LM-3204 OWNER'S MANUAL

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'éléctrocution.

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.

SAFETY INSTRUCTIONS

1. Read Instructions — Read all the safety and operation instructions before operating the LM-3204 Console.

2. Retain Instructions — Keep the safety and operating instructions for future reference.

3. Heed Warnings — Follow all warnings on the LM-3204 Console and in these operating instructions.

4. Follow Instructions — Follow all operating and other instructions.

5. Water and Moisture — Do not use the LM-3204 Console near water - for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, near a swimming pool, swamp or salivating St. Bernard dog, etc.

6. Heat — Locate the LM-3204 Console away from heat sources such as radiators, compost pits or other devices that produce heat.

7. Power Sources — Connect the LM-3204 Console only to a power supply of the type described in these operation instructions or as marked on the LM-3204 Console.

8. Power Cord Protection — Route power supply cords so that they are not likely to be walked upon or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit the LM-3204 Console.

9. Object and Liquid Entry — Do not drop objects or spill liquids into the inside of the LM-3204 Console.

10. Damage Requiring Service — The LM-3204 Console should be serviced only by qualified service personnel when:

A. LM-3204 Console power-supply cord or the plug has been damaged; or

B. Objects have fallen, or liquid has spilled into the LM-3204 Console; or

C. The LM-3204 Console has been exposed to rain; or

D. The LM-3204 Console does not appear to operate or exhibits a marked change in performance; or

E. The LM-3204 Console has been dropped, or its chassis damaged.

11. Servicing — Do not attempt to service the LM-3204 Console beyond those means described in this operating manual. All other servicing should be referred to the Mackie Tech SupportDepartment.

13. To prevent electric shock, do not use the LM-3204 Console polarized plug with an extension cord, receptacle or other outlet unless the blades can be fully inserted to prevent blade exposure.

Pour préevenir les chocs électriques ne pas utiliser cette fiche polariseé avec un prolongateur, un prise de courant ou une autre sortie de courant, sauf si les lames peuvent être insérées à fond sans laisser aucune pariie à découvert.

14. Grounding or Polarization — Do not defeat the grounding or polarization of the LM-3204 Console.

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 las 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.

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

PLEASE! SAVE THE SHIPPING BOX!

Top Ten Reasons for saving your shipping box:

10. It's here.
9. It's yours.
8. It's paid for.
7. It's strong and sturdy.
6. It fits your mixer perfectly.
5. You will need it if you ever ship your mixer.
4. We may have to sell you another one if you need to ship your mixer and you don't have it.
3. It will impress your friends who have no lives when they see it in your basement.
2. It's the ecologically sound thing to do.
1. It's the Mackie sound thing to do.

Top Ten Reasons for *not* saving your shipping box:

10. Your cat has already used it.
9. You stole the mixer out of a Karaoke bar.
8. Your Mackie mixer will never break.
7. You will never move again.
6. You wrote a song on it and are considering framing it.
5. You have cut off the top and are using it as an equipment rack.
4. You really hate planning ahead because it never works out anyway.
3. It fits some other manufacturer's product, which is broken, perfectly.
2. You have kept all the boxes of all the other equipment you have ever bought and you have never used one of them ever.
1. You are afraid of corrugated products.

TABLE OF CONTENTS

SECTION 1: INTRODUCTION

The Mackie LM-3204 is a 32-input, 2+2 Bus line level sound mixer. Each of the 16 stereo input modules is fitted with gain, balance, EQ and auxiliary send controls.

The LM-3204 is designed for applications requiring control of a number of stereo/mono line level sources, while providing exceptional audio performance in a small (and very affordable) rack-mounted unit — it makes the ideal centerpiece of a MIDI project suite.

The LM-3204 is equally suited for use as a synthesizer/sampler/effects submixer for stage, sound reinforcement and studio applications. The LM-3204 is also perfect for audio-visual sound mixing in exhibit halls and in presentation rooms, for multiple-source architectural sound distribution, and for simple audio and video post-production suites.

IF YOU IGNORE MANUALS...

How did you find this section?

Because you're secretly wondering if there might actually be something worth your time in a book like this. What can we say? We'll give you concise, accurate information that even relates to the real world, some nice patching diagrams, a bit of entertainment and a full year's worth of weather forecasts for 7 regions of the country. Why, we're even thinking of drilling a hole in the corner so you can hang it by the toilet.

If you're moving too fast to review all this great prose, try to check out Section 2 and the system Block Diagram. There are a few handy and/or unique features in the LM-3204 design you should know about.

At the very least, look for this important icon:

It marks information that is absolutely critical or is unique to the LM-3204.

In addition, sections tagged with this icon:

include both in-depth information and our own deeply felt but never biased opinions.

Note: one of the icons in the manual is actually a scratch-off icon, which, if you rub long enough with the edge of a coin, will make a hole in the page. If you succeed in finding a secret message under a Mackie icon, please write us and tell us about it. (We were going to make another industry first and put a scratch-and-sniff icon in this manual, but our Odors and Pheromones Department could not find a smell related to sound mixing that was not in some way offensive.)

IMPORTANT SENSITIVITY ADJUSTMENT PROCEDURE!

So important we put it first, before anything else.

To fully achieve the LM-3204 Mixer's impressive headroom and specs, you should *always* "tune" the input sensitivity for each channel.

FOLLOW THIS PROCEDURE FOR EACH CHANNEL IN USE

1. Set the Control Room, Phones, Left and Right Master Fader and Solo controls all the way ***off***. (As you are working through the steps, you can bring these controls up a bit to hear what you are doing, but be careful. There's a lotta level in this mixer.)
2. Apply signal to channel input.

   Insert a stereo line input into the corresponding Left and Right Input jacks at the rear of the mixer.

   or

   Insert a mono line input into the corresponding Left Input jack on the rear of the mixer.
3. Set channel strip controls as follows:

   Gain control at "U" detent.

   Solo switch ***down***.

   Mute switch ***up***.

   Balance control at "U" detent.

   EQ controls at "U" detent.

   Aux controls fully counterclockwise ***(off)***.
4. Apply an audio signal to the input. The material and level you use to set up the mixer should be vaguely representative of what you will really be doing when you really do it. If you're connected to a tape deck or a CD player, put some music on and push the button! If you're hooked up to a synthesizer, tickle those plastic ivories!
5. The channel's –20dB LED should light. The L/R main meters will show the actual internal operating level of soloed signals. Now you will optimize levels.

   For a meter reading of 0dBu with +4dBu input (line level) signals, the settings in step 3 should be just about right. Adjust the channel Gain control slightly so that you get peaks that regularly hit 0dB on the Left and Right meters.

   For –10dBV signals, you may have to turn the channel Gain control clockwise to boost the signal to read 0d B on the Left and Right meters.

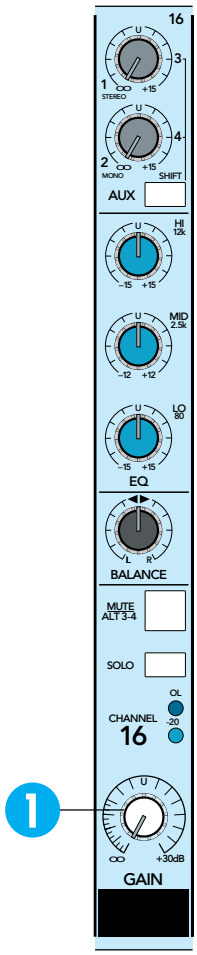
   On the other hand, you might have to deviate from this approach on certain channels. For example, you don't want to set the hi-hat cymbal channel at 0dB. Use your judgement on this.

   The **Long Arm Exercise**: For Microphone signals (using an onboard Mackie mic preamp), leave the channel Gain setting at the "U" detent and instead adjust the Mic Trim pot on the rear of the mixer until you get peak levels of around 0dB on the Left and Right meters. Remember, the sound coming in the microphone should be typical of what you will really be using. For patching instructions, see page 11, "Microphone Preamplifiers."
6. If desired (optional):

   Adjust the channel strip's EQ to about what you will be using during the session.

   Repeat Step 5.
7. Return the channel strip's Solo button to the ***up*** position.
8. Repeat steps 1–7 on the next channel that is being used.
9. As you un-solo the channel strips to listen to your mix, ease up the Left and Right master faders to set a good mix level on the meters, with occasional peaks of 0dB.

SECTION 2: PANEL LAYOUT & FUNCTION



ON THE LEFT SIDE

Most of the LM-3204 front panel (four-fifths, precisely) is occupied by the 16 stereo, line level *input modules* or *channel strips*. Each strip sports identical features, functions, knobs and buttons, so we'll take a close look at one and leave it to you to extrapolate. Still with us?

ON THE RIGHT SIDE

The rightmost one-fifth of the LM-3204 is the Master Output section, featuring auxiliary returns, master level controls, meters, lights and a few other tricks.

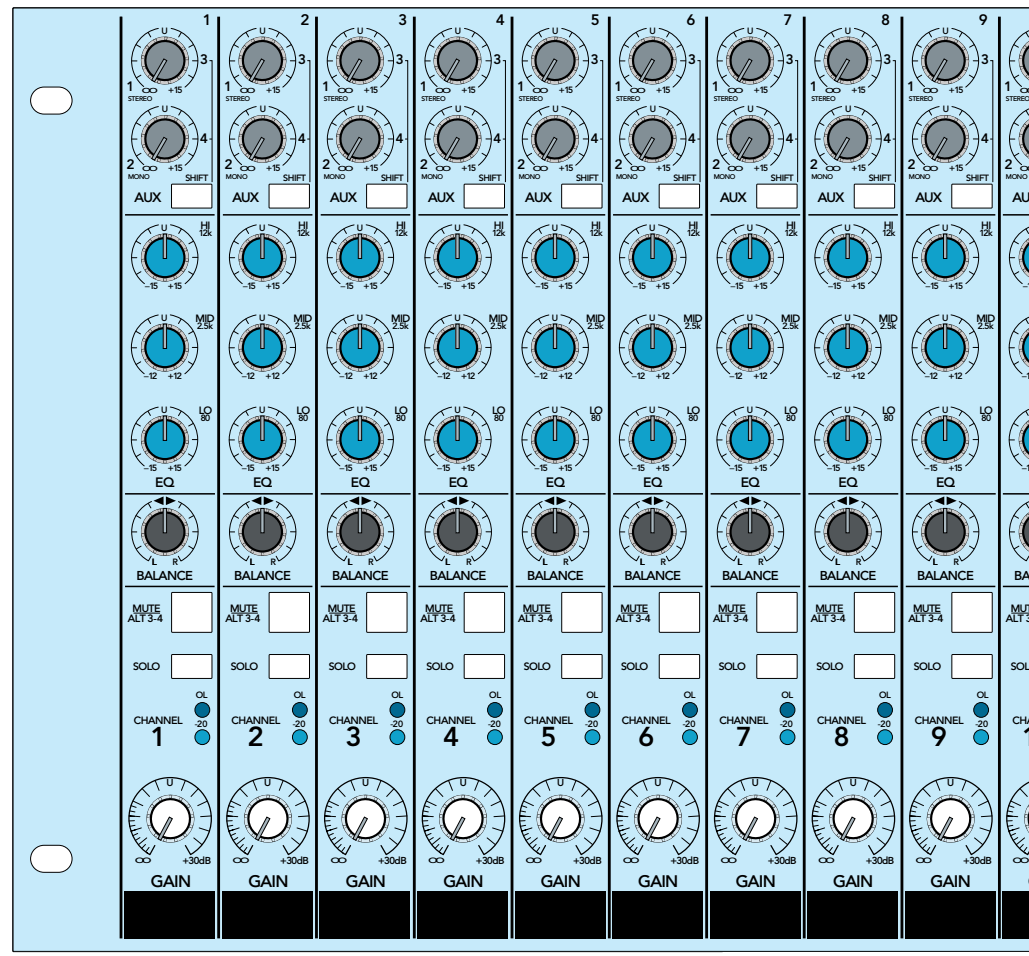
THE OFFICIAL GUIDED TOUR OF A TYPICAL LM-3204 INPUT MODULE (CHANNEL STRIP)

Pretty straightforward. But remember, these are all *stereo* input modules, so even though there is only one volume control and one EQ section per channel strip, there are actually *two* audio channels, Left and Right, routed through each strip…so each control on an input module is a *dual* control, working on both sides of the stereo signal.

THE GAIN CONTROL 1

At the bottom of each strip is the white Gain knob, which is a stereo gain control for that channel's signal. In the time-honored Mackie tradition, the Gain control has a tremendous range, from *off* at the "∞" mark to unity (no gain or loss of gain) to a 30dB increase in signal level when fully clockwise providing 15dB of gain above unity. This range allows the LM-3204 to easily handle a wide range of "line level" inputs, from professional +4dBu and +8dBu levels all the way down to consumer and semi-pro-type –10dBV levels and lower.

The "U" mark at the top center the Gain control's arc of travel stands for "Unity Gain." It's the point at which no level is added to or subtracted from the input signal. With the input Gain control and Left/Right master gain controls set at "U," a –10dBV signal at the input jacks of the LM-3204 is still –10 at the output jacks. Likewise, a +4dBu signal comes in at +4 and goes out at +4.



To make matters even easier, the crack Mackie Detent Crew have put a little mechanical "pot-hole" or *detent* at the Unity Gain point on every rotary control. Adding detents is a precise, tedious and largely thankless job, so think of those guys every now and then as you're going about your glamorous and exciting lives mixing and recording and performing, while they work late into the night in rainy Woodinville with their little bags of punches and elf-sized ball-peen hammers.

THE LEDs 2

Above the Gain knob are two LED (light-emitting diode) indicator lights to help you monitor the signal levels within each input module.

–20 LED

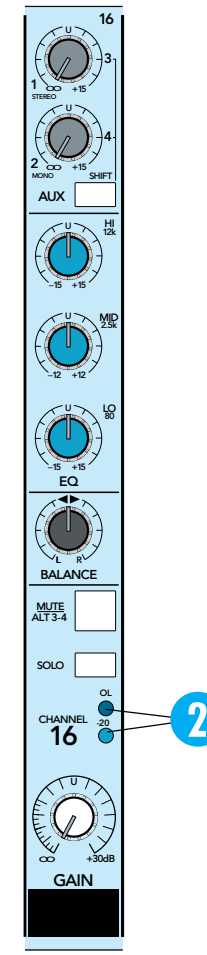
The green LED is marked –20. It will light whenever there is a signal level of –20dBu (at 1kHz) or above at the input jacks of that channel strip. In practice, this LED will flicker or light almost constantly when there is activity in that channel, and it basically serves as a convenient indicator for you — a way of figuring out who's singing now or what's plugged into where.

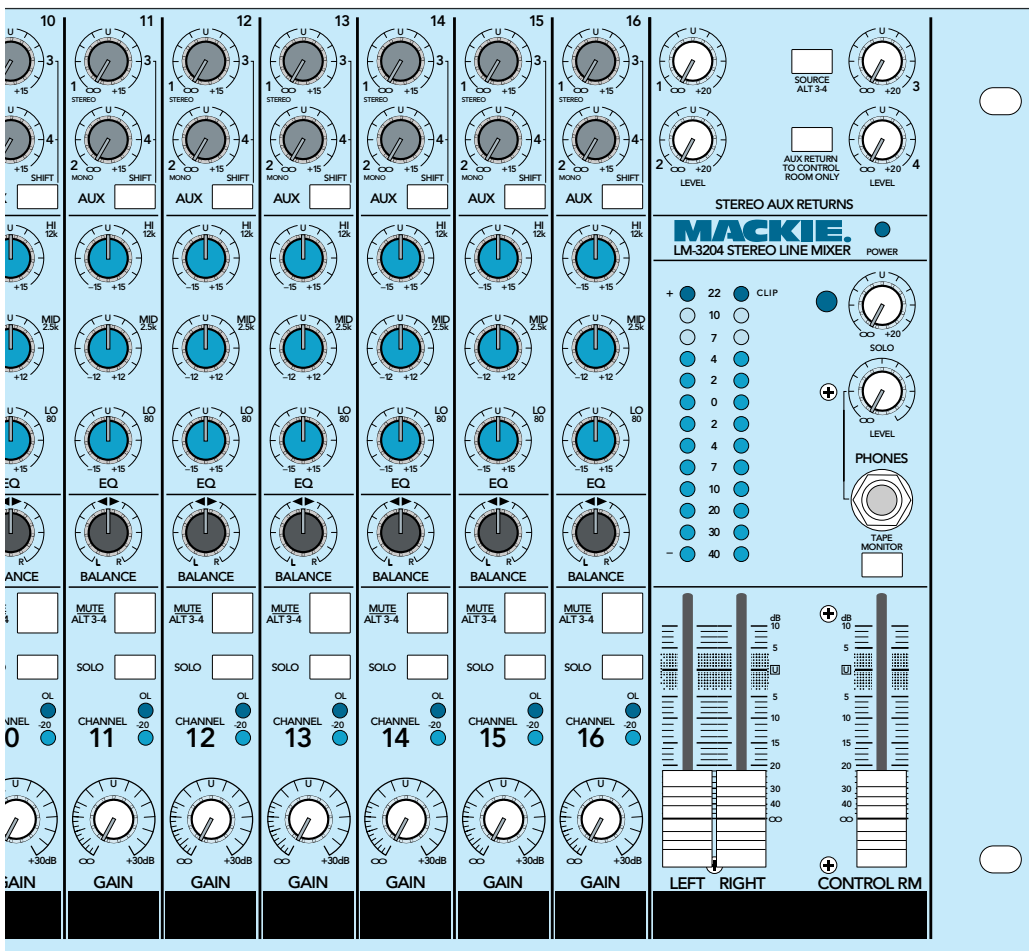
Whether it lights rarely or is on all the time is not really important; it's just a porch light to show you somebody's home. We designed it to be ultra-responsive, so, with a little practice, you can probably tell what's on the channel (or at least the difference between the kick drum channel and a keyboard channel). However, it's not the way to determine levels. There is a much more accurate way to measure your input strip levels: see the section on Setting Levels in Solo further down the pike here.

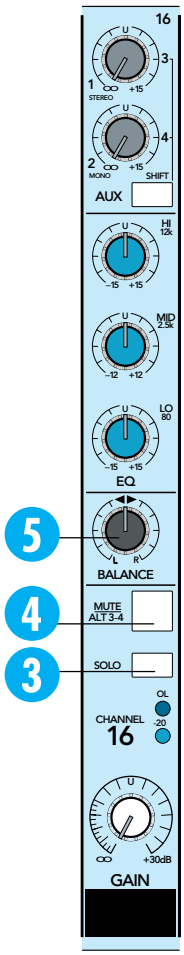
Note: The –20 LED shows signal activity on the right side of each channel. If you had a stereo source (two cords, two plugs) or a mono source (one plug into the left MONO jack), the –20 LED will reflect that signal. However, if you have a stereo source with no signal happening on the right side, the –20 LED will be as unresponsive as a hybernating hippo on Sominex™.

OL LED

The red LED is marked OL, and that stands for OverLoad. The channel strip OverLoad circuits constantly check at two critical points in the input module: after the line input's first gain amplifier and after the EQ and gain circuits. If either circuit is driven too hard (into overload),







the red OL light will flash.

This is to be avoided. Overloading a mixer circuit forces the audio signal to *clip* and seriously distort the sound. When the OL light flashes, it means something is too loud. It could be the level of the unit connected to the LM-3204 input jacks or a device you plugged into the Insert Jack; maybe you have the Gain control turned too high or an extreme amount of EQ (which lifts the gain in certain frequency ranges). You need to find out what is too loud and turn it down until the OL LED no longer lights.

Note: When a channel strip is soloed, both the channel LEDs light steadily to indicate that module's solo status.

SOLO 3

A solo function on a mixer allows you to listen to (and on a Mackie mixer, to observe on the meters) any input or combination of inputs without affecting the main or auxiliary outputs of the mixer. In other words, you can push a solo button to check something out just about any time without affecting your recording or sound reinforcement feed.

The Solo switch on each LM-3204 channel strip assigns the stereo signal in that channel to the stereo *solo buses*. Both the channel –20 LED and OL LED will light steadily to indicate the module's solo status. The solo signals are tapped off after the Balance control, the Gain control and the EQ circuits, and will be affected by all these settings.

IMPORTANT!! Setting Levels with Solo

On the LM-3204, Solo has another important function.

Each Solo switch also triggers circuitry that disconnects the meters, the Control Room monitors and the Phones from their normal duties and reconnects them all to the output of the solo buses. Not only can you listen to the soloed tracks but you can *measure* them on the 13-segment main meters.

In fact, **this is the recommended way to adjust input levels**. As you are initially setting up a stereo pair of inputs, push the Solo button. It doesn't matter if the channel strip is muted: solo will function on a muted or unmuted track. Now set the input level to the range you want, simply by checking out the main meters.

Lastly, by means of extremely expensive state-of-the-art highly obfuscated envelope-pushing silicon technology, *any Solo switch on the board* will *also* light that pulsating flambeau, that impudent alarm, that ruby pharos guarding the Mackie shore, the Rude Solo Light.

MUTE / ALT 3–4 4

Next up is the Mute switch, which lives up to its name by *muting* its channel strip. When the Mute switch is depressed, the signal in that input module is removed from the main Left/Right buses and from any selected Auxiliary buses.

Even though the channel is muted, there can still be audio within the input module. The –20 and OL lights will light, signal will still be available at the Insert jack (channels 1–4), and the channel Solo function will still work. In regard to the main and auxiliary outputs, though, the channel is effectively turned off. But there is a twist.

IMPORTANT: Any and all muted channels are routed to an additional pair of stereo outputs, called the Alt 3–4 outputs. If you have nothing connected to Alt 3–4 outputs, the Mute switch is simply a Mute switch. If you use Alt 3–4, then the Mute switch acts like an assignment button, switching the signal between two sets of stereo output buses: the Main L–R and the Alt 3–4 buses. This feature is fraught with potential. What appeared at first as a two-bus mixer now is revealed to be, for many purposes, a *four-bus* mixer. Yow!

BALANCE 5

What looks like a pan pot, acts like a pan pot but is *not* a pan pot? It's a Balance control! With a stereo input module, you are no longer dealing with a mono signal to pan from left to right. Instead, you have a stereo signal already spread across the soundstage, and you may have to only tweak the balance between the two channels a bit.

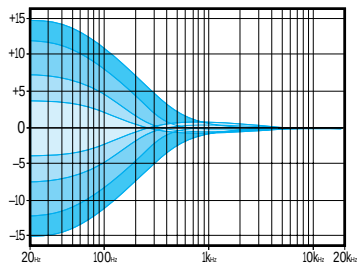
That's what the Balance control on the LM-3204 does. It's identical to the balance control on your Aunt Agatha's Unrealistic hi-fi receiver. There is a detent at the top, where the balance is even. As you shift the control from one side to the other, the stereo balance changes, with the extremes being left channel only or right channel only.

Note: It is possible to use a channel strip on the LM-3204 as a mono input by plugging a cord only into the Left (MONO) input. In this case, the mono signal is applied equally to both of the stereo signal paths. In this mode, the Balance control acts just like a pan pot, automatically! What a world we live in.

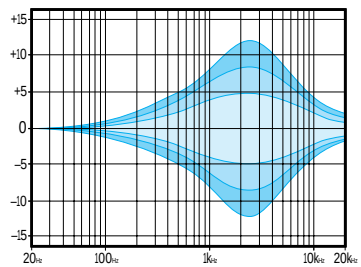
EQ

In keeping with the stereo theme of this entire mixer, the engineers at Mackie have decided to provide stereo equalization as well. Just like the stereo Gain control, the EQ knobs have both left and right EQ sections ganged on a single shaft.

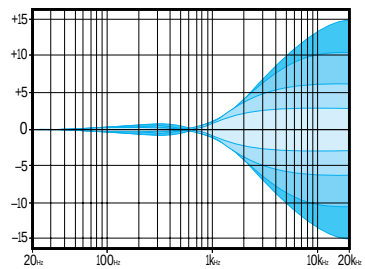
The LM-3204 EQ has three sections, each with a fixed knee or center frequency and bandwidth. Frequency curves are shown below.



LM-3204 Lo shelving EQ ±15dB boost/cut.



LM-3204 Mid peaking EQ ±12dB boost/cut.



LM-3204 Hi shelving EQ ±15dB boost/cut.

The low-frequency equalizer (6) is a shelving EQ with the knee of the shelf set at 80 Hz. The Lo section offers a swing of ±15dB.

The mid-frequency EQ (7) is a peaking EQ, featuring a bell-shaped peak/dip curve centered at 2.5 kHz with a smooth-sounding 2-octave bandwidth. The Mid section can cut or boost over a range of ±12dB.

The high-frequency equalizer (8) is a shelving EQ with the knee of the shelf set at 12 kHz. Like the Lo section, the Hi section offers a swing of ±15dB at a very useful frequency.

When any of the EQ knobs are set at their "Unity" detents, that section is effectively out of the circuit.

AUX SENDS

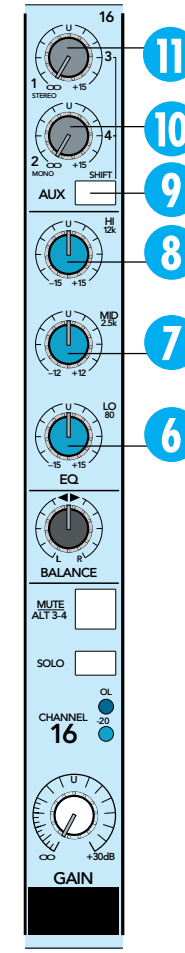
The LM-3204 offers 4 separate sets of auxiliary sends from each input module. Two sets of sends per module can be selected at any one time. The Shift switch (9) allows you to choose either sends 1 and 2, *or* sends 3 and 4 on any channel strip.

Sends 1 and 3 (10), selected alternately by the Shift button, are true stereo sends with left and right channels maintained separately throughout the auxiliary send circuitry.

Sends 2 and 4 (11), also selected alternately by the Shift switch, are mono sends. Within each channel strip, the left and right input signals are combined into a mono sum for sends 2 and 4, which appear at their output jacks as monaural signals.

All the sends on the LM-3204 are post-Gain control, post-EQ, post-Mute switch. Unfortunately, due to the incredibly dense surface mount circuitry inside this beast, modifications are not possible.

Each AUX send control has a "Unity" detent at the top of its travel, and, like the rest of the mixer, will deliver a "level in = level out" signal at the send outputs when set to "U." Setting the aux send controls fully clockwise delivers a whopping +15dB of gain.



THE MASTER OUTPUT SECTION — THE TOUR CONTINUES

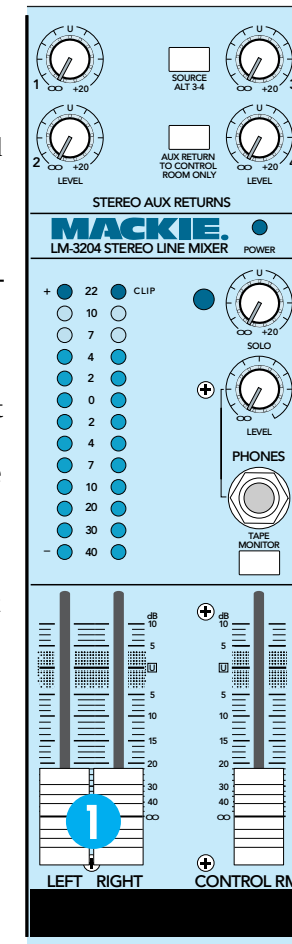
The Master Output section is that right-hand one-fifth of the LM-3204 we promised we'd talk about earlier in the manual. This section is home to the Master Faders, Control Room, Headphone and Solo level controls, the AUX Returns and, of course, the Rude Solo Light.

LEFT AND RIGHT MASTER FADERS (1)

The mix level of the main Left and Right buses is controlled by the Left and Right Master Faders. The unity gain point for the mix output circuits is marked with a "U," with 10dB of gain available beyond that point. When both channel strip Gain and the Left and Right Master Faders are set at unity, the output level of the LM-3204 will be the same as the input level.

LEFT AND RIGHT METERS (2)

Above the Master Faders are the Left and Right Meters. These are peak averaging meters, with zero (0)dB referenced to



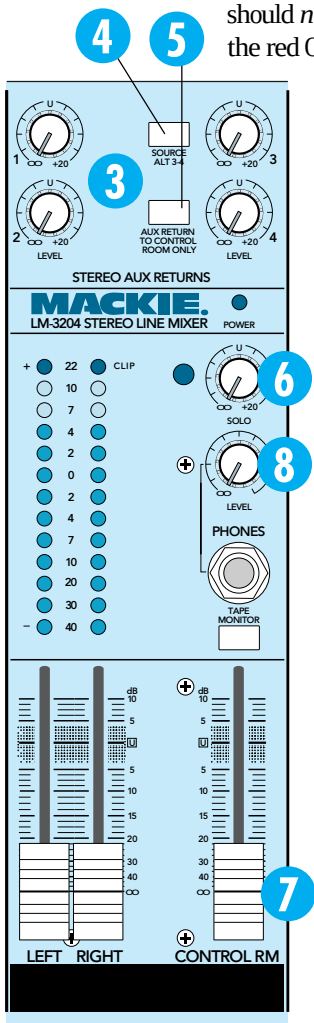
0dBu (.775 volts rms) at the rear output jacks. The LM-3204's main outputs are 0dBu=0dB Meter whether you are using balanced or unbalanced cables.

The meters are switched by the same circuits that switch the Control Room and Phones monitors. So whatever you are hearing in the monitors is what's on the meters. Normally, that would be the main Left and Right bus outputs. If the Tape Monitor switch is pushed down, the meters (and the monitors) are connected to the Tape In jacks. (See the Tape Monitor switch note in the Monitoring section a little farther on.)

NOTE: The Control Room fader does not affect meter levels.

And remember, whenever any solo button is pressed, the meters are ***not*** reading the main output bus level. When a Solo button is pressed, the monitors and the meters are connected to the solo buses for input level adjustment.

You should set your L/R levels for a reading in the middle of the meters, with occasional peaks reaching into the yellow +7 to +10 range. You should *never* have the levels loud enough to light the red OL LEDs, which are set at +20dBu, just before clipping (+22dBu) to indicate bus distortion.



STEREO AUX RETURNS 3

The LM-3204 has 4 stereo Auxiliary (AUX) returns for reverb, delay and other effect returns. The returns pass through ganged stereo level controls and are routed into the main Left and Right buses. Each level control has a "U" detent and plenty of gain (+20dB) for any effect you use. Just like a channel strip input, any return can be used in mono by patching into the Left input only.

There are a couple of Mackie bonus switches in the AUX Return circuits:

THE SOURCE ALT 3–4 SWITCH 4

This switch works on the AUX Return 3. With the switch ***up,*** AUX Return 3 is just what it's advertised to be: an AUX Return. When the Source Alt 3–4 switch is ***down,*** AUX Return 3 inputs are disconnected. Instead, the outputs of the Alt 3–4 buses are routed into the AUX Return 3 control and circuitry.

This allows you to use Alt 3–4 as a pair of submix buses and then re-mix them back into the main Left and Right buses.

AUX RETURN TO CONTROL ROOM ONLY 5

It has such a long name that it hardly needs any explanation. When this switch is ***up,*** AUX Return 4 functions normally. When the switch is ***down,*** the AUX Return 4 is disconnected from the main Left and Right buses and is re-connected to the control room monitor and headphone circuits (where it is mixed back in with Left and Right signal on its way to the Monitor section).

This allows you to use ***wet monitor,*** listening with echo or delay without actually using the effect in the main Left and Right outputs, or to "play along" to a cue or click feed without having it go onto tape.

SOLO

When a Solo button is pressed, the soloed signals are sent to the meters and the solo buses, which are fed to the control room monitor and headphone circuits. The Solo control 6 in the main Output section sets solo monitoring level. It has no effect on the levels on the meters or on any of the main, alternate or auxiliary buses.

Next to the Solo level control is the Rude Solo Light, as nasty an indicator as our Indicator Department could find without actually being dangerous. When it is blinking, something is soloed. Simplicity itself.

Furthermore, the –20 and OL LEDs on soloed channel(s) glow steadily to indicate Solo-ed status.

MONITORING

The LM-3204 has both Control Room 7 and Phone 8 monitoring outputs, each circuit with its own level control. Monitoring controls consist of the stereo Control Rm fader, the Phones level control (with a handy Phones jack just below it), and the Tape Monitor switch.

Control Rm and Phone monitor outputs always share the same sources:

- The main Left and Right buses under normal conditions;
- The output of your tape recorder (or some other source patched into the Tape In jacks) when the Tape Monitor switch is pushed, or;
- The stereo solo buses whenever any Solo switch is pressed. The solo circuits override the Tape Monitor switch.

Quick recap: In the ***up*** position, the Tape Monitor switch selects the main Left and Right bus outputs for the monitor circuits and the meters. In the ***down*** position, the Tape Monitor switch selects the Tape Inputs for the monitor circuits and the meters.

MICROPHONE PREAMPLIFIERS

Another Mackie bonus feature! How did this come about? Was there just too much blank space on the back panel? Did somebody say, "Well, what if you have a ***microphone***?" We'll never know. But the happy fact is, in addition to all the fabulous stereo line input features you could possibly want, there are two high-performance Mackie microphone preamplifiers hidden away on the rear panel, just in case you need them.

The mic preamps each have a standard XLR-3 input connector, a trim control, and switchable phantom powering. However, they don't ***go*** anywhere (non-normalled). That's up to you.

To use a mic preamp, simply patch one of the (unbalanced ¼") Mic Out jacks into any one of the line input jacks of the mixer. Patch 'em in mono, patch 'em in stereo, patch 'em anywhere your cord will reach.

NOTE: While dynamic mics ignore phantom power, ribbon mics don't. Make sure that the Phantom Power switch is off before plugging in a ribbon mic. Wouldn't want to barbecue your Beyer®…

The *Long Arm Exercise* revisited

The mic Trim knob will add from +10dB to +50dB of sensitivity to an LM-3204 input. For proper level setting, put all the controls in your signal path at the "U" detent and solo the input module you are using for a mic input. Then, while someone is making appropriate noises in front of the microphone, adjust the mic trim so that the peak levels read about 0dB on the meters.

If you are using condenser microphones, don't forget to engage the Phantom Power switch, located between the two mic trim knobs.

REAR-PANEL CONNECTIONS

With the exception of the handy Phones output jack, all of the connections to the LM-3204 are made on the rear panel of the unit, back in your equipment rack where all the cabling is lurking.

LINE INPUTS 1

There are 32 line inputs in the LM-3204, a left-right pair for each of the 16 input modules. The channel inputs are each electronically balanced, high impedance line inputs, accommodating a range of signals from nominal levels of less than –10dB to over +4dBu.

The input jacks will also accept unbalanced line level inputs.

Each jack is wired as a TRS (Tip-Ring-Sleeve) ¼" phone jack, commonly called a "stereo" phone jack. The tip of the jack is wired to the "high" (hot) side of the input circuitry, the ring is wired to the "low" (cold) side, and the sleeve is the circuit ground (earth) connection.

Standard TS (Tip-Sleeve) ¼" phone plugs (often called "mono" plugs) may be used to bring unbalanced signals into the LM-3204. The sleeve of the TS plug will automatically connect the low side of the input jack to ground and unbalance the input.

MONO PATCHING 2

The stereo pair of input jacks connected to each input module is wired so that an input signal plugged only into the LEFT (Mono) jack will be applied to both the left and right input circuits. Inserting a plug into the RIGHT input jack (with the LEFT input still plugged in) disables the mono switching and returns the input module to the stereo mode.

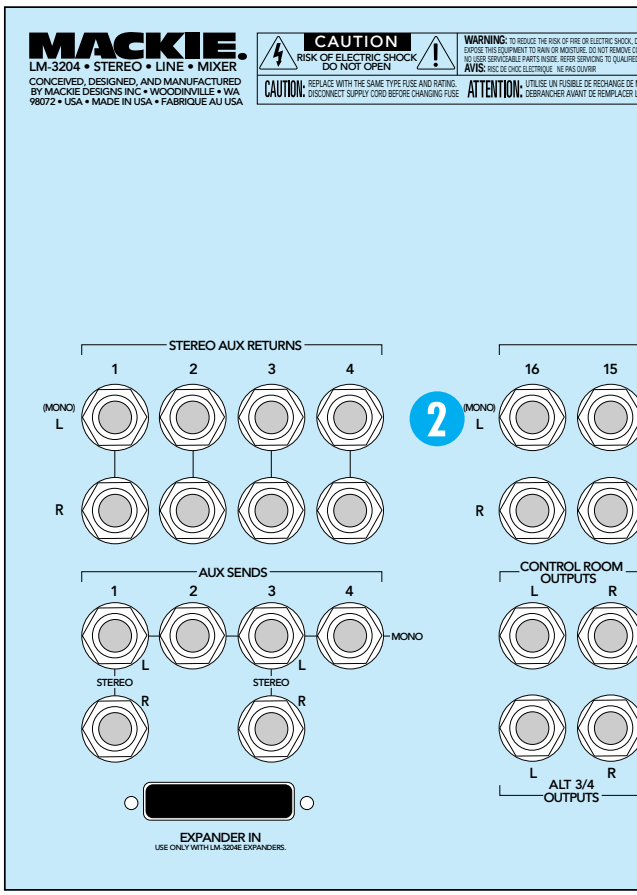
INSERTS—CHANNELS 1–4 ONLY 3

Stereo input modules 1 through 4 have channel insert jacks on the back panel. An insert jack allows you to tap the signal out of the circuit for processing in another piece of equipment and then return the processed audio back into the LM-3204.

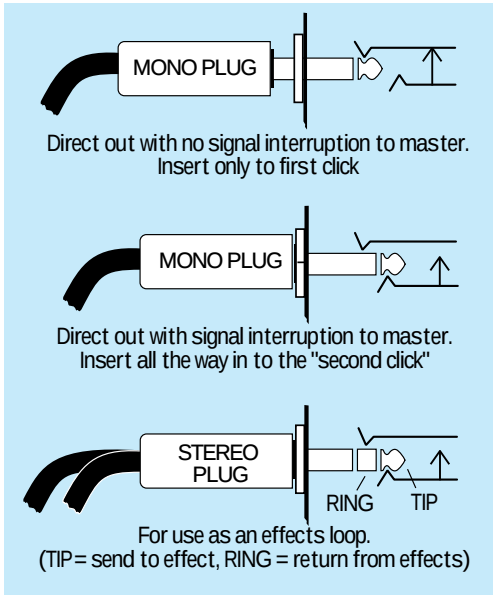
The channel inserts occur just before the balance, gain and EQ circuits and controls.

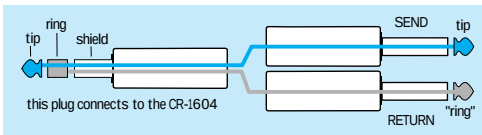
Mackie inserts use ¼" TRS phone jacks, and can be used in three different ways:

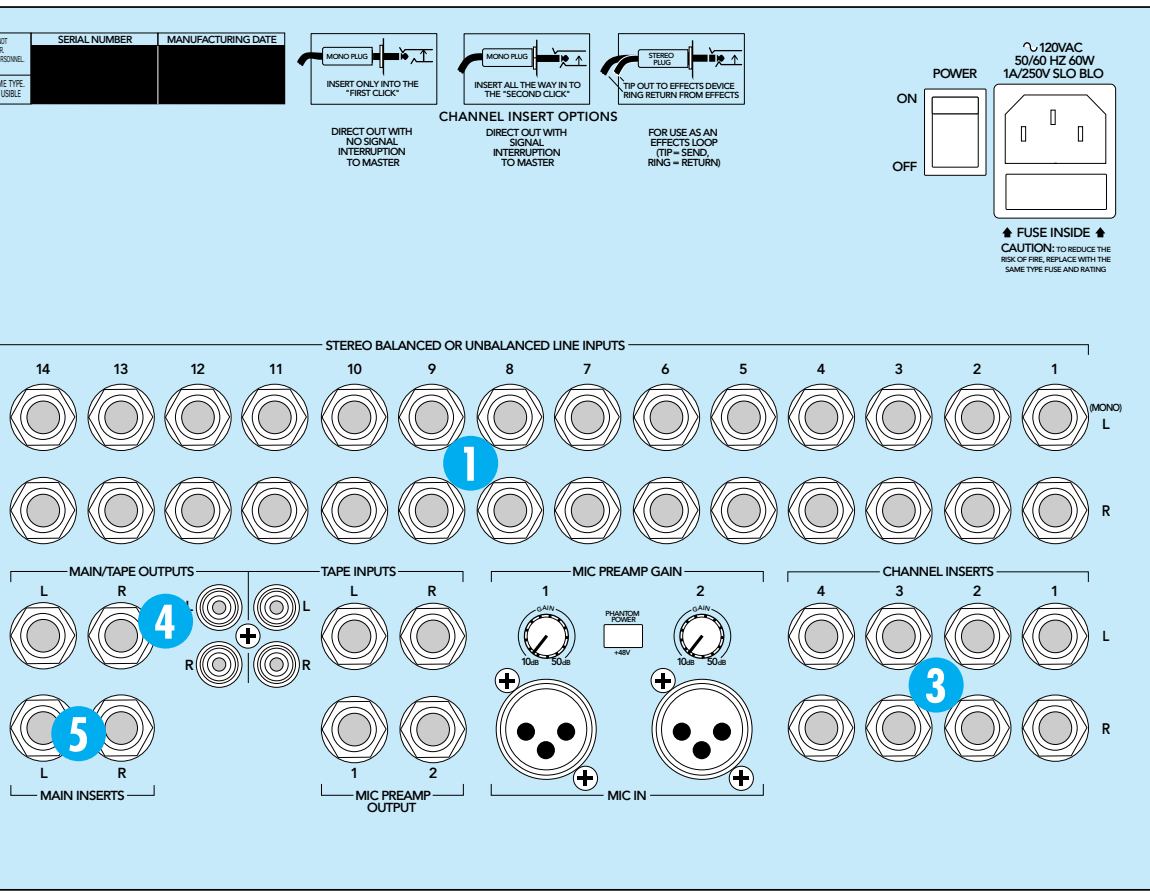
1. As a "direct output," with no interruption of the signal to the output section. Use a ¼" TS (mono) plug, but insert it only to the first click.



2. As a "direct output," which also interrupts the signal to the output section. Use a ¼" TS (mono) plug, and push it in all the way to the second click.







3. As a send-return insert for processing. Use a ¼" TRS (stereo) plug "Y"-ed to two mono (TS) ¼" plugs. The tip should be wired to send to the effect's input, and the ring should be wired as the return from the effect back into the LM-3204. The sleeve is the common ground connection.

See the Insert Jack diagram at left. The same diagram is on the back panel of the LM-3204 for your wiring convenience. Bring your own flashlight.

MAIN / TAPE OUTPUTS 4

The Left and Right Main Outputs are each electronically balanced, line level outputs, capable of driving line levels of –10dBV or +4dBu equally well.

Each output jack is wired as a TRS (Tip-Ring-Sleeve) ¼" phone jack. Like the balanced input jacks, the tip of the jack is wired to the "high" side of the input circuitry, the ring is wired to the "low" side, and the sleeve is the circuit ground connection.

Standard TS (Tip-Sleeve) ¼" phone plugs may be connected to the LM-3204 Main Outputs for connection to unbalanced equipment. The sleeve of the TS plug will automatically connect the low side of the jack to ground and unbalance the output.

There is no change in signal level when using an unbalanced (TS) cord instead of a balanced (TRS) cord.

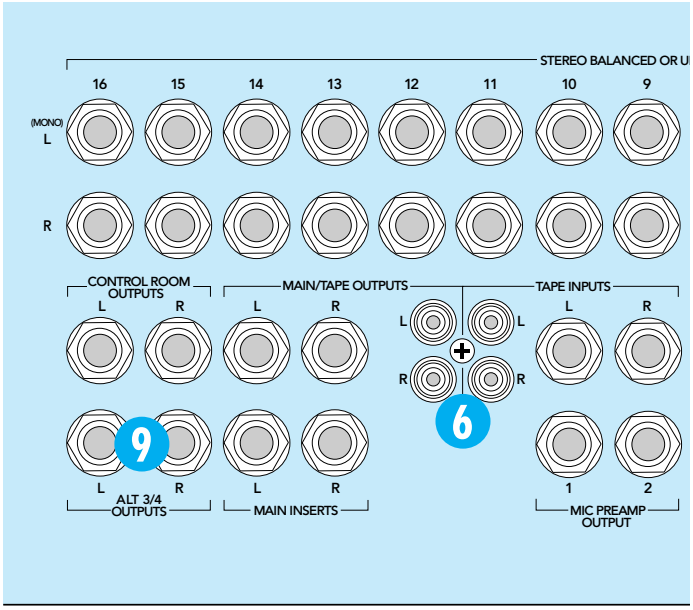
The Main Outputs also appear as unbalanced outputs on the Tape L–R Out RCA jacks immediately to the right. (Also able to drive –10 to +4.)

MAIN INSERTS 5

The main left and right output circuits also have insert jacks available on the back panel. Like the channel inserts, these jacks allow you to tap the signal out of the circuit for processing in another piece of equipment and then return the processed audio back into the LM-3204. In this case, the entire main left-right mixing buses will be processed.

The main inserts occur just after the bus summing amplifiers and before the master Left and Right faders. When "printing" a mix, this would be the place to patch in a stereo compressor/limiter, EQ and/or aural exciter. If you're using the LM-3204 for live sound, you may want to patch in a stereo graphic equalizer or anti-feedback processor here.

The main inserts are the same as the channel inserts in regard to send/return, direct, and direct with interrupt wiring. See the three ways to use



an insert at left, or check the patching illustration on the back of the LM-3204.

TAPE OUT AND TAPE IN 6

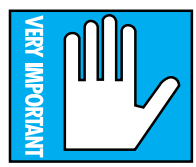
The LM-3204 provides a number of ways to feed a tape deck, a cassette or DAT recorder and to monitor the output of the recorder as well.

The Main Output connections are mentioned earlier, and may be used as the primary feed to your recorder.

The ¼" TS Tape In jacks provide a monitor return from the output of your deck. The Tape In jacks are routed through the Tape Monitor switch in the Main Output section on the front panel, which can send the signal to the control room and phones.

Additionally, the LM-3204 has four unbalanced "RCA"-type connectors labeled "Tape" on the rear panel for easy connection to your recorder. The Tape Out RCA jacks are connected in parallel to the Main Output jacks.

The Tape In RCA jacks are connected in parallel with the Tape In ¼" phone jacks.



NOTE: Using the ¼" Tape In jacks will deactivate the RCA Tape In jacks.

AUX SENDS 7

Remember that on the front panel, AUX Sends 1 and 3 were stereo sends and AUX Sends 2 and 4 were mono? Well, it's true back here too, where they finally come out of the mixer.

AUX Sends 1 and 3 each have a left-right pair of line level, unbalanced ¼" TS phone jacks for connection to the outside world.

If you want to use AUX Send 1 and/or AUX Send 3 as a good old mono AUX send (like 2 and 4), just plug your cord into the Left (MONO) AUX Send output. Then both the Left and Right signals will be summed into that output.

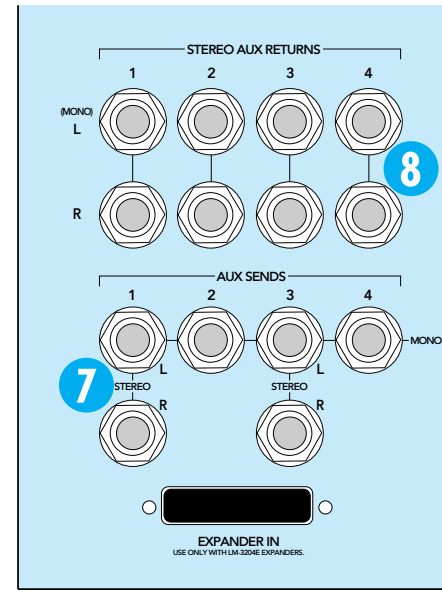
Sends 2 and 4 have one mono, unbalanced ¼" TS phone jack each.

STEREO AUX RETURNS 8

The LM-3204 has four sets of stereo AUX returns for bringing that fine stereo reverb and delay back into your mix. (Even though sends 2 and 4 are mono, all the AUX returns are ready for stereo signals generated within your effects boxes.)

Each input is a line level, unbalanced ¼" TS standard phone jack, which routes the signal directly to the AUX Return amplifiers and front panel controls, and on to the main L/R mix bus. See page 10, "Stereo Aux Returns," for switching options.

Just like the channel inputs, using the (Mono) Left input jack only will apply the return signal equally to both the left and right AUX inputs for a mono return.

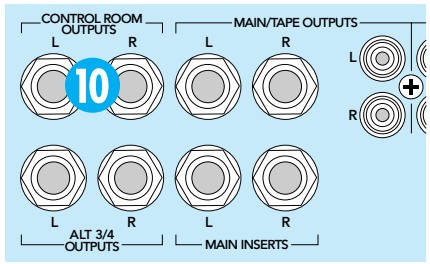


ALT 3/4 OUTPUTS 9

The Alt 3/4 Outputs are straightforward: Left and Right line level unbalanced ¼" TS jacks, each connected to the Alt 3/4 buses. Use them for whatever you can dream up. For instance, you could use them to send selected channels to your multitrack deck for bouncing or overdubbing (see the hook-up diagrams farther on for more possibilities).

CONTROL ROOM OUTPUTS 10

This is where you plug in your monitor power amplifier. The Left and Right Control Room Outputs are line level unbalanced ¼" TS jacks, controlled by the Control Room fader on the front panel.



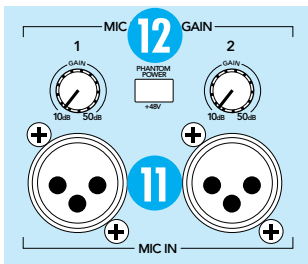
MICROPHONE CONNECTIONS

Here's a Mackie bonus: two mic preamps hidden away on the back panel!

The Mic In connectors 11 are standard female XLR3-type microphone connectors, wired to a pair of classic Mackie balanced mic preamplifiers with more headroom than a Kenworth cab and less noise than a mortuary at midnight.

Pin 2 is wired high, pin 3 is low and pin 1 is grounded, per AES standards.

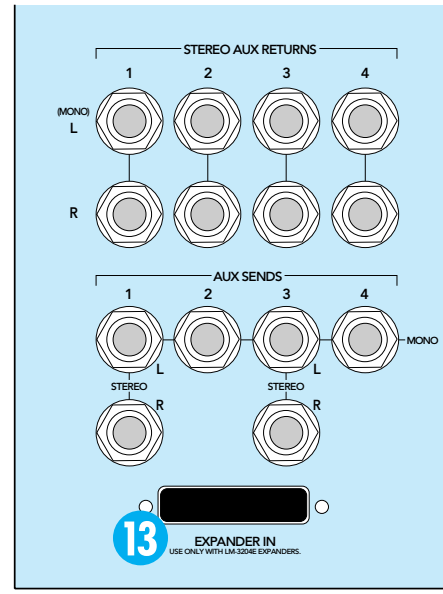
Phantom mic powering can be applied to both inputs with a flick of the Phantom Power switch 12. Mic preamp levels are individually adjusted by two Trim controls.



The mic signals won't go anywhere unless you patch them. Each preamp has a line level unbalanced ¼" TS Mic Out jack. You can patch the mic out signal into any channel input or even into other pieces of line level equipment in your rack.

EXPANDER IN 13

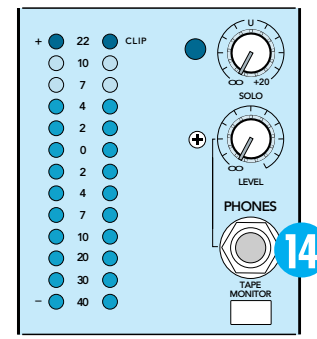
The Expander In jack is where you plug in your optional LM-3204E expander. See Appendix B.



PHONES OUT 14

The Phones jack is located on the front panel to the right of the meters and below the Phones Level knob. The jack is a standard ¼" TRS stereo headphone jack with the left channel on the tip, the right channel on the ring, and the common ground connection on the sleeve. Careful; it's *loud*. It *is* an IC, and it will not drive a speaker and it will toast a power amp (if turned up).

WARNING: Turn down the Phones level control before you plug in the headphones. Then inch the control up until you feel groovy.



SECTION 3: GENERAL INFORMATION

Maybe you don't need to read this at all. Battle-scarred pros: skip to Section 4. Beginners: face the blackboard, please.

Many of you reading this manual have a lot of experience in using mixers and mixing consoles. For you battle-scarred pros, Section 2 and the Block Diagram will probably be all that you need to look at.

For those of you who are either new to using mixers or just like to read even larger quantities of our glib prose, we've provided this short section. It discusses the basic concepts and procedures used in recording, mixing and sound reinforcement work. If you can make some sense of it, you can check out your application and patching in Section 4 and start plugging things in.

GENERAL INFORMATION

Here is a primer covering a few important ideas you should be on good terms with before you sit down to a mixer.

LEVELS

Microphones have low output levels. Line level devices have high output levels. One of the functions of a mixer is to amplify or attenuate these signal levels properly. Since it's easy to degrade the signal by not handling levels well, and since it's *your* hand on the knobs, you should be sure you know how much gain to apply and where to apply it.

Note: No matter what combination of cable adapters you may have at hand, *never* connect the output of a power amplifier to the input of a mixer.

Noise

Every electronic circuit produces noise or hiss or hash or buzz, and any noise present on the input of an electronic circuit will be faithfully passed through. Turn it up high enough, and you will hear the noise.

Headroom

Every electronic circuit also has a point of overload, a *clip point*, where the voltage simply cannot rise any higher, no matter what the input signal and your fader move would like. This overload, or clipping, will show up as tooth-grinding distortion.

Somewhere between the noise and the clipping is an optimum level for your signal: high enough above the noise floor to render the hiss inaudible, and far enough below the distortion point to allow range for loud peaks of music to pass without clipping. This safe operating zone might be called *operating level* or *nominal level* or *zero* or perhaps *line level*. The range between your operating level and clipping is called *headroom*, which defines just how tall your signal can be without having to duck for the rafters.

Your mission as a designated Master of the Levels is to get the low level signals up to line level as soon as possible and to keep them there as much as possible, but *not* to turn them up *too* much.

Unity Gain

On a Mackie mixer, the easy way to do this is to set all the level controls in your path to the "U" marks screened onto the panels. Set the Balance control to the center and press the channel Solo button. This will display the channel level on the Left and Right meters. Then adjust the channel Gain or the Mic trim until you have a good level on the meters. The "U" stands for unity gain, which basically means *level in = level out*. Now, with mic inputs that's not exactly the case, but ignore that and set your faders at "U". That will get you in the safe zone.

Metering

Pay close attention to the meters. A meter is an aid, a window looking onto part of the dynamic range of your signal, and it will tell you if your level is in the ballpark, so to speak.

Try to keep your signals in the middle range of the meters, for the most part. If the signal is always very low, you may not be getting the best signal-to-noise ratio you can. If the meter LEDs are always solidly lit from bottom to top, you are likely distorting both the console and your recording tape regularly. Keep the signal in the middle, with occasional peaks into the yellow. Remember, the top yellow LED of the meter represents a level of +10dBu, and the LM-3204 doesn't clip until +22dBu. Even when "banging" the yellow LEDs hard, you still have around 12dB of headroom for your peaks. The Left and Right meters have a *red* LED segment to show imminent clipping at +20dBu.

But if your music is sounding good, don't worry if you're in the yellow a lot or if some parts of the track hardly read at all. You'll quickly get a feel for what works for you, when you can get away with really smacking the tape or the electronics.

BUSES

More often than not, the goal in a mixing console is to mix two or more inputs into one output. Like a coach who has two or more players to get to the same ballgame, console designers use a *bus*. Even Webster's Unabridged Dictionary agrees, defining the word *bus* in electronics as "a conductor serving as a common connector for three or more circuits."

The Mackie LM-3204 has 12 buses. The four suggested in the name (the main Left and Right buses and the Alt 3–4 buses) are important, but there are also Auxiliary buses (two stereo and two mono = six) and a pair of solo buses. We will try to be clear just what bus we are talking about when we do talk about buses.

SENDS AND RETURNS

Sends are buses fed to outputs, and returns are inputs. So why don't we call them outputs and inputs?

Well, actually, the terms *send* and *return* can mean many things, but the way they are generally used in mixing console parlance is to refer to *send buses*, which tap off a little of a signal to *send* to some effects device (like a reverberation unit), and *return inputs*, which function to *return* that reverb back into the mix. The original, unprocessed signal is called the "dry" signal. The reverb unit's output signal is called the "wet" signal.

Sends are also used to tap some of the signal from a collection of channels for a headphone cue mix or monitor mix. For that matter, sends can be used as additional mix buses, if needed.

In the same way, if you don't need returns for reverb or effects, they can be used as additional line level inputs to your mix.

SOLO

Solo is a standard console function that allows you to listen to one or more sources all by themselves (soloed).

You can check EQ, possible distortion or buzz, or just listen to see if a particular mic is open or not. When soloing more than one source, you can listen to the blend of just part of your mix: only a flute sample on channel one, for example, or just the percussion module on channel eight.

The solo circuits are designed not to interrupt the recording process. The solo bus signal is sent directly to the Control Room and Headphone outputs without affecting any of the other inputs, outputs or recording buses. Solo circuits on the LM-3204 are "After Fader Listen" (AFL), meaning the soloed channel's gain control affects the solo level.

EQ

Everybody knows what EQ is, but just in case you'd like a refresher, we'll put in a few paragraphs here.

Equalization (EQ) refers to purposely changing the frequency response of a circuit, sometimes to correct for previous unequal response (hence the term, *equalization*), and more often to add or subtract level at certain frequencies for a pleasing effect.

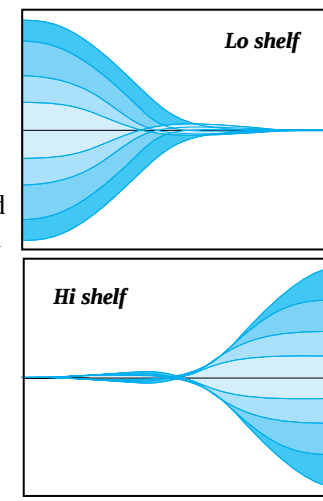
Bass and treble controls on your stereo are EQ; so are the units called *parametrics* and *graphics* and *notch filters*.

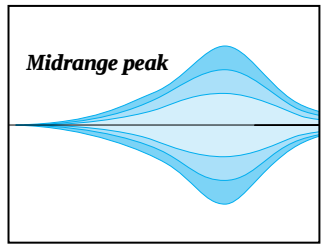
A lot of how we refer to equalization has to do with what a graph of the frequency response would look like. A *flat* response (no EQ) is a straight line; a *peak* looks like a hill, a *dip* is a valley, a *notch* is a really skinny valley, and a *shelf* looks like a plateau (or a shelf). The *slope* is the grade of the hill on the graph.

Graphic equalizers have enough frequency slider controls to form a visual representation of the EQ curve right on the front panel. *Parametric* EQs let you vary several EQ parameters at once. A *filter* is simply a form of equalizer which allows certain frequencies through unmolested and other frequencies are attenuated or removed.

The equalizer on the LM-3204 combines two different types of EQ into three different sections.

The LO and HI sections of the EQ are *shelving* equalizers. As you can see, shelving EQs lift or lower the entire range of frequencies above or below a certain point. The LO EQ on the LM-3204 is at 80 Hz and the HI is at 12 kHz, and can vary the bass and treble by 15dB. We picked these frequencies because they make for a more musical and pleasant sounding equalizer; they give you





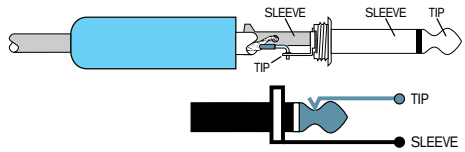
more punch and more sizzle without making the mix muddy or harsh.

The MID EQ section is a peaking/dipping equalizer with a bell-shaped response curve. The frequency is centered at 2.5kHz and the bandwidth is fixed. The MID EQ can cut or boost 12dB.

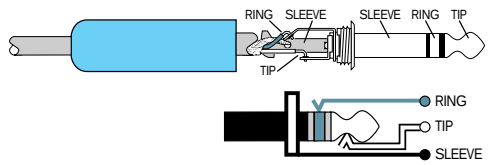
CONNECTORS

If you've used a Mackie MicroSeries 1202, a CR-1604 or a Mackie 8-Bus Series, you're familiar with the various kinds of connectors used with or mixers. If you're new to the whole thing, review the drawings below. They're also described in detail in Appendix A on page 30 of this manual.

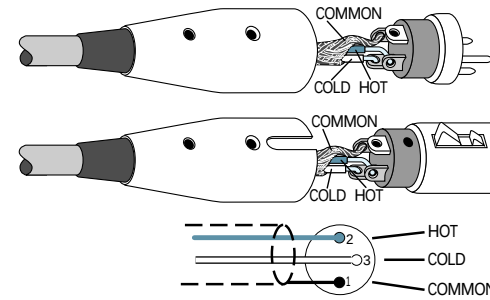
Tip/Sleeve (TS) Plug



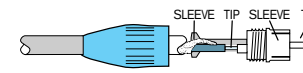
Tip/Ring/Sleeve (TRS) Plug



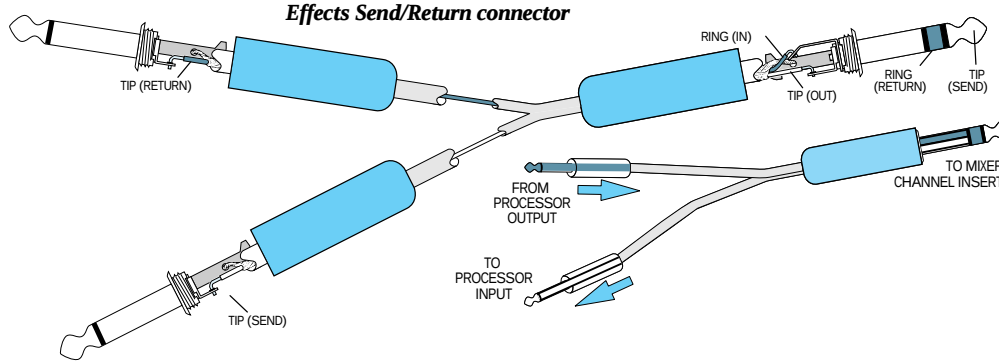
Balanced XLR Connectors



RCA Plug used on some outboard gear



Effects Send/Return connector



SECTION 4: USING THE LM-3204

If you're a seasoned patch-cord weaver and general propellor-head, just refer the to the way-cool hook-up drawings that start on page 22 of this section.

If, you're a glutton for verbal effluvia, read on.

IMPORTANT SENSITIVITY ADJUSTMENT PROCEDURE!

To fully achieve the LM-3204 Mixer's impressive headroom and specs, you must "tune" the input sensitivity for each channel. This simple operation is so important that we're repeating it here as well as at the beginning of this manual. If our Technical Support department had its way, the adjustment procedure would probably be repeated on every other page of this manual. They spend a fair amount of their time "solving" new Mackie Mixer users' noise and headroom "problems" by directing neophyte owners to the IMPORTANT SENSITIVITY ADJUSTMENT PROCEDURE.

FOLLOW THIS PROCEDURE FOR EACH LM-3204 CHANNEL IN USE:

1. Set the Control Room, Phones, Left and Right Master Faders, and Solo controls all the way ***off.*** (As you are working through the steps, you can ease these controls up a bit to hear what you are doing, but be careful. There's a lotta level in this mixer.)
2. Apply signal to channel input.

   Insert a stereo line input into the corresponding Left and Right Input jacks at the rear of the mixer.

   or

   Insert a mono line input into the corresponding Left Input jack on the rear of the mixer.
3. Set channel strip controls as follows:

   Gain control at "U" detent.

   Solo switch ***down***.

   Mute switch ***up***.

   Balance control at "U" detent.

   EQ controls at "U" detent.

   Aux controls fully counterclockwise ***(off)***.
4. Apply audio signal to the input. The material and level you use to set up the mixer should be vaguely representative of what you will really be doing when you really do it. If you're connected to a tape deck or a CD player, put some music on and push the button! If you're hooked up to a synthesizer, tickle those plastic ivories! On the other hand, you might have to deviate from this approach on certain channels. For example, you don't want to set the hi-hat cymbal channel at 0dB. Use your judgement on this.
5. The channel's –20dB LED should light. The L/R main meters will show the actual internal operating level of soloed signals. Now you will optimize levels.

   For a meter reading of 0dBu with +4dBu input (line level) signals, the settings in step 3 should be just about right. Adjust the channel Gain control slightly so that you get peaks that regularly hit 0dB on the Left and Right meters.

   For –10dBV signals, you may have to turn the channel Gain control clockwise to boost the signal to read 0dB on the Left and Right meters.

   The **Long Arm Exercise**: For Microphone signals (using an onboard Mackie mic preamp), leave the channel Gain setting at the "U" detent and instead adjust the Mic Trim pot on the rear of the mixer until you get peak levels of around 0dB on the Left and Right meters. Remember, the sound coming in the microphone should be typical of what you will really be using. For patching instructions, see page 11, "Microphone Preamplifiers."
6. If desired (optional):

   Adjust the channel strip's EQ to about what you will be using during the session.

   Repeat Step 5.
7. Return the channel strip's Solo button to the ***up*** position.
8. Repeat steps 1–7 on the next channel that is being used.
9. As you un-solo the channel strips to listen to your mix, ease up the Left and Right master faders to set a good mix level on the meters, with occasional peaks of 0dB.

MUSICAL INSTRUMENT SUBMIXER: STAGE

A rock stage setup used to only include three guitar amps and a set of drums. Here at the turn of the century, it still means guitars and drums, but add to that samplers and synthesizers and drum pads and guitar synths and MIDI saxophones and delays and reverbs and choruses and maybe even sub-harmonic synthesis. Imagine the joy your

sound engineer feels when you come at her with your 12 output cables.

We figure that if you bought an LM-3204 for stage use, you already have an equipment rack just about full of fine electronic musical technology. So, we designed the LM-3204 to be 19" wide and a mere 5 rack units high. To fit in your rack.

The LM-3204 will let you submix all your instruments in stereo, add your effects and provide stage amp, sound reinforcement, monitor or recording feeds. Not only does it make the impossible possible *and* clean up that nest of cables, but it leaves the balance, EQ and effects blend in *your* hands, right there in your rack.

All of your electronic instruments (and CD players and DAT players) can patch directly into the LM-3204 stereo inputs. Guitar and bass preamps, whether rack-mount units or built into the amp heads, can patch in here too. If you have a mono instrument, simply plug its output into the Left (MONO) jack of the LM-3204 channel input you select.

Use the LM-3204 main Left and Right outputs to connect to the main house PA mixer, or feed them directly into your stage amp. In fact, you can connect to both at once, using the main 1/4" outputs for the house mixer and the RCA Tape outputs (which carry the same signal) for your amplifier.

You can use the Control Room outputs to feed a small amp next to you, if you'd like. This output will also allow you to Solo various LM-3204 inputs to check MIDI patches, verify presets, send a click track (via AUX Return 4's "AUX Return to Control Room Only" switch) to yourself only, and so on, without affecting the main outputs. You can also use headphones on the Phones output.

Effects such as reverb, delay or chorus can easily be patched into the AUX send and return circuits in the LM-3204. Gates and compressors will usually be connected to either a stereo pair of channel strip Insert jacks (channel 1–4 inserts for mics, drum machines, guitars…) or to the main Left and Right Insert jacks. After you've adjusted the compressor or gate settings as you want, adjust the effect's overall gain for unity, so that the level of your signal is about the same with the insert device in or out of the circuit.

MUSICAL INSTRUMENT SUBMIXER: STUDIO

MIDI suites and project studios run into the same problems as large stage setups: racks full of synthesizers and samplers eating up all the mixing console inputs.

So, use your LM-3204 as a musical instrument submixer. Connect your banks of instruments into the stereo inputs of the LM-3204, and patch the main Left and Right outputs into a pair of inputs on your main console. Suddenly, more mixing inputs appear!

EFFECTS SUBMIXER

And as long as we're discovering more inputs for your studio, consider your main console auxiliary returns: do you have enough? An LM-3204 can give you an additional 16 stereo returns with the added bonus of EQ on the returns.

Keep the routing of the sends from your main console the same; but run all your many effects' stereo returns through the LM-3204, and patch the LM-3204 Left and Right outputs back into one pair of auxiliary returns (or into a pair of channel inputs).

MAIN STUDIO MIXER

There's no reason why you can't use the LM-3204 as your main mixer. Not everybody's in love with adjusting mixes with rotary controls, but it's not hard to get used to (a gazillion MS1202 mixers owners can't be *all* wrong). And remember, the LM-3204 has the same legendary sound quality that's allowed our CR-1604 to be used for tracking and mixing of all sorts of hits. Plus, we'll send you a free T-shirt if you send us a CD or cassette mixed on the LM-3204 (see page 39 for details).

CLUB SOUND REINFORCEMENT MIXER

For a small act with entirely electronic instruments and only two vocalists, the LM-3204 is an extremely affordable, compact and easy-to-operate sound reinforcement mixer.

Plug your mics into the two preamps in the rear and patch the preamp outputs into a pair of channel strips, using the Left (MONO) jacks. Now connect your drum machines, keyboards and samplers to more inputs. Connect your effects to the AUX sends and returns, and patch the main Left and Right (or Control Room) outputs to your power amplifier. Turn on the spotlights, smoke generator and bubble machine, and you're ready.

You can use the same setup to record a demo of your band. Simply connect a stereo recorder to the Tape In and Tape Out jacks. To check out what you're recording, plug in some headphones (or use the Control Room outputs) and press the Tape Monitor switch. You can record and check playback as you are performing, if you want, without affecting what your audience is hearing (unless a bit of button-pushing gets you off tempo).

DJ MIXER

Connect a couple of CD players, a DAT player or two and a microphone. Add subwoofers and an attitude and stir well.

The LM-3204 makes a great Disc Jockey mixer. With stereo gain, mutes and EQ, it's easy to keep all your music sources balanced. Each pair of inputs simply plugs into the back, with the main Left and Right outputs feeding your amplifiers.

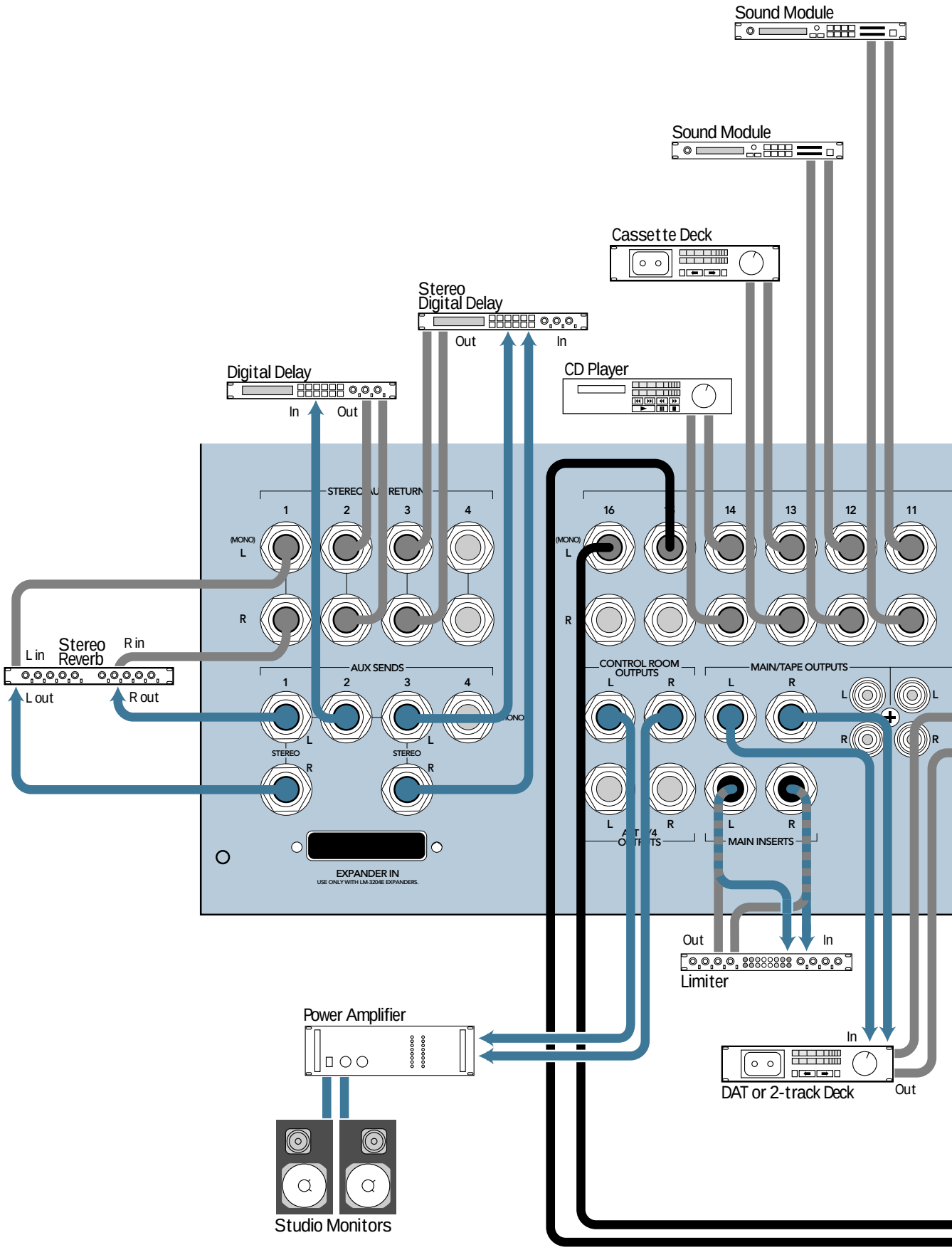
Any processing or effects can be handled either by using the Insert jacks or the AUX sends and returns. You can cue and pre-audition the next selection by using headphones and the LM-3204 Solo circuits along with headphones plugged into the Phones jack. Be sure the channel you want to cue is muted (Mute 3/4 switch pushed) and then press the Solo button.

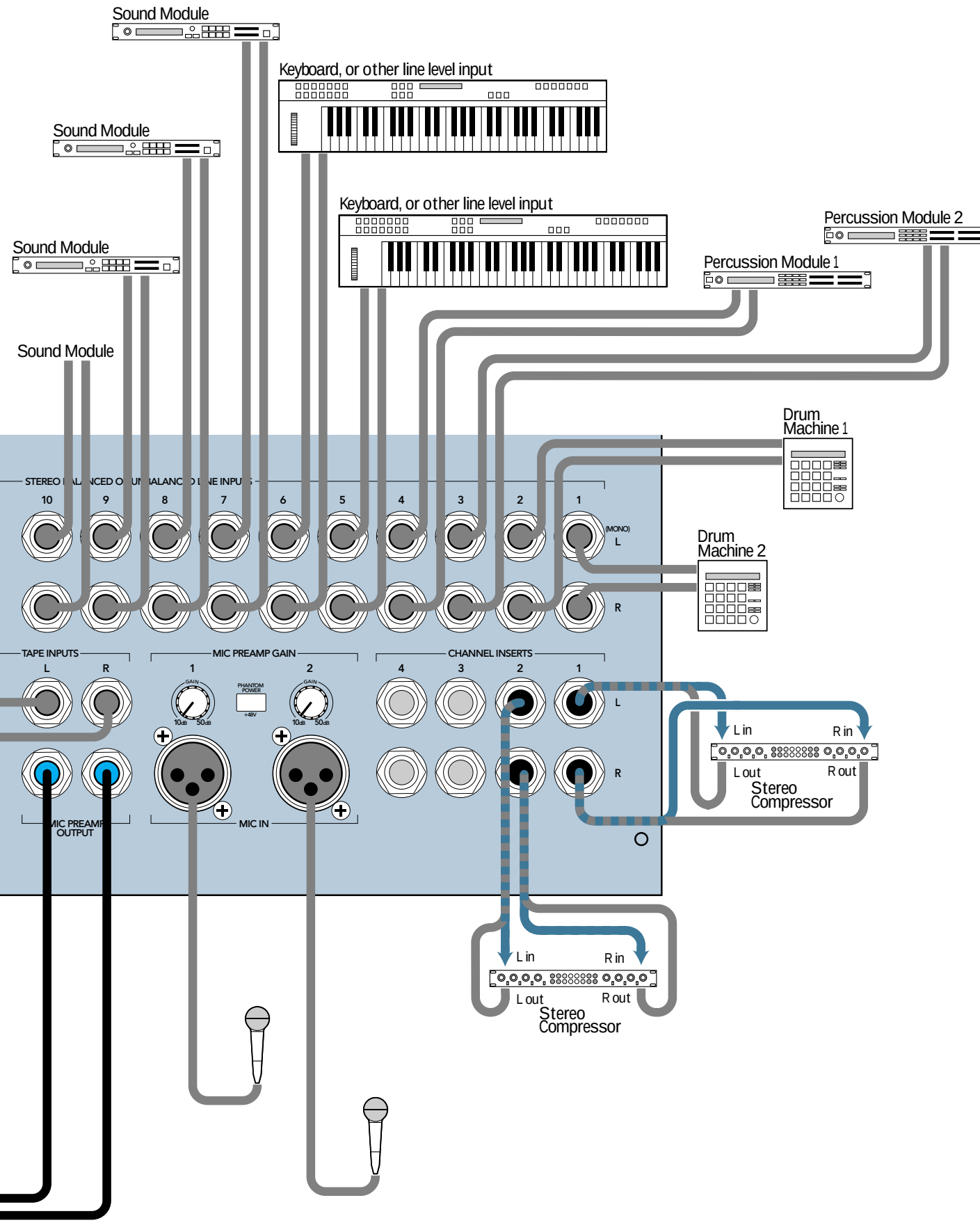
Note: If you are using turntables and vinyl discs, you must have a stereo phono preamplifier for each turntable for correct impedance matching, gain and EQ response tailoring. Connect the outputs of the phono preamplifiers into the LM-3204 line input jacks. The Mackie LM-3204 does *not* have internal phono preamplifiers. Sorry.

MULTI-IMAGE / MULTIMEDIA MIXER

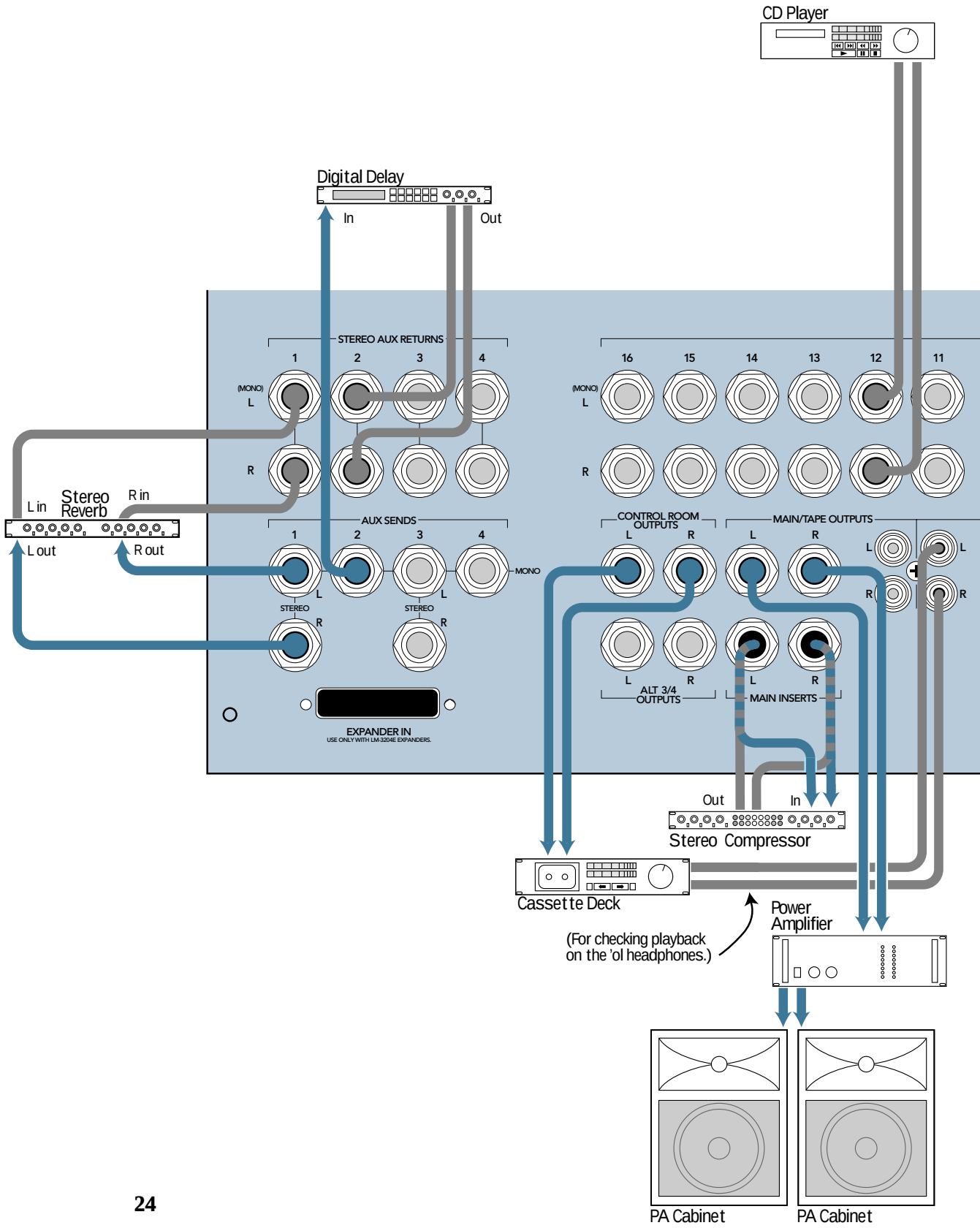
With its 16 stereo inputs, the LM-3204 is perfect for combining the multiple VCR/CD player/DAT machine/cassette player/reel-to-reel/laserdisc/computer audio/you-name-it sources found in a corporate boardroom, a focus-group cubicle or a sales convention exhibit.

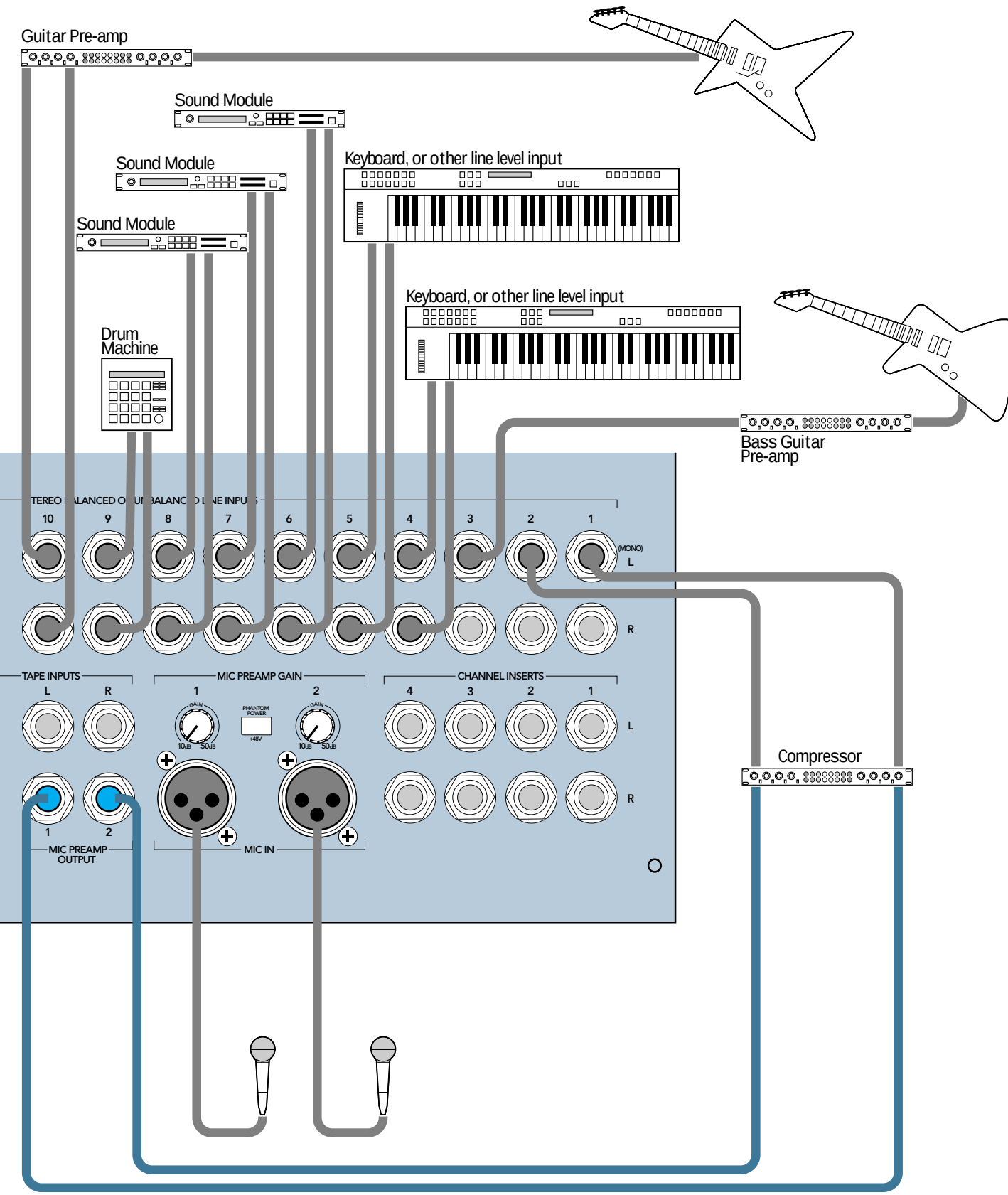
All these line level sources will plug directly into the LM-3204, and the main Left and Right outputs connect to the system power amplifiers. Headphones and the Solo switches will allow you to audition upcoming audio cues privately (be sure the channels are muted for cueing). And, of course, there are two microphone preamplifiers for live presentations or voice-overs.



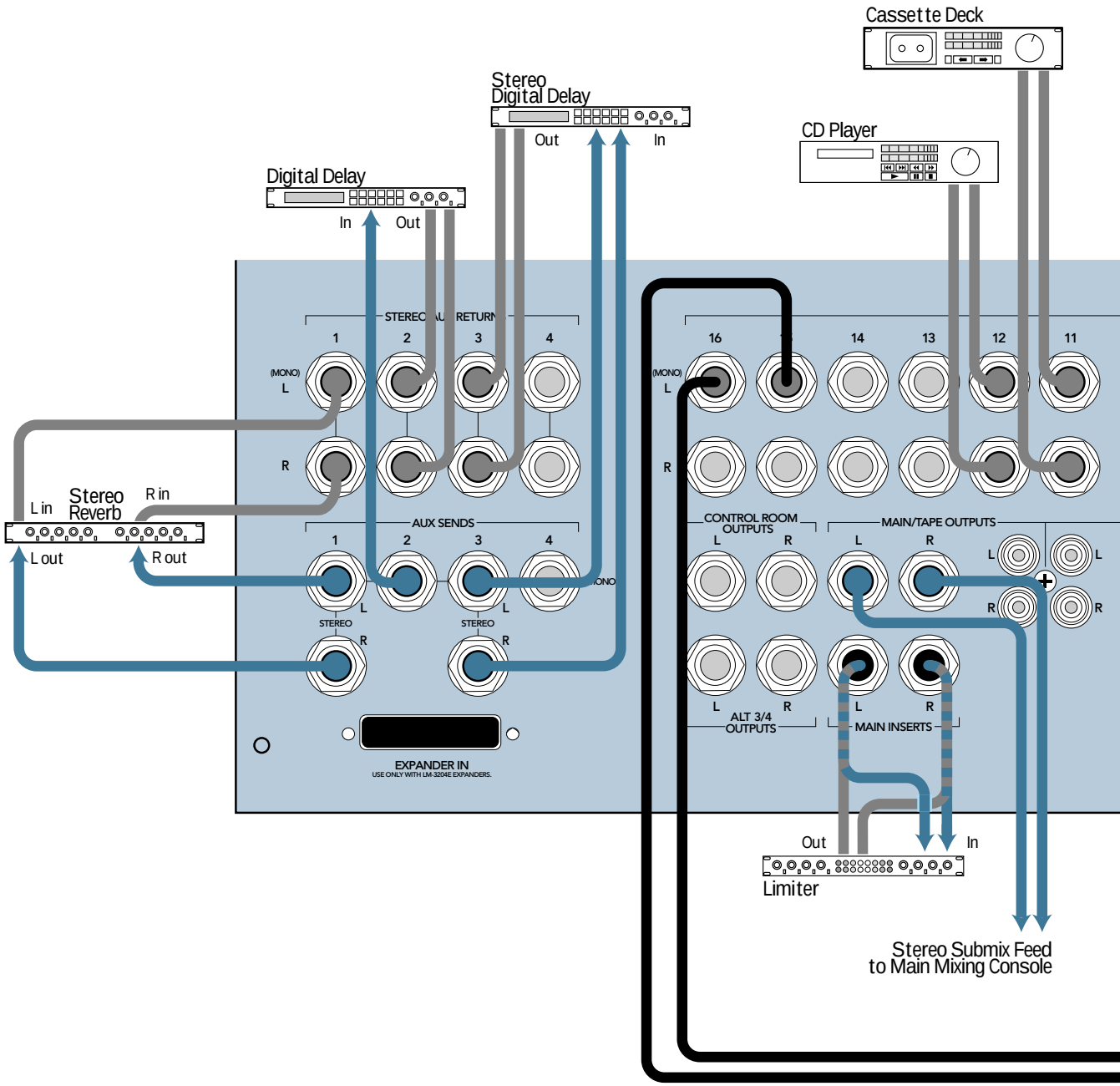


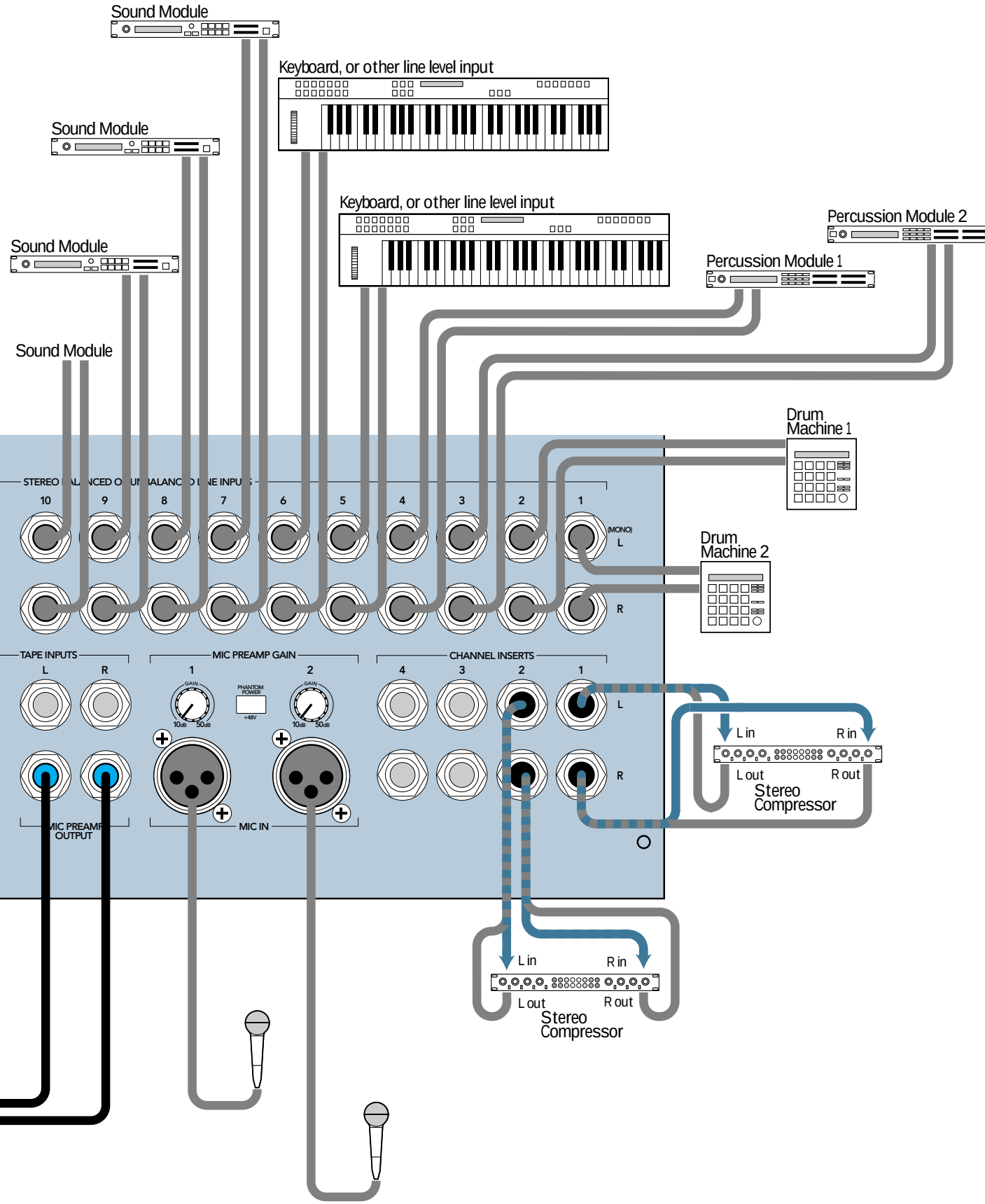
LIVE 2trk RECORDING



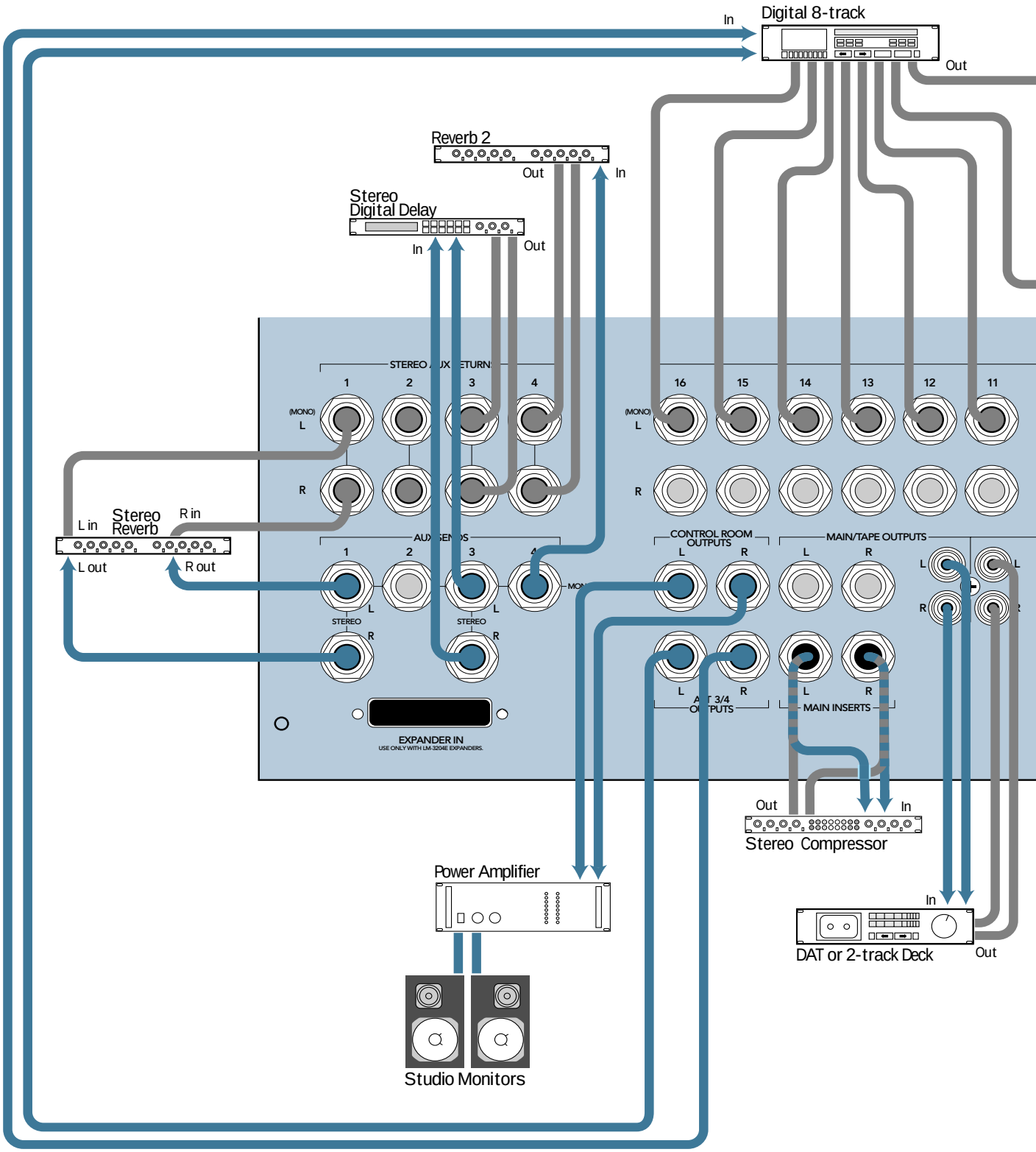


NIGHTCLUB ACT w/2trk RECORDING

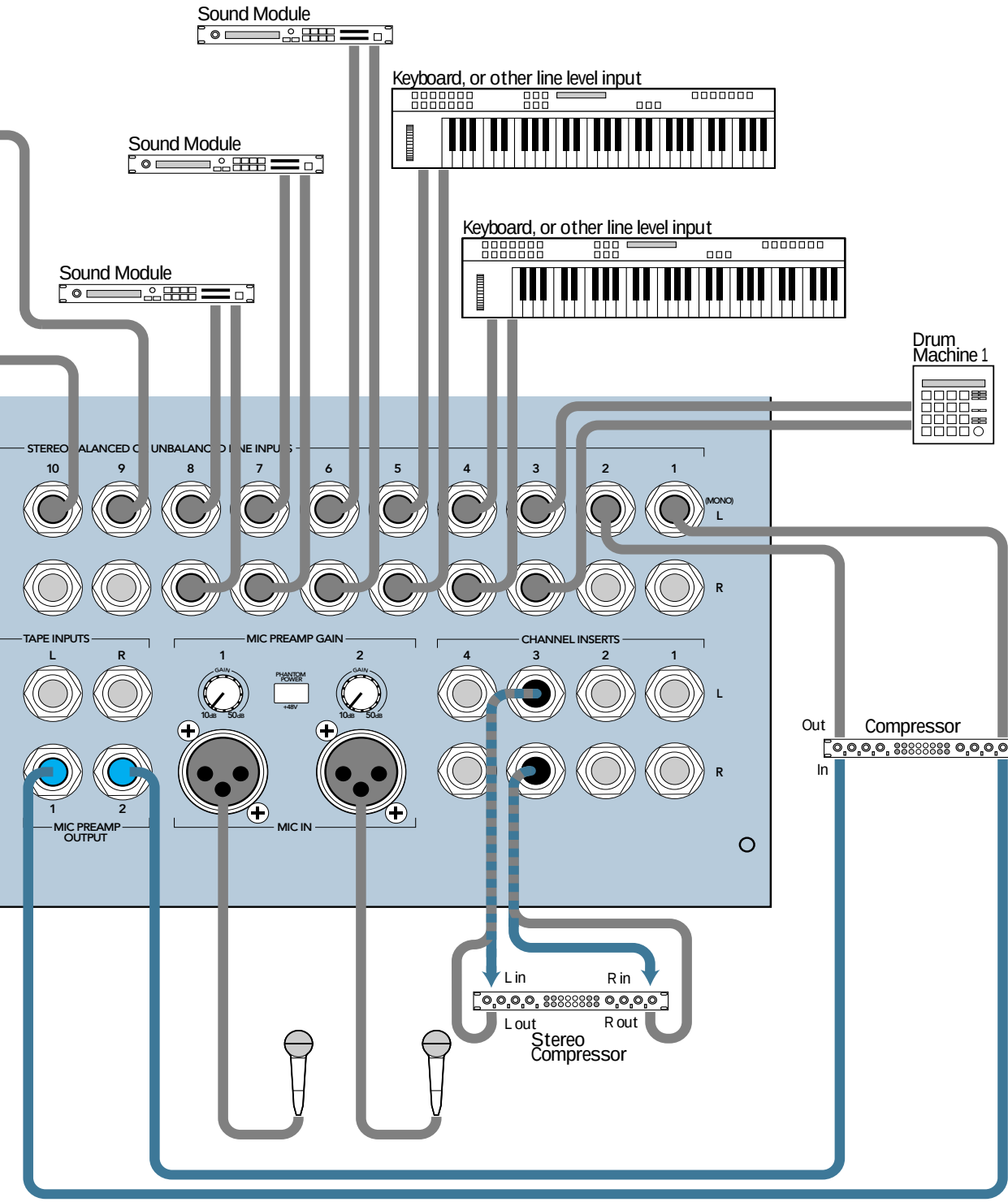




STEREO SUBMIXER



NOTE: Tascam DA-88 owners:
go buy a bunch of "y" cords!



APPENDIX A: Connections

"XLR" CONNECTORS

Mackie mixers use 3-pin female "XLR" connectors on all microphone inputs, with pin 1 wired to the grounded (earthed) shield, pin 2 wired to the "high" ("hot" or positive polarity) side of the audio signal and pin 3 wired to the "low" ("cold" or negative polarity) side of the signal (Figure A). All totally aboveboard and in

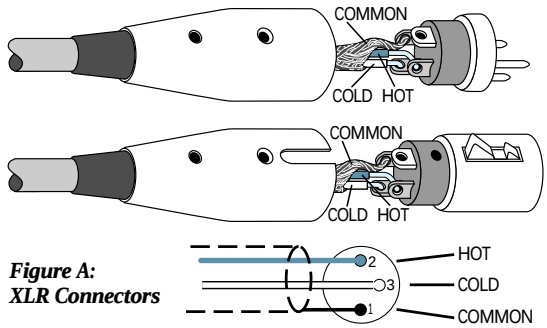


Figure A: XLR Connectors

full accord with the hallowed standards dictated by the AES (Audio Engineering Society).

Use a male "XLR"-type connector, usually found on the nether end of what is called a "mic cable," to connect to these inputs.

¼" TRS PHONE PLUGS AND JACKS

"TRS" stands for Tip-Ring-Sleeve, the three connections available on a "stereo" ¼" or "balanced" phone jack or plug. See Figure B. TRS jacks and plugs are used in several different applications:

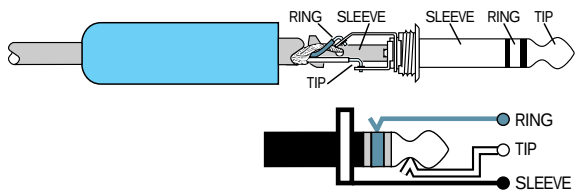


Figure B: 1/4" TRS plugs

- Stereo Headphones, and rarely, stereo microphones and stereo line connections. When wired for stereo, a ¼" TRS jack or plug is connected tip to left, ring to right and sleeve to ground (earth). Mackie mixers do not directly accept 1-plug-type stereo microphones. They must be separated into a left cord and a right cord which are plugged into the two mic preamps.

  You can cook up your own adapter for a stereo microphone adapter. "Y" two cables out of a female ¼" TRS jack to two male XLR plugs, one for the Right signal and one for the Left.
- Balanced mono circuits. When wired as a balanced connector, a ¼" TRS jack or plug is connected tip to signal high (hot), ring to signal low (cold), and sleeve to ground (earth).
- Unbalanced Send/Return circuits. When wired as send/return "Y" connector, a ¼" TRS jack or plug is connected tip to signal send (output from mixer), ring to signal return (input back into mixer), and sleeve to ground (earth).

¼" TS PHONE PLUGS AND JACKS

"TS" stands for Tip-Sleeve, the two connections available on a "mono" ¼" phone jack or plug (Figure C). TS jacks and plugs are used in many

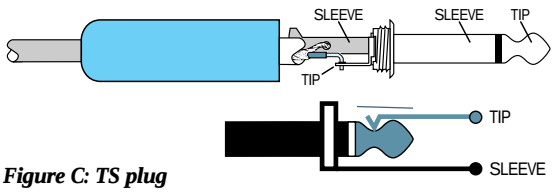


Figure C: TS plug

different applications, always unbalanced. The tip is connected to the audio signal and the sleeve to ground (earth). Some examples:

- Unbalanced microphones
- Electric guitars and electronic instruments
- Unbalanced line level connections

NOTE: All the unbalanced ¼" inputs on the LM-3204 have the ring conductor wired to the shield (ground), so that you can plug in a balanced cord with no loss of level.

ANOTHER NOTE: All the unbalanced ¼" outputs on the LM-3204 implement "impedance balancing". When you plug a balanced cord into one of these, both the tip and ring conductors have equal impedance, significantly improvings common mode characteristics. In other words, although unbalanced, a balanced input receiving this cord will "think" it's getting a balanced signal!

SWITCHED ¼" PHONE JACKS

Switches can be incorporated into ¼" phone jacks which are activated by inserting the plug. These switches may open an insert loop in a circuit, change the input routing of the signal or serve other functions. The Mackie LM-3204 uses switches in the channel insert and bus insert jacks, input jacks, AUX sends and AUX returns labeled "(MONO) Left." See **Special Mackie Connections** farther on. We also use these switches to ground the line level inputs when nothing is plugged into them.

In most cases, the plug must be inserted fully to activate the switch. Mackie takes advantage of this in some circuits, specifying circumstances where you are to insert the plug only partially. Once again, see **Special Mackie Connections**, later in this section.

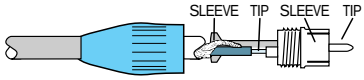


Figure D: RCA plug

RCA PLUGS AND JACKS

RCA-type plugs (also known as phono plugs) and jacks are often used in home stereo and video equipment and in many other applications (Figure D). They are unbalanced, and electrically identical to a ¼" TS phone plug or jack. Connect the signal to the center post and the ground (earth) or shield to the surrounding "basket." Tape In and Tape Out are available on RCA jacks on the Mackie LM-3204.

UNBALANCING A LINE

In most studio, stage and sound reinforcement situations, there is a combination of balanced and unbalanced inputs and outputs on the various pieces of equipment. This usually will not be a problem in making connections.

- When connecting a *balanced output* to an *unbalanced input*, be sure the signal high (hot) connections are wired to each other, and that the balanced signal low (cold) goes to the ground (earth) connection at the unbalanced input. In most cases, the balanced ground (earth) will also be connected to the ground (earth) at the unbalanced input. If there are hum or radio frequency ground-loop problems, this connection may be left disconnected at the balanced end.
- When connecting an unbalanced output to a balanced input, be sure that the signal high (hot) connections are wired to each other. The unbalanced ground (earth) connection should be wired to the low (cold) and the ground (earth) connections of the balanced input. If there are ground-loop problems, try connecting the unbalanced ground (earth) connection only to the input low (cold) connection, and leaving the input ground (earth) connection disconnected.

In some cases, you will have to make up special adapters to interconnect your equipment. For example, you may need a balanced XLR female connected to an unbalanced ¼" TS phone plug.

SPECIAL MACKIE CONNECTIONS

The balanced-to-unbalanced connection has been anticipated in the wiring of the Mackie LM-3204 jacks. A ¼" TS plug inserted into a ¼" TRS balanced input, for example, will automatically unbalance the input and make all the right connections. Conversely, a ¼" TRS plug inserted into a ¼" unbalanced input will automatically tie the ring (low or cold) to ground (earth).

APPENDIX

TRS Send / Receive Insert Jacks

The insert jacks on both the LM-3204 input channels 1-4 and on the left and right main buses are the three-conductor, TRS type ¼" phone. They are unbalanced, but have both the mixer output (send) and the mixer input (return) signals in one connector (See Figure B).

The sleeve is the common ground (earth) for both signals. The send from the mixer to the external unit is carried on the tip, and the return from the unit to the mixer is on the ring.

Using the Send Only on an Insert Jack

If you insert a TS (mono) 1/4" plug only partially (to the first click) into an LM-3204 insert jack, the plug will not activate the jack switch and will not open the insert loop in the circuit (thereby allowing the channel signal to continue on its merry way through the mixer).

This allows you to tap out the channel or bus signal at that point in the circuit without interrupting normal operation.

If you push the ¼" TS plug in to the second click, you will open the jack switch and create a direct out, which *does* interrupt the signal in that channel. See Figure F.

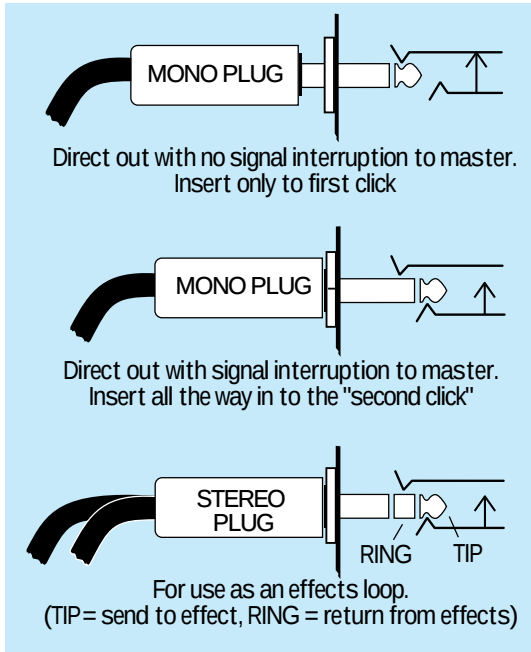


Figure E

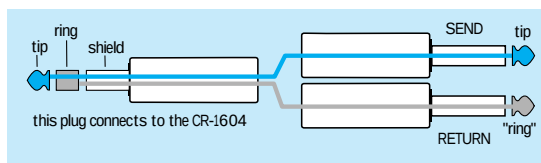


Figure F

Note: Do not overload or short-circuit the signal you are tapping from the mixer. That will affect the internal signal in the LM-3204.

MACKIE STEREO INPUTS AND RETURNS: Mono, Stereo, Whatever

The LM-3204 stereo line inputs, stereo AUX sends and stereo AUX returns are a fine example of the Mackie philosophy (which we just made up) of Maximum Flexibility with Minimum Headache. The inputs and returns will automatically be mono or stereo, depending upon how you use the jacks. Here's how it works:

A mono signal should be patched into the input or return jack labeled Left (MONO). The signal will be routed to both the left and right sides of the return circuit, and will show up in the center of the stereo pair of buses it's assigned to, or can be "panned" with the Balance control.

A stereo signal, having two plugs, should be patched into the Left (MONO) and the RIGHT input or return jacks. A jack switch in the RIGHT jack will disable the mono function, and the signals will show up in stereo.

A mono signal connected to the RIGHT jack will show up in the right bus only. You probably will only want to use this sophisticated effect for special occasions (weddings, bar mitzvahs, Rush Limbaugh's birthday party, etc.)

MULTS AND "Y"s

A mult or "Y" connector allows you to route one output to two or more inputs by simply providing parallel wiring connections. You can make "Y"s and mults for the outputs of both unbalanced and balanced circuits.

Remember: Only mult or "Y" an *output* into several *inputs*. If you need to combine several outputs into one input, you must use a mixer, not a mult or a "Y."

APPENDIX B: OPTIONS, ADD-ONS AND EXTRA STUFF

LM-3204E Stereo Line Expander

Nobody ever has enough inputs. And when 16 stereo line inputs are finally too few, you, a proud Mackie LM-3204 owner, don't even need to think about a new mixer. For less than the price of another LM-3204, you can get an LE-3204E Stereo Line Expander and add another 16 stereo line inputs to your system.

It looks just like an LM-3204 but without the Master Section.

But why stop there? You can expand your expander, and expand that expander, and expand that expander, until you reach the theoretical limit of 65,536 inputs or the weight limitation of your building. (Actually, there IS some residual noise build-up — utterly inaudible when adding two or three or four expanders, so we suggest keeping it to that number).

Contact your dealer.

APPENDIX C: SPECIFICATIONS: TECH STUFF

LM-3204 Owner's Manual Specs

Noise (20Hz to 20kHz bandwidth, Line inputs to Main L/R outputs, all channels assigned):

Master fader down, Ch. gains down	–104.2dBu
Master fader @ unity, Ch. gains down	–86.6dBu
Master fader @ unity, Ch. gains @ unity	–84.0dBu

Total Harmonic Distortion (1KHz @ +14dBu 20Hz–20kHz, Channel input):

Main L/R output	.0022%
Control Room output	.0024%
Alt 3–4 output	.0016%

Crosstalk (1kHz @ 0dBu, 20Hz to 20Khz bandwidth, channel in to Main Left outputs):

Channel gain down, channels 2–16 at Unity	–73dBu
Channel muted, channels 2–16 at Unity	–81dBu

Frequency Response (any input to any output):

20Hz to 50KHz	+0dB/–1dB
20Hz to 100KHz	+0dB/–3dB

Maximum Levels

Mic preamp input	+14dBu
All other inputs	+22dBu
All outputs	+22dBu

Impedances

Mic preamp input	5kΩ
All other inputs	10kΩ
All outputs	120Ω

Equalization

Lo EQ	Shelving	80Hz	+/–15dB
Mid EQ	Peak	2kHz	+/–12dB
Hi EQ	Shelving	12kHz	+/–15dB

Microphone Preamp

E.I.N. (150Ω terminated, max gain): –129dBm

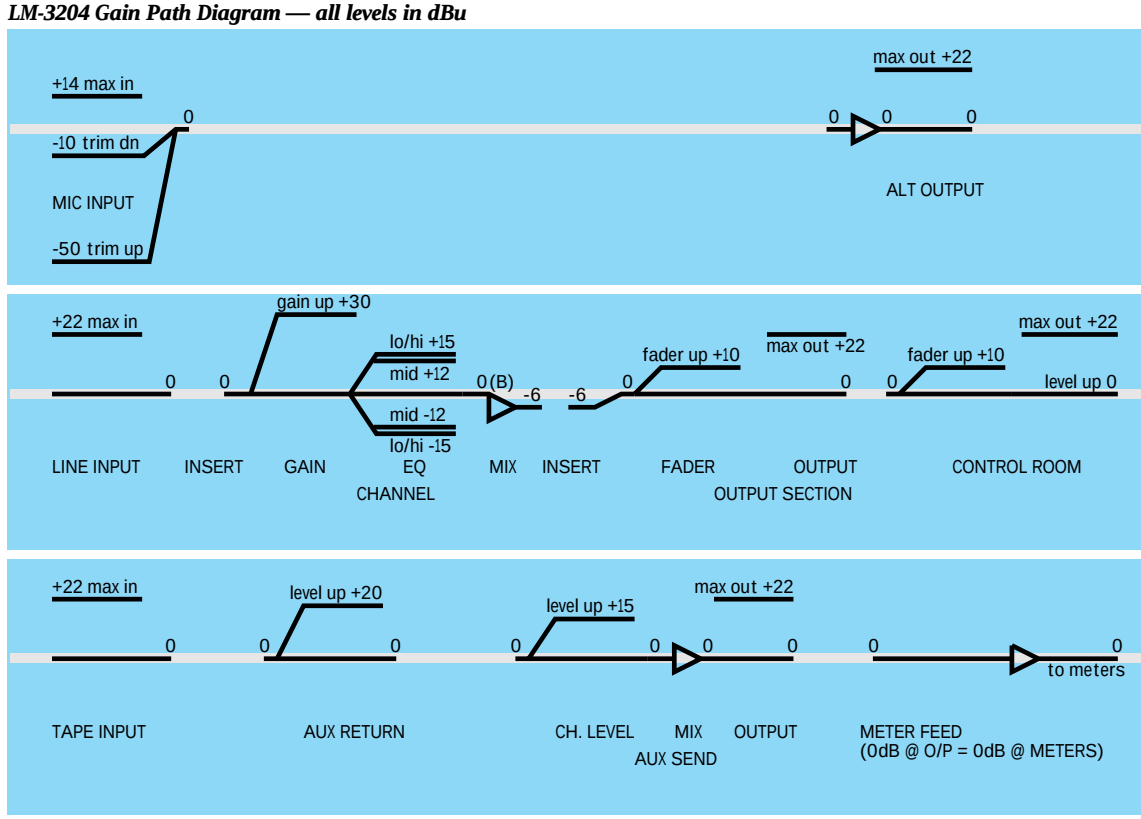
Power Requirements

120 VAC, 50/60Hz, 60 watts

Weight

LM-3204 console 24 lbs.

LM-3204 Gain Path Diagram — all levels in dBu

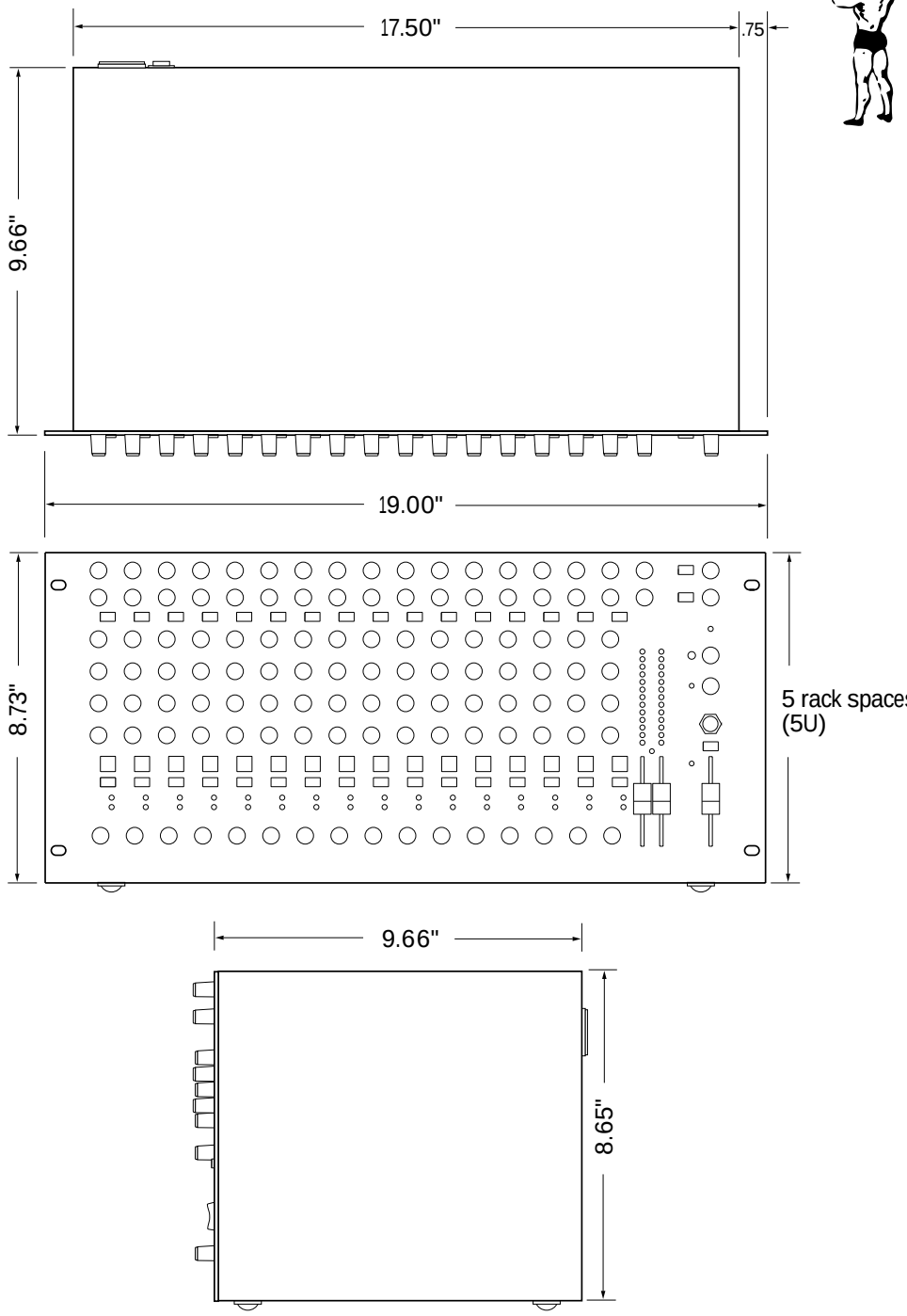


MACKIE.

LM-3204 LINE MIXER

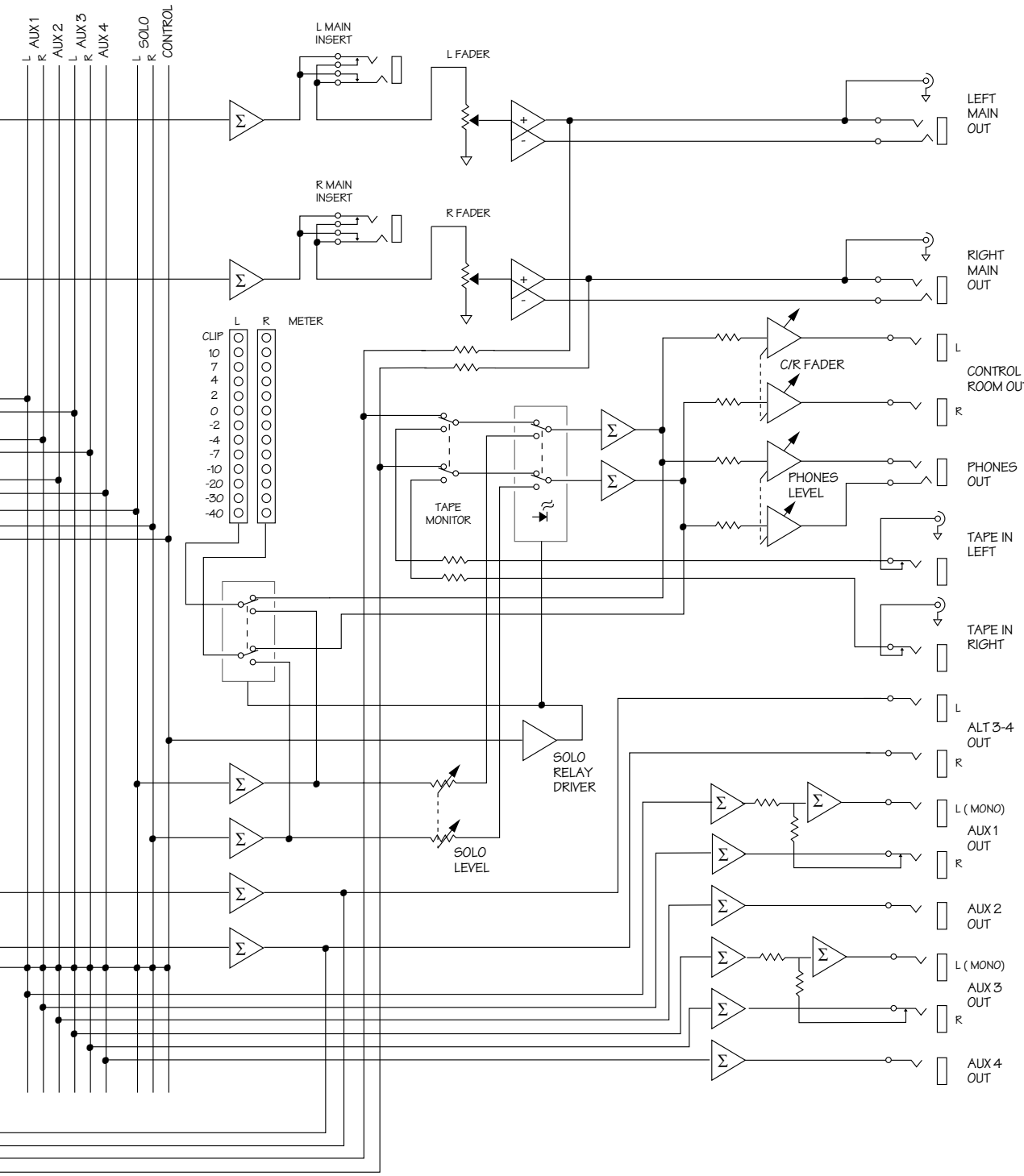
Dimensions also apply to LM-3204E Expander.

7/94 | ©1994 MACKIE DESIGNS INC.



LM-3204
BLOCK DIAGRAM

Rev. 3.3 - 8/15/94 | ©1994 Mackie Designs



APPENDIX

APPENDIX D: SERVICE

PLEASE! SAVE THE SHIPPING BOX!

Yes, we know that it's slightly larger than the suitcase you're living out of, but you will need the entire carton and internal foam if your mixer ever needs service at some time in the future.

If your kids make the box into a gerbil palace and cut holes in it — or if you stuff it in the dumpster of the fast-food place next door to your studio, we may have to sell and ship you another packing box later on.

Don't end up buying an empty box!

SERVICE

Mackie mixing systems are notoriously bullet-proof and reliable. But, hey...stuff happens. Any electronic product with as many parts as a 40-input audio mixer can occasionally have a minor casualty somewhere inside.

And even if we could build our products to never break, there are those acts of nature that tend to visit mixing boards on occasion: spilled coffee, toppling monitors, lizard infestations, etc. This section covers how to get your Mackie LM-3204 mixer healthy again.

TROUBLESHOOTING

It benefits everyone if you do a bit of basic troubleshooting in advance of panicking and sending the unit back. Some low-key detective work will determine whether or not your mixer is really malfunctioning. First, it saves you downtime and embarrassment if, for example, you discover that the only thing wrong is an unplugged power cord. Second, it will save money. If you ship your mixer to Mackie and we can't duplicate the problem, you may get slapped with a service charge (plus shipping costs).

We could write a whole manual on troubleshooting, but our main point is that there are a few obvious things you can easily look for:

Power connections. This sounds insultingly simple, but if the whole mixer is completely dead, it's time to make sure that: the power cable is connected into a live source of power, the mixer is turned on, the fuse is OK, etc.

Intermittent signal problems. Faulty plugs and cables are often the culprits. A TRS plug can sit in a socket for months doing its job and then suddenly decide (based on the phase of the moon and barometric pressure) to short or stop conducting. If you're having trouble with an individual channel, send or return, for gosh sakes swap cables before sending the mixer in for service.

Check patching and switch positions. The LM-3204 is not a Boeing 777 (the Glass Cockpit pride of the Northwest) but it *is* possible to have a switch in the wrong position and not notice it. How about the Tape Monitor switch? Or, have you plugged something into a channel or bus Insert jack?

Finally, ***it doesn't hurt to call our Product Support Department at 800/258.6883 (8:00 AM–5:00 PM Pacific Time) to see if they have any ideas as to what might be wrong.***

WHERE IT GETS FIXED

Service and repairs of Mackie LM-3204 mixers are to be performed *only* at our high-tech, rainforest factory.

Unauthorized service, repairs or modification will void your warranty.

TO OBTAIN FACTORY SERVICE:

1. Call Mackie Customer Service at 800/258-6883 (Monday through Friday 8:00 AM–5:00 PM Pacific Time) to get a Return Authorization Number (RA number).

   Products returned without an RA number will be refused.

2. Pack the LM-3204 mixer in its original shipping carton. If you do not have the carton, request one when you get your RA number, and we'll send a shipping carton out promptly. There may be a charge, however—we put those huge "SAVE THE BOX" warnings in this manual for a reason.

   Make sure that you encase the mixer in its plastic wrapper and insert all the foam blocks to properly protect the mixer.

3. When packing the mixer, include:

   A. a note explaining exactly how to duplicate the problem.

   B. a copy of the sales receipt showing price and date. If we cannot duplicate the problem at the Mackie factory or establish the starting date of your Limited Warranty, we may, at our option, charge for service time.

   C. your complete return street address (no P.O. boxes or route numbers, please!) and DAYTIME phone number.

4. **Write the RA number plainly on the outside of the shipping carton in BIG print (those huge stinky sign markers work well for this).**
5. Ship the product in its original shipping carton, freight prepaid to:

Mackie Designs
20205 144th Avenue N.E.
Woodinville, WA 98072
U.S.A.

A FREE T-SHIRT OFFER

We love to hear what folks have created using our mixers. If you use your LM-3204 to track or mix (or track and mix) a CD or cassette that is commercially released, we'll trade you a copy for a genuine Mackie T-shirt.

If you send us some notes as to when and where and how the production was accomplished, a picture of your cassette or CD, a short caption will probably end up in our monthly newsletter.

Also Greg Mackie listens to most of 'em.

By "commercially released," we mean "offered for sale," even if it's just being sold in your local area, during band breaks at clubs or via mail order.

No hand-lettered dubs, please. Save those for our infrequent Mixed on a Mackie contests.

To get your genuine 100% cotton, Made in USA, Mackie celebrity T-shirt, send your cassette or CD to:

Mackie Designs
FREE T-SHIRT OFFER
attn: Communications Department
20205 144th Ave. NE
Woodinville, WA 98072

Make sure to specify L, XL or XXL size.

If you prefer a small or medium size, just request a Large and run it through a hot dryer several times.

Allow several weeks for delivery. We're always busier than a carrion fly at a Rottweiler convention.

Bouquets and brickbats

This manual was primarily written by Dave Matthew, with additional scribbles by Ron Koliha. It was viciously scribbled up with red pens by the Mackie Technical Support Department and by Manufacturing Engineering Honcho, Jeff Gilbert. Valiant attempts at proofreading by Linn Compton. Composed on souped-up Mac™s in PageMaker™ 5.0 by the galley slaves in the Mackie Digital Mosh Pit.

As is invariably the case, there are mistakes and fuzzy parts that need correction. Feel free to write us with your comments and criticisms. We *do* respond to outside input — except for the occasional priggish letters that take us to task for our lighthearted writing style. Since comments run 100-to-1 FOR our non-stuffy style, we tend to ignore comments about how smart-alecky we are and secretly hope that the writers are condemned to a lifetime of reading other companies' often dry or incomprehensible manuals.

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