Which Is Best? A Dynamic Microphone or A Condenser Microphone?

The basic differences between dynamic microphones and condenser microphones. Their strengths and weaknesses and where they work best in the video production process.

Shopping for microphones is a complicated process. There's a lot of hype surrounding some mics, while others are overlooked. The spec sheets - when you can find them - are filled with confusing math and unfamiliar phrases. You could buy based on a review or the opinion of someone else, but why not make an informed decision for yourself? One of the most basic differences between microphones is their operating principle - dynamic or condenser. This month, we'll look at both, identifying their strengths, weaknesses and where they work best in the video production process.

It's Dynamic!
The word dynamic sounds like something straight from an infomercial, doesn't it? While there are several definitions for the word, the one we're going with is: "of or relating to variation of intensity, as in musical sound." Microphones in general are a specific kind of electromechanical device called a transducer, converting mechanical energy into electrical energy. In the case of a dynamic microphone, a very thin diaphragm of mylar or other material is attached to a coil of hair-thin copper wire. The coil is suspended in a magnetic field and, when sound vibrates the diaphragm, the coil moves up and down, creating a very small electrical current. The electrical signal is attached to a connector on the microphone. Just plug it in and it works.

Dynamic microphones come in many shapes and sizes - some with large diaphragms, others small. The size and design of the dynamic element plays a big role in how the mic sounds. In general, the larger the diaphragm, the smoother and deeper the sound. For instance, the venerable large-diaphragm ElectroVoice RE-20 is prized for its silky smooth vocal reproduction. It is also a favorite for brass instruments and bass drums. Another iconic dynamic microphone is the Shure SM-58. Virtually unchanged since its introduction in 1966, the SM-58 is a favorite vocal mic in live sound and concert applications. Using the same dynamic element in a different package, the SM-57 has its own place in history. In addition to duty as the de facto snare drum mic, you can see the SM-57 in action every time the President of the United States speaks. His podium always sports two SM-57s complete with windscreens and a dual-mic mount.

Why does the White House choose a $100 dynamic microphone when there are so many other options? In short, its SM-57s survive all kinds of torture from the road and the elements. It's not unusual for a professional dynamic mic to take all kinds of abuse and keep working for decades. If there's a downside to dynamics, it would be their sensitivity and frequency range, although both shortcomings have been minimized over the years with new materials and magnets.

The Anatomy Of A Condenser Microphone
Condenser microphones use a different type of transducer. Condenser elements are essentially a fancy kind of capacitor. In most designs, there is a fixed backplate and a movable front plate. These plates are fixed a specific distance apart and an electrical charge is applied. As sound hits the movable plate, it flexes or vibrates. This creates a tiny change in the capacitance, which can be turned into an electrical signal. However, this signal is extremely small and needs some amplification before it is suitable for connection to audio equipment. Consequently, condenser microphones require a fair amount of electronic circuitry to produce recordable sound. The electronics package needs some type of power source, which

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Dynamic and Condenser Microphones in the Real World

Many times, microphone selection is based purely on the application. If you need a lapel or shotgun mic, you’re looking for a condenser. It’s virtually impossible to manufacture a dynamic mic in those forms and, since condensers aren’t really dependent on size, they are the perfect choice for the job. On the other hand, if you’re using microphones in crazy weather conditions or dirty, unprotected circumstances, you may want a dynamic model instead. In addition, there are microphones suited to particular tasks. For instance, there are dozens of condenser mics produced specifically for use in theater and church applications. Whether hanging from a ceiling, mounted on the floor or even a podium, these microphones are designed for optimum pickup of voices in this unique environment, and there are no dynamic equivalents. On the other hand, a band touring the country might opt for more durable dynamic mics - especially for vocals, guitars and pianos to vocals, the U-87 is a pricey but desirable addition to anyone’s mic collection. In recent years, Chinese manufacturers have dominated the cost-effective condenser microphone arena. Just check the pages of any music catalog, and you’ll find studio-type condensers starting under $100. There are also many very nice mics in the $300-500 range. Of course, it’s rare for one of these cheaper mics to rival one with a $3000 price tag, but the technology has evolved to the point that anyone can afford a nice condenser mic.

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