BASIC MICROPHONE TECHNNIQUES FOR LIVE PERFORMANCE AND MUSIC RECORDING IN NIGERIA.

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Abstract:
This study exploits several ways by which microphone can be positioned/placed during live performance and recording in Nigeria. Musical performance cannot be appreciated without proper microphone techniques. Participation, observation as well as literature reviews from the research methodology are used in carrying out the research. Challenges facing this work would be highlighted as well as possible solutions and recommendations.

Introductions

We cannot digest this discourse without knowing the meaning of this instrument called microphones. From the acoustic point of view, microphones are familiar, and almost ubiquities piece of sound equipment that changes sound energy into electrical energy. A lay man's understanding will have it as an instrument for singing. Perhaps the best way to emphasise the importance of the microphone is to say that without it, with the exception of electronic instruments and computers, audio in the recording would not exist. Going to the historical lain, it should be noted that the earliest recordings were made through a horn; sounds were emitted into horn and recorded directly onto a cylinder or disc. This type of acoustic recording was supplanted by electrical recording around 1925, and then microphone took over, in 1876, Emile Berliner invented the first microphone used as a telephone voice transmitter. At the US centennial exposition, Emile Berliner had seen a bell company telephone demonstrated and

was inspired to find ways to improve the newly invented telephone. In 1878, the carbon microphone was invented by David Edward Hughes, and later developed during the 1920's.Hughes's microphone was the early model for the various carbon microphones now in use. The ribbon microphone was invented in 1942 for radio broadcasting.In1964, Bell laboratories researchers James West and Gerhard Sessle, invented electro acoustic transducers, an electric microphone. The electric microphones offered greater reliability, higher precision lower cost and a smaller size. It revolutionized the microphone industry with almost one billion manufactured each year. During the 1970's, dynamic and condensermics were developed allowing for a lower sound level sensitivity and a clearer sound recording.

Operating Principles

The recording industry which is changing rapidly has one area where the technology is almost the same as it always was and this area is microphones. When choosing a microphone, there are three things to consider: operating principles, directional characteristics and sound response, cost and durability may be two other considerations. Going back to our physics class, microphones are transducers. They change sounds acoustics energy (variations in air pressure) into electrical energy (variations in voltage) from a technical design standpoint; therefore, the most basic way to classify different types of micsis by the methods they use to do this. Microphones use a diaphragm usually of twin, lightweight material, that is struck by sound waves and vibrates accordingly into an analogous pattern of varying voltage and the electrical signal is then available for recording and processing. Based on this way we can break microphones down into the following categories:

- Dynamic moving –coil designs (the diaphragmis attached to a coil of wire)
- Ribbon (actually, dynamics as well, but with a ribbon of a moving coil)

Condenser (i.e capacitor mics, where the diaphragm is part of capacitor)

Dynamic moving- coil microphones designs, better known as dynamic mics, use the principal of electromagnetic induction to convert acoustic energy to electrical. The diaphragm is attached to a coil, which lies in a magnetic field (generated by a magnet incorporated into the mic).When sound waves strike the diaphragm, it vibrates accordingly, and this causes the attached coil to move within the magnetic field generating a voltage which varies in accordance with the pattern of the original sound wave (a typical loudspeaker works by the same principle, only in reverse) moving-coil designs are usually sturdy and rugged and so are popular for live use, especially hand – held applications. Moving-coil microphones are rugged, generate low self-noise, tend to be less susceptible to humidity and a wide temperature variations, and handle high sound –pressure levels without distortion. They are less expensive than other professional microphones.

Ribbon Microphone is another type of mic design that uses electromagnetic induction. People refer to this design as "ribbons". A thin (usually) corrugated ribbon of metal foil is used as diaphragm again suspended in a magnetic field, inducing a voltage whose pattern is analogous to the original acoustic sound wave's as above. In older ribbon designs, the ribbon material itself was extremely fragile, making these mics more suitable for studio use than live. Ribbon microphones are not widely used today, except in music recording and for the speaking voice. They are more expensive than many moving-coilmics and have to be handled with care particularly when it comes with loud sound levels. Recently developed ribbon microphone technology is the active ribbon microphone which uses an amplifier system that requires phantom power. Phantom power is a method of remotely powering an amplifier or impedance converter by sending voltage along the audio cable.

Among the advantages of the active ribbon microphone over conventional ribbons are higher output and sensitivity, wider and flatter frequency response and the ability to handle higher sound levels before distortion (Alten: 1981)

Performance Characteristics

Microphones have their individualistic approach for a particular application. Moving-coil microphones are rugged, generate low self-noise, tend to be less susceptible to humidity and wide temperature variations and handle high sound pressure levels without distortion. They are usually less expensive than the other professional types and come in a wide variety of makes and models. The element of a moving-coil mic has more mass than that of a ribbon of capacitor microphone and, therefore, has greater inertia in responding to sound variations. This results in a slower response to transients sounds that begin with a quick attack, such as a drum hit, breaking glass, and then quickly decay. Ribbon microphones are not widely used today, except in music recording and for the speaking voice. They are more expensive than many moving coil mics and have to be handled with care, particularly when it comes to loud sound levels. Ribbon mics generally have low self-noise, but they also have the lowest output level of the three major types. This means a power signal-to-noise ratio if the mic is too far from the sound source or if the cable runs us too long. Capacitor microphones are highly-performance instruments. They reproduce clear, airy, detailed sound and are the choice among professional-quality microphones when it is necessary to record sounds rich in harmonics and overtones. Capacitor mics have high sensitivity, which make them the preferred choice for distant miking: high-end response is not hampered by extended mic-to-source distances. The capacitor microphones are generally more expensive than moving coil and ribbon microphones.

Behavioural Characteristics

The way in which a microphone responds to sound in the air around it is expressed as the mic's pattern. This describes the microphone's sensitivity to sound coming at it from the front, sides and rear of the diaphragm-in other words, the microphones directional characteristics.

Microphones Has Three Basic Directional Characteristics

A. Omni-directional: the mic responds with equal sensitivity to sounds from all directions (front, rear, sides).
B. Bi-directional: the mic is sensitive to sounds from the front and rear (0^0 and 180^0 respectively) but rejects bounds from sides within 90^0-270^0.
C. Uni-directional: the mic is primarily sensitive to sounds from one direction (cardioids, super-cardioids, and hyper-cardioids) and rejects sounds from the rear.

As mentioned earlier, an omni-directional mic which picks up sounds from everywhere consists of a disc-shaped diaphragm in a sealed enclosure, open only at the front. That means all sound is picked up by direct pressure on the (front of the) diaphragm. Omnimics can be referred to as pressure mics. When sound waves from the side (90^0-270^0) strike, both sides of the diaphragm at the same time resulting in equal but opposite pressure on the front and rear, the sounds from the sides will be cancelled, that is to say that the mic therefore picks up sound waves from the front and rear and rejects sound from the side, this is a pressure gradient design, also known as a bi-directional mic. The microphone that falls under this category is condenser microphone and are mostly used for choir applications, they are generally more capable of flat, wide-range frequency response rather than one microphone per sound source the object is to pick up multiple sound sources (or a "large" sound source) for one microphone picking

up a typical choir, the suggested placement is a few feet in front of, and a few feet above, the heads of the first row, it should be centred in front of the choir and aimed at the last low. A cardioids microphone can cover up to 15-20 voices, arranged in a rectangular or wedge-shaped section, for larger or unusually shaped choirs, it may be necessary to use more than one microphone.

Uni-Directional

Unidirectional comes into play where a more restricted pick up characteristics would be desirable. Sound waves arriving at the rear of the diaphragm are delayed, usually by rear entry ports (acoustic chambers) in the body of the mic. This delays the arrival of a sound wave relative to its arrival at the front of the diaphragm-in other words it puts the sound coming in at the rear out of phase with the same sound coming in at the front. This type of mic is very sensitive to the sound coming from the front, and which rejects sounds from the rear. When the pattern of this kind of unidirectional design is plotted, it looks like a heart shape and so is commonly referred to as a cardioids pattern from the latin word for "heart". This type of mic can be used in mixing a bass drum since it has its concentration in the front. Also close mixing guitar cups, drum kits, close on trumpet bells.

Vocal Mixing Techniques

Some singers, even professional find it very hard to perform with microphones especially during live recording or performance. These bad techniques often times result in some fantastic voices being over looked due to poor sound quality.

Things to Bear in Mind While Handling the Microphone

1. Pointing the microphone towards a speaker when you are two close causes a high pitched noise called FEEDBACK.
2. Aiming the volumes too high will cause FEEDBACK and DISTORTION.
3. Holding the microphone too close or too far from your mouth. This results in your singing sounding multiple and distorted.

Set your volume controls so that the backing track is lower than your singing. To avoiding, ensure the mic is held no closer than 2 to 3 inches from your mouth during normal singing. Also, when aiming for high notes, avoid moving the microphone closer to your mouth. Furthermore, point the mic at about a 45 degree angle above; below; or to the side of the performer's mouth, depending on the mic's pick up pattern'. Cardioidsmics are best suited for this. Ideally, hand held mic should be positioned 6 to 12 inches from the performers mouth at an angle of 45 degrees or less. Positioning the microphone at the angle of about 90 degrees may result in popping sounds when consonants like P and T are pronounced.

Snare Drum

Use a capacitor mic which makes snare to sound richer or crisper or moving coil mic that tends to give it a harder edge in mixing the snare drum. Point your mic 6 to 10 inches from the drum head and aim the mic so that its pick up pattern is split between the head and side of the drum.

Bass Drums

This drum purpose in most music is to provide transient, low-frequency energy burst that help establish the primary rhythmic pattern of a song.The kick drum's energy is primarily focused in two areas:low-end timbre and "attack". Although this varies by individual drum, the attack tends to be in the 2.5-5khz range.

Tom Tom

The kick and snare establish the low and high rhythmic functions the toms are multiple drums that will be tuned from high to low between the snare and kick. They are primarily used for fills during performance, but may also be consistent parts of the rhythmic structure. The attack range is similar to snare drum, but often with more sustain. An individual directional mic on the top head near edge can be used on each drum and panned to create some spatial image.

Hi Hat Cymbal

the hi-hat cymbal produces too sounds; a clap and shimmer; depending on how important these accents are to the music, the hi-hat can either can either share the snare drum's mic or have a microphone of its own. If it shares, place the mic between the hi-hat and snare and adjust the sound balance through mic placement. If your miking only the hi-hat place the mic at the edge of the hi-hat to produce a brighter sound.

Acoustic Guitar

When recording an acoustic guitar, place your microphone about 6 inches above the bridge and even within the front of the guitar brightens the natural sound of the instrument. Aiming a microphone at the centre of the guitar hole 2 to 3 feet away produces a sound with balanced highs, middles, and lows.

Congas This is a special instrument in Africa, miking such an instrument that has its sound concentration both in the middle and at the edge of the instrument would require a special skill in the sense that the instrument is play with the expression of the body as part of its skill. Miking the instrument from top may engage the player and microphone in a "fight" but not that a good result may not be achieved miking from the top, but to achieve a more desirable result, is preferably good to mic beneath the instrument.

Conclusion

Trying to exhaust the microphone technique of all the instruments may not be possible in this discourse as we have numerous musical instruments. The basic thing or aim of this work is to create consciousness in the use of microphones especially in the vocal technique. We should also bear in mind that mixing something that makes sound; use a microphone with a frequency response that is suited to the frequency range of the sound, if possible, or filter out frequencies above and or below the highest and lowest frequencies of the sound.

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