Discussion on the Maintenance and Management of Broadcasting Network Transmission Rooms: Postprint

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Abstract

In recent years, with the accelerated digital transformation of cable television in China, digital television systems have imposed increasingly stringent requirements on television program broadcasting quality. To better guarantee transmission quality, scientific management and maintenance of broadcast network transmission facilities are imperative to ensure television program broadcasting quality. Consequently, how to strengthen the maintenance and management of broadcast network transmission facilities has gradually become a pressing issue that must be addressed. This paper conducts an in-depth discussion on the maintenance and management of broadcast network transmission facilities, aiming to achieve rational maintenance and scientific management of such facilities, and to provide theoretical support and reference for controlling broadcast network transmission quality in China.

Full Text

A Discussion on the Maintenance and Management of Broadcast Television Network Transmission Rooms

Abstract: With the accelerated digitization of cable television in China in recent years, the quality requirements for digital television program broadcasting have become increasingly stringent. To better ensure transmission quality, scientific management and maintenance of broadcast television network transmission rooms are essential to guarantee program playback quality. Consequently, how to strengthen the maintenance and management of these transmission rooms has become an urgent issue. This paper provides an in-depth discussion on the maintenance and management of broadcast television network transmission rooms, aiming to achieve rational maintenance and scientific management while offering

theoretical support and reference for controlling broadcast network transmission quality in China.

Keywords: Broadcast television network transmission room; rational maintenance; scientific management; quality control

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The broadcast television network is a systematic and complex infrastructure. To a significant extent, its transmission quality is influenced by multiple quality indicators, including program reception, broadcasting, and related transmission processes. Signal quality represents the primary and direct factor affecting broadcast quality. Therefore, as broadcast quality requirements intensify, the maintenance and management of broadcast television network transmission rooms have gained prominence as critical measures to ensure signal quality and network transmission performance. Current transmission rooms contain a wide variety of equipment, each requiring targeted maintenance protocols and scientific management to guarantee operational quality and effectiveness.

1. Environmental Management of Broadcast Television Network Transmission Rooms

As the frontline facility and crucial component of broadcast television networks, transmission rooms substantially impact broadcast quality and efficiency. This impact stems not only from equipment quality but also from the room environment itself. Therefore, comprehensive environmental assessment is necessary when implementing management and quality control measures, enabling selection of optimal operating conditions and fundamentally optimizing transmission quality.

1.1 Temperature and Humidity Control

Environmental management of transmission rooms fundamentally involves controlling temperature and humidity while preventing dust accumulation. Effective management of these two aspects is both basic and essential. Temperature and humidity control must be prioritized to avoid instability in transistor operating parameters caused by thermal or moisture fluctuations, which can compromise circuit reliability. Excessive humidity also adversely affects transmission equipment—for instance, connectors and tube components may corrode due to high moisture, reducing circuit board insulation strength and increasing short-circuit risks. Conversely, excessive dryness can generate static electricity, which also threatens safe equipment operation [1].

1.2 Dust Management

During equipment operation, substantial dust accumulation can cause poor contact, reduced insulation, and potentially catastrophic short circuits or system paralysis. Beyond settled dust, excessive suspended particles such as negative

ions or metal ions pose serious operational risks. If these contaminants enter the room through air circulation and adhere to circuit boards, they can create charged dust particles invisible to the naked eye, compromising equipment safety, stability, and transmission quality while causing transmission losses.

1.3 Electrical Environment Management

In addition to humidity, temperature, and dust, comprehensive management of the transmission room' s electrical environment is necessary to prevent transmission quality degradation from electrical interference. This involves two key aspects: electrostatic prevention and electromagnetic interference mitigation. For example, semiconductor circuits commonly used in transmission equipment are highly sensitive to static electricity, which can directly damage semiconductor devices and disrupt overall system operation. Therefore, proper grounding is essential during integrated management to prevent static generation.

2. Safety Maintenance of Transmission Rooms

For current transmission room maintenance and management, ensuring safety is paramount. Safety maintenance primarily encompasses fire safety and power supply system maintenance.

2.1 Fire Safety

Since most equipment employs fire-resistant frameworks and materials, fire safety emphasis shifts to enhancing personnel awareness. Improving staff fire safety consciousness has become a key focus to ensure daily operations meet safety standards and prevent fire hazards from operational errors [2]. Beyond awareness enhancement, establishing clear fire safety standards and providing dedicated fire exits are essential. These measures enable immediate alarm activation and fire suppression when incidents occur, facilitating prompt fire control.

2.2 Power Supply Systems

In recent years, power equipment in broadcast television network transmission rooms has gradually become integrated and intelligent. Therefore, during integrated system design, special attention must be paid to enhancing electromagnetic compatibility of power equipment and implementing electrical isolation. This approach prevents normal operation from being affected by other equipment while reasonably avoiding interference from electrical devices on other systems. For instance, considering that harmonics can adversely affect neutral line current, reasonable mitigation measures must be established. Furthermore, power supply design and application require systematic overall planning to propose scientific, rational, and integrated power solutions, with proper coordination with relevant power construction organizations to ensure power supply reliability.

3. Optimization of Transmission Room Maintenance and Management Strategies

With a solid understanding of environmental management and safety maintenance, targeted optimization of maintenance and management strategies becomes possible. The following sections propose specific optimizations for transmission room operations.

3.1 Hardware Maintenance and Management

Hardware maintenance and management must begin with equipment optimization. Since internal connectors and printed circuit boards in transmission equipment should not be arbitrarily handled, daily hardware maintenance primarily involves dust removal and surface technical maintenance. Consequently, maintenance personnel must conduct targeted daily observations and regular inspections to enable immediate action when issues are detected. Additionally, hardware maintenance must strictly follow operational protocols to prevent equipment failures caused by improper maintenance procedures.

3.2 Software Maintenance and Management

Software maintenance and management constitute a critical complement to hardware maintenance in ensuring transmission quality. Key tasks include: regular maintenance and modification of user data content; testing user function status for normal operation; periodic software testing for database backup and data preservation; coordinating with manufacturers for remote software maintenance; and conducting regular virus scans to prevent data loss from malware, thereby ensuring data transmission quality [3]. Software maintenance serves as an essential supplement to hardware management and a vital measure for guaranteeing transmission quality.

In summary, equipment maintenance and management in broadcast television network transmission rooms are crucial measures for ensuring program broadcast quality and directly impact television programming. Therefore, strengthening emphasis on internal equipment operational requirements and implementing targeted maintenance and management practices are essential for genuinely improving broadcast network transmission quality and ensuring safe, reliable television program distribution.

References

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