JSD-100MA Manual

Cinema Processor



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1. Safety Notice

Review the following safety precautions to avoid injury and prevent damage to this product. To avoid potential risk, use this product only as specified and only for the purpose described in the instruction manual.

To Avoid Fire and Personal Injury:

- **Use correct power cable**. Use only the power cable provided. Ensure that the AC power outlet is located near the product and is easily accessible.
- **Use a correctly grounded power source.** The power supply earth ground is established through the ground conductor in the power cable. To avoid the potential of electric shock, the ground conductor must be correct.
- **Observe source ratings.** To avoid risk of fire or electric shock, the power source must be 100 – 240 VAC, 50 – 60 Hz.
- **Do not operate with suspected failures.** If you suspect there is damage or malfunction with this product, call the factory.
- **Do not attempt repair.** Only a trained factory service person is authorized to repair this product.
- **Do not operate this product near heat sources.** This product should not be located near heat sources such as radiators, heat registers, or stoves.
- **Provide proper ventilation.** The operating temperature range is between 0º C and 40º C. The humidity range is between 20% and 80%, non-condensing. The cooling method is convection.
- **Keep product surfaces clean and dry.** Disconnect the power cable from the power source before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
- **Do not push objects into openings of this product.** Never insert objects into the product through openings.
- **Do not operate in wet or damp conditions.**
- **Do not operate in an explosive atmosphere.**
- **Inspect the power cable and all cables prior to use.** Confirm that the power cable and other interconnecting cables are free from damage.

2. Regulatory Compliance

EN 60950-1

The EN 60950-1 standard specifies the safety design requirements that reduce or eliminate the risk of personal injury to both the product user and service personnel. This product is designed and tested to meet the standards of the International Electrotechnical Commission (IEC) European Norm EN 60950-1, IEC 60950-1 (the standard for information technology equipment including electrical business equipment).

2.1 Declaration of Conformity

The JSD-100MA meets the intent of Directive 89/336/EEC for Electromagnetic Compatibility and Low Voltage Directive 73/23/EEC for Product Safety. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:

EN 55022: 2006 Conducted and Radiated Emissions

- Conducted Emissions
- Radiated Emissions, Class A Limits

EN 55024: 1998 + A1: 2001 & A2: 2003 Immunity

- Electrostatic Discharge Immunity
- RF Electromagnetic Field Immunity
- Power Line Surge Immunity

- Conducted RF immunity
- Power Frequency Magnetic Field Susceptibility
- Voltage Dips, Short Interruptions and Variations
- EN 61000-3-3: 1995 +A1: 2001 & A2: 2005 Voltage Fluctuation and Flicker

FCC Part 15, Subpart B

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

Certifications

- Low Voltage Directive 73/23/EEC.
- EN 60950 Information Technology, Video, and similar Electronic Apparatus.
- IEC 60950 Safety Requirements.
- CE, UL, cUL Safety and Overall Compliance.
- VDE Certified Power Cords.
- Pollution: Not intended for environments where conductive pollutants may be present.

2.2 Equipment Class

Type A: Equipment that is intended for connection to the building power supply wiring via nonindustrial plugs and sockets or via appliance couplers, or both.

2.3 Disposal and Recycling

Wheelie-Bin Symbol



The Wheelie-Bin symbol is attached to this product in compliance with the EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE). Its purpose is to deter the improper disposal of this product and to promote reuse and recycling.

Proper Disposal

In conformance with the Directive, at end of life this product should be either sent to an appropriate recycling facility for disassembly and recycling or returned to the supplier. Under no circumstances should this product be deposited in a landfill for disposal.

Hazards of Noncompliance

Electrical and electronic products may contain chemicals which can leach into the groundwater and cause health concerns through contaminated drinking water. Failure to dispose of this product in compliance with the WEEE Directive may result in penalties as determined by local ordinance.

3. System Version

The JSD-100MA is continuously being improved. New features are added through software/firmware updates and replacement of plug-in modules. This manual describes the JSD-100MA versions available at this writing.

Firmware/software versions for the systems described in this manual are listed in the table below:

Component	Version
Graphical User Interface (GUI)	1.0.1
Main PIC	160610
DSP 1	1151217
DSP 2	2151217

4. System Overview

4.1 System Description

The JSD-100MA cinema sound processor is specially designed for digital cinema applications. Low noise and low distortion 96 kHz processing ensures superb presentations. In addition to the eight standard formats, the JSD-100MA offers two fully configurable formats. The two user-configurable buttons can be configured to support a variety of existing and future formats. They may also be used to duplicate an existing format but at a different fader level to simplify desired volume changes between content types. The front panel display shows the current fader level, the format name (which is user configurable), and the measured audio level on each channel of the main audio output. The built-in bypass audio circuitry Ensures that the presentation goes on in the unlikely event of a system failure.

The JSD-100MA is "automation friendly." It features the standard DB25 parallel automation interface, an RS-232 (EIA232) interface, and Ethernet. The Ethernet interface accepts 5 simultaneous TCP connections to allow control by a digital cinema server and other equipment while simultaneously being monitored over another TCP connection.

The Graphical User Interface runs on Windows XP®, Windows 7®, Windows 8®, and Windows 10® operating systems. It allows for complete system configuration, monitoring, and firmware updates over USB, Ethernet, or RS-232. The JSD-100MA graphical user interface simplifies installation by including sound pressure level measurement and automatic equalization. System monitoring, control, and firmware update functions are also available on a standard web browser.

The JSD-100MA includes a precision 1/3 octave RTA that uses the filters specified in ANSI S1.11-1986. The JSD-100MA also does sound pressure measurements using the C-weighted filter specified in ANSI S1.4-1983. The RTA and SPL meter can be used to equalize an auditorium manually or automatically.

The JSD-100MA includes an automatic equalization feature (auto-EQ). Auto-EQ uses user-defined microphone calibration files and standard or user-defined equalization curves to automatically adjust the graphic equalizer on each channel.

The JSD-100MA is also "diagnostic friendly." The system logs the last 32,000 events (format changes, level changes, internal temperature, loss of AES audio, etc.) to internal flash memory. Log data can be reviewed on the GUI or the web interface. Current operational status, including selected format, fader level, and measured audio output levels, is available on the GUI and on the web interface. The current status of the system is also available over SNMP (Simple Network Management Protocol).

4.2 Block Diagrams

The following pages contain simplified block diagrams to assist the user in understanding the structure and operation of the JSD-100MA.

Figure 1 shows a simplified overall view of the JSD-100MA system. Two channel analog inputs are converted to digital. There is a "simple matrix" in the DSPs that can convert stereo inputs to 5.1. The JSD-100MA allows for a 16 channel digital input. All these signals are routed through various input select switches based on the selected format, then sent to the DSPs.

DSP1 handles the screen channels, while DSP2 handles the surround channels. All channels except LFE go through a graphic equalizer. The LFE channel goes through a parametric equalizer and a 125Hz low pass filter as specified by SMPTE EG0432-2-2006. Similarly, the surround channels go through a graphic equalizer. Provision is made to select the source of the surround channels (discrete channels or synthesized sources). Surround delays (individual delays for each channel pair) are added to the surround channels.

All channels have a synchronization delay to compensate for projector and other system delays. Sync delays are configurable for each format. Note that the JSD-100MA can support multiple LFE and surround outputs. Because of this, the LFE parametric equalizer is actually located in the crossover section of the DSP and GUI XO, Etc tab. Similarly, individual Ls/Rs output delays are also available in the crossover section where multiple Ls/Rs outputs are available. See the following crossover figures for more detail.

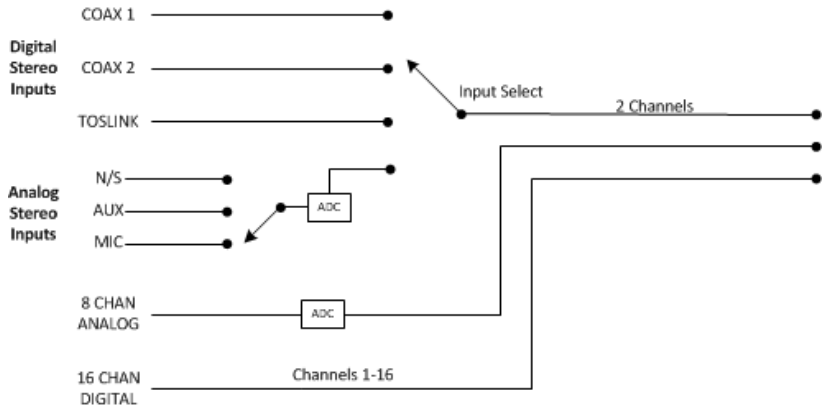


Figure 1 Audio Processing

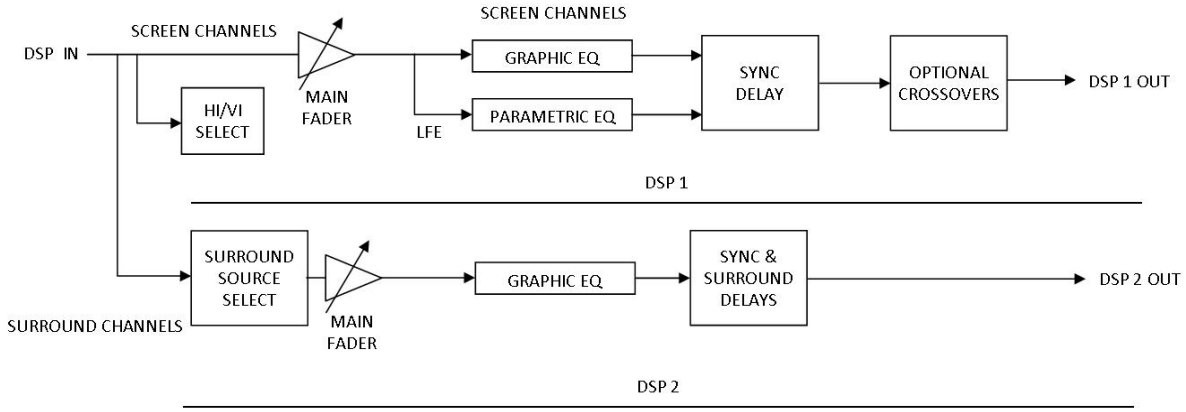


Figure 2 Audio Processing

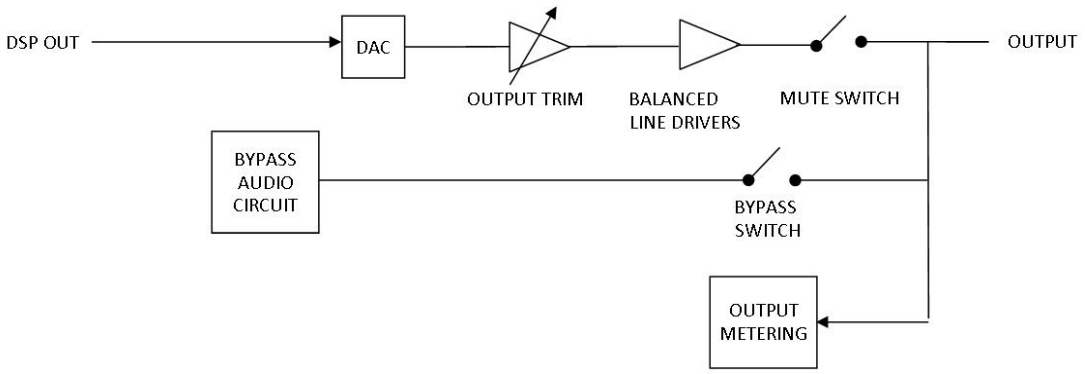


Figure 3 Output Module

The bottom section of figure 3 shows what a typical analog output looks like. The appropriate DSP drives a digital to analog converter, which drives the output trim controls, and then the balanced line driver. The output is disconnected when the system is muted. Separate bypass audio circuitry is switched to the output when bypass is enabled. Output module circuitry measures the actual audio level on the outputs for presentation on the front panel bar graph.

The following figures show the details of the crossovers. In most installations, the user merely loads crossover settings from the supplied speaker library, and then adjusts the output trims as required to compensate for amplifier gain differences and speaker efficiency differences.

Figure 4 shows a typical biamp crossover for a screen channel. The audio leaving the graphic equalizer drives a high pass filter (filter #16). The cutoff frequency and the Q can be adjusted by the user. The audio is then split into high band and low band components with high pass filter #0 and low pass filter #9. These are both 4th order Linkwitz-Riley filters. These are followed by a series of parametric filters. The high band includes a pair of shelving filters (#2 and #3) to compensate for the high frequency characteristics of the high frequency horn and the screen. Each band ends up with a delay block. Individual band delays can be set as required to get the high and low frequency acoustic signals in phase. This block also includes a provision to flip the phase in case a speaker is wired incorrectly. The delay block also has adjustable gain, though this gain is normally set to 0dB. band gains are adjusted using the output trim shown in the bottom section of figure 4.2a. Use of this analog control instead of a digital control provides the widest possible dynamic range. Figure 5 shows a typical triamp crossover for a screen channel. The details are very similar to the biamp crossover of figure 4.2b except that the channel is split into three bands.

Figure 5 shows the LFE "Crossover." It is not really a crossover since it does not split the channel into multiple frequency bands. It is similar to a crossover, however, in that a single audio channel is split into multiple outputs and separate equalization (parametric) and delay can be applied to each output. Because of this similarity, the LFE equalizer is located in the crossover section of the DSP and in the "XO, etc." tab on the GUI. The multiple LFE outputs are only available on output modules with enough outputs, but the LFE equalization is always in the "XO, etc." tab on the GUI. For convenience, the LFE parametric equalizer settings are shown in both the Equalizer and XO, etc. tabs in the GUI.

Figure 6 shows the Ls "Crossover." The Rs “Crossover” is identical. Similar to the LFE, this is not a true crossover since it does not split the channel into frequency bands. It does, however, split a channel into multiple outputs with individual delays, similar to a crossover. For that reason, the "XO, Etc." tab on the GUI contains delay and gain settings for multiple Ls/Rs outputs. The Surround Outputs tab has level adjustments and surround delays for individual surround channel pairs. These can be thought of as "master" level settings and delays with individual level and delay settings available for Ls and Ls1 outputs (and similarly for Rs). The total delay is the sum of the delay shown on the Surround Outputs tab and the delay on the "XO, etc." tab.

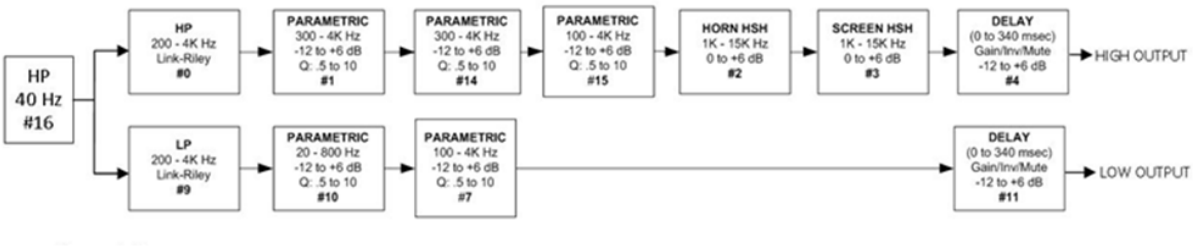


Figure 4 Screen Channel Biamp Crossover

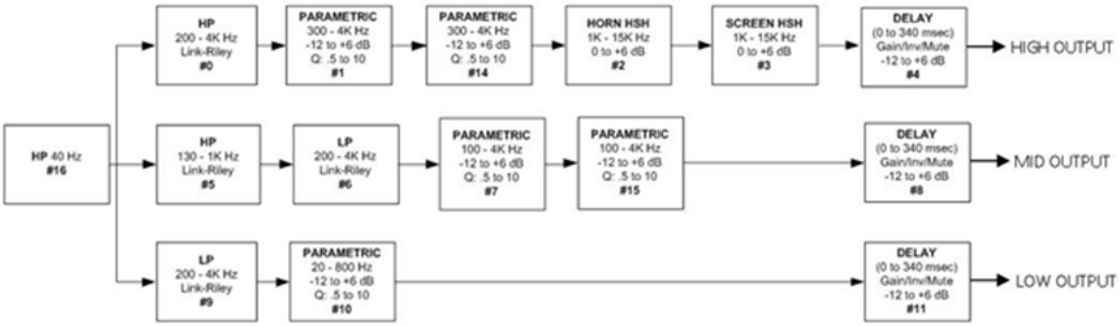


Figure 5 Screen Channel Triamp Crossover

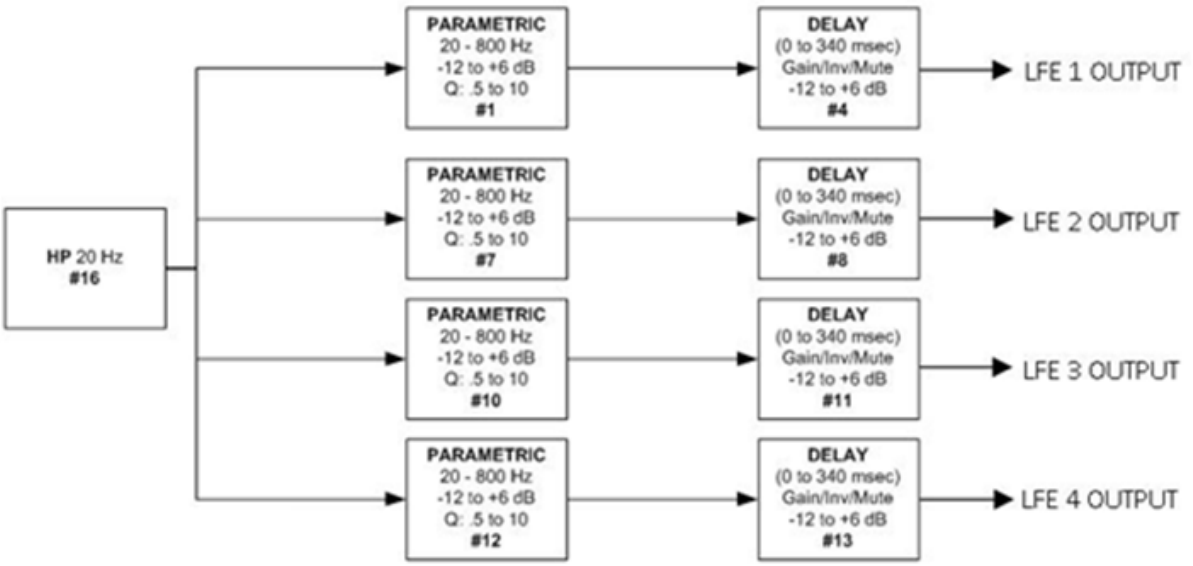


Figure 6 LFE Channels

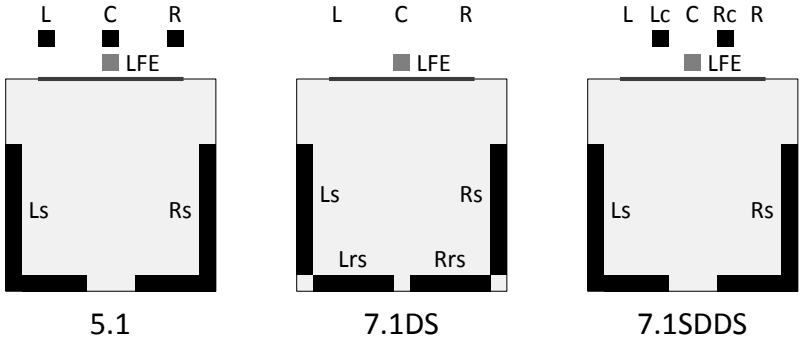
4.3 Channel Descriptions

JSD-100MA has 16 AES input channels. In the transition to digital cinema, the industry is adopting new names and abbreviations for speaker locations. Generally, the first letter is capitalized and either L for left, C for center or R for right. The second and third letters, if present, are lower case and further define the position. In some cases the second letter is upper case to eliminate confusion with bi-amp and tri-amp speaker output labels such as Left High Band (Lh). The actual speaker placement is determined by the auditorium room size and shape. The following is a general speaker placement description to aid in distinguishing the JSD-100MA output channels for an object base sound environment.

New Name (abbreviation)	Description	Previous Name (abbreviation)
Left (L)	Typically positioned behind the screen to the far left edge, horizontally, of the screen center as viewed from the seating area.	Left (L)
Left High (LH)	Located above the front left at approximately screen height top region of the screen.	
Right (R)	Typically positioned behind the screen to the far right edge, horizontally, of the screen center as viewed from the seating area.	Right (R)
Right High (RH)	Located above the front right at approximately screen height top region of the screen.	
Center (C)	This loudspeaker position is typically behind the screen corresponding to the horizontal center of the screen as viewed from the seating area. Also the intended speaker position for mono reproduction.	Center (C)
Low Frequency Effects (LFE)	Screen low frequency effects subwoofer loudspeaker(s). This is typically one or more band-limited low frequency only loudspeakers at the screen end of the room.	Subwoofer (SW)
Left Side Front (Lsf)	Located on the left side at about 1/2 the distances from the screen and before the surround speaker array located at about 1/3 the distance from the front.	
Right Side Front (Rsf)	Located on the right side at about 1/2 the distances from the screen and before the surround speaker array located at about 1/3 the distance from the front.	
Left Side surround (Lss)	Typically an array of loudspeakers positioned along the left side of the room starting approximately 1/3 of the distance from the screen to the back wall and the left side of the rear wall. Left surround may not extend to the back wall of the auditorium.	Left Surround (LS)
Left Side High (Lsh)	Located above the left surrounds near the ceiling, an array of speakers starting at approximately 1/3 the distance from the screen and rear wall.	
Right Side surround (Rss)	Typically an array of loudspeakers positioned along the right side of the room starting approximately 1/3 of the distance from the screen to the back wall and the right side of the rear wall. Right surround may not extend to the back of the auditorium.	Right Surround (RS)
Right Side High (Rsh)	Located above the right surrounds near the ceiling, an array of speakers starting at approximately 1/3 the distance from the screen and rear wall.	
Left rear surround (Lrs)	One or more loudspeakers typically on the back wall of the room to the left horizontally.	Back Surround Left (BSL)
Right rear surround (Rrs)	One or more loudspeakers typically on the back wall of the room to the right horizontally.	Back Surround Right (BSR)
Ceiling Channel A (CEA)	An array of speakers that can be located as rows parallel to the side or front (screen) producing audio above from front to back Or left to right.	
Ceiling Channel B (CEB)	An array of speakers that can be located as rows parallel to the side or front producing audio above from front to back Or left to right.	

4.4 Sound Field Configurations

The standard sound field configurations (or speaker configurations) as defined by SMPTE are shown in the diagram below. Note there are two defined 7.1 configurations. One (7.1DS) has rear surround speakers, while the other (7.1SDDS) extends the side surround speakers to the rear wall and adds left center and right center speakers. The JSD-100MA by default is configured as a 16.1 channel cinema processor not shown in the illustration below.



The JSD-100MA is configured for the particular speaker configuration in the auditorium. Each format is then configured as to how the speakers in that auditorium are driven. For example, when an auditorium is configured for 7.1DS, which includes rear surround speakers, and 5.1 content is played, the rear surround speakers can be driven by the surround channels, or a mix of the surround channels.

4.5 Processing Channels

The JSD-100MA has 16 "processing channels." Each of these receives audio from a variety of sources. The "processing channel" includes the main fader control, equalization, synchronization or input delay, surround delay (on the surround channels), and, as an option, crossovers on the screen channels. Outputs on the rear panel are identified by the channel usage (i.e., L for left). The table below describes the processing channels, their inputs, and how their outputs are identified on the rear panel.

Input Channel AES-EBU	Processing Channel	Channel Label	Output Panel Identifier
1	Left	L	L
2	Right	R	R
3	Center	C	C
4	Low Frequency Effects	LFE	LFE
5	Left Side Surround	Lss	Ls
6	Right Side Surround	Rss	Rs
7	Left Screen Height	LH	Lrs(Lc)
8	Right Screen Height	RH	Rrs(Rc)
9	Left Side Front Surround	Lsf	Lm/LCh (CH9)*Note1
10	Right Side Front Surround	Rsf	Rm/RCh (CH10)*Note 1
11	Left Rear Surround	Lrs	Lrs *Note 1
12	Right Rear Surround	Rrs	Rrs *note 1
13	Left Side Height	Lsh	Cm (CH13)*Note 1
14	Right Side Height	Rsh	Ch (CH14)*Note 1
15	Ceiling Channel A	CEA	Lh (LFE2)*Note 1
16	Ceiling Channel B	CEB	Rh (LFE3)*Note 1

- Notes: 1. Signal located in the Optional Outputs connector.

5. Specifications

5.1 Features

A processor specially designed for Digital Cinema applications. Low noise and low distortion processing ensures superb presentations. In addition to eight standard formats, the JSD-100MA offers two fully configurable optional formats to address such details as audio level changes and 3 or 5 stage channels. Built-in bypass audio circuitry ensures that the presentation goes on.

5.2 Audio Inputs

- PA Microphone – XLR 0.7mV sensitivity.
- Calibration Microphone – 3.5mm stereo jack 0.7mV sensitivity with 10V power.
- Non-Sync analog input – RCA 75mV to 4.775V.
- Auxiliary analog input – RCA 300mV.
- Eight Channel analog input – DB25F 300mV.
- COAX1 – RCA PCM.
- COAX2 – RCA PCM.
- TOSLINK – Optical PCM.
- AES/EBU 16 Channel 48-96KHz sample rates

5.3 Sixteen Channel Analog Audio Outputs (JSD-100MA)

Sixteen Channels Balanced 300mV adjustable outputs that can be configured as 5.1, 7.1, 13.1, 15.1 broadband, biamp , or triamp.

5.4 Communication Ports

- DB25F pulse automation.
- Serial control – RS-232.
- USB for laptop setup.
- Ethernet 10/100 - RJ45.

5.5 Front Panel Interface

- Eleven buttons: COAX1, COAX2, TOSLINK, DIGITAL 16 CH, USER 1, USER 2, ANALOG 8 CH, NON/SYNC, AUX, MIC, and MUTE.
- Main Fader – 0-10 used for main audio and bypass audio.
- Front panel displays fader level and selected format. Bar graphs display output levels.
- USB connector.
- Power switch and power supply status LEDs. Turning power off activates bypass mode.

5.6 Format Selection

- Digital (COAX1, COAX2, TOSLINK, 8 or 16 Channel AES/EBU).
- Analog (8 channel, Non-Sync, Auxiliary, Microphone).
- User 1, User 2 (Configurable in software, e.g., digital 16 channel at lower level, 7.1, 13.1, etc.).

5.7 Rear Panel Connectors-Main Chassis

- PA Microphone – XLR / ¼" phone jack.
- Calibration Microphone – 3.5mm stereo jack.
- Eight Channel Analog – DB25F

- Non/Sync – two RCA jacks.
- AUX – two RCA jacks.
- Hearing Impaired and Visual Narration – pluggable Phoenix connector.
- COAX1 and COAX2 – RCA Jacks with transformer input
- TOSLINK – Optical.
- 16 Channel Digital AES/EBU – DB25 and Dual RJ45.
- Removable Memory Card – SD compatible.
- Serial Control – RS-232 on DE9F.
- Pulse Automation – DB25F.
- 10/100M Ethernet – RJ45.
- DC 12V Power Connector – 5mm with 2.5mm pin.
- AC Power – IEC socket. 100-240VAC, 50/60Hz, 18W typical, 7.5W sleep.

5.8 Rear Panel Interface Module

All rear panel interface modules include an RJ-style connector for "RS-485." This IEEE 485 bus is used for remote volume controls and other control functions. Two DB25M and two Phoenix connectors have 16 channels of analog signals that are typically connected to a monitor and then routed to the amplifiers. The outputs can be configured as crossover outputs in which the signals are reassigned to provide the respective low, mid, and high bands.

5.9 Processing

- 96 kHz processing.
- One-third octave equalization on all channels except LFE, HI, and VI-N.
- Parametric equalizers on LFE.
- Synchronization delays for all inputs.
- Surround delays for all surround channels.
- Internal crossovers on systems with 16 or more outputs. Crossovers support biamp and triamp of up to five screen channels plus individual parametric equalization on one to three LFE outputs. Crossover includes a speaker library and allows for user defined speaker systems.

5.10 Sleep Mode

With an Ethernet command or preset timeout, the unit can go into a sleep mode. Another Ethernet command, "button press," or automation pulse will wake up the unit.

5.11 Bypass Mode

In an emergency situation, the JSD-100MA can be switched off, automatically enabling the bypass circuitry. Front panel buttons, LEDs and fader will still function, allowing the operation of the unit in various analog and digital formats. Final output is a monophonic signal feed to the left and right channels. Note: The 12 VDC bypass power supply must be connected for this functionality.

5.12 Graphical User Interface

The JSD-100MA Graphical User Interface (GUI) operates under Windows XP, Windows 7, Windows 8 and Windows 10. It communicates with one or more JSD-100MA systems simultaneously over USB, Ethernet, or RS232. The GUI is used for system configuration including auditorium equalization (both manual and automatic equalization).

Dynamic Range: Typically 105dB.
Power Requirements: 100-240VAC, 50/60Hz, 30 watts maximum (18 watts typical, 7.5 watts sleep).
Dimensions: Standard 2U rack-mount chassis.
Agency Approvals: UL, cUL, CE and FCC.

6. Installations

6.1 Initial Power-up

A “Quick Power-up” test of the JSD-100MA is suggested before mounting it in the equipment rack and wiring it up. This test can quickly detect shipping or other damage.

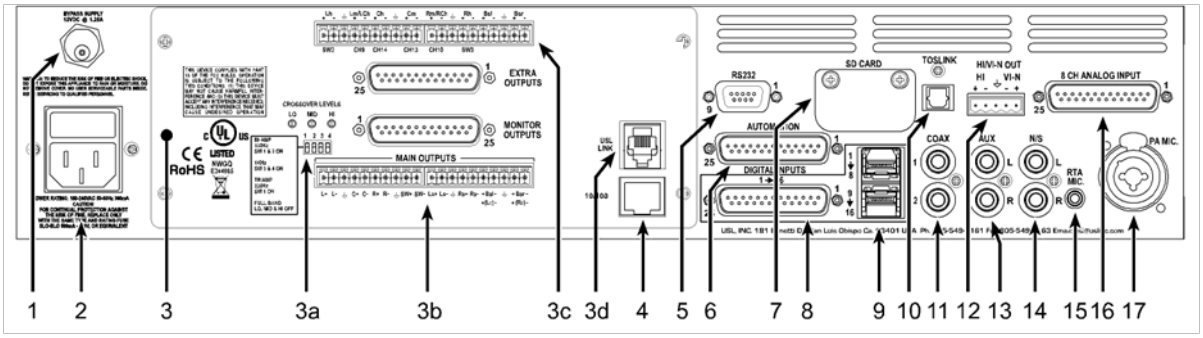
- Turn the AC power switch to the off position.
- Using the supplied AC line cord or one appropriate for the installation location (the power supply is a universal input supply 100-240 VAC, 50/60 Hz), connect the JSD-100MA to the AC line.
- Connect the supplied 12 VDC bypass power supply to the bypass power input on the rear panel of the JSD-100MA and plug it in to the AC line. The front panel “Bypass Mode” LED should flash, the bypass power LED should light, and one of the format buttons should light.
- Press each of the format buttons and the mute button, one after another. The appropriate button should light.
- Turn on the AC power switch. The display should immediately light, but be blank. All the green power LEDs on the bottom right of the front panel should light. The “Bypass Mode” LED should stop flashing.
- After approximately 25 seconds, the format buttons will flash and then a single format LED will light. The display should show the fader level and the selected format.
- Press each of the format buttons, verifying that the corresponding LED lights and that the display changes accordingly. Note that the format button LEDs for digital formats will flash when no digital input is provided.
- Press the mute button verifying that its LED toggles each time the button is pressed.
- Rotate the fader in each direction verifying that the fader numbers on the display change.

6.2 System Hardware Mounting, Grounding, and Ventilation

The JSD-100MA is designed to mount in a standard 19 inch (482.6mm) rack and is two rack units high (3.5 inches, 137.8mm). The JSD-100MA should be mounted at “eye level” in the equipment rack for optimum display contrast and visibility. We recommend vented panels above and below the JSD-100MA whenever space permits. Mounting the unit immediately above a major heat-producing component, such as a power amplifier, is not recommended. Equipment mounted immediately above the JSD-100MA should not be more than 9 inches (225mm) deep to ensure adequate airflow through the rear ventilation slots on the JSD-100MA. The JSD-100MA includes a three-prong grounding plug and a three-wire power cord to accommodate a safe ground path from the chassis to the electrical system ground. Defeating this ground by removing the ground prong is not recommended.

6.3 Sixteen Channel Analog Output Rear Panel Connections (JSD-100MA)

A set of clip-on ferrite “beads” is supplied with the JSD-100MA. To ensure the JSD-100MA continues to meet FCC and CE radio emissions requirements, one of these beads should be clipped around each cable connected to the rear panel of the JSD-100MA except for the TOSLINK, AC Power, and Bypass Power connection.



1. Bypass Power Supply – 12VDC at 1.25A.
2. Power entry Module – Accepts IEC-type line cord from 100-240VAC power source. Also contains a 500mA Slo-Blo 5x20mm fuse.
3. Sixteen Channel Analog Output Module
   a. Bypass crossover adjustments.
   b. Main outputs cover the first 8 output channels. The Phoenix connectors normally drive the power amplifiers, and the DB25M connectors drive the booth monitor.
   c. Extra outputs cover the second 8 output channels.
   d. RS-485 - An RJ25 connector that provides an RS-485 interface for remote volume control and other functions.
4. Ethernet – Network communications with GUI, web browsers, automation, etc.
5. RS-232 on a DE9F connector for communications with GUI or automation.
6. Automation DB25F Connector – A bidirectional port for receiving and sending automation pulses between the JSD-100MA and other system components. 12 Control lines, 11 Status lines and +5V are provided. Standard pulse to ground system.
7. SD Card - Stores a backup copy of unit configuration. Can also be used to transfer settings to another.
8. AES connector (DB25F) – Channels 1-16
9. AES connectors (Dual RJ45s) – parallel connections to the DB25F above.
10. TOSLINK Port – Optical Fiber input for SPDIF (PCM).
11. COAX 1, COAX 2 - RCA type connectors for SPDIF (PCM).
12. Hearing Impaired/Visual Narration Outputs.
13. AUX connectors – L and R analog inputs, 300mV sensitivity.
14. Non Sync (N/S) connectors – L and R analog inputs.
15. RTA microphone – 3.5mm stereo jack with +10V on the ring, designed for use with a powered electret microphone.
16. 8 Channel Analog Input on DB25F – Balanced line inputs. Six channels are fixed (L, C, R, LFE, Ls, Rs) and two can be set up as either Lc/Rc or Lrs/Rrs.
17. Public Address Microphone – Dual connector with XLR and ¼" phone jack in the center.

6.4 Audio Input Connections

6.4.1 16 Channel AES Input

The JSD-100MA accepts 16 channel AES audio. This input is typically driven by the digital cinema server (DCS). The JSD-100MA includes a DB25F connector using an industry standard[1] pin out and a pair of RJ-45 connectors using the StudioHub[2] pin out. The first six channels are assigned speakers by industry convention. The remaining channels are configured by default to provide a 15.1 channel sound field. The input sources for HI/VN are user configurable. For convenience, all connector pin outs are listed in Appendix A.

6.4.2 8 Channel Analog Input

The JSD-100MA eight channel analog input is on a DB25F connector. The analog inputs are active balanced (differential) inputs. They may be driven by balanced or unbalanced sources. When driven by an unbalanced source, the negative input should be connected to the low side of the source at the source equipment to

1 The XSP-1000 DB25 AES input uses a de-facto industry standard pin out. The pin out was the subject of a draft SMPTE Engineering Guideline in 2004. Though SMPTE never adopted the guideline, much of the industry adopted the pin out specified in this draft.
2 Please see the Studio Hub website: www.StudioHub.com

minimize ground loop noise. The cable should be twisted pair with individual shields, even when driven by an unbalanced source.

6.5 Analog Audio Output Connections

The JSD-100MA provides sixteen main channel outputs. All outputs are balanced and may drive balanced or unbalanced loads. When driving unbalanced loads, run two conductor shielded cable and connect the " – " terminal of the JSD-100MA output to the low side of the unbalanced load at the load instead of at the JSD-100MA to minimize ground loop noise.

6.5.1 Main Audio Outputs

The main audio outputs are on a module that can be replaced from the rear. To allow for proper bypass operation, a passive crossover is included. For full band operation, set all four DIP switches to OFF and set the MID and HIGH trim pots to full counter-clockwise. Adjust the LOW trim pot for the desired full range bypass audio level. Remember that the front panel fader also affects output level when in bypass. For bypass operation with crossovers, see Section 7.5.1. The connections for these output modules are detailed in Appendix A.

6.5.2 HI/VI-N Outputs

The JSD-100MA has balanced HI and VI-N outputs that can drive balanced or unbalanced loads. As with other outputs, the use of twisted pair shielded cable is suggested whether the load is balanced or unbalanced. When driving an unbalanced load, connect the "–" output of the JSD-100MA to low side of the unbalanced input at the destination end of the cable to minimize ground loop noise. The source of audio to drive the HI and VI-N outputs is configurable on a per-format basis. The USL supplied ferrite block should be clipped on to the cables adjacent to the connectors to comply with FCC and CE emission requirements. See Appendix A for pin out information.

6.6 Automation Interface

The JSD-100MA includes the traditional parallel automation interface plus RS-232 and Ethernet. See appendix B for a list of the automation commands.

6.6.1 Parallel Interface

Pins 1 through 10 of the DB25F automation connector are "control" pins that accept contact closure or open collector pulses to ground to select formats. On a format change, the corresponding pin is also pulsed low allowing this interface to drive other equipment. Pulsing pin 11 low toggles the mute state. Pins 14 through 24 are "status" pins. One of the pins 14 through 23 is pulled low continuously by the JSD-100MA to indicate the selected format. These pins could drive LEDs with a 470 ohm series resistor to provide a remote format indication. The JSD-100MA pulls pin 24 low when the system is muted. Pins 1 through 11 are internally pulled up to +8.4V. They each source 400uA when grounded. A pin needs to be pulled below 2.6V for 10ms or more for the JSD-100MA to recognize it as low. On a format change, the JSD-100MA pulls the appropriate pin low for 500ms. +5V at 100mA is available on pin 13 to drive external LEDs or relays. The individual control and status outputs can sink up to 150mA with an open circuit voltage of +12VDC for inductive loads like relays or +24V for non-inductive loads (indicator lamps, etc.). Pin 12 is the "automation return." Use this as the low side of switches and indicators instead of using chassis ground. It is ground through a 10 ohm resistor to limit ground loop current. The USL supplied ferrite block should be clipped on to the cables adjacent to the connectors to comply with FCC and CE emission requirements. See Appendix A for pin out information.

6.6.2 RS-232 Interface

The RS-232 interface appears on a DE9F connector on the rear panel. The connector is wired as a DCE device. A command interpreter accepts ASCII commands over the RS-232 and Ethernet interfaces. The RS-232 port operates at 38.4kbps, 8N1 (8 data bits, no parity, 1 stop bit), hardware handshake. In most situations, no handshake is required, and the RTS and CTS pins can be left open. The USL supplied ferrite block should be clipped on to the cables adjacent to the connectors to comply with FCC and CE emission requirements. See Appendix A for the connector pin out.

6.6.3 Ethernet Interface

The JSD-100MA includes a standard 10/100Mbps Ethernet interface. The same automation commands are available on TCP connections to port 10001 on the Ethernet interface. The JSD-100MA accepts up to 5 simultaneous TCP connections, allowing multiple control and monitor devices to be used. The Ethernet interface also includes a web server. System status and basic control are available on internally generated web pages. System status is also available over SNMP. The JSD-100MA also includes a Network Time Protocol (NTP) client that can be used to keep the internal real time clock accurate. Use a CAT5 or better Ethernet cable to connect the JSD-100MA to the control network. The supplied ferrite block should be clipped on to the cable adjacent to the connector to comply with FCC and CE emission requirements.

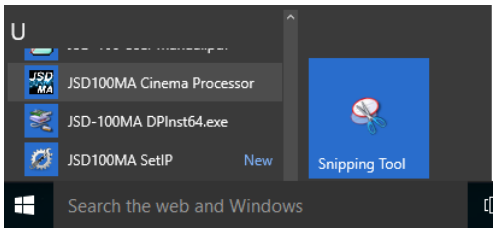
6.6.4 RS-485

The RS-485 bus used to interface the JSD-100MA to other compatible devices such as the remote volume control (See Section 9 and Appendix A). The supplied ferrite block should be clipped on to the cables adjacent to the connectors to comply with FCC and CE emission requirements. See Appendix A for the connector pin out.

7. Graphical User Interface Configuration

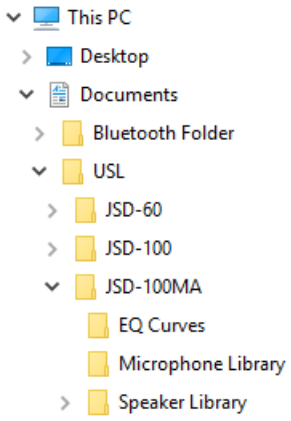
7.1 System Configuration Using the Graphical User Interface

The graphical user interface (GUI) allows for configuration and monitoring of the JSD-100MA. When the application has been installed there are two programs available through the Windows Start Menu. The JSD-100MA Cinema Processor is an application used for setting up sound processing. The JSD-100MA SetIP is a utility used for configuring the network parameters that requires a USB connection to the cinema processor.



7.2 GUI File Organization

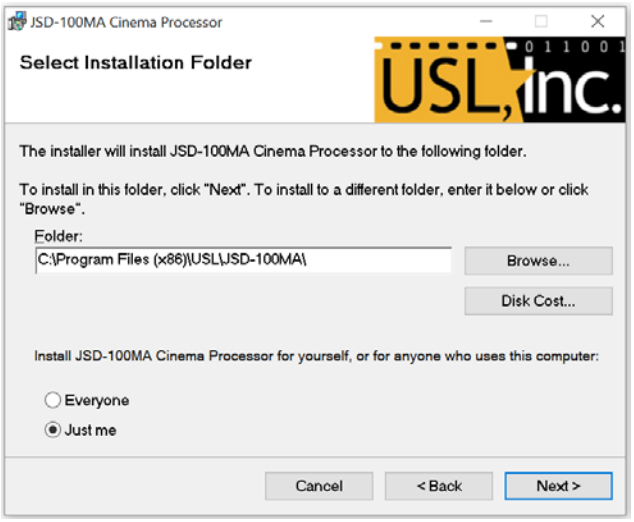
The GUI installer places the executable program files in the Program Files\USL\JSD-100MA directory. Configuration files are placed in My Documents\USL\JSD-100MA as shown.



The EQ Curves directory holds data for generating limit curves for the RTA and automatic equalization. Standard curve data for several auditorium sizes are provided. Since these are plain text files, custom limit curves can be easily created. The Microphone Library holds calibration data on microphones used on the RTA. A separate file can be created for each microphone used with the system. The file includes the required preamp gain and frequency response adjustment. The Speaker Library holds crossover configuration files for a wide range of biamp and triamp speaker systems. These are also text files; so appropriate crossover settings for additional speaker systems can be created. See Appendix E for configuration file formats.

7.3 Windows JSD-100MA Installation

The JSD-100MA.exe user interface and SetIP.exe applications are supported on Windows® XP, Windows® 7, Windows® 8, or Windows® 10 operating systems.



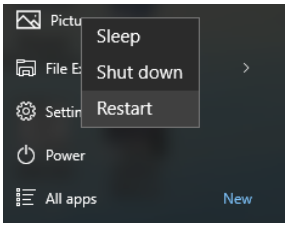
7.3.1 Windows Installer

The installation CD contains an electronic copy of the user manual, Windows Setup application, and USB drivers. When the CD is inserted into the drive on the computer, an auto-run executable starts the installer. When manually running the installer, launch the Setup.exe as this contains setup conditions that are required for proper application installation. This is especially the case with Windows 10, an attempt to install by invoking the setup.msi will result in an installation error.

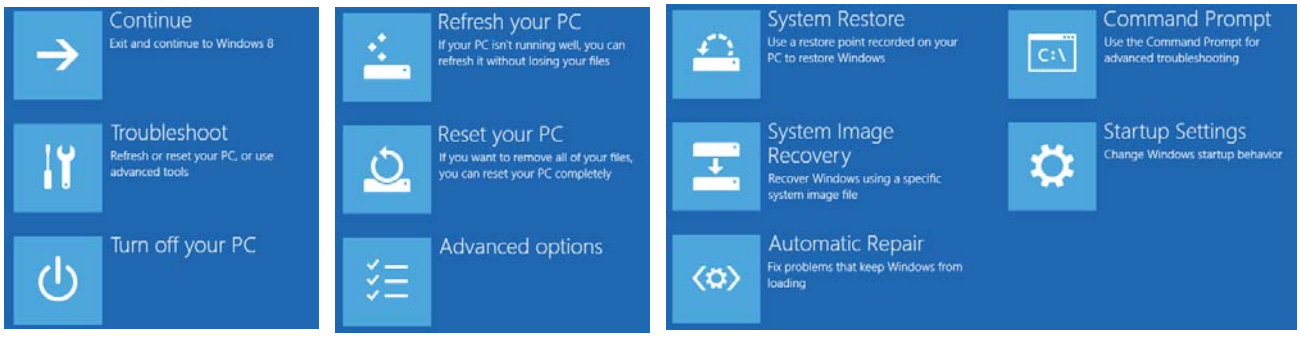
7.3.2 USB Driver Installation

Windows 10 USB driver signing and certification requirements for device drivers being installed on the computer require selecting a mode that will bypass the signing requirement via the Advance Startup Options. In addition to accessing the startup options, Bit Locker must be disabled. Access to Bit Locker settings can be found by entering “Manage BitLocker” in the task bar search field. As a note BitLocker is only available in the Windows 10 Pro edition.

The following are the steps required for Windows 10 to disable driver signature enforcement by accessing the advance startup options.

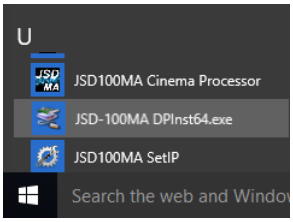


- Activate the Windows Start menu and select the Power item. When the power options appear, hold the shift-key and then with the mouse select the “Restart” option.
- Windows will appear to shut down with the typical wait status displayed and on restart the “Choose an option” menu is displayed.
- Select the “Troubleshoot” menu item and then the “Advanced options.” The next menu group it will contain the “Startup Settings” item that will then prepare the computer to restart with the settings menu interface.

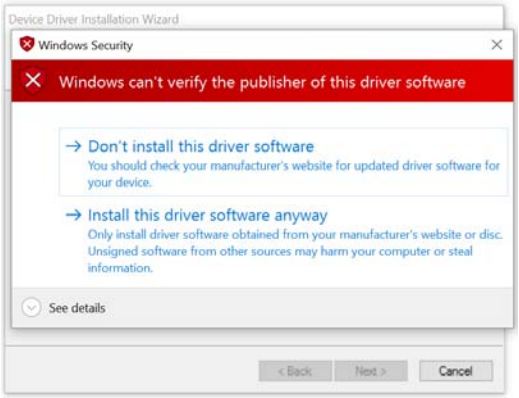


- When Windows 10 restarts, the startup settings menu is displayed with option 7, typically is “Disable driver signature enforcement.” To continue the restart process, press the F7 key.

- Windows 10 will then complete its booting and will appear as it does normally. Activate the Start Menu and select “All apps.” In the list select USL and then “JSD-100MA DPInst64.exe.” The User Account Control prompt will be displayed requesting permission to run the Driver Package Installer utility.



- A “Welcome to the Device Driver Installation Wizard!” will be displayed. Following the activation of the next button a Windows Security dialog will appear. Proceed with the “Install this driver software anyway” option.



- After the installation wizard completes, the driver is now loaded and ready for activation.

- Connect the USB to the computer and JSD-100MA to initiate the next driver installation phase. Basically you will see a status in the task bar’s far right side indicating a driver installation process.

- On most computers Windows can take about 45 seconds to a couple of minutes. By activating the up-arrow an installation icon may appear in the task bar near the tray items such as network connection status. The driver will be ready for use once the installation completes.

As another alternative, Device Manage can be used to manually select the driver using Device Manager’s Update option. For manual driver installation execute the following steps:

- For Windows 10 activate the Start menu button with a right mouse click and then select Device Manager. With Windows 7 launch Control Panel and then activate Device Manager from with its programs group.

- With the USB cable connected to the computer and the JSD-100MA, the device will appear as either “Others” or “Unknown” with a name of “USL JSD-100MA Cinema Processor” in the tree.

- Use the right mouse button on the device item (USL JSD-100MA…) to display its properties. Select the driver tab to access the update driver option.

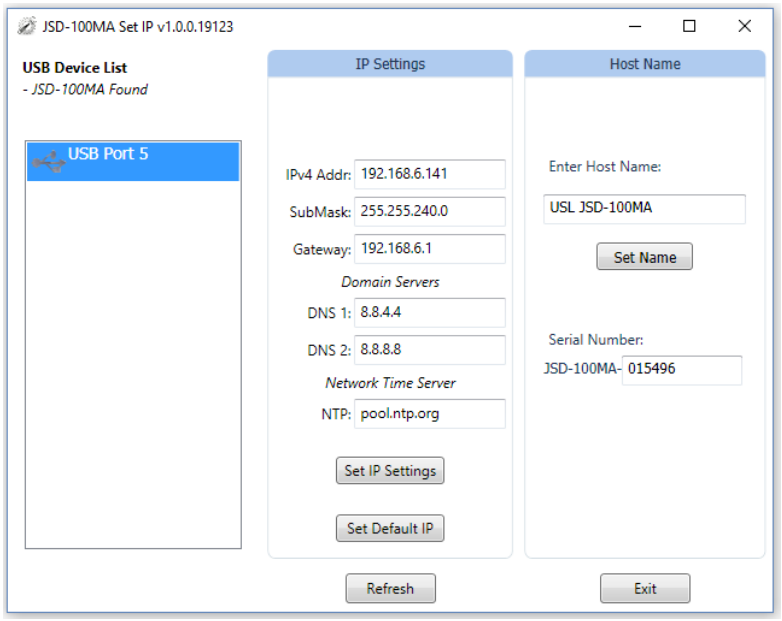
- In the next window select the “Browse my computer for the driver software.” Use the browse button to select the desired driver folder and then check “include subfolder” option followed by next button activation. An installer warning will be displayed and select the “Install this driver software anyway.”

  As a note the drivers are stored with the application in the following folder:

  C:\Program Files (x86)\USL\JSD-100\WinUSB_Drivers

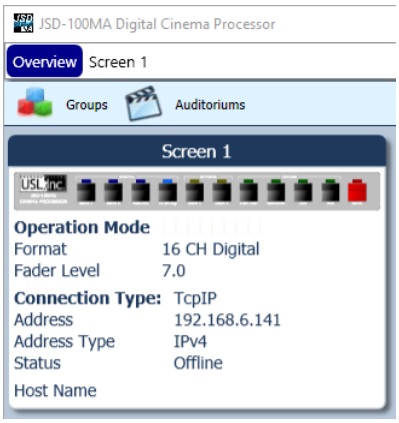
7.4 Set IP Utility

The Set IP utility allows the user to configure the network settings on the JSD-100MA.



- Connect the host computer to the USB port on the front of the JSD-100MA. The JSD-100MA should appear under the USB Device List. It is identified by which USB port it is connected to on the host computer. Click the JSD-100MA on the found list.
- Fill in the IP address, subnet mask, and gateway as dotted decimal values. Press "Set IP" to save the values in the JSD-100MA.
- Fill in the network hostname for the JSD-100MA. The hostname can be up to 15 characters long and cannot contain spaces. The hostname will be converted to upper case before being saved. Press "Set Name" to save the value to the JSD-100MA.

7.5 JSD-100MA Configuration



The JSD-100MA is configured using the graphical user interface (Shown in start menu as: JSD-100MA Cinema Processor). The GUI may connect to the JSD-100MA over USB, RS-232, or Ethernet. In most installations, configuration is done over USB. With USB, it is very clear which JSD-100MA you are configuring (the one that the USB cable is plugged in to).

The GUI and the JSD-100MA provide two sets of controls and two displays. For example, you can change the format on either the JSD-100MA unit or on the GUI and both will reflect the new value. If you open a configuration file when connected to the JSD-100MA, all the settings in that configuration file are sent to the JSD-100MA. When you connect to a JSD-100MA, all the configuration settings in that unit are loaded into the GUI. It is quite possible to operate the GUI and create configuration files without the JSD-100MA being connected. Make sure the new file is saved before connecting the JSD-100MA since the connection will cause the current values in the JSD-100MA to be overwritten with the values in the JSD-100MA. When the JSD-100MA is connected to the GUI and a new configuration file opened, that configuration data is copied out to the connected JSD-100MA.

When the GUI is started, the "Overview Screen" will be visible. This screen can show the status of multiple JSD-100MA systems on a network. The title bar shows the theater name and the screen number for that particular JSD-100MA. Click "Screen 1"to bring up the details of the first (and only, at this point) JSD-100MA.

Click "Comm Settings" and then the "USB" tab. Make sure "Connect to first available USB device" is checked and then press OK. Press the "Connect" button to connect to the JSD-100MA. Current settings will be downloaded from the JSD-100MA and displayed on the GUI. Detailed below are the several buttons that are visible along the top of the GUI.

7.5.1 File Management

This group of buttons detailed below deals with loading and saving configuration files from the host computer. Configuration files are located in the My Documents\USL\JSD-100MA directory.

- **New.** Pressing “New” creates a new configuration file with all settings at their default values. It does not change the settings in the JSD-100MA or in the GUI view of the JSD-100MA. You can use this as a starting point for configuring a new system (you could also use open Default.x100, as described below). You will be presented with a “save as” dialog asking you to name the new configuration file.
- **Open.** Pressing “Open” allows you to load an existing configuration fie. Use Default.x100 to load the factory defaults. You can then revise the settings and save them under another filename. Note that you may specify either a JSD-100MA or other configuration file under “file type.”
- **Save.** The “Save” button prompts you for the filename under which the configuration data is to be saved. Data can be restored to this or another unit using the Open button.

7.5.2 Communications

This group of buttons sets communications parameters between the GUI and the JSD-100MA and allows connections to be set up and taken down.

- **Connect.** The GUI connects to the JSD-100MA specified in the Comm Settings dialog over the specified link.
  Disconnect. The GUI disconnects from the currently viewed JSD-100MA**.** When the Disconnect button is pressed, the GUI will ask if you want to save changes to the JSD-100MA. When “Save Changes” is selected, the current configuration will be saved to flash memory and will be reloaded the next time the JSD-100MA is powered up. If “Save To SD Card” is checked, the configuration will be saved to both the SD card and the flash memory when the Save Changes button is pressed. If “Save Changes” is not selected, the current configuration will not be saved. Instead, the previous configuration will be loaded on the next power up.

7.5.2.1 Communication Settings

Press this button to configure the communications link to the JSD-100MA. The JSD-100MA GUI can communicate with the JSD-100MA over Ethernet (TCP/IP), USB, or RS-232. Click on the appropriate tab for this unit. If you find the GUI on occasion disconnects from the JSD-100MA, try clicking the “Advanced” button and increase each of the timeout values. This may be required on a slow network.

7.5.2.2 TCP/IP

Check "Display automatically detected network devices" to get a list of JSD-100MA units the GUI can find on the network. Any device ever found is listed (they do not disappear if they have not been heard from in a while). Select the appropriate unit from the list or click "Manual Add" to specify an IP address for a JSD-100MA. Use the "Remove" button to remove a displayed unit from the list. Once the desired unit is selected, press OK to exit the dialog.

7.5.2.3 USB

Select this tab to connect to the JSD-100MA using USB. When the host computer is connected to the JSD-100MA USB port, the JSD-100MA should be listed under the device list. If the "Connect to first available USB device" is checked, the first device (and probably the only device) on the list will be selected. If it is not checked, select the appropriate device, and then click OK.

7.5.2.4 RS-232

Select the COM port the JSD-100MA is connected to, and then click OK.

7.5.2.5 Unit Settings

This group of buttons handles a few “system wide” system configuration settings and backing up those settings.

7.5.2.5.1 Channel Configuration

The JSD-100MA uses a configuration ".jsa" file that contains the settings that defines sound fields, inputs, and mixes for all formats. An editor such as "Note Pad" can be used to customize the XSP-100 cinema sound processor to suite the requirements of the installation. Included in the configuration file a parameter is read to identify the type of sound field configuration the settings represent.

7.5.2.5.2 Headroom

The system is designed around 26dB headroom. Incoming audio is converted to floating point, dropped 6dB (divide by 2), as digital signal processing is applied, converted back to integer and sent to the ADC. The output analog circuitry is adjusted such that a digital -26dBFS yields 300mV RMS with the trims set at 0dB. With headroom a positive EQ can be applied and not have the input peak at or beyond 0dBFS clipping level due to an EQ boost. The amount of headroom is selectable and defined in the configuration file. When reduced, the headroom (to say 20dB), a -20dBFS comes out at 600mV RMS with 0dB trim. This then allows for a trim setting of -6dB to get back to 300mV, the noise goes down 6dB. So, of course, it's a balance between headroom and noise.

7.5.2.5.3 Flash Save Settings

Pressing this button saves the current configuration to flash memory inside the JSD-100MA. The JSD-100MA will load this configuration the next time it is powered up. Because of the importance of saving the configuration, you are also given another opportunity to save the settings when disconnecting from the JSD-100MA.

7.5.2.5.4 SD Card Backup

Pressing this button writes the current configuration to the SD or MMC card plugged in behind the removable panel on the rear of the JSD-100MA. If the cover is removed, you will see a red LED to the left of the card light as the card is written. A backup to the SD card can fail if no card is present, if the card is write protected, or if the card is not formatted correctly (FAT16 or FAT32). The data written on the card is a series of commands in a text file (JSD100.CFG). If a JSD-100MA needs to be swapped out, the SD/MMC card can be moved from the old unit to the new unit to copy all the old settings to the new unit. To load data from the SD/MMC card, hold down buttons 9 and 10 (AUX and MIC) when turning the JSD-100MA main power switch on. Continue to hold the buttons down until the display says "Loading From SD Card". The display will show the progress of the load and then return to the normal display.

7.5.3 Main Fader

The current main fader level can be viewed and changed using the slider. These are equivalent to the front panel main fader knob and display. The fader level display also shows a small bar graph that displays the measured output level on each channel.

7.5.4 Front Panel View

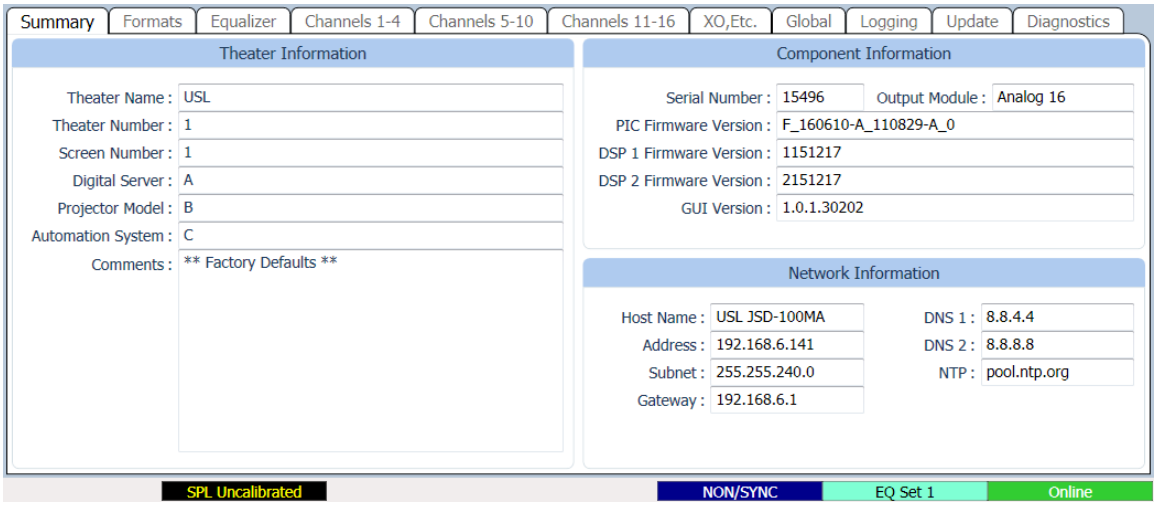
Front Below the above-described buttons is a view of the JSD-100MA front panel. When connected to the JSD-100MA, this view duplicates the look of the front panel. In addition, the buttons can be pressed to change format or mute the system, just as on the front panel. The LED above the format button lights when that format is selected. It flashes if the format is a digital format and no digital signal is present on the selected input.

7.5.5 Tabs

The remainder of the GUI window contains tabs that divide the remaining configuration data into logical groups. Each tab will be discussed in sequence.

7.5.5.1 Summary Tab

The "Summary" tab (shown below) gives a broad view of the JSD-100MA and its installation. The Theater Information fields may be changed as needed. The other sections of this screen cannot be changed through the summary tab.



7.5.5.1.1 Theater Information

The data in the theater information fields is not used by the JSD-100MA, but is stored in the JSD-100MA for the convenience of the user. Fill in the desired information. This data will be saved with other configuration information in the JSD-100MA and displayed the next time the unit is connected to.

7.5.5.1.2 Component Information

Various pieces of information about the JSD-100MA are shown here. The Output Module field shows the type of output module (Analog 8, Analog 16, or AES32). The PIC firmware version identifies the firmware version in two of the microcontrollers and the circuit board revision of the main circuit board. In the sample screen above, the first "F" indicates this is main board Revision F. The 160610 is the main processor firmware revision. The next series of revision identifications are board revision A and firmware version 110829 for the rear panel (output module) assembly. This tab also shows the versions of the firmware for each of the two digital signal processors and the version for the GUI software itself. Each of these version numbers can be compared with later updates to determine if the latest firmware is already installed.

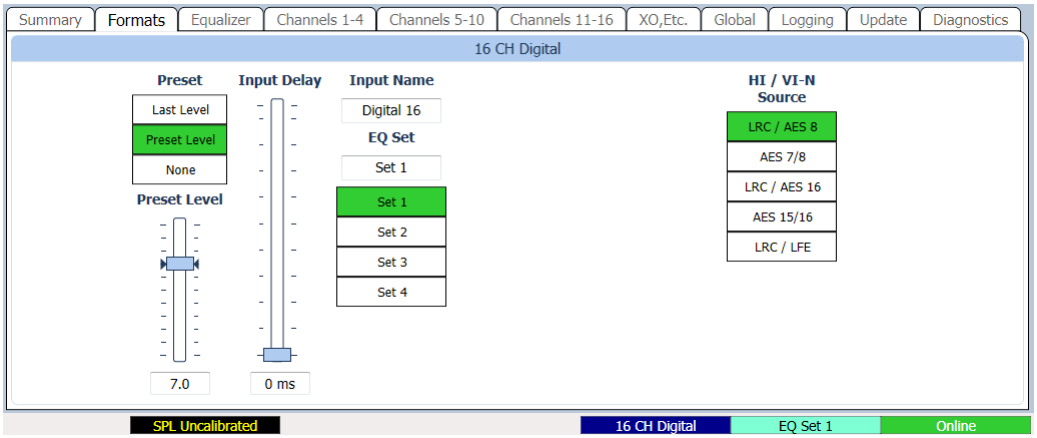
7.5.5.1.3 Network Information

This is the network information that was set with the JSD-100MA Set IP Utility, discussed Section 7.4.

7.5.5.2 Formats Tab

The "Formats" tab contains the settings that are applicable for the selected format. For each format the setting types are presented to the user for JSD-100MA unit configuration. For instance only two channel analog sources, such as non-sync will have an input trim control. And all formats will have a preset type and level settings.

As shown in the following the format options for 16 digital channels are shown.



7.5.5.2.1 Preset Level

The preset level is used to restore an output level for a selected format. When the Last Level option is selected, the JSD-100MA will store the main fader level last set or adjustment when switching to another format. The level is then restored when switching back to the format set with the last level selection. The preset level option will use the slider control's value to set the main fader to when that format is reselected. The last and preset main fader values update when the user selects another format and then returns. When none is selected the main fader does not change when switch back to the format. This is usually the selection used when the media server controls the desired main fader level.

NOTE that presets can only be changed through the GUI. This feature prevents unauthorized people from changing the presets.

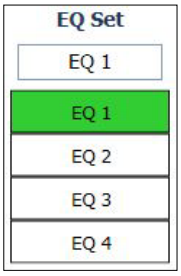
7.5.5.2.2 Input Delay

A separate input delay setting is available for each format to enable precise synchronization of the audio with the projected image.

7.5.5.2.3 Input Name

The name that is shown on the display and logged when a particular format is selected can be set by the user. Type a meaningful name for the format in the Input Name field.

7.5.5.2.4 EQ Set



The JSD-100MA allows different formats to use different equalization curves. Four EQ sets are available. Each EQ set holds all the settings available on the Equalizer tab. These controls include the graphic equalizer settings and channel output level, but do not include the LFE parametric equalizer or controls in the crossover. The EQ set portion of this tab shows the currently selected EQ set and has four buttons to select other EQ sets. The name in the currently selected field can be changed by the user to give a meaningful name to the EQ set. These names are saved in the JSD-100MA and will be shown the next time the GUI connects to the JSD-100MA. The currently selected equalizer set is always visible on the status bar at the bottom of the GUI window.

7.5.5.2.5 Input Select

There are two formats that are user definable for custom configurations. The "JSD100Default.jsa" file contains a digital 5.1 and 7.1 channel configurations in addition to their sources. As noted in the default configuration file the source is the 16 channel digital input.

7.5.5.2.6 Rear Surround Source

Channel configuration parameters are located in a ".jsa" file that defines the sound field and contains speaker assignments in conjunction with their location within the auditorium. For instance a 7.1 DS is defined within the configuration file as USER 2 (format #5).

7.5.5.2.7 HI/VI-N Source

The HI output can be driven by a discrete input (such as AES channel 7) or an LCR mix. Most auditoriums are wired to put HI on AES channel 7 since that is where the HI track is located in an Interop DCP. VI-N is typically placed on AES 8. Some content, especially trailers and other preshow content, does not have a separate HI track. The LCR mix will provide HI output whether the content has an HI track or not. The JSD-100MA has a decoding feature to share the LFE channel with narration content by filtering the voice frequencies above 200Hz (LRC/LFE). This "frequency division multiplexing" splits the audio received on the LFE channel (typically AES/EBU channel 4). Audio below 125Hz is sent to the LFE (SW) output. Audio above 200Hz is sent to the VI output. When servers support this multiplexing, the JSD-100MA can deliver 15.1 audio along with HI/VI.

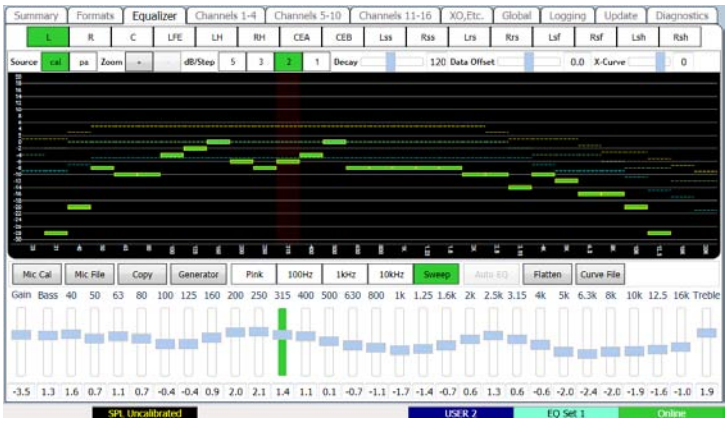
7.5.5.2.8 Decode Options

Two channel sources can be decoded out to several channels. These options are available on digital and analog two channel formats, such as COAX1, COAX2, TOSLINK, NON/SYNC, and AUX.

Decode Option	Description
L_R	The two channel source drives just the left and right speakers.
L_C_R	The left and right channels of the source drive the left and right speakers. The center speaker is driven with 0.707 times the sum of the left and right channels. The LFE channel is driven with the center channel after passing through an 80Hz low pass filter.
Simple Matrix	The front speakers are driven with the same signals as L_C_R, described above. The surround speakers are driven with 0.707 times the difference between left and right (0.707(L-R)). The rear surrounds are driven with side surrounds (Lrs = Lss and Rrs = Rss).

7.5.5.3 Equalizer Tab

The JSD-100MA equalizer allows the frequency response of the JSD-100MA to be adjusted for the acoustics of the room. The RTA screen shows the measured sound pressure level (SPL), the measured level in each 1/3 octave spectrum band, and limit lines for the desired equalization. By default, the limit lines correspond to the SMPTE ST 202:2010 limits for a 500 seat auditorium. Other limit sets can be displayed (see Curve File, below). The equalizer tab also allows access to the automatic equalization feature of the JSD-100MA.



7.5.5.3.1 RTA Channel Select Buttons

Channel select buttons are along the top of the RTA window. These select which speaker the generator is driving and which channel the equalizer controls are adjusting. If an external pink noise generator is to be used with the internal RTA, enable the internal pink noise generator, then disable it. Enabling the internal pink noise generator configures the internal RTA for proper operation.

7.5.5.3.2 RTA Settings

When the mouse cursor is over the display area of the RTA, another row of settings becomes visible (as shown above). Use the Source button to select whether the "cal" (calibration) or "pa" (public address) microphone input is being used to drive the RTA. The calibrate microphone input is on the 3.5mm TRS connector on the rear panel. The PA microphone input is on the combination XLR ¼ inch TRS connector. Use the Zoom buttons to enlarge or reduce the text within the RTA display area. Use the dB/step selector to adjust the vertical resolution as required for viewing all bands on screen while providing the best vertical resolution. Make initial adjustments with a fast decay time. The fast decay time provides a faster update, but a less stable display. As you close in on the final adjustment of the equalizer, increase the decay time towards maximum to provide a stable display and precise indication of the equalization. Use the Data Offset control to slide the RTA data up

and down as required to place it within the X-curve limits. Similarly, the X-Curve control can be used to move the limit curves up and down to best fit the RTA data.

7.5.5.3.3 SPL Meter

The auditorium SPL is visible along the bottom of the GUI window, no matter which tab is selected. The display will show "SPL Uncalibrated" until the SPL meter is calibrated by reading in an existing microphone calibration file or adjusting the SPL calibration with a reference pink noise level. The SPL meter uses a C-weighted filter as per ANSI S1.4-1983.

7.5.5.3.4 Microphone Calibration

Press this button to calibrate the microphone driving the RTA. Turn on pink noise in the auditorium. Adjust the Microphone Gain control until the indicated SPL matches the SPL indicated on a reference meter. Press Save to save this calibration to a file. The file name might consist of the manufacturer's model number and microphone serial number. The RTA gain setting required for the proper SPL indication is saved. See Appendix E for information on the microphone calibration file format.

7.5.5.3.5 Microphone File

Press this button to load a previously saved microphone calibration file.



7.5.5.3.6 Equalizer Copy

Press this button to copy equalizer settings from one channel to another or to copy one equalizer set to another. Choose the source and destination, and then click the Copy button that appears. If no channel is selected for the EQ Copy Destination, all channels in the Copy Source set are copied to all channels in the Copy Destination set.

7.5.5.3.7 Generator

Press the Generator button to turn the generator on or off. Use the adjacent Pink, 100Hz, 1kHz, 10kHz, and Sweep buttons to select the type of generator output. Auditorium equalization typically uses pink noise.

7.5.5.3.8 Auto Equalization

The JSD-100MA includes automatic equalization for all channels except LFE. The auto equalization uses the calibrated microphone level that is used in sound pressure level measurements with the main fader and channel gains. A description of the processing and sound checks is in the following list and section 7.6.2.

Auto EQ is not enabled until the RTA microphone has been calibrated or a microphone calibration file has been loaded. Once the microphone is calibrated and a channel is selected, the Auto EQ goes through the following process:

1. Select digital 16 input.
2. Set equalizer to flat.
3. Adjust main fader to 0.0.
4. Adjust channel output trim to -20dB.
5. Listen for quiet. Abort if SPL too high (room not quiet).
6. Turn on pink noise.
7. Increase main fader towards 7.0 while insuring SPL does not exceed increase main fader towards 7.0 while ensuring the SPL does not exceed the SPL equalization will be run at (EQSPL in the AutoEQ.ini file, typically 80dB).
8. Adjust output trim up until SPL reaches target. Abort if trim increase does not result in SPL increase.
9. Normalize RTA data to place majority of RTA bands within limit curves.
10. Adjust equalizer as required to put all bands at desired RTA level.
11. Smooth equalizer settings to avoid large transitions between adjacent bands while keeping RTA data within limits.
12. Adjust output trim to target SPL. The target SPL is specified in AutoEQ.ini as StageSPL and SurroundSPL, typically 85dB and 82dB, respectively.
13. The pink noise is left on to allow final manual adjustments.

7.5.5.3.9 Flatten

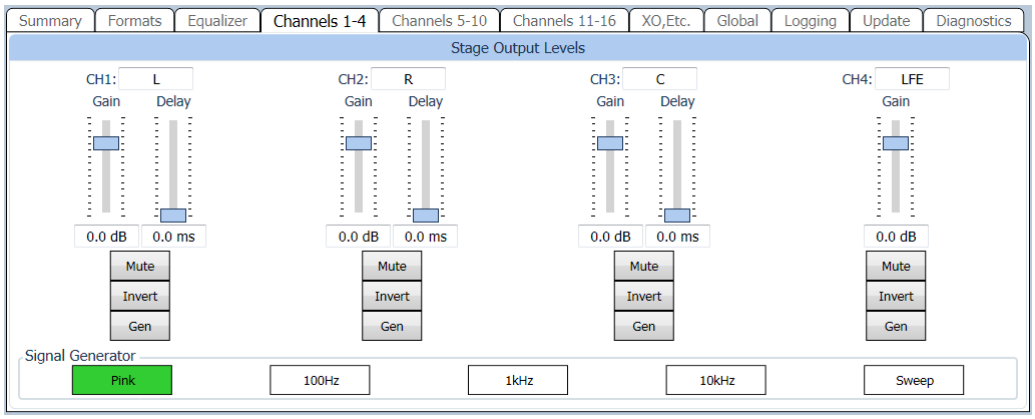
Press this button to return the equalization to flat (all bands at 0dB).

7.5.5.3.10 Curve File

Press this button to load a curve file from the “My Documents/USL/JSD-100MA/EQ Curves” directory. The installer placed several curve files for different sized auditoriums in this directory. Current practice is to use one of the X-Curve files, based on auditorium size. N-Curves are also available for use with loudspeakers with poor high frequency response. If a custom equalization curve is required, use one of the existing files as a template to create new curve limit file using a text editor. See Appendix E for the Curve File Format.

7.5.5.4 Channel Output Tabs

The channel outputs are grouped into three tabs with the outputs indicated in the tab’s labels. The first tab in the group is the primary stage channels. The next tab contains the output controls for side surrounds including the addition of the left and right stage high channels. The third tab in the group is for the remaining surround channels including ceiling points.



7.5.5.4.1 Channel Label

To identify the output a channel number along with a text channel name is provided. The channel name text can be edited to reflect labels and or acronyms as required for installation.

7.5.5.4.2 Channel Output Trim

For each channel the output trim control has an adjustment range of +3dB to -22dB. The output trim control is also available in the Equalizer tab view as required when adjusting the equalization.

7.5.5.4.3 Channel Delay

Included in the output channel groups, a delay control is available. The LFE has its delay control located in the XO, ETC tab. The surround delay is set usually based on the length and width of the auditorium. Formulas to determine the surround delay with auditorium Length and Width in meters and feet are provided.

- With Length and Width of the auditorium in meters, the surround delay, in ms, should be (L/3)-(W/6)+20.
- With Length and Width of the auditorium in feet, the surround delay, in ms, should be set to L-(W/2)+20.

7.5.5.4.4 Channel Invert

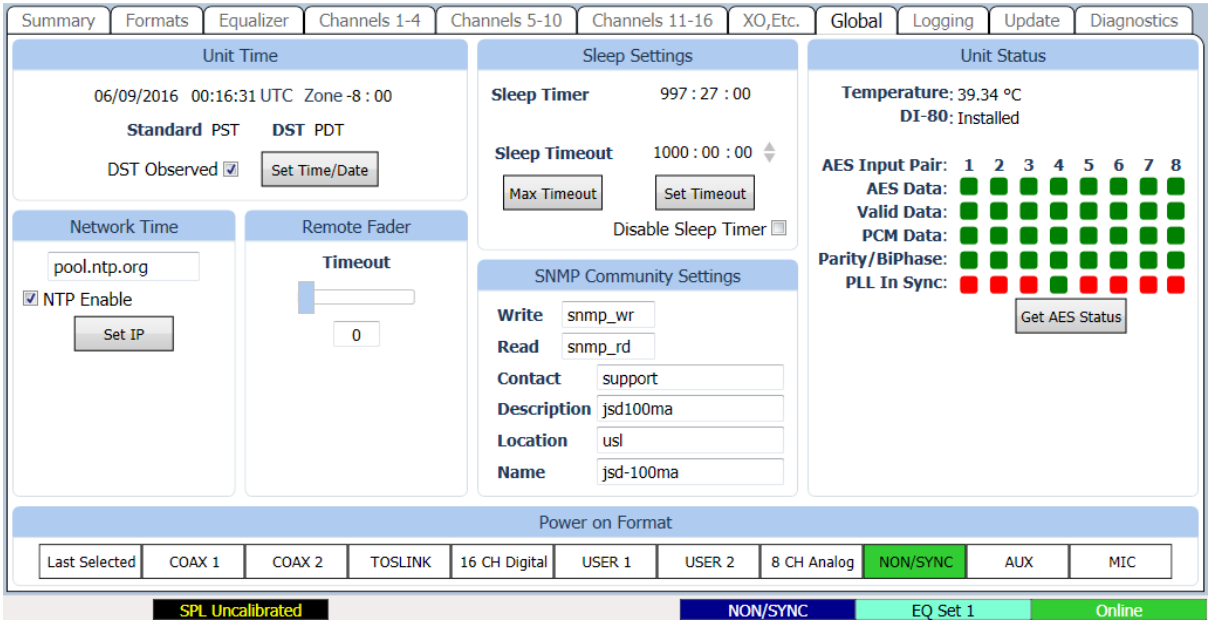
When active the final output phase is complemented and typically used to address polarity reversals in the speaker wiring. As a note when the channel source uses a parametric, an additional option for inversion is available and useful in bi-amp and tri-amp configurations.

7.5.5.4.5 Channel Generator

For each channel an internal signal generator is available to verify speaker frequency response and for equalization. Located along the bottom are generator playback selections such as pink noise.

7.5.5.5 Global Tab

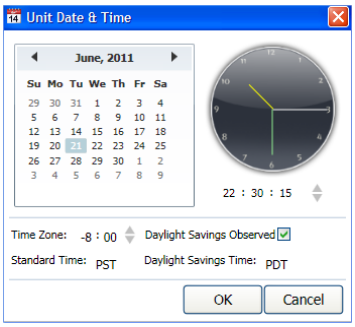
Global settings are for items such as the unit's real-time clock, network time resource, remote fader timeout, simple network management protocol, and unit status.



7.5.5.5.1 Unit Time

The time settings in the unit can be observed in this section of the tab. The Unit Time data includes the current UTC value in the JSD-100MA real time clock, the time zone offset from UTC for standard time, the abbreviations for standard and daylight saving time, and whether daylight saving time is observed at this location.

7.5.5.5.2 Set Time



This date button sets the time and time zone information in the JSD-100MA. The JSD-100MA itself only uses time of day in logging. Further, all log entries are made in UTC. When viewed through the GUI, log data includes the time in UTC, the time at the JSD-100MA (XSP Time), and the time at the GUI (GUI Time). The use of these three time zones allows for simple comparison of device logs, even when the devices are in multiple time zones. The Date and Time dialog allows setting of date and time data for the JSD-100MA. Since the JSD-100MA uses UTC time, the displayed time is UTC. If the system is using an NTP server, you do not need to set the date and time. If no NTP server is available, set the date and time to the current UTC time. The bottom portion of the dialog box deals with the date and time at the JSD-100MA itself. Set the Time Zone field to the offset from UTC for *standard time* in the time zone where the JSD-100MA is located. If daylight saving time (summer time) is observed at the JSD-100MA location, check the corresponding checkbox. Note that this checkbox indicates whether daylight saving time is *ever* observed at this location, not whether it is currently in effect. For example, you would check the checkbox in California, but uncheck it in Arizona. Fill the next two fields with the abbreviations for standard time and daylight saving time in the time zone where the JSD-100MA is located. The daylight saving time abbreviation will not be used if the daylight saving time observed checkbox is unchecked, but you may want to fill it in anyway. Clicking OK transmits the data to the JSD-100MA.

US Time Zone	UTC Offset	Standard Time Abbreviation	Daylight Saving Time Abbreviation
Hawaii-Aleutian	-10:00	HAST	HADT
Alaska	-9:00	AKST	AKDT
Pacific	-8:00	PST	PDT
Mountain	-7:00	MST	MDT
Central	-6:00	CST	CDT
Eastern	-5:00	EST	EDT

Note: Worldwide time zones may be viewed at the following websites:

- http://www.timeanddate.com/library/abbreviations/timezones/
- http://en.wikipedia.org/wiki/List_of_time_zones_by_UTC_offset

7.5.5.5.3 Network Time Protocol

This section also allows the IP address of the Network Time Protocol server to be set and enabled or disabled. If an NTP server is available on the network, enter its IP address, check NTP Enable, and press the Set IP button.

7.5.5.5.4 Remote Fader Settings

This section allows the display timeout on remote volume controls JSDV-100 to be set. Use the slider to set the number of seconds after an adjustment that the remote volume display will blank. Setting the timeout value to zero prevents the display from blanking. See section 9 for more information on the JSDV-100.

7.5.5.5.5 Sleep Settings

The JSD-100MA includes a sleep timer. The timer is reset to its timeout value on any format change, any fader level change, or any audio output above -20dB (referenced to 300mV RMS). If, for example, the sleep timeout is set to 1 hour, the system will go to sleep 1 hour after the last format change, level change, or audio. When the system goes to sleep, power consumption is decreased from about 18W to about 7.5W. The system wakes up on a format change, a level change or a specific command over Ethernet (See Appendix B). Audio presence will not wake the system up since the audio circuitry is shut down during sleep. The current sleep timer value is shown. The unit will go to sleep in the displayed number of hours and minutes. To set the sleep timeout, key in the number of hours and minutes or use the arrows to change the Sleep Timeout value. Once the value is entered, press Set Timeout to save the value in the JSD-100MA. If sleep is not to be used, check Disable Sleep Timer and press Set Timeout.

7.5.5.5.6 SNMP Settings

This section allows the Write and Read community settings to be viewed or changed. The JSD-100MA does not currently use the write community setting since the JSD-100MA cannot be controlled over SNMP, only monitored. The contact, system description, and location information reported over SNMP can also be set. Read and Write community strings are limited to 8 characters each. Contact, description, and location are limited to 39 characters each.

7.5.5.5.7 Unit Status

This portion of the global tab shows the temperature within the JSD-100MA, DI-80 module's presence, and status for each AES input converters. The DI-80 board is required for 16 channel digital input. Without it, the AES input is 8 channels. When "Get AES Status" button is pressed, the AES Channel Status indicators are updated. Green indicates the parameter is true. Red indicates it is false. Gray indicates it cannot be determined.

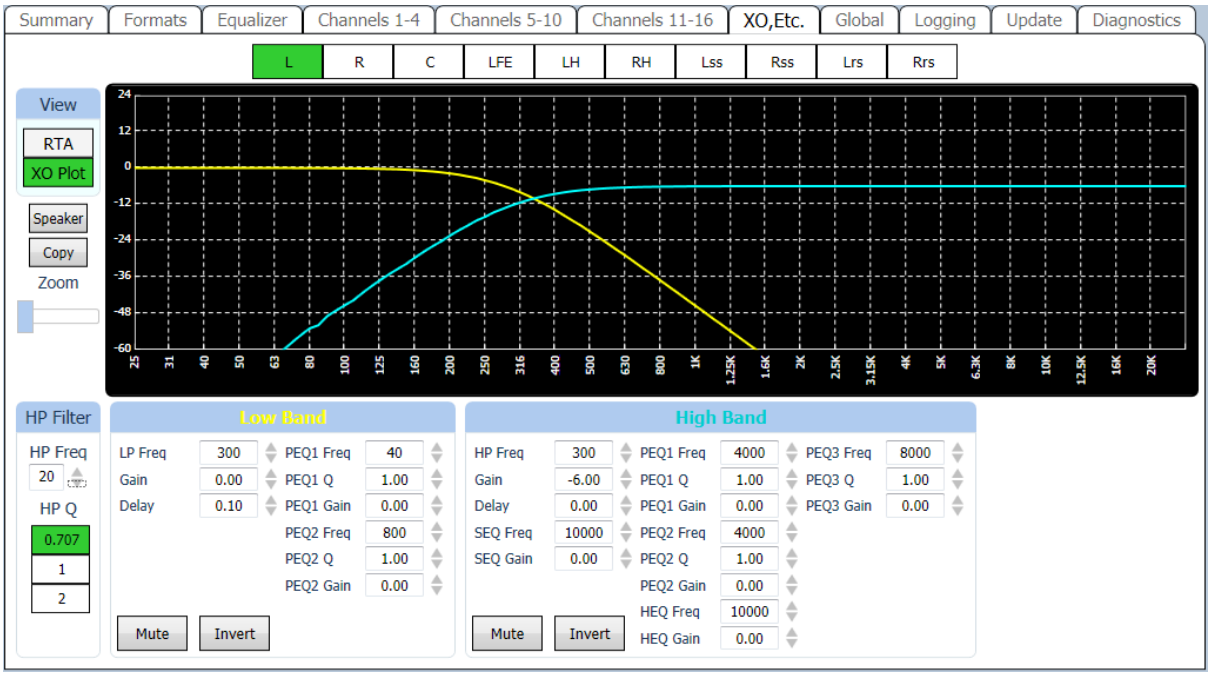
7.5.5.5.8 Power On Format

These buttons determine which format will be selected the next time the JSD-100MA is powered up. The power on format can be a specific format or can be the format that was active when the JSD-100MA was powered off.

7.5.5.6 XO, Etc. Tab

The XO, Etc. Tab is used to configure crossovers and other outputs where a single channel drives multiple outputs (see section 4.2 for block diagrams showing crossovers and other outputs).

This section describes the display and controls of this tab.



Along the top of the XO, Etc. Tab display are buttons that select which channel the current display applies to. Note that all channels are listed, including those where no crossover controls are available. If a channel without crossover controls is selected, the controls will be "grayed out."

The View button toggles the graph between a view of the filter frequency response and the RTA display.

You can watch how the controls affect the filters within the JSD-100MA or how they affect the sound in the auditorium. If an external pink noise generator is to be used with the internal RTA, enable the internal pink noise generator, then disable it. Enabling the internal pink noise generator configures the internal RTA for proper operation.

The Speaker button opens a file select dialog where you can select a speaker from the speaker library. This loads all the crossover settings with values appropriate for that speaker. Depending on the system configuration (as set by the Channel Config button at the top of the JSD-100MA screen), the appropriate library (biamp or triamp) is opened. Once a speaker is selected, you can select which screen channels to apply these crossover settings to.

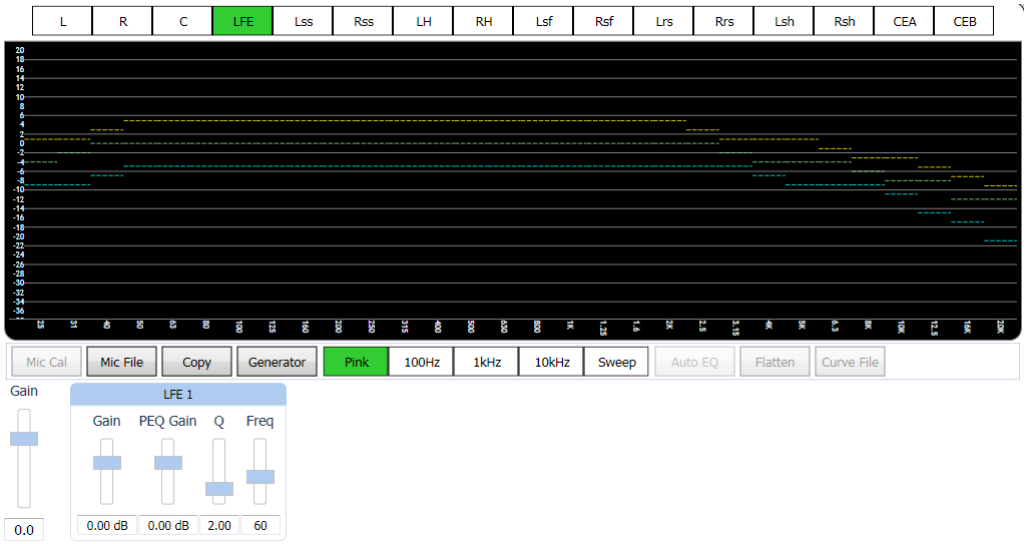
The Copy button allows you to copy the crossover settings from one channel to one or more additional channels.

The Zoom slider changes the number of dB per vertical grid line on the graph. This control is only visible when viewing the filter response, not the RTA.

The Bypass button is only visible when the RTA view is selected. When Bypass is enabled, the JSD-100MA outputs are switched from the normal processed outputs to the bypass outputs. This allows viewing the RTA output while in bypass so the bypass crossover can be adjusted.

The HP Filter controls drive the channel high pass filter at the input of the crossover (see figures 4 and 5). This filter limits the extremely low frequency output for the channel, but can also be used to apply a low frequency peak by increasing the Q above 0.707.

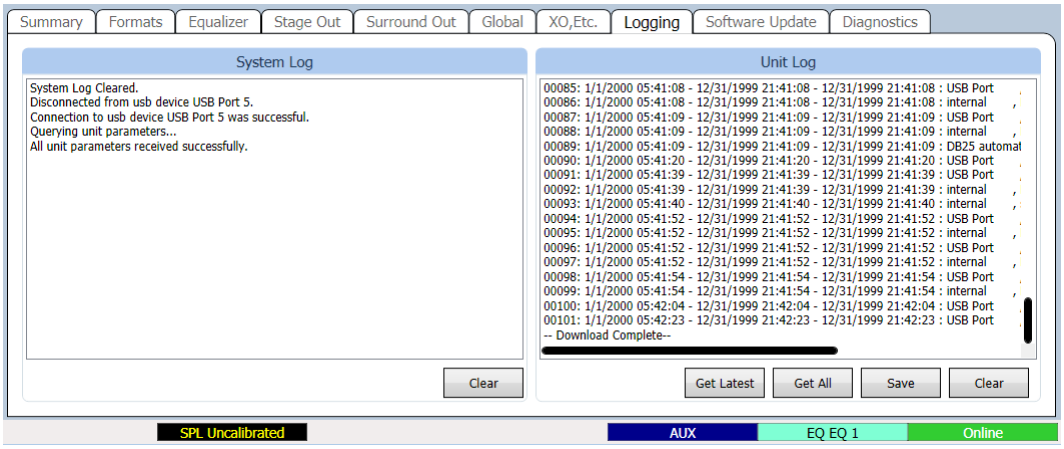
The filters in each crossover band are described in section 4.2. Note that frequencies are in Hz, gains in dB, and delays in ms. The filter types are abbreviated as LP for Low Pass filter, HP for High Pass filter, PEQ for Parametric EQualizer, HEQ for the high frequency Horn shelf EQualizer, and SEQ for the high frequency Screen shelf EQualizer. The Mute and Invert buttons mute a particular band output or invert the phase.



The figure above shows the "crossover" settings for an LFE output. Depending on the output module type, one or more LFE outputs are available. Each has a separate parametric equalizer that can be adjusted on this screen. Similarly, Ls and Rs may have multiple outputs and separate delay controls for each. Note that the filter plot of the LFE channel includes the effect of the 125Hz low pass filter specified for the LFE channel in SMPTE EG0432-2-2006.

7.5.5.7 Logging Tab

The JSD-100MA includes extensive logging. The left side of the screen shows the GUI log. It shows GUI activity, such as connections to JSD-100MA units and other activities. The right side of the screen shows the Unit Log for the specific JSD-100MA.



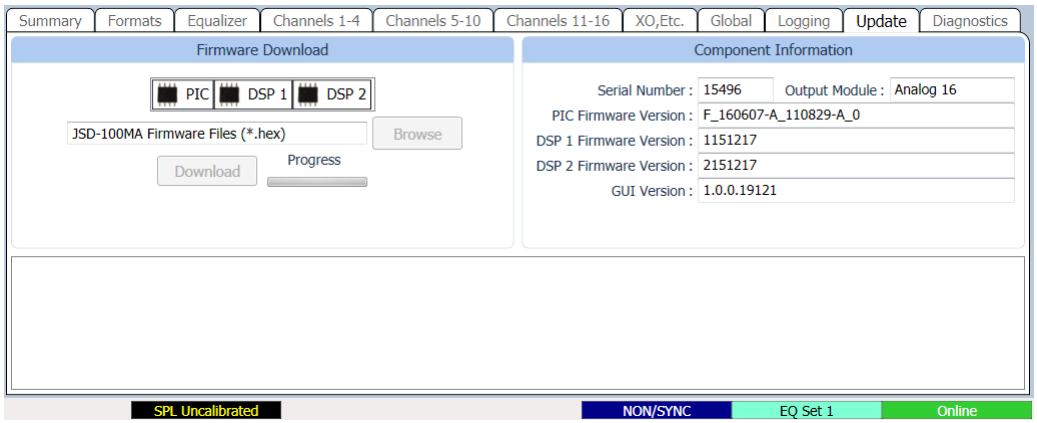
The JSD-100MA holds a log of the last 32,768 events. Events include level changes, format changes, remote connections by the GUI or other devices, etc. Press the Get Latest button to get the 100 most recent log entries. Press the Get All button to get the full log from the JSD-100MA.

The log shows the record number in the JSD-100MA log, the UTC time of the event, the "XSP Time" of the event, and the "GUI Time" of the event. The JSD-100MA stores all log events in UTC time. When the log events are displayed by the GUI, the time at the JSD-100MA is calculated based on the settings entered using the "Date & Time" button on the Global Tab. The GUI applies the time zone offset for where the JSD-100MA is located, determines if the daylight saving time is observed where the JSD-100MA is located, and whether daylight saving time is currently in effect. Based on this data, the GUI calculates and displays the time of the event at the JSD-100MA. The name of the time zone (PDT in the sample) is shown in the column header to help identify the time. The GUI also does a similar calculation to display "GUI time." That is the time the event occurred at the GUI location, which may be several time zones away from where the JSD-100MA is located.
The log shows the source of the event (internal, USB Port, front panel, TCP4, etc.). When a device connects to the JSD-100MA over Ethernet, the connection and the IP address are logged. Later actions can be tied to a specific IP address by looking back through the log for the last connection to that TCP port. The JSD-100MA supports 5 simultaneous TCP connections on TCP4 through TCP0.

Pressing the Save button saves the currently displayed log data as a tab delimited text file. This file can be imported into a spreadsheet or viewed with a text editor.

7.5.5.8 Software Update Tab

The firmware in the main processor and the Digital Signal Processors (DSPs) in the JSD-100MA can be updated through the GUI over Ethernet or USB. The right side of the screen shows the current firmware versions. The left side of the screen contains controls to do a firmware update.



Firmware is usually delivered in a Software Package that includes new versions of the code for each DSP and the main processor (PIC). We suggest making the updates in this order: DSP2, DSP1, PIC. Look at the versions of each piece of code in the software package. If one of the versions is already installed in the JSD-100MA, that portion of the JSD-100MA does not need to be updated.

Select the device to be updated: DSP2, DSP1, or the PIC. Press the Browse button to select the file to be downloaded to the JSD-100MA. Press the Download button. During the download, the front panel LEDs on the JSD-100MA will flash. After a download of the PIC (the main processor), the JSD-100MA will reset to start executing the new code. The GUI will disconnect at that time.

7.5.5.8.1 PIC Firmware Restore

If a download of the PIC firmware to the JSD-100MA is interrupted, the JSD-100MA may be left inoperable. To restore the original firmware, turn off the JSD-100MA, press buttons 4 and 6 on the front panel (Digital 16 Channel and User 2), then turn the power on while continuing to hold the buttons down until the front panel LEDs start flashing. They will normally start flashing immediately, but it could take up to two minutes for them to start flashing. When they stop flashing, the factory installed firmware has been restored, and the JSD-100MA will restart. This only restores the PIC firmware not the DSP firmware. Ensure the versions for each are from the same code package.

7.5.5.9 Diagnostics Tab

This tab provides diagnostics that help USL personnel in debugging the system. You may be instructed by USL to perform various functions on this tab to debug problems in the installation. The terminal section of this screen can be used to test JSD-100MA, such as automation command types could send. The image to the right shows a couple automation commands being sent to the JSD-100MA. Click the mouse cursor in the terminal area, and then type commands (tab delimited and terminated with a carriage return). See Appendix B for more information on automation commands.

7.6 Channel Crossover and Equalization Procedure

Audio channel equalization consists of two steps:

1. Crossover adjustment (if crossovers used).
2. Channel Equalization.

7.6.1 Crossover Adjustment

A suggested crossover adjustment procedure is listed below. It should be skipped if the JSD-100MA internal crossovers are not being used. If an external pink noise generator is to be used with the internal RTA, enable the internal pink noise generator, then disable it. Enabling the internal pink noise generator configures the internal RTA for proper operation.

1. Ensure that the proper speaker configuration is correct by loading the ".xsp" configuration file.
2. Position the RTA microphone in the auditorium as specified by SMPTE ST 202:2010 (about 2/3 of the way back from the screen and 2/3 of the way from a side wall of the auditorium). The microphone is normally 1.0 to 1.2 meters (3.3 to 4.0 feet) from the floor, or "ear level" for a typical audience member.
3. Plug the microphone in to the PA or CAL microphone input of the JSD-100MA. Set the RTA input to the appropriate microphone input.
4. On the Stage Output tab, slide all the level controls to minimum level.
5. Turn the power amplifier gains all the way down.
6. Set the JSD-100MA fader to 7.0.
7. Under the XO, Etc. Tab, press the Speaker button and select the desired speaker from the speaker library.
8. Under the Stage Outputs tab, select pink noise and press the Gen button for the left channel.
9. Turn up the amplifier gains as far as possible without exceeding 85dB SPL in the auditorium.
10. On the X-Overs tab, press the View button to make the RTA display visible.
11. Adjust the RTA Gain (control becomes visible when cursor over graph area) until the RTA results become visible on the RTA display.
12. Adjust the band gains as necessary for the flattest RTA response possible. For optimum noise performance, JSD-100MA systems with analog output boards use a single electronic potentiometer for both the channel output trim and the crossover band gain. If, for example, the channel output trim is set to -6dB, and the crossover band gain setting is set to -10dB, the potentiometer is set to -16dB. The potentiometer is limited to a -22dB to +8dB range. Ensure the algebraic sum of these two settings does not go outside this -22dB to +8dB range.
13. If there appears to be a notch in the response at the crossover frequencies, try pressing an Invert button to switch the phase on that band.
14. Press Copy and copy the crossover settings to each of the other screen channels.
15. Go back to the Stage Output tab, turn off the generator on the left channel and turn it on for the next channel. Repeat the above process for each channel.
16. If the output board is a 16 channel analog board and internal crossovers are being used, apply an external pink noise source to left, center, or right channels of a JSD-100MA input. This may be an AES generator or test content that has pink noise.
17. Set the rear panel DIP switches according to the following table:

Speaker Configuration	SW1	SW2	SW3	SW4
Biamp 330Hz crossover	ON	ON	OFF	OFF
Biamp 1kHz Crossover	OFF	OFF	ON	ON
Triamp	ON	OFF	OFF	OFF
Full Range	OFF	OFF	OFF	OFF

18. On the XO, Etc. Tab, press the Bypass button to put the JSD-100MA in bypass.
19. Use the rear panel trim pots to adjust the low, mid, and high band gains as required for a relatively flat response as shown on the RTA. Remember that the front panel fader also adjusts the overall output level, so it may be necessary to adjust that control up.
20. Take the system out of bypass by pressing the Bypass button on the X-Overs tab again.

7.6.2 Auditorium Equalization

The JSD-100MA allows auditorium equalization to be completed automatically or manually using its precision internal RTA.

7.6.2.1 Automatic Equalization

1. Connect four microphones to a microphone multiplexer. Position the microphones as specified in SMPTE 202-2010 sections 5.2 and 5.3.
2. Connect the microphone multiplexer output to the CAL or PA microphone input of the JSD-100MA.
3. On the Equalizer tab, select the CAL or PA microphone as appropriate.
4. On the Equalizer tab, press the Curve File button and select the appropriate curve file (such as x-curve 150 seats.ini). This sets the limit lines on the RTA display.
5. Press Mic File to load a previously generated microphone calibration file, or calibrate the microphones as described below:
    a. On the equalizer tab, select the center channel.
    b. Set the gain control at the far left of the equalizer to minimum.
    c. Set the main fader to 0.0.
    d. Press the Flatten button.
    e. Press Pink and Generator to drive the center channel with pink noise.
    f. Adjust the main fader towards 7.0 without exceeding 85dB SPL in the auditorium.
    g. Adjust the gain control at the far left of the equalizer tab to yield 85dB SPL in the auditorium.
    h. Press the Mic Cal button to bring up the microphone calibration dialog box.
    i. Adjust the Microphone Gain control in the microphone calibration dialog box until the XSP SPL agrees with the reference SPL meter.
    j. If desired, press the Save button to save this microphone calibration in a file. The use of the microphone model number and serial number(s) as a filename is suggested.
    k. Press the Generator button again to turn off the generator.
6. Press Auto EQ to automatically equalize this channel. The Auto EQ sequence will put up messages showing the progress of the equalization.
7. Select the next channel to be equalized and press Auto EQ again. Repeat this until all channels are equalized.

7.6.2.2 Manual Equalization

A suggested procedure for equalizing a channel is listed below. You theater may use a modified or different procedure. If an external pink noise generator is to be used with the internal RTA, enable the internal pink noise generator, then disable it. Enabling the internal pink noise generator configures the internal RTA for proper operation.

1. Connect four microphones to a microphone multiplexer. Position the microphones as specified in SMPTE 202-2010 sections 5.2 and 5.3.
2. Connect the microphone multiplexer output to the CAL or PA microphone input of the JSD-100MA.
3. On the Equalizer tab, select the CAL or PA microphone as appropriate.
4. On the Equalizer tab, press the Curve File button and select the appropriate curve file (such as x-curve 150 seats.ini). This sets the limit lines on the RTA display.
5. Press Mic File to load a previously generated microphone calibration file, or calibrate the microphones as described below:
    a. On the equalizer tab, select the center channel.
    b. Set the gain control at the far left of the equalizer to minimum.
    c. Set the main fader to 0.0.
    d. Press the Flatten button.
    e. Press Pink and Generator to drive the center channel with pink noise.

f. Adjust the main fader towards 7.0 without exceeding 85dB SPL in the auditorium.
g. Adjust the gain control at the far left of the equalizer tab to yield 85dB SPL in the auditorium.
h. Press the Mic Cal button to bring up the microphone calibration dialog box.
i. Adjust the Microphone Gain control in the microphone calibration dialog box until the XSP SPL agrees with the reference SPL meter.
j. If desired, press the Save button to save this microphone calibration in a file. The use of the microphone model number and serial number(s) as a filename is suggested.
k. Press the Generator button again to turn off the generator.

6. Press Default EQ to load a starting point equalization unless another channel was copied to this one.
7. Turn the main fader and Gain control (on the left side of the Equalizer tab) all the way down.
8. Press the Pink Noise and Generator buttons to turn on pink noise in the auditorium.
9. Adjust the main fader towards 7.0 without exceeding the desired SPL in the auditorium (typically 85dB for screen channels and 82dB for surround channels).
10. Adjust the Equalizer tab Gain control for the desired SPL.
11. Position the cursor in the RTA graph area to make additional controls visible. Adjust the Data Offset and X-Curve controls to place the mid-band RTA levels within the curve limit lines.
12. Adjust the Bass and Treble controls to provide the required low and high frequency response.
13. Adjust the remaining equalizer controls to put each RTA band within the limit lines. Avoid extreme variation between adjacent equalizer values. The auditorium will generally sound best applying the least equalization possible while remaining within the curve limit lines.
14. Turn off the generator.
15. Use the copy button to copy the equalization to each of the other channels as a starting point.
16. Go back to step 6 to equalize the next channel.

7.6.2.3 LFE Equalization Procedure

The LFE channel uses a parametric equalizer instead of a graphic equalizer. As explained in section 4.2, the LFE parametric equalizers are actually located in the crossover section of the DSP to allow for multiple LFE outputs. For convenience, the LFE controls are also visible on the equalizer tab, as shown in the image below.

In the below image, the leftmost Gain control is the master LFE gain that applies to all LFE outputs. It corresponds to the LFE gain control shown on the Stage Out tab. Within each LFE box is another gain control that applies to ONLY that LFE output. The box also contains the parametric filter controls (PEQ gain, Q, and frequency) that applies to that particular LFE output. The GUI determines the capabilities of the particular JSD-100MA hardware and only shows the appropriate number of LFE outputs.

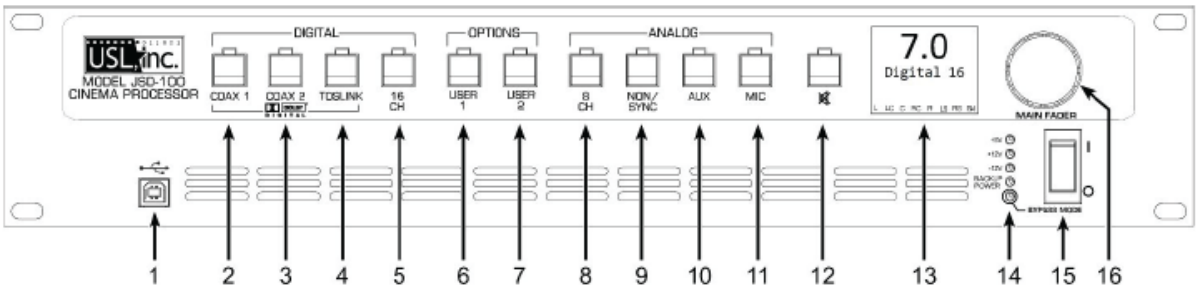
A suggested LFE adjustment procedure is below. Note that selecting the LFE channel in the equalizer tab does NOT turn off pink noise on the previously selected channel. This is different than the behavior on all other channels. This difference allows pink noise to drive the LFE and center channels simultaneously so the transition frequency region can be viewed for possible phase errors. When the LFE channel is selected on the equalizer tab, a warning box (shown in the image below) will appear if pink noise is currently driving another channel. The procedure below drives the LFE and center channels simultaneously.

1. On the Equalizer tab, select the Center channel, Pink noise, and turn on the generator. Pink noise should be visible on the RTA based on the equalization done in the previous section.
2. Select the LFE channel. The warning box should appear indicating that the center channel is also being driven. At this point, pink noise is driving both the center and LFE channels.
3. Adjust the leftmost (master) gain control until the LFE level matches the mid-band level of the center channel on the RTA display.
4. Adjust the frequency control to the worst dip or peak in the LFE portion of the RTA display.
5. Set the Q to 4 and adjust the PEQ gain as required to remove the peak or dip. The Q can be increased to make the peak or notch narrower, or decreased to make it wider. The frequency can be adjusted as required to center the peak or notch on the notch or peak displayed on the RTA.
6. If desired, the HP filter to the left of the parametric filters can be adjusted to add a bit more low frequency range. Try increasing the Q above the default 0.707, then adjust the frequency as required to yield a flatter LFE response. A Q above 0.707 adds a peak at the filter cutoff frequency before the rolloff begins.
7. If there is a notch in the transition region between the LFE and center channel frequencies, try reversing the phase on the LFE channel (Invert button on the Stage Out tab).

8. Finally, adjust the leftmost gain control up to increase the LFE output as required. SMPTE RP 200-2002 calls for LFE to be 10dB above the center channel, but this may be excessive in some auditoriums.
9. If the JSD-100MA has multiple LFE outputs, the individual PEQ controls can be adjusted similarly.

8. System Operation

The JSD-100MA is controlled by the digital cinema server in most installations. Control is also available from the front panel.



1. USB Connector for communications. Select on the user interface
2. COAX 1 – Rear Panel RCA type connector for PCM.
3. COAX 2 – Rear Panel RCA type connector for PCM.
4. TOSLINK – An optical fiber connection for.
5. 16 CHANNEL DIGITAL – AES Balanced line inputs.
6. USER 1 – allows the selection and configuration of any input and any settings.
7. USER 2 – allows the selection and configuration of any input and any settings.
8. 8 CHANNEL ANALOG – Balanced line inputs. Six channels (L, C, R, LFE, Ls, Rs) are fed through the unit with appropriate delays and EQ. The two remaining channels may be configured as Lc/Rc (7.1SDDS) or Lrs/Rrs (7.1DS).
9. NON-SYNC – 2 Channel Analog Unbalanced Line Input. Input sensitivity and level may be adjusted.
10. AUX – 2 Channel Analog Unbalanced Line Input. Input sensitivity is fixed but input level may be adjusted.
11. MIC – Public Address Balanced line input. Input sensitivity and level may be adjusted.
12. MUTE – mutes all outputs.
13. Display – indicates the Fader level, format input and bar graph display of the output signal levels.
14. Power Indicator LEDs – displays status of power supply voltages.
15. Power Switch – On for normal operation, off for bypass operation.
16. Fader – Controls the overall volume of all the channels.

8.1 Front Panel

The input select buttons choose which input is to drive the auditorium speakers. The LED above the button will light when that input is selected. If the selected input is digital, but no digital signal is available, the LED will flash. Pressing the “mute” button controls muting of the auditorium speakers. The LED above the button is lit when the system is muted.

The display shows the current main fader level, the user defined name of the currently selected format, and a bar graph showing the measured audio levels on each output. The number of bars and the labels under the bars varies with speaker configuration. When the speaker configuration includes use of the JSD-100MA internal crossovers, the bar graph shows the low band in yellow, the mid-band in green, and the high band in blue. Full range outputs (such as the surround channels, HI, VI-N) are shown in green. When an AES output board is used, the bargraph indication is relative to the headroom setting. For example, if the headroom is set to 26dB, the bargraph indicates 0dB when the output level is -26dBFS.

The Main Fader adjusts the output volume. As it is adjusted, the display is updated to show the new fader level. Note that the fader level will generally change on a format change. If the format has a preset fader level, the fader will change to that level when the format is selected. If the format does not have a preset fader level, the fader will change to the level last used on that format. The *last used* fader level memorizes “on the fly” fader adjustments. If the operator turns down the fader during the preshow and then switches to Digital 16 for the movie, the fader level will return to the newly set level for preshows the next time that format is selected.

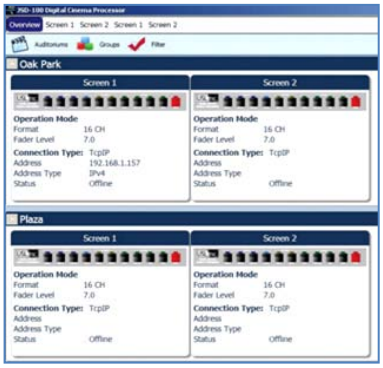
The main power switch turns the JSD-100MA on and off. When the power is off, the JSD-100MA enters bypass mode if the bypass power supply is plugged in. The bypass system in the JSD-100MA uses completely separate electronics to generate a monaural signal that drives the left and right main audio outputs. The front panel switches and fader operate the same in bypass and normal modes. All inputs except microphone are available in bypass mode.

8.2 Automation

The JSD-100MA accepts external control (such as automation) over Ethernet, RS-232, and a parallel automation port.

- The JSD-100MA accepts up to 5 simultaneous TCP connections on port 10001. A digital cinema server can send commands to the JSD-100MA through a TCP connection. The JSD-100MA accepts commands over the RS-232 port. The hardware interface is described in the installation section. The commands are described in Appendix B.
- The JSD-100MA accepts and generates parallel automation pulses on the DB25F rear panel automation connector. Pulsing pin 1 to ground is the same as pushing the first button on the front panel (COAX 1). Pulsing pin 2 to ground is the same as pushing the second button. The parallel automation interface is described in more detail in Appendix A.

8.3 System Monitoring



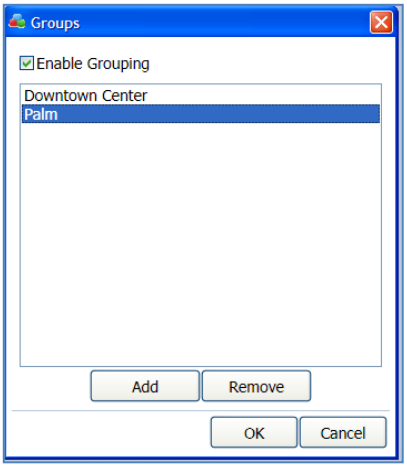
A large number of JSD-100MA systems can be monitored simultaneously over Ethernet. Multiple units can be monitored and controlled using the GUI. Multiple units can be monitored and controlled using a web browser. The web interface duplicates the front panel controls, allowing selection of input, setting fader level, and muting the system. Multiple units can be monitored using SNMP.

8.3.1 GUI View of Multiple JSD-100MAs

The GUI main screen provides an overview of several JSD-100MA systems. Systems are normally broken into groups representing theaters. Each group contains the individual JSD-100MA systems for each auditorium.

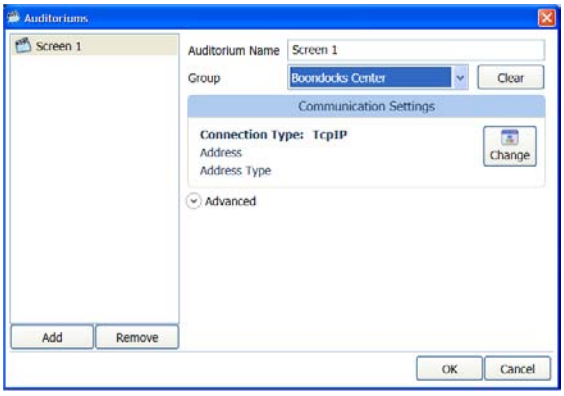
Adding Groups

Create a group for each theater. The group is a collection of JSD-100MAs, one in each auditorium.



- Click the “Groups” button at the top of the screen.
- Click “Add”. You will be prompted to enter the name of the new group.
- Click “OK” when you have finished adding groups.

Adding Auditoriums



- Click the "Auditoriums" button. The Add Auditorium dialog box will appear.
- Click "Add" to add an auditorium.
- The name of the auditorium can be changed as desired. A suggested auditorium name is 123-12 where 123 is the theater number and 12 is the screen number. When multiple auditoriums are listed along the GUI title bar, this name will be used. Use of theater number - auditorium number makes it easy to identify which auditorium is which
- Select the group from the previously defined list of groups.
- Click "Change" under Communications Settings to set the IP address of the JSD-100MA in this auditorium.
- Select the IP address of the JSD-100MA from the auto-detected device list if it is present. If not, press "Manual Add" and then key in the IP address of the JSD-100MA in this auditorium.
- Press "OK" to exit Comm Settings and OK to exit Auditoriums.

Once groups and auditoriums are defined, the GUI shows a summary view of each JSD-100MA on the network. The summary view includes the selected format, the fader level, and communications settings. Clicking on the summary view box brings up the detailed view of that particular JSD-100MA where all controls are available.

8.3.2 JSD-100MA Web Interface

The JSD-100MA includes a web server. The web server can be used to view the current status of the JSD-100MA, view the JSD-100MA log, and upload new firmware.

The Status Page shows the current fader level, the current format, and a bar graph showing the audio output levels, auditorium information and network information. It also has buttons to select input format, adjust fader level, and mute or un-mute the system.

The Log Page shows the JSD-100MA system log. A portion of a typical log page is shown below. Note that three time zones are listed: UTC Time, GUI Time, and XSP Time. XSP Time and GUI time make adjustments for daylight saving time based on whether daylight saving time is currently in effect at the GUI location. Since the observation of daylight saving time varies, there is no guarantee that this setting will also be correct at the JSD-100MA location. Clicking the time zone abbreviation at the top of the XSP time column will reload the log page toggling whether daylight saving time is used in the XSP time column. Click this as necessary for proper display of the time at the JSD-100MA.

The Configuration Page shows the same auditorium data and network data as the status page. When first accessing the configuration page, you will be asked for a username and password. The username is admin. The default password is ultra. To change the password, enter it twice at the bottom of the configuration page, then press the "Save New Password" button. The Configuration Page has a link to the Update Firmware page.

The Update Firmware page allows the firmware in the two DSPs and the main processor (PIC) to be updated.

Firmware is usually delivered in a Software Package that includes new versions of the code for each DSP and the main processor (PIC). We suggest making the updates in this order: DSP2, DSP1, PIC. Look at the versions of each piece of code in the software package. If one of the versions is already installed in the JSD-100MA, that portion of the JSD-100MA does not need to be updated. The currently installed firmware version is shown on the Update button for each processor.

Select the device to be updated: DSP2, DSP1, or the main processor (PIC). Press the "Browse" button to select the file to be downloaded to the JSD-100MA. Press the "Update" button. During the update, the front panel LEDs on the JSD-100MA will flash. After an update of the main processor, the JSD-100MA will reset to start executing the new code. The browser will disconnect at that time.
If a download of the PIC firmware to the JSD-100MA is interrupted, the JSD-100MA may be left inoperable. To restore the original firmware, turn off the JSD-100MA, press buttons 4 and 6 on the front panel (Digital 16 and User 2), then turn the power on while continuing to hold the buttons down until the front panel LEDs start flashing. They will normally start flashing immediately, but it could take up to two minutes for them to start flashing. When they stop flashing, the factory installed firmware has been restored, and the JSD-100MA will restart. This only restores the PIC firmware, not the DSP firmware. Ensure the versions for each are from the same code package.

9. JSDV-100 Remote Volume Control

The JSDV-100 remote volume control can be installed in an auditorium or other location. It is wired to the JSD-100MA RS-485 using CAT-5 cable with an RJ 25 connector on each end. The JSDV-100 includes a two digit seven segment display that shows the current output level. It also includes a fader control knob that can be used to adjust the main fader level. After making an adjustment, the JSDV -100 display blanks in the number of seconds specified under the global tab (as described above) unless the timeout is set to zero seconds. In that case, the display is lit continuously.

When the JSDV -100 is first connected or the JSD-100MA is powered up, the JSD-100MA "discovers" the JSDV-100 units on the RS-485. Each JSD-100MA supports up to 256 JSDV -100 units on its RS-485. As the devices are discovered, their discovery is logged. Adjustments to the main fader level by a JSDV -100 are also logged, including which JSDV-100 made the adjustment.

For further information on the installation of the JSDV-100, consult the instructions that are included with the JSDV-100.

The image below from the web log shows discovery of a JSDV-100 and a fader adjustment.

Theatre Name - Screen 1

GDC XSP-1000 Log Page

Status Page | First Log Page | Previous Log Page

Record Number	UTC Time	GUI Time Pacific Standard Time	GDC XSP-1000 Time PDT	Source	Event	Details
2427	Thu Jan 21 00:22:49 2016	Wed Jan 20 16:22:49 2016	Wed Jan 20 17:22:49 2016	Internal	Fader change	Format preset changed fader to 7.0
2428	Thu Jan 21 00:22:50 2016	Wed Jan 20 16:22:50 2016	Wed Jan 20 17:22:50 2016	USB Port	Input change	Input mode changed to AUX
2429	Thu Jan 21 00:22:50 2016	Wed Jan 20 16:22:50 2016	Wed Jan 20 17:22:50 2016	Internal	Fader change	Format preset changed fader to 7.0
2430	Thu Jan 21 00:22:52 2016	Wed Jan 20 16:22:52 2016	Wed Jan 20 17:22:52 2016	USB Port	Input change	Input mode changed to NON/SYNC
2431	Thu Jan 21 00:22:52 2016	Wed Jan 20 16:22:52 2016	Wed Jan 20 17:22:52 2016	Internal	Fader change	Format preset changed fader to 7.0
2432	Thu Jan 21 00:22:54 2016	Wed Jan 20 16:22:54 2016	Wed Jan 20 17:22:54 2016	USB Port	Input change	Input mode changed to Analog 8
2433	Thu Jan 21 00:22:54 2016	Wed Jan 20 16:22:54 2016	Wed Jan 20 17:22:54 2016	Internal	Fader change	Format preset changed fader to 7.0
2434	Tue Jan 26 21:08:24 2016	Tue Jan 26 13:08:24 2016	Tue Jan 26 14:08:24 2016	Internal	Loaded config	Config loaded from flash

10. Product Support

USL proudly stands behind its products. We are ready to answer questions about the installation or operation of the JSD-100MA. Application notes, manuals, and other documents are available on our website. You may contact us by:

- Phone: +1 805-541-0161
- E-mail: support@usl-inc.com
- You may file a support ticket at: www.uslinc.com/support

USL is interested in your comments. Please feel free to contact us with any comments or suggestions.

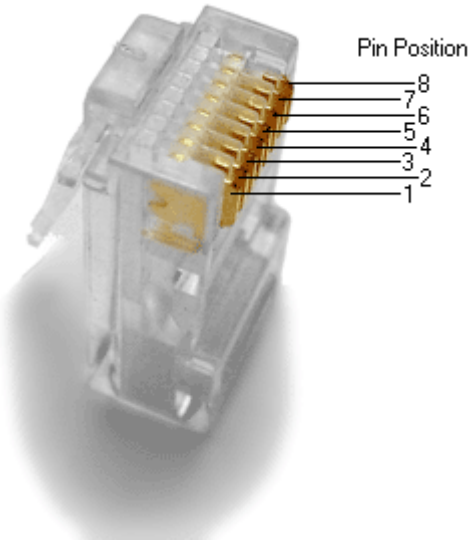
Appendix A – Connector Pin Outs

Connector Pin Outs
For convenience, all connector pin outs are located in this appendix.

DB25F AES Input.
The JSD-100MA uses an industry standard pin out for the multi-channel AES digital audio input. Cable should be twisted pairs with individual shields and 110 ohm characteristic impedance. The USL supplied ferrite block should be clipped on to the cable adjacent to the connector to comply with FCC and CE emission requirements.

Audio Channels	AES Pair	JSD-100MA Pin out (+, -, shield)	Speakers
1,2	1	24, 12, 25	L, R
3, 4	2	10, 23, 11	C, LFE
5, 6	3	21, 9, 22	Lss, Rss
7, 8	4	7, 20, 8	LH,RH
9, 10	5	18, 6, 19	Lsf/Rsf
11, 12	6	4, 17, 5	Lrs/Rrs
13, 14	7	15, 3, 16	Lsh/Rsh
15, 16	8	1, 14, 2	CEA/CEB

RJ-45 AES Input
The JSD-100MA uses the StudioHub pin out for AES over CAT5 or CAT6 Ethernet cable. These cables are twisted pair and have the required characteristic impedance. The USL supplied ferrite block should be clipped on to the cables adjacent to the connectors to comply with FCC and CE emission requirements. The top RJ-45 connector connects to audio channels 1 through 8. The bottom RJ-45 connector connects to audio channels 9 through 16 are routed to DI-80 module.



Audio Channels	AES Pair	Top RJ-45 Pins (+, -)	Speakers
1, 2	1	1, 2	L, R
3, 4	2	3, 6	C, LFE
5, 6	3	4, 5	Lss, Rss
7, 8	4	7, 8	LH,RH

Audio Channels	AES Pair	Bottom RJ-45 Pins (+, -)	Speakers
9, 10	5	1, 2	Lsf/Rsf
11, 12	6	3, 6	Lrs/Rrs
13, 14	7	4, 5	Lsh/Rsh
15, 16	8	7, 8	CEA/CEB

Eight Channel Analog Input

The JSD-100MA eight channel analog input is on a DB25F connector. The analog inputs are active balanced (differential) inputs. They may be driven by balanced or unbalanced sources. When driven by an unbalanced source, the negative input should be connected to the low side of the source at the source equipment to minimize ground loop noise. The cable should be twisted pair with individual shields, even when driven by an unbalanced source. A USL supplied ferrite block should be clipped around the cable to Ensure FCC and CE EMI requirements are met. The DB25F connector uses the THX® pin out as specified in the table below.

Channel Number	DB25F PINS (+, -, shield)	Speakers
1	2, 14, 1	Left
2	8, 20, 7	Right
3	5, 17, 4	Center
4	25, 12, 13	LFE
5	23, 10, 22	Lss
6	24, 11, 9	Rss
7	16, 3, 15	LH
8	19, 6, 18	RH

Sixteen Channel Analog Audio Outputs

The main outputs drive a pair of Phoenix connectors, and a pair of DB25M connectors. The Phoenix output terminals are marked “Main Outputs” and “Optional Outputs.” The DB25M connectors are marked “Monitor 1 Outputs” and “Monitor 2 Outputs.” The DB25M connectors typically drive a booth monitor, while the Phoenix terminals drive the auditorium amplifiers or crossover. The corresponding Phoenix strips and DB25M connectors are connected together within the JSD-100MA.

The DB25M connectors use the same THX® pin out as the eight channel analog input. The USL supplied ferrite block should be clipped on to the cables adjacent to the connectors to comply with FCC and CE emission requirements. The “optional outputs” can be configured as additional full range channels (for example, for 16 channel output), or may be configured as the outputs of the internal crossovers.

Note that the 16 channel analog output module supports crossovers. To allow for proper bypass operation, a passive crossover is included. For full band operation, set all four DIP switches to OFF and set the MID and HIGH trim pots to full counter-clockwise. Adjust the LOW trim pot for the desired full range bypass audio level. See section 7.5 for more information on adjusting the bypass crossover. Remember that the front panel fader also affects output level when in bypass.

Rear Silk Label (Main)	Channel Label	Full Range Audio Channel	AES Pair	Phoenix Main Output Pins (+, -, shield)	DB25M Monitor 1 Output Pins (+, -, shield)
L+ L-	L	1	1	1, 2, 3	2, 14, 1
R+ R-	R	2		6, 7, 8	8, 20, 7
C+ C-	C	3	2	4, 5, 3	5, 17, 4
LFE+ LFE-	LFE	4		9, 10, 8	25, 12, 13
Ls+ Ls-	Lss	5	3	11, 12, 13	23, 10, 22
Rs+ Rs-	Rss	6		14, 15, 13	24, 11, 9
+Lrs-	LH	7	4	16, 17, 18	16, 3, 15
+Rrs-	RH	8		19, 20, 18	19, 6, 18

Rear Silk Label (Optional)	Channel Label	Full Range Audio Channel	AES Pair	Phoenix Optional Output Pins (+, -, shield)	DB25M Monitor 2 Output Pins (+, -, shield)
Lm/LCh (CH9)	Lsf	9	5	4, 5, 3	14, 15, 7
Rm/RCh(CH10)	Rsf	10		11, 12, 13	9, 22, 7
Lrs+ Lrs-	Lrs	11	6	16, 17, 18	16, 3, 7
Rrs+ Rrs-	Rrs	12		19, 20, 18	19, 6, 7
Cm+ Cm- (CH13)	Lsh	13	7	6, 7, 8	4, 18, 7
Ch+ Ch- (CH14)	Rsh	14		9, 10, 8	5, 17, 7
Lh+ Lh- (LFE2)	CEA	15	8	1, 2, 3	13, 12, 7
Rh+ Rh- (LFE3)	CEB	16		14, 15, 13	8, 20, 7

HI/VI-N Outputs

The JSD-100MA has balanced HI and VI-N outputs that can drive balanced or unbalanced loads. As with other outputs, the use of twisted pair shielded cable is suggested whether the load is balanced or unbalanced. When driving an unbalanced load, connect the " – " output of the JSD-100MA to low side of the unbalanced input at the destination end of the cable to minimize ground loop noise. The source of audio to drive the HI and VI-N outputs is configurable on a per-format basis. The HI audio output can be driven from AES inputs 7 or 15, or from a main audio mix. The USL supplied ferrite block should be clipped on to the cables adjacent to the connectors to comply with FCC and CE emission requirements.

Audio Channel	HI/VI-N Phoenix Connector Pins (+, -, shield)
HI	1, 2, 3
VI-N	4, 5, 3

Parallel Automation Interface

Pins 1 - 10 of the DB25F automation connector are "control" pins that accept contact closure or open collector pulses to ground to select formats. On a format change, the corresponding pin is also pulsed low allowing this interface to drive other equipment. Pulsing pin 11 low toggles the mute state. Pins 14 through 24 are "status" pins. One of the pins 14 through 23 is pulled low continuously by the JSD-100MA to indicate the selected format. These pins could drive LEDs with a 470 ohm series resistor to provide a remote format indication. The JSD-100MA pulls pin 24 low when the system is muted. Pins 1 through 11 are internally pulled up to +8.4V. They each source 400uA when grounded. A pin needs to be pulled below 2.6V for 10ms or more for the JSD-100MA to recognize it as low. On a format change, the JSD-100MA pulls the appropriate pin low for 500ms. +5V at 100mA is available on pin 13 to drive external LEDs or relays. The individual control and status outputs can sink up to 150mA with an open circuit voltage of +12VDC for inductive loads like relays or +24V for non-inductive loads (indicator lamps, etc.). Pin 12 is the "automation return." Use this as the low side of switches and indicators instead of using chassis ground. It is ground through a 10 ohm resistor to limit ground loop current. The USL supplied ferrite block should be clipped on to the cables adjacent to the connectors to comply with FCC and CE emission requirements.

Pin	Description
1	Control 1. Pulse low to select format 1 (COAX1). Pulses low when format 1 selected.
2	Control 2. Pulse low to select format 2 (COAX2). Pulses low when format 2 selected.
3	Control 3. Pulse low to select format 3 (TOSLINK). Pulses low when format 3 selected.
4	Control 4. Pulse low to select format 4 (16 Channel Digital). Pulses low when format 4 selected.
5	Control 5. Pulse low to select format 5 (User 1). Pulses low when format 5 selected.
6	Control 6. Pulse low to select format 6 (User 2). Pulses low when format 6 selected.
7	Control 7. Pulse low to select format 7 (8 Channel Analog). Pulses low when format 7 selected.
8	Control 8. Pulse low to select format 8 (Non/Sync). Pulses low when format 8 selected.
9	Control 9. Pulse low to select format 9 (AUX). Pulses low when format 9 selected.
10	Control 10. Pulse low to select format 10 (MIC). Pulses low when format 10 selected.
11	Mute. Pulse low to toggle the mute state of the system.
12	Automation Return. Return control and status signals here.
13	+5V at 100mA to drive external indicators.
14	Status 1. Low when format 1 (COAX1) is selected.
15	Status 2. Low when format 2 (COAX2) is selected.

Pin	Description
16	Status 3. Low when format 3 (TOSLINK) is selected.
17	Status 4. Low when format 4 (16 Channel Digital) is selected.
18	Status 5. Low when format 5 (USER 1) is selected.
19	Status 6. Low when format 6 (USER 2) is selected.
20	Status 7. Low when format 7 (8 Channel Analog) is selected.
21	Status 8. Low when format 8 (NON/SYNC) is selected.
22	Status 9. Low when format 9 (AUX) is selected.
23	Status 10. Low when format 10 (MIC) is selected.
24	Mute Status. Low when the system is muted.
25	Unused. Make no connection to this pin.

RS-232 Interface

The RS-232 interface appears on a DE9F connector on the rear panel. The connector is wired as a DCE device. A command interpreter accepts ASCII commands (described in Appendix B) over the RS-232 and Ethernet interfaces. The RS-232 port operates at 38.4kbps, 8N1 (8 data bits, no parity, 1 stop bit), hardware handshake. In most situations, no handshake is required, and the RTS and CTS pins can be left open. The USL supplied ferrite block should be clipped on to the cables adjacent to the connectors to comply with FCC and CE emission requirements.

Pin	Description
1	DCD – Internally connected to pins 4 and 6. Does not need to be connected in most cases.
2	TXD – The JSD-100MA transmits data on this pin.
3	RXD – The JSD-100MA receives data on this pin.
4	DTR – Internally connected to pins 1 and 6. Does not need to be connected in most cases.
5	GND – Signal ground.
6	DSR – Internally connected to pins 1 and 4. Does not need to be connected in most cases.
7	CTS – The JSD-100MA holds off transmitting data if the device connected to the JSD-100MA drives this pin low. Data transmission is resumed when this pin is driven high. The pin is pulled high in the JSD-100MA so the pin can be left open in most cases.
8	RTS – The JSD-100MA drives this pin low when it is not ready to receive data and drives it high when it is ready to receive data. In most cases this pin can be left open.
9	RI – The JSD-100MA provides a current limited (900mA) +5V to drive external equipment on this pin.

RS-485

A RS-485 bus is used to interface the JSD-100MA to other USL devices such as the JSDV-100 remote volume control (discussed earlier in this manual). The USL supplied ferrite block should be clipped on to the cables adjacent to the connectors to comply with FCC and CE emission requirements.

Pin	Description
1	Current limited (100mA) +5V to drive external devices.
2	RS-485 Signal Ground.
3	RS-485 Data.
4	RS-485 Data Not.
5	No Connect.
6	No Connect.

Appendix B – Automation Commands

These commands are used to query the status of the JSD-100MA or change its operation (adjust level, select input, etc.). The commands are typically sent by an automation system. They may be sent over RS-232 or Ethernet. This is a subset of the full command set. The full command set includes commands for adjust equalization, etc. Commands are not echoed by the JSD-100MA. Commands are terminated by a carriage return (0x0d). Commands are tab delimited. There needs to be a tab character (0x09) between the command and the first parameter, then another tab before the second parameter, etc. The JSD-100MA responds to every command. Responses are also tab delimited and are terminated with a carriage return. All commands are lower case and are case sensitive. Note: Every command generates some sort of response that must be picked up by the command sender. Failure to pick up these responses can cause buffers in the JSD-100 or the host to fill, possibly halting communications. If the response is not needed, a simple "eat garbage" routine that loops until the receive buffer is empty should be called before sending a command.

RS-232

The JSD-100 is a DCE device that transmits on pin 2 of the 9 pin D connector. The JSD-100 receives data on pin 3. Communications is at 38.4kbps, 8N1 (8 data bits, no parity, 1 stop bit).

Ethernet

The JSD-100 listens on port 10001 for TCP connections from other equipment (typically a digital cinema server). Commands and responses are then exchanged in ASCII.

Automation Command List

The Automation Command List shown in table below. For simplicity, tab and carriage return characters are not shown. Remember that commands are tab delimited and terminated with a carriage return. In the table below, the required tab characters are shown as "\t", and the required carriage return characters are shown as "\r".

Command	Response	Description
xsp1000.sys.fader\t700\r	700	Sets or reads the current fader level. If a parameter is provided, the main fader is set to the corresponding level. The parameter is the fader level times 100. In this example, the fader is set to 7.0. If no parameter is supplied, the fader level is not changed. The command always returns the current fader level times 100. If the command changed the fader level, the new level is returned.
xsp1000.sys.fader_rel\t-50\r	-50	Makes a relative adjustment to the current fader level. The parameter is the relative adjustment times 100. In the example, the fader level was decreased by 0.5 (perhaps from 7.0 to 6.5). The relative adjustment that was made is returned.
xsp1000.sys.format\t0\r	0	Select the COAX 1 format (0-9), zero inclusive.

Appendix C – System Restore and Power-Up Buttons

System Restore
The JSD-100MA has several methods of recovering from an unlikely failure. These are detailed below.

Bypass Mode
When the JSD-100MA main power switch is off and the bypass power supply is plugged in, independent bypass circuitry creates a mono sum of the selected analog or digital input audio and routes it to the left and right outputs. A quick way of recovering from a system failure is to turn the JSD-100MA off.

Restore Factory Firmware
If a firmware update of the main (PIC) processer is interrupted, it is possible to leave the system inoperable. To restore the factory installed firmware, turn off the JSD-100MA, then hold down buttons 4 and 6 (Digital 16 Channel and User 2) while turning the power back on. The front panel LEDs will start flashing. They will normally start flashing immediately, but it could take up to two minutes for them to start flashing. Release the buttons when the LEDs start flashing. When the LEDs stop flashing, the system will restart with the original firmware. The interrupted firmware update can then be repeated. This only restores the PIC firmware, not the DSP firmware. Ensure the versions for each are from the same code package.

Load Configuration from SD Card
The SD card is used as a "personality module" in the JSD-100MA. Should a JSD-100MA need to be replaced, all the saved settings from the old unit can be easily loaded in to the new unit without the use of a computer. These settings were saved during the initial configuration using the SD Card Backup button on the GUI. To restore the settings to a new JSD-100MA, insert the card from the old unit (behind the removable cover on the rear panel) in the new unit. With the JSD-100MA off, hold down buttons 9 and 10 (AUX and MIC) down while turning on the power. Continue to hold the buttons about 30 seconds until the display says "Loading from SD card." The configuration will be loaded and copied to the internal non-volatile memory. The JSD-100MA is now configured the same as the previous unit. Any errors (missing card, missing file, etc.) are reported on the display.

Power-Up Buttons
The JSD-100MA checks the state of front panel buttons during power up to determine if some special action is required. During normal operation, no front panel buttons are down during power up. The table below describes the response of the JSD-100MA when buttons are held down during power up.

Buttons	Action
DIGITAL 16, USER 2	Restores factory installed PIC firmware and configuration. Hold buttons until front panel LEDs start flashing. Does not restore DSP firmware.
AUX, MIC	Loads configuration from SD card and saves to external flash. This is usually used when swapping out a JSD-100MA, as described above.
MUTE	Hold the mute button down to suspend the boot process so boot data on display can be read. Boot process continues when button is released.

Appendix D – INI File Formats

Many configuration files used by the JSD-100MA GUI are plain text ini files. They are located in My Documents\USL\JSD-100MA and its subdirectories. These files can be edited with a standard text editor to change the operation of the system. This appendix shows the typical contents of these files. Note that the file contents are described in comments (where a line starts with #).

AutoEQ.ini

```
# This is the initial state for starting automatic EQ.
# Settling - Specifies the amount of time in seconds to wait
# before taking a first time SPL reading.
# QuietLevel - This is the upper limit to determine no background
# noise in the auditorium is present.
# ChannelGain - This is the initial starting point for setting the
# starting channel trim level, it must be low enough that with a fader
# level the output SPL in low enough to continue with auto EQ.
# Fader - This is the output fader level setting, trims are used to adjust
# the level.
# EQSPL - Is used for the initial sound level and the level for automatic EQ.
# Decay - The RTA setting for controlling the update rates.
[Initialize]
Settling=3.0
QuietLevel=60.0
ChannelGain=-20.0
Fader=7.0
EQSPL=80.0
Decay=100

# This state is used for setting up the settings prior to running
# the automatic EQ procedure. An average is created within a valid
# range of the distribution, the Mode. The Mode is a reference
# level that is used to set the gains for the desired SPL for a
# given speaker location.
# StageSPL - Level for stage speakers to be automatically EQ'ed.
# SurroundSPL - Level for surround speakers to be automatically EQ'ed.
# Maximum && Minimum - The upper and lower limits for channels being
# sampled and to be used for generating the current average, Mode.
# Samples - The number of passes to calculate the mode within a valid
# distribution of RTA band samples.
# Settling - Amount of time to wait between updating the average mean, mode.
[Normalize]
StageSPL=85.0
SurroundSPL=83.0
Maximum=10.0
Minimum=-10.0
Samples=3
Settling=0.5

# When the automatic EQ process is running, there is a
# count for the number of passes. With each pass the EQ's are updated.
# With each pass, after a number of passes, the amount of change between
# the current and last EQ setting is then used to determine if the automatic
# EQ processing is complete.
# After automatic EQ setting, the bands can then be offset to move them all
# up or down (whole set).
# OffsetEQBands - When set to a one, offset all bands so they are round.
[Completion]
Count=15
Max=1.5
```

```
Min=-1.5
OffsetEQBands=1

# Smoothing will remove harsh EQ level changes across a subset of bands.
# Enable - A boolean value of 0 for false and 1 for true to execute smoothing.
# Threshold - This is the minimum level that adjacent bands have for
# smoothing to be applied to it.
[Smoothing]
Enable=1
Threshold=1.5

# Each equalizer band has a range of +/- 6dB of adjustment. The following
# parameters allow the user to define the minimum and maximum range.
# EQMaximum - The maximum value that automatic equalization will go up to.
# EQMinimum - The minimum value that automatic equalization will go down to.
[EQBandRange]
EQMaximumDB=4.0
EQMinimumDB=-5.0

# This is used for controlling which bands will be updated by the
# automatic EQ process. A '1' or '0' is used to enable or disable a
# band for automatic EQ.
[BandsToEQ]
Bass=1
Band40=1
Band50=1
Band63=1
Band80=1
Band100=1
Band125=1
Band160=1
Band200=1
Band250=1
Band315=1
Band400=1
Band500=1
Band630=1
Band800=1
Band1000=1
Band1250=1
Band1600=1
Band2000=1
Band2500=1
Band3150=1
Band4000=1
Band5000=1
Band6300=1
Band8000=1
Band10000=1
Band12500=1
Band16000=1
Treble=1

# The bass and treble are a shelving filter that are adjusted prior to
# the individual equalizer bands. That is if the respective bass/treble
# is enabled for automatic equalization. For each there is a cut off
# frequence and is specified below.
# Bass - Low band range, specified in units of hertz.
# Treble - High band range, specified in units of hertz.
[BassTrebleRange]
Bass=100
Treble=8000
```

X-Curve 150 Seats.ini

```
[Curve]
Name=X-Curve150Seats

[Band25Hz]
Value=-3
Max=0
Min=-8
[Band31Hz]
Value=-2
Max=1
Min=-7
[Band40Hz]
Value=-1
Max=2
Min=-6
[Band50Hz]
Value=0
Max=3
Min=-5
[Band63Hz]
Value=0
Max=3
Min=-4
[Band80Hz]
Value=0
Max=3
Min=-3
[Band100Hz]
Value=0
Max=3
Min=-3
[Band125Hz]
Value=0
Max=3
Min=-3
[Band160Hz]
Value=0
Max=3
Min=-3
[Band200Hz]
Value=0
Max=3
Min=-3
[Band250Hz]
Value=0
Max=3
Min=-3
[Band315Hz]
Value=0
Max=3
Min=-3
[Band400Hz]
Value=0
Max=3
Min=-3
[Band500Hz]
Value=0
```

Max=3
Min=-3
[Band630Hz]
Value=0
Max=3
Min=-3
[Band800Hz]
Value=0
Max=3
Min=-3
[Band1kHz]
Value=0
Max=3
Min=-3
[Band1.25kHz]
Value=0
Max=3
Min=-3
[Band1.6kHz]
Value=0
Max=3
Min=-3
[Band2kHz]
Value=0
Max=3
Min=-3
[Band2.5kHz]
Value=-1
Max=2
Min=-4
[Band3.15kHz]
Value=-2
Max=1
Min=-5
[Band4kHz]
Value=-2.5
Max=0.5
Min=-5.5
[Band5kHz]
Value=-3.5
Max=-0.5
Min=-6.5
[Band6.3kHz]
Value=-4.5
Max=-1.5
Min=-7.5
[Band8kHz]
Value=-5
Max=-2
Min=-8
[Band10kHz]
Value=-6
Max=-3
Min=-10
[Band12.5kHz]
Value=-8
Max=-5
Min=-13
[Band16kHz]

Value=-10
Max=-7
Min=-16
[Band20kHz]
Value=-12
Max=-9
Min=-19

MicDefault.ini

This is the manufacture and characteristics for the selected microphone.
[Model]
Manufacture=USL
Name=ULTRA

The Microphone Gain is the relative number of DB written to the RTA Mic Input
Gain Control.
[SPL]
MicGain=0.0

The Microphone frequency response is used to offset the RTA data being
reported from the JSD-100MA. The RTA display will reflect the response and
is also reflected in the Auto EQ execution. A positive value will increase the RTA
display level for that band.
[Response]
Band25=0.0
Band31=0.0
Band40=0.0
Band50=0.0
Band63=0.0
Band80=0.0
Band100=0.0
Band125=0.0
Band160=0.0
Band200=0.0
Band250=0.0
Band315=0.0
Band400=0.0
Band500=0.0
Band630=0.0
Band800=0.0
Band1000=0.0
Band1250=0.0
Band1600=0.0
Band2000=0.0
Band2500=0.0
Band3150=0.0
Band4000=0.0
Band5000=0.0
Band6300=0.0
Band8000=0.0
Band10000=0.0
Band12500=0.0
Band16000=0.0
Band20000=0.0

XSP 4632T.ini

[Model]
Bands=3
Name=XSP4632T

[HP Filter]
HPF=32
HPQ=2.0

[Low Band]
LPFreq=300
Gain=0.0
Delay=1.6

PEQ1Freq=40
PEQ1Q=1.0
PEQ1Gain=0.0

[Mid Band]
HPFreq=260
LPFreq=1600
Gain=-2.5
Delay=0.1

PEQ1Freq=800
PEQ1Q=1.0
PEQ1Gain=0.0

PEQ2Freq=6000
PEQ2Q=1.0
PEQ2Gain=0.0

[High Band]
HPFreq=1400
Gain=-5.0
Delay=0.0
PEQ1Freq=4000
PEQ1Q=1.0
PEQ1Gain=0.0

PEQ2Freq=8000
PEQ2Q=1.0
PEQ2Gain=0.0

SEQFreq=10000
SEQGain=0.0
HEQFreq=10000
HEQGain=0.0

Revision History

160624 – First release.