

# The method of installing the screen door in the urban rail transit signal system is discussed

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## Abstract

with the rapid development of urban rail transit, regional cities based on digital track circuit quasi mobile block signal system line in the process of construction did not design the door interface, but in the process of operation, the platform without screen door is a hazard, seriously affect the passengers waiting for the train safety, so both has not yet configured the door line more urgent install screen door. This paper will discuss the method of installing screen door for quasi-mobile block signal system based on digital track circuit from the perspective of new interface integration platform.

## Keywords

Urban rail transit, signal system, screen door.

## 1. Technical background

In the development process of urban rail transit system, the screen door, as a crucial safety facility, its status and function can not be ignored. Shield doors play a key role in ensuring passenger safety, improving the station environment and optimizing the operation process. However, for many quasi-mobile block signal system lines based on digital track circuits that have been put into operation, it is a complex and necessary task to add the screen door interface because it is not installed in the early stage of construction.

In the urban rail transit system, the digital rail circuit is the core technology to realize the train operation control and signal transmission. The quasi-mobile block signal system is an advanced train control system based on the digital track circuit, which can realize the safe interval control between the trains and improve the transportation capacity of the line. However, these lines did not take into account the installation of the screen doors in the early stage of construction, which brought challenges to the later renovation work.

In order to make up for this defect, it becomes an urgent and important task to add the screen door interface in the later operation process. This transformation process requires a comprehensive consideration of multiple aspects, including technical feasibility, economic cost, operational impact, etc. First, the existing digital track circuit and quasi-mobile block signal system are deeply analyzed to determine the access points and technical solutions of the shielding gate interface. This requires a deep understanding of the system structure, principle, and signal transmission mode to ensure the compatibility and stability of the interface.

Adding the interface of the screen door may cause some interference and influence on the operation of the existing lines, so it is necessary to arrange the construction time and operation process reasonably to minimize the impact on passenger travel and train operation.

Adding the screen door interface is a complex and necessary task for the quasi-mobile block signal system circuit based on the digital track circuit. By comprehensively considering the technical feasibility, economic cost and operational impact, the smooth progress of the transformation work and the effective operation of the screen door system can be ensured. This will not only help to improve the safety and operational efficiency of the urban rail transit

system, but also to provide passengers with a more comfortable and convenient travel experience.

## **2. Install the shield door to influence the factors**

### **1. Line conditions**

The installation of screen doors requires a comprehensive assessment of the line conditions, including a detailed analysis of the track structure, power supply system, signal system, and station building. Due to the differences in the specific conditions of each line, it is necessary to determine whether the shielding door is suitable for installing the shielding door and its interface according to the actual situation of the line. For example, some lines may not be able to install standard screen door systems due to rail structure or power supply system constraints. In this case, we need to carry out targeted transformation, or look for alternatives suitable for the line.

### **2. Interface design**

Interface design is a key link in the transformation process. Accurately design the position, size and structure of the interface according to the requirements of the screen door system. This includes the interface with the track, the power supply system, and the signal system. In the design process, the interface needs to ensure a reasonable location, accurate size and stable structure to ensure that the screen door system can connect with the existing line system smoothly. At the same time, the compatibility and scalability of the interface should also be considered to meet the possible future upgrade and transformation needs.

### **3. Impact on existing operations**

In the process of subway line reconstruction, it is very important to add screen door interface. However, this transformation will not happen overnight and requires a careful consideration of the possible impact on the existing line operation. In order to ensure the smooth progress of the renovation work, we need to minimize the impact on passengers' travel on the premise of not affecting the normal operation of the line.

First, it is crucial to develop a detailed construction plan and a planned plan. We need to arrange the construction time and schedule reasonably according to the actual operation situation of the line. This includes determining the time point when the construction starts and ends, and the construction content of each stage. Through scientific planning and arrangement, we can minimize the impact on passengers' travel and ensure that the normal operation of the line is not too much interference.

Secondly, it is also essential to strengthen the safety management in the construction process. In the construction process, we need to ensure the safety of the construction personnel and take the necessary protective measures to avoid accidents. At the same time, we also need to pay attention to the stable operation of the equipment to ensure that the renovation work will not cause damage or impact on the existing equipment. This requires us to strengthen the maintenance and maintenance of equipment, timely find problems and deal with.

In addition, the addition of the screen door interface also needs to take into account the compatibility and coordination with the existing systems. In the transformation process, we need to ensure that the newly added screen door interface can seamlessly connect with the existing system to achieve smooth communication and control. This requires us to deeply study the structure and principle of the existing system, develop the appropriate interface design scheme, and conduct sufficient test and verification.

In short, the addition of the screen door interface in the renovation process requires special attention to the impact on the existing line operation. We need to develop detailed construction plans and plans, strengthen safety management, consider system compatibility, and pay

attention to communication and coordination with passengers. Only in this way can we ensure the smooth progress of the renovation work, and reduce the impact on passengers' travel, providing passengers with a safer, more comfortable and convenient travel experience.

### 3. Add to install the screen door scheme design

The quasi-mobile block signal system based on digital track circuit consists of relay interlocking, ZCC area control equipment and TWC induction loop equipment. The system is not equipped with the interface related to the shield door and the wireless interface related to the on-board subsystem.

Under the condition that the line track, power supply and other majors can meet the requirements of installing the screen door, in order to realize the new screen door equipment on the line and reduce the changes to the existing signal system, it is a very advantageous method to consider the indoor interface integration platform equipment to realize the drive and acquisition of the screen door equipment. The interface integration platform equipment occupies a small area of the equipment room, and can communicate with the interlocking subsystem in real time, so that the interlocking subsystem can obtain the open and closed state of the screen door in real time. The interface integrated platform equipment can also communicate with the on-board subsystem in real time, so that the on-board subsystem can issue the open and close command to the screen door in the platform area and obtain the real-time status information of the screen door.

In addition, in the process of installing the screen door, the signal system vehicle subsystem and interlocking subsystem increase the interface protocol with the interface integrated platform equipment for transmitting the screen door status and control information; the interlocking subsystem increases the interface protocol with the interface integration platform equipment for transmitting the screen door status information.

In the transformation process of this scheme, it only involves the installation of the screen door on the platform, the new equipment transformation of the signal system equipment room, and the adaptation and upgrading of the signal system, which has little impact on the normal operation of passengers and the line. It is the preferred scheme and method in most cities at present.

### 4. Conclusion

The requirement of adding the screen door is one of the transformation schemes of the quasi-mobile block signal system based on the digital track circuit. However, with the continuous development of the urban rail transit system and the continuous progress of technology, more innovative shielding door interface solutions may appear in the future.

For has open operation of urban rail transit line although increase shielding door interface may face some challenges and difficulties, but as long as keep an open mind and the spirit of innovation, actively explore and apply new technologies and new methods, will be able to overcome these difficulties, provide passengers with more safe, comfortable and convenient travel environment.

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