

MIXER BASICS FOR BEGINNERS

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A mixer is the central component of a P.A. system. It's a control panel that takes signals from several microphones, processes them, mixes or blends them into one composite signal, and sends it to a power amp and loudspeakers.

Mixers let you control the loudness and tone quality of the sounds picked up by multiple microphones.

In this article we'll look at each part of a mixer: what it does and how to use it.

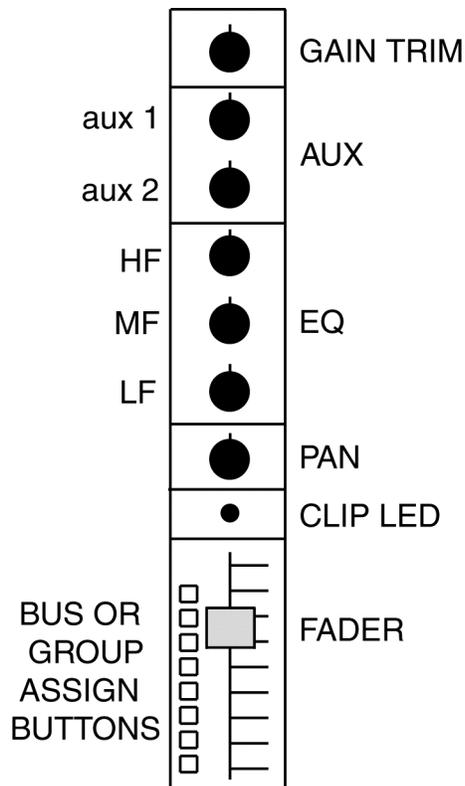
The Signal Path

The electrical signal from each microphone goes through the mixer in a path that is a series of stages. Here is the signal flow from input to output:

1. Mic input connector and phantom power switch
2. Mic preamp with a gain trim control
3. Fader
4. EQ
5. Aux send and aux connectors
6. Bus assign buttons
7. Pan
8. Bus faders
9. Master faders
10. Output connectors

We'll explain each stage.

First, note that a mixer has several vertical channel strips in a row. Each channel strip controls the signal of one microphone. If you know the functions of one channel strip, you know them all. So a mixer is not as complicated as it appears.



A channel strip has all the controls for one microphone's signal.

Let's look at each part of the signal path in detail.

Mic input connector and phantom power switch

On the back of the mixer, in each mixer channel is a connector labeled MIC IN. That's where you plug in a microphone or direct box. The connector type is a female XLR, also called female 3-pin pro audio connector.



A female XLR connector has three holes. A MIC IN connector looks like this.

If you are plugging a condenser microphone into a mixer, the mic requires phantom power to operate, so turn on the phantom power switch in the mixer. This switch is usually in the back of the mixer or somewhere on top toward the right side. It might be labeled P48 or Phantom.

Some mixers let you turn phantom on or off for each mic connector. Others have a phantom switch for a group of connectors, or for all the mic connectors at once. Plug condenser mics into inputs that have phantom power and plug

ribbon and dynamic mics into inputs that don't have phantom power. If all the mic inputs have phantom power, plug in any type of microphone.

Mic preamp with gain trim control

The microphone signal is very weak (low voltage), so it needs to be made stronger by a mic preamp built into the mixer. You can control the gain or amount of amplification of each mic preamp by turning the TRIM or GAIN TRIM knob at the top of each mixer channel.

Here's how to set the trim knob. Turn down all the faders (sliding volume controls) on the mixer. Have someone talk or sing loudly, or play their instrument loudly, into their microphone. In the mixer channel for that mic, turn up the TRIM control until the CLIP or PEAK LED (light) starts flashing. Then turn down the TRIM control just until the CLIP or PEAK LED goes out. If it's flashing, that light indicates that the mic signal is distorted, so it has an undesirable gritty sound.

Fader

This is a sliding volume control, one for each microphone. Use it to turn each mic up or down to control its loudness through the PA speakers. A typical position for each fader in use is $\frac{1}{2}$ to $\frac{3}{4}$ up. Set the fader level after setting the TRIM knob.

Some mixers have a MUTE button above each fader. It lets you turn a mic off and on without changing the setting of its fader.

EQ

EQ or equalization means "tone control". The EQ knobs affect the amount of bass, midrange and treble of each mic's sound. Bass is usually called LF EQ (low-frequency EQ), midrange is usually called MIDS or MF, and treble is called HF EQ (high-frequency EQ).

In the EQ section of most mixers, you have a choice of frequencies to select, and the amount of boost or cut at the selected frequencies. Low frequencies are roughly around 40-250 Hz, low-mids are around 250 Hz – 1kHz, high-mids are about 1kHz-7kHz, and highs are around 7kHz to 20 kHz. Those frequencies are somewhat arbitrary.

Generally you start with the EQ knobs set "flat" or at 12:00 o'clock. That means there is no boost or cut at any frequency.

If a mic sounds too thin (weak in the bass), turn up the low frequencies around 100 Hz. If a mic sounds too bassy or boomy, turn down 100 Hz. If a mic sounds too dark or muffled (weak in the treble), turn up the high frequencies around 10

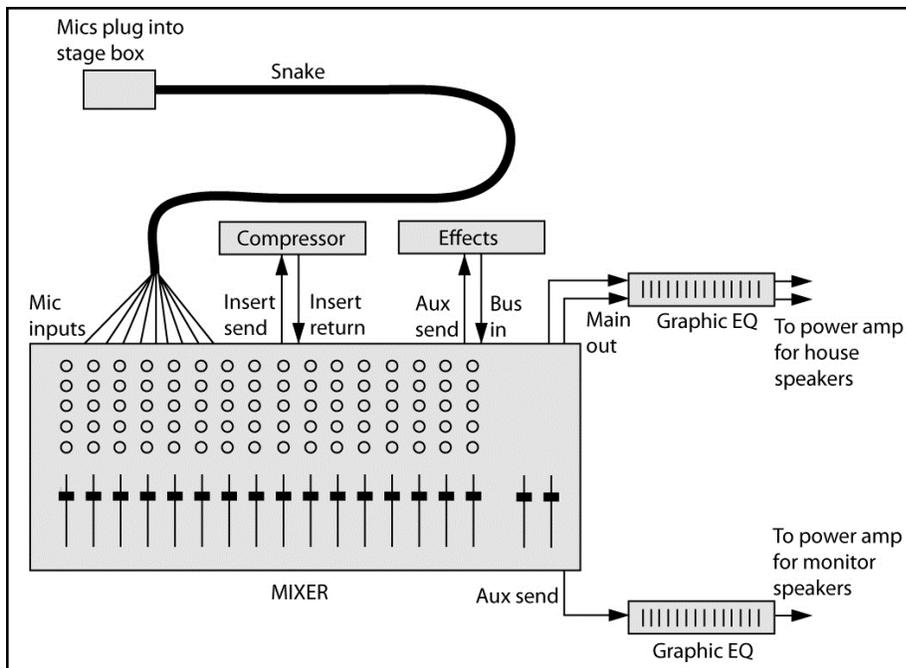
kHz. If a mic sounds too bright or sizzly, turn down the high frequencies. In each case, adjust the boost or cut by an amount that sounds right. But if you apply a boost, watch out for feedback.

Aux-send knobs and aux connectors

In each mic channel, the aux knob controls either (1) how much effects you hear in that mic's sound or (2) how loud that mic is in the monitor speakers. Some mixers have several aux knobs per mic channel labeled AUX1, AUX2, etc.

Start with the aux knobs turned all the way down. If you want to hear an effect such as reverb on a mic's signal, first you'll need to find out if the mixer has built-in effects. If so, select the type of effect you want, and turn up the aux knob by amount that sounds right.

If your mixer does not have built-in effects, you need to connect an external effects device to the mixer. Look for the aux send and aux return (or bus in) connectors on the back of the mixer. Connect aux send to the effects device input, and connect aux return (or bus in) to the effects device output. There might be two effects device outputs and two aux returns (left and right) for stereo effects. Turn up the mixer's aux return knob about halfway, and turn up the aux send knob for the mic in use until you hear the amount of effects that you want.



Mixer connections. Insert send and Insert return are not covered in this article.



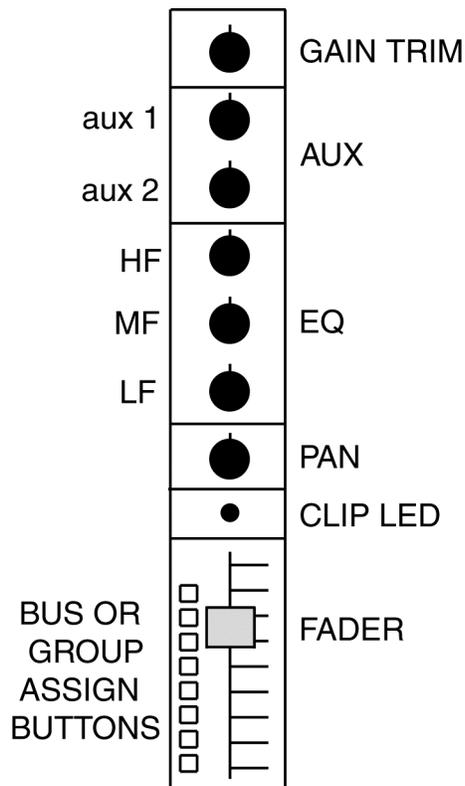
A 1/4" phone jack. An aux send connector looks like this. So does an aux return or bus in connector.

When you use effects, see if the mixer has a pre-fader/post-fader switch next to the aux send knob. Set it to post-fader.

If you want to hear a mic's signal in the floor monitor speakers, set the pre/post fader switch to PRE. Connect the mixer's aux output connector to the monitor power amp's input. Turn up that power amp about halfway. Then turn up the aux knob in each mic's mixer channel by an amount that sounds loud enough in the monitor speakers, but not so high that you cause feedback.

Bus assign buttons

These pushbutton switches let you select where the mic signal goes. If you want to send all the mic signals directly to the output of the mixer, select Stereo Bus or Output Bus. A Bus is a channel in a mixer that carries many signals at once. Each bus has its own bus fader.



Suppose you want to control the volume of certain types of mics all at once with a single bus fader. For example, you might send all the floor mics to Bus 1, all

the wireless mics to Bus 2, and all the CD sound effects to Bus 3. Here's how. In each floor mic channel, select Bus 1. In each wireless mic channel, select Bus 2. In the two CD channels, select Bus 3.

Pan

If you have a stereo mixer and two stereo speakers, left and right, you can rotate the pan knob to make a mic signal go to the left, right, or anywhere between. However, most PA systems are run in mono, so you just leave the pan knob straight up.

Bus faders

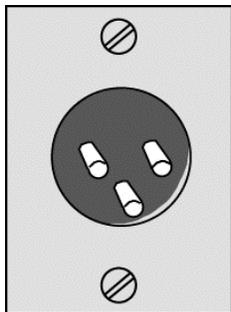
Located toward the right side of the mixer, these faders control the level of Bus 1, Bus 2, Bus 3, etc. All the mics feeding Bus 1 are controlled by the Bus 1 fader, and so on.

Master faders

Also located on the right side of the mixer, the master faders control the overall level or volume of everything passing through the mixer. Normally you set the master faders about $\frac{3}{4}$ up and leave them there. This fader position might be labeled "0" or "U" (for Unity gain).

Output connectors

On the back of the mixer are one or two MAIN or MASTER output connectors. They are male XLR types or $\frac{1}{4}$ " phone jacks. You connect them either to a power amplifier, or to a graphic equalizer which is then connected to a power amplifier. The amplifier drives the loudspeakers.



Male XLR connector. A mixer main output connector might look like this.



$\frac{1}{4}$ " phone jack. A mixer main output connector might look like this.

If your mixer has a power amp built in, just look for the speaker connectors on the back of the mixer, and plug in the speaker cables there.

We've covered mixer connectors and controls from input to output. Now you should have a better understanding of how a mixer works.