An Effective Method for Anti-electronic Interference Grounding of Equipment in Electronic Communication Engineering

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Abstract

At present, electronic equipment is more and more widely used in communication engineering. In order to ensure the normal use of the equipment, designers should continuously optimize its performance. This article explores the anti-interference grounding performance of equipment in electronic communication engineering. It discusses effective methods of anti-interference grounding of equipment in electronic communication engineering from many aspects such as grounding design, line layout and elimination of ground ring interference. Hope to provide reference for related staff.

Keywords

Electronic Equipment; Communication Engineering; Electrical Engineering; Anti-interference Grounding.

1. Introduction

Economic development and the improvement of the level of science and technology have led to the rapid development of my country's communication engineering, which has brought tremendous help to people's production and life. In order to further improve the quality of communication engineering, designers should design high-standard, high-quality electronic equipment that better meets the requirements of use. Among them, the most important work is to optimize its anti-interference grounding work to ensure that the communication equipment can operate smoothly and safely.

Figure 1. Common electromagnetic interference classification
However, in perfect communication, we often face a variety of interference, such as interference caused by communication equipment, atmospheric noise interference in natural environment, man-made interference caused by human activities and so on. At present, there are many classification methods of electromagnetic interference. Figure 1 classifies common types of interference.

2. Anti-interference grounding requirements and treatment status of equipment in communication engineering

2.1. Anti-interference grounding requirements

In the communication engineering equipment anti-interference grounding design, we must ensure the rationality and scientific design. It is necessary to ensure that the ground wire of the equipment in communication engineering does not have voltage, so as to ensure the safety of equipment operation and guarantee the quality of communication engineering. During the operation of the equipment, the signal source can form resistance and potential difference according to the backflow of the ground wire. In this way, even if there is a grounding defect in the project, the potential difference can also be generated. In order to ensure the safe operation of the equipment, the potential difference must be removed to make it isoelectric potential. Designers should work without voltage to ensure their own safety [1].

In the specific operation, the scientificity of the wiring should be improved and the separation of the wiring should be ensured. When using communication engineering equipment, different ground wire forms will be produced due to the difference in the nature of the equipment, and there are differences between these lines. In order to deal with equipment problems in a timely manner, designers should try their best to ensure the rationality and standardization of various circuit designs, distinguish and determine the grounding circuits of various equipment, and ensure that they have a strong anti-interference grounding effect. Moreover, when constructing a communication project, digital signals will interfere with analog signals and will also affect the operation of the equipment to a certain extent. Therefore, the relevant staff should separately connect the digital signal and the analog signal, so that the two are connected in parallel to ensure that the wiring is separated.

2.2. Status of grounding treatment

Grounding is a very important task in communication engineering. Especially the reasonableness of anti-interference grounding line design will greatly affect the construction quality of communication engineering. At present, when the power energy is applied in China, the rated voltage of the power network system is set at 220V; This amount can ensure that the power network system is in the best running state, and then ensure the safety and effectiveness of the use of relevant equipment. In the construction of communication engineering, the staff will take the way of setting voltage to ensure the safety and stability of equipment operation. Although rated voltage is set to the same standard for most equipment in use, there are still some risks. For example, in the process of equipment operation, there are often leakage problems. This problem means that the grounding design of equipment is not safe, and its anti-interference ability is not strong. If the relevant staff does not immediately take effective response and protection plan after the problem occurs, it will cause extremely serious safety accident. Therefore, communication engineering workers must strengthen the scientific research on equipment anti-interference grounding, realize grounding technology optimization, to ensure the safety of equipment and system operation.
3. An effective method for anti-interference grounding of equipment in electronic communication engineering

3.1. Improve wiring quality

Wiring is a key content in the anti-interference grounding design of communication engineering equipment. The rationality of the wiring will have a great impact on the rationality and scientificity of the anti-interference grounding design. Therefore, in order to ensure the quality of anti-interference grounding of electronic communication engineering equipment, it is necessary to ensure that the wiring work is carried out scientifically and accurately. The equipment grounding design of communication engineering is different from the grounding design of other equipment, and the difference is obvious. In the link of communication engineering equipment grounding design, designers must work strictly in accordance with relevant design standards, and debug multiple times after issuing the design plan to ensure the accuracy of the grounding location and method [2]. In work, any changes in details may cause changes in the overall application level of the communication system. Only by applying reasonable anti-interference methods can the work of reducing interference be effective. Moreover, the real location of the equipment grounding and the real data of the relevant location will affect the loop. Based on this, designers should focus on improving the quality of wiring, deeply combine the design plan and actual construction conditions, and effectively judge the number of grounding and its location, and then achieve effective equipment anti-interference grounding.

3.2. Enhanced ground impedance control

Each point of the ground wire and its overall system will be affected by the ground wire impedance. Generally speaking, the content of ground impedance design is related to inductance and resistance. In high frequency circuits, inductance plays a vital role. There is a direct connection between the length of the ground wire and the impedance of the inductor. Therefore, in the circuit system, the designer should choose the multi-point grounding method to complete the connection between the adjacent ground and the ground contact point in order to reduce the length of the wire. In addition, the designer should also realize effective control of its impedance from the aspect of ground wire material. For example, in a certain electronic communication project, the designer chooses to use the copper ground wire for operation. After reasonable analysis, choosing the appropriate parameter of the copper ground wire can effectively reduce the inductance value and make the impedance of the ground wire lower. In practice, however, enough space should be left for the connection of the wires so that they do not become unsafe. In low frequency circuits, resistance plays a very important role, the less its value is less impedance. Therefore, in order to reduce the impedance of the ground wire in the low-frequency circuit, you can choose to use large interface or short length of the ground wire layout.

3.3. Clear ground ring interference

The multi-point grounding method can effectively reduce the ground wire impedance, but this wiring method is also easy to form a ground loop. If there are distributed capacitors with different conditions between the grounding line and circuit components, when current enters the distributed capacitors, it will cause a ground loop. If at this time, the communication engineering equipment has a high alternating electromagnetic field, then the engineering equipment will be affected by the ground ring, which will cause electromagnetic induction, as shown in Figure 2. In this case, an induced voltage will be formed in the ground loop. When the electromagnetic exceeds the standard, the value of the induced voltage will increase as the area
of the ground loop expands, which will seriously affect the safety of the circuit and the electromagnetic compatibility of communication equipment.

![Figure 2. Schematic diagram of electromagnetic interference](image)

In order to reduce the ground loop interference, the relevant staff should use the electric coupler reasonably, so that the ground loop current in the circuit can be cut off in time. If it is in a low-frequency circuit, balance the circuit can be used to reduce the interference ability of the ground loop electronic equipment. In addition, the equipment grounding location and the number of grounding points will affect the interference capability of electronic equipment located in the ground loop. To this end, it is necessary for the staff to reasonably delineate the location and number of grounding points, ensure the rationality of the point distribution, and achieve balanced and accurate positioning, so that its anti-interference ability can be improved. This operation can also organize the connection between the ground and the signal source, thereby eliminating the potential difference generated by the ground ring structure and controlling its adverse effects to the lowest range.

### 3.4. Improve the scientific grounding of shielded wires

In order to ensure the quality of the anti-interference grounding design of equipment in communication engineering, relevant staff should improve the grounding science of shielded wires in the design process. There are many types of communication equipment, and the types of grounding systems are also very rich; therefore, in the design process, it is necessary to ensure the full connection of the lines according to actual needs and equipment application schemes, to ensure that the equipment wiring is reasonable and the engineering quality meets the standards. Then, when setting the shielding wire to ground, you should do a good job of protection, so that the high-frequency equipment of the communication engineering equipment and the shielding wire are closely integrated, and then use the form of cable shielding layer wiring to achieve protection and improve design safety. In the actual construction process, the length of the ground wire is often higher than the signal wavelength. At this time, the length of the grounding wire should be reasonably controlled, taking 1/4 of the odd multiple of the wavelength as the highest standard to ensure that the length of the grounding wire is lower than the highest standard [3]. Reasonable control of the length of the grounding wire can significantly improve the running stability of the equipment. In addition, when the equipment is grounded, it is prohibited to use underground water pipes or heating pipes as electrical wiring. If these pipes are used, interference will easily occur, which will affect the use of the equipment. In actual operation, designers should take equipment additional testing as their core link, and attach great importance to testing. At the same time, multiple tests should be
carried out to ensure reasonable data collection, so that the design rules can be clearly grasped; and, the loopholes in the design link should be found in a timely manner and a treatment plan should be issued, so that the rationality and standardization of related operations can be improved.

4. Conclusion

To sum up, finding an effective anti-interference connection method for electronic communication engineering equipment can improve the performance of the equipment, improve the quality of the project, and make it play a more important role in people's production and life. At present, the level of science and technology in China is constantly improving, and the design requirements of communication engineering are also gradually improving. Designers must start from each link of equipment to improve the rationality of design and realize the grounding anti-interference of equipment.

References

