

Microphone Basics: Earset and Lapel

A very basic discussion:

Microphones are stupid. They have no idea what you want them to pick up so they pick up everything that is available. This might seem like a ridiculous statement but unless the concept behind it is understood proper application of any microphone will not be achieved except by accident.

All microphones operate on the principles of proximity effect or, in other words, whatever is closest to them or loudest at the face of the microphone will be the thing they pick up and pass on to the loudspeaker also as the loudest. All other sounds within the pickup area of the mic will also be present but may or may not be heard by the person listening depending on how loud they are in the final mix.

If the sound source is some distance away from the microphone any sounds that can reach the mic through the intervening distance will also be picked up whether they are desired or not. This can be as simple as air handler noise or the ambient noise inherent in any given room or environment. In a space without artificial sound reinforcement, the human brain can filter out the sound of general air movement and separate it from other sounds, for example, leaving the brain to process the primary desired sounds unless and until any undesired secondary sounds levels exceed the levels of the desired sounds. While the brain can perform this function when the sounds are coming naturally generated from different directions around a room or space, the brain can't separate those same sounds as efficiently if the sounds are coming from an artificial device like a loudspeaker.

Understanding this phenomenon leads us to understand that we need to use the right microphone and locate microphones in as close a proximity to the sound origination source, like a human voice or musical instrument, in order to reduce the possibility of undesired sounds from reaching the mic louder than the desired sound(s).

Pickup patterns (common, partial list):

1. Omnidirectional – Picks up from all directions around the mic
2. Cardioid – Picks up in a pattern directly in front of the mic in a pattern shaped like a heart.
3. Hyper-cardioid - Picks up in a pattern directly in front of the mic in an exaggerated pattern shaped like a heart.

To apply this principle to typical spoken word applications we need to address the different types of mics that might be used in this application:

1. Handheld
2. Earset (also know as over the ear)
3. Lapel (also know as lavalier)
4. Podium

For this discussion we will look at the Earset and Lapel mics in detail.

Lapel: A lapel mic is most commonly located at the sternum on the person speaking but can be clipped to a shirt collar or other vestment. Occasionally I have seen them located around the belly button area. There are pros and cons to this application.

A. When used in a studio or other setting where the sound inserted into the mic is not reentered into the room.

Pros:

1. Less obtrusive for the wearer.
2. Gain can be raised to overcome the noise floor (undesired background noise) of the room since feedback is not possible.
3. Much less visible which is desirable if the subject is being videoed.

Cons:

1. The greater distance from the mic to the mouth allows for greater insertion of background noise thereby raising the noise floor for the listener whether on a recording or through a sound system speaker.

B. When used in the same room as the loudspeaker playing the sounds back:

Pros:

1. I can't think of any other than it might be less intrusive visually or for artist desire than an earset style mic.



Cons:

1. Due to the location under the chin of the user and about 18" from the mouth, sibilant sounds have a harder time traveling from the mouth to the mic. This causes the mic to be turned up in the system and at some point, generally at a point not loud enough for the audience to hear comfortably, the system goes into feedback.
2. In this configuration, the mic stays directionally stable with the wearer's body which allows the user to turn their head from one side to the other thereby changing the loudness of the sounds reaching the mic making the sound to the listener inconsistent and in some cases inarticulate as a result of the change in proximity.
3. Subject to directional induction of feedback. As the person speaking moves around the space the mic, which is generally already operating at max gain before feedback, is turned toward the loudspeaker the system starts to ring or goes into full feedback.
4. Due to the location on clothing it is very common for the mic to become covered by the clothing or get pulled directionally away from orientation toward the person speaking's mouth. This causes the audience listening levels to be reduced and generally the sound system turned up and the system entering the feedback zone.

Earsset Style Mic: This style of mic is worn either under or over the ear. There are a variety of lengths available from long enough to reach the mouth of the wearer or shorter with the mic being closer to the ear. There is an option for a bracket that will also go around the back of the head and mount over the opposite ear for better stability.

Pros:

1. This style of mic brings the mic capsule within inches, or even less, of the mouth. This location substantially reduces the ambient noise that reaches the mic before the desired sounds.
2. With the mic consistently at the same distance from the mouth there is never a time when the sound quality varies due to proximity variation.
3. Critical sibilant sounds are much more present and clear due to the shorter travel distance between the mouth and the mic. This makes the content much more understandable to the listening audience.

In other words it is easier for the audience to understand the words because the sounds are much sharper and clear with this style of mic.

Cons:

1. This style of mic requires very careful attention to its relative location to the edge of the mouth. If the mic is in the path of the air movement from the mouth on hard sounds with a lot of air movements or "plosives" the sound system will pop. If the person speaking has a tendency to have explosive consonants, a shorter stem mic should be used or if a longer mic is used it should be positioned above or below the edge of the mouth to take it out of the path of the air movement.

Between these two mic styles, the earset is always the better choice for live sound reinforcement. I prefer the omnidirectional pattern if possible but in the event that leaves too much room for feedback the cardioid or hyper-cardioid patterns will work very well.

