

LA-5291 Professional Audio Encoder

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Congratulations on your purchase of the Linear Acoustic LA-5291 Professional Audio Encoder.

The LA-5291 provides decoding, encoding, and transcoding to and from PCM and select Dolby® coded formats for up to 16 audio channels in support of real-time immersive Dolby Atmos® workflows. This includes:

- Decoding Dolby ED2 to PCM
- Transcoding Dolby ED2 to Dolby Digital Plus JOC and Dolby E to Dolby Digital Plus Encoding
- PCM to Dolby Digital, Dolby Digital Plus JOC, and Dolby ED2

In the OB truck, the LA-5291 can encode a Dolby Atmos mix into either Dolby ED2 for backhaul to the network center or directly to Dolby Digital Plus JOC for direct transmission to the viewer.

In the broadcast center, it can decode an incoming ED2 stream from the venue and send the PCM audio through the facility for mixing in with studio shows and the playback of interstitials and commercials.

In the air chain, the LA-5291 can encode PCM coming through the plant to Dolby Digital Plus JOC or transcode an incoming ED2 stream directly to Dolby Digital Plus JOC.

Quick Start Guide

Hardware

LA-5291 Front Panel





Figure 1 - Front panel

LA-5291 front panel features include:

- **Reset button** for restarting the unit from the front panel (1A)
- **Four status LEDs** indicating the **status of each power supply** (1B, 1C), the **overall status** of the unit (1D), and **sync** for the reference clock (1E)
- A **color LCD display** to show status and basic configuration parameters (1F)
- A **five-button navigation cluster** with Left, Right, Up, and Down arrows plus a green “OK” button (1G)
- A **USB port** used for software updates (1H)

The front panel is used for the initial setup and configuration including setting the IP address of the Control Ethernet port. Additional configuration is accomplished via the remote user interface.

LA-5291 Rear Panel



Figure 2- Rear panel

The rear panel of the LA-5291 contains the following connections:

- Two **RJ-45 Gigabit Ethernet connections**, one for network remote control (2A) and one for AES67 I/O (2B)
- **3Gb/s HD/SD-SDI input and output** (2C) on female BNC connectors
- **Quad-Link SDI or MADI I/O** (2D) - optional
- Five **AES-3 I/O connections** (2E) on female BNC connectors
- Parallel **GPI/O control port** (female DB-15) for five inputs and five outputs (2F)
- Two **IEC power inlets** for the redundant internal universal auto-ranging power supplies (2G)

Note - Although the hardware is present for two independent SDI I/O paths, only the first SDI I/O is active at this time. The second path will be enabled in a future firmware update.


Installation and Initial Setup

Installation

LA-5291 is a 1RU product intended to be permanently installed in standard 19 ½" equipment rack and secured with four standard rack screws. It is fan cooled with air intakes and exhausts located on the side of the unit just behind the front panel, but whenever possible, it is recommended to leave 1RU of empty space above and below the unit.

Power

Plug the supplied IEC power cords into the LA-5291 and connect each to different mains power sources. Remember that while redundant supplies do protect against the unit losing power in the event of a PSU failure, the loss of mains supply voltage is a bigger concern. Accordingly, each supply should be fed from a different circuit equipped with adequate surge protection and fitted with an uninterruptible power supply (UPS).

 **Important** - [Please click here](#) for important information on proper grounding and other items pertaining to electrical safety.

Boot Up and Home Screen

The unit will power up as soon as the power cords are connected, and using the **Reset button** is not required on initial startup. The front panel of the unit will remain dark during most of the boot process but the **Status LED** will light. Once the boot process is complete, the **Home Screen** will appear and the Status LED will turn green.



Figure 3- Front panel home screen

Setting IP Addresses

LA-5291 ships with DHCP enabled and will automatically retrieve an IP address when connected to a network with a DHCP server.

i Important - The Control and AES67 Ethernet connections both require 1000BASE-T (Gigabit) switch ports in order to work properly.

If both the Control and AES67 ports will be used, they must be in different subnets. In-band control is available using the AES67 port.

If only one port will be used, set the unused port to "Static IP" with an IP Address of 0.0.0.0, a Subnet Mask of 0.0.0.1, and a Gateway of 0.0.0.0.

To set a fixed IP address for the Control port:

- Press the **Right button** once to show the Information screen and once more to navigate to the IP Configuration (Control) screen
- Press the **Down button** to highlight "Edit"
- Press the **OK button** to highlight "Use DHCP"
- Press the **Right button** to highlight "Yes"
- Press the **Up/Down buttons** to select "No"
- Press the **Left button** to highlight "DHCP" again
- Press the **Down button** to highlight "Address"
- Press the **Right button** to move to the first digit of the IP address
- Use the **Up/Down buttons** to change the value
- Use the **Right/Left buttons** to select another digit to edit
- When finished editing the Address field, press the **Right/Left buttons** to highlight "Address" again
- Press the **Down button** to navigate to the "Netmask" field, following the instructions above for entering the value
- When finished editing the Netmask field, press the **Right/Left buttons** to highlight "Netmask" again
- Press the **Down button** to navigate to the "Gateway" field, following the instructions above for entering the value
- When finished editing the Gateway field, press the **Right/Left buttons** to highlight "Gateway" again
- Press the **Down button** to highlight "Update"
- Verify the information has been entered correctly and press the **OK button** to save the new values
- If you notice incorrect information and need to start over, use the **Right button** to highlight "Cancel" followed by the **OK button**



Figure 4 - System screen



Figure 5- IP Configuration (Control) screen

If you are using AES67 I/O, pressing the **Right button** from the IP Configuration (Control) screen will bring you to the IP Configuration (AES67) screen. The steps for configuring this port are identical to those above for the Control port.

Connecting Inputs and Outputs

The LA-5291 offers 3Gb/s HD/SD-SDI inputs and outputs, Quad-Link SDI or MADI I/O (optional and mutually exclusive), five AES-3 inputs and outputs on female BNC connectors, plus AES67 I/O via the AES67 Ethernet port. Connect the physical inputs and outputs as appropriate for your installation.

Connecting to the Web-Based User Interface

No special client software is required to remotely connect to the LA-5291, and the HTML-5-based GUI is device, operating system, and browser agnostic. We recommend Google Chrome or Apple Safari. The

computer or tablet should be on the same network and subnet as the LA-5291.

Once both LA-5291 and your computer are connected to your network, enter the IP address of the LA-5291 in the URL field of your browser. Once connected, the **Home screen** will appear.

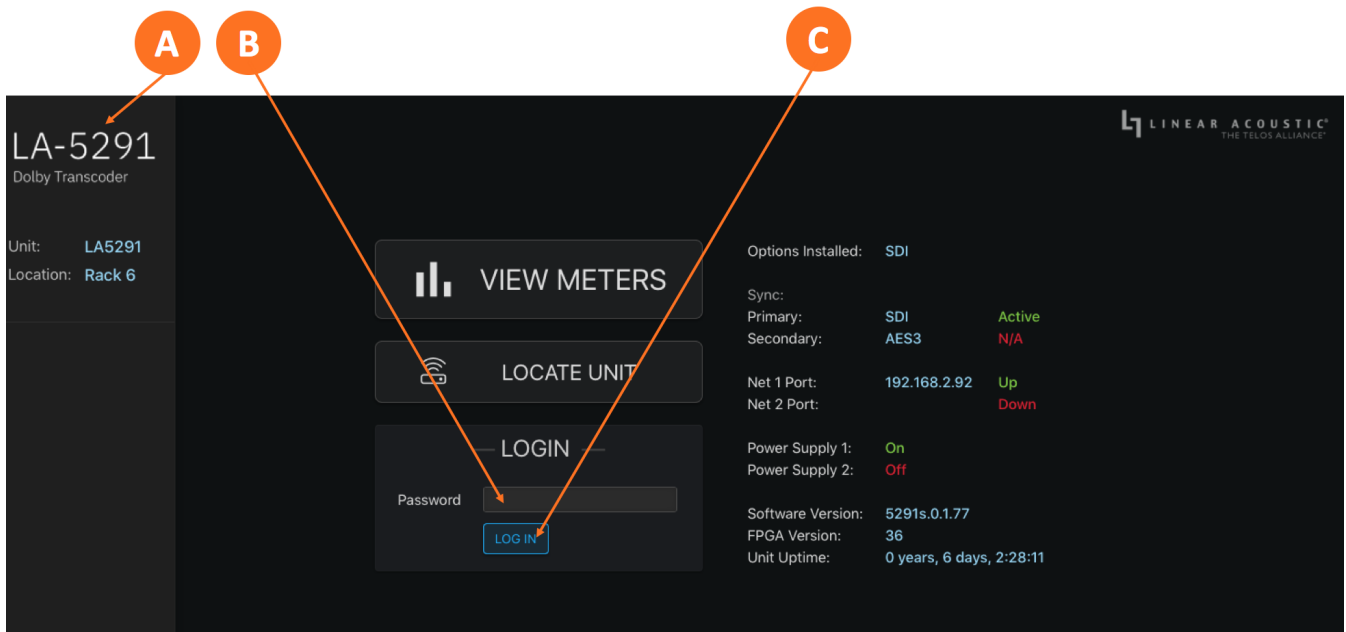


Figure 6 - Home screen

Clicking on the **LA-5291 logo** (6A) will always bring you back to the Home screen. To log in to the unit, enter the default password of 1234 into the **Password field** (6B) then click the **Log In button** (6C). The ability to change the password will be included in an upcoming software update.

Note - The Linear Acoustic LA-5291 is manufactured under license from Dolby Laboratories. Dolby, Dolby Audio, and the double-D symbol are trademarks of Dolby Laboratories.

User Manual



Introduction

The LA-5291 provides decoding, encoding, and transcoding to and from PCM and select Dolby® coded formats for up to 16 audio channels in support of real-time immersive Dolby Atmos® workflows. This

includes:

- Decoding Dolby ED2 to PCM
- Transcoding Dolby ED2 and Dolby E to Dolby Digital Plus and Dolby Digital Plus JOC
- Encoding PCM to Dolby Digital, Dolby Digital Plus JOC, and Dolby ED2

In the OB truck, the LA-5291 can encode a Dolby Atmos mix into either Dolby ED2 for backhaul to the network center or directly to Dolby Digital Plus JOC for direct transmission to the viewer.

In the broadcast center, it can decode an incoming ED2 stream from the venue and send the PCM audio through the facility for mixing in with studio shows and the playback of interstitials and commercials.

In the air chain, the LA-5291 can encode PCM coming through the plant to Dolby Digital Plus JOC or transcode an incoming ED2 stream directly to Dolby Digital Plus JOC.

Application and Use Cases

Live Dolby® Atmos Creation

In this example, two devices are employed: A Dolby DP590 to author the Atmos-related metadata, and the LA-5291 to encode the Dolby ED2 or Dolby Digital Plus JOC:

- The DP590 ingests PCM audio over a MAD I connection, which can be a combination of stem mixes and objects
- The DP590 outputs a rendered presentation over MAD I for monitoring
- The DP590 functions may be controlled via the mixing console using GPIO or Ember+, or directly via its web remote UI
- The DP590 outputs metadata via an IP connection
- The LA-5291 encodes the content into Dolby ED2 or Dolby Digital Plus JOC.

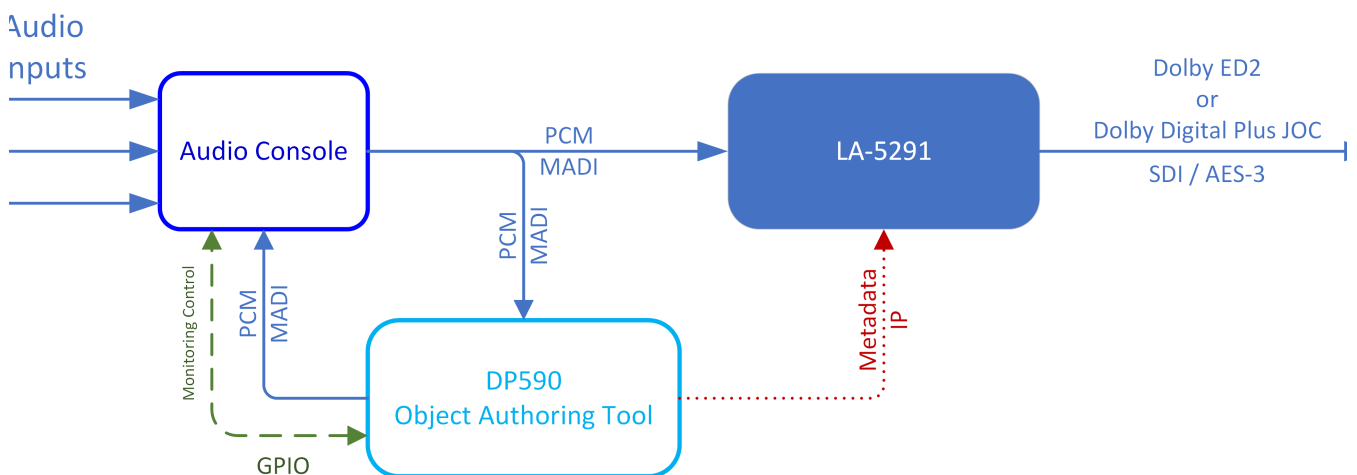


Figure 1- Live Dolby Atmos creation

Contribution Encoding

In this example, the Dolby DP590 and LA-5291 work together for contribution encoding:

- The LA-5291 ingests PCM over MADI or SDI from the DP590, with the metadata being delivered to the LA-5291 via an IP connection
- The LA-5291 drives the output based on the Vref input
- The LA-5291 encodes PCM + PMD to Dolby ED2 or Dolby Digital Plus JOC and outputs it via SDI, 2x AES-3, or AES67

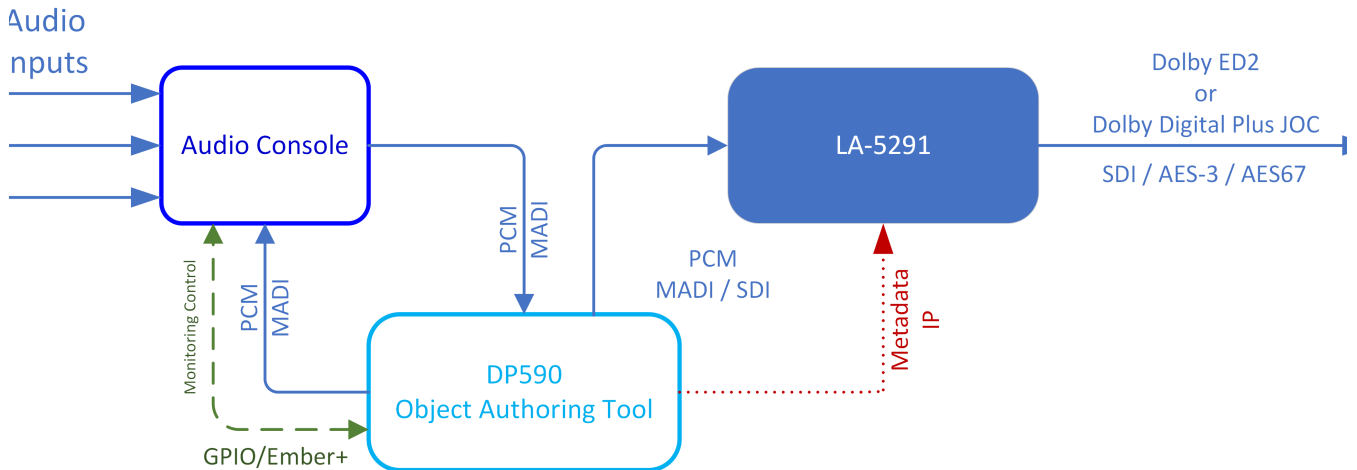


Figure 2 - Contribution encoding

Headend Transcoding

In this example, the LA-5291 provides transcoding at the headend:

- The LA-5291 ingests Dolby ED2, Dolby E, or PCM via Quad-Link 3G SDI, AES67, or Audio/Video over IP (SMPTE ST 2110)
- The LA-5291 supports a Vref input to drive the output
- The LA-5291 transcodes Dolby ED2 or Dolby E to Dolby Digital Plus JOC
- The LA-5291 outputs Dolby Digital Plus JOC over Quad-Link 3G SDI, AES-3, AES67, or Audio/Video over IP

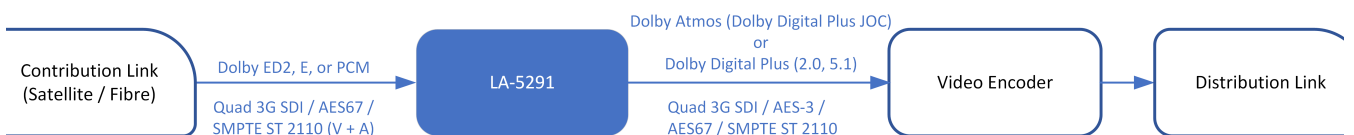


Figure 3- Headed transcoding

Headend Contribution Decoding

Here, the LA-5291 ingests a coded stream and decodes it:

- The LA-5291 ingests a Dolby ED2 stream over Quad-Link 3G SDI, Audio/Video over IP, or AES67

- The LA-5291 decodes the coded streams and outputs PCM to route through the facility and mix in with studio shows, advertisements and interstitials, etc.
- The second LA-5291 encodes the PCM signal going to air into the final Dolby Atmos (Dolby Digital Plus JOC) signal

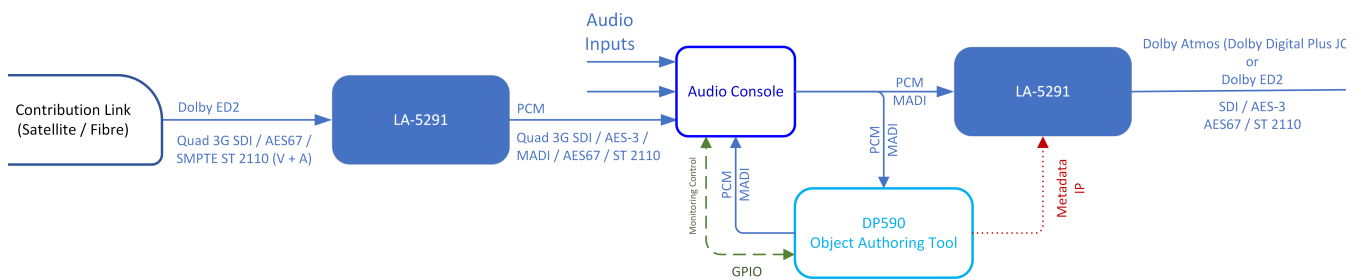


Figure 4 - Headend contribution decoding

Front and Rear Panel Overview

LA-5291 Front Panel



Figure 1- Front panel

LA-5291 front panel features include:

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LA-5291 is a 1RU product intended to be permanently installed in standard 19 ½" equipment rack and

secured with four standard rack screws. It is fan cooled with air intakes and exhausts located on the side of the unit just behind the front panel, but whenever possible, it is recommended to leave 1RU of empty space above and below the unit.

Power

Plug the supplied IEC power cords into the LA-5291 and connect each to different mains power sources. Remember that while redundant supplies do protect against the unit losing power in the event of a PSU failure, the loss of mains supply voltage is a bigger concern. Accordingly, each supply should be fed from a different circuit equipped with adequate surge protection and fitted with an uninterruptible power supply (UPS).

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Boot Up and Home Screen

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Figure 1- Front panel home screen

Setting IP Addresses

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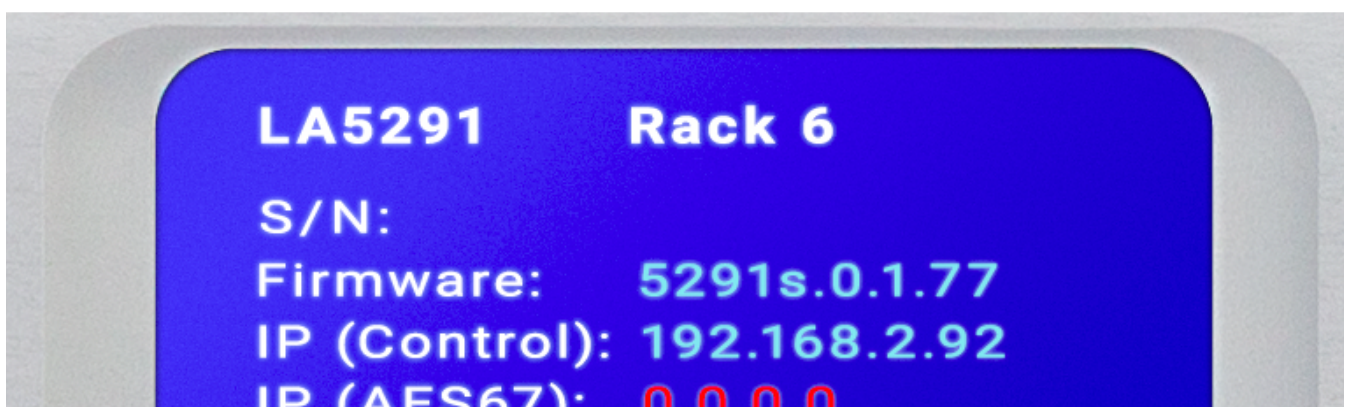
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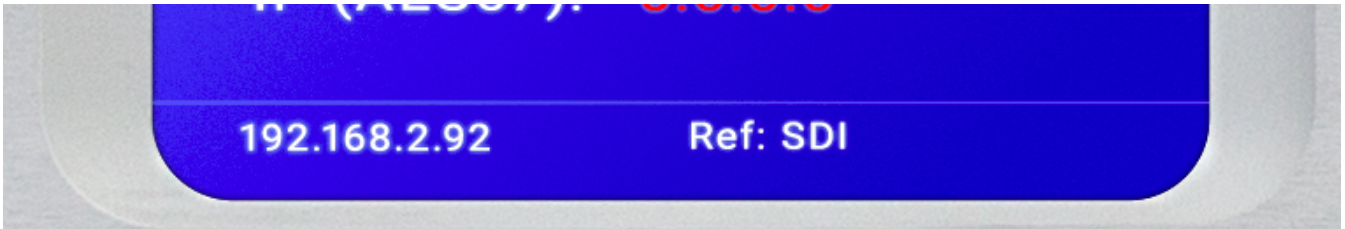


Figure 2 - System screen

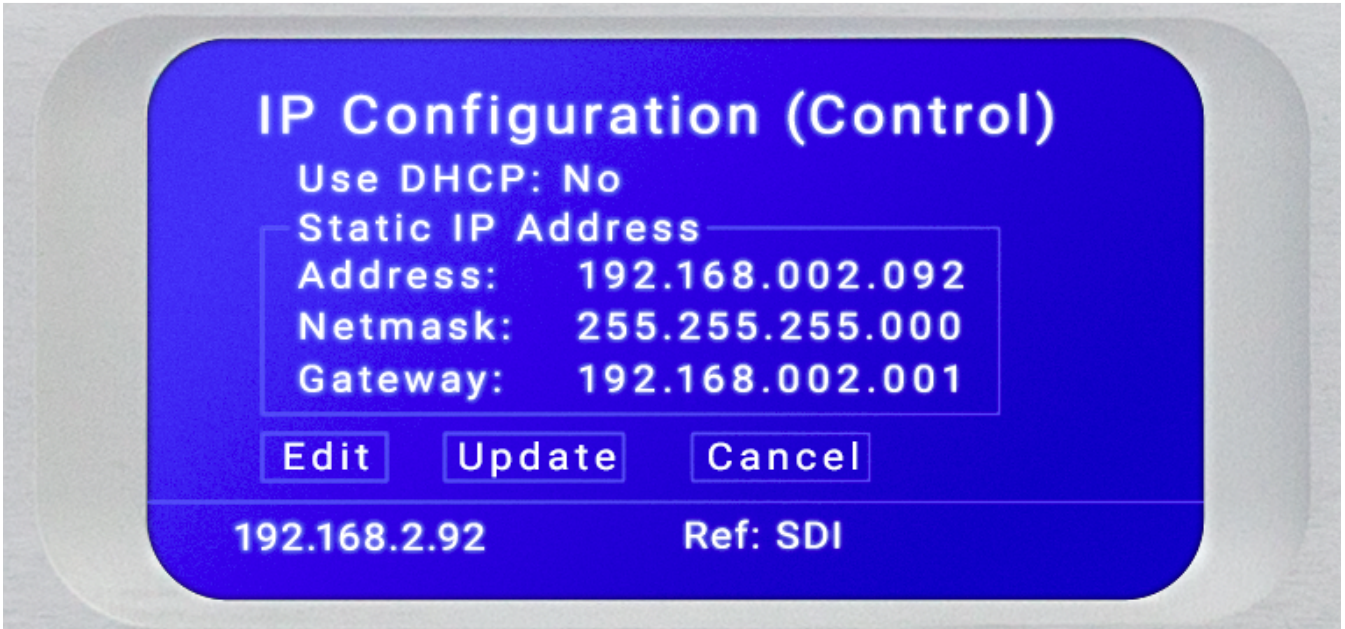


Figure 3 - IP Configuration (Control) screen

If you are using AES67 I/O, pressing the **Right button** from the IP Configuration (Control) screen will bring you to the IP Configuration (AES67) screen. The steps for configuring this port are identical to those above for the Control port.

Pressing the **Right/Left buttons** will eventually return you to the Home screen.

Locate Mode

Our sincere hope is that you like your LA-5291 so much that you'll eventually end up with dozens of them populating your racks, but since one LA-5291 looks pretty much like another, we've come up with a way to help you identify an individual unit.

When you enable the "Locate Mode" from the remote user interface, the unit's front panel display will repeatedly change color until Locate Mode has been cleared by pressing any key on the front panel or by pressing the "Locate Unit" button on the remote user interface a second time. Enabling Locate Mode affects only the unit's display and has no effect on the audio. Special Function Key Presses

Factory Reset

To reset the unit to its factory defaults, simultaneously press and hold the **Left, Up, and Right buttons** for

ten seconds until a red countdown timer appears in the bottom left corner of the display.

! **Important!** Performing a factory reset will erase all I/O routing as well as any other custom settings you may have saved. This information cannot be reclaimed once you reset the LA-5291, even by contacting customer support or feeling genuine remorse for your decision. We strongly recommend backing up your configuration to a computer before performing a factory reset to avoid re-setter's remorse. You have been warned!

Hardware Relay Bypass

LA-5291 includes a hard relay bypass that removes all internal circuits and processes from the signal path and connects each SDI and AES-3 input directly to its corresponding output.

To toggle the relay bypass on and off, simultaneously press and hold the **Left**, **Down**, and **Right** keys for three seconds until a red countdown timer appears in the bottom left corner of the display. **Do not confuse this sequence with the Factory Reset procedure described above.**

Remote User Interface

Connecting to LA-5291

As outlined in the section on [Installation and Initial Setup](#), certain settings and configurations can be accessed and performed using the front panel buttons and screen, but the LA-5291 is designed to be connected to a network and operated through its web-based interface.

! **Important!** As explained in the section on [Setting IP Addresses](#), LA-5291 must be connected to 1000BASE-T (Gigabit) switch ports, and the Control and AES67 ports should not be connected to a common network with the same netmask/subnet.

No special client software is required, and the HTML-5-based GUI is device-, operating system-, and browser-agnostic. We recommend using Google Chrome or Apple Safari. The computer or tablet should be on the same network and subnet as the LA-5291.

i **Note** - This section is primarily an overview of the user interface to provide an explanation of the various menus and screens. It is not intended to provide step-by-step instructions for setting up or operating the LA-5291. Where applicable, references to specific chapters will be made where you can find more detailed instructions for specific controls.

Once the LA-5291 and your computer are connected to your network, enter the IP address of the LA-5291 to which you want to connect in the URL field of your browser. Once connected, the Home Screen will appear. As you navigate through the user interface, clicking on the **LA-5291 logo** (A) in the top left corner will always return you to this screen.

Multiple users can connect to the same LA-5291 hardware simultaneously. Anyone connected to the unit will be able to see the information on this screen including the **unit's name** (B) and **physical location** (C).

Additionally, all users can access the **Meters screen** (D) which offers level meters along with pertinent information about the input or output bitstream (depending on the workflow selected).

The **Locate Unit feature** (E), which causes the front panel display of the unit to flash for easy identification in a crowded rack, can also be activated without logging in.

Additional information about installed options, clock sync, network status and IP address, power supply status, software and FPGA versions, and unit uptime **are displayed to the right of the screen** (F).

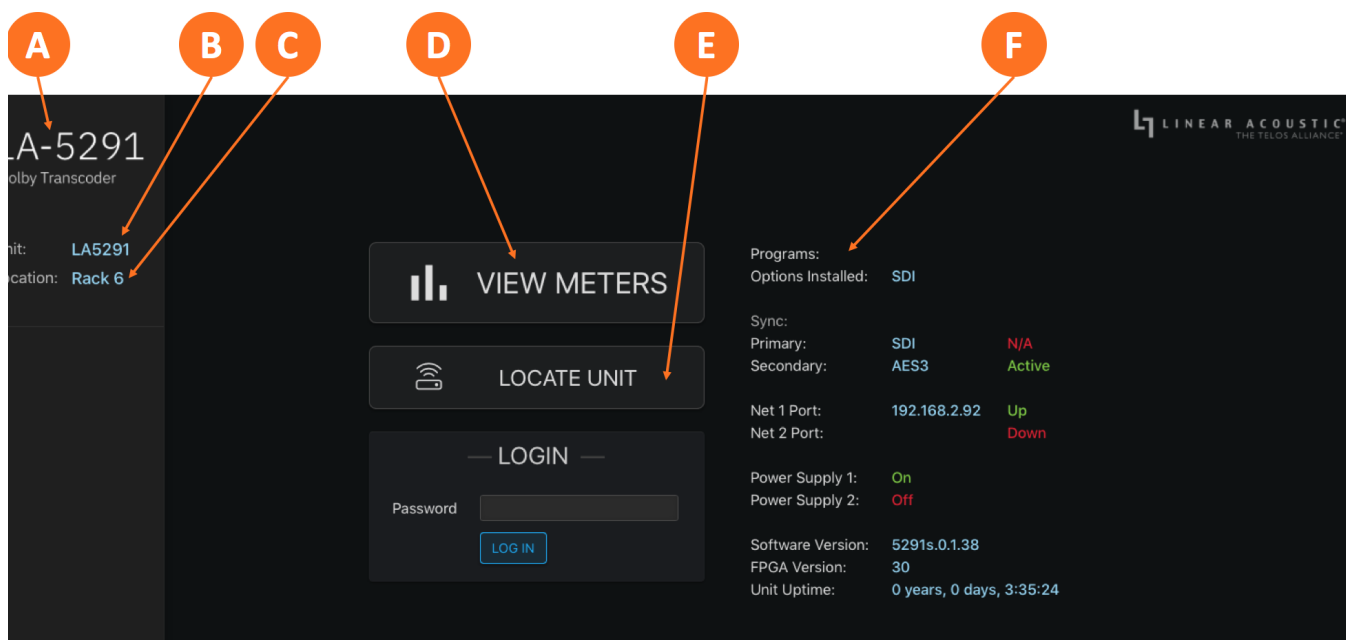


Figure 1 - Home screen before logging in

User Accounts and Logging In

Making modifications to the LA-5291's configuration, signal routing, or transcoding parameters via the remote user interface requires logging into the unit. At this time, only one user account with one password and one level of access is supported.

By default, the password is **1234**. The ability to change the password will be included in an upcoming software update.

Additional menus and options available after logging in include the **transcoder controls** (A), the **I/O menus** (B) which include clock, GPI/O, and delay controls, and **detailed system-wide information and configuration settings** (C) which includes the IP configuration menu.

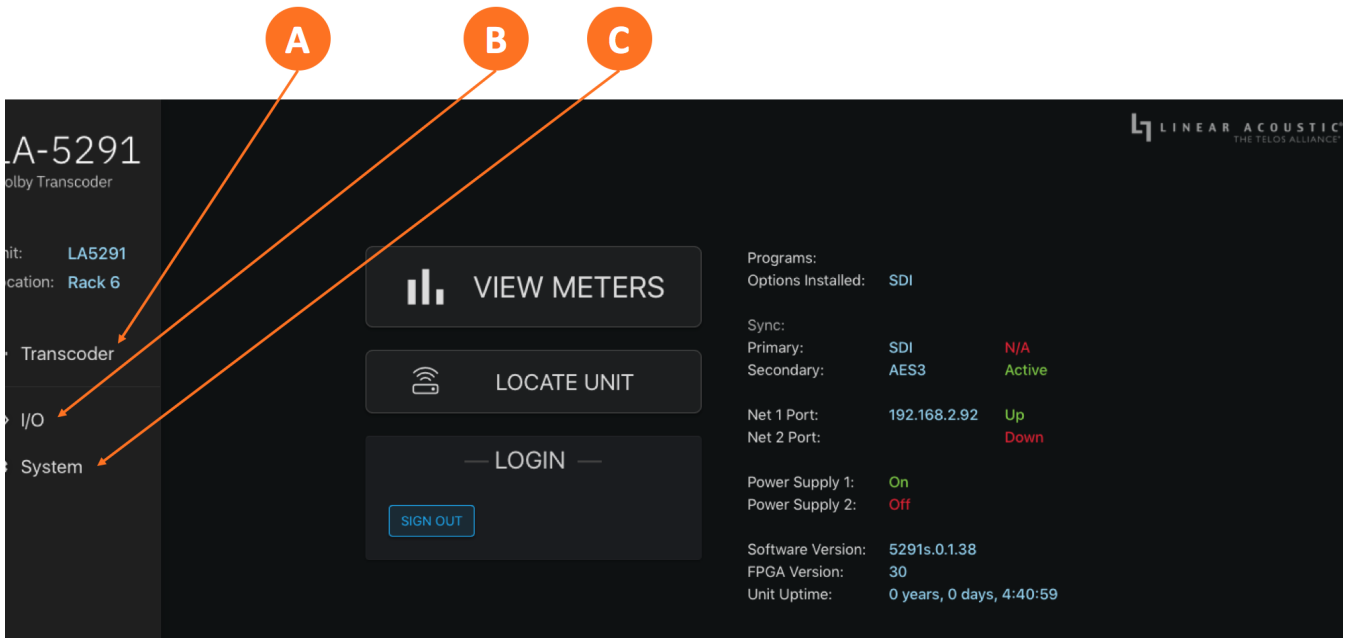


Figure 2 - Home screen when logged in

I/O, Clocking, and Reference

Input and Output Routing

Connect your SDI, AES-3, and/or AES67 sources to the rear panel of the LA-5291 as required for your installation.

The LA-5291 can access any of the eight audio pairs carried on its incoming HD- or SD-SDI streams. Inputs and outputs for five stereo pairs via AES-3 are also provided.

Note - Although the hardware is present for two independent SDI I/O paths, only the first SDI I/O is active at this time. The second path will be enabled in a future firmware update.

Any visible and accessible AES67 networked audio source can be input into LA-5291 for decoding, transcoding, or encoding, then returned to the network via AES67, embedded into the SDI output, and/or sent to the AES-3 output.

LA-5291 supports taking an input signal for decoding, transcoding, or encoding from one source type and sending the resulting audio or bitstream to another output type.

Initial I/O Setup

Log into the LA-5291 and click on the **I/O menu** (1A). Choose between SDI/AES-3/MADI or AES67 inputs and outputs in the **Workflow menu** (1B).





Figure 1 - I/O menu

Signal Routing

Routing a signal into the LA-5291 is a two-step process.

The first step is creating an input group from the **available physical hardware inputs** (2A). The second step is **routing the audio from these inputs into the transcoder input** (2B).

Routing a signal to the output is a similar two-step process.

The first step is creating an output group from the **available physical hardware outputs** (2D). The second step is **routing the audio from the transcoder output** (2C) to the physical outputs.

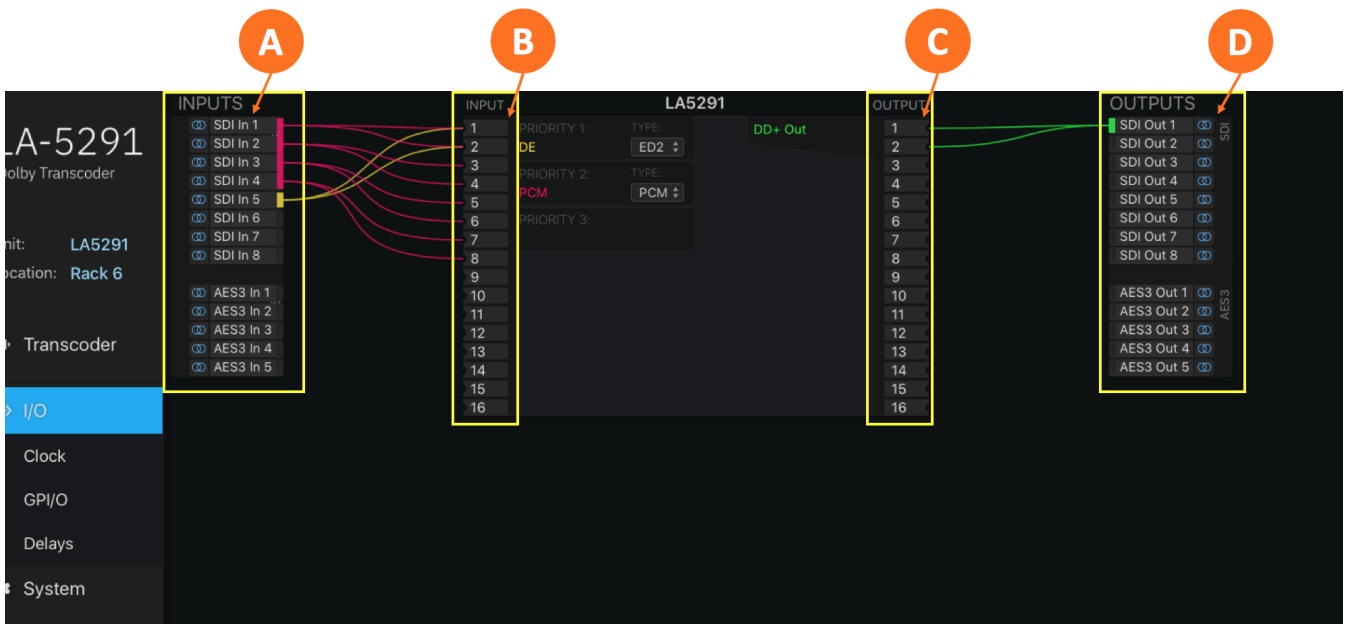


Figure 2- Signal routing overview

Creating an Input Group

Click on your first **audio input source** (3A) to highlight it, then right click and select "Create Input Group." You may enter a custom name for this source in the **Label field** (3C) and **customize the color** (3B) of the

graphical routing lines

Click the **Save button** (3D) to save the configuration or the **Cancel button** (3E) if you need to start over without saving your configuration.

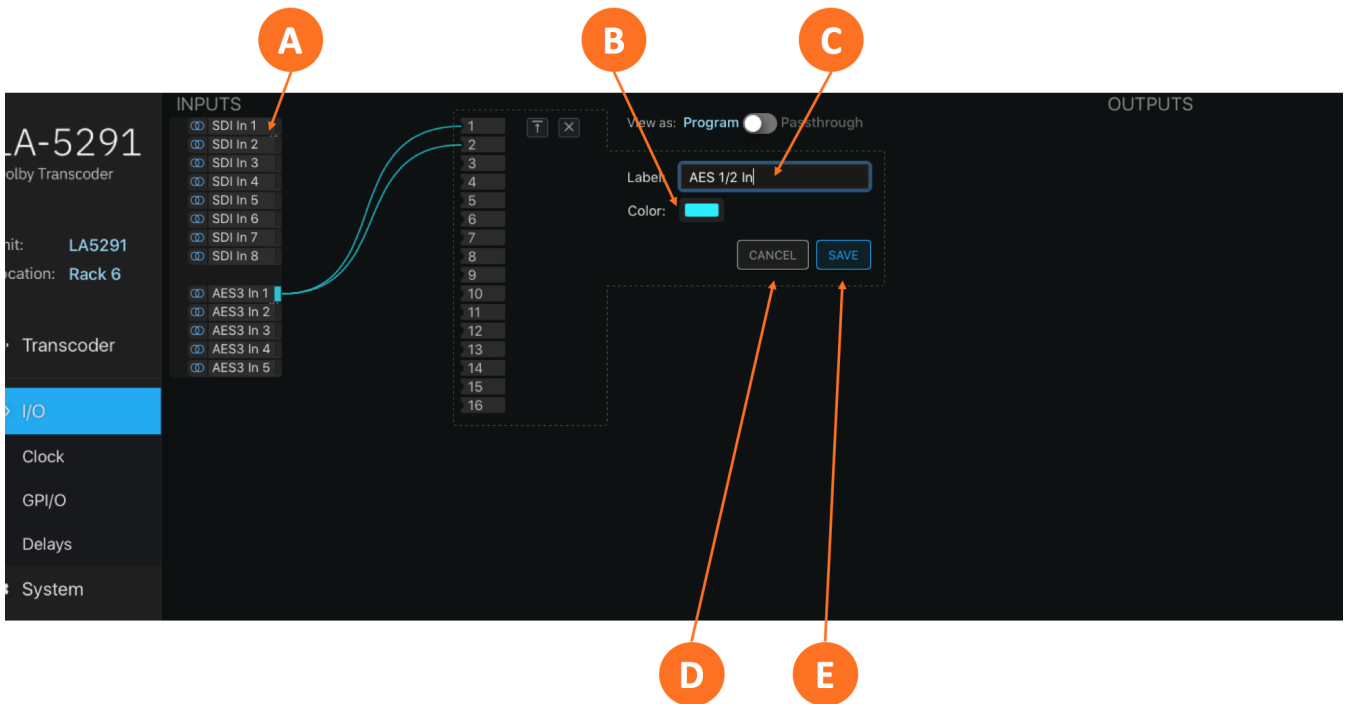


Figure 3 - Creating an input group.

Routing a Signal to the Transcoder Input

After saving the input group, it is necessary to first set the priority of the input source by dragging the **input audio lines** (4A) and then clicking when the **desired priority level** is highlighted (4B). The LA-5291 will look for a signal first on the inputs connected to Priority 1. If no signal is present, it will look to subsequent priorities in order.

Important - Priorities must be configured so that encoded sources are a higher priority than PCM (non-coded) sources. Important

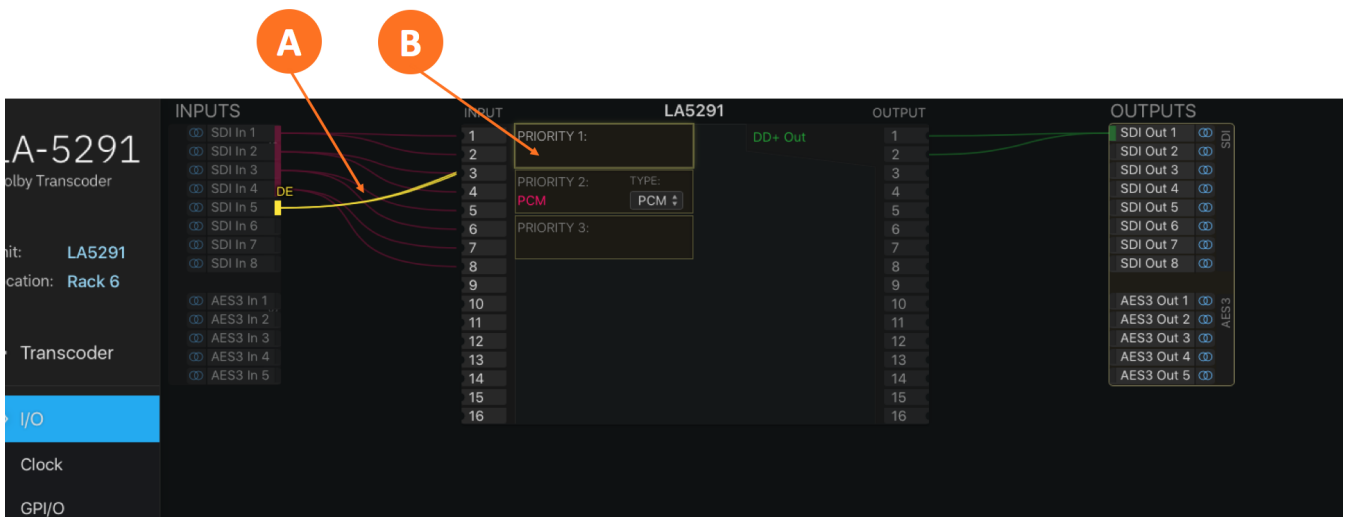




Figure 4 - Setting the priority

Next, choose the input signal type for this input group (PCM, Dolby E, or Dolby ED2) from the **Type** dropdown menu (5A).

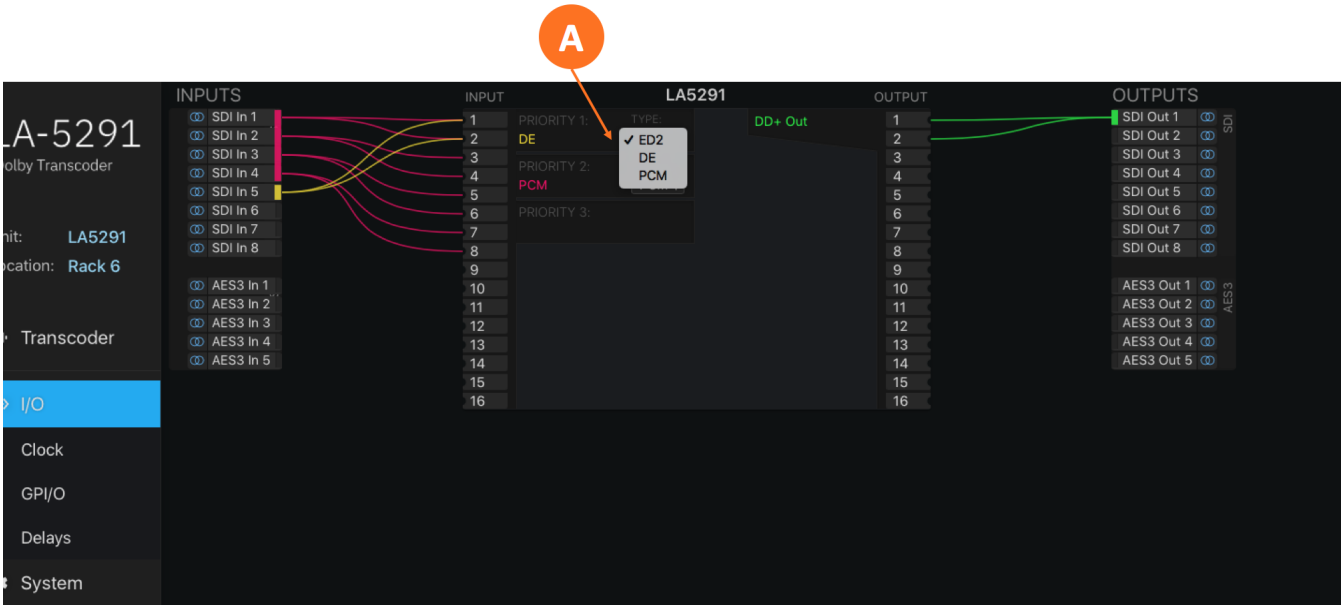


Figure 5 - Input signal type

To edit or delete a group, highlight then right click on the **colored Edit rectangle** (6A).

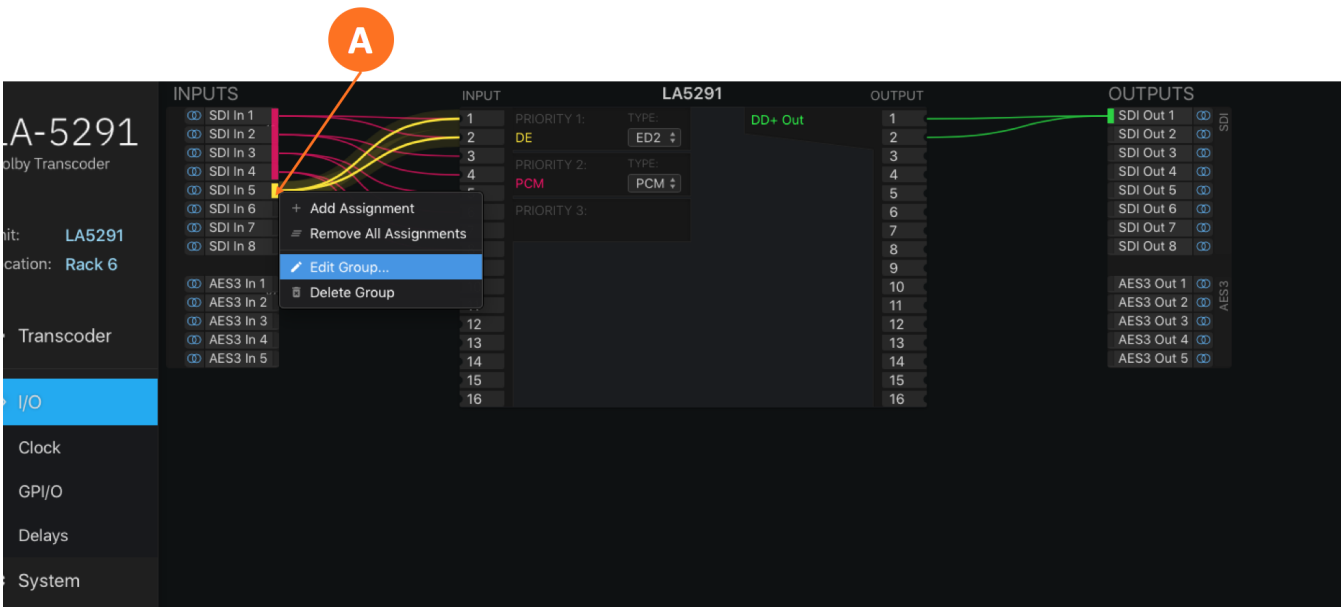


Figure 6 - Editing or deleting an input group

Creating an Output Group

The steps for creating an output group are identical to creating an input group, but with the Outputs menu.

Routing Transcoded Audio to the Physical Output

Once the first output group has been created and saved, drag the output audio lines to connect the physical outputs to the output of the transcoder, then click to save.

Latency and Delays

Latency through the LA-5291 varies depending on which inputs and outputs are used and whether or not SRCs are enabled. In any case, it will be necessary to compensate for any latency incurred by the transcoding process. Please see the [Specifications](#) section for latency measurements for the current software version.

To compensate for the encoder's latency and avoid lip-sync issues, an SDI video delay is provided in the **Delays sub-menu** of the I/O menu (5-7A). Click on the millisecond and/or microsecond fields in the **Video Delay section** (5-7B) and type in the required value. If the output needs to be delayed by an even frame (the value of which will vary depending on frame rate), simply enter that number.

Note - Entering an even frame value will result in a situation where it is necessary to add additional audio delay to the AES67 and AES-3 outputs so that they match the timing of the SDI output signal. This can be accomplished by setting the **Audio Delay** (5C) to a value equal to the difference between a full frame and the latency of the unit.

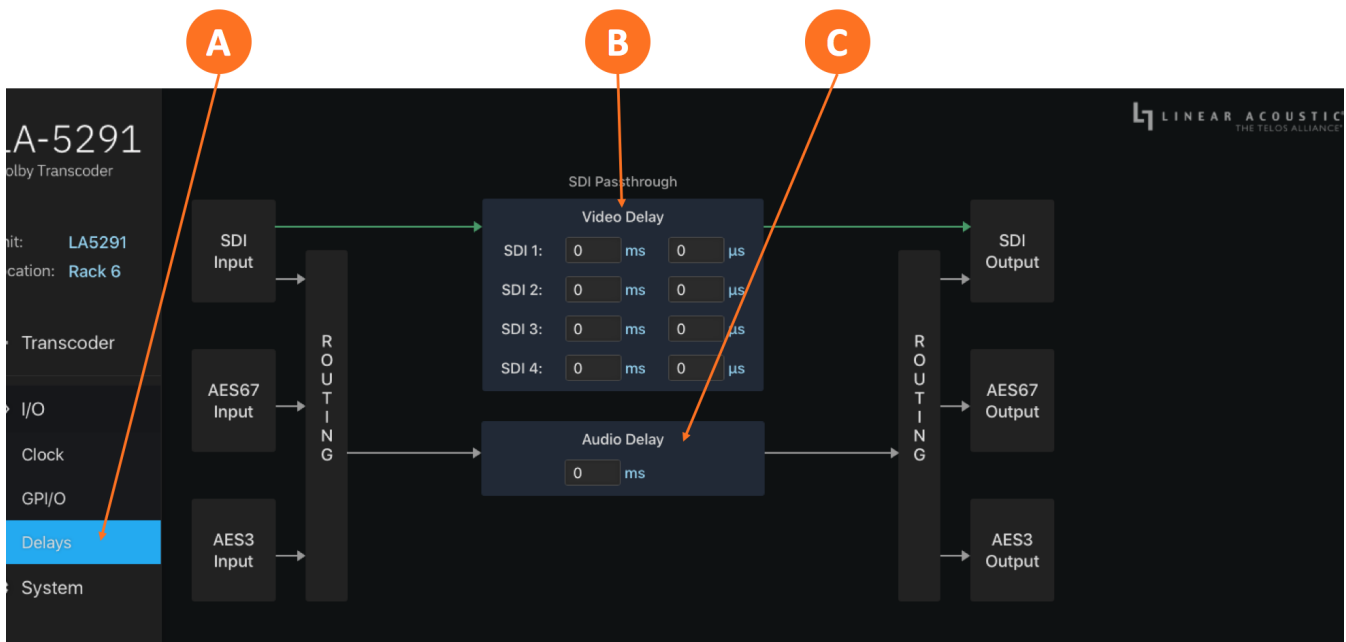


Figure 7 - Delays menu

Sample Rate Converters

Sample rate converters (SRCs) are provided on each SDI input pair, each SDI output pair of the first SDI output, and each AES-3 input pair. The AES-3 output is always synced to the active reference clock. **There**

are no SRCs in the AES67 path.

The SRCs can be enabled and disabled per pair by first highlighting then clicking on the appropriate input or output pair, and then selecting **Channel Settings** (8A).

! **Important!** Only PCM audio can be passed through a Sample Rate Converter. Coded audio bitstreams including Dolby Digital Plus, Dolby Digital Plus JOC, Dolby ED2, and Dolby E cannot be passed through an SRC without corrupting the data stream.

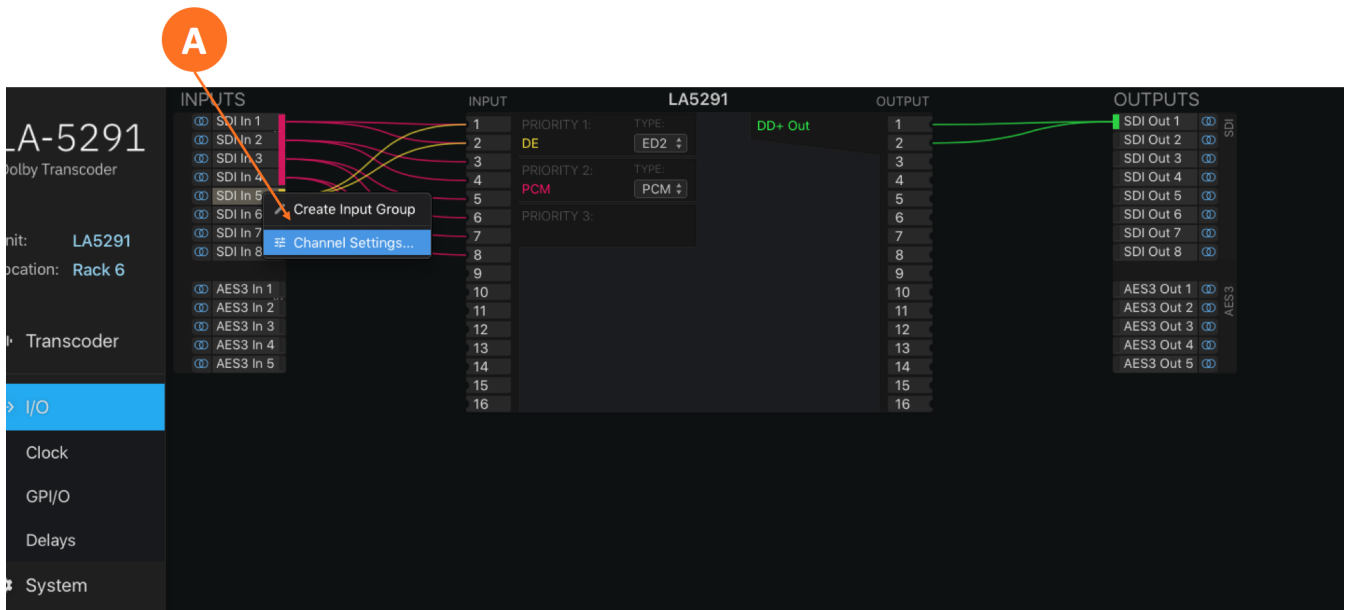


Figure 8 - Sample rate converters

Clock Reference

Because the LA-5291 offers very flexible signal routing and supports multiple input and output formats, having a firm grasp of the clock sync (reference) requirements is critical.

Clock Reference Requirements

Sample Rate Converters (SRCs) are provided on both SDI inputs, the SDI 1 output, and the AES-3 input. The AES-3 output is always synced to the active reference clock. There are no SRCs in the AES67 path.

Reference clock source options include:

- Internal 48kHz
- SDI Input
- AES-3 Input/MADI Input (when optional MADI card is present)
- PTP (AES67)

When all input sources are SDI and the output of the transcoder is routed to the embedded SDI output, the

reference signal present on the SDI input **must** be used.

When using AES-3 I/O, the LA-5291 can be referenced to either the AES-3 clock (using the SRCs in the SDI path) or to the SDI clock (using the SRCs in the AES-3 path).

When using an AES-3 source without an accompanying reference, the LA-5291's 48kHz internal clock can be used as the system reference if necessary, providing the SRC on the AES-3 input is enabled.

Whenever AES67 audio is used either on the input, the output, or both, the LA-5291 **must** be slaved to an externally-generated PTP clock as it cannot generate its own PTP reference.

Note - The LA-5291 is set to operate in slave mode by default. There are controls in the Sync/ QoS sub-menu of the System menu to change this should the ability to operate as a clock master be introduced in future software versions, but only Slave Only mode is currently supported.

Setting Clock Reference

Click on the **Clock menu** (9A). Use the dropdown menus to choose a **Primary Reference Clock** and a **Secondary Reference Clock** (9C) and, if needed, a **VRef clock source** (9E).

The **status** of the selected Primary and Secondary Reference Clocks is shown to the right of the dropdown menu (9D). The absence or presence of a signal for each input type along with the format, resolution and frame rate for incoming SDI signals is shown in the **Input Status** section (9B).

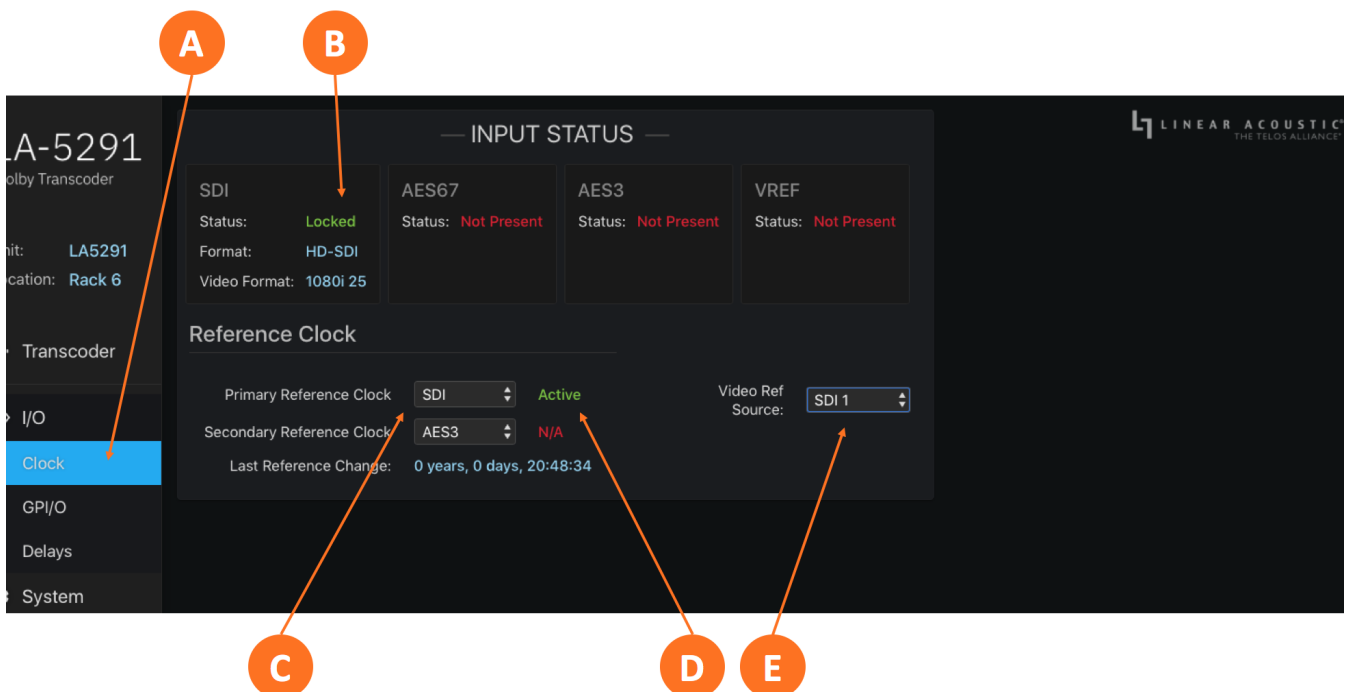


Figure 9- Clock reference

The LA-5291 offers five GPI and five GPO functions through its rear panel DB-15 connector, activated by a momentary contact closure.

GPI/O Pinout

Pin	Function	Pin	Function
Pin 1	+5VDC	Pin 9	+5VDC
Pin 2	GPI 1	Pin 10	GPO 1
Pin 3	GPI 2	Pin 11	GPO 2
Pin 4	GPI 3	Pin 12	GPO 3
Pin 5	GPI 4	Pin 13	GPO 4
Pin 6	GPI 5	Pin 14	GPO 5
Pin 7	Ground	Pin 15	Status OK
Pin 8	Ground		

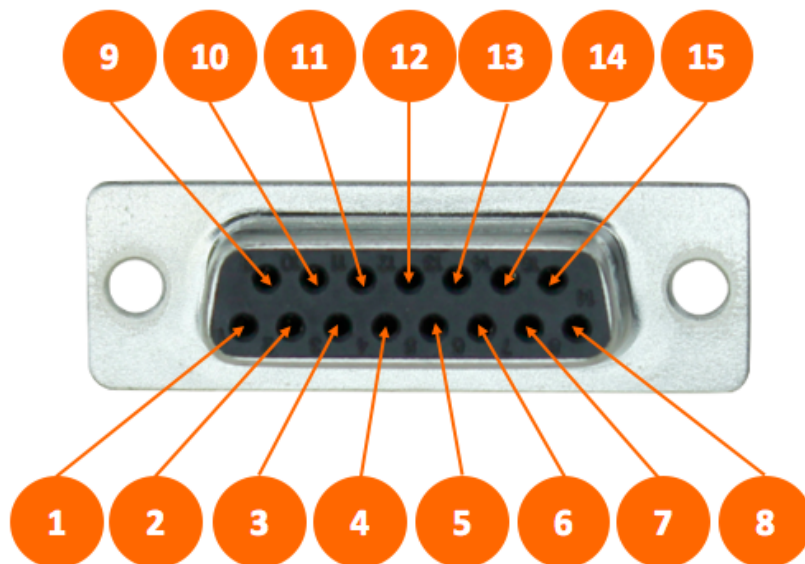


Figure 10 - GPI/O pinout

GPI/O Functions

GPI functions (11A) include:

- None
- Reboot/Reset Unit
- Hardware (Relay) Bypass

GPO functions (11D) include:

- None
- GPI Passthrough
- Power Supply 1 up
- Power Supply 2 up
- Power Supply 1 down
- Power Supply 2 down
- Unit resetting
- Unit rebooting
- Unit powering down
- Unit above temperature
- Unit bypass (relay bypass) active
- Change in reference
- Primary reference clock is lost
- Secondary reference is lost
- Primary reference clock is active
- Secondary reference is active
- Internal reference is active

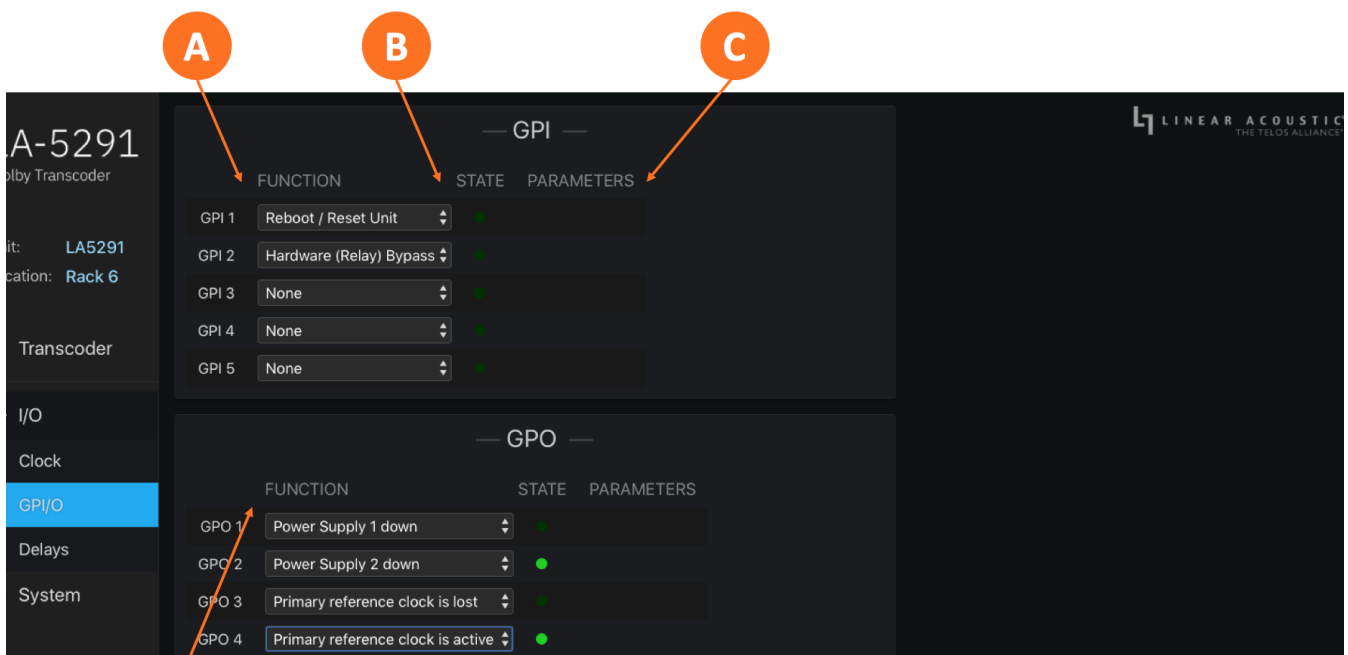




Figure 11 - GPI/O menu

The **State Indicator** (11B) for each function will light for the duration of the closure on GPIs. For GPOs, it will light for the duration of the active event.

At this time, there are no user-defined **Parameters** (11C) associated with any GPI or GPO. Should functions with such parameters be included in future software releases, they will appear in a dropdown menu.

System and Network Configuration

System Menu Overview

The **System Menu** is home to the System status screen. It also contains the menus and controls for configuring the Control and AES67 Ethernet ports, entering SNMP server information, and setting up Sync and QoS when using a PTP clock.

System Screen

The main system screen contains a wealth of technical **status information about the device hardware and software** (1A). Some of it relates to the overall health of the unit (such as Power Supply status and unit uptime) but most information will only be required during the course of troubleshooting an issue with our support team or performing software updates.

The **Unit Name and Location** (1B) are entered on this screen. These are “friendly” fields to be used in any way that makes sense for your particular operation. Click inside each field to make it editable, enter the information, then click on the green checkmark to save.

The LA-5291 has **two software banks** (1H). Both can be populated with different software versions, but only one version can be active at any given time. The active bank is indicated in red. Instructions for uploading and selecting different software versions is provided along with the software when you either download it from the customer portal or website or it is provided by our customer support team.

Clicking on the **Master Unit Bypass button** (1C) engages a hard relay bypass that removes all internal circuits and processes from the signal path and connects each SDI and AES input directly to its corresponding output. This button will turn red when the LA-5291 is in bypass mode. Note that this same hard relay bypass automatically engages when the unit is powered down.

Clicking on the **Locate Unit button** (1D) will cause the front panel of this particular LA-5291 to change color, making it easy to identify it amongst the dozens of them we hope will populate your racks. A second click will return the display to normal. Note that enabling Locate Mode will not affect the audio.



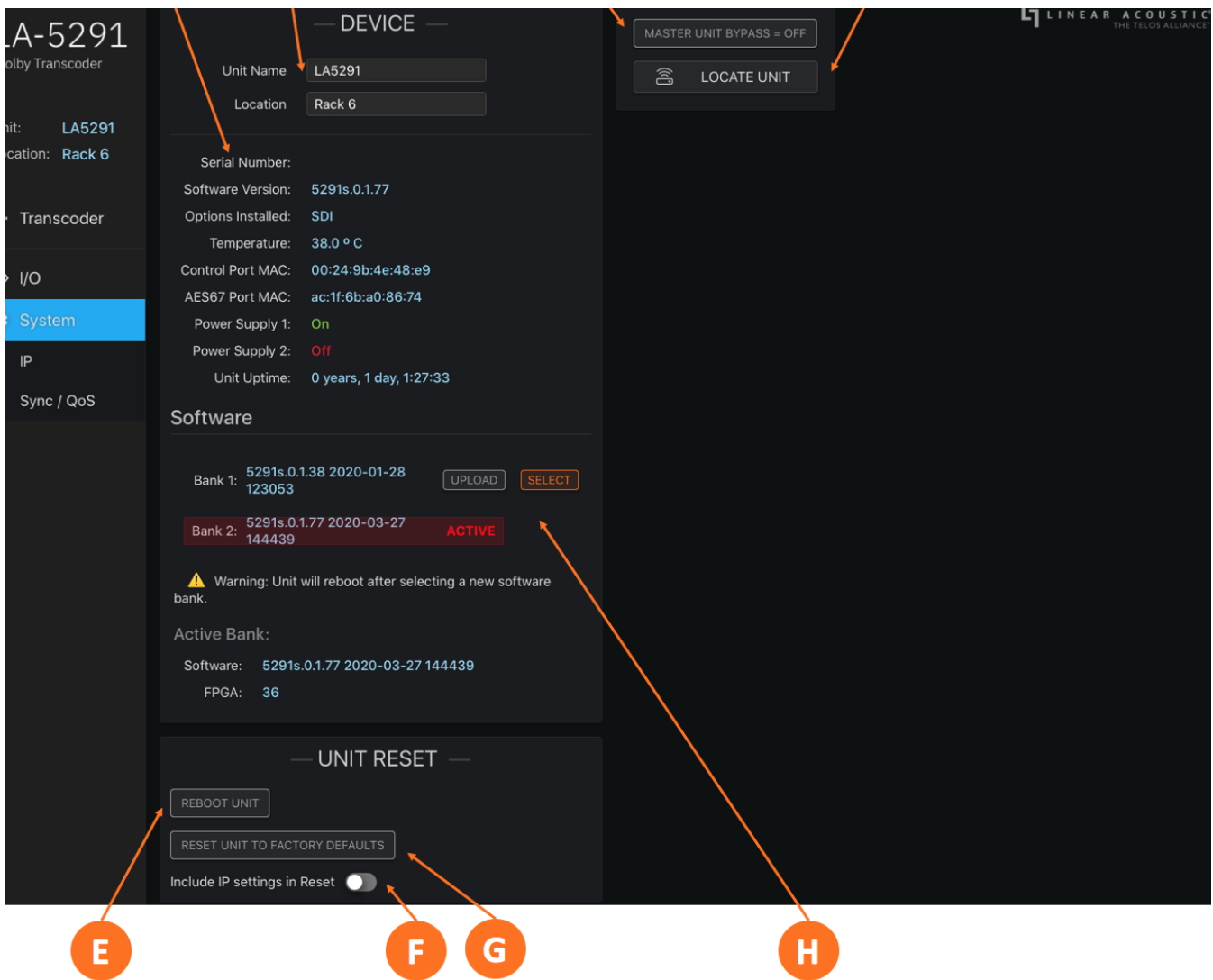


Figure 1 = System screen

Clicking on the **Reboot Unit button** (1E) – wait for it – reboots the LA-5291 and engages the hard relay bypass for the duration of the reboot process.

Important! During the reboot process – which typically takes less than one minute – no transcoding will take place. Depending upon your I/O configuration, a complete loss of audio may occur

Clicking on the **Reset Unit to Factory Defaults** button (1G) resets all parameters to the factory default state with the exception of IP settings, which will be retained so that you can remotely connect to the LA-5291 even after performing a reset.

If you wish to reset IP settings as well, enable the **Include IP Settings in Reset** button (1F) prior to the reset.

Important! Performing a factory reset will erase all I/O routing as well as any other custom settings you may have saved. This information cannot be reclaimed once you reset the LA-5291, even by contacting customer support or feeling genuine remorse for your decision. We strongly recommend backing up your configuration to a computer before performing a factory reset to avoid re-setter's remorse. You have been warned!

IP Configuration

Clicking on the **IP Menu** (2A) reveals the controls for DHCP settings plus fields for entering static IP addresses, subnets, and gateways for both the Control and AES67 Ethernet ports as well as network activity and status. It also contains the control and server address information required for SNMP.

Important! The Control and AES67 Ethernet connections both require 1000BASE-T (Gigabit) switch ports in order to work properly.

If both the Control and AES67 ports will be used, they must be in different subnets. In-band control is available using the AES67 port.

If only one port will be used, set the unused port to “Static IP” with an IP Address of 0.0.0.0, a Subnet Mask of 0.0.0.1, and a Gateway of 0.0.0.0.

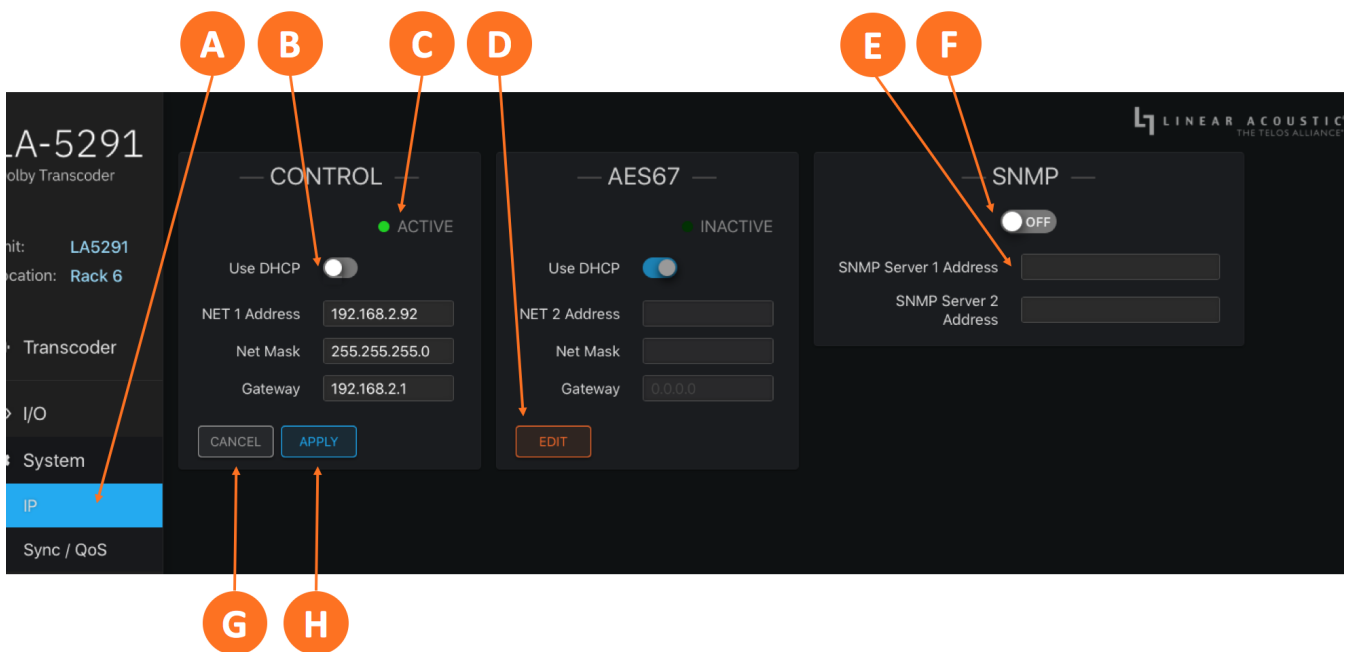


Figure 2- IP configuration menu

By default, LA-5291 is set up with DHCP enabled and will automatically receive an IP address when its Control Ethernet port is connected to a network with a DHCP server.

To use a fixed IP address, first click the **Edit button** (2D) for the appropriate port which unlocks the settings. (Please note the **Edit** button of the AES67 port is used for illustration in Figure 2 as the it is replaced by the **Cancel** and **Apply** buttons once you click on it).

Click on the **Use DHCP button** (6-2B) to disable DHCP. The text of the **NET Address**, **Net Mask**, and **Gateway fields**, which is grayed out when DHCP is enabled, will turn white and become editable. Once the information is entered, click on the **Apply button** (2H) to save the information or the **Cancel button** (2G) to back out without saving any changes. Verify that you have a good network connection by looking for a green dot and the word **Active** in the status window (2C).

Setup is identical for both the Control and AES67 ports.

When connecting to an SNMP server, click on the **SNMP enable button** (2F) and enter the IP address of at least one SNMP server in the **SNMP Server Address fields** (2E).

Using the Transcoder

Setting Up the Transcoder

LA-5291 supports a variety of decoding, transcoding, and encoding options, including:

- Decoding Dolby® ED2 streams to PCM
- Transcoding Dolby ED2 streams to Dolby Digital Plus JOC and Dolby E streams to Dolby Digital Plus
- Encoding PCM audio to Dolby Digital Plus, Dolby Digital Plus JOC, and Dolby ED2

Transcoding Basics

The name of the program being transcoded can be customized by clicking on the **Program 1 name box** (1A), typing a name, and clicking the green checkmark.

The LA-5291 supports three different workflows, selectable in the **Workflow dropdown menu** (1B), including:

- Dolby Digital Plus Atmos (Dolby Digital Plus JOC) transcoding
- Dolby ED2 encoding
- Dolby ED2 decoding

Note that certain settings may be grayed out if they are not applicable to the selected workflow.

Note - It is assumed that the signal being fed into the LA-5291 is appropriate for the selected workflow. For example, if the “Dolby ED2 Decoding” workflow is selected, the unit expects to see a Dolby ED2 or Dolby E bitstream at its input.

When the input source is a Dolby ED2 bitstream, the **Presentation menu** (1C) selects which of the presentations found in the Dolby Atmos metadata are encoded to the output stream.

The **Encoding Mode dropdown** (1D) determines the channel format of the encoded output. When set to “External Metadata”, the metadata values as presented by a Dolby DP590 connected to the Control Ethernet port of the LA-5291 will be used. If no metadata is present, or if a different channel output format is required, the output can be encoded as 2.0, 5.1, 5.1.4, or 7.1.4.

Incoming audio channel mapping for the various encoding modes is shown in the table below, where "rs" indicates "rear surround," "tm" indicates "top middle," "tf" indicates "top front," and "tr" indicates "top rear."

Note - Scroll left and right on the table below to see additional channels.

Encoding Mode	Ch 1/2	Ch 3/4	Ch 5/6	Ch 7/8	Ch 9/10	Ch 11/12
2.0	L/R	---	---	---	---	---
5.1	L/R	C/LFE	Ls/Rs	---	---	---
5.1.2	L/R	C/LFE	Ls/Rs	Ltm/Rtm	--	---
5.1.4	L/R	C/LFE	Ls/Rs	Ltf/Rtf	Ltr/Rtr	---
7.1	L/R	C/LFE	Ls/Rs	Lrs/Rrs	---	---
7.1.4	L/R	C/LFE	Ls/Rs	Lrs/Rrs	Ltf/Rtf	Ltr/Rtr

When the "DD+ Atmos Transcoding" workflow is selected, the **Data Rate dropdown** (1E) lists all available encoding data rates supported by the current Encoding Mode.

The **Dialog Normalization dropdown** (1F) is used to select the *dialnorm* metadata value.

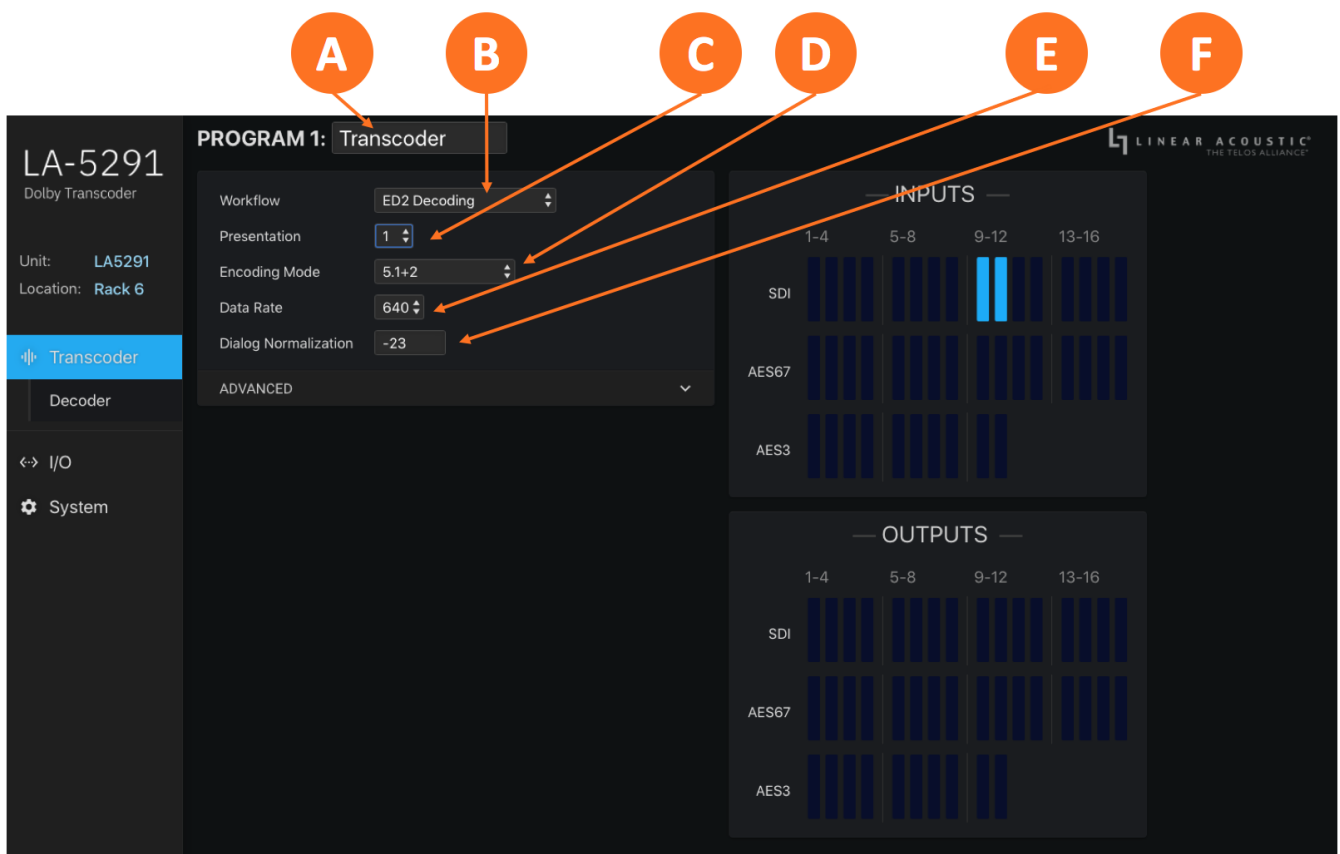


Figure 1 - Transcoder menu

Advanced Transcoder Controls

Clicking on **the Advanced down arrow (7-2A)** expands the Advanced menu for the transcoder.

As in the basic transcoder menu, certain settings will be grayed out if they are not applicable to the currently selected workflow. Specifically:

- When the “DD+ Atmos Transcoding” workflow is active, the “ED2 Frame Rate” control is grayed out
- When the “ED2 Encoding” workflow is selected, all advanced controls *except* the “ED2 Frame Rate” are grayed out
- When the “ED2 Decoding” workflow is active, all advanced controls are grayed out

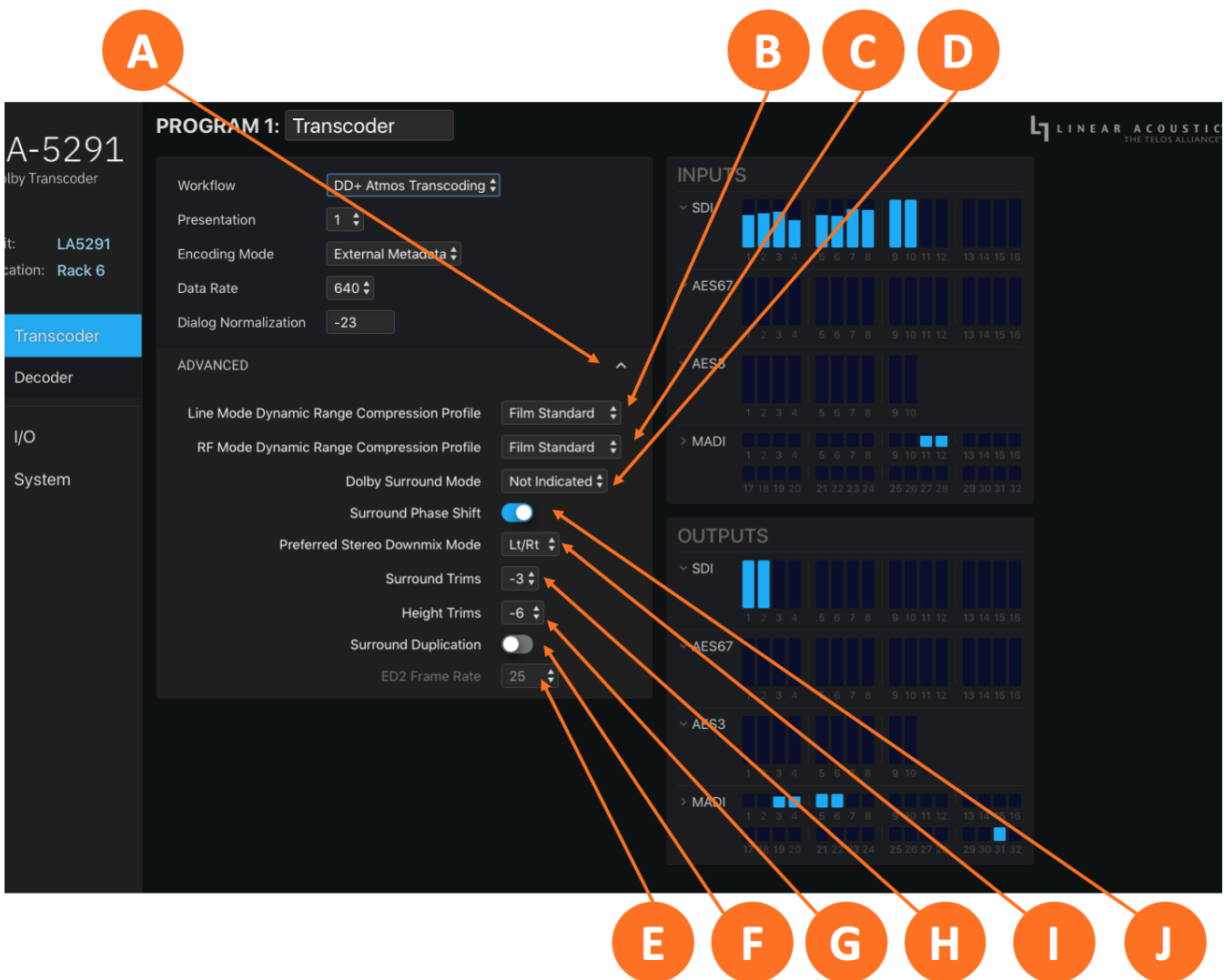


Figure 2- Advanced transcoder settings

The dynamic range compression profiles for **Line Mode** (2B) and **RF Mode** (2C) are independently selectable and include Film Standard (the default mode), Film Light, Music Standard, Music Light, and Speech.

The **Dolby Surround Mode** (2D) identifies to the decoder that a 2-channel output is either PCM stereo (“Not Encoded”) or matrix surround-encoded (“Encoded”). If it is not necessary to indicate the mode at all, select “Not Indicated”.

Enabling **Surround Phase Shift** (2J) adds a 90-degree phase shift filter to one surround channel to de-correlate the surrounds and prevent channel buildup during the downmixing process. It is recommended this be set to the default value of “Enabled.”

The preferred downmix type is selected with the **Preferred Stereo Downmix Mode control** (2I).

- An Lt/Rt downmix sums the surround channels and adds them to the left channel (in phase) and the right channel (out of phase) which allows an AVR with a Dolby Pro Logic decoder to reconstruct the Left, Center, Right, and mono Surround (Pro Logic), or Left, Center, Right, and stereo Surround channels (Pro Logic II)
- A Lo/Ro downmix simply adds the Left and Right surround signals to the Left and Right stereo channels respectively, and is appropriate for stereo-only listening and where delivering a mono-compatible signal is important

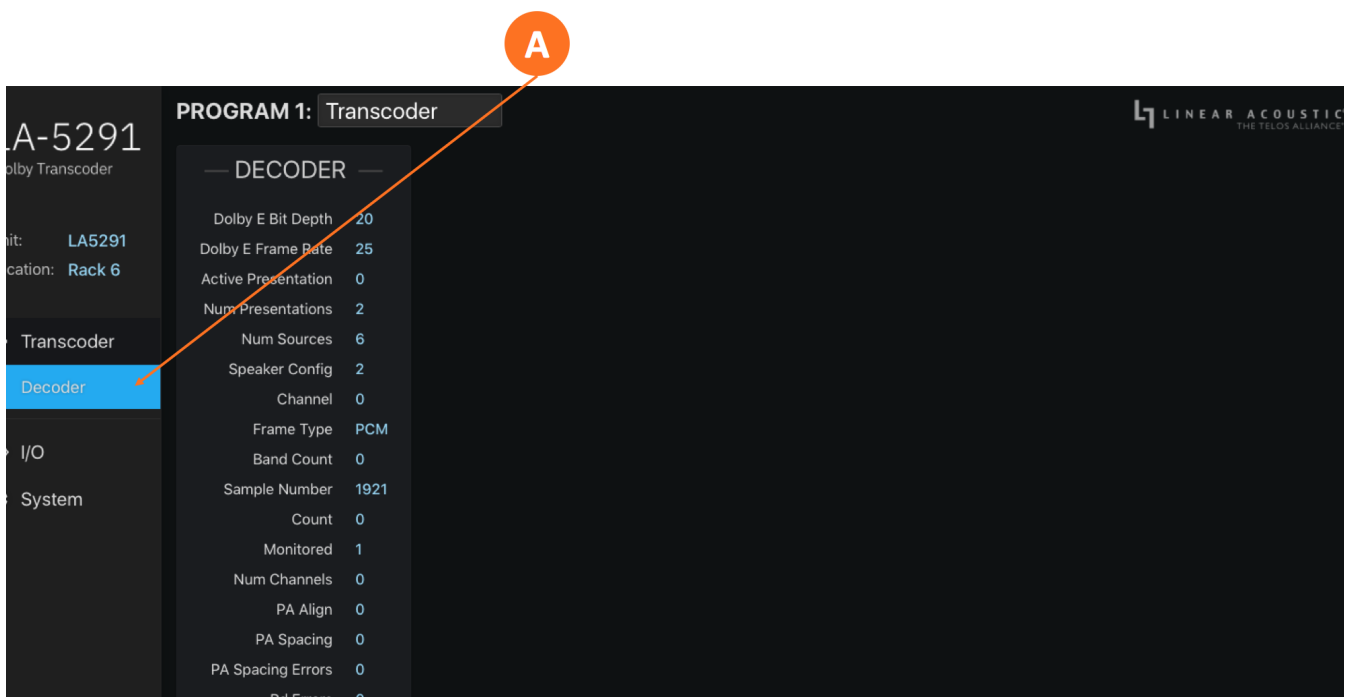
The **Surround Trims control** (2H) and **Height Trims control** (2G) adjust the amount of attenuation to their respective channels applied in the decoder.

When the **Surround Duplication control** (2F) is enabled, the incoming audio is in 5.1-channel format, and the desired output is 7.1, the encoder will copy the Left Surround (Ls) audio to the Left Rear Surround (Lrs) channel, and the Right Surround (Rs) audio to the Right Rear Surround (Rrs) channel.

The **ED2 Frame Rate control** (2E) sets the frame rate to either 25 or 29.97 when using the “ED2 Encoding” workflow. This should be set to match the frame rate of the accompanying video signal, or ½ of the frame rate if the accompanying video signal is 50 or 59.94 Hz.

Decoder Metadata Screen

The **Decoder screen** (3A) shows various values of the incoming Dolby ED2 or Dolby E bitstream. The displayed values will vary depending upon which bitstream type is preset.



Specifications

Coding

Decoding

- Decodes Dolby ED2 to PCM

Transcoding

- Transcodes Dolby ED2 to Dolby Digital Plus JOC and Dolby E to Dolby Digital Plus

Encoding

- Encodes PCM to Dolby Digital Plus and Dolby Atmos (via Dolby Digital Plus JOC)
-

I/O

SDI I/O

- 3Gb/s HD/SD-SDI input (SMPTE ST 425-1, 292M, and 259M), up to 1080p/60/59.94/50Hz
- Optional Quad-Link 3Gb/s SDI for 4K workflows (mutually exclusive with MAD I option)

AES-3 I/O

- Five stereo pairs via 75 Ohm BNC unbalanced female connectors, internally terminated; signal levels per SMPTE 276M/AES-31D-2001

AES67 I/O

- 16 channels of bi-directional AES67 I/O in support of SMPTE ST 2110-30 and -31 workflows

MADI I/O

- Optional MADI I/O supports up to 16 channels for processing (mutually exclusive with Quad-Link SDI option)
 - Passthrough and shuffling for up to 64 channels
 - I/O via coax or optical SFP socket (SFP sold separately)
-

Latency

- AES-3 input to AES-3 output with SRCs disabled: 30.5ms
 - AES-3 input to AES-3 output with AES-3 input SRC enabled: 33.5ms
 - SDI input to SDI output with SRCs disabled: 33.5ms
 - SDI input to SDI output with SRCs enabled: 36.5ms
 - AES67 input to AES67 output: 107ms (measurement made using Telos Alliance SDI xNode which has a latency value of 80ms)
-

Reference

- 48kHz reference via SDI, PTP, AES-3, internal clock (standalone use only), or MADI (when MADI option is installed)
 - Vref
-

Sample Rate/Resolution/Frequency Response

- 48kHz, 24-bit, 20Hz – 20kHz
-

Ethernet

- Two Gigabit RJ-45 connections – one for AES67, one for networked remote control
-

Parallel GPI/O Control Port

- 15-pin female D connector, 0-5V TTL levels; 5 inputs, 5 outputs

Front Panel Controls and Indicators

- 5-key navigation cluster
 - Graphical color LCD display
 - LED status indicators for each power supply, status, and reference
-

Power

- Dual internal redundant auto-ranging power supplies, each rated at 100-264VAC, 50/60Hz, 100 Watts maximum
-

Dimensions and Weight

- 19"W x 9"D x 1.75" H (approximately 48.2 x 22.0 x 4.5 cm)
 - Net weight approximately 9.0 pounds (4.08kg)
 - Shipping dimensions 22"W x 20"D x 7"H (approximately 55.6 x 50.8 x 17.8 cm)
 - Shipping weight approximately 16 pounds (7.26kg)
-

Environmental

- Operating temperature 0 to 50 degrees Celsius (32 to 122 degrees Fahrenheit)
 - Non-operating temperature -20 to 70 degrees Celsius (-4 to 158 degrees Fahrenheit)
-

Intended Location

- Telecommunications center or dedicated computer/machine room
-

Regulatory

- North America – FCC and CE tested and compliant with UL-approved power supplies

- Europe – Complies with European Union Directive 2002/95/EC on the restriction of use of certain hazardous substances in electrical and electronic equipment (RoHS), as amended by Commission Decisions 2005/618/EC, 2005/717/EC, 2005/747/EC (RoHS directive), and WEEE
-

Licensing

- The Linear Acoustic LA-5291 is manufactured under license from Dolby Laboratories. Dolby, Dolby Audio, and the double-D symbol are trademarks of Dolby Laboratories.
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Warranty

- Standard Telos Alliance 2-year limited parts and labor
- <https://www.telosalliance.com/warranty-information>