level of a signal to a certain threshold. Whereas a compressor will begin smoothly reducing the gain above the threshold, a limiter will almost completely prevent any additional gain above the threshold. A limiter is like a compressor set to a very high compression ratio (typically $1/\infty$).

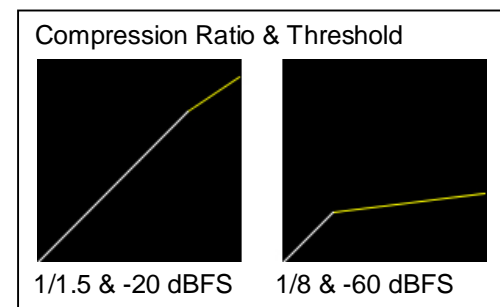
For example, if the limiter threshold is set to -20 dBFS and the input signal level is -10 dBFS (10 dB above the threshold), the signal level at the output of the limiter will be -20 dBFS.



- Use the *Limiter Threshold* slider to set the threshold from -20 dBFS to 0 dBFS (1 dB steps) – default is 0.

Compressor

Audio compression is a method of reducing the dynamic range of a signal. All signal levels above the specified threshold are reduced by the specified ratio. When the signal level exceeds the threshold, the compressor will begin smoothly to reduce the gain, following the attack time, until the output level reflects the specified compression ratio. When the signal level is below the threshold, the compressor will begin smoothly to increase the gain, following the release time, until the output level matches the input level.



For example, if the compressor threshold is set to -20 dBFS and a ratio of 1/2, and the input signal level is -10 dBFS (10 dB above the threshold), the signal level at the output of the compressor will be smoothly reduced to -15 dBFS (following the attack time). Then, if the input signal level suddenly drops to -30 dBFS (10 dB below the threshold), the signal level at the output of the compressor will smoothly go back to -30 dBFS (following the release time).

Use the *Attack Time* pulldown to set the attack time. The attack time specifies how fast the compressor will reduce the gain:

- Possible values: 1, 5, 10, 20, 40, 80, 160 and 320 ms.

Use the *Release Time* pulldown to set the release time. The release time specifies how fast the compressor will increase the gain:

- Possible values: 72, 48, 36, 24, 18, 12, 9 and 6 dB/s

Use the *Ratio* pulldown to set the compression ratio (i.e. slope of the transfer curve). The compression ratio specifies how much the output level changes with respect to the input level:

- Possible values: 1/1 (OFF), 1/1.25, 1/1.5, 1/1.75, 1/2, 1/3, 1/4, 1/8, 1/16

Use the *Threshold* slider to set the compression threshold (i.e. break point in the transfer curve). The compression threshold specifies the level above which the compressor will process the signal.

- Range -60 dB to 0 dB; default is 0, i.e. OFF.

Expander

Audio expansion means to expand the dynamic range of a signal. It is basically the opposite of audio compression. Like compressors and limiters, an audio expander has an adjustable threshold and ratio. Whereas compression and limiting take effect whenever the signal goes *above* the threshold, expansion effects signal levels *below* the threshold. Any signal below the threshold is expanded downwards by the specified ratio.

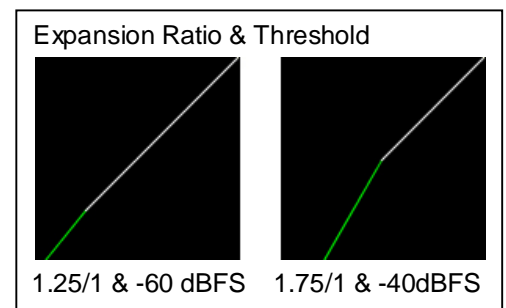
For example, if the expander threshold is set to -40 dBFS and a ratio of 2/1, and the input signal level is -60 dBFS (20 dB below the threshold), the signal level at the output of the expander will be reduced to -80 dBFS. Then, if the input signal level suddenly increases to -30 dBFS (10 dB above the threshold), the signal level at the output of the expander will go back to -30 dBFS.

Use the *Ratio* pulldown to set the expansion ratio (i.e. slope of the transfer curve). The expansion ratio specifies how much the output level changes with respect to the input level :

- Options available: 1/1 (OFF), 1.125/1, 1.25/1, 1.375/1, 1.5/1, 1.625/1, 1.75/1, 1.875/1, 2/1

Use the *Threshold* slider to set the expansion threshold (i.e. break point in the transfer curve). The expansion threshold specifies the level below which the expander will process the signal.

- Range -80 dB to -40 dB



Dynamics for 1 minute.

Click the *Dynamics for 1 minute* button to display the dynamics processing in the meters at the bottom of the panel for a period of one minute

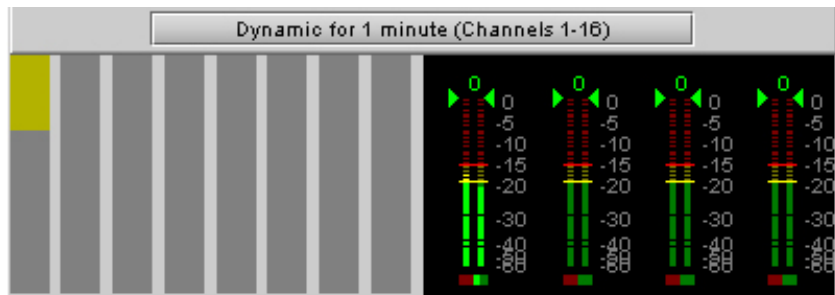


Figure 5.13 Dynamics for 1 minute display

- The right-hand portion of this section shows the output channels of the dynamics processor on level meters, as found in the RALM panel.
- The left-hand side shows approximately how much dynamic processing is being applied to the signal (by amplitude) on a channel basis.
- The example shown above is the result of substantial compression being applied to Channel 1

5.7 Audio Programs panel

The Audio Programs panel provides resources to define eight audio programs, and to specify the inputs for each program.

Coding Mode:

Use the eight pull-downs to specify the coding of the programs that you want to embed in the output. The options are:

Coding Mode	Program Channels					
	Left	Right	Center	LFE	Ls	Rs
1/0			X			
2/0	X	X				
3/0	X	X	X			
3/0L	X	X	X	X		
2/1	X	X				X
2/1L	X	X		X	X	
3/1	X	X	X			X
3/1L	X	X	X	X	X	
2/2	X	X			X	X
2/2L	X	X		X	X	X
3/2	X	X	X		X	X
3/2L	X	X	X	X	X	X
OFF	This program is not used					

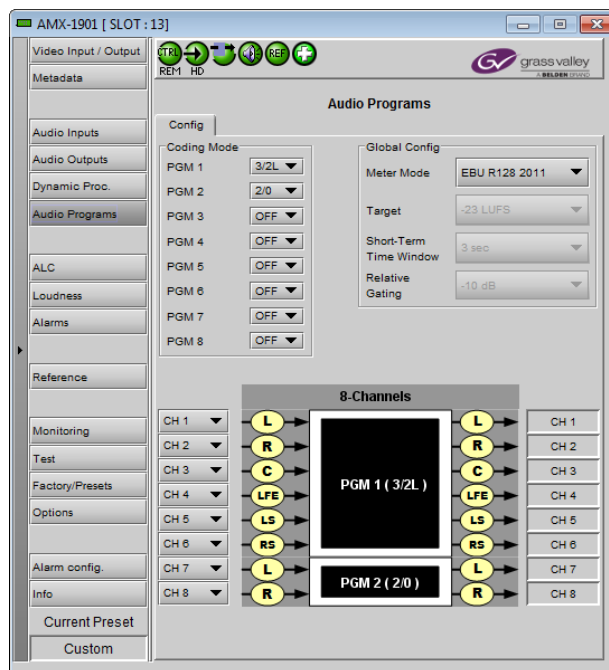


Figure 5.14 Audio Programs panel

The graphic at the bottom of the panel illustrates the selected programs, and provides pull-downs to choose the audio input that feeds each program input.

Note 1: An input channel cannot be assigned to more than one (1) program, and can only be used once within a program.

Note 2: The programs defined here are the programs available for [Loudness monitoring](#) and [ALC](#).

Global Config:

Use the Meter Mode pull-down to select the meter that will be used for all audio level measurements on this AMX-1901.

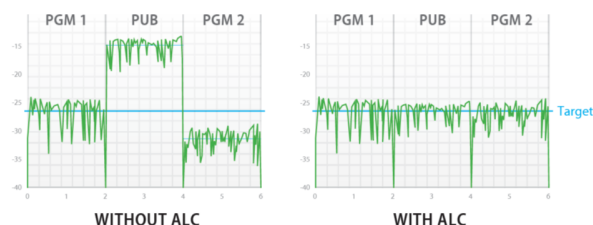
Mode	Loudness Unit	Target	Short-Term Time Window	Relative Gating
EBU R128 2011	LUFS	-23	3 sec	-10 dB
A85 ITU BS.1770-2	LKFS	-24	10 sec	-10 dB
ARIB TR-B32	LKFS	-24	3 sec	-10 dB

Each of these has predetermined values for Target, Short Term Time Window and Relative Gating, as shown in the table, and which are displayed in gray in their (inactive) pull-downs in the panel.

If you select *Custom* in the Meter Mode pull-down, these parameters can all be selected in order to define a custom meter mode.

5.8 ALC panel

Minimizing loudness differences between segments in a playout channel is an important issue in a world where multiple programs originating in different formats from different sources must be integrated seamlessly. The [Automatic Loudness Control \(ALC\) option](#) is the solution to this need. It uses Grass Valley's proprietary *wideband* ALC algorithm.



- Identified as AMX-1901-OPT-ALC, this option is valid for 8 input channels and up to 8 independent programs.

5.8.1 Config tab

The Config tab includes only a checkbox to enable global loudness monitoring; i.e. on all the audio programs defined in the Audio Programs panel.



Figure 5.15 AFC panel – Config tab

5.8.2 PGM1-8 tabs

One tab is active for each of the programs defined in the [Audio Programs Panel](#) (see section 5.7) (see Audio Programs panel)

Loudness monitoring

When turned ON, the loudness meters display the program input loudness (before ALC processing), the dynamic correction applied by the ALC, the ALC limiter correction, and the program output loudness (after ALC processing).

The input and output loudness are given in **LUFS or LKFS**, depending on the meter mode selected in the Audio Programs panel. Loudness meters are integrated over a “sliding-window” period which is also mode-dependent.

Dynamic and limiter corrections are always given in dB.

ALC Presets

Three factory presets for the ALC are available to cover most broadcast applications.

- **Factory Light** – The ALC applies low dynamic range compression on the audio program content. The overall response time is relatively slow, which reduces the ALC ability to tightly follow the target output loudness. Using this preset, the program content will sound a little more dense, while keeping most of the original program dynamic range.

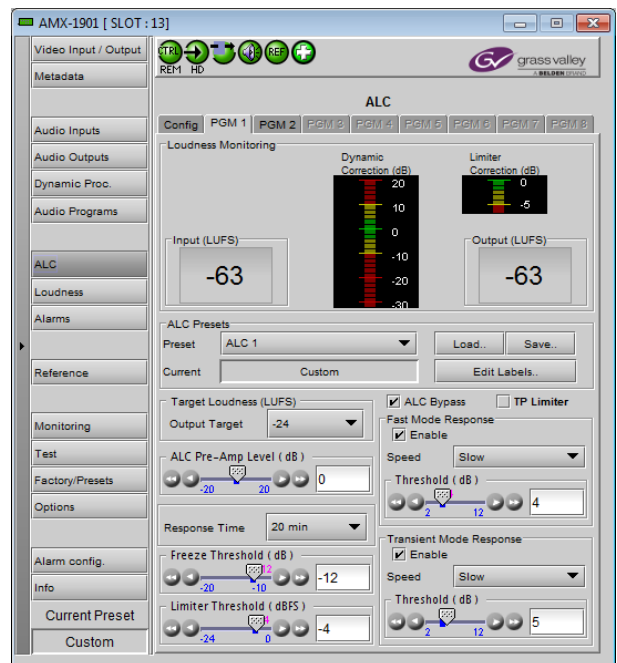


Figure 5.16 ALC – PGM1 to PGM 8 tab

- **Factory Standard** – The ALC applies moderate dynamic range compression on the audio program content. The overall response time is also moderate, which allows the ALC to follow the target output loudness quite well. This preset is well-suited for most types of audio content. It is the factory preset loaded when loading the card default parameters.
- **Factory Heavy** – The ALC applies high dynamic range compression on the audio program content. The overall response time is relatively fast, which improves the ALC ability to tightly follow the target output loudness. Using this preset, the program output content will sound much more dense, less dynamic.

Five user presets are also available to save and load custom configurations of the ALC. These presets are labeled ALC 1 to 5 but the user can edit the preset names via the “Edit Labels” button.

We **STRONGLY** recommend starting with the ALC factory preset (Light, Standard, Heavy) that is closest to the desired objective, then fine tuning it to reach the desired goal. This will minimize the troubles that will likely be encountered as many adjustments interact.

ALC Bypass

Checking this box bypasses the ALC program processing, and the input channels pass through to the output unaltered.

TP Limiter ON

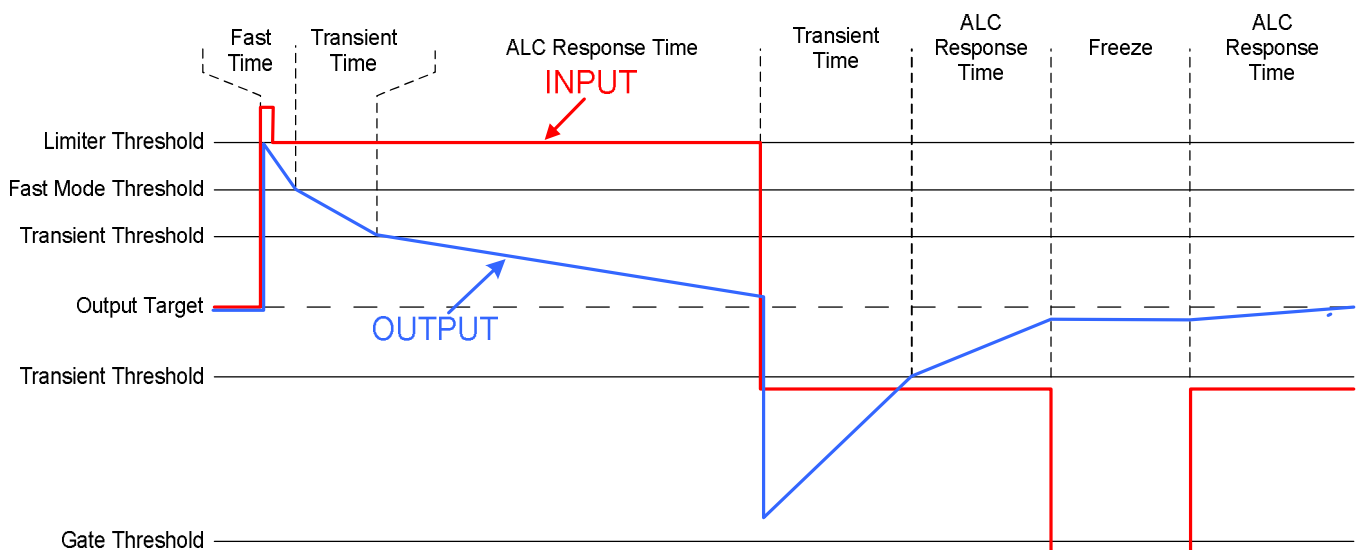
The True Peak Limiter can be turned ON for this program by selecting the checkbox. This function can be used independently from the ALC.

Target Loudness

Sets the Target output loudness. This value sets the *average* output loudness, which means that due to the program dynamics, the output loudness will move around the selected target. The units of measurement and the nominal value, as well as the window size for the measurements (not shown on this panel) are set by the *Meter Mode* pull-down in the Audio Programs panel.

Although the nominal Target Loudness is reset according to the table above when the *Mode* is changed, the user may change the value at any time using the pull-down, where the available range is -10 to -31 for all modes.

Here’s the time-domain response of the ALC:



ALC Pre-Amp Level

A pre-amp stage is available in front of the ALC to compensate for programs having an input loudness out of the ALC tracking range (very low or very high input loudness). The pre-amp level ranges from -20 dB to + 20 dB, in steps of 1 dB. Its effect is visible on the Input (LUFS) display to make the adjustment easier.

Fast Mode Response

The *Fast Mode Response* is optional and is enabled by checking the **Enable** box.

The ALC *Fast Mode Response* kicks in whenever the input loudness goes over the **Fast Mode Threshold** and loudness is reduced, in a few milliseconds. The **Fast Mode Threshold** is given in dB with respect to the target loudness and ranges from 2 to 12 dB, in dB steps.

Transient Mode Response

The *Transient Mode Response* is optional and is enabled by checking the **Enable** box.

The ALC *Transient Mode Response* kicks in whenever the input loudness goes over or under the **Transient Mode Threshold**. The **Transient Mode Threshold** is symmetric with respect to the target loudness and ranges from 2 to 12 dB, in dB steps. When the input loudness is over the **Transient Mode Threshold**, loudness is reduced following the rate set by the **Speed** pull-down. When the input loudness is under the **Transient Mode Threshold**, loudness is increased, again following the **Speed** pull-down, which ranges from Slow (up to 15 seconds) to Fast (up to 4 seconds).

Response Time

Outside of the *Fast* and *Transient* modes ranges, the ALC performs loudness correction slowly, following the **Response Time**. Response time values are : 5 sec, 10 sec, 15 sec, 20 sec, 30 sec, 45 sec, 1 min, 5 min, 10 min, 15 min, 20 min.

Freeze Threshold

The **Freeze Threshold** sets the threshold below which the ALC will not increase loudness. This prevents quiet portions of programs (and noise) from being unintentionally boosted. If the input program loudness is under the **Freeze Threshold** for more than 30 seconds, the ALC will smoothly return to 0 dB of loudness correction.

Limiter Threshold

The **Limiter Threshold** will limit the output loudness under the selected threshold. This avoids unintentional clipping of loud portions of programs. If the input program loudness is over the **Limiter Threshold**, the ALC will reduce the loudness very quickly, in 1 millisecond.

5.9 Loudness Panel

The AMX-1901 allows the user to measure the loudness of audio streams passing through it. The measurement process is flexible:

- All major loudness standards are supported.
- The measurement standards can be customized if desired.
- Up to eight programs can be measured at once.
- Segment markers can be inserted from two triggers.
- Log files of the measurements can be stored externally, for analysis using Miranda's Audio Loudness Analyzer.

5.9.1 Loudness | Config panel

Global Config

All loudness measurements performed by this AMX-1901 are performed on the programs defined in the [Audio Programs Panel](#), using the metering defined and described in that panel.

Global Control

The AMX-1901 can monitor loudness on up to eight programs specified by the user.

Enable Loudness Monitoring turns all loudness monitoring functions ON or OFF

RESET resets the measurements, and places a segment marker in the log file (but only if *User Event* is selected in the Segment Marker area).

RUNNING / PAUSE shows the current status of the loudness monitoring.

- Click the button to change the status.
- PAUSE stops the measurement until the button is clicked again, but keeps the last value for logging and measurement.

Segment Marker

Select the checkboxes corresponding to the events for which you want a segment marker inserted in the loudness log file:

- User Event – a manually-triggered RESET (but not a PAUSE).
- Target change – a manually-triggered Meter Mode or Target change in the Audio Programs tab.

Note that segment marker triggers in one PGM will generate segment markers in the logs for all PGMs.

Logging Status/Control

This panel monitors logging activity for all loggers connected to the application server associated with this AMX-1901 and its associated Densité frame.

- The Logging Activity icon will be GREEN when logging activity is detected.
- The number of loggers connected to the appserver is shown in the data box.

About Log Files

Loudness logs contain data for a period of up to 24 hours. New log files are started when the logging function is enabled.

5.9.2 Loudness | PGM panel

Eight PGM panels – PGM 1 to PGM 8 – are available. These panels show the results of loudness measurements made on this program.

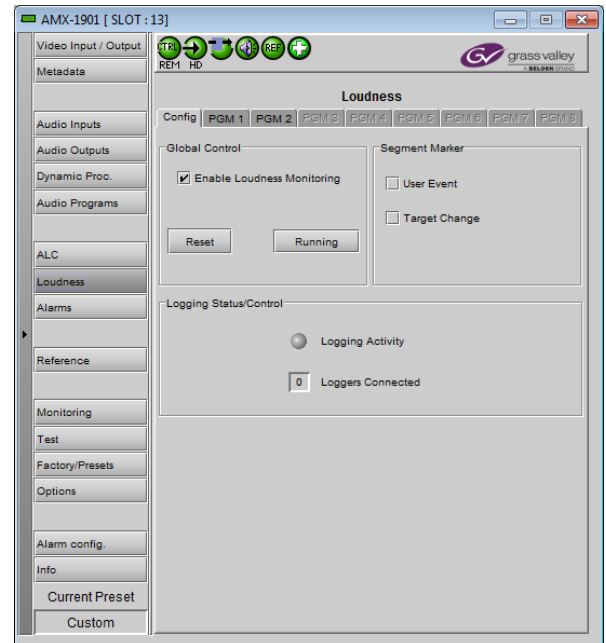


Figure 5.17 Loudness panel – Config tab

Program Settings & Input Channel Settings

These data boxes show the program definition – the coding mode and channel selections are those made in the [Audio Programs panel](#).

Coding Mode	Program Channels					
	Left	Right	Center	LFE	Ls	Rs
1/0			X			
2/0	X	X				
3/0	X	X	X			
3/0L	X	X	X	X		
2/1	X	X			X	
2/1L	X	X		X	X	
3/1	X	X	X		X	
3/1L	X	X	X	X	X	
2/2	X	X			X	X
2/2L	X	X		X	X	X
3/2	X	X	X		X	X
3/2L	X	X	X	X	X	X



Figure 5.18 Loudness panel – PGM 1 tab

Measurements

The Measurements area displays results from the loudness measurements performed on the selected program according to the settings made in the Loudness | Config tab and the Audio Programs panel. The three data boxes show these values:

- True peak MAX Maximum true peak level found in all selected input channels
- Momentary MAX Loudness averaged over a 400 ms sliding rectangular time window
- Short term (S) Loudness averaged over the short-term time window

The chart shows a running plot of the last 15 seconds of the value of the Short Term (yellow trace) and Momentary (green trace) loudness values. The bar graph at the right indicates the current Momentary value.

A reset, initiated by a user via the Reset button on the Loudness | Config tab, will reset all of these measurements.

About Log Files

Loudness logs contain data for a period of up to 24 hours. New log files are started:

- when the logging function is enabled
- every 24 hours after logging was enabled, until logging is disabled
- when the reference changes
- when the global config is changed,

See [ANNEX 4 - Loudness Logging and the Miranda Audio Loudness Analyzer](#) beginning on page 59 for detailed instructions on activating logging and analyzing the logged data files.

5.10 Alarms panel

This panel provides resources to set the detection conditions and card response for each of the alarms supported by the AMX-1901

5.10.1 Alarms – Video panel

Only one video alarm is defined.

Input Black Detect

This alarm detects the presence of a continuous black signal on the input for a period of time; the condition is flagged only when the time duration criterion has been satisfied.

Enable the alarm by selecting the checkbox.

The user sets the detection parameters for this error using three sliders:

- Threshold (mV) – sets the signal level below which Black will be considered to have been detected.
- Set Duration (sec) – sets the time interval over which Black must be continuously detected before the error is flagged.
- Clear Duration (sec) – sets the time interval over which a non-black signal (i.e. above the Threshold) must be continuously present to clear the alarm if it has been set.

Use the *LED Color* pulldown to choose the color that will be displayed by the status LED on the card edge when a Black Detect alarm is set. Choices are:

- Green, Yellow, Red, Flashing Red

Zone settings – define a zone within which the alarm detection will be applied.

- Line: Start Stop
- Pixel: Start Stop

The ranges always start at 1, but the upper limit depends on the video format.

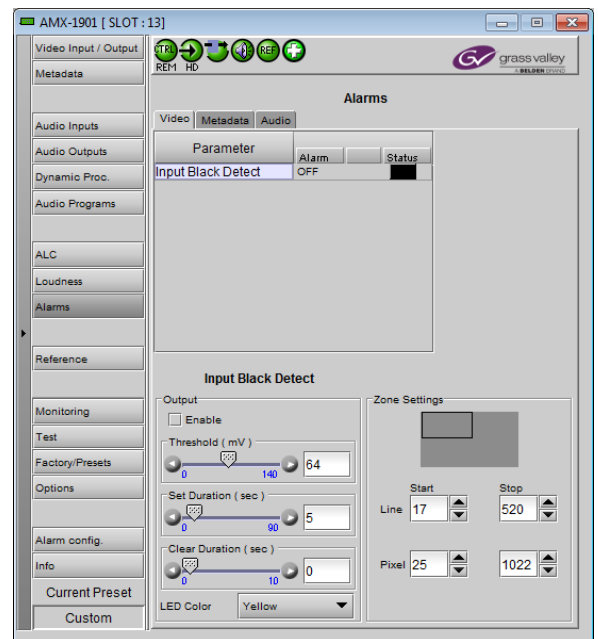


Figure 5.19 Alarms panel – Video – Input Black

5.10.2 Alarms – Metadata panel

AFD

This alarm checks the presence of AFD, VLI or WSS content in the input video signal. It follows the position of the Metadata - AFD - Source selector.

Enable the alarm by selecting the checkbox.

The user sets the detection parameters for this error using two sliders:

- Set Duration (sec) – sets the time interval over which AFD must be continuously absent before the condition is flagged and the alarm is set.
- Clear Duration (sec) – sets the time interval over which AFD must be continuously present to clear the alarm if it has been set.

Use the *LED Color* pull-down to choose the color that will be displayed by the status LED on the card edge when an AFD alarm is set. Choices are:

- Green, Yellow, Red, Flashing Red

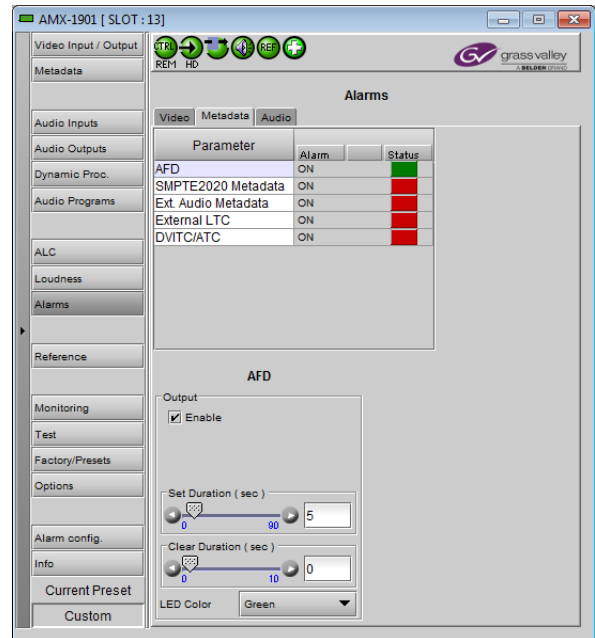


Figure 5.20 Alarms – Metadata – AFD

SMPTE2020 Metadata

This alarm checks the presence of audio metadata inserted (SMPTE-2020) in the input video signal.

Enable the alarm by selecting the checkbox.

The user sets the detection parameters for this error using two sliders:

- Set Duration (sec) – sets the time interval over which Audio Metadata must be continuously absent before the condition is flagged and the alarm is set.
- Clear Duration (sec) – sets the time interval over which Audio Metadata must be continuously present to clear the alarm if it has been set.

Use the *LED Color* pull-down to choose the color that will be displayed by the status LED on the card edge when a SMPTE-2020 alarm is set. Choices are:

- Green, Yellow, Red, Flashing Red

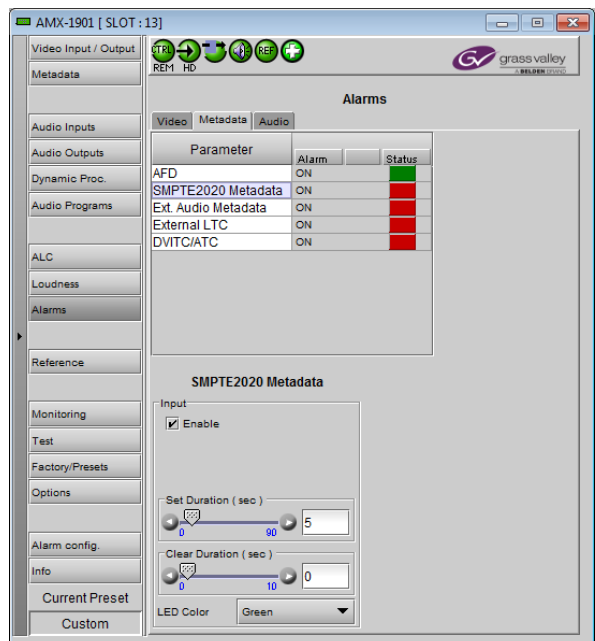


Figure 5.21 Alarms – Metadata – SMPTE 2020

Ext Audio Metadata

This alarm checks the presence of audio metadata presented on the external input (rear panel).

Enable the alarm by selecting the checkbox.

The user sets the detection parameters for this error using two sliders:

- Set Duration (sec) – sets the time interval over which Audio metadata coming from the rear-panel RS422 input must be continuously present before the condition is flagged and the alarm is set.
- Clear Duration (sec) – sets the time interval over which Audio metadata must be continuously absent to clear the alarm if it has been set.

Use the *LED Color* pull-down to choose the color that will be displayed by the status LED on the card edge when an Audio Metadata alarm is set. Choices are:

- Green, Yellow, Red, Flashing Red

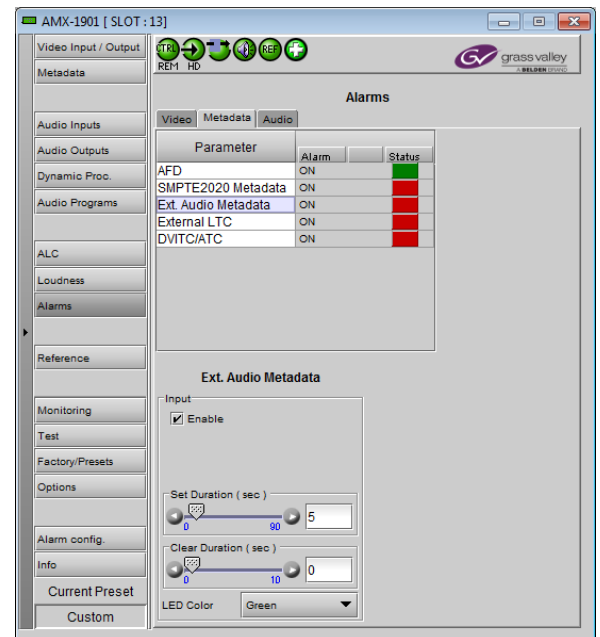


Figure 5.22 Alarms – Metadata – EXT Audio

External LTC

This alarm checks the presence of a Linear Time Code presented on the external input (rear panel).

Enable the alarm by selecting the checkbox.

The user sets the detection parameters for this error using two sliders:

- Set Duration (sec) – sets the time interval over which External TC must be continuously detected before the condition is flagged and the alarm is set.
- Clear Duration (sec) – sets the time interval over which External TC must be continuously absent to clear the alarm if it has been set.

Use the *LED Color* pull-down to choose the color that will be displayed by the status LED on the card edge when an External LTC alarm is set. Choices are:

- Green, Yellow, Red, Flashing Red

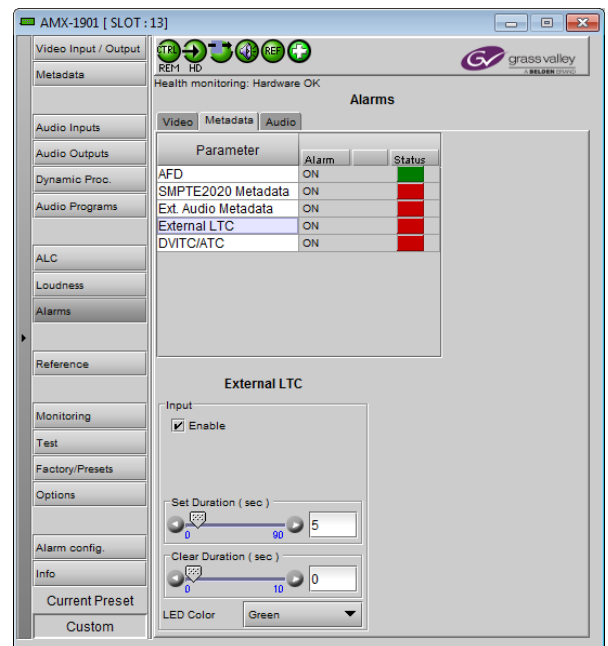


Figure 5.23 Alarms – Metadata – Ext LTC

DVITC/ATC

This alarm checks the presence of a DVITC or an ATC Time Code inserted in the input video signal.

Enable the alarm by selecting the checkbox.

The user sets the detection parameters for this error using two sliders:

- Set Duration (sec) – sets the time interval over which DVITC/ATC must be continuously absent on the video input before the condition is flagged and the alarm is set.
- Clear Duration (sec) – sets the time interval over which DVITC/ATC must be continuously present to clear the alarm if it has been set.

Use the *LED Color* pull-down to choose the color that will be displayed by the status LED on the card edge when a DVITC/ATC alarm is set. Choices are:

- Green, Yellow, Red, Flashing Red

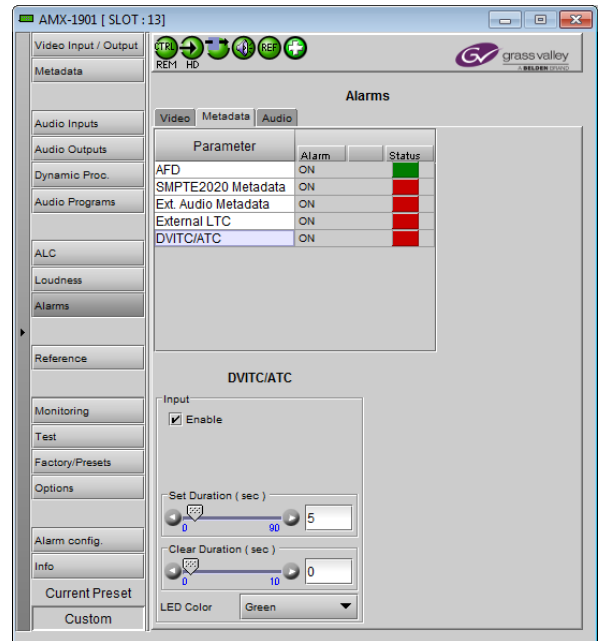


Figure 5.24 Alarms – Metadata – DVITC

5.10.3 Alarms – Audio panel

The Audio alarms are detected on the eight channels – CH1 to CH8 – derived from the analog inputs, at the output stage, just before embedding. Individual alarm settings are provided for each channel.

TP Overload

The overload detection is True Peak.

Enable the alarm by selecting the checkbox.

The user sets the detection parameters for this error using three sliders:

- Threshold (dBFS) – sets the signal level above which an overload will be considered to have been detected.
- Set Duration (sec) – sets the time interval over which an overload must be continuously detected before the error is flagged.
- Clear Duration (sec) – sets the time interval over which a non-overload signal (i.e. below the Threshold) must be continuously present to clear the alarm if it has been set.

Use the *LED Color* pulldown to choose the color that will be displayed by the status LED on the card edge when an Overload alarm is set. Choices are:

- Green, Yellow, Red, Flashing Red

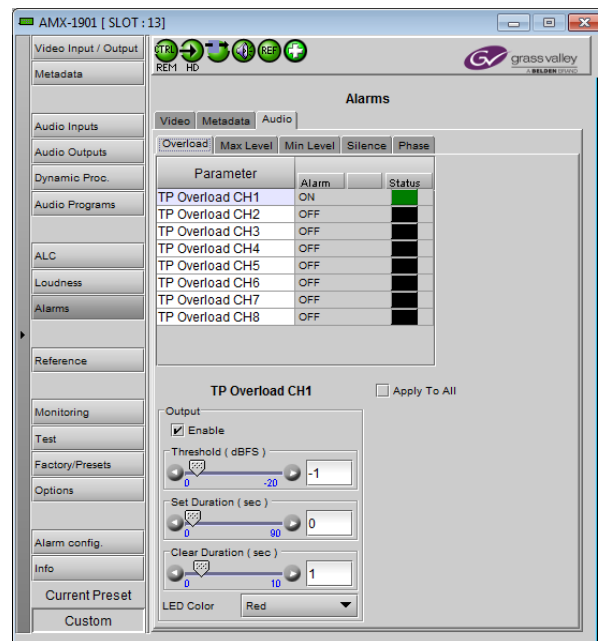


Figure 5.25 Alarms – Audio – Overload

Max Loudness

This parameter is measured for the programs defined in the Audio Programs panel, and uses the Momentary Loudness values.

Enable the alarm by selecting the checkbox.

The user sets the detection parameters for this error using three sliders:

- Threshold (dBFS) – sets the signal level above which Max Level will be considered to have been detected.
- Set Duration (sec) – sets the time interval over which Max Level must be continuously detected before the error is flagged.
- Clear Duration (sec) – sets the time interval over which a non-Max-Level signal (i.e. below the Threshold) must be continuously present to clear the alarm if it has been set.

Use the *LED Color* pulldown to choose the color that will be displayed by the status LED on the card edge when a Max Level alarm is set. Choices are:

- Green, Yellow, Red, Flashing Red

Min Loudness

This parameter is measured for the programs defined in the Audio Programs panel, and uses the Momentary Loudness values.

Enable the alarm by selecting the checkbox.

The user sets the detection parameters for this error using three sliders:

- Threshold (dBFS) – sets the signal level below which Min Level will be considered to have been detected.
- Set Duration (sec) – sets the time interval over which Min Level must be continuously detected before the error is flagged.
- Clear Duration (sec) – sets the time interval over which a non-Min-Level signal (i.e. above the Threshold) must be continuously present to clear the alarm if it has been set.

Use the *LED Color* pulldown to choose the color that will be displayed by the status LED on the card edge when a Min Level alarm is set. Choices are:

- Green, Yellow, Red, Flashing Red

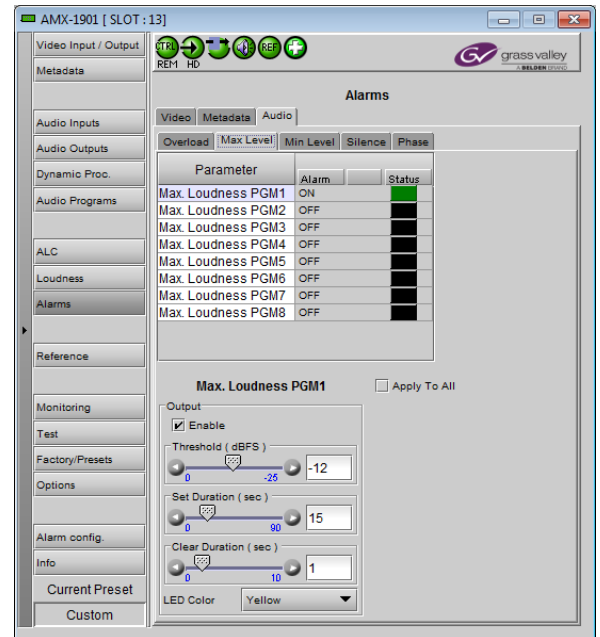


Figure 5.26 Alarms – Audio – Max Level

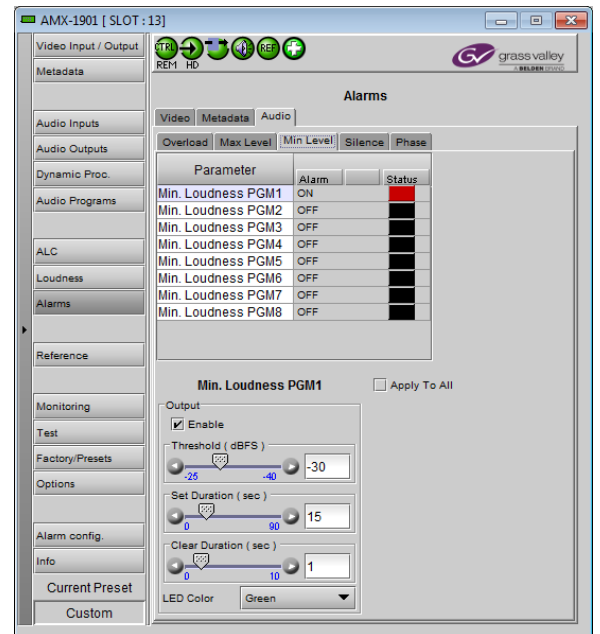


Figure 5.27 Alarms – Audio – Min Level

Silence

Enable the alarm by selecting the checkbox.

The user sets the detection parameters for this error using three sliders:

- Threshold (dBFS) – sets the signal level below which Silence will be considered to have been detected.
- Set Duration (sec) – sets the time interval over which Silence must be continuously detected before the error is flagged.
- Clear Duration (sec) – sets the time interval over which a non-silent signal (i.e. above the Threshold) must be continuously present to clear the alarm if it has been set.

Use the *LED Color* pulldown to choose the color that will be displayed by the status LED on the card edge when a Silence alarm is set. Choices are:

- Green, Yellow, Red, Flashing Red

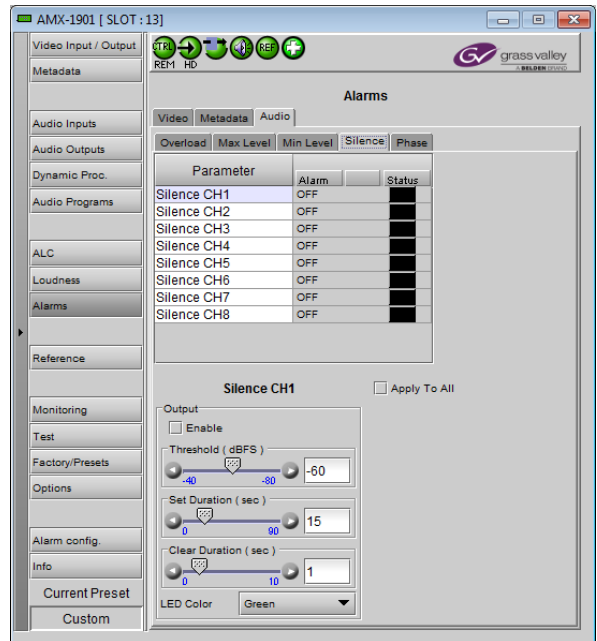


Figure 5.28 Alarms – Audio – Silence

Phase

The Phase measurements are limited to adjacent channel pairs.

Enable the alarm by selecting the checkbox.

The user sets the detection parameters for this error using three sliders:

- Threshold (degrees) – sets the value above which a phase error will be considered to have been detected.
- Set Duration (sec) – sets the time interval over which a phase error must be continuously detected before the error is flagged.
- Clear Duration (sec) – sets the time interval over which an in-phase signal (i.e. below the Threshold) must be continuously present to clear the alarm if it has been set.

Use the *LED Color* pulldown to choose the color that will be displayed by the status LED on the card edge when a Phase alarm is set. Choices are:

- Green, Yellow, Red, Flashing Red

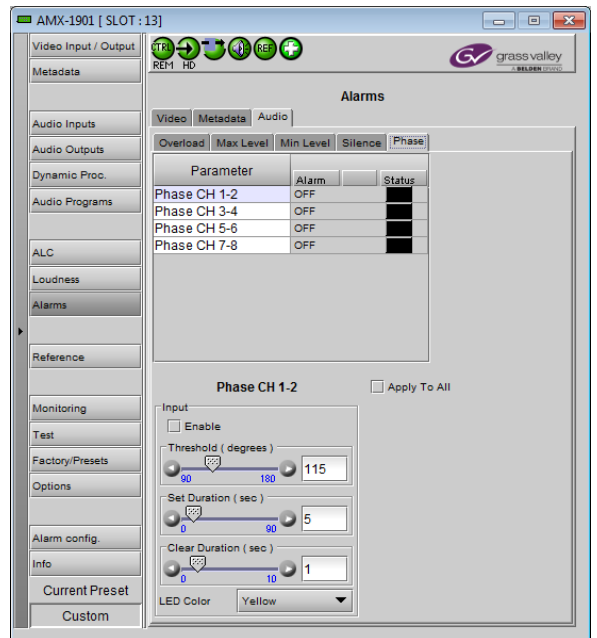


Figure 5.29 Alarms – Audio – Phase

5.11 Reference panel

This group of icons displays the reference to be used by the AMX-1901.

Reference Presence – indicates if either of these references is available:

- External – a reference applied to the rear panel REF IN of the AMX-1901
- URS (Universal Reference Signal) – the Densité frame’s internal reference from the backplane. A REF-1801 module is required in Slot #10 of the frame.

Reference Source – shows which of the possible references is in use:

- Input
- External
- URS
- Free-Run – used if there is no input to the card.

The selection is automatic, in the order of priority shown.

Note: The input signal is not required to be locked to the reference signal.



Figure 5.30 Reference panel

5.12 Monitoring panel

The Remote Audio Level Meter (RALM) panel displays audio output level meters only for the 8 channels derived from the analog inputs, and measured just before embedding. Channels are displayed in pairs, so up to four meters will be present in the meter display window. The source for each meter is selected using the pull-downs in the RALM Remote Control area at the bottom of the control panel.

- OFF
- Audio Output CH 1&2 up to CH 7 & 8

The meter is divided into three zones, and the dividing points and color of each zone are individually configurable under the *Meter Ballistics Config* tab.

Speed – select the meter response from the pull-down list, options are [fast, medium, slow]

5.12.1 RALM Connections tab

Use the radio buttons to turn the meter display ON (RALM) or OFF for the indicated channels. The meter appears directly above the controls.

Reset Counter: click this button to reset the overload counter on the ALM display to zero. See the next section for instructions on setting up the overload counter.



Figure 5.31 Monitoring - RALM

5.12.2 Meter Ballistics Config tab

Type – select a type of meter from the pull-down list

Upper Zone Limits – select the crossover level between the upper and middle zones of the meter (the range of values shown in the pull-down list depends on the type of meter selected)

Lower Zone Limits – select the crossover level between the middle and lower zones of the meter (the range of values shown in the pull-down list depends on the type of meter selected)

Color samples – the three samples show the current selected color for the upper, middle and lower zones of the meter.

- Click on the color sample of a zone to open a color selection panel to choose a different color for that zone

Overload Cursor – The overload cursor appears on the meter as an arrowhead in the meter scale. The two pull-down boxes set the position of the overload cursor on the left and right meters. If the audio level on a channel goes above the cursor, the Overload Counter at the top of the meter is incremented.

This counter shows a running count of the number of overloads detected.

The *Phasemeter* (located at the bottom of the RALM meter display) is a small meter that represents the phase correlation factor between the two channels of a pair.

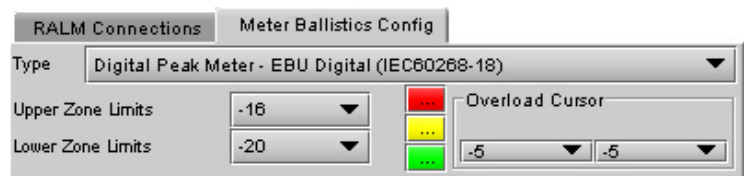


Figure 5.32 RALM - meter ballistics configuration

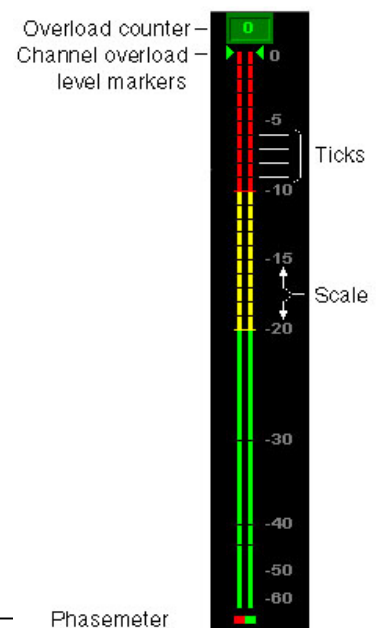


Figure 5.33 RALM meter display

5.13 Test panel

This panel contains a pulldown that allows the user to select an internally-generated test signal to replace the program signal at the AMX-1901 output.

OFF: the program signal appears at the output, and test signals are OFF

Color Bars and Tone: sends a 75% color bar test pattern (100% white), along with audio test tones (a continuous tone on right channel with pulsed tone on left channel in every pair) to the AMX-1901 output.

Lip Sync: sends a special test signal comprising color bars and tone plus a detectable element that is used to align audio-video delays in a processing path. This AMX-1901 becomes the transmitter in the alignment path. A second device (e.g. FRS-1801) will perform the measurement at the other end of the path.

- The special test signal consists of 75% color bars within which a white square is inserted every 4 seconds for a duration of 10 frames. Simultaneously with the beginning of the first field of video containing the white square, the 16 embedded audio channels and the 8 AES outputs are pulsed with a tone lasting 250 ms.

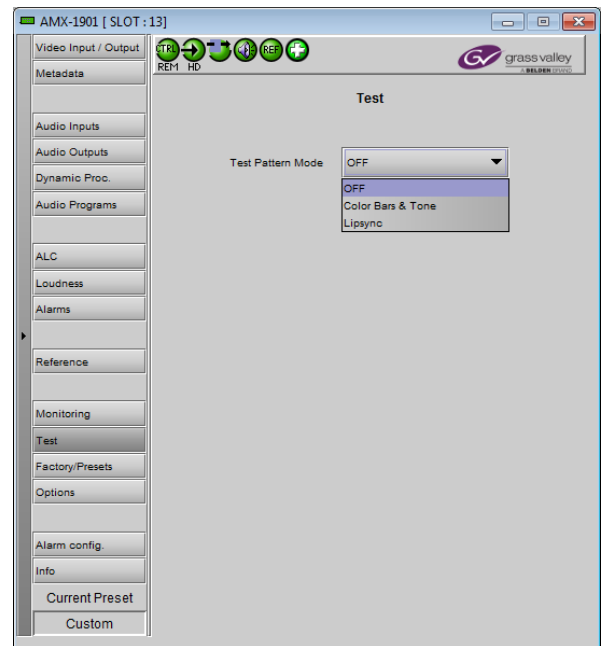


Figure 5.34 Test panel

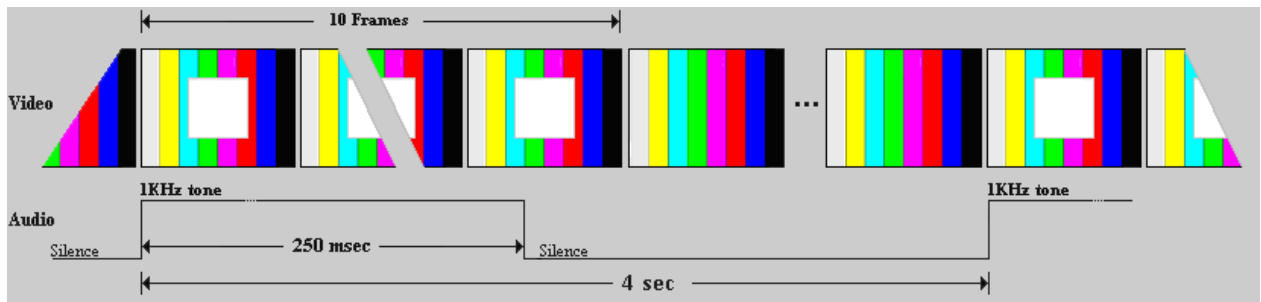


Figure 5.35 Lip Sync test signal appearance and timing

5.14 Factory/Presets panel

5.14.1 Factory/Presets tab

Factory Section

Load Factory: Clicking this button will restore the card to a factory default state. Two checkboxes enable the user to choose whether to include Parameters and/or Alarms in the restoration process

- Note that User Presets are not changed

User Presets section

The AMX-1901 has memory registers which can hold up to 5 user-defined parameter settings.

The *Current Preset* box (at the bottom left corner of the panel) displays the last loaded preset. Any change to the card configuration after a preset is loaded will change the display to "Custom" instead of the preset value.

Select any one of the five presets using the pull-down list.

Click **Load** to load the contents of the selected User Preset into the AMX-1901. All parameter settings and values will be replaced by the contents of the selected User Preset.

Click **Save** to store the current parameter settings and values from the AMX-1901 into the selected User Preset. The existing contents of the preset will be overwritten.

Profiles

This section provides the option to save and recover the entire card configuration (including user presets if desired) on an external disk, or to copy it to another AMX-1901 card.

Click on *Profiles* to open the Profile Copy window.

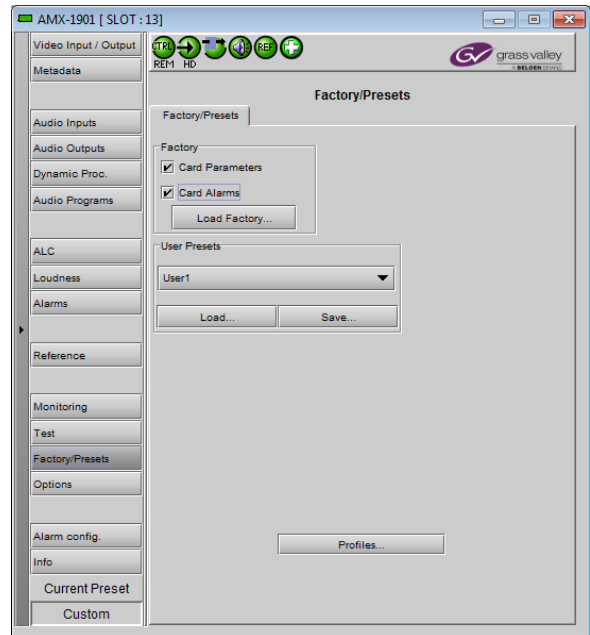


Figure 5.36 Factory / Presets panel

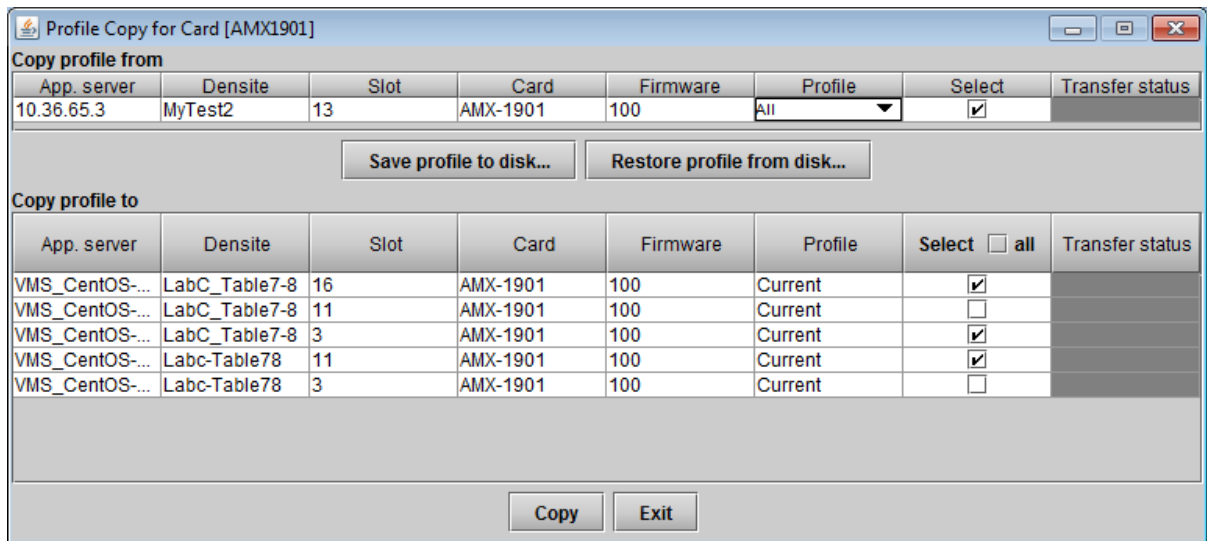


Figure 5.37 Profile Copy window

Copy profile from

This line shows this AMX-1901 card, and identifies it by App server, Densité frame and slot number, card type and firmware version.

The *Profile* column has a pulldown that allows you to select which profiles you will work with, and gives these choices:

- Current, User1, User2, User3, User4, User5, All

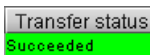
The *Select* column includes a checkbox (preselected checked) to confirm that you want to work with the current card.

Save Profile to Disk...

Click this button to open a Save dialog allowing you to specify a file name and location to which the selected profiles for this card will be saved.

Hint - It is a good idea to create a folder for these files, because they are not explicitly identified as AMX-1901 profiles, and will be difficult to find and identify if not clearly named and conveniently located.

- Click the save button once the name and location have been identified in the Save box
- If the file is saved correctly, the Transfer Status box on the right of the *Copy profile from* line will indicate *Succeeded* against a green background:



- If the file was not saved for some reason, the Transfer Status box to the right of the *Copy profile from* line will indicate *Failed* against a red background:

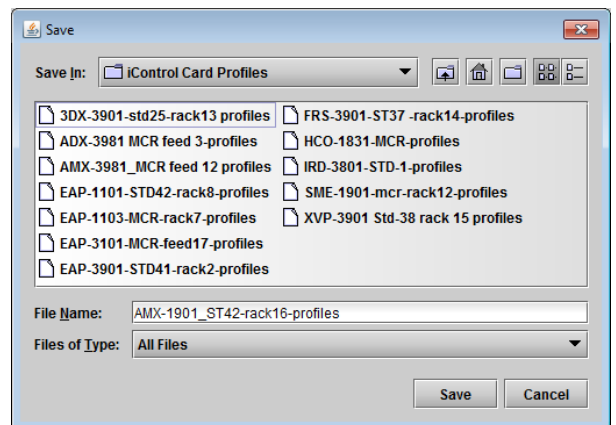
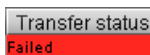


Figure 5.38 Save Profile to Disk dialog

Restore profiles from disk...

Click this button to open an *Open* dialog box within which you can locate and select a valid AMX-1901 profile file.

- Click Open to read the contents of the file and to reconfigure this AMX-1901's profiles according to its contents
- While the reconfiguration is in progress, the Transfer Status box on the right of the *Copy profile from* line will indicate *Working* against a yellow background
- When the reconfiguration is complete, the Transfer Status box on the right of the *Copy profile from* line will indicate *Succeeded* against a green background

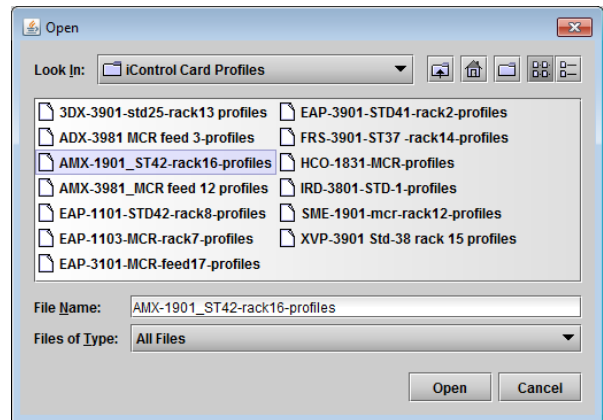


Figure 5.39 Restore Profiles from Disk dialog

Copy profile to

This line shows other AMX-1901 cards that are available on the iControl network, each identified by App server, Densité frame and slot number, card type and firmware version.

The *Profile* column shows the same information as is shown for the current card in the *Copy profile from* line, i.e. one of the following:

- Current, User1, User2, User3, User4, User5, All

The *Select* column includes a checkbox to identify the AMX-1901 cards onto which you will copy profiles from the current card.

- For convenience, a *Select all* checkbox is provided in the column header
- Note that you can only select AMX-1901 cards with the same firmware version as the source card; cards with a different firmware version will show N/A against a yellow background in the *Transfer Status* column.

Click *Copy* to copy the selected profiles from this card into the selected other AMX-1901 cards

- While the profile copy operation is in progress, the Transfer Status box on the right of the *Copy profile to* line will indicate *Working* against a yellow background
- When the profile copy operation is complete, the Transfer Status box on the right of the *Copy profile to* line will indicate *Succeeded* against a green background

5.15 Options panel

Two options are available for the AMX-1901:

- Dynamic Processing Option (AMX-1901-OPT-DP)
- ALC Option (AMX-1901-OPT-ALC)

To activate each of these options, you must

- Obtain a license key from Grass Valley.
- Type the license key in the *Enter Key* box
- Click on ENABLE OPTION to enable the option's features.

5.15.1 Dynamic Processing option:

This option enables the audio dynamics processing functionality of the AMX-1901.



Figure 5.40 Dynamic Processing option

5.15.2 ALC option

This option enables the Automatic Loudness Control feature for the 8 channels, up to 8 programs, of the AMX-1901.

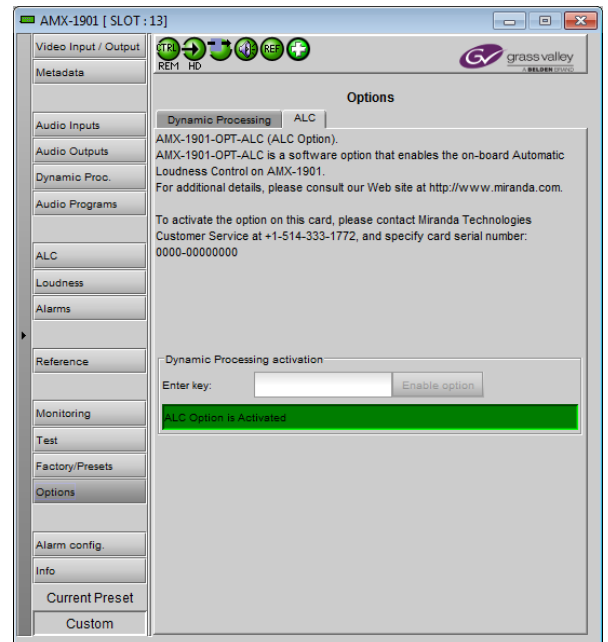


Figure 5.41 ALC option

5.16 Alarm Config panel

This panel allows the alarm reporting of the AMX-1901 to be configured. The panel opens in a new window when the button is clicked, and can be resized if needed.

The panel is organized in columns.

Status/Name

This contains an expandable tree listing all the alarms reported by this AMX-1901 card.

- Each alarm name includes an icon that shows its current status
- Some alarms may be text-only and the alarm status is shown in the name and not by a status icon
- The figure shows the entire tree, but some repetitive alarms were removed to reduce the size of the image.

The **Card LED**, **Overall alarm** and **GSM contribution** columns contain pulldown lists that allow the level of contribution of each individual alarm to the alarm named in the column heading to be set.

- If there is no arrowhead in the box, there is no pulldown and the alarm is not user-configurable

Card LED

This column allows configuration of the contribution of selected individual alarms to the status LED located on the front card edge. The Card LED status is shown at the bottom of the alarm tree in the Status/Name column.

Overall Alarm

This column allows configuration of the contribution of each individual alarm to the Overall Alarm associated with this card. The Overall Alarm is shown in the upper left corner of the iControl panel, and also appears at the bottom of the Status/Name column.

GSM Contribution

This column allows configuration of the contribution of each individual alarm to the GSM Alarm Status associated with this card. GSM is a dynamic register of all iControl system alarms, and is also an alarm provider for external applications. The possible values for this contribution are related to the Overall alarm contribution:

- If the Overall alarm contribution is selected as Disabled, the GSM alarm contribution can be set to any available value
- If the Overall alarm contribution is selected as any level other than disabled, the GSM contribution is forced to follow the Overall Alarm.

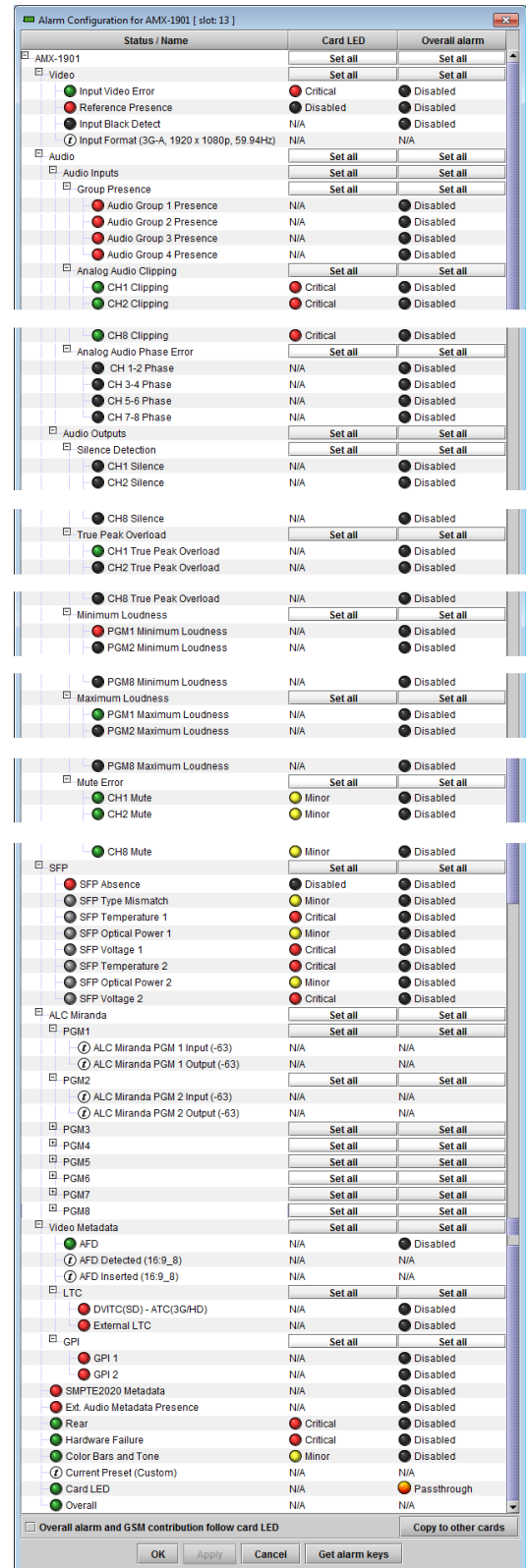







Figure 5.42 Alarm Configuration panel

Levels associated with these alarms:

The pulldown lists may contain some or all of the following options:

- | | | |
|---|-------------|---|
|  | Disabled | The alarm makes no contribution (black icon) |
|  | Minor | The alarm is of minor importance (yellow icon) |
|  | Major | The alarm is of major importance (orange icon) |
|  | Critical | The alarm is of critical importance (red icon) |
|  | Passthrough | The alarm exists but has no effect (used for text and composite alarms) |

Shortcut: if you click in one of the Set All boxes beside a section heading, you will open a pulldown that lets you assign a level to all alarms in that section of the column simultaneously.

Once the alarms are configured, you may accept the changes or discard them:

Log Events

iControl maintains a log of alarm events associated with the card. The log is useful for troubleshooting and identifying event sequences. Click in the checkbox to enable logging of alarm events for each individual alarm.

At the bottom of the window are several other controls

Overall alarm and GSM contribution follow card LED

Click in the checkbox to force the Overall alarm and GSM contribution to be identical to the Card LED status

- All Overall alarms and GSM contributions for which there is a Card LED alarm will be forced to match the Card LED alarm
- All Overall Alarms and GSM contributions for which there is no Card LED alarm will be forced to Disabled

A warning box will open allowing you to confirm the action, since it will result in changes to the configuration and there is no *undo* function.

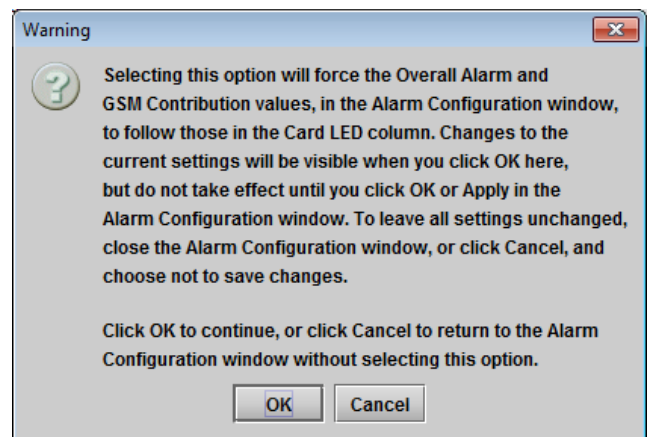


Figure 5.43 Warning for Follow LED change

Copy to other cards

Click this button to open a panel that allows the alarm configuration set for this card to be copied into another AMX-1901 card.

- Select one or more destination cards from the list in the window by clicking in the checkboxes, or all of them by clicking in the *All* checkbox
- Note that when you do a [Copy Profile](#) for this card (see section 5.14), the alarm configuration is copied along with all the other settings.

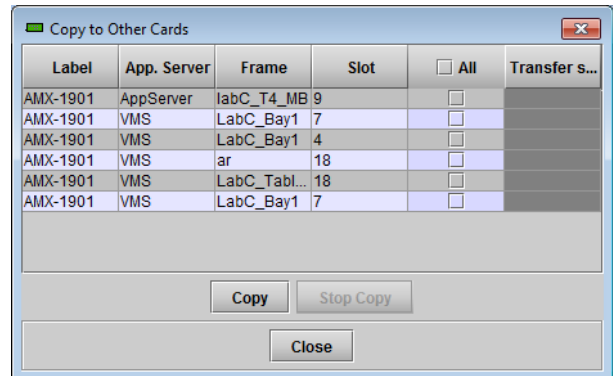


Figure 5.44 Copy to Other Cards window

Get alarm keys

Click this button to open a save dialog where you can save a file containing a list of all alarms on this card and their current values, along with an Alarm Key for each. The alarm keys are useful for system integration and troubleshooting.

- The file is saved in .csv format

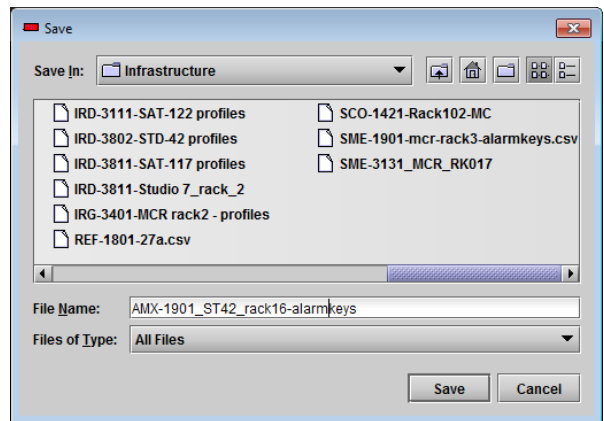


Figure 5.45 Get Alarm Keys dialog

OK, Apply, Cancel

- **OK** accepts the settings and closes the window once the card confirms that there are no errors.
- **Apply** accepts the settings, but leaves the window open
- **Cancel** closes the window without applying any changes, and leaves the previous settings intact.

5.17 Info panel

When the AMX-1901 is included in an iControl environment, certain information about the card should be available to the iControl system. The user can enter labels and comments that will make this card easy to identify in a complex setup. This information is entered into data boxes in the Info control panel.

Rear Type: specifies the rear module currently installed.

Label: type the label that is shown for this AMX-1901 when it appears in iControl applications

Short Label type the short-form label that iControl uses in some cases (8 characters)

Source ID type a descriptive name for this AMX-1901

Comments: type any desired text

The remaining data boxes show manufacturing information about this card.

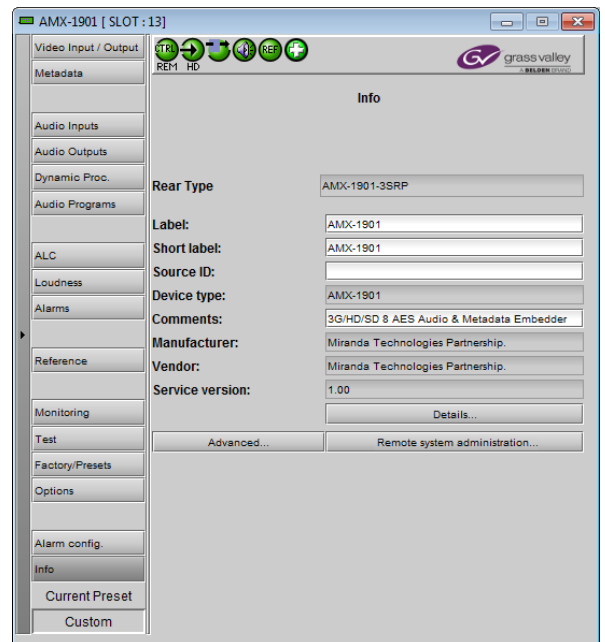


Figure 5.46 Info panel

Three buttons in the panel give access to other information.

- Details...: Reports the Firmware version, service version, and panel version for this card

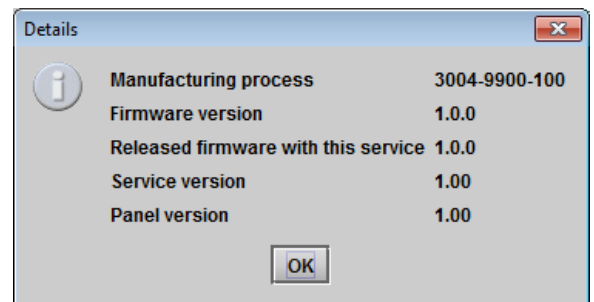


Figure 5.47 Details window

- Advanced...: Shows the Long ID for this card. The Long ID is the address of this AMX-1901 in the iControl network.

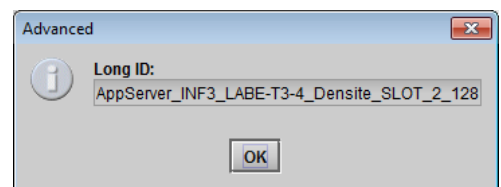


Figure 5.48 Advanced window

- Remote System Administration – opens the Joining Locators window, which lists remote lookup services to which this AMX-1901 is registered

Add: Force the iControl service for this AMX-1901 to register itself on a user-specified Jini lookup service, using the following syntax in the data box:

jini://<ip_address>

where <ip_address> is the ip address of the server running the lookup service, e.g.:

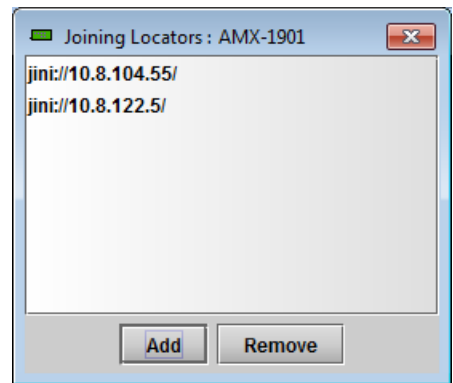
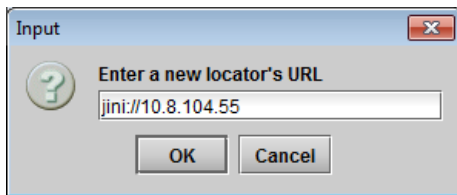
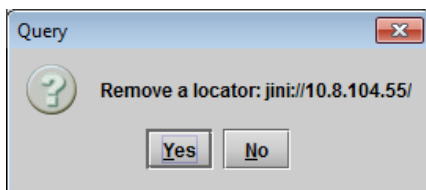


Figure 5.49 Joining Locators window

Remove: select one of the services listed in the window by clicking on it, and click *Remove* to open a query box allowing you to delete it from the window.



6 Specifications

Analog Audio Inputs (8)

Signal:	balanced analog audio
Input impedance:	> 12 k Ω
Max. level:	+24 dBu

Audio Processing Performance

Quantization:	24 bits
Sampling:	48 kHz
SNR:	>117 dB A weighted
0 dBFS:	0 to +24 dBu (1 dB steps)
Distortion:	-90 dB (20Hz to 5 kHz)
Crosstalk:	-100 dB (20 Hz to 20 kHz)
Freq. response:	\pm 0.05 dB (20 Hz to 20 kHz)
Processing delay:	400 μ s to 3 ms depending video resolution and processing options
Tone generator:	-18 dBFS 1 kHz sine wave interrupted on left channel (250 ms) per EBU R49

Video Input (1) / Output (2)

Signal:	SMPTE 259M (270 Mb/s) SMPTE 292M (1.485, 1.485/1.001 Gb/s) SMPTE 424M (2.970, 2.970/1.001 Gb/s)
Supported formats:	480i59.94, 576i50 SMPTE 274M: 1080/59.94,1080p23.98, 24sF/25/29.97 SMPTE 296M: 720p24, 720p23.98, 24/50/59.94 SMPTE 425 Level A (mapping 1),Level B: 1080p59.94, 1080/50 SMPTE 272M (SD), SMPTE 299M (HD)
Embedded audio:	SMPTE RP188
Embedded ATC:	SMPTE 291M
Embedded ANC:	
Cable length:	300 m Belden 1694A at 270 Mb/s 150 m Belden 1694A at 1.485 Gb/s 120 m Belden 1694A at 2.970 Gb/s
Input impedance:	75 Ω
Return Loss:	>15 dB up to 1.5 GHz >10 dB from 1.5 GHz to 3 GHz
Jitter: SD/HD:	< 0.2 UI
3G:	< 0.4 UI

External Reference Input (1)

Signal:	SMPTE 170M/SMPTE 318M/ITU 624-4 Black Burst SMPTE 274M / SMPTE 296M Tri-level sync
Input impedance:	75 Ω
Return loss:	>35 dB up to 5.75 MHz

Frame Reference

Signal:	URS from REF-1801 card installed in the frame
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GUIDE TO INSTALLATION AND OPERATION

LTC Input (1)

Signal:	SMPTE12M
Connector:	RJ45
Impedance:	10 k Ω unbalanced
Level:	0.2 to 5 Vpp

GPI Input (2)

Signal:	Contact closure to ground.
Connector:	RJ45

RS-422 Metadata Input (1)

Signal:	RS-422
Connector:	RJ45
Level:	300 mVpp min.
Rate:	115200 bauds

OPTICAL VIDEO INPUT (0 or 1)

Refer to SFP module specifications:	SFP-R-S13-LC, SFP-RT-S13-LC, SFP-RT-W13-LC, SFP-RT-W15-LC
-------------------------------------	--

Optical Video Output (0, 1 OR 2)

Refer to SFP module specifications:	SFP-T-S13-LC, SFP-TT-S13-LC, SFP-RT-W13-LC, SFP-RT-W15-LC
-------------------------------------	--

Video Processing

Signal Path:	10 bits
I/O Processing delay:	Normal: < 1.1 line for all formats except 3G Level B
	Minimum: < 0.25 line for all formats except 3G Level B

Electrical

Power:	<7W with dual SFP cartridge
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7 Grass Valley Technical Support

For technical assistance, please contact the Grass Valley Technical Support Center nearest you:

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 Telephone: 1-800-547-8949
 +1 530 478 4148
 Fax: +1 514 335 1614
support@grassvalley.com

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ANNEX 1 – AMX-1901 Local User Interface

LEV1	LEV2	LEV3	LEV4	VALUES	Conditions
STATUS	GENERAL STATUS VIDEO STATUS AUDIO STATUS REFERENCE STATUS METADATA STATUS	ASPECT RATIO TIME CODE AUDIO METADATA		REAR TYPE / OPTIC TYPE / NO CARRIER or "FORMAT" / TRS ERROR GROUP N# "1 to 4" "VALID or NONE" / ANALOG "1-2 to 7-8" "L-R or _-_" EXT. REF "NONE" or "TYPE", INT.URS "NONE" or "VALID" AFD "FORMAT or NONE", VLI "FORMAT or NONE", WSS "FORMAT or NONE" LTC "VALID or NONE", VITC "VALID or NONE", ATC "VALID or NONE" S-2020 "VALID or NONE", RS-422 "VALID or NONE"	
CONFIG	LOAD SAVE			[USER1, USER2, USER3, USER4, USER5] [USER1, USER2, USER3, USER4, USER5]	
VIDEO IN/OUT	INPUT SELECT * FIBER OUTPUT RECOVERY	FIBER OUT 1 * FIBER OUT 2 * SIGNAL FORMAT REF SOURCE		[BNC IN, FIBER IN1] [OFF, ON] [OFF, ON] [COLOR BAR, BLACK BURST] [525, 625, 720p23/24/50/59, 1080p23/24SF/25/29, 1080i50/59, 1080p50/59, OFF] [AUTO, EXTERNAL, URS, FREE-RUN]	Requires -F rear module Requires -F rear module Requires -F rear module
METADATA	AFD LTC AUDIO METADATA	AFD MODE AFD DEFAULT AFD FORCED AFD SOURCE AFD LINE NUMBER AFD INSERTION LTC MODE LTC LINE NUMBER LTC DELAY AUDIO META MODE AUDIO MT LINE NB AUDIO META SDID AUDIO META DELAY		[PASS, BLANK, AUTO, INSERT] [4:3_0, 4:3_1, ..., 16:9_15] [DEFAULT, KEEP LAST] [AFD, VLI, WSS*] [9, 21] [AFD, VLI, WSS*] SD [OFF, ON], HD [OFF, BOTH] [9, 21] [0, 50] [PASS, BLANK, AUTO, INSERT] [9, 21] [1, 9] [0, 2700] [0, 47]	insert AFD mode * 625 SD Only * 625 SD Only SD Only unit=frame unit = ms, sample
AUDIO	INPUT OUTPUT MIXER AUDIO EMBEDDING	0 dBFS SETTING INPUT CH1-8 OUTPUT 1-8 GROUP 1-4	PHASE INVERT AUDIO DELAY MIX MODE SOURCE A LEVEL A SOURCE B LEVEL B MUTE	[0, ..., 24] [OFF, ON] [0, 2700] [0, 47] [OFF, A, A+B, MIX] [CH01, ..., CH8] [-96, ..., 12] [CH01, ..., CH8] [-96, ..., 12] [OFF, ON]	step = 1dBu unit = ms, sample step = .5dB step = .5dB
TEST PATTERN				[PASS, BLANK, OUT1-4, OUT 5-8]	
VERSION	UC FPGA			[OFF, COLOR BAR, LIPSYNC]	
OPTIONS	DYN PROC ALC	ON/OFF ON/OFF		Key:XX.XX.XX.XX Key:XX.XX.XX.XX	
FACTORY DEFAULT	CARD PARAMETERS CARD LED ALARMS			[RESTORE] [RESTORE]	

Note: Some menu items may not be present depending on input format, or card configuration.

ANNEX 2 – Installing the Optical Interface

Installing and removing the Fiber I/O interface cartridge requires special care. This annex describes the process.

Some rear panels used with the AMX-1901 incorporate a fiber optic interface. The interface consists of two parts:

- A socket on the rear panel into which an SFP interface module is plugged
- An SFP (Small Form-factor Pluggable) module into which the optical fibers are plugged, and which incorporates the optical/electrical interface

Cautions and Warnings



SFP Transmitter modules contain a class 1 laser, which emits invisible radiation whenever the module is powered up. Because the SFP is hot-swappable, the module may be powered up as soon as it is installed. **DO NOT LOOK INTO AN OPERATING SFP MODULE'S CONNECTORS, AS EYE DAMAGE MAY RESULT.**



The SFP module is sensitive to electrostatic discharge (ESD). It is recommended that you use an ESD-preventive wrist strap grounded to the Densité chassis while handling the SFP module.



SFP modules are subject to wear, and their useful lifetime is reduced each time they are inserted or removed. Do not remove them more often than is absolutely necessary.



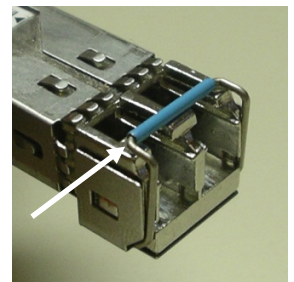
Never remove or install an SFP module with the fiber optic cables connected. Damage to the cables could result.



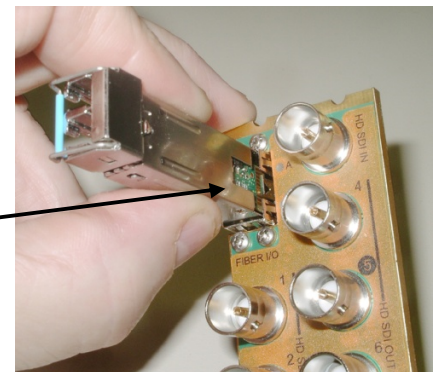
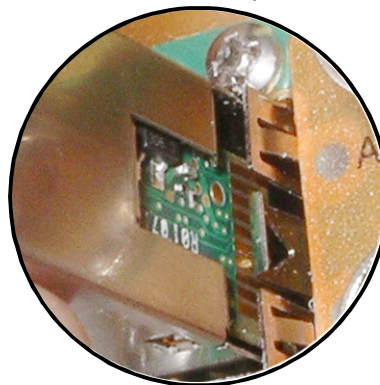
The presence of dust and debris can seriously degrade the performance of an optical interface. It is recommended that you insert a dust plug into the SFP module whenever a fiber optic cable is not connected.

Installing an SFP module

1. Make sure that the bale clasp lever is in the closed position



2. Position the SFP module so that the recessed slot is lined up with the tab side of the socket.

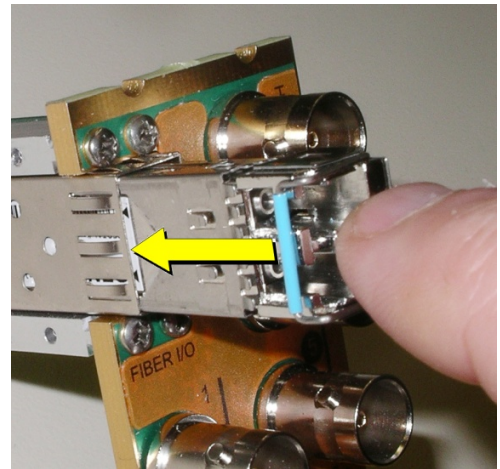


GUIDE TO INSTALLATION AND OPERATION

3. Slide the module straight into the socket, and push gently until it clicks into position.

Connecting the fiber optic cables

1. Remove the dust plug from the SFP module if present
2. Verify that the exposed end of the optical fiber in the LC connector is clean
 - Carefully remove any debris if necessary.
3. Plug the LC-terminated fiber optic cable into the SFP module

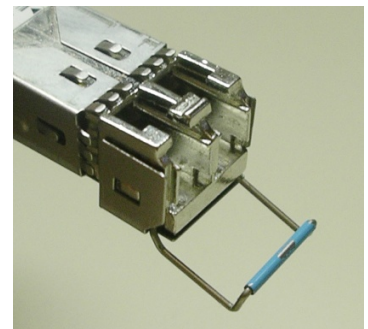


Removing the fiber optic cables

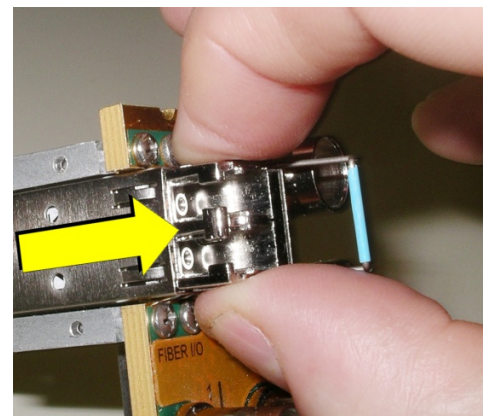
1. Grasp the LC fiber optic connector that is plugged into the SFP module, and pull it straight out to disengage the optical fiber from the SFP.
 - Never pull the fiber optic cable itself, as catastrophic damage may occur.
2. Insert a dust plug into the SFP module.

Removing the SFP module

1. Move the bale clasp lever to the open position.



2. Grasp the SFP module between your thumb and forefinger, and pull it straight out of the slot.
 - Do NOT pull on the bale clasp lever to remove the module, as it is easily damaged
 - You may find that you need to wiggle the module, or perhaps push it into the slot a bit, before it will release and slide out.





3. Insert a dust plug into the SFP module.

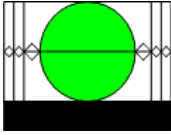
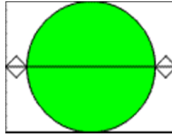
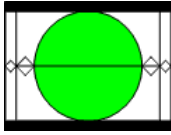
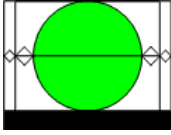
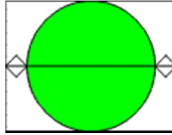
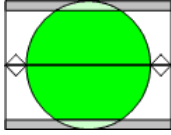
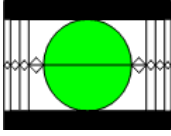
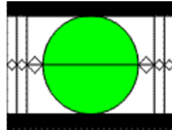
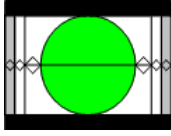
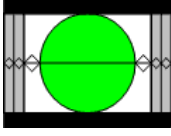
ANNEX 3 – AFD Flags

The two charts below list all available Active Format Descriptor (AFD) flags supported by the AMX-1901.

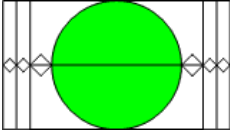
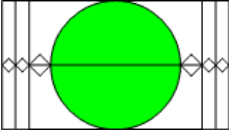
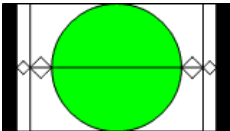
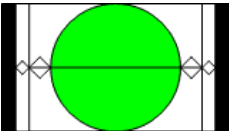
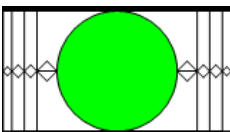
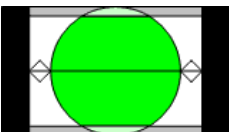
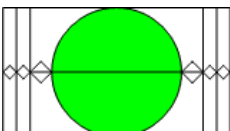
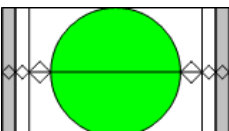
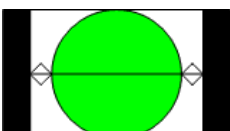
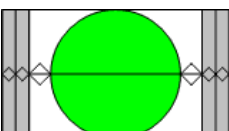
In the images shown in the chart:

BLACK  Indicates that this portion of the transmitted image will be black

GREY  indicates Protected Area, consisting of picture content which may be cropped for optimum display on screens with a different aspect ratio.

4:3 AFD flags		
<p>16:9 Letterbox (top) image in a 4:3 frame</p>  <p>(4:3_2)</p>	<p>4:3 Full frame image in a 4:3 frame</p>  <p>(4:3_8)</p>	<p>14:9 Letterbox image in a 4:3 frame</p>  <p>(4:3_11)</p>
<p>14:9 Letterbox (top) image in a 4:3 frame</p>  <p>(4:3_3)</p>	<p>4:3 Full frame image in a 4:3 frame (use preferred 4:3_8 code instead)</p>  <p>(4:3_9)</p>	<p>4:3 Image shoot and protect 14:9 in a 4:3 frame</p>  <p>(4:3_13)</p>
<p>> 16:9 Letterbox (center) image in a 4:3 frame</p>  <p>(4:3_4)</p>	<p>16:9 Letterbox image in 4:3 frame</p>  <p>(4:3_10)</p>	<p>16:9 Letterbox image shoot and protect 14:9 in a 4:3 frame</p>  <p>(4:3_14)</p>
<p>16:9 Letterbox image shoot and protect 16:9 in a 4:3 frame</p>  <p>(4:3_15)</p>		

GUIDE TO INSTALLATION AND OPERATION

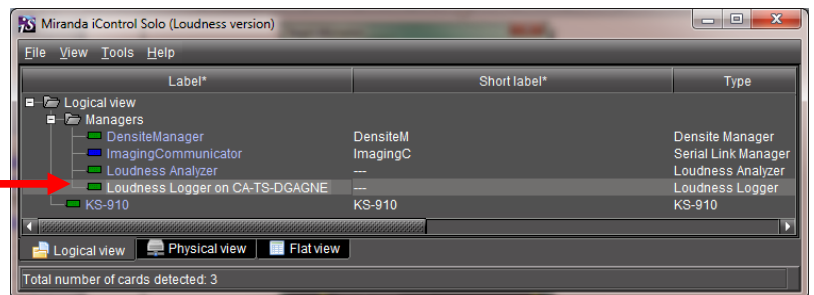
16:9 AFD flags	
<p>16:9 Full frame image in a 16:9 frame (use preferred 16:9_8 flag instead)</p>  <p>(16:9_2)</p>	<p>16:9 Protected Full frame image in a 16:9 frame</p>  <p>(16:9_10)</p>
<p>14:9 Pillar-box image in a 16:9 frame (use preferred 16:9_11 flag instead)</p>  <p>(16:9_3)</p>	<p>14:9 Pillar-box image in a 16:9 frame</p>  <p>(16:9_11)</p>
<p>> 16:9 Letterbox (center) image in a 16:9 frame</p>  <p>(16:9_4)</p>	<p>4:3 Pillar-box image Shoot and protect 14:9 in a 16:9 frame</p>  <p>(16:9_13)</p>
<p>16:9 Full frame image in a 16:9 frame</p>  <p>(16:9_8)</p>	<p>16:9 Image shoot and protect 14:9 in a 16:9 frame</p>  <p>(16:9_14)</p>
<p>4:3 Pillar-box image in 16:9 frame</p>  <p>(16:9_9)</p>	<p>16:9 Image shoot and protect 4:3 in a 16:9 frame</p>  <p>(16:9_15)</p>

ANNEX 4 - Loudness Logging and the Miranda Audio Loudness Analyzer

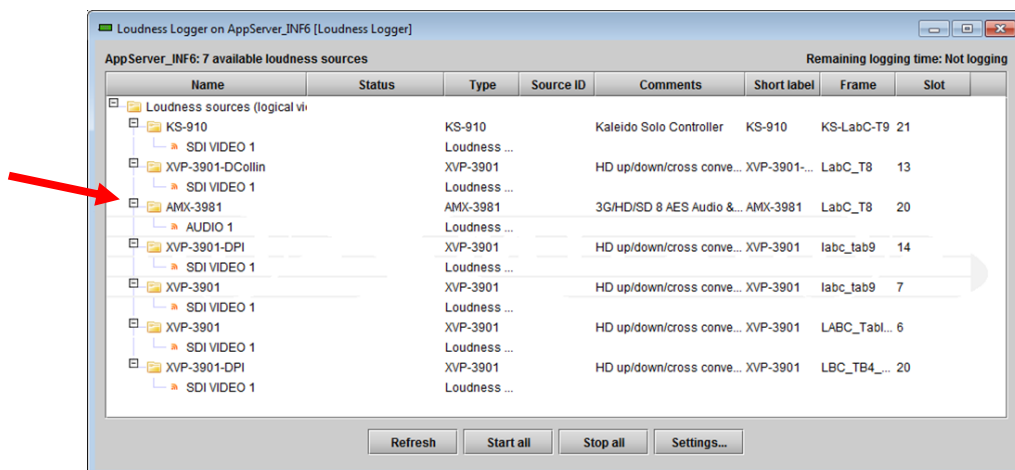
Activating and Managing Loudness Logging

Use iControl or iControl Solo to activate the loudness logging feature of the AMX-1901, and specify the location where the log files will be saved for future analysis.

- In the Logical View of your iControl Application (iControl Solo or iControl Navigator) open the Managers folder, and double-click on Loudness Logger
 - Note that in Navigator, there may be more than one logger available; be sure to select the one associated with the appserver whose DensitéManager was used to install the AMX-1901.



- A list of loudness monitoring resources will appear, including your AMX-1901.



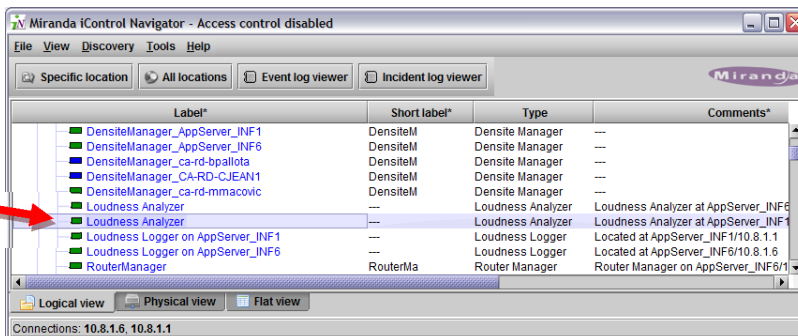
- Click "Settings" to specify the path to the location where loudness data files will be saved.
- Browse to the desired location and click the "Apply" button.

Note that the Settings apply to all loudness sources reported in the window, so be careful not to change them if other sources are active.
- To start logging on an individual AMX-1901, right-click on its icon and select "Start"
- To start logging on all the loudness sources in the display, click the "Start all" button.
- Look under "Status" and verify that logging is in progress, as indicated by the green check mark.
- To stop logging, right-click on the individual AMX-1901 and select "Stop", or click "Stop all" to stop logging on all devices in the list.

Starting the Audio Loudness Analyzer from iControl

The Audio Loudness Analyzer processes the log files saved from the AMX-1901, as described above.

1. From your iControl Application (iControl Solo or iControl Navigator), double-click *Loudness Analyzer*.



The complete user manual for the Audio Loudness Analyser is available from its Help menu.

1. Pull down Help and select Open Help to see the manual
2. Consult the manual as necessary to perform the loudness analysis.

