Principal Characteristics of the Different Microphone Types

Pressure Transducers

...are characterized by an omnidirectional polar pattern, i.e. they pick up sound from all directions to an (ideally) equal degree. Microphones of this type do not have "proximity effect" (low-frequency emphasis with close placement to a sound source). But condenser microphones operating on this principle can have flat frequency response down to the lowest audible frequencies, permitting full, impressive low frequency sound reproduction. Unlike a loudspeaker, a microphone's membrane size has no effect on its low-frequency capabilities since it operates purely as a sensor, like an eardrum; it doesn't have to move large volumes of air at low frequencies as a loudspeaker must do.

For reasons of physics (capsule dimensions), the omnidirectional pattern can be maintained in its ideal form only up through the midrange frequencies. At higher frequencies, sounds arriving on axis are progressively emphasized by the interaction of the capsule housing with the shorter wavelengths. The larger the diameter of the housing, the greater the difference in high-frequency response between on-axis and off-axis sound. This effect can be seen clearly in the capsules' polar diagrams. It is the reason for their differing frequency response in the direct versus the diffuse sound field.

When the high-frequency emphasis is corrected so that the response measures flat on axis, the result is a pressure transducer type such as the MK 2 or CCM 2. These microphones are ideally suited to picking up acoustic sources in the near field. But if a microphone of this type is placed in the reverberant sound field, where reflections from walls, ceiling, floor, etc. predominate, there will be a loss of overall brilliance. These reflections, with their high-frequency content attenuated by surface absorption, reach the microphone at oblique angles of incidence and suffer additional losses as compared with sounds picked up directly. Here (in the diffuse sound field, beyond the reverberation radius) a microphone with some high-frequency emphasis (MK 2H, MK 2S, MK 3 or the corresponding CCM Compact Microphones) is required so that at high frequencies there will be balanced sound rather than a rolloff. This, of course, adds brilliance to sounds picked up at close range and on axis – an effect which may be desired in some circumstances.

A pressure transducer with ideal response in all situations does not exist. A very small capsule could allow the high-frequency response to be flat regardless of direct- or diffuse-field placement, but such small capsules are quite noisy. The user must therefore consider the nature of the pickup and make an appropriate choice. Please note that the design of of the MK 2S or CCM 2S achieves a technically sophisticated compromise between the requirements of working in the direct and the reverberant sound fields (in the region of the reverberation radius).

Particularly for two- and three-microphone stereo pickups, which are usually made near the reverberation radius (where the direct and reverberant sound fields are of equal level), the MK 2S and CCM 2S have become favorites of many sound engineers. This is also true for the MK 2H and CCM 2H, whose characteristics are somewhat closer to those of the free-field models MK 2 and CCM 2.

SCHOEPS GmbH · Spitalstr. 18 · 76227 Karlsruhe (Durlach) · Germany
Tel.: +49 (0)721 943 200 · Fax: +49 (0)721 495 750 · mailbox@schoeps.de · www.schoeps.de