

Discussion on Sound Pickup and Post-Production Techniques for Recording (Postprint)

Authors: Wu Junsheng

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Abstract

In the vast world, sound is ubiquitous, and sounds of various frequencies evoke different sensations and associations in human auditory perception. The task of recording professionals is to capture these different frequency sounds through microphones and recorders, and to perfectly blend various sounds. In daily life, we are often captivated by the pleasant and melodious sounds in radio programs and films; in fact, such effects are inseparable from sound pickup techniques and post-production processing. Sound quality is influenced by multiple factors and is closely related to microphone pickup in recording studios, program post-production, and signal transmission. To improve audio recording quality, interference from external environmental sounds must be minimized to create a suitable environment for the recording process. Simultaneously, issues arising from microphone sound pickup during recording must be addressed, and the recorded sound should be aesthetically processed in post-production through hardware equipment or audio software, thereby obtaining high-quality recording works. This paper analyzes the technical key points in the recording pickup process and post-production.

Full Text

Abstract

In our vast world, sound is omnipresent, and different frequencies produce distinct auditory sensations and associations. The work of recording professionals involves capturing these varied frequencies through microphones and recording devices, and seamlessly blending them into a cohesive whole. In daily life, we are often captivated by the pleasant and melodious sounds in radio programs and films—an effect achieved through meticulous microphone pickup techniques and post-production processing. Sound quality is influenced by multiple factors, including microphone pickup in the studio, post-production, and signal transmission. To enhance recording quality, external environmental interference must be

minimized to create an optimal recording environment. Simultaneously, issues arising during microphone pickup must be addressed, and the recorded sound refined through hardware equipment or audio software. Only through this comprehensive approach can superior-quality recordings be produced. This paper analyzes the technical essentials of microphone pickup and post-production in recording.

Introduction

Broadcast recordings are a constant presence in our lives, accessed through car radios, the internet, mobile phones, and other electronic devices. We are frequently moved by the compelling audio quality, which requires not only a solid vocal foundation from the announcer but also the elimination of external noise interference. During recording, noise must be reduced to the lowest possible level while capturing the announcer's voice through various recording devices. Announcers must also attend to numerous details, such as avoiding breath sounds and paper rustling, and maintaining proper distance from the microphone. These considerations are prerequisites for optimal recording. Beyond recording, meticulous post-processing is essential to remove residual noise and adjust pitch and timbre, thereby enhancing the recording's impact. Both pickup techniques and post-production are indispensable, and only their perfect integration can yield broadcast recordings of exceptional quality.

1. Key Technical Aspects of Microphone Pickup

Audio processing comprises two stages: acquisition and post-production. While post-production plays a significant role, the initial pickup stage is paramount—without it, superior sound cannot be achieved. The pickup process is crucial for audio reinterpretation and quality. For speech programs, pickup demands clear articulation, high intelligibility, pure sound quality, pleasing timbre, appropriate spatiality, and vivid environmental presence. For music programs, pickup requires continuous sound image distribution, clear localization, appropriate width and depth, and authentic, dynamic spatiality. The processing must be appropriate, with smooth quality transitions and dynamic range consistent with the original work, forming a unified whole. The following sections examine the technical details of the pickup process.

1.1 Pre-Recording Content and Format Familiarization

To achieve optimal pickup results, the general content should be understood before recording. This understanding facilitates better process control and more rational scheduling of time and venue. Additionally, it enables effective communication with relevant personnel, allowing insight into their speaking habits and the development of appropriate recording strategies. For music recording, advance knowledge of content and format is particularly critical. Familiarity with recording content and characteristics enables better preparation.

1.2 Proper Microphone Selection and Usage

Microphones are essential recording tools, and their proper use is particularly important. Different microphones exhibit varying frequency responses, resulting in distinct tonal characteristics. Microphone selection should be based on the announcer's vocal features or the musical work's requirements. The environment's characteristics must be authentically reproduced to create an immersive experience for the audience. Therefore, details regarding microphone selection and usage must be thoroughly understood beforehand.

1.2.1 Indoor Pickup: Determining Appropriate Distance and Angle

Distance directly affects sound clarity and the ratio of direct to reverberant sound, while angle influences timbre. For speech pickup, the typical microphone distance is 20-30 cm, though this must be adjusted according to the room's reverberation time. The ratio of direct to reverberant sound must be carefully controlled: longer reverberation times require closer placement, while shorter times permit greater distance. Additionally, pickup distance relates to microphone directionality, requiring adjustment based on the specific polar pattern. Generally, pickup distance should not be excessively close (except for special requirements). For live hosting scenarios, careful control of mouth-to-microphone distance and angle is necessary to avoid "popping" and audible breath intake.

1.2.2 Outdoor Recording: Preventing Overload Distortion and Noise

Outdoor pickup requires thorough equipment inspection and proper gear preparation. When encountering excessively loud sounds, small pre-prepared attenuators can be used to prevent recorder input overload and distortion. The relationship between desired signal and noise must also be considered. To prevent masking by ambient noise, microphone distance from the sound source should be optimized to reduce unwanted noise—for example, by positioning microphones away from noise sources or using sound-absorbing materials for isolation. Wind protection measures, such as windscreens, should be employed to minimize environmental impact.

1.3 Selecting Appropriate Recording Methods Based on Program Requirements

The recording venue must authentically reflect environmental characteristics. Unlike live performance, recording artistry allows freer and more rational utilization of halls and sound as "materials." To achieve superior recordings, different recording methods must be selected according to program type, with appropriate microphones chosen accordingly. Professional pickup employs three primary approaches: single-point pickup, main microphone, and multi-track pickup, as well as stereo techniques such as AB, M-S, and X-Y configurations.

2. Technical Essentials of Program Production and Mixing

The recording process aims to capture optimal source material for post-production, which further enhances sound through audio software plugins and hardware processing devices. Post-production primarily encompasses three aspects: music scoring, noise reduction, and frequency compensation.

2.1 Music Scoring and Recording Integration

Music scoring is a common post-production technique. It can shift time and space, transition scenes, and enhance artistic and aesthetic impact. It also renders atmosphere and emotion, strengthening emotional and artistic resonance. Additionally, scoring adjusts speech tempo and rhythm, maintaining auditory consistency by bridging linguistic pauses. However, music selection must not be arbitrary. First, emotional expression must be unified between musical language and program text. Second, narrative rhythm must be harmonious. Finally, configuration must be balanced and appropriate—scoring enhances programs where needed but becomes superfluous where unnecessary, requiring careful consideration from producers.

2.2 Noise Reduction in Program Production

Noise reduction is a critical aspect of recording. Even with excellent on-site control, noise issues inevitably arise, significantly affecting results. Noise encompasses not only external interference but also any unwanted elements within the recording. Any sound substantially impacting the work requires post-production treatment. Noise reduction primarily utilizes compression, expansion, and noise gating functions in digital mixing consoles, along with powerful noise reduction software in audio workstations, effectively eliminating environmental and background noise in speech and interview recordings. In music production, noise reduction is particularly evident, as background music is often prominent and performers may exhibit tonal variations. Post-production noise reduction creates more comfortable sound while removing interference from background music.

2.3 Frequency Compensation for Sound Processing

Frequency compensation involves boosting or attenuating specific frequency components as required, improving program signal quality and speech intelligibility to beautify sound. It can enhance quality, create special effects, increase presence, compensate for frequency response deficiencies, and reduce noise and microphone placement issues. For example, when speech signals exhibit sibilance or sound thin and dull, an equalizer can attenuate high frequencies around 6–8 kHz to eliminate sibilance while boosting low frequencies around 100 Hz and mid frequencies around 2 kHz to enhance fullness and brightness. Processed sound shows marked improvement in clarity, fullness, roundness, authenticity, and balance.

Conclusion

Producing high-quality broadcast recordings requires three elements: selecting optimal sound sources (announcers or ensembles), avoiding recording issues through meticulous attention to detail, and applying technical processing for beautification. Only through this comprehensive approach can superior broadcast recordings be achieved. It is hoped that continuous breakthroughs in recording technology will provide ever-improving listening experiences.

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Author Affiliation: Anhui Radio and Television Station

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