Postprint: Research on the Application of Audio Processing Technology in Medium Wave Relay Stations

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Abstract

For signal processing and transmission operations in medium wave broadcast relay stations, audio processing technology constitutes a critical core technical methodology. Technical personnel at relay stations must appropriately select and utilize audio processing techniques to ensure that broadcast relay signals achieve clear and complete effects, reduce processing and transmission costs for medium wave relay stations, and optimize the listening experience of broadcast programs. Therefore, this paper focuses on exploring the key application points of audio processing technology in the daily practical operations of medium wave relay stations, aiming to rationally improve and innovate technical methods and means.

Full Text

Preamble

Research on the Application of Audio Processing Technology in Medium Wave Relay Stations

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Abstract: Audio processing technology represents a critical core technical means for signal processing and transmission in medium wave relay stations. Technicians at relay stations must properly select and employ audio processing methods to ensure broadcast relay data signals achieve clarity and integrity, reduce processing and transmission costs, and optimize the audience listening experience. This paper focuses on examining the key application points of audio

processing technology in the daily operational practice of medium wave relay stations, with the aim of reasonably improving and innovating technical methods and means.

Keywords: audio processing technology; medium wave relay station; pulse width modulation; audio transmission; signal feedback processing

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1. Fundamental Concepts and Characteristics of Audio Processing Technology

Audio processing technology fundamentally involves broadcast technicians using specialized processing equipment to convert original audio signals into broadcast audio signals with specific formats, which are then transmitted as processed program content. In recent years, the audio data screening and processing methods employed by medium wave relay stations have undergone continuous optimization and renewal. When technical operators at relay stations make appropriate selections of audio processing modes, they can strictly ensure the content integrity of broadcast audio data and effectively avoid the transmission consequences of distorted broadcast audio.

The essence of audio processing technology lies in radio station technical personnel implementing audio processing procedures through professional means of signal conversion and data transmission, transforming original audio signal formats and transmitting broadcast program content according to specific audio conversion data formats. Consequently, audio processing technology must fundamentally be established on the premise of specialized processing and conversion equipment. Broadcast technicians must ensure complete transmission of converted audio signal data to prevent errors during the audio data transmission process.

Current audio processing technology primarily demonstrates technical advantages in real-time performance, precision, and efficiency. Medium wave relay stations constitute important media platforms for transmitting and processing massive amounts of broadcast signal data, as the comprehensive transmission and screening processes of broadcast signals must rely on audio processing methods. In recent years, digital instrument technologies have been integrated into broadcast signal processing practices, demonstrating the significant transformational impact of information technology on audio processing. On the basis of

integrating and screening broadcast audio signals, professional technicians at medium wave relay stations should be able to fully ensure audio signal clarity and effectively prevent the occurrence of audio signal distortion during relay transmission.

In recent years, network-intelligent modern processing technologies have been comprehensively integrated into the field of broadcast audio processing practice. The analog conversion process of broadcast audio signals benefits from the support of network-modernized information technology media, thus becoming more advantageous for relaying real-time broadcast program content. However, simultaneously, information-based audio relay processing methods also increase the security risks of broadcast audio data distortion and may even cause the loss of important data information from radio and television stations. Therefore, audio processing technical operators at medium wave relay stations currently need to establish complete audio processing databases, using network databases as important carriers to preserve broadcast audio information and comprehensively enhance security maintenance and supervision efforts for broadcast audio data. The important function of digital medium wave transmitters is to accurately transmit complete data signal content, combining digital network technology to ensure data clarity of broadcast signals and strictly guarantee broadcast signal data transmission quality. At present, digital medium wave transmitter systems increasingly demonstrate obvious technical practice advantages, as digital transmitters comprehensively improve the safe use performance of noise signal filtering.

2.1 Ensuring Signal Transmission Clarity

The key responsibility of medium wave relay stations lies in accurately and completely transmitting medium wave broadcast signals, ensuring that converted medium wave broadcast data can meet clarity indicators. Audio processing methods with intelligent and automated advantages can help radio station personnel aggregate massive audio processing resources and ensure data integrity through audio simulation network technology methods. The important mission of radio and television stations is to transmit mainstream value concepts and completely send and disseminate the real data content of broadcast news. To ensure that broadcast news signal quality reaches optimal standards, the key technical means at present should be reflected in the correct selection and application of audio processing technology. During the comprehensive transmission and emission operation process of broadcast medium wave signals, various environmental factors and human operation factors will bring obvious operational interference to broadcast emission devices. Medium wave emission system devices with digital characteristics include the function of automatically filtering interference waves and external environmental noise, effectively ensuring the transmission and sending quality of medium wave signals. Therefore, to ensure that broadcast data transmission sound quality meets standards, the key is to actively introduce digital emission systems to promote the improvement of

anti-interference performance in emission signals.

Each operational link in the process of transmitting broadcast signals must ensure the removal of external factor interference, which critically involves lightning interference, strong wind climate interference, rain and snow climate interference, etc. In addition to program transmission data interference phenomena caused by natural climate, incorrect manual operation behaviors at broadcast stations also increase signal distortion transmission risks. Under the important technical support influence of audio processing, relay station technicians can timely identify and judge distortion risk factors, ensuring that relay station personnel can implement necessary processing before signal emission and strictly ensuring the integrity of transmitted medium wave broadcast programs. For example, filter amplifier circuits can help relay station technicians achieve the goal of comprehensively filtering broadcast signal noise and play a non-negligible role in increasing the integrity and clarity of broadcast transmission data.

2.2 Reducing Technical Processing Costs of Medium Wave Relay Stations

Whether the data signal processing costs of medium wave relay stations can be maximally saved directly determines the comprehensive implementation benefits of the entire audio processing process. Intelligent audio processing methods can help broadcast technicians accurately distinguish various audio data signals and achieve the purpose of accurate resolution and judgment for broadcast audio data with similar frequencies. Against the current background, modernized audio processing technical means have gained universal recognition from radio station personnel because audio processing methods help reduce technical processing costs and reasonably save signal relay processing resources for medium wave relay stations. The data information dissemination processing costs of medium wave relay stations mainly include labor costs, material facility costs, time costs, etc. Audio processing technical methods can achieve good effects in simulating and converting original broadcast data signals, helping medium wave relay stations achieve optimal cost-benefit objectives. Simultaneously, intelligent audio conversion processing methods can also help broadcast station technicians save more labor costs and prevent technical operators from making processing errors due to coping with massive data information.

Under the original medium wave signal transmission and processing mode, operation technicians at broadcast emission stations had to use manual methods to control the medium wave emission process. The new signal emission processing mode relying on audio processing equipment can achieve important goals such as saving operation time, reducing manual operation costs, and improving system economic benefits, fully demonstrating the functions and advantages of the medium wave emission network information system. Digital medium wave emission devices generally include radio frequency systems, audio modulation systems, and automated detection control systems, all of which constitute key signal transmission devices. When technical personnel at radio and television

stations operate digital instruments, they can use quick technical methods to operate medium wave broadcast emission devices, which also helps broadcast technicians detect abnormal data signals in medium wave emission at any time. To ensure safe and efficient digital signal sending and processing effects, broadcast emission department personnel should focus on implementing comprehensive transformation and processing of existing digital systems to reduce the system operation burden of medium wave emission devices. Currently, with the guarantee and promotion of audio processing methods, the operation costs of medium wave broadcast signal emission systems can be comprehensively controlled.

2.3 Optimizing Audience Experience of Broadcast Programs

The audience experience effect of broadcast programs is mainly determined by audio processing effects. If medium wave relay stations want to provide more guarantees for the overall broadcast quality of relayed programs, the most fundamental prerequisite is optimizing the broadcast audience experience. Audio processing methods constitute important processing methods for broadcast relay data, and technical methods of audio analog processing can promote broadcast media audiences to obtain clearer and more accurate signal listening experiences, while avoiding external environmental interference when medium wave relay stations transmit broadcast program signals. From the current perspective, most audience groups of broadcast programs are no longer simply satisfied with listening to broadcast signal content but require more accurate and clear audio transmission effects to ensure real-time reception of broadcast program content. Audio processing technology can fundamentally meet the above various levels of demands from broadcast audience groups and therefore has a significant guarantee effect on comprehensively optimizing the emotional experience of broadcast program audiences.

Audio processing software can be divided into many types, and management personnel of medium wave relay stations must make accurate and reasonable selections for different specifications and types of audio processing software. Simultaneously, audio processing software has different audio simulation parameter indicators, and technicians should fully master the different technical indicators of audio signal conversion and processing to implement corresponding adjustments and changes using flexible technical methods. When technical personnel at medium wave relay stations accurately apply audio processing methods, they should be able to significantly reduce the probability of broadcast data distortion phenomena.

3. Specific Application Points of Audio Processing Technology in Medium Wave Relay Stations

Audio processing software should perform analog conversion operations on the original data content of broadcast audio, then conduct comprehensive screening

operations on the analog-converted audio data materials to collect broadcast transmission signals on various channel frequencies. By completing the above processes of broadcast data simulation, data conversion, and data integration transmission, the audio software processing system can achieve the purpose of comprehensively removing broadcast program noise and completely collecting multi-channel broadcast audio signals. From the perspective of current operational practice at medium wave relay stations, correctly applying technical measures and means of audio processing should be reflected in the following key points:

3.1 Pulse Width Modulation Technology

The key points of pulse width modulation technology should be reflected in accurately controlling signal gain and signal attenuation amplitude, using information-based and intelligent instrument technical means to achieve the above goals. With the cooperation of positive feedback technology methods, broadcast technicians at relay stations can fully demonstrate the best practical effects of pulse width modulation and fully maintain the data accuracy of broadcast signals. In recent years, important relay processing signal technologies of pulse width modulation have been gradually innovated.

Medium wave relay stations should be equipped with specialized pulse width modulation instrument systems to closely monitor whether relay transmission signals can meet basic standard requirements such as sound smoothness effects, signal transmission levels, and gain attenuation amplitude. In certain situations, if relay station technicians need to achieve the technical operation goal of separating peak limiters, they must ensure short system reaction time and fast response speed. Technical operators at relay stations should optimize pulse width modulation parameters and achieve accurate control of signal transmission frequency by improving various pulse width modulation parameter indicators, effectively avoiding broadcast data content distortion phenomena at relay stations.

Audio processing devices are not limited to single broadcast signal emission sources but include system signal sources with multiple paths. At present, digital broadcast emission processing technology with multi-source signals is being widely applied in the medium wave broadcast emission processing process, demonstrating the practical advantages of multi-source signal technology application. Broadcast data collection, information reception, data transmission monitoring, and picture surveillance modules based on multi-source signals can achieve independent operation status, effectively preventing mutual interference among various device modules. Audio processing devices with intelligent characteristics have added real-time data acquisition and monitoring functions, which can effectively ensure that central control equipment meets safe use standards. Broadcast data signals can achieve clear and complete transmission effects through multi-path system signal source networks.

3.2 Audio Transmission Technology

Medium wave relay stations should ensure safe transmission effects for broadcast signal content requiring relay operation processing. However, during the entire process of transmitting medium wave relay signals, certain spatial environmental factors, human operation factors, and system-inherent factors will obviously interfere with the medium wave relay processing process. Therefore, technical personnel at relay stations should actively explore new technical means of audio transmission to fully ensure real-time and accurate monitoring of audio processing effects and implement comprehensive adjustment operations on medium wave signal data with distortion risks and hidden dangers. Thus, audio transmission technology occupies an important position in the field of audio processing practice.

Relevant responsible personnel at medium wave relay stations must strictly guarantee audio transmission quality, and the key technical means is to optimize transmission media carriers. Under current conditions, fiber optic transmission media have been widely applied in the audio transmission field. Fiber optic transmission media themselves have important practical application advantages such as light weight, good transmission timeliness, and strong signal integrity, making them worthy of popularization and promotion in the business implementation process of medium wave relay stations. Specific staff members at medium wave relay stations should correctly operate and use signal separators, fully relying on signal separators to complete the goal of separating various types of medium wave data signals and strictly ensuring the stability and security of sending and transmitting broadcast program information.

3.3 Signal Feedback Processing Technology

Signal feedback processing methods have significant impacts on controlling audio signal quality, reducing audio signal attenuation amplitude, and ensuring audio data integrity. Current signal feedback processing methods have been obviously improved. Technical personnel at medium wave relay stations should ensure that feedback processing devices achieve safe transmission and sending signal effects and correctly use signal feedback reception processing mechanisms. In recent years, many regional medium wave relay stations have been committed to the comprehensive construction of semiconductor material relay signal circuit systems, effectively ensuring that semiconductor materials can achieve faster signal feedback speeds and effectively eliminating delay transmission defects in medium wave relay.

In addition, management responsible personnel at medium wave relay stations should attach importance to lightning protection safety device facilities to ensure that broadcast audio sending, conversion, and transmission processes are not affected by lightning interference. Natural climate disasters will directly impact the sending and processing process of medium wave transmission. Based on this, technical implementation personnel at medium wave relay stations must deeply

recognize the necessity of lightning protection device improvement and optimization, relying on specialized lightning protection devices to assist in completing audio processing and effectively safeguarding the medium wave relay sending process.

Note: Figure translations are in progress. See original paper for figures.