



# UPMAX:neo

## 5.1 Channel Surroundfield Processor Model LA-5190

# User Guide



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# User Guide

**Release Date:** July, 2008  
**Software Version:** V00.00.57 and later



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# Chapter 1: Introduction

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The Linear Acoustic UPMAX:neo produces a 5.1 channel audio signal that is perfect for eventual transmission via Dolby Digital (also known as AC-3) to all consumers. The unit accepts a 2-channel input and “upmixes” it to fill as many of the 5.1 output channels as the user selects. Any input signal from mono to LtRt (Left Total/Right Total) surround encoded audio can be applied to the Main Input and an output will be produced that maintains consistency with other 5.1 channel programming.

The UPMAX:neo provides the following features:

- Advanced upmixing algorithm for stable, convincing surround experience.
- Optionally selectable DTS neo:6 algorithm for further upmixing flexibility.
- The only processor fully downmix compatible with Dolby Digital (AC-3).
- Upmixed surround field is infinitely adjustable.
- External inputs allow crossfaded bypassing of upmixing to enable discrete 5.1 channel audio to pass untouched.
- Built-in independent LoRo/LtRt encoder
- Relay bypassed digital inputs for “mission critical” broadcast applications.

## 1.1 Principles of Operation

The UPMAX:neo contains two paths for audio signals. The first path contains an upmixer, a bass extension filter to create the LFE (Low Frequency Effects) or subwoofer channel, and a simple but powerful set of mix controls to vary each element of the surroundfield. The second path provides discrete inputs for the Center, LFE, Ls (Left Surround), Rs (Right Surround), Lf (Left Front) and Rf (Right Front) channels. The upmixed and discrete outputs can be crossfaded between to allow smooth transitions between upmixed and discrete audio.

Please refer to Figure 1-1. It should be noted that this diagram is a general representation of signal flow. Please consult the appropriate section of this manual for an accurate description of actual functionality.

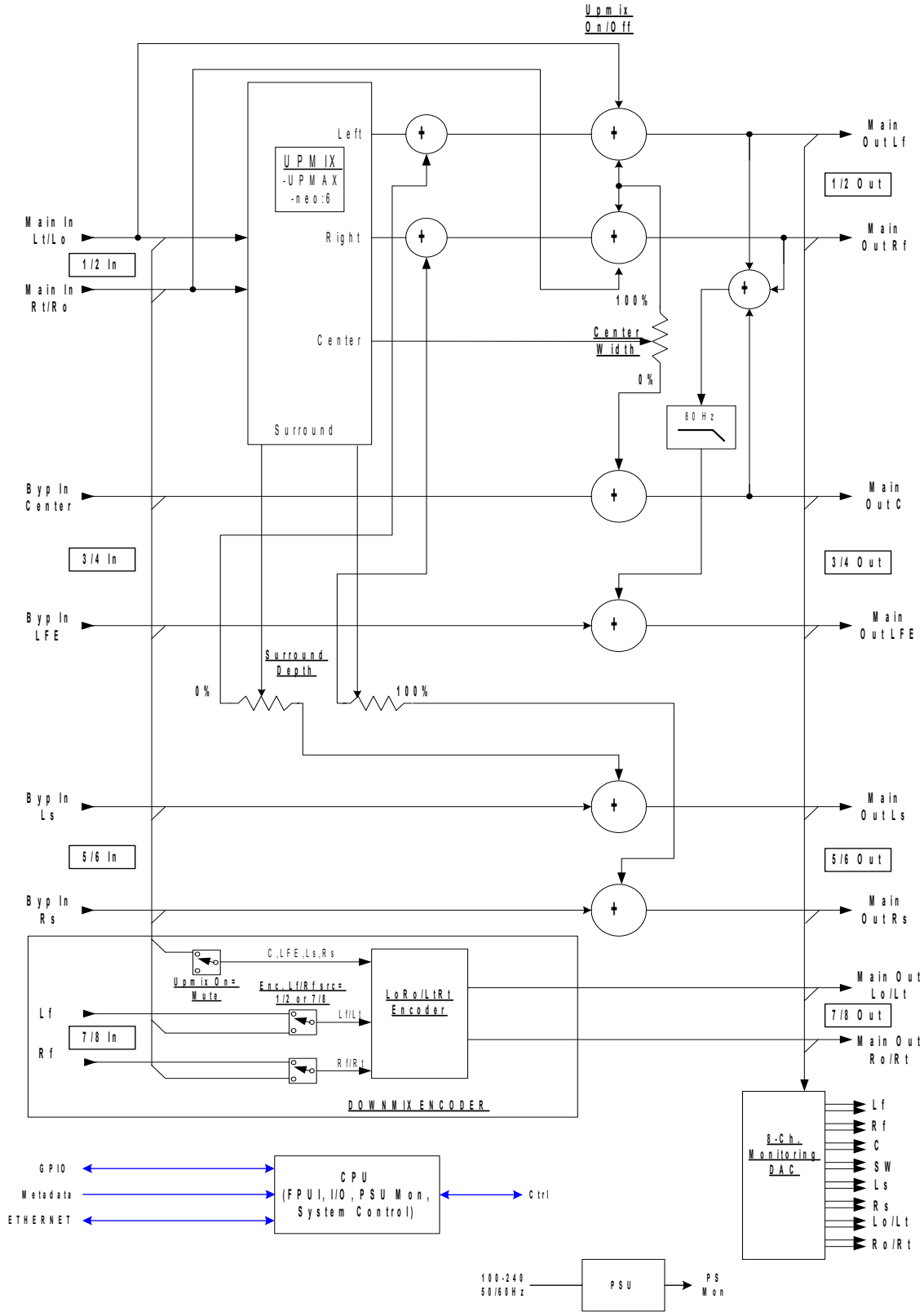


Figure 1-1 Audio Block Diagram

## 1.2 Warranty and Feedback

Please take a moment to fill out the postage-paid warranty card included with the unit and drop it in the mail. 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 on-going suggestions and comments from users.

We look forward to hearing from you!



## Chapter 2: Connections and Quick Setup

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This chapter covers all required connections for the UPMAX:neo.

### 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:
  - Quick-start sheet to get you up and running
  - One 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

UPMAX:neo 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, but either AES 1/2 or 3/4 can be used as the reference. For proper plant timing, it is strongly recommend that one of these two AES inputs be supplied with a 48kHz AES signal and used for reference.

## 2.3 Rear Panel

The rear panel of the UPMAX:neo contains its electrical I/O.

### 2.3.1 Connection Ports

All of the UPMAX:neo's connections 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. Future option will allow output of internally generated metadata.
- **SDI Input/SDI Output:** Future Option will allow access to all 16 channels for embedding and de-embedding.
- **GPI/O:** Connect dry contact closures here to control upmixing on/off. Note that GPI functions require held closures for the duration of the desired function. Status of upmixing will be reflected on the corresponding GPO pin.
- **ETHERNET:** Used for firmware upgrades and a future remote control.
- **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, and 7/8 = Stereo +2 or Local input.
- **Bypass/Encoder Inputs:** Audio from C/LFE and Ls/Rs applied to these connectors will be passed through when upmixing is disabled, allowing a 5.1 channel program to pass through 1/2, 3/4 and 5/6. In parallel, these inputs also feed the LoRo encoder, with Left Front/Right Front from 7/8, allowing simultaneous encoding and upmixing of a single or different programs.

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**NOTE:** *Appropriate reference should be applied to Input 1/2 for proper operation.*

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- **Main Audio Outputs:** Main 48kHz processed digital audio outputs. 1/2 = Left Front/Right Front, 3/4 = Center/LFE, 5/6 = Left Surround/Right Surround.

- **LoRo Output:** An LoRo encoded version of the audio applied to Inputs 3/4, 5/6, and 7/8 is available from this connector at all times.
- **\*Future:** Extra RJ-45 connector for future I/O use.
- **\*Remote:** Remote control of analog volume, mute, and return to reference using a standard rotary encoder, switches, and LEDs (with series resistors). This port can be wired to connect to a Dolby Cat. No. 549 remote control. A suitable high-quality remote control is available from Linear Acoustic.
- **\*Analog Outputs:** A balanced analog version of outputs 1-8. Volume can be controlled from the front panel or via the Remote port.

\*Present only with Analog Option.

## 2.4 Quick Setup Notes

The Linear Acoustic UPMAX:neo is configured at the factory and is ready to go on the air after making the proper input and output connections and determining if upmixing is desired.

- Apply a two channel (stereo or LtRt) signal to Main Input 1/2
- The Reference and Main Input front panel indicators should be green.
- The main menu will default to showing output meters, and you should see activity on some or all of the first six meters.
- Upmixed audio will be output from the Main Out 1-6 AES outputs in the following format: 1/2 = Left Front/Right Front, 3/4 = Center/LFE, 5/6 = Left Surround/Right Surround
- If the Analog Option is installed, you will have audio on the first six analog outputs in the same format as above.
- Note that 7/8 is the LoRo output and will show activity and produce output only when signals are applied to the LoRo encoder inputs (3/4 = C/LFE, 5/6 = Ls/Rs, 7/8 = LfRf)

The best way to learn the processor is to explore the different settings with audio applied and monitored. There are several factory presets to support many different tastes. Some presets may not sound much different at first, but will perform very differently depending on program content. When in doubt, try turning the upmixing process off or as a last resort use the Master Bypass feature which will remove the UPMAX:neo completely from the signal path.





## Chapter 3: Applications

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The UPMAX:neo is intended to be used either in the production or distribution stages of 5.1 channel programming, and also selectively in transmission environments. Cable and satellite facilities may find it useful as the distribution and transmission sections are usually very close together. For terrestrial emission (transmission) applications such as at DTV stations, the Linear Acoustic AEROMAX 5.1 may be a more appropriate choice as it contains requisite dynamic range processing and additional useful features such as voice-over.

**The Linear Acoustic UPMAX:neo is *not* a substitute for a good, discrete multi-channel mix (if one is available), however it is a useful tool to help create one.**

That being said, the UPMAX:neo *is* an excellent tool useful in either creating a 5.1 channel version of a program when few or no other elements exist, and also for creating a solid foundation for a true discrete multichannel mix.

This chapter discusses several applications of the UPMAX:neo:

- Integrating 2-channel commercials into a 5.1 channel program
- Creating a 5.1 channel sports program from stereo plus natural sources
- Use for music programming
- Discussion of presets stored in the unit

### 3.1 Typical Scenarios

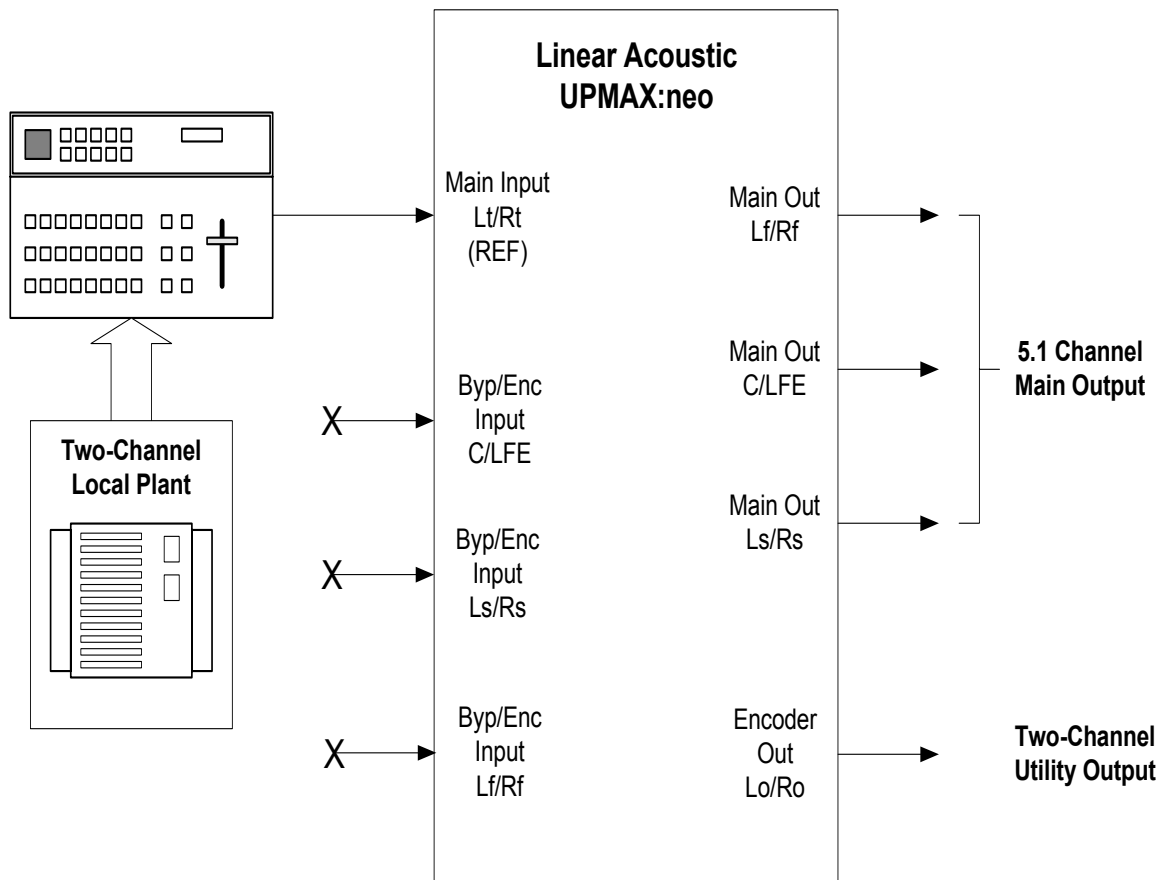
Below are some application examples to give users some guidance in real-world situations. However, before continuing, it is absolutely imperative that a proper multichannel monitoring environment be set up and *calibrated* before **every** mix. If the mix cannot be heard properly, then it cannot be created properly. Users are advised to obtain copies of the *Dolby Surround Mixing Manual* and the *Dolby Digital Professional Encoding Manual*, both available from the Dolby Laboratories web site ([www.dolby.com](http://www.dolby.com)) for detailed, accurate information on both the monitoring and mixing processes.

The Linear Acoustic UPMAX:neo is useful almost anywhere a multichannel mix must be created. From hands-on adjust-as-you-go environments like a music awards program to set-and-forget applications like helping two-channel commercials fit into 5.1-channel programming, the UPMAX:neo is the answer.

### 3.1.1 Two-Channel Commercials and Interstitial Programming

One of the largest complaints viewers of digital and high definition television programming is the annoying fact that stereo commercials don't seem to "fit" into the 5.1-channel program. This is because in many cases, the commercials are simply transmitted on the Left and Right channels of a 5.1-channel program. The net result is that during the program, dialogue comes from the center speaker, but at commercial or station breaks, all of the dialogue comes from the left and right speakers. It can be a jarring experience.

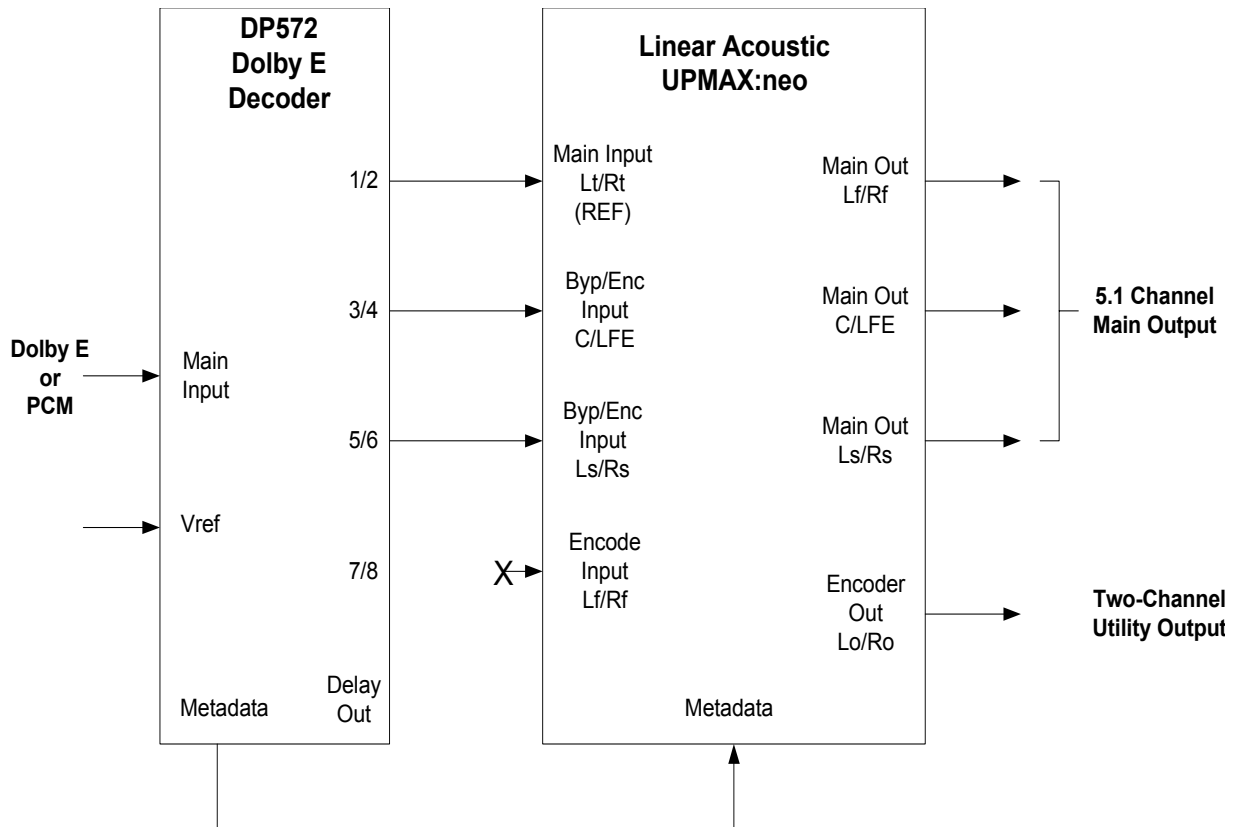
The first application is one where the UPMAX 2251 processes the stereo material allowing it to fit nicely within a 5.1 channel program. Figure 3-1 shows this scenario.



**Figure 3-1** UPMAX:neo in a commercial upmixing application

Note that the two channel material is simply input to the UPMAX:neo and a 5.1 channel signal is available at the output. Either of the **Commercial** or **Music** presets can be chosen, and are explained in detail at the end of this chapter.

A similar situation can arise when the Dolby E system is in use, and can actually help to automate the process of turning the upmixing process on and off with no user intervention. The metadata output of a Dolby E decoder (DP572 or other) provides information that can be used by the UPMAX:neo to control upmixing. Connecting a pin-to-pin cable between the metadata connectors on the two units, upmixing can automatically be turned on and off, and audio will be smoothly crossfaded between the two modes. Figure 3-2 shows how this can be easily accomplished.



**Figure 3-2** UPMAX:neo with Dolby DP572 Dolby E Decoder

The result is a clean, consistent 5.1 channel program that is discrete when Dolby E is present and is upmixed when PCM is present, but with no audible change apparent to listeners or viewers.

## 3.2 Factory Presets

To get users up and running as quickly as possible, a few basic presets have been created for different situations. The name of the game with this unit is “play”. There is no possible way that presets appropriate for every situation could be generated, so we have included a few to get you started. By all means, make adjustments, listen, store your new preset with a name of your choice when you get it just right (we even have some Swedish characters in there).

The UPMAX:neo ships with the following factory presets:

- **Music Full**- Straight two-channel to 5.1 channel upmixing, with the center channel spread across the Left, Center, and Right outputs. This is very useful for programming that either contains dialogue with music or is just mono dialogue as it nicely fills the front three channels, and feeds the surrounds when appropriate.
- **MUSIC Narrow** - Again, straight two-channel to 5.1 channel upmixing, but with the Center channel kept discrete. Useful for film mixes and certain music mixes. Two-channel mono programs will be reproduced from the Center channel only.
- **COMMERCIAL DEEP** - Straight two-channel to 5.1 channel upmix with the Surround audio positioned all the way to the back and the Center channel spread by the standard 33%

## Chapter 4: Detailed Operation

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This chapter discusses in detail the structure of the Linear Acoustic UPMAX:neo, 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 the last page of this section for a detailed menu tree.

#### 4.1.1 Volume Control Menu

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**NOTE:** *To access the analog volume control menu, simply press the Left arrow from the top menu and then use the rotary encoder to adjust the volume.*

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From the Volume Control menu, it is possible to access three special hot key functions: Mute, Upmix On/Off, and Upmix Source:

- To Mute, press and hold the Prev key, then press the Down arrow for 1 second. When muting is enabled, the display will show “Mute:Y” and when muting is disabled the screen will show “Mute:N”. Note also that when muting is active, the front panel Remote LED will flash.
- To toggle between Upmix On or Off, press the Up arrow. When upmix is on, the display will show “UM=y” and when it is off the display will show “UM=n”. Note that this manual control is only active when the upmixing control (under the I/O menu below) is not set to a GPI or Metadata control. In these modes, the display will show UM=Y or UM=N (in all caps) and is only a status display. To use local control, disable metadata or GPI control.
- To toggle the source for the upmixer between AES Input 1 and AES Input 4, press the Down arrow. The display will show Src:1 or Src:4.

#### 4.1.2 Output and Upmix Status

This is the top level menu screen and it shows the output activity of the unit and the status of the upmixing process (for local control it will show UM=y or UM=n (lower-case), and for GPI or metadata it will show UM=Y or UM=N (upper-case)). Audio channels are dis-

played in the order in which they appear on the physical outputs of the unit.

Sub-menus of the top menu can be accessed by pressing the Down arrow key:

- **MD In PCF PGM 1-8:** Metadata In Program Config as extracted from applied metadata, plus the audio coding mode (acmod) and dialnorm value from the selected program will be displayed (if that program is present in the metadata stream)

### 4.1.3 Statistics

Pressing the Down arrow key, the firmware revision and any installed firmware options are displayed.

### 4.1.4 UPMAX Setup

This menu is the main entrance to all setup parameters for the unit, which are accessed via the submenus described below:

- **Presets Down To View:** Press the Down arrow to view and modify presets- the default is the currently active preset.
- **Active Preset:** Preset\_1 - Preset\_16, or a named preset. Displays and recalls a preset to be used by the UPMAX:neo.
- **View/Edit Preset:** Select the preset to be adjusted in the following menus.
- **Algorithm:** Choose either the Linear Acoustic upMAX algorithm or the Linear Acoustic-tuned DTS neo:6:
  - **upMAX** – Standard upmixing algorithm optimized to produce a satisfying 5.1 channel surround field while maintaining 100% compatible downmixing. Supports downmixing to both LoRo and LtRt in the most compatible manner. Also withstands multiple downmix/re-upmix operations.
  - **neo:6** – An alternate upmixing algorithm developed by DTS. Provides additional surround effects that may be useful in upconverting certain content.
- **Center Width:** Controls how much of center channel output of the upmixer is spread back into the Left and Right channel Main Outputs of the unit. 100% width equals all Center channel information summed back into the Left and Right outputs, while 0% equals all Center channel information sent to the Center Channel output; Default is 33%
- **LCR Sum to LFE:** Enable or disable the Low Frequency Effects (subwoofer) output of the unit.

- **LCR Sum Level:** Controls how much of a 80Hz low pass filtered sum of the Left, Center, and Right outputs of the upmixer is fed to the LFE channel Main Output; Default **25%**
- **Surround Depth:** Controls back-to-front panning of the Surround output of the upmixer, where 100% equals full signal from the Left Surround and Right Surround Main Outputs and 0% equals surround fully mixed back into the LCR outputs; Default: **100%**.

#### 4.1.5 I/O Menu

Provides for general input and output configuration via the following menus:

- **Master Bypass:** Activates the hard relay bypass of each AES input signal to the BNC connector directly below it. Note that this is a “crash” switch and will likely produce disturbances to downstream equipment. It will activate automatically in case of unit failure and manual control is included to aid in troubleshooting.
- **Clock Source:** Selects the output reference source for the unit. Selections include AES 1 (default), AES 4, and Internal 48kHz.

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**NOTE:** *All inputs pass through audio frame synchronization (SRCs) whose output is determined by the clock setting. Inputs of many different sample rates can be accommodated, but reference must be from a 48kHz source. Good clocking practices are strongly encouraged!*

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- **Upmix On When:** Controls how upmixing is engaged. Selections include:
  - Set On Now (Local Control)
  - GPI 1 is On - Pull GPI 1 low to turn on upmixing
  - GPI 1 is Off - Pull GPI 1 low to turn off upmixing
  - MD = 2/0 - If applied metadata = 2/0
  - G1 or MD=2/0 - If GPI 1 is activate or metadata = 2/0
  - Set off now (Local Control)
- **MD = 2/0 Pgm Sel:** Allows selection of any program present in an applied metadata signal to control upmixing. This control is based on the acmod parameter of the selected program. Default is Pgm 1.

- **Downmix LfRf Src (AES Input 1/AES Input 4):** Selects the Left Front/Right Front (LfRf) inputs for the downmixing encoder. To use the Upmixer and Downmixer separately, set this to AES Input 4 and apply the LfRf signal for the downmixer to this input. To use the LtRt or LoRo signal applied to the first AES pair (i.e. the input of the upmixer) set this to AES Input 1.
- **Upmix Src (AES Input 1 or AES Input 4):** Allows the input to the upmixer to be switched between AES 1 or AES 4. This function can also be controlled via a hot key in the volume menu. While in the Volume menu, press Down to toggle between AES 1 and AES 4.
- **When Upmixing (Mute AES In 2&3/Do Not Mute):** Because AES Input 2 (C/LFE) and 3 (LsRs) are also inputs to the Downmix encoder, it is necessary to mute these inputs when using the upmixer and downmixer together. The upmixer will always mute these inputs, and this setting allows the same thing to happen for the downmixer. When using the downmixer for a separate program not related to the audio applied to the upmixer (along with Downmix LfRf Src = AES Input 4), set this to Do Not Mute.
- **Downmix Type (LoRo/LtRt):** Set for LoRo ITU style stereo downmix or LtRt surround downmix compatible with Dolby Pro Logic and PL-II. Note that the LtRt setting introduces an additional 5msec of delay on the 7/8 output due to additional filtering requirements of this mode.
- **Analog Trim Left-RoRt (0dB to -10dB):** Allows 10dB of attenuation to be applied in 0.5dB steps individually to each analog output channel. These values are stored for recall during power-up. These channel trims are used to calibrate a listening environment *after* first adjusting power amplifiers or powered speakers (see below).
- **Analog Left-RoRt Mute (Unmute Channel/Mute Channel):** Allows individual muting of output channels. This is useful for troubleshooting and channel ID use. Note that these values are *not* saved and will return to their normal un-muted state when the unit is power cycled.

#### 4.1.6 Communication

Setup of TCP/IP parameters can be done in this menu group

#### 4.1.7 System

Selective reset to factory defaults can be performed in this menu group.



## 4.2 Monitor Calibration (Analog Outputs)

The Linear Acoustic UPMAX:neo can be optionally supplied with a monitoring grade digital-to-analog converter that provides balanced outputs of all eight audio channels. The level of these outputs can be controlled by the front panel rotary encoder or from an external volume control (a high quality “big knob” remote is available from Linear Acoustic).

The individual channels can be calibrated over a 10-dB range to allow matching the unit to power amplifiers or powered speakers. To maintain the lowest noise and widest dynamic range, it is important to manage analog gain stages properly and in order.

It is strongly recommended that gains be adjusted in the following order:

- Gains of power amplifiers or powered speakers
- UPMAX:neo channel trims
- UPMAX:neo volume control

With an input level of -20dBFS, the analog outputs will be at +4dBu. While appropriate for most every power amplifier/speaker combination, many powered loudspeakers will produce excessive output SPL when driven at this level and thus will usually contain continuously adjustable input gain controls for trimming. In some cases, these might not have enough range or the gain controls may just be coarse adjustments. In this case, it will be necessary to use an external attenuator to match the reference levels of the UPMAX:neo and the powered speaker or amplifier. Contact the factory for more information.

### 4.2.1 Main Channel SPL Adjustment

Monitor calibration is the single most important part of calibrating an UPMAX:neo and a proper mix environment. Take the time to get this right and check it regularly.

With the UPMAX:neo properly referenced, set to NOT upmix (pass through), and volume and channel trims at 0dB, apply pink noise at plant reference (such as -20dBFS) to one channel at a time starting with the Center channel. This is best accomplished via a console where the pink noise can be “eyeball averaged” at 0VU and routed to one channel at a time. If the pink noise can only be supplied as a two-channel signal, this will also work by either disconnecting the speaker that is not being adjusted, or setting its Output Trim setting to “Mute”.

Using a sound pressure level (SPL) meter set to “C-weighted” and “Slow Response” adjust the Center channel power amplifier to the desired SPL. Typical industry levels range from 78-79dB/C/Slow for near field television mixing to 85dB/C/Slow for far-field film mixing. It is important to note that while an overall reference level is very important, it is more important to ensure that all main channels are set to the *same SPL*.

If the power amplifier or powered speaker is adjusted as low as possible and the desired target SPL cannot be reached, use the Center channel output trim on the UPMAX:neo to adjust to the desired SPL.

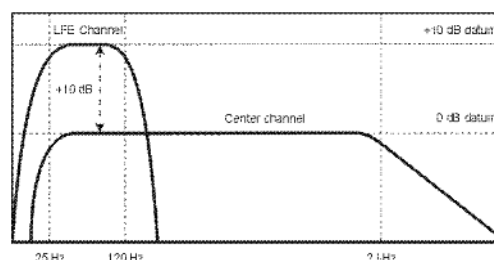
Repeat this procedure for all of the main audio channels, again making sure that the UPMAX:neo volume control remains at 0dB. This allows the “return to reference” function to support any desired volume setting while mixing, and a simple return to the calibrated SPL during final mixing or mastering.

## 4.2.2 Subwoofer SPL Adjustment

For 5.1 channel mixing, the subwoofer is required to apply 10dB of gain to the signal applied to it. This means that if the reference SPL of the main channels is set to 79dB SPL/C/Slow, then the subwoofer is set to 89dB SPL/C/Slow. This is based on the long-standing practice in film to allow an extra 10dB of headroom in the Low Frequency Effects (LFE) channel and was originally required by optical and magnetic tracks that could not pass high-level low frequency information without severe overload. Modern 5.1 systems no longer have a headroom issue, but for compatibility with industry practice and legacy material, the increased reproduction level of the subwoofer is maintained.

It is strongly recommended that this adjustment be made with a real-time analyzer (RTA) due to constraints of frequency response of typical SPL meters. The procedure is simple: after calibrating the main channels, apply pink noise to the Center channel and note the average level. Next, apply pink noise through the LFE channel to the subwoofer and adjust its level so that it has 10dB of additional mid-band level as compared to the Center channel.

The desired relationship between Center and Subwoofer is shown below



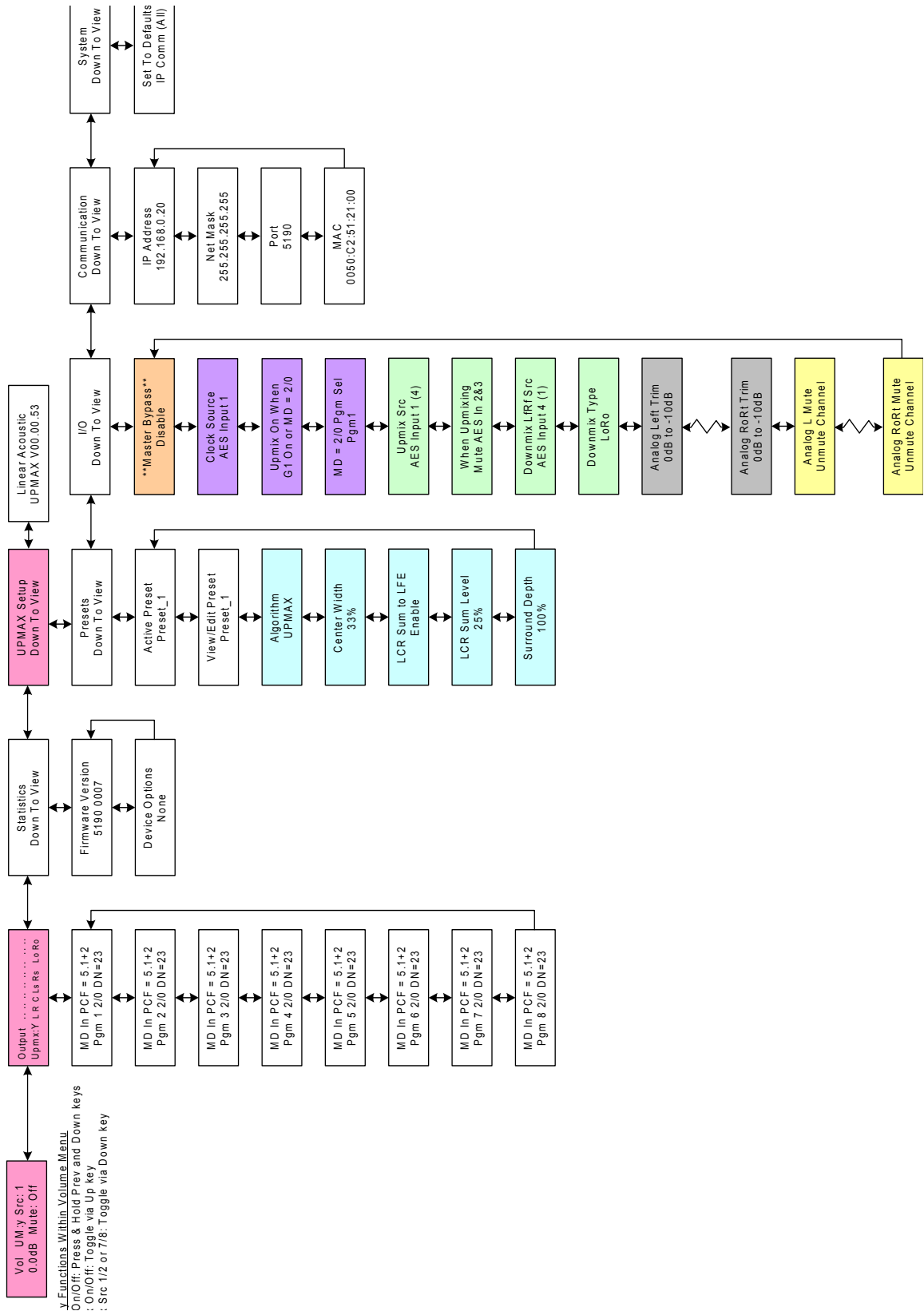
Note that this is a real-time analyzer display of the response of a typical film mixing stage. Due to the large distance from the speakers to the mixer, there is a natural roll off above 2 kHz (described in SMPTE 202M, and sometimes called the "X-curve.") In small mixing and control rooms this response would be flat.

Once the alignment of all channels is complete, play some content through the system and *listen* to make sure things sound normal. Never underestimate the effectiveness of taking a listen to known content to make sure that things are really what they seem.



# Linear Acoustic UPMAX:neo Menu Tree

(S/W Version 00.00.57 and higher)



## Chapter 5: Specifications

Table 5-1 Electrical Specifications

<b>Sampling Rate</b>	48 kHz ( $\pm 0.1\%$ )
<b>Output Delay</b>	Main Out (any mode): 5 msec LoRo Out: 6 msec LtRt Out: 11 msec
<b>Upmixing Algorithms</b>	Linear Acoustic UPMAX and a pro version of DTS neo:6
<b>Audio Word Length</b>	24-bits
<b>Digital Audio In</b>	Four BNC female connectors, AES-3ID-2001/SMPTE 276M
<b>Digital Audio Out</b>	Four BNC female connectors, AES-3ID-2001/SMPTE 276M
<b>Metadata Input/Output</b>	RS-485, 9-pin female D-connector on rear panel
<b>GPIO Port</b>	TTL level, 25-pin female D-connector
<b>Ethernet Port</b>	RJ-45 female jack connector
<b>Analog Monitor Output (OPTION)</b>	
<b>Frequency Response</b>	20 Hz–20 kHz, $\pm 0.5$ dB
<b>Distortion</b>	Less than 0.01% at 1 kHz Less than 0.02%, 20 Hz–20 kHz
<b>Dynamic Range</b>	Greater than 85 dB
<b>Output Level</b>	+4dBu @-20dBFS, +24dBu into 600 Ohms @0dBFS
<b>Digital I/O</b>	
<b>Digital Audio Inputs</b>	Four unbalanced female BNC connectors, comply with AES-3ID-2001/SMPTE 276M. Internal 75-Ohm termination.
<b>Digital Audio Outputs</b>	Four unbalanced female BNC connectors that comply with AES-3ID-2001/SMPTE 276M specifications.

Table 5-2 Mechanical Specifications

<b>Dimensions</b>	1.75 × 19 × 12 in
<b>Net Weight</b>	7 lb (3.2 kg) approx.
<b>Shipping Weight</b>	10 lb (4.5 kg) approx.
<b>Power Requirements</b>	100-240VAC 50–60 Hz
<b>Power Consumption</b>	40 W maximum

Table 5-3 Environmental Specifications

<b>Operating Temperature</b>	0°C to 50°C, fan cooled
<b>Non Operating Temperature (Storage)</b>	-20°C to +70°C
<b>Humidity</b>	Up to 98% relative humidity, non-condensing
<b>EMC Radiation Limits</b>	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 5-4 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 100BASE-T.

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**NOTE:** This port is currently only used for software updates.

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## Analog Output Port (Analog Option)

DB-25 Female connector with an electrical pinout that matches the Tascam DA-88 format. Signals are +4dBu nominal with a digital input signal of -20dBFS, and have a maximum balanced output of +24dBu into 600 ohms.

Table 5-5 Analog Output Connector Pinout

Pin	Function	Pin	Function
1	Ch 8 Ro/Rt + Out	14	Ch 8 Ro/Rt - Out
2	Ch 8 Ro/Rt Gnd	15	Ch 7 Lo/Lt + Out
3	Ch 7 Lo/Lt - Out	16	Ch 7 Lo/Lt Gnd
4	Ch 6 Rs + Out	17	Ch 6 RS - Out
5	Ch 6 Rs Gnd	18	Ch 5 Ls + Out
6	Ch 5 Ls - Out	19	Ch 5 Ls Gnd
7	Ch 4 Subwoofer + Out	20	Ch 4 Subwoofer - Out
8	Ch 4 Subwoofer Gnd	21	Ch 3 Center + Out
9	Ch 3 Center - Out	22	Ch 3 Center Gnd
10	Ch 2 Right + Out	23	Ch 2 Right - Out
11	Ch 2 Right Gnd	24	Ch 1 Left + Out
12	Ch 1 Left - Out	25	Ch 1 Left Gnd
13	NC		

Table 5-6

### Remote Volume Port (Analog Option)

Female DB-9 connector accepts TTL level controls, active Low. GPIs require a momentary contact closure to activate their assigned function. The 5-V output for external GPO indicators is limited by a self-resetting fuse.



Table 5-7 Remote Volume Port

Pin	Connection
1	Mute (GPI A)
2	Return to Ref (GPI B)
3	GPO A (High when Muted)
4	GPO B (High when at Ref)
5	Ground
6	Encoder Phase A Input
7	NC
8	Encoder Phase B Input
9	+5V, 200 mA Max



## Chapter 6: Troubleshooting

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The Linear Acoustic UPMAX:neo 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. In an effort to speed troubleshooting, some common problems and solutions are described below.

### 6.1 Problems and Possible Causes

One of the best troubleshooting features of the UPMAX:neo 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 System Options 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.

#### 6.1.1 Unit won't power on

Check to make sure that the unit is connected to a live outlet (it happens...). If proper AC voltage is being applied to the unit, remove power and check the fuse (the IEC inlet module has a fuse compartment that can be carefully opened with a small screwdriver). If the fuse is blown there is a spare in the holder. Install the replacement fuse, re-insert the fuse carrier, and re-apply power.

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**NOTE:** Replace fuses only with the same size and rating: 5mmx20mm T1AL (250V)

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#### 6.1.2 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). The unit is designed to default to an internal 48kHz reference in case the external reference is removed. This allows 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 unit is feeding is not properly referenced. Using the master bypass function of the unit is a helpful way to troubleshoot this issue.

### 6.1.3 Unit is Not Upmixing

From the main output screen, make sure that UM=Y (Upmix=Yes) is shown. If not, access the I/O menu, then “Upmix When” and set appropriately. Consult the Menu Tree in Chapter 4 or the Quick Start Guide for more information.

If UM=Y, make sure that the unit is not in Master Bypass (relay bypass) under the I/O menu.

Lastly, ensure that Center Width is between 0% and 33% and Surround Depth is 100%. Adjusting these controls can set the surroundfield back to stereo. If Center Width is set to 100% (Center from Lf/Rf) and Surround Depth is set to 0% (Surround from LfRf), the output signal will be stereo! Normally, these adjustments are Center = 0% and Surround = 100%.

### 6.1.4 Cannot Manually Control Upmixing

If on the main screen UM=N or UM=Y (all caps), then the unit is set to respond to GPI or metadata commands. Access the I/O menu and set the unit back to either of the manual modes (Upmix On Now or Upmix Off Now).

### 6.1.5 Analog Outputs Have Noise

Ensure that the system has been set with proper gain structure. This means adjusting the power amplifiers or powered speakers first, UPMAX:neo channel trims second, and volume control last. Not following this will cause unnecessary increase of the noise floor and will impact overall dynamic range. If the Master Volume is set to -40 for normal listening, the system is not adjusted properly! Consult Chapter 4 for more detailed alignment instructions.