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# Chapter One

## What Is Sound Reinforcement?

The basic premise of sound reinforcement is to bring the band's sound level up above the ambient room sound so it can be heard. Ambient room sound is the noise caused by things like conversations, cash registers, and air conditioners. Sound reinforcement is achieved through the use of microphones, mixers, signal processing, power amps, and speakers. I will take you through the different pieces that make up a modern P.A. system and give you some practical applications for operating a sound system in a live performance situation.

## System Types

There are two types of sound systems: integrated and component. Both have advantages and disadvantages, but choosing the right type for your needs is essential. If you play small clubs with a trio, you will probably need an integrated system. On the other hand, if you play in a number of different room sizes with medium to large groups, you'll need to invest in a component system. You may even need to buy a couple of different speaker size combinations to accommodate the various places you play. I remember bringing a P.A. to a gig only to find out there wasn't enough room on the stage, floor, or any place else for the large speakers. One more thing—don't expect a club owner to give up customer seating so you can put your speakers on the tables.

### The Integrated System

An integrated or self-contained system is one in which the mixer and amplifier are boxed as a single unit and often includes a set of speakers. This type of system is compact and requires little set-up.

An integrated system, shown in Figure 1 on the next page, is usually a box with mike and line inputs as well as basic controls such as a mike or line input, volume control, monitor/auxiliary send, and high and low equalization (known as EQ) on each channel. (EQ is a sophisticated type of tone control.) Sometimes a graphic equalizer is included in the main output section to allow for the overall tonal balance of the speaker's sound. The amplifier is built into the unit, so no additional connections are necessary from the mixer. You just need to plug in your mikes and instruments, set the levels, add some EQ (if necessary), connect the speakers, and you're ready to go. The main limitation of the integrated system is that it usually has only six or eight inputs, but for small groups, solo performers, and duos that shouldn't be a problem. The advantage of the integrated sound system is its small size. If the room is small enough and you're not using stage monitors, the main unit and two speakers are all you'll need to bring to your gig.


# Chapter Six

## Microphones

A microphone is a transducer that converts sound into an electrical voltage (signal). The microphone's characteristics are determined by the type of mike and its polar pattern or patterns. A microphone's type can be dynamic (a moving coil or ribbon), condenser (also known as a capacitor mike), or electret condenser. The polar pattern of a mike is a graph that shows its frequency response at different angles as sound hits the diaphragm. A mike with good frequency rejection off-axis (from behind or off to the side of the mike) is useful in eliminating feedback sometimes produced by stage monitor systems. Microphone polar patterns fall into two categories. The omni-directional mike is equally sensitive to frequencies from all directions. The uni-directional mike is most sensitive to sound frequencies directly approaching the front of it (on-axis).

When you purchase a microphone, it will almost always come with a mike clip or holder to mount it on a stand. Always keep the clip with the mike; do not leave it on the stand. One reason is that the clip may break in transit on the mike stand. Clips are made of high-impact plastic, but throwing them in the back of a truck on the stand is just asking for trouble. Another reason is that not all mikes have the same barrel, so they won't interchange easily and may break if a large mike is squeezed into a small clip. Another tip: When mounting a mike clip on a stand, loosen the clutch on the stand pole and hold the mike clip over the threading on the stand. Turn the stand pole clockwise (not the mike and not the entire stand) to tighten the clip on the stand, and then adjust the height of the stand and tighten the clutch. You'll be amazed how much easier this is rather than turning the mike clip. To take the clip off the stand, just reverse the procedure.

### Types of Microphones

## Dynamic

Dynamic mikes usually fall into two categories, moving coil and ribbon, as seen in Figure 32. In a moving coil mike, a diaphragm is attached to a coil of thin wire. When sound pressure causes the diaphragm to move, it passes the coil around a fixed magnet. As you may remember from science class, this generates voltage at the output, which can then be amplified by the mike pre-amp of the mixer. A ribbon mike uses a metal ribbon suspended in a magnet. When sound pressure causes the ribbon to move in the magnetic field, voltage is generated at the mike's output. Ribbon mikes are almost always bi-directional because of the way the ribbon is suspended in the magnet. Sound approaching from the side can't create much motion in the ribbon, so little voltage is generated.

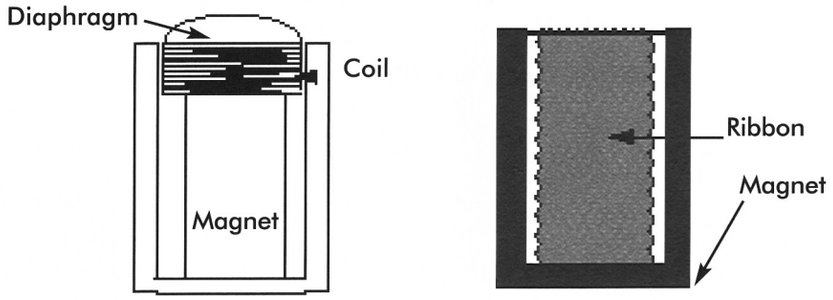


Figure 32: Moving Coil Mike Capsule and Ribbon Mike Capsule