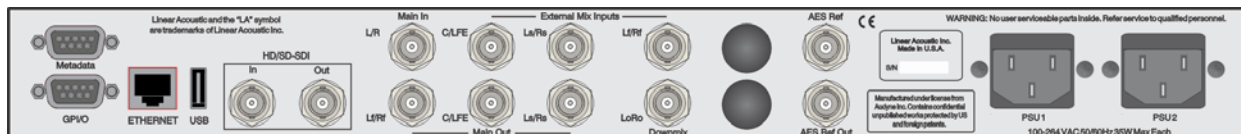


UPMAX

5.1-Channel Reference Upmixer

User Guide

Release Date: June 2013
Software Version: 0.98 and later



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Warranty Information

DISCLAIMER OF WARRANTIES: Products manufactured by Linear Acoustic are warranted against defects in material and workmanship for a period of two (2) years from the date of purchase. **THERE ARE NO OTHER IMPLIED OR EXPRESS WARRANTIES AND NO WARRANTY FOR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

During the warranty period Linear Acoustic Inc. will repair, or at our discretion replace, components which prove to be defective, provided the unit is returned, shipped pre-paid to us directly with a return authorization (RA) number clearly marked on the packaging. **Please note, this RA number must be present or package will be refused and returned to sender.**

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

DEFECTS CAUSED BY UNAUTHORIZED MODIFICATIONS, MISUSE OR ACCIDENTS, UNAUTHORIZED CUSTOMER REPAIRS, OR ANY FURTHER DAMAGE CAUSED BY INADEQUATE PACKAGING FOR SERVICE RETURN ARE NOT COVERED BY THIS WARRANTY.

PLEASE SAVE THE SHIPPING CARTON AND ALL PACKING MATERIALS. FAILURE TO RETURN UNIT IN ORIGINAL SHIPPING CARTON AND PACKING MATERIALS WILL RESULT IN A CHARGE FOR NEW SHIPPING MATERIALS.

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This product contains Audyne technology and is manufactured under license.

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Regulatory Notices and Fusing Information

FCC

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

Canada

This Class A digital apparatus complies with Canadian ICES-003.

UL

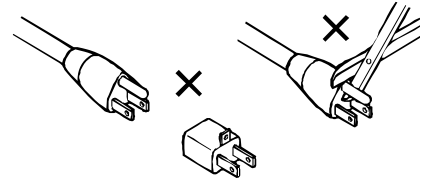


WARNING: Troubleshooting must be performed by a trained technician. Do not attempt to service this equipment unless you are qualified to do so.

Check that the correct fuses have been installed. To reduce the risk of fire, replace only with fuses of the same type and rating.

Exposed portions of the power supply assembly are electrically “hot”. In order to reduce the risk of electrical shock, the power cord MUST be disconnected when the power supply assembly is removed.

The ground terminal of the power plug is connected directly to the chassis of the unit. For continued protection against electric shock, a correctly wired and grounded (earthed) three-pin power outlet must be used. Do not use a ground-lifting adapter and never cut the ground pin on the three-prong plug.



UK

As the colours of the cores in the mains lead may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

- The core that is coloured green and yellow must be connected to the terminal in the plug identified by the letter E or by the earth symbol \perp or coloured green or green and yellow.
 - The core that is coloured blue must be connected to the terminal that is marked with the letter N or coloured black.
 - The core that is coloured brown must be connected to the terminal that is marked with the letter L or coloured red.
 - This apparatus must be earthed.
-

J

s equipment complies with the EMC requirements of EN55103-1 and EN55103-2 when operated in an E2 environment accordance with this manual.

IMPORTANT SAFETY NOTICE

unit complies with the safety standard EN60065. The unit shall not be exposed to dripping or splashing and no objects filled with liquids, such as cups, shall be placed on the equipment. To ensure safe operation and to guard against potential shock hazard or risk of fire, the following **must** be observed:

Ensure that your mains supply is in the correct range for the input power requirement of the unit. (GB)

Ensure **fuses** fitted are the **correct rating and type** as marked on the unit.

The unit **must be earthed** by connecting to a correctly wired and **earthed** power outlet.

The **power cord** supplied with this unit must be wired as follows:

Live—Brown Neutral—Blue Earth—Green/Yellow

IMPORTANT – NOTE DE SECURITE

matériel est conforme à la norme EN60065. Ne pas exposer cet appareil aux éclaboussures ou aux gouttes de liquide. Ne pas poser d'objets remplis de liquide, tels que des tasses de café, sur l'appareil. Pour vous assurer d'un fonctionnement sans danger et de prévenir un choc électrique ou tout risque d'incendie, veuillez à observer les recommandations suivantes. (F)

Le selecteur de tension doit être placé sur la valeur correspondante à votre alimentation réseau.

Les fusibles doivent correspondre à la valeur indiquée sur le matériel.

Le matériel doit être correctement relié à la terre.

Le cordon secteur livré avec le matériel doit être câblé de la manière suivante:

Phase—Brun Neutre—Bleu Terre—Vert/Jaune

WICHTIGER SICHERHEITSHINWEIS

Das Gerät entspricht der Sicherheitsnorm EN60065. Das Gerät darf nicht mit Flüssigkeiten (Spritzwasser usw.) in Berührung kommen; stellen Sie es nicht auf Gefäße, z.B. Kaffeetassen, auf das Gerät. Für das sichere Funktionieren des Gerätes und zur Unfallverhütung (elektrischer Schlag, Feuer) sind die folgenden Regeln unbedingt einzuhalten:

Der Spannungswähler muß auf Ihre Netzspannung eingestellt sein. (D)

Die Sicherungen müssen in Typ und Stromwert mit den Angaben auf dem Gerät übereinstimmen.

Die Erdung des Gerätes muß über eine geerdete Steckdose gewährleistet sein.

Das mitgelieferte Netzkabel muß wie folgt verdrahtet werden:

Phase—braun Nulleiter—blau Erde—grün/gelb

NORME DI SICUREZZA – IMPORTANTE

L'apparecchiatura è stata costruita in accordo alle norme di sicurezza EN60065. Il prodotto non deve essere sottoposto a schizzi, spruzzi e gocciolamenti, e nessun tipo di oggetto riempito con liquidi, come ad esempio tazze di caffè, deve essere appoggiato sul dispositivo. Per una perfetta sicurezza ed al fine di evitare eventuali rischi di scossa elettrica o d'incendio vanno osservate le seguenti misure di sicurezza:

Assicurarsi che il selettore di cambio tensione sia posizionato sul valore corretto. (I)

Assicurarsi che la portata ed il tipo di fusibili siano quelli prescritti dalla casa costruttrice.

L'apparecchiatura deve avere un collegamento di messa a terra ben eseguito; anche la connessione rete deve avere un collegamento a terra.

Il cavo di alimentazione a corredo dell'apparecchiatura deve essere collegato come segue:

Filo tensione—Marrone Neutro—Blu Massa—Verde/Giallo

AVISO IMPORTANTE DE SEGURIDAD

La unidad cumple con la norma de seguridad EN60065. La unidad no debe ser expuesta a goteos o salpicaduras y no deben colocarse sobre el equipo con líquidos, como tazas de café. Para asegurarse un funcionamiento seguro y prevenir cualquier posible peligro de descarga o riesgo de incendio, se han de observar las siguientes precauciones:

Asegúrese que el selector de tensión esté ajustado a la tensión correcta para su alimentación. (E)

Asegúrese que los fusibles colocados son del tipo y valor correctos, tal como se marca en la unidad.

La unidad debe ser puesta a tierra, conectándola a un conector de red correctamente cableado y puesto a tierra.

El cable de red suministrado con esta unidad, debe ser cableado como sigue:

Vivo—Marrón Neutro—Azul Tierra—Verde/Amarillo

VIKTIGA SÄKERHETSÅTGÄRDER!

Enheten uppfyller säkerhetsstandard EN60065. Enheten får ej utsättas för yttre åverkan samt föremål innehållande vätska, såsom kaffemuggar, får ej placeras på utrustningen." För att garantera säkerheten och gardera mot eventuell elchock eller brandrisk, måste följande observeras:

Kontrollera att spänningsväljaren är inställd på korrekt nätspänning. (S)

Kontrollera att säkringarna är av rätt typ och för rätt strömstyrka så som anvisningarna på enheten föreskriver.

Enheten måste vara jordad genom anslutning till ett korrekt kopplat och jordat el-uttag.

El-sladden som medföljer denna enhet måste kopplas enligt följande:

Fas—Brun Neutral—Blå Jord—Grön/Gul

BELANGRIJK VEILIGHEIDS-VOORSCHRIFT:

De unit voldoet aan de EN60065 veiligheids-standaards. Dit apparaat mag niet worden blootgesteld aan vocht. Vanwege het risico dat er druppels in het apparaat vallen, dient u er geen vloeistoffen in bekertjes op te plaatsen. Voor een veilig gebruik en om het gevaar van elektrische schokken en het risico op brand te vermijden, dienen de volgende regels in acht te worden genomen:

Controleer of de spanningscarroussel op het juiste Voltage staat. (NL)

Gebruik alleen zekeringen van de aangegeven typen en waarden.

Aansluiting van de unit alleen aan een geaarde wandcontactdoos.

De netkabel die met de unit wordt geleverd, moet als volgt worden aangesloten:

Fase—Bruin Nul—Blauw Aarde—Groen/Geel

Fusing Information



WARNING: To reduce the risk of fire, replace fuses only with the same type and rating.

Both units use a universal switching power supply that handles the full range of nominal mains voltages between 90 and 264 VAC and any frequency between 50 Hz and 60 Hz.

Check Main Fuse

The Main fuse rating is:

T 1A L (1 Amp, 250 V, 20 mm, time-lag, low breaking capacity) for all operating voltages.



WARNING: The power to the unit must be off when the following steps are performed. Ensure that the main power cable to the unit is not connected to a power source.

1. Open the fuse compartment door in the AC power input housing with a small flat-blade screwdriver (Figure 1). Carefully pull out the fuse carrier.
2. Check that the replacement fuse has the correct rating. The fuse carrier must be inserted into the compartment carefully. *Do not force the carrier into the compartment or both could be damaged.*
3. Snap the fuse compartment door closed.

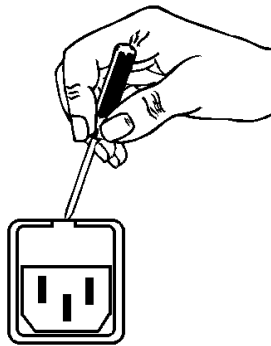


Figure 1 Checking the Main Fuse

Internal Fuse

The switching power supply contains a separate fuse. Most fault conditions should be protected by the main fuse.

If you find it necessary to replace the internal fuse, be certain to replace it with a fuse of the same type and rating as printed on the switching power supply board.

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Chapter 1: Introduction

The Linear Acoustic UPMAX 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 provides the following features:

- Advanced upmixing algorithm for stable, convincing surround experience.
- The only Upmixer 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 automatically pass untouched.
- Built-in independent LoRo/LtRt encoder
- Relay bypassed digital inputs for “mission critical” broadcast applications.
- Dual redundant auto-ranging power supplies

1.1 Principles of Operation

The UPMAX 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.

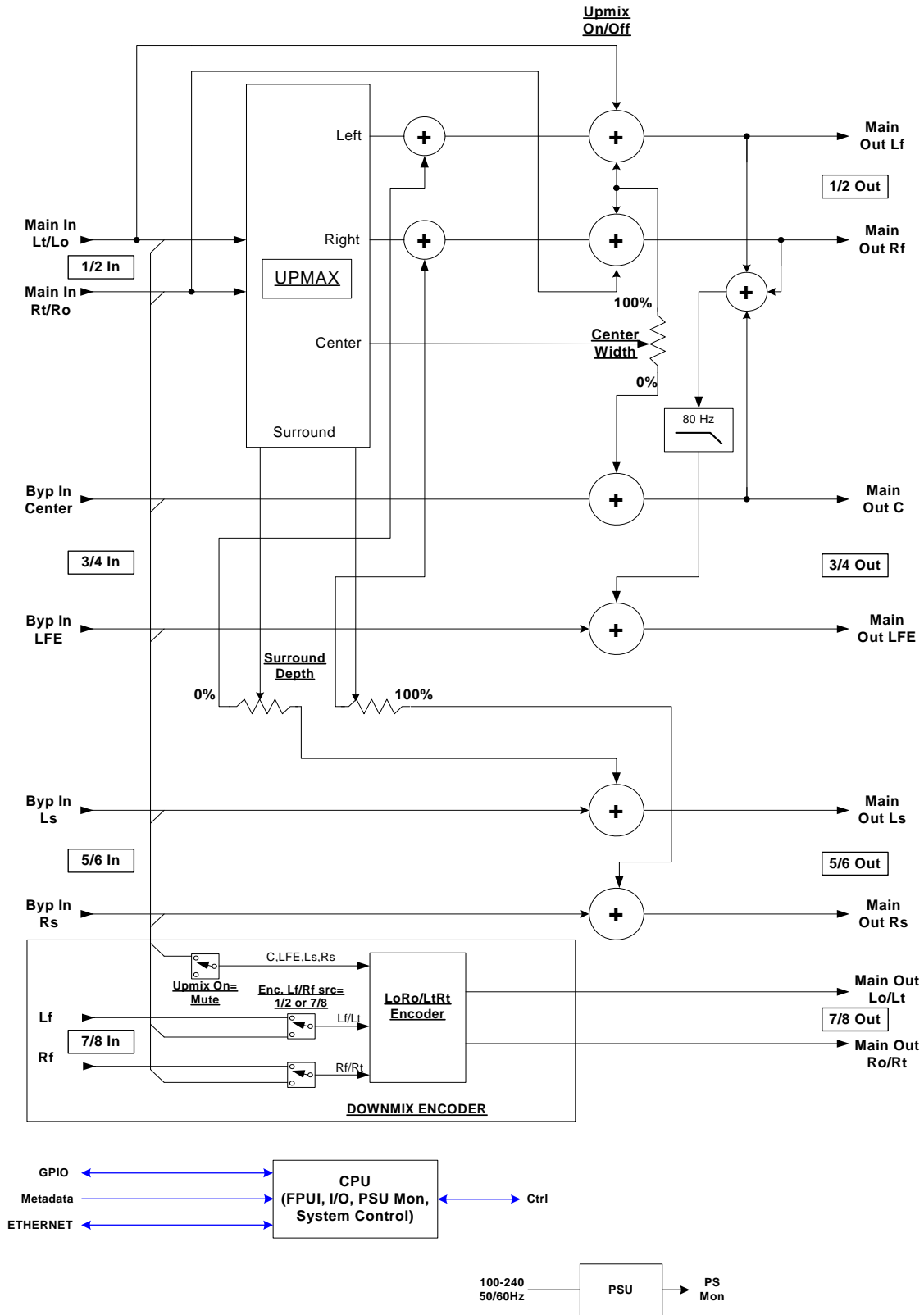


Figure 1-1 Audio Block Diagram

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 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 UPMAX.

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
 - 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

UPMAX 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 contains its electrical I/O.

2.3.1 Connection Ports

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

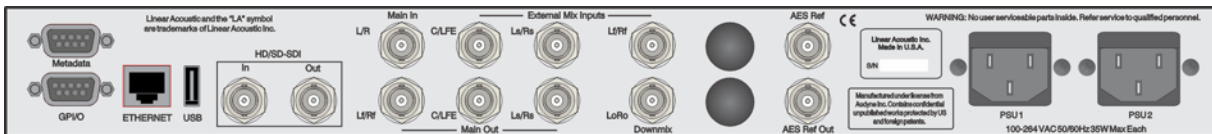


Figure 2-1 Rear Panel

- **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.
- **SDI Input/SDI Output:** Allows access to all 16 audio channels for HD and SD-SDI 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.
- **Main Audio Input (1/2):** Connect the two channel source for upmixing to this input. In many cases the first pair of a 5.1 channel signal (LfRf) is also the stereo signal that needs to be upmixed (L/R).
- **External Mix Inputs (3/4 and 5/6):** 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.

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

- **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.

- **Downmix Output:** An LoRo or LtRt encoded version of the main inputs (Ch. 1-6) is available from this connector at all times. Optionally, the LfRf source can come from 7/8 to allow separate upmixing and downmixing (see I/O Settings)

2.4 Quick Setup Notes

The Linear Acoustic UPMAX 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
- Note that 7/8 is the downmix output and will show activity and produce output only when signals are applied to the LoRo/LtRt encoder inputs.

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 completely from the signal path.

Chapter 3: Applications

The UPMAX is intended to be used either in the production or distribution stages of 5.1 channel programming, and also selectively in transmission environments. For transmission applications such as at DTV stations, the Linear Acoustic AERO line of products may be more appropriate as they also contain requisite loudness processing and additional useful features such as voiceover and EAS insertion.

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

That being said, the UPMAX *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:

- 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 ATSC A/85 (www.atsc.org/standards) for detailed, accurate information on modern monitoring practices.

The Linear Acoustic UPMAX 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 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.

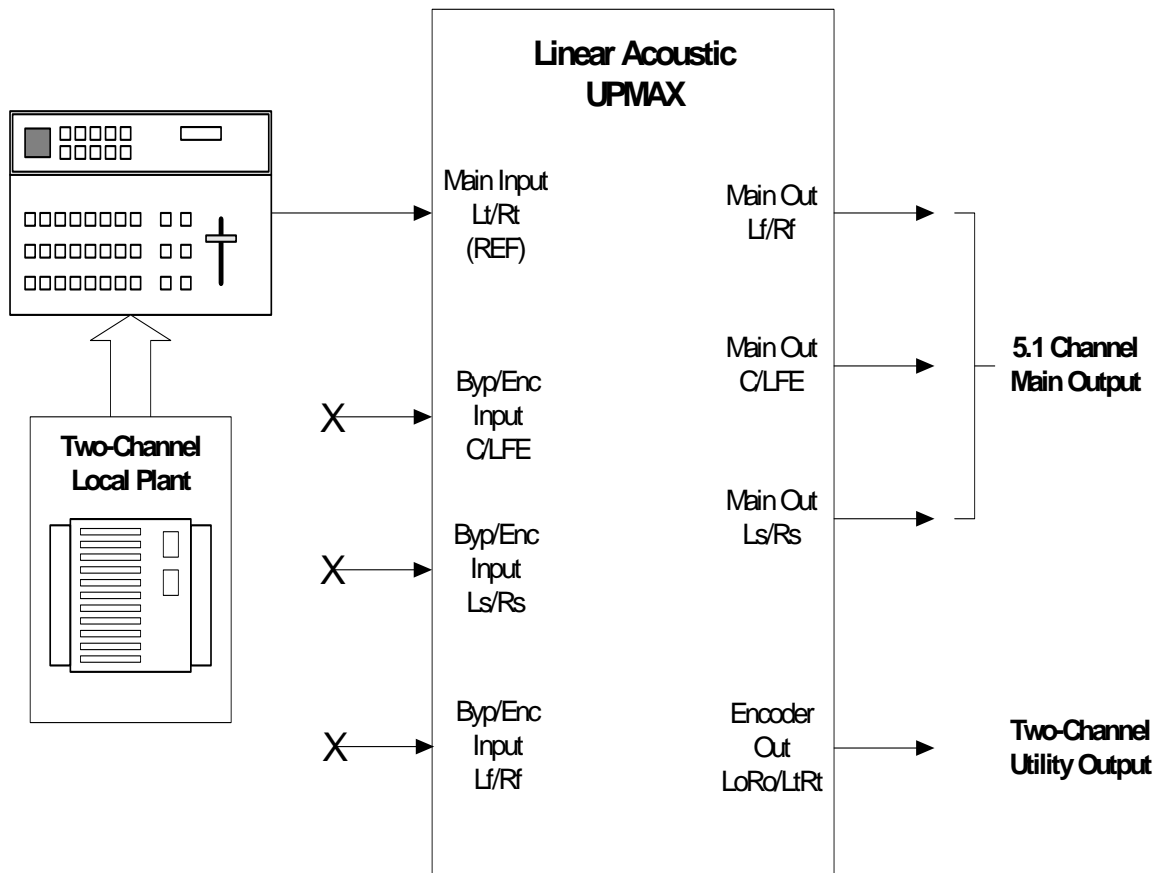


Figure 3-1 UPMAX in a commercial upmixing application

Note that the two channel material is simply input to the UPMAX 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 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.

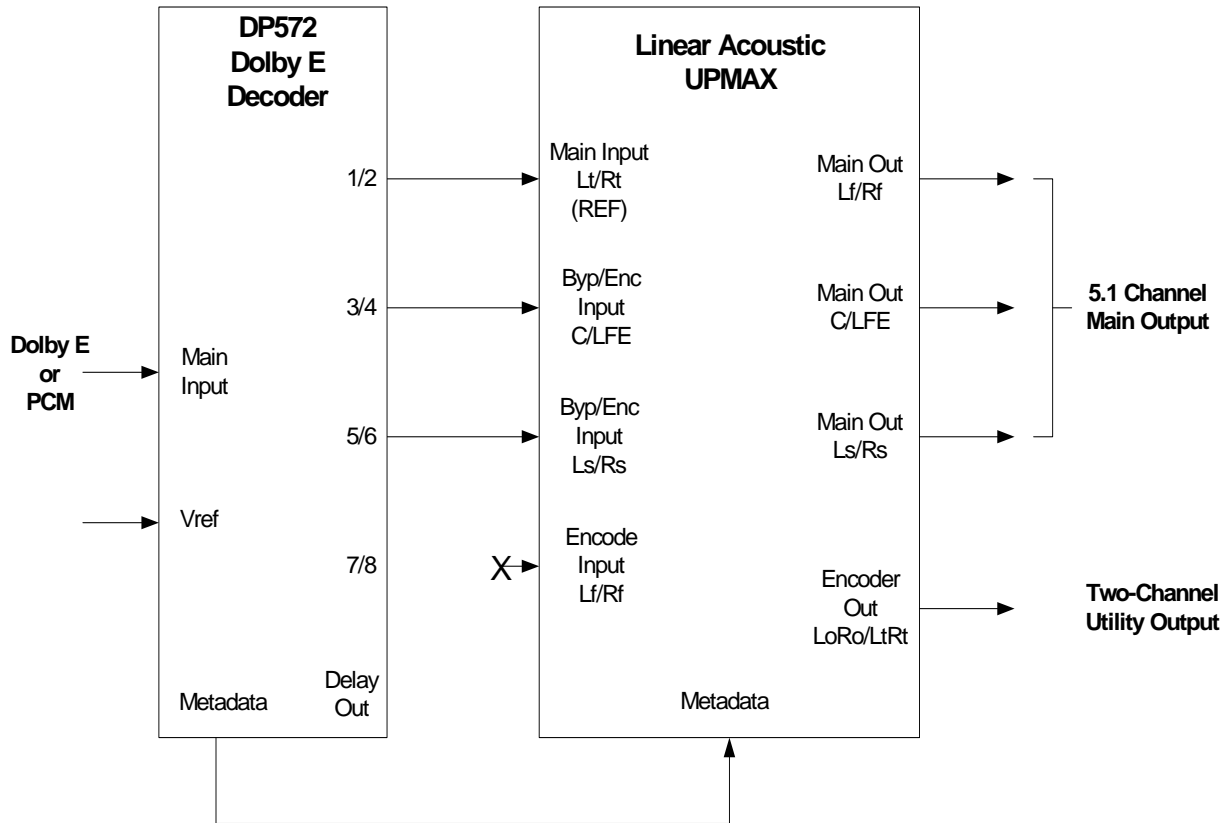


Figure 3-2 UPMAX with Dolby DP572 Dolby E Decoder

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.

The UPMAX ships with the following factory presets:

- **Music Full** - Straight two-channel to 5.1 channel upmixing, with the center channel spread across the Left front, Center, and Right front 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** - Straight two-channel to 5.1 channel upmixing, but with the Center channel kept fully discrete with no spread into Left front and Right front channels. Useful for film mixes and certain music mixes. Two-channel mono programs will be reproduced from the Center channel only. Note that Sum to LFE is enabled by default.
- **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%.
- **Quad** - Two-channel to 4.1 channel upmixing, with audio coming from Left front, Right front, Left surround, Right surround and LFE channels and nothing from the Center channel. This preset is useful for creating a surround “bed” with a hole in the center into which a wet or ambient announce feed can be added. Innovated by Linear Acoustic in 2004, this mode and Quad Spill have found widespread use in sports production including the Olympics.
- **Quad Spill** - Two channel quad upmixing, but with 33% “spilled” back into the Center channel. Since there is some Center information still present, this preset is useful for creating a 5.1 channel mix with a dry announce feed (little or no ambient information such as audio from a voiceover booth).
- **Bypass** - Center Spread set to 100% and Surround Depth set to 0% resulting in two channels in, two channels out. Useful for “soft bypass” comparisons, although using the Up arrow from the main screen accomplishes the same thing.

Chapter 4: Detailed Operation

This chapter discusses in detail the structure of the Linear Acoustic UPMAX, 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 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 displayed 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)

4.1.2 Statistics

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

4.1.3 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.
- **View/Edit Preset:** Select the preset to be adjusted in the following menus.

- **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%.**

4.1.4 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, SDI and Internal 48kHz.

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!

- **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.

4.1.5 Communication

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

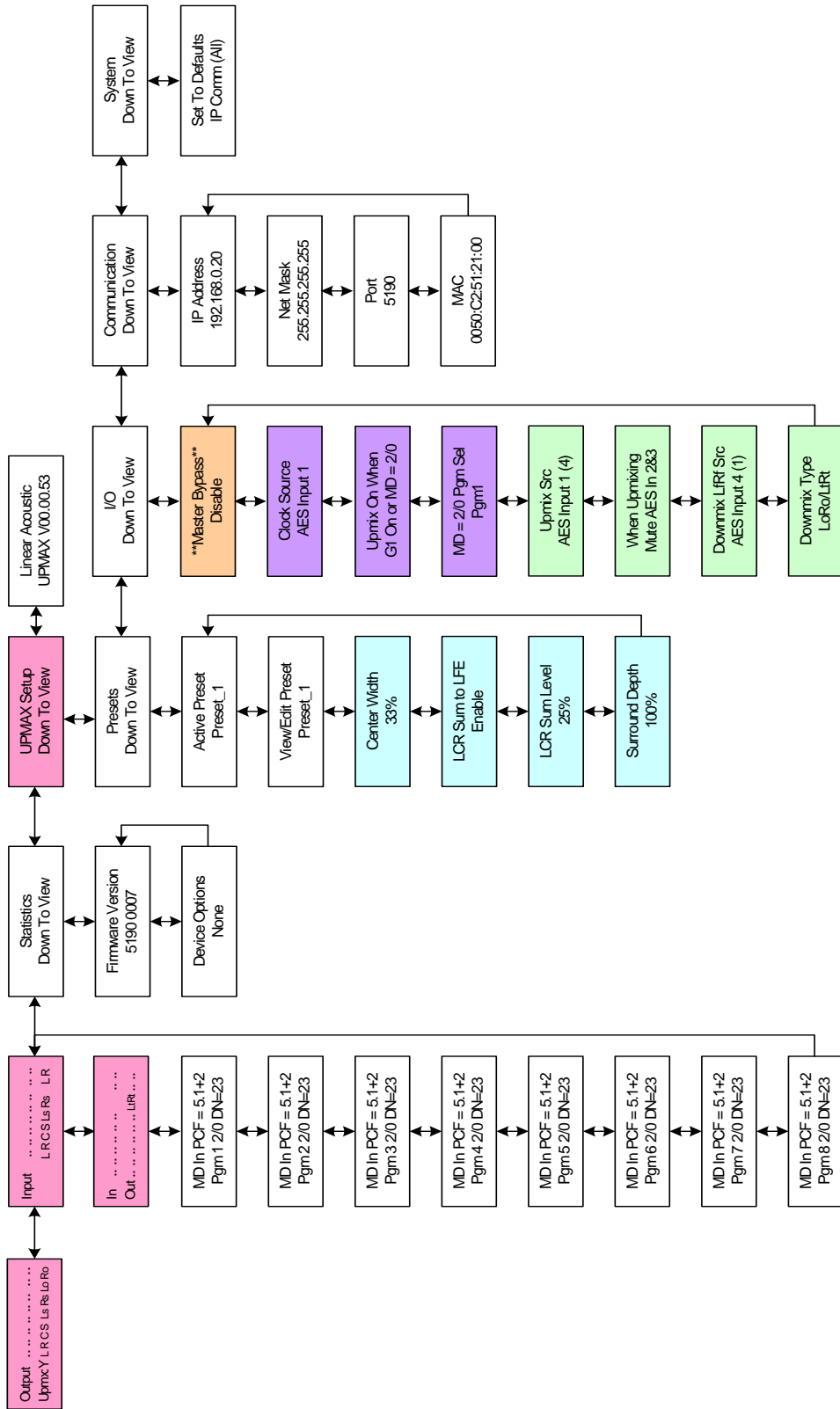
4.1.6 System

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

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Linear Acoustic UPMAX Menu Tree

(SW Version 0.0.98 and higher)



Chapter 5: Troubleshooting

The Linear Acoustic UPMAX 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.

5.1 Problems and Possible Causes

One of the best troubleshooting features of the UPMAX 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.

5.1.1 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.

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

5.1.2 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.

5.1.3 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%.

5.1.4 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).

Chapter 6: Specifications

Figure 6-1 Electrical

Processing	
Algorithm	UPMAX®: 5.1-channel upmixing, automatic bypass of discrete content
Sampling Rate	48kHz
Word Length	24-bits
Digital I/O	
Digital Audio I/O	All inputs and outputs via BNC female connectors, unbalanced, 75-Ω with internal termination for the inputs. Signal levels per SMPTE 276M/ AES-3ID-2001
Reference	48 kHz via AES DARS reference or SDI input
HD/SD-SDI Auto-Sensing I/O	De-embed up to 16 audio channels from SDI, process and/or encode, and re-embed up to 16 channels; Signal levels per SMPTE 292M /259M; Supports up to 1080i/60/59.94/50 Hz
Ethernet	100 to 1000 BASE-T via RJ-45 connector

Table 6-1 Physical

Dimensions	1RU H = 1.75 in (45 mm) W = 19 in (483 mm) D = 13.25 in (337 mm)
Net Weight	12.5 lb (6 kg) approximate
Environmental	Operating: 0 – 50°C Non-operating: -20 – 70°C
Power Requirements	Dual redundant auto-sensing power supplies, each rated at 100–240 VAC, 50–60 Hz, 40W maximum

Latency

The UPMAX has very low latency which is fixed for the main path. Downmix latency depends on the type chosen but is also fixed.

Table 6-2 Fixed latency for different modes and functions

Mode	Function	Latency
Any	Main Output	5 msec
	LoRo Downmix	6 msec
	LtRt Downmix	11 msec

Connector Pinouts

Table 6-3 Metadata Input 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

F-DB9 connector with full-duplex RS-485 protocol running at 115 kbps. Pinout is compatible with SMPTE 207M. Pin-for-pin compatible with Dolby Metadata (SMPTE RDD6).

Regulatory

North America: Designed to comply with the limits for a class A digital device pursuant to Part 15 of the FCC rules (CFR). Designed for U.S. and Canadian listing with UL.

Europe: Designed to comply with the requirements of Low Voltage Directive 73/23/EEC and EMC Directive 89/336/EEC. Designed for RoHS and WEEE compliance.

