User Manual

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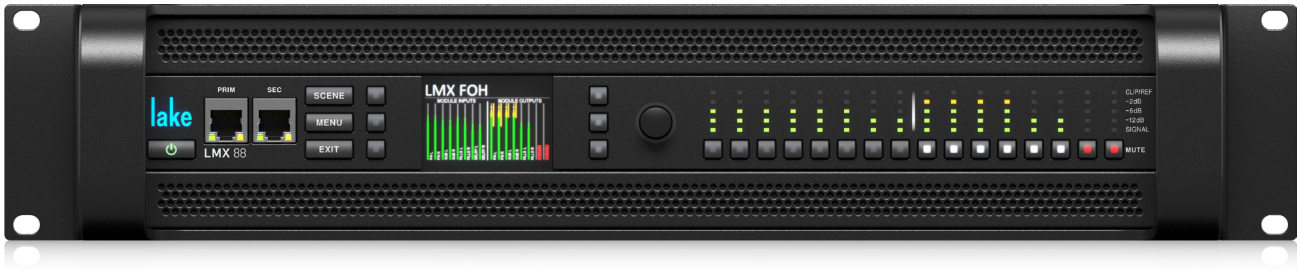

LMX 88/LMX 48

Audio System Processor for System Control in High-Performance Applications

LAB.GRUPPEN

lake

V 1.0

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EN Important Safety Instructions

CAUTION
RISK OF ELECTRIC SHOCK!
DO NOT OPEN!
ATTENTION
RISQUE D'ÉLECTROCUTION !
NE PAS OUVRIR !

Terminals marked with this symbol carry electrical current of sufficient magnitude to constitute risk of electric shock. Use only high-quality professional speaker cables with ¼" TS or twist-locking plugs pre-installed. All other installation or modification should be performed only by qualified personnel.

This symbol, wherever it appears, alerts you to the presence of uninsulated dangerous voltage inside the enclosure - voltage that may be sufficient to constitute a risk of shock.

This symbol, wherever it appears, alerts you to important operating and maintenance instructions in the accompanying literature. Please read the manual.

Caution
To reduce the risk of electric shock, do not remove the top cover (or the rear section). No user serviceable parts inside. Refer servicing to qualified personnel.

Caution
To reduce the risk of fire or electric shock, do not expose this appliance to rain and moisture. The apparatus shall not be exposed to dripping or splashing liquids and no objects filled with liquids, such as vases, shall be placed on the apparatus.

Caution
These service instructions are for use by qualified service personnel only. To reduce the risk of electric shock do not perform any servicing other than that contained in the operation instructions. Repairs have to be performed by qualified service personnel.

Warning
Please refer to the information on the exterior of bottom enclosure for electrical and safety information before installing or operating the device.

1. Please read and follow all instructions and warnings.

2. Keep the apparatus away from water (except for outdoor products).

3. Clean only with dry cloth.

4. Do not block ventilation openings. Do not install in a confined space. Install only according to manufacturer's instructions.

5. Protect the power cord from damage, particularly at plugs and appliance socket.

6. Do not install near any heat sources such as radiators, heat registers, stoves or other apparatus (including amplifiers) that produce heat.

7. 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 (only for USA and Canada). A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

8. Protect the power cord from damage, particularly at plugs and appliance socket.

9. Use only attachments and accessories recommended by the manufacturer.

10. Use only specified carts, stands, tripods, brackets, or tables. Use caution to prevent tip-over when moving the cart/ apparatus combination.

11. Unplug during storms, or if not in use for a long period.

12. Only use qualified personnel for servicing, especially after damage.

13. The apparatus with protective earthing terminal shall be connected to a MAINS socket outlet with a protective earthing connection.

14. Where the MAINS plug or an appliance coupler is used as the disconnect device, the disconnect device shall remain readily operable.

15. Avoid installing in confined spaces like bookcases.

16. Do not place naked flame sources, such as lighted candles, on the apparatus.

17. Operating temperature range 5° to 45°C (41° to 113°F).

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ES Instrucciones de seguridad

CAUTION
RISK OF ELECTRIC SHOCK!
DO NOT OPEN!
ATTENTION
RISQUE D'ÉLECTROCUTION !
NE PAS OUVRIR !

Las terminales marcadas con este símbolo transportan corriente eléctrica de magnitud suficiente como para constituir un riesgo de descarga eléctrica. Utilice solo cables de altavoz profesionales y de alta calidad con conectores TS de 6,3 mm o de bayoneta prefijados. Cualquier otra instalación o modificación debe ser realizada únicamente por un técnico cualificado.

Este símbolo, siempre que aparece, le advierte de la presencia de voltaje peligroso sin aislar dentro de la caja; este voltaje puede ser suficiente para constituir un riesgo de descarga.

Este símbolo, siempre que aparece, le advierte sobre instrucciones operativas y de mantenimiento que aparecen en la documentación adjunta. Por favor, lea el manual.

Atención
Para reducir el riesgo de descarga eléctrica, no quite la tapa (o la parte posterior). No hay piezas en el interior del equipo que puedan ser reparadas por el usuario. Si es necesario, póngase en contacto con personal cualificado.

Atención
Para reducir el riesgo de incendio o descarga eléctrica, no exponga este aparato a la lluvia, humedad o alguna otra fuente que pueda salpicar o derramar algún líquido sobre el aparato. No coloque ningún tipo de recipiente para líquidos sobre el aparato.

Atención
Las instrucciones de servicio deben llevarlas a cabo exclusivamente personal cualificado. Para evitar el riesgo de una descarga eléctrica, no realice reparaciones que no se encuentren descritas en el manual de operaciones. Las reparaciones deben ser realizadas exclusivamente por personal cualificado.

Advertencia
Consulte la información en el exterior del recinto inferior para obtener información eléctrica y de seguridad antes de instalar u operar el dispositivo.

1. Por favor, lea y siga todas las instrucciones y advertencias.

2. Mantenga el aparato alejado del agua (excepto para productos diseñados para uso en exteriores).

3. Limpie solo con un paño seco.

4. No obstruya las aberturas de ventilación. No instale en un espacio confinado. Instale solo de acuerdo con las instrucciones del fabricante.

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5. Proteja el cable de alimentación contra daños, especialmente en los enchufes y en el tomacorriente del aparato.

6. No lo instale cerca de fuentes de calor como radiadores, rejillas de calefacción, estufas u otros aparatos (incluyendo amplificadores) que generen calor.

7. No anule el propósito de seguridad del enchufe polarizado o del tipo con toma de tierra. Un enchufe polarizado tiene dos clavijas, una más ancha que la otra (solo para EE. UU. y Canadá). Un enchufe con toma de tierra tiene dos clavijas y una tercera clavija de toma de tierra. La clavija ancha o la tercera clavija se proporcionan para su seguridad. Si el enchufe suministrado no encaja en su toma de corriente, consulte a un electricista para reemplazar la toma obsoleta.

8. Proteja el cable de alimentación contra daños, especialmente en los enchufes y en el tomacorriente del aparato.

9. Utilice solo accesorios y accesorios recomendados por el fabricante.

10. Utilice solo carritos, soportes, trípodes, soportes o mesas especificados. Tenga cuidado para evitar que el carro/ combinación de aparatos se vuelque al moverlo.

11. Desenchufe durante tormentas o si no se utiliza durante un largo período.

12. Solo utilice personal cualificado para el servicio, especialmente después de daños.

13. El aparato con terminal de puesta a tierra protectora debe conectarse a un tomacorriente de red con una conexión de puesta a tierra protectora.

14. Cuando se utilice el enchufe de red o un acoplador de aparatos como dispositivo de desconexión, el dispositivo de desconexión debe seguir siendo fácilmente operable.

15. Evite la instalación en espacios confinados como estanterías.

16. No coloque fuentes de llama desnuda, como velas encendidas, en el aparato.

17. Rango de temperatura de funcionamiento de 5° a 45°C (41° a 113°F).

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FR Consignes de sécurité

Les points repérés par ce symbole portent une tension électrique suffisante pour constituer un risque d'électrocution. Utilisez uniquement des câbles d'enceintes professionnels de haute qualité avec fiches Jack mono 6,35 mm ou fiches à verrouillages déjà installées. Toute autre installation ou modification doit être effectuée uniquement par un personnel qualifié.

Ce symbole avertit de la présence d'une tension dangereuse et non isolée à l'intérieur de l'appareil - elle peut provoquer des chocs électriques.

Ce symbol signale les consignes d'utilisation et d'entretien importantes dans la documentation fournie. Lisez les consignes de sécurité du manuel d'utilisation de l'appareil.

Attention
Pour éviter tout risque de choc électrique, ne pas ouvrir le capot de l'appareil ni démonter le panneau arrière. L'intérieur de l'appareil ne possède aucun élément réparable par l'utilisateur. Laisser toute réparation à un professionnel qualifié.

Attention
Pour réduire les risques de feu et de choc électrique, n'exposez pas cet appareil à la pluie, à la moisissure, aux gouttes ou aux éclaboussures. Ne posez pas de récipient contenant un liquide sur l'appareil (un vase par exemple).

Attention
Ces consignes de sécurité et d'entretien sont destinées à un personnel qualifié. Pour éviter tout risque de choc électrique, n'effectuez aucune réparation sur l'appareil qui ne soit décrite par le manuel d'utilisation. Les éventuelles réparations doivent être effectuées uniquement par un technicien spécialisé.

Avertissement
Veuillez vous référer aux informations situées à l'extérieur du boîtier inférieur pour obtenir les renseignements électriques et de sécurité avant d'installer ou d'utiliser l'appareil.

1. Veuillez lire et suivre toutes les instructions et avertissements.

2. Éloignez l'appareil de l'eau (sauf pour les produits conçus pour une utilisation en extérieur).

3. Nettoyez uniquement avec un chiffon sec.

4. Ne bloquez pas les ouvertures de ventilation. N'installez pas dans un espace confiné. Installez uniquement selon les instructions du fabricant.

5. Protégez le cordon d'alimentation contre les dommages, en particulier au niveau des fiches et de la prise de l'appareil.

6. N'installez pas près de sources de chaleur telles que radiateurs, registres de chaleur, cuisinières ou autres appareils (y compris les amplificateurs) qui produisent de la chaleur.

7. Ne contrecarrez pas le but de sécurité de la fiche polarisée ou de type mise à la terre. Une fiche polarisée a deux lames, l'une plus large que l'autre (uniquement pour les États-Unis et le Canada). Une fiche de type mise à la terre a deux lames et une troisième broche de mise à la terre. La lame large ou la troisième broche sont fournies pour votre sécurité. Si la fiche fournie ne s'adapte pas à votre prise, consultez un électricien pour remplacer la prise obsolète.

8. Protégez le cordon d'alimentation contre les dommages, en particulier au niveau des fiches et de la prise de l'appareil.

9. Utilisez uniquement des accessoires et des pièces recommandés par le fabricant.

10. Utilisez uniquement des chariots, des supports, des trépieds, des supports ou des tables spécifiés. Faites attention pour éviter le renversement lors du déplacement de la combinaison chariot/appareil.

11. Débranchez pendant les tempêtes ou si l'appareil n'est pas utilisé pendant une longue période.

12. Utilisez uniquement du personnel qualifié pour l'entretien, surtout après des dommages.

13. L'appareil avec une borne de mise à la terre protectrice doit être connecté à une prise secteur avec une connexion de mise à la terre protectrice.

14. Lorsque la fiche secteur ou un coupleur d'appareil est utilisé comme dispositif de déconnexion, le dispositif de déconnexion doit rester facilement utilisable.

15. Évitez l'installation dans des espaces confinés comme des bibliothèques.

16. Ne placez pas de sources de flamme nue, telles que des bougies allumées, sur l'appareil.

17. Plage de température de fonctionnement de 5° à 45°C (41° à 113°F).

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DE Wichtige Sicherheitshinweise

CAUTION
RISK OF ELECTRIC SHOCK!
DO NOT OPEN!
ATTENTION
RISQUE D'ÉLECTROCUTION !
NE PAS OUVRIR !

Die mit dem Symbol markierten Anschlüsse führen so viel Spannung, dass die Gefahr eines Stromschlags besteht. Verwenden Sie nur hochwertige, professionelle Lautsprecherkabel mit vorinstallierten 6,35 mm MONO-Klinkensteckern oder Lautsprecherstecker mit Drehverriegelung. Alle anderen Installationen oder Modifikationen sollten nur von qualifiziertem Fachpersonal ausgeführt werden.

Dieses Symbol weist Sie immer dann darauf hin, wenn es erscheint, dass im Inneren des Gehäuses gefährliche unisolierte Spannung vorhanden ist – eine Spannung, die ausreichend sein kann, um ein Stromschlagrisiko darzustellen.

Dieses Symbol weist Sie an jeder Stelle, an der es erscheint, auf wichtige Betriebs- und Wartungsanweisungen in der beiliegenden Literatur hin. Bitte lesen Sie die Bedienungsanleitung.

Vorsicht
Um eine Gefährdung durch Stromschlag auszuschließen, darf die Geräteabdeckung bzw. Geräterückwand nicht abgenommen werden. Im Innern des Geräts befinden sich keine vom Benutzer reparierbaren Teile. Reparaturarbeiten dürfen nur von qualifiziertem Personal ausgeführt werden.

Vorsicht
Um eine Gefährdung durch Feuer bzw. Stromschlag auszuschließen, darf dieses Gerät weder Regen oder Feuchtigkeit ausgesetzt werden noch sollten Spritzwasser oder tropfende Flüssigkeiten in das Gerät gelangen können. Stellen Sie keine mit Flüssigkeit gefüllten Gegenstände, wie z.B. Vasen, auf das Gerät.

Vorsicht
Die Service-Hinweise sind nur durch qualifiziertes Personal zu befolgen. Um eine Gefährdung durch Stromschlag zu vermeiden, führen Sie bitte keinerlei Reparaturen an dem Gerät durch, die nicht in der Bedienungsanleitung beschrieben sind. Reparaturen sind nur von qualifiziertem Fachpersonal durchzuführen.

Warnung
Bitte beachten Sie die Informationen auf der Außenseite der unteren Abdeckung bezüglich elektrischer und sicherheitstechnischer Hinweise, bevor Sie das Gerät installieren oder in Betrieb nehmen.

1. Bitte lesen Sie alle Anweisungen und Warnhinweise sorgfältig durch und befolgen Sie diese.

2. Halten Sie das Gerät von Wasser fern (außer bei Produkten für den Außenbereich).

3. Reinigen Sie nur mit einem trockenen Tuch.

4. Blockieren Sie nicht die Belüftungsöffnungen. Installieren Sie das Gerät nicht in einem engen Raum und nur gemäß den Anweisungen des Herstellers.

5. Schützen Sie das Netzkabel vor Beschädigungen, insbesondere an Steckern und Gerätebuchsen.

6. Installieren Sie das Gerät nicht in der Nähe von Wärmequellen wie Heizkörpern, Heizregistern, Öfen oder anderen Geräten (einschließlich Verstärkern), die Wärme erzeugen.

7. Heben Sie nicht den Sicherheitszweck des polarisierten oder geerdeten Steckers auf. Ein polarisierter Stecker hat zwei Klingen, von denen eine breiter ist als die andere (nur für USA und Kanada). Ein geerdeter Stecker hat zwei Klingen und einen dritten Erdungszapfen. Die breite Klinge oder der dritte Zapfen dienen Ihrer Sicherheit. Wenn der mitgelieferte Stecker nicht in Ihre Steckdose passt, konsultieren Sie einen Elektriker, um die veraltete Steckdose zu ersetzen.

8. Schützen Sie das Netzkabel vor Beschädigungen, insbesondere an Steckern und Gerätebuchsen.

9. Verwenden Sie nur vom Hersteller empfohlene Anbaugeräte und Zubehörteile.

10. Verwenden Sie nur spezifizierte Wagen, Ständer, Stative, Halterungen oder Tische. Achten Sie darauf, dass der Wagen/Geräte-Kombination beim Bewegen nicht umkippt.

11. Ziehen Sie bei Gewittern oder bei längerer Nichtbenutzung den Stecker.

12. Lassen Sie nur qualifiziertes Personal für Wartungsarbeiten arbeiten, besonders nach Beschädigungen.

13. Das Gerät mit schützendem Erdungsterminal muss an eine Steckdose mit schützender Erdungsverbindung angeschlossen werden.

14. Wenn der Netzstecker oder ein Gerätekuppler als Trennvorrichtung verwendet wird, muss die Trennvorrichtung leicht bedienbar bleiben.

15. Vermeiden Sie die Installation in engen Räumen wie Bücherregalen.

16. Platzieren Sie keine offenen Flammenquellen, wie brennende Kerzen, auf dem Gerät.

17. Betriebstemperaturbereich von 5° bis 45°C (41° bis 113°F).

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PT Instruções de Segurança Importantes

CAUTION
RISK OF ELECTRIC SHOCK!
DO NOT OPEN!
ATTENTION
RISQUE D'ÉLECTROCUTION !
NE PAS OUVRIR !

Terminais marcados com o símbolo carregam corrente elétrica de magnitude suficiente para constituir um risco de choque elétrico. Use apenas cabos de alto-falantes de alta qualidade com plugues TS de ¼" ou plugues com trava de torção pré-instalados. Todas as outras instalações e modificações devem ser efetuadas por pessoas qualificadas.

Este símbolo, onde quer que apareça, alerta para a presença de tensão perigosa não isolada dentro do invólucro - uma tensão que pode ser suficiente para constituir um risco de choque.

Este símbolo, onde quer que o encontre, alerta-o para a leitura das instruções de manuseamento que acompanham o equipamento. Por favor leia o manual de instruções.

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Atenção
De forma a diminuir o risco de choque eléctrico, não remover a cobertura (ou a secção de trás). Não existem peças substituíveis por parte do utilizador no seu interior. Para esse efeito recorrer a um técnico qualificado.

Atenção
Para reduzir o risco de incêndios ou choques eléctricos o aparelho não deve ser exposto à chuva nem à humidade. Além disso, não deve ser sujeito a salpicos, nem devem ser colocados em cima do aparelho objectos contendo líquidos, tais como jarras.

Atenção
Estas instruções de operação devem ser utilizadas, em exclusivo, por técnicos de assistência qualificados. Para evitar choques eléctricos não proceda a reparações ou intervenções, que não as indicadas nas instruções de operação, salvo se possuir as qualifi-cações necessárias. Para evitar choques eléctricos não proceda a reparações ou intervenções, que não as indicadas nas instruções de operação. Só o deverá fazer se possuir as qualificações necessárias.

Aviso
Consulte as informações na parte externa do invólucro inferior para obter informações elétricas e de segurança antes de instalar ou operar o dispositivo.

1. Por favor, leia e siga todas as instruções e advertências.

2. Mantenha o aparelho longe da água (exceto para produtos destinados a uso externo).

3. Limpe apenas com um pano seco.

4. Não obstrua as aberturas de ventilação. Não instale em espaços confinados. Instale apenas de acordo com as instruções do fabricante.

5. Proteja o cabo de alimentação contra danos, especialmente nos plugs e na tomada do aparelho.

6. Não instale próximo a fontes de calor, como radiadores, registros de calor, fogões ou outros aparelhos (incluindo amplificadores) que produzam calor.

7. Não desfaça a finalidade de segurança da tomada polarizada ou do tipo com aterramento. Uma tomada polarizada possui duas lâminas, sendo uma mais larga que a outra (apenas para EUA e Canadá). Uma tomada com aterramento possui duas lâminas e uma terceira ponta de aterramento. A lâmina larga ou a terceira ponta são fornecidas para sua segurança. Se o plug fornecido não se encaixar na sua tomada, consulte um eletricista para substituir a tomada obsoleta.

8. Proteja o cabo de alimentação contra danos, especialmente nos plugs e na tomada do aparelho.

9. Use apenas acessórios e equipamentos recomendados pelo fabricante.

10. Use apenas carrinhos, suportes, tripés, suportes ou mesas especificados. Tenha cuidado para evitar tombamentos ao mover a combinação carrinho/aparelho.

11. Desconecte durante tempestades ou se não estiver em uso por um longo período.

12. Use apenas pessoal qualificado para serviços, especialmente após danos.

13. O aparelho com terminal de aterramento protetor deve ser conectado a uma tomada de corrente com conexão de aterramento protetor.

14. Quando o plugue de corrente ou um acoplador de aparelho é usado como dispositivo de desconexão, o dispositivo de desconexão deve permanecer prontamente operável.

15. Evite instalar em espaços confinados, como estantes.

16. Não coloque fontes de chama nua, como velas acesas, no aparelho.

17. Faixa de temperatura de operação de 5° a 45°C (41° a 113°F).

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Para obter os termos de garantia aplicáveis e condições e informações adicionais a respeito da garantia limitada do Music Tribe, favor verificar detalhes na íntegra através do website community.musictribe.com/support.

IT Informazioni importanti

I terminali contrassegnati da questo simbolo conducono una corrente elettrica di magnitudine sufficiente a costituire un rischio di scossa elettrica. Utilizzare solo cavi per altoparlanti professionali di alta qualità con jack sbilanciati da 6,35mm. o connettori con blocco a rotazione. Tutte le altre installazioni o modifiche devono essere eseguite esclusivamente da personale qualificato.

Questo simbolo, ovunque appaia, avverte della presenza di una tensione pericolosa non isolata all'interno dello chassis, tensione che può essere sufficiente per costituire un rischio di scossa elettrica.

Questo simbolo, ovunque appaia, segnala importanti istruzioni operative e di manutenzione nella documentazione allegata. Si invita a leggere il manuale.

Attenzione
Per ridurre il rischio di scosse elettriche, non rimuovere il coperchio superiore (o la sezione posteriore). All'interno non ci sono parti riparabili dall'utente. Per la manutenzione rivolgersi a personale qualificato.

Attenzione
Per ridurre il rischio di incendi o scosse elettriche, non esporre questo apparecchio a pioggia e umidità. L'apparecchio non deve essere esposto a gocciolio o schizzi di liquidi e nessun oggetto contenente liquidi, come vasi, deve essere collocato sull'apparecchio.

Attenzione
Queste istruzioni di servizio sono destinate esclusivamente a personale qualificato. Per ridurre il rischio di scosse elettriche non eseguire interventi di manutenzione diversi da quelli contenuti nel manuale di istruzioni. Le riparazioni devono essere eseguite da personale di assistenza qualificato.

Avvertimento
Consultare le informazioni sulla parte esterna dell'involucro inferiore per ottenere informazioni elettriche e di sicurezza prima di installare o utilizzare il dispositivo.

1. Si prega di leggere e seguire tutte le istruzioni e gli avvertimenti.

2. Mantenere l'apparecchio lontano dall'acqua (tranne che per i prodotti destinati all'uso all'aperto).

3. Pulire solo con un panno asciutto.

4. Non ostruire le aperture di ventilazione. Non installare in spazi ristretti. Installare solo secondo le istruzioni del produttore.

5. Proteggere il cavo di alimentazione dai danni, soprattutto alle spine e alla presa dell'elettrodomestico.

6. Non installare vicino a fonti di calore come termosifoni, bocchette di calore, fornelli o altri apparecchi (compresi gli amplificatori) che producono calore.

7. Non eludere lo scopo di sicurezza della spina polarizzata o della spina con messa a terra. Una spina polarizzata ha due lame di cui una più larga dell'altra (solo per USA e Canada). Una spina con messa a terra ha due lame e una terza spina di messa a terra. La lama larga o la terza spina sono fornite per la vostra sicurezza. Se la spina fornita non si adatta alla vostra presa, consultare un elettricista per la sostituzione della presa obsoleta.

8. Proteggere il cavo di alimentazione dai danni, soprattutto alle spine e alla presa dell'elettrodomestico.

9. Utilizzare solo accessori e attrezzature raccomandati dal produttore.

10. Utilizzare solo carrelli, supporti, treppiedi, staffe o tavoli specificati. Prestare attenzione per evitare il ribaltamento durante lo spostamento della combinazione carrello/apparecchio.

11. Scollegare durante le tempeste o se non viene utilizzato per un lungo periodo.

12. Utilizzare solo personale qualificato per la manutenzione, specialmente dopo danni.

13. L'apparecchio con terminale di messa a terra protettiva deve essere collegato a una presa di corrente con connessione di messa a terra protettiva.

14. Se la spina di rete o un accoppiatore dell'elettrodomestico viene utilizzato come dispositivo di disconnessione, il dispositivo di disconnessione deve rimanere facilmente utilizzabile.

15. Evitare l'installazione in spazi ristretti come librerie.

16. Non posizionare fonti di fiamma nuda, come candele accese, sull'apparecchio.

17. Intervallo di temperatura di funzionamento da 5° a 45°C (da 41° a 113°F).

DISCLAIMER LEGALE

Music Tribe non si assume alcuna responsabilità per eventuali danni che possono essere subiti da chiunque si affidi in tutto o in parte a qualsiasi descrizione, fotografia o dichiarazione contenuta qui. Specifiche tecniche, aspetti e altre informazioni sono soggette a modifiche senza preavviso. Tutti i marchi sono di proprietà dei rispettivi titolari. Midas, Klark Teknik, Lab Gruppen, Lake, Tannoy, Turbosound, TC Electronic, TC Helicon, Behringer, Bugera, Aston Microphones e Coolaudio sono marchi o marchi registrati di Music Tribe Global Brands Ltd. © Music Tribe Global Brands Ltd. 2024 Tutti i diritti riservati.

GARANZIA LIMITATA

Per i termini e le condizioni di garanzia applicabili e le informazioni aggiuntive relative alla garanzia limitata di Music Tribe, consultare online i dettagli completi su community.musictribe.com/support.

NL Belangrijke veiligheidsvoorschriften

Aansluitingen die gemerkt zijn met het symbool voeren een zodanig hoge spanning dat ze een risico vormen voor elektrische schokken. Gebruik uitsluitend kwalitatief hoogwaardige, in de handel verkrijgbare luidsprekerkabels die voorzien zijn van ¼" TS stekkers. Laat uitsluitend gekwalificeerd personeel alle overige installatie- of modificatiehandelingen uitvoeren.

Dit symbool waarschuwt u, waar het ook verschijnt, voor de aanwezigheid van ongeïsoleerde gevaarlijke spanning binnenin de behuizing - spanning die voldoende kan zijn om een risico op elektrische schokken te vormen.

Dit symbool wijst u altijd op belangrijke bedienings - en onderhoudsvoorschriften in de bijbehorende documenten. Wij vragen u dringend de handleiding te lezen.

Attentie
Verwijder in geen geval de bovenste afdekking (van het achterste gedeelte) anders bestaat er gevaar voor een elektrische schok. Het apparaat bevat geen te onderhouden onderdelen. Reparatiewerkzaamheden mogen uitsluitend door gekwalificeerd personeel uitgevoerd worden.

Attentie
Om het risico op brand of elektrische schokken te beperken, dient u te voorkomen dat dit apparaat wordt blootgesteld aan regen en vocht. Het apparaat mag niet worden blootgesteld aan neerdruppelend of opspattend water en er mogen geen met water gevulde voorwerpen – zoals een vaas – op het apparaat worden gezet.

Attentie
Deze onderhoudsinstructies zijn uitsluitend bedoeld voor gekwalificeerd onderhoudspersoneel. Om elektrische schokken te voorkomen, mag u geen andere onderhoudshandelingen verrichten dan in de bedieningsinstructies vermeld staan. Reparatiewerkzaamheden mogen alleen uitgevoerd worden door gekwalificeerd onderhoudspersoneel.

Waarschuwing
Raadpleeg de informatie op de buitenkant van de onderste behuizing voor elektrische en veiligheidsinformatie voordat u het apparaat installeert of bedient.

1. Gelieve alle instructies en waarschuwingen zorgvuldig te lezen en op te volgen.

2. Houd het apparaat uit de buurt van water (behalve voor producten bedoeld voor gebruik buitenshuis).

3. Reinig alleen met een droge doek.

4. Blokkeer de ventilatieopeningen niet. Installeer niet in een afgesloten ruimte. Installeer alleen volgens de instructies van de fabrikant.

5. Bescherm de voedingskabel tegen schade, vooral bij stekkers en het stopcontact van het apparaat.

6. Installeer niet in de buurt van warmtebronnen zoals radiatoren, warmte registers, fornuizen of andere apparaten (inclusief versterkers) die warmte produceren.

7. Hef het veiligheidsdoel van de gepolariseerde of geaarde stekker niet op. Een gepolariseerde stekker heeft twee pennen waarvan één breder is dan de andere (alleen voor de VS en Canada). Een geaarde stekker heeft twee pennen en een derde aardingspen. De brede pen of de derde pen zijn voor uw veiligheid. Als de meegeleverde stekker niet in uw stopcontact past, raadpleeg dan een elektricien om het verouderde stopcontact te vervangen.

8. Bescherm de voedingskabel tegen schade, vooral bij stekkers en het stopcontact van het apparaat.

9. Gebruik alleen accessoires en apparatuur die door de fabrikant worden aanbevolen.

10. Gebruik alleen gespecificeerde karren, stands, statieven, beugels of tafels. Wees voorzichtig om kantelen te voorkomen bij het verplaatsen van de kar/apparaatcombinatie.

11. Trek de stekker uit tijdens stormen of als het apparaat gedurende lange tijd niet wordt gebruikt.

12. Gebruik alleen gekwalificeerd personeel voor onderhoud, vooral na schade.

13. Het apparaat met een beschermende aardingsaansluiting moet worden aangesloten op een stopcontact met een beschermende aardingsverbinding.

14. Als de stekker van het stopcontact of een apparaatkoppeling als het ontkoppelingsapparaat wordt gebruikt, moet het ontkoppelingsapparaat gemakkelijk bedienbaar blijven.

15. Vermijd installatie in afgesloten ruimtes zoals boekenkasten.

16. Plaats geen open vlambronnen, zoals brandende kaarsen, op het apparaat.

17. Bedrijfstemperatuurbereik van 5° tot 45°C (41° tot 113°F).

WETTELIJKE ONTKENNING

Music Tribe aanvaardt geen aansprakelijkheid voor enig verlies dat kan worden geleden door een persoon die geheel of gedeeltelijk vertrouwt op enige beschrijving, foto of verklaring hierin. Technische specificaties, verschijningen en andere informatie kunnen zonder voorafgaande kennisgeving worden gewijzigd. Alle handelsmerken zijn eigendom van hun respectievelijke eigenaren. Midas, Klark Teknik, Lab Gruppen, Lake, Tannoy, Turbosound, TC Electronic, TC Helicon, Behringer, Bugera, Aston Microphones en Coolaudio zijn handelsmerken of gedeponeerde handelsmerken van Music Tribe Global Brands Ltd. © Music Tribe Global Brands Ltd. 2024 Alle rechten voorbehouden.

BEPERKTE GARANTIE

Voor de toepasselijke garantievoorwaarden en aanvullende informatie met betrekking tot de beperkte garantie van Music Tribe, zie de volledige details online op community.musictribe.com/support.

SE Viktiga säkerhetsanvisningar

CAUTION
RISK OF ELECTRIC SHOCK!
DO NOT OPEN!
ATTENTION
RISQUE D'ÉLECTROCUTION !
NE PAS OUVRIR !

Uttag markerade med symbolen leder elektrisk strömstyrka som är tillräckligt stark för att utgöra en risk för elchock. Använd endast högkvalitativa, kommersiellt tillgängliga högtalarkablar med förhandsinstallerade ¼" TS-kontakter. All annan installering eller modifikation bör endast utföras av kompetent personal.

Denna symbol, var den än förekommer, varnar för närvaron av farlig, oisolerad spänning inuti höljet - spänning som kan vara tillräcklig för att utgöra en risk för stöt.

Den här symbolen hänvisar till viktiga punkter om användning och underhåll i den medfölljande dokumentationen. Var vänlig och läs bruksanvisningen.

Försiktighet
Minska risken för elektriska stötar genom att aldrig ta av höljet upptill på apparaten (eller ta av baksidan). Inuti apparaten finns det inga delar som kan repareras av användaren. Endast kvalificerad personal får genomföra reparationer.

Försiktighet
För att minska risken för brand och elektriska stötar ska apparaten skyddas mot regn och fukt. Apparaten går inte utsättas för dropp eller spill och inga vattenbehållare som vaser etc. får placeras på den.

Försiktighet
Serviceinstruktionen är enbart avsedd för kvalificerad servicepersonal. För att undvika risker genom elektriska stötar, genomför inga reparationer på apparaten, vilka inte är beskrivna i bruksanvisningen. Endast kvalificerad fackpersonal får genomföra reparationerna.

Varning
Vänligen se informationen på utsidan av bottenhöljet för elektrisk och säkerhetsinformation innan du installerar eller använder enheten.

1. Vänligen läs och följ alla instruktioner och varningar noggrant.

2. Håll apparaten borta från vatten (utom för utomhusprodukter).

3. Rengör endast med en torr trasa.

4. Blockera inte ventilationsöppningarna. Installera inte i trånga utrymmen. Installera endast enligt tillverkarens anvisningar.

5. Skydda nätkabeln från skador, särskilt vid kontakter och apparatkontakten.

6. Installera inte nära värme källor som element, värmeregistrar, spisar eller andra apparater (inklusive förstärkare) som producerar värme.

7. Förstör inte säkerhetsfunktionen hos den polariserade eller jordade kontakten. En polariserad kontakt har två blad varav ett är bredare än det andra (endast för USA och Kanada). En jordad kontakt har två blad och en tredje jordningsstift. Det breda bladet eller det tredje stiftet är till för din säkerhet. Om den medföljande kontakten inte passar i ditt uttag, kontakta en elektriker för att byta ut det föråldrade uttaget.

8. Skydda nätkabeln från skador, särskilt vid kontakter och apparatkontakten.

9. Använd endast tillbehör och tillbehör som rekommenderas av tillverkaren.

10. Använd endast specificerade vagnar, ställ, stativ, fästen eller bord. Var försiktig för att förhindra vältningsrisk när du flyttar vagnen/apparatkombinationen.

11. Koppla ur under åskväder eller om enheten inte används under en längre tid.

12. Använd endast kvalificerad personal för service, särskilt efter skador.

13. Apparaten med skyddsjordanslutning ska anslutas till ett vägguttag med skyddsjordanslutning.

14. Om nätkontakten eller en apparatkoppling används som frånkopplingsanordning måste frånkopplingsanordningen vara lätt åtkomlig.

15. Undvik installation i trånga utrymmen som bokhyllor.

16. Placera inte öppna lågor, som tända ljus, på apparaten.

17. Driftstemperaturområde 5° till 45°C (41° till 113°F).

FRISKRIVNINGSKLAUSUL

Music Tribe tar inget ansvar för någon förlust som kan drabbas av någon person som helt eller delvis förlitar sig på någon beskrivning, fotografi eller uttalande som finns här. Tekniska specifikationer, utseenden och annan information kan ändras utan föregående meddelande. Alla varumärken tillhör respektive ägare. Midas, Klark Teknik, Lab Gruppen, Lake, Tannoy, Turbosound, TC Electronic, TC Helicon, Behringer, Bugera, Aston Microphones och Coolaudio är varumärken eller registrerade varumärken som tillhör Music Tribe Global Brands Ltd. © Music Tribe Global Brands Ltd. 2024 Alla Rättigheter reserverade.

BEGRÄNSAD GARANTI

För tillämpliga garantivillkor och ytterligare information om Music Tribes begränsade garanti, se fullständig information online på community.musictribe.com/support.

PL Ważne informacje o bezpieczeństwie

CAUTION
RISK OF ELECTRIC SHOCK!
DO NOT OPEN!
ATTENTION
RISQUE D'ÉLECTROCUTION !
NE PAS OUVRIR !

Terminale oznaczone symbolem przenoszą wystarczająco wysokie napięcie elektryczne, aby stworzyć ryzyko porażenia prądem. Używaj wyłącznie wysokiej jakości fabrycznie przygotowanych kabli z zainstalowanymi wtyczkami ¼" TS. Wszystkie inne instalacje lub modyfikacje powinny być wykonywane wyłącznie przez wykwalifikowany personel techniczny.

Ten symbol, gdziekolwiek się pojawi, informuje Cię o obecności nieizolowanego niebezpiecznego napięcia wewnątrz obudowy - napięcia, które może stanowić ryzyko porażenia.

Ten symbol informuje o ważnych wskazówkach dotyczących obsługi i konserwacji urządzenia w dołączonej dokumentacji. Proszę przeczytać stosowne informacje w instrukcji obsługi.

Uwaga
W celu wyeliminowania zagrożenia porażenia prądem zabrania się zdejmowania obudowy lub tylnej ścianki urządzenia. Elementy znajdujące się we wnętrzu urządzenia nie mogą być naprawiane przez użytkownika. Naprawy mogą być wykonywane jedynie przez wykwalifikowany personel.

Uwaga
W celu wyeliminowania zagrożenia porażenia prądem lub zapalenia się urządzenia nie wolno wystawiać go na działanie deszczu i wilgotności oraz dopuszczać do tego, aby do wnętrza dostała się woda lub inna ciecz. Nie należy stawiać na urządzeniu napełnionych cieczą przedmiotów takich jak np. wazony lub szklanki.

Uwaga
Prace serwisowe mogą być wykonywane jedynie przez wykwalifikowany personel. W celu uniknięcia zagrożenia porażenia prądem nie należy wykonywać żadnych manipulacji, które nie są opisane w instrukcji obsługi. Naprawy wykonywane mogą być jedynie przez wykwalifikowany personel techniczny.

Ostrzeżenie
Przed zainstalowaniem lub uruchomieniem urządzenia prosimy zajrzeć do informacji umieszczonej na zewnętrznej części dolnej obudowy dotyczącej informacji elektrycznych i bezpieczeństwa.

1. Proszę przeczytać i ścisłe przestrzegać wszystkich instrukcji i ostrzeżeń.

2. Trzymaj urządzenie z dala od wody (z wyjątkiem produktów przeznaczonych do użytku na zewnątrz).

3. Czyść tylko suchą szmatką.

4. Nie blokuj otworów wentylacyjnych. Nie instaluj w zamkniętym miejscu. Instaluj tylko zgodnie z instrukcjami producenta.

5. Zabezpiecz przewód zasilający przed uszkodzeniem, zwłaszcza przy wtyczkach i gnieździe urządzenia.

6. Nie instaluj w pobliżu źródeł ciepła, takich jak grzejniki, rejestratory ciepła, kuchenki lub inne urządzenia (w tym wzmacniacze), które generują ciepło.

7. Nie unieważniaj celu bezpieczeństwa wtyczki spolaryzowanej lub wtyczki z uziemieniem. Wtyczka spolaryzowana ma dwie wtyczki, z których jedna jest szersza niż druga (tylko dla USA i Kanady). Wtyczka z uziemieniem ma dwie wtyczki i trzeci bolc uziemiający. Szeroka wtyczka lub trzeci bolc są dostarczone dla Twojego bezpieczeństwa. Jeśli dostarczona wtyczka nie pasuje do Twojej gniazdka, skonsultuj się z elektrykiem w celu wymiany przestarzałego gniazdka.

8. Zabezpiecz przewód zasilający przed uszkodzeniem, zwłaszcza przy wtyczkach i gnieździe urządzenia.

9. Używaj tylko akcesoriów i dodatków zalecanych przez producenta.

10. Używaj tylko określonych wózków, stojaków, statywów, uchwytów lub stolików. Uważaj, aby uniknąć przewrócenia wózka/kombinacji urządzenia podczas przemieszczania.

11. Odłączaj w czasie burz lub jeśli urządzenie nie jest używane przez długi okres.

12. Korzystaj tylko z kwalifikowanego personelu do serwisowania, zwłaszcza po uszkodzeniach.

13. Urządzenie z zabezpieczonym terminalem uziemiającym powinno być podłączone do gniazdka sieciowego z połączeniem ochronnym.

14. Jeśli wtyczka sieciowa lub złącze urządzenia jest używane jako urządzenie odłączające, urządzenie odłączające powinno pozostać łatwo dostępne.

15. Unikaj instalacji w zamkniętych miejscach, takich jak biblioteczki.

16. Nie umieszczaj źródeł otwartego ognia, takich jak palące się świeczki, na urządzeniu.

17. Zakres temperatury pracy od 5° do 45°C (od 41° do 113°F).

ZASTRZEŻENIA PRAWNE

Music Tribe nie ponosi odpowiedzialności za jakiekolwiek straty, które mogą ponieść osoby, które polegają w całości lub w części na jakimkolwiek opisie, fotografii lub oświadczeniu zawartym w niniejszym dokumencie. Specyfikacje techniczne, wygląd i inne informacje mogą ulec zmianie bez powiadomienia. Wszystkie znaki towarowe są własnością ich odpowiednich właścicieli. Midas, Klark Teknik, Lab Gruppen, Lake, Tannoy, Turbosound, TC Electronic, TC Helicon, Behringer, Bugera, Aston Microphones i Coolaudio są znakami towarowymi lub zastrzeżonymi znakami towarowymi firmy Music Tribe Global Brands Ltd. © Music Tribe Global Brands Ltd. 2024 Wszystkie prawa zastrzeżone.

OGRANICZONA GWARANCJA

Aby zapoznać się z obowiązującymi warunkami gwarancji i dodatkowymi informacjami dotyczącymi ograniczonej gwarancji Music Tribe, zapoznaj się ze wszystkimi szczegółami w trybie online pod adresem community.musictribe.com/support.

JP 安全にお使いいただくために

感電の.恐れがありますので、カバーやその他の部品を取り外したり、開けたりしないでください。高品質なプロ用スピーカーケーブル（¼" TS 標準ケーブルおよびツイスト ロッキング プラグケーブル）を使用してください。

このシンボルは、どこに現れても、筐体内部に絶縁のない危険な電圧が存在しており、これは感電の危険性を構成する可能性があることを示しています。

火事および感電の危険を防ぐため、本装置を水分や湿気のあるところには設置しないで下さい。装置には決して水分がかからないように注意し、花瓶など水分を含んだものは、装置の上には置かないようにしてください。

注意
このマークが表示されている箇所には、内部に高圧電流が生じています。手を触れると感電の恐れがあります。

注意
取り扱いとお手入れの方法についての重要な説明が付属の取扱説明書に記載されています。ご使用の前に良くお読みください。

注意
これらのサービス指示は、有資格のサービス担当者のみが使用するためのものです。操作説明書に含まれているもの以外のサービスを行わないでください。修理は有資格のサービス担当者によって行われなければなりません。

警告
デバイスの取り付けまたは操作を行う前に、電気および安全に関する情報については、底部の外装に記載されている情報を参照してください。

1. すべての指示と警告を注意深く読み、従ってください。

2. 装置を水から離してください（屋外用の製品を除く）。

3. 乾いた布でしか清掃しないでください。

4. 換気口を塞がないでください。密閉されたスペースには取り付けないでください。必ず製造元の指示に従って取り付けてください。

5. 電源コードを特にプラグやアプライアンスの差込口で損傷から守ってください。

6. 暖房器、ヒーター、ストーブ、アンプなど発熱する機器の近くには取り付けないでください。

7. 偏光または接地型プラグの安全目的を妨げないでください。偏光プラグは片方がもう一方より幅が広いものです（アメリカとカナダ専用)。接地型プラグは二本の刃と三本目のアースプラグがついています。幅の広い刃または三本目のプラグは安全のために設けられています。提供されたプラグがコンセントに合わない場合は、電気技師に相談して陳腐化したコンセントを交換してください。

8. 電源コードを特にプラグやアプライアンスの差込口で損傷から守ってください。

9. 製造元が推奨するアタッチメントやアクセサリーだけを使用してください。

10. 指定されたカート、スタンド、三脚、ブラケット、またはテーブルだけを使用してください。カート/装置の組み合わせを移動する際には倒れないように注意してください。

11. 嵐時や長期間使用しない場合はプラグを抜いてください。

12. 特に損傷後は、修理には資格のある専門家を利用してください。

13. 保護アース端子のある装置は、保護アース接続のあるメインの電源コンセントに接続してください。

14. メインプラグまたはアプライアンスコプラが切断装置として使用される場合、切断装置は操作可能でなければなりません。

15. 書棚などの密閉された空間には設置しないでください。

16. ろうそくなどの明火を装置に置かないでください。

17. 動作温度範囲は 5° から 45℃までです (41° から 113°F)。

法的放棄

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CN 重要的安全须知

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请勿打开机盖

产品输出端子带有此标志表示此端子具有大电流, 存在触电危险。仅限使用带有 ¼" TS 或扭锁式插头的高品质专业扬声器线。与这些端子连接的外部导线需要由经过指导的人员来安装和使用厂家提供的导线或指定的导线。

此标志提醒您, 产品内存在未绝缘的危险电压, 有触电危险。

此标志提醒您查阅所附的重要的使用及维修说明。请阅读有关手册。

小心
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小心
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1. 请阅读, 保存, 遵守所有的说明, 注意所有的警示。

2. 请勿在靠近水的地方使用本产品。

3. 请用干布清洁本产品。

4. 请勿堵塞通风孔, 安装本产品时请遵照厂家的说明, 通风孔不要覆盖诸如报纸, 桌布和窗帘等物品而妨碍通风。

5. 请勿将本产品安装在热源附近, 如暖气片, 炉子或其它产生热量的设备 (包括功放器)。产品上不要放置裸露的火焰源, 如点燃的蜡烛。

6. 如果产品附带接地插头, 请勿移除接地插头的安全装置, 接地插头是由火线和零线两个插片及一个接地插片构成。如随货提供的插头不适合您的插座, 请找电工更换一个合适的插座。

7. 妥善保护电源线, 使其不被践踏或刺破, 尤其注意电源插头, 多用途插座接设备连接处。

8. 请只使用厂家指定的附属设备和配件。

9. 请只使用厂家指定的或随货销售的手推车, 架子, 三角架, 支架和桌子等。若使用手推车来搬运设备, 请注意安全放置设备, 以避免手推车和设备倾倒而受伤。

10. 遇闪电雷鸣或长期不使用本设备时, 请拔出电源插头。

11. 如果电源线或电源插头受损, 液体流入或异物落入设备内, 设备遭雨淋或受潮, 设备不能正常运作或被摔坏等, 设备受损需进行维修时, 所有维修均须由合格的维修人员进行维修。

12. 如果产品附带接地插头, 本产品应当连接到带保护接地连接的电网电源输出插座上, 确保连接电源时一定有可靠的接地保护。

13. 若电源插头或器具耦合器用作为断路装置, 应当保证它们处于随时可方便操作状态。

14. 本产品仅适合用于海拔 2000 米以下和非热带气候条件下的地区。

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1. Welcome

1.1 Introduction

Thank you for choosing the Lake LMX 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 LMX Series Quick Start & Field Reference 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 preferably via the Lake Controller software, which can be downloaded from either labgruppenlakeprocessing or labgruppen.com.

It is recommended that the Quick Start & Field Reference Guide and all product documentation included with the Lake Controller installer are reviewed to ensure familiarity with the various configuration and control options.

Thank you again for placing your confidence in Lake products.

1.2 Main Features

The LMX 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.

1.2.1 Lake processing and controller

LMX Series devices integrate seamlessly into the Lake Processing environment and are accessible via the Lake Controller software v8.1 and later. 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. Please refer to the Lake Controller Operation Manual for further information.

1.2.2 Lake Analyzer Plugin

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 v9.1, v8, v7, Di, Di2 and SysTune from AMFG, and WaveCapture Live-Capture Light or Live-Capture Pro; additional third-party analyzers may be approved in the future.

1.2.3 Dante Audio Network

LMX 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.

1.2.4 Additional Documentation

This document, the Lake LMX Series Operation Manual, serves as the primary reference source for detailed information on the installation and operation of LMX Series devices. It also provides detailed information on set-up and configuration using the front-panel interface.

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)
- On the downloaded software installer
- Online at https://www.labgruppen.com/downloads

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2. Installation

2.1 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 LMX Series device, the shipping carton include the following items:

- Lake LMX Series Quick Start & Field Reference Guide
- AC mains lead (IEC power cable) with locking connector
- Rear brackets for additional rack support, with associated mounting hardware

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

2.2 Mounting

Airflow for cooling the device is from front panel intake to rear panel exit. Please ensure that no objects such as rack doors or lids are placed at the front or rear of the rack to ensure that airflow is maximized. These devices have 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.

2.2.1 Rear Mounting

Two rear support brackets along with associated mounting hardware are included with the LMX, as shown in Figure 2.1; it is recommended that these are used wherever possible. Fit the brackets to the vertical rails at the rear of the rack. Figure 2.2 and Figure 2.3 show the fitting options for fixed and removable installation.

The support brackets are reversible and may be fitted to point either to the front or rear of the rack; the orientation used depends on the rack depth and position of the rear rack rails. Two mounting methods are possible; note that the method shown in Figure 2.2 additionally provides extra security against unauthorized removal. For situations where rapid removal and replacement is required, the method shown in Figure 2.3 should be used.

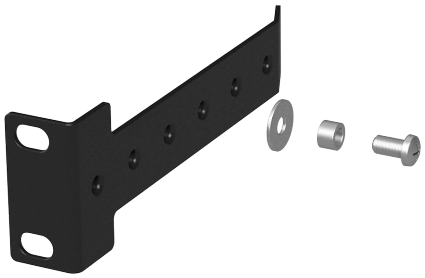

Figure 2.1: Rear support bracket with mounting hardware

Figure 2.2: Rear support bracket mounted with washer for fixed installation and bracket pointing forward

Figure 2.3: Rear support bracket mounted with tube for removable installation (bracket pointing back)

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2.3 Cooling

The LMX series use a forced air cooling system with airflow from front to rear. To optimize air circulation, ensure that no objects such as rack doors or lids obstructs the front or rear of the rack. Do not attempt to reverse the air flow. A sufficient air supply must be maintained at the front of LMX series devices and there must be ample space for air egress at the rear. Please maintain a cool ambient temperature around the rack, as high temperatures and humidity can significantly affect the expected lifetime of the components.

We recommend that solid blank panels be used to mask unused rack spaces rather than ventilation panels; and that gaps are not left between LMX devices in the rack as this diminishes the effectiveness of forced air cooling.

If one or more LMX series device is to be used in a rack with other equipment, please ensure that this equipment also uses front to rear airflow cooling. Failure to observe this precaution may result in overheating.

LMX Series devices are equipped with a sophisticated temperature sensing system designed to protect them from overheating caused by inadequate ventilation. A warning will be displayed if the temperature exceeds 70° C, and a temperature fault will occur at 85° C.

Note **The Processor will NOT mute or shutdown when the temperature reaches or exceeds 85°C (185°F), however sustained performance at this temperature cannot be guaranteed.**

2.4 Operating Voltage

The LMX Series devices are equipped with dual independent universal power supplies with two separate locking IEC mains inlets, allowing the LMX to be powered by two separate mains sources for redundancy if one mains are lost.

Only one is required to function to power the LMX and the LMX will seamlessly switch between PSUs if one is lost. In the event that mains are lost this can optionally be indicated on the Front panel as well as in the connected Lake Controller.

The label above each IEC connector indicates the AC mains voltage range for which the device is approved.

LMX Series devices utilizes two universal power supplies, and will operate within the range 70-265V~50-60Hz : 75W. 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 to power the device, although is essential if locking functionality is required.

Once a suitable AC power supply is connected to either PSU (or both), 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).

2.5 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. This is configurable in groups of four channels.

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 minimize hum and interference. Please refer to section 6.1.5 for further information.

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

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3. Product Overview

This chapter provides an overview of key features and functionality. For further information please see chapters 5 to 9 of this Operation Manual.

3.1 Front Panel Overview

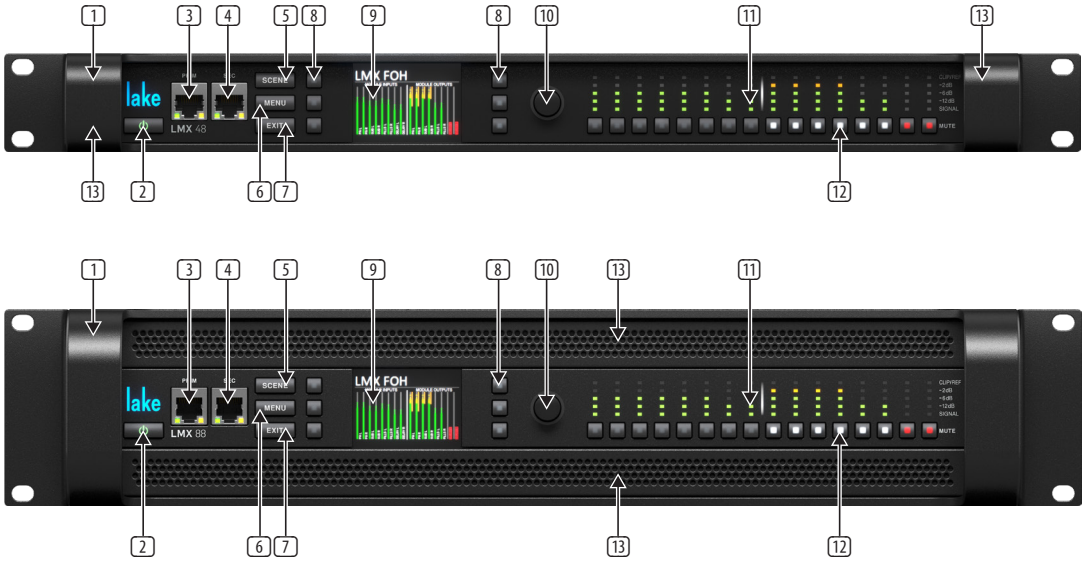

Figure 3-1: LMX Series Front Panel Overview

The front panel controls are clustered around a daylight readable full color LCD, allowing adjustment and monitoring of some parameters and meters. The two clusters of controls on either side of the LCD include three dedicated function buttons, six dynamic function buttons with embedded LEDs and a rotary data encoder. To the right of these controls is a dynamic illuminated module divider along with input and output mute buttons and level meters.

1. Handles

Two sturdy aluminum 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.

2. Standby

LMX 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.**

3. Primary RJ45 Socket for Dante connection and control, this is connected to an internal switch and can be used to easily connect to the LMX. When the device has Dual Redundancy enabled, this is for the Primary network.

4. Secondary RJ45 socket for Dante connection and Control, this is connected to an internal switch and can be used to easily connect to the LMX. When the device has Dual Redundancy enabled, this is for the Secondary network.

5. Scene

After pressing the SCENE button, the LCD will display the SCENE Preset Recall view. From this, it is possible to recall any of the SCENE presets stored on the device (SCENE presets are stored from the Lake Controller).

In SCENE Preset recall mode the dynamic function buttons are lit when there is a stored SCENE preset that can be recalled. Two pages are displayed, Scene preset 1-5 and on page 2 preset 6-10.

SCENE Preset recall is only available while in MESA mode.

6. 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 5.4 for further details.

7. Exit

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

8. Dynamic Function Buttons with LEDs

The function of these buttons changes according to the currently selected view or menu.

All six LEDs will flash white simultaneously and then stay white to indicate that the frame is selected in the Lake Controller, or flashes white to indicate communication from the Lake Controller.

All six LEDs will also flash simultaneously to indicate frame faults (red) or warnings (yellow).

When a System recall, firmware update or any other lengthy operation is done, the corner LEDs will cycle in yellow and there is a “Please wait” indication displayed on the display.

Please refer to chapter 5 for further details.

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9. Display

The full color IPS display illuminates when the device is on. The LCD, function buttons, and the rotary encoder provide real-time control and monitoring of the parameters that are useful to have front panel access to, such as IsoFloat or Termination control etc. The LEDs embedded in the function buttons indicate available menu options, provide confirmation of Controller communication, and indicate various faults and warnings.

Available settings are displayed in blue, and enabled settings are displayed in amber.

The selection of the parameters is done with the function buttons, and then the settings is altered with the rotary encoder.

The brightness and contrast of the display and front panel LEDs can be adjusted via the front panel menu. The default Meter view display, Frame Label, Module Labels, Module Input meter, Module Output meter and Gain Reduction. If any Fault or Warning is present, this will also be displayed in full in the top right corner.

Please refer to chapter 5 for further details.

10. Rotary Encoder

The rotary encoder is used to modify the parameters via the menu. When a menu item is selected that permits adjustment of parameter values, the ring around the rotary encoder illuminates.

11. Dynamic Illuminated I/O Dividers

In Mesa mode, there is an illuminated divider between module inputs to the left and module outputs to the right. In Contour mode the Module Inputs and Module Outputs are together with an illuminated divider between each module.

12. Module Input / Output Mute Buttons and LED Meters

Independent mute buttons and LED meters are provided for the Module inputs and outputs.

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), or unused (not illuminated).

Please refer to section 5.7 for further information.

13. Dust Filters

Always ensure that the dust filters behind the detachable front panel are clean to ensure maximum airflow.

On the LMX88 two dust filters are positioned behind the magnetically attached metal dust filter covers. To remove the covers gently bend them from the side cutouts behind the handles. Once detached the foam dust filters can be removed for cleaning. Clean the filters using a vacuum cleaner or by gently shaking them. The filters can be fitted by reversing the removal procedure. Do not use the LMX88 while the filters are removed.

On the LMX48 the air intakes are located behind the handles, with the dust filters on either side. To clean use a vacuum cleaner directly onto the intake. Do not have the LMX48 powered on while cleaning the filters.

3.2 Back Panel Overview

3.2.1 LMX48

Figure 3-2: LMX48 Rear Panel Overview

14. AES3/Analog Outputs

AES3 and Analog outputs are provided via standard XLR3M connections, which are shared and can be configured to be either analog or AES3 from the Lake Controller. The eight analog 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 6.1 for further information. AES3 outputs are available in pairs on the odd numbered output sockets. Please refer to section 6.1.2 and 6.2.1 for further information.

15. AES3 / Analog Inputs (shared)

AES3 and Analog inputs are provided via standard XLR3F latching connectors, which are shared, the LMX48 can sense which type of input is being used. The four analog 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 6.1.1 and 6.2.1 for further information. AES3 inputs are available in pairs on the odd numbered sockets, with termination available per pair. Please refer to section 6.1.1 and 6.2.1 for further information.

16. Word Clock Input

A female BNC socket is provided to synchronize to other devices using an external word clock signal. Termination can be selected from the front panel or from Lake Controller. Please refer to section 6.3.1 for further information.

17. Work Clock Output

Any of the onboard clock signals can be sent on the word clock output at any sample rate. Please refer to section 6.3.2 for further information.

18. AES50 Input / Output

Any of the available 96 channels of AES50 input from interface A and B can be assigned to the 24 channels of AES50 receivers which then are used in the Input router AES50 outputs are configured to the 24 AES50 Transmitters in the Output Router and then in the AES50 Configuration the AES50 Transmitters are patched out on the AES50 Interface and channel. It is recommended that Shielded Twisted Pair (STP) cables are used. STP cable has the added advantage of a foil or braided shield that guards the cable against electromagnetic interference. A good foil or braided shield and correctly connected shielded plugs and shells also helps protect against Electrostatic discharge (ESD) that can be the cause of dropouts on AES50 connections.

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19. GPI Connector

An RJ45 GPI (General Purpose Input) connection is provided to enable integration with external systems such as alarm/fire systems, providing basic control of power state, change input router settings, scene preset recall, frame preset recall and mute. Please refer to sections 6.6 for further details.

20. Mains Power Connectors

Two universal power supplies capable of accepting 70-265 V ~ 50-60 Hz are built into LMX Series devices, with two inlets for added redundancy mission in critical situations. The IEC power cable provided includes a locking feature via a pin on the bottom of the connector; the connectors 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.

LMX devices can be configured to show a mains warning if mains are not present on both inputs. This is disabled by default to allow an LMX device to be fed by a single mains supply. This can be configured from the front panel or by using the Lake Controller software.

21. Primary Network Connector

Primary RJ45 connections provide 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, and the AES67 protocol when AES67 mode enabled.

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 6.4. Additional information is available in the Lake Network Configuration Guide. If the LMX devices have Dante dual redundancy disabled all five ethernet ports (three on the back and two on the front) will work in the same way.

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).**

22. Secondary Connector

The secondary network connectors can be used to daisy-chain multiple LMX and/or other Lake devices. Alternatively, Dante dual redundancy can be enabled, and the ports labelled as primary and secondary will be set up as two separate VLANs, 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 6.4. Additional information is 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.**

23. Primary Network Connector with PoE+ out

Extra Primary RJ45 connector. The primary port marked PoE can have Power over Ethernet enabled (PoE+ 802.3at) which can deliver up to 25 W to power external equipment, such as a wireless accesspoint. This can be configured in the Lake Controller software or from the Front panel, and can be set to continue providing power when the LMX device is in Standby mode. Please note that additional filtering will need to be configured in the access point if Dante Multicast is being used on the network.

3.2.2 LMX 88

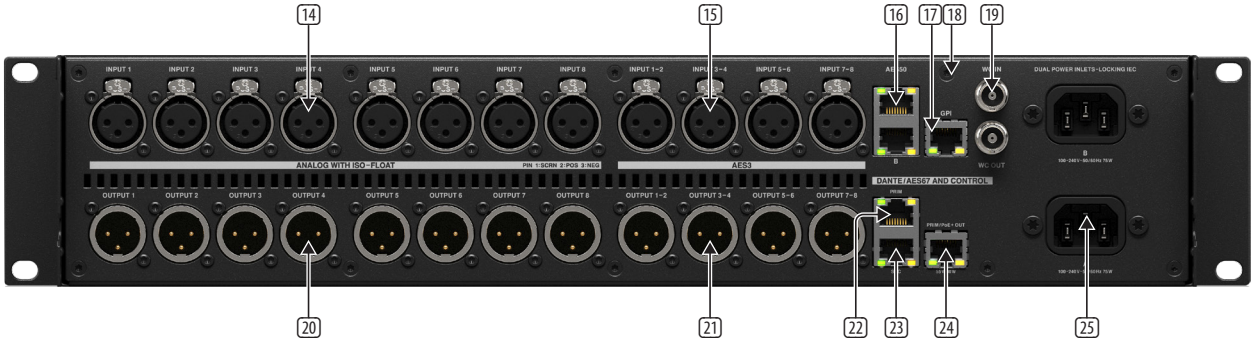

Figure 3-3: LMX88 Rear Panel Overview

14. Analog Inputs

Analog inputs are provided via standard XLR3F latching connectors. The eight analog 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 6.1 for further information.

15. AES3 Inputs

Eight AES3 inputs are available in pairs on four standard XLR3F latching connectors. Please refer to section 6.2 for further information.

16. AES50 Input / Output

Any of the available 96 channels of AES50 input from interface A and B can be assigned to one of the LMX series input modules. AES50 outputs can be used in place of DANTE, AES3 or analog if required. It is recommended that Shielded Twisted Pair (STP) cables are used. STP cable has the added advantage of a foil or braided shield that guards the cable against electromagnetic interference. A good foil or braided shield and correctly connected shielded plugs and shells also helps protect against Electrostatic discharge (ESD) that can be the cause of dropouts on AES50 connections. Please refer to section 6.5 for further information.

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17. GPI Connector

An RJ45 GPI (General Purpose Input) connection is provided to enable integration with external systems such as alarm/fire systems, providing basic control of power state, change input router settings, scene preset recall, frame preset recall and mute. Please refer to sections 6.6 for further details.

18. Word Clock Input

A female BNC socket is provided to synchronize to other devices using an external word clock signal. Termination can be selected from the front panel or from Lake Controller. Please refer to section 6.3 for further information.

19. Work Clock Output

Any of the onboard clock signals can be sent on the word clock output at any sample rate. Please refer to section 6.3 for further information.

20. Analog Outputs

Analog outputs are provided via standard XLR3M connections. The eight analog 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 6.1 for further information.

21. AES3 Outputs

AES3 outputs are available in pairs on standard XLR3M connections. Please refer to section 6.2 for further information.

22. Primary Network Connector

Primary RJ45 connections provide 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, and the AES67 protocol.

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 6.4. Additional information is available in the Lake Network Configuration Guide. If the LMX devices have Dante dual redundancy disabled, all five ethernet ports (three on the back and two on the front) will work in the same way.

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).**

23. Secondary Connector

The secondary network connectors can be used to daisy-chain multiple LMX and/or other Lake devices. Alternatively, Dante dual redundancy can be enabled, and the ports labelled as primary and secondary will be set up as two separate VLANs, 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 6.4. Additional information is 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.**

24. Primary Network Connector with PoE+ out

Extra Primary RJ45 connector. The primary port marked PoE can have Power over Ethernet enabled (PoE+ 802.3at) which can deliver up to 25 W to power external equipment, such as a wireless accesspoint. This can be configured in the Lake Controller software or from the Front panel, and can be set to continue providing power when the LMX device is in Standby mode. Please note that additional filtering will need to be configured in the access point if Dante Multicast is being used on the network.

25. Mains Power Connectors

Two universal power supplies capable of accepting 70-265 V ~ 50-60 Hz are built into LMX Series devices, with two inlets for added redundancy in critical situations. The IEC power cable provided includes a locking feature via a pin on the bottom of the connector; the connectors 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.

LMX devices can be configured to show a mains warning if mains is not present on both inputs. This is disabled by default to allow an LMX device to be fed by a single mains supply. This can be configured from the front panel or by using the Lake Controller software. Please refer to section 6.7 for further information.

EN

4. Signal Flow and Lake Processing

4.1 Signal Flow

The figures below depict the audio signal flow for LMX Series devices configured in Contour mode, Mesa modes or a combination of both in Contour/Mesa mode. 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, Mesa Mode or Contour/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. How to change mode is described in section 5.9.2.2.

Important information regarding correct setting of the gain structure can be found in section 8.1.

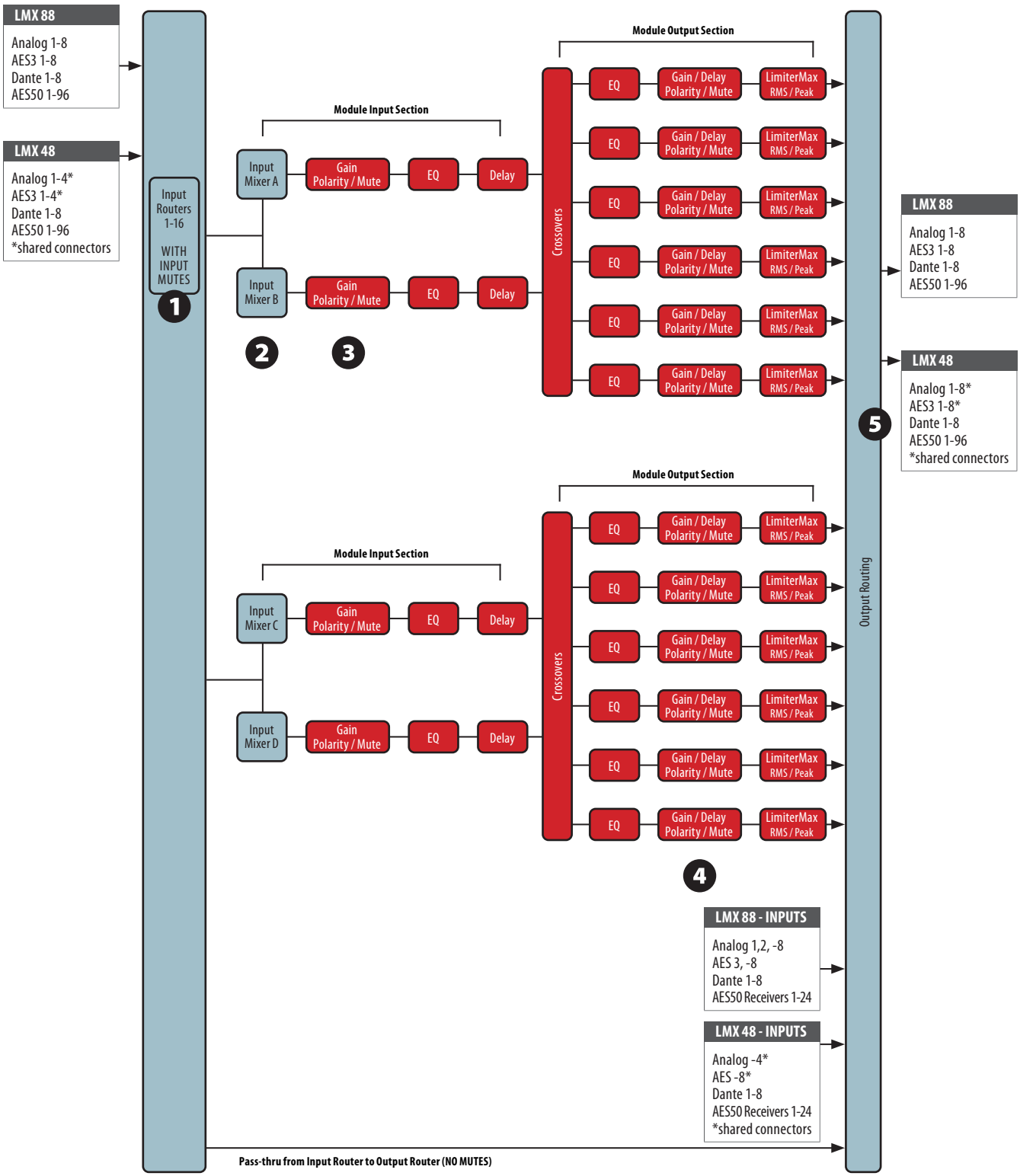

Figure 4-1: LMX Series Signal Flow (Contour Mode)

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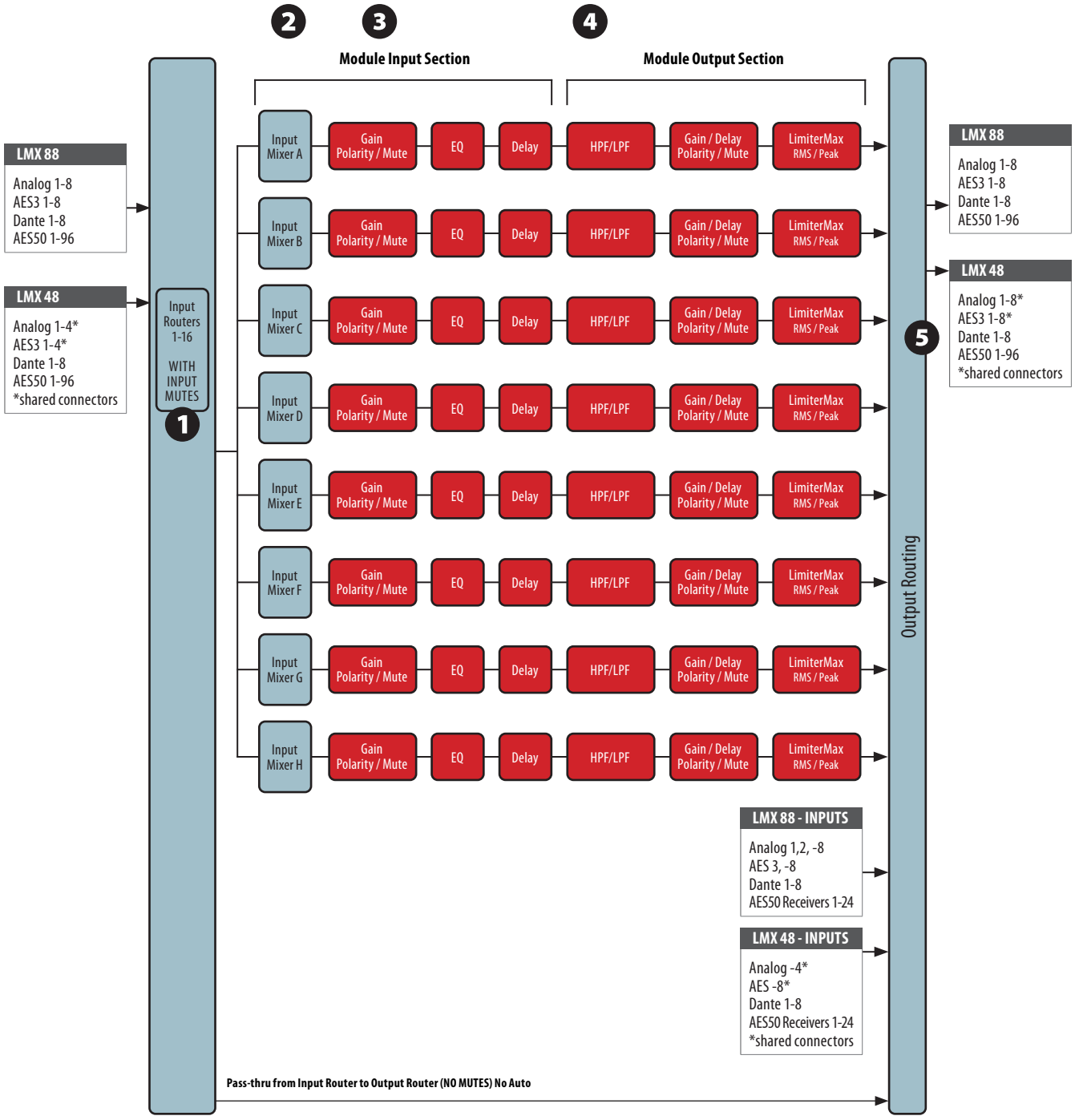

Figure 4-2: LMX Series Signal Flow (Mesa Mode)

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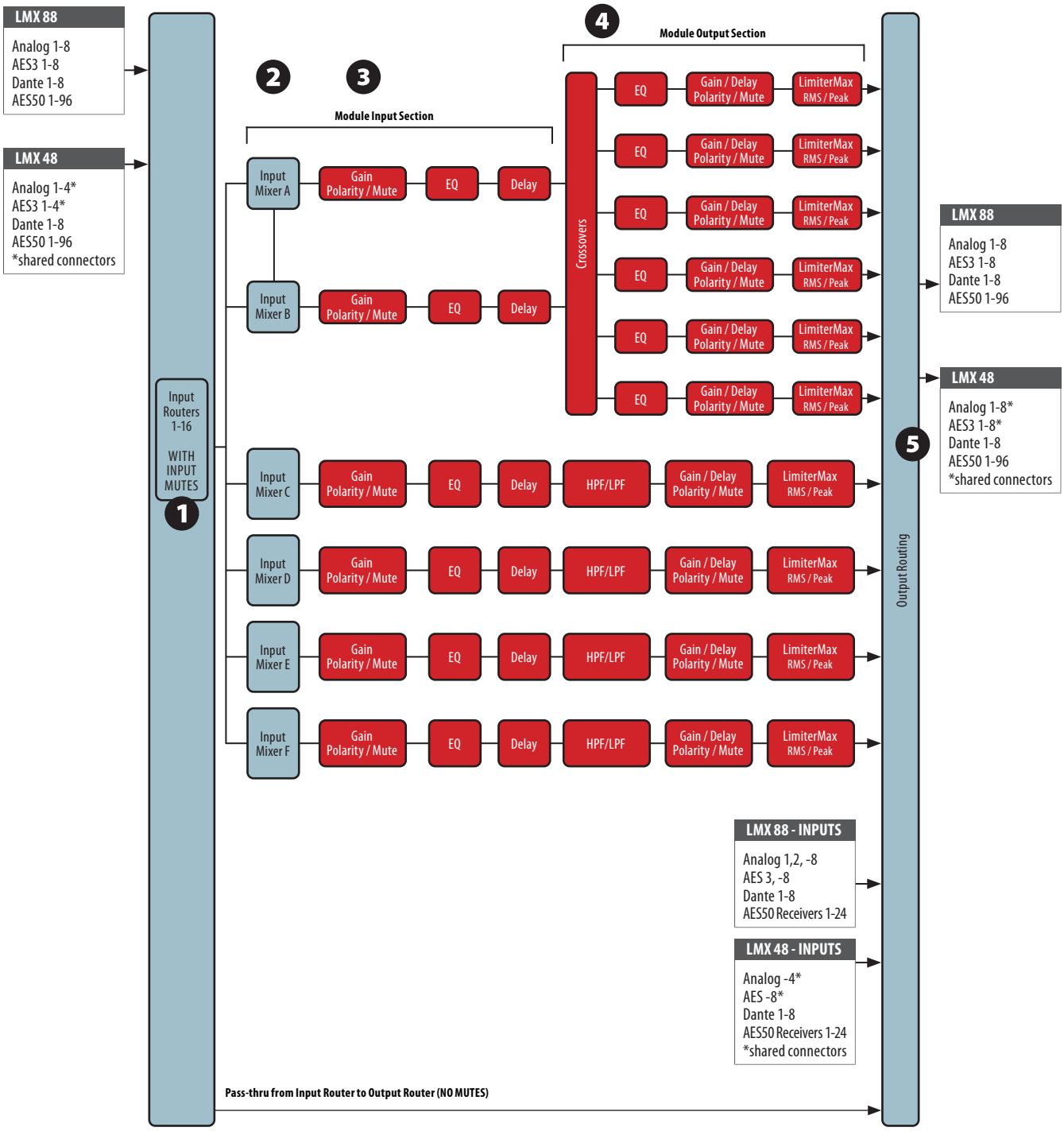

Figure 4-3: LMX Series Signal Flow (Contour/Mesa Mode)

Please refer to section 5.9.2.2 for information on changing the Frame configuration between Contour, Mesa or Contour/Mesa Modes.

4.1.1 Level Adjustment and Mute Points

The numbers below correspond the points identified in Figure 4-1, Figure 4-2 and 4-3.

1. Input Router Stage - Input selection and mute
2. Input Mixer Stage - Router ON/OFF connection to mixer and gain settings and mute
3. Module Input Stage - Mute (N/A for Mesa Mode) and gain settings
4. Module Output Stage - Mute and gain settings
5. Output Router Stage - Output ON/OFF routing connections

Note **If the required audio signal is not passing correctly, verify the connection, mute and gain settings at all five stages and power state.**

4.2 Lake Processing and Control

As outlined in section 1.2.1, 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 con- trolled via the supplied Lake Controller software.

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

Visit http://labgruppen.com to download the latest software, firmware and documentation for your devices.

EN

4.3 Modules and Frames

4.3.1 Overview

A Frame represents one physical Lake Processor (e.g. LMX 48 or LMX 88). In Contour Mode, a maximum of four Modules are contained within each Frame; these are referred to as Module A to D. 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 eight Modules labelled A - H.

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 XP module which includes classic crossovers, multiband limiter, FIR and array optimization can also be used. The default configuration for LMX devices is eight Mesa EQ Modules, providing a total of eight Module outputs.

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

4.4 Loudspeaker Processor (Contour Mode) Overview

In Contour Mode, LMX Series devices may be configured with up to four processing Modules containing a total of up to twelve processing Module outputs as shown in Figure 4. 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.

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 and are used in different way in the LP, FIR and XP modules.

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

4.5 System Equalizer (Mesa Mode) Overview

In Mesa Mode, default configuration, an LMX Series device provides eight processing Modules with independent EQ, HPF/LPF, Gain, Polarity, Delay and Limiters as shown in Figure 5-2 on page 12. The relationship between inputs and outputs is defined via the Lake Controller.

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

4.6 Hybrid Configuration Contour/ Mesa Mode Overview

The LMX series offers a hybrid configuration mode (Contour/Mesa) featuring 2 Contour Modules with up to six processing outputs for loudspeaker processing and 4 Mesa Modules with four outputs for system processing.

4.7 Switching Between Contour, Mesa, or Countour/Mesa Modes

When switching between Contour, Mesa or Contour/Mesa Modes, all current Frame configuration data is lost including stored Scene Presets (Frame 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 RESET (refer to section 5.9.2.2) or via the Lake Controller MODULES > I/O CONFIG > FRAME CONFIG menu (refer to the Lake Controller Operation Manual).

4.8 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.

4.8.1 Module, System and Sub-System Configuration 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 each individual (i.e. the data shown in red in the signal flow diagrams in section 4.1). A Module file may be recalled into other Lake devices. It is not possible to store a Module File directly on the hardware device. The speaker presets included in the Lake Load Library are Module Files.

A System or Sub-System Configuration File contains a set of Module file information in addition to Frame related information such Group data, I/O configuration and other settings (i.e. the data shown in blue in the signal flow diagrams in section 4.1), except all the settings available under Technical Data in the Lake Controller, such as IP settings. For LMX series devices the Scene presets are also included in the System file. Storing a System file will store the complete system as it is in the work area. Recalling a previous System file allows access to a previous system configuration. The Recall Last System Configuration option when Lake Controller is started will perform a Recall Compare and will not push any settings to online frames.

4.8.2 Scene Presets

A Scene Preset is stored on the device, but also stored in the Lake System File as the scenes are set up to match the specific system, therefore making it easy to perform a Frame Replace and all Scene presets stored will follow to the new destination device. The Scene presets include all settings for Dante receivers, all priorities for the input routers and the input mixer settings for all modules. This enables quick changes to the inputs used for the LMX modules or output routes set from the Input router.

4.8.3 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 5.9.4) 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 LMX 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 and all stored Scene presets. 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 LMX & other Lake Series devices. This enables fast retrieval and switching of entire system configurations as minimal data is being sent between the Controller and Processors.

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5. Front Panel Interface

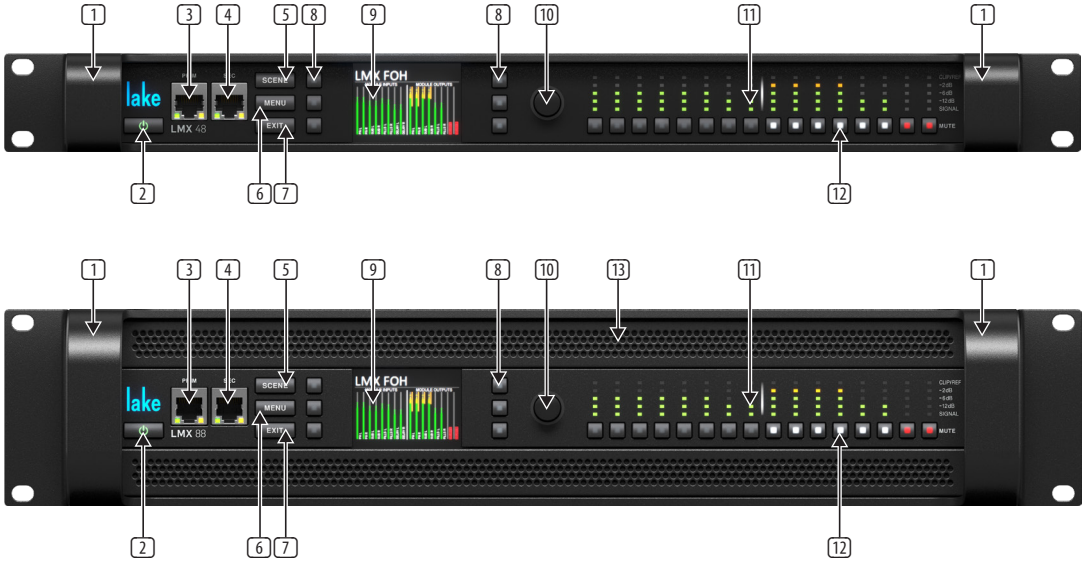

Figure 5-1: Front Panel Interface

5.1 Overview

The front panel interface is framed by two cast aluminum handles 1 and features the On/Standby button 2; the primary and secondary RJ45 sockets for Dante, AES67 and control 3 & 4; the Scene, Menu and Exit buttons 5 to 7; Multi-function buttons 8; display 9; rotary encoder 10; I/O LEDs 11 and Mute buttons 12.

5.1.1 Warning, Fault and Mute Indications

Fault or warning conditions are indicated via flashing the LEDs embedded in the dynamic function buttons around the display; a simultaneous description is shown in the top or bottom right corner of the LCD, according to preference.

Further information on faults and warnings is provided in section 7.1.

5.1.2 Selecting a Module in the Lake Controller Software via the Device

It is sometimes useful to identify which Module icon/s in the Lake Controller software are associated with a particular hardware Frame. To highlight the module in the Lake Controller software:

Ensure Meter View is selected and press any button adjacent to the LCD.

If the Frame is online, but the Module is not in the work area, the selected Module will be centered on the Module scroll bar (assuming the Modules Menu is selected in the Lake Controller).

5.2 Power Button 2

The unit is powered on by pressing the left-most button on the front panel, labelled 1 in Figure 5-1. It has a colored power symbol which illuminates blue when connected to the AC mains and red when the unit is in standby mode. It turns yellow when the button is pressed and green when the processor is on. A subsequent press of this button will turn the color to yellow while pressed and then returns to red when the unit is in standby mode.

5.3 Scene Button

When the device is in Mesa Mode the Scene button is used to enter the Scene preset recall menu. Scene presets can be recalled by pressing the adjasent dynamic function button beside each stored Scene preset position. There are two views, Scene 1-5 and Scene 6-10. The active Scene is indicated with Orange background. Changing settings included in the Scene will make it “dirty” to indicate that it was the last recalled Scene but currently not active. While in Scene menu, it will never time out automatically to Meter view.

5.4 Menu Button

Menu Mode is selected by pressing the MENU button. The screen displays the top-level menu with various submenu options. Press the button adjacent to the required submenu to select it.

Pressing the MENU button while in Menu Mode will display the previous menu level.

Menu Mode is used for processor configuration, or for editing a parameter.

5.5 Exit Button

Pressing Exit steps back one level in the menu hierarchy. Pressing and holding the button returns to Meter View.

5.6 Dynamic Buttons, Controls and LEDs

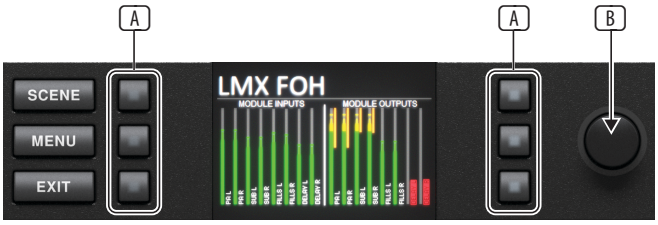

Figure 5-2: LCD with Dynamic Buttons, Controls and LEDs

5.6.1 Select Me (A)

These 6 bright white LED embedded in the dynamic function button around the display together with the Frame Label highlighted in White signifies selection in the Lake Controller, or Controller communication providing visual confirmation of:

- Network communication between the Lake Controller and the Lake Processor (Flashing LED).
- Selection of the Lake Processor in the Lake Controller software (Steady LEDs and White frame label).

Note **The Communication LED can be dimmed via the front panel by selecting Frame menu, and then Front - Dimming.**

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5.6.2 Fault and Warning LEDs (A)

All LEDs around the display flash red when a Fault is present, and flash yellow when a Warning is present. A detailed description of the actual fault/warning is also displayed in the corner. See also Faults and Warning section.

5.6.3 Rotary Encoder (B)

The rotary encoder is used to adjust parameters in conjunction with the selection made via the dynamic function buttons and LCD menus. The ring around the rotary encoder illuminates when a selected parameter is available for adjustment and illuminates in the color of the selection.

Turn the encoder clockwise to increase the selected parameter, or counter-clockwise to decrease the value. Parameters with only two states (e.g. ON, OFF) are toggled by turning clockwise or counter-clockwise.

Some parameters enable simultaneous adjustment of a combination of input and output channels. To select which parameters are adjusted:

- Press the associated soft button/s to select the parameter/s for editing. A selected parameter is indicated by inverse text and background color.
- Use the rotary encoder to change the value.
- It is possible to select multiple parameters for simultaneous editing even if the values are different on each channel.

5.6.4 Dynamic Function Buttons (A)

The buttons surrounding the display are unlabeled because their functions change according to the currently selected menu or display.

In Menu Mode these buttons are used to navigate the menu structure. A white LED illuminates on each button when a valid menu option is available.

5.7 Module I/O Mute Buttons and LED Meters

LMX Series devices provide mute functions at several points in the audio signal path. Please refer to section 4.1 for mute locations and descriptions.

Two types of mutes are available from the front panel:

1. Module Input Mutes

2. Module Output Mutes

In Home View (default), Module Input and Output Mutes are controlled via the dedicated mute buttons underneath each channel's five-segment LED meter as shown in Figure 5-3. In Mesa Mode only Module Output Mutes are available.

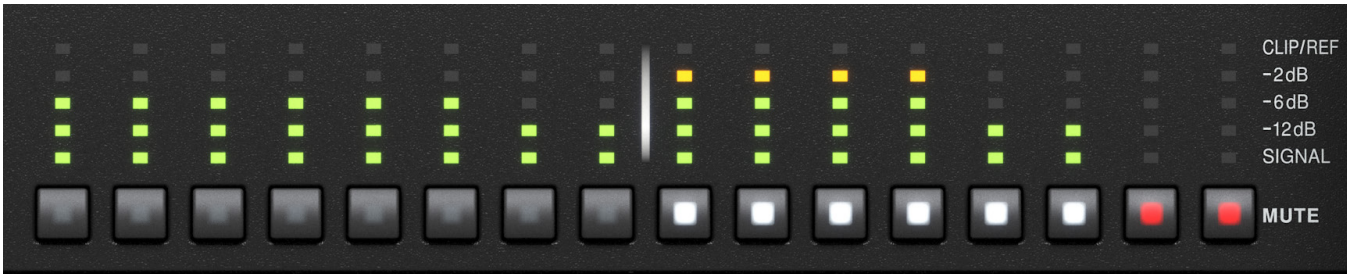

Figure 5-3: Dedicated Module Input and Output Mutes - Home View

In Figure 5-3, the buttons labelled A & B provide Module input muting; the buttons labelled 1-6 provide Module output muting. The embedded LED in each mute button confirms whether the associated Module input/s or output/s are muted (red), unmuted (white), or unused (not illuminated).

5.7.1 Module Input and Output Mutes

Module input mutes are only available in Contour Mode; Module input mutes are not applicable in Mesa Mode. The quantity and position of the output mute buttons changes as shown in Figure 3-3 depending on whether the device is configured in Contour Mode (up to twelve outputs) or Mesa Mode (eight outputs). The mute state is also indicated in red on the display

Please refer to the Lake Controller Operation Manual for details of Module mute controls via the software.

5.7.2 Clip Indication

The dedicated 5-segment metering LEDs (Figure 5-3) display Module input and output clip or pre-clip conditions. Additionally, the faults and warnings LED described in section 5.1 provides clip warnings for input mutes, or GPI protective mutes, along with confirmation text on the LCD screen.

Clipping is monitored at the following positions in the signal chain:

- Analog Inputs: If the input signal exceeds +26 dBu, a clip indication will be given. This does not apply if digital inputs are selected.
- Module Inputs: If the signal level at this point exceeds +25 dBu, a clip indication will be given.
- Module Outputs: If the signal level at this point exceeds +21 dBu, a clip indication will be given.

EN

5.8 Meter Mode

5.8.1 Home View (Contour Mode)

Contour Mode is the Meter Mode Home View as shown in 5-5.

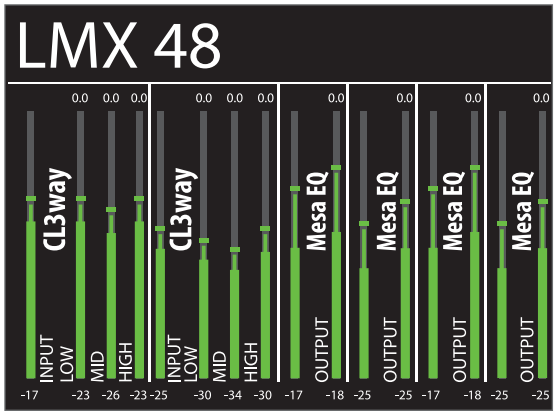

Figure 5-5: Meter Mode > Home View

5.8.2 Home View (Mesa Mode)

The default view when powering on an LMX Series device configured in Mesa Mode is Meter Mode > Home View as shown in Figure 5-6.

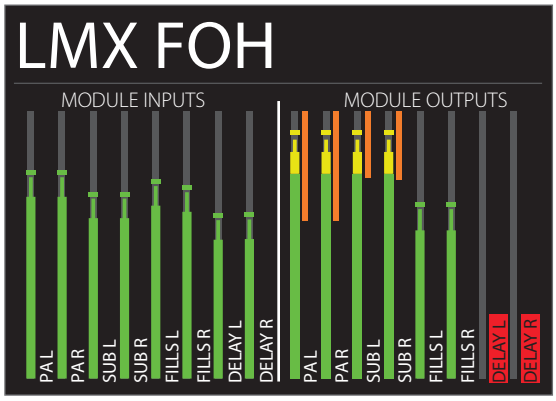

Figure 5-6: Meter Mode > Home View (Mesa - Module Outputs)

Home View (Mesa Mode) provides a summary of Module I/O gain level and limiter gain reduction, along with frame, module and channel labeling information.

5.8.3 Home View (Contour/Mesa Mode)

Contour / Mesa Mode is shown as in Figure 5-7.

Home View (Contour/Mesa Mode) provides a summery of Module I/O gain level and limiter gain reduction, along with frame, module and channel labeling information.

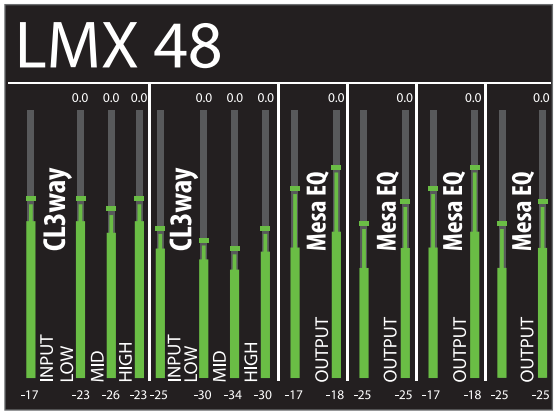

Figure 5-7: Meter Mode > Home View (Contour/Mesa - Module Outputs)

5.9 Menu Mode

5.9.1 Overview

The front panel allows an overview of some settings. These functions include the ability to recall Frame Presets, configure various parameters such as Mains warning, GPI state, analog input Iso-Float and AES3/Word Clock Termination and view important parameters such as firmware version, MAC address, network mode, FrameID etc., or to perform a reset of the device.

Menu Mode can be accessed at any time by pressing the MENU button.

After pressing the MENU button, various submenu options are displayed as shown in Figure 5-8.

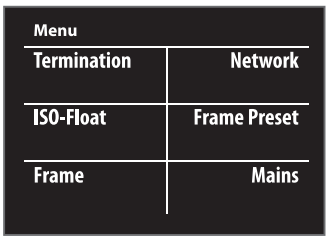

Figure 5-8: Menu Mode > Main Menu

Press the illuminated button adjacent to the required option to display an associated submenu. When parameter level is reached, individual parameters may be selected for adjustment by pressing the adjacent button. The selected parameter value/s are highlighted and are adjustable using the rotary encoder.

A parameter may be adjusted simultaneously across multiple channels by selecting all values to be adjusted; any current value offsets are retained. Some parameters default to multiple selection, with all inputs or outputs adjusted simultaneously. Changes are affected in real-time and a stored without further confirmation. Pressing EXIT returns to the previous menu level, automatically retaining any parameter changes.

Note **All parameters are also editable via the Lake Controller unless specified otherwise.**

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5.9.1.1 Menu Structure Overview

From the Main Menu, the following submenus are available, as shown in Figure 5-9 and described in the following sections.

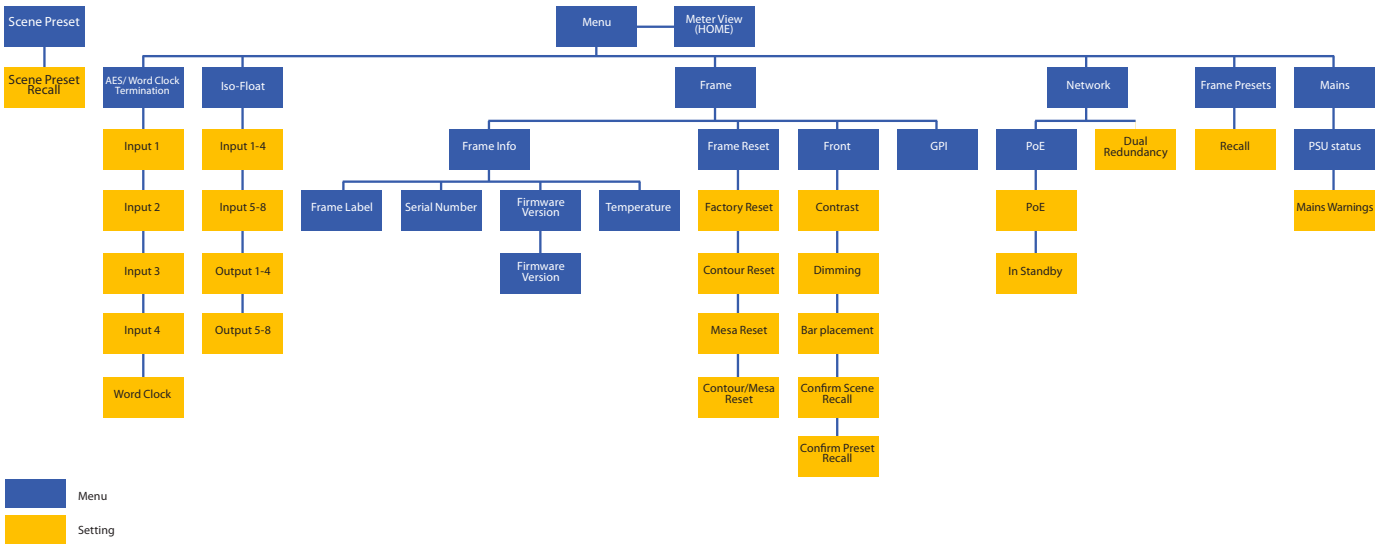

Figure 5-9: Menu Structure

5.9.1.2 AES and Wordclock Termination

MENU > TERMINATION

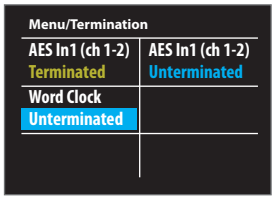

Figure 5-10: AES Termination Edit Screen

To adjust the AES3 or Word Clock Input Termination, select Termination from the menu then use the rotary encoder to toggle the value.

For fault-free operation when using AES3 digital audio as an input source, inputs must be correctly terminated with the characteristic impedance of 110 ohm. The Input Termination setting is determined by the method used to distribute the AES3 signals.

The processor at the end of a distribution line should be set to TERMINATED; all other processors should be set to UNTERMINATED. If an AES3 distribution amplifier (DA) is being used to distribute the digital audio signals, with one DA output per processor, then all terminations should be on. However, if the AES3 is daisy-chained, only terminate the last processor in the chain. The termination settings are stored as part of the Lake System file.

5.9.1.3 ISO Float

MENU > ISO-FLOAT

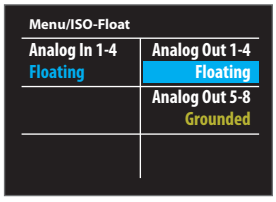

Figure 5-11: Iso-Float Menu

To change the Iso-Float setting, press the desired Inputs or Outputs button, then adjust the value using the rotary encoder.

The analog inputs utilize Iso-Float transformerless electronic balancing circuitry. This provides electrical isolation from an analog source comparable to that achieved with transformer-based designs. However, pin 1 of the XLR input connector may be connected to ground within the device if desired. This option is selected by using the rotary encoder to toggle between FLOATING and GROUNDED.

It may be necessary to change this setting to resolve ground loop problems when using analog inputs.

Iso-float is available in groups of four channels (1-4, 5-8).

5.9.2 Frame Submenu

MENU > FRAME

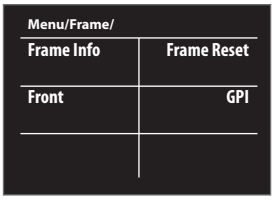

Figure 5-12: Frame Menu

The Frame Menu provides information and options relating to the device as a physical unit. It is referred to as a Frame for consistency with Lake Controller terminology.

5.9.2.1 Frame Info

MENU > FRAME > FRAME INFO

Frame Info provides information about the device settings and configuration. All data in this front panel menu is read-only; some parameters are fixed; some can be changed only via the Lake Controller software.

Frame Label

The Frame Label as defined in the Lake Controller is displayed in this menu. It is also displayed at the top-left of the screen in Meter Mode, Home View.

Serial Number (Serial No.)

The printed serial number on the device is also electronically embedded in the hardware and can be seen in the Front panel and Lake Controller software, and therefore cannot be removed or altered if stolen.

EN

5.9.2.2 Frame Reset and Configuration

MENU > FRAME > FRAME RST

Use this option to display a further menu with options to reset all parameters back to their original factory default values, or to reconfigure the Frame in a different mode (i.e. Contour or Mesa). See section 7.3 for a full list of the default factory reset parameter values.

Four types of resets are provided: Factory Reset, Contour Reset, Mesa Reset and Contour/Mesa Reset.

Factory Reset

A Factory Reset will reset all settings and parameters to the original factory-defined default values. This includes the deletion of any Frame Presets and Scene Presets stored within the device, and the default Mesa mode. It also resets the IP Address mode and all network related settings; a hard power cycle (disconnect from mains and reconnect) is required to complete this reset.

Contour Reset

A Contour Reset will configure the Frame in Contour Loudspeaker Processor Mode (4-in, 12-out) and will reset all settings and parameters to the original factory-defined default values for that configuration including stored Scene presets. Frame Preset and IP / Network configuration will be unaffected. A power cycle is not required to complete this type of reset.

Mesa Reset

A Mesa Reset will configure the Frame in Mesa System Processor Mode (8-in, 8-out) and will reset all settings and parameters to the original factory-defined default values for that configuration including stored Scene Presets. Frame Preset and IP / Network configuration will be unaffected. A power cycle is not required to complete this type of reset.

Contour / Mesa Reset

A Contour / Mesa Reset will configure the Frame in Contour Loudspeaker Processor Mode and Mesa System Processor mode with 2x Contour Modules and 4x Mesa Modules (8-in, 10-out) and will reset all settings and parameters to the original factory-defined default values for that configuration including stored Scene Presets. Frame Preset and IP / Network configuration will be unaffected. A power cycle is not required to complete this type of reset.

5.9.2.3 GPI

MENU > FRAME > GPI

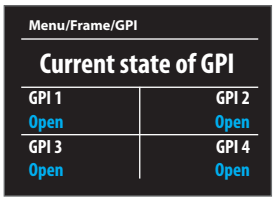

Figure 5-13: GPI Menu

Four general purpose inputs are available, whose status can be observed from the front panel.

GPI Configuration

The current state of the four GPI inputs can be seen in the GPI menu view. Configuration of the desired settings for each GPI input can only be carried out using the Lake Controller software.

Table 5-3 lists the options available for General Purpose Input (GPI). These options can be set independently for a transition from closed > open and from open > closed.

Table 5-3: GPI Options

Acting on	Transition Option
Protective Mute State	1. No Action 2. Toggle State 3. Mute 4. Unmute
Standby State	1. No Action 2. Toggle State 3. Standby 4. Turn On
Preset Recall	1. No Action 2. Recall #99 3. Recall #100
Input Router Configuration	Configuration for one or more of the input routers.
Scene Preset Recall	1 = No action 2 = Recall #1 3 = Recall #2 4 = Recall #3 5 = Recall #4 6 = Recall #5 7 = Recall #6 8 = Recall #7 9 = Recall #8 10 = Recall #9 11 = Recall #10
No Action	-

A change to the 'Acting on' setting takes effect the next time the transition occurs. For example, changing a GPI closed to open transition when the selected GPI is currently open is not executed until the next transition to open.

Note **A change in GPI open/closed state occurring when the device is disconnected from power will be acknowledged and executed when power is reconnected.**

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The current state (open/closed) is reported for all GPI settings on the front panel and in the Lake Controller software.

Table 6-5: Default GPI Configuration

GPI #	Default Option
GPI 1	No Action
GPI 2	No Action
GPI 3	No Action
GPI 4	No Action

5.9.3 Front Panel Controls

MENU > FRAME > FRONT

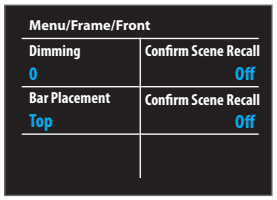

Figure 5-15: Front Panel Display Controls Menu

Dimming

To adjust the front panel LCD & LED brightness, select this option then use the rotary encoder to change the value.

Bar Placement

Change if the Frame Label, Faults & Warnings indication and menu tree navigation information bar should be in the top or bottom of display.

Confirm Scene Recall

Select if a confirm dialog should be displayed before a Scene Preset recall is done.

Confirm

Select whether a confirm dialog should be displayed before a Frame Preset recall is carried out.

5.9.4 Frame Preset Menu

MENU > FRAME PRST

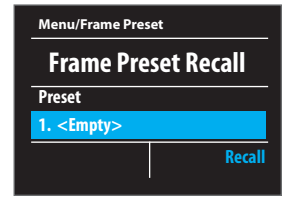

Figure 5-16: Frame Preset Menu

To recall an existing Frame Preset, use the rotary encoder to select the required Preset then press the RECALL button to overwrite the current configuration.

Note **Frame Presets must initially be created in the Lake Controller and stored as a Preset using the Lake Controller or the IMX Series Preset Manager.**

Up to 100 Frame Presets can be stored in the device. The data within a Frame Preset includes the configuration of all Modules in the Frame including input routers, input mixers, levels, crossovers, EQ, and output routing.

Frame Presets are stored within the device using the Lake Controller or can be distributed between devices and bank files using the standalone preset manager utility. Complete processor configurations can be recalled without connecting the device to a PC.

6. Back Panel Interface

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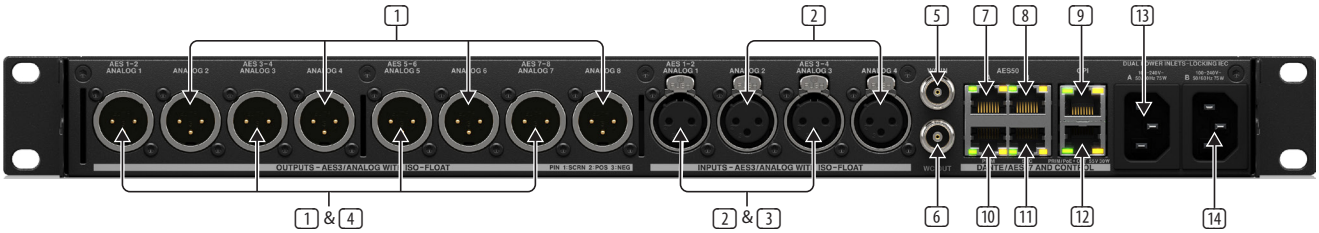

Figure 6-1: Back Panel Interface (LMX 48)

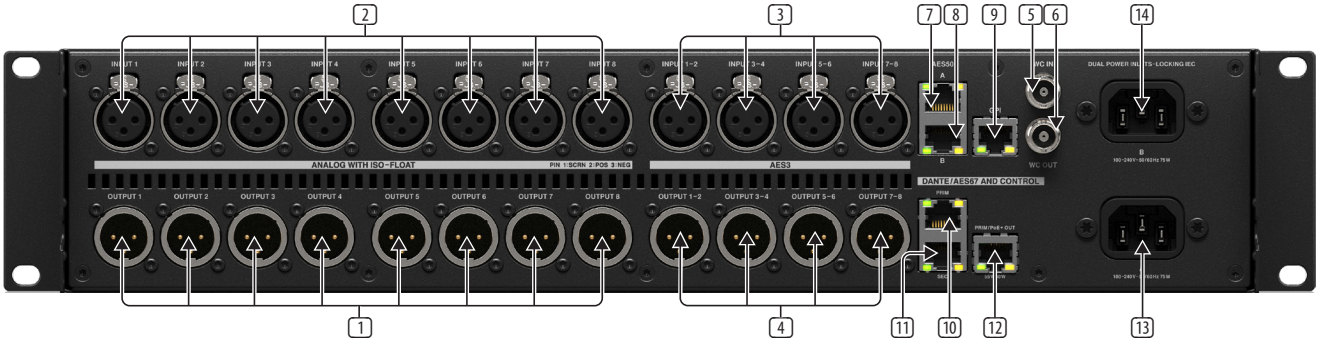

Figure 6-2: Back Panel Interface (LMX 88)

6.1 Analog Inputs and Outputs

6.1.1 Analog Input XLR Connections 2

The LMX88 has eight electronically balanced analog inputs provided by latching 3 pin female XLR sockets. These feature optional Lake iso-float, applicable to channels 1 – 4 and channels 5 – 8.

The LMX48 has four electronically balanced analog inputs, which are shared with the AES3 inputs. These feature Lake iso-float. The sockets are auto-sensing and connecting an AES3 input will automatically make the socket AES3. When an even socket is used for AES3 the odd socket can still be used for analog input.

The maximum input level accepted by the input pre-amplifiers without clipping is 26 dBu. To enhance its adaptability with a wide range of input signal amplitudes the LMX series utilizes gain-stacking, a technique involving multiple gain stages in its analog to digital converter (ADC). The gain-stacking functionality of the LMX devices involves two parallel converters in the signal path, allowing for a seamless automatic switch between high and low converters on the same ADC IC. This approach not only optimizes the dynamic range of the analog inputs, but also ensures the integrity of the digitalized signal by adapting the gain to the specific requirements of the input signal. This flexibility is particularly valuable in scenarios where signals may vary in amplitude, lowering the noise with low level signals.

6.1.2 Analog Output XLR Connections 1

LMX 88 has eight dedicated electronically balanced analog outputs provided via standard XLR3M connections. These can be set to Grounded or use Lake Iso-Float in pairs of Channel 1-4 and 5-8. Configured from Lake Controller or Front panel. See 6.1.5 for more information.

LMX 48 has eight shared (with AES3) electronically balanced analog outputs are provided via standard XLR3M connections. These can be set to Grounded or use Lake Iso-Float in pairs of Channel 1-4 and 5-8. Configured from Lake Controller or Front panel. See 6.1.5 for more information.The selection between Analog or AES3 is done in the Lake Controller Output Router, if both a AES3 and Analog Output is routed from a connector the output will be AES3 and a warning displayed in the Lake Controller output router. If only Analog is routed the output will be Analog, and a warning will be displayed in Lake Controller.

NOTE: When the odd connectors are used as AES3 inputs, the even numbers are still available for Analog.

6.1.3 Analog XLR Wiring and Pin Out

All XLR connections are wired to IEC268 as shown in Figure 6-3.

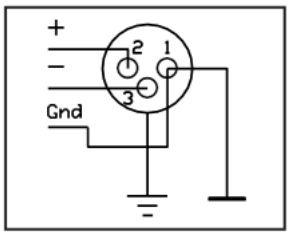

Figure 6-3: IEC268 XLR Wiring and Pin Out

Pin 1:	Ground / Shield
Pin 2:	Hot (+)
Pin 3:	Cold (-)

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6.1.4 Unbalanced Operation

Balanced connections are recommended where possible. However, if it is necessary to drive the device from equipment with an unbalanced output, wire the inputs as shown in Figure 6-4.

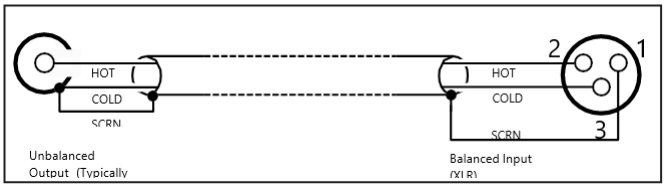

Figure 6-4: Balanced to Unbalanced Analog Wiring and Pin Out

The method shown in Figure 6-4 uses twin-and-screen (balanced) cable and standard XLR pin connections at the LMX Series device end, with the cold wire and the cable screen connected to the signal ground of the equipment at the source end.

This usually provides better noise and hum rejection than the more common method of joining pins 1 and 3 together in the XLR. However, if only a single-core (unbalanced) cable is available, the method shown in Figure 6-5 may be used.

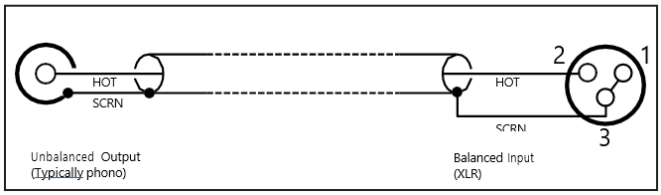

Figure 6-5: Unbalanced Analog Wiring and Pin Out

6.1.5 ISO-Float Electronic Balancing

The analog input and output electronic balancing circuits use the Lake Iso-Float system.

The Iso-Float technology 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-quality transformers and opto-isolators create a barrier between the device and possible grounding aberrations from the outside electrical environment.

Iso-Float settings are adjustable via the front panel menu or the Lake Controller software.

6.2 AES3 Digital Input and Output

6.2.1 AES3 Input XLR Connections 3

The LMX88 has four dedicated 3 pin female XLR sockets for eight AES3 inputs. The LMX48 has four AES3 inputs shared with the analog inputs on sockets 1 and 3, which automatically become AES3 when an AES3 signal is present.

6.2.2 AES3 Output XLR Connectors 4

The LMX88 has four dedicated 3 pin male XLR sockets for eight AES3 outputs.

The LMX48 has four 3 pin male XLR sockets to eight AES3 outputs, shared with the analog outputs on sockets 1, 3, 5 and 7.

Selecting whether a socket is used for analog or AES3 is done in the output router configuration in the Lake Controller. By default, the sockets are used for analog outputs. When sockets 1, 3, 5 and 7 are used for AES3 2, 4, 6 and 8 can still be used for analog outputs.

6.3 Word Clock Input and Output

6.3.1 Word Clock Input 5

Word clock input on female BNC connector with selectable 75 Ohm Termination available from Front panel or Lake Controller. Word clock input can be used to syncronize any of the internal Clocks.

6.3.2 Word Clock Output 6

Word Clock output on female BNC connector. Any on the onboard clocks can be output on the Word Clock output at any rate.

6.4 RJ45 Connections

There are three RJ45 sockets on the rear panel: two Primary 10 & 12 and one Secondary 11 for use with Dante, AES67 and for control use (in addition there is also one Primary and one Secondary on the front panel). These five RJ45 contacts can be used as a switch when the LMX device has Dual Redundancy disabled, and all sockets work the same.

When Dual Redundancy is enabled, the Primary and Secondary sockets are on separate VLANs, and Primary must only be connected to other devices using the Dante Dual Redundancy feature and be connected to the Primary network. The same goes for the Secondary network ports that should only be connected to other Secondary ports in the network.

Primary ports 12 also has PoE+ (802.3at Type 2) and can deliver 25W. This can be used, for example, to power a wireless access port. If it is used in this way, then it cannot be used for Dante Multicast streams. The PoE is enabled in the front panel of the device, or from the Lake Controller. It can be configured if the PoE should continue to be on when the device is in Standby.

The switched 100/100 Base-T network connections auto-sense whether standard or crossover Cat-5e cables are in use. The green ACT LED illuminates (flashes) to show network activity, and when a 1 Gbps connection is present; the orange LED illuminates (static) to indicate a 1 Gbps connection.

If it is necessary to make up custom Cat-5e network cables, use pinout described in table 6-1.

Pin No.	Color
1	Brown
2	Brown + White
3	Green
4	Blue + White
5	Blue
6	Green + White
7	Orange
8	Orange + White

Table 6-1: RJ45 Wiring & Pin Out Description

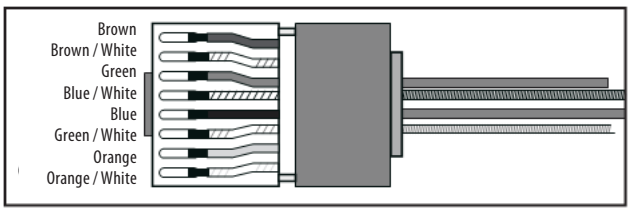

Figure 6-10: RJ45 Wiring and Pin Out Diagram

When the device is connected to an active network, the yellow LINK LED illuminates above the connector in use. Data activity on the network is indicated by illumination of the green ACT LED. It is normal for the ACT LED to flicker either sporadically or continuously.

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6.5 AES50 Input and Output

Interface A 7 and Interface B 8 AES50 RJ45 ports can each act as a master or slave independently.

Receive Configuration

There are 24 AES50 receivers, which are configurable to receive any channel from either AES50 interface A or B. These are then assigned using the input router in a similar way to Dante channels. The AES50 receivers are configured in the AES50 receive configuration view in Lake Controller.

Transmit Configuration

There are 24 AES50 transmitters, which are configured in the output router. They can be assigned in the AES50 transmit configuration view in the Lake Controller.

6.6 GPI Connection

General Purpose Input (GPI) are provided on one standard RJ-45 9 allowing interface to external devices such as fire alarm systems for emergency muting, input configuration changes, processor power control, or Scene preset recall. The wiring is the same as in Figure 6-11, and Table 6-2 describes the pinout configuration for the GPI connector.

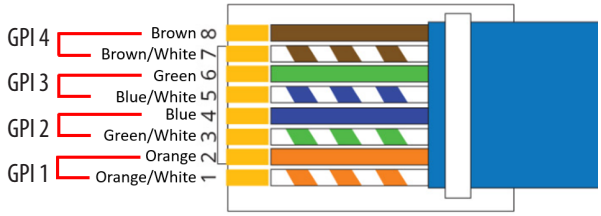

Figure 6-11: GPI Pinout Wiring Diagram

Table 6-2: GPI Pinout Wiring Reference

Cable Number	Color	GPI
1	Orange	1
2	Orange + White	1
3	Green + White	2
4	Blue	2
5	Blue + White	3
6	Green	3
7	Brown + White	4
8	Brown	4

GPI state can be monitored via the front panel or Lake Controller software. Configuration is via the Lake Controller software. Please refer to Lake Controller Operation Manual for information on adjusting via software interface.

6.7 Redundant Universal Power Supply Connectors 13 14

Two universal power supplies capable of accepting 70-265 V ~ 50-60 Hz: 75 W are built into the devices. The LMX Series has dual redundant IEC sockets, which can accept locking and standard IEC cables.

The power supply must be connected to AC mains using a power cable with a correctly wired and molded plug for the country of operation. LMX devices work with either or both Mains A 13 or Mains B 14 connected, and both can be connected simultaneously for seamless fallback if either mains power is lost for critical operations where power redundancy is preferred. There is also an optional warning that can be enabled from the front panel menu or Lake Controller if either socket loses power. This makes it easy to see if power is lost on a power grid expected to have power. There is an additional service warning if either PSU malfunctions when mains is connected.

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7. Appendix

7.1 Faults and Warnings Overview

Fault or warning conditions are indicated by the LEDs and brief textual description of the fault or warning is provided on the display. Table 7-1 lists all Faults and Warnings and what may have triggered each fault or warning condition.

Table 7-1: Warning, Fault and Mute Indications

Faults

LMX Display	Lake Controller	Lake Controller Event Log	Description
PROTECTIVE MUTE	PROTECTIVE MUTE	Protective mute via GPI	Protective mute trigged through GPI. All outputs from the device are muted. Unmute via GPI or through a Reset (Mesa, Contour, Contour/Mesa or Factory reset)
OVERTEMP	OVERTEMP	Temp fault: DSP area	The temperature has reached 85°C (185°F). Take additional steps to reduce temperature. Audio is not muted, but continued operation is not guaranteed.
FPGA B FAULT	FPGA B FAULT	Frame Fault: FPGA B communication	There is a internal communication issue. Power cycle device, if still an issue send the device for service.
FPGA B UPD FAIL	FPGA B UPD FAIL	Frame Fault: FPGA B update failed	There is a internal communication issue. Power cycle device, if still an issue send the device for service.
I2C COMM FAULT	I2C COMM FAULT	Frame Fault: I2C communication	There is a internal communication issue. Power cycle device, if still an issue send the device for service.
NO INPUT	NO INPUT	No input source	There is a Input router used that for the Module that does not have a valid input.
INPUT CLIP	INPUT CLIP	N/A	Input Clip, reduce signal level
MOD. CLIP	MOD. CLIP	N/A	Module Clip, reduce signal level
IN RTR MUTE	IN RTR MUTE	Input Router X Mute	All Input Routers used for the Module Input are muted
MOD. IN MUTE	MOD. IN MUTE	Module input mute	Module Input enabled
MOD. OUT MUTE	MOD. OUT MUTE	Module output mute	Module Input enabled

Warnings

LMX Display	Lake Controller	Lake Controller Event Log	Description
FPGA B UPDATE	FPGA B UPDATE	Frame warning: FPGA B is updating	FPGA B is updating, please wait and let the device update the internal components.
PSU-B SERVICE	PSU-B SERVICE	Frame warning: PSU-B Service	There is a problem with the power supply B for the device. The device can still be powered with PSU A. Send the device for service.
PSU-A SERVICE	PSU-A SERVICE	Frame warning: PSU-A Service	There is a problem with the power supply A for the device. The device can still be powered with PSU B. Send the device for service.
PoE SERVICE	PoE SERVICE	Frame warning: PoE Service	There is a problem with the Power Over Ethernet circuit. The device can still be used without PoE. Send the device for service.
NAME CONFLICT	NAME CONFLICT	Dante device name conflict	Dante Device name conflict, Dante will not work properly. Set a new Dante Device Name in Lake Controller or Dante Controller.
TEMP WARNING	TEMP WARNING	Temp warning: DSP area	The temperature has reached 70°C (158°F). Monitor the temperature and take additional steps to reduce temperature if it continues to increase.
DANTE FAILSAFE	DANTE FAILSAFE	Dante module in failsafe	Dante Module is in FailSafe, please follow the Dante Failsafe Recovery Guide.pdf found in the Documents folder.
DANTE INVALID	DANTE INVALID	Dante module is invalid	Dante Module unresponsive, but present. Perform a firmware update, if issue still persist send in for service.
DANTE SPI FAULT	DANTE SPI FAULT	Dante module SPI fault	Dante Module communication failed. Power cycle device.
DANTE DISABLED	DANTE DISABLED	Dante module disabled	Dante Module Disabled, remove any Dante Lock or DDM settings and see if this rectify the issue. Perform a new firmware update.
DANTE INCOMPAT	DANTE INCOMPAT	Dante firmware incompatible	Dante Module firmware is not compatible, perform a new firmware update with LakeUpdate utility.
DANTE SERVICE	DANTE SERVICE	Dante module needs service	The device cannot detect a working Dante Module. Send the device for service.
CLOCK SLIPPING	CLOCK SLIPPING	Clock Slipping	The selected digital clock and digital input combination is not aligned. Verify digital input configuration to ensure all clock settings match or if the Sample Rate converter need to be enabled for the input.
A/D 1-8 SERVICE	A/D 1-8 SERVICE	Frame warning: Analog In Ch 1-8 power supply service	There is a problem with both the power supply's for the Analog Inputs ch1-4+5-8. These will not be available. Send the device for service. (*LMX 88 only)
A/D 1-4 SERVICE	A/D 1-4 SERVICE	Frame warning: Analog In Ch 1-4 power supply service	There is a problem with the power supply for the Analog Inputs ch1-4. These will not be available. Send the device for service.
A/D 5-8 SERVICE	A/D 5-8 SERVICE	Frame warning: Analog In Ch 5-8 power supply service	There is a problem with the power supply for the Analog Inputs ch5-8. These will not be available. Send the device for service. (*LMX 88 only)
D/A 1-8 SERVICE	D/A 1-8 SERVICE	Frame warning: Analog Out Ch 1-8 power supply fault	There is a problem with both the power supply's for the Analog Outputs ch1-4+5-8. These will not be available. Send the device for service. (*LMX 88 only)
D/A 1-4 SERVICE	D/A 1-4 SERVICE	Frame warning: Analog Out Ch 1-4 power supply fault	There is a problem with the power supply for the Analog Outputs ch1-4. These will not be available. Send the device for service.
D/A 5-8 SERVICE	D/A 5-8 SERVICE	Frame warning: Analog Out Ch 5-8 power supply fault	There is a problem with the power supply for the Analog Outputs ch5-8. These will not be available. Send the device for service. (*LMX 88 only)
FAN SERVICE	FAN SERVICE	Frame Fault: Fan Fault	There is a problem with one or both fan(s) on the device. To avoid overheating, identify and fix the problem immediately.
PSU-B <70V	PSU-B <70V	Frame Warning: Mains on PSU-B <70V	Mains for PSU B is below 70 Volts (*Optional Warning)
PSU-A <70V	PSU-A <70V	Frame Warning: Mains on PSU-A <70V	Mains for PSU A is below 70 Volts (*Optional Warning)
N/A	OFFLINE	Frame Offline	The Lake Controller cannot detect the device on the network. Check network connectivity.
CTRL OFFLINE	N/A	N/A	The device cannot detect any Lake Controller on the network. Check network connectivity.

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7.2 Maintenance

During normal operation these devices provides trouble-free service. If the front panel display requires cleaning, use a soft cloth only; do not use solvent cleaners. Clean the dust filters to ensure maximum airflow through the device, which is front to back.

Disconnect the unit from mains power prior to removing dust the filter and ensure the dust filter is replace prior to turning the unit back on.

Do not use sharp or metal objects to remove the dust filter and be careful that the implement used to remove the filter does not enter the device.

In extreme cases it may be necessary to clean the inside of the device. This procedure should only be carried out by qualified service personnel. This may be necessary if the device has had prolonged operation in an extreme environment such as one where cracked oil smoke machines are in use. If the device is used in extreme conditions, it is recommended to have it serviced every three years as a preventative measure.

7.3 Factory Default Settings

7.3.1 Module Defaults

Module Type:	8 x Mesa EQ
Gain:	0 dB (unity)
Delay:	0 ms
Polarity:	Positive (In phase)
MaxRMS:	20 dB
MaxPeak:	21 dB
Input & Output EQ:	Flat

7.3.2 Input and Router Defaults

Autoselect:	On
Input sensitivity:	+26 dBu
Dante:	Disabled
AES3:	Terminated
Iso-Float:	Enabled

7.3.2.1 Router Defaults (LMX 88)

Router 1:	Dante 1 as Priority 1, AES3 (Ch.1) as Priority 3, Analog 1 as Priority 4
Router 2:	Dante 2 as Priority 1, AES3 (Ch.2) as Priority 3, Analog 2 as Priority 4
Router 3:	Dante 3 as Priority 1, AES3 (Ch.3) as Priority 3, Analog 3 as Priority 4
Router 4:	Dante 4 as Priority 1, AES3 (Ch.4) as Priority 3, Analog 4 as Priority 4
Router 5:	Dante 5 as Priority 1, AES3 (Ch 5) as Priority 3, Analog 5 as Priority 4
Router 6:	Dante 6 as Priority 1, AES3 (Ch 6) as Priority 3, Analog 6 as Priority 4
Router 7:	Dante 7 as Priority 1, AES3 (Ch 7) as Priority 3, Analog 7 as Priority 4
Router 8:	Dante 8 as Priority 1, AES3 (Ch 8) as Priority 3, Analog 8 as Priority 4
Routers 9 – 16 are unassigned.	

7.3.2.2 Router Defaults (LMX 48)

Router 1:	Dante 1 as Priority 1, AES3 (Ch.1) as Priority 3, Analog 1 as Priority 4
Router 2:	Dante 2 as Priority 1, AES3 (Ch.2) as Priority 3, Analog 2 as Priority 4
Router 3:	Dante 3 as Priority 1, AES3 (Ch.3) as Priority 3, Analog 3 as Priority 4
Router 4:	Dante 4 as Priority 1, AES3 (Ch.4) as Priority 3, Analog 4 as Priority 4
Router 5:	Dante 5 as Priority 1, AES3 (Ch.1) as Priority 3, Analog 1 as Priority 4
Router 6:	Dante 6 as Priority 1, AES3 (Ch.2) as Priority 3, Analog 2 as Priority 4
Router 7:	Dante 7 as Priority 1, AES3 (Ch.3) as Priority 3, Analog 3 as Priority 4
Router 8:	Dante 8 as Priority 1, AES3 (Ch.4) as Priority 3, Analog 4 as Priority 4
Routers 9 – 16 are unassigned.	

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7.4 Glossary of Terms, Acronyms and Abbreviations

The explanations given in Table 8-3 below are based on the specific use of each term in this manual. The definitions are not intended to be exhaustive and many of these terms have wider meanings.

Table 8-3: Glossary of Terms, Acronyms and Abbreviations

Term	Description
100/1000 Base-T	100/1000 Base-T is IT industry-speak for different standards of Ethernet network. This term incorporates 100 Base-TX, which operates at 100 Mbps, and 1000 Base-T which operates at 1000 Mbps (1 Gbps).
Access Point	See Wireless Access Point.
AES50	Is a point-to-point topology digital audio network protocol, using the Ethernet physical layer on standard CAT5 cables. It supports cable lengths of up to 100m and up to 48 channels in 48kHz. The latency is deterministic and extremely low with 63 µs.
Auto-Sensing	The Ethernet ports automatically determine the base speed of the network they are connected to (10 Base-T or 100 Base-T) and configure themselves appropriately. This is termed auto-sensing.
Auto-Uplink	The Ethernet ports can operate with either straight or crossed network cables. This ability to connect correctly with either type is termed auto-uplinking.
Auxiliary Output	Some of the configurations possible in the Lake processing system Modules result in a single audio processing channel being created in addition to a crossover. This is termed an Auxiliary output.
Backbone	Large Ethernet networks are often implemented with a very high speed "trunk" part of the network topology feeding main switches, which in turn support smaller, lower-speed local networks. The term backbone is used to describe such a trunk.
Bandwidth	The bandwidth of a signal channel or interconnection is the range of frequencies it is able to handle. The term can be applied to both audio channels and Ethernet networks.
Cat-5e/Cat-6, etc.	Designations of industry-standard cables suitable for Ethernet networks using four twisted pairs of conductors. Often referred to as UTP cable (Unscreened Twisted Pair). Cat-5 has generally been replaced by Cat-5e (e = 'enhanced'). Either Cat-5e or Cat-6 cable are suitable for networking Lake and Lab.gruppen devices.
Chain	An Ethernet network comprising several devices interconnected using the Secondary connectors to daisy-chain the units together is an example of a network with a chain topology.
Clock	Digital audio is produced by sampling analog audio at a known, fixed rate, controlled by some form of master clock. Problems can occur when interconnecting two pieces of digital audio equipment if their internal master clocks are not synchronized. Various techniques may be employed to ensure that this is the case, either locking the internal to the externa incoming or using the ASRC.
Contour	Terminology given to a Frame or Module that denotes it is configured as a Loudspeaker Processor, normally featuring crossovers and multiple outputs fed from the same input.
Crossed Network Cable	An Ethernet cable in which four of the eight conductors (pins 1, 2, 5 & 6) are not wired pin-to-pin. Such a cable is required in conventional IT networks to connect two PCs together without using a hub or switch. The auto-uplink feature of the Ethernet ports allows crossed cables to be used if wished. See also Straight network cable.
Dante	A new-generation audio data protocol developed by Audinate® Pty Ltd, allowing multichannel high-resolution digital audio plus control data to be transmitted via standard IT-industry networks using TCP/IP data packets. The Lake processing system integrated within the LMX Series device includes a dual-redundant Dante network interface, providing digital audio inputs and outputs via Ethernet.
dBu	dBu's are usually used instead of voltages to describe signal levels in audio systems. A signal level of 0 dBu may be taken as 0,775 Vrms.
Delay	Up to two seconds of delay may be added to the input and/or output channels to time-align loudspeaker arrays.
Digital Gain Offset	Digital gain offset is effectively a 'fine' gain adjustment performed in the digital domain, which can be applied to digital input signals to optimize the signal to the gain structure.
Distribution Amplifier	A distribution amplifier (usually abbreviated to DA) is an audio buffer stage – usually with zero gain – with one input and several outputs. Mono, stereo and AES3 digital versions can be obtained. Use of a DA to feed a signal to several destinations ensures correct impedance matching and isolation between source and destinations.
Dual-Network Topology	A network topology consisting of two (usually) identical networks, one connecting to the Primary Ethernet ports and the other to the Secondary ports. Although more complex to implement, the advantage of using a dual-network system is one of greatly improved reliability as one complete network remains operational if the other should fail.
Dynamic Function Buttons	The six buttons around the front panel display are termed dynamic function buttons because their function varies depending upon which display page is currently on-screen.
Electronic Balancing	In the analog domain, balanced inputs and outputs may be provided on audio equipment either by the use of transformers (traditional, very good, but heavy and expensive) or via electronic balancing circuits (nearly as good, without full electrical isolation, but a great deal cheaper).

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Term	Description
Event Log	The details of any fault or warning conditions which arise in the device during operation are recorded in a data file created by the Lake Controller software called the Event Log.
Fault	A Fault in the device occurs when one of the operating parameters exceeds pre-determined safety levels, or when a condition is detected that otherwise seriously affects the performance. Some fault conditions may result in one or all of the channels being muted.
FIR Filter	Finite Impulse Response Filter. An alternative design of crossover filter realisable in the digital domain, providing linear phase characteristics. FIR filtering is provided in all Lake devices.
Floating	An analog balanced input or output is said to be floating when full electrical isolation exists between that input or output and the equipment connected to it. Transformer-coupled inputs and outputs are inherently floating. Electronically balanced inputs and outputs can never be truly floating, though better designs – such as that found in LMX Series devices - do mimic the characteristics of transformer- coupled designs to a high degree.
Frame	Lake terminology for a physical unit containing a Lake processing system (i.e. a single LMX or PLM+ Series device, or legacy Lake Processor).
Frame ID	An electronic identification 'label' which can be given to each Frame in an amplification system. Naming Frames in a large system is desirable as it simplifies identification in the Lake Controller.
Frame Preset	Frame Presets are a class of Presets within the Lake processing system. Up to 100 can be stored in the hardware device, and each holds the complete configuration of all Modules and the Modules' internal settings.
Gigabit Ethernet	Describes the speed of Ethernet data transfer for devices that transmit Ethernet frames at a rate of a gigabit per second, as defined by the IEEE 802.3-2008 standard.
GPI	The General Purpose Input (GPI) port on a LMX Series device allows input communication with external devices for certain functions.
Hub	A type of network interface device with multiple Ethernet ports. Data arriving at any port is sent to all others. Hubs have been largely replaced by Switches.
Input Level	The amplitude of an audio signal at the point where it is applied to the input of the device, or at the input of an intermediate stage within it. An analog input signal level will be expressed in dBu's, while a digital input signal level in dBFS (dBs below digital clip level; FS = fullscale)
Input Router	The Input Router allows automatic or manual selection of any device input to be allocated to a Module Input or directly to any output. The Input Router is effectively an intelligent digital patch bay & automated switch that can seamlessly failover to up to four levels of inputs in the event of digital signal loss. The output from the router is the input signal from a valid input with the highest priority.
IP Address	Every item of equipment connected to an Ethernet network has a unique address called the IP address, so that data gets to the correct place. IP addresses are written as four groups of three decimal numbers between 0 and 255. In a system consisting of Lake Processors and a Lake Controller they are assigned and detected automatically.
IP Subnet Mask	IP subnet masks are required in all IP networks. The subnet is determined by the size and type of network being used. For small networks (less than 254 addresses) a subnet mask of 255.255.255.0 can be used. (A Class C network).
Iso-Float	Iso-Float is Lake's proprietary method of electronic balancing, which provides a particularly high level of isolation and immunity from ground loops.
Lake Controller	The Lake Controller is the software application used to control LMX and other Lake processors. This software application provides additional functionality and allows various grouping functions for simultaneous control of multiple Lake Processing- enabled devices.
Latency	The small but finite delay incurred by audio signals when they are transformed into the digital domain, processed digitally and then converted back into analog signals. In the Lake system, latency is assured to be constant.
Legacy Lake Device	This term refers to older Lake audio equipment which may form part of an audio system (i.e. Lake Contour Pro 26, Lake Mesa Quad EQ and the Dolby Lake Processor). The Lake Controller V6 and upwards does not support control of legacy Lake products.
LimiterMax	LimiterMax is the name given to Lake's proprietary package of dynamics control which forms part of the Lake Processing system.
Line Driver	An analog audio amplifier, usually with zero gain, having very low output impedance and high drive capability. They are used for transmitting balanced analog audio over very long cables.
Linear Phase Crossover	See FIR Filters
MAC Address	In addition to an IP address, every device on an Ethernet network has a MAC address. This address is fixed at the time of manufacture and is effectively the permanent identifier of the physical unit. MAC stands for Media Access Control
MaxPeak	Lake's LimiterMax provides independent dynamics control over signal peaks (MaxPeak) and the average signal level (MaxRMS).
MaxRMS	See MaxPeak.
Mesa or Mesa EQ	Terminology given to a Frame or Module that denotes it is configured as a System EQ Processor, providing HPF/LPF, EQ & Levels functionality (no crossovers). Often configured with a single input to single output routing.

Term	Description
Module	Module is the term used in the Lake Controller to describe the virtual set of signal processing that routes an audio input to the various frequency-weighted outputs of a crossover. The processing system within the device allows for two Modules, each of which may be assigned a range of crossover configurations, input sources, etc.
Module Preset	A class of Preset within the Lake processing system. A Module Preset (Module file) contains all the configuration data and settings for one Module, and is saved in the Lake Controller software, not in the hardware device.
Offline	A device on an Ethernet network which is not communicating with the rest of the network either due to a fault or intentionally is said to be offline.
Online	A device on an Ethernet network which is fully operational and communicating with the rest of the network is said to be online.
Parallel	Two or more e.g. inputs which are wired together so that all inputs are connected to the same source are said to be paralleled. Signal levels will be reduced if too many inputs are paralleled; in the case of AES3, this may result in a complete loss of audio.
Parameter	Any control function which can be adjusted by the user to one of several different values is termed a parameter. For example, input level, gain, delay, and limiter threshold are all parameters.
Pass-Through Cable	See Straight network cable.
Ping	Ping is a term coined by the IT industry to the procedure of sending a command over a network to a particular Ethernet device asking it to confirm its identity and possibly reply with additional information. Thus an Lake device on the network can be pinged from the Lake Controller; on receipt of the 'ping', the hi-intensity white LED on the front panel or around the display are illuminated. Reverse pinging is also possible, whereby the ping is instigated from Lake hardware device and a visual identification of the processor registers in the Lake Controller software.
PoE	Power over Ethernet can pass electric power along with data on twisted-pair Ethernet cabling. This allows a single cable to provide both data connection and electrical power to devices such as wireless access points (WAPs)
Preset	A complete frame configuration that is stored in the device hardware.
Primary Ethernet Port	The Primary Ethernet port on the is the means of connecting the device to a network. See also Secondary Ethernet Port.
PSU	Abbreviation of Power Supply Unit. The PSU in any item of electronic equipment converts the AC mains into a set of internal DC voltages which run the electronic assemblies themselves.
RJ45	RJ45 connections are the industry-standard connectors for Ethernet ports.
Router	As far as networks of the type discussed in this manual are concerned, see Switch. For a description of the term Input Router used on Lake devices, see Input Router.
Scene	A Scene preset is a preset that store the settings of the Input routers, Input Mixers and Dante Receivers. A Scene preset recall does not affect the Module settings of the frame.
Secondary Ethernet Port	The Secondary Ethernet port can be used either as a daisy-chain output, when Dante Dual Redundancy is disabled, repeating the network connection at the Primary port, or for the connection of a separate second network for full redundancy, when Dual Redundancy is disabled.
Star Topology	A network topology which uses a network switch to connect to individual Lake devices. Each device connects to one port on the switch with its own cable, thus the network looks like a star when drawn as a diagram with the switch at the center.
Straight Network Cable	A Cat-5/6 network cable with full pin-to-pin connections is called a straight network cable. Lake devices can connect to a network using either straight or crossed network cables.
Subsystem	It is possible when working with large networked systems to store selected components of the system into a Subsystem. This is useful if working on a tour that encompasses both large and mid-sized venues. The same core Lake Controller data can then be used for a reduced number of Lake devices.
Switch (Ethernet)	An Ethernet switch allows several Ethernet devices to be connected to a network using a star topology. More intelligent than the earlier hubs which they now largely replace, they route packets of data only to the units for which they are intended, and perform other system housekeeping and control functions.
System Preset	A class of Preset within the Lake Processing system, System Presets allow Module or Frame configurations and settings to be stored for the entire network frames.
Tablet PC	A compact PC which uses a touchscreen instead of keyboard and mouse. The Lake Controller has been optimized for use on Tablet PCs.
Termination	AES3 digital audio interconnections must be correctly terminated for reliable operation. The 110 ohm terminations must be set 'on' at the beginning and end of a set of daisy-chained digital audio equipment, and 'off' at any intermediate ones.
Topology	A mathematical word for "arrangement" or "configuration". The topology of a network is a means of visualizing the overall configuration of the network.

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Term	Description
Universal Power Supply	A power supply that operates in all countries, without the need for manual adjustment, as long as the voltage falls within the specified range for the device.
Vrms	The RMS voltage of a signal. See RMS.
Wireless Access Point	A device used to connect a computer to an Ethernet network without cables; a radio transmitter/receiver for data.
Wireless Network	An Ethernet network where some or all cabled connections are replaced by wireless links.

8. Application Guide

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8.1 Gain Structure

The LMX 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. The signal flow diagrams in chapter 5 provides a useful reference for the signal path. The following sections describe the various adjustment points, all of which are available via the Lake Controller software.

8.1.1 Input Headroom (Analog Inputs)

LMX devices have a fixed Analog Input Headroom of 26 dBu. but is utilizing gain-stacking of two different Analog inputs with automatic switch between high and low converter.

8.1.2 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, or muted.

To adjust, navigate to I/O CONFIG and tap the Input Mixer blocks for the Module in the Lake Controller. Please refer to the Lake Controller Operation Manual for further details.

8.1.3 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.

To adjust, navigate to MODULES > EQ/LEVELS > LEVELS in the Lake Controller. Please refer to the Lake Controller Operation Manual for further details.

8.1.4 Module Output Gain

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 (Contour configuration) or the Module output level (Mesa configuration).

1. Factory Gain is set by the system designer and can be hidden within the Module file. The Factory Gain parameter is only accessible when the Module is unlocked and the Lake Controller is in Designer Mode. Adjust via MODULES > LEVELS > METER OPTIONS > ADJUST FACTORY.
2. User Gain is editable by a user unless the system designer has locked away the parameter; adjust via MODULES > LEVELS.

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

8.2 Gain / Level Optimization

8.2.1 Maximize Volume Capacity

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.

8.2.2 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.

8.3 Digital Audio Connections

Whenever possible, it is preferable to connect a digital rather that analog input signal to the device. This is particularly relevant if the source signal is already in the digital domain, such as the source from a digital mixing console or digital distribution system. The primary cause of signal distortion and signal delay (latency) is the digital-to-analog and analog-to-digital conversion process. Therefore, using digital inputs normally provides higher quality audio with lower latency.

Three types of digital audio inputs are available: Dante networked multi-channel digital audio, AES50 and digital audio via AES3. Dante-based system configurations and interconnections are explained in a separate document, the Lake Network Configuration Guide.

The information in this section is supplied for users unfamiliar with AES3. Users already familiar with AES3 will find that the device conforms to established conventions.

8.3.1 AES3 Digital Audio

The original AES/EBU digital audio interface standard was developed by the Audio Engineering Society in conjunction with the European Broadcast Union. Originally published in 1985, it was revised in 1992 and 2003, and in its current iteration it is properly designated the AES3 standard.

AES3 is a serial transmission format for linearly represented (uncompressed) digital audio data. It describes a method for carrying two channels of periodically sampled and uniformly quantized audio signals on a single twisted-pair cable.

The data format allows for auxiliary data which can be used for information on signal characteristics as well as the sampled audio data. The physical interconnection, as defined by IEC 60958 Type I, specifies three-conductor 110-ohm twisted pair cabling terminated by an XLR connector. Please refer to section 6.2 for wiring details.

AES3 provides for multiple sampling rates and resolutions of up to 24 bits; this device accepts sample rates from 44.1 to 192 kHz. The LMX series has asynchronous sample rate converters for each AES3 input. This is enabled by default but can be bypassed in the clock configuration view in Lake Controller for synchronous operation.

8.3.2 System Latency and Delay Compensation

All types of digital audio processing inherently involve a small processing delay referred to as latency. If the processing chain does not involve analog-to-digital or digital-to-analog conversion, the amount of latency is usually very small and often may be disregarded.

However, in complex systems involving multiple digital audio components and connections, enough delay may be generated to cause audio phasing problems. Therefore, the lowest latency is always preferred, and it is always important to consider system latency delays when calculating and adjusting overall delay for time-aligning multiple loudspeaker systems.

8.3.3 External Signal Distribution Hardware

8.3.3.1 Distribution Amplifiers

Dedicated distribution amplifiers for AES3 signals are available from several manufacturers. The most common format is one input and six outputs. Digital distribution amplifiers are designed to refresh or reconstruct the signal as well making up for line losses.

One type of distribution amplifier is a simple repeater, which restores the waveform shape and brings the signal amplitude back up the required level. Some distribution amplifiers also offer a re-clocking feature, which also re-times the signal to prevent signal degradation from clocking errors known as jitter.

Distribution amplifiers that offer re-clocking often make the feature optional as using re-clocking can introduce small additional amounts of latency, so should not be used unless necessary.

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8.3.3.2 Passive Splitters

In some limited applications, a single AES3 input may be split into two signals using a simple passive splitter. Splitters provide a convenient and low cost solution when only one additional signal is required, and in situations where cable lengths are short. Attenuation is minimal, but there is no refreshing of the signal.

8.3.4 Additional Reference Material

Complete technical information on the AES/EBU (AES3) standard can be downloaded from the AES web site at http://www.aes.org/publications/standards/.

8.4 Digital Clock Configuration

8.4.1 Digital Clock Overview

All digital inputs have a new high performance low latency asynchronous sample rate converter (ASRC) enabled by default, making it possible to connect digital inputs with the same simplicity as analog inputs. The device is also equipped with a configurable digital clocking system. There are three separate digital clocks which can generate various independent internal sample rates, or can sync to an incoming Dante, AES50 or AES3 signal. The ASRC can be manually bypassed for synchronous operation in the clock configuration view in Lake Controller.

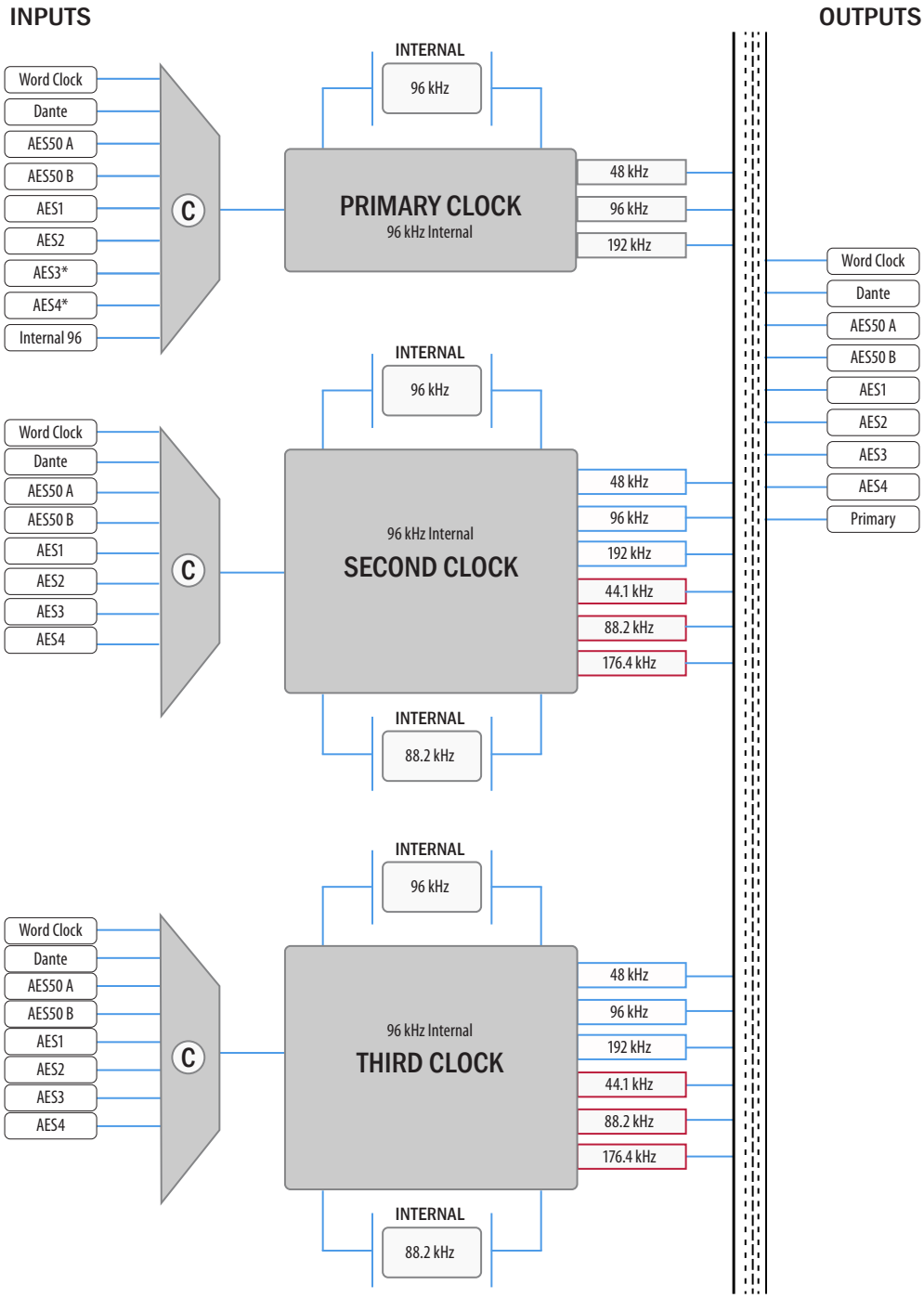

Figure 8-1 shows the various sample rates and options available. *Only applicable on LMX 88

8.4.2 Clock Source Priorities

There are two options for Primary clock source configuration:
Manual Configuration or Automatic Detection.

Second and third are always manual.

For Manual Configuration, the selected internal or external clock source remains fixed regardless of whether a compatible clock signal is preset.

For Automatic Detection, the most appropriate clock matching the selected base-rate is automatically selected according to the following priorities.

1. Word Clock
2. Dante
3. AES50 A (when enabled and set to Slave)
4. AES50 B (when enabled and set to Slave)
5. AES3 (Input 1 & 2)
6. AES3 (Input 3 & 4)
7. AES3 (Input 5 & 6 (LMX 88 Only))
8. AES3 (Input 7 & 8 (LMX 88 Only))
9. Internal Clock at 96 kHz

When using manual configuration, if the manually configured clock source is lost, the device will automatically switch to the internal clock temporarily but will switch back to the manually configured clock once it returns.

Please refer to the Lake Controller Operation Manual for additional information.

8.4.3 Word Clock

Word Clock is a clocking system that is embedded into digital audio signals to ensure that they are sample accurate. Typically, one unit in a system is designated as the master, and all other connected units are slaved to its clock. It is important that the end of the chain is terminated (termination selection available).

Word clock should not be confused with Timecode, which is time rather than sample rate based.

8.4.4 Dante Clock Configuration

Dante uses its own digital clocking technology across the Ethernet network to ensure that all Dante devices are synchronized. As part of this logic, an order of priority is defined to identify which device becomes the Dante Master. A Dante-capable device with a valid BNC Word Clock is chosen as the highest priority, followed by a device with a valid AES50 or AES3 signal then an internally generated clock.

Dante only operates at 48 kHz or 96 kHz, and either of the three clocks can be used for Dante, or the LMX device can be configured to lock to the incoming clock from Dante. From the Clock Configuration Dante/AES67 tab select whether the LMX device should be in the default Syncronous mode, or a asynchronous mode and which domain should be overridden when Dante is Follower. If Dante is in sync with the Primary clock, it can be manually set to Synchronous Primary. Any of the Clock domains can also manually be configured to Dante in the Clock Domain Config, then no further configuration is needed in the Clock Configuration Dante tab. All Clock Configuration is done from Lake Controller, see Lake Controller Operation Manual for further information.

When the LMX is Dante Leader, select whether the onboard Dante module should sync to the Primary clock (synchronous), or any of the other clocks in asynchronous mode, or if the LMX should sync to the Dante module.

8.4.5 AES50

AES50 is a multichannel point-to-point audio-over-ethernet protocol, defined by the AES50-2011 standard. It allows a maximum of 48 bi-directional full duplex signals to be transmitted over CAT5 cable to distances of up to 100 meters at a rate of 100 Mbit/second physical layer. It is not possible to connect AES50 CAT5 to a Ethernet switch.

Sample rates of 48 kHz and 96 kHz are supported, with 48 channels in 48kHz and 24 channels in 96kHz.

Pin No.	Description
1	Audio Data Transmit +
2	Audio Data Transmit -
3	Audio Data Receive +
4	Sync Transmit +
5	Sync Transmit -
6	Audio Data Receive -
7	Sync Receive +
8	Sync Receive -

Figure 8-2: AES50 Wiring Configuration

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8.4.6 Signal Processing Latency

The information in Table 8-1 lists the total latency for common input-output configurations when Pass-thru and when the audio passes through the Module processing.

Table 8-1: Latency for Common I/O Configurations

Total Latency (ms)

Input Config	Output Config	Pass-thru (direct route)	via Module (Mesa)
Analog	Analog	0.288	1.027
Analog	48 kHz sync	0.399	1.143
Analog	96 kHz sync	0.197	0.936
Analog	AES50 96 kHz sync	0.255	0.994
48 kHz sync	Analog	0.497	1.237
48 kHz sync	48 kHz sync	0.611	1.351
48 kHz. async	Analog	0.505	1.244
48 kHz. async	48 kHz sync	0.611	1.351
96 kHz sync	Analog	0.133	0.372
96 kHz sync	96 kHz sync	0.042	0.781
96 kHz async	Analog	0.317	1.057
96 kHz async	96 kHz sync	0.227	0.966
AES50 48 kHz sync	Analog	0.451	1.19
AES50 48 kHz sync	48 kHz sync	0.613	1.352
AES50 48 kHz sync	96 kHz sync	0.3275	1.0665
AES50 48 kHz sync	AES50 48 kHz sync	0.613	1.352
AES50 96 kHz sync	Analog	0.255	0.994
AES50 96 kHz sync	48 kHz sync	0.387	1.126
AES50 96 kHz sync	96 kHz sync	0.102	0.341
AES50 96 kHz sync	AES50 96 kHz sync	0.162	0.901

9. LMX 48 Technical Specification

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Front-Panel User Interface

Display	Daylight readable full color IPS (320 x 210)
	Fault/Warning detailed description on display
Menu	Intiutive interface with ability to recall Scene- and Frame Preset, Frame Config, see IP address, Mains status
Meters and Mute buttons	16x LED meters and clip indicators, with individual mute of inputs or outputs with dedicated buttons

Lake featues

Module configuration	8x MESA, 4x Contour or 2x Contour/4x MESA modules
Processing channels	12x in Contour, 8x in MESA, 10x in Contour/MESA
Block program	Mesa, XP, Linear phase, Classic crossovers and Auxililary
Input routers	16 input routers with 4 priorities in each, seamless fallback to lower prioritizes
Module Input mixer	16 ch. for Contour-, 16 ch. for MESA-modules. Mix any ratio between all input routers.
Link ability	Yes, via 24 channels of AES50
Input Processing	Parameteric EQ with MESA and Ideal Graphic equalizers, both utilizing Raised Cosine algorithms
Output Processing	Crossovers with up to 48dB/oct. Parametric EQ, shelving and allpass filters, FIR
Features	Delay, Mute, Phase, Gain etc.
Limiters	LimiterMax with Peak and RMS limiter
SuperModule compatible	No

Audio Performance

Conversion Resolution	24-bit
Internal Sample Rate	96 kHz
Internal Floating Path	32-bit floating point
Product Propagation Delay	Best case (AES syncronous 96 kHz to AES syncronous 96 kHz via DSP) 0.872 ms Analog (Analog in to Analog out via DSP) 1.036 ms Pass thru (Analog in to AES syncronous 96 kHz bypassing DSP 0.143 ms
Maximum Available User Delay	2 seconds from any input to any output

Analog

Inputs	4x inputs with Iso-Float™ ground isolation configurable (connectors shared with AES3 inputs)
Outputs	8x outputs (connectors shared with AES3 Outputs)
Frequency Response, analog-to-digital	+/-0.05 dB, 20 Hz to 20 kHz
Frequency Response, digital-to-analog	+/-0.2 dB, 20 Hz to 20 kHz
THD+Noise, Inputs	0.0015% typical at 1 kHz
THD+Noise, Outputs	0.0008% typical at 1 kHz
Dynamic Range, Inputs	126 dB
Dynamic Range, Outputs	116 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	+21 dBu
Maximum Output level	+21 dBu
Crosstalk, inputs	-108 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 with Sample Rate Converts available

Inputs and Outputs	4x inputs, 8x outputs (shared with Analog)
ASRC	Yes, high quality low latency available per digital input
Supporting Sample Rates	44.1 kHz, 48 kHz, 88.1 kHz, 96 kHz, 176.4 kHz, 192 kHz (I/O individually selected)
Supported Resolutions	Up to 24-bit
THD+Noise (limits)	-135 dB at 96kHz and -125 dB at 44.1 kHz sample rate
THD+Noise (typical)	-145 dB at 96kHz and -138 dB at 44.1 kHz sample rate
Dynamic Range	Base48 -144 dBFS, Base44 -142 dBFS

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Internal clock

Oscillator type	High quality VCXO clock
Syncronization	Can syncronize to any digitial input and output any input clock on any output
Synchronous / Asynchronous	Yes / Yes
Base48	x3
Base44	x2
Clock accuracy	< ± 7 ppm
Pull up/down	±80ppm from any sample rate
Word clock	Syncronize internal clock, and output any clock

Dante (Audio Network)

Topology	Brooklyn 3
Inputs (shared with AES 67)	8x
Outputs (shared with AES 67)	8x
Supported Sample Rates	48 kHz, 96 kHz
Casting	Unicast or Multicast
Support Redundant paths	Yes, Dante Dual Redundancy (Glitch-free Dante audio Redundancy using dual Ethernet networks)
Receiver latency	0.25 ms, 0.5 ms, 1 ms, 2 ms, 5 ms
Network	4x 1000 Base-T / 100 Base-Tx (shared with AES 67)

AES67 (Audio Network)

Topology	Brooklyn 3
Inputs (shared with Dante)	8x
Outputs (shared with Dante)	8x
Supported Sample Rates	48 kHz
Casting	Multicast
Support Redundant paths	No
Receiver latency	1 ms
Network	4x 1000 Base-T / 100 Base-Tx (shared with AES 67)

AES50 (Audio Network)

Interfaces	2x AES50 interfaces
Inputs	24x channels can be individually selected out of up to 96 channels
Outputs	24x channels
Supported Sample Rates	48 kHz, 96 kHz
Support Redundant paths	Yes, via Mirror mode using both AES50 interfaces

GPI

Inputs	4x General Purpose Inputs (GPI) supporting external contact closure
Software configurable input control	Standby state, Mute state, Dual preset recall, Scene preset recall, Force input router prio

Device presets

Frame presets	100
Scene presets	10

Power supply features

Mains connectors	2x Locking IEC
Universal	Yes
Semless continued operations if mains lost on one PSU	Yes

Power requirements

Nominal Voltage	100-240VAC
Operating Voltage	70-265 VAC
Power consumption	75 W maximum

Backpanel Interface

Analog inputs and outputs	4x8 where Inputs and Outputs can be configured for either Analog or AES3 operation
AES3 inputs and outputs	2x4 where Inputs and Outputs can be configured for either Analog or AES3 operation for 4x8 channels of AES3
Ethernet (Dante, AES67 and Control)	Auto 100/1000, Auto uplink, 3x RJ45 connectors
Ethernet with PoE+	Auto 100/1000, Auto uplink, 1x RJ45 connectors with PoE+ (802.3at) out
AES50	2x RJ45 connectors
GPI	GPI via 1x RJ45 connectors
Word Clock Input and output	2x female BNC with selectable termination on input
Power	2x Detachable Locking 3-pin IEC
Control and monitoring interface	Ethernet for Lake Controller software, or DLM (the 3rd Party Protocol)
Cooling	2x fans, front-to-rear airflow
Dimensions (W/H/D)	483 x 44 x 405 mm (19" x 1 U x 16")
Weight	5.1 kg (11.2 lbs)
Finish	Black painted steel chassis with alumimum handles
Approvals	CE, ETL (ANSI/UL 62368-1 & CSA C22.2#62368-1), FCC, ICES, PSE, UKCA, RCM
Warranty	3 years, componants and factory workmanship; see full warranty statement

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10. LMX 88 Technical Specification

Front-Panel User Interface

Display	Daylight readable full color IPS (320 x 210)
	Fault/Warning detailed description on display
Menu	Intiutive interface with ability to recall Scene- and Frame Preset, Frame Config, see IP address, Mains status
Meters and Mute buttons	16x LED meters and clip indicators, with individual mute of inputs or outputs with dedicated buttons

Lake featues

Module configuration	8x MESA, 4x Contour or 2x Contour/4x MESA modules
Processing channels	12x in Contour, 8x in MESA, 10x in Contour/MESA
Block program	Mesa, XP, Linear phase, Classic crossovers and Auxililary
Input routers	16 input routers with 4 priorities in each, seamless fallback to lower prioritizes
Module Input mixer	16 ch. for Contour-, 16 ch. for MESA-modules. Mix any ratio between all input routers.
Link ability	Yes, via 24 channels of AES50
Input Processing	Parameteric EQ with MESA and Ideal Graphic equalizers, both utilizing Raised Cosine algorithms
Output Processing	Crossovers with up to 48dB/oct. Parametric EQ, shelving and all pass filters, FIR
Features	Delay, Mute, Phase, Gain etc.
Limiters	LimiterMax with Peak and RMS limiter
SuperModule compatible	No

Audio Performance

Conversion Resolution	24-bit
Internal Sample Rate	96 kHz
Internal Floating Path	32-bit floating point
Product Propagation Delay	Best case (AES syncronous 96 kHz to AES syncronous 96 kHz via DSP) 0.872 ms Analog (Analog in to Analog out via DSP) 1.036 ms Pass thru (Analog in to AES syncronous 96 kHz bypassing DSP 0.143 ms
Maximum Available User Delay	2 seconds from any input to any output

Analog

Inputs	8x inputs with Iso-Float™ ground isolation configurable per blocks of 4
Outputs	8x outputs
Frequency Response, analog-to-digital	+/-0.05 dB, 20 Hz to 20 kHz
Frequency Response, digital-to-analog	+/-0.2 dB, 20 Hz to 20 kHz
THD+Noise, Inputs	0.0015% typical at 1 kHz
THD+Noise, Outputs	0.0008% typical at 1 kHz
Dynamic Range, Inputs	126 dB
Dynamic Range, Outputs	116 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	+21 dBu
Maximum Output level	+21 dBu
Crosstalk, inputs	-108 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 with Sample Rate Converts available

Inputs and Outputs	8x inputs, 8x outputs
ASRC	Yes, high quality low latency available per digital input
Supporting Sample Rates	44.1 kHz, 48 kHz, 88.1 kHz, 96 kHz, 176.4 kHz, 192 kHz (I/O individually selected)
Supported Resolutions	Up to 24-bit
THD+Noise (limits)	-135 dB at 96kHz and -125 dB at 44.1 kHz sample rate
THD+Noise (typical)	-145 dB at 96kHz and -138 dB at 44.1 kHz sample rate
Dynamic Range	Base48 -144 dBFS, Base44 -142 dBFS

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Internal clock

Oscillator type	High quality VCXO clock
Syncronization	Can syncronize to any digitial input and output any input clock on any output
Synchronous / Asynchronous	Yes / Yes
Base48	x3
Base44	x2
Clock accuracy	< ± 7 ppm
Pull up/down	±80ppm from any sample rate
Word clock	Syncronize internal clock, and output any clock

Dante (Audio Network)

Topology	Brooklyn 3
Inputs (shared with AES 67)	8x
Outputs (shared with AES 67)	8x
Supported Sample Rates	48 kHz, 96 kHz
Casting	Unicast or Multicast
Support Redundant paths	Yes, Dante Dual Redundancy (Glitch-free Dante audio Redundancy using dual Ethernet networks)
Receiver latency	0.25 ms, 0.5 ms, 1 ms, 2 ms, 5 ms
Network	4x 1000 Base-T / 100 Base-Tx (shared with AES 67)

AES67 (Audio Network)

Topology	Brooklyn 3
Inputs (shared with Dante)	8x
Outputs (shared with Dante)	8x
Supported Sample Rates	48 kHz
Casting	Multicast
Support Redundant paths	No
Receiver latency	1 ms
Network	4x 1000 Base-T / 100 Base-Tx (shared with AES 67)

AES50 (Audio Network)

Interfaces	2x AES50 interfaces
Inputs	24x channels can be individually selected out of up to 96 channels
Outputs	24x channels
Supported Sample Rates	48 kHz, 96 kHz
Support Redundant paths	Yes, via Mirror mode using both AES50 interfaces

GPI

Inputs	4x General Purpose Inputs (GPI) supporting external contact closure
Software configurable input control	Standby state, Mute state, Dual preset recall, Scene preset recall, Force input router prio

Device presets

Frame presets	100
Scene presets	10

Power supply features

Mains connectors	2x Locking IEC
Universal	Yes
Seamless continued operations if mains lost on one PSU	Yes

Power requirements

Nominal Voltage	100-240VAC
Operating Voltage	70-265 VAC
Power consumption	75 W maximum

Backpanel Interface

Analog inputs and outputs	8x8 XLR
AES3 inputs and outputs	4x4 XLR for 8x8 AES3 channels
Ethernet (Dante, AES67 and Control)	Auto 100/1000, Auto uplink, 3x RJ45 connectors
Ethernet with PoE+	Auto 100/1000, Auto uplink, 1x RJ45 connectors with PoE+ (802.3at) out
AES50	2x RJ45 connectors
GPI	GPI via 1x RJ45 connectors
Word Clock Input and output	2x female BNC with selectable termination on input
Power	2x Detachable Locking 3-pin IEC
Control and monitoring interface	Ethernet for Lake Controller software, or DLM (the 3rd Party Protocol)
Cooling	2x fans, front-to-rear airflow
Dimensions (W/H/D)	483 x 88 x 404mm (19" x 2 U x 16")
Weight	6.6 kg (14.6 lbs.)
Finish	Black painted steel chassis with alumimum handles
Approvals	CE, ETL (ANSI/UL 62368-1 & CSA C22.2#62368-1), FCC, ICES, PSE, UKCA, RCM
Warranty	3 years, components and factory workmanship; see full warranty statement.

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11. Warranty and Support

11.1 International Warranties

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

11.2 Technical Assistance and Service

11.2.1 International Service

If your Lake product requires repair, contact your Lake dealer or distributor, or contact Lake by email to obtain the location of the nearest authorized service center.

11.2.2 Factory Service

In the event a Lake product requires service, you may contact Lake's service department for return instructions and a Return Authorization number. Please note for service shipment:

1. Use the original packing or ensure your product is sufficiently packaged, any damage caused during transit is not covered under warranty.
2. Include a copy of the sales receipt, your name, return address, phone number, email address and description of the defect.
3. Mark the Return Authorization number on the outside of the packing.
4. Ship the product prepaid to the address given.

11.2.3 Trademarks

Lake is a national and/or international registered trademark of Music Tribe Brands Sweden AB. LMX, PLM+, Loudspeaker Management and Powered Loudspeaker Management are trademarks of Music Tribe Brands Sweden AB.

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FEDERAL COMMUNICATIONS COMMISSION COMPLIANCE INFORMATION

Lake

LMX 88/48

Responsible Party Name:	**Music Tribe Commercial NV Inc.**
Address:	**122 E. 42nd St.1, 8th Floor NY, NY 10168, United States**
Email Address:	**legal@musictribe.com**

LMX 88/48

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

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

Important information:
Changes or modifications to the equipment not expressly approved by Music Tribe can void the user's authority to use the equipment.

CE

Hereby, Music Tribe declares that this product is in compliance with Directive 2014/35/EU,Directive 2014/30/EU, Directive 2011/65/EU and Amendment 2015/863/EU, Directive 2012/19/EU, Regulation 519/2012 REACH SVHC and Directive 1907/2006/EC.

Full text of EU DoC is available at https://community.musictribe.com/

EU Representative: Music Tribe Brands DK A/S
Address: Gammel Strand 44, DK-1202 København K, Denmark

UK Representative: Music Tribe Brands UK Ltd.
Address: 8th Floor, 20 Farringdon Street London EC4A 4AB, United Kingdom

Correct disposal of this product: This symbol indicates that this product must not be disposed of with household waste, according to the WEEE Directive (2012/19/EU) and your national law. This product should be taken to a collection center licensed for the recycling of waste electrical and electronic equipment (EEE). The mishandling of this type of waste could have a possible negative impact on the environment and human health due to potentially hazardous substances that are generally associated with EEE. At the same time, your cooperation in the correct disposal of this product will contribute to the efficient use of natural resources. For more information about where you can take your waste equipment for recycling, please contact your local city office, or your household waste collection service.

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