DATASAT
DIGITAL ENTERTAINMENT

LS10 Audio Processor

Installation and Operating Guide

Version 1.02

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Document # 9301H66300

Amplifier Technologies Inc.
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USA

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Record of Changes

Manual Version / Date	Description
1.00 July 2014	Production release.
1.01 May 2015	Updates for software V1.00.02. Addition of USB Audio appendix.
1.02 January 2020	Added Dolby Atmos, DTS:X, Dirac Live and Auro 3D as standard features. Updated HDMI specs.

Regulatory Notices

INSTRUCTION TO THE USER

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

* Reorient or relocate the receiving antenna.

* Increase the separation between the equipment and receiver.

* Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

* Consult the dealer or an experienced radio/TV technician for help.

In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

Canadian Department of Communications compliance statement:

This equipment does not exceed Class B limits per radio noise emissions for digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications. Operation in a residential area may cause unacceptable interference to radio and TV reception requiring the owner or operator to take whatever steps are necessary to correct the interference.

Avis de conformite aux normes du ministere des Communications du Canada:

Cet equipment ne depasse pas les limites de Classe B D'emission de bruits radioelectriques pour les appareils numeriques telles que perscrites par le Reglement sur le brouillage radioelectrique etabli par le ministere des Communications du Canada. L'exploitation faite en milieu residentiel peut entrainer le brouillage des receptions radio et television, ce qui olbigerait le proprietaire ou l'operateur a prendre les dispositions necessaires pour en eliminer les causes.

Complies with EU Low Voltage Directive:

EN 60065:2002 + A1:2006 + A11:2008 + A2:2011 + A12:2011 – Audio, video and similar electronic apparatus – Safety requirements.

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Introduction to LS10 Audio Processor

This manual explains the LS10 Audio Processor setup and operation. It contains full instructions for installing hardware and software, setting up audio playback, configuring the system, performing maintenance and troubleshooting, and setting up and operating optional functions.

How to Use this Guide

The guide is divided into three parts. The first part covers functions for the "operator". The second part covers the installation, setup and other technical functions. The third part consists of appendices with technical details such as connector and wiring diagrams.

> **Note:** Technical adjustments should only be performed by a qualified installer. The appendices provide detailed information for the installer.

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- Troubleshooting – Operations

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- System Software Setup and Menus
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About LS10 Audio Processor

The Datasat LS10 Luxury Series audio processor focuses solely on the features required to deliver the cutting edge sound experience for motion picture, music or video games. In addition to native support for all common stream types including Dolby TrueHD, DTS-HD Master Audio and DTS Neo:X, the processor also has the Auro-3D® format bringing fully immersive Surround Sound to a home audience with speaker configurations up to 13.2.

With precise control of each of its 15 channels and superior bass management, the Datasat LS10 ensures high quality sound that is rich, textured and realistic. Its range of remote control options – including iOS and Android devices – places this audio power at the user's fingertips.

In addition to unbeatable reproduction of the latest movie and music releases, the Datasat LS10 intelligently enhances the enjoyment of game playing and streaming live sport to become the cornerstone of the ideal home entertainment system.

Features and Benefits

15 channels of digital audio
The Datasat LS10 supports the latest 3D sound formats with speaker configurations up to 13.2.

Extensive equalization functionality
The Datasat LS10 delivers precise control with 10 band parametric EQ for each individual channel.

Dirac Live® digital room optimization technology is now also a standard feature.

Superior bass management
User-adjustable bass control with low and high pass filters and support for up to 2 subwoofers.

Wide-ranging sound format support
The LS19 supports all current Dolby and DTS codecs, the LS10 supports innovative and immersive formats such the Auro-3D® Decoding and Upmix engine.

Future-proofed technology
LS10 features 8 HDMI audio and video inputs - supporting 3D and 4K content. Note: Early 4K versions supported only 7 inputs.

Ease of management
A range of Remote and Network Control options including VNC for iOS and Android devices. IR remote included.

Product Details

Digital Audio Decoders

Auro

- Auro-3D® Decoding Engine
- Auro-3D® Upmix engine

Dolby

- Dolby® Atmos
- Dolby® Digital
- Dolby® Digital Plus
- Dolby® TrueHD

DTS

- DTS:X®
- DTS-HD® Master Audio

DTS Neural:X® Upmixer

Signal Inputs

HDMI Audio & Video Inputs:

HDMI V1.4b and 2.0b with video passthrough (8 in / 2 out)

Digital Audio Inputs:

TOSLINK – 2

S/PDIF – 2

USB 2.0 – 1

Analog Audio Inputs:

Channels: 2 stereo single ended input pairs

Connectors: 4 RCA jacks

Impedance: 10k ohms

Sensitivity Adjustable: -16dBv to -4dBv

Signal Outputs

Analog Audio Outputs:

Channels: 15

Balanced (can be connected unbalanced or single ended)

Connectors: 15 XLR

Level: 300mV with Volume Control at -15.0dB, +26dBu max (balanced)

Audio EQ

Parametric

10-band parametric EQ

Adjustable from 20Hz to 20kHz, gain+/-6dB in 0.1dB steps

Q range from 0.7 to 5

Bass Management

Full or adjustable high pass settings for screen and surround speakers

Adjustable low pass filter for subwoofers

Support for none, 1 or 2 subwoofers

Dirac Live® Room Optimization:

Note: Also requires Datasat Dirac Installation kit and software for setup.

Note: Dirac version 2 only.

High resolution filter technology

Frequency limit adjustment

Phase alignment

Time alignment

Impulse control

Adjustable curves

Ability to save multiple EQs

Audio Delays

Individual Channel Delays:

0 – 100 ms

Global Delay:

0 –1000 ms

Control

RS232 DB9

Network control using TCP/IP

VNC control including by iOS and Android devices

IR Remote

Power Requirements

105-130 VAC or 215-260 VAC, 50-60Hz. Input voltage range is manually switched at the rear panel by rotating the fuse holder.

Power consumption 45W

Regulatory Compliance

FCC Part 15, subpart B Class A

CE

RoHS compliant

E&OE

All product specifications are subject to change without notice. All trademarks are properties of their respective owners.

To get the most out of your LS10, we suggest that you review this manual and keep it available during system installation and initial operation.

Limited Warranty

Datasat Digital Entertainment software is warranted against defects for a period of 90 days from the date of the original purchase. LS10 hardware is warranted against defects in material and workmanship for a period of three years from the date of the original purchase. This warranty includes parts and labor.

THIS WARRANTY EXCLUDES UNITS THAT HAVE BEEN MODIFIED, REPAIRED BY UNAUTHORIZED PERSONNEL, OR DAMAGED BY ABUSE, IMPROPER OPERATION OR INSTALLATION, DIRT, MOISTURE OR STATIC ELECTRICITY. PROPER OPERATION OF THIS EQUIPMENT REQUIRES THE USE OF A SURGE PROTECTOR AND POWER FILTER. SUPPLYING POWER TO THE LS10 UNIT WITHOUT THE USE OF A PROPERLY FUNCTIONING SURGE PROTECTOR WILL VOID THIS WARRANTY.

Using an uninterruptible power supply (UPS) is highly recommended.

Product Improvements and Upgrades

Amplifier Technologies Inc. reserves the right to make changes and/or improvements to its products, without notification and without incurring any obligation to incorporate such changes or improvements in products previously sold or shipped.

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Products being returned under warranty should be sent to Datasat Digital Entertainment freight prepaid in the original or equivalent packaging. Please contact Datasat Digital Entertainment prior to shipping any parts or merchandise to receive a Return Merchandise Authorization number.

Datasat Digital Entertainment's shipping address is:

Datasat Digital Entertainment
Attn: RMA #
4596 Ish Drive #210
Simi Valley, CA 93063
U.S.A.

Thank you for choosing Datasat Digital Entertainment!

Contact Information

To contact Datasat Digital Entertainment's Technical Support staff:

Telephone: +1.818.401.4253 or toll free in USA and Canada: 1(888) 428-2268

Customer Service: customerservice@ati-amp.com
Technical Support: techsupport@ati-amp.com

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Unpacking

The packaging is designed to handle normal shipping and handling. Upon receipt of shipment, check for signs of damage before opening and report all damage to the carrier. All shipments made from Datasat Digital Entertainment are the customer's responsibility once they leave our premises.

Before installation begins, we suggest that a complete inventory be taken to minimize problems or questions during installation. Additionally, save all packing material until installation is complete in the unlikely event that a component(s) requires return to the factory. Use the packing slip that came with your unit to verify received inventory.

The following is a standard packing list for the LS10 Audio Processor:

Table 1. LS10 Standard Packing Kit

ITEM KEY	ITEM DESCRIPTION	QTY
2501000100	Power cord, straight detachable, (17250) standard Volex 17250 10 B1 blk. **Note**: International power cords may also be included, as needed.	1
2200015D01	Batteries, AAA, 2-pack	1
5110004900	Remote control, LS10	1
9003E11901	Screw Kit, Rack, Truss head screw & Washer	1
9003H68500	Fuse kit, LS10 115V	1
9003H68501	Fuse kit, LS10 230V	1
9120H66000	Rack ear, LS10	2
9303H679M0	Tech note, LS10 Input voltage setting and fuse replacement	1
9331H67101	Document flash drive	1

Important Safety Instructions

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where it exits from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Unplug this apparatus during lightning storms or when unused for long periods of time.
13. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as the power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, and does not operate normally, or has been dropped.

Warning and Caution Notices

⚠ **WARNING:** Before powering on the LS10 for the first time, verify that the correct input voltage has been selected at the rear panel power entry module. An incorrect input voltage setting will damage the LS10. See section 2.5.3.

⚠ **Power Cord to the LS10 rear panel:** The power cord is the main disconnect device. It should be plugged into an easily accessible outlet with surge protection. The power cord to be used is a minimum type SVT 18/3 rated 250 Volts AC, 10 Amps with a maximum length of 4.5 M, with one end terminated in an IEC 320 attachment plug and the other end terminated in a NEMA 5-15P Plug.

⚠ **WARNING:** To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture. Do not expose this apparatus to dripping or splashing. No objects filled with liquids, such as vases, shall be placed on the apparatus.

⚠ **WARNING:** This apparatus is a Class I product. This product must be connected to a mains socket outlet with a protective earthing connection.

Part 1: Operation

This part of this manual contains information the user needs to operate the LS10 Audio Processor on a day-to-day basis.

1.0 Operating LS10

1.1 How-To Procedures – Operations

> ⚠ **Caution:** Before powering on the LS10 for the first time, verify that the correct input voltage has been selected at the rear panel power entry module. Incorrect input voltage setting will damage the LS10. See section 2.4.

ACTIVITY	INSTRUCTIONS
Turn Power ON	See the Note above. Press and hold the center of volume control on the front panel. If the unit will not power up, be sure that the rear panel power switch is ON and the unit is plugged into a working AC outlet protected by a surge protector. See *Powering ON the LS10 Processor*, page 16.
Turn Power OFF	Press and hold the power button on the front panel for about 2 seconds.
Adjust volume	Turn the master volume control knob on the front panel to adjust volume on all channels. Turn clockwise to increase volume. See *Adjusting the Volume control*, page 18.
Select an input	Touch the desired input button in the lower part of the LS10 display. If the input name is not visible, select the Input button at the top of the screen and select from one of the 15 input sources. See *The Home Screen,* page 18.
Identify the selected input	The selection button for the current input is highlighted in the lower part the LS10 display, if the input is one of the visible selection buttons. If not, the input is displayed on the right just above the selection buttons.
Mute the LS10	Touch the MUTE button (the speaker icon in the top right corner). If successful, the MUTE button will change color to red. See *Adjusting the Volume control*, page 18.

Unmute the LS10	Touch the red MUTE button (the speaker icon in the top right corner). If successful, the button color will no longer be red.
Identify muted mode	When the LS10 is muted, the MUTE button will turn red.

1.2 Front Panel Controls and Indicators

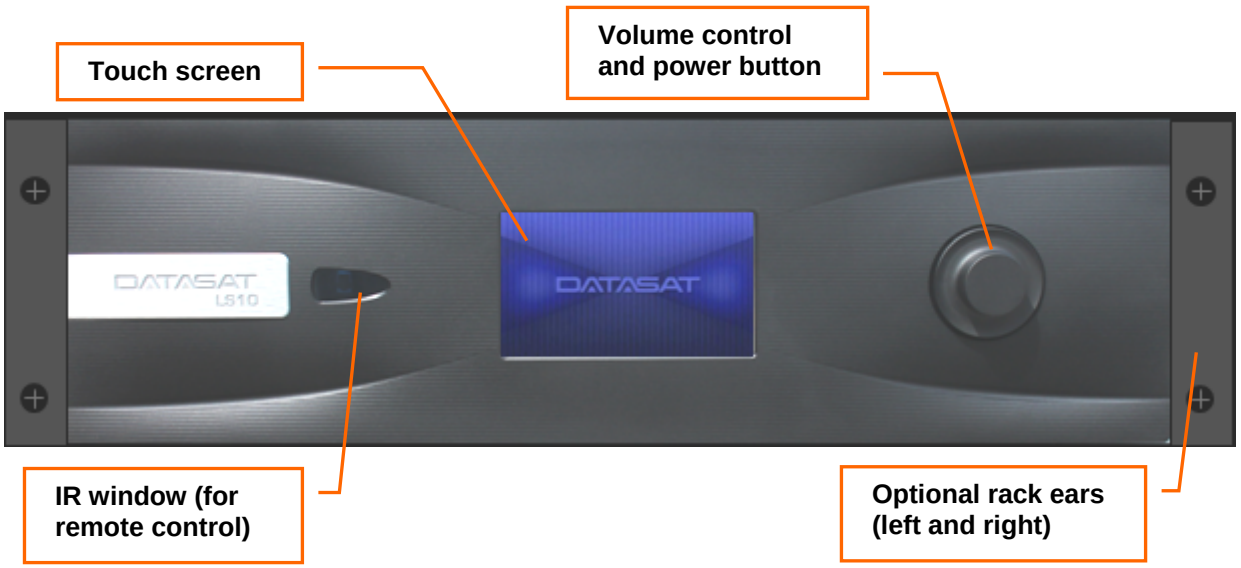


Figure 1: Front Panel Controls and Indicators

The front panel contains the following controls and indicators for operating the LS10.

- **Touch Screen**: Displays system configuration and status and allows configuration changes. Most selections can be made by touching the screen with your finger or by using a stylus, and by turning the Volume control.
- **Volume Control**: Used for volume control and turning power on/off.

1.3 Powering ON the LS10 Processor

> ⚠ **Caution:** Before powering on the LS10 for the first time, verify that the correct input voltage has been selected at the rear panel power entry module. Incorrect input voltage setting will damage the LS10. See section 2.4.

Turn ON the main power switch on the rear panel. A “hard boot” (cycling the power at the power entry module on the rear panel) typically takes the system 35 seconds to initialize.

You can turn power on/off by pressing and holding the center of the Volume control on the front panel. Also, see Appendix D, Remote Controller.

While the system is initializing, the following start up screen will appear. As initialization continues, a progress bar will appear and status messages will show in the lower left hand corner of the screen.

Figure 2. Initial screen

Note: If no image appears on the touch screen after you have turned on the power switch, check the following:

- Is the power to the equipment rack on? Has the circuit breaker to the audio rack been tripped?
- Is the power cable connected?
- Have the fuses blown?

When the Home screen appears, the LS10 is ready.

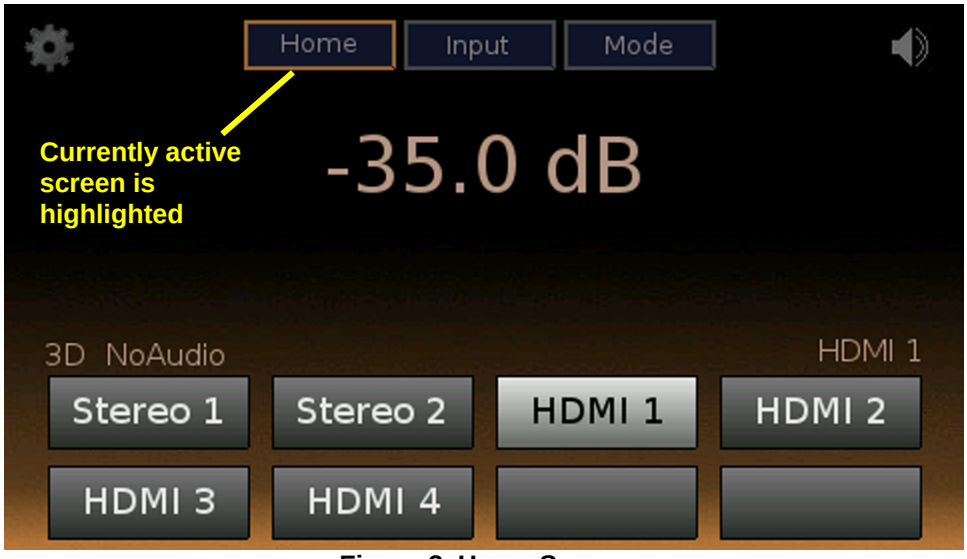


Figure 3. Home Screen

1.3.1 Using the Touch Screen

The LS10 is equipped with a touch screen display that enables you to easily navigate by touching any button with your finger. You can also use a non-abrasive stylus that will not scratch the screen, if you prefer.

1.4 The Home Screen

When the system has finished booting up, the Home Screen will appear, as shown in the above example. Your Home Screen may look somewhat different, due to user-configurable input names, currently selected input, and current audio volume.

Figure 4. Home Screen

The Home Screen of the LS10 provides one-touch access to the following features:

- Volume and current input appears on the main part of the display (see Figure 4).
- Mute/Unmute – the top-right "speaker" icon selects mute/unmute.
- Setup – the top-left "gear" icon opens the User Setup screen. See *User Setup*, page 19.
- Home button – this top button returns you to the Home screen.
- Input button – the top center button opens the Inputs screen, for complete input selection. See *Inputs*, page 26.
- Mode button – audio processing mode, see *Mode, Audio Processing*, page 23.
- Named Audio Input buttons – provide simple means of selecting an input.

1.4.1 Adjusting the Volume control

Adjust the volume control by using the knob on the front panel. Select a volume level from -70 dB to 0 dB. The selected volume level is displayed in the upper center of the Home screen.

To mute the volume control, touch the **Mute** button (see Figure 4).

Unmute the LS10 by touching the **Mute** button again. Increasing the volume will also unmute.

1.5 User Setup

Selecting the "gear" icon from the **Home** screen opens the User Setup screen.

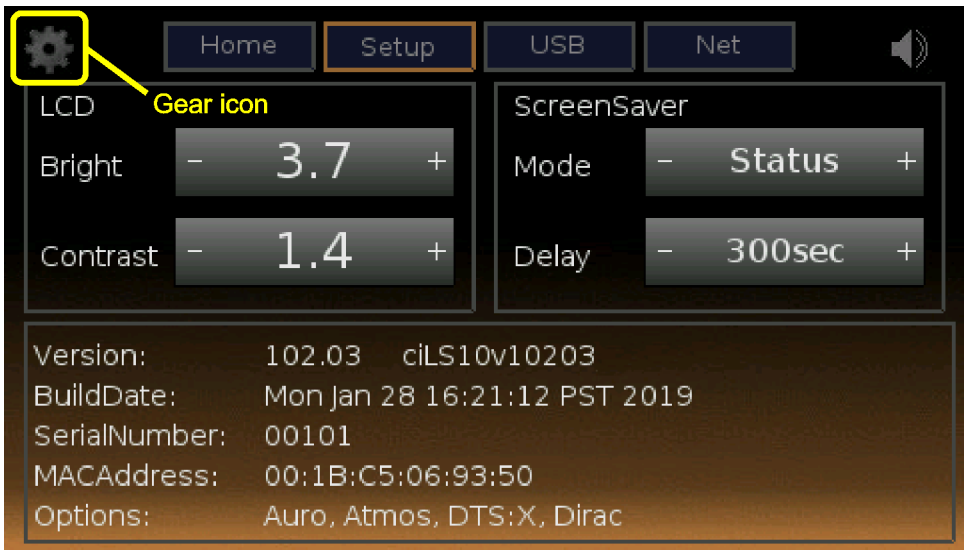


Figure 5. User Setup Screen

The User Setup screen provides these functions:

- Adjust the brightness and contrast of the touch screen (+/- to increase or decrease)
- View LS10 version information
- Select the **ScreenSaver** mode (displaying Status, None, Dim, Image, or Black) and set its Delay timing (10, 60 (default), or 300 seconds)
- Touch **USB** to access information you have stored on a flash drive that is installed into the USB port on the rear panel
- Touch **Net**, to access the Network screen

Touch **Home** to return to the **Home** screen.

1.5.1 Network

The Network screen features two network modes: **DHCP** and **Static**. It also features a **Save** button which must be used to accept any changes to the network configuration.

> **Note**: A network IP address is required for the installer to use VNC to access the setup menus. The IP address can be either DHCP or Static.

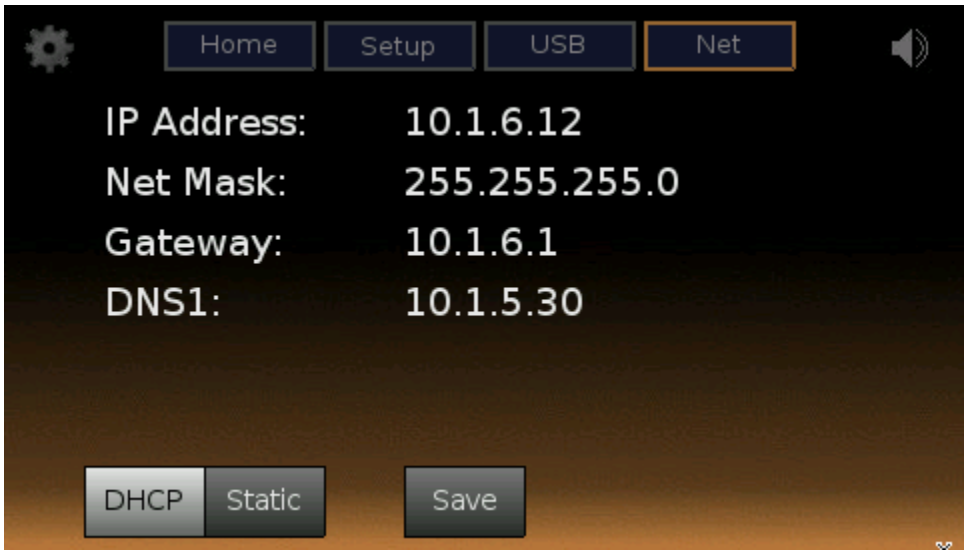


Figure 6. Network DHCP Screen

The DHCP screen displays the IP address assigned by the DHCP server after a system reset. The addresses shown on the screen are the current settings for the Network IP address, Network Mask address, Gateway address, and addresses for DNS1 and DNS2. The addresses are displayed whether or not they were set statically by the LS10 or retrieved from the DHCP server.

> **Note**: If the IP address is not seen in the DHCP mode, it means the unit is not connected to the network.

Press **Save** to confirm changes to the network configuration. If changes are not saved, the previous configuration will display after turning power off and on again from the rear power switch. After Saving and cycling the power from the rear power switch, the changes will display.

Figure 7. Network Static Screen

On the Static screen, enter the static addresses for IP Address, Network mask, Gateway, and DNS. If DNS1 cannot be accessed, DNS2 will be used, so either one may be selected.

If Static is selected and saved, the LS10 will (upon reset) use the network configuration address entered for Network IP address, Network Mask address, Gateway address, and DNS.

Press **Save** to confirm changes to the network configuration. If changes are not saved, the previous configuration will display after turning power off and on again.

1.5.2 USB

To load or save a configuration, update LS10 software, or save diagnostic data, select **USB** from the upper row of buttons. The initial USB screen will prompt you to insert a USB memory stick (flash drive) into the **USB Save/Restore** port on the rear panel.

Figure 8. Setup USB Screen

When a USB drive has been inserted, the LS10 USB screen will display the options shown below.

Figure 9. USB Screen, Submenu

If **Save** is selected, the current LS10 setup configuration will be saved to the USB drive. The configuration file name is “ls10_nnnn.tgz”, where “nnnn” is replaced by the four-digit serial number of the unit.

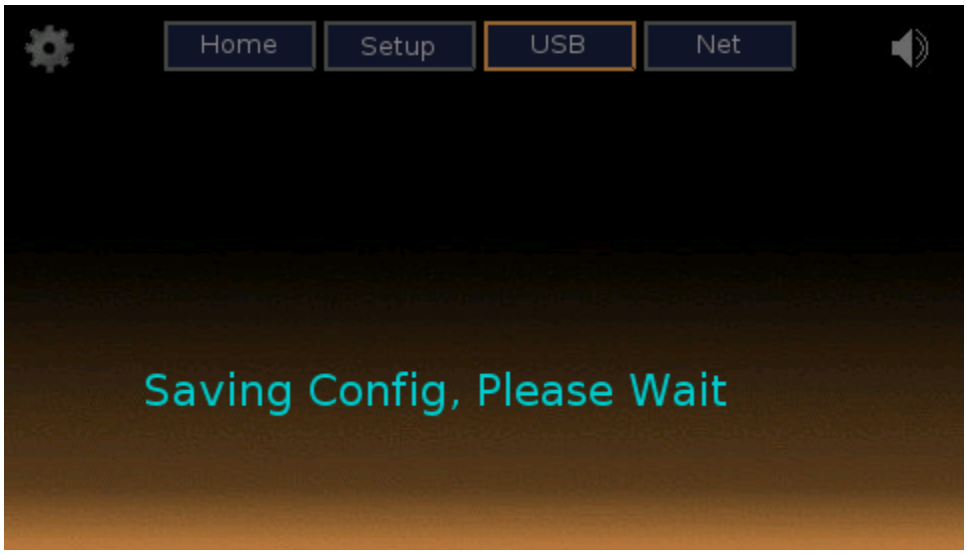


Figure 10. USB Screen, Saving Configuration

If **Load** is selected, a new LS10 setup configuration will be loaded to the LS10 from the USB drive. The configuration file must have the same name "ls10_nnnn.tgz" where "nnnn" is the serial number of the unit.

> ⚠ **Caution:** Loading from the USB will overwrite the current system configuration.

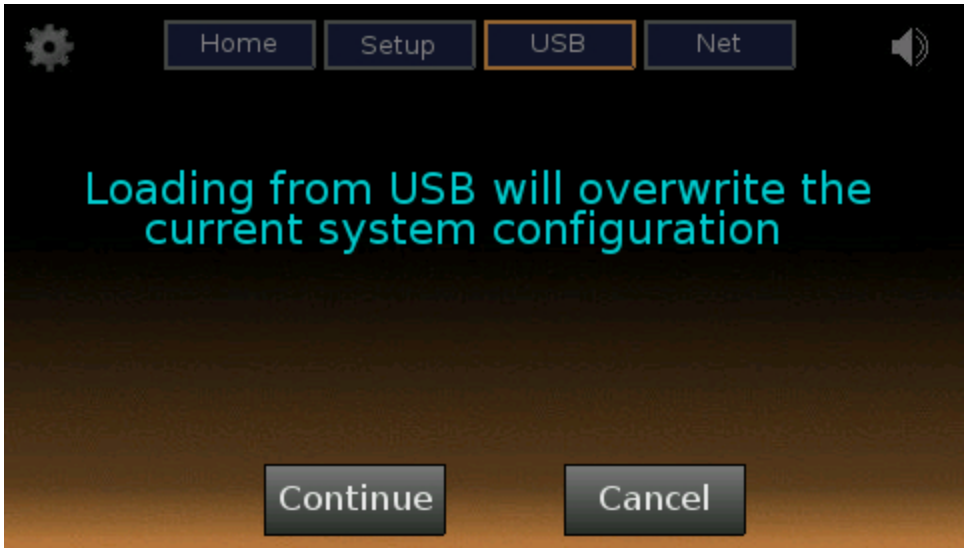


Figure 11. USB Screen, Loading from USB

If **Update** is selected, the LS10 software will be updated from a USB memory device. The update file can be retrieved from the Datasat Digital Entertainment web site and copied onto a USB memory device. The update file is named "ciLS10vxyyzz_rel.upd", where xyyzz are values taken from the version string x.yy.zz.

As an alternate method, the software update can be done through the network without requiring USB, by using the Setup menus. See *Update System Software from Network, page* 59.

If **Diag** is selected, diagnostic information will be saved to the USB from the LS10, for use by your installer or Datasat technical support, to diagnose a problem.

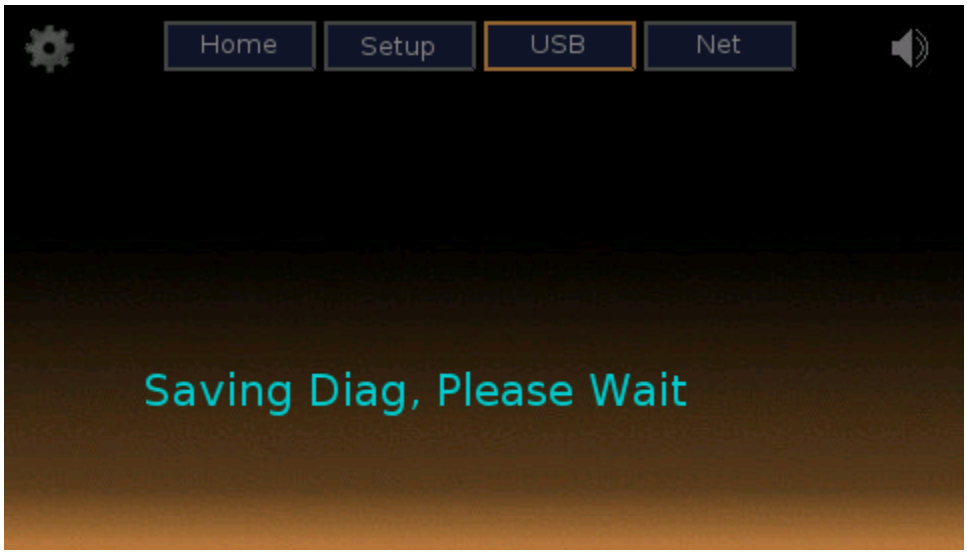


Figure 12. USB Screen, Saving Diagnostic Info

1.6 Mode, Audio Processing

Select the Mode button from the **Home** screen to open the audio processing setup screen.

The following example is the Mode screen with **no processing** selected.

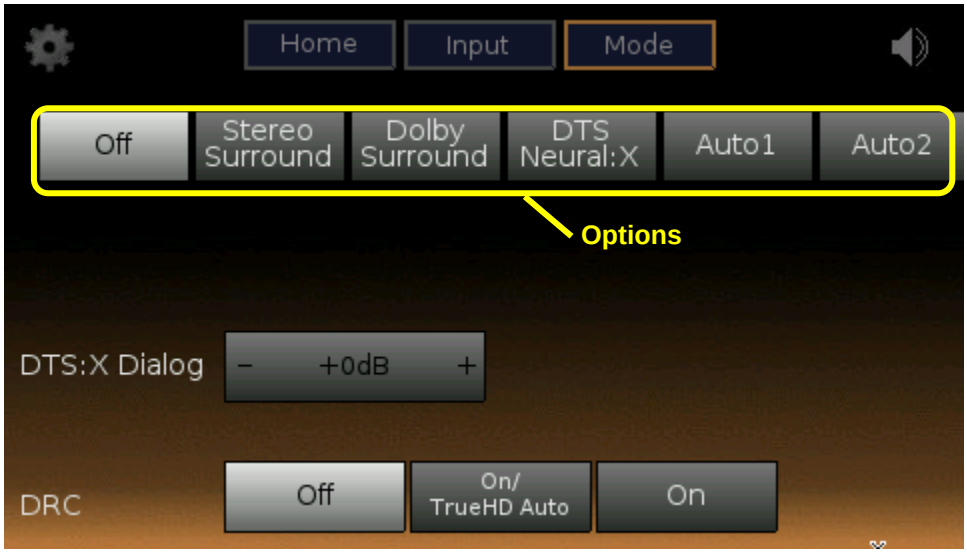


Figure 13. Mode Screen, Off

Note: When Off is selected, no processing is done.

The top row of options on the audio processing screen depends on the speaker configuration. When an Auro speaker configuration is selected, only Off, Stereo Surround and Auro modes are available.

- Off – No Postprocess mode is selected.
- Stereo Surround – 2-channel content only will copy L to all Left floor-level speakers and R to all Right floor-level speakers. An LR mix will go to Center. Non 2.0 content will pass through without being changed.

- Dolby Surround – Upmixes Dolby and LPCM content to the available speaker configuration. Note: Dolby Surround only works at 48K. Higher rate content may be downsampled so that upmixing may be applied. Note: Legacy Dolby PLII, PLIIx and PLIIz upmixing is replaced by Dolby Surround.
- DTS Neural:X – Upmixes DTS and LPCM content to the available speaker configuration. Note: DTS Neural:X only works at 48K. Higher rate content may be downsampled so that upmixing may be applied.
- Auto 1 – DTS content will upmix with Neural:X, Dolby will upmix with Dolby Surround and LPCM will upmix with Neural:X. Note: Neural:X only works for content up to 48K.
- Auto 2 – DTS content will upmix with Neural:X, Dolby will upmix with Dolby Surround and LPCM will upmix with Dolby Surround.

1.6.1 DTS:X Dialog

Dialog volume may be boosted by up to +6dB for content which supports this feature.

1.6.2 DRC

Dynamic Range Control (DRC) is used to reduce the audio volume range between soft and loud sounds. The louder volumes are decreased and the quieter volumes increased. The amount that the range is reduced is determined dynamically by the metadata stream of the particular decoder that is being used. DRC works only with some Dolby or DTS content, depending on how it was created.

- **Off** – no range control is applied
- **On/TrueHD Auto** – range control is applied on TrueHD content only if enabled by the content. For DTS content, it is the same as ON.
- **On** – it is applied by the DTS or Dolby decoder

1.6.3 Auro 3D®

Select Auro-3D® to create an immersive sound experience using one of the Auro Speaker configurations. When selected, the Auro processing works in one of two ways. Auro-encoded input signals, natively recorded and/or mixed for an Auro-3D® configuration, will be decoded with the built-in Auro-Codec® Decoder. Alternatively, legacy content (standard stereo, surround and mono sources) are up-mixed using the Auro-Matic® 3D module.

Figure 14 shows the audio processing setup with **Auro** selected.

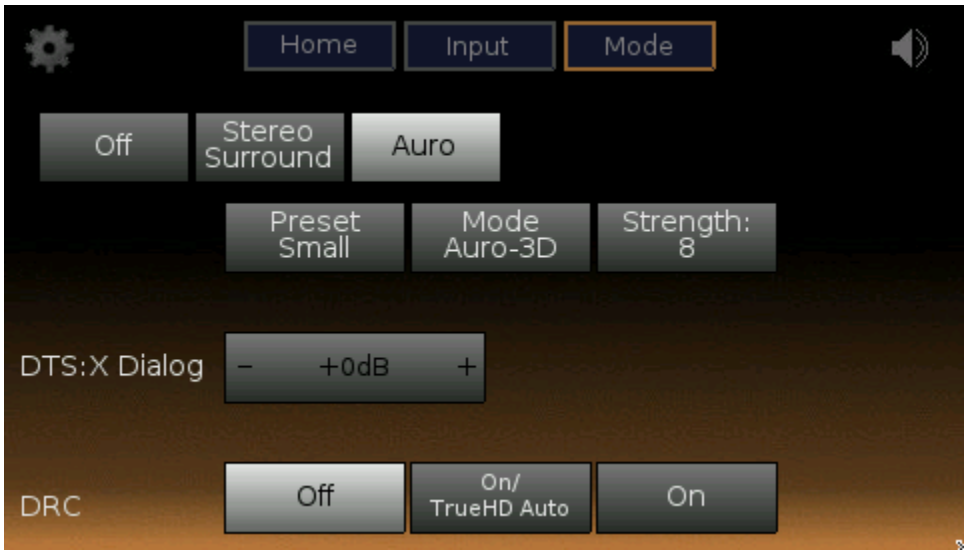


Figure 14. Auro Mode

These are configuration options for Auro mode:

- **Preset** – These are Auro-Matic upmixer options to adjust the 3D effect for different content or preferences.
  - Small
  - Medium
  - Large
  - Speech
- **Mode**
  - Auro-3D – Decodes Auro-3D native content and upmixes non-Auro-3D content.
  - Native – Decodes Auro-3D native content but does not upmix non-Auro-3D content.
  - Stereo – Plays in stereo (Left front/Right front).
  - Surround – Does not use High channels. Plays in 5.1 or 7.1 configurations.
- **Strength**: 1 to 16 – Adjusts the strength of the Auro-Matic upmixer where 16 is the highest amount of upmixing.

1.7 Inputs

The LS10 features 15 physical hardware inputs that are available for selection: 8 HDMI, 2 TOSLINK, 2 stereo, 2 SPDIF, and 1 USB audio.

> **Note**: Using the Setup Home screen, the installer can select an input to be visible on the touch screen **Home** display and (optionally) give it a user-friendly name. See *Input*, page 38, for setup information.
>
> **Note**: This application accepts only Latin alphanumeric characters.

Press the **Input** button to see the complete range of input options.

Figure 15. Inputs Screen

Select an input on this screen, and the **Home** screen displays this as the current input. For example, if HDMI 1 is selected, the **Home** screen will appear like the example below.

Figure 16. Home Screen, HDMI 1 Selected

1.8 Troubleshooting (Operation)

The following table provides troubleshooting data for the LS10.

Table 2. Troubleshooting Information

PROBLEM	SOLUTION
LS10 will not power ON	Press and release the power button on the front panel. If the unit will not power up, be sure that the rear panel power switch is ON and that the unit is plugged into a working AC outlet protected by a surge protector. See *Powering ON the LS10 Processor*, page 16. If the LS10 is mounted in a rack and a breaker is used for the rack, make sure the breaker is ON. Verify the surge protector is powered and is working. Try changing the LS10 power cord. If power is getting to the LS10 but it still will not power ON, maybe a fuse has blown and/or the input voltage setting is incorrect. See section 2.4 for more information or call a qualified installer to check it.
LS10 front panel display is too dim	The front panel display automatically dims when not touched for a few seconds. Gently touch the display screen to brighten it.
No sound in listening room	On the front panel display, verify that the LS10 is not muted (Mute button symbol will have a red X on it if in mute). Unmute by touching the Mute button. Mute symbol will not have a red X when unmuted. Be sure the volume control level is not too low (-70dB). Turn the knob to increase the volume. Verify the correct input is selected.
Volume is too low or high in the listening room	Turn the volume control knob to achieve proper volume.
Wrong sound in listening room	Verify that the correct LS10 input is selected (The current input is highlighted.) Touch a different input to select. If the input you want is not listed, touch the Input button at the top of the screen to select from a complete list of inputs.

Part 2: Installation and Setup

This part of this manual contains information the installer needs to set up and configure the LS10 Audio Processor.

2.0 Installation

Important Safety Instructions

1. Read and keep these instructions.
2. Heed all warnings.
3. Follow all instructions.
4. Do not use this apparatus near water.
5. Clean only with dry cloth.
6. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
7. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
8. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
9. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
10. Only use attachments/accessories specified by the manufacturer.
11. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

Portable Cart Warning

12. Unplug this apparatus during lightning storms or when unused for long periods of time.
13. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

2.1 Unpacking System Components

See the list of standard components for an LS10 shipment, on page 13. The exact contents may vary, depending on the options you have ordered.

> **Note**: Refer to the actual packing slip from your order to verify the contents of your shipment. Contact Datasat Digital Entertainment immediately if items listed on your packing slip are missing.

2.1.1 Preliminary Inspection

Before installing the LS10 unit, take a complete inventory of system components to minimize problems or questions during installation. Check for scratches or other damage to the LS10.

Save all packing materials until installation is complete in case you need to return parts to the factory.

2.2 Installation Overview

The LS10 chassis is the main component of the LS10 system. Installation procedures include:

- Checking the LS10 for proper input voltage setting/fuses
- Mounting the LS10 chassis in a rack, if desired
- Connecting the LS10 unit to other equipment
- Connecting the LS10 power cord to a surge protector

2.3 LS10 Rear Panel Connections

Figure 17 shows the rear panel of the LS10. Table 3 gives a description of each connector shown in the figure. For specific information on the pin-outs of each connector, please see Appendix A of this manual.

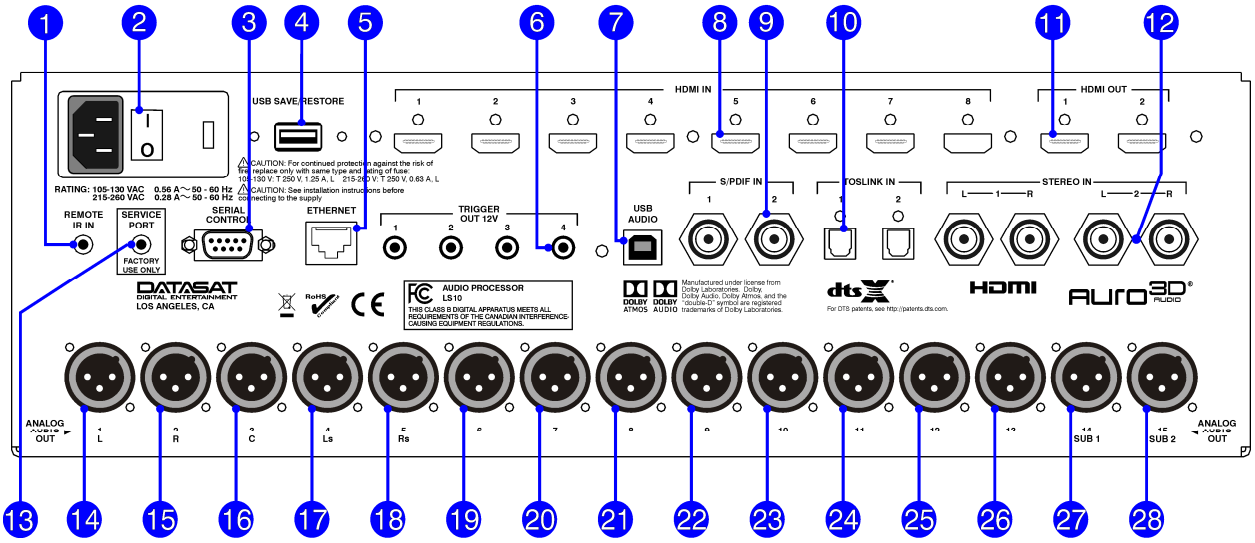


Figure 17. LS10 Rear Panel

Table 3. LS10 Rear Panel Connections

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	Remote IR In (for Universal IR Receiver)	14 to 28	Analog Audio balanced output using XLR-M connectors. Connect to amplifier(s): 14 (L) Left Front 15 (R) Right Front 16 (C) Center Front 17 (Ls) Left Surround 18 (Rs) Right Surround 19 (Lb) Left Back 20 (Rb) Right Back 21 (HL) High Left Front 22 (HR) High Right Front 23 (HC/Lw) High Center or Left Wide 24 (HLs) High Left Surround 25 (HRs) High Right Surround 26 (T/Rw) Top or Right Wide 27 (SUB 1) Subwoofer 1 28 (SUB 2) Subwoofer 2
2	Power Entry Module/Power Switch		
3	Serial Control (RS232) – DB9F (serial automation control)		
4	USB Save/Restore		
5	Ethernet – RJ45F (Network connection for VNC, LS10 control and software updates when connected to the internet)		
6	Trigger Out 12V (4)		
7	USB Audio		
8	HDMI In (8)		
9	S/PDIF In (2) - RCA Female 75 Ohm digital interface		
10	TOSLINK In (2)		
11	HDMI Out (2)		
12	Stereo In (2) left and right, Two RCA L/R Single ended analog inputs (can be used for music, etc.)		
13	Service Port –used for factory testing		

2.4 Power Supply

> **WARNING:** Before powering on the LS10 for the first time, verify that the correct input voltage has been selected at the rear panel power entry module. Incorrect input voltage setting will damage the LS10.

The LS10 may be set for either 115V (105-130V operation) or 230V (215-260V operation).

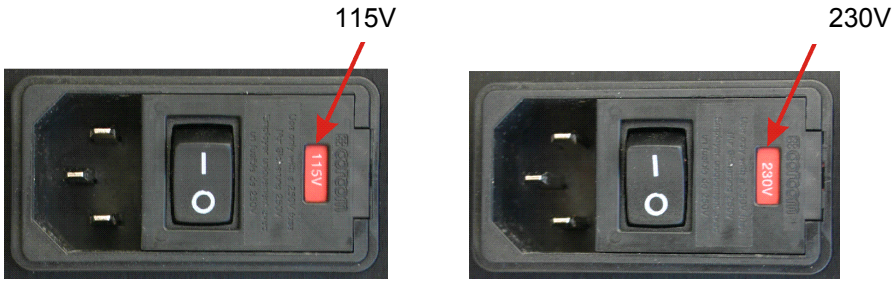


Figure 18. Power Entry Module – Voltage Input Settings

2.4.1 Changing the Input Voltage Setting and Fuses

> **Caution:** Double pole / neutral fusing.

1. Remove the power cord (if plugged in).
2. Open the fuse compartment door.
   Use a small flat blade screwdriver to release the door. Protect the LS10 metal finish from damage by the screwdriver, using a rag or other soft item.

Figure 19. Power Entry Module – Releasing the Fuse Compartment Door

3. Remove the fuse block by freeing it with a small flat blade screwdriver.
   The block has slots for this purpose in the sides, as shown. Do not try to pry the block out from the top or bottom, as this will damage the block. Use a rag or other soft item to protect the LS10 metal finish.

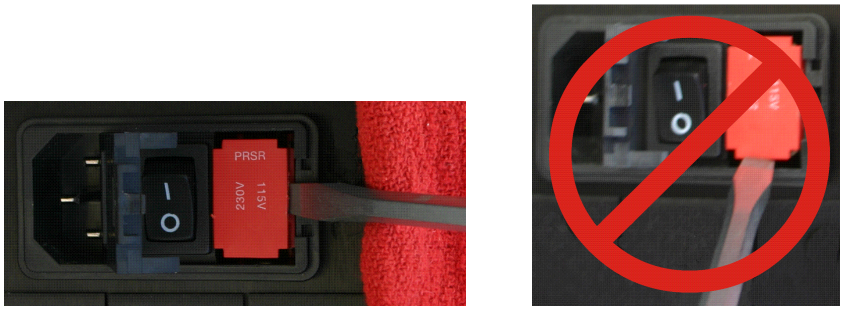


Figure 20. Accessing Fuse Block. This one is set to 115V.

4. Remove the fuse block and install correct fuses.
   The LS10 uses two 5x20 mm fuses (one on each side of the fuse block):
   - For 115V operation, use two 1.25A, T fuses
   - For 230V operation, use two 0.63A, T fuses

5. Insert the fuses into the fuse block, making sure each fuse is fully seated in the clip. Figure 25 shows the correct position for a 5x20mm fuse.

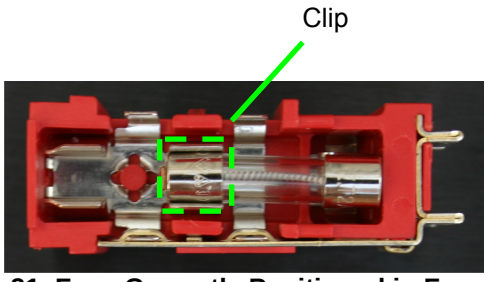


Figure 21. Fuse Correctly Positioned in Fuse Block

6. Replace the fuse block in the power entry module and verify that the correct voltage setting is shown (see Figure 18).

2.5 Mounting and Connection

The LS10 may be mounted in a standard equipment rack or placed in a cabinet or on a sturdy surface.

> ⚠ **Caution:** Because power line surges can damage the LS10, we require the use of a properly functioning computer-grade surge /spike suppressor.

2.5.1 Rack/Enclosure Requirements

Follow these recommendations if the LS10 unit will be installed in a closed or multi-unit rack/enclosure assembly.

- Elevated Operating Ambient Temperature – Determine the operating ambient temperature within the rack or enclosure, since this may be greater than the ambient temperature in the room. The maximum ambient temperature for the equipment in a closed or multi-rack assembly is 40°C (104F°)
- Reduced Air Flow – Ensure adequate airflow for cooling purposes on all sides of the equipment. Make sure that the ventilation holes are not blocked.
- Mechanical Loading – Mounting of the equipment in a rack should be such that a hazardous condition is not caused due to uneven mechanical loading.
- Circuit Overloading – Consider the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on over-current protection and supply wiring. Pay attention to equipment nameplate ratings when addressing this concern.
- Reliable Earthing – Maintain reliable grounding of the equipment. Give particular attention to supply connections when connecting to power strips, rather than direct connections to the branch circuit.
- Surge Protection – Using a properly functioning quality surge protector is required to protect the unit.

2.5.2 Rack Mount Installation

- The LS10 requires 3U of standard rack space for proper mounting.

Note: The LS10 ships with feet installed. These may need to be removed for rack space clearance.

- Install the supplied rack ears onto the LS10 by removing three 8-32 screws on each side of the LS10 and using them to attach the rack ears.

Figure 22. Rack Ear Installation

- Mount the LS10 into the rack securing it properly with 4 rack screws. 10-32 Rack screws and washers are provided in the packing kit.

2.5.3 Installing/Removing Feet

The LS10 is shipped with feet already installed, for placing on a desktop or shelf. When rack mounting, the feet may need to be removed for clearance. To remove the feet, simply twist by hand to unscrew.

To replace feet, screw them onto the bottom of the LS10 and hand tighten.

> ⚠ **WARNING**: Only use the feet provided with the LS10, which have the correct screw length to prevent internal damage to the LS10 circuitry.

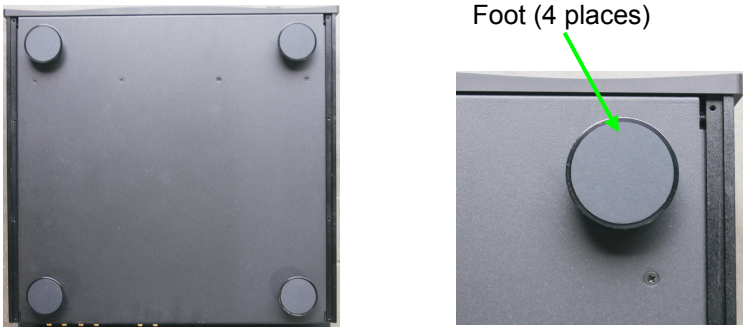


Figure 23. LS10 Bottom

3.0 LS10 Configuration and Setup

To access the Setup screens, you must use VNC to connect to the LS10 from a separate computer (desktop, laptop, or tablet). This approach prevents making unauthorized changes to the LS10 setup via the touch screen on the front panel.

> **Important!** The Setup screens are intended for use by a qualified installer only. Password protection is highly recommended.

3.1 How-To Procedures for Setup

This table provides a list of setup activities and provides instructions, or a link to instructions elsewhere in this manual.

Table 4. Setup Procedures

ACTIVITY	INSTRUCTIONS
Connect to LS10 using VNC	See 3.2 Using VNC to Access Setup Menus, page 35.
Select inputs and assign names	See 3.4 Input, page 38.
Set and check Audio Levels	See 3.5 Audio Levels, page 40.
Set Param EQ	See 3.6 EQ, page 42.
Copy or Clear EQ settings	See 3.6.3 EQ Copy or Clear, page 43.

Set Delays	See 3.7 Delays, page 45.
Set Decoder Options	See **Error! Reference source not found. Error! Reference source not found.**, page **Error! Bookmark not defined.**.
Set up Base Management	See 3.9 Bass Management Setup, page 47.
Set Front Panel LCD Screen Appearance	See 3.10 System Setup, page 56.
Update LS10 System Software	See 3.11 Update LS10 Software, page 58.
Save or Restore System Setup on a USB drive	See 3.13 USB Save/Restore, page 61
Examine Log File	See 3.14 LogFile, page 63.
View LS10 Software version and other information	See 3.15 Info, page 64.
View Network Mode and IP address	See 3.17 Network, page 66.
View Network Diagnostics information	See 3.18 Network Diagnostics, page 67.
Set Passwords to restrict access to Setup screens	See 3.19 Access Control, page 69.
Create and manage Automation Macros	See 3.20 Automation Macros, page 70.
Create and manage Automation Events	See 3.21 Automation Events, page 71.
Set up Automation Serial control	See 3.22 Automation Serial Setup, page 74.
Verify Sound Performance	Listen in listening room. See LS10 Playback Sound Check, page 75.

3.2 Using VNC to Access Setup Menus

A VNC (Virtual Network computing) client program must be used to access the LS10 setup menus. This requires a laptop or desktop computer, tablet or similar device running a VNC client (such as UltraVNC Viewer). The LS10 and the "computer" must be connected on the same network. The connection from the

computer to the router may be wired or wireless, but the connection from the router to the LS10 must be wired.

Network.

The VNC client software requires the LS10 IP address to establish a connection. The LS10 IP address can be viewed on the LS10 touchscreen menus by selecting **Setup** (the gear icon), followed by the **Net** button on the top. The first line in white text on that screen shows the IP Address (see section 1.5.1 Network, page 19). In case an IP address is not displayed, verify the LS10 network connection by checking DHCP or Static selection, and the network addresses if Static is selected. Once the IP address is available, you should be able to enter the IP address in the VNC client and connect to the LS10. If the VNC client cannot connect to the LS10, verify that the VNC computer is on the same network.

Password.

When the VNC connection to the LS10 is made, the VNC software will prompt you for the LS10 password. The default password for the LS10 is a dash character ('-'). This password may be changed by changing the Setup Password field in the Access Control screen (see section: 3.19 Access Control, page 69).

The VNC connection is no longer needed once the configuration is completed. Everyday changes to the playback operating mode are available through the IR control, automation control, or touchscreen display.

> **Note**: When using a laptop to VNC into the LS10, use the up and down arrows to mimic the scrolling action of the front panel volume control. A mouse wheel also works for up/down on screen controls for numbers or lists.
>
> **Note**: When using a VNC device that does not have a keyboard, such as a tablet, virtual arrow keys may be enabled/disabled by double tapping the volume level display box on the **Home** screen.
>
> **Note**: If desired you can also view the LS10 front touch screen thru the VNC program. Both screens can be active at the same time. Open the VNC viewer and enter the LS10 IP address adding "**:**1" to the end of the address. The LS10 Touch Screen image will appear.

3.3 Setup Home Screen

Upon connecting to the LS10 using VNC, the **Setup Home** screen appears on the connected computer.

Figure 24. Setup Home Screen

Select **Mute** to mute or unmute the selected input. When activated, the Mute button turns **red**.

The **Volume** setting can be changed using the up/down arrow keys on your connected computer. A mouse wheel can also be used.

> **Note**: On-screen arrow buttons are enabled or disabled by a double-click on the volume box. The arrows work as on-screen up/down keys.

The following are the controls on the Setup screen:

- *Input*, see page 38
- *Levels*, see *Audio Levels,* page 40
- *Delays*, see page 45
- ***Error! Reference source not found.***, see page **Error! Bookmark not defined.**
- *Bass Management*, see page 47
- *System,* see page 60
- *Update* (for software update), see page 58
- *USB,* see USB Save/Restore, page 61
- *LogFile*, see page 63
- *Info,* see page 64
- *Network*, see page 66
- *Access*, see Access Control, page 69
- *EQ*, see page 42
- *Automation*, see *Automation Macros*, page 70

3.4 Input

The LS10 has 14 separate input connections that are ready to use: 8 HDMI, 2 TOSLINK, 2 Stereo, 2 SPDIF, and one USB. You can (optionally) assign a name to the input and make the name visible on the LS10 touch screen button for that input.

> **Note**: There are a few configuration items, in addition to those in this section, that are tied to the input selection. Those items are set independently for each input. The following three configuration items are affected by the input:
> - Global delay (not channel delay)
> - Input Trim
> - Stereo Input level (only for stereo analog input).
>
> Refer to the sections about these items for more detail.

1. Select an **Input** (upper left) from the dropdown listing.

Figure 25. Setup Home Screen, Select and Name an Input

2. Select the **Name** (optional) field. A virtual keyboard will appear.

Figure 26. Input Name Keyboard

Note: This application accepts only Latin alphanumeric characters.

3. Enter a name for the input. Then tap **OK** when finished.

When you touch **OK**, the name will appear on the touch screen, as shown below.

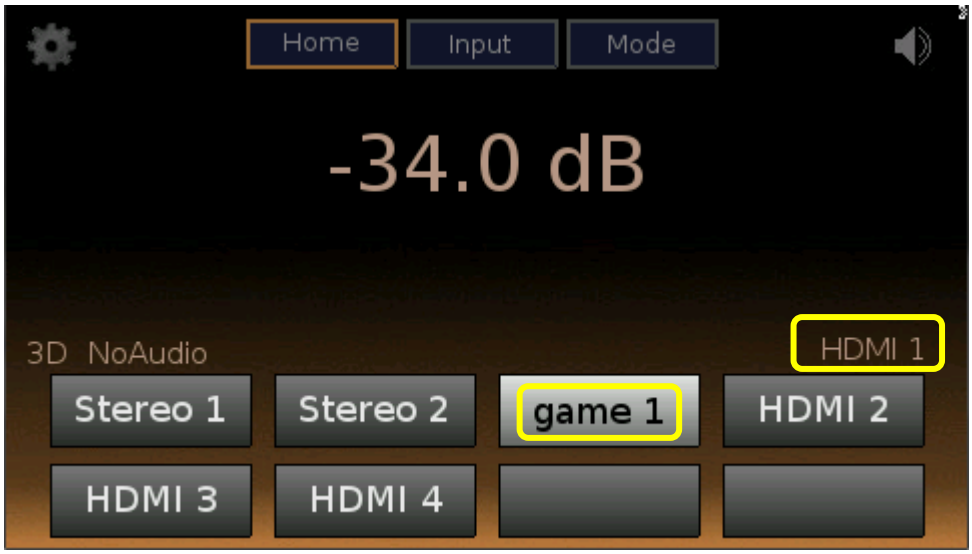


Figure 27. Touch screen with HDMI 1 named “game 1”

In this example, HDMI 1 has been named “game 1” and made visible on the touch screen.

Note: Changing existing input names will affect external automation control for that input. Verify that automation is sending the correct command (see Appendix E Remote Control API).

4. When selecting an audio input other than HDMI 1-8, you have an option to select whether or not to pass through HDMI video from one of the HDMI inputs. This is selected on the dropdown box labeled HDMI Video Input that appears on the upper right side. The options are None and HDMI 1 through HDMI 8. See Figure 28, below.

Figure 28. Non-HDMI input selected

3.5 Audio Levels

Tap the **Levels** button on the **Setup Home** screen to open the Levels screen for the selected input. Use this screen to adjust audio levels for each of the channels.

The Speaker Configuration affects the channels that show up on the Audio Levels screen. If you do not see the expected channels displayed, then check the Speaker Configuration in the Bass Management section.

The Audio Levels screen can be used for these functions:

- **Set the levels**. You can turn on the pink noise on any single channel to check and adjust the level. With Master Volume control set to -15dB the output on each speaker should be 85dBC when using an SPL meter.
- **Check channel phase**. This is done by enabling the pink noise on more than one channel and checking the difference in sound level with an SPL meter or RTA.
- **General testing or troubleshooting**. The installer may diagnose a problem by muting selected channels while playing content, or playing pink noise on selected channels.

Figure 29. Setup Audio Levels

In this example, the selected input is HDMI 1 and the listening room is configured for 13.2 audio.

Table 5. Audio Levels Setup

Controls	Description
Pink Noise	Tap the button to turn pink noise On or Off for one speaker, or activate **Pink Noise Multi Chan** to turn pink noise on/off for several or all channels together.
Output Level (dB)	Select a channel, then tap up/down arrow keys repeatedly to increase/decrease output level for that channel. Range is from -20dB to +10dB in .5 dB increments. A wheeled mouse can also scroll up/down through the values.
Invert	Tap the button to enable/disable channel invert. The button turns blue when invert is enabled. (Invert is used primarily for test purposes.)
Chan Mute	Tap the button to mute or unmute the selected channel. Multiple channels may be muted. Channels remain muted when exiting this screen. The mute will reset after a power cycle.
Volume / Mute	Master volume and mute controls. Select the **Volume** control and use the up/down arrow keys to change the master volume control setting. This volume control is the same as the one in the touch screen **Home**. Tap the **Mute** button to mute/unmute all channels. This mute enable is the same as that on the touch screen **Home**. Use it in case of accidental loud noise.
Pink Noise Multi Chan	Enabling allows multiple channels of pink noise to be chosen. When disabled, selecting pink noise on one channel automatically disables pink noise from the other channels.
Fade In/Out	Tap the In or Out control to select, then use the arrow keys to adjust the time (in ms) for the Fade In/Out. During an input change, the Fade In and Fade Out period can be up to 5 seconds.
Stereo In Level	This menu is used to adjust the Stereo input channel levels and is available only when the Input Source is set to **Stereo 1** or **Stereo 2**. Select Left or Right and adjust the gain (-6.0dB to +6.0dB).
Input Trim	This can be used to apply volume level trim to the current input (0 to -10dB). This may be used when you want to balance the volume level of two different sources. The Input Trim allows you to change the master volume control level and keep the relative levels balanced.
Param EQ	Tap this button go open the Parametric EQ screen.

3.6 EQ

The LS10 has two distinct sets of configurations for audio tuning, named EQ1 and EQ2. The configuration set includes all parametric filters settings and the level adjustments. When EQ1 is selected, the previous EQ1 configuration is in effect and any additional parametric filter configurations and level adjustments are saved within the EQ1 configuration. Similarly, when EQ2 is selected, the previous EQ2 configuration is in effect and any parametric filter configurations and level adjustments are saved within the EQ2 configuration. Switching between EQ1 and EQ2 brings back the respective configurations.

The user interface also provides a function for copying EQ1 to EQ2, or vice-versa.

3.6.1 EQ1/EQ2

Select EQ1 or EQ2 to retrieve the parametric filters and level adjustments made for that configuration set. Any changes to parametric filter and levels will be saved under the current selection of EQ1 or EQ2.

3.6.2 Parametric EQ

On the **Setup Home** screen, tap the **PEQs** button, or on the **Audio Levels** screen, tap **Param EQ** to open the Parametric EQ screen.

The LS10 features Parametric EQ on every channel. The Parametric EQ screen displays a frequency range from 20Hz to 20kHz. The screen has channel and pink noise controls, but also has controls for 10 filters.

The filters can be configured regarding Q (width of filter), Gain, and Frequency, and are either enabled or disabled.

Filter disabled in effect turns off Parametric EQ.

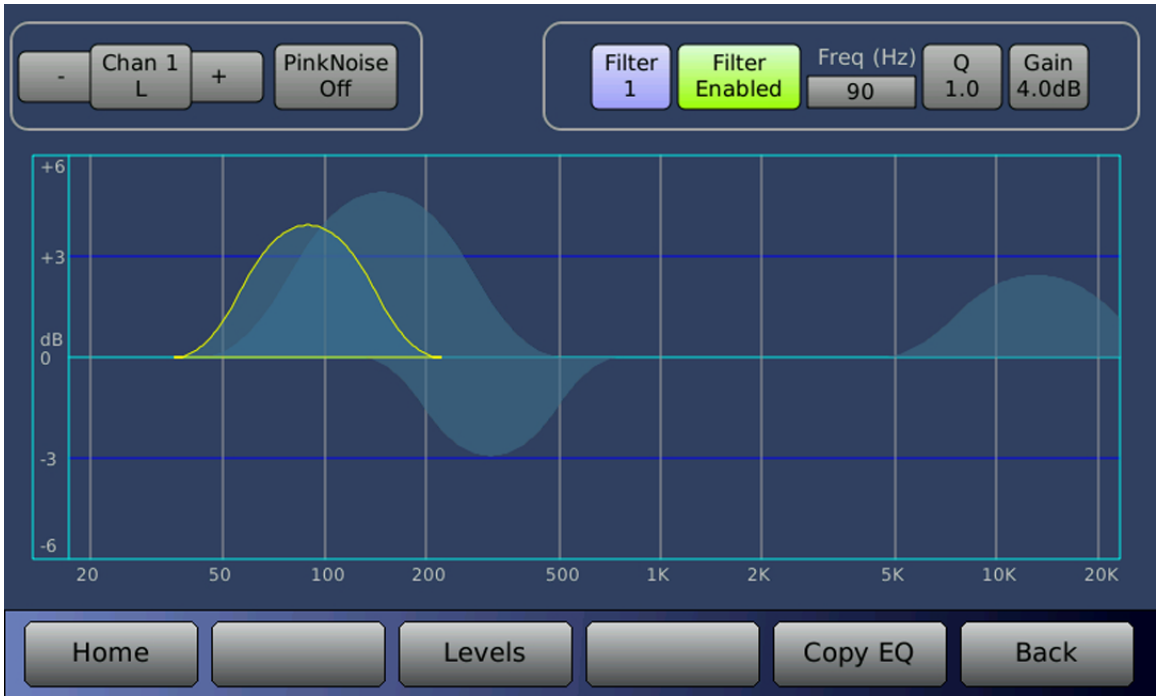


Figure 30. Parametric EQ

Table 6. Parametric EQ

Controls	Description
Chan	Tap the **Chan** button and a screen opens where you can directly select a channel. Alternatively, you can tap the - or + buttons to cycle the **Chan** button through the available channels.
PinkNoise On/Off	Tap this button to turn pink noise on/off for the selected channel.
Filter	Tap to select, then use the up/down arrow keys to select the desired filter (of 10 total).
Filter Enabled/Disabled	Tap this button to enable or disable the selected filter. **Filter disabled** in effect turns off the selected filter.
Freq (Hz)	Tap to select, then use the computer keyboard to enter the numbers. Alternatively, use the up/down arrow keys to adjust the frequency for this filter. Hold down the arrow key to quickly move upward/downward through the frequencies (from 20Hz to 20kHz). **Note**: If you have no keyboard access, double-click on the Freq field open a virtual keyboard where you can directly enter the desired frequency.
Q	Tap to select, then use the up/down arrow keys to adjust the Q for this filter. Hold down to arrow key to quickly move upward/downward through the range (0.7 to 5.0).
Gain	Tap to select, then use the up/down arrow keys to adjust the Gain for this filter. Hold down the arrow key to quickly move upward/downward through the range (-6.0 to +6.0 dB).

3.6.3 EQ Copy or Clear

On the **Setup Home** screen, select between **EQ1** and **EQ2** in the dropdown.

Press the **Copy EQ** button, and the **Copy / Clear EQ** screen appears.

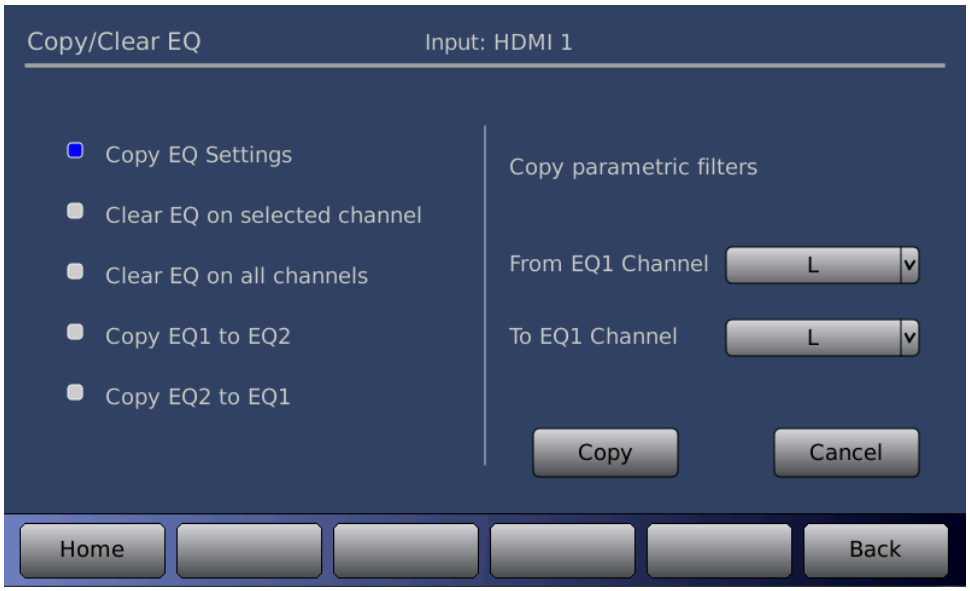


Figure 31. Copy / Clear EQ

This screen is used to copy or clear the EQ settings for one or all channels.

Use the **Copy/Clear EQ** screen to perform these functions:

Table 7. Copy/Clear EQ

Field	Description
Copy EQ Settings	Copy parametric filters from EQ Channel to EQ Channel. 1. Select the **From EQ Channel** (select from the dropdown). 2. Select the **To EQ Channel** (from the dropdown). 3. Then tap the **Copy** button.
Clear EQ on selected channel	Clear parametric filters on selected channel. 1. Select the channel to clear (from the dropdown). 2. Tap **Clear**.
Clear EQ on all channels	Clear parametric filters on all channels
Copy EQ1 to EQ2	Copies all parametric filters in EQ1 to EQ2. The previous settings in EQ2 are lost.
Copy EQ2 to EQ1	Copies all parametric filters in EQ2 to EQ1. The previous settings in EQ1 are lost.

3.7 Delays

Press the **Delays** button on the **Setup Home** screen to open the Delays screen for the selected input. Your speaker configuration determines the channels that are displayed on the Delays screen.

Figure 32. Delays Screen

You can set the delay (in milliseconds, “ms”) for each of the output channels, or set a Global Delay value that affects all channels. Such a delay may be necessary to synchronize with a digital video projector.

There is a separate global delay configuration setting for each Input. Changing the global delay only affects the current Input selection, and is retrieved when that Input is again selected.

Touch the **Delays (ms)** control under the desired channel. Enter the delay by using the up/down arrow keys.

- Channel Delays may be set in 0.1 ms increments from 000 to 100ms.
- Global Delay may be set in 1 ms increments from 000 to 1000ms.

3.8 LS10 Output Speaker Connections

The LS10 XLR Speaker outputs are fixed and defined for Left, Right, Center, Left Surround, Right Surround, and Subwoofers (2), these outputs never change. The remaining outputs are assignable depending on the setup configuration. Although some LS10's may have numbered or labeled outputs, it is very important to follow the menu display after configuration for correct channel output connections.

For this reason you should first complete the speaker configuration in the Bass Management setup menu (see section 3.9 below). After this has been completed all XLR channel output assignments will be displayed in the Output Channel assignments screen. This will show the configured channel output assignments for channels 1 – 15 and will enable the proper output connection to the correct channels.

Select the ChanList button from the Bass Management screen to view the output channel assignments. The example in Figure 33 shows a 9.1 wide speaker configuration.

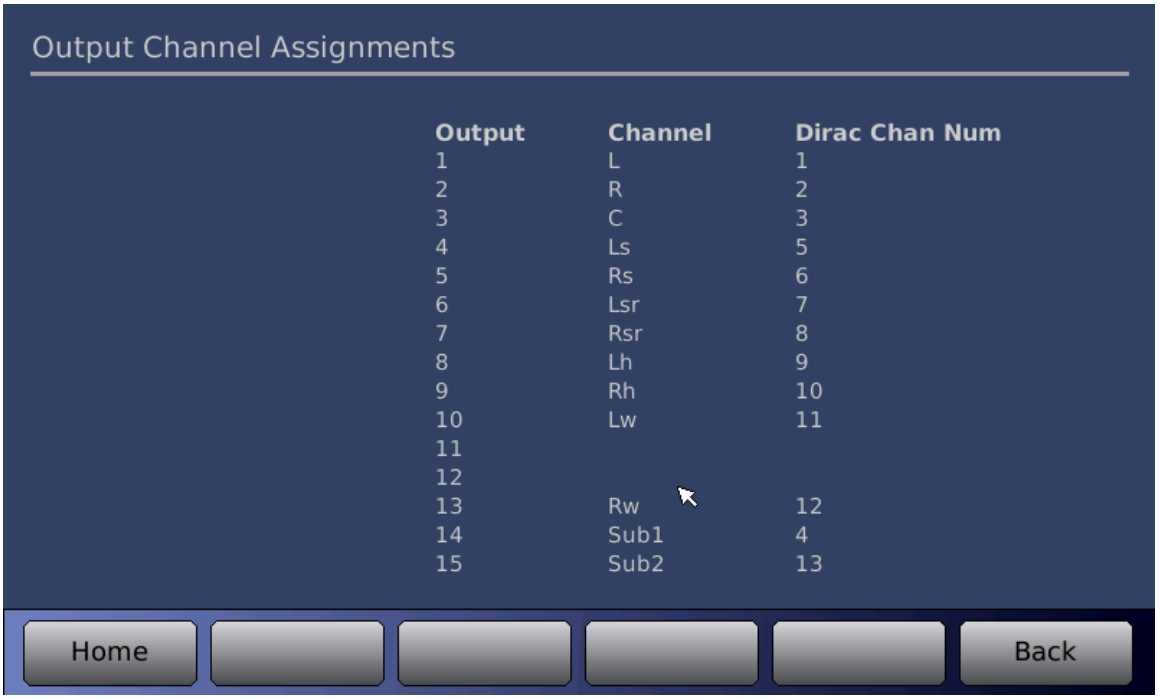


Figure 33. Output Channel Assignments screen

3.9

Bass Management Setup

Bass management balances the bass portion of the audio system based on the speaker configuration. Sub-bass configurations vary from none up to 2 subwoofers. For details of bass management theory, see 4.1 Bass Management Theory, page 75.

Press the **Bass Management** button on the **Setup Home** screen (or from the **Decoder** screen) to open the Bass Management Setup screen for the selected input.

Figure 34. Bass Management Setup

Table 8. Bass Management Setup

Controls	Description
Speaker Configuration	Select speaker configuration that matches the installation. Only the speakers available for the chosen configuration will be active for setup. Unavailable speakers will be disabled and grayed out on the screen. Use the up/down arrow keys (or mouse wheel) on your connected computer to view choices and select.
Subwoofer Configuration	Select number and positions for subwoofers. See **Error! Reference source not found.** subwoofer configuration options below.
Height Speaker Conf	Select height speaker number and positions, if applicable. This screen also configures Dolby Enabled Speakers (DES)
Enable Bass Mgmnt	Global enable for all bass management functions.
Full Range to Subs	When enabled, omits the Low Pass filters for all channels crossed to the subwoofer.
Speaker icons	Click an active speaker icon to open a speaker setup screen.

3.9.1 Speaker Options Configuration Screen

Any Left/Right paired speakers share the same settings, so the configuration needs to be set only on one of the two. For example, when the Left Front speaker is configured, the Right Front speaker will use that configuration.

Each speaker or speaker pair may display a different set of options. The figure below shows Bass Management Center Speaker Options for a configuration with Subwoofers. Click the icon of the Center Speaker, in the Bass Management Setup screen, to access this screen.

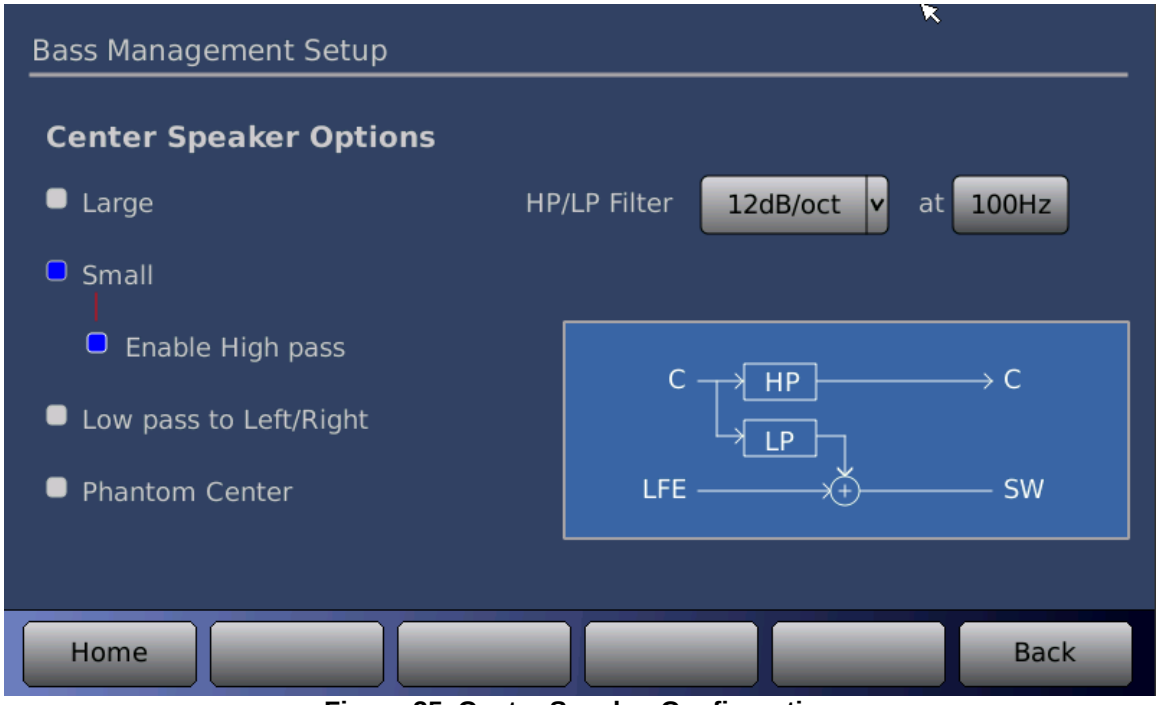


Figure 35. Center Speaker Configuration

Options differ for other speakers, and the speaker function may change if there are no subwoofers. Please refer to the tables in this section for options available depending on speaker: with one or two subwoofers, Table 9; with no subwoofers, Table 10.

HP/LP Filter

This configures the high pass and low pass filters when Small speaker option is selected. The HP and LP use is illustrated in the screen image. The HP and LP both use the same configuration.

The slope can be set at either 12dB/octave or 24dB/octave. The cutoff frequency can be set between 31Hz and 160Hz.

> **Note**: If the bass management option for full range to subs is selected, then there is no low pass filter. All frequencies in the signal are sent to the sub.

Offset

The offset control appears only for phantom speaker options. It allows the level for that speaker to be adjusted before being mixed with the left and right speaker. The offset level can be adjusted from +3dB to -10dB.

Table 9 shows the possible types of speaker configuration options available when the speaker configuration includes one or two subwoofers.

Table 9. Speaker Option with One or Two Subwoofers

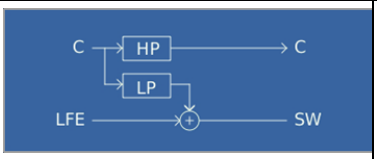
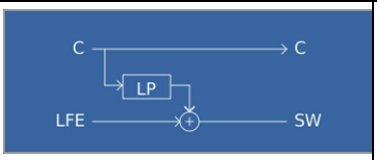
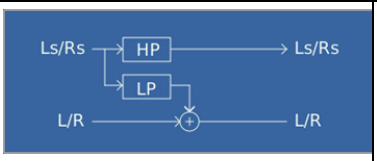
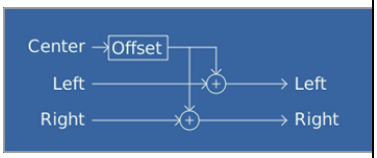
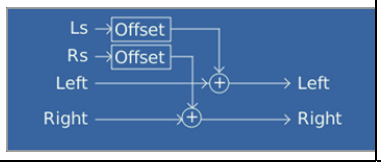
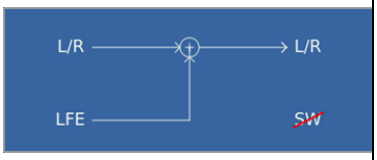
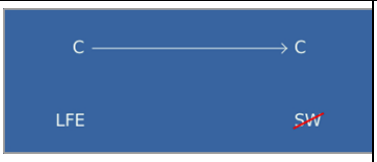
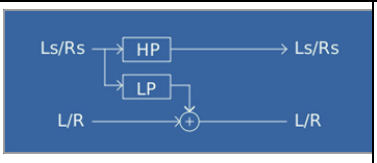
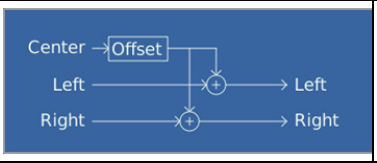
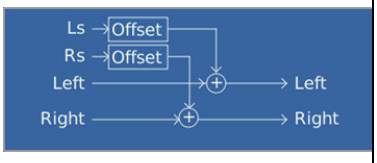
Controls	Applicable Channels	Diagram	Description
Large	All		No modifications to channel
Small, Enable High Pass	All speakers except C and L/R have high pass enabled when Small is selected. C and L/R have an additional button to enable High Pass.		Crossed with LFE High pass on channel audio Low pass to LFE
Small, High Pass Not Enabled	Center, Left/Right		Channel audio is crossed with LFE Low pass to LFE
Small, cross to (other speaker)	Depends on speaker: C cross to L/R Ls/Rs cross to L/R Lb/Rb cross to L/R HL/HR cross to L/R HC cross to C HLs/HRs cross to Ls/Rs T cross to L/R/LS/RS		When this option is used, the "other" speaker must be large. If it is not, there will be an error message in **red text** displayed below the diagram on the screen.
Phantom Center	Center		Center channel offset and mixed with Left and Right channels.
Phantom Surround	Left Surround/ Right Surround		Left Surround offset and mixed with Left channel Right Surround offset and mixed with the Right channel.

Table 10 shows the possible types of speaker configuration options available when the speaker configuration includes no subwoofer.

Table 10. Speaker Options with No Subwoofers

Controls	Applicable Channels	Diagram (replace center with applicable channel)	Description
Large	All	For L/R and Ls/Rs:  For other speakers: 	LFE signal will be added to L/R and/or Ls/Rs. LFE signal will not be added to other speakers.
Small, High Pass Enabled	All		No LFE added to audio channel High pass on channel
Small, High Pass Not Enabled	Center, Left/Right	 .	No LFE added to channel
Small, cross to (other speaker)	Depends on speaker: C cross to L/R Ls/Rs cross to L/R Lb/Rb cross to L/R HL/HR cross to L/R HC cross to C HLs/HRs cross to Ls/Rs T cross to L/R/LS/RS		When this option is used, the "other" speaker must be large. If it is not, there will be an error message in red text displared below the diagram on the screen.
Phantom Center	Center		Center channel offset and mixed with Left and Right channels.
Phantom Surround	Left Surround/ Right Surround		Left Surround offset and mixed with Left channel Right Surround offset and mixed with the Right channel.

3.9.2 Height Speaker Configuration Screen

The **Height Speaker Conf**iguration selection is available with all speaker configurations except the Auro configurations. After setting the basic speaker and subwoofer configurations, the Height Speakers can be configured.

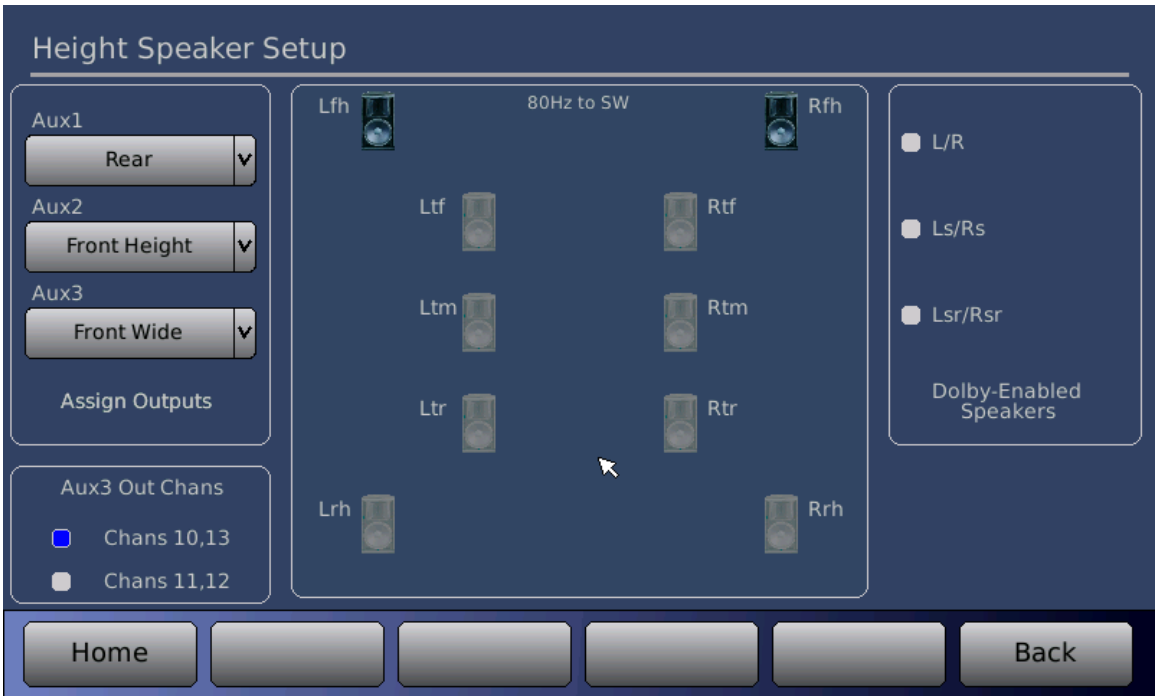


Figure 36. Height Speaker Setup

Three Aux channel pairs are available for assignment. Use the pull-down menus to assign channel outputs to speaker locations.

The availability of Aux output assignments will change depending on the number of speakers in the selected Speaker Configuration. Some Aux channels will already be assigned to basic speaker locations in the higher speaker count configurations (6.1 and above).

Aux 1 (Ch6/Ch7)	**Aux 2 (Ch8/Ch9)**	**Aux 3 (Ch10/Ch13 or Ch11/Ch12)**
Off	Off	Off
Top Front	Front Height	Rear Height
Top Middle	Top Front	Top Front
Top Rear	Top Middle	Top Middle
	Top Rear	Top Rear

☑ Aux 1 assignment choices are not available when 6.1 or 7.1 is selected. The default “Rear” will appear which provides audio to the rear surround channels Lrs and Rrs on channels 7 and 8.

- ☑ Aux 1 and Aux 3 assignment choices are not available when 9.1W is selected, the default "Rear" will appear in Aux 1 for Channels 7 and 8, and "Front Wide" will appear in Aux 3 for Channels 10 and 13, or 11 and 12.
- ☑ If Aux channel locations have already been assigned to another Aux channel the choice will be grayed out and cannot be selected.

Dolby Enabled Speakers. On the right side of the screen are selections for Dolby-Enabled Speakers. Do not choose any of these selections when using ceiling mounted speakers.

Dolby-Enabled Speakers (DES), are now available from many speaker manufacturers. This type of speaker incorporates an additional speaker pointed upwards, designed to be part of, or fit on top of, existing floor speakers. See the generic example in Figure 37. The up-firing speakers are designed to reflect audio off the ceiling to simulate ceiling installed speakers. Although ceiling speakers are preferred it may not always be possible or desirable to install ceiling speakers. For example general installation cost of ceiling speakers, restrictions of being in a rental home, or the ceiling construction itself, could make Dolby-Enabled Speakers the alternative over installing ceiling speakers.

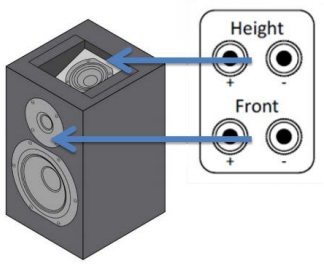


Figure 37 Dolby Enabled Speaker (DES)

Refer to the Dolby Home Installation Guide for the proper placement of these speakers to best fit your room environment. Depending on the basic speaker configuration either one or two pairs of DES speakers will be chosen and assigned.

The selections for Dolby Enabled Speakers are:

(L/R) Left and Right Front

(Ls/Rs) Left Surround and Right Surround

(Lsr/Rsr) Left surround rear and Right surround rear

When Dolby Enabled Speakers are selected, these selections will become available for Aux output assignment in the pull-down menus.

3.9.3

Bass Management Setup Procedure

1. Select the **Speaker Configuration** (that matches your basic installation) from the drop down at the upper right. Any height speakers are selected from a different menu. See Figure 34.

Table 11. Bass Management Speaker Configuration

Speaker Configu-ration	Channels														
2.0	L	R													
2.1	L	R												SUB 1	SUB2
3.1	L	R	C											SUB1	SUB2
4.1	L	R		Ls	Rs									SUB1	SUB2
5.1	L	R	C	Ls	Rs									SUB 1	SUB2
6.1	L	R		Ls	Rs	Lb	Rb							SUB1	SUB2
7.1 w	L	R	C	Ls	Rs					Lw			Rw	SUB1	SUB2
7.1	L	R	C	Ls	Rs	Lb	Rb							SUB1	SUB 2
9.1w	L	R	C	Ls	Rs	Lb	Rb			Lw			Rw	SUB1	SUB 2
Auro 9.1	L	R	C	Ls	Rs			HL	HR		HLs	HRs		SUB1	SUB 2
Auro 10.1	L	R	C	Ls	Rs			HL	HR		HLs	HRs	T	SUB1	SUB 2
Auro 11.1	L	R	C	Ls	Rs			HL	HR	HC	HLs	HRs	T	SUB1	SUB 2
Auro 11.1 (7+4)	L	R	C	Ls	Rs	Lb	Rb	HL	HR		HLs	HRs		SUB1	SUB 2
Auro 13.1*	L	R	C	Ls	Rs	Lb	Rb	HL	HR	HC	HLs	HRs	T	SUB1	SUB 2

***Note**: When Auro 13.1 is selected, a checkbox labeled “Phantom HC” appears on the Bass Management screen, for selecting a 13.1 configuration without the HC speaker. When selected, the HC channel is downmixed with HL and HR.

2. Activate **Enable Bass Management**. This is the master enable that turns on all Bass Management functions.

Speaker configurations

For steps 3 through 11, tap on the speaker below its label and set the options for that speaker. Use the Back button to return to the main Bass Management screen to select the next speaker. Note: Any speakers that are not used in the current speaker configuration will be grayed out and cannot be selected.

3. **C – Center** speaker options:
   a. **Large** – (default) Speaker can handle full range of frequencies.

b. **Small** – Cross with the subwoofer(s). Select the desired crossover filter frequency and slope. The high-pass filter to the Center speaker may be disabled if desired.

c. **Low Pass to Left/Right** – Cross the center channel to the Left and Right Front speakers. Adjust the crossover frequency and slope as needed.

d. **Phantom Center** – Use this if there is no center speaker installed. This divides the center channel between the left and right speakers. The offset can be adjusted. Note: when this is selected, the speaker is grayed out on the main Bass Management screen.

4. **L, R – Left** and **Right** speaker options:
   a. **Large** – (default) Speaker can handle full range of frequencies.
   b. **Small** – Cross with the subwoofer(s). Select the desired crossover filter frequency and slope. The high-pass filter to the Left and Right speaker may be disabled if desired.
5. **Ls, Rs – Left Surround** and **Right Surround** speaker options:
   a. **Large** – (default) Speaker can handle full range of frequencies.
   b. **Small** – Cross with the subwoofer(s). Select the desired crossover filter frequency and slope.
   c. **Small, cross to L/R** – The Left Surround will be crossed to the Left Front speaker and Right Surround will be crossed to the Right Front speaker. Select the desired crossover filter frequency and slope. In order to use this option, the Left and Right Front speakers should be defined as Large. If not, an error message will appear on the screen.
   d. **Phantom Surround** – Use this if Left and Right Surround speakers are not installed. The Left Surround channel is mixed with the Left Front speaker and the Right Surround channel is mixed with the Right Front speaker. The offset can be adjusted.
6. **Lb, Rb – Left Back** and **Right Back** speaker options:
   a. **Large** – (default) Speaker can handle full range of frequencies.
   b. **Small** – Cross with the subwoofer(s). Select the desired crossover filter frequency and slope.
   c. **Small, cross to L/R** – The Left Back will be crossed to the Left Front speaker and Right Back will be crossed to the Right Front speaker. Select the desired crossover filter frequency and slope. In order to use this option, the Left and Right Front speakers should be defined as Large. If not, an error message will appear on the screen.
7. **Lw, Rw – Left Wide** and **Right Wide** speaker options:
   a. **Large** – (default) Speaker can handle full range of frequencies.
   b. **Small** – Cross with the subwoofer(s). Select the desired crossover filter frequency and slope.

8. **HL, HR – High Left** and **High Right** speaker options:
    a. **Large** – (default) Speaker can handle full range of frequencies.
    b. **Small** – Cross with the subwoofer(s). Select the desired crossover filter frequency and slope.
    c. **Small, cross to L/R** – The High Left will be crossed to the Left Front speaker and High Right will be crossed to the Right Front speaker. Select the desired crossover filter frequency and slope. In order to use this option, the Left and Right Front speakers should be defined as Large. If not, an error message will appear on the screen.
9. **HC – High Center** speaker options:
    a. **Large** – (default) Speaker can handle full range of frequencies.
    b. **Small** – Cross with the subwoofer(s). Select the desired crossover filter frequency and slope.
    c. **Small, cross to C** – The High Center will be crossed to the Center speaker. Select the desired crossover filter frequency and slope. In order to use this option, the Center speaker should be defined as Large. If not, an error message will appear on the screen.
10. **HLs, HRs – High Left Surround** and **High Right Surround** speaker options:
    a. **Large** – (default) Speaker can handle full range of frequencies.
    b. **Small** – Cross with the subwoofer(s). Select the desired crossover filter frequency and slope.
    c. **Small, cross to Ls/Rs** – The High Left Surround will be crossed to the Left Surround speaker and High Right Surround will be crossed to the Right Surround speaker. Select the desired crossover filter frequency and slope. In order to use this option, the Left Surround and Right Surround speakers should be defined as Large. If not, an error message will appear on the screen.
11. **T – Top** speaker options:
    d. **Large** – (default) Speaker can handle full range of frequencies.
    e. **Small** – Cross with the subwoofer(s). Select the desired crossover filter frequency and slope.
    f. **Cross to L/R/Ls/Rs** – Top speaker will be crossed with the Left Front, Right Front, Left Surround, and Right Surround speakers. In order to use this option, the L, R, Ls, and Rs speakers should be defined as Large. If not, an error message will appear on the screen.

Subwoofer configurations

12. Select the **Subwoofer Configuration** button and select the appropriate number and position of the subwoofers used from the dropdown menu. The subwoofer configuration option configures the bass management with the number of subwoofer channels from 0 to 2.

Table 12. Bass Management Subwoofer Configuration

Subwoofer Configuration Options	Number of Subwoofers	Subwoofer Assignments
No Subs	0	None
Mono	1	SUB 1 Mono
2 x Mono	2	SUB 1 Mono, SUB 2 Mono
Left/Right	2	SUB 1 – Left, SUB 2 - Right
Front/Back	2	SUB 1 – Front, SUB 2 - Back

13. Select **Full Range to Subs** only if you wish to omit the Low Pass filter for all channels crossed to the subwoofer.
14. Select the **Height Speaker Conf** button to setup any height speakers or Dolby-Enabled speakers, if applicable. See section 3.9.2 above for more information.
15. Return to the Bass Management Setup screen and verify the configuration. All speaker configuration options are described in text next to the speaker. This completes the bass management setup.

3.10 System Setup

Press the **System** button on the **Setup Home** screen to open the System Setup screen.

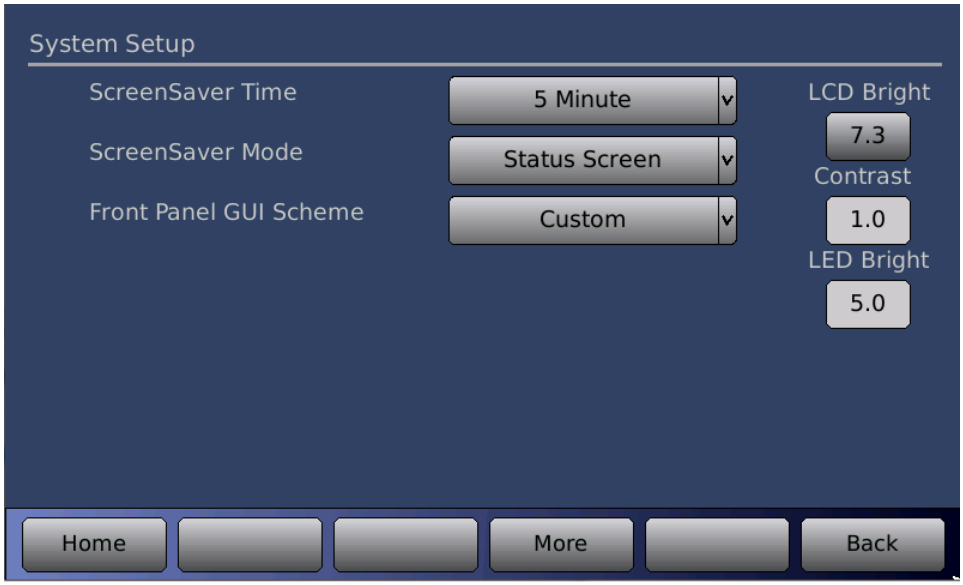


Figure 38. System Setup

Select ScreenSaver Time, Mode, and Front Panel GUI Scheme on this screen. You can also set the touch screen brightness and contrast, and LED brightness on the front panel touch screen.

ScreenSaver Time - Options include a 10 second delay, 1 minute delay, or 5 minute delay before screen saver initiates.

ScreenSaver Mode - Disabled, Dim Screen, Graphic, Black Screen, or Status Screen.

- **Disabled** will turn off the screen saver.
- **Dim Screen** will reduce the touch screen brightness after the time specified in the ScreenSaver Time drop-down menu. Click on the line to select. Use the up/down arrow keys on your connected computer to scroll the list if the list is longer than the viewable lines.
- **Graphic** mode uses a stored screen saver graphic. The LS10 comes from the factory loaded with a Datasat screensaver graphic. A custom screensaver . may be loaded via USB into the LS10 using the "Custom GUI" function (see section 3.13 USB Save/Restore).
- **Black Screen** will black out the screen after the specified time selected under Screensaver Time.
- **Status Screen** shows the volume level, the current input, and displays stream information (ex. PCM 2.0).

Front Panel GUI Scheme – select color scheme for the touchscreen: Warm (orange-brown background with gray buttons), Blue (dark blue background with light blue buttons), or Custom (requires downloading color scheme.txt file through USB).

LCD Bright – Use the up/down arrow keys on your connected computer to adjust the brightness of your touch screen.

Contrast – Use the up/down arrow keys on your connected computer to adjust the contrast of your touch screen.

LED Bright – Adjusts brightness for the two blue LEDs on the Datasat logo on the front panel. Brightness can be set from 0.0 (off) to 10.0.

Date/Time – This screen allows you to read or set the system time and date. This should be used to set the time only if not using Network Time Protocol (NTP), which sets the time automatically through the network when the system boots.

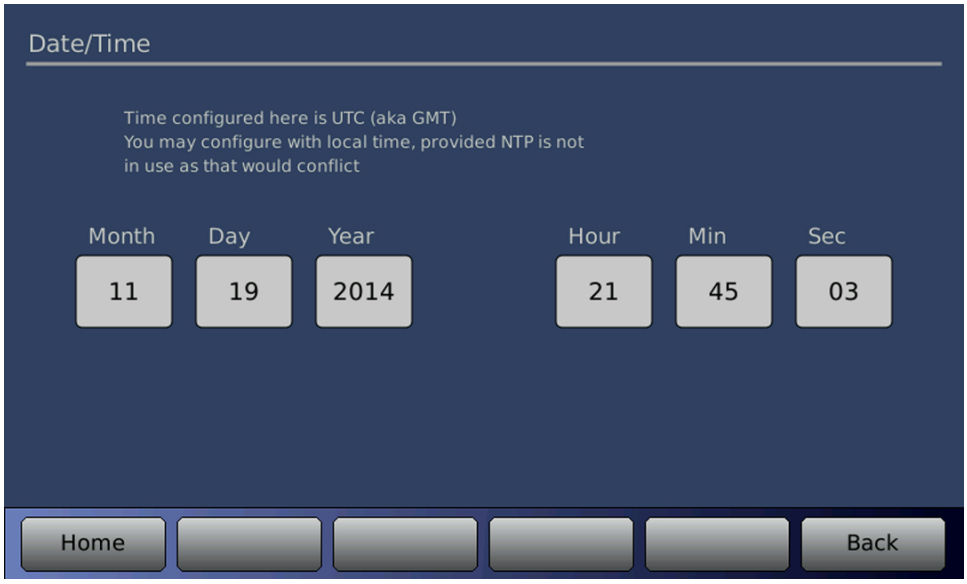


Figure 39.Date/Time

The system time and date are used for the timestamps given on files written to a USB device. It also assists troubleshooting, when problems occur, because a timestamp is included in all log entries.

Touch the **More** button to view the second System Setup screen.

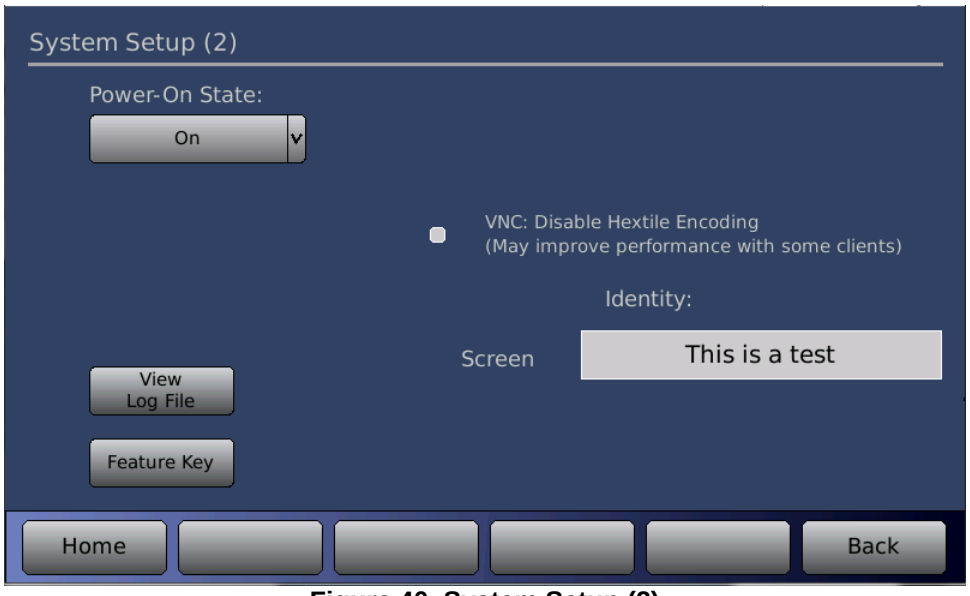


Figure 40. System Setup (2)

On this screen you can set the following:

Power-On State – Select On, Off, or Last Power State.

View Log File – Touch the button to switch to the Log File screen.

Feature Key – Touch to open a virtual keyboard for entering the key.

Identity: – Touch to open a virtual keyboard for entering text to appear on the touchscreen.

VNC: Disable Hextile Encoding – Touch to activate.

3.11 Update LS10 Software

Tap the **Update** button on the **Setup Home** screen to open the **System Update** screen. The current version of LS10 software is displayed in the **Current** field.

There are two ways you can update your software using this interface. The first way is to use the System Update screen to connect to the servers at Datasat Digital Entertainment to select and install the update. This requires that the LS10 is connected to the Internet. The second way is to install the update from a **USB Device**. Both methods are described in more detail below.

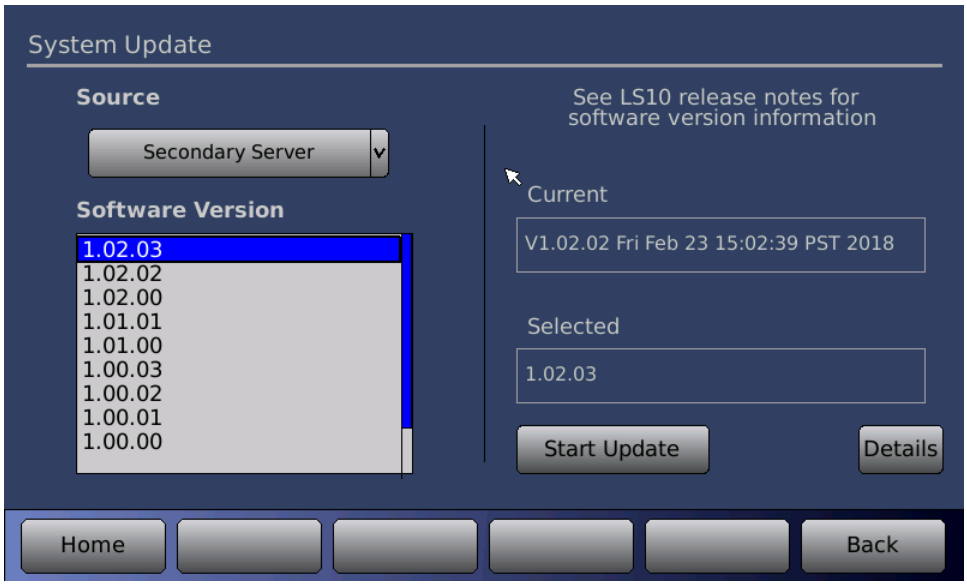


Figure 41. System Update

Tap **Select Update Source** to select from the dropdown. (Main Server, Secondary Server, or USB).

3.11.1 Update System Software from Network

The following steps describe how to update your LS10 software through the Internet by connecting to a Datasat server.

1. From the **Select Update Source** drop down menu, select **Main Server**, or **Secondary Server**. Both will provide the same information.

If you successfully connect to the server a list will appear of all available software versions. The most current will always be at the top of the list. The version of software currently loaded on the LS10 will be shown in the **Current** box on the upper right hand side of the screen.

2. Use the up/down arrow keys on your connected computer to highlight the desired software version. The highlighted software version will display under **Selected** on the right side of the screen.
3. Click **Details** to see more information on the selected version.
4. Once the desired version is confirmed, press the **Start Update** button

> **Note**: If you select an older version of software than is currently loaded on the LS10, you will receive a warning message and be asked to verify that you wish to continue.
>
> **Note**: Your LS10 must already have an active internet connection in order to update software through the internet. If you receive a message “failed to get file list” your internet connection is not working and the LS10 is unable to connect with the server.

5. Connection will take place automatically, and the following screen will appear.

Figure 42. Downloading Software Update via Internet

Depending upon your connection speed, downloading, decompressing, and installing files could take anywhere from 10 minutes to less than a few minutes to complete.

6. When the installation process is finished, the LS10 will automatically reboot. The VNC connection is lost during a reboot, so you will need to reconnect after the update and reset completes. Wait for the **Home** screen to appear again on the front panel when the reboot completes.
7. Using VNC, check the **System Update** screen to verify that the new version of software is installed. The installed software version can also be verified through the LS10 touch screen display by selecting the gear symbol in the upper left hand corner.

3.11.2 Update System Software from USB Device

You may update the software through a USB drive.

1. First, obtain the software update file from the Datasat Digital Entertainment web page at http://www.datasatdigital.com/training and support/product support & downloads/LS10.

   Note: This is a zipped file.

2. Download the zipped file to your desktop, unzip it and extract the file with the .upd extension (example: ciLS10v10203_rel.upd). Note that the extracted file's name must not be changed in order be correctly identified by the LS10.
3. Copy the extracted .upd file to the USB drive root directory.
4. Insert the USB drive into the **USB Save/Restore** slot on the rear panel of the LS10, choose **Select Update Source > USB**, then select the update file and press the **Start Update** button.

   Note: If you select an older version of software than is currently running on the LS10, you will receive a warning message and be asked to verify to continue.

5. When the installation process is finished, the LS10 will automatically reboot. The VNC connection is lost during a reboot, so you will need to reconnect after the update and reset completes. Wait for the **Home** screen to appear again when the reboot completes. You may remove the USB drive from the LS10 when the **Home** screen appears.
6. Using VNC, check the **System Update** screen to verify that the new version of software was installed. The installed software version can also be verified through the LS10 touch screen display by selecting the gear symbol in the upper left hand corner.

3.12 HDMI Status and Firmware Update

Press the **Decoder** button, on the **Setup Home** screen, then press the **HDMI** button in the lower right corner to open the **HDMI Status** screen. The left hand section of the screen will display HDMI status info.

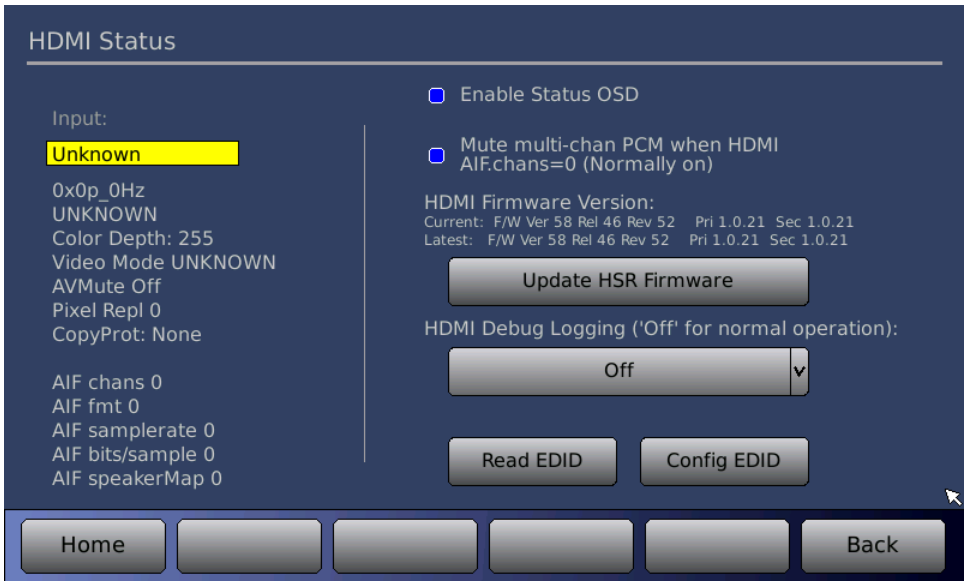


Figure 43. HDMI Status

Enable Status OSD – Select to enable on screen display of input source, volume, and audio stream type on your monitor or TV. Note: The OSD is not persistent. It displays for a short time when a change in status is detected (such as changing the volume).

Mute multi-channel PCM when HDMI AIF.chans=0 – This is set to on for most equipment, to mute any extraneous noise when the AIF information indicates that no audio is being received. Turn this off if needed, notably for some DIRECTV receivers.

Update HSR Firmware – The current loaded HDMI firmware version vs. the latest available version is listed above this button. If a newer version is available, press the button to update. In the example shown in Figure 43 above, no update is needed.

HDMI Debug Logging – This is normally set to **Off**. Select **Log to hsrdbg.txt** to create a log file. The log file is helpful for debugging by Datasat Digital Entertainment staff. You may be asked by the Datasat staff to save the diagnostic information including the log files on the USB Flash drive, to send for troubleshooting purposes.

Read EDID – Press this button to see extended display identification data (EDID). Use a mouse wheel or the keyboard up/down arrows to scroll through the data displayed.

Config EDID – Pressing this button brings up an **EDID OverRide** screen. This screen will allow you to select between HDMI versions 1.4 and 2.0 for each HDMI input. Some older devices may have compatibility issues with HDMI 2.0 and require the version to be set to1.4 for proper function.

3.13 USB Save/Restore

Press the **USB** button on the **Setup Home** screen to open the **USB Save/Restore** screen.

Figure 44. USB Save/Restore

Use this screen to save your configuration on a USB storage device, or to load from a USB. Select an activity on the left, then tap **Copy** on the right.

You can save the following:

- LS10 Configuration
- Master Configuration
- Diagnostic Information – (the system log file) for use in troubleshooting the system

You can load the following from a USB drive:

- LS10 Configuration
- Master Configuration
- Custom GUI

These functions (above) are identical to the following USB functions available through the touch screen display.

- Save LS10 Configuration = [Save]
- Save Diagnostic Information = [Diag]
- Load LS10 Configuration = [Load]

3.13.1 Saving and Restoring Configuration Files

A **Master Configuration** is intended to be a template used to configure similar LS10s in a system. It is used as the first step in creating the configuration of each installed unit. Copy the master configuration file from one LS10 and load it via USB into all LS10 units.

> **Note**: Always be careful, as any existing Master Configuration file on the USB will be overwritten when you save another one.

The **LS10 Configuration** is specific to one LS10 by including the serial number of the unit in its filename. This configuration contains the unique parametric EQ, inputs, automation, and global configurations set for that LS10. The configuration file can only be loaded back onto the same LS10.

You can also load a **Custom GUI** (screensaver) of your choice via the USB port. The screensaver must be a jpeg image. The maximum image size is a 480 wide x 272 high (smaller images will be centered). The file must be named “ls10.jpg" and placed in the root directory of the USB device.

To perform any of these actions, insert the USB Flash drive into the **USB Save/Restore** connector on the rear panel and then select the **USB** button on the **Setup Home** screen. (If no Flash drive is present, a message will appear prompting you to insert a USB device.)

The following table summarizes the available options when using a USB Flash drive:

Table 13. USB Flash Drive Options

Option	Result
Save LS10 Config	Save LS10 configuration to USB device. This will erase from the USB device any previous configuration stored for this unit.
Save Master Config	Save LS10 configuration to USB device as MASTER configuration, which may be loaded onto other LS10 units. This will erase from the USB device any existing MASTER configuration.
Save Diagnostic Info	Save LS10 Diagnostic information to the USB device to facilitate troubleshooting.
Load LS10 Config	Copy LS10 configuration from USB device to system. This will ERASE the existing configuration on the LS10 and cause a system restart after loading the new configuration.
Load Master Config	Copy LS10 MASTER configuration from USB device to system. This will ERASE the existing configuration and cause a system restart after loading the new configuration on the LS10.
Load Cutom GUI	Load a graphic image from the USB device and use it as the screensaver.

3.14 LogFile

Press the **Log File** button on the **Setup Home** screen to open the **Log File** screen.

The log file is a complete listing of all software events that have taken place since the LS10 was last powered on. The listing includes changes made internally by the LS10 software, as well as user initiated system changes through the touch screen interface. You may scroll through the log file using the up/down arrow keys on your connected computer.

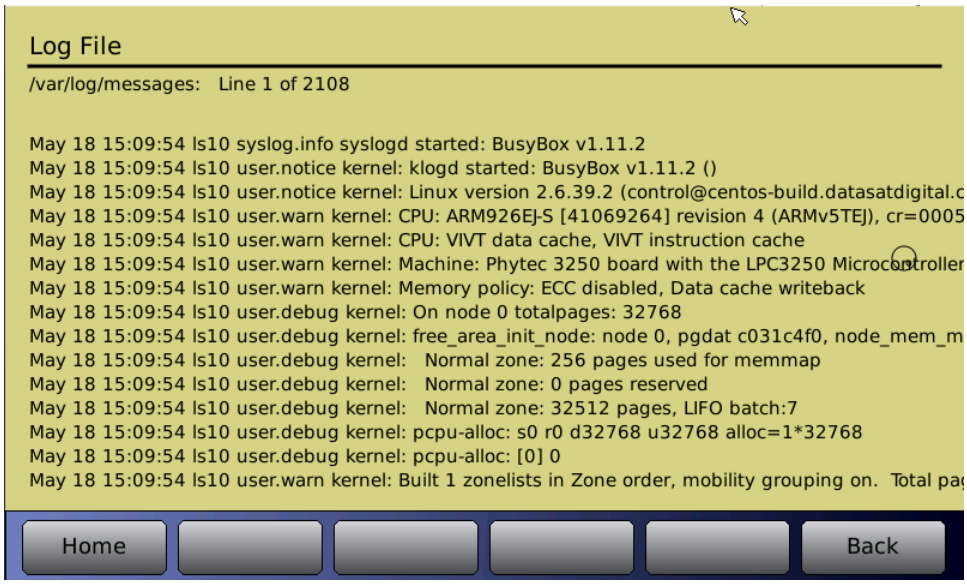


Figure 45. Log File

The log file is helpful for debugging by Datasat Digital Entertainment staff. You may be asked by the Datasat staff to save the diagnostic information including the log files on the USB Flash drive, to send for troubleshooting purposes.

3.15 Info

Press the **Info** button on the **Setup Home** screen to open the **Info** screen.

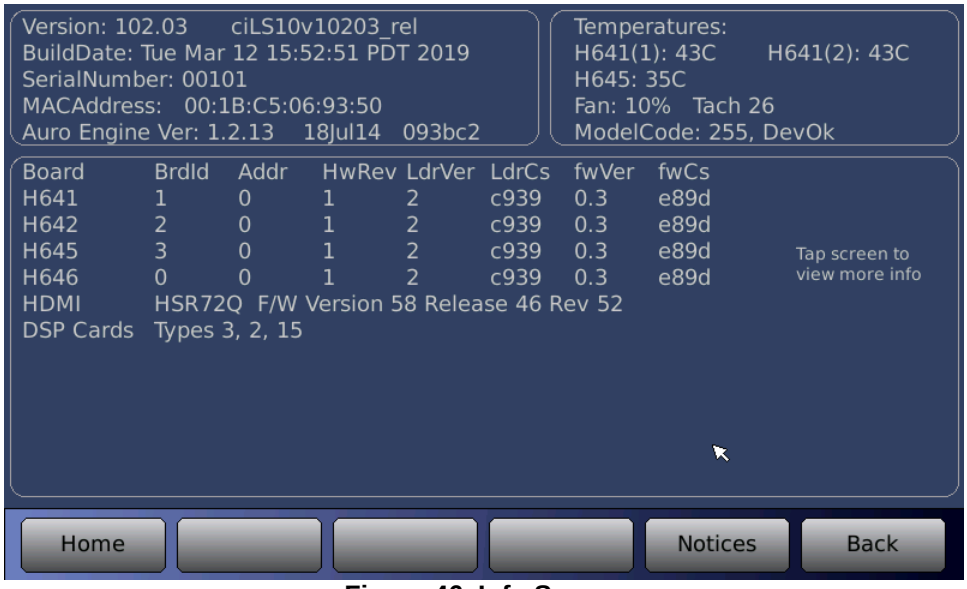


Figure 46. Info Screen

The **Info** screen displays the LS10 software version, build date, serial number, and MAC address. The screen also displays internal temperatures, and circuit board identification.

Version, Serial Number, and MAC address

- The upper left portion displays software version and build date, unit serial number, MAC address, and the Auro Engine version (if applicable).

System Monitor

- The upper right portion displays the internal circuit board temperatures.
- The lower portion on the first screen displays board information such as board ID, Address, hardware revision level, loader version, loader check-sum, firmware version, and firmware check-sum.
- Tap the lower portion of the screen to view the second info screen, which displays the expected and actual bus voltages for each board. It is normal for the actual level to vary slightly from the expected. The background color for the expected and actual values will turn red should the actual voltage be out of the acceptable range.

3.16 Notices

The **Notices** screen identifies open source software packages that were used in the system. The screen can be scrolled to view open source software packages used, along with the version number and license agreements.

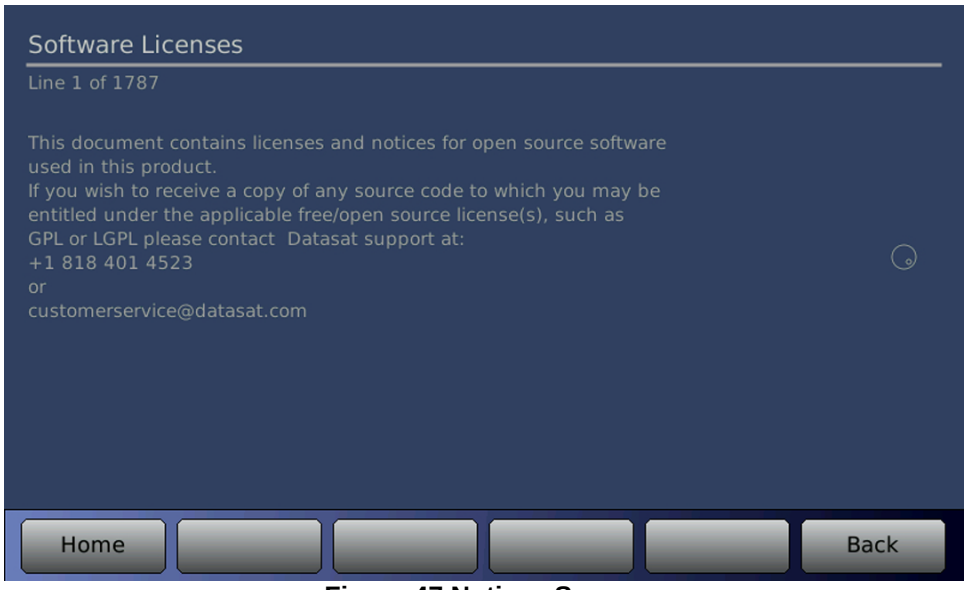


Figure 47.Notices Screen

3.17 Network

Press the **Network** button on the **Setup Home** screen to open the **Network Configuration** screen.

> **Note**: Some of the network configuration functionality is duplicated in the front panel touch screen interface. Refer to *Network*, page 19, to check or change network settings in order to get VNC access to the LS10.

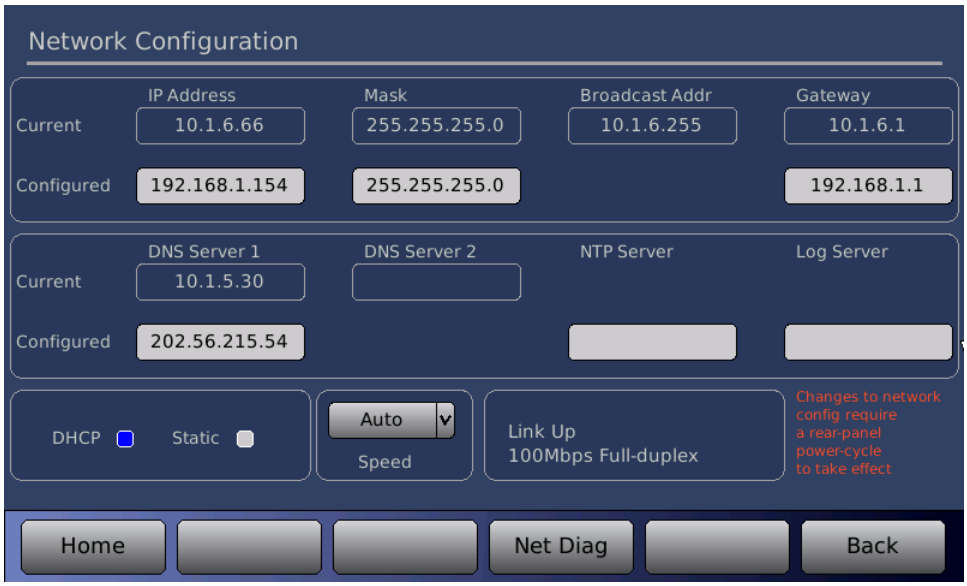


Figure 48. Network Configuration

The Network screen displays the current network mode and IP address. It also displays whether or not the network connection is currently up or down. Use it to change between dynamic and static IP addressing. Any changes require the LS10 be rebooted (power cycled from the rear panel power switch) to take effect.

- To change or enter a value, touch the box under the appropriate label.
- The DNS Server, NTP server and Log file server can be entered whether using DHCP or Static modes.

Table 14. Network Configuration

Field	Description
IP Address	Current and configured IP address. The Configured IP address is one you have entered (while in Static mode). The Current IP address is the one obtained from the server (when in DHCP mode, this is the IP address issued by the DHCP server). **Note**: If you switch from DHCP to Static and enter a new IP address into Configured, the IP address shown in Current will not change until you reboot.
Mask	Current and configured netmask, specifies the size of the network. For simple networks this is: 255.255.255.0
Broadcast Addr	This is a single address for devices to communicate with all other devices on the LAN at once. For simple networks, the first 3 number groups are the same as the IP addresses and the 4th group is 255.

Gateway	Current and configured gateway or router, which connects to other networks (for example, to the Internet).
DNS Server 1	Domain Name Server 1, current and configured
DNS Server 2	Domain Name Server 2, current.
NTP Server	Network Time Protocol server, configured, where the correct time will be obtained.
Log Server	Server where the log files will be stored. Note: Server must support the syslog logging protocol.
DHCP or Static	**DHCP** means that when the LS10 is connected to the network, an IP Address is automatically assigned to it. The boxes for IP Address, Mask, Broadcast Addr, Gateway and DNS Server 1 are filled in. In **Static** IP mode, the installer must assign the IP Address, Mask, Broadcast Addr, Gateway and DNS Server 1.
Speed	Auto, 100 MB/s or 10 Mb/s (use the up/down arrow keys on the connected computer to select)
Link Up	When the LS10 is successfully connected to the network, the text **Link Up** will be displayed along with the connection type. The options are: 10Mbps Full-duplex or 100Mbps Full-duplex

3.18 Network Diagnostics

On the Network Configuration screen, tap **Net Diag**.

Figure 49. Network Diagnostics

Table 15. Network Diagnostics

Field	Description
Ping Test	Tests whether the remote network device can be accessed through the network.
Dest: <SelectAddr>	Selects the remote computer or IP address for the ping test. Open the dropdown and select: **Gateway** **DNS Server** **NTP Server** **Log Server** **Datasat** Click on the text box to enter or change an IP address. Then a virtual keyboard screen opens, where you enter the IP address.
Log Net Stats	Enable this to include additional network events in the log to troubleshoot a network problem. This option is always disabled after a power cycle.
Phy Interface	Physical interface
Rx	Monitors Receive activity.
Tx	Monitors Transmit activity.
DHCP	DHCP address

3.18.1 Is there an Internet Connection?

Some local area networks (LANs) have a connection to the Internet, some do not. In order to update the LS10 from the Datasat server, there must be an Internet connection. To test this, select **Net Diag** and use the **Ping Test** utility. Select the destination **Datasat** in the **Dest:** box. Press **Ping Test**, and verify the reply is 'OK'.

3.19 Access Control

Press the **Access** button on the **Setup Home** screen to open the **Setup Access Control** screen.

By creating passwords, you can control user access to certain functions of the LS10.

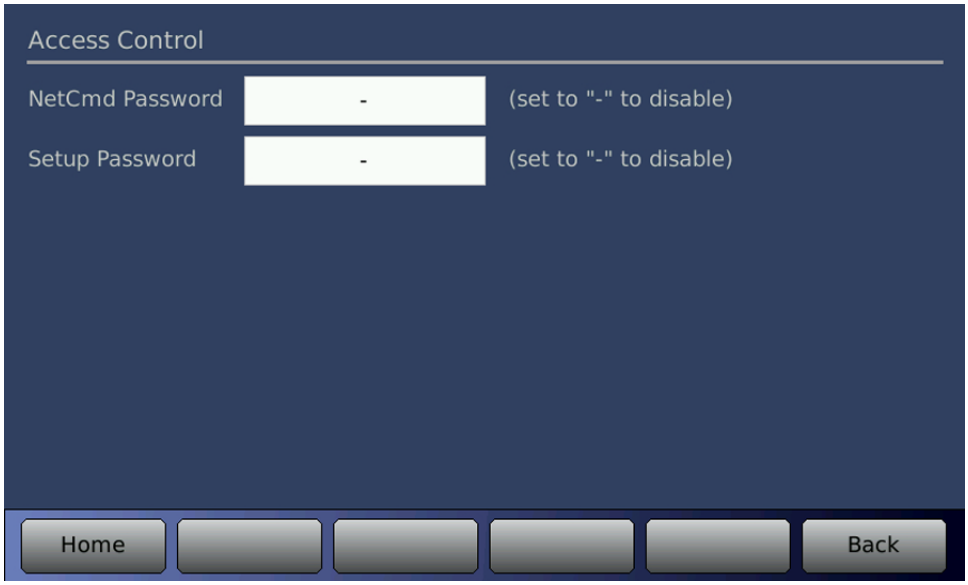


Figure 50. Access Control

> **Note**: This application accepts only Latin alphanumeric characters.

Enter your **Network Command** password and **Setup** Password, to continue.

The **NetCmd** password is used to prevent unauthorized access to network TCP/IP operator level commands. A **Setup** password is used to authorize a network TCP/IP connection to perform setup commands, and also sets the password for VNC access.

If the setup password is set to "-" then the password is disabled at the LS10 touchscreen, but VNC access will require the "-" as a password for access. If this is set to blank, the password will be disabled for both the touchscreen and VNC access.

> **Note**: Remember that the setup password entered must be used to reenter the VNC interface.

If the password is lost and you cannot access the LS10, contact Datasat Digital Entertainment technical support.

Password restrictions take place as soon as the password is configured in the Access Control screen.

Passwords are case sensitive. You can enter upper case characters by using the shift button on the virtual keyboard (see figure below). To remove Setup password protection, clear the password by pressing the **Clear** button, then enter a hyphen "-" and press **OK**.

Tap **Home** to return to the **Setup Home** screen.

Figure 51. NetCmd Virtual Keyboard

3.20 Automation Macros

On the **Setup Home** screen, press **Macros**.

The Automation Macros feature allows you to create a script of multiple actions. A Macro may then be assigned to an Event. The menu bar contains an **Events** button to allow easy navigation between the Events screen and the Macros screen when building Macros and assigning them to Events.

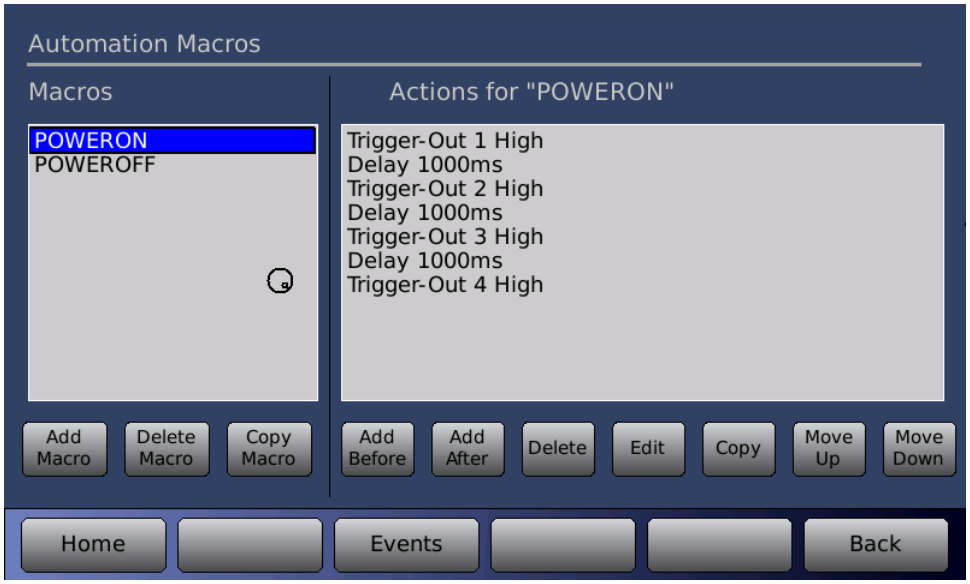


Figure 52. Automation Macros

A list of existing Macros are displayed on the left. Scroll through the list of Macros using the up/down arrow keys. When an existing Macro is highlighted the actions making up that Macro are displayed. The example above shows the POWERON Macro.

> **Note**: The macros named POWERON and POWEROFF are automatically executed during the power-on and power-off cycle, respectively.

3.20.1 Add Macro

To add a Macro, select the **Add Macro** button. The virtual keyboard screen will appear where you enter a Macro name.

> **Note**: This application accepts only Latin alphanumeric characters.

Enter a name that is meaningful. A name of up to 15 characters will be displayed. The new Macro name will appear on the list and its **Actions** list will be blank.

Select the screen panel under **Actions for** <macro name>. Actions may now be added. Select **Add After** to enter the first action. This will bring up the **Automation Edit Action** screen (for a description of options available, see Figure 55 and text following it, on page 73).

Continue to define the Macro script by adding Actions before or after existing Actions (highlight existing actions using the up/down keys or mouse scroll wheel). Existing Actions may also be highlighted and edited (select the **Edit** button) or removed (select the **Delete** button).

3.20.2 Delete Macro

To delete a macro, highlight it on the list and select the **Delete Macro** button. A Delete/Cancel prompt will appear.

> ⚠ **Caution:** A macro may be deleted even if it is associated with an Event.

3.20.3 Copy Macro

This feature is useful to create a Macro similar to an existing Macro without reentering all the actions. After the Macro is copied, just change or edit actions as needed.

To copy a Macro, first highlight the source macro, then press the **Copy Macro** button. A keyboard will appear to enter the name of the new Macro. After entering the new Macro name, press OK to return to the Macro list, where the new Macro will be added.

3.21 Automation Events

The **Events** button on the **Automation Macros** screen opens the **Automation Events** screen, where Events are configured.

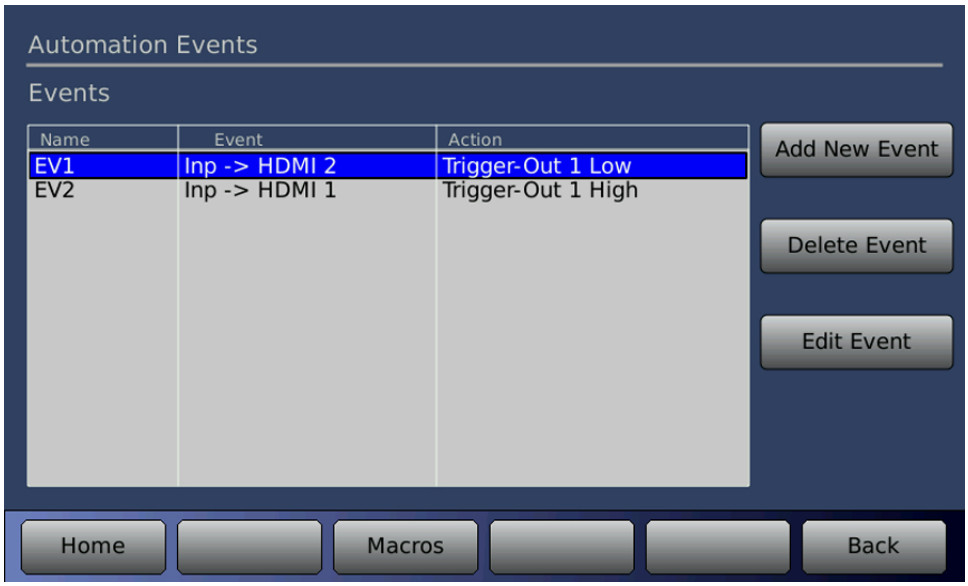


Figure 53. Automation Events

Existing events are displayed in the Automation Events screen. Use the up/down arrow keys or mouse scroll wheel to move the selection bar to an existing event for editing or deleting. The list will scroll when there are more events in the list than can display at one time. The **Macros** button at the bottom of the screen allows easy navigation between the **Events** screen and the **Macros** screen when building Macros.

3.21.1 Add New Event

Selecting the **Add New Event** button takes you into the **Automation Edit Event** screen and automatically assigns a temporary event name. In the example below, EV2 is the temporary name.

When an event is first added the Event Type defaults to **No Event**. This means the event type is not yet configured.

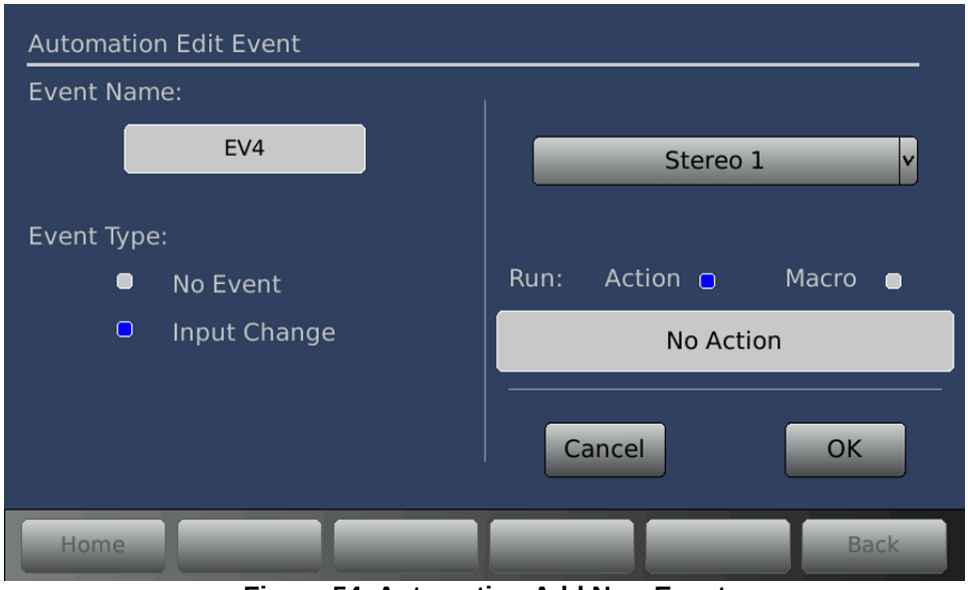


Figure 54. Automation Add New Event

- To assign or change the Event name, touch the **Event Name** field. A keyboard screen will open allowing you to type in a new name for this Event.

Note:	This application accepts only Latin alphanumeric characters.

- Touch the **Input Change** button to set up the Event or change its actions. The screen will display more options, in the right panel.
- Select an audio input from the dropdown on the right. (In this example, Stereo 1 is selected.)
- To assign a macro to the Event, select the **Macro** button, touch the Macro dropdown list and select from the list (POWERON and POWEROFF, or any custom macros added by the user). Touch **OK** when finished, or touch **Cancel** to cancel.
- To assign an Action to the button, select the **Action** button and touch the white field that appears below it. This will bring up the **Automation Edit Action** screen.

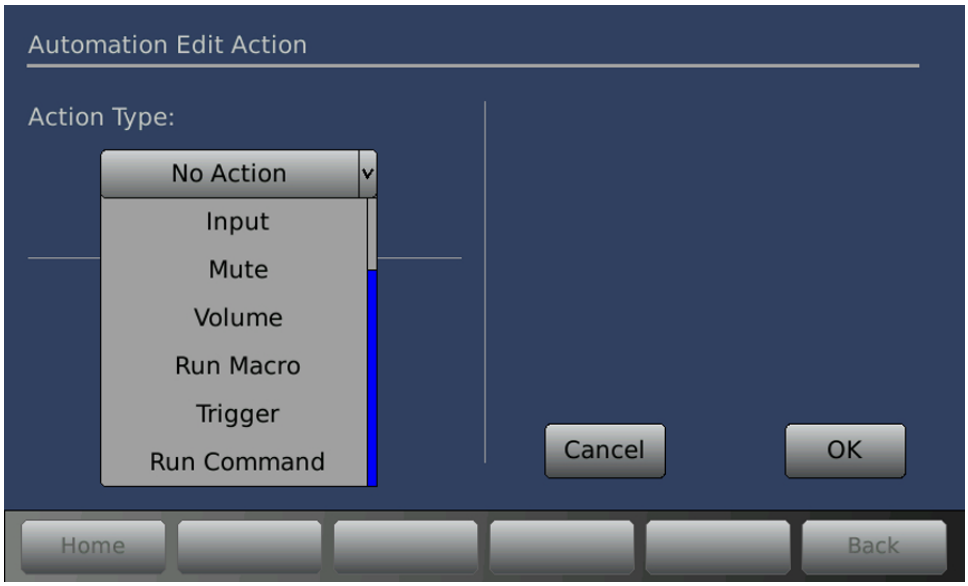


Figure 55. Automation Edit Action

- Select an **Action Type** from the dropdown list, using the up/down arrow keys or the mouse scroll wheel.
  - **Delay** is set in milliseconds (ms) with a range of 0-10000ms (10 seconds).
  - **Input** – select the Input type from the **Change Input To** dropdown.
  - **Mute**– Select between **On** or **Off**.
  - **Volume** – The master volume control can be either **Set** to a specified value, or it can be incremented or decremented (**Adjust**) through automation.
  - If **Run Macro** is selected, then accept or change the **Macro Name**. Touch the field to open a keyboard screen.

    Note: This application accepts only Latin alphanumeric characters.

  - **Trigger** – In the **Set** field, select which Trigger output (1 through 4) to use. In the **To** field, select **Pulse**, **Low**, or **High**. If **Pulse** is selected, then enter a value in the **Width** field. The pulse width can be set between 100ms and 1000ms in 5ms increments.
  - **Run Command** – Touch the **Cmd** field to open a virtual keyboard screen. Enter an LS10 command to be run. Any LS10 command defined by the LS10 command API can be executed by this action. The LS10 API command definitions are in **Appendix E, LS10 Command API**. Do not include the leading '@' character, or the trailing carriage return when entering the command as a Run Command action (they are necessary only for remote serial or network commands).
- Touch **OK** when finished, or touch **Cancel** to cancel this setup.

3.21.2 Delete Event

Select an Event from the listing and touch the **Delete Event** button. A confirmation screen will appear. Select **Delete** or Cancel.

3.21.3 Edit Event

To edit an existing event, highlight the event on the list and select **Edit Event**. This will bring up the Automation Edit Event screen. Editing choices are the same as those described above in 3.21.1 Add New Event.

3.22 Automation Serial Setup

The LS10 can be configured to allow an external device to send an RS232 command to the LS10. When the LS10 receives the specified serial command, it will then execute any predefined action or macro.

From the Setup Home screen, select Automation **Serial**.

- The baud rate and number of Data Bits must be set in the **Automation Serial Setup** screen to match the settings used by the external RS232 device.
- The RS232 device must be connected to the Serial Control port on the back of the LS10.

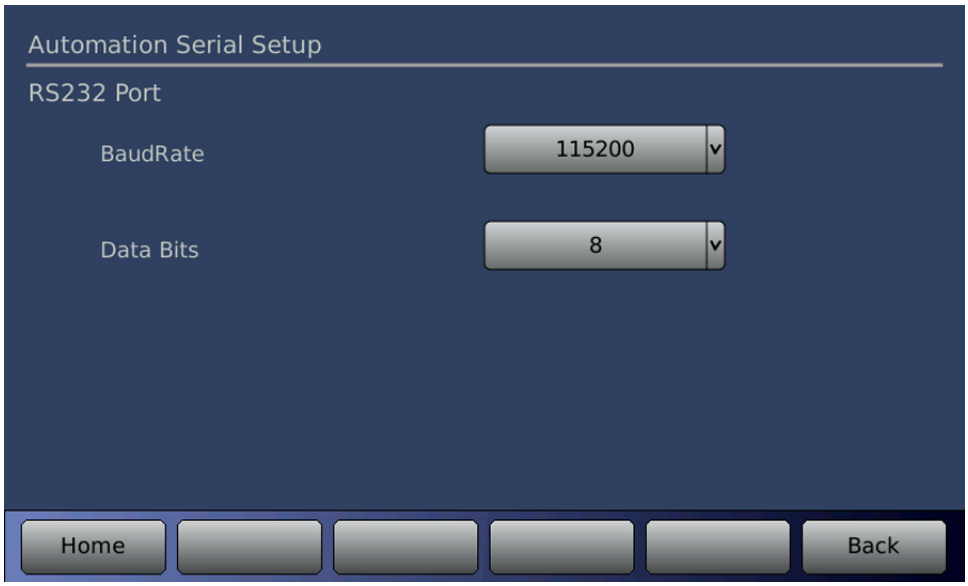


Figure 56. Automation Serial Setup

- Select the correct **Baud Rate** from the dropdown list.
- Select the **Data Bits**: 7 or 8, from the dropdown.

3.23 HDMI Outputs to Different Devices

When HDMI outputs are connected to different display devices, the video image is displayed on both. The HDMI interface on the LS10 does not perform any video conversion. The same video resolution will be used on both outputs.

If the player (HDMI input to the LS10) is set to Auto-Select the Resolution, then the resolution of the image is negotiated between the player and the display devices. It will be set to the highest resolution that is supported by both display devices. If the display device on output 1 supports up to 1080p and the highest resolution on display device for output 2 is 720p, then the player will select to play at 720p, and that resolution is used on both HDMI outputs on the LS10. Some players can be configured to output at a specific resolution and, in that case, the selected resolution will be used on both HDMI outputs.

3.24 LS10 Playback Sound Check

After installing and setting up the LS10—or doing a maintenance check—it is a good idea to play content and stand in the listening room while listening to the first few minutes of the movie. Check for the following:

- The overall sound level is comfortable and balanced.
- The sound quality is excellent and does not include extraneous noise.
- The dialog is in sync with the picture being shown.
- The surround speakers are heard at the correct level (Please note that not all content will have surround material.)

To adjust the overall sound level in the listening room, adjust the main volume control on the audio processor.

4.0 Audio Processing Theory

4.1 Bass Management Theory

Bass management balances the bass portion of the audio system based on the speaker configuration. Sub-bass configurations vary from 0 to 2 subwoofers.

4.1.1 Crossed Speakers

Each channel may be combined with the LFE channel in order to extend the low range beyond what can be heard from the channel's speaker. The software allows you to set crossover filter frequency and slope to best match the speaker(s). The high pass and low pass filters range from 31Hz to 160Hz, and use either 12dB/octave or 24dB/octave.

Figure 57 illustrates how the left channel input may be divided between the left channel and the LFE channel. Each channel works in a similar fashion. The high pass filter can optionally be bypassed.

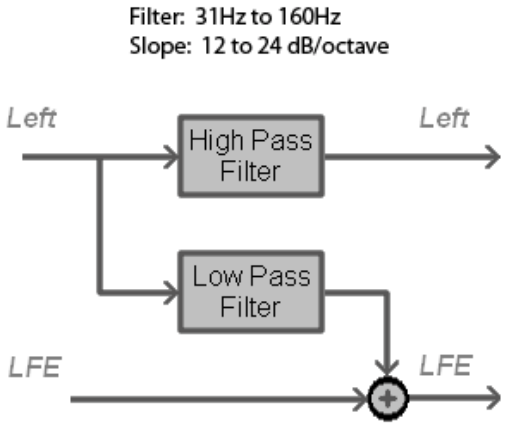


Figure 57. Dividing the Left Channel

There is one configuration for each of the channel pairs, and a separate configuration for the Center, High Center, and Top channels. Individual configurations can be made for the following speakers or speaker pairs:

- Center Speaker (C)
- High Center (HC)
- Top (T)
- Left Front, Right Front (L/R)
- Left Surround and Right Surround (Ls/Rs)
- Left Back Surround and Right Back Surround (Lb/Rb)
- Left High Front and Right High Front (Lh/Rh)
- Left Wide Front and Right Wide Front (Lw/Rw)
- High Left Surround and High Right Surround (HLs/HRs)

The speakers that can be selected for bass management crossover options depends on the speaker configuration.

4.1.2 Single Subwoofer

A bass management configuration with a single subwoofer will mix the low frequency of all crossover channels with the LFE channel. You can select which speakers to cross by assigning them to be “small” speakers in the bass management configuration setup screens.

4.1.3 Two Subwoofers

When there are two subwoofer channels assigned using bass management the LFE channel is evenly mixed between both of the subwoofers. The LFE in SUB 1 and SUB 2 is attenuated to compensate for having two subwoofers. The summed output level can be adjusted for each subwoofer on the Audio Levels screen.

When two subwoofer channels are used they can be assigned location information to specify Left/Right, Front/Back, or 2 X Mono positioning. If Left/Right is selected, the speakers on the left will be crossed with the left subwoofer (SUB 1) while speakers on the right are crossed with the right subwoofer (SUB 1). The Center, High Center and Top speakers would always be crossed evenly between both subwoofers.

If Front/Back is selected, the front speakers are crossed with front subwoofer (SUB1) while surrounds are crossed with back subwoofer (SUB 2).

The option 2 X Mono can be used if it is preferred to have both subwoofer outputs be the same. That is, an equal mix of crossed signals from all speakers.

4.1.4 No Subwoofers

When no subwoofer is installed, the LFE can be mixed with the Left/Right and/or Left Surround/Right Surround speakers by having those speakers selected as “Large” in the Speaker Options screen.

Figure 58 illustrates the LFE input being mixed with the left channel.

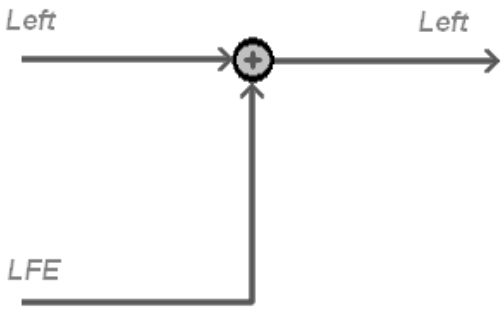


Figure 58. LFE Mixed with Left Channel

4.1.5 Subwoofer Audio Processing

Each subwoofer channel from the bass management output can be adjusted with Parametric EQ, Levels, and Delays.

4.1.6 Low Pass to Other Speaker

Certain speakers have an option to have the low end cross with another speaker, instead of a subwoofer. This may help to keep the positioning of the speaker's low end sound, and also to avoid a large number of speakers being crossed with the subwoofers. This can only be done if the corresponding speaker is defined as a large speaker.

The following speakers can be crossed to other speakers:

- Ls/Rs may crossed to L/R
- Lb/Rb may be crossed to L/R
- HL/HR may be crossed to L/R
- HC may be crossed to C
- T may be crossed to L/R/Ls/Rs.
- Hls/Hrs may be crossed to Ls/Rs

4.1.7 Phantom Center Option

The Phantom Center option allows you to direct the center channel to the left and right speakers if there is no Center speaker. There is an offset configuration used to increase or decrease the center channel level. Note that 0dB offset is the default and includes the 3dB signal level attenuation needed to account for the sound being sent to 2 speakers.

The phantom center option and offset is set in the Center channel configuration screen.

4.1.8 Phantom Surround Option

The Phantom Surround option allows you to direct the surround channels to the front speakers. This is used for an installation without surround channel speakers. The left surround channel will be mixed into the left front channel and the right surround channel will be mixed with the right front channel.

The phantom surround option is set in the left or right surround channel configuration screen.

4.1.9 HP/LP Filter

The slope can be set at either 12dB/octave or 24dB/octave. The cutoff frequency can be set between 31Hz and 160Hz.

4.1.10 Offset

The offset control appears only for phantom speaker options. It allows the level for that speaker to be adjusted before being mixed with the left or right speaker. The offset level can be adjusted from +3dB to -10dB.

5.0 Maintenance

Check the Datasat Digital Entertainment Online Support site, at www.datasatdigital.com/docs/consumer, select **LS10 – Support Documents** for the latest information on maintenance, troubleshooting, and LS10 software versions.

5.1 Routine Maintenance

We recommend that every six months you vacuum the outside of the unit to remove dust, especially around ventilation holes.

Clean the touch screen as needed with a soft cloth and non-abrasive cleaning solution suitable for cleaning touch screens.

5.2 Error Messages

5.2.1 Software Installation

Figure 59. USB Device Not Found

If you encounter this error message, be sure you have inserted a USB device into the LS10. If a device is present, it may be malfunctioning. Replace the USB device with another to see if the problem is resolved.

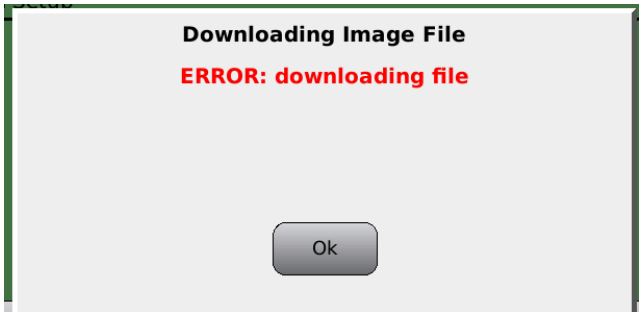


Figure 60. Downloading Error

You may encounter this message when attempting to upgrade the LS10 operating system software through an internet connection. This message indicates there is a problem with the physical connection between your processor and the outside world. Check your cables, router, modem, or IP addressing scheme, as applicable, to make sure all is in order.

5.2.2 Loading or Saving Settings

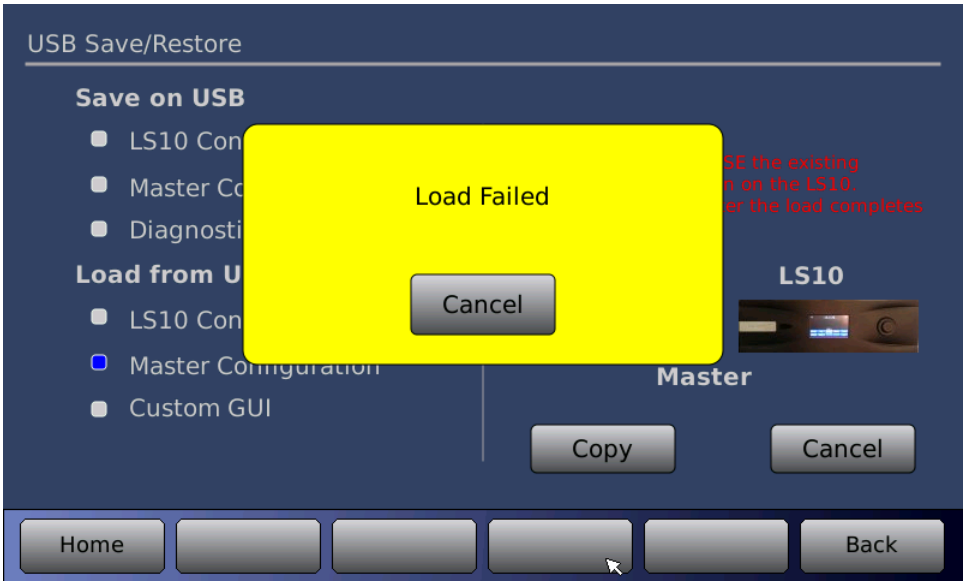


Figure 61. USB Load Failed

If you encounter “Load Failed” error message, when loading from a USB device, the device may be malfunctioning. Replace the USB device with another to see if the problem is resolved.

A “Save Failed” error message when saving to a USB device may indicate the USB device is full. Replace the USB device with another to see if the problem is resolved.

5.2.3 Error Booting the LS10

If, during boot up, an object (such as your finger) is in contact with the touch screen, the software will fail to load. The message below will appear with details, and continues to display until power is cycled at the rear panel power switch (hard boot).

********** Boot process interrupted **********

To solve this problem, reboot the LS10, making sure nothing is in contact with the touch screen during the boot-up process.

PART 3. Appendices

On the pages that follow:

A. Connector Pin-outs
B. Specifications
C. USB Audio Interface
D. LS10 Remote Controller
E. LS10 Remote Command API

Appendix A. Connector Pin-outs

This appendix lists the pin-out of all of the connectors on the back panel of the LS10 Audio Processor.

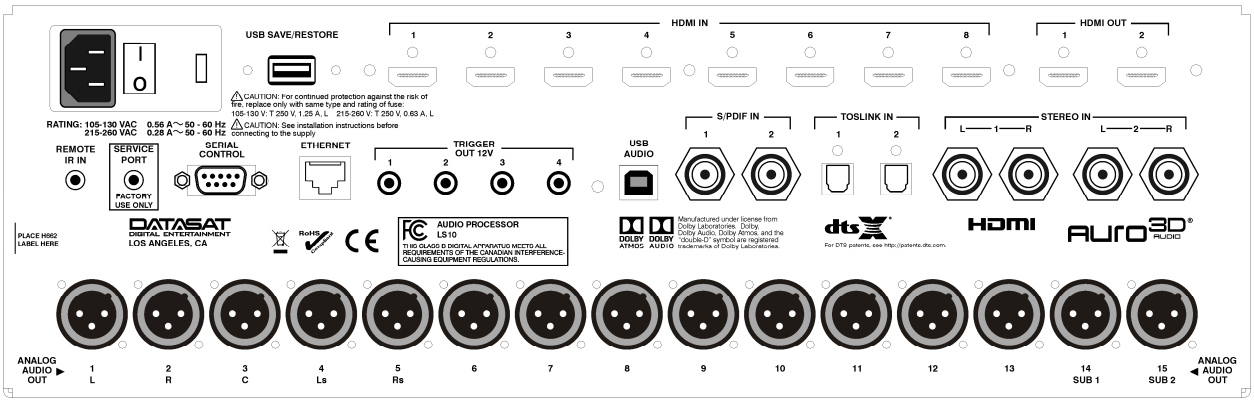
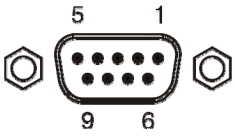


Figure 1. LS10 Rear Panel

SERIAL CONTROL (RS232)– DB9F	
Pin	**Description**
1	N/C
2	Data out - TXD
3	Data in - RXD
4	Connected to pin 6
5	Chassis GND
6	Connected to pin 4
7	Connected to pin 8
8	Connected to pin 7
9	N/C

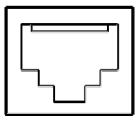
N/C = No connection

9-PIN FEMALE "D"



ETHERNET – RJ45F	
Pin	**Description**
1	TX_D1 (+)
2	TX_D1 (-)
3	RX_D2 (+)
4	Not used
5	Not used
6	RX_ D2 (-)
7	Not used
8	Not used

8-PIN FEMALE RJ45



Stereo Inputs 1&2, S/PDIF In 1&2 – RCA

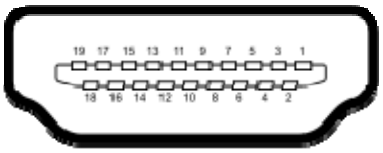
RCA FEMALE	
Pin	**Description**
Center	Signal
Outer	Ground

RCA FEMALE

HDMI Inputs and Outputs

HDMI IN 1-8, OUT 1-2 – HDMI	
Pin	**Description**
1	TMDS Data 2 (+)
2	TMDS Data 2 (Shield)
3	TMDS Data 2 (-)
4	TMDS Data 1 (+)
5	TMDS Data 1 (Shield)
6	TMDS Data 1 (-)
7	TMDS Data 0 (+)
8	TMDS Data 0 (Shield)
9	TMDS Data 0 (-)
10	TMDS Clock (+)
11	TMDS Clock (Shield)
12	TMDS Clock (-)
13	CEC
14	N/C
15	DDC Clock
16	DDC Data
17	Ground
18	+5 V
19	Hot Plug Direct

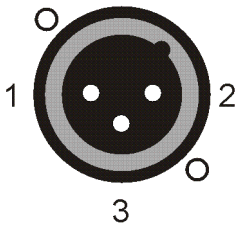
HDMI



Analog Out

ANALOG AUDIO OUT – XLR M	
Pin	**Description**
1	Ground
2	Out (+)
3	Out (-)

3-PIN XLR MALE



Note: LS10 Analog channels are designed to be balanced, not single ended, for highest sound quality. If wiring single ended, wire only to (+) and ground. The (-) side of the channels should not be connected. Do not short the (-) sides of the channels to ground, which will degrade sound quality and cause the LS10 output stage to draw excess current.

Infrared Remote Controller Input (for Universal IR Receiver)

IR REMOTE INPUT – 3.5mm STEREO JACK	
Pin	**Description**
TIP	+5V
RING	Signal
SLEEVE	Ground

3.5mm STEREO JACK

Trigger Out

TRIGGER OUT 12V – 3.5mm MONO JACK	
Pin	**Description**
TIP	Trigger out
SLEEVE	Ground

3.5mm MONO JACK

Appendix B: LS10 Product Specifications

Digital Audio Decoders

Auro

- Auro-3D® Decoding Engine
- Auro-3D® Upmix engine

Dolby

- Dolby® Atmos
- Dolby® Digital
- Dolby® Digital Plus
- Dolby® TrueHD

DTS

- DTS:X®
- DTS-HD® Master Audio
- DTS Neural:X® Upmixer

Signal Inputs

HDMI Audio & Video Inputs:

- HDMI V1.4b and 2.0B with video passthrough (8 in / 2 out). Note: Early 4K versions supported only 7 inputs.
- Up to 4K pixel rates at 24-60Hz (4:4:4)
- 4K 4:2:0 format video at 60Hz
- Up to 12 bit Deep Color and HDR
- All typical color spaces
- Audio extraction (1^2S standard) and loop through

Digital Audio Inputs:

- TOSLINK – 2
- S/PDIF – 2
- USB 2.0 – 1

Analog Audio Inputs:

- Channels: 2 stereo single ended input pairs
- Connectors: 4 RCA jacks
- Impedance: 10k ohms
- Sensitivity Adjustable: -16dBv to -4dBv

Signal Outputs

Analog Audio Outputs:

Channels: 15

Balanced (can be connected unbalanced or single ended)

Connectors: 15 XLR

Level: 300mV with volume at -15dB, +26dBu max (balanced)

Audio EQ

Parametric

10-band parametric EQ

Adjustable from 20Hz to 20kHz, gain+/-6dB in 0.1dB steps

Q range from 0.7 to 5

Bass Management

Full or adjustable high pass settings for screen and surround speakers

Support for 0 to 2 subwoofers

Dirac Live® Room Optimization:

Note: Also requires Datasat Dirac Installation kit and software for setup.

Note: Dirac version 2 only.

- High resolution filter technology
- Frequency limit adjustment
- Phase alignment
- Time alignment
- Impulse control
- Adjustable curves
- Ability to save multiple EQs

Audio Delays

Individual Channel Delays:

0 - 100ms

Global Delay:

0 –1000ms

Management

Remote Control

- RS232 DB9
- Network control using TCP/IP
- VNC control including by iOS and Android devices
- IR Remote

Power Requirements

105-130 VAC or 215-260 VAC, 50-60Hz. Input voltage range is manually switched at the rear panel by rotating the fuse holder.

Power consumption: 45W

Hardware Dimensions

- Imperial – 5.80 inches (H) x 17.40 in. (W) x 17.10 in. (D). Height with feet removed 5.25 in.
- Metric – 14.73 cm (H) x 44.20 cm (W) x 43.44 cm (D). Height with feet removed 13.34 cm
- Shipping Weight (with packaging and accessories) 34 lbs (15.42 kg)
- LS10 unit weight 25.6 lbs (11.61 kg)
- 3U 19 in. rackmount with rack ears installed
- LS10 depth behind optional rack ears 16.50 in. (41.91 cm)

Regulatory Compliance

FCC Part 15, subpart B Class A

CE

RoHS compliant

E&OE

All product specifications subject to change without notice. All trademarks are properties of their respective owners.

Appendix C. USB Audio Interface

The Datasat Audio USB interface runs in Class 2 mode. This allows playback of 24/192 audio. Windows requires installation of a driver to play 176 and 192 KHz audio over USB. Mac or Linux computers do not require installation of a driver.

Setting up USB Audio on a Mac

1. Connect the Datasat LS10 USB Audio input to the Mac.
2. On the Mac, go to **System Preferences > Sound**.

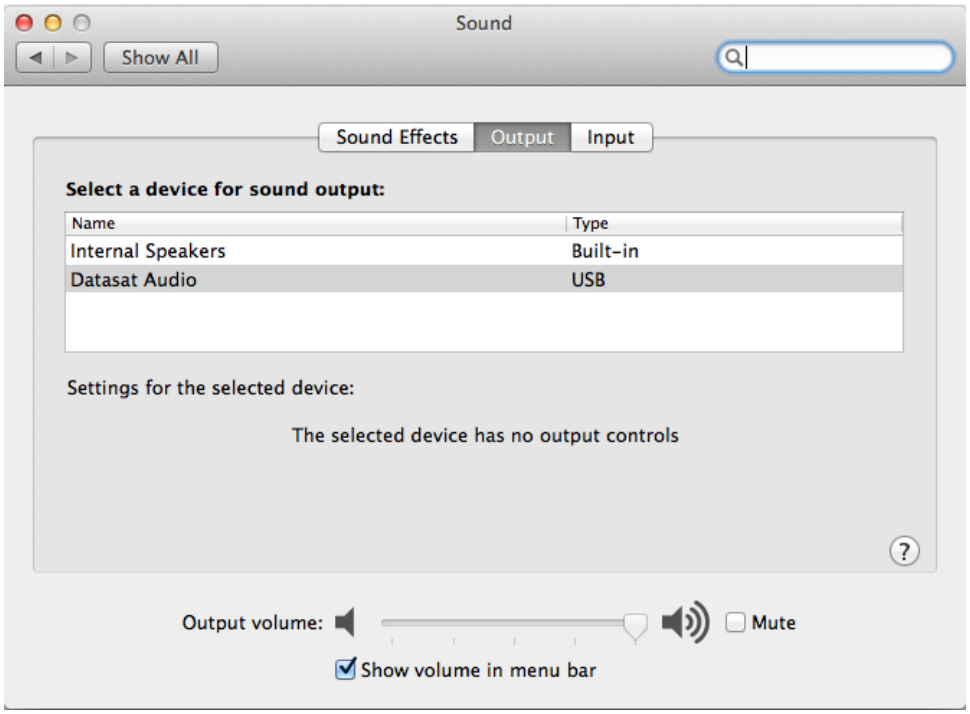


Figure 1

3. Select **Datasat Audio** as the **Output**. You may also need to select Datasat Audio as the playback device.
4. Start the Audio Midi Setup utility, which is located in **Applications > Utilities > Audio MIDI Setup (**Or type **audio** into the spotlight search and click on **Audio Midi Setup**).
5. Click on **Datasat Audio**. Set the audio output to the desired sample rate and choose the 2ch-24bit Integer or the 2ch-32bit Integer option. *Note*: Some audio players will adjust the sample rate to the source material.

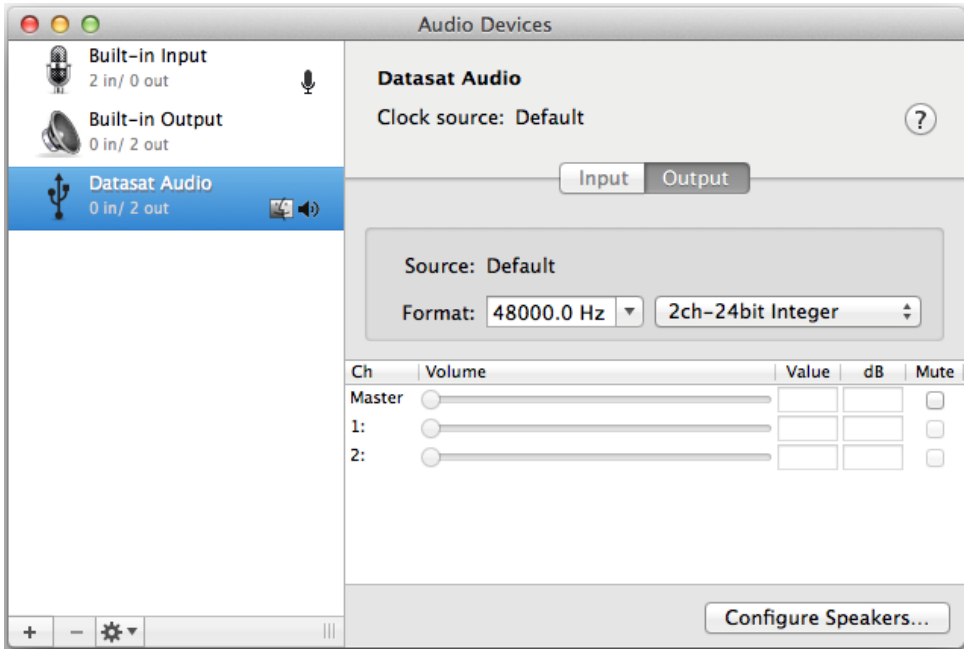


Figure 2

6. Mac Options
   In the **Sound Effects** window you may choose to have the OS X generated sounds come out of the Mac's internal speakers instead of over your USB audio sound system.

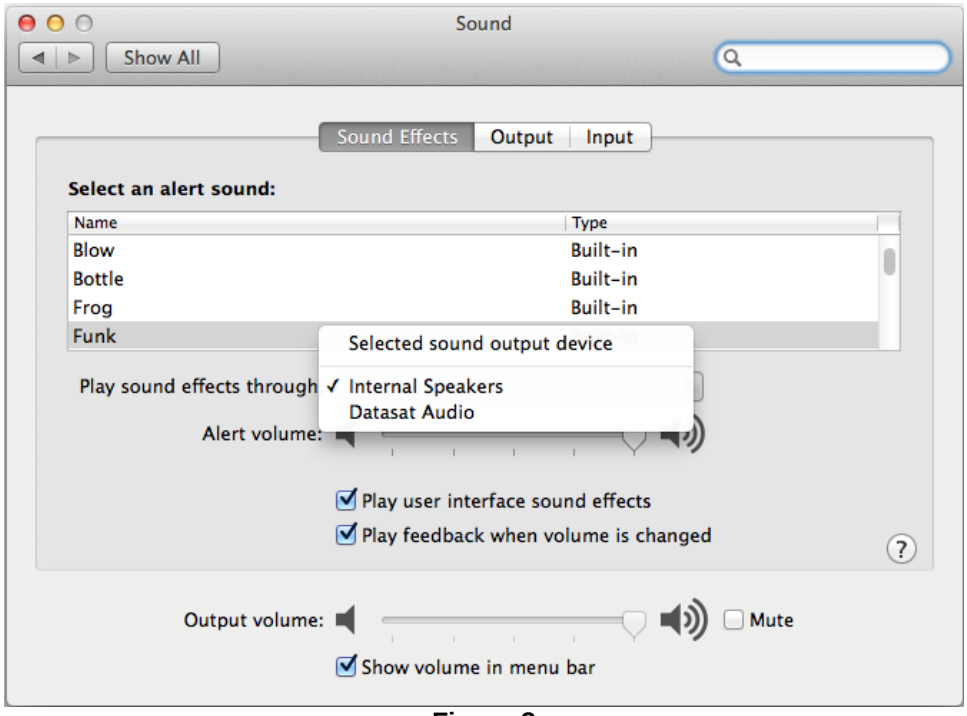


Figure 3

Note: Options on OS X earlier than versions 10.6 may be different.

Setting up USB audio on a Windows PC

A Windows PC requires the installation of drivers to play audio at sample rates above 96 Khz. The Datasat USB drivers work with Windows 8, 7, Vista, and XP systems, though best performance is on Windows 7 and 8 machines.

Download the package Datasat_USB_1_03.zip for Windows 8, 7, and XP: Unified USB Drivers 1.03 (20MB)

Download the Windows Vista package Datasat_USB_1_03_Vista.zip: Vista Drivers 1.03 (7MB)

These packages can be found on the Datasat Digital Entertainment website www.datasatdigital.com in the LS10 support documents section under “Software”.

Once you've downloaded the drivers, follow the steps below:

1. If an earlier 'CMEDIA USB 2.0 Audio Device' driver is installed on your computer, please uninstall it. (From Control Panel choose Programs and select Uninstall a program).
2. Unplug your Datasat USB input from the computer if it is connected.
3. Go to the download location of the Windows drivers
4. Extract the files from Datasat_USB_1.03.zip.
5. Click on the folder CM6631_6631A_-1.03(CR) to open it.
6. Connect your Datasat LS10 with a standard USB cable, preferably no longer than 2 meters.
7. Double-click on setup.exe. This will automatically select the correct driver for your version of Windows.

Figure 4

8. Follow the prompts from the installation program to install the drivers. You may have to restart your computer.
9. In your Control Panel/Audio Devices, select Speakers: Datasat Audio. In Windows 7, select **Sound > Playback > Speakers**.

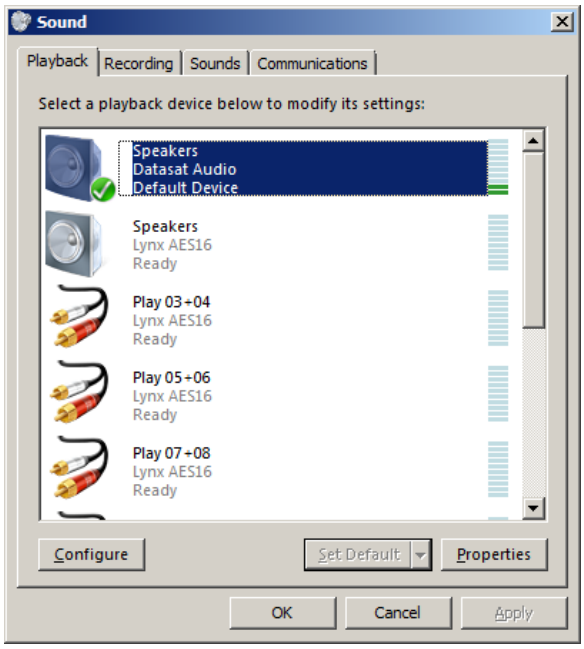


Figure 5

If desired, click the **Properties** button to choose the default sample rate output under the advanced tab. A 24 bit setting is recommended. Check the setting "Allow applications to take exclusive control of this device".

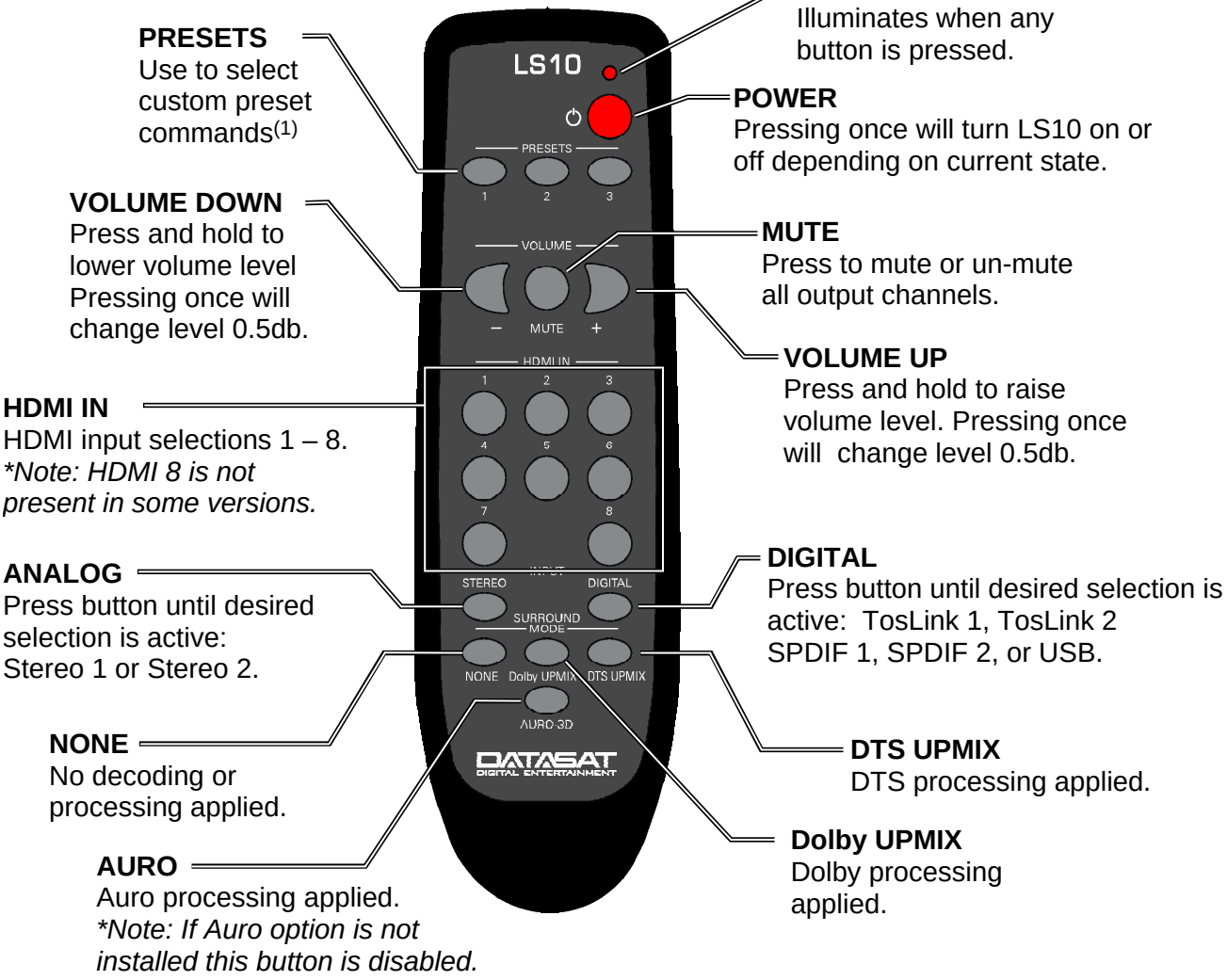
Note: Some audio players will adjust the sample rate to the source material.

Note: You may need to select the “Datasat Audio device” in the player software you are using to get output.

Appendix D. LS10 Remote Controller and IR Codes

This appendix describes the controls on the IR Remote Controller provided with the LS10 and also provides a list of IR codes.

LS10 Remote Control



PRESETS
Use to select custom preset commands(1)

RED LED
Illuminates when any button is pressed.

POWER
Pressing once will turn LS10 on or off depending on current state.

VOLUME DOWN
Press and hold to lower volume level Pressing once will change level 0.5db.

MUTE
Press to mute or un-mute all output channels.

VOLUME UP
Press and hold to raise volume level. Pressing once will change level 0.5db.

HDMI IN
HDMI input selections 1 – 8.
**Note: HDMI 8 is not present in some versions.*

ANALOG
Press button until desired selection is active:
Stereo 1 or Stereo 2.

DIGITAL
Press button until desired selection is active: TosLink 1, TosLink 2 SPDIF 1, SPDIF 2, or USB.

NONE
No decoding or processing applied.

DTS UPMIX
DTS processing applied.

Dolby UPMIX
Dolby processing applied.

AURO
Auro processing applied.
**Note: If Auro option is not installed this button is disabled.*

(1) Custom commands for the Preset buttons, PRESETS 1,2, and 3, are defined in the LS10 GUI by creating Automation Macros PRESET1, PRESET2, and PRESET3, respectively. For information on creating Macros in the LS10 see 3.19 Automation Macros.

The Remote Controller requires two (2) AAA batteries.

To install batteries:

1. Remove battery compartment cover located on back of remote.
2. Insert batteries correctly by matching the (+) and (-) as shown in compartment.
3. Reinstall battery cover.

LS10 IR Codes

LS10 uses NEC Protocol, System Code =0x36.

The follow codes are used in the provided remote controller.

Function	NEC Code	Pronto Hex Code
Toggle Power	0x02	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
Preset1	0x03	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
Preset2	0x04	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
Preset3	0x05	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
Vol -	0x09	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
Mute	0x0a	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
Vol+	0x0b	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
Inputs:		
HDMI 1	0x0f	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
HDMI 2	0x10	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
HDMI 3	0x11	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
HDMI 4	0x12	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
HDMI 5	0x13	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
HDMI 6	0x14	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
HDMI 7	0x15	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
HDMI 8	0x17	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
Stereo	0x18	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C

Digital Input	0x1a	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
Post Processor:		
None	0x1b	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
Do by UPMIX	0x1c	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
DTS UPMIX	0x1d	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
Auro-3D	0x1f	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C

The following are additional discrete codes that are available.

Function	NEC Code	Pronto Hex Code
Power Off	0x25	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
Power On	0x26	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
Stereo1	0x27	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
Stereo2	0x28	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
TosLink 1	0x29	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
TosLink 2	0x2a	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
SPDIF 1	0x2b	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
SPDIF 2	0x2c	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C
USB	0x2d	0000 006C 0022 0002 015B 00AD 0016 0016 0016 0041 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0016 0016 0016 0016 0016 0016 0041 0016 0016 0016 0041 0016 0041 0016 0041 0016 05F7 015B 0057 0016 0E6C

Appendix E. LS10 Remote Command API

Introduction

This document describes the serial and network control commands for the Datasat LS10 Audio Processor. The LS10 supports a command set for remote control and automation. These commands can be transmitted via either the Ethernet or the serial interface.

This document is intended to be used by any system integrator who needs to control the LS10 remotely. Example of an application where these commands could be used may be an automation unit, a remote control unit, or a remote software interface.

It assumes that the reader is familiar with standard serial and network TCP/IP concepts.

Serial Control

The remote serial control device must be connected to the RS232 ”Control” connector on the back of the LS10. To configure the serial port on the LS10, go to the menu Automation ->Serial. Select the desired baud rate, and data bits should be 8.

For test purposes you may connect to the LS10 using PuTTY or any similar serial communications program. Connection from a standard PC to the LS10 is a straight-through cable.

Once the serial connection is made and setup the user can execute any of the commands listed within this document.

Ethernet connection to LS10

The RJ45 connector labeled Ethernet on the back of the LS10 can be connected to a network switch or router. Once the network parameters are properly set the IP address for the LS10 can be found in the Network screen in the IP Address box.

The LS10 could also be connected directly to another network device using crossover cable, or a straight cable if the device supports auto-MDIX.

The client initiates the communication session with the LS10 IP address at TCP port 14500. Once connected the client may send commands as described in this document to set or read the LS10 configuration. The configuration changes happen as soon as they are received. For example, you should see the volume change immediately after receiving a command to set the volume.

For test purposes you may use PuTTY or any similar communications program to make a TCP/IP connection to the LS10.

Using PuTTY

Open PuTTY in the configuration Session and set the following:

- Host Name: (enter the LS10 IP address)
- Port: 14500
- Configuration type: Raw.
- Select the Open button.

Once the network connection is made the user may type in commands listed within this document and read the response.

Password Protection

The LS10 may be protected from unauthorized access by setting a password under the **System > Access Control** screen. There are two levels of password protection in the LS10, labeled as **NetCmd Password** and **Setup Password** in the system access screen on the LS10.

NetCmd Password

The **NetCmd Password** is used to prevent unauthorized access to the LS10 through a network connection. The **NetCmd Password** does not prevent access through the serial command.

Setup Password

The Setup Password prevents unauthorized access to the LS10 VNC GUI. This does not affect the operator level commands that are used in this document.

Authentication Command

The AUTH command must be sent to the LS10 before sending a password protected command. If this is not done, then the command results in no action and the LS10 returns the string “SECERR”. Sending the correct password enables all network commands for the password level for as long as the network connection is maintained.

Not all network commands require a password. Inquiry commands such as SYSTEM and IDENTIFY will operate without a password.

Command Format

The general command format for all configuration commands is listed below:

@COMMAND *[arg1] [arg2]*<CR>

Each **COMMAND** and its arguments (***arg1***, ***arg2***) are defined in this document. Whether or not ***arg1*** and/or ***arg2*** are used depends on the command. Square brackets **[]** around the argument in this document indicate that the argument is optional .

The command is terminated by a **<CR>**. The response returns ASCII text and is also terminated by **<CR>** character at the end. The **<CR>** represents an ASCII character with the value **0x0D**. How to enter this character in the command is entirely dependant on the remote program or interface used. On a terminal interface, it is added by pressing ENTER on the keyboard. In some GUI interfaces it is represented by “**\r**”, and for XML it may be **&#10**.

> ***Important:*** If you are having problems with executing a simple command to the LS10, check that the command string starts with ‘@’ and properly sends the carriage return at the end.

Some commands are characterized as “Read” and are used only to read status or information from the LS10. Commands that are “Read/Write” can be used to set the specific configuration item, or just read it.

For “Read/Write” commands the last argument is the value to write to the configuration. Omit the final argument in order to read the configuration item without changing it.

Input Selection Commands

1. Input Selection

Command:	@**INPUT**<space>***[input]***<CR>	**Operation**
Response:	**INPUT**<space>***input***<CR>	**Read/Write**

This is used to select a new input, or view the current input.

Parameters

input Identifies the desired or selected input name. For the set command to be successful, the name must be one of the input names:

Stereo 1	Stereo 2	USB	
TosLink 1	TosLink 2	SPDIF 1	SPDIF 2
HDMI 1	HDMI 2	HDMI 3	HDMI 4
HDMI 5	HDMI 6	HDMI 7	HDMI 8

Note: Names with a space must use exactly one space. Upper/lower cases in the name must be followed.

Example

Set the Input to Stereo 1
Send: @INPUT Stereo 1<cr>
Receive*:* INPUT Stereo 1<cr>

2. EQ Selection

Command:	@**EQSET**<space>***[eq]***<CR>	**Operation**
Response:	**EQSET** <space>***eq***<CR>	**Read/Write**

This is used to select a new EQ set, or view the current EQ set.

Parameters

eq **EQ1 or EQ2**.

Example

Select EQ2
Send: @EQSET EQ2<cr>
Receive*:* EQSET EQ2<cr>

Control Commands

1. Standby Power

Command:	@**POWER**<space>***[mode]***<CR>	Operation
Response:	**POWER**<space>***mode***<CR>	**Read/Write**

This is used to control the power mode.

Note: On a network TCP/IP connection, the network connection is closed / reset during the power on process. A reconnection should be performed after power on.

Parameters

Mode	***Selection***
0	Power off, or sleep mode
1	Operating mode. Requires 15 seconds for unit to be operational

Example

Set unit to operating mode.
Send: @POWER 1<cr>
Receive*:* POWER 1<cr>

Automation

1. Execute an LS10 Macro

Command:	@**RUNMACRO**<space>***[macro]***<CR>	Operation
Response:	***OK*** or ***ERR no macro***<CR>	**Write**

This is used to execute a user defined automation macro in the LS10. User defined macros must be created in the LS10 setup menus, or copied through the configuration file. See the command MACRONAMES to extract a list of available macros in the current LS10 configuration.

Parameters

[macro] This is the macro name to execute. The name must match exactly the macro name on the LS10.
Note: Spaces may be included within the macro name.

OK Response after macro is found and executed.

ERR* no *macro Response if macro does not exist on the LS10.

Example

Run Macro named Auto1
Send: @RUNMACRO Auto1<cr>
Receive*:* OK<cr>

Volume and Mute Commands

1. Master Volume Level

Command:	@**VOLUME**<space>***[+][-][Value]***<CR>	**Operation**
Response:	**VOLUME**<space>***Level***<CR>	**Read/Write**

This is used to set or read the volume level.

Parameters

[+]	Add [Value] to current volume.
[-]	Subtract [Value] from current volume.
[Value]	Value to set the volume in negative tenths dB or, if +/- is used, it is the value to increment or subtract from the current volume. The value should be in increments of 5, or 0.5dB steps. Omit this argument to only read the volume.

Returns

[Level]	Current volume level represented using the range of 0 (-0dB) to 700 (-70.0 dB)**.**

Example

Set the volume to -35dB

Send @VOLUME 350<cr>

Receive*:* VOLUME 350<cr>

Increase volume by 0.5dB

Send: @VOLUME +5<cr>

Receive: VOLUME 345<cr>

2. Master Volume Mute

Command:	@**MUTED**<space>***[value]***<CR>	**Operation**
Response:	**MUTED**<space>***value***<CR>	**Read/Write**

Mute or Unmute the LS10 output.

Parameters

value	***Selection***
0	Unmute
1	Mute
±	Toggle the mute state

Example

Mute

Send: @MUTED 1<cr>

Receive*:* MUTED 1<cr>

Audio Setup

1. Channel Noise Sequencer

Command:	@**NOISESEQ**<space>***[value]***<CR>	**Operation**
Response:	**NOISESEQ *value***<CR>	**Read/Write**

Enable an internally generated pink noise that is sequenced through LS10 channels. The exact channel sequence is dependant on the speaker configuration. This sequence for each speaker configuration is shown in the table below. The LFE and additional sub woofers are not included in the noise sequence.

LS10 Noise Sequencer Channels

Parameters

value	***Selection***
0	Turn off pink noise.
1	Automatically sequence pink noise through each channel.
2	Manual mode: Enable pink noise with manual stepping through channels.
3	Channel Step. Advance to the next channel in the sequence and return to manual mode (value will be 2 when read from the command).

Example

Start automatic pink noise sequence.

Send: @NOISESEQ 1<cr>
Receive*:* NOISESEQ 1<cr>

Turn off pink noise.

Send: @NOISESEQ 0<cr>
Receive*:* NOISESEQ 0<cr>

Audio Decoder Configuration

1. Post Processing Mode

Select post processing function between None, DTS NeoX, Dolby Pro Logic II or IIx, Dolby Pro Logic IIz, or Auro-3D.

The option for Pro Logic IIz is only valid for speaker configurations that include front left/right high speakers. If Pro Logic IIz is selected for a speaker configuration without these speakers, the system defaults to operating as if None were selected for the processing mode.

Command:	@**DECODERPOST *[mode]***<cr>	**Operation**
Response:	**DECODERPOST *[mode]***<CR>	**Read/Write**

Parameters

[mode]	*Selection*	*Valid Speaker Configurations(1)*
0	Off/None	Any
3	DTS Neo:X	All, except 2.0 or 2.1
4	Dolby PLII, or Dolby PLIIx	Not Available for 2.0 or 2.1 PLIIx for all configuration with LB/RB PLII for all other configurations
5	Dolby PLIIz	Must include High Left / High Right
6	Auro-3D (2)	Auro 9.1, Auro 10.1, Auro 11.1 or Auro 13.1, 2.0, 2.1, 5.1, 7.1.
7	**Dolby Surround**	**All Atmos speaker configurations (available when Atmos decoding option is present)**
8	**DTS Neural:X**	**All DTS speaker configurations (available when DTS:X decoding option is present). Not available when Auro or Atmos is selected.**
9	**Stereo Surround**	**Any. 2-channel content only will copy L to all Left floor-level speakers and R to all Right floor-level speakers. An LR mix will go to Center. Non 2.0 content will pass through without being changed.**

Notes:

(1) The mode will not change when the selected mode is not valid for the current speaker configuration.

(2) Auro-3D is available only on units with the Auro-3D upgrade option installed.

Sub Configurations

DTS Neo:X See the command **NEOXMODE** for details on configuration item available only with DTS Neo:X.

Dolby PLIIx See the command **DPL2MODE** for details on Pro Logic IIx configuration items.

Dolby PLIIz See the command **DPL2HEGAIN** for details on and additional Pro Logic IIz configuration item.

Example

Enable Auro-3D.

Send: @DECODERPOST 6<cr>
Receive*:* DECODERPOST 6<cr>

2. Neo:X Mode

Select Neo:X mode to Cinema, Music or Game. The Neo:X mode selection is in affect only when the Post Processing Mode (**DECODERPOST**) is set for Neo:X.

Command: @**NEOXMODE** ***[value]***<cr>	**Operation**
Response: **NEOXMODE** ***[value]***<CR>	**Read/Write**

Parameters

[value]	***Selection***
0	Cinema
1	Music
2	Game

3. Generate Subwoofer with Neo:X

Generate a subwoofer (LFE) channel when using Neo:X with a 2-channel input source.

Command: @**NEOXLFE** ***[value]***<cr>	**Operation**
Response: **NEOXLFE** ***[value]***<CR>	**Read/Write**

Parameters

[value]	***Selection***
0	Disable
1	Enable

4. DTS:X Dialog Boost

Sets DTS:X Dialog Gain. This raises or lowers the level of the center channel (Dialog) only.

Command: @**DTSXDIALOG** <space> ***[n]***<cr>	**Operation**
Response: **DTSXDIALOG** ***[n]***<CR>	**Read/Write**

N = gain in dB (0 to 6)

Example:

Set DTS-X Dialog to 5

Send: @DTSXDIALOG 5
Receive: DTSXDIALOG 5

DTS:X Dialog Gain may also be raised or lowered as follows:

Command: @**DTSXDIALOG** <space> ***[+][-]***<cr>	**Operation**
Response: **DTSXDIALOG** ***[+][-]***<CR>	**Read/Write**

Parameters:

[+] [-]	***Selection***
+	Increase current level by 1
-	Decrease current level by 1

Example:

Raise DTS-X dialog by 1

Send: @DTSXDIALOG +<cr>

Receive: DTSXDIALOG 1

5. Pro Logic II/IIx Mode

Selects Pro Logic II or Pro Logic IIx mode to Pro Logic, Music, Game, or Dolby Digital EX. The Pro Logic II/IIx mode selection is in affect only when the Post Processing Mode (**DECODERPOST**) is set for Pro Logic II or Pro Logic IIx.

Command: @**DPL2MODE** ***[value]***<cr>	**Operation**
Response: **DPL2MODE** ***[value]***<CR>	**Read/Write**

Parameters

[value]	***Selection***
0	Pro Logic (1)
2	Music
3	Movie
5	Dolby Digital Ex (2)

Notes:

(1) Pro Logic can only be selected with Pro Logic II (speaker configuration without LB/RB).

(2) Pro Logic EX can only be selected with Pro Logic IIx (speaker configuration with LB/RB).

Three additional controls are available only for use with Pro Logic IIx Music mode (**DPL2MODE 1**). Those are Dimension, Center Width, and Panorama. See commands **DPL2DIM, DPL2CW,** and **DPL2PANO** for additional details.

6. Dimension for Pro Logic IIx Music Mode

The Dimension control is used with Pro Logic IIx music mode to adjust the sound field.

Command: @**DPL2DIM [*DIM]***<cr>	**Operation**
Response: **DPL2DIM *DIM***<CR>	**Read/Write**

Parameters:

DIM	***Selection***	
7	+ 7	Sound field towards
6	+ 6	the rear
5	+ 5	
4	+ 4	⇑
3	+ 3	
2	+ 2	
1	+ 1	
0	0	
-1	- 1	
-2	- 2	
-3	- 3	
-4	- 4	⇓
-5	- 5	
-6	- 6	Sound field towards
-7	- 7	the Front

7. Center Width for Pro Logic IIx Music Mode

The Center Width control works with Pro Logic IIx music.

Command: @**DPL2CW [*cw]***<cr>	
Response: **DPL2CW *cw***<CR>	**Read/Write**

Parameters:

cw	*Selection*
0	0 (Off, no balance applied)
1	1
2	2
3	3 (Neutral)
4	4
5	5
6	6
7	7 Phantom Center

8. Panorama for Pro Logic IIx Music Mode

Enable or Disable the Panorama setting used with Pro Logic IIx music mode.

Command: @**DPL2PANO** ***[pano]***<cr>	
Response: **DPL2PANO** ***pano*** <CR>	**Read/Write**

Parameters:

pano	*Selection*
0	0 Panorama off
1	1 Panorama on

9. Height Gain for Pro Logic IIz

This command sets or reads the height gain selection used with Pro Logic IIz.

Command: @**DPL2HEGAIN** ***[value]***<cr>	
Response: **DPL2HEGAIN** ***value***<CR>	**Read/Write**

Parameters:

[value]	*Selection*
0	Low
1	Mid
2	High

10. Auro-3D Strength

This command sets upmixing strength for Auro-3D.

Command: @AUROSTRENGTH [value]<cr>	
Response: AUROSTRENGTH value<CR>	Read/Write

Parameters:

[value]	*Selection*
1-16	16 is the highest strength level

11. Auro-3D Preset

This command sets or reads the Auro-3D Preset. Selections are Small, Medium, Large, or Speech.

Command: @AUROPRESET [value]<cr>	
Response: AUROPRESET value<CR>	Read/Write

Parameters:

[value]	*Selection*
0	Small
1	Medium
2	Large
3	Speech

12. Auro-3D Listening Mode

This command sets or reads the Auro-3D Listening Mode. Selections are Stereo, Surround, and Auro-3D.

Command: @AUROLM [value]<cr>	
Response: AUROLM value<CR>	Read/Write

Parameters:

[value]	*Selection*
0	Native
1	Stereo
2	Surround
3	Auro-3D (Valid only with one of the Auro speaker Configurations

13. Dolby Surround Upmixer Center Spread

This command sets or reads the Center-Spread setting for the Dolby Surround Upmixer

Command: **@DSUCENTERSPREAD** <space> **[value]**<cr>	
Response: **DSUCENTERSPREAD value<CR>**	**Read/Write**

Parameters:

[value]	***Selection***
0	Center Spread disabled
1	Center Spread enabled

14. Downsample higher sample rates to allow Dolby Surround Upmix

This command sets or reads the setting which permits downsampling of higher-rate audio streams to allow upmixing using DSU

Command: **@DOWNSAMPLEFORDSU** <space> **[value]**<cr>	
Response: **DOWNSAMPLEFORDSU value<CR>**	**Read/Write**

Parameters:

[value]	***Selection***
0	Disabled
1	Enabled

15. Dolby DRC Setting

Command: @**TRUEHDDRC *[drc]***<cr>	
Response: **TRUEHDDRC *drc***<CR>	**Read/Write**

Parameters:

drc	***Selection***
0	DRC Off
1	On / TrueHD-Auto
2	DRC On

16. Post Stereo Gain

Sets gain (attenuation) for non-LR speakers

Command: @**POSTSTEREOGAIN** <space> ***[n]***<cr>	**Operation**
Response: **POSTSTEREOGAIN** ***[n]***<CR>	**Read/Write**

N = gain (attenuation) in dB (-20 to 0)

LFE Boost

1. DTS LFE Boost

Enable 10dB gain to the subwoofer outputs when playing DTS audio

Command: @**DECODERDTSLFEBOOST** ***[dtslfe]***<cr>	
Response: **DECODERDTSLFEBOOST** ***[dtslfe]***<CR>	**Read/Write**

Parameters:

dtslfe	***Selection***
0	Do not apply 10dB gain for DTS
1	Apply 10dB gain for DTS

2. PCM LFE Boost

Enable 10dB gain to the subwoofer outputs when playing PCM audio

Command: @ **DECODERPCMLFEBOOST** ***[pcmlfe]***<cr>	
Response: **DECODERPCMLFEBOOST** ***pcmlfe***<CR>	**Read/Write**

Parameters:

pcmlfe	***Selection***
0	Do not apply 10dB gain for PCM
1	Apply 10dB gain for PCM

3. Dolby LFE Boost

Enable 10dB gain to the subwoofer outputs when playing Dolby Digital decoded audio

Command: @ **DECODERDDLFEBOOST *[ddlfe]***<cr>	
Response: **DECODERDDLFEBOOST *ddlfe***<CR>	**Read/Write**

Parameters:

ddlfe	***Selection***
0	Do not apply 10dB gain for Dolby Digital
1	Apply 10dB gain for Dolby Digital

Audio Decoder Stream Information

1. Decoder Stream

Returns a text description of the stream type currently playing

Command: @**DECSTREAM**<cr>	
Response: ***[Desc]***<CR>	**Read/Write**

Parameters:

[Desc] Description of the current audio stream type being received by the decoder.

Example

Send: @DECSTREAM<cr>
Receive*:* DTS 48k + NeoX <cr>

2. Decoder Channels

Returns a text description of the number of channels at the decoder output. This does not include additional channels from processing by Auro Decoder or Upmix, DTS NEO:X or Dolby PLIIx/PLIIy.

Command: @**DECCHANS**<cr>	
Response: ***[n.s]***<CR>	**Read/Write**

The string [n.s] appears only when the decoder is running. In that case the values ***n*** and ***s*** are defined as follows.

[n] Number of main channels at the decoder output.

[s] The value is 1 when there is a decoder LFE output. Otherwise it is 0.

Example

Send: @DECCHANS <cr>
Receive*:* 7.1 <cr>

Setup Information

1. List Generic Input Names

This command returns a comma delimited string with the generic Input names in the LS10.

Command: @**INPUTNAMES** <cr>	**Operation**
Response*:* **INPUTNAMES Stereo 1,Stereo 2,USB,ToSLink 1,** **TosLink 2,SPDIF 1,SPDIF 2,HDMI 1,HDMI 2,** **HDMI 3,HDMI 4,HDMI 5,HDMI 6,HDMI 7,HDMI 8,** <CR>	**Read**

2. List Assigned Input Names

This command returns a comma delimited string with the user assigned Input names in the LS10.

The order of the returned name is the match the inputs returned from @INPUTNAMES. Unassigned names are blank.

Command: @**INPNAMES** <cr>	**Operation**
Response*:* **INPNAMES *[n1], [n2], [n3], [n4], [n5], [n6], [n7], [n8], [n9], [n10], [n11], [n12], [n13], [n14], [n15],*** <CR>	**Read**

3. List Macro Names

The LS10 may have several user-defined macros. This command returns a comma delimited string with all macro definitions in the LS10.

Command: @**MACRONAMES** <cr>	**Operation**
Response: **MACRONAMES *[m1],[m2],[m3],…*** <CR>	**Read**

Parameters

m1-mx Macro names. Each name will have a comma to separate it from the next name. Spaces may be included within the macro names. This will be empty if there are no macros defined in the LS10.

General Commands

1. System Information

Returns system versions and MAC address

Command:	@**SYSTEM** <cr>	Operation
Response:	**VER**<space>***version***<LF> **VERDATE**<space>***date***<LF> **MAC**<space>***mac address***<CR>	Read

Parameters

version	Software version number
date	Software date/time
mac address	LS10 MAC address

2. Identify

Get system identify information. Mostly used in discovery protocol.

Command:	@**IDENTIFY**<cr>	Operation
Response:	**LS10**<space>***IP***<space>***[screen]***<cr>	Read

Parameters

LS10	General identifier for Datasat audio processor product. XZ
ip	IP address (useful after network broadcast command)
[Screen]	User defined ID string, if entered in the LS10 configuration.

3. Model

Determines that the Datasat Audio processor is an LS10.

Command:	@**MODEL**<cr>	Operation
Response:	**MODEL**<space>**LS10**<cr>	Read

Parameters

LS10	An LS10 returns this model string.

4. Authorization

Command:	@**AUTH**<space>**[Password]**<cr>	Operation
Response:	**AUTH**<space>***[SETUP|OP|SECERR]***<cr>	Read

Give a password to allow usage of restricted commands. The authorization is required for many commands if access to the LS10 has been configured with a Password. The **AUTH** must be issued before issuing any password protected commands, and is valid only for the duration of the TCP/IP connection.

Note: This application accepts only Latin alphanumeric characters.

There are two levels of password protection in the LS10. The **NetCmd Password** will allow access to the LS10 for Operator level type commands. The **Setup Password** allows access to setup and configuration level commands. The commands in this document only require the operator level password (if set).

The **AUTH** may be used for either the Operator or Setup level password.

Parameters:

[Password]	NetCmd or Setup level password. The LS10 compares this first with setup level password and gives Setup Level authorization if it matches. Otherwise, it compares it to the NetCmd password and authorizes operator commands if it matches.
SETUP	The LS10 returns this value when Setup Level authorization has been granted.
OP	The LS10 returns this value when NetCmd Level authorization has been granted.
SECERR	The LS10 returns this value if neither Setup nor Operator level authorization has been granted.

5. Serial Number

Command:	@**SERIALNO**<CR>	**Operation**
Response:	**SERIALNO** <space>***SN***<CR>	**Read**

Reads the LS10 serial number.

Parameters

SN	This value is the serial number string that has been permanently assigned to the LS10 unit.

6. MAC Address

Command:	@**MAC**<CR>	**Operation**
Response:	**MAC**<space>***Mac adr***<CR>	**Read**

Reads the LS10 network MAC address.

Parameters

Mac adr	This is the 12 digit LS10 network interface MAC address.

Example

Send: @MAC<cr>
Receive*:* MAC 080077124578<cr>

7. Video Resolution

Command:	@**VIDRES**<CR>	**Operation**
Response:	**Video resolution**<CR>	**Read**

Reads the current video resolution.

Example

Send: @VIDRES<cr>
Receive*:* 1080p<cr>

8. Video Protection

Command:	@**VIDPROT**<CR>	**Operation**
Response:	**Video protection**<CR>	**Read**

Reads the current video protection applied.

Example

Send: @VIDPROT<cr>
Receive*:* HDCP<cr>