LM 44: Digital Audio System Processor

Features

- **Configurable Lake® Processor**
  - Mesa Mode (system EQ processor 4-in / 4-out)
  - Contour Mode (loudspeaker processor 2-in / 6-out)
  - Raised Cosine Equalization™
  - Linear phase and classic crossovers
  - LimiterMax™ peak and RMS limiters
  - Maximum available delay of 2 seconds
- **Audio Inputs and Outputs**
  - 4-in / 4-out analog with Iso-Float™ ground isolation
  - Digital AES3 8-in / 8-out
  - Gigabit dual redundant Dante™ by Audinate® audio networking
- **Full control via Lake Controller software application**
- **Software configurable GPIO**
- **Front Panel**
  - Daylight-readable display
  - Dedicated module input and output LED metering
  - Dedicated module input and output mute buttons with LED
  - Dynamic buttons and rotary encoder for parameter adjustment
- **Performance**
  - High quality A/D and D/A 24-bit conversion
  - 96 kHz internal sampling frequency
  - 32-bit floating point internal data path

Technology Overview

The LM 44 is a powerful, full-featured digital audio processor based on the highly acclaimed Lake Processing technology. As its name suggests, LM 44 features 4-in / 4-out analog configuration, while also accommodating 8-in / 8-out AES3 and 4-in / 8-out Dante digital audio transport. The LM 44 benefits from the latest implementation of Lake's iconic 'Mesa EQ' configuration, utilising 4 Mesa modules, each with an independent input mixer and output signal processing chain.

With this configuration, the LM 44 is ideally suited for a wider range of applications, including as a mix-matrix and full system EQ when sitting between a mixer and virtually any high-end performance loudspeaker system. Other possible assignments include switching between consoles on large events, inserted EQ for monitor systems, FOH-to-stage digital transmission, line driver for self-powered systems, and as a Dante break-in/break-out box.

With its flexible 4 × 4 input configuration, one or more LM 44 units can replace the now-discontinued Dolby Lake Processor in most applications. It also offers a cost-effective, scalable alternative to other larger and more expensive processors in situations when only a 4 × 4 analog I/O configuration is required, or when multiple 4 x 4 configurations are needed.

Additionally, LM 44 can be operated in Contour mode configuration (two Contour modules) allowing for utilization as a loudspeaker crossover processor, much like the intended operation of LM 26. Inputs that are not routed to the processing modules (in each mode) may be passed through to the output router. As with the LM 26, all three signal types – Dante, AES and analog – are maintained simultaneously, with user-prioritised automatic failover and extra redundancy, eliminating single point of failure.

LM 44: Highlights

Display Meter View:

The default view of the daylight-readable display provides Module I/O gain and limiter gain reduction meters along with associated frame, module and channel labels; an alternate I/O Status View provides a summary of input configuration with easy access to input mutes, digital clock status and input level metering. A dedicated LED indicates various faults or warnings.

Powerful Matrix Router:

The LM 44 provides a powerful output routing matrix via the front panel. This matrix, similar to the Lake Controller, allows any input or module output to be routed to the analog or digital outputs. This allows easy configuration of I/O routing, without the need for a connected PC - convenient and practical.

Module I/O Levels and Dedicated Mute Buttons:

This section is dedicated to the Module input and output signals. The inputs and outputs are separated by a white marker, depending on Mesa or Contour mode being used. The meter segments for each channel indicate clipping (red); -2 dB (yellow); and -6, -12, -60 dB (green). The dedicated MUTE button is either RED (muted), WHITE (unmuted) or UNLIT (unused).

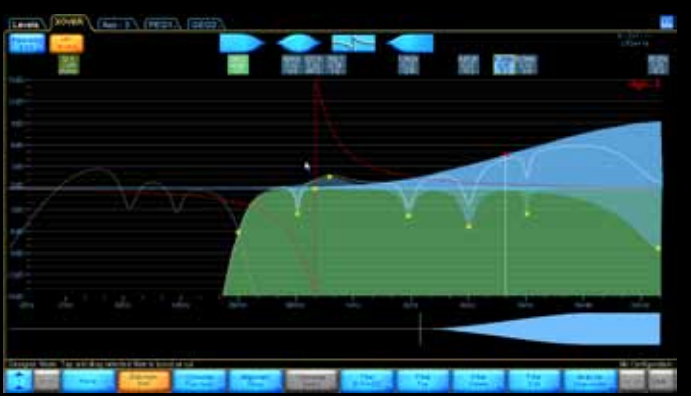
Intuitive Parameter Adjustment:

Parameters are adjustable using six dynamic function buttons and a rotary encoder. A user-editable parameter is identified with an illuminated button or encoder, providing intuitive navigation and control. Parameters can be adjusted in small increments and simultaneous multiple-parameter adjustment is also available.

Lake Controller Software:

The Lake Controller and associated applications, including Firmware Update and Preset Manager Utilities, form a powerful suite of software enabling detailed control and management of Lake Processor networks. The Lake Controller enables adjustment of all LM 44 parameters, including gain, delay, limiters, EQ, crossovers and all I/O configuration and routing.

Installed on a wireless touch-screen Tablet PC, the Lake Controller can be used to group processors together for simultaneous control from any location in the venue. The Lake Controller provides a real-time integration with Smaart 7 and Live Capture Light/Pro, providing direct audio analysis and measurement feedback within the Lake Controller.



One Lake Controller for all Lake products:

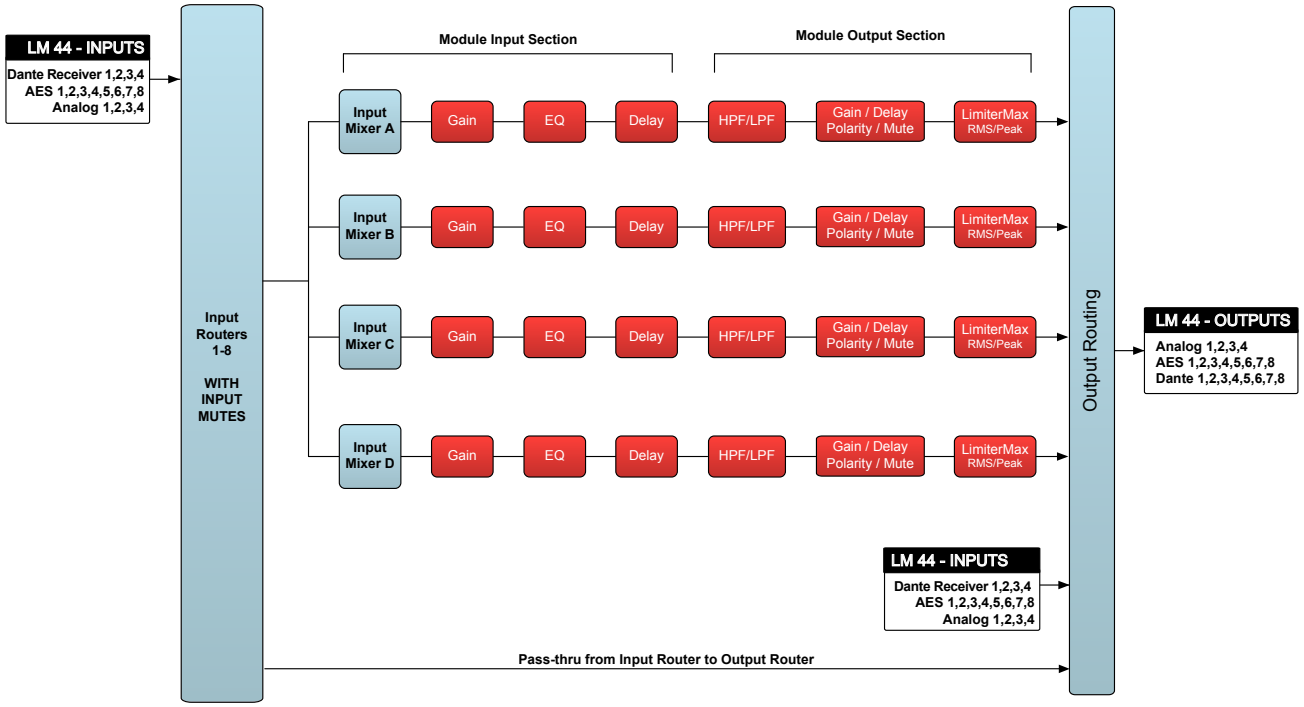
The LM 44 integrates into the Lake Controller software, alongside LM Series, PLM Series devices, and the Yamaha MY8-LAKE. New Lake Controller functionality provides LM Series-specific routing features, GPIO configuration and combined PLM and LM Series global power control and event log.

LM 44: System EQ or loudspeaker crossover processor

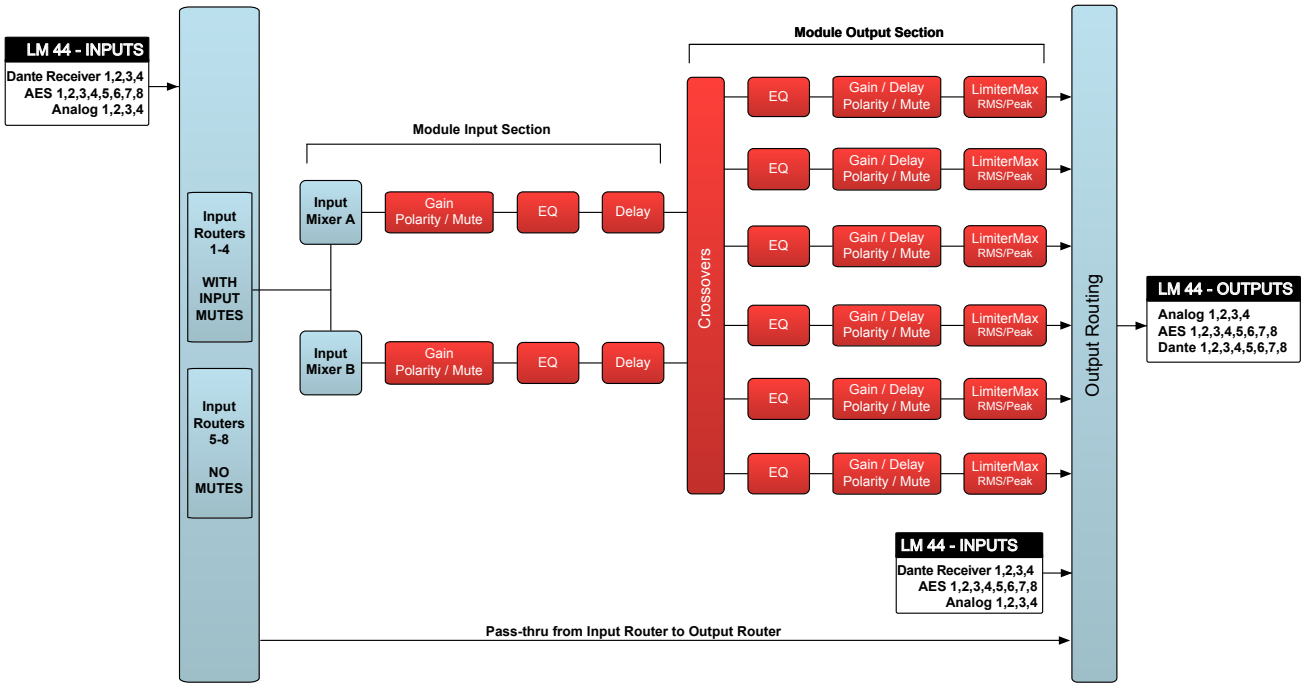
The LM 44 provides all the popular features found in legacy Lake Processors, including Mesa EQ filters, Linear Phase crossovers, AES3 connectivity, analog I/O with Iso-Float and Dante digital audio. In addition, this flagship Lake Processor range includes dual redundant Dante networking, GPIO connectivity, and new routing capabilities with dedicated pass-thru input routers to provide true Dante break-in and failover functionality.

The processor can be software-configured to operate in Mesa mode (4-channel system processor) or Contour mode (loudspeaker crossover). A total of eight input routers can be independently configured with up to four input failover priority settings. Also the output of any of these eight input routers can also be patched directly to any analog, AES3 or Dante output without using any of the valuable module processing channels.

Signal Flow for Lake LM 44 in Mesa Mode:



Signal Flow for Lake LM 44 in Contour Mode:



Specifications: LM 44

Lake features	
Module configuration	2 Contour or 4 Mesa modules
Processing channels	6 in Contour mode, 4 in Mesa mode
Input routers	8 input routers with 4 priorities in each, seamless failover to lower priorities
Module input mixer	4 ch. for Contour, 8 ch. for Mesa-modules. Mix any ratio between all input routers.
Input processing	Parameteric EQ with Mesa and Ideal Graphic equalizers, both utilizing Raised Cosine algorithms
Output processing	Linear phase or Classic crossovers, Parametric EQ, shelving and all-pass filters
Features	Delay, Mute, Phase, Gain etc.
Limiters	LimiterMax with Peak and RMS limiter. Configurable MaxRMSLevel, MaxRMSCorner, MaxRMSAttack, MaxRMSRelease and MaxPeakLevel
SuperModule compatible	Yes
Audio performance	
Conversion resolution	24-bit
Internal sample rate	96 kHz
Internal data path	32-bit floating point
Product propagation delay	Best case (AES synchronous 96 kHz to AES synchronous 96 kHz via module) 0.871 ms Analog (Analog in to Analog out via module) 1.049 ms Pass thru (Analog in to AES synchronous 96 kHz bypassing module) 0.158 ms
Maximum available user delay	2 seconds
Analog	
Inputs and Outputs	4 inputs, 4 outputs
Frequency response, analog-to-digital	+/-0.1 dB, 20 Hz to 20 kHz
Frequency response, digital-to-analog	+/-0.1 dB, 20 Hz to 20 kHz
THD+Noise, inputs	0.00024% typical at 1 kHz
THD+Noise, outputs	0.00037% typical at 1 kHz
Dynamic range, inputs	116 dB
Dynamic range, outputs	115 dB
Input impedance	20 kOhm balanced, 10 kOhm unbalanced
Output impedance	50 ohm
Maximum input level	+26 dBu
Input sensitivity - settings for digital full-scale	+12 dBu, +26 dBu
Maximum output level	+21 dBu
Crosstalk, inputs	-98 dB, 20 Hz to 20 kHz
Crosstalk, outputs	-98 dB, 20 Hz to 20 kHz
Common mode rejection ratio (CMRR)	>70 dB, 20 Hz to 20 kHz
AES3/EBU (sample rate converters available as desired)	
Inputs and Outputs	8 inputs, 8 outputs
Supported sample rates	44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz, 176.4 kHz, 192 kHz (I/O individually selectable)
Supported resolutions	Up to 24-bit
THD+Noise	0.00002 % at 96 kHz and 0.00006 % at 44.1 kHz sample rate
Dynamic range	Base48 -140 dBFS, Base44 -125 dBFS
Clocking	
Clock selection	Manual or automatic according to priority scheme
Oscillator type / synchronization	High quality VCXO clock can provide Dante master clock or slave. Automatic synchronization with Dante network.
Base48	2 (Primary and SRC)
Base44	1 (SRC)
Clock accuracy	< ± 7 ppm
Dante (audio network)	
Inputs and Outputs	4 inputs, 8 outputs
Supported sample rates	48 kHz, 96 kHz
Support redundant paths	Glitch-free Dual Redundant Dante using two Ethernet networks
Device latency	0.25 ms, 0.5 ms, 1.0 ms, 2.0 ms, 5 ms
GPIO	
Inputs	2 General Purpose Inputs (GPI) supporting external contact closure
Outputs	2 General Purpose Outputs (GPO) with internal contact closure
Software configurable input control	Standby state, Mute state, Dual preset recall
Software configurable output indication	Standby state, Mute state, Faults, Ready
Device presets	
Frame presets	100
Power requirements	
Nominal voltage	100-240 VAC
Operating voltage	70-265 VAC
Power consumption	30 W maximum
Front panel interface	
Display	Daylight readable monochrome (128 x 64)
Meters	LED for signal level and clip indicators per channel
Mute access	Dedicated Mute button and LED indication per processing channel
Menu	Intuitive and powerful user interface with soft keys
Status indication	LED Fault and Warning indication and detailed description on display
Parameter adjustment	Single/multiple parameter edits with rotary encoder
Back panel interface	
Analog Inputs and Outputs	4 + 4 XLR
AES Inputs and Outputs	DB-25, with selectable termination
Ethernet	Auto 100/1000, Auto uplink, 2 x Neutrik etherCON RJ45 connectors
GPIO	DB-9
Power	Detachable locking 3-pin IEC
Control and monitoring interface	Via Ethernet for Lake Controller software, or DLM (the 3rd party protocol)
Dimensions (W/H/D)	483 mm (19"), 44 mm (1 U), 290 mm (11.5")
Weight	5 kg (11 lbs)
Finish	Black painted steel chassis with cast alumimum handles
Approvals	CE, ANSI/UL 60065 (ETL), CSA C22.2 NO. 60065, FCC
Warranty	3 years, components and factory workmanship; see full warranty statement

Specifications subject to change without notice

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