LSM-480

AMERICAN AUDIO®

USER MANUAL

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ELECTRICAL SAFETY PRECAUTIONS

ELECTRICAL PRECAUTIONS

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE THE COVER (OR BACK). THERE ARE NO USER SERVICEABLE PARTS INSIDE. REFER SERVICE TO YOUR AUTHORIZED AMERICAN AUDIO® SERVICE TECHNICIAN.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

IMPORTANT SAFETY INSTRUCTIONS

READ INSTRUCTIONS — All the safety and operating instructions should be read before the product is operated.

RETAIN INSTRUCTIONS — The safety and operating instructions should be retained for future reference.

HEED WARNINGS — All warnings on the product and in the operating instructions should be adhered to.

FOLLOW INSTRUCTIONS — All operating and use instructions should be followed.

CLEANING — The product should be cleaned only with a polishing cloth or a soft dry cloth. Never clean with furniture wax, benzine, insecticides or other volatile liquids since they may corrode the cabinet.

ATTACHMENTS — Do not use attachments not recommended by the product manufacturer as they may cause hazards.

WATER AND MOISTURE — Do not use this product near water — for example, near a bathtub, wash bowl, kitchen sink, or laundry tub; in a wet basement; or near a swimming pool; and the like.

ACCESSORIES — Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to a child or adult, and serious damage to the product. Use only with a cart, stand, tripod, bracket, or table recommended by the manufacturer, or sold with the product. Any mounting of the product should follow the manufacturer's instructions, and should use a mounting accessory recommended by the manufacturer.

CART — A product and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the product and cart combination to overturn.

VENTILATION — Slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating, and these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should not be placed in a built-in installation such as a bookcase or rack unless proper ventilation is provided or the manufacturer's instructions have been adhered to.

POWER SOURCES — This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply to your home, consult your product dealer or local power company.

LOCATION – The appliance should be installed in a stable location.

NONUSE PERIODS – The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.

GROUNDING OR POLARIZATION

- If this product is equipped with a polarized alternating current line plug (a plug having one blade wider than the other), it will fit into the outlet only one way. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug should still fail to fit, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the polarized plug.
- If this product is equipped with a three-wire grounding type plug, a plug having a third (grounding) pin, it will only fit into a grounding type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding type plug.

POWER-CORD PROTECTION - Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the product.

OUTDOOR ANTENNA GROUNDING — If an outside antenna or cable system is connected to the product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Article 810 of the National Electrical Code, ANSI/NFPA 70, provides information with regard to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode. See Figure A.

LIGHTNING — For added protection for this product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the antenna or cable system. This will prevent damage to the product due to lightning and power-line surges.

POWER LINES — An outside antenna system should not be located in the vicinity of overhead power lines or other electric light or power circuits, or where it can fall into such power lines or circuits. When installing an outside antenna system, extreme care should be taken to keep from touching such power lines or circuits as contact with them might be fatal.

OVERLOADING — Do not overload wall outlets, extension cords, or integral convenience receptacles as this can result in a risk of fire or electric shock.

OBJECT AND LIQUID ENTRY - Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.

SERVICING — Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

DAMAGE REQUIRING SERVICE - Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

- When the power-supply cord or plug is damaged.
- If liquid has been spilled, or objects have fallen into the product.
- If the product has been exposed to rain or water.
- If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
- If the product has been dropped or damaged in any way.
- When the product exhibits a distinct change in performance — this indicates a need for service.

REPLACEMENT PARTS -- When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or have the same characteristics as the original part. Unauthorized substitutions may result in fire, electric shock, or other hazards.

SAFETY CHECK - Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.

WALL OR CEILING MOUNTING — The product should not be mounted to a wall or ceiling.

HEAT — The product should be situated away from heat sources such as radiators, heat registers, stoves, or other products (including amplifiers) that produce heat.

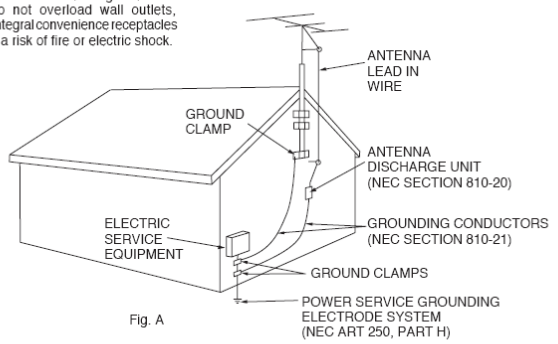


Fig. A

NEC — NATIONAL ELECTRICAL CODE

Table of Contents

1.0 Introduction

The LSM series is a digital loudspeaker management system designed for the touring or fixed sound installation markets. The absolute latest in available technology is utilized with 32-bit (40-bit floating point) processors and high performance 24-bit Analog Converters. The high-bit DSP prevents noise and distortion induced by truncation errors of the commonly used 24-bit fixed-point devices. A complete set of parameters include I/O levels, delay, polarity, 6 bands of parametric EQ per channel, multiple crossover selections and full function limiters. Precise frequency control is achieved with its 1 Hz resolution. Inputs and outputs can be routed in multiple configurations to meet any requirement. The LSM series can be controlled or configured in real time on the front panel or with the intuitive PC GUI accessed via the USB or RS485. Software upgrade for CPU and DSP via PC keeps the device current with newly developed algorithms and functions once available. Multiple setup storage and system security complete this professional package.

Shipped contents:

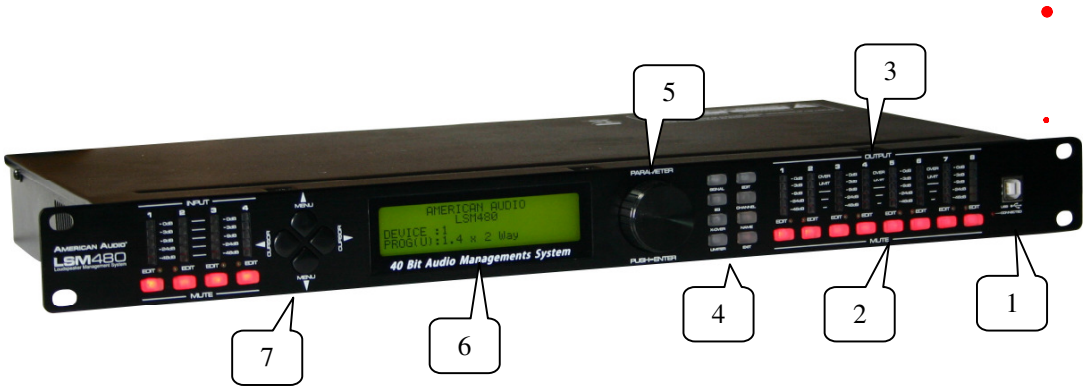
- LSM- unit

- LSM Drive CD (incl. User Manual & PC Software)

2.0 Features

- 32-bit DSP (Highly accurate digital processing)
- High Performance 24-bit A/D and D/A Converters
- Accurate 1 Hz Frequency Resolution.
- 6-Band Parametric Equalizers for each Input and Output
- Full-Function Limiters on Output Channels
- One Touch" easy access setup button
- Backlit 4-Line x 32 Character LCD Display
- Full 5-segment LEDs on every Input and Output
- Storage up to 30 Program Setups
- USB and RS-485 interfaces for PC Control and Configuration
- Pink noise and single frequency generator
- Original Neutrik XLR connectors
- Security Lock

3.0 Front Panel Functions



1. **USB** – a standard Type B USB connector. Proper device driver must be installed prior to usage.The red LED will come on for indication will USB cable connected

2. **Mute keys** – Mute/Unmute input and output channels. When an input channel is muted, a red LED will come on for indication.
When **Menu Control** key is pressed, it selects the corresponding channel for the LCD menu display which is acknowledged by a green LED above the button's. The last modified menu will be displayed on the LCD. While the Menu Control key is hold down, multiple channels can be linked or unlinked by pushing the desired channels. This eases programming the same parameters across multiple channels. Multiple Inputs can be linked together and multiple outputs can be linked together. Inputs and Outputs are linked separately.

3. **Peak Level LED** - Indicates the current peak level of the Signal: Signal, -12dB, -6dB, -3dB, Over/Limit. The Input **Over** LED references to the device's maximum headroom. The Output **Limit** LED references to the threshold of the limiter.

4. **Menu keys** - There are 8 menu keys for Signal-Gain/Phase/Delay, EQ, X'over (Crossover), Limiter, Channel (Input Mix), Name (Channel name) for each input/output channel and System and Exit control for main system.

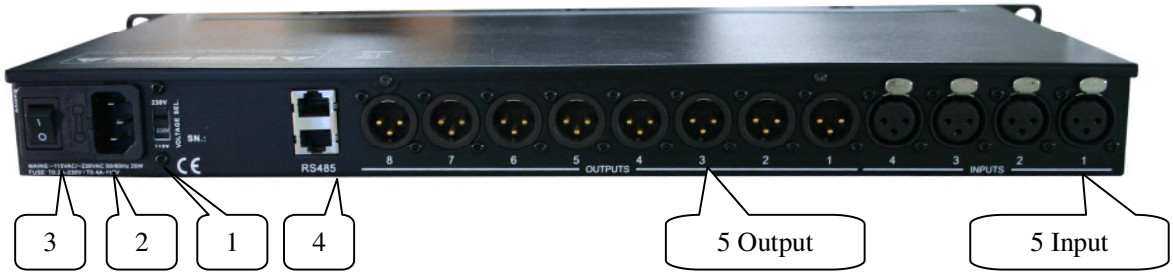
5. **Rotary Thumb Wheel** - Changes data values of a parameter and confirms the change. The wheel has travel velocity sensing which eases large incremental data modifications. While modifying delay and frequency (1 Hz resolution), pressing the **Speed** key simultaneously will increment/decrement the data value by 100X. To confirm the setting push the wheel one time.

6. **LCD** – 4 line x 32 words to show all the information necessary to control the unit.

7. Cursor control- 4 keys for Cursor control.


MENU
CURSOR
CURSOR
MENU

4.0 Rear Panel Functions



1. **Main Power** - Connected via a standard IEC socket. A compatible power cord is supplied with the unit. The voltage input is 90-240VAC, 50-60Hz.

2. **Main Fuse** - T2.5A-250V. Slow blow type.

3. **Power switch** - Controls power On/Off.

4. **RS485** – Enables remote control of the device up to 1000M..

5. **XLR input and outputs -** Separate 3-pin XLR connectors are provided for each audio input and output. The device's output stage employs the balanced impedance topology. All I/O connectors have pin 1 as ground (shield), pin 2 as + and pin 3 as -.

5.0 Powering Up the Device

• After powering up the unit, the following initialization screen is displayed on the LCD:

• The initialization process takes about 8 seconds and during that period the unit boots and displays the device model and firmware version.

• After the initialization process is finished the LSM displays its main screen:

• The screen shows the current program number and program name assigned to the unit. If the 2 fields are empty, it means that no program is assigned, the last data before previous power down is recalled instead.

• Now the LSM is ready to operate.

```
** LSM Series **
LSM-480 v1.00
DEVICE : 1
PROG (U):1

(U)> User program (F) factory program
```

6.0 Operating the Device

Tips: Channel Linking – While holding down the Mute button for 2 Seconds more than 1 channel from the same group (Input or Output group) can be selected to link the channels together. The green LEDs above the **Mute** buttons are lit for the linked channels. Any modification of the data for the selected channel will be applied to the linked channels as well. To cancel the linking, simply deselect the desired channel when the Mute key is still pressed.

6.1 Input/Output menus

Each of LSM input channels has a separate Mute key. Hold down the Mute key for 2 seconds then the Channel menu can be used and the green LEDs above the Mute button are lit.

One Touch easy access setup button
LSM Drive have 8 one touch setup buttons enabling the user to control the Signal, EQ, X over, Limiter, Channel, Name for each input/output, and System and Exit button in an easy and direct way.

-Signal-Gain/Phase/Delay - Signal parameters

- LEVEL - Gain, -40.00dB to +12.00dB in 0.1dB steps.
- POL - Polarity, can be normal (+) or inverted (-).
- DELAY - Delay in 21µs steps. Can be displayed in ms, ft or m. The time of the unit delay can be changed in the **System** menu. The maximum delay permitted is 1000ms.

```
OUI_1:XXXXXX  MENU:Signal
LEVEL:0.00dB
POL   :+
DELAY :0.105ms
```

-EQ - EQ parameters

- EQ# - Selects one of the 6 available Equalizers.
- LEVEL - EQ level gain. Ranges from -30.00dB to +15.00dB in 0.1dB steps.
- FREQ - EQ center frequency. Ranges from 20 to 20,000Hz in either 1Hz steps or 1/36 octave steps
- BW - EQ Bandwidth. Ranges from 0.05 to 3.00 octaves in steps of 0.01 octave steps for PEQ. The Q value is automatically shown beneath the octave value. For Lo-Sht or Hi-Shf, it is either 6 or 12dB/Oct.

Type - Type of EQ. The types can be parametric (PEQ), Lo-shelf (Lo-shf) and Hi-shelf (Hi-shf).

.

```
OUT_1:xxxxxx  MENU: EQ
EQ#:EQ1          BW:0.50OCT
LEVEL:0.00dB        Q=28.85
FREQ  : 1000HZ   TYPE:PEQ
```

-X Over **-** Crossover Parameters

- FTRH - Filter Type of low frequency crossover point (high pass). Types can be Butterworth, Linkritz Riley or Bessel.
- FRQH - Filter cut-off Frequency of low frequency crossover point (high pass). Ranges from 20 to 20,000Hz in either 1Hz steps or 1/36 octave steps. The frequency steps can be selected in the
- SLPH - Filter Slope of low frequency crossover point (high pass). Ranges from 12 to 48dB/octave. If the selected Filter Type is Linkritz Riley, the available slopes are 12 / 18 / 24 / 48 dB/octave.
- FTRL - Filter Type of high frequency crossover point (low pass).
- FRQL - Filter cut-off Frequency of high frequency crossover point (low pass)
- SLPL - Filter Slope of low frequency crossover point (high pass). Ranges from 12 to 48dB/octave. If the selected Filter Type is Linkritz Riley, the available slopes are 12 / 18 / 24 / 48 dB/octave.

```
OUT_1:XXXXXX      MENU:X-Over
FTRH: Butwrth     FTRL: Butwrth
FRQH: 1000Hz      FRQL:1000Hz
SLPH: 24dB        SLPL:24dB
```

-Limiter - Output Limiter

• THRESH - Limit Threshold. Ranges from -20 to +20dBu in 0.5dB steps.

• ATTACK - Attack time. Ranges from 0.3 to 100ms in 0.1ms steps, then ranges from 1 to 100ms in 1ms steps.

• RELEASE - Release time. Can be set at 2X, 4X, 8X, 16X or 32X the attack time.

```
OUT_1:XXXXXX          MENU:Limiter
THRESH:+20.0dB
ATTACK:10ms
RELEASE:2X (20ms)
```

-Channel - Input Mixer

• 1,2,3,4– Input channel source for the current output channel. Can be used to mix the input source or disable it (Off). If more than one input sources are enabled, they will be added together as the source for the current output channel.

```
OUT 1 :               MENU:Source
InA:ON
InB:ON
InC:OFF
InD:OFF
```

Name - Channel Name

• Name - Channel name. 6 characters in length.

```
OUT 1:XXXXXX          MENU:Name
NAME:XXXXXX
```

6.2 System Menus

The **System Menus** allow the user to control and change parameters that are related to the system behavior and general operation. It can be accessed by pressing the **System one touch key**

SYSTEM MENU
*Load a Xover
Store a Xover
Erase a Xover
System Set
Signal Generate

-Load a Xover - Program Recall
The LSM has a built in non-volatile memory that can store up to 30 different program setups. A program can be recalled by using this menu.

⇩

Load a Xover
*User Mode
Factory Mode

⇩

Load a Xover: User Mode
*1
2
3…

- PROG - Program Number to be recalled.

-Store a Xover - Program store
The LSM has a built in non-volatile memory that can store up to 30 different program setups. A program can be stored by using this menu. The old program with the same program number will be replaced. Once the program is stored in the flash memory, it can be recalled at a later time, even after power down.

Store a Xover
*1
2
3…

- PROG - Program Number for the current data to be stored.

Erase a Xover

Erase a Xover
*1
2

3…

-SYSTEM Set

SYSTEM MENU
*Password
BackLight Set
Delay Unit
Device ID
Systen info

*Password- The password of the LSM is 6 characters in length.

⇩

SYSTEM SETUP MENU: Password
------
*0 *

BackLight Set
SYSTEM SETUP MENU: Time
Light on / 20 s

The LCD display can be set to be always on or switch off after 20 Second.

Delay ID
SYSTEM SETUP MENU: Delay
DELAY UNIT: ms /cm / ft

Set the Delay unit in ms or cm or ft

Device ID
SYSTEM SETUP MENU: Device
DEVICE ID: 1

Set the Device ID from 1 to 250

System Info
Version: V1.0.1
Copy Right :
Created by:
Created Date: 2008-08-18

-Signal Generate
*Normal
  Pink Noise
  Tones (XXXX Hz)

Normal- Normal mode
Pink Noise-Pink Noise Generate mode
Tones- Tones mode, you can select any frequency from 20Hz to 20kHz.

• NAME - Program Name, allows a maximum length of 15 characters.

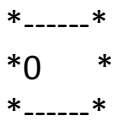
```
SYSTEM Recall
P:1 XXXXXXXXXXX
SYSTEM Store
P:1
SYSTEM Store
NAM:XXXXXXXXXXX
```

Security - Security Lock
The LSM enables the user to secure the unit and prevent undesired changes in the setup. In order to lock/unlock the unit the user must enter the correct password.

• PASSWORD – Under the System Menu

The password of the LSM is 6 characters in length. The user can change it via the PC application software. The factory default of a new unit does not require a password.

*Password
⇩
SYSTEM SETUP MENU: Password



7.0 Quick Reference

Parameters	**Menu <<Menu>>**	**Field <<Cursor>>**	**Min**	**Max**	**Steps**	**Units**
Level	Signal	LEVEL	-40	+15	0,1	dB
Polarity	Signal	POL	+ / -			
Delay	Signal	DELAY	0	1000	1	21µs
EQ Number	EQ	EQ#	1	6	1	
EQ Level	EQ	LEVEL	-30	+15	0.1	dB
EQ Frequency	EQ	FREQ	20	20.000	1	Hz
EQ Bandwidth	EQ	BW	0.05	3	0.01	Octave
Crossover low	XOver	FTRH	Off / Butterworth / Linkwitz-Riley / Bessel			
Crossover low	XOver	FRQH	20	20.000	1	Hz
Crossover low	XOver	SLPH	12/18/24/48 Octave			
Crossover High	XOver	FTRL	Off / Butterworth / Linkwitz-Riley / Bessel			
Crossover High	XOver	FRQL	20	20.000	1	Hz
Crossover High	XOver	SLPL	12/18/24/48 Octave			
Out limiter thresh	Limit	THRESH	-20	+20	0.1	dB
Out attack time	Limit	ATTACK	0.3	100	0.1 / 1	ms
Out release time	Limit	RELEASE	2 / 4 / 8 / 16 / 32X Attack time			
Source	Source	1, 2, 3, 4	Off / On			
Channel name	Ch-Name	NAME	6 characters			

8.0 PC Control Software

The LSM series is shipped with a special PC Control Software - LSM Drive gives the user an option to control the unit from a remote PC via the USB or RS485 serial communication link. The software makes it much easier to control and monitor the device allowing the user to get the whole picture on one screen. Programs can be recalled and stored from/to PC's hard drive,

The LCD will display below when PC software are connected

9.0 Specifications

Inputs and Outputs
Input Impedance: >10k Ohms
Output Impedance: 50 Ohms
Maximum Level: +20dBu
Type: Electronically balanced

Audio Performance
Frequency Response: +/- 0.1dB (20 to 20 kHz)
Dynamic Range: 115dB type (unweighted)
CMMR: > 60dB (50 to 10 kHz)
Crosstalk: < -100dB
Distortion: 0.002% (1 kHz @+4dBu)

Digital Audio Performance
Processor: 32-bit
Sampling Rate: 96 kHz
Analog Converters: High Performance 24-bit
Propagation Delay: 1.5ms

Front Panel Controls
Display: 4 x 32 Character Backlit LCD
Level Meters: 5 segment LED
Buttons: Mute/Edit Controls
Menu Controls
Dial Encoder: Embedded Thumb Wheel

Connectors
Audio: 3-pin XLR
RS-485 X 2
USB: Type B
Power: Standard IEC Socket

General
Power: 90-120 or 200-240 VAC (50-60Hz)
Dimensions: 19”x1.75”x9” (483x44x229 mm)
Weight: 7lbs / 3.2kg

Audio Control Parameters
Gain: -40 to +12dB in 0.1dB steps
Polarity: +/-
Delay: Up to 1000ms per I/O
Parametric Equalizers (6 per I/O)
EQ Type: Parametric, Hi-shelf, Lo-shelf
Gain: -30 to +15dB in 0.1dB steps
Bandwidth: 0.05 to 3 octaves (Q=0.404 to 28.852)
Crossover Filters (2 per Input / Output)
Filter Types: Butterworth, Bessel, Linkwitz Riley
Slopes: 12 to 48dB/Oct

Limiters
Threshold: -20 to +20dBu
Attack: 0.3 to 100ms
Release: 2 to 32X the attack time

System Parameters
No. of Programs: 30, (10 factory program and 20 user define)
Program Names: 12 character length
Delay Units: ms, ft, m
Frequency Modes: 36 steps/Oct, 1Hz resolution
Security Lock: Lock/Unlock
Copy channels: All parameters (with PC software)
Channel Names: 6 character length

Note: Specifications subject to change without notice