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The thesis concerns the development of a method for generating functional tests of railway traffic control devices. Tests are used throughout the life cycle of devices. Their greatest use is at the time of their certification, when we implement devices and confirm compliance with the requirements and during periodic diagnostics or after device repairs. In the initial chapters a literature review was carried out and the research area, goal and thesis of the work were defined. The characteristics of the used railway traffic control devices were made, as well as the basic requirements for them and their definition was presented. Particular attention was paid to the functional and diagnostic properties of the devices. The next chapter focuses on the issues of diagnostic tests of technical objects, their modeling and the organization of diagnostic processes. The basic and applied methods of diagnosing the condition of devices were presented and analyzes of the usefulness in examining the condition of the railway traffic control devices were made. Then, analyzes of diagnostic tests, control and monitoring of the performance of the railway traffic control equipment functions in various processes occurring in the equipment life cycle were performed.

Assumptions were developed on which the functional and diagnostic model of computer station railway traffic control devices was based and built. Station devices were selected due to the most extensive structure and functionality in relation to line block devices or level crossing signaling systems. Device configuration elements were distinguished and features such as the state and status of individual device configuration elements that occur during the implementation of operational processes at the station were specified.

The results of the research and analyzes were the basis for the development of the assumptions of the method and the method of determining functional tests. The test determination procedure algorithm was developed, the conditions to be met by the set of tests and optimization criteria were defined. In the final part of the work, the method was verified, computational examples and printouts of data implementation in Mathematica environment were given, and the results were analyzed. The work ends with a chapter with a summary and conclusions from the deliberations.