Rev. 1.3.6
Item no. QSG-LM

LM SERIES

Digital Audio **Processors**



lake®

Quick Start Guide

1. Important safety instructions

Before using the device, be sure to carefully read the Safety Instructions. Keep this document with the device at all times.

1. Read these instructions.
2. Keep these instructions
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with a cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. Use the mains plug to disconnect the appartus from the mains.
16. WARNING: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.
17. Do not expose this equipment to dripping or splashing and ensure that no objects filled with liquids, such as vases, are placed on the equipment.
18. The mains plug of the power supply cord shall remain readily operable.
19. Do not connect the unit's output to any other voltage source such as battery, mains source, or power supply, regardless of whether the unit is turned on or off.
20. Do not remove the top (or bottom) cover. Removal of the cover will expose hazardous voltages. There are no user serviceable parts inside and removal may void the warranty.
21. An experienced user shall always supervise this professional audio equipment, especially if inexperienced adults or minors are using the equipment.
22. The US National Differences clause 16.3 requires that network cables must be flame rated VW-1.

1.1 Approvals

This equipment conforms to the requirements of the EMC Directive 2014/30/EU and the requirements of the Low Voltage Directive 2014/35/EU.

Standards applied: EMC Emission EN55103-1, E3
EMC Immunity EN55103-2, E3, with S/N below 1% at normal operation level.
Electrical Safety EN60065, Class I

This equipment is tested and listed according to the U.S. safety standard ANSI/ UL 60065 and Canadian safety standard CSA C22.2 NO. 60065. Intertek made the tests and they are a Nationally Recognized Testing Laboratory (NRTL).

1.2. Explanation of warning symbols

The lightning bolt triangle is used to alert the user to the presence of un-insulated "dangerous voltages" within the unit's chassis that may be of sufficient magnitude to constitute a risk of electric shock to humans.

The exclamation point triangle is used to alert the user to presence of important operating and service instructions in the literature accompanying the product.

1.3. Warnings

To prevent electric shock do not remove top or bottom covers. No user serviceable parts inside, refer servicing to qualified service personnel.
Français: À prévenir le choc électrique n'enlevez pas les couvercles. Il n'y a pas des parties serviceable à l'intérieur, tous reparations doit etre faire par personnel qualifié seulment.

To completely disconnect this equipment from the AC mains, disconnect the power supply cord plug from the AC receptacle. The mains plug of the power supply cord shall remain readily operable.
Français: Pour démonter complètement l'équipement de l'alimentation générale, démonter le câble d'alimentation de son réceptacle. La prise d'alimentation restera aisément fonctionnelle.

To reduce risk of fire or electric shock, do not expose this apparatus to rain or moisture.
Français: Pour réduire les risques d'incendie ou de choc électrique, n'exposez pas l'appareil à la pluie ou à l'humidité.

Do not expose this system/apparatus to dripping or splashing and ensure that no objects filled with liquids, such as vases, are placed on the apparatus.
Français: N'exposez pas ce système/appareil au ruissellement ni aux éclaboussures et assurez-vous qu'aucun objet contenant du liquide tel qu'un vase n'est placé sur l'appareil.

This apparatus must be connected to a mains socket outlet with a protective earthing connection.
Français: Cet appareil doit être raccordé à une prise secteur avec terre de protection.

The mains plug is used as a disconnect device and shall remain readily operable.
Français: Lorsque la prise du réseau d'alimentation est utilisés comme dispositif de déconnexion, ce dispositif doit demeuré aisément accessible.

1.4. Caution

To reduce the risk of fire or electric shock, do not remove screws. No user-serviceable parts inside. Refer servicing to qualified service personnel.
Français: Pour réduire le risque d'incendie ou de choc électrique, ne pas retirer les vis. Aucune pièce réparable par l'utilisateur. Confier l'entretien àpersonnel qualifié.

1.5. User responsibility

1.5.1. Mains connection grounding

Your amplifier must be connected to a grounded socket outlet.

1.5.2. Speaker output hazard on amplifiers

Amplifiers are capable of producing hazardous output voltages. To avoid electrical shock, do not touch any exposed speaker wiring while the amplifier is operating. The external wiring connected to the speaker terminals shall be installed by a qualified person, or ready-made leads or cords of appropriate capacity shall be used.

As the power output channels on amplifiers produce high voltage, do not connect or disconnect speaker cables when the mains power is on.

1.5.3. Radio interference

A sample of this product has been tested and complies with the limits for the European Electro Magnetic Compatibility (EMC) directive. This equipment has also 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 from electrical equipment. This product uses radio frequency energy and if not used or installed in accordance with these operating instructions, may cause interference to other equipment, such as radio receivers.

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Check if the affected unit complies with the EMC limits for immunity, (CE-labeled). If not, address the problem with the manufacturer or supplier. All electrical products sold in the EC must be approved for immunity against electromagnetic fields, high voltage flashes, and radio interference.
- Consult the dealer or an experienced radio/TV technician for help.

1.5.4. Speaker damage

Amplifier apparatus is very powerful and can be potentially dangerous to both loudspeakers and humans alike. Many loudspeakers can be easily damaged or destroyed by overpowering them. Always check the speaker's continuous and peak power capabilities. Although the amplifiers attenuators can be used to reduce the overall gain, an increase of the input signal can result in full output power, which may cause damage to connected speakers.

1.5.5. Maintenance

For safe and reliable operation, the dust filters on both sides of the front panel, behind the grilles, should be removed and cleaned regularly to ensure maximum airflow through the device.

If the dust filters are not maintained there will be safety risks; for example, high internal temperatures could ignite the dust and start a fire. There is also a risk that the unit will malfunction since it is dependent on constant airflow from front to rear. If the dust filters are not clean and the unit malfunctions, any resulting problems will not be covered by the warranty.

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2. Introduction

2.1. Welcome

Thank you for choosing the LAKE LM Series of Digital Audio Processors. We are confident that you will be pleased with the performance, unique features, configuration flexibility, reliability, and long-term durability offered by this product.

For fast installation and use of this product, your welcome package includes a printed copy of the LM Series Quick Start Guide which contains the information required to safely install the product and place it in service. Control and editing features are accessible via the front panel interface or via the included LAKE Controller software.

It is recommend that this Quick Start Guide is reviewed to ensure familiarity with the various configuration and control options.

Thank you again for placing your confidence in Lake products.

2.2. Main Features

The LM Series incorporates a number of sophisticated technologies to ensure the best possible performance and many years of reliable operation. The following section summarizes the benefits of each feature; additional information is available in the reference manuals.

2.2.1. Lake Processing and Controller

LM Series devices integrate seamlessly into the Lake Processing environment and are accessible via the Lake Controller software. Processing modules offer precise settings for gain, delay, crossover settings, equalization and limiting. Lake processing features incorporated in each module include Raised Cosine Equalization™, linear phase crossovers, and LimiterMax™ loudspeaker protection. The Super Module feature allows hardware processing modules in two or more separate devices to function as a single module in the Lake Controller software. Please refer to the Lake Controller Operation Manual for further information.

2.2.2. Analyzer Plug-In

Lake Controller software provides integration with third-party real-time analyzers, providing simultaneous measurement display and EQ adjustment via the Lake Controller. Approved analyzers include Rational Acoustics Smaart 7 and WaveCapture Live-Capture Light or Live-Capture Pro; additional third-party analyzers may be approved in the future.

Please refer to the Lake Controller Operation Manual for further information regarding the Analyzer plug-in and associated functionality.

2.2.3. Dante™ Audio Network

LM Series devices include Dante digital audio networking as standard. Utilizing the latest advances in Ethernet technology, Dante offers simplified system configuration and extremely low latency while delivering very high quality uncompressed digital audio across the LAKE network. The Zen™ automatic configuration feature enables plug-and-play setup without third-party DHCP or DNS servers. Dante is compatible with high-bandwidth networks, allowing large numbers of audio channels to be distributed alongside control and analyzer data.

2.3. Additional Documentation

This document, the LAKE LM Series Quick Start Guide, serves as a basic introduction to the installation and operation of LM Series devices. More detailed information is available in the comprehensive LAKE LM Series Operation Manual, which serves as the primary reference source for detailed information on the installation and operation of LAKE LM Series devices.

If you intend to use the device as part of a networked system, or access features via the LAKE Controller, please refer to the various supporting documents which can be located via these methods:

- Start > Programs > LAKE Controller > Documentation (after installing LAKE Controller software)
- Online at: https://www.labgruppen.com/lake-processing

3. Installation

3.1. Unpacking

Carefully open the shipping carton and check for any damage to the device or the supplied accessories. Every LAKE product is tested and inspected before leaving the factory and should arrive in perfect condition. If any damage is discovered, please notify the shipping company immediately. Only the consignee may initiate a claim with the carrier or their insurers for damage incurred during shipping. Save the carton and packing materials for the carrier's inspection.

In addition to the LAKE LM Series device, the shipping carton include the following items:
- LAKE LM Series Quick Start Guide
- AC mains lead (IEC power cable) with locking connector
- AES break-out cable (8-in, 8-out)
- Ethernet Cable

Please keep the original carton and associated packaging to facilitate shipping of the device should the need arise.

3.2. Mounting

Airflow for cooling the device is from side to side (right-side intake to left-side fan). Please ensure there is sufficient space each side of the unit to allow airflow; the space provided by standard rack-rails should be sufficient. This device has no top or bottom vents and therefore may be stacked directly on top of each other.

Sufficient space should be available at the front of the rack to accommodate the handles, and at the rear to accommodate connectors and cables; allowance must be made for cable or loom bends within a rack.

3.3. Cooling

The LAKE LM Series devices use a forced-air cooling system, with airflow from right to left. The dust filter on the air intake (right-side) should be regularly cleaned, especially after exposure to dusty environments, to ensure the maximum possible airflow through the unit.

This device is designed to operate in situations where the ambient temperature is below 55° C (131° F). Automatic actions and warnings occur at following temperature thresholds:

- At 40° C (104° F) or less, the fan is OFF
- At more than 40° C (104° F) the fan is ON
- At 55° C (131° F) a temperature warning is indicated on the front panel as 'TEMP WARNING' and in the Controller Event Log as 'Temp warning: DSP area'.
- At 70° C (158° F) the device has exceeded the maximum normal operating temperature. This fault is indicated on the front panel as 'OVERTEMP' and in the Controller Event Log as 'Temp fault: DSP area'.

NOTE: The Processor will NOT mute or shut down when the temperature reaches or exceeds 70° C (158° F), however, sustained performance at this temperature cannot be guaranteed.

3.4. Operating voltage

The label above the IEC connector indicates the AC mains voltage range for which the device is approved. LM Series devices utilize a universal power supply, and will operate within the range 70-265 V ~ 50 - 60 Hz: 25W. If the plug on the IEC cable provided is not appropriate for your country, a locally-sourced IEC cable with the appropriate molded plug should be used. A locking IEC cable is not necessary in order to power the device, although is essential if locking functionality is required. Once a suitable AC power supply is connected, the device can be turned on using the front panel power button. When the device is turned on, the power button LED changes from red (Standby) to green (Active).

3.5. Grounding

Analog inputs and outputs feature Iso-Float™ ground isolation, a technology which combines the benefits of transformer-coupled isolation with the advantages of clean, direct-coupled inputs and outputs.

The audio converters are galvanically isolated, and not connected to the main ground. High-speed transformers and opto-isolators create a barrier between the device and the outside electrical environment.

NOTE: The Iso-Float feature is activated by default, but may be disabled via the LAKE Controller software, or via the front panel menu.

Use correctly-shielded balanced audio input connections to minimise hum and interference. Please refer to section 7.1.5 of the LM Series Operation Manual for further information.

NEVER disconnect the earth (ground) pin on the mains cable (AC power cord).

4. Product overview

4.1. Front panel

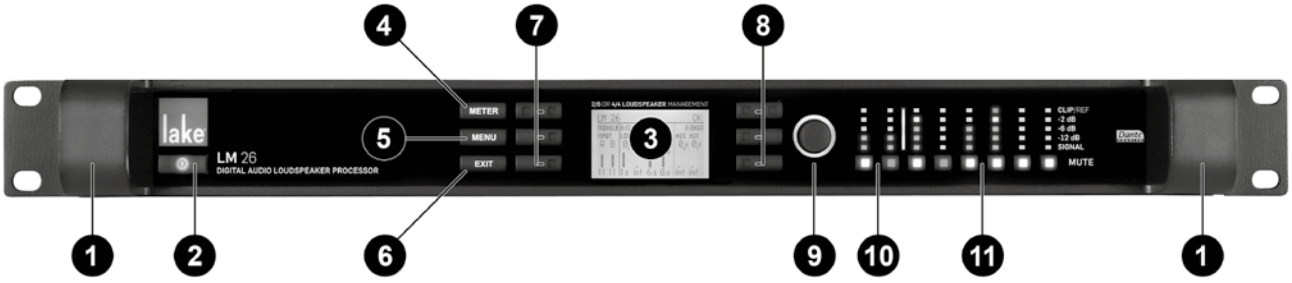


Figure 4.1: LM Series Front Panel Layout

The front panel controls are clustered around a daylight readable LCD ❸ , allowing adjustment and monitoring of the majority parameters and meters. The two clusters of controls on either side of the LCD include five dedicated function buttons ❹❺❻ , six dynamic function buttons with embedded LEDs ❼❽ and a rotary data encoder ❾ . To the right of these controls is a dynamic illuminated I/O divider ❿ along with input and output ⓫ mute buttons and level meters.

❶ **Handles -** Two sturdy cast aluminium handles are integrated into the front panel. The handles should be used when carrying the device, and when fitting into or removing from a rack. Ensure that any door or removable rack front cover has sufficient depth to clear the handles.

❷ **Standby -** LM Series devices are powered on and placed into standby mode using the left-most button, or via the LAKE Controller. Standby mode is not equivalent to turning the device off at the mains power.

NOTE: All audio in and out of the processor is muted when in Standby mode. Network communication remains active to allow the device to be turned on via the LAKE Controller.

❸ **Display -** The display illuminates when the device is on. The LCD, function buttons, and the rotary encoder provide real-time control and monitoring of most parameters. The LEDs embedded in the function buttons indicate available menu options, provide confirmation of Controller communication, and indicate various faults and warnings. The brightness and contrast of the display and front panel LEDs can be adjusted via the front panel menu. Please refer to chapter 6 of the LM Series Operation Manual for further details.

❹ **Meter -** The METER button scrolls through various meter views including the default Home View, Input Meters View (Mesa Mode only) and I/O Status View. Pressing METER from Menu Mode returns the screen to Meter Mode with the Home View displayed. Please refer to section of the LAKE LM Series Operation Manual for further details.

❺ **Menu -** After pressing the MENU button, the LCD will display the top level menu. In Menu Mode the dynamic function buttons enable access to various information and functionality. Please refer to section 6.5 of the LM Series Operation Manual for further details.

❻ **Exit -** The EXIT button is used primarily while navigating the menu system in Menu Mode; pressing EXIT will return the menu up one level. In Meter Mode, pressing EXIT returns the metering display to the default Home View.

❼ **Dynamic Function Buttons with LEDs (Left of LCD) -** The function of these buttons change according to the currently selected view or menu.

The left LED in the top button illuminates white to indicate the Frame is selected in the LAKE Controller, or flashes white to indicate communication from the LAKE Controller. If this button is pressed while in Home View, and with the LAKE Controller on the Home page or the Modules Menu, the associated Module/s of the selected frame will be highlighted in the Controller (Module A in Contour Mode, or Modules A&B in Mesa Mode).

The three LEDs on the right side of each button illuminate white when an associated option is available on the LCD screen. Please refer to chapter 6 of the LM Series Operation Manual for further details.

❽ **Dynamic Function Buttons with LEDs (Right of LCD) -** The function of these buttons change according to the currently selected view or menu.

The right bi-color LED in the top button illuminates red or yellow to indicate faults or warnings. If this button is pressed while in Home View, and with the LAKE Controller on the Home page or the Modules Menu, the associated Module/s of the selected frame will be highlighted in the Controller (Module B in Contour Mode, or Modules C&D in Mesa Mode).

The three LEDs on the left side of each button illuminate white when an associated option is available on the LCD screen. Please refer to chapter 6 of the LM Series Operation Manual for further details.

❾ **Rotary Encoder -** The rotary encoder is used to modify various parameters (e.g. input level) via the menu. When a menu item is selected that permits adjustment of parameter values, the ring around the rotary encoder illuminates. In Home View the encoder can be used to scroll through the Meter Views.

❿ **Dynamic Illuminated I/O Divider -** The dynamic illuminated divider moves position to indicate the split between inputs and outputs for metering and mute purposes in the two different modes of configuration. Contour Mode provides two Module inputs, and six Module outputs; Mesa Mode provides four Module inputs and four Module outputs. The LED meters and mute buttons to the left of the illuminated divider relate to the Module inputs; the LED meters and mute buttons to the right of the divider relate to the Module outputs. The I/O divider is not illuminated in I/O Status View as all eight LED meters and associated mute buttons are used for Input Router signal and mute functionality.

⓫ **Module Input / Output Mute Buttons and LED Meters -** Independent mute buttons and LED meters are provided for the Module inputs and outputs. The number of inputs and outputs varies depedning on processor and module configuration. Refer to the description above regarding the Dynamic Illuminated I/O Divider.

The LED meters for each channel are split into five segments: The bottom three segments (green) indicate signal; the 4th segment (yellow) indicates signal 2 dB below clipping; and the 5th segment (red) indicates signal clipping.

The embedded LED in each mute button confirms whether the associated Module input/s or output/s are muted (red), unmuted (white), associated input router is muted (pink), or unused (not illuminated). Please refer to section 6.7.5 of the LM Series Operation Manual for further information.

4.2. Rear panel

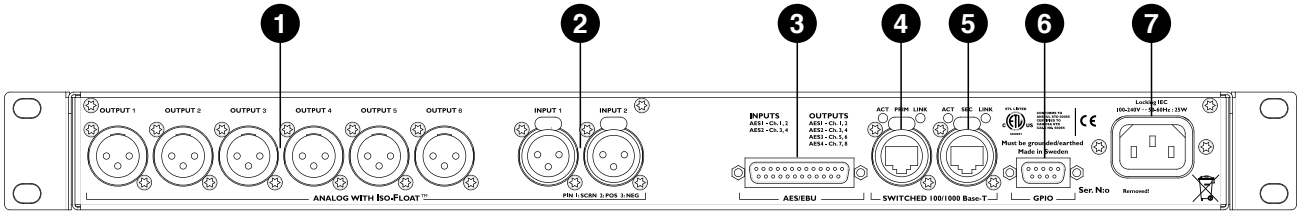


Figure 4.2: LM 26 Back Panel Layout

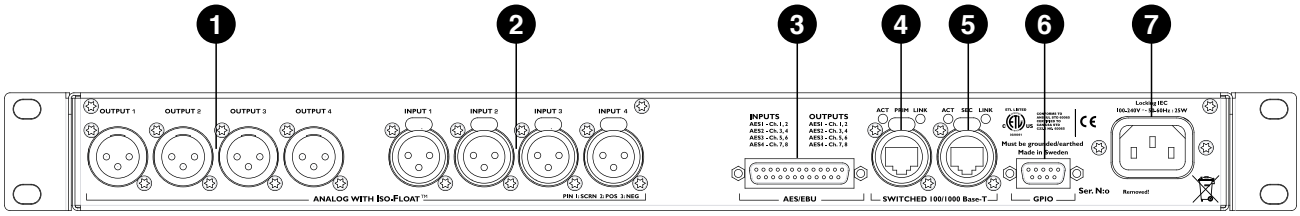


Figure 4.4: LM 44 Back Panel Layout

❶ **Analog Outputs -** Analog outputs are provided via standard XLR3M connections. The outputs are electronically balanced and feature LAKE Iso-Float circuitry; it is not recommended to use unbalanced connections. The output impedance is 50 ohms, providing a maximum output level of +21 dBu. Please refer to section 7.1 of the LM Series Operation Manual for further information.

❷ **Analog Inputs -** Analog inputs are provided via standard XLR3F latching connectors. The inputs are electronically balanced and feature LAKE Iso-Float circuitry; it is not recommended to use unbalanced connections. The impedance is 20 kohms (balanced), and the inputs can accept a maximum input level of +26 dBu. Please refer to section 7.1 of the LM Series Operation Manual for further information.

❸ **AES3 I/O -** AES inputs and outputs are provided via a 25-pin DB25 connector. Inputs can be received on AES1 (Ch.1,2) and AES2 (Ch.3,4) for all LM Series devices; the LM 44 also allows input from AES3 (Ch.5,6) and AES4 (Ch.7,8).

Outputs are via AES1 (Ch.1,2), AES2 (Ch.3,4), AES3 (Ch.5,6) and AES4 (Ch.7,8). Please refer to section 7.2 of the LM Series Operation Manual for further information.

The sample rates available for AES3 inputs and outputs are 44.1, 48, 88.2, 96, 176.4, 192 kHz; input and output sample rates can be configured to lock to different sample rates.

❹ **Primary Network Connector -** The primary Neutrik RJ45 etherCON® connection provides integration into an Ethernet control network which may include other LAKE Processors and the LAKE Controller software. Network connection permits full control of all functions along with real-time metering from a remote position. This device supports the Dante audio networking protocol, which allows transmission of multichannel, high-definition digital audio over the same Ethernet connection.

Use the primary connector when using a star network topology, consisting of individual Cat-5e connections between the devices and an Ethernet switch. Alternatively this connection can be used to daisy chain directly to another LAKE Processor. The daisy chain topology should not be used with Dante.

For a technical reference of the Ethernet Port, please refer to section 7.3 of the LM Series Operation Manual. Additional information is also available in the LAKE Network Configuration Guide.



NOTE: The Ethernet ports automatically switch to operate at Ethernet data rates of 100 Mbps or 1000 Mbps, and allow straight or crossed network cables. Two LEDs above each port indicate valid network connection (LINK) and network activity (ACT).

❺ **Secondary Connector -** The secondary network connector can be used to daisy-chain multiple LM & PLM Series and legacy Dolby and LAKE devices. Alternatively, a Dante dual-network topology can be created by connecting all secondary network connectors to a separate Ethernet switch, ensuring full redundancy in the event of a network component failure.



NOTE: Additional processor configuration is required for a dual redundant network setup. See the LAKE Controller Operation Manual for further details.

For a technical reference of the Ethernet Port, please refer to section 7.3 of the LM Series Operation Manual. Additional information is also available in the LAKE Network Configuration Guide.



NOTE: When connecting multiple devices to an Ethernet network, care must be taken NOT to create a closed loop which causes network malfunction.

❻ **GPIO Connector -** A 9-pin GPIO (General Purpose Input Output) connection is provided to enable integration with external systems such as alarm/fire systems, providing basic control of power state, mute along with fault notification to an external monitoring system. Please refer to sections 6.9.4.4 and 7.4 of the LM Series Operation Manual for further details.

❼ **Mains Power Connector -** A universal power supply capable of accepting 70-265 V ~ 50-60 Hz : 25 W is built into LM Series devices. The IEC power cable provided includes a locking feature via a pin on the bottom of the connector; the connector can accept standard or locking IEC power cables.

The power supply must be connected to AC mains using a power cable with a correctly wired plug for the country of operation.

5. Signal Flow and LAKE Processing

5.1. Signal flow

The figures below depict the audio signal flow for LM Series devices configured in both Contour and Mesa modes. It is worth noting that this sophisticated device provides up to five points in the signal chain where the signal level can be adjusted, muted or disconnected (depending on whether configured in Contour or Mesa Mode as described below). The blue sections represent Frame data, and the red sections represent Module data - please refer to the LAKE Controller Operation Manual for further information.

Important information regarding correct setting of the gain structure can be found in section 9.1 of the LM Series Operation Manual.

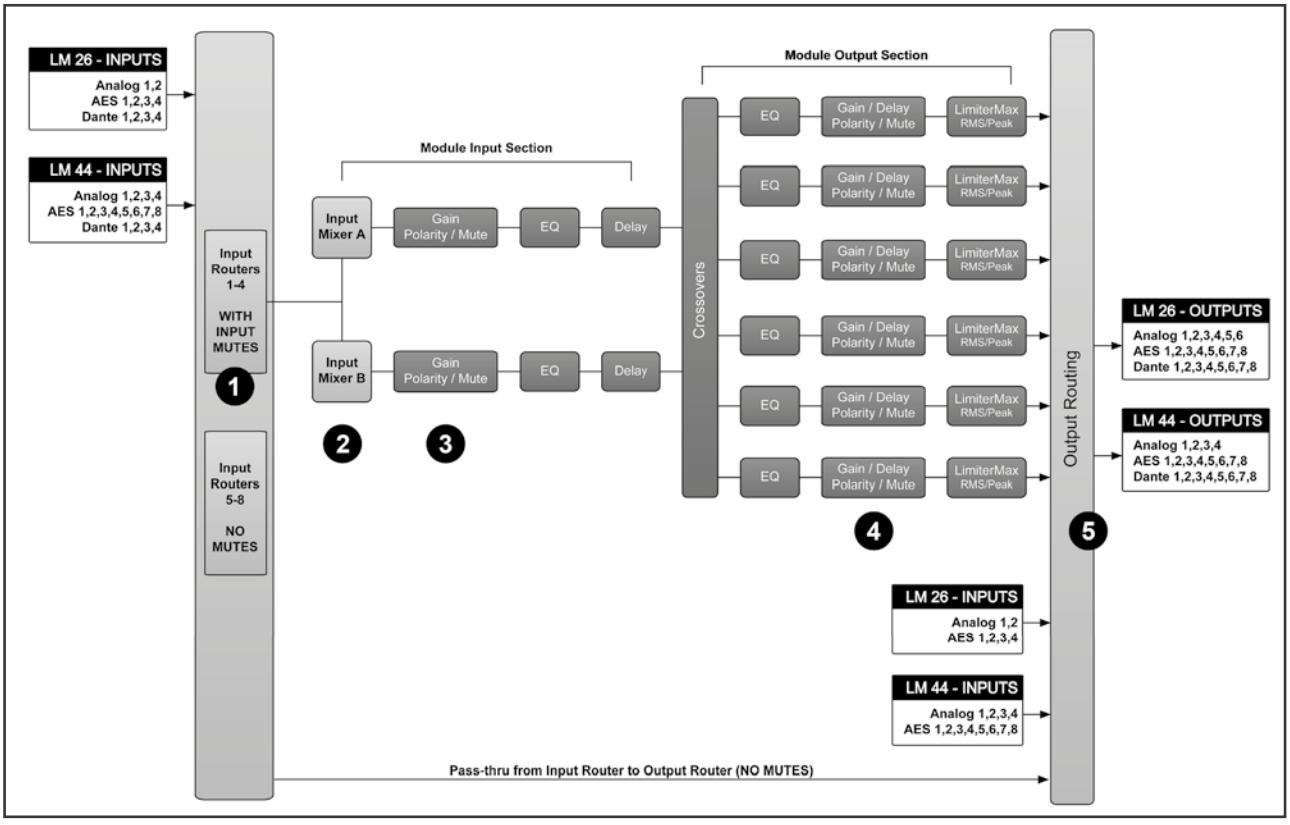


Figure 5.1: LM Series Signal Flow (Contour Mode)

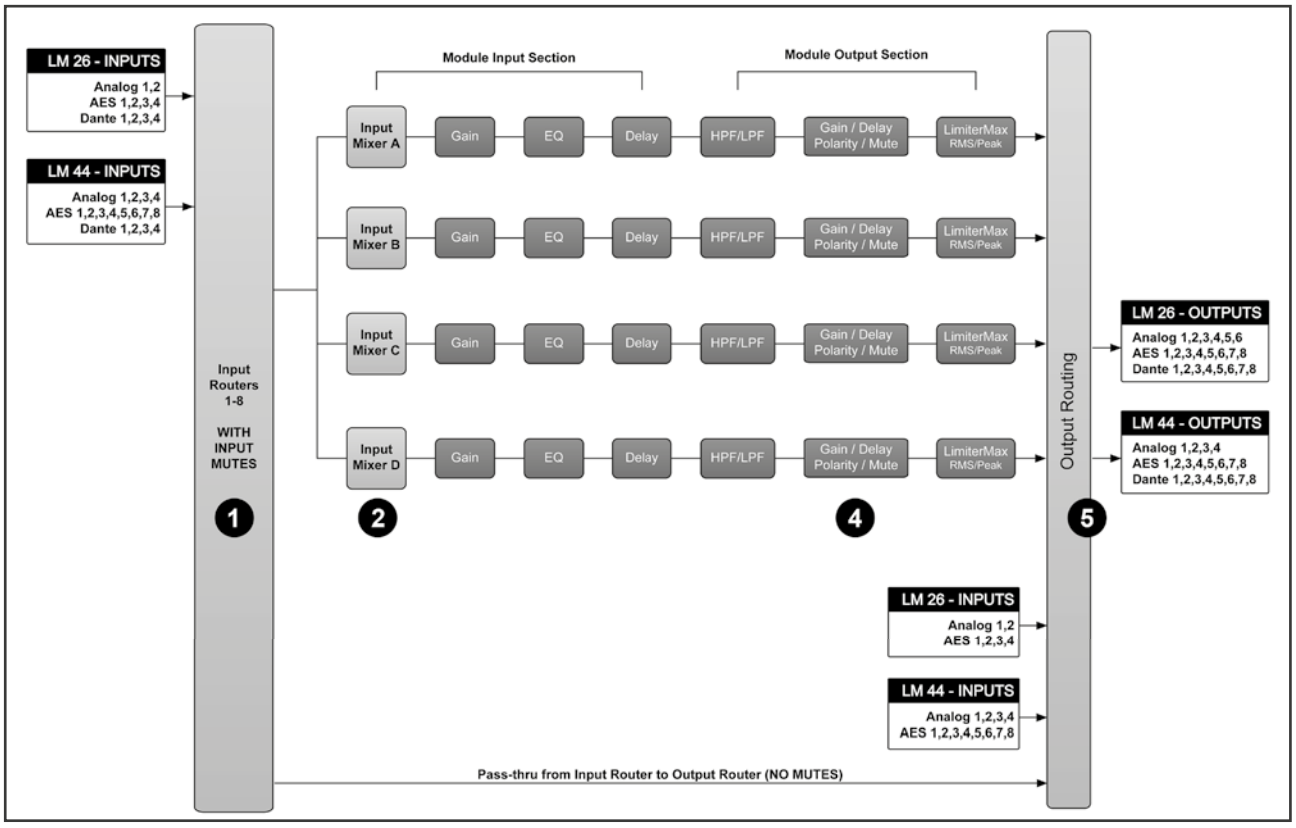


Figure 5.2: LM Series Signal Flow (Mesa Mode)

Please refer to section 6.9.4.2 of the LM Series Operation Manual for information on changing the Frame configuration between Contour and Mesa Modes.

The numbers below correspond the points identified in Figure 5.1 and 5.2.

❶ **Input Router Stage** - Input selection and MUTE
❷ **Input Mixer Stage** - Router ON/OFF connection to mixer and gain settings
❸ **Module Input Stage** - Mute (N/A for LM Series Mesa Mode) and gain settings
❹ **Module Output Stage** - Mute and gain settings
❺ **Output Router Stage** - Output ON/OFF routing connections

In Contour Mode, a Module can be connected to Input Routers 1-4 providing all five stages of mute/connectivity functionality via the front panel interface or the LAKE Controller; Input Routers 5-8 allow stage 1 input selection only (MUTE unavailable), along with stage 5 output ON/OFF routing connections (i.e. pass-thru).

In Mesa Mode, a Module can be connected to any of the eight input routers, providing four stages of mute/ connectivity (stage 1,2,4 & 5).

NOTE: If the required audio signal is not passing correctly, verify the connection, mute and gain settings at all five stages.

5.2. LAKE Processing and Control

As outlined in section 2.2.1, this device integrates seamlessly into the LAKE Processing environment, providing all features, functionality and connectivity associated with all LAKE Processors. The internal LAKE Processing includes programmable crossovers, EQ, dynamics and other functions, and can be fully controlled via the supplied LAKE Controller software. Additionally, many functions can be controlled or accessed directly via the front panel.

The LAKE Controller Operation Manual and LAKE Network Configuration Guide is available from the Start Menu after software installation.

Visit labgruppen.com/lake-processing to download the latest software, firmware and documentation for your devices.

5.3. Modules and Frames

5.3.1. Overview

A Frame represents one physical LAKE Processor (e.g. LM 26 or LM 44). In Contour Mode, a maximum of two Modules are contained within each Frame; these are referred to as Module A and Module B. The number of Modules shown in a given Frame is also dependent upon the signal processing configuration of that Frame. In Mesa Mode each Frame contains four Modules labelled A, B, C & D.

In Contour Mode, each Module can be configured as a Classic Crossover (Bessel, Butterworth, Linkwitz- Riley), as a Linear Phase Crossover, or as multiple full bandwidth Auxiliary Outputs. The default configuration for the LM 26 is 2 x Classic 3-Way Modules, providing a total of six Module outputs. The default configuration for an LM 44 is four Mesa EQ Modules, providing a total of four Module outputs.

Please refer to the LAKE Controller Operation Manual for further information.

5.3.2. Super Modules

Super Modules allow control of multiple Modules of the same type, distributed across multiple Frames, as a single entity within the LAKE Controller software. A change made in the Super Module is replicated across all assigned Modules, resulting in improved efficiency in system configuration and a reduction of on-screen icons within the LAKE Controller software.

The key benefit of this feature is the ability to connect and control crossovers, levels and EQ across multiple hardware devices simultaneously from the LAKE Controller. For example, one device may be driving sub and low-frequency speakers, while another device controls mid-range and hi-frequency drivers. Using a single adjustment the crossover points between the two devices can be changed simultaneously.

Please refer to the LAKE Controller Operation Manual for further information regarding Super Modules.

5.4. Loudspeaker Processor (Contour Mode) Overview

In Contour Mode, LM Series devices may be configured with up to two processing Modules containing a total of up to six processing Module outputs as shown in Figure 5-1 on page 11. Each set of processing elements is referred to as a Module and can be configured as crossovers, full-bandwidth auxiliary outputs, or a combination of the two. The relationship between inputs and outputs is defined via the LAKE Controller or via the front panel I/O CONFIG Menu.

The LAKE Processing system provides two distinct categories of crossovers:

- Infinite Impulse Response filters (IIR) such as the classic Bessel, Butterworth or Linkwitz-Riley types; these are available with slopes ranging from 6 dB/octave to 48 dB/octave.
- Finite Impulse Response filters (FIR) providing zero phase shift with steep transition slopes at the crossover frequencies. These are also referred to as Linear Phase Crossovers.

Further details on these types of crossovers and information on configuring various module types can be found in the LAKE Controller Operation Manual.

5.5. System Equalizer (Mesa Mode) Overview

In Mesa Mode, an LM Series device provides four processing Modules with independant EQ, HPF/LPF, Gain, Polarity, Delay and Limiters as shown in on page 15. The relationship between inputs and outputs is defined via the LAKE Controller or via the front panel I/O Input Config Menu.

Please refer to the LAKE Controller Operation Manual for addiitonal information on Mesa Mode and associated I/O routing.

5.6. Switching between Contour and Mesa Mode

When switching between Contour and Mesa Modes, all current Frame configuration data is lost (Presets are retained) and the device is completely reconfigured into the selected Mode. Ensure you have stored any existing frame configuration data before configuring into a different mode.

The device configuration may be changed either via the Front Panel MENU > FRAME > FRAME RST (refer to section 6.9.4.2 of the LM Series Operation Manual) or via the LAKE Controller MODULES > I/O CONFIG > FRAME CONFIG menu (refer to the LAKE Controller Operation Manual).

5.7. Files and Presets

The LAKE system provides various methods for storing and recalling Module, Frame, or system-wide data. An overview is provided below; for further information please refer to the LAKE Controller Operation Manual.

5.7.1. Module, System and Sub-System Configuration Files

Module, System and Sub-System Configuration files are stored on the LAKE Controller PC, and data is passed across the network when recalling or storing these type of files.

- A Module file is the smallest set of data that can be stored and recalled; it contains crossover, gain, delay, and limiter information for an individual loudspeaker (i.e. the data shown in red in the signal flow diagrams in section 5.1). A Module file may be recalled into other LAKE devices. It is not possible to store a Module File directly on the hardware device.
- A System or Sub-System Configuration File contains a set of Module file information in addition to Frame related information such Group data and I/O configuration (i.e. the data shown in blue in the signal flow diagrams in section 5.1).

5.7.2. Frame and System Presets

This device allows the complete processor configuration to be stored as a Frame Preset on the hardware unit itself. Presets can be recalled via the front panel (please refer to section 6.9.6) or via the LAKE Controller software (please refer to the LAKE Controller Operation Manual). Presets can be stored into the device using the LAKE Controller or the LM Series Preset Manager utility.

A maximum of 100 Frame Presets can be stored on this device. The data within a Frame Preset includes the configurations of both Modules in the Frame, including all levels, crossover, EQ, input mixer, output routing, and all other Module, Frame and Group parameters. As Frame Presets are stored in the device, complete processor configurations may be recalled without the need to connect the device to a PC.

Using the System Presets function in the LAKE Controller, entire system configurations can be stored and recalled across a network of LM & PLM Series devices. This enables fast retrieval and switching of entire system configurations as minimal data is being sent between the Controller and Processors.

6. Quick Start Tutorial

6.1. Introduction

This section describes installation of the LAKE Controller software, input and output connections, basic functionality, and setup instructions. The information provides a basic level of understanding of the system architecture along with configuration instructions for a basic system application.

The tutorial in section 6.4 provides a step-by-step example for configuring this device for use with a generic professional sound system. Please refer to the documentation listed in section 2.3, which provides detailed information on all features and functionality.

6.2. LAKE Processing and Control

The LM Series of Digital Audio Processors provide programmable crossovers, EQ, dynamics and other functions. Primary control is via the supplied LAKE Controller software, although many functions can be accessed via the front panel interface.

The LAKE Controller software allows all parameters to be configured, controlled and monitored; please refer to the LAKE Controller Operation Manual for further details. The LAKE Network Configuration Guide provides information regarding connection of one or more LAKE Processors to a PC via an Ethernet network.

6.3. Installing the LAKE Controller Software

6.3.1. Overview

Visit labgruppen.com/lake-processing to download the latest LAKE Controller software package. This should be installed on any PC/s that will be used to control and monitor the LAKE Processor network. In a situation where multiple networked LAKE Processors are involved, this will generally be a Tablet PC.

The minimum recommended computer specifications are:

- 1 GHz or faster
- 512 MB RAM or greater
- 128 MB video RAM or greater
- Windows XP, Windows Vista or Windows 7
- DirectX® 8.1 or later
- 100 Base-T wired Ethernet adapter and/or 802.11 wireless Ethernet adapter

When using large LAKE processor systems it is recommended that a computer exceeding the minimum specifications is used. If you are unsure about installing PC software, please contact an IT specialist.

6.3.2. Software Installation

To download the latest LAKE Controller Software, please visit; labgruppen.com/lake-processing and locate the "Download" section. Click on the appropriate link and follow the on-screen instructions. Note the destination location of the downloaded installation folder in case you need to find it when the download is completed.

Once the software is installed, the application is launched by double-tapping the LAKE icon on the Windows desktop. Please refer to the LAKE Controller Operation Manual for further details on software installation and PC configuration.

6.3.3. Software and Firmware Updates

Regular software and firmware updates are available for the LAKE Controller software and LM Series devices. Please check for updates regularly to ensure you have the latest features and improvements.

Registered users will receive email notification of updates as they become available. The latest updates are also available from https://www.labgruppen.com/lake-processing

Please refer to the LAKE Controller Operation Manual for further details on the firmware upgrade procedure.

6.3.4. Ethernet Configuration

This device provides control, monitoring and digital audio functionality via an Ethernet network.

For further information on the setup and configuration of an Ethernet network, please refer to the LAKE Controller Operation Manual and the LAKE Network Configuration Guide.

6.4. LM Series Configuration Tutorial

This tutorial provides a step-by-step guide for configuration of a typical professional loudspeaker system and provides an overview of the basic features and operation of LM Series devices. This tutorial uses the LAKE Controller software for configuration, although many steps are also available via the front panel interface.

This tutorial describes how to configure a single LM 26 for use with a 3-way loudspeaker system (with separate HF, MF and LF drivers), plus a separate Auxiliary output for feeding a subwoofer. It assumes the use of an analog mixing desk, and that a dedicated subwoofer output is generated on the mixing console itself using an auxiliary output send.



NOTE: The following tutorial assumes use of a Tablet PC and therefore the term TAP rather than CLICK is used for activating commands.

1. Connect the amplifiers/powered loudspeakers to the four LM 26 output channels:
   - Channel 1 – Low Frequency Driver
   - Channel 2 – Mid Range Driver
   - Channel 3 – High Frequency Driver
   - Channel 4 – Subwoofer

2. Connect the main output of the mixing console (left or right channel as appropriate) to Analog Input 1 of the LM 26. Connect the sub output from the mixing console to Analog Input 2.

3. Ensure the volume is turned down for both the main and sub send on the console and that no audio is passing through the system.

4. Ensure the LM 26 is connected to a PC running the LAKE Controller software.

5. After ensuring that no audio is being output from the mixing console, power on the LM 26.

6. On the Tablet PC, launch the LAKE Controller software application. Select the appropriate network adapter if more than one is enabled, and tap NO to the dialog asking whether to load the previous configuration.

7. Tap MODULES to access the Module Menu and scroll bar.

8. On the Module scroll bar, the LM 26 is represented with a frame containing two discs. These are labeled A and B and represent the two LAKE processing modules.

9. Tap the frame to select it, then tap again in the MAIN area of the screen to place both modules of the frame in the current system configuration. The LAKE Controller uploads settings from the LM 26.

10. Tap the icon for Module A; its border will turn yellow to confirm selection and an LED on the front panel of the associated device will also be illuminated.

11. Tap the MODULE STORE/RECALL button on the Modules Menu; the menu will change to show additional options.

12. Double-tap the Default Modules folder then double-tap the Contour Classic Crossovers folder. A set of loudspeaker symbols will be displayed.

13. Tap CL3w+1a, and then tap the RECALL button. This configures the DSP for the Module A as a 3-way crossover, plus a separate auxiliary channel.

14. Tap YES when asked to confirm that all data will be overwritten; tap 2-Way on the subsequent dialog regarding Module B configuration (not be used during this tutorial).

15. Tap STORE/RECALL EXIT to return to the Modules Menu.

16. Ensuring Module A is still selected (yellow border), tap I/O CONFIG.

17. The top-right of the I/O CONFIG screen displays a block diagram of Module A, including an input gain mixer summary. Tap on the blue INPUT 1 block to open the Input Mixer.

18. The Input Mixer shows the individual input levels and connectivity status, along with a meter on the right which displays the combined mixer output signal level. Verify Input 1 fader is set to 0.00 dB and turn all other inputs off.

19. Tap the blue return arrow button at the bottom right of the screen to return to I/O CONFIG.

20. Locate the small square block labeled POST EQ towards the bottom of Module A's block diagram. A setting of POST EQ indicates that the Auxiliary output channel is fed from same audio source and the 3-way crossover.

21. Tap the POST EQ button so it changes to read INPUT MIX.

22. Tap any of the blue INPUT MIXER summary blocks associated with the Auxiliary Output channel to open the separate Aux Input Mixer.

23. Ensure INPUT 2 is turned on and set to 0.00 dB, and that all other inputs are OFF.

24. Tap the bottom-right return button to close the Aux Input Mixer.

25. As Module B's processing is not required for this configuration, open Module B's input mixer, and turn all inputs OFF. Press the return key/button to navigate back to I/O CONFIG.

26. Tap any of the four magnifying glass icons on the right-side of Module A's block diagram to open the Output Configuration screen.

27. Verify that the Output Configuration is routed as shown in Figure 6-1 below where Source = Module Outputs and Destination = Analog Outputs.

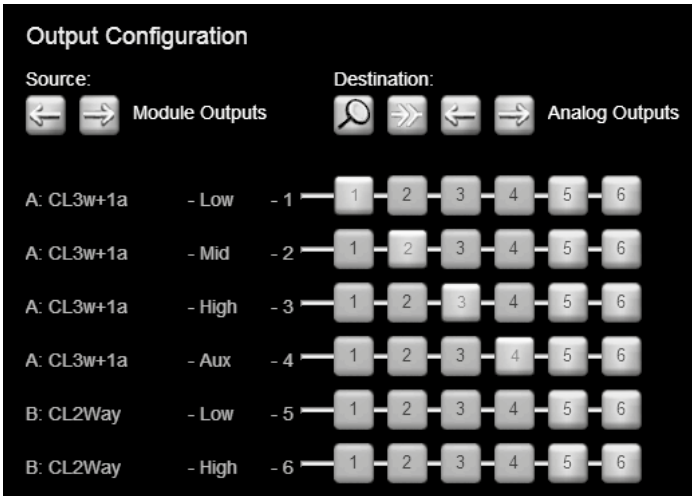


Figure 6.1: Classic 3+1 Analog Output Configuration

28. If the output assignments are not as shown, tap the Clear All Assignments button (split arrows); tap YES to the warning dialog box; then tap the numeric buttons correctly route the audio to the appropriate physical output/s.

29. Tap the return key to close this screen and return to I/O CONFIG.

30. The following settings on the left-side of the I/O CONFIG screen should be correct by default; if they are incorrect, please refer to the LAKE Controller Operation Manual for further details.

- PRIMARY DIGITAL CLOCK:
  Internal – 96 kHz

- SRC CLOCK:
  Internal – 88.2 kHz

- INPUT CONFIGURATION:
  #1: Auto Type: Analog Offset/Headroom: 26 dBu
  #2: Auto Type: Analog Offset/Headroom: 26 dBu

- DANTE CONFIGURATION:
  Dante Disabled

- ANALOG ISO-FLOAT & AES TERMINATION:
  Inputs 1-2: Floating Outputs 1-6: Floating AES: Terminated

31. Tap the INPUT GAIN block on the interactive block diagram for Module A. The LEVELS screen displaying the gain parameters for Module A will be displayed. This screen can also be accessed by returning to HOME and tapping the Module icon.

32. There are five gain faders displayed (1 Module Input, 4 Module Outputs). Set the values by dragging the fader, or by tapping the blue highlighted values at the top of the screen:

- INPUT: -0.00 dB
- LOW-1: -3.00 dB
- MID-2: -6.00 dB
- HIGH-3: -12.00 dB
- AUX-4: 0.00 dB

33. Tap the EQ tab at the top-left of the screen, then tap the XOVER tab. This screen shows the frequency split settings for the 3-way crossover and can be adjusted according to manufacturer specifications or by measurement and manual tuning as required. Please refer to the LAKE Controller Operation Manual for detailed information on the XOVER screen.

34. Tap the AUX-4 tab to show the HPF/LPF and EQ settings for the Subwoofer channel. Please refer to the LAKE Controller Operation Manual for detailed information on the AUX screen.

35. Navigate to the LEVELS page by tapping the LEVELS tab at the top left of the screen.

36. Unmute the Module Input by tapping the red MUTED button; the button turns blue and reads UNMUTED.

37. Turn on the amplifiers / powered speakers and turn up the volume as required.

38. Start playback of audio through the mixing console and gradually increase the volume of the MAIN and SUBWOOFER channels from the mixing console.

39. Use the powerful XOVER, AUX, PEQ and GEQ screens to tune your loudspeaker as required. Please refer to the LAKE Controller Operation Manual for detailed information on these features.

6.5. Gain Structure

The LM Series architecture provides gain adjustments at various points in the signal path and therefore, various places for muting and level adjustment. Each mute or gain adjustment point serves a different purpose.

Detailed information on signal flow and gain structure is available in the LM Series Operation Manual. The signal flow diagrams show in chapter 5 are useful signal path references, and the following sections describe the various adjustment points, all of which are available via the LAKE Controller software.

6.5.1. Input Headroom (Analog Inputs Only)

This parameter should be set relevant to the output level of the analog audio source (e.g. mixing console). This setting does not affect the other gain stages, or the overall noise floor; it allows control of the appropriate headroom at the input stage only.

6.5.2. Input Mixer

Input Mixer gains can remain at 0.00 dB for most configurations; if only one input channel is used per Module, the other can be set to -INF.

6.5.3. Module Input Gain

Input Gain is used to adjust the level between different speaker cabinets in the system. This gain can remain at 0.00 dB unless a lower level is required for the cabinet/s driven by this Module.



NOTE: Module Input Gain is not applicable for LM Series devices configured in Mesa Mode.

6.5.4. Module Output Gain (Levels)

Factory and User Gain are provided for each Module output. These two stages provide a level of security and control for the system designer (Factory) and a further level of adjustment for the user (User), both of which combine to balance the level between frequency bands in a multi-way crossover.

Generally, output gain values are configured within a Module / loudspeaker preset file and should not need to be adjusted further.

6.6. Gain / Level Optimization

6.6.1. Maximize Volume Capability

To maximize the volume capability of the device, ensure there is sufficient headroom in the signal path to avoid clipping before the limiters engage. It must be possible to achieve enough gain through the device to engage the limiters and realize a high average SPL. As an optimal setting, allow for a headroom of 10 dB or more for all channels; the simplest way to accomplish this is to increase the Module input gain.

6.6.2. Minimize Noise

To help provide the best volume to noise ratio, use an AES or Dante digital input signal wherever possible. If using analog inputs, ensure that unused or unnecessarily high headroom is not introduced at the input to the device. If full or high average power is not required, the Module input gain may be reduced.

7. LM 26 Technical Specifications

Lake features	
Module configuration	2 Contour Modules 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	Raised Cosine Mesa and Ideal Graphic input equalizers
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,
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) 1.039 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	2 inputs, 6 outputs
Frequency Response, analog-to-digital	+/-0.1 dB, 20 Hz to 20 kHz
Frequency Response, digital-to-analog	+/-0.03 dB, 20 Hz to 20 kHz
THD+Noise, Inputs	0.00024% at 1 kHz
THD+Noise, Outputs	0.00037% 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 or 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	4 inputs, 8 outputs
Supported sample rates	44.1, 48, 88.2, 96, 176.4, 192 kHz
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, 96 kHz
Support redundant paths	Yes
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	2 + 6 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, PSE (Japan) and RCM (AUS/NZ)
Warranty	3 years, components and factory workmanship; see full warranty statement

Specifications subject to change without notice

8. LM 44 Technical Specifications

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, PSE (Japan) and RCM (AUS/NZ)
Warranty	3 years, components and factory workmanship; see full warranty statement

Specifications subject to change without notice

9. Warranty and support

9.1. General

This product is manufactured by LAKE, and it is warranted to be free from any defects caused by components or factory workmanship, under normal use and service, for a period of three (3) years from date of purchase from an authorized LAKE dealer.

If the product fails to perform as specified during the warranty period, LAKE will undertake to repair, or at its option, replace this product at no charge to its owner, provided the unit is returned undamaged, shipping prepaid, to an authorized service facility or to the factory.

This warranty shall be null and void if the product is subjected to: repair work or alteration by a person other than those authorized by us; mechanical damage including shipping accidents; war, civil insurrection, misuse, abuse, operation with incorrect AC voltage; incorrect connections or accessories; operation with faulty associated equipment; or exposure to inclement weather conditions. Damage due to normal wear and tear is not covered by the warranty. Units on which the serial number has been removed or defaced will not be eligible for warranty service.

LAKE shall not be responsible for any incidental or consequential damages. LAKE's responsibility is limited to the product itself. LAKE takes no responsibility for any loss due to cancellation of any events, or rent of replacement equipment or costs due to a third party's or customer's loss of profit, or any other indirect cost or losses however incurred.

LAKE reserves the right to make changes or improvements in design or manufacturing without assuming any obligation to change or improve products previously manufactured.

This warranty is exclusive, and no other warranty is expressed or implied. This warranty does not affect the customer's statutory rights.

International Warranties
Please contact your supplier or distributor for this information, as rights and disclaimers may vary from country to country.

9.2. Technical assistance and service

9.2.1. International service

If your LAKE product requires repair, contact your LAKE dealer or distributor, or contact LAB GRUPPEN by fax or email to obtain the location of the nearest authorized service centre.

9.2.2. Factory service

In the event a LAKE product requires factory service, you may contact LAKE's service department for return instructions and a Return Authorization number.

Please note for product return:
1. Use the original packing.
2. Include a copy of the sales receipt, your name, return address, phone and fax number, email address and description of the defect.
3. Mark the Return Authorization number on the outside of the packing.

Ship the product prepaid to:

Music Group Innovation Sweden AB
Faktorvägen 1
SE-434 37 Kungsbacka
Sweden
Phone: +46 300 56 28 00
Fax: +46 300 56 28 99

support.empowertribe.com
labgruppen.com/lake-processing

labgruppen.com/lake-processing

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Item no. QSG-LM