

On the Maintenance and Management of Broadcasting Technology (Postprint)

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Abstract

With the rapid development of China's social economy and continuous advancement of science and technology, the radio and television industry is gradually trending toward convergence in the new media era. In recent years, the development of the radio and television industry has been facing pressures and challenges. Therefore, conducting maintenance and management of radio and television technology is crucial, as this is conducive to improving broadcast quality and further promoting the efficient development of the television media industry. However, due to the complexity of radio and television technology and the numerous factors affecting safe broadcasting, effective maintenance and management require more effective measures. In view of this, this paper primarily analyzes the radio and television wireless transmitters currently employed in the operations of radio and television broadcasting institutions and proposes specific management and maintenance measures. It explores the factors affecting the security of radio and television transmission signals at wireless transmitting stations and puts forward effective strategies for strengthening the maintenance and management level of radio and television technology, aiming to improve television broadcast quality and achieve stable development of the television media industry.

Full Text

A Brief Discussion on Broadcasting Television Technology Maintenance and Management

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Abstract: With the rapid development of China's social economy and continuous advancement of science and technology, the broadcasting and television

industry is gradually converging in the new media era. In recent years, the development of the broadcasting and television industry has faced pressures and challenges. Therefore, conducting maintenance and management of broadcasting and television technology is crucial, as it helps improve broadcast quality and further promotes the efficient development of the television media industry. However, due to the complexity of broadcasting and television technology and the numerous factors affecting safe broadcasting, effective measures are required for proper maintenance and management. In view of this, this paper primarily analyzes the broadcasting and television wireless transmitters currently used in broadcasting institutions' operations, proposes specific management and maintenance measures, explores factors affecting the safety of broadcasting signal transmission at wireless transmitter stations, and puts forward effective strategies to strengthen broadcasting and television technology maintenance and management, aiming to improve television broadcast quality and achieve stable development of the television media industry.

Keywords: broadcasting television technology; wireless transmitter; maintenance; management; maintenance inspection

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Broadcasting and television serve as crucial media for social information transmission, playing a significant role in improving people's quality of life and enriching daily experiences. Simultaneously, broadcasting and television constitute an essential component of China's infrastructure development, contributing to national economic progress to a certain extent. In the current new media era, broadcasting and television technology faces higher demands. Strengthening maintenance and management ensures safe television program broadcasting and provides better broadcasting services to the public. Accordingly, personnel at broadcasting institutions should thoroughly master broadcasting and television technology, analyze factors affecting safe broadcasting based on actual conditions, and propose effective maintenance and management strategies to promote the healthy development of the broadcasting and television industry.

1. Wireless Digital Transmitters at Broadcasting Television Transmitter Stations

With scientific and technological progress, broadcasting television transmitter stations have essentially implemented wireless digital transmitter operation to provide stable and secure television program broadcasting services. The output

power of wireless digital transmitters varies significantly across different stations, requiring higher standards for their management and maintenance to provide listeners with multi-channel services. Meanwhile, ensuring satisfactory broadcasting reception effects necessitates advanced broadcasting television technology as support, while operational procedures for wireless digital transmitters continue to evolve. Currently, management and maintenance measures for wireless digital transmitters in China are implemented according to the latest standards to ensure normal display of frequency, power, reflected power, amplifier current and voltage, and amplifier temperature, thereby guaranteeing normal service and operation of FM radio, digital television, and front-end links.

2.1 Strengthening Daily Management and Preventive Maintenance of Transmitters

Wireless transmitters are critical components for implementing broadcasting television technology. Malfunctions in transmitters can create safety hazards throughout wireless transmission systems. Therefore, practical management and maintenance should emphasize daily management and preventive maintenance of transmitters to ensure normal front-end link operation and extend transmitter service life. Accordingly, relevant management and maintenance personnel should implement routine preventive measures, maintain transmitter cleanliness and dryness, improve panel sensitivity, and avoid direct exposure to intense light. They should also regularly inspect air-cooling systems and promptly clean debris from chassis. Additionally, front-end link maintenance requires attention, checking equipment operating status based on original device data, monitoring variations in input, output, incident, and reflected signals to ensure stable transmitter operation and establish a solid foundation for wireless broadcasting television technology.

2.2 Solving Heat Dissipation Problems in Wireless Transmitters

For wireless broadcasting television transmitters, the final-stage power amplifier represents the core component and primary heat generation source. However, excessive heat significantly degrades component performance and service life, potentially causing component damage. Therefore, addressing heat dissipation is crucial for ensuring orderly broadcasting television technology implementation [1]. Relevant management and maintenance personnel must strengthen management of transmitter work areas, ensure timely ventilation and dust removal in equipment rooms, and reasonably control room temperature. Since prolonged operation in humid environments can impair wireless broadcasting television technology functionality, personnel must regularly conduct dehumidification operations.

2.3 Maintenance During Operation

During wireless broadcasting television transmitter operation, maintenance personnel must perform effective supervision and inspection. They should maintain

detailed records while equipment is working, check for unusual odors or sounds, and monitor front-end link data input and output. Additionally, scientific maintenance measures should be implemented during transmitter startup and shutdown [2]. For instance, personnel should verify button positions and check for indicator light failures. After transmitter shutdown, focus should be placed on replacing high-frequency components inside the wireless broadcasting television transmitter. If sparking phenomena occur, immediate effective measures must be taken to ensure stable and safe transmitter operation.

2.4 Regular Inspection and Maintenance

Maintenance of wireless broadcasting television transmitters should emphasize ongoing inspection and examination during operation. Maintenance personnel should regularly conduct safety transmission meetings, focusing on equipment operation and front-end link security to summarize and evaluate maintenance work. Departments should also establish refined broadcasting television technology maintenance and inspection systems, implementing daily, weekly, monthly, quarterly, and annual equipment inspections [3]. Maintenance should prioritize checking contact conditions of fuses and fuse holders, comprehensively maintain relays and fans, and finally conduct comprehensive testing of all transmitter indicators and front-end links to ensure effective transmission of FM radio and digital television signals.

Furthermore, several additional considerations apply to wireless broadcasting television transmitter maintenance. First, personnel must meticulously record all maintenance data to provide references for future broadcasting television technology management and maintenance, generally using data recording to promote technology development and innovation. Second, if identical failures occur at the same location during different management periods, this indicates inadequate broadcasting television technology maintenance [4]. Therefore, personnel must thoroughly understand failure causes and implement fundamental maintenance solutions to address specific problems.

3. Factors Affecting Safety of Wireless Transmitter Station Broadcasting Signal Transmission

Broadcasting television technology serves as a key measure for ensuring safe television program broadcasting, maintaining stable broadcasting television system platform operation, and achieving secure, reliable, continuous data and signal transmission while preventing tampering and interference. Based on current broadcasting television technology applications and front-end link characteristics, primary factors affecting safe broadcasting include human factors, equipment factors, and information factors.

3.1 Human Factors

During broadcasting television technology implementation, technical personnel must implement appropriate safety protection measures for entire systems, particularly comprehensive equipment repair and management. This requires technicians to strengthen safety and quality awareness. However, in current maintenance management practices at many broadcasting institutions, some technical personnel lack adequate safe broadcasting awareness and understanding of safety management regulations and standardized work procedures. This results in unclear broadcasting technology management rules and inconsistent work standard implementation, affecting maintenance management effectiveness [5]. For example, at certain broadcasting institutions, staff business operations that fail to prioritize maintenance management can cause broadcasting technology problems and failure hazards that seriously affect program broadcasting safety, such as untimely or incomplete equipment maintenance, lack of proactive inspection awareness, low work enthusiasm, and neglect of critical equipment or line monitoring.

3.2 Equipment Factors

As the broadcasting television industry continuously develops, system equipment increasingly trends toward automation and precision. During prolonged continuous operation, various failures may occur, such as component aging and wear, significantly hindering broadcasting television technology implementation and severely affecting front-end links, thereby degrading FM radio and digital television signal transmission quality. Maintenance management of technical equipment such as network broadcasting systems, optical transceivers, wireless routers, and set-top boxes is crucial for safe broadcasting. However, many broadcasting institutions still have significant equipment management problems. For instance, some institutions lack daily equipment maintenance and inspection during operation, often failing to detect and address equipment hazards promptly. This easily creates broadcasting risks that affect service quality and negatively impact television media development.

3.3 Information Factors

During broadcasting television system operation, comprehensive and strict information control is required to ensure normal and accurate broadcasting. Broadcast content must comply with relevant Chinese media industry requirements, with television programs being positive and aligned with socialist core values. Simultaneously, to enrich audience viewing experiences, information product formats should be diversified to create innovative broadcasting structures, eliminating vulgar content and erroneous ideology dissemination while emphasizing broadcasting safety. Therefore, broadcasting institutions must fully utilize broadcasting television technology to ensure security at the technical level, enabling efficient transmission of broadcasting signals through authorized equipment. This process involves security protocols and a series of regulatory provi-

sions to ensure transmitted signals meet requirements and achieve broadcasting purposes [6].

Once problems exist in front-end links of wireless broadcasting television transmission systems, illegal devices may steal signals during transmission, enabling pirated broadcasting, unauthorized insertion, or content tampering, seriously jeopardizing broadcasting television technology implementation and affecting broadcast quality. For example, in recent years, when television media broadcast popular dramas, some criminals exploited security maintenance vulnerabilities in broadcasting television technology to steal information resources for online sale, harming normal program broadcasting. Consequently, strengthening broadcasting television technology maintenance and management is essential.

4. Strategies for Strengthening Broadcasting Television Technology Maintenance and Management

4.1 Strengthening Education and Training for Maintenance and Management Personnel

In conducting broadcasting television technology maintenance and management, priority should be given to personnel education and training to fundamentally improve technology application levels and more efficiently and accurately address various broadcasting failures and hazards. Broadcasting institutions should actively implement training programs to enhance personnel awareness of maintenance management importance, clarify responsibilities, and establish effective coordination and division of labor mechanisms. For example, one broadcasting institution conducted comprehensive training activities covering electrical principles, basic electrical knowledge, television equipment room maintenance projects, and microwave power technology maintenance management, comprehensively improving technical personnel's maintenance and repair capabilities to ensure effective equipment failure handling and orderly execution of various technical maintenance tasks. Additionally, broadcasting institutions should provide favorable learning environments and opportunities for technical personnel to flexibly apply broadcasting television technology in practical work.

At this institution's comprehensive channel broadcasting, technicians discovered television transmitter image signal interruptions and abnormal picture interference. After detection and professional judgment based on work experience, they identified a clamp amplifier box failure. Technical maintenance and management personnel replaced a 100uf/25v capacitor, but other components showed no faults and problems persisted. Combining training knowledge with in-depth detection, the institution's technical maintenance personnel used an electrical demodulator to check modulation units and monitor correction and transmission unit conditions. The failure recurred around 10 PM, intermittently appearing with severe image ghosting. Technicians immediately implemented maintenance measures based on clamp amplifier capacitor adjustment requirements and other exciter box operating curve adjustments. They discovered that

clamp and adjustment switches in the clamp amplifier circuit had remained in adjustment positions for extended periods. After switching to clamp status, image interruptions were eliminated, but black interference stripes appeared on screen. Following clamp amplifier circuit adjustment and testing, comprehensive channel broadcasting returned to normal and the failure was effectively resolved.

4.2 Improving Daily Equipment Maintenance and Management Measures

Broadcasting television maintenance technology represents an important means for ensuring safe and stable system equipment operation. Therefore, technical personnel must strictly follow relevant procedures and steps, master equipment operating modes, conduct daily maintenance and safety inspections, and emphasize comprehensive inspection without neglecting details. Additionally, they should utilize professional, high-precision auxiliary instruments and detection equipment to improve failure location accuracy. When encountering unknown causes during daily maintenance, personnel must not arbitrarily change connection lines to prevent greater losses.

In one regional broadcasting institution's daily equipment maintenance and management practices, personnel regularly cleaned broadcasting television equipment, focusing on removing rust, dirt, and dust. Before equipment use, they checked power connections to ensure good contact and safety. They then detected DC voltage and current values of wiring equipment, making timely adjustments when operation requirements were not met. When components showed severe aging or wear, they were centrally repaired or replaced. Furthermore, since broadcasting television equipment is relatively fixed and easily affected by environmental conditions, maintenance management personnel should implement appropriate cooling measures when temperatures are too high. This institution primarily uses air conditioning and fans for heat dissipation. When environmental temperatures are low, personnel should preheat transmitters in advance to effectively extend system warm-up time. Equipment power can be activated once operating temperature is reached. To avoid affecting broadcasting television program transmission, maintenance management measures are typically implemented during downtime. Additionally, daily maintenance should incorporate lightning protection technology to reduce broadcasting system failures caused by lightning and ensure stable program broadcasting. In practice, personnel install lightning rods around transmitters and equipment rooms to achieve proper equipment grounding, avoid using bare wires at the top, and intensify lightning protection device inspections during thunderstorm seasons, immediately repairing or replacing any problematic components.

4.3 Establishing and Improving Broadcasting Maintenance Technology Systems

For broadcasting television technology maintenance and management, relevant personnel should actively improve technical systems. First, automation technology can be applied to establish automated facility maintenance management mechanisms, introducing advanced intelligent detection equipment to assist maintenance and management work and enable real-time monitoring of broadcasting television system operating status. Simultaneously, stable network sharing platforms should be constructed to ensure rapid resource information sharing among platforms, minimizing failure analysis and processing time and improving maintenance management efficiency. For example, one broadcasting institution applied unattended maintenance technology based on computer, sensor, and monitoring technologies to achieve unattended maintenance and repair of broadcasting television systems, automatically detecting equipment failures and implementing corresponding solutions. This reduces personnel input and subjective human factors, thereby optimizing broadcasting television technology maintenance.

Conclusion

Under current conditions of continuous scientific and technological development, the broadcasting television industry faces tremendous challenges. To fully ensure safe television program broadcasting, broadcasting institutions should strengthen broadcasting television technology optimization, focusing on analyzing influencing factors for failure-prone master control systems and implementing effective maintenance and management strategies. This ensures broadcasting television technology functions and roles are fulfilled, improves broadcast quality, achieves comprehensive integration with new media, and ultimately promotes innovative development of the television media industry.

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