GENERAL INFORMATION

SIMPLWINDOWS NAME:	L-Acoustics Amplified Controller Advanced
CATEGORY:	MULTI-CHANNEL AUDIO AMPLIFIER
VERSION:	V3.1.0
SUMMARY:	The module provides the major control and preset functions via TCP/IP.
GENERAL NOTES:	This module is for the control of LA4, LA8, LA4X and LA12X Amplified Controllers. Each Amplifier to be connected and controlled will require one complete module assigned to it. Each module should therefore use unique digital, analog and serial joins. The simplest way of achieving this is to use a unique prefix which identifies the amplifier such as AMP1_MUTE and AMP2_MUTE. The module features error/status messaging that is designed to comply with the regulations regarding fault monitoring set in EN 60849.
CRESTRON HARDWARE REQUIRED:	C3ENET, 3-Series Processor
SETUP OF CRESTRON HARDWARE:	The processor's IP address must be in the same subnet as the amplified controllers (typically 192.168.1.x/255.255.255.0, but other classes are possible, see amplified controller user manual). If not the case, then the TCP/IP connection will be impossible, as L-Acoustics amplified controllers currently don't support Layer 3 IP routing.
VENDOR FIRMWARE:	LA4/LA8/LA4X/LA12X minimum firmware version: V2.8.1 Maximum firmware version: V2.10.x
VENDOR SETUP:	Amplified Controller connected to the Ethernet Network

SUPPORT CONTACT

COMPANY NAME:	L-Acoustics
SUPPORT CONTACT:	Application, Electronics / AV Control System
EMAIL ADDRESS:	avcontrol@l-acoustics.com
PHONE:	+33 (0) 1 69 63 69 63
ADDRESS:	L-Acoustics 13 rue Levacher Cintrat 91460 Marcoussis France

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RELEASE NOTES

- **Version 3.1.0**

New features/Improvements

0007429	Support of Firmware 2.10.x
0007215	Clear preset loading error 5 seconds after loading a preset was refused because of channel sets mismatch
0007281	Add signal to temporarily bypass Speaker Monitoring (for not disturbing Load Checker procedure)

Fixed issues

0007433	Fast successive PUSH on Gain_Up/Down can desynchronize gain within channel sets
0007215	Fast alternation of PUSH on Select_Next_Preset and Load_Selected_Preset can lead to illegal loading of a preset with different channel sets
0007351	Bits 9-12 (HF Short Circuit) of output signal PAVA_Speaker_Errors# sometimes have incorrect values
0007521	Connection issues when using "1" signal on "Enable" input

- **Version 3.0.0** (February 2019)

Initial release

CONTROL

Enable	D	The **Enable** signal is used to activate the functions of the module. As soon as this signal is HIGH, the module tries to connect to the amplified controller over TCP/IP. When the connection is successful, all other input signals are effective. When the signal is LOW, the TCP/IP connection gets closed, and input signals become ineffective.
Set_Online **Set_Standby**	D	**Set_Online** and **Set_Standby** react to rising edges. Setting these signals HIGH turns the amplified controller into either Online state or Standby state. Of course, it cannot be in both states at the same time, so the latest rising edge will prevail.
Display_Lock **Display_Unlock**	D	**Display_Lock** and **Display_Unlock** react to rising edges. Setting these signals HIGH either locks or unlocks the front panel controls of the amplified controller. It cannot be in both states at the same time, so the latest rising edge will prevail.
Mute_Ch1 **Mute_Ch2** **Mute_Ch3** **Mute_Ch4**	D	**Mute_Ch[X]** react to rising edges. Push these signals to mute the individual outputs of the amplified controller.
Mute_All **Unmute_All**	D	**Mute_All** and **Unmute_All** react to rising edges. Push these signals to either mute or unmute all the channels of the amplified controller.
Unmute_Ch1 **Unmute_Ch2** **Unmute_Ch3** **Unmute_Ch4**	D	**Unmute_Ch[X]** react to rising edges. a Push these signals to unmute the individual outputs of the amplified controller.
Master_Mute **Master_Unmute**	D	**Master_Mute** and **Master_Unmute** react to rising edges. These signals have a different behavior than **Mute_All** and **Unmute_All**, because they don't act on channels that are already muted. **Master_Mute** is muting all the unmuted channels. **Master_Unmute** is unmuting only the channels that were muted by **Master_Mute**.
Gain_Ch1_Select **Gain_Ch2_Select** **Gain_Ch3_Select** **Gain_Ch4_Select**	D	Setting one or more **Gain_Ch[X]_Select** signals HIGH tells the module which channels should be affected by the **Gain_Up** and **Gain_Down** signals. For example, set **Gain_Ch1_Selected** and **Gain_Ch4_Selected** to LOW, and **Gain_Ch2_Selected** and **Gain_Ch3_Selected** to HIGH in order to change the gain of channels 2 and 3 only (provided that Channel Sets* allow that).
Gain_Up **Gain_Down**	D	**Gain_Up** and **Gain_Down** react to rising edges. Pushing these signals raises/lowers the selected channels' gain value by ±1.0dB. If one of the selected channels' gain value is reaching the boundaries of −60dB or +15dB, then the gain won't increase/decrease any further for all selected channels (relative gain differences of selected channels are preserved).

Select_Next_Preset	D	**Select_Next_Preset** reacts to rising edges. Push this signal to pre-select the next available user preset in the amplified controller's memory. The user presets are available in the slots 1 to 10 of the presets bank. Unlike user presets, factory presets can only be accessed by LA Network Manager or the amplified controller front panel, and not from Crestron.
Select_Preset_Index#	A	**Select_Preset_Index#** accepts values between 1 and 10. When changing its value, if a user preset is available in the corresponding preset slot, it is then pre-selecting this preset, just like **Select_Next_Preset** would do, but by indicating the slot number directly.
Load_Selected_Preset	D	**Load_Selected_Preset** reacts to rising edges. Push this signal to ask the amplified controller to actually load the preset that was pre-selected thanks to **Select_Next_Preset** or **Select_Preset_Index#** signals. Loading a preset is possible only if this new preset has the same Channel Sets* as the currently loaded preset. Trying to load a preset with different Channel Sets* will have no effect and raise an error in the **Error_Message$** output signal.
Routing_Ch1# **Routing_Ch2#** **Routing_Ch3#** **Routing_Ch4#**	A	**Routing_Ch[X]#** accept values between 1 and 28, and are used to update the audio routing between audio inputs A,B,C,D and output channels 1,2,3,4. List of possible values for each output channel: 1 (A) ; 2 (B) ; 3 (A+B) ; 4 (C) ; 8 (D) ; 12 (C+D) ; 15 (A+B+C+D) ; 19 (A-B) ; 28 (C-D) Routing values are applied to all outputs pertaining to the same Channel Set*. Routing values 4, 8, 12, 15 and 28 are compatible with LA4X and LA12X only, and will have no effect on LA4 and LA8.
Input_Source_Set_AVB **Input_Source_Set_XLR**	D	**Input_Source_Set_AVB** and **Input_Source_Set_XLR** react to rising edges. Push these signals to switch between AVB and ANALOG/AES inputs on LA4X/LA12X devices. This has no effect on LA4 and LA8 units. AVB and XLR cannot be active at the same time, so the latest rising edge will prevail.
Input_XLR_AB_Set_ANALOG **Input_XLR_AB_Set_AES**	D	**Input_XLR_AB_Set_ANALOG** and **Input_XLR_AB_Set_AES** react to rising edges. Push these signals to switch between ANALOG and AES on inputs A/B. ANALOG and XLR cannot be active at the same time, so the latest rising edge will prevail. This has no effect on LA4/LA8 which don't have an AES optional input card plugged in.

Input_XLR_CD_Set_ANALOG **Input_XLR_CD_Set_AES**	D	Same as **Input_XLR_AB_Set_ANALOG** and **Input_XLR_AB_Set_AES**, but for inputs C/D. Only LA4X and LA12X units are compatible. These have no effect on LA4 and LA8 units because they don't have C/D inputs.
AVB_Fallback_Enable	D	**AVB_Fallback_Enable** is used to enable the fallback feature of failover from AVB input stream to XLR inputs. If this signal is HIGH, a failing network AVB input stream will automatically failover to XLR inputs.
AVB_Fallback_Trigger	D	**AVB_Fallback_Trigger** reacts to rising edges. Push this signal when AVB fallback is enabled, to simulate an AVB failure and manually failover to XLR inputs. (pushing this signal when the AVB fallback is disabled or already active may have the effect to trigger the AES fallback instead)
AVB_Fallback_Reset	D	**AVB_Fallback_Reset** reacts to rising edges. Push this signal when AVB fallback is enabled and active, to switch back from XLR inputs to AVB input stream. This will have no effect if the AVB listener is still in a failing status, the input would then remain switched to XLR.
AES_Fallback_Enable	D	**AES_Fallback_Enable** is used to enable the fallback feature of ailover from XLR A/B AES input XLR C/D inputs. If this signal is HIGH, a failing AES input A/B will automatically failover to C/D inputs, no matter if input C/D is configured for AES or ANALOG.
AES_Fallback_Trigger	D	**AES_Fallback_Trigger** reacts to rising edges. Push this signal when AES fallback is enabled, to simulate an AES failure on inputs A/B and manually failover to XLR C/D inputs. (pushing this signal when the input source is set to AVB instead of XLR may have no effect, or trigger AVB fallback)
AES_Fallback_Reset	D	**AES_Fallback_Reset** reacts to rising edges. Push this signal when AES fallback is enabled and active, to switch back from inputs C/D to AES inputs A/B. This will have no effect if the AES input A/B is still in a failing status, the input would then remain switched to XLR C/D.
Bypass_Speaker_Monitoring	D	**Bypass_Speaker_Monitoring** is used to temporarily disable the PA/VA Speaker Monitoring generator, in order to prevent disturbing the Load Checker (LA Network Manager) or Enclosure Check process. When this signal is HIGH, the PA/VA Speaker Monitoring option is turned down. When this signal is LOW, the PA/VA Speaker Monitoring option is restored to its original state.

* Depending on the preset currently loaded in the amplified controller, channels can be linked by what we call 'Channel Sets'. For instance, this is the case for output channels driving bi-amplified or quadri-amplified loudspeaker enclosures. Each channel is dedicated to a loudspeaker section (LF, MF, HF…) and their preset parameters (gain, delay, polarity and routing) are linked, i.e. they cannot be changed independently from one another. So even if the user selects only one channel of a 'Channel Set', all gain and routing values will change simultaneously within the Channel Sets.

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FEEDBACK

Connected_fb	D	This signal is HIGH when the TCP/IP connection to the amplified controller is established, and the remote device is compatible with the module.
Online_fb	D	HIGH = the amplified controller is Online. LOW = the amplified controller is in Standby mode.
Display_Lock_fb	D	HIGH = the front panel controls are locked. LOW = the front panel controls are unlocked.
Mute_Ch1_fb **Mute_Ch2_fb** **Mute_Ch3_fb** **Mute_Ch4_fb**	D	HIGH = the output channel is muted. LOW = the output channel is unmuted.
Master_Mute_fb	D	HIGH = Master Mute is active, all channels are muted. LOW = Master Mute is inactive, or some channels were manually muted/unmuted.
Gain_Ch1_Selected_fb **Gain_Ch2_Selected_fb** **Gain_Ch3_Selected_fb** **Gain_Ch4_Selected_fb**	D	HIGH = the channel is part of the selection for Gain_Up and Gain_Down. LOW = the channel is not part of the selection for Gain_Up and Gain_Down.
Gain_Ch1# **Gain_Ch2#** **Gain_Ch3#** **Gain_Ch4#**	A	These analog signals represent the gain value of the output channels. The full analog signal range (0d ~ 65535d) is used to represent the full gain range (-60.0 ~ $+15.0$dB) of the output channels, which means that: - **Gain_Ch*[X]#*** = 0d (minimum) ⇒ gain = -60.0dB (minimum) - **Gain_Ch*[X]#*** = 65535d (maximum) ⇒ gain = $+15.0$dB (maximum) - **Gain_Ch*[X]#*** = 52428d ⇒ gain = 0.0dB (unity)
Signal_Ch1_fb **Signal_Ch2_fb** **Signal_Ch3_fb** **Signal_Ch4_fb**	D	HIGH = the channel is outputting audio level > -60.0dBFS. LOW = the channel is outputting audio level ≤ -60.0dBFS.
Limit_Ch1_fb **Limit_Ch2_fb** **Limit_Ch3_fb** **Limit_Ch4_fb**	D	HIGH = the internal DSP is currently limiting the audio level for the channel LOW = the internal DSP is not limiting the audio level for the channel
Clip_Ch1_fb **Clip_Ch2_fb** **Clip_Ch3_fb** **Clip_Ch4_fb**	D	HIGH = the output level is reaching 0dBFS. Audio is clipping on the channel. LOW = the output level is below 0dBFS.
Selected_Preset_Name$	S	This signal represents the name and slot number of the pre-selected preset, for instance: '001:KARA_FI'.
Selected_Preset_Index#	A	This signal represents the slot number of the pre-selected preset. Value can vary between 1d and 10d.
Current_Preset_Name$	S	This signal represents the name and slot number of the currently loaded preset in the amplified controller, for instance: '001:KARA_FI'.

Output_Name_Ch1$** **Output_Name_Ch2$ **Output_Name_Ch3$** **Output_Name_Ch4$**	S	These signals represent the type of speaker section connected to each output channel, according to the currently selected preset. Possible values are: 'PA', 'LF', 'MF', 'HF', 'SR' or 'SB'.
Routing_Ch1_fb# **Routing_Ch2_fb#** **Routing_Ch3_fb#** **Routing_Ch4_fb#**	A	These signals give the current routing of audio inputs to audio outputs (see **Routing_Ch[X]#** signals definition for the list of possible values for each output channel). Audio routing is a preset parameter, so it follows the rules of Channel Sets*. Outputs pertaining to the same Channel Set will always have the same routing, even if the user sets their input signals **Routing_Ch[X]#** to distinct values.
Input_Source_Selected_AVB_fb **Input_Source_Selected_XLR_fb**	D	One of these signals is HIGH when the other is LOW, and vice-versa. They give the current input source selected between network AVB and XLR jacks.
Input_XLR_AB_Selected_ANALOG_fb **Input_XLR_AB_Selected_AES_fb**	D	One of these signals is HIGH when the other is LOW, and vice-versa. They give the currently selected input mode of XLR A/B, between AES and ANALOG.
Input_XLR_CD_Selected_ANALOG_fb **Input_XLR_CD_Selected_AES_fb**	D	One of these signals is HIGH when the other is LOW, and vice-versa. They give the currently selected input mode of XLR C/D, between AES and ANALOG. When connected to LA4 or LA8 units, both of these signals are LOW because such devices don't have inputs C/D.
AVB_Fallback_Enable_fb	D	HIGH = AVB fallback feature is enabled. LOW = AVB fallback feature is disabled.
AVB_Fallback_Active_fb	D	HIGH = AVB fallback feature is enabled, and AVB failover to XLR is currently active. LOW = AVB fallback feature is disabled or AVB failover to XLR is not active.
AES_Fallback_Enable_fb	D	HIGH = AES fallback feature is enabled. LOW = AES fallback feature is disabled.
AES_Fallback_Active_fb	D	HIGH = AES fallback feature is enabled, and AES A/B failover to C/D is currently active. LOW = AES fallback feature is disabled or AES A/B failover to C/D is not active.
AVB_Error_fb	D	HIGH = there is an error occurring with AVB input. LOW = there is no error with AVB input.
AVB_Error_Message$	S	This signal gives details on the nature of the AVB error if present.
XLR_AB_Error_fb	D	HIGH = there is an error occurring with XLR A/B AES input. LOW = there is no error with XLR A/B AES input.
XLR_AB_Error_Message$	S	This signal gives details on the nature of the XLR A/B AES error if present.
XLR_CD_Error_fb	D	HIGH = there is an error occurring with XLR A/B AES input. LOW = there is no error with XLR A/B AES input.
XLR_CD_Error_Message$	S	This signal gives details on the nature of the XLR A/B AES error if present.

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Signal_inA_fb **Signal_inB_fb** **Signal_inC_fb** **Signal_inD_fb**	D	HIGH = the input is receiving audio level > −60.0dBFS. LOW = the input is receiving audio level ≤ −60.0dBFS.
PAVA_Settings_fb	D	HIGH = PA/VA settings for this amplified controller were found and loaded from processor's file system. LOW = one of these cases occur: - PA/VA settings file was not found on the processor's file system, - PA/VA settings file was found, but is invalid or corrupted, - PA/VA settings file was found and loaded, but the current amplified controller of the module is not mentioned in these settings. **Note** PA/VA settings are located in an XML file that can be present on the CRESTRON processor's file system, in this exact location: /USER/*.xml This file is created by L-Acoustics engineers, consultants or integrators when the installation project requires constant monitoring according to EN-54/EN-60849. It contains all parameters and thresholds measured at calibration time, for all L-Acoustics devices controlled by the programs running on the processor. The file must be uploaded to the processor each time it requires updates, or whenever the processor is replaced, or when the file is removed for any reason from the processor. If multiple valid XML files are located in the folder, the module reads the latest settings found in all XML files. This file is fetched and loaded at program startup. Use this signal to ensure that the file was correctly detected and take action in case you expect it to be present but **PAVA_Settings_fb** is LOW.
PAVA_Enable_fb	D	HIGH = PAVA features are enabled. LOW = PAVA features are disabled.
PAVA_Options#	A	This analog signal is a bit-field representing the enabled/disabled status of PA/VA features: - bit 1 (LSB) = Pilot Tone - bit 2 = AES Lock - bit 3 = AES Audio - bit 4 = Speakers monitoring - bit 5 = AVB Lock If any of these bits have a value of 1, then the associated function is enabled. In other case it is disabled. Examples: - **PAVA_Options#** = 0d ⇒ All features disabled - **PAVA_Options#** = 8d ⇒ Only Speakers monitoring enabled - **PAVA_Options#** = 7d ⇒ Pilot Tone, AES Lock, AES Audio enabled Note: in addition to these 5 optional features, there are statuses that are always monitored when PAVA is globally enabled, like temperature issues or hardware failures.

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PAVA_Global_Error_fb	D	HIGH = One of the enabled PAVA features detected an error. LOW = No error present over the whole PAVA selected features.
PAVA_Errors#	A	This analog signal is a bit-field representing the detailed list of possible PAVA errors present: - bit 1 (LSB) = Amplifier error - bit 2 = Speakers monitoring error - bit 3 = Pilot Tone error - bit 4 = AES Lock error - bit 5 = AES Audio error - bit 6 = Temperature error - bit 7 = Output error - bit 8 = AVB Lock error
PAVA_Speaker_Errors#	A	This analog signal is a bit-field representing the detailed list of possible Speaker monitoring errors present: - bit 1 (LSB) = Channel 1 HF open circuit - bit 2 = Channel 2 HF open circuit - bit 3 = Channel 3 HF open circuit - bit 4 = Channel 4 HF open circuit - bit 5 = Channel 1 LF open circuit - bit 6 = Channel 2 LF open circuit - bit 7 = Channel 3 LF open circuit - bit 8 = Channel 4 LF open circuit - bit 9 = Channel 1 HF short circuit - bit 10 = Channel 2 HF short circuit - bit 11 = Channel 3 HF short circuit - bit 12 = Channel 4 HF short circuit - bit 13 = Channel 1 LF short circuit - bit 14 = Channel 2 LF short circuit - bit 15 = Channel 3 LF short circuit - bit 16 (MSB) = Channel 4 LF short circuit
Unit_Type$	S	This signal represents the amplified controller type connected by the module. Possible values are: 'LA4', 'LA8', 'LA4X' or 'LA12X'.
Unit_Fw_Version$	S	This signal represents the amplified controller's current version of firmware. Example: '2.9.3.4'
Unit_Ip_Address$	S	IP address of the connected unit (primary IP address if the unit is in redundant network mode) Example: '192.168.1.100'
Error_Present_fb	D	HIGH = an error is present in the module (other than input status errors). LOW = no error present in the module (other than input status errors).
Error_Message$	S	This signal gives details on the nature of the errors present in the module or the unit. If several errors occur, they are delimited by '\r' (\x0D) carriage return characters.

PARAMETERS

IpAddress	S	IP address of the Amplified Controller, for example "192.168.1.100". The IP address must be in the following ranges: - 10.0.0.1 – 10.255.255.254 (Class A) - 172.16.0.1 – 172.31.255.254 (Class B) - 192.168.0.1 – 192.168.255.254 (Class C) - 100.64.0.1 – 100.127.255.254 (SAS) - 169.254.0.1 – 169.254.255.254 (APIPA)
Signals_Enable	A	This parameter is used to enable audio levels monitoring. - 0d = audio levels monitoring is disabled. **Signal_in[X]_fb** and **Signal_Ch[X]_fb** are always LOW. - 1d = audio levels monitoring is enabled. **Signal_in[X]_fb** and **Signal_Ch[X]_fb** can get HIGH if associated audio level exceeds −60.0dBFS. **Important note** Enabling audio levels can be CPU-consuming for the CRESTRON processor, especially when multiple modules are inserted in the programs. They are disabled by default, and we recommend that they remain disabled unless this feature is absolutely necessary, or when the number of modules if less than 10. Alternatively, audio levels can be enabled only on a limited selection of modules, for example one amplified controller per line source. Please test your program first with audio levels disabled, and if CPU has good headroom when running the full programs, then try to enable signals and send normal audio to all unmuted amplified controllers to check that CPU is not going over 90%.

TESTING

OPS USED FOR TESTING:	RMC3 v1.601.3857
SIMPL WINDOWS USED FOR TESTING:	4.11.06.01
CRESTRON DB USED FOR TESTING:	78.05.002.00
DEVICE DB USED FOR TESTING:	104.05.001.00
SAMPLE PROGRAM:	L-Acoustics Amplified Controller Advanced (single unit) L-Acoustics Amplified Controller Advanced (60 units)
REVISION HISTORY:	V. 1.0 First release V. 1.1 Update to handle new firmware V. 2.0 Major update (change in the input and output signals of the module) V. 2.1 Added compatibility with October 2015 firmware V. 2.2 Added support for LA12X and compatibility with 2016 firmwares V. 2.3 Added compatibility with firmwares up to February 2018 V 3.0.0 Module rebuilt from scratch using SIMPL# (December 2018) V 3.1.0 Added compatibility with firmware 2.10.x