

M-SERIES

HIGH EFFICIENCY POWER AMPLIFIERS

M•2000

M•3000

M•4000

OWNER'S MANUAL

MACKIE®

Important Safety Instructions

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with a cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

WARNING — The speaker output terminals, marked with (⚡) can pose a shock hazard to the user. Speaker cables should be purchased ready-made from a qualified supplier. If the user decides to construct speaker cabling (using the instructions provided later in this manual), it is recommended that the construction be reviewed by a qualified electrician.

15. This apparatus has been designed with Class-I construction and must be connected to a mains socket outlet with a protective earthing connection (the third grounding prong).
16. This apparatus has been equipped with a single pole rocker style AC mains power switch. This switch is on the front panel and should remain readily accessible to the the user. Note that when the power switch is not in the "ON" position, the apparatus is still energized, and internal hazardous voltages are still present.
17. This apparatus does not exceed the Class A/Class B (whichever is applicable) limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

ATTENTION — *Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de class A/de class B (selon le cas) prescrites dans le règlement sur le brouillage radioélectrique édicté par les ministere des communications du Canada.*

18. Exposure to extremely high noise levels may cause permanent hearing loss. Individuals vary considerably in susceptibility to noise-induced hearing loss, but nearly everyone will lose some hearing if exposed to sufficiently intense noise for a period of time. The U.S. Government's Occupational Safety and Health Administration (OSHA) has specified the permissible noise level exposures shown in the following chart.

According to OSHA, any exposure in excess of these permissible limits could result in some hearing loss. To ensure against potentially dangerous exposure to high sound pressure levels, it is recommended that all persons exposed to equipment capable of producing high sound pressure levels use hearing protectors while the equipment is in operation. Ear plugs or protectors in the ear canals or over the ears must be worn when operating the equipment in order to prevent permanent hearing loss if exposure is in excess of the limits set forth here.

Duration Per Day In Hours	Sound Level dBA, Slow Response	Typical Example
8	90	Duo in small club
6	92	
4	95	Subway Train
3	97	
2	100	Very loud classical music
1.5	102	
1	105	Tami screaming at Adrian about deadlines
0.5	110	
0.25 or less	115	Loudest parts at a rock concert

WARNING — To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

PORTABLE CART WARNING



Carts and stands - The Component should be used only with a cart or stand that is recommended by the manufacturer. A Component and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the Component and cart combination to overturn.



CAUTION AVIS

RISK OF ELECTRIC SHOCK
DO NOT OPEN
RISQUE DE CHOC ELECTRIQUE
NE PAS OUVRIR

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK
DO NOT REMOVE COVER (OR BACK)
NO USER-SERVICEABLE PARTS INSIDE
REFER SERVICING TO QUALIFIED PERSONNEL
ATTENTION: POUR EVITER LES RISQUES DE CHOC
ELECTRIQUE, NE PAS ENLEVER LE COUVERCLE. AUCUN
ENTRETIEN DE PIECES INTERIEURES PAR L'USAGER. CONFIER
L'ENTRETIEN AU PERSONNEL QUALIFIE.
AVIS: POUR EVITER LES RISQUES D'INCENDIE OU
D'ELECTROCUTION, N'EXPOSEZ PAS CET ARTICLE
A LA PLUIE OU A L'HUMIDITE



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure, that may be of sufficient magnitude to constitute a risk of electric shock to persons.
Le symbole éclair avec point de flèche à l'intérieur d'un triangle équilatéral est utilisé pour alerter l'utilisateur de la présence à l'intérieur du coffret de "voltage dangereux" non isolé d'ampleur suffisante pour constituer un risque d'électrocution.



The exclamation point within an equilateral triangle is intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.
Le point d'exclamation à l'intérieur d'un triangle équilatéral est employé pour alerter les utilisateurs de la présence d'instructions importantes pour le fonctionnement et l'entretien (service) dans le livret d'instruction accompagnant l'appareil.

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Don't forget to visit our website at www.mackie.com for more information about this and other Mackie products.



Introduction

Thank you for choosing a Mackie high-efficiency power amplifier. We appreciate your vote of confidence for the folks in Woodinville who specialize in awesome and affordable professional audio designs.

The Mackie M-Series power amplifiers have a wide variety of features that set them apart from any other amplifier in their price range.

• More Output Devices

The more output devices that are used in a power amplifier, the more reliably the amplifier will operate over the long-term at high power levels into low-impedance loads. The M-Series amplifiers typically use more output devices for the same output power than our competitors amplifiers. This means the output devices are required to handle less power, thus drastically extending the life-expectancy of our amplifiers.

• True 2-ohm Power Capability

Some amplifier manufacturers present their power ratings into 2-ohms at 1 kHz. Because our M-Series power amplifiers use more output devices, they can provide full-power into 2-ohms over the entire audio frequency range, from 20 Hz to 20 kHz, all night long!

• Higher Efficiency

The M•2000 uses a highly efficient two-rail Class-H topology, while the M•3000 and M•4000 use an even more efficient three-rail Class-H topology. This allows the amplifiers to run cooler, even in high-ambient temperatures, while improving their long-term reliability.

• Lower Distortion

Our design engineers have paid particular attention to reducing distortion in the M-Series amplifiers. From triple darlington output stages to a fully complementary differential design from input to output, to the Mackie exclusive adaptive slew Class-H switching design that allows the amplifiers to pass the fastest transient peaks

Please write your serial number here for future reference (i.e., insurance claims, tech support, return authorization, etc.)

Purchased at:

Date of purchase:

while minimizing Class-H switching distortion. The bottom line is the M-Series amplifiers achieve some of the lowest distortion numbers in the business without resorting to substantial amounts of negative feedback.

• That's Not All!

There are plenty more features that make your selection of a Mackie M-Series power amplifier a good investment, from the Fast Recovery design pioneered in our FR Series amplifiers, to the quiet fans and constant thermal gradient heatsinks to dissipate heat away from the output devices evenly and efficiently, to the extensive protection circuits designed to protect the amplifier and your loudspeakers.

HOW TO USE THIS MANUAL

We know that many of you can't wait to get your new amplifier hooked up, and you're probably not going to read the manual first (sigh!). So the next section is a Quick-Start Guide to help you get the amplifier set up fast so you can start using it right away. Right after that are the ever popular hook-up diagrams that show typical setups for live sound applications.

Then, when you have time, read the Features Description section. This describes every knob, button, and connection point on the M-Series amplifiers.

Throughout this section you'll find illustrations with each feature numbered. If you want to know more about a feature, simply locate it on the appropriate illustration, notice the number attached to it, and find that number in the nearby paragraphs.



This icon marks information that is critically important or unique to the M-Series amplifiers. For your own good, read them and remember them. They will be on the final test.



This icon leads you to in-depth explanations of features and practical tips. While not mandatory, they usually have some valuable nugget of information.

More resources on our website at www.mackie.com.

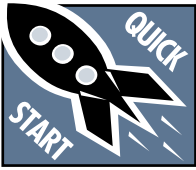
Click on Support to find answers to many of your questions. The FAQ (Frequently Asked Questions) section is filled with answers to many of the questions our Technical Support staff has fielded over the years.

Check out the glossary for explanations of many of the pro-audio terms used in our manuals.

Visit our forums to seek help from our online community of Mackie users.

Getting Started

READ THIS PAGE!!



Even if you're one of those people who never read manuals, all we ask is that you read this page now before you begin using the M-Series power amplifier. You'll be glad you did!



IMPORTANT: The amplifier draws its ventilation air in from the rear and out through the front panel. It needs plenty of fresh air to stay cool. **DO NOT BLOCK THE VENTILATION PORTS!**

Connections and Settings

- Turn down the channel Gain controls.
- Set the 150 Hz X-OVER switches to FULL.
- Set the LIMIT switches ON.
- Turn the POWER switch off.
- Determine which AMP MODE is best for your application.
 - STEREO mode (separate left and right inputs, separate left and right outputs) is the typical setup for amplifying stereo signals.
 - MONO mode (sometimes called Dual-Mono mode — one mono input, two mono outputs) is for sending a mono signal to two different speaker sets, with separately-adjustable level controls.
 - BRIDGE mode (sometimes called Bridged-Mono — one mono input, one mono output) uses both sides of the amp to double the power to one speaker set.

Note: 4 ohms is the minimum impedance you should connect to the amplifier in BRIDGE mode (2 ohms in MONO or STEREO modes). If you connect a lower impedance load, the SHORT LEDs may light, putting the amplifier into PROTECT mode.

Set the AMP MODE switch accordingly.
- In STEREO mode, connect line-level cables from your signal source to the M-Series amplifier's INPUT jacks, either XLR, TRS, or screw terminals:
 - All the inputs and thru jacks for each channel are wired in parallel.
 - The balanced XLR inputs are wired pin 2 = hot (+), pin 3 = cold (-) and pin 1 = shield (ground).
- The 1/4" TRS inputs are wired tip = hot (+), ring = cold (-) and sleeve = shield (ground), and can accept either balanced (TRS) or unbalanced (TS) cables.
- The screw terminal inputs are wired as indicated: hot (+), cold (-), and ground (GND).
- In MONO and BRIDGE modes, the signals appearing at Channel 1 and Channel 2 inputs are summed together to create a mono signal.
- In STEREO and MONO modes, connect speaker cables to the SPEAKER OUTPUTS, either binding posts or Speakons®:
 - The binding post connectors are wired red = hot (+) and black = cold (-).
 - The Speakon connectors are wired as follows:

Channel 1

 pin 1+ = Ch 1 hot (+) and pin 1- = Ch 1 cold (-)
 pin 2+ = Ch 2 hot (+) and pin 2- = Ch 2 cold (-)

Channel 2

 pin 1+ = Ch 2 hot (+) and pin 1- = Ch 2 cold (-)
 pin 2± = unused

BRIDGE

 pin 1+ = hot (+) and pin 1- = cold (-)
 pin 2± = unused
- In BRIDGE mode, connect the binding post cable like this: the hot (+) side goes to the CHANNEL 1 SPEAKER OUTPUTS red post and the cold (-) side goes to the CHANNEL 2's red post. Connect nothing into the black posts.
- Connect the other ends of the speaker cables to your loudspeakers.
- Plug the amplifier's power cord into an outlet properly configured with the correct voltage for your amplifier, and capable of delivering enough current to reach full power.
- Make sure your signal source (feeding the amplifier's inputs) is powered up and delivering signal to the amp.
- Turn the amplifier's POWER switch on and verify that the signal present (SIG) LEDs are blinking.
- Slowly turn both Gain controls up:

You should hear the music and see the SIG and meter LEDs flashing. If the topmost LEDs (named OL, for OverLoad) are flashing, turn down either the Gain controls on the amp or the source signal's output level controls (i.e., master faders). The point is: The OL LEDs should only occasionally light up. Frequent lighting of the the OL LEDs indicates that the amplifier is being driven too hard and clipping distortion is likely audible.

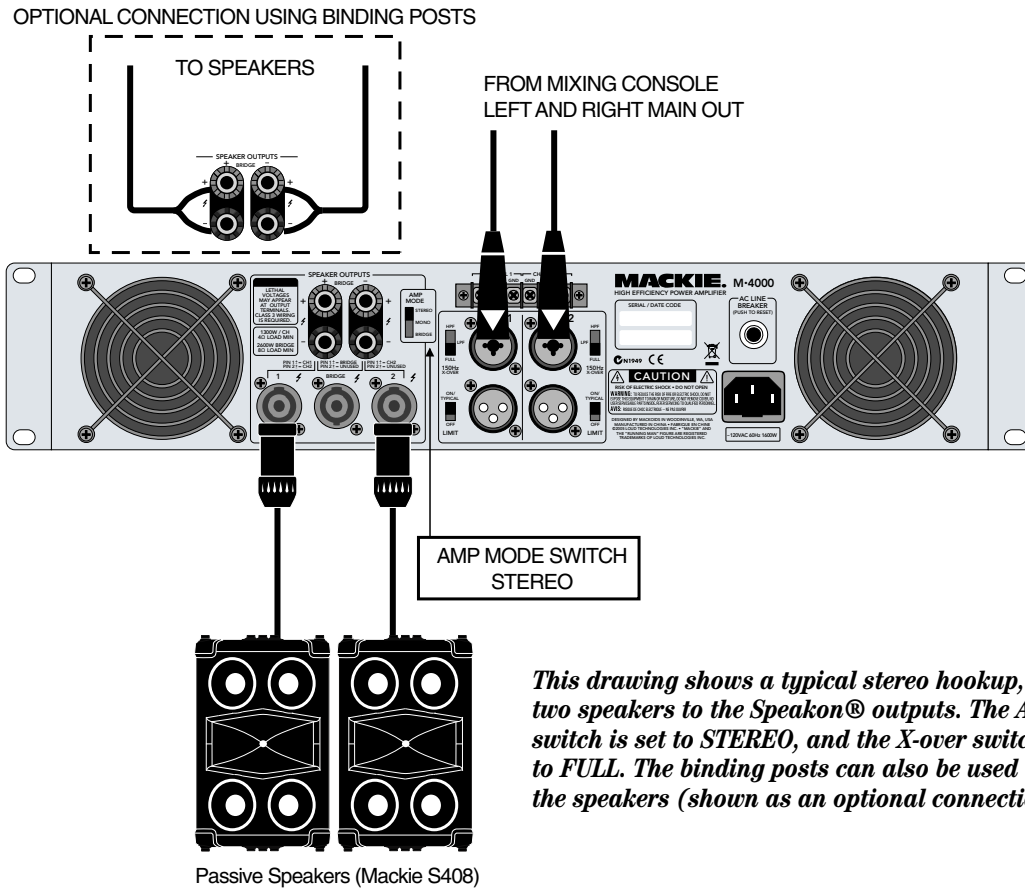
15. For quieter listening, it is preferable to adjust the amplifier's gain controls rather than the source signal's output level (unless you have the source's control all the way up!).

Other Nuggets of Wisdom

- For optimum sonic performance, the channel and main mix faders on your mixer should be set near the "U" (unity gain) markings. Then adjust the amplifier's gain control to attain the desired volume through the loudspeakers.
- Never plug amplifier outputs into anything except speakers (unless you have an outboard box specifically designed to handle speaker-level signals).
- Before making connections to an amp or reconfiguring an amp's routing, turn the amp's level (Gain) controls down, turn the power off, make the changes, turn the power back on, and then turn the level controls back up.
- When you shut down your equipment, turn off the amplifiers first. When powering up, turn on the amplifiers last.
- Never listen to loud music for prolonged periods. Please see the Safety Instructions on page 2 for information on hearing protection.
- Save the shipping box! You may need it someday, and you don't want to have to pay for another one.

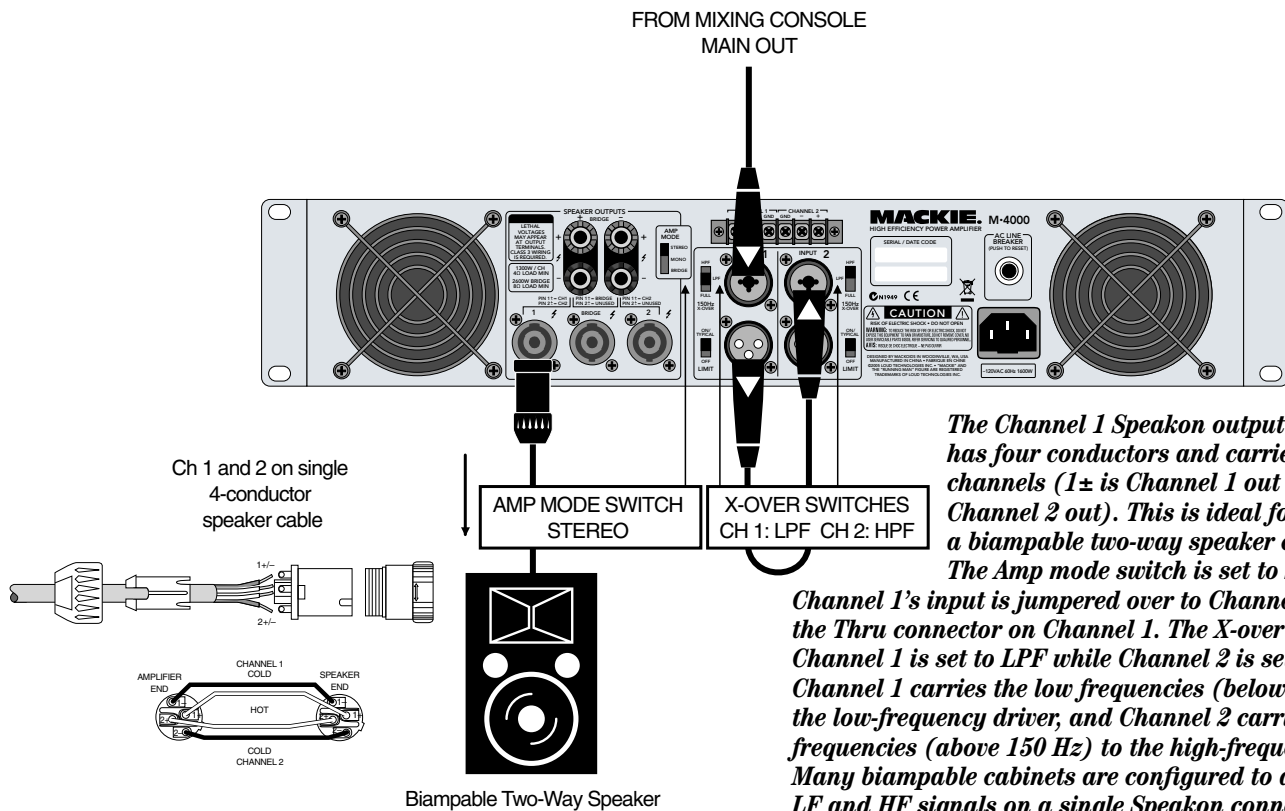
That's it for the "Getting Started" section. Next comes the "Hookup" section that shows you some typical ways that you might use the M-Series amplifier in real applications. After that, take the grand tour of the amplifier, with descriptions of every knob, button, input, and output. We encourage you to take the time to read all of the feature descriptions, but at least you know it's there if you have any questions.

Hookup Diagrams



This drawing shows a typical stereo hookup, connecting two speakers to the Speakon® outputs. The Amp Mode switch is set to STEREO, and the X-over switches are set to FULL. The binding posts can also be used to connect the speakers (shown as an optional connection).

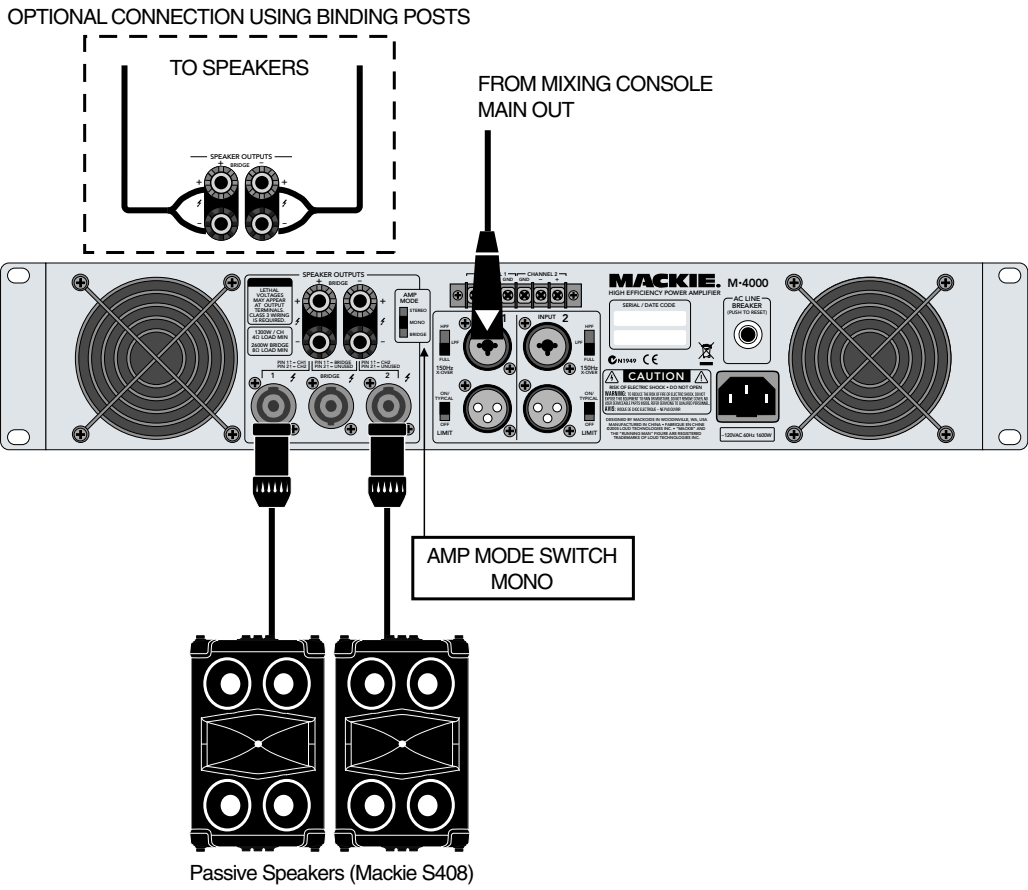
M-Series Power Amplifier: Stereo Mode Connection



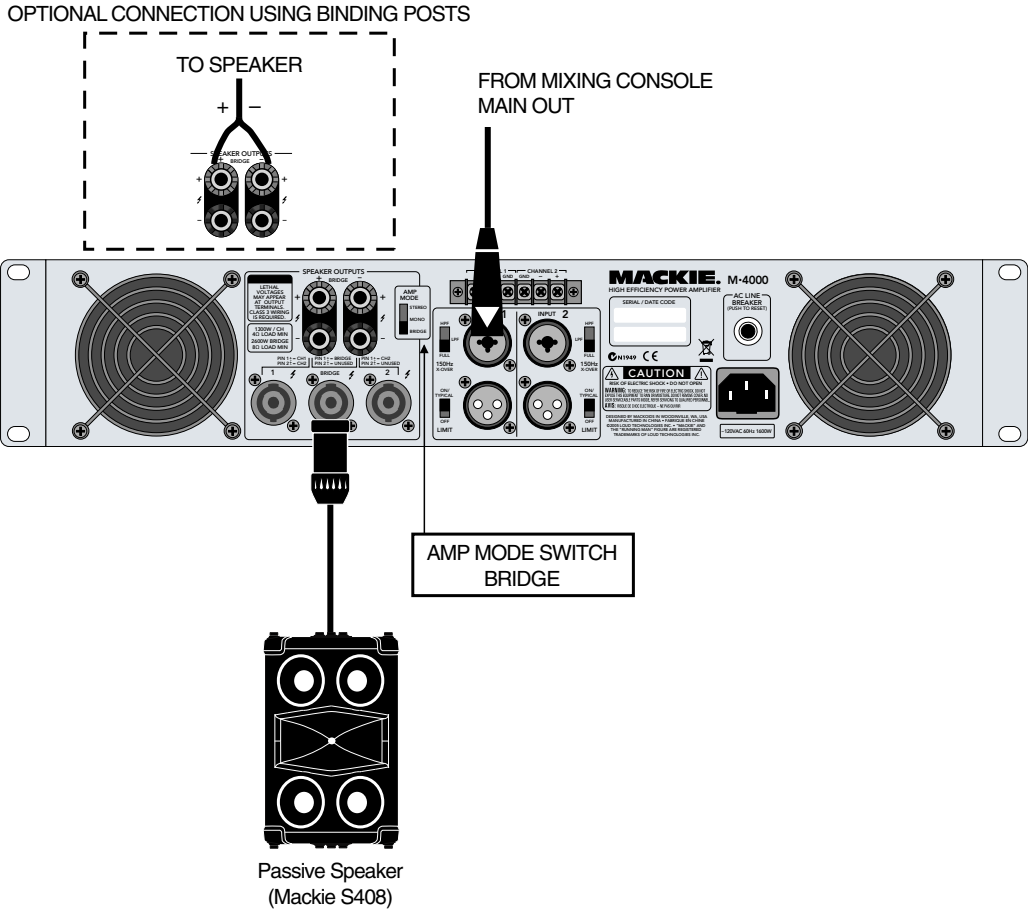
The Channel 1 Speakon output connector has four conductors and carries both channels (1± is Channel 1 out and 2± is Channel 2 out). This is ideal for driving a biampable two-way speaker cabinet.

The Amp mode switch is set to STEREO, Channel 1's input is jumpered over to Channel 2 using the Thru connector on Channel 1. The X-over switch on Channel 1 is set to LPF while Channel 2 is set to HPF. Channel 1 carries the low frequencies (below 150 Hz) to the low-frequency driver, and Channel 2 carries the high frequencies (above 150 Hz) to the high-frequency driver. Many biampable cabinets are configured to accept both LF and HF signals on a single Speakon connector.

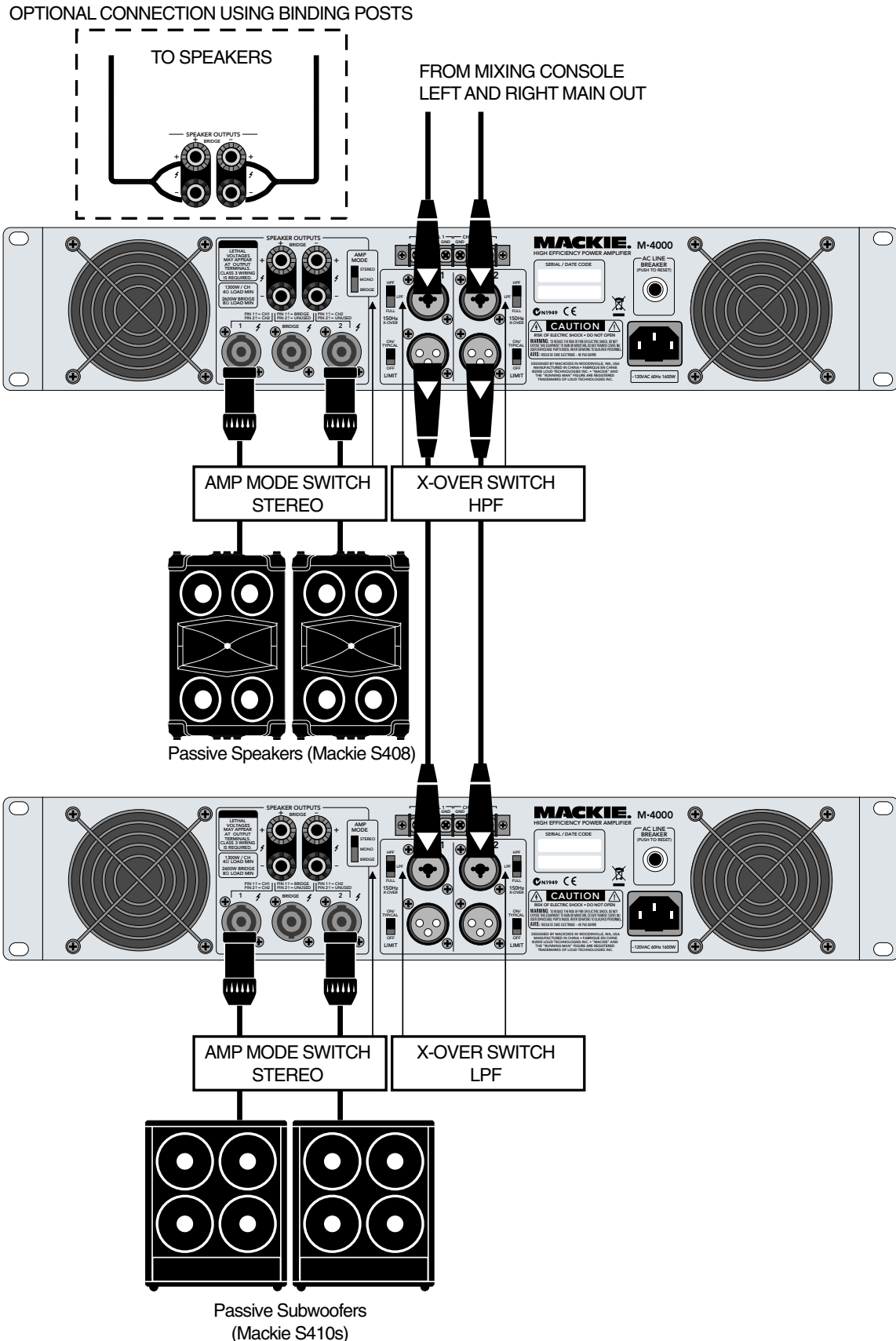
M-Series Power Amplifier: Biamp Connection Using Built-in X-over



M-Series Power Amplifier: Mono Mode Connection



M-Series Power Amplifier: Bridge Mode Connection



This drawing shows how to use the X-over switches to power a stereo two-way system without using an external crossover. The X-over switches on Amplifier 1 are set to HPF and both channels pass frequencies above 150 Hz to the loudspeakers.

The Thru connections pass the full-range signals on to Amplifier 2. The X-over switches on Amplifier 2 are set to LPF and both channels pass frequencies below 150 Hz to the subwoofers.

M-Series Power Amplifier: Two Amps Using Built-in X-over

M-Series Features

Front Panel

Much of the front panel of the M-Series amplifiers is comprised of ventilation slots for expelling warm air from the inside of the amplifier. Be sure to leave space in front of the amplifier for proper ventilation to occur.

1. Gain Control

These knobs control the levels to the output section of the M-Series amplifiers. You'll notice that their travel is detented, meaning there are 21 built-in "resting points" so you can easily set both controls to the same level. Usually, these controls are set all the way up.

The gain structure of the amplifier is designed so that a +4 dBu (1.23V rms) input signal drives the amplifier to full power into 4 ohms.

M•2000 = 525 watts/channel into 4 ohms

M•3000 = 800 watts/channel into 4 ohms

M•4000 = 1050 watts/channel into 4 ohms

This is how the sensitivity of an amplifier is defined (the input voltage required to attain maximum output power into a specified load impedance). In this case, it equates to a voltage gain of 31.4 dB for the M•2000, 33.3 dB for the M•3000, and 34.4 dB for the M•4000).

With the Gain control all the way up (fully clockwise), the input sensitivity is 1.23V, which works well with professional equipment operating at a nominal +4 dBu level.

On the other hand, you may want your listening level to be quieter than the M-Series amplifier's maximum level. For instance, if you're using the amplifier as a control room amp, and your control room is the size of a telephone booth, you'll probably never want to hear the amp at its maximum level.

You can set the Gain controls as low as you like. However, reducing the Gain controls requires an increased input level to reach full power at the amplifier's output.

Like all amplifier controls, you'll typically determine the optimal settings during installation or sound check, then leave them alone, using your signal source (usually a mixer) to control listening levels as you work. Or play.

2. Meters

The M-Series amplifier's meters indicate the relative output level of the amplifier referenced to full power. The numbers next to the meter's LEDs are in dB below full power.

Ideally, the -20, -9, -6, and -3 LEDs will light and blink at normal signal levels, while the OL LED may flicker occasionally during peak moments.

OL is short for Overload. Overloading, or clipping, occurs when the output voltage no longer linearly follows the input voltage and simply stops. This causes a sine wave to "square off," or get "clipped off." Thus, the term clipping. Fear not — this scenario is quite unlikely. Even with the Gain controls fully up, the M-Series amplifier easily accepts professional "+4 dBu" operating levels.



If the OL (Overload) LED is blinking frequently or continuously, turn down the amplifier's Gain control or the source signal (i.e., the mixer's master faders).



3. PROTECT Indicator

If the PROTECT LEDs are on, the amplifier's output section has shut down. That, of course, means you won't hear anything until you rectify the situation. Three things can cause the PROTECT circuit to engage:

1. Powering up the amplifier. A built-in delay circuit saves your speakers (and ears) from the thumps or pops that can sometimes occur when powering up a system. During this three-second delay, the PROTECT LEDs light up.
2. A short circuit (or near short) in either of the outputs. Both the PROTECT and the SHORT LEDs light up.
3. The temperature in the amplifier has risen to an unsafe level. The PROTECT and the OVER TEMP LEDs light up.

The M-Series amplifier draws its ventilation air in from the rear and out through the front. The amp needs plenty of fresh air to stay cool. **DO NOT BLOCK THE VENTILATION PORTS.** See "Thermal Considerations" on page 16 for more details.

Note: In the unlikely event that the power transformer overheats (in general, this cannot happen during normal use — but could occur when bench testing at high power levels for an extended period of time), the PROTECT LED will light, but not the OVER TEMP LED. It takes from one to two hours for the transformer to cool to a safe temperature, when normal operation resumes.

4. SHORT Indicator

If this LED comes on, the amplifier has detected a short circuit (or near short) in either of the outputs, meaning that the hot (+) and cold (–) speaker wires are touching, or a speaker itself is shorted out. Such a condition causes the amplifier to engage its Protect mode, muting all signals at the amp's outputs.

This short-circuit LED is a Mackie exclusive and can save precious minutes of your troubleshooting time. Without it, you'd still have speaker and amp protection (via the PROTECT circuit), but you wouldn't be able to determine the source of the problem. But with the SHORT LED, the M-Series amplifier comes right out and tells you!



WARNING: The SHORT LEDs indicate an unsafe condition for the power amplifier. When the short-circuit protection is activated, the SHORT LED lights, then the PROTECT LED lights and the SHORT LED turns off. After about four seconds, the protection circuit turns off and

the amplifier resumes normal operation. If it senses the shorted condition again, the cycle repeats until you fix the problem.

Typical causes for a "short" indication would be either a shorted speaker cable or too many speaker cabinets connected to the amplifier (i.e., the load impedance is too low). If a "short" is indicated, please check your cables. If the cabling is OK, then reduce the number of cabinets driven by the amplifier.

Note: When using the amplifier in BRIDGE mode, one or both SHORT LEDs may light under shorted or low impedance conditions. Regardless of whether one or both LEDs light, it's an indication of a problem that requires further investigation.

5. OVER TEMP Indicator

OVER TEMP (short for over-temperature) is another feature designed to keep your mind at ease. Under extreme conditions the amplifier may overheat. You may ask, "What kind of extreme conditions?"

Overheating problems are usually caused by one of the following situations: improper ventilation, high ambient temperatures, overdriving the amplifier into clipping, driving the amplifier hard into low-impedance loads, frayed or partially shorted speaker cables, or defective or internally shorted speakers.

The heaviest load the M-Series amplifier can tolerate is 2 ohms per channel (4 ohms in bridged mode). If you've got a set of speakers wired in parallel, be sure the load isn't adding up to less than 2 ohms. Anything below 2 ohms can cause the SHORT LED to light and trigger the PROTECT mode, or cause the amplifier to overheat, which also triggers the PROTECT mode.



Note: Since each channel has its own temperature sensor and protection circuit, it is possible for only one channel to go into PROTECT mode while the other channel continues to operate.

As the internal temperature of the amplifier rises, the fans turn on at 50°C (122°F), and they kick into high speed at 65°C (149°F). More air moves through the constant temperature gradient cooling tunnel to remove additional heat from the output transistors. However, if the internal temperature of the amplifier should exceed 85°C (185°F), the OVER TEMP LED turns on, and both PROTECT LEDs shine. The output of the amplifier is muted — at this point the amplifier is in Protect mode and remains there until the internal temperature cools off to a safe level (60°C or 140°F). When this occurs, the OVER TEMP and PROTECT LEDs turn off, and normal operation resumes.

Be Aware: If the OVER TEMP LED comes on frequently, something is overworking the amplifier or it's not properly ventilated. Look at each of the "extreme conditions" described above and try to determine what is causing the amplifier to overheat. Refer to "Thermal Considerations" on page 16 or to the "Troubleshooting" section in Appendix A for more help.



You may ask, "Why don't the fans just go fast all the time?" Well, if it did, you might actually hear it whirring during your quiet moments (there are quiet moments in your life, aren't there?). While this whirring

would be of no concern in most live-sound situations, it could become annoying in a control room environment. So, when the M-Series amplifier is not working hard, the fans are off (or they go slow); when the music gets loud and puts the amp to work, the fans go fast.

6. POWER Switch

To make the amp operate, push the top half of the POWER switch. It clicks into place and the light in the switch illuminates. To turn the amp off, push the lower half. It'll click again and the light will extinguish.

When you power up the M-Series amplifier, a built-in delay circuit prevents any pops or thumps from being transmitted to the speakers due to turn-on instability in the system. Be sure the signal driving the amplifier is turned down when you first power up the system. There are few things as rude as 3 seconds of silence followed by 250 watts of full-blast stereo sound! (Well, maybe 250 watts of accordion music...)

If you shut down your system, turn off your amplifiers first. When powering up, turn on your amplifiers last. This way, equipment feeding the amp won't "pop" or "thud" when it's powered up or down.

Rear Panel

The rear panel of the M-Series amplifiers is comprised of the fans, the input and output connectors, and a number of cool extra features.

7. SPEAKER OUTPUTS

There are two methods for connecting your speakers to the M-Series amplifier, binding posts and Speakon® connectors.

To use the binding post outputs, you can terminate your speaker cables with single or double banana plugs, spade lugs, or leave them unterminated with bare wire. Unscrew the amp's binding posts enough to reveal the holes on their sides, then insert your stripped wires (stripped about 3/8" back) into the holes and retighten the posts (finger tight is fine — please don't reef on them with a wrench!). Be careful that no runaway strands touch the chassis or other terminals.

The red posts are labeled "+," which means positive. The black posts are labeled "-" for negative. You probably know the importance of getting these terms correct — if one side is hooked up "in phase" and the other side is "out of phase," you'll be "out of work." (By the way, although everyone says "phase" in this situation, the correct word is "polarity"... but it's not as much fun to say.)

Using high-quality stranded speaker cable (16 gauge or thicker), connect the positive outputs of the amplifier to the positive inputs of your speakers, and the negative outputs to the negative inputs. The exception: If you're using the amplifier in BRIDGE mode, this does not apply, (see Bridge Mode on page 19).

In addition to the binding posts, the M-Series amplifier also has Speakon SPEAKER OUTPUTS. These have the advantage of locking into place, and many professional loudspeakers are equipped with Speakon connectors. There are three Speakon connectors, for channel 1, channel 2, and for a bridged connection.



See “Output Wiring” on page 18 for more info on making the speaker output connections.

8. AMP MODE

This three-way switch, along with the X-OVER switches, determines what kind of amplifier you want the M-Series amplifier to be (or not to be — what was the question?).

The AMP MODE switch determines the input signal routing within the amplifier. Shipped from the factory, the switch is set to STEREO. This is correct for about 90% of the applications using an amp like this. But you may be in the 10% bracket, requiring special input routing within the amp.

The AMP MODE should be configured before operation — if you must change it during performance, turn down the Gain controls as a precaution to protect the speakers from any inadvertent pops or thumps.

STEREO mode (separate left and right inputs, separate left and right outputs) is the typical setup for amplifying stereo signals.

MONO mode (sometimes called Dual-Mono – one mono input, two mono outputs) is for sending a mono signal to two different speaker sets, with separately-adjustable Gain controls.

BRIDGE mode (sometimes called Bridged-Mono – one mono input, one mono output) uses both sides of the amp to double the power to one speaker set. With two M-Series power amplifiers, each set to BRIDGE mode, you can deliver as much as 4000 watts per amplifier for the M•4000 (2000 watts for the M•2000 and 3000 watts for the M•3000).

If you set the AMP MODE switch to MONO or BRIDGE, normally you would use just the Channel 1 input. You can connect a stereo input to Channels 1 and 2, but the M-Series amplifier sums the two inputs and delivers a mono signal to the amplifier stage.

9. INPUTS

The M-Series amplifiers give you a choice — it has combination XLR and 1/4" inputs, as well as screw terminal balanced input connectors. Sonically (and electrically) they're identical. Since these inputs are all in parallel (the Thru jacks are in parallel with the inputs as well), you shouldn't connect more than one source to the INPUT connectors. Each can be used with either balanced or unbalanced signals. See “Input Wiring” on page 17 for more information about making the input connections.

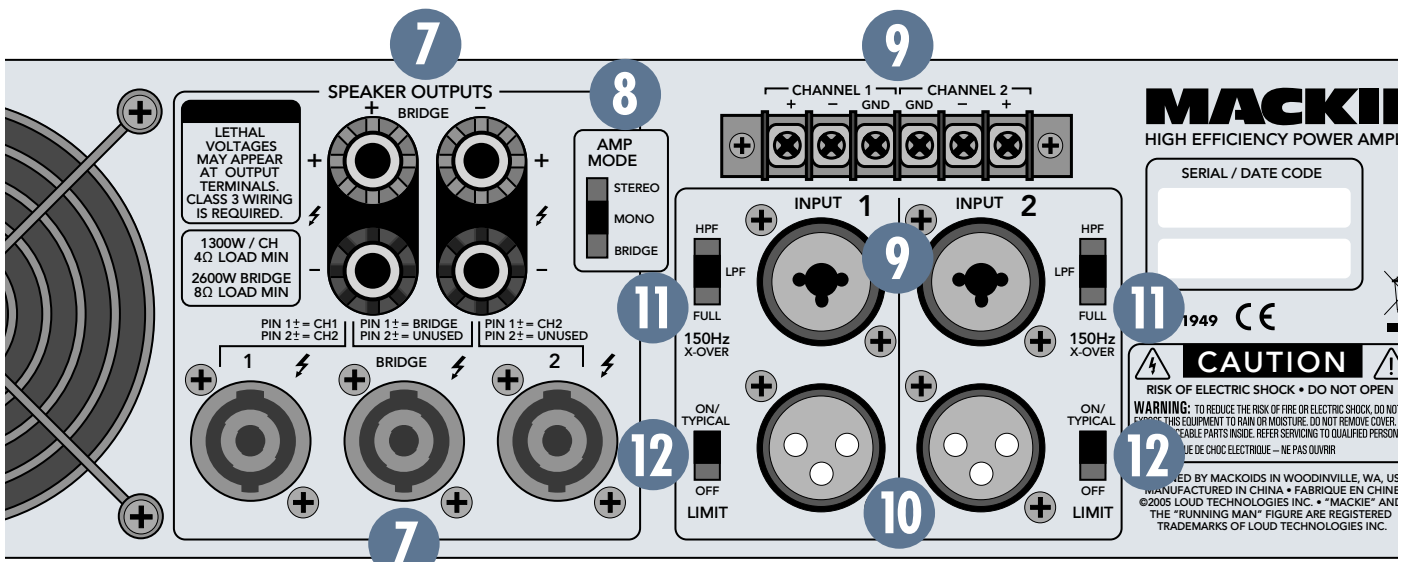
The M-Series amplifier expects to see a nominal signal level anywhere between the -10dBV “semipro” and +4 dBu “pro” standards, meaning almost any line-level mixer or other device can be plugged into the amp's INPUTs. Use the Gain controls to adjust the gain of the amplifier to match the signal level you're using.

10. Thru Connectors

Someday you'll do a show and realize that one M-Series amplifier is just not going to do the job — you'll need a six-foot-high rack full of 'em. That's what the Thru jack is for. Simply plug the signal source outputs into the first amp's INPUTs, patch from that amp's Thru jacks to the next amp's INPUTs, and so on, daisy-chaining as many amps as you can afford (assuming your console has low-impedance outputs).

A general rule of thumb is to maintain a load impedance 10 times or more than the source impedance to prevent excessive loading. If your console has an output impedance of 100 ohms, then you can daisy-chain up to twenty-four M-Series amplifiers, which presents a load of 1000 ohms to the console (input impedance of 24 kohms divided by 24 amplifiers = 1000 ohms).

The Thru jacks can also be used to relay the signal on to other devices such as a DAT or cassette recorder, enabling you to record exactly what the audience is hear-



ing. The Thru jacks are wired straight from the XLR and TRS INPUTS — there is no electronic circuitry between — so the signal going into the amp is exactly the same as the signal coming out of the Thru jacks.

You can use the Thru jack as an input, if necessary, since it's wired in parallel with the other input connectors. You can also use the 1/4" TRS INPUT jacks as Thru jacks. Simply connect the 1/4" TRS INPUT jacks on the first amplifier to the TRS 1/4" INPUT jacks on the second amplifier using 3-conductor shielded cables with TRS plugs on both ends.

Warning: If you use a regular guitar cord with 2-conductor TS plugs, you'll unbalance the signal at the screw terminal input by grounding the low side (–) of the signal (pin 3).

11. 150 Hz X-OVER

This switch allows you to turn your M-Series amplifier into a combination two-way crossover and power amplifier. You can use one channel to power a woofer or subwoofer, and the other channel to power the mid and high frequencies.

For normal operation, leave the switch in the FULL position. This allows full-range operation for that channel (no crossover filter).

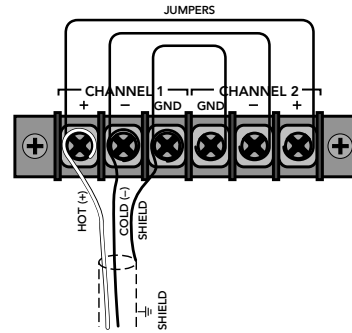
With the switch in the LPF (low-pass filter) position, all the frequencies below 150 Hz are allowed through the channel, and all the frequencies above 150 Hz are rolled off with a 2nd-order Butterworth filter.

With the switch in the HPF (high-pass filter) position, all the frequencies above 150 Hz are allowed through the channel, and all the frequencies below 150 Hz are rolled off with a 2nd-order Butterworth filter.

To use the X-OVER switches in a two-way or bi-amplified system:

1. Connect the same input signal to Channel 1 and Channel 2 inputs. If you are using the screw termi-

nal inputs, you could jumper the signal over from Channel 1 to Channel 2 as shown below.



If you are using the combination input, you could use the Thru connector from Channel 1 to connect to the input of Channel 2.

2. Set the AMP MODE switch to STEREO.



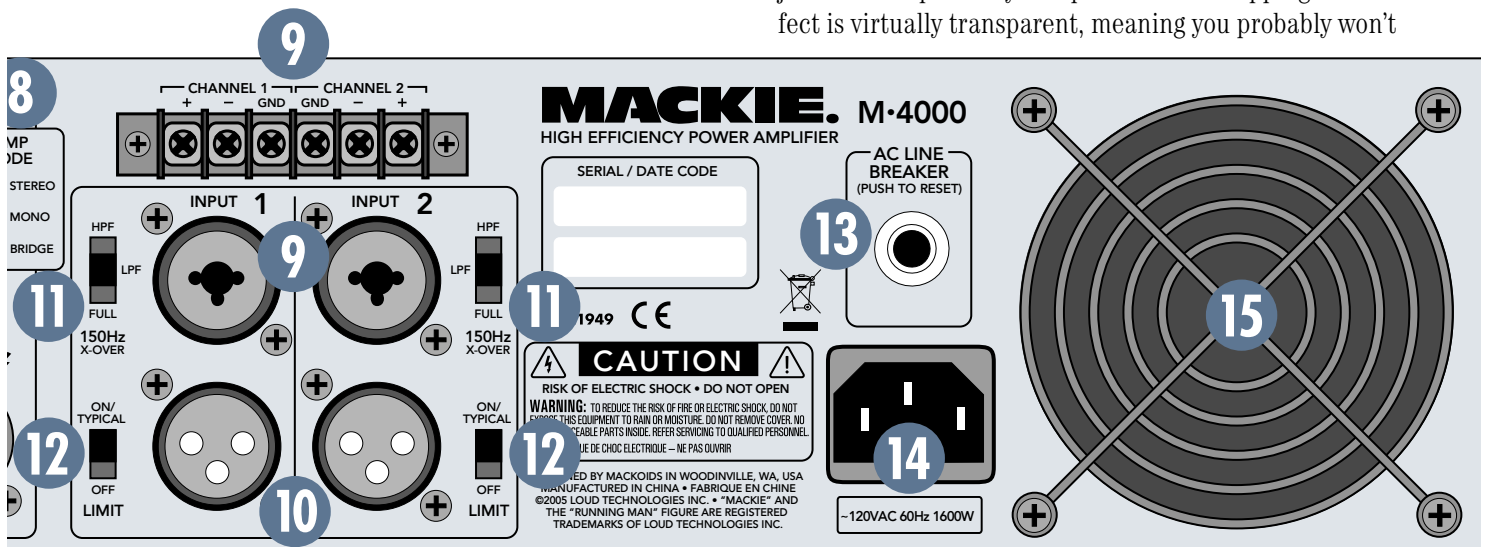
Note: You cannot use the AMP MODE switch set to MONO to accomplish this because the X-OVER switches are located before the AMP MODE switch in the signal path.

3. Set the X-OVER switch on Channel 1 to LPF and the X-OVER switch on Channel 2 to HPF.
4. Connect the Speaker Output for Channel 1 to the woofer or subwoofer speaker cabinet.
5. Connect the Speaker Output for Channel 2 to the full-range or mid/high speaker cabinet.

You could also use the X-OVER switch as a high-pass filter for both channels. For example, in a monitor system, many monitor speakers don't reproduce frequencies below 100 Hz or 150 Hz. By rolling off the lower frequencies, you can preserve the amplifier's power for the frequencies that count, and the system will sound louder and cleaner.

12. LIMIT

The LIMITER is not designed to alter your sound — it's just there to protect your speakers from clipping. Its effect is virtually transparent, meaning you probably won't



even notice any audible difference. We recommend that you leave it engaged, hence the TYPICAL label above it.

If you're working at quiet levels all the time, or you've already placed a compressor/limiter in the signal path, or if you just hate compression, you can leave the LIMITER out of the circuit (OFF).

The LIMITER works independently on each channel. It senses when the amplifier channel is about to be overdriven and attenuates the overall level just enough to keep the signal from clipping. Clipping occurs when the output voltage no longer linearly follows the input voltage and simply stops. This causes a sine wave to "square off," and the average power going into the speaker is roughly double that of a sine wave. Square waves sound awful, and could possibly damage your speakers and/or your reputation.

The LIMITER is especially handy when you're working with loud output levels. Having the signal spikes (kick drum, for instance) attenuated a bit can actually increase the apparent loudness of the overall mix without diminishing the "power" behind the spikes.

Also, if you are driving the amplifier quite hard in an adverse environment (high heat) and under heavy loading, turning on the LIMITER will help to prevent the amplifier from going into "OVER TEMP" protection. This is much more preferable to lightening the load on the amplifier by reducing the number of speakers connected.

Be Forewarned: With the LIMITER engaged, you can still overdrive the amplifier into clipping and cause distortion. It just takes a stronger signal to do it. So even with the LIMITER turned on, you should still pay attention to the OL LEDs.

13. AC LINE BREAKER

This is a resettable circuit breaker that monitors the amount of current being drawn by the amplifier. Under normal operating conditions, this should never pop. An unusual condition may cause the breaker to pop, such as a mains voltage surge occurring at the same time as a peak amplifier output.

Turn the POWER switch off, and push the BREAKER button to reset the circuit breaker. Turn the POWER switch back on and the amplifier should resume normal operation. If the circuit breaker pops again, something probably isn't right.

- Make sure the total impedance of the speakers connected to the outputs is 2 ohms or greater (per channel) in stereo mode, or 4 ohms or greater in bridged mode.
- If the breaker pops right away, even with the Gain controls turned down and the speakers disconnected, there may be something wrong inside the amplifier. Refer to "Appendix A: Service Info."

14. Power Receptacle

This is a standard 3-prong IEC power connector. Connect the detachable linecord (included in the box with your M-Series amplifier) to the power receptacle, and plug the other end of the linecord into an AC outlet properly configured with the correct voltage for your particular model.



The power cord that comes packed with your amplifier may look like the same one that plugs into your mixer or computer, but it's not! An IEC power cord that you find on a typical product will likely have tiny 18 gauge wire inside. The power cord that comes with our amplifier has 14 gauge wire inside, 250% larger than that of an 18 gauge cord. If you use one of these lighter gauge cords on your amplifier it may, quite literally, melt! So don't lose that power cord, but if you do, contact Mackie for a replacement.

For current-delivery purposes, the amplifier's voltage source (wall outlet, extension cords, or power strips) must be capable of continuously delivering the following AC current (for 120V version):

M•2000	9 amps
M•3000	12 amps
M•4000	15 amps

And for safety reasons, that source must be a "3-prong" outlet with hot, neutral, and ground terminals. We're dealing with some big-time electricity here — don't mess with it. See "AC Power Considerations" on page 16 for more details.

15. Fans

There are two fans, one for each amplifier channel. They pull air in from the rear, move it through the constant thermal gradient heatsinks, and exhaust the warm air through the front.

When the amplifier is first turned on, the fans are off. They remain off until the inside of the amplifier warms to 50° C (122° F). The fans start up at a slow speed until the inside of the amplifier warms to 65° C (149° F), when they kick into high speed.

In a live sound application, the sound of the fans is usually not a problem. But in a control room or quiet listening situation, it may be of a concern. When the amplifier is idling or operating at a low power, the fans are off so you don't hear the constant whirring of the fans. At moderate power levels, the fans turn on at a slow speed, so they probably still won't be audible above the program that you are listening to. At high power levels, the fans may kick into high speed, but the high volume level will certainly cover the sound of the fans.

It is important to leave space in front of and behind the amplifier so the air can flow freely. See "Thermal Considerations" on page 16 for more information.

General Precautions and Considerations

Rack Mounting

The M-Series amplifiers require two rack space units (2 IU = 3.5"). The M•2000 requires 17.0" depth inside the rack, including the rear supports. The M•3000 and M•4000 require 19.5" depth inside the rack, including the rear supports. When designing your rack, put the heavier items at the bottom and the lighter items toward the top.

Secure the front panel of the amplifier to the front of the rack using four screws with soft washers to prevent scratching the panel. In addition, because of the weight of the amplifier, you must secure the rear support brackets of the amplifier to the back of the rack. You could use a support rail or shelf across the back of the rack, or angle brackets attached between the rear support brackets and the rear rails of the rack. This is recommended for all components mounted in a rack that is going to be moved frequently (or thrown in the back of a pickup truck and transported down a bumpy gravel road to that outdoor festival!).

Thermal Considerations

The M-Series amplifier is fan-cooled and brings air in through the rear and out through the front. Make sure that cool air is available at the rear of the amplifier, and that there is room at the front for the warm air to exit from the amplifier and dissipate. If rack-mounted, make sure the amplifier is not pulling warm (or hot) air in from the rack.

The M-Series amplifier's unique Constant Thermal Gradient heatsinks provide substantially better cooling for the output transistors than conventional designs that simply blow air through the chassis, getting dust and other contaminants over all the internal components. The heatsinks contain a cooling tunnel that provides a shorter, more directed path for the air, with the air moving faster toward the end of the tunnel to balance the temperature along the entire length of the heatsink. This results in increased reliability and longevity for the amplifier because the output transistors are kept cooler.

AC Power Considerations

Be sure the amplifier is plugged into an outlet that is able to supply the correct voltage specified for your model.

If the line voltage should drop below about 97% of the rated voltage, the amplifier will no longer be able to supply rated power. (It will continue to operate down to 65% of the rated line voltage, but it just won't be able to reach full rated power.)

Be sure the AC outlet can supply enough current to allow full power operation of all the amplifiers plugged into it. The outlet should be a socket that matches the power cord.



WARNING: Bypassing the plug's ground pin can be dangerous. Don't do it!

The AC current demand of an amplifier varies depending on several factors, including the crest factor and the duty cycle of the program material. Under typical conditions reproducing rock music where musical peaks are just below clipping, the M-Series amplifiers require the following average currents:

	Average Current Required	
M•2000 Amplifier Loading	<u>120V</u>	<u>240V</u>
2 ohms per side or 4 ohms bridged	8.6A	4.3A
4 ohms per side or 8 ohms bridged	5.6A	2.8A
8 ohms per side or 16 ohms bridged	3.7A	1.9A
M•3000 Amplifier Loading	<u>120V</u>	<u>240V</u>
2 ohms per side or 4 ohms bridged	11.1A	5.6A
4 ohms per side or 8 ohms bridged	7.4A	3.7A
8 ohms per side or 16 ohms bridged	4.8A	2.4A
M•4000 Amplifier Loading	<u>120V</u>	<u>240V</u>
2 ohms per side or 4 ohms bridged	14.2A	7.1A
4 ohms per side or 8 ohms bridged	9.3A	4.7A
8 ohms per side or 16 ohms bridged	6.0A	3.0A

It is recommended that a stiff supply of AC power be used because the amplifier places high current demands on the AC line. The more power that is available on the line, the louder the amplifier will play and the more peak output power will be available for cleaner, punchier bass.

Under typical conditions, reproducing rock music where musical peaks are just below the clipping point, you can safely connect one or more amplifiers to an AC service. Use the table below as a guideline:

Maximum Number of Amplifiers on a 120V/15A Service (or 240V/7.5A Service)	
M•2000 Amplifier Loading	
2 ohms per side or 4 ohms bridged	2
4 ohms per side or 8 ohms bridged	3
8 ohms per side or 16 ohms bridged	4
M•3000 Amplifier Loading	
2 ohms per side or 4 ohms bridged	1
4 ohms per side or 8 ohms bridged	2
8 ohms per side or 16 ohms bridged	3
M•4000 Amplifier Loading	
2 ohms per side or 4 ohms bridged	1
4 ohms per side or 8 ohms bridged	1
8 ohms per side or 16 ohms bridged	2

The M-Series amplifiers are equipped with an in-rush limiting circuit to minimize startup current and prevent tripping the breakers when two or more amplifiers are turned on at the same time, on the same breaker. Sequencing is not required.

If you use an extension cord to supply power to the "amp rack," it should have a third wire safety ground to avoid presenting a safety hazard. We also recommend using a cord that has conductors large enough to avoid severely limiting the amplifier's ability to supply high currents on transients.

Power amplifiers can have momentary peak current requirements many times above the nominal average current draw. According to Ohm's Law, the greater the resistance of the linecord, the more input power is lost between the AC outlet and the power amplifier (across the linecord). And to further aggravate the matter, this relationship is nonlinear. The amount of power lost across the linecord increases exponentially as the current demand increases. So if the current demand doubles momentarily because of an exceptionally loud bass note, the amount of AC input power lost across the linecord increases four times. You can see that it is very important to keep the resistance of the linecord to a minimum. That's why we recommend using a heavy gauge extension cord (like 14 gauge or bigger). Remember, wire gets thicker as the gauge number gets smaller (10 gauge is thicker than 14 gauge).

AC Power Distribution

In order to minimize ground loops, the safety grounds for all the outlets should be connected to a common ("star") grounding point, and the distance between the outlets and the common grounding point should be as short as possible.

If lighting is used in a show, it is preferable to power the lights from a different AC circuit than the one powering the audio equipment. This will help minimize noise from the lights coupling into the audio (particularly if SCRs are used).

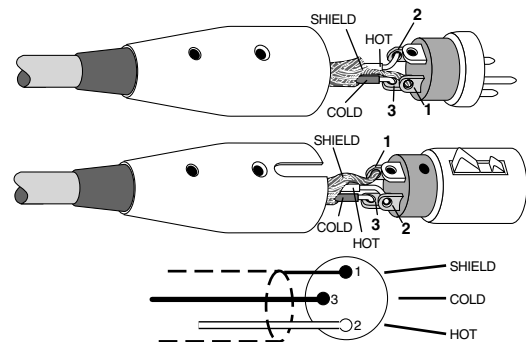
Input Wiring

Use a high-quality 3-conductor shielded cable to connect the signal between the signal source (mixing console, equalizer, etc.) and the balanced inputs to the amplifier. If you're making an unbalanced connection, use a high-quality 2-conductor shielded cable. Your Mackie Dealer can recommend a suitable cable for your application.

Refer to "Inputs" [9] on page 13 for more information about making the input connections.

When connecting a balanced line-level signal using XLR plugs, they're wired thusly, per AES (Audio Engineering Society) standards:

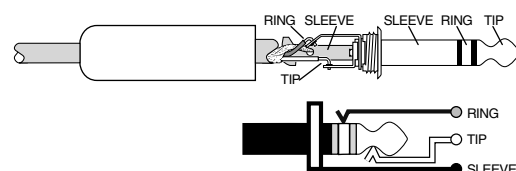
- Pin 2 = Hot (+)
- Pin 3 = Cold (-)
- Pin 1 = Shield (Ground)



Balanced XLR Connectors

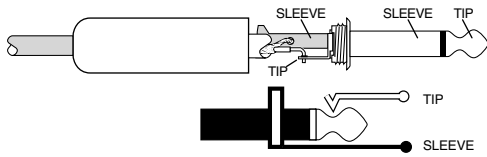
Balanced TRS (tip-ring-sleeve) plugs can be connected to the combination jacks as well. They are wired as follows:

- Tip = Hot (+)
- Ring = Cold (-)
- Sleeve = Shield (Ground)



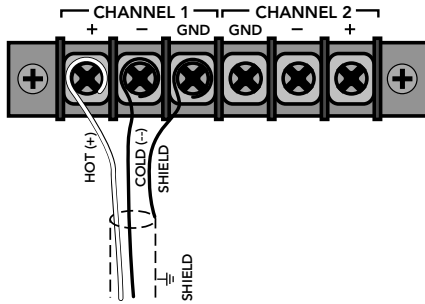
Balanced TRS Connectors

Unbalanced TS (tip-sleeve) signals can be accommodated via the combination jack. Make sure the cord terminates with a TS plug (like a guitar plug), or if it's a TRS plug (like a headphone plug), make sure the ring is tied to the shield, preferably at the source.



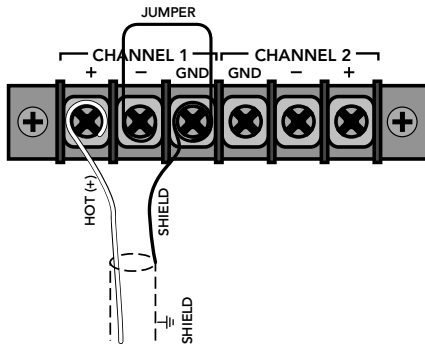
Unbalanced TS Plug

The screw terminal connections are clearly marked, indicating “+”, “-”, and GND. You can use bare wire to wrap around the screws, or spade lugs connected to the wires.



Balanced Screw Terminal Connection

If connecting an unbalanced line-level input to the screw terminals, connect a jumper between the “-” and GND screws.



Unbalanced Screw Terminal Connection

Output Wiring

Use heavy gauge, stranded wire for connecting speakers to the M-Series amplifier’s SPEAKER OUTPUT terminals. As the distance between the amplifier and the speakers increases, the thickness of the wire should also increase. Speaker wire has resistance, and when electricity passes through a resistor, power is lost. The thicker the wire, the less resistance it offers, and the more power actually gets to the speakers.

The thickness of wire is rated in gauges. Use the chart below to determine the correct gauge of wire to use according to the distance between the speakers and the amplifier, and the impedance of the load the amplifier is driving. This ensures that the power lost across the speaker wire is less than 0.5 dB.

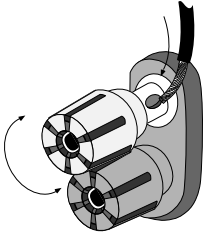
Wire Length	Load Impedance	Gauge of Wire
Up to 25 ft.	2Ω	14 gauge
	4Ω	16 gauge
	8Ω	18 gauge
Up to 40 ft.	2Ω	12 gauge
	4Ω	14 gauge
	8Ω	18 gauge
Up to 60 ft.	2Ω	10 gauge
	4Ω	12 gauge
	8Ω	16 gauge
Up to 100 ft.	2Ω	8 gauge
	4Ω	10 gauge
	8Ω	14 gauge
Up to 150 ft.	2Ω	6 gauge
	4Ω	8 gauge
	8Ω	12 gauge
Up to 250 ft.	2Ω	4 gauge
	4Ω	6 gauge
	8Ω	10 gauge

Stereo and Mono Modes

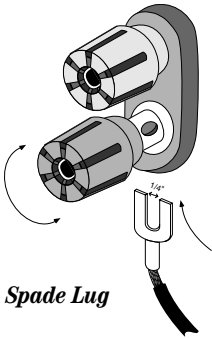
Binding Posts

When using the binding post outputs in stereo or mono modes, you can terminate your speaker cables with single or double banana plugs, spade lugs, or leave them unterminated (bare wires): unscrew the amp’s binding posts enough to reveal the holes on their sides, then insert your stripped wires (stripped about 3/8" back) into the holes and retighten the posts (finger tight is fine). Be careful that no runaway strands touch the chassis or other terminal.

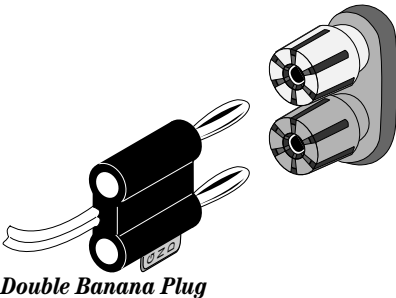
The red posts are labeled “+,” which means positive. The black posts are labeled “-” for negative. Be sure to connect the positive speaker output terminal to the positive connection on the speaker cabinet, and the negative speaker output terminal to the negative connection on the speaker cabinet.



Bare Wire



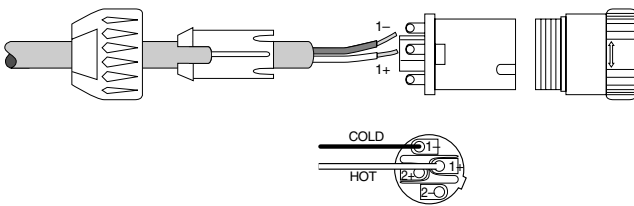
Spade Lug



Double Banana Plug

Speakons

When using the Speakon outputs in stereo or mono modes, wire the Speakon connectors as shown below:

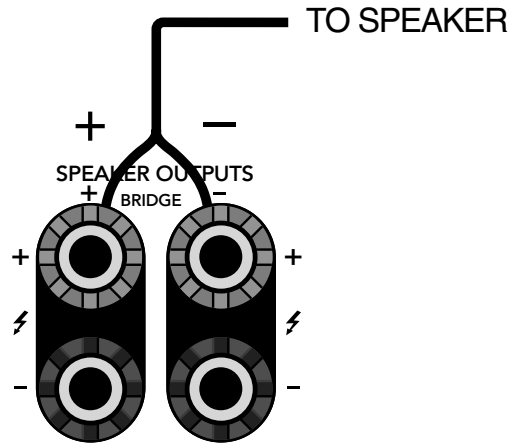


Stereo and Mono Speakon Connection

Bridge Mode

Binding Posts

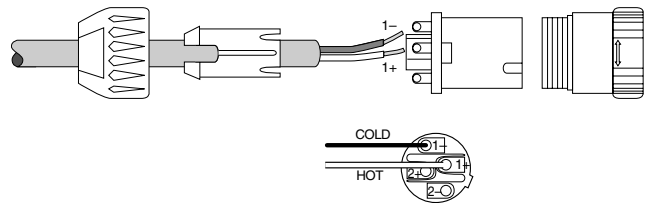
When using the binding posts in bridge mode, connect the positive side of the speaker cable to the CHANNEL 1 red (+) binding post, and connect the negative side of the speaker cable to the CHANNEL 2 red (+) binding post. No, that's not a typo. **You only use the red binding posts in Bridge mode. Do not use the black posts.**



Bridge Binding Post Connection

Speakon

When using bridge mode, wire the Bridge Speakon connector the same as the stereo and mono connectors:



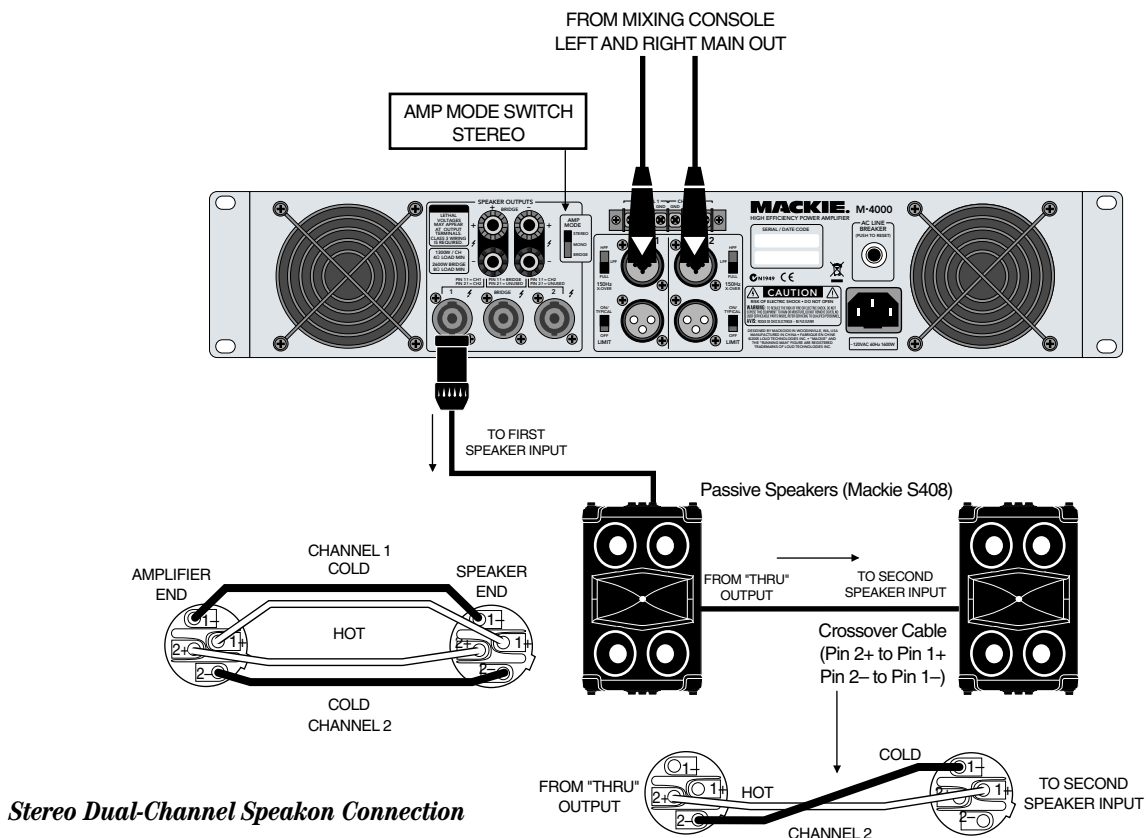
Bridge Speakon Connection

Dual-Channel Connection

The Channel 1 Speakon connector has the added feature of providing both speaker outputs on a single connector. This allows you to use a single cable to carry both channels from the amplifier to the speakers. Refer to the hookup diagram on page 7 for a typical application using the dual-channel connection.

Many speakers with Speakon connectors provide an Input connector and a "Thru" connector for connecting a second speaker in parallel. You can use the Thru connector on the speaker cabinet to connect the Channel 2 amplifier output to the Channel 2 speaker.

For the cable connecting the amplifier to the first speaker, wire all four pins in the Speakon connector, as shown below, at both ends of the cable. For the cable connecting the "Thru" connector to the second speaker, you need to use a "crossover" cable that connects pins 2+ and 2- on the "Thru" connector to pins 1+ and 1- on the second speaker input end.



Appendix A: Service Information

Warranty Service

Details concerning Warranty Service are spelled out in the Warranty section on page 27.

If you think your M-Series amplifier has a problem, please do everything you can to confirm it before calling for service. Doing so might save you from the deprivation of your amplifier and the associated suffering.

These may sound obvious to you, but here are some things you can check. Read on.

Troubleshooting

No Power

- Our favorite question: Is it plugged in? Make sure the AC outlet is live (check with a tester or lamp).
- Our next favorite question: Is the POWER [6] switch on? If not, try turning it on.
- Is the light in the power switch illuminated? If not, make sure the AC outlet is live. If so, refer to “No Sound” below.
- The AC line breaker on the rear panel has popped. To reset the breaker, turn the power switch off, push in the button on the breaker, and turn the power switch back on.

If the breaker pops again, disconnect the speakers from the amplifier and repeat the above procedure.

If the breaker pops again, there may be a problem with the amplifier. Refer to “Repair” on the next page to find out how to proceed.

No sound!

- Are the Gain [1] controls turned all the way down? Slowly turn them up and see if you hear anything.
- Is the signal source turned up? Make sure the signal level from the mixing console (or whatever device immediately precedes the amplifier) is high enough to produce sound in the amplifier. The SIG LEDs [2] should be blinking to indicate that signal is present.
- If the speakers are wired for BRIDGE mode, make sure the AMP MODE [8] switch is set to BRIDGE.
- Is the X-OVER [11] switch set to LPF? If so, you are only getting the lowest frequencies (below 150 Hz) through the speakers. Set the X-OVER switch to the FULL position to verify sound is present.

- Is the SHORT [4] LED lit? Turn the POWER off, check the speaker connections and make sure that there are no strands of wire shorting across the speaker terminals.
- Is the OVER TEMP [5] LED lit? Make sure there is cool air available at the rear of the amplifier. Make sure there is room at the front of the amplifier for warm air to exit. Allow the amplifier to cool off.
- Is the PROTECT [3] LED lit? The power transformer may have overheated and shut down the amplifier. Turn the amplifier off and wait until the transformer cools down (it could take several hours).
- Are there fuses in the speaker or in-line fuses in the speaker wire? Check 'em to see if they're blown.
- Make sure the speakers are working properly.

One side is way louder than the other!

- Do the amplifier's meters [2] read the same on both sides? If not, your source signal may be delivering an out-of-balance stereo signal.
- Are both Gain [1] knobs set to the same position?
- Are the speaker(s) impedances matched?
- Try swapping sides: Turn off the amp, swap the speaker cables at the amp, turn the amp back on. If the same side is still louder, the problem is with your speakers or speaker cabling. If the other side is louder now, the problem is with the mixer, the amp, or the line-level cabling.

The stereo music sounds kind of sideways, and the bass frequencies diminish when standing center, but get louder as you approach one side!

- Check the polarity of the speaker cable connections. You may have your positive and negative connections reversed at one end of one speaker cable.

As soon as the music gets loud, the amp shuts down!

- Check the amplifier's meters [2]. Be sure that OL is not lighting up frequently or continuously.
- Can the amp breathe? The M-Series amplifier draws its ventilation air in from the rear and out through the front. It needs plenty of fresh air to stay cool. Do not block the ventilation ports.
- Is the SHORT [4] LED lit? If so, you've got a dead short somewhere in your speaker setup, or the total impedance of the load is too low. Turn the amp off and rectify that right away.

It hurts when I touch my arm, or my leg, or even my head!

- You have a broken finger.

Bad sound!

- Is it loud and distorted? Turn down the signal coming from the mixer or signal source.
- Is the input connector plugged completely into the jack? Check the speaker connections and verify that all connections are tight and that there are no stray strands of wire shorting across the speaker terminals.
- If possible, listen to the signal source with headphones plugged into the console. If it sounds bad there, the problem's not in the amplifier.

Noise/Hum

- Check the signal cable between the mixer and the amplifier. Make sure all connections are good and sound.
- Make sure the signal cable is not routed near AC cables, power transformers, or other EMI-inducing device.
- Is there a light dimmer or other SCR-based device on the same AC circuit as the amplifier? Use an AC line filter or plug the amplifier into a different AC circuit.
- If possible, listen to the signal source with headphones plugged into the console. If it sounds noisy there, the problem's not in the amplifier.

For additional up-to-date information please visit our website at www.mackie.com.

Repair

Service for Mackie products is available at a factory-authorized service center. Service for Mackie products living outside the United States can be obtained through local dealers or distributors.

If your M-Series amplifier needs service, follow these instructions:

1. Review the preceding troubleshooting suggestions. Please.
2. Call Tech Support at 1-800-898-3211, 7 am to 5 pm PST, to explain the problem and obtain a Service Request Number. Have your serial number ready. ***You must have a Service Request Number before you can obtain warranty service.***
3. Keep this owner's manual and the detachable line-cord. We don't need them to repair the amplifier.
4. Pack the amplifier in its original package, including endcaps and box. This is **VERY IMPORTANT**. *Mackie is not responsible for any damage that occurs due to non-factory packaging.*
5. Include a legible note stating your name, shipping address (no P.O. boxes), daytime phone number, Service Request Number, and a detailed description of the problem, including how to duplicate it.
6. Write the Service Request Number in **BIG PRINT** on top of the box. Units sent without the Service Request Number will be refused.
7. Tech Support will tell you where to ship the amplifier for repair. We suggest insurance for all forms of cartage.
8. You will need to contact the authorized service center for their latest turn-around times. The amplifier must be packaged in its original packing box, and must have the Service Request Number on the box. Once it's repaired, the authorized service center will ship it back, pre-paid (if it was a warranty repair).

Note: Under the terms of the warranty, you must ship or drop-off the unit to an authorized service center. The return ground shipment is covered for those units deemed by us to be under warranty.

Note: You must have a sales receipt from an Authorized Mackie Dealer to qualify for a warranty repair.

Need Help?

**You can reach a technical support representative
Monday through Friday
from 7 AM to 5 PM PST at:**

1-800-898-3211

**After hours, visit www.mackie.com and click Support,
or email us at: techmail@mackie.com**

Appendix B: Technical Info

M-Series Specifications

	M•2000	M•3000	M•4000
Continuous Average Output Power in watts, both channels driven 20 Hz-20 kHz into 8 ohms per channel	325	475	650
20 Hz-20 kHz into 4 ohms per channel	525	800	1050
40 Hz-20 kHz into 2 ohms per channel	800	1200	1600
Bridge Mono: 20 Hz-20 kHz into 8 ohms	1050	1600	2100
Bridge Mono: 40 Hz-20 kHz into 4 ohms	1600	2400	3200
Maximum Output Power in watts, both channels driven 1 kHz @ 1% THD into 8 ohms per channel	400	600	800
1 kHz @ 1% THD into 4 ohms per channel	650	1000	1300
1 kHz @ 1% THD into 2 ohms per channel	1000	1500	2000
Bridge Mono: 1 kHz @ 1% THD into 8 ohms	1300	2000	2600
Bridge Mono: 1 kHz @ 1% THD into 4 ohms	2000	3000	4000

Note: Power ratings are specified at 120VAC (U.S. and Canada) and 240VAC (Export) line voltages.

The M-Series power amplifiers draw large amounts of current from the AC line with continuous sine wave testing. Accurate measurement of power requires a steady and stable AC supply. This means the line impedance must be very low to insure that the peak AC line voltage does not sag to less than 97% of its value.

If driving highly reactive loads, we recommend that the limiter circuit be engaged.

Power Bandwidth (rated power into 4 ohms):

20 Hz to 20 kHz
(Output power typically -3 dB at 50 kHz. Amplifier protection circuits typically mute the output signal above 40 kHz at full power.)

Frequency Response (1 watt into 8 ohms):

< 10 Hz to 55 kHz (+0, -3 dB)

Distortion:

THD, SMPTE IMD < 0.05% @ 8Ω
< 0.10% @ 4Ω
< 0.20% @ 2Ω

Signal-to-Noise Ratio:

> 107 dB below rated power into 4 ohms

Channel Separation:

> 80 dB @ 1 kHz

Damping Factor:

> 500 (8 ohms @ 400 Hz)

Input Impedance:

24 kΩ balanced
12 kΩ balanced

Input Sensitivity:

1.23 volts (+4 dBu) for rated power into 4 ohms

Gain:

M•2000 31.4 dB (37.3 V/V)
M•3000 33.3 dB (46.0 V/V)
M•4000 34.4 dB (52.7 V/V)

Maximum Input Level:

9.75 volts (+22 dBu)

Rise Time (8 ohms):

< 6 μs

Slew Rate:

M•2000

Voltage Slew Rate 50V/μs
Current Slew Rate 25A/μs at 2Ω
H-Switch Slew Rate 10-50V/μs (program dependent)

M•3000

Voltage Slew Rate 55V/μs
Current Slew Rate 27.5A/μs at 2Ω
H-Switch Slew Rate 16-70V/μs (program dependent)

M•4000

Voltage Slew Rate 60V/μs
Current Slew Rate 30A/μs at 2Ω
H-Switch Slew Rate 16-70V/μs (program dependent)

CMRR:

> 34 dB, 20Hz to 20kHz

Load Angle:

8(±jx) time independent at 8Ω
4(±jx) time dependent, T > 6 min. at 4Ω
2(1±jx) time dependent, T > 2 min. at 2Ω

Transient Recovery:

< 1μs for 10 dB overdrive @ 1kHz

Maximum Output Offset Voltage:

±50 mV

High Frequency Overload and Latching:

No latch up at any frequency or level.

High Frequency Stability:

Unconditionally stable driving any resistive or reactive load.

Turn On Delay:

3 seconds

High-Pass Filter:

150 Hz, 2nd-Order Butterworth

Low-Pass Filter:

150 Hz, 2nd-Order Butterworth

Limiter Section:

Complementary Positive and Negative Peak Detecting

Indicators:

Power ON LED (in power switch)

6 meter LEDs per channel

SIG (Signal Present), -20, -9, -6, -3, OL (Overload)

CH 1 & 2

PROTECT LEDs, SHORT LEDs, OVER TEMP LEDs

AC Line Power:

U.S./Canada 120VAC, 60Hz

Europe 240VAC, 50Hz

Japan 100VAC, 50/60Hz

Korea 220VAC, 60Hz

(Factory configured)

AC Drop-out Voltage:

At approximately 65% of rated line voltage

Physical:

M•2000

Height	3.5 in/89 mm
Width	19.0 in/483 mm
Depth	15.7 in/398 mm
Overall Depth	17.0 in/432 mm
Weight	41 lb/18.6 kg

M•3000

Height	3.5 in/89 mm
Width	19.0 in/483 mm
Depth	18.1 in/460 mm
Overall Depth	19.5 in/494 mm
Weight	48 lb/21.8 kg

M•4000

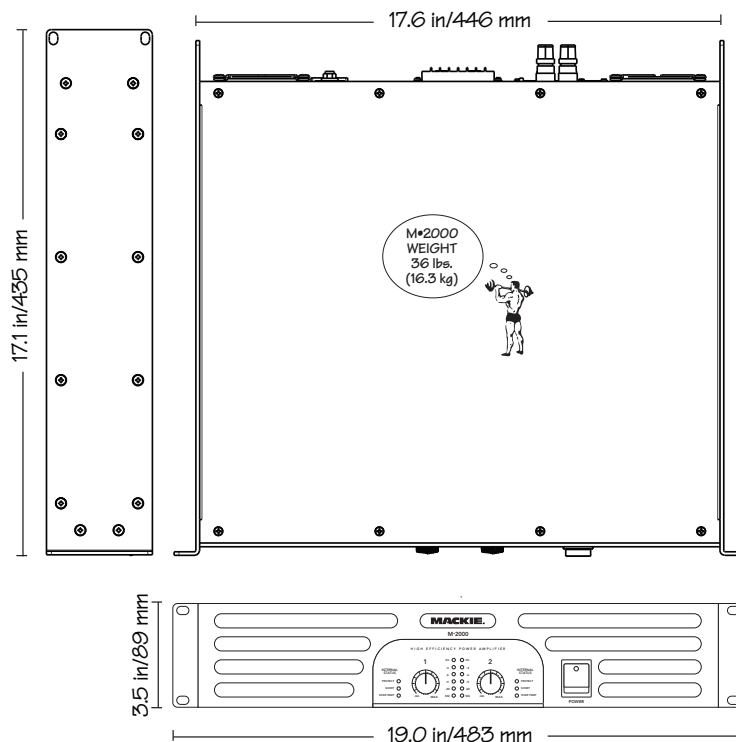
Height	3.5 in/89 mm
Width	19.0 in/483 mm
Depth	18.1 in/460 mm
Overall Depth	19.5 in/494 mm
Weight	53 lb/24.0 kg

LOUD Technologies Inc. is always striving to improve our products by incorporating new and improved materials, components, and manufacturing methods. Therefore, we reserve the right to change these specifications at any time without notice.

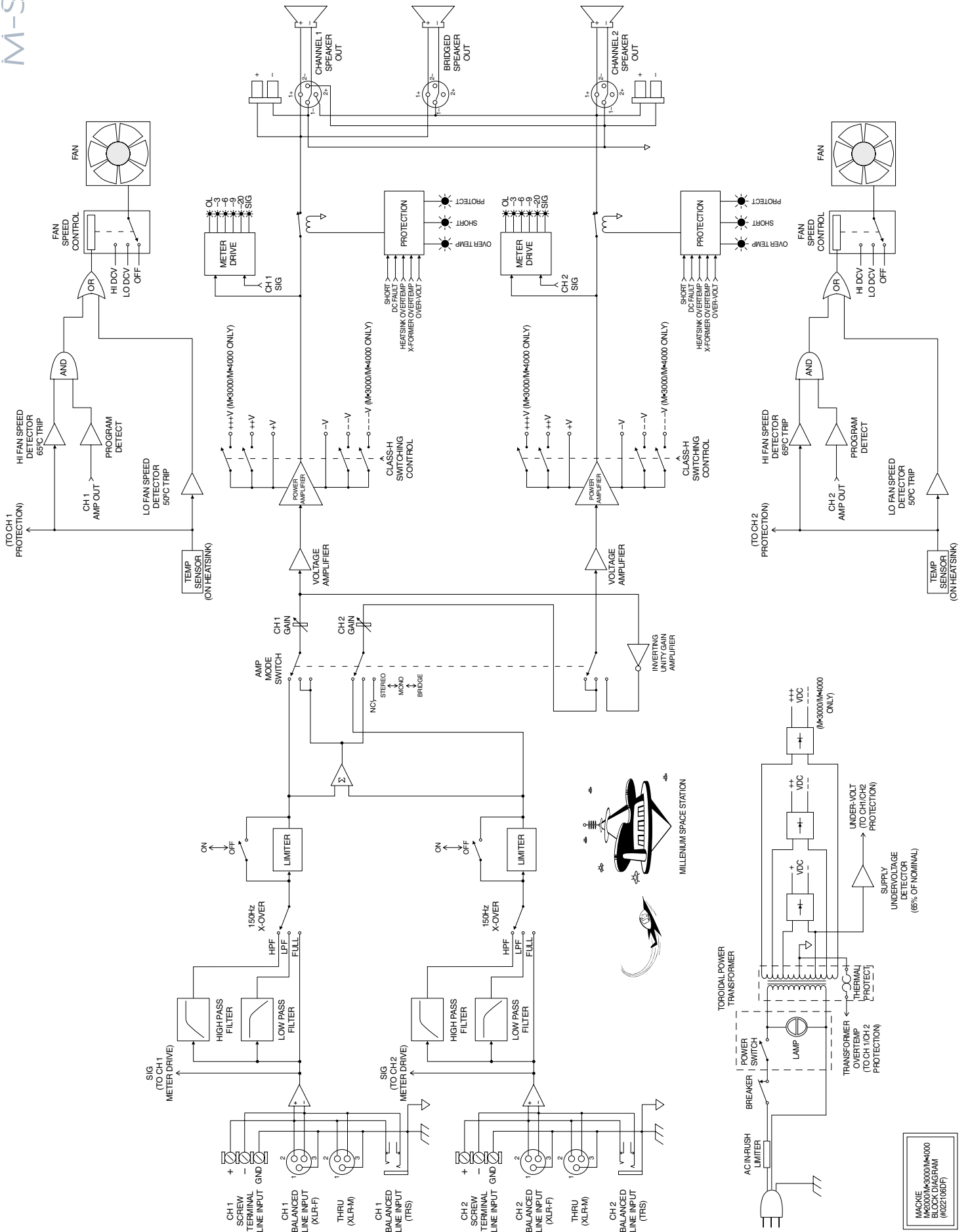
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M-Series Dimensions



M-Series Block Diagram



MACPAC M-3000/M-4000
BLOCK DIAGRAM
(#022106DF)

M-Series Limited Warranty

Please keep your sales receipt in a safe place.

A. LOUD Technologies Inc. warrants all materials, workmanship and proper operation of this product for a period of **five years** from the original date of purchase. If any defects are found in the materials or workmanship or if the product fails to function properly during the applicable warranty period, LOUD Technologies, at its option, will repair or replace the product. **This warranty applies only to equipment sold and delivered within the U.S. by LOUD Technologies Inc. or its authorized dealers.**

B. Failure to register online or return the product registration card will not void the five-year warranty.

C. Service and repairs of Mackie products are to be performed **only** at a factory-authorized facility (see D below). Unauthorized service, repairs, or modification will void this warranty. To obtain repairs under warranty, you must have a copy of your sales receipt from the authorized Mackie dealer where you purchased the product. It is necessary to establish purchase date and determine whether your Mackie product is within the warranty period.

D. To obtain factory-authorized service:

1. Call Mackie Technical Support at 800/898-3211, 7 AM to 5 PM Monday through Friday (Pacific Time) to get a Service Request Number. Products returned without a Service Request Number will be refused.
2. Pack the product in its original shipping carton. Also include a note explaining exactly how to duplicate the problem, a copy of the sales receipt with price and date showing, and your return street address (no P.O. boxes or route numbers, please!). If we cannot duplicate the problem or establish the starting date of your Limited Warranty, we may, at our option, charge for service time.
3. Ship the product in its original shipping carton, **freight prepaid** to the authorized service center. The address of your closest authorized service center will be given to you by Technical Support.

IMPORTANT: Make sure that the Service Request Number is plainly written on the shipping carton.

E. LOUD Technologies reserves the right to inspect any products that may be the subject of any warranty claims before repair or replacement is carried out. LOUD Technologies may, at our option, require proof of the original date of purchase in the form of a dated copy of the original dealer's invoice or sales receipt. Final determination of warranty coverage lies solely with LOUD Technologies.

F. Any products returned to one of the LOUD Technologies factory-authorized service centers and deemed eligible for repair or replacement under the terms of this warranty will be repaired or replaced within thirty days of receipt. LOUD Technologies and its authorized service centers may use refurbished parts for repair or replacement of any product. Products returned to LOUD Technologies that do not meet the terms of this Warranty will be not be repaired unless payment is received for labor, materials, return freight, and insurance. Products repaired under warranty will be returned freight prepaid by LOUD Technologies to any location within the boundaries of the USA.

G. LOUD Technologies warrants all repairs performed for 90 days or for the remainder of the warranty period. This warranty does not extend to damage resulting from improper installation, misuse, neglect or abuse, or to exterior appearance. This warranty is recognized only if the inspection seals and serial number on the unit have not been defaced or removed.

H. LOUD Technologies assumes no responsibility for the quality or timeliness of repairs performed by an authorized service center.

I. This warranty is extended to the original purchaser and to anyone who may subsequently purchase this product within the applicable warranty period. A copy of the original sales receipt is required to obtain warranty repairs.

J. This is your sole warranty. LOUD Technologies does not authorize any third party, including any dealer or sales representative, to assume any liability on behalf of LOUD Technologies or to make any warranty for LOUD Technologies Inc.

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