LINEAR ACOUSTIC

Dolby® Digital/Plus Transcoder
Model LA-5269

User Guide

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Release Date: March, 2011
Software Version: V0.0.15 and later

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All requests for repairs MUST include the unit serial number to ensure quick and accurate service.

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This product optionally contains Dolby Digital (AC-3) encoding and is manufactured under license from Dolby Laboratories, Inc. The encoder contains confidential unpublished works and is protected by US and foreign patents and is copyright 2007 Dolby Laboratories, Inc.

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Chapter 1: Introduction

The Linear Acoustic LA-5269 is a Dolby decoder, encoder, and transcoder enabling inputs of PCM, Dolby E, and Dolby Digital (AC-3) to be output as Dolby Digital (AC-3), Dolby Digital Plus (E-AC-3) and in the future Dolby Pulse (AAC and HE AAC).

Below are some features of the LA-5269:

- AES and HD/SD-SDI inputs and outputs standard
- Support for serial (RS-485) and VANC (SMPTE 2020) metadata
- Dual power supplies
- SNMP reporting (option)
- Encode:
    - PCM to Dolby Digital (AC-3), Dolby Digital Plus (E-AC-3)
    - PCM to Dolby Pulse (AAC and HE AAC) - future option
- Transcode:
    - Dolby Digital (AC-3) to Dolby Digital Plus (E-AC-3)
    - Dolby E to Dolby Digital (AC-3), Dolby Digital Plus (E-AC-3) - Option
- Smooth splicing and switching of transcode and main audio
- Framesync of transcode input
- Metadata translation between codecs

1.1 Principles of Operation

Figure 1-1 shows the internal audio path of the LA-5269. It should be noted that this diagram is a general representation of signal flow. Please consult the appropriate section of this manual for specific functionality.

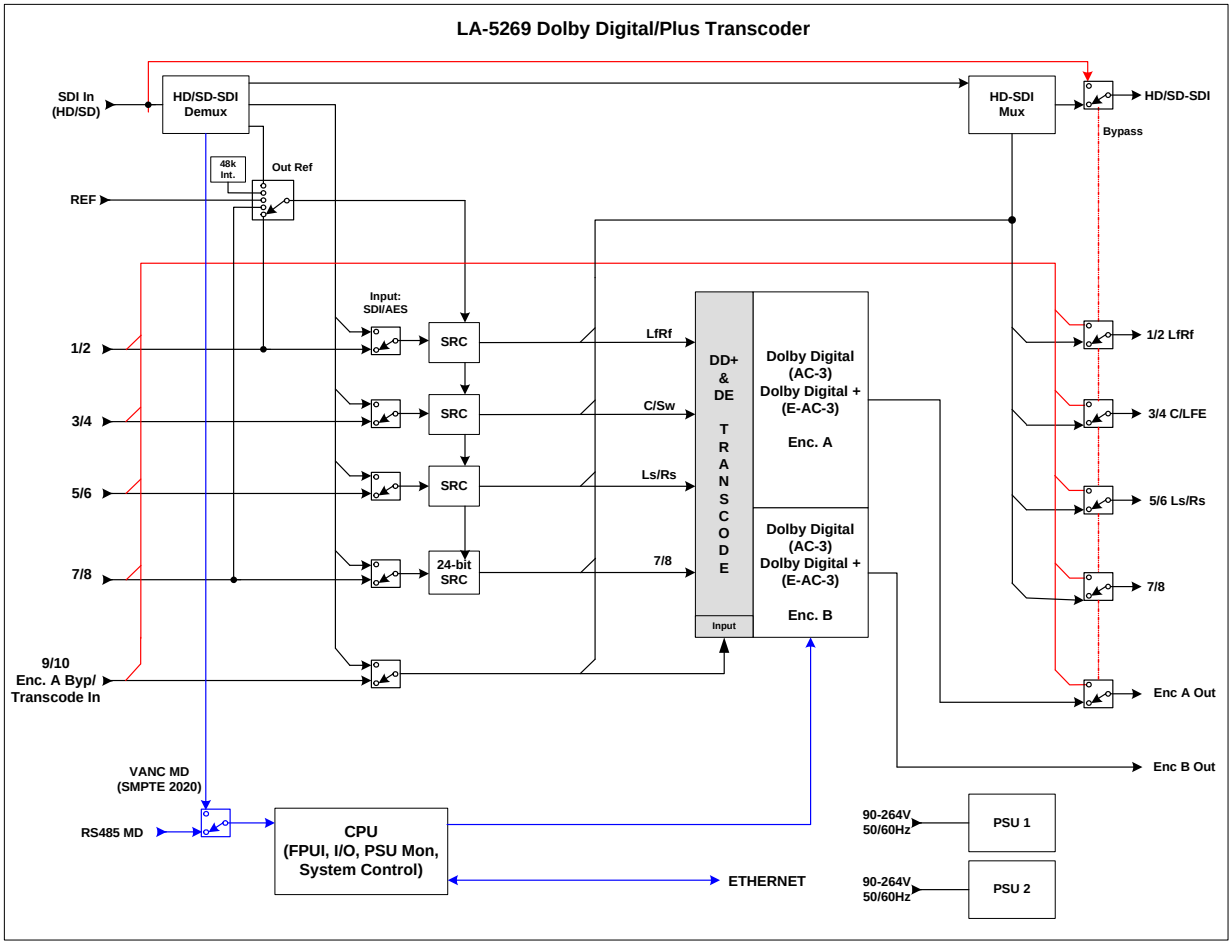


Figure 1-1 Audio Block Diagram

1.2 Location of LA-5269

In the signal flow of a modern television station, audio processors can be placed in a variety of locations depending on how the transmission path is designed. Our suggestion is to try to keep LA-5269 near the MPEG video encoder and/or multiplexer as the units work closely together and will benefit from short cable runs and common clocking.

1.3 Reference Levels

The LA-5269 is designed to support a standard reference level of -20dBFS via its digital inputs.

1.4 Reset and Upgrades

A soft re-boot of the unit can be accomplished by briefly and simultaneously pressing the Left, Up, and Right arrow keys.

Upgrades are performed via the rear-panel Ethernet connector. The USB connector is unused, however please do not insert any device into this connector.

1.5 Warranty and Feedback

Please take a moment to fill out and return the warranty card included with the unit. This will enable us to contact you if there are any software or documentation issues. Also, we are very interested in your feedback. This unit was designed based on input gathered from many broadcast engineers and it will evolve further thanks to ongoing suggestions and comments from users. We look forward to hearing from you.

Chapter 2: Connections and Quick Setup

This chapter covers all required connections for the LA-5269.

2.1 Unpacking and Inspection

Before unpacking the unit, inspect the outer carton for shipping damage. If the carton shows damage, inspect the unit in those areas. Please save the carefully designed shipping carton and packing materials. In the unlikely event that the unit needs to be returned to the factory, alternate cartons or packing materials may not be adequate and can cause damage not covered by warranty.

The following essential items are provided with the unit:

- Bag containing:
    - Two IEC power cords (style matches country of order);
    - this manual, and a handy black pen.
- Warranty information: Please fill out and return the warranty card to Linear Acoustic to ensure your software and documentation are kept up to date.

2.2 Installation

LA-5269 installation requires:

- One standard rack space unit with ADEQUATE VENTILATION (the unit relies on convection cooling from side-panel vents);
- standard 75-Ohm BNC cables for digital signal connections;

  To connect to digital equipment with 110-Ohm XLR connectors, use impedance-matching transformers (available from Canare, Neutrik and other manufacturers).
- Proper reference. The unit will default to internal 48kHz with no signals applied, however correct reference is of critical importance especially with encoded audio. Different MPEG multiplexers may have different requirements, however best success has typically been achieved with SDI connections as there is embedded clock information. Note that if embedding is enabled, reference will be forced to SDI.

2.3 Rear Panel

The rear panel of the LA-5269 contains its electrical I/O.

2.3.1 Connection Ports

All of the connections for LA-5269 are on the rear panel and are described in detail below. See Chapter 5: *Specifications* for specific pinouts.

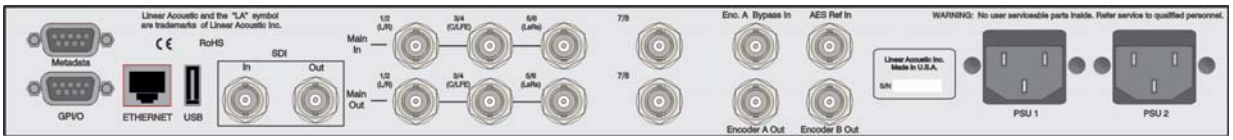


Figure 2-1 Rear Panel

- **Metadata I/O:** RS-485 connection accepts the metadata output of any Dolby equipment (DP572, DP570, etc...) or any Dolby-compatible metadata source. Used to control upmixing and other functions.

- **SDI Input/SDI Output:** Option allows for de-embedding and re-embedding any of the 16 available channels in an applied HD or SD-SDI signal. VANC metadata extraction per SMPTE 2020 methods A and B is also supported.

- **GPI/O:** Output of unit status, GPI currently not used.

- **ETHERNET:** Used for firmware upgrades and SNMP reporting (see chapter 3)

- **Main Audio Input**: Connect the 48kHz PCM signals to these inputs. The input channels are arranged as follows: 1/2 = Left front/Right front, 3/4 = Center/LFE, 5/6 = Left surround/Right surround. 7/8 is for the +2 program.

- **Enc. A Bypass:** Bypass input for Dolby Digital (AC-3) encoder A. Accepts output of external encoder for fail-safe operation. Connector is also the input for the transcoder. Apply Dolby E encoded audio here for decode then re-encode to Dolby Digital (AC-3) or Dolby Digital Plus (E-AC-3), or apply Dolby Digital (AC-3) for transcode to Dolby Digital Plus (E-AC-3).

- **AES REf Input:** Apply 48kHz DARS (Digital Audio Reference Signal) here and choose AES Ref as clock source in Setup->I/O menu. Note that this is useful with some MPEG video encoders which provide an AES reference output.

NOTE: *Appropriate reference must be applied and selected for proper operation.*

- **Main Audio Outputs:** 48kHz discrete audio inputs selected for encoding. If input is SDI, these outputs are the de-embedded audio channels. For 5.1+2 operation, 1/2 = Left Front/Right Front, 3/4 = Center/LFE, 5/6 = Left Surround/Right Surround, 7/8 = Alternate program.

- **Encoder A Output:** AC-3 output of the 5.1 channel Dolby Digital encoder option

- **Encoder B Output:** AC-3 output of the 2.0 channel Dolby Digital encoder option

2.4 Quick Setup Notes

The Linear Acoustic LA-5269 is configured at the factory and is ready to go on the air after making the proper input and output connections.

- Apply audio to Main Input 1/2

- Set Clock Reference = AES 1

- The front panel Reference indicator should be green.

- The main menu will default to showing input and output meters, and there should be activity on some or all of the first six meters.

- Audio will be available on the main outputs 1-6 and encoded audio will be present on the Enc A and Enc B outputs.

The best way to learn the menus is to explore the different settings with audio applied and monitored.

Chapter 3: Applications

The LA-5269 is essentially a modern updated version of the classic Dolby DP569. Features such as dual power supply, HD/SD-SDI I/O, and SNMP have been added to a Dolby-manufactured encoder card. Support for encoding from PCM inputs is provided along with several space and cost saving transcode functions that allow inputs to be PCM, Dolby E, or Dolby Digital (AC-3) and outputs to be Dolby Digital, Dolby Digital Plus, or optionally Dolby Pulse.

3.1 Example

Below is a simple connection scenario to highlight some possible applications for the LA-6269.It should be noted that both SDI and AES connections are shown, but likely both will not be used in every case.

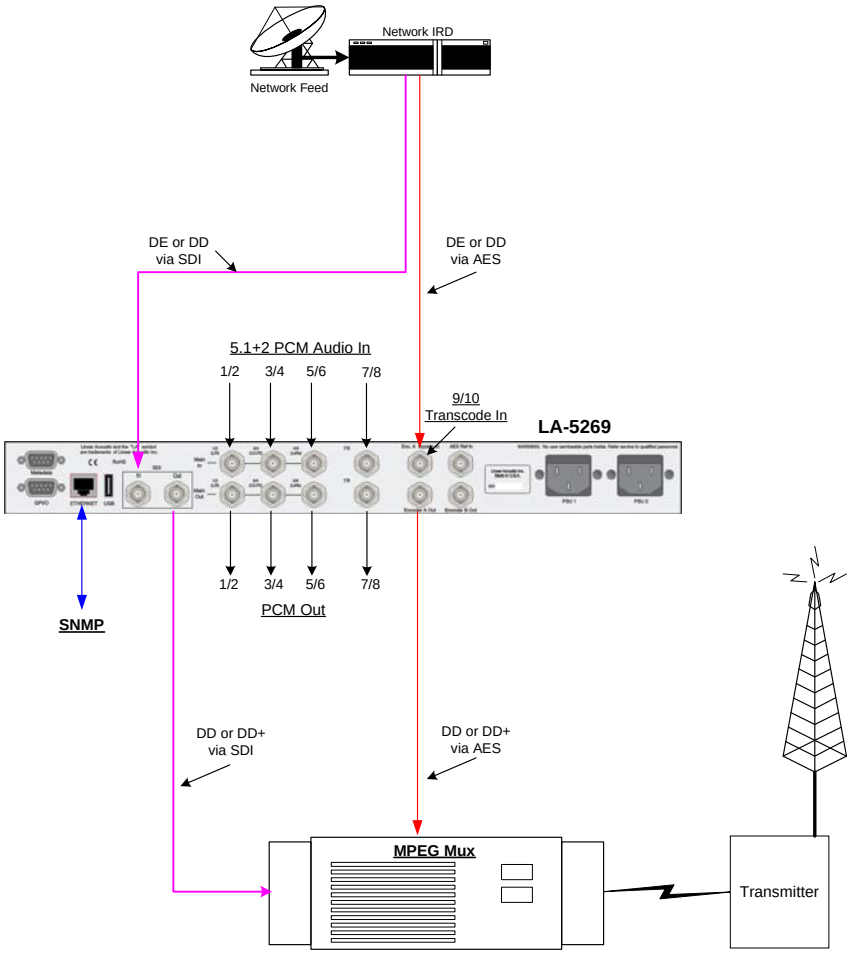


Figure 3-1 LA-5269 Connection Example

3.2 Latency

Audio coding takes time. Luckily, so does video, and in all modern multiplexers there is far more video delay than audio delay and so adjustable compensation is added to the audio inputs. When installing an external audio encoder such as the LA-5269, the latency imposed by the audio coding process can be "tuned out" of the MPEG multiplexer by removing some of the compensating delay. This adjustment is sometimes called "External Coding Delay" or simply "External Delay" and when set to the latency of the external encoder, this value is actually *removed* from the audio path thereby lining up audio and video properly in time.

The simple block diagram below illustrates the internal signal flow inside a typical MPEG encoder and multiplexer.

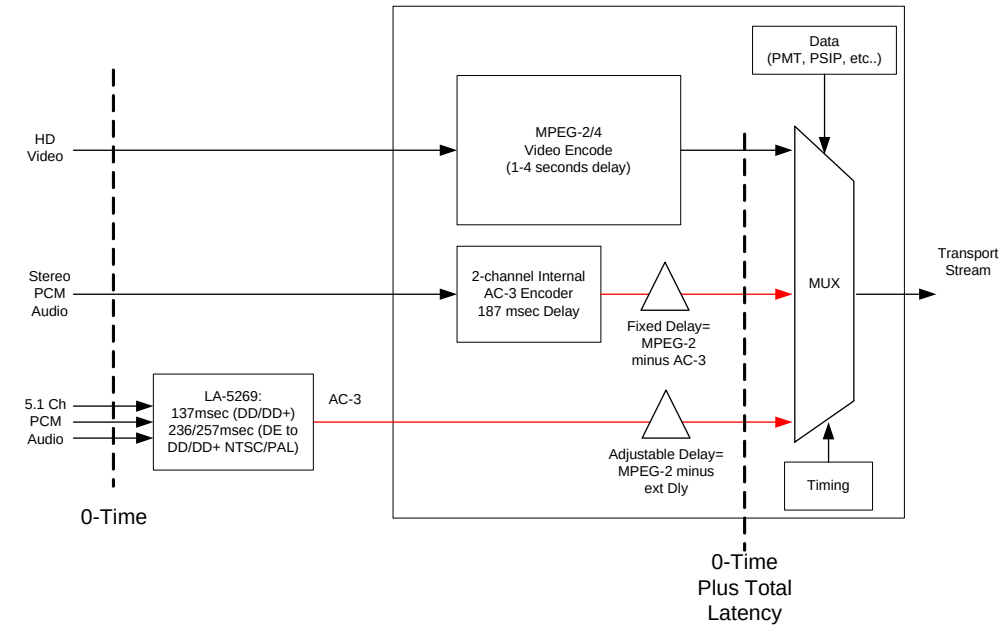


Figure 3-2 A/V Sync Timing

This is an elegant method for maintaining proper lip sync. External delays could be employed, but it seems somewhat counterintuitive to introduce additional delay when delay can actually be removed to achieve the same result.

3.3 SNMP (option)

The LA-5269 supports error reporting via the Simple Network Management Protocol. Status of critical functions such as the health of each power supply, encoder function, unit bypass, metadata reversion, audio presence and others are reported.

The current LA-5269 MIB file is copied below. Note that this data can be copied and pasted to a text file that can be re-named LINEAR-ACOUSTIC-LA5269.mib and used by an SNMP manager.

```
---------------------------------

LINEAR-ACOUSTIC-LA5269-MIB DEFINITIONS ::= BEGIN


-- MIB for Linear Acoustic la5269 devices


IMPORTS

enterprises                FROM RFC1155-SMI

TRAP-TYPE                        FROM RFC-1215

OBJECT-TYPE                        FROM RFC-1212;


linearAcoustic   OBJECT IDENTIFIER ::= { enterprises 28660 }

la5269          OBJECT IDENTIFIER ::= { linearAcoustic 5269 }

la5269-system    OBJECT IDENTIFIER ::= { la5269 1 }

la5269-status    OBJECT IDENTIFIER ::= { la5269 2 }


--

--  la5269-system

--


-- model

la-model          OBJECT-TYPE
```

```
    SYNTAX      OCTET STRING (SIZE (0..40))
    ACCESS      read-only
    STATUS      mandatory
    DESCRIPTION
"Linear Acoustic Model."
    ::= { la5269-system 1 }

-- software version
software-version OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE (0..40))
    ACCESS      read-only
    STATUS      optional
    DESCRIPTION
"Device's software version."
    ::= { la5269-system 2 }

-- firmware version
firmware-version OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE (0..40))
    ACCESS      read-only
    STATUS      optional
    DESCRIPTION
"Devices's firmware version."
    ::= { la5269-system 3 }

--
-- la5269-status
```

```
--


-- Power Supply 1

power-supply-1  OBJECT-TYPE

   SYNTAX      INTEGER {fail (1), ok (2)}

   ACCESS      read-only

   STATUS      mandatory

   DESCRIPTION

"Status of power supply 1."

   DEFVAL { 1 }

   ::= { la5269-status 1 }


-- Power Supply 2

power-supply-2  OBJECT-TYPE

   SYNTAX      INTEGER {fail (1), ok (2)}

   ACCESS      read-only

   STATUS      optional

   DESCRIPTION

"Status of power supply 2."

   DEFVAL { 1 }

   ::= { la5269-status 2 }


-- Master Bypass

master-bypass   OBJECT-TYPE

   SYNTAX      INTEGER {off (1), on (2)}

   ACCESS      read-only

   STATUS      optional
```

```
    DESCRIPTION
"Status of Master Bypass."
    DEFVAL { 1 }
    ::= { la5269-status 3 }

-- System Reference
system-reference OBJECT-TYPE
    SYNTAX      INTEGER {absent (1), present (2)}
    ACCESS      read-only
    STATUS      optional
    DESCRIPTION
"Status of System Reference."
    DEFVAL { 1 }
    ::= { la5269-status 4 }

-- Audio Detected
audio-detected  OBJECT-TYPE
    SYNTAX      INTEGER {no (1), yes (2)}
    ACCESS      read-only
    STATUS      optional
    DESCRIPTION
"Detection of Audio Signal."
    DEFVAL { 1 }
    ::= { la5269-status 5 }

-- MD Presence
metadata-presence OBJECT-TYPE
```

```
    SYNTAX      INTEGER {absent (1), present (2)}
    ACCESS      read-only
    STATUS      optional
    DESCRIPTION
"Metadata Presence status."
    DEFVAL { 1 }
    ::= { la5269-status 6 }

-- Encoder/Decoder
codec           OBJECT-TYPE
    SYNTAX      INTEGER {error (1), ok (2)}
    ACCESS      read-only
    STATUS      optional
    DESCRIPTION
"Status of Encoder/Decoder module."
    DEFVAL { 1 }
    ::= { la5269-status 7 }

-- Metadata Reverted
metadata-reverted  OBJECT-TYPE
    SYNTAX      INTEGER {no (1), yes (2)}
    ACCESS      read-only
    STATUS      optional
    DESCRIPTION
"Metadata Reverted Status."
    DEFVAL { 1 }
    ::= { la5269-status 8 }
```

```
--
--  traps
--


-- 10/29/2010 RDC
-- Linear Acoustic rules for enterprise-specific traps
-- 1. Use trap numbers from 10 to 127.
--    This makes them different from generic traps (0 - 5) and
--    lets them fit into a consistent and small space in BER TLV packet.
-- 2. Do not include VARIABLES to keep the overall BER packet
--    size consistent.


-- power supply failed
trap-ps-failed TRAP-TYPE
   ENTERPRISE  la5269
   DESCRIPTION
"Trap, Power Supply failed."
   ::= 10


-- Audio Loss
trap-audio-loss       TRAP-TYPE
   ENTERPRISE  la5269
   DESCRIPTION
"Trap, Audio lost or not detectd."
   ::= 11
```

```
-- Codec failed

trap-codec-failed    TRAP-TYPE

   ENTERPRISE  la5269

   DESCRIPTION

"Trap, Encoder/Decoder failed or not detected."

   ::= 12


-- Metadata Loss

trap-metadata-loss    TRAP-TYPE

   ENTERPRISE  la5269

   DESCRIPTION

"Trap, Metadata lost or not detected."

   ::= 13


-- Metadata Reverted

trap-metadata-reverted TRAP-TYPE

   ENTERPRISE  la5269

   DESCRIPTION

"Trap, Metadata has reverted."

   ::= 14


END

---------------------------------
```

For detailed assistance with SNMP setup, please contact your local sales engineer or the factory directly.

Chapter 4: Detailed Operation

This chapter discusses in detail the structure of the Linear Acoustic LA-5269, how to use the front panel interface to access the menus, accessing and saving factory and user processing presets, and GPI and Metadata setup.

4.1 Menu Navigation

Most of it is rather obvious, and a bit of experimentation will quickly make you comfortable navigating through the submenus. If in doubt, use the Left Arrow to back out towards the Main menu. The menus and submenus are structured to access more complex functionality as you go deeper into the hierarchy. See page XX for a menu tree.

4.2 Statistics Menu

Provides details about software and firmware versions, communications status, SNMP trap errors, and SNMP transmission or reception errors as well as listing any installed options. This menu also shows the presence for each of the AES pairs, 1-8.

- **Firmware Version:** 5269.00.07
- **Device Options:** SDI
- **App Uptime:** Shows time running in d:hh:mm:ss
- **Ref Chg:** Counts the number of times the system reference has changed since reboot or reset
- **SNMP Trap Errors:** Counts the number of errors and the code of the last captured event. Press the Right arrow (Next) to reset.
- **SNMP Tx/Rx Errors:** Counts the number of transmission errors and displays the code of the last captured event. Press the right arrow (Next) key to reset.
- **SNMP Pkt Rx/Trap/Tx:** Summary screen of all errors.
- **AC-3 Encoder:** Displays the status of the encoder, normal is Detect=Y and Rdy=Y.
- **AC-3 Enc FW Vers:** Displays the firmware version of the encoder, currently 2.0.6.1.

- **AC-3 Enc HW Vers:** Displays the hardware version of the encoder, this may vary by unit.
- **AC-3 Enc Serial:** Displays the serial number of the encoder card.
- **AC-3 Feature Set:** Shows the options included with the encoder where 1=Dolby Digital/Dolby Digital Plus Encode and 7=Dolby Digital/Dolby Digital Plus and Dolby E decode.
- **AC-3 Enc Tx/Rx Errs:** Displays any communication errors and their type.
- **AES In Detect:** Shows presence of AES carrier on any of the 8 pairs (only four pairs are currently used to support 8 audio channels). See below for a picture of the screen

4.3 I/O Menu

The I/O menu is where the input and output audio, control, and metadata signals are selected to interface with the loudness control and upmixing engines.

4.3.1 Master Bypass

Enabled de-energizes the audio, metadata, and SDI relays for a hard bypass.

4.3.2 Reference Setup

Setup Output Reference for the LA-5269. A stable, high quality, non-interrupted signal should be applied and chosen for reference. Seems silly to have to even write this, but remember this choice determines the ultimate quality of your on-air audio, possibly the stability of your multiplexer. Outputs of crash switches are not recommended.

Clock Src Type

If the chosen clock source is from a stable reference, choose stable. For instances where clock reference might switch, choose Changing to minimize (but not eliminate) audio corruption. We strongly recommend using a stable reference source!

Clock Source (Output Reference)

AES 1, AES 4, SDI, or Internal 48kHz can be selected as the reference for the AES audio outputs. Note that if a selection is made for a source that is not applied, the front panel Ref LED will be red, and the LA-5269 will revert to internal 48kHz to maintain audio. All inputs have sample rate converters on them so asynchronous audio can be accepted as long as the reference is set correctly.

NOTE: *If SDI Embed is enabled, Clock Source will be forced to SDI for proper timing.*

4.3.3 Audio Input Sources (Channels 1-8)

Selects between applied AES audio or audio de-embedded from SDI. Each of the input pairs 1/2, 3/4, 5/6, and 7/8 can be sourced from its corresponding AES input pair or any SDI pair. Default is AES.

4.3.4 SDI Embed

Selects whether to enable audio re-embedding or pass the SDI signal through the LA-5269 untouched. Note this does not affect de-embedding which is active at all times. See note above about Clock Reference when SDI Embed is enabled.

4.3.5 SDI Out Destination (Channels 1-16)

Selects source of audio for re-embedding into an applied SDI signal. Choices are Mute, AES (corresponding pair), and any of the SDI pairs. This menu can be used as a router or pair shuffler within SDI.

4.3.6 Metadata Setup

The LA-5269 has been designed to take best advantage of metadata. The incoming Dolby or Dolby-compatible metadata stream is input as serial RS-485 or in the vertical ancillary space of an applied HD-SDI signal (per SMPTE 2020).

LA-5269 Metadata Setup Procedure:

- **Source: RS485/VANC**- Selects between the RS-485 serial metadata input and metadata extracted from the Vertical Ancillary (VANC) of an applied HD-SDI signal. For VANC metadata there are several other settings:
    - **VANC MD is Async:** Disabled for standard VANC metadata, Enabled for CBS-style VANC metadata. Default is Disabled.
    - **VANC DID:** Selects the Data ID of the metadata signal in hex. SMPTE RP2020 recommends this value be set to 0x45. Currently CBS network uses 0x50 but will be changing to 0x45. Default is 0x45.
    - **VANC SDID:** Selects the Secondary DID of the VANC metadata signal in hex. SMPTE RP2020 recommends this value be set to 0x01 and this is the default.
    - **VANC Extract Line:** Selects the video line to extract VANC metadata from.

SMPTE RP2020 recommends that metadata be inserted on Line 9, but we have seen a great deal of variation, thus the default is Auto.

4.4 AC-3 Encoder Menu

The Dolby Digital encoder option provides two encoders, the first capable of encoding up to 5.1 channels and the second capable of up to two channels. Both Dolby Digital (AC-3) and Dolby Digital Plus (E-AC-3) are supported.

4.4.1 AES Channel Status Bits

- **Audio Bit:** Controls the audio/non-audio bit of the channel status bits present on Encoder A and Encoder B outputs. Default in Non-Audio data.

- **Validity Bit:** Controls the validity bit of the channel status bits present on Encoder A and Encoder B outputs. Default is Valid.

4.4.2 Transcoder

- **Encode Input:** Enables the signal from the 9/10 input (from AES or SDI) to be applied to the transcoder input of the encoder. This signal can be Dolby Digital (AC-3) or Dolby E if the option is present. Default is Off Now.

- **Encoder Config:** Sets the encoder to 5.1+2 or 5.1+Transcode. 5.1+2 is the default mode for PCM inputs, and 5.1+Transcode allows Dolby Digital (AC-3) applied to the 9/10 input to be transcoded to Dolby Digital Plus (E-AC-3). If Dolby E is applied to 9/10, it can be decoded and re-encoded to Dolby Digital or Dolby Digital Plus and works in either 5.1+2 or 5.1+Transcode modes.

NOTE: *When Transcode Mode (5.1 + Transcode) is enabled, BOTH Encoder A and Encoder B MUST be set to the same Encoder Mode (i.e. Both to DD or DD+) else transcoding will not function reliably.*

4.4.3 Encoder Mode & Metadata

- **MD Reversion:** Sets the Metadata Reversion Mode between Last Valid and Internal. Default is Internal and applies to both Encoder A and Encoder B.

WARNING: Use of "Last Valid" can be dangerous. If the last good metadata signal indicated a stereo program and the audio changes to 5.1 channels, there will be loss of dialogue. Best to use "Internal" and set the encoder for 3/0 or greater.

Encoder A

- **Encoder Mode EnA:** Sets the encoder type for Encoder A to DD for Dolby Digital (AC-3) or DD Plus for Dolby Digital Plus (E-AC-3). Normal default is DD. Note that if Transcoding is enabled, Encoder Mode EnA and EnB MUST be the same type!

- **DD+ Rate EnA:** Sets the output data rate for Encoder A when it is in Dolby Digital Plus mode. Default is 448 kbps.

- **DD Rate EnA:** Sets the output data rate for Encoder A when it is in Dolby Digital (AC-3) mode. Default is 448 kbps.

- **Acmod EnA:** Sets the acmod or Encoding Mode for Encoder A. Notation is front channels/rear channels/LFE. So 3/2L is 5.1 while 2/0 is 2.0 stereo.

- **Line Mode EnA:** Choose the Encoder A Dolby Digital DRC profile for Line Mode dynamic range compression (i.e the default mode for the stereo line-level outputs of most set top boxes and TV sets). Choices include Film Std, Film Lgt, Music Std, Music Lgt, Speech, and "None". Default is Film Std.

- **RF Mode EnA:** Choose the Encoder A Dolby Digital DRC profile for RF Mode dynamic range compression (i.e the default mode for the RF re-modulated outputs of most set top boxes). Choices include Film Std, Film Lgt, Music Std, Music Lgt, Speech, and "None". Default is Film Std.

***WARNING:** It is **Strongly** recommended **not** to choose "None" mode for either Line Mode or RF Mode. This is a test mode intended for controlled laboratory use and not for over the air applications. Choosing "None" mode may result in unnecessary protection limiting occurring during downmix, so "None" is not really None! Choose Film Lgt. for minimal DRC action.*

- **Dialnorm EnA:** Using an ITU loudness meter (Linear Acoustic LAMBDA, LQ-1000 or equivalent), set the transmitted dialnorm value here. Note that the factory default preset of TV 5B Gen is pre-adjusted to produce -24 on average with typical program audio inputs so the default setting is -24. This should be measured as part of initial system setup. The actual value does not matter as long as it matches the measurement.

NOTE: *To correctly set dialnorm, the loudness of the output audio must be verified using an ITU-R BS.1770 loudness meter. For compliance, any value between -1 and -31 could be valid, as long as it matches the actual measured audio. Default is -24.*

- **MD Source EnB:** Selects the metadata source for Encoder B. If the chosen metadata source is not available, the encoder will revert per reversion mode setting in I/O Setup. Choices for MD Source are:
    - Internal - Local metadata parameters (above) are used by Encoder B
    - External - Depending on selection in I/O Setup, external metadata can be from either the RS485 serial or HD-SDI VANC inputs.
    - Dolby E Input - With the Dolby E option installed, Metadata will come from an applied Dolby E bitstream. If Dolby E is removed or Encoder Input is set to off, the encoder will revert per the reversion mode setting.

Encoder B

- **Encoder Mode EnB:** Sets the encoder type for Encoder B to DD for Dolby Digital (AC-3) or DD Plus for Dolby Digital Plus (E-AC-3). Normal default is DD. Note that if Transcoding is enabled, Encoder Mode EnA and EnB MUST be the same type!
- **DD+ Rate EnB:** Sets the output data rate for Encoder B when it is in Dolby Digital Plus mode. Default is 448 kbps.
- **DD Rate EnB:** Sets the output data rate for Encoder B when it is in Dolby Digital (AC-3) mode. Default is 448 kbps.
- **Acmod EnB:** Sets the acmod or Encoding Mode for Encoder B. Notation is front channels/rear channels/LFE. So 2/0 is 2.0 stereo while 1/0 is mono.
- **Line Mode EnB:** Choose the Encoder B Dolby Digital DRC profile for Line Mode dynamic range compression (i.e the default mode for the stereo line-level outputs of most set top boxes and TV sets). Choices include Film Std, Film Lgt, Music Std, Music Lgt, Speech, and "None". Default is Film Std.
- **RF Mode EnB:** Choose the Encoder B Dolby Digital DRC profile for RF Mode dynamic range compression (i.e the default mode for the RF re-modulated outputs of most set top boxes). Choices include Film Std, Film Lgt, Music Std, Music Lgt, Speech, and "None". Default is Film Std.

***WARNING:** It is **Strongly** recommended **not** to choose "None" mode for either Line Mode or RF Mode. See Above.*

- **Dialnorm EnB:** Using an ITU loudness meter (Linear Acoustic LAMBDA, LQ-1000 or equivalent), set the transmitted dialnorm value here. Note that the factory default preset of TV 5B Gen is pre-adjusted to produce -24 on average with typical program audio inputs so the default setting is -24. This should be measured as part of initial system setup. The actual value does not matter as long as it matches the measurement.

***NOTE:** To correctly set dialnorm, the loudness of the output audio must be verified using an ITU-R BS.1770 loudness meter. For compliance, any value between -1 and -31 could be valid, as long as it matches the actual measured audio. Default is -24.*

- **MD Source EnB:** Selects the metadata source for Encoder B. If the chosen metadata source is not available, the encoder will revert per the Reversion Mode setting. Choices for MD Source are:
    - Internal - Local metadata parameters (above) are used by Encoder B
    - External - Depending on selection in I/O Setup, external metadata can be from either the RS485 serial or HD-SDI VANC inputs.
    - Dolby E Input - With the Dolby E option installed, Metadata will come from an applied Dolby E bitstream. If Dolby E is removed or Encoder Input is set to off, the encoder will revert per the reversion mode setting.

4.5 Communication Menu

Display and adjust the IP, Net Mask, Port addresses in this menu. The MAC address can also be found in this location. This is also where the two available SNMP trap addresses are set.

4.5.1 IP Address & Subnet

Enter a valid IP address and subnet for connecting the LA-5269 to the network.

4.5.2 SNMP Trap Addresses

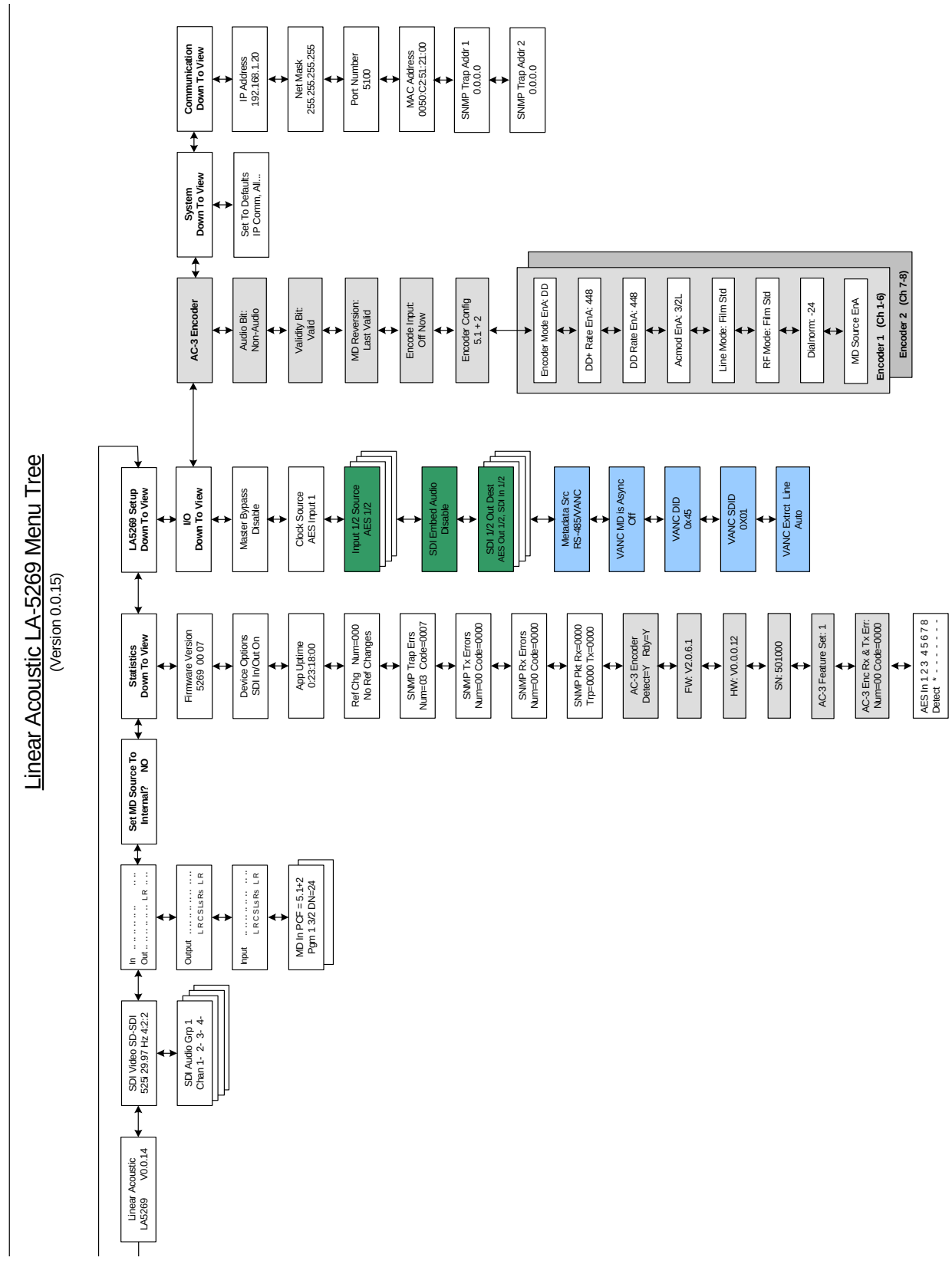
Two trap IP addresses can be set and any messages will be relayed to both.

4.6 System Menu

Allows reset to factory defaults. Note that IP settings, Presets, and I/O can be reset individually or "All" can be chosen to be reset simultaneously.

4.7 SDI Status Menu

Pressing the left arrow key when at the top menu will display the status of an applied SDI signal. The SDI input is auto-sensing between SD and HD, and although it is not recommended to hard switch input streams between SD and HD if a clean switch is desired, the unit will automatically track the change. HD or SD, frame rate and frequency are displayed. SD-SDI is shown on the left below, and HD-SDI is shown on the right.


Linear Acoustic LA-5269 Menu Tree
(Version 0.0.15)
Linear Acoustic LA5269 V0.0.14
SDI Video SD-SDI 525 29.97 Hz 4:2:2
SDI Audio Grp 1 Chan 1- 2- 3- 4-
In ... ... Out ... ... LR ... ...
Output ... ... L R C Ls Rs L R
Input ... ... L R C Ls Rs L R
MD In PCF = 5.1+2 Pgm 1 3/2 DN=24
Set MD Source To Internal? NO
Statistics Down To View
Firmware Version 5269 00 07
Device Options SDI In/Out On
App Uptime 0:23:18:00
Ref Chg Num=000 No Ref Changes
SNMP Trap Errs Num=03 Code=0007
SNMP Tx Errors Num=00 Code=0000
SNMP Rx Errors Num=00 Code=0000
SNMP Pkt Rx=0000 Trp=0000 Tx=0000
AC-3 Encoder Detect=Y Rdy=Y
FW: V2.0.6.1
HW: V0.0.0.12
SN: 501000
AC-3 Feature Set: 1
AC-3 Enc Rx & Tx Err: Num=00 Code=0000
AES In 1 2 3 4 5 6 7 8 Detect * - - - - - - -
LA5269 Setup Down To View
I/O Down To View
Master Bypass Disable
Clock Source AES Input 1
Input 1/2 Source AES 1/2
SDI Embed Audio Disable
SDI 1/2 Out Dest AES Out 1/2, SDI In 1/2
Metadata Src RS-485/VANC
VANC MD is Async Off
VANC DID 0x45
VANC SDID 0X01
VANC Extrct Line Auto
AC-3 Encoder
Audio Bit: Non-Audio
Validity Bit: Valid
MD Reversion: Last Valid
Encode Input: Off Now
Encoder Config 5.1 + 2
Encoder Mode EnA: DD
DD+ Rate EnA: 448
DD Rate EnA: 448
Acmod EnA: 3/2L
Line Mode: Film Std
RF Mode: Film Std
Dialnorm: -24
MD Source EnA
Encoder 1 (Ch 1-6)
Encoder 2 (Ch 7-8)
System Down To View
Set To Defaults IP Comm, All...
Communication Down To View
IP Address 192.168.1.20
Net Mask 255.255.255.255
Port Number 5100
MAC Address 0050:C2:51:21:00
SNMP Trap Addr 1 0.0.0.0
SNMP Trap Addr 2 0.0.0.0

Chapter 5: Troubleshooting

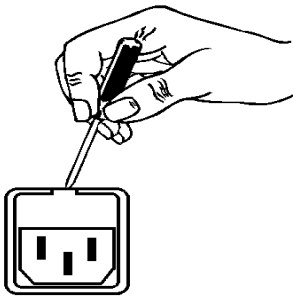
The Linear Acoustic LA-5269 is a very stable and reliable unit, and most problems can be traced back to mis-wiring causing incorrect signals to be applied to the unit, or more than likely mis-configuration. As simple as the unit is to use once installed, it is very flexible and thus a necessarily complex processor. In an effort to speed troubleshooting, some common problems and solutions are described below.

5.1 Problems and Possible Causes

One of the best troubleshooting features of the LA-5269 is the hard-bypass of the audio signals. This is useful because it allows instant removal of the unit from the signal path. Hard-bypass can be accomplished two ways, the simplest being to remove AC power from the unit by turning the power switch off. A less dramatic way to accomplish the same result is to access the I/O menu and enable Master Bypass. If you are unsure of what is happening in a particular system, simplifying the signal path is a good start and will help isolate problems quickly.

5.1.1 Unit won't power on

First check the obvious and make sure that the power cord or cords are plugged into live AC outlets (it happens). Next, see if either or both of the blue front panel PSU lights is illuminated. If not, check the power supply fuses by removing the power cords and using a small flat-blade screwdriver to remove the fuse holder from the IEC inlet module. The holder carries a spare fuse and extras were included in the packing kit with the unit. If the fuse is bad and continues to blow, please contact the factory.



5.1.2 The Ref LED is red

Check to make sure that an AES reference signal is connected to the unit and that the correct reference is selected. Note that this signal can be either AES black (i.e. an AES signal with silent audio), or an AES signal with audio. Reference can be derived from Main Input 1, Input 4, SDI, or Internal within the I/O Options menu (see Chapter 4).

5.1.3 Output Audio Clicks and Pops

This could indicate that the AES Reference is missing or at the wrong sample rate (the unit expects to be locked to 48kHz). If improper reference is chosen, the Ref LED will be red and the unit will revert to internal 48kHz reference allowing the audio to continue, but due to the sample rate converters present on each input pair, the outputs will be asynchronous with the inputs. The solution is to make sure that the reference is connected.

It could also mean that audio applied to the unit is not properly referenced, or that the equipment that the LA-5269 is feeding is not properly referenced. Using the master bypass function of the unit is a helpful way to troubleshoot this issue.

5.1.4 Received Audio Has Dropouts

The primary cause of this is the Dolby Digital (AC-3) encoder not being properly referenced with respect to the MPEG video encoder/multiplexer. This is normally accomplished very simply by having all gear referenced to the local plant.

In some cases, such as with certain equipment from Tandberg, a special reference signal is generated in the multiplexer and it needs to be connected back to the Dolby Digital (AC-3) encoder and used as its reference. This can be accomplished by applying the signal to Ref In and selecting External Reference as the clock source (Setup -> I/O menu). Possibly the best method is to re-embed the encoded Dolby Digital (AC-3) signal and apply it to the MPEG encoder via SDI. Consult your MPEG encoder reference manual for more details.

5.1.5 Audio Pumps and Breathes

If the dialnorm metadata parameter is set incorrectly, the dynamic range control (DRC) subsystem in the Dolby encoder may act inappropriately. Make sure to measure the input audio with an ITU-R BS.1770 loudness meter such as a Linear Acoustic LAMBDA or LQ-1000 and set dialnorm based on the measured loudness value.

5.1.6 Nielsen Watermark Issues

Careful testing has shown that the Nielsen audience measurement watermark is not disturbed by Dolby encoding as long as the data rate is sufficient to pass the watermark information. It is highly recommended that for two channel audio the minimum Dolby Digital (AC-3) data rate is 192kbps, with 224kbps preferred and for 5.1 channel audio the minimum data rate is 384kbps with 448kbps preferred.

5.1.7 Problems with EAS decoding

EAS should be inserted into the audio prior to encoding, and will pass without issue through any of the codecs as long as the encoder data rate is sufficient.

Chapter 6: Specifications

Table 6-1 Electrical Specifications

Sampling Rate	48 kHz (±0.1%)
Coding Delay	See Table 6-2 below.
Audio Word Length	24-bit performance
Metadata Input/Output	RS-485, 9-pin female D-connector on rear panel
GPIO Port	TTL level, 25-pin female D-connector
Ethernet Port	RJ-45 female jack connector
Digital I/O	
Digital Audio Inputs	Six unbalanced female BNC connectors, comply with AES-3ID-2001/SMPTE 276M. Internal 75-Ohm termination.
Digital Audio Outputs	Six unbalanced female BNC connectors that comply with AES-3ID-2001/SMPTE 276M specifications.
SDI I/O	
HD/SD-SDI I/O	Up to 16 channels of audio can be de-muxed from any of the four groups and muxed into any of four the groups. Signals per SMPTE 299M-2004/292M-2004. Metadata can be extracted from VANC per SMPTE 2020 A or B.

Table 6-2 Audio Coding Specifications

Audio Codecs	-Dolby Digital (AC-3) Encode from PCM or Dolby E -Dolby Digital Plus (E-AC-3) Encode for PCM or Dolby E and Transcode from Dolby Digital (AC-3 to E-AC-3) Optional: -Dolby Pulse (AAC and HE AAC) -Dolby E Decode and encode to DD, DD+, DP
Encoder Modes	Primary: up to 5.1; Secondary: up to 2.0
Encoder Rates	Dolby Digital: Up to 640 kbps Dolby Digital Plus: Up to 1532 kbps
Encoder Latency	-Dolby Digital/DD Plus encode/transcode: 137msec fixed -Dolby E Decode: 99msec/120msec (NTSC/PAL)

Table 6-3 Mechanical Specifications

Dimensions	1.75 × 19 × 24 in (44.4 × 48.3 × 61 cm)
Net Weight	6 lbs (2.72 kg) approx.
Shipping Weight	8 lbs (3.63 kg) approx.
Power Requirements	90-240VAC 50–60 Hz
Power Consumption	40 W maximum

Table 6-4 Environmental Specifications

Operating Temperature	0°C to 50°C
Non Operating Temperature (Storage)	–20°C to +70°C
Humidity	Up to 98% relative humidity, non-condensing
EMC Radiation Limits	FCC Part 15 Class A, ICES-003

Metadata Input Port

9-pin female D-connector with full-duplex RS-485 protocol running at 115 kbps. Pinout is compatible with SMPTE 207M. Pin-for-pin compatible with Dolby metadata sources (i.e. straight-through cable should be used.

Table 6-5 Metadata I/O Port Pinout

Pin	Connection
1	Shield
2	TX A asynchronous data out –
3	RX B asynchronous data in +
4	Ground
5	NC
6	Ground
7	TX B asynchronous data out +
8	RX A asynchronous data in –
9	Shield

Ethernet Port

Standard RJ-45 female connector that supports 10 or 100BASE-T.

GPI/O Parallel Control Port

TTL level controls, active Low. The 5-V output for external GPO indicators is limited by a self-resetting fuse.

Table 6-6 GPI/O Port Pinout

Pin	Connection
1	GPI 1
2	GPI 2
3	GPI 3
4	GPI 4
5	Ground/Common
6	GPO 1
7	GPO 2
8	GPO 3
9	GPO 4