

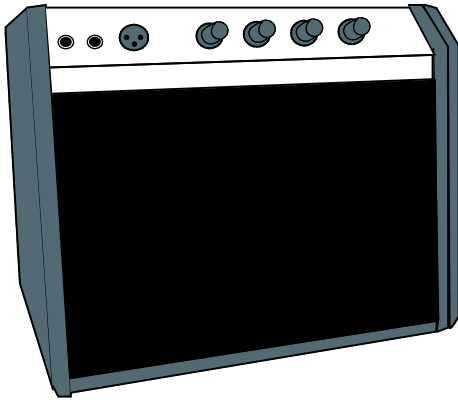
SOUND SYSTEM BASICS for instrument microphones

(c) 2013 by Bruce Bartlett

To amplify your musical instrument, you need a sound system or instrument amp. A **sound system** includes microphones, a mixer, a power amplifier (or powered mixer), loudspeakers, speaker stands, and cables.

An **instrument amp** is designed to amplify one acoustic instrument and sometimes a vocal mic. The amp includes a simple mixer, power amplifier and speakers in a single cabinet. Even if you're playing in a band with a sound system, you might want to have your own instrument amp to monitor yourself (in addition to the sound system's monitor speakers).

A guitar amp is designed to sound best with an electric guitar, while an instrument amp is better for an acoustic instrument or keyboard.



An instrument amp

Of course, a sound system is more complex than an instrument amp. Here's how to set up your sound system for best sound.

The parts of a sound system are shown below:

Microphones: The Bartlett instrument mics are the Guitar Mic, Guitar Mic B, Guitar Mic EJ, Fiddle Mic, Cello Mic, Banjo Mic, and Mandolin Mic.



Mic cables: They carry the signal from the mics to the mixer. The type of mic cables you need are called "2-conductor shielded mic cables" with a male XLR connector on one end and a female XLR connector on the other end. They typically come in 15 or 20 foot lengths, and you can connect several of them together to reach from the stage to your mixer.



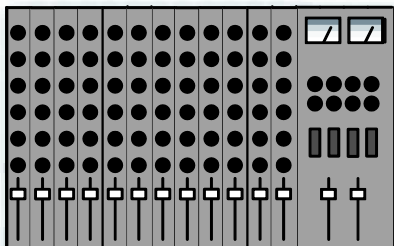
Mic cable

Mic snake (optional): This is a metal box with several mic connectors in it, wired to a long, thick cable (maybe 50 or 100 feet long). At the end of the cable are several XLR connectors which plug into your mixer. Using a snake is easier and neater than using many separate mic cables. You still may need some 20-foot mic cables to reach from the stage to the snake box.



Mic snake

Mixer: This device amplifies the mic signals and lets you control their volume and tone (bass, midrange and treble).

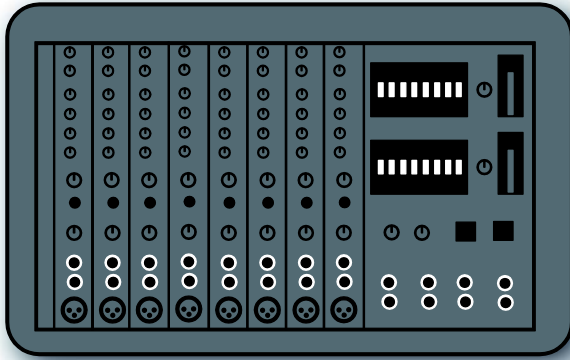


Mixer

Power amplifier: This device further amplifies the mixer signal up to a stronger level that can drive loudspeakers. Note: A **powered mixer** combines a mixer and power amp in a common chassis.



Power amplifier



Powered mixer

Cable between the mixer and power amplifier: On one end of this cable is a connector that mates with your mixer output connector. The cable connector might be an XLR connector, phone plug or RCA plug. On the other end of the cable is a similar connector that mates with your power amplifier input connector. You won't need this cable with a powered mixer.



Cable with phone plugs

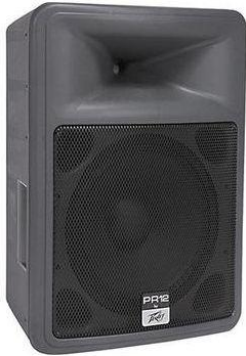


Cable with XLR connectors



Cable with RCA plugs

Loudspeakers: These play the amplified instrument sounds to the audience. A typical portable PA speaker has a 10-inch or 12-inch diameter woofer cone plus a horn-shaped tweeter, shown below.



Speaker cables: These go between the power amplifier and the speakers. Typically a speaker cable has two thick wires, like an electrical cord (lamp cord). On one end of a speaker cable is a connector that mates with your power amplifier: a banana plug, phone plug, Speakon[®] connector or bare wires. On the other end of the speaker cable is a similar connector that mates with your loudspeakers.



Lamp cord



Speaker cable with banana plugs



Speaker cable with phone plugs



Speaker cable with Speakon™ connectors



Banana plug:



Phone plug.



Speakon™ connector on back of power amplifier.



Speakon™ connector on cable:

Speaker stands: A speaker stand is a collapsible stand that mounts a loudspeaker 6 to 14 feet high off the floor. That way, the speakers don't blast the nearest listeners, and the sound clears the heads of the audience and isn't blocked by them.



Phantom Power

Most mixers have a feature called **phantom power**. It's a source of power at each mic connector, and it powers the microphones automatically when you plug them into the mixer.

Look at your mixer and find the model number. You can look it up online and find out if it has phantom power. If it does, you're all set. You also could check the owner's manual if you still have it. Or look for a button labeled "phantom", "P48", or "48V".

If your mixer does not have phantom power, you need a phantom power supply, one per microphone, such as the Behringer PS400 or Rolls PB23. They are available from online vendors and most music stores.

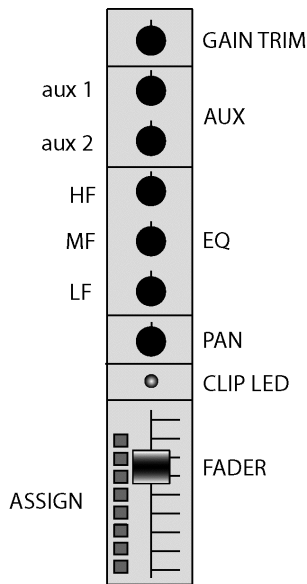
You plug the mic into the phantom power supply, and connect the phantom power supply's output to a mixer mic input. Note: The Bartlett Guitar Mic B is battery powered, so it doesn't need phantom power.

Speaker Placement

Place the speakers up high on the speaker stands, one on either side of the stage, far apart and a few feet toward the audience. You might also have monitor speakers on the floor or on stands. If so, connect the AUX 1 SEND jack on your mixer to a separate power amp that drives the monitor speakers.

Some powered mixers have jacks for the main speakers and for the monitor speakers. Simply connect the speakers and monitors to those jacks.

Mixer input module



Mixer input module

Each mic has its own input module in the mixer. The controls in the input module affect the sound of that mic. Several modules are side-by-side in the mixer, one for each microphone. The controls are described below:

Fader: Volume control

Assign buttons: Press one to send that mic's signal to the desired output channel

Clip or overload LED: Flashes if the mic signal is too strong - turn it down with the gain trim knob

Pan: Controls how much of that mic's signal goes to one channel or another. Leave it straight up.

EQ: Tone control (bass, midrange, treble)

AUX: Controls how loud that mic's signal is in the monitor speakers.

Mixer operation

1. With the mixer turned off, plug all the band's mic cables or snake into the mixer. Using a strip of masking tape, label the faders according to the instrument or vocal that each fader affects.
2. Turn all the faders down. Set all the aux knobs all the way down (counter-clockwise). Set all the EQ knobs "flat" (12 o'clock).
3. If you have a separate power amplifier, set its volume controls halfway up.
4. Turn on the mixer and phantom power, then turn on the power amp.
5. Turn up the mixer master faders to "0", about 3/4 up.
6. Play your miked instrument loudly. Find the input channel on the mixer for your instrument. In that channel, slowly turn up the GAIN knob until the CLIP or OVERLOAD light flashes. Then turn down that knob just to the point where the CLIP light goes out.
7. Repeat step 6 for all the instruments and vocals.
8. In the mixer channel for your instrument, turn up the AUX 1 (monitor send) knob until the sound is as loud as you want it in the monitor speakers -- but watch out for feedback.
9. In the mixer channel for your instrument, turn up the fader until the sound is as loud as you want it. If it's too quiet, turn up the power amp volume controls a little.

10. Repeat steps 8 and 9 for all the instruments and vocals.
11. Using the mixer faders, set up a good balance among the instruments and vocals.
12. Using the mixer EQ knobs, adjust the bass, midrange, and treble for the desired tone quality on each instrument and vocal. The bass is LF EQ (usually around 100 Hz), mids are MF EQ (sweepable frequencies), and treble is HF EQ (usually around 10 kHz.).

Good luck in your quest for clear, natural sound.